第十一届中国眼科学和视觉科学研究大会

论文汇编

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专题报告

S-001

New glaucoma therapeutics

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1.Duke University
2. Albert Eye Research Institute President-Elect
3. ARVO

This lecture will briefly review the physiology and pharmacology of aqueous humor dynamics, and discuss current medications used in the clinic to treat ocular hypertension. Focus will turn to the unique anatomy and physiology of the trabecular outflow pathway, the ocular tissue responsible for homeostatic intraocular pressure regulation, and the diseased tissue causing ocular hypertension. Next, information will be presented about the mechanism of action of two new glaucoma medications (netarsudil and latanoprostene bunod). These drugs target the trabecular outflow pathway, and efficacy data in mouse models and human glaucoma patients will be presented. The lecture will end with a brief discussion about the clinical advantages of finally targeting and restoring function in a diseased tissue in glaucoma.

S-002

New Cataract Therapeutics: From Bench to Bedside and Back

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Cataract is the leading cause of blindness worldwide. Up to now, surgical removal of the opacified lens remains to be the only established management of cataract, which is not only costly but also leads to various complications inevitably. Therefore, it is an irresistible trend to develop new therapies of cataract besides surgery. Anti-cataract drug discovery and lens regeneration are the two major research fields of new cataract therapeutics. This presentation reviews the development courses as well as the forefront achievements of these two fields, and prospects the future developing trends.

S-003

Structure-Function Agreement Is Better Than Commonly Thought in Eyes with Early Glaucoma

Donald Hood
1.Columbia University Editor-in-Chief
2. IOVS

Purpose: To assess the agreement between structural (OCT) and functional (visual field) glaucomatous damage employing deviation/probability maps and an automated method.
Methods: Wide-field OCT scans, including the disc and macular regions, and 24-2 and 10-2 visual fields (VF) were obtained from 45 healthy control (H) eyes with normal fundus exams and IOP <22 mmHg, and 53 eyes/patients with 24-2 MD better than -6 dB diagnosed as “definite glaucoma” by experts. These eyes are considered “early glaucoma” based upon 24-2 MD better than -6 dB. Abnormal structure-abnormal function (aS-aF) agreement was assessed with an automated topographical (T) method based upon the 24-2 and 10-2 VF pattern deviation and OCT probability maps. A comparison was made to a more traditional metric (M) method, [i.e., 24-2 GHT or PSD, or 10-2 PSD AND abnormal OCT (quadrant)].
Results: For the T-method, 47 (88.7%) of the 53 DG eyes aS-aF agreement, compared to 2 (4.5%) of the 45 H eyes. Both of these H eyes were easily identified as genuine false positives (FPs). Without the 10-2, the aS-aF agreement for the T-method decreased to 34 (64.2%) eyes. For the M-method, 37 (69.8%) of the 53 DG eyes showed aS-aF agreement, while omitting the 10-2 VF resulted in agreement in 33 (62.3%) agreement.
Conclusions: The is good agreement between structural and functional damage, even in eyes with early glaucomatous damage, if both 24-2 and 10-2 VFs are obtained, and abnormal locations on the VFs are compared to abnormal OCT RGC and RNFL regions. This can be done in an objective, automated fashion. Our findings do not support the premise that structure precedes function in glaucoma.

S-004

Short-term Cerebrospinal Fluid Pressure Reduction Model Mimic Optic Neuropathy Disease ——Beijing Intracranial and Intraocular Pressure (iCOP) Study

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Purpose: To determine whether short-term reduction of cerebrospinal fluid pressure(CSFp) triggers selective mitochondrial autophagy and ultrastructural changes in Sprague Dawley(SD) rat.
Methods: The experiment included 26 male SD rats, during which underwent continuous cerebrospinal fluid drainage for 6 hours (n=13). For control, 13 normal rats were anaesthetized for 6 hours. We used transmission electron microscopy (TEM) to display the ultrastructural features of mitochondria in the orbital optic nerve(ON), the retinal autophagosomes, and the retinal ganglion cells (RGCs) axons in the optic nerve head (ONH). Retinal mitophagy was detected by immunostaining and western blot for PTEN induced putative kinase 1(PINK1), Parkin, LC3B-II/I, and lysosome-associated membrane protein 1(LAMP1).
Results: TEM showed that the area of mitochondria was much bigger, wider, and shorter in ON, the retinal autophagosomes increased in the low-CSFp group, without loss of axons in the ONH

S-005

In Vivo Effect of the Principal AMD-risk Associated Complement Factor H Variant

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Duke University

One of the strongest susceptibility genes for age-related macular degeneration (AMD) is complement factor H (CFH); however, how it contributes to AMD pathobiology is still unclear and clinical trials of complement inhibitors in AMD patients to date have failed. To help clarify this apparent paradox, the effect of the principal AMD-risk associated CFH variant (Y402H) on the development and progression of age-dependent AMD-like pathologies was determined in vivo. We generated transgenic mice expressing equal amounts of the full-length normal human CFH Y402 (CFH-Y/0) or the AMD-risk associated CFH H402 (CFH-H/H) variant on a Cfh-/- background. The resulting phenotype was compared to age-matched controls maintained on ND. These were aged to 90 weeks and switched from normal diet (ND) to a high fat, cholesterol-enriched (HFC) diet for eight weeks. Strikingly, an AMD-like phenotype including vision loss and RPE damage was detected only in aged CFH-H/H mice following the HFC diet. Genotype-dependent changes in plasma and eyecup lipoproteins, but not complement activation, were detected that correlated with the AMD-like phenotype in aged CFH-H/H mice. For the first time, we show that aged mice expressing the human H402 risk variant, but not the Y402 variant, develop AMD-like changes and these results support targeting lipoproteins, not complement, for the treatment of AMD.

S-006

The CNS Changes of Glaucomatous Low Vision and Implications for Potential Rehabilitation

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Glaucoma optic neuropathy with high prevalence ranked as top cause for nonreversible blindness worldwide. The prevalence of glaucoma is 2% in China. Among these glaucoma patients, there were 2/3 as mid to late stage when first diagnosed and totally 22.7% blindness.
In clinical practice, traditional view is to control IOP and avoid further damage, but no options for the present damage. Is that true? We want to do researches on functional impairments and rehabilitation in glaucoma by evaluation strategies with functional MRI, visual psychophysics, et al. Based on our previous work, visual perception and cognition in the brain is restricted partly due to the crowding effect after central vision loss in glaucoma. Visual function could be improved if crowding is reduced.
We found that biofeedback fixation stability training improved stability of eccentric viewing. The perceptual learning and low vision rehabilitation in advanced glaucoma by spatial discrimination training could improve their visual acuity.

S-007

AAV cis-regulatory sequences are correlated with ocular toxicity

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S-008

Protein S-Glutathionylation in Leber's Hereditary Optic Neuropathy

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S-009

基因治疗 Leber's 遗传性视神经病变的早期临床观察

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Vector Development for Achromatopsia and X-linked Retinitis Pigmentosa Gene Therapy-From Bench to the Bedside

Guo-jie Ye
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S-011

AAV2 and gamma-Synuclein Promoter-Mediated Retinal Ganglion Cell-specific Gene Targeting and Neuroprotection in SOHU Glaucoma Model

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视网膜变性疾病的研究进展

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Preliminary Study of Transient Receptor Potential Vanilloid in Human Conjunctival Epithelium

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Manage Sjögren's syndrome-Associated Dry Eye by Targeting Its Underlying Cause in the Lacrimal Gland

Chuanqing Ding
University of Southern California

S-015

The discovery of novel LFA-1 antagonist VVN001 to treat Dry Eye Disease (DED)

Wang Shen
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S-016

GDNF / XPO1 / Survivin 信号通路促进人角膜上皮再生机制研究

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S-017

Sumoylation Regulation of Lens Development and Cataratogenesis

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Purpose: Sumoylation is now established as one of the key regulatory mechanisms in eukaryotic cells, regulating many physiological processes (Ann. Rev. Biochem. 82:235-385). Moreover, It also acts as a molecular mechanism mediating global changes at the cellular and organism levels when stress conditions such as heat shock or oxidative stress occur. Furthermore, sumoylation plays causal roles in many major human diseases such as cardiovascular, neuronal diseases and cancers (Rev Mol Cell Biol. 8:947-956). In the eye, sumoylation plays a key role in retina development (Neuron. 61:234-246.). Our recent studies revealed that sumoylation plays an indispensable role during lens development (Yan et al. 2010. PNAS. 107:21034-21039; Gong et al. 2014. PNAS. 111:5574-5579). Whether sumoylation plays a role in cataractogenesis remains elusive.

Methods: SUMO1(-/-) knockout mice were established with cas technology. Absence of SUMO1 was confirmed by RT-PCR and Western blot analysis. Adult mouse lenses from wild type and SUMO1 knockout mice were dissected out and irradiated with UVA for 60 minutes after 24-hour culture in vitro to exclude damaged lenses. RNA-seq, qRT-PCR, Western blot analysis and immunocytochemistry were used to analyze the differential gene expression in both control and irradiated wild type and SUMO1 knockout lenses. Co-Immunoprecipitation was used to determine protein-protein interaction.

Results: After UVA irradiation, SUMO1(-/-) lenses develop cataract in 4 hours during the post-irradiation culture, while the wild type lenses remain transparent up to 10 hours. After 10 hours post UVA irradiation, the wild type mouse lens also began to develop cataract. At the molecular

level, caspase-3 in the SUMO1(-/-) lens was completely activated after 2-hour culture post-UVA irradiation while in the wild type lens majority of the caspase-3 exists in pro-caspase-3 and partially processed caspase-3. Co-IP linked Western blot analysis revealed that caspase-8 was sumoylated in the wild type animal but not in the SUMO1 (-/-) mouse lens. UVA irradiation also significantly activates p53, and upregulates caspase-8 but down regulates Bcl-2 in the SUMO1 (-/-) lens in comparison with wild type lenses.

Conclusion: Under stress condition, lack of SUMO1 distinctly promotes activation of Caspase-3, and activates both extrinsic and intrinsic apoptotic pathways to enhance stress-induced apoptosis. As a result, lack of SUMO1 accelerate stress-induced cataractogenesis. (Supported by grants from National Natural Science Foundation of China, 81570824, 81770910, and 81700821 as well as the Fundamental Funds from the State Key Laboratory of Ophthalmology, Zhongshan Ophthalmic Center, Sun Yat-sen University).

S-018

晶状体内蛋白质稳态调控研究

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S-019

Using human pluripotent stem sell-derived 3D retinal organoids to study retinal ganglion cell development and diseases

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S-020

Activation of Liver X Receptor Ameliorates Ang II induced inflammation by activating the ACE2/Ang-(1-7)/MAS axis in human retinal pigment epithelium

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How to treat moderate or severe visual impairment caused by severe myopia?

李文生
上海爱尔眼科医院

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VEGF regulates neuronal health in diabetic retinopathy and age-related macular degeneration through coordinated production and trophic effect of BDNF and GDNF

Yunzheng Le
University of Oklahoma

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AI 时代的到来—人工智能在医学领域的应用

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Optogenetic stimulation of phosphoinositides in eye pressure regulation

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Yutao Liu
Augusta University (Medical College of Georgia)

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磷酸胆碱修饰的骨胶原支架设计构建及其在 CLASS 青光眼手术中的应用

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纳米药物载体的构建及在眼部药物递送中的应用

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How to build an ophthalmic innovative drug platform

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S-031

纳米材料在眼科细菌感染疾病中的应用与探索

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S-032

临床需求出发，眼科医生创新与转化发展之路

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S-033

人工晶状体材料的创新研究

陈浩
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S-034

以晶状体蛋白聚集体为靶点高通量筛选白内障防治药物

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研究目的：
解决目前所有白内障患者及眼科医生所棘手的问题：“白内障治疗的有效方案是手术治疗，没有一种有效的药物治疗白内障”。能否筛选（研发）一种滴眼液治疗白内障疾病？本研究建立一套完善的白内障药物筛选及评估平台，为了更加便利，快速地去筛选、获取活性化合物。我们抓住白内障疾病发病的根本问题出发，以晶状体内蛋白质发生错误折叠形成聚集体为靶标，进行筛选系统的建立优化。
研究方法：
白内障聚集蛋白样本均来自浙江大学附属二院眼科中心，由姚克医生为白内障患者进行飞秒激光白内障手术后所收集的晶状体组分。以羊毛甾醇、25 羟基胆固醇为有效药物参照，通过生物物理学、生物化学与分子生物学检测候选药物作用后，聚集体样品的浑浊度，蛋白质聚集状态，可溶性蛋白比例、组分等指标，来综合评估候选药物对白内障异常聚集体的作用效果，建立一套完善的白内障防治药物高效筛选评估系统。
研究结果：

羊毛甾醇、25 羟基胆固醇与蛋白聚集样品旋转孵育 2 周，结果显示，肉眼可见晶状体的混浊度有效降低，恢复一定的屈光效果。经过仪器的检测分析结果定量表征，晶体样品浊度由 0.8 左右降低到 0.3 左右，效果显著。另外，可溶组分的蛋白浓度明显升高，大约有 50%左右变为可溶蛋白。SEC 和 Western blot 检测分析，羊毛甾醇可以恢复晶状体内大多数类型的可溶性；25 羟基胆固醇依然作用效果有限，局限于 αA、αB 家族系列蛋白。

研究结论：

本研究建立了一套以临床白内障患者样品为靶点的筛选系统，通过此筛选评估系统，可以高通量筛选白内障防治药物并进行临床前候选药物的研发。

S-035

眼科大数据和人工智能

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上海市儿童屈光档案：百万数据分析

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首都医科大学附属北京同仁医院

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S-046

人胚胎干细胞 3D 培养的 C-Kit+/SSEA4−视网膜前体细胞改善变性视网膜微环境保护视功能的临床前研究

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S-047

Wnt5a 激活 Wnt/JNK 通路促进人胚胎干细胞定向分化为晶状体小体的机制研究

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目的：Wnt5a 在胚胎发育中起关键作用，但其在晶状体发育中作用尚不明确。本研究主要探讨了 Wnt5a 及其下游 Wnt 非经典通路是否可促进晶状体的早期分化。
方法：采用“三阶段法”对 H9 系人胚胎干细胞（hESC）进行晶状体小体（LB）定向分化。外源性添加 Wnt5a 及 RNA 干扰技术调控分化过程中 Wnt5a 的表达水平，并利用 SP600125 抑制 JNK 级联反应，通过测量所得的晶状体小体的数量和大小，以及 qRT-PCR、Western blotting 和免疫荧光技术检测晶状体相关基因的表达变化，以观察 Wnt5a 及下游 Wnt/JNK 通路对晶状体小体分化的影响。
结果：在外源性添加 Wnt5a 组中，所得的晶状体小体的数量和大小明显增加，并伴随着晶状体特异基因 CRYAA、CRYAB、BFSP1、MIP、以及晶状体分化相关因子 PROX1 的表达显著上调。此外，Wnt/JNK 通路成分 Dvl2、Rac1 和 JNK 的表达亦显著上调。经慢病毒敲降人胚胎干细胞的 Wnt5a 后，诱导所得的晶状体小体面积变小、数目减少，其晶状体标记蛋白的表达显著下调，同时导致了 Wnt/JNK 通路活性下降。最后，应用 JNK 抑制剂也可抑制晶状体小体的形成，其结果与 Wnt5a 敲降组一致。
结论：Wnt5a 通过激活 Wnt/JNK 通路，促进人胚胎干细胞定向分化为晶状体小体。本研究为晶状体的早期发育及先天性白内障的发病机制提供了理论基础。

S-048

先天性白内障病人特异性再生晶状体在白内障药物筛选中的运用

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S-049

中国葡萄膜炎及其相关全身性疾病的临床谱系与视力预后

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S-050

眼部微生物与眼部

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S-051

Angio OCT 观察 Vogt-小柳原田综合征患者急性期和静止期的微血管形态特点

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目的：应用 Angio OCT 观察 Vogt-小柳原田(VKH)综合征患者急性期和用药后静止期的微血管病变特征。
方法：收集 15 例初发 VKH 综合征急性期患者的 30 只眼，15 个正常人的 30 只眼作为正常对照，应用 Angio OCT 观察患者各层视网膜、脉络膜毛细血管的形态特征。所有急性期患者接受 3 个月的糖皮质激素治疗后，眼部病变完全静止，复查 Angio OCT,观察静止期 VKH 综合征的微血管形态特点和血流情况。

结果：我们的研究首次发现急性期 VKH 患者可以根据其 OCTA 脉络膜血管形态特点分为两类：一类以多发圆点状低反射病灶为主要表现，一类以多发的高反射点状病灶为主要表现。与正常眼相比，第一类患者的脉络膜血流灌注面积显著减少，第二类的脉络膜血流灌注面积增加。经过 3 个月激素治疗，所有静止期患者都表现为低反射点状病灶，并且尽管病变已经静止，但其脉络膜血流灌注面积较正常眼仍显著降低。

结论：OCTA 是一种较好的检测手段观察 VKH 综合征不同时期的病变特点及潜在的病变机制。

S-053

AQP4 蛋白在 CNS 中表达与其致病能力相关性研究

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S-054

非编码 RNA 与视网膜血管性疾病

颜标

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眼内新生血管发生中 Notch 信号调控的作用和机制

窦国睿

空军军医大学西京医院

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腺苷 A2A 受体：眼底病理血管控制的新靶点

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S-057

近视防控成为国家战略，更要重视近视基础研究

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S-058

高度近视眼底病变

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S-059

视网膜多巴胺与近视：小鼠近视模型提供的启示

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S-060

近视性屈光参差视觉感知功能的研究

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S-061

胸腺基质淋巴细胞生成素与白介素 4 在烟曲霉菌性角膜炎中相互作用

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目的：探究真菌性角膜炎中胸腺基质淋巴细胞生成素(TSLP)对 $CD4^+T$ 细胞的作用，及能否与 Th2 型细胞因子白介素-4(IL-4)形成炎症循环通路。
方法：将小鼠分为空白对照组、PBS 组，烟曲霉感染组(AF)、乱序小干扰 RNA 组、TSLPsiRNA 组、预注射 TSLP 组、免疫球蛋白组、预注射 IFN-ɣ 组、预注射 IL-4 组、预注射 IL-13 组、预注射 IL-17A 组、预注射 IL-17F 组，建立烟曲霉菌性角膜炎模型。利用 qRT-PCR 和 ELISA 检测胸腺基质淋巴细胞生成素和细胞细胞因子,如干扰素(IFN) -ɣ、白介素(IL)-4, IL-13, IL-17A, IL-17F, TGF-β,转录因子,如 T-bet GATA-3 STAT-3, FoxP3 在 RNA 和蛋白质水平的表达。采用免疫荧光法观察烟曲霉菌丝感染后细胞因子的分布。
结果：与对照组相比,TSLP,IFN-ɣ,T-bet,GATA-3,和 STAT-3 在 24h 高表达,IL- 4,IL-13 IL-17A,IL-17F 在感染后的 5d 表达量最高，而 TGF-β 和 FoxP3 没有明显变化。与 AF 组相比，IL-4、IL-13、GATA-3 的表达在 TSLPsiRNA 组降低，在预注射 TSLP 组中升高。TSLP 的表达在预注射 IL-4 组中显著增加，在预注射 IFN-ɣ,预注射 IL-13,预注射 IL-17A,预注射 IL-17F 组无明显变化。
结论：研究表明，真菌性角膜炎建立后，TSLP 能够以在体内诱导 Th2 型获得性免疫应答，促进 CD4+T 细胞向 Th2 方向分化。Th2 型细胞因子 IL-4 又可促进炎症 TSLP 的分泌，形成炎症环路。

S-062

VKH 综合征分子遗传学及发病机制研究

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葡萄膜炎是一大类疾病，病因和类型多达 100 余种，其中 Vogt-小柳原田（VKH）综合征是我国最主要和最重要的致盲的类型之一。流行病学研究发现，VKH 综合征多发于黄种人（中国、日本）、拉丁裔（西班牙）和印第安人等色素较多的人种。临床病例报道表明 VKH 综合征具有一定的家族聚集性，但未见到 2 代以上家系的报道，也没有见到单个突变/基因导致此病的报道，提示该病属于多基因遗传的复杂疾病。基于复杂疾病研究理论，我们团队经过多年的研究，鉴定了中国汉族 Vogt-小柳原田综合征多个遗传易感基因。利用候选基因方法鉴定了 Vogt-小柳原田综合征 JAK1、OPN、IL17 等多个相关基因。利用全基因组测序及全外显组测序等方法发现了 Vogt-小柳原田综合征 IL23R-C1orf141、EGR2-ZNF365-ADO 等多个疾病相关基因并阐明了其可能的作用机制。

S-063

开发与验证预测葡萄膜炎相关全身性疾病的决策树

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S-064

FEVR 的现状与困惑

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S-065

Formation of nonnative H-bond and hydration of hydrophobic core contribute to congenital cataract formation caused by mutations in crystalins

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Purpose: Numerous inherited mutations in β/γ-crystallins have been linked to cataractogenesis. Herein I summarized our recent findings demonstrating the roles of nonnative H-bond and hydration of hydrophobic core in crystallin stability.

Methods: Effects of mutagenesis on structural features and stability of crystallins were studied by both experimental approaches and molecular dynamic simulations.

Results: Molecular mechanism studies of several cataract-causing mutations suggested that cataract-causing mutations might destabilizing crystallins by the introduction of a nonnative hydrogen bond or partially hydration of the domain hydrophobic interior or domain interface.

Conclusion: We propose that fformation of nonnative H-bond(s) and hydration of hydrophobic interior might be important to the understanding of the molecular mechanisms of cataract-causing mutations in crystallins.

S-066

GJA8 基因相关白内障的细胞自噬机制及药物干预靶点研究

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S-067

青光眼基因治疗进展

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S-068

角膜上皮干细胞缺乏的精准治疗

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S-069

人工智能与精准医疗健康大数据 hope or hype

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S-070

Development and application of novel ophthalmic imaging technology

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S-071

SIG：How to Publish Papers in Good Medical Journals Publishing Ethics and Tips for Success in Getting Published

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2. Experimental Eye Research
3. Experimental Eye Research

S-072

A Novel Drug Delivery System with Rapid Prototyping IOL

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S-073

Slippery Liquid-Attached Surface for Robust Biofouling Resistance

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S-074

角膜内皮的干细胞修复

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S-075

组织工程支架材料构建及其对眼睑缺损的修复研究

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睑板是眼睑主要支撑结构，维持眼睑外形和功能。较大面积睑板缺损的眼睑重建如果没有植入睑板替代物，可能导致眼睑缺乏支撑而收缩，出现眼睑内翻、退缩等而导致重建失败。我们基于对天然睑板特殊结构和力学性能研究，指导设计和构建组织工程支架材料作为眼睑替代物。一方面支架材料的结构和机械性能可调控再生组织的结构、尺寸和形貌，作为连接细胞和组织的框架，引导组织生长成特定形态。我们构建具有弹性机械性能的多孔聚（富马酸丙烯酸酯）-co-2-羟乙基甲基丙烯酸酯（PPF-HEMA），并被证明是一种潜在睑板替代材料。另一方面，支架材料还可以作为种子细胞和生物活性因子的载体，调节组织再生和修复。我们制备了聚（乳酸-co-羟基乙酸) /纤维蛋白凝胶/

间充质干细胞/转化生长因子-β 复合支架（PLGA/FIB/BMSC/TGF-β1）用于眼睑缺损修复。我们的研究结果表明，基于组织工程学原理，具有组织修复作用的多孔支架型睑板替代物可通过诱导细胞长入和支持新生组织形成，恢复眼睑支撑结构，为进一步实现功能重建奠定基础。

S-076

Genetics and Mechanisms of Myopia

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S-077

青光眼的分子遗传学

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S-078

早发近视致病基因鉴定及致病机制研究

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S-079

白内障研究新进展

卢奕
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S-080

眼表疾病大数据的前景与问题

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S-081

眼科人工智能系统临床应用的瓶颈与应对

袁进
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S-082

近视眼的智能预测与精准防治

林浩添
中山大学中山眼科中心

S-083

视黄醛代谢—干性年龄相关性黄斑变性的发生及调控

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S-084

角膜损伤修复过程中的干细胞谱系示踪

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S-085

RNA 甲基化 m6A 在葡萄膜黑色素瘤中的功能与分子机制

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S-086

Heterochromatin represses senescence-associated secretory phenotype gene expression in senescent retinal pigment epithelial cells

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Purpose. Heterochromatin alterations is a hallmark of aging process. This study is aimed to investigate structure and distribution of heterochromatin on retinal pigment epithelial (RPE) cell premature senescence induced by oxidative stress exposure or X-ray irradiation, and to explore the effects of heterochromatin in regulating senescence-associated secretory phenotype (SASP) gene expression during RPE senescence.

Methods. Heterochromatin structure was assessed by confocal microscopy and transmission electron microscope. Genome-wide heterochromatin distribution was studied by chromatin immunoprecipitation (ChIP)- seq analysis. ARPE-19 cells were continually exposed to tert-Butyl hydroperoxide (t-BHP) or X-ray irradiation to induce cell senescence, which was confirmed by senescence-associated β-galactosidase (SA β-gal) staining, senescent-associated gene expression and RPE barrier function analysis. Chromatin structure on SASP gene locus was assessed by formaldehyde-assisted isolation of regulatory elements (FAIRE), and the occupancy of heterochromatin there was determined by quantitative ChIP (q-ChIP) analysis. Heterochromatin was disrupted by chaetocin treatment. Expression of inflammatory cytokines were examined by qRT-PCR and cytokine protein array.

Results. Heterochromatin mark H3K9me3 was enriched in SASP gene locus. A prominent nuclear peripheral heterochromatin loss was found in senescent RPE cells. Decreased chromatin

compaction was detected in proinflammatory genes upregulated during RPE senescence. Disruption of heterochromatin led to robust upregulation of SASP genes.

Conclusion. Heterochromatin represses SASP gene expression during RPE senescence. Our data suggest a potential role for targeting heterochromatin in the treatment of oxidative-related retinal degeneration, such as age-related macular degeneration (AMD).

S-087

缰核相关光信息传导通路在介导光疗抗抑郁过程中的功能与机制

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S-088

视神经保护-从实验室走向临床

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S-089

褪黑素通过抑制 HIF-1α-VEGF 通路缓解氧诱导视网膜病小鼠的视网膜新生血管形成及神经胶质细胞功能异常

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S-090

视网膜类器官的构建及应用前景

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S-091

干细胞与变性视网膜微环境的互动及其对干细胞命运的影响

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S-093

干细胞移植重建眼表功能的应用基础研究

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S-094

组蛋白甲基化转移酶 PRMT6 与 miR-647 反馈环在 RPE 细胞氧化性损伤中的作用

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S-095

细胞极性基因功能紊乱导致白内障的机制研究

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目的： 晶状体起源于具有典型基顶端极性的上皮细胞。顶端极性蛋白 Crb 复合物功能紊乱将导致上皮细胞的的细胞黏连、运动和组织紊乱，但具体机制尚未明了。本研究旨在分析 Crb 复合物对晶状体发育的影响，及对细胞黏连调控的分子机制。
方法：我们以斑马鱼为模型，采用细胞与分子生物学、免疫组化、电镜等技术，研究以上科学问题。
结果： 我们发现，Crb 复合物功能紊乱将导致斑马鱼晶状体出现白内障表型。其机制主要是该复合物与 Rab11 相互作用，定向诱导钙黏蛋白在顶端的聚集，维持上皮细胞的有序性。该复合物功能紊乱导致钙黏蛋白被随机分泌到细胞膜的各个部位，从而导致上皮细胞异常运动，产生白内障表型。
讨论：脊椎动物晶状体的发育与功能保守，因此，以上研究可能亦反应了 Crb 复合物在人类疾病中的功能。此外，上皮细胞是多种组织包括神经、晶状体等的前体细胞，Crb 复合物亦非常保守的存在

于脊椎动物的各类上皮细胞中，因此，以上分子机制可能适用于上皮细胞起源的各类组织的早期形态发生。

S-096

导师能够给研究生带来什么？

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中国有句老话，一日为师终身为父，它所表达的含义有三个方面：（1）学生对老师的尊重，把老师比作父亲，如此之高的尊重恐怕是世界上独一无二的；（2）学生的权力，作为儿女，对父亲是有要求的，这实际上是对老师的一种压力和动力；（3）老师的责任，既然学生把老师尊为父亲，那么作为父亲的老师应该为学生做什么？带来什么？把他们培养成什么样的人？这是每一位老师应该认真思考和对待的问题。作为一名老师，我对这些问题进行了长时间的思考，并提出自己的看法，希望对老师在指导研究生过程中有所帮助和裨益，也希望对研究生学习、如何利用老师的学识、资源、影响力等提升自己素质和水平有所帮助和启迪。

S-097

《医学期刊出版涉及的伦理规范》解读

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S-098

大动物视觉电生理检查方法规范及技巧

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眼科大动物实验中，对动物视功能的随访评估非常重要,人类可以通过视敏度等主观视觉反应来获得定性或定量的数据,但实验动物只能通过辅助检查评估其视功能。视觉电生理因其客观、定量、无创等优势,成为视功能检查的重要组成部分；但其使用中若不注意规范和技巧，会出现从技术操作到结果解读的偏差，导致结果不具可重复性和可比性。我们探讨了光诱导视网膜变性巴马小型猪、以及正常猕猴的视觉电生理检查方法规范及技巧，并与人进行对比，行眼底照相、光学相干断层扫描（OCT）、视网膜电图（ERG）、视觉诱发电位（VEP）等眼科检查。结果提示：与光照前相比，

光变性巴马小型猪眼底照相无显著可见改变；OCT 可见光变性猪视网膜厚度显著变薄(P<0．05)；fERG 可见光变性猪在暗适应时最大混合反应的 a、b 波和 ops 波振幅均有显著下降(P<0．05)，在明适应时 b 波波幅显著下降(P<0．05)；多焦 ERG 可见光变性猪 P1 波平均振幅密度显著降低(P<0．05)。正常猕猴和人的 fERG 对比：暗适应 0.01ERG 的 b 波及暗适应 3.0ERG 的 a 波、b 波猕猴与人相比峰时明显较短，振幅明显较低（P<0.05）。暗适应 Ops 的 Os2 波猕猴与人相比振幅明显较低（P<0.05）。明适应 3.0ERG 的 a 波、b 波峰时和振幅，明适应 30Hz 振荡电位振幅两者差异无统计学意义。FVEP 的 P2 波猕猴与人相比峰时明显较短，振幅明显较高（P<0.05）。PERG 猕猴与人相比 P50 及 N95 波振幅明显较低（P<0.05）。PVEP 的 P100 波峰时猕猴与人差异无统计学意义，P100 波振幅猕猴与人相比较低（P<0.05）。综上所述，视网膜电图及视觉诱发电位可对小型猪和猕猴行视功能评价，作为评估视功能的客观量化参照。

S-099

炎症对氧诱导视网膜病变的影响

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S-100

小梁网、Schlemm 管与生物力学

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S-101

睑板腺癌发病机制和临床研究

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目的：睑板腺癌是眼睑特有的恶性肿瘤，恶性度高，发病机制不清，临床诊疗存在很多棘手问题。本研究旨从探讨睑板腺癌的血管新生和表观遗传发病机制入手，鉴定睑板腺癌分子病理诊断靶点，建立睑板腺癌多中心回顾性队列，比较 Mohs 法显微手术（MMS）和扩大切除手术（WLE）在睑板腺癌手术治疗中的作用，并建立新型预后预测列线图模型。

方法：利用大样本高通量检测，鉴定睑板腺癌发病相关长非编码 RNA（LncRNA）和微小 RNA（MiRNA）,利用大量病理标本，检测睑板腺癌血管新生表达和 PD-L1 表达，并比较分析睑板腺癌与

其他眼睑恶性肿瘤鉴别诊断的分子病理靶点。通过国内多中心合作，收集全世界最大的睑板腺癌病例队列，回顾分析比较 MMS 和 WLE 在睑板腺癌手术治疗中的价值，指标包括生存率、复发率、转移率等。建立睑板腺癌新型列线图 nomgram 模型，评估其在睑板腺癌患者生存预后评估中的作用。**结果：**500 个 LncRNA 和 326 个 LncRNA 在睑板腺癌中差异表达，涉及肿瘤增值信号通路相关的 LncRNA 和 MiRNA 差异表达最明显。睑板腺癌中存在特征性的血管新生模式-血管拟态的表达，并证实其是促进肿瘤生长侵袭的重要因素。睑板腺癌标本中 PD-L1 表达明显高于癌旁组织，且在转移性睑板腺癌标本中升高更为显著。睑板腺癌中 Shelterin 蛋白复合体表达显著高于眼睑基底细胞癌。MMS 方法治疗睑板腺癌患者复发率和转移率显著低于 WLE，生存率无显著差异。与 TNM 分期相比，nomgram 列线图模型可更加精确的预测 T2b 期以后睑板腺癌患者生存预后。

结论：表观遗传调控和血管新生调控是促进睑板腺癌的重要因素。PD-L1 有望作为转移性睑板腺癌靶向治疗的靶点。Shelterin 蛋白复合体在睑板腺癌鉴别诊断是重要的分子病理靶点。MMS 可推荐作为手术治疗睑板腺癌的一线方法。新型列线图模型可结合 TNM 分期，全面精确评估睑板腺癌患者生存预后。

大会发言

OR-001

维持脱细胞角膜基质透明机理的研究 — —种新型脱细胞猪角膜基质的制备及临床初步观察

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目的：探索维持脱细胞角膜透明的机理，研究一种保护性脱细胞体系，在脱除异种细胞和抗原的同时保持角膜结构和透明度，并初步观察其临床应用效果。
方法：通过透射电镜、免疫荧光染色等方法分析溶胀造成角膜透明度下降的原因，并检测不同离子和胶体渗透压在脱细胞过程中对角膜的影响，确定影响角膜透明度的关键因素；确定新型保护性脱细胞体系的最佳参数，采用新型脱细胞体系制备脱细胞猪角膜基质，并对其生物学特征进行评价；临床上对 5 例符合条件的角膜溃疡患者移植该新型脱细胞猪角膜基质，术后随访 3 个月，初步评价其临床效果。
结果：随着溶胀程度的增加，角膜透明度逐渐下降，溶胀超过 2 mm 厚度时，角膜基质纤维的完整性和规则排列被破坏且脱水后也难以恢复正常；随着胶体渗透压的增高，脱细胞后角膜透明度、厚度和透光率均逐渐改善，当达到 50 mmHg 时与正常猪角膜基质最为接近，但离子渗透压的高低对角膜透明度的维持作用不大；新型保护性脱细胞体系有效去除了猪角膜基质中约 98.6％的 DNA 成分和 28.4％的 α-gal 成分，而胶原蛋白、糖胺聚糖含量和机械性能未见明显降低，角膜透明度好，兔板层角膜移植术后 6 个月未观察到排斥反应，生物相容性好。临床上 5 位患者移植后，平均 3.8±1.5 天可完成角膜再上皮化，3 个月时患者视力较术前明显改善，角膜厚度为 504.2±54.2 μm，植片厚度为 411.0±31.8 μm，未见层间渗出，眼压稳定，角膜植片透明，未发生明显的免疫排斥反应。
结论：角膜过度肿胀会引起基质纤维不可逆的损伤，并导致透明度下降，通过胶体渗透压控制角膜的溶胀程度是维持脱细胞角膜基质透明度的关键因素；胶体渗透压辅助的新型脱细胞体系在有效脱除猪角膜基质细胞和抗原的同时，未对角膜超微结构、胶原和糖蛋白成分造成明显破坏；新型脱细胞猪角膜基质具有免疫原性低、生物力学和生物相容性好等特点；临床移植 3 个月时效果良好。

OR-002

线粒体靶向肽 SS31 对氧化应激下 661W 细胞自噬影响的研究

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目的：线粒体靶向肽 SS31 对过氧化氢损伤下 661W 细胞自噬影响的研究。
方法：MTT 法筛选不同浓度 H_2O_2 损伤 661W 细胞最佳浓度，用筛选 H_2O_2 浓度，作用 661W 细胞不同时间，MDC 染色检测自噬变化筛选 H_2O_2 损伤时间，构建 661W 细胞氧化损伤模型。MTT 法

筛选不同浓度 SS31 最佳保护浓度，加入自噬诱导剂雷帕霉素（Rap）及抑制剂巴弗洛霉素(baf A1)干预 661W 细胞自噬，观察 SS31 对 H_2O_2 损伤下 661W 细胞自噬的影响，将实验分为：空白组;H_2O_2 组;Rap 组；bafA 组；SS31 组；Rap+H_2O_2 组；baf A1+H_2O_2 组；SS31+H_2O_2 组；SS31+Rap 组；SS31+baf A1 组；SS31+Rap+H_2O_2 组；
SS31+baf A1+H_2O_2 组，流式检测各组细胞 ROS 水平及 AnnexinV/PI 检测细胞凋亡率，MDC 染色检测自噬，Western Blot 检测各组细胞自噬标志蛋白 LC3-II、LC3-II/LC3-I、Beclin-1 表达及双荧光 mRFP-eGFP-LC3 质粒转染 661W 细胞，检测自噬流变化。
结果：H_2O_2 对 661W 细胞活力及自噬影响结果示：随着 H_2O_2 浓度增加 661W 细胞存活率下降，空白对照组细胞存活率(70.16±18.30)%，600uM H_2O_2 组细胞存活率下降至(55.55±12.16)%。600uM H_2O_2 作用细胞 2h 时，与对照组比较，自噬变化比较显著（$p<0.05$）。SS31 对 H_2O_2 损伤 661W 细胞干预作用结果示：不同浓度 SS-31 组细胞存活率都较模型组明显升高，H_2O_2+SS31（100nM）组细胞活力增加最显著（$p<0.05$）。
结论：H_2O_2 能够抑制 661W 细胞活性,引起细胞氧化损伤，同时可引起自噬水平增加；SS31 对氧化损伤的 661W 细胞具有抗氧化保护作用。

OR-003

Novel ultra-small micelles based on rebaudioside A: a potential nanoplatform for ocular drug delivery

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Background：Rebaudioside A (RA) could form micelles in aqueous solutions. It was postulated that the self-assembled micelles of RA could potentially be utilized to be as an ocular drug delivery system.
Methods: Coumarin-6(Cou6) was acted as a model hydrophobic drug, and Cou6-loaded RA micelles (RA-Cou6 micelles) were formulated, optimized, and then further evaluated its ocular safety with *in vitro* cytotoxicity, cell apoptosis, and *in vivo* ocular tolerance. The cellular uptake and intracellular distribution of Cou6, *in vitro*/*ex vivo* endocytosis mechanism, and *in vivo* corneal permeation were also characterized.
Results: CMC values of RA at 34 °C are 4.83±0.12, 4.54±0.25, and 4.88±0.17 mg/ml in artificial tears, PBS, and water, respectively, suggesting RA has a great tendency to form micelles. RA self-assembled into micelles with ultra-small particle size (< 4 nm) in a homogeneous distribution state (PDI < 0.3). Cou6 was highly encapsulated into the RA micelles according to the weight ratios of RA to Cou6. The encapsulation improved with the increase of RA/ Cou6 weight ratio. The encapsulation improved to 98.02±0.96% for Cou6, when the RA/ Cou6 weight ratio was 1200:1 (12 mg/ml RA per 0.01 mg/ml coumarin 6). RA had good cellular tolerance without significantly causing apoptosis. The IC_{50}(24h), IC_{50}(48h), and IC_{50}(72h) in human corneal epithelial cells (HCECs; ATCC

CRL-11135) for RA was 27.88, 27.10, and 27.54 mg/ml, respectively. While the IC_{50}(24h), IC_{50}(48h), and IC_{50}(72h) for Pluronic F127 (as high as 250 mg/ml of Pluronic F127 is widely used in ocular drug delivery system) was 10.34, 13.84, and 15.82 mg/ml, respectively. As to the effect of RA on cell apoptosis, HCECs expsoed to RA did not show a significant increase in the number of apoptotic cells when the RA concentration ≤ 12 mg/ml ($P > 0.05$, respectively). RA-Cou6 micelle ophthalmic solution also had excellent cellular tolerance and *in vivo* ocular tolerance. The use of RA micelles improved of Cou6 significantly, and this cellular uptake was characterized with ultra-fast and quick uptake balance could be reached to RA micelle formulation. As to the endocytosis mechanisms, an energy-independent active intracellular endocytosis pathway was apparently involved and cellular organelles such as lysosome, endoplasmic reticulum, and mitochondria were observed with high distribution of Cou6, while an much more sophisticated endocytosis pathway was apparently involved in the *ex vivo* corneal endocytosis mechanism tests. The use of RA micelles significantly improved the *in vivo* corneal permeation of the encapsulted Cou6 when compared to free Cou6 eye drops. After ocular topical administration in rabbits, the Cou6 levels from RA-Cou6 micelle groups were 1.53, 5.32, and 8.29 folds higher than from free Cou6 formulation at the 30, 60 and 120 min time points, respectively. The results from in vivo mice and rats tests supported the results from in vivo rabbits' cornea test. Results from CLSM observation also accorded with these results that RA micelles significantly improved the *in vivo* corneal permeation of the encapsulted Cou6.
Conclusion: RA micelle formulations have great potential as a novel ocular drug delivery system to improve the bioavailability of hydrophobic drug.

OR-004

ROS 响应性纳米颗粒/VEGF siRNA 复合物对小鼠碱烧伤后角膜新生血管形成的抑制作用

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目的：研究 ROS 响应性纳米颗粒/siRNA-VEGF 复合物的递送效率，观察其对小鼠碱烧伤后 CNV 形成的抑制效果及作用机制。
方法：体外培养小鼠微血管内皮细胞。免疫荧光检测氧化应激条件下纳米复合物在血管内皮细胞中的胞吞及释放效能。取健康"VEGFR2-Luciferase 标记小鼠"100 只，随机分为 PBS 组、Scramble 组、纳米复合物组及雷珠单抗组，每组各 25 只。将右眼敷 1mol/LNaOH 滤纸片 8s，建立碱烧伤模型，间日结膜下定量注射给药。前节照及小动物活体成像仪检测不同处理组 CNV 生长情况。病理学切片检测炎症细胞数量及新生血管密度及范围。qPCR 检测不同时间梯度炎症介质（VEGF、IL-1、IL-6、MCP-1、MMP-2、MMP-9）mRNA 表达量。免疫荧光检测角膜组织中 CD31、VEGF、VEGFR1 的位置及含量。DHE 染色测定角膜组织中活性氧簇（ROS）含量。WB 验证

VEGFR2/Raf/Mek/Erk 及 PI3K/Akt 通路。测定纳米复合物的细胞毒性、血管迁移及血管形成能力。

结果：纳米复合物在氧化应激条件下可以促进 VEGF siRNA 在胞内释放。纳米复合物组在碱烧伤后较其余组更显著降低新生血管的数量及面积，与活体荧光读值相一致。病理学证实纳米复合物组可以减少角膜炎症细胞数量并减少 CNV。qPCR 证实纳米复合物组可以降低炎症介质表达。免疫荧光可见纳米复合物可以减轻基质层 CNV 形成。碱烧伤后 1、3、7 天 ROS 含量升高，2、4、6 小时的 SOD-2 及 CAT 含量下降。组织水平及细胞水平 WB 证实纳米复合物可以抑制 VEGFR2/Raf/Mek/Erk 及 PI3K/Akt 通路活化。同时，纳米复合物可以抑制小鼠血管内皮细胞的迁移及成管能力。

结论：ROS 响应性纳米颗粒/VEGF siRNA 复合物在氧化应激下促进 VEGF siRNA 释放，并较其他组更显著抑制小鼠碱烧伤后角膜新生血管的形成。

OR-005

LONG LASTING VISCOELASTICS SUPRACHOROIDAL BUCKLING FOR RHEGMATOGENOUS RETINAL DETACHMENTS IN CHINESE POPULATION: A PRELIMINARY REPORT

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To report preliminary functional and anatomical outcomes of suprachoroidal buckling for the management of peripheral retinal breaks in rhegmatogenous retinal detachment.

METHODS:

A prospective cohort study of patients underwent suprachoroidal buckling for the management of rhegmatogenous retinal detachment(RRD) in a single center. Eyes with peripheral retinal breaks were recruited, with exclusion criteria as 1. Affected eye is the only eye, 2. Uncooperative (age<18 or mental disability), 3. Retinal breaks within the vascular arch, 4. Refusal to participate.

The retinal breaks were positioned and marked, cryopexy or laserpexy were done as a routine. A 23-gauge (23-G) olive-tipped, suprachoroidal cannula was inserted into the suprachoroidal space through a full thickness scleral wound, and move suprachoroidally to the position of the retinal break. Healaflow and Healon5 were injected into the sites of the breaks as filler materials to form a dome-shaped suprachoroidal indentation to achieve chorio-retinal apposition. Combined 25-G vitrectomy was performed when necessary. Best corrected visual acuity was the primary outcome measure. Final retinal reattachment rate, single-surgery reattachment rate, and complications were secondary outcome measures.

RESULTS:

7 eyes of 7 consecutive patients meeting the criteria were recruited. 6 patients were followed postoperatively to at least 6 months. Single surgery reattachment rate was 71.4% (5/7 eyes). Failed Best-corrected visual acuity was improved in all cases. Final retinal reattachment was achieved in all 6 eyes (100%). There was no statistically significant difference in visual acuity gain or anatomical reattachment in terms of filler material, retinal break quadrant or extent. No major complications were observed. The two failed cases were:1. Moderate vitreous hemorrhage and RRD relapse 2 months after the attachment of the retina. 2. Diabetic and vitreous hemorrhagic RRD patient and RRD relapsed 3 months after the surgery.

CONCLUSION:

Suprachoroidal buckling is an effective procedure for the management of rhegmatogenous retinal detachment in carefully selected case, while there is a moderate learning curve.

OR-006

Epivotide, the p55PIK inhititor,alleviated the inflammation of the Endotoxin-induced uveitis(EIU)

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Purpose: Preclinical studies are performed to investigate the anti-inflammatory effects of the Epivotide eyedrops(the p55PIK inhibitor)on the Endoxin-induced uveitis (EIU).

Methods:EIU was induced by the intravitreal injection of 200ng LPS in 1ul PBS. Epivotide eyedrops were used before and after LPS injection for three days.Efficacies were assessed by slit-lamp microscope, clinical scores and H&E staining. The mRNA levels of inflammatory cytokines and mediators in the Iris-ciliary body complex（ICB） were analyzed by qRT-PCR. The protein levels of TNF-α, IL-1β, IL-6 in the aqueous humor was measured by ELISA. The protein concentration of NF-κB p65 was assessed by Western blotting.

Results: The Epivotide eyedrops alleviated the clinical manifestations and histopathology. The mRNA levels of TNF-α, IL-1β, IL-2,IL-6 ， NF-κB p65 in the ICB and the protein levels of TNF-α, IL-1β and IL-6 in the aqueous humor(AH) were downregulated.

Conclusions: These results confirmed that the tropical administration of Epivotide suppressed the ocular inflammation in EIU,which have potentials for providing a novel class of drugs to manage the ocular inflammation.

OR-007

那他霉素-胶束载药系统体外抑菌能力的实验研究

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目的：真菌性角膜炎是一种致盲率极高的感染性角膜病，危害巨大。研究表明，那他霉素是控制真菌性角膜炎最有效的药物之一。但那他霉素难溶于水，对角膜的通透性较差，且那他霉素用药频率高，患者依从性差。胶束作为一种新型纳米载体，具有载药范围广、结构稳定、组织渗透优良、体内滞留时间长、组织靶向性高等优点，是极具发展前景的药物载体。本项目利用胶束为载体，合成那他霉素-胶束载药系统，提高那他霉素的溶解度，增强那他霉素的稳定性，同时延长那他霉素的释放时间，促进药物在角膜的吸收、分布，从而有效地控制白色念珠菌。
方法：构建那他霉素-胶束载药系统，利用电镜检测大小、形态，利用高效液相色谱分析描绘药物释放曲线。体外培养白色念珠菌（ATCC 10238），利用最小抑菌浓度实验检测体外抑菌能力。体外培养角膜上皮细胞，利用 CCK-8 检测体外细胞毒性。

结果：那他霉素-胶束载药系统为类圆形，直径 160nm 左右，属于纳米级尺寸。药物在 37℃可以自发释放，释放曲线为抛物线形，在 25 小时时，释放的那他霉素累积量为 20%，随着时间延长，释放逐渐减少，100 小时释放 32%，之后进入平台期，累积释放量不再增加。纯那他霉素的最小抑菌浓度为 2ug/ml，那他霉素-胶束载药系统的的最小抑菌浓度为 8ug/ml。与 control 组相比，那他霉素-胶束载药系统组的细胞 OD 值无统计学差异（$P<0.05$）。
结论：那他霉素-胶束载药系统具有缓释的物理化学特性；那他霉素-胶束载药系统能够抑制白色念珠菌生长，且对角膜上皮细胞无毒性。

OR-008

A rapid casting intraocular lens based on polyurethane acrylate as a drug delivery system with antibacterial activity

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Purpose: The study is to prepare an novel Rapid prototyping intraocular lens as drug delivery system and to evaluate its optical performance, mechanical property, biocompatibility and drug sustained release behavior.

Methods: A photocurable urethane acrylate(PUA) was synthesized and a formula of PUA mixed with acrylate monomer, assisted component and gatifloxacin was prepared. Foldable intraocular lens was cured by UV light at specific wavelength for 10 mins in a 3D printed mold. The light transmittance and the refractive index of the material were measured to evaluate the optical property, tensile stress-strain analysis and glass transition temperature were determined to assess the mechanical property. Drug release behavior was studied in vitro, and the cytotoxicity test was performed in vitro with ARPE-19 and hLec cell line. The antibacterial activity of the PUA-IOL was tested in vitro.
Results: The novel PUA-IOL material shows high light transparency with UV light block function and proper refractive index, it performed well in flexibility while it had very high strength in mechanical test. The material showed no significant cytotoxicity to ARPE-19 and hLec. Gatifloxacin was sustained released from material for more than 40days in drug release study and the antibacterial test in vitro indicated that the drug loaded PUA-IOLs had excellent antibacterial activity.
Conclusion: We successfully developed a novel IOL from new polymer material and formula with drug delivery behavior. It performed well in optics and mechanics, showed no cytotoxicity, with long-last drug release behavior and outstanding antibacterial activity.

OR-009

Gender inequality in global burden of uncorrected refractive error

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Purpose: To explore gender inequality in global burden of Uncorrected refractive error (URE) by year, age, and socioeconomic status using disability-adjusted life years (DALYs).
Methods: Global, regional and national gender-specific DALY numbers, crude DALY rates, and age-standardized DALY rates caused by URE, by year and age, were extracted from the Global Burden of Disease Study 2015. Human development index (HDI) in 2015 as an indicator of national socioeconomic status was extracted from the Human Development Report. Pearson correlation and linear regression analyses were conducted to investigate the association between socioeconomic status and gender inequality.
Results: Gender inequality in global URE burden has persisted since 1990 through 2015, with little improvement over the decades. Age-standardized DALY rates were 189.8 among males vs. 223.0 among females in 1990 and 188.4 vs. 225.2 in 2015. Females had higher burden than males of the same age and gender inequality increased with age. Female-minus-male difference in age-standardized DALY rates ($r = -0.562$, $P < 0.001$; standardized $\beta = -0.562$, $P < 0.001$) and female to male age-standardized DALY rate ratios ($r = -0.258$, $P < 0.001$; standardized $\beta = -0.258$, $P < 0.001$) were negatively related to HDI.

Conclusions: Gender inequality in global URE burden has persisted over the past few decades, with females bearing more burden than males. Older age and lower socioeconomic status are related to greater gender inequality. These findings highlight the importance to make gender-sensitive health policy to manage global vision loss caused by URE.

OR-010

我国青少年近视患病情况及趋势的荟萃分析研究

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目的：整理近年来国内的相关流行病学研究，分析我国儿童和青少年的近视患病情况及其影响因素。
方法：通过搜索 Pubmed，Embase 和 Web of Science 数据库，筛选高质量的相关流行病学研究。
结果：本研究最终纳入了 1998-2016 年的 22 篇文献，涵盖了来自我国 13 个省级行政区域的 192569 位研究对象，人群年龄为 3-19 岁。我国青少年的总体近视患病率（<-0.5D）为 37.7% (95%CI: 23.5%-52.0%) ，高度近视患病率（<-6.0D）为 3.1% (95%CI: 1.2%-5.0%)。我国 16-18 岁青少年的近视和高度近视患病率分别为 56.2%(95%CI: 29.8%-82.5%)和 15.1% (95%CI：6.4%-23.8%)。女性是近视（OR=1.29；95%CI: 1.14-1.46；P<0.001）和高度近视（OR=1.37；95%CI: 1.05-1.78；P=0.02）的危险因素。我国南北方青少年的近视患病率无明显差别（37.2% v.s 38.4%），但居住在农村者近视患病率要明显低于居住在城市者（48.8% v.s 31.9%；P<0.001）。我国青少年的屈光度与年龄呈线性相关，屈光度＝-0.40´年龄+3.22（P<0.001）。2008 年以前，16-18 岁人群的近视患病率为 48.4% (95%CI: 44.3%-52.5%)；2008 年以后，近视率达到 58.7% (95%CI: 28.2%- 89.2%)。近 5 年的数据显示，近视和高度近视的患病率已达到 84.8% (95%CI: 84.4%-85.2%)和 19.3% (95%CI: 18.6%-20.2%)。据线性趋势估计，至 2050 年，我国青少年的总体近视患病率将达到 84.3%。
结论：我国青少年近视患病率较欧美国家更高，且这个数字逐年增长，我们应当对其给予足够的重视。

OR-011

Prevalence and ocular biometric characteristics of high myopia in Chinese cataract patients at Zhongshan Ophthalmic Center : a 10-year data report

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PURPOSE: To evaluate the prevalence and ocular biometric characteristics of high myopia (HM) in Chinese cataract patients at Zhongshan Ophthalmic Center (ZOC).

METHODS: In this clinic-based cross-sectional study of ZOC in the city of Guangzhou, all patients underwent cataract surgery in the last ten years (from August 1, 2008 to July 31, 2018), with preoperative IOLMaster optical biometry eligible. HM was defined as axial length (AL)≥26.0mm, and divided into 3 subgroups according to AL: mild (≥26.0mm and＜28.0mm), moderate (≥28.0mm and＜30.0mm) and extreme long ALs (≥30.0mm). Patient demographics, axial length (AL), keratometry (K), anterior chamber depth (ACD) and corneal astigmatism (CA) were collected and analyzed.

RESULTS: A total of 163853 eyes of 104296 consecutive cataract patients were comprised in the 10-year period study, and totally 18291 eyes (11.16%; 95%CI, 11.01%-11.31%) of 10729 cases had HM in the population. In the cataract patients with HM, there were 7562 cases (70.48%) in bilateral eyes and 5766 cases (53.74%) in women. The mean age (±SD) was 57.18±14.35years, much smaller than cases with normal ALs (69.46±8.20years; P=0.000).The mean AL was 28.99±2.41mm (range 26.00 to 37.95mm), and the prevalence of eyes with mild, moderate and extreme long ALs was 43.73%, 25.15% and 31.12%, respectively. The mean K was 43.48±2.07D (K1,42.82±2.06 and K2,44.15±2.18D), and the prevalence of eyes with flat cornea (K＜42.0D), medium (42.0-46.0D) and steep cornea (K＞46.0D) was 18.64%, 73.09% and 8.27%, respectively. The mean ACD was 3.57±0.38mm (range 2.63 to 5.74mm).The mean CA was 1.33±0.92D (range 0.06 to 6.82D), and with mean CA axis (84.73±54.90 degree). CA less than 0.75D, between 0.75D and 3.00D, 3.00D or higher was found in 5334 eyes (29.16%), 11933 eyes (65.24%) and 1024 eyes (5.60%), respectively. CA with the rule (WTR), against the rule (ATR) and oblique was in 39.73%, 43.99% and 16.28% of eyes, respectively.

CONCLUSIONS: HM was common in Chinese cataract population, with a high prevalence (more than 10%), and comparable to that in young adults. Patients with HM underwent cataract surgery much younger than normal ALs cases, especially in men. HM most happened in bilateral eyes, almost 1/3 eyes with AL≥30.0mm and 1/5 eyes with flat cornea. CA with 0.75D or higher was very common in eyes with HM, and almost half with ATR. Our data may help improve intraocular lens (IOL) power calculation, selection and surgery decisions in cataract patients with HM, and highlight the need of further investigation on aetiology of the high prevalence of HM in Chinese cataract population.

OR-012

基于 AGREE II 进行中国眼科指南质量的评价

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目的 采用 AGREE II 评价工具对我国眼科临床实践指南进行质量评价。**方法** 计算机检索 CBM、CNKI、VIP 和 WanFang 数据库，检索时限为建库至 2017 年 12 月，收集相关的中国眼科临床实践指南，根据纳入排除标准筛选。3 名评价者利用 AGREE II 指南评价工具对纳入的指南进行独立评价。**结果** 共纳入 60 篇中国眼科临床指南。范围和目的、参与人员、制定的严谨性、表达的清晰性、应用性和编辑的独立性这 6 个领域的平均得分分别为 66.4%、24.7%、13.5%、67.4%、14.5%和 19.3%。2013 年至 2017 年发表的指南较之前发表的指南，在除领域 4 清晰性以外的所有领域得分都有提高。**结论** 我国现有眼科临床实践指南总体质量不高，与国际水平还存在较大差距。今后在指南制定过程中应更加重视遵循制定规范，加强参与人员多样性、制定的严谨性、指南的应用性和编辑独立性。

OR-013

Eyelid Tumors and Proliferative Lesions: A Clinicopathological Analysis of 5146 Cases in a Tertiary Hospital in South China

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Objective To describe the clinicopathological characteristics of patients with eyelid tumors and tumor-like lesions in South China.
Methods A total of 5146 cases with histologically confirmed eyelid tumors and tumor-like lesions in the Second Affiliated Hospital, Zhejiang University School of Medicine (ZJU-2) were retrospectively reviewed from 2000 to 2018. Eyelid tumors and tumor-like lesions were classified by histogenesis and pathologic diagnosis. Age-specific and gender-specific incidence constitutions were calculated. Time trends and distribution in different age groups were calculated. We further compared with data from other countries containing different races.
Results Benign eyelid lesions accounted for 85.08% of all cases while malignant eyelid tumors accounted for 14.92%. Nevus (33.07%) was the most common benign eyelid lesions, followed by squamous papilloma (12.31%), basal cell papilloma (9.55%), epidermal cyst (5.44%) and hemangioma (4.77%). The most common malignant eyelid tumors were basal cell carcinoma (48.70%), followed by sebaceous gland carcinoma (34.24%), squamous cell carcinoma (12.37%), malignant melanoma (2.86%) and lymphoma (1.43%). Patients with benign eyelid tumors were mainly middle-aged while malignant tumors occurred mainly in the elderly of 60 years and above.
Conclusions Benign eyelid lesions constituted most of the eyelid tumors and tumor-like lesions. Of which, Nevus was the most common among benign eyelid tumors. While basal cell

carcinoma was the most common type in malignant eyelid tumors and affected old population. The spectrum of diseases varied in different countries and races.

OR-014

Comparative study of peeled internal limiting membrane (ILM) reposition and ILM peeling in idiopathic macular hole: a randomized-control trial

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Purpose: To compare the functional and anatomical outcomes of peeled internal limiting membrane (ILM) and ILM peeling for the treatment of idiopathic macular hole.

Methods: This was a prospective randomized control trial. In this clinical trial, 30 patients with idiopathic macular hole were randomly assigned to two groups (Group 1: peeled ILM reposition; Group 2: ILM peeling). Patients were followed up for 6 months. The primary outcomes are macular hole closure rate in 1 month after the initial surgery and the best corrected visual acuity (BCVA) at 6 month postoperatively. The second outcomes are multifocal electroretinogram (mfERG)， microperimeter evaluation, microstructural changes based on optical coherence tomography (OCT), and M-CHART score.

Results: BCVA improved significantly both in Group 1 (t < 0.001) and Group 2 (t < 0.001). The mean improvement of BCVA was greater in Group 1 than in Group at 6 month postoperatively (p = 0.043). The macular hole closure rate had no statistical significance between two groups (p = 0.319). For Group 1, the mfERG P1 wave density amplitudes were higher in all the rings than in Group 2 at the last follow-up (ring 1: p = 0.043; ring 2: p = 0.018; ring 3: p = 0.021; ring 4: p = 0.005; ring 5: p = 0.011). OCT scanning showed the scope of the inner retinal dimplings was 7.8 clocks in Group 1 and 19.5 clocks in Group 2 (p = 0.0002).

Conclusions: Novel technique of peeled ILM reposition correlates with better mfERG P1 wave density amplitudes than total peel, and significantly prevents the formation of inner retinal dimplings.

OR-015

穿透性粘小管成形术与小梁切除术在原发性闭角型青光眼中治疗效果的随机对照临床试验

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目的：通过前瞻性随机对照临床试验比较穿透性粘小管成形术与小梁切除术在原发性闭角型青光眼患者中的治疗效果。
方法：前瞻性随机对照临床试验。成功纳入分析的穿透性粘小管成形术的患眼有 15 只（1 组），行小梁切除术的患眼有 14 只（2 组）；手术成功定义为眼压≤21 mmHg，未使用抗青光眼药物为完全成功，无论有无抗青光眼药物的使用为条件成功；对两组患眼的术前及术后眼压、抗青药物的种类、手术成功率、术后并发症及干预措施进行统计分析。
结果：第 1 组术眼的眼压在术前，术后 1 天，1 周，1 月，3 月，6 月和 12 月分别为 34.5±12.1 mmHg，12.6±8.3 mmHg，15.7±6.9 mmHg，18.3±6.7 mmHg，15.4±4.8 mmHg，15.1±2.9 mmHg 和 13.5±3.4 mmHg。第 2 组术眼的眼压在术前，术后 1 天，1 周，1 月，3 月，6 月和 1 年分别为 25.8 ± 11.8 mmHg，13.9±8.2 mmHg，11.0±5.5 mmHg，18.9±10.2 mmHg，16.5±7.0 mmHg，16.9±6.8 mmHg 和 13.3±1.0 mmHg。两组术眼的眼压在术前（p=0.025）和 1 周（p=0.026）差异有统计学意义。两组患眼术后随访过程中，抗青光眼药物量上没有统计学差异，但在术后 1 年时第 1 组的用药量明显低于第 2 组（0 vs 0.8±1.3，p=0.055）。穿透性粘小管成形术组术眼最后一次随访的条件成功率和完全成功率均为 100%，而小梁切除术组术眼最后一次随访的条件成功率和完全成功率均为 78.6%。
结论：穿透性粘小管成形术在原发性闭角型青光眼患者中的降压效果于小梁切除术相当，但手术成功率高于小梁切除术。

OR-016

视神经脊髓炎谱系疾病的流行病学和人口学特征分析

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目的：视神经脊髓炎谱系疾病（neuromyelitis optica spectrum disorders，NMOSD）是一种抗体介导的中枢神经系统炎性脱髓鞘疾病，作为一种罕见病，其发病具有种族、性别和年龄差异，了解该疾病患病人群的流行病学和人口学特征有助于进一步指导临床工作。
方法：综述不同国家、地区，不同种族 NMOSD 流行病学数据。
结果：与高加索人口相比，亚裔人口 NMOSD 发病率和患病率更高，其中约 70%-90%患者水通道蛋白 4 抗体（Aquaporin-4 antibody, AQP4-Ab）阳性。该疾病女性高发，女性患病率约为男性的 3-10 倍，平均首次发病年龄 40 岁左右，约 40%-50%患者以脊髓炎为首发症状，20%-50%患者以视神经炎为首发症状，该病以复发病程为主，复发率高达 70%-95%，女性生育后患者发病风险显著增高。NMOSD 中约 10%-33%患者伴有自身免疫性疾病，少数文献报道有遗传倾向。
结论：NMOSD 是一种亚裔人口高发的、青年女性更易受累的、严重的中枢神经系统炎性脱髓鞘性疾病，该疾病造成的社会经济压力和家庭负担更加沉重，因此其诊断的精准性和治疗规范化需要引起临床医生足够的关注。

OR-017

Trends in treatment and survival rate based on size for 1048 Chinese Choroidal melanoma patients.

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Objective: To describe the trend of therapy and survival rate for 1048 choroidal melanoma patients based on tumor thickness, who were evaluated and treated at BeiJing Tongren Eye center from 2007 to 2017.
Methods: Retrospective medical record review.
Results: 1048 patients were included for time trend analysis. The proportion of case with tumor thickness less than 3 mm increased overtime, but the adopt rate of Iodine Plaque Therapy decreased from 100% at first to 29.4% reported in 2017. Iodine Plaque Therapy was the most often used for those tumor thickness were larger than 3mm but no more than 12m m, and presented an increasing adopt rate by years. Enucleation showed a decreasing tendency in use when tumor thickness were smaller than 12mm, but kept steady elected proportion for tumor those were larger than 12mmin thickness. The 5-year survival rate remained stable under corresponding observation phase.
Conclusion: During this entire 11-year peroid, elected proportion of Iodine Plaque Therapy and eye enucleation were in creasing and decreasing respectivel y overtime, for cases whose tumor thickness ranged from 3mm to 12mm. Patients number with small choroidal melanoma increased but presented a declined use of Iodine Plaque Therapy recently. For cases that tumor thickness were larger than 12mm, enucleation remained fashionable. Dispite changes have arisen to treatment of Chinese choroidal melanoma, the 5-year survival rate is relatively stable.

OR-018

Design, methodology, and baseline data of the Shanghai Cohort Study of Diabetic Eye Disease: a 3-year community-based study in diabetes

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Background: To describe the design, methodology, and baseline characteristics of the Shanghai Cohort Study of Diabetic Eye Disease (SCODE).
Methods: The SCODE was a community-based prospective cohort study for 3 consecutive years (from 2016 to 2018). Individuals with diabetes aged 35 years and above were selected from all communities in 16 districts using stratified random sampling, the subjects of which were recruited and participated in the study. Each enrolled participant underwent an investigation, including a detailed interview, physical examination, and comprehensive ocular examination (visual acuity assessment, intraocular pressure measurement, ocular biometry, fundus assessment, slit-lamp examination, and dry eye disease assessment).
Results: A total of 7,733 (34.74%, 22,258 eligible) adults with diabetes from 8 communities in 4 districts were recruited and participated in the study. In contrast to the non-participants, those who participated were more likely to be female (53.66%), elderly (mean age 67.74 ± 8.75 years), and living in an urban area (4,143, 53.57%). The prevalence, incidence, distribution, risk factors, impacts, and trends of diabetic eye disease, especially diabetic retinopathy, can be estimated.
Conclusions: The methodology of the SCODE ensures that the prevalence and associated factors of diabetic eye disease can be estimated with reasonable accuracy in adults with diabetes in Shanghai. Results from the SCODE will provide insights on the burden of diabetic eye disease in Shanghai and contribute to the policies and strategies to address and limit the burden.

OR-019

L313 非球面人工晶体生物相容性及眼内稳定性观察

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目的 比较 Ientis L313 一片式非球面人工晶体和其他一片式非球面 IOL 在白内障超声乳化术后的生物相容性及眼内稳定性，评价这种非球面 IOL 设计特性对白内障术后视觉质量及屈光稳定性的影响。
方法 对诊断为单纯性年龄相关性白内障并行微切口超声乳化联合后房型 IOL 植入术，同时完成术前检查及术后 3 个月的随访检查的 67 只眼进行回顾性分析。分别在术前、术后 1 周、1 个月及 3 个月行常规眼科检查、Pentacam 检测及前房闪辉检查。比较两组患者手术前后晶体有效位置（ ELP）、ELP_{RMS} 及前房闪辉值的差异。
结果 32 只眼植入 L313，35 只眼植入 Akreos MI60。1 周时 L313 组的 ELP 显著小于 MI60 组（t=2.821，P＜0.01），而 1 个月和 3 个月时两组的 ELP 无明显差异（t=1.882，1.985，P＞0.05）。无论是 L313 还是 MI60 组，1 周、1 个月和 3 个月的 ELP 之间并无显著差异（F=1.784，0.668，P＞0.05）。L313 的 ELP_{RMS} 显著小于 MI60 组（t=2.615，P＜0.05）。两组患者的前房闪辉在术前、术后 1 周及 3 个月均无统计学差异（t=1.690，0.280，0.339，P＞0.05）。L313 组的前房闪辉术后 1 周、术后 3 个月与术前比较均无统计学差异（t=1.948，1.874，P＞0.05）。然而，MI60 组术后 3 个月的前房闪辉值显著低于术前（t=2.891，P＜0.01）。

结论 相较于其他非球面 IOL，L313 一片式非球面 IOL 在白内障术后具有较好的眼内稳定性，且其术后生物相容性较好。

OR-020

High Prevalence of Myopia in Children and Their Parents in Hong Kong Chinese Population: Hong Kong Children Eye Study

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Purpose: To determine the prevalence of myopia and the ocular biometry in Chinese children and their parents

Design: Population-based cross-sectional study

Methods: A total of 10,137 individuals including 4,257 children aged 6 to 8 years, and 5,880 parents were recruited in the Hong Kong Children Eye Study. Axial length (AL), anterior chamber depth (ACD), corneal curvature, and corneal radius of curvature (CR) were obtained from partial-coherence laser interferometry. Axial length/corneal radius (AL/CR) was derived. Cycloplegic auto-refraction was measured for children; and non-cycloplegic auto-refraction for parents. Biometric and refractive parameters were assessed as a function of age and gender. Multiple regression analysis was performed to explore the associations between refraction and ocular biometry.

Results: The prevalence of myopia in children aged 6 to 8 years, and in parents was 26.21% and 72.16% respectively. AL/CR explained a larger variance in refraction than axial length (R^2=74.54% in children and R^2=76.61% in parents).

Conclusion: We have determined a strikingly high prevalence of myopia in both children and their parents in Hong Kong. In terms of ocular biometry, AL/CR had a greater impact on refraction than AL alone.

OR-021

Factors associated with over one-year remission in neovascular age-related macular degeneration with as-needed anti-vascular endothelial growth factor therapy: experience in over 800 eyes with treated CNV

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Purpose: To show the characteristics and outcomes of neovascular age-related macular degeneration (nAMD) patients who had over one-year remission after the last anti vascular endothelial growth factor (anti-VEGF) injection while on a modified as needed treatment protocol.
Methods: Over one year remission was defined as the absence of intraretinal/subretinal fluid on optical coherence tomography (OCT), hemorrhage, and absence of leakage on fluorescein angiography (FA) for ³ 52 weeks. The baseline characteristics of patients inremission were compared with a control group of 84 eyes of 70patients matched by age, gender, ethnicity and baseline best-corrected visual acuity who did not achieve remission in the retrospective review. Regression analysis was used to identify predictors of the time to achieve remission and the time to recurrence.

Results: Of 830 eyes treated with anti-VEGF monotherapy,77 eyes (9.2%) eyes had remission during a median of 236 weeks (range, 70-525 weeks) follow up. The median time needed to achieve remission from baseline (initial anti-VEGF injection) was 77 weeks (range, 12-466 weeks). The median duration of remission was 108 weeks since the last injection. Thirty-two percent of eyes (25 eyes) achieved remission during the first year of presentation; 19% of eyes (15 eyes) had remission at 2 years; and 19% of eyes (15 eyes) had remission at 3 years. Cox regression analysis showed that remission was achieved faster in younger age (COR; 95% CI, 0.930-0.996; p=0.028), fewer anti-VEGF injections (COR; 95% CI, 0.827-0.899; p< 0.001) and presence of solo subretinal fluid (SRF) (COR; 95% CI,1.517-6.558; p=0.009) or intraretinal fluid (IRF)(COR; 95% CI, 1.517-6.558; p=0.002) at presentation. None of the covariates were found to be associated with recurrence. Comparison analysis between remission and control groups revealed that type 3 AMD (p=0.017), presence of serous or drusenoid pigment epithelium detachment (PED) (versus fibrovascular PED) (p=0.009), thinner subfoveal choroidal thickness (p=0.009), smaller choroidal neovascularization (CNV) lesion size (p=0.037) at presentation were all associated with likelihood of long-term remission.

Conclusion: Over one-year remission is achievable in 9.2% of patients under PRN therapy for neovascular AMD. The presence of thinner choroid, smaller lesion size, less frequency of

fibrovascular PED, presence of type 3 AMD at presentation are associated with a higher likelihoodof achieving remission when treating AMD-associated CNV in a PRN regimen. Seventy percent of eyes achieve remission in the first three-years since baseline. Younger age, fewer injections and isolated SRF or IRF could achieve remission faster.

OR-022

Fundus characteristics of human immunodeficiency virus with acquired immune deficiency in Hunan and Kunning

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Objective： Typical cytomegalovirus retinitis(CMVR) was recognized by many retina specialist in China. However, atypical CMVR and complicated cases were easy to be misdiagnosed. We aim to improve our understanding about this disease by investigating the fundus characteristics of human immunodeficieney virus withacquired immune deficiency(HIV／AIDS).
Methods: This cross sectional study was carried out in Hunan province and Kunming city from July 2016 to October 2017. A total of 2002 HIV／AIDS patients were enrolled in this study． Documentary were collected and ocular examinations were performed on recruited patients with HIV／AIDS． Additional examination were done if abnormal ocular fundus was found．The ocular manifestations were diagnosed according to clinic reference．The character of fundus were analysis and All statistical analyses were performed using SPSS (version 17.0)
Results: The patients included 1520 males(75.92 ％)and 482 females(124.08 ％)． Ocular manifestations of HIV／AIDS were detected in 501 patients (25.02％)．Of 247 patients，the most common ocular manifestation was HIV retinopathy，which was present in 265 patients(52.89％) cytomegalovirus retinitis(CMVR)was second place，affecting 132 Participants (26.35％)．Three cases were progressed from HIV retinopathy to CMVR among 132 CMVR cases. There are 104 patients (20.76%) suffered from other retinopathy such as TB chorioretinitis 、 syphilitic chorioretinis 、Progressive outer retinal necrosis. Immunologic reconstitution syndrome affected 4 patients(0.8%). 34 complicated cases(6.79%) suffered from more than 2 complication such as CMVR combined with TB chorioretinitis、vitreous hemorrhage or retinal detachment.

Conclusion: It’s common for HIV/AIDS patients suffer from relative retinopathy. The character of fundus was complicated due to the multi infection and system diseases, which might lead to misdiagnosis. So it’s important to recognize the fundus character of this disease.

OR-023

智能手机应用辅助的医疗服务提高儿童白内障术后的随访依从性

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研究目的：评估智能手机应用辅助的医疗服务提高儿童白内障术后随访依从性；
研究方法：本前瞻性研究共计纳入了 163 位行常规手术的儿童白内障患儿。根据术后随访的 方法分为智能手机 APP 辅助的医疗服务组（微信组，75 例）和对照组（88 例）。本研究记录了术后五次随访的出席率，同时对完成五次随访和进行屈光矫正的患儿的百分比进行评估；
研究结果：尽管两组间术后首次的随访率并无显著差异（98.7% vs. 94.3%，P=0.293），但微信组其余四次随访率显著高于对照组（第二次：98.7% vs. 89.8%；第三次：97.3% vs. 83%；第四次：93.3% vs. 78.4%；第五次：80% vs. 56.8%；整体：93.6% vs. 80.5%）。与对照组相比，微信组中男性患儿依从性提高的比值比为 4.4（95% CI 2.54–7.65），大于两岁的患儿为 4.75（95% CI 2.41–9.36），植入 IOL 的为 4.19（2.29–7.66），双侧白内障的为 6.93 （2.9–16.52），发展中城市的为 4.87（2.74–8.65），偏远城市的为 3.49（2.04–5.96），所有 P 值均小于 0.0001；
研究结论：本研究表明使用智能手机应用的医疗服务能显著提高儿童白内障术后随访的依从性。

OR-024

Visual impairment and spectacle use in university students in central China: The Anyang University Students Eye Study

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Purpose: To investigate the prevalence and associations of visual impairment and the spectacle use in university students in central China.
Methods: This study included students aged 16-26 years in China. Subjects from two universities underwent distance visual acuity (VA) assessment in both eyes using a logarithm of the minimum angle of resolution chart and refraction measurement by cycloplegic autorefraction. Blindness was defined as VA <3/60 in the better eye (World Health Organization definition) and visual impairment was defined as VA <6/12.
Results: Overall, 7704 eligible subjects were included, with an average age of 20.15 ± 1.43 years. The prevalence of uncorrected visual impairment and blindness was 69.9% and 0.9%, respectively. Only 77.0% (n = 4148) of subjects with uncorrected VA in the better eye of <6/12 wore glasses. When presenting VA, the prevalence of mild (VA <6/12 to 6/18), moderate (VA <6/18 to 6/60), and

severe (VA <6/60 to 3/60) visual impairment was 6.3%, 12.2%, and 0.7%, respectively. Overall, 71.7% of students with myopia wore spectacles, as did 20.0% of the students with hyperopia. In the multiple logistic regression analysis, visual impairment was associated with female gender ($p < 0.001$) and lower year level of education ($P = 0.006$) when presenting with VA.
Conclusions: This study has documented a relatively high prevalence of visual impairment and low spectacle coverage existed in central Chinese university students. Given the potential impact of visual impairment, target education and accessible refraction services are highly important to solve the problem.

OR-025

海南省城市及乡村地区青少年近视流行病学调查

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目的：探讨海南省南北不同地区在校青少年视力分布及近视患病情况。
方法：横断面调查研究。使用 2017 年 10 月至 2018 年 12 月海口市及昌江黎族自治县在校学生数据，检查包括裸眼视力（ETDRS 视力表）、1%环戊酮散瞳电脑验光（ARK-30；Nidek Corp.）及裂隙灯检查。近视定义为：等效球镜（SE）≤-0.50D，高度近视定义为：等效球镜（SE）≤-5.00D。
结果：共统计 2340 名 6~17 在校青少年数据，其中海口市 4 所中学 1194 人及昌江黎族自治县 6 所小学 1146 人。昌江地区裸眼视力中位数为 1.2，海口地区中位数 0.25。两地区散瞳前后屈光度均有差异，海口地区散瞳前 SE 中位数为-3.25D，散瞳后 SE 中位数为-3.00D（$p<0.001$），昌江地区散瞳前 SE 中位数为+0.5D，散瞳后 SE 中位数为+0.5D（$p<0.001$）。海口地区中学生近视患病率 89%，高度近视患病率 17%，昌江地区小学生近视患病率 16%，高度近视患病率 1%。海口地区男 637 人（13.546±0.973 岁）近视患病率 87%，海口女 557 人（13.271±1.011 岁）患病率 91%。昌江地区男 606 人(9.660±1.715 岁)近视患病率 13%，女 540 人（9.302±1.726）近视患病率 20%，两地不同性别患病率差异无统计学意义（p=1.000）。昌江地区汉族学生近视患病率 17%，黎族学生近视患病率 14%，两民族近视患病率无统计学差异（p=1.000）。
结论：海南省在校青少年近视患病率随年龄增长呈逐渐增加趋势，高度近视患病率增加。热带少数民族地区汉族与黎族近视患病率无明显差异。散瞳验光检查对屈光状态分析有重要作用。

OR-026

高度近视眼球形态特征与影响因素分析

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摘要： 目的 应用 3D-MRI 成像技术构建高度近视眼球模型，观察高度近视的眼球三维形态特征及其影响因素，分析后巩膜葡萄肿患病危险因素。
方法 观察性研究。选取 2015 年 10 月至 2017 年 8 月在上海交通大学附属第一人民医院眼科就诊的高度近视患者，共计 99 例 198 眼。所有的入选患者均接受全面的眼科检查，包括最佳矫正视力（best-corrected visual acuity, BCVA）、眼压（intraocular pressure, IOP）、验光、眼轴（axial length, AL）、眼底照相、光相干断层扫描、三维磁共振眼眶扫描。按照 3D-MRI 成像技术构建的眼球赤道后巩膜不同三维形态，分为 5 组，比较组间高度近视患眼基本特征的差异，分析后巩膜葡萄肿患病的独立危险因素。
结果 99 例高度近视患者均以右眼纳入统计研究。其中男性 23 名（23.2%），女性 76 名（76.8%），平均年龄为 57.32±12.37 岁，平均 BCVA（LogMAR）为 0.81±0.63，平均屈光度为-14.48±4.70D，平均眼轴 29.77±2.06mm。不同眼球形态的高度近视患者间，年龄（P=0.029）、屈光度（P=0.025）、眼轴（P＜0.004）差异存在显著统计学意义。而性别、BCVA（P≥0.05）差异不具有统计学意义。多因素二元 logistic 回归分析显示，年龄与眼轴是后巩膜葡萄肿患病的独立危险因素（OR：1.012，95%CI：1.025～1.184；OR：2.279，95%CI：1.256～4.136）。
结论 高度近视眼球形态的变化随着年龄、眼轴而改变。严重的眼球变形更多见于高龄，高屈光度，长眼轴患眼。年龄与眼轴是后巩膜葡萄肿的独立危险因素。

OR-027

Diverse mammalian retinal ganglion cell types characterized by single cell transcriptome profiling

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Retinal ganglion cells (RGCs) integrate visual signals from bipolar and amacrine cells and transduce them to various regions of the brain. Mammalian RGCs are very diverse in morphology and function. Using a Pou4f2::GFP knockin mouse line, we enriched GFP+ adult retinal cells and performed single-cell RNA-sequencing (scRNA-seq) analysis. RGCs were classified into 28 types with clustering method. We were able to characterize the molecular signature of each type, which can be represented by one or a combination of a few cell markers, as verified by RNA *in situ* hybridization. We found that many of the known RGC types were matched with the corresponding clusters based on their expression of characteristic cell markers such as Pou4f2, Pou4f1, Opn4, Isl1, Foxp1, Sdk1, Sdk2, Trhr, Mmp17 and Col25a1. Additionally, we identified some specific cell markers to distinguish these types. Overall, this work provided insights and guidance for future exploration of RGC diversity, function and regeneration.

OR-028

Cortical alterations by the abnormal visual experience beyond the critical period: A resting-state fMRI study on constant exotropia.

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Abstract

Background: The pathological mechanisms of constant exotropia (XT) is still not fully understood. The purpose of this study is to investigate whether XT-positive patients express brain's neuronal activities changes prior to the critical period of visual development, and furtherly explore how these likely alterations relate with behavioral performance.

Methods: Fourteen patients with XT and sixteen healthy controls (HCs) underwent resting-state functional magnetic resonance imaging (fMRI) scans. The Regional Homogeneity (ReHo) method was used to evaluate spontaneous brain activities. The Pearson's correlation analysis assessed the association between the resulting mean ReHo values of altered regions and behavioral performance.

Results: Compared with HCs, the right secondary visual cortex (V2) of the XT-positive individuals exhibited increased ReHo values whereas the left Brodmann Area 47 (BA47) demonstrated decreased spontaneous ReHo measures. In the participating XT-patients, the mean ReHo values of the left BA47 and the duration of strabismus were significantly positively correlated.

Conclusions: These findings indicate that XT-positive patients severely suffer from neural dysfunction in the right V2 and the left BA47, and the progression of severity in the left BA47 is likely influenced by duration of ongoing strabismus within the patients. These results, therefore, may provide clinically important information towards understanding the underlying pathological mechanisms of the XT, and thus can be fundamental in pursuing more XT researches.

OR-029

Transformation of feature selectivity from membrane potential to spikes in the mouse superior colliculus

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Neurons in the visual system display varying degrees of selectivity for stimulus features such as orientation and direction. Such feature selectivity is generated and processed by intricate circuit and synaptic mechanisms. A key factor in this process is the input-output transformation from membrane potential (V_m) to spikes in individual neurons. Here, we use *in vivo* whole-cell recording to study V_m-to-spike transformation of feature selectivity in the superficial, visual, neurons of the mouse superior colliculus (SC). As expected from the spike threshold effect, direction and orientation selectivity increase from V_m to spike responses. The degree of this increase is highly variable, and interestingly, it is correlated with the receptive field size of the recorded neurons. We find that the relationships between V_m and spike rate and between V_m dynamics and spike initiation are also correlated with receptive field size, which likely contribute to the observed input-output transformation of feature selectivity. Together, our findings provide useful information for understanding information processing and visual transformation in the mouse SC.

OR-030

Rapamycin inhibited photoreceptor necroptosis and protected the retina by activation of autophagy in experimental retinal detachment

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Purpose

After experimental retinal detachment (RD), the applications of caspase inhibitor z-vad-fmk (a pan caspase inhibitor) could inhibit apoptosis, but increased receptor interacting protein (RIP)-mediated necroptosis. In this study, we investigated whether rapamycin could inhibit necroptosis and cooperate with z-vad-fmk to protect the retina after RD.

Methods

RD animal models were established in Sprague–Dawley rats by subretinal injection of sodium hyaluronate and treated with subretinal injections of z-vad-fmk or z-vad-fmk combined with rapamycin. On day 3 after RD, retinas were collected and analyzed by transmission electron microscopy (TEM), ROS assay, and western blot (for beclin-1, LC-3, RIP-1, AIF). On day 7 after RD, retinas were observed by H&E staining. Vision-dependent behavior of rats was tested by the modified Morris water maze.

Results

TEM and H&E staining indicated that rapamycin combined with z-vad-fmk could reduce photoreceptor necrosis and preserve the ONL thickness after RD. The modified Morris water maze test showed that vision-dependent behavior was also significantly improved in the rapamycin + z-vad-fmk group.Western Blotting results demonstrated that rapamycin promoted the activation of autophagy by promoting beclin-1 and LC-3 induction and inhibited z-vad-fmk-induced necroptosis by inhibiting RIP-1 expression. In addition, rapamycin could also inhibit ROS production and AIF release.

Conclusions

These findings indicated that rapamycin is a promising therapeutic agent that inhibits z-VAD-induced necroptosis, and protects photoreceptors and improves functional outcome in combination with z-vad-fmk.

OR-031

虚拟现实视觉训练治疗弱视疗效分析

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目的 观察并分析弱视患儿应用精细训练联合虚拟现实视觉训练的治疗效果。方法 病例对照研究。首次就诊于保定市儿童医院眼科的 232 例（416 眼）弱视患儿，随机分为两组，A 组采用精细训练治疗，B 组采用精细训练联合视觉训练治疗，治疗时间为 6 个月。分别将 A、B 两组根据年龄分为 3 组：4＜～≤6 岁、6＜～≤8 岁、8＜～≤10 岁；根据弱视程度分为 3 组：轻度弱视、中度弱视、重度弱视。观察并分析治疗效果。结果 基本治愈率：A 组 35.58%（74/208），B 组 51.44%（107/208），B 组高于 A 组（*P*=0.000）；总有效率：A 组 80.77%（168/208），B 组 91.35%（190/208），B 组高于 A 组（*P*=0.006）。各年龄组治疗效果：基本治愈率：A 组：55.88%（38/68）、34.88%（30/86）、11.11%（6/54）（*r*=-0.78，*P*=0.0000），B 组：70.59%（48/68）、54.65%（47/86）、22.22%（12/54）（*r*=-0.81，*P*=0.0000），A、B 两组基本治愈率随年龄增长均呈下降趋势。弱视程度各组治疗效果：基本治愈率：A 组：63.29%（50/79）、25.00%（22/88）、4.88%（2/41）（*r*=-0.96，*P*=0.0000），B 组：81.01%（64/79）、44.32%（39/88）、9.76%（4/41）（*r*=-0.93，*P*=0.0000），A、B 两组基本治愈率与弱视程度均呈负相关。结论 精细训练联合虚拟现实脑力视觉训练为治疗弱视安全有效的方式，基本治愈率随年龄增长呈下降趋势；基本治愈率与弱视严重程度呈负相关。

OR-032

人眼脉络膜厚度和视锥细胞密度随年龄变化及其与视力的相关性探究

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目的：利用 AO 眼底照相机和 SD-OCT，探究正常人眼的脉络膜厚度和视锥细胞密度随年龄的变化及其与视力的相关性。

方法 ：本实验共招募 82 名 20-70 岁受试者，根据年龄分为四组：G1 组（20-35 岁）、G2 组（36-49 岁）、G3 组（50-60 岁）、G4 组（61-70 岁）。对所有受试者均进行常规眼科检查及 AO 眼底照相和 SD-OCT 检查。利用 AO 眼底照相机，获取黄斑区 10°×10°范围的视锥细胞高分辨率图像，在上、下、鼻、颞四个方向上，选取距离黄斑中心凹 0.3mm、0.5mm、0.7mm、0.9mm、1.1mm 的位置，分析 80×80 像素区域内的视锥细胞密度。采用 SD-OCT 放射状扫描模式拍摄黄斑区 8mm 直径范围的脉络膜视网膜图像，利用实验室自行编写的算法获取黄斑区 3mm 直径范围的脉络膜厚度数据。分析视锥细胞密度和脉络膜厚度随年龄的变化趋势，以及两者与视力的相关性。

结果 ：G3 组、G4 组的脉络膜厚度和视锥细胞密度均显著低于 G1 组、G2 组(全部，$P<0.05$)，G4 组的脉络膜厚度和视锥细胞密度显著低于 G3 组($P<0.05$)，而 G1 组与 G2 组之间的脉络膜厚度和视锥细胞密度无统计学差异。视锥细胞密度随年龄增长呈线性下降趋势；而脉络膜厚度与年龄之间呈“S 型”曲线关系： 从 20 岁至 39 岁这个年龄段，脉络膜变薄速度逐渐增快，至 39 岁速度最快，在 39 岁之后脉络膜变薄速度减慢；在 68 岁以后，脉络膜厚度随年龄基本不变。脉络膜厚度和距中心凹 0.3mm、0.5mm 位置的视锥细胞密度与年龄成显著负相关，与 logMAR 视力成显著正相关。

结论 ：50 岁以上人眼的脉络膜厚度和视锥细胞密度与 50 岁之前相比具有显著差异。随着年龄的增长，视锥细胞密度呈线性趋势下降，而脉络膜厚度则呈先加速变薄后减速变薄。脉络膜厚度变薄和视锥细胞密度下降与年龄增长过程中视力下降相关。

OR-033

SCF/SCFR signaling plays an important role in the early morphogenesis and neurogenesis of human embryonic neural retina

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The stem cell factor receptor (SCFR) has been demonstrated to be expressed in the neural retina of mice, rat, and human for decades. Previous reports indicate that SCFR correlates with glia differentiation of late retinal progenitor cells(RPC), retinal vasculogenesis, and homeostasis of the blood-retinal barrier. However, the role of SCF/SCFR signaling in the growth and development of the neural retina (NR), especially in the early embryonic stage, remains poorly understood. Here we show that the SCF/SCFR signaling orchestrates invagination of the hESC-derived NR via regulation of symmetric cell division, cytoskeleton dynamic, and apical constriction of RPCs in the CMZ. Furthermore, activation of SCF/SCFR signaling enhances neurogenesis in the central-most NR via accelerating the migration of immature ganglion cells. Our study reveals an unreported role of SCF/SCFR signaling in controlling ciliary marginal cellular behaviors during early morphogenesis and neurogenesis of the human embryonic NR, providing a new potential therapeutic target for human congenital eye diseases such as anophthalmia, microphthalmia, and congenital high myopia.

OR-034

Three Dimensional RPE Spheroids facilitate the enrichment and expansion of human PSC-derived RPE

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PURPOSE. To establish a cost effective approach to enrich and expand hPSC-derived retinal pigment epithelium (RPE) for basic and translational study.
METHODS. hPSCs were cultured on MatriGel coated plates with mTeSR1 medium, and differentiated into RPE cells with our published retinal organoid induction method. After detachment of neural retina on 4th wk, the remaining mixture was also scraped off from the dish

and subjected to suspension culture for the formation of RPE spheroids. RPE cells were isolated for expansion. Different assays were used to evaluate the biological charateristics of RPE cells.
RESULTS. Under suspension culture, hPSC-RPE spheroids with pigmentation self-formed, and were readily enriched by removing out the non-retinal tissues. RPE cells could be readily purified from the spheroids, cultured and serially passaged in serum medium, yielding large numbers of cells with high quality in a short period. When switched to serum-free medium, the passaged RPE cells could mature in cellular, molecular and physiological levels.
CONCLUSIONS. A simple and novel RPE spheroids formation approach was established to enrich and expand hiPSC-RPE cells generated along with retinal neurons on a universal retinal organoid induction platform. This achievement will evidently reduce the cost and time in producing retinal cells for basic and translational researches, for retinal cell therapy in particular.

OR-035

Exosomes derived from mesenchymal stem cells modulate miR-126 to ameliorate hyperglycemia-induced retinal inflammation via targeting HMGB1

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Purpose: In this study, we aim to investigate whether mesenchymal stem cell (MSC)-derived exosomes (MSC-Exos) could regulate hyperglycemia-induced retinal inflammation by transferring microRNA-126 (miR-126).
Methods: MSC-Exos were isolated from the media of hUCMSCs (human umbilical cord-derived mesenchymal stem cells), and this isolation was followed by the transfer of miR-126. MSC-Exos or MSC-Exos overexpressing miR-126 were intravitreally injected into diabetic rats in vivo and were cocultured with high glucose-affected human retinal endothelial cells (HRECs) in vitro. Plasma samples were obtained from the vitreous of rats and from HREC cells after treatment for ELISA assay. Retinal sections were examined using immunohistochemistry. RT-PCR and Western blotting were conducted to assess the levels of high-mobility group box 1 (HMGB1), NLRP3 inflammasome, and NF-κB/P65 in retinas and HRECs.
Results: Our results showed that hyperglycemia greatly increased inflammation in diabetic rats or HRECs exposed to high glucose, increasing the levels of caspase-1, interleukin-1β (IL-1β) and IL-18. The administration of MSC-Exos could effectively reverse this reaction. Compared to control MSC-Exos, MSC-Exos overexpressing miR-126 more successfully suppressed the HMGB1 signaling pathway and suppressed inflammation in diabetic rats. The administration of miR-126-expressing MSC-Exos significantly reduced high glucose-induced HMGB1 expression and the activity of the NLRP3 inflammasome in HRECs.

Conclusions: miR-126 expression in MSC-Exos reduces hyperglycemia-induced retinal inflammation by downregulating the HMGB1 signaling pathway.

OR-036

Construction and application of tissue engineered corneal epithelium from human embryonic stem cells

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Purpose: To construct corneal epithelial like tissue from human embryonic stem cells (hESCs) and determine the efficacy of this tissue in rabbit corneal epithelial stem cell deficiency model.

Methods: hESCs were seeded on low attachment plates containing a differentiation medium I. After 8 days, an intermediate neural progenitor cell (NPs) was obtained. Then dissociate the NPs into single cells and reseed on attachment plates followed by 4 to 7 days of exposure to differentiation medium II. Subsequently, the resulting cells were harvested and seeded onto a deepithelialized amniotic membrane (dAM) and exposed to differentiation medium II for another 7 days. Epithelial cell sheets (ES-CE) were obtained after 21 days, which served as bandages for covering bare corneal stroma in limbal stem cell deficiency (LSCD) model. The progression of each stage of this controlled differentiation process was monitored based on characterization of changes in cell-type biomarker expression pattern.

Results: Human ESCs cultured in differentiation medium I for 8 days differentiated into NPs. P63 and Pax6 expression gradually increased and peaked after 8 days. Single cell enzymatic dissociation of these spherical intermediates and subsequent differentiation induction for 7 days by differentiation medium II on dAM resulted in generation of a stratified epithelium. H&E staining along with P63, E-cadherin, K14 and Ki67 gene expression and localization documented successful simulation of in-vivo structural integrity. Eight weeks after the ES-CE transplantation, corneal transparency was restored to an extent similar to that in the normal uninjured control. In contrast, epithelial stem cell deficient rabbits bandaged instead with dAM remained translucent. The limbal and central corneal epithelial morphology in the ES-CE group were similar to that in normal corneas and expressed corneal epithelial cell biomarker K3 / K12 duplex. However, cornea transplanted with dAM alone showed only 1-2 layers of epithelial cells. Eight weeks after transplantation, a large number of hESCs-derived cells were still present on the corneal surface based on human cell nuclear staining.

Conclusion: A defined novel protocol induces hESCs to rapidly differentiate into Pax6 positive corneal epithelial progenitor cells. Corneal epithelium-liked tissue derived from this protocol restores normal corneal tissue structural integrity and transparency in LSCD rabbit model.

OR-037

骨髓间充质干细胞条件培养基治疗角膜缘干细胞 缺乏症的作用及机制研究

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目的：角膜病是我国第二大致盲性眼病，角膜缘干细胞缺乏症患者占第二位，本课题将通过小鼠角膜缘干细胞缺乏症模型，深入研究肿瘤坏死因子-α（TNF-α）诱导的骨髓间充质干细胞（MSCs）条件培养基对角膜缘干细胞的氧化应激的保护、抑制新生血管和炎症等功能的作用及机制，为拓展骨髓间充质干细胞重建眼表的临床应用提供新的理论支持和干预手段。

方法：1、通过碱烧伤建立小鼠角膜缘干细胞缺乏症模型，分别给予 MSCs 条件培养基（Con-CM）、TNF-α 诱导的 MSCs 条件培养基（TNF-α-CM），正常的细胞培养液（α-MEM）作为对照，裂隙灯观察小鼠角膜新生血管、水肿等情况。2、免疫荧光染色检测 TNF-α-CM 处理后角膜缘干细胞中活性氧（ROS）和谷胱甘肽（GSH）水平的变化，以及 P63、Pax6、v-H2AX 等基因的表达变化情况，荧光定量 PCR 检测氧化还原相关基因（MnSOD, catalase, NQO-1 , HO-1,），炎症相关基因（IL-6，IL-1b, TNF-a, MCP-1）的表达变化情况。

结果： 1、小鼠角膜缘干细胞缺乏症术后给予 α-MEM 、Con-CM 和 TNF-α-CM 治疗，28 天后，α-MEM 组小鼠角膜出现严重混浊及新生血管长入，且组织切片染色结果显示 α-MEM 组小鼠角膜 CK12 阳性的角膜上皮细胞显著减少，而 Mucin 5AC 阳性的结膜杯状细胞侵入角膜缘。与 α-MEM 组相比，TNF-α-CM 组角膜浑浊度显著减轻，新生血管显著减少，具有统计学差异。2、与 α-MEM 组相比，TNF-α-CM 组 ROS 表达水平显著降低，GSH 表达水平显著升高，且 P63、Pax6 表达水平显著升高，而 v-H2AX 表达减少。

结论： TNF-α 诱导的 MSCs 条件培养基促进角膜缘干细胞抗炎症，抗氧化应激，具有提高角膜干细胞移植的临床治疗效果，可能为眼表重建和角膜缘干细胞的临床治疗提供新的理论支持和干预手段。

OR-038

The mechanism of ranibizumab preventing Müller cell edema in diabetic retinopathy

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Purpose: To explore the mechanism(s) of ranibizumab targeting Müller glia for intracellular edema in diabetic retinopathy.
Materials and methods: Sprague-Dawley rats were rendered diabetes with intraperitoneal injection of streptozotocin. Intravitreal injection of ranibizumab (20 mg/eye) was performed 8 weeks after diabetes onset. Four weeks later, the rats were sacrificed and the retinas were harvested for detection. rMC-1 cells were treated with glyoxal (1 mM) for 24 hours, with or without ranibizumab. Cell viability was detected with CCK-8 assay. The expressions of Kir4.1, Dp71, VEGF-A and Glutamine synthetase were examined with WB. VEGF-A in the supernatant was detected with ELISA. The intracellular potassium and sodium level was detected with the specific probe.
Results: Compared to the normal control, the protein expressions of Kir4.1 and Dp71 were down-regulated significantly in diabetic rat retina, which could be reversed by ranibizumab. The above changes were confirmed with *in vitro*study. The intracellular potassium level is increased in glyoxal-treated rMC-1 cells compared with that in normal control, while intracellular sodium level, but not potassium, was decreased by ranibizumab.
Conclusion: Ranibizumab, through binding VEGF-A, could maintain the expressions of Kir4.1 and Dp71 to decrease the intracellular osmotic pressure, thus protect Müller cells from swelling.
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OR-039

重度干眼对角膜缘干细胞的影响及其机制的研究

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目的：研究重度干眼对角膜缘干细胞的影响及其相关机制。
方法：手术切除 6-8 周大鼠单侧眶内外泪腺构建重度干眼模型，以对侧非手术眼为对照。对实验大鼠进行泪液分泌功能测定，角膜共聚焦显微镜观察。角膜组织标本进行 H&E 染色，免疫荧光和/或 RT-qPCR 检测 Pax6、K12、Ki67、SPRR1b、K10、K14、ABCG2、p38 及 pp38 等基因表达；用 RT-qPCR 检测炎症因子 S100A9、TNF-α、IL-1β 等基因的表达；以克隆形成率评价重度干眼中角膜缘干细胞的情况。将大鼠角膜缘干细胞克隆培养分别置于正常 SHEM 培养基、模拟干眼环境

的高渗培养基、高渗培养基中加入 P38 抑制剂、高渗培养基中加入载体中培养，观察角膜上皮细胞形态，检测 S100A9、TNF-α、IL-1β、p38 及 pp38、Pax6、K12、Ki67、SPRR1b、K1、K14、P63、ABCG2、SCF 等基因的表达情况。

结果：切除眶内外泪腺的大鼠，泪液分泌明显降低，角膜共聚焦显微镜可见角膜上皮基底层及基质炎症细胞浸润，H&E 染色显示角膜上皮结构紊乱。角膜上皮细胞表型相关基因 Pax6、K12 表达减少，炎性因子标记物 S100A9、TNF-α、IL-1β 表达明显升高， Ki67、K10、SPRR1b 及 K14 表达明显增多。与正常组相比，重度干眼大鼠角膜缘上皮克隆形成率明显下降，ABCG2 表达量下降；角膜上皮细胞克隆培养过程中，高渗环境下 p38 被明显激活，加入 p38 抑制剂可有效抑制角膜上皮细胞 P38 的磷酸化，明显减少高渗环境下炎性因子 S100A9、TNF-α、IL-1β 的分泌，同时明显减少鳞状上皮化生相关标记物 K1、SPRR1b 的表达，有效维持角膜上皮细胞表型基因 Pax6、K12 的表达，克隆形成率较高渗环境中提高。

结论: 严重干眼可导致角膜缘上皮干细胞功能障碍，p38MAPK 信号通路的激活在干细胞功能障碍发生过程中起重要作用。

OR-040

胚胎干细胞来源的视网膜色素上皮细胞免疫原性的评估及调控

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目的：视网膜变性疾病的共同病理发展过程首先是不可逆视网膜色素上皮细胞（RPE）的变性和凋亡，因此，外源性视网膜色素上皮细胞替代治疗是重建患者视觉功能的关键。本课题组前期利用人胚胎干细胞诱导来源的 RPE 细胞（hESC-RPE）进行研究发现：虽然,眼球是免疫豁免器官, 但病变过程中血–视网膜屏障破坏，免疫细胞的迁入及炎性因子释放会导致微环境的改变，使 hESC-RPE 移植后仍然会存在发生免疫排斥反应的可能。因此，评估移植入病变微环境前后 hESC-RPE 免疫原性的变化，通过合适的药物对该过程进行干预并探索其机制，为临床转化提供新思路。

方法：利用液相悬浮芯片、rt-PCR、流式细胞术、免疫组化、ELISA 等技术，检测不同变性阶段的 RCS 大鼠网膜及视网膜变性病人玻璃体中炎症因子表达水平及炎症细胞浸润情况。评估不同诱导天龄及炎症因子处理前后 hESC-RPE 的人类白细胞抗原（HLA）的表达差异。通过 LDH、RNA-seq、POS 等技术检测炎症因子处理后及药物 X 干预 hESC-RPE 免疫原性及细胞功能的变化。应用电生理、行为学、活体成像等手段表征移植细胞的存活及功能发挥情况。

结果: RCS 大鼠变性晚期视网膜 IFN-γ 表达量显著上升，且出现阳性免疫细胞（T/B/NK），IFN-γ 可诱导 hESC-RPE 表达 HLA-II 抗原，并诱发细胞凋亡；药物 X 预处理 hESC-RPE 可以剂量依赖的阻断这一过程，使细胞维持正常状态下的免疫原性从而减少 hESC-RPE 细胞对免疫细胞的激活作用和细胞毒性 T 细胞的趋化效应，促进移植细胞在体内的长期存活及稳定发挥功能。

结论: 视网膜微环境的变化严重影响了移植细胞的存活和功能发挥，IFN-γ 主要用过上调移植细胞的免疫原性诱导免疫排斥反应的发生，药物 X 预处理 hESC-RPE 可呈剂量依赖型的阻断这一过程，保护种子细胞在体内的存活和功能，延长干细胞移植的治疗效果。

OR-041

rno-miR-30b-5p 慢病毒抑制 Atg5/Atg12/Becn1 自噬通路活化、治疗葡萄膜炎大鼠的作用机制研究

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目的 通过大鼠体内实验探讨 miR-30b-5p 对葡萄膜炎大鼠脾脏、淋巴结 T 淋巴细胞中 Atg5、Atg12、Becn1 等自噬基因的表达影响。方法 给予 Lewis 大鼠分别均匀注射含有光感受器间维生素 A 结合蛋白、结核菌素以及完全弗氏佐剂的乳化液诱导葡萄膜炎。EAU 造模大鼠第 0 天时脾脏分别注射携带 rno-miR-30b-5p 慢病毒、rno-miR-30b-5p 慢病毒空载体以及等量无菌生理盐水进行处理，实时荧光定量 PCR 检测 T 淋巴细胞中自噬基因表达水平的变化，眼底相机每天观察大鼠眼前节炎症变化情况，并在免疫后第 12 d 分别摘取各组大鼠眼球制备切片，苏木素-伊红染色法观察视网膜、虹膜、睫状体的病理改变；另取脾脏、淋巴结组织分离 T 淋巴细胞，流式细胞仪检测 T 淋巴细胞中 Th17 细胞活性水平变化、 IL-17 炎性因子表达水平改变以及细胞凋亡的改变情况，Q-PCR 检测各组大鼠脾脏、淋巴结组织中自噬基因表达水平的改变情况。结果 与慢病毒阴性对照组相比，免疫后 12 d 感染 rno-miR-30b-5p 慢病毒组大鼠的脾脏和淋巴结中 Th17 细胞水平下降，而 Treg 细胞水平升高，Th17/Treg 比例水平降低，向恢复平衡状态改变；而感染 rno-miR-30b-5p 慢病毒阴性对照组大鼠脾脏和淋巴结中 Th17 细胞水平升高， Treg 细胞水平降低，Th17/Treg 比例水平明显升高，呈不平衡表达状态；不同处理组的细胞凋亡水平检测发现，感染 rno-miR-30b-5p 慢病毒组大鼠细胞凋亡率下降。Q-PCR 检测发现，感染 rno-miR-30b-5p 慢病毒大鼠的脾脏和淋巴结中 Atg5、Atg12、Becn1 和 LC3 明显下调表达，其差异具有统计学意义(P<0.01)。结论 大鼠体内实验表明， rno-miR-30b-5p 可以调控 Atg5、Atg12 和 Becn1 等自噬基因在 EAU 大鼠体内的表达水平。

OR-042

Curative effect of toluidine blue O-mediated 630 nm red light in the treatment of rabbit bacterial keratitis

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Objective: To evaluate the antimicrobial effect of toluidine blue O-mediated 630 nm red light on *Staphylococcus aureus* isolated from ocular surface infection.

Methods: Experimental Study. An *S. aureus* rabbit keratitis model was established by injecting *S. aureus* broth into the shallow stromal layer of the right eye cornea of New Zealand white rabbits. The 48 rabbits successfully modeled were randomly divided into 4 groups: red light combined with toluidine blue O (TBOR), antibiotic group (A), red light combined with toluidine blue O + antibiotic group (TBOR+A), and No Treatment group (NT), 12 in each group. Slit lamp external ocular photography and AS-OCT were performed before treatment and 3, 7, 14, and 28 days after treatment. Clinical manifestations of rabbit keratitis under different treatment methods were compared. The degree of conjunctival hyperemia, corneal ulcer area, and neovascularization were compared. The depth of ulcer infiltration and the degree of corneal edema were compared before treatment and at 14 and 28 days post-treatment. At the same time, 3 rabbits from each group were killed at 3, 7, 14, and 28 days after treatment. Corneal specimens were collected for pathological examination, immunohistochemical staining, and projection electron microscopy. Normal data were compared before and after treatment using the paired t-test, and non-normal data were compared before and after treatment using the paired rank sum test; the Kruskal–Wallis rank sum test was used to compare 4 groups of data, using generalized estimation. The equation compares the repeated measurements of data at various time points within each treatment group.
Results: The TBOR group and the TBOR+A group showed significant improvement from baseline at 3 day after treatment ($P<0.0001$), while the conjunctival hyperemia in group A was reduced but was not obvious until at 7 days after treatment. The corneal ulcer area in the TBOR and TBOR+A groups was significantly smaller than at baseline, a statistically significant reduction ($P=0.0009$; $P<0.0001$). At 14 days of treatment, conjunctival hyperemia and corneal ulcer area reduction in group A were statistically significant compared with baseline ($P<0.0001$, $P=0.01$). Corneal neovascularization began to appear on day 3 in all groups, while there was no statistically significant difference in the number of corneal neovascularization between TBOR and TBOR+A groups before treatment (baseline). There was a statistically significant difference between the NT group and the other three groups. The corneal thickness and depth of corneal ulcer infiltration were also significantly lower than before treatment. Microscopic observation of histopathological sections of the corneas of the TBOR and TBOR+A groups cornea showed that the structure of each layer was complete, with an intact epithelial layer. There were no inflammatory cells in the corneal stroma. However, the corneas of groups A and NT were still edematous, the epithelial structure was disordered or defective, and a large number of inflammatory cells were visible in the stroma. The IL-1 β and TNF-β were highly expressed in the corneas of groups A and NT, indicating that the cornea was still in the inflammatory phase, but low in the TBOR and TBOR+A groups. Transmission electron microscopy（TEM） showed that the corneal epithelial cells in the TBOR and the TBOR+A in the ulcer area were intact at 14 days, while those from groups A and NT were swollen or missing.

OR-043

Phospholipase Cγ2 is critical for Ca2+ flux and cytokine production in anti-fungal innate immunity of human corneal epithelial cells

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Aim: This study aimed to identify the role of PLCγ2 in Dectin-1-mediated Ca2+ Flux and its effect on the expression of proinflammatory mediators at the exposure to Aspergillus fumigatus (A. fumigatus) hyphae antigens in human corneal epithelial cells (HCECs).
Methods: The HCECs were preincubated with or without different inhibitors respectively before A. fumigatus hyphae stimulation. Intracellular calcium flux in HCECs and levels of PLCγ2 and spleen-tyrosine kinase (Syk) were detected by fluorescence imaging and Western Blotting. The expression of proinflammatory mediators was determined by reverse transcriptase polymerase chain reaction (RT-PCR) and enzyme-linked immunosorbent assay (ELISA).
Results: We demonstrated that an intracellular Ca2+ flux in HCECs was triggered by A. fumigatus hyphae and could be reduced by pre-treatment with PLCγ2-inhibitor U73122. A. fumigatus hyphae induced PLCγ2 phosphorylation was regulated by Dectin-1 via Syk. Furthermore, PLCγ2-deficient HCECs showed a drastic impairment in the Ca2+ signaling and the secretion of IL-6, CXCL1 and TNF-α.
Conclusions: PLCγ2 plays a critical role for Ca2+ Flux in HCECs stimulated by A. fumigatus hyphae. Syk acts upstream of PLCγ2 in the Dectin-1 signaling pathway. The expressions of proinflammatory mediators induced by A. fumigatus are regulated by the activation of Dectin-1-mediated PLCγ2 signaling pathway in HCECs.

OR-044

Identification of Bacterial Composition in Patients with Exogenous Endophthalmitis by 16S rDNA High-throughput Sequencing

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Background: To identify bacterial composition in patients with exogenous endophthalmitis by a high-throughput sequencing approach.
METHODS: Eighteen samples from eyes with exogenous endophthalmitis (13 aqueous humor samples and 5 vitreous fluid samples) and 10 samples from eyes with noninfectious eye disease (5 aqueous humor samples and 5 vitreous fluid samples) were included in this study. Microbiological culture and smear testing were performed. The relative abundance and distribution of individual pathogens were tested by 16S rDNA high-throughput sequencing.
RESULTS: Among the 18 samples from infective eyes, four were positive on smear or microbial culture, with 3 gram-positive and 1 gram-negative bacilli; 181 genera were identified in all samples by 16S rDNA high–throughput sequencing analysis. The top ten widely distributed genera were *Pseudomonas*, *Acinetobacter*, *Achromobacter*, *Staphylococcus*, *Sphingomonas*, *Ralstonia*, *Streptococcus*, *Caulobacter*, *Methylobacterium*, and *Comamonas*. Gram-negative bacteria accounted for 80% (8/10). *Pseudomonas* was identified in all 18 samples and had the highest relative content (17.71%). None of control samples yielded positive culture or clarified 16S rDNA gene sequencing.
CONCLUSIONS: The 16S rDNA high-throughput sequencing could be used to observe the mixed profile of causative pathogens and provide useful information of bacterial composition in patients with endophthalmitis. Gram-negative bacteria might play an important role in exogenous endophthalmitis.

OR-045

Progranulin attenuates the development of experimental autoimmune uveitis

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Objective: Progranulin (PGRN) was reported to an important regulator in some T-cell-mediated autoimmue disease, such as inflammatory arthritis and osteoarthritis. This study was aimed to investigate the role of PGRN in autoimmune uveitis.
Methods: The expression of PGRN in serum and PBMCs in patients with Vogt-Koyanagi-Harada disease (VKH) and Behcet's disease(BD) was detected using ELISA and RT-PCR, respectively. B10RIII mice were immunized with interphotoreceptor retinoid-binding protein (IRBP) peptide $_{161-180}$ in Complete Freund's adjuvant to induce experimental autoimmune uveitis(EAU). PGRN(6mg/mice) or vehicle was administrated intraperitoneal injection for every other day from 7 days . The severity of EAU was evaluated with clinical and histological scores. The levels of PGRN,

IL-17, IFN-γ,IL-1beta, IL-6, MCP-1 in the retina were detected with RT-PCR. The levels of IFN-γ, IL-17 and IL-10 in spleen were measured using Flow cytometry and ELISA.

Results: We found the serum level of PGRN and the gene expression of PGRN in PBMCs were decreased in active BD and active VKH patients. PGRN expression in retina was temporally correlated with the progression of EAU. The administration of PGRN protein significantly attenuated the severity of uveitis evidenced by the clinical and pathological score. The expression of proinflammatory cytokines, including IL-17, IFN-γ, IL-1beta, IL-6 and MCP-1, in the retina were inhibited in the PGRN-treated mice. A decreased frequency of Th1 and Th17 cells in spleen was detected in PGRN-treated mice, while no statistical difference was found concerning the frequency of Treg cells between PGRN-treated mice group and control mice group.

Conclusion: This study provides a new insight into the pathogenesis of uveitis, and also present PGRN may be a valid approach for treating autoimmune uveitis.

OR-046

Development and Evaluation of Diagnostic Criteria for Vogt-Koyanagi-Harada Disease

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Objective: To develop and evaluate a set of diagnostic criteria for VKH disease using data from Chinese patients.

Methods: This case-control study reviewed medical records of patients from a tertiary referral center between October 2011 and October 2016. Data from 634 patients with VKH disease and 623 patients with non-VKH uveitis from southern China were used to develop the Diagnostic Criteria for VKH Disease (DCV). Data from an additional group of 537 patients with a definite VKH disease diagnosis and 525 patients with non-VKH uveitis from northern China were used to evaluate the diagnostic criteria.

Results: Of the 1257 patients used to construct the DCV, 665 (52.9%) were male, and the mean (SD) age at disease onset was 38.6 (13.6) years. The 3-class model and 21 clinical findings were selected by latent class analysis. Variables with a high positive rate in the early-phase or late-phase VKH group or high specificity constituted essential parameters. Constellations of these essential parameters constructed the DCV. The sensitivity and negative predictive value (NPV) of the DCV were higher than those of the Revised Diagnostic Criteria for VKH Disease (RDC) (sensitivity: 94.6%vs 71.9%; difference, 22.7%; 95%CI, 18.5-27.0; NPV: 94.3%vs 76.6%; difference, 17.7%; 95%CI, 13.9-21.5). The specificity and positive predictive value (PPV) of the DCV were not different from that of the RDC (specificity: 92.2%vs 93.9%; difference, 1.7%; 95%CI, −1.4 to 4.8; PPV: 89.3%vs 92.3%; difference, 3.0%; 95%CI, −1.4 to 4.8). The area under the receiver operating

characteristic curve of the DCV and the RDC were 0.934 (95%CI, 0.917-0.951) and 0.829 (95%CI, 0.803-0.855), respectively.

Conclusions: The DCV were developed and evaluated using data from Chinese patients with VKH disease and showed a high sensitivity, NPV, and area under the receiver operating characteristic curve in comparison with the RDC.

OR-047

Chronic stress exposure exacerbates immune disorder in rats with experimental autoimmune uveitis

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Purpose: The present study aimed to explore the effect of chronic unpredictable mild stress (CUMS) on the immunoregulatory mechanism involved in rats with experimental autoimmune uveitis (EAU).

Methods: Eighty-four Lewis rats were randomly assigned into four groups: Control group, CUMS group, EAU group and EAU+CUMS group. EAU was induced in Lewis rats with $IRBP_{1177–1191}$ peptide supplemented with complete Freund's adjuvant and mycobacterium tuberculosis. CUMS paradigm was designed based on previously described. The stressors were changed every day and were applied for 21 consecutive days. At week 1, 2, 3 and 4 after immunization, the open-field test score, the weight, and sucrose preference of each rat were evaluated, respectively. Meanwhile, on days 7, 11, 14, 21 and 28 after immunization, lymphocytes from spleen in each group were isolated and performed on a flow cytometer to analyze the levels of regulatory T (Treg) and Th17 subsets. Moreover, the levels of different cytokines (i.e., IL-17, IL-6, IL-10, TGF-β) in serum were detected by enzyme-linked immunosorbent assay (ELISA). Real-time quantitative PCR (RT-PCR) was further done to measure IL-17, IL-6, Foxp3 and TGF-β mRNA levels.

Results: In EAU group, the clinical signs of dilated blood vessels in the iris were first observed on day 8 post immunization, the peak period of intraocular inflammation was exhibited on day 12 ± 1 post immunization. After the peak period, the intraocular inflammation faded away gradually, and with only little vascular congestion on day 21 post immunization. In EAU+CUMS group, the severity of the intraocular inflammation was weaker than that of EAU group. Compared to the Control group, the scores of horizontal and vertical movement of the rats in CUMS and EAU+CUMS groups decreased significantly on the 21^{th} day (2 weeks after CUMS), and the sucrose preference and body weight also noticeably decreased on the 28^{th} day. The results in EAU group were similar to those in Control group. The frequencies of Th17 cells in EAU group on days 7, 11, 14, 21 and 28 were 1.03±0.72, 5.34±0.14, 3.64±0.12, 2.38±0.11 and

1.91±0.11, respectively. The frequencies of Th17 cells peaked on day 11, and then decreased during disease remission. The EAU+CUMS group were 1.08±0.17, 4.65±0.12, 3.18±0.09, 2.29±0.15 and 1.73±0.15, respectively, and also peaked on day 11, but lower than that of EAU group. The frequencies of Th17 cells on days 11 and 14 had a significant difference as compared to the relevant levels in EAU group (all $p<0.05$). The frequencies of Th17 cells between Control and CUMS groups had no significant difference. Moreover, the frequencies of Treg cells on days 7, 11, 14, 21 and 28 were 10.13±0.28, 20.87±1.33, 34.14±0.59, 35.49±0.74 and 19.24±1.05 in EAU group, respectively, peaked on day 21, and then declined during disease remission. The EAU+CUMS group were 10.64±0.21, 25.22±2.09, 48.60±1.46, 44.74±1.66 and 22.59±1.26, respectively, and peaked on day 14, higher than that of EAU group. The frequencies of Treg cells on days 11, 14, 21 and 28 had a significant difference compared to the relevant levels in EAU group (all $p<0.05$). The frequencies of Treg cells had no significant difference between Control and CUMS groups. In serum, the levels of IL-17 and IL-6 in EAU group peaked on day 7 and gradually decreased to baseline on day 28. The levels of IL-17 and IL-6 in EAU+CUMS group also peaked on day 7, but lower than in EAU group. On days 11 and 14, the IL17 levels in EAU+CUMS group were slightly lower than those of EAU group (all $p<0.05$). The levels of IL-6 in EAU+CUMS group had a significant difference as compared to the relevant levels in EAU group on days 11, 14 and 21 (all $p<0.05$). Meanwhile, the IL-10 level increased on day 7, peaked on day 21, and then decreased in EAU+CUMS group, while the TGF-β level increased on day 7, peaked on day 11, and then decreased. In addition, both TGF-β and IL-10 levels had a significant difference as compared to the relevant levels in EAU group on days 11, 14 and 21 (all $p<0.05$). However, the levels of IL-17, IL-6, IL-10 and TGF-β had no difference between Control and CUMS groups. These results were also confirmed by quantitative-PCR technique.

Conclusions: This research reveals that CUMS can further aggravate the immune disorders, providing a new research idea for future prevention and treatment of uveitis and immune diseases.

OR-048

Activation of Notch signaling pathway is responsible for the disturbed CD4/CD8, Th17/Treg balance in rats with experimental autoimmune uveitis

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Objective and design We aimed to investigate the relationship between disturbed balance of CD4/CD8, Th17/Treg and the activation of Notch signaling pathway in experimental autoimmune uveitis (EAU).

Methods An EAU rat model was induced, and the pathology analysis was performed by hematoxylin and eosin (H&E) staining. CD4, CD8, Th17, and Treg levels in spleen, lymph nodes and eye tissues were determined by flow cytometry. The expressions of Notch1, DLL4, IL-10, and IL-17 were determined by Quantitative PCR (Q-PCR) and enzyme-linked immunosorbent assay (ELISA), respectively.

Result The pathological results showed the inflammatory cell infiltration in ocular tissues in EAU rats. The CD4/CD8 and Th17/Treg ratios in EAU rats were apparently higher than in normal control individuals. Q-PCR and ELISA analyses indicated the expressions of Notch1, DLL4, IL-10, and IL-17 in EAU rats were increased gradually from 6 days after immunization, peaked at 12 days, and then decreased gradually. The tendency of dynamic expressions of Notch1 and DLL4 in EAU rats is the same as those of CD4/CD8, Th17/Treg.

Conclusion The activation of Notch signaling pathway can regulate the naïve $CD4^+$ T cell differentiation into Th17 and Treg cells, disrupt the CD4/CD8 and Th17/Treg balance, aggravate the severity of EAU.

OR-049

Interaction between CCR6+ Th17 cells and CD34+ fibrocytes promotes inflammation: Implications in Graves' orbitopathy in Chinese population

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Purpose: Recent reports suggest that Th17 immunity and bone marrow-derived $CD34^+$ fibrocytes contribute to the pathogenesis of Graves' orbitopathy (GO). This study investigated interactions between Th17 cells and fibrocytes in GO inflammation in Chinese subjects.

Methods: Th17 cells and fibrocytes were enriched from blood samples from Chinese GO patients and healthy controls. Proportions and phenotypes of Th17 cells, regulatory T cells (Tregs), and fibrocytes were examined by flow cytometry. Exogenous IL-17A was used to study inflammatory activity of fibrocytes from GO patients and control subjects. Co-culture, qRT-PCR, Luminex, and transwell assays were performed to investigate the relationship between Th17 cells and fibrocytes.

Results: CCR6$^+$ Th17 cells were increased in both active ($P<.001$) and inactive ($P<.05$) GO patients, compared with healthy controls. There was a positive correlation between number of CCR6$^+$ Th17 cells and GO clinical activity score ($P<.0001$, r=0.8176). Further, CD34$^+$ fibrocytes were increased in GO patients, with increased expression of IL-17RA ($P<.05$), CD80 ($P<.05$), and CD86 ($P<.05$). Decreased population of effector Treg cells ($P<.01$) and increased CTLA-4 expression on naïve Treg cells ($P<.05$) were observed in GO patients. IL-17A stimulated cytokine production in fibrocytes; GO fibrocytes exhibited more robust production than normal fibrocytes. Autologous Th17 cells promoted inflammatory and antigen-presenting functions of GO fibrocytes; conversely, fibrocytes enhanced Th17 cell function and recruited Th17 cells in a MIP-3/CCR6-dependent manner.

Conclusions: The crosstalk between CCR6$^+$ Th17 cells and fibrocytes plays a role in the pathogenesis of GO. Suppressing these interactions may be a candidate molecular target for therapeutic approaches of GO.

OR-050

Optic Nerve Injury Induced Apoptosis via attenuation of ROS overproduction and lysosomal membrane permeabilization

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Purpose: Our last research demonstrated that mitochondrial ROS overproduction and lysosomal membrane permeabilization (LMP) made significant contribution to neurite destruction induced by hypothermia stress. We were wondering whether the similar cellular disorders would exist in axonal injury of central nerve system (CNS) and manipulation of these pathways would benefit neuron survival and functionality.

Method: We performed the optic nerve crush (ONC) surgery on mice which was a widespread CNS axonal injury model following by retrograde death of retinal ganglion cells (RGCs). Bam 15 & Protease inhibitor (Pi) cocktail was delivered by intravitreal injection (IV) as our treatment, which had been efficiently capable of attenuating ROS overproduction and LMP according to our previous paper. Drug toxicity and RGC functionality were evaluated by electroretinogram (ERG) and multi-electrode array (MEA). Post-surgery retina from different group settings and timepoints were dissected for immunostaining with RBPMS and cleaved-caspase 3 or for Western blot with apoptotic and oxidized proteins. Mice were pre-injected different cholera toxin subunit B (CTB) from superior colliculus one week, then retina samples were performed live image with DND 26, TMRE

or magic red dye to assess LMP. UCP2 virus was used to interfere mitochondrial ROS production for further verification of our hypothesis.

Results: Both ERG and MEA indicated that no significant change could be detected after IV of Bam 15 & Pi for 21 days. As we hypothesized, ONC did trigger significant ROS and LMP compared with PBS control. Encouragingly, the cocktail alleviated those disorders and decreased apoptotic proteins. Meanwhile, significantly more RGCs survived at all timepoints and it was almost five times at the end of observation (21 days post-surgery) of PBS control. Virus also showed similar results. MEA data confirmed these remaining RGCs were not silent by spontaneous and light response spikes.

Conclusion: Bam 15 & Pi cocktail prevented RGCs from apoptosis in an ONC model, which indicated a potential treatment for further traumatic ON injury. The mechanism of protection might be dependent on manipulation of ROS and LMP.

OR-051

The anti-angiogenic role of cabozantinib in zebrafish embryos and mouse choroidal neovascularization model

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Aim: Choroidal neovascularization (CNV) is a leading cause of blindness in the elderly in the developed nations, particularly when it is associated with age-related macular degeneration (AMD). As a tyrosine kinase inhibitor (TKI), cabozantinib (CBZ) down-regulates the activation of multiple receptor tyrosine kinases involved in tumor angiogenesis, invasion, and metastasis, including hepatocyte growth factor receptor (MET), and vascular endothelial growth factor receptor 2 (VEGFR2). In the present study, we investigated whether CBZ alleviated CNV progression via inhibiting the phosphorylation of MET and VEGFR2.

Methods: Firstly, the wild type zebrafish embryos were soaked in CBZ (0.01, 0.1, 1, 5, 10, 50, 100, or 500 μg/ml) at 8 hpf, and analyzed for normal, malformed, tardive and dead phenotypes at 48 hpf. The transgenic zebrafish line Tg (Flk:mcherry::Hb9:EGFP) in control, CBZ 0.1 μg/ml, CBZ 1 μg/ml, and CBZ 5 μg/ml groups at 48 hpf was visualized under confocal microscope for intersegmental vessel (ISV) and neuron. The other transgenic zebrafish line Tg (Flk:EGFP) in control, CBZ 0.1 μg/ml, CBZ 1 μg/ml, and CBZ 5 μg/ml groups at 48 hpf was observed under confocal microscope for brain and eye vessel. The ISV length and absence ratio of IVS at 48 hpf in different groups were quantified. Next, mouse CNV model was generated by laser photocoagulation. Western blot and quantitative analysis were taken to detect p-MET, MET, p-VEGFR2, and VEGFR2 protein level in the mouse retinal pigment epithelium (RPE) and choroid mix in normal, CNV 1 d, CNV 3 d, CNV 7 d, and CNV 14 d groups. The mouse eye tissue cryosections were stained by DAPI (nucleus), Collagen IV (represents vascular basement

membrane), and p-MET or DAPI, Collagen IV, and p-VEGFR2. Thirdly, laser photocoagulation was performed in mice at day 0. Then 0.1% DMSO (vehicle group), 2 μg/μl CBZ (CBZ group) or 10 μg/μl RBZ (RBZ group) each for 1 μl was injected intravitreally at day 3. The mouse eye tissues were collected and analyzed at day 7. Fluorescein angiography (FFA) of CNV lesion and fluorescein leakage in CNV lesions was graded at 7 d after CNV in control, vehicle, CBZ, and RBZ groups. Mouse CNV lesion area at 7 d after CNV induction was assessed by staining of choroidal flat-mount preparations with fluorescent isolectin B4 (IB4). The protein level of p-MET, MET, p-VEGFR2, and VEGFR2 in control, vehicle, CBZ, RBZ groups was detected by Western blot and quantitative analysis. Finally, the mice were treated (control group) with laser at day 0. Meanwhile, 200 or 300 mg/kg/day CBZ was added to mouse daily fodder till day 14 when the mouse eye tissues were collected and analyzed. Fluorescein angiography (FFA) of CNV lesion and fluorescein leakage in CNV lesions was graded at 14 d after CNV in control, 200 mg/kg/day CBZ, and 300 mg/kg/day CBZ groups. Mouse CNV lesion area at 7 d after CNV induction was assessed by staining of choroidal flat-mount preparations with fluorescent IB4 and phalloidin and quantitative analysis. The protein level of p-MET, MET, p-VEGFR2, and p-VEGFR2 in control, 200 mg/kg/day CBZ, and 300 mg/kg/day CBZ groups was detected by Western blot and quantitative analysis.
Results: In zebrafish embryos, CBZ perturbed ISV formation without the neurodevelopment impairment. In mouse laser-induced CNV model, p-MET and p-VEGFR2 increased in the CNV region. CBZ intravitreal injection or oral gavage alleviated CNV leakage and area, and disturbed the phosphorylation of MET and VEGFR2.
Conclusion: CBZ alleviates mouse CNV leakage and area via the potential inhibiting of phosphorylation of MET and VEGFR2. The findings provide a novel therapy potential method for CNV patients.

OR-052

MyocN450Y induces Endoplasmic Reticulum stress in human primary trabecular meshwork cells

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Objective: Investigating the role and mechanism of N450Y mutation of myocilin gene in glaucoma.
Methods: CDS sequences of wild-type myocilin (WT-myoc) gene and N450Y mutant myocilin gene (*Myoc*^{N450Y}) were cloned into lentiviral vector for lentiviral packaging. The cell morphology change was observed under microscope after lentivirus infection of empty vector, WT-myoc and *Myoc*^{N450Y}. Western blot and qRT-PCR were used to detect the expresson of myocilin gene in empty vector group, WT-myoc group and *Myoc*^{N450Y} group in human primary trabecular meshwork (HPTM) cells. The secretion of Myocilin protein in the supernatant of cell culture was detected by Western Blot. qRT-PCR was applied to detect the mRNA level of Endoplasmic Reticulum stress (ER stress) and

unfolded protein response (UPR) related proteins in overexpressed WT-myoc and *Myoc*^{N450Y} HPTM cells. Immunofluorescence was used to detect the localization of myocilin protein and ER stress related protein. Finally, the effect of *Myoc*^{N450Y} on the expression level of apoptosis-related proteins was determined by Western blot.

Results: Lentivirus efficiently infected HPTM cells, and compared with the control group, lentivirus carrying WT-myoc and *Myoc*^{N450Y} infected HPTM cells in a good state without significant changes in morphology. qRT-PCR and Western Blot results showed that the mRNA level and protein level of myocilin in the WT-myoc group and *Myoc*^{N450Y} group were significantly up-regulated compared with the control group. Moreover, N450Y mutation significantly inhibit the secretion of myocilin protein. Compared with the control group and WT-myoc group, *Myoc*^{N450Y} significantly up-regulate the mRNA level of ER stress related proteins Grp78 and Grp94, while the mRNA level was not significantly different between the control group and WT-myoc group. And compared with the control group and WT-myoc group, *Myoc*^{N450Y} markedly increased the mRNA level of UPR-related proteins XBP1s and Chop, while the mRNA level had no significance between the control group and WT-myoc group. Immunofluorescence results revealed that *Myoc*^{N450Y} colocalized with ER stress related proteins. The expression of cleaved caspase-3 and caspase-9 were upregulated in *Myoc*^{N450Y} group.

Conclusion: *N450Y mutation is a functional acquired mutation and may promote apoptosis of HPTM cells by inducing ER stress.*

OR-053

RUNX3 plays a vital role in the retinal neovascularization by regulation of PHD2-HIF1α-VEGF signal axis

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Purpose

RUNX3 has been demonstrated to inhibited angiogenesis by modulating PHD2-HIF1α-VEGF signal axis in tumor. This study was to investigate the effect of RUNX3 on retinal neovascularization (RNV) and its mechanism.

Methods

A transgenic mouse model with conditional loss of RUNX3 in retina was generated. Normal retinal vascular development as well as progression and severity of RNV in oxygen-induced retinopathy (OIR) models was observed both in normal C57BL/6J and RUNX3 conditional knock-out (RUNX3-cKO) mice. Further, the interaction between RUNX3 and PHD2, HIF1α was detected in mouse retinal microvascular epithelial cells (mRMECs) under different oxygen condition by co-immunoprecipitation.

Results

RUNX3 deficiency led to aberrant angiogenesis in the developing murine retina. The size of retinal neovascular area, the number of filopodia of tip cells and the number of pre-retinal neovascular cell nuclei were significantly increased RUNX3-cKO OIR mice, while the size of retinal neovascular area was reduced (#P<0.05, ##P<0.01, ###P<0.001). Next, the results of co-immunoprecipitation showed that RUNX3 had an interaction with PHD2 and HIF1α in mRMECs under normal culture condition, which was weaken under hypoxic condition (*P<0.05, **P<0.01, ***P<0.001).

Conclusion

Our results indicated that RUNX3 played a pivotal role during retinal vascular development as well as in the progression of RNV. And its effects on RNV might be realized by regulation of PHD2-HIF1α-VEGF signal axis. This might provide a novel target for RNV therapeutic strategy.

OR-054

一种基于 Schlemm's 管堵塞的新型可逆性慢性青光眼猴子模型

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目的：建立一种基于 Schlemm's 管堵塞的可逆性慢性青光眼猴子模型

方法：利用微导管对实验动物食蟹猴（n=4）进行 Schlemm's 管 360°堵塞手术。在术后第 6 周，其中一只食蟹猴接受第二次手术以移除 Schlemm's 管内的微管。所有实验动物随访 11 个月，眼压每周测一次，视乳头部位的光学相干断层扫描(OCT)及眼底照相每两周测一次。

结果：Schlemm's 管堵塞 1 周后，堵塞猴眼的眼压显著高于对侧参照猴眼（27.9±13.0 mm Hg/15.5±2.1 mm Hg, P < 0.001）。猴子 A 接受了微管移除手术，在移除 1 周后手术眼的眼压下降至接近基线水平。在其余的实验猴子中，堵塞猴眼的眼压在随访过程中均显著高于对侧参照猴眼（22.7±5.7 mm Hg vs 15.5±1.4 mm Hg, P < 0.001）。OCT 检测显示所有的阻塞猴眼的视神经纤维层厚度均出现了不同程度的变薄，眼底照相提示 50%的堵塞猴眼出现了局限性视神经纤维层缺损。

结论：基于 Schlemm's 管堵塞的猴子模型仅需单次手术操作就能实现稳定的眼压升高，同时不在前房引入任何异物。通过移除堵塞的微管，眼压可恢复正常水平。这种可逆性的慢性青光眼模型可用于探索青光眼的发病机制。

OR-055

Simultaneous interference of SP1 and HIF1α retarding the proliferation, migration and invasion of human microvascular endothelial cells (HMEC-1) under hypoxia

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Pathologic angiogenesis is an important feature in the retina neovascular diseases, but cellular mechanisms are poorly understood. Therefore, we developed and characterized a vitro hypoxia model, based on HMEC-1. We detected the expression of SP1 and HIF1α under normoxic and hypoxic conditions and knocked down it by siRNA. The proliferation, migration and invasion of HMEC-1 were measured by CCK8, EDU and Transwell co-culture system. Western blot and Immunofluorescence were carried out to study the mechanisms of simultaneously inhibiting the CD39,CD73, adenosine and VEGF. We found that simultaneous inhibition of SP1 and HIF1α demonstrated a much greater restraint of proliferation, migration and invasion characteristics on HMEC-1 than respectively knocking down SP1 or HIF1α and anti-VEGF drugs . Our study demonstrated that both SP1 and HIF1α played important roles on HMEC-1 under hypoxia condition through the CD39-CD73-adenosine and VEGF angiogenesis pathway. Our study may provide a new approach to the treatment of retinal neovascular diseases.

OR-056

A new short blunt-ended double strand RNA，dsRNA-184-U， inhibits retinal neovascularization through dissociating FoF1-ATP synthase

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Purpose: Pathological retinal neovascularization is an important component of irreversible causes of blindness in eye diseases. The F_oF_1- ATP synthase produces most of the ATP in the cell and plays a crucial role in microvascular proliferation. It attracts increasing attention as drug target in

pharmacology. New drug therapeutics, including miRNA and siRNA, are attracting special attention from both academia and biotechnology companies. Here, we identified a new noncoding RNA, dsRNA-184-U, inhibits F_oF_1- ATPase activity and retinal neovascularization.

Methods: To identify the mechanism and associated factors involved in dsRNA-184-U, we performed luciferase reporter system and RNA pull-down technology on HLE cells extracts using desthiobiotinylated C or U type RNA. Silver staining and Nano-LC-ESI mass spectrometry were performed to identified dsRNA-184-U binding protein. Finally, cell viability and ATP production were assay. To identify the function of dsRNA-184-U involved in retinal neovascularization, we performed a dsRNA-184-U injection into the vitreous of OIR mouse and observed the retinal neovascular angiogenesis by FITC-Dextran filled retinamounts.

Results: Notably, we concluded that dsRNA-184-U which has no base overhang at the 3'-end utilized a different intracellular mechanism than miRNA which has a 2 bases overhang. Further, we also identified that DExH-box helicase 9 (DHX9) probably acts as a dsRNA-184-U duplex recognition factor and unwinds the dsRNA-184-U duplex into a single strand. The released single strand containing U base in the seed region interacts with ATP synthase α subunit (ATP5A) and releases ATP5A from mitochondrial membrane into cytosolic and impairs ATPase activity. Furthermore, dsRNA-184-U lowers ATP production and reduce cell viability. Finally, lower vessel leakage amounts and characteristic vessel morphology were observed after dsRNA-184-U injection into the vitreous of OIR mouse.

Conclusions: This novel finding offers a powerful probe to investigate the physiological role of F_oF_1-ATPase and may present a promising therapeutic approach for retinal neovascularization caused by abnormal ATP production.

OR-057

大鼠视神经碾压伤模型视网膜中 PACAP 表达变化及其对视神经节细胞的作用机制

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目的：外源性垂体腺苷酸环化酶激活多肽（pituitary adenylate cyclase-activating polypeptide，PACAP）在视网膜损伤动物模型中起着重要的作用。本研究的目的是分析大鼠视神经碾压伤（optic nerve crush，ONC）后，其内源性 PACAP 及其受体在视网膜上表达和定位的变化，以及玻璃体腔注射 PACAP 对视网膜神经节细胞（retinal ganglion cells，RGCs）凋亡的作用及其机制。

方法：采用免疫印迹法、实时定量荧光 PCR 法和免疫荧光双重染色法检测各组 PACAP 及其受体蛋白表达量以及 mRNA 水平在不同时间点的时空表达变化。向大鼠玻璃体腔内注射不同浓度的 PACAP，通过荧光金逆行追踪法，检测各组大鼠视网膜 RGCs 的染色情况和存活率。采用 TUNEL 分析、免疫荧光双重染色和免疫印迹等方法，观察 PACAP 对 ONC 后 RGCs 凋亡的作用。

结果：ONC 组 PACAP 和 PAC1R 的表达随时间增加，在 ONC 后第 5 天到达高峰，随后下降，且 PACAP 和 PAC1R 主要表达在视网膜神经节细胞层（ganglion cell layer，GCL）上。PACAP 治疗减少 ONC 后 RGCs 的丢失，并在浓度为 100nM 时效果最显著。此外，ONC+PACAP 组在 GCL 上的 TUNEL 阳性细胞数量和 cleaved-caspase3 染色强度明显低于 ONC 组，Bcl-2 和 p-CREB 的表达量与 ONC 组相比显著升高。

结论：大鼠 ONC 后，PACAP 及其高亲和力受体 PAC1R 的表达明显增加，且主要表达于视网膜 GCL 上；玻璃体腔注射 PACAP 通过促进 CREB 磷酸化，上调抗凋亡基因 Bcl-2 的表达，抑制 caspase-3 介导的 RGCs 凋亡，增加 RGC 的存活率。这些结果提示 PACAP 在 ONC 诱导的 RGCs 凋亡中起着重要保护作用，并为 PACAP 在治疗青光眼等各种视神经疾病提供理论依据。

OR-058

Adiponectin inhibits high glucose-induced angiogenesis of RF/6A cells via blocking autophagy

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Purpose Adiponectin, one of the adipose-derived hormone with metabolic activity, has been reported to conversely affect angiogenesis of endothelial cells in vitro. Previous study in animal models has demonstrated that adiponectin has a protective role in retinal vascular injury following pathological stimuli. However, clinical researches regarding the relationship between plasma adiponectin level and diabetic retinopathy (DR) are inconclusive. The aim of this study was to investigate the effect of adiponectin on high glucose-induced retinal angiogenesis and its association with autophagy by using RF/6A cells as a model.

Methods RF/6A cells were randomly divided into five groups (control, mannitol, high glucose, high-glucose with adiponectin, and high-glucose with 3-MA). Cell vitality, migration, and tube formation was assessed by CCK-8, transwell chamber, and matrigel assay, respectively. For apoptosis, the protein expressions of Bax and Bcl-2 and cell apoptosis rates was assayed by western blot and flow cytometry, respectively. Ad-mCherry-GFP-LC3B fluorescence assay was performed to investigate autophagy flux. Autophagy-related proteins (LC3B, Atg5 and p62) and key proteins in the typical autophagy signaling pathway (PI3K, AKT, mTOR) were measured by western blot.

Results We found that cell vitality decreased and cell migration and tube formation increased in the high-glucose group. Treatment with adiponectin or 3-methyladenine (3-MA, an autophagy inhibitor) increased cell viability and inhibited cell migration and tube formation. In the high-glucose group, the protein expression of Bax and apoptosis rate of cells increased and the expression of Bcl-2 decreased, while treatment with adiponectin or 3-MA reversed these results. Autophagy was

activated in the high-glucose group to present as more LC3B fluorescent dots and higher expressions of LC3B, Atg5 proteins as well as lower expression of p62. Treatment with adiponectin or 3-MA inhibited autophagy by promoting the expression of p-PI3K, p-AKT and p-mTOR when compared with the high-glucose group.

Conclusions The results of this study suggested that adiponectin inhibits high glucose-induced angiogenesis of RF/6A cells by inhibiting autophagy, and promotion of PI3K/AKT/mTOR pathway might be involved in the anti-autophagy activities of adiponectin.

OR-059

Functional and expressional changes of L- and T-type voltage-gated Ca2+ channels in retinal ganglion cells in experimental glaucoma

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Calcium homeostasis imbalance is known to be involved in retinal ganglion cell (RGC) injury in glaucoma. In the present study, we explored changes of L- and T-type voltage-gated Ca^{2+} channels in rat RGCs in a chronic ocular hypertension (COH) model, and the underlying mechanisms were also investigated. Our results showed that total Ca^{2+} current densities of RGCs in COH rats were decreased as compared with control. The reduction of Ca^{2+} currents was mainly mediated by L-type Ca^{2+} channels, but not T-type ones, which was supported by immunohistochemistry experiments. TNF-alpha is one of key factors for L-type Ca^{2+} current reduction of RGCs in COH retinas since extracellular application or intravitreal injection of TNF-alpha may mimic the intraocular pressure elevation induced changes of Ca^{2+} currents. The intracellular MAPK and NF-κB signaling pathways mediated the change of L-type Ca^{2+} currents. Furthermore, the T-type Ca^{2+} channel blocker mibefradil, but not the L-type Ca^{2+} channel blocker nimodipine significantly decreased TUNEL-positive RGC numbers in COH retinas. These results suggest that L- and T-type voltage-gated Ca^{2+} channels in RGCs are dichotomously changed in experimental glaucoma. Inhibition of T-type Ca^{2+} channels may be a potential mechanism for protecting RGCs against injury in glaucoma.

OR-060

Contribution of impaired mitophagy to all-trans-retinal induced retinal pigment epithelial cell degeneration, an implication for Stargardt disease and age-related macular degeneration

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PURPOSE. Visual (retinoid) cycle is an essential metabolic process to convert light into electrical signals in eye. Aberrant visual (retinoid) cycle, especially the accumulation of intermediate product all-*trans*-retinal (atRAL), is considered as the major cause of Stargardt disease and age-related macular degeneration (AMD). Recently, defective mitochondria are implicated in the retinal pigment epithelium (RPE) cell loss in AMD. Moreover, mitophagy eliminates damaged mitochondria under both physiological and pathological conditions. Thereby, here we try to elucidate how mitophagy involves in atRAL induced RPE degeneration.

METHODS. Primary porcine RPE (pRPE) cells were utilized. Mitochondrial oxygen consumption rate (OCR) was monitored by Seahorse Bioscience XF^{e}96 Extracellular Flux Analyzer, and its morphology was imaged by confocal fluorescence microscopy. Autophagosome formation was detected by both electron microscopy (EM) and fluorescence microscopy. Mitochondrial fission/fusion protein markers and membrane proteins as well as autophagy regulatory proteins were analyzed by Western blots.

RESULTS. In pRPE cells treated with 40 μM atRAL, a decrease of OCR was observed, and tubular mitochondria network disintegrated to punctiform. The amounts of mitochondrial fusion proteins MFN1 and MFN2 were reduced accompanying mitochondrial morphological alterations. Moreover, mitochondria were ubiquitinated, and autophagic markers LC3 and SQSTM1 were found to co-localize with TOM20, a mitochondrial outer membrane protein. Moreover, aggregation of mitochondrial membrane proteins such as TOM20, TIM23, and cytochrome c oxidase subunit IV (COXIV) was observed. Simultaneously, protein levels of autophagic markers Beclin1, LC3 and SQSTM1 were increased.

CONCLUSIONS. Our results found that over-accumulation of atRAL caused mitochondrial dysfunction and mitophagy defects in RPE.

OR-061

Inhibiting the expression of Sox2 increased the differentiation of retinal bipolar cells in postnatal mouse retina

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Purpose: Sox2, a neuronal stem cell-associated transcription factor, regulates neural development in maintains and vertebrates neural stem cell identity in the central nervous system. This study is to identify a novel functional role of Sox2 during bipolar cells differentiation in postnatal mouse retina.
Methods: Injection and electroporation in P0 CD1 mouse retina: 1 μl of shRNA to knockdown Sox2 (pSico-shSOX2+IRES+GFP) (3 μg/μl) or vehicle only was injected into the subretinal space, using a Microliter Syringe (Hamilton). Immediately following injection, electric pulses (100 V; five 50 ms pulses with 950 ms pause intervals) were applied through tweezer-type electrodes using the pulse generator ECM 830 (BTX). Scotopic ERG was performed to check the retina neuron function at P30 and P60. IOP was also monitored every month. Transfected retinas were collected for analysis. Immunohistochemistry cell staining with type-specific markers were performed to identify retinal neurons number change. RNA-seq was performed to identify RNA changes of the retina when Sox2 is inhibited.

Results: At P12, P30, P60, inhibition of Sox2 leads to a significant increase of unregulated bipolar cells number and a decrease number of amacrine cells in transfected retinas. However, very surprisingly, the scotopic ERG b-wave amplitude significantly decreased in Sox2i-treated retinas, indicate the gained bipolar cells either has no function, or the overall retina bipolar cells function decreased as well. IOP has no change during the whole process. RNA-seq analysis of developmental stage-specific retinal transcriptomes showed that Vsx2, Isl1, Otx2 etc. which were transcription factors of bipolar cells had a high level of expression in P12.
Conclusion: Sox2 protein plays an important influence on retina bipolar cells differentiation and modulates function of bipolar cells in the mouse retina developmental stage.

OR-062

多巴胺 D1 和 D2 受体在先天性近视进展中的作用

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目的 多巴胺合成异常的白化豚鼠出现高度近视，给与多巴胺非选择性受体激动剂 Apomorphine 低浓度促进其近视发展，高浓度则抑制其近视发展，但通过何种受体起作用尚未明确。本实验目的用多巴胺受体特异性药物干预进一步探讨 Apomorphine 在白化近视进展中的作用。
方法 选择 2 周龄近视的白化豚鼠，分为正常组（N=23）、溶剂组（N=27）、低浓度 Apomorphine 组（25ng）（N=15）、低浓度 Apomorphine（25ng）+D2 受体拮抗剂 Sulpiride 组（N=21）、高浓度 Apomorphine 组（250ng）（N=20）、高浓度 Apomorphine（250ng）+D1 受体拮抗剂 SCH23390 组（N=20）。每天行球后注射，连续注射 4 周。实验前、实验 2 周、4 周分别检测屈光度、眼轴参数。
结果 给药 4 周后，正常组和溶剂组相比，屈光和眼轴各参数都均无统计学差异。近视白化豚鼠注射 Apomorphine 成双向作用，并有统计学意义。高浓度 Apomorphine+ SCH23390 组，SCH23390 能拮抗高浓度 Apomorphine 抑制近视的作用，屈光-11.18±5.17D vs-8.60±5.07 D ($p<0.05$)，相对溶剂组-11.83±4.11 D ($p>0.05$)，并且眼轴参数也有相应的变化。低浓度 Apomorphine+ Sulpiride 组，Sulpiride 能拮抗低浓度 Apomorphine 促进近视的作用，屈光-12.18±4.85D vs-15.00±5.49 D ($p<0.05$)，眼轴等参数存在类似的改变但无统计学意义。
结论 高浓度 Apomorphine 抑制白化病近视进展通过 D1 受体，低浓度 Apomorphine 促进近视进展通过 D2 受体，进一步提示多巴胺 D1 和 D2 受体在屈光发育和近视形成中存在相反的作用
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OR-063

视网膜缝隙连接在三色豚鼠屈光发育中的作用

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目的：电耦联是视网膜信号传导重要部分。本课题拟研究视网膜缝隙连接在豚鼠屈光发育中的作用，以及近视过程中视网膜缝隙连接功能和缝隙连接蛋白表达的改变。
方法：18-β-GA）明确阻断缝隙连接对豚鼠屈光以及视网膜水平细胞电耦联，Cx36 的表达及其磷酸化水平的影响。
结果：形觉剥夺扩大了水平细胞生物素的扩散，但灰色视标及镜片离焦不影响水平细胞生物素扩散范围（P＞0.05)。形觉剥夺使内丛状层 Cx36 斑块的磷酸化水平（P＜0.05）以及 Cx36 斑块中发生磷酸化的百分比均下降（P＜0.05），但对外丛状层各参数没有显著影响。
18-β-GA 可诱导出剂量依赖性近视,且伴有眼轴延长（p＜0.05）。18-β-GA 使明适应条件下水平细胞生物素扩散明显降低（P＜0.05），但对暗适应后该参数无显著影响（P=0.398）。外丛状层 Cx36 斑块的荧光强度和平均面积减少(P＜0.05)，磷酸化水平以及磷酸化的百分比无明显变化（P＞0.05）。在内丛状层 Cx36 斑块的荧光强度下降（P＜0.05）、磷酸化水平以及磷酸化的百分比下降(P＜0.01)。
结论：形觉剥夺过程中视网膜水平细胞的耦联水平上升可能由于形觉剥夺引起的光照下降引起。形觉剥夺同时引起了视网膜内丛状层 Cx36 水平下降。球旁注射缝隙连接拮抗剂 18-β-GA，可以诱导近视，同时伴有水平细胞之间的电耦联水平下降，内丛状层 Cx36 磷酸化水平下降。以上结果提示内丛状层 Cx36 的功能参与豚鼠近视形成。

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OR-064

Sclera-specific Hif-1α knockdown attenuates form deprivation myopia (FDM) development in mice

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Purpose
Hypoxia contributes to myopia development in form deprived (FD) mice and guinea pigs through promoting myofibroblast transdifferentiation and suppressing collagen synthesis, whereas two hypoxia inhibitors slowed FDM development. To confirm the role of hypoxia in myopia development, we determined the effect of sclera-specific hypoxia inducible factor-1α (Hif-1α) knockdown on scleral remodeling and FDM development in mice.
Methods
To generate sclera-specific Hif-1α knockdown mice, *Hif-1α*$^{fl/fl}$ mice were injected with an AAV8-packaged Cre overexpressing vector (AAV8-Cre) in the sub-Tenon's capsule. The effects of scleral Hif-1α knockdown on myopia development were evaluated in 4-week-old *Hif-1α*$^{fl/fl}$ mice. They were randomly assigned to three different groups: mice injected with either AAV8-Cre overexpression vector or AAV8-package empty vector, and after a week FDM was initiated for the next 2 weeks (AAV8-Cre+FD and AAV8-vector+FD). Non-injected mice subjected to FDM served as the controls (Control+FD). Refraction and ocular biometric parameters were measured before and 2 weeks after FD (weeks 5 and 7). Western blot analysis determined protein expression levels of Hif-1α and Col1α1. α-SMA measurements assessed myofibroblast transdifferentiation.
Results
Consistent with our previous study, after 2 weeks of form deprivation, Hif-1α protein expression was significantly higher in FD treated (FD-T) eyes than in untreated fellow (FD-F) eyes of the AAV8-Vector+FD group. In contrast, this increase was suppressed in FD-T eyes of AAV8-Cre+FD mice compared with FD-T eyes of AAV8-Vector+FD mice. AAV8-Vector+FD mice exhibited significantly higher α-SMA expression and lower Col1α1 expression in FD-T eyes than in FD-F eyes. These protein expression level changes were inhibited in FD-T eyes of AAV8-*Cre*+FD mice compared with FD-T eyes of AAV8-Vector+FD mice. After 2 weeks of form deprivation, significant myopia was induced in the Control+FD and AAV8-Vector+FD groups but not in the AAV8-*Cre*+FD group. Myopia development was significantly suppressed in these sclera-specific Hif-1α knockdown mice. In parallel with refraction changes, AL and VCD increases were also significantly less in AAV8-*Cre*+FD mice than in AAV8-Vector+FD mice.
Conclusions

These results thus indicate that reducing scleral Hif-1α expression levels attenuate myopia development in a form deprivation mouse model.

OR-065

电针干预对近视眼底病豚鼠视觉诱发电位及视皮层 GABA 的影响

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目的：探讨电针干预对近视并发眼底病豚鼠眼底病理改变、视觉诱发电位和视皮层 GABA 的影响。
方法：出生后 2 周龄雄性豚鼠随机分为 5 组：正常对照组、近视组、近视+电针干预组，近视+视皮层微量注射生理盐水组，近视+视皮层微量注射 GABA 合成抑制剂 3-MPA 组。应用-10D 透镜诱导豚鼠右眼近视；电针干预组应用电针刺激双侧太阳、合谷穴，每日 30 分钟，每周至少 5 天。1 月后对各组进行进行眼底照相、视觉诱发电位(VEP)检测，应用高效液相色谱检测视皮层 GABA、ELISA 检测 GABA 合成酶 GAD 含量，应用实时荧光定量 PCR 检测 GABA 受体的改变。微量注射组分别于近视造模 15 天至 30 天期间进行脑内微量注射，每 3 天注射一次，共注射 5 次，注射结束后进行 VEP 检测和眼底照相。
结果：(1) 正常组眼底较少出现视网膜变薄，萎缩斑等病理改变，近视造模组 60%眼的眼底出现视网膜变薄，20%眼的眼底出现萎缩斑。与正常对照组比较，近视组 VEP 的 N2P2 振幅显著降低；N2,P2,N3 潜时延长。此外，近视模型组 GAD，GABA 及 GABA A 和 C 受体含量均显著增加。（2）近视+针灸干预组 67%的眼亦出现视网膜变薄，17%的眼亦出现萎缩斑。与近视模型组比较，电针干预可以显著增高 VEP 的 N2P2 波；电针干预后 N2,P2,N3 潜时较非针灸干预组显著缩短。电针干预还可降低视皮层 GABA，GAD 含量和 GABA A 受体水平。（3）视皮层微量注射 3-MPA 组仍有 83%的眼出现视网膜变薄，17%的眼亦出现萎缩斑。近视模型组视皮层微量注射 3-MPA 后 N2,P2,N3 潜时与溶剂对照组比较显著降低。N2P2 振幅没有显著变化。
结论：电针干预虽不能纠正近视并发眼底病豚鼠的眼底病理改变，但可以纠正近视豚鼠升高的 VEP N2,P2,N3 潜时，其作用可能与视皮层 GABA 变化相关。

OR-066

视锥细胞矩阵结构紊乱导致斑马鱼近视

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目的：近视是一种非常普遍的人类疾病。据调查，在东亚地区，90%以上 20 岁以上成年人具有不同程度的近视。高度近视也是人类重要致盲性眼病之一。在世界范围内，有超过 20%的致盲是因为未矫正的屈光不正引起（*Lancet Glob Health 2017;*5: e1221–34 ）。但近视的致病原因与机理至今仍未能明确。环境和遗传因素都会影响近视的发展。通过 GWAS 分析，目前已筛选到超过 200 个近视风险基因，但仍然只覆盖了少部分近视患者，且这些基因的致病机制亦不清楚。遗传因素大致可以归类为两个方面，一个方面是影响视网膜神经细胞，如感光细胞和双极细胞等，另一个方面是影响巩膜细胞外基质的组成和代谢。然而，关于感光细胞如何影响近视仍然知之甚少。因此，本研究旨在研究感光细胞的组成与组织结构是否与近视相关

方法：通过综合比较小鼠、鸡和斑马鱼这些模式动物，我们选取斑马鱼为模型，通过 CRISPR-Cas9 技术敲出 Crb2b 和 Tbx2b 基因，采用动物行为学和免疫组化等分析方法，分析基因敲除斑马鱼捕食观察距离和捕食效果，分析视锥矩阵结构紊乱后斑马鱼是否表现出近视特征。

结果：研究结果表明，Crb2b 和 Tbx2b 等基因敲除后，斑马鱼视锥矩阵结构紊乱，斑马鱼表现出明显的近视特征，其捕食距离比野生型缩短 30%左右，在测试条件下突变型斑马鱼的捕食效率比野生型降低 20%以上。

讨论：小规模临床研究表明， L / M 视锥细胞比例可能与近视有关。此外，在鸡中的研究表明，L/M 视锥细胞比例可以与眼球大小和折光基线有关。因此，基于本研究的实验结果，我们推测，人类黄斑区视锥细胞的组成和组织结构可能是近视易感性的一个重要决定因素。

OR-067

MicroRNA-146a modulates the inflammation in dry eye disease

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Aim *Dry eye disease is one of the most common ophthalmologic diseases that can potentially affect the ocular surface resulting in a low quality of life. Inflammation is recognized as playing an etiological role in dry eye disease. Recent studies have identified microRNAs (miRNAs) as important regulators of diverse biological processes including inflammation. This study aimed to assess the expression and role of miR-146a in the animal models with dry eye disease.*

Methods *5-7 week-old BAKB/c mice treated with benzalkonium chloride to induce dry eye. The ocular surface examination including the tear film breakup time (TBUT), Schirmer test, and corneal fluorescein staining score (FLS) were performed. The expression of miR-146a, interleukin (IL)-1, IL-6, IL-8, interleukin -1 receptor associated kinase 1 (IRAK1) and tumor necrosis factor receptor associated factor 6 (TRAF6) were detected through real-time quantitative PCR. Histology examination including hematoxylin eosin (HE) staining and periodic acid-schiff staining (PAS) were performed.*

Results *TBUT in the dry eye group was significantly declined compared with control. FLS was significantly higher than that in the control. HE staining showed that in dry eye group, corneal epithelial cell layer was uneven and the number of cells increased; and Collagenous fibers in the corneal stromal layer were irregular and accompanied with keratocytes activation. Besides, the number of conjunctival epithelial cells was also increased and uneven and accompanied with the defect in the dry eye group. PAS showed that the number of goblet cells in dry eye group was significantly lower than that in the control. The expression level of miR-146a, IL-1, IL-6, Il-8 was increased in the cornea and conjunctiva in dry eye group in compared with the control. The validated targets of miR-146a including IRAK1 and TRAF6 were decreased in corneal and conjunctival in dry eye group.*

Conclusion *In dry eye disease, owing to the onset of inflammation, negative feedback regulation might be involved in, which is dependent on the up-regulation expression of miR-146a and the effect of miR-146a on the target gene in inflammation.*

OR-068

Topical Application of Benzalkonium Chloride Increases CD4+ T Cell-mediated Inflammation in Ocular Surface of Mice

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PURPOSE. *To determine if topical application of Benzalkonium Chloride (BAC) induce CD4+ T cell-mediated immunocyte and ocular surface damage in mice.*

METHODS. *Topical treatment of BAC was applied in C57BL/6 mice. Oregon-green-dextran (OGD) staining was performed to assess corneal epithelial barrier function. PAS staining was used to quantify conjunctival goblet cells. The phenol red cotton test was used to measure tear production. Immunohistochemical staining was used to detect the infiltration of $CD4^+$ T cells and mast cells. Quantitative (q) RT-PCR assay and ELISA assay were used to measure the gene expressions or protein levels of IFN-γ, IL-17, IL-13, IL-4 and IL-5 in conjunctiva and cervical lymph node (CLN). Adoptive transplantation of $CD4^+$ T cells isolated from the mice after treatment of BAC into the nude mice was conducted to identify the function of $CD4^+$ T cell-mediated inflammation.*

RESULTS. *Topical administration of BAC induced corneal barrier dysfunction, goblet cell loss, and decrease of tear production. BAC also resulted in infiltration of $CD4^+$ T cells and mast cells in conjunctiva, and increased gene expressions and protein levels of IFN-γ, IL-17, IL-13, IL-4 and*

IL-5 in conjunctiva and cervical lymph nodes. Furthermore, adoptive transplantation of $CD4^+$ T cells into nude mice increased immunocyte and $CD4^+$ T cell-mediated inflammation, and caused ocular surface damage.

CONCLUSIONS. *Topical application of BAC induced ocular surface damage through $CD4^+$ T cell-mediated inflammation.*

OR-069

Interaction of mannose binding lectin and other pattern recognition receptors in human corneal epithelial cells during Aspergillus fumigatus infection

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Mannose binding lectin (MBL), a member of C-type lectin superfamily, plays a significant role in the innate immune system as one of the Pattern-Recognition Receptors (PRRs). This study investigated the relationship between MBL and other PRRs including Dectin-1and TLR2, and detected the reaction of MBL towards the expression of cytokines in human corneal epithelial cells (HCECs) and murine corneas upon Aspergillus fumigatus (A. fumigatus) hyphae infection. We found that MBL was significantly up-regulated in C57BL/6 corneas infected with A. fumigatus and HCECs incubated with A. fumigatus hyphae. Moreover, both of mRNA and protein levels of Dectin-1, TLR2, IL-1β and TNF-α were increased dramatically to peak point with the pretreatment of exogenous MBL, while decreased significantly with the pretreatment of MBL monoclonal antibody in HCECs. Pretreatment with laminarin and TLR2 neutralizing antibody decreased both of mRNA and protein levels of MBL and proinflammatory mediators (IL-1β and TNF-α) in A. fumigatus hyphae infected HCECs. These data demonstrate that A. fumigatus introduce the expression of MBL in human corneas, C57BL/6 corneas and HCECs. MBL, Dectin-1 and TLR2 interact with each other upon the treatment of A. fumigatus, and MBL contributes to the innate immune responses by regulating proinflammatory mediators, such as IL-1β and TNF-α.

OR-070

Tofacitinib has preventive and therapeutic effects for uveitis in mice model by regulating Th17/Treg cell balance

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Abstract
Purpose: To explore the roles of tofacitinib in the treatment of uveitis and the underlying mechanisms.
Methods: The first group of experimental autoimmune uveitis (EAU) mice were intraperitoneally injected with different dose of Tofacitinib (30 mg/kg,10mg/kg,5mg/kg) on alternate days, from the day of the induced immunization until euthanasia on postoperative day(day 28). The second group of EAU mice were treated with the exact same way after the onset of uveitis(day 14 to day 28).EAU mice control groups were setted. The clinical signs of the uveitis were evaluated by fundus opthalmoscope, histological examinationa and recorded according to a previously published system. Proinflammatory cytokines expression in serum were detected by histology, western blot, and real-time PCR. The Th17/Treg balance and other subtypes lymb cell levels in mice model are tested by flow cytometry in vivo. We also explore the mechanisms of tofacitinib on Th17/Treg balance in vitro.
Results: In comparison with the control group, treatment with tofacitinib significantly prevents uveitis from happening in EAU mice. Moreover, tofaticinib treatment alleviated fundus inflammation in vivo and in vitro, as characterized by downregulated CD4(+) IFNγ(+) IL17(+) TNFa(+) cells frequency,upregulated CD4(+) Foxp3(+) CD25(+) cells frequency, and related RNA levels of pro-inflammatory mediators such as IFNγ(+), IL17(+), TNFa(+), IL22, IL10, IL1b. It reduced serum levels of other proinflammatory cytokines and interferon responses in splenocytes and lymph gland tissue.
Conclusions: Our results demonstrate that tofacitinib, a JAK inhibitor approved by FDA, plays a positive role in prevention and teatment in EAU mice. These findings indicate that tofaticinib might be a potential alternative treatment for uveitis, providing further evidence for clinical application.

OR-071

树突状细胞参与介导角膜烟曲霉菌感染 Th17 型炎症反应的实验研究

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目的：研究角膜烟曲霉菌感染中，树突状细胞对 Th17 型获得性免疫的诱导作用。
方法：构建角膜烟曲霉菌感染的 C57 小鼠动物模型，于感染的不同时间点进行裂隙灯拍照，临床评分观察各组的感染程度和临床转归，检测小鼠角膜中炎细胞的浸润，DCs 的表达、分布、迁移、活化和分型情况，检测 Th17 趋化因子的表达水平，以及 Th17 细胞分泌的 Th17 细胞因子表达量。
结果：本研究中，动物模型的感染及炎细胞的浸润程度随感染时间推移而逐渐加重，在感染后第三天达到高峰，而后逐渐减轻，至感染后第七天基本自愈。PCR 和 Elisa 等检测结果表明，在感染过程中 DCs 的表达明显增加，DCs 活化成熟，由基底膜向角膜上皮层逐渐迁移。在此过程中，角膜中 Th17 趋化因子的表达明显增加，Th17 细胞分泌的 Th17 细胞因子的量也明显上升。
结论：烟曲霉菌感染后，小鼠角膜内 DCs 大量聚集、成熟，分泌 Th17 趋化因子，分泌 Th17 因子，诱导 Th17 炎症反应。在此过程中，MΦ、PMN 和 NK 细胞等炎症细胞也参与了小鼠抗真菌感染的免疫反应。这为深入研究角膜的免疫防御体系，寻找抗真菌感染的有效途径提供理论依据。

OR-072

Retinal transcriptome analysis in the treatment of endotoxin induced uveitis with tetramethylpyrazine eyedrops

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PURPOSE: To investigate retinal gene expression of tetramethylpyrazine eyedrops treated endotoxin induced uveitis (EIU) in mice and to explore the mechanisms.
METHODS: The inflammatory signs of the anterior segment were evaluated,and clinical scores were graded. The retinal transcriptome from the TMP eyedrops treated and the untreated mice was identified by RNA sequencing (RNA-seq) strategy. DEGs were validated by real time-PCR. The protein-to-protein interaction (PPI) was analyzed by using the STRING software.
RESULTS: Compared with the TMP treated group, the inflammatory responses of the untreated control group were much severe and clinical score was remarkably higher($p<0.001$) at 24h after LPS administration. RNA-seq assay identified 407 DEGs, among which 356 were up-regulated and 51 were down-regulated. There were 12 up-regulated GO terms enriched and 27 up-regulated pathways. Seven DEGs, including inflammation-related, complementsystem-related and interferon-related genes were validated by using Q-PCR.

CONCLUSIONS:TMP exerted anti-inflammatory effect in EIU. Local application of TMP inhibited retinal inflammatory response by regulating the inflammation related genes, suggesting TMP may be a potential novel therapeutic drug for ocular inflammation.

OR-073

Microglia mediate synaptic material clearance at the early stage of rats with retinitis pigmentosa

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Resident microglia are the main immune cells in the retina and play a key role in the pathogenesis of retinitis pigmentosa (RP). Many previous studies on the roles of microglia mainly focused on the neurotoxicity or neuroprotection of photoreceptors, while their contributions to synaptic remodeling of neuronal circuits in the retina of early RP remained unclarified. In the present study, we explored the roles of microglia in synaptic remodeling of neuronal circuits at the early stage of RP using RCS rat models.Then, a CSF1R inhibitor was used to generically ablate microglia in the RP retina in a sustained manner to validate the effects of microglia on synapse loss and visual function. Using immunohistochemical techniques and electron microscopy, the mechanism underlying the effects of microglia on the synapses of RBCs in the retina were investigated. Our findings revealed that rod degeneration resulted in synapse disruption and loss in the outer plexiform layer (OPL) at the early stage of RP. Coincidentally, the resident microglia in the OPL increased phagocytosis and mainly engaged in phagocytic engulfment of postsynaptic mGluR6 of rod bipolar cells (RBCs). Complement pathway might be involved in clearance of postsynaptic elements of RBCs by microglia. We pharmacologically deleted microglia using a CSF1 receptor (CSF1R) inhibitor to confirm this finding, and found that it caused the accumulation of postsynaptic mGluR6 levels and increased the number and length of ectopic dendrites in the RBCs. Interestingly, the numbers of presynaptic sites expressing CtBP2 and colocalized puncta in the OPL of RCS rats were not affected by microglia elimination. However, sustained microglial depletion led to progressive functional deterioration in the retinal responses to light in RCS rats. Based on our results, microglia mediated the remodeling of RBCs by phagocytosing postsynaptic materials and inhibiting ectopic neuritogenesis, contributing to delay the deterioration of vision at the early stage of RP.

OR-074

利用新一代测序技术探究幼年型特发性关节炎性葡萄膜炎的致病机理

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目的：幼年型特发性关节炎性葡萄膜炎（Juvenile idiopathic arthritis-associated uveitis，JIAU）是儿童最常见的葡萄膜炎，也是幼年型特发性关节炎（JIA）最常见的关节外表现。JIA 发病通常被认为是一种多基因遗传病，越来越多的基因多态性研究发现其与 SNP 变异有关，而家族性 JIAU 遗传学研究报道较少。本研究基于一例显现遗传的 JIAU 家系，利用新一代测序技术探究其致病机理。方法：我们收集了诊断为 JIAU 的先证者和其父亲，以及无症状的母亲。我们对先证者进行了全外显子组测序，并用系统的生物信息学方法分析过滤变异位点，结合多种致病性预测工具。再将得到的候选变异在其父亲和母亲的样本中进行一代测序验证，排除不符合共分离的变异。结果：我们在门诊发现一个葡萄膜炎家系，先证者表现为幼年发病的腕关节、掌指关节炎、双眼慢性前葡萄膜炎，我院门诊诊断 JIAU，其父亲有葡萄膜炎病史，未正规诊治。父母否认亲近结婚，母亲及弟弟均无类似病史。经过外显子测序和生物信息学分析以及家系共分离验证，我们总共发现了两个候选的突变位点，分别是位于 CRYGD 基因的无义突变（p.Y56X）和 ABCA7 基因的错义突变（p.A273V）。结论：CRYGD 基因已经被报道其突变可以导致先天性白内障，而 ABCA7 基因变异的功能和眼病的关联之前并无任何相关研究。本研究首次在 JIAU 病人的基因组上发现了一个全新的 ABCA7 变异以及一个已报到的 CRYGD，提示其致病机理有可能跟这两个基因存在关联。其具体的致病机理还有待更深入的功能学研究。

OR-075

Multiple steps determine CD73 shedding from RPE: lipid raft localization, ARA1 interaction and MMP-9 up-regulation

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Objective：Physiologically, retinal pigment epithelium (RPE) expresses high levels of CD73 in their membrane, converting AMP to immune suppressive adenosine, mediates an anti-inflammatory effect. However, after being exposed to inflammatory factors RPE rapidly become CD73-negative cells; which render RPE's immune suppressive function and accelerates local inflammation. Here, we investigated the mechanism leading to the loss of membrane CD73 in RPE.

Method: Membrane localized CD73 molecule and mRNA expression of Cd73 gene in RPE under normal and inflammatory conditions were detected by western blot and qPCR respectively. Then it was tested which enzyme, PI-PLC or MMPs, mediated CD73 releasing from PRE. By the expression of mutant recombinant CD73 in *Cd73*$^{-/-}$ PRE the MMP-9 catalyzing site in CD73 was figured out. Co- immunopricipation following by peptide sequencing was applied to identify the CD73 associated molecule which is necessary for CD73 being recognized by MMP-9. At last whether lipid rafts synthesis is indispensable for shuttling ARA1 to CD73 to form the digestible complex.

Results: We found the controversy that when membrane CD73 was significantly diminished in inflammatory RPE, *Cd73* mRNA levels were not changed at all. It was further verified that, matrix metalloproteinase-9 (MMP-9) mediated the shedding of CD73 from the cell membrane of inflammatory RPE by catalyzing its K547/F548 site. However, MMP-9 could not catalyze uncomplexed CD73, the interaction of CD73 with adenosine receptor A1 subtype (ARA1) is necessary for being catalyzed by MMP-9. After being treated by LPS and TNF-α the formation of CD73/ARA1 complex in RPE was verified by co-immunopricipation and FRET-based assays. It was also revealed that CD73 need to be localized in lipid rafts to be capable of interacting with ARA1, since CD73/ARA1 interaction and CD73 shedding were completely blocked by the addition of lipid raft synthesis inhibitor.

Conclusion: As a conclusion, multiple steps are involved in CD73 shedding in RPE, including up-regulation of MMP-9 activity, localization of CD73 in lipid rafts and the formation of CD73/ARA1 complex. Lipid rafts committed CD73 with high mobility, shuttled CD73 to ARA1 to form a complex, which was capable of being recognized and catalyzed by MMP-9.

OR-076

Doxycycline suppresses ocular inflammation by Stat3/miR155/Th17 pathway

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PURPOSE: Uveitis is catastrophic intraocular inflammation and contributing to over 10% blindness in China.

Current therapeutics for uveitis are mainly corticosteroids and immunosuppressive agents, and good efficacy has been shown in most patients. However, high costs and long term adverse complications of the current therapeutics are unneglectable. Novel and effective treatment are desirable. As a broad spectrum and long acting antibiotic, Doxycycline has been used safely in clinics for the past decades. Recently, anti-inflammation and immunosuppressive effect of Doxycycline are attracting researchers‘ eyes. Doxycycline has been used to attenuate rheumatoid arthritis, rosacea, periodontitis and other autoimmune diseases. In this study, we aim to

investigate the effect of Doxycycline on experimental autoimmune uveitis(EAU) and further explore potential mechanisms.
METHODS: We induced EAU in C57BL/6C mice by immunization with interphotoreceptor retinoid-binding protein in complete Freund's adjuvant. Mice were gavaged Doxycycline 5mg/kg daily from Day 7 until Day 21. Disease severity was assessed by fundoscopy and histological examination. The development of inflammation or production of inflammatory molecules was assessed by flow cytometry and ELISA and mRNA analysis of cells in the draining lymph nodes and retina.
RESULTS: Treatment with doxycycline significantly reduced the clinical and pathological scores of EAU ($P < 0.001$), with significant decreases in inflammatory cell infiltration, protein concentrations, and the production of IL17A, TNFα, and IL6 in the draining lymph nodes and retina. In vitro, doxycycline significantly inhibited IRBP specific Th17 induction and IL17A production dependent on Stat3/miR155/Th17 pathway. Importantly, Doxycycline also suppresses systemic immune responses.
CONCLUSIONS: Oral administration of Doxycycline attenuated uveitis in the mouse EAU model by suppressing the expansion of pathogenic cells and migration into the retina. Stat3/miR155/Th17 pathway is essential for the anti-inflammatory and immunoregulatory effect of Doxycycline. Doxycycline is safe and effective, suggesting that oral administration of Doxycycline can be exploited as an alternative choice for human uveitis.

OR-077

Reduction of Myopic Axial Elongation by Suppressing the Expression of Amphiregulin in Experimental Myopia

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Purpose: To examine the influence of an intraocularly applied antibody to amphiregulin, a bifunctional growth modulator interacting with the epithelial growth factor/tissue growth factor-α receptor, on ocular axial elongation.
Methods: Guinea pigs (age:2-3 weeks) undergoing unilateral or bilateral lens-induced myopization (group 1), and guinea pigs which were primarily myopic at baseline without additional lens-induced myopization (group 2), received unilateral intraocular injections of amphiregulin antibody (doses:5,10,or 15μg) three times in intervals of 9 days, while the contralateral eyes received intraocular injections of Ringers solution.
Results: In intra-animal inter-eye comparison and intra-eye follow-up comparison in groups 1 and 2, the study eyes as compared to the contralateral eyes showed a dose-dependent reduction in axial elongation.

Conclusions: Repeated intraocular injection of amphiregulin-antibody was associated with a reduction of lens-induced axial myopic elongation and with reduction of the physiological eye enlargement in young guinea pigs.

OR-078

Organoid-derived human retinal progenitor cells promote a protective retinal microenvironment during transplantation in a model of retinal degeneration

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Background and purpose: Stem cell therapy may replace lost photoreceptors and preserve residual photoreceptors during retinal degeneration (RD). Unfortunately, the degenerative microenvironment compromises the fate of grafted cells, demanding supplementary strategies for microenvironment regulation. Donor cells with both proper regeneration capability and intrinsic ability to improve microenvironment are highly desired. The purpose of this study is to explore the therapeutic effect of organoid-derived C-Kit+/SSEA4- human retinal progenitor cells and the underlying mechanism.

Materials and method: A subpopulation of retinal progenitor cells (RPCs) was isolated through surface marker (C-Kit+/SSEA4-) sorting from human embryonic stem cell (hESC)-derived retinal organoids. Then, the characteristics of RPC were tested through immunofluorescence (IF), clone-forming essay and induced differentiation in vitro. C-Kit+/SSEA4- cells (hereafter called C-Kit+ cells) were labelled EGFP through leti-virus transfection and subretinally transplanted into RCS rats. fERG and optomotor response were used to determine visual function. IF, Western blots and RT-PCR were used to analyze the suppression of microglia and gliosis. Human microglial co-culture system was set up to detect microglial suppression in vitro. Transcriptional analysis was performed to identify immune- and inflammation-related differently expressed genes (DEGs).

Results: Isolated C-Kit+ cells were indeed a subpopulation of RPCs for being expressed of RPC markers, such as RAX, CHX10, PAX6. The C-Kit+ cells could form putative clone after two weeks and differentiate into multiple retinal cells in vitro, confirming its ability of self-renew and multi-differentiation. Following subretinal transplantation into RCS rats, C-Kit+ cells significantly improve vision and preserve the outer nuclear layer (ONL). We demonstrated that C-Kit+ cells migrated into ONL, expressed photoreceptor markers Recoverin and Gnat-1 following transplantation. Remarkably, C-Kit+ cells suppress microglial activation, gliosis and the

production of inflammatory mediators, thereby providing a healthier host microenvironment for the grafted cells and delaying RD. Convincingly, microglial suppression were supported by the reduced number of activated microglia, the reduced level of activation markers TSPO, and the presence of a less active morphology in C-Kit+ cell-transplanted group. Furthermore, the inflammatory response of LPS-treated human microglia was significantly dampened by co-cultured with C-Kit+ cells. To explore the underlying mechanism of microglial suppression, we identified a cohort of immune- and inflammation-related DEGs through transcriptional analysis between C-Kit+ cells and primary human RPCs.

Conclusion: C-Kit+ cells from hESC-derived retinal organoids are a promising therapeutic cell source for its ability to differentiate and improve retinal microenvironment.

OR-079

OPTN（E50K）点突变正常眼压性青光眼模型小鼠的 视神经退行性变及视觉功能损伤

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目的：利用 Crispr-cas9 基因组编辑技术建立的 OPTN（E50K）点突变正常眼压性青光眼(NTG）模型小鼠，研究 OPTN（E50K）点突变对视神经退行性变及视功能的影响，为研究 NTG 的发病机制和治疗提供新思路。
方法：以 3 个月及 16 个月月龄（M）的野生型（WT）和 OPTN（E50K）突变纯和型小鼠进行研究。回弹式眼压计测量眼压； OCT 活体检查和 HE 染色评价视网膜厚度；视网膜平铺计数评价 RGCs 存活数量；荧光标记的 CTB 行视神经逆向追踪评价轴突逆行运输功能；闪光视觉诱发电位（F-VEP）和明暗穿梭实验评价小鼠视觉功能。
结果：眼压在 3M 及 16M 组内突变组及 WT 组间均无明显差别（$P>0.05$，n=12/组）且眼压均在正常范围内。16M 组内：F-VEP 结果显示突变组较 WT 组主波 P2 振幅降低（$P<0.05$，n=10/组）， OCT 活体检查及 HE 染色结果显示突变组较 WT 组的视网膜厚度明显变薄（$P<0.05$，n=8/组），视网膜平铺计数显示突变组较 WT 组 RGCs 存活数目明显减低（$P<0.05$， n=8/组），CTB 视神经逆行标记显示突变组较 WT 组视神经纵行切片的荧光强度明显降低，即轴突逆行运输功能下降（$P<0.05$，n=8/组）；明暗穿梭实验显示突变组较 WT 组在明亮环境中停留时间明显延长（$P<0.05$，n=5/组）。以上结果在 3M 组内比较均无明显差异。
结论： OPTN（E50K）点突变小鼠是 NTG 的理想模型；OPTN（E50K）突变不改变眼压，可导致视功能下降、视网膜变薄及 RGCs 丢失，其轴突逆行运输功能下降可能是 OPTN（E50K）突变导致视功能损害的重要原因之一。

OR-080

年龄相关性黄斑变性进展的遗传、环境和表型危险因素

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目的：建立年龄相关性黄斑变性（AMD）由早期转变至晚期的预测模型，包括遗传、环境和表型危险因素（RF）。**方法：**病例对照研究，305 名早期/中期 AMD 患者，纳入 121 名，随访 5 年。AMD 分期和表型特征基于彩色眼底照片和光学相干层析成像（SD-OCT）。发展为晚期 AMD 分别对环境，表型和主要遗传危险因素进行 Logistic 回归分析（CFH rs1410996 与 ARMS2 rs10490924）。接收操作特性和 Hosmer Lemeshow 试验对简易模型进行验证。**结果：**平均随访 5.04 年，29 例（23.9%）进展至晚期 AMD。年龄（比值比（OR）：1.09，P = 0.004，95%可信区间（95% CI）：1.02-1.17），CFH rs1410996 OR：4.10，P = 0.001，95%可信区间：1.81-9.56），玻璃膜疣样色素上皮脱离（DPED，OR：20.21，P = $1.92x10^{-7}$，95%可信区间：6.42-61.67），高反射灶（HF）（OR：89.76，P = $2.10x10^{-6}$，95%可信区间：13.96-578.54），HF 位置（OR：11.53，P = 0.002，95%可信区间：2.45-55.12），中心玻璃膜疣位置（OR：10.76，P = $8.60x10^{-5}$，95%可信区间：3.27-34.57），网状玻璃膜疣（OR：6.22，P = 0.002，95%可信区间：2.01-18.38）和色素异常（或：9.12，P = $3.82x10^{-5}$，95%可信区间：3.18-26.05）与 AMD 的进展独立相关。预测模型，包括年龄，CFH rs1410996，DPED，HF，对过渡到晚期 AMD 有最高预测价值（曲线下面积：0.903）。**结论：**SD-OCT DPED 和 HF 同时出现，会增加 5 年内进展为晚期 AMD 的可能性。加强监测尽早发现进展必并予以治疗。

OR-081

应用斑马鱼模型研究 Hdac8 基因影响眼球发育的分子机制

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目的：探索 *Hdac8* 基因影响眼球发育的分子机制。方法：本研究以斑马鱼模式动物为模型，通过显微注射、整胚原位杂交、基因敲除等方法进行研究。结果：（1）*Hdac8* 基因在斑马鱼早期胚胎的眼球组织中有很强表达。（2）*Hdac8* 基因敲除导致眼球屈光异常，各类神经细胞比例异常。结论：Hdac8 致病的直接分子机制很可能并不局限于目前已报道的 cohesin 复合物去乙酰化，而是有新的重要的作用机制。

OR-082

慢病毒载体介导的外酶 C3 转移酶基因表达和对恒河猴的降眼压作用

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目的：评价慢病毒载体介导 C3 的转导体系对原代人小梁网细胞形态的影响，以及在猴眼球的降眼压效果。

方法：（1）事先制备好装载了 C3 基因的慢病毒载体（LV-C3）。将 LV-C3 转导人小梁网细胞后观察荧光表达情况和细胞形态变化，并且提取总 RNA 进行 RT-qPCR 以及提取总蛋白进行 western blot 实验，分别观察 C3 基因转录情况和 C3 基因表达对 RhoA 蛋白的影响。动物实验中，猴的左眼和右眼前房分别注射等剂量（TU）的 LV-C3 和 LV。眼球 GFP 的表达由 MicronIV型视网膜成像仪进行监测。猴眼压监测为注射后第 3 天测量一次，然后每隔 7 天测量一次。前房是否有炎症反应由裂隙灯进行监测，而房角各组织情况则由 UBM 和病理组织切片分别在活体和离体上进行观察。

结果：LV 介导 C3 的表达引起了人小梁网细胞的形态收缩变圆。RT-qPCR 检测到 C3 基因的高转录水平。Western blot 实验显示靶蛋白 RhoA 的水平下降和分子量增加。猴眼全房角组织在注射后的第 3 天即可见环形 GFP 表达，并且于注射后的第 35 天达到高峰。相对于对照组眼压，LV-C3 组眼压在注射后第 3 天开始出现显著降低（$p<0.05$），该降眼压效果持续至第 119 天。LV-C3 注射眼仅在注射后的前 5 天出现轻度炎症反应，随后未出现任何炎症表现。UBM 检查和眼前节病理组织结果显示组织无炎症反应。

结论： LV 介导 C3 的表达，不仅可以诱导培养的人小梁网细胞形态的改变，而且在注射入恒河猴眼前房后，于房角组织表达并有降眼压效果。

OR-083

Systematic analysis of the effects of dual-target therapy (anti-VEGF combined with shCTGF) on a potential new factor, Follistatin-like protein 1, in patients with PDR

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OBJECTIVE:The results of RNA-Seq analyses was used to explore related factors and verify a two-targeted treatment in proliferative diabetic retinopathy (PDR) patients.
Method: Monkey retinal vascular endothelial cells were cultured in vitro and transfected with a CTGFshRNA lentivirus. The knockdown efficiency of the lentivirus was quantified by PCR and Western blot analyses. In a high-glucose state, an anti-VEGF and CTGFshRNA dual-target model was used to simulate a clinical dual-target treatment in PDR patients, and RNA-Seq technology was used for whole transcriptome sequencing. iTRAQ was used for proteome sequencing of vitreous humour obtained from PDR patients treated with or without anti-VEGF injection to verify the results. The vitreous humour was collected from patients treated with or without anti-VEGF treatment and used for qualitative and quantitative ELISA. Blood samples collected from patients with and without PDR were used to quantitatively verify differentially expressed factors. Proliferative membranes were collected from patients treated with and without anti-VEGF treatment and used for auxiliary analysis. In vitro hypoxia cell model was constructed, and differential factors were quantified by PCR to explore the role of oxidative stress.
RESULT:
Real-time PCR testing found significant differences in the gene expression levels of CTGF、FN、α-SMA、COL1 between the knock-down group and the blank control group（F=128.83、124.44、144.76、1374.45，P=0.000、0.000、0.000、0.000）.Western blot analyses revealed that there were also significant differences in the levels of related proteins between the knock-down group and the blank control group（F=22.55、41.6、25.73、161.68，P=0.002、0.000、0.001、0.000）. A comparison of the V+LU vs. HG+LU+anti-CTGF groups showed that the following genes were differentially expressed: HMOX1, SPP1, GCLC, LCN2, ANTXR2, SQSTM1, FTH1, HSPA5, and TXNRD1. A pathway enrichment analysis showed that the differentially expressed genes (DEGs) between the two cell groups were related to the following: steroid hormone biosynthesis, steroid biosynthesis, the regulation of the actin cytoskeleton, prion diseases, porphyrin and chlorophyll metabolism, pertussis, nicotinate and nicotinamide metabolism, the extracellular membrane (ECM), hypertrophic cardiomyopathy (HCM), neuroactive ligand-receptor interactions, galactose metabolism, and cytokine-cytokine receptor interactions. In a comparison of the HG+LU vs. HG+LU+anti-CTGF groups, the following DEGs were identified: FSTL 1, E2F2, C9orf131, NNMT, and CARD9. A pathway enrichment analysis showed that the genes that were differentially expressed between the two cell groups were related to the following: vitamin digestion and absorption, tryptophan metabolism, steroid biosynthesis, sphingolipid metabolism, the notch signalling pathway, neuroactive ligand-receptor interactions, and the MAPK signalling pathway. A gene ontogeny (GO) enrichment analysis showed that these DEGs mainly act in three ways: regulating biological behaviours, organizing cellular components and performing molecular functions. FSTL1 and ECM receptor interactions were significantly different between the two groups. iTRAQ results showed that FSTL1 expression and the importance of the ECM receptor interactions pathway were significantly different between vitreous humour obtained from PDR patients treated with and without anti-VEGF treatment. PCR results showed that FSTL1 levels were significantly different between blood samples obtained from PDR and non-PDR patients. Patients with PDR who were treated

with intravitreal bevacizumab (IVB) showed stronger FSTL1 staining, consistent with the PCR results. Real-time PCR results in the in vitro constructed hypoxia model showed that FSTL1 expression was higher in the cells of model.
Conclusion: The CTGFshRNA lentivirus effectively knocked down CTGF expression, inhibited cell migration and downregulated the expression of FN, a-SMA and ColI. Anti-VEGF therapy may upregulate FSTL1 expression, while dual-target treatment resulted in FSTL1 downregulation. This effect of FSTL1 was associated with enhanced fibrosis.

OR-084

肿瘤坏死因子 α -308 g>A 基因多态性与糖尿病视网膜病变风险的更新荟萃分析

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目的：越来越多的研究结果表明，肿瘤坏死因子（tumor necrosis factor，TNF）-α 可提高糖尿病患者患视网膜病变的风险。多项研究指出，TNF-α 基因启动子的变异可能对罹患糖尿病视网膜病变的风险具有一定的影响，但其结论却尚未统一。鉴于近些年来新的研究结果的发表，我们对已有荟萃分析进行了更新，以评估 TNF-α-308 G>多态性与糖尿病视网膜病变的相关性。
方法：采用统计软件对相关文献与数据进行系统检索和分析。使用比值比（OR）和 95%置信区间（CI）来评估相关性的强度。
结果：本研究共纳入 8 项研究，其中包括 1698 例病例组和 2064 例对照组。对病例组和对照组之间的等位基因、基因型进行评估。总体分析表明，TNF-α-308 A 等位基因多态性与糖尿病视网膜病变存在相关性，其中，GA VS. GG: OR 1.21，95%CI 1.04-1.41；（GA+AA）VS. GG: OR 1.20，95%CI 1.03-1.39；A VS .G：1.14，95%CI 1.01-1.30。在按种族进行的亚组分析中，我们发现欧洲人群与糖尿病视网膜病变存在相关性，其中，GA VS. GG: OR 1.27，95%CI 1.06-1.51；（GA+AA）VS. GG: OR 1.25，95%CI 1.05-1.49；A VS. G：OR 1.17，95%CI 1.01-1.36。
结论：荟萃分析表明，TNF-α -308 A 可能增加糖尿病患者患视网膜病变的风险，且该差异具有种族相关性。

OR-085

重要眼病基于计算机辅助图像分析诊断技术研究

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目的：眼底疾病可导致视力下降，是致盲的首要原因。传统的眼底疾病早期筛查方法是眼底成像术与医生主观分析相结合，这无法满足当前大数据和精准医学的需求。眼底疾病 CADx 系统结合图像增强和深度学习技术，有望实现眼底疾病的智能诊断。
方法：通过研发的便携式眼底照相进行眼底数据采集，比较便携式眼底照相与传统桌面式眼底照相的成像质量。基于人眼视觉系统建立眼底图像质量评价系统，筛选出屈光介质混浊造成的失真眼底图像。建立基于视觉模糊度的屈光介质浑浊眼底图像增强系统，辅助医生诊断眼底疾病。建立青光眼眼底照相数据库，构建基于深度学习的青光眼 CADx 系统，通过 CADx 系统的灵敏度和特异性，验证算法应用在临床中的可行性。
结果：新型便携式眼底照相机可以在非散瞳情况下拍摄出和桌面式眼底照相相同质量的具有临床诊断价值的眼底图像。针对亮度和颜色失真、模糊失真以及对比度失真这三个方面来综合评价眼底图像的质量，三种失真的支持向量机分类器的曲线下面积（AUC）分别为 93.10%，93.14%和 87.83%。基于对比度限制的自适应直方图均衡的眼底图像质量增强后，青光眼分类的 AUC 为 99.6%，糖尿病视网膜病变（DR）分类为 98.9%，老年黄斑变性（AMD）分类为 97.5%，其他视网膜疾病为 97.9%，正常眼底为 97.6%。基于深度学习眼底图像诊断青光眼的计算机辅助诊断系统，辅助诊断青光眼的灵敏度为 92.1％，特异度为 89.6％，AUC 为 98.6%。
结论：新型便携式眼底照相机结合眼底图像质量评价系统可提供具有临床诊断价值的眼底图像。眼底图像质量增强和深度学习在眼病辅助诊断中显示出较高的灵敏度和特异性，为进一步实现眼科疾病的智能精准早期诊断提供相关研究基础。

OR-086

Evaluating the Vision of Children with an Electronic Vision Examination Platform Equipped with Behavior Recording Cameras and Artificial Intelligence

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Purpose: Development and validation of an artificial intelligence (AI) system for evaluating the visual acuity of children.
Design: Development of an automatic vision examination modality.
Participants: The dataset includes 1885 videos captured during the vision examination processes: N/A (Not Applicable) level (n = 56); visual acuity of [0.01 - 0.05] (ordinary, n = 335); visual acuity of [0.08 - 0.15] (better, n = 604); best (≥ 0.21, n = 401); uncooperative (n = 489).
Methods: A human-in-the-loop AI system that contains two rounds (human round and AI round) was created to examine the visual acuity of children. The second round simulated doctors' experiences using AI and videos captured with the platform to automatically and more accurately

evaluate the vision of children. AI and human can help each other and make whole system evolve to be more efficient and effective so that AI can finally be independent complete this task.
Main Outcome Measures: The main measure is the accuracy for evaluating the visual acuity of children. The intermediate processes were quantified with average precision for object localization; accuracy, sensitivity, specificity, and area under the receiver operating characteristics curves (AUC) for classification.
Results: All important objects can be effectively detected with an average precision of more than 85%. The visual acuities of [0.01 - 0.05] and [0.08 - 0.15] can be effectively classified with mean accuracy, mean sensitivity, mean specificity and mean AUC of more than 98%, 99%, 97% and 0.99, respectively. The accuracy of this system is improved with the optimization of all thresholds. The final accuracy of this system is 75.54%, which is considerably higher than a fully automatic video classification method (mean accuracy = 49.02%) which does not apply doctors' experiences. An additional 50 videos were evaluated by three other ophthalmologists, and the results show that this system can assess the vision of children more accurately than humans.
Conclusions: This system can evaluate the visual acuity of children better than a fully automatic video classification method that does not consider doctors' experiences. Moreover, this system can provide doctors with a reference for evaluating the vision of children.

OR-087

1990 年至 2015 年中国人群视觉损伤负担分析

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目的： 分析 2015 年中国人群视觉损伤负担并分析 1990 年至 2015 年视觉损伤负担的变化趋势。**研究方法：** 采用全球疾病负担研究（Global Burden of Diseases Study，GBD）的研究方法和数据，该研究是定量地评估疾病损伤对健康造成的损失的全球性合作研究项目。研究使用标准化的分析程序对各个疾病损伤对健康造成的负担进行测算，其评价方法实现了不同疾病、时间和地域间的健康数据的分析比较。**主要指标** 伤残损失寿命年（Years lived with disability，YLDs）,包括 YLDs、YLD 率和 YLD 构成比分布。**结果：** 2015 年中国人群视觉损伤的 YLDs 为 488.5 万人年，占全球视觉损伤 YLDs 总数的 17.3%。视觉损伤引起的 YLDs 随着年龄的增长呈现逐渐增长的趋势。1990 年至 2015 年间中国人群视觉损伤 YLDs 逐年增长，2015 年 YLDs （488.5 万人年）与 1990 年（288.3 万人年）相比增长了 69.4%。标准化 YLD 率在 1990 年至 2010 年间逐年增长，却在 2010 年至 2015 年间呈下降趋势，2015 年标准化 YLD 率（340.1/10 万）与 1990 年（330.4/10 万）相比仅增长了 2.94%。**结论：** 自 1990 年至 2015 年，我国人群视觉损伤负担呈现逐年增长的趋势。校正年龄构成和人口基数的影响后显示 2010 年后视觉损伤负担略有好转。

OR-088

基于眼底阅片的人工智能系统在 DR 筛查中的临床应用评价

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目的：
研究基于眼底阅片的人工智能（AI）系统在糖尿病视网膜病变（DR）筛查中的诊断效率与准确性。
方法：
通过迁移学习+NASNet 架构算法，对 4465 张精标眼底彩照（正常眼底 2510 张，DR1955 张）学习，建立针对 DR 的 AI 系统（ZOC-DR-V1）。1000 张确诊的眼底彩照（300 张正常眼底和 700 张不同程度 DR 眼底），分别交由 AI 系统组，眼科医生组（3 名医生）、内分泌科医生组（3 名医生），医生组均包含初级、中级和高级职称，分别进行阅片，记录 AI 系统和医生组的单张阅片时间和总耗时，比较 AI 系统与不同级别医师阅片准确率和效率的差异。
结果：
眼科 AI 系统（ZOC-DR-V1）完成训练后测试集的诊断符合率为 94.67%，AUC 为 0.994。在人机对抗中，内分泌组初、中、高级医生诊断符合率分别为：94%，91.4%，93.4%，眼科组初、中、高级医生符合率分别为 92.7%，94.4%，95.6%，AI 系统诊断符合率为：95.2%。AI 系统与眼科高级医生阅片诊断符合率无差异（P=0.749＞0.05）。
内分泌科组初、中、高级医生单张阅片时间和总耗时分别为：(4.63±1.87)s，1.29h；(3.74±3.47)s，1.04h ；(5.71±3.47)s，眼科医生组初中高级医生单张阅片时间和总耗时分别为 1.58h；(7.25±6.58)s，2.02h；(5.18±5.01)s，1.44h；(5.18±3.47)s，1.44h。AI 系统单张阅片时间和总耗时分别为(1.62±0.67)s，0.45h，AI 系统阅片时间优于医生组（P=0.000＜0.001）。
结论：
基于眼底阅片的眼科 AI 系统诊断符合率可达眼科专业高级职称医生水平，且具有良好的诊断效率，为大规模 DR 人群筛查提供了新的方法与平台。

OR-089

An Automated Screening System for Detection of Diabetic Retinopathy and Age-Related Macular Degeneration Using Deep Learning

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Purpose: The objective of this study was to develop robust diagnostic technology to automate screening of Diabetic retinopathy (DR), Age-related macular degeneration (AMD).
Methods: We developed and evaluated a data-driven deep learning algorithm as a novel diagnostic tool for automated Retinopathy detection. The algorithm processed color fundus images and classified them as healthy (no retinopathy) or having retinopathy, identifying relevant cases for medical referral. A total of 47 476 fundus images (negative: 26053; positive; 21423) from diabetic patients and 18 029 fundus images (negative: 9531; positive; 8498) from AMD patients were used to train and test to measure the precision-recall trade-off of our algorithm. We used area under the receiver operating characteristic curve (AUC) as a metric to measure the precision-recall trade-off of our algorithm, reporting associated sensitivity and specificity metrics on the receiver operating characteristic curve.
Results: For DR, our model achieved a 0.989 AUC with 94.7% and 96.1% sensitivity and specificity, respectively. We also tested our model using the public MESSIDOR 2 database for external validation, and it achieved a 0.933 AUC with 86.2% and 87.6% sensitivity and specificity, respectively. For AMD, our model achieved a 0.936 AUC with 85.3% and 88.7% sensitivity and specificity, respectively.
Conclusions: A fully data-driven artificial intelligence-based grading algorithm can be used with high accuracy in the detection of vision-threatening referable DR in retinal images. This technology offers potential to increase the efficiency and accessibility of DR screening programs. However, further research should be done for this grading algorithm on AMD.

OR-090

Deep Learning for Screening Manifest Strabismus Based on Telemedicine Photographs

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PURPOSE: To implement and evaluate a deep learning (DL) approach for screening strabismus based on telemedicine photographs.
METHODS: 3450 strabismus and 3500 non-strabismus images were acquired from telemedicine website in China. All images in dataset were graded by 3 senior ophthalmologists for the presence of manifest strabismus which was defined as misalignment of the first Purkinje I images from the center of patient's pupil. The latent, intermittent strabismus, or microtropias were excluded in this study. The images dataset was further randomly divided into a training set, a

validation set and a test set. Transfer learning and fine-tuned of the pre-trained convolutional neural network (CNN) was used to build DL algorithms in training and validation set. The test set was used to evaluate the performance of DL algorithms.
RESULTS: After grading by 3 senior ophthalmologists, 6153 images (3157 non-strabismus and 2997 strabismus images respectively) were included for final study. 4 DL alogrithms were trained with good convergence. On 444 testing images dataset, DL model achieves AUC from 0.978 to 0.998. There has a big performance gap between resident ophthalmologists (with accuracy from 0.827 to 0.870) and DL algorithms (with accuracy from 0.959 to 0.984).
CONCLUSIONS: Our study demonstrated that DL algorithms based on pre-trained CNN was capable of screening manifest strabismus with high sensitivity and specificity on telemedicine photographs.

OR-091

PEA 改善泪腺脂质代谢缓解睡眠剥夺诱发的干眼

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目的：睡眠剥夺（SD）引起小鼠泪腺脂质代谢异常，造成泪腺脂质堆积，减少泪液分泌量，出现干眼症状。在此过程中，一种内源性小分子脂质棕榈酰基乙醇胺（Palmitoylethanolamide，PEA）表达显著下降。本研究旨在讨论 PEA 在 SD 诱发干眼过程中的作用与机制。
方法：采用水上支架站立法建立 SD 小鼠模型，睡眠剥夺强度分别选取 5d 与 10d。HPLC-MS^n 法检测 SD 小鼠组织中 PEA 含量。溶剂组组与 PEA 处理组小鼠于 SD 6d 开始腹腔注射对照溶剂及 PEA 溶液，每日两次。SD 10d 后开展泪液分泌量、角膜敏感度、 OGD 与 PAS 染色等干眼临床指标检测，采取泪腺组织测量体积、质量，制备冰冻、石蜡切片与透射电镜样本。HE 染色评价泪腺腺泡细胞大小，油红 O 染色检测泪腺脂质堆积，透射电镜检测泪腺腺泡细胞超微结构。以 PPAR-$\alpha^{-/-}$和 PPAR-α 抑制剂 MK886 讨论主要作用机制。
结果：与对照组小鼠相比，SD 5d 与 10d 小鼠泪腺中 PEA 含量显著下降，主要由于合成酶 NAPE-PLD 表达显著下降所致。给予外源性 PEA 能梯度依赖性回升小鼠泪液分泌量，恢复腺泡细胞体积。PEA 能显著抑制泪腺脂质堆积，改善由于脂质堆积造成的细胞线粒体损伤，同时 PEA 能够增加结膜杯状细胞数量、增加泪液分泌量从而降低 SD 小鼠角膜敏感性、减少角膜屏障损伤，改善 SD 引发的干眼症状。PEA 的上述作用在 PPAR-α 敲除小鼠中以及给予 PPAR-α 抑制剂 MK886 后均未体现。
结论：PEA 参与了 SD 引发的泪腺病理变化及干眼发展过程。PEA 可通过减少泪腺腺泡细胞脂质堆积，改善腺泡细胞功能，从而改善 SD 引发的一系列干眼症状。这一过程可能经由全身系统发挥作用，而非局限在泪腺中。PEA 的主要药理作用主要由 PPAR-α 受体介导，可能作为缓解睡眠缺乏引发干眼症状的有效治疗手段。

OR-092

温敏壳聚糖凝胶复合 iPSC-MSC 外泌体促进角膜修复及机制研究

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目的：角膜病发病率高，致盲性强，角膜损伤形成瘢痕修复，表现为永久性角膜混浊，是角膜病导致视力障碍的主要原因。通过利用角膜组织工程技术来治疗和修复角膜损伤。
方法：通过外泌体作用于角膜细胞，评估外泌体是否影响细胞的相关功能，如增殖、迁移、分化和胶原相关基因表达等。将 iPSC-MSCs-Exosomes 进行 microRNA 测序分析，用 Real-time qPCR 进一步验证其表达量。在体内动物实验中验证组织工程角膜的修复作用。
结果：iPSC-MSCs 衍生的外泌体 Exosomes 能够促进角膜上皮细胞和角膜基质干细胞增殖，迁移和分化能力。外泌体 Exosomes 中高表达 miR-432-5p，其能促进角膜基质干细胞胶原相关基因表达。iPSC-MSCs 衍生的外泌体复合温敏壳聚糖凝胶组与 iPSC-MSCs 复合温敏壳聚糖凝胶组同样能显著的促进角膜基质层胶原聚集和规则排列,实验组大鼠获得了更加透明的角膜基质层,而对照组角膜基质层胶原堆积，排列紊乱。
结论：iPSC-MSCs 可通过外泌体 miR-432-5p 途径调控角膜基质层胶原分泌起作用。温敏壳聚糖凝胶复合 iPSC-MSCs 或 iPSC-MSCs-Exosomes 组织工程角膜在动物实验中的具有修复效果，为组织工程化角膜临床转化打下基础。

OR-093

α-Melanocyte-stimulating hormone protects against retinal damage in type 2 diabetic mouse model via MC4R/lncRNA TSIX/NCOA5 pathway

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Objective: To study the antagonistic effects of α-melanocyte-stimulating hormone (α-MSH) on vascular leakage and blood-retinal barrier (BRB) damage in mouse retinas of type 2 diabetes (T2D) and the molecular mechanisms underpinning the α-MSH's effects.
Methods: Eight-week-old type 2 diabetic mice (BKS-*db/db*) were randomly divided into diabetic group and diabetic+α-MSH group. Meanwhile, wild type mice (BKS+/+) were employed as normal controls. The metabolic parameters of all mice were monitored. At 10 and 12 weeks of age, the

mice in diabetic+α-MSH group were intravitreally injected with α-MSH (1 μl at 3.3 μg/μ1); whereas diabetic and normal control groups received equal amount of sterile saline. In another 3 weeks, electroretinogram (ERG), staining of hematoxylin and eosin (H&E), extravascular albumin, glial fibrillary acidic protein (GFAP), dihydroethidium (DHE), and terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) were performed to characterize the protective effects of α-MSH in type 2 diabetic retinas. *In vitro,* simian retinal vascular endothelial cells (RF/6A) were seeded into a 24-well format Transwell plate, establishing a cell culture model of inner BRB. The cells were divided into four groups: normal control group was maintained in conventional cell culture media; the cells in model group were stimulated by sodium palmitate (PAM) and high glucose (HG), mimicking the hyperlipidemic and hyperglycemic conditions under T2D; and the cells in two α-MSH-related groups were pretreated with α-MSH or α-MSH with a MC4R-specific antagonist HS024, and then were stimulated by PAM+HG as in the model group. Eight hours later, fluorescein isothiocyanate (FITC)-labeled dextran was used to examine the monolayer endothelial cell leakage, and the monolayer transendothelial electrical resistance (TEER) was also measured. Afterwards, all four groups of cells were collected for high-throughput RNA sequencing (RNA-seq), and the selected molecular targets downstream melanocortin receptor, the cognate receptor of α-MSH, were verified by quantitative real-time PCR (qPCR).

Results: Physiological monitoring showed that the *db/db* mice exhibited typical symptoms of T2D, such as hyperphagia, polydipsia, hyperglycemia, and dyslipidemia. ERG tests suggested that α-MSH restored partial electrophysiological functions in the diabetic mouse retina. H&E staining revealed that α-MSH increased the thickness of retinal nuclear layers and total retina in the *db/db* mice. Moreover, the vascular leakage of albumin was normalized and the reactive gliosis profoundly suppressed by α-MSH. Additionally, DHE and TUNEL staining demonstrated that α-MSH significantly alleviated the oxidative stress and apoptosis in the *db/db* retinas, respectively. On the other hand, the cell culture results showed revealed that under the stimulation of PAM and HG, the FITC-dextran leakage from the monolayer endothelial cells was increased as compared to the normal group, which, however, was reduced by α-MSH to the normal level. The α-MSH's anti-leakage effect was abrogated by the presence of HS024, the MC4R-specific antagonist. Conversely, PAM and HG stimulation in the BRB model decreased the TEER, which was augmented by α-MSH. Furthermore, the α-MSH's augmenting effect was also abolished by HS024. According to the RNA-seq results, α-MSH dramatically and significantly upregulated lncRNA TSIX and a transcriptional co-regulator NCOA5 in the retinal vascular endothelial cells stimulated with PAM and HG. The expression patterns of both genes were verified by qPCR.

Conclusions: Intravitreal administration of α-MSH restores morphology and electrophysiological functions, inhibits vascular leakage, oxidative stress, and apoptosis, and remarkably suppresses gliosis in T2D retinas. Further, the anti-vascular leakage effects of α-MSH in the diabetic retinas might be attributed to the MC4R-mediated up-regulation of a novel antisense lncRNA TSIX and the downstream co-regulatory factor NCOA5.

OR-094

小梁切除联合异体角膜基质透镜植入治疗 难治性青光眼的疗效观察

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目的 观察小梁切除联合巩膜瓣及结膜瓣下异体角膜基质透镜植入治疗难治性青光眼的眼压控制疗效及安全性。

方法 于 2015 年 06 月-2017 年 03 月，对 56 例（56 只眼）难治性青光眼患者进行小梁切除联合巩膜瓣及结膜瓣下异体角膜基质透镜植入手术，观察患者术后眼压、前房恢复、眼内出血、眼部感染及排拆反应等并发症发生情况，术后分别随访 6-17 个月，平均 13 个月。

结果 56 只眼术前平均眼压 38.7±9.5 mmHg，出院时平均眼压 8.3±3.1 mmHg，术后 1 个月平均眼压 14.5±5.4 mmHg，术后 3 个月平均眼压 13.7±4.2 mmHg，术后 6 个月平均眼压 14.3±2.7 mmHg，末次随访平均眼压 17.9±5.4 mmHg。56 只眼中，有 1 只第二次手术的慢性闭角型眼发生恶性青光眼，行玻璃体腔穿刺抽液联合前房成形术，术后前房恢复，眼压控制良好；有 2 只外伤性青光眼发生滤过泡增殖，行滤过泡分离术后眼压控制良好；所有患者术后无眼内出血、眼部感染及排拆反应等并发症发生。

结论 小梁切除联合异体角膜基质透镜植入能有效地建立功能性滤过泡，降低难治性青光眼的眼压，手术操作简捷，无明显并发症，是治疗难治性青光眼的安全而有效的手术方法之一。

OR-095

通过可注射、自供能的视网膜特异性结合的“纳米天线”实现哺乳动物近红外成像视觉

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哺乳动物包括人类的成像视觉可见光波谱范围不能超过 700 nm。这是由哺乳动物视网膜经典成像视觉的光感受器细胞的视蛋白固有的物理化学特性所决定。所有的视蛋白如果能够对光子能量较低的红外光产生反应，势必降低自身光异构化的能级阈值，从而会导致大量的热力学噪音。但是感知红外光对于哺乳动物虽有很大挑战，却对其生理活动具有很大的用途例如在黑暗条件下通过红外线感知清晰地辨别物体、躲避天敌等。**为了使哺乳动物获得红外线感知的能力**，我们**设计了视网膜光感受器细胞特异性结合的上转换纳米颗粒**（photoreceptor-binding upconversion nanoparticles，pbUCNPs）。这种纳米颗粒可以锚定在视网膜光感受器细胞上，作为一种红外光的转换子来创造哺乳动物的红外视觉。通过**不同水平的形态学、单细胞电生理、视网膜电图、光感知行为学、视觉**

诱发电位、图像视觉行为学等实验，我们验证了注射这种纳米颗粒的小鼠获得了红外图像识别视觉的能力。

OR-096

Formulation development, optimization, and in vitro - in vivo characterization of novel ultra-small micelles based on ginsenoside Rb1 for ocular applications

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Purpose: Ginsenosides Rb1 (Rb1) could form micelles in aqueous solutions. Self-assembled ultra-small micelles of Rb1 could potentially be utilized to be as an ocular drug delivery system, and it was postulated that the encapsulation of a medicine within Rb1 micelles might strengthen the drug's therapeutic action and reduce side effects.

Methods: Diclofenac-loaded Rb1 micelles (Rb1-Dic micelles) were formulated, optimized, and then further evaluated for *in vitro* cytotoxicity/*in vivo* ocular irritation, *in vivo* corneal permeation, and *in vivo* anti-inflammatory efficacy.

Results: The CMC values of Rb1 at 34 °C were 0.3728±0.0271, 0.3593±0.0119, and 0.3516±0.0154 mg/ml in artificial tears, PBS, and water, respectively, suggesting that Rb1 has a great tendency to form micelles. Rb1 self-assembled into micelles with ultra-small particle size (< 8 nm) in a homogeneous distribution state (PDI < 0.3). Diclofenac was highly encapsulated into the Rb1 micelles according to the weight ratios of Rb1 to diclofenac. The optimized formulation was with an Rb1/diclofenac weight ratio of 30:1, and the mean diameter, the polydispersity index, and the zeta potential of the optimized Rb1-Dic micelles were 7.27 ± 0.12 nm, 0.259, and -12.82 mV, respectively, while the values for the blank micelles were 7.59 ± 0.41 nm, 0.217, and -12.85 mV, respectively. The micelle size obtained by photo-correlation spectroscopy was the same as the size visualized by TEM. The encapsulation efficiency was 95.78 ± 1.44%. IR absorption spectrophotometry, DSC, and XRD measurements indicated the absence of any free crystalline diclofenac in this Rb1 micelle preparation, and they also indicated that the Rb1 could inhibit drug crystallization during micelle formation. Rb1 showed no obvious changes in its physicochemical characterization. The Rb1-Dic micelle ophthalmic solution was simple to prepare and was stable when stored for six weeks at room temperature. Rb1 had good cellular tolerance(no cytotoxicity was observed, even at RA concentrations as high as 7.5 mg/ml after a 72 h incubation), and it also improved the cellular tolerance of the encapsulated diclofenac(The Rb1-Dic micelle solution showed no obvious cytotoxicity at concentrations of diclofenac below 25 μg/ml, even after 72 h of incubation. By contrast, the same concentration of diclofenac caused a significantly greater

cytotoxicity at 25 μg/ml, even after only 24 h incubation). Rb1-Dic micelles also showed excellent ocular tolerance in rabbits. The use of Rb1 micelles significantly improved the *in vivo* corneal permeation. After a single instillation in rabbits, the diclofenac levels were 137.54%, 74.93%, and 255.43% higher in the Rb1-Dic micelle solution group than in the commercial diclofenac eye drop group at the 0.5, 1, and 2 h time points, respectively. After four instillations, the diclofenac levels were 187.95%, 91.91%, and 108.60% higher in the Rb1-Dic micelle solution group than in the commercial diclofenac eye drop group at the 0.5, 1, and 2 h time points, respectively. The differences between the Rb1–Dic micelle solution group and the commercial diclofenac eye drop group were statistically significant (P<0.05) for both the single and four instillations at all three time points. The use of Rb1 micelles also significantly improved the anti-inflammatory efficacy of diclofenac when compared to commercial diclofenac eye drops. The Rb1-Dic micelle solution (1 mg/ml) showed significant anti-inflammatory efficacy during the entire observation period (P<0.05, when compared to PBS group), and was significantly more effective when compared to the commercial diclofenac eye drops at the 180, 240, and 360 min time points (P<0.05). **Conclusion:** Rb1 micelle formulations have great potential as a novel ocular drug delivery system to improve the bioavailability of drugs such as diclofenac.

OR-097

一种具有光动力疗效涂层改性的人工晶状体研究

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目的：超声乳化联合人工晶状体植入是目前治疗白内障的主要手段。然而由于手术过程中晶状体上皮细胞的不完全去除，导致细胞在植入材料表面的粘附和增殖，从而诱发后发性白内障(PCO)。研究首先采用材料表面改性的方法在人工晶状体表面接枝梳状聚乙二醇(PEG)，然后通过 PEG 分子与 α-环糊精(CD)的超分子相互作用，在材料表面引入修饰有光敏剂二氢卟吩 e6 (Ce6)的 CD，利用 Ce6 的光敏效应控制晶状体上皮细胞的增殖，获得具有光动力疗效的涂层对人工晶状体进行表面改性，为抑制后发性白内障研究提供新的方法。
方法：研究首先将 RAFT 链转移剂化学固定于人工晶状体材料表面，随后利用表面引发的可逆加成-断裂链转移聚合(SI-RAFT)将甲基丙烯酰 PEG (PEGMA)聚合到材料表面，形成表面梳状 PEG 层；最后利用超分子自组装原理将 CD-Ce6 组装至 PEG 链上。通过紫外光谱，荧光光谱，接触角等方法研究表面涂层制备；通过体外细胞实验，研究光刺激响应的细胞凋亡行为；通过动物体内植入研究改性人工晶状体的体内效果。
结果：材料学表征方法表明梳状 PEG 层的成功构建及其后续 Ce6 分子在表面的成功引入；体外细胞实验结果显示表面修饰后人工晶状体材料在 660 nm 红光激发下能产生具有细胞杀伤作用的活性氧，进而可控地原位诱导白内障术后残余晶状体上皮细胞的凋亡；动物实验结果也显示对 PCO 的抑制具有积极的作用。

结论：采用 SI-RAFT 及超分子自组装方法，在人工晶状体材料表面构建含光敏剂 Ce6 的亲水性具有光动力疗效的表面涂层。利用 Ce6 的光敏效应，能原位残余晶状体上皮细胞凋亡，预期能有效解决人工晶状体植入后后发性白内障高发生的临床问题，是一种安全有效的 PCO 抑制方法。
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OR-098

Therapeutic effects of nano-sized cerium dioxide on dry eye mice nano-sized cerium dioxide

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Purpose: The aim of this study was to investigate the therapeutic effects of nano-sized cerium dioxide on a mouse model of dry eye .
Methods: Thirty-two healthy adult male BALB/c mice were selected in this study and divided into four groups randomly (A,B,C and D), with each group consisting of 8 mice. The dry eye model was induced by eye drop of 0.1% benzalkonium chloride and established in group A, group B and group C. Group D served as the normal control without any treatment. The A group was given nano-sized cerium dioxide （PN-CeO_2）eye drop, while the B group was given PBS eye drop, each treatment was performed three times per day for 1 week and the C group were not received anything as the negative control. The Schirmer I test, tear break-up time (BUT), and corneal fluorescein staining (FL) were evaluated before and after dropping eyes for 1 day, 4 day and 7. The cornea samples of all mice were collected on day 7 for histological investigation of corneal epithelium using hematoxylin and eosin staining, and ultrastructure of corneal epithelial cells was further examined by transmission electron microscopy(TEM).
Results: There were no statistical changes in tear volume, BUT, FL staining before therapy among A, B, C three groups (P＞0.05). Significantly more tear volume（P<0.05）, longer BUT（P<0.05）, lower FL score（P<0.05）were shown on day 4 and day 7 in group A . But, there were no significant difference in tear volume, BUT, FL staining in group B after therapy (P＞0.05). TEM showed that the number of corneal chondriosome/desmosomes was obviously increased （P<0.05）in group A and the morphological features of microvilli and desmosomes closed the normal group, the group B still presented the shorter and flattened, disordered corneal epithelial microvilli, and looser intercellular desmosomes.
Conclusions: PN-CeO_2 exhibit signicantly therapeutic effects on dry eye mice model, which suggest that PN-CeO_2 administration is a promising method for the treatment of dry eye.

OR-099

全色盲的遗传学研究

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目的 应用目标区域捕获结合二代测序及全基因外显子测序技术检测全色盲患者的致病基因，结合文献分析全色盲相关致病基因的研究进展。

方法 选择 2011-2017 年在宁夏眼科医院就诊的 5 个全色盲家系作为研究对象。收集所有患者及家庭成员临床资料，完善眼科相关检查确定临床表型。采集患者及家系成员外周静脉血，提取 DNA。运用目标区域捕获技术对目前已知的 230 个视网膜疾病相关基因进行筛查；未发现致病性突变的家系，采用全基因外显子测序筛查，确定候选致病性突变位点，运用 PCR 和直接测序法进行验证，确定致病性突变位点。检索美国国家生物技术信息中心、人类基因突变数据库及查阅 1997～2017 年发表的相关文献，从这些文献数据中归纳全色盲相关致病基因研究现状。

结果 收集到 5 个全色盲家系，其中 2 个家系确定了致病性突变位点。家系 1 为全色盲家系，两个患者是一对同卵双生子，误诊为弱视 8 年，在同卵双生子患者均检测到 PDE6C 基因新的复合杂合性突变（c.G305A：p.R102Q，c.1413+1G>C）；家系 2 为不完全性全色盲家系，父母为一级表兄妹近亲婚配，患儿接受弱视治疗 2 年，在患者 PDE6C 基因检测到新的复合杂合性突变（c.305G>A:p.R102Q, c.1413+1G>C）。两个家系的父母亲均分别携带 1 个杂合突变，遗传方式为常染色体隐性遗传。目前，已发现 5 个与全色盲相关的致病基因，CNGA3, CNGB3 和 GNAT2 基因编码的蛋白在视锥细胞的光传导通路中发挥重要作用。CNGA3 和 CNGB3 突变约占全色盲基因突变的 50％和 25％，NAT2 或 PDE6C 却罕报道。

结论 绝大多数全色盲是由 CNGA3 和 CNGB3 突变引起。本研究发现两个罕见的 PDE6C 基因的新突变导致的全色盲。全色盲在临床上易误诊为眼球震颤，弱视等。基因诊断是从基因水平诊断疾病，不依赖表型，通过基因检测可以快速、准确地明确诊断，将少误诊发生。

OR-100

基因治疗逆转视网膜色素变性小鼠模型中的小胶质细胞的活化

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目的

了解小胶质细胞在视网膜色素变性（Retinitis Pigmentosa RP）病理进程的作用，及对 RP 小鼠行基因治疗后小胶质细胞的转归。

方法

本研究采用可行基因治疗的 RP 转基因小鼠模型 Cx3cr1GFP/+,Pde6bH620Q/STOP,Pde6gCre/+，分别疾病进程的早期、中期及 晚期行基因治疗，并通过光相干断层扫描、自发荧光及免疫组化等方法对小胶质细胞的形态、大小、位置及密度等进行观察。

结果

小胶质细胞在不同基因背景的视网膜色素变形模型小鼠中均被激活，而且伴随 RP 病程的全程。小胶质细胞在变性的视网膜可以移行，通常聚集在 PDE6 缺陷的感光细胞的内节和外节层。基因治疗不仅可以完全阻止感光细胞的变性同时还可以灭活小胶质细胞。不论在 RP 的早期、中期或晚期进行基因治疗，小胶质细胞密度均可降低，位置及形态均可回归正常水平。

结论

小胶质细胞参与视网膜变性病理全程，并且在视网膜色素变性基因治疗的成功实施中起重要作用。提示我们基因治疗联合下调小胶质细胞可能会为阻止 RP 进展的新途径。

OR-101

GJA8 基因突变介导的细胞凋亡在先天性白内障中的机制研究

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目的：先天性白内障严重影响儿童的视功能，手术是目前唯一的治疗手段，但其手术并发症较多、手术效果欠佳且发病机制不清晰。因此，深入研究其发病机制和寻找新的治疗方式显得尤为必要。本课题组前期实验结果表明，过表达野生型缝隙连接蛋白基因（GJA8）的细胞具有抗凋亡的作用，而该基因突变则可以导致晶体上皮细胞（HLEC）凋亡从而参与白内障的形成，但其导致凋亡的机制尚不明确。本课题拟应用过表达 GJA3 和 GJA8 基因的细胞系和白内障模式动物，结合流式细胞术检测和斑马鱼药物筛选体系，从细胞凋亡的角度去阐明先天性白内障的发病机制，研究抗凋亡药物 SS-31 在 GJA3 和 GJA8 突变型先天性白内障中的应用前景。项目的顺利实施和完成有望深入解析先天性白内障的致病机制，为该类疾病的预防、干预与药物治疗提供坚实基础。方法：本项目拟采取体外稳定转染的 HLEC 细胞系和体内斑马鱼白内障模型相结合的研究策略，通过分析野生型和突变型 Cx46 和 Cx50 的表达、定位和生物学功能，以及基因型-表型的关系，探讨其致病的凋亡机制。结果：过表达 GJA8 的野生型和突变型的 HEK-293 细胞系中，应用 H2O2 诱导细胞凋亡和 Cx 蛋白抑制剂 FFA 抑制缝隙连接通道功能，检测了细胞凋亡和线粒体膜电位改变情况。结果显示过表达 GJA8 的细胞具有抗凋亡的作用，而在突变型细胞中该作用明显减弱。同时，FFA 可以使 HLEC 的线粒体膜电位下降， SS-31 则可以修复该异常。结论：外源性过表达野生型及突变型 GJA8 的细胞同样符合以上相应的细胞凋亡特性（见工作基础）。因此，HLEC 凋亡可能参与 GJA3 和 GJA8 调控晶状体分化及其突变导致先天性白内障的过程中。若能在病变早期抑制该凋亡途径的异常作用，则有可能阻止先天性白内障的发生或发展。

OR-102

Whole exome sequencing identifies novel USH2A mutations and confirms Usher syndrome 2 diagnosis in Chinese retinitis pigmentosa patients

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Objective: Retinitis pigmentosa (RP) is a common phenotype in multiple inherited retinal dystrophies (IRD). Disease gene identification can assist the clinical diagnosis of IRD patients for better clinical management, treatment and counseling. In this study, we aimed to delineate and characterize the disease-causing mutations in Chinese familial and sporadic patients with initial diagnosis of RP.

Methods: Four unrelated Chinese families and 118 sporadic RP patients were recruited for whole exome sequencing analysis.

Results: A total of 5 reported and 3 novel *USH2A* mutations were identified in four Chinese probands. The probands and their family members showed typical RP features and mild to severe hearing impairment, confirming the diagnosis of Usher syndrome 2 (USH). Moreover, 11 sporadic RP patients were identified to carry the compound heterozygous mutations in the *USH2A* gene, confirming the diagnosis of USH2. The patients carried the truncating mutations had a younger age of first visit than the patients carried only the missense mutations.

Conclusions: In summary, this study revealed 8 novel *USH2A* variants in Chinese familial and sporadic RP patients, assuring that whole exome sequencing analysis is an adequate strategy to facilitate the clinical diagnosis of USH from the sporadic RP patients.

OR-103

环状 RNA-cZNF609 在视网膜神经病变中的调控作用研究

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目的： 视网膜神经病变是引起青光眼发生发展的重要病理因素，涉及神经节细胞的凋亡和胶质细胞的活化。本研究着重研究环状 RNA-cZNF609 在视网膜反应胶质化和神经节细胞存活过程的调控作用。

方法与结果：采用定量 PCR 和 Sanger 测序分析，发现 cZNF609 在视网膜中组成型表达，且在视网膜神经病变进程中表达发生上调；cZNF609 表达沉默可以抑制反应胶质化和 RGC 的存活；MTT, Ki67 染色和 PI 染色发现，cZNF609 表达沉默可以直接调控胶质细胞的功能，间接地调控 RGC 的功能；RNA pull down、荧光素酶和生物信息学等实验发现，cZNF532、miR-615 和 METRN 构成调控网络，参与调控胶质细胞的增殖和活化，METRN 过表达可以缓解挽救 cZNF609 沉默引起的胶质细胞增殖抑制。

结论：环状 RNA-cZNF609 通过 ceRNA 调控网络影响视网膜神经病变的进程，该分子有望成为治疗青光眼的新靶点。

OR-104

Whole exome sequencing revealed HKDC1 as a candidate gene associated with autosomal-recessive retinitis pigmentosa

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Purpose: Retinitis pigmentosa (RP) is an inheritable retina degenerative disease leading to blindness. Despite the identification of 70 genes associated with RP, the genetic cause of approximately 40% of RP patients remains to be elucidated. We aim to identify novel genes for RP using next generation sequencing technology and knockout mouse models.

Methods: Whole exome sequencing was applied on the probands of a RP cohort of 68 unsolved cases to identify candidate genetic mutations. Missense variant was introduced into cDNA by site-direct mutagenesis and the effect of the variant was evaluated by biochemical assays. Knockout mouse models were generated using CRISPR/Cas9 technique. Phenotypes of the knockout mice were examined.

Results: A homozygous missense variant (c.173C>T, p.T58M) was found in *HKDC1* in two unrelated families presenting late-onset retinal degeneration. This variant affects highly conserved amino acid residue and is very rare in several databases and absent in 4000 ethnic-matched controls. Mutant HKDC1 protein partially lost hexokinase activity. *Hkdc1* is expressed in the mouse retina and localized to photoreceptor inner segments. To elucidate the *in vivo* roles of *Hkdc1* in the retina, we generated *Hkdc1* knockout mouse models using CRISPR/Cas9 technique. Two independent alleles were identified and backcrossed to C57BL/6J for 6

generation. Absence of HKDC1 expression in the *Hkdc1* knockout retina was confirmed by western blot and immunostaning using HKDC1 antibody. *Hkdc1* knockout mice exhibited reduced scotopic ERG response and thinner outer nuclear layer, similar to some of the human patient phenotypes. Loss of *Hkdc1* led to mislocalization of rhodopsin to the inner segments and cell bodies of rods in some regions in the retina.

Conclusions: Our data demonstrated that *HKDC1* is a good candidate gene for autosomal recessive RP.

OR-105

中国上海大学生手持电子设备使用与视疲劳患病率的相关性研究

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背景：本研究的目的是调查数字设备的使用和上海大学生自我报告的视疲劳的患病率，并确定它们之间可能存在的关联。
方法：采用自我报告的视疲劳问卷对 5 千名学生进行随机评估。记录人口统计特征，使用数字产品的习惯。进行单变量分析以选择潜在的风险因素初步，并使用多变量逻辑回归来估计所选择的风险因子的比值比。
结果：在完成调查的 4786 名学生中，视疲劳的患病率为 53.5％。多变量分析显示视疲劳与数字成瘾之间存在显着关系（OR 1.350,95％CI：1.230-1.481）。其次是学习负担，花在计算机上的时间，性别，在便携式数字设备（PED）上花费的时间。有氧运动持续时间（OR 0.912,95％CI：0.839-0.990）被发现是减少视疲劳症发生率的强有力预测因素。
结论：视疲劳似乎是上海大学生的常见病。数字设备在床上使用的时间较短（<0.5h），躺在一个人的背部姿势，连同有氧运动一个多小时，将是一个很好的预防视疲劳。该领域仍需要进一步研究。

OR-106

14 万例中老年白内障患者眼部生物学参数分布特征——基于多中心研究

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目的：描述眼部生物学参数的分布特征以及随着年龄的变化趋势

方法：采用多中心回顾性分析临床研究，从 2013 年 7 月到 2018 年 12 月，收集在爱尔眼科集团旗下分布在全国各地的 18 家爱尔眼科医院就诊的白内障患者 2038733 例，将其中 143889 位患者的 143889 只眼睛（无眼别要求）纳入研究，患者年龄均大于 40 岁，收集这些病人用 IOL master 测得的眼轴长度、前房深度、角膜曲率等眼部结构生物学结构参数，并探讨这些参数的分布特征以及与年龄之间的关系。

结果：这项研究评估了 143889 只眼睛，眼轴长度（AL）、前房深度（ACD）、角膜散光的平均数和标准差分别为 23.92±2.14mm、3.04±0.45mm、1.05±0.90D、44.38±1.68mm。眼轴长度主要分布在 21-26mm，所占比例为 87.74%，>26mm 的比例为 11.37%，>28mm 的比例为 6.54%，<22mm 的比例为 1.03%，<19mm 的比例为 0.01%。角膜曲率 42D 所占比例为 7.08%，45D 所占比例为 33.9%。前方深度主要集中在 2.8-3.2mm 之间，占 34.22%，且分布比较均匀。角膜散光 0.5—1D 之间的比例最大为 36.22%，有 39.88%的人角膜散光大于 1D。平均眼轴长度，前房深度随着年龄的增加呈递减趋势（P<0.001）。

结论：眼部生物学特征性数据和角膜散光可以帮助眼科医生改进手术操作，选择合适的人工晶体以获得高质量的术后视力。

OR-107

智能眼科图像管理及自定义分析系统的研发与评价

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（国家重点研发计划项目 2017YFC0112400）

目的：建立自适应、一体化、流程化、满足不同分析需求的眼科图像管理及自定义分割分析模型系统，为临床人工智能辅助诊断提供标准化和智能化数据。

方法： 采用 Python 语言开发眼科图像管理及自定义分割分析模型系统，高斯滤波，双边滤波，中值滤波及 CLAHE 直方图均衡化技术进行眼科图像预处理。采用 TensorFlow 开源 AI 架构，通过神经网络分割模型（denseblock-unet，gan，u-net）进行图像特征提取。针对不同的图像、部位、特征进行自定义选择分割模型训练，设定训练代数及学习率等参数，通过 Tensorboard 追踪训练结果。选择 RFI(retinal function imager)眼底血管图像 100 幅分别建立训练集和测试集图像二值图由医生手工标注，然后通过系统进行自动分割及生物特征提取与测量。

结果： RFI 眼底微血管图像经系统分割，单张分割时长为 0.65s ， epochs 和 batch_size 分别为 150 和 32，双边滤波和形态学变换预处理后， 自动生成眼底血管区域面积、线型长度、直径、分型分析复杂度及扭曲度等特征参数。PR（Precision and Recall）及 AUC ROC 分别为 0.9122 及 0.9801，Dice（Dice Coefficient）为 0.832。

结论：眼科智能管理及分割分析系统对于眼科图像数据归类、特征分析提供标准高效解决方案，为建立标准化眼科图像数据库进行人工智能研究提供了全新平台。

OR-108

不同机器学习方法诊断早期原发性开角型青光眼的评价

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目的：通过机器学习区分早期青光眼、可疑青光眼及健康患者，建立早期青光眼辅助诊断模型。
方法：回顾性病例系列研究。收集在 2014 年 9 月至 2018 年 12 月就诊于哈尔滨医科大学附属第二医院眼科且符合原发性开角型青光眼（Primary Open-angle Glaucoma，POAG）诊断标准的 81 只早期 POAG 患眼，86 只可疑青光眼，86 只健康眼，分别接受海德堡 OCT 视神经纤维层厚度扫描，蔡司 Humphrey 视野计 24-2 检查及 24 小时眼压检查，获得 RNFL6 个象限厚度值，24 小时眼压值及视野检查参数（VFI，MD，PSD，TD），年龄等共 63 维特征的样本数据作为第一组；同时，去掉视野参数中 TD 特征，剩余 14 维特征的样本数据作为第二组进行训练。两组均使用 169 例样本数据作为训练集，84 例作为测试集进行交叉验证。使用四种不同机器学习方法，逻辑回归 (Logistic Regression, LR)，随机森林（Random Forest, RF），支持向量机（Support Vector Machine, SVM），神经网络（Neural Network, NN），对数据进行三分类，测试并优化模型。
结果：使用全部特征（共 63 维）训练模型后 RF 准确性最高，为 0.91，其他三种模型准确度相似，约为 0.87。使用 14 维特征训练模型后，四个模型的准确度均有提升，其中 SVM 准确度为 0.96，AUC 为 0.97；RF 准确度 0.95，AUC0.96；LR 准确度 0.94，AUC0.95；NN 准确度 0.92，AUC0.94。
结论：四种机器学习方法均能有效的区分早期青光眼及可疑青光眼，且 SVM、RF 更佳，临床上可以建立一个基于 OCT、眼压及视野等的 POAG 机器学习早期诊断模型。

OR-109

A large-scale analysis of the public perceptions, receptivity, and demands regarding medical artificial intelligence

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Background: The artificial intelligence (AI) revolution in healthcare is inevitable. The core objectives of the revolution are capitalizing on AI appropriately and maximizing its medical benefits to the general public. Awareness of the public attitudes, demands, and expectations regarding medical AI helps us to plan for future development and share the benefits of intelligent healthcare among more people.

Methods: An online questionnaire was created to investigate the perceptions, receptivity, and demands of the public regarding medical AI from October 13 to October 30, 2018. The distributions of current achievements, public perceptions, receptivity, and demands among individuals in different lines of work (i.e., healthcare vs non-healthcare) and different age groups were accessed by descriptive statistic. Factors associated with the public receptivity of medical AI were accessed using a linear regression model.
Results: A total of 2780 participants from 11 countries were enrolled. Healthcare workers accounted for 54.3% of all participants. There was no significant difference between the healthcare workers and non-healthcare workers in the high proportion (99%) of participants expressing acceptance of AI ($p=0.8568$), but remarkable distributional differences were observed in demands ($p<0.001$ for both demands for AI assistance and the desire for AI improvements) and perceptions ($p<0.001$ for safety, validity, trust, and expectations). High levels of receptivity (approximately 100%), demands (approximately 80%), and expectations (100%) were expressed among different age groups. The receptivity of medical AI among non-healthcare workers was associated with gender, educational qualifications, and demands and perceptions of AI. There was a very large gap between the current achievements and the public demands of intelligence services ($p<0.001$). More than 90% of healthcare workers expressed a willingness to devote time to learning about AI and participating in AI research.
Conclusions: The public have exhibited a high level of receptivity regarding medical AI. The achievements to date present numerous possibilities, and further advancements are required to satisfy the public demands. Intelligent assistance is in strong demand in terms of many medical aspects, including imaging and pathology departments, outpatient services, and surgery. More contributions are imperative to facilitate integrated and advantageous breakthroughs in medical AI.

OR-110

Detecting Glaucoma Based on Spectral Domain Optical Coherence Tomography Imaging of Peripapillary Retinal Nerve Fiber Layer: A Comparison Study between Hand-crafted Features and Deep Learning Model

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AIMS: To develop a deep learning (DL) model for automated detection of glaucoma and to compare diagnostic capability against hand-craft features (HCFs) based on Spectral Domain Optical Coherence Tomography (SD-OCT) peripapillary retinal nerve fiber layer (pRNFL) images.
METHODS: A DL model with pre-trained convolutional neural network (CNN) based was trained using a retrospective train set of 1501 pRNFL OCT images, which included 690images from 153 glaucoma patients and 811 images from 394 normal subjects. The DL model was further tested in an independent test set of 50 images from 50 glaucoma patients and 52 images from 52 normal subjects. A customized software was used to extract and measure HCFs including pRNFL thickness and optical intensity in average and 4 different sectors. Area under the receiver operator characteristics (AROC) curves was calculated to compare the diagnostic capability between DL model and hand-crafted pRNFL parameters.
RESULTS: In independent test set, the DL model achieved an AROC of 0.98 [CI: 0.96 to 1.00]. which was significantly larger than the AROC values of all other HCFs (AROCs 0.661 with 95% CI 0.549 to 0.772 for temporal sector, AROCs 0.696 with 95% CI 0.549 to 0.799 for temporal sector,AROCs 0.913 with 95% CI 0.855 to 0.970 for superior sector,AROCs 0.938 with 95% CI 0.894 to 0.982 for inferior sector).
CONCLUSION: Our study demonstrated that DL models based on pre-trained CNN has capable of identifying glaucoma with high sensitivity and specificity based on SD-OCT pRNFL images.

OR-111

Predicting Visual Outcomes Based on Preoperative Data and Intraoperative Surgical Video in Small Incision Lenticule Extraction Using Machine Learning

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Purpose: Small incision lenticule extraction (SMILE) is a novel corneal refractive surgery, approved by FDA in 2016 and performed worldwide recently for the correction of myopia and myopic astigmatism. Despite the fact that it has shown safety, efficacy, predictability, and stability in refractive error correction, there are still reports of intraoperative complications in SMILE, resulting in different clinical outcomes. We aimed to find key factors affecting visual outcomes of SMILE surgery, quantitatively analyze the importance of factors affecting the visual outcomes of SMILE, and build prediction models for visual outcome evaluation using machine learning.
Method: A total of 1358 eyes from 784 patients, who underwent SMILE surgery for the correction of myopia and myopic astigmatism in Refractive Surgery Center in Tianjin Eye Hospital, were included. 1358 eye samples with twenty-six preoperative and intraoperative features were analyzed under three indicators (safety index, efficacy index, and spherical equivalent) by

XGBoost (machine learning technique). Key factors affecting each indicator were identified with importance scores, based on which three prediction models were built for visual outcome evaluation. To avoid estimation bias, ROC curves, sensitivity, specificity, and accuracy were estimated by 10-fold cross-validation, which demonstrate the effectiveness of prediction models in evaluating safety, efficacy, and spherical equivalent of SMILE.
Results: The centration time and manual operation time had the highest importance scores for safety index (0.089 and 0.089 respectively), efficacy index (0.098 and 0.074 respectively) and spherical equivalent (0.084 and 0.087 respectively). Features with importance value above 0.04 were labelled as key factors affecting visual outcomes. The following importance values were noted: (1) for safety index: centration time (0.089), manual operation time (0.083), CCT (0.066), IOP (0.064), age (0.059), LT (0.057), anterior scan quality within 3mm diameter (0.048), and Kf (0.044); (2) for efficacy index: manual operation time (0.098), centration time (0.074), Kf (0.067), CCT (0.067), IOP (0.062), Ks (0.060), LT (0.053), age (0.053), RST (0.050), and anterior scan quality within 3mm diameter (0.044); and (3) for SE: manual operation time (0.087), centration time (0.084), Ks (0.067), CCT (0.065), LT (0.062), IOP (0.058), RST (0.056), Kf (0.050), age (0.049), and anterior scan quality within 3mm diameter (0.042).
Conclusions: The attempts of applying machine learning techniques in complex preoperative and intraoperative data analysis, would deliver valuable insights for future refractive surgery. And surgeons are suggested to improve surgical experience for shorter surgical time and better outcomes of SMILE.

OR-112

Automated Identification of Malignancy in Whole Slide Pathologic Images: Identification of Eyelid Malignant Melanoma in Gigapixel Pathologic Slides Using Deep Learning

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Aims: To develop a deep learning system (DLS) can automatically detect malignant melanoma in the eyelid from histopathological sections with colossal information density.
Methods:
Setting: Double institutional study.
Study Population: Retrospectively reviewed 225230 pathological patches (patch: a small section cut from labelled area by pathologist from a Hematoxylin-Eosin image) cut from 155 H&E stained whole slide images (WSIs).

Observation Procedures: The labelled gigapixel pathologic WSIs were cut into small patches which were used to train and test a model to assign patch-level classification. With malignant probability from a Convolutional Neural Network (CNN), we embedded the patches back into the WSI to generate a visualization heatmap and leveraged Random Forest to establish WSI-level diagnosis.
Main Outcome Measure(s): For classification, area under the receiver operating characteristic curve (AUC), accuracy, sensitivity and specificity were used to evaluate the efficacy of the DLS in detecting MM. For visualization effect, we produced contrast figures (Original H&E stained WSI vs Probabilistic Heatmap).
Results: The model achieved a 0.989 AUC, 95% Confidence Interval (CI) 0.989-0.991 with 94.9% accuracy, 94.7% sensitivity and 95.3% specificity for patch diagnosis. We displayed the lesion area on WSI graded by malignant potential. For WSI, obtained sensitivity, 100%; specificity, 96.5%； Acc, 98.2%; with an AUC of 0.998(95%CI, 0.994 - 1.000).
Conclusions: A DLS using Artificial Intelligence can automatically detect malignancy in histopathological slides of MM and highlight the lesion area on WSI by probabilistic heatmap. Our approach also has potential to be applied to other tumor histopathological section.

OR-113

microRNA21 mimics reduce intraocular pressure by PTEN/Akt/eNOS pathway

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Purpose: To study how miR21 regulates intraocular pressure and aqueous humor outflow facility and the mechanism involved.

Methods: Mouse eyes (C57BL/6) were transfected with 2 uL of miR21 mimics by anterior chamber injection with Invivofectamine 3.0. The contralateral eyes were transfected in the same way with 2 uL of miRNA mimics negative control (mirVana, ThermalFisher, USA). IOP was monitored over time up to 72 hours after miR21 mimics application. Subsequently, we repeated the experiment in a different cohort of six mice, and the outflow facility was measured 24h post-transfection. PTEN/Akt/eNOS expression of the trabecular meshwork tissue was measured by western blot.

Results: miR21 mimics significantly reduced IOP at 6, 8, 24 and 48 hours post transfection (n=6, $p<0.05$) with the greatest reduction at 8 h (4 mmHg, $p<0.05$). Conventional outflow facility significantly increased by 1.74 fold 24h after transfection (from 0.0092 uL/min/mmHg to 0.0160

uL/min/mmHg, n=6). miR21 mimics transfection significantly reduced PTEN but upregulated Akt and eNOS expression ($p<0.05$, n=6).

Conclusions: miR21 might be a novel target for modulating intraocular pressure by indirectly activating Akt/eNOS through inhibition of PTEN.

OR-114

雾霾颗粒物（PM2.5）暴露对人角膜上皮细胞生物学影响的转录组分析研究

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目的：研究雾霾颗粒物（PM2.5）暴露对人角膜上皮细胞（HCECs）的生物学影响及其机制。**方法：**取 50μg/mL PM2.5 提取物处理 24 小时的 HCECs 及空白对照细胞进行 RNA-seq，根据测序结果对差异表达的基因进行 GO/KEGG 富集分析，并对一系列相关基因的表达进行 qRT-PCR 验证。**结果：**测序结果显示，PM2.5 暴露共引起 239 个基因表达显著上调，192 个基因显著下调。GO 富集分析表明，PM2.5 暴露所引起变化的 HCECs 生物学过程主要包括发育过程、细胞增殖、细胞分化等。KEGG 富集分析提示有 9 条通路明显改变。利用 qRT-PCR 分别检测上调和下调改变最为显著的前 10 个基因，其中包括与细胞增殖、细胞凋亡、炎症反应、芳香烃类刺激相关的基因，结果显示其 qRT-PCR 与 RNA-seq 的变化趋势基本一致，从而验证了 RNA-seq 结果的可信度。**结论：**PM2.5 暴露显著改变 HCECs 的基因表达，可能与 PM2.5 所引起的 HCECs 损伤有关。

OR-115

Dynamic tuning of chromosome accelerates tumorigenesis by co-driving a gene cluster encoding GAU1 lncRNA and GALNT8 in retinoblastoma

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Chromatin dynamics, defined by the positioning and modifications of nucleosomes, fulfills functional roles in transcriptional regulation and DNA repairing. Tumor cell hallmarks are underpinned by transcriptional programmes operating in the context of a dynamic chromatin

regulation. However, the mechanism of chromatin dynamics induced tumorigenesis has not been fully understood. Here, we revealed that the dynamic chromatin tuning induce tumorigenesis by co-driving a lncRNA *GAU1* (*GALNT8 antisense upstream-1*) and a protein coding gene *GALNT8 (polypeptide N-acetylgalactosaminyltransferase 8)* expression cluster. In this cluster, we found that around 100kb open chromatin state in Chr12p13.32 in tumor cells compared to normal cells. *In vitro* and *in vivo* experiment showed that that the tumor growth was significantly inhibited, either by knocking down *GAU1* or *GALNT8*. Moreover, both *GAU1* and *GALNT8* was highly expressed in tumor tissues from patients, we also found that over expressed *GAU1* or *GALNT8* indicate poor prognosis by bio-informatics from TCGA database. This dynamic chromatin transformation induces transcription elongation factor, TCEA1 binding to *GAU1* promoter, thereby activates GAU1 expression. Most importantly, the activated *GAU1* induced by TCEA1 would interact with *GALNT8* promoter and recruit more TCEA1 for activating a novel oncogene *GALNT8* expression. These results showed a novel dynamic chromatin guided mechanism underlying tumorigenesis in which the turning of chromatin state could co-activate a long non-coding RNA *GAU1* and protein coding gene *GALNT8* cluster, thereby accelerate tumor progression .

OR-116

Phosphorylation/dephosphorylation of the Histone Methytransferase EZH2 by AKT kianase/ MYPT1/PP-1 holoenzyme Modulate Its Control of Epithelial-Mesenchymal Transition

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Purpose: Posterior capsular opacification (PCO) is the most common complication after cataract surgery, causing vision impairment. Epithelial-mesenchymal transition (EMT) of the residual lens epithelial cells (LECs) in the lens capsular bag is a major pathologic change during the development of PCO. Transforming growth factor β (TGFβ) is the prominent factor in ocular aqueous humor driving EMT of LECs, and accumulated studies have suggested that elucidation of the mechanisms underlying TGFβ-induced EMT of LECs is instructive for clinical prevention and therapy strategies of PCO. At present a few studies have revealed the correlation between AKT kinase activation and TGFβ-induced EMT of LECs, however, the underlying regulatory mechanisms remain largely unknown.

Methods: Mass Spectrometry and Co-IP were used to analyze the interaction between PP1 and EZH2. Various inhibitors were used to control AKT activity, the EZH2 phosphorylation status was determined with western blot analysis. The expression patterns of the downstream EMT genes were analyzed with qRT-PCR, Western blot analysis and immunofluorescence.
Results: In this study, we found that specific inhibitors for AKT1, AKT2 and PI3K can cause suppression of EZH2 Ser21 phosphorylation and subsequently enhanced global H3K27me3 modification in TGFβ1-treated human lens epithelium cells (HLE). Downstream EZH2, these inhibitors can attenuate or abolish TGFβ1-induced mRNA upregulation of EMT transcription factor and mesenchymal gene in human and rabbit lens epithelial cells. Meanwhile，knockdown of AKT1 or AKT2 impairs TGFb1 induced-EMT gene up-regulation, and mitigates enhanced EZH2 Ser21 phosphorylation level and dampen the global decrease of H3K27me3. And we also identified the overexpression of EZH2 S21A mutant in HLE cells can robustly decelerate TGFb-induced mRNA upregulation of EMT transcription factor SNAIL1 and mesenchymal gene FN1. Finally, we demonstrate that PP1 directly dephosphorylates EZH2 to modulate its activity.
Conclusions: Our study revealed an epigenetic regulatory pathway of TGFβ1-induced EMT in HLE cells controlled by EZH2 phosphorylaiton and dephosphorylation. EZH2 Ser21 phosphorylation and H3K27me3 modification changes mediated by AKT kinase and MYPT1/PP-1c holoenzyme lay down the basis through which the available epigenetic drugs could be used in PCO prevention and treatment. (Supported by grants from National Natural Science Foundation of China, 81700821, 81570824, and 81770910 as well as the Fundamental Funds from the State Key Laboratory of Ophthalmology, Zhongshan Ophthalmic Center, Sun Yat-sen University).

OR-117

Long Noncoding RNA MALAT1 Acts as a Competing Endogenous RNA to Regulate TGF-β2 Induced Epithelial-Mesenchymal Transition of Lens Epithelial Cells by a MicroRNA-26a-dependent Mechanism

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Purpose: The aim of the present study was to characterize whether the long noncoding RNA metastasis-associated lung adenocarcinoma transcript 1 (MALAT1)/miR-26a/Smad4 axis is involved in epithelial–mesenchymal transition (EMT) of lens epithelial cells (LECs).
Material and Methods: Primary human LECs were separated and cultured. Microarray analysis was performed by human lncRNA Array v2.0 (Arraystar, Rockville, MD, USA), which target

differential expression of lncRNAs on the primary HLECs treated with TGF-β2 (experiment) and it treated without TGF-β2 (control). RNA immunoprecipitation (RIP) was performed using an EZ-Magna RIP RNA-binding protein immunoprecipitation kit (Millipore, Billerica, MA, USA)
Results: Microarray analysis showed that a total of 568 lncRNAs are differentially expressed in primary HLECs in the presence of TGF-β2 and MALAT1 is mostly significantly dysregulated lncRNAs, which is increased by nearly 17-fold. In addition, upregulation of MALAT1 and downregulation of miR-26a were detected in human posterior capsule opacification (PCO) attached LECs and the LECs obtained from patients with anterior polar cataracts by quantitative RT-PCR (qRT-PCR). Next, our results showed that TGF-β2 induces the expression of EMT markers in primary HLECs via a MALAT1-dependent mechanism. The mechanism is that MALAT1 negatively regulates miR-26a and miR-26a directly targets Smad4 by luciferase reporter assays and RNA-binding protein immunoprecipitation assay.
Conclusions: TGF-β2 induces MALAT1 over-expression, which in turn MALAT1 acts as a ceRNA targeting Smad4 by binding miR-26a, and promotes the progression of EMT of LECs.

OR-118

LncRNA NEAT1 通过竞争性结合内源性 miR-34a 和改变 MITF 可变剪切抑制 RPE 细胞的增殖

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研究目的：成年 RPE 细胞在体基本处于静止状态，但在 PVR 等病理状态下则可重新进入增殖状态，引起视网膜病变和视力损伤。目前调控 RPE 细胞增殖的分子机制尚不完全清楚。本课题的研究目的旨在研究长链非编码 RNA（LncRNA）在 RPE 细胞增殖调控中的功能作用并阐明其分子机制。
研究方法：利用 RNA-seq 分析增殖状态和静止状态的小鼠 RPE 细胞的 LncRNA 表达谱，并在不同增殖状态的人胚胎干细胞诱导得到的 RPE 细胞中验证了候选 LncRNA NEAT1 的表达。此后，利用 siRNA 在 ARPE-19 和 D407 细胞系中干扰 NEAT1 的表达，通过细胞生长曲线、细胞周期分析和 Ki67 免疫荧光等实验检测细胞的增殖。在干扰 NEAT1 的 RPE 细胞中，通过定量 PCR 和荧光素酶报告实验检测 miR-34a 的表达及功能，利用 RT-PCR 检测 *MITF* mRNA 可变剪切的改变。最后，在干扰 NEAT1 的细胞中转染 miR-34a 抑制剂以检测其是否可以部分逆转 RPE 细胞的增殖。
研究结果：小鼠原代 RPE 细胞和人胚胎干细胞诱导而来的 RPE 细胞结果均显示 LncRNA NEAT1 高表达于高增殖活性的 RPE 细胞中。在 ARPE-19 和 D407 细胞中干扰 NEAT1 的表达可以显著抑制细胞的增殖。机制研究显示 RPE 细胞中干扰 NEAT1 的表达后，RPE 细胞中内源性的 miR-34a 的表达水平升高，其主要增殖相关靶基因蛋白水平显著下降。在干扰 NEAT1 的细胞中同时转染 miR-34a 的抑制剂则可以部分逆转 RPE 细胞的增殖。同时，结果还显示 RPE 细胞中干扰 NEAT1

后，具有抑制 RPE 细胞增殖功能的 MITF 的可变剪切(-)的表达显著升高，而（+）MITF 的表达则相对降低。

研究结论：研究结果显示 NEAT1 是一个新的 RPE 细胞增殖调控因子，其部分机制是通过竞争性结合内源性 miR-34a 和影响转录因子 MITF 可变剪切体的表达。

OR-119

Znhit1 在小鼠视网膜发育中的功能

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目的:

锌指 HIT 蛋白 1 (Znhit1)是 Znhit 蛋白家族的一员[1]。Znhit1 在细胞周期调控和细胞分化中发挥重要作用[2-7]。然而，Znhit1 在神经发育中的作用尚未见报道。本研究中着重研究了 Znhit1 在视网膜发育中的作用。

方法:

用免疫荧光法检测 Znhit1 在小鼠视网膜中的分布。将 $Znhit1^{flox}$ 小鼠与 six3 - cre 转基因小鼠交配构建了 Znhit1 视网膜特异性敲除小鼠，研究 znhit 在视网膜发育中的作用。利用视网膜电图（electroretinogram, ERGs）分析了 Znhit1 在视网膜中的生理作用。用苏木精和伊红(H&E)染色评价视网膜组织形态学变化。

结果:

免疫荧光检测显示 Znhit1 在视网膜各层均有表达，而水平细胞中表达最强。在 P35 时,与同窝仔的对照组小鼠（$Znhit1^{f/f}$, $Six3\text{-}Cre^{-}$）相比，敲除组小鼠（$Znhit1^{f/f}$, $Six3\text{-}Cre^{+}$）视觉反应完全消失；在 P7 和 P10 时，视网膜上特异性敲除 Znhit1 可导致小鼠的外丛状层（outer plexiform layer, OPL）出现明显分层缺陷，视网膜厚度急剧减少；在 P10 和 P35 时，外核层（outer nuclear layer, ONL）形成玫瑰花结病变。

结论:

视网膜缺失 Znhit1 可导致视觉反应缺失，外丛状层分层明显缺陷，视网膜厚度急剧减少，外核层形成玫瑰花结样病变。因此，Znhit1 是视网膜发育所必需的。

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OR-120

多聚嘧啶序列结合蛋白相关剪接子-抑制视网膜血管内皮细胞迁移的新因子

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目的制备并浓缩可特异性稳定上调多聚嘧啶序列结合蛋白相关剪接子（PSF）表达的慢病毒颗粒，经体外实验观察 PSF 高表达对缺氧诱导下人视网膜微血管内皮细胞（HRCEC）迁移的影响。**方法**首先构建可高表达 PSF 的重组质粒 pCDH-CMV-PSF-EF1-copGFP，经测序及 SmiⅠ和 XbaⅠ酶切双重鉴定构建成功后，将提取的无内毒素的 pCDH-CMV-PSF-EF1-copGFP 和 pEGFP-Vector 分别与穿梭质粒 pCMV-VSV-G 及包装质粒 psPAX2 组成 3 质粒系统转染 293T 细胞，培养 48h、72h 时收集病毒并浓缩，使用批量快速测定（LaSRT）法测定病毒滴度。体外培养的 HRCEC 分为正常细胞组（正常组）：正常体外培养的 HRCEC、空载体对照组（空载组）和 PSF 高表达组，利用荧光显微镜观察、流式细胞仪测定感染效率并通过 Real-time PCR 定量分析 PSF mRNA 的上调水平，并在此基础之上经细胞划痕实验和 Transwell 细胞迁移实验观察 PSF 高表达对乏氧诱导的细胞迁移的影响。**结果**成功构建可稳定高表达 PSF 的重组慢病毒颗粒并实现 PSF 在 HRCEC 中的高表达，流式细胞仪测定感染效率为 97%，Real-time PCR 检测到 PSF 高表达组 HRCEC 中的 PSF mRNA 水平明显上调，相较正常组而言差异具有统计学意义（p0.0001，t=30.60）；另一方面，细胞划痕实验结果显示: 乏氧条件下正常组细胞迁移率 43%，而 PSF 高表达组迁移率 12%，两者相比较差异具有统计学意义（P1=0.0068，t1=4.047；P3=0.0053，t3=4.262），与此同时，Transwell 细胞迁移实验结果表明，PSF 高表达组中穿过小孔细胞数量为 114，与正常组穿过小孔细胞数量为 255，相比较差异同样具有统计学意义。**结论** PSF 高表达可显著抑制乏氧诱导的视网膜血管内皮细胞的迁移。

OR-121

Integrin-Linked Kinase Controls Choroidal Neovascularization by Recruitment of Endothelial Progenitor Cells

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PURPOSE. Vasculogenesis has been shown to contribute to the formation of choroidal neovascularization (CNV). However, the mechanism behind the recruitment of endothelial

progenitor cells (EPC) to CNV is not well understood. Therefore, we were interested to know whether integrin-linked kinase (ILK) plays a role in recruiting EPC to CNV, and its possible mechanism.METHODS. We investigated the effect of hypoxia on retinal pigment epithelium (RPE) cells expressing ILK, hypoxia-inducible factor 1a (HIF-1a), stromal-derived factor-1 (SDF-1), and vascular endothelial growth factor (VEGF), and we further examined the effect of ILK small interfering RNA (siRNA) on their expression. The function of ILK expressed by RPE on EPC in vitro with regard to angiogenic effect was also studied. In vivo, we determined the expression levels of the above factors in CNV. We also examined the role of ILK on their expression, on EPC recruiting, and on the growth of CNV.
RESULTS. We found that hypoxia strongly induced the expression of ILK, HIF-1a, SDF-1, and VEGF. Moreover, the silencing of ILK attenuated their expression. It also decreased the phosphorylation of protein kinase B (PKB/AKT) and extracellular regulated protein kinases (ERK) and nearly abolished the proliferation, migration, and adhesion of EPC to RPE cells. In vivo, we showed that these factors were upregulated in CNV. Inhibiting the expression of ILK prohibited the ‘‘homing’’ of EPC to CNV lesions and attenuated the growth of CNV.
CONCLUSIONS. We demonstrate that ILK controls the development of CNV by regulating the recruitment of EPC to CNV lesions, possibly through ILK-dependent expression of SDF-1 and VEGF in RPE.

OR-122

ROS and caspase-3/-8 mediate Zn2+-induced retinal ganglion cell apoptosis

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Purpose
Zinc was reported to have a wide range of effects on physiological and pathological reaction such as immunology, apoptosis, gene activation and expression as well as cell differentiation by constituting enzymes and transmitting cellular signaling. Our previous studies revealed that ionic zinc (Zn2+) concentration elevated in the retina under different optic injury models including optic nerve crush and acute intraocular hypertension. There might be mechanism that exorbitant Zn2+ could induce retina ganglion cells apoptosis and contribute to the progress of glaucoma. Here we focused on the effect of Zn2+ on retinal ganglion cell apoptosis and demonstrated reactive oxygen species (ROS), caspase-3/-8 as downstream signaling of Zn2+.
Methods
1. Cells culture and model establishment. RGC-5 cells were cultured in 12-well-plate by DMEM with 10% FBS in 5% CO2 incubator at 37 ℃ for 24 hours before model establishment. Then cells were divided into 6 groups and stimulated by 0, 50, 150, 200, 300 and 500 μM Zn2+ solution

for 18 hours. Another 4 groups were stimulated by 200 μM Zn2+ solution for 0, 6, 12 and 18 hours respectively. Equivalent dose of specific Zn2+ chelators ZX-1 or TPEN were added to determine the effect of Zn2+ on RGC-5 apoptosis.
2. RGC-5 apoptosis assay. RGC-5 were collected and washed 3 times with PBS and stained with Annexin-V/FITC apoptosis detection kit following the manufacture's guidelines 18 hours after stimulation. Then, the RGC-5 apoptosis was detected by flow cytometry.
3. Caspase-3/-8 and ROS activity detection. RGC-5 were collected and washed 3 times with PBS and stained with Caspase-3/-8 and ROS activity detection kit following the manufacture's guidelines 18 hours after stimulation. Then, the caspase-3/-8 and ROS activity were detected by flow cytometry.
Results
1. Stimulation of exorbitant Zn2+ (≧200 μM) induced cells apoptosis in RGC-5 (Fig. 1), and the proportion of apoptotic cell increased to 15.32±0.32% ($P < 0.001$) at 6 hours, 52.44±1.78% ($P < 0.001$) at 12 hours and 62.4±2.71% ($P < 0.001$) at 18 hours after stimulated by 200 μM Zn2+ solution (Fig. 2).
2. The caspase-3/-8 and ROS activity increased to 27.93±2.46% ($P < 0.01$), 27.40±0.88% ($P < 0.01$) and 37.07±2.46% ($P < 0.05$) compared with control (15.43±1.08%, 20.6±0.52% and 27±0.8% respectively) at 18 hours after stimulated by 200 μM Zn2+ solution (Fig. 3).
3. Zn2+ significantly up-regulated RGC-5 apoptosis compared with control group (58.85±0.75% vs. 21.17±1.13%, $P < 0.001$), whereas Zn2+ chelators decreased the proportion of apoptosis cells to 26.59±2.19% ($P < 0.05$) and 24.01±1.31% ($P < 0.05$) respectively compared with Zn2+ group (58.85±0.75%) (Fig. 4).
Conclusion
Exorbitant Zn2+ leads to retinal ganglion cell apoptosis through activation of caspase-3/-8 and ROS signaling in cultured RGC-5, suggesting a promising downstream molecular mechanism in zinc-induced RGC death.

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功能性组织工程干细胞视网膜膜片恒河猴眼内移植及疗效观察

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【目的】建立一种恒河猴眼内功能性视网膜膜片移植手术，为未来青光眼患者的干细胞移植手术提供基础。
【方法】首先，外源添加 BDNF 因子诱导 hiPSC 来源的三维视网膜类器官诱导分化富集视网膜神经节细胞（RGC）。随后将三维视网膜组织接种于可降解的 PLGA 支架上，构建功能性视网膜膜片。在评估了 RGC-PLGA 视网膜膜片的电生理功能后，通过移植手术将 RGC 输送到恒河猴视网膜内表面。术后采用 OCT、眼底彩照和多焦 ERG 进行三个月随访。同时，本研究建立了一种有效的视网膜类器官冷冻保存方法，并对解冻后的组织进行移植。

【结果】在盖玻片和 PLGA 支架上诱导的 RGC 表现出神经节细胞的典型形态，可监测到连续动作电位和突触后电位。GFP 标记的细胞在视网膜移植后能存活至少 3 个月，而 PLGA 支架在 2 个月内降解。移植物内未见到肿瘤样组织。免疫荧光染色显示，hiPSC 诱导的 RGC 沿着宿主视网膜迁移并整合到神经节细胞层，同时产生定向投射到宿主视神经的再生轴突。多焦 ERG 显示移植区域可能有电活动。此外，冻存后的三维视网膜类器官亦可诱导富集 RGC，且在移植猴眼内存活和增殖。

【结论】本研究揭示了恒河猴眼内功能性视网膜膜片移植的可能性，为未来干细胞治疗青光眼性视神经损害及视觉重建提供了基础。

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OR-124

小胶质细胞在视网膜新生血管中的保护性作用研究

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背景：视网膜新生血管严重危害着视力健康，近年来，研究发现作为炎症细胞的小胶质细胞在视网膜新生血管中发挥着重要的作用。目的：探讨小胶质细胞的密度对视网膜新生血管生成的影响及具体的机制。方法：分别选用 C57 小鼠，Balb/c 小鼠和 SD 大鼠进行氧诱导视网膜病变（OIR）造模，对 Balb/c OIR 小鼠的使用腹腔注射米诺环素抑制小胶质细胞的激活，使用氯膦酸盐脂质体进行玻璃体腔注射以减少小胶质细胞密度，观察视网膜新生血管生成情况；机制方面，提取小胶质细胞外泌体，体内体外检测小胶质细胞外泌体对新生血管生成的作用以及对缺氧诱导的光感受器细胞损伤的保护性作用。结果：Balb/c OIR 小鼠 P17 天视网膜无新生血管生成，减少或抑制小胶质细胞的激活促使 Balb/c OIR 小鼠视网膜中形成新生血管簇，并抑制无血管区的血管化进程。机制方面，小胶质细胞外泌体在体内体外均能降低相关促血管生长因子的分泌，并抑制视网膜新生血管的生成，小胶质细胞的外泌体还能够通过 miR-24-3p 及内质网应激途径减轻缺氧诱导的光感受器细胞凋亡，保护视网膜的功能。结论：视网膜中小胶质细胞的密度可以在一定程度上决定 OIR 小鼠视网膜血管病变的程度；小胶质细胞外泌体能够减轻缺氧诱导的视网膜血管病变和光感受器细胞损伤。小胶质细胞的外泌体能够进入光感受器细胞中，并转移大量的 miR-24-3p，进而抑制 ER stress 和 IRE-1α-XBP-1/JNK-CHOP 并减轻缺氧诱导的光感受器细胞凋亡。小胶质细胞外泌体可以抑制缺氧的光感受器细胞中促血管生成因子包括（VEGF 和 TGF-β）的表达。这些结果表明小胶质细胞在缺氧诱导的视网膜血管病变中发挥保护作用，而小胶质细胞外泌体可能是发挥保护作用的重要途径。

OR-125

视网膜变性早期缝隙连接重塑及对病程影响的研究

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引言：
神经元之间的信息交流除了通过化学性突触外还有细胞间缝隙连接通讯（Gap Junction Intercellular Communication，GJIC），GJIC 可迅速传递信息，并且缝隙连接开放后，可允许胞内信号分子以及小分子代谢物质之间传递，目前认为 GJIC 可以影响神经元的重塑过程。
目的：细胞间缝隙连接通讯对 RP 初期影响感光细胞凋亡的影响机制
方法：对于早期 RP 大鼠进行视觉电生理、染料扩散检测、免疫组化实验，并通过药物干预，所得数据曲线拟合后统计分析。
结果：ERG 增益分析显示视网膜变性初期光感受器对光敏感性增强；视网膜变性初期褪黑素丧失对视网膜昼夜节律调控功能；视网膜变性初期褪黑素丧失调控是由于 RCS 大鼠全天视网膜感光细胞均表达大量磷酸化褪黑素合成限速酶（AANAT）造成；视网膜变性初期褪黑素白天升高导致缝隙连接耦合率的增加
结论：RCS 病变早期感光细胞损伤引起褪黑素限速酶表达增加，导致褪黑素病理性增，感光细胞缝隙连接耦合的持续开放，硬起谷氨酸通透性增加及视网膜光敏感性增加，形成正反馈环路，共同加速了光感受器的死亡。

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人骨髓来源 CD133+CD34+干细胞重塑血管外基质并改善糖尿病视网膜血管病变

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目的：微血管基底膜增厚是早期糖尿病视网膜血管病变的主要病理特征，是诱发周细胞和内皮细胞死亡的主要原因。本研究旨在探讨人骨髓来源 CD133+CD34+干细胞能否通过旁分泌作用抑制过度产生或者降解早期糖尿病视网膜血管外基质从而阻断糖尿病视网膜血管病变发展。
方法：1、流式细胞术分选骨髓中的 CD133+CD34+干细胞，体外培养扩增；2、链脲霉素（stz）腹腔注射诱导糖尿病视网膜血管病变小鼠模型，以及玻璃体腔 CD133+干细胞注射后电生理和视网膜免疫荧光、PCR 及 WB 检测；3、CD133+CD34+、CD133-CD34+细胞和 MSC 条件培养基（CM）中血管生成因子蛋白芯片检测与 miRNA 检测；4、CD133+CD34-、CD133+CD34+和 CD133-CD34+细胞的转录组测序。
结果：1、CD133+CD34+细胞移植可改善糖网小鼠 FERG 中的 ops 波波幅下降，提高视网膜血管密度，减少血管外基质；2、CD133+CD34+、CD133-CD34+细胞的 CM 可以抑制高糖诱导的

HREC 细胞外基质增加，前者尤甚；3、CD133+CD34+、CD133-CD34+细胞的 CM 中存在丰富的基质金属蛋白酶 MMP-8/9，而 MSC 条件培养基中存在丰富的 MMP-8/9 以及金属蛋白酶抑制剂 TIMP-1/4；4、CD133+CD34+细胞条件培养基比其他两种细胞条件培养基含更多的抑制细胞外基质生成的 miR-29a/b；5、转录组测序结果显示，CD133+CD34+和 CD133-CD34+细胞中高表达的、编码分泌蛋白的基因均能显著性富集到细胞外基质降解的通路上。
结论：人骨髓来源 CD133+CD34+干细胞能通过分泌基质金属蛋白酶来降解细胞外基质，也能通过分泌 miR-29a/b 来抑制细胞外基质的产生。将此群细胞移植到早期糖尿病视网膜血管病变小鼠模型中后能显著提高视网膜血管密度。

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多巴胺 D1 受体在视网膜血管新生中的作用研究

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目的：新生血管性眼病已成为全球仅次于白内障不可逆性致盲的第二大原因。随着社会的发展，其致盲比例仍在逐年增加。本课题用药物干预和基因敲除的方法，在氧诱导视网膜病变（OIR）模型中明确多巴胺 D1 受体(DRD1）在视网膜血管新生中的作用，并探究是视网膜哪类细胞上的 DRD1 发挥作用。
方法：本课题分三部分：1）用 C57BL/6 小鼠构建 OIR 模型，随机分为 *DMSO* 溶剂组及 DRD1 拮抗剂 *SCH39166* 药物处理组（0.4 mg/kg），OIR 小鼠自 P12 天腹腔给药，至 P17 天取材观察血管形态，明确 SCH39166 对视网膜血管新生的作用。2）用视网膜 Drd1 敲除小鼠，构建 OIR 模型，P17 天取材观察血管形态。3）用星形胶质细胞 DRD1 特异性敲除小鼠，构建 OIR 模型，明确星形胶质细胞上的 DRD1 对血管新生的作用。
结果：1）DRD1 拮抗剂 SCH39166 可增大 OIR 模型中的无灌注区面积（DMSO vs SCH39166: 13.71% ± 2.64% vs 18.73% ± 3.56%, P = 0.0111），并抑制病理性的血管新生（DMSO vs SCH39166: 4.40% ± 1.24% vs 2.29% ± 0.83%， P = 0.0030）。2）用视网膜 DRD1 敲除小鼠构建的 OIR 模型，与同窝仔野生型小鼠相比，同样出现了无灌注区面积显著增大，病理性新生血管减少。3）用星形胶质细胞 DRD1 特异性敲除小鼠构建的 OIR 模型，与对照小鼠相比，无灌注区面积并无显著差异，而病理性新生血管面积同样受到抑制（$D1^{flox/flox}$ vs $D1^{flox/flox}$GFAPcre+：4.36%±0.74% vs 2.26%±0.79%，P=0.0199）。
结论：DRD1 在视网膜血管新生中发挥着重要的调控作用。1）拮抗 DRD1 可同时抑制视网膜病理及生理性新生血管的形成； 2）星形胶质细胞上的 DRD1 参与病理性新生血管的调控，但不影响生理性新生血管的形成。

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Caspase-1 Deficiency Alleviates Retinal Microvasculopathy in Diabetic Mouse models

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Purpose: Diabetic retinopathy (DR) is a low-grade inflammatory disease characterized by retinal vascular hyper-permeability and pathological retinal neovascularization. We previously reported that activation of NLRP inflammasome plays a causal role in neuroinflammation during DR. Caspase-1 is a key effector of NLRP inflammasome activation. However, its exact role in DR remains to be elucidated.
Methods: Animal models of streptozotocin (STZ)-induced diabetes and oxygen-induced retinopathy (OIR) were set up with both wild type mice and Capsase-1 deficient mice. Retinal vascular leakage were measured by Evan's blue retinal vascular permeability assay. Retinal vascularization were examined by isolectin IB4 staining with retinal flat-mounts. Retinal vascular leukostasis were evaluated by ConA-lectin perfusion. Activation of retinal glial cells and expression of inflammatory cytokines were determined by immunofluorescence staining and western-blot analysis.
Results: Retinal expression of active caspase-1 p20 were significantly increased in wild type diabetic mice and OIR mice. Meanwhile, increased retinal vascular leakage and aberrant neovascularization were observed wild type diabetic animal model. However, retinal vascular hyper-permeability, increased vascular leukostasis and pathological neovascularization were significantly ameliorated in Caspase-1 deficient mice. Moreover, Caspase-1 deficient mice displayed attenuated retinal glial activation and inflammatory cytokine expression.
Conclusion: Taken together, these results provide in vivo evidence of concept for Caspase-1 deficiency against diabetic microvasculopathy.

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Altered brain network centrality in patients with retinal detachment: a resting-state fMRI study.Running header: DC study in RD patients

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Purpose: To investigate the intrinsic brain activity variations in retinal detachment (RD) subjects by using the voxel-wise degree centrality (DC) technique.
Methods: Totally 30 patients with RD (16 males, 14 females) and 30 healthy controls (HCs) similarly analogue in age, gender and education status were enrolled and examined with the resting-state functional magnetic resonance imaging (rs-fMRI). The spontaneous cerebrum activity variations were investigated using the DC technique. The receiver operating characteristic (ROC) curve was performed to classify the mean DC values of RD patients from HCs. And the interrelationships between DC signal values of distinct cerebrum regions and the clinical manifestations in RD patients were evaluated in terms of the Pearson's correlation analysis.
Results: RD group showed notably higher DC signals in right middle frontal gyrus, angular gyrus, inferior parietal lobule and bilateral precuneus, but decreased DC values in left middle temporal gyrus and lingual gyrus when comparing with HCs. The mean DC value in the right inferior parietal lobule was positively correlation with the contralateral best-corrected visual acuity and the DC values of the left lingual gyrus were negatively correlated with anxiety scale and depression scale. ROC curve analysis of each brain regions showed the accuracy of AUC was perfect.
Conclusion: RD is correlated to aberrant intrinsic brain activity patterns in diverse brain regions including visual-related and sensory-related areas, which might assist to reveal the underlying neural mechanisms.

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Insights into Local Orbital Immunity: Evidence for the Involvement of the Th17 Cell Pathway in Thyroid-Associated Ophthalmopathy

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Objective: Unique features of local immunity in thyroid-associated ophthalmopathy (TAO) may affect disease progression. This study aims to investigate the association between the orbital immune microenvironment and TAO development.

Methods: TAO and control orbital connective tissues were collected. Single-cell sequencing examined orbital lymphocytic infiltrates. Multi-color flow cytometry explored the phenotypes of different cell subsets and *in vitro* models for cell

functional studies. Co-culture experiment and western blotting assay were used to determine underlying mechanism of the enhanced T helper (Th)17 cell pathway.

Results: The TAO orbital microenvironment was composed of natural killer cells, dendritic cells, macrophages, T cells, plasma cells, and $CD34^+$ orbital fibroblasts (OFs), but few B cells. Increases in $CD3^+CD8^-$ interleukin (IL)-17A-producing and RAR-related orphan receptor (ROR)γt-expressing T cells and in $CD3^+CD8^-$ IL-13-producing and GATA3-expressing T cells suggested Th17 cell and Th2 cell responses in TAO orbits. Increased interferon (IFN)-γ-producing and $ROR\gamma t^+Tbet^+$ T cells indicated a Th1-like phenotype of orbital-infiltrating Th17 cells. Higher IL-23R and IL-1R expression and lower IL-21R expression were also observed on Th17 cells in TAO orbits. Multivariate analyses revealed that the Th17 pathway [IL-17A (p=0.001), IFN-γ (p=0.009), RORγt (p=0.003), IL-23R (p=0.033), IL-21R (p=0.019)] and Th2 pathway [IL-13 (p=0.015), GATA3 (p=0.012)] were associated with TAO. IL-17A, IL-23R, and IL-1R correlated with clinical activity score and visual acuity. $CD34^+$ OFs exhibited distinct cell surface marker expression and promoted IL-23R and IL-1R expression on T cells to facilitate the Th17-cell phenotype through prostaglandin E_2-EP2/EP4-cAMP signaling.

Conclusion: Our study addressed the importance of retroorbital immunity and suggests possible means of disrupting TAO pathogenesis.

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Cell-independent extracellular matrix configuration in early corneal development.

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Purpose: Mechanisms controlling the spatial configuration of the remarkably ordered collagen-rich matrix of the transparent cornea remain incompletely understood. Some years ago we described the assembly of the emerging corneal matrix in the mid and late stages of corneal embryogenesis after neural crest cell invasion (*Proc Natl Acad Sci USA* 2014;111:687-692), and concluded that collagen fibril organisation was driven by cell-directed mechanisms. Here, we examine early stages of corneal morphogenesis.

Methods: Serial block face sectioning scanning electron microscopy of embryonic chick corneas starting at embryonic day three (E3) followed by Fourier transform analysis of three-dimensional datasets and theoretical considerations of factors that influence matrix formation. Normally developing eyes and eyes that had the lens removed at E3 were studied.

Results: Uniformly thin collagen fibrils are deposited by surface ectoderm-derived corneal epithelium in the primary stroma of the developing chick cornea and form an acellular matrix with a striking micro-lamellar orthogonal arrangement. Fourier transform analysis confirms the orthogonality, in which adjacent micro-lamellae display a clockwise rotation direction, depth-wise below the epithelial basal lamina. On a supra-lamellar scale, fine cords of non-collagenous filamentous matrix were detected over large tissue volumes and in three-dimensions. These extend into the primary developing cornea from the epithelial basal lamina and associate with the first and second waves of neural crest cells that migrate inwardly to form, respectively, the corneal endothelium and the secondary corneal stroma. Matrix cords are present even when periocular neural crest migration and corneal morphogenesis are disrupted following surgical removal of the lens at E3.

Conclusions: We propose that the spatial organization of the initial corneal matrix is controlled by cell-independent, intrinsic mechanisms, possibly driven by the axial charge along the collagen fibril(s) axes based on proteoglycan associations. Previous work by other groups has suggested that the matrix cord structures might be produced by invading keratocytes; our data refute this concept.

OR-132

YAP/TAZ as regulatory hubs of VEGF signaling during angiogenesis

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Background-Vascular endothelial growth factor (VEGF), regarded as a pivotal angiogenesis factor, regulates numerous processes, including endothelial cell proliferation, migration, and cell survival. However, the signal transduction pathways culminating into the biological consequences of VEGF signaling are only partially understood. Recent studies have demonstrated significant roles of Yes-associated protein (YAP) and PDZ-binding motif (TAZ) as master regulators of organ growth, yet little is known about how YAP/TAZ activity is evoked during angiogenic process, and how YAP/TAZ regulate vascularization of organs. Therefore we aimed to understand those questions.

Methods- Endothelial specific YAP/TAZ knockout mice were used for investigating the role of YAP/TAZ in blood vessel *in vivo*. Bioinformatics analyses were used to investigate RNA-seq and Chip-seq data to identify the genes regulated by YAP/TAZ. *In vitro* and *in vivo* experiments were used to study the interaction of VEGF signaling and YAP/TAZ.

Results- Endothelium deficient of YAP/TAZ leads to embryonic lethality and impaired retina vascularization. Mechanistically, we show that VEGF activates YAP/TAZ via its effects on actin cytoskeleton and that activated YAP/TAZ induce a transcriptional program to further control cytoskeleton dynamics and thus establish a feed-forward loop that ensures a proper angiogenic response. Lack of YAP/TAZ also results in altered cellular distribution of VEGFR2 due to trafficking defects from the Golgi apparatus to the plasma membrane.

Conclusions- YAP/TAZ are essential for proper formation of the vascular system. During angiogenesis, YAP/TAZ activity is controlled by VEGF, which induce a YAP/TAZ-dependent transcriptome linked to cytoskeleton remodeling. YAP/TAZ deletion results in impaired VEGFR2 cellular distribution and trafficking. Together, our study establishes YAP/TAZ as crucial mediator of VEGF signaling, hence, regulate angiogenesis.

壁报交流

PO-001

Relation between horizontal corneal diameter and horizontal ciliary sulcus diameter in high myopia eyes

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Objective: To evaluate the relation of between horizontal corneal diameter and horizontal ciliary sulcus diameter in high myopia eyes, and influence by anterior chamber depth.
Methods: A retrospective, single-center study. The implantable collamer lens(ICL) candidates with high myopia from June 2015 to October 2018 were involved in this study, and only data of right eyes were collected. The correlations between horizontal corneal diameter(i.e. white-to-white, WTW) and horizontal sulcus diameter(i.e. sulcus-to-sulcus, STS) values in 115 eyes were analyzed, as well as difference between groups according to anterior chamber depth(ACD). α=0.05.
Results: There were significant differences between WTW and STS values（11.49±0.40mm versus 11.67±0.46mm, paired t test, t=5.27，P<0.01）, with strong linear correction(Pearson r=0.65, P<0.01). Bland-Altman plot analysis showed mean difference of STS-WTW was 0.18mm，with 95% limit of agreement(LoA) [-0.53，0.90]. The WTW and STS values in ACD≤3.23mm were wider than those in ACD＞3.23mm(11.37±0.37mm versus 11.62±0.39mm, independent samples t test, t=3.594, P<0.01; 11.56±0.48mm versus 11.79±0.41mm, independent samples t test, t=2.181, P<0.05.) The STS-WTW difference between ACD≤3.23mm group and ACD＞3.23mm group showed no difference significantly(0.19±0.39mm versus 0.17±0.33mm，independent t test, t=-0.348, P>0.05).
Conclusions: There is difference between WTW and STS values in high myopia eyes, with poor agreement and strong positive correlation. The WTW and STS values increase while ACD values increase. The ACD values has no effect on STS-WTW difference.

PO-002

Retinal Nerve Fiber Layer Thickness in Children. The Gobi Desert Children Eye Study

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Purpose: Since there is a paucity of population-based data on retinal nerve fiber layer thickness (RNFLT) for children, we measured the RNFLT and its associations in schoolchildren in a population-based study.
Methods: The population-based Gobi Desert Children Eye Study included all school children aged 6-21 years and living in Ejina, an oasis of the Gobi Desert. The children underwent a comprehensive ocularexamination with cycloplegic refractometry and spectral domain optical coherence tomography (OCT) of the optic nerve head. The peripapillary RNFLT was measured on the OCT images of a circular scan with a diameter of 3.4 mm. Results: Out of 1565 participants, RNFLT data were available for1440 (92.5%) children(mean age:10.3±2.7 years). The mean global RNFLT was 101.3±9.2μm in right eyes and 101.2±9.3μm in left eyes. The RNFLT was thickest in the temporal inferior sector(157.3±21.8 μm), followed by the temporal superior sector (143.8±19.5 μm), the nasal inferior sector (109.7±25.1μm) , the nasal superior sector (106.9±22.0μm), temporal sector (85.2±14.3μm) and finally the nasal sector (61.7±20.4μm). In multivariate analysis, RNFLT increased with more hyperopic refractive error (standardized coefficient beta:0.35;P<0.001), female gender (beta0.08;P=0.001), lower intraocular pressure (beta:-0.08;P=0.002) and higher birth weight (beta:0.06:P=0.03). It was not significantly associated with age (P=0.98), body height (P=0.88), systolic blood pressure (P=0.32) and subfoveal choroidal thickness (P=0.09).
Conclusions: Similar as in adults, the profile of the RNFLT follows the ISNT (inferior-superior-nasal-temporal)-rule of the neuroretinal rim in Chinese schoolchildren. The RNFLT significantly increased with higher (more hyperopic) refractive error and female gender. In schoolchildren as compared to adults, the RNFLT did not decrease with older age. These findings may be taken into account when interpreting RNFLT data in children.

PO-003

小鼠视觉皮层 PV 神经元环路相关的眼优势关键期调控机制

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在神经系统的发育过程中，新突触的形成存在着一个由低到高再到低的动态变化过程，其中的高峰时期被定义为神经系统的关键期。在视觉皮层(V1)中，关键期的可塑性对于小儿弱视的形成和治疗有重要的影响。如何在成年时期重新启动关键期的可塑性，是开发弱视临床治疗新途径的首要难题。前期研究表明，视觉可塑性的关键期启动，是由靶向 V1 中兴奋性神经元胞体的抑制性突触的成熟所触发的。为了阐明这一调控机制，我们研究了敲除 Narp 基因的小鼠。Narp 是一种经验依赖的，在暗环境中会对光刺激产生迅速表达的即早基因。我们使用在体和离体电生理记录的方法，发现 $Narp^{-/-}$小鼠中，主要的兴奋性神经元锥体细胞输入到 PV 神经元的连接数减少了，而 PV 神经元输入到锥体细胞的连接数没有变化，这使得 $Narp^{-/-}$小鼠的 V1 神经兴奋性提高，无法正确表达可塑性，因此无

法启动关键期。重要的是，通过注射 Diazepam 增强抑制性输入，可以在任何年龄的 Narp$^{-/-}$小鼠中触发视觉可塑性。因此，招募抑制的能力，而不是抑制性突触的强度，在眼优势可塑性的关键期启动中发挥着核心的作用。

上述 Narp$^{-/-}$小鼠未能启动关键期的现象揭示了在 V1 的关键期开始时一条关于 PV 神经元的全新的回路。为了进一步研究这个问题，并且寻找药物开发的可能性，我们针对在此突触上的另一条信号通路 NRG1-ErbB4 展开了研究。NRG1 是由兴奋性突触前膜分泌的一种表皮生长因子，ErbB4 是特异的存在于 PV 神经元表面的酪氨酸激酶受体，两者的结合会增强该突触的兴奋性。我们通过在体和离体电生理方法，结合药理学实验发现，在幼年小鼠中激活 NRG1-ErbB4 信号通路会提前终止关键期，而在成年小鼠中抑制 NRG1-ErbB4 通路则会重新启动关键期。这一研究结果进一步阐明了改变 PV 神经元受到的兴奋性输入对关键期可塑性的全新调控机制，具有很高的临床应用价值。

PO-004

电针干预对弱视大鼠视皮层脑功能连接的影响

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目的：探讨电针干预对弱视大鼠的作用及机制。
方法：动物分三组：正常对照组、弱视模型组和弱视模型+电针干预组。出生 13 天的 SD 大鼠，行右眼眼睑缝合造弱视模型，出生 45 天剪开缝合眼睑。出生 30 天开始对太阳、合谷、攒竹、百会进行电针及针灸干预，每天 30 分钟，每周 5 天。出生 60 天开始进行双通道水迷宫行为学视力测定。出生后 180 天，针灸和行为学视力测试结束进行核磁共振扫描。核磁共振扫描结束进行透射电镜样品的取材和制备。
结果：（1）行为学视力测试结果提示：弱视大鼠弱视眼视锐度较正常大鼠显著降低，弱视+电针干预组弱视眼视锐度较非针灸干预组大鼠显著升高。（2）透射电镜结果表明：放大 1 万倍，弱视组初级视皮层单眼投射区（V1M）单位面积视野内线粒体总面积百分比较正常组大鼠显著降低。弱视模型+电针干预组大鼠 V1M 区单位面积视野内线粒体面积百分比较弱视非针灸干预组又显著增加。（3）前人研究表明：线粒体钙转运等功能增强或减弱都可降低脑功能连接。本实验功能核磁共振（BOLD）结果表明：弱视模型组大鼠 RSD 脑区及多个脑区与 V1M 脑区之间功能连接显著降低，针灸干预后 RSD 脑区与 V1M 脑区的功能连接较弱视组又明显增强，具有统计学差异。
结论：电针干预不仅可有效提高弱视大鼠的行为学视锐度，提高初级视皮层 V1M 区线粒体含量，还可提高 RSD 脑区与 V1M 脑区的功能连接。RSD 脑区与视觉行为学决策相关，因此电针干预还可有效提高行为决策水平。

PO-005

The safety and higher TGF-β2 level in the aqueous humor of the second eye after bilateral sequential cataract surgery

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Purpose: To evaluate the incidence of acute-onset endophthalmitis after separate bilateral cataract surgeries less than 5 days apart (SBCS5), and assess the differences in cytokine levels in the aqueous humor (AH) of bilateral eyes.
Methods: The medical records of all patients who underwent SBCS5 at a single medical center were retrospectively reviewed. The levels of 33 cytokines in AH samples collected from separate single-eye operations of 26 age-related cataract patients who experiencing sequential cataract surgery were compared between the first-eye and second-eye groups.
Results: The medical records for treatment of 5374 eyes of 2687 patients were examined. The mean interval between the first and second surgeries was 3 days. No case of bilateral simultaneous endophthalmitis was observed. Unilateral endophthalmitis developed in five eyes of five patients. Thus, the incidence of endophthalmitis after SBCS5 was 0.093%. All cases of endophthalmitis occurred in the first operated eye. SBCS5 was 15% less expensive than unilateral cataract surgery. The AH level of transforming growth factor beta 2 (TGF-β2), an immunosuppression regulator, in the second-eye group was significantly higher than that in the first-eye group (p=0.002). No differences in the concentrations or detection rates of other cytokines were observed between the first- and second-eye groups.
Conclusion: The incidence of endophthalmitis after SBCS5 was acceptably low with topical but not intracamaral antibiotic prophylaxis. During bilateral sequential cataract surgery, the AH of the second eye had a higher level of TGF-β2 but not of proinflammatory cytokines or chemokines compared with those in the first eye, implying a protective mechanism preventing the sympathetic immune reaction induced by the first-eye cataract surgery.
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PO-006

The effect of adenosine A2AR on the dendritic development of retinal ganglion cells

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Recent studies have indicated a possible role for the adenosine A_{2A} receptor ($A_{2A}R$) in embryonic development of cortical neurons. However, it is still unclear whether $A_{2A}R$ signaling affects neuronal growth and differentiation of retinal ganglion cells (RGCs) during the postnatal development. In the present study, Thy1-YFP transgenic mice were treated intraperitoneally with $A_{2A}R$ antagonist KW6002 or vehicle daily from postnatal day 4 (P4) to P6. Three types (Type I, II, III) of RGCs were distinguished and classified according to the characteristic features in their dendritic field area and dendrite density on P21. Compared with the control group, KW6002 did not alter the composition of the three RGC types but produced distinct changes in the dendritic development of these RGC types. These results suggest that $A_{2A}R$ activity is required for morphological diversity of RGCs during normal postnatal development.

PO-007

脑视觉可塑性训练对青光眼患者双眼视功能影响的研究

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目的：本研究旨在探讨青光眼患者脑视觉可塑性训练前后双眼视功能变化的情况
方法：入选 42 例青光眼患者，对入选患者进行以下眼科基础检查,包括裸眼视力、矫正视力、裂隙灯，眼压，眼底照相、OCT、视野，头部 CT 或 MRI 排除颅内病变，随后进行脑视觉功能检查，个性化的脑视觉短期可塑检查。观察所有患者训练前后的各项指标，进行对比分析。采用 SPSS21.0 软件进行统计学分析，异 P<0.05 作为统计学差异标准。
结果：42 例患者经过短期可塑性训练（取变化最大的眼睛训前训后数值分析，两个眼睛提升行数一样优先取视力较差眼，有视力下降优先取视力下降眼），一共取得了 34 个符合要求的样本，短期可塑性训练前视力均值 0.64，训练后视力均值 0.77，t 检查 p<0.0001.42 例患者经过脑视觉检查，其中精细立体视觉缺损最严重，占比 78.5%(33/42),水平知觉眼位异常患者占比 31.4%(11/42),垂直知觉眼位异常患者占比 45.7%(16/42),粗糙立体视异常患者占比 30.9%(13/42),运动立体视异常患者占比 42.8%(18/42).
结论：
1.青光眼患者存在知觉眼位、精细、粗糙立体、运动立体视觉等脑视觉功能异常
2.青光眼患者知觉眼位垂直偏差损害大于水平偏差损害
3.脑视觉可塑性训练有可能改善青光眼患者的视功能

PO-008

压电离子通道蛋白 Piezo1 在小鼠视网膜发育中的时空表达研究

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青光眼是由病理性高眼压等因素引起 RGCs 损伤、视神经退化的不可逆致盲性眼病，其发病机制复杂，目前尚无明确理论。压电离子通道蛋白 Piezo1 是于 2010 年发现的一种专职应力感受的新型机械敏感性离子通道，参与多种应力相关疾病的发病，如软骨应力劳损、高血压、受压性膀胱炎和肾炎等，但在高眼压青光眼中未有报道。我们猜测病理性高眼压可以通过应力激活 Piezo1，导致 RGCs 中钙离子内流，胞内钙离子浓度持续升高，引起系列胞内病理反应，诱发 RGCs 退行性病变，最终形成青光眼。本研究将采用石蜡切片免疫荧光染色法和实时荧光定量 PCR 检测法，明确压电离子通道蛋白 Piezo1 在发育各个阶段小鼠视网膜中的时空表达。取 E16.5 到成年各阶段小鼠眼球，石蜡切片后进行 Piezo1 免疫荧光染色，确定 Piezo1 在不同发育阶段视网膜各种类型细胞的表达定位。取 E16.5 到成年各阶段小鼠视网膜，提取总 RNA 并逆转录为 cDNA 后，采用 qPCR 的方法检测不同发育阶段视网膜中 Piezo1 表达量变化趋势。进而构建 Piezo1 在小鼠视网膜发育过程中的时空表达模式图。免疫荧光染色结果发现，压电离子通道蛋白 Piezo1 在视网膜发育初期各层细胞均有表达，随发育过程逐渐集中表达于 RGCs，其他部分则为阴性。qPCR 检测结果发现，压电离子蛋白 Piezo1 在发育早期表达量最强，随着视网膜发育的进行逐渐减少。由于在视网膜发育期 Piezo1 高表达，可以推测其在视网膜发育过程中发挥重要的生物学功能。由于视网膜发育成熟后 Piezo1 表达集中于 RGCs，可以推测其在高眼压青光眼 RGCs 凋亡中可能具有重要的调控作用。本研究结果首次证明了 Piezo1 在视网膜中的时空表达模式，为研究 Piezo1 在视网膜发育中的生物学功能和高眼压青光眼发病中的作用奠定了理论基础。

PO-009

暗视觉对小鼠空间记忆的影响

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目的：通过建立不同光照度小鼠视觉刺激的模型，了解并比较明视觉和暗视觉对小鼠空间记忆和搜索策略影响。方法：选择健康雄性昆明种小鼠 30 只，随机等分为 1、2、3 组。第 1 组：明视觉组（光照度>1500 lx）；第 2 组：暗视觉组（光照度<50 lx）；第 3 组：挖除眼球组(摘眼球，止血 3 日后实验)。实验 1：定位巡航试验。将 3 组小鼠分别放在 Morris 水迷宫内寻找平台，历时 4 天，每天上、下午两段时间，每时段 4 次在四个不同象限寻找平台，一天共 8 次，然后记录时间。实验 2：空间搜索试验。第 5 天移走平台，让 3 组小鼠在水迷宫内作空间搜索试验，每个象限 2 分钟，用摄像机记录其运动轨迹。使用 SPSS17.0 软件包对定位巡航试验时间和空间记忆搜索试验路线百分比进行分析比较。结果：暗视觉组和挖眼组较对照组在定位航行试验中的潜伏时间更长,空间搜索试验平台象限游泳路程随机变化,与其它象限无明显差别。而对照组平台象限游泳路程占总路程的百分比均高于其它象限。结论：提示暗视觉组与挖眼组的空间记忆能力和搜索策略有明显的变化。实验显示在暗环境中情况下，小鼠的空间记忆学习能力会减退。

PO-010

Progressive retinal vessel malformation in a premature infant with Sturge-Weber syndrome after intravitreal anti-VEGF

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We report a case of progressively formed retinal vessel malformation in a premature male infant with Sturge-Weber syndrome(SWS) after he was treated with intravitreal anti-VEGF. The baby was born prematurely with a port wine mark involving his left eyelids and maxillary. On postmenstrual age week 33 he had intravitreal anti-VEGF, and one week after, he presented with posterior retinal vessel tortuosity and comprehensive vein-to-vein anastomoses. retinal vessel tortuosity is characteristic in SWS, but vein to vein anastomoses are rarely reported. Besides, to the best of our knowledge, this is the first report of documented progression of retinal vessel malformation in Sturge-Weber syndrome.

PO-011

Mitochondrial Fission Is Required for Blue Light-Induced Apoptosis and Mitophagy in Retinal Neuronal R28 Cells

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Objective: To elucidate the role of Drp1-mediated mitochondrial fission in blue light induced damages in retinal neuronal R28 cells, including mitochondrial dysfunction, oxidative stress, mitophagy and apoptosis.
Methods: Blue light at 450 nm or red light at 630 nm was used for irradiation to retinal neuronal R28 cells. After light exposure, expression of mitochondria, apoptosis and mitophagy related proteins were examined using western blot analysis. Mitochondrial morphology, mitophagy, intracellular and mitochondrial ROS were also measured by confocal microscopy or flow cytometry. In addition, the apoptosis after blue light was evaluated by TUNEL staining.

Results: It was found that exposure to blue light for up to 12 h significantly up-regulated the expression of mitochondrial fission protein Drp1, while down-regulating the expression of mitochondrial fusion protein Mfn2 in cells. Mitochondrial fission was simultaneously stimulated by blue light irradiation. Moreover, exposure to blue light increased the production of ROS, disrupted mitochondrial membrane potential (MMP), and induced apoptosis in R28 cells. Notably, Drp1 inhibitor Mdivi-1 and Drp1 RNAi not only attenuated blue light-induced mitochondrial fission, but also alleviated blue light-induced ROS production, MMP disruption and apoptosis in cells. Compared with Mdivi-1 and Drp1 RNAi, the antioxidant N-acetyl-L-cysteine (NAC) only slightly inhibited mitochondrial fission, while significantly alleviating apoptosis after blue light exposure. We also examined markers for mitophagy, which is responsible for the clearance of dysfunctional mitochondria. It was found that blue light stimulated the conversion of LC3B-I to LC3B-II as well as the expression of PINK1 in R28 cells. Mdivi-1 or Drp1 RNAi efficiently inhibited the blue light-induced expression of PINK1 and co-localization of LC3 with mitochondria.
Conclusion: Our data suggest that Drp1-mediated mitochondrial fission is required for blue light-induced mitochondrial dysfunction and apoptosis in RGCs.

PO-012

Tmem30a deficiency leads to retinal rod bipolar cell degeneration

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Purpose
Phospholipids are asymmetrically distributed across the mammalian plasma membrane, with phosphatidylserine (PS) and phosphatidylethanolamine (PE) concentrated in the cytoplasmic leaflet of the membrane bilayer and phosphatidylcholine in the exoplasmic leaflet. This asymmetric distribution is dependent on a group of P4 ATPases called PS flippases. The proper transport and function of PS flippases require a β-subunit transmembrane protein 30A (TMEM30A). Disruption of PS flippases leads to several human diseases. Tmem30a is essential for photoreceptor survival. However, the roles of Tmem30a in the retinal rod bipolar cells (RBC) remain elusive.
Methods
To investigate the role of Tmem30a in the RBCs, we developed a RBC-specific *Tmem30a* knockout (cKO) mouse model. Photopic and scotopic electroretinograms (ERGs) of control and cKO mice were performed to evaluate the physiological status of the retina; Histological study was carried out to verify the RBC loss in inner nuclear layer (INL). Immunofluorescent labeling of several antibodies was performed to reveal pathological alterations caused by *Tmem30a* deficiency.
Results
The *Tmem30a* cKO mice exhibited defect in RBC function and progressive RBC death. PKCα staining of retinal cryosections from cKO mice revealed a remarkable dendritic sprouting of rod

bipolar cells during the early degenerative process. Immustaining analysis of PSD95 and mGluT6 demonstrated that rod bipolar cells in Tmem30a cKO retinas exhibited aberrant dendritic sprouting as a result of impaired synaptic efficacy, which implied a crucial role for Tmem30a in synaptic transmission in the retina. Loss of *Tmem30a* led to reactive gliosis with increased expression of glial fibrillary acidic protein (GFAP) and CD68. TUNEL staining suggested that apoptotic cell death occurred in the retinal inner nuclear layer (INL). Our data show that loss of *Tmem30a* in RBCs results in dendritic sprouting of rod bipolar cells, increased astrogliosis and RBC death.

Conclusion

Our studies demonstrate an essential role for *Tmem30a* in the retinal bipolar cells.

PO-013

间歇性外斜视青少年优势眼与注视眼的关系

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目的：探究间歇性外斜视（IXT）青少年优势眼与注视眼(非偏斜眼)的关系。方法：纳入 43 位 IXT 患者，屈光全矫后分别使用卡洞法测量注视性优势眼、使用集合近点法测量运动性优势眼、使用基于 Gabor 信号识别的连续闪烁抑制法测量知觉性优势眼，并采用 Mayo 眼位控制力评分(0-5 分制)观察受检者的远距离客观控制力来判定注视眼。采用 Kappa 一致性检验比较优势眼与注视眼的一致性，采用单因素 logistics 回归分析双眼知觉性优势差异和优势眼与注视眼一致性程度的关系。结果：所有 IXT 患者中，注视性优势眼、运动性优势眼及知觉性优势眼均与注视眼呈现出中度一致性（Kappa 分别为 0.46、0.43 及 0.68，$P<0.05$）。当明确了双眼知觉优势差异后，比较 30 位具有明确知觉性优势眼的患者其知觉性优势眼与注视眼的一致性，发现二者高度一致（Kappa=0.86，$P<0.01$），而注视性优势眼、运动性优势眼与注视眼的一致性仍为中度一致性（Kappa 分别为 0.57 和 0.44，$P<0.01$）。单因素 logistic 回归分析发现，IXT 患者的双眼知觉性优势差异(ODI)是知觉性优势眼与注视眼一致性程度的影响因素(B=0.53，OR=1.70，$P<0.01$)。结论：对于 IXT 患者可依据知觉性优势眼检查结果来判断其注视眼，尤其当患者有明确知觉优势差异时，比通过注视性优势眼和运动性优势眼检查来确定注视眼更为可靠。

PO-014

Changes in corneal biomechanics during small incision lenticule extraction (SMILE) and femtosecond-assisted laser in situ keratomileusis (FS-LASIK)

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Abstract

Purpose: Observe the influence of femtosecond laser cutting during small incision lenticule extraction (SMILE) or femtosecond-assisted laser in situ keratomileusis (FS-LASIK) and these two operations on corneal biomechanics with Corvis ST II.

Methods: Prospective,non-randomized study.80 patients with 80 eyes were treated with either SMILE or FS-LASIK.Inverse concave radius, deformation amplitude ratio 2 mm or 1 mm (DA ratio 2 mm or 1 mm), highest concavity radius (HC radius), biomechanically-corrected intraocular pressure (bIOP), and central corneal thickness (CCT) were recorded at day 1 preoperatively, immediately after the lenticule or flap creation and subsequent lenticule extraction or excimer laser ablation, follow-up at week 1 , month 1 and 3 postoperatively.

Results: After lenticule creation,DA ratio 2 mm or 1 mm were bigger ($p<0.05$)meanwhile CCT was thicker($p<0.05$) than flap creation.Partial parameters altered significantly after lenticule creation or flap creation and all parameters changed significantly after tissue remove. All parameters have no significant difference between these two groups ($p>0.05$) after operation. The variation of bIOP (ΔbIOP) after operation were significantly less than Δnon-contact IOP ($p<0.001$) in two groups.

Conclusions: Femtosecond laser cutting during lenticule creation exert greater impact on corneal biomechanics than flap creation. Both the femtosecond laser cutting and removal of tissue decrease corneal biomechanical;however, these decreases may be caused predominantly by the tissue remove.SMILE and FS-LASIK have no difference in corneal biomechanics when the same CCT is consumed. BIOP is more reliable after the operation, further study is essential.

PO-015

Searching for the novel pathogenic factor in myopia: results from high-throughput proteomics and cell culture studies

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Objectives: Myopia has become an epidemic. The pathologies of myopia are hallmarked by elongation in ocular axis and thinning in choroidal and scleral tissue at posterior pole of the eye. The initiating factor of axial elongation may be derived from central nervous system, however, the factor mediating choroidal and scleral thinning remains elusive. In the current study, high-

throughput proteomics was used to identify such a factor from ocular posterior pole, and the effects of this factor on the adjacent types of cells were examined.

Materials and Methods: Three week-old pigmented guinea pigs were randomly assigned to three groups. The normal control group was without any treatment. Myopia was induced monocularly by translucent latex facemasks and -10 D concave lenses in the right eyes in form-deprived myopia (FDM) group and lens-induced myopia (LIM) group, respectively. The left eyes of the two groups served as self-controls. Refraction, axial length, and radius of corneal curvature were measured immediately before and every two weeks following the induction. At six weeks after the myopic induction, all animals were deeply anesthetized and sacrificed. All the right eyes were quickly enucleated, some of which were paraffin-sectioned for hematoxylin-eosin (H&E) staining and examining the posterior scleral thickness and morphological changes. Whereas the posterior poles of the rest of the right eyes were collected and subjected to high-throughput proteomic analysis for detection of differentially-expressed proteins among the three groups. The location and expression of cochlin were detected by immunohistochemistry. Subsequently, quantitative real-time PCR (qPCR) and Western blot were used to verify *Coch* expression at mRNA and protein levels, respectively in the FDM group. On the other hand, ARPE-19 cells of human origin were cultured with monomeric or multimeric recombinant human cochlin for 24 h. Untreated cells served as a normal control. Differentially-expressed mRNAs in the RPE cells were revealed by a gene chip analysis and validated by qPCR.

Results: No significant differences in refraction, axial length and radius of corneal curvature were found among the three groups before the myopic induction (all $P > 0.05$). Following the induction, the right eyes of both FDM and LIM groups showed significant reduction in refraction and elongation in axial length, as compared to the normal control (all $P < 0.05$). Moreover, the FDM group exhibited higher degree of myopia than LIM group after 6 weeks of induction. However, there was no significant difference in radius of corneal curvature among the three groups ($P > 0.05$). The H&E staining revealed diminished thickness and disordered collagen fibers in posterior sclera in the FDM and LIM groups, as compared to the normal controls. More importantly, high-throughput proteomic results showed significant upregulation of cochlin in both myopic groups (3.77 fold for FDM vs Normal; 1.71 fold for LIM vs Normal). Immunohistochemistry revealed that cochlin was predominantly located in the outer segment of photoreceptor cells, abutting the widespread RPE cells. Furthermore, the results of qPCR and Western blots confirmed the upregulation of this gene at transcript and protein levels, respectively in the FDM group in comparison to the normal controls. The microarray analysis of the RPE cells treated with recombinant human cochlin is underway.

Conclusions: The induced myopia in guinea pigs is mainly caused by axial length elongation accompanied with posterior scleral remolding. The upregulation of *Coch* at mRNA and protein levels was detected in the posterior poles of myopic eyes, indicating the crucial role of this factor in the pathogenesis and progression of myopia. Cochlin located at photoreceptor outer segment might affect choroid via RPE cells. The exact mechanism underlying this interaction is being investigated.

PO-016

Ldb1 is required for mouse retinal vascular development

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Purpose: LIM domain binding protein-1 Ldb1 is a widely expressed cotranscription factor, which plays a very important role in the development of heart, hematopoietic system, brain, retina and so on. However, up to now, there is no any report showing Ldb1 can regulate retinal vascular development. This present study aims to investigate the role of Ldb1 in mouse retinal vascular development. **Methods:** Immunostaining assay was used to investigate expression pattern of Ldb1 in retinal astrocyte. Loss-of-function assay was used to investigate the function of Ldb1 in regulating migration and fate of retinal astrocytes and vascular endothelial cells. What's more, retinal fundus imaging and fluorescence angiography were used to further comfirm the role of Ldb1 in retinal vascular development. **Results:** we found co-expression of Ldb1 and astrocyte marker Sox9 in E15.5 mouse retinal optic disc and optic stalk. Conditional knockout of *Ldb1* in retina with Six3-cre caused loss of astrocyte in E15.5 mouse retinal optic disc and optic stalk. What's more, specific ablation of *Ldb1* caused GFAP immunoreactivity, defective retinal vascular, blood vessel leakiness and so on. **Conclusion:** Ldb1 regulates mouse retinal vascular development by controlling the migration and survival of astrocytes.

PO-017

To evaluate the effectiveness of Kaleidos photoscreening in detecting amblyopia risk factors meeting 2013 the American Association of Pediatric Ophthalmology and Strabismus (AAPOS) criteria in Chinese 4 -14years

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Methods

One hundred and 502 children (1004 eyes), aged between 4 to 14 years (9.49 ± 2.7 years) underwent complete ophthalmologic examination, Kaleidos photoscreening, and KR8800 auto-refraction. The agreement of the results obtained with the photoscreening and KR800 was

evaluated by linear regression and Bland-Altman plots. The sensitivity and specificity of detecting amblyopia risk factors were calculated based on the AAPOS 2013 guidelines. The overall effectiveness of detecting amblyopia risk factors was analyzed with Receiver Operating Characteristic (ROC) curves.

Result

The mean refractive errors measured with the Kaleidos were: spherical equivalent (SE) = -1.45 ± 1.76 D, J0 = -0.02 ± 0.53 D, J45 =-0.02± 0.61D. The mean results from KR8800 were: (SE) = -1.05 ± 2.20 D, J0 = -0.1 ± 1.37 D, J45 = 0.05± 1.09 D. There was a strong linear agreement between results obtained from those two methods (R2 = 0.782, P<0.01). Bland– Altman plot indicated a moderate agreement of cylinder values between the two methods. Based on the criteria specified by the AAPOS 2013 guidelines, the sensitivity and specificity 80.1% and 75%.

Conclusion

The refractive values measured from Kaleidos photoscreener showed a moderate agreement with the results from KR8800 auto-refraction. The performance in detecting individual amblyopia risk factors was satisfactory.

PO-018

Zeb2 对视网膜发育和血管生成起重要作用

张容

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目的：*Zeb2* 基因突变引起的 Mowat-Wilson 综合征伴随视网膜缺损、小眼等症状，探究 Zeb2 对视网膜神经元发育与血管生成的作用可以帮助我们在临床上更快更准确诊断 Mowat-Wilson 综合征。**方法：**通过在小鼠 P0 时期过表达 *Zeb2* 基因和条件敲除视网膜中 *Zeb2* 基因，利用免疫荧光染色来观察 Zeb2 对视网膜不同类型细胞和血管造成的影响。而后用 RNA-seq 分析 P0 时期 $Zeb2^{\Delta fl/\Delta fl}$ 和对照小鼠的视网膜，探究 Zeb2 下游的调控因子。**结果：***Zeb2* 条件敲除小鼠的视网膜伴随有退行性病变、视神经变细、视盘膨大和视功能受损等表型，视网膜前体细胞趋向于向感光细胞分化。另一方面，虽然条件敲除小鼠在 P21 成熟的的视网膜中双极细胞、无长突细胞、水平细胞、神经节细胞和穆勒细胞均减少，但早期 P0 时期的的神经节细胞和 P7 时期的穆勒细胞数目无明显变化，说明 Zeb2 对双极细胞、无长突细胞和水平细胞的分化、特化和维持起到充分必要的作用，对神经节细胞和穆勒细胞来说，仅对其后期特化和维持起作用。此外，突变小鼠的视网膜血管与对照相比异常。**结论：**Zeb2 抑制细胞向感光细胞分化，促使其向非感光细胞分化成熟，并对血管发生有重要意义。

PO-019

Inhibition of Cdk5 rejuvenates inhibitory circuits and restores experience-dependent plasticity in adult visual cortex

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Amblyopia is treatable during childhood owing to the malleability of juvenile neural networks. Following the closure of the critical period of visual cortex, however, the treatment of adult amblyopia is unavailing since that visual circuits can be less modified. However, the mechanisms that mediate the transformation of plasticity progress are still elusive. Cyclin-dependent kinase 5 (Cdk5) is a proline-directed serine/threonine kinase and acts as an essential modulator for neural development and neurological disorders. Here we show that Cdk5 plays a pivotal role in modulating GABAergic signaling and the maturation of visual system. In adult mouse primary visual cortex, Cdk5 formed complex with the GABA synthetic enzyme glutamate decarboxylase GAD67, but not with GAD65. In addition to enhancement in the surface level of NR2B-containing NMDA receptors, inhibition of Cdk5 reduced the protein levels of GADs and Otx2, while leaving intact the expression of vesicular GABA transporter and subunits of GABAA or AMPA receptors. Whole-cell patch-clamp recording in layer II/III pyramidal neurons revealed a decrease in the frequency of miniature inhibitory postsynaptic current (mIPSC). Consequently, pharmacological inhibition and genetic knockdown of Cdk5 in adult mice led to a restoration of juvenile-like ocular dominance plasticity in vivo. Cdk5 was highly expressed in both excitatory and inhibitory neurons. However, selectively knockdown of Cdk5 in PV-positive neurons, but not in CaMKIIα-positive neurons rescued the plasticity in adult mice. Enhancement of GABA signaling by diazepam impeded ocular dominance plasticity rescued by Cdk5 inhibition. Moreover, we observed a reinstatement of the capability to evoke long-term synaptic potential in layer II/III induced by white matter stimulation as well as presynaptic endocannabinoid receptors dependent long-term depression at inhibitory synapses (iLTD). These results suggest that a physiological role of Cdk5 in visual cortex is to consolidate and stabilize neural circuits through controlling GABAergic signaling. Thus, targeting the Cdk5 pathway may provide a promising therapeutic mechanism to accelerate functional recovery from adult amblyopia and neurological disorders.

PO-020

巩膜巨噬细胞通过上调 MMP-2 在近视发生中的作用

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目的人类和啮齿动物巩膜中存在大量巨噬细胞，但它们在是否参与巩膜细胞外基质重塑及近视形成尚不明确。本研究将利用小鼠形觉剥夺性近视(FDM)研究巨噬细胞在近视形成中的作用。

方法对 3 周龄雄性野生型 C57BL/6 小鼠进行 2 周的形觉剥夺(FD)，建立近视眼模型。在剥夺周期结束后，利用免疫荧光染色检测形觉剥夺眼(FD-T)巩膜巨噬细胞密度及巨噬细胞 MMP-2 的表达水平，并与非剥夺左眼(FD-F)和正常对照眼(NC)进行比较。另外，我们将利用巨噬细胞特异性敲除 MMP-2 (*LysM^{Cre}Mmp-2$^{fl/fl}$*)小鼠及其对照组小鼠(*Mmp-2$^{fl/fl}$*)明确巨噬细胞是否可以通过分泌 MMP-2 参与近视形成。

结果 FD2 周后，FD-T 组小鼠巩膜后部巨噬细胞密度及其 MMP-2 表达水平显著高于形觉剥夺小鼠对侧眼（FD-F）组和正常对照（NC）组(P<0.05)。*Mmp-2$^{fl/fl}$* 小鼠 FD 4 周后， F4/80 和 MMP-2 共染的免疫荧光结果显示，*Mmp-2$^{fl/fl}$* 小鼠 FD-T 眼与 FD-F 眼相比，巩膜中 MMP-2+ F4/80+细胞密度及其占总 F4/80+细胞的百分比均明显增加，而 *LysM^{Cre}Mmp-2$^{fl/fl}$* 小鼠的 FD-T 眼与 FD-F 眼相比无明显差异。此外，*LysM^{Cre}Mmp-2$^{fl/fl}$* -FD-T 眼与 *Mmp-2$^{fl/fl}$*-FD-T 眼相比，FD 诱导的 MMP-2^{+} F4/80^{+} 细胞密度和百分比的增加均受到抑制。FD 4 周后，*LysM^{Cre}Mmp-2$^{fl/fl}$* 小鼠的近视率比 *Mmp-2$^{fl/fl}$* 小鼠低 59%。与这些屈光度的差异相一致，与 *Mmp-2$^{fl/fl}$* 小鼠相比，*LysM^{Cre}Mmp-2$^{fl/fl}$* 小鼠眼轴长度的增加受到明显抑制。
结论 FD 引起了巩膜巨噬细胞数量增加，并伴随 MMP-2 表达上调。这一结果表明，这种增加有助于近视进展中的细胞外基质重塑。

PO-021

转化生长因子-β1 对人巩膜成纤维细胞 Smad 泛素化调节因子 2 和Ⅰ型胶原 α1 影响的实验研究

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目的 探讨 Smad 泛素化调节因子 2（Smurf2）在人胚胎眼巩膜成纤维（HFSFs）细胞中表达，及检测转化生长因子 β1（TGF-β1）影响下 HFSFs 细胞中 Smurf2 和Ⅰ型胶原 α1（COLIA1）的变化，分析 TGF-β1 对 HFSFs 细胞 Smurf2 通路的作用。**方法** HFSFs 细胞复苏并稳定传代后，用免疫细

胞化学法检测细胞中 Smurf2 蛋白的表达；分别用不同浓度 TGF-β1（0ng/ml、1ng/ml、5ng/ml、10ng/ml）处理 HFSF 细胞 24 小时以及 10ng/ml TGF-β1 处理 HFSFs 细胞不同时长（1 小时、 6 小时、12 小时、24 小时）后，用实时荧光定量法检测各组 Smurf2 mRNA 和 COLIA1 mRNA 表达水平。采集数据以均数±标准差（$\bar{x} \pm s$ ），各组间比较采用单因素方差分析，若方差不齐则采用 Kruskal Wallis H 检验。**结果** 免疫细胞化学检测的结果显示 HFSFs 细胞中有 Smurf2 蛋白的表达；5 ng/ml、10 ng/mlTGF-β1 干预组 Smurf2 信使核糖核酸（mRNA）表达上调（F=2.001， P=0.002、0.028，P＜0.05），其他浓度干预组差异没有统计学意义（F=2.001，P >0.05）。10 ng/ml TGF-β1 干预 HFSFs 细胞培养 1 小时、6 小时、12 小时、24 小时后，24 小时干预组 COLIA1 mRNA 表达显著升高（F=29.201，P=0.033，P＜0.05）。Smurf2 mRNA 表达改变呈先增加后降低趋势，6 小时干预组 Smurf2 mRNA 表达升到最高（F=10.653，P=0.024，P＜0.05）；而在 24 小时下降至与未刺激无显著差异（F=10.653，P>0.05）。**结论** TGF-β1 可能通过调控 HFSFs 细胞 Smurf2 的表达，诱导 HFSFs 细胞 COLIA1 的合成。

PO-022

Attenuation of myopia progression by aripiprazole is dependent on form deprivation

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***Purpose**: Although there is suggestive pharmacological evidence that dopamine D2 receptor activation promotes form-deprivation myopia (FDM) development, this notion requires further validation. This uncertainty exists because the drugs used for this purpose are only proved to be effective on development of FDM, but the exact cause and mechanism of myopia is unknown. To address this question, we evaluated the effects of a dopamine D2 receptor partial agonist, aripiprazole, to assess D2 receptor involvement in controlling FDM development.*

***Methods**: C57BL/6 mice were raised either in a visually normal environment or wore sight compromising goggles inducing FDM development from a postnatal age of 28 to 56 days. Both groups were divided into 4 sub-groups including control, vehicle and two different aripiprazole dosage (1 mg/kg and 10 mg/kg) treatments groups who were injected in the peritoneum with this drug. Their body weight, refraction, corneal radius of curvature, and ocular axial components were measured prior to and after the experiment. Monocular photopic flash electroretinograms were recorded from the form-deprived eyes.*

***Results**: In normal mice, daily injection of aripiprazole did not affect normal postnatal refraction development. However, in the FDM group, the higher aripiprazole dose attenuated form deprived myopia development (5.98 ± 0.92D in FDM - aripiprazole versus 10.38 ± 0.88D in FDM - vehicle, p<0.05), with a shortened vitreous chamber depth (0.015 ± 0.006mm in FDM - Aripiprazole versus 0.035 ± 0.003mm in FDM - vehicle, p<0.05). Neither of the drug treatments altered corneal radius*

of curvature and other axial components from those in the vehicle –treated and control groups. The aripiprazole dose did not affect FDM development at low dose, but decreased the ERG b-wave amplitudes of the form-deprived eyes in a dose-dependent manner.

Conclusions: *Aripiprazole only attenuated FDM without altering refraction development under normal vision environment or in vehicle injected mice. This dependence on form deprivation suggests that vision obstruction may somehow alter the response patterns controlled by D2R-linked signaling. Additional studies are warranted to gain insight into the underlying molecular mechanisms accounting for why aripiprazole suppresses myopia development.*

PO-023

环状 RNA-cZNF532 靶向调控视网膜血管周细胞和内皮细胞 crosstalk 影响糖尿病视网膜血管病变的发生

颜标

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目的：视网膜血管病变是糖尿病常见并发症，其中内皮细胞和周细胞是视网膜血管的主要组成单元。既往研究大多聚焦内皮功能异常，忽视了周细胞以及两种细胞的 crosstalk。本研究着重研究环状 RNA-cZNF532 在视网膜周细胞与内皮细胞 crosstalk 以及视网膜血管病变中的调控作用。

方法与结果：采用定量 PCR 检测，发现 cZNF532 在视网膜血管病变和周细胞损伤过程中发生差异表达；视网膜平铺片、Evans Blue 和 ELISA 等实验检测发现，cZNF532 的表达沉默显著地加重视网膜血管的损伤，引起病理性的血管新生；MTT、EdU、Transwell 和 martrigel 等实验发现，cZNF532 的表达沉默抑制周细胞增殖、分化以及周细胞和内皮细胞的 crosstalk；RNA pull down、荧光素酶和生物信息学等实验发现，cZNF532、miR-29a-3p 以及 CSPG4 (NG2)/ LOXL2/ CDK2 构成调控网络影响周细胞功能以及周细胞和内皮细胞的 crosstalk。

结论：环状 RNA-cZNF532 通过 ceRNA 网络调控视网膜血管病变的进程。

PO-024

ARPE-19 细胞 SnoN 的表达及其 TGF-β/Smad 信号通路中的作用

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Smad 核转录共抑制因子(Ski-related Protein N，SnoN)是 TGF-β/Smad 信号通路中重要的细胞因子，人视网膜色素上皮细胞上是否存在 SnoN 及其在 TGF-β/Smad 信号通路中的作用尚不清楚。

目的：检测 SnoN 基因在人视网膜色素上皮细胞 ARPE-19 细胞中的表达以及人重组 TGF-β1（rh TGF-β1）对 ARPE-19 细胞 SnoNmRNA 表达的影响。
方法：用免疫荧光法（Immunofluoresent Assay，IFA）检测 ARPE-19 细胞 SnoN 的表达水平及部位；用不同浓度 rh TGF-β1 干预 ARPE-19 细胞不同时间后，用实时荧光定量 PCR 法检测 SnoN 的 mRNA 表达。
结果：免疫荧光结果显示 SnoN 在 ARPE-19 细胞中有表达，且主要位于胞浆中；不同浓度 rhTGF-β1（0ng/ml，1ng/ml，2ng/ml，5ng/ml，10ng/ml，20ng/ml）作用于 ARPE-19 细胞 2h 后，与空白对照组相比，各处理组 SnoN 的 mRNA 表达量水平显著高于对照组（P<0.05）；在相同浓度 rhTGF-β1（5ng/ml）、不同时间点（0min，30min，1h，2h，3h，6h，12h，24h，48h）作用于 RPE 细胞后，与空白对照组相比，30min 组 SnoN mRNA 表达量下降，但差异无统计学意义（P>0.05），其余各处理组 SnoN mRNA 表达量均上升，且差异有统计学意义（P<0.05）。
结论：SnoN 主要表达于 ARPE-19 细胞胞浆，且可能参与调节 RPE 细胞 TGF-β/Smad 信号通路。

PO-025

空间频率剥夺引起豚鼠脉络膜变薄促进豚鼠近视

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目的：豚鼠空间频率剥夺可诱导近视的发生，但是具体机制尚不明确。我们通过研究空间频率剥夺豚鼠的视网膜、脉络膜改变，探究空间频率剥夺诱导近视的视网膜、脉络膜机制，为进一步阐明近视发生发展的机制提供理论依据。
方法：本实验采用了灰色视标建立空间频率剥夺模型（灰色视标组，n=11），采用黑白条纹视标（黑白条纹组，n=10）以及普通开放笼具（正常对照组，n=12）作为对照。3 周后，通过红外偏心验光仪检测豚鼠屈光；利用 A 超检测眼轴参数。通过 cut-loading 检测视网膜水平细胞缝隙连接开放程度。实验 2 天和 3 周后，利用 Angel-OCT 对脉络膜厚度及血流量进行检测。
结果：空间频率剥夺 3 周可使豚鼠屈光发育向近视方向进展。灰色视标组的豚鼠屈光明显偏向近视（灰色 vs 黑白条纹 vs 对照：-3.00±2.64D vs 4.11±0.85 D vs 4.57±1.30D,P<0.001, 单因素方差分析），同时伴有玻璃体腔加深（灰色 vs 黑白条纹 vs 对照：3.33±0.09 mm vs 3.18±0.06 mm vs 3.17±0.03 mm,P<0.001, 单因素方差分析）和眼轴延长（灰色 vs 黑白条纹 vs 对照：8.35±0.10mm vs 8.23±0.10mm vs 8.19±0.08mm,P<0.001，单因素方差分析）。灰色视标组的豚鼠视网膜水平细胞缝隙连接开放程度并无明显区别（P=0.795, 单因素方差分析）。灰色视标组的豚鼠脉络膜厚度明显变薄(P<0.001, 单因素方差分析)，血流量明显减少(P<0.001, 单因素方差分析)。空间频率剥夺 2 天后，灰色视标组的豚鼠脉络膜厚度明显变薄(P=0.036, 单因素方差分析)，水平方向血流量相对于黑白条纹组减少(P=0.271, 单因素方差分析)。
结论：空间频率剥夺可能通过减少脉络膜血流量诱导豚鼠近视，但引起脉络膜血流量减少的视网膜因素还需进一步研究。

PO-026

波前像差引导的 LASIK 手术与传统 LASIK 手术理论与实际切削深度的比较研究

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目的：探讨波前像差引导的 LASIK 手术实际切削深度与理论切削深度的差异，以及与传统手术切削深度的比较研究，为临床手术方式的选择提供依据。
方法：回顾性分析。收集来我院行 LASIK 手术的中高度近视患眼 319 眼，按切削范围及手术方式分为：单纯近视个性化 LASIK 切削范围 6.0mm 组及 6.5mm 组；单纯近视传统 LASIK 切削范围 6.0mm 组及 6.5mm 组。复性近视个性化 LASIK 切削范围 6.0mm 组及 6.5mm 组；复性近视传统 LASIK 切削范围 6.0mm 组及 6.5mm 组，共 8 组。分别记录激光仪器提供的理论切削值和术后测得的实际切削值。对其进行统计学分析，$p<0.05$ 有统计学意义。
结果：1. 各组理论值与实际值均不同，实际切削量大于理论切削量，除了复性近视个性化 6.5mm 组外，均 $p<0.05$。而复性近视个性化 6.5mm 组实际值与理论值相符。2. 传统手术各组实际切削深度和理论切削深度的差值分别大于个性化手术各组实际切削深度和理论切削深度的差值，可见个性化手术的各组差异值均小于传统手术的差异值，统计学分析 $p<0.05$。3.传统单纯近视组的理论切削深度与传统复性近视组的理论切削深度值相近，$p>0.05$，没有统计学差异，实际切削深度两组值 $p<0.05$，有统计学差异。个性化单纯近视组与复性近视组理论上和实际上都有统计学差异，$p<0.05$。4. 单纯近视组常规手术和个性化手术在角膜切削厚度上没有统计学差异，$p>0.05$；复性近视组传统手术和个性化手术角膜切削厚度有统计学意义，$p<0.05$。
结论：1. 无论传统手术还是个性化手术实际切削值与理论切削值是存在差异的。2.个性化术中切削比常规手术更稳定。3.传统手术切削柱镜理论上是不消耗角膜的，个性化手术切削柱镜是消耗角膜组织的。4. 波前像差引导的 LASIK 手术所需切削角膜厚度大于传统手术。5.切削范围越大，理论值与实际值越相符，手术切削过程越稳定。

PO-027

五种方法测量近视患者中央角膜厚度的研究

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目的 研究 Pentacam、RTVue OCT、Tomey OA-2000、IOL Master700 及 A 超角膜测厚仪（NIDEK US-500）测量近视患者中央角膜厚度的可靠性。方法 选取 我院门诊拟行角膜屈光手术的近视患者 56 人(112 眼) ，分别用 Pentacam、OCT、OA-2000、IOL Master 700 及 A 超（NIDEK US-500）测量中央角膜厚度（CCT），取五组测量值的平均值，将五组测量值分别与平均值比较差异性、相关性及一致性。 结果 112 眼的 CCT 测量值为：Pentacam (530.17 ± 25.08) μm、OCT (519.79

± 26.90) μm、OA-2000 (521.75 ± 26.51)μm、IOL Master 700 (519.53 ± 28. 15)μm 、A 超 (542.23 ± 26.88) μm，五组测量值的平均值为(526.69 ± 26.08) μm。五种仪器测量值及平均值总体间比较差异有统计学意义 (F = 11.951，P ＜0.01)，Pentacam 、OA-2000 与平均值之间差异无统计学意义(P =0.329、P=0.180)，OCT、IOL Master 700 及 A 超与平均值间差异均有统计学意义(P ＜ 0.05)，Pearson 相关分析结果显示：五组测量值与平均值之间均有显著的相关性（r = 0.979、r = 0.980、r =0.987、r =0.958、r =0.981， P＜0.01）。Bland-altman 分析结果：五组测量值与平均值一致性均良好, Pentacam 及 OA-2000 的 CCT 测量值与平均值的一致性程度最高。结论 五种仪器测量 CCT 的值与平均值的相关性及一致性均良好， Pentacam 及 OA-2000 具有更好的临床参考价值，二者的 CCT 测量值相对于 A 超角膜测厚仪更为保守，更好的保障手术安全性，或可取代传统的 A 型超声测厚法成为中央角膜测厚新的“金标准”。

PO-028

MiR-29a 人对巩膜成纤维细胞生物学行为的影响

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目的：研究 miR-29a 对原代培养的人巩膜成纤维细胞生物学行为的影响
方法：采用 miR-29a mimics、inhibitor(人工合成的 microRNA 的模拟物和抑制剂)转染人巩膜成纤维细胞，检测对细胞胶原合成水平，细胞分化、细胞增殖、细胞迁移能力的影响。
结果：人巩膜成纤维细胞转染 miR-29a mimics 后，PCR 和 Wstern Blot 实验结果显示细胞内 1 型胶原表达水平下降，Transwell 迁移实验结果显示细胞迁移能力增强，细胞免疫荧光和 Western Blot 结果显示纤维连接蛋白表达减少；转染 miR-29a inhibitor 后，细胞内 1 型胶原表达水平上升，细胞迁移能力减弱，纤维连接蛋白表达增加。EdU 细胞增殖检测表明 miR-29a 对人巩膜成纤维细胞增殖能力无明显影响。细胞免疫荧光和 Western Blot 检测 α-SMA 表达水平，发现 miR-29a 人巩膜成纤维细胞分化为肌成纤维细胞无明显调控作用。
结论：miR-29a 减弱了巩膜合成 1 型胶原的能力，使巩膜成纤维细胞纤连蛋白表达减少，增强了细胞迁移能力，可能与近视巩膜重塑时细胞外基质丢失，巩膜变薄拉长相关，需要进一步体内实验证明 miR-29a 在近视中的作用。

PO-029

PM2.5 对 hESCs 三维诱导神经视网膜发育的影响

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目的
研究环境中 PM2.5 对早期视网膜发育的影响及作用机制。

方法

通过人胚胎干细胞（hESCs）三维诱导的神经视网膜层（NR）为模型进行研究。在诱导第 18 天时给予不同浓度 PM2.5 处理（25ug/ml、50ug/ml、100ug/ml），观察时间点为 1w、2w、3w NR 形成率、面积、厚度的影响，视网膜祖细胞标记物 PAX6 和 CHX10 的表达，以及增殖标记 ki67 和凋亡指标 tunel 的变化。

结果

18 天的 hESCs-NR 用 PM2.5 处理 1w，发现随着 PM2.5 处理浓度增高，NR 形成率呈下降趋势；处理后 3W 即神经视网膜发育第 39 天，通过对视网膜祖细胞标记的观察，发现 control 组视网膜逐渐分为 2 层，内层为 PAX6 阳性，外层为 CHX10 阳性，与视网膜生理发育模式一致。但 PM2.5 处理后的神经视网膜层，出现 PAX6 阳性细胞排列紊乱，CHX10 阳性细胞缺失， Ki67 阳性细胞显著减少且阳性细胞集中在 NR 外层，Tunel 凋亡细胞显著增加，主要集中在 NR 内层。

结论

较高浓度的 PM2.5 暴露对早期视网膜发育有明显影响。

PO-030

双眼视功能训练在弱视训练中的应用

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目的：探讨双眼视功能训练在弱视训练中的应用分析。

方法：选取 48 例屈光参差性弱视患者作为研究对象，随机分为两组。观察组（24 例 24 眼）年龄（6~11）岁，平均（8.27±0.41）岁；男 13 例，女 11 例；轻度弱视 9 例，中度 11 例，重度 4 例。对照组（24 例 24 眼）年龄（6~12）岁，平均（8.31±0.42）岁；男 14 例，女 10 例；轻度弱视 10 例，中度 10 例，重度 4 例。两组患者均进行遮盖+红光+光栅+光刷等治疗；观察组在此基础上给予双眼视功能训练（包括脱抑制训练、调节训练、融合训练以及立体视训练），随访 6 个月，对两组患者的视力、视功能进行评价。

结果：两组患者视力均较治疗前有所提高，观察组患者视力提高更为明显。观察组患者治愈、进步、无效分别为 17 例（70.83%）、5 例（20.83%）、2 例（8.33%），对照组分别为 7 例（29.17%）、15 例（62.50%）、2 例（8.33%），观察组治愈率明显高于对照组。观察组患者近立体视≤60”者 10 例（41.67%），对照组仅 4 例（16.67%）；观察组患者恢复远立体视者 22 例（91.67%），对照组 12 例（50.00%），观察组患者立体视恢复情况明显优于对照组。

结论：弱视治疗患者联合双眼视功能训练，不仅可以有效提高视力，还有利于建立双眼视功能。

PO-031

知觉性优势眼与屈光参差的关系

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目的：
探究双眼知觉性优势的差异与双眼屈光参差之间的关系，从而进一步了解屈光不正进展及屈光参差发生的机制。
方法：
受试者在暗室中，通过人眼对 Gabor 图形和 Mondrian 图形对比度连续改变做出的反应，并自动计算本次检查的视觉通路强度指数（Ocular Strength Index，OSI），即按键确认时的 Mondrian 图形与 Gabor 图形的对比度比值，单位为 db。来检测双眼的优势差异。
结果：
在 145 名受试者中，96 人有明确的优势眼，49 人双眼无明显差异。在那些有明确优势眼且双眼等效球镜差异<2.0D 的 53 人当中，知觉性优势眼为更近视那只眼的占 58.97%，而非知觉性优势眼为更近视那只眼的占 41.03%。在那些有明确优势眼且双眼等效球镜差异≥*2.0D* 的 43 人当中，知觉性优势眼为更近视那只眼的占 32.56%，而非知觉性优势眼为更近视那只眼的占 67.44%。知觉性优势眼与屈光参差的关系两者间有统计学意义（R=0.31,P<0.05）。
结论：
本实验表明在屈光参差<2.0D 的人群中知觉性优势眼趋向于更近视眼，在屈光参差≥*2.0D* 的人群中非知觉性优势眼趋向于更近视眼。

PO-032

Correlation Analysis between the Vault and Evaluation of double － pass optical quality analysis system after Collamer lens implantation

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Objective: To evaluate the effect of vault on lens transparency and visual quality of the double － pass optical quality analysis system after intraocular lens implantation.
Methods: Twenty-nine patients with fifty-eight eyes with myopia and myopic astigmatism who underwent phakic intraocular lens implantation were divided into three groups according to the size of postoperative vault (OCT measurement). Group A (100um <arch height ≤300um) 16 eyes, B

Group (300um < arch height ≤ 600um) 29 eyes, group C (600um < arch height ≤ 900um) 13 eyes. The patients were followed up for 1 year. The modulation transfer function cutoff frequency (MTF cutoff), objective scatter index (OSI), and strehl ratio (SR) were recorded at 1 month, 6 months, and 1 year after surgery) and analyze the results.

Results:MTF cutoff, OSI, and SR values all met the spherical distribution hypothesis. There was no statistically significant difference between January, June, and 1 year after surgery(P>0.05), time and group had no interaction, and time factor did not follow the grouping. The difference was analyzed by multivariate analysis of variance P>0.05. There was no statistical difference between the two groups at each time point.

Conclusion: The vault after posterior chamber intraocular lens implantation with V4c has no effect on lens transparency and visual quality of the two-channel system. The low vault of 100um~300um does not cause lens transparency and visual quality degradation.

PO-033

Deficient stereopsis in the normal population revisited: why current clinical stereo tests may not be adequate

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Purpose: To determine why the high incidence of stereo anomaly found using laboratory tests with polarity-based increment judgements (i.e., depth sign) is not reflected in clinical measurements that involve single-polarity incremental judgements (i.e., depth magnitude).

Methods: An iPod-based measurement that involved the detection of an oriented shape defined by a single polarity-depth increment within a random dot display was used.A staircase procedure was used to gather sufficient trials to derive a meaningful measure of variance for the measurement of stereopsis over a large disparity range. Forty-five adults with normal binocular vision (20 - 65 years old) and normal or corrected-to-normal (0 logMAR or better) monocular vision participated in this study.

Results: Observers' stereo acuities ranged between 10 and 100 arc seconds, and were normally distributed on alog scale (p= 0.90, 2-tailed Shapiro-Wilk test). The present results using a single polarity depth increment task (i.e.,depth magnitude) show a similar distribution to those using a similar task using the Randot preschool stereo test on individuals between the ages of 19-35using either the 4-book test (n = 33) or the 3-book test (n = 40), but very different results when the iPod test involved a polarity-based increment judgement (i.e., depth sign).

Conclusions: The present clinical stereo tests are based on magnitude judgements andare unable todetect the high percentage of stereo anomalous individualsin the normal population revealed using depth sign judgements.

PO-034

屈光适应选择性改变弱视的大细胞通路视觉电生理反应

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研究目的：目前国际上对屈光适应的研究局限于视觉行为学，而缺乏客观的证据，故对其神经生理机制仍不清楚。通过不同模式的分离格栅视觉诱发电位（ic-VEP）研究屈光矫正的有无对屈光参差性弱视患者大细胞和小细胞通路视觉电生理反应的影响。
研究方法：对 16 名正常被试者、25 名未接受过屈光矫正的和 15 名接受过屈光矫正的屈光参差性弱视患者（AA）进行 ETDRS 视力和 ic-VEP 检查。分离格栅刺激 16×16 的格栅阵列。在基底对比度上，以 12.5Hz 方波模式调制对比度，对比度调制强度为 1%、2%、4%、8%、16%、32%。通过改变不同的基底对比度，可选择性地刺激 MC 通路和 PC 通路。通过傅里叶变换分析视觉诱发电位，得到刺激频率下的反应幅度、相位和信噪比，以米氏方程对数据拟合得到最大反应幅度（Rmax）、最大反应幅度一半时的对比度（σ）。
研究结果：对于正常被试者，MC 刺激产生非线性的对比度反应曲线，起始增长较快，在 16%对比度时开始饱和，而 PC 刺激产生线性的对比度反应曲线，增长稳定。正常受试者双眼信号无统计学差异（$p = 0.543$）。接受过屈光矫正的 AA 患者的弱视眼对于 MC 刺激和 PC 刺激所产生的信号均有明显下降（MC：$p = 0.001$；PC：$p = 0.007$），弱视眼起始对比度增益和最高反应均较对侧眼下降。但未接受过屈光矫正的 AA 患者弱视眼信号在 MC 通路上信号更差（$p = 0.001$），但 PC 通路信号无统计学差异（$p = 0.114$）。未矫正的弱视眼具有更弱的起始对比度增益和更低的最高反应。对他们进行两个月的屈光矫正后再次检查 MC 和 PC 通路信号发现：屈光适应后的 MC 通路信号增强（$p = 0.040$），而 PC 通路则无明显变化（$p = 0.430$）。
结论：分离格栅视觉诱发电位可选择性检测 M 细胞通路和 P 细胞通路。屈光适应可能选择性改变了屈光参差性弱视患者的大细胞通路信号，提示大细胞通路可能更具有可塑性。

PO-035

2 型糖尿病患者黄斑部结构改变与视力的相关性研究

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目的：研究不同眼底病变程度的 2 型糖尿病患者黄斑中心凹无血管区(FAZ) 面积、黄斑中心凹下视网膜厚度（CFT）、黄斑神经节细胞/内丛状层（mGCIPL ）厚度的改变，同时测量最佳矫正视力（ BCVA），并探讨各参数之间的相关性。**方法：**53 例 83 眼,糖尿病无视网膜病变组（NDR 组，n=31）,非增殖期糖尿病视网膜病变组（NPDR 组，n=52）。对照组(对照组，n=13)。受试者应用 OCT 测量 CFT、mGCIPL 厚度。软件测量浅层 FAZ 面积。统计分析各组 BCVA、CFT、mGCIPL、浅层 FAZ 面积差异性，并进行相关性分析。

结果：一、浅层 FAZ 平均面积 NPDR 组>对照组(p=0.012),NPDR 组>NDR 组,差异有统计学意义。平均 LogMAR BCVA NPDR 组>对照组(p=0.000),NPDR 组>NDR 组，平均 CFT NPDR 组>对照组(p=0.037),NPDR 组>NDR 组，NPDR 组>对照组(p=0.004),NPDR 组>NDR 组（p=0.006）,差异均有统计学意义。二、浅层 FAZ 面积与 logMAR BCVA 成正相关;浅层 FAZ 平均面积与 CFT 成负相关;浅层 FAZ 面积与最小 mGCIPL 成负相关; logMAR BCVA 与平均 mGCIPL 成负相关，;logMAR BCVA 与最小 mGCIPL 成负相关。

结论：1、随着病情进展，浅层 FAZ 面积逐渐扩大，最小 mGCIPL 厚度逐渐减小,视力下降。2、浅层 FAZ,视网膜厚度及视力间存在一定的相关性。3、OCTA 是一种相对较新的非侵入性的研究 T2DM FAZ 大小的方法，可在 T2DM 尚未出现明显 DR 之前观察到 FAZ 变化，可作为 T2DM 眼底筛查和监测疾病进展中的重要手段。

PO-036

单眼形觉剥夺性弱视豚鼠视皮质血管活性肠肽（VIP）的动态表达

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目的：探讨 VIP 与视觉发育可塑性的联系及单眼视觉剥夺对 VIP 在视皮质中的表达所产生的影响。

方法：将 30 只 3-4 周龄健康三色豚鼠随机分为两组：正常对照组、单眼形觉剥夺组，眼罩缝合遮盖右眼，均饲养在相同自然光线环境中，12h:12h 昼夜循环饲养。分别在第 0 周、第 1 周、第 2 周行体重、屈光度、图形视觉诱发电位（PVEP）检查，同时每次检查后随机处死 2 只豚鼠，并采用免疫组化技术对豚鼠视皮质 VIP 进行半定量分析及 Western blot 检测视皮质 VIP 的动态表达情况。

结果：遮前和遮盖后不同时间点，幼龄豚鼠各生物学参数比较，差异具有统计学意义。遮盖前，不同组间眼球及视皮质各生物学参数差异无统计学意义。随着遮盖时间的延长，两组幼龄豚鼠的体重逐渐增加，屈光度逐渐降低，正常组及形觉剥夺组未遮盖眼 PVEP P100 波潜伏期逐渐缩短，振幅逐渐升高，各眼 P100 波潜伏期、振幅差异无统计学意义（P>0.05）；形觉剥夺组遮盖眼 P100 波潜伏期逐渐延长，振幅逐渐降低；遮盖眼分别与未遮盖眼及正常对照眼 P100 波潜伏期比较，各眼 P100 波差异有统计学意义（P<0.05）。形觉剥夺组遮盖侧分别与正常对照组及形觉剥夺组未遮盖侧视皮质比较 VIP 免疫组化均有明显差异，差异有统计学意义（P<0.05）；正常对照组与形觉剥夺组遮盖侧视皮质 VIP 比较免疫组化无明显差异，差异无统计学意义（P>0.05）。形觉剥夺组未遮盖侧分别与正常对照组及形觉剥夺组遮盖侧视皮质比较 VIP Western blot 均有明显差异，差异有统计学意义（P<0.05）；正常对照组与形觉剥夺组遮盖侧视皮质 VIP 比较 Western blot 无明显差异，差异无统计学意义（P>0.05）。

结论：视觉发育关键期，行单眼遮盖可形成弱视；PVEP 检查在协助弱视诊断中的具有重要作用和意义；VIP 在单眼形觉剥夺弱视模型中表达具有差异性，提示 VIP 可能参与视觉发育过程的形成

PO-037

Photopic higher order aberrations and optical quality after posterior chamber phakic intraocular lens implantation for high myopia assessed by skiascopic ocular wave-front-sensing device

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Purpose:
To investigate photopic higher order aberrations (HOAs) and optical quality after posterior chamber phakic implantable collamer lens (ICL) implantation in high myopia patients assessed by skiascopic ocular wave-front-sensing device.
Methods:
Forty two eyes of 24 patients who underwent ICL implantation for myopic correction were enrolled in the prospective interventional study. The best corrected visual acuity (BCVA) and spherical equivalent (SE) were assessed 2 days before surgery and uncorrected visual acuity (UCVA) and SE were also evaluated 3 months after surgery. Preoperative refractive uncorrected, preoperative refractive corrected and 3 months postoperative total ocular wave-front aberration in 4mm pupil was checked by OPD Scan Ⅲ (Nidek Technologies, Gamagori, Japan) based on the skiacopy principle. Total ocular HOAs, coma, trefoil, spherical aberration and total corneal HOAs in 4mm pupil 2 days before and 3 months after surgery were also assessed. Total ocular point spread function (PSF) strehl ratio and modulation transfer function (MTF) area ratio of preoperative refractive uncorrected, preoperative refractive corrected and postoperative condition were also acquired. Normal distribution of the data was checked using Kolmogorov-Smirnov test. Pair T-test was used to analyze the data if normal distribution present and Wilcoxon test was used if not. P-values less than 0.05 ($P<0.05$) were considered statistically significant.
Results:
Mean SE of 42 eyes was decreased to -0.5±0.35D from -9.94±2.60D at baseline. Only one patient lost 1 line of BCVA. Postoperative total ocular wave-front aberration was significantly higher than that Preoperative refractive uncorrected (0.696±0.198μVS5.083±1.057μ,P=0.000),but significantly lower than that Preoperative refractive corrected (0.696±0.198μVS0.383±0.191μ,P=0.000). Postoperative total ocular HOAs, coma, trefoil, spherical aberration were significantly higher than the preoperative (P=0.006, P=0.019, P=0.009, P=0.006 respectively). But total corneal HOAs was not significantly changed (P=0.30). Postoperative total ocular PSF strehl ratio and MTF area ratio was significantly higher than that Preoperative refractive uncorrected (P=0.000), but significantly lower than that Preoperative refractive corrected (P=0.000).

Conclusions:

Our results suggests that photopic postoperative total ocular HOAs, coma, trefoil and spherical aberration are increased significantly after ICL implantation to correct high myopia. Photopic postoperative optical quality is better than preoperative refractive uncorrected condition but worse than preoperative corrected condition.

PO-038

Clinical effect of intraocular collamer lens implantation in the treatment of high myopia

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Objective: To explore the posterior chamber intraocular lens implantation (ICL) effects of correction of high myopia. Methods: Thirty-two patients with high myopia who underwent implantable contact lens implantation in the hospital were selected for orthodontic treatment by ICL implantation. The patients were followed up with la after the operation, and their visual quality, contrast sensitivity, high-order aberration and complications were analyzed and compared. Results: The results of ICL V4c implantation in 64 patients at 1 month, 6 months and 12 months after UCVA implantation were significantly different from those before UCVA implantation (P < 0.05). The difference of BCVA1 week and 1 month was statistically significant (P < 0.05). The difference between the results before and 1 week, 1 month and 6 months after surgery was statistically significant (P < 0.05). 1 week, 1 month and 12 months after the operation in the spatial frequency band of 1.5c/d, 3c/d, 6c/d, 12c/d and 18c/d with no glare, the differences in the preoperative results were statistically significant (P < 0.05). In the dark environment without glare, the results at 6 months and 12 months after the operation in the 1.5c/d spatial frequency band were significantly different from those before the operation (P < 0.05). 1 week, 6 months and 12 months after the operation of 3c/d12c/d spatial frequency band showed statistically significant differences compared with preoperative results (P < 0.05). 1 month, 6 months and 12 months after the operation of 6c/d 18c/d spatial frequency band showed statistically significant difference compared with preoperative results (P < 0.05). RMS values of total high-order aberration and total aberration at 12 months after surgery were significantly different from those before surgery (P < 0.05). The difference in total aberration RMS between 1 week and 1 month after surgery was statistically significant (P < 0.05). The spherical aberration, coma aberration and clover aberration 12 months after surgery were statistically significant (P < 0.05). The coma aberration and clover aberration at 1 and 6 months after surgery were statistically significant (P < 0.05), while the clover aberration at 1 week after surgery was statistically significant (P < 0.05). No serious complications occurred. Conclusion :ICL implantation can effectively improve the visual quality of patients with high myopia.

PO-039

活性氧在实验性视网膜脱离后坏死性凋亡中表达及与 RIP-1 的关系

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目的 观察实验性视网膜脱离后活性氧（ROS）和受体相互作用蛋白 1（RIP-1）表达以及 z-VAD 和 Necrostatin-1 干预下对其表达的影响 。
方法 健康雄性 SD 大鼠首先分为正常对照组（attached）和单纯视网膜脱离组来观察网脱不同时间点 ROS 和 RIP-1 的表达情况，借此选择最佳时间点为药物干预做准备。再将大鼠分为无网脱组（attached）、单纯网脱组（untreated）、z-VAD-FMK 组，z-VAD-FMK+Necrostatin-1 组，观察 z-VAD 和 Necrostatin-1 干预下对 ROS 表达的影响。通过视网膜下注入透明质酸钠构建网脱模型。利用蛋白质免疫印迹法（western blot）测出内部 RIP-1 蛋白表达情况，活性氧检测试剂盒检测各组内视网膜 ROS 表达情况。
结果 与 attached 组相比，实验性视网膜脱离后 RIP-1、ROS 表达明显增加，并且均于网脱后第三天达峰值，D3 组与其它组相比，差异有统计学意义(P <0.05)。 药物干预实验结果显示 z-VAD-FMK 诱导的坏死性凋亡组 ROS 表达最高，而 Necrostatin-1 干预后，与 untreated 组及 z -VAD-FMK 组相比，ROS 表达明显降低 (P<0.05)。
结论 ROS 作为 RIP-1 的下游参与了光感受器细胞的坏死性凋亡，Necrostatin-1 可以通过降低活性氧的水平，对网脱后的视网膜起到一定程度的保护作用。

PO-040

APP/PS1 鼠视网膜中未发现可用于诊断痴呆的阳性指标

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目的: 随着老龄化社会的到来，阿尔茨海默氏病（AD）成为困扰老龄人群的一种严重影响生活质量的疾病。AD 发病隐匿，不易诊断，人们一直致力于寻找一种可以早期诊断的方法，日本科学家发明“嗅棒”用于 AD 的早期诊断，受此影响，我们选取 AD 经典的 APP/PS1 转基因动物模型进行系列视网膜功能学，结构学，病理学和分子生物学检测，我们设计如下实验。
方法: 选取 8 mons 龄 APP/PS1 和 8 mons 龄野生型 C57/B6 小鼠各 12 只，进行全视野视网膜电图（ffERG），相干光断层成像（OCT），眼底彩照检测。之后处死小鼠，常规方法取视网膜进行 HE 染色，对小胶质细胞标志物（Iba1），AD 特征性标志物（Aβ）。
结果: FfERG 发现 APP/PS1 组和对照组 b 波（d3.0）和 Ops2 波幅值无统计学差异（all P>0.05）；APP/PS1 组眼底未发现脂褐素乘积，与对照组眼底彩照无明显差异。APP/PS1 组视网膜整体厚度以及各层厚度和对照组相比无显著差异（all P<0.05）；APP/PS1 组视网膜中未发现 Iba1 和 Aβ 着色；而 APP/PS1 组大脑组织海马区和皮质区有大量 Iba1 着染；同时海马区有 Aβ 着色。

结论: APP/PS1 痴呆小鼠未发现可用于诊断的阳性眼科学改变。

PO-041

新型低色温 LED 与传统 LED 光暴露对 ARPE-19 细胞的影响

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目的 探讨新型低色温 LED 和传统 LED 光暴露对 ARPE-19 细胞的影响。

方法 将 APE-19 细胞（iCell Bioscience 公司，感谢上海市第十人民医院于靖教授赠送）系快速复苏后，接种于完全培养基培养一周。将生长培养的细胞传 2-3 代至细胞密度为 5×106/ml 左右。将 ARPE-19 细胞暴露于黑暗（对照组）、1800K（新型 LED 光源）、3000K、4000K、6500K、蓝光（波长 400nm-470nm）（光源由南昌大学国家硅基地 LED 工程技术研究中心提供）光照环境中，光照强度为 1.0mW/cm2，暴露时间 24h。观察细胞代谢活性变化，通过检测细胞活力、细胞内 ROS 的变化。

结果 1.新型 LED 光源对 ARPE-19 细胞增殖无影响，传统色温 LED 和蓝光 LED 光源显著降低 ARPE-19 细胞增殖，并导致 ARPE-19 细胞凋亡。

2.新型 LED 光源对 ARPE-19 细胞活力无影响，传统 LED 光源显著降低 ARPE-19 细胞活力

3.相比新型 LED 光源，传统 LED 光源导致 ARPE-19 细胞内 ROS 增多

结论 1、与新型低色温 LED 光源相比，高色温 LED 光源含较多短波长光成分，致使 ARPE-19 线粒体产生更多 ROS，导致 RPE 细胞线粒体功能障碍。

2、传统 LED 光源对 ARPE-19 细胞损伤更严重，新型低色温 LED 光源对 ARPE 细胞无损伤，使用低色温光源可能减少 AMD 发病率。

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PO-042

光控大鼠视皮层神经元反应特性的离体研究

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目的：

通过光遗传学技术控制视皮层神经元反应取代电刺激控制视皮层神经元反应，以此减轻使用芯片植入视皮层治疗视觉障碍患者带来的创伤和感染风险。

方法：

新生 LongEvans 大鼠原代视皮层神经细胞培养 10 天后转染 ChR2-GFP 病毒，24-36 小时后用荧光显微镜观察细胞荧光表达，应用 470nm 蓝光刺激转染后视皮层神经细胞行膜片钳记录检测其功能。

结果：

新生 Long Evans 大鼠原代视皮层神经细胞染色。(A)绿色荧光为 ChR2-GFP 蛋白的表达；(B)红色荧光为通过 NeuN 标记的视皮层神经细胞；(C)黄色荧光为绿色荧光和红色荧光的融合。表明新生 Long Evans 大鼠原代视皮层神经细胞转染 ChR2-GFP 蛋白

新生 Long Evans 大鼠原代视皮层神经细胞全细胞膜片钳记录（A）白场下 Long Evans 大鼠原代视皮层神经细胞；（B）蓝光（470nm）下可见荧光，表明该细胞转染了 ChR2-GFP 蛋白；（C）电流钳记录动作电位说明该细胞是神经细胞；（D）蓝光刺激可引起神经元的动作电位。说明表达 ChR2-GFP 的神经细胞获得了对光反应能力

结论：

本实验证明大鼠的离体培养视皮层神经元能够转染光敏感蛋白（ChR2），并用光刺激取代电刺激神经元使其产生相应的反应效应，此实验为视觉障碍患者提供一种更为安全的治疗方式。

PO-043

白藜芦醇通过促进 SIRT4 介导视网膜发育过程中的 Muller 胶质细胞的增殖和去分化潜能

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目的：探讨线粒体酶 SIRT4 在视网膜 Muller 胶质细胞（MGC）发育过程中的作用特点，进一步研究白藜芦醇（RES）通过促进 SIRT4 介导视网膜发育过程中 MGC 的增殖和去分化潜能。

方法：WB 和 IF 确定 SIRT4 在大小鼠、人视网膜发育阶段的定位及定量。在 MIO-M1 和 rMC-1，SIRT4 与胶质细胞标记物共染色确定在胶质细胞中的定位。研究 SIRT4 在鼠出生后视网膜发育阶段的特点，选择出生后第 1 天，10 天，20 天，30 天，2 月和 10 月，研究 RES 通过促进 SIRT4 介导视网膜发育过程中 MGC 的增殖和去分化潜能，在 20 天的 SD 鼠腹腔注射 RES，至 30 天时即 P30+RES,至 2 个月即 P2M+RES。在相应的时间点提取视网膜分析调控 MGC 发育的 Notch1 信号通路上的相关转录因子的表达情况和调控细胞增殖的 AKT/mTOR 通路的变化。在体外，慢病毒干扰及质粒过表达 SIRT4 研究该基因在 MIO-MI 细胞中的具体调控机制。SIRT4 全基因敲除小鼠研究视网膜的稳态和发育特点。

结果：线粒体酶 SIRT4 在大鼠和小鼠视网膜发育早期中高度表达，RES 调控 SIRT4 介导 MGC 增殖和发育；直接调节 Notch 信号通路，上调控制 MGC 发育的多种生物转录因子生成，在一定程度

上影响 AKT/mTOR 增殖通路。体外实验 MIO-M1 细胞中运用慢病毒干扰 Sirt4 表达会下调 MGC 中 GS，Vimentin 和 PCNA,质粒过表达 SIRT4 后则能逆转。SIRT4 过表达促进 MGC 的增殖及增强胶质细胞的功能，小鼠基因敲除 SIRT4 导致 Notch 通路相关基因的快速下调和 Notch 信号的丢失，小鼠存在视网膜的发育障碍和功能缺陷.

结论：SIRT4 在 MGC 发育阶段是必需的,证明 SIRT4 具有维持视网膜稳态和完整性的重要作用。同时证明白藜芦醇不仅能够通过直接调控的 Notch 信号通路成分的表达，而且可能与 SIRT4 一起驱动 MGC 的增殖和分化

PO-044

TGF-β2／Smad3 信号通路对巩膜 I 型胶原调控及其在近视形成过程中的作用研究

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目的：进一步研究 TGF- β2／Smad3 信号通路对近视的调控机制，我们采用形觉剥夺性近视小鼠和人巩膜成纤维细胞两种实验模型，研究 TGF- β2／Smad3 在近视形成过程中的变化。

方法：(1) 小鼠单眼形觉剥夺 2 天，利用 q-PCR 和 WB 技术检测 Smad3 表达水平，以明确 Smad3 与近视的关系。
(2) 以原代分离的人巩膜成纤维细胞为研究对象，分别通过 Smad3 小 RNA 干扰和 TGF-β2 改变 Smad3 的功能，以明确 Smad3 对人巩膜成纤维细胞胶原的调控作用。

结果：形觉剥夺 2 天，剥夺眼较对照眼巩膜 Smad3 mRNA 水平明显升高，蛋白水平无变化；干扰 Smad3 后，I 型胶原在 mRNA 和蛋白水平上都下调；TGF-β 处理后 I 型胶原在 mRNA 和蛋白水平均上调，而 Smad3 下调。

结论：形觉剥夺过程中，巩膜 Smad3 mRNA 表达上调，提示近视的形成过程 Smad3 可能参与；TGF-β 处理后人巩膜成纤维细胞、I 型胶原和 Smad3 变化不一致，提示 Smad3 可能不只是参与了 TGF- β2／Smad3 信号通路来调控胶原。

PO-045

智能脉冲技术辅助的经上皮准分子激光角膜切削术与像差优化的经上皮准分子激光角膜切削术治疗高度近视的长期对照研究

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目的：比较智能脉冲技术（Smart pulse technology, SPT）辅助的经上皮准分子激光角膜切削术（Transepithelial photorefractive keratectomy, TransPRK）与传统像差优化的经上皮准分子激光角膜切削术（Aberration free Transepithelial photorefractive keratectomy）矫正高度近视的临床效果。**方法**：回顾性研究，选择接受手术的高度近视患者（等效球镜度数≥6.0D）共 177 例（307 眼），其中接受 SPT 辅助的 TransPRK 患者（SPT 组）共 65 例（117 眼），接受像差优化的 TransPRK 患者（AF 组）共 112 例（190 眼），随访 12 个月，对角膜上皮愈合时间、视力、屈光度、安全性、有效性、术后 Haze、像差等方面进行比较分析。**结果**：SPT 组术后平均上皮愈合时间 3.75±1.00 天，AF 组为 3.76±1.27 天（P=0.937）。SPT 组术后半小时、1 小时、1 天及 3 天的裸眼视力好于 AF 组，差异有统计学意义。两组术后 12 月时平均裸眼视力及矫正视力均比术前提高且屈光度数降低，差异有统计学意义（P＜0.001），两组间结果无统计学意义的差异。SPT 组和 AF 组分别有 40%和 29%眼达到 20/16（Snellen 视力）或更好的视力，分别有 77%和 76%眼达到 20/20 或更好的视力。SPT 组 79%眼及 AF 组 69%眼术后 12 月 UDVA 达到术前 CDVA 水平或更好。术后各随访阶段安全性指数及有效性指数 SPT 组均优于 AF 组。Haze 整体发生率两组之间未出现有统计学意义的差异。其他随访时间无统计学差异。SPT 组 RMS total、RMS HOA、Coma 90°的结果优于 AF 组，Coma 0°和球差两组间无统计学差异。**结论**：SPT 辅助的 TransPRK 在术后早期视力恢复，远期视觉质量方面有潜在的优势。

PO-046

对比研究环曲面和球性角膜塑形镜对散光患者的有效性和安全性

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目的：对比评估中高度角膜散光患者长期配戴环曲面设计和球性设计角膜塑形镜后镜片定位、视力变化、角膜形态学变化、眼轴变化和眼前节不良反应。评估两种镜片对于治疗中高度散光患者的有效性和安全性。

对象和方法:本研究属于病例对照研究，回顾性分析完成 1 年定期随访的 50 名中高度角膜散光（≥1.50D）青少年近视患者资料。根据配戴镜片类型，将受试者分为球镜组和环曲面组。每名受试者在常规验配角膜塑形镜后，嘱每夜配戴角膜塑形镜 8-10 小时，在戴镜 1 年时间里定期（1 天、1 周、1 月、6 月和 12 月）随访其裸眼视力、角膜地形图、眼轴、眼前节裂隙灯检查等相关内容。采用角膜地形图随访结果对夜戴角膜塑形镜镜片定位进行量化评估。数据统计分析使用 SPSS 22.0 软件。

结果：（1）针对中高度角膜散光的近视患者，环曲面角膜塑形镜从戴镜 1 月起显示出比球性角膜塑形镜更稳定的镜片定位（ANOVA，p＜0.05）；（2）两组受试者的裸眼视力、角膜等效屈光力变化量和角膜顶点屈光力变化量在任意随访阶段均无统计学差异；（3）配戴环曲面角膜塑形镜能有效降低角膜环曲面性，但角膜环曲面性与镜片偏位量之间存在线性正相关性（$Y = 3.268*X + 0.9182$ ，$p<0.0001$， $R^2=0.5035$）；（4）配戴环曲面角膜塑形镜能显著降度角膜 J180，球性组角膜 J180 无显著变化；两组受试者角膜 J45 在随访阶段无显著变化；（5）配戴镜片后，环曲面组较球形组出

现更显著的散光轴向变化；（6）配戴球性和环曲面角膜塑形镜 1 年均具有较好的安全性，两组受试者角膜点染发生率之间无统计学差异；（7）球镜组和环曲面组 1 年眼轴变化量之间无统计学差异。**结论：**环曲面角膜塑形镜相对球性角膜塑形镜能有效较少中高度角膜散光患者配戴时的镜片偏位的发生，且能有效降低角膜环曲面性和角膜 J180。但环曲面角膜塑形镜对角膜形态的影响易受镜片定位和镜片旋转的影响。

PO-047

一种来源于非编码 RNA 的短肽对缪勒细胞、双极细胞的分化促进作用

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目的：神经系统发育过程中表达多种长链非编码 RNA（Long non-coding RNA，LncRNA），但绝大部分的作用还不甚清楚。视网膜作为中枢神经系统的重要组成器官，是研究神经发育的极佳模型，通过转录组测序分析，我们发现了一种在视网膜神经发育过程中高表达的 LncRNA：181-Rik，并探究该 LncRNA 在视网膜发育过程中的作用。
方法：原位杂交（ISH）实验获得该 LncRNA 在视网膜上的表达分布。多物种同源比对和启动子分析预测出短肽（Short peptide）的存在。通过融合基因的细胞转染实验，确认短肽的表达及分布。过表达实验通过构建含有 181-Rik 或短肽的克隆，于 P0 小鼠眼内注射、电转并在 P12 收集视网膜，免疫荧光染色后计算各类细胞分化比例。构建 181-Rik 的基因敲除鼠，视网膜电图（ERG）、免疫荧光探究视觉功能和组织结构。
结果：181-Rik 广泛表达于早期胚胎视网膜，并在成熟过程中逐渐集中于内核层（INL）、节细胞层（GCL）。基因翻译区内含有一段长为 144bp 高度保守的序列，该序列与绿色荧光蛋白（GFP）或标签蛋白（FLAG）融合并转染 293T 细胞后，融合基因分布于胞质并和线粒体膜蛋白共标，证明该短肽的存在且和线粒体功能相关。过表达 181-Rik 或短肽使得双极细胞（Bipolar）、缪勒细胞（Müller）比例显著上升，光感受器（Photoreceptors）比例显著下降，二者作用效果相同，提示 181-Rik 是通过编码短肽调控分化过程的。视网膜电图（ERG）及免疫荧光染色结果表明，敲除 181-Rik 对视觉功能、视网膜结构几乎没有影响，提示该过程或许存在平行通路。
结论：181-Rik 通过编码短肽，抑制光感受器的分化，促进祖细胞分化为双极细胞、缪勒细胞，该过程与线粒体功能相关，且存在平行通路。

PO-048

运用单细胞测序研究人类胎儿视网膜发育轨迹和谱系

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运用单细胞测序研究人类胎儿视网膜发育轨迹和谱系

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摘要：视觉始于视网膜上的图像形成，其包含各种细胞类型，包括感光细胞，水平细胞，双极细胞，无长突细胞，神经节细胞和 Müller 胶质细胞等。各种神经细胞提取、处理和传递视觉信息到大脑的高级处理中心，从而形成完整的视觉处理环路。虽然有关哺乳动物视网膜细胞发育和亚型分类研究方面已经有了十分可观的进展，但是我们有关人类胚胎视网膜发育的了解甚少。视网膜多种细胞发育早在出生之前就开始，各种视网膜细胞从何而来，在发育中的基因动态表达变化一直不得而知，这在一定程度上阻碍了对各类视网膜疾病的研究。单细胞测序技术能够对单个细胞的转录组进行测序，其能够了解不同细胞的转录异质水平，在解析组织中的细胞异质性，研究疾病发生，个体发育上有着十分巨大的先进性。我们通过对不同时期人类胚胎视网膜进行单细胞测序，获得不同时期的视网膜细胞基因表达数据库，通过对数据分析我们构建了人类视网膜发育的细胞谱系，了解各种细胞发育分化进程，解析了各类细胞命运决定和成熟过程中的基因表达变化。我们的结果揭示了在人类胚胎视网膜的一个较长的发育时期中视网膜细胞分化的一个精确的基因表达分级程序，提供了胚胎期人类的视觉形成的基因表达数据库。

PO-049

通过 DREADD 技术研究视网膜多巴胺 D1 受体活性 对小鼠屈光发育的影响

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目的：近视是目前发病率最高的一种屈光不正。前人多采用药理学方法研究多巴胺受体与近视的关系，提示多巴胺 D1 类受体参与近视的形成但结果却不一致。这可能归因于药物的特异性不足和/或扩散部位的不确定性。因此，本研究采用化学遗传学方法（DREADD 技术）来明确视网膜多巴胺 D1 受体（Drd1）在小鼠屈光发育中的作用。

方法：本研究分为两部分，分别模拟视网膜 Drd1 激活和抑制。筛选出双眼屈光参差<3D 的 4 周龄 D1-Cre 小鼠，右眼视网膜下注射 AAV8-DIO-hM3Dq（激活部分）或 AAV8-DIO-hM4Di（抑制部分），左眼不做任何处理。注射一周后，每部分实验小鼠各随机分为两组：对照组，腹腔注射生理盐水（Saline，1mg/kg）；实验组，腹腔注射氯氮平-N-氧化物(CNO，1mg/kg)激活受体发挥激活或抑制作用。出生后 4、6、8、10 周时分别测量屈光度、眼轴长度等眼球生物学参数，在出生后 6 周进行眼底拍照，9 周记录视网膜电图（ERG），10 周测量结束后取小鼠视网膜、角膜、晶体、巩膜，qRT-PCR 检测 hM3Dq 或 hM4Di 表达量。

结果：1、视网膜下注射 AAV8-DIO-hM4Di 或 AAV8-DIO-hM3Dq 均未损伤眼底，ERG 结果无明显变化；

2、与对侧眼相比，hM3Dq 在注射眼的视网膜、角膜及巩膜高表达（*P*<0.01）；hM4Di 在注射眼的视网膜、晶状体中高表达（*P*<0.01）；
3、注射 AAV8-DIO-hM4Di，相对于 Saline 组，CNO 组屈光向近视方向发展（*P*<0.05）；注射 AAV8-DIO-hM3Dq，相对于 Saline 组，CNO 组屈光向远视方向发展（*P*<0.05）。
结论：增强视网膜多巴胺 D1 受体的激活水平导致小鼠出现远视，反之则出现近视。这一结果提示，视网膜 D1 受体活性降低可能是近视发生的原因，升高其活性可能是潜在的近视治疗方法之一。

PO-050

Activation of Nrf2 by Ginsenoside Rh3 protects retinal pigment epithelium cells and retinal ganglion cells from UV

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Introduction
Excessive Ultra-violet (UV) radiation shall induce damages to resident retinal pigment epithelium (RPE) cells (RPEs) and retinal ganglion cells (RGCs). Here we tested the potential activity of Ginsenoside Rh3 ("Rh3") against the process.
Methods
We cultured ARPE-19 cells and human RGCs, then give them UV radiation. Using qRT-PCR assay to test the expression of AntagomiR-141 under control, Rh3,UV and UV+Rh3. Using MTT assay, Trypan blue staining assay, FACS assay, ELISA assay, TUNEL intensity assay and the caspase-3 activity assay to test cell viability and cell death under control,Rh3,UV and UV+Rh3. Using Western blotting assay to test the expression of related protein and then using Image J software to analyze. In Experimental animals, we create a model of light damage and using electro retinography (ERG) to analyze.
Results
In cultured human RPEs and RGCs, pretreatment with Rh3 inhibited UV-induced reactive oxygen species(ROS) production and following apoptotic/non-apoptotic cell death. Rh3 treatment in retinal cells induced nuclear-factor-E2-related factor 2 (Nrf2) activation, which was evidenced byNrf2 protein stabilization and its nuclear translocation, along with transcription of anti-oxidant responsive element (ARE)-dependent genes (HO1, NOQ1 and GCLC). Nrf2 knockdown by targeted-shRNA almost abolished Rh3-induced retinal cell protection against UV. Further studies found that Rh3 induced microRNA-141 ("miR-141") expression, causing down-regulation of its targeted gene Keap1 in RPEs and RGCs. On the other hand,Rh3-induced Nrf2 activation and retinal cell protection were largely attenuated by themiR-141's inhibitor, antagomiR-141. In vivo, intravitreal injection of Rh3 inhibited retinal dysfunction by light damage in mice. Rh3 intravitreal injection also induced miR-141expression, Keap1 down-regulation and Nrf2 activation in mouse retinas.

Conclusion
Rh3 protected RPEs and RGCs from UV radiation through activation ofNrf2 signaling. Expression of miR-141 could be the key mechanism of Rh3-induced Nrf2activation and retinal cell protection. Our results imply that Rh3 might have therapeutic value for UV or oxidative stress-associated retinal degeneration disease.

PO-051

探究 TPRK、FS-LASIK、SMILE 对角膜生物力学行为参数的影响

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目的：利用 Corvis ST 可视化生物力学分析仪探究经上皮激光角膜切削术（TPRK）、飞秒准分子激光角膜原位磨镶术(FS-LASIK)和小切口微透镜提取术(SMILE)对角膜生物力学行为参数的影响。方法：选取 2016 年-2019 年在我院近视激光中心接受屈光手术的患者 210 例， TPRK、FS-LISIK 和 SMILE 各 70 眼，只取右眼数据进行分析。分别于术前及术后不同时期直至术后 6 月对患者进行 Corvis 测量，获取角膜生物力学行为参数。结果：TPRK、FS-LISIK、SMILE 三组术后 6 月随访期内各角膜力学行为参数均发生显著改变。峰间距离 PD、形变幅度 DA 和反向积分半径 IntInvRad 术后增大；角膜硬度 SPA1、第一次压平时间 AT1 和生物力学矫正眼内压 bIOP 术后下降；其中，DA 和 AT1 术后 6 月内呈持续变化趋势，其余力学行为参数呈稳定趋势。术后 6 月 TPRK 峰间距离变化量△PD 和生物力学眼内压变化量△bIOP 显著小于 FS-LASIK。线性回归分析显示，术后 6 月△bIOP 与△PD 及△DA 成负相关,与△AT1 及△SPA1 成正相关。△CCT 与△AT1 及△SPA1 成正相关,与△PD、△DA 及△IntInvRad 成负相关。结论：三种角膜屈光术后 6 月随访期内 Corvis ST 力学行为参数均发生显著变化，手术对角膜生物力学特性均产生了明显影响，其中 TPRK 影响较小，FS-LASIK 影响较大。三种术式术后 6 月随访期内，除 DA 和 AT1 外，其余生物力学行为参数术后均呈稳定趋势。术后力学行为参数的变化与眼内压和中央角膜厚度相关性较大。获国家自然科学基金项目(81600712, 31771020)，浙江省自然科学基金项目(LY18A020008, LY16H120005)，温州市公益性科技计划项目(Y20170198)和浙江省医药卫生科技计划项目(2016ZHB012, 2018RC057)的联合资助。

PO-052

透镜诱导型近视豚鼠视网膜中谷氨酸及其受体的表达变化

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目的 观察谷氨酸及其离子型受体 N-甲基-D-天冬氨酸受体(N-methyl-D-aspartate receptor，NMDAR)功能亚单位 NR2A 在近视豚鼠视网膜上的动态表达，探讨其在近视发病过程中的作用。
方法 3 周龄健康豚鼠 120 只，随机分为 0 周正常组、2 周正常组、2 周近视组、4 周正常组、4 周近视组，每组 24 只;正常组不作干预，近视组右眼均戴－10D 透镜，左眼不戴镜作为对照。入组前与处死前均进行屈光度及眼轴长度检测，采用高效液相色谱分析检测视网膜中谷氨酸的含量变化，实时荧光定量 PCR 以及 ELISA 分别检测豚鼠视网膜中 NR2A mRNA 及其蛋白水平的表达变化。
结果 造模前各组屈光度及眼轴长度差异均无统计学意义。造模后各组与造模前比较均有统计学意义。2 周近视组与 4 周近视组比较，右眼眼轴长度和屈光度差异均有统计学意义(P＜0.001; P＜0.001),左眼均无统计学意义;两组分别与相应的左眼比较,眼轴长度差异均有统计学意义(2 周近视组: P＜0.005;4 周近视组: P＜0.001),屈光度差异同样均有统计学意义(2 周近视组: P＜0.001;4 周近视组: P＜0.001)。视网膜中谷氨酸含量正常组之间差异均无统计学意义(均为 P＞0.05);造模后 2 周近视组与 4 周近视组比较，右眼视网膜中谷氨酸含量逐渐增加，差异有统计学意义(P＜0.01),与 2 周正常组比较，右眼谷氨酸含量增加,差异有统计学意义(P＜0．05);同样 4 周近视组较 4 周正常组右眼谷氨酸含量亦增加，差异亦有统计学意义(P ＜0．01)。视网膜中 NR2A mRNA 及蛋白表达量的变化与谷氨酸含量变化一致。
结 论 负透镜诱导型近视豚鼠视网膜中谷氨酸及其 NMDAR 受体亚单位 NR2A 在透镜诱导眼中表达上调，并随透镜诱导时间的延长和近视程度的加深而增加。

PO-053

FS-LASIK 联合预防性角膜胶原交联术（CXL）矫正特殊近视眼的安全性和有效性

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目的：评估 FS-LASIK 联合预防性 CXL 矫正角膜形态欠佳、有术后角膜膨隆风险的近视眼的安全性和有效性。
方法：以 D 值、后表面高度图形态、后表面增强图及年龄、MRSE、最薄点角膜厚度、承载因子为参数，创建了 LASIK 术后角膜膨隆风险评估系统。收集了 86 只前 3 项评分 1-5、后 4 项评分 0-2、7 项总分 1-5 的近视眼接受 LASIK 联合预防性 CXL（联合组），75 只前 3 项评分 0、后 4 项评分 0-2 的近视眼接受 LASIK 手术（对照组）。要求两组术前一般资料(CCT、IOP、MRSE、切削深度、瓣厚等)无统计学差异。分别于术前和术后 1 年测量两组的视力、屈光状态和角膜形态。角膜形态是利用高度图上的数据点，通过 Zernike 拟合重构角膜面型，分别获取前后表面、三个区域（中央 0-3mm 直径、旁中央 3-6mm 直径和周边 6-9mm 直径）的 M、J0 和 J45。
结果：两组视力及屈光状态的对比均无统计学差异。术后较术前 M 绝对值的变化如下：对照组和联合组前表面中央区分别减小了 4.591D 和 4.475D；前表面旁中央区分别减小了 2.296D 和 2.006D（P=0.013）；前表面周边区分别增加了 2.517D 和 2.339D；后表面中央区分别减小了 0.023D 和 0.038D（P=0.002）；后表面旁中央区分别增加了 0.023D 和 0.022D；后表面周边区分别增加了 0.044D 和 0.009D（P=0.009）。

结论：两组术后 1 年与术前相比均表现为：前表面中央区和旁中央区变平，周边区变陡；后表面中央区变平，旁中央区和周边区变陡。不同的是，联合组前表面曲率的变化幅度小于对照组，后表面中央区变平的幅度大于对照组，后表面旁中央区和周边区变陡的程度小于对照组。LASIK 联合预防性 CXL 可降低角膜形态欠佳患者术后角膜膨隆的风险，并潜在减少术后的屈光回退，提高手术的安全性和有效性。

PO-054

儿童近视前后脉络膜厚度的变化及其与眼轴和屈光度的相关性研究

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目的：应用 OCT，探究脉络膜厚度在正视儿童近视前后的变化规律。
方法：本研究纳入 7~10 岁儿童，取右眼作为被检眼，初始球镜度数为-0.25D～+1.00D，散光度数小于-0.25D。对所有受试者进行 6 个月为间隔的 2 年随访。在随访期间，以 SER＜-0.50D 作为近视的标准，首次发现近视发生时的随访时间点记为 P1，P1 前一次的随访时间点记为 P0。根据 2 年随访期间受试者是否发生近视分为正视-近视组和正视-正视组两组。所有受试者每次均接受眼科检查，包括电脑验光、主觉验光、眼压测量、lenstar 测量眼轴，以及利用 OCT 对黄斑处视网膜脉络膜进行成像。OCT 成像采用 crossline 模式，扫描宽度设置为 8mm。采用自行编写的软件对脉络膜厚度进行测量，并将脉络膜分为中心凹区（距中心凹半径 0.5mm 内的区域）和旁中心凹区（距中心凹 0.5mm～3.0mm），旁中心凹区又分为上、下、鼻、颞四个象限。统计方法包括： pearson 相关分析、配对 t 检验和独立样本 t 检验。
结果：P0 时，正视-正视组和正视-近视组的等效球镜（P=0.08）、眼轴（P=0.46）及各区域脉络膜厚度（P=0.32）均无统计学差异。P1 时，两组的等效球镜有显著统计学差异（P＜0.001），但眼轴（P=0.43）和各区域脉络膜厚度（P=0.15）无统计学差异。正视-正视组的脉络膜厚度在 P0 和 P1 之间差异无统计学意义（黄斑中心及上下鼻颞四个象限的 P 值均大于 0.05），正视-近视组的脉络膜厚度在黄斑中心及上下鼻颞四个区域在 P0 和 P1 之间差异有统计学意义（P＜0.05）；脉络膜厚度的变化与屈光度变化相关性无统计学意义（P=0.058），而与眼轴变化呈负相关（P＜0.05）。
结论：发生近视的儿童与未发生近视儿童的眼轴和脉络膜厚度没有明显差异，但是在儿童发生近视之后，脉络膜厚度较发生近视前明显变薄，且变薄与眼轴延长相关。

PO-055

Abnormal monocular and dichoptic temporal synchrony in adults with Amblyopia

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Purpose: We investigated how temporal processing within and between eye was affected in amblyopia by comparing temporal synchrony sensitivity at the binocular, monocular, and dichoptic viewing conditions.
Methods: Eight anisometropic amblyopia (23.75±2.73y) and 15 age-matched normal controls （23.73±1.77y） participated. Stimuli were generated using a Macintosh computer and displayed on a GOOVIS 3D goggles.The stimuli consisted of four Gaussian blobs each flickering at 1Hz, with two spots presented at the top and the other two spots at the bottom of the screen. Subjects were asked to determine which pair of spots (top or bottom) were flickering asynchronously. Constant stimuli method was used to measure the minimum degrees of asynchrony that allowed subjects to discriminate which pair of the blobs was flickering asynchronously in time (synchrony thresholds). Six synchrony thresholds were compared: (1) binocular viewing where the four spots were presented to both eyes; (2) monocular amblyopic viewing where the four spots were presented to amblyopic (non-dominant) eye; (3) monocular fellow eye viewing where the four spots were presented in the fellow (dominant) eye; (4) dichoptic amblyopic viewing where the two asynchrony spots were presented to amblyopic eye and the two synchrony spots were presented to fellow eye; (5) dichoptic fellow eye viewing where the two asynchrony spots were presented to fellow fixing eye; and (6) pure dichoptic viewing where the paired spots were presented to different eyes.
Results: Repeated-measure ANOVA showed that the synchrony threshold was significantly different among conditions ($F(5,105) = 5.046$, $P = 0.026$), and such difference was significantly different in different groups as the joint effect between condition and groups was significant ($F(5,105) = 4.162$, $P = 0.043$). Post-hoc test further showed that synchrony thresholds were significantly higher for amblyopic subjects comparing to normal controls under monocular amblyopic viewing ($P = 0.041$) and pure dichoptic viewing condition ($P = 0.050$). The slope of the psychometric functions were not significantly different between groups ($F(1,21) = 0.789$, $P = 0.384$).
Conclusions: Our results suggest that there are within eye and between eye temporal synchrony deficits in amblyopia.

PO-056

高散光人群 FS-LASIK 术后不同区域角膜上皮的变化研究

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目的：研究高散光人群 FS-LASIK 术后角膜不同区域的上皮厚度变化。

方法：本研究纳入 28 名患者的 42 只眼，术前全眼散光量均大于 2.00D。使用 AngioVue OCT 于 FS-LASIK 术前及术后 1 个月测量角膜上皮厚度。记录 7mm 直径内散光轴方向（K1）及垂直散光轴子午线方向（K2）的角膜上皮厚度。定义 2mm 以内区域为中央区，2-5mm 范围为旁中央区，5-7mm 范围为中周边区。对比术后角膜各区域不同子午线方向的角膜上皮厚度变化量及其与术前屈光度的相关性。

结果：1.术前 K1、K2 方向上的屈光度分别为-8.13±2.14D、5.65±2.17D，术前术后各区域不同子午线方向的上皮厚度均有显著改变。2. 术后旁中央区、中周边区 K1 方向增长量大于 K2 方向，K2 方向中周边区出现变薄（旁中央区：P=0.014,中周边区：P<0.001）。3.中央区和旁中央区角膜上皮变化量与术前屈光度有相关性（中央区 r=0.439，旁中央区 r=0.258）。4.中央区和旁中央区 K1 方向每 1.0D 引起的上皮变化量比 K2 方向小，（RatioK1cent=0.50±0.52 vs RatioK2cent=0.75±0.78，P<0.001，RatioK1para=0.55±0.47 vs RatioK2cent=0.74±0.70，P=0.003）。

结论：高度散光患者 FS-LASIK 术后中央区及旁中央区角膜上皮出现显著增长，且旁中央区散光轴方向增长量显著高于垂直子午线方向。屈光度是影响角膜上皮增长量的因素之一，且对角膜中央区的影响大于旁中央区。中周边区垂直子午线方向角膜上皮出现减少，可能与制瓣切削导致的角膜上皮破坏有关，有待进一步探究。

PO-057

配戴接触镜者角膜树突状细胞和基底下神经密度变化

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目的：探究接触镜配戴者角膜基底下神经密度和树突状细胞的变化。

方法：招募 20 名从未配戴接触镜的健康志愿者。在配戴接触镜之前、1 周、4 周、12 周和 24 周使用在体共聚焦显微镜（IVCM）检查角膜中央和周围基底神经和树突状细胞（DC）。分析参数包括树突细胞密度、面积、树突长度、树突数目、基底下神经密度等。取受试者右眼数据行统计学分析。

结果：基底下神经密度在戴镜中一直成下降趋势，其中角膜周边基底下神经密度在戴镜后四周明显降低（$p = 0.005$）,而中央基底下神经密度在 12 周时显著下降（$p = 0.040$）。DC 密度在戴镜过程中呈现先增高后降低的趋势，在 4 周时达到最高。中央 DC 密度在戴镜后四周有显著增高（$p = 0.018$），周边 DC 密度在戴镜后一周就明显增高（$p = 0.002$）。中央及周边活化 DC 密度均是在四周时显著升高（$p < 0.001$）。基底下神经密度在 12 周时变化速率最大，而树突状细胞密度的改变速率在 4 周时达到峰值。基线时，中央神经密度与中央 DC 树突长度、周边 DC 树突长度及周边 DC 面积成负相关;周边基底下神经密度与周边 DC 树突长度成负相关关系。一周时，中央基底下神经密度与中央 DC 面积成负相关（$r = -0.508, p = 0.022$）；周边基底下神经密度与周边 DC 树突长度成负相关关系（$r = -0.565, p = 0.009$）。一月，周边基底下神经密度与中央 DC 密度呈现正相关（$r = 0.563$， $p = 0.010$）。三月，中央基底下神经密度与中央活化 DC 密度及周边 DC 树突数也成正相关（$r = 0.520, p = 0.019$; $r = 0.497, p = 0.026$）。

结论：对于从未配戴接触镜的正常人群而言，戴镜后 1 月是角膜树突状细胞所反应出的眼表潜在炎症状态最为活跃的时期。在戴镜早期，随着树突状细胞的增高呈现的炎症状态的加重，可能会导致基底下神经密度相对减少；而在戴镜后期，随着炎症状态的减弱，基底下神经也呈现出再生的趋势。

PO-058

Comparison of Toric and Spherical Design Orthokeratology used in Astigmats

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Purpose: This retrospective research aimed to compare the effectiveness and safety of the toric and spherical design orthokeratology in the treatment of patients with moderate to high astigmatism.

Method： Fifty adolescent myopes with moderate to high astigmatism（≥1.50D）and underwent a consecutive orthokeratology treatment for at least 1 year were concluded in this study. The toric group comprised 25 subjects（25 eyes，11M14F，age11.45±1.63years）who were fitted with the toric design orthokeratology. And the spherical group comprised 25 subjects（25 subjects，11M14F，age10.67±1.46years）who were fitted with the traditional spherical orthokeratology as control. Corneal topography, visual acuity, axial length, and slit lamp biomicrosopy were measured and analyzed to conduct the differences between this two groups. The corneal tangential difference maps were conducted between baseline and every visit to calculate the multitude of lens decentration.

Result： The mean decentration and its vertical vector of the toric group is significantly less than the spherical group after 1 month of lens wear.The toric orthokeratology can significantly reduce the corneal toricity and CJ180 of patients with moderate to high astigmatism in the first month of wearing. There was a significant linear correlation between the change of corneal toricity and lens decentration of the toric group during 1month to 1year($Y = 3.268 * X + 0.9182$, $R2 = 0.5035$, $p < 0.0001$(X:lens decentration;Y:astigmatic changes)). There was no significant difference in the correction of visual acuity, myopia control and ocular health between the toric and spherical design orthokeratology.

Conclusion： The toric design orthokeratology can effectively reduce the magnitude of lens decentration ,corneal toricity and corneal J180 in patients with high or medium corneal astigmatism. However, the effect of toric lens on corneal morphology is susceptible to lens positioning.

PO-059

眼球摘除术后继发交感性眼炎一例

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目的：介绍一例一眼眼球摘除术后另一眼继发交感性眼炎的案例
方法：因右眼视物模糊 15 天入院。患者入院前 17 天于湖南省冷水江市某医院行左眼球摘除术，术后第三天清晨醒来发现右眼视力骤降，无明显眼胀眼痛等不适。入院查体：右眼：视力 0.1，矫正视力：+1.25DS/-0.25DC×10→0.2。眼压：14mmHg，结膜无充血，角膜透明，KP（-），前房中深，前房闪辉（+），虹膜纹理清，瞳孔药物性散大，约 5mm，晶状体轻度混浊，视盘明显水肿，边界模糊，视网膜血管迂曲扩张，黄斑水肿，中心凹反射（-）。左眼球缺如，结膜囊狭窄，未见眼外肌组织。入院诊断：右眼交感性眼炎，左眼球缺如，左眼结膜囊狭窄。
结果：入院后予以甲泼尼龙琥珀酸钠 500mg+5%葡萄糖 500ml Qd 静滴冲击治疗 5 天后改早晨空腹口服醋酸泼尼松龙片 50mg、环孢素胶囊 150mg Bid，局部予以 1%醋酸泼尼松龙眼液 Q1h、硫酸阿托品凝胶 Qn、复方托吡卡胺眼液 Tid 抗炎、扩瞳等治疗。
讨论：眼球摘除术可诱发交感性眼炎，临床工作中需注意。

PO-060

TLR4-Myd88 信号通路通过激活 caspase-8 促进 NLRP3/NLRP6 的不平衡活化介导角膜碱烧伤

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目的：探讨 TLR4 在角膜碱烧伤及继发干眼中参与调控 NLRP3 及 NLRP6 活化、启动固有免疫反应的分子机制。
方法：本研究运用了角膜碱烧伤及碱烧伤合并干眼的小鼠动物模型来探讨固有免疫反应的启动机制。
结果：我们的研究发现，角膜碱烧伤可以诱导 TLR4-MyD88 信号通路激活，引起 caspase-8 活化，继而导致 NLRP3 和 NLRP6 的活化失衡。碱烧伤后继发的干燥压力可放大此现象加重角膜上皮损伤。激活后的 caspase-8 可促进 NF-KB 转核引起 NLRP3 上调，而 NF-KB 转核可以被 NLRP6 抑制。TLR4-Myd88 通路被靶向敲除后能显著改善角膜碱烧伤引起的或干燥压力恶化的眼表免疫失调。
结论：角膜碱烧伤可激活 TLR4-MyD88 信号通路调控 NLRP3 和 NLRP6 的不平衡活化启动固有免疫反应，继发性的干燥胁迫可放大此失衡。基因敲除 TLR4 或者 MyD88 可有效缓解角膜碱烧伤引起的及继发性干燥压力恶化的角膜病损，为后续治疗碱烧伤提供治疗靶点及治疗方案。

PO-061

In vitro antimicrobial activity of diacerein on 76 gram-positive cocci isolates from bacterial keratitis patients and an in vivo study of diacerein eye drops on Staphylococcus aureus keratitis in mice

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Bacterial keratitis is an aggressive infectious corneal disease. With the continuing rise in antibiotic resistance and a decline in the discovery of new antibiotics, new antimicrobial drugs are now required. In the present study, we determined the antibacterial activity of diacerein, an anti-inflammatory drug, against 76 Gram-positive cocci isolated from bacterial keratitis patients in vitro and anti-*Staphylococcus aureus* activity in mouse bacterial keratitis model in vivo. The zones of inhibition and the minimum inhibitory concentration (MIC) of diacerein were tested using the Kirby-Bauer disc agar diffusion and the broth microdilution method respectively in vitro. A BALB/c *Staphylococcus aureus* keratitis animal model was selected and the corneal clinical observation, viable bacteria and Hematoxylin-eosin and Gram staining of infected corneas were measured to evaluate antibacterial efficacy of diacerein in vivo. An in vivo eye irritation study was carried out by a modified Draize test in rabbits. Our in vitro results showed that diacerein possesses satisfactory antibacterial activity against the majority of Gram-positive cocci (59/76), including all 56 tested *Staphylococcus* and 3 *Enterococcus aureu*. The in vivo experiment showed that diacerein reduced bacterial load and improved ocular clinical scores after topical administration of diacerein drops on infected corneas. The ocular irritation test revealed that diacerein eye drop had excellent ocular tolerance. These results indicated that diacerein possesses in vivo anti-*Staphylococcus aureus* activity. We suggest that diacerein is a possible topically administered drug for *Staphylococcus aureus*-infected patients, especially those with ocular surface inflammatory disorders.

PO-062

霉酚酸酯治疗特发性视神经炎疗效观察

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目的：观察霉酚酸酯治疗特发性视神经炎的疗效及安全性。

方法：2016 年 10 月至 2018 年 12 月于我院诊治的特发性视神经炎患者 8 例，已除外感染性、外伤性因素，患者无全身免疫系统疾病（风湿免疫科会诊）及颅内病变（MOG 抗体阳性 2 人，头 MRI/脊椎 MRI 已除外神经系统受累）。既往采用激素治疗仍反复发作超过三次，予以霉酚酸酯单独或联合糖皮质激素（口服醋酸泼尼松剂量不超过 20mg）治疗。记录患者视神经炎症情况，包括 FFA 检查、视神经 OCT 检查、视野检查，必要时复查颅脑及/或视神经 MRI。患者给予免疫治疗后，常规每 6~8 周复查血常规、尿常规、肝功能、肾功能。记录患者炎症复发及药物不良反应。
结果：霉酚酸酯治疗后三个月，所有患者眼部炎症得到有效控制。霉酚酸酯治疗后一年，4 例（50.0%）患者可停用糖皮质激素治疗；7 例（87.5%）患者无临床复发；1 例（12.5%）患者复发，增加糖皮质激素剂量后炎症得到控制。治疗期间未观察到药物不良反应发生。
结论：霉酚酸酯治疗特发性视神经炎，可有效控制炎症，预防疾病复发，减少糖皮质激素的应用，阻止视神经进一步萎缩。

PO-063

Activation of focal adhesion kinase enhances the adhesion of Aspergillus fumigatus to human corneal epithelial cells via the tyrosinespecific protein kinase signaling pathway

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Purpose: To determine the role of the integrin-FAK signaling pathway triggered by the adherence of *A. fumigatus* to human corneal epithelial cells (HCECs).
Methods: After pretreatment with/without genistein, HCECs were incubated with *A. fumigatus* spores at different times (0-6 h). Cell adhesion assays were performed by optical microscopy. Changes of the ultrastructure were observed using scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The expression of F-actin and Paxillin (PAX) were detected by immunofluorescence and western blotting to detect the expression of these key proteins with/without genistein treatment.
Results: Cell adhesion assays showed that the number of adhered spores began to rise at 30min after incubation and peaked at 60min. SEM and TEM showed that the HCECs exhibited a marked morphological alteration induced by the attachment and entry of the spores. The expression of PAX increased, while the expression of F-actin decreased by stimulation with *A. fumigatus*. The interaction of *A. fumigatus* with HCECs causes actin rearrangement in HCECs. Genistein strongly inhibited FAK phosphorylation and the activation of the downstream protein (PAX). *A. fumigatus* -induced enhancement of cell adhesion ability was inhibited along with the inhibition of FAK phosphorylation.
Conclusions: Our results suggest that the integrin-FAK signaling pathway is involved in the control of *A. fumigatus* adhesion to HCECs and that the activation of focal adhesion kinase enhances the

adhesion of human corneal epithelial cells to *A. fumigatus* via the tyrosine-specific protein kinase signaling pathway.

PO-064

复发性多软骨炎伴发巩膜炎 1 例

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患者刘某，男，31 岁，因主诉双眼疼 1 月，于 2017 年 11 月就诊于我科。查双眼视力 1.0，眼压 R11mmHg，L13mmHg，双眼球结膜及巩膜充血明显，触痛阳性，双眼角膜透明，角膜后 KP 阴性，房水清，双眼晶体及玻璃体未见明显混浊，双眼视网膜未见出血渗出。在外院诊断为“巩膜炎”，用百利特眼液后好转，1 周前再次出现眼红， 眼疼，再次使用百利特未见明显好转，故就诊于我院我科。UBM 检查显示双眼巩膜不同程度的肿胀，间质回声不均匀，巩膜表层的球结膜及筋膜肿胀。。追问病史，患者有双侧耳廓红肿，疼痛史，曾就诊于耳鼻喉科诊断为反应性耳廓骨膜炎，对症治疗后一直未彻底好转。有多个关节不适病史，但否认有喉部、肺部不适和心脏不适。查双侧耳廓红肿明显，血常规显示白细胞总数 19.3×109/L，高敏 C 反应蛋白 104.0 mg/ml，血沉 57mm/h。胸片及心电图未见明显异常。类风湿因子、尿常规、肝功及肾功检查结果未见明显异常。请风湿免疫科会诊，诊断为复发性多软骨炎。结合患者眼部表现、双耳廓表现及关节不适病史，考虑患者为复发性多软骨炎伴发的巩膜炎，给予患者口服激素（强的松 1mg/kg.d）及环磷酰胺 （2mg/kg.d），同时局部使用百力特眼液。治疗一月后，患者双眼巩膜充血明显好转。双耳廓肿胀消失。（图 3）随访至今，双眼及耳廓等改变未出现复发。

PO-065

PD-1/PD-L1 对年龄相关性黄斑变性发展的影响及免疫机制的研究

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目的：通过建立小鼠 CNV 模型，从细胞、分子等多个层面探讨 PD-1 及其配体 PD-L1 对 CNV 小鼠外周及眼内炎症微环境的影响；证实 PD-L1 有缓解及改善 CNV 作用，并阐明其作用机制。
方法：将 6-8 周雌性 C57BL/6J 小鼠 150 只，随机分为正常对照组 50 只和实验组 100 只，实验组小鼠采用氪离子激光光凝建立脉络膜新生血管模型。造模成功后 2 周后所有小鼠进行干预，正常组和模型组给予尾静脉注射 PBS 溶液，PD-L1 组给予尾静脉注射 PD-L1 50ug，每组 50 只。再根据给药后不同观察时间，将每组随机非为 4 个亚组：3 天组、7 天组、14 天组、21 天组，进行眼底血

管荧光造影检查；在 21 天处死小鼠，行视网膜脉络膜铺片，荧光染色后计算 CNV 体积。在 21 天磁珠分选小鼠脾脏外周血淋巴细胞，进行 PI3K/AKT 信号通路检测。
结果：注射 PD-L1 组荧光渗漏面积较干预前明显减小；PD-L1 组荧光渗漏强度较 PBS 组在 14 天、21 天明显减轻（P<0.05）。PD-L1 组 CNV 体积较 PBS 组减小，具有统计学差异（P<0.05）。PD-L1 蛋白通过下调 PI3K、AKT 蛋白缓解及改善 CNV。
结论：给予 PD-L1 后，CNV 病变得到缓解及延缓，其可能机制为 PD-1 与 PD-L1 结合，抑制 T 细胞内 PI3K/AKT 信号转导通路活性。

PO-066

Immuopathogenesis of Behcet's disease

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Behcet's disease (BD) is a chronic systemic inflammatory vasculitis of unknown etiology characterized by recurrent episodes of oral aphthous ulcers, genital ulcers, skin lesions, ocular lesions and other manifestations. Although the pathogenesis of BD is unclear, some studies have shown that immunological aberrations play an important role in the development and progression of BD. Infection-related trigger factors, including antigens and autoantigens, are believed to mediate the development of BD in patients with a genetic predisposition and subsequently activate the innate and adaptive immune systems, resulting in the production of numerous cytokines and chemokines to combat the infection-related factors. The study of the immunological mechanism of BD paves the way for the development of innovative therapies. Recently, novel biotherapy approaches, including interferon-α (IFN-α) and tumor necrosis factor-α (TNF-α) antagonists, have shown promising results in the treatment of patients with refractory BD and have improved the prognosis of BD. In this review, we provide the current concepts of BD immunopathogenesis.

PO-067

眼内炎的实验室诊断进展

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目的：眼内炎是临床上快速致盲、预后差的眼科急症。传统的诊断方法主要为临床表现结合微生物涂片和培养，但要在第一时间确诊病原微生物的类型比较困难。近些年，随着分子生物学检测技术的进步，眼内炎的实验室诊断技术也得到了发展。此外，微创玻璃体切割技术的开展，也为玻璃体取样带来便利，提升了眼内炎的治疗效果，并减少了手术并发症。

方法：报道恒温扩增、广谱细菌/真菌 PCR、流式细胞仪微球法、G 实验、GM 实验等技术手段进行眼内炎病原微生物检测的进展情况，以及微创玻璃体切割技术取样/治疗眼内炎的手术经验。
结果：对原因不明的眼内炎，通过恒温扩增技术可以在 1.5 个小时内完成内获得病原微生物的检测，而传统的涂片阳性率只有约 10%，微生物培养的时间较长（3 天-3 周）；流式细胞仪微球法对于细胞因子的定量检测准确性和特异性高，可以在治疗过程中指示炎症的活跃程度；G 实验可以在 1 个小时判断是否真菌感染；GM 实验可以帮助判断是否曲霉菌感染；23G/25G/27G 微创玻璃体切割系统可以更加安全地取到玻璃体样本，并且在治疗眼内炎的手术过程中，减少组织不必要的损伤，减少术中术后并发症的发生。
结论：利用各种实验室手段，可以更加快速地诊断眼内炎以及坚定治疗过程的方向，微创玻璃体切割可以减少玻璃体取样和手术治疗的并发症发生，综合提升诊治效果。

PO-068

β2 肾上腺素能受体抑制剂抑制小鼠铜绿假单胞菌角膜炎的严重程度

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目的：组织损伤导致应激激素去甲肾上腺素的分泌，并增加对机会性感染的易感性。在这里，我们探讨了抑制肾上腺素能受体活性对小鼠铜绿假单胞菌（PA）角膜炎严重程度的影响。
方法：成人 C57BL / 6 小鼠在角膜中央划伤后，用 ATCC19660 菌株 10^5 菌落形成单位（CFU）感染。在接种后 6 小时局部施用肾上腺素能受体拮抗剂酚妥拉明（α1+α2），阿替洛尔（β1），ICI118551（β2）或噻吗洛尔（β1+β2）并持续 3 天，将生理盐水用作载体对照。在感染后 1,2 和 3 天（dpi）对角膜疾病进行评分。评估角膜去甲肾上腺素含量，浸润的中性粒细胞和活细菌负荷。通过实时 qPCR 测量小鼠炎症细胞因子和 PA-毒力因子的表达。
结果：角膜划伤后，角膜去甲肾上腺素含量增加。与载体和其他肾上腺素能受体拮抗剂相比，β2-肾上腺素能受体拮抗剂 ICI118551 显示角膜病评分降低最显著。在 3 天的观察期间，与对照小鼠中的穿孔相比，用 ICI118551 给予的小鼠保持了角膜的透明度。角膜中髓过氧化物酶活性的降低，渗透的中性粒细胞减少。角膜细菌负荷从感染后 6 小时开始减少，并且与载体对照相比，在 1dpi 时约减少 50％。此外，局部应用 ICI118551 可下调小鼠 IL-1β、TNF-α 和 CXCL2 及 PA-毒力因子的表达。
结论：β2-肾上腺素受体抑制剂可降低小鼠 PA 角膜炎的严重程度，代表了控制 PA 角膜炎和抗生素治疗的潜在治疗方法。

PO-069

Aspergillus fumigatus Increased PAR-2 Expression and Elevated Proinflammatory Cytokines Expression Through the Pathway of PAR-2/ERK1/2 in Cornea

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PURPOSE. *To determine the role of protease-activated receptor-2 (PAR-2) in cornea infected by Aspergillus fumigatus.*
METHODS. *PAR-2 was tested in normal and infected corneas of C57BL/6 mice. Mice corneas were infected with A. fumigatus with or without pretreatment of PAR-2 antagonist (FSLLRY[1]NH2). Polymorphonuclear neutrophilic leukocytes (PMNs) were stimulated with 75% ethanol[1]killed A. fumigatus with or without pretreatment of FSLLRY-NH2. Disease severity was documented by clinical score and photographs with a slit lamp. PCR, Western blot, and ELISA tested expression of PAR-2, IL-1b, TNF-a, IFN-c, MIP-2, and p-ERK1/2. PMN infiltration was assessed by myeloperoxidase assay and immunofluorescent staining.*
RESULTS*. PAR-2 expression was significantly elevated by A. fumigatus, whereas the upregulation was significantly inhibited by FSLLRY-NH2 in mice corneas. FSLLRY-NH2 decreased disease response, PMN infiltration, and proinflammatory cytokine expression compared with infected control. In PMNs, PAR-2 expression was also significantly increased by A. fumigatus, which was significantly inhibited by FSLLRY-NH2. FSLLRY-NH2 significantly inhibited proinflammatory cytokine protein expression, as compared with that in infected control cells, which may be modified by p-ERK1/2.*
CONCLUSIONS*. These data provide evidence that A. fumigatus increased PAR-2 expression and elevated disease, PMN infiltration, and proinflammatory cytokine expression through PAR-2, which may be modified by p-ERK1/2.*

PO-070

TREM-1 expression in rat corneal epithelium with infection

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AIM: To investigate the expression of triggering receptor expressed on myeloid cells-1 (TREM-1) in the
aberrant inflammation within the corneal epithelium at early period of fungal infection.

METHODS: A total of 65 Wistar rats were randomly divided into control group, sham group and fungal
keratitis (FK) group, in which the cornea was infected by *Aspergillus fumigatus* (*A. fumigatus*). After executed randomly at 8, 16, 24, 48 and 72h after experimental model being established, the severity of keratomycosis in rats was scored visually with the aid of a dissecting microscope and slit lamp. Then corneas in three groups were collected to assess the expression of TREM -1 through quantitative reverse transcription -polymerase chain reaction (RT-PCR), immunofluorescence technique and Western blot analysis. The correlation between FK inflammation and expression of TREM -1 was also analyzed.
RESULTS: Corneal inflammation scores increased with time after fungal infection (F =49.74, P=0.000). The inflammation scores in FK group were obviously higher than those in sham group on the whole (F=137.78, P= 0.000). Levels of TREM-1 in the infected rat corneal epithelium had elevated at 8h and peaked at 48h (<0.001, compared with control group). Western blot analysis also showed an obviously elevated TREM-1 level in rat corneal epithelium at 24h and 48h after fungal infection. Immunofluorescence technique showed that TREM-1 mainly existed in corneal epithelium and infected corneal stoma of rat. TREM-1 protein expression was enhanced after fungal infection. Moreover, severity of FK inflammation was significantly related to TREM -1 expression in FK (r=0.942, P=0.000).
CONCLUSION: TREM-1 may contribute to amplify the inflammation in the cornea infected with *A. fumigatus* and play critical roles in the battle against *A. fumigatus* in the innate immune responses.

PO-071

NLRP3 inflammasome regulates acute corneal allograft rejection through enhanced phosphorylation of STAT3

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Objective: Accumulative evidence indicated the involvement of NLRP3 inflammasome in the pathogenesis of allograft rejection. However, its contribution to corneal allograft rejection remains unknown. Here we investigate the effect of NLRP3 inflammasome on corneal allograft rejection.
Methods: Orthotopic corneal transplantation was performed to assess the effects of IL-1β blockade via neutralizing antibody, as well as the effects of NLRP3 inflammasome using genetical and pharmacological approaches. Grafts were evaluatedby ophthalmic slit-lamp biomicroscopy for one month and analyzed by Kaplan-Meier survival curve. The pathological changes were examined using HE staining, real-time PCR and ELISA. Additionally, the effect of NLRP3 inflammasome on Th17 cells was investigated by flow cytometry and western blot, respectively.
Results: Blockade of IL-1β signaling using neutralizing antibody significantly improved the survival of corneal allografts. The NLRP3 inflammasome component Nlrp3, which is required for pro-IL-1β

maturation, was critical for the pathogenesis of corneal allograft rejection. Extracellular ATP contributed to NLRP3 inflammasome-mediated IL-1β production, and inhibition of ATP/P2X7 signaling pharmacologically not only pronouncedly prolonged the survival of corneal allografts but also decreased the IL-1β production. Mechanistically, NLRP3 inflammasome derived IL-1β promoted Th17 responses through enhanced STAT3 phosphorylation. Furthermore, both blockade of STAT3 signaling pharmacologically and IL-17 signaling via neutralizing antibody significantly delayed the pathogenesis of corneal allograft rejection.

Conclusions: NLRP3 inflammasome promoted corneal allograft rejection through Th17 responses induced by enhanced STAT3 phosphorylation.

PO-072

自身免疫性视网膜病变血清抗视网膜抗体的检测

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目的 探讨自身免疫性视网膜病变(autoimmuneretinopathy,AIR)患者血清抗视网膜抗体(anti-retinal antibodies,ARA)检测的临床应用价值。

方法 设计前瞻性比较性病例系列。选取 2016 年 9 月-2018 年 5 月北京同仁医院就诊的临床疑似 AIR 患者 17 例作为实验组,健康人 20 例作为对照组,RP 患者 18 例、双眼葡萄膜炎患者 9 例、白点综合征患者 6 例作为其他视网膜病变对照组。通过免疫印迹法检测各组受检者血清 ARA,比较各组的阳性率及差异。主要指标血清恢复蛋白(recoverin),烯醇化酶 α(α-enolase),碳酸酐酶 II(carbonic anhydraseII,CAII),塌陷反应介导蛋白 5(collapsin response mediator protein 5,CRMP5)抗体。

结果 临床疑似 AIR 组、其他视网膜病变对照组及健康人部分受试者血清中均有不同种类 ARA 检出。一种或两种以上抗体表达阳性率在临床疑似 AIR 组分别为 76.5%及 64.7%,在其他视网膜病变对照组分别为 54.5%及 30.3%,在健康受试者分别为 33.3%及 0%。RP 患者抗体阳性率为 33.3%。各组中以 α-enolase 及 CA II 抗体表达阳性率最高;recoverin 抗体特异性存在于癌症相关性视网膜病变患者(cancer-associated retinopathy, CAR)血清中。

结论 临床疑似 AIR 患者血清中 ARA 存在率较高,明显高于健康人及 RP 患者;二个以上 ARA 表达明显高于其他视网膜病变,故对该疾病具有重要辅助诊断价值。血清 ARA 的存在必须与临床体征结合才能确诊 AIR。

PO-073

97 例感染性角膜炎的回顾性分析

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目的：分析哈尔滨医科大学附属第一医院眼科一病房 2018 年 3 月—2018 年 12 月中 97 例感染性角膜炎患者的发病原因、治疗方案和预后评估。
方法：通过角膜炎患者的发病原因以及病原学分析等方法明确角膜感染的种类，采用药物以及手术两种方式对疾病进行治疗，并对治疗后患者的预后效果进行评估。
结果：97 例患者中 95 例为单眼发病，2 例患者双眼发病；发病年龄 2-84 岁；其中，男性患者 52 人，女性患者 45 人；异物入眼病史 20 例，眼部植物外伤史 15 例，过量饮酒，睡眠欠佳史 9 例，无明显诱因 53 例；真菌性角膜溃疡 18 例（18.6%），细菌性角膜炎 26 例（26.8%），病毒性角膜炎 25 例（25.8%），棘阿米巴角膜炎 2 例（2%），病因不明确 26 例（26.8%）；单纯接受药物治疗患者 26 例（26.8%），接受手术治疗患者 71 例（病灶搔扒+基质内注药术 20 例，病灶搔扒+羊膜移植术 25 例，病灶搔扒+结膜瓣遮盖术 18 例，角膜移植手术 7 例，球内容物除去术 1 例）。
结论：本院角膜溃疡患者中细菌以及病毒性角膜炎是感染性角膜炎的主要病因，早期、轻度的角膜溃疡药物治疗有效，必要时需要进行手术治疗。

PO-074

22 例 HIV 感染者/AIDs 患者眼部并发症回顾分析

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目的　报告 22 例人类免疫缺陷病毒（HIV）感染者及获得性免疫缺陷综合征（AIDs）患者的眼部并发症。
方法　回顾报道我院诊治的 22 例 HIV 感染者及 AIDs 患者的基本信息、眼部并发症的临床表现及治疗前后病情变化。
结果　通过对我院诊治的 22 例 HIV 感染者及 AIDs 患者的诊治资料汇总，进行回顾性分析研究。统计的患者基本信息包括年龄、性别、CD4+T 细胞计数、HIV 病毒载量、梅毒血清学检查结果、巨细胞病毒 DNA 检查结果；眼部检查包括视力、眼前节照相、眼底照相、眼压检查、B 超、眼底荧光素造影等，同时询问患者的发病情况及此前的诊治情况，并记录诊断结果。按性别分组，男患 20 人，女患 2 人；按照年龄分组，青中年组 18-50 岁 16 人，高年龄组 50 岁以上 6 人。眼部并发症主要包括巨细胞病毒性视网膜炎、梅毒性葡萄膜炎、梅毒性视神经炎、HIV 视网膜病变、白内障及干眼。大多数患者发病时 $CD4^+T$ 细胞计数少于 200 个/μL。
结论　随着高效抗逆转录病毒治疗（HAART）的推广，HIV/AIDs 人群的寿命有所延长，该人群的眼部并发症发病率也逐年上升。HIV/AIDs 人群眼部疾病表现多变，常见疾病包括巨细胞病毒性视网膜炎、梅毒性眼病、白内障及干眼。部分患者可以眼部并发症为首发症状，就诊于眼科。掌握 HIV/AIDs 人群的常见眼病种类及临床表现、及时提示患者完善相关检查，有助于延长患者寿命，提高患者生活质量；此外，对于 $CD4^+T$ 细胞计数少于 200 个/μL 的 HIV/AIDs 患者应常规进行眼病筛查，以便及早进行相关疾病的干预，改善视力预后。

PO-075

来源于不同体外诱导型调节性 T 细胞外泌体功能差异的研究

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目的：比较来源于不同体外诱导型调节性 T 细胞外泌体（$iT_{reg}Exo$）的功能差异。
方法：利用免疫磁珠分选法分选出脾组织来源的 $CD4^+CD25^-$ T 细胞，分别给予 IL-2、IL-10 刺激诱导为 $CD4^+CD25^+$T 细胞，即诱导型调节性 T 细胞（iTreg），利用流式细胞仪检测纯度及 Foxp3 表达情况；利用超速离心法自上清获得 IL2-$iT_{reg}Exo$ 和 IL10-$iT_{reg}Exo$，利用透射电子显微镜观察形貌，利用纳米颗粒跟踪分析仪测量粒径，Western blot 检测标志分子 CD63 及 CD9；体外培养由 LPS 刺激活化的巨噬细胞（Mφ），经 IL2-$iT_{reg}Exo$ 和 IL10-$iT_{reg}Exo$ 作用后，利用流式细胞仪分别检测 IL2-$iT_{reg}Exo$ 组和 IL10-$iT_{reg}Exo$ 组的 Mφ 凋亡率。
结果：1、IL-2 和 IL-10 刺激均能得到 Foxp3+诱导型调节性 T 细胞，两组纯度分别为（92.5±16.3）%和（93.8±11.7）%，差异无明显统计学意义（P＞0.05）；2、两组外泌体粒径范围均为 50-150nm；3、巨噬细胞凋亡率分别为（16.9±9.7）%和（9.8±8.1）%，差异有统计学意义（P＜0.05）。
结论：IL-2、IL-10 体外刺激脾组织来源的 $CD4^+CD25^-$ T 细胞，均可得到相同纯度的 iTreg，但 IL2-$iT_{reg}Exo$ 对巨噬细胞抑制作用更强。

PO-076

龙胆泻肝汤对葡萄膜炎大鼠 Th17 和 Treg 细胞水平的影响

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目的 探讨龙胆泻肝汤（Longdan Xiegan Decoction, LXD）对实验性自身免疫性葡萄膜炎（experimental autoimmune uveitis, EAU）大鼠 Th17 和 Treg 细胞表达水平的动态影响。
方法 用随机数字表法将雌性 Lewis 大鼠分为正常对照组、EAU 模型组和 LXD 干预组。其中 EAU 模型组和 LXD 干预组大鼠足底、腹壁两侧和后背处各注射 200μL 含光感受器间维生素 A 结合蛋白（interphotoreceptor retinoid- binding protein, IRBP）、完全弗氏佐剂（complete Freund's adjuvant, CFA）和结合菌素(tuberculin，TB)混合的乳糜液以诱导 EAU，正常对照组相同部位注射等量不含 IRBP 的乳糜液。免疫后每天给予 LXD 干预组 LXD 灌胃处理，EAU 组大鼠给予相同体积的 PBS 缓冲液灌胃处理。每天观察大鼠眼底炎症表现，12d 时取各组大鼠眼球进行病理切片，比较眼组织病理学差异；此外，分别在 6d、9d、 12d、15d、18d 取三组大鼠的脾脏、淋巴结和全血收集 $CD4^+$ T 细胞，流式细胞仪检测 Th17、Treg 细胞的表达水平，观察 Th17/Treg 比例随不同时间点的变化趋势。
结果 病理结果表明，LXD 对 EAU 大鼠眼部组织结构有明显的保护作用；流式细胞仪检测发现，在免疫后 6、9、12、15d 和 18d, EAU 模型组大鼠各组织中 Th17/Treg 比例均高于正常对照组，呈现不均衡表达；经 LXD 干预后，Th17 细胞水平表达下降，Treg 水平表达升高，两者比例逐渐恢复均衡。

结论 LXD 能有效减轻 EAU 大鼠的眼部炎症并加速炎症消退，减少炎症细胞浸润，保护眼部组织结构，调节免疫状态。此外，LXD 可明显减少 Th17 细胞的表达水平、提高 Treg 细胞的表达水平，从而改善 Th17/Treg 细胞比例的平衡。

PO-077

树突状细胞的体外诱导及在烟曲霉菌感染中炎症反应的研究

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目的：探讨体外诱导培养 C57BL/6J 小鼠骨髓来源的树突状细胞(BMDCs)在烟曲霉菌感染中炎症反应的研究。
方法：无菌条件下取 C57BL/6J 小鼠骨髓，用小鼠重组粒细胞-巨噬细胞集落刺激因子(GM-CSF)和白细胞介素（IL-4）联合诱导、培养 BMDCs，培养过程中于倒置显微镜下动态观察 DC 形态，第 10 天收集部分细胞悬液，流式细胞术检测 CD11c 及刺激分子（CD80 和 CD86）的表达。将培养第 10 天的新鲜小鼠 DCs 随机分为烟曲霉菌（浓度为 10^6/ml）刺激组及 PBS 对照组，于刺激 1h，3h，6h，12h，24h，48h 后收取细胞及上清液，qPCR 和 ELISA 分别检测细胞因子 TNF-α、IL-6、IL-10、IL-12、IL-13、IL-23 的 mRNA 和蛋白表达,并进行统计学分析。
结果：倒置显微镜下见骨髓细胞体外诱导培养 48 h 内呈贴壁生长,体积较小,有少量细胞聚集。培养至第 6-8 天，细胞集落明显增大，多数悬浮细胞表面有毛刺形成。培养至第 10 天，见大量悬浮状态的细胞集落，细胞表面呈树突状突起，呈典型的树突状细胞形态。流式细胞术检测第 10 天 DCs 中 CD11c 、CD80、CD86 均呈表达 。烟曲霉菌刺激后，与 PBS 对照组相比,TNF-α、IL-6、IL-10、IL-12、IL-13、IL-23 在感染后均呈现高表达。
结论：研究表明，骨髓细胞中富含大量 DC 的前体细胞且能成功诱导为成熟 DCs。在烟曲霉感染中，DCs 促进细胞因子分泌，其表面表达大量的共刺激分子和细胞因子受体可与天然免疫所产生的细胞因子相结合，最终诱导炎症产生。

PO-078

Protective Role of Surfactant Protein D in Ocular Staphylococcus aureus Infection

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Objectives To investigate the role of SP-D in ocular S. aureus infection. Materials and Methods The eyes of wild-type (WT) and SP-D knockout (SP-D KO) C57BL/6 mice were infected with S. aureus (107 CFU/eye) in the presence and absence of cysteine protease inhibitor(E64).Bacterial

counts in the ocular surface were examined 3, 6, 12, 24 hrs after infection. Bacterial phagocytosis by neutrophils and bacterial invasion in ocular epithelial cells were evaluated quantitatively. S. aureus-induced ocular injury was determined with corneal fluorescein staining. Result The results demonstrated that SP-D is expressed in ocular surface epithelium and the lacrimal gland; WT mice had increased clearance of S. aureus from the ocular surface ($p<0.05$) and reduced ocular injury compared with SP-D KO mice. The protective effects of SP-D include increased bacterial phagocytosis by neutrophils ($p<0.05$) and decreased bacterial invasion into epithelial cells ($p<0.05$) in WT mice compared to in SP-D KO mice. In the presence of inhibitor (E64), WT mice showed enhanced bacterial clearance ($p<0.05$) and reduced ocular injury compared to absent E64 while SP-D KO mice did not. Conclusion SP-D protects the ocular surface from S. aureus infection but cysteine protease impairs SP-D function in this murine model, and that cysteine protease inhibitor may be a potential therapeutic agent in S. aureus keratitis.

PO-079

自体脂肪面部填充后致迟发性眶周脂肪肉芽肿 4 例报告

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目的：自体脂肪面部填充是一种常见的微整形美容技术。虽然自体脂肪填充术取材方便，对自身组织无排斥反应，是一种安全有效的软组织填充整形技术，但仍有其缺陷与风险。本文报告 4 例面部自体脂肪填充术后出现眶周肿块患者的临床特征和治疗方法。

方法：回顾性分析 2016 年 1 月至 2018 年 5 月因眶周肿块来我院就诊的患者 4 例，通过详细病史询问，均有在外院行面上部（额部和/或颞侧）自体脂肪填充手术史。完善体格检查，实验室检查和影像学检查后，给予药物治疗或手术治疗。

结果：所有患者均为女性，年龄为 32-49 岁，发病时间为自体脂肪注射后 10 月-16 月。1 例患者给予口服糖皮质激素后肿块消退。1 例患者病灶周围注射曲安奈德后改善。1 例患者因双侧眶周多发肿块，药物治疗无效，行手术切除一侧眶周肿块并行病理检查，术中可见液化的坏死脂肪流出。1 例患者为单侧上睑肿块，造成机械性上睑下垂，予以手术切除肿块并行病理检查。病理报告：眼眶脂肪肉芽肿，纤维组织增生，伴急慢性炎细胞浸润。随访 1-24 个月，无明显复发。

结论：上睑(非填充部位)脂肪肉芽肿是面部自体脂肪注射后的一类罕见的、迟发的并发症。自体脂肪填充操作中应规范脂肪细胞的取材、富集和移植，提高填充脂肪细胞的生存力。脂肪肉芽肿形成后，皮质类固醇药物治疗表现出良好的反应，可作为眶周肿块手术切除前的一线治疗方案，药物治疗效果不明显者通过手术切除仍可达到满意的治疗效果。

PO-080

人 β-防御素 3(hbd3)对 LPS 刺激人视网膜色素上皮细胞（retinal pigment epithelium，RPE）产生炎症因子的作用研究

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目的：研究人 β-防御素 3(hbd3)对 LPS 刺激人视网膜色素上皮细胞（retinal pigment epithelium，RPE）产生炎症因子的影响。**方法**：原代纯化培养人 RPE 细胞，通过免疫荧光鉴定 RPE 细胞，体外制备过表达人 β-防御素 3(hbd3)的慢病毒并通过显微镜观察和 Western Blot 进行鉴定，采用 100ng/ml LPS 刺激，分别通过 ELISA 和 Real-time PCR 研究 RPE 细胞产生炎症因子的变化。**结果**：LPS 组上清液中 IL-1b、IL-6、IL-8 和 TNF-a 的浓度（328.39±14.15rg/ml、412.69±28.58rg/ml、1690.83±173.28rg/ml、 500.78±38.65rg/ml）与对照组（201.41±15.18rg/ml、301.51±25.87rg/ml、1018.67±253.42rg/ml、 300.93±39.58rg/ml）比较分别为显著上调（$p<0.01$）、明显上调（IL-6、IL-8）（$p<0.05$）和极显著上调（$p<0.001$）。相比于 LPS 组而言，HBD3+LPS 组的相关基因表达均受到抑制，其中 IL-1b 基因表达有差异（$p<0.05$），IL-8、CCL20 和 TNF-a 差异极显著（$p<0.001$），CCL2 与 IL-6 则组间无显著差异($p>0.05$)。**结论**：成功包被过表达人 β-防御素 3 的慢病毒，其对 LPS 刺激视网膜色素上皮细胞产生炎症因子具有一定的调节作用，人 β-防御素 3 对治疗眼部炎症的作用可供临床参考。

PO-081

Examination of viruses and cytokines in the aqueous humor of Fuchs uveitis syndrome

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ObjectivesTo evaluate the clinical features and aqueous humor cytokine levels of Chinese patients with Fuchs' syndrome.

MethodsAuxiliary examinations, including ophthalmic examinations, laser flare-cell photometry, immune mediators, and serologic tests for Rubella virus (RV), Cytomegalovirus (CMV), Herpes simplex virus (HSV), Varicella zoster virus (VZV) and Epstein-Barr virus (EBV) were performed in certain cases. Patients' demographics, clinical presentation, and auxiliary examination findings. Patients' demographics, clinical presentation, and auxiliary examination findings.

Results

27 patients (14 male, 13 female) and 30 heathy controls were included in this study. Unilateral involvement was noted in 26 patients (96.3%). The most common symptom was blurred or decreased vision and floaters. Stellate keratic precipitates (KPs) were noted in 16 eyes (59.26%). Heterochromia was observed in 21.43% affected eyes. Iris nodules, mostly Koeppe, were present in 28.57% of the affected eyes. Cataract were observed in 16 of 28 eyes. The median concentrations of VEGF and TGF were 31.05 (6.20–93.40) pg/mL and 11.30 (0–194.00) pg/mL. IL-6 showed a high level in FUS patients (36.35 [10.70–212.70] pg/mL). Median concentrations of IL-8 and IL-10 were 23.70 (6.60–196.30) pg/mL, 3.25 (0–15.40) pg/mL, respectively. VCAM was 1706.65 (196.00–13410.20) pg/mL. 11 (68.75%) patients had a positive outcome for intraocular antibody production against RV.Intraocular antibody production against RV was found in 11 of 16patients(68.75%) with FUS.

Conclusions Fuchs' syndrome in Chinese patients is characterized by a mild uveitis with characteristic stellate KPs, iris heterochromia, and iris nodules. Unilateral iris nodules may be important in the identification of Fuchs' heterochromic uveitis. Immune mediators play a crucial role in specific viral intraocular inflammation. Our laboratory data strongly suggest a relationship between FUS and rubella virus.

PO-082

Activated γδ T cells promote dendritic cell maturation and exacerbate the development of experimental autoimmune uveitis (EAU) in mice

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We recently reported that γδ T cells were activated and DCs underwent maturation during the inflammation phase (days 16-20) in experimental autoimmune uveitis (EAU) mice. The interaction between DCs and γδ T cells may significantly exacerbate the development of EAU. However, the interactions between DCs and γδ T cells that affect DC maturation to influence EAU development must be further addressed. In this study we showed that mature DC numbers in TCR-$\delta^{-/-}$ (KO) EAU mice were lower than those in wild-type (WT) C57BL/6 (B6) mice. After γδ T cell injection, the inflammatory symptoms of WT EAU mice were more aggravated. In vitro co-cultures of both cell types showed that activated γδ T cells induced DCs to generate higher levels of intracellular cell adhesion molecule-1 (ICAM-1/CD54), CD80, CD83, and CD86. Furthermore, γδ T cells harvested from WT EAU mice secreted more IFN-γ. In contrast, the percentage of IFN-γ- and IL-17-producing $CD4^+$ T cells in KO EAU mice decreased to a greater extent than that in WT EAU mice during the inflammatory phase, while the percentages of Th2 and Treg subsets demonstrated no obvious alterations. Additionally, the leveles of IFN-γ/IL-17/IL-4/IL-10 in serum were agreement

with those of $CD4^+$ T cells. Moreover, co-culture of γδ T cells and DCs in vitro induced the activation of autoreactive $CD4^+$ T cells, resulting in exacerbated EAU. Taken together, our results demonstrated that activated γδ T cells promote DC maturation and further enhance the generation of autoreactive Th1 and Th17 cells in EAU mice.

PO-083

Ragweed pollen-induced allergic conjunctivitis mice through multiple sensitization methods via mast cell activation

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AIM:
To investigate and compare the ragweed pollen-induced allergic conjunctivitis mice with different sensitization methods.
METHODS
Mice were separated into four groups, control group(group A), intragastric group(group B), subcutaneous injection（nuchal back） group(group C) and aerosol inhalation group(group D)(n=5 mice/group). On day 0, the group A was administered with placebo and other three groups were administered 50 μg of RW in 5mg of alum to systemic sensitization. On day 7 and 8, mice were challenged by topical application through intragastric, subcutaneous injection and pulverization inhalation respectively. On day 9, all mice were sacrificed. we measured the mast cells count and the expression of Carboxypeptidase A (CPA), RANTES(CCL5) in palpebral conjunctiva by HE stain and immunohistochemistry, detected the expression of IgE, IL-10, IL-17 in serum and splenocyte supernatant by Elisa, and analyzed the Th-17/Treg balance by Quantitative real time PCR and Flow cytometry.
RESULTS
Mean mast cell density in cells per square millimeter was significantly less in group A when conpared to group B, C and D, Especially in group C, the increase was more significant. The CPA expression level in the group B was significantly higher in the model group, the RANTES level in the group C was significantly higher in the model group. Both in serum and splenocyte supernatant, the expression level of IgE and IL-17 in group C was the highest, as for IL-10, the expression level in group B and D was higher than that in group C in model groups. Quantitative real time PCR results showed that IL-17 mRNA expression was significant increase in group B, C and compare to group A, especially in group C, the increase was more significant. Foxp3 mRNA expression in group B, C and D has no significant difference. However, compared to group A,

Foxp3 mRNA expression in group B, C and D was significantly decreased. The results of flow cytometry and Quantitative real time PCR showed similar trends.

CONCLUSIONS

This study demonstrates that allergic conjunctivitis mice could be induced by digestive tract, subcutaneous injection, and respiratory tract. It is worth noting that the sensitization effect of subcutaneous injection is better than the other two methods.

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PO-084

Pseudomonas aeruginosa quorum-sensing signaling molecule N-3-oxododecanoyl homoserine lactone induces

IL-8 secretion via TLR2/NF-κB pathway in human corneal epithelial cells

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Purpose:
To investigate the role of N-3-oxododecanoyl-homoserine lactone (3OC12HSL) in corneal epithelial barrier function and the mechanism of 3OC12HSL on activated TLR2 dependent IL-8 secretion in human corneal epithelial cells (HCECs).
Methods:
HCECs were cultured and different concentrations of 3OC12HSL were added. The cell viability was measured by Crystal violet staining and CCK-8. The expressions of Toll-like receptors(TLR2、4、5、6) were detected by PCR. For TLR2 and TLR4 with significantly elevated mRNA expression, we further tested the protein expression with Western Bolt. Immunofluorescence staining and Western blot were employed for measuring the transcriptional activity of NF-κB. The secretion of cytokines IL-6, IL-8, IL-10 and TNF-α was detected by PCR. Moreover, we selected IL-8 with significant change in mRNA expression for a more in-depth study. HCECs were pre-incubated with agonists or blocking antibodies of TLR2、4、5、6 before 3OC12HSL stimulation and then the secretion of IL-8 in the supernatant was detected by ELISA.
Results:
In this study, we exhibited that administration of 3OC12HSL decreased cell viability and survival in HCECs concentration-dependently and time-dependently. 3OC12HSL of high concentration rapidly promotes the expression of TLR2 and TLR4, which have a positive correlation with the processing time. Nuclear translocation and expression of NF-κB were increased after 3OC12HSL treatment. Among the inflammatory factors (IL-6, IL-8, IL-10, TNF-α) we tested, IL-8 was found increased significantly after treated with 3OC12HSL and the expression can be inhibited by the specific blocking antibody of TLR2.
Conclusions:
3OC12HSL destroyed the barrier function of corneal epithelial cells. Meanwhile it can be recognized by the host innate immune system, followed by the trigger of an immune inflammatory response which involves the activation of TLR2 and the increasement in activated NF-κB dependent IL-8 expression. And this correlation between 3OC12HSL and host immune contributes to the development and progression of *Pseudomonas aeruginosa* (*P. aeruginosa*) keratitis.

PO-085

Evaluation of extraocular muscles in patients with moderate-to-severe Grave's ophthalmopathy using

Apparent Diffusion Coefficient measured by magnetic resonanceimaging before and after radiation therapy

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Purpose: To characterize the inflammation of extraocular muscles in moderate-to-severe thyroid-associated ophthalmopathy patients using apparent diffusion coefficient (ADC) measured by magnetic resonance (MR) imaging before and after radiation therapy and to correlate ADCs of extraocular muscles with clinical activity.
Materials and methods: ADCs of the superior rectus (SR), inferior rectus (IR), medial rectus (MR), lateral rectus (LR) muscles were measured with magnetic resonanc resonance imaging in 52 eyes of 26 patients (51.62±12.48 yrs old, age range 26-75) with moderate-to-severe thyroid-associated ophthalmopathy, not sensitive to 4.5g intravenous glucocorticoids (ivGC) therapy, before and 3 months after orbital radiation therapy. Clinical activity scores were evaluated. MRI was performed on 3.0-T MRI system (Philips Ingenia). The apparent diffusion coefficient (ADC) of extraocular muscles the ADC maps were reconstructed automatically by the commercially available software and was measured on coronal diffusion weighted imaging(DWI) sequence and calculated in mm^2/s. Statistical analyses were performed with paired T test and Pearson correlation.
Result: For OD, the mean ADCs before treatment were 1.44±0.22 in SR, 1.36±0.22in IR, 1.39±0.23 in MR and 1.25±0.23 in LR. The mean ADCs after treatment were 1.27±0.19, 1.21±0.24, 1.31±0.21 and 1.14±0.19, respectively. For OS, the mean ADCs before treatment were 1.41±0.26 mm2/s in SR, 1.38±0.24in IR, 1.43±0.20 in MR and 1.31±0.26 in LR. The mean ADCs after treatment were 1.25±0.18, 1.23±0.27, 1.29±0.23 and 1.16±0.24, respectively. There was a significant drop in ADC values of extraocular muscles before and 3 months after radiation therapy (P values:OD SR:0.001; IR:0.001 ; MR: 0.046; LR: 0.017; OS SR:0.001; IR:0.001 ; MR: 0.002; LR: 0.001). There was a statistically significant correlation between the mean ADC of all 4 muscles measured and the clinical activity scores both before and after treatment before,OD r=0.54, OS r=o.40;after,OD r=0.43, OS r=0,.68)($P<0.05$ for all correlations)
Conclusion: There was a significant drop in ADC values of extraocular muscles before and 3 months after radiation therapy in our TAO patient population. The ADC values of extraocular muscles may discriminate the activity of TAO and monitor its treatment response as a quantitative indicator.

PO-086

Conjunctival microbiome changes associated with fungal keratitis: Metagenomic analysis

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2.Department of Medicine， Qingdao University

Abstract

AIM: To investigate the ocular surface microbiome profile of patients with fungal keratitis (FK) through bacterial 16S rDNA sequencing.

METHODS: The swab samples were collected from 8 patients with FK (group 1 from the corneal ulcer, Group 2 from the conjunctival sac of the infected eyes, and Group 3 from the conjunctival sac of the fellow eyes) and 10 healthy eyes (Group 4 from the conjunctival sac). Bacterial 16S rDNA V4-V5 region sequencing was performed to characterize the bacterial communities on the ocular surfaces of the patients with FK.

RESULTS: Our metagenomic data showed that 97% of the sequence reads were categorized into 245 distinct bacterial genera, with 67.75±7.79 genera detected in Group 1, 73.80±13.44 in Group 2, 74.57±14.14 in Group 3, and 89.60±27.49 in Group 4. Compared with the healthy eyes (Group 4), both infected (Groups 1 and 2) and fellow eyes (Group 3) of the patients with FK showed reduced bacterial diversity and altered ocular surface microbiota compositions, with lower abundance of *Corynebacterium* and *Staphylococcus* and higher abundances of *Pseudomonas*, *Achromobacter*, *Caulobacter* and *Psychrobacter*.

CONCLUSION: Our report depicts the altered ocular surface bacterial community structures both in the affected and fellow eyes of patients with FK. These changes may contribute to the pathogenesis of FK or the increased risk for FK.

PO-087

免疫抑制治疗对角膜手术损伤引发的视网膜炎症的作用及机制研究

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目的：通过对临床的长期观察，我们发现角膜损伤通常会对患者造成不可逆且难治性的青光眼并激发视神经损害，为了探究免疫细胞在视网膜炎性反应中的作用机制，本研究采用四种不同的角膜损伤模型对相关细胞因子进行筛检，证明角膜损伤引起视网膜组织中出现单核/巨噬细胞浸润的现象。选取包括激素在内的三种免疫抑制药物进行干预治疗观察其对炎症的抑制作用及神经保护作用。

方法：采用四种不同的角膜急性损伤模型对相关细胞因子进行筛检，分别对不同组别的 C57BL/6 小鼠进行 NAOH 角膜烧伤，单根角膜缝线，自体穿透性角膜移植术，自体穿透性角膜移植术加晶状体摘除术处理。术后 24h 收集角膜及视网膜标本进行 qPCR，流式细胞术，TUNEL 及激光共聚焦显微镜检测，观察炎性细胞因子的表达情况。

结果：本研究表明以上四种角膜损伤模型均可引发明显的视网膜炎症性损害，视网膜内炎性反应的激活与外周 CD11b+及 CD45+单核细胞浸润相关，其中以穿透性角膜移植术外加晶状体摘除术处理组的表现最为严重。通过 qPCR 的分析可见 TNF-α，IL-1β 及 IL-6 的 mRNA 表达上调，经过免疫抑制剂的联合治疗可以有效减少炎性细胞数量。
结论：通过氧化还原反应及眼内压监测，本研究发现碱烧伤后的角膜炎性因子并未通过眼内组织的渗透作用到达视网膜，说明角膜损伤可通过免疫反应引发视网膜内部的单核/巨噬细胞募集现象。角膜手术损伤程度与炎性细胞因子的表达呈正相关，使用免疫抑制剂观察到的疗效进一步证实阻断免疫细胞激活通路可以有效抑制视网膜组织中的单核/巨噬细胞数量的增长，不仅为研究角膜损伤后青光眼的发生机制提供了基础，更为临床治疗提供了新思路。

PO-088

Teriflunomide alleviate the experimental autoimmune uveitis via inhibiting T helper and dendritic cells

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自身免疫性葡萄膜疾病，是世界范围内致盲性眼病。其发病及复发机制尚不完全清楚。目前认为，Th1/Th17 是重要的致病因素。其中 DCs 也发挥重要的作用。
目前临床上的常用药物主要是糖皮质激素类药物或免疫抑制剂，而这些药物具有较多不良反应。Teriflunomide(Teri)应用于临床治疗多发性硬化，效果显著且副作用较小。自身免疫性葡萄膜炎的发病机制与 MS 都是自身免疫疾病，发病机制相似。但是，Teri 在葡萄膜炎的作用及其机制至今未被发现。所以，此实验通过自身免疫性葡萄膜炎动物模型，探究 Teri 能否对自身免疫性葡萄膜炎有同样的治疗效果，为自身免疫性葡萄膜炎寻求新的药物治疗手段。
方法：首先建立 EAU 模型若干只，给予不同处理（溶剂组， Teri 组）。在相同的 SPF 级环境中饲养 14 天后，观察各个分组 EAU 小鼠眼底，进行临床和病理评分；取小鼠外周淋巴组织进行流式细胞分析；取小鼠视网膜及淋巴细胞，提取 RNA,做 q-PCR 分析。采用过继实验验证 Teri 对 IRBP 特异性 T 细胞的作用。体外验证 Teri 对 CD4+ T 细胞和骨髓诱导 DC 的作用。
体内结果：Teri 能有效治疗 EAU 小鼠，缓解炎症。流式细胞分析显示，Teri 治疗组中 Th1、Th17 相对数量降低；Teri 显著降低过继实验所诱导的 EAU 发病；DCs 数量显著降低，并且成熟 DCs 的比例明显降低。Q-PCR 结果显示: Teri 能有效抑制 IL17、IFNγ 以及 TNFα 的表达。
体外结果：Teri 有效抑制 T 细胞的增殖，以及 Th1/Th17 的分化和炎症因子表达；重要的是发现，Teri 明显抑制 DCs 的成熟。
总之，我们发现，Teri 能有效治疗 EAU。更有意义的是，我们发现了 Terie 在 EAU 治疗中的新的机制。我们的实验结果为进一步 Teri 在临床中的应用提供有力的实验基础。

PO-089

间充质干细胞在自身免疫性葡萄膜炎中的应用及机制研究

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背景与意义

葡萄膜炎是由于异常免疫炎症反应导致的一类疾病。在世界范围内，葡萄膜炎致盲人数就占到眼科疾病致盲总人数的 10%-25%。目前临床治疗的方法主要包括糖皮质激素和免疫抑制剂等，疗效有限，副作用大，亟需寻找新的治疗手段。间充质干细胞(Mesenchymal stem cells，MSCs)是一类具有多分化潜能的成体多功能干细胞。既往研究表明 MSCs 具有强大的免疫调节和促进组织损伤修复的生物学功能，是眼免疫性疾病极具前景的一种治疗方法。所以，此实验望通过在自身免疫性葡萄膜炎动物模型中应用 MSCs，探究 MSCs 能否治疗自身免疫性葡萄膜炎，为自身免疫性葡萄膜炎寻求新的药物治疗手段。

研究方法

建立 EAU 模型，在第 14 天起病时随机分为三组（空白组、溶剂组以及尾静脉注射 MSCs 治疗组）。饲养 28 天后，用眼底照相仪观察各个分组 EAU 小鼠的视网膜，并进行分级。记录发病情况后，对取各组小鼠眼球进行 HE 染色，观察病理变化；取血清，检测血清中炎症因子 IL-17、IL-6、IL-22、TNF-α、IFN-γ 差异；取小鼠外周淋巴组织及脾脏，分离淋巴细胞，进行 CD4、CD25、IL-17、TNF-α、IFN-γ、Foxp3 等流式细胞分析；取小鼠视网膜及淋巴细胞，提取 RNA 进行 TH1、TH17 等相关因子的 q-PCR 分析。

结果

空白组以及溶剂组小鼠眼底评分、HE 病理无明显差异，且均比 MSCs 治疗组较重；血清中炎症因子以及 q-PCR 结果显示 IL-17、IL-6、IL-22、TNF-α、IFN-γ，MSCs 治疗组较空白组和溶剂组均降低；流式细胞分析显示，MSCs 治疗组中 Th1、Th17 等淋巴细胞相对数量降低。

结论

尾静脉注射 MSCs 可缓解小鼠葡萄膜炎的病理改变，同时降低其相关炎症因子的表达，从而调节 TH1/TH17 的平衡，这意味着 MSCs 可作为一种潜在的治疗方式用于葡萄膜炎的治疗。

PO-090

房水脂多糖检测指导白内障术后细菌性眼内炎治疗 1 例

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目的：报道 1 例通过房水检测 LPS（脂多糖）指导白内障术后细菌性眼内炎治疗病例。

方法：患者女性，66 岁，主因左眼眼红、眼痛、视物模糊 2 天入院，入院 10 天前行左眼白内障超声乳化抽吸术伴人工晶体一期植入术，平素体健。入院查体左眼视力眼前手动，眼压 13mmHg，角膜可见尘状 KP，Tyn（+++），浮游细胞>50/视野，下方少许积脓，人工晶体在位，玻璃体轻度混浊，眼底窥不清。眼部 B 超（-）。入院当天行左眼前房灌洗术并取房水送检同时行细菌培养+药敏鉴定，予以前房注入万古霉素，玻璃体腔注入头孢他啶治疗。当天房水检测结果回报：基因芯片（-），

IL-6 70186.8pg/ml，G 试验<10pg/ml，LPS>2.5。诊断为细菌性眼内炎，革兰阴性菌感染可能性大。予以左氧氟沙星、托百士频点，同时予以头孢呋辛钠 1.5g QD 静点治疗。

结果：术后第一天患者无明显症状，左眼视力 0.02，前节（-），术后第五天左眼视力 0.3，矫正 0.6，Tyn（+），浮游细胞两个/视野，细菌培养结果回报为嗜麦芽窄食单胞菌，左旋氧氟沙星敏感，予以出院。出院后一周门诊复查左眼裸眼视力 0.5，矫正视力 1.0，眼压 15mmHg，眼前节无活动性炎症。

结论：研究表明，随着广谱甚至超广谱抗生素的应用，革兰阴性菌成为构成我国院内感染的主要病原微生物。传统的细菌培养法虽为细菌感染诊断金标准，但其耗时长、阳性率低，无法指导早期临床诊断及治疗。内毒素是一种革兰阴性细菌细胞壁外膜的主要组成成分, 其化学本质为脂多糖，是诱发炎症反应过程中主要的致病成分，于细菌死亡解体后释放。故眼内液中脂多糖的阳性提示眼内革兰阴性菌的感染。在全身感染的临床研究中，已证明对于革兰阴性菌感染患者，血浆脂多糖法检测的敏感性高于细菌培养法，对于革兰阴性菌感染的患者具有早期快速特异性诊断的优势。故眼内液脂多糖的阳性，可为临床医生早期针对性选择抗生素提供依据。

PO-091

Protective Effects of a Novel LFA-1 Antagonist on LPS-induced Inflammatory Responses in RPE Cells and in a Mouse Model of EIU

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PURPOSE: To investigate the protective effects of VVN001, a novel lymphocyt function-associated antigen (LFA-1) antagonist which blocks binding of intercellular adhension molecule 1 (ICAM-1) to LFA-1, on lipopolysaccharide (LPS) induced inflammatory response in retinal pigment epithelial (RPE) cells and a mouse model of endotoxin-induced uveitis (EIU), furthermore to explore the underlying mechanisms of the protection.
METHODS: Human primary RPE (hRPE) and ARPE-19 cells were pre-treated with or without VVN001 (1 μM) for 1 hour followed by 10 μg/mL LPS stimulation for 24 hours. The mRNA expression and protein levels of inflammatory cytokines were analyzed at the 24th hour after LPS induction using real-time PCR, Western blotting and ELISA. *In vivo* studies were performed in BALB/c mice injected intravitreally with 125 ng LPS. VVN001 eyedrops (1%) was locally administrated every 4 hours for 24 hours after LPS injection. Mice in control group and PBS group received no treatment and intravitreal injection of PBS, respectively. The examination of anterior segment with a slit lamp and assessment of clinical scores were performed at the 24th hour after LPS injection, and simultaneously the mRNA and protein expression levels of inflammatory cytokines were investigated by real-time PCR and Western blotting.

RESULTS: Compared with LPS group, pretreatment with VVN001 significantly reduced mRNA levels of ICAM-1, interleukin (IL)-6, IL-8, tumor necrosis factor (TNF)-α, IL-1β, IL-18, Caspase-1 both in ARPE-19 cells and human primary RPE cells. Increased protein levels of ICAM-1, TNF-α caused by LPS stimulation were obviously suppressed by VVN001 treatment in ARPE-19 cells; furthermore, it inhibited the overproduction of IL-1β, NLRP3, Caspase-1 and ratio of pIκBα to IκBα remarkably by comparing to just LPS induction. *In vivo*, compared to LPS group's average clinical score of 5.0, VVN001 administration significantly alleviated the inflammatory response with the average clinical score of 1.3. By comparing to LPS group, mRNA expression of ICAM-1, TNF-α, IL-6, NLRP3, IL-1β and Caspase-1, as well as overproduction of ICAM-1, IL-1β, NLRP3, Caspase-1 and pIκBα/IκBα were strongly suppressed by VVN001 treatment.
CONCLUSIONS: VVN001 alleviated the inflammatory response induced by LPS both *in vitro* and *in vivo* through inhibiting NF-κB signaling pathway and activation of NLRP3 inflammasome.

PO-092

Role of neutrophil extracellular traps in Pseudomonas aeruginosa keratitis

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Purpose: Neutrophils are wildly thought to play a vital role in the host's immune defense against bacteria invasion. In addition to general mechanisms, neutrophils release neutrophil extracellular traps (NETs) to trap and kill bacteria. However, excessive NETs formation has been implicated in the development of many diseases. The dynamics of the formation and the role of NETs in *Pseudomonas aeruginosa* (*P. aeruginosa*) keratitis remain unreported and is our purpose.
Methods: Murine model of *P. aeruginosa* keratitis was established and randomly divided into four groups. Infected eyes were treated topically sterile saline, dexamethasone eye drops (DXM), tobramycin eye drops (TOB) or tobramycin Dexamethasone eye drops (TOB+DXM) 4 times daily. Immunofluorescence staining and scanning Electron Microscope were used to detect the formation of NETs. Visible bacteria of different groups at 1, 3, 5, 7 and 10 days p.i. was quantified.
Results: We examined NETs formation on the natural course, and the effect of DXM and TOB on the bactericidal effect of NETs on the infection process. In the saline group, NETs were present in the stroma on day 1 p.i., increased and reached the peak on day 3 p.i., then reduced since day 7 p.i., and a few remained on day 10 p.i.. Immunofluorescence staining showed the decrease of NETs by the treatment with DXM or TOB compared with the saline group. Greater numbers of NETs were reduced in TOB+DXM and DXM group.
Conclusions: NETs are involved in *P. aeruginosa* keratitis. NETs play a dual role: infection control and corneal damage. DXM inhibited *P. aeruginosa*-induced NETosis, but did not decrease the antibacterial activity of TOB.

PO-093

清开灵眼用凝胶对 EAU 大鼠的治疗作用及其机制研究

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目的 观察清开灵眼用凝胶对大鼠 EAU 的疗效并探讨其作用机制。
方法 建立 EAU 模型，免疫后大鼠分为 A 组(对照组)、B 组(“清开灵”组)、C 组（“地塞米松”组）。A 组用生理盐水点眼，B、C 组分别用相应的药物点眼(3 次/d)。观察评估大鼠眼前节炎症；组织病理学方法观察大鼠前房、虹膜和睫状体的炎性浸润情况；流式测定大鼠脾脏、淋巴结分离的 $CD4^+$和 $CD8^+$细胞百分比、$CD4^+/CD8^+$值以及 Th1/Th17 值。
结果 A 组大鼠免疫后第 9 天开始出现眼部炎症，第 11 天达高峰，而 B、C 组大鼠较 A 组炎症轻，发生晚，病程短，且 B、C 组炎症评分明显低于 A 组（P<0.05）。组织病理学检查发现，A 组大鼠前房、虹膜及睫状体组织中可见炎细胞浸润，B、C 组明显减轻。A 组大鼠脾脏和淋巴结中 $CD4^+$、$CD8^+$细胞的百分比及 $CD4^+/CD8^+$值分别为(83.10±0.15) %、(18.60±0.09) %和 4.50±0.02，B 组分别为（79.90±0.21）%、（19.20±0.15）%和 4.20±0.04，C 组分别为（78.60±0.09）%、（23.43±0.09）%和 3.40±0.01（且均 P=0.00）。A 组大鼠脾脏和淋巴结中 $CD4^+$ $IFN\text{-}\gamma^+$，$CD4^+$ $IL\text{-}17^+$细胞的百分比分别为（32.20±0.19）%和（55.10±0.09）%，B 组分别为（20.40±0.18）%和（25.20±0.32）%，C 组分别为（10.40±0.23）%和（8.20±0.15）%（且均 P=0.00）。
结论 清开灵眼用凝胶可减轻大鼠 EAU 炎症，抑制 $CD4^+$细胞增生和分化，降低 $CD4^+/CD8^+$值，抑制 Th1、Th17 的分化，减少相应细胞因子的分泌。

PO-094

清开灵注射液含药血清对 EAU 大鼠 IRBP1177-1191 特异性 T 细胞的作用研究

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目的 观察清开灵注射液含药血清对 EAU 大鼠的疗效，并探讨其机制。
方法 建立 EAU 模型，将大鼠随机分为 A 组(对照组)、B 组(“清开灵”组)、C 组（“地塞米松”组）。免疫后第 7 天开始用药，每日一次，剂量分别为：生理盐水 2ml 腹腔注射，清开灵 3ml/kg 注射液，生理盐水 2ml 腹腔注射，地塞米松 0.1ml/kg 注射，生理盐水 2ml 腹腔注射。观察眼部炎症改变以及脾脏与淋巴结的大小；制备并筛选含药血清，干预 IRBP1177-1191 特异性 T 细胞悬液；流式检测 EAU 大鼠免疫状态。
结果 A 组大鼠免疫后第 9 天开始出现眼部炎症表现，第 11 天炎症达到高峰期，第 15 天炎症开始减轻并逐渐消失。B 组及 C 组大鼠眼部炎症的减轻，病程都明显缩短。观察发现免疫后第 14 天,与 B 组和 C 组相比，前房、虹膜组织及睫状体组织中可见炎细胞浸润，主要为中性粒细胞和淋巴细胞。

模型组大鼠视网膜出现脱离。B 组和 C 组炎症反应明显减轻。药物血清干预 T 细胞培养 24h 后各组大鼠脾脏和淋巴结中 CD4+和 CD8+的百分比。各组相比差异均有统计学意义。

结论 清开灵注射液可减轻大鼠 EAU 炎症，清开灵和地塞米松含药血清可抑制 EAU 大鼠 CD4+细胞的增殖分化，同时可降低 CD4+/CD8+的比值。并且经过这些含药血清干预后 EAU 大鼠的 CD8+的比例增加。

PO-095

毛囊蠕形螨基因组草图为研究眼部蠕形螨感染性疾病提供研究基础

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毛囊蠕形螨和皮脂蠕形螨是人体专性寄生螨，长久以来蠕形螨是引起眼表疾病如睑缘炎、霰粒肿、干眼等的重要病因之一。然而，我们对蠕形螨的遗传生物学背景仍知之甚少。因此，本次研究首次测序并组装了毛囊蠕形螨的基因组，该基因组大小约 54.3 Mb，N50 长度达到了 6.1 Mb，共注释得到了 10309 个基因。依据对基因组的初步分析，我们惊奇地发现螨虫的解毒家族 P450 急剧收缩而同时脂质合成类的基因 FAS 却得到了扩张现象。根据这一提示，我们进行了睑脂成分的调查，发现螨虫感染组的睑脂成分特性相对于未感染组发生了显著变化。同时，睑脂成分的改变与马拉色球菌数量显著升高有密切的联系。此现象提示了睑脂中的螨虫和微生物的可能对眼表疾病有协同作用。螨虫基因组和以上初步研究结果为研究眼部蠕形螨病的致病性和治疗提供了重要的线索和依据。

PO-096

年龄相关性黄斑变性与微生物相关的发病机制研究

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年龄相关性黄斑变性（age-related macular degeneration，AMD）是老年人中一种常见的致盲性眼病，给患者和社会带来了巨大痛苦和损失，可由多种内源性及外源性因素引起，但其具体的发病机制尚不清楚[1]。近年来，随着高通量测序技术的迅猛发展极大地加深了我们对于与人类健康和疾病密切相关的微生物组的认识[2-4]。为研究微生物在 AMD 发病机制中的重要作用，我们收集了 20 例 AMD 患者及 41 例非感染性眼病患者的房水进行宏基因组测序分析，结合负染透射电镜和细菌培养结合发现一种自然存在土壤中的革兰氏阳性菌巨大芽孢杆菌(B.megaterium)与 AMD 密切有关。接下来，我们通过灵长类动物体内实验进一步证实了 B.megaterium 在 AMD 发病机制中的关键作用：非人灵长类动物猕猴自发性的软性玻璃膜疣在透射电镜下可直接观测到多种细菌样的形态，通过 qPCR 技

术发现 B.megaterium 在软性玻璃膜疣中的表达量显著高于非玻璃膜疣的视网膜组织。更重要的是，在非人灵长类动物猕猴的视网膜下注射 B.megaterium 可导致与 AMD 患者类似的玻璃膜疣样病灶以及炎症反应。综上所述，我们的研究结果表明 *B.megaterium* 特异性富集于 AMD 患者的房水和玻璃膜疣中，在食蟹猴视网膜下注射 B.megaterium 可诱导与 AMD 患者类似的玻璃膜疣样病灶。因此，对与微生物相关的 AMD 发病机制的研究将有助于加深我们对 AMD 发病机制的认识，并为这种致盲疾病的诊断、治疗和预防提供了新的方向。

PO-097

玻璃体淀粉样变性患者 TTR 基因突变特点和临床特征

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目的：分析携带 TTR 基因突变的玻璃体淀粉样变性患者致病基因突变特点和临床特征。方法：纳入 2011-2017 年就诊于北京同仁医院眼科门诊的玻璃体淀粉样变性患者 10 例，对患者及家属进行眼科和全身体检。在获得知情同意后，抽取患者及家属外周静脉血，提取全基因组 DNA，用 PCR 扩增甲状腺素转运蛋白基因(transthyretin，TTR)的 4 个外显子，扩增产物纯化后进行 Sanger 测序。利用在线分析软件对可疑基因变异致病性进行预测，并在正常人数据库中查看可疑基因变异的等位基因频率。利用 Sanger 测序对家系成员进行共分离分析。将 5 例患者玻璃体切除术后标本涂片并进行苏木精-伊红(hematoxylin-eosin staining，HE) 染色及刚果红染色，在显微镜下观察。结果：在 8 例患者中发现 6 种已知 TTR 基因杂合错义突变：p.V30A，p.K35N，p.L55R，p.Y69H，p.G83R 和 p.Y114C，分别位于蛋白 β 折叠股及 β 发卡区结构域。8 例患者平均发病年龄 41.9 岁，所有患者玻璃体内可见致密灰白团块状或条索状混浊。5 例患者玻璃体标本涂片 HE 染色提示絮状粉染无结构物质，1 例患者刚果红染色阳性。8 例患者中，6 例合并外周神经系统、自主神经系统或听力异常。结论：p.G83R 突变是国人玻璃体淀粉样变性的突变热点，β 折叠股 C 是 TTR 基因常见突变所在蛋白区域，对于确诊玻璃体淀粉样变性，TTR 基因检测较病理学检测更准确和更敏感。

PO-098

CRB2 mutation causes autosomal recessive retinitis pigmentosa

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Retinitis pigmentosa (RP), the most common form of inherited retinal dystrophies, exhibits significant genetic heterogeneity. The crumbs homolog 2 (CRB2) protein, together with CRB1 and CRB3, belongs to the Crumbs family. Given that *CRB1* mutations account for 4% of RP cases, the role of *CRB2* mutations in RP etiology has long been hypothesized but never confirmed. Herein, we report the identification of *CRB2* as a novel RP causative gene in a Chinese consanguineous family and have analyzed its pathogenic effects. Comprehensive ophthalmic and systemic evaluations confirmed the clinical diagnosis of the two patients in this family as RP. WES revealed a homozygous missense mutation, *CRB2* p.R1249G, to segregate the RP phenotype, which was highly conserved among multiple species. *In vitro* cellular study revealed that this mutation not only interrupted the stability of the transcribed *CRB2* mRNA and the encoded CRB2 protein, but also interfered with the wild type CRB2 mRNA/protein and decreased their expression. This mutation was also shown to trigger epithelial-mesenchymal transition (EMT) in retinal pigment epithelium (RPE) cells, thus impairing regular RPE phagocytosis and induce RPE degeneration and apoptosis. Thus, we conclude that *CRB2* p.R1249G mutation causes RP via accelerating EMT, dysfunction and loss of RPE cells, and establish CRB2 as a novel Crumbs family member associated with non-syndromic RP. We provide important hints for understanding of CRB2 defects and retinopathy, and for the involvement of EMT of RPE cells in RP pathogenesis.

PO-099

Identification and preliminary functional analysis of two novel congenital cataract associated mutations of Cx46 and Cx50

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Background: Congenital cataract is a significant cause of visual damage and blindness. The present study examined the disease-causing mutations in three Chinese families with autosomal dominant congenital cataract (ADCC) to provide a preliminary characterization of the mechanisms underlying congenital cataract formation.

Methods: Three pedigrees affected with ADCC were recruited. All participants underwent detailed ophthalmic examinations. Leucocyte DNA was extracted from venous blood for direct sequencing of candidate genes. In silico bioinformatics analysis was conducted to verify the functional impacts of the mutant proteins. Distribution patterns of connexin proteins were assessed through fluorescence microscopy using an enhanced green fluorescent protein (EGFP)-labeled expression vector in stably transfected Hek293 cells.

Results: We identified three Chinese pedigrees with ADCC. Family 1 and family 2 presented with pulverized cataract and family 3 with an unknown phenotype. Direct sequencing of family 1 and

family 2 revealed a missense mutation of c.64G>A encoding for G22S of connexin46 (Cx46), while a similar c.64G>A encoding for G22S of connexin50 (Cx50) was found in family 3; both mutations co-segregated well within all affected individuals in their families and were absent from 100 unrelated controls. Bioinformatics analysis revealed with high confidence that both mutations were deleterious. Confocal microscopy revealed accumulation of both mutant connexins in the cytoplasm with punctate staining and a failure of gap junction formation between adjacent cells.
Conclusions: Two novel G22S mutations of Cx46 and Cx50 were identified, and preliminary functional analysis revealed a potential deleterious effect of these mutations due to malfunction of connexins.

PO-100

一个中国先天性全白白内障家系的热休克蛋白转录因子 4（HSF4）基因新突变筛查

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目的: 本研究致力于鉴定一个中国常染色体显性先天性全白白内障家系的致病基因突变。
方法: 本研究收集了一个表型为全白白内障的先天性白内障大家系，通过目标区域靶向芯片联合二代测序的方法对该家系所有先天性白内障相关候选基因以及突变进行筛选和鉴定，并采用 Sanger 测序的方法对所筛选到突变的共分离情况进行验证。
结果: 本研究在热休克蛋白转录因子 4（*HSF4*）基因的 179 位核苷酸位点发现了一个 C – T 的致病突变，该核苷酸替换导致第 60 位氨基酸编码区的一个高度保守的脯氨酸突变为亮氨酸，该突变被证实可与疾病显著共分离。
结论: 我们的研究结果鉴定了 *HSF4* 基因的一个 p.P60L 新错义突变，并拓展了先天性白内障的遗传学突变谱。目标区域靶向芯片联合二代测序为先天性白内障患者提供了一个有力的基因诊断工具。

PO-101

中国一常染色体显性先天性白内障家系的 CRYBB2 基因新突变分析

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目的: 本研究致力于鉴定一个中国四代常染色体显性先天性白内障大家系的致病基因突变。

方法: 通过裂隙灯显微镜下拍照的方式获取家系患者的眼部白内障临床表型，提取外周血基因组DNA 用于功能组基因筛选法测序分析。
结果: 该家系患者的先天性白内障表型经裂隙灯显微镜照相为双眼点状白内障。对晶状体βB2(CRYBB2)基因的直接测序发现了第 3 外显子第 67 核苷酸位点 C --> T 的基因突变，其导致该蛋白第 23 位氨基酸由谷氨酸突变为谷氨酰胺(p.E23Q)。该突变经证实可与疾病显著共分离。
结论: 本研究鉴定了 CRYBB2 基因的一个新致病突变，研究结果表明 CRYBB2 基因是先天性白内障的一个致病候选基因，同时，先天性白内障是一个具有临床和遗传异质性的疾病。

PO-102

通过全外显子组测序鉴定中国一常染色体显性先天性白内障家系的 PRMT3 新致病基因

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目的:先天性白内障是由于胚胎期各种因素所导致的晶状体代谢或发育异常而导致透明度下降的疾病，其中约 8-29%与遗传因素相关。本研究对一个四代中国常染色体显性先天性白内障家系进行全外显子组测序来鉴定其遗传病因。
方法:利用 Illumina 62M TruSeq 芯片进行外显子捕获，并在 Illumina HiSeq2500 测序平台上进行全外显子组测序(WES)，利用 Sanger 测序法对 WES 结果进行验证。
结果:所有患病成员白内障特点为双眼晶状体后囊膜下中央呈局限性白色圆形或类圆形混浊，伴皮质片状混浊。外显子组测序首次定位了一个新的先天性白内障候选基因蛋白质精氨酸甲基转移酶 3（*PRMT3*），该基因第 15 外显子上第 435 位点出现丝氨酸到脯氨酸的致病突变（NM_001145167：c.1615C>T;p.P435S），该位点通过 Sift，PolyPhen-2，Mutation taster，Provean 软件预测其功能改变对蛋白有致病影响，经 ClustalW 预测该位点在多个物种中具有高度保守性
结论: 本研究首次鉴定了先天性白内障相关的一个新候选基因 *PRMT3*，其突变可能为导致该家系晶状体混浊的病因。

PO-103

中国一常染色体显性先天性白内障家系的主要内源性蛋白(MIP)基因单碱基缺失突变分析

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目的: 鉴定一个中国常染色体显性先天性白内障点状白内障家系的致病基因突变。

方法：对该家系成员进行全面临床和眼科检查，收集血样用于提取 DNA。通过 DNA 直接测序法对目前多有已报道的先天性白内障相关候选基因进行致病突变筛查。采用生物信息学分析对氨基酸改变对蛋白结构和功能的影响进行预测。

结果：该家系所有患者均表现点状先天性白内障。候选基因测序在主要内源性蛋白（*MIP*）基因在第一个外显子第 301 位碱基处（位于 101 位编码区）发现一新的单碱基缺失突变。该突变可与白内障表型显著共分离，生物信息学分析表明该突变可影响 MIP 蛋白的功能和二级结构。

结论：我们的研究结果认为 *MIP* 基因 c.301delG 单碱基缺失突变为该家系先天性白内障的遗传病因。本研究拓展了引起先天性白内障的 *MIP* 基因突变遗传图谱。

PO-104

家族性渗出性玻璃体视网膜病变和 Norrie 病的联合产前诊断

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背景：遗传性视网膜病因潜在致盲,且缺乏有效治疗成为产前诊断的热点，通常遗传病的产前诊断为分子学诊断，但是由于 FEVR 具有外显不全，表现度差异较高的特点，单一产前分子诊断无法明确胎儿眼部病变情况，已有文献报道产前超声能够发现视网膜母细胞瘤，永存原始玻璃体增生症，视网膜脱离等眼部异常。

目的：联合产前分子及影像检查降低重度 FEVR 患儿出生率(出生低视力、盲)。

方法：以家庭为单位评估该突变在家庭成员的外显率及表现度，在孕妇妊娠早期进行羊膜腔穿刺，检测胎儿是否携带家族致病突变，在妊娠晚期利用产前超声（妇产超声波诊断系统，VolusonE8 GE Healthcare; Milwaukee, WI）评估胎儿眼部发育情况，产后眼底检查确定新生儿眼部有无病变及病变程度，利用诊断试验分析该联合产前诊断方法的诊断符合率，敏感性，特异性。

结果：总共对 15 例高危孕妇进行了产前咨询与诊断，6 例胎儿携带家族致病突变，4 例继续妊娠，孕晚期 B 超均正常，出生后行眼底筛查发现 2 例新生儿为 1 期 FEVR，2 例眼底正常。

结论：首次联合产前分子和影像检查对 FEVR 和 Norrie 病家庭进行产前咨询与诊断，并且利用产后眼底检查证实了此方法的可行性。联合产前分子和影像检查较单一产前分子诊断提高了特异性，即降低了轻度病变（FEVR 的单纯视网膜周边血管异常可随访观察或激光治疗控制病情）或者不外显胎儿的引产率。

PO-105

Association of gene polymorphisms with primary open angle glaucoma A systematic review and meta-analysis

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Purpose: To confirm the association of all reported common polymorphisms with Primary open angle glaucoma (POAG).
Methods: We searched in PubMed and Web of Science for genetic studies of POAG. All case control studies investigating the association between single-nucleotide polymorphisms and POAG risk were included. Odds ratios with 95% confidence intervals were calculated by fixed or random effect model.
Results: This meta-analysis included 108 case control studies involving 35,389 POAG patients and 51,742 controls. The pooled results showed a significant association between 20 SNPs in 12 genes (148Asp/Glu in APE1 gene; rs449647 in APOE gene; rs1052990 and rs4236601 in CAV1/CAV2 gene; rs1799750 in MMP gene; c.603T3A in OPTN gene; rs7081455 in PLXDC2 gene; rs1279683 in SLC23A2 gene; 372T/C in TIMP1 gene; rs1927911, rs2149356, rs4986791, rs7037117, rs10759930 in TLR4 gene; rs4656461 in TMCO1 gene; 399Arg/Gln in XRCC1 gene; and rs540782, rs547984, rs693421 in ZP4 gene) with POAG.
Conclusion: Based on the current meta-analysis, we indicate 20 SNPs in 12 genes as predictive risk factors for POAG.

PO-106

Jagged1 和 Jagged2 在新疆维吾尔族剥脱综合征患者外周血中的表达及意义

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摘要：目的 探讨 Jagged1 与 Jagged2 的表达在新疆维吾尔族剥脱综合征患者发病过程中的差异及意义。**方法** 维吾尔族剥脱综合征患者 18 例为观察组，维吾尔健康人群 18 例为对照组，采用实时荧光定量 PCR 法分别检测 Jagged1 与 Jagged2 在观察组和对照组人群外周血中的表达水平。**结果** 对照组正常人群外周血中 Jagged1 表达量为 0.22464±0.33912 表达水平高于观察组剥脱综合征外周血中的表达量 0.06037±0.23463，经 *t* 检验分析，差异无统计学意义（*t*=1.690，*P*=0.100）。Jagged2 在观察组中的表达量 0.00006±0.00027 显著低于对照组正常人群表达量 0.26986±0.27691，差异有统计学意义（*t*=4.134，*P*=0.001）。**结论** 新疆维吾尔族剥脱综合征发病可能与 Jagged1 和 Jagged2 表达异常有相关性。
关键词：剥脱综合征；Jagged1；Jagged2；表达量

PO-107

双眼眼底血管样条纹一例

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目的：介绍一例双眼眼底血管样条纹症案例，探讨其治疗时机
方法：患者老年男性，因左眼视力下降 10 年余就诊。眼科检查：视力：右眼 0.1，左眼 0.06；双眼眼压正常。双眼前节未见异常，扩瞳眼底检查：双眼视盘边界清，色淡红，视盘周围可见数条不规则浅棕褐色条纹，呈放射状走行，逐渐变细而消失，右眼黄斑区未见棕褐色条纹长入，左眼见团状棕褐色条纹累及黄斑区，未见渗出、出血。双眼后极部色素脱失紊乱，黄斑颞侧视网膜可见散在颗粒状色素沉着，视网膜血管正常
结果：诊断为双眼眼底血管样条纹。
讨论：眼底血管样条纹临床上少见，一般双眼发病，但病变多不对称，其典型表现为以视盘为中心向周围呈放射状血管样走行的棕褐色或红褐色条纹改变。目前尚无有效治疗方法。对视功能影响不大，黄斑区未受累者，采取定期随访。对于继发脉络膜新生血管者，既往研究表明 PDT（光动力疗法）可延缓病变进展，但提高视力非常有限。

PO-108

孪生兄弟马凡综合征眼部体征及生物学参数比较-病例报告

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目的：本病例报道两位男性马凡综合征双胞胎患者眼部表现和眼部生物学参数进行比较，为马凡综合征的治疗提供新的思路。
病例：患者男性 16 岁，患者男性（弟弟），16 岁。因左眼视力下降半年就诊于天津医科大学眼科医院。家族史：患者哥哥、母亲及舅舅及患马凡氏综合征。全身检查：身高：2.05m，瘦高体型，蜘蛛状指（趾），胸廓形态正常，心前区无隆起。超声心动图：主动脉根部相对扩张；二尖瓣松软、膨隆并少量反流；主动脉瓣反流（少量）。眼部检查：右眼裸眼视力 0.5，矫正视力 0.8（+5.50-2.75*15）；左眼裸眼视力 0.12，矫正视力 0.2（+6.00-2.50*165）。眼压右眼 12.6mmHg，左眼 10.1mmHg。眼轴：右眼 30.50mm，左眼 30.36mm。角膜地形图（PENTACAM）可见双眼角膜曲率较平，前表面曲率为 40.8D，40.6D（图 5）。双眼外眼无异常，角膜透明，前房深可，右眼晶状体向上方脱位，左眼晶状体向鼻上方脱位（图 1CD），双眼豹纹状眼底（图 2CD）。OCT：右眼黄斑中心凹反射曲线存在，左眼视网膜劈裂，神经上皮层脱离。（图 3CD）诊断:1.左眼视网膜劈裂 2.双眼高度近视性视网膜病变 3.双眼晶状体半脱位 4.马凡氏综合征。

PO-109

伴发其他疾病的 Leber's 遗传性视神经病变的临床特点分析

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目的：分析 9 例临床诊断为 Leber 遗传性视神经病变（LHON）同时合并其他疾病的患者临床表现、人口学特点和影像学表现。方法：回顾性分析 2010 年 7 月至 2018 年 10 月于中国人民解放军总医院眼科就诊的 9 例临床诊断为 LHON 并发其他疾病的患者的患者资料，分析其临床特点、影像学检查、实验室检查及人口学特征。结果：（1）9 例患者中 8 男 1 女，平均年龄（28.00±12.49）岁；（2）其中 5 例患者 11778 基因位点突变，3 例患者 14502 位点突变，1 例患者 12811 位点突变，其中 1 例患者包含 11778 和 11696 两个位点突变；（3）所有患者均无家族遗传史；（4）4 例患者合并视神经炎，血清 AQP4 抗体均阴性，其中 2 例患者 MOG 抗体阳性，滴度分别为 1：10 和 1：100；（5）1 例患者合并鞍区生殖细胞瘤；1 例患者合并多发性硬化；1 例患者合并多颅神经炎；1 例患者合并线粒体相关脑病；1 例患者行双眼玻璃体切除术联合硅油注入术。结论：LHON 是神经眼科常见的遗传性视神经病变，mtDNA 突变位点检测可明确诊断。LHON 可合并多种疾病，突变位点的检测可先于或于其他疾病治疗后症状仍未缓解而发现。因此眼科医师应熟识 LHON 的临床特点及影像学检查表现，避免临床漏诊或误诊。

PO-110

USH2A 基因突变的遗传性视网膜疾病的临床表型分析

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目的：对 USH2A 基因突变导致的不同类型遗传性视网膜疾病患者临床表型进行分析。
方法: 收集宁夏眼科医院就诊经外显子测序芯片检测证实携带有 USH2A 基因突变的 6 个家系和 6 例散发患者的临床资料，完善眼部相关检查，包括裸眼视力、最佳矫正视力、眼前段照相、眼底检查、视野检查、电生理检查和听力检查，分析基因型和临床表型
结果：在 6 个常染色体隐性遗传 RP 家系检测到 USH2A 基因 7 个突变位点，6 个为新发突变位点，ARRP01 家系携带一个新的纯和无义突变，患者 10 岁时出现夜盲，病情进展较快，20 岁时已为管状视野，黄斑区明显受累；ARRP02 家系有 3 名患者，携带一个新的纯和错义突变，先证者发病年龄最小且病情进展最快，3 名患者的眼底呈现典型的 RP 改变，ERG 呈现熄灭型改变。在一个近亲结婚视网膜色素变性家系（ARRP03 家系）患者的 USH2A 基因上检测到两个新的纯和错义突变，患者在 12 岁时出现夜盲，14 岁时出现视野缩窄，ERG 呈现熄灭型改变。眼底表现为血管变细、视盘色淡、黄斑中度萎缩但不合并有骨细胞样的色素沉着。ARRP04 家系有近亲结婚家族史，携带一个已知的突变位点，患者 40 岁时出现夜盲，43 岁时视野开始出现缩窄，裂隙灯检查显示双眼有轻度白内障，有近亲结婚家族史。在两个隐性遗传 USHER 综合征家系分别检测到 USH2A 基因的纯

合性错义突变和杂合性错义突变，两个家系的患者均从出生起开始出现中等程度的听力丧失，儿童时期开始出现夜间视力下降，前庭功能正常。眼底表现为典型的 RP 三联征。在 6 例散发 USHER 综合征Ⅱ型患者 USH2A 基因上检测到 6 个复合杂合性突变，其中 1 个新的剪切位点突变，4 个新的移码突变，3 个新的错义突变。患者均有夜盲，自幼出现中等程度的听力损害，前庭功能正常，眼部检查呈现 RP 特征，根据临床表型诊断为 USHER 综合征Ⅱ型。

结论：USH2A 基因突变导致的遗传性视网膜疾病种类丰富，临床表型各异

PO-111

全基因组外显子测序检测一个常染色显性遗传视网膜色素变性家系的致病基因突变

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目的：研究宁夏地区一个五代常染色体显性遗传视网膜色素变性（ADRP）家系患者的致病基因突变及临床表型特征。
方法：收集宁夏眼科医院诊治的一个五代 ADRP 家系的临床资料，共有 27 名家庭成员参与了本研究，其中患者 10 例，正常同胞 17 例。完善相关眼科检查，包括裸眼视力、最佳矫正视力、视野检查及全视野视网膜电流图检查。选取家系两名患者和一名正常成员利用罗氏公司的液相外显子组序列捕获芯片 v2.0 进行全基因组外显子测序检测所有遗传变异，通过生物信息学分析技术同时辅以验证对变异进行筛选和过滤，明确致病基因和突变，并对表型和基因型间的关系进行分析。
结果：通过全基因组外显子测序技术和优化的生物信息学分析技术，证实 PRPF31 基因的 c.C1048T（p.Q350X）终止突变为该家系的致病基因突变。该家系患者的主要临床特征为发病年龄较早（5-6 岁），均以夜盲为首发症状；病情进展较为迅速，就诊时视功能均严重受损，同时合并后囊下白内障，眼底和 ERG 均呈现典型的视网膜色素变性改变。
结论：PRPF31 基因的 c.C1048T（p.Q350X）终止突变为该家系的致病基因突变，该突变在中国人群中首次报道，该突变可引起的临床表型包括发病年龄早、病情进展较为迅速、合并后囊下白内障及视功能严重受损等。

PO-112

宁夏地区视网膜色素变性患者基因突变频谱分析

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目的 分析宁夏地区视网膜色素变性患者的基因突变频谱。**方法** 纳入 2015 年 1 月至 2016 年 12 月在宁夏眼科医院就诊的视网膜色素变性患者，采集家系相关成员病史资料，进行裸眼视力和最佳矫正视力（BCVA）测定、眼底检查、光相干断层扫描（OCT）、荧光素眼底血管造影（FFA）和视觉电生理检查，用 Agilent 液相捕获技术、PCR 和直接测序技术对患者的基因突变位点进行检测和鉴定。**结果** 检测到突变位点视网膜色素变性家系共 37 个，ADRP 家系 8 个，检测到致病基因 6 个，均携带有单一的杂合突变；ARRP 家系 25 个，检测到致病基因 12 个，以 USH2A 基因突变率最高，占 28%（7/25），其次为 EYS 基因和 MYO7A 基因，占 12%（3/25）；XLRP 家系 4 个，均携带有 RPGR 基因纯和突变位点。散发 RP 患者 49 名，共检测到致病基因 25 个，USH2A 基因突变率最高，占 26.5%（13/49），其次为 RP1 基因，占 8.1%（4/49）。**结论** 宁夏地区视网膜色素变性患者以隐性遗传居多，USH2A 基因是宁夏地区视网膜色素变性的主要致病基因。

PO-113

辽宁地区视网膜色素变性致病基因突变的分布和临床表型特征研究

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目的 研究我国辽宁地区视网膜色素变性的致病基因突变的分布和临床表型特征。
方法 采用横断面研究设计，将 2017 年 1 月 2018 年 7 月在沈阳何氏眼科医院确诊的籍贯是辽宁省区域的视网膜色素变性患者共 57 例纳入研究，采集所有受检者外周血 5ml，提取 DNA 后，采用下一代高通量基因测序技术对患者及家系样本进行基因测序，然后经过 Sanger 验证结果，最终确认致病基因及突变位点，并统计分析视网膜色素变性的基因突变等信息。
结果 本研究共收集 57 例视网膜色素变性样本，检测出已知或疑似致病性基因突变病例 36 例，占比 63.15%；检测出临床意义未明基因突变 16 例，占比 28.07%；未检出基因突变 5 例，占比 8.77%。检出病例中，遗传方式为 adRP 的病例 9 例，占比 17.31%；遗传方式为 arRP 的病例 25 例，占比 48.08%；遗传方式为 xlRP 的病例 7 例，占比 13.46%；遗传方式为未知型的病例 11 例，占比 21.15%。本研究检测出的新发基因位点中，共涉及 41 个突变基因和 101 个致病位点突变基因，USH2A（17.82%），RPGR（6.93%）、EYS（5.94%）和 RP1（5.94%）是本研究队列 RP 患者的主要致病基因。其中 USH2A 基因检出 18 个致病位点，占比 18.57%；RPGR 基因检出 7 个致病位点，占比 8.57%；RP1、SLC7A14 和 EYS 基因分别检出 6 个致病位点，占比 5.71%。共发现 15 个未报道的致病基因突变。
结论 我国辽宁地区视网膜色素变性高发突变基因、突变位点和临床表型具有区域特征，NGS 技术有助于发现新发位点突变，并提高视网膜色素变性临床诊治能力。

PO-114

Protection of retinal function and morphology in MNU-induced retinitis pigmentosa rats by ALDH2: an in vivo study

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Aims: Retinitis pigmentosa (RP) is a kind of inherited retinal degenerative diseases characterized by progressive loss of photoreceptors. RP has been a conundrum without satisfactory countermeasures in clinic up to now. Acetaldehyde dehydrogenase 2 (ALDH2) has been demonstrated to be beneficial for a growing body of human diseases. However, its protective effect against RP remains unknown. Our study explored the impact of ALDH2 on the retinal function and structure in N-methyl-N-nitrosourea (MNU) induced RP rats.
Methods: Rats were gavaged with 5 mg/kg Alda1, the ALDH2 activator, 5 days before and 3 days after intraperitoneal injection of 50 mg/kg MNU. Detections of retinal function and morphology with some proteins expression levels were conducted.
Results: Electroretinogram recording showed that ALDH2 alleviated the decrease of amplitudes caused by MNU(Fig. 1). Mitigation of photoreceptor degeneration in MNU-treated retinas was observed by optical coherence tomography and retinal histological examination (Fig. 2, 3). Western blotting results revealed that ALDH2 was upregulated by Adal-1 intervention, with an increased expression of SIRT1 protein. Endoplasmic reticulum stress (ERS) was reduced according to the significant downregulation of GRP78 protein, while apoptosis was ameliorated as showed by an decreased expression of PARP1 protein (Fig. 4).
Conclusions: Our data together demonstrated that ALDH2 prevents photoreceptors from degeneration in MNU induced RP retinas, which is possibly associated to modulation of SIRT1/ERS related apoptosis. Our study reveals the possible target of ALDH2 in photoreceptors apoptosis, which would increase the understanding of ALDH2 contribution as a potential target in new therapeutic approaches for RP.

PO-115

An example of the role of a small in-frame deletion in congenital cataracts: a genetic study in a Chinese family

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Purpose. To identify the genetic factors that contribute to congenital cataracts with esotropia and nystagmus in a Chinese family.
Methods. In a two-generation family (Family 1), all three descendants inherited congenital cataracts with esotropia and nystagmus from the father, while the mother's lens was normal. Whole-exome sequencing (WES) was performed on samples from all five family members. The two brothers of the father in Family 1 and their daughters were then enrolled in the study, and 47 suspected variants were sequenced among the 9 subjects using Sanger sequencing. The mRNA and protein levels of CRYBA1 in the lens epithelium from cataract patients and normal controls were compared using quantitative polymerase chain reaction (qPCR) and Western blot. The wild-type and mutated forms (p.G91del) of CRYBA1 cDNA were transfected into two types of cell lines (human lens epithelial cell line SRA01/04 and embryonic kidney cell line 293T), and the expression level of exogenous CRYBA1 was measured by qPCR and Western blot. The exogenous CRYBA1 proteins were visualized by immunofluorescence staining.
Results. After two rounds of sequencing, the deletion mutation of CRYBA1 (c. 269-271 del, p.G91del) was identified as the mutation responsible for the autosomal dominant congenital cataract with esotropia and nystagmus in the Chinese family. CRYBA1 was expressed less in cataract lenses than in normal controls. The deleted form (c. 269-271 del, p.G91del) of CRYBA1 was expressed less and was more aggregated to the cell membrane than was wild-type CRYBA1.
Conclusions. The in-frame deletional mutation of CRYBA1 (p.G91del) has been identified in six different Chinese, Caucasian and Pakistani families and is assumed to be the causative mutation of cataracts. We performed molecular experiments to confirm that this mutation was able to destabilize the protein, and this study shows that the computationally predicted nonpathogenic variant could be the cause of cataracts.

PO-116

两个视锥-视杆细胞营养不良家系的 AIPL1 基因突变分析

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目的 分析两个视锥-视杆细胞营养不良(CORD)家系患者致病基因变异情况，探索基因突变类型与临床表型之间的联系。 **方法** 对家系成员进行电生理、眼底照相等眼科临床检查，初步诊断为视锥-视杆细胞营养不良。采集患者及直系亲属外周静脉血 3 毫升，提取基因组 DNA。采用全外显子组测序方法筛选家系候选致病基因并进行分析。**结果** 两个家系患者中均检测出新的 *AIPL1* 基因复合性杂

合突变体，家系 1 患者检测出 *AIPL1* 基因错义突变 c.923T>C（p.L308P）和无义突变 c.421C>T（p.Q141X）；家系 2 患者检测出 *AIPL1* 基因错义突变 c.572T>C（p.L191P）和无义突变 c.421C>T（p.Q141X）。 **结论** *AIPL1* 基因新的 p.L308P、p.L191P、p.Q141X 复合杂合突变体尚未见报道，是导致两名视锥-视杆细胞营养不良患者发病的主要诱因；全外显子组测序方法有助于对锥-视杆细胞营养不良进行分子鉴别诊断，并为患者遗传咨询提供依据。

PO-117

Variable reduction of Norrin signaling activity caused by the novel FZD4 mutations identified in patients with familial exudative vitreoretinopathy

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Purpose: To identify novel *FZD4* mutations and to investigate their pathogenicity in a cohort of Chinese patients with familial exudative vitreoretinopathy (FEVR).

Methods: Next-generation sequencing was performed in patients with a clinical diagnosis of FEVR. Wide-field angiography was performed in probands and family members if available. Clinical data were collected from patient charts. The effect of the *FZD4* mutations on its biologic activity in Norrin/*β*- catenin signaling pathway was analyzed by luciferase reporter assay.

Results: Four novel *FZD4* mutations (c.1188_1192del / p.F396fs, c.1220delC / p.A407Vfs*24, c.905G>A / p.C302Y， c.1325T>A / p.V442E) were identified in four unrelated families. The mutations were not detected in 200 normal individuals. The variability of ocular phenotypes was not only observed in the probands and parents harboring the same mutation, but also between two eyes in one individual. All four novel mutations introduced reduction in luciferase activity. Compared with the wild type, the FZD4 level of the four mutants also decreased variably.

Conclusions: Four novel *FZD4* mutations were identified in Chinese patients with FEVR. No correlation in the reduced luciferase activity and ocular phenotype was observed in this study. Our study further emphasized the complexity of the FEVR causing machinery.

PO-118

Decoy Assisted Recognition of Transcript factors' targets (DART) strategy illuminates CTCF guided chromosomal loop in Chr12q21.31 accelerates tumorigenesis of Uveal Melanoma

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The transcriptional regulator CCCTC binding factor (CTCF), serving as a molecular glue to secure intra-chromosomal and inter-chromosomal interactions. However, the role of CTCF guided chromosomal conformation in tumorigenesis remains unclear. Here, we devised a genomic analysis method and name as Decoy Assisted Recognition of Transcript factors' targets (DART) strategy. Here, we identified CTCF bind at promoter region of *Neurotensin* (*NTS*), a tumor-overexpressed oncogene and activate its expression. Furthermore, we revealed the CTCF formed a tumor-specific chromosomal looping between *NTS* promoter and its 800kb-upstream enhancer, thus activate its expression. Decoy-CTCF or deletion of enhancer DNA by CRISPR-Cas9 abolished the intrachromosomic interaction, resulting in silencing of the *NTS* and suppression of the tumor formation in both *in vitro* and *in vivo*. Our data represent a novel strategy in recognizing functional CTCF target gene, thereby provide novel alternative concept of chromosomal conformation exploration.

PO-119

Axenfeld-Rieger 综合征一例

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目的：报道一例 Axenfeld-Rieger 综合征病例并回顾相关文献，为此疾病的诊治提供经验。
方法：李某，33 岁，双眼视力下降半年伴双眼胀痛。曾被诊断为"双眼继发性青光眼"并用降眼压药物治疗，眼压控制不理想。既往体健，否认家族中有类似眼部病史。眼部查体：VD: 0.5，VS: HM/眼前 TR: 14mmHg TL: 38mmHg 右眼角膜透明，后部近角膜缘处可见白色线样后胚胎环，前房常深，虹膜基质萎缩，可见多处裂孔形成，裂孔边缘色素外翻。瞳孔向鼻侧移位，对光反射尚可。视网膜血管走行僵直，C/D 约 0.6，黄斑中心凹反射（±）。左眼：角膜透明，周边可见相似的后胚胎环，部分虹膜贴附角膜内皮，前房常深，虹膜基质萎缩，多处裂孔形成。视网膜血管走行僵直，视盘色苍白，C/D 约 0.9，黄斑中心凹反射（-）。辅助检查：角膜内皮细胞数目和形态正常 UBM：双眼

虹膜部分残缺，虹膜前粘连，Schwalbe 线前移。其余查体：上中切牙缺如。诊断：Axenfeld-Rieger 综合征，左眼继发性青光眼。
结果：行左眼小梁切除术，术后眼压控制良好，滤过泡扁平弥散，切口愈合良好。
结论：Axenfeld-Rieger 综合征是一组发育异常性疾病，为常染色体显性遗传。基因突变的染色体位点主要是 PITX2，FOXC1 及 PAX6 位点。典型特征为 Schwalbe 线增粗和前移（角膜后胚胎环）。其他还包括前房角异常，虹膜基质变薄、萎缩甚至裂孔形成，瞳孔畸形，晶状体异常，视网膜血管异常，视神经萎缩等。眼外体征：牙齿异常，上颌骨发育不良，面部扁平等。诊断上需与虹膜角膜内皮综合征鉴别，后者常为单眼发病，年轻人、成年人多见，女性多于男性，罕见阳性家族史，无全身异常，有角膜内皮异常和继发性角膜水肿。治疗上无继发性青光眼时只需长期随访，出现青光眼者可先行药物治疗，无效者可考虑滤过性手术联合抗代谢药物，晚期患者可采取睫状体冷凝术或经巩膜的睫状体光凝术。

PO-120

PAX6 基因突变导致的先天性白内障伴晚发型角膜营养不良一个家系研究

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目的：本文对一个先天性白内障家系的先证者及家属，进行眼科遗传病相关的 41 个基因的检测，明确致病基因突变，并分析临床表型关系。
方法：收集到一个先天性白内障家系。家系中包括患者及其配偶，患者女儿及 2 名正常同胞，完善家系内所有受试者的眼部检查，抽取外周静脉血，提取基因组 DNA，将 DNA 打断并制备文库，然后通过芯片对目标基因编码区及邻近的剪切区的 DNA 进行捕获和富集，最后用高通量测序平台进行突变检测，从而确定该家系的致病突变。
结果：测序结果显示：在 PAX6 基因有一个新的杂合突变 c.77G＞C，它导致一个高度保守的精氨酸被脯氨酸取代（P.Arg26Pro），可导致无虹膜 1 型（先天性白内障伴角膜营养不良）（AD）。家系分析其患病女儿也携带上述变异，而家系中的正常人未发现此变异。
结论：PAX6 c.77G＞C 杂合突变为该家系的致病突变,是该家系发生先天性白内障及眼球震颤等一系列临床表型的主要致病原因。该变异在东亚人群数据库(ExAC EAS)中未见报道。PAX6 基因主要参与眼的形成和发育，PAX6 错义突变通常引起的先天性无虹膜症状较轻，可出现眼球震颤、白内障、青光眼、晶体脱位、视网膜发育不全、视力下降、嗅觉敏感性降低、前脸和缺损或发育不全、胼胝体发育不全，少部分患者可能出现松果体缺损、嗅觉缺损或多小脑回等症状。

PO-121

Research progress in the gene therapy of retinitis pigmentosa

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Retinitis pigmentosa (RP) is a class of diseases that leads to progressive degeneration of the retina. Experimental approaches to gene therapy for the treatment of inherited retinal dystrophies have advanced in recent years, inclusive of the safe delivery of genes to the human retina. This review is focused on the development of gene therapy for RP using recombinant adenoassociated viral vectors, which show a positive safety record and have so far been successful in several clinical trials for congenital retinal disease. Gene therapy for RP is under development in a variety of animal models, and the results raise expectations of future clinical application. Nonetheless, the translation of such strategies to the bedside requires further understanding of the mutations and mechanisms that cause visual defects, as well as thorough examination of potential adverse effects.

PO-122

Hmox1 表达剂量依赖性在视网膜损伤修复中的作用

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实验目的：基于抗氧化基因 Hox1(血红素氧合酶 1）在组织损伤修复过程中发挥重要作用，本研究采用 AAV8 介导的基因过表达技术，探索研究 Hmox1 表达剂量在视网膜损伤修复中所发挥的作用。

实验方法:首先，采用光诱导视网膜损伤模型，分析在不同程度的视网膜损伤情况下 Hmox1 表达量的变化情况。其次，采用不同剂量 AAV8-HMOX1（0.6×10^{12}U/ml ，2.2×10^{12}U/ml）的腺相关病毒进行眼内注射（1ul），检测 HMOX1 在视网膜中的过表达情况，同时利用 HE 染色、ERG 以及 TUNEL 分析过表达 HMOX1 对视网膜的结构和功能的影响。最后，结合光损伤处理，分析不同剂量的 AAV8-HMOX1 的腺相关病毒在光诱导视网膜损伤中的功能。

实验结果：（1）在光诱导视网膜损伤过程中，Hmox1 基因表达量随着视网膜变性加剧而逐渐升高；（2)不同剂量 AAV8-HMOX1 均能在视网膜中过表达 HMOX1，且高剂量比低剂量过表达程度更高；（3）高剂量 AAV8-HMOX1 在正常环境下引起视网膜变性，并引起 Rhodopsin 蛋白从外节转运至外核层；（4）低剂量 AAV8-HMOX1 在正常环境下未引起小鼠视网膜发生明显的改变，且在光诱导视网膜损伤过程中抑制感光细胞的凋亡。

实验结论：低剂量 Hmox1 在光诱导视网膜损伤过程中抑制感光细胞凋亡，但高剂量 Hmox1 反而引起视网膜变性。研究提示 Hmox1 的表达剂量与基因治疗过程中的视网膜中损伤修复的程度有着密切的关系。

PO-123

Novel mutations of RPGR in Chinese families with X-linked retinitis pigmentosa

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Purpose: To identify genes and mutations in two Chinese families who presented with X-linked retinitis pigmentosa.
Methods: Genomic DNA was extracted from peripheral blood. The coding regions and intron-exon boundaries of the Retinitis Pigmentosa GTPase Regulator (RPGR) and RP2 genes were amplified by PCR and then sequenced directly. Ophthalmic examination was performed to identify affected individuals from two families and to characterize the disease phenotype.
Results: Mutation screening demonstrated two novel nonsense mutation(c.1541C>G;p.S514X and c.2833G>T; p.E945X) in RPGR genes. Genotype-phenotype correlation analysis suggested that patients with mutation close to down-stream of ORF15 in family 2 manifested the early loss of cone function; Family 2 with a nonsense mutation in ORF15 demonstated a semi-dominant pattern of inheritance in their families.
Conclusions: we identified two novel mutations of RPGR genes, which broaden the spectrum of RPGR mutations and the phenotypic spectrum of the disease in Chinese families.

PO-124

通过二代测序技术对两个中国无脉络膜症家系的表型鉴别

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目的 分析二代测序技术用于鉴别无脉络膜症与视网膜色素变性的可行性。**方法** 回顾性研究。从 2017 年 1 月至 2018 年 12 月在沈阳何氏眼科医院就诊的遗传性视网膜疾病患者中，选择经临床医生初步诊断为视网膜色素变性的家系 2 个，完善相关病史资料采集，并进行了目标序列捕获测序，

分析无脉络膜症与视网膜色素变性的临床表型差异及基因型与临床表型之间的关系。**结果** 来自中国东北地区的两个曾被诊断为视网膜色素变性的家系，通过二代测序技术识别了 *CHM* 基因中的两个曾报道过的已知致病突变 EX9DEL 和 c.715C>T，进而辅助明确患者的临床诊断为无脉络膜症，快速有效的鉴别无脉络膜症与视网膜色素变性的临床表型。**结论** 遗传性眼病表型复杂，难以诊断，二代测序技术是鉴别无脉络膜症与视网膜色素变性的有力工具，为有生育需求的家属提供生育指导，为后续基因治疗的应用提供指导。

PO-125

对四个马凡综合征家系进行 FBN1 基因突变筛查并发现一个新的突变位点

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目的： 对四个马凡综合征家系进行纤维蛋白基因-1（*fibrillin-1* gene，*FBNI*）基因突变筛查，探讨该其分子发病机制。

方法： 对四个家系的全部成员进行眼部、骨骼系统及超声心动图检查，根据 2010 年修订版 Ghent 标准判定其全身特征评分，并根据表型绘制家系图谱。在征得患者知情同意下，采集家系成员静脉血 5ml 并提取 DNA。采用双向测序法对 *FBNI* 基因全部 65 个外显子，以及外显子内含子拼接部进行序列分析。采用 Polyphen2 和 SIFT 生物学软件分析 *FBNI* 基因突变对蛋白结构和功能的改变。

结果： 通过基因突变筛查，家系 1（图 1）所有患者均携带 c.4100 G>A（p.1367 C>Y）突变体，而患者家中正常个体及 100 名正常对照无此突变。经 Polyphen2 和 SIFT 程序分析的预测值分别为 1.0 及 0.02，表示此突变将导致 FBNI 蛋白结构和功能的改变。多重序列比对显示第 1367 位编码子编码的 C1367 在进化中高度保守。家系 2 和家系 3 患者分别携带 c.2180 G>A（p.727 C>Y，rs794728186）及 c.2986 T>G（c.2986 T>G，rs140592）错义突变（图 2 及表 1）。而家系 4 未发现存在 *FBNI* 基因致病碱基变异。

结论：*FBN1* 基因 c.4100 G>A（p.1367 C>Y）突变体是导致马凡综合征家系 1 的致病原因，此突变首次在马凡综合征患者中发现。

PO-126

一核性先天性遗传性白内障家系突变基因定位及功能研究

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目的：对一例先天性白内障家系进行相关候选基因定位及功能研究
方法：收集先天性白内障家系一例，明确类型和遗传方式，绘系谱图。抽外周血行二代测序，sanger 测序验证可疑位点。SWISS-MODEL，SIFT 等预测生物信息学。体外 DNA 重组构建 CRYβB2 野生型和突变型质粒并转染进入细胞，qPCR 和 Western Blot 验证质粒是否转染入细胞，激光共聚焦显微镜观察突变型和野生型 CRYβB2 在晶状体上皮细胞中的分布情况。
结果： 该家系表型为核性混浊，遗传方式常染色体显性遗传。DNA 测序家系 I 中存在 CRYβB2 的 c.436G>C 杂合突变，该位点经查阅相关数据库暂未发现相关致病性报道。生物信息学分析会影响蛋白疏水性，造成蛋白结构和功能影响。激光共聚焦拍照发现正常型 CRYβB2 蛋白表达均匀分布整个细胞，而突变型蛋白荧光聚集在人晶状体上皮细胞质，少数在细胞核，且呈现不均匀分布。
结论：本研究在 CRYβB2 基因中发现了新的突变位点，导致 CRYβB2 晶状体蛋白表达分布异常，影响了晶状体透明性，从而引发了白内障的发生，丰富了先天性白内障致病基因位点的信息库，为相关致病基因的功能研究提供理论基础。

PO-127

两个先天性白内障家系的致病基因筛查与功能研究

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目的：本研究的目的是对两个先天性遗传性白内障家系进行疾病相关候选基因定位及功能研究。方法:本实验研究对象取自郑州市眼科医院收集的两个先天性白内障家系，所有家系成员完成详尽临床检查、抽取外周血行基因检测、针对目标突变分析致病机制。结果：两个白内障家系遗传方式均为常染色体显性遗传，家系 1：CRYBA1 基因编码区一条等位基因的 279 位到 281 位碱基缺失（c.279-281delGAG），造成了基因的移码突变，并使得密码子编码蛋白提前终止，这是一个已知突变。家系 2：CRYGS 基因编码区一条等位基因的 244 位碱基由胸腺嘧啶变为胞嘧啶（c.244T>C）,导致了第 82 位氨基酸由丝氨酸变为脯氨酸（p.82S>P），这是一个新发突变。这两个家系的碱基改变在相应家系患者中共分离，不存在于未患病的亲属以及 100 个健康人中。综合 SIFT、PolyPhen-2 和 Taster Mutation 预测分析 c.279-281delGAG、c.244T>C 均为可影响蛋白质结构和功能的有意义突变。结论: 1. CRYBA1 基因的 c.279-281delGAG 是导致家系 1 先天性核性白内障的致病突变。2. 本研究在家系 2 中发现了 CRYGS 基因上一个新的致病突变(c.244T>C)，进一步扩大了常染色体显性先天性白内障相关基因突变谱。研究结果提示 CRYGS(c.244T>C)突变可通过减少 CRYGS 蛋白表达，扰乱细胞骨架结构，诱导细胞早期凋亡等途径，导致先天性核性白内障的发生。

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一个先天性白内障大家系的致病基因筛查和功能研究

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目的：先天性白内障致病基因众多，本研究应用目标区域外显子捕获测序筛查一个先天性白内障大家系的致病基因，分析突变位点的生物信息学特征和致病机制，并对细胞凋亡在其中的致病作用进行了探讨。**方法：**研究对象来自我院眼科中心诊治过的一个先天性白内障家系，对所有入组的患者和家系成员进行详细的病史采集和临床检查，绘制家系图谱，分析遗传学模式。提取入组家系成员的外周血 DNA，构建基因组测序文库，对先天性白内障的相关致病基因的外显子及相邻内含子区域进行目标区域外显子捕获与富集，完成高通量测序和结果分析。对发现的新致病突变，进行致病性预测、疏水性评价和蛋白质同源建模等分析。构建野生型和突变型表达载体，转染真核细胞，观察目的蛋白在细胞内的定位和表达量，检测缝隙连接通道的功能，并使用 CCK-8 检测细胞增殖。H_2O_2 诱导细胞氧化损伤，应用 AnnexinV-FITC/PI 检测细胞凋亡，最后分析 MAPK 通路相关蛋白的改变。**结果：**该家系现存四代成员，其中有 5 位先天性白内障患者，符合常染色体显性遗传先天性白内障的特征，表型为绕核性粉尘状白内障。患者携带 *GJA3*/p.T148I 这一新的白内障致病突变。氨基酸改变预测结果均提示该突变有致病性。突变蛋白 CL 区域的疏水性较野生型有明显升高，突变蛋白 C 端的 α-螺旋结构缺失。*GJA3*/p.T148I 使 Cx46 蛋白在胞内异常聚集，并且可以增加其表达量。突变型蛋白减弱了 Cx46 的缝隙连接半通道功能，加速细胞增殖。氧化损伤可诱导 *GJA3* 基因表达下调，该突变不仅能够诱导细胞凋亡和减弱细胞抵抗氧化损伤的能力，还可诱导 MAPK 通路异常表达。**结论：***GJA3*/p.T148I 是导致该家系发生白内障的致病突变，这一发现不仅扩充了 *GJA3* 基因的突变图谱和发病机制，也进一步证实了缝隙连接通道蛋白功能改变和细胞凋亡参与先天性白内障致病的分子机制。

PO-129

Analysis of ATP7B gene mutations in Wilson disease patients in south China

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object: Wilson disease (WD) is an autosomal recessive disorder of copper transport caused by the mutations in the P-type ATPase gene (*ATP7B*). It is a fatal disease without timely diagnosis and

treatment. Early diagnosis and therapy can result in a good prognosis, especially in pre-symptomatic WD. In ophthalmic examination, K-F ring is a classical symptom. **methods:**Genetic detection now represents the most sensitive and effective diagnostic method for early diagnosis. In this study, we analyze the comprehensive mutations in 32 WD patients from unrelated families using a combination of PCR and sequencing.**results:**26 genetic variations including 17 mutations and 9 SNPs were identified, one of which was novel:c.1757T>A. Three bioinformatics software containing SIFT, PolyPhen-2 and Taster Mutation were used to predict whether the amino acid substitution in *ATP7B* could have an effect on protein function. And the novel mutation:c.1757T>A,was identified as a disease-causing mutation.At the same time, we make a statistical analysis of the experimental data of this study.R778L (14.4%), T935M(6.24%) and P992L (6.24%) were the top three frequent mutations and exon8、12、13 are the most frquent areas which mutations locate in our study.**conclusion:**Our study enriches the mutation spectrum of the *ATP7B* variants and broadens our knowledge about *ATP7B* mutations.

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Axenfeld-Rieger 综合征 1 例

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目的: Axenfeld-Rieger 综合征为中胚层发育不全的常染色体显性遗传病。通常表现为角膜、前房角、虹膜的中胚层发育不全，并可伴发青光眼。通过收治我院的 1 例 AR 综合征患者，观察并探索该病的诊治方法。 方法：患者男性，12 岁，右眼视物模糊 11 年，伴右眼球增大 2 年，偶伴眼痛，畏光，流泪，2 年前发现右眼球增大，突出，视物模糊加重。测眼压：右眼 49mmHg，左眼 15mmHg，当时外院就诊，诊断“左眼虹睫炎”“左眼色素性青光眼”，予激素及降眼压后症状缓解。但反复发生，就诊我院。眼科检查示：1.UBM:右眼无法配合，左眼 3、6、9 点钟位未见巩膜突，虹膜明显变薄、萎缩、裂孔形成，部分前表面与角巩膜内面相贴，房角关闭，部分虹膜根部离断，瞳孔不规则、移位、变性；2.中心视野：左眼可见散在暗点；3.眼部电生理：右眼 F-ERG 暗适应最大反应未记录到 a、b 波成分，左眼 b 波振幅下降。右眼 F-VEP 的 P100 波潜时延长，振幅下降，左眼振幅 p-VEP 的 P100 波潜时延长，振幅正常；4.眼部 B 超示：右眼玻璃体可探及絮状、点状、条状的中低度回声光斑，动度后运动（+）5.双眼彩超：右眼轴约 2.80cm，左眼轴 2.22cm。双眼符合 Rieger 综合症声像改变。结果：初步诊断：1.Axenfeld-Rieger 综合征（双眼）；2.右眼继发性青光眼 ；3.右眼并发性白内障。入院后行“右眼复合式小梁切除术+周边虹膜切除术+前房成形术”。术后双眼彩超：右眼眼球较前缩小，未见脉络膜脱离。患者出院三个月眼压控制良好:OD 12-16mmHg, OS 11-14mmHg。结论：对于 Axenfeld-Rieger 综合征，首要的治疗策略是及时发现和控制并发性青光眼；有效的降低眼压的药物是减少房水生成的药物，如噻吗心安和碳酸酐酶抑制剂，肾上腺素也可能有效，但大多数 A-R 综合征继发青光眼的患者应选择小梁切除术。

PO-131

巨大视网膜母细胞瘤 1 例

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目的：总结临床诊治的 1 例巨大视网膜母细胞瘤患儿，为 RB 的诊治提供经验性指导。方法：患儿男，1 岁 7 个月。双眼瞳仁区发白 1 年 6 个月，眼科查体：右眼前一球形实性肿物突出眼眶，大小约 5.5cm*5.5cm*5.0cm，肿物呈粉白色，表面包膜完整，包膜见大量血管爬行，伴出血。左眼角膜增大呈瓷白色，伴新生血管生长，中央前房窥不见，隐约见周边前房浅，其后黄白色实性肿物，眼底窥视不清。MRI 示右眼：巨大类圆形软组织肿块突出于眶外，边缘尚规则，眶外侧壁可见骨质破坏吸收，眼内结构紊乱伴多发钙化灶；左眼：左眼起自球后壁实性隆起团块回声占据大部玻璃体腔，仅鼻侧周边空余，眼内见多发钙化灶；颅内未见明显占位病灶。结果：诊断：双眼 RB，行“右眼眼眶内容物剜出术”。术后病理回报小蓝圆细胞肿瘤，肿瘤侵犯眼球及周围软组织，伴神经侵犯及脉管内瘤栓形成，视神经断端查见肿瘤浸润。考虑视网膜神经母细胞瘤，低分化型。行免疫组化后补充报告：（右眼眶肿物）结合形态及免疫组化结果，考虑视网膜神经母细胞瘤，低分化型。肿瘤免疫组化结果:SYN(+),NSE(+),CgA(灶区+),CD56(+),AE1/AE3(-),GFAP(-),CD99(-),HMB45(-),VIM(-),LCA(-),KI67(+80%)。术后建议联合化疗，另眼采取放疗或化疗，但患者家属拒绝，遂出院。结论：本例患儿的诊疗过程提示我们：（1）早发现、早诊断、早治疗仍是 RB 临床诊疗的重要内容，提倡多学科协作，RB 基因筛查也应引起重视，特别是对于有家系遗传特征的病例展开筛查；（2）双眼发病的 RB 患儿，除了重视眼部诊疗外，应评估转移风险，结合发病时间、患儿年龄、术前分期及术后病理综合治疗；（3）已经发生全身转移的患儿，应把提高生存率视为首要治疗目标，在此基础上可采用综合疗法，同时注重预后管理，提高生存质量

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人来源 melanopsin 光基因遗传学技术挽救视网膜色素变性 RCS 大鼠视功能及安全性的研究

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目的研究人来源 melanopsin 光基因遗传学技术是否可挽救视网膜色素变性 RCS 大鼠的晚期视功能。
方法

重组人来源 melanopsin 光基因，并利用遗传学技术视网膜下腔转染 RCS 大鼠后 30 天、45 天、60 天行全视网膜电图（FERG）/闪光视觉诱发电位（FVEP）检测及行为学 open field 和标准条栅视动追随视敏度检测实验，研究利用光遗传学技术是否能够挽救 RCS 大鼠变性晚期的视功能。
结果
RCS 大鼠在出生后 60 天 FERG-b 波波形基本呈熄灭性，当利用光遗传学技术在 RCS 大鼠变性中期（生后 40 天）转染人来源 melanopsin 后，可以成功使视网膜内残留神经元细胞表达外源性人来源 melanopsin 光敏感蛋白，并且可以使变性晚期的 RCS 大鼠 FERG-b 波及 FVEP-P1 波幅值出现明显增高，且波形恢复可维持至转染后 60 天，即大鼠天龄 100 天。在 open field 行为学检测中光遗传基因转染组大鼠暗室时间明显增长，条栅视动追随行为学实验中其视敏度也有明显提高。且视网膜下腔转染方法改善效果较玻璃体腔转染更为明显。

结论 RCS 大鼠视网膜下腔转染人来源 melanopsin 光基因可以延缓变性、挽救大鼠的视功能。

PO-133

A novel connexin50 mutant associated with congenital cataract leads to mislocalization of protein to Golgi.

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Objects : To identify the gene mutation responsible for autosomal dominant Y-sutural cataract, combined with punctuate nuclear opacities, in a Chinese family and verify the pathogenic mechanism of the mutation.

Methods: Family history and clinical data were recorded, and we used targeted sequencing technique to identify the gene mutation. The cellular localization and trafficking of wild type and mutant connexins were analyzed by fluorescence microscopy in Hek293T cells.
Results: A heterozygous change C>A at position 660 (c.660C>A) was identified in exon 2 of the GJA8 gene by targeted sequencing, which was also confirmed with Sanger sequencing. The protein of Cx50N220K predominantly located in the perimuclear region and some in the cytoplasm instead of localizing to the plasma membrane. And Cx50-N220K mutant cells showed significantly obvious colocalization with Golgi, trans-Golgi network and ERGIC. Further mutation analysis in the same position showed that the acid-base property in the position relates to the correct transportation of connexin proteins.

Conclusions: We identified a novel heterozygous mutation (p.N220K) in GJA8 related to congenital cataract. The cataract in this family probably resulted from loss of function, and position 220 maybe one of the important spots that influence the right transportation of connexins to the plasma

membrane. The acid-base property in the position matters to the correct transportation of connexin proteins. This represents a possible new mechanism by which mutants may lead to congenital cataracts.

PO-134

Congenital cataract-causing mutation G18D increases γS-crystallin sensitivity to thermal and chemical stress

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Objects: To compare the structure of wild type protein and mutant protein and analyze the underlying mechanism of congenital cataract.
Methods: The coding sequence of human γS-crystallin was obtained from a human lens cDNA library to construct γS-crystallin wild type and G18D mutant pet28a plasmid, and the proteins were isolated and purified. The secondary and tertiary structural characteristics, aggregation features and structural stability against thermal and chemical stress were compared by spectroscopic methods.
Results: The G18D mutant doesn't change the secondary and tertiary structure of the protein. Chemical denaturation revealed that the wild type exhibits the classic two-state transition, however, the G18D mutant had an intermediate state and more sensitive to the thermal and chemical stress. And the G18D mutant protein was more prone to form accumulation in cells.
Conclusions: The G18D mutation destabilizes the stability of γS-crystallin against thermal and chemical stress. The results offers a more detailed insight into the mechanism of congenital cataracts.

PO-135

Genetic and clinical findings in a large cohort of Chinese patients suspected of retinitis pigmentosa

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Purpose: To characterize the genetic landscape of patients suspected of retinitis pigmentosa (RP) in Chinese population.

Methods: A total of 2701 patients and their available family members were recruited. They were screened using multigene panel testing, followed by clinical variant interpretation.
Results: 72.08% of the patients received a molecular diagnosis, and the 17 top genes covered 75.63% of the diagnostic cases. Diagnostic yield was higher among patients in the early-onset subgroup than in the childhood and late-onset subgroup. Genetic testing helped to establish a precise diagnosis and allow more accurate refinement of risk to family members.
Conclusions: Our study provides population-based data of genome landscape for patients suspected of RP in China. Those results expand the existing genotypic spectrum, and serve as an efficient reference both for the design of panel-based genetic diagnostic testing.

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专题发言稿：先天性泪道瘘管转位移植代泪小管治疗遗传性泪点泪小管缺失

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目的：对先天性泪道瘘管合并遗传性上泪点泪小管缺失的患者进行泪道瘘管转位代泪小管手术治疗，观察其实用性、有效性和安全性。
方法：先天性泪道瘘管合并遗传性上泪点泪小管缺失的患者 1 例，行仔细的泪道探查，手术显微镜下在正常上泪点位置仔细探查寻找，未能找到上泪点，做诊断性泪点位置穿刺，未能找到上泪小管，支持先天性泪道瘘管合并先天性上泪点泪小管缺失诊断，患者同时患有左眼慢性泪囊炎、鼻泪管阻塞。全麻下做泪道瘘管转位代泪小管手术治疗，手术中环形切开泪管瘘管口，仔细分离，游离瘘管的近外瘘口一端，长约 5mm，做一皮下隧道把游离出来的瘘管转位到内眦侧上睑缘和泪阜之间形成再造的上泪小管，瘘管口切缘和结膜切缘缝合形成再造的泪点，经再造的泪点内置入一双泪管置入式人工泪管的一端入再造的上泪小管，人工泪管的另一端从下泪小管置入，两端经过泪囊和泪囊鼻腔吻合道入鼻腔。
结果：患者术后恢复顺利，术后 6 个月后取管，流泪流脓症状消失，显微镜下再造的上泪点形成好，探查再造的上泪小管能顺利进入鼻腔，冲洗泪道通畅，经鼻窥镜检查见泪囊鼻腔吻合道通畅，面部外观皮肤切口恢复好，未见特殊并发症。
结论：泪道瘘管转位代泪小管手术治疗的遗传性泪点泪小管缺 1 例患者，实用、安全、有效，当然，有关结论需要扩大样本量加以验证。

PO-137

应用全外显子测序技术诊断一误诊为视网膜色素变性的无脉络膜症家系

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目的：应用全外显子测序技术诊断 1 个曾被误诊为视网膜色素变性的无脉络膜症家系。
方法：对一中国内地视网膜病家系成员进行详细的临床检查，包括视力、裂隙灯、眼底照相、视野、OCT 等，提取 3 位家系成员（2 名患病男性和 1 名携带者女性）外周血基因组 DNA，进行全外显子测序筛查突变基因，Sanger 测序进一步证实本家系的基因突变位点。
结果：根据家系成员夜盲、进行性视力下降及向心性视野缩小、视网膜色素分布等临床特点考虑诊断为视网膜色素变性，但全外显子基因测序未发现视网膜色素变性相关突变基因，反而是发现了一个无脉络膜症相关基因（Choroideremia-associated gene，CHM）的新型突变位点 c.1475_1476insCA。该突变位点经 Sanger 测序进一步证实，并排除了为罕见遗传多态性位点的可能。根据基因测序结果及临床表现，修正该家系诊断为无脉络膜症。进一步的分子遗传学分析提示该新型 CHM 突变位点导致移码突变(p.Leu492PhefsX7)，编码非功能 Rab 蛋白 1（REP-1）。另外，该家系一妊娠期女性成员的测序结果显示她未携带该突变基因，提示可以生下健康的婴儿。
结论：应用全外显子测序技术在一曾误诊为视网膜色素变性的无脉络膜症家系中发现了新的突变位点，提示在罕见的视网膜脉络膜疾病的诊断中遗传学技术发挥重要的价值。

PO-138

全外显子组测序揭示一视网膜色素变性家系 RPGR 基因的新生突变

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目的：应用全外显子组测序技术研究一视网膜色素变性（retinitis pigmentosa, RP）隐性遗传家系的致病基因。
方法：收集一个隐性遗传视网膜色素变性家系。对 6 名参与的家系成员进行资料及病史采集，绘制家系图。进行完善的眼科检查包括视力检查、眼压检查、眼底照相，3D-OCT 检查，ERG 检查。对 6 名家系成员采集外周静脉血，提取全基因组 DNA、全外显子组测序、测序数据分析和筛选、Sanger 测序验证突变与疾病的共分离。
结果：6 名家系成员参与研究，4 例患者均为男性，呈隔代传递，不存在男性至男性的传递。其中 3 例患者（包括先证者）是同母异父的兄弟，其母亲诊断是高度近视无 RP 临床表型，另 1 例患者是这 3 例患者的舅舅。此家系符合 X-连锁隐性遗传的特征。临床检查结果，视力：右眼 0.1，左眼 0.08；眼底检查可见视乳头颜色变淡，视网膜血管变细，周边视网膜可见骨细胞样色素沉着；3DOCT 检查双眼均呈视网膜广泛变薄，脉络膜萎缩；ERG 检查结果：双眼国际标准五项检查均为引出明显稳定波形。余下 3 例患者均为年幼发病，首先出现夜盲，眼底表现均符合典型的视网膜色素变性特征。

先证者母亲双眼高度近视，后极部视网膜可见脉络膜萎缩弧。先证者外显子组测序结果显示在 X 染色体上 *RPGR* 基因上存在 1 个新的纯合移码突变位点 c.374_377delTCTT，p.E125fs。Sanger 测序验证结果：4 例男性患者存在 *RPGR*:c.374_377delTCTT，p.E125fs 纯合移码突变，先证者母亲存在 *RPGR*:c.374_377delTCTT，p.E125fs 杂合移码突变，1 例家系正常人不存在此位点突变。对 119 名散发视网膜色素变性患者和 211 名老年性白内障对照的 Sanger 测序结果均未发现此位点突变。结论：全外显子组测序揭示出 *RPGR* 基因上新生移码突变 c.374_377delTCTT 是该视网膜色素变性家系的致病原因。

PO-139

One novel mutation in SREBF1 causing cornea and glaucoma associated syndrome

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Purpose: We have collected a patient with Cornea disease, congenital glaucoma and periodical hair loss. Other family members including parents and sister are normal. This study aimed to identify the novel gene mutations responsible in this family.
Methods: Patient and the family members were recruited into this study. All the participants underwent a complete ophthalmological assessment. Whole-exome sequencing (WES) was performed. Subsequently, Sanger sequencing was used to confirm whether any of the candidate variants co-segregated with the disease phenotype in the family.
Results: A variant *SREBF1*:exon8:c.C1579T:p.R527C was identified in *SREBF1*. This variant, co-segregate within this family and is predicted to be pathological.
Conclusion: This is the first report about the identification of one novel SREBF1 mutation in cornea and glaucoma associated syndrome.

PO-140

A novel mutation of PanK4 causes autosomal dominant congenital posterior cataract

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Though many mutations have been identified to be associated with the occurrence of congenital cataract, pathogenic loci in some affected families are still unknown. Clinical data and genomic

DNA were collected from a four-generation Chinese family. Candidate mutations were independently verified for cosegregation in the whole pedigree. Linkage analysis showed that the disease-causing mutation was located between 1p36.21 and 1p36.33. Analysis of the wholeexome sequencing data combined with linkage analysis identified a novel pathogenic variant (g.2451906C>T) at intron 4 of Pantothenate kinase 4 (PANK4 protein, PANK4 gene) in 1p36.32|606162. This variant showed complete cosegregation with the phenotype in the pedigree. Themutationwas not detected in 106 normal controls nor in 40 sporadic congenital cataract patients. The mutation was demonstrated to significantly reduce the expression of the PANK4 protein level in the blood of cataract patients than that in normal individuals by ELISA. Pank4−/− mice showed a cataract phenotype with increased numbers of apoptotic lens epithelial cells, fiber cell aggregation, and significant mRNA variation of crystallin family members. Thus, the association of a new entity of an autosomal dominant cataract with mutations in PANK4, which influences cell proliferation, apoptosis of lens epithelial cells, crystallin abnormalities, and fiber cell derangement, subsequently induces cataract.

PO-141

Whole exome sequencing study of 27 families with high myopia

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Purpose: This study aims to identify causal gene variants in 27 families with high myopia by using whole exome sequencing (WES).
Methods: Genomic DNA was selected from 27 Chinese families with high myopia for WES. Gene mutations were filtered to identify potential pathogenic changes, followed by cosegregation analysis to check suspected variants in the family members. The silico prediction programs were employed to assess mutations pathogenicity. Functional prediction and conservation analysis were performed using bioinformatics analysis.
Results: In 27 high myopia families, we identified 6 variants as potential pathogenic candidates. Four missense variants were discovered, including c.904C>T(p.R302C) in CSMD1, c.860G>A(p.R287H) in PARP8, c.G848A(p.G283D) in ADAMTSL1 and c.686A>G(p.H229R) in FNDC3B. One frameshift variant(c.416dupC, p.P139fs) in RP1L1 and one X-linked recessive inheritance variant(c.2430A>C; p.K810N) in RPGR were discovered, respectively**.** All variants were estimated as highly pathogenic and were rare or absent in ExAC and 1000G databases.
Conclusions: WES and bioinformatics analyses were performed to determine gene variants associated with high myopia. The size of this study is much more than any other similar studies based on the authors' knowledge. Our study expands the spectrum of candidate genes associated with high myopia in Chinese population.

PO-142

A haplotype in PDGFB predisposes to polypoidal choroidal vasculopathy in Chinese population

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PURPOSE: To investigate the association of the *platelet derived growth factor subunit B* (*PDGFB*) and *vascular endothelial growth factor A* (*VEGFA*) genes with neovascular age-related macular degeneration (AMD) and polypoidal choroidal vasculopathy (PCV).
METHODS: Three haplotype-tagging single-nucleotide polymorphisms (SNPs) in *PDGFB* and three SNPs in *VEGFA* were analyzed in an independent Chinese cohort, using TaqMan genotyping assays. Association analysis and gene-gene interactions were evaluated.
RESULTS: None of the *PDGFB* and *VEGFA* SNPs had a significant association with neovascular AMD and PCV (P>0.05). However, a haplotype C-G-G, defined by rs9622978, rs5757570 and rs4416326 in *PDGFB*, conferred an increased risk in PCV (P = 0.024, odds ratio = 1.38). In addition, none of the SNP-SNP interaction was identified for neovascular AMD and PCV.
CONCLUSION: In this study, *PDGFB* haplotype containing the three alleles C-G-G in rs9622978, rs5757570 and rs4416326 may increase PCV development. Further replication in other populations should be warranted.

PO-143

crouzon 综合征 1 家系

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对 1 个 crouzon 综合征家系三代共 9 人的临床表现及基因结果进行分析。先证者：患者男性，28 岁。右眼自幼视力低，双眼逐渐视物模糊 6 个月入院。查体：患者呈尖头突眼面容，前后囟已闭合，额部中央向前隆突；上唇短，反颌错颌畸形，下颌前突，腭弓高尖呈倒 8 字形；牙釉质发育不全，牙间隙大，散乱不齐；脊柱侧弯，胸廓畸形；双眼球突出，结膜无充血，角膜透明，前房深浅正常，瞳孔圆，直径约 4mm，直接对光反应迟钝，晶状体及玻璃体未见混浊，视盘颜色淡白，盘周可见黄白色条状强反光，边界清楚，视网膜血管走行大致正常，黄斑组织清楚，中心凹光反射可见。眼球突出度右眼 25cm，左眼 20cm，眶距 104cm。眼眶 CT：右眼内直肌增粗，双眼视神经迂曲，双侧鼻窦腔内见软组织密度影；视野：双眼上方视野缺损，下方光敏度下降；颅脑、眼眶 MRI 示：双侧视神经扭曲，颅脑 DR 示：双侧颅骨脑回压迹增深、增宽。患者母亲：尖头突眼面容，前后囟已闭合，额部中央向前隆突，上唇短，反颌畸形，腭弓高尖呈倒 8 字形，牙齿散乱不齐，脊柱侧弯，胸廓畸形；眼科检查：视力：右眼 0.3，左眼 0.2，不能矫正。眼压（NCT）：右眼 15mmHg 左眼 14mmHg。

双眼眼球突出，上睑下垂，眶距变宽，结膜无充血，角膜清，前房深浅正常，瞳孔圆，直径约 3mm，直接对光反应略迟钝，晶状体及玻璃体未见混浊，视盘颜色淡白，边界清楚，视网膜血管走行大致正常，黄斑组织清楚，中心凹光反射可见。家系图略。基因检测结果家系中 2 名 FGFR2 基因第 10 外显子的 1038 位核苷酸发生 C-to-G 的转换突变，该突变为错义突变，使该位点所编码的氨基酸由半胱氨酸变为色氨酸（C342W）。测序结果显示该位点的突变在先证者和先证者的母亲的 DNA 中为杂合子突变。

PO-144

无巩膜瓣单线法人工晶状体悬吊术治疗 Marfan 综合征的临床研究

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目的:探讨无巩膜瓣单线法后房折叠型人工晶状体悬吊术在 Marfan 综合征晶状体脱位患者中的应用并观察其临床疗效。**方法**:对 18 例（18 眼）Marfan 综合征晶状体脱位 2-4 个象限的患者实施我院改良的无巩膜瓣单线法后房折叠型人工晶状体悬吊术式,记录手术前后的裸眼及最佳矫正视力、眼部专科检查情况并对患者进行 24-48 个月的随访。**结果**: 18 例患者视力均有提高，随访 12-24mo 患者平均裸眼视力为 0.53±0.19，最佳矫正视力为 0.88±0.25，与术前裸眼视力比较，差异有显著统计学意义(P＜0.05)，与术前最佳矫正视力比较，差异无统计学意义(P＞0.05)。随访期间未见人工晶状体移位、脱位及倾斜，无缝线脱落及暴露等严重并发症。**结论**:对于矫正晶状体脱位的 Marfan 综合征患者,无巩膜瓣单线法折叠型人工晶状体悬吊术是一种安全有效的理想选择, 值得临床推广。

PO-145

两个马凡综合征家系的 FBN1 基因突变分析

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目的 对两个马凡综合征家系进行原纤维蛋白基因-1(fibrillin-1 gene, FBN1)基因突变的筛查分析。方法 采集家系中患者外周静脉血 5 毫升及正常个体外周静脉血 2 毫升，提取基因组 DNA。应用二代测序法对 FBN1 基因全部 65 个外显子进行序列分析。使用 PolyPhen-2 和 SIFT 预测 FBN1 蛋白可能的结构和功能变化。 结果 两个家系的患者均表现出眼部和骨骼系统的症状；测序结果显示两家系患者分别携带 FBN1 基因 c.1879C>T(p.R627C), c.2584T>C(p.C862R)杂合错义突变，家系中其

他正常成员均未检出该突变。通过蛋白质同源序列比对分析，发现上述两个突变位点在不同物种的 FBN1 蛋白中高度保守。PolyPhen-2 和 SIFT 预测该突变位点可能导致 FBN1 蛋白的结构和功能受到破坏。 结论 两个家系中的 FBN1 基因突变分别是 c.1879C>T, c.2584T>C，其可能是患者致病的原因；其中 c.2584T>C 基因突变首次在中国马凡综合征患者中报道；我们的结果丰富了 FBN1 基因的突变谱，为家系的遗传咨询和产前诊断提供了依据，为临床工作提供了新的思路。

PO-146

BBS7 基因新突变导致 Bardet-Biedl 综合征 1 例

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目的：本课题目的是研究一例 Bardet-Biedl 综合征家系（图 1）的致病基因突变。
方法：根据先证者（图 2-3）眼部及全身表现明确诊断后，运用新一代测序技术（包含 381 个遗传性视网膜疾病致病基因）对该家系的先证者进行高通量测序，经原始数据处理、生物信息学分析初步确定候选致病基因突变；然后通过 Sanger 测序方法对家系进行共分离验证。
结果：通过高通量区域捕获测序，发现先证者的 BBS7 基因突变 c.728G>A（p.C243Y）和 c.349T>C（p.S117P），这两个突变位点分别位于两等位基因，c.349T>C 基因突变为新突变，该突变位点来源于父亲。BBS7 基因突变位点 c.728G>A 已有报道[1]。
结论：本研究在一例 Bardet-Biedl 综合征家系中找到了的 BBS7 基因新发突变位点 c.349T>C，扩大了该基因的突变图谱。BBS7 基因发生 c.349T>C 突变很可能与 Bardet-Biedl 综合征密切相关。Bardet-Biedl 综合征新突变位点的发现，对该病的临床诊断和未来基因治疗有重要意义。

PO-147

COL2A1 protective variant reduces sporadic rhegmatogenous retinal detachment severity

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Purpose: To investigate the genetic association and clinical correlation of collagen type II alpha 1 (*COL2A1*) variants with sporadic rhegmatogenous retinal detachment (RRD) in southern Chinese population.
Methods: Total 156 RRD patients and 254 control subjects were recruited, and complete ophthalmic examination was conducted. Genetic association of 12 *COL2A1* tag single nucleotide

polymorphisms (SNPs; rs12721428, rs4760608, rs1793937, rs2276454, rs917055, rs2071437, rs1034762, rs2213162, rs3737548, rs1793958, rs1793954 and rs1793931) was determined, and the genotype-phenotype correlation was also evaluated.

Results: The RRD patients had poorer visual acuity (*P*<0.001) and lower intraocular pressure (IOP; *P*<0.001) in their surgical eyes compared to the fellow eyes. Significant smaller IOP differences between the surgical and fellow eyes were observed in RRD patients, but not in control subjects (*P*<0.001). The *COL2A1* rs1793958 variant was significantly associated with RRD in the genotypic (*P* = 0.024), allelic (*P*=0.011, odds ratio (OR)=0.669), recessive (*P*=0.011, OR=0.384) and homozygous models (*P*=0.007, OR=0.348). RRD patients carrying rs1793958 G allele had smaller retinal detachment area (*P*=0.041) and smaller IOP differences (*P*=0.046) between the surgical and fellow eyes compared to those carrying the wildtype AA genotype.

Conclusion: This study revealed that the *COL2A1* rs1793958 variant is associated with reduced risk of sporadic RRD in southern Chinese population, and the patients carrying rs1793958 G allele have lower RRD severity.

PO-148

Longitudinal Evaluation of Inflammation in AAV-mediated Gene Therapy by Optical Coherence Tomography

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Purpose: This study aimed to evaluate the inflammatory responses of adeno-associated virus-2 (AAV-2)-mediated gene transfer in rats longitudinally by optical coherence tomography (OCT) .

Methods: Adult Fischer F344 rats received single intravitreal injection of saline (negative control), AAV-BDNF, AAV-GFP or zymosan (positive control). Retinal thickness and cell infiltration were measured by OCT examination for 2 months, and verified by the histological analysis. In addition, the transduction rate in retinal ganglion cells (RGCs) was evaluated by the RETImap and immunohistochemistry analyses.

Results: The AAV transduction rate in RGCs was 92.84%. An acute response of cell infiltration was observed from Day 1 - 5 after AAV injection in both AAV-GFP and AAV-BDNF groups. The inflammatory response ceased after 1 week and was absent for 2 months. The inflammatory response in the zymosan control group was higher than AAV-GFP and AAV-BDNF groups and ceased later, and there is no inflammatory response in the saline control group. The thicknesses of total and inner retina were increased at Day 1 - 3 after AAV injection, but retreated over time.

Conclusions: This study revealed the longitudinal inflammatory responses after intravitreal injection of AAV2. AAV2-mediated gene therapy should be safe in spite of an acute inflammatory response and retinal edema.

PO-149

Evaluating Correlation Between the Ocular Biometry and Genetic Variants of MYOC and ABCA1 with Primary Angle-Closure Glaucoma in a Cohort from Northern China

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AIM: To investigate the association of single nucleotide polymorphisms (SNPs) in *MYOC* and *ABCA1* with primary angle-closure glaucoma (PACG) and the ocular biometric parameters of anterior chamber depth (ACD) and axial length (AL) in samples from northern China.
METHODS: The present case-control association study consisted of 500 PACG patients and 720 unrelated controls. All individuals were genotyped for eleven SNPs in *MYOC* and *ABCA1* genes (rs12076134, rs183532, rs235875 and rs235913 in *MYOC,* rs2422493, rs2487042, rs2472496, rs2472493, rs2487032, rs2472459 and rs2472519 near *ABCA1*) using an improved multiplex ligation detection reaction (iMLDR) technique. Hardy-Weinberg equilibrium was tested using the χ2 test. The genetic association analyses were performed by PLINK using a logistic regression model, the association testing between genotypes and ocular biometric parameters was performed by SPSS using generalized estimation equation (GEE). Bonferroni corrections for multiple comparisons were implemented and the statistical power was calculated by the Power and Sample Size Calculation.
RESULTS: Two SNPs rs183532 and rs235875 as well as a haplotype TTC in *MYOC* were nominally associated with PACG despite the loss of significance after multiple correction. No association was observed between *ABCA1* and PACG, neither did the association between these variants and the ocular biometric parameters of ACD and AL.
CONCLUSION: The present study suggests *MYOC* and *ABCA1* do not play a part in the pathogenesis of PACG as well as the regulation of ocular biometric parameters of AL and ACD in a northern Chinese population. Further investigations in a larger population are needed to verify this conclusion.

PO-150

Association of Specific Genetic Polymorphisms with Primary Angle Closure Glaucoma and the Ocular Biometric Parameters in a Northern Chinese Population

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Background: To investigate the association of single nucleotide polymorphisms (SNPs) in *ABCC5, COL11A1, PLEKHA7* and *PCMTD1-ST18* with primary angle closure glaucoma (PACG) in a northern Chinese population, as well as the association of these SNPs with the ocular biometric parameters anterior chamber depth (ACD) and axial length (AL).
Methods: 500 PACG patients and 720 controls were recruited, all individuals were genotyped for ten SNPs in four specific genes (rs1401999, rs9838667, rs4912517, rs4148568 and rs1879258 in *ABCC5*， rs3753841, rs1031820 and rs12138977 in *COL11A1*, rs11024102 in *PLEKHA7,* rs1015213 located between *PCMTD1* and *ST18).* Differences in the allelic and genotypic frequencies were evaluated using a logistic regression model. Generalized estimation equation (GEE) analysis was conducted for primary association testing between genotypes and ocular biometric parameters. False discovery rate (FDR) corrections for multiple comparisons were employed and the statistical power was calculated by the Power and Sample Size Calculation.
Results:Significant genetic associations with PACG were identified for rs4148568 in *ABCC5* (p=0.0046), rs3753841 (p=0.007) and rs12138977 (p=0.048) in *COL11A1*. However, only rs4148568 and rs3753841 survived after FDR correction. Three haplotypes were associated with PACG, but only the haplotype GAT in *COL11A1* was still significant after 10000 permutations (p=0.0492). Meanwhile, rs3753841 in *COL11A1* and rs4148568 in *ABCC5* were found to be nominally associated with ACD (p=0.026) and AL (p=0.008) respectively, however, the significance was lost after FDR correction.
Conclusions: Our findings suggest that rs4148568 in *ABCC5* and rs3753841 as well as the haplotype GAT in *COL11A1* are associated with PACG in northern Chinese people.

PO-151

DNA 高甲基化介导抗氧化应激基因低表达导致白内障在高度近视眼中的早发

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目的：探索抗氧化应激基因 DNA 甲基化在高度近视并发性白内障（HMC）发病中的作用机制。
方法：分析 2014 至 2017 年在本院接受白内障手术患者的临床信息。通过检测总抗氧化能力（TAOC）和丙二醛（MDA）比较 HMC 和年龄相关性白内障（ARC）晶状体上皮细胞（LEC）中的氧化应激水平。飞行时间质谱筛选 6 个目标基因启动子区域的 DNA 甲基化水平；qPCR、Western blot、免

疫荧光染色和 ELISA 检测目标基因的 mRNA 蛋白水平；荧光素酶报告实验检测启动子转录激活能力；5-Aza 对 LEC 进行去甲基化处理和 H_2O_2 氧化处理后检测目标基因甲基化和表达水平的改变。**结果：**HMC 患者平均年龄显著低于 ARC（P<0.001），而白内障核分级显著较高（P<0.001）。HMC 的 LEC 较 ARC TAOC 显著下降 MDA 显著升高（P<0.05）。HMC 的 GSTP1 和 TXNRD2 启动子区域 CpG 21-25/31-33 和 CpG 34/36-37 甲基化水平较 ARC 显著升高（P<0.01），并伴随对应蛋白的显著下调（P<0.0001）。过表达或敲减 LEC 中的 GSTP1/ TXNRD2 可显著增加或降低 LEC 的 TAOC。GSTP1 和 TXNRD2 启动子序列去除差异甲基化片段后对基因的转录激活显著降低（P<0.0001）。DNA 甲基转移酶 DNMT1 在 HMC LEC 中呈现显著高 mRNA 和蛋白表达水平（P<0.01，P<0.05）；去甲基化处理后，LEC GSTP1 和 TXNRD2 的表达水平显著增加。氧化处理后，LEC 增殖活性显著下降（P<0.01），GSTP1 和 TXNRD2 呈时间依赖性甲基化水平增加和基因表达下降。**结论：**高度近视眼的晶状体较正常眼处于更高的氧化应激水平，DNMT1 上调介导抗氧化应激基因 DNA 高甲基化和转录活性下调，削弱晶状体抗氧化力，这一恶性循环导致了高度近视的白内障发病更早、更重。

PO-152

中药单体阿魏酸治疗视网膜变性疾病的作用与机制研究

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目的：小胶质细胞是视网膜固有免疫细胞，视网膜变性疾病多伴有神经组织免疫炎症。既往研究表明，中药单体阿魏酸具有抗炎作用。本研究利用视网膜变性疾病动物模型 rd10，探索阿魏酸能否调控小胶质细胞免疫活性状态，改善视网膜免疫炎症微环境，延缓疾病进展，并探索其潜在机制。
方法：rd10 小鼠出生后 P4-P28 给予阿魏酸（25mg/kg,50mg/kg,100mg/kg）灌胃治疗，PBS 灌胃作为病变对照，C57 小鼠为正常对照。在 rd10 病情进展最快的 P21，处死小鼠，获取小鼠视网膜，荧光定量 PCR 检测视网膜炎症因子(CCL2、Tnfα、IL6)表达，免疫荧光染色（iba1/NOS2/Arg1）检测小胶质细胞免疫活性状态，WB 检测小胶质细胞相关转录因子（IRF8）表达情况。在 rd10 病情晚期 P28，HE 染色观察视网膜结构，ERG 检测小鼠视功能。
结果：P21 时 rd10 小鼠视网膜 iba1（小胶质细胞标志物）主要与 iNOS（M1 型小胶质细胞标志物）共染，提示 M1 型小胶质细胞加速病情进展。应用阿魏酸干预后，M1 型小胶质细胞数量明显减少，并且明显抑制了促炎因子 CCL2、Tnfα、IL6 的表达，促进小胶质细胞向 M1 极化的转录因子 IRF8 表达明显下调。P28 时 HE 染色发现 50mg/kg 阿魏酸治疗组视网膜外核层感光细胞数量较 PBS 治疗组明显增多，ERG 检测发现阿魏酸治疗组 rd10 小鼠 a、b 波振幅明显升高。
结论：中药单体阿魏酸能够通过干预 IRF8，抑制小胶质细胞介导的免疫炎症微环境，促进感光细胞存活维持视功能，为视网膜变性疾病综合治疗提供了新策略。

PO-153

中国人 Leber 先天性黑朦及及早发型视网膜色素变性患者基因突变分析

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目的：Leber 先天性黑朦（LCA）及早发型视网膜色素变性（EOSRD）是导致婴幼儿严重视力障碍的遗传性视网膜病变，具有高度临床及遗传异质性。本研究的目的是描述一组中国 LCA/EOSRD 患者的致病基因突变谱及基因突变特征。

方法：对 148 例入组患者（91 例 LCA 和 57 例 EOSRD）进行遗传学研究分析。所有患者接受相应眼科检查。通过多种检测方法对该组患者进行遗传学检测，包括 Sanger 测序、目标区域捕获测序、实时荧光定量 PCR 等。

结果：我们在 110 例患者中检测出 158 种突变，检出率为 74.3%（110/148）。其中涉及 LCA 致病基因 13 个，RP 及 CORD 致病基因 14 个，遗传性视网膜病变（综合征型）致病基 4 个，先天性静止性夜盲致病基因 1 个。本研究中 LCA 患者以 *AIPL1* （11%）, *RPGRIP1* （8.8%）, *CEP290*（7.7%）、*GUCY2D*（7.7%）、*RPE65*（7.7%）基因突变为主，EOSRD 组患者中以 *RPGR*（12.3%）,*CRB1* （11.5%）,*RPE65* （10.5%）基因最常见。其中 *AIPL1* 基因 p.Q141X 突变在两组患者中突变频率最高，等位基因突变频率高达 60%.

结论：分析结果表明 LCA 与 EOSRD 患者具有截然不同的的突变谱，本研究确立了中国患者 LCA 基因突变谱，这对于患者的遗传咨询、临床预后非常重要，并有助于未来的基因治疗。

PO-154

原发性闭角型青光眼的三个易感基因在中国汉族人群中的验证研究：江苏眼病研究

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目的：一项全基因组关联研究（GWAS）发现了原发性闭角型青光眼（PACG）的三个易感位点，他们分别位于 PLEKHA7、COL11A1 和 PCMTD1-ST18 基因。本研究拟验证这三个位点在中国汉族人群与原发性前房角关闭（PAC）及眼球解剖特征的相关性，包括前房深度（ACD)、眼轴长度（AL）和屈光度（DS）。方法：本研究是江苏眼病研究的一部分。本研究的研究对象为江苏省阜宁县流行病学调查中筛查出的 PAC232 例，正常对照 306 例。我们检测了 PAC 和对照的 PLEKHA7 的

rs11024102，COL11A1 的 rs3753841，PCMTD1-ST18 的 rs1015213 的基因型。提取研究对象 DNA 后采用 TaqMan-MGB 荧光探针法进行基因型检测。
结果：结果显示这 3 个位点的基因型分布和等位基因频率在 PAC 组和对照组间无差异，眼球解剖参数在各基因型间也无差异。
结论：虽然 GWAS 证实这三个位点是 PACG 的易感位点，但在我们的研究对象中与 PAC 并不相关。同时，也没有证据说明这三个位点与前房深度、眼轴长度和屈光度有关。

PO-155

家族性渗出性视网膜病变患者的护理

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目的：探讨家族性渗出性视网膜病变的护理对策，减轻患者的心理负担，降低患者在治疗过程中不良情绪的发生率，做好相关疾病的知识宣讲做好遗传疾病的规避问题。
方法：对我院 2017 年 5 月到 2018 年 5 月的家族型渗出性视网膜病变的患者共 10 人。实行常规的护理，症状护理，以及心理护理。
结果：患者及家属在完成治疗后，满意度达 100%的出院。
结论：有效的护理干预能降低家族型渗出性视网膜病变患者的恐惧心理，可以降低家族型渗出性视网膜病变患者治疗过程中消极情绪的产生。详细的健康宣教及遗传疾病知识宣讲能让病人能更清晰的了解疾病。

PO-156

Structural and functional features of X-linked Retinoschisis in a young male: Case Report and Review of the Literature

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Introduction: X-linked Retinoschisis (XLRS) is a kind of macular degeneration, most commons in young males. Clinical diagnosis of XLRS has been easy with the aid of OCT scanning. However, the electrophysiology could be of great help to depict more details about XLRS. The purpose of this report is to describe the structure and function features a case of XLRS.
Case report: A 25-year-old young male presented to our ophthalmology department complaining of decreased visual acuity. Clinical evaluation showed best corrected visual acuity of 0.12 OD, and 0.25 OS. No obvious light refraction from fovea was detected. Cystoid edema in the macula was observed on dilated fundus examination. Spectral-domain optical coherence tomography (SD-

OCT) revealed schitic splitting in the macula and intraretinla cysts in extramacular area. The foveal schisis was more severe in OD. There were some leakage of fluorecein insides macular under FFA. The ISCEV full-field electroretinogram (ERG) revealed no scotopic b-wave in both eyes, with reduced amplitudes in other ERG responses. PVEP detected a reduced amplitude and delayed phase in P100-wave, which was worse in OD.

Conclusions: This report depicts detailed functional feature of XLRS with the ERG and VEP examination, in addition to the morphological changes. Electrophysiology permits detailed analysis of the clinical picture of XLRS, and helps to gain a deeper understanding of its pathogenesis.

PO-157

家族性渗出性玻璃体视网膜病变（FEVR）的 B 型超声检查

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目的 分析 B 型超声检查在家族性渗出性玻璃体视网膜病变(FEVR)诊断中的价值。**方法** 回顾性分析 13 例（26 眼）FEVR 患儿，眼 B 型超声形态学特点，并与其眼底检查结果进行对照分析。**结果** 超声图像正常 5 眼；全视网膜脱离 6 眼；局限视网膜脱离 6 眼，为镰状视网膜脱离，超声扫描呈现连于视盘和周边球壁前的新月形膜样回声；单纯玻璃体增殖条索或视盘颞侧球壁回声增厚 3 眼；单纯玻璃体点状弱回声 6 眼。6 例(46.1%)患者 B 超提示为 FEVR,其余 7 例患者中 3 例诊断为 PHPV，2 例诊断为玻璃体浑浊,2 例诊断为视网膜脱离。所有患者通过综合 B 超、眼底检查和眼底荧光血管造影结果综合评估，最终明确诊断。**结论** B 型超声能初步提示临床 3 期的 FEVR 患者的玻璃体视网膜病变，但对临床 1、2 期患者缺乏特异性提示。临床诊断需与眼底检查和荧光造影结果综合评估。

PO-158

视网膜色素变性患者瞬时瞳孔对光反射与视网膜敏感度及视力的相关性分析

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目的：探讨视网膜色素变性（RP）患者黄斑区视网膜敏感度、固视情况、最佳矫正视力与瞳孔对光反射之间的相关性。

方法：2016 年 1 月至 2017 年 12 月陆军军医大学第一附属医院西南医院眼科诊治的 73 例（137 只眼）视网膜色素变性患者纳入研究。采用 MetroVision Moncolor 视觉监视系统测量患眼在不同强度（10^{-5} cd/m^2，10^{-3} cd/m^2，10^{-1} cd/m^2，1cd/m^2）颜色光（蓝光、白光）下瞳孔瞬时对光反射参数；早期治疗糖尿病视网膜病变研究视力表检测患眼最佳矫正视力（BCVA）；MAIA 微视野计测量黄斑

区视网膜敏感度和固视稳定性。视网膜色素变性患者不同光强阈值下的的视网膜黄斑区敏感度、固视情况、最佳矫正视力的分析采用单因素方差分析；各因素间的相关性分析采用 Spearman 相关分析。

结果：相同颜色光刺激下，RP 患者瞳孔相对收缩幅度、收缩潜伏期和收缩速度随光照增强而显著增加（P＜0.05)；相同光照强度下，蓝光刺激下瞳孔相对收缩幅度和收缩速度均较白光显著（P＜0.05)。RP 患者的瞳孔反射刺激阈值呈现不同程度的提高，且患者相应的黄斑区平均敏感度、最佳矫正视力、固视稳定性分布呈现差异（P＜0.05）。相关性分析中，无论蓝光或白光刺激下，RP 患者的相对瞳孔收缩面积与视网膜黄斑区外周敏感度呈显著正相关，且固视稳定的患者其相关性更显著。

结论：视网膜色素变性患者瞳孔对光反射收缩面积与视网膜黄斑区敏感度相关，且与黄斑外周敏感度相关度相对于中心区更高。而最佳矫正视力与黄斑区中心敏感度显著相关。结合光反射、最佳矫正视力检查可对视网膜色素变性患者黄斑功能进行初步预测和评估。

PO-159

The Research of Association between Single Nucleotide Polymorphisms of the Sirtuin 1(SIRT1) Gene and Age-related Cataract

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Purpose: To investigate whether 5 variants in sirtuin 1 (SIRT1) gene contributed differently in patients with age-related cataract (ARC)in a Chinese Han population.

Methods: We conducted a case–control study in a group of Chinese patients with cataract (n.825) and contrasted the results against a control group (n.517). Five single nucleotide polymorphisms (SNPs) of SIRT1 gene including rs12778366（5'-flanking），rs3740051（5'-flanking），rs4746720（3'UTR），rs2236318（intron）and rs7895833（5'-flanking）were genotyped using improved multiplex ligase detection reaction. The association between targeted SNPs and ARC was then analyzed by codominant, dominant, recessive, and allelic models. Statistical software Haploview 4.2 and STATA12.0 was used to carry out Hardy-Weinberg equilibrium test for genotypes and Chi-square test, respectively. Then, We used logistic regression model to correct age and gender differences

Results:

The genotyping data of five SNPs of SIRT1 did not reveal significant deviations from Hardy–Weinberg equilibrium tests in the ARC group and the control group. We detected no significantly differences of five allele distribution between 2 groups in odominant, dominant, recessive, and allelic models (P<0.05).Haploid analysis also revealed no statistical correlation between haplotype of five SNPs and age-related cataract genetic susceptibility.

Conclusions:
In our study, we detected no association between five SNPs (rs12778366，rs3740051，rs4746720，rs2236318 and rs7895833) of SIRT1 gene and age-related cataract in the Chinese Han population.

PO-160

隐匿性黄斑营养不良的多模式观察

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目的：报告隐匿性黄斑营养不良的频域 OCT、视野、常规和多焦 ERG、自发荧光的检查结果。
方法：本研究共纳入临床诊断明确的隐匿性黄斑营养不良患者 8 例（16 眼），所有患者均接受了主觉验光、眼底照、频域 OCT、视野、常规和多焦 ERG 和自发荧光检查。
结果 ：患眼最佳矫正视力 0.08-0.3（平均 0.2），所有患者眼底检查正常，自发荧光正常，视野：30°视野正常或小中心暗点，10°视野表现为致密中心暗点。频域 OCT 表现为黄斑中心凹感光细胞内外节 IS/OS 层连续性中断，常规 ERG 正常,其中一例患者随诊 3 年后出现视锥细胞反应降低，随诊 7 年后出现视杆细胞反应降低。所有患者 mfERG 表现为内环振幅显著降低或消失。
结论：对于视力缓慢下降患而眼底和常规 ERG 正常的患者，应注意排除隐匿性黄斑营养不良。OCT、10°视野和 mfERG 可以早期发现病变。

PO-161

常染色体隐性 Best 样病 BEST1 基因新突变位点研究分析

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目的：Bestrophin 病是一类由 BEST1 基因突变导致的遗传性视网膜退行性病变，目前已确定至少 5 种临床表型，常染色体隐性 Best 样病（ARB）是其中一种临床亚型。本研究发现一汉族 ARB 大家系中 BEST1 基因新突变位点，并行验证分析。
方法：对一 ARB 患者的近亲结婚大家系成员行眼科临床检查，包括裂隙灯、房角、自发荧光、光学断层扫描、眼底荧光造影等。收集外周血，抽提 DNA，行目标测序、生物信息分析、Sanger 测序验证分析。
结果：在这个近亲结婚的汉族 ARB 大家系中，发现了 BEST1 基因的新突变位点 chr11: 61725867G→A，疾病突变位点位于 7 号内含子区，介于 7-8 外显子区。该位点的纯合子突变导致相似的临床表型，表现为后极部环形的高自发荧光病灶、黄斑囊样水肿及网膜下积液，而单染色体位点突变并未引起 ARB 的眼底改变。

结论：研究发现这 ARB 大家系 BEST1 基因新突发位点，扩大了 ARB 病 BEST1 基因致病谱，为基因治疗提供一定研究基础。

PO-162

Unraveling the genetic cause of Batten disease: expanding the phenotypic variability of CLN3 mutations

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Purpose. Batten disease, also known as juvenile neuronal ceroid-lipofuscinosis (JNCL), is an inherited neurodegenerative disorder. It's clinically characterized by very early onset ages, progressive vision loss, and severe neurological symptoms such as seizures, learning impairment and loss of motor functions. In this study, we aimed to investigate the genetic basis of a Chinese family with Batten disease.

Methods. A 13-year-old girl who suffered from progressive vision loss followed by seizure and her younger brother with only ocular manifestation were involved in this study. Both patients underwent comprehensive ophthalmologic examinations, including best-corrected visual acuity (BCVA), fundus photography and optical coherence tomography (OCT). Genomic DNA of two patients and three unaffected family members was extracted. Then targeted exome sequencing (TES), Sanger sequencing and comprehensive analyses of pathogenicity were performed.

Results. The proband presented loss of external segments of photoreceptors and diffuse retinal pigment epithelium atrophy of the macula. After applying TES, Sanger validation and assessments of pathogenicity, two novel mutations in *CLN3* gene were identified, which segregated with the phenotype in this family. *CLN3* has been proven to be the causative gene of Batten disease.

Conclusion. In this study, we identify two novel mutations in *CLN3* for Batten disease, expanding the mutation spectrum of *CLN3*. Considering the high clinical heterogeneity of inherited retinal diseases, especially syndromic cases, genetic test is playing a vital role in diagnosis, guiding future treatment and prognostic evaluation.

PO-163

全外显子测序检测到一 Leber 先天性黑朦家系 RDH12 基因致病剪切新突变

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目的 探讨一个中国 Leber 先天性黑朦(LCA)家系的致病基因及其变异位点。
方法 对一个 LCA 家系的成员进行病史采集、视力检查、眼底检查及多焦视网膜电图(mfERG)检查。绘制家系图，对家系成员采血，进行 DNA 提取、全外显子测序、对候选基因进行生物信息学分析、Sanger 测序验证和家系共分离分析，并在 300 例健康对照者中进行测序验证。
结果 共纳入该家系成员 6 例，含 1 例患者。患者表现为幼年发病，视力无光感，眼球震颤，眼底检查显示视网膜血管变细，视乳头蜡黄色，弥漫性脉络膜萎缩。mfERG 熄灭表现。家系特点为患者父母近亲婚配，患者兄妹二人，妹妹正常，父母等其他成员均未发病，符合常染色体隐性遗传模式特征。经全外显子组测序、数据分析和 Sanger 测序验证后发现 RDH12 变异性剪切位点 c.188-1G＞A 发生纯合突变,另在 300 例健康对照者中，Sanger 测序没有发现该位点纯合突变。
结论 研究发现了一个新的 Leber 先天性黑朦致病基因突变位点 c.188-1G＞A，扩大了 RDH12 致病基因位点谱，为临床的诊断和治疗提供了新靶点。

PO-164

Clinical characteristics of a KIF21A mutation in a Chinese family with congenital fibrosis of the extraocular muscles type 1

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Purpose: To characterize the clinical ocular phenotype with congenital fibrosis of the extraocular muscles type 1 (CFEOM1) and to confirm whether the kinesin family member 21A (*KIF21A*) mutation was the pathogenic gene in this Chinese family.
Methods: Three affected individuals and two asymptomatic kinsfolk from a Chinese family underwent comprehensive ophthalmic examinations, orbital computerized tomography (CT) and postoperative histological examinations were performed in the proband. All the recruited members were screened for *KIF21A* mutations using polymerase chain reaction (PCR) amplification and direct sequencing of corresponding PCR products.

Results: All patients shared the clinical characteristics including bilateral ophthalmoplegia, blepharoptosis, hypertropic and exotropic position with inability to raise either eye above the midline, and a chin-up head position. Genetic analyses reveal a CTT deletion at nucleotide 4458_4460 in the exon 54 of COL2A1.

Conclusion: The CTT deletion at nucleotide 4458_4460 in the exon 54 of COL2A1 was the causative mutation in this Chinese pedigree with CFEOM1.

PO-165

Clinical Characteristics and Mutation Mapping of a Family with Stickler Syndrome Type 1

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Purpose

1. To analyze the typical clinical characteristics of a STL1 family, and to investigate skeleton features of X-ray in the affected individual.

2. To mapping the virulence gene loci of the family by extract and purify DNA, and amplification DNA by polymerase chain reaction, and then sequence the whole COL2A1 by next generation sequencing. To replenish the genetics and bioinformatics of STL of Chinese people, and to provide reference for the gene therapy of genetic diseases.

Methods

1. We recorded the disease histories of the 9 family members, including 2 affected members and 7 asymptomatic members. Basic examinations were carried out in all family members. The proband underwent comprehensive examinations including exhaustive ophthalmic examinations, audiological tests, limbs and spine X-ray.

2. Vitrectomy retinal detachment prosthesis were operated in the right eye of the proband since he suffered rhegmatogenous retinal detachment.

3. Genomic DNA was extracted from 5ml peripheral blood leukocytes of 9 family members. After constructing genomic libraries, the whole COL2A1 was sequenced by next generation sequencing. Identify the mutation loci of the pedigree and compare the correlation between genotype and phenotype.

Results

1. In the Chinese pedigree, 2 individuals were shared STL characteristics, however, they showed different clinical representation. The proband was noted typical features, including membrane vitreous degeneration, rhegmatogenous retinal detachment, myopia from childhood, congential cataract, hearing loss of high frequency, micrognathia, short stature, secondary osteoarthritis, and lumbar scoliosis. The proband’s mother was noted short stature and arthralgia after movement in her first and second dacades.

2. The postoperative retina of right eye was flat and the retina tear of right eye was sealed after operation. There was no sign reflecting the retinal detachment.
3. Next generation sequence analysis from the affected individuals in the family revealed a CTT deletion at nucleotide 4458-4460 in the exon 54 of COL2A1, wich would result in phenylalanine and leucine deletion at codon 1486-1487. The c.4458_4460delCTT mutation was not present in 7 unaffected family members. The mutation has not been reported.

Conclusions

1. The disease of the family is Stickler syndrome type 1, patients present a high level of genetic heterogeneity. It is the first report of a patient with Stickler syndrome type 1 and bilateral femoral head ischemic necrosis in China.
2. 23G vitrectomy retinal detachment prosthesis is effective to deal with RRD in Stickler syndrome.
3. The family shows autosomal dominant inheritance. The new reported virulence gene loci of the STL1 family was c.4458_4460delCTT in the exon 54.

PO-166

KITLG/KIT 在视网膜变性过程中的神经保护功能研究

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研究目的：感光细胞变性是视网膜变性疾病致盲的主要病因之一，严重危害视觉健康，目前尚难治愈。本研究利用光诱导视网膜损伤模型，分析视网膜的内源性保护机制，进而找出对感光细胞具有神经保护作用的候选分子，为临床治疗感光细胞变性提供潜在的干预靶点。

研究方法：首先，采用小鼠光损伤模型，利用 RNA-Seq 以及基因表达检测技术，筛选感兴趣的候选基因。随后，利用遗传小鼠模型以及 AAV8 过表达技术，结合光损伤处理，通过 ERG、HE 染色以及 TUNEL 等视网膜变性分析，阐明候选基因在光诱导视网膜损伤过程中的功能。最后，采用 RP 小鼠模型，采用 AAV8 过表达技术，分析候选基因在遗传性视网膜色素变性过程中的功能。

实验结果：（1）RNA seq 分析以及多种基因表达检测，发现光损伤上调了 KITLG 的表达，并激活了受体 KIT，但并未改变 KIT 的基因表达。（2）Kit-Wps 突变小鼠对光损伤较 WT 小鼠更敏感，易受光损伤诱导而引起感光细胞变性。（3）AAV8-KITLG 在视网膜中能成功过表达 KITLG，并在 WT 小鼠视网膜中能抑制光损伤诱导的感光细胞变性。（4）AAV8-KITLG 在 rd10 小鼠中能抑制感光细胞变性。

结论：（1）光损伤能激活视网膜中的 KIT 信号通路，且该信号通路发挥内源性神经保护作用。
（2）KITLG 能够抑制遗传性视网膜色素变性小鼠模型中的感光细胞变性。

PO-167

Leber 遗传性视神经视神经病变患者家系和临床特征分析

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目的：探讨 Leber 遗传性视神经病变（LHON）患者外显率及不同时期、不同突变位点患者视网膜神经纤维层（RNFL）、节细胞复合体（GCC）与视网膜全层（ILM-RPE）相关参数变化特征。
方法：回顾性分析已经基因检测确诊的 LHON 患者家系情况并计算外显率；应用 光学相干断层扫描（OCT）测量 82 例 LHON 患者、35 例未发病的突变基因携带者及 62 例健康对照者 RNFL、GCC 及 ILM-RPE 参数变化，并分析与病程、视力等因素的相关性。
结果：通过对 88 个家系，1492 名母系相关人员进行分析，11778 突变位点外显率为 19.84%，14484 突变位点外显率为 20.50%，罕见突变位点外显率为 19.10%， 男性外显率为 27.38%，女性外显率为 11.90%。约 1/3 的 LHON 患者没有明确的家族遗传史。RNFL、GCC 和 ILM-RPE 全层各象限随发病时间延长逐渐变薄（p=0.00）。14484 位点及罕见位点对各层造成的损害轻于 11778 和 3460 位点突变，这也与视力结果相匹配（p＜0.05）。
结论：我们本次研究得出的 LHON 外显率与以往的报道有所不同；LHON 患者 OCT 各层参数具有一定的特征性，需要进一步完善纵向相关研究。

PO-168

OCT 检测 GCC 和 RNFL 在无症状 Leber 遗传性视神经病变基因携带者中的变化

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目的 探讨无症状 leber 遗传性视神经病变突变基因携带者视网膜 GCC 和 RNFL 的变化特点。方法 纳入 2017 年 6 月至 12 月于我院就诊 LHON 患者的未出现 LHON 临床表现的母系亲属 31 人 62 眼，行全线粒体基因检测、视敏度（visual acuity VA）、BCVA 及眼压检查，经 OCT 检测 RNFL、GCC 及黄斑全层厚度变化。结果 无症状 Leber 遗传性视神经病变基因携带者 GCC 层平均厚度为 78.67±13.41μm，RNFL 层平均厚度为 103.77±14.59μm。平均 RNFL、鼻侧 RNFL 及下方 RNFLp＜0.05。三组 GCC 平均厚度与正常值相近，不同突变位点组 GCC 比较均无统计学意义，但其中 44%存在视网膜病理改变的突变基因携带者 GCC 层厚度明显变薄 p＜0.01。结论 无症状 LHON 突变基因携带者虽然没有视功能下降，但约 44%的携带者已出现 GCC 或 RNFL 的病理性改变，主要位于 RNFL 层的颞侧和下方，GCC 全层及黄斑部的中心及内环，无症状 leber 遗传性视神经病变突变基因携带者视网膜神经纤维层随年龄增大而更薄。

PO-169

PITX2 基因移码突变所致一个中国 Axenfeld-Rieger 综合征家系的研究

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目的：对一中国 Axenfeld-Rieger 综合征（ Axenfeld-Rieger Syndrome，ARS）家系进行基因检测，明确其致病基因突变，为产前诊断和 ARS 突变基因致病机制的研究奠定基础。
方法：收集该 ARS 家系成员临床资料并绘制家系图谱，对本家系的先证者和家属进行临床检查，包括全身一般检查及眼科专科检查；经家系成员知情同意后，取外周静脉血 5ml 并提取 DNA；采用 Agilent 液相芯片捕获系统对先证者样本全外显子区域 DNA 高效富集后，HiSeq2500/4000 上高通量测序，在获得的所有染色体可能致病突变位点中，通过 HGMD 数据库和 SIFT、PolyPhen 评分筛选与 ARS 致病最相关的位点，合成特异引物，采用 Sanger 测序法对该家系成员进行突变位点验证。
结果：该 ARS 家系先证者及其父亲均在典型的双眼发育异常（角膜后胚胎环、虹膜异常、虹膜前粘连）、继发性青光眼、上颌骨发育不全、牙列缺失、牙齿缺损或小牙、脐部突出；全外显子测序发现突变为 4 号染色体 111539731 位点（hg19 / GRCh37），HGVS.c=c.525delC，HGVS.p=p.Asp175fs，即 PITX2 基因外显子区间第 525 位发生 C 碱基的缺失，蛋白质水平第 175 位氨基酸开始发生移码突变；Sanger 测序结果验证先证者及其父亲均携带该杂合突变，其他家系成员不携带有该突变。
结论：本研究首次在我国 ARS 家系中发现 PITX2 基因新缺失移码突变 HGVS.c=c.525delC，证实与国外报道的 c.366delC（NM_153427.2）/p.Asp122fs*33（NP_700476.1）突变相一致，本研究结果扩展了我国 PITX2 基因突变频谱，对完善 ARS 综合征遗传特性和致病机制有重要意义。

PO-170

斑状角膜营养不良疾病基因型-表型及相关发病机制研究

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目的 筛查中国 11 个不同的 MCD 家系相关 CHST6 突变基因，并对 MCD 进行组织学检测，分析基因型和临床表型的关系；目前为止关于 MCD 疾病致病机制尚不清楚，因此，本课题拟通过研究分子的改变和可能参与的信号通路，探讨角膜营养不良疾病发生及其发展过程。
方法 采集患者和家系正常人血液，进行 PCR 反应及测序。收集 MCD 病变角膜组织和正常角膜组织，进行组织学、电镜检查，及原代细胞培养，并通过 western-blot 等方法，研究基因突变的角膜基质细胞生物学功能的变化。最后，提取了正常和病变角膜组织总 RNA，进行长链非编码 RNA（lncRNA）二代高通量测序，探讨可能参与的 MCD lncRNA。
结果 本研究中发现了 10 种 CHST6 基因突变，7 种单核苷酸点突变、2 个插入和 1 个缺失突变，其中三处突变为首次发现。组织学染色结果发现 MCD 角膜上皮变薄，上皮下胶原纤维排列紊乱、断

裂，伴有不同着色的淀粉样物质沉积。透射电子显微镜观察可见 MCD 角膜基质细胞和细胞外基质存在大量空泡样改变，一些电子致密颗粒大量聚集在角膜基质细胞质内。体外培养的 MCD 人角膜基质细胞体积增大，生长速度下降。通过流式细胞学检测，MCD 患者角膜基质细胞凋亡百分比增加；同时，Bcl-2 表达下调，而 Bax 表达上调。另外，Chop 蛋白的上调说明内质网应激反应的激活。此外，检测到 MCD 与正常角膜组织之间存在 659 个差异表达 lncRNAs 及可能相关的分子通路。
结论 我们确定了 MCD 相关 CHST6 基因的 10 种突变类型，角膜组织和角膜基质细胞组织学和电镜下的改变与 GlcNAc6ST 功能异常导致的 KS 糖蛋白沉积有直接关系。而且我们提出了细胞凋亡参与 CHST6 突变相关 MCD 疾病的发生发展，ER 应激也很可能参与了这一过程。此外，我们还发现并验证了一组在角膜营养不良组织中差异表达的 lncRNAs，为诊断和探索潜在的治疗靶点提供了有效的信息。

PO-171

GJA3 基因单核苷酸多态性与白内障风险的相关性

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缝隙连接蛋白 α3（ Gap junction protein alpha3, GJA3）是先天性白内障的风险基因，在众多家系研究中被证实具有显著性。然而，目前并没有研究报道其与年龄相关性白内障发病风险的相关性。本研究旨在 500 名年龄相关性白内障患者及 500 名正常对照组成的白内障队列中探索 GJA3 标签单核苷酸多态性与年龄相关性白内障及其不同亚型发病风险的相关性。本研究共纳入 4 个单核苷酸多态性位点（rs6490519, rs9506430, rs9509053 以及 rs9552089），统计结果表明均与总体年龄性相关性白内障的发病风险没有显著相关性。在亚型分析中，rs9506430 对年龄相关性白内障表现出了显著的保护作用 (p=0.002, OR:0.227, CI:0.088-0.590)。这一结果尚需在大规模年龄相关性白内障队列中进一步验证。

PO-172

GJA8 基因与斑马鱼晶状体发育的相关研究

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目的：白内障作为全球首要致盲眼病，防治工作任重道远。目前白内障发病机制尚未完全明确，课题组在多个白内障家系中发现 GJA8 基因突变与白内障发生有关，GJA8 基因突变导致的缝隙连接通道功能的失调是晶状体混浊发生发展的潜在机制，但部分引发白内障的突变并未引起缝隙连接通道的异常，说明 CX50 除了参与缝隙连接通道的作用，还有其他未发现的细胞内作用。本研究采用 GJA8 基因敲除斑马鱼作为动物模型，以探究 GJA8 基因在晶状体发育及白内障形成过程中的重要作用。

方法：采用 CRISPR/cas9 技术敲除斑马鱼 GJA8 基因，光镜及免疫荧光共聚焦显微镜下观测晶状体表型。
结果：在 GJA8 基因 1 号外显子处进行敲除，得到 GJA8 基因敲除纯合子，并通过测序及酶切验证；在 5 天的 GJA8 基因敲除斑马鱼晶状体中发现了明显的白内障样表型及小晶状体（直径减小）；通过免疫荧光检测发现其中央出现了未降解的细胞核及细胞器，提示白内障表型与这些表型相关。
结论：GJA8 基因缺失引起斑马鱼晶状体出现白内障表型及小晶状体表型，说明 GJA8 对晶状体的发育有重要作用；同时，晶状体内细胞器及细胞核的正常降解主要通过自噬及蛋白水解酶，结果说明中央区域未降解的细胞核和细胞器与细胞内的自噬或蛋白水解异常有关，有待进一步验证。

PO-173

KPNA4 基因敲除动物模型导致白内障的相关研究

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目的: 目前，白内障仍然为全球首要致盲眼病，关于白内障的治疗手段主要是手术摘除及人工晶体植入，但该方式存在一定的并发症及覆盖范围的局限性，而白内障的病因研究显得尤为重要。我们课题组在前期白内障相关 SNP（单核苷酸多态性）分析中首次发现，KPNA4 基因与白内障的发生发展存在密切联系，该基因编码 importin a3 蛋白，参与细胞核内物质运输，与细胞凋亡、衰老密切相关。我们猜测该基因可能为研究白内障病因提供新线索。
方法: 我们选择斑马鱼作为动物模型，采用 crispr/cas9 技术敲除野生型斑马鱼 KPNA4 基因，并获得其 F3 代纯合子。同时，采用光学显微镜及激光共聚焦显微镜观察纯合子晶状体性状。
结果: 在 KPNA4 敲除斑马鱼纯合子中，发育早期，即受精卵发育 3 天后，发现晶状体中心区域出现白内障性状；通过免疫组化检测该纯合子斑马鱼晶状体内 P53 蛋白表达，发现在晶状体中央区域出现 P53 蛋白异常聚集。
结论: 首次构建 KPNA4 基因敲除动物模型，发现敲除纯合子早期出现白内障表型，首次验证 KPNA4 基因与白内障之间的相关性；在免疫组化结果中发现，P53 蛋白表达异常，提示 KPNA4 基因敲除引起白内障性状可能因其对细胞凋亡等正常生理功能的影响，并有待进一步验证。

PO-174

Wolfram 综合征一例

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目的：介绍一例 Wolfram 综合征病例，加深疾病认识，掌握诊断要点。
方法：报告一例 Wolfram 综合征病例，结合文献分析讨论。
结果：患者青少年男性，13 岁。双眼无明显诱因视力下降 2 年。听力逐渐下降 3 月，间断嗡嗡样耳鸣 1 年。Ⅰ型糖尿病 1 年。当地诊断为“双眼视神经萎缩，Leber 遗传性视神经病变待排”，建议基因

检测，患者拒绝，口服营养神经药物保守治疗。为行进一步诊疗来我科。眼科检查：视力：右眼 0.25（矫正 0.4），左眼 0.12（矫正 0.4）。眼压：右眼 10 mmHg，左眼 13mmHg。双眼前节未见明显异常。双眼底视盘界清，色淡白，C/D 约 0.4，血管走形可，余未见明显异常。视野提示双眼与生理盲点相连的弓形视野缺损。视盘 OCT：双眼神经纤维层变薄。视觉电生理（FVEP）示 P2 波峰时值均延迟，左眼波幅相对右眼降低。入院诊断：双眼视神经萎缩（原因待查）。耳鼻喉科会诊诊断“感音神经性耳聋（双侧）”。监测 24h 出入量：入 9800ml，出 13000ml。患者一姐视力差（具体不详），Ⅰ型糖尿病，已去世；异卵双生一兄体健；父母体健。初步诊断：双眼视神经萎缩；Wolfram 综合征；Ⅰ型糖尿病。建议患者及家属行基因检测，结果待回报。予以门冬胰岛素控制血糖，输注保护神经药物。**结论：**Wolfram 综合征又名 DIDMOAD[diabetes insipidus (尿崩症)，diabetes mellitus (糖尿病)，optic atrophy (视神经萎缩)，deafness(耳聋)]，属常染色体隐性遗传性神经变性疾病，多在 20 岁前发病。诊断以临床表现为主，4 种表现均出现为完全型，不全者为不完全型。少年型糖尿病出现不能用糖尿病解释的视力障碍时应做相应检查并诊断。本病属遗传性疾病，主要应用胰岛素治疗糖尿病，余对症处理。Wolfram 综合征临床少见，眼部症状以视神经萎缩为表现，注意与 Leber 鉴别。

PO-175

浅谈眼科遗传疾病临床资料采集工作

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目的 为了给临床遗传性眼病患者提供简单的咨询，给临床遗传性眼病提供诊疗相关的分析依据和遗传性眼病研究提供临床数据支持
方法 根据患者的教育文化背景，遵循隐私保密原则和知情同意原则，平等与循序渐进地进行。 首先，我们将从患者以下方面进行收集：个人基本信息，个人生活习惯，个人特殊癖好或特殊工种，病史，体征，家族史，家系图和血液样本；并将资料录入电子档，纸质打印后按照约定序列号再装订成册归档；血液样本以实验方法采集保存。其次，利用生活实例等通俗易懂的 方式使患者对遗传性眼病和遗传性眼病的传播有了初步的了解后，再根据患者需求安排进一步眼科一般检查和影像检查等或者基因检测。最后，临床眼科医师利用临床眼科检查结果与基因检测比对结果对疾病做出诊治判断，采取相应专科治疗和用药的同时给予心理护理。
结果 至今我科已收集数千例不同遗传性眼病患者资料，并以产出多篇文章同时为患者诊治提供了可循依据
结论 通过对临床遗传性眼病患者资料的收集，在此过程中更进一步的了解到大家对遗传性眼病认知的严重缺乏，需要更多的眼科同仁引起关注做好宣传，让更多的人更早的了解遗传性眼病的发生发展，并且早知道早预防早阻断早治疗。

PO-176

中国西南地区汉族高度近视并发视网膜脱离家系全外显子测序分析

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目的:视网膜脱离是高度近视的重要并发症，给患者带来严重的视力损害，成为眼科常见的致盲眼病之一。至今，高度近视并发视网膜脱离的发病机制并未完全阐明，大量临床调查和研究的数据显示：高度近视有家族遗传倾向性，但由于地域分布等因素的差异，高度近视具有显著的遗传异质性，本研究拟通过一例中国西南地区高度近视并发视网膜脱离家系的全外显子分析，进行候选基因的突变筛查，以期发现新的高度近视并发视网膜脱离的新致病基因，从基因遗传学水平进一步阐明高度近视并发视网膜脱离的分子机制。
方法:本研究通过临床筛查获得一例高度近视并发视网膜脱离家系，在获得患者及家属同意并完成医院医学伦理审批的前提下，抽取先证者及家属外周血进行 DNA 提取，所获得的 DNA 经全外显子测序后，进行遗传学分析及数据库比对。
结果:遗传家系分析结果显示，该家系涉及常染色体显性遗传基因 2 个（ASB10、VCAN），涉及常染色体隐性遗传基因 30 个（MAGEL2、JAG1、CREBBP 等），所有突变均未杂合突变，生物信息学蛋白功能预测软件 SIFT、PolyPhen_2、REVEL 预测结果显示：良性突变占比 42.5%，有害突变比例 57.5%。
结论: 本研究通过全外显子分析证实 ASB10、VCAN、MAGEL2 等基因在中国西南地区高度近视并发视网膜脱离家系的遗传方式，为阐明高度近视并发视网膜脱离提供了新的致病基因，进一步丰富了高度近视并发视网膜脱离的分子遗传机制。

PO-177

Mutational Screening in a Cohort of 103 Nonsyndromic High Myopia Patients

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Purpose: High myopia (HM) is one of the leading causes of irreversible vision loss, characterized by a spherical equivalent refractive error of at least -6 diopters (D) and/or an ocular axial length no less than 26 mm. With a rapidly increasing global prevalence, it has become the major cause of acquired blindness in the world. Variants in several genes have been detected in a portion of HM cases, while a large number of HM patients still haven’t been deciphered in genetics. In the present

study, we aimed to investigate the underlying genetic contributions of five causative genes (*ZNF644*, *SCO2*, *SLC39A5*, *P4HA2*, *BSG)* and two potential causal genes (*AGRN* and *FBN1)* in 103 Chinese sporadic patients with nonsyndromic high myopia.

Methods: Genomic DNA samples from 103 Chinese sporadic patients with nonsyndromic high myopia were collected. All participants received comprehensive ophthalmic examination. Sanger sequencing was utilized to identify mutations in *ZNF644, SCO2, SLC39A5, P4HA2, BSG, AGRN* and *FBN1.* Bioinformatics analysis were subsequently applied for mutation verification.

Results: After a string of database and bioinformatics analysis filtering, a total of nine heterozygous variants potentially affecting the protein function were detected in eight patients, including c.1350delC, p.V451Cfs*76, c.1023_1024insA, p.P342Tfs*41 and c.325G>T, p.G109W in *SLC39A5*, c.244_246delAAG, p.K82del in *SCO2*, c.545A>G, p.Y182C in *P4HA2*, c.415C>T, p.P139S in *BSG*, c.3266A>G, p.Y1089C in *ZNF644*, c.2627A>T, p.K876M in *AGRN* and c.8176C>T, p.R2726W in *FBN1*. All variants were predicted to be highly deleterious and were absent in 200 control subjects free of ocular problems.

Conclusions: In this study, 8 cases were identified with mutations, including one *SLC39A5* biallelic compound mutation, one *SLC39A5* monoallelic mutation, one *ZNF644* heterozygous mutation, one *SCO2* heterozygous mutation, one *P4HA2* heterozygous mutation, one *BSG* heterozygous mutation, one *AGRN* heterozygous mutation and one *FBN1* heterozygous mutation. We enlarged the genetic spectrum of nonsyndromic high myopia and provided more information to support to the genes which probably involved in the pathogenesis of high myopia.

PO-178

一例蓝色锥体全色盲患者合并有 OPN1LW 和 NR2R3 基因新突变位点

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目的：明确一例合并有 NR2E3 和 OPN1LW 基因新突变位点的患者的诊断，并描述其临床特点。
方法：一名 47 岁男性，视力下降 8 年，夜间视力差。根据其临床表型，我们重点研究了与这些特征相关的 36 个基因。通过二代测序筛选出可能的致病突变位点，发现 NR2E3 和 OPN1LW 基因有新的突变位点。通过 Sanger 测序对患者的姐姐和女儿进行了相应突变位点的验证。为了明确诊断，对患者的临床症状进行观察和分析，并结合综合眼科检查。
结果：基因测序结果表明，该患者存在两个基因的复合杂合突变。在 NR2E3 基因中存在一种新的杂合突变(c.361G>A；p.E121K)。已有研究证明 NR2E3 基因突变与 S 锥体增强综合征(ESCs；oMIM#268100)的发病相关。并发现在 OPN1LW 基因中存在一种新的杂合突变（c.244A>G；p.K82E），该基因与蓝色锥体全色盲(BCM；OMIM#303700)的发病相关。由于该患者视网膜电图的检查结果不符合典型的 S 锥体增强综合征的特征性表现，排除此诊断。进一步根据临床表现和综合眼科检查，该患者诊断为蓝色锥体全色盲。

结论：OPN1LW 基因 c244A>G；p.K82E 位点和 NR2E3 基因 c.361G>A；p.E121K 位点的新突变均可导致蓝色锥体全色盲的发病，而 OPN1LW 基因突变是该患者的主要致病基因。这些基因新突变位点的发现可能有助于未来对于蓝色锥体全色盲的遗传诊断和治疗。

PO-179

飞秒激光辅助下先天性无虹膜伴眼球震颤患者的白内障手术

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背景：先天性无虹膜患者大多伴有视力低下和眼球震颤。在进行此类患者的白内障手术时，一旦患者晶体囊袋破裂，人工晶体无法固定在晶体囊袋内，且由于术后晶体虹膜屏障消失，容易形成前房玻璃体疝。
目的：通过角膜负压环固定患者眼球，飞秒激光精准撕囊、劈核，降低人为因素和超声设备因素导致的晶状体囊袋破裂的风险。
方法：选取 2 例（4 眼）先天性无虹膜并眼球震颤患者，单眼视力分别在 HM/50cm 至 0.04 之间，红绿色觉正常，角膜散光为 100 度之内规则散光，年龄在 40 岁至 55 岁之间。常规消毒术眼，局部麻醉，使用飞秒激光物镜负压环固定眼位。设定角膜主切口、副切口及角膜松解切口的位置等参数。根据囊膜位置和植入晶体光学面大小确定撕囊大小和深度。由于缺少虹膜的屏障功能，术中撕囊过大将引起劈核后的晶体前移，导致前房消失。劈核深度不宜超过晶体前后径的 3/4，以确保囊膜结构完整。完成飞秒激光的角膜松解、主副切口、撕囊、劈核后，进行常规的 phaco 及 IOL 植入术。
结果：4 眼中术后第一天视力恢复至 0.02 至 0.1 者 1 眼，0.1 至 0.3 者 3 眼，0.3 及以上者 0 眼。术后一周视力恢复至 0.02 至 0.1 者 1 眼，0.1 至 0.3 者 3 眼，0.3 及以上者 0 眼。术后 3 月视力恢复至 0.02 至 0.1 者 0 眼，0.1 至 0.3 者 2 眼，0.3 及以上者 2 眼。
结论：通过角膜负压环固定患者眼球，飞秒激光精准撕囊、劈核，降低了人为因素和超声设备因素导致的晶状体囊袋破裂的风险。飞秒激光进行角膜松解治疗可以一定程度去除角膜散光对视力恢复的影响。

PO-180

中国人群中 BEST1 基因突变类型的分布

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目的：Best 卵黄样黄斑营养不良（Best Vitelliform Macular Dystrophy， BVMD），是一种先天性黄斑营养不良类疾病，多以常染色体显性遗传，也有散发及常染色体隐性遗传。1998 年起，BEST1 被确定为 BVMD 的致病基因，迄今已有 200 余种突变形式被报道。BEST1 基因突变引起的眼底疾病

有五种，包括 Best 卵黄样黄斑营养不良、常染色体隐性遗传 Best 病（Autosomal Recessive Bestrophinopathy， ARB），成年人型卵黄样黄斑营养不良不良（Adult-onset Vitelliform Macular Dystrophy， AVMD），常染色体显性遗传的玻璃体视网膜脉络膜病（Autosomal Dominant Vitroretinochoroidopathy，ADVIRC）及视网膜色素变性（Retinitis Pigmentosa，RP）。关于 BEST1 突变类型的统计主要集中于欧洲人群中，本文旨在中国人群中 BEST1 基因突变类型的分布，以及分析突变类型与表型之间的潜在联系。
方法：文献回顾，描述性统计。
结果：共纳入 16 篇研究，共 82 个家系。中国人群中 BEST1 突变相关的眼底疾病最常见的是 BVMD 和 ARB，未见其他表型的报道。其中最常见的基因突变类型为 p.R255W（14.2%）、p.A195V（8.4%）及 p.R218C（7%）。其中 p.R218C 是中国人群中 BVMD 最常见的致病突变位点，p.R255W 是中国人群中 ARB 最常见的致病突变位点，p.A195V 是中国人群中 ARB 第二常见的致病突变位点。
结论：中国人群中 BEST1 基因突变类型的分布与白种人有明显差异，其中 p.R255W、p.A195V 及 p.R218C 是最常见的三个突变位点。

PO-181

Identification of Gene mutations in 10 congenital cataract and microcornea families Using Whole Exome Sequencing

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Purpose: This study aims to reveal the pathogenic mutations in ten congenital cataract and microcornea families.
Methods Ten unrelated families with congenital cataract and microcornea were recruited. All of them are sporadic families. The genomic DNA was extracted from peripheral blood , whole exome sequencing(WES) was performed to identify the genetic cause of congenital cataract and microcornea.
Results Using whole exon sequencing (WES), 6 mutations were identified in four genes,GJA8(c.595C>T, p.P199S; c.839C>T, p.P280L; c.133TC, p.W45R), NHS(c.3590dupA, p.E1197fs; c.472C>T, p.Q158X);CRYGC(c.470G>A, p.W157X).
Conclusion: Our study identified three novel mutations and three reported mutations in ten Chinese families, broadened the Mutation Spectrum and Genotype–Phenotype Correlations with congenital cataract and microcornea.

PO-182

Whole exome sequencing in 24 Chinese congenital cataract families：a new sigth of Connexin Genes.

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Purpose: Our study aimed to investigate the genetic defects of Chinese patients with congenital cataract through mutational analyses of 24 pedigrees.
Methods: Peripheral blood and clinical data were collected from 24 pedigrees with congenital cataract. Whole-exome sequencing (WES) was performed to identify the genetic cause of congenital cataract. The clinical relevance of the identified mutations was assessed following the standards and guidelines of American College of Medical Genetics and Genomics (ACMG) and Association for Molecular Pathology (AMP). *In silico* analysis was used to predicted the mutations' pathogenicity and crystal structure modeling was used to demonstrate the mutations' affection on protein structure. Then co-segregation testing was used to verify suspected variants in the family members.
Results: Ten probands (10/24, 41.7%) were confirmed to have mutations in the known genes, three of them have been reported and seven are novel mutations. Among them, three mutations located in *GJA3*, three located in GJA8, both belong to the connexin genes, which accounted for the largest proportion of25% (6/24)，three mutations located in NHS, accounted for 12.5% (3/24,) , the rest mutations located in CRYGC proportion of 4.17% (1/24). All the novel changes were predicted to be pathogenic by *in silico* analysis.
Conclusions: Whole-exome sequencing (WES) was performed to identify the genetic cause of congenital cataract in 24 pedigrees. We identified pathogenic variants in 41.7 % of cases, and over 70% of these were novel. These results expand the mutation spectrum and frequency of genes responsible for congenital cataracts. Also we provided an important reference for the follow-up genetic screening work and a reliable basis for genetic counseling. Meanwhile, it also laid a certain foundation for the development of gene therapy basis.

PO-183

RDH5 基因 rs3138144 位点 G/C 变异对启动子活性的影响

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目的：探讨近视相关基因 *RDH5* 内含子区单核苷酸多态性（single nucleotide polymorphism，SNP）位点 rs3138144（G>C）对其启动子功能的影响。
方法：在 *RDH5* 基因中从 ATG 往前扩增 1.5kb 的 5'端上游调控区域作为拟研究的启动子片段，以包含 SNP 位点的 220bp 的区段作为研究的内含子片段一并与萤火虫荧光素酶报告基因载体 pGL3-Basic 进行重组质粒的克隆与鉴定，构建 pGL3-RDH5-G（野生型）及 pGL3-RDH5-C（突变型）荧

光素酶报告基因载体。与内参质粒 pRL-TK 共转染 ARPE-19 及 HEK293 细胞，通过双荧光素酶报告基因系统检测荧光素酶活性。
结果：在两种细胞中，pGL3-RDH5-G 和 pGL3-RDH5-C 重组质粒较 pGL3-Basic 荧光素酶活性明显增高（F＝84.559，P＜0.001）；pGL3-RDH5-G 较 pGL3-RDH5-C 重组质粒荧光素酶活性较高，差异有统计学意义（P<0.01）。
结论：RDH5 基因内含子区 SNPrs3138144 位点（G>C）影响 *RDH5* 基因启动子转录活性。

PO-184

Genome-wide DNA methylation profiles differences between sporadic congenital cataract patients and control group as measured by bisulfite sequencing

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Congenital cataract is a major cause of childhood visual impairment and preventable blindness in the world. However, its pathogenesis remains largely unknown. Although genetic studies have found many mutations associated with familial hereditary congenital cataracts, environmental factors such as drug use or viral infection during pregnancy can still affect the morbidity of sporadic congenital cataracts. This is likely to be associated with changes in epigenetics. Therefore, we investigated the possible relationship between genome-wide DNA methylation and the incidence of sporadic congenital cataract. We did genome-wide DNA methylation analysis on blood from sporadic binocular congenital cataract patients, sporadic monocular congenital cataract patients and control group. We found some differentially methylated regions between different groups may be related to sporadic congenital cataract. These differentially methylated regions may be one of the causes of sporadic congenital cataracts.

PO-185

Bringing the age-related macular degeneration high-risk allele age-related maculopathy susceptibility 2 into focus with stem cell technology

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Abstract
Age-related macular degeneration (AMD) is a major cause of blindness in older adults in developed countries. It is a multifactorial disease triggered by both environmental and genetic factors. High-temperature requirement A serine peptidase 1 (HTRA1) and age-related maculopathy susceptibility 2 (ARMS2) are two genes that are strongly associated with AMD. Because ARMS2 is an evolutionarily recent primate-specific gene and because the ARMS2/HTRA1 genes are positioned at a locus on chromosome 10q26 in a region with strong linkage disequilibrium, it is difficult to distinguish the functions of the individual genes. Therefore, it is necessary to bring these genes into focus. Patient-specific induced pluripotent stem cell (iPSC)-derived retinal pigment epithelium (RPE) provides direct access to a patient's genetics and allows for the possibility of identifying the initiating events of RPE-associated degenerative diseases. In this paper, a review of recent epidemiological studies of AMD is offered. An argument for a definite correlation between the ARMS2 gene and AMD is presented. A summary of the use of ARMS2 genotyping for medical treatment is provided. Several ARMS2-related genetic models based on such stem cells as iPSCs are introduced. The possibility of applying gene-editing techniques and stem-cell techniques to better explore the mechanisms of the ARMS2 high-risk allele, which will lead to important guidance for treatment, is also discussed.

PO-186

BPES 患者的临床及基础研究

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目的 BPES 属于一种典型的常染色体显性遗传性疾病，典型的临床表现为双侧上睑下垂、睑裂狭小、逆向内毗赘皮，内毗间距过宽等。可分为两型:I 型和 II 型。I 型女性患者因 POF 患有不孕症；II 型患者仅累及眼部。 88%的 BPES 患者证实有 FOXL2 基因缺陷。本课题收集一 BPES 家系，对家族成员进行二代测序技术进行致病基因的检测，探索该家系的主要致病基因及 BPES 患者的临床表现。
方法 收集就诊于宁夏眼科医院的一 BPES 家系，其中共涉及五代，其中包括病人 28 人，正常人 40 人，纳入愿意参与研究的 21 人，包括病人 13 名，正常人 8 名。采集外周血提取 DNA 后采用二代测序技术对 BPES 的首位致病基因 FOXL2 进行检测，分析该家系 FOXL2 基因突变与临床表型关系。
结果 采用二代测序技术检测出该家系中患者存在 NM-023067:c*780-*781insA 的突变，但因该突变位于内含子区域，目前无法对于该突变的致病性做明确诊断，我们将对该家族的患者进一步检测其他突变基因，明确该家族的致病原因。

结论：采用二代测序技术可对 BPES 患者致病基因进行检测以明确其致病原因，对该家系患者进行 FOXL2 基因检测未检测到致病突变，是否存在其他突变我们将进一步研究。

PO-187

先天性白内障合并先天性无虹膜一例

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目的：报道先天性白内障合并先天性无虹膜一例
方法：患者男，*15* 岁，因“发现视物模糊、畏光两年余”于四年前于我院就诊，诊断“双眼先天性白内障，双眼先天性无虹膜，双眼屈光不正，双眼弱视”，患者父母、弟弟及家族其他成员无眼部相关疾病。同时行基因检测，发现 *NOD2,c.30C>G*（*p.H10Q*）可疑变异，变异来源父亲，*ELP4,1-9* 号外显子疑似杂合缺失。考虑到行白内障术后畏光会加重，暂建议半年复查一次观察病情。近日复查时发现白内障明显加重，于我院行双眼白内障超声乳化联合人工晶体植入术，术后 *1* 天复查：双眼裸眼视力由 *0.2* 提升至 *0.3*，右眼眼压：*18.0mmHg,*左眼眼压：*21.6mmHg.*畏光感轻微加重。术后常规使用左氧氟沙星滴眼液、妥布霉素/地塞米松滴眼液，加用布林佐胺、盐酸卡替洛尔滴眼液降眼压，*1* 周后复查：双眼裸眼视力 *0.3*，右眼眼压：*20.1mmHg,*左眼眼压：*28.4mmHg.*停用妥布霉素/地塞米松滴眼液，继续观察。
结果：术后 *10* 天复查：双眼裸眼视力：*0.3*，双眼眼压：*18.1mmHg,19.6mmHg*。自觉视物较术前清晰。
结论：诊断：双眼先天性白内障，双眼先天性无虹膜，双眼屈光不正，双眼弱视。先天性白内障合并先天性无虹膜患者，如白内障程度较轻，矫正视力尚可，可暂缓白内障手术，以免术后畏光加重影响生活。通过基因分析发现 *NOD2,c.30C>G*（*p.H10Q*）可疑变异，变异来源父亲，*ELP4,1-9* 号外显子疑似杂合缺失，但相关机制不明，可进一步研究。

PO-188

眼白化病、眼球震颤新突变 GPR143, c.8C>A(p.Ser3Tyr)中国伴 X 连锁遗传家系报道

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目的：报道眼白化病、眼球震颤新突变 GPR143, c.8C>A(p.Ser3Tyr)中国伴 X 连锁遗传家系
方法：患者家系图如图 1 所示

（图 1）

Ⅲ-10 先证者双眼裸眼视力：OD：0.05，OS：0.05，双眼眼球震颤，黄斑中心凹缺失，虹膜脱色素，视杯凹陷变浅，色弱。其兄弟Ⅲ-8 具有相同临床表现。先证者核心家系的 WESTERN 分析（Ⅲ-10/Ⅱ-7/Ⅱ-8）及家系其余成员（Ⅲ-4/Ⅲ-7/Ⅲ-8/Ⅲ-11/IV-3/IV-4/IV-6/IV-7/IV-8/IV-9）验证，发现新突变位点 GPR143, c.8C>A(p.Ser3Tyr);RS1, c.215A>C(p.Glu72Ala)。如图 2

（图 2）

结果：此家系符合眼白化病（OA1）诊断，新突变位点为 GPR143, c.8C>A (p.Ser3Tyr)。RS1 基因在视网膜劈裂症中有报道，但是该家系无视网膜劈裂表现。

结论：通过眼白化病（OA1）家系的基因筛查，发现新突变位点 GPR143, c.8C>A(p.Ser3Tyr)，而突变 RS1, c.215A>C(p.Glu72Ala)未在家系中有临床表现，其机制不明，有待进一步研究。

PO-189

探究青光眼家系高眼压的发生与 BAMBI 基因突变的关系

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目的：青少年性青光眼（JOAG）以难以控制的高眼压、过早的发病年龄和预后不良为眼科界所重视，对 JOAG 家系患病及非患病成员行全外显子测序，发现一参与 TGF-β 通路的 BAMBI 基因在所有被测序成员中均有突变发生，对 BAMBI 基因进行功能研究，可以帮助我们探索 POAG 发病的分子机制，定义新的青光眼相关致病基因，为后续青光眼致病基因诊断、基因治疗和视神经修复奠定基础。

方法：将通过重编程技术获得的家系成员的 iPSC 诱导为 iPSC-TM，并对 GZ-1 iPSC-TM 及对照 iPSC-TM 行 TGF-β 刺激，行免疫荧光染色记录同刺激下 ECM 变化情况。用 RT-PCR 测量两组 iPSC-TM 的 BAMBI-mRNA 表达量差异，用 WB 测定两组 iPSC-TM 的 BAMBI 蛋白表达量差异。对对照 iPSC-TM 转染 mut-BAMBI 过表达载体，转染后的对照 iPSC-TM 胞外基质成分改变。从 GZ-1 iPSC-TM 提取突变的 BAMBI 蛋白，行蛋白质测序，构建 mut-BAMBI 蛋白的 3D 模型。

结果：iPSC-TM 在 TGF-β 刺激下胞外基质中 fibronectin、collagen1、collagen4 及 α-smooth muscle actin 等成分分泌增多，来源于 JOAG 家系的 BAMBI-mRNA 有 mut-BAMBI mRNA 表达，对照

结论：BAMBI 基因通过 TGF-β 通路影响小梁网胞外基质成分的表达，该 JOAG 家系的 BAMBI 基因突变对蛋白功能有影响，敲低 BAMBI 基因导致小梁细胞胞外基质沉积增多，BAMBI 基因的突变可能与高眼压症的发生有关，其具体致病程度仍需进一步实验研究证明。

PO-190

一例疑似中浆的成人遗传眼病

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目的：通过一例疑似中浆的成人遗传眼病病例汇报，分享常染色体隐性黄斑营养不良的相关研究进展。
方法：通过检索关键词 Autosomal recessive bestrophinopathy; Mutations in bestrophin-1 在 PubMed、web of science、万方等数据库，查询并阅读文献 23 篇。
结果：ARB 是一种少见遗传性视网膜变性疾病，在 2008 年 Burgess 等首次报道并命名。该病多累及双眼，与典型的 best 不同，该疾病眼底表现最显著的特征是中心凹外和黄斑外视网膜下物质沉积以及黄斑区视网膜神经上皮层内或神经上皮层下积液，无典型的卵黄样损害。同时视觉电生理中，视锥细胞和视杆细胞反应振幅下降,潜伏时间延长， Arden 比显著下降。
结论：复合杂合 BEST1 基因突变产生了非典型的 BEST 疾病，与中心性浆液性脉络膜视网膜病变的鉴别，在指导患者治疗与家庭基因咨询方面有重大意义。

PO-191

一例 Stargardt 病的分子遗传学研究分析

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目的：本课题对一例 Stargardt 病患者进行临床特点和遗传学分析，寻找可能的致病基因及其突变位点。
方法：对患者及其家人进行眼科各项检查，采集外周血并提取外周血白细胞基因组 DNA，选取 Stargardt 病相关联基因 ABCR，设计引物。应用合成的特异性引物，进行聚合酶链式反应（PCR）扩增 ABCR 基因的全部 50 个外显子。 PCR 扩增后，将产物纯化后进行 Sanger 测序分析，并和人类基因库序列进行比对，寻找与疾病共分离的致病突变。
结果：该患者的临床表现包括：不能矫正的中心视力下降、黄斑区域对称性萎缩，中心凹反光消失，色素紊乱，伴眼底黄色斑点，诊断为 Stargardt 病，其余家庭成员表型均正常。ABCR 基因分析结果显示，患者同时带有纯合突变 c.4773+1g>t 和 H423R、M1209T 及 T1428M 三个 SNPs。而携带 c.4773+1g>t 杂合突变的患者父母和未携带此突变的弟弟均表现正常。
结论：根据临床表现该患者诊断为 Stargardt 病，而 c.4773+1g>t 为 33 号内含子上突变，引起剪切位点变化。查阅文献分析该剪切位点的突变可能与 AMD 有关联。另三个 SNP 在 AMD 患者， Stargardt 患者及正常人群中筛查均有发现，没有统计学意义。Stargardt 病为多为隐性遗传疾

病，发病较早，综合以上结果，推测本患者最有可能的致病原因为 ABCR 基因 c.4773+1g>t 纯合突变。

PO-192

慢病毒载体介导的外酶 C3 转移酶基因表达对大鼠的降眼压作用

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目的：评价慢病毒载体介导 C3 的转导体系在正常大鼠活体的降眼压效果。
方法：健康正常的 SD 大鼠左眼为 LV/C3 实验组（前房注射量 4×106 TU），右眼为 LV 空载对照组（前房注射量 4×106 TU）。 采用回弹式眼压计在大鼠清醒状态下检测双眼眼压，测量时间点为注射后第 1 天、第 3 天、第 7 天，之后每周一次，直至第 48 天。采用 MicronIV型视网膜成像仪在活体检测大鼠双眼前节和眼底 GFP 表达，时间点为注射后第 8、16、21、35、48 天；同期双眼球取材，做前房角组织切片，荧光显微镜下观察 GFP 在双眼角膜内皮、虹膜和前房角的表达情况。眼部炎症反应情况通过裂隙灯活体观察和病理组织切片检测。
结果：注射后第 3 天开始，左眼（C3 组）眼压显著低于右眼（空载组），该显著性差异持续至注射后 40 天以上，与左眼注射前基础眼压值比较也有显著降低。注射后第 8 天直至第 48 天均可在大鼠双眼（C3 组和空载组）活体观察到眼前节环形的 GFP 表达，与前房角组织切片观察到的荧光持续时间一致，在角膜内皮、虹膜表面和小梁网均可观察到 GFP 表达，且主要集中在小梁网部位。双眼眼底未见 GFP 表达。裂隙灯和眼前节病理均没有发现眼内明显的炎症反应。

结论： 通过前房注射方法，LV 成功介导 C3 在大鼠小梁网的高表达，观察到至少 40 天以上的持续降眼压效果，没有发现明显的炎症反应。

PO-193

Best 病和“闭青”

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目的 从临床表现型和基因型角度探讨眼前节发育异常与常染色体隐性遗传 Best 病的关系。
方法 对一个临床诊断为常染色体隐性遗传 Best 病（Autosomal recessive bestrophinopathy, ARB）的家系的所有患者及其正常家庭成员进行全面的眼科检查，并收集其临床资料，采集外周血 2ml，

提取外周静脉血细胞基因组 DNA。应用一代测序方法对家系其他成员进行 Best-1 基因突变位点验证，并进行生物信息学分析。
结果 先证者女性，21 岁，反复发作双眼胀痛伴同侧头痛数月。眼部检查可见双眼前房浅，静态下全周房角窄 4，动态下全开放，双眼黄斑区对称性黄白色病灶。OCT 和 FFA 符合 best 病表现。予行双眼激光虹膜周切术治疗后，双眼周边前房明显加深。对患者外周静脉血 DNA 进行 BEST1 基因筛查，发现疾病相关突变，诊断为双眼常染色体隐性遗传 Best 病（Autosomal recessive bestrophinopathy, ARB）。
结论 BEST1 基因和眼前节发育异常相关，因此部分 ARB 患者出现闭角型青光眼表现。对于 Best 病患者应常规进行眼前段筛查，而对于房角“反常”狭窄的年轻患者也应排除 Best 病。

PO-194

COL1A1 基因突变成骨不全家系 1 例

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目的 分析成骨不全家系 1 例，探讨家系基因突变位点与临床特征的关系。
方法 收集 1 个成骨不全家系的临床资料，采集成员外周血 2ml，提取基因组 DNA，采用二代测序技术对先证者进行检测获取可疑基因位点，对检出的突变序列经 PCR 扩增后进行 Sanger 测序，在家系成员和正常个体中进行验证分析，确定致病突变，分析突变位点与临床特征的关系。
结果 该家系来自广东潮汕地区，现已追踪至 3 代共 19 人，其中患者 4 人。先证者，女性，55 岁，“双眼视力逐渐下降半年”来我院就诊。既往反复非强力骨折史；40 岁时牙齿逐渐脱落；否认父母近亲婚配史。体格检查：身材矮小，身高约 135cm，体重 60kg，脊柱后凸，听力轻度下降。眼科查体：Vod 0.1 矫正至 0.12，Vos 0.1 矫正至 0.3，双眼眼压正常，巩膜淡蓝色，结膜无充血，前房轴深 4CT，瞳孔圆直径 3mm，对光反射灵敏，晶状体混浊，后极部视网膜平伏。辅助检查：角膜厚度：右眼 385μm，左眼 386μm；眼轴长度：右眼 22.57mm，左眼 22.65mm；X 线检查：右侧肱骨外科颈、左侧挠骨小头骨折，双侧股骨、胫骨远端骨折，右侧股骨粗隆间骨折，胸椎多发压缩性骨折至后凸畸形。诊断：老年性白内障 ou；成骨不全症 I 型。测序结果显示，家系患者中均检出 COL1A1 基因第 10 外显子区域杂合突变（c.725G>T），使得 242 位氨基酸由甘氨酸（Gly）突变为缬氨酸（Val），在家系内非患者及正常对照者中均未发现该突变。
结论 经检索人类胶原突变数据库，该突变为成骨不全已知致病位点的新突变，丰富了成骨不全的基因突变谱。

PO-195

视网膜色素变性家系的分子遗传学研究分析

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目的：应用眼科基因芯片对一个视网膜色素变性家系进行临床特点和遗传学分析，明确其基因突变情况及可能发病机制。
方法：对该家系的所有患者及其正常家庭成员进行全面的眼科检查，并收集其临床资料，采集外周血 2ml，提取外周静脉血细胞基因组 DNA。应用华大基因视网膜相关疾病的基因芯片（共覆盖 59 个 RP 候选基因），采用目标区域捕获技术对先证者进行基因突变分析。Sanger 测序对家系其他成员进行可疑突变位点验证，并进行生物信息学分析。
结果：该视网膜色素变性家系共 3 代，患者 5 人，正常成员 10 人，为常染色体显性遗传模式。所有患者均有典型的视网膜色素变性表现：不同程度的夜盲、周边视野缩窄、中心视力下降；其余正常成员眼部检查均未见异常。RP 芯片的测序结果显示，在 *NRL* 基因第 2 号外显子上存在一杂合突变 c.152C>T（p.Pro51Leu），该突变导致 bZIP 蛋白第 51 位脯氨酸被亮氨酸取代，进而影响蛋白质的功能。Sanger 测序验证该突变在该家系中共分离，证实为该家系的致病原因。
结论：该家系的视网膜色素变性的致病原因为 *NRL* 基因的第 2 号外显子 c.152C>T（p.Pro51Leu）杂合突变所致，而目前仅有一例报道显示在 NRL 基因的 51 位脯氨酸上发现有突变。

PO-196

Effect of slc7a14 knockdown on retina in zebrafish

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Purpose: Retinitis pigmentosa (RP) is the main cause of hereditary blindness in the world. Symptoms mainly include visual field defects, night blindness, pigmented retinopathy. Genetic factors such as gene mutations and chromosomal abnormalities are the main causes of RP. Our previous study found that *SLC7A14* is the causative gene of RP [1]. However, the pathogenesis of the *SLC7A14* gene is currently unclear. In this study, a knockdown zebrafish model was constructed to evaluate the impact of *slc7a14* on zebrafish retina from the morphology and function, and discuss The mechanism of disease.
Methods:We prepared a *slc7a14* targeting Morpholino oligos (MO), which was injected into the zebrafish fertilized egg by microinjection technique to construct a *slc7a14* knockdown zebrafish model. To gain insights into the expression characteristics of the *slc7a14* gene, we investigated the expression profile of *slc7a14* in zebrafish tissues using qRT-PCR.To observe Morphology of *slc7a14*-deficient zebrafish morphants'eyes , we measured and analyzed the axial length and the eye area.To analyze the visual condition at the behavioral level, we carried out visual motor responses (VMR) and optokinetic responses (OKR) testing.To observe the structural changes of zebrafish retina, we performed immunofluorescence staining.To research the apoptosis of zebrafish retina, we performed TUNEL staining.

Results: qRT-PCR results showed *slc7a14* was expressed in the early stage of zebrafish embryo, its expression increases during development of the zebrafish, and a high expression of *slc7a14* in the brain, retina and spine.These findings indicate that *slc7a14* is associated with retinal development.The axial length and the eye area of zebrafish in the knockdown group decreased compared with control group, suggesting that the *slc7a14* gene is associated with zebrafish eyeball development. Then We examined the retinal architecture of the larvae by immunofluorescence staining. The zpr-1 (labeled cone photoreceptor cells) and the zpr-2 (labeled retinal pigment epithelium) were expressed normally in both control group and knockdown group. Zpr-3 (labeled rod photoreceptor cells) expression was barely detectable in knockdown group compared with control group. These results suggest that knocking down slc7a14 disrupted rod photoreceptor cells development in zebrafish. TUNEL staining of the eyes of knockdown group showed a significantly increased apoptosis signal compared with control group at 60 hours post fertilization（hpf）, indicating that the pathogenesis may be related to apoptosis. Subsequently, we carried out VMR testing to analyze the visual condition at the behavioral level.The control group larvae displayed normal ON (0.25)and OFF (0.17) activity peaks. Interestingly, both ON (0.11) and OFF (0.025) activity peaks significantly decreased in knockdown group.Similarly, OKR testing also showed visual malfunction. Compared with eye movement frequency (5.3 times/minute) of control group control larvae, Eye movement frequency (0.78 times/minute) of knockdown group was almost completely extinguished. Thus these results further demonstrate that knocking down *slc7a14* led to severe visual impairment.

Conclusions: Our findings demonstrate that knocking down *slc7a14* disrupted rod photoreceptor cells development and led to severe visual impairment in zebrafish, which is consistent with the partial pathological phenotype of RP patients. Consequently, *slc7a14* plays an important role in regulating the development and function of zebrafish retina.

PO-197

slc7a14 敲减对斑马鱼视网膜的影响研究

庄友源

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目的：视网膜色素变性（RP）是全球遗传性失明的主要原因，主要表现为视野缺损，夜盲等症状，基因突变是 RP 主要的致病原因之一。我们的前期研究发现，*SLC7A14* 是 RP 的致病基因[1]。然而，*该*基因的致病机制目前还未明确。在本课题中，通过显微注射 *slc7a14* 特异性反义吗啉环寡核苷酸（MO）构建斑马鱼基因敲减模型，从形态和功能等方面评估该基因对斑马鱼视网膜的影响，并对其致病机制进行探讨。

方法：制备特异性 MO，通过显微注射将 MO 注入斑马鱼受精卵，构建斑马鱼 *slc7a14* 基因敲减模型。在分子实验方面，通过定量 PCR 检测该基因在斑马鱼不同发育阶段各个组织内的表达情况。在表型方面，通过测量幼鱼眼球的长轴和眼球面积，观察眼球形态；通过行为学实验(包括视觉运动反

应（VMR）和眼动反应（OKR）)对*敲减*组及对照组幼鱼的视觉行为进行评估；通过免疫荧光染色，观察视网膜结构变化；通过 TUNEL 染色，观察视网膜细胞凋亡情况。

结果：定量 PCR 结果显示*该基因*在斑马鱼胚胎早期即有表达，高表达于斑马鱼的视网膜和脑组织中，且随着发育表达量逐渐增高。敲减组斑马鱼的眼轴和眼球面积减少，提示该基因与斑马鱼眼球发育相关。免疫荧光染色中，敲减组的 zpr-1（标记视锥）信号和 zpr-2（标记 RPE）信号与对照组相比无显著差异，但 zpr-3（标记视杆）信号显著降低，提示其视杆细胞的发育受到较大影响；Tunel 染色中敲减组鱼卵受精后第 60 小时大量凋亡信号，提示其致病机理可能与细胞凋亡相关。在行为学实验中亦存在异常表现，VMR 的 ON 反应峰值明显降低，OFF 反应峰值熄灭性降低；OKR 的眼动频率显著降低，提示该基因敲减后影响斑马鱼的视觉。

结论：*slc7a14* 基因敲减后对斑马鱼眼球的发育以及视觉均有不利影响，尤其对视网膜的视杆细胞有较大影响，这与 RP 病人的部分病理表型一致，表明该基因对斑马鱼视网膜发育和功能有着重要的调控作用。

PO-198

CRISPR/Cas9 gene-editing rescues retinal degeneration in rd1 mice

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Purpose: Retinitis pigmentosa (RP) is a kind of retinal degenerative disorders with high heritability, affecting approximately 1 in 4,000 individuals. Of the more than 90 genes have been implicated in the RP, mutations of the β subunit of rod cGMP-phosphodiesterase 6 (PDE6β) has become one of the most prevalent forms of the disease, accounting for 1 to 2% of all human RP cases. To date, there is no effective treatment for this pathology. The aim of this study was conducted to test whether rd1 mouse can be treated by AAV-mediated CRISPR/Cas9 gene-editing.

Methods: Adeno-associated virus (AAV) vector carrying spCas9 and Pde6β sgRNA were generated. rd1 mice were subretinally administered with AAV8-spCas9 and AAV8-Pde6βsgRNA at postnatal day (P) 2. Electroretinogram (ERG), fundus photograph and fundus fluorescein angiography (FFA) were recorded using Micron IV, photoreceptor morphology was detected by immunofluorescent staining.

Results: AAV8-spCas9 and AAV8-Pde6βsgRNA were successfully infected photoreceptor cells of rd1 mice. Fundus and FFA showed that the area of lesions and vascular leakage was reduced in the Cas9-Pde6βsgRNA-treated eyes. ERG results indicated that the Cas9-Pde6βsgRNA-treated eyes displayed better responses under stimuli with a wide range of flash intensities. Immunofluorescent staining demonstrated that outer nuclear layer was significantly increased in the treatment group. AAV-mediated CRISPR/Cas9 gene-editing rescued cone photoreceptor.

Conclusions: Our results demonstrated the ability of CRISPR/Cas9 to edit the photoreceptor cells *in vivo* and restore the visual function of rd1 mice, providing a promising treatment option for patients with retinitis pigmentosa.

PO-199

应用全外显子测序研究小口氏病的致病基因

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目的 小口氏病是一种罕见的常染色体隐性遗传性视网膜疾病，患者通常自幼发病，临床主要表现为静止性夜盲、水尾氏现象。患者视网膜电图改变具有特异性，对该疾病的早期诊断有重要意义。目前 SAG 基因和 GRK1 基因已被确认为小口氏病的致病基因。全外显子测序技术是一种强大有效探究孟德尔遗传病的致病基因的方法。本研究旨在应用全外显子测序技术检测一例日本小口氏病患者的致病基因。
方法 一例日本小口氏病患者被纳入研究，对其进行病史采集及基本眼部检查，包括视力、视野、激光眼底彩照、光学相干断层扫描、视网膜电图等并采集外周静脉血，提取 DNA，进行全外显子组测序，对候选突变进行生物信息学分析，筛选致病性突变。
结果 该患者自幼患有先天性静止性夜盲，其父母为表兄妹近亲婚配。通过全外显子测序以及严格的生物信息学分析，发现患者带有 SAG 基因的一个纯合移码突变（c.924delA, p.N309Tfs*12）。该移码突变导致 SAG 编码蛋白的结构与功能严重受损且未在 1000G 数据库中被发现，在 ExAC 数据库的等位基因频率极低。保守性分析表明该突变位点在物种间具有高度保守性。
结论 我们通过全外显子测序以及生物信息学分析成功发现了一例日本小口氏病患者的 SAG 基因的致病突变。全外显子测序有成本低、通量高、效率高的特点，将其应用于临床，对罕见遗传性疾病的早期诊断、明确病因及遗传咨询有重要意义。

PO-200

Whole-exome sequencing identifies a novel homozygous missense variant in REEP6 gene in a retinitis pigmentosa patient complicated with macular hole

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Purpose: This study was to identify the underlying gene defect leading to retinitis pigmentosain a Chinese patient.

Methods:A55-year-old Asian male proband complained of night blindness and decrease of vision acuity for 20 years.Ophthalmic examinations including fundus photography, spectral domain optical coherence tomography (SD-OCT), fundus autofluorescence (AF), infrared reflectance (IR) and full-field electroretinogram (ERG) were conducted. Blood samples from the proband, his consanguineous parents, son and wife were collected.Whole-exome sequencing (WES) followed by Sanger validation was performed.

Results: The visual acuity of the proband waslight perception in the right eye and 0.02 in the left eye.Fundus showed bone-spicule deposits and the ERG responses were non-recordable. Outer nuclear layer and ellipsoid zone loss outside the fovea was observed. Bilateral macular hole(MH) and epiretinal membranes (ERMs) were evident. WES data analyses identified 2 presumably homozygous variants in REEP6 and NPHP4 respectively.Since the patient did not exhibit kidney and mental disorders, the causative variant was most likely attributed to the novel missense mutation in exome 3 of REEP6 (c.268G>C, p. V90L, NM_138393.1), which encodeda transmembrane domain of the reep6 protein. Protein structure encoded by this novel homozygous missense variant has been predicted. But dramatic changes of the protein's structure haven't been obversed. With a frequency of 0.01158 in the Asian population (ExAC), this variation previously has not been reported. Bioinformatics analysis with Mutation Taster, SIFT and PolyPhen2 indicated the mutation was harmful. The parents and the son of the proband, who did not present the above signs, were heterozygous of the variant, while his wife did not have such a variant.

Conclusions:A novel homozygous missense variantc.268G>C, p. V90L in REEP6in a retinitis pigmentosa 77 patient originating from a consanguineous Chinese couple may be disease-causing. What we found expands the mutation spectrum of RP in the Chinese population. In addition, not only loss of photoreceptor layer but also involvement of vitreoretinal interface, which caused MH, was observed in this case. Whether the bilateral MH is related with the variant remains unknown.

PO-201

新型环状 RNA(circRims2)在小鼠视网膜中的研究

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目的：circRims2 是小鼠视网膜中一类高丰度表达的新型环状 RNA，在人和小鼠中具有高度的序列保守性。前期研究提示线性 RIMS2 为遗传性视网膜病变（IRD）病人的新型致病基因。然而，目前没有关于 circRims2 参与疾病视网膜功能调控的报道。因此，我们研究 circRims2 对小鼠视网膜的功能影响，为阐明遗传性视网膜病变的致病机制提供理论依据。

方法：我们通过体内体外实验对 circRims2 进行研究。在小鼠神经母细胞瘤 (N2A) 细胞中分别干扰和过表达 circRims2，检测其对细胞功能的影响；利用双荧光素酶报告系统（Dual-luciferase assay）

体外检测 circRims2 对 miRNA 的“sponge”功能：利用视网膜下腔注射技术对野生型小鼠视网膜注射 shRNA 干扰 circRims2，并通过 HE 染色、TUNNEL 染色、免疫荧光染色、原位杂交、ERG 及 OCT 等方法检测其对小鼠视网膜结构和功能的影响。

结果：我们成功在 N2A 细胞中干扰和过表达 circRims2，发现干扰 circRims2 可能促进细胞凋亡,并检测出 circRims2 与 miR-874-5p 有“sponge”功能，在小鼠视网膜中成功干扰 circRims2 后，小鼠视网膜外核层 (ONL)明显变薄。

结论：由于 circRims2 主要分布于视网膜神经元突触上，干扰 circRims2 的表达可能会影响神经元突触膜间的信号传递，对小鼠视网膜结构和功能起着重要的调控作用。

PO-202

飞秒激光辅助白内障超声乳化手术治疗先天性小角膜合并白内障患者一例

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目的: 探讨小角膜伴眼球震颤合并白内障患者的眼部临床表现、手术治疗效果。
方法: 通过分析我院 1 例先天性小角膜伴眼球震颤合并白内障给予行飞秒激光辅助白内障超声乳化联合人工晶体植入手术的患者，术后随访 3 个月，评价术后视力和并发症等。
结果: 患者手术安全，顺利植入人工晶体于囊袋内，术后视力有明显改善，术后随访 3 个月病情稳定，无并发症发生。
结论: 白内障合并先天性小角膜常伴发虹膜、脉络膜缺损，眼球震颤等合并症，针对白内障的治疗，建议尽早手术治疗，飞秒激光辅助白内障超声乳化伴人工晶状体的植入手术安全有效，能明显提高患者视力，改善患者生活质量，但术中应注重防范角膜损伤、后囊破裂等并发症，术后加强管理，特别是眼压的监测，以极早防治青光眼等并发症。

PO-203

携带相同 USH2A 基因致病突变的两家系的基因型-表型比较分析

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目的 通过对两家系患者的 *USH2A* 基因的测序，进一步了解 USH2A 基因相关疾病的基因型-表型特征 方法 对就诊于北京同仁医院的两名可疑 *USH2A* 基因相关疾病患者进行捕获测序，对患病家属与父母用 sanger 测序进行验证 结果 家系 A 与家系 B 中患者中 *USH2A* 基因均存在 c.8559-2A>G 与 c.2802T>G,p.C934W 复合杂合双突变且共分离，其中家系 A 中兄弟四人均表现出视网膜色素变

性与听力受损的 UHSER 综合征Ⅱ型的症状，家系 B 中的姐弟两人则表现为单纯的视网膜色素变性

结论 携带 USH2A 基因 c.8559-2A>G 与 c.2802T>G,p.C934W 复合杂合双突变患者既可以表现为 USHER 综合征，也可以表现为单纯的 RP,且在同胞中表现一致，提示存在其他例如双基因等强力因素控制表型

PO-204

慢病毒介导的 SOX9 基因敲减对大鼠视网膜光损伤保护作用的研究

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目的：探究 SOX9 基因敲减对大鼠视网膜光损伤的保护作用及可能机制
方法：视网膜光损伤作为视网膜变性的动物模型。在光损伤前 2 周，将大鼠玻璃体腔内注入 SOX9-shRNA 病毒。光损伤 3 天、7 天、14 天后，用视网膜 ERG 评估视视网膜功能，用 HE 组织学染色评估视网膜外核层厚度（ONL）。用 Western Blot 观察 GFAP, vimentin, nestin 和 CSPGs 的蛋白水平等，这些蛋白与 Müller 细胞胶质化和细胞外基质重塑相关。GFAP 的表达情况进一步用免疫荧光确认。
结果：光损伤 3 天、7 天、14 天后，SOX9-shRNA 组和对照组相比，视网膜外核层厚度更厚，视网膜 ERG 的 a、b 波振幅更高。GFAP, vimentin, nestin 和 CSPG 蛋白表达水平下降的更多。另外，在 SOX9-shRNA 组，每个时点 GFAP 的免疫荧光也更弱。
结论：玻璃体腔注射 SOX9-shRNA 可以有效的保护大鼠光损伤视网膜的形态和功能，下调与细胞胶质化和基质重塑相关蛋白 vimentin, nestin, 和 CSPGs 的蛋白水平。这些结果提示 SOX9 基因可能是未来视网膜变性疾病的一个可能治疗靶点。

PO-205

双眼 SMILE 术后误诊球后视神经炎一例

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目的：介绍一例 SMILE 术后双眼视力恢复不佳被误诊为球后视神经的案例，以给广大临床工作者参考

方法：患者中年男性，欲行双眼近视手术来院。专科检查：右眼视力 0.08，矫正视力：-5.25DS/-1.00DC×170→1.0；左眼视力 0.1，矫正视力：-6.50DS→1.0。双眼前节检查（-），眼底：双眼呈豹纹状眼底改变，右眼黄斑区色素紊乱

结果：诊断为双眼屈光不正，行双眼 SMILE。术后第 1 天视力：右眼 0.4、左眼 0.6；术后第 1 周：右眼视力 0.5，验光：+0.75DS/-1.00DC×160→0.5^{+}，眼压 17.3mmHg；左眼视力 0.5，验光：+0.25DS/-0.75DC×10→0.5^{+}，眼压 20.7mmHg。降眼压抗炎治疗后：右眼视力 0.6，验光：+0.75DS/-0.50DC×65→0.6^{+}，眼压 10.5mmHg；左眼视力 0.6^{-}，验光：-0.25DS/-0.50DC×100→0.6，眼压 12.9mmHg。术后 1 月：右眼视力 0.1，验光：-1.50DS/-0.75DC×105→0.3，眼压 22.9mmHg；左眼视力 0.1，验光：-2.25DS/-1.00DC×95→0.3，眼压 24.9mmHg。降眼压治疗 2 天后：右眼视力 0.6，验光：-0.25DS/-0.75DC×85→0.7，眼压 8.1mmHg；左眼视力 0.3，验光：-1.00DS/-1.25DC×105→0.7，眼压 7.0mmHg。外院 FFA 示双眼造影晚期视盘荧光稍增强，右眼边界清、左眼边界稍模糊，疑诊为双眼球后视神经炎，予以改善微循环、营养神经、球周注射地塞米松等治疗

讨论：飞秒激光角膜屈光手术的负压吸引环吸引过程中眼内压小于 40 mmHg，尤其是 SMILE 负压吸引仅持续十几秒，对眼后节影响小，目前尚未报道出现眼后节并发症的案例，本案例表明 SMILE 仍有影响视盘、视神经的可能，但这种改变是暂时性的、可逆的。

PO-206

以眼部表现为首发、主要症状的颅内动脉瘤临床特征

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病例一：

刘某某，女，59 岁，无明显诱因左侧头痛 3 天，伴左眼视力下降首次来我院神经科就诊。既往：高血压病史 5 年，否认眼部用药史，否认外伤及其它病史。查体：血压 140 / 90mmHg。空腹血糖：6.0mmol/L。神经系统检查未见明显阳性体征后，行颅脑 CT 平扫及颅脑 MR 检查：均未见发现明显异常。因为患者自述左眼视力下降同时发现左眼瞳孔扩大，故转眼科会诊。

眼科情况：视力：右眼 1.0，左眼 0.3(+0.25DS+1.25DC*85=0.6)；眼压正常；双侧外眼正常，右眼瞳孔直径 3mmm，对光反射正常；左眼瞳孔直径约 6.5mm，对光反射迟钝。眼底未见异常。

诊断：左眼瞳孔散大（原因待查）

考虑为传出神经障碍引起的瞳孔异常，故行左眼（大瞳孔）匹罗卡品试验：滴 0.1%毛果芸香碱后 30 分钟：瞳孔没有变化（排除 Adie 瞳孔）；再滴 1%毛果芸香碱，瞳孔明显缩小（排除交感神经功能亢进扩瞳）故此例应该考虑动眼神经麻痹。

单侧动眼神经麻痹，49.5%的原因是颅内动脉瘤(占第一位原因），高度怀疑该例患者颅内动脉瘤可能性大，随即联系神经外科，行 CTA+腰穿检查。腰穿结果：微量血性脑脊液；CTA：左侧后交通动脉与颈内动脉交界区动脉瘤。后转外院行 A 瘤介入栓塞治疗。

病例 2：略（具体见附件）

病例 3：略（具体见附件）

以上 3 例患者特征：1、病因相同：颅内动脉瘤；2、临床特征：眼部作为首发或主要症状；3、临床表现：不尽相同（瞳孔异常，眼肌麻痹，上睑下垂，或伴头痛头晕等）。
颅内动脉瘤是颅内血管系统常见的疾病，是引起自发性蛛网膜下腔出血的第一位原因。临床上约有 20％患者在动脉瘤未发生破裂出血前因某些眼部症状首诊于眼科；眼科医师若能及时识别，早期诊断，使颅内动脉瘤在瘤体破裂前及时有效的治疗，对预防动脉瘤破裂至关重要。

PO-207

OCTA 在息肉样脉络膜血管病变中的应用

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目的：观察 OCTA 在息肉样脉络膜血管病变（PCV）的诊断价值。方法：采用前瞻性系列病例观察方法，选取 2018 年 01-12 月在我院就诊经吲哚青绿血管造影（ICGA）确诊的 PCV 患者 23 例 23 眼，行常规眼科检查及影像学检查，包括眼底照相及 OCTA，OCTA 扫描区域分别为黄斑区 3mm×3mm、6mm×6mm 范围，由两名医生盲法阅片确诊后对比 ICGA。结果：ICGA 检查中可见脉络膜异常分支血管网（BVN）9 例 9 眼，在 OCTA 检查中可见 BVN 位置、形态及范围有相似表现；ICGA 检查中可见息肉样病变 12 例 12 眼，OCTA 检查可见强信号亮点；ICGA 检查表现为 BVN 合并息肉样病变 3 例 3 眼，OCTA 检查可见 BVN 和对应部位强信号亮点；ICGA 检查无明显异常表现 2 例 2 眼，OCTA 检查无异常表现。结论：ICGA 和 OCTA 在 PCV 检查中病变位置和形态相似。

PO-208

OCTA 在病理性近视黄斑区脉络膜新生血管病变治疗中的应用

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目的：评估 OCTA 在病理性近视（PM）合并黄斑区脉络膜新生血管病变（CNV）治疗中的应用价值。方法：采用前瞻性系列病例观察方法，选取 2018 年 01-12 月在我院就诊经荧光素眼底血管造影（FFA）确诊的 PM 合并 CNV 患者 17 例 20 眼，患者屈光度为（-11.5±4.25）D。行常规眼科检查及影像学检查，包括眼底照相、SD-OCT、FFA 及 OCTA，OCTA 扫描区域分别为黄斑区 3mm×3mm、6mm×6mm 范围。患者知情同意后，15 例 15 眼接受抗 VEGF 药物康柏西普玻璃体腔内注射，分别于注射后 1d、1wk、每月复查 OCTA，随访 6 个月，观察术后病变区 OCTA 的图像特征。结果：接受康柏西普玻璃体腔内注射 15 例 15 眼在 1wk 时 OCTA 检查中可见脉络膜毛细血管层及视网膜外层 CNV 面积缩小，在 1 个月时病变稳定。5 例 5 眼复发再次注射后 CNV 面积缩小。结论：OCTA 在 PM 合并 CNV 病情变化监测中具有重要价值，玻璃体腔注射康柏西普 1wk 即可观察到明显变化。

PO-209

5 例特发性动眼神经炎患者的临床特点分析

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目的：分析 5 例临床表现为动眼神经麻痹的患者特点和影像学表现。方法：回顾性分析 2012 年 1 月至 2018 年 8 月于中国人民解放军总医院眼科就诊的 5 例临床表现为动眼神经麻痹的患者资料，分析其临床特点、影像学检查、实验室检查及人口学特征，分析其发病的共同原因。结果：（1）5 例患者中 1 男 4 女，平均年龄（39.20+18.02）岁；（2）5 例患者均无前期感染症状，均可排除其他疾病引起的动眼神经麻痹；（3）2 例患者可见瞳孔散大，眼眶核磁排除交通动脉瘤；（4）1 例患者合并视神经炎；（5）1 例患者头颅核磁 T2WI 序列可见多发长 T2 信号，不伴 T1 强化，考虑为陈旧病灶；（6）5 例患者眼眶核磁平扫+增强均可见不同节段长度的动眼神经增粗，T2WI 可见动眼神经呈长 T2 信号；造影剂增强后可见 T1 强化。（7）5 例患者均给与激素静脉注射治疗，症状明显缓解。（8）5 例患者随访时间均大于 6 月，未见复发。结论：动眼神经麻痹临床多见，原因多样，排除其他疾病的前提下，核磁可见动眼神经增粗，T2WI 呈长 T2 信号，造影剂增强后可见 T1 强化，临床诊断特发性动眼神经炎。动眼神经炎可合并其他疾病，如视神经炎或颅内脱髓鞘病变，其机制仍需进一步研究。特发性动眼神经炎诊断依赖核磁检查，激素治疗效果良好。

PO-210

外伤性视神经病变的诊治进展

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外伤性视神经病变(traumatic optic neuropathy,TON)是由眼部或头部外伤引起的急性视神经损伤，可导致不同程度的视力丧失（很大的变异性），是永久性视力损失的重要原因之一；按损伤的性质分为直接性 TON 和间接性 TON；按损伤的部位：球内段、眶内段、管内段、颅内段；TON 可引起视神经的原发性骨折或继发神经元凋亡坏死，导致部分或全部失明，常常伴随着头部创伤；TON 直接损伤的治疗优势不大，而间接损伤治疗的空间大；早期发现和干预可能部分挽救视功能；TON 治疗临床上常采用保守治疗、皮质类固醇和手术三种方式，到目前为止没有任何特定的治疗方案达成共识。作者对近 5 年文献进行检索，对外伤性视神经病变的诊治进展进行报告。

PO-211

Intravitreal Injection of Hydrogen Peroxide Induces Acute Retinal Degeneration, Apoptosis, and Oxidative Stress in Mice

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Purpose. Oxidative stress is a common pathological condition for multiple retinal diseases. Hydrogen peroxide (H2O2) has been applied as an oxidative stress inducer for the in vitro studies. Here, we report the in vivo effect of H2O2 exposure to the mouse retina and its underlying mechanism.
Methods. The H2O2 or saline solution was intravitreally injected into the eyes of female C57BL/6J mice for two consecutive days. The retinal structure was evaluated by in vivo imaging using spectral domain optical coherence tomography (OCT) and validated by histological assessment as well as retinal marker expression. In addition, retinal stress, cell apoptosis, and antioxidant enzyme expression were also determined.
Results. Retinal and outer nuclear layer thickness thinning was observed at days 7 and 14 by OCT imaging with the treatment of 10 μg H2O2, which was confirmed by the histopathological analysis. The expressions of photoreceptor (Rho, Rora, Rorb, and Rcvrn), bipolar cell (Chat and Calb2), and retinal pigment epithelial (Rpe65) markers were reduced in the H2O2-treated group, whereas the expression of retinal ganglion cell marker (Tubb3) was increased. TUNEL-positive cells were obviously found in the outer nuclear layer and inner nuclear layer of H2O2-treated mice but sparely found in the ganglion cell layer. Coherently, apoptotic gene expressions (Casp3, Casp9, Bax, and Parp8) were significantly increased in the retina with increasing dosages of H2O2, while Bcl2 expression was mildly decreased. In addition, the expressions of Gfap and antioxidant enzyme genes (Txn2, Sod2, and Gpx4) were significantly upregulated in the retina after the H2O2 treatment, compared to the vehicle control group.
Conclusions. This study revealed that intravitreal injection of H2O2 induces acute retinal damage by increasing oxidative stress and cell apoptosis in the retina. This acute retinal degeneration mouse model could provide a platform for drug screening against oxidative stress and retinal diseases.

PO-212

Anti-inflammatory effects of transgelin-2 in murine diabetic retinopathy

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Purpose: To explore the novel anti-inflammatory role and mechanism of transgelin-2 (TAGLN2) in DR.
Methods: The murine model of DR was induced by STZ. Lentiviral delivery of shRNA was used to knockdown TAGLN2 gene in BV2. The effect of proliferation and migration of BV2 were evaluated by CCK8 and transwell cell assays. Biological function of TAGLN2 on BV2 apoptosis was determined by flow cytometry. RT-PCR, WB and ELISA were used to investigate the mechanism of TAGLN2 on regulating the biological functions of BV2.
Results: TAGLN2 mRNA was found significantly upregulated in mouse DR and in BV2 exposed to high glucose. Knockdown of TAGLN2 significantly suppressed the cells migration, proliferation and colony formation of BV2, accompanied by the increased apoptosis rate. WB showed that activation of p-IκB and p-ERK1/2 were increased after knockdown of TAGLN2, activated microglial leads increase of IL-1β, TNFα and IL-6, and chemokines, CCL2, CCL3 and CXCL1.
Conclusions: Our findings demonstrate the novel anti-inflammatory effects of TAGLN2 in glucose-stimulated BV2 and STZ induced murine DR.

PO-213

感光细胞缺氧诱发湿性年龄相关性黄斑变性新生血管

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目的：感光细胞缺氧与视网膜新生血管的关系及其机制探索。
方法：利用转基因小鼠 $Pde6g^{creERT\ 2/}$；$VHL^{LOXP/LOXP}$，分别于 P7 及 P28 注射他莫昔芬，特异性敲除感光细胞 VHL，从而上调 HIF、VEGF 及 EPO 的表达，造成模拟光感受器缺氧条件的小鼠模型。于造模后 4 周、8 周、12 周及 16 周行 FFA 及眼底照相观察视网膜新生血管的位置，多少及渗漏情况。通关 HE 及免疫荧光染色观察新生血管的形态、位置并探讨感光细胞缺氧对整个视网膜毛细血管网的影响。
结果：特异性敲除感光细胞 VHL 可引起视网膜下新生血管团，此新生血管符合湿型年龄年龄相关性黄斑变性中第 3 型 CNV（Retinal Angiomatous Proliferation RAP)的主要特征,表现为大量视网膜下新生血管及渗漏，可伴有出血、渗出及局限性视网膜脱离等。同时感光细胞缺氧可引起视网膜深层毛细血管增生。
结论：本研究成功建立一种湿性 AMD 的动物模型，该小鼠系具有可靠、准确、可控且可持续的表型，为今后的湿性 AMD 的病理机制和治疗研究提供了有用的工具。

PO-214

玻切术后硅油填充继发性青光眼的治疗策略

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目的： 临床回顾病例分析，研究玻切术后硅油填充后继发性青光眼的治疗。
方法： 回顾性分析我院玻切术后患者病史信息，统计相关病例资料，并对早期（术后 2 周内）、中晚期（术后 2 周后）高眼压程度，发生率及危险因素进行分析。并对难治性玻切术后继发性青光眼发生率，发病危险因素及治疗方案进行分析。
结果： 收集我院 2 年玻切术后病人情况，高眼压、继发性青光眼发生率为 19.23%。玻切术后硅油填充继发青光眼的主要危险因素包括既往青光眼病史、糖尿病患者、无晶体眼、高度近视、复杂视网膜脱离、激素敏感患者，年轻患者眼压更易升高。难治性青光眼降眼压药物治疗效果差，早期眼压升高，可行部分硅油取出降低眼压。我们收集的病例中，对于视功能差、结膜及眼表条件较差的患者，采用睫状体光凝术，可有效控制眼压，患者痛苦小。对于年轻，且视功能尚可的患者，采用青光眼阀植入术，眼压控制良好，术中眼内压波动小，眼底视网膜损伤小。此外，对于眼压升高＜30mmHg 的患者，行 SLT 治疗，也可起到降低眼压的效果。
结论： 玻切术后继发性硅油填充继发青光眼，常见及严重的并发症，治疗复杂，需要眼底病科和青光眼科专业交叉解决。治疗是一个持久战，应综合患者视功能，结膜巩膜条件，选择合适的治疗方案，治疗后应长期随访，监测眼压。治疗方案中药物、SLT、睫状体光凝、青光眼阀植入术，是治疗的重要手段。

PO-215

Salvianolic Acid A Protects Optic Nerve From Acute High IOP Ischemia–Reperfusion via Inhibiting Astrocytes and ROCK Pathway

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Backgrounds: Ischemia/reperfusion (I/R) injury induces apoptosis in retinal ganglion cells (RGCs) and optic nerve,which supposed to be condition of acute high IOP of glaucoma. Salvianolic Acid A (Sal A) is a potent natural anti- I/R monomer while little is known about its neuroprotection effects.The present study was performed to investigate the underlying mechanisms of the neuroprotection effect of Sal A, especially focusing on astrocytes inactivation and ROCK inhibition.
Methods: SD mice were divided into 2 groups: PBS and Sal A group. A 60-min ischemic model was administered to the rat eye by raising the IOP, followed by a reperfusion period till 3

weeks.RGC apoptosis, retina and optic nerve morphology and glial cells activation were detected and underlying neuroprotective mechanisms of Sal A were explored.

Results:

Sal A attenuated I/R injury-induced RGC apoptosis and optic nerve degeneration. I/R model activated astrocytes ,reduced βⅢ-Tubulin proteins expression and retina thickness,which was also prevented by Sal A. In addition, Sal A inhibits I/R induced neurodegeneration via inhibiting mapk phosphrylation and down-regulating ROCK1/2 proteins.

Conclusions:

The above results suggested that Sal A prohibits glaucomatous neuropathy induced by I/R injury with associated molecular changes indicative of posterior drug activity.

PO-216

伴视盘出血的埋藏型视盘玻璃疣患者的临床特征

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目的 观察伴视盘出血的埋藏型视盘玻璃疣患者的临床特征。**方法** 临床检查确诊患者 14 例纳入研究。回顾分析患者的临床资料和眼底表现、OCT、FA、B 超、视野等眼科检查特点。**结果** 14 例患者均为近视、小视盘，14 眼视盘表面及其鼻侧视网膜下出血，8 眼伴玻璃体出血。OCT 检查见所有患眼视盘鼻侧视网膜浅脱离，外层状层与 RPE 层之间见中高反射光团，其内散在点状高信号。B 超检查提示视盘隆起，降低增益，仍可见视盘内高回声。FA 检查早期视盘表面遮蔽荧光，晚期呈高荧光。视野检查 8 眼生理盲点扩大，对侧眼视野正常。患者因眼前黑影遮挡或视力下降就诊，最佳矫正远视力 0.8-1.0，随访 6m～4.5 年,视盘出血完全吸收，无复发。**结论** 埋藏型视盘玻璃疣患者可并发视盘出血、玻璃体出血。OCT 可直接观察到视盘深层的玻璃疣，结合 FA、B 超等检查，可避免误诊。

PO-217

The role of TL1A in Nonproliferative diabetic retinopathy development and therapy

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Purpose

Pathological vascular permeability participates the whole process of diabetic retinopathy (DR) and contributes to the progression of nonproliferative diabetic retinopathy (NPDR) to proliferative

diabetic retinopathy (PDR). We sought a relationship between TL1A and the happening of pathological vascular permeability, illustrate transcriptional regulation of TL1A expression, and detect its protective effect and mechanism in NPDR.

Methods

Pathological vascular permeability was confirmed by phosphorylation of VE-cadherin at Tyr685. TL1A gene expression was assessed by RT-qPCR, Western blot (WB)and immunohistochemistry. Motif analysis was performed to identify transcription factor binding sites and we verified transcriptional regulation by ChIP-qPCR, luciferase assay, and small interfering RNA (siRNA). TL1A recombinant protein intervention and TL1A overexpressed cell line were used to identify TL1A protection by WB, IF and Hopping probe ion conductance microscopy (HPICM) in vitro experiments. In vivo experiments, after intravitreous injection protein and lentivirus of TL1A, fluorescence angiography (FA) combining indocyanine green angiography (ICGA), Miles assay, IF and Evens blue staining were used to proof TL1A protective effect. Co-immunoprecipitation was used to illustrate protection mechanism of TL1A on pathological vascular permeability.

Results

Retinal microvascular endothelial cells were responsive to high glucose at 2 hours after stimulating, and phosphorylation Tyr685 of VE-cadherin was increased at 8 hours. TL1A expression began to decrease in the meantime of high glucose response and then kept in low. Four transcription factors were predicted to bind TL1A promoter. FOXP1 was the only one which can bind exactly and regulate TL1A expression. 250ng/mL TL1A could improve endothelial cells permeability and morphology of VE-cadherin. Overexpress or knock out TL1A by siRNA could delay or accelerate these pathological changes. Intravitreous injection of 0.5ng TL1A could improve pathological vascular permeability in DR models without side effects compared with the same dose of VEGF and IgG. TL1A binding with death receptor 3 could inhibit Src phosphorylation at Tyr416 to decrease phosphorylation of VE-cadherin at Tyr685.

Conclusions

Decreasing of TL1A in the early stage may promote the happening of pathological vascular permeability. A low dose of TL1A could delay and anesis the progression of disease. These findings may lead to new approaches in clinical interventions or treatment target in NPDR.

PO-218

Stimulation of Systemic Low-Grade Inflammation in Primary Angle Closure Glaucoma patients by Psychosocial Stress

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Purpose: Psychosocial stress is an important precursor of disease and reduced quality of life in humans. The aim of this study was to investigate the correlation between anxiety-depression status and cytokines in primary angle closure glaucoma (PACG) .
Methods: A sample of 60 PACG patients and 30 normal controls were enrolled in this study. All the participants were asked to complete the following questionnaires: Anxiety and depression were evaluated using Hospital Anxiety and Depression Scale (HADS) questionnaire, which consists of 2 subscales with ranges of 0 to 21, representing anxiety (HADS-A) and depression (HADS-D). The levels of systemic cytokines (IL-1β, IL-6, TNF-α, CRP and NF-κB) in serums of the participants were detected by enzyme-linked immunosorbent assay (ELISA).
Results: The results demonstrated that the anxiety and depression scores in the PACG group were significantly higher than those in the control group ($P<0.05$). The levels of IL-1β, IL-6, TNF-α, CRP and NF-κB in the PACG with anxiety，PACG with depression and PACG with anxiety and depression group were significantly higher than those in the control group and the PACG without anxiety and depression group ($P<0.05$). Correlation analysis between HADS score and cytokine levels revealed a positive association of anxiety and/or depression with IL-1, IL-6, TNF-α and CRP.
Conclusions: These results indicate that systemic cytokines are involved in the pathophysiology of anxiety and depression in PACG patients. A better understanding of the molecular mechanisms involved in these psychological disorders will allow the design of therapeutic interventions that lead to an improved quality of life of PACG patients.

PO-219

Clinical characteristics and outcomes of myelin oligodendrocyte glycoprotein antibody-seropositive optic neuritis at different ages：a cohort study in China

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Aims: To investigate clinical characteristics and prognosis of myelin oligodendrocyte glycoprotein antibody-seropositive optic neuritis (MOG-ON) at different ages in China.
Methods: Patients displaying onset of MOG-ON were recruited from the Neuro-ophthalmology Department in the Chinese People's Liberation Army General Hospital from January 2016 to May 2018. They were assigned into three groups based on different ages: pediatric-, young- and middle-aged-MOG-ON.
Results: Totally 110 patients were assessed, including 58 pediatric (52.7%), 34 young (30.9%), and 18 middle-aged (16.4%). The pediatric were significantly younger at onset compared to the

other groups. Of the pediatric group, 93.9% had good recovery of visual acuity (≥0.5) compared to 66.7% of middle-aged group(p<0.001). The annualized relapse rate is lower in pediatric than young and middle-aged groups (0.34±0.52 vs 0.87±1.11, 0.55±1.21, p<0.024). Six children ended up being diagnosed with acute disseminated encephalomyelitis, while only one patient in the pediatric group developed neuromyelitis optica during follow-up. The average peripapillary RNFL were 70.27±12.78μm, 71.70±16.53μm and 78.57±12.56μm for the pediatric-, young- and middle-aged-MOG-ON respectively, which showed no statistic difference between the three subgroups(p=0.837). Orbital MRI revealed a larger proportion of pediatric patients had intracranial optic nerve involvement than the other two groups (45.4% vs. 21.2% vs 36.7%, p=0.014).

Conclusion: Pediatric ON was the most common MOG-ON subtype in China. Pediatric had different clinical features including earlier age of onset, equal female/male ratio, better recovery of visual acuity, and lower annualized relapse rate. Age of onset may be a potential biomarker for determining visual prognosis with MOG-ON.

PO-220

髓鞘少突胶质细胞糖蛋白抗体阳性视神经炎临床特征和预后分析

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目的 观察髓鞘少突胶质细胞糖蛋白抗体阳性视神经炎（MOG-ON）的临床特征和预后。**方法** 回顾性系列病例研究。选取 2016 年 1 月至 2017 年 10 月在解放军总医院眼科临床确诊为 MOG-ON 的 65 例住院患者的临床及随访资料，随访时间为 14~217 个月。**结果** 儿童患者（<18 岁）35 例，成人患者（≥18 岁）30 例，女性 37 例，男性 28 例，发病年龄（23±16）岁（3～61 岁）。首次发病时单眼发病 40 例，双眼发病 25 例。首次发病时伴有眼痛 55 例，占 84.6%，儿童患者眼痛发生率明显低于成人患者[P=0.016]；同时合并自身抗体异常 13 例，占 20.0%；47.8%（43/90）的患眼出现视盘水肿。60.0%（39/65）的患者呈复发性视神经炎，73.8%（48/65）的患者最终症状累及双眼。63 例行眼眶 MRI 检查者中发现视神经呈长 T2 信号 62 例，占 98.4%。19 例行颅脑 MRI 检查者中发现脑部脱髓鞘病变 12 例。发病 2 周以内，78.9%（71/90）的患眼 BCVA≤0.1，儿童与成人患者发病视力均损伤严重，二者间差异无统计学意义（P=0.650）。经糖皮质激素治疗后患眼视力均有改善。首次发病恢复视力：95.6%（86/90）的患眼 BCVA≥0.5，儿童与成人患者首次发病恢复视力均较好，二者间差异无统计学意义（P=0.061）。末次随访视力：86.7%（98/113）的患眼 BCVA≥0.5，儿童患者末次随访视力均明显好于成人（P=0.013）。儿童患者中 3 例（8.6%）发病时伴有 ADEM。首次发病 6 个月后 pRNFL 为（69.90±12.49）μm，mGCIPL 为（59.58±7.91）μm，均出现不同程度萎缩变薄，儿童与成人患者之间差异均无统计学意义（P=0.606、0.233）。**结论** MOG-ON 患者临床特征多样，儿童患者多见、预后更好，部分患者伴有脑部脱髓鞘病变。

PO-221

姜黄素促进自噬保护急性高眼压大鼠视网膜神经节细胞

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目的：研究姜黄素对急性高眼压大鼠视网膜神经节细胞的保护作用及机制。
方法：Western blot 检测大鼠视网膜组织中凋亡、自噬相关蛋白的表达水平。采用 TUNEL 分析 RGC 层细胞的凋亡水平。应用荧光金逆行标记法定量分析 RGC 数量的变化水平。
结果：Beclin1、p62、 LC3-II 和 LC3-I 蛋白结果显示建模后 24h 视网膜自噬水平明显受到抑制，腹腔注射姜黄素（2.5-10 mg/kg）可促进视网膜的自噬水平。荧光金逆行标记 RGC 显示建模 7d 后 RGC 数量(960±105 个/mm2)约下降到正常对照组(2302±163 个/mm2)的 41.7%（P<0.01），姜黄素治疗组的 RGC 数量(1864±159 个/mm2)明显高于模型组，为正常对照组的 81.0%（P<0.001）。TUNEL 结果显示建模 24h 后姜黄素能减少 RGC 层细胞 TUNEL 阳性率，玻璃体腔注射自噬抑制剂 3-MA 和 CQ 后姜黄素保护 RGC 层细胞的作用明显下降。急性高眼压组视网膜 beclin1，bcl-2，LC3-II 蛋白水平比正常对照组下降，而 p62、 bax、 LC3-I、p-Akt 蛋白水平则升高；姜黄素组与此相反，且可被自噬抑制剂抑制。
结论：姜黄素保护急性高眼压大鼠视网膜神经节细胞主要通过诱导自噬抑制 RGC 的凋亡。姜黄素可能是通过 Akt/beclin1/LC3 通路促进视网膜自噬。

PO-222

姜黄素对慢性高眼压大鼠视网膜神经节细胞的保护作用

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目的：研究姜黄素对慢性高眼压大鼠视网膜神经节细胞（RGC）的保护作用。
方法：采用大鼠前房注射体外培养的结膜基质细胞的方法建立慢性高眼压模型。大鼠右眼前房注射体外培养的结膜基质细胞，左眼不作处理作为对照眼。实验分为模型组和姜黄素（10mg/kg 饲料）治疗组。应用眼压计监测两组大鼠眼压的变化。应用荧光金逆行标记法定量分析 RGC 数量的变化水平。
结果：大鼠前房注射体外培养的结膜基质细胞后，右眼眼压明显比左眼升高，建模后第三天右眼眼压为 38.2 ± 3.2mm Hg , 2 个月内平均为 25.6 ± 1.5 mm Hg 。姜黄素组的右眼眼内压和模型组右眼眼内压没有明显的差异性（P>0.05）。荧光金逆行标记 RGC 显示建模 1 月和 2 月后 RGC 数量分别约下降到正常对照眼的 67.2%和 32.6%，而姜黄素可以有效改善由于高眼压所致的 RGC 的丢失，RGC 显示建模 1 月和 2 月后 RGC 数量分别约下降到正常对照眼的 87.8%和 68.5%，明显比模型组高。

结论：姜黄素具有保护慢性高眼压大鼠 RGC 的作用，其具体保护作用机制有待进一步研究验证。

PO-223

YAP via interacting with STAT3 regulates VEGF-induced angiogenesis in human retinal microvascular endothelial cells

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Endothelial dysfunction is a main feature of retinal neovascular diseases which are the leading cause of blindness in developed countries. Yes-associated protein (YAP) and signal transducer and activator of transcription factor 3 (STAT3) participate in angiogenesis via vascular endothelial growth factor (VEGF) signaling. Additionally, YAP can bind STAT3 in endothelial cells. In the study, dimethyloxalylglycine (DMOG) stimulated human retinal microvascular endothelial cells (HRMECs) was used as retinal endothelial hypoxia model. The proliferation of HRMECs, as well as t-YAP, p-STAT3 (Tyr705) increased, while p-YAP (Ser127), p-YAP (Ser397) decreased following hypoxia. Meanwhile, YAP and STAT3 translocated to the nucleus. YAP knockdown inhibited the proliferation, migration and tube formation of HRMECs. YAP overexpression up-regulated phosphorylation of STAT3. The YAP overexpression-induced HRMECs proliferation, migration and tube formation were reversed by S3I-201, a selective STAT3 inhibitor. YAP interacted with STAT3 to promote STAT3 nuclear translocation. Additionally, YAP and STAT3 promoted the transcription of VEGF synergistically. Finally, inhibition of YAP alleviated retinal pathological neovascularization in mouse oxygen-induced retinopathy (OIR) model. In summary, activated YAP interacted with STAT3 to promote the activation and nuclear translocation of STAT3, hence boosted the proliferation, migration and tube formation of HRMECs via VEGF signaling following hypoxia. The data will further elucidate the mechanisms of retinal neovascular diseases.

PO-224

P2X7R mediated neuroinflammation of retinal Müller cells in chronic ocular hypertension

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PURPOSE. Inflammasome activation and following inflammatory cytokine production have been suggested to have a vital role in neurodegenerative disease. Activation of $P2X_7$ receptor ($P2X_7R$) induces the NLRP3 inflammasme activation. Herein, we investigated the role of $P2X_7R$-NLRP3 inflammasome neuroinflammatory pathway in activated Müller cell mediated retinal ganglion cells(RGCs) loss.

METHODS. Microbeads anterior chamber injection was made for mouse chronic ocular hypertension (COH) model. Visual function in mice was evaluated by ERG and contrast sensitivity (CS) testing. Brn3a-positive cell counting in whole mount retinal was used to evaluate the number of RGCs. Primary Müller cells and primary RGCs were purified and cultured in vitro. We detected expression of $P2X_7R$, NLRP3, CASP-1, ASC, some cytokines and NF-κB using qPCR, Western blot, and immunofluorescence. Cell viability was with cell counting kit-8 (CCK-8) and/or cell live/dead kit.

RESULTS. The expression of $P2X_7R$, NLRP3, CASP-1 and ASC increased in COH mice retina. Inhibition of $P2X_7R$ and NLRP3 inflammasome activation reduced the RGC loss and visual disfunction in COH. BzATP, the agonist of $P2X_7R$, upregulated the expression of $P2X_7R$, NLRP3, CASP-1 and ASC in cultured Müller cells. The conditioned medium of Müller cells activated by BzATP induced RGCs loss in vitro. BzATP also increased the expression of NF-κB, some pro-inflammatory cytokines, while some neuroprotective cytokines was downregulated. MCC950, the blocker of NLRP3, decreased these effects of BzATP. NF-κB inhibitor diminished the effect of MCC950.

CONCLUSIONS. Our study suggests that $P2X_7R$-NRLP3 pathway activation plays an important role in RGCs loss in COH. NF-κB intracellular pathway is involved in $P2X_7R$ mediated NRLP3 inflammasome activation.

PO-225

Corneal collagen cross-linking pretreatment mitigates inflammation, hemangiogenesis and lymphangiogenesis in rats

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Corneal collagen cross-linking (CXL) is becoming the preferred surgical option for treating progressive ectasia. Its reported beneficial effects include temporary suppression of suture-induced hemangiogenesis and lymphangiogenesis as well as regression of both preexisting blood and lymphatic vessels in different animal models. However, neither the underlying molecular mechanisms nor the time dependence is known for the development of these sight compromising

effects. Furthermore, it has not been determined whether or not CXL pretreatment dampens inflammatory-induced angiogenesis and lymphangiogenesis reactivated by either trauma, keratoplasty or microbial infection. We addressed these questions by determining if CXL pretreatment reduced subsequent suture emplacement-induced hemangiogenesis and lymphangiogenesis in rat corneas. Following CXL treatment, proinflammatory IFN-γ, MMP-9 and MCP-1 expression levels were markedly but only transiently elevated. Stromal infiltration of immunostained CD45, CD68 and MMP-9 cells accompanied these changes. By day 28, all of these effects had reversed to near baseline levels. Suture emplacement subsequently vascularized both the CXL-pretreated and the untreated normal control (NC) corneas. Interestingly, the magnitudes of rises in these suture-induced proinflammatory cytokines along with hem- and lymphangiogenesis were less in the CXL pretreated corneas than in their NC counterpart. These diminished effects following CXL pretreatment suggest that future studies are warranted to determine if this procedure has the potential to decrease corneal immune responses and thereby provide more effective treatment of hemantic- and lymphatic-related corneal diseases.

PO-226

巩膜上静脉烙闭法建立大鼠高眼压模型及其视网膜微观结构的观察

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目的：观察不同体重大鼠眼压差异及大鼠眼压的昼夜变化。观察巩膜上静脉烙闭法建立的大鼠高眼压模型对视网膜微观结构的影响，为青光眼视神经损伤及保护机制提供研究基础。**方法：**选取不同体重 SD 大鼠 40 只，分为 A 组（150-200g）、B 组（200-250g）、C 组（250-300g）、D 组（300-350g），每组各 10 只，分别测量 3 天白天及夜间基线眼压。随机选取 SD 大鼠（雌雄随机，250-300g）40 只，术前测量三天基线眼压，以右眼为实验眼，烙闭实验眼 3-4 支巩膜上静脉，以左眼为对照，于术后即刻、1-7 天、14 天，21 天、28 天分别测量各组眼压。于术前及术后 28 天分别行 OCT 检查。于术后 28 天处死大鼠，行石蜡包埋、HE 染色，计数 RGC 细胞，测量视网膜厚度。**结果：** 不同体重大鼠昼夜眼压比较差异均有统计学意义（P<0.001）。A 组大鼠眼压较其他三组眼压低（P<0.05）。巩膜上静脉烙闭术后即刻实验眼眼压达到峰值，较对照眼高 122%（p<0.001），之后缓慢下降，到术后第 14 天、第 21 天实验眼眼压较对照眼分别升高约 41%、20%（p<0.001），到第 28 天升高无统计学意义（p>0.05）。OCT 提示内层视网膜变薄（p<0.001）。HE 染色切片结果提示 RGC 数量减少，内、中、外层视网膜均变薄（p<0.05），且以内层变化最明显（p<0.001）。**结论：**大鼠基线眼压昼夜存在差异，白天眼压较夜间眼压低，低体重（150-200g）大鼠眼压偏低。烙闭大鼠巩膜上静脉能维持三周的眼压升高，且能使视网膜变薄、RGC 数量减少，故巩膜上静脉烙闭法是建立大鼠高眼压模型的有效方法。

PO-227

前房注射卡波姆建立大鼠慢性高眼压模型昼夜升压效果差异性及视网膜改变的研究

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目的 对大鼠前房注射卡波姆建立稳定的大鼠高眼压青光眼模型，观察卡波姆升压效果及大鼠眼前节及视网膜的改变。 **方法** 随机选取 30 只 SD 大鼠,注射前 3d 早晚测基线眼压。右眼定为实验眼，左眼定为对照眼，放出房水后将 30ul 卡波姆混悬液注射入前房，每日早 10 时、晚 22 时在大鼠清醒状态下测眼压。每周进行双眼眼前节照相并对比。4 周末处死 26 只大鼠（超过 4 周后处死的大鼠有 4 只）并取双眼眼球，行 HE 染色。在光镜下观察对比实验眼与对照眼视网膜形态，测量视网膜厚度，观察并对比房角形态。 **结果** 注射前，大鼠实验眼白天和夜间眼压分别为 11.10（±0.90）mmHg 和 11.92(±1.07)mmHg。对照眼白天和夜间眼压分别为 11.22（±1.07）mmHg 和 11.76（±1.08）mmHg，（P＞0.05）。实验眼白天与夜间，对照眼白天与夜间的差异具有统计学意义（P 均小于 0.05）。注射后 1 周，卡波姆在前房中呈现出弥散型和沉积型分别为 17.83（±3.54）mmHg 和（13.00±1.55）mmHg，两者对比差异具有统计学意义（P＜0.05）。注射后第 1 天至注射后第 27 天实验眼与对照眼夜间眼压的平均值对比差异具有统计学意义（*P*＜0.05）。注射后第 1 天至第 19 天实验眼与对照眼白天眼压的平均值对比差异具有统计学意义（*P*＜0.05）。其中 4 只高眼压模型大鼠眼压可以维持在 20mmHg 以上时长达 6-9 周。实验眼视网膜各层形态均发生改变，视网膜全层细胞厚度减少，内丛状层厚度减少，内外核层融合为一层，细胞排列紊乱，神经节细胞明显减少。实验眼注射后 4 周视网膜厚度为（254.70±21.80）μm,与对照眼的 346.73（±24.63）μm 相比（*P*＝0.00）。 **结论** 前房注射卡波姆建立大鼠高眼压模型，可维持中度升压效果 4 周以上，昼夜升压差异较为明显，表现为夜间眼压较白天更高，4 周后视网膜出现高眼压损伤后的表现。

PO-228

2 年内 3 家医院误诊的双眼视盘水肿致失明一例

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目的：报道一例 2 年内 3 家医院误诊的双眼视盘水肿致双目失明患者一例，期望广大眼科临床医生在遇到类似患者时予以借鉴，明确诊疗思路，及时医治，避免类似的悲剧再次发生。**方法：**收集男性 55 岁患者一例 ，2018 年 11 月因左眼视力下降 2 年，右眼视力下降伴黑矇 2 周入院。患者 2 年内曾因左眼视力下降先后就诊全国 3 家医院眼科，先后诊为 “视神经萎缩 左眼”，颅脑 MRI 检查未见异常，给以营养神经、改善循环等药物治疗，无效，左眼逐渐失明，右眼视力逐渐下降伴黑矇。本次入院眼科查体：右眼视力 0.4 矫正不提高，左眼无光感，双眼除晶体皮质轻度不均匀混浊外，眼前段正常，双眼视盘水肿、色淡，边界不清。颅脑 MRI 显示：空泡蝶鞍，鞍背气化。颈动脉彩色超

声检查：双侧颈动脉粥样硬化斑块形成，无管腔狭窄。MRA：颅内动脉未见明显狭窄。入院诊断：1.视盘水肿原因待查 双眼 2.视神经萎缩 左眼 3.高血压 3 级。入院后给予甘露醇静滴，并完善检查，FFA：双侧视盘灌注延迟。右眼电脑视野：重度向心性缩小。脑脊液压力正常，颜色黄，微混，红细胞（+++）、白细胞 18X10^6/l，单个核细胞 94.4%，多个核细胞 5.6%，葡萄糖 6.25mmol/l，氯 102.5mmol/l，脑脊液蛋白 23071.3mg/l，抗核杆菌（-）。神经内科会诊意见：建议完善 MRV 和颈部、胸部、腰部的椎体 MRI 检查。MRV 正常。**结果**：颈、胸、腰 MRI 检查：腰骶部室管膜瘤？，追问患者腰痛 20 余年，未正规治疗。遂将该患者转入神经外科手术。完整摘除肿瘤，病理报告：室管膜瘤 I 级。术后患者双眼视盘水肿消退，右眼残存视力完全丧失。**结论**：脊髓内室管膜瘤可引起脑脊液蛋白明显增高，致脑脊液循环障碍进而导致颅内压增高引起双眼视盘水肿，压迫双眼视神经导致视力丧失，眼科临床医生在遇到原因不明的双眼视盘水肿的患者时，还应排除椎管肿瘤。

PO-229

Altered energy status in traumatic optic neuropathies: Implications of aerobic glycolysis for facilitating RGC survival

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Purpose: Neurons are metabolically demanding and energetically vulnerable during the injury, especially for the axons. However, the exact alterations of energy budget during the early axon injury and their effects on neuronal survival remain unknown.
Methods: A classic optic nerve crush injury mouse model was used. The energy levels (ATP,7 ADP and ADP/ATP ratio) and the activities two main metabolic pathways (i.e., glycolysis and oxidative phosphorylation) were measured in optic nerves and retinas. RGC survival was rated using the Thy-1 labeling flow cytometry and Tubulin labeling retinal whole-mount.
Results: ADP and ATP levels increased in traumatized optic nerves and retinas, and the glycolysis and oxidative phosphorylation were more activated in the injured groups. Further exploration of the metabolism activation showed that mitochondrial oxidative phosphorylation was unduly amplified over other pathways. By redirecting metabolic flux toward glycolysis (magnifying Warburg effect) using the drug meclizine, the RGC survival was significantly improved.
Conclusions: Traumatized optic nerves responded to the acute energy demand by activating glycolysis and oxidative phosphorylation. An oxidation-favoring metabolic pattern rather than energy levels underlies RGC survival failure after optic nerve crush, which offers a novel strategy for neuroprotection.

PO-230

Brivanib, a multitargeted small-molecule tyrosine kinase inhibitor, Suppresses laser-induced CNV mouse model of neovascular AMD

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In age-related macular degeneration (AMD), choroidal neovascularization (CNV), a major pathologic feature of neovascular AMD (nAMD), affects 10% of AMD patients and is the most severe and rapidly progressing form of AMD, potentially leading to serious complications including vision loss. The vascular endothelial growth factor receptor 2 (VEGFR2) and fibroblast growth factor receptor 1 (FGFR1) contribute to the pathogenesis of CNV. Brivanib is an oral, selective dual receptor tyrosine kinase (RTK) inhibitor of FGFR and VEGFR, especially VEGFR2 and FGFR1. In the study, brivanib inhibited zebrafish embryonic angiogenesis without neurodevelopment impairment effect. In the mouse CNV model, brivanib intravitreal injection blocked the phosphorylation of FGFR1 and VEGFR2, and mitigated CNV leakage, area and formation in the absence of intraocular toxicity. Moreover, brivanib oral gavage relieved CNV leakage and area. In conclusion, our study suggested that brivanib can be a novel therapeutic strategy for nAMD.

PO-231

抑制 CYP2J 增强 Omega-3 长链多不饱和脂肪酸对新生血管性眼部疾病的治疗作用

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目的：增加膳食中 ω-3 长链多不饱和脂肪酸（LCPUFAs）的摄入量可减少视网膜和脉络膜中的新生血管形成，但 ω-3 LCPUFA 通过细胞色素 P450 氧化酶（CYP）2J 代谢得到的产物被发现是促进病理性新生血管生成的。因此，抑制 CYP2J 的活性可增强 ω-3 LCPUFAs 对新生血管性眼部疾病的保护作用。

方法：高氧诱导的视网膜病变（OIR）和激光介导的脉络膜新生血管生成（CNV）小鼠模型用来模拟新生血管性眼部疾病。液相色谱和串联质谱用来测量血浆中各脂代谢产物的浓度。小鼠动脉环与脉络膜离体培养和人内皮细胞微管形成与迁移实验用来在体外评估氟桂利嗪调节内皮细胞功能和新生血管生成的作用及机制。
结果：CYP2J 拮抗剂氟桂利嗪使 ω-3 LCPUFAs 对视网膜和脉络膜新生血管生成的抑制作用分别提高了 30%和 20%。氟桂利嗪将 CYP2J2 过表达小鼠的视网膜和脉络膜中的病理性新生血管生成分别减少了 36%和 39%，并有效降低了血浆中 CYP2J2 代谢产物的浓度。ω-3 LCPUFAs 经 CYP2J 代谢得到的产物可显著逆转氟桂利嗪对病理性新生血管生成的抑制作用。环氧化物水解酶抑制剂可以富集 ω-3 LCPUFAs 经 CYP2J 途径得到的代产物，同样可以增加眼部的病理性新生血管生成。
结论：抑制 CYP2J 的活性可以增强 ω-3 LCPUFAs 对病理性眼部新生血管生成的治疗作用。CYP2 抑制剂可能是抑制增殖性视网膜病及其他新生血管性疾病的有效方法。

PO-232

陈旧性高度近视视神经病变的临床观察

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目的：探讨陈旧性高度近视视神经病变眼部的临床特点，局部激素和全身支持治疗效果观察。
方法：回顾 2000～2017 年 300 例高度近视最佳矫正视力低抑或无助的患者，女性 220 例，男性 80 例。年龄 45 岁～89 岁,平均年龄 56±23.1 岁。病程 5 年到 20 年，平均 12±6.3 年，屈光状态 7～23D，平均 12.3D。观察组均采用局部球后注射激素及口服活血及神经营养药物治疗，对照组口服活血及神经营养药物治疗，追踪观察 6 个月～10 年。
结果：对照组和治疗组在治疗前后的视力和视野变化有统计学意义（$p<0.05$）。陈旧性近视性视神经病变患者，视力隐秘下降多年，呈波动性变化，总趋势是下降的。病程 10 年以上，视野严重异常，视野向心性缩小明显最为常见。FFA 呈高度近视性改变，大都没有发现特殊病变；OCT 排除黄斑萎缩、裂孔、劈裂、新生血管病变；大多数患者 CT 抑或 MRI 检查没有发现视神经部位异常结构病变。球后激素治疗 2 周左右视野抑或视力改善，70%患者一月有效果，视野异常值越小、基础视力越好效果更好。30%左右的病人视力增加不显著。在不同治疗均有效果。治疗后视力相对较稳定，仍有波动，但是最终视力无法恢复到从前。此病不自愈，球后激素治疗并发症少，表现为球后疼痛，眼压些许升高及激素常见并发症。长期追踪观察复发病例少。
结论：陈旧性高度近视视神经病变不能自限自愈，无球后转痛，球后激素治疗有效，视功能有不同程度恢复。FFA、OCT、MRI 等无明显异常。并发症与复发较少。

PO-233

A case study of ciliary detachment with primary pulmonary hypertension

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Purpose To introduce a case of ciliary detachment with primary pulmonary hypertension.
Methods The clinical manifestations of a case of ciliary detachment with PPH were addressed by comprehensive examination including UBM, IOP, color fundus photographs, FFA. In addition, echocardiography is used to measure primary pulmonary pressure.
Results When the echocardiography displayed a systolic pulmonary arterial pressure of 106 mmHg, UBM exhibited ciliochoroidal detachment, as well as peripheral retinal effusion and non-perfusion areas in FFA. After well controlled of PPH, UBM showed normal ciliary body. FFA confirmed that retinal effusion disappeared.
Conclusions The elevated venous pressure in PPH is responsible for decreased choroidal backflow and reduced venous blood outflow from the eye.

PO-234

Tmem30a Deficiency in endothelial cells impairs cell proliferation and angiogenesis via VEGF/VEGFR2 signaling

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Purpose:
Phosphatidylserine (PS) is PS asymmetry in the eukaryotic cell membrane is maintained by a group of proteins belonging to the P4-ATPase family, namely, PS flippases. The folding and transporting of P4-ATPases to their cellular destination requires a beta-subunit member of the TMEM30 protein family. Loss of *Tmem30a* has been shown to cause multiple disease conditions. However, its roles in vascular development have not been elucidated.

Methods:
Expression of Tmem30a in various endothelial cell lines and tissues was analyzed. The effect of Tmeme30a on endothelial cell growth was analyzed by nockdown of *TMEM30A* in primary human retinal endothelial cells and tube formatipn was assessed. Endothelial specific knockout mouse

model of Tmem30a was generated using PDGFb-Cre line. Vessel growth and tip cell proliferation was assessed in retinal wholemouts. RNA-seq analysis was performed to assess downstream pathways in Tmem30a deficeincy cells.
Results:
Knockdown of *TMEM30A* in primary human retinal endothelial cells led to reduced tube formation. In mice, endothelial cell (EC)-specific deletion of *Tmem30a* led to retarded retinal vascular development with a hyperpruned vascular network as well as blunted-end, aneurysm-like tip endothelial cells (ECs) with fewer filopodia at the vascular front and reduced number of tip cells. Deletion of *Tmem30a* also impaired vessel barrier integrity. Mechanistically, deletion of *TMEM30A* caused reduced EC proliferation by inhibiting VEGF-induced signaling.
Conclusions:
Our findings reveal essential roles of *TMEM30A* in angiogenesis, and providing a potential therapeutic target.

PO-235

口服尼莫地平对正常眼压性青光眼视盘旁和黄斑区血流的影响

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目的：探讨口服尼莫地平后对正常眼压性青光眼视盘旁和黄斑区的血流是否有影响及其影响因素。
方法:本研究纳入 10 例正常眼压性青光眼伴有视盘旁萎缩区的患者，运用 OCT 血流成像技术描画和测定 α，β 和 γ 区浅层及脉络膜层血流密度。采用进行线性回归分析，探讨血流密度与各分区结构参数之间的关系，包括宽度，面积和相应的视网膜神经纤维层厚度等。
结果：10 例正常眼压性青光眼的平均年龄和平均轴长为 48.20±15.43 岁，24.17±1.15 mm。在 α，β，γ 区，β 和 γ 区显示出较低的放射状视盘旁毛细血管密度（radial peripapillary capillary density，RPC）。β 区 RPC 与 β 区的面积,宽度及视网膜神经纤维层厚度无明显相关性（P ＞0.05）。 γ 区 RPC 与 γ 区面积和宽度呈正相关（P <0.05），但与 γ 区视网膜神经纤维层厚度无明显相关性（P ＞0.05）。与 α 区相比，γ 和 β 区均显示脉络膜毛细血管明显减少。 β 区与 γ 区脉络膜微血管密度无明显差异（P ＞0.05）。 β 区和 γ 区的脉络膜微血管密度分别与 β 区和 γ 区的宽度及面积无明显相关性（P ＞0.05）。
结论：我们在正常眼压性青光眼患者中发现视盘旁萎缩区三个亚区中存在浅层和脉络膜层微血管的差异。正常眼压性青光眼患者视盘旁萎缩区 β 区和 γ 区中可能存在着微循环的障碍。

PO-236

Clinical Features of Microvasculature in Subzones of Parapapillary Atrophy in Myopic Eyes

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Purpose: To investigate the microvasculature in subzones of parapapillary atrophy and its influencing factors in healthy myopic eyes.

Methods: The cross-sectional study included 55 healthy myopic eyes with parapapillary atrophy. The superficial and choroidal microvascular densities were delineated and measured in alpha, beta and gamma zones respectively using optical coherence tomography angiography. Linear regression analysis was performed to explore the relationship between the vascular parameters and the structural parameters of each subzone including the width, the area, and corresponding retinal nerve fiber layer thickness, etc.

Results: The mean age and mean axial length of the participants were 27.55 ± 5.72 years and 25.19 ± 1.08 mm. Among alpha, beta, gamma zones, the beta zone showed the lowest radial peripapillary capillary density, which was negatively correlated with the area and width of beta zone (P<0.05). The gamma zone showed the highest radial peripapillary capillary density, which was positively correlated with the retinal nerve fiber layer thickness of gamma zone (P<0.01). Compared with alpha zone, both gamma and beta zones showed marked decrease of choriocapillaris. The beta zone showed a lower choroidal microvascular density than that of gamma zone (P<0.01). Choroidal microvascular density in beta and gamma zones were negatively correlated with the width of beta zone and gamma zone, respectively (P<0.01).

Conclusions: Topographic differences on superficial and choroidal microvasculature were found in the subzones of parapapillary atrophy. The microcirculatory deficiency in beta zone parapapillary atrophy may exist in myopic eyes.

PO-237

缺氧诱导下人微血管内皮细胞的活化与腺苷水平的关系

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背景 目前普遍认为视网膜局部缺氧状态是诱导视网膜新生血管形成的主要原因之一，其发病机制研究是国内外的研究热点。研究证实缺氧刺激下多种转录因子活性增加可促进微血管内皮细胞活化，导致新生血管形成，其中除血管内皮生长因子外，腺苷的血管生成作用也逐渐受到关注。**目的** 研究缺氧诱导下微血管内皮细胞的活化过程与腺苷水平之间的关系，探讨腺苷微环境对血管生成的促进作用。**方法** 体外培养 HMEC-1，分为常氧组和缺氧组。通过细胞计数试剂盒-8（CCK8）和 EDU 法检测常氧组与缺氧组细胞的增生水平；通过 Transwell 法检测常氧组与缺氧组细胞的迁移与侵袭能力；Western blot 法检测常氧组与缺氧组 CD39、CD73 的蛋白表达水平，并用免疫荧光法进行佐证；高效液相仪检测常氧组与缺氧组的腺苷浓度。**结果** 缺氧组 12 h、24 h 较常氧组细胞更显著，差异有统计学意义（*P*<0.001）；缺氧组 24 h 较常氧组细胞迁移和侵袭能力明显提升（*P*<0.001）；缺氧组 12 h、24 h 较常氧组 CD39、CD73 蛋白表达水平更显著（*P*<0.001），免疫荧光结果与之一致（*P*<0.001）；缺氧组比常氧组 6、12、24 和 36 h 腺苷浓度明显增高（*P*<0.001）。**结论** 相较于常氧环境，缺氧培养下人微血管内皮细胞增生速度更快，迁移和侵袭能力更强，同时，腺苷生成关键酶 CD39、CD73 蛋白表达明显增加，腺苷浓度也显著上升。提示我们，缺氧诱导下人微血管内皮细胞的活化过程与腺苷水平及其生成关键酶 CD37、CD39 有较大关联。

PO-238

The Other Side of Verteporfin in retinal non-angiogenic vessels without photodynamic characteristics

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Purpose: Verteporfin (VP) were widely used in photodynamic therapy (PDT) to treat retinal angiogenesis for age-related macular degeneration (AMD). Recently, it was revealed that VP could also be used as a YAP antagonist in research of tumorgenesis. However, VP has multi-face in different cell types independent of YAP, in colon cancer and endometrial cancer, which imply the potential mechanisms of VP's function in different cell types. In current study, we explore the side effects of VP in non-angiogenic retinal vessels.

Methods: blood samples were collected from the patients who undertook PDT. Retinas were collected from the mice after VP injected intravitreally and intraperitoneally. Western blot was conducted to detect the levels of YAP and Hippo-related proteins after VP treatment in vivo and in vitro. The cytoplasmic nuclear location of YAP was presented by immunofluorescence. A retinopathy of prematurity (ROP) model was set up to observed the effect of VP in pathological retina.

Results: VP injection dramatically increase the YAP level in patients' blood and mice retina, as well as p-YAP^{Ser127} and p-YAP^{Ser397}. in vitro study showed the YAP level was declined in U87 cell line, while increased in HUVEC. p-YAPs measurement indicated that the inactive forms of YAP in

both U87 and HUVEC. In addition, our ROP model revealed that retinal vascular leakage was significantly alleviated by VP which functioned similar as YAP agonist.

Conclusion: The study explored the novel effect of VP in YAP activation under physiological and pathological conditions, which suggested the tissue specific effect of VP in YAP bioactivities. Our findings provide a new insight into VP effects in non-angiogenic vessels without photodynamic characteristics, and it may consider to be a novel non-invasion therapeutic intervention in retina of prematurity.

PO-239

埋藏型视盘玻璃疣光相干断层扫描血管成像特征及其与视野的相关性分析

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目的：观察埋藏型视盘玻璃疣（ODD）患眼 OCTA 影像特征。方法：纳入埋藏型 ODD 的患者 43 只眼和健康志愿者 41 只眼。将患眼分为有 RNFL 损伤的 ODD、无 RNFL 损伤的 ODD，分别设为 A、B 组；健康志愿者设为 C 组。采用 OCTA 和 Matlab 软件分析受检眼视盘周围神经纤维层（pRNFL）厚度、视盘周围视乳头层面血管密度（pNHVD）、视盘周围放射状毛细血管网血管密度（pRCVD）以及黄斑区神经节细胞复合体（GCC）厚度、黄斑中心凹旁视网膜厚度（PRT）、黄斑中心凹旁浅层血管密度（PSVD）和黄斑中心凹旁深层血管密度（PDVD）。结果：与 B、C 组受检眼比较，A 组患眼视盘周围 pRNFL、pNHVD、pRCVD 明显减少，差异有统计学意义（P＜0.05）；而 B、C 组比较，差异无统计学意义（P＞0.05）。3 组受检眼之间 GCC、PRT、PSVD 和 PDVD 比较，差异均有统计学意义（P＜0.05）。相关性分析结果显示，视盘周围 pNHVD、pRCVD 与 MD 呈正相关；与 PSD 无相关；与 BCVA 呈负相关。视盘周围 pNHVD、pRCVD 与 pRNFL 呈无相关。结论：有 RNFL 损伤的埋藏型 ODD 患眼视盘周围 pNHVD、pRCVD 与黄斑区 GCC、黄斑中心凹旁 PRT、PSVD 和 PDVD 均减少；视盘周围 pNHVD、pRCVD 与视野缺损呈相关。

PO-240

CXCL12 过表达可减轻 EAE 大鼠症状并促进中枢神经系统髓鞘修复的机制研究

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背景及目的：视神经炎可作为中枢神经系统（CNS）脱髓鞘疾病多发性硬化的首发症状出现。以往研究表明趋化因子 12（CXCL12）可介导细胞迁移、增殖、分化等一系列生物学行为，且可能在 CNS 髓鞘修复过程中有重要功能，但目前其在视神经炎中发挥的作用和具体调控机制仍尚未明确。本研究旨在通过体内和体外试验证明 CXCL12 在视神经炎中的相关生物学作用。
方法：对 Lewis 大鼠行脊髓鞘内置管术，沿管向大鼠脊髓内注射 AAV9/CXCL12-GFP 使 CXCL12 过表达并诱导构建多发性硬化脱髓鞘动物模型 EAE。观察 CXCL12 上调后动物模型发作症状的严重程度及发作频率，并进行行为学评分。同时在体外试验中，分离培养大鼠少突胶质前体细胞（OPCs）并添加不同浓度的 CXCL12 及其抑制剂 AMD3100 进行诱导，在其分化过程中通过免疫荧光（IF）检测分化的标志蛋白来确定 CXCL12 浓度与 OPCs 分化的相关性，明确 CXCL12 对 OPCs 的功能。
结果：CXCL12 在 Lewis 大鼠脊髓中过表达后可显著减轻 EAE 动物模型临床症状并减少发作频率。添加 AMD3100 及 CXCL12 受体（CXCR4）拮抗剂进行诱导可明显减弱 CXCL12 对 CNS 的保护功能。在体外试验中，10ng/ml CXCL12 可显著促进 OPCs 分化为少突胶质细胞。另外，我们发现部分 NG2+ OPCs 可共表达 CXCL12 和 CXCR4。
结论：CXCL12 可显著促进 OPCs 的成熟并分化为少突胶质细胞，从而有效保护 CNS 并减轻 EAE 动物模型的症状和体征，促进髓鞘修复。

PO-241

不同亚型视神经炎患者脑脊液蛋白质谱检测及分析比较

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目的：通过对不同亚型视神经炎患者的脑脊液进行蛋白质谱检测及分析比较，鉴定蛋白数量， 定量比较蛋白差异并研究各种蛋白的修饰变化情况，进一步分析其潜在的发病机制。
方法：根据视神经炎患者血清抗体类型选取发病急性期的 AQP4-ON 患者、MOG-ON 患者及 CVST 患者（正常对照）脑脊液各 12 例进行蛋白质组 iTRAQ 定量检测并分析。
结果：AQP4-ON 患者与正常组相比共鉴定 1278 种蛋白，有 67 种蛋白水平有显著差异。其中上调蛋白数量为 15 种，下调蛋白数量为 52 种。MOG-ON 患者与正常组相比共鉴定了 1236 种蛋白，有 104 种蛋白水平有显著差异。其中上调蛋白数量为 46 种，下调蛋白数量为 58 种。AQP4-ON 与 MOG-ON 相比共鉴定到 41 种蛋白水平有显著差异，其中共有 20 种蛋白差异倍数大于 1.5 且均为 AQP4-ON 组蛋白水平较低。
结论：不同亚型视神经炎患者脑脊液中各种蛋白含量差异，预示其具有不同的蛋白修饰变化及蛋白差异，为探索各类亚型视神经炎不同发病机制提供新的科学思路。

PO-242

抗血管内皮生长因子对兔角膜碱烧伤新生血管的抑制作用

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目的 观察角膜基质内注射抗血管内皮生长因子康柏西普（Conbercept）对碱烧伤导致的新西兰大白兔角膜新生血管（corneal neovascularization，CNV）的抑制作用。
方法 使用碱烧伤方法建立兔 CNV 模型，将 15 只建模成功的新西兰大白兔随机分为实验组、对照组、空白组三组，实验组（5 只）为角膜基质内注射康柏西普组（建模后 2w 用药），对照组（5 只）为同期角膜基质内注射生理盐水对照组，空白组（5 只）为不注射任何物质组。每日观察并于特定时间（用药前 1d，用药后 1w、2w、3w、4w）裂隙灯下拍照观察兔 CNV 生长情况，同时各组随机选取一只兔处死取房水及角膜，HE 染色观察 CNV 形态，免疫荧光观察血管内皮生长因子（vascular endothelial growth factor，VEGF）、血管内皮生长因子受体-1（vascular endothelial growth factor receptor-1，VEGFR-1）、胎盘生长因子（placental growth factor, PLGF）以及 α 平滑肌肌动蛋白（alpha smooth muscle actin, α-SMA）的表达情况，Elisa 检测房水中 VEGF 含量。
结果 实验组用药后 CNV 面积、VEGF、VEGFR-1、PLGF 以及 α-SMA 表达量均低于同期对照组、空白组，差异有统计学意义（$P<0.05$）； 对照组与空白组两组之间同期实验数据无统计学差异（$P>0.05$）。
结论 康柏西普对兔碱烧伤 CNV 有抑制作用。

PO-243

乙酰肝素酶通过调控 VEGF 表达影响视网膜新生血管形成

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糖尿病性视网膜病变（diabetic retinopathy，DR）是糖尿病最常见的并发症之一。最新的流行病学调查显示，DR 已成为导致 40 岁以上成人致盲的首要原因，而视网膜血管新生血管是造成此类患者视力丧失的共同终末的病理机制。乙酰肝素酶(Heparanase, HPA)是一种内切糖苷酶，研究发现，HPA 可增加炎症因子或生长因子表达和转位，如 VEGF、成纤维细胞生长因子等，促进局部炎症反应和血管增生。同时，内质网是维持细胞功能的细胞器，是沟通细胞核内外信号的重要枢纽，在病理状态下内质网应激会诱发非折叠蛋白反应（unfold protein response, UPR）导致细胞稳态失衡；越来越多的研究显示 UPR 的激活在视网膜疾病，如 DR、视网膜色素变性及 ROP 等发病机制中扮演着重要角色。本研究分别通过体内和体外实验，运用免疫荧光、Western blot、Real-time PCR 等方法检测 HPA、VEGF、UPR 信号分子 PERK/eIF2a/ATF4 在正常状态和疾病状态下视网膜细胞、视网膜内皮细胞（RF/6A）中的表达情况；运用 ER stress 激动剂（Tm）、（Tg）刺激 RF/6A 细胞后，观察 VEGF 及 HPA 表达改变情况；运用 siRNA 技术下调 RF/6A 细胞中 HPA 基因表达后，通过 Western blot、TUNEL、CCK8 等方法观察其在视网膜内皮细胞株（RF/6A）生长中的作用，检测

VEGF、UPR 信号分子的表达情况，并阐明 DR 的微环境对 HPA 表达调控的分子机理。最后，拟通过调节 HPA 在视网膜的表达或抑制其下游的效应通路，探讨其作为新靶点治疗 DR 的可能性。

PO-244

聚嘧啶束结合蛋白相关剪接子通过活化 ERK 通路诱导 HO-1 的表达

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目的 探讨聚嘧啶束结合蛋白相关剪接子（PSF）高表达对于糖基化终产物(AGEs)诱导下人视网膜毛细血管内皮细胞（HRCECs）细胞氧化损伤的保护作用及相应分子机制。**方法** 以 HRCECs 为模型，利用慢病毒感染的方法实现 PSF 蛋白在细胞中的高表达，辅以 AGEs 刺激，行 HE 染色法和 Hoechst33258 染色法观察 PSF 高表达对细胞损伤的保护作用以及锌原卟啉（ZnPP）的抑制剂对 PSF 的拮抗作用；并经 WB 检测 PSF 高表达对 HO-1 表达水平及细胞外调节蛋白激酶（ERK）通路活化的影响；之后再次引入 U0126（ERK 通路的特异性拮抗剂）并联合 WB 验证 U0126 对 PSF 蛋白所诱导的 HO-1 上调的逆转作用。**结果** HE 染色和 Hoechst33258 染色结果均提示 PSF 可以保护细胞免受 AGEs 的氧化损伤，且差异具有统计学意义，而 ZnPP 可以有效拮抗 PSF 的作用，提示 PSF 所发挥的保护作用与调控 HO-1 表达相关。同时，WB 结果显示 PSF 可显著上调 HO-1 的表达，差异具有统计学意义不仅如此，PSF 高表达以时间依赖性的方式上调 pERK 的表达，即显著活化 ERK 通路，差异具有统计学意义；除此之外，当我们将 U0126 引入实验体系中可发现，U0126 可有效逆转 PSF 对 HO-1 表达的上调作用以及对 Nrf2 核转位的促进作用，差异均具有统计学意义。**结论** PSF 高表达可以通过活化 ERK 通路，促进 Nrf2 转位入核进而诱导 HO-1 表达，从而保护 HRCECs 免受 AGEs 诱导的氧化损伤。

PO-245

Corneal denervation causes epithelial apoptosis through inhibiting NAD+ biosynthesis

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Purpose: Corneal innervations derived from trigeminal ganglion maintains the homeostasis and turnover of corneal epithelium. The dysfunction of corneal innervations, named corneal denervation, may cause the epithelial defects, stromal thinning and even perforation as neurotrophic keratopathy. However, the regulatory mechanism of corneal innervation on epithelium remains

unclear. Here we used a mouse corneal denervation model and explored the mechanistic relationship between corneal innervation and epithelial homeostasis.
Methods: Corneal denervation of C57BL/6 mice was conducted according to the previous description of trigeminal axotomy. The apoptosis of corneal epithelium was examined by microarray analysis and TUNEL assay. Neurotransmitter (TRP, KYN and 3-HK), intracellular NAD^+ content and NAD^+ biosynthesis-related enzymes were analyzed by real-time PCR, immunofluorescence staining and Western blot. The inhibitor of nicotinamide phosphoribosyltransferase (NAMPT) FK866, or the exogenous nicotinamide mononucleotide (NMN) or NAD^+ was used to evaluate the effect of inhibiting or replenishing NAD^+ in the apoptosis of cultured corneal epithelial cells and epithelial erosion in corneal denervated mice. The related signaling pathways were further analyzed by Western blot.
Results: The mice after corneal denervation showed apparent epithelial cell apoptosis and erosion, accompanied with increased TRP, KYN and 3-HK levels, reduced intracellular NAD^+ contents and NAMPT expression in denervated corneal epithelium. In mice and cultured cells, the NAMPT inhibitor FK866 recapitulated the apoptotic induction of corneal epithelial cells. Moreover, the replenishment of NMN or NAD^+ improved the epithelial erosion in denervated mice and the apoptosis induction in cultured cells. Mechanistically, NMN or NAD^+ restored the activation of SIRT1, AKT and CREB signaling pathways.
Conclusions: Corneal denervation impaired the intracellular NAD^+ level, caused cell apoptosis and epithelial defect. The data suggests corneal innervation controls epithelial homeostasis through regulating NAD^+ biosynthesis.

PO-246

Corneal epithelial cells alter phenotype by metabolic reprogramming to promote corneal neovascularization

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Purpose: To investigate whether metabolic reprogramming promote corneal neovascularization (CNV) through altering phenotype of corneal epithelial cells.
Methods: Keratin-12-Cre mice were bred to mT/mG dual reporter mice to target green fluorescent protein (GFP) within Keratin-12 cells, whereas other cells expressed tomato red. Transgenic mice Tomato/Keratin-12 were used to observe the change of keratin-12 in the process of corneal neovascularization in four different models, alkali burn, big range of scratch corneal epithelium, small range of scratch corneal epithelium and corneal suture through flat-mounted staining, digital camera under fluorescence excitation. Corneal neovascularization and the repair of corneal epithelium were observed under the slit lamp microscope and digital camera under fluorescence excitation at 470 nm. The expression of Keratin-5(K5), keratin-12(K12), keratin-13(K13), keratin-

14(K14), Carnitine palmitoyltransferase IA (CPTIA) and Hexokinase 2 (HK2) by normal and model mice corneas was determined via quantitative (q)RT-PCR , immunohistochemistry and protein mass spectrometry.
Results: Keratin-12 was predominantly expressed by epithelial cells in normal mice corneas. With the formation of corneal neovascularization, the expression of CPT1A decreased and HK2 increased, thereby changing the phenotype of corneal epithelial cell. The expression of keratin-12 and keratin-5 were decreased, while the expression of keratin-13 and keratin-14 were increased.
Conclusions: Our results show that the altered phenotype of corneal epithelial cells in facilitating corneal neovascularization through metabolic reprogramming. We suggest that targeting corneal epithelial cells metabolism might be a promising strategy for CNV treatment.

PO-247

玻璃体腔注射康柏西普治疗视网膜静脉阻塞(RVO)继发黄斑水肿的临床效果及相关分析

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目的：评估玻璃体腔注射康柏西普治疗 RVO 继发黄斑水肿的临床效果及相关分析
方法：将确诊为 RVO 继发黄斑水肿的患者 30 例(30 眼)纳入研究，采用康柏西普 0.05ml 玻璃体腔注射治疗，每月 1 次，持续 3 个月，随后根据患者病情判定是否继续注射，随访 6 个月。每月进行一次评估，评估内容为最佳矫正视力(BCVA)、黄斑中心凹视网膜厚度(CMT)的平均值和最大值，并观察术后有无并发症的发生。将最终矫正视力和黄斑中心凹厚度(平均值和最大值)分别从性别、年龄、病程、治疗前 BCVA、CMT 等方面分折以评价术后视力恢复的影响因素。
结果：共有 30 名 RV0 患者 30 眼纳入研究，其中包括视网膜中央静脉阻塞(CRVO)16 例(16 眼)，视网膜分支静脉阻塞(BRVO)14 例(14 眼)。12 名患者为男性(40%)，18 名患者为女性(60%)。BRVO 组和 CRVO 组在年龄(P= 0.083)，性别(P=0.765)，研究眼别(P= 0.301)，病程(P=0.232)，基线 BCVA(P=0.051)，IOP(P= 0.237)之间没有统计学差异。CRVO 组，黄斑区视网膜厚度更大(平均值：P=0.026，最大值：P=0.035)。在第 9 个月时，BRVO 组 BCVA 提高了 25.38±8.23 个字母，黄斑区视网膜厚度平均值降低了 340.13±20.43μm，CRVO 组 BCVA 提高了 21.29±18.29 个字母，黄斑区视网膜厚度平均值降低了 467.86±149.30μm，两组间没有统计学差异(P= 0.481,P=0.122)。BCVA 从基线水平到最后一次随访的变化值与年龄(P=0.001)，眼别(P=0.013)，病程(P=0.018)，基线 BCVA(P=0.026)，基线黄斑区视网膜厚度平均值(P=0.005)与最大值(P=0.048)之间有很大的相关性。
结论：玻璃体腔注射康柏西普治疗 CRVO 和 BRVO 均安全有效。

PO-248

Long non-coding RNA MEG3 silencing protects against light-induced retinal degeneration

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Purpose: Excessive light exposure leads to retinal degeneration and accelerates the progression and severity of several ocular diseases, such as age-related macular degeneration (AMD) and retinitis pigmentosa. Long non-coding RNAs (LncRNAs) have emerged as important regulators of photoreceptor development and ocular diseases

Methods and Results: We built the light-induced retinal neurodegeneration model and used qRT-PCR to showed that light exposure leads to increased MEG3 expression. To reveal the role of MEG3 in light-induced retinal degeneration in vivo, an intravitreal injection of scrambled shRNA or MEG3 shRNA adeno-associated viral shRNAs was performed, and the results of TUNEL assays, the dark-adapted ERG amplitudes, morphometric analysis showed that MEG3 silencing protects against light-induced retinal degeneration in vivo. We used the MTT assay and PI staining to reveal that MEG3 silencing protects against light stress-induced photoreceptor cell apoptosis in vitro. To investigate the molecular mechanism of MG3 function，RNA pull down and RIP experiments revealed a direct interaction between p53 and MEG3 and results of western blots and qRT-PCR showed that MEG3 silencing significantly decreased the activity of caspase 3/7.

Conclusion: MEG3 expression was significantly up-regulated after light insult in vivo and in vitro.MEG3 silencing protected against light-induced retinal degeneration in vivo and light-induced photoreceptor cell apoptosis in vitro. Mechanistically, MEG3 regulated retinal photoreceptor cell function by acting as p53 decoy. MEG3 silencing decreased caspase 3/7 activity, up-regulated anti-apoptotic protein (Bcl-2) expression, and down-regulated pro-apoptotic protein (Bax) expression. Taken together, this study provides a promising method of MEG3 silencing for treating light-induced retinal degeneration.

PO-249

Association among Retinal Microvascular Damage, Structural Changes and Visual Acuity in the Early stages of Diabetic Retinopathy

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Purpose. To investigate the associations among retinal microvascular damage, thickness changes of individual retinal layers and visual acuity (VA) in eyes with early stage of diabetic retinopathy (DR) and the absence of diabetic macular edema (DME).
Methods. This is a prospective, observational study. The cohort included 55 eyes from 36 diabetic patients with nonproliferative diabetic retinopathy (NPDR) without any previous treatment. Eyes were classified into 2 groups by VA: normal (logMAR, 0; Snellen equivalent, 20/20) and decreased (logMAR, >0; Snellen equivalent, <20/20). The control group included 33 eyes from 33 healthy participants with normal vision. Macula microvasculature was evaluated with the spectral-domain optical coherence tomography (SDOCT) angiography and intraretinal layer thickness evaluated with the SD-OCT. The quantification of microvascular parameters and retinal thickness was performed by a custom algorithm.
Results. The mean vessel density (VD) in deep capillary layer was lower for eyes with DR and decreased VA compared with controls (0.063 vs. 0.072; P=0.002), and was also lower compared with DR with normal VA (0.063 vs. 0.069, P=0.031). No difference was found in the comparison of area of foveal avascular zone area (FAZ) and VD in superficial vessel density among groups. The thickness of inner nuclear layer (INL), outer nuclear layer (ONL) as well as total retina in the DR with decreased VA group were increased significantly compared with the DR with normal VA group (INL: 18.16 vs. 15.97, P=0.015; ONL: 105.07 vs. 97.76, P<.001; Total: 246.39 vs. 237.99, P=0.002).
Conclusions. Decreased vessel density in deep capillary layer and edema of INL and ONL are associated with reduced VA in eyes with early stage of DR. These methods may act as a promising role in monitoring disease progression and identifying parameters that affect visual function.

PO-250

Lower Retinal Macular Capillary Density Correlated with Cognitive Impairment in Type 2 Diabetes Mellitus Without Clinically Detectable Retinopathy

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Objective: Recent studies have shown an increased risk for cognitive impairment in patients with type 2 diabetes. The purpose of this study was to investigate the retinal microvasculature changes in type 2 diabetic patients with cognitive impairment compared with those with no cognitive impairment and normal controls.
Methods: Fifty-four patients with type 2 diabetes without clinically detectable retinopathy were recruited together with twenty cognitively normal controls. All participants underwent retinal photography and had the Mini-Mental State Examination (MMSE). Cognitive impairment was

defined as an MMSE score of 23 or less. Optical coherence tomography angiography was used to image the retinal microvascular network at the macular region, including superficial vascular plexus (SVP), and deep vascular plexus (DVP). General linear modeling was used to examine the associations of retinal microvasculature and cognitive impairment, adjusting for confounders.

Results: Cognitive impairment was present in thirty participants (55.6%). In the total population, after adjusting for age, sex, education and other factors, patients with cognitive impairment had significant lower density of DVP in the inferior quadrant than that of the patients with normal cognition (P=0.028) and controls (P=0.003) respectively.

Conclusions: Type 2 diabetes with cognitive impairment have less density of retinal microvascular networks, especially in the DVP. Our findings suggest the presence of retinal microvascular dysfunction in cognitive impairment with type 2 diabetes, even without clinically detectable retinopathy.

PO-251

A Case of Hyaluronic Acid Induced Blindness with Ophthalmoplegia and Ptosis

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Hyaluronic Acid (HA) injection can lead to skin necrosis, visual loss, and other complications. The blindness with ophthalmoplegia and ptosis is a rare, but terrible and devastating complication. The disfigured appearance usually has significant impact on patient’s social life.There is no standard treatment. A patient with HA induced blindness, ophthalmoplegia and ptosis is reported. Six days after the onset, peribulbar/retrobulbar injections of high dosage hyaluronidase were performed. The orbital edema and ptosis immediately improved. The ophthalmoplegia and ptosis improved significantly within a month and resolved completely within three months, although the right vision remained blind. Peribulbar/retrobulbar injection of hyaluronidase is a potentialrescue therapy for the HA induced ophthalmoplegia and ptosis.

PO-252

多通道光纤记录系统在神经疾病研究中的应用

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目的：阐述多通道光纤记录系统基本原理，探讨其在神经系统，神经疾病中的应用，讨论其优势与不足，并对其在医学领域的研究前景提出展望。
方法： 通过检索中国知网、PubMed 等数据库，查阅相关文献，进行资料的整合与分析。
结果：多通道光纤记录系统使用一根多模光纤植入大脑。荧光信号神经元活动指标通过光纤返回，由检测器检测。这一技术在神经系统，神经疾病中有较多应用。检索发现：多通道光纤记录系统在中缝背核神经元和奖赏关系、在内嗅皮层-海马投射末梢钙活动记录、在室旁丘脑区域、在臂旁神经元、在脑转移瘤的光纤拉曼成像、在 M4 毒蕈碱乙酰胆碱受体激活剂等研究中的已有应用。
结论：多通道光纤记录系统凭借着适用行为多样、抗电磁干扰能力强、记录稳定可重复、长时程等诸多优点，在识别诊断神经疾病、评价药物治疗效果中有较好的判断依据。相信在科研工作者的努力下，多通道光纤记录系统在神经系统乃至视觉神经科学领域中有更加深入的应用。

PO-253

DSCR1 调控 CREB-Bcl-2 信号通路在氧化应激诱导 RGCs 凋亡中的作用

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目的：研究氧化应激状态下唐氏综合征候选区域 1（DSCR1）基因在视网膜神经节细胞（RGCs）中的表达变化及其在 RGCs 凋亡中的作用。
方法：构建 SD 大鼠视神经碾压伤模型（ONC）和 H_2O_2 诱导的原代 RGCs 氧化应激模型，运用 western blot、real time PCR 和免疫荧光等方法观察 DSCR1 的表达与定位情况。通过体外转染技术，观察过表达/敲除 DSCR1 对 CREB 及其磷酸化、Bcl-2 转录表达、RGCs 凋亡和存活情况的影响。
结果：DSCR1 表达于正常 SD 大鼠 RGCs 上，且在 ONC 模型和 H_2O_2 诱导的 RGCs 细胞模型中 DSCR1 表达显著增加且具有时间依赖性，呈现“先升高后降低”的趋势；其中 DSCR1 蛋白表达量和 mRNA 水平在 ONC 术后第 5 天与 H_2O_2 处理 24h 这两个时间点上达到高峰（$P<0.0001$）。通过体外转染技术和 western blot，发现在 H_2O_2 处理组中，过表达 DSCR1 基因，RGCs 中 CREB 磷酸化水平、Bcl-2 转录表达和 RGCs 存活率显著增加，RGCs 凋亡率显著降低；敲除 DSCR1 基因，RGCs 中 CREB 磷酸化水平、Bcl-2 转录表达和 RGCs 存活率显著降低，RGCs 凋亡率显著增加。
结论: DSCR1 通过调控 CREB-Bcl-2 信号通路，保护氧化应激诱导的 RGCs 凋亡。

PO-254

健康人群中黄斑微血管密度改变与认知功能障碍的关系

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引言：据文献报道，痴呆患者的视网膜黄斑微血管会发生改变。但是，这些黄斑微血管参数与正常人群认知之间的关系仍然很模糊。本研究旨在探讨健康人群黄斑微血管与认知的关系。
方法：这项横断面研究纳入了85名无痴呆的健康人(年龄>40岁)。采用蒙特利尔认知评估量表(MOCA)和简短精神状态量表(MMSE)对每名受试者的认知状况进行评估。用光学相干断层血管造影(OCT-A)对受试者黄斑微血管进行成像，并用自动血管造影软件测量微血管密度。同时记录心血管等危险因素信息。应用广义估计方程（GEE）进行统计分析，探讨黄斑微血管密度与整体认知的关系。
结果：纳入实验的85人平均年龄为55(8.0)岁，55%为女性。经危险因素矫正后，深层毛细血管丛总区密度(β=0.299，CI=0.004~0.594，p=0.047)、中心凹旁区密度(β=0.219 CI=0.022~0.417，p=0.030)与MOCA评分显著相关。深层毛细血管丛总区密度与MOCA评分的延迟记忆相关(β=0.861，CI=-0.015~1.056，p=0.030)。MMSE评分的延迟记忆与中心凹区浅层、深层毛细血管丛密度有显著相关性(p<0.05)。
结论：健康人群黄斑微血管密度的改变，尤其是深层微血管密度的改变与认知能力有关（正相关）。基于 OCT-A 的视网膜深层毛细血管丛密度指标分析方法可能可以为血管与认知的关系的深入理解提供新的技术途径和思路。

PO-255

糖尿病性视网膜病变患者凝血因子Ⅷ合并Ⅻ异常

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摘要：患者男，48岁，2016年1月8日主因右眼突然视力下降5天入院。既往史：糖尿病2年，高血压2年。患者左眼术后持续出血，检查患者凝血因子Ⅷ合并Ⅻ异常。该例病例提示我们在临床工作中，需要对于后段手术的患者详细谨慎的检查凝血功能。对有凝血因子缺乏的患者采用输注血浆补充凝血因子后再行必要的手术治疗[3]。一旦出现血小板低下，凝血因子消耗，存在出血倾向即需转往专科再次输注血浆治疗，防止严重出血的情况发生。
ABSTRACT: A 48 year old male patient with past history of two year diabetic and hypertention presented to our hospital. After vitrectomy on the left eye, the hemorrhage can not be controlled.The diabetic retinopathy patient was checked out Factor Ⅻ and Ⅷ deficiency. From this case, we learn a lesson that patients should be checked coagulation function carefully before vitrecomy. Some coagulation factor deficiency patient may not have any syndrome. If the patient with coagulation factor deficiency, we should do prophylactic treatment before operation.

PO-256

探讨自体 Tenons 囊在青光眼滤过泡渗漏修补中的应用

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目的 探讨应用自体 Tenons 囊组织修补滤过泡渗漏的手术效果。方法 回顾性病例系列研究。收治 2010 年 1 月至 2018 年 8 月收治青岛眼科医院的 16 例（16 眼）青光眼小梁切除术后滤过泡渗漏患者，在球周组织麻醉下剪开滤过泡边缘球结膜剥离囊样变性滤过泡，钝性分离上方球结膜瓣，暴露巩膜瓣并按原巩膜板层重新剥离，取原巩膜瓣相应大小的健康 Tenon 组织备用，10-0 尼龙线固定缝合巩膜瓣，将备用的 Tenon 组织填塞于巩膜瓣下，形成前房，探查眼压和滤过，将上方球结膜瓣对位缝合于角膜缘。评估指标主要包括术前术后眼压、视力、术后并发症等。结果 术后随诊时间中位数 10 个月（2 个月至 8 年）。眼压由术前 9.7±1.2mmHg（6-15mmHg）上升至术后 3 个月 15.5±2.7mmHg（10-20mmHg），差异有显著性（t=2.63，P=0.02），末次随访均保持滤过功能。术后 3 个月视力较术前有明显改善（t=3.04，P=0.02），末次随访视力较术后 3 个月无显著改变（t=0.81，P=0.42）。修补术后有 3 眼发生一过性浅前房，其中 2 眼合并脉络膜脱离，药物治疗 1 周内恢复，无其他严重并发症。结论 应用 Tenon 囊组织联合结膜瓣前徙术修补滤过泡渗漏是一种简单易行、安全有效的手术方式。

PO-257

Genome-wide identification of circular RNAs as a novel class of putative biomarkers for an ocular surface disease.

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BACKGROUND/AIMS:
Pterygium is a common ocular surface disease with an unknown etiology and threatens vision as it invades into the cornea. Circular RNAs (circRNAs) are a novel class of RNA transcripts that participate in several physiological and pathological processes. However, the role of circRNAs in pathogenesis of pterygium remains largely unknown.
METHODS:
Genome-wide circRNA expression profiling was performed to identify pterygium -related circRNAs. GO analysis, pathway analysis, and miRNA response elements analysis was performed to predict the function of differentially expressed circRNAs in pterygium. MTT assays, Ki67 staining,

Transwell assay, Hoechst 33342 staining, and Calcein-AM/PI staining were performed to determine the effect of circRNA silencing on pterygium fibroblast and epithelial cell function.
RESULTS:
Approximately 669 circRNAs were identified to be abnormally expressed in pterygium tissues. GO analysis demonstrated that the host genes of differentially expressed circRNAs were targeted to extracellular matrix organization (ontology: biological process), cytoplasm (ontology: cellular component), and protein binding (ontology: molecular function). Pathway analysis showed that dysregulated circRNAs-mediated regulatory networks were mostly enriched in focal adhesion signaling pathway. Notably, circ_0085020 (circ-LAPTM4B) was shown as a potential biomarker for pterygium. circ_0085020 (circ-LAPTM4B) silencing affected the viability, proliferation, migration, and apoptosis of pterygium fibroblast and epithelial cells in vitro.
CONCLUSIONS:
This study provides evidence that circRNAs are involved in the pathogenesis of pterygium and might constitute promising targets for the therapeutic intervention of pterygium.

PO-258

The neuroprotective effects of novel estrogen receptor GPER1 in mouse retinal ganglion cell degeneration

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Purpose. To investigate the protective function of the novel G protein coupled estrogen receptor (GPER1) in the mouse retina to NMDA induced neurotoxicity.
Methods. Intravitreal NMDA injection was performed to induce retinal ganglion cells (RGCs) toxic injury. 17-β-estradiol (E2), GPER1 agonist (G-1) or antagonist (G-15) were subcutaneous administered for 14 days before NMDA injection. Immunofluorescence staining was performed to explore the RGCs survivor rate and Müller cell gliosis. TUNEL staining was used to evaluate the RGC apoptosis. The involved molecular pathway was detected via antibody microarray.
Results. We firstly identified the expression of GPER1 in mouse retina, which mainly located in the ganglion cells layer (GCL) and inner nuclear layer (INL). Application of E2 or G-1 significantly increased the survivor of Brn3a positive RGCs. E2+tamoxifen (TAM), estrogen receptor α and β (ERα and ERβ) antagonist, mimicked the protective effects, whereas E2+G-15 did not. Moreover, the TUNEL positive RGCs and GFAP expression were attenuated in E2/G-1 group. Application of the PI3K/Akt antagonist LY294002 abolished the effect of G-1. Antibody microarray indicated the apoptosis modulators: Bad, Caspase 3, Caspase 7, Smad2, P-53 and TAK1 were all obviously reduced in G-1 group. The similar protective effects of G-1 was found in acute ocular hypertension (AOH), an acute glaucoma model.

Conclusion. Estrogen exhibited protective effects in mouse retina, which was modulated via novel estrogen receptor GPER1, but not classical receptors ERα and ERβ. Activation of GPER1 attenuated RGCs apoptosis and Müller cells gliosis, indicating a potential target GPER1 in the glaucoma treatment.

PO-259

Resting cerebral blood flow alterations specific to the retinitis pigmentosa patients revealed by arterial spin labeling perfusion magnetic resonance imaging.

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PURPOSE: Retinitis pigmentosa (RP) is a inherited retinal degeneration characterized by retinal photoreceptor cells death and progressive vision loss. Previous studies revealed that the atrophy of visual pathway and visual cortices was observed in RP patients. Whereas alterations of resting cerebral blood flow (CBF) occurring in RP patients remains unknown. The purpose of the study was to assess the resting CBF changes in RP patients using pseudo-continuous arterial spin labeling (pCASL) perfusion method.

METHODS: 49 RP patients (31 males and 18 females) and 51 healthy controls (HCs) (30 males and 21 females) underwent T1-weighted structural and pCASL sequence MRI scans at rest. Two sample t-tests was performed to compare CBF differences between the two groups by using ASLtbx toolbox and spm12.Pearson correlation was used to analyze the relationships of CBF values with the clinical variables in RP group.

RESULTS: Compared with HCs, RP patients had significantly lower CBF values in the bilateral cuneus/lingual gyrus/precuneus/posterior cingulate/middle occipital gyrus.[voxel level at $P < 0.01$, Gaussian random field(GRF)-corrected, cluster level at $P < 0.05$]. Moreover,

In the RP group, the CBF values in the left middle and inferior occipital gyrus were positively correlated with mean retinal nerve fiber layer (RNFL) thickness, in contrast, the CBF values in

several regions were correlated with and the duration of disease and onset age.

CONCLUSION: Our results highlighted that RP patients exhibited decreased CBF values in the visual cortices and vision-related cortices,which was closely related to the severity of disease. Our results suggested that altered CBF might be a contributing factor to trans-synaptic retrograde degeneration of visual pathway in RP patients.

PO-260

抗 VEGF 联合微脉冲激光按需治疗糖尿病性黄斑水肿的真实世界研究

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目的: 分析真实世界中抗 VEGF 联合微脉冲激光治疗糖尿病性黄斑水肿(DME)的临床效果。
方法: 采用前瞻性队列研究方案，绵阳万江眼科医院 2016 年 11 月至 2017 年 11 月共 73 例（125 眼）DME 纳入分析，按糖尿病视网膜病变（DR）的程度分为非增殖期（NPDR）组 33 例（45 眼）和增殖期（PDR）组 40 例（80 眼）。治疗方案采用按需治疗原则即：当视网膜中央厚度（CMT）大于 400um 时给予抗 VEGF 治疗（康柏西普玻璃体注射），当 CMT 小于 400um 则采用微脉冲激光治疗。观察两组注药次数、微脉冲激光次数，BCVA 和 CMT，随访时间半年。
结果:两组末次随访 BCVA 和 CMT 均较基线值有改善，NPDR 组 BCVA 从 4.43±0.9 提高到 4.76±1.7，(t=2.27,p<0.05)；CMT 从 492.5±72.6 减小为 238.6±29.7，(t=27.52,p<0.05)。PDR 组 BCVA 从 4.23±0.8 提高到 4.52± 1.1，(t=2.84,p<0.05)；CMT 从 516.7±23.4 降低到 287.6±17.3，(t=62.65,p<0.05)。两组末次随访 BCVA 比较无明显统计学差异，(t=0.80,p>0.05)。两组末次随访 CMT 比较有统计学意义，(t=11.67,p<0.05)。NPDR 组平均注药 3.5±1.2 次和平均微脉冲激光 4.7± 2.3 次，少于 PDR 组平均注药 4.8±2.4 次和平均微脉冲激光 5.2± 1.7 次，p 值均<0.05。
结论: 在真实世界中，微脉冲激光联合抗 VEGF 按需治疗 DME 可有效改善患者视力和黄斑水肿程度，NPDR 合并 DME 治疗次数少于 PDR 患者。

PO-261

慢性光照联合氢醌诱导小鼠年龄相关性黄斑变性模型

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目的：采用慢性光照联合氢醌喂食的方法诱导建立小鼠年龄相关性黄斑变性模型，观察其病理特征、超微结构及视网膜功能改变，为 AMD 发病机制及防治研究提供新模型。**方法：**3-4 月龄 C57BL/6 小鼠 20 只随机分为模型组和正常组，每组 10 只。模型组小鼠被喂以基于基础纯净合成的含 8g.Kg^{-1} 氢醌的饮食，同时每日接受 12h、强度 2500 lx 的光照。正常组小鼠被喂以不含氢醌的同配方饮食，正常光照明，饲养 3.5 个月。采用视网膜电图、光镜及电子显微镜技术观察两组小鼠视网膜功能和结构改变，TUNEL 法观察视网膜细胞凋亡，免疫荧光法检测视网膜、脉络膜血管内皮生长因子（*VEGF*）及 CD31 的表达和分布。**结果：**ERG 结果显示模型组小鼠视网膜功能较正常组下降；光镜观察显示模型组视网膜色素上皮层呈现萎缩样改变，Bruch 膜结构破坏，可见新生血管样组织长入，感光细胞计数模型组为 164.67+34.37，正常组为 243.33+15.231，模型组感光细胞数较正常组显著减少，

差异有统计学意义（P<0.05）；透射电镜显示，模型组视网膜的感光细胞的膜盘结构松散变形，部分碎裂，RPE 细胞微绒毛变短，Bruch 膜不规则增厚，外胶原层见层状沉积物，脉络膜毛细血管基底膜内皮细胞突入 Bruch 膜内。TUNEL 结果显示正常组几乎没有凋亡细胞，模型组视网膜色素上皮细胞层及感光细胞层出现了大量凋亡细胞，感光细胞凋亡率 43+2.73%，两组差异有统计学意义（P<0.01）。免疫荧光结果显示，正常组外丛状层、神经纤维层可见散在 VEGF 弱阳性表达，模型组除上述细胞外，在 RPE 细胞层亦可见强阳性染色。正常组视网膜各层细胞未见明确 CD31 阳性染色，模型组 RPE 细胞层可见较强 CD31 表达，提示 RPE 层新生血管生长。

结论：慢性光照联合氢醌饲料喂养的小鼠非常接近人 AMD 的发病进程及特点，可为进一步探讨 AMD 发病机制及防治研究提供可靠的动物模型。

PO-262

视神经脊髓炎患者血浆置换期间的生活体验研究

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目的：深入了解视神经病变患者血浆置换治疗期间的生活体验。为建立患者血浆置换期间的个性化照护模式提供理论依据，找到更好的医患沟通模式，提高患者治疗期间的配合度。

方法：采用质性研究中的现象研究方法，针对 2018 年 1 月至 2018 年 12 月于陆军军医大学西南医院进行血浆置换的 30 位视神经患者进行半结构式访谈，然后采用 Colaizzi 七步分析法对资料进行整理和分析。

结果：本研究的 30 位视神经脊髓炎患者，在血浆置换期间生活体验可归纳为患者角色缺如、心理消极以及焦虑的精神状态。患者希望能提前预防血浆置换期间的过敏反应，希望能采取更低廉便利的方式治疗此病。

结论：视神经脊髓炎患者血浆置换期间的生活处于不同程度的应急状态。应积极开展血浆置换前的心理疏导和健康宣教。本研究充分反映现有健康管理模式的匮乏与不足。患者置换期间处理不良反应的时效性，对整个治疗期间的满意度起着至关重要的作用。及时满足患者的个性化需求是确保有效医患沟通的根本。

PO-263

A case of ischemic optic neuropathy caused by stenosis of the internal carotid artery: a case presentation and review of the literature

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Background: Ischemic optic neuropathy (ION), due to a disease of arteries supplying the optic nerve, is an infarction of the anterior or posterior part of the optic nerve. This report highlights a case of monocular decreasing vision acuity due to ION caused by dissection of the internal carotid artery, which is a relatively rare cause.
Case report: A 44-year-old female presented to our clinic complaining of decreasing visual acuity and defected visual field of the right eye for 1 week. Clinical evaluation showed best corrected visual acuity of 0.05 OD, and 1.0 OS. The pupil of the right eye showed little reaction to light and had a relative afferent pupillary defect. The visual field test of the right eye disclosed a defect in the inferior field connecting to the blind spot. ERG recording showed declined rod function in both eyes and declined cone function in the right eye. The pattern visual evoked potential (PVEP) and flash visual evoked potential (FVEP) revealed a delay of peak time and reduced amplitude in the right eye. An enhanced computed tomographic (CT) scanning with the three dimensional reconstruction and CT angiography of the cervical vertebrae revealed a 21.5% stenosis of the right intracarotid artery dissection (ICA) and an occlusion of the distal segment in the right cerebral middle artery, which as confirmed by digital subtraction angiography (DSA). This case was diagnosis as ION due to ICA dissection.
Conclusions: Ischemic optic neuropathy with the signs of decreasing monocular vision acuity may occur due to intracarotid artery dissection, with no other obvious neurologic symptom. The present case emphasizes the importance of suspicion of carotid artery problems as the underlying cause for ION when facing similar cases in order to avoid further complications.

PO-264

58 例特发性颅内压增高症病人早期误诊为眼科疾病之探讨

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目的 分析特发性颅内压增高症（Idiopathic intracranial hypertension，IIH）误诊为眼科疾病病例的临床特点，总结减少误诊误治的措施，提高临床诊断的正确率。设计 回顾性病例分析。研究对象 58 例 IIH 误诊病例。方法 回顾性分析 58 例明确诊断为 IIH，但入院前均误诊为不同眼科疾病患者的临床资料，总结误诊病例特点及误诊原因。主要指标 误诊病例的临床表现、视功能和影像学检查结果、误诊后治疗转归及入院后确诊情况。 结果 误诊 58 例，男 22 例（37.9%），女 36 例（62.1%），病程 6 天-8 年，平均 7.4 个月；肥胖者 18 人，占 31.0%，超重者 28 人，占 48.3%；临床症状以眼部症状为主（100%），持续性视力下降最为多见（62.0%）；所有患者均有双侧视乳头水肿；误诊诊断依次前 4 位的分别是：视神经炎 28 例（48.3%），前部缺血性视神经病变 10 例（17.2%），

视乳头水肿 6 例（10.3%），视盘血管炎 5 例（8.6%）；46 例患者（79.3%）接受过激素治疗，疗效差。结论 部分 IIH 临床特点不典型，误诊率高。通过提高临床医师对颅内压增高综合征，特别是特发性颅内压增高症的认识，仔细询问病史，根据症状及体征，结合头部/视神经磁共振（magnetic resonance imaging, MRI）、腰椎穿刺等辅助检查，可有效提供临床诊断的正确率。

PO-265

不同类型神经炎患者血清及脑脊液中 IGF-1 和 IGFBP-3 水平及疾病转归

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目的：检测不同类型 ON 患者血清和脑脊液中 IGF-1 和 IGFBP-3 的浓度，分析其与预后的相关性，为疾病的预后及髓鞘再生的机制研究提供实验依据；
方法：收集 2015 年 1 月至 2016 年 9 月解放军总医院眼科部分急性视神经炎住院患者，应用 Elisa 的方法检测不同类型 ON 患者血清和脑脊液中 IGF-1 和 IGFBP-3 的浓度，计算其比值，评估其与视力预后的关系；
结果：在 AQP-4 抗体阳性的 ON 患者中，血清和脑脊液中 IGF-1 和 IGFBP3 浓度及其比值和对照组比较无明显统计学差异（P=0.12)；在 AQP4-Ab 阴性的 ON 患者中，血清和脑脊液中 IGF-1 浓度和 IGF-1/IGFBP3 比值和其他两组比较均显著降低，脑脊液中 IGFBP-3 浓度明显增高，说明 IGF-1 在 AQP-4 抗体阴性的视神经炎中利用度降低；脑脊液中 IGF-1 和 IGF-1/IGFBP3 比值和预后视力具有明显正相关性，脑脊液中 IGF-1 浓度高或 IGF-1/IGFBP3 比值高的患者视力预后较好。
结论：脑脊液中 IGF-1 在 AQP-4 抗体阴性的 ON 患者中具有判断预后价值；IGF-1 浓度越高，IGF-1/IGFBP-3 比值越高，视功能恢复越好。

PO-266

Lamina cribrosa astrocytes are involved in the self-regulation ability of optic nerve head vessels

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Purpose: To investigate the role of the lamina cribrosa (LC) astrocytes in the self-regulation ability of optic nerve head (ONH) vessels and to investigate the underlying molecular mechanisms.

Methods: The vitro ischemia/reperfusion model (Oxygen-glucose deprivation/reperfusion, OGD/R) was constructed to observe the changes in cell morphology and the expression of proteins of the LC astrocytes. The LC astrocytes and vascular smooth muscle cells were co-cultured to test the role of LC astrocytes in the self-regulation ability of vessels.
Results: Under the condition of OGD/R, the expression of GFAP protein, the mTOR protein, the $cPLA_2$ protein and the PGE_2 concentration in supernatant of the LC astrocytes were up-regulated, which can be limited by the mTOR inhibitor. By co-culturing with the LC astrocyte, the expression of MYPT1 protein of the vascular smooth muscle cells (VSMCs) is increased, and the VSMCs had a relaxed morphology.
Conclusions: In vitro OGD/R conditions, the lamina cribrosa astrocyte were activated through the mTOR signaling pathway. Also increased the secretion of PGE_2 to localy regulate dilation of vascular smooth muscle cells. The lamina cribrosa astrocytes might regulate the local blood flow of ONH.

PO-267

GATA-binding protein 3 (GATA3) Regulates Transcription of the Breast Cancer Type 1 Susceptibility Protein (BRCA1) in Retina Neurocytes

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Previous studies have reported that the Breast Cancer Type 1 Susceptibility Protein (BRCA1) plays an important role in retinal neuocytes development. However, the transcriptional mechanisms of BRCA1 in retinal neurocytes remains unclear. Here, we demonstrate that the transcription factor GATA-binding protein 3 (GATA3) could specifically bind to BRCA1 promoter, as evidenced by the GATA3 depletion and overexpression assay as well as DNA pull-down assay. Moreover, our data shown that BRCA1 is downregulated in Trichostatin A(TSA)-differentiated retinal ganglion precursor-like 661W cells. And BRCA1 knockdown could induce the similar differentiation effect as TSA: promoting neurites outgrowth and down-regulating the Nestin expression. Consistently, GATA3 knockdown could markedly promote the differentiation of 661W cells. And exogenous GATA3 could significantly inhibit the neurite outgrowth in mouse retinal neurocytes. *In vivo*, we found that both GATA3 and BRCA1 are highly expressed in 1-day old mouse but dramatically decreased with ages. Thus, our data suggest that the GATA3/BRCA1 signaling is involved in the differentiation of retinal neurocytes.

PO-268

Exosome-mediated delivery of an anti-angiogenesis peptide inhibits angiogenesis by targeting VEGFR2 phosphorylation in human umbilical vein endothelial cells.

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Background & Aims: Diabetes mellitus is a global epidemic with profound morbidity. Diabetic retinopathy (DR) is a specific microvascular complication of diabetes and is a major cause of vision loss in middle-aged and elderly people. Anti-vascular endothelial growth factor (VEGF) therapies for DR has been widely used for the treatment of neovascular fundus diseases to improve quality of life and reduce vision impairment. Intravitreally injection are used to improve the uptake efficiency of anti-VEGF agents with strong hydrophilicity and high molecular weight. Moreover, the repeated injections that are required can cause infection and tissue injury. A more effective and noninvasive manner remains to be investigated.

Methods: In this study, we used endogenous nano-vesicles—exosomes derived from human umbilical vein endothelial cells (HUVEC) as the delivery vehicle of KV11 which is a functional anti-angiogenesis peptide previously demonstrated to inhibit pathological neovascularization in the retina. In this work, peptide KV11 was chemically conjugated to a reported peptide CP05 which is a novel exosomal anchor peptide enables direct and effective binding to exosomes. The angiogenesis efficacy of purified exosomes derived from HUVEC binding with CP05-KV11 were investigated *in vitro*, VEGF receptor 2 (VEGFR2) phosphorylation, migration, microtubule formation and endothelial cell permeability were tested.

Results: Flow cytometry analysis of FITC-labeled CP05-KV11 incubated with exosomes derived from HUVEC (EXO_{HU}) revealed a high binding efficiency about 86.5% of labeled peptides were binding to exosomes. Compared with KV11 alone, EXO_{HU} binding with CP05-KV11 (EXO_{KV11}) significantly increased the uptake efficiency of KV11 peptide into HUVEC about 98.9%. We demonstrated that EXO_{KV11} inhibited angiogenesis strongly *in vitro* by suppressing HUVEC migration and microtubule formation compared with KV11 alone. Furthermore, we observed a markable reduce in vascular permeability induced by VEGF after treatment with EXO_{KV11} *in vitro*. We also elucidated that EXO_{KV11} suppresses angiogenesis by targeting VEGFR2 when incubated with HUVEC resulted in significant inhibition of the activation of phosphorylation of VEGFR2 upon VEGF stimulation.

Conclusions: Our finding provide evidence that peptide KV11 binding with EXO_{HU} through CP05 shows high cell delivery efficiency leading to significant anti-angiogenesis effect and thus providing a novel antiangiogenic drug delivery system and a noninvasive manner for Diabetic Retinopathy therapy.

PO-269

Peritoneal macrophages attenuate retinal ganglion cell survival and neurite regeneration

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Objective:
To investigate the effect and mechanism of peritoneal macrophages and their activation on RGC survival and neurite regeneration in the retinal explant co-culture system.
Methods:
Retinas of adult Fischer rats were co-cultured with primary peritoneal macrophages or zymosan-treated peritoneal macrophages for seven days. The immunofluorescence analysis was applied to stain survival RGCs and macrophages.
Results:
Peritoneal macrophages significantly reduced RGC survival, neurite outgrowth and the length of regenerated neurites in the retinal explant by 47.26%, 73.21% and 71.01% respectively ($p < 0.001$). Addition of zymosan to peritoneal macrophages further attenuated the survival and neurite outgrowth of RGCs by 10.01% ($p = 0.007$) and 9.82% ($p = 0.042$), respectively. The condition media collected from peritoneal macrophages also reduced RGC survival, neurite outgrowth and the length of regenerated neurites.
Conclusion:
This study revealed that primary peritoneal macrophages from rat attenuated the RGC survival and neurite regeneration, and macrophage activation aggravated the RGC degeneration.

PO-270

腺苷转运体 ENT1 活性调控氧诱导视网膜病变

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目的：腺苷及其受体在氧诱导视网膜病变（OIR）中发挥重要作用，但胞内腺苷在 OIR 中的功能尚不清晰，本课题采用药理学方法调控小鼠胞内腺苷的代谢或转运，以明确胞内腺苷在 OIR 中的作用。
方法：实验所用动物均为 C57BL/6 小鼠，同窝鼠随机分组进行 ABT-702（腺苷激酶 ADK 抑制剂）、EHNA（腺苷脱氨酶 ADA 抑制剂）和 NBMPR（腺苷转运体 ENT1 抑制剂）注射和溶剂注射，实验小鼠进行 OIR 造模，小鼠出生当天记为 P0，P7 放入含氧量为 75%的氧舱中， P12 重新放回空气

中，小鼠 P17 取材，视网膜铺片后进行 Isolectin B4 免疫荧光染色，统计分析各组的无血管区、病理性新生血管面积。
结果：与对照组相比，ABT-702 抑制腺苷激酶 ADK 不影响氧诱导的小鼠视网膜无灌注区和新生血管面积。同样，EHNA 抑制腺苷脱氨酶 ADA 也对氧诱导的小鼠视网膜无灌注区和新生血管面积没有影响。但是 NBMPR 抑制腺苷转运体 ENT1 显著增大氧诱导的小鼠视网膜无灌注区和新生血管面积。
结论：抑制 ENT1 的转运功能，可加剧小鼠视网膜 OIR 病变，提示 ENT1 有望成为治疗早产儿视网膜病变及其它视网膜血管增殖性病变的新靶点。

PO-271

Optic Disc Edema Area, a Reliable Parameter Indicating the Severity of Papilledema in Patients with POEMS Syndrome

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Objective: This study was conducted to evaluate ocular manifestations especially optic disc edema (ODE) of patients with polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy and skin changes (POEMS) syndrome and the effectiveness of lenalidomide to POEMS syndrome from the aspect of ocular involvement, as well as to determine whether the severity of ODE is significantly correlated with serum vascular endothelial growth factor (VEGF) using a novel parameter, optic disc edema area.
Methods: Forty-one treatment-naive patients with POEMS syndrome were enrolled in this prospective phase 2 study, among which, 38 patients had complete ocular examination meeting study requirements. All of them received systemic treatment with lenalidomide and dexamethasone at Department of Hematology of our hospital. Ocular examination including fundus photography (TOPCON TRC.NW6S, Non-mydriatic retinal camera) and spectral domain optic coherence tomography (SD-OCT) was performed to each patient before treatment and during follow-up to measure their optic disc area and determine other optic manifestations. Serum VEGF levels were measured through ELISA before and after treatment. And the correlation between serum VEGF level and ODE area was determined.
Results : Among the 38 patients with complete ocular examination, ODE was found in 25(65.8%) patients, of which 24(96%) were bilateral and only 1(4%) was unilateral. Ocular symptoms occurred in 17(68%) patients with ODE and mainly manifested as blurred vision, decreased vision and palpebral edema. At initial visit, binocular mean ODE area of patients with ODE was significantly correlated with their ODE grading (r=0.620, p=0.003) and peripheral retinal thickness (r=0.760, p=0.000). Mean serum VEGF level was significantly different between patients with and without ODE (p=0.025) and there was a significant correlation between serum VEGF and binocular mean ODE area among all patients suffered from papilledema (r=0.460, p=0.036). After treatment with

lenalidomide, binocular mean ODE area decreased significantly (p=0.000), along with the decreasing of serum VEGF levels (p=0.000).
Conclusions: ODE occurs frequently in patients with POEMS syndrome and ODE area could be a reliable index in ODE severity evaluation. Higher serum VEGF level might be an important contributor to severe ODE and systemic treatment with lenalidomide could relieve ODE in patients significantly, which might be associated with the declination of serum VEGF.

PO-272

玻璃体切割手术治疗未知原因的严重玻璃体积血的初步研究

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目的 观察术前无法判断原因的严重玻璃体积血患者，通过玻璃体切割手术后所确定的玻璃体出血原因以及视力预后。
方法 纳入 2017 年 2 月至 6 月在温州医科大学附属眼视光医院行玻璃体切割手术治疗的严重玻璃体积血患者，排除眼外伤史、玻璃体视网膜手术史、既往视网膜疾病史。在手术后确定玻璃体积血的原因，比较不同病因的玻璃体积血的临床特点以及手术前后的视力变化。
结果 65 例（66 只眼）纳入本研究,年龄 19-89 岁，平均 62.5 岁。术前平均最佳矫正视力 logMAR2.128, 玻璃体积血程度为 2-3 级。玻璃体切割手术后明确玻璃体积血的原因分别为视网膜静脉阻塞（36 只眼）、孔源性视网膜脱离（12 只眼）、息肉状脉络膜血管病变（10 只眼）、视网膜裂孔（3 只眼）、视网膜血管炎（4 只眼）、视盘血管瘤（1 只眼）。视网膜静脉阻塞组、孔源性视网膜脱离组及息肉状脉络膜血管病变平均年龄分别为 65.3 岁，54.5 岁及 71.5 岁，差异有统计学意义。玻璃体后脱离在上述三组中的比例分别是 66.7%、58.3%和 50%，无统计学的差异。手术后平均最佳矫正视力 logMAR0.425，较术前提高。
结论 视网膜静脉阻塞、孔源性视网膜脱离及息肉状脉络膜血管病变是不明原因的严重玻璃体积血的常见病因。玻璃体手术干预可以提高患者的视力。

PO-273

内皮细胞中 Notch 信号激活对其旁分泌功能及脉络膜新生血管生成的影响

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研究目的：脉络膜新生血管（CNV）是目前多种眼底疾病的主要致盲原因之一。其中被异常激活的内皮细胞可通过分泌一些血管生成因子、促进增值和移行的因子等参与病理性新生血管的生成。Notch 信号是一种介导相邻细胞间信号传导的重要信号通路，在多种生理性和病理性的血管发育过程中发挥关键作用。我们通过研究内皮细胞中 Notch 信号激活对其旁分泌功能的调控及其对 CNV 微环境中平滑肌细胞、巨噬细胞的影响，进一步了解 CNV 的病发机理，可以为 CNV 靶向药物的研发及高效临床治疗的开展奠定重要的理论依据。

研究方法：于 6-8 周龄时，诱导获得内皮细胞中特异性 Notch 激活的转基因小鼠（NICD 小鼠）；通过激光光凝术构建小鼠 CNV 模型，通过脉络膜组织铺片、免疫荧光组织染色实验，观察比较转基因小鼠与对照小鼠的 CNV 体积、巨噬细胞浸润、平滑肌细胞数量的差异；通过脉络膜组织体外培养实验，检测转基因小鼠与对照小鼠的脉络膜血管出芽能力；通过 NICD 病毒感染，激活内皮细胞中 Notch 信号，分析内皮细胞分泌因子的变化；通过体外培养，观察 Notch 信号激活的内皮细胞培养上清对巨噬细胞、平滑肌细胞增殖、迁移及分泌因子的影响。

实验结果：构建小鼠 CNV 模型，发现内皮细胞中特异性 Notch 激活可减小激光诱导的小鼠 CNV 体积，且其脉络膜出芽明显减少；CNV 建模后，NICD 小鼠较对照小鼠 CNV 局部的平滑肌细胞数相对增加，而巨噬细胞数则无明显变化。体外结果显示，Notch 信号激活的内皮细胞培养上清可促进平滑肌细胞的募集；Notch 信号激活的内皮细胞培养上清可抑制巨噬细胞炎性因子的分泌，但对巨噬细胞募集无显著影响。

实验结论：本研究表明内皮细胞中 Notch 信号激活可能通过调控内皮细胞分泌功能，进而影响 CNV 局部巨噬细胞功能及平滑肌细胞募集，参与调控脉络膜新生血管生成，提示我们可以通过靶向调控内皮细胞中的 Notch 信号来干预 CNV 的生成。

PO-274

穿透性粘小管成形术与粘小管成形术在原发性开角型青光眼中治疗效果的随机对照研究

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目的：通过前瞻性随机对照临床试验比较穿透性粘小管成形术与粘小管成形术在原发性开角型青光眼患者中的治疗效果。

方法：前瞻性随机对照临床试验。成功纳入分析的穿透性粘小管成形术的患眼有 14 只（穿透组），粘小管成形术的患眼有 12 只（粘小管组）；手术成功定义为眼压≤21 mmHg，未使用抗青光眼药物为完全成功，无论有无抗青光眼药物的使用为条件成功；对两组患眼的术前及术后眼压、抗青药物的种类、手术成功率、术后并发症进行统计分析。

结果：1 组术眼的眼压在术前，术后 1 天，1 周，1 月，3 月，6 月，12 月，18 月和 24 月分别为 27.3±14.1 mmHg，13.9±7.2 mmHg，15.8±7.7 mmHg，15.8±4.2 mmHg，14.6±6.5 mmHg，15.2±3.3 mmHg，12.8±3.2 mmHg，17.1±2.4 mmHg 和 13.3±4.5 mmHg。2 组术眼的眼压在术前，术后 1 天，1 周，1 月，3 月，6 月，12 月，18 月和 24 月分别为 22.5 ±8.6 mmHg，16.1±8.5 mmHg，20.4±9.9 mmHg，15.6±5.3 mmHg，15.7±2.4 mmHg，16.0±4.2 mmHg，15.3±3.3 mmHg，18.8±3.7 mmHg

和 14.6±3.0 mmHg。两组术眼的眼压在术前（P=0.042），术后 6 月时（P=0.031）差异有统计学意义。两组患眼术后随访过程中，1 组抗青光眼药物量明显低于 2 组，且在 18 月时（0 vs 0.33±0.52，P<0. 01）差异有统计学意义。1 组术眼最后一次随访的条件成功率和完全成功率分别为 100%和 78.6%，2 组术眼最后一次随访的条件成功率和完全成功率分别为 83.3%和 58.3%。
结论：穿透性粘小管成形术在原发性开角型青光眼患者中的降压效果强于粘小管扩张成形术，且手术成功率高于粘小管扩张成形术。

PO-275

Macular Evaluation of the Retinal and Choroidal Vasculature Changes in Anterior Ischemic Optic Neuropathy

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Background: This study aimes to characterize the fundus structural changes in patients with nonarteritic anterior ischemic optic neuropathy (NAION) and the correlation between macular vessel density, retinal nerve fibre layer (RNFL) parameters and visual field sensitivity (VFS) in NAION patients.
Methods: A retrospective case control study was performed using 37 eyes with NAION, 30 uninvolved contralateral eyes, and 27 eyes of healthy age-matched subjects. Data on the retinas and choroidal vessel densities and VFS were compared among the three groups.
Results: The NAION group exhibited significantly lower RNFL thicknesses, lower ganglion cell complexes (GCC), larger global loss volume (GLV) values and focal loss volume (FLV) values when compared with both uninvolved eyes and healthy eyes ($p < 0.01$ for all comparisons). The superficial vessel density (SVD) valus (whole, parafovea, superior-hemi and inferior-hemi) were significantly lower in NAION eyes, followed by uninvolved eyes and healthy eyes ($p < 0.01$; LSD, $p < 0.05$ for all comparisons). The deep vessel density (DVD) values (parafovea, superior-hemi and inferior-hemi) were the lowest by a significant value in NAION eyes, followed by uninvolved eyes and healthy eyes ($p < 0.01$; LSD, $p < 0.05$ for all comparisons). However, DVD value measurements (whole and fovea) of healthy and uninvolved eyes were not significantly different. The average threshold deviation (TD) was − 11.02 ± 3.75 dB for the overall field region, − 6.01 ± 2.21 dB for the affected superior field region and − 9.98 ± 3.34 dB for the affected inferior field region in NAION eyes. A statistically significant correlation was found between the RNFL thickness and visual field(VF) loss ($r = -0.788$, $p < 0.001$).
Conclusion: In addition to peripapillary vascular changes occurring in NAION eyes, macular vessel density is also involved. Furthermore, NAION-uninvolved eyes exhibited abnormalities compared with healthy eyes. This indicates that vascular changes may occur before changes in retinal thickness at the early stages of NAION.

PO-276

增殖性糖尿病视网膜病变患者血浆外泌体 miRNA 表达谱的差异性分析

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外泌体（exosomes）是细胞分泌的直径 40-100nm 的细胞外囊泡，具有双层脂质膜结构，内含大量蛋白质和 RNA 成分，是细胞之间生物信息传递的重要媒介。血液或尿液来源的外泌体成分的改变可反映局部病灶的严重程度，从而可用于判断疾病病情和预后，已用于多种疾病的诊断和发病机制研究。既往研究显示糖尿病患者血液外泌体的数量和成分均发生改变，可能参与糖尿病的病程。我们研究显示增殖性糖尿病视网膜病变（PDR）患者血浆外泌体中含有多种显著差异表达的 miRNA，其中 has-miR-431-5p 在 PDR 患者血浆外泌体中显著升高(P=0.041，P=0.040)，但在全血浆以及 MV 中表达无明显差异。进一步研究显示在 4-HNE 刺激的人视网膜微血管内皮细胞中（HRMECs）中 hsa-miR-431-5p 表达水平也显著升高(P=0.005)，且 CCK-8 及划痕实验的结果显示转染 hsa-miR-431-5p mimic 后 HRMECs 的细胞增殖和迁移能力显著增强，而转染 hsa-miR-431-5p inhibitor 后 HRMECs 的细胞活性及迁移能力均有下降趋势。上述研究结果显示，患者血浆、外泌体、MV 中 miRNA 的表达水平不同，不可互相替代；相较于正常对照和糖尿病患者，hsa-miR-431-5p 在 PDR 患者血浆外泌体中显著升高，可能对 PDR 的发生发展具有重要作用。因此，对 DR 患者血浆外泌体 miRNA 表达谱进行分析有望寻找相关生物标记物或探寻 DR 的发病机制。

PO-277

雷珠单抗和激光光凝治疗 2 区早产儿视网膜病变疗效观察

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目的　比较球内注射雷珠单抗和激光光凝治疗 2 区 1 型早产儿视网膜病变(ROP)效果观察。**方法**　回顾分析 2014 年 1 月-2016 年 12 月在雷珠单抗治疗 2 区 ROP 54 例和激光治疗的 2 区 ROP48 例。除外 1 区和急进性 ROP。**结果**：总计 102 例（204 眼），随诊到患者矫正 1 年。两组在出生胎龄、出生体重、治疗时矫正胎龄、多胎、性别、剖腹产、呼吸窘迫综合征、败血症、缺血缺氧脑病、贫血、肺炎、低血糖症、颅内出血、输血、吸氧、应用肺泡表面活性物质、肺出血、黄疸、动脉导管未闭、坏死性小肠结肠炎、化脓性脑膜炎无统计学差异。雷珠单抗组有 18 只眼（16.67%）复发，而激光治疗组仅 2 只眼（2.08%）复发（P=0.013），对 2 区 ROP 雷珠单抗治疗的复发率明显高于激光治疗。雷珠单抗组有 1 只眼因玻璃体积血需行玻璃体手术。到 1 岁时，仅 29.63%早产儿视网膜周边完全血管化。**结论**　球内注射雷珠单抗治疗有例病变消退，但复发率较激光治疗高，再次玻璃体腔注射仍能有效控制病变。对 2 区 ROP 患儿雷珠单抗治疗后仍需密切随访，并延长随访时间直到视网膜完全血管化。

PO-278

玻璃体腔注射康柏西普治疗视网膜分支静脉阻塞继发黄斑水肿 6 个月结果：视力预后和微动脉瘤形成

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目的：研究玻璃体内康柏西普（IVC）注射治疗视网膜静脉阻塞相关黄斑水肿（RVO-ME）的 6 个月结果。
方法：纳入标准包括最小患者年龄 18 岁，最佳矫正视力（BCVA）≥20 个字母或更多和视网膜中央厚度（CRT）≥250μm。主要指标是第 6 个月 BCVA 较基线的平均变化;次要结果是 CRT，残留 ME 和微动脉瘤形成的平均变化。
结果：基线平均 ETDRS 字母和 CRT 分别为 63.2 和 500μm；确诊至初次治疗的平均时间为 1.7 个月；且平均 ETDRS 增加和 CRT 减少分别为 15.1 个字母和 231μm。 Snellen 等效 BCVA≥20/40（70 ETDRS 字母）和≥20/20（85 ETDRS 字母）的患者百分比分别为 90％和 15％。在 83％和 34％的患者中观察到残留的 ME 和微动脉瘤。微动脉瘤的形成与初次治疗延迟有关。
结论：更早的 IVC 注射在第 6 个月与更好的视力预后相关，并抑制了微动脉瘤的形成。

PO-279

Hyperreflective foci in OCT image as a biomarker of poor prognosis in diabetic macular edema patients treating with Conbercept in China

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Purpose: To investigate the dynamic changes of hyperreflective foci (HF) in diabetic macular edema (DME) patients during the intravitreal Conbercept treatment in China.
Methods: DME Patients receiving intravitreal Conbercept (IVC) injections during the year 2016-2017 were retrospectively investigated. Thirteen patients (26 eyes) were recruited in this study. They received IVC once a month for 3 consecutive months. The number and location of HFs, the best-corrected visual acuity (BCVA) and central macular thickness (CMT) at each visit were analyzed and compared.
Results: After the first injection, BCVA (LogMAR) was increased from 0.75±0.48 to 0.43±0.24 ($p < 0.05$), CMT improved from 575.9 ± 191.9 to 388.2 ± 198.5μm ($p=0.014$). However, the BCVA and CMT had no statistical difference after the second and third injection as compared with those

after the first injection respectively. The baseline number of HFs was 5.39±4.24, 5.15±5.17 and 0.88±1.90 in the inner retinal, outer retinal and subretinal layer respectively. The number of HFs in these three retinal layers decreased significantly after the first injection. However, after the second injection, only the number of HFs in the inner retinal layer experienced a further decrease. After the third injection, no statistically significant HFs changes was overserved in each retinal layers. The final BCVA was associated with baseline HF. There were no severe ocular adverse reactions or systemic adverse events.

Conclusions: Conbercept is effective and safe in the treatment of DME. HFs can act as a biomarker of poor final visual outcome.

PO-280

Resveratrol protect axons of retinal ganglion cells by the SIRT1-JNK pathway

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Purpose: To determine the protective effect of resveratrol on axons of retinal ganglion cells (RGCs) in ischemia/reperfusion (I/R) injury models, and to explore whether the protective effect of resveratrol is achieved by the SIRT1-JNK pathway.

Methods: Retinal I/R was induced in Sprague-Dawley rats by increasing intraocular pressure to 110 mmHg for 60 minutes. Immunostaining was used to assess axonal and cell body damage in RGCs. Western blotting was used to quantify damage and apoptosis of RGCs. The regulation of SIRT1 and JNK by resveratrol was also reflected by Western blotting.

Results: I / R caused the swelling of the nerve，the holes and the chaos of the nucleus in axons of RGCs. These changes were reversed by Intraperitoneal injection of resveratrol. At the same time, resveratrol could also reverse the activation of retinal astrocytes and the loss of RGCs caused by I / R. Resveratrol increased the expression of SIRT1 while decreasing the phosphorylation of JNK, and SP600125 decreased the phosphorylation of JNK while increasing the expression of SIRT1, indicating that SIRT1 and JNK can interact with each other. Simultaneous administration of resveratrol and sirtinol (SIRT1 inhibitor) neither increased the expression of SIRT1 nor decreased the phosphorylation of JNK. It was indicated that resveratrol affects the phosphorylation of JNK by SIRT1.

Conclusion: Resveratrol treatment significantly reduced apoptosis and axonal degeneration of RGCs, and this protection is partly mediated through the SIRT1-JNK pathway.

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阻断腺苷 A2A 受体保护高氧诱导视网膜损伤而拮抗 VEGF 则加重视网膜损伤

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目的：早产儿视网膜病变（ROP）目前治疗手段（激光光凝和 VEGF 抗体）主要抑制中后期缺氧所致的病理性血管增生，但早期诊断和干预手段有限。我们前期实验发现用基因敲除和药理学手段阻断腺苷 A_{2A} 受体后，不影响小鼠正常视网膜血管发育，但选择性减少小鼠氧诱导视网膜病变（OIR）。且 A_{2A} 受体拮抗剂主要在高氧期发挥保护效应。提示腺苷 A_{2A} 受体可作为 ROP 高氧期干预的优选靶点。在高氧期，促血管内皮细胞生成因子 VEGFA 的水平明显降低，我们探讨比较 A2A 受体拮抗剂与 VEGF 抗体对高氧期无血管区形成的药理作用。
方法：1、全身腺苷 A_{2A} 受体基因敲除小鼠与同窝野生小鼠进行 OIR 造模，P12 取材，实时定量 PCR 分析视网膜组织 VEGFA 的 mRNA 表达水平。2、C57BL/6 野生小鼠 P7 左眼玻璃体腔注射 BSA，右眼注射抗 VEGF 药物 Lucentis，同时 P7 开始隔天腹腔注射腺苷 A_{2A} 受体特异性拮抗剂 KW6002 或者溶剂，分组为：溶剂+BSA 组，KW+BSA 组，溶剂+Lucentis 组，KW+Lucentis 组；小鼠进行 OIR 造模后于 P12 取材，定量各组视网膜无血管区面积。
结果：1，小鼠 OIR 模型中， A_{2A} 受体基因敲除小鼠视网膜的 VEGFA 的 mRNA 水平明显高于同窝野生组。2，野生小鼠无血管区面积比较：左眼注射 BSA 野生小鼠中，腹腔注射 KW6002 组比腹腔注射溶剂组小；腹腔注射溶剂野生小鼠中，右眼注射 Lucentis 视网膜无血管区面积较左眼注射 BSA 组大；腹腔注射 KW6002 野生小鼠中，右眼 Lucentis 视网膜无血管区面积与左眼注射 BSA 组无明显统计学差异。
结论：阻断腺苷 A_{2A} 受体减弱高氧诱导视网膜损伤而拮抗 VEGF 则加重视网膜损伤。腺苷 A_{2A} 受体不依赖 VEGF 通路发挥作用，可作为 ROP 高氧期干预的优选靶点。

PO-282

复杂性前部缺血性视神经病变一例

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目的：复杂的前部缺血性视神经病变较少见，需与 Foster–Kennedy 综合征等鉴别，OCTA 提示眼底供血改变，为诊断提供新思路。
方法：报道一例前部缺血性视神经病变，回顾相关文献。
结果：代某，男性，48 岁，左眼视物遮挡 5 天。8 年前以“右眼虹膜炎”于当地就医，全身激素治疗。左眼起病后，当地未给予明确诊断，现为明确诊疗遂来我院。查体：VD：0.8，VS：0.1，左眼 RAPD

（+），右眼视盘苍白，左眼视乳头水肿，伴线状出血，其余结构未见异常。检查：①OCT 提示:左眼视神经纤维层弥漫增厚。②FFA 提示：左眼视盘充盈迟缓，后期荧光渗漏，视盘周围呈低荧光，左眼 AION 可能性大。③左眼 OCTA 提示左眼视网膜各层血管密度变小，尤以深层视盘显著。④视野提示：左眼下方视野缺损，未累及黄斑区，右眼仅存中心视野。⑤全身检查未见异常。血常规、尿常规、肝肾功能、凝血检查、红细胞沉降率、C 反应蛋白、免疫球蛋白及补体、抗核抗体、心磷脂抗体、风疹病毒、巨细胞病毒、单纯疱疹病毒、弓形虫、艾滋病、梅毒、乙型肝炎和丙型肝炎检查均无异常。⑥头部 CT 未见异常。口服醋酸泼尼龙 80mg，1 次/d，逐渐减量；肌内注射用鼠神经生长因子 15000U，1 次/d。左颞侧皮下注射复方樟柳碱注射液 2ml，1 次/d。1 周后，左眼视盘下部水肿明显消退，视力未有明显提高。6 周后，左眼视盘苍白，边界基本清晰，视野仍为下半侧缺损。
结论：追溯 8 年前病史，右眼应为缺血性病变，被当地误诊为虹膜炎。本病例为双眼发作的前部缺血性视神经病变（AION），文献报道 1 只眼发生 AION 后 5 年内，对侧眼的 AION 发生率为 14.7％。本病例的眼底表现极易与 Foster–Kennedy 氏综合征混淆，但后者为额叶肿瘤所致，伴嗅觉障碍。OCTA 检查中也提示了网膜供血的改变情况，为今后 AION 的诊断提供了新的思路，那么 OCTA 是否能代替有创 FFA 检查仍需要进一步的研究。

PO-283

Eales 病合并中枢神经系统损害 1 例

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目的：回顾性分析 1 例 Eales 病合并中枢神经系统损害病例，总结经验教训。方法：男性，25 岁。2014 年 10 月起先后双眼视物模糊，先后于多家医院诊断为“双眼 Eales”，给予口服改善循环、糖皮质激素等药物及视网膜激光光凝等治疗。2015 年 11 月于我院行双眼玻璃体注药术（康柏西普）。2018 年 1 月于我院行左眼玻璃体注药术(雷珠单抗)及左眼玻璃体切除+硅油填充术。2018 年 3 月患者无明显诱因出现左眼视物模糊加重、头晕、恶心、呕吐、耳鸣、步态不稳，双眼葡萄膜炎体征加重。完善相关检查：HLA-B27+，抗“O”179IU/ml，PCT10172ng/ml，CEA5.66ug/L，EB 病毒 VCA-IgG+，头颅 MR 未见明显异常。给予糖皮质激素冲击治疗后全身及眼部症状改善，遗留步态不稳。转至解放军总医院行头颅 MR 提示脑桥病变，脑脊液检查阴性。2018 年 9 月患者突发右侧面部麻木及右侧肢体无力，右侧上肢肌力Ⅱ级，右侧下肢肌力Ⅲ级。头颅 CT：左侧豆状核、左侧中脑、左侧小脑半球多发低密度病灶。头颅增强核磁：1、右侧小脑半球、右侧脑室前角旁、右侧岛叶及左侧颞岛叶多发异常信号影，多考虑炎性病变，结核性脑膜脑炎可能性大。2、右侧小脑半球及左侧侧脑室体旁脑梗死（亚急性期）。结核杆菌特异性细胞免疫反应阳性。脑脊液常规：白细胞计数 17×10^6/L；脑脊液生化：氯 129.5mmol/L、葡萄糖 2.91mmol/L、脑脊液蛋白 413.0mg/L。给予“强的松片 10mg

1/日、乙胺丁醇片 0.5g 1/日、吡嗪酰胺片 0.5g 3/日、利福平胶囊 0.45g 1/日、异烟肼片 0.6g 1/日”治疗。结果：治疗半月后右侧肢体肌力恢复至IV级，轻微步态不稳。观察 3 月全身及眼部症状平稳。

结论：1、Eales 病在眼部症状出现数月至数年后可能出现神经系统症状。2、全面神经系统查体及实验室检查对于查找病因、及时诊断及治疗至关重要。

PO-284

乙醛脱氢酶 2 可能参与了 I 型糖尿病大鼠中央角膜基质层水肿和角膜上皮功能下降

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目的: 探究不同时期 I 型糖尿病大鼠模型中央角膜厚度以及角膜上皮细胞损伤的变化，同时观察糖尿病进程角膜中相关氧化应激分子的表达水平的变化。
方法: 采用高脂高糖饲养联合 STZ（60mg/kg，IP）构建 24 只糖尿病 SD 大鼠模型，选取 24 只正常 SD 大鼠为同期对照。于糖尿病模型构建成功后 1m，2m 和 3m 后进行角膜相干光断层成像（OCT），角膜荧光素钠染色和 Schirmer 泪液检测；同时每组于各时间点随机处死 8 只，进行角膜病理组织 HE 染色以及 ALDH2，SOD 和 VEGF-α 免疫荧光染色。
结果: STZ 注射后 72h 随机血糖示糖尿病大鼠构建成功（Glu>16.7mmol/L），糖尿病组中央角膜厚度于 1m 和 2m 时与对照组相比没有显著差异（all P>0.05）；而在 3m 时候，糖尿病组角膜基质层和总厚度均大于对照组（all P<0.05）；糖尿病组角膜荧光素钠染色评分于 1m，2m 和 3m 时均大于对照组（all P< 0.05）；糖尿病组 Schirmer 泪液长度于 1m，2m 和 3m 时与对照组相比没有显著差异（all P>0.05）；糖尿病组 1m，2m 和 3m 时角膜乙醛脱氢酶 2（ALDH2）表达均显著小于对照组（all P<0.05），角膜超氧化物歧化酶（SOD）表达水平于 1m，2m 和 3m 时和对照组相比无显著差异（all P>0.05），角膜 VEGF-a 表达水平在 2m 和 3m 大于对照组（all P<0.05）。
结论: 角膜上皮组织在糖尿病早期（2m 之前）容易受到损伤，3m 之后表现为角膜厚度（基质层）的增加，而糖尿病大鼠的干眼症状不明显。ALDH2 表达水平的下降可能在糖尿病角膜损伤的过程中可能发挥着重要作用。

PO-285

Optical Coherence Tomography Angiography Features in Children With a History of Visual Deprivation

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Objective: To evaluate the retinal and microvascular features using optical coherence tomographic angiography (OCTA) in children (<18 years) with a history of cataract.
Design: Prospective cross-sectional study.
Methods:
Setting: A tertiary referral center in Southeast China
Study Population: The patients included children with a history of cataract who had undergone cataract surgery. The controls included age-matched healthy children.
Observation Procedure: All participants underwent comprehensive ophthalmological examinations, including visual acuity, refraction, ocular motility tests, cover tests; anterior and posterior segment examination; and OCTA.
Main Outcomes and Measures: Reduced superficial and deep retinal capillary vessel density on macular 3 x 3-mm scan.
Results: We enrolled 37 eyes of children with a history of cataract and 36 eyes of healthy children. The mean (SD) age of patients with a history of cataract was 7.8 (3.7) years and 9.1 (2.4) years for the controls. Of the 37 eyes with a history of cataract, 25 eyes were amblyopic whose mean best-corrected visual acuity (SD) was 0.5(0.2). The macular vessel density of the superficial capillary plexus (SCP) was lower in the eyes with a history of cataract than in the controls (46.8%[3.6] vs 48.9%[2.2], *P* = .003). Macular vessel density of the deep capillary plexus (DCP) was also lower in eyes with a history of cataract than in the controls (49.7%[4.7] vs 51.9%[3.3], *P* = .021). There were no significant differences of papillary and peripapillary vessel density and foveal avascular zone between eyes with a history of cataract and the controls.
Conclusions: The macular vessel density of SCP and DCP in eyes with a history of cataract is lower than that in the age-matched healthy controls. How the experience of a period of vision deprivation affects the normal retinal vasculature development needs further studies.

PO-286

巩膜开窗-涡静脉减压术治疗真性小眼球葡萄膜渗漏综合征的术后观察

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背景：葡萄膜渗漏综合征的发病机理目前尚未明了，有些患眼具有一种或多种先天性异常。如小眼球患者巩膜和脉络膜增厚，引起经由涡静脉回流的血液压力增高，从而引起脉络膜血液流出受阻，出现液体渗漏聚积，导致脉络膜脱离和渗出性视网膜脱离。

目的：探讨巩膜开窗减压术-涡静脉分流术治疗脉络膜脱离合并渗出性视网膜脱离的葡萄膜渗漏综合征患者的手术效果。通过对比不同手术方式选择最优手术，以较小的手术量获得相同的或者更好的术后效果，同时减轻患者的经济负担。

方法：选取真性小眼球葡萄膜渗漏综合征患者 3 人（6 眼），均有渗出性视网膜脱离。在颞侧角膜缘做一 6mm 结膜切口，两端向后做放射状切开，暴露颞侧巩膜和外直肌。若患者视网膜下积液量大，可使用 1mm 注射器在赤道后的直肌下行巩膜穿刺放出视网膜下液。通过调整患者头位，使穿刺孔位于最低位。在赤道部后、涡静脉出口处做 6mm×6mm 大小前后方向的全层窗口，深达脉络膜，底部巩膜切开，脉络膜上腔液体自动排除，切开涡静脉血管鞘，分离血管外结缔组织。同法再做 3 个巩膜窗口并切开涡静脉血管鞘，连续缝合球结膜。自睫状体平坦部向玻璃体腔注入过滤空气，调整眼压。

结果：术中减少了昂贵且高耗损医疗器械的使用。术后残余视网膜下液多在 2 个月内吸收，3 例患者术后第一天有 2 眼视力较术前提高，术后 1 周有 5 眼视力较术前提高，1 月后视力 3 例患者视力均较术前提高。3 例（6 眼）患者 2 年随访观察均未出现暴发性脉络膜出血、脉络膜和视网膜脱离复发。

结论：巩膜开窗-涡静脉减压术以较低的手术代价取得较好的手术效果。相对于玻璃体手术费用更低，减轻了患者的经济负担。玻璃体手术费用相对较高，术中灌注液及手术器械对视网膜影响大，术后视力恢复时间长，且容易出现脉络膜和视网膜脱离复发、暴发性脉络膜出血等严重并发症。巩膜扣带术对此病无效，且有加重脉络膜渗漏可能。

PO-287

An Amacrine Cell Circuit for Signaling Absolute Light Intensity in the Mammalian Retina

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Purpose: Amacrine cells are a diverse class of retinal interneurons that interact with bipolar and ganglion cells to mediate complex visual computation in the inner plexiform layer. The function of each amacrine cell type, however, are poorly understood except in a few special cases. Here, we report a polyaxonal amacrine cell that detect absolute light intensity in the mouse retina. Methods: Patch-clamp recordings were made from wide-field amacrine cells in a flat-mount retinal preparation of vGluT3-Cre/ChR2-YFP mouse. vGluT3 amacrine cells were optogenetically activated by blue LED light, while potential postsynaptic amacrine cells were recorded under on-cell loose-patch and whole-cell voltage- or current clamp, followed by receptive field characterization using patterned visual stimulation and morphological identification under two-photon imaging. Results: A small number of wide-field amacrine cells were selectively connected to vGluT3 amacrine cells via glycinergic synapses, showing direct postsynaptic current responses ranging in amplitude from 30 to 300 pA at 0 mV. These currents persisted in the presence of

blockers of glutamate and GABA receptors, as well as gap junctions, but they were completely blocked by strychnine. The cells that received glycinergic input from vGluT3 cells did not display any detectable current response at -70 mV. The receptive field properties and the morphology of these cells, particularly a type of polyaxonal amacrine cell, were characterized. The characteristic form of this polyaxonal amacrine cell was identified. Conclusions: The study identified a specific polyaxonal amacrine cell type that detect absolute light intensity and provide wild field inhibition to the retina neurons on basis of background luminosity.

PO-288

TNF-α 激活 MSCs 分泌的外泌体对视网膜节细胞损伤的保护作用

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目的 外泌体是一种由细胞分泌的微小囊泡，在细胞间起到传递生物效能的重要作用，不同种细胞在不同状态下分泌的外泌体存在差异。有研究表明，间充质干细胞（MSCs）对炎症有抑制作用[1]。本研究旨在阐明 TNF-α 激活 MSCs 分泌的外泌体对于视网膜节细胞的保护作用及关键因子。

方法 1. 将未经处理的 MSCs（实验组 0）、TNF-α 处理 48h 的 MSCs（实验组 1）培养液收集，进行超速离心法提取外泌体[2]，并进行透射电镜（TEM）、粒径分析（NTA）、Western Blot（WB）、流式细胞术（Fc）鉴定。

2. rtPCR 对比两组 MSCs 中 TNF-R1、TNF-R2、TSG-6、PGE-2 的表达。

3. 将 2 组外泌体对 I/R 模型小鼠进行玻璃体腔注射（实验组 0/1），空白组进行 PBS 注射，利用荧光金标记检测视网膜 RGC 存活数目。

4. 同上处理两周后，进行视网膜 Brn3a（红色）、Tuj1（绿色）染色铺片观察。

5.将 2 组外泌体进行基因芯片分析 miRNA 的表达情况。

结果 1.电镜下可观察到清晰的茶托状双层膜结构、直径在 90-210nm。NTA 粒径显示为单峰且峰值落于 120nm 附近，实验组 1 的数量都高于实验组 0。WB 显示两组 CD63 为皆阳性，两组之间有明显差异。

2.rtPCR 显示实验组 1 的 TNF-R1、TNF-R2、TSG-6、PGE-2 的表达较实验组 0 有升高。

3.I/R 模型小鼠视网膜铺片置于荧光显微镜观察，空白组和实验组 0 的 RGC 存活数目明显少于实验组 1。

4.模型小鼠视网膜染色铺片置于荧光显微镜观察，空白组和实验组 0 的 RGC 存活数目明显少于实验组 1。

5.基因芯片结果显示，外泌体中 miR-21 高表达，并且 TNF-α 激活 MSCs 后 miR-21 的表达增多。

结论 TNF-α 激活 MSCs 分泌的外泌体数量增多，并对急性高眼压损伤的视网膜神经节细胞具有显著保护作用。miR-21 的表达升高提示它可能为此过程中的关键分子。

PO-289

丙酮酸激酶 M2 对糖尿病性视网膜病变发病及进展的影响

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目的：丙酮酸激酶（PK）是糖酵解过程中的限速酶，还可作为转录因子参与多种细胞活动，本研究探索糖尿病视网膜病变（DR）中 PKM2 表达改变，了解其在 DR 的发病与疾病进展中的功能。
方法和结果：在人视网膜内皮细胞（HRMECs）和大鼠视网膜组织中，PKM2 的表达与葡萄糖状态的改变相关。具体而言，高糖条件下，PKM2 蛋白表达增加，核/质比增加，磷酸化水平增加。为了探究 PKM2 与 DR 新生血管的关系，使用 siRNA 敲除 HRMECs 中的 PKM2 后，进行成管实验与划痕实验，PKM2 敲减组表现为血管生成减弱。PKM2 选择性激活剂 TEPP-46 处理后，糖尿病大鼠的视网膜新生血管与渗漏明显改善。质谱分析显示信号转导和转录激活因子 3（STAT3）作为潜在的结合 HRMEC 的合作伙伴。蛋白质印迹和免疫沉淀测定表明，PKM2 与 STAT3 结合并促进其转录活性，并通过调节 Ang2 促进血管生成。选择性 STAT3 抑制剂或 Ang2 阻断部分减弱糖尿病大鼠中的视网膜新生血管生成。
此外，敲减 PKM2 后蛋白质印记测定显示，IL-18、IL-1β、TNF-α 等炎性细胞因子下降，**TUNEL** 染色表明细胞凋亡减少。
结论：PKM2 在高糖状态下上调，并且与糖尿病性视网膜病变的新生血管与渗漏相关，通过调节 **STAT3** 转录活性促进新生血管生成。

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非动脉前部缺血性视神经病变中 circRNAs 和 mRNAs 的转录组学分析

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目的：探究非动脉炎性前部缺血性视神经病变（NAION）患者外周血中环状 RNA（circularRNA,circRNA）表达谱变化，分析差异表达结果，预测 circRNAs 在疾病发生发展中的作用。
方法：应用高通量测序方法测定 6 例 NAION 患者和 5 例健康对照组外周血中 RNAs 的表达谱，筛选出差异表达的 circRNAs，经实时定量 PCR 技术进一步验证筛选出的差异表达的 circRNAs，并对其进行聚类分析和生物信息学预测。

结果: 高通量测序结果显示 NAION 患者外周血中有 49 个 circ RNAs 和 1161 个 mRNAs 表达差异显著。其中有个 24circ RNAs 表达上调，25 个 circ RNAs 表达下调（变化倍数＞2 倍且 P 小于 0。05）。经实时定量 PCR 验证，hsa_circ_0005583，hsa_circ_0003922, hsa_circ_0002021 and hsa_circ_0000462 在 NAION 患者外周血中显著下调（变化倍数＞2 倍且 p＜0。05），尤其是 hsa_circ_0005583 下调最显著（p＜0。001） 这些差异表达的 circRNAs 经过预测发现可能与神经变性,氧化应激,免疫和代谢等过程相关。

结论: NAION 患者外周血中 circRNAs 表达谱发生显著变化，差异表达的 circRNAs 可能成为 NAION 疾病诊断和治疗的生物学标记物，在疾病的发生发展中扮演重要的角色。

PO-291

雷帕霉素滴眼液减少高眼压模型对视网膜神经节细胞的损伤

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目的：雷帕霉素（RAPA）已被证明可通过腹腔注射方式对大鼠慢性高眼压青光眼模型具有神经保护作用，雷帕霉素也是一种免疫抑制剂，如果通过全身给药，可能会严重损害免疫功能，但却未有研究表明雷帕霉素可通过局部滴眼的方式对青光眼模型的保护作用。本研究目的是确定雷帕霉素是否可以通过局部滴眼方式进入眼部，以及能否抑制视网膜神经节细胞（RGC）丢失、视网膜神经胶质细胞的增生和炎症。

方法：在成年雄性 Sprague Dawley 大鼠右眼前房注射直径为聚苯乙烯微珠（MB）诱导眼压升高，左眼前房注射无菌 PBS 作为对照。从高眼压模型损伤后第 14 天再次注射微珠，且将微珠诱导的高眼压模型随机分成两组，MB+RAPA 组局部滴眼给予雷帕霉素治疗，MB+Vehicle 组眼局部给予溶剂处理，评价并比较雷帕霉素保护作用。通过使用 TonoLab 眼压计监测各分组中眼压；通过高效液相色谱法检测雷帕霉素在房水中的分布情况；通过 HE 染色评估各组视网膜厚度及 RGC 数量变化；通过免疫蛋白印迹及免疫荧光染色评估 Brn3a、胶质纤维酸性蛋白（GFAP)和波形蛋白、iNOS 的变化。

结果：在该研究，微珠诱导青光眼模型组眼压一直维持在高眼压状态，且雷帕霉素滴眼液显着减少了视网膜损伤和 RGC 损失，在第 28 天苏木精和伊红染色中相对完整的组织结构和 RGC 存活量增加所证明。在点药后 5min,30min,1h,2h 在房水中均检测到雷帕霉素。此外，在微珠诱导的慢性高眼压损伤模型中，Brn3a 表达减少，GFAP 与 iNOS 表达增加，给予雷帕霉素滴眼液治疗后 Brn3a 表达量上升，GFAP 与 iNOS 表达减少，且都具有统计学意义（P<0.05）。

结论：这些结果表明，雷帕霉素滴眼液可进入前房且对微珠诱导的高眼压模型损伤后的视网膜具有保护作用，减少了 RGC 丢失和胶质增生相关炎症。因此，可表明雷帕霉素滴眼液可能具有治疗青光眼相关疾病的潜能。

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Rapamycin mediates mTOR signaling in reactive astrocytes and reduces retinal gang cell loss

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Purpose: To investigate the effect of mTOR signaling pathway on the activity of astrocytes (AS) and further study the mechanism of mTOR pathway on retinal ganglion cells (RGC).
Methods: In vitro, primary astrocytes were isolated fromthe optic nerve head of adult rats, and the cells were randomly divided into control group (CON) group, EGF group, rapamycin (RAPA) group and EGF+RAPA group. Cells induced by epidermal growth factor (EGF) are cell activation models. EGF-stimulated cells were treated with mTOR pathway inhibitors, PI3K/AKT inhibitors and Erk/MAPK inhibitors. Two upstream pathway-associated proteins of the mTOR pathway were detected by Western blot (WB): p-Erk, p-Akt, p-S6K and p-mTOR. In vivo, rats were randomly assigned to the CON group, the ischemia-reperfusion (I/R) group, the RAPA group, and the I/R+RAPA group. WB was used to detect the expression of mTOR pathway-related protein in the retina; Astrocyte activation was assessed by immunostaining retinal flat mounts or cross sections with antibody against GFAP, and we also used western blots to detect the expression of GFAP. The fluorescence of gold (FG) was retrogradely labeled and the survival rate of RGC cells was calculated.
Results: 1. WB: changes in p-mTOR and p-S6K protein expression after EGF and RAPA treatment: compared with the CON group, the EGF group was increased; the EGF+RAPA group was lower than the EGF group. Compared with the I/R group, the expression of p-Akt was increased in the RAPA+I/R group, while the expression of p-mTOR and p-S6K was decreased. 2. Fluorescence staining was used to detect the expression of GFAP: compared with the CON group, the expression of GFAP was increased and the morphology of the cells was changed in the I/R group. Compared with the I/R group, the expression of GFAP was decreased in the I/R+RAPA group and the morphology was closer to the normal group. 3. The results of FG labeling showed that the RGC survival was reduced compared with the CON group, but the I/R+RAPA group had higher survival than the I/R group than the RGC.
Conclusion: Rapamycin significantly blocked EGF-induced mTOR signaling mainly through the PI3K/Akt pathway in primary astrocytes, but not through the MAPK/Erk pathway.And data reveals the neuroprotective effects of rapamycin in an experimental retina injury model, possibly through decreasing glialdependent intracellular signaling mechanisms for suppressing apoptosis of RGCs. Our study also presents an approach to targeting reactive astrocytes for the treatment of optic neurodegenerations.

PO-293

Ginsenoside Rh2 inhibits vascular endothelial growth factor–induced corneal neovascularization

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OBJECTIVE:VEGF-induced neovascularization plays a pivotal role in corneal neovascularization (CoNV). The current study investigated the potential effect of ginsenoside Rh2 (GRh2) on neovascularization.
METHODS: Ki-67 immunofluorescence assay;Scratch wound healing assay;Transwell migration array;Tube formation assay;Western blot analysis;Coimmunoprecipitation
RESULTS:GRh2 inhibits VEGF-induced HUVEC proliferation;GRh2 inhibits VEGF-induced HUVEC migration and vessel-like tube formation in vitro;GRh2 inhibits VEGF-induced signaling in HUVECs;Gab1 shRNA takes over GRh2 actions against VEGF;GRh2 inhibits alkali burn–induced neovascularization and inflammatory cell infiltration in mouse cornea;GRh2 inhibits alkali burn–induced mRNA/long noncoding RNA change in mouse cornea.
CONCLUSIONS: GRh2 inhibits VEGF-induced angiogenic effect via inhibiting VEGFR2-Gab1 signaling in vitro. It also alleviates angiogenic and inflammatory responses in alkali burn–treated mouse corneas.

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非动脉炎性前部缺血性视神经病变合并黄斑区视网膜下液的研究

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非动脉炎性前部缺血性视神经病变(nonarteritic anterior ischemic optic neuropathy，NAION)是临床上常见的， 以视盘水肿和视野缺损为特征的视神经疾病 。眼底常表现为视盘水肿及盘周小量出血。OCT 是其常用的检查方法。过去利用 OCT 研究 NAION 往往集中在视盘及神经纤维层等方面，对黄斑区关注较少。随着 OCT 的广泛应用，人们逐渐发现部分 NAION 还合并了黄斑区改变，本文将对这一部分研究做一综述。大量研究显示，部分 NAION 患者除视盘水肿外还可见黄斑区视网膜下液，比例在 10-16.7%。其发生与视盘水肿程度高有关，可合并或不合并视网膜水肿及其他区域视网膜下液。对这些患者行荧光血管造影检查，发现视神经存在渗漏和染色，而黄斑区未见任何泄漏迹象。由此考虑黄斑区下的液体不来自视网膜或脉络膜血管系统。Sibel Demirel 等人的研究认为其可能来源于视神经，Hedges 等人则认为其可能是盘周脉络膜液体进入视网膜从而蔓延至黄斑，但具体机制目前依旧不详。而随着黄斑区视网膜下液的减少，部分患者视力有提高。马伟娜等人对急性期 NAION 患者患眼进行 OCT 检查， 发现 16.7%伴有黄斑区视网膜下

液，而随着视盘水肿的消退，黄斑区神经上皮层下液体逐渐消失，部分患眼可合并视盘黄斑间少量点状硬性渗出。有研究提示，应用全身糖皮质激素治疗后黄斑区视网膜下液可明显减少，视力提高。有研究发现黄斑区视网膜下液的患眼视力明显低于无黄斑区下液的患眼，而两者视野平均敏感度无统计学差异。综上所述，NAION 合并黄斑区视网膜下液并非罕见情况，其对患者视力有一定的影响，这提示我们在遇到 NAION 患者时应应用 OCT 检查患眼黄斑，必要时进行荧光血管造影以区分其与中浆。但目前其发病机制、影响因素及对患者预后的影响依旧不详，还有待于进一步研究。

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The effect of mobile zinc on glaucomatous retinal ganglion cells death

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Purpose:

Traditional therapies targeting RGCs failed to maintain the long-term cell survival or axon regeneration in glaucoma, which suggested unknown molecular mechanisms exist. Our previous research revealed that mobile zinc (Zn^{2+}) increased rapidly in the early stage after injury directly to the optic nerve and mediated RGCs apoptosis (*Li Y, et al. PNAS 2017*). In addition, Zn^{2+} chelation enabled long survival of RGCs and axon regeneration. However, the effect of Zn^{2+} on RGCs death in the glaucoma model has not been fully elucidated.

Method:

1. A mouse model of acute ocular hypertension (OH, 80 mmHg for 1 hour) was established, and the level and localization of Zn^{2+} in retina were monitored by autometallography (AMG) 6 hours post injury.

2. RGC-5 was cultured and treated with Zn^{2+} *in vitro*. We studied the time-dependent effect of Zn^{2+} on RGCs apoptosis at 6h, 12h and 18h using flow cytometry labeled by Annexin V-FITC/PI.

3. The dose-dependent effect of Zn^{2+} (50, 100, 150 μM) on mitochondrial function was revealed by detecting fluorescenct level of JC-1, a fluorescence probe which reflects mitochondrial membrane potential with different color.

4. The oxygen-glucose deprivation for 3h and reperfusion for 6h (OGD/R model) was established on primary cultured mouse RGCs, and the effect of specific Zn^{2+} chelator ZX1 on RGCs apoptosis was detected by flow cytometry.

Result:

1. After OH, the level of Zn^{2+} increased rapidly (1.76±0.26-fold, P<0.05) in the inner-plexiform layer within 6 hours (Fig. 1).

2. 6 hours after Zn^{2+} treatment (150 μM) *in vitro*, significant death of RGC-5 was observed (15.32 ±0.32 %, P<0.05). The toxicity of Zn^{2+} increased in a time-dependent manner (Fig. 2A).

3. The mitochondrial membrane potential declined in accordance with Zn^{2+} concentration, and the toxicity of Zn^{2+} increased in a dose-dependent manner (Fig. 2B)
4. Zn^{2+} Chelator ZX1 (5 μM) significantly inhibited the apoptosis of RGCs in OGD/R model (*P*<0.0001, Fig. 2C).

Conclusion:

Mobile Zn^{2+} increased rapidly in mouse retina after OH, leading to RGCs injury. Zn^{2+} chelators significantly enhanced the survival of RGCs. Apoptosis mediated by mitochondrial disfunction could be the mechanism underlying Zn^{2+} toxicity. This study provides a new and promising therapeutic target for glaucoma.

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Trends in retinal neuroprotection research -a bibliometric analysis

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Purpose:

This article conducted a data mining based on the retinal neuroprotection literatures. We would provide quantitative analysis of literature to explore the history, development, current status, impact, network as well as future direction of retinal neuroprotection research.

Method:

Relevant literatures on retinal neuroprotection were collected from Web of Science Core Collection database. We extracted the relevant words and established the co-occurrence and co-citation matrixes by Citespace software. Cooperative network analysis, co-citation analysis, cluster analysis combining timelines and keywords co-occurrence analysis were conducted and graphed.

Result:

1. A total of 21,389 articles and more than 60,000 cited articles during 1991-2017 on retinal neuroprotection were collected. According to the trend of publications, the amount of total publications in 2018 would reach 23,132 (Fig. 1 A, B).
2. The United States is the country with 9201 articles published, accounting for 33.50% of the total literatures, followed by Germany (2089 articles), England (1781 articles) and P. R. China (1698 articles) (Fig. 1 C, E). The most publishing institution was Harvard University, occupying 4.94% of the total. The following were University College London (UCL, 2.87%) and Johns Hopkins University (2.52%). Except for UCL, which belonged to England, the rest of top 10 publishing institutions were all in the United State (Fig. 1 D, F).
3. Top 3 highly cited authors were Quigley HA, Osborne NN, and Lavail MM with 661, 420 and 395 citation times respectively.

4. 12 research directions were divided into by cluster analysis. The top-five was Müller glia, axon regeneration, axotomy, retinitis pigmentosa and photoreceptor (Fig. 2 A, B).
5. Evolution trend of research hotspots was evaluated by keywords analysis. Anatomy and physiology were the initial hotspots and had lasted for more than 11 years. The following 10 years was unstable with researchers exploring different directions, such as long-term potentiation, intraocular pressure and progenitor cell. And during the latest 5 years, research on retinal nerve degeneration was the main focus (Fig. 2 C).
Conclusion:
The bibliometric analysis provided a macroscale view on the retinal neuroprotection, dividing the field in to 12 directions and revealing the hotspot evolution from anatomy, physiology to retinal nerve degeneration.

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以视神经炎为主要症状的 57 例视神经脊髓炎谱系疾病的回顾性分析

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目的 中西医结合治疗视神经炎为主要临床表现的视神经脊髓炎谱系疾病的不同抗体亚型的疗效观察。**方法** 收集以视神经炎为主要临床表现的视神经脊髓炎疾病的 57 例病例，按血清抗体结果分为 3 组：MOG 抗体阳性组、AQP-4 抗体阳性组及 AQP-4 抗体阴性组，各组患者根据病情及病程分为急性期、缓解期，经中西医结合治疗，分析各亚型有效率，并对比不同亚型、分期的有效率差异。结果 1.各亚型有效率: MOG 抗体阳性组有效率 50.00%，AQP-4 抗体阳性组有效率 39.19%，AQP-4 抗体阴性组有效率：37.50% 2. 不同 NMOSD 亚型有效率分析，结果无统计学差异（P＞0.05）；3. 不同组别同一分期的有效率：急性期：MOG 抗体阳性组：28.57%，AQP-4 抗体阳性组 59.38%，AQP-4 抗体阴性组 75.00%；缓解期：MOG 抗体阳性组：71.43%，AQP-4 抗体阳性组 23.81%，AQP-4 抗体阴性组 0%。4. 不同组别同一分期下有效率统计结果显示：急性期各组之间有效率无统计学差异（P＞0.05），缓解期 MOG 抗体阳性组有效率高于 AQP-4 抗体阳性组（χ^2=4.36，P=0.037＜0.05），余各组之间无统计学差异（P＞0.05）。**结论：**MOG 抗体相关性视神经脊髓炎患者视力恢复较 AQP-4 抗体阳及 AQP-4 抗体阴性者视神经脊髓炎有更好的趋势，在缓解期仍有较多病例视力继续提升。AQP-4 抗体阳性者在急性期内视力恢复者更多，缓解期后视力提升更为困难。中医疗法在本病中的治疗作用有待于进一步观察。

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MiR-29a 在新生血管性眼病中的作用机制研究

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目的:眼部新生血管形成是致盲的主要原因之一，分为视网膜新生血管、脉络膜新生血管及角膜新生血管。目前临床治疗方法有限，寻找新的靶向药物至关重要。MiR-29a 在肿瘤新生血管的形成中发挥重要作用。然而，在新生血管性眼病中的功能机制尚不清楚。为了揭示 miR-29a 在眼部新生血管形成过程中的作用，我们利用人视网膜微血管内皮细胞（HRMEC)、野生型（WT）和 miR-29a 敲除（miR-29a$^{-/-}$）鼠，联合氧诱导视网膜病变（OIR）模型、激光诱导脉络膜新生血管（CNV）模型以及角膜新生血管模型（Corneal NV）进行体内外实验，探讨该分子在眼部新生血管形成过程中的作用机制。

方法：在 HRMEC 中过表达或抑制 miR-29a，进行增殖、迁移、管腔形成等细胞功能实验并利用敲除鼠脉络膜进行发芽实验。同时，利用敲除鼠制作 OIR、CNV 及 Corneal NV 模型，进行表型分析。用预测软件筛选靶基因并分析相关信号通路，蛋白免疫印迹和实时荧光定量 PCR 验证靶基因表达情况。

结果：在各新生血管模型中，miR-29a 的表达量均下调。HRMEC 功能实验中，过表达 miR-29a 显著抑制其增殖、迁移及管腔形成。敲除鼠脉络膜发芽面积较 WT 小鼠明显增加。OIR 模型中，敲除鼠视网膜新生血管面积较 WT 小鼠明显增加，血管闭塞面积减少。CNV 与 Corneal NV 模型中，敲除鼠的新生血管面积明显大于 WT 小鼠。预测软件找到 miR-29a 的下游靶基因 PDGFRβ，mRNA 水平检测示：在过表达 miR-29a 的 HRMEC 细胞中 PDGFRβ 的表达量较对照组明显下调。蛋白免疫印迹示：OIR 模型组与对照组相比 PDGFRβ 的表达量明显增加；OIR 模型组中敲除鼠较 WT 小鼠，PDGFRβ 的表达量明显增加。

结论:我们的研究揭示了 miR-29a 在眼部新生血管形成过程中发挥重要的调控作用，并暗示我们该小分子非编码 RNA 或可成为新的治疗靶点。

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低氧环境诱导斑马鱼幼鱼视网膜血管增生及视功能障碍

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【目的】模式动物斑马鱼具有与人类高度保守的视网膜结构，其视网膜分层和相对应的细胞类型与哺乳动物类似(Larison and Bremiller, 1990; Marsh-Armstrong et al., 1994)。幼年斑马鱼通体透明，视网膜血管系统较啮齿类动物相对简单，可方便的观察视网膜血管发育过程。湿性年龄相关性黄斑变性（age-related macular degeneration，AMD）的血管异常（增生和渗漏）可能导致视网膜结构改变以及视觉功能损伤。为进一步解析血管异常如何影响视网膜结构改变以及视功能损伤以及探索可能的修复机制，我们使用低氧环境初步诱导出斑马鱼幼鱼视网膜血管增生模型。【方法】我们使

用标记血管的转基因斑马鱼品系 Tg(*flk*:EGFP)，将胚胎置于自制低氧装置中（包括溶氧监控装置和溶氧调节装置等），连续低氧处理（1-5dpf），同时使用激光共聚焦显微镜（FV1000，奥林巴斯）对斑马鱼幼鱼眼球进行三维成像，比较低氧组和对照组视网膜血管形态学差异。成像完成后，再使用本实验室搭建的斑马鱼视觉功能检测装置（授权专利）检测低氧组和对照组幼鱼的眼动反应（optokinetic response，OKR），从而验证幼鱼视网膜血管增生对视觉功能的影响。【结果】形态学结果显示，整个视网膜发育阶段，与对照组相比，低氧组的视网膜血管出现了显著增生的现象。而 OKR 行为学结果进一步显示，与对照组相比，低氧组的视觉功能（视锐度、对比敏感度、视阈值等）都出现了下降的趋势。【结论】我们初步构建了斑马鱼幼鱼视网膜血管增生模型，并验证了血管增生对视觉功能的影响。在此基础上，我们将进一步研究探讨调控视网膜血管增生的分子机制以及相关药物筛选。

PO-300

Multifractal and Lacunarity Analyses of Microvascular Morphology in Eyes with Diabetic Retinopathy Using Optical Coherence Tomography Angiography

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Objective: To evaluate the degree of microvascular impairment in diabetic retinopathy using multifractal and lacunarity analyses and to compare the diagnostic ability between traditional Euclidean measures (fovea avascular zone area and vessel density) and fractal geometric features.
Methods: This retrospective cross-sectional study included a total of 143 eyes of 94 patients with different stages of diabetic retinopathy. The retinal microvasculature was imaged by projection removed optical coherence tomography angiography. We examined the degree of association between fractal metrics of the retinal microvasculature and diabetic retinopathy severity. The area under the receiver operating characteristic curve was used to estimate the diagnostic performance.
Results: With increasing diabetic retinopathy severity, the multifractal spectrum shifted towards the left bottom and exhibited less left skewness and asymmetry. The vessel density, multifractal features and lacunarity measured from the deep capillary plexus were strongly associated with diabetic retinopathy severity. The multifractal feature D5 showed the highest diagnostic ability. The combination of multifractal features further improved the discriminating power.
Conclusions: Multifractal and lacunarity analyses can be potentially valuable tools for assessment of microvascular impairments in diabetic retinopathy. Multifractal geometric parameters exhibit a better discriminatory performance than Euclidean measures, particularly for detection of the early stages of diabetic retinopathy.

PO-301

Effects of acute sleep deprivation on tear film in healthy adult males

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Purpose: To investigate the effect of 24 hours of acute sleep deprivation (ASD) on the homeostasis of the tear film and the tear proteomics structure in healthy adult males.

Methods: The participants were healthy male adults (20–30 years of age) with a normal sleeping pattern, and had no history of ocular surface disease. The participants were totally sleep deprived for 24 h under constant routine conditions. Tear film evaluation and tear collection was conducted at 6 AM and 6 AM the following day. Schirmer's test, tear film break-up time (TBUT), tear meniscus height (TMH), lipid layer thickness (LLT) and number of incomplete blinks were measured. Tear proteins were prepared and treated with iTRAQ (isobaric tag for relative and absolute quantitation). All MS/MS spectra were identified by using SEQUEST against the human International Protein Index (IPI) database and the relative abundance of individual proteins was assessed by spectral counting. Bioinformatics technology was applied to analyze the significant proteins, and the potential proteins were verified by Western blotting.

Results: In the morning after a night of sleep loss, TBUT, TMH, LLT and was significantly shorter, and tear secretion measured by Schirmer's test was significantly reduced compared with morning levels following uninterrupted sleep. Analysis of spectral counts of tear proteins showed that, a total of 269 proteins were quantified, and 118 proteins were considered to be significantly altered by at least 2.0- or 0.5-fold. For pathway analyses, the top enrichments were mainly involved in response to wounding, inflammatory as well as lipid metabolism. Coronin-1A was verified as a potential protein involved in the early stage of acute sleep deprivation.

Conclusions: This study first demonstrates that tear proteomics is a powerful tool for better understanding of the mechanisms underlying acute sleep deprivation, and that coronin-1A might be a tear protein marker in dry eye disease.

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PO-302

角膜基底下神经弯曲度的分析及其在干眼和糖尿病神经病变中的改变

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目的 建立评价角膜基底下神经弯曲度的客观标准并分析其在干眼及糖尿病神经病变中的改变。 **方法** 根据主观分级方法随机选取Ⅰ级到Ⅳ级弯曲度的角膜基底下神经图片各 50 张，提取神经后对 6 个弯曲度相关参数（L_C、Seg_L_C_mean、Cur_mean、Specific_p、ICM、SCC_mean）进行分析。确认参数有效性后，进行横断面研究。招募正常对照组、轻中度干眼组、重度干眼组、糖尿病非干眼组和糖尿病干眼组各 9-16 例不等，收集基本资料后，每人每眼各选取 2 张角膜基底下神经图片进行上述参数分析。 **结果** L_C、Seg_L_C_mean、Cur_mean、SCC_mean 随弯曲度级别增高而增大，总体差异具有统计学意义（均 P<0.001）。其中 Cur_mean、L_C 两两比较（Ⅲ级、Ⅳ级 L_C 比较除外）均有统计学差异（均 P<0.05）；Seg_L_C_mean、SCC_mean 两两比较（Ⅰ级与Ⅱ级比较除外）均有统计学差异（均 P<0.05）。Ⅲ、Ⅳ级 ICM 较Ⅰ级增大具有统计学意义（均 P<0.05）。4 组之间 Specific_p 无显著性差异。重度干眼组、糖尿病非干眼组、糖尿病干眼组较正常对照组角膜知觉降低（均 P＜0.001）。4 组患者角膜基底下神经的 Cur_mean 较正常对照组均增大（均 P<0.05）；重度干眼组、糖尿病非干眼组、糖尿病干眼组的 L_C 较正常对照组增大（均 P<0.05）；仅糖尿病干眼组 Seg_L_C_mean 和 SCC_mean 较正常对照组增大（P<0.05）；重度干眼组与糖尿病干眼组的 ICM 较正常对照组增大（P<0.05）。 **结论** Cur_mean、L_C、 Seg_L_C_mean、SCC_mean、ICM 适用于分析神经弯曲度。Specific_p 不能用于分析神经弯曲度。正常人角膜基底下神经卷曲度介于Ⅰ级与Ⅱ级之间。重度干眼与糖尿病患者角膜知觉下降，角膜基底下神经弯曲度增高。

PO-303

Quantitative Analysis of Conjunctival Vascular Density in Dry Eye Based on Optical Coherence Tomography Angiography

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Aim: To investigate and analyze quantitatively the density changes of conjunctival vascular networks and blood flow areas using anterior segment optical coherence tomography angiography (AS-OCTA) in dry eye patients.
Methods: The experiment was divided into two groups: 40 eyes of 20 healthy subjects were normal control group, 8 males and 12 females, average age of 42.7 years old. 40 eyes of 20 dry eye patients were dry eye group, 7 males and 13 females, with an average age of 43.2 years old. Sex and age were matched between the two groups. 6mm diameter (from limbal cornea) of temporal conjunctiva of all subjects had been scanned by using a commercially available AngioVue OCTA system (Optovue, Fremont, California, USA) with the Angio Retina 6×6 mm volume cubes program for vascular density (VD), using an anterior segment lens adapter . VD scanning images had been processed and quantitatively analyzed for VD values by using a series of free public software including photoshop V 8.0, Image J software (NIH, Bethesda, MD, USA). All subjects had been taken anterior segment photography.
Results: Our pilot study was the first time to preliminarily explore and evaluate of quantitative analysis of vascular density (VD) on normal conjunctival vessels by using AS-OCTA system and related image processing and analysis software. VD values of temporal conjunctiva could be scanned by AS-OCTA and quantitatively analyzed by related software . Compared with the normal group, conjunctival VD values in dry eye group were increased significantly ($p < 0.05$). The calculation formula of VD values is shown below:
VD = (1-mean/max) ×100%.
Conclusions: VD of temporal conjunctiva could be scanned by AS-OCTA and quantitatively analyzed by software. Conjunctival vascular density and blood flow area were increased significantly in dry eye, and increased with the severity grade of dry eye, which may be related to conjunctival inflammatory congestion in dry eye.

PO-304

基于 RNA-seq 技术探索糖尿病视网膜病变治疗新靶点

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目的: 基于 RNA-seq 的转录组学分析，研究高糖状态对视网膜血管内皮细胞的影响并探索糖尿病视网膜病变治疗靶点。
方法: 将猴视网膜微血管内皮细胞分为对照组和高糖组，通过细胞增殖及迁移实验对两组细胞进行检测，运用 RNA-seq 对两组细胞进行全转录组测序及分析。基于转录组数据，筛选出两组间差异表达倍数位于前八的基因，并分别在体内（糖尿病与非糖尿病患者的血液中）及体外（缺氧和过氧化氢刺激细胞来模拟糖尿病视网膜病变中细胞所处的微环境）运用 PCR 对这些基因的表达进行验证。
结果: 细胞增殖及迁移实验显示高糖组与正常组相比，其 OD 值及迁移率显著性上升，表明高糖模型的成功建立。通过 RNA-seq 获得高糖诱导血管内皮细胞的差异基因表达谱，比较两组的测序结果发

现，共有 449 个差异表达基因。GO 和 Pathway 分析显示差异表达基因集中在 TGF-β 通路、补体通路等，进而影响细胞的能量代谢、蛋白合成等。从差异基因中筛选出 8 个特异性表达较高的基因，分别为：SMAD9、BMP4、SLC34A2、DAB1、ATP1A3、CHST5、NCF1、UNC5C。其中 BMP4 和 SLC34A2 导致新生血管的形成，SMAD9、DAB1 和 CHST5 促进纤维化的形成，ATP1A3 和 NCF1 既可导致细胞缺血，又可协同 UNC5C 导致神经节细胞凋亡。另 RT-PCR 的验证结果显示，在糖尿病患者血液，乏氧及氧化应激细胞模型中 SMAD9、BMP4、SLC34A2 的表达均上调，而 ATP1A3 的表达下调，上述两种表达趋势均与转录组数据结果保持一致。

结论: 高糖对视网膜血管内皮细胞的影响是多方面的，通过破坏视网膜血管内皮细胞的跨膜传导、细胞外基质代谢等，从而影响其功能。后续实验中我们将选择 SMAD9、BMP4、SLC34A2、ATP1A3 进行功能验证，进一步挖掘其作为糖尿病视网膜病变治疗靶点的分子依据。

PO-305

Full-field optical coherence tomography for non-contact en face cellular resolution imaging of in vivo human cornea

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Purpose: We developed a new non-contact, millimeter field-of-view, cellular-level resolution device, based on full-field optical coherence tomography (FFOCT) to image the cornea *in vivo* compared with confocal microcopy.

Methods:A customized FFOCT system was developed and combined with a spectral-domain OCT (SDOCT) system. Real-time optical path length matching and defocus correction for FFOCT to image various corneal layers were achieved by the SDOCT cross-sectional images providing the focus and depth information of FFOCT *en face* images. With a high-speed camera (750Hz), FFOCT imaging was performed at 275Hz, fast enough to freeze the eye motions during an imaging acquisition. Corneal images were obtained from 3 healthy subjects while no contact with the eye was required. Stacks of *en face* images were acquired at one depth and an image registration algorithm was applied to compensate for the slow lateral eye movements. Registered images were then averaged to obtain high signal to noise final frames. Biometrics of the visualized corneal structures were measured on the final FFOCT images. Confocal microscopy (HRT3, Heidelberg) data were obtained on the same subjects for comparison.

Results:*In vivo* corneal epithelium, Bowman's layer, sub-basal nerve plexus (SNP), stromal keratocytes, stromal nerves, Descemet's membrane and endothelial cells with nuclei were visualized using FFOCT. Nuclei of the anterior, middle and posterior stromal keratocytes had diameters of 13 ± 4 μm, 20 ± 5 μm and 19 ± 7 μm, respectively. Keratocyte nuclei had an oval shape, which became more oblong with depth. Thicknesses of the SNP and stromal nerves were

measured to be 4 ± 1 μm and 8 ± 1 μm, respectively. Endothelial cells had diameters of 20 ± 1 μm with nuclei of 3.5 ± 1 μm. Cells were hexagonal in shape with round nuclei. These results are in agreement with the confocal microscopy data in literatures.

Conclusions:FFOCT allows non-contact visualization of millimeter-field regions of the *in vivo* human cornea with cellular resolution. Dimensions and shapes of the structures observed in FFOCT are in agreement with those seen with clinical confocal microscopy. The non-contact and wide imaging field present advantages in terms of patient comfort and clinical value in comparison to confocal microscopy.

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PO-306

基于深度学习的早产儿视网膜病变的临床诊断

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目的 人工智能（artificial intelligence, AI）技术的迅速发展为医学影像的识别提供了新的方法和思路。本研究在此基础上提出一种基于深度学习的早产儿视网膜病变（retinopathy of prematurity, ROP）智能诊断系统，并评估其在临床上的应用场景和价值。**方法** 采集武汉大学人民医院眼科中心 2009 年 7 月至 2016 年 12 月行早产儿眼底筛查的共 38895 张图像构建视网膜眼底图像大规模数据集，由 10 名眼科医生进行标注，建立深度学习（Deep learning, DL）网络，通过对模型的训练实现 ROP 的自动诊断，判断该算法自动筛查 ROP 分期,分区及“Plus”病的性能和准确率。**结果** 深度学习智能诊断系统实现了对 ROP 分期及其“Plus”病、视盘、黄斑及激光治疗疤痕检测的平均准确率为 0.931；其中检测分界线（I 期）准确率为 0.876，视网膜嵴（II 期）为 0.942，膜嵴伴血管扩张（III 期）为 0.968；视网膜不完全脱离（IV 期）为 0.998，视网膜完全脱离（V 期）为 0.999；血管迂曲扩张（“Plus”病）为 0.896，视盘为 0.954，黄斑为 0.781，激光治疗疤痕为 0.974。 **结论** 深度学习算法有高准确率的早产儿视网膜病变的疾病分期和“Plus”病的诊断，可辅助临床眼科医生筛查早产儿视网膜病变，为临床诊断和治疗提供辅助。

PO-307

Optical coherence tomography-based deep learning algorithm for the evaluation of treatment indication with anti-vascular endothelial growth factor agents

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Purpose: Intravitreal injections with anti-vascular endothelial growth factor (anti-VEGF) medications such as conbercept have become the standard of care for their respective indications. Optical coherence tomography (OCT) scans of the central retina provide detailed anatomical data and are widely used by clinicians in the decision-making process of anti-VEGF indication. In recent years, significant progress has been made in artificial intelligence and computer vision research. We trained a deep convolutional artificial neural network to predict treatment indication based on central retinal OCT scans without human intervention.
Method: A total of 512 retinal OCT B-scans acquired between 2017 and 2018 were exported from the institutional image archive of a university hospital. OCT images were cross-referenced with the electronic institutional intravitreal injection records. OCT images with a following intravitreal injection during the first 21 days after image acquisition were assigned into the 'injection' group, while the same amount of random OCT images without intravitreal injections was labeled as 'no injection'. After image preprocessing, OCT images were split in a 4:1 ratio to training and test datasets. We trained an artificial neural networks and assessed its performance on the validation dataset. We calculated prediction accuracy, sensitivity, specificity, and receiver operating characteristics.
Results: The deep convolutional neural network was successfully trained on the extracted clinical data. The trained neural network classifier reached a prediction accuracy of 93.8% on the images in the validation dataset. For single retinal B-scans in the validation dataset, a sensitivity of 91.6% and a specificity of 96.7% were achieved. The area under the receiver operating characteristic curve was 0.959 on a per B-scan image basis, and 0.971 by averaging over six B-scans per examination on the validation dataset.
Conclusion: Deep artificial neural networks show impressive performance on classification of retinal OCT scans. After training on historical clinical data, machine learning methods can offer the clinician support in the decision-making process. Care should be taken not to mistake neural network output as treatment recommendation and to ensure a final thorough evaluation by the treating physician.

PO-308

基于图像语义分割方法的人工智能技术在糖尿病性黄斑水肿诊断分级中的应用

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目的：近年来，随着以图像语义分割方法为代表的人工智能技术不断发展和成熟，出现了人工智能技术与医疗健康领域开始深度结合的迹象。图像语义分割是将像素按照图像中表达语义含义的不同

进行分割并识别出图像中的内容。本研究探讨基于图像语义分割方法的人工智能技术通过 OCT 图像诊断糖尿病性黄斑水肿的诊断效能。
方法：回顾性系列病例研究。临床检查确诊的 2 型糖尿病患者 271 例 507 只眼，每只眼 OCT 图像共 4262 幅纳入研究。由视网膜专科医生对其中 2131 幅 OCT 图像进行分级，同时通过图像语义分割方法对 OCT 图像进行回顾性发展数据集训练。由此产生的算法在对另外 2131 幅 OCT 图像进行分级，同时再由视网膜专科医生对 OCT 图像进行分级。建立受试者工作特征（receiver operating characteristic，ROC）曲线，评价基于图像语义分割方法的人工智能技术对糖尿病性黄斑水肿的诊断效能。
结果：图像语义分割方法对糖尿病性黄斑水肿诊断的曲线下面积为 0.87（95%可信区间，0.85-0.89）(95% CI, 0.988-0.993)，敏感性为 88.5%（95%可信区间，86.8%-91.2%），特异性为 92.3%（95%可信区间，87.1%-94.3%）。
结论：基于图像语义分割方法的人工智能技术在糖尿病性黄斑水肿的诊断分级中具有较高的敏感性和特异性。但仍需高质量的多中心、大样本、长期随访的随机对照试验进一步研究证实。

PO-309

高分辨率相干光断层扫描测量视盘周围神经纤维层及其功能分区在青光眼早期、中期和晚期诊断中的作用

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目的 探讨高分辨率相干光断层扫描（Cirrus HD OCT）测量视盘周围神经纤维层（pRNFL）厚度及其功能分区和黄斑节细胞-内丛状层（mGCIPL）厚度在开角型青光眼早期、中期和晚期的诊断表现。
方法 181 例开角型青光眼（共 318 眼：早期 122 眼，中期 60 眼和晚期 136 眼）和 70 例正常对照（70 眼）均行 Cirrus HD-OCT 扫描，测量 pRNFL 和 mGCIPL 厚度。FORUM 软件（版本 V4.0）用于测量与视野功能相对应的各区域 pRNFL 厚度，共分为 6 个区域。比较各青光眼组之间每个区域的厚度及各个参数的受试者工作曲线下面积（AUROC）。
结果 正常对照组 pRNFL 平均厚度为 99.81±10.06μm，mGCIPL 平均厚度为 83.24±5.91，均明显高于青光眼组（67.42±13.22μm 和 63.31±10.85μm，*P* 均< 0.001）。在早期、中期和晚期青光眼组中， pRNFL 平均厚度的 AUROC 在各个参数中均为最高。在早期青光眼组， pRNFL 平均厚度的 AUROC 为 0.935，区域 2（与上方视野相对应）厚度的 AUROC 为 0.915，均明显高于 mGCIPL 平均厚度（0.859，*P* 均为 0.003）。在中期和晚期青光眼组，pRNFL 厚度和区域 2 分别与 mGCIPL 平均厚度的 AUROC 值无显著差异（P 均＞0.05）。
结论 pRNFL 平均厚度在早期、中期和晚期青光眼组均具有最高诊断能力。在早期青光眼组，平均 pRNFL 厚度和与上方视野相对应的 pRNFL 区域厚度的诊断能力要好于 mGCIPL 平均厚度。在中期和晚期青光眼组，两者之间无明显差别。

PO-310

Next generation sequencing to detect the exosomal microRNA derived from retinal pigment epithelia cells with oxidative stimulation

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Purpose: This study aimed to identify exosomal microRNAs (miRNAs) derived from retinal pigment epithelia (RPE) cells with oxidative stimulation, to better understand the intercellular communication of age-related macular degeneration.
Methods: Exosomes were collected from ARPE-19 cells, with or without stimulation by H2O2. Exosomes were identified under electron microscope and western blot for CD61. Next generation sequencing was used to detect the profile of miRNAs, in RPE exosomes and cells. Gene Ontology (GO) annotation and Genomes (KEGG) pathway enrichment analysis was used to reveal possible functions associated with these selective exosomal miRNAs.
Results: We first isolated and characterized the exosomes derived from the RPE cells. A total of 813 and 631 miRNAs were detected in RPE exosomes and cells, respectively. Among those miRNAs, 42 were identified upregulated and 69 were downregulated in the exosomes compared with parental cells, such as miR-3614-5p, miR-5096, miR-548a-3p, miR-150-5p. Those miRNAs were related to neovascularzation, inflammation, immune, and proliferation.
Conclusion: Our data contribute substantially to knowledge within the exosome-identified miRNA database. A number of miRNAs might be potentially involved in AMD pathogenesis.

PO-311

优化 SRK-T 公式在眼轴长 27mm 以上高度近视眼 IOL 度数计算准确性的研究

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目的 评价按眼轴区间组优化的 SRK-T 公式在计算眼轴长 27mm 以上近视眼的人工晶状体度数的准确性。
方法 应用 SRK-T 公式在不同眼轴长区间的优化系数（马秀艳，周健. 高度近视眼人工晶状体度数计算公式的准确性比较. 眼科新进展，2016，36（9）：863-867），在我科对 97 例（142 眼）的白

内障术前 IOL 植入的预测术后屈光度进行优化，得到调整术后等效球镜度数（Adjusted Predicted Postoperative Spherical Equivalence，APPSE），并获取植入人工晶状体的度数；在术后 3 月，比较目标屈光度（Target Spherical Equivalence,TSE）和术后实际等效球镜度（Actual Postoperative Spherical Equivalence，APSE）的差异、SRK-T 公式优化前、后预测屈光度误差绝对值（Absoluted Predictive Error，APE）的分布变化。

结果 优化 SRK-T 公式计算确定植入 IOL 度数，获得的 TSE、APSE 的平均值分别为（-2.36±1.10）D， APSE（-2.37±1.26）D； TSE 与 APSE 无显著的统计学差异（t=0.079, *P* =0.937，*P*＞0.05），在每个眼轴长组内比较 TSE 和 APSE，只有 29mm 组中 TSE 与 APSE 有显著性差异（t = -2.765, *P*=0.011），其它眼轴长组中均无显著差异（*P*＞0.05）。APE 在≤0.50D、≤1.00D、≤1.50D 三个区间在优化后较优化前的百分比明显提高（优化后 *vs* 优化前）， 差异有统计学意义（$\chi^2$1=7.199，*P*1=0.007，$\chi^2$2=11.012，*P*2=0.001，$\chi^2$3=3.877，*P*3=0.049）。

结论 经过优化的 SRK-T 公式在计算高度轴性近视眼的人工晶状体度数上准确度有明显提高。

PO-312

MGD 与正常人睑板腺腺体形态学参数自动分析及临床评价

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目的：研究睑板腺腺体形态学参数分析重复性，分析 MGD 及正常人睑板腺形态学特征及其应用价值。**方法**：健康受试者 39 例 63 眼，MGD 患者 26 例 45 眼进行睑板腺红外成像，通过自主设计的睑板腺腺体分析软件（Meibomian Gland Bioimage Analyzer V3）分析腺体形态学参数，完成重复性检验，比较 MGD 与正常人上述生物学测量值的差异，分析其在 MGD 中的诊断价值。**结果**：睑板腺腺体分析软件的腺体长度，腺体直径，腺体面积百分比，腺体形变系数的组间变异系数（CV）分别为 0.68%，0.51%，0.5%，1.60%，1.02%，一致性相关系数（CCC）分别为，0.990，0.999，0.980，0.997。正常人腺体平均长度为 5.42±0.70mm，平均腺体直径为 0.13±0.03mm，平均腺体面积为 1.6±2.2mm^2，平均形变系数为 9.62±3.44，平均显影值为 68.30±14.58，腺体占上睑结膜面积百分比为 64.07%。MGD 组腺体平均长度为 4.80±1.29mm，平均腺体直径为 0.12±0.02mm，平均腺体面积为 1.7±0.6mm^2，平均形变系数为 8.17±3.17，平均显影值为 60.73±9.23，腺体占上睑结膜面积百分比为 50.69%，两组差异具有显著统计学意义（P＜0.05）。睑板腺形态学各参数诊断 MGD 的 ROC 曲线下面积分别为：AUC $_{面积百分比}$=0.83，AUC $_{腺体长度}$=0.70，AUC $_{腺体面积}$=0.70，AUC $_{腺体显影值}$=0.67，AUC $_{腺体形变系数}$=0.64，AUC $_{腺体直径}$=0.63。**结论**：MGD 与正常人的腺体面积、形变系数和显影值等睑板腺形态学参数具有差异性，自动分析软件对腺体的精准测量具有良好的可重复性和可靠性，为 MGD 的诊断提供新的指标。

PO-313

Development of a residual network learning algorithm to screen for keratitis from IVCM images

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Purpose: Develop a new intelligent system based on deep learning for automatic in vivo confocal microscopy (IVCM) image classification to help doctors quickly and accurately identify abnormal keratitis cells in IVCM.
Methods: A total of 4355IVCM images were labeled, finaly2772 images (1556 abnormal pictures with keratitis features and 1216 normal pictures) were included. We applied 5-fold cross-validation method to train and optimize our algorithms，used a random method to assign 4/5 of all images to the training dataset and 1/5 to the testing dataset. To discriminate abnormal cells of keratitis, using the training dataset, develop a Deep Residual Learning for Image Recognition (used ResNet-101 in our study) , then validated this Deep Residual Learning using the testing dataset. and using the area under the receiver operating characteristic curve (AROC) show its diagnostic accuracy，sensitivity and specificity in the testing dataset, We also validated again the system with external testing dataset and compared the performance of the system with results obtained by two experts.
Results: Areas under curves of respective receiver operating characteristics were 0.985 0.988, and 0.98 for the three classifier. ResNet shows a high level of comparison between human and machine performance. In the course of 5-fold cross-validation, cases involving normal and fungal hyphae, normal and inflammatory cells, and normal and activated dendritic cells resulted in more than 97% accuracy. At the same time, the time it takes for the machine to give a diagnosis is significantly lower than the time used by humans.
Conclusions: This deep learning-based system is able to automatically detect and differentiate various IVCM images with excellent accuracy. Moreover, the performance of the system is at a level comparable to or better than that of human experts. This study is a promising step in revolutionizing current IVCM diagnostic infectious keratitis pattern and has the potential to generate a significant clinical impact.

PO-314

Classification of subclinical keratoconus based on the combination of Scheimpflug and Spectral-Domain OCT imaging data using Artificial Intelligence

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Purpose: To develop an automated classification system using artificial intelligence to distinguish the clinically unaffected eyes in patients with keratoconus from a normal control population based on the combination of Scheimpflug camera and Spectral-Domain OCT imaging data.
Methods: In total, 78 eyes from 78 participants had previously been classified by 2 cornea experts as either normal eyes (30 eyes), keratoconus (28 eyes) or subclinical keratoconus (20 eyes). All eyes were imaged with a Scheimpflug camera and a Spectral-Domain OCT. Convolutional neural networks were used to extract corneal features from the imaging data of these two machines. Random forest classifier was used to train a model based on these features to distinguish the subclinical keratoconus from normal eyes. Fisher score was used to rank the differentiable power of each parameter.
Results: Among all individual features, the maximum localized thinning in the vertical meridian in corneal epithelium extracted from OCT ranked the first one to differentiate the subclinical keratoconus from normal eyes. The combination of Spectral-Domain OCT features reached a higher differentiable power (AUC = 0.94, sensitivity = 93%, specificity = 94%) than Schimpflug camera (AUC = 0.86). The developed classification model to combine all features from the two machines dramatically improved the differentiable power to discriminate between normal and subclinical keratoconus eyes (AUC = 1.00 with 100% sensitivity and 100% specificity).
Conclusion: The automated classification system using artificial intelligence based on the combination of Scheimpflug camera and Spectral-Domain OCT imaging data showed very good performance to discriminate the subclinical keratoconus eyes from normal eyes. The epithelial features extracted from OCT images played an important role in the discrimination. This classification system has the potential to improve the differentiable power of subclinical keratoconus and the efficiency of keratoconus screening.

PO-315

A single cell transcriptomic profile for diabetic retinopathy in non-human primates

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Purpose

Diabetes mellitus is a global epidemic with approximately 750 million people suffered worldwide. Diabetic retinopathy (DR) is the most common complication which presented in about 30% of diabetic patients. DR was well-defined as a microvascular disorder according to its pathogenic progression, but recent studies start to support the idea that retinal degeneration also involves in the early events in DR. How different retinal subtypes are altered in the affliction of DR is now poorly understood. In this study, a high-resolution single-cell transcriptomic dynamic was identified

by performing single-cell RNA sequencing (scRNA-seq) to expand our understanding on the mechanism of DR pathogenesis.

Methods

The retinas from 20-year-old monkeys with or without diabetes were dissected and digested into single-cell suspension. ScRNA-seq libraries was constructed on 10 × Genomics platform. Sequencing data was processed with CellRanger V2.1.1 and R toolkit Seurat.

Results

We have profiled 8940 single cells with 0.14 million reads per cell. We identified 13 clusters matching to known retinal cell types, such as Rod, Cone, Muller glia, based on the expression of known markers of each. The proportion of cone and muller cells was increased in the condition of diabetes. Furthermore, the differentially expressed genes were identified, such as *UBC*, *ROD*, *RPS27*, and *FABP5.* GO terms such as ribosomal small subunit assembly and photoreceptor cell development were significantly enriched. In addition, the number of rod cells was decreased in the condition of diabetes. A group of genes were differentially expressed, such as *PKM2*, *HK2*, *GRTP1*, with GO terms like negative regulation of reactive oxygen species metabolic process and negative regulation of reactive oxygen species metabolic process significantly enriched.

Conclusions

Our data provided a transcriptional atlas of non-human primate retinal cells, including cell type specific dynamics in DR. It can deepen our understanding of the molecular mechanism underlying DR and provide potential biomarkers for the treatment of the related diseases.

PO-316

Low-intensity Pulsed Ultrasound Protects Retinal Ganglion Cell from Optic Nerve Injury Induced Apoptosis via Yes Associated Protein

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Purpose. Low-intensity pulsed ultrasound (LIPUS) has been used in clinical rehabilitation studies. However, little is known about its effects on the retinal ganglion cells (RGCs), or its mechanism of action. Given that intracelluar yes associated protein (YAP) activation relies on the mechanotransduction, we examined the anti-apoptotic effect of LIPUS on RGCs by YAP activation. Methods. An optic nerve crush model was set up to induce RGC death. LIPUS was used to treat mice eyes daily, and the retina samples were dissected for immunostaining and Western blot. Apoptosis of RGCs was evaluated by TUNEL staining, the surviving RGCs were labeled by Fluro-gold and Tuj1 antibody. Whole-mount retinas were scanned by confocal microscope in a tile-scan

model. The activation of YAP and apoptosis-related proteins were detected by Western blot and immunostaining.
Results. Low energy LIPUS protected RGC from loss and apoptosis. The ratio of cleaved-caspase3, decreased significantly. As the cellular mechanical sensor, YAP increased by LIPUS stimulation in vivo and in vitro, however, phospho-YAP decreased. While knockdown of YAP by siRNA attenuated the LIPUS induced anti-apoptotic effect on crush induced retinal injury and rotenone induced RGC degeneration.
Conclusions. LIPUS prevented RGCs from apoptosis in an optic nerve crush model system, which indicates a potential treatment for further traumatic central nervous system (CNS) injury.

PO-317

Curcumin Protects Retinal Ganglion Cells and Via Regulating Microglia Activation After Acute Ischemia/Reperfusion in the Mouse Retina

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Purpose: Retinal ischemia/reperfusion is a complication of ocular diseases such as diabetic retinopathy and glaucoma, there are no effective therapeutic approaches currently available. Curcumin has been shown to improve cell survival of retinal ganglion cells (RGCs) following ischemia/reperfusion (I/R) injury for glaucoma.However, the precise mechanisms for curcumin's protective effects are still unclear. This study was performed to evaluate whether curcumin can inhibit RGC apoptosis, microglia activation and inflammation after acute retinal ischemia/reperfusion in the mouse retina.
Methods: Retinal ischemia/reperfusion was induced in adult wild-type mice by increasing intraocular pressure for 45 minutes, and then intraperitoneal injection of curcumin or control buffer immediately. Retinal thickness was investigated by spectral-domain optical coherence tomography (SD-OCT) 2 days and 7 days after injury. Retinal function was assessed by flash-electroretinography (flash-ERG). Retinal ganglion cell (RGC) survival and microglia activation were determined with immunostaining of retinal cross sections. The mRNA levels of TNF-a, IL-1β, IL-6 and iNOS were evaluated by RT-PCR.
Results: Retina thickness was increased 2 days after I/R injury, curcumin relieve retinal edema. A significant decrease in a- and b-wave amplitudes was detected 2 days and 7day after I/R, but they were reduced to a lesser extent in the curcumin group. Curcumin treatment significantly reduced RGC loss 2 days and 7days after I/R injury marked by Tuj-1 antibody. The number of

activated microglia marked by Iba-1 antibody was increased after I/R, and curcumin inhibit this activation. The mRNA levels of TNF-a, IL-1β, IL-6 and iNOS in the retina after I/R injury were attenuated with curcumin treatment.

Conclusions: These results demonstrate that curcumin can protect retinal ganglion cells, relieve retinal edema and maitain retinal function though inhibit microglia activation and inflammation in the retina after I/R injury. Together these results support the use of curcumin as a possible therapeutic strategy for retinal ischemia-reperfusion injury.

PO-318

The efficacy of fenofibrate eye drop for the retinal avascular leakage at various animal models

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Objective: Retinal vascular leakage disorders, such as Diabetic retinopathy (DR) and age-related macular degeneration (AMD), remain one of the leading causes of blindness. We provided the fenofibrate eye drops to verify the efficacy in the treatment of retinal vasculature leakage in streptozotocin (STZ)-induced diabetic Brown Norway (BN) rat and very low-density lipoprotein receptor (Vldlr) knock out (KO) mouse models and evaluate the potential therapy for ocular microvascular diseases.

Methods: The nanometer sized fenofibrate eyedrops were topically administrated to STZ-induced diabetic rats and Vldlr KO mice. The inhibition of fenofibrate on retinal vascular leakage and inflammation were assessed using retinal permeability and leukostasis assays and fundus fluorescein angiography (FFA). The drug delivery efficacy was evaluated by the pharmacokinetic (PK) study in which the the bioavailability of fenofibrate and its activated metabolite, fenofibric acid, in target eye tissues using mass spectrometry. The action mechanism of fenofibrate involved in anti-angiogenesis through down-regulation of Vascular Endothelial Growth Factor (VEGF) and anti-inflammation by mediating ICAM-1. The anti-angiogenic effect was evaluated by the analysis of VEGF and ICAM-1 expression using Western Blot and ELISA assays in STZ-induced diabetic rats and Vldlr KO mice.

Results:

The pharmacokinetic study indicated fenofibrate eye drops delivered much more drugs into the eye compared with intraperitoneal (IP) injection. The administration of fenofibrate eyedrops resulted in an approximately 50-fold increase in BN rats and 10-fold elevation in Vldlr KO mice about drug delivery as measured in concentrations of fenofibrate plus fenofibric acid. Compare to the vehicle group, the STZ-induced diabetes rats and Vldlr KO mice treated with fenofibrate eye drops showed statistically fewer leukocytes adhering to the retinal vasculature and significantly decreased retinal

vascular permeability, which coincided with the down-regulation of retinal VEGF and ICAM-1 levels. Functional and morphological analyses of the eye showed no detectable ocular toxicities in STZ-induced diabetic rats and Vldlr KO mice treated by fenofibrate eye drops.

Conclusion: Topical administration of fenofibrate is a feasible way delivering drug effectively in retina to attenuate retinal vascular leakage without visible toxicity, suggesting it has therapeutic potential for ocular vasculature disorders.

PO-319

抗 VEGF 药物预防外伤性 PVR 进展的实验研究

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目的：探讨眼外伤后玻璃体腔注射抗 VEGF 药物雷珠单抗、康柏西普及曲安奈德后能否预防外伤性 PVR 进展。

方法：比利时兔随机分组，雷珠单抗组 30 只，康柏西普组 30 只，曲安奈德组 30 只，眼外伤不打药组 10 只，空白组 5 只。每实验组分别造两种动物模型，开放性眼外伤兔麻醉后，于右眼颞上角巩膜缘后 3.5mm 巩膜平坦部用 15 度穿刺刀刺入眼球内部约 4.0mm，并沿该穿刺口平行于角膜缘用眼科剪逆时针延长球壁切口至 7.0mm，0.5h 后无菌缝合伤口并涂抗生素预防感染；闭合性眼外伤兔麻醉后，应用液压打击仪（fluid percussion injury,FPI）正面击打于兔右眼角膜中心 1 次，设置打击锤角度为 65°，击打后抗生素涂眼预防感染。模型完成后打药组分别在不同时间点（伤后 0.5h、3d、7d）玻璃体腔注射雷珠单抗 0.25mg、康柏西普 0.25mg 和曲安奈德 2mg，注药 7d 后抽取玻璃体 0.2mL。ELISA 测实验组和对照组玻璃体内 VEGF、PDGF、TGF-β、PAI-1 因子的含量。模型完成后 28d 取眼球固定切片染色，显微镜观察视网膜各层组织病理变化。

结果：两种眼外伤后玻璃体内 VEGF、PDGF、TGF-β、PAI-1 均比空白对照组升高，且外伤 28d 后视网膜变薄，病理学观察可见纤维组织增生。玻璃体腔注射雷珠单抗 0.25mg 和康柏西普 0.25mg 后，玻璃体内 VEGF、PDGF、TGF-β、PAI-1 比外伤组明显降低，视网膜厚度增加，纤维组织减少，且注射时间越早效果越明显。玻璃体腔注射曲安奈德 2mg 后玻璃体内 VEGF、PDGF、TGF-β、PAI-1 比外伤组明显降低，视网膜厚度略有增加。（$P<0.05$）

结论：眼外伤后眼内 VEGF、PDGF、TGF-β、PAI-1 均较空白对照组表达增高且纤维组织增多，提示外伤性 PVR 发展的趋势；玻璃体腔注射抗 VEGF 药物后 PVR 发生相关因子降低，且注射时间越早效果越明显。

PO-320

飞秒激光辅助体外构建人工生物角膜的实验研究

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目的：通过飞秒激光技术辅助制备猪角膜基质薄片，体外培养原代兔的角膜内皮细胞，以脱细胞猪角膜基质(APCM)为支架体外模拟构建角人工生物角膜来解决临床角膜供体缺乏的困难，探索飞秒激光技术应用于组织工程角膜载体制备的可行性。**方法：**成年新西兰大白兔 12 只，摘除新鲜眼球，无菌条件下取完整角膜环，光学显微镜下将兔角膜带有内皮细胞的后弹力层面完整分离，胰蛋白酶消化、纯化后得到 CECs 后进行体外培养，使用飞秒激光技术获得猪角膜基质薄片，将基质片置于 0.5％SDS 溶液中 4℃脱细胞 24 h，获取 APCM。 DiI 荧光标记追踪兔角膜内皮细胞（RCECs），将体外培养的角膜内皮细胞接种于 APCM 上，倒置显微镜下分别在接种后 2h，1d，3d，5d，1w 观察体外培养的形态变化，苏木精-伊红染色法、 免疫组织化学染色法对细胞表型进行鉴定（ZO-1）。**结果：**原代 RCECs 在体外培养 生长状态良好，培养 6 天后基本可长满形成紧密单层时，细胞大小均一，形态基本一致，多为近似六边形内皮样形态。飞秒激光辅助下制备的超薄 APCM， HE 染色和 DAPI 染色显示猪角膜基质结构完好，胶原纤维排列规则，脱细胞完全无残留； 以飞秒激光辅助制备的超薄 APCM 为支架接种 RCECs，DiI 荧光追踪定位显示在超薄 APCM 上可形成连续的单层细胞层，免疫组织化学证实 ZO-1 呈阳性染色。**结论：**飞秒激光辅助制备的超薄猪角膜基质片具有良好的生物相容性，具备构建组织工程角膜支架材料的可行性。

PO-321

New micelle myricetin formulation for ocular delivery: improved stability, solubility, and ocular anti-inflammatory treatment

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Background ： Myricetin (Myr) is a natural flavonol compound that possesses multiple pharmacological properties such as anti-inflammatory and antioxidant, and many studies have shown Myr's potential benefits in ophthalmology. However, the lack of an ocular formulation significantly hinders its clinical application. The main challenging for ocular formulation lies in its poor water solubility and low aqueous stability. The purpose of this article was to develop an ophthalmic solution based on polyvinyl caprolactam-polyvinyl acetate-polyethylene glycol graft copolymer (PVCL-PVA-PEG) polymeric micelles for the solubility, stability, and ocular delivery of Myr (Myr micelle ophthalmic solution).

Methods: The Myr micelle ophthalmic solution was prepared and characterized encapsulation efficiency, micelle size, and zeta potential. Chemical stability of Myr and short-term storage stability of the Myr micelle ophthalmic solution were evaluated, followed by *in vitro* cytotoxicity and *in*

vivo ocular irritation; *in vitro* cellular uptake and *in vivo* corneal permeation; and *in vitro* antioxidant activity and *in vivo* anti-inflammatory efficacy were also further evaluated.

Results: Myr could be encapsulated into the micelles as self-assembled from polymer PVCL-PVA-PEG, and the characterizations highly depended on the weight ratio of PVCL-PVA-PEG/Myr. Myr micelles with an optimized 18 : 1 weight ratio of PVCL-PVA-PEG/Myr showed high micelle encapsulated (99.5 ± 0.52%), small micelle size (60.72 ± 1.09nm), uniform size distribution (PdI = 0.140 ± 0.018), and stable zeta potential (- [2.29 ± 0.33] mV). The Myr micelle ophthalmic solution also exhibited excellent storage stability. The aqueous solubility of Myr in PVCL-PVA-PEG micelles was 261.6-fold higher than its free aqueous solubility. The PVCL-PVA-PEG micelle encapsulation also significantly improved the stability and *in vitro* antioxidant activity of the Myr. No cytotoxicity was observed in the Myr micelle ophthalmic solution, and the *in vivo* ocular irritation studies also confirmed its good ocular tolerance. Membrane permeation was 6.70-fold higher for the Myr micelle ophthalmic solution than for the free Myr after 3.5 h incubation. The cellular uptake was greatly improved in the Myr micelles than in the free Myr. The *in vivo* corneal permeation test also confirmed a greater improvement in the Myr micelles than in the free Myr. As to *in vivo* anti-inflammatory efficacy, remarkable improvements and dosage-related anti-inflammatory efficacies of Myr micelle ophthalmic solutions were observed.

Conclusion: The Myr micelle ophthalmic solution could be a promising nanomedicine for ocular diseases.

PO-322

Ultra-small micelles based on polyoxyl 15 hydroxystearate for ocular delivery of myricetin: Optimization, in vitro, and in vivo evaluation

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Purpose: The purpose of this research was to develop a nanocarrier based on polyoxyl 15 hydroxystearate (Kolliphor® HS15, HS15) micelles for the solubility, stability, and delivery of Myricetin (Myr) to the eye.

Methods: An optimized ratio of HS15 and Myr (21:1 wt%) was prepared to entrap Myr in the hydrophobic core of micelles to fabricate an HS15-Myr micelle ophthalmic solution. Myr-encapsulating HS15 micelles (HS15-Myr micelles) were subjected to physicochemical characterizations. The chemical stability of free Myr and Myr in HS15 micelles and storage stability studies of HS15-Myr micelle ophthalmic solutions were evaluated. The in vitro parallel artificial membrane permeability assay (PAMPA) and antioxidant activity studies of free Myr and Myr in

HS15 micelles were also measured. In vivo ocular tolerance, corneal permeation, and anti-inflammatory efficacy studies were conducted following ocular topical drop administration.
Results: HS15-Myr micelles were successfully prepared and presented transparent appearance with high encapsulation (96.12±0.31%), ultra-small micelle size (a mean diameter of 12.17±0.73 nm), uniform size distribution (polydispersity index [PDI] =0.137±0.013), and negative surface charge (-[4.28±0.42] mV). Myr in the HS15 micelle solution demonstrated higher aqueous stability than the free Myr solution among the accepted pH range for eyedrops. The HS15-Myr micelle ophthalmic solution demonstrated high storage stability at 4°C and 25°C. The HS15 micelles could significantly improve in vitro antioxidant activity and faster membrane permeation of Myr. No irritations or corneal damage were revealed in rabbit eyes after ocular topical administration of the HS15-Myr micelle solution. The in vivo corneal permeation study demonstrated that the HS15-Myr micelles could penetrate the cornea efficiently in mouse eyes. Further, the HS15-Myr micelles also demonstrated significant in vivo anti-inflammatory activity.
Conclusion: HS15 micelles are a potential ophthalmic delivery nanocarrier for poorly soluble drugs such as Myr.

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Construction of a Full-Thickness Human Corneal Substitute from Anterior Acellular Porcine Corneal Matrix and Human Corneal Cells

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AIM: To construct functional human full-thickness corneal replacements.
METHODS: Acellular porcine corneal matrix (APCM) was developed from porcine cornea by decellulariztion. The biomechanical properties of anterior-APCM (AAPCM) and posterior-APCM(PAPCM) were checked using Uniaxial Tensile Testing. Human corneal cells were obtained by cell culture. Suspending Ring was designed by deformation of an acupuncture needle. MTT Cytotoxicity Assay was used to check the cytotoxicity of suspending ring soaking solutions. A new three-dimensional organ culture system was established by combination of suspending ring, 48-well plate and medium together. A human full-thickness corneal substitute was constructed from human corneal cells with AAPCM in a organ coculture system. Biochemical marker expression of the construct was measured by immunofluorescent staining and morphological structures were observed using scanning electron microscopy. Pump function and biophysical properties were examined by penetrating keratoplasty and follow-up clinical observations.

RESULTS: There were no cells in the AAPCM or PAPCM, whereas collagen fibers, Bowman's membrane, and Descemet's membrane were retained. The biomechanical property of AAPCM was better than PAPCM. Human corneal cells grew better on the AAPCM than on the PAPCM. There was no cytotoxicity for the suspending ring soaking solutions. For the constructed full-depth human corneal replacements, keratocytes in the central stromal-like region were distributed uniformly throughout the AAPCM and expressed vimentin. On the surface of Bowman's membrane, the epithelial layer appeared as a thin, differentiated, stratified epithelium expressing CK3. On the lower surface, the endothelial monolayer was clearly visible as a line of cells that expressed Na^+/K^+ATPase. The construct was similar to normal human corneas, with many microvilli on the epithelial cell surface, stromal cells with a long shuttle shape, and zonula occludens on the interface of endothelial cells. The construct withstood surgical procedures during penetrating keratoplasty. The corneal transparency increased gradually and was almost completely restored 7 days after surgery.

CONCLUSION: AAPCM is an ideal scaffold for constructing full-thickness corneal replacement, and functional human full-thickness corneal replacements were successfully constructed using AAPCM and human corneal cells.

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人工晶状体表面改性抑制后发性白内障研究

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目的：后发性白内障(PCO)是人工晶状体(IOL)植入术后面临的主要并发症。究其原因，主要是术后残留晶状体上皮细胞(LEC)在晶状体囊袋内人工晶状体表面的粘附、迁移、增殖等所致。本研究组通过材料学方法对人工晶状体材料进行生物相容性改性，抑制术后晶状体上皮细胞在材料表面的粘附、增殖等行为，从而抑制后发性白内障的发生[1-4]。

方法：研究通过表面层层组装方法在 IOL 材料表面构建天然聚合物涂层，或通过表面引发的自由基聚合方法在 IOL 材料表面制备含聚乙二醇、磷脂酰胆碱、磺酸甜菜碱等亲水单元的梳状亲水聚合物涂层等。并通过对所获得表面涂层进行多功能化修饰，制备具有抗粘附-药物释放多功能表面改性涂层。通过材料学研究方法验证了表面涂层的理化性能；通过体外细胞实验，研究光刺激响应的细胞凋亡行为；通过动物体内植入研究改性人工晶状体的体内效果。

结果：材料学表征方法表明通过上述方法可以在 IOL 材料表面成功制备相应的修饰层；体外细胞实验结果验证了抗粘附修饰表面涂层对 LEC 的有效粘附抑制、载药多功能涂层对 LEC 的粘附增殖的有效抑制；动物实验结果抗粘附涂层修饰的 IOL 对 PCO 发生具有一定的抑制效果，而载药多功能涂层对 PCO 的抑制效果更为显著。

结论：采用 IOL 表面改性方法，在人工晶状体材料表面制备了各种不同功能的表面涂层。抗粘附表面涂层改性 IOL 能抑制 PCO 发生，但不能长期有效抑制，只是延迟了它的发生进程；而药物缓释涂层改性 IOL 能更有效地抑制 PCO 发生。说明针对 PCO，仅抗粘附表面改性 IOL 是不够的，抗粘附-抗增殖多功能协同改性是发展趋势。

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Rose Bengal 和绿光角膜交联术（RGX）生物力学效率的实验研究

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目的：明确各种参数对 Rose Bengal（RB）和绿光角膜交联术（RGX）增强角膜张力的影响，并评估其专用导光装置应用的安全性。
方法：去上皮离体兔眼角膜用不同浓度（0.1, 0.5, or 1%）的 RB 着染不同时间后，用荧光显微镜观察 RB 在基质内浸润深度。不同氧微环境下行 RGX 交联，使用张力测试仪检测角膜张力。设计专用导光装置，使绿光光斑聚焦于角膜平面后散射于视网膜，采用该装置对 Dutch Belt 兔进行 RGX 交联，检测角膜和虹膜温度变化，交联后 1d、7d 和 28d 行 FFA 检查观察视网膜渗漏情况，交联后 1d 和 28d 取材行 H&E 角膜染色计数基质细胞，LDH 虹膜染色观察热损伤情况，电镜检查观察视网膜超微形态。
结果：0.1% RB 着染 2min 可穿透入兔角膜总厚度的 27%，1%RB 着染 2min 可穿透入角膜总厚度的 70%，0.1%RB 着染 10min 可穿透入角膜总厚度的 60%（P< 0.05）。空气中 RGX 可增强角膜张力 64%（P< 0.05），在氮气环境内 RGX 没有增强角膜张力的作用。RGX 可以使角膜温度提高 8℃、虹膜温度增高 4℃。特殊导光装置 RGX（150J/cm^2）后 1d 和 28 天分别兔眼角膜张力 1.9 倍（P< 0.05）和 2.8 倍（P< 0.01）。RGX 后 1d 角膜基质细胞减少（P < 0.01），但 28d 恢复正常（P = 0.51）。与正常对照组相比，虹膜 LDH 染色、视网膜 FFA 和电镜均未见差异。
结论：改变 RB 的浓度或延长着染时间可促进其在角膜基质中的渗透深度，从而可能促进交联反应的深度和强度。采用特殊导光装置后，RGX 在有效增强角膜张力的同时，对眼部各组织未见损害性影响。

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Development and characterization of poly(propylene fumarate)-2-hydroxyethyl methacrylate copolymers

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Purpose

The purpose of this study was to investigate the feasibility of introducing 2-hydroxyethyl methacrylate (HEMA) to copolymerize with PPF to enhance the toughness of PPF gels.

Methods

Based on observation of the morphology and examination of biomechanical properties of rabbit tarsal plates, we used natural polymer materials of PPF and HEMA as the main raw materials to fabricate an elastic copolymer network. The chemical composition and changes in the copolymers was characterized by FTIR spectroscopy. The thermal behavior of the polymer was characterized by a dynamic mechanical analyzer (DMA). The tensile strength, Young's modulus and the maximum elongation of the film were detected by the universal testing machine. Static water contact angle was tested to analyzed the film's hydrophobicity and hydrophilicity.

Results

Average Young's modulus of the rabbit tarsal plates was 25.30 ± 6.97MPa. The strong absorbance at 3400-1 and 1740 cm-1 were the typical vibrations of hydroxyl and carbonyl groups, respectively. Because the hydroxyl groups are mainly derived from the PHEMA component, the increase in the absorbance of the hydroxyl groups and the decrease in the absorbance of the carbonyl groups from PPF-HEMA0.5 to PPF-HEMA2 reveal that the relative content of PHEMA in PPF-HEMA networks increased consistently. The water contact angle on the PPF-HEMA networks decreased with an increase of the PPF-HEMA copolymers. The swelling ratio of PPF-HEMA0.5, PPF-HEMA1 and PPF-HEMA2 was 16%、20% and 30%, respectively. PPF-HEMA0.5, which has the lowest crosslinking density, had the largest elongation at break of 20%. For all the samples, the compression modulus decreased from 15-20 MPa to 1.5-2 MPa after swelling.

Conclusions

In this study, the hydrophilic HEMA monomer was successfully introduced into PPF by bulk polymerization. With the addition of HEMA, the obtained PPF-HEMA copolymer showed better swelling ability and outstanding toughness compared to the traditional PPF gels.

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水凝胶作为 3D 视网膜类器官膜片移植粘贴材料的初步评估

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【目的】制作 3D 视网膜类器官植片固定的透明可降解粘合剂。

【方法】1. 应用 PEG 材料，按照梯度浓度混合，分别测试在空气中成胶时间、溶胀率、粘附力、降解时间。2. MTT 法测试水凝胶对 3D 视网膜类器官的毒性；将水凝胶注射到实验动物玻璃体腔，观察生物安全性。3. 将植片分别种在水凝胶上表面、水凝胶中间，和水凝胶下，观察视网膜类器官是否可生存，增殖和迁移，并观察维持视网膜类器官分化为视神经细胞能力的潜能。

【结果】1. 水凝胶成胶时间按照浓度 10%~0.25%，成胶时间是 5 秒~42 分钟；溶胀率 300%~50%，粘附力随着浓度降低，粘附力减弱，直至浓度为 1%是，粘附数秒后，泡水漂浮不能粘附；随浓度降低而加速。1mL 的 10%水凝胶经历 4 个月仍未降解，0.05%水凝胶在 1 个月降解。2. MTT 测试表明 3D 视网膜类器官与水凝胶共存和正常生长；但 10%水凝胶在新西兰兔玻璃体腔注射会导致视网膜异常增殖。3. 视网膜类器官植片可分别在水凝胶上、中和下三层中存活，但只有在水凝胶上层表面才可以增殖和迁移，并分化为视网膜节细胞、双极细胞和光感受细胞。
【结论】水凝胶作为 3D 视网膜类器官膜片移植粘贴材料，除了不抑制正常移植细胞生长，还需要提供增殖分化的可能性，但该材料在高浓度时导致视网膜异常增殖，因此，该材料不符合视网膜移植黏贴的备选材料。

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TGF-β 空间动态分布的角膜基质创伤修复体外三维培养体系的构建

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目的 构建模拟角膜基质创伤修复过程中 TGF-β 时空动态分布的体外三维培养系统。**方法** 构建牛角膜基质细胞 Pellet 体外三维培养模型进行培养。将 Pellet 分为有透析袋组和无透析袋组，置入 Transwell 小室系统上下室中进行培养。根据角膜损伤修复中 TGF-β 损伤区域内外空间分布，上室应用含有 TGF-β1、TGF-β2 的培养液，下室应用基础培养液，培养 72h 后应用 qPCR 法分别检测各组 Pellet 中 α-平滑肌肌动蛋白（α-smooth muscle actin, α-SMA）、纤维连接蛋白（fibronectin, Fn）、I 型胶原（collagen I, Col I）、III 型胶原（collagen III, Col III）mRNA 相对表达量。**结果** 培养后 72h Pellet 均成团生长。有透析袋组上室 α-SMA、Fn、Col I 和 Col III mRNA 及 Col III/Col I 比值均高于下室，差异有统计学意义（P=0.000）。无透析袋组上室 α-SMA、Fn、Col I 和 Col III mRNA 及 Col III/Col I 比值与下室相比无显著性差异（P＞0.05）。无透析袋组上室各目的基因 mRNA 的相对表达量与有透析袋组上室、有透析袋组下室比较，组间差异均有统计学差异（P＜0.05）。无透析袋组下室各目的基因 mRNA 的相对表达量与有透析袋组上室、有透析袋组下室比较，组间差异均有统计学差异（P＜0.05）。**结论** Transwell 小室系统与透析袋相结合可构建模拟 TGF-β 空间动态分布的角膜基质创伤修复体外三维培养系统。

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Synthesis, Evaluation, and Structure-Activity Relationship Study of Lanosterol Derivatives To Reverse Mutant-Crystallin-Induced Protein Aggregation

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We describe here the development of potent synthetic analogues of naturally occurring triterpenoid lanosterol to reverse protein aggregation in cataracts. Lanosterol showed superiority to other scaffolds in terms of efficacy and generality in previous studies. Various modified lanosterol derivatives were synthesized via modification of the side chain, ring A, ring B and ring C. Evaluation of these synthetic analogues draws a clear picture for SAR. In particular, hydroxylation of the 25-position in the side chain profoundly improved the potency, and 2-fluorination further enhanced the biological activity. This work also revealed that synthetic lanosterol analogues could reverse multiple types of mutant crystalline aggregates in cell models with excellent potency and efficacy. Notably, lanosterol analogues have no cytotoxicity but can improve the viability of the HLE-B3 cell line. Furthermore, representative compound 6 successfully redissolved the aggregated crystallin proteins from the amyloid-like fibrils in a concentration-dependent manner.

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表面修饰的益康唑固体脂质纳米粒对药物穿透角膜能力的影响

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目的：评价经阳离子修饰的益康唑固体脂质纳米粒（Econazole solid lipid nanoparticles，E-SLN）穿透角膜的能力。

方法：利用星点设计效应面优化法（Central Composite Design and Response Surface Methodology，CCD-RSM）获得益康唑固体脂质纳米粒的最佳处方。随后采用微乳法，分别制备荷正电（SA-E-SLN）、荷中性(E-SLN)、荷负电(CC-SLN)的益康唑固体脂质纳米粒，并对其进行表征，包括粒径、Zeta 电位、体外释放等，并进行兔眼角膜离体渗透性评价。之后通过体外扩散法及微量肉汤稀释法分别考察三种纳米粒和益康唑混悬液抑菌能力。并采用 Driaze 刺激评价法考察制剂的兔眼刺激性，并评价兔眼单次给药后其在泪液、角膜、房水中的药动学。

结果：通过对 E-SLN 表面进行修饰，成功制备了荷正电的 SA-E-SLN 和荷负电的 CC-SLN。E-SLN、SA-E-SLN、CC-SLN 的粒径分别为 25.58±0.17、63.71±0.21、14.54±0.10nm，Zeta 电位分别为-2.2±0.1、19.8±0.1、-12.0±0.5mV。电镜结果显示 E-SLN 粒径均一，表面光滑。三种纳米粒在体外均表现出持续释放的特性。E-SLN 的 MIC_{90} 和 MIC_{50} 分别为 0.892、0.37ug/ml。三种纳米粒对兔眼均无刺激性。动物预实验显示：E-SLN、SA-E-SLN、CC-SLN 及益康唑混悬液在泪液、角膜的药物浓度无差别（1h、2h），但是 SA-E-SLN、E-SLN 在房水中的药物含量高于 CC-SLN 和益康唑混悬液。

结论：成功制备了带正电荷的益康唑固体脂质纳米粒，并能克服角膜屏障在房水中达到很高的药物浓度。

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碳纳米管修饰 PLGA 支架构建可降解工程化视网膜膜片

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目的：本研究是利用静电纺丝技术及表面修饰等方法制备新型可降解的纳米碳管（CNT）-PLGA 支架材料，与干细胞来源视网膜神经元结合，构建'细胞-支架'复合体系，为未来干细胞治疗不可逆视神经病变提供基础。

方法：碳纳米管(CNTs)表面依附性能好、细胞毒性小、易于修饰加工，此外，它具有独特的电学特性，是理想的支架材料。CNT 具有良好的电导性，在 CNTs 制成的再生支架中可以导入弱电刺激，从而提高神经再生效果。本研究分为两个部分：

第一部分： CNT-PLGA 支架的制备及评估

利用静电纺丝技术构建 CNT-PLGA 支架材料。获得的静电纺丝 CNT-PLGA 纳米纤维材料进行理化表征，评估其降解速率和生物相容性。

第二部分：CNT-PLGA 支架对人 iPSC 来源的视网膜神经元的生物学研究

将 hiPSC 来源的视网膜类器官中神经上皮层（Neural Epithelium，*NR*）分离，并接种在 CNT-PLGA 支架上，通过免疫荧光、扫描电镜等方法对其进行鉴定和生物学特性检测。

结果：

1.扫面电镜显示 CNT 成功修饰在 PLCA 材料表面，体外降解实验表明 CNT-PLGA 材料需 50 天降解，同时，CNT-PLGA 比 PLCA 导电性能提高 17%。

2. CCK-8 实验和细胞流式术表明 CNT-PLGA 膜片未对细胞凋亡造成影响。

3.倒置显微镜可观察接种的视网膜神经元能够较好地贴附在 CNT-PLGA 支架上；免疫荧光结果显示视网膜神经元的树突明显增多，细胞与细胞相互连接增多。

结论:

1. 成功构建了 CNT-PLGA 支架，该支架具有良好的生物降解和生物相容性；

2. CNT-PLGA 支架有利于视网膜类器官来源的视网膜神经元生长和增殖。这为未来视网膜干细胞移植治疗提供了一种新方法。

视网膜类器官；视网膜神经元；PLGA；CNT；静电纺丝

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泪液外泌体用于干眼疾病检测研究

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目的：外泌体携带的生物分子（包括蛋白、核酸等）为疾病检测提供了新的手段。泪液的采集量有限，目前没有针对泪液的外泌体提取的标准方法，这制约了外泌体在眼相关疾病上的基础研究和临

床应用。本研究的目的是建立一种基于微流控的外泌体分离平台，可以实现从有限体积的泪液中快速提取高纯度外泌体，并通过蛋白质组学筛选生物标志物，从而为干眼疾病的临床检测技术研究建立新的方法。**方法：**我们采用 Schirmer test 滤纸条收集正常人泪液。当滤纸条湿长到达 30 mm 时，将其浸入 5mL PBS 中浸泡 30 min。将混合液分别经离心（室温 2000g 离心 10 min）和过滤（0.22 μm）等步骤除去细胞碎片。通过我们开发的外泌体分离平台，分离纯化外泌体。通过动态光散射仪(Zetasizer Nano ZS ZEN3600, Malvern, UK），扫描电子显微镜(SU8010, HITACHI, Japan）和 Western Blot 分别验证所提取的泪液中外泌体的粒径、形貌及蛋白表达。用 PKH67 对外泌体进行标记，与角膜上皮细胞共培养 12 小时，通过荧光显微镜观察细胞摄取能力。**结果：**动态光散射仪显示得到的物质粒径大小为 101.2± 61.8 nm。扫描电镜观察到泪液中提取的外泌体呈圆形结构，这与文章中报道的外泌体的直径和形貌一致。Western Blot 结果显示，泪液外泌体有标志蛋白 CD81, CD9, Alix 和 TSG101 的表达，但无白蛋白表达。荧光显微镜显示 PKH67 标记的外泌体能被角膜上皮细胞摄取，分布于细胞质中。**结论：**我们的外泌体分离平台实现了从有限体积的泪液中得到纯度较高的外泌体，并且杂蛋白污染较低。我们的分离平台具有操作简便、快速、高效的处理小体积样本的特点。所提取的外泌体具有良好的生物活性。下一步我们将通过蛋白质组学来筛选干眼相关的具有临床诊断价值的外泌体标志物。同时进一步通过外泌体来研究干眼的发病机制。

PO-333

天冬酰胺合成酶对萘白内障大鼠的保护作用

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目的：本课题旨在研究天冬酰胺合成酶（Asparagine Synthetase, ASNS）对萘白内障大鼠模型发病的保护作用，为进一步药物研究提供有效靶点。

方法：在本课题中，我们首先利用微阵列分析技术（microarray analysis），对萘白内障 SD 大鼠晶状体和正常晶状体全基因组表达谱进行比较，筛选表达差异的基因，接着采用蛋白免疫印迹（western blot, WB）、实时荧光定量 PCR（realtime-PCR）验证其表达水平。通过慢病毒感染，获得目的基因敲减和过表达稳定的晶状体上皮细胞（SRA01/04）亚细胞株，在细胞水平上验证 ASNS 对晶状体上皮细胞损伤的保护效果。同时，利用 NADP/NADPH 测定法等验证 ASNS 激动剂和 ASNS 抑制剂对晶状体催化萘终末代谢物萘醌生成的影响。通过体内实验，对萘白内障大鼠进行眼内注射 ASNS 激动剂和 ASNS 抑制剂干预，观察 ASNS 在萘白内障发生中的作用。

结果：ASNS 的表达水平在萘白内障模型的晶状体中无论蛋白还是 mRNA 都存在显著上调（P<0.05）。在体外细胞损伤模型中，ASNS 过表达和激活都能够保护细胞损伤 (P<0.05)。萘-萘醌代谢酶促反应，NADPH 的产量和 ASNS 的表达量或者激动剂的存在呈负相关，说明 ASNS 的表达量增加和活化均能降低萘在晶状体的毒性代谢产物萘醌的生成。体内实验，通过对萘性白内障大鼠晶状体眼内注射 ASNS 激动剂或抑制剂干预，发现相比萘白内障大鼠晶状体，ASNS 抑制剂处理组的晶状体混浊出现提前，且随着时间的推移而加深；而用 ASNS 激动剂处理组，其晶状体浑浊度明显得到改善。

结论：在大鼠萘白内障模型中，ASNS 的活化能够缓解白内障的发展进程。有望成为抗白内障药物筛选的新靶点。

PO-334

High drug payload nanoparticles formed from dexamethasone-peptide conjugates for the treatment of endotoxin-induced uveitis in rabbit

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Purpose: To develop and demonstrate the effectiveness of a novel dexamethasone (Dex) nanoformulation for treating uveitis.
Materials and methods: We designed and screened a dexamethasone-peptide conjugate (Dex-SA-FFFE), formed via a biodegradable ester bond linkage, that could spontaneously form high drug payload nanoparticles in aqueous solution for treating uveitis.
Results: An in vitro release study indicated that Dex and Dex-SA-FFFE sustainably released from Dex-SA-FFFE nanoparticles over a 48 h study period. Meanwhile, the formed Dex-SA-FFFE nanoparticles hardly caused cytotoxicity in human corneal epithelial cell at drug concentrations up to 1 mM after 24 h of incubation but reduced cell viability after 48 h and 72 h of incubation. An in vitro anti-inflammatory efficacy assay showed that the Dex-SA-FFFE nanoparticles exhibited a comparable anti-inflammatory efficacy to that of Dex in lipopolysaccharide (LPS)-activated RAW264.7 macrophages via significant decreases in the secretion of various pro-inflammatory cytokines (e.g., nitric oxide, tumor necrosis factor-α, interleukin-6). Topical instillation of Dex-SAFFFE nanoparticles showed good ocular tolerance without causing changes in corneal thickness and intraocular pressure during the entire study period. Furthermore, topical instillation of Dex-SAFFFE nanoparticles displayed a comparable in vivo therapeutic efficacy to that of dexamethasone sodium phosphate (Dexp) aqueous solutions in an endotoxin-induced uveitis (EIU) rabbit model.
Conclusion: Based on these results, it is reasonable to believe that the proposed Dex-SA-FFFE nanoparticles might have great application for the treatment of anterior uveitis.

PO-335

不同色温 LED 对 R28 细胞和 rMC-1 细胞损害的影响

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目的：南昌大学自主研发的新型高效低色温 LED 因蓝光含量少、光电转换效率显著高于国外同类 LED 而有望成为新型健康照明光源。以往实验常研究单纯蓝光对细胞的影响，但在实际生活中，人们长期接触单纯蓝光的机会并不多，更多的是不同类型的白光。不同类型的白光光谱成分相同，但是各个波长可见光比例不同。色温则是体现白光光谱中各个波长比例变化的指标。色温越低，白光中蓝光含量越少。本实验旨在探究我校新型低色温 LED 和市面上普通色温 LED 对 R28 细胞和 rMC-1 细胞的损害影响。

方法：将 R28 细胞和鼠来源 muller 细胞（rMC-1）随机分为 6 组，分别用不同色温的 LED 处理，六种光照条件分别为黑暗、1800K（新型低色温 LED，不含蓝光）、3000K（K 为色温单位）、4000K、6500K、蓝光（波长 400-470nm），五种光源强度皆为 1.0mW/cm^2，处理 24 小时。光照处理后立即通过流式细胞仪法测定活性氧水平；通过蛋白免疫印迹测定线粒体蛋白 L-opa1、S-opa1、oma1、pink1，前凋亡因子 Bax、caspase-3 和细胞增殖标记物 PCNA；利用 qPCR 定量线粒体 DNA 拷贝数目；半定量 PCR 检测线粒体 DNA 损伤情况。通过 CCK8 方法检测细胞活力，PI 法检测细胞凋亡。

结果：R28 细胞和 rMC-1 细胞各项指标的趋势相似：随着光源色温升高，细胞产生的 ROS 呈升高趋势；线粒体蛋白 L-opa1/S-opa1 的比例下降、oma1 上升、pink1 下降；前凋亡因子 Bax 和 caspase-3 随色温上升而表达上调；PCNA 呈下调趋势。光源色温越高，其照射细胞后线粒体的拷贝数目越少，线粒体 DNA 损伤亦越严重。

结论：蓝光主要通过影响线粒体来引发细胞凋亡或死亡以及增殖能力下降。LED 色温越低，对 R28 和 rMC-1 损害越小。可进一步探究 1800K 低色温 LED 对眼部的其他影响和作用，从而为新型健康照明光源提供思路。

PO-336

Semaphorin 3A Inhibits the Epithelial-mesenchymal Transition Induced by Hypoxia in Retinal Pigment Epithelial Cells

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Purpose: To investigate the effects and possible mechanisms of Semaphorin3A (Sema3A) on retinal pigment epithelial (RPE) cells that have undergone epithelial-mesenchymal transition (EMT) induced by hypoxia.

Methods: The concentrations of Sema3A in the vitreous body of proliferative vitreoretinopathy (PVR) subjects were evaluated with Western blots and compared with idiopathic macular hole (IMH) as the control. RPE cells were incubated in hypoxic conditions and treated with Semaphorin3A. The RPE cell activities, including proliferation and migration, were studied. The EMT-related markers, including fibronectin and α-smooth muscle actin (α-SMA), were measured. Moreover, the

vascular endothelial growth factor 165 ($VEGF_{165}$) and a signaling pathway of p-p38MAPK were also evaluated. Data were analyzed with Graphpad Prism 5.0 software.

Results: The vitreous Sema3A concentrations in PVR subjects were significantly increased compared to that of the IMH control. In the *in vitro* studies, hypoxia induced Sema3A expression and enhanced the proliferation and migration of cell activities. In addition, hypoxia stimulated the EMT of RPE cells, which was demonstrated by significant up-regulation of characteristic markers, including fibronectin, α-SMA, and p-p38MAPK. The exogenous Sema3A effectively inhibited the RPE behavior and molecular changes under hypoxic conditions, while also suppressing the p38MAPK pathway and the utilization of $VEGF_{165}$.

Conclusion: Sema3A inhibits EMT induced by hypoxia in RPE cells and could be a potential therapeutic strategy or an adjunctive treatment strategy for treating PVR.

PO-337

MiR-30a regulates S100A12-induced retinal microglial activation and inflammation by targeting NLRP3

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Purpose: Our previous study has identified that the plasma levels of S100A12 are closely associated with presence and severity of diabetic retinopathy (DR). In this work, we explored whether S100A12 can contribute to retinal microglial activation and the inflammatory changes of DR via a microRNA-dependent mechanism.

Material and Methods: Streptozotocin (STZ)-induced rats DR model was developed. Rat retinal microglia was activated through intravitreal injection of S100A12. Differential expression of miRNAs on the retinal microglia treated with S100A12 or DMEM/F-12 alone was determined using microarray analysis. Luciferase reporter assays were performed, which explored the regulation of a putative target of miR-30a.

Results: S100A12 is increased approximately fivefold in the retina of 16-week diabetic rats compared with nondiabetic retinas. Furthermore, in vivo, the levels of NLRP3, ASC, caspase-1, IL-1β and IL-18 were significant increased in the retina of rats treated with intravitreal injection of S100A12. Moreover, in vitro, S100A12 induced an increase in the microglial expression of NLRP3, ASC, caspase-1, IL-1β and IL-18 in a dose- and time-dependent manner. S100A12 was a proinflammatory trigger in diabetes-induced retinal microglial activation and inflammation by activating NLRP3 in vivo and in vitro. In addition, our results also showed that S100A12 induces retinal microglial activation via a miR-30a-dependent mechanism. Mechanistically, S100A12 inhibit miR-30a expression controlled by HDAC and miR-30a downregulated NLRP3 expression by directly targeting its 3'-UTR.

Conclusions: S100A12 plays an important role in the pathogenesis of DR by activating retinal microglia via a miR-30a-dependent mechanism.

PO-338

Inhibitor of growth 4 affects hypoxia-induced migration and angiogenesis regulation in retinal pigment epithelial cells

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Inhibitor of growth 4 (ING4), a potential tumor suppressor, is implicated in cell migration and angiogenesis. However, its effects on diabetic retinopathy (DR) have not been elucidated. In this study, we aimed to evaluate ING4 expression in normal and diabetic rats and clarify its effects on hypoxia-induced dysfunction in human retinal pigment epithelial (ARPE-19) cells. A type 1 diabetic model was generated by injecting rats intraperitoneally with streptozotocin (STZ) and then sacrificed them 4, 8 or 12 weeks later. ING4 expression in retinal tissue was detected by Western blot, RT-qPCR, and immunohistochemistry assays. After transfection with an ING4 overexpression lentiviral vector or small interfering RNA (siRNA), ARPE-19 migration under hypoxia was tested by wound healing and transwell assays. The angiogenesis role of conditioned medium (CM) from ARPE-19 cells was examined by assessing human retinal endothelial cells (HRECs) capillary tube formation. Additionally, Western blot and RT-qPCR were performed to investigate the signaling pathways in which ING4, Sp1, MMP-2, MMP-9, and VEGF-A were involved. Here, we found that ING4 expression was significantly reduced in the diabetic rats' retinal tissue. Silencing ING4 aggravated hypoxia-induced ARPE-19 cell migration. Moreover, CM collected from ING4 siRNA-transfected ARPE-19 cells under hypoxia promoted HREC angiogenesis. In contrast, these effects were reversed by ING4 overexpression. Furthermore, ING4 suppressed MMP-2, MMP-9, and VEGF-A expression in an Sp1-dependent manner in hypoxia-conditioned ARPE-19 cells. Overall, our results provide valuable mechanistic insights into the protective effects of ING4 on hypoxia-induced migration and angiogenesis regulation in ARPE-19 cells. Restoring ING4 may be a novel strategy for treating DR.

PO-339

Long non-coding antisense RNA GPX3-AS inhibit lens epithelial cell apoptosis by up-regulating GPX3 expression in age-related cataract

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Purpose: Age-related cataract (ARC) is a leading cause of visual impairment and blindness worldwide. The apoptosis of lens epithelial cells (LECs) induced by oxidative damage is a major contributing factor in ARC. Long noncoding RNAs (lncRNAs) play important roles in various biological processes. We aimed to explore the role of GPX3-AS in the ARC.
Methods: We extracted total RNAs from the transparent and age-matched cataractous human lenses, and detected lncRNA expression profiles using high-throughput RNA sequence. The expression of GPX3-AS and GPX3 were detected by qRT-PCR. Apoptosis proteins were detected by western blot and Immunofluorescence. We treated SRA01/04 cells with H_2O_2 to mimic oxidative stress and induced cell apoptosis, which was analyzed by flow cytometry and tunel assay. CCK-8 assay was used to detect the viability of SRA01/04 cells. The location of GPX3-AS was determined by fluorescence in situ hybridization (FISH) and cell nuclear and cytoplasmic RNA separation.
Results: LncRNA glutathione peroxidase 3 (GPX3)-antisense (AS), located in the nucleus of LECs, was down-regulated in cataractous human lenses, and pro-apoptosis proteins were highly expressed in the anterior lens capsules of ARC tissues. In vitro study suggested that GPX3-AS inhibited H_2O_2-induced SRA01/04 cell apoptosis. As GPX3-AS was transcribed from the antisense strand of the GPX3 gene locus, we further revealed its regulatory role in GPX3 expression. GPX3-AS was positively correlated with GPX3 expression. Additionally, GPX3-AS inhibited H_2O_2-induced SRA01/04 cell apoptosis by up-regulating GPX3 expression.
Conclusions: In summary, our study revealed that GPX3-AS down-regulated the apoptosis of LECs via promoting GPX3 expression, implying a novel therapy target for ARC.

PO-340

Single cell RNA sequencing of hESC-derived 3D retinal organoids reveals novel genes regulating RPC commitment in early human retinogenesis

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Purpose

The development of the mammalian retina is a complicated process involving generating distinct types of neurons from retinal progenitor cells (RPCs) in a spatiotemporal-specific manner. The progression of RPCs during retinogenesis includes RPC proliferation, cell fate commitment, and specific neuronal differentiation. Previous studies have focused on dissecting the molecular mechanism regulating differentiation of multiple retinal neurons. However, our understanding of how human RPCs gain neurogenic competence before the generation of neurons is still limited. In addition, developing retina contains many types of heterogeneous cells, which complicates the data interpretation based on bulk genomic analysis, such as RNA-seq data of entire retina. Therefore, the goal of the study is to investigate the mechanism of RPC commitment during human early retinogenesis at the single-cell resolution.

Methods

To address the dynamic progression of RPC at the onset of human retinogenesis, we designed experiments by combining single-cell RNA sequencing (scRNA-seq) and human embryonic stem cell (hESC)-derived 3D retinal organoid, which is an in-vitro model to recapitulate both morphological and molecular features of developing human retina. A modified Smart-seq2 protocol was used to establish the transcriptomic profile of single cells isolated from the central neuroretina of the 3-D optic cup at six time points from D25 to D35, which spans RPC proliferation, RPC commitment, and onset of retinal neurogenesis. Systematic approaches including single-cell pseudotime analysis, single-cell trajectory reconstruction, and weighted gene co-expression network analysis (WGCNA) were performed.

Results

We have profiled 457 single cells with 0.65 million reads (sd = 0.18 million) uniquely mapped per cell. Expression of 16,348 genes across all cells was detected. Using bioinformatical analysis, we identified two distinctive subtypes of RPCs with unique molecular profiles, namely multipotent RPCs and neurogenic RPCs. We found genes related to the Notch and Wnt signaling pathway, as well as chromatin remodeling were dynamically regulated during RPC commitment. Interestingly, our analysis identified CCND1, a G1-phase cell cycle regulator, was co-expressed with ASCL1 in a cell-cycle independent manner. Temporally-controlled overexpression of CCND1 in retinal organoid suggested a role for CCND1 in promoting early retinal neurogenesis. Together, our results revealed critical pathways and novel genes in early retinogenesis of humans.

Conclusions

Single-cell RNA sequencing has emerged as a powerful tool to discriminate the heterogeneity of cell types and states in a complex population. By taking advantage of human embryonic stem cell-derived retinal organoid as a model of studying human retinal development, molecular continuum of retinal progenitor progression and neurogenesis was dissected at the single-cell resolution, which unveiled new perspectives of intrinsic programs in retinal progenitors driving sequential cell fate transition during early retinogenesis.

PO-341

Molecular mechanism of heat shock factor 4 in the regulation of lens epithelial cell homeostasis.

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Objective: Genetic mutation in heat shock factor 4(HSF4) lead to congenital cataracts in human and animal models. HSF4 exhibits dual transcription activities in lens epithelial cells. It upregulates the expression of small heat shock proteins (e.g. HSP 25, alpha B-crystallin) and simultaneously inhibits the expression of HSP70, FGF4 and vimentin. However, the signaling mechanism underlying HSF4 transcription regulation is still enigma. The purpose of this study is to determine the regulation of HSF4 by posttranslational modifications such as phosphorylation and ubiquitination.

Materials and Methods

Golden-match yeast two hybrid was used to determine the protein factors that bind HSF4. GST-pull down, immunoprecipitation and immunofluorescent staining were used for protein-protein interaction. Immunoblotting and qRT-PCR were used for measuring the expression level of proteins and mRNAs. Site-direction mutation was used for cDNA mutation.

Results

MEK-ERK1/2 phosphorylation of S299 down regulates HSF4-controled alpha B-crystallin expression

HSF4/S299, which consists of PDSM motif (phosphorylation-dependent sumoylation motif) in HSF4 peptide sequences, plays negative regulation on HSF4 transcription activity. However, it still not clear whether S299 is regulated by phosphorylation, and its biological consequences during lens development. To do this, we made rabbit polyclonal antibody against phospho-S299/HSF4, This antibody can bind to wild-type HSF4, but not HSF4/S299A or HSF4/S299D. Using this antibody, we found that MEK1-ERK1/2 can phosphorylate HSF4/S299, and inhibits HSF4-mediated the expression of alpha B-crystallin in lens epithelial cell lines and P 3 mouse lens. In early development of mouse lens, in which HSF4 showed high transcriptional activity, the phosphorylation of S299 is also upregulated, and the phosphorylation level is coordinated with phosphor-ERK1/2. Accordingly, we proposed that upregulation of S299 phosphorylation plays a role in preventing HSF4 from high activity.

UBA52 upregulates HSP25 expression by orchestrating the association between HSF4 and BRG1.

Using yeast two hybrid, we found that HSF4 interacts with UBA52, HSF4's DNA bingding domain interacts with Ub domain of UBA52. Ectopic UBA52 or knocking down UBA52 by siRNA can upregulate or down regulate HSP25 expression. UBA52 makes K63-dependent polyubiquitination in lens epithelial cells. UBA 52 can ubiquitinate BRG1 increasing the interaction between HSF4

and BRG1 and HSF4 binding ability to HSP25 promoter. Knocking down BRG1 decreases HSF4-mediated the expression of HSP25. Accordingly, we hypothesize that UBA52 links the proteotoxic stresses to the activation of HSF4-mediated heat shock response. These results highlight a novel molecular mechanism underlying HSF4's surveillance of the proteostatic stress during lens development.
Conclusion: During lens development, HSF4 can sense the proteotoxic stress by interacting with ubiquitin derived from UBA 52, and its transcription activity is downregulated by phosphorylation at S299.

PO-342

人脐带间充质干细胞防治糖尿病视网膜病变的应用基础研究

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目的: 糖尿病视网膜病变（DR）发病率随着糖尿病（DM）患病率的增加而递增，在 DR 早期使用间充质干细胞（MSCs）分化进行干预对延缓 DR 的发展及预后具有重要意义。探索人脐带间充质干细胞(hUCMSCs)干预治疗对预防 DR 发生的作用、DR 视网膜功能恢复的影响以及基因治疗的优劣，为 hUCMSCs 在视网膜血管性及神经退行性病变科学领域的临床应用提供理论依据和实验基础。
方法: 体外完成 hUCMSCs 的分离、纯化和鉴定；建立 DM 大鼠模型；构建 hUCMSCs 病毒载体转染系统，通过病毒载体色素上皮源性生长因子（PEDF）基因转染 hUCMSCs 的研究；研究不同移植途径、不同细胞类型的 hUCMSCs 分化或转染后干预 DR 发生发展的作用。观察对 DR 模型玻璃体腔注射 hUCMSCs、hUCMSCs-PEDF 或 lucentis，使用闪光视网膜电图（F-ERG）、FITC-dextran 荧光造影视网膜铺片、免疫组化、RT-PCR 等方法对比研究。
结果: DR 大鼠视网膜 BDNF 表达降低，出现视网膜神经节细胞（RGC）凋亡以及视网膜电图波幅下降。表明早期 DR 已出现视网膜神经功能损伤。玻璃体腔注射间充质干细胞（MSC）诱导神经干细胞能促进 DR 大鼠视网膜 BDNF 表达，增加视网膜 RGC 数量并提高视网膜电图波幅。说明 MSC 诱导神经干细胞对 DR 大鼠视网膜具有神经保护作用。我们在体外实验也表明，MSC 能提高高糖环境视网膜血管内皮细胞的增生活力，调控 Foxp3、IL-17 表达来平衡修复内皮细胞。
结论: 证实了 MSC 在 DR 治疗方面的意义及视网膜神经修复作用机制，为后续研究 MSC 改善糖尿病神经视网膜损伤的临床应用价值提供理论依据。

PO-343

Long noncoding RNA KCNQ1OT1 promotes diabetic keratopathy via activation of pyroptosis.

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Objectives: Diabetic keratopathy seriously threaten vision and delaying wound healing. However, no study has established the pathophysiological role of lncRNAs and pyroptosis, in diabetic keratopathy (DK).The aims of this study are to examine the effects of KCNQ1OT1 on pyroptosis and interactive relationship in the diabetic cornea.

Methods:Organ-cultured autopsy human diabetic corneas were treated with D-glucose. Sprague-Dawley rats were induced to develop diabetes by streptozotocin, and wound-healing assays were performed 10 weeks afterward. The expression of KCNQ1OT1, microRNA-214 (miR-214) and pyroptosis correlation factors (NLRP3, caspase-1 and interleukin-1β(IL-1β)) were measured in human and rat corneal tissues. To elaborate cellular molecular biology, we investigated the effects of D-glucose on glucose-induced pyroptosis in vitro. we stained human corneal epithelial cells (HCECs) for TUNEL and immunofluorescence. Moreover, to examine the effects of glucose on pyroptosis and inflammation, we quantified the expression of caspase-1, NLRP3 and IL-1β. Scratch test for cell migration was also performed. Gene expression and/or distribution were detected by real-time PCR, Western blotting, and immunohistochemistry.

Results: Here, we found for the first time the abnormal expressions of KCNQ1OT1, miR-214 and pyroptosis biomarkers in vivo, ex vivo and in vitro (P<0.05). Ac-YVAD-cmk (caspase-1 inhibitor) can suppress pyroptosis and reduce LDH release in HG-treated HCECs (P<0.05). Bioinformatic prediction and luciferase assays indicated that KCNQ1OT1 functioned as a competing endogenous RNA sponge of miR-214, thereby regulating the expression of caspase-1. The targeting relationship between KCNQ1OT1 and miR-214 was proved by co-transfecting experiments. Our study further showed that KCNQ1OT1 knockdown by small interfering RNA increased miR-214 expression but decreased caspase-1 expression (P<0.05) and that miR-214 directly downregulated caspase-1 and attenuated pyroptosis in vitro (P<0.05). By co-transfecting KCNQ1OT1 and miR-214, we confirmed that KCNQ1OT1 regulated pyroptosis in HCECs by directly targeting and downregulating miR-214, which in turn induced pyroptosis by suppressing caspase-1 translation.

Conclusions: These data demonstrate that KCNQ1OT1 is a key regulator which may function as endogenous miRNA “sponge” to bind miR-214 and targeting caspase-1 in diabetic keratopathy, suggesting that KCNQ1OT1 might be a potential target for the diagnose and treatment of diabetic keratopathy.

PO-344

CNTF promotes trigeminal ganglion cell axis regeneration

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Objective

To detect the expression of phosphorylated signal transduction and activators of transcription 3 (p-STAT3) in trigeminal ganglion from normal mice without or with the activation of ciliary neurotrophic factor (CNTF) in cell culture in vitro, and the role of CNTF and its possible mechanism during the course of axon regeneration in mice trigeminal ganglion cells.

Methods

The primary trigeminal ganglion cells from normal mice were cultured in vitro, and treated with Stattic, Stattic+CNTF, AGE, and AGE+CNTF. The expression of p-STAT3 in trigeminal ganglion cells was detected by western blot. The axon growth of trigeminal ganglion cells was detected by immunofluorescence staining.

Results

In trigeminal ganglion cells cultured in vitro, the expression of p-STAT3 was decreased in the cells treated with AGE or Stattic, and the axon growth of the trigeminal ganglion cells was significantly decreased ($P<0.05$) compared with the normal cells without treatment. However, the decreased expression of p-STAT3 in the cells treated with AGE or Stattic was reversibly increased in the trigeminal ganglion cells after CNTF was added, and the growth of axons was significantly increased as well ($P<0.05$).

Conclusions

AGE and Stattic can reduce the expression of p-STAT3 in the trigeminal ganglion and inhibit the growth of trigeminal ganglion cell axons in vitro. CNTF can reverse the decreased expression of p-STAT3 in trigeminal ganglion cells treated with AGE or Stattic, and significantly promote the regeneration of trigeminal ganglion cell axis.

PO-345

MicroRNA-17 Inhibiting Mice Corneal Epithelial Healing Through Down-expression of Fibronectin

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Purpose: To explore the role of miR-17 in corneal epithelial healing in mice and to explore its mechanism in vivo and in vitro.

Methods: The mice corneal epithelia were scraped followed with the subconjunctival injection of non-targeting negative control (NTC) or miR-17. The fibronectin (FN) eye drops or saline were further administered and the corneal epithelial defects were observed and compared during the epithelial healing. The expression level of corneal limbal stem cells related markers delta-NP63 and Ki67 were detected with PCR and immunofluorescent staining. Mouse corneal epithelial stem/progenitor cell line (TKE2 cells) were cultured in vitro and processed with NTC as vehicle control and other three experimental groups processed with miR-17, FN, or miR-17+FN,

respectively. Expression of stem cell related genes and FN, cell cycle, cell migration, and cell adhesion were compared between groups.

Results: Subconjunctival injection of miR-17 inhibits the corneal epithelial healing, and adding FN can neutralize the effects of miR-17 and promote epithelial healing in mice. There is no difference in the expression of delta-NP63 and Ki67 between the miR-17 group and NTC group. In vitro, adding miR-17 to TKE2 cells neither has obvious effect on its cell cycle nor the expressions of delta-NP63 and Ki67. However, adding miR-17 can inhibit the TKE2 cell migration, cell adhesion and the expression of FN.

Conclusions: MiR-17 can inhibit the adhesion and migration of corneal epithelial cells, resulting in delayed corneal epithelial defect healing in mice, which may be related to the down-expression of FN.

PO-346

Initiation of fibrosis in the integrin Avβ6 knockout mice.

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We previously demonstrated that β6 knockout mice showed impaired wound repair in corneal debridement and keratectomy wounds. In the current investigation, we continued our examination of integrin αvβ6 in order to determine if it was required for the initiation of wound healing in a corneal wound model that normally heals in a fibrotic manner. A full-thickness corneal incision was made in C57BL/6 J wild type (WT) and C57BL/6-Itgb6 KO (β6-/-) mice. The mice were observed at 3, 7, 14, and 28 days post-incision. The morphology of corneal restoration was observed in tissue sections stained with hemotoxilin and eosin (H&E). In addition, indirect-immunofluorescence (IF) was performed on sections and/or whole mounts to evaluate the immunolocalization of α-smooth muscle actin (SMA) and thrombospondin-1 (TSP-1). H&E staining revealed that the corneas in β6-/- mice healed slower than those in WT mice, with an obvious delay in the restoration of the stromal matrix and epithelium. In sections at 3 and 7 days, SMA and TSP-1 were greatly reduced in the β6-/- mice as compared to WT, but peaked at 28 days after incision. Whole mount SMA IF results were consistent with those from sections. Therefore, the initiation of fibrosis was inhibited by the lack of αvβ6; however, there appeared to be an alternate mechanism that initiated fibrosis 7-14 days later. Localization of TSP-1 correlated with expression of SMA whether wound healing was delayed or initiated immediately after wounding.

PO-347

Vitreous microparticles shedding in proliferation diabetic retinopathy.

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Purpose Microparticles are small vesicles produced during cellular activation and apoptosis, whose biological effects mainly including procoagulant activity and inhibition of inflammation. The diameters of microparticels are about 100-1000nm. It was performed the levels of vitreous microparticles changing in several ocular diseases, including diabetic retinopathy. Our study was to measure the levels of different cell-derived microparticles shedding in vitreous fluid in proliferative diabetic retinopathy (PDR), and to evaluate the effects of microparticles in microvascular complications of patients with PDR.

Methods A total of 68 vitreous samples were analyzed using flow cytomerty, including the PDR group (n=52) and control group (n=17). Macular hole, epimacular membrane, vitreous-macular traction and dislocation of lens were included in the control group. The study was in accordance with the tenets of the Helsinki Declaration and was approved by the Tianjin Medical University General Hospital Ethics Committee.

Results Microparticles of endothelial, platelet, photoreceptor origin were identified in vitreous samples. The ratio of above three cell-derived microparticles to phosphatidylserine (PS)-expressing MPs was also calculated to reflect standardized data. Vireous endothelial and platelet microparticles levels were increased in PDR patients, but the photoreceptor-derived MPs were significantly decreased. In PDR group, vitreous EMPs were higher and PMPs were lower in patients with stage IV (vitreous hemorrhage) than stage VI (traction retinal detachment). In addition, preoperative intravitreal injection of anti-VEGF antibody significantly decreased the concentration of endothelial-derived microparticles ($p<0.05$).

Conclusions The existence of different cell-derived microparticles was proved in vitreous fluid in patients with proliferative diabetic retinopathy, and the levels of them varied from different vitreoretinal diseases, different stage of PDR and whether performed preoperative intravitreal drug injection.

PO-348

Novel circular RNA expression profile of uveal melanoma revealed by microarray

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Objective: Purpose of the present study was to investigate **circular RNA**(circRNA) expression in Uveal Melanoma (UM).
Methods: First,we used microarrays to compare the expression profiles of circRNA in five UM samples and five normal uvea tissues. Then, bioinformatics analysisincluding gene ontology (GO) analysis, pathway analysiswas applied to study these differentially expressed circRNAs to predict pathogenic pathways that may be involved.Quantitative real-time PCR in 20 UM samples and 20 normal uvea sampleswas used to confirm the circRNA expression profiles obtained from the microarray data. Finally, we analyzed the interaction between validated circRNAs and their potential cancer-associated miRNA targets.
RESULTS: A total of 50,579circRNAs (Fold change ≥ 2.0 and P values < 0.05), including 20,654 up-regulated and 29,925 down-regulated circRNAs,were identified as differentially expressed between the UM tissues and normal uvea tissues. Weused qRT-PCR methodto verifyseven dysregulated circRNAs indicated by the microarrays data, which may be promising candidates for studying of future molecular mechanisms.
Conclusion: This study explored for the first time the abnormal expression of circRNAs in UM and described the expression profile of circRNAs, providing a new potential target for the mechanism of UM and future treatment of UM.

PO-349

miR-181s 家族靶向抑制 CTDSPL 表达促进葡萄膜黑色素瘤细胞周期进展

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目的：研究发现 microRNA 在细胞增殖、凋亡、分化和发育等各种生物过程中起到重要作用。mir-181s 家族成员包括 mir-181a、-181b、-181c 和-181d，目前关于 mir-181s 家族研究相对较少，尤其是葡萄膜黑色素瘤（UM）中 miR-181 家族的作用机制亟待解决。
方法：本课题组首次在葡萄膜黑色素瘤研究 mir-181s 对 UM 生长转移的影响。RT-PCR 检测发现 mir-181s 家族在 UM 组织和 UM 细胞中明显上调，抑制 miR-181s 表达，明显抑制 UM 细胞周期进展，其中 mir-181b 作用最明显。生物信息学和双荧光素酶报告分析证实 CTDSPL 是 mir-181s 的作用靶点。
结果：miR-181s 家族成员在不同物种间具有高度同源性，miR-181s 表达上调促进 UM 细胞周期进展。在家族成员中，mir-181b 在 UM 组织和大多数 UM 细胞中明显高表达。生物信息学和双荧光素酶报告分析证实 CTDSPL 是 mir-181b 的靶点。mir-181b 过度表达抑制了 CTDSPL 的表达，进而导

致 RB 基因磷酸化和下游周期因子 E2F1 积累，进而促进 UM 细胞周期进展。用 siRNA 敲除 CTDSPL 表达，亦促进了 UM 细胞中 E2F1 的表达和细胞周期的进展。
结论：mir-181s 家族成员是 CTDSPL 介导的细胞周期进展的主要负调控因子。mir-181 家族成员，特别是 mir-181b，可作为 UM 诊断和治疗的新靶点。

PO-350

Expression levels of aqueous humour cytokines and their associations with disease severity in Coats disease

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Purpose To investigate the expression levels of aqueous humour cytokines and analyze their associations with disease severity in Coats disease
Methods Aqueous humour samples were collected in 38 patients (38 eyes) with Coats disease and 10 age-matched control patients (16 eyes) with congenital cataract. Concentrations of 22 cytokines including angiogenic, proinflammatory and vasopermeability cytokines in aqueous humour were assessed through Cytometric Bead Array (CBA) technology. Clinical features in patients with Coats disease were also recorded for analysis.
Results The aqueous humour expression levels of VEGF, IL-4, IL-6, IL-8, IL-12, MIP-1α, IP-10, MCP-1, RANTES, VCAM-1, ICAM-1 and G-CSF in Coats disease group were significantly higher than control group ($P < 0.001$, < 0.001, < 0.001, < 0.001, 0.006, < 0.001, < 0.001, < 0.001, 0.021, <0.001, <0.001 and <0.001), in which IL-8, MIP-1α concentrations showed a significant positive correlation with VEGF concentration ($r=0.391$, $P=0.015$; $r=0.497$, $P=0.001$). The aqueous humour expression levels of VEGF, IL-8, MIP-1α and G-CSF were significantly positively correlated with the extent of retinal exudation ($r=0.483$, $P=0.002$; $r=0.559$, $P<0.001$; $r= 0.675$, $P<0.001$; $r=0.389$, $P=0.016$), and the aqueous humour expression levels of VEGF, IL-8, MIP-1α and G-CSF were significantly positively correlated with the extent of exudative retinal detachment ($r =0.508$, $P=0.001$; $r=0.713$, $P<0.001$; $r=0.455$, $P = 0.004$; $r = 0.367$, $P = 0.023$; $r = 0.559$, $P < 0.001$).
Conclusion In Coats disease, VCAM-1 and ICAM-1 may be important markers for investigating retinal vascular abnormalities. The high expression levels of VEGF and inflammation-related factors IL-8, MIP-1α, MCP-1 and G-CSF may significantly correlate with the severity of the disease.

PO-351

ANGPTL4-induces retinal pigment epithelial barrier breakdown by activating STAT3：Evidence from ARPE-19 cells under hypoxic condition and diabetic rats

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Purpose: Diabetic retinopathy (DR) is a primary contributor of visual impairment in adult diabetes mellitus (DM) patients. Previous studies have demonstrated angiopoietin-like protein 4 (ANGPTL4) as an effective DR therapeutic target, however, its role in maintaining the outer BRB in DR has yet not elucidated.
Methods: We established an in vivo diabetic rat model with the use of streptozotocin injections and cultured ARPE-19 cells under (hypoxia, 1%) condition. We first investigated the expression of Hypoxia induced factor-1α (HIF-1α) and ANGPTL4 in vivo and subsequently studied the transcriptional regulation and underlying molecular mechanisms in ARPE-19 cells under oxygen-deprived situations.
Results: The expression of HIF-1α and ANGPTL4 was increased with DR progression both in vivo and in vitro. Depletion of HIF-1a by siRNA inhibited hypoxia-induced ANGPTL4 expression. Repressing the HIF-1a / ANGPTL4 signalling effectively alleviated the migration and cellular permeability induced by hypoxia in ARPE-19 cells. Depletion of ANGPTL4 by siRNA significantly alleviated signal transducer and activator of transcription 3 (STAT3) activity in vitro, thereby attenuating the decrease of tight junction proteins Occludin and zona occludens-1(ZO-1) caused under hypoxia in ARPE-19 cells.
Conclusions: Our results suggest that ANGPTL4 partially modulates STAT3, and could serve as an effective DR-treatment strategy.

PO-352

视神经损伤后的能量代谢变化及其对 RGC 存活的影响

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目的: 近年来，人们逐渐认识到能量代谢紊乱参与了青光眼视神经损害及 RGC 凋亡的发生与发展。然而，急性轴突损伤后 RGC 的能量代谢变化及其在 RGC 凋亡的关系未知。
方法: 实验以小鼠视神经夹伤为模型，在体测量了视神经中能量分子 ATP 及 ADP 的水平。利用流式细胞术，免疫组化，定量 PCR 技术等测定能量代谢主要两条通络-糖酵解及有氧氧化的活性程度。

通过流式细胞术及视网膜铺片 Tuj1 染色定量 RGC 存活数目，并对 RGC 存活率及对应视神经的能量水平进行相关性分析。最后，腹腔注射 ATP，观测其对 RGC 存活的影响。
结果: 夹伤后的视神经 ATP 和 ADP 水平明显高于对照组，且其活化线粒体数目，有氧氧化及糖酵解酶的活和 mRNA 含量均高于对照组，且进一步研究证明视神经损伤后有氧氧化的增强明显高于其他能量代谢通路。Pearson 相关性分析发现，ATP 水平高低与 RGC 存活率无明显相关，且腹腔注射 ATP 并不能减少 RGC 死亡。
结论: 夹伤后的视神经有更高的能量消耗。为维持能量供给，视神经会代偿性地激活有氧氧化和糖酵解通路来增加产能以自足，因此，额外提供能量无明显的神经保护作用。另外，视神经代偿性供能水平高并不保证 RGC 能更多的存活，提示我们能量代谢变化对于损伤神经元的影响并不单一，其背后复杂的机制有待研究。

PO-353

OIP5-AS1 Overexpression Makes Lens Sensitize to Oxidative Stress by Inhibiting POLG Expression

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Objectives*: To investigate the role of OIP5-AS1 during the development of cataract.* ***Methods****: H_2O_2 was applied to establish the cell oxidative stress model. Human lens epithelial cells (HLECs) cell fraction qRT-PCR was utilized to verify the distribution of OIP5-AS1. Micro plate spectrophotometer detection of mean fluorescence intensity was used to detect Reactive oxygen species* （ROS） induced by H_2O_2, OIP5-AS1 knockdown and POLG knockdown. Western blot, and JC-1 stain was used to examine the endogenous mitochondrial Bax/caspase3 apoptosis pathway activation. Ribonucleoprotein immunoprecipitation (RIP)-qRT-PCR was performed to explore the relationship of OIP5-AS1 and POLG. Ex vivo cataract lens model was established to verify the impact of OIP5-AS1 knockdown by siRNA. **Results**: OIP5-AS1 is distributed in both nucleus and cell cytoplasm. OIP5-AS1 knockdown protects cells from H_2O_2 stimulation by downregulating ROS production, mitochondrial potential, and Bax/caspase3 expression. POLG knockdown consequently resulted in less mt DNA copy number, downregulated mitochondrion potential, caused more ROS, and more Bax/caspase3 expression. OIP5-AS1 and POLG mRNA were recruited by HuR to stress granule and POLG mRNA degraded. Knockdown of OIP5-AS1 ex vivo could effectively alleviate lens opacity. **Conclusion**: OIP5-AS1 contributed to cataract formation by inhibiting POLG expression via decreasing ROS production and Bax/caspase3 activation.

PO-354

The role of cancer stem cells in the formation of Vasculogenic mimicry in Retinalblastoma in vitro

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Objective *To explore the effect of hypoxia on potential of RB cells to transdifferentiate to endothelioid cells and to form vasculogenic mimicry(VM) in three-dimension culture in vitro; and to investigate the role of cancer stem cells (CSCs) in VM formation.*

Methods *Y79 cells were cultured under the normoxic or hypoxic circumstance in vitro, morphological changes were observed with inverted microscope. Analyzed specific cell markers (ABCG2, AC133, CD31, vWF) using immunofluorescence and flow cytometry(FCM). CSCs were isolated, uptaking of Dil-acLDL by endothelioid cells was tested under fluorescence microscope, the ability of VM formation was detected in the three-dimension culture, expressions of HIF-1α were detected by Real-time PCR and Western Blot at different time.*

Results *In vitro, after the hypoxic culture, a little subpopulation of Y79 cells (who express ABCG2, AC133) became stick-wall growth like endothelium, and express early endothelial marker CD31 as well, but not vWF at 14d, and obtain the ability of uptaking Dil-acLDL. In the three-dimension culture, Y79 cells formed tube structure(VM) at 14d after hypoxic induction. Above mentioned changes were observed in almost all CSCs, but not in Y79 cells rejects CSCs. Expressions of HIF-1α were significantly increased after the hypoxia culture.*

Conclusion *Hypoxia is one of the most inducing factors of VM formation in RB in vitro, there is a subpopulation of Y79 cells called CSCs, who in fact possessed the potential of transdifferentiating to endothelioid cells and forming VM structure. The endothelial-like cell express endothelial precursor cell phenotype but not mature endothelial factor vWF after 14 days induction of hypoxia.*

PO-355

Rapidly differentiation of multi-zone ocular cells from human iPSCs and generation of corneal epithelial and endothelial cells

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Eye is a complex organ with highly specialized tissue structure. The establishment of human embryonic stem cell (hES) has allowed the simulation of eye development *in vitro*. Most differentiation works of hES-derived ocular cells focus on a single, tissue-specific lineage, however, which face the difficulty in reflecting the complexity of eye development. Recently, generation of a self-formed ectodermal automomous multi-zone (SEAM) of ocular cells availably mimics the process of whole-eye development. In this study, we developed a rapid defined method to induce the differentiation of multi-zone ocular cells (MZOCs) from human induced pluripotent stem (iPS) cells, which specifically experienced the key progenitor stages of anterior neuroectoderm and eye field stem cells (EFSCs) by 2.5-dimensional (2.5D) culture. These differentiated cell types spanned neural retina, retinal pigment epithelium (RPE), surface ectoderm, neural crest and lens cells. In addition, the surface ectoderm zone of MZOCs could be mechanically isolated and induced into corneal epithelial cells (CEpCs), and the isolated neural crest zone could be directed into corneal endothelial cells (CEnCs). This *in vitro* differentiation process vividly mimics the development of vertebrate eye, and provides a promising model for the study of ocular morphogenesis, as well as an ideal resource of seed cells for corneal regenerative medicine.

PO-356

Effects of LncRNA-MALAT1 on retinal ganglion cells in glaucoma through mediating PI3K/Akt signaling pathway in a rat model

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Objective: To investigate the effects of LncRNA-MALAT1 on retinal ganglion cells (RGCs) in glaucoma through mediating PI3K/Akt signaling pathway in a rat model.

Methods: Chronic high intraocular pressure (IOP) rat model of glaucoma was established by the episcleral vein cauterization. Sixty Sprague-Dawley (SD) rats were randomly divided into the normal group, high IOP group, high IOP + MALATI-negative control (NC) group (injected with NC lentiviral vector), high IOP + MALATI-RNAa group (injected with MALATI-RNAa lentivirus), and high IOP + MALATI-RNAi group (injected with MALATI-RNAi lentivirus). Retinal tissue pathology was detected by HE staining. RGCs were counted by methylene-blue staining. qRT-PCR was used to detect the mRNA expressions of PI3K and Akt, Western Blotting to detect the protein expressions of PI3K/Akt signaling pathway, immunohistochemical staining to detect the expressions of PI3K/Akt total proteins and phosphorylated proteins, and TUNEL staining to detect the apoptosis of RGCs.

Results: The number of RGCs in high IOP model groups was significantly less than that in the normal group. RGCs were significantly lower in the high IOP + MALATI-RNAi group than in the high IOP + MALATI-RNAa, high IOP + MALATI-NC, and high IOP groups. Compared with the high IOP + MALATI-RNAa group, RGCs were lower in the high IOP and high IOP + MALATI-NC groups. Compared with the normal and high IOP + MALATI-RNAa groups, PI3K and Akt mRNA expression, total protein and phosphorylation levels were decreased in the high IOP group, high IOP + MALATI-NC group, and high IOP + MALATI-RNAi group. Compared with the normal group, the positive rate of apoptotic RGCs in high IOP model groups was significantly increased. Compared with the high IOP + MALATI-NC and high IOP groups, the positive rate of apoptotic RGCs was increased in the high IOP + MALATI-RNAi group while decreased in the high IOP+MALATI-RNAa group.

Conclusions: Our study provides evidence that LncRNA-MALAT1 inhibits RGCs apoptosis in glaucoma through promoting PI3K/Akt signaling pathway.

Keywords: LncRNA-MALAT1; PI3K/Akt signaling pathway; Glaucoma; Retinal Ganglion Cells; Apoptosis

PO-357

MicroRNA-24 protects retina from degeneration in rats by down-regulating chitinase-3-like protein 1

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PURPOSE. To explore the protective mechanisms for microRNA-24 (miR-24) in maintaining retinal structure and visual function in rats.

METHODS. Subretinal injection was performed in Royal College of Surgeons (RCS) rats and Sprague-Dawley (SD) rats. Retinal function was evaluated with electroretinography (ERG). Retinal

cell apoptosis was detected with TUNEL. Direct targeting of chitinase-3-like protein 1 (CHI3L1) by miR-24 was confirmed by dual-luciferase reporter assay. The expressions of mTOR, AKT, ERK, p62, LC3, NF-kB, MerTK and RPE65 were examined with Western blot. The morphology of retinal pigment epithelial (RPE) cells and photoreceptor outer segments (OS) was evaluated with Transmission Electron Microscopy (TEM) and confocal microscopy.

RESULTS. In the RPE cells of RCS rats, miR-24 was found lower and CHI3L1 level was higher in comparison with those in SD rats. Other changes in the RPE cells of RCS rats include activated AKT/mTOR and ERK pathways and abnormal autophagy flux. Such roles of miR-24 and CHI3L1 were further confirmed in RCS rats by subretinal injection of agomiR-24, which decreased CHI3L1 level and preserved retinal structure and function. Upstream, NF-kB was identified as the regulator of miR-24 in the RPE cells of these rats. On the other hand, in SD rats, intraocular treatment of antagomiR-24 or CHI3L1-overexpressing lentivirus induced pathological changes similar to those in RCS rats.

CONCLUSIONS. In this study, miR-24 was found to maintain the retinal structure and visual function of rats by acting directly on CHI3L1.

PO-358

Keratocan 表达阳性角膜基质细胞在角膜损伤修复中的作用

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目的： 角膜基质细胞（KCs）既往被认为是均质单一的细胞，其特异性标志物为 keratocan（Kera）。本研究旨在探讨 Kera 表达阳性角膜基质细胞（Kera+ KCs）在角膜损伤修复中的功能。

方法： 利用 Cre/LoxP 重组酶系统构建两种条件性基因敲除小鼠 Kera-Cre; mTmG 和 Kera-Cre; $TGF\beta r2^{flox/flox}$。在 Kera-Cre; mTmG 小鼠中 Kera 表达阳性的细胞特异性表达绿色荧光，在 Kera-Cre; $TGF\beta r2^{flox/flox}$ 小鼠中 Kera 表达阳性的细胞 $TGF\beta r2$ 基因被特异性敲除。

以正常、角膜碱烧伤以及上皮刮伤后 Kera-Cre; mTmG 小鼠角膜平铺片和冰冻切片观察 Kera+ KCs 的形态与分布；EDU 检测细胞增殖；免疫荧光，qRT-PCR 和蛋白印迹检测细胞转分化；qRT-PCR 检测 Kera-Cre; $TGF\beta r2^{flox/flox}$ 与野生型小鼠细胞外基质相关基因的表达；透射电镜检测角膜基质超微结构；裂隙灯显微镜和免疫荧光检测角膜新生血管。

结果： 角膜基质中并非所有 KCs 都呈绿色荧光，即 Kera 表达阳性，同时还存在着大量 Kera 表达阴性的红色 KCs，这与既往报道不符。Kera+ KCs 散在分布于角膜基质中，无树枝状突起，也未相连成网。在角膜碱烧伤和上皮刮伤后的损伤修复过程中，除细胞形态改变外，它们既不增生、迁移，也不转分化为肌成纤维细胞参与伤口愈合。正常 Kera-Cre; $TGF\beta r2^{flox/flox}$ 小鼠的眼表外观与野生型小鼠相比无明显差异，透射电镜显示转基因小鼠的基质纤维束排列紊乱，各型胶原和细胞外基质相关蛋白多糖的表达降低。碱烧伤后，转基因小鼠角膜新生血管比野生型小鼠数量增多且更密集，但是并无明显的角膜基质增厚。

结论： 本研究首次发现 Kera+ KCs 不参与角膜损伤的伤口愈合，但能够通过抑制细胞外基质的合成来促进角膜新生血管。

PO-359

DAPL1 在年龄相关性视网膜病变中的功能及机制研究

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研究目的：年龄相关性视网膜病变是引起老年人不可逆性致盲的主要原因之一，其致病机制未明。我们的前期工作发现一个可能与 AMD 相关且在 RPE 细胞中高表达的新功能基因 *DAPL1*（Death associated protein like 1）。本研究旨在深入解析 DAPL1 在年龄相关性视网膜病变中的功能作用及其分子机制。
研究方法：利用本课题组首建的 *Dapl1-/-*小鼠，通过 ERG，OCT 和眼底成像技术对不同年龄段的 *Dapl1-/-*小鼠和 WT 小鼠视网膜的结构和功能进行分析。通过 HE 染色、电镜分析、视网膜损伤的特异性分子 maker 免疫荧光检测等研究手段检测视网膜细微结构和分子 maker 的改变情况。最后，通过 RNA-seq 分析可能在 RPE 细胞中介导 DAPL1 生物学功能的下游候选靶基因，并通过基因干扰、过表达实验和功能挽救实验证实下游靶分子的生物学功能及其调控机制。
研究结果：与同龄 WT 小鼠相比， 2 月龄 *Dapl1-/-*小鼠视网膜未见明显的结构和功能异常，而 16-18 月龄的 *Dapl1-/-*小鼠出现年龄相关性的视网膜功能及结构异常，其中包括视网膜 ERG 波幅显著下降，视网膜外核层变薄，神经胶质细胞的异常激活，Rhodopsin/Opsin 的表达降低，RPE 细胞的退行性病变，以及在 RPE 内侧发生小胶质细胞的聚集和脂质沉积等病理特征。机制研究结果显示 DAPL1 在 RPE 细胞中可以通过抑制 DAPK1 的方式促进 RPE 细胞的自噬。
研究结论：本研究证明 DAPL1 的功能缺失可引起小鼠视网膜 AMD 样的病理改变，其致病机制之一是 DAPL1 的功能缺失促进了 DAPK1 对自噬相关蛋白的调控,从而抑制了 RPE 细胞的自噬能力。

PO-360

ROCK Inhibition Mediated Morphological Shift and Enhanced Neurite Outgrowth-promoting Property of Olfactory Ensheathing Cells via YAP-dependent Up-regulation of L1-CAM

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Purpose:

Olfactory ensheathing cells (OECs) are heterogeneous in morphology, antigenic profiles and functions, and these OECs subpopulations have shown different outcomes following OECs transplantation for central nervous system (CNS) injuries. Morphologically, OECs are divided into two subpopulations, process-bearing (Schwann cells-like) and flattened (astrocytes-like) OECs, which could switch between each other reversibly and are affected by extracellular and intracellular factors. However, neither the relationship between morphology and function of OECs nor their molecular mechanisms have been clarified.

Methods:

Using in vitro scratch assay, immunocytochemical staining, matrigel drop migration assay and Trans-well chamber migration assay to detect Migratary ability of OECs. Using cortical neurons and OECs no-cultures to determine neurite outgrowth and extension.

Results:

OECs mainly displayed process-bearing shape under pro-inflammatory conditions (LPS), while displayed flattened shape under anti-inflammatory conditions (IL-4 and TGF-β1). The morphological changes were partially reversible and ROCK/F-actin pathway was involved. Functionally, process-bearing OECs under pro-inflammatory conditions showed increased cellular metabolic activity and higher migratory rate when compared with flattened OECs under anti-inflammatory conditions, and significantly promoted neurite outgrowth and extension. Remarkably, morphological shift towards process-bearing OECs induced by ROCK inhibitor Y27632 enhanced neurite outgrowth-promoting property of OECs. Furthermore, as the downstream of ROCK pathway, transcriptional co-activator YAP mediated morphological shift and enhanced neurite outgrowth-promoting property of OECs through up-regulating the expression of neural adhesion molecule L1-CAM.

Conclusions:

Our data provided evidence that OECs with specific shapes correspond to specific functional phenotypes, and opened new insights into potential combination of OECs and small-molecule ROCK inhibitors for the regeneration of CNS injuries.

PO-361

Prdx6 is required to protect human corneal epithelial cells against UV-B injury

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Purpose: The protective role of Prdx6 on rat corneal tissue against Ultraviolet B (UV-B) injury in vivo has been confirmed previously.We further investigated the function and molecular mechanism of Prdx6 in human corneal epithelial cells (HECEs) under UV-B radiation.

Methods: The experimental groups were design as follws: (1) Prdx6 RNAi; (2) Prdx6 RNAi + UV-B radiation; (3) normal HECEs; (4) normal HECEs + UV-B radiation; (5) wild-type Prdx6 overexpression; (6) wild-type Prdx6 overexpression + UV-B radiation; (7) mutant-type Prdx6 overexpression; (8) mutant-type Prdx6 overexpression + UV-B radiation. The cell survival rate was detected by an Thiazolyl Blue Tetrazolium Bromide (MTT) assay. Apoptosis, reactive oxygen species (ROS), and Malondialdehyde (MDA) were detected with a commercial kit. Gene expression was detected by real-time PCR.

Results: We found the following results. (1) Compared to normal cells, the survival rates were 32%, 87%, and 58% under UV-B radiation in the Prdx6 interference, wild-type overexpression and mutant-type overexpression groups, respectively. The survival rates decreased to 50% at 24 h and 31% at 48h when the PLA2 activity of Prdx6 was inhibited after UV-B radiation. (2) Apoptosis, ROS content, and MDA levels increased when Prdx6 was downregulated. This phenomenon became more severe under UV-B radiation. (3) The expression levels of apoptosis-related and antioxidant genes all changed along with the changes in expression of Prdx6.

Conclusions: (1) Both peroxidase and PLA2 activities of Prdx6 are crucial for its protective role in corneal tissue. (2) Down regulated expression of Prdx6 resulted in high ER stress. (3) Apoptosis in HECEs with down regulated Prdx6 coupled with UV-B radiation was related to the pathways of DNA damage and the death receptor. (4) Low levels of antioxidants are sufficient for maintaining homeostasis in HECEs without external stimuli. Under the condition that Prdx6 was down regulated, HECEs were more sensitive to UV-B radiation.

PO-362

High fat diet induced functional and pathological changes in lacrimal gland

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Purpose: To investigate the effect of high fat diet on lacrimal gland.

Methods: One-month-old male C57BL/6 mice were administered with a standard diet (SD) or a high-fat diet (HFD) for different durations from 1 month to 4 months. Some animals were shift to SD for 1 month after feeding HFD for 1 month, some HFD mice of 5-month-old were treated with fenofibrate for 1 months. Tear production was evaluated by phenol red thread. The mice were sacrificed at different time points. The lacrimal gland were harvested and processed for H&E staining, Oil red O staining, qRT-PCR, Western Blot, MDA Kit test, Cholesterol Assay Kit test, transmission electron microscope (TEM) , immumohistochemical staining (IHC staining) and immunofluorescence staining (IF staining).

Results: After feeding with high-fat diet, tear secretion was decreased after 1 month. The acinar cells of lacrimal gland showed lipid droplets accumulation increased with time by Oil Red O staining and TEM. The content of cholesterol from lacrimal gland was gradually increased. The enzymes of fatty acid oxidation were disordered. The expression of PPAR-α gene gradually increased from one month to 3 months after HFD feeding, and obviously decreased after 4 months. Besides, the lacrimal gland showed cell infiltration around the acinus started from 1 month of HFD. IHC staining and IF staining revealed inflammatory cells infiltration increased. QRT-PCR demonstrated inflammation related factors such as IL-1β, TNF-α, TSG6, IL-10 increased significantly. In addition, the degree of lipid peroxidation was enhanced and antioxidants were increased. Furthermore, TEM showed mitochondria hypermegasoma after 4 months HFD. The apoptotic cells were increased and proliferation was decreased in lacrimal gland after HFD. After 4 months HFD, the animals were shifted to SD for 1 month, most pathologic changes could be recovered. In addition, after feeding with fenofibrate, the tear production increased, lipid droplets reduced, inflammation relieved and the oxidative stress was decreased.

Conclusion: Long-term high fat diet could induce lipid peroxidation, inflammatory cell infiltration, mitochondria damage, cell apoptosis increase and proliferation inhibition in lacrimal gland, resulted in aqueous tear secretion decrease, which may induce dry eye.

PO-363

Inflammatory cytokine TNF-α promotes corneal endothelium apoptosis via upregulating TIPE2 transcription during corneal graft rejection

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Purpose Endothelial dysfunction accounts for 50% of total corneal transplantation failures, suggesting that corneal endothelial damage is the leading cause of graft failure. Tumor necrosis factor-α (TNF-α) is known to contribute to the negative regulation of corneal transplantation, but

how it does so remains unclear. Here, we report a regulatory loop involving TNF-α, TNF-α-induced protein 8 like 2 (TNFAIP8L2 or TIPE2), and apoptosis during corneal graft rejection.

Methods We established mice models of penetrating keratoplasty to verify whether the quantification of TNF-α in allogeneic corneas is enhanced through ELISA assay and immunofluorescence staining. In cornea tissues, we obtained corneal endothelium and measured apoptosis of the removed cells. Meanwhile, quantitative real-time PCR and Western blotting were used to detect the mRNA and protein expression of TIPE2. In human corneal endothelial cells, we verified the conclusions through some experiments. By specifically knocking down TIPE2, we detected the importance of TIPE2 in TNF-α-triggered apoptosis.

Results In mice models, TNF-α was higher in the cornea and aqueous humor in allograft group and TNF-α elevation increased the apoptosis of the corneal endothelium. In addition, high levels of TIPE2 were found in allograft rejection models following TNF-α elevation. In human corneal endothelial cells (HCECs), TNF-α clearly augments TIPE2 expression and promotes cell apoptosis through upregulating TIPE2 transcription. Knocking down markedly decreased cell apoptosis.

Conclusions Our study identifies the molecular mechanisms underlying the interplay of TNF-α, TIPE2, and apoptosis during allograft rejection, and it suggests that both TNF-α and TIPE2 might be potential targets for the successfully grafted corneal endothelium.

PO-364

p38 信号通路抑制剂在组织工程角膜上皮构建中的应用

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目的：探讨应用 p38 信号通路抑制剂对组织工程角膜上皮构建过程中干细胞干性的维持及上皮间质转化（Epithelial-mesenchymal transition，EMT）的抑制作用。

方法：在构建组织工程角膜上皮的过程中，在培养基中加入 p38 抑制剂，观察细胞形态及生长情况，H&E 观察角膜上皮的形态结构；蛋白印迹方法检测上皮细胞 p38、pp38 的表达；免疫荧光和/或 RT-qPCR 检测 Pax6、K12、Claudin-1、E-Cadherin、K14、ABCG2、Wnt7a 及 P63 的表达，同时用克隆培养方法验证干细胞的维持；免疫荧光和/或 RT-qPCR 检测 EMT 标志物 snail1 及 Wnt 信号通路的下游表达因子 TCF4 的表达；将构建的组织工程角膜上皮移植于兔角膜缘干细胞缺乏模型，观察上皮愈合情况。

结果：在构建组织工程角膜上皮过程中，培养基加入 p38 抑制剂后，细胞排列更加紧密，容易分离出完整的角膜上皮片。p38 抑制剂明显抑制角膜上皮 p38 的磷酸化，Pax6 及 K12 的表达没有明显变化；角膜上皮片的细胞连接蛋白 Claudin-1、E-Cadherin 表达更强，分布更规律；角膜干细胞标记物 K14、ABCG2、Wnt7a 及 P63 的表达显著增加；上皮细胞克隆形成率明显提高；EMT 标记物

snail1 的表达明显下降，TCF4 表达升高。将构建的组织工程角膜上皮移植于角膜缘干细胞缺乏的兔模型中，与对照组相比，角膜上皮的愈合明显加快，并有正常的角膜上皮表型 K12、Pax6 的表达。**结论：**P38 抑制剂能有效抑制角膜上皮细胞体外培养过程中发生 EMT，维持角膜上皮干细胞的干性，p38 信号通路的抑制有利于组织工程角膜上皮的构建。

PO-365

Notch Signaling Inhibition Attenuates the Glutamate Response in Human Adipose Stem Cell-derived Retinal Cells

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Purpose: This study aimed to delineate the role of Notch signaling on the responses of human adipose-derived stem cell (ASC)-derived retinal cells to glutamate.

Methods: Human ASCs were induced into retinal lineage by noggin/Dkk-1/IGF-1 approach. Notch signaling activation was mediated by JAG1, whereas Notch signaling inhibition was mediated by DAPT. The response of human ASC-derived retinal cells to glutamate was evaluated by transient intracellular calcium elevation analysis using Fluo-4AM. The cellular change of fluorescence intensity and the response time to the peak fluorescence intensity were recorded and compared to the control group.

Results: Human ASC-derived retinal cells were able to respond to the glutamate stimulation at 59.40 ± 10.29 sec and showed the fluorescence intensity changes of 525.18 ± 228.80%. Upon Notch signaling activation by JAG1, human ASC-derived retinal cells showed similar responses to glutamate stimulation (60.30 ± 9.94 sec) and fluorescence intensity changes (532.10 ± 191.77%), compared to those without Notch signaling modulation treatment. On the contrary, the time response to the glutamate stimulation in the Notch signaling-inhibited human ASC-derived cells was significantly delayed (141.60 ± 16.24 sec, $p < 0.001$) and the fluorescent intensity changes were also significantly attenuated (369.36 ± 90.43%, $p < 0.05$), compared to the group without Notch signaling modulation treatment.

Conclusions: Notch signaling inhibition by DAPT delayed and attenuated human ASC-derived retinal cells responding to glutamate stimulation. Notch signaling is required for the glutamate responses in human ASC-derived retinal cells.

PO-366

Defined- and Xeno-free differentiation of human iPSCs to functional trabecular meshwork cells

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Purpose: We have successfully generated trabecular meshwork (TM) cells from human induced pluripotent stem cells (iPSCs) using the medium conditioned by the primary human TM cells. For future stem cell-based therapy for glaucoma, the production of functional TM cells from human iPSCs in a defined- and xeno-free condition is highly desirable. The goal of this study was to identify key factors critical for iPSCs differentiation, and validate a defined- and xeno-free protocol for generation of functional TM cells from human iPSCs.

Methods: The medium conditioned by the primary TM cells was used to induce differentiation of human iPSCs. Human iPSCs-derived TM cells after differentiation for 1-3 months and primary TM cells were individually collected for RNA extractions and sequencing. AutoSome and GO analysis were performed to identify highly expressed receptors during differentiation, which were confirmed by qRT-PCR. A defined- and xeno-free differentiation protocol was optimized for induction of human iPSC differentiation. The similarity between the iPSC-derived cells and primary TM cells were determined by morphological observations, immunohistochemical staining with LAMA4, TIMP3, AQP1, Col IV antibodies, and the formation of cross-lined actin network (CLANs) after dexamethasone (DEX) treatment.

Results: The expressions of receptors such as HTGFBR, PTGER4, PTPRN, EDIL3 MEGF8, PTGFR were significantly higher in iPSC-derived TM cells induced by conditioned medium than iPSCs. The primary TM cells from two individuals also exhibited high expression of these receptors. A defined- and xeno-free differentiation protocol was optimized for culture of human iPSCs. Defined- and xeno-free differentiated cells showed morphological resemble of human primary TM cells. Immunohistochemical staining demonstrated that these differentiated cells could robustly express the LAMA4, TIMP3, AQP1, and Col IV. The ratio of differentiated cells that formed CLANs was dramatically increased after DEX treatment (20.81% vs. 14.94%, p=0.0023), which was similar to DEX induced CLANs formation of the primary TM cells (19.69% vs. 13.52%, p=0.0001).

Conclusions: A defined- and xeno-free differentiation protocol is developed and optimized for generation of functional TM resembling cells from iPSCs in this study. The putative iPSC-derived TM cells express proteins characteristic for primary TM cells, and are capable of forming CLANs. Our protocol can also provide a guidance for Good Manufacturing Practice-production of TM cells for potential use in clinics.

PO-367

视网膜上全反式视黄醛转化为全反式视黄醛二聚体反映了全反式视黄醛的解毒/代谢通路

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目的：研究视网膜上全反式视黄醛二聚体（atRAL-dimer）的生成及意义。
方法：原代视网膜色素上皮细胞、感光细胞外节、视网膜色素上皮组织及神经视网膜组织均取自猪眼球，与全反式视黄醛（atRAL）共培养后，高效液相色谱法检测 atRAL-dimer 的生成情况。220 勒克斯或 10000 勒克斯光照 5 分钟或非光照条件下，猪原代视网膜色素上皮细胞与 atRAL 或 atRAL-dimer 共培养 6 小时、24 小时、3 天、5 天，MTS 法或结晶紫染色法检测细胞活力。高效液相色谱法检测 220 勒克斯或 10000 勒克斯光照 0.5、1、2、5 分钟后 atRAL、atRAL-dimer、A2E 分解情况，高效液相色谱-串联质谱法分析 atRAL-dimer 在这两种光强下照射 5 分钟后的光解产物。
结果：与 atRAL 共培养后，猪原代视网膜色素上皮细胞、感光细胞外节、视网膜色素上皮组织及神经视网膜组织中均有 atRAL-dimer 生成，atRAL-dimer 生成水平呈时间/浓度依赖性增长。无论在光照或非光照条件下，相较于同浓度下造成显著细胞损伤的 atRAL，atRAL-dimer 及其光照产物未显示细胞毒性。atRAL-dimer 的光敏性强于 atRAL 和 A2E，在 10000 勒克斯 LED 光照射 5 分钟后几乎完全分解，正离子模式下质谱检测到的三个主要产物离子峰质荷比分别为 335、365 和 391。
结论：视网膜上 atRAL 转化为 atRAL-dimer 是一条解毒/代谢通路：脱离视觉循环的 atRAL 可以在感光细胞和视网膜色素上皮细胞中转化为 atRAL-dimer，atRAL-dimer 具强光敏性，在不引起细胞损伤的情况下发生光致分解，这种光解产物及其前体可随每日感光细胞外节正常脱落更新被视网膜色素上皮细胞吞噬，而光解产物也更易被细胞代谢清除。这条代谢通路的发现和研究可能为年龄相关性黄斑变性等 atRAL 清除障碍引起的疾病提供治疗新思路。

PO-368

Oxidative stress-induced KLF4 activates IL17RA transcription in retinal pigment epithelial cells

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Purpose. Age-related macular degeneration (AMD) is a leading cause of irreversible blindness worldwide. Recent evidences suggest interleukin 17 (IL17) signaling is activated in AMD, however, the regulation and molecular function remains elusive.
Methods. Human retinal pigment epithelial (RPE) cell line ARPE19 and RPE1 were exposed to oxidative stress generated by glucose oxidase treatment. To induce oxidative stress in vivo, mice

were injected with 70 mg/kg sodium iodate. The expression of inflammatory genes in control or treated cells were determined by microarray analysis. The protein and RNA expressions of KLF4 and IL17RA were analyzed by western blot and qRT-PCR analysis, respectively. The distribution of IL17RA in retina and RPE was investigated by immunohistochemistry and immunofluorescence. The binding of KLF4 to IL17RA promoter was access by Electrophoretic mobility shift assay (EMSA) and chromatin immunoprecipitation (ChIP) assay. The trans-activity of KLF4 on IL17RA was determined by luciferase assay and qRT-PCR analysis.
Results. We found a highly significant upregulation of IL17 receptor, IL17RA, in AMD patients. Through an AMD-like mouse model and cultured RPE cell line, we demonstrate that IL17RA is induced by oxidative stress. Functionally, IL17RA promotes inflammatory response in RPE cells upon OS exposure. We further identified that transcription factor KLF4 directly activates IL17RA expression, therefore, promotes production of IL1β and IL8 in an IL17RA-dependent manner.
Conclusion. Our study demonstrates an unrevealed regulatory mechanism of IL17RA, which may provide potential new therapeutic target for AMD treatment.

PO-369

Prostaglandin E2 receptor (EP2)-mediated cyclic adenosine monophosphate (cAMP) modulation affects peroxisome proliferator-activated receptor alpha (PPARα) and hypoxic signaling events during myopia development.

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Purpose: Modulation of EP2 and PPAR affects cAMP levels in various tissue systems. Increased cAMP levels were shown to reduce scleral collagen content in guinea pigs. Hypoxia, a key mediator of extracellular matrix (ECM) remodeling, shares an inverse relationship with PPARα levels. We aimed to determine the role of EP2 in facilitating the crosstalk between cAMP, hypoxia inducible factor (HIF) and PPAR signaling that impacts scleral ECM remodeling during myopia.
Methods: Three-week old guinea pigs (n=20 in each group) exposed to normal vision were monocularly injected with an EP2 antagonist (AH6809-10μM/30μM) or a vehicle solution (0.1% DMSO) for 2 weeks. Some animals underwent FD alone, while others also received either 10μM/30μM AH6809 or vehicle injections (FD+DMSO) for 2 weeks. A separate set of animals served as untreated age-matched (AM) controls. Refraction and axial length were measured at 2 weeks, followed by scleral tissue isolation, total RNA extraction (n=10) and gene expression analysis using quantitative polymerase chain reaction. The remaining sclerae underwent radioimmunoassay to detect cAMP levels using a gamma scintillation counter. Statistical

significance was estimated using one-way ANOVA with Bonferroni correction (refraction and axial length) and t-tests (cAMP and gene expression levels).

Results: Both FD and FD+DMSO groups developed significant myopia relative to fellow and AM controls. A low dose of AH6809 was adequate to inhibit the progression of experimental myopia ($p<0.001$), while the highest dose reduced myopic axial elongation ($p<0.05$). Increase in cAMP levels in FD+DMSO eyes was inhibited by AH6809 (FD+AH6809) injections during FD ($p<0.05$). The drug had no effect on refraction and axial length under an unobstructed visual environment. Out of a diverse set of 27 genes from PPAR/RXR, cAMP and HIF signaling pathways, 16 were differentially regulated during myopia relative to fellow eyes. However, AH6809 injections during FD either suppressed or completely negated such changes in 15 genes.

Conclusion: EP2 antagonism limits myopia progression by suppressing the increases in scleral cAMP levels, which is accompanied by differential regulation of various downstream genes in the PPAR and HIF signaling pathways. These effects implicate a potential EP2-mediated crosstalk between cAMP, HIF and PPAR signaling pathways may be critical in scleral ECM remodeling and myopia development in guinea pigs.

PO-370

CREB Promotes Mouse Lens Epithelial Cell Differentiation Through Regulation of Multiple Downstream Genes

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Purpose: The cAMP response element binding protein (CREB) is a general transcription factor which plays an important role during nerve system development and memory. Its activation is relied on phosphorylation of S133 by multiply kinases such as PKA and others. We have recently observed that CREB is highly expressed during lens development (Lan Yang et al. this meeting), its activation as shown by the phosphorylation of S133 primarily occurs in the differentiation zone of mouse lenses. However, the mechanisms mediation CREB control of differentiation remains elusive.

Methods: RNAseq was used to explore the CREB target genes mediating lens differentiation. , QRT-PCR, Western blot analysis and immunocytochemistry were used to confirm the RNAseq results. Over-expression or knock-down were used to further analyze the effects of the CREB target genes on lens differentiation.

Results: Wild type CREB but not its S133A mutant promotes lens cell differentiation. Such functions are closely associated with its regulation of expression of various sets of down-stream genes. Overexpression of wild type CREB in mouse lens epithelial cells alters a total of 1743 genes （up:761， down:982） among which， over 100 genes have been shown to be closely related to

differentiation. Among these genes, Wnt7b and Pax6 were further confirmed to regulate lens differentiation.

Conclusion: CREB plays an important role in promoting lens differentiation. （Supported by grants from National Natural Science Foundation of China， 81570824， 81770910 and 81700821 as well as the Fundamental Funds from the State Key Laboratory of Ophthalmology， Zhongshan Ophthalmic Center, Sun Yat-sen University）.

PO-371

Circadian moudulation of egr1 regulated zebrafish visual functions

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Aims: We use the diurnal zebrafish to study the rhythmicity of *egr1* in retina and its biological involvement in visual functions.

Methods: Q-PCR experiment was used to detect the rhythmic expression of egr1 and clock genes. Optokinetic response and retinal electrophysiological experiments were used to evaluation the zebrafish visual functions.

Results: The results showed that *egr1* gene exhibited a circadian rhythm in retina under light-dark (LD) and dark-dark (DD) conditions, which was disrupted in *per1b* and *per2* mutant zebrafish. Chip experiment showed that the Bmal1b directly bind to the E-box element in the promoter of *egr1*. The core molecular clock gene oscillation of the zebrafish was not affect in *egr1* mutant zebrafish under LD conditions. Optokinetic response assay showed decreased contrast sensitivity and visual acuity in *egr1* mutant zebrafish. Retinal electrophysiological experiments demonstrated that the b-wave of the *egr1* mutant was lower than that in the wild-type fish.

Conclusions: These results demonstrated that *egr1* was a clock-controlled gene that regulated the visual function of zebrafish larvae.

PO-372

iPSC-derived mesenchymal stem cells transfer mitochondria to corneal endothelial cells

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Purpose: Since corneal endothelial cells (CECs) cannot regenerate itself under normal physiological conditions, loss of CECs lead to devastating consequences in the patients, including severe vision loss. Currently, corneal transplantation is the only recognized therapy for such disease conditions. In this study, we sought to investigate whether mitochondrial uptake of CECs from healthy neighboring cells preserves their function from degeneration *in vitro*.
Methods: CECs with mitochondrial complex I inhibitor, rotenone, induced stress were co-cultivated with healthy CECs or human induced pluripotent stem cell (iPSC)-derived mesenchymal stem cells (MSCs). Extracellular oxygen consumption rate (OCR) was performed to test the mitochondrial function of CECs. Immunofluorescence (IF), transmission electron microscope (TEM) analysis, confocal microscopy imaging, transwell assay, and RNA-Seq were conducted to investigate mitochondrial transfer from healthy cells to stressed CECs.
Results: The results revealed CECs could uptake mitochondria from adjacent cells via tunneling nanotubes (TNT) -like structures. Furthermore, the donated mitochondria effectively protected against CECs death and largely preserved cell function with rotenone stress. Importantly, the effects of mitochondrial donation from iPSC-MSCs or healthy CECs to damaged cell were associated with F-actin expression under using of Y-27632/ROCK inhibitor.
Conclusion: iPSC-MSCs can effectively donate functional mitochondria to CECs and protect against cell loss in stressed condition. Our study uncovered a critical role of promoting of mitochondrial donation in protection of CEC from early degeneration, and highlight a viable therapeutic strategy by mitochondrial donation for the treatment of CEC degeneration.

PO-373

MYPT1 Guides PP-1 to Dephosphorylate the Histone Methytransferase EZH2

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Purpose: We have previously shown that protein phosphatase-1 (PP-1) and –2A (PP-2A) are major phosphatases in the eye (Li et al., 2001. IOVS). PP-1 plays important roles in regulating

lens development and pathogenesis by directly dephosphorylating the tumor suppressor, p53 (Li et al., 2006. Oncogene) and the major survival kinase AKT (Xiao et al., 2010. CDD). Whether PP-1 also regulates other targets remains to be explored. In the present study, we have shown that PP-1 can dehosphorylate EZH2 to modulate EMT of lens epithelial cells.

Methods: Mass Spectrometry and Co-IP were used to analyze the interaction between PP-1 and EZH2. IP-linked de-phosphorylation was used to determine that PP-1 directly dephosphrulates EZH2.

Results: Mass spectrometry revealed that MYPT1, the regulatory subunit of PP-1 directly interacts with EZH2. Co-IP further confirmed that MYPT1 can interact with EZH2. IP-linked dephosphorylation assay revealed that PP-1 directly dephosphorylates EZH2. qRT-PCR and western blot analysis revealed that PP-1 dephosphorylation of EZH2 modulates EMT.

Conclusion: PP-1 directly dephosphorylates EZH2 to modulate EMT of lens epithelial cells.

PO-374

Allelic deletion of CRX in ES cells rendering delayed maturation of photoreceptors in three-dimensional Retinal organoids differentiation

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Purpose

Photoreceptors make up 70-80% of the retinal cells. CRX, an established photoreceptor gene in postmitotic photoreceptor precursors, determines precursor cell fate and regulates the development and function of photoreceptors. Herein, we use three-dimensional differentiation system on established CRX allelic deletion ES cells for systemic gene function analysis.

Methods

One CRX allele was replaced by tdTomato using CRISPR-Cas9 system in H9 cells. Chromosome aberration in the resulting H9-tdTomato cell line was detected by karyotype analysis. Flow cytometry and immunostaining were used to detect the expression consistency between CRX and tdTomato. Whole transcriptome profiling in retinal organoids were performed at different 3-D differentiation stages. Mature photoreceptor markers, M-/S-opsin and Rhodopsin, were detected by immunostaining.

Results

H9-tdTomato cell line preserved genomic stability through genotyping. Fluorescent cells appeared inside of retinal organoids in early differentiation stage and gradually migrated outward, with exactly the same with CRX expression in the immunostaining characterization. mRNA level of CRX was significantly decreased on day 90 ($P<0.01$) but no obvious changes observed on NRL.

Immunostaining detection of M-/S-opsin appeared on day 110 in organoids derived by H9 cell line, while it must be delayed up to day 250 in H9-tdTomato cell line differentiation.

Conclusions

Deletion an allele of CRX greatly slowed the photoreceptor maturing process down during this in vitro neural retina organization. This study provided an efficient simulation way to dissect the importance of CRX in the retinal development. Allelic deletion in ES cells and the following differentiation may provide an alternative tool for understanding the role of gene in human organogenesis and occurrence of diseases.

PO-375

Dynamical Expression and Activation of the cAMP Response Element Binding Protein (CREB) Predicts Its Important Roles for Mouse Lens Development

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Purpose: cAMP response element binding protein (CREB) is a general transcription factor belonging to the bZIP family. In its kinase inducible domain (KID), there are several residues that can be phosphorylated by different kinases such as PKA and others, thus affecting the activity of CREB. Among which, the phosphorylation of S133 is a key step for the activation of CREB. Previously, CREB has been well studied in nervous system. However, its role in visual system, especially in lens has not been well defined yet. Here, we have examined the expression and the activity of CREB during development (from ED10.5 to ED19.5) of mouse lens as well as in adult mouse lens.

Methods: Western blot analysis and immunocytochemistry were used to analyze expression pattern and activity of CREB gene.

Results: From the lens placode (ED10.5) to lens vesicle (ED11.5) stage, CREB was highly expressed in all lens cells. In the later stages (ED12.5 to ED19.5) as well as in the adult lens, most of the CREB existed in the lens epithelium but not in the differentiated lens fiber. On the other hand, in the lens placode (ED10.5) stage when the lens differentiation does not occur, activation of CREB (as reflected by S133 phosphorylation) just emerged in very few cells. In contrast, during lens vesicle stage (ED11.5) when the posterior epithelial cells began to differentiate into primary fiber cells, CREB was strongly activated. Consistently, in the later stages (ED12.5 to ED19.5) as well as in the adult lens, CREB phosphorylation at S133 residue was largely observed in the equatorial region where the cells migrated from germinal zone begin to differentiate into secondary fiber cells.

Conclusion: The constant expression of CREB during lens development suggest its important function, and the activation pattern of CREB indicates that CREB promotes fiber cell differentiation. Together, CREB is a key transcription factor for lens development. (Supported by grants from National Natural Science Foundation of China, 81570824, 81770910 and 81700821 as well as the Fundamental Funds from the State Key Laboratory of Ophthalmology, Zhongshan Ophthalmic Center, Sun Yat-sen University).

PO-376

Analysis of Non-Sumoylated and Sumoylated Isoforms of Pax-6, the Master Regulator for Eye and Brain Development in Ocular Cell Lines

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Purpose: Pax-6 is a master regulator for eye and brain development. Previous studies including ours have shown that Pax-6 exists in 4 major isoforms. According to their sizes, they are named p48, p46, p43 and p32 with the corresponding molecular weight of 48, 46, 43 and 32 kd, respectively. While p48 and p46 is derived from alternative splicing, p32 Pax-6 is generated through an internal translation initiation site. As for 43 kd Pax-6, two resources have been reported. In bird, it was found that an alternative splicing can generate a p43 Pax-6. In human and mouse, we reported that the p43 kd Pax-6 is derived from sumoylation: addition of a 11 kd polypeptide SUMO1 into the p32 Pax-6 at the K91 residue. Whether other Pax-6 isoforms can be sumoylated or not remains to be determined.

Methods: The 5 major ocular cell lines were cultured in Dulbecco's modified Eagle's medium (DMEM) containing fetal bovine serum (FBS) or rabbit serum (RBS) and 1% penicillin-streptomycin. The mRNA levels were analyzed with qRT-PCR. The protein levels were determined with western blot analysis and quantitated with Image J.

Results: Both non-sumoylated and sumoylated isoforms of Pax-6 exist in 6 major types of ocular cells. Our results revealed that the most abundant isoforms of Pax-6 are the p32 and p46 Pax-6. These two major isoforms can be sumoylated to generate p43 (mono-sumoylated p32 Pax-6), p57 and p68 Pax-6 (mono- and di-sumoylated p46 Pax-6). In addition, the splicing-generated p48 Pax-6 is also readily detected.

Conclusion: Our results for the first time, have determined the relative isoform abundance and also the sumoylation patterns of pax-6 in 6 major ocular cell lines.

PO-377

Glucose Oxidase- and UVA-Induced Changes in the Expression Patterns of Seven De-sumoylation Enzymes(SENPS) Are Associated with Cataract Development

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Purpose: It has been well established that sumoylation acts as an important regulatory mechanism that controls many different cellular processes. In the eye, we and others have shown that sumoylation plays an indispensable role during mouse eye development. Wether sumoylation is implicated in ocular pathogenesis remains to be further studied. In the present study, we have examined the expression patterns of the de-sumoylation enzymes(SENPS) in the in vitro catarac models induced by glucose oxidase and UVA irridiation.

Methods : Four-week-old C57BL/6J mice were used in our experiment. Lens were carefully dissected out from mouse eyes and cultured in M199 medium(Sigma 3769) for 12 hours. Transparent lenses(without surgical damage) were selected for experimentation.The lenses were exposed to UVA for 60 min or treated with 30 mU/mL glucose oxidase(GO, MP Biomedicals,1673) to induce cataract formation. The mRNA levels were analyzed with qRT-PCR.The protein levels were determined with western blot analysis and quantitated with Image J.

Results: At the mRNA level, all SENPs were highly expressed in retina, and much reduced expression paterrns in cornea, lens epithelium and lens fiber. At the protein level, SENP1to-3, and SENP6 were highly abundant in coenea, while SENP5, SENP7 and SENP8 were enriched in retina and these SENPs were relatively less abundant in lens tissues.

Conclusions: Our results for the first time established the differentiation expression patterns of the 7 de-sumoylation enzymes(SENPs), which provides a basis for further investigation of protein desumoylation functions in vertebrate eye.

PO-378

Trabecular meshwork stem cells are functional in extracellular matrix turnover via matrix metalloproteinases

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Objective: Human trabecular meshwork (TM) extracellular matrix (ECM) turnover plays important roles in intraocular pressure (IOP) regulation. Matrix metalloproteinases (MMPs) are involved inTM ECM metabolism. Human TM stem cells (TMSCs) are able to home to the TM region after intracameral injection in mice. The hypothesis of this study is that TMSCs are functional in ECM turnover via MMPs for TM regeneration and IOP controlling.
Methods: Human TM cells and TMSCs were used between passages 5 to 7 from at least 3 different donors for this study. Using quantitative polymerase chain reaction (qPCR), expression levels of *MMP1, MMP2, MMP3, MMP8, MMP9, MMP12, MMP14*in TM cells and TMSCs were compared. ECM degradation assay was performed to compare the function of TM cells and TMSCs. Specific and broad MMP inhibitors were used to block MMP secretion to explore specific functional MMPs in TM cells and TMSCs. MMP activity was assayed by gelatin, casein, and collagen zymography. *T-test* was used for statistical analysis.
Results: TM cells and TMSCs were confirmed by their gene expression and response to dexamethasone treatment. BothTM cells and TMSCs produced detectable basal amounts of MMPs. The expression of *MMP1, MMP3, MMP12, MMP14* are significant higher in TMSCs than in TM cells. The expression of *MMP2, MMP8*, and *MMP9* were comparable between the two cells. MMP-1, 2, 7, 9, 13 activity levels were detected by zymography and they were greater in TMSCs than in TM cells. Both TM cells and TMSCs were able to digest precoated labeled collagen gel. With a broad-spectrum MMP inhibitor GM6001, the collagen degradation was blocked within 24-hr in TMSCs and up to 72-hr in TM cells.Similarly, selective MMP-3, 12 inhibitor UK370106, MMP-2 inhibitors ARP100, MMP-13 inhibitors CL82198 and MMP-13 inhibitors NSC405020 could block collagen degradation on both cells, stronger in TMSCs.
Conclusion: TMSCs have higher MMP expression and activities in TMSCs than TM cells. Both TMSCs and TM cells are able to degrade collagen fibrils which could be blocked by MMP inhibitors. This study unveils the TMSC function in TM ECM turnover which is one of the mechanisms for TM regeneration.

PO-379

Mer 缺失导致视网膜退行病变的分子机制及细胞干预研究

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目的 研究 *mer* 突变导致视网膜退行性病变的分子机制，并应用人胎儿来源视网膜色素上皮细胞(fRPE)进行视网膜下移植干预，探讨其对视网膜神经退行性病变的保护作用。**方法** 以 *mer*$^{-/-}$小鼠为

动物模型，观察其疾病进展阶段视网膜病理学改变及视功能改变，应用巨噬细胞模型观察 *mer* 缺失如何影响细胞吞噬功能。选取 6 周龄大小雄性 *mer*$^{-/-}$小鼠，将 fRPE 细胞移植到小鼠右眼视网膜下腔，术后不同时间点行眼底相、OCT 及电生理功能检查，同时取相应时间点动物眼球行病理学检测。**结果** *mer*$^{-/-}$小鼠出生后 21 天即出现视网膜退行性病变，3 月左右外核层几乎全部丢失。*mer* 基因的敲除可引起细胞骨架重塑的紊乱，进而引起与细胞骨架相关的吞噬、迁移功能严重下降,级联导致视网膜神经退行性病变。应用人 fRPE 移植干预后，眼底相检测显示移植组眼底未见明显异常。OCT 检测结果显示移植组的外核层厚度显著高于对照组。电生理检查可见代表视杆细胞和 RPE 功能的 b 波，代表 photoreceptor 和 RPE 功能的 a 波，细胞移植组波幅都显著高于对照组。病理结果与功能学检测基本一致。**结论** *mer* 基因的敲除可通过影响细胞的吞噬、粘附、迁移等功能导致视网膜退行性病变。人胎儿来源视网膜色素上皮细胞移植可延缓 *mer*$^{-/-}$小鼠视网膜退行性病变进程。

PO-380

HA/CD44 信号通路促进视网膜前体细胞的定向迁移

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目的： 视网膜前体细胞的定向迁移是细胞替代治疗的关键因素之一， HA/CD44 途径在细胞迁移起着关键作用，此研究目的是探讨 HA/CD44 途径是否参与了视网膜前体细胞的定向迁移。
方法：通过细胞粘附实验和垂直胶原凝胶侵袭实验等方法分别比较评价 HA 处理 RPCs 组、无 HA 处理 RPCs 组、HA 处理 RPCs（加上抑制剂抗 CD44 抗体）组、HA 处理+反义寡核苷酸 RPCs 组各组细胞的迁移能力。同时检测 MDR1、eIF4A、survivin、XIAP 以及抑制迁移相关蛋白 PDCD4 等的表达。
结果： HA 处理可以增强细胞的粘附和迁移能力，HA 和 CD44 抗体共同处理后细胞粘附和迁移能力有所下降，PKC 和 Nanog 的反义寡核苷酸以及 miR-21 antagomir 可以明显减弱细胞粘附和迁移能力， 即抑制 PKC/Nanog/miR-21 通路能减弱细胞粘附力。HA 处理后促迁移相关蛋白 MDR1、eIF4A、survivin、XIAP 表达上调，抑制迁移相关蛋白 PDCD4 表达下调；HA+CD44 Antibody、HA +PKC ASODN、HA +Nanog ASODN、HA +miR-21 antagomir 处理后促迁移相关蛋白 MDR1、eIF4A、survivin、XIAP 表达下调，抑制迁移相关蛋白 PDCD4 表达上调。
结论： HA 处理可以增强细胞的粘附和迁移能力，软骨素酶可能通过 HA/CD44 下游信号通路 PKC/Nanog/miR-21 调节视网膜前体细胞的定向迁移。

PO-381

泪腺腺样囊性癌组织高级别转化的临床病理联系和 miRNA 调控机制分析

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目的 总结泪腺腺样囊性癌(LACC)中发生的高级别转化(HGT)现象，分析其临床病理联系，筛选 HGT 相关的 miRNA，探讨发生机制。**方法** 采用回顾性系列病例研究，选择资料完整的 43 人 54 例 LACC 组织学样本，行 HE 和免疫组化染色。根据病理结果分为 LACC-HGT 组(9 例)和非高级别转化(non-HGT)组(45 例)，应用 Fisher 精确检验和 Log-rank 检验分析两组的临床特点。采用 Agilent Human miRNA 芯片筛选两组各 6 例样本的差异表达 miRNA，对靶基因预测及生物学功能进行初步分析。选择差异 miRNA 中的 miRNA-29a，miRNA-140，miRNA-150 和 miRNA-1224 进行 RT-qPCR 验证。 **结果** LACC 中男性 15 例，女性 28 例，发病年龄 20~75 岁，中位数年龄 42 岁。HGT 区域 SMA 和 p63 阳性肌上皮细胞数目明显减少或消失，p53 阳性、Ki-67 阳性指数增高。两组在发病时间、局部疼痛、骨膜及骨破坏、病理分型、分级和 TNM 分期的差异具有统计学意义，治疗方案差异无统计学意义；LACC-HGT 组术后 2 年复发率和 5 年转移率、死亡率均高于 non-HGT 组，LACC-HGT 组存活时间短。miRNA 芯片检测筛选出 24 个差异 miRNA。筛选 miRNA-29a，miRNA-140，miRNA-150 和 miRNA-1224 可能与 HGT 发生相关。通过 RT-qPCR 证实 miRNA-29a，miRNA-140 在两组 LACC 组织中表达差异具有统计学意义。**结论** LACC 中存在 HGT 现象，具有显著的组织病理学特征，应重视 HGT 的检测与治疗方案调整。LACC-HGT 可能加速肿瘤复发、转移，患者死亡率升高，术后生存时间短。LACC-HGT 的发生具有分子遗传学基础，miRNA-29a，miRNA-140 在 HGT 组低表达，可能具有调控抑癌基因的作用。

PO-382

Rescue of retinal degeneration in rd1 mice by metformin and its possible mechnisms

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Retinal degeneration (RD), including retinitis pigmentosa (RP), is a hereditary retinal disease characterized by progressive apoptosis and loss of function of progressive retinal pigment epithelium and photoreceptor cells. There is currently no effective treatment for this disease. Metformin is reported that can inhibit the synthesis of proinflammatory cytokines ,decrease oxidative stress, and protect the nerves. rd1 mice are a type of animal model of rapid retinal photoreceptor cell degeneration, mainly due to mutations in the phosphodiesterase β subunit gene that cause retinal light transmission to be blocked and eventually lead to photoreceptor cell death. Mutations in rd1 mice are homologous to human pathogenic causes, and the mice are often used as animal models of retinal degenerative diseases. At present, the potential effect of metformin on rd1 the retinal degeneration mouse model has not been reported yet. And we have studied this potential effect in this experiment.

Rd1 mice received vitreous cavity injections of metformin (metformin, 20 μg/μl) or PBS at P6, P9 and P12 with age-matched C57/BL6 mice as controls. The vitreous-injected mouse were tested at

P14, P18 and P22 for the detection of visual function in Light/dark transition test. The mouse in the experiment group were mice that received bilateral metformin injections, and the control groups were the same age mouse that received bilateral PBS injections. The activity of the mice in the light room was recorded with a camera and statistically analyzed. The mouse were given injections at the time points described above, and the mice was injected with metformin in one eye and PBS in the other eye were examined for visual function of ERG at P14, P18 and P22. An appropriate eye ERG device was used to measure scotopic ERG recordings at light intensities of -4.5, -2.5, -0.5, -0.02, 0.5 and 1 log candela·s/meter2 (log cd·s/m2).

In the present study, we also used immunofluorescence staining, Western blot, RT-qPCR and RNA-Seq to explore the effects of metformin on retinal degeneration in rd1 mice. We found that metformin significantly reduced apoptosis in photoreceptors and delayed the degeneration of photoreceptors in rd1 mice, thus markedly improving the visual function of rd1 mice at P14, P18 and P22 when tested with a light/dark transition test and ERG. Microglial activation in the outer nuclear layer (ONL) of the retina of rd1 mice was significantly suppressed by metformin. RNA-Seq showed that metformin markedly downregulated the inflammatory genes and upregulated the expression of crystallin proteins, which have been demonstrated to be important neuroprotective molecules in the retina, revealing the therapeutic potential of metformin for RP treatment. It was previously reported that the Ca2+ ionophore induced Ca2+ overload in the 661W photoreceptor cell line and that Ca2+ overload induced the loss of phosphorylated CREB and calpastatin, thus activating calpain-2 and causing cell apoptosis, similar to the results that were observed in rd1 mice. We treated 661W cells with Ca2+ ionophore to further verify the protective effect of metformin. These results indicate that metformin protected the photoreceptor cells from the damage caused by Ca2+ overload. A similar protective effect was also observed in the CCK8 experiment. And we further found that the expression of αA-crystallin in 661W that has been injury and then treated with metformin was significantly increased. That is similar to the up-regulation of crystallin expression after metformin treatment we observed in rd1 mice. Therefore, metformin may protect the photoreceptor-661W from Ca2+ ionophore-induced damage by increasing the expression of crystallin proteins. These data suggest that metformin exerts a protective effect in rd1 mice via both neuroprotective and immunoregulatory mechanisms.

Our study demonstrates that metformin can delay the progression of RP in rd1 mice. In addition, we provide the first data suggesting that the functional protective effects of metformin may exert roles in neuroprotection and inflammation inhibition by increasing the expression of crystallin proteins. Metformin and crystallin may therefore be used in the treatment of RP in the future. Our study provides new directions and ideas for future research on RP, and we have identified new possibilities for the use of metformin in retinal diseases.

PO-383

Caspase-1 调控小胶质细胞 参与氧诱导视网膜病变新生血管生成的作用

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目的：探讨 Caspase-1 对小鼠氧诱导视网膜病变（OIR）中小胶质细胞参与视网膜新生血管生成的作用及其机制。
方法：12 只 P7 C57BL/6J 小鼠，随机分为正常组、OIR 组和 OIR+VX-765（Caspase-1 抑制剂）组：于 P17 比较三组间视网膜无血管区和新生血管区面积；观察视网膜组织中 Caspase-1 的表达和活化小胶质细胞的分布。培养小胶质细胞 BV-2 分为对照组、缺氧组及抑制剂组：通过 Western blot 检测 Caspase-1、p20（Caspase-1 活化形式）、IL-1β 和 VEGF 的蛋白表达变化；用各组 BV-2 细胞培养上清液作为条件培养基，刺激培养血管内皮细胞 RF/6A，进行管腔形成和细胞迁移实验，并比较各组间的差异。
结果：P17 正常组小鼠视网膜血管化完全；OIR 组视网膜无血管区和新生血管面积百分比分别为（16.58±1.14）%、(4.00±0.41）%；OIR+VX-765 组两者明显减少为（12.23±1.02）%和（2.16±0.52）%（$P<0.01$）。结果显示，Caspase-1 在正常小鼠视网膜组织中表达较弱，在 OIR 小鼠中主要与活化小胶质细胞共定位表达于神经节细胞层和内丛状层。Western blot 检测显示，缺氧处理的 BV-2 细胞中 Caspase-1、p20、IL-1β 和 VEGF 蛋白表达明显提高，而 Caspase-1 抑制剂则可明显下调其表达水平（$P<0.05$）。管腔形成和细胞迁移实验显示，培养 RF/6A 细胞，经缺氧组 BV-2 培养上清液处理后，管腔形成长度和细胞迁移数目分别为 271±12 和 347±34，而加入抑制剂后，二者明显减少（$P<0.05$）。
结论：在小鼠 OIR 中，Caspase-1 能够调节小胶质细胞促进视网膜新生血管的生成，其作用机制可能与 Caspase-1 活化小胶质细胞中其下游炎性效应分子 IL-1β，并释放 VEGF 相关。

PO-384

脂质过氧化致新生开睑大鼠角膜缘干细胞缺乏（LSCD）的机理研究

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目的：探讨脂类代谢和脂质过氧化在 LSCD 病变中的变化和影响，进而研究脂类代谢异常与角膜缘干细胞缺乏的关系。
方法：建立新生大鼠强行开睑（FEOB）角膜缘干细胞缺乏模型，研究分两部分。第一部分分正常对照组和 FEOB 组，每组又分 P0、P1、P5、P10、P15、P30；第二部分 3 组：正常对照组、（FEOB+PBS）组和（FEOB+非诺贝特 Fen）组。采用裂隙灯、HE 染色和 PAS 染色观察其组织病理学形态；油红 O 染色检测角膜表面的中性游离脂肪酸；qRT-PCR 和 WB 检测 LSC 的标志物、脂类代谢相关因子、

脂质过氧化相关因子的表达；原位杂交定位 PPARα 在角膜的表达；同时检测丙二醛（MDA）的含量和 SOD 的活性。

结果：与正常大鼠相比，FEOB 大鼠角膜符合角膜缘干细胞缺乏诊断标准；FEOB 大鼠角膜表面油红 O 染色阳性，脂类沉积，PPARα 表达下调，脂质代谢相关酶如肉碱棕榈酰基转移酶（Cpt1）、脂酰辅酶 A 合酶（Acsl）、脂酰辅酶 A 脱氢酶（Acadm）和烯酰辅酶 A 水合酶（Ech）均表达下调；脂质过氧化酶 5-脂氧合酶（ALOX5）表达上调，脂质过氧化产物 MDA 增多，表明脂类代谢异常，脂质发生过氧化。与 FEOB+PBS 组相比，Fen 处理 FEOB 大鼠后，角膜未见溃疡，新生血管减少，油红 O 染色为阴性，LSCD 病状减轻；Fen 为 PPARα 的激动剂，可激活 PPARα 表达，上调 Cpt1α、Acsl、Acadm 和 Ech 的表达，促进脂类 β 氧化；角膜中的 ALOX5 和 ALOX5ap 均表达下调，脂质过氧化的产物 MDA 含量下降。

结论：新生大鼠开睑后，角膜微环境发生改变，角膜表面出现脂类沉积，同时脂类代谢相关调控因子 PPARα 下调，脂类 β 氧化被抑制，脂类代谢异常，脂质发生过氧化导致损伤，是引起角膜缘干细胞缺乏的可能关键因素；Fen 通过激活 PPARα，促进脂类代谢，降低脂质过氧化，是病理状态下角膜缘干细胞的新型保护剂。

PO-385

Effects of MicroRNA-155 on the Expression of Extracellular Matrix and smooth muscle actin through RhoA/Rock1 pathway in Cultured Trabecular Meshwork

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Purpose: Abnormal accumulation of the extracellular matrix can cause obstruction of aqueous outflow, leading to elevated intraocular pressure and irreversible optic nerve damage which plays an important role in the pathogenesis of primary open angle glaucoma. We investigated the role of miR-155 in regulating the expression of fibronectin in extracellular matrix components of trabecular meshwork induced by transforming growth factor-β2 (TGF-β2), and explored a new direction for the pathogenesis of primary open angle glaucoma. **Methods:** Fetal calves were cultured in primary trabecular meshwork cells and passaged to the 3rd to 5th generations for experiments. Serum-free anti-DMEM containing 2.5 ng/mL of activated human recombinant TGF-β2 was added to the experimental group, and an equal amount of serum-free anti-DMEM was added to the control group. The morphology of the cells was observed after 24 hours, and Western blot was used to detect both fibronectin expressions. The cells treated with TGF-β2 were divided into two groups. The experimental group was transfected with microRNA-155 mimics while the control group was transfected with microRNA-155 mimics control. The growth status of the cells was observed after 48 hours. **Results:** The morphological changes of trabecular meshwork cells treated with TGF-β2 were not significantly influenced, but the expression of fibronectin was drastically increased.

There was no obvious morphological change in trabecular meshwork cells in the MiR-155 experimental group compared to the control group. MiR-155 mimics inhibit the expression of fibronectin in TM, and miR-155 inhibitors promote the expression of fibronectin in TM. **Conclusion:** MiR-155 plays an important role in the expression of extracellular matrix of trabecular meshwork cells treated with TGF-β2. Up-regulation of MiR-155 can notably inhibit the expression of fibronectin. Research on MiR-155 may provide a new direction for exploring the development of primary open-angle glaucoma.

PO-386

EGR1 对后发性白内障形成的早期调控作用

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目的：本研究是为了探讨早期生长反应蛋白 1（EGR1）在小鼠白内障术后晶状体上皮细胞增殖启动阶段所发挥的作用。
方法：建立正常 C57BL/6 小鼠白内障术后模型，检测术后 0h、3h、24h、48h、72h 晶状体上皮细胞 EGR1 的表达变化。建立 EGR1 基因敲除小鼠（EGR1-/-）白内障术后模型，免疫荧光检测术后 0h 和 24h 晶状体上皮细胞中 CXCL1、S100a9、G-CSF、COX-2、CCL2、LCN2 和 HMOX1 的表达变化及中性粒细胞标志物 CD11b 在晶体囊袋内的表达。同时，检测术后 5d pSMAD3 和 αSMA 的表达变化。
结果：正常小鼠白内障术后 3h 晶状体上皮细胞可见 EGR1 高表达，随后从 24h 开始下降至 72h。免疫荧光检测证实 EGR1-/-小鼠白内障术后 24h，炎症因子 CXCL1、S100a9、G-CSF、COX-2、CCL2、LCN2 和 HMOX1 在晶状体上皮细胞中的表达较正常鼠明显下调，同时晶体囊袋内的中性粒细胞浸润明显减少。EGR1-/-小鼠白内障术后 48h 至 5d，pSMAD3 和 αSMA 的表达较正常鼠减弱。
结论：EGR1 参与了白内障术后晶状体上皮细胞炎症与纤维化的过程，并且可能发挥重要作用。
关键词：晶状体上皮细胞，白内障手术，炎症，纤维化，EGR1

PO-387

Protective Effects of Microrna-22-3p Against Retinal Pigment Epithelial Inflammatory Damage by Targeting NLRP3 Inflammasome Signaling Pathway

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Purpose: This study aimed to investigate the role of microRNA-22-3p (miR-22-3p) in retinal pigment epithelial (RPE) damage by targeting NLRP3.
Methods: The potential miRNAs targeting NLRP3 mRNA were sequenced by miRNA microarray profiling. Real-time polymerase chain reaction (RT-PCR) was used to analyze the change of 4 candidate miRNAs in retinas from albino mice after light-induced retinopathy. NLRP3 related cytokine expression was measured using RT-PCR and Western blotting. The relationship between miR-22-3p and NLRP3 was investigated by A luciferase reporter, and through knockdown and overexpression of miR-22-3p.
Results：In-vitro, after LPS and rotenone stimulation, ROS level were found upregulated, NLRP3 inflammasome activated, and IL-1β increasingly secreted. miRNA sequencing indicated 4 miRNAs which potentially regulate NLRP3. After light exposure, the expressions of NLRP3, caspase-1, IL-1β were significantly up-regulated in mice retinas and only miR-22-3p was found significantly decreased. Back in vitro, overexpression of miR-22-3p could significantly reduce while inhibition miR-22-3p could increase the mRNA and protein expressions of NLRP3, Caspas-1, and IL-1β.
Conclusion: Our research describes a mechanism by which miR-22-3p suppresses NLRP3 in RPE cells and suggests miR-22-3p as a potential target for future intervention of RPE inflammatory damage.

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TSP1 在人晶状体上皮细胞自噬过程及白内障发生中的作用及机制探讨

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目的 白内障为全球首位致盲性眼病，一直是国内外眼科学研究的重点，虽然发病因素已有了广泛的了解，其分子机制仍不清楚。已有研究提示自噬不仅在晶体发育中，在白内障发生的病理过程中也起着不容忽视的作用。然而，自噬在晶状体发育及白内障发生中的分子机制至今仍不清楚。有报道指出 TSP1 在胚胎期大量表达于晶状体上皮及纤维细胞中，随后逐渐减少仅表达与成熟晶状体上皮细胞。TSP1 通过 CD47 信号通路调控自噬已在其他组织受到广泛的认可，但是其是否参与晶状体自噬过程有待进一步研究。
方法 首先，体外构建自噬模型，利用人晶状体上皮细胞系（human lens epithelial cell line），经 rapamycin 或 0%FBS 或 rapamycin+0%FBS 处理后，利用 western blot 和免疫荧光染色检测自噬标志物 LC3B 表达水平；其次，在上述模型中，利用荧光定量 PCR 检测 TSP1 在晶状体上皮细胞自噬模型中的表达变化；最后，在不同年龄病人囊膜中检测 TSP1 的表达变化。
结果：

晶状体上皮细胞通过 rapamycin 或 0%FBS 或 rapamycin+0%FBS 处理后 rapamycin 或 0%FBS 或 rapamycin+0%FBS 处理后细胞中 LC3B 表达增高，成功构建自噬模型。荧光定量 PCR 检测提示 TSP1 在自噬模型中表达明显下降。在年龄相关性白内障患者手术取下的人囊膜中，TSP1 随着年龄的增加而减少。

结论 首先我们成功构建了体外晶状体上皮细胞自噬模型，并发现 TSP1 在自噬组中表达明显下降；同时，在病人晶状体囊膜荧光染色发现，TSP1 随着年龄的增加表达逐渐减少。因此，我们的研究提示了 TSP1 很有可能参与晶状体上皮细胞自噬过程及白内障发病机制。

PO-389

TNS1 基因致 GZ.1 家系高眼压症初探

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【目的】鉴定 TNS1 基因突变是否导致小梁网外周基质异常蛋白堆积，以致 MYOC 突变 GZ.1 家系青光眼青少年化的诱因

【方法】1.对 GZ.1 家系成员进行随访，检查眼压、眼底彩超、OCT、视野等；收集成员外周血，进行全外显子测序并进行生物信息学分析，筛选细胞骨架异常基因。2.收集正常人小梁网，观察突变基因该结构是否表达。3.利用原代人小梁细胞共培养方法，诱导正常人和家系成员 iPSC 为小梁细胞 iPSC-TM；利用免疫荧光和 WestBlot 观察筛选的基因在体外诱导小梁细胞相关分泌蛋白表达差异。

【结果】1.随访发现家系 20 周岁成员高眼压，视神经纤维层稍微变薄，杯盘比正常；全外显子测序表明该成员在家族突变的 MYOC（pro370）基因显示正常；张力蛋白 TNS1 剪切位点突变。2.正常人小梁网结构免疫荧光共染表明 TNS1 在小梁表达。3.家系 iPSC-TM 与正常人 iPSC-TM 比较，Fibronectin、Collagen-1、Collagen-4、Lamin 和 α-SMA 均表达异常。

【结论】TNS1 基因通过 TGFβ 通路影响小梁细胞胞外基质沉积，其突变可能导致胞外基质结构发生改变，导致房水外流异常，根据青光眼 MYOC 突变中，提示 TNS1 突变可能作为青少年性青光眼高眼压发病机制的因素之一，为后续研究青光眼致病基因诊断、基因治疗提供研究基础。

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MicroRNA-15a mediated cross-talk between VEGF and Robo4 in the development of diabetic retinopathy

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Purpose: Vascular endothelial growth factor (VEGF) is recognized to play implicated roles in diabetic retinopathy (DR). Meanwhile, roundabout 4 (Robo4) attracts researchers' interest as it is involved in angiogenesis and vasculogenesis. This study determined the colocalization of VEGF and Robo4 in fibrovascular membranes (FVM) from patients with proliferative diabetic retinopathy (PDR). Then, microRNA (miRNA)-mediated modulation on VEGF and Robo4 was explored in diabetic rats and human retinal cells under hyperglycemia.
Methods: Immunofluorescence was implied to analyze the colocalization of VEGF and Robo4 in the FVM. The expression levels of VEGF and Robo4 were determined in diabetic retinas and retinal cells under high glucose condition by western blotting and RT-qPCR. MicroRNA agomir was intraocular injected to downregulate the levels of VEGF and Robo4 in diabetic retinas.
Results: Colocalization of VEGF and Robo4 in vessels of FVM was observed by immunofluorescence staining. The overexpressed level of VEGF was consistent in diabetic retinas and human retinal cells cultured under high glucose condition. However, Robo4 was found decreased in retinal cells exposed to hyperglycemia for 72 hours, while it was enhanced in retinas from diabetic rats. Several miRNAs were differentially expressed during the progression of DR. Furthermore, miR-15a agomir injection inhibited the high levels of VEGF and Robo4 in diabetic retinas.
Conclusions: VEGF and Robo4 accelerated the formation of FVM in PDR patients. In the early periods of DR, VEGF is upregulated and contributes to DR development. While, in the late stage of DR, VEGF and Robo4 work together to aggravate the progression of DR. However, miR-15a could downregulate VEGF and Robo4 to ameliorate DR development.

PO-391

Expression of phagocytosis-related receptors of hESC-RPE after transplantation in RCS rats

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PURPOSE: Retinal degeneration, including retinitis pigmentosa and age-related macular degeneration, are leading cause of blinding diseases worldwide. Efficient phagocytosis of photoreceptor outer segment (POS) fragments by RPE cells plays a key role in biological renewal and maintenance of retina health. hESC-RPE cell based treatment for retinal degeneration is starting clinical trial. This study aimed to observe the expression of functional-related receptors of hESC-RPE after implanted into the sub-retinal space of retinal degenerated animal model.
Methods: Polarized monolayer hESC-RPE cell cultured on an ultrathin scaffold were transplanted into the sub-retinal space of RCS rats. Eyeball samples were fixed and dissected at 1 week, 2 weeks, 1 month and 4 months after implantation. OCT and H&E staining were used to assess the position of implanted scaffold in retina. Expression of human cell marker (TRA-1-85) and RPE

specific marker (RPE65) were observed by Immunofluorescence staining. Phagocytosis-related receptors, including Integrin αvβ5, MerTK and Rhodopsin were stained with corresponding antibodies.

Results: OCT and H&E staining confirmed the presence of monolayer of hESC-RPE attached to parylene up to 4 months post-implantation. No expression of Integrin αvβ5, MerTK or Rhodopsin was observed by IF staining until 2 weeks after implantation. Long-term expression of Phagocytosis-related receptors was observed 1 month and 4 months after implantation.

Conclusions: Sub-retinal implanted hESC-RPE cell might not conduct its biology function in short-term after implantation. Microenvironment of degenerated retina or surgical trauma might attribute to the delayed expression of functional receptors of hESC-RPE cell.

PO-392

微球体诱导成体 RPE 细胞再程序化的机制研究

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目的：探讨微球体诱导成体 RPE 细胞再程序化的可能及机制。

方法：通过转基因小鼠 Rosa26/Sor-Td Tomato 小鼠及 C57BL/6-Tg(Best1/Cre)1Jdun/J 小鼠杂交获得具有遗传标记 PRE 细胞（Td Tomato+/Best 1+，红色荧光）,以遗传标记的 RPE 细胞为主要研究对象，通过平头细胞铲处理 RPE 细胞形成微球体悬浮培养，根据不同微球体大小及悬浮培养日分组培养，运用免疫组化法、WB、流式细胞仪及 RT-PCR 等方法观察 RPE 细胞形成微球体前后的变化，检测干细胞分子标记，裸鼠皮下注射观察成瘤性；通过分化培养液诱导培养及视网膜下注射细胞悬液观察体外及体内分化情况，并检测 RPE 细胞、视网膜神经元等分子标记物的表达。

结果：与同源 RPE 细胞相比，PCR 结果表明，微球体诱导悬浮培养 7 日的 RPE 细胞表达更高水平的 c-myc、 c-kit、cd44 和 abcg2，在球体边缘的细胞中通过免疫染色检测到了 oct4 的短暂表达。裸鼠皮下植入细胞后未检测到肿瘤形成。体外分化培养，微球体诱导 RPE 细胞不仅能够分化表达神经标记物 Tubb3 和 Rho，而且能表达普通上皮标记物 zoula occudens-1（zo1）和 RPE 特异性标记物 RPE65。视网膜下腔注射细胞，细胞整合到外核层（ONL）时分化为 Rho+光感受器样细胞，整合到 RPE 组织时产生色素及表达 RPE65+标记。

结论：通过微球体诱导的成体 RPE 细胞表现出两个主要的 RPE 干细胞特征，即自我更新和分化为 RPE 和视网膜谱系的双重潜能。

PO-393

采用 RNA-Seq 技术分析 STZ 诱导的糖尿病视网膜小鼠视网膜中 Mir-RNA 变化

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目的：采用 RNA-Seq 测序技术，分析 C57 与 STZ 诱导的糖尿病视网膜小鼠视网膜中 Mir-RNA 的变化情况，为治疗糖尿病视网膜病变提供新方法。
方法：采用 8 周雄性的 C57 小鼠，用链脲霉素（STZ)溶于 0.1mol/L 的柠檬酸钠溶液中，按 55mg/kg 量连续 5 天每天注入小鼠腹腔中， 3 天后空腹测定血糖，大于 16.7mmol/L 入实验组。每 2 周测一次血糖，体重变化，3 个月后，用电镜的方法，观察视网膜内超微结构改变；采用消化法和 PAS 染色，观察视网膜微血管的改变；提取视网膜总 RNA，送样至公司进行 RNA-Seq 测序分析，再采用 RT-PCR 方法验证结果。
结果： C57 小鼠连续 5 天注射链脲霉素（STZ)， 3 天后或每 2 周测定小鼠空腹血糖，与对照组相比，STZ 小鼠空腹血糖显著性增加，体重下降；在 STZ 小鼠视网膜中可见无细胞的血管，毛细血管管腔闭锁；周细胞、内皮细胞数量减少；透射电镜观察造模后 STZ-C57 小鼠视网膜超微结构毛细血管内线粒体空泡化；多处微绒毛样突起，内外核层部分核染色质浓缩, 分布不均匀；微血管基底膜增厚，提示糖尿病视网膜小鼠成功。取小鼠视网膜于 1ml 的 trizol 中，提取总 RNA，送公司进行 RNA-Seq 测序分析，结果发现，与 C57 相比，miRNA 共有 42 种上调，29 种下调，根据多个软件进行靶基因预测，发现预测目标的主要生物学功能和分子途径，主要包括信号传导、钙信号通路、血管平滑肌收缩和 II 型糖尿病；发现 20 种细胞外基质发生变化；结合与糖尿病发展、胶原酶合成相关的 miRNA 共 18 个，采用 PCR 方法，对其进行验证，发现糖尿病视网膜病变进程中 Mir-29a、miR-9、miR-6715b、miR-6715a 变化明显，其中 mir-29a 变化最大。
结论：利用 RNA-Seq 技术分析得到了 STZ 诱导的 C57 小鼠视网膜中 MiRNA 变化情况，为后续实验奠定基础。

PO-394

Angiogenin 在激光诱导的小鼠脉络膜新生血管模型中的表达研究

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目的：研究血管生成素（Angiogenin，ANG）在激光诱导的小鼠脉络膜新生血管模型中的表达。方法：2 月龄大的 C57BL/6J 小鼠在距视盘约 2-3 个视盘直径 3 点、6 点、9 点、12 点方向处进行激

光。激光后 3 天和 7 天分别分离提取脉络膜/RPE 复合物的 RNA 和蛋白质检测 ANG 的表达量；激光后 7 天取小鼠眼球，分离脉络膜/RPE 复合物，平铺后进行血管内皮染色；激光后 7 天取小鼠眼球，进行组织冰冻切片，用免疫荧光的方法检测 CNV 病灶处 ANG 的表达；激光后 2 周进行眼底血管造影检查。结果：激光术后 3 天，脉络膜/RPE 复合物中小鼠 ang 1 和其同家族成员 Rnase 4 的 mRNA 的表达量较未激光组明显升高；激光术后 7 天，脉络膜/RPE 复合物中小鼠 ang 1 蛋白的表达量较未激光组明显升高；组织冰冻切片免疫荧光染色结果显示激光术后 7 天在 CNV 病灶处有明显的 ang 1 的表达，并与血管内皮有共定位。结论：ANG 在激光诱导的小鼠脉络膜新生血管模型中有明显的高表达，并与新生血管共定位，提示 ANG 可能参与 CNV 形成。

PO-395

基于第二代测序的不同发育阶段人类胚胎晶状体转录组分析

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目的：转录组是细胞或组织在特定时间表达的全部转录本，本研究采用第二代全转录组测序的方法，以深入探究发育中人胚胎晶状体的转录组表达情况。

方法：本研究收集了 16 周，23 周和 25 周，3 个发育时间点的人胚胎晶状体，进行 RNA 抽提，纯化和质检。经过 RNA 文库构建及质检后，在 Illumina HiSeq 2500 上对 RNA 文库进行测序，然后使用生物信息学工具对转录组中的 mRNA 和 lncRNA 进行分析。

结果： 3 组样本测序序列质量评估提示，所有样本测序结果优良，碱基分布均衡。测序所得的数据经基因组比对，16 周、23 周和 25 周胚胎晶体分别得到 55.48，97.79 和 66.36 百万个 Mapped Pair Reads。基因水平表达定量分析发现 16 周、23 周和 25 周胚胎晶体分别表达了 25234，28773 和 22898 个基因（≥1.0 RPKM ）。在这些表达基因中，我们筛选并得到每个阶段表达水平最高的 20 个基因。经过样本间差异基因分析，我们筛选得到了各个阶段之间差异表达最显著的 20 个基因。进一步地，lncRNA 的表达分析发现 16 周、23 周和 25 周胚胎晶体分别表达了 26636，31485 和 23813 个 lncRNA（≥1.0 RPKM ），并且预测与重注释了 537 个新 lncRNA。同样地，我们分析得到了晶体发育各个阶段表达水平最高的 20 个 lncRNA，差异表达分析筛选得到了差异表达最显著的 20 个 lncRNA。

结论：我们的研究提供了的人胚胎晶状体 3 个不同发育时间点转录组的概况，从而深入我们对转录组在晶状体透明度维持和疾病表现中的作用理解，为后续晶状体发育及致病重要基因的筛选与研究提供支持。

PO-396

4-methylumbelliferone diminishes tumor metastasis by dampening cancer stem-like cells in uveal melanoma

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Purpose：Uveal Melanoma(UM) is a lethal intraocular malignancy without effective drugs, and tumor metastasis is the major cause of death. Here, we investigated the anti-tumor activity of 4-methylumbelliferone (4-MU) on uveal melanoma both in vitro and in vivo.
Methods：The proliferation rate was assessed by CCK8 and colony formation assay, when UM cells were treated with different concentrations of 4-MU. Cell migration assay was performed to investigate the effects of 4-MU on migration. Cancer stem-like cells (CSCs) properties were examined by treatment of 4-MU. In vivo, 4-MU was injected intraperitoneal every day after the tumors become palpable to detect the therapeutic effect in a UM xenograft mouse model. The effect of metastasis was also assessed using mouse transfer model. RNA-seq was performed to detect the pathways affected by 4-MU. Western and immunofluorescence confirmed the pathway changes.
Results: we showed that 4-MU potently inhibited UM cell proliferation, induced apoptosis and reduced migration and invasion. At the meantime, 4-MU could significantly inhibited the capacities of tumor formation and frequency of CSC. Also, 4-MU exerted potent in vivo antitumor activity in a UM xenograft mouse model and in vivo imaging. Tumors from 4-MU treated animals also showed reduced microvessel density. Mechanistically, 4-MU induced UM cells apoptosis through abrogating the activation of the Akt pathway in UM cells, and reduced the expression of CD44, CXCR4, MMP2 and MMP9. The reduction of CD44 and the induction of apoptosis proteins were also confirmed by western assay.
Conclusion：Our studies validate 4-MU may be a promising therapeutic target for the treatment of patients with metastasis of UM through diminishing cancer stem-like cells.

PO-397

褪黑素通过内质网应激途径对人晶状体上皮细胞凋亡

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目的 探讨褪黑素通过内质网应激途径对人晶状体上皮细胞凋亡产生的影响。**方法** 实验研究。选取人晶状体细胞株（HLE-B3），诱导内质网应激产生。实验分为 4 组：A 组为 H_2O_2 组，B 组为磷酸盐缓冲液（PBS）组，C 组为褪黑素（100 μmol/L)组，D 组为褪黑素（100 μmol/L）+H_2O_2 组。采用细胞计数试剂盒 8(CCK-8)法检测各组人晶状体细胞活力，流式细胞仪检测各组人晶状体上皮细胞凋亡率，并采用实时定量聚合酶链反应(RT-PCR)和 Western 印迹分别检测各组人晶状体上皮细胞内半胱氨酸蛋白酶 3（caspase-3）及葡萄糖调节蛋白质 78（GRP78）在 mRNA 及蛋白水平的表达。**结果**采用 CCK-8 法结果显示 H_2O_2 未干预细胞，褪黑素浓度为 100μmol/L 时，细胞的细胞活力没有显著改变（P>0.05），随着 H_2O_2 浓度的增加，在 H_2O_2 浓度分别为 200μmol/L 及 400μmol/L 时褪黑素+H_2O_2 组细胞存活率依次为 (83.3±4.2)%，(74.5±3.1)%，其存活率均高于相应 H_2O_2 浓度的 H_2O_2

组，差异具有统计学意义，流式细胞仪检测结果显示四组凋亡率依次为(31.4±4.5)%、(2.1±0.2)%、(1.9±1.8)%，(16.5±2.8)%，褪黑素+H_2O_2组凋亡率低于H_2O_2组，两者比较差异有统计学意义(t:24.67，P=0.013)。Western 印迹结果显示，caspase-3 的蛋白表达量褪黑素+H_2O_2组(0.712±0.212)较 H_2O_2组(1.126±0.251)降低，GRP78 的蛋白表达量褪黑素+H_2O_2组(0.512±0.012)较 H_2O_2组(0.735±0.051)降低蛋白水平上，差异具有统计学意义(caspase-3:t=15.43, P=0.010, GRP78:t=20.62, P=0.018)。

PO-398

Chronic inflammation induces abnormal differentiation of corneal epithelial stem cells

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Purpose: To investigate effect of chronic inflammation on the fate of corneal limbal stem cells. **Methods:** We established a chronic corneal inflammation rat model using corneal suture method. Corneal neovascularization, inflammation, and epithelial status were observed under slit-lamp microscope. The eyeball and corneal epithelium were collected at 3, 7, 14, 28 days and evaluated with inflammatory markers, cytokeratin markers, stem cell markers, and signaling pathway related molecules by immunofluorescence, immunohistochemistry or/and RT-qPCR. Clone culture was performed to demonstrate proliferation potential of limbal stem cells. **Results:** Corneal suture induced corneal neovascularization, stromal inflammation, and diffuse epithelial defect in rats. K12 and Pax6 expression was dramatically reduced in the corneal epithelium, while K10 and Sprr1b was upregulated in rat cornea after suturing. The cloning forming efficiency (CFE) was decreased in rat cornea with suture, and K14, p63, ABCG2 and wnt7a expression was also decreased. P38 MAPK signaling pathway was activated after suture and could be reversed by administration of 0.02% fluorometholone and p38 inhibitor. In corneal epithelium clone culture, p38 inhibitor could promote the expression of Ki67, K14, p63, ABCG2 and wnt7a, and downregulate the expression of K12. **Conclusions:** Chronic inflammation induces abnormal differentiation of limbal stem cells through activation of P38 MAPK signaling pathway. Inhibition of p38 MAPK could promote the self-renewal of corneal limbal stem cells and inhibit abnormal differentiation.

PO-399

APE1 调控晶状体上皮细胞增殖在后发性白内障发病中的作用机制

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目的: 白内障术后后囊膜混浊（posterior capsule opacification,PCO）影响患者视功能，术后残留晶状体上皮细胞的分化增殖是导致 PCO 的关键环节；脱嘌呤/脱嘧啶核酸内切酶(apurinic/ apyrimidinic endonuclease,APE1)对细胞增殖具有重要调控作用；本研究拟通过细胞实验和人体样本的统计学分析探讨 APE1 在 PCO 发生过程中的作用和可能机制。
方法:本研究通过 si-APE1 抑制人晶状体上皮细胞 SRA01/04 中 APE1 的表达，采用 CCK-8 和 ELISA 方法检测细胞增殖活性及相关细胞生长因子表达变化。收集 26 例（41 眼）白内障囊外摘除联合人工晶体植入术患者前房水及晶状体前囊膜，密切随访患者术后 PCO 发生情况。采用 ELISA 和 WB 检测患者前房水中细胞生长因子的表达及晶状体后囊膜中 APE1 蛋白的表达。统计学分析患者晶状体上皮细胞中 APE1 的表达水平与 PCO 发生及前房水中细胞生长因子表达的关联性。
结果: si-APE1 敲低人晶状体上皮细胞 SRA01/04 的表达可显著抑制细胞增殖活性（P＜0.01），并同时抑制多种细胞生长因子的分泌。与对照组相比， PCO 患者晶状体上皮中 APE1 的表达水平显著升高(P＜0.05)。相关性分析结果显示，患者晶状体上皮中 APE1 的表达水平与前房水中 FGF（R=0.784，P＜0.01）、TGF-β（R=0.581，P＜0.01）、VEGF（R=0.654，P＜0.01）的表达水平显著相关。
结论: APE1 可以通过调控人晶状体上皮细胞的增殖活性参与 PCO 的发生。促进细胞因子的分泌可能是 APE1 调控人晶状体上皮细胞的增殖活性的机制。本研究为白内障术后 PCO 的发生机制提供了重要的理论依据，同时靶向 APE1 调控人晶状体上皮细胞的增殖活性对于控制白内障术后并发症，提高患者术后视觉质量具有一定临床应用价值。

PO-400

太赫兹辐射对晶状体上皮细胞受体聚簇的诱导作用

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目的：本研究旨在探索太赫兹（Terahertz，THz）辐射对人晶状体上皮细胞表皮生长因子（epidermal growth factor，EGF）受体聚簇的影响，为进一步揭示 THz 磁场的生物学效应机制奠定基础。
方法：本研究利用人眼晶状体上皮细胞（human lens epithelial cells，hLECs）建立稳定表达 EGFR-GFP 融合蛋白的细胞暴露模型，利用 300 GHz、5 mW 太赫兹磁场分别辐照 1 min、5 min 和 15 min，每组设立假辐射对照组，100 ng / ml EGF 处理 15 min 作为阳性对照组。细胞经不同处理后，

用 4％多聚甲醛固定，hochest 染色处理（稀释比例 1:10000），在激光共聚焦显微镜观察拍片，统计每个细胞中 EGF 受体聚簇焦点数，实验组焦点的数目超过假辐照平均焦点数的细胞定义为阳性细胞，以细胞 EGF 受体聚簇平均焦点数、EGF 受体聚簇阳性细胞率和 EGF 受体聚簇焦点分段分布率为指标评价 THz 辐射对 EGF 受体聚簇的影响。
结果：作为阳性对照组，100 ng / ml EGF 处理 15 min 后，hLECs 细胞中可观察到明显的受体聚簇现象，出现了大量的 EGF 受体聚簇焦点。与假辐照组相比，1 min 和 5 min THz 辐照组 EGF 受体聚簇焦点数和阳性细胞率均明显增加（$p<0.01$）；THz 辐照 15 min 组可观察到少数 EGF 受体聚簇现象，但 EGF 受体聚簇焦点数和阳性细胞率与假辐照间未见明显差异($p>0.05$)。EGF 受体聚簇焦点的结果显示，与假辐照组相比，1 min 和 5 min 辐照组 EGF 受体聚簇焦点高分段组（10--20 焦点数组）的细胞比率显著增加（$p<0.05$），而 15 min 辐照组焦点分段分布未见显著差异（$p>0.05$）。
结论：短时程（1 min 和 5 min）THz 辐射可诱导 hLECs 细胞膜 EGF 受体聚簇，提示细胞膜受体可能是 THz 磁场的信号耦合位点。

PO-401

TRX/TBP-2 在人晶状体上皮细胞氧化应激后自噬发生中的调控作用

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目的：主要阐明低水平氧化应激诱导人晶状体上皮细胞（LECs）自噬对 TRX-1、TRX-2 和 TBP-2 的调节作用以及 TRX-1 对 LECs 自噬过程的调节作用。
方法：根据之前建立的细胞自噬模型，采用 50μM H_2O_2 的无血清培养基处理 LECs 12h，提取全细胞蛋白和线粒体、细胞质组分蛋白，并运用 Western Blot 检测 TRX-1、TRX-2、TBP-2 的表达量，TRX-1 活性检测试剂盒检测 TRX-1 活性变化，免疫荧光观察自噬前后 TRX-1、TRX-2 与 TBP-2 定位情况，以探索自噬对 TRX-1、TRX-2、TBP-2 的影响。利用慢病毒构造 TRX-1 过表达细胞，用 H_2O_2 处理上述细胞后，用 CCK-8 检测细胞活性、Western Blot 实验检测细胞自噬水平变化。
结果：与正常组比较，50 μM H_2O_2 处理 LECs 12h 的细胞自噬模型中，TBP-2、TRX-2（仅存于线粒体中）表达量升高（$P<0.01$），而 TRX-1（仅存于细胞质中）的表达量表达量无显著差异；遂我们对 TRX-1 的活性进行检测后发现，在低氧刺激以后，TRX-1 活性降低（$P<0.05$）。免疫荧光结果显示低氧刺激后，TBP-2 与 TRX-1、TRX-2 共定位增加。氧化应激后，TRX-1 OE 的 LECs 与 Vector 细胞比较，TRX-1 OE 的 LECs 细胞活性损失降低（$P<0.05$），且自噬相关蛋白 LC3-II，p62 表达量增高（$P<0.05$），
结论：低浓度（50μM）H_2O_2 作用 12 h 诱导 LECs 自噬，使得 TBP-2、TRX-2 表达量增加，TRX-1 活性降低，且两者的共定位提示两者可能发生相互作用；而 TRX-1 能够促进该自噬水平，且其促进的自噬发生可能对 LECs 有保护作用。

PO-402

二甲双胍抑制过氧化氢诱导的晶状体上皮细胞的衰老

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年龄相关性白内障是世界上的主要致盲眼病，其发病率逐年增加。为探求年龄相关性白内障的新的治疗方法，拟对人晶状体细胞在过氧化氢(H_2O_2)诱导下的衰老细胞进行研究，试图发现二甲双胍(MET)对过氧化氢诱导的衰老晶状体上皮细胞的作用。将人晶状体上皮细胞分为 3 组，正常对照组，H_2O_2 组和 H_2O_2+MET 组，分别在 mRNA 和蛋白水平检测衰老基因的表达水平。在离体的人晶状体囊膜中进行免疫组化，观察衰老基因表达是否表现出明显差异。在 mRNA 水平上，P21 在 H_2O_2 组表达是 H_2O_2+MET 组 16 倍，P16 在 H_2O_2 组表达是 H_2O_2+MET 组 3 倍。在蛋白水平上，Western Blot 结果显示 P53 和 P21 表现出明显差异。免疫组化结果显示，P21 和 P53 在正常组前囊膜和年龄相关性白内障组前囊膜的表达表现出显著差异。研究发现二甲双胍抑制 H202 诱导的晶状体上皮细胞衰老。

PO-403

The anti-inflammatory effects of CXCR5 in the mice retinal injury following acute ocular hypertension

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Object: The pathogenesis of glaucoma remains unclear and immunological damage is getting more and more attention. Increasing evidence indicate that microglia mediated neuroinflammation play an important role in the retinal injury induced by elevated intraocular pressure. In this study, we aimed to investigate the roles of chemokine receptor CXCR5 in the pathological process of retinal injury in an acute ocular hypertension (AOH) model.

Method: AOH mice model was established in CXCR5 knockout and wild mice, and the eyes were harvested for further analyses. The retinal microglia were detected as stained for Iba1 (+). Leakage of inflammatory cells was observed on the H&E stained cryo-sections. The protein expression and quantification of zonula occludens (ZO-1) were determined by Western blotting and densitometry. Capillary degeneration was identified on the intact retinal vasculatures prepared by trypsin digestion.

Results: The number of activated microglia marked by Iba1 antibody in the retina was increased after acute high intraocular pressure injury in both KO and WT mice, more significant in KO mice.

The leakage of inflammatory cells was observed largely at 2 days after injury, but no or little at 7 days. The number of inflammatory cells (mainly neutrophils) was greater in CXCR5 KO mice than WT mice, mainly located under internal limiting membrane. CXCR5 deficiency led to more ZO-1 degradation caused by acute ocular hypertension in CXCR5 KO mice compared to C57BL6 WT mice. The cellular capillaries were also significantly increased in the KO mice compared to the WT mice.

Conclusion: Our findings suggest that the chemokine receptor CXCR5 may protect retina from acute ocular hypertension injury by its anti-inflammatory effects. Thus, CXCR5 may be a promising therapeutic target for the treatment of glaucoma.

PO-404

Study on the mechanism of EGF/EGFR system in the protection of dry eyes of α-MSH

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Objective: The aim of this study was to evaluate the protective effect and mechanism of α-MSH on ocular surface of rats and human cornea epithelial cells (hCECs).

Methods: The rat dry eye model was established by injecting scopolamine hydrobromide subcutaneously. The dry eye rats were treated topically with different doses α-MSH twice a day. Dry eye clinical parameters, including Schirmer`s I test, BUT and corneal fluorescein staining were examined on the weekly basis. On day 28 following model establishment, the eyeballs with upper and lower eyelids were collected for H&E staining and PAS staining. Meanwhile, the cornea and conjunctiva in normal group, α-MSH-treated and NaCl-treated dry eye groups were examined by QAH-DED-1 protein chip for the differentially expressed proteins. Furthermore, the α-MSH's protective mechanism was investigated in a cell model where BAC was used to stimulate hCECs. The hCECs were incubated with EGFR pharmacological blockers or transfected shRNA against human EGFR, and then cell proliferation and migration capacities were examined using CCK-8 kit and scratch test, respectively. In addition, the cell apoptosis was detected by flow cytometry using Annexin-V staining.

Results: The results of clinical examinations showed that α-MSH at different doses ameliorated the signs of dry eye, including tear secretion, tear film stability, and corneal epithelial punctate defects, and maintained the morphology of the cornea and conjunctiva. The results of QAH-DED-1 protein chip demonstrated that EGFR was significantly upregulated by α-MSH in the ocular surface of dry eye rats as compared to the saline-treated dry eye rats. Mechanistically, both EGFR

pharmacological blocker and its shRNA could abolish the α-MSH's protective effects on the HCECs stimulated with BAC.

Conclusion: These results demonstrated that α-MSH could ameliorate lesions and restore functions on ocular surface via upregulating EGFR expression and activating EGFR-mediated signaling pathway.

PO-405

急性闭角型青光眼急性发作期房水蛋白质组学分析

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目的 研究急性闭角型青光眼(acute angel-closure glaucoma, AACG)联合白内障患者与单纯白内障患者房水蛋白表达差异，并分析差异蛋白与急性闭角型青光眼发作的潜在机制。
方法：收集 2016 年 10 月至 2017 年 6 月在天津医科大学眼科医院手术的急性闭角型青光眼联合白内障患者与白内障患者房水各 10 例（*n*=10），通过非标记定量蛋白质组学（Label-free）质谱分析技术分析两组蛋白，采用 Maxquant significances A 的方法进行差异显著性检验，以 $p < 0.05$，差异倍数 > 2 的标准筛选得到两组病人的差异蛋白，并将生物学大数据通过 GO 功能、KEGG 显著性富集分析对两组患者差异蛋白的功能及调控的信号通路加以注解。
结果：本次蛋白组学分析共检测到 91 个差异蛋白，其中包括 50 个上调蛋白和 41 个下调蛋白。一方面，GO 分析显著差异蛋白功能涉及诸多方面，其中膜联蛋白 A1（Annexin A1）、CD163(Cluster of Differentiation 163) 、S100 人钙结合蛋白 A8 (S100A8)、C 反应蛋白（C-reactive protein，CRP）参与炎症反应，钙粘蛋白（Cadherin4 ,CDH4）、层粘连蛋白（Laminin）介导细胞粘附，层黏蛋白（Laminin）、母系蛋白（Matrilin2）等参与组织纤维化；另一方面，KEGG 显著性富集分析表明，ERK 信号通路、PI3K-AKT 信号通路、TGF-β 信号通路、表达在两组细胞间存在差异。
结论：急性闭角型青光眼房水中 Annexin A1 的表达显著上调，可能通过调控 ERK 及 TGF-β 信号通路对急性闭角型青光眼疾病进展过程中的炎症反应、组织粘联、纤维化产生影响，从而提示 AnnexinA1 作为潜在生物学标记及治疗靶点的可能性。

PO-406

细胞因子在原发性眼内淋巴瘤患者房水中的表达

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目的：探讨细胞因子在原发性眼内淋巴瘤患者房水中的表达情况，明确房水中细胞因子在诊断原发性眼内淋巴瘤及判断疗效及其预后中作用。
方法：通过眼底检查、眼底自发荧光、FFA、OCT 等眼科检查，疑诊原发性眼内淋巴瘤的 10 名患者，应用 30G 针头连接 1ml 注射器，在角膜缘处进针进入前房，抽取房水检测 IL-10/IL-6、VEGF、BFGF、IL-6、IL-10、VCAM、IL-8。
结果：肿瘤 B 细胞分泌大量 IL-10，炎性 B 细胞分泌大量 IL-6，正常情况下房水和眼内玻璃体中均无 IL-10 和 IL-6 表达，因此检测眼内标本 IL-10 水平以及 IL-10 与 IL-6 的比例，有助于 B 细胞淋巴瘤的诊断。VEGF 通过与血管内皮上的相应受体结合促进内皮细胞增殖，同时可增加血管通透性使内皮细胞迁移，诱导新生血管生成，是目前发现的最强烈的血管生成因子。BFGF 促进成纤维细胞的生长，促进人成纤维细胞 IL-6 的产生，与眼内纤维增生有一定关联。IL-6 能诱导 B 细胞分化和产生抗体，并诱导 T 细胞活化增殖、分化，参与机体的免疫应答，是炎性反应的促发剂。IL-10 是一种抗炎性因子，发挥下调炎症反应、拮抗炎性介质的作用，与眼内弥漫大 B 淋巴瘤密切相关。VCAM 是细胞黏附因子，与血眼屏障破坏有关。IL-8 能刺激中性粒细胞、T 淋巴细胞和嗜酸性粒细胞的趋化。
结论：房水细胞因子表达可辅助诊断原发性眼内淋巴瘤，结果可用于监测病情变化，评价治疗效果。

PO-407

LncRNA H19 在角膜新生血管发病中的作用研究

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目的 研究 lncRNA H19 在角膜新生血管（CNV）发病中的作用，进一步补充 CNV 的发病机制，同时为 CNV 新的治疗方式的研究提供新的思路。
方法 收集人 CNV 组织和供体角膜环组织，同时大鼠角膜缝线诱导生成 CNV，采用 real-time PCR 的方法检测 H19，miR-29c 以及 VEGFA 基因在角膜中的表达变化。体外实验中，采用 bFGF 刺激 HUVECs 进行细胞造模，应用 real-time PCR 的方法检测 H19，miR-29c 的表达变化，real-time PCR 及 western blot 的方法检测 VEGFA 的表达变化。然后进行 H19 的转染，分别应用 CCK-8、划痕实验、小管生成实验、real-time PCR 及 western blot 检测 H19 上调或下调对 HUVECs 的增殖、迁移、成管能力的影响以及对 miR-29c 和 VEGFA 表达变化的影响。最后进行 miR-29c 转染或者同 siH19 的共转染，应用 real-time PCR 的方法检测 H19，miR-29c 的表达变化，real-time PCR 及 western blot 的方法检测 VEGFA 的表达变化。
结果 H19 与 VEGFA 在 CNV 组织以及 bFGF 处理过的 HUVECs 中表达量明显升高；上调 H19 的表达能提高 HUVECs 的增殖、迁移、小管生成能力，促进 VEGFA 的表达。生物信息学预测发现 miR-29c 有可能成为 H19 与 VEGFA 之间有共同调控关系的 miRNA。miR-29c 在 CNV 组织以及 bFGF 处理过的 HUVECs 中的表达量明显下降。上调 miR-29c 可降低 VEGFA 的表达。H19 与 miR-29c 的共转染结果发现 miR-29c 是 lncRNA H19 的直接作用靶点，H19 可通过抑制 miR-29c 从而增加 VEGFA 的表达，促进 CNV 的发生。
结论 H19 在 CNV 的发病中可通过与 miR-29c 竞争性的结合进而调控 VEGFA 的表达，从而参与 CNV 的发病过程。

PO-408

不同外泌体分离方法用于泪液的比较分析

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目的:不同体液的来源及组成不同，因此体液收集、处理及分离过程均有所不同，而目前泪液的研究还较少。分析比较不同外泌体分离方法应用于泪液的效率，为泪液外泌体下一步研究取提供参考。
方法: 分别用毛细管和滤纸条收集泪液 5 分钟并溶于 PBS 中，分别用 ExoTic 和商用试剂盒：ExoQuick-TC、qEV、MagCapture Exosome Isolation Kit 分离泪液外泌体。用 Qubit 测量原始泪液和纯化外泌体样本的蛋白质浓度，用 Western blot 方法鉴定外泌体的蛋白表达，用透射电镜和动态光散射检测泪液外泌体的形态及粒径分布。
结果: 从等量的泪液中，ExoTIC 获取样本的外泌体标志物表达量最高，而 qEV 样本最低。对于相同蛋白质总量的样本，MagCapture Exosome Isolation Kit 获取样本的外泌体标志物表达量最高。MagCapture Exosome Isolation Kit 获取的外泌体样本粒径较小，分布较集中，粒径范围较窄（分布宽度：78-220nm）。ExoTic 和 qEV 获取的外泌体样本粒径较大，分布较均匀，粒径范围较宽（分布宽度：12-712nm 和 68-615 nm）。在相同时间内，滤纸法收集的反射性泪液来源的外泌体纯化样本蛋白质总量及外泌体标志物表达高于毛细管法收集的基础泪液，且均表达 Alix、Flotillin 1 和 TSG 101 等外泌体标志物。此外泪液的稀释倍数与 ExoTIC 的外泌体回收效率相关。
结论:在四种方法中，ExoTIC 的外泌体回收效率最高，而 MagCapture Exosome Isolation Kit 回收的外泌体纯度最高，此外粒径分布各有特点。

PO-409

RUNX1 的 O-GlcNAc 糖基化修饰能促进高糖培养的人视网膜微血管内皮细胞增殖和迁移

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目的：探讨 RUNX1 是否被 O-GlcNAc 糖基化修饰；RUNX1 的 O-GlcNAc 糖基化修饰在高糖环境下的变化；RUNX1 的 O-GlcNAc 糖基化修饰对高糖培养的人视网膜微血管内皮细胞功能的影响。
方法：通过雄性 Sprague-Dawley(SD)大鼠腹腔注射链脲佐菌素（Streptozotocin，STZ）建立糖尿病大鼠模型；分别用正常葡萄糖浓度（5.5 mM）培养基和高葡萄糖（25mM）浓度培养基培养人视网膜微血管内皮细胞（Human Retinal Microvascular Endothelial Cells，HRMECs）;通过免疫共沉淀实验研究 RUNX1 能否被 O-GlcNAc 糖基化修饰且高糖能否促进其 O-GlcNAc 修饰；联合应用 O-GlcNAc 糖基化修饰促进剂 Thiamet G 和 RUNX1 siRNA，通过 Western bolt 检测 RUNX1 siRNA 敲除效果和细胞整体 O-GlcNAc 糖基化修饰水平；通过 CCK-8 细胞增殖实验、Ki67 免疫荧光染色实

验研究 RUNX1 的 O-GlcNAc 糖基化修饰能否促进 HRMECs 的增殖；通过划痕实验、Transwell 实验、管腔形成实验研究 RUNX1 的 O-GlcNAc 糖基化修饰能否促进 HRMECs 的迁移。

结果：RUNX1 能够被 O-GlcNAc 糖基化修饰,且高糖条件下 RUNX1 的 O-GlcNAc 糖基化修饰增强; RUNX1 的 O-GlcNAc 糖基化修饰能促进 HRMECs 增殖;RUNX1 的 O-GlcNAc 糖基化修饰能促进 HRMECs 迁移。

结论：RUNX1 的 O-GlcNAc 糖基化修饰能够促进高糖培养的 HRMECs 增殖和迁移。

PO-410

Tetramethylpyrazine Down-regulates Transcription of the CXC Receptor 4 (CXCR4) via Nuclear Respiratory Factor 1(Nrf-1) in WERI-Rb1 Retinoblastoma Cells

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Background. TMP is ideal therapeutic agent to retinoblastomas due to the properties of inhibition of the proliferation of tumor cells and protection of neurons against damage. Nevertheless, the underlying mechanisms are not well defined.

Methods. Co-culturing system was used to assay the cell viability. The level of mRNA and protein was measured by Real time RT-PCR and western blot. The activity of CXCR4 promoter was analyzed by luciferase reporter system. siRNA interferance and CHIP assays were performed to investigate regulating mechanism of CXCR4 in WERI-Rb1 cells. The results were confirmed in murine xenograft model of retinoblastoma *in vivo*.

Results. TMP significantly promotes cell viability of retinal neurocytes and suppresses WERI-Rb1 cells in Co-culture systems. TMP significantly downregulates CXCR4, in WERI-Rb1 cells. Moreover, TMP significantly inhibits CXCR4 promoter activity in WERI-Rb1 cells. Among several transcription factors of CXCR4, TMP could only significantly down-regulate Nrf-1 expression. Downregulation of Nrf-1 significantly inhibits expression of CXCR4. CHIP assay indicates that Nrf-1 directly bounds to CXCR4 promoter in WERI-Rb1 cells. Furthermore, downregulation of Nrf-1 and CXCR4 expression of retinoblastoma by TMP were confirmed *in vivo*.

Conclusions. Our results reveal a novel mechanism in WERI-Rb1 cells, in which CXCR4 expression is regulated by Nrf-1, thereby identifying new potential targets for treatment of retinoblastoma.

PO-411

人脐带间充质干细胞来源外泌体对外周血单核巨噬细胞的调控

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目的 探讨人脐带间充质干细胞来源外泌体（Human umbilical cord mesenchymal stem cells derived exosomes，hUC-MSC-exo）对外周血单核巨噬细胞表型及相关细胞因子分泌的影响。 **方法** 分离培养 hUC-MSCs 并鉴定。超速离心法分离外泌体，并通过透射电镜及 Western blot 进行鉴定。建立兔自身免疫性干眼模型，造模 8 周后收集泪腺组织，实时荧光定量 PCR（qRT-PCR）检测巨噬细胞相关基因 mRNA 表达。在体外，将 hUC-MSC-exo 与经兔泪腺上皮细胞刺激后的自体外周血单个核细胞（Peripheral blood mononuclear cells, PBMCs）共培养，48h 后收集 PBMCs，qRT-PCR 检测巨噬细胞相关基因 mRNA 表达。 **结果** hUC-MSCs 具有 MSCs 的免疫表型和基本生物学特性。hUC-MSC-exo 为直径介于 30~100 nm 的膜性小囊泡，表达特异性蛋白 CD9、CD63、CD81。qRT-PCR 结果显示，与正常组相比，在干眼组泪腺组织中，M2 型巨噬细胞相关基因 Arg1、CD206 和 IL-10 mRNA 相对表达显著降低，M1 型巨噬细胞相关基因 NOS2、TNF-α 和 IL-1βmRNA 相对表达显著升高（均 $P<0.05$）。在体外，激活的 PBMCs 经 hUC-MSC-exo 处理后，M2 巨噬细胞相关基因 Arg1、CD206、TGF-β、IL-10 和 IL-4 mRNA 相对表达均明显升高，M1 巨噬细胞相关基因 NOS2、TNF-α 和 IL-1β mRNA 相对表达明显降低（均 $P<0.05$），而 IFN-γ mRNA 相对表达在两组间差异无统计学意义。 **结论** hUC-MSC-exo 可诱导外周血单核巨噬细胞向抗炎表型（M2）极化，促进抗炎因子 IL-10 和 TGF-β 分泌，同时降低炎性因子 TNF-α、IL-1β 表达，具有抑制炎症反应的潜能。

PO-412

米诺环素对光感受器的毒性机制研究

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背景：我们的上一项研究结果发现，发现米诺环素抑制小胶质细胞激活会加重氧诱导视网膜病变动物的视觉损伤（视觉电生理结果），我们猜测米诺环素可能对光感受器有毒性作用。
目的：检测米诺环素对光感受器细胞的毒性作用及具体的机制。
方法：在光感受器细胞系（661W 中），使用不同浓度的米诺环素检测米诺环素促进光感受器细胞凋亡的情况，选取最优浓度进行进一步试验。机制方面，检测内质网应激在米诺环素促进的光感受器细胞凋亡中的作用，并使用 Nrf2 的病毒的质粒转染光感受器细胞，检测 Nrf2 在米诺环素促进内质网应激中的作用。
结果：在光感受器细胞中，CCK8 和 Ki67 染色结果显示米诺环素抑制增殖，流式细胞术和 TUNEL 显示高浓度的米诺环素促进细胞凋亡作用显著。此外，内质网应激中 PERK-eIF2α-CHOP 级联被激活，可能是凋亡中的关键机制。此外，Nrf2 水平在低浓度米诺环素下上调，而高浓度米诺环素则抑制 Nrf2 的表达。此外，Nrf2 过表达减轻了米诺环素对光感受器的促凋亡作用。
结论：我们的结果证明米诺环素对光感受器具有毒性，米诺环素的促凋亡作用主要是通过调节 Nrf2 对内质网应激实现的。

PO-413

βB2-晶状体蛋白 W195G，W151R 突变导致先天性白内障的分子机制研究

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目的：先天性白内障（congenital cataract），指出生前后晶状体混浊的相关疾病，是引起儿童失明的第二大因素，目前唯一有效的治疗手段是手术，主要原因是白内障的发病机制尚未阐明。前期研究中课题组发现 βB2 晶状体蛋白上 W151R，W195G 突变的先白家系，故望通过探究 W151R、W195G 突变引起白内障的机制，找寻白内障及类似蛋白质相关疾病的治疗新思路。
方法：通过原核表达重组蛋白，运用荧光光谱，紫外，圆二色，Uncle 等生物物理学方法研究突变前后蛋白结构及稳定性的变化。通过白内障细胞模型，运用 western blot，annexin v 等方法明确其在细胞中的具体作用机制。通过给予本实验组发现的小分子药物到白内障细胞模型中，明确小分子药物是否可对该类型白内障有潜在治疗作用。
结果：内源性荧光示 W195G 峰位向前移动，W151R 峰位向后移动。外源性荧光显示 W195G 峰高相比于野生型较低，外部非极性输水结构暴露较少，W151R 则峰值比野生型大。体积排阻色谱显示 W195G 洗脱体积起峰相对野生型提前。Uncle 结果显示 W195G 与 W151R 突变体变性 Tm 值均比野生性低。细胞实验可明显观察到 W151R 突变体可以引起蛋白聚集，给予羊毛甾醇可以缓解，western blot 示 W151R 突变体易发生降解。
结论：W195G 突变体由于影响 βB2 晶状体蛋白 C 末端游离端可能影响蛋白寡聚态与多聚态的相互转化，影响了蛋白的稳定性，使得带有该突变的患者更易在胁迫下发生白内障。而 W151R 的突变则使得突变后 βB2 晶状体蛋白易被降解，从而形成不规则的蛋白聚集，引起白内障。且羊毛甾醇可以缓解 W151R 引起的蛋白聚集现象，对白内障的药物研发提供一定的理论基础。

PO-414

scAAV 载体介导的外酶 C3 转移酶基因表达和对恒河猴的降眼压作用

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目的：评价 scAAV 载体介导 C3 的转导体系对原代人小梁网细胞形态的影响，以及在猴眼球的降眼压效果。

方法：（1）事先制备好装载了 C3 基因的 scAAV 载体（scAAV-C3）。将 scAAV-C3 和 scAAV-EGFP 分别转导人小梁网细胞后，观察细胞形态变化和细胞荧光表达情况。应用 phalloidin-rhodamine 对细胞骨架进行染色，观察 C3 基因表达对肌动蛋白应力纤维的影响。动物实验中，猴的左眼和右眼前房分别注射等剂量（TU）的 scAAV-C3 和 scAAV-EGFP。眼球 EGFP 的表达由 MicronIV型视网膜成像仪进行监测。猴眼压监测为注射后第 3 天测量一次，然后每隔 7 天测量一次。前房是否有炎症反应由裂隙灯进行监测，而房角各组织情况则由 UBM 和病理组织切片分别在活体和离体上进行观察。

结果：scAAV 介导 C3 的表达引起了人小梁网细胞的形态收缩变圆。Actin 荧光染色显示肌动蛋白应力纤维破坏。猴眼前房各组织在注射后的第 7 天即可见绿色荧光表达，其中角膜内皮组织呈现弥散均匀分布的荧光。scAAV-C3 注射眼在注射后第 7 天出现角膜水肿，随后逐渐明显。UBM 检查显示角膜水肿在各猴眼之间差异明显。相对于对照组眼压，scAAV-C3 组眼压在注射后第 3 天开始出现显著降低（$p<0.05$），该降眼压效果于第 27 天被角膜水肿所掩盖。角膜水肿最轻的两只猴眼，其眼压测量值持续显示降低状态，截至目前已维持了 175 天。H&E 染色结果显示角膜内皮细胞收缩，角膜基质水肿。

结论： scAAV 介导 C3 表达可以诱导人小梁网细胞骨架破坏；在注射入恒河猴眼前房后，于小梁网组织表达产生降眼压效果，于角膜内皮组织表达产生角膜水肿反应而掩盖降眼压效果。

PO-415

兔 IL-10 基因修饰脂肪来源间充质干细胞对外周血 T 细胞亚群的免疫调控

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目的：探讨 IL-10 基因修饰的兔脂肪来源间充质干细胞（Adipose-derived mesenchymal stem cells, ADSCs）对外周血 T 细胞亚群相关炎性因子分泌的调控。**方法：**构建兔 IL-10 过表达慢病毒载体并感染兔 ADSCs(IL-10-ADSCs),荧光显微镜观察绿色荧光蛋白（GFP）表达情况。q-PCR 及 western blot 检测 IL-10 基因过表达水平。建立 IL-10-ADSCs 与兔泪腺上皮细胞刺激后的自体外周血淋巴细胞（Peripheral blood mononuclear cells, PBMCs）共培养体系，同等数量的 HDF-α 作为实验对照，q-PCR 检测共培养后 PBMCs 中 T 细胞亚群相关炎性因子的分泌情况。**结果：**构建兔 IL-10 重组慢病毒载体并成功转染兔 ADSCs，荧光显微镜下观察绿色荧光蛋白（GFP）表达率达 80%以上，q-PCR 及 Western blot 结果显示 IL-10-ADSCs 可过表达目的基因 IL-10。q-PCR 结果显示，与 HDF-α 相比，IL-10-ADSCs 可以有效抑制 Th1,Th17 细胞相关炎性因子（IFN-γ，T-Bet,IL-17,RORC）的分泌（均 $P<0.05$）。**结论：**IL-10 基因修饰脂肪来源的间充质干细胞（IL-10-ADSCs）可有效抑制外周血 Th1,Th17 细胞相关炎性因子的分泌，为后期进一步探索 IL-10-ADSCs 治疗自身免疫性干眼的疗效及作用机制提供了实验基础。

PO-416

Expression levels and localization of estrogen receptors in a mouse model of oxygen-induced retinopathy

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Purpose: The aim of this study was to detect the expression levels and localization of estrogen receptors in murine retina and their changes that occur in the retina of oxygen-induced retinopathy (OIR) mouse models.
Methods: OIR models were induced. The expression levels of estrogen receptor-α(ER-α), estrogen receptor-β (ER-β) and G-protein-coupled estrogen receptor1 (GPER1) in retinas of OIR mice were investigated using western blot analysis. The localization of ERs was further investigated using immunohistochemistry and immunofluorescence staining.
Results: All types of ERs expressed in murine retina and their expression levels increased after OIR was induced($P<0.05$). Our results showed that ER-α and ER-β mostly co-localized with isolectin B4 (IB4). Results of immunochemistry staining showed GPER1 located in the retinal ganglion cell layer (GCL) and inner nuclear layer (INL) , immunofluorescent staining further confirmed that GPER1 mainly co-localized with β3-tubulin and PKC-α. Our results suggested that ER-α and ER-β selectively expressed on retinal microvascular endothelial cells while GPER1 mainly expressed on retina ganglion cells (RGCs) and bipolar cells.
Conclusions: All types of ERs expressed in murine retina. Our results suggested that E2 might play an important role in retinal neovascularization.

PO-417

Pigment epithelium-derived factor expression in diabetic lacrimal gland and its potential regulating mechanisms

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Purpose：PEDF is a 50-kD secreted glycoprotein in the serine proteinase inhibitor (Serpin) family. Previous studies have suggested that the elevated or decreased levels of PEDF in tissues of patients with diabetes are compensatory responses to hyperglycaemia. Our study was aimed to

determine the expression of pigment epithelium-derived factor (PEDF) in the rat lacrimal gland with diabetes, and investigate the role of tear PEDF in the corneal epithelial homeostasis.
Methods：The diabetic Sprague-Dawley rats were induced by a single dose IP injection of STZ. Control were injected with citrate buffer alone. PEDF expression in corneal epithelium and lacrimal gland were studied with Western blot, real time PCR and immunofluorescence staining.
Results：The mRNA and protein levels of PEDF were up-regulated in lacrimal gland with diabetes progression from 2 weeks to 4 months. While the expression of PEDF was down-regulated in corneal epithelium of diabetic rats. Immunostaining results were consistent with western blot and real time PCR study. Overexpression of PEDF suppressed Wnt signaling pathway in the diabetic lacrimal gland. During corneal epithelial debridement wound healing, PEDF expression in lacrimal gland were up-regulated in the normal rats, while the expression patterns did not change significantly in diabetic rats. Furthermore, both sympathetic and parasympathetic nerve network was activated in lacrimal gland during corneal wound healing.
Conclusion：PEDF expression was up-regulated in rat lacrimal gland in the process of STZ-induced type I diabetes. Elevated PEDF levels suppressed Wnt/β-catenin signaling. During the corneal epithelial wound healing, PEDF levels in the lacrimal gland is regulated by the neural response via the activation and stimulation of sympathetic and parasympathetic nerves.

PO-418

雄激素剥夺对睑板腺细胞的影响及其机制的研究

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目的：通过对小鼠进行去势手术来研究雄激素剥夺对睑板腺细胞的影响及其机制研究，进一步建立睑板腺功能障碍模型。
方法：健康的 3-4 周 c57bl/6 雄性小鼠 40 只。去势组摘除两侧睾丸，对照组按相同方法找到睾丸后不摘除。分别于术后 4 周、8 周、12 周、16 周取材，分离眼睑组织进行体式显微镜拍照观察。术后 16 周取材的眼睑组织冰冻切片，进行 HE、油红、雄激素受体（androgen receptor ,AR）、Ki67、K14、PPARγ 等病理组织学观察。将术后 8 周鼠进一步给与 PPARγ 信号通路激动剂（罗格列酮 20mg/kg/day）治疗 8 周，取眼睑组织进行体式显微镜拍照、ki67、PPARγ 等病理组织学观察。
结果：两组鼠睑板腺体式显微镜观察：随着去势后时间的延长，睑板腺缺失现象逐渐加重。与对照组相比，去势组睑板腺明显出现腺体萎缩、排列稀疏，腺泡细胞缺失、分布减少。病理学 HE 观察：去势组鼠睑板腺腺管周边腺泡缺失，腺泡分布紊乱，团块样改变。油红染色观察：含有脂质成分的腺泡染色减弱，睑板腺腺体内脂质成分下降。AR:鼠睑板腺腺泡细胞中表达雄激素受体，去势组雄激素受体表达水平明显低于对照组。K14：去势组鼠睑板腺腺泡区基底细胞表达减少。Ki67：去势组鼠睑板腺腺泡区表达减弱，表明睑板腺腺泡细胞增殖能力减弱。PPARγ：去势组睑板腺细胞表达减弱，表明雄激素水平低下可对睑板腺细胞分化和功能相关的调节因子产生影响。罗格列酮治疗 8 周后，腺管周边腺泡无明显的缺失现象，腺泡细胞增殖能力正常，睑板腺细胞 PPARγ 表达水平正常。

结论：睑板腺是雄激素的靶器官，去势后雄激素受体表达水平明显下降，PPARγ 信号通路受抑制，最终影响睑板腺细胞的生长和分化。雄激素水平下降可引起睑板腺的组织结构改变，进一步引起睑板腺功能障碍。

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PO-419

Human retinoblastoma in retinal organoids derived from embryonic stem cells with targeted RB1 mutations

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Purpose: Retinoblastoma (Rb) is a primary intraocular cancer in children caused by biallelic inactivation of the retinoblastoma 1 (*RB*1) gene. Nowadays the 'cell origin' and tumorigenesis of Rb remain elusive due to the unavailability of human Rb models. Human embryonic stem cells (hESCs)-derived three dimensional (3D) retinal organoids provide an extraordinary platform for retinal disease modeling, allowing us to develop an ideal in-dish Rb model called human Rb organoids (hRORs).

Methods: *RB*1-mutant (*RB*1$^{Mut/Mut}$) and -null (*RB*1$^{-/-}$) hESCs were generated by CRISPR/Cas9 mediated genome-editing, its genetic integrity, pluripotency, cell cycle and proliferation were evaluated to confirm their differentiation capacity into retinal organoids. Stepwise differentiation of *RB*1$^{Mut/Mut}$ and *RB*1$^{-/-}$ hESCs into hRORs *in vitro* were carried out. The molecular, cellular, histopathologic, and morphometric characteristics of hRORs were identified by RNA sequencing (RNA-seq), single-cell RNA-seq, whole-genome bisulfite sequencing (WGBS), assay for transposase-accessible chromatin with high throughput sequencing (ATAC-seq), transmission electron microscopy (TEM), immunostaining, and subretinal engrafting in SCID mice.

Results: We generated the *RB*1$^{Mut/Mut}$ (c.958C>T; p.R320*) and *RB*1$^{-/-}$ hESCs remained in an undifferentiated state and genetic integrity, which were successfully differentiated into hRORs. Developing hRORs progressed through molecular, cellular, histopathologic, and morphometric stages that were nearly identical to the tumorigenesis and development of primary Rb. Subretinal engrafting of hRORs further validated its proliferative capacity similar to the Rb tumor cell line (Y79). We observed Rb initiation from cone precursors which are more sensitive to *RB*1 inactivation, and ARR3^{+} cells were primarily present in cultured hRORs. The PI3K/AKT/mTOR pathway was found to be aberrantly regulated in hRORs, indicating a therapeutic target. We also demonstrated that hRORs are suitable for evaluation of drug effects in the treatment of Rb.

Conclusions: We successfully developed a novel hROR in-dish model through directed differentiation of *RB*1$^{Mut/Mut}$ or *RB*1$^{-/-}$ hESCs, and reported the development of 3D-hRORs for the study of human Rb tumor initiation, progression, and response to perturbation. Our developed hRORs faithfully recapitulated the molecular, cellular, histopathologic, and morphometric features

of human primary Rb, which will provide a valuable complement to the current basic and preclinical models for mechanism study and drug screening.

PO-420

P2X7 antagonist attenuates retinal inflammation and neovascularization induced by oxidized low density lipoprotein in mice

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Purpose: To investigate whether A740003, a P2X7 receptor antagonist, could prevent retinal inflammation and neovascularization induced by oxidized low density lipoprotein (ox-LDL) and to explore the underlying mechanisms in ARPE-19 cells and in mice.
Methods: ARPE-19 cells were incubated with A740003 for 2 hours before treatment with ox-LDL. Same concentrations of DMSO were used as vehicle controls. C57BL/6 mice were subretinally injected with ox-LDL to induce retinal inflammation and neovascularization and subretinal injection of PBS used as control. A740003 (30 mg/kg/d) or vehicle was administrated intraperitoneally starting from day 3 before to day 14 after ox-LDL injection (n=6). Retinal neovascularization was detected by whole flat mount of retinas stained with isolectin-B4, CD31 and VEGF antibodies. Retinal function was assessed by dark- and light-adapted ERG. The mRNA and protein levels of NLRP3, Caspase-1, pIKBa, IKBa, HIF-1a and VEGF in retinas of mice and ARPE-19 cells were detected by Western Blot and qPCR. IL-1b, IL-18 and TNF-a were determined by ELISA assay.
Results: Compared to vehicle group, A740003 decreased the expression of NLRP3 Caspase-1, HIF-1a and VEGF in ARPE-19 cells. Inflammatory cytokines including IL-1b, IL-18 and TNF-a were down-regulated in A740003 treated cells. The phosphorylation of IKBa was inhibited by A740003 treatment. Whole flat mount of retinas showed that A740003 inhibited the angiogenesis in retinas induced by ox-LDL. Compared with vehicle treated mice, the mRNA and protein levels of NLRP3 Caspase-1, HIF-1a and VEGF decreased and the phosphorylation of IKBa was inhibited in the retinas of A740003 treated mice. The b- and a-wave amplitudes of ERG were alleviated in the A740003 treated mice compared with vehicle group.
Conclusions: We found A740003 significantly reduced ocular inflammatory responses and VEGF level in ARPE-19 cells. In addition, the P2X7 antagonist inhibited retinal inflammation and neovascularization, and protected retinal function in ox-LDL induced impairment in mice. The protective effects of A740003 were associated with regulating of NLRP3 inflammasome and NF-kB pathway, as well as inhibition of HIF-1a and VEGF.

PO-421

角膜内皮细胞周期阻滞的分子机制

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角膜病是全世界导致失明的主要眼部疾病之一，是仅次于白内障，成为第二大致盲因素。同种异体角膜移植是治疗角膜盲的有效手段之一，然而由于世界范围内的供体角膜缺乏，很多角膜患者不能得到及时有效的治疗。众所周知，已形成汇合单层的人角膜内皮细胞（human corneal endothelial cells ,HCECs）丧失了增殖能力，而研究发现，HCEC 并没有完全退出细胞周期，而是被阻滞在 G1 期，仍然具有增殖的潜能。然而周期阻滞的分子机制目前还不清楚。细胞周期是一系列在进化过程中高度保守的分子生物学事件，在静止期的细胞中，转录因子 E2F 与 pRb 紧密结合，从而阻止了 E2F 的活化，抑制了 DNA 的合成，当细胞受有丝分裂刺激诱导 cyclin D 的合成增加，并与周期活化激酶 CDK4/6 形成复合物，激活 pRb-E2F 复合物，使 pRb 高度磷酸化，释放并激活转录因子 E2F，促进 CDK2， cyclin A/E 的转录，促进细胞从 G1 向 S 期过渡。Cip/Kip、INK 家族是周期依赖的激酶抑制剂 CKI，能通过抑制 G1 期 Cyclin D-CDK 复合物激酶活性对细胞周期进行负性调控。我们利用兔的角膜内皮细胞（Rabbit corneal endothelial cells,RCECs），用 qPCR 检测 RCEC 的周期依赖的相关蛋白，发现 Rb1,CDK4/6,P18 ,p53，均有较高的表达；随后利用转染的方法分别将 Rb1,p18,p53 干扰和同时将 p18/p27、Rb1/p18/p27 干扰;用倒置显微镜检测细胞形态，用 MTT 检测细胞活力，用 Edu 检测细胞增殖，用流式细胞术检测细胞周期，结果显示当同时干扰 Rb1，p18，p53，细胞有一定程度的增殖恢复。我们将进一步探索调控 Rb1、p18、p53 高表达的分子机制，本课题的研究结果对于刺激体内 HCEC 细胞增殖能力恢复，维持 HCEC 单层的细胞密度、角膜的透明度及视敏度提供一定的参考价值。

PO-422

FGF9 regulates endothelial-to-mesenchymal transition of corneal endothelial cells

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Purpose：Corneal endothelial cells (CECs) can undergo endothelial-to-mesenchymal transition (EndMT) after injuries or during ex vivo culture. Fibroblast growth factor 9 (FGF9) is reported to reverse the epithelial-to-mesenchymal transition in prostate cancer cells and accelerate wound healing. Our current study aims to investigate the expression and function of FGF9 on CECs.

Methods：The expressions of FGF9 and its receptor FGFR3 on CECs of human and rabbit were detected by immunohistochemistry and PCR. Slit-lamp microscope observation was performed on day 0, day 4 and day 7 after corneal endothelial injuries. Endothelial cells were harvested at different time points and the gene expressions of N-cadherin, ZO-1, Na^+-K^+ -ATPase, α-SMA, FGF9, and FGFR3 were detected by qRT-PCR. Rabbit CECs were cultured in SHEM for 4 passages with or without exogenous FGF9. CCK8 and immunofluorescence staining of N-cadherin, ZO-1, Na^+-K^+ -ATPase, α-SMA, FGF9, FGFR3, and Ki67 were performed on FGF9-treated CECs.
Results：FGF9 and FGFR3 were expressed on both human and rabbit CECs. During rabbit corneal endothelium wound healing process and ex vivo culture, α-SMA was upregulated, while FGF9, FGFR3, N-cadherin, ZO-1, and Na^+-K^+ -ATPase were downregulated. Under the treatment of exogenous FGF9, α-SMA was down-regulated while FGF9, FGFR3, N-cadherin, ZO-1, and Na^+-K^+ -ATPase were upregulated in cultured CECs. Exogenous FGF9 had no effects on cell viability or proliferation.
Conclusions：FGF9 and its receptor FGFR3 are expressed on CECs. FGF9-FGFR3 signaling pathway is involved in the process of EndMT and phenotype transition of CECs.

PO-423

钙信号通路在小鼠屈光发育及形觉剥夺性近视的作用研究

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目的：本实验主要通过探讨电压依赖性钙通道（VDCCs）在小鼠视网膜中的作用，以明确钙信号通路在近视发生发展过程中的作用以及机制，进一步阐明近视的发病机制。
方法：选取 3 周龄 C57BL/6 小鼠作为实验动物。（1）单纯形觉剥夺实验（2）药物干预实验: ①L-VDCCs 激动剂 Bay-K8644 对形觉剥夺小鼠干预实验②L-VDCCs 拮抗剂维拉帕米（Verepamil）干预实验；③N-VDCCs 拮抗剂 ω-conotoxin GVIA 干预实验；④视网膜下注射 rAAV-shRNA 病毒表达载体特异性敲减 CACNA1B 基因实验。实验结束后通过视网膜钙离子流式技术检测钙离子荧光强度，用 RT-PCR、免疫荧光以及 western blot 检测视网膜 CACNA1B mRNA 和蛋白水平变化。
结果：1.单纯形觉剥夺后，钙离子流式检测全视网膜钙离子荧光强度正常对照组最强，剥夺眼最弱，但差别无统计学意义。2. 药物干预实验中，正常屈光的药物组与溶剂组相比屈光并无明显差异，形觉剥夺小鼠注射激动剂后与对照组相比明显抑制近视 3、视网膜下腔注射病毒实验，CACNA1B-KD 组注射眼与 Control 组注射眼相比，IF 显示 CaV2.2 明显减少。实验 2w、4w 后 CACNA1B-KD 组 T 眼相比 Control 组 T 眼屈光向明显近视方向进展，眼轴延长。
结论： 1. 在形觉剥夺过程中，形觉剥夺眼相对于正常对照眼有钙离子总量减少趋势。
2. 视网膜 L 型钙通道在小鼠屈光发育过程中有一定的影响。
3. 视网膜 N 型钙通道可能参与小鼠近视的形成与发展。

PO-424

人胚胎干细胞诱导的视网膜色素上皮细胞外泌体参与介导免疫排斥反应的研究

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目的：多数视网膜疾病都伴随着大量的视网膜色素上皮细胞（RPE）凋亡，但 RPE 所发挥的营养及支持作用是维持视网膜功能稳定的关键环节。视网膜下腔移植人胚胎干细胞（hESC）衍生的视网膜色素上皮（hESC-RPE）细胞是治疗此类疾病的最佳临床治疗策略之一。但由于患者血视网膜屏障的破坏，移植后的细胞将长期浸润在炎症环境中。移植细胞在受到炎症因子刺激后，其分泌的外泌体所搭载的货物会发生显著改变。有研究表明，适应性免疫的启动和维持需要不同类型细胞之间的多方面通信，其中外泌体通过递送蛋白、核酸等生物活性分子，在其中占据着重要地位。因此，鉴定炎症因子刺激前后 hESC-RPE 外泌体所携带货物差异，明确外泌体通过何种途径参与介导免疫排斥反应至关重要。
方法：超速离心收集炎症因子刺激或不刺激的 hESC-RPE 所分泌的外泌体，透射电镜、动态光散射测定外泌体的形态和大小；利用蛋白质印记和流式细胞术检测外泌体特异性标志物；通过组学手段检测不同处理后 hESC-RPE 分泌外泌体的成分差异；应用 ELISPOT、体外移植、免疫荧光、rt-PCR、IHC 等技术评估外泌体的功能差异及激活免疫细胞能力差异。
结果：对比炎症因子处理组和未处理组 hESC-RPE 分泌的外泌体，共检测到 429 种差异表达的蛋白质，875 种差异表达的 miRNA；发现炎症因子处理组 hESC-RPE 分泌的外泌体能够显著提高健康 hESC-RPE 免疫原性并增多了免疫细胞的募集。我们还发现了外泌体可能通过减少递送 miR-x 来增强 Y 通路的激活，进而上调 NK 细胞和细胞毒性 T 细胞的激活，转染该 microRNA 后，这种激活显著下降。
结论：炎症因子的刺激显著改变了 hESC-RPE 外泌体的蛋白质和 microRNA 表达谱，进一步增强了移植细胞诱发的移植物抗宿主反应，过表达 miR-x 可能对提升 hESC-RPE 的长期存活能力及有效发挥功能具有积极意义。

PO-425

机械张力对结膜上皮细胞终末分化的影响及其机制的研究

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目的：结膜上皮内的杯状细胞主要集中在穹窿部，有研究认为这可能与穹隆部可以提供更好的物理屏障，同时内含丰富的血管、免疫细胞等有关。从结构上看，穹隆部结膜较球结膜和睑结膜厚而疏

松。本研究通过给予机械张力使结膜组织维持一定的紧张状态，以此来探究机械张力对结膜上皮细胞终末分化的影响。

方法：选取正常成年新西兰大白兔右眼上直肌与内眦之间约 4mm×8mm 大小的球结膜组织，拉紧并缝合使其固定于巩膜上，在相同位置的左眼球结膜上单纯缝合作为假手术组。缝合后第 3、7、14 天，进行裂隙灯照相，并取材行 HE 染色，PAS 染色，TUNEL 染色，免疫荧光染色，Real-Time PCR 及蛋白印迹实验检测相关指标，观察结膜组织的结构和功能改变。同时取正常成年新西兰大白兔的结膜组织，在体外培养时给予一定张力，培养 1、3 和 7 天后检测结膜组织相关指标的变化情况。

结果：实验动物手术区域内的结膜上皮完整，未见明显的炎症细胞浸润和细胞凋亡；相较于正常组及假手术组，手术组结膜上皮内杯状细胞数量及密度显著减少，结膜上皮 MUC5AC 和 K7 的表达量降低，而 K3/K12（角膜上皮的特异性标记物）的表达量增高；RT-PCR 显示手术组 Wnt 信号通路下游靶点 TCF4 的表达量降低，同时 TRP 通道中部分基因表达也发生了改变。体外张力培养的结膜组织除了未明显表达 K3/K12，其余结果和动物实验一致。

结论： 机械张力可以调节结膜上皮细胞的终末分化方向，使结膜上皮细胞失去杯状细胞分化，而向角膜上皮的方向分化。机械张力可能是调节眼表上皮细胞分化方向的重要调节因素。

PO-426

A Facile Method to Generate Induced Pluripotent Stem Cells from the Peripheral Blood Cells of Retinitis Pigmentosa patient's with inducible Lentiviral Vector

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Purpose: Since development of the in vitro 3D retina tissue differentiation model using stem cells, patient specific Induced Pluripotent Stem Cells (iPSC) have great application potential in retinal disease model and mechanism study. To date, it has been reported that several sources of donor somatic cells can be successfully reprogrammed, including fibroblast, blood cell, urine cell and ocular epithelial cells. Compared to other cell types, the blood cells show unique advantages including easy access, noninvasive and lowest risk of contamination. However, the reprogramming efficiency of blood cells is relatively lower. In the present study, we report a modifier reliable method to generate human iPSC from periphery blood of patient with retinitis pigmentosa(RP).

Methods: Early onset RP patient with compound heterozygous mutations in CRB1(c.1369C>T (p.R457X) and c.2027C>T (p.T676M)) was selected as donor. A total of 4 ml peripheral blood was drawn from the donor. The peripheral blood mononuclear cells (PBMNC) were purified with Ficoll-Paque Premium and cultured in serum free MNC medium at a density of 1-2 million per milliliter. After 24-hour culture, the PBMNC were transfected with DOX-inducible lentivirus vectors FUW-tetO (Addgene) expressing human OCT4, SOX2, KLF4,c-MYC and rtTA. 24 hours after

transfection, the transfected cells were harvested by spinning down with low speed, the pelleted MNCs were resuspended in fresh MNC medium with DOX and seeded in a new plate coated with matrigel. Two days later, half of the culture media were replaced with mTesr plus DOX. Cells were grown in this condition until individual cells with stem cell morphology became attached to the culture dish when the media were completely replaced with mTesr plus DOX. After additional 7 to 14 days culture, colonies with stem cell morphology would emerge. The newly formed stem cell clones were individually harvested and either stored in liquid nitrogen tank or further cultured for experimentation. qRT-PCR and immunocytochemistry were used to characterize the pluripotency of the iPS clones. The expression profiles of genes in the PBMC-derived iPSCs and HESC were analyzed using RNAseq, and further confirmed with qRT-PCR and western blot analysis.

Results: We generated iPSC from a 10-year old male patient diagnosed with early-onset non-syndromic retinitis pigmentosa caused by novel compound heterozygous mutations in the CRB1 gene using inducible plasmids containing OCT4, SOX2, KLF4, c-MYC. The derived iPSCs have the ability to differentiate into retina tissues including retinal pigmented epithelial cells and multi-layer retina tissues in vitro.

Conclusion: The derived iPSCs provide a valuable tool to study the pathological mechanism of retinitis pigmentosa, and for development of potential therapeutic strategies. (Supported by grants from National Natural Science Foundation of China, 81500707 as well as the Fundamental Funds from the State Key Laboratory of Ophthalmology, Zhongshan Ophthalmic Center, Sun Yat-sen University).

PO-427

探究 Orai3 对晶状体囊膜上皮细胞增殖、凋亡以及通透性的影响

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背景: 钙库操控钙内流(SOCE)由 Orai（钙释放激活的钙调节剂）和 Stim(基质相互作用分子)组成，细胞内钙库中的钙离子耗竭后激活细胞膜上钙库操控的 Ca^{2+} 通道，介导细胞外 Ca^{2+}内流。其介导的钙信号可能是细胞内外信息交流新的重要途径，对细胞的增殖和凋亡具有重要的调节作用。已有文献报道，具有皮质性白内障的人类晶状体中 Ca^{2+}水平升高在浑浊化过程中起主要作用。因此，Ca^{2+}稳态被认为在晶状体病理生理学中具有根本重要性。目的：探讨 Orai3 对晶状体囊膜上皮细胞增殖、凋亡以及通透性的影响。方法：收取人的糖尿病性白内障晶状体囊膜上皮组织、老年性白内障晶状体囊膜上皮组织和正常人晶状体囊膜上皮组织，用免疫组化技术检测 orai3 蛋白的表达；钙离子成像技术检测原代培养的野生型大鼠和 orai3 敲除鼠晶状体囊膜上皮细胞 SOCE 水平；细胞增殖实验检测原代培养的野生型大鼠和 orai3 敲除鼠晶状体囊膜上皮细胞增殖能力；细胞凋亡实验检测原代培养的野生型大鼠和 orai3 敲除鼠晶状体囊膜上皮细胞凋亡能力；利用电阻仪检测原代培养的野生型大鼠和 orai3 敲除鼠晶状体囊膜上皮单层细胞在使用 orai3 激动剂或阻断剂后各组细胞的跨膜阻抗; 多功能图像分析技术分别统计糖尿病造模后的野生型和 Orai3 敲除大鼠晶状体浑浊面积，按白内障严重程度分级。结果：Orai3 基因敲除的晶状体囊膜上皮细胞比未敲除的晶状体囊膜上皮细胞 SOCE

明显下降。结论：orai3 基因敲除后的晶状体囊膜上皮细胞 SOCE 明显下降，说明在晶状体囊膜上皮细胞中，Orai3 是 Orai 家族中对 SOCE 起重要作用的基因;Orai3 可能对晶状体囊膜上皮细胞增殖、凋亡以及通透性有影响。

PO-428

5-HTR1A 敲除小鼠的视网膜表型研究

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目的：5-羟色胺(5-HT)作为一种神经递质广泛存在于哺乳动物的神经组织中。5-HT 通过激活 5-HT 受体调节广泛的生物和神经生理过程，例如焦虑、食欲、学习、记忆、睡眠等，并在中枢及外周神经系统中发挥重要作用。研究显示，5-HT 协同参与视网膜合成、代谢等各项生理功能，并通过不同受体亚型介导视杆细胞感光信号传导。5-HT 受体有 5-HTR1～5-HTR7 7 种亚型，而 5-HTR1 是分布最为广泛的受体亚型，但其在视网膜的作用机制目前尚不清楚。因此，我们利用基因敲除小鼠模型探究 5-HTR1A 对视网膜结构、功能的影响。

方法：利用 RNA-seq 测序技术及 q-PCR 探究 C57BL/6J 小鼠 5-HTR1A 表达情况，通过 CISPRI/Cas9 技术成功构建 5-HTR1A 敲除小鼠模型，利用视网膜电图（ERG）技术采集不同发育阶段的小鼠视网膜功能，并进一步用小鼠眼底照相机（FP）、SD-OCT、免疫荧光染技术（IF）等技术等动态监测不同发育阶段的 5-HTR1A 敲除小鼠视网膜结构的变化，对以上结果进行统计学分析以评估 5-HTR1A 敲除后其对小鼠视网膜宏观结构及功能的影响。

结果：5-HTR1A 在小鼠大脑、视网膜中均有表达，我们成功构建了 5-HTR1A 敲除小鼠模型，但是，常规的检测方法并没有发现视网膜结构和功能的明显改变。

结论：通过 FP、SD-OCT、ERG 等常规的检测手段，我们并未发现 5-HTR1A 敲除小鼠视网膜结构和功能的改变，提示我们 5-HTR1A 虽然表达于视网膜上，但是它的主要功能并不是维持视网膜结构和功能的完整，而是在 5-HT 的信号传导通路上其他的方面，需要后期更全面的检测手段练来进行进一步的探索。

PO-429

Sema3A 对小鼠原代视网膜神经节细胞轴突生长的抑制作用

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目的 观察 Sema3A 对小鼠原代 RGCs 轴突生长的作用。方法 生后 24 h 内的 C57/BL6 小鼠，颈椎脱臼法处死后剥离出视网膜组织原代培养 RGC，采用 Brn3a 免疫荧光染色法鉴定 RGC。将培养 7d 的 RGC 分为对照组、0.05μg/ml、0.1μg/ml 和 0.5μg/ml Sema3A 组，分别加入相应浓度 Sema3A 处理 2 h，采用免疫荧光染色法检测各组细胞中神经元特异性标志物 β3-tubulin、树突标志物 MAP2 的表达，β3-tubulin+/MAP2-鉴定为轴突，用 Image J 软件测量轴突长度；选取 0.1 μg/ml Sema3A

处理组和对照组细胞，分别于处理后 0.5、1.0 和 2.0 h 测量轴突长度。根据不同药物处理方式将细胞分为对照组、Sema3A 处理组、Y27632 处理组和联合处理组，观察并比较各组轴突长度变化。结果 原代培养的细胞 Brn3a 呈阳性表达，鉴定为 RGC。0.05 μg/ml、0.1 μg/ml、0.5 μg/ml Sema3A 组轴突长度分别为（69.35±1.49）、（60.45±1.42）和（93.65±1.86）μm，均明显短于对照组的 109.80±2.29 μm，差异均具有统计学意义（均 P<0.001）。0.1μg/ml Sema3A 处理 1.0 和 2.0 h 后细胞轴突长度分别为（165±4.39）、（97.63±2.79）μm，明显低于相应时间对照组（210.40±4.44）、（199±4.36）μm (均 P<0.001)，差异有统计学意义；对照组、Sema3A 处理组、混合处理组、Y27632 处理组轴突长度总体比较差异均有统计学意义（F=142.5，P<0.01）；其中 Sema3A 处理组 RGC 轴突长度显著低于对照组和混合处理组，差异具有统计学意义（均 P<0.001）。结论 Sema3A 对小鼠原代视网膜 RGCs 轴突生长具有抑制作用，ROCK 抑制剂可减轻 Sema3A 对轴突生长的抑制作用。

PO-430

人和脊椎动物神经视网膜中的环状 RNA

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目的：环状 RNA（circularRNA, circRNA）是一类不具有 5’末端帽子和 3’末端 poly（A）尾巴，并以共价键形成环形结构的非编码 RNA 分子。近年，已有报道发现环状 RNA 在哺乳动物的脑中大量表达[1，2]，但极少有在视网膜中的研究，其分子特征和功能尚不清楚。为了探究环状 RNA 在神经视网膜中的表达模式，我们以人、猴、鼠、猪、树鼩及斑马鱼 6 个物种为研究对象，深入分析环状 RNA 的表达及可能的功能。

方法：我们提取了 6 个物种的视网膜组织的总 RNA，构建了总 RNA 和 mRNA 文库，进而分析环状 RNA 的表达。采用 PCR 和 Northern Blot 检测环状 RNA 的成环形式，利用原位杂交检测环状 RNA 的定位，qPCR 检测人视网膜中环状 RNA 的表达水平，荧光素酶报告系统检测环状 RNA 与小 RNA（microRNA）的结合。

结果：我们发现与物种特异性的环状 RNA 相比，保守的环状 RNA 更为丰富，并且呈现复杂的成环模式：外显子成环、内含子成环、外显子与内含子共同成环以及反义链成环等。我们鉴定了其中一种在人视网膜中高丰度表达的 circPDE4B：它由两个外显子组成，耐受 R 酶处理，并且在细胞质中表达。该环状 RNA 与 miR-181 簇（miR181a/b/c/d）结合，通过吸附 miR-181 簇改变细胞表型，抑制细胞的增殖。

结论：研究人和其它脊椎动物视网膜中的环状 RNA 的表达模式及分子特征，为环状 RNA 在人类及脊椎动物视网膜相关疾病中的重要作用提供新的见解。

PO-431

Establishment of non-integrated iPSCs from urine-derived cells of a Chinese family with macular corneal dystrophy

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Purpose: Macular corneal dystrophy (MCD) is an autosomal recessive, which is related to carbohydrate sulphotransferase (CHST6) gene mutations. CHST6 gene mutations lead to abnormal keratin sulfate (KS) synthesis and corneal opacity. However, the mechanism of MCD is still unclear. Here, we generated induced pluripotent stem cells (iPS) via a nonintegrative method using urine-derived cells (UCs) from a Chinese family with MCD (MCD-UiPS) for future pathological and mechanical study.
Methods: We chose a Chinese family of three siblings with MCD identified by blood sample for DNA-sequence. Extraction of urine cells from 200ml fresh midstream urine. Reprogramming was performed by plasmids of reprogramming factors OCT4, SOX2, KLF4 and c-MYC. The single iPSClike clone was selected for picking and expansion. The pluripotency was confirmed by immunofluorescence staining and real time polymerase chain reaction (qPCR).
Results: Slit lamp photograph showed two of macular keratopathy in three siblings with MCD patients (two female) (Fig.1A). We confirmed their CHST6 gene mutations in exon 3 of frameshift deletion/insertion at c.62_63delTinsGA and c.C892T (Fig.1B). Non-integrated MCD-UiPS line was generated by plasmid Vectors reprogramming in the urine-derived cells collected from above MCD patient. The pluripotency was confirmed by immunofluorescence staining of pluripotency marker (OCT4 and SSEA4) (Fig.2A). Real time polymerase chain reaction (qPCR) was further verified that endogeneous pluripotency genes OCT4, SOX2, and Nanog were fully activated, with expression levels comparable to those of the normal human control-iPS cell line (Fig.2B).
Conclusions: The CHST6 gene mutation of c.62_63delTinsGA in exon 3 is first reported for MCD. We generate MCD-iPS line from a Chinese family of three siblings with MCD, which can offers a useful resource to investigate pathogenic mechanisms in MCD, as well as a plentiful source of cells for future individual gene-based therapies.

PO-432

Meibomian gland atrophy induced by chronic sleep deprivation

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Purpose. To investigate the effect of chronic sleep deprivation (SD) on Meibomian Gland (MG).

Methods. A chronic sleep deprivation mouse model was set up using a 'stick over water' method. MG morphology changes were observed under slit-lamp microscope and stereomicroscope. Pathologic MG changes in SD mice were examined by lipid staining, histology, immunostaining and qRT-PCR assay.

Result. There was MG orifice obstruction with white secretions in SD mice after 4 months sleep deprivation. As revealed by the gross dissections of the eyelid, chronic sleep deprivation resulted in widespread MG atrophy in 6 month old mice. H&E staining showed that the number of MG acini in SD mice was reduced compared with that of control mice. ORO staining of upper eyelid cross sections showed reduced MG acinar size and decreased meibum volume in the central duct in SD group. K14, K10 and Ki67 expression was dramatically reduced in the MG, while p63 was upregulated in the MG after SD. TUNEL assay showed apoptotic cells in the MG duct epithelium after 4 months of SD.

Conclusion. Chronic sleep deprivation could induce MG acinar atrophy and clinical manifestations of MGD in mouse.

PO-433

PRMT5 在葡萄膜黑色素瘤中的功能研究

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目的：葡萄膜黑色素瘤是成人眼内最常见的恶性肿瘤，极易发生转移，转移后缺乏有效的治疗方法，其发病机制目前尚不清楚。PRMT5（Protein Arginine Methyltransferase 5）作为Ⅱ型蛋白质精氨酸甲基转移酶，能催化蛋白底物精氨酸上的单甲基化和对称性二甲基化修饰，对正常发育和多种疾病有着重要的调控作用。迄今为止，尚无蛋白质精氨酸甲基化修饰调控葡萄膜黑色素瘤的研究报道。本研究旨在探索 PRMT5 在葡萄膜黑色素瘤中的功能。

方法：通过实时荧光定量 PCR 和 Western Blot 技术检测 PRMT5 在葡萄膜黑色素瘤细胞中的表达。通过 MTS、平板克隆形成、流式细胞术、Transwell 以及 Caspase3/7 活性分析实验分别检测 PRMT5 抑制剂-GSK591 对葡萄膜黑色素瘤细胞的增殖、细胞周期以及细胞迁移的影响。GSK591 处理葡萄膜黑色素瘤细胞后，Western Blot 技术检测细胞中 PRMT5 的表达和蛋白质精氨酸二甲基化修饰水平的改变，以及细胞周期相关蛋白的表达。利用活体荧光成像技术检测 GSK591 对体内葡萄膜黑色素瘤生长的影响。

结果： PRMT5 在葡萄膜黑色素瘤细胞中的表达水平与正常对照相比显著升高。GSK591 能够显著抑制葡萄膜黑色素瘤细胞的增殖和迁移，并导致细胞周期 G1 期阻滞。Western Blot 结果显示 GSK591 不改变葡萄膜黑色素瘤细胞中 PRMT5 的表达，但总体蛋白质精氨酸对称性二甲基化水平显著降低。同时 GSK591 导致细胞周期相关蛋白 p-Rb、E2F1 和 CDK4 表达降低，P21 表达升高。此外，GSK591 能够显著抑制葡萄膜黑色素瘤的在体生长。

结论： PRMT5 对葡萄膜黑色素瘤的发展具有促进作用，是新的潜在治疗靶点，GSK591 具有治疗该恶性疾病的应用前景。

PO-434

Runx2 在角膜上皮损伤修复中的功能研究

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目的：角膜上皮位于角膜的最外层，是角膜的保护屏障。角膜上皮手术后或眼外伤后，角膜上皮的修复能力对于恢复正常视力至关重要。转录因子 Runx2（Runt-related transcription factor 2）在成骨细胞和脂肪细胞增殖和迁移过程中起着重要的作用，但其在角膜上皮损伤修复过程中的功能尚不明确。本研究旨在探讨 Runx2 在角膜上皮损伤修复中的功能。

方法：构建 C57BL/6J 小鼠的角膜上皮损伤修复（Corneal Epithelial Wound Healing，CEWH）模型，利用 Western Blot 检测 Runx2 在损伤修复过程中的蛋白表达情况。体外培养人角膜上皮细胞（Human Corneal Epithelial Cell，HCEC），通过转染 siRNA 在 HCECs 中沉默 Runx2 的表达；应用 MTS 实验和划痕实验分别检测敲减 Runx2 后对 HCEC 增殖和迁移能力的影响，细胞流式技术分析敲减 Runx2 对 HCEC 细胞周期的影响。

结果： Runx2 在 CEWH 过程中表达明显上调，敲减 Runx2 的表达可显著抑制 HCEC 的增殖和迁移能力，并导致 HCEC 阻滞在 G2 期。

结论：本研究表明 Runx2 通过促进细胞增殖和迁移从而调控角膜上皮损伤修复进程，揭示了 Runx2 在 CEWH 中的功能，为临床治疗角膜上皮损伤相关疾病提供了潜在的药物靶点和新的治疗策略。

PO-435

UBR5 在角膜上皮损伤修复中的功能研究

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目的： UBR5 是一种 E3 泛素连接酶，在泛素化过程中参与催化泛素共价连接至靶蛋白上。角膜上皮损伤修复对于维持角膜的透明性意义重大，但因其机制复杂目前仍不明了。本研究旨在探讨 UBR5 在角膜上皮损伤修复过程中的作用，为进一步解析泛素化调控角膜上皮损伤修复的分子机制奠定基础。

方法：构建 C57BL/6J 小鼠的角膜上皮损伤修复模型，通过 Western blot 检测 UBR5 在损伤修复过程中的表达情况。通过 siRNA 在体敲减 UBR5 的表达，检测 UBR5 下调时对小鼠角膜上皮损伤修

复的影响。运用 MTS 实验、划痕实验、流式细胞术检测敲减 UBR5 对人角膜上皮细胞（Human Corneal Epithelial Cell，HCEC）增殖、迁移和细胞周期的影响。

结果： UBR5 在小鼠角膜上皮损伤修复中相较于对照组的表达明显上调。在体抑制 UBR5 的表达后，角膜上皮损伤修复速度较对照组明显减慢。敲减 UBR5 可抑制 HCEC 的增殖、迁移、并引起细胞周期 G2 期阻滞。

结论： UBR5 通过调控细胞的增殖和迁移促进角膜上皮的损伤修复，泛素化在角膜上皮损伤修复过程中发挥重要作用。

PO-436

miR-34a 及其下游靶标 LGR4 调控葡萄膜黑色素瘤细胞迁移、侵袭功能和相关分子机制研究

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目的：富含亮氨酸的 G 蛋白偶联受体 4（LGR4）对于人多种组织和器官的发育以及诸多癌症的发生发展中的调控作用已被研究报道，但其在葡萄膜黑色素瘤（UM）中行使着怎样的功能还尚未明确。本课题组前期研究发现 UM 细胞中 miR-34a 表达低于正常葡萄膜黑色素细胞，干扰 LGR4 表达后抑制了 UM 细胞的迁移和侵袭功能。本研究旨在探讨 miR-34a 及其下游靶标 LGR4 在葡萄膜黑色素瘤中的具体功能及其相关分子机制。

方法：qPCR 和 Western blotting 检测葡萄膜黑色素瘤细胞和人原代葡萄膜黑色素细胞中 LGR4 的表达差异。通过 MTS 细胞增殖实验分析细胞增殖状况，细胞迁移和侵袭功能的影响分别由体外划痕实验、Transwell 实验以及基质胶侵袭实验评测，Western blotting 和免疫荧光实验检测上皮-间充质转换(EMT)相关蛋白的表达。

结果：qPCR 和 Western blotting 检测，与正常人原代葡萄膜黑色素细胞相比，LGR4 在葡萄膜黑色素瘤细胞株中高表达。干扰 LGR4 表达并未对 UM 细胞的增殖产生影响。体外划痕实验和 Transwell 实验结果显示，转染 miR-34a 或干扰 LGR4 表达后，葡萄膜黑色素瘤细胞的侵袭和迁移明显减少，Western blotting 和免疫荧光结果表明，转染 miR-34a 或干扰 LGR4 后，上皮标志蛋白 E-cadherin 和 α-cadherin 的表达增加，而间充质标记物 N-cadherin，Vimentin 和 Snail 的表达下调。

结论：我们的研究首次发现 LGR4 基因在葡萄膜黑色素瘤细胞迁移和侵袭具有重要的调控作用，同时我们证实在葡萄膜黑色素瘤细胞中 miR-34a 可以直接调控 LGR4 的表达，转染 miR-34a 或干扰 LGR4 的表达可以抑制葡萄膜黑色素瘤细胞迁移和侵袭。

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PO-437

Conditioned medium from human amniotic epithelial cells attenuates allergic conjunctivitis through IL-1RA/ IL-1R/Th2 Pathways

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Background: The immunomodulatory and anti-inflammatory functions of mesenchymal stem cells (MSCs) have been demonstrated in several inflammatory diseases. Especially, perinatal MSCs (including amniotic epithelial cells and amniotic mesenchymal stromal cells) show vast potential in these, but their contribution to allergic conjunctivitis and underlying antiallergic mechanisms remain largely unknown.

Objective: To explore the clinical application of perinatal MSCs to experimental allergic conjunctivitis (EAC) and its underlying antiallergic mechanisms.

Methods: The murine EAC models were generated with short ragweed (SRW) pollen. Conditioned medium from human amniotic epithelial cells (AEC-CM) and human amniotic mesenchymal stromal cells (AMSC-CM) were administered topically to mice with EAC, and the related clinical symptoms and biological changes were evaluated. Murine mast cells (MCs), and conjunctival epithelial cells were cultured in vitro to investigate the antiallergic mechanisms.

Results: Topical instillation of AEC-CM significantly attenuated the clinical symptoms of EAC, with a significant decrease in inflammatory cell frequency, TNF-α, IL-1β and IL-4 production, NF-κB expression, and IgE release in serum. *In vitro*, AEC-CM treatment also decreased the production of IL-4 and IgE, the enrichment and activation of MCs, and the hyperpermeability of conjunctival vessels. AEC-CM show relative high expression of IL-1RA and IL-10, compared with conditioned medium of human embryonic fibrocytes. The AEC-CM–mediated antiallergic effects during EAC were abrogated when neutralizing with IL-1RA and IL-10 antibody. Topical instillation of IL-1RA and IL-10 also significantly attenuate EAC.

Conclusions: Our findings provide fascinating evidence that AEC-CM inhibits EAC through IL-1 RA-dependent antiallergic mechanisms and support the instillation of AEC-CM as a novel strategy for treating allergic conjunctivitis.

PO-438

羊毛甾醇合酶协同 ERS-UPR 信号通路参与维持晶状体稳态的机制研究

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目的：白内障作为全球致盲率最高的眼部疾病，可认为是由于晶状体蛋白质错误折叠造成蛋白质高级结构改变，影响蛋白质相互作用，最终导致蛋白质聚集和沉淀，造成晶状体浑浊。因此，研究白内障相关的发病机制，探寻非手术方式治疗白内障具有重要意义。本研究团队前期发现并确 LSS 基因是白内障致病基因。LSS 主要定位于细胞内质网，而且参与晶状体内蛋白质错误折叠的调控功能。因此我们探讨在胁迫应激条件下，LSS 是否会协同内质网应激-未折叠蛋白应答（ERS-UPR）信号通路维持晶状体正常生理功能及其分子调控机制。
方法：本实验以临床白内障患者晶状体、房水等为研究材料，探寻 LSS 参与调控晶状体内蛋白质稳态，维持正常生理功能的线索。进而设计 UVB 辐照、H2O2 氧化应激、热激胁迫、 血清饥饿、低氧胁迫、亚砷酸盐处理、ERS-UPR 相关应激胁迫因子等胁迫应激条件，模拟白内障疾病诱导因素。以晶状体上皮细胞或 iPSCs 诱导分化的再生晶体为材料，调控 LSS 的转录表达情况或其酶活产物羊毛甾醇的含量，通过实时定量 PCR、Western-Blot、免疫荧光、免疫沉淀及蛋白质质谱等技术方法，重点研究 LSS 协同 ERS-UPR 信号通路调控晶状体内蛋白质稳态、维持正常生理功能的分子机制。
结果：实验结果表明 LSS 与白内障疾病的发展具有相关性，且上调 LSS 的转录表达水平或提高细胞内羊毛甾醇含量，可以提高细胞活力，并在胁迫应激条件下，维持晶状体的蛋白质稳态及生理活性；LSS 作为 ERS-UPR 信号通路的上游调控子，协同 ERS-UPR 信号通路参与晶体蛋白的稳态调控。
结论：LSS 基因在白内障疾病中可协同 ERS-UPR 信号通路参与晶体的稳态调控，具有重要分子调控机制及生理病理机制，为蛋白异常聚集造成的白内障、神经退行性病变等老年疾病的预防和治疗提供新的思路和策略。

PO-439

IL-6 通过激活 JAK/STAT3 和 NF-κB 信号通路促进视网膜色素上皮细胞转分化和细胞外基质合成

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目的 探讨增殖性糖尿病性视网膜病变、增殖性玻璃体视网膜病变和湿性黄斑变性等病变引发的炎症中炎症因子白介素-6（IL-6）对视网膜色素上皮细胞发生上皮间质转分化（EMT）及细胞外基质（ECM）合成的影响及机制。**方法** 20 μg/L IL-6 刺激 RPE 细胞不同时间（0、12、24、36、48h）后，qRT-

PCR 和 Western-blot 方法检测上皮间质转分化特异性指标 α-平滑肌肌动蛋白(α-smooth muscle actin，α-SMA)，细胞外基质主要成分 I 型胶原纤维（Type I collagen fiber，COL-I）和纤维连接蛋白（fibronectin，Fn）和转化生长因子 β2 (TGF-β2) mRNA 及蛋白的表达以及 p-STAT3 和 p-IκBα 活化。进而分别使用 JAK/STAT3 及 NF-κB 信号通路的特异性抑制剂，观察 α-SMA、COL-I、Fn 和 TGF-β2 mRNA 及蛋白的表达变化以及 NF-κB 和 JAK/STAT3 信号通路激活标志 p-STAT3 和 p-IκBα。**结果** RPE 细胞经 20 μg/L IL-6 刺激后，α-SMA、Fn、COL-I、TGF-β2、p-STAT3 和 p-IκBα mRNA 及蛋白的表达明显增加，且这种作用随 IL-6 处理时间增加而增强。NF-κB 信号通路的抑制剂能有效抑制 IL-6 诱导的 RPE 细胞中 α-SMA、Fn、COL-1 和 TGF-β2 mRNA 和蛋白的表达同时增加了 p-STAT3 表达。JAK/STAT3 信号通路的抑制剂能有效抑制 IL-6 诱导的 RPE 细胞中 α-SMA、Fn、COL-1 和 TGF-β2 mRNA 和蛋白的表达同时增加了 p-IκBα 表达。**结论** IL-6 能通过激活 JAK/STAT3 及 NF-κB 信号通路促进 RPE 细胞转分化和 ECM 合成及 TGF-β2 的表达，且两条信号通路可能协同发挥作用，可能在眼底炎症性疾病致瘢痕化过程中起重要作用。

PO-440

Prevalence and Risk Factors of Refractive Error: A Cross-Sectional Study in Han and Yi Adults in Yunnan, China

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Background: Few studies have investigated the prevalence of refractive error (RE) in older adults in China, and most have focused on East China. Our study determined the prevalence and risk factors of RE in Han and Yi adults aged 40-80 years in rural and urban areas in Yunnan Province, Southwest China.

Methods: Our cross-sectional study is part of the China National Health Survey (CNHS). The age-adjusted prevalence rates of RE in Han and Yi adults aged 40-80 years in Yunnan were compared. We used a multivariate logistic regression model to identify risk factors for myopia and hyperopia.

Results: Among 1626 participants, the age-adjusted prevalence rates of myopia, hyperopia, high myopia and astigmatism were 26.35% (95%CI 24.01%-28.70%), 19.89% (95%CI 18.16%-21.61%), 2.64% (95%CI 1.75%-3.53%), and 56.82% (95%CI 54.31%-59.34%). Compared to the Yi population, the Han population had higher prevalence of myopia (31.50% vs 16.80%, p<0.0001), high myopia (3.34% vs 1.31%, p=0.049) and astigmatism (60.07% vs 50.67%, p=0.026) but lower prevalence of hyperopia (16.58% vs 27.37%, p<0.0001). In the multivariate logistic regression,

individuals aged 45-49 (p<0.001), 50-54 (p<0.001), 55-59 (p=0.014), and 60-64 years (p=0.005) had a lower myopia risk than those aged 40-44 years, and individuals aged 50-54 (p=0.002), 55-59, 60-64 and 65 years and older (all p<0.001) had a higher hyperopia risk than those aged 40-44 years. Myopia was also associated with height (p=0.035), time spent in rural areas (p=0.014), undergraduate/graduate education level (p=0.001, compared with primary school or lower education level) and diabetes (p=0.008). The Yi population had a higher risk of hyperopia than the Han population (p=0.025). Moreover, hyperopia was related to time spent in rural areas (p<0.001) and pterygium (p=0.019).

Conclusions: Our study investigated the overall prevalence of RE in older adults in rural and urban areas of Southwest China. Compared to the Yi population, the Han population had a higher prevalence of myopia, high myopia and astigmatism but a lower risk of hyperopia. The prevalence of myopia in the Han population in underdeveloped Southwest China was similar to that of residents in East China or of Chinese Singaporeans under urban or rural settings.

PO-441

Stereoacuity and related factors in healthy preschool children: The Nanjing Eye Study

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Purpose: To assess the distribution of stereoacuity and related factors in healthy preschool children aged 48 to 60 months in eastern China.

Methods: Preschool children without any neurological problems or ophthalmological abnormalities completed comprehensive eye examinations performed by a team composed of ophthalmologists and optometrists, including visual acuity (VA), ocular alignment and movements, cycloplegic refraction, axial length, interpupillary distance, Titmus stereotest, anterior segment and fundus examination. Multivariate linear regression model was used to determine the factors associated with stereoacuity score and logistic regression model was used to determine the factors associated with subnormal stereoacuity (worse than 40 arc seconds).

Results: Among 942 healthy preschool children (mean age = 55 months), the mean (SD) stereoacuity was 81 (2.3) arc seconds with majority (76.5%) worse than 40 arc seconds. In the

multivariate analysis, older age (*P* = 0.001) and better presenting visual acuity (PVA) (*P* = 0.01) were independently associated with better stereoacuity score. Older age was also associated with low risk of subnormal stereoacuity (OR = 0.37, *P* < 0.001 for age 57 - 60 months compared to age 48 - 51 months).

Conclusions: The maturation of stereopsis has not completed by the age of 48 to 60 months. Age and PVA should be taken into account when evaluating stereopsis in healthy preschoolers. The significant associations of age and PVA with stereoacuity provide valuable insights into possible intervention for healthy preschool children with poor stereoacuity.

PO-442

病理性近视中脉络膜毛细血管层及脉络膜全层的特征性改变及相互关系

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目的：研究病理性近视中脉络膜毛细血管层及脉络膜全层的特征性改变及相互关系。

方法：前瞻性研究。24 例正视、49 例单纯性高度近视及 21 例病理性近视患眼纳入研究。通过自行开发的软件分析利用血流光学相干断层扫描成像技术（OCT/OCTA）获得的眼底图像，测量黄斑区脉络膜全层厚度，脉络膜毛细血管层的血管密度，上述指标将分别反映脉络膜总体血供及毛细血管层血流灌注。

结果：本研究中正视组、单纯性高度近视组、病理性近视组的黄斑区脉络膜全层厚度分别为 262.59±57.18、158.78±49.04 和 74.51±14.66μm，三组之间存在显著的统计学差异（P<0.001）。三组的黄斑区脉络膜毛细血管层血流密度分别为 63.51±5.65、60.95±3.92 和 60.33±5.66%，仅单纯性高度近视组和病理性近视组相对于正视组存在显著的下降（P<0.04）,而三组之间及单纯性高度近视组和病理性近视组之间不存在显著的统计学差异（P>0.05）。与眼轴的相关性分析中发现，脉络膜毛细血管层血流密度与脉络膜全层厚度均与眼轴存在显著的相关性，且眼轴与脉络膜全层厚度（r=-0.715，P<0.001）的相关性显著强于脉络膜毛细血管层血流密度（r=-0.223，P=0.031）。与最佳矫正视力的相关性分析中，最佳矫正视力与脉络膜全层厚度的相关性（r=-0.529，P<0.001）也强于脉络膜毛细血管层血流密度（r=-0.254，P=0.013）。脉络膜全层厚度与脉络膜毛细血管层血流密度之间不具有相关性（P=0.187）。

结论：脉络膜全层厚度和脉络膜毛细血管层血流密度在单纯性高度近视及病理性近视患者中下降，两者与眼轴、最佳矫正视力均具有相关性，且脉络膜全层厚度改变与眼轴和最佳矫正视力的相关性较脉络膜毛细血管层血流密度更强。脉络膜全层厚度和脉络膜毛细血管层血流密度不具有相关性。

PO-443

231 例葡萄膜炎临床分析

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【摘要】目的 分析葡萄膜炎临床类型、病因及预后。**方法** 对 2012 年 1 月至 2017 年 9 月我院诊治的 231 例葡萄膜炎患者的临床资料进行回顾性分析。**结果** 231 例葡萄膜炎患者中，男性 124 例，女性 107 例，男女比例 1.16:l，患者平均年龄（43.9±17.5）岁；汉族 93 例(40.26%)，维吾尔族 101 例（43.7%），其他 37 例（16.01%）。按解剖位置分类，前葡萄膜炎 138 例（59.74％），中间葡萄膜炎 11 例（4.76％），后葡萄膜炎 25 例（10.82％），全葡萄膜炎 57 例（24.68％）。能够确定病因或归于特定类型的患者 109 例（47.19％），其余为特发性葡萄膜炎 122 例(52.81%)。**结论** 葡萄膜炎多发于青壮年，男性整体上稍多于女性，少数民族整体多于汉族。就诊后很大一部分患者因伴随眼部并发症视力不理想。除特发性葡萄膜炎外，以强直性脊柱炎、VKH 综合征、Behçet 病所致的葡萄膜炎最为常见

PO-444

联合应用 Corvis ST 和 Pentacam 角膜地形图诊断圆锥角膜

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目的：探讨可视化角膜生物力学分析仪（Corvis ST）联合 Pentacam 角膜地形图在圆锥角膜诊断中的意义
方法：圆锥角膜患者 34 例（60 眼）,根据病情分为亚临床期圆锥角膜（ SKC）组(19 眼)和临床期圆锥角膜（KC）组（41 眼）.选取同时期在本院屈光中心接受角膜屈光手术的近视患者 30 例（60 眼）作为对照组。每只眼均采用 Corvis ST、Pentacam 角膜地形图测量三次，得到 DA 比（2mm）、综合半径、中央水平截面 Ambrosio 相关厚度（ARTh）、刚性指数（SP-A1）、CBI、TBI 及 Belin/Ambrosio 综合偏差值（BAD-D）7 个参数。采用方差分析、秩和检验对数据进行统计分析，依据受试者工作特征曲线（ROC）探寻各参数诊断阈值，再根据曲线下面积（AUC）评估参数的诊断价值
结果：SKC 组 BAD-D、TBI 高于对照组，两组间 DA 比、综合半径、ARTh、SP-A1、CBI 无统计学意义；KC 组 DA 比、综合半径、CBI、BAD-D、TBI 均高于对照组（$P<0.001$），ARTh、SP-A1 低于对照组（$P<0.001$）。在 SKC 组，TBI、BAD-D、综合半径具有中等诊断效果，其 AUC 分别为 0.815、0.751、0,653；在 KC 组，BAD-D、CBI、综合半径、TBI、DA 比具有良好诊断效率，其 AUC 分别为 1.000（敏感度为 100%，特异度为 100%）、0.989、0.964、0.962、0.929
结论：TBI 对亚临床期圆锥角膜的诊断效率最高，其次是 BAD-D,而 CBI 对亚临床期圆锥角膜诊断效率不高；BAD-D、CBI 和 TBI 对临床期圆锥角膜都有良好诊断效果。

PO-445

Integration of Scheimpflug-Based Biomechanical Assessments and Corneal Tomography for Enhancing Keratoconus Detection

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ABSTRACT Objective to investigate the role of integrating corneal visualization Scheimpflug technology (Corvis ST) and corneal tomography in the diagnosis of keratoconus. **Methods** In this case-contral study, twenty-one eyes with the diagnosis of subclinical keratoconus (SKC group), forty-two eyes keratoconus (KC group) and sixty normal eyes (control group) were included. Tomography and biomechanical parameters of all eyes were obtained with the Pentacam HR and Corvis ST (Oculus Optikgerate GmbH, Wetzlar, Germany), respectively. BAD-D, TBI (tomographic and biomechanical index) and CBI (Corvis biomechanical index) were compared between the KC group, SKC group and normal group. An ANOVA, Kruskal-Wallis H rank sum test were used. The receiver operating characteristic (ROC) curves were plotted to distinguish keratoconus and subclinical keratoconus from the normal eyes. **Results** BAD-D and TBI were significantly different between the SKC group and the control group(P<0.05 for each parameters).The cut-off points of BAD-D , TBI were 2.44 and 0.58, respectively. For these two parameters, the AUC values were 0.759 and 0.804 . Three parameters were significantly different between the KC group and the control group (P<0.001 for each parameters). The cut-off points of BAD-D , CBI and TBI were 3.77, 0.97 and 0.99, respectively. For these three parameters, the AUC values were 1.000 , 0.988 and 0.950 , respectively. **Conclusions** The TBI was the highest sensitivity for detecting subclinical keratoconus, secondly was BAD-D, but CBI was not. And BAD-D, TBI, CBI have good diagnostic value for keratoconus.

PO-446

二代眼反应分析仪在健康人低度和高度散光波形分析的应用

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目的应用二代眼反应分析仪（ORA）控制潜在混杂因素后对比分析健康人低度（柱镜<1.0 D=LA）和高度角膜规则散光（柱镜>2.5 D=HA）的生物力学波形参数差异。**设计**病例对照研究。**研究对象** **2018** 年 1 月至 2018 年 12 月我院眼科中心就诊的角膜低度规则散光者 125 例 200 眼、角膜高度规

则散光者 15 例 22 眼。**方法**应用二代 ORA 收集两组病例角膜滞后量（CH）、角膜阻力因子（CRF）及 37 项角膜生物力学波形参数。对组间参数差异比较采用 t 检验。调整角膜中央厚度、性别及年龄控制潜在混杂影响后将各参数纳入多重回归模型，采用逐步回归法分析选择最具价值的两组间差异性参数。**主要指标**两组病例角膜滞后量（CH）、角膜阻力因子（CRF）及 37 项角膜生物力学波形参数。**结果**控制混杂因素影响后，平均 CRF 在 LA 组和 HA 组分别为（10.0±1.8）mmHg（1mmHg=0.133KPa）和（9.7±1.5）mmHg，差异无统计学意义（P＝0.41）。平均 CH 在 LA 组和 HA 组分别为（10.6±1.5）mmHg 和（10.4±1.6）mmHg，差异无统计学意义（P＝0.53）。只有参数 aspect1 在 LA 组和 HA 组分别为（19.1±5.2）和（16.5±3.8），组间差异性上具有价值（P＝0.03）。**结论**低度和高度角膜规则散光组间角膜生物力学波形差异无统计学意义。因此，圆锥角膜和正常角膜的波形差异原因是角膜生物力学变化而非形状改变。ORA 在诊断圆锥角膜具备一定的特异性。

PO-447

青少年航空学校学生三年近视发病率 及影响因素的研究分析

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目的：研究空军青少年航空学校学生三年的屈光度变化及近视发病率，并探讨影响近视发生的相关因素。

方法：本研究是一项为期三年高中非近视学生近视发病率的前瞻性队列研究。主要的纳入标准为：14-16 岁男性初中毕业生，双眼裸眼视力≥1.0，双眼散瞳后等效球镜值（Spherical Equivalent Refraction, SER ）在大于等于-0.25 Diopter（D）至小于等于+2.00 D 范围内。入组前及三年后对其进行视力、散瞳检影验光等全面的眼科检查，并完成问卷调查。本次研究抽取 522 名学生的数据进行分析，该 522 名学生分别来自位于 15 个城市的 16 所青少年航空学校。

结果：高中三年 **27.01%**的学生发生近视（SER ≤ -0.5 D），-0.50~0 D 组学生近视发病率为 52.67%，+0.01~+0.50 D 组为 26.99%，+0.51~+1.00 D 组为 8.94%，+1.01~+1.50 组及+1.51~+2.00 组为 0%，各组间存在显著差异（**P<0.05**）。+1.51~+2.00D 学生三年屈光变化最大，近视化屈光进展增快（**P<0.05**）。户外活动时间、近距离读写时间、近距离读写距离为近视发病率的影响因素（**P=0.006, P_{trend}=0.002; P=0.001, P_{trend}=0.001; P=0.032**）。父母近视、小学入学年龄、室内活动时间、偏食与否、睡眠时间不是近视发病率的明显影响因素。

结论：非近视高中生入学屈光**基线值**越低越容易发生近视，但轻度远视学生向近视屈光进展增快。**近距离读写时间**及**读写距离**为近视发病的危险因素，**户外活动时间**为近视发病的保护性因素。

PO-448

Prevalence of and risk factors for refractive error: a cross-sectional study in Han and Mongolian adults aged 40 to 80 years in Inner Mongolia, China

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Objectives: To assess the prevalence of and risk factors for refractive error (RE) in Han and Mongolian adults aged 40-80 years in Inner Mongolia in China and to identify ethnic differences in RE between these populations.

Methods: Our cross-sectional study is part of the China National Health Survey (CNHS). The age-adjusted prevalences of RE in Han and Mongolian adults aged 40-80 in Inner Mongolia were compared. A multivariable logistic regression model was used to identify risk factors.

Results: Among 2090 people, the age-adjusted prevalences of myopia (SE<-0.5D), hyperopia (SE>0.5D), high myopia (SE<-6.0D) and astigmatism (cylinder≥0.5 D) were 29.4% (95% confidence interval (CI), 27.4-31.3%), 28.4% (95% CI, 26.4-30.5%), 3.6% (95% CI, 2.8-4.4%), and 65.9% (95% CI, 63.9-67.9%), respectively. The age-adjusted prevalence of myopia in the Han population was higher than that in the Mongolian population (31.8% vs. 23.0%, p<0.001), but the prevalence of hyperopia was lower (25.8% vs. 35.3%, p=0.002). In the multivariable logistic regression, ethnicity was associated with myopia (p=0.001) and hyperopia (p=0.001). Myopia was also associated with age, time spent in rural areas (p<0.001) and middle/high school and undergraduate/graduate education levels (p=0.027 and p<0.001, respectively, compared with lower education levels). Additionally, age, height (p=0.015) and pterygium (p=0.014) were associated with hyperopia.

Conclusions: Ethnicity is closely related to RE in Inner Mongolia in mainland China. Our study investigates differences in prevalence of and risk factors for RE between the Han and Mongolian populations, which could not be explained by differences in the risk factors investigated in this study.

PO-449

Macular microvasculature features before and after vitrectomy in idiopathic macular epiretinal membrane: an OCT angiography analysis

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Purpose
To evaluate pre-operative and post-operative morphologic characteristics in idiopathic macular epiretinal membrane (ERM) by optical coherence tomography angiography (OCTA).
Methods
Thirty-three subjects with unilateral idiopathic ERM were enrolled and the contralateral eyes served as controls. Vascular parameters including superficial capillary plexus (SCP), deep capillary plexus (DCP), outer capillary plexus (OCP) and choroidal capillary plexus (CCP) were evaluated by OCTA.
Results
The superficial foveal avascular zone (FAZ) was significantly smaller in eyes with ERM (P< 0.0001). The vessel densities (VDs) were significantly increased in the fovea but dramatically decreased in the parafovea in SCP and DCP of ERM eyes (all P< 0.0001), in contrast to those in OCP and CCP. The blood flow was augmented in OCP but declined in choroid compared with the controls. In CCP, the mean foveal VD in ERM was significantly smaller (P = 0.023), whereas parafoveal VD did not significantly change (P = 0.66). At 6 months after surgery, flow area was decreased in OCP (P = 0.0007), and foveal and parafoveal VDs were significantly altered in all layers except the foveal VD in OCP and the choroid (all P<0.05). The total and inner retinal thickness of the fovea and parafovea were correlated with pre- and post-operative visual outcomes, respectively. Smaller FAZ and greater interocular differences between post-operative and fellow eyes in FAZ were associated with worse post-operative visual outcomes.
Conclusions
OCTA provides a better display of the vascular network of the retina and choroid to evaluate the severity and surgical prognosis of ERM patients.

PO-450

成年人不同显微眼外肌手术后 眼屈光状态及角膜形态变化的临床观察

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目的：
探讨成年患者不同术式的显微眼外肌术后角膜不同直径范围曲率、屈光度的变化。
方法：

显微眼外肌术患者 62 例（85 眼），年龄 18-43 岁。按手术方式分为水平直肌手术：Ⅰ组（单纯后徙组）、Ⅱ组（单眼一条直肌后徙联合其拮抗肌截除组）、下斜肌手术：Ⅲ组（单眼下斜肌断腱组）、Ⅳ组（下斜肌转位组）。分别于术前与术后 1 天、1 周、1 月行主观验光获得屈光度，角膜地形图采集角膜前表面（0~3mm、5mm、7mm）曲率值，比较各组内不同时间点患者屈光状态及角膜形态动态变化，并进行统计学分析。
结果：

1.角膜曲率：Ⅰ组术后 1 天与术前比较直肌后徙侧距角膜顶点 0~3 mm、5mm 区角膜曲率增大，对侧角膜曲率变小，差异有统计学意义（P＜0.01）；术后 1 周与术前比较差异有统计学意义（P＜0.05）。Ⅱ组术后 1 天与术前比较眼肌后徙侧距角膜顶点 0~3mm、5mm 区角膜曲率增大，截除侧角膜曲率变小，差异有统计学意义（P＜0.01）；术后 1 周与术前比较差异有统计学意义（P＜0.05）。两组术后 1 月较术前差异无统计学意义（P＞0.05）。Ⅲ组、Ⅳ组角膜曲率术后各时间点较术前有不同程度的改变，差异无统计学意义（P＞0.05）。各组 7mm 区角膜曲率差异无统计学意义（P＞0.05）。

2.屈光度：Ⅰ组及Ⅱ组术后 1 天、1 周与术前比较呈屈光指数性近视变化，散光度增加，差异有统计学意义（P＜0.001）；术后 1 月较术前差异无统计学意义（P＞0.05）。Ⅲ组、Ⅳ组术前术后不同时间点比较差异无统计学意义（P＞0.05）。
结论：
1.不同术式对角膜曲率的改变：水平直肌术后短期可导致水平角膜曲率改变，此仅限于角膜中央 5mm 区内，基本在术后 1 月恢复至术前水平。下斜肌术后对角膜曲率无明显影响。
2.不同术式对屈光状态的影响：水平直肌术后早期散光值增加；并出现近视移位，在术后 1 月恢复至术前水平。下斜肌术后球镜度，散光值无明显变化。

PO-451

病理近视后巩膜葡萄肿合并黄斑裂孔视网膜脱离手术前后影像观察(附手术视频）

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目的 观察后极部视网膜光凝联合黄斑旁内放液在伴有后巩膜葡萄肿的高度近视黄斑裂孔性视网膜脱离（MHRD）玻璃体视网膜手术中应用的临床疗效。**方法** 眼轴≥30mm，存在明显脉络膜视网膜色素上皮萎缩并伴有后巩膜葡萄肿的高度近视 MHRD 患者 例 只眼纳入研究。采用玻璃体切割术，术中以曲安奈德（TA）染色，剥除视网膜前膜，吲哚青绿（ICG）染色，剥除后极部黄斑区内界膜，激光封闭视网膜赤道及周边变性区，排出视网膜下液后硅油填充。常规手术组于黄斑裂孔处排出视网膜下液；PE 手术组于后极部巩膜葡萄肿，即脉络膜视网膜萎缩斑边缘行视网膜光凝，并在距黄斑区 3PD 以上后极部视网膜颞侧造孔、排出视网膜下液，激光封闭人造孔。两组硅油取出时间相比，差异无统计学意义。硅油取出术后 3,6,12 个月，观察两组矫正视力、视网膜复位情况及黄斑裂孔闭合情况。**结果** 硅油取出术后 3 个月常规手术组，PE 手术组患者术后平均视力为 ，视网膜复位率 ，黄斑裂孔复位率 ，统计学差异 。硅油取出 6 个月后常规手术组，PE 手术组患者术后平均视力为 ，视网膜复位率 ，黄斑裂孔复位率 ，统计学差异 。硅油取出 12 个月后常规手术组，PE 手术组患者术后平均视力为 ，视网膜复位率 ，黄斑裂孔复位率 ，统计学差异 。**结论** 后极部视网膜光凝联合黄斑旁内放液在治疗伴有后巩膜葡萄肿的高度近视黄斑裂孔性视网膜脱离的玻璃体视网膜手术中操作简单，与常规玻璃体视网膜手术相比，可提高黄斑裂孔闭合率及视网膜复位率，且效果长期稳定。

PO-452

Long-term follow-up of heteroepikeratophakia with lenticule from rhesus monkeys

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[Objective] To evaluate the long-term efficacy of heteroepikeratophakia (HEP) with lenticule from rhesus monkeys.
[Methods] A 43-year-old man underwentextracapsular cataract extraction without IOL implantation for traumatic cataract in the left eye 26 years ago. HEP was performed 2weeks later, and the lenticule from rhesus monkeys was +10.0D. The patient received 26 years follow-up observation for transparency of the lenticule, thickness of cornea, visual acuity and dry eye measures.
[Results] One month after HEP re-epithelialization was completed and the lenticuleturned to transparentwhile the CDVA was 20/25. Six months after HEP the lenticule remained transparent and the CDVA was stable as 20/25. 14 years after the HEP procedure, the UDVA was 20/80 and the CDVA was 20/33 while the lenticule was transparent.26 years after HEP, the UDVA was 20/100 and the manifest refraction was +4.50-1.25*120 (20/33). The cornea and the lenticule remained transparent with a clean interface while the thickness of cornea was 864um.

Non-invasive average tear breakup time was 4.52s, however, the OSDI questionnaire score was 9 points while the morphology and the secretion of meibomian glands were normal.
[Conclusions] This long-term follow-up suggested HEP was safe, effective and stable, and it provided a theoretical basis of femtosecond laser lenticule transplantationin further.

PO-453

雷珠单抗联合全视网膜光凝治疗缺血型视网膜中央静脉阻塞的临床疗效观察

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目的 研究与探讨雷珠单抗联合全视网膜光凝(PRP)治疗缺血型视网膜中央静脉阻塞(CRVO)的效果.方法 选取 2016 年 7 月至 2018 年 7 月于我院诊治的缺血型 CRVO 患者 80 例(80 眼),并采用随机数字表法分为观察组和对照组,每组各 40 例 40 眼,根据发病时间再将两组患者各分为两个亚组,Ⅰ组病程≤3 个月,Ⅱ组病程＞3 个月,观察Ⅰ、Ⅱ组采用玻璃体内注射雷珠单抗(IVR)+PRP 治疗,对照Ⅰ、Ⅱ组采用单独 PRP 治疗,比较 4 组玻璃体腔中血管内皮生长因子(VEGF)水平,并检查记录 IVR 前、PRP 时及 PRP 后 1 周、3 个月、6 个月最佳矫正视力(BCVA)、黄斑中心凹视网膜厚度(CMT),同时观察患者的术后并发症及复发率.结果 观察Ⅰ组和观察Ⅱ组 PRP 时玻璃体液中 VEGF 浓度较 IVR 前下降,且其下降的浓度显著低于对照Ⅰ组、对照Ⅱ组,组间差异均有统计学意义(P＜0.05);观察Ⅰ组 PRP 时及 PRP 后 1 周、3 个月、6 个月ⅡBCVA 均优于对照Ⅰ组,观察Ⅱ组优于对照Ⅱ组(P＜0.05),且观察Ⅰ组与观察Ⅱ组、对照Ⅰ组与对照Ⅱ组比较,差异均有统计学意义(P＜0.05);观察Ⅰ组 PRP 后 1 周、3 个月、6 个月 CMT 均显著低于对照Ⅰ组,观察Ⅱ组低于对照Ⅱ组(P＜0.05),但观察Ⅰ组与观察Ⅱ组、对照Ⅰ组与对照Ⅱ组组内各时间点比较,差异均无统计学意义(P＞0.05);观察Ⅰ组未出现黄斑水肿复发,对照组Ⅰ术后黄斑水肿复发率为：1.05%，观察Ⅱ组、对照Ⅱ组黄斑水肿复发率分别为 5.26%、9.52%,4 组比较差异无统计学意义(P＞0.05);4 组均未出现严重不良反应.结论 早期采用 IVR 联合 PRP 治疗缺血型 CRVO 治疗效果较好，可有效改善患者最佳矫正视力及黄斑区视网膜厚度以及减少玻璃体腔内 VEGF 浓度。

PO-454

血管成像 OCT 观察微脉冲治疗 RVO-ME 的临床疗效

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目的：使用 OCTA 观察眼内注药联合治疗视网膜静脉阻塞继发性黄斑水肿的临床疗效；方法：经荧光素眼底血管造影及光学相干断层扫描血管成像检查确诊的 RVO 患者 60 例 60 只眼纳入研究.采用非随机自愿法将患者分为对照组眼内注曲安奈德，实验组微脉冲联合曲安奈德,各为 30 只眼.收集治疗术前与术后 1W、1 月、3 月最佳矫正视力；眼压；OCTA 观察视网膜的相关变化指标：黄斑中心厚度、黄斑区脉络膜血流、黄斑区无灌注区面积等。结果：对照组与实验组与治疗前比较，在术后 1 周、1 月、3 月视力都有所提高，二组术前与术后的 BCVA 比较，差异有统计学意义（P＜0.05），但二组组间比较，差异无统计学意义（P>0.05）；二组患者的黄斑区的厚度对照组与实验组术前与术后 1 周、1 月、3 月，差异有统计学意义（P＜0.05）；组间比较：术后一周，差异无统计学意义（P>0.05），术后 1 月、3 月，差异有统计学意义（P＜0.05）；二组患者的黄斑区无灌注区面积治疗前后，差异均有统计学意义（P＜0.05）；二组组间比较，差异无统计学意义（P>0.05）。二组患者的黄斑区脉络膜血流较治疗前均有所改善，治疗前后差异均有统计学意义（P＜0.05）；二组组间比较：差异无统计学意义（P>0.05）。结论：1.黄斑区无灌注区的面积及脉络膜的血流等指标与患者的预后有一定关联性，OCTA 能够作为评估患者的病情及预后发展的有效工具；2.曲安奈德组与微脉冲联合治疗组对静脉阻塞性黄斑水肿均有一定的疗效，但在控制黄斑水肿的稳定程度上，微脉冲联合治疗组的疗效更为显著。

PO-455

Spectral-Domain Optical Coherence Tomography Outcomes of Different Skills in Vitrectomy for Lamellar Macular Holes

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Objective we aim to observe the outcomes of new techniques repair of different types of Lamellar macular holes.

Methods 44 eyes with LMHs underwent Pars plana Vitrectomy (PPV) to treat LMH. PPV combined ILM peeling were used in 28 eyes with Tractional type, LHEP flap insertion and autologous blood clot without ILM peeling were used in 16 eyes with degenerative type LMHs.

Result The closure rate was 100% for Group 1 and Group 2. The mean central foveal thickness recovered from 193.67±60.29 mm pre-op to 226.61±70.49 mm at the final visit post-op (*P* = 0.146) for Group 1. The mean CFT± SD recovered from 124.00±36.86 mm pre-op to 200.1±58.78 mm at the final visit post-op (P = 0.005,) in Group 2.

Conclusion PPV with LHEP flap insertion and ABC could improve anatomic and visual outcomes in the treatment of degenerative LMHs, and PPV with ILM peeling could recover tractional type LMHs.

PO-456

中晚期原发性青光眼黄斑区神经节细胞-内丛状层厚度与视野缺损之间的相关性研究

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目的：探究中晚期青光眼病人视盘以及黄斑的结构参数与视野的相关性。
方法：收集 2016.11-2017.5 在四川大学华西医院眼科确诊为中期和晚期的原发性青光眼（不包括原发性急性闭角型青光眼）患者 30 例（39 只眼），其中男性 16 人，女性 14 人， 年龄 40~60 岁;另在门诊收集同年龄段、健康无眼病者 20 例（40 眼），男性 8 人，女性 12 人。应用 Octopus900 自动视野计对原发性青光眼患者进行视野检查及光学相干断层扫描仪（OCT）检测的操作，检测视网膜结构参数为黄斑区神经节细胞-内丛状层（GCIPL）厚度和视盘周围视网膜神经纤维层(RNFL)厚度。所得数据用 IBM SPSS Statistics21.0 统计软件处理，分别对 RNFL 和视野平均缺损（MD）、GCIPL 和 MD 进行散点图绘制，并进行 Pearson 双变量直线相关分析。
结果：39 只中晚期青光眼视野的 MD 为（15.9±7.9）dB，视盘周围平均 RNFL 为（67±15.9）μm，黄斑区平均 GCIPL 为（63.5±15.2）μm，较正常组的 RNFL（101.6±7.7）μm 及 GCIPL（85.6±5.6）μm 均明显变薄，差异有统计学意义（t=12.2,P＜0.001；t=6.9,P＜0.001）。 Pearson 双变量相关分析显示：中晚期青光眼病人视野的 MD 值与视网膜结构指数（RNFL、GCIPL）分别有负相关性，相关系数依次为（r=-0.401，P=0.011；R=-0.604，P＜0.001）；据总体相关系数假设检验的统计值计算公式，得 P<0.05。因此可以认为 GCIPL 与 MD 的相关性强于 RNEL 与 MD 的相关性。
结论：青光眼病人的视野参数与视网膜结构参数呈负相关；对于中晚期青光眼病人，黄斑区平均 GCIPL 与视野的相关性比 RNFL 与视野的相关性强，应关注患者黄斑区 GCIPL 厚度变化，来追踪和评估青光眼病情的变化。

PO-457

原发性青光眼患者睡眠障碍的现况调查及机制分析

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目的: 调查慢性原发性青光眼（cPG）患者的睡眠情况；并进一步分析 cPG 人群的睡眠质量与内源感光性神经节细胞（ipRGC）丢失之间的相关性。
方法: 按照纳入、排除标准收集 2016.10-2017.7 在四川大学华西医院眼科门诊确诊的 cPG 患者 104 例；另在体检中心收集正常人 41 例。所有纳入对象均接受眼科基本检查、视野检查、视盘和黄斑 OCT 检查等仪器检查，所有研究对象的睡眠质量通过匹兹堡睡眠质量指数（PSQI）量表进行评估，ipRGC 则通过神经节细胞内丛状层（GCIPL）厚度来评估。将青光眼和正常人分别按照 20 岁年龄间隔分为两组；再把同年龄段的青光眼患者按照视野平均缺损(MD)分为早、中、晚期组。数据的统计分析均使用 SPSS 软件处理，组间比较和双变量相关性分析均根据样本数据的分布特征选择合适的方法。
结果: 在 40-60 岁和 60-80 岁组中 cPG 患者睡眠障碍的发生率分别为 38%和 50%，相较于正常对照组发生率明显升高；cPG 患者的平均睡眠质量分数明显高于正常对照组，有统计学差异。各年龄段的中、晚期青光眼患者睡眠质量分数均明显高于正常组（P＜0.05），但早期青光眼患者的睡眠质量分数与正常组相比无统计学差异。青光眼患者睡眠质量分数与平均 GCIPL 厚度呈负相关，相关系数分别为-0.325 和-0.467。
结论: 慢性原发性青光眼患者睡眠质量变差、睡眠障碍发生率明显升高，其睡眠质量与 ipRGCs 丢失具有负相关性，推论青光眼在损伤经典 RGC 的同时亦会损伤 ipRGC，进而使 ipRGC 调节睡眠相关的非形觉功能遭到破坏，因此高发睡眠障碍。总之，临床医生在处理青光眼患者病情的同时，也应该关注其睡眠状况。对于需要干预的睡眠异常的青光眼患者，应该联合睡眠疾病相关的科室，根据该人群睡眠障碍发生的特殊机制为其提供合理的治疗。

PO-458

玻璃体切割联合内界膜剥除术治疗高度近视低视力黄斑视网膜劈裂症的临床观察

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目的：观察玻璃体切除术联合视网膜内界膜（ILM）剥除术治疗高度近视低视力黄斑视网膜劈裂症的临床效果。方法：接受玻璃体切除联合 ILM 剥除治疗的高度近视低视力黄斑劈裂（MF）患者 36 例 37 只眼纳入研究。其中，男性 5 例 5 只眼，女性 31 例 32 只眼；平均年龄(60．13±10．00)岁。所有患眼均行最佳矫正视力(BCVA)、屈光度、光相干断层扫描检查以及眼轴长度测量。根据患眼 OCT 影像特征将其分为单纯黄斑劈裂组(A 组)、黄斑劈裂伴中心凹脱离组(B 组)、黄斑劈裂伴板层黄斑裂孔组(C 组)，分别为 11、12、14 只眼。采用经睫状体平坦部三切口 25G PPV 联合 ILM 剥除，气液交换后，填充空气、硅油或平衡盐溶液。手术后随访时间 1 年。观察末次随访时患眼 BCVA 和黄斑中心凹结构情况；对比分析不同类型黄斑劈裂之间疗效差异。结果：末次随访时，37 只眼 BCVA、CFT 与手术前比较，差异均有统计学意义(P<0．05)。MF 愈合 33 只眼。3 组黄斑区椭圆体带完整分别为 8、2、12 只眼。B 组患眼 BCVA 低于 A、C 组，差异有统计学意义(P<0．05)；B 组患眼椭

圆体带完整率最低。C 组并发全层黄斑裂孔 1 只眼。3 种内填充物术后视力均改善，差异均有统计学意义(P<0．05)。结论：PPV 联合 ILM 剥除和玻璃体填充可有效治疗高度近视低视力黄斑劈裂；合并中心凹脱离患眼手术后 BCVA 和黄斑区外层结构最差

PO-459

2009-2017 年板层角膜移植术的原因分析

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目的 分析近年来青岛眼科医院板层角膜移植术（LKP）的手术原因及变化。 **方法** 收集 2009 年 1 月至 2017 年 12 月在我院接受 LKP 患者的病历资料，并与我院 2001-2008 年的数据进行比较。 **结果** 2009-2017 年间我院共行 LKP 537 例，其中男性 361 例，女性 176 例，平均年龄（34.8±20.1）岁。术前疾病依次为：感染性角膜炎（38.2%）、圆锥角膜（24.0%）、角膜变性与营养不良（10.2%）、角膜皮样瘤（9.3%）、蚕食性角膜溃疡（6.2%）、再次 LK（4.7%）、角膜白斑（3.0%）、角膜外伤（2.8%）及其他（1.6%）。2001-2008 年及 2009-2017 年两个时间段内，我院 LKP 首位的手术原因均为感染性角膜炎，在两个时间段内的比例差异无统计学意义（χ^2=1.200，P=0.273）。2009-2017 年间，圆锥角膜（χ^2=11.154，P=0.001）和角膜皮样瘤（χ^2=21.465，P=0.000）在 LKP 中所占的比例较 2001-2008 年增加；而再次 LKP（χ^2=4.351，P=0.037）和角膜外伤（χ^2=50.971，P=0.000）所占的比例下降，其差异均有统计学意义。角膜变性与营养不良、蚕食性角膜溃疡、角膜白斑和其他疾病在 LKP 中的差异均无统计学意义。**结论** 感染性角膜炎是我院 2009-2017 年 LKP 手术的首位原因，其余依次为圆锥角膜、角膜变性与营养不良和角膜皮样瘤。与 2001-2008 年相比，2009-2017 年间圆锥角膜和角膜皮样瘤在 LKP 中的比例增加，而再次 LKP 和角膜外伤的比例下降。感染性角膜炎、角膜变性与营养不良、蚕食性角膜溃疡、角膜白斑所占比例的差异无统计学意义。

PO-460

穿透性角膜移植手术适应证的回顾分析

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目的：回顾分析近年来青岛眼科医院穿透性角膜移植术（PKP）的手术适应证。**方法**：收集 2013 年 1 月至 2017 年 12 月在我院接受 PKP 所有患者的病历资料，并与 2005-2010 年在我院接受 PKP 患者的资料进行比较。**结果**：2013-2017 年间，我院共行 PKP 855 例，前五位的手术适应证依次为：化脓性角膜炎（35.4%）、再次角膜移植（15.4%）、圆锥角膜（15.2%）、病毒性角膜炎（13.5%）及大泡性角膜病变（6.8%）。2005-2010 年间，我院前五位的手术适应证依次为：化脓性角膜炎（37.1%）、病毒性角膜炎（19.1%）、圆锥角膜（11.2%）、大泡性角膜病变（8.5%）及再次角膜

移植（6.7%）。2005-2010 年及 2013-2017 年两个时间段内，我院 PKP 的首位手术适应证均为化脓性角膜炎，所占比例的差异无统计学意义（χ^2=0.543，*P*=0.461）。2013-2017 年间，再次角膜移植的比例较 2005-2010 年增加（χ^2=33.294，*P*=0.000），而病毒性角膜炎的比例下降（χ^2=6.397，*P*=0.011）。两个时间段中，圆锥角膜均是第三位的手术适应证，但 2013-2017 年圆锥角膜行 PKP 的比例较 2005-2010 年增加（χ^2= 6.061，*P*=0.014）。而大泡性角膜病变、角膜白斑、角膜变性及营养不良、角膜烧伤、免疫性角膜炎在 PKP 中的比例差异无统计学意义。**结论**：化脓性角膜炎是 2013-2017 年我院 PKP 的首位手术适应证，其余依次为再次角膜移植、圆锥角膜与病毒性角膜炎。与 2005-2010 年相比，2013-2017 年化脓性角膜炎在 PKP 中的比例无明显变化，圆锥角膜及再次角膜移植所占比例上升，而病毒性角膜炎的比例下降。

PO-461

再次角膜移植的原因分析

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目的：回顾性分析近年来青岛眼科医院再次角膜移植的原因及首次移植的原发病。
方法：对 2010 年 1 月 1 日至 2017 年 12 月 31 日在青岛眼科医院接受再次角膜移植患者的病历资料进行回顾性分析，分析再次行角膜移植的原因、首次行角膜移植的原发病以及同一眼不同时间接受角膜移植的手术方式。
结果：2010-2017 年间，我院共有 184 例患者（186 只眼）接受了再次角膜移植手术（196 例），其中男性 122 例，女性 62 例，平均年龄（48.32±14.31）岁；145 例患者（147 只眼）接受 2 次角膜移植，39 例患者（39 只眼）接受大于 2 次的角膜移植。196 例再次角膜移植术中，穿透性角膜移植术（PKP）173 例（88.3%），板层角膜移植术(LKP)23 例（11.7%）；与前一次角膜移植比较，两次术式均为 PKP 者 140 例(71.4%)，LKP 改 PKP 者为 33 例(16.8%)，两次术式均为 LKP 者 19 例(9.7%)，PKP 改 LKP 者 4 例(2.0%)。再次角膜移植的原因依次为角膜植片混浊（55.1%）、角膜植片溃疡（28.6%）、原发病复发（14.8%）及其他（1.5%）。首次行角膜移植的原发病依次为化脓性角膜炎（32.1%）、单纯疱疹病毒性角膜炎（15.8%）、圆锥角膜（7.1%）、角膜内皮功能失代偿（9.2%）、角膜白斑（5.6%）、角膜烧伤（6.6%）、角膜营养不良或变性（9.7%）、角膜破裂伤（6.1%）、蚕食性角膜溃疡（5.1%）及其他（2.6%）。
结论：再次角膜移植移植的主要原因是角膜植片混浊及角膜植片溃疡，首次角膜移植及再次角膜移植的主要手术方式均为 PKP。首次行角膜移植的原发病以感染性角膜炎为主，包括化脓性角膜炎及病毒性角膜炎。

PO-462

Indications for penetrating keratoplasty and lamellar keratoplasty from 2010 through 2017: A 8-Year Review

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Purpose: To review the indications of penetrating keratoplasty (PK) and lamellar keratoplasty (LK) at Qingdao Eye Hospital, Shandong Eye Institute, in recent years.
Methods: The data of all patients undergoing PK or LK from January 2010 to December 2017 was retrospectively reviewed, with the indications during 2010-2013 and 2014-2017 compared.
Results: A total of 1869 eyes were included, among which 1405 eyes (75.2%) had PK and 464 eyes (24.8%) had LK. The leading indications were suppurative keratitis (36.8%), keratoconus (15.5%), herpes keratitis (13.1%), and regraft (10.5%). The proportion of suppurative keratitis in eyes undergoing keratoplasties declined from 42.7% during 2010-2013 to 31.4% during 2014-2017 (χ^2=25.889, P=0.000). Keratoconus was the third indication of keratoplasties during 2010-2013 and increased to the second place during 2014-2017 (χ^2=9.578, P=0.002). Herpes keratitis was the second indication during 2010-2013 and decreased to the fourth place during 2014-2017 (χ^2=11.018, P=0.001). Regrafts were the fifth indication during 2010-2013 and increased to the third indication during 2014-2017 (χ^2=18.475, P<0.001). In eyes undergoing PK, the top four indications were suppurative keratitis (38.7%), herpes keratitis (15.3%), keratoconus (12.6%), and regraft (12.5%) during 2014-2017, in which the proportion of suppurative keratitis and herpes keratitis decreased while regraft and keratoconus increased compared with 2010-2013. In eyes with LK, suppurative keratitis (30.8%), keratoconus (24.1%), corneal dystrophies and degenerations (10.6%), and corneal dermoid tumor (9.7%) were the major four indications, and there was no significant difference in the proportion of each indication between 2010-2013 and 2014-2017.
Conclusions: Suppurative keratitis was the most common indication for PK and LK at Qingdao Eye Hospital during 2010-2017, followed by keratoconus, herpes keratitis, and regraft. The proportion of suppurative keratitis and herpes keratitis presented a trend of decrease, while regraft and keratoconus increased in keratoplasties.

PO-463

Risk Factors for Corneal Graft Ulcers after Penetrating Keratoplasty and Lamellar Keratoplasty

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Purpose: To assess the risk factors for corneal graft ulcers after penetrating keratoplasty (PKP) and lamellar keratoplasty (LKP).

Methods: Clinical data of 1354 patients (1379 eyes) undergoing PKP or LKP at Qingdao Eye Hospital, Shandong Eye Institute from January 2010 to January 2016 were retrospectively reviewed. All patients were followed up regularly after keratoplasty. The risk factors for graft ulcers were statistically analyzed with the Chi-square test and logistic regression analysis.
Results: Graft ulcers occurred in 91 patients (91 eyes), of which 59 eyes (64.8%) occurred within one year after keratoplasty, with microbial infection (44 eyes, 48.4%) being the dominating cause. Persistent corneal graft epithelial defects (*OR*=6.60, *P*＜0.01) was the most common risk factor for graft ulceration, followed by recurrence of herpes simplex keratitis (*OR*=3.27，*P*＜0.01), graft diameter ≥9 mm (*OR*=2.18, *P*＜0.05), long-term preservation of corneal donors (*OR*=1.94, *P*＜0.05), and old age of the recipient (*OR*=1.01, *P*＜0.05).
Conclusions: Most graft ulcers occurred within 1 year after keratoplasty. Persistent graft epithelial defect, recurrence of herpes simplex keratitis, graft diameter ≥9 mm, long-term preservation of corneal donors, and old age of the recipient were identified to be risk factors for corneal graft ulcers.

PO-464

Aqueous inflammation and ischemia related biomarkers in neovascular glaucoma with stable iris neovascularization

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目的 测定新生血管性青光眼（NVG）患者房水炎症及缺血相关生物标志物的水平，并分析其治疗前后的变化。

方法 从 139 只眼采集房水，包括 NVG（n=12）、临床稳定 NVG（n=26）、CRVO（n=11）、NPDR（n=18）、PACG（n=18）、PDR（n=25）、BRVO（n=7）和白内障（n=22）。用酶联免疫吸附法测定血管内皮生长因子-A、白细胞介素-8 和 EPO 的含量。同时收集患者的人口学和眼内压（IOP）等临床资料进行分析。

结果 抗 VEGF 和 PRP 后，VEGF-A 的房水浓度显著降低（t=2.935，p=0.015）。比较临床稳定的 NVG 组和其他组（CRVO、NPDR、PACG、PDR、BRVO、白内障）的细胞因子，发现 VEGF-A、IL-8 和 EPO 的差异有显著性（F=10.476，P=0.000，F=8.412，P=0.000，F=6.203，P=0.000）。VEGF-A 和 IL-8 的房水浓度与眼压呈正相关（r=0.413，p=0.000，r=0.349，p=0.000）。VEGF-A 与 IL-8 和 EPO 呈正相关（r=0.750，p=0.000，r=0.294，p=0.002）。IL-8 与 EPO 呈正相关（r=0.317，P=0.000）。
结论 在稳定的 NVG 组中，VEGF-A、IL-8 和 EPO 的水平仍高于白内障对照组。炎症和缺血过程可能持续于稳定的 NVG 眼。这些发现可以解释为什么这些患者虹膜新生血管的复发率很高。进一步抗血管内皮生长因子和抗炎可能有助于改善预后。

PO-465

Reproducibility and Agreement of 4 Anterior Segment-Optical Coherence Tomography Devices for Anterior Chamber Angle Measurements

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PURPOSE: To compare the reproducibility and agreement of anterior chamber angle (ACA) parameters and metrics obtained by different anterior segment-optical coherence tomography (AS-OCT).
METHODS: 30 eyes of normal subjects were undergone anterior segment angle scan using the Spectralis, Cirrus and Optovue spectral domain-optical coherence tomography (SD-OCT), as well as Visante time-domain optical coherence tomography (TD-OCT). For each eye, the scan line was performed perpendicularly on the inferior (270) angle and the inferior ACA image was acquired 2 times. Interinstrument and intrainstrument, as well as interobserver and intraobserver reproducibility of anterior chamber angle metrics Schwalbe's line (SL) to scleral spur (SS) distance (TM-Span), angle opening distance (AOD) and trabecular-iris space area (TISA) measurements were evaluated by intraclass correlation coefficients (ICCs) and Bland-Altman plots with limits of agreement (LoA).
RESULTS: For all 30 eyes, the mean TM-Span, AOD and TISA was 0.966±0.198mm, 0.750±0.205mm and 0.286±0.090mm^2 in Spectralis; 0.929±0.113mm, 0.717±0.120mm and 0.267±0.095mm^2 in Cirrus; 0.923±0.191mm, 0.683±0.161mm and 0.265±0.072mm^2 in Optovue; 0.970±0.070mm, 0.705±0.150mm and 0.279±0.065mm^2 in Visante. The agreement for intrainstrument (ICCs>0.838), intragrader (ICCs>0.910), and intergrader (ICCs>0.869) was excellent. Excellent agreement between the 4 devices was also documented with the ICCs from 0.901 to 0.967 for TM-Span, 0.887 to 0.941 for AOD and 0.923 to 0.961 for TISA.
CONCLUSIONS: Our study supported the excellent reproducibility and consistency of AS-OCT in the quantitative assessment of the angle, suggesting that the effect of consecutive image acquisitions. The inherent limitations of TD-OCT imaging technology could be possible reasons of the measurement variability.

PO-466

Characteristics of central visual field defect after macular hole surgery

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AIM: To investigate the characteristics of postoperative central visual field defect (cVFD) in patients with macular hole (MH).
METHODS: Eighteen eyes, from 18 MH patients, were involved in this retrospective study which reviewed square root of loss variance (sLV) and mean defect (MD) of the visual field test in all subjects. The relationship between cVFD and MH stage, as well as the postoperative ellipsoid zone disruption were evaluated using Spearman's correlation test.
RESULTS: Our analysis determined Spearman coefficient is 0.705 for the correlation between sLV and MH stage (P<0.01), 0.877 for the correlation between sLV and postoperative ellipsoid zone disruption (P<0.01) and 0.721 for the correlation between MD and postoperative ellipsoid zone disruption (P<0.01). A significant relationship was also detected between postoperative ellipsoid zone disruption and MH stage (r=0.470, P<0.05). Univariate regression analysis indicated that sLV and MD were associated with postoperative ellipsoid zone disruption (P<0.01, P<0.01, respectively).
CONCLUSION: Postoperative cVFD is highly correlated with MH stage and postoperative ellipsoid zone disruption in patients with MH.

PO-467

Epidemiology of sports-related eye injuries among athletes in China

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Purpose: To investigate the prevalence of sports-related eye injuries among athletes, as well as analysing the risk factors of such injuries in China.
Methods: This cohort, cross-sectional study investigated athletes from Tianjin University of Sport, Tianjin Vocational College of Sports, and Tianjin provincial sports teams. The investigation included questionnaire and ophthalmic examination. The outcome of examination including visual acuity, refraction, introcular pressure, slit lamp biomicroscopy, and fundus examination were recored.
Results: There were 1413 athletes enrolled in our study, and 151 of which had suffered sports-related eye injuries in their professional career. The prevalence rate was 10.69%. Although male athletes with eye injuries accounted for 66.23%, there was no statistically significant difference in comparison with female(χ^2=0.176, P=0.675). Track and filed(23.00%) and volleyball(19.61%) occupied the largest proportion among male and female, respectively. Otherwise, athletes with water polo(72.73%) had highest prevelance of eye injuries, followed by art gymnastics(56.25%) and handball(38.46%). Overall, 42.38% of athletes were injuried by ball, and 22.52% of injuries

came from teammate. There was statistically significant difference between male and female in causes of injury(χ^2=14.767, P=0.011). Eye injuries usually occurred in trainning ground(64.24%) and playground(14.57%). Males were different from female in places where sustained eye injuries(χ^2=8.241, P=0.016). Adnexa wound(51.66%) was the most common type of injuries. About 11.92% of athletes with eye injuries had impaired vision, and 66.67% of which failed to see doctors in time. The age, marital status, educational degree, family income, and trainning time were associated with sports-related eye injuries(OR=0.934, 95%CI=0.880-0.992, P=0.025; OR=12.770, 95%CI=2.117-77.046, P=0.005; OR=0.709, 95%CI=0.579-0.867, P=0.001; OR=1.394, 95%CI=1.176-1.653, P=0.000; OR=1.483, 95%CI=1.290-1.706, P=0.000). Howere, gender, BMI, myopia, exercise level, training age, and application of protective devices had no contribution to eye injuries, as well as reading, smooking, drinking, partical eclipse, and sleep debt(P>0.05).
Conclusion: Sports-related eye injuries were extremely common among athletes with serious consequence. Identifying risk factors will reduce the prevalence of sports-related eye injuries during activity.

PO-468

The healing process and functional recovery of neuro-retina after macular hole surgery

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Purpose: To demonstrate the healing process and functional recovery of neuro-retina after macular hole surgery.
Methods: Thirty-six eyes of 31 patients with full-thickness idiopathic macular hole (IMH) were enrolled in this retrospective study. All of them were operated using 23-gauge or 25-gauge vitrectomy followed by inner limiting membrane peeling and room air-filling. Spectral-domain optical coherence tomography was performed before surgery and after surgery to observe the structural changes of neuro-retina.
Results: Twenty eyes (55.56%) had the macular hole closed at 3 to 5 days after surgery (Group 1), beginning from the inner retina based on OCT. Sixteen eyes (44.44%) remained unclosed holes and progressed to larger holes at 13 to 15 days (t=-2.811, P=0.013) after surgery (Group 2). Compared with eyes in group 1, the eyes in group 2 had significantly larger hole diameter (t=-2.882, P=0.007). VA of eyes in group 1 was significantly improved (t=2.573, p=0.019) and better than that in group 2 after surgery.
Conclusion: Closure of IMHs was achieved by first-step inner retina tissue bridging. Macular hole diameter was an important factor affecting the healing of the holes. The delayed restoration of fovea detachment and IS/OS deficiency were responsible for poor vision outcomes after surgery.

PO-469

阿托伐他汀钙对超声乳化术后糖尿病黄斑水肿的影响

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目的 探讨阿托伐他汀钙对超声乳化术后糖尿病黄斑水肿的影响。 **方法** 42 例（42 只眼）高脂血症糖尿病患者，分为观察组 23 例和对照组 19 例，两组均接受晶状体超声乳化人工晶状体植入术。两组术前和术后均严格控制血糖、血压，观察组在术后给予 10 mg/天的阿托伐他汀钙口服。观察最佳矫正视力（BCVA）、黄斑中心厚度(CRT)、血清总胆固醇（TC）、低密度脂蛋白胆固醇(LDL-C)和高密度脂蛋白胆固醇(HDL-C)值。 **结果** 超声乳化术前，两组平均 BCVA 分别为（0.32±0.23, 0.39±0.17）（t=1.042, P>0.05），术后 24 周，观察组平均最佳矫正视力为（0.70±0.33），优于对照组（0.64±0.15）（t=6.855， P<0.05）。观察组和对照组的平均 CRT 分别由术前的（152.93±73.52 μm，145.37±93.34 μm）（t=1.257, P>0.05）,增加为术后 24 周的（191.68±95.01 μm，216.38±68.17 μm），而术后的 24 周，观察组平均 CRT 少于对照组（t=9.035, P<0.05）。术后 4~24 周，观察组的 TC、LDL-C 值均较术前明显降低，而对照组则无明显变化。 **结论** 在控制血糖、血压的基础上，高脂血症的糖尿病患者在超声乳化术后，应用阿托伐他汀钙控制血脂，可以有效减少黄斑水肿的发生。

PO-470

抗 VEGF 药物治疗时机对超声乳化术后糖尿病黄斑水肿的影响

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目的 探讨晶状体超声乳化术后，不同时机使用雷珠单抗玻璃体腔注射，对糖尿病黄斑水肿疗效的影响。 **方法** 46 例（46 只眼）糖尿病黄斑水肿并发白内障的患者，分为观察组 25 例（25 只眼）和对照组 21 例（21 只眼），两组患者均接受晶状体超声乳化联合人工晶状体植入术。观察组在术后立即给予 5mg 雷珠单抗玻璃体腔注射治疗，对照组则在术后 4w 行雷珠单抗治疗。观察指标包括：测定最佳矫正视力、眼底彩色照相分析黄斑水肿程度、OCT 扫描黄斑中心厚度以及记录眼压和血糖值。 **结果** 超声乳化术后行雷珠单抗治疗的 4w、8w、12w，观察组平均最佳矫正视力和平均黄斑中心厚度优于对照组；两组患者经雷珠单抗治疗后黄斑水肿的人数均较治疗前减少，而观察组较对照组的轻度黄斑水肿患者比例明显增加、中度黄斑水肿的比例明显减少，两组重度黄斑水肿比例基本相同。两组患者均未出现眼内炎、眼内出血、医源性视网膜裂孔、视网膜脱离、高眼压和全身血栓形成等并发症。 **结论** 糖尿病黄斑水肿患者在超声乳化术后，通过玻璃体腔注射雷珠单抗，可有效地治疗黄斑水肿，而超声乳化术后即刻行雷珠单抗注射，更有利于黄斑水肿的治疗。

PO-471

iTrace 引导下的两种不同多焦点人工晶状体植入后视觉质量对比

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目的：比较 3 种不同类型人工晶状体（Zeiss AT LISA tri 839MP 衍射多焦点晶状 体，LENSTEC SBL-3 区域折射人工晶状体，单焦非球面人工晶状体 Zeiss CT ASPHINA 409MP）的视功能，评价不同多焦点人工晶状体的临床应用效果和价值。
方法：这是一项回顾性队列研究。 2016 年 1 月至 2018 年 2 月在上海和平眼科医院收集 120 例白内障超声乳化白内障摘除联合人工晶状体植入术后的 160 只眼。根据植入人工晶状体的不同类型，共有 42 例（57 只眼）非球面多焦组，33 例（47 只眼）区域折射组，非球面单焦组 45 例（56 只眼）。术后 3 个月评估以下参数：未矫正和最佳矫正远中近距视力，对比敏感度，波前像差，调制传递函数（MTF），立体视觉，视功能和生活质量（VF / QOL）问卷调查。 iTrace 分析三种人工晶状体植入后不同瞳孔直径下的调制传递函数，strehl 比和波前像差。
结果：未矫正和最佳矫正远视力，最佳矫正近视力无统计学差异。未矫正的近视力，矫正的中间距离（40cm，60cm 和 80cm）和近视力，差异有统计学意义。手术后 3 个月，日常生活中的脱镜率分别为：839MP 88.1％（37/42），SBL-3 84.8％（28/33），409MP 37.8％（17/45）。在不同瞳孔直径下，三组间调制传递函数和 strehl 比值差异无统计学意义（P> 0.05）。三组波前像差差异无统计学意义（P> 0.05）。
结论：与单焦点非球面人工晶状体相比，两种多焦点人工晶状体可以为患者提供良好稳定的远，中，近视力，显著降低患者对眼镜的依赖率。它可以满足患者脱镜的需求。 iTrace 的各种功能指标可以很好地评估视觉质量。

PO-472

Clinical and Genetic Features of Familial Exudative Vitreoretinopathy with Only Unilateral Abnormalities in a Chinese Cohort

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IMPORTANCE FEVR with only unilateral abnormalities may masquerade as other vitreoretinal disorders. Wide-field angiographic screening and genetic testing are suggested in patients with unexplained unilateral abnormalities. Clinicians should be vigilant to consider close observation of patients with unilateral FEVR, recognizing that the relatively normal vision of the fellow eye could compromise a patient’s attention to decreased vision of the affected eye.

OBJECTIVE To describe the clinical findings and genetic spectrum of FEVR patients with only unilateral abnormalities.

DESIGN A retrospective chart review was conducted of patients with a diagnosis of FEVR between January 2010 and October 2017 to identify individuals with unilateral abnormalities. Analysis started at December 2017.

SETTING At a hospital-based academic clinic.

PARTICIPANTS Patients were excluded if retinal abnormalities were noted in both eyes or if a diagnosis of FEVR could not be confirmed by genetic testing. Inclusion criteria included clinical diagnosis of FEVR with only unilateral features on wide-field angiography and confirmed mutations in 5 FEVR genes (*LRP5*, *FZD4*, *ZNF408*, *NDP*, *TSPAN12*).

EXPOSURES Clinical data were collected from patient charts. Wide-field angiography and targeted genes sequencing were performed in all patients of this cohort.

MAIN OUTCOMES AND MEASURES Clinical findings and genetic spectrum.

RESULTS A total of 20 (18 male, 2 female) patients with unilateral FEVR were identified among 621 (3.22%, 95% confidence interval 1.83%, 4.61%) FEVR patients. All patients were Han Chinese and had a mean (± SD) age at presentation of 2.6 (± 2.7) years. The most common clinical presentations were total retinal detachment (60%) or retinal fold (30%). *LRP5* accounted for the most prevalent mutations (55%), followed by *FZD4* (20%), *ZNF408* (10%), *TSPAN12* (10%), and *NDP* (5%).

CONCLUSIONS AND RELEVANCE FEVR with only unilateral features on wide-field angiography likely is <5% but not zero among FEVR patients in this Chinese cohort, in which the *LRP5* gene was identified in more than half of all mutations. These findings suggest that identification of unilateral peripheral retinal abnormalities should include consideration of FEVR, perhaps more often seen with mutations in the *LRP5* gene, and variable phenotypic penetrance of the retinal abnormalities can lead to seemingly unilateral disease.

PO-473

玻璃体注射抗 vegf 药物治疗高度近视 CNV 的疗效观察

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目的：通过频域 OCT 观察高度近视 CNV 患者抗 vegf 药物治疗前后视网膜厚度、病灶大小、视力变化情况，以及注射次数与预后的相关性。

方法：纳入 2015 年 4 月至 2018 年 12 月在青岛眼科医院确诊为高度近视 CNV 的患者共 61 例患者，所有患者观察 24 个月。采用频域 OCT 分别测量患者抗 vegf 治疗黄斑中心凹视网膜厚度及 CNV 病灶的高度，并检查最佳矫正视力。抗 vegf 治疗采取 1+PRN 的治疗方案，每次治疗后均再次测量黄斑中心凹视网膜厚度、CNV 病灶的高度及最佳矫正视力。分析 12 个月、24 个月抗 vegf 治疗的次数。

结果：61 例患者治疗后 CNV 均能够完全萎缩，不再渗漏。12 个月内抗 vegf 药物治疗 1 次 CNV 即能萎缩的患者 40 人，治疗 2 次 16 人，治疗 3 次 4 人，4 次及以上 1 人。24 个月内抗 vegf 治疗 1 次 CNV 能够萎缩的患者 35 人，治疗 2 次的 19 人，治疗 3 次的 3 人，4 次及以上 4 人。61 例患者治疗前视网膜中心凹视网膜厚度（296±30.4μm），治疗后 12 个月厚度为（192±24.5μm），差异有统计学意义（P=0.006）。治疗 24 个月厚度为（189±29.5μm），与治疗前视网膜厚度差异有统计学意义（P=0.007）。

结论：玻璃体抗 vegf 药物治疗高度近视 CNV 安全、有效。采取 1+PRN 治疗方案即可取得较好的效果。

PO-474

保留中心凹的内界膜剥除术联合空气填充治疗中等直径特发性黄斑裂孔的临床观察

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目的 观察保留黄斑中心凹内界膜(internal limiting membrane ,ILM)剥除术联合空气填充治疗直径在 250~400 μm 的特发性黄斑裂孔（idiopathic macular hole, IMH）临床疗效。**方法** 收集 2014 年 1 月至 2016 年 1 月确诊为 IV 期的 IMH 经 OCT 测量裂孔最小直径在 250~400 μm 的患者 45 例 45 眼，随机分为常规内界膜剥除组（常规组）22 眼及保留中心凹内界膜剥除组（保留组）23 眼。所有患者均行 23G 玻璃体切割术，常规组剥除后极部包括黄斑区内界膜至血管弓，保留组则保留以中心凹为圆心 300-400 μm 直径的内界膜内界膜，全气-液交换后无菌空气填充。手术后随访时间为（21.52±5.68）个月 ，观察术后两组黄斑孔闭合及最佳矫正视力(best corrected visual acuity，BCVA)情况。**结果** 术前常规组与保留组患者术前黄斑裂孔直径分别为（337.77±34.54）μm 和（324.87±31.95）μm；MHI 分别为 0.53±0.09 和 0.51±0.08，BCVA（LogMAR）分别为 0.95±0.20、1.30±0.26，两组间比较，差异均无统计学意义(均为 P>0．05)。末次随访时，常规组与保留组黄斑裂孔闭合率分别为 95.45%和 100.00%，差异无统计学意义(P=0.489）。常规组、保留组患眼平均 BCVA（LogMAR）分别为 0.72±0.15、0．49±0．11，皆低于术前，差异具有统计学意义（P<0.05）。两组之间比较，保留组患眼 BCVA（LogMAR）低于常规组，差异具有统计学意义(*t*=-5.849，P<0.001)。**结论** 常规内界膜剥除与保留黄斑中心凹内界膜的剥除联合空气填充对于治疗直径在 250~400μm 之间 IV 期 IMH 成功率均较高，行保留中心凹内界膜的剥除术患者术后视力改善情况要好于常规内界膜剥除术。

PO-475

Toric 人工晶状体矫正中高度角膜散光的远期临床效果观察

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目的 研究 Toric 人工晶状体（IOL）植入术对于矫正中高度角膜散光的远期临床效果及其旋转稳定性。
方法 选择术前存在规则角膜散光且散光≥2.57D 的白内障患者 57 例（57 眼），行白内障超声乳化吸除术并植入 Toric IOL。观察并记录患者术前、术后 1 年的裸眼视力（UCVA）及最佳矫正视力（BCVA），并对术前角膜散光、术后残余散光、像差、IOL 旋转度及相关因素进行统计分析，评价 Toric IOL 矫正高度散光的有效性、安全性及稳定性。
结果 术后一年时，患者裸眼视力较术前明显提高（术前 logMAR0.868±0.343，术后 logMAR0.312±0.263，*P*=0.000），术后远用镜脱镜率为 68.42%。总残余散光为（1.175±0.841）D，明显小于术前（3.406±0.985D），与术前比较有统计学差异（*P*=0.000）。Toric IOL 在囊袋里旋转的度数为（4.930±3.023）°，54.39％的患者晶状体轴位旋转≤4°。
结论 Toric IOL 植入可以使得合并中高度散光的白内障患者获得良好的裸眼远视力，减少术后残余散光及对眼镜的依赖，并且具有较好的囊袋内旋转稳定性，预测性较强，用于矫正白内障术前高度角膜散光长期安全有效。

PO-476

Under the New Historical Conditions, How to Explore the Operation and Development of Chinese sci-tech Periodicals by SWOT Analysis

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Abstract [Purposes] The CPC national congress proposes to highlight the belt and road, and adheres to the "introduction" and "going out". Opening up and cooperating to strengthen innovation capabilities, promoting the transformation achievements are encouraged actively and steadily. Chinese science and technology journals need to examine the changes between own and the external environment under the new historical conditions and explore a path of development. [Methods] SWOT analysis was applied to assess the advantages and disadvantages of own and the external environment under the new historical conditions. [Fingdings] Advantages: rich experience, good reputation in editorial vocation. Disadvantages: evaluation system of Chinese sci-tech periodic is still to be further improved. Opportunity: cultural confidence is proposed initially,

afterwards Chinese journal of science and technology begin to get more attention. Threats: new media and self-media, and influence of SCI journals are uninterruptedly impacting. [Conclusions] Under the background of "the Belt and Road", Chinese science and technology periodicals should continue to obedience to science value, then take into account economic benefits, and take advantage of opportunities to meet challenges.

PO-477

流程管理在白内障手术中的应用效果研究

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目的：探讨流程管理对于优化白内障手术流程的效果。
方法：组建流程管理小组，分析患者围手术期需求及导致患者手术等候时间长、疼痛视觉模拟评分(visual analogue scale，VAS)高的关键因素，对原有手术流程进行整理、规范、优化。以 2017 年 1 月～4 月白内障手术患者 412 例为对照组，2017 年 5 月～8 月手术患者 401 例为观察组，比较流程改进前后患者手术相关知识知晓情况、手术等候时间、VAS 评分 、术后患者满意度及医护人员对改造后流程的满意度情况，验证优化流程的有效性。
结果：优化流程后，观察组平均等候时间为 33.40±4.84，显著短于对照组的时间 45.30±3.63（$P<0.001$）；观察组 VAS 评分为 0.72±0.55，显著低于对照组评分 1.13±0.89（$P<0.001$）；观察组手术相关知识情况以及手术相关满意度显著优于对照组（$P<0.001$），医护人员对优化后流程的满意度大于 90%。
结论：流程管理的运用，可有效缩短患者手术等候时间，改善患者的术后感受，提高手术室运作效率。

PO-478

基于基质注射伏立康唑的真菌性角膜炎综合治疗的临床疗效评估

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目的： 探讨基于基质注射伏立康唑的深基质真菌性角膜炎综合治疗的有效性和安全性。
方法： 对温州医科大学附属眼视光医院 2013 年 03 月至 2017 年 07 月行角膜基质注射伏立康唑治疗的 62 例患者的资料进行统计分析。观察指标包括年龄、注药次数、治愈率、复发率以及并发症情况等，并且术后至少随访 6 个月。

结果： 62 例患者平均年龄为 57.06 ±12.33 岁，其中 56 例患者（90.32%）发病到就诊时间为 21.20 ±13.62 天。术后随访 6～36 月，平均为 10.6 个月。单纯角膜基质注射伏立康唑治疗治愈 43 例（69.35%），其中 18 例需重复注药；角膜基质注射伏立康唑联合结膜瓣覆盖治愈 17 例（27.42%）；术后复发 2 例。深基质真菌性角膜炎经综合治疗治愈率达 96.77%。且术中及术后随访未见明显并发症。

结论： 对于病灶范围广泛的患眼，单纯角膜基质注药疗效欠佳，联合结膜瓣覆盖可大大提高深基质真菌性角膜炎的治愈率。单纯的角膜基质注射伏立康唑与角膜基质注射伏立康唑联合结膜瓣覆盖术的综合治疗方法对于深基质真菌性角膜炎疗效显著且安全性高。

PO-479

一种新型的动物眼底成像系统评估糖尿病视网膜病变的眼底形态学变化

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目的: 利用小动物视网膜成像系统观察诱导型 ZDF 大鼠糖尿病视网膜病变的眼底形态学变化，着重关注眼底荧光造影(FFA)渗漏情况。

方法： 购买北京维通利华实验动物技术有限公司 ZDF 大鼠 6 只，模型组 3 只高脂饲料诱导 2 周,正常组不做任何处理。2 周后尾静脉取血检测血糖浓度，诱导模型成功后次日深度麻醉后，双眼滴散瞳药、表麻药。待大鼠瞳孔完全散开后，

并在角膜表面涂上一层凝胶，将大鼠右眼角膜置于视网膜成像系统前（Optoprobe, OPTO-RIS）进行眼底彩照及荧光素钠血管造影（FFA）拍摄。

结果： 糖尿病组与正常组对比眼底彩照未发现明显异常，但是糖尿病组远离视盘部分区域有白色絮状硬性渗出现象（如红色箭头），正常组未发现。荧光素钠血管造影（FFA）显示糖尿病组出现有点状、棉絮状荧光堆积渗漏（如黄

色箭头），但正常组眼底未见明显渗漏区域。

结论： 小动物视网膜系统能明显观察到高脂饲料诱导 BN 鼠糖尿病模型视网膜荧光造影有明显渗漏情况，可作为视网膜糖尿病病变模型检查设备。

PO-480

皮质性及核性白内障与年龄、性别、高度近视、糖尿病之间的关联性研究

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[目的] 分别探讨白内障的皮质性及核性混浊与年龄、性别、高度近视、糖尿病之间的关联。 **[方法]** 采用以医院为基础的病例回顾性研究，选取四川省人民医院 2016 年 1 月-2016 年 8 月的白内障（年龄>50 岁）患者 938 只眼，应用裂隙灯前节照相系统采集图片后，用 LOCSIII 分级标准进行晶体混浊分级。采用秩和检验及多因素回归分析寻找皮质性白内障及核性白内障与年龄、性别、高度近视、糖尿病之间的关联。**[结果]**高度近视眼相对于非高度近视眼的皮质性混浊等级更低（95%CI：-0.882～-0.360；P<0.001）。糖尿病患者相对于非糖尿病患者的核性混浊的等级更高（95%CI：0.069～0.434；P=0.007）。随着年龄的增加，白内障核性混浊等级越来越高（95%CI：0.254～0.399；P<0.001）。男性患者相对于女性患者，不仅白内障的皮质性混浊等级更高（95%CI：-0.679～-0.312；P<0.001），核性混浊的等级也更高（95%CI：0.030～0.301；P=0.017）。**[结论]** 年龄、糖尿病是核性白内障的重要影响因素，控制血糖可能延缓核性白内障的发展。男性较女性患者白内障发展进程可能更快。

PO-481

Anti-inflammatory Effect of Triamcinolone Acetonide in Acute Primary Angle-Closure Patients Receiving Phacoemulsification and Intraocular Lens Implantation

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Aim To examine the effect of an intracameral injection triamcinolone acetonide on postoperative inflammation in acute primary angle-closure (APAC) patients who received phacoemulsification combined with intraocular lens (IOL) implantation.

Methods Fifty-eight patients with APAC (total 58 eyes) receiving phacoemulsification combined with IOL implantation were enrolled, and were randomly assigned into 4 treatment groups. At the conclusion of the surgery group B, C, and D received intracameral injection of 0.5 mg, 1.0 mg and 1.5 mg triamcinolone acetonide, respectively. Group A was the control group receiving tobramycin/dexamethasone eye drop after surgery. The effects on intraocular pressure (IOP), visual acuity, and clinical indexes of anterior segment inflammation were assessed 1, 3, 7, and 30 days postoperative.

Results Compared to the control eyes, those received triamcinolone acetonide showed more significant improvements in IOP and visual acuity. The disappearances of anterior chamber cells and flare were also faster in triamcinolone acetonide-treated eyes than in those received dexamethasone. Furthermore, 0.5 mg was determined as the most effective dosage in controlling IOP and inflammation after surgery.

Conclusion Triamcinolone acetonide is a promising anti-inflammatory agent that control inflammation after phacoemulsification combined with intraocular lens (IOL) implantation in patients with APAC.

PO-482

OCTA 在正常人和高血压患者黄斑区及视盘定量分析的研究

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目的：应用光学相干断层血管成像技术观察正常人和高血压病人眼底黄斑区及视乳头微血管变化和视网膜厚度的关系。方法：横断面病例对照研究。收集高血压患者 33 例 61 眼（高血压组）及健康志愿者 36 例 58 眼（正常对照组），行 OCTA 黄斑区及视乳头区血流密度检测，以及眼轴、眼压及眼底照相检查。分析黄斑区浅层、深层血管密度及视盘旁微血管密度及黄斑区厚度，以及中心凹无血管区面积、周长以及比值。结果：正常人黄斑区除中心凹外的 8 个区域浅层微血管密度互不相同，颞侧浅层血流密度最低，鼻侧血流密度最高，越往鼻侧血流密度越高。深层微血管密度无明显不同，8 个区域之间 ILM-IPL 厚度不同，且与浅层微血管密度呈正相关性。深层血流密度与 ILM-IPL 厚度具有负相关性。RNFL 与浅层血流密度呈正相关。视盘颞侧的血流密度及 RNFL 厚度均大于鼻侧；且与年龄无关。中心凹无血管区与年龄呈负相关。与 FD 呈正相关。FD 与年龄呈负相关。中心凹处浅层血流和深层血流呈强正相关。高血压病人 8 个区域浅层、深层血流密度大小分布同正常人相似，差异无统计学意义。结论：高血压病人黄斑区上下方浅层血流密度随收缩压升高而减少，与病史长短无关，而 ILM-IPL 与病史呈负相关，与收缩压无关。高血压可影响血流密度，而长期的血压波动可能导致网膜厚度及功能的改变。中心凹无血管区仅深层血流密度与收缩压呈负相关；视盘旁微血管密度和 RNFL 厚度在鼻侧与收缩压呈负相关，鼻侧也是 RNFL 厚度最薄的区域，故血压升高损伤鼻侧视盘神经纤维层，可能是鼻侧血流密度小，血流灌注少，血压升高导致视盘血流局部灌注减少，血流密度小的鼻侧神经纤维层最先受累。临床上在运用 OCTA 进行疾病早期筛查及诊断时应注意高血压对眼底血管密度和网膜的影响。

PO-483

Ahmed 阀改良植入术治疗新生血管性青光眼

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目的：比较经巩膜瓣下穿刺和经巩膜长隧道植入 Ahmed 青光眼引流阀(AGV)的引流管在治疗新生血管性青光眼(NVG)中的疗效及安全性等。**方法**：回顾就诊我院并接受 AGV 植入术的 20 例患者（20 只眼）资料，其中男 11 例、女 9 例，巩膜瓣组共 10 例 10 只眼，其中男 6 例，女 4 例，巩膜长隧道组共 10 例 10 只眼，其中男 5 例，女 5 例。观察并分析术后 3 天，7 天，1 月，3 月，6 月，12 月的视力、眼压及并发症等。观察患者术后的视力、眼压及并发症。**结果**：末次随访时，常规巩膜瓣下植入组平均眼压 （17.0±8.97）mmHg，巩膜长隧道组平均眼压 (18.5±7.78) mmHg。组内各随访时间点的眼压同术前相比，差异具统计学意义。组间各随访时间点的眼压之间相比较，差异无统计

学意义。巩膜瓣组完全成功率 60%，部分成功率 30%，巩膜长隧道组完全成功率 80%，部分成功者率 20%，两组之间完全成功率比较差异有统计学意义（P=0.035），部分成功率比较差异无统计学意义（P=0.487）。两组间的低眼压性浅前房发生率比较，差异有统计学意义（P=0.0433）。**结论**：两种 AGV 植入方法降眼压效果相当，引流管经巩膜长隧道植入较经巩膜瓣下穿刺植入的方法，其对组织损伤更轻、操作更简便、并且术后早期并发症更少，可成为 AGV 植入术的新选择。

PO-484

OCTA 对原发性青光眼诊断价值的 Meta 分析

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目的:应用循证医学理论与方法，对光学相干断层扫描血管造影诊断原发性青光眼的价值进行系统性评价，寻找或发现诊断效能较高的参数指标，从而为原发性青光眼的诊断提供有效的检查方法和有力的依据。**方法**:通过计算机检索 PUBMED、EMBASE、Cochrane Library、万方等数据库，搜索与 OCTA 相关的诊断性试验文献资料，并提取纳入文献的相关数据信息，应用 Revman5.3 软件的诊断性试验的质量评价工具 QUADAS-2 对纳入文献进行质量评估，应用 Meta 分析软件对提取的信息数据进件系统评价分析，得出合并敏感度与合并特异度、合并阳性似然比与合并阴性似然比以及诊断比值比，并绘制汇总受试者工作特征曲线。**结果**:本研究最终共纳入 9 个研究，采用随机效应模型进行统计分析，结果显示 OCTA 检测视盘旁血管密度诊断原发性青光眼的合并敏感度、合并特异度及其 95%CI 分别为 0.59 和 0.95，合并阳性似然比、合并阴性似然比及其 95%CI 分别为 9.64 和 0.39，诊断比值比为 29.36，该组 SROC 的曲线下面积（AUC）为 0.9119。而 OCTA 检测视盘血管密度诊断原发性青光眼的合并敏感度、合并特异度及其 95%CI 分别为 0.44 和 0.93，合并阳性似然比、合并阴性似然比及其 95%CI 分别为 5.65 和 0.6，DOR=13.07，该组 AUC 为 0.8523。**结论**:OCTA 诊断青光眼优势？OCTA 检测视盘旁血管密度的异常对原发性青光眼的 AUC 较高，有显著的诊断效能，但漏诊率偏高，故视盘旁血管密度尚不能独立用做青光眼确诊的检查方法；而 OCTA 检测视盘血管密度的变化对原发性青光眼的诊断效能 AUC 较好，但结合敏感度、阳性似然比、阴性似然比的值综合考虑，该参数指标尚只能用于青光眼的一般检查手段。

PO-485

北京某医院健康体检人群年龄相关性白内障的患病情况和相关危险因素分析

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目的 研究分析健康体检人群中白内障的患病率和相关危险因素，并指导临床上对高危人群的筛查和制定预防、治疗策略。**方法**统计 2017 年 3 月至 12 月在解放军总医院第一医学中心健康体检人群中白内障的患病率，并通过 Logistic 回归模型分析与白内障相关的危险因素。**结果** 调研期间共有非糖尿病成年人群 6270 名进行眼科裂隙灯检查并纳入分析，诊断白内障 1755 例，总患病率为 27.99%，皮质型混浊 667 例（38%），核型混浊 474 例（27%），后囊下型 105 例（6%），混合型 509 例（29%）。白内障的患病率随年龄增长和人群中心血管病危险因素（高血压、高血脂）的个数增加及高尿酸血症、吸烟、社会经济因素（教育程度低和低收入）、手机等视频终端设备使用时间的增加而增高。在多因素 Logistic 回归分析中，年龄增大、高血压、吸烟、社会经济因素（教育程度低和低收入）、手机使用年限增加、手机每天使用时长增加均为白内障的独立危险因素。**结论** 北京某医院体检人群中白内障的患病率相对较高，以老龄、高血压、吸烟、社会经济因素（教育程度低和低收入）、手机等视频终端设备使用时间长为主要危险因素。

PO-486

后极后圆锥患儿白内障手术与保守治疗的疗效分析

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目的:分析后极后圆锥保守及手术的视力的转归，旨在为其治疗方法的选择、预后的评估提供参考。
方法:回顾性分析后极后圆锥病例 126 例(125 眼)，其中保守治疗 80 例(80 眼)，手术治疗 46 例(46 眼)。检测治疗前后的视觉功能转归。检测白内障类型、混浊位置、直径、屈光参差、斜视和年龄，将保守治疗和手术治疗前后各个阶段组织学特征，视觉功能特点及其相关关系做统计学分析。
结果：两组患儿的临床基本特征、视力和眼压均无显著性差异。与保守治疗的患者（0.21±0.27 logmar）（p<0.001）相比，行白内障手术的患者的最佳矫正视力（0.37±0.26 logmar）改善更大，在手术治疗患者中，与良好视力相关的变量为白内障位置（p=0.031）、治疗前最佳矫正视力（p<0.001）和是否存在斜视（p=0.009）。
结论：后极后圆锥患儿保守治疗或白内障白内障手术均具可获得良好的视力效果。然而，进行白内障手术的患儿的视力改善更大。手术对混浊位于视轴中央，治疗前有较好的 BCVA 且无斜视的后极后圆锥患儿具有更多的获益。

PO-487

385 眼先天性白内障流行病学资料分析

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目的 探讨近阶段先天性白内障患儿人群的人口学、生物学和遗传学特征及眼球发育情况，为先天性白内障的科学治疗提供参考依据。

方法 回顾性分析 2013 年 1 月至 2018 年 1 月于青岛眼科医院诊为先天性白内障并行手术治疗的 235 例 385 眼患儿资料，按照年龄分为：≤1 岁、2～3 岁、4～6 岁、＞6 岁，记录患儿年龄、性别、白内障类型、遗传情况、角膜直径、房角情况、眼轴、角膜曲率及其他眼部发育异常。采用 spss20.0 对不同年龄段单眼及双眼患病例数、眼轴、角膜曲率、角膜直径行配对 *t* 检验；年龄与眼轴、角膜直径行 Spearman 秩相关检验以 *P* 小于 0.05 为差异有显著性意义。

结果 235 例先天性白内障纳入研究。男 115 例（48.9%），女 120 例（51.1%），男女之比 1：1.04；单眼患病 34.5%，双眼患病 65.5%，各年龄段双眼患病较单眼患病率高，差异有统计学意义（t=-2.962,p=0.041）。人口学分析农村患者占 24.6%。有家族遗传史的比例为 16.6%，白内障表现类型 41.3%为核性混浊。角膜直径与年龄增长呈正相关（r_s=0.208, *P*= 0.002），同白内障类型间眼轴比较差异无统计学意义（*F*=0.246,*P=0.493*），前极性混浊类型中角膜直径测量长度较其他三种类型长，差异有统计学意义(*F*=0.798,*P*=0.046）。角膜直径<3 月龄组为 9.74±0.95mm，＞3 岁组角膜直径 11.08±0.67mm，<3 月龄组角膜直径<10.0mm 占 36.36%。房角镜检查显示全部患儿为开角。合并永存胚胎血管比例为 3.6%，B 超对 PFV 诊断漏诊率 33.3%，另有 2 例 B 超误诊为 PFV，术中发现为后囊先天性破裂，皮质坠入玻璃体腔产生的伪影。

结论 先天性白内障患儿人群具有特殊的人口学、生物学和遗传学特征，眼球发育受个体发育、年龄、白内障类型、先天遗传等多种因素影响，合并永存胚胎血管是最常见的眼部发育异常。

PO-488

红外眼底照相辅助下的 Nd:YAG 激光玻璃体消融术疗效分析

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目的：玻璃体漂浮物是常见的一种生理现象，可以引起视力下降、降低生活质量。Nd:YAG 玻璃体消融术是治疗飞蚊症的一种选择，但其临床疗效尚不确定。我们的目的是通过测定红外眼底照相拍摄到的漂浮物面积的变化，半定量评价 Nd:YAG 玻璃体消融术处理玻璃体漂浮物的效果。

方法：回顾性总结 2015 年 6 月至 2017 年 11 月因玻璃体漂浮物接受 Nd:YAG 玻璃体消融术的患者的临床资料。眼压、视力、视功能问卷(VFQ-25)，术前及 YAG 激光治疗 6 个月后分别记录评分及 IMAGE-J 软件计算的漂浮物面积。

结果：符合条件共 50 名 55 眼（男：女比例为 1:1），平均年龄 60.34 岁，均在接受玻璃体消融术治疗前后进行红外眼底照相检查。其中重度混浊 17 眼，中度混浊 21 眼，轻度混浊 17 眼。所有患者均未发生有临床意义的并发症，1 例患者出现轻微视网膜损伤，未产生临床后果。所有患者的视力眼压在治疗前后均无明显改变。43 眼症状改善，8 眼症状消失，4 眼无明显自觉症状改变。术前玻璃体漂浮物平均面积为 1.41（0.29-12.85）mm^2，治疗后为 0.12（0-2.77）mm^2，（t=5.849，P=0.001）. VFQ-25 评分由术前的 71.44±12.77 提高到 88.54±12.74；（t=11.82，P=0.001）。

结论：Nd：YAG 玻璃体消融术时治疗有症状的玻璃体漂浮物的安全有效方法，红外眼底照相可以辅助观察玻璃体漂浮物的面积及治疗后面积的减少，有助于帮助患者直观理解治疗的意义、帮助医师评价治疗效果。

PO-489

Pentacam 眼前节分析系统联合 Corvis ST 角膜生物力学测量仪评估角膜后表面高度影响因素

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目的 利用 Pentacam 眼前节分析系统联合 Corvis ST 角膜生物力学测量仪检测近视人群角膜后表面高度值异常的影响因素及差异性研究。
方法 选取 2017 年 12 月至 2018 年 5 月在青岛眼科医院拟行角膜屈光手术患者。收集患者的一般资料，选取 Pentacam 7 个参数 Corvis ST 15 个参数。采用独立样本 *t* 检验和 Mann-Whitney *U* 检验进行组间差异性分析，并利用 Spearman 相关分析探讨。
结果 正常组和异常组年龄、球镜度、柱镜度无统计学差异（*P*=0.12、0.07、0.20）；Pentacam 参数中 ASK、PSK、PAstig、W-W 组间有统计学差异（*P*=0.03、0.00、0.00、0.00）；AAstig、CCT 组间无统计学差异（*P*=0.52、0.05）。Corvis ST 参数中除 SP-A1 组间存在统计学差异（*P*=0.00），其余参数无统计学差异（*P*＞0.05）；将每组患者的 BD 与 ASK、PSK、AAsting、PAsting、CCT、W-W 进行 Spearman 相关性分析发现，无论在正常组、异常组以及所有患者中，BD 与 ASK 呈低度正相关（*r*=0.20、0.25、0.24，*P*＜0.05），与 PSK 呈低度负相关（*r*=-0.36、-0.30、-0.46，*P*＜0.05），与 W-W 呈中度负相关（*r*=-0.54、-0.53、-0.56，*P*＜0.05），BD 与其他参数相关性较低。

PO-490

俯卧位及可调节体位对孔源性视网膜脱离玻切手术术后效果的影响

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目的：本研究拟在分析因孔源性视网膜脱离于我院本医疗组行玻璃体切除术的患者，在可调节体位及严格面向下体位在术后恢复情况是否存在差异。 方法：回顾性分析 2017 年 10 月-2018 年 10 月共 128 例因原发孔源性视网膜脱离于我院行玻璃体切除手术的患者在两种体位下术后恢复情况是否存在差异。本研究主要分为两组：A 组，患者避免仰卧位至硅油取出；B 组：严格面向下位至硅油取出。硅油取出时间多为术后 3-6 个月。排除标准：术眼外伤史，黄斑裂孔性视网膜脱离，合并其他眼底疾病，及因孔源性视网膜脱离曾行玻切手术。主要观察两种不同体位对患者视网膜复位率，最佳矫正视力及术后并发症是否存在统计学差异。 结果：本研究中共包含 88 例可调节体位及 40 例严格面向下体位患者，视网膜复位率分别为 95.4%及 97.5%（p=0.735)，不存在统计学差异。不论裂孔位于上方／下方／两侧或多发裂孔两种体位对视网膜复位率的影响（p=0.770)均不存在统计学差异。在术前存在并发脉络膜脱离／增殖性玻璃体视网膜病变／黄斑裂孔时两种体位对术后视网膜

复位率的影响不存在统计学差异。两种不同体位对术后最佳矫正视力（p=0.062)及术后高眼压的发生（p=0.624)均不存在统计学差异。 结论：是否严格面向下体位不影响孔源性视网膜脱离患者经玻璃体切除手术的术后恢复

PO-491

应用 OCTA 观察正常人和青光眼患者视盘和黄斑区血流的昼夜波动

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目的：应用 OCTA 观察正常人和青光眼患者视盘和黄斑区血流昼夜波动情况，并探究血流昼夜波动与眼压(IOP)和眼灌注压(OPP)的关系。
方法：通过纳入 13 例青光眼患者以及 15 例正常受试者，分别在 10:00、12:00、14:00、16:00、18:00、20:00、22:00、00:00、2:00、4:00、6:00 和 8:00 共 12 个时间点测量两组人群血压、脉搏和眼压，同时采用 OCTA 测量受试者视盘和黄斑区血流密度。采用重复测量方差分析两组人群检测指标是否存在昼夜波动，通过方差(SD)反映昼夜波动的程度，检测指标的相关性采用 Spearman 秩相关分析。
结果：两组人群的视盘区血流密度在 Whole enface 区域均存在昼夜波动，且青光患者波动更大（青光眼：方差=17.900，P=0.022；对照组：方差=3.884，P=0.033）；只有正常组黄斑区血流密度在 Superior（P=0.015）、Nasal（P=0.02）和 Inferior-Hemi (P=0.014) 区域存在昼夜波动性。视盘区 Whole enface 血流密度波动与 IOP 和 OPP 波动在两组受试者中存在不同的相关性，青光眼患者 Whole enface 血流密度波动与 IOP 呈正相关（r=0.473，P<0.001），与 OPP 呈负相关(r = -0.305, P<0.001)；而健康对照组 Whole enface 血流密度波动与 IOP 呈负相关（r=-0.244，P<0.001），与 OPP 呈正相关(r = 0.105, P=0.034)。
结论：青光眼患者和正常人视盘血流存在昼夜波动性，且青光眼患者的波动更加显著。结果支持青光眼与血流调节异常的假说。

PO-492

甲状腺相关眼病眼外肌的影像学定量测量与眼球运动受限分析

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目的 确定眼眶 CT 眼外肌的测量平面，提出符合临床需要的眼外肌测量参数；分析中重度 TAO 眼球运动受限患者的眼外肌影像学参数与眼球运动受限的关系，为临床评估眼外肌病变提供参考。
方法

回顾性研究 40 眼正常对照和 40 例（80 眼）眼球运动受限的中重度 TAO 患者的眼外肌影像学测量参数，采用 Mimics 18.0 对患者的眼眶 CT 图像进行三维重建与重新切面，分别测量下直肌（IR）、内直肌（MR）、上直肌提上睑肌复合体（SR）、外直肌（LR）的最大横截面积。根据 CAS 评分分为 TAO 活动期和静止期，分析 TAO 两组的眼外肌测量参数与眼球运动受限情况。

结果 1.本研究提出的斜冠状面测量四条眼外肌横截面积的信度优于常规冠状面。

2.各眼外肌最大横截面积在中重度 TAO 组与正常对照组存在统计学差异（$p<0.05$），中重度 TAO 患者眼外肌最大横截面积由大到小依次为：IR>MR>SR>LR。

3.四条眼外肌最大横截面积与 CAS 评分无相关性。

4.上转受限等级与 IR 最大横截面积、下转受限等级与 SR 最大横截面积、外转受限等级与 MR 最大横截面积呈正相关，内转受限等级与 LR 最大横截面积无相关性。

结论

斜冠状面可以作为眼眶 CT 眼外肌的测量平面。TAO 患者的下直肌、内直肌、上直肌最大横截面积与眼球运动受限存在相关性，眼眶 CT 的眼外肌最大横截面积可作为一种简单可靠的方法辅助评估 TAO 眼外肌病变。

PO-493

后发性白内障相关因素分析

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目的：探讨院内不同人工晶体植入术后行 Nd：YAG 激光后囊膜切开术的高发时间，并分析相关因素。

方法：收集于我院行白内障摘除联合人工晶体植入术并且术后行 Nd：YAG 激光后囊膜切开术的患者共（348）例，（378）眼。统计患者的一般资料，包括年龄、性别、植入的人工晶体类型、行后囊膜切开的时间等，分析不同类型人工晶体植入术后后发性白内障的高发时间。

结果：在所有行 Nd：YAG 激光后囊膜切开术的患者中，按照人工晶体光学面材料分组，各组间行后囊膜激光切开时间差异有统计学意义，按照襻成角分组，10°成角组与其他各组间差异有统计学意义，按照襻材料分组，各组间比较无统计学意义。

结论：白内障超声乳化摘除术后行 Nd：YAG 激光后囊膜切开术的时间与植入人工晶体的材料、人工晶体光学部与襻的夹角有关，与人工晶体襻材料无关。

PO-494

共焦显微镜下念珠菌性角膜炎的临床研究

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目的 研究利用海德堡共焦显微镜（IVCM）观察念珠菌性角膜炎患者以及离体培养下念珠菌孢子及假菌丝的特点以期提高念珠菌的检出率。**方法** 回顾性分析选取 2012-2018 年山东省眼科医院刮片或者培养出念珠菌的患者 24 例，排除角膜穿孔，角膜变薄等共焦显微镜检查的禁忌，分析年龄，性别的特点，回顾患者职业，诱因及手术史，裂隙灯下观察病灶的特点，共焦显微镜观察病灶的特点及离体培养下念珠菌的形态及特点 **结果** 共 24 例患者 24 只眼，年龄 8 个月到 91 岁，男性和农民居多，22 例有角膜移植或结膜瓣手术史（91.6%），16 例有长期应用激素史（66.7%），裂隙灯下病灶呈白色浸润，较干燥，板层移植术后可发生在层间，较少出现前房积脓，共聚焦显微镜检出 21 例，检出率为 87.5%。共焦显微镜下可以发现密集点状的强反光结构，部分成堆排列，大小比较均匀，直径约 2-4um. 其中部分可见假菌丝结构，假菌丝呈高对比度细长颗粒状，长度为 10-20um 宽度约 5-10um,部分假丝形态呈树枝状，形态不规则，离体培养的念珠菌共焦显微镜下可见大量密集点状结构，大小较均匀，形态与活体共焦显微镜下图像有良好的一致性。**结论** 念珠菌性角膜炎部分早期诊断较为困难，部分受无法进行刮片检查，培养时间又相对较长，共焦显微镜检查对念珠菌有较高的检出率，作为一种实时活体无创性检查，共焦显微镜对念珠菌性角膜炎的诊断有重要的意义。

PO-495

The measurement of normal orbital bony cavity and soft tissue volume based on three-dimensional reconstruction by CT scans

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PURPOSE
To provide reference values for orbital parameters in southern Chinese adults and analyze orbital parameters to assess any correlation between general conditions. Then, to compare orbital parameters between southern Chinese adults and Caucasians.
METHODS
Computed tomographic scans of 103 orbits from 52 men and 51 women, aged 18-81 years, not affected by orbital disease were retrospectively evaluated. Orbital bony cavity volume (OV), fat volume (FV), extraocular muscle volume (MV) and optic nerve volume (NV) were calculated using Mimics software. Eyeball volume (BV), transverse globe protrusion (EX), posterior pole of eyeball to orbital apex (PA) were measured. Furthermore, we also analyzed the correlation between orbital parameters and general conditions, including age, gender, height, weight, and BMI.
RESULTS
OV, FV, MV and NV in male were 22.21±2.17cm³, 8.89±1.79 cm³, 1.94±0.34cm³, 0.41±0.08cm³ and in female were 20.18±1.54 cm³, 8.09±1.74 cm³, 1.57±0.28 cm³, 0.36±0.07 cm³, respectively. OV, FV, MV and NV were all significantly larger in male than in female ($p<0.05$), and all volumes

in southern Chinese are smaller than in Caucasians. In both male and female adults, OV had no relation with age, FV increased with increasing age, whereas MV and NV decreased. OV, FV and MV showed positive correlations with weight. FV, MV, FV/OV and MV/OV showed positive correlations with EX and PA, but negative correlations with BV/OV.
CONCLUSIONS
This study provides reference values for orbital parameters in healthy southern Chinese adults. Age and weight are related to many orbital parameters. All volumes in southern Chinese are smaller than in Caucasians.

PO-496

虹膜睫状体囊肿对原发性青光眼的影响与临床观察

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目的：探讨原发性虹膜睫状体囊肿与原发性青光眼的相关性，从而了解虹膜睫状体囊肿对原发性青光眼的影响大小。方法：收集 2015 年 1 月至 2017 年 2 月在我院收治原发性青光眼患者 70 例(135 眼)及非青光眼患者 27 例（50 眼）进行回顾性分析。依据患者最终诊断将其分为原发性开角型青光眼组（55 眼）、原发性闭角型青光眼组（80 眼）和非青光眼组（55 眼）。所有患者均行超声生物显微镜(UBM) 检查。依据 UBM 图像结果将两组患者再分为：A.闭角型青光眼组：a 合并虹膜睫状体囊肿，b 不合并虹膜睫状体囊肿；B.开角型青光眼组：a 合并虹膜睫状体囊肿，b 不合并虹膜睫状体囊肿；C.非青光眼组：a 合并虹膜睫状体囊肿，b 不合并虹膜睫状体囊肿。所有数据均应用 SPSS19.0 软件进行统计学处理。所有数据分析前进行正态性及方差齐性检验，正态数据计量资料均以均数±标准差表示，计数资料以百分比表示。计量资料两组间比较采用 t 检验或秩和检验；计数资料采用卡方检验或 Fisher 确切概率法。所有分结果以 $p<0.05$ 为差异有统计学意义。**结果**：在 185 只受检眼中，25 只眼发现合并虹膜睫状体囊肿，占受检眼的 13.51%。闭角型青光眼组囊肿检出率为 18.75%。开角型青光眼组囊肿检出率为 10.91%。非青光眼组囊肿检出率为 7.27%**结论**：原发性虹膜睫状体囊肿在原发性青光眼患者中的检出率高于非青光眼患者，且原发性闭角型青光眼患者较原发性开角型青光眼患者检出率高。 原发性虹膜睫状体囊肿与原发性青光眼有较强的相关性。

PO-497

IOL 计算公式在儿童白内障术后早期的准确性比较

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目的：评价人工晶状体 (IOL) 屈光度计算公式 (SRK II、SRK T、Holladay 1、Hoffer Q、T2) 在儿童白内障群体中的准确性
方法：对在中山眼科中心接受一期 IOL 囊袋内植入的 13 岁以下先天性白内障患者进行回顾性病例记录审查。外伤性白内障、合并 PHPV、青光眼等眼病和缺乏术后 1 到 3 月屈光数据予排除。双侧眼，一只眼纳入研究。亚组分析时，将按手术年龄（<2y，2y-6y,>6y）、眼轴(<22mm,22-24.5mm,>24.5mm)和角膜曲率(<42,42-46D,>46D)进行分组。评价指标包括平均预测误差 (ME)、平均绝对预测误差 (MAE)、绝对预测误差中位数 (MedAE)、以及在预测误差±0.5D，±1D，±2D 范围的所占比例。
结果：375 例患者 375 只眼纳入分析。平均手术年龄，眼轴，角膜曲率分别为 55.21±28.27 月，22.45±1.88mm，43.96±2.04D。公式预测误差 (ME)的范围:-5.78D 至 6.1D。SRK II、SRK T、Hoffer Q 、Holladay 1 和 T2 公式的平均预测误差 (ME)分别为-0.25±1.42D，-0.12±1.23D，+0.12±1.21D，+0.10±1.20D。SRK II、SRK T、Hoffer Q 、Holladay 1 和 T2 公式的平均绝对预测误差 (MAE)分别为 1.06D、0.89D、0.89D 、0.86D 和 0.87D。预测误差±1D 所占比例，SRK II 58%，SRK/T67%，HofferQ 68%，Holladay1 和 T2 均是 71%。
结论：SRK II 公式在儿童白内障群体中表现最差，SRK T、Hoffer Q 、Holladay 1 和 T2 公式表现相当，其中以 Holladay 1 和 T2 公式稍好。

PO-498

快速角膜交联治疗进展性圆锥角膜临床疗效评价

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目的 评价去上皮快速角膜胶原交联术治疗进展性圆锥角膜的临床疗效。方法 前瞻性自身对照系列病例研究。纳入 2016 年 9 月至 2017 年 9 月于中国人民解放军总医院接受手术治疗的进展性圆锥角膜患者 46 例（60 只眼），术后随访 12 个月。分别于术前、术后 1 周、1、3、6、和 12 个月进行视力（LogMAR）、屈光状态（球镜和柱镜）、角膜内皮细胞计数、角膜地形图、及角膜生物力学检查。术后 1 个月行眼前节光学相干断层扫描仪（AS-OCT）检查。结果 本研究统计完成全部各时间点复查的患者 35 例（48 只眼），其中男性 24 例，女 11 例；年龄（22.83±3.87）岁。患者术前、术后 1 周、1、3、6 和 12 个月裸眼视力及最佳矫正视力均明显改善。术前球镜和柱镜度数分别为(-6.00±4.07)D 和(-5.18±2.36)D，术后均有显著降低（P＜0.05）。术前后不同时间点角膜内皮检查结果未见明显变化（P>0.05）。术前角膜中央厚度为 452.56±31.81μm，术后 1、3、6 个月分别为 446.06±4.28μm、446.33±4.51μm 和 448.15±4.39μm，均较术前明显下降(P＜0.01)。术前、术后 1 周、1、3、6 和 12 个月角膜曲率最大值分别为 57.20±7.41D、56.60±7.23D、56.35±7.28D、55.56±6.91D、55.53±6.97D 和 55.04±6.93D，较术前有显著降低（P＜0.01）。角膜生物力学相关的硬度参数（SP-A1）较术前明显升高、变形幅度比率（DA-ratio）及反向内凹半径（1/R）较术前明显降低 (P＜0.01)，提示治疗后角膜生物力学改善。结论 去上皮快速角膜交联术可以提高患者术后视力，改善角膜生物力学稳定性。对进展性圆锥角膜的治疗具有良好的安全性及有效性。远期疗效需要进一步观察。

PO-499

CO2 Laser-Assisted Sclerectomy Surgery (CLASS) in the Treatment of Open-Angle Glaucoma in Chinese Patients

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Purpose: To evaluate the efficacy and safety of CO_2-Laser Assisted Sclerectomy Surgery (CLASS) with 5-fluorouracil (5-FU) in treating open angle glaucoma (OAG) in Chinese patients.
Methods: All patients from 2016 to 2017 who received CLASS were recruited in this study. The primary outcome was the change in intraocular pressure (IOP) and the number of IOP-lowering medications over a 12-month follow-up period. Adverse events were evaluated as secondary outcomes.
Results: Data were collected from forty-two eyes of 31 patients. The average preoperative IOP was 31.3±7.6 mmHg. The mean percentage of IOP reduction from baseline at postoperative months (POM) 1, 3, 6, 9, and 12 were 48.1%±24.6% (95% CI, 40.4-55.7), 51.4%±19.3% (95% CI, 45.4-57.4), 51.2%±17.2% (95% CI, 45.9-56.6), 50.9%±15.0% (95% CI, 46.3-55.6), 49.2%±16.3% (95% CI, 50.0-54.3), respectively (all P<0.0001). The number of glaucoma medications decreased from a baseline of 3.02±0.81 to 0.05±0.22(95% CI, -0.02-0.11), 0.10±0.37(95% CI, -0.02-0.21), 0.12±0.40(95% CI, -0.004-0.24), 0.17±0.44(95% CI, 0.03-0.30) and 0.24±0.58(95% CI, 0.06-0.42) at POM 1, 3, 6, 9, and 12, respectively (all P<0.0001). At POM 1, 3, 6, 9, and 12, complete success rates were 66.7%, 73.8%, 76.2%, 69.1%, and 71.4%, respectively. At POM 1, 3, 6, 9, and 12, qualified success rates were 71.4%, 82.0%, 85.3%, 83.3%, and 90.5%, respectively. Major postoperative complications include peripheral iris synechia, iris incarceration, and anterior chamber shallowing.
Conclusions: CLASS with 5-FU shows safety and efficacy for decreasing IOP and the number of IOP-lowering medications over a 12-month follow-up period. It could be an alternative treatment for patients with OAG.

PO-500

糖尿病患者黄斑前膜的相关因素：广州糖尿病眼病研究

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目的 调查糖尿病患者黄斑前膜（Diabetic epiretinal membranes, DERM）的发病情况及相关因素描述性统计分析。

方法 本研究样本来自广州糖尿病眼病研究，这是一个正在持续进行的人群流行病学研究。共招募了1432 名 50 岁以上的 II 型糖尿病患者。所有受检者均接受详细的眼科检查，包括视力，眼压，眼前段照相，眼底照相，光学相干断层扫描(OCT)和光学相干断层血管成像(OCTA)，并记录了患者年龄、性别、BMI、血压、血脂等信息。严重的屈光介质浑浊或拒绝进行眼科检查的患者已被排除。根据眼底照相和 OCT 检查结果，按照患者是否合并视网膜前膜/黄斑前膜分为 DERM 组与 NERM 组。结合 2017 年 Govetto 等人对黄斑前膜的分级研究，使用 OCT 结果将 ERM 组进一步分为 4 级，1 级为黄斑形态基本正常，2 级为黄斑凹陷消失，3 级为有内层视网膜变化，4 级为黄斑结构不能辨认。NERM 组作为对照组，按照 ERM：NERM=1：2 的比例，随机抽取糖尿病患者加入对照组。
结果 ERM 组的 45 名/48 眼患者中，30 眼为视网膜前膜，18 眼为黄斑前膜。其中 4 眼 1 级，12 眼 2 级，4 眼 3 级，并有 3 眼合并有黄斑板层孔。ERM 组和对照组平均视力分别为 0.53 和 0.63，平均眼压无明显差异。在相关因素的描述性统计分析中，仅年龄与 ERM 有显著相关性，性别、BMI 血压、血脂无显著相关性。
结论 本研究中，视网膜前膜/黄斑前膜的发病率达 6.32%，且其对视力、眼压影响明显/不明显。目前仅发现年龄与 ERM 有相关性，可能需要更大样本量的研究，来进一步查看影响黄斑前膜发生发展的因素。

PO-501

Multiple cytokine analyses of aqueous humor from the patients with retinitis pigmentosa

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Purpose: Cataracts are the most common eye complications of retinitis pigmentosa (RP).This study aimed to investigate the cytokine profiles of the aqueous humor of RP with cataracts.
Methods: The aqueous humor wascollected from RP eyes with cataract (RP group, n=20) and age-related cataract eyes (ARC group,n=20) during cataract surgery. The levels of 37 mediators were measured withmultiplex fluorescent bead-based immunoassay and compared across groups. The correlationamongchemokines, growth factors，andcytokines was analyzed withSpearman's rank correlation coefficient.
Results: Twelve cytokines (IL-1α, IL-1β, IL-4, IL-10, TNF-α, IFN-γ, EGF, GM-CSF, PDGF-AB/BB, TGF-α, BMP-9，and E-selection) were below the limit of detection, and the detection rate of IL-6 was significantly higher in RP group than in the ARC group (P< 0.01). Compared with those in the control group , the aqueous humor levels of monocyte chemoattractant protein-1 (MCP-1), interleukin-8（IL-8）, interferon gamma-induced protein (IP)-10 , hepatocyte growth factor (HGF), platelet-derived growth factor AA (PDGF-AA), matrix metalloproteinase-2 (MMP-2), MMP3, MMP-7, MMP-8, plasminogen activator inhibitor-1 (PAI-1), and thrombospondin-2 (TSP-2) in the RP

group increased significantly ($P < 0.01$). A lower level of BMP-4 in the aqueous humor was observed in the RP patients than in the controls ($P< 0.05$).

Conclusions: Significantly increased levels of PDGF-AA, MMP2, MMP3, MMP-7, MMP-8, PAI-1, and TSP-2 and lower levels of BMP-4 were found in the aqueous humor of RP patients.This result indicates a disorder of the extracellular matrix (ECM) and suggests a possible role of these cytokines in the pathogenesis of capsular contraction syndrome (CCS) in RP patients.

PO-502

23G 微创玻璃体切割手术对先天性白内障患儿黄斑的影响

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目的 观察晶状体切除联合后囊膜切开联合前段玻璃体切除联合囊袋内人工晶体植入术对黄斑区视网膜厚度的影响。

方法 收集 2016 年 6 月至 2018 年 7 月就诊于温州医科大学附属眼视光医院先天性白内障患儿 41 例 53 眼，年龄相匹配的正常儿童 45 例 45 眼，均行海德堡频域光学相干断层扫描仪检查（SD-OCT），内置软件自动按照国际标准 ETDRS 黄斑分区法记录黄斑九分区视网膜厚度数值。所有患儿均行晶状体切除联合后囊膜切开联合前段玻璃体切除联合囊袋内人工晶体植入术。配合完成术前、术后 1 月、3 月、6 月、12 月 SD-OCT 检查的共计 30 例 40 眼，其中单眼患者 20 例 20 眼，双眼患者 10 例 20 眼。比较先天性白内障患儿黄斑区视网膜厚度与年龄相匹配的正常儿童有无差异，以及手术后先天性白内障患儿黄斑区视网膜厚度的变化。

结果 先天性白内障患儿外环黄斑区视网膜厚度均较正常儿童厚且差异有统计学意义（$p<0.05$），黄斑中心凹及内环两者厚度无明显差异。先天性白内障患儿术后早期黄斑区视网膜厚度较术前逐渐增加，至术后 3 月时达到峰值，而后逐渐降低，至术后 12 月时回落至术前水平。其中，单眼先天性白内障患儿术后黄斑区视网膜厚度较健眼明显增厚，至术后 12 月时差异消失，厚度恢复至术前水平（$P>0.05$），健眼的黄斑九分区视网膜厚度在各随访时间点均无明显变化。

结论 先天性白内障患儿的外环黄斑区厚度厚于正常儿童，手术使黄斑区视网膜厚度增厚，持续约 3 月后逐渐恢复。23G 微创玻璃体切割手术对先天性白内障患儿黄斑的影响较小，有较好的应用前景。

PO-503

Transcutaneous electric nerve stimulation improved tear film stability by eliciting blink in asymptomatic individuals

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Purpose

Our study aimed to explore a safe and comfortable condition of transcutaneous electric nerve stimulation (TENS) to elicit blink. Furthermore, we analyzed whether increased frequency of blink induced by TENS may improve the stability of tear film in individuals free from Dry Eye Syndrome (DES).

Methods

Healthy volunteers were recruited to explore the optimal condition of TENS, which may induce complete eye closure, cause minimum discomfort and undergo the lowest current intensity. Electric stimulation was generated by the KD-2B TENS Therapy Apparatus. Additionally, we recruited healthy volunteers with no symptom of DES in the further study. Each volunteer played the video game Tetris for 5 minutes and the corresponding game score was recorded. Afterwards, TENS was conducted around volunteers' right eye for 30 minutes under the optimal TENS condition explored above. During TENS around right eye, volunteers were asked to play Tetris for 5 minutes. The trial repeated for 3 times per week, with an interval of 2-3 days for two weeks. Before the first trial and after the third and sixth trial, noninvasive Keratograph average tear breakup time (NIKa-BUT) and tear meniscus height (TMH) were measured. Statistical analysis was conducted with repeated measurement data analysis of variance and Bonferroni t-test and calculated by SPSS 20.0.

Results

There were 18 volunteers enrolled in our study. The optimal TENS condition was defined on current frequency, pulse width and positive electrode site, which elicited complete blink without discomfort. In the further study, we recruited 17 volunteers who met the criteria. Analysis showed that the average NIKa-BUT of right eye was 13.25±4.26s before TENS and increased to 17.46±3.74s after the sixth TENS, between which the difference was statistically significant (P=0.02). The TMH of the right eye was 0.22±0.09mm at the baseline and increased to 0.28±0.12mm after the third TENS (P=0.03). The TMH of the right eye after TENS for 6 times was 0.27±0.10mm, significantly higher than the TMH before TENS as well (P=0.03).

As for the measurement of the left eye, no statistically significant difference was found in NIKa-BUT before and after TENS (P=0.16). In contrast, the difference was obvious in the TMH of left eye. Statistical difference existed between the TMH before TENS and both after the third TENS (P=0.01) and after the sixth TENS (P=0.01).

The score of Tetris implied a rising tendency as the numbers of TENS increased. Moreover, the difference between the score of Tetris before and during TENS was not statistically significant (P=0.12).

Conclusions

Increased blinking frequency elicited by TENS promoted the stability of tear film in healthy individuals without affecting reading. Furthermore, it may be used in the prevention and treatment of Dry Eye Syndromes.

PO-504

青光眼小梁切除术后视盘血流密度的变化观察

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目的:应用光学相干断层扫描血管成像（optical coherence tomography angiography, OCTA）观察青光眼患者小梁切除术后视盘和视盘旁微血管的变化。
方法：前瞻性纳入 34 例（52 眼）确诊为原发性青光眼的手术患者为研究对象。对所有观察眼行术前、术后眼压、OCT 和 OCTA 等检查。观察术前、术后 1 周术眼的眼压、平均视网膜神经纤维层（retinal nerve fiber layer，RNFL）厚度、平均神经节细胞复合体厚度、C/D 比值及视盘整体血流密度、视盘旁血流密度（peripapillary vessel density, PvD）以及视盘旁不同区间血流密度值，并对两次测量值差异进行比较。
结果：术后 1 周眼压为(10.88±4.26)mmHg(1kPa=7.5 mmHg)，与术前的(19.88±5.22)mmHg 相比，差异具有统计学意义（*P*=0.002）。术后 1 周视盘整体血流密度和 PvD 分别为（50.73±5.74）%和（42.77±4.32）%，与术前的（49.34±7.27）%和（39.38±2.75）%相比，差异均有统计学意义（*P*=0.028,*P*=0.021）。术后视盘鼻上、鼻侧、鼻下、颞侧和颞下血流密度与术前相比，差异均无统计学意义（均为 *P*>0.05）；颞上血流密度术前、术后分别为（42.72±6.89）%和（43.09±6.83）%，差异有统计学意义（*P*=0.033）；术后视盘整体血流密度和 PvD 改变多因素分析结果显示，与手术前后眼压降低差值有关，与年龄、术前眼压、C/D 值、平均神经节细胞复合体厚度及平均 RNFL 厚度无相关性。
结论：青光眼患者在小梁切除术后 OCTA 视盘扫描检查提示，随着眼压的下降，视盘区整体血流密度以及 PvD 显著增加。

PO-505

白内障术末前房注射低浓度万古霉素发生 迟发性非感染性眼内炎症的回顾研究

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[摘要] 目的 根据《我国白内障摘除手术后感染性眼内炎防治专家共识（2017 年）》指出在使用较高浓度万古霉素（即 10 mg/ml 万古霉素 0.1 ml）前房注射时，须注意有可能发生非感染性眼内炎。回顾分析我院白内障术末前房注射低浓度万古霉素（0.01 mg/ml，0.1 ml）后安全性分析，及其引起迟发性非感染性眼内炎症的发病特点、临床表现及治疗。方法 收集 2014 年 1 月至 2017 年 11 月于我院行白内障手术患者 24916 例，所有患者均于术末前房注射低浓度万古霉素 0.1ml（0.01mg/ml）。其中男性 13983 例，女性 10933 例。左眼 11723 例，右眼 13193 例。平均年龄 68.32±7.08 岁。收集到迟发性眼内炎 21 例 25 眼。观察术后视力、眼压、角膜、前房、人工晶体、玻璃体混浊、眼底

表现及房水炎症因子等变化情况。收集患者发病后治疗方案，并对其治疗有效性进行评估。结果 共收集迟发性眼内炎症患者 21 例 25 眼，其中男性 4 例，女性 17 例。单眼 17 例，双眼 4 例。平均年龄 60.95±9.18 岁。患者白内障术后平均 22.26± 12.58 天出现眼内炎，分别出现前房炎症及玻璃体混浊，部分患者前房房水检测显示：炎症因子 IL-6、血管内皮生长因子 VEGF、转化因子 TGF-B1、血管细胞粘附因子 VCAM 有明显升高但未检测到眼内常见的 21 种病原微生物及培养无真菌、细菌生长。患者使用万古霉素治疗无效甚至加重病情，使用激素治疗有效。结论 即使将万古霉素浓度降至共识中提及的 1/1000，但超过前房注射万古霉素的最低抑菌浓度 0.004mg/ml。仍发现了迟发型非感染性眼内炎症的病例，故即便使用低浓度万古霉素仍非绝对安全，建议权衡万古霉素在预防眼内炎中的利弊，重视随访。而治疗上对于疑似病例，建议选用激素治疗。

PO-506

角膜移植术后植片溃疡的危险因素分析

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目的 回顾性分析角膜移植术后植片溃疡的相关危险因素。**方法** 对 2006 年 4 月至 2017 年 4 月 2323 例于我院行角膜移植术后发生植片溃疡的 170 例病例进行回顾性分析，分别记录原发病，植片溃疡发生的直接危险因素等。**结果** 发生角膜植片溃疡的原发病分别为：（1）感染性角膜炎 673 例，62 例（9.21%）发生植片溃疡。其中真菌性角膜炎 309 例（29 例溃疡，9.39%），单纯疱疹病毒性角膜炎（HSK）268 例（25 例溃疡，9.33%）；细菌角膜炎 76 例（8 例溃疡，10.53%）；（2）蚕蚀性角膜溃疡 79 例，10 例发生植片溃疡（12.66%）；（3）角膜营养不良或变性 216 例，9 例（4.17%）发生植片溃疡；（4）圆锥角膜 420 例，11 例（2.62%）发生植片溃疡；（5）角膜烧伤 438 例，14 例发生植片溃疡（3.2%）。其中碱烧伤 237 例（7 例溃疡，3%）；热烧伤 143 例（5 例溃疡，3.5%），酸烧伤 58 例（2 例溃疡，3.45%）；（6）角膜白斑 247 例，4 例发生植片溃疡（1.62%）。（7）角膜肿物 127 例，7 例（5.5%）发生角膜溃疡。植片溃疡的前 3 位直接危险因素为：缝线相关因素 47 例；免疫排斥反应 40 例；上皮缺损 32 例等。**结论** 原发病为蚕蚀性角膜溃疡、感染性角膜炎角膜移植术后易发生植片溃疡，植片溃疡形成的主要危险因素是缝线问题、免疫排斥及上皮缺损。应重视相关危险因素以降低角膜移植术后植片溃疡发生。

PO-507

Ahmed 引流阀植入联合康柏西普治疗新生血管性青光眼的疗效观察

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目的 探讨引流阀植入联合玻璃体腔注入康柏西普在新生血管性青光眼的治疗效果。方法 对我院自2015年1月至2019年1月诊断为新生血管性青光眼的患者59例60只眼，根据手术方式分成试验组和对照组，试验组采取引流阀植入联合玻璃体腔注入康柏西普，共20例21眼，对照组采用睫状体光凝术，共39例39眼，术后随访3个月，比较两组术后视力、眼压和虹膜新生血管消退情况。结果 两组病例资料术前数据无明显统计学差异，两组治疗方法均可以达到降眼压的效果，但两组眼压在术后1周（t=2.976,P＜0.05），术后1月（t=2.855,P＜0.05）和术后3月（t=3.5,P＜0.05）差异具有明显统计学意义，新生血管消退情况有显著差异（χ^2=7.651，P＜0.05）。结论 引流阀植入联合康柏西普可有效地控制新生血管性青光眼术后眼压，效果持久，使新生血管消退。

PO-508

白内障术后 MGD 发病率及睑板腺功能及结构变化研究

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目的：本文旨在研究50-80岁的睑板腺功能异常的患者白内障术后MGD的发生率，睑板腺的结构及功能的变化。

方法：本研究纳入2017年11月至2018年7月至温州医科大学附属眼视光医院进行白内障手术的50-80岁的93名患者的131只眼。对纳入研究的每一位患者都由同一位医师详细询问基本信息，并对患者进行SPEED问卷评分，行角膜荧光素染色，记录荧光素泪膜破裂时间，在裂隙灯下对患者睑缘进行评估，同时对其行睑脂挤压试验和睑脂性状评分，并对上下睑板腺行红外照相，评估睑板腺腺体缺失程度。

结果：本研究共纳入93名患者的131只眼。结果如下：（1）术前睑板腺功能异常的白内障患者术后发展为MGD的比率占36.64%；（2）SPEED评分在1周（P<0.001）、1月（P<0.001）、3月（P=0.001）均增加；（3）TBUT在1周（P=0.001）、1月（P<0.01）、3月（P<0.01）均缩短；（4）角膜荧光染色评分在1周（P<0.05）增加,1月、3月与术前相比，无统计学意义；（5）睑缘充血评分在1周（P<0.001）、1月（P<0.001）、3月（P<0.001）均增加；（6）睑缘泡沫评分在1周（P<0.001）、1月（P<0.001）、3月（P=0.001）均增加；（7）睑缘不规则评分在1周（P=0.01）、1月（P<0.001）、3月（P=0.001）均增加；(8)睑板腺开口评分在1月（P<0.05）、3月（P=0.001）增加；(9)睑板腺分必物性状评分在1周（P<0.05）、1月（P<0.001）、3月（P<0.001）均增加；(10)睑板腺分泌状态评分在1月（P<0.001）、3月（P<0.001）增加；(11）上睑与下睑睑板腺缺失面积程度变化无统计学意义。

结论：

白内障患者术后MGD发病率为36.64%，睑缘异常及睑板腺功能均恶化，睑板腺结构可能未发生变化。

PO-509

The effect of pan-retinal photocoagulation combined with intravitreal conbercept in treatment of proliferative diabetic retinopathy

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Objective: To investigate effectiveness of panretinal photocoagulation combined with intravitreal conbercept (IVC) for proliferative diabetic retinopathy patients.
Design: Retrospective, interventional case series.
Methods: Patients with PDR and treated with IVC and combined with retinal photocoagulation from Jan 2017 to Jun 2018 were included. Exclusion criteria consisted of IVC treatment prior to the study, a history of pars plana vitrectomy (PPV) or retinal photocoagulation, and less than 6 month of follow-up. Patients with PDR first received IVC (0.5 mg/0.05 mL) and scheduled for panretinal photocoagulation (PRP) within one month. Outcomes of interest were additional treatments including PPV and injections, best corrected visual acuity (BCVA), the central macular thickness (CMT) documented by optical coherence tomography (OCT) and regression of neovascularization (NV) area assessed by fundus fluorescein angiography (FFA) and the risk factor of need for vitrectomy because of occurrence of vitreous hemorrhage, tractional retinal detachment or other complications of DR.
Results: A total of 72 eyes of 53 patients' medical records were reviewed, which included 32 eyes of early PDR, 24 eyes of high-risk PDR and 16 eyes of proliferative PDR. Patients were followed up for 6–18 months (mean 10.2 months). Mean age of the patient was 57.47± 6.08 years. 65 (90.2%) had PRP, and 7 (9.8%) had PPV. Complete NV total regression was observed in 65.6%.
Conclusion: IVC could be conducted as primary treatment of PDR followed by conventional photocoagulation. Panretinal photocoagulation combined with intravitreal conbercept (IVC) in patients with proliferative diabetic retinopathy is safe and effective.

PO-510

2 型糖尿病人群轻度视力损伤患者 2 年随访研究报告

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目的了解 2 型糖尿病人群中双眼轻度视力损伤患者随访 2 年后的视力变化及相关因素。**方法**以人群为基础的前瞻性研究。研究对象是 2014 年前期研究中发现的 2 型糖尿病人群中双眼轻度视力损伤社区居民 650 名，于 2016 年再次随访，获得随访对象人群的基本特征、血生化检测结果和眼科检查结果。采用国际眼科学会理事会 2002 标准，轻度视力损伤定义为最佳矫正视力<0.8，且≥0.3，中重度损伤定为最佳矫正视力<0.3，且≥0.05，盲定为最佳矫正视力<0.05。将 2 年后的视力变化分为三组：视力损伤程度减轻组，加重组和不变组，确定影响视力变化的相关因素，及 2 年后视力损伤的主要原因。**结果** 605 位居民完成了 2 年后的随访。其中，477 人仍为双眼轻度视力损伤，占 78.8%（477/605）；49 人单眼或双眼视力损伤程度减轻，占 8.1%（49/605）；79 人单眼或双眼视力损伤程度加重，占 13.1%（79/605）。年龄轻、病程短、血糖化血红蛋白值低或血总胆固醇值低是视力损伤程度减轻的相关因素。受教育程度低、血糖化血红蛋白值高或血总胆固醇值高是视力损伤程度加重的相关因素。白内障、糖尿病性视网膜病变为导致轻度、中重度视力损伤或盲的第一和第二位的视力损伤原因。**结论** 2 型糖尿病人群轻度视力损伤者在 2 年后视力发生下降比例较高，加强对血糖化血红蛋白及血总胆固醇的监测和控制，有助于减少视力损伤的进展。

PO-511

Mild visual impairment in type 2 diabetes is associated with macular vascular abnormalities

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Purpose: To analyze the characterized quantitative optical coherence tomography angiography (OCTA) features in type 2 diabetic patients with new-onset, unexplained mild visual impairment.

Design: Community-based prospective cohort study.

Methods: The prospective cohort study included 715 patients with type 2 diabetes who had normal vision in 2014. Demographic information, systemic examination results, and comprehensive ophthalmological examination results were collected for each participant. Mild visual impairment, defined as BCVA < 20/25 but ≥ 20/63. The quantitative OCTA features and association between each potential risk factor and unexplained mild visual impairment was analyzed.

Results: Twenty-nine patients had unexplained mild visual impairment. The OCTA of eyes with unexplained mild visual impairment showed a significant decrease in the vessel diameter index (VDI) (17.82 ± 0.59 versus 18.06 ± 0.59; P = 0.02) and vessel area density (VAD) (0.40 ± 0.03 versus 0.41 ± 0.03; P < 0.01), and a significant enlargement of the foveal avascular zone size (FAZ) (0.97 ± 0.24 mm^2 versus 0.85 ± 0.06 mm^2; P < 0.01) compared to those with normal vision in the deep retinal layer (DRL). The difference was not significant in the superficial retinal layer (SRL) and non-segmented retinal layer (N-SRL). Patients with higher hemoglobin A1c levels (OR=6.805, P<0.01) and bigger deep FAZ (OR=13.602, P<0.001) were more likely to have unexplained mild visual impairment.

Conclusions: The FAZ, DVI, and VAD in DRL could be used as a non-invasive and simple target index during follow-up of patients with unexplained mild visual impairment in large-scale population-based studies.

PO-512

高度近视并发性白内障患者术前角膜后表面散光特征分析

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目的：分析高度近视并发性白内障患者术前角膜后表面散光的特征。**方法：**回顾性病例研究。收集2015 年 1 月至 6 月期间就诊于山西省眼科医院白内障科白内障患者 215 例 215 眼，按照眼轴长度分为高度近视组（AL≥26mm）和对照组(20mm≤AL＜26mm)。其中高度近视组 94 例 94 眼，对照组 121 例 121 眼，术前行 pentacam 检查，分析角膜后表面散光（PA）、总角膜散光(TA)、模拟角膜散光(KA)的分布特点及相关性，采用算术法和矢量法分析 TA 与 KA 的差异。**结果：**高度近视组 PA 的算术平均值为（-0.33±0.20）D，其中 78.72%为逆规散光，大于 0.5D 的患眼为 30.85%，与对照组之间差别无统计学意义（t=0.589，P=0.557）。KA 与 TA 的矢量误差为 0.12±0.21@4°，其中 24.47%患眼两者之间误差≥0.5D。PA 与 KA、Km（KA）、Km（PA）之间具有正相关性（r=0.340，P=0.001；r=0.285，P=0.006；r=0.333，P=0.001），对于 KA>0.5D 患者，KA 和 PA 轴位差值与 TA 和 KA 差值之间具有正相关性（r=0.235，P=0.004）。**结论：**高度近视组 PCA 分布与对照组之间差异无统计学意义。高度近视组忽略 PA 同样会导致 TA 计算误差，对植入 Toric 人工晶状体的患者应考虑个性化 PA。

PO-513

To research the impact of different 3.2mm incisions of cataract surgery on patients whose corneal astigmatism within 25 degrees by Orbscan

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Objective: To research the impact of different 3.2mm incisions of cataract surgery on patients whose corneal astigmatism within 25 degrees by Orbscan.

Methods: We collect 40 cases of cataract patients whose corneal astigmatism within 25 degrees detected by Orbscan and randomly divided them into A, B two groups. Detected by Orbscan, the A group of 20 patients (20 eyes) was conducted with 3.2mm corneal astigmatism axial incision

and the B group of 20 patients (20 eyes) was conducted with 3.2mm corneal incision on 90 degrees of the axis . All cataract operations were implemented by the same physician. We observe the postoperative changes of corneal astigmatism between two groups.

Results: The comparisons of Polar K on each time preoperative and postoperative point were significant differences within each group. But the comparisons of Polar K on each time preoperative and postoperative point were not statistically significant between two groups. After 3 months, two kinds of incisions will both increase about 0.3D Polar K in the cornea.

Conclusions: 3.2mm corneal incision may cause Polar K 0.3 Din corneal astigmatism.

PO-514

飞秒激光辅助白内障手术对比传统超声乳化手术在不同眼轴长白内障患者中对眼高阶相差的对比研究

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目的：研究飞秒激光辅助白内障手术对比传统超声乳化手术在不同眼轴长白内障患者中对眼高阶相差的对比研究。

方法：白内障手术患者按眼轴长不同分为 22mm≤A<24mm 组、24mm≤A<26mm 组及 26mm≤A 组，各组内均 100 例，组内患眼再随机均分为飞秒激光组及传统超乳组，每组各 50 例患眼。所有患眼术前及术后 3 个月均行眼高阶相差检测并分析结果。

结果：眼轴 22-24mm 组，飞秒手术患眼手术后全眼及眼内的三种高阶相差均比术前明显减少；传统超乳组，全眼及眼内的三种高阶相差均比术前明显减少，角膜的三种相差均有比术前不同程度的增加。眼轴 24-26mm 组，无论是飞秒组还是传统组，眼总高阶相差及 3 阶像差这两项指标全眼及眼内相差均比术前有所减少。眼轴大于 26mm 组中，传统组患眼全眼及眼内三种高阶相差均比术前明显减少，飞秒组中仅眼内的眼总高阶相差和 3 阶像差改变有统计学意义。

结论：晶状体的浑浊引起的白内障是眼高阶相差产生的主要来源，两种手术都能有效减少眼内高阶相差，而且两种手术方式对眼高阶相差的改变差异不明显。对于正常眼轴白内障患眼，飞秒激光辅助手术切口制作能减少角膜相差的产生。

PO-515

2 型糖尿病合并睑缘蠕形螨的眼表相关分析

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目的：探讨 2 型糖尿病病程、血糖控制状况合并蠕形螨患者的眼表改变。从而为该类患者的诊断和治疗提供证据并指导用药。方法：1.研究对象及分组：观察组：选取山东省眼科医院 2 型糖尿病患者 50 人，共 100 眼作为观察组；正常人（年龄性别相匹配)50 人，共 100 眼作为对照组。2.实施方法：用共焦显微镜及裂隙灯观察睑缘及睫毛根部蠕形螨，使用欧杰思眼表分析仪及 Lipview 观察受试者眼表情况 3.观察指标：①裂隙灯照相：观察睑缘皮肤、睑缘充血、鳞屑及睫毛根部“套袖”状分泌物。②共焦下蠕形螨的大小、数量、形态：共焦显微镜下可以在没有破坏毛囊的前提下直接观察螨虫寄生状态，我们可以观察到单个毛囊内螨虫的数量，成年螨虫的大小、形态，毛囊破坏程度，观察毛囊有无扩张，有无角化上皮堆积。③眼表分析各项指标：使用欧杰思眼表综合分析仪测量以下数据：泪膜破裂时间（第一次泪膜破裂时间、平均泪膜破裂时间）；泪河高度；眼红分析；睑板腺缺失度。④脂质层厚度：使用 Lipview 测量脂质层厚度。采取 SPSS 统计软件进行分析。可能得出的结论：2 型糖尿病患者睑缘蠕形螨检出率高于正常组。2 型糖尿病合并睑缘蠕形螨眼表问题严重性高于正常组。

PO-516

年龄相关性白内障患者不同仪器的角膜散光测量值与 Barrett 在线计算公式估算值的比较研究

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目的：采用光学生物测量仪器（IOLMaster，Zeiss，德国）和三维眼前节分析系统（Pentacam HR，Oculus，德国）对白内障患者的术前角膜散光进行测量，并经 Barrett 在线计算公式进行全角膜散光计算，比较不同仪器的角膜散光测量值与计算值之间的差异。
方法：将研究病例分为顺规散光组、逆规散光组以及斜轴散光组采用质心法对散光测量值（IOLmaster K_A，SimK_A, $TCRP_A$ 与 TNP_A）与估算值（Barrett-K_A，Barrett-SimK_A）之间进行比较分析。
结果：经 Barrett 公式计算后 K_A 和 SimK_A 顺规散光组及斜轴散光组中减小，在逆规散光组中增大，同时轴位也发生改变。在顺规散光中，IOL Master K_A 与 $TCRP_A$ 的质心误差为 0.25D，垂直方向，而 Barrett K_A、Barrett-SimK_A 与 $TCRP_A$ 相比，质心误差较大，分别为 0.54D，0.61D，均位于水平方向。在逆规散光中，IOL Master K_A、Barrett-SimK_A 与 $TCRP_A$ 的质心误差分别为 0.4D、0.3D，位于水平方向，而 Barrett K_A 与 $TCRP_A$ 的误差较大，为 0.77D，位于水平方向。在斜轴散光中，与顺规散光相似，IOL Master K_A 与 $TCRP_A$ 的质心误差较小为 0.36D，水平方向， Barrett K_A、Barrett-SimK_A 与 $TCRP_A$ 的质心误差较大，分别为 0.60D、0.51D，位于水平方向。
结论：采用不同设备所测量的角膜散光值、全角膜散光值与 Barrett 公式计算的全角膜散光估算值之间存在一定差异。在临床应用中需要进一步进行研。

PO-517

利用微信提醒进行青光眼患者体力活动干预的随机对照试验

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目的：评估利用微信增加青光眼患者体力活动的可行性。
方法：入组 2018 年 6 月至 2018 年 10 月就诊于温州医科大学附属眼视光医院门诊的青光眼患者。随机分为对照组（口头宣教）和干预组（口头宣教+微信干预），患者右侧腰上佩戴运动监测仪器（ActiGraph , WGT3X-BT），进行 7 天基线和随访 30 天的运动监测，同时采集干预前后眼部参数（基线入组时和 30 天随访结束时）。主要监测指标包括：干预前后的轻、中、高、超高强度体力活动时间，中高强度体力活动时间，代谢当量，步数以及运动消耗的卡路里。
结果：门诊入组 100 名确诊为青光眼的患者，剔除基线运动量较大者 11 名（>12,000 步/天），随访中其他原因丢失 17 名，最终符合入组患者 72 名，其中对照组 42 名，干预组 30 名。干预组微信干预后，平均运动量明显高于 7 天基线时的平均量，其中每天平均运动步数，消耗的卡路里，代谢当量（METs），中等强度体力活动时间，高强度体力活动时间，中高强度体力活动时间均具有统计学意义（P=0.00，0.004，0.001，0.004，0.02，0.003）。轻度体力活动时间，久坐静止次数较干预前减少（P=0.04，0.01）。对照组 30 天随访的平均步数也高于基线时（P=0.00），但干预组的步数增加量明显高于对照组，-1733.70±1921.96 步/天 vs -1187.84±2342.48 步/天；干预后的轻度体力活动时间也较基线减少（P=0.01）。另外，比较对照组和干预组基线与 30 天随访的平均运动差值，发现两组高强度体力活动时间和超高强度体力活动时间的差值具有统计学意义（P=0.002,0.04）。
结论：利用微信提醒可以增加青光眼患者的体力活动，但医生的口头宣教也可以起到一定的作用。

PO-518

糖尿病黄斑缺血患者脉络膜厚度特征

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目的 观察糖尿病黄斑缺血（DMI）患者黄斑区脉络膜厚度特征。
方法 回顾性病例研究。经眼底荧光血管造影（FFA）检查确诊的糖尿病视网膜病变（DR）不伴糖尿病黄斑水肿（DME）患者 80 例 102 只眼纳入本研究。其中 DR 伴 DMI 患者 37 例 47 只眼（DMI+组），DR 不伴 DMI 患者 43 人 55 眼（DMI-组）；选择同期年龄、性别相匹配的经散瞳检查明确眼底无明显 DR 的 2 型糖尿病（T2DM）患者 33 例 50 只眼作为对照组（NDR 组）。所有患者均经光

相干断层扫描 EDI 模式测量黄斑中心凹下脉络膜厚度（SFCT）。采用独立样本 *t* 检验比较三组 SFCT 差异。

结果 三组间性别、年龄比较，差异无统计学意义。EDI-OCT 检查结果显示，DMI**+**组、DMI**-**组及 NDR 组 SFCT 分别为 357.13±101.41μm、296.00±95.88μm、342.68±80.76μm。与 DMI**-**组比较，DMI**+**组 SFCT 明显增厚，差异有统计学意义（*t*=3.125，*P*=0.002）。DMI**-**组与 NDR 组 SFCT 比较，差异有统计学意义（*t*=2.684，*P*=0.008）。DMI**+**组与 NDR 组 SFCT 比较，差异无统计学意义（*t*=0.779，*P*=0.438）。

结论 DR 患者黄斑中心凹下脉络膜厚度（SFCT）变化与是否存在 DMI 有关。DMI 患者较 DR 不伴 DMI 患者 SFCT 明显增厚。DR 不伴 DMI 患者较 DM 无 DR 患者 SFCT 明显降低。

PO-519

Clinical Observation of Modified Intracystic Ethanol Irrigation

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PURPOSE: To evaluate the efficacy and safety of modified intracystic ethanol irrigation for traumatic iris cyst eyes.

METHODS: 12 cases of traumatic iris cyst patients were observed during August 2016 and August 2018 in ocular trauma department of our hospital. After anterior chamber filled with DisCoVisc, cyst fluid was drained gently via a 30-gauge needle, and the ethanol was irrigated into the cyst through 3-way T-extension until the cyst wall turned white. The DisCoVisc was washed in the end. Patients were followed for cornea and anterior chamber condition, best-corrected visual acuity (BCVA), intraocular pressure (IOP) and endothelial cell density (ECD). The diameters of maximal length and width in maximal cross-sectional area were calculated by ultrasound biomicroscopy (UBM) preoperatively and postoperatively.

RESULTS: All iris cysts were successfully drained with ethanol. Anterior chamber was kept stable with the help of DisCoVisc. No ethanol leakage was observed. All cysts were resolved and without recurrence at the last follow-up. BCVA was no significant changes after surgery in one week (0.40±0.34 preoperatively vs 0.44±0.34 postoperatively ,t=-1.17, P=0.27>0.05). IOP was also no significant changes after surgery(14.46±5.72mmHg preoperatively vs 15.70±3.77mmHg postoperatively, t=-0.914, P=0.38>0.05). Mean loss of ECD was 159.27 cells/mm^2, and there was significant changes after surgery (2270.79±458.43/mm^2 preoperatively vs 2111.52±483.46/mm^2 postoperatively, t=3.760, P=0.004<0.05). Mean postoperative maximal length diameter was reduced by 4.41mm (5.87±0.95mm preoperatively vs 1.46±0.83mm postoperatively, t=18.55, P=0.00<0.05). Mean postoperative maximal width diameter was reduced by 2.21mm (3.10±0.55mm preoperativly vs 0.89±0.47mm postoperatively, t=11.75,P=0.00<0.05). Patients'

postoperative follow-up period was 3~24 months. BCVA was elevated in 5 cases at the last follow-up, but declined in 3 cases. The others kept stable. No significant complications (such as cornea endothelial decompensation, endophthalmitis, sympathetic ophthalmia and retinal detachment) were occurred during follow-up period.

CONCLUSION: Modified intracystic ethanol irrigation was a safe and effective procedure to treat traumatic iris cysts, more simple, less injury and low rate of complications.

PO-520

ICE 综合征并发症手术治疗的效果观察

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目的 观察 ICE 综合征（iridocorneal endothelial syndrome ICE syndrome）并发症手术治疗的临床效果。**方法** 回顾性病例分析，统计 2001～2012 于青岛眼科医院就诊并确诊为 ICE 综合征继发性青光眼、角膜内皮失代偿入院行抗青光眼手术与穿透性角膜移植术治疗患者共 40 例 40 眼，排除其他可导致青光眼及角膜内皮病变的疾病，记录患者性别、ICE 综合征类型、手术方式、术前与术后视力、眼压、角膜内皮数目、房角情况、并发症、平均随访 4.2±0.7 年。统计学方法采用 SPSS17.0 软件，术前与术后视力、眼压、内皮采用配对秩和检验。**结果** 最终随访 34 眼（85%）发生青光眼，其中 15 眼（44.1%）合并发生角膜内皮失代偿；6 眼（15%）仅发生角膜内皮失代偿。10 眼（55.6%）继发性青光眼发生于角膜移植术后 1 月～1 年；仅有 2 眼（6.9%）角膜内皮失代偿发生于继发性青光眼小梁切除术后 3～4 年。抗青光眼术后最终随访平均眼压较术前下降，差异有统计学意义（Z=－4.011，P＜0.01），单行角膜移植患者最终随访眼压较术前无明显变化，差异无统计学意义（Z=－0.956，P > 0.05）。40 例患者最终随访平均视力较术前改善，差异有统计学意义（Z=－4.508，P＜0.05），有 8 眼（20%）因青光眼视力下降为无光感至指数。穿透性角膜移植术后 2 年内角膜内皮数目平均以每年 14.88%的速度减少，单行小梁切除术后角膜内皮数目平均以每年 7.68%速度减少。手术并发症发生率最高的是高眼压，其次是角膜排斥、角膜内皮失代偿。最终随访角膜植片透明率 71.4%。**结论** 手术是治疗 ICE 综合征的有效手段，继发性青光眼行小梁切除术 1 月内联合 5-FU 结膜下注射可提高手术成功率，角膜内皮失代偿行角膜移植术后约 1/2 患者在 1 年内需行抗青光眼手术；高眼压是 ICE 综合征反复手术的最主要原因。

PO-521

Effect of non-invasive tear stability assessment on the upper and lower tear meniscus height

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Purpose: To investigate the effect of non-invasive tear stability assessment with forced eye opening on the upper and lower tear meniscus.

Methods: Ten eyes with evaporative dry eye disease and 10 normal eyes were enrolled. All subjects underwent imaging with a Keratograph 5M equipped with a modified tear film scanning function. The upper and lower tear meniscus height (U-TMH and L-TMH) at the central point relative to the pupil center was measured with an integrated ruler before and after non-invasive Keratograph break-up time (NIKBUT) measurements in each subject. Subjects were instructed to keep their eyes open as long as possible during NIKBUT measurements, and the recording was discontinued at the next blink.

Results: The U-TMH values of the normal and dry eye groups were 0.21 ± 0.06 mm and 0.14 ± 0.09 mm; while the L-TMH values were 0.27 ± 0.12 mm and 0.22 ± 0.07 mm, respectively, at baseline. The TMH values of dry eyes were significantly smaller than those of normal eyes (P<0.001). Significant increases in L-TMH values were observed in both normal (0.19 ± 0.13 mm) and dry eyes (0.14 ± 0.11 mm) with the NIKBUT measurement (P<0.001, P =0.027); while there were no significantly increases of U-TMH in both group (normal, 0.08 ± 0.09 mm, P = 0.067; dry eyes, 0.06 ± 0.08 mm, P = 0.054). The changes of L-TMH were more significantly than the U-TMH in both groups (both P<0.001).

Conclusions: Forced eye opening required for the non-invasive tear stability assessment influences the TMHs measurement possibly due to reflex tear secretion. The L-TMH values were more severely affected by than the U-TMH.TMHs should be assessed before tests that require forced eye opening.

PO-522

中国农村 50 岁及以上人群翼状胬肉的患病率：2014 年全国九省调查

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目的 调查全国九省农村地区 50 岁及以上人群翼状胬肉患病率，探讨翼状胬肉的患病与年龄、性别、文化程度、不同地区等因素的关系。**方法** 采用整群随机抽样方法，抽取全国九省 50 岁及以上人群作为调查对象，进行问卷调查，视力及验光检测；眼表、眼前节及眼底检查和其他检查；Logistic 回归分析翼状胬肉的危险因素。**结果** 根据调查点居民户口本获得所有 50 岁及以上人群人员名单并进

行检录，结合调查对象纳入标准，应调查 56,630 人，实际调查 51,310 人，受检率为 90.6%，翼状胬肉患者 8487 例，患病率为 16.54%；其中双眼胬肉 4101 例，患病率为 7.99%；其中男性受检者 22,245 人，男性患者 3733 例，患病率为 16.78%；女性受检者 29,065 人，女性患者 4754 例，患病率为 16.36%。Logistic 回归分析结果显示，不同性别翼状胬肉患病率差异无统计学意义（OR=1.03，*P*=0.318）。高龄(50～<60 岁：*OR*=1.00；60～<70 岁：OR=1.29，*P*<0.001；70～<80 岁：OR=1.59，*P*<0.001；≥80 岁：OR=1.47，*P*<0.001)、低教育程度(文盲：*OR*=1.00；小学：*OR*=0.99，*P*=0.802；初中：*OR*=0.94，*P*=0.190；高中及以上：*OR*=0.69，*P*<0.001)为翼状胬肉危险因素。九个调查地的患病率不同，江苏启东（*OR*=1.45，*P*=0.048）、广东阳西（*OR*=8.42，*P*<0.001）、河北隆尧（*OR*=3.70，*P*<0.001）、宁夏同心（*OR*=3.20，*P*<0.001）患病率高于北京顺义；黑龙江双城（*OR*=0.49，*P*<0.001）、江西吉安（*OR*=0.63，*P*<0.001）患病率低于北京顺义。**结论** 九个调查地 50 岁及以上人群翼状胬肉高患病率较高，不同地区的患病率不同，高龄、低教育程度是翼状胬肉患病的风险因素。

PO-523

眼睑痉挛患者的角膜形态学研究

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目的：比较并分析眼睑痉挛患者和正常人群的角膜曲率，角膜厚度，角膜地形等差异，明确眼睑压力对角膜地形的影响。
方法：病例对照研究。收集 2016 年 1 月至 2016 年 6 月就诊于浙江大学医学院附属第二医院眼科中心的眼睑痉挛患者共 65 例，按照 Jankovic Rating 标准将其分为轻度，中度和重度三组，同时期就诊的老年性白内障患者作为对照组。应用 Pentacam 眼前节测量评估系统进行扫描，收集患者角膜曲率、角膜厚度、角膜曲率、角膜高度等参数并进行比较。
结果：眼睑痉挛组的角膜前表面以及后表面曲率与正常对照组比较均有显著性差异，且与眼睑痉挛程度成正比；角膜地形参数中，重度眼睑痉挛组前表面变异系数，垂直不对称系数，圆锥角膜指数，final-D 与对照组相比较具有显著性差异；各组之间角膜高度以及角膜厚度并无差异。
结论：眼睑痉挛对角膜的长期压迫确实对眼表前后表面曲率以及角膜地形造成一定的影响，眼睑痉挛对患者的影响不只是外观，还会对患者的视觉质量造成一定的影响。

PO-524

Aqueous Semaphorin3A Level Correlates with Retinal Macular Edema and Ganglion Cell Degeneration in Patients with Retinal Vein Occlusion

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Purpose: To investigate the Semaphorin 3A (SEMA3A) level in aqueous humor of patients with retinal vein occlusion (RVO), and explore the correlation of SEMA3A with macular edema and ganglion cell degeneration in RVO.

Methods: This comparative study prospectively included 41 consecutive patients (41 eyes) with RVO who had intravitreal anti-VEGF injections from March 2014 to March 2015 for cystoid macular edema (CME) or neovascular glaucoma (NVG). The patients were divided into three groups according to the fluorescein angiograghy (FFA): central retinal vein occlusion (CRVO) group (*n*=15), branch retinal vein occlusion (BRVO) group (*n*=15) and NVG group (secondary to CRVO, *n*=11). The patients who had undergone cataract surgery (*n*=16) during the same period served as controls. The SEMA3A concentration in aqueous humor collected before the initial anti-VEGF injection were determined by enzyme-linked immunosorbent assay (ELISA). Central retinal thickness (CRT), cube volume (CV) and ganglion cell-inner plexiform layer (GC-IPL) thickness was analyzed by spectral-domain optical coherence tomography (SD-OCT).

Results: SEMA3A level in CRVO group (1.52±1.23 ng/mL) and NVG group (1.67±0.98 ng/mL) were significantly higher than the control group (0.66±0.58 ng/mL; both *P*<0.05). Moreover, SEMA3A level in CRVO group was higher than BRVO group (1.52±1.23 ng/mL *vs* 0.53±0.37 ng/mL; *P*<0.05). SEMA3A level was positively correlated with CRT and CV in both BRVO group (CRT *r*=0.6535, *P*=0.0082; CV *r*=0.5190, *P*=0.0474) and CRVO group (CRT *r*=0.6270, *P*=0.0124; CV *r*=0.6898, *P*=0.0044). In RVO patients, the GC-IPL thickness of affected eyes were significantly reduced compared with the normal follow eyes (CRVO *t*=4.55, *P*=0.006; BRVO *t*=4.54, *P*=0.004). Meanwhile, negative correlation of SEMA3A level with GC-IPL thickness was found in both BRVO group (*r*=-0.5906, *P*=0.0205) and CRVO group (*r*=-0.6100, *P*=0.0157).

Conclusion: SEMA3A level is increased in aqueous humor of RVO patients. Positive correlation of CRT as well as negative correlation of GC-IPL thickness with SEMA3A may suggest a pathological role of SEMA3A in macular edema and ganglion cell degeneration during RVO.

PO-525

Switching Aflibercept for Refractory Macular Edema Associated with Diabetic Retinopathy or Retinal Vein Occlusion Following Initial Bevacizumab or/and Ranibizumab Treatment

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Aim: To evaluate the efficacy of the switching therapy for refractory macular edema (ME) caused by two major retinal vascular disorders: retinal vein occlusion (RVO) and diabetic retinopathy (DR).
Method: PubMed, Embase and Cochrane Library were systematically reviewed for single-arm retrospective case series and prospective self-controlled clinical trials of switching therapy from Ranibizumab or Bevacizumab to Aflibercept in refractory ME, published between 1990 and 2018. Data on the mean change of best corrected visual acuity (BCVA) and Central Retinal Thickness (CRT) were extracted, and adverse events (AEs) were collected.
Results: We identified 831 studies from Pubmed, Embase, and Cochrane Library databases. 393 participants from 15 studies fulfilled including criteria and fit the refractory definition were included. A significant change was found in switching to Aflibercept Group with improvement of the BCVA among all participants (total SMD 0.30, 95%CI 0.15-0.44). Conversion to Aflibercept on refractory ME significantly improved BCVA in RVO patients (SMD=0.52 [0.23, 0.81] P<0.01), but mildly improved BCVA in DR patients (SMD=0.23 [0.07, 0.39] P<0.01). The rapid improvement of BCVA was observed during the early period after switching but was not maintained after 6 months or longer time (SMD 0.28 [0.13,0.43] for Short-Follow-Up vs 0.42 [-0.01,0.84] for Long-Follow-Up group). There was no difference of BCVA improvement in comparison between RVO patients and DR patients (p>0.05). The CRT improvement was significant after switching therapy among the refractory patients. Multivariance regression showed there was no significant relevant between CRT/BCVA and mean age, male ratio, treatment course, length of follow-up, baseline VA, baseline CRT and VA at end of follow-up.
Conclusions: Conversion to aflibercept for refractory ME resulted in functional and anatomical improvements within 6 months. The more benefit with switching to aflibercept was obtained by patients with RVO than DR.

PO-526

Clinical features and long-term outcomes of pediatric ocular trauma after pars plana vitrectomy in Southwest of China

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Purpose: Pediatric ocular trauma may cause serious visual impairment which can be damaging to happiness of every family involving. We established the epidemiology of pediatric patients who developed ocular trauma to expose problems avoidable and improve people’s concerns for prevention in China.

Methods: A retrospective review about the medical records under 12 years old have received three-port pars plana vitrectomy (PPV) at our eye research center from January 2007 to December 2017. Data records included age, sex, cause, type and time of injury, initial and final visual acuity (VA), type and times of operation. Eye injuries were classified by Birmingham Eye Trauma Terminology (BETT).

Results: This study was based on the analysis of 122 eyes of 122 patients, with 99 males (81.15%) and average age of 6.60±3.06 years. Boys were more likely to suffer ocular injury than girls ($P < 0.05$). Twenty-seven eye injuries (22.13%) occurred in February. There were 100 (81.97%) open globe injuries, 22 (18.03%) closed globe injuries. Of the open globe injuries, 70 eyes (57.38%) were penetrating, 15 eyes (12.30%) with intraocular foreign body (IOFB), 2 eyes (1.64%) with perforating injury, and 13 eyes (10.66%) with rupture wound. The most common causes of injury were sharp metal objects (55/122). Three-port pars plana vitrectomy significantly improve visual acuity in children with ocular trauma($P < 0.01$). We didn't find significant difference between successful rate of PPV and age distribution ($P=0.23$).But retention of eyeball was correlated with intraocular tamponade ($P < 0.05$).

Conclusions: The most common predisposing factors in ocular trauma received pediatric vitrectomy were penetrating (57.38%) in southwest of China. In our study, silicone oil tamponade for vitrectomy had the lowest successful rate, balanced salt solution (BSS) tamponade was the second, gas tamponade was best. Initial visual acuity was a strong prognostic indicator of final visual acuity. But no significant difference was found between the final visual acuity and age distribution($P > 0.05$) and classification of injury($P > 0.05$).

PO-527

Macular Ganglion Cell Inner Plexiform Layer Thickness in Glaucomatous Eyes with Localized Retinal Nerve Fiber Layer Defects

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Purpose

To investigate macular ganglion cell–inner plexiform layer (mGCIPL) thickness in glaucoma- tous eyes with visible localized retinal nerve fiber layer (RNFL) defects on stereophotographs.

Methods

112 healthy and 149 glaucomatous eyes from the Diagnostic Innovations in Glaucoma Study (DIGS) and the African Descent and Glaucoma Evaluation Study (ADAGES) subjects had standard automated perimetry (SAP), optical coherence tomography (OCT) imaging of the macula and optic

nerve head, and stereoscopic optic disc photography. Masked observ- ers identified localized RNFL defects by grading of stereophotographs.

Result

47 eyes had visible localized RNFL defects on stereophotographs. Eyes with visible local- ized RNFL defects had significantly thinner mGCIPL thickness compared to healthy eyes (68.3 ± 11.4 μm versus 79.2 ± 6.6 μm respectively, P<0.001) and similar mGCIPL thickness to glaucomatous eyes without localized RNFL defects (68.6 ± 11.2 μm, P = 1.000). The average mGCIPL thickness in eyes with RNFL defects was 14% less than similarly aged healthy controls. For 29 eyes with a visible RNFL defect in just one hemiretina (superior or inferior) mGCIPL was thinnest in the same hemiretina in 26 eyes (90%). Eyes with inferior- temporal RNFL defects also had significantly thinner inferior-temporal mGCIPL (P<0.001) and inferior mGCIPL (P = 0.030) compared to glaucomatous eyes without a visible RNFL defect.

Conclusion

The current study indicates that presence of a localized RNFL defect is likely to indicate sig- nificant macular damage, particularly in the region of the macular that topographically corre- sponds to the location of the RNFL defect.

PO-528

Comparison of six intraocular lens power calculation formulas for a trifocal intraocular lens in Chinese cataract patients

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Purpose: To evaluate the accuracy of 6 intraocular lens (IOL) formulas（Barrett universal II, Haigis, HofferQ, SRK/T,SRKII and Holladay1）calculating the power of the trifocal IOL in Chinese cataract patients.

Methods: Prospective case series. Patients who had undergocataract surgery with implantation of a trifocal IOL over 3 months were enrolled. Preoperative biometry measured by a Lenstar LS 900. Optimized IOL constants were used from ULIB website. The primary outcomes were differences in mean absolute prediction error (MAE) between the formulas. Median and maximum absolute prediction errors (MedAE and MaxAE) were evaluated as well as percentages of eyes within prediction errors of ±0.5D，±1.0D and ±2D.

Results: The study comprised 78 eyes of 55 patients. The formulas were ranked by the MAE as follows: Barrett universal II (0.3332D), SRK/T (0.420D), Haigis (0.480), Holladay1 (0.607D), HofferQ (0.626) and SRKII (0.822). The differences in absolute errors with the formulas were

significant (P=0.000). MaxAE of the Barrett Universal II was the lowest among all formulas. The highest percentage of eyes within prediction error of ±0.5D，±1.0D and ±2D was also obtained with the Barrett Universal II (73%,94.8% and 100% resp.).
Conclusions: The most accurate predictions of actual postoperative refraction were achieved using the Barrett Universal II, SRK/T and Haigis formulas. Thus, one of these formulas should be used for IOL power calculation of the trifocal IOL.

PO-529

Corneal transplantation in Ningbo Eye Hospital over the past five years: an investigation of epidemiology and surgical options

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Objective To identify the primary disease spectrum and trends of surgical procedure of keratoplasty patients． **Methods** Retrospective case series study. To review all patients who underwent keratoplasty at Department of ophthalmology in Ningbo eye Hospital from January 1, 2013 to December 31, 2017. The data collected included age, sex, birthplace, and primary corneal disease and associated surgical procedures. Then the data were compared with similar papers domestic and foreign. **Results** A total of 283 keratoplasties were performed during this 5-year period. The average age of patients at time of surgery was (54.37±17.18) years, range from 5 years to 92 years, 186 cases (65.7%) were from 18 to 65 years; male: female ratio was 1.46:1. Totally 199 cases (70.3%) came from Zhejiang province, 84 cases (29.7%) were from other provinces．The leading indications for corneal transplantation were corneal leucoma in 127 cases (44.9%), followed by were keratitis in 59 cases (20.8%), keratoconus in 26 cases (9.2%), pseudophakic bullous keratopathy in 24 cases (8.5%), corneal dermoid in 4 cases (1.4%), corneal dystrophy and degeneration in 25 cases (8.8%)，and others (including chemical injuries，thermal burns, post-traumatic corneal leucoma and corneal opacity) in 18 cases (6.4%). In accordance with the classification of corneal transplant surgery, lamellar keratoplasty (LKP) was completed in 162 cases (57.2%), penetrating keratoplasty (PKP) was performed in 102 eases (36.0%), and corneal endothelial transplantation (EK) was made in 19 patients (6.7%). **Conclusions** Corneal leucoma was the leading indication for corneal transplantation followed by infectious keratitis. keratoconus and Corneal endothelium decompensation in Ningbo eye hospital patients who underwent keratoplasty. Lamellar keratoplasty was the main part of corneal transplantation from 2013 to 2017.

PO-530

52 例闭合性眼外伤低眼压的临床疗效分析

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目的：研究闭合性眼外伤后低眼压的临床疗效分析。
方法：收集 52 例 52 眼闭合性眼外伤后低眼压病例，从治疗方案及预后进行回顾性总结分析。
结果：52 例 52 眼闭合性眼外伤中视网膜脱离 12 例（23.08%），晶状体脱位（不全脱位和全脱位）4 例（7.70%），睫状体脱离 12 例（23.08%），睫状体伴脉络膜脱离 10 例（19.23%），外伤性眼内炎症 14 例（26.92%）。其中 36 眼（69.23%）（睫状体脱离、睫状体伴脉络膜脱离、外伤性眼内炎症）为单纯药物治疗，16 眼（30.77%）（视网膜脱离 12 例、晶状体脱位）为手术治疗；随访时间为 3 个月-6 个月；治疗前平均眼压为 6.16mmHg，治疗后平均眼压为 13.65mmHg；46 例（88.47%）眼压控制在 10mmHg-21mmHg 之间；视力提高者 42 例（80.77%）。
结论：正确的治疗方案对于闭合性眼外伤患者的预后非常重要。

PO-531

西北地区早产儿视网膜病变发病情况分析

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目的：通过分析西北地区近 10 年来早产儿视网膜病变（ROP）的筛查与治疗情况，探讨本地区 ROP 的发病情况与临床诊治特征。
方法：将 2009 年 1 月至 2018 年 12 月在第四军医大学西京医院眼科 ROP 筛查与治疗中心行筛查的 5821 例（11642 只眼）受检儿资料进行回顾分析。对于轻度 ROP，随访直至病变完全退化；对于阈值前期Ⅰ型和阈值期 ROP，行间接检眼镜引导的视网膜激光光凝治疗或抗 VEGF 治疗；出现视网膜脱离的 4、5 期患儿行手术治疗。治疗后随访 24.6 m（6~36m）。
结果：10 年间，共筛查出 ROP 患儿 774 例（1507 只眼），检出率为 13.3%。其中男 487 例，女 287 例，出生孕周 30±3.3 w（25~40 w），出生体重 1487±432 g（850~3300 g）。需要治疗的 ROP 患儿（严重程度在阈值前期病变Ⅰ型以上者）256 例，约占 33.1%。774 例 ROP 患儿中，出生体重 2000 g 以上者 70 例，约占 9.0%，其中需要治疗者 21 例（占 30.0%），与低出生体重≤2000g 的 ROP 患儿相比，其病情严重程度无明显差异（P>0.05）。需治疗的 253 例 ROP 患儿中，行视网膜激光光凝治疗者 186 例，抗 VEGF 治疗 59 例，其中 532nm 激光治疗 62 例（120 只眼），810nm 激光治疗 124 例（245 只眼），经治疗病变完全退化者 359 只眼（占 98.4%），且两种激光治疗效果相当（P>0.05），但需要重复激光治疗、不良预后及白内障等严重并发症者主要出现在 532nm 激光治疗的阈值期 ROP 患儿中。

结论：西北地区 ROP 患儿中，高出生体重者及晚期病变者占有一定比例。早期发现的 ROP 患儿经治疗预后良好，在视网膜激光光凝治疗中，两种波长激光光凝均可有效治疗阈值前期Ⅰ型和阈值期 ROP。

PO-532

24 小时眼压/灌注压波动与 TAO 患者视野缺损的相关性研究

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目的：分析 24 小时眼压/灌注压波动与 TAO 患者视野缺损的相关性，探讨 24 小时眼压/灌注压异常在 DON 发病中的可能机制
方法：收集 2016.7---2017.10 在温州医科大学附属眼视光就诊的 TAO 患者，所有患者行眼科常规检查、视野、眼眶 CT 并计算眼肌指数与内直肌肉最大厚度，记录 24 小时眼压/24 小时血压并计算 24 小时灌注压、平均动脉压、平均脉压差等。按视野 MD 值分为视野正常组与视野异常组（MD<-2dB）。
结果：24 小时灌注压波动在视野异常组(7.01±3.60mmHg)大于视野正常组(5.45 ±1.90mmHg), p<0.05)，并且 24 小时灌注压波动与 MD 之间存在显著负相关（p=0.001. r=-0.434）. 在视野异常组，22.22% (8/36)的患眼 24 小时眼压波动≥8mmHg ，而正常组为 16.67% (4/24)的患眼 p<0.05。同样的在视野异常组，25%(9/36)的患者平均眼压≥21mmHg ，正常组为 *8.33% (2/24)(p =0.000).* 两组在眼肌指数、最大内直肌厚度、平均眼压、24 小时眼压波动平均值以及平均脉压差等存在统计学差异。.但是最后的多因素回归分析发现，24 小时灌注压波动以及最大内直肌厚度是视野缺损的主要危险因素。
结论：24 小时灌注压波动可能是 TAO 患者视野缺损的原因，同时 24 小时平均眼压以及波动以及最大内直肌厚度亦是不可忽视的危险因素。

PO-533

Global health burden of glaucoma

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PURPOSE: To assess the global burden of glaucoma by year, age, sex, regions and the health inequality with socioeconomic status

METHODS: Global, national and regional burden related data of glaucoma by year, age, sex were extracted. The human development index (HDI) and national total, male, female mean years of schooling (MYS) in 2015 were obtained. Mann-Whitney U test was performed to explored the sexual difference in global burden data. Kruskal-Wallis tests were performed to explore the difference of glaucoma burden data across WHO regions and HDI-related country groups. Linear regression analyses were performed to explore the association between glaucoma burden data with HDI and MYS. The socioeconomic related indexeswere calculated to evaluate the trends in health inequality of glaucoma from 1990 to 2016.

RESULTS:glaucoma burden numbers due to glaucoma increased straightly by 118.0%, glaucoma burden rates rose by 55.22% and age-standardizedglaucoma burden rates increased by 12.12% from 1990 to 2016. Global glaucoma burden numbers and crude glaucoma burden rates increased with age, and Mann-Whitney U testrevealed no significant sex difference in global glaucoma burden numbers (P=0.807 > 0.05) and global crude glaucoma burden rates (P=0.976 > 0.05). Africa (10.42; 95% UI: 14.42–7.10), Eastern Mediterranean (14.39; 95% UI: 19.68–9.76) had higher age-standardized glaucoma burden rates than the global one (7.03; 95%UI: 9.78-4.76) in 2016. Kruskal-Wallis testindicated significant difference in age-standardized glaucoma burden rates across WHO regions ($\chi2_{(5)}$ =94.227, P=0.000 < 0.05). Linear regression analysis indicated that HDI (adjusted R^2 = 0.079; $F_{(1,182)}$ = 16.722, P=0.000 < 0.001) and MYS (adjusted R^2= 0.108; $F_{(1,182)}$ = 23.048, P=0.000 < 0.001) had a significant effect on age-standardized glaucoma burdenrate. The socioeconomic related indexesof glaucoma burden declined from 1990 (-0.099) to 2000 (-0.077) with reaching a low peak value, then rapidly increased to -0.097 in 2015.

CONCLUSIONS: With population growth and ageing, global burden of glaucoma is increasing, and older age, lower socioeconomic status and lower MYS are associated with higher glaucoma burden. Our results help to gain a better understanding of glaucoma and can guide the future health policies tailored forpublic.

PO-534

Clinical observation of the postoperative intraocular lens position though a novel technique: transscleral suture fixation of a foldable 3-looped haptics one-piece PCIOL implantation through scleral pockets with intact conjunctiva

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Background: To present the follow-up outcomes of a modified technique of transscleral suture fixation of posterior chamber intraocular lens (PCIOL) in eyes with inadequate capsule support.
Methods: A retrospective chart review of 21 patients underwent transscleral suture fixation of a foldable 3-looped haptics one-piece PCIOL implantation through scleral pockets was conducted. Follow-up data for at least 3 months were collected for all patients.
Results: The mean postoperative anterior chamber depth was 3.05±0.44 mm. The mean postoperative IOL tilt degree was 2.81±1.41°, and the mean postoperative IOL decentration degree was 0.31±0.13 mm.
Conclusions: The modified technique had a feasible anatomic outcome of PCIOL implantation.

PO-535

云南边疆勐海县初三中学生近视状况的调查研究

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目的调查云南省西双版纳傣族自治州勐海县初三学生的近视状况。**方法** 对勐海县所有初三学生进行近视普查。现场调查包括视力检查、电脑验光、主觉插片和问卷调查。数据双份录入，采用 SPSS 软件进行统计分析。**结果**调查的 2894 人中近视 594 人，患病率为 20.53%。女生近视患病率高于男生（χ^2=212.28,*P*＜0.05）。城区学生近视患病率高于农村学生（χ^2=21.06,*P*＜0.05）。不同民族学生的近视患病率不同（χ^2=56.19,*P*＜0.05）：汉族 29.11%、傣族 23.27%、哈尼族 14.97%、布朗族 14.00%、拉祜族 14.65%、其他民族（彝族、佤族、壮族、白族）28.97%。近视学生的身高（t=-6.97）、体重（t=-6.20）、BMI 指数（t=-2.47）均较非近视学生低（*P*＜0.05）。Logistic 回归分析显示近视与父母近视（OR=6.79，*P*＜0.05）、户外运动小于 2 小时（OR=9.26，*P*＜0.05）、阅读距离小于 1 尺（OR=4.79，*P*＜0.05）、每天电子产品使用超过 1 小时（OR=7.58，*P*＜0.05）有关。**结论**近视是青少年视力不良的常见原因，与性别、民族、地区、体格发育有关，影响因素多，在我国多民族边远地区应采取针对性的措施进行预防和社会干预。

PO-536

特发性与继发性黄斑前膜的临床特点分析及转录组差异

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目的:玻璃体切割联合前膜剥除手术是解除黄斑前膜的有效方法，本研究旨在探讨分析在我院手术治疗的黄斑前膜患者的临床特点，为临床 治疗提供相关经验并为探讨黄斑前膜发生机制提供临床数据。

方法:本研究为回顾性分析，纳入对象为 2011 年至 2017 年于中南大学湘雅二医院眼科行黄斑前膜手术的患者。收集患者的基本信息和临床资料，分析特发性与继发性黄斑前膜的病因，以及继发性黄斑前膜原 发疾病的分类和构成比等指标。
结果:本研究共收集 457 例黄斑前膜手术患者，372 例 (81.4%) 超过 50 岁。在黄斑前膜手术患者中，继发性黄斑前膜患者的比例高于特发性黄斑前膜患者。特发性黄斑前膜女性患者的比例高于继发性黄斑 前膜(P <0.05)。继发性黄斑前膜的主要病因包括糖尿病视网膜病变，孔源性视网膜脱离及高度近视。与特发性黄斑前膜相比，继发性黄斑 前膜中玻璃纸样黄斑病变和较难确诊的比例更高(P <0.05)。
结论:在我院眼科行手术治疗的黄斑前膜患者中，继发性黄斑前膜比特发性黄斑前膜更常见，糖尿病视网膜病变，孔源性视网膜脱离，高度近视是继发性黄斑前膜常见的原发疾病。

PO-537

康柏西普治疗黄斑中心凹下盘状渗出型糖尿病黄斑水肿的疗效观察

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目的 临床发现，既往行玻璃体切除术后的增殖性糖尿病视网膜病变的患者，因同时伴有特殊类型的糖尿病黄斑水肿------黄斑中心凹下黄白色盘状渗出直径约 0.5-1.2PD 大小，导致患者中心视力严重丧失，术后视力提高受限。探讨该类型糖尿病黄斑水肿的治疗效果。
方法 干预性试验研究。采集增殖性糖尿病视网膜病变的 7 例（8 眼）患者，既往行 25G 标准玻璃体切割联合全视网膜光凝术，手术成功，糖尿病控制稳定。但因患者同时伴有黄斑中心凹下盘状渗出型糖尿病黄斑水肿------黄斑中心凹下黄白色盘状渗出直径约 0.5-1.2PD 大小，导致术后视力提高欠佳。8 眼术后视力 0.01-0.05，眼压 15-20mmHg。对其经睫状体扁平部玻璃体腔注射康柏西普注射液（成都康弘生物科技有限公司）0.5mg/0.05ml，每月注射一次，共 3 次。分别于注射后 1、2、3、6、9、12 个月，行视力、眼压、OCT 以及眼底照相检查。

结果 在治疗期间，8 眼视力恢复至 0.1-0.25，中心视力明显改善，视觉质量明显提高。玻璃体腔注射康柏西普注射液后，黄斑中心凹下盘状渗出范围逐渐缩小，黄斑渗出物逐渐吸收，大约至注射后 2 个月时，渗出物明显吸收， 3 个月时肉眼观几乎不见，黄斑生理结构明显改善。随访 6-12 个月，黄斑中心凹下盘状渗出未见复发，未见眼内炎以及高眼压等并发症发生。
结论 康柏西普是一种融合蛋白类抗-VEGF 药物，在糖尿病控制稳定的前提下，行玻璃体腔注射，可以有效治疗视力严重受损的伴有黄斑中心凹下盘状渗出的特殊类型糖尿病黄斑水肿，明显提高患者的中心视力，改善患者的视觉质量。

PO-538

Effect of Intravitreal Air Tamponade on Scleral Incision, Hypotony and Ciliochoroidal Detachment after Silicon Oil Removal

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Purpose: To investigate the effect of intravitreal air tamponade on scleral incision, hypotony and ciliochoroidal detachment (CCD) after silicon oil removal (SOR) by 23-gauge sutureless vitrectomy.
Methods: Patients (primary disease was rhegmatogenous retinal detachment) undergoing SOR were enrolled in the study. Active SOR with conventional sutureless three scleral incisions were performed using a 23-gauge operative system (Alcon Laboratories, Inc., Fort Worth, TX). Exclusion criteria was following: preexisting detached retina, scleral buckling, one or more incicions was sutured during surgery, 360° conjunctival scarring, hypotony (intraocular pressure < 6 mmHg), trauma history, glaucoma, chamber angle abnormalities and uveitis. During surgery, air or fluid (balanced salt solution, BSS) was randomized to tamponade the eyeball. Postoperative sclerotomies and related ciliochoroidal detachments were evaluated by three-dimensional corneal and anterior segment OCT (3-D CAS OCT, SS-1000 CASIA; Tomey Corporation, Nagoya, Japan), with an axial resolution of 10 mm and transverse resolution of 30 mm. Intraocular pressures (IOPs) were measured by Goldmann applanation tonometer on postoperative days 1, 7, 14 and 28. Incision architecture, IOP and the rate of hypotony and CCD were compared between two groups. Logistic regression model was used to reveal the potential risk factors for hypotony after SOR.
Results: Thirty-six eyes of 36 patients, with 16 males and 20 females, and with 14 right eyes and 22 left eyes, were analyzed. Among them, twenty-two eyes were filled with air and 14 were with fluid. On postoperative day 1, sixty-two incisions (57.4%) were closed, and 46 (42.6%) were unclosed. The mean length of closed incisions was longer (P = 0.008) and the mean angle was smaller (P = 0.015) than that of unclosed incisions. The mean IOP values preoperatively and on postoperative days 1, 7, 14 and 28 were 16.07 ± 4.66 mmHg, 6.64 ± 4.26 mmHg, 15.49 ± 5.16 mmHg, 15.89 ± 5.03 mmHg and 14.82 ± 3.60 mmHg in the fluid-filled eyes, and 17.50 ± 5.64 mmHg, 10.15 ± 4.21 mmHg, 19.05 ± 8.23 mmHg, 16.15 ± 4.80 mmHg and 15.25±4.11 mmHg in the air-filled eyes, respectively. The hypotony rate was 64.3% (9/14) in fluid-filled eyes and 9.1% (2/22) in air-filled eyes on the day after surgery. The IOP increased to normal level by one week after surgery in all eyes. Shallow CCD near the incision on postoperative days 1, 7, 14 and 28 were 12 (85.7%), 4 (28.6%), 2 (14.3%) and 0 in fluid-filled eyes and 7 (31.8%), 1 (4.5%), 0 and 0 in air-filled eyes, respectively. Compared to those of fluid-filled eyes, the closure rate of sclerotomies and the mean IOP value of air-filled eyes were higher (P = 0.005 and P = 0.007, respectively) and the incidences of hypotony and CCD of air-filled eyes were lower (P = 0.001 and P = 0.002, respectively) on

postoperative day 1. However, there were no significant differences among above indications between two groups on postoperative days 7 and thereafter. Intravitreal air tamponade was the independent protective factor for hypotony and CCD.

Conclusions: Incision architecture by anterior segment OCT reveals the time-dependent process of wound healing in SOR eyes. Intravitreal air tamponade hastens postoperative recovery by accelerating wound closure, maintaining IOP stability and preventing CCD.

PO-539

载脂蛋白 E 缺乏导致小鼠睑板腺功能障碍

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目的：研究载脂蛋白 E 基因敲除（*ApoE*$^{-/-}$）小鼠睑板腺和眼表组织的病理变化，探讨睑板腺功能障碍（MGD）与高脂血症的关系。

方法：在裂隙灯显微镜下观察 3、5、7 个月龄 *ApoE*$^{-/-}$ 雄性小鼠以及年龄和性别匹配的野生型（WT）小鼠的眼表，用立体变焦显微镜对睑板腺结构进行观察和拍照。睑板腺组织切片进行 H&E 染色，油红 O 染色，TUNEL 测定和 K10、 Fabp5、Ki67、 p63、PPAR-γ、 IL-6、TNF-α、NF-κB p65、p-NF-κB p65、AC-caspase 8 的免疫荧光染色。免疫组织化学染色方法检测 CD45,4-HNE，NOX-4,3-NT。实时定量 PCR 和 Western 印迹检测睑板腺组织中相应基因表达。通过灌胃的方法给 5 个月的 *ApoE*$^{-/-}$小鼠服用罗格列酮和 GW9662 +罗格列酮 2 个月。

结果：*ApoE*$^{-/-}$小鼠眼睑明显肥厚，睑板腺缺失，睑板腺腺泡形态异常，睑板腺导管扩张，睑板腺开口堵塞。*ApoE*$^{-/-}$小鼠中的睑板腺腺泡呈现出过多的脂质沉积。睑板腺导管和腺泡细胞异常角化增加，睑板腺先泡细胞增殖减少，细胞凋亡增加。炎症细胞浸润到睑板腺腺泡的周围微环境中，NF-κB 信号通路在睑板腺腺泡细胞中被激活。*ApoE*$^{-/-}$小鼠的睑板腺腺泡细胞中的氧化应激明显增加。进一步研究显示 *ApoE*$^{-/-}$小鼠睑板腺腺泡细胞中 PPAR-γ 的表达下调。PPAR-γ 激动剂罗格列酮治疗 2 个月可降低 *ApoE*$^{-/-}$小鼠眼睑、角膜病变发病率，同时减少睑板腺炎症。

结论：总之，睑板腺功能障碍（MGD）和高脂血症密切相关，*ApoE*$^{-/-}$小鼠可作为模型研究脂代谢紊乱相关性 MGD 的病理生理和治疗。

PO-540

Therapeutic Effect of MK2 Inhibitor on Experimental Murine Dry Eye

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PURPOSE. To investigate the role of mitogen-activated protein kinase–activated protein kinase-2 (MK2) in ocular surface damage of dry eye.

METHODS. MK2 inhibition was performed in mice subjected to desiccating stress (DS) by topical application of MK2 inhibitor (MK2i) or vehicle eye drops. The total and phosphorylated MK2 in conjunctiva were detected by Western blot. The phenol red cotton test was used to measure tear production, and Oregon green dextran staining was performed to assess corneal epithelial barrier function. PAS staining was used to quantify conjunctival goblet cells. Immunofluorescent staining and quantitative RT-PCR were used to assess the expression of matrix metalloproteinase (MMP)-3 and -9 in corneal epithelium. Apoptosis in ocular surface was assessed by TUNEL and immunofluorescent staining for activated caspase-3 and -8. Inflammation was evaluated by $CD4^+$ T-cell infiltration and production of T helper (Th) cytokines, including IFN-γ, IL-13, and IL-17A in conjunctiva.

RESULTS. DS promoted MK2 activation in conjunctiva. Compared with vehicle control mice, MK2i-treated mice showed increased tear production, decreased goblet cell loss, and improved corneal barrier function. Topical MK2 inhibition decreased the expression of MMP-3 and -9 in corneal epithelium, and suppressed cell apoptosis in ocular surface under DS. Topical MK2 inhibition decreased $CD4^+$ T-cell infiltration, with decreased production of IFN-γ and IL-17A and increased production of IL-13 in conjunctiva.

CONCLUSIONS. Topical MK2 inhibition effectively alleviated ocular surface damage via suppressing cell apoptosis and $CD4^+$ T-cell-mediated inflammation in ocular surface of dry eye.

PO-541

Altered regional homogeneity in diabetic patients with vitreous hemorrhage: a resting-state fMRI study

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Objective: To assess the local characters of spontaneous brain activity in diabetic patients with vitreous hemorrhage (VH) and their relationship with clinical features via the amplitude of low-frequency (ALFF).

Methods: Thirty-one individuals (15 females and 16 males) with diabetic VH and healthy controls (HCs) were recruited, respectively, for this study with similar gender, age and education. All individuals received resting-state functional magnetic resonance imaging (rs-fMRI) scanning. Local

characters of spontaneous brain activity were assessed by ALFF method. The difference between VH and HCs was obtained by using Receiver operating characteristic curves (ROC). Pearson correlation analysis was applied to evaluate the relationship between the mean ALFF values of specific brain areas and related clinical manifestations in diabetic VH patients.

Results: By comparison with HCs, the ALFF values of diabetic patients with VH occurred remarkable increased in right cerebellum posterior lobe, left cerebellum posterior lobe, left cerebellum posterior lobe/left lingual gyrus and bilateral superior frontal gyrus/left postcentral gyrus, while had significant decreased in left middle frontal gyrus, right middle frontal gyrus, right medial frontal gyrus/left anterior cingulate, right inferior frontal gyrus, right superior frontal gyrus, right middle frontal gyrus, right superior frontal gyrus/middle frontal gyrus and left middle frontal gyrus. Nevertheless, there was no significant association between mean ALFF values and clinical characteristics in different brain areas.

Conclusion: There were unusual spontaneous activities in lots of brains which might suggest the neuropathological mechanisms of visual impairment in the diabetic patients with VH.

PO-542

Morphological Characteristics and Risk Factors of Myopic Maculopathy in an Older High Myopia Population - Based on the New Classification and Grading System (ATN)

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PURPOSE: To investigate the distribution and risk factors of different types of myopic maculopathy (MM), according to the newly ATN classification system in a highly myopic population.

DESIGN: Population based, cross-sectional study.

METHODS: Eligible residents with age ≥ 50 years and axial length (AL) ≥ 26mm (820 eyes of 496 patients) in Shanghai, China. 266 normal eyes were randomly selected as the control group. Each participant underwent detailed ocular examinations. Combining the fundus photographs and optical coherence tomography images, types of MM were assessed as myopic atrophy maculopathy (MAM), myopic tractional maculopathy (MTM) or myopic neovascular maculopathy (MNM) according to the ATN classification system. Peripapillary atrophy (PPA) area, tilt ratio, and macular choroidal thickness (mChT) were measured individually.

RESULTS: Among the 820 highly myopic eyes, 488 (59.51%) had MAM, 233 (28.41%) had MTM and 393 (47.93%) had MNM, and 545 (66.5%) had MM in this cohort. The severity of MNM was consistent with that of MAM, whereas the severity of MTM and MAM was not exactly the same.

Multivariate analyses revealed that eyes with a larger PPA area were more likely to have MAM (odds ratio [OR], 1.220; 95% confidence interval [CI], 1.012–1.471; P = 0.037 per 1-mm^2 increase) and MNM (OR, 1.723; 95% CI, 1.384–2.144; P < 0.001 per 1-mm^2 increase), and eyes with a thicker mChT were less likely to have MAM (OR,0.970; 95% CI, 0.963–0.977; P < 0.001 per 1-μm increase) and MNM (OR, 0.976; 95% CI, 0.968–0.984; P < 0.001 per 1-μm increase). Eyes with a higher tilt ratio were less likely to have MTM (OR, 0.020; 95% CI, 0.004–0.100; P < 0.001 per 1 increase), and all MTM patients presented with posterior staphyloma. No associations were found of the PPA area with MTM and the tilt ratio with MAM.

CONCLUSIONS: Different types of MM had different risk factors; a larger PPA area and a thinner mChT were risk factors for MAM and MNM, whereas a lower tilt ratio was a risk factor for MTM. Our results indicate that the pathogenesis of MTM is different from that of MAM and MNM.

PO-543

应用 OCTA 探究眼部微循环改变与心脑血管危险因素的关系

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目的：近 30 年来，我国心脑血管疾病的患病率明显增加，中国成人血脂异常总体患病率高达 40.4%血清胆固醇水平的升高将导致 2010 年～2030 年期间我国心血管病事件约增加 920 万。应用 OCTA 观察视网膜、脉络膜供血的微循环状态，可以无创、快速的对全身的血管状态进行评估，探究眼部微循环改变参数与心脑血管危险因子的相关性。

方法：本研究选取开滦眼病研究进行观察性研究。排除既往眼病史、免疫病史等对象后，分别进行视力、眼压、眼内生物学测量和分频增幅去相干血管成像（split-spectrum amplitude–decorrelation angiography，SSADA），即 OCTA 检查，观察视网膜、脉络膜供血的微循环状态和图像表现，并利用 OCTA 可分层定量的特点，分层定量测定并与血压、血脂、腰臀比、BMI 等全身参数进行统计学分析。

结果：矫正年龄、性别、等效球镜、眼轴等因素后，视网膜和脉络膜血流微循环改变均随血压、BMI、血脂增高而降低。

结论：OCTA 可以便捷的通过观察视网膜、脉络膜供血的微循环状态，进行对心脑血管疾病的危险因素进行评估。

PO-544

Clinically significant macular edema among patients with diabetes in southern china

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Purpose: To investigate the clinical characteristic of the clinically significant macular edema (CSME) and its associated factors in patients with diabetes

Methods: A total of 1432 participants with diabetes aged 50 years and older were recruited and investigated in Guangzhou, southern China. All participants underwent detailed ophthalmic examination including visual acuity, intraocular pressure(IOP) fundus photography,optical coherence tomography (OCT) and angiography (OCTA). Anterior chamber depth (ACD)，lens thickness(LT), and Axial length (AL) were measured by IOLMaster. DR severity was graded from fundus photographs and classified into R1, R2 and R3 according to the grading standards of the English National Screening Programme.CSME was defined as retinal thickening within 500 μm of the center of the fovea, or by the presence of hard exudates within 500 μm of the center of the fovea associated with adjacent thickening of the retina, or thickening of at least 1 disc area, any part of which is within 1 disc diameter of the center of the fovea. Blood sample and other systematic information, such as duration of diabetes, treatment, other medical history were also collected by questionnaire.

Results:After excluding 36 participant who did not have qualified fundus photography , 1396 participants(97.5%, mean age:65.6±8.2) with 58.9% of females had an available data on this current analysis. Among 1396 participants, the proportion of DR and CSME were 20.9% and 12.0% .In logistic regression analyses, thicker of center point thickness (CPT) (OR=1.0,95%CI=1.00~1.02,P=0.03),lower BMI (OR=0.85, 95%CI=0.73~0.98, P=0.024) ,lower diastolic blood pressure(OR=0.97,95%CI=0.94~0.99,P=0.049) and DR severity (OR=2.91,95%CI=1.83~ 4.64，P<0.001) were risk factors for CSME.No association was found for age,sex, SE, ACD, LT,AL and CC with CSME

Conclusion:In participants with DR,severity of DR,diastolic blood pressure ,and BMI were independently associated with the occurrence of CSME.

PO-545

山东省青少年眼内压的影响因素分析

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目的：调查山东省 4-18 岁青少年眼内压的分布状况及其影响因素。

方法：本研究采取整群抽样的方法，选取山东省聊城市冠县农村地区和威海市城区的 4-18 岁的幼儿园、小学、初中和高中学生作为研究对象。对所有调查对象均进行非接触眼内压、屈光状态和眼球生物学检查，同时通过问卷调查的方式获得身体状况、生活习惯、用眼习惯和父母双亲的视力状况等其他方面的信息。

结果：共有 6364 名学生被纳入调查对象，其中 5919 人接受检查，受检率为 93.0%。调查发现，青少年眼内压平均值为 17.6±2.7 mmHg，波动范围为 10-28 mmHg。4-18 岁青少年眼内压随年龄呈 M 型增长曲线，10 岁以前随年龄增加而升高，并在 10 岁达到眼内压峰值，10 岁以后随年龄增加而下降，但在 12-15 岁时出现波动并达到第二次峰值，随后随年龄增加而下降。同时我们的研究发现，女孩的眼内压明显高于男孩（*P*<0.001)。此外，眼内压与身体质量指数（OR=0.07, *P*<0.001），母亲近视程度（OR=0.34，*P*<0.001），室内读写时间（OR=0.07，*P*=0.002）和眼轴长度（OR=0.29，*P*<0.001）正相关，与角膜水平直径（OR=-0.31，*P*<0.001）负相关。
结论：在 4-18 岁青少年中，眼内压随年龄呈 M 型增长曲线，高眼压与女性，身体质量指数，母亲近视程度，室内读写时间，以及眼参数中的眼轴长度正相关，与角膜水平直径负相关。

PO-546

宁夏地区睑缘炎患者感染蠕形螨的调查研究

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目的 了解睑缘炎患者眼睑人体蠕形螨感染情况, 及眼部蠕形螨感染存在的可能相关因素，为蠕形螨性睑缘炎患者的诊疗提供依据。方法 选择我院 2017 年 5 月至 2018 年 5 月睑缘炎患者 150 例及其他眼痒患者 150 例，将患者分为睑缘炎组和对照组各 150 例，对两组患者分别使用普通显微镜检查和共聚焦显微镜检查，对上述患者的病例进行研究分析，从而为蠕形螨性睑缘炎患者的诊疗提供依据。结果 在使用了普通显微镜检查的睑缘炎患者当中检查出有蠕形螨感染的病例有 121 例，对照组的患者 0 例；使用共聚焦显微镜检查的患者当中有蠕形螨感染的病例有 147 例，对照组的患者 0 例。结论 蠕形螨感染是睑缘炎的重要致病因素，而且共聚焦显微镜检查较普通显微镜检查结果更加准确。

PO-547

Cystotome-assisted prechop phacoemulsification surgery versus femtosecond laser-assisted cataract surgery for hard nucleus cataracts

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Background: To compare the safety and efficacy of cystotome-assisted prechop phacoemulsification surgery (CAPPS) and femtosecond laser-assisted cataract surgery (FLACS) in patients with hard nucleus cataract.

Methods: Prospective, consecutive, comparative cohort study. 96 eyes of 64 patients with grade IV hard nucleus cataract were assigned to 1 of the 2 groups(49 CAPPS and 47 FLACS). Postoperative follow-up was at 1 day, 1 week, 1 month, 3 months, 6 months and 1 year, and the outcome measures comprised ultrasound power, effective phacoemulsification time(EPT), corrected distance visual acuity(CDVA), endothelial cell density(ECD), corneal endothelium cell loss rate(ECL), central corneal thickness(CCT), intraoperative and postoperative complications.
Results: The ultrasound power and EPT in the CAPPS group were lower than they were in the FLACS group (P=0.03 and <0.0001, respectively). Patients in both groups gained a better CDVA postoperatively. ECD value decreased at each follow-up visit and did not return to the preoperative level; FLACS resulted in greater endothelial cell loss than CAPPS did, which was significant. CCT increased immediately after the surgery, and decreased thereafter. The mean CCT values returned to preoperative levels at 3 months after surgery in the CAPPS group while in the FLACS group, CCT value took 6 months to return to the preoperative levels. Miosis was more likely to occur in the FLACS than in the CAPPS group.
Conclusion: Because of its efficacy and cost effectiveness, CAPPS is worthy of being promoted and applied in the future clinical work.

PO-548

先天性白内障复杂情况的手术技术

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近年来，随着对先天性白内障的认识、白内障显微手术技术和设备的进步，先天性白内障的手术效果明显改善。然而，小儿眼球具有固有的解剖生理特点，如眼球发育不成熟，巩膜薄、弹性大，晶状体囊膜韧性大以及后房压力高，还可能合并晶状体后囊膜缺陷和眼部其它组织的异常，术中的任何步骤和操作不慎，都可能发生手术并发症，影响手术效果，因此有时需要特殊的手术技巧。本文介绍先天性白内障术中复杂情况如后囊膜缺损、晶状体脱位、人工晶状体脱位、人工晶状体夹持等情况的手术技术，通过这些手术技术，提高手术效果，减少术中、术后并发症的发生率。

PO-549

Clinic Results of Intraductal Meibomian Gland Probing Combined Intense Pulsed Light in Treating Patients With Refractory Obstructive Meibomian Gland Dysfunction: A Randomized Controlled Trial

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Background: To optimize therapeutic regimen for refractory obstructive meibomian gland dysfunction (o-MGD) patients by combining intraductal meibomian gland probing (MGP) and intense pulsed light (IPL) to enhance their effect and reduce their limitations.
Methods: This randomized, assessor blind study include 45 patients (90 eyes) with refractory o-MGD. They were divided into 3 groups by allocation concealment: IPL (group I, received an IPL treatment course: 3 times at 3-week intervals), MGP (group II, received MGP one time) and MGP combined IPL (group III, MGP at first then an IPL treatment course). Standard Patient Evaluation of Eye Dryness score (SPEED), tear break-up time (TBUT), corneal fluorescein staining (CFS), meibum grade and lid margin finding results were assessed at baseline, 3 weeks after final treatment in group I and III, 3 and 12 weeks after MGP in group II. Six months after final treatment, the SPEED and willingness to receive any treatment again were also collected in all groups. Paired Wilcoxon, Mann-Whitney U with Bonferroni correction and Kruskal-Wallis tests were used for data analysis.
Results: In 3 groups, all above indexes improved significantly after treatment (all P＜0.01). MGP-IPL was better than IPL and MPG in posttreatment SPEED, TBUT, meibum grade, lid telangiectasia (all P＜0.05/3). Besides, the MGP-IPL was better than IPL in lid tenderness and better than MGP in orifices abnormality (all P＜0.05/3). Six months later, the SPEED in MGP-IPL was also significantly lower than other groups (all P＜0.05/3). And no patients in MGP-IPL group revealed the need to be treated again, while 35.7% or 20% of patients with IPL or MGP need retreatment.
Conclusions: Compared with single IPL or MGP, the combination of MGP and IPL demonstrated the most efficient results in relieving all signs and symptoms and can help patients attain the most lasting symptom relief.

PO-550

有晶体眼人工晶体植入术后患者视觉质量的观察研究

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目的：观察近视患者行有晶体眼人工晶体植入术（ICL 植入术）后的视觉质量
方法：本研究纳入 2016 年 3 月至 2017 年 3 月在我院行 ICL 植入术的患者，术前和术后 3 个月进行裸眼视力，矫正视力，屈光度和眼压检查，并填写屈光矫正者生活质量量表(QIRC 量表)，观察 ICL 植入手术的治疗效果以及患者视觉质量的改变。
结果：本研究共纳入 92 例患者，屈光度由术前的-10.37±3.36D 降低为 0.35±0.76D（p<0.01），术后 LogMAR 裸眼视力较术前明显提高（术前 1.15±0.31，术后 0.08±0.17，p<0.01），术后 LogMAR 矫正视力也较术前明显提高（术前 0.07±0.12，术后 0.02±0.06，p<0.01），所有患者眼压正常，手术及术后随访过程中均无明显的并发症发生。视觉质量量表结果显示，患者术后的视觉质量总分较

术前明显提高（术前 38.23±4.45，术后 42.65±5.48，p<0.01），其中关于夜间驾驶，眼疲劳，运动，满意度，期望值等 12 项条目手术前后有显著性差异。视觉质量改变量与性别和文化程度无关，但超高度近视患者（≧-9.0D）的视觉质量改善程度较其他患者更明显（p<0.05），年龄较大患者（≧29 岁）的视觉质量改善也较年龄较小患者（<29 岁）更明显（p<0.05）。
结论：ICL 植入术后患者视觉质量明显改善，特别是超高度近视和年龄较大患者的改善程度更佳。

PO-551

3 岁以内小儿斜视特点

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目的：探讨 3 岁以内小儿斜视特点。
方法：收集青岛眼科医院从 2013 年 1 月起至 2017 年 12 月止连续 5 年，年龄≤3 岁入院患有斜视的患者，分析其斜视特点，屈光状态以及手术特点。
结果：共 338 例，男性 168 例(49.70%)，女性 170 例(50.30%)；其中行斜视手术 312 例，未行斜视手术 26 例。合并全身异常 1 例，合并眼底异常 8 例，合并先天性白内障 22 例，合并眼球震颤 6 例。行斜视手术的 312 例患者中，平均屈光度数+1.02D(等效球镜)，手术年龄≤2 岁 74 例(23.72%)；2 岁~3 岁 238 例(76.28%)。生后半年内发现眼斜 97 例(31.09%)。内斜视 73 例(23.40%)，内斜度数+15△~+70△，平均+44.12△，内斜视合并下斜肌亢进 20 例（6.41%）；外斜视 227 例（72.76%），外斜度数-15△~-100△，平均-52.35△，其中间歇性外斜视 160 例（51.28%），外斜视合并下斜肌亢进 61 例（19.55%）；垂直斜视 62 例（19.87%），其中 DVD49 例（15.71%）； DVD 合并内斜视 6 例（1.92%），DVD 合并外斜视 34 例（10.90%），DVD 合并下斜肌亢进 21 人（6.73%）；上斜肌麻痹 24 例（7.69%）；能配合眼底照相患者 165 人，其中双眼外旋 49 例（29.70%），眼底无旋转 105 例（63.64%）。眼底外旋患者中有 20 人患有 DVD（40.82%），30 人患有下斜肌亢进（61.22%），9 人患有上斜肌麻痹（18.37%）。
结论：3 岁以内小儿斜视常合并其他眼部疾病，其远视度数较正常人远视度数偏小，水平斜视居多，外斜多于内斜，且水平斜视度数多较大。伴有垂直以及旋转斜视的患者多合并眼底外旋。

PO-552

弱视诊治中需重视的问题

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目的：通过报告弱视诊治过程中的病例 6 例，探讨进行弱视诊断及治疗中需要重视的问题。

方法：1.患者女，9 岁，右眼 0.4（0.4X+1.00DS），左眼 0.4(0.5-X+0.75DS)。双眼前节，眼底（-）。双眼黄斑 OCT 及视野检查无异常。视功能检查：双眼调节不足。行调节训练 2 个月后双眼 1.0.2. 患者刘某，女，8 岁，视力右眼 1.0（平光），左眼 0.5X+0.50DS+0.75DC×90，眼科检查及双眼 OCT，视野，VEP、视神经纤维层厚度、B 超均及颅脑 CT 平扫未见明显异常。视功能检查：左眼调节不足，集合不足，建议行集合+调节训练。训练后双眼视力 1.0。3.患者男，4 岁，右眼 0.2（0.4X-1.00DS/-1.00×130），左眼 0.3（0.6X+0.50DS/-1.25×15），双眼前节及眼底（-）。弱视治疗 3 年后双眼视力均无提高，黄斑 OCT:右眼椭圆体带不连续，左眼椭圆体带欠清。4.患者王某，女，8 岁，右眼 0.6（0.8X+0.75DS），左眼 0.6（0.9X+1.00DS/+0.75×80），双眼前节（-）。黄斑 OCT:双眼未探及黄斑中心凹。5.患者男，6 岁，右眼 0.4（0.6X+1.50DS/+2.00×85），左眼 0.2（0.3X+4.50DS/+2.00×110），双眼前节（-）。黄斑 OCT:中心凹未见。6. 患者女，4 岁，右眼 0.05（0.05X+1.25DS/+0.75×85），左眼 0.5（1.0X+1.50DS），眼部检查、B 超、黄斑 OCT 及 PVEP 均无明显异常。颅脑检查颅咽管瘤。行手术治疗。手术后双眼矫正视力均 1.0。

结果：6 例患者中，2 例因双眼调节力不足导致视力差，3 例合并眼底异常。1 例因视力差，眼部检查无异常，检查出脑部肿瘤患者，并行手术治疗。

结论：弱视诊治中应重视眼底及视功能检查，必要时行颅脑检查。

PO-553

OPTICAL COHERENCE TOMOGRAPHY PREDICTORS OF SHORT-TERM VISUAL ACUITY IN EYES WITH MACULAR EDEMA SECONDARY TO RETINAL VEIN OCCLUSION TREATED WITH INTRAVITREAL CONBERCEPT

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Purpose: To identify the spectral-domain optical coherence tomography (SD-OCT) predictors of visual prognosis in retinal vein occlusion macular edema (RVO-ME) after intravitreal conbercept injection.

Methods: Retrospective cohort study of 63 treatment-naïve RVO-ME eyes received PRN intravitreal conbercept injection with at least three months of follow-up. The best-corrected visual acuity (BCVA) and OCT scans were recorded at baseline, one and three months after starting therapy. On SD-OCT, the following lesions in the 1-mm-wide retinal area centered on the fovea: disorganization of the retinal inner layers extent, cysts, hyper reflective foci (HF), microaneurysms, external limiting membrane (ELM) or ellipsoid zone (EZ) disruption, foveal bulge and foveal depression were evaluated by masked graders. Regression analysis was used to determine independent predictors of BCVA at one and three months follow-up.

Results: The thicker central subfield thickness (CST), greater extent of ELM disruption and presence of HF > 20 at baseline correlated with the worse baseline BCVA (all $P < 0.05$). The greater extent of ELM disruption and presence of HF > 20 at baseline were associated with poorer BCVA during follow-up (all $P < 0.05$). The CST and extent of EZ disruption at baseline and their changes over time were correlated with the three-month BCVA improvement (all $P < 0.05$). Furthermore, changes in the EZ disruption extent or CST following one month identified eyes with a high likelihood of subsequent BCVA improvement or decline.
Conclusion: The ELM status and HF > 20 at baseline could be good predictors for short-term visual outcome, while CST and the EZ status at baseline and their changes over time may predict visual improvement in patients with RVO-ME following intravitreal conbercept.

PO-554

SD-OCT 预测视网膜前膜的手术结果

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目的：研究术前 OCT 和相关临床参数对预测视网膜前膜（ERM）手术后的视力预后的作用。
方法：101 名接受 ERM 手术的患者的 104 眼纳入本回顾性观察研究。 基于中心凹形态，黄斑中心凹厚度（CST），感光细胞内节椭圆(（ISe）带完整性，光感受器变形指数（PDI）和 SD-OCT 冠扫 ERM 面积。 使用逐步多元逻辑回归确定与术后结果的关联。
结果：术前更小的 ERM 面积（P=0.005），更高的 CST（P=0.013）和更小的患者年龄（P=0.037）与术后视力改善相关。
结论：年轻视网膜前膜患者术前视力较差、较厚 CST、较小 ERM 面积，ERM 手术后视力较好。

PO-555

非渗出性年龄相关性黄斑变性黄斑中心凹无血管区，黄斑区血管密度和神经节细胞复合体厚度的研究

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目的：量化非渗出性年龄相关性黄斑变性（AMD）对黄斑中心凹微血管的影响。回顾性观察研究，通过光学相干断层扫描血管造影（OCTA）来评估 AMD 对黄斑中心凹无血管区（FAZ）面积，黄斑区血管密度（FVD），和旁中心凹视网膜神经节细胞复合体（GCC）厚度的影响。分析了年龄（老化）对 FAZ 面积，FVD 和 GCC 厚度的影响。**方法**：共纳入 121 例患者（208 眼），年龄为 18-90 岁（平均年龄为 59.2±15.7 岁），并对 OCTA 图像进行分析。于 3x3mm 的区域集中在浅层视网膜

毛细血管丛的中心凹，分别计算 FAZ 面积，FVD 和旁中央凹（0.5mm～1.5mm 偏心）GCC 厚度。入组标准为临床诊断为非渗出性 AMD。排除标准为扫描质量低于 55，且存在其他眼部疾病。对照组 24 眼（平均年龄 35.3±16.3 岁）和 nAMD 组 26 眼（平均年龄 70.2±7.9 岁）进行多因素分析比较。使用相关系数回归分析年龄对所有 208 眼 FAZ 面积，FVD 和 GCC 厚度的影响。所有分析显著性差异的水平设置为 p＜0.05。**结果：**nAMD 组较对照组 FAZ 面积和 FVD 均值均较大 (0.346±0.028 mm^2 vs. 0.246±0.013 mm^2;P=0.005 , 45.8%±0.82% vs 30.2%±0.94%; P<0.001），nAMD 组较对照组 GCC 厚度较低（108.27±2.17um vs. 122.76±2.07um）。年龄与 GCC 厚度呈负相关，每增加 1 岁减少 0.246μm（R2＝0.078，p＜0.001）。年龄和 FAZ 面积或 FVD 之间没有相关性（分别为 R2 = 0.012；P = 0.082，R2 = 0.004；P = 0.317）。**结论：** AMD 眼 FAZ 面积增加和毛细血管密度分布，无法用老化和旁中心凹 GCC 厚度降低来解释，需要进一步大规模的研究，研究结果将有助于明确 AMD 对视网膜微血管的影响。

PO-556

特制 Ritleng 泪道插管系统治疗儿童复发性泪道阻塞临床研究

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目的 观察探针式泪道扩张联合 Ritleng 泪道插管术治疗儿童复发性泪道阻塞的疗效。方法 2013 年 12 月至 2015 年 3 月在保定市儿童医院眼科进行探针式泪道扩张联合 Ritleng 泪道插管术治疗复发性泪道阻塞患儿 84 例（106 只眼），平均年龄 22 个月，随访 1~16 个月。分析患儿年龄、泪道探通次数、泪道阻塞情况对治愈率的影响。使用 Pearson 相关系数计算及独立样本 *t* 检验进行统计学分析。结果 84 例（106 只眼）中 98 只眼治愈，总治愈率为 92.45%（98/106），总有效率 100%（106/106）。年龄因素：在 6～≤12 个月、12～≤24 个月、24～≤36 个月、＞36 个月年龄组中，治愈率依次为 97.22%（35/36）、95.45%（42/44）、88.89%（16/18）、62.50%（5/8）（*R*=-0.968，*P*=0.0022）；泪道探通次数因素：1 次泪道探通术后复发、2 次泪道探通术后复发及 2 次以上泪道探通术后复发患眼中，治愈率分别为：95.35%（82/86）、86.67%（13/15）、60.00%（3/5）（*R*=-0.982，*P*=0.0014）；泪道阻塞情况因素：术中仅 1 次突破和 2 次及以上突破分组中，治愈率分别为 98.44%（63/64）、83.33%（35/42）（*P*=0.0003）。结论 探针式泪道扩张联合 Ritleng 泪道插管术对治疗儿童复发性泪道阻塞疗效显著，手术操作简单，具有较高的安全性，治愈率随年龄增长呈下降趋势，随探通次数增加呈下降趋势，复杂性泪道阻塞治愈率下降。

PO-557

奥瑞姆护理模式对糖尿病的影响研究

高畅
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奥瑞姆护理模式对糖尿病的影响研究

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目的：为了提高糖尿病患者的遵医行为和自护能力，改善和提高糖尿病患者血脂、血糖等疾病控制情况，旨在为糖尿病患者提供新的护理模式。

方法：筛选符合条件的 2 型糖尿病患者 90 名为研究对象，随机分为观察组、对照组，观察组 45 名患者给予奥瑞姆护理模式干预，对照组 45 名患者给予常规护理模式干预。问卷调查比较干预前后两组患者的遵医行为及自护能力，对护理的满意度，并对患者血糖、糖化血红蛋白、血脂等代谢指标进行干预前后的评估。

结果：1.经奥瑞姆护理模式干预后患者从被动接受治疗护理转为主动参与，自护能力显著提高。2.干预前两组患者的平均血糖值、糖化血红蛋白值和血脂水平均高于正常值，研究对象存在高血糖和脂代谢紊乱的情况。观察组干预 2 个月时血糖较前下降明显，与对照组相比出现明显差异（$t=5.278$，$p<0.01$），6 个月后两组相比差异显著（$t=57.267$，$p<0.001$）；糖化血红蛋白在干预 6 个月后两组出现明显差异($t=9.215$，$p<0.01$)；观察组血脂的各项指标控制在干预 4 个月后下降明显，与对照组出现差异($t=6.210$，$p<0.05$)，干预 6 个月后两组出现明显差异($t=6.342$，$p<0.01$)。

结论：患者对奥瑞姆护理模式干预感到满意。干预研究 6 个月时仅 1 例感觉一般，干预结束时满意度达到 100%。

PO-558

Natural history of myopia progression and parental influence on it: 12-year annual observation from the Guangzhou Twin Eye Study

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Purpose: To investigate the natural history of myopia progression and axial length (AL) elongation, as well as the effect of parental myopia in their offsprings.

Design:A longitudinal observational study.

Participants:A total of 1831 childrenparticipants aged 7-15 years.

Methods: Baseline data was collected from 2006. Spherical equivalent (SE) of children was measured at each visit by autorefraction (KR8800, Topcon Corp, Tokyo, Japan) after successful cycloplegia and AL was measured using IOLMaster (Carl Zeiss Meditec, Oberkochen, Germany). Parental refractive status was determined using the refraction data at their first visit. Children was classified into five groups according to their parental refractive status: non-non, non-moderate, non-high, moderate-moderate and moderate-high/high-high. Linear mixed-effects models were used to estimate the relationship between longitudinal change of SE and AL in twins with parental refractive status.

Main Outcome Measures: Longitudinal change of SE and AL and their relationship to parental refractive status.

Results: Participants at baseline presented a mean age of 11±2.7 years and mean SE of -0.49±2.16D. The median of follow-up visit times was nine. The average SE and AL was 0.81±1.15D and 22.74±0.75mm at the age of seven, growing to -2.93±2.62D and 24.80±1.32mm at the age of 20, respectively. Age-specific change of SE and AL displayed a growth pattern of rapid increase around 10 years old and slow progression thereafter. The parental refractive status had significant influence on their children's refractive progression that rate of myopia progression and AL elongation were on average faster for children with parental myopia. Age-specific change of SE and AL also displayed different changes among all groups. Children in the mod-high/high-high group presented the fastest progression at around 8 years while children in the non-non group progressed fastest at around 11 years.

Conclusions: In general, refraction develops and AL elongates most rapidly before 12 years old. Children with parental history of myopia progresses at a faster rate with an earlier onset of myopia. Parental myopia is postulated to influence refraction development by accelerating the process of emmetropization and myopia onset.

PO-559

Visual acuity, eye diseases and 5-year mortality among a rural cohort in China: the Handan eye study

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Aim: To present the relationship between visual acuity (VA) and mortality in an older rural Chinese population.

Methods: The Handan Eye Study (HES) is a population-based longitudinal study. In 2006-2007, 6830 subjects with an age of 30 years or older were selected for this study using a randomized, clustered, sampling technique from 13 villages (HES I). In 2012-2013, we reexamined study participants (HES II) and the original participants who had died were registered and the information on the date and cause of death were recorded. Baseline characteristics for the surviving and deceased participants were compared. Then the Cox proportional hazard regression was used to investigate the associations of baseline variables and mortality.

Results: There were 507 (7.42%) of the study population had died by the time of HES II. In univariate analysis, mortality was higher in older (P <0.001) and male (P <0.001) individuals, smokers (P <0.001) and drinkers (P <0.001). And those with lower VA (P <0.001) and more ocular diseases (P <0.001), less income (P <0.001) and lower education (P <0.001), higher glucose (P <0.001) and blood systolic pressure (P <0.001) were more likely to die. In Cox proportional hazard regression analyses, VA was not significantly associated with mortality [P =0.238, Hazard Ratio

(HR): 0.73, 95% confidence interval (CI): 0.43-1.24], while presence of diabetic retinopathy was significantly associated with increased risk of mortality (P =0.006, HR: 3.02, 95% CI: 1.37-6.63).
Conclusions: Lower baseline VA was not associated with the risk of mortality after adjustment for appropriate confounders. Diabetic retinopathy remained significantly associated with incident mortality even after adjustment.

PO-560

眼蠕形螨感染在不同年龄段患者中的表现差异

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目的：观察和比较青少年和中老年患者眼表蠕形螨感染的临床特点，并初步探讨导致其差异的可能因素。
方法：病例对照和横断面研究。纳入门诊确诊为蠕形螨感染的青少年患者（≤30y）43 例及中老年患者(≥45y)30 例。入组患者均接受睫毛镜检，蠕形螨鉴定及计数，裂隙灯显微镜下观察睑缘形态、角结膜病变，眼表综合分析仪评估睑板腺缺失程度及角膜共聚焦显微镜检查。比较两组患者蠕形螨计数、睑缘改变、睑板腺丢失程度、角膜病变患病率及程度的差异，并寻找两组患者临床表现差异的可能相关因素。
结果：青少年组平均年龄为 22.7±5.4 岁，中老年组平均年龄为 54.8±10.5 岁。青少年组及中老年组的总蠕形螨计数无统计学差异 (6.4 ± 3.7 vs. 7.0±4.6, P=0.951)，但青少年组皮脂螨检出数量显著高于中老年组(2.9±2.5 vs. 1.4±2.3, P=0.001), 而毛囊螨检出数量显著低于中老年组 (3.5±2.3 vs. 5.6±3.4, P=0.006)。青少年组重度睑板腺缺失的患病率显著高于中老年组（32.6% vs. 6.7%，P=0.001）。青少年组的睑板腺缺失程度更为严重（P=0.001），两组泪膜破裂时间（BUT）及泪河高度（TMH）差异无显著性。青少年组角膜病变患病率显著高于中老年组（67.4% vs. 16.7%，P＜0.001），且 15 例出现角膜基质浸润、角膜溃疡的改变，而上述这类角膜改变并未在中老年组出现。相关性分析发现，青少年组睑板腺缺失程度及角膜病变程度与皮脂螨数量成正相关（P=0.015，P=0.005）。回归分析显示皮脂螨数量为角膜病变及睑板腺缺失的危险因素。
结论：蠕形螨感染在青少年和中老年的表现存在差异，青少年组皮脂螨检查率更高，睑板腺缺失程度及角膜病变程度比中老年组更重，皮脂螨与睑板腺和角膜病变相关

PO-561

不同撕囊直径下行囊袋内超声乳化对角膜和血-房水屏障的影响

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目的：初步探讨不同撕囊直径下行囊袋内超声乳化对角膜和血-房水屏障的影响。

方法：选取 2016-05-01/2017-04-31 在潍坊眼科医院行飞秒激光辅助超声乳化手术的白内障患者（78 例 100 眼）。术前按照撕囊直径分为试验组 36 例 50 眼，术中撕囊直径 4.7mm；对照组 42 例 50 眼，术中撕囊直径 6.0mm。观察并分析两组患者术中平均超声能量和有效超声时间，术前和术后 1d、1wk、2mo 的最佳矫正视力、中央角膜厚度、房水闪辉细胞，术后 2mo 的角膜内皮细胞计数变化。
结果：两组患者术后各时间点的最佳矫正视力比较，差异没有统计学意义（*P*>0.05）。术后 1d，1wk 试验组患者的中央角膜厚度变化小于对照组，差异有统计学意义（*P*<0.05）；术后 2mo 中央角膜厚度变化比较，差异无统计学意义（*P*>0.05）。术后 1d，1wk 试验组患者的房水闪辉细胞数低于对照组；至术后 2mo，两组间差异无统计学意义（*P*>0.05）。术后 2mo 试验组角膜内细胞丢失率明显低于对照组，差异有统计学意义（*P*<0.05）。
结论：小直径撕囊行囊袋内超声乳化能够减少术中超声乳化能量对角膜的损伤，同时减少对血-房水屏障的破坏，患者术后恢复更快。

PO-562

飞秒激光辅助白内障超声乳化手术术后眼表微环境的变化观察

马健利
潍坊眼科医院

目的：初步探讨飞秒激光辅助白内障超声乳化手术术后干眼症情况。
方法：对 86 例（100 眼）行飞秒激光辅助超声乳化手术的白内障患者术前及术后 1 天、1 周、2 周、1 个月及 2 个月泪膜破裂时间、下睑中央泪河高度及干眼分级进行分析，并与行传统超声乳化手术的 81 例（100 眼）白内障患者进行比较分析。
结果：与术前相比，飞秒激光组术后 1 天及 1 周时泪膜破裂时间明显缩短，干眼分级增加，术后 1 天下睑中央泪河高度明显增高，差异均有统计学意义（P＜0.05）。下睑中央泪河高度于 1 周，泪膜破裂时间及干眼分级于术后 2 周恢复至术前水平。而传统超声乳化组术后 1 天及 1 周及 2 周时泪膜破裂时间明显缩短，干眼分级增加，术后 1 天及 1 周下睑中央泪河高度明显增高，差异均有统计学意义（P＜0.05）。下睑中央泪河高度于 2 周，泪膜破裂时间及干眼分级于术后 1 个月恢复至术前水平。
结论：飞秒激光辅助的白内障超声乳化手术与传统超声乳化手术都会在短期内影响泪膜的稳定性，增加干眼程度，但飞秒激光组恢复较传统组更快。

PO-563

不同 α 角眼多焦点人工晶状体植入术后视觉质量观察

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目的：探讨不同 α 角眼多焦点人工晶状体植入术后视觉质量的差异。方法：前瞻性观察研究。选取潍坊眼科医院行白内障超声乳化摘除联合多焦点人工晶状体植入术的年龄相关性白内障患者 38 例(42 眼)，年龄 49～77 岁。根据术前 α 角(视轴与囊袋中央的距离)的大小将患者分为 2 组：A 组(0<α≤0．25 mm)21 例(24 眼)，B 组(0．25 mm<α<0．50 mm)17 例(18 眼)。术后随访 3 个月，记录裸眼远、中、近视力，调制传递函数截止频率(MTF cutoff)，斯特列尔比(SR)和对比敏感度(CS)，是否出现视觉不良症状及是否戴镜。2 组样本中裸眼远、中、近视力，MTF cutoff，SR 和 CS 比较采用独立样本 t 检验，眩光和光晕的发生率比较采用 X2 检验。结果 B 组光晕、炫光发生率显著高于 A 组，差异有统计学意义(P＜O．05)；术后 2 组裸眼视力、MTF cutoff、SR 差异均无统计学意义(P>O．05)，对比敏感度 B 组较 A 组减低，差异有统计学意义(P＜0.05)。结论：α 角对多焦点人工晶状体植入术后视觉质量在对比敏感度上有差异，其他指标无显著影响，对术后视觉不良症状有影响。

PO-564

飞秒激光辅助超声乳化联合环曲面人工晶体（T2）植入矫正小度数角膜散光的效果观察

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目的：评估飞秒激光辅助超声乳化联合 T2 人工晶体植入矫正小度数角膜散光的效果。**方法：**选取 50 例（50 眼）行飞秒激光辅助超声乳化联合 T2 人工晶体植入的白内障患者，分析患者术前术后角膜曲率变化及术源性散光情况，并与行传统超声乳化联合 T2 人工晶体植入的 50 例（50 眼）患者进行比较。**结果：**飞秒激光联合 T2 组术前角膜散光为 0.604 ±0.176D 与传统手术联和 T2 组的 0.613±0.184D 比较差异无统计学意义。两组患者术后裸眼视力均有明显提高，飞秒激光联合 T2 组 3 个月 94%患眼 UCVA≥0.6,88%患眼 UCVA≥0.8，BCVA≥0.8 者达 96%。传统手术联合 T2 组 3 个月 90%患眼 UCVA≥0.6，78%患眼 UCVA≥0.8，BCVA≥0.8 者达 96%。两组角膜散光较术前均明显减少，飞秒激光联合 T2 组 3 个月时平均角膜散光为 0.122 ± 0.069mmHg，而传统手术联合 T2 组末次随访的平均角膜散光为 0.194±0.087，差异有统计学意义（P＜0.05）。飞秒激光辅助超声乳化手术的术源性散光为 0.38±0.24，较传统超声乳化手术的 0.64±0.39 差异有统计学意义（P＜0.05）。飞秒激光联合 T2 组术后 3 个月时 IOL 旋转平均为（1.857±1.153）°，传统超声乳化手术术后 3 个月 IOL 旋转度为（2.142±1.972）°，差异无统计学意义（P＞0.05）。结论：飞秒激光辅助超声乳化联合 Toric（T2）植入在矫正小度数角膜散光方面较传统超声乳化联合 Toric（T2）植入更精确，术后残余散光更小；同时飞秒激光辅助超声乳化手术较传统超声乳化手术的术源性散光更小；两种手术方式比较，飞秒激光组较传统超声乳化组在人工晶体的旋转稳定性方面无明显差异。

PO-565

飞秒激光辅助超声乳化联合 Toric（T2）人工晶体植入矫正小度数角膜散光的效果观察

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目的：评估飞秒激光辅助超声乳化联合 T2 人工晶体植入矫正小度数角膜散光的效果。**方法：**选取 50 例（50 眼）行飞秒激光辅助超声乳化联合 T2 人工晶体植入的白内障患者，分析患者术前术后角膜曲率变化及术源性散光情况，并与行传统超声乳化联合 T2 人工晶体植入的 50 例（50 眼）患者进行比较。**结果：**飞秒激光联合 T2 组术前角膜散光为 0.604 ±0.176D 与传统手术联和 T2 组的 0.613±0.184D 比较差异无统计学意义。两组患者术后裸眼视力均有明显提高，飞秒激光联合 T2 组 3 个月 94%患眼 UCVA≥0.6,88%患眼 UCVA≥0.8，BCVA≥0.8 者达 96%。传统手术联合 T2 组 3 个月 90%患眼 UCVA≥0.6，78%患眼 UCVA≥0.8，BCVA≥0.8 者达 96%。两组角膜散光较术前均明显减少，飞秒激光联合 T2 组 3 个月时平均角膜散光为 0.122 ± 0.069mmHg，而传统手术联合 T2 组末次随访的平均角膜散光为 0.194±0.087，差异有统计学意义（P＜0.05）。飞秒激光辅助超声乳化手术的术源性散光为 0.38±0.24，较传统超声乳化手术的 0.64±0.39 差异有统计学意义（P＜0.05）。飞秒激光联合 T2 组术后 3 个月时 IOL 旋转平均为（1.857±1.153）°，传统超声乳化手术术后 3 个月 IOL 旋转度为（2.442±1.972）°，差异有统计学意义（P＜0.05）。结论：飞秒激光辅助超声乳化联合 Toric（T2）植入在矫正小度数角膜散光方面较传统超声乳化联合 Toric（T2）植入更精确，术后残余散光更小；同时飞秒激光辅助超声乳化手术较传统超声乳化手术的术源性散光更小，IOL 旋转稳定性更好。

PO-566

白内障超声乳化与有晶体眼人工晶体植入术后角膜曲率变化的比较

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目的:研究超声乳化白内障吸除联合 IOL 植入术后角膜曲率及散光的变化，并与 ICL 植入术后角膜曲率及散光变化进行比较。
方法:收集我院行超声乳化白内障吸除联合人工晶体植入术 34 例 52 眼的资料，术前视力 FC/50cm 至 0.5，白内障分级 II 级至 IV 级，手术前后分别行裸眼视力和医学验光检测，并使用 Pentacam 行眼前节分析系统检测患者手术前后角膜前后表面曲率、散光及其轴位的变化。并与我们之前统计的 27 例 52 眼 ICL 患者手术前后角膜表面曲率、散光的变化进行比较。

结果: 术后患者裸眼视力均在 0.4-1.0 之间，其中，裸眼视力≥1.0 者 43 眼（82.69%）。术后 3 月超声乳化白内障患者角膜前表面曲率变化无统计学差异，与 ICL 植入术患者角膜前表面曲率的变化一致。手术前后角膜前表面角膜曲率及散光值无统计学差异（*p*=0.734，*p*=0.427），ICL 植入患者手术前后角膜前表面角膜曲率无统计学差异（*p*=0.475），角膜前表面散光值差异也无统计学意义（*p*=0.446）。白内障患者手术前后角膜后表面角膜曲率有明显统计学差异（*p*=0.022），角膜后表面散光值差异有统计学意义（*p*=0.000），该结果与 ICL 患者手术前后角膜后表面的曲率与散光值变化一致。两组患者手术前后角膜前表面散光轴位倾向于顺时针旋转，角膜后表面散光轴位倾向于逆时针旋转，而总散光轴位均倾向于顺时针旋转。
结论:白内障超声乳化联合 IOL 植入术与 ICL 植入术相比较，手术前后角膜前表面散光变化均不具有显著性差异。而角膜后表面散光轴位变化均呈现显著性差异。因此超声乳化手术对角膜曲率及散光的影响主要在角膜后表面，且主要是角膜主切口产生。本研究发现白内障超声乳化患者角膜后表面的曲率变化改变较 ICL 植入患者角膜后表面曲率变化更大，说明超声乳化过程中超乳手柄能量、器械进出切口引起内切口的灼伤及角膜组织损伤对角膜后表面曲率的变化产生了重要作用。

PO-567

Dry eye and sleep quality: a large community-based study in Hangzhou

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Study objectives: To investigate the relationship between dry eye and sleep quality in a large community-based Chinese population.
Methods: A total of 3,070 participants aged 18 to 80 were recruited from a community-based study in Hangzhou, China during 2016-2017. Sleep quality was evaluated using the Chinese version of the Pittsburgh Sleep Quality Index (CPSQI), and dry eye were evaluated using the Ocular Surface Disease Index (OSDI) questionnaire. Multiple linear regression and multinomial logistic regression were used to investigate the associations, adjusting for age, smoking, drinking, season, and other potential confounders.
Results: Overall, participants with worse CPSQI score or sleep dysfunction (CPSQI score >7) had worse OSDI score (β: 0.13, 0.53; all p<0.001). In addition, six of the seven components of CPSQI showed significant associations with dry eye (all p<0.001), except for the component of sleep medication use. CPSQI score and sleep dysfunction were also significantly associated with mild, moderate, and severe dry eye (ORs for CPSQI score: 1.07, 1.13, 1.15, all p<0.001; for sleep dysfunction: 1.30, 1.73, 1.67, all p<0.05). Moreover, we observed significant associations of dry eye in all three subscales of OSDI with CPSQI score and sleep dysfunction.
Conclusions: Our large, community-based study showed a strong association between poor sleep quality and an increased severity of dry eye, suggesting that preventing either one of the discomforts might alleviate the other.

Keywords
dry eye, sleep quality, the Ocular Disease Index, the Pittsburgh Sleep Quality Index

PO-568

康柏西普玻璃体腔内注射治疗白内障术后顽固性黄斑水肿的疗效观察

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目的：观察玻璃体腔注射康柏西普治疗白内障术后顽固性黄斑水肿的临床疗效和安全性。
方法：收集 2015 年 9 月至 2017 年 9 月在我院行白内障超声乳化吸除联合人工晶状体植入术后发生顽固性黄斑水肿患者 7 例(8 眼)，病史均大于 6 个月。经荧光素眼底血管造影（FFA）及光学相干断层扫描(OCT)确诊并排除其他黄斑相关疾病引起的黄斑水肿。予患眼玻璃体腔内注射康柏西普 0.5 mg(0.05ml)，随访 3 个月，对比观察治疗前后患眼最佳矫正视力、眼压、OCT 及 FFA 的改变。
结果：经过 1 次注射，7 例患者 8 眼的最佳矫正视力在注射后 1 周、1 个月、3 个月较术前均明显提高（P ＜ 0. 05)；黄斑中心凹视网膜厚度（CFT）较术前下降(P ＜ 0. 05)；所有患眼无黄斑水肿复发，所有患者均未出现眼内或全身不良反应。
结论：玻璃体腔注射康柏西普治疗白内障术后顽固性黄斑水肿，能明显改善患者最佳矫正视力，减轻黄斑水肿，安全可靠。

PO-569

Five-year changes in anterior segment parameters in an older population in urban southern China: The Liwan Eye Study

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Purpose: To investigate the five-year changes in static and dynamic anterior segment optical coherence tomography (AS-OCT) parameters and their predictors.

Methods: This was a prospective, population-based cohort study of people aged 50 and older residing in the Liwan District, Guangzhou, China. Standardized AS-OCT scans were performed in November 2008 and November 2013 under dark and light conditions. Customized software was used to analyze horizontal AS-OCT images. Parameters in dark and measurements of light-to-dark changes were used for analyses.

Results: A total of 160 (66.4%) subjects underwent AS-OCT twice, five years apart and were included for analyses. The mean age in 2008 was 64.7±7.0 years, and 60.2% were female. The anterior chamber width (ACW) decreased from 11.74±0.44 mm in 2008 to 11.60±0.37 mm in 2013 (P=0.001). There was a trend towards a decrease in dynamic capacity (light-to-dark changes) in the anterior segment, with decreased ΔIT750, ΔACW, ΔACA, and ΔPD at 5 years (all P<0.05). After adjusting for age and sex, the following baseline parameters were associated with a greater decrease in TISA500 at 5 years: TISA500, IT750, and ACA in dark (P<0.001 for all).

Conclusions: Anterior chamber angle width decreased and the amount of light-to-dark changes declined during five-year follow-up. Subjects with wider angle width and thicker iris at baseline have greater angle narrowing at follow-up.

PO-570

穹顶样黄斑形态对于雷珠单抗注射液治疗继发于病理性近视的脉络膜新生血管的疗效比较

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目的：比较穹顶样黄斑（dome-shaped macular，DSM）形态对于雷珠单抗玻璃体腔注射治疗继发于病理性近视的脉络膜新生血管（choroidal neovascularization，CNV）的疗效是否有影响。

方法：根据病人是否有穹顶样黄斑形态，将具有影像学诊断依据的病理性近视继发的 CNV 的患者 24 人（24 眼）分为两组：有 DSM 形态组和无 DSM 形态组。所有的患者在研究开始时都接受了雷珠单抗玻璃体腔注射，之后根据每一次随访的情况决定是否再次接受雷珠单抗注射。在 12 个月的随访周期内，每个月对病人都进行最佳矫正视力和 OCT 的评估。比较两组之间最佳矫正视力（BCVA）的平均变化值、中央视网膜厚度（central retinal thickness，CRT）（包括视网膜和 CNV 厚度），以及注射次数的平均改变值。

结果：12 个月的随访后，两组之间的视力改善没有显著的统计学差异（P>0.05）。有 DSM 形态组的病人 BCVA 平均提高 8.7 个字母，而无 DSM 形态组的病人平均提高 14.2 个字母（P=0.68）。然而，相对于有 DSM 形态的病人，更多无 DSM 形态的病人 BCVA 提高大于 15 个字母。随访结束时，中央视网膜厚度较基线数据的变化值在两组之间没有明显差异（P=0.42）。两组的平均注射次数分别为：有 DSM 组 8.83，无 DSM 组为 8.17，差异无统计学意义（P>0.05）。两组间的视力改善、解剖学变化及注射次数均无明显差异。

结论：对于病理性近视继发 CNV 的病人，有无 DSM 形态不会改变雷珠单抗的治疗效果及疗程。

PO-571

Abnormal Intrinsic Functional Hubs in corneal ulcer: Evidence from a Voxel-Wise Degree Centrality Analysis

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Abstract

Purpose: Many previous neuroimaging researches revealed that corneal ulcer (CU) was related with alternations in brain anatomical function and regional function. However, the functional characteristics of network organization in the whole brain is unknown to a large extent. The study aims to confirm the CU-associated spacial centrality distribution functional network of the whole brain and to explore how the larvaceous changed intrinsic functional hubs.

Methods: Totally 40 patients with CU, and 40 normal controls (NCs) matched in sex, age, and education underwent resting-state functional magnetic resonance imaging scans. The voxel-wise degree centrality (DC) was measured throughout the brain, and the differences between the groups were compared. Linear correlation analysis was used to evaluate the relationship between abnormal DC value and clinical variables.

Results: Compared with NCs, CU patients show high DC values in the frontal lobe, precuneus, inferior parietal lobule, posterior cingulate, occipital lobe, and temporal lobe in the brain functional connectivity maps of the whole brain. The intergroup differences were also largely similar based on the different correlation thresholds. In addition, DC values showed a positive correlation with the duration of CU in the left middle frontal gyrus

Conclusions: We finds that CU patients showed spatially abnormal intrinsic functional hubs including relatively increased or reduced DC. This reinforces our understanding of the functional features of CU, which might provide useful information to help us understand the dysfunction of CU.

PO-572

Investigation of Functional Connectivity Density mapping in patients with keratitis by using resting-state functional MRI

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Purpose: The brain function in keratitis patients have not been studied by any research. The understanding of the alterations of short range Functional Connectivity Density (lFCD) and long range Functional Connectivity Density (longFCD) in keratitis patients remains unknown. Resting-state functional connectivity (rsFC) analysis is a powerful way to assess the spontaneous functional organization via functional connectivity, which measures the temporal correlation between the time series of the blood oxygen level-dependent (BOLD) signals of two brain regions. Our study aimed to compare the FCD between the keratitis patients and normal controls using rsFC method.
Methods： 40 patients with keratitis (26 males and 14 females), and 40 normal controls (26 males and 14 females) with matched age, sex status underwent a Functional magnetic resonance (MR) examination at the resting state. The lFCD and longFCD were compared by one sample T test. The keratitis patients were distinguishable from the healthy controls (NCs) by receiver operating characteristic (ROC) curves.
Results: Compared with normal controls, significant reduced lFCD value were found in left Cerebellum Posterior Lobe (CPL), right Inferior Parietal Lobule (IPL), left Cerebellum Anterior Lobe (CAL), significant reduced longFCD value were found in both CPL. Significant increased lFCD value were found in both Superior Frontal Gyrus (SFG Brodmann's area 6), increased longFCD value were found in left Inferior Temporal Gyrus (ITG), left SFG (Brodmann's area 11). Compared with normal controls, there are less reduction of lFCD in right CPL, right Supramarginal Gyrus (SG), left Middle Temporal Gyrus (MTG), bilateral SFG, bilateral Caudate.
Conclusion: Keratitis indicated increased binarized lFCD and long lFCD in chronic pain sensoring related brain areas including SFG Brodmann's area 6, 11, ITG, which might give an explanation of brain function compensation for the chronic eye pain disorders in the keratitis patients. Reduced binarized lFCD and long lFCD in CPL, IPL, left CAL may provide an explanation of vision.

PO-573

Clinical study of macular vascular density in patients with pterygium by optical coherence tomography angiography

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[Abstract] Purpose：By using OCTA to detect changes in macular vascular density in patients with pterygium and the correlation between macular vascular density and the area and duration in patients with pterygium; **Method:**18 female patients with pterygium and 18 normal females were selected. Group A and B are two groups. The superficial retinal layer (SRL) and the deeper retinal layer (DRL) of the macular retina in each eye were scanned by 6 6mm angiographic OCT to produce 3d OCTA images.We calculated the microvessel (MIR) and macrovascular (MAR) densities, and compared the MIR, MAR and total MIR (TMI) densities in healthy controls and pterygium groups, respectively.

Result:The correlation between macular vascular density and pterygium area and course was studied by using circular zoning method (C1-C6) and quadrant zoning method with fovea as the center diameter of 1 mm circle and 3 mm, parafovea as the side center (C1-C6).Results: in the superficial retinal layer (SRL), SMIR, SR, IR, R, C1,C2 and C3 regions significantly decreased macular vascular density in patients with pterygium. ($P < 0.05$).In the deep retinal layer (DPL),DTMI, DMIR, SR, IR, C2 and C3 decreased significantly in the macular area ($P<0.05$).In the superficial retinal layer, the vascular density of SMIR, SR, IR, C1, C2 and C3 in the pterygium group is significantly correlated with the course of disease($r=-0.6038$ to -0.7762, $P=0.0080$).In pterygium group, the vascular density of SMIR, SR, IR, R, C1,C2 and C3 is significantly correlated with the area of pterygium($r=-0.6043$ to -0.9508, $P<0.05$).In the deep retinal layer, the vascular densities of DTMI, DMIR, SR, IR, R, C2 and C3 in the pterygium group were correlated with the course of pterygium($r=-0.6901$ to -0.7795, $P=0.0015$).The density of DTMI, DMIR, SR, IR, R, C2 and C3 in pterygium group were significantly correlated with the area of pterygium($r=-0.6043$ to -0.9563, $P<0.05$).

Conclusion:OCTA results showed that macular vascular density was significantly reduced in patients with pterygium. In addition, the longer the course of pterygium and the larger the area of pterygium may cause a decrease in macular density.

PO-574

Altered spontaneous brain activity patterns in patients with diabetic retinopathy using amplitude of low-frequency fluctuation: a fMRI study

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Objective: To investigate the altered spontaneous brain activity in patients with diabetic retinopathy (DR) through the amplitude of low-frequency fluctuation (ALFF) technique and their relationships with the behavioral performances.

Methods: Selecting 24 patients with PDR and 24 healthy controls (HCs) matched for gender and age. The spontaneous cerebrum activity variations were investigated using the ALFF technique. The average ALFF values of the DR patients and the HCs were classified utilizing receiver operating characteristic (ROC) curves. The correlations among ALFF signals of distinct regions of the cerebrum and clinical manifestations of the DR patients were evaluated using Pearson's correlation analysis.

Results: Contrary to HCs, the DR patients had significantly higher ALFF values in the left cerebellum posterior lobe, right cerebellum posterior lobe and right anterior cingulate, but the ALFF values of the bilateral calcarine were lower. ROC curve analysis of each brain regions showed the

accuracy of AUC was perfect. However, the mean ALFF values in different regions were not significantly correlated with clinical performance. The subjects showed abnormal neuronal synchronization in many areas of brain, which is consistent with cognitive and visual function deficits.

Conclusion: Abnormal spontaneous activities were detected in many areas of the brain, which may provide useful information for understanding the dysfunction of DR. And these activity changes in brain regions would be used as effective clinical indicators for DR.

PO-575

Corneal Spherical Aberration in Patients with Marfan Syndrome and Ectopia Lentis

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Purpose: *To measure corneal spherical aberration (CSA) in patients with Marfan syndrome (MFS) and ectopia lentis.*
Methods: *CSA was measured and keratometry was performed using a Pentacam HR system at the 6-mm optical zone in patients with MFS. Axial length and total corneal astigmatism were also determined.*
Results**:** A total of 170 eyes in 97 MFS patients (44 women, 53 men) were included in this study. The mean age of patients was 18.6 ± 12.2 years. CSA was not significantly different between males and females or between right and left eyes (all $P > 0.05$). Anterior spherical aberration (ASA) was greater than total spherical aberration (TSA) (0.129 ± 0.105 μm vs. 0.082 ± 0.101 μm). Both ASA and TSA were significantly lower in MFS patients aged ≤ 10 years old than in four groups of older patients (all $P < 0.05$). TSA was correlated with age ($r = 0.394$; $P < 0.001$) and total keratometry ($r = 0.273$; $P < 0.001$); CSA values were lower in patients with a flatter cornea (< 41.5 D). Multiple linear regression showed that age, axial length, anterior keratometry, and posterior keratometry were correlated with CSA (all $P < 0.05$).
Conclusions**:** *In MFS patients, CSA values were low, varied and were correlated with age, being lower in children ≤ 10 years old. Ocular biometric parameters were not predictive of CSA. Preoperative measurement of CSA should be considered before selecting and implanting aspheric intraocular lenses in patients with MFS and ectopia lentis.*

PO-576

Factors affecting foveal avascular zone area in healthy eyes among Young Chinese Adults

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Purpose: To evaluate the influence of systemic and ocular factors on foveal avascular zone (FAZ) area in young Chinese subjects' healthy eyes.
Methods: The current observational, cross-sectional study included 344 eyes from 172 healthy individuals (103 women, 69 men). Optical Coherence Tomography Angiography realized with split-spectrum amplitude-decorrelation angiography (SSADA) algorithm was used to assess the area of superficial FAZ. To determine the related factors and to reveal their potential correlations with FAZ area, comprehensive examination including both systemic and in ocular ones were executed. Systemic examination involved factors including age, gender, body mass index, while ocular examination involved factors including BCVA, refractive error, intraocular pressure, axial length (AL), anterior chamber depth and central corneal thickness. Especially for fundus examination, central macular thickness (CMT), retinal volume, mean retinal thickness, macular blood flow area/vessel density in superficial retinal layer (SRL) and deep retinal layer (DRL), mean retinal nerve fiber layer (RNFL) thickness, ganglion cell layer (GCL) thickness, C/D rate, rim area and subfoveal choroid thickness were assessed. Using mixed effects regression models to appropriately account for inter-eye correlation. Subgroup analyses were performed based on gender and high myopia categories.
Results: Mean FAZ area was 0.30 ± 0.11 mm^2 and varied significantly across gender (P=0.0024). AL, CMT and RNFL thickness were found significantly correlated with FAZ area in the univariate regression analysis (AL, p=0.0005; CMT, p＜0.0001; RNFL thickness, p=0.0461). According to the multivariate results, CMT and macular blood flow in SRL were negatively correlated with FAZ (CMT: P < 0.0001; macular blood flow in SRL: P = 0.00223). Mean retinal thickness, mean GCL thickness and macular blood flow in DRL were positively correlated with FAZ (mean retinal thickness: P=0.0005; mean GCL thickness: P< 0.0001; macular blood flow in DRL: P=0.0099). Correlation among these filtered factors and FAZ were more pronounced in non-high myopic eyes than in high myopic eyes, and had significant difference when data of male and female subjects were processed separately from each other.
Conclusion: The present cross-sectional study operated comprehensive systemic and ocular examinations in young Chinese adults and filtered factors affecting FAZ. We indicated that among all the assessed candidate factors, gender, AL, retinal thickness, macular blood flow, RNFL and GCL thickness affected FAZ area most significantly. Such findings would facilitate future research concerning the role of FAZ variation in fundus diseases.

PO-577

炫彩多色激光成像联合扫频光相干扫描成像对高度近视漆裂纹的鉴别诊断

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目的 分析高度近视漆裂纹在基于共聚焦激光扫描检眼镜（cSLO）的炫彩多色共焦眼底层析激光成像联合扫频光相干扫描成像（SS-OCT）中的成像特点，评价 cSLO 联合 SS-OCT 在漆裂纹临床鉴别诊断中的价值。
方法 观察性研究。选取 2017 年 5 月至 2018 年 1 月在上海交通大学附属第一人民医院眼科就诊的高度近视患者，经眼底荧光血管造影和吲哚菁绿血管造影检查，分为四组。其中，漆裂纹组（LCs）组，8 例 12 眼；高近色素条纹（MSLs）组，14 例 15 眼；合并症（LCs+MSLs）组，23 例 34 眼；空白对照组，13 例 22 眼。所有的入选者均接受全面的眼科检查，通过对比图像、计算检出阳性率、一致性检验和准确性检验，比较各项检查项目对漆裂纹诊断的准确性。
结果 共 58 例 83 眼纳入研究，男性 20 例 30 眼，女性 38 例 53 眼。平均年龄 50.65±12.02 岁，平均 BCVA 0.37±0.32，平均屈光度-11.38±4.96D，平均眼轴 28.91±2.15mm。LCs 的明确诊断以 FFA 上一致的线性高荧光影和 ICGA 晚期线性低荧光影为标准，MSLs 则以 FFA 和 ICGA 的低荧光影为诊断标准。对于 LCs，cSLO 联合 SS-OCT 的检出阳性率最高，达 92.8%。对于鉴别诊断 LCs 和 MSLs， cSLO 联合 SS-OCT 的检验一致性（kappa 值=0.856，P＜0.001）和检验准确性（ROC 曲线下面积为 0.935）最佳。SS-OCT 断层扫描成像中，漆裂纹主要表现为 RPE 线条模糊粗糙，局部变薄透见，内层椭圆体带不连续，脉络膜变薄及后方声影，严重可见 RPE 断裂。MSLs 主要表现为 RPE 细胞团块状增殖隆起，其下伴行脉络膜大血管。
结论 cSLO 结合 SS-OCT 断层扫描图像可以为鉴别诊断高度近视漆裂纹提供更多的细节，有望成为漆裂纹无创诊断的重要技术。

PO-578

Factors affecting pain in patients undergoing bilateral cataract surgery

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Purpose To compare the perceived pain and estimated operative duration among patients undergoing bilateral cataract surgery and to demonstrate correlations with the surgical interval and the demographic and medical characteristics of the patients.
Methods A total of 466 patients with cataract who underwent ocular surgery were included. The patients estimated the perceived operative duration and pain they felt during the operation at two times, immediately after surgery and on the first postoperative day; pain was scored using a visual analog scale ranging from 0 (no pain) to 10 (unbearable pain). Patients undergoing bilateral surgeries were divided into 4 subgroups based on the interval between the two operations (1, 2, 4,

or 6 weeks). The perceived pain score and the estimated operative duration were the primary outcomes.
Results The pain scores were higher for the second surgery than the first surgery both immediately after surgery (P = 0.043) and on the first postoperative day (P = 0.002). The estimated operative duration was longer for the second surgery (P = 0.001). Only patients who underwent the second surgery at an interval of 2 weeks perceived more pain both immediately and one day postoperatively (P = 0.002, P = 0.022) and a longer operative duration (P < 0.001). Gender, age, and education level might also influence the pain score.
Conclusions Female patients, patients with a younger age and with higher education level are likely to report more pain. Patients who require bilateral cataract surgery should not undergo the second surgery before an interval of two weeks.

PO-579

天津市滨海新区中小学生屈光状态的流行病学研究

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摘要：**目的** 了解天津市滨海新区中小学生屈光状态，分析该地区学生屈光状态和屈光参数的流行病学特征。 **方法** 采用横断面调查研究，选取 2018 年该地区 4218 名 7-18 岁学生，检测裸眼视力、矫正视力、小瞳下屈光度、眼轴、角膜曲率。**结果** 7-18 岁学生近视患病率右眼为 59.60%，左眼为 55.10%。其中，7-12 岁学生近视患病率右眼为 54.29%，左眼为 50.10%；13-15 岁学生近视患病率右眼为 80%，左眼为 73.1%；16-18 岁学生近视患病率右眼为 77.42%，左眼为 74.9%。高度近视患病率：右眼 2.84%，左眼 2.52%，中度近视患病率：右眼 14.89%，左眼 13.30%，轻度近视患病率：右眼 41.84%，左眼 39.28%。近视患病率右眼>左眼，差异有统计学意义（P<0.05）。远视患病率：右眼 5.83%，左眼 7.81%，其中，高度远视患病率：右眼 0.07%，左眼 0.09%。正视眼：右眼 34.57%，左眼 37.08%。平均屈光度：高度近视：右眼-7.50±1.36D，左眼-7.38±1.14D；中度近视：右眼-4.21±0.82D，左眼-4.16±0.81D；轻度近视：右眼-1.60±0.70D，左眼-1.56±0.67D。平均眼轴长度：重度近视：右眼 26.05±1.01mm，左眼 26.08±1.00mm；中度近视：右眼 25.01±0.96mm，左眼 25.08±0.87mm；轻度近视：右眼 23.96±0.92mm，左眼 23.99±0.91mm。正视眼眼轴平均长度：右眼 23.31±0.78mm，左眼 23.30±0.77mm。**结论**：天津市滨海新区中小学生视力损害的主要原因是近视，近视眼患病率高;右眼和左眼近视患病率不等，在今后的流行病学调查中，应避免因调查数据工作量大，只调查单眼，用单眼的屈光参数推测双眼的屈光参数。

PO-580

有晶状体眼后房型人工晶状体植入术矫正近视的远期多中心临床观察

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目的：观察有晶状体眼后房型人工晶状体（ICL）植入术矫正近视的远期临床疗效。
方法：多中心横断面研究。在武汉、长沙和重庆爱尔医院对 ICL 植入术后≥5 年的近视患者进行回访，邀请患者来院复查。收集术前、术后各随访期间及末次（本次）随访的临床资料做统计分析。
结果：共收集 149 人/285 眼(武汉 69 人/134 眼，长沙 53 人/102 眼,重庆 27 人/49 眼)。手术时年龄（27.8±7.6）岁，末次随访为术后(5.5±0.8)年（范围 5 年～9 年）。术后已行白内障手术、角膜增效手术、ICL 置换或调位、眼底病变等并发症及不良事件 30 眼未纳入统计分析。术前平均 LogMAR 裸眼视力(UCVA)1.26±0.30、LogMAR 最佳矫正视力（BCVA）0.05±0.09、等效球镜（SE）(-14.89±3.24)D（范围-4.375D～-23D）。末次随访(≥5 年)；UCVA:0.17±0.21,BCVA: 0.02±0.08,SE:(-1.65±0.95)（范围+0.375D～-4.625D）；安全指数 1.25±0.23，有效指数 0.93±0.27；末次平均拱高为（406±197.7）mm(范围 24mm～1300mm)；与术前比：UCVA 提高、BCVA 更佳,、眼轴轻度增长，差异有统计意义（t=50.531、5.761、3.252，p＜0.05）；角膜内皮细胞平均减少 7.19%。并发症及不良事件:高眼压、黄斑出血、脉络膜新生血管、外伤性 ICL 晶体移位各 1 眼；外伤性视网膜脱落、已行角膜增效手术、单纯 ICL 取出各 2 眼，已行白内障手术 4 眼，行 ICL 调位 7 眼，异常拱高致 ICL 置换 9 眼。
结论： ICL 植入术矫正近视术后远期安全有效，但其远期并发症及不良事件仍值得关注。

PO-581

有晶状体眼后房型人工晶状体植入术矫正准分子激光角膜屈光手术后再近视的远期评估

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目的：评估有晶体眼后房型人工晶状体（Implantable collamer lens, ICL）植入术矫正准分子激光角膜屈光手术后再近视的远期临床疗效。
方法：回顾性研究。收集 2013 年～2016 年重庆爱尔眼科医院行 ICL 植入术矫正准分子激光屈光手术术后出现再近视的患者。收集 ICL 术前及术后 1 天、1 月、3 月、之后每年一次的临床资料进行统计分析。
结果：共 5 例 8 眼，末次随访时间为平均术后（31±13）个月（范围 1.5 年～4 年），术前：平均 logMAR 裸眼视力 (Uncorrected Visual Acuity，UCVA)为 0.84±0.37，平均 logMAR 最佳矫正视力（Best Corrected Visual Acuity, BCVA）为 0.12±0.14，等效球镜（spherical equivalents ，SE）为

-4.86D±2.64D（范围-2.125D～-8.75D）。术后 1 天、1 周、1 月、3 月、末次随访的 UCVA 分别为:0.15±0.24,0.11±0.19、0.10±0.17、0.07±0.19、0.30±0.32。末次随访：37.5%（3/8）眼 SE 为±0.50D/±1.00D，62.5%（5/8）眼出现了轻度近视进展（-1.30D～-2.31D），安全指数、有效指数分别为：0.92±0.30、0.74±0.39。末次随访与术前比：BCVA 下降,前房容积减小、房角变窄，差异有统计学意义（t=-0.905、-5.408、4.403,p＜0.05），眼轴、眼压、角膜内皮细胞计数、前表面曲率、中央角膜厚度、前房深度及暗光下瞳孔直径无明显变化（t=-2.406、-1.194、0.184、1.316、0.831、-1.513、0.312，p＞0.05）。未观察到白内障、青光眼、眼底等严重并发症的出现。结论：ICL 矫正准分子激光角膜屈光手术后再近视安全有效，但不能阻止高度近视进一步进展。

PO-582

GLP-1 类似物联合康柏西普在 PDR 中的临床应用研究

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目的：研究胰高血糖素样肽-1（glucagon-like peptide-1,GLP-1）类似物利拉鲁肽(liraglutide)联合康柏西普对增生期糖尿病视网膜病变（proliferative diabetic retinopathy,PDR）的临床疗效观察。**方法**：收集 2017-9 至 2018-9 于我科治疗的 PDR 患者 25 例（30 眼）。随机分为试验组 11 例（13 眼）和对照组 14 例（17 眼），试验组患者使用二甲双胍、胰岛素联合利拉鲁肽降血糖，对照组使用二甲双胍、胰岛素降血糖。入选后 2 组患者均予以玻璃体腔注射康柏西普，每月一次，连续 3 个月，比较两组患者 3 个月后糖化血红蛋白、黄斑区视网膜厚度变化、F-ERG 的 OPs 总波幅值的变化。**结果**：治疗后试验组和对照组糖化血红蛋白值对比差异无统计学意义（*P*=0.311，T=0.815）。治疗前 2 组患者 OPs 总波幅比较差异无统计学意义（*P*= 0.092，T=0.709）。试验组和对照组患者治疗后 OPs 总波幅较治疗前均增加，差异有统计学意义(*P* 均＜0.01，T=-4.949、-3.675)。治疗后试验组患者 OPs 总波幅比对照组高，差异有统计学意义（*P*=0.041,T=1.944）。治疗前试验组和对照组患者黄斑区视网膜厚度比较差异无统计学意义（*P*=0.217，T=-1.563），试验组和对照组治疗后黄斑区视网膜厚度较治疗前均变薄，差异有统计学意义（*P* 均＜0.01，T=5.422、6.534），但是 2 组患者治疗 3 个月后 RT 对比差异无统计学意义(*P*= 0.352，T=-1.155）。**结论**：在短期内 GLP-1 类似物联合康柏西普治疗和单独使用康柏西普治疗的方法均可以在一定程度上改善 PDR 患者视网膜微循环，减轻血管渗漏引起的视网膜水肿，而且前者改善视网膜微循环的疗效优于后者。

PO-583

利拉鲁肽在糖尿病性视神经病变中的视神经保护作用

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目的：评估胰高血糖素样肽-1（glucagon-like peptide-1,GLP-1）在糖尿病性视神经病变(diabetic optic neuropathy,DON)中的视神经保护作用。**方法**：收集 2017-3 至 2018-9 于我科诊断为 DON 的患者 23 例（35 眼）。随机分为试验组 11 例（16 眼）和对照组 12 例（19 眼），试验组患者使用二甲双胍、胰岛素联合利拉鲁肽降血糖，对照组使用二甲双胍、胰岛素降血糖。比较两组患者治疗前后 6 个月糖化血红蛋白、视乳头神经纤维层厚度变化。**结果**：治疗后试验组和对照组糖化血红蛋白分别是（7.35±0.69）%、（7.04±0.92）%，2 组对比差异无统计学意义（*P*=0.431，T=0.647）。治疗前试验组和对照组患者 RNFL 分别是 86.22±9.02μm、88.19±8.69μm，差异无统计学意义（*P*=0.433，T=-1.254），治疗后试验组和对照组患者 RNFL 分别是 89.56±8.11μm、85.37±9.88μm，差异无统计学意义(*P*=0.062，T=-1.155)。且 2 组患者治疗前后对比，RNFL 变化差异均无统计学意义(*P*=0.210、0.184，T=-1.593、1.634）。**结论**：GLP-1 类似物可以一定程度上改善糖尿病性视神经病变患者的眼电生理反应，部分恢复已受损的神经节细胞的功能。

PO-584

国人白内障视功能相关生存质量简表在白内障手术前后的应用及最小临床重要差异计算

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目的：评估国人 Catquest 9SF 量表应用于白内障手术人群的的反应度，并结合锚定法和分布法确定最小临床重要差异值（MCID）。

方法：前瞻性观察性队列研究。纳入温州医科大学附属眼视光医院的 181 例白内障术前患者进行国人 Catquest 9SF 量表调查。术后 1-3 个月对来院复查的患者再次进行量表调查和校标条目调查。分析量表的天花板和地板效应，通过配对 t 检验分析手术前后量表得分和视力的差异，并根据术前视力、术前有无并发症和术眼数量分别进行分组，计算各组手术前后的量表总分，通过单因素方差分析（根据术前视力分组）或独立样本 t 检验（根据术前有无并发症或者术眼数量分组）分析组内差异。分布法通过 1 个效应值和 1/2 个得分变化标准差估算 MCID，校标法通过校标条目中选择“有点提高”患者得分变化的平均值估算 MCID，最后根据和最小可测得差异（MDC）的比值确定取值。

结果：共 116 人完成国人 Catquest 9SF 量表的随访调查。量表术前的天花板和地板效应为 2.8%，术后提高至 21.5%。术前术后配对的量表得分和视力差异均表现出显著的统计学意义，手术带来的量表总得分变化为（10.44±7.72）分，logMAR 视力变化为（0.34±0.31）。根据前视力、术前有无并发症和术眼数量分别进行分组后，组内差异未表现出显著的统计学意义。分布法的 1 个效应值和 1/2 个得分变化标准差估算 MCID 分别为 1.80 分和 3.86 分，校标法估算 MCID 为 7.05 分，计算得到 MDC 为 6.59，校标法估值和 MDC 比值为 1.19。

结论：国人 Catquest 9SF 量表在中国白内障人群中反应度好，适用于白内障手术前后的生存质量评估，量表应用于白内障手术的最小临床重要差异值为 7 分。

PO-585

中国视觉损伤患者报告结局条目池的构建

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目的：患者报告结局（patient-reported outcomes，PROs）已经作为临床试验终点的重要指标之一。目前尚缺乏适用于我国人群的视觉损伤特异、全面的 PROs 测量工具。本研究旨在构建视觉损伤患者报告结局条目池，为 PROs 评估和康复评价提供新的工具，也为今后视觉损伤 PROs 条目库的构建及计算机自适应测试（CAT）的研发提供重要基础。
方法：遵循国际 PROs 测量工具研制流程构建视觉损伤 PROs 条目池。首先建立条目池理论框架，再通过计算机检索美国国立图书馆医学文献检索系统（PubMed）、荷兰医学文摘数据库（Embase）、循证医学数据库（Cochrane）等数据库以及万方和 CNKI 中文数据库，纳入所有视觉损伤 PROs 量表，进行条目初筛，再按照跨文化调试、患者访谈、条目分类和二次筛选、专家评审、确立条目主干和选项、人群验证等步骤构建视觉损伤 PROs 条目池。
结果：通过文献检索后纳入 37 个 PROs 量表，其中视觉损伤特异性量表 29 个、眼病普适性量表 8 个，最终构建的条目池共纳入 10 个维度，共计 208 个条目，其中活动受限维度 86 个条目，健康关注和诊治维度 18 个条目，社交维度 13 个条目，视觉症状维度 13 个条目，眼表、眼周和全身症状维度 6 个条目，精神心理健康维度 36 个条目，经济维度 1 个条目，行动能力维度 25 个条目，满意度维度 3 个条目，便利性维度 7 个条目。
结论：本研究规范地构建了包含 10 大维度的视觉损伤 PROs 条目池，具有语言通俗易懂、内容全面且能反映视功能损害等特点，弥补了目前眼科领域 PROs 测量工具的缺陷，为今后视觉损伤条目库和计算机自适应测试系统的构建奠定了基础。

PO-586

国人版角膜接触镜配戴者生活质量量表的研制与评估

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目的 研制国人版角膜接触镜配戴者生活质量量表（CLIQ）并评估其信度和效度，分析角膜接触镜配戴者患者报告结局（PROs）的影响因素。
方法 对原版 CLIQ 量表进行翻译、回译、文化调试形成国人版量表，对 205 例接角膜触镜配戴者进行问卷调查，随机选取 20 例由 2 名调查员分别进行调查，分析量表的信度和效度，探索量表得分的影响因素。
结果 纳入有效问卷 201 例。视功能维度应答率低被删除；量表的 Cronbach's α 系数为 0.773，删除任一条目后为 0.752～0.774；眼部症状的 Cronbach's α 系数为 0.681，便利性、经济、情感维度的 Cronbach's α 系数均＞0.7，删去任一条目后均下降。认知维

度的 Cronbach's α；健康关注维度删除条目 20 后的 Cronbach's α 系数和均提高，故删去条目 15、16 和 20。各个维度得分和量表总分在两名调查员结果均呈高度正相关。23 项的 CLIQ 量表进行探索性因子分析，提取的 5 个因子分别对应各个维度。眼部症状和便利性维度均与年龄呈轻度负相关；经济维度与戴镜年数和双眼戴镜视力呈轻度相关；情感维度与戴镜年数和每月戴镜天数呈轻度相关。量表总分的秩均值在不同戴镜年数、每月戴镜天数和无/有眼部症状的佩戴者间有统计学差异。

结论 CLIQ 量表视功能维度在中国的适用性差，认知维度和条目 20 信度差，删去这些条目后量表的信度和效度较好，可用于临床及科研工作中接触镜配戴者 PROs 的评估。眼部症状维度和便利性均与年龄呈轻度负相关；经济维度与戴镜年数和双眼戴镜视力呈轻度相关；情感维度与戴镜年数和每月戴镜天数呈轻度相关。量表总分的影响因素包括在戴镜年数、每月戴镜天数和眼部症状。

PO-587

基于项目反应理论评估两种量表用于中国成年视觉损伤患者报告结局的测量特性及其一致性比较

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目的：选取低视力生活质量调查问卷（LVQOL）和退伍军人事务部低视力视觉功能量表（VA LV VFQ-48），进行翻译、回译、文化调试，验证其用于中国视觉损伤患者报告结局（RPOs）评估的测量特性，并比较二者中国版结果的一致性。

方法：英文原版 LVQOL 和 VA LV VFQ-48 量表经翻译、回译、文化调试形成中文版 LVQOL 和 VA LV VFQ-48，对视觉损伤患者进行问卷调查。通过项目反应理论（IRT）评价量表的测量特性并对其进行修订。采用相关系数评估量表评分与临床视功能检查指标的相关性。采用相关性分析、一致性相关系数和 Bland-Altman 分析比较中国版 LVQOL 和中国版 VA LV VFQ 之间的相关性和一致性。

结果：共纳入 128 名视觉损伤患者。原版 LVQOL 量表选项有序，删去 1 项不适用的条目、7 项拟合度差的条目以及降维分析后，最终形成 LVQOL-CN-14 量表；原版 VA LV VFQ-48 量表选项杂乱，合并选项 3 和选项 4 后，选项分布合理。删去 8 项不适用的条目、7 项拟合度差的条目、个别在性别亚群和教育程度上存在 DIF 的条目，降维分析删去 4 项条目，最终形成 VA LV VFQ-CN-25 量表。LVQOL-CN-14 量表和 VA LV VFQ-CN-25 量表基于 IRT 均具有良好的心理测量特性，选项类别有序，测量精度良好，匹配度好，条目与 IRT 模型拟合，不存在 DIF，单维性好。LVQOL-CN-14 量表和 VA LV VFQ-CN-25 量表与视力具有中度相关性。两量表得分中度相关性，但一致性差。

结论：基于 IRT 修订的 LVQOL-CN-14 和 VA LV VFQ-CN-25 量表具有良好测量特性，可用于评价中国成年视觉损伤 PROs。LVQOL-CN-14 和 VA LV VFQ-CN-25 量表得分中度相关，但二者一致性差。

PO-588

特发性脉络膜新生血管患者血清炎性细胞因子分析

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目的: 探讨特发性脉络膜新生血管患者血清中炎性细胞因子含量变化及其临床意义。
方法：本研究共纳入 32 位患者和 30 位正常人。所有受试者都接受了全面的眼科检查。采集患者第一次玻璃体腔注药前的静脉血。通过液态悬浮芯片的方法，测量血清中的 7 种炎性细胞因子，包括白细胞介素-2（interleukin-2,IL-2),白细胞介素-10（IL-10), 白细胞介素-15(IL-15),白细胞介素-17（IL-17),碱性成纤维细胞生长因子(basic fibroblast growth factor, basic FGF),粒细胞-巨噬细胞集落刺激因子(Granulocyte-macrophage colony stimutaing factor, GM-CSF)和血管内皮生长因子(vascular endothelial growth factor, VEGF)的含量。探讨患者血清炎性细胞因子含量与最佳矫正视力（Best corrected visual acuity，BCVA）、中央区黄斑厚度 (Central Retinal Thickness,CRT)和损伤面积(Lesion Area,LA）间的关系。
结果：与正常对照组相比，患者血清中 IL-2, IL-10, IL-17, basic FGF 和 VEGF 的含量显著升高（$p<0.001$,$p=0.002$,$p<0.001$,$p<0.001$，$p=0.004$，均为 $p<0.05$），而 IL-15 和 GM-CSF 的含量差异无统计学意义（$p>0.05$）。此外我们发现患者血清中 IL-17 的含量与 LA 呈明显正相关关系（$r=0.735$，$p=0.004$）。
结论：IL-2, IL-10, IL-17, basic FGF 和 VEGF 可能在特发性脉络膜新生血管发生发展过程中发挥重要作用。血清中 IL-17 的含量可能是特发性脉络膜新生血管形成的一个系统性危险因素。

PO-589

Changes in Aqueous Humor Levels of TGFβ2 and SFRP1 in Open-Angle and Angle-Closure Glaucomas

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***Purpose**: To assess bioactive transforming growth factor-β2 (TGFβ2) and secreted frizzled-related protein-1 (SFRP1) levels in aqueous humor (AH) of different types of glaucoma.*

***Methods**: AH samples were collected from 126 eyes (105 patients) divided into five groups: cataract (control), primary open-angle glaucoma (POAG), chronic angle-closure glaucoma (CACG),*

primary angle-closure suspects (PACS), and acute angle-closure glaucoma (AACG). Bioactive TGFβ2 and SFRP1 levels were assayed by ELISA.

***Results**: The concentration of TGFβ2 in AH of POAG patients, but not CACG, PACS, or AACG patients, was significantly higher than control eyes. Within the AACG group, TGFβ2 in AH correlated significantly with intraocular pressure (IOP); TGFβ2 of AACG patients with high IOP (> 21 mmHg) was significantly higher than those with normal IOP. AH levels of SFRP1 were not significantly different among the groups. However, a statistical significant*，negative correlation between SFRP1 and IOP existed in the POAG group. POAG patients with high IOP had lower levels of SFRP1 than those with normal IOP. In contrast, a significant，positive correlation between SFRP1 level and IOP was detected in the AACG group. AACG patients with high IOP had a higher level of SFRP1 than those with normal IOP. Concentrations of TGFβ2 and SFRP1 did not correlate significantly with each other, or with age.

***Conclusions**: These results indicate that AH levels of TGFβ2 and SFRP1 showed different profiles in different types of glaucomas. Their levels do not correlate with each other or age. Their roles in the pathogenesis and pathophysiology of different types of glaucomas deserve further research.*

PO-590

老龄化对于 AMD 形成的影响

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目的 氧化低密度脂蛋白（Ox-LDL）在 AMD 的发病中具有重要的作用。我们前期的实验证明玻璃体内注射 Ox-LDL 可以明显促进激光诱导的脉络膜新生血管（CNV）形成。文献证实衰老与氧化应激关系密切。本研究拟采用不同年龄来源的视网膜色素上皮（RPE）细胞和不同年龄的小鼠，探讨年龄因素在 Ox-LDL 诱导的 CNV 中的作用和机理。

方法 细胞实验：原代培养不同年龄（21Y 和 80Y）人 RPE 细胞，培养液中加入浓度为 50μM 的 Ox-LDL 进行处理。不同时间点后采用 PCR 和 WB 等方法，检测不同细胞炎症因子、趋化分子和生长因子等表达差异。

动物实验：不同年龄（6W 和 24M）的 C57 小鼠采用玻璃体腔注射 Ox-LDL 联合激光光凝诱导 CNV 形成。一定时间后采用 WB、PCR 和脉络膜铺片染色等方法，观察不同年龄组小鼠脉络膜组织内细胞因子表达、CNV 面积和氧化磷脂沉积的差异。

结果 细胞实验：经氧化磷脂刺激后，老龄来源的 RPE 细胞相比青年来源的 RPE 细胞分泌更多炎症因子 IL-1β、IL-6，趋化因子 CCR2、MCP-1，生长因子 PDGF、IGF-1 和 VEGF 等。证明 RPE 衰老后其对氧化损伤的敏感性增加。

动物实验：WB 和 PCR 结果显示老龄组炎症因子 IL-1β、IL-6，趋化因子 CCR2、MCP-1，生长因子 PDGF、IGF-1 以及 VEGF 等表达明显高于低龄组。免疫荧光染色显示老龄组 CNV 面积大于低龄组，且有更多氧化磷脂沉积。

结论 老龄 RPE 细胞和小鼠对氧化损伤的敏感性增加，组织和细胞表达更多的炎症因子、趋化因子和生长因子等，从而促进 CNV 的形成并导致湿性 AMD 的发病。

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PO-591

针药治疗视网膜色素变性的相关临床研究

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摘要：目的：视网膜色素变性(RP）,是一种进行性、遗传性、营养不良性退行性病变，慢性进行性视野缺损、多年夜盲、色素性视网膜病变以及视网膜电图异常等是该病的主要表现，最终导致视力下降。中医眼科方面属于“高风内障”。方法：取 30 例（58 只眼），给予西药加中药，配合针灸及电针治疗，15 天为 1 个疗程。针灸，取穴方面，以局部取穴为主，主要是眼睛周围以及眼眶周围的穴位，比如：睛明穴、攒竹穴、鱼腰穴、瞳子髎穴、球后穴等，根据 RP 中医证型加以远端配穴，比如太冲、合谷、足三里、三阴交等，每日 1 次，1 次 30 分钟，并加以电针。中药，以活血化瘀，补肾明目为主，如：黄芪、当归、丹参、白芍等，每日 1 剂。结果：1 疗程后，30 例患者的视力、视野、暗适应及视网膜电图均有不同程度的好转。结论：关于视网膜色素变性，西医尚无有效的治疗方法，而中医中药针灸在该病的治疗、控制等方面取得显著效果，越来越得到更多的中医名家及患者认可。虽然不能从根本上治愈 RP，但对于患者视力的提高、视野的改善等方面有着肯定的疗效。

PO-592

婴幼儿双眼先天性白内障术后远期临床观察的研究

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目的：探讨婴幼儿双眼先天性白内障人工晶状体植入术后的远期临床效果。
方法：回顾分析 2010 年 7 月至 2015 年 5 月于我院接受白内障摘除+后囊膜切开+前段玻璃体切除+I 期或 II 期 IOL 植入术的婴幼儿双眼先天性白内障患儿的临床资料，末次随访时患儿的年龄是 6~8 岁。全部患儿所选择 IOL 度数的原则是根据不同的眼轴，选择不同的 IOL 计算公式，植入的 IOL 度数=公式计算所得度数-（7-年龄（y））， 同时根据患儿年龄和眼轴进行调整。收集的观察指标包括 IOL 植入年龄、验光、眼轴、末次平均角膜曲率值（Km 值）。采用 SPSS 17.0 统计软件进行数据处理。
结果:16 例 32 眼 IOL 植入时患儿平均年龄为 23.3±11.0 月 ，平均随访时间为 5.1±0.9 年，末次随访平均眼轴为 22.76±1.75mm，末次随访最佳矫正视力<0.3 者 14 只眼（43%），0.3~0.5 者 13 只眼（41%），>0.5 者 5 眼（16%）。末次随访时有 20 眼（62%）的屈光状态达到正视，5 眼（16%）发生近视，而 7 眼（22%）发生了远视。不良事件主要是后发性白内障（6 眼，19%），其中 5 眼在全麻下行后囊膜切开术，1 眼在局麻下行后囊膜 YAG 激光切开术。5 眼（16%）发生了青光眼相

关不良事件，用药物均能控制眼压。余均未发生术后切口渗漏、出血、眼内炎、视网膜脱离等并发症发生。
结论：婴幼儿双眼先天性白内障行人工晶体植入是安全有效的，随访时间 6-8 年青光眼相关不良事件发生率约 16%。

PO-593

光学相干断层扫描血管造影诊断息肉状脉络膜血管病变的诊断价值及病灶检出率的 Meta 分析

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目的：采用 Meta 分析方法评价光学相干断层扫描血管造影（OCTA）诊断息肉状脉络膜血管病变（PCV）的灵敏度和特异性，评价 PCV 中息肉和分支静脉网（BVN）的病灶检出率。
方法：检索 1990 年 1 月 1 日至 2019 年 1 月 30 日外文数据库（PubMed、Embase、Cochrane Library）和中文数据库（万方数据知识服务平台、中国知网）中，使用 OCTA 和吲哚菁绿血管造影（ICGA）金标准诊断 PCV 的临床研究，使用诊断准确性研究质量评价标准-2（QUADAS-2）进行质量评价。应用双变量或单变量模型，计算合并的灵敏度、特异性、阳性及阴性似然比、诊断比值比；应用随机效应模型计算息肉、BVN 病灶的合并检出率。
结果：通过检索数据库，最终纳入 20 项研究，其中报道 OCTA 对 PCV 的诊断性研究 4 项，报道 PCV 息肉检出率的研究 17 项，报道 BVN 检出率的研究 16 项。OCTA 诊断 PCV 的合并灵敏度为 0.86，特异性为 0.81，阳性似然比为 4.55，阴性似然比为 0.17，诊断比值比为 26.59，SROC 曲线下面积为 0.91。OCTA 诊断 PCV 中息肉的合并检出率为 0.87（95%可信区间为 0.82-0.92），诊断 PCV 中 BVN 的检出率为 0.93（95%可信区间为 0.89-0.97）。
结论：OCTA 诊断 PCV 具有较高的灵敏度和特异性，OCTA 对 PCV 的息肉和 BVN 具有较高的检出率，有助于临床诊断 PCV。

PO-594

不同材料及设计人工晶体对后囊膜混浊影响的量化分析

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目的 使用 EPCO2000 定量比较不同材料及设计人工晶体（intraocular lens ，IOL）对后囊膜混浊（Posterior capsule opacification，PCO）发生的影响。方法 回顾性研究，随访观察 2016 年 3-11 月在我院行白内障超声乳化吸除联合人工晶体植入术后 1 年的年龄相关性白内障患者 600 例（971

只眼）。按 IOL 类型分为 4 组：ZCB00 组 43 只眼，ZA9003 组 365 只眼；HQ201hp 组 340 只眼，Human Optics 组 223 只眼。充分扩瞳后获取后照法图片，使用 EPCO2000 进行 PCO 程度评分并将各组进行比较分析。结果 PCO 累及瞳孔中央 3 mm 的有 167 只眼（17.20%），发生显著性 PCO 的有 78 只眼（8.03%）；按 IOL 光学面材料疏水性分组，疏水组总分（0.032±0.012）显著低于亲水组（0.224±0.025），差异有统计学意义（P<0.05）；按 IOL 光学面肝素修饰与否分组，无肝素修饰组总分（0.224±0.025）低于肝素修饰组（0.322±0.026），差异有统计学意义（P<0.05）；按 IOL 一片式及三片式设计分组，一片式组总分（0.032±0.012）显著低于三片式组（0.196±0.016），差异有统计学意义（P<0.05）；按襻成角分组，襻成角 0°组总分（0.191±0.021）低于襻成角 5°组（0.255±0.015），差异有统计学意义（P<0.05）。结论 一片式疏水性直角边缘设计的丙烯酸酯 IOL 可以更有效的减少 PCO 形成。

PO-595

吲哚青绿血管造影引导下的光动力疗法治疗 孤立性脉络膜血管瘤的疗效观察

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目的 观察脉络膜血管造影（ICGA）引导的光动力疗法（PDT）治疗孤立性脉络膜血管瘤（CCH）的临床疗效。**方法** 回顾性分析 PDT 治疗的 CCH 患者 17 例 17 只眼，根据 ICGA 图像确定病灶进行 PDT 治疗，比较治疗前后其最佳矫正视力（BCVA）、视网膜下积液（SRF）、黄斑中心视网膜厚度（CRT）、瘤体大小的变化。**结果** 16 例患者行单次 PDT 治疗，平均随访时间（23.3±11.8）月。治疗前和治疗后 1 周、1 月、3 月、末次随访 BCVA（logMAR）分别为 0.99±0.52、1.09±0.50、0.97±0.53、0.81±0.66、0.79±0.69，CRT 分别为（440.76±281.34）、（329.18±175.02）、（274.24±169.55）、（271.53±150.00）、（291.06±201.41）μm，总体比较差异均有统计学意义（均 *P*<0.05）。所有患眼治疗前 OCT 均显示 SRF 累及黄斑区，治疗后 3 个月，7 例（41.2%）完全吸收，8 例（47.1%）明显减少。与治疗前比较，治疗 CRT 均下降，差异有统计学意义（均 *P*<0.05）。末次随访瘤体最大直径较治疗前缩小 15 例（88.2%），无明显变化 2 例（11.8%）；瘤体渗漏均较治疗前减轻。治疗前和末次随访瘤体厚度分别为（3.80±1.13）和（3.42±1.14）mm，差异具有统计学意义（*t*=4.101，*P*=0.01）。根据病灶位置分组，两组治疗前与末次随访 BCVA、CRT、瘤体厚度，SRF 吸收情况比较差异无统计学意义（均 *P*>0.05）。根据末次 BCVA（小数）分为视力较好组和视力较差组视力较好组治疗前 BCVA(logMAR)、治疗前瘤体最大和最小直径，治疗前瘤体厚度均小于视力较差组，差异有统计学意义（均 *P*<0.05）。**结论** ICGA 引导下的 PDT 治疗 CCH 可以改善患者的视功能、促进视网膜下积液吸收、致瘤体萎缩。

PO-596

Morphological Characteristics of Optic Nerve Head and Peripapillary Structure in Young Adults with High Myopia

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ABSTRACT

Purpose: To delineate the morphological characteristics in the optic nerve head (ONH) and peripapillary structure using swept-source optical coherence tomography (SS-OCT) and to investigate the factors associated with ONH and peripapillary structural changes in young adults with high myopia.

Methods: 167 subjects with highly myopic eyes and 172 subjects with non-highly myopic eyes were included. Global and sectorial PPA area was measured on fundus photographs. Both ends of Bruch's membrane opening (BMO), the location of temporal border tissue (BT) and clinical optic disc margin were assessed, and Bruch' s membrane opening distance (BMOD), border length (BL), Border Tissue angle (BTA) and horizontal tilt angle were measured on horizontal SS-OCT scans.

Results: Larger global (***P*** < .0001) and regional PPA areas (***P*** for trend < .0001 for all locations except for Inferonasal sector), longer BMOD (***P*** < .0001), BL (***P*** < .0001), and horizontal tilt angle (***P*** < 0.0001), as well as smaller BTA (***P*** <.0001) were found in highly myopia group. The changes of PPA area, BMOD, BL, and horizontal tilt angle were significantly associated with the group divided by AL (β = 0.4585, β = 0.3660, β = 0.3453, and β = 0.3441, respectively, all ***P***-values < .0001), while no significant correlation was found between BTA and group.

Conclusions: PPA area, BL, BMOD, and horizontal tilt angle were increased with axial elongation of globe in highly myopic group. PPA area combined with BMOD can be better predictors for high myopic degeneration and visual impairment.

PO-597

静脉监护麻醉下行翼状胬肉切除术提高护理质量及满意度

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目的：静脉监护麻醉下行翼状胬肉切除术能提高护理质量及满意度。
方法：选取 2018 年 9 月—2018 年 12 月我院眼科收治的 180 列翼状胬肉患者作为研究对象，随机分为 90 列实施对照组（实施静脉监护麻醉下行翼状胬肉切除术）和观察组（未实施静脉监护麻醉下行翼状胬肉切除术），对比两组患者在静脉监护麻醉下行翼状胬肉切除术能提高患者满意度。
结果：应用静脉监护麻醉下行翼状胬肉切除术后，有效减轻患者痛苦，提高护理质量及患者满意度（P<0.001）。
总结：静脉监护麻醉下行翼状胬肉切除术能提高护理质量及患者满意度。
关键字： 静脉监护麻醉 翼状胬肉切除术 满意度

PO-598

先天性白内障术后中央角膜厚度及眼内压关系的研究

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目的
评估先天性白内障术后人工晶状体眼、无晶状体眼患者中央角膜厚度（CCT）、眼内压(IOP)的变化，并探究影响其变化的因素。
方法
本研究纳入单眼或双眼先天性白内障患者，分别于术前、术后 1 月、3 月、6 月、12 月、24 月测量患者 CCT、IOP、K 等参数。
结果
本研究共纳入先天性白内障患者 76 例 119 眼，其中 42 眼为人工晶状体眼，77 眼为无晶状体眼，对照组 33 眼。
人工晶状体眼组 CCT 在术后随访 12 月时和术前相比增加了 8.36±19.91μm，明显高于术前（P=0.01）。随访至 24 月时 CCT 增加了 0.31±14.19μm（P=0.931）。IOP 在术后随访 12 月时和术前相比增加了 0.78±3.69mmHg（P=0.176）。随访至 24 月时，增加了 0.14±0.14mmHg（P=0.836）。
无晶状体眼组 CCT 在术后随访 12 月时和术前相比增加了 31.14±44.32μm，明显高于术前（P＜0.001）。随访至 24 月时，CCT 增加了 33.09±35.42μm（P＜0.001）。无晶状体眼组 CCT 增加量在术后 12 月、术后 24 月均明显高于人工晶状体眼组（P<0.001，P=0.024）。IOP 在术后随访 12 月时增加了 0.90±3.23mmHg（P=0.017），随访 24 月时 IOP 增加了 1.70±3.51mmHg（P=0.003）。两组间 IOP 的增加量在术后 12 月、术后 24 月均无明显差别（P=0.672，P=0.080）。

无论在人工晶状体眼组还是无晶状体眼组，CCT 和 IOP、CCT 和 K 之间均具有相关性，而 CCT 和手术时月龄在两组之间均无相关性。

结论

先天性白内障术后 CCT 增加趋势，IOP 却基本保持在正常范围内。因此成人 CCT 和 IOP 的基本规律“IOP 随着 CCT 的增加而升高”可能不适用于儿童。然而，关注先天性白内障术后 CCT、IOP 的变化对于预防术后青光眼依然具有重要意义。

PO-599

Quantification of Anterior Chamber Reaction after Intravitreal Injections of Conbercept and Ranibizumab: a pilot study

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Purpose: Inflammation is an important adverse reaction after intravitreal injection of anti-vascular endothelial growth factor (VEGF) agents. The purpose of this study is to investigate the incidence and risk factors of anterior chamber reaction after intravitreal injections of anti-VEGF agents using swept-source anterior-segment optical coherence tomography (AS-OCT).

Methods: This is a prospective case series. Patients received intravitreal injections of anti-VEGF agents were recruited. AS-OCT was used to detect aqueous cells at two time-points, before injection and 1 day after injection. Positive reaction was defined as increased more than 1 cell compared to baseline. Clinical parameters were compared between the groups with positive and negative anterior chamber reaction.

Results: A total of 128 eyes were included. There were 39 (30.5%) cases with positive anterior chamber reaction. There was no significant difference between positive and negative groups in gender, number of injections and types of drugs injected. Patients who received Conbercept had higher incidence of positive anterior chamber reaction compared to those who received Ranibizumab (44.7% vs. 24.5%, p=0.02, Odds ratio= 2.502, 95% confidence interval: 1.124-5.569).

Conclusions: Significant proportion of cases developed the anterior chamber reaction after intravitreal injections of anti-VEGF agents. Conbercept had higher incidence of anterior chamber reaction than Ranibizumab.

PO-600

翼状胬肉对人工晶体度数测定的影响及相关因素分析

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目的：本研究通过对翼状胬肉的生物测量评估其对人工晶体度数测量的影响，分析相关因素，减小白内障联合翼状胬肉切除术前人工晶体度数测定的误差。**方法**：研究选取了 2017 年 5 月到 2018 年 8 月在弋矶山医院眼科住院的 34 名单眼翼状胬肉患者。所有患者均行翼状胬肉切除+角膜缘干细胞移植术。术前测得患者翼状胬肉侵犯角膜的长度、宽度，计算面积数值，收集、分析患者术前及术后三个月的双眼最佳矫正视力、角膜散光度数、相关参数、IOL 度数（SK-T、SK-II）。**结果**：1.胬肉眼术前术后及术前双眼测量的最佳矫正视力、角膜散光度数、水平角膜曲率、平均角膜曲率、IOL 度数（SK-T、SK-II）有明显差异（P<0.05），角膜垂直曲率、前房深度及眼轴长度无明显变化（P>0.05）。2、术前角膜散光度数与翼状胬肉的长度、宽度、面积呈正相关（P 均<0.05），术后角膜散光度数与翼状胬肉的长度呈正相关（P<0.01）。3、研究组术前角膜散光度数-1.130D、术前双眼角膜散光度数差值-0.625D 为评估翼状胬肉是否对角膜散光产生影响的诊断临界点。4、角膜水平曲率、平均曲率与翼状胬肉的长度、宽度、面积呈正相关。5、翼状胬肉长度大于 2.78mm、宽度大于 5.60mm、面积大于 7.38mm^2 时，在人工晶体计算中产生的偏差至少≥0.5D。
结论：1、翼状胬肉会造成视力、角膜曲率下降，角膜散光加重，增加 IOL 度数测定的误差。2、较大的翼状胬肉会造成角膜水平曲率变化，进而影响 IOL 度数的测定。3、术前角膜散光度数、术前双眼角膜散光度数差值、术前双眼 IOL 度数差值、术前术后 IOL 度数差值可为翼状胬肉合并白内障患者手术时机的选择提供参考。4、翼状胬肉长度大于 2.78mm、宽度大于 5.60mm、面积大于 7.38mm^2 时，在白内障合并翼状胬肉手术时，植入 IOL 的度数至少比计算的 IOL 体功率减少 0.5 D。

PO-601

严重角膜碱烧伤患者足疗程局部使用皮质类固醇激素的临床疗效的研究。

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目的：严重角膜碱烧伤患者足疗程局部使用皮质类固醇激素的临床疗效的研究。
方法：回顾性研究纳入了 2014 年至 2018 年我院 17 例严重角膜碱烧伤并接受治疗的患者中的 20 只眼。患者符合严重角膜碱烧伤的 Roper-Hall 分类，并用妥布霉素地塞米松滴眼液 4 次/天 治疗 1-2 周后，改为 0.1％氟米龙滴眼液 4 次/天，根据治疗效果逐渐减量。随访 3—12 个月，观察这些患者的临床疗效（上皮修复，视力，新生血管的变化、并发症发生情况等）。

结果：18 眼角膜上皮完全修复，平均持续时间为（1.53±0.74）月，而 2 眼角膜上皮无法完全修复。治疗后视力提高 16 只眼（0.1~0.3 2 眼，0.3~0.5 10 眼，≥0.5 4 眼）但仍有 4 眼在 0.1 左右。新生血管明显消退，其中新生血管消失 9 眼，10 只眼有不同程度的消退，1 眼无明显变化。并发症：高眼压，睑球粘连，白内障，假性胬肉分别是 1 眼，1 眼，1 眼，2 眼。没有其他严重的并发症如葡萄膜炎，角膜穿孔，眼内炎甚至眼球萎缩等发生。
结论：对于严重角膜碱烧伤患者，早期和全程使用皮质类固醇可以缓解角膜炎症反应，抑制新生血管生长，改善视功能。

PO-602

Comparative Study of Compression Sutures combined with Intracameral Air Injection and Thermokeratoplasty for Management of Acute Corneal Hydrops

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Purpose: To compare the efficacy of compression sutures combined with intracameral air injection and thermokeratoplasty for management of acute corneal hydrops in keratoconus.
Methods: In this multi-center prospective randomized comparative study, 20 patients (20 eyes) with defined moderate to severe acute cornea hydrops disease were included. Each patient received either compression sutures combined with intracameral air injection (CSAI) or thermokeratoplasty (TKP).
Results: Corneal hydrops resolved with the healing of Descemet's membrane (DM) ruptures in all patients (n=10) in CSAI group and 8/10 patients in TKP group at 2-week follow-up. The other two patients' corneal edema also resolved in 2 weeks, but DM ruptures healed later: one patient healed at 1-month follow-up, and another patient healed at 2-month follow-up. Except for the baseline ($p=0.699$), week 2 ($p=0.150$) , month 1 ($p=0.169$) and month 3 ($p=0.540$), the mean corneal thicknesses in TKP group was significantly thinner than CSAI group ($p<0.05$). Except for the baseline ($p=0.561$) and day 1 ($p=0.104$), the best-corrected visual acuity (BCVA) in CSAI group was significantly better than the TKP group ($p<0.05$). Overall, patients in both groups had a statistically significant improvement in BCVA compared to baseline ($p<0.001$). Statistically significant differences in endothelial cell density (CSAI vs TKP, 2628±326.26 vs 1955±298.09 cells/mm^2, $p<0.001$) and corneal curvature (mean curvature: CSAI vs TKP, 55.10±5.40 vs 63.51±5.83D, $p<0.05$; maximum curvature, CSAI vs TKP, 67.07±8.37 vs 77.13±12.01D, $p<0.05$) were observed between two groups at 6-month follow-up.

Conclusion: Our study shows compression sutures with intracameral air injection has better BCVA, DM healing, more endothelial density and lower corneal curvature than TKP for the management of acute corneal hydrops in keratoconus.

PO-603

瞳孔直径及眼压在飞秒激光辅助白内障超声乳化手术中的变化

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目的：比较飞秒激光辅助白内障超声乳化手术中，术前使用非甾体类抗炎药普拉洛芬及不使用非甾体类抗炎药的患者瞳孔直径及眼压变化。
方法：前瞻性随机队列单中心研究。本研究将我院于 2018 年 1 月至 2019 年 1 月接受飞秒激光辅助白内障手术的患者 330 例（眼）随机分为两组。其中术前 1 天使用非甾体类抗炎药（1mg/ml 普拉洛芬滴眼液，4/日）为 A 组，未使用非甾体类抗炎药为 B 组。观察充分散瞳后飞秒激光术前及完成飞秒激光即刻、15 分钟、30 分钟瞳孔直径、眼压等临床资料。
结果：A 组完成飞秒激光即刻瞳孔直径（8.11±0.72mm），较术前（7.97±0.75mm）增大，其余时刻（15 分钟（7.85±0.82mm），30 分钟（7.89±0.84mm））差异无统计学意义。B 组完成飞秒激光即刻（8.21±0.57mm）、15 分钟（7.55±1.11mm）、30 分钟（7.66±1.09mm）瞳孔直径均较术前（8.13±0.56mm）缩小，差异有统计学意义。其中 A、B 组飞秒激光后瞳孔直径<5mm 分别为 3 例（2.44%）、5 例（3.88%），两组发生率差异无统计学意义。A、B 组完成飞秒激光即刻、15 分钟、30 分钟眼压均较术前升高，差异有统计学差异。
结论：飞秒激光辅助白内障手术，瞳孔直径在飞秒激光术后 30 分钟内各观察时间点，术前使用非甾体类抗炎药组较术前均未缩小，而不使用非甾体类抗炎药组较术前均缩小。但是，瞳孔直径<5mm 导致影响白内障超声乳化手术的发生率，两组差异无统计学意义。无论术前是否使用非甾体类抗炎药，眼压在飞秒激光术后各时间点较术前均升高。

PO-604

Sirius 眼前节分析仪系统对兰州市中小学生干眼状况的研究

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目的：利用 Sirius 眼前节分析仪评估兰州市中小学生干眼的特点

方法：随机抽取兰州市两所小学小学生共 151 名及一所初中初中生 264 名作为研究对象。采用国际通用 OSDI 问卷对受检者进行干眼症状评估并对受检者视力、非侵入性首次泪膜破裂时间(NIF-BUT)、非侵入性平均泪膜破裂时间(NIAvg-BUT)、睑板腺缺失面积等相关眼科检查进行检测并确定诊断，根据诊断结果将受检者分为正常组与干眼组，对各组数据经行评估比较。
结果：151 例（302 眼）受检小学生中有 26 例（52 眼）罹患干眼，患病率为 17.22%；初中生 264 例(528 眼)中有 79 例(158 眼)罹患干眼，患病率为 29.92%。小学生两组 NIF-BUT 为(10.74±3.81)、(5.54±1.47)；初中生两组分别为(10.31±2.97)、(4.61±1.37)干眼组明显低于正常组(P＜0.001)。小学生中两组 NIAvg-BUT 为(13.72±3.71)、(7.11±2.36)；初中生分别为(11.16±3.25)、(6.29±2.35)差异均有统计学意义(p<0.001)。小学生两组睑板腺缺失面积分别为(8.26±6.64)、(31.96±13.02)；初中生两组分别为（9.31±6.64）、（29.96±9.57）,干眼组明显大于正常组（P＜0.001）。小学、初中生 OSDI 评分与 NIF-BUT、NIAvg-BUT 呈负相关（P＜0.001），与睑板腺缺失面积呈正相关（P＜0.001）。
结论：研究结果显示兰州市中小学生 OSDI 评分与睑板腺缺失面积有相关性，且与 NIF-BUT、NIAvg-BUT 有明显的相关性。初中生干眼组中存在较小的泪膜破裂时间，较高的睑板腺缺失面积百分比。我们将在后续研究中扩大研究人群，进一步为干眼诊疗提供新思路。

PO-605

Demographic，Clinical characteristics and Risk Factors of Keratoconus in Chinese patients

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Purpose: To investigate the demographic, clinical characteristics and risk factors in Chinese Keratoconus patients.
Methods: In this prospective cross-sectional study, patients diagnosed with Keratoconus were invited to fill in the online electronic questionnaire designed with the help of the App WenJuanXing. Several questions like, sex, age of diagnosis, eye care habits were administered to each subject through this e-questionnaire. Pictures of corneal topographies taken from Pentacam were also collected. Non-parametric and c2-test analysis were used to show statistical significance.
Results: 391 Chinese keratoconus outpatients were enrolled in this study. The diagnosis age of keratoconus was 22.24±6.18. 73.9% of patients had the maximum keratometry (Kmax) more than 52D when keratoconus diagnosed. 91.3% of keratoconus patients mentioned the habit of eye rubbing, with 48.8% rubbing their eyes frequently. Allergic conjunctivitis (194, 49.6%) was common as were allergic rhinitis (109, 27.9%) and eczema (33, 8.4%). Only 3 patients (0.77%) revealed a positive family history of keratoconus. The severity of male patients was significantly worse than female patients (P＜0.001). Patients with younger age at onset (P=0.005), male sex and history of frequent eye rubbing (P=0.003) and smoke (P=0.002) and were found significantly associated with increased risk of acute hydrops.

Conclusion: The weak awareness of keratoconus among Chinese patients may lead to the serious conditions of keratoconus at diagnosis. Allergic diseases and eye rubbing were the most important pathogenic factors in Chinese patients. Younger age at onset, male sex, frequent eye rubbing and smoke seemed to be risk factors for the development of hydrops in Chinese keratoconus patients.

PO-606

Prevalence of Demodex spp. in eyelash follicles in children in Guangdong and Jiangxi Province

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Purpose: To investigate the prevalence of *Demodex* spp. in eyelash follicles in 3-14 year old children and find the risk factors.

Methods: In this population based cross-sectional study, we enrolled 1575 children in Guangzhou, Guangdong and Yudu, Jiangxi. All of them were study with the questionnaire, lash sampling, slit lamp examination, microscopic *Demodex* mite counting and identification. The risk factors of the presence of *Demodex* was analyzed according to age, gender, region, lifestyle, and the close contact with family members.

Results: The prevalence of *Demodex* in children aged 3-14 year old was 11.7% (185/1575). Among the infected, the presence of *Demodex folliculorum* was much higher than that of *Demodex brevis* (11.4% vs. 0.7%), with 0.4% coexistence. The related symptoms, such as eye itch, face itch and history of acne, were not higher in infected groups. However, eyelash disorder was more prevalent in the infected (24.3% vs. 1.7%), especially in primary school and middle school children (p <0.001). Interestingly, Winter has higher detection rate than summer (16.3% vs. 6.5%, p <0.001). Multivariate regression revealed that sampling season was significantly correlated with the presence of *Demodex* spp. in children (OR=2.6, 95%CI: 1.4-4.7, p =0.001) but not associated with wearing eye glasses, sharing towels, clean face times, resident, living with grandparents, sleeping with adults, and kissed by elders (p >0.05 for all).

Conclusions: The prevalence of *Demodex* in 3-14 year old children was 11.7%, and the presence of *Demodex folliculorum* was much higher than that of *Demodex brevis*. Eyelash disorder was more prevalent in the children infected. Winter has a higher detection rate and may be a risk factor of *Demodex* infestation in children.

PO-607

抗血管内皮生长因子药物治疗病理性近视继发脉络膜新生血管的预后因素分析

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目的：对于病理性近视继发的脉络膜新生血管，玻璃体腔内注射抗血管内皮生长因子药物的治疗方案已经在临床广泛使用并取得很好的疗效。但因患病人群中病理性近视发展程度、人口学特征以及治疗过程等因素的差异，疾病预后情况不尽相同。本文旨在对玻璃体内注射抗 VEGF 药物治疗 pmCNV 的预后因素进行分析。
方法：通过检索关键词 Choroidal neovascularization; Pathological myopia; Anti-vascular endothelial growth factor 在 PubMed、web of science、万方等数据库，查询并阅读文献 52 篇。
结果：完整的椭圆体带、较小的基线 CNV 与较好的基线 BCVA 是抗血管内皮生长因子治疗预后良好的重要预测因素，而发生 ChRA 或病理性近视相关并发症则预示着预后较差，年龄、种族、PDT 治疗经历以及治疗是否及时等因素是与前者相关联的可疑预后因素，可疑预后因素因混杂多个相关因素而展现出更多的复杂性，相关研究也有待进一步证实。随着时间的推移，病理性近视的高患病率将导致老年 pmCNV 发病率不断增加。年龄对其预后的影响因其指导临床治疗方案的可能性而意义重大，但目前的研究结果仍存在争议。而且大部分研究均以 50 岁为年龄截点，其科学性也有待考证。同时，更需关注的是抗 VEGF 治疗过程中，病理性近视其他相关并发症的防治。在治疗过程中要密切关注有可能被 CNV 出血掩盖的黄斑裂孔，以及视网膜厚度变化引发的黄斑前膜牵拉加重。
结论：对 pmCNV 进行抗 VEGF 预后因素分析，更重要的意义是指导医生对 pmCNV 患者进行个性化治疗。目前部分预后因素的影响并不明确，需要系统综述或者更大范围的临床验证；多种预后因素需标准化，为不同等级医疗机构的 pmCNV 抗 VEGF 个性化治疗提供参考；预后因素相关的基础研究也将加深对疾病的认识，需引起关注。

PO-608

华中地区 1359 例患儿 retcamIII 眼底检查分析

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目的 分析华中地区 2016 年 9 月至 2017 年 8 月 1359 例眼底检查情况 **方法** 用 retcamIII 对 1359 患儿进行眼底检查并拍照 **结果** 1359 例患儿中共发现病变 181 例，其中早产儿视网膜病变 121 例，AP-Rop2 例，视网膜出血 16 例，PHPV1 例，视网膜渗出 10 例，fever3 例，coat's 病 1 例，色素失禁综合征 2 例，黄斑出血 1 例，白化病眼底 3 例，虹膜异色 1 例，视交叉胶质瘤术后 1 例，白内障 5 例，牵牛花综合征 1 例，视网膜脉络膜缺损 1 例，先天性视乳头缺损 6 例，视乳头残膜 2 例，视乳头发育不良 1 例，虹膜残膜 1 例，Rb1 例，CWV 感染视网膜病变 1 例。**结论** 无创性 RetcamIII

检查是早产儿及合并不追物、斜视、眼球震颤及婴幼儿视力筛查测不出等不能配合常规眼底检查的婴幼儿早期发现眼底病变的必要手段，对视网膜病变早诊断早治疗起到非常重要的作用。

PO-609

一双胞胎 Apert 综合征的分子遗传学研究

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目的：探讨一 Apert 综合征的双胞胎家系的临床特点和分子遗传学发病机制。
方法：对收集的双胞胎及其父母进行病史采集及全身检查，具体包括 MRI，裂隙灯，检眼镜等。经知情同意后，对双胞胎及其父母进行外周静脉血采集，并提取其白细胞基因组 DNA。设计 Apert 综合征候选基因 *FGFR2* 的突变热点区域（7 号外显子）的正反向引物，应用聚合酶链反应（PCR）进行 Sanger 测序分析，以期找到致病突变位点。
结果：双胞胎患儿均为女性，头颅稍尖，枕部扁平状，颅顶短，前额轻度高耸，眶距轻度增宽，鼻梁低平，双眼粗测视力可，能追光，眼球轻度突出，双眼视物向上轻度凝视，眼睑闭合可。双眼前节及眼底未见明显异常。两侧手指及脚趾对称，五指（及趾）均并拢融合，呈鸭蹼状。指（趾）甲部分融合，双手掌指关节活动可，指间关节活动差，双手基本不能完成抓，握，捏等功能。足趾偏斜生长。余检查未见明显异常。Sanger 测序发现双胞胎均存在 *FGFR2* 基因的杂合突变 c.755C>G（p. Ser252Trp），而父母正常。
结论：*FGFR2* 基因的 c.755C>G（p. Ser252Trp）为 Apert 综合征已报道突变，该突变为该双胞胎的致病原因。

PO-610

我国大陆地区近 10 年早产儿视网膜病变变化趋势分析

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目的：通过文献回顾，分析我国大陆地区近 10 年早产儿视网膜病变（ROP）筛查情况和发病变化趋势，为其防治提供一定的理论参考。
方法：在 Pubmed、中国生物医学文献数据库和中国知网等数据库中，对近 10 年（2008-01-01~2019-01-01）有关大陆地区 ROP 筛查的论著类文献进行检索，总结分析不同地区 ROP 筛查情况、检出率差异以及 10 年来的变化趋势。
结果：共筛选出近 160 篇相关 ROP 筛查文献，我国大陆地区除辽宁省和西藏自治区以外，其余各省、市均有 ROP 筛查的报道。东部沿海经济相对发达地区，ROP 筛查工作更为普及，报道文献数

量较多，ROP 检出率相对较低，ROP 检出率呈现下降趋势；10 年前缺乏筛查报道的西北和西南地区，近年来报道明显增多，ROP 检出率较高，并呈上升趋势；东北地区 ROP 筛查的相关报道仍较少， ROP 发病情况相对不够明晰。

结论：近 10 年我国大陆各地区 ROP 筛查工作开展仍不平衡，ROP 检出率和变化趋势不尽相同，这不仅与各地区地理因素、经济状况、新生儿救治水平和筛查技术水平有关，也与不同单位筛查标准、患者来源不同等因素密不可分。我国各地区，尤其是中西部经济欠发达地区，ROP 筛查和治疗工作有待进一步大力推广和加强。

PO-611

香烟烟雾提取液对小鼠角膜上皮的毒性研究

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目的：大量流行病学研究表明二手香烟烟雾会导致心血管疾病、呼吸系统疾病、癌症等的发生，关于香烟烟雾对眼睛影响的研究很少。本研究旨在评估香烟烟雾提取液对角膜上皮组织的影响。

方法：制备香烟烟雾提取液（CSE），将健康成年 C57BL/6 小鼠 40 只，随机分为 4 组进行香烟烟雾提取液干预，每组 10 只鼠，10 只眼，分别为：正常组不做任何处理，对照组为每天暴露于人工泪液中 1 小时，1%和 5%香烟烟雾组为每天分别暴露于 1%和 5%CSE 中 1 小时。持续暴露 1 周后分别在裂隙灯下观察各组小鼠角膜形态并进行荧光素钠染色评分，活体共聚焦显微镜检查中央角膜的结构，扫描电子显微镜检查角膜上皮的形态学变化，利用免疫荧光染色、细胞凋亡检测角膜上皮改变，通过 RT-PCR 检测炎症因子表达的变化。

结果：与正常组相比，5%CSE 组荧光素钠染色评分有显著性差异($P<0.05$)，活体共聚焦显微镜显示角膜上皮细胞脱落明显，排列疏松，角膜基质细胞呈激活状态，密度减低，扫描电子显微镜显示角膜上皮局灶性脱落，角膜上皮微绒毛变短、融合及消失。此外，与正常组相比，5%CSE 组角膜上皮 K10 表达上升、ZO-1 分布减少，凋亡细胞增加，同时，CSE 显著增加角膜上皮中 IL-1β、TNF-α、IL-6 和 IL-8 的含量。

结论：角膜表面在短暂被动暴露于香烟烟雾后，可破坏角膜上皮屏障功能以及产生炎症因子而造成毒性作用。

PO-612

Pathological features and injury mechanisms in corneal bee sting

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Purpose: To develop a stable mouse model of corneal bee sting for investigating the bee sting-induced corneal injuries.
Methods: Bee venom solution of 0.1 mg/ml and 0.5 mg/ml concentrations were injected into the corneal stroma in C57BL/6 mice (male, 6-8 weeks) using a micro-syringe to establish the corneal bee sting model. Slit lamp microscopy, optic coherence tomography (OCT), HE, F-actin, F4/80 staining and TUNEL assay were performed at different time points after the injection.
Results: Slit lamp examination showed corneal opacity, mydriasis, and epithelial defects in the developed mice models. Corneal edema, epithelial defects, inflammatory cell infiltration, and anterior chamber exudation was observed in the OCT and HE staining. Whole-mount F-actin staining revealed a corneal endothelial cell damage, decreased density, skeletal disorder and stroma thickening, and inflammatory cell infiltration in the developed mice model. The pharmacological changes observed were time and concentration dependent. It was observed that there was an increase in the macrophages in the stroma of the 0.1mg/ml venom administered group that increased with time, but no change was seen in the 0.5mg/ml group in the F4/80 assay. TUNEL assay showed that the apoptotic cells in the 0.1mg/ml group increased significantly with time, but only appeared in the 0.5mg/ml group on the first day.
Conclusions: Our study successfully established a stable and reliable corneal bee sting model for the first time. We carried out the preliminary research on the pathological characteristics in the corneal bee sting, which can help in understanding its pathogenesis and the course of treatment.

PO-613

重水辅助下内界膜翻转治疗高度近视黄斑裂孔性视网膜脱离的临床观察

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目的 比较重水辅助下内界膜翻转术与单纯内界膜剥除术对高度近视黄斑裂孔性视网膜脱离视网膜复位率、黄斑裂孔闭合率以及术后视力恢复的影响。
方法 对 2016 年 7 月至 2018 年 9 月于江苏省人民医院接受玻璃体切除联合重水辅助下内界膜翻转或单纯内界膜剥除治疗的高度近视黄斑裂孔性视网膜脱离患者（共 21 眼）进行回顾性队列研究，分为内界膜翻转组（11 眼）及内界膜剥除组（10 眼）。术后随访 6 个月以上，行术前术后 OCT 检查及最佳矫正视力(1ogMAR 视力)检查。观察手术后视网膜复位率、黄斑裂孔闭合率及最佳矫正视力情况。两组间视网膜复位率及黄斑裂孔闭合率比较用 Fisher 精确概率法，两组间视力比较采用独立样本 t 检验。
结果 内界膜翻转组视网膜均复位，黄斑裂孔均闭合。内界膜剥除组视网膜复位率 90%（9/10），黄斑裂孔复位率 40%（4/10）。两组间视网膜复位率比较差异无统计学意义(P=0.476)，两组间黄斑裂孔复位率比较差异有统计学意义（P =0.004)。内界膜翻转组与内界膜剥除组术前最佳矫正视力分别

为 2.36±0.5 和 2.27±0.51，至末次随访时，内界膜翻转组与内界膜剥除组最佳矫正视力分别为 1.17±1.01 和 1.56±0.52，比较术后两组间最佳矫正视力，差异无统计学意义（P=0.290）。
结论 重水辅助下内界膜翻转术能提高黄斑裂孔的闭合率，是治疗高度近视黄斑裂孔性视网膜脱离的有效方法。

PO-614

Epithelium-off and trans-epithelial pulsed accelerated corneal cross-linking for treatment of progressive keratoconus: Twelve-month results

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Abstract
PURPOSE: To compare the outcomes of epithelium-off pulsed accelerated corneal cross-linking (ACXL) and trans-epithelial pulsed accelerated corneal cross-linking (Trans-ACXL) in progressive keratoconus.
SETTING: Department of ophthalmology, the Chinese PLA general hospital, Beijing, China.
DESIGN: Prospective clinical trial.
METHODS: In total, 69 eyes (54 patients) with progressive keratoconus were subjected to ACXL (36 eyes; ACXL group), and Trans-ACXL (33 eyes; Trans-ACXL group). Patients were evaluated through visual acuity, keratometry, corneal biomechanics, corneal tomography, endothelial cell count, anterior segment optical coherence tomography and *in vivo* confocal microscopy. The follow-up period was 12 months.
RESULTS: Transient haze was observed in 21% of keratoconic corneas in the ACXL group and none in the Trans-ACXL group. There were no significant postoperative differences in astigmatism, corneal biomechanical parameters or endothelial cell counts; while visual acuity, keratometry and manifest refraction spherical equivalent showed significant improvement at 12th months postoperatively in both groups. The demarcation line depth was 220.27±41.34 μm in ACXL group, deeper than in Trans-ACXL group, whose depth was 197.54±32.37 μm (P = 0.014), at 1 month postoperation. *In vivo* confocal microscopy showed keratocytes apoptosis and stromal edema 1 month postoperation; but the changes gradually recovered similar to normal status after 12 month postoperation in both groups. There were no apparent changes to the posterior stroma and endothelium in either group.
CONCLUSIONS: The results of this study revealed that both ACXL and Trans-ACXL were safe and effective at stabilizing the progression of keratoconus. The ACXL technique offers more

effective visual and topographic outcomes than Trans-ACXL, but Trans-ACXL with less micro-structural damage.

PO-615

重庆偏远地区青光眼患病率的调查分析

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目的：了解重庆偏远地区青光眼患病情况，以期为重庆偏远地区青光眼治疗提供理论依据。
方法：采用筛查的方式，对重庆 5 个偏远乡镇的 1755 人进行筛查，其中 6-11 岁 312 人，12-14 岁 90 人，15-17 岁 4 人，18-39 岁 117 人，≥40 岁 1232 人，然后对结果进行分析。

结果：1755 人中有 23 人确诊为青光眼，其患病率约为 1.3％。
结论：在我国，青光眼是主要的致盲原因之一，尤其是在偏远的农村，由于对青光眼认识不足，就医意识薄弱，再加上医疗水平有限，造成青光眼患者不能及时察觉自身患病情况，更不能及时治疗，最终造成失明。此次筛查可见重庆偏远地区青光眼患病率较高，需引起有关部门的重视，并采取相应的措施。

PO-616

Relationship between Coronary Heart Disease and Retinal Microvascular Abnormalities: A Case-control Study

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Purpose: To investigate the relationship between the severity of coronary heart disease and retinal microvascular abnormalities.

Methods: A case-control study was designed in which patients with angina (n=110) or myocardial infraction (n=107), aged no less than 50 years and diagnosed within six months by Guangdong General Hospital between April 2012 to December 2012 (cases), were matched with 412 patients without history of major cardiovascular events (controls) according to age and gender, from

Guangzhou Government Servant Physical Check-up Center between January 2010 to December 2010. The information such as gender, age, smoking, diabetes mellitus and other diseases were collected from questionnaires. Meanwhile, the records of physical and ocular examinations such as height, weight, blood pressure, serum lipids, coronary angiogram and color fundus photographs were collected from relevant medical record systems. Retinal vessels were evaluated by a validated software which could provide the detail of central retinal arteriolar equivalent (CRAE), central retinal venular equivalent (CRVE) and arteriole-to-venule ratio (AVR). Retinal microvascular signs, including arteriovenous nicking (AV-nicking), focal arteriolar narrowing (FAN) and opacification of arteriolar wall (OPAC), were separately identified by two experienced ophthalmologists. Spearman rank correlation analysis was used to study the association between Gensini score、coronary artery stenosis and retinal vascular caliber. An ordinal logistic model was designed to analyze the relationship between different severity of coronary heart disease and retinal microvascular abnormalities.

Results: In all, 103 cases with angina (mean age 66.48 + 8.29 years; 80.58% male), 105 patients with myocardial infraction (mean age 62.58 + 7.58years; 84.76% male) and 412 controls (mean age 64.95 + 8.06 years; 81.55% male) were analyzed. Cases were more likely to develop diabetes mellitus and dyslipidemia than controls: 31.68% and 69% for angina, 25.96% and 77% for myocardial infraction, 12.25% and 36.61% for controls, respectively ($p < 0.001$). After adjustment of age, gender, blood pressure, serum lipid and other traditional cardiovascular risk factors, ordinal logistic regression analysis showed that subjects with lower AVR(odds ratio [*OR*], 1.93; 95% confidence interval [*CI*], 1.13 to 3.31) and AV-nicking (*OR*, 2.60; 95%*CI*, 1.65 to 4.09)had more risk to develop harder coronary heart disease. The relationship between narrower CRAE(*OR*, 1.54; 95%*CI*, 0.88 to 2.73), wider CRVE(*OR*, 1.29; 95%*CI*, 0.73 to 2.29), FAN(*OR*, 0.88; 95%*CI*, 0.55 to 1.43), OPAC(*OR*, 1.38; 95%*CI*, 0.93 to 2.05) and coronary heart disease were not significant. Spearman rank correlation analysis suggested that Gensini score had a negative correlation with AVR(r_s, -0.16; $p< 0.05$), the stenosis of right coronary artery had a negative correlation with AVR (r_s, -0.20; $p< 0.05$) and a positive correlation with CRVE (r_s, 0.17; $p< 0.05$). However, there was no statistical significance between other branch vessels of coronary artery and retinal vascular caliber.

Conclusions: The decrease of AVR and exist of AV-nicking are significantly associated with the severity of coronary heart disease, while CRAE, CRVE, FAN and OPAC are not. There might be a relationship between coronary artery stenosis and retinal vascular caliber.

PO-617

智能镜架在儿童近视防控过程中的作用研究

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目的：探讨可穿戴智能设备（智能镜架）在儿童近视防控研究中的可行性。
方法：选择 9-10 岁儿童 10 名，采用问卷调查和智能眼镜架动态监测相结合的方法记录儿童用眼行为，2 周后汇总数据并分析；分析动态监测记录数据的有效性和完整性，分析可量化的用眼行为与眼轴增长及近视发生发展的相关性；
结果：智能镜架可提供客观、有效监测儿童用眼负荷参数；
结论：智能镜架为儿童近视防控及相关研究提供了一种新的有效方法。

PO-618

Intraocular Lens power calculation after keratorefractive surgery: A Meta-Analysis

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Purpose
To compare the accuracy of different intraocular lens(IOL) power calculation formulas after keratorefractive surgery.
Methods
A comprehensive literature search of PubMed and EMBASE was conducted to identify comparative cohort studies and case series comparing different formulas: Haigis, Shammas-PL, SRK/T, Holladay 1 and Hoffer Q.
Results
Seven cohort studies and three observational studies including 292 eyes were identified. There were significant differences when Hoffer Q formula compared with SRK/T, Holladay 1. Holladay 1 formula produced less prediction error than SRK/T formula in double-K method. Hoffer Q formula performed best among SRK/T and Holladay 1 formulas in total and single-K method.
Conclusions
In eyes with pre-keratorefractive surgery data, it is not recommended to choose double-K formula. For the third generation formulas, single-K Hoffer Q is a good choice. In eyes with no previous data, Haigis formula is recommended. There is no significant difference between Haigis and Shammas-PL formula.

PO-619

糖尿病引发的睑板腺病变及其机制的研究

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目的：糖尿病人长期存在的高血糖引发的代谢紊乱可导致眼部并发症，本研究旨在探讨糖尿病高血糖状态下睑板腺的形态、功能变化及其可能的机制。
方法：SD 大鼠腹腔注射链脲佐菌素（Streptozotocin,STZ）建立糖尿病模型。分别于注射后第 2 周，第 2 月，第 4 月进行睑板腺形态和功能的观察。采用裂隙灯观察其眼表形态和睑板腺形态变化，体视显微镜和切片 HE 染色观察睑板腺腺体和腺管的变化，免疫组织化学染色观察其炎症细胞浸润的情况，分别检测炎症因子 TNFα、IL-1β、IL-6、IL-11、IL-12α 和 IL-15 的变化，黏附分子 ELAM1、ICAM1 和 VCAM 的变化。检测相关信号通路 pJNK、JNK、IKKα、ERK、pERK、NF-kB p65 的表达量变化。
结果：与同龄正常 SD 大鼠相比较，STZ 注射 2 周后，睑板腺腺体结构保持完好，无炎症细胞浸润；STZ 注射 2 个月后睑板腺形态发生轻微的腺体结构紊乱和炎症细胞浸润,但炎症因子及相关信号通路的表达无明显变化；STZ 注射 4 个月后睑缘粗糙，睑板腺形态结构紊乱，出现腺体缺失，炎症细胞浸润明显，促炎因子和黏附分子表达升高，抑炎因子表达降低，pJNK、JNK、IKKα、ERK、pERK 表达升高。
结论：糖尿病可引起睑板腺形态结构紊乱，炎症细胞浸润，炎症因子分泌，且病理改变随糖尿病病程持续而发展。

PO-620

Shape discrimination ability and disability glare in orthokeratology children

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Purpose: To evaluate shape discrimination ability with and without glare in children undergoing orthokeratology treatment, and to reveal the effect of glare during the first month of treatment.

Method: Forty-nine eyes from 49 children (age: 11.49±2.02 years) with mean spherical equivalent refractive error -3.23±1.09D were included into this prospective study. Radial frequency (RF) patterns with radial frequency of 4 cycles/360°, peak spatial frequency of 3 cycles/degree, and mean radius of 1.5 degrees were used as the visual stimuli. Shape discrimination thresholds (SDT), with and without glare, were measured using a 2-down-1-up staircase procedure. SDTglare was defined as the difference between the SDTs with and without the presence of glare. Measurements were done at baseline with frame spectacles, and days 7 and 30 of after treatment with naked eyes.

Result: No statistically significant differences were observed between the SDTs without glare obtained at baseline and 1 week and 1 month after orthokeratology lens wear ($P > 0.05$). With transient glare, SDTs in all subjects were significantly higher than SDTs without glare ($P < 0.05$). SDTs with glare on day 7 and day 30 were significantly lower than baseline ($P < 0.05$). Compared with baseline, SDTglare significantly decreased at 1 week and 1 month after orthokeratology lens wear ($P < 0.05$).

Conclusion: While SDT without glare was stable following orthokeratology treatment, SDT with glare decreased during the first month of treatment. This short-term reduction in SDT may be the combined effect of spectacle removal, subtle changes in cornea optical quality, and the neural adaptation.

PO-621

高度近视合并原发性开角型青光眼的靶眼压设定

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目的： 探讨高度近视合并原发性开角型青光眼患者的靶眼压设定问题通过眼压测量、靶眼压设定应考虑因素等方面进行分析。**方法：**整合近年来高度近视合并青光眼、标准眼压、靶眼压相关问题的资料。**结果：**对靶眼压的范围设定有进一步略综合性的概括，提示目标眼压设定的必要性。**结论：**高度近视是一种常见的眼部疾病，是造成青光眼的风险因素之一，高度近视可影响 POAG 的典型体征包括眼压、眼底及视野。患者对靶眼压的动态选择，需考虑周全不同情况下的高度近视合并原发性闭角型青光眼的目标眼压设定，本文将就高度近视合并原发性开角型青光眼患者的靶眼压设定问题通过眼压测量、靶眼压设定应考虑因素等方面进行综述。对靶眼压的范围设定有初步的概知和了解，以进临床一步指导临床。

书面交流

PU-001

静息态功能核磁在眼科中的应用进展

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神经元本身不能存储能量，当其活动增强时，相邻的毛细血管产生调节以使局部脑血流供应增加，满足其增多的能量和供氧需求。功能核磁即是基于此血流动力反应来检测脑活动强弱及功能连接[1]。1995 年 Biswal 第一次描述了此血氧水平依赖的成像方法，功能核磁主要分为任务态功能核磁与静息态功能核磁（resting state functional MRI，rs-fMRI）两种。任务态功能核磁是基于预先设计的任务或一定的外界刺激来检测相应功能区的神经活动，而 rs-fMRI 是检测受试者在静息状态下自发性神经活动及功能联系。Rs-fMRI 与任务态功能核磁相比的优势在于：1）不要求病人能够配合完成相应地任务；2）为我们提供不同脑区在时间轴上的相互作用（任务态功能核磁包含的时间信息很少）[2]。Rs-fMRI 代表了一种研究脑功能连接的新兴方法，它对一种特定功能有着最小的选择偏倚[3]。由于很多眼科疾病可伴有视功能减弱或是不自主眼动，而这些因素可能会干扰任务态功能核磁的分析。基于其优势，近几年 rs-fMRI 在多种眼科疾病中逐渐应用，此综述旨在总结 rs-fMRI 在眼科疾病中的研究现状，以更好的理解正常及疾病状态下的视觉变化，为进一步治疗提供可能的思路。

PU-002

睑板腺处理对合并睑板腺功能障碍的翼状胬肉患者术后眼表的影响

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目的 探讨术前睑板腺处理对合并睑板腺功能障碍（*Meibomian gland dysfunction,MGD*）的翼状胬肉患者术后眼表的影响 **方法** 选取患有 MGD 的翼状胬肉患者 90 眼，随机分为 A 组、B 组，A 组为试验组（48 眼）），其中男 18 例（20 眼），女 22 例（28 眼），年龄 45～69 岁，平均年龄（55.30±8.2）岁； B 组为对照组（42 眼），其中男 19 例（20 眼），女 21 例（22 眼），年龄 52～70 岁，平均年龄（57.40±7.02）岁。两组患者均行翼状胬肉切除联合角膜缘干细胞移植术，分别于术后 3d，术后 1w、2w、4w 比较两组的眼部舒适度评分及泪膜破裂时间(break-up time，BUT)。
结果：术后 3 d，术后 1w，术后 2w 两组眼部舒适度评分比较，A 组术后眼部舒适度评分低于 B 组，差异有统计学意义(P<0.01），术后 4w 两组比较差异无统计学意义（P＞0.05）。术后 1w 和 2w 泪膜破裂时间比较,A 组较 B 组长，差异有统计学意义(P <0.01），术后 4w 两组比较差异无统计学意义（P＞0.05）。
结论: 术前睑板腺处理可以有效促进翼状胬肉合并 MGD 患者术后眼表的修复，稳定泪膜，提高患者的眼部舒适度。

PU-003

Agreement of white-to-white values obtained by Allegro Topolyzer, Pentacam HR, and IOLMaster in high myopia patients

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Purpose:
To evaluate the agreement of white-to-white values between Allegro Topolyzer, Pentacam HR and IOLMaster.
Methods:
In this retrospective, single-center case series, the values of WTW were measured by three methods (Allegro Topolyzer,Pentacam HR and IOLMaster) in right eyes of high myopia patients as implantable collamer lens(ICL) surgery candidates from Oct 1st, 2014 to Sep 30th, 2018. Statistical analysis was carried out by MedCalc 18.5 sofeware (Mariakerke, Belgium). The data were analyzed by paired t test and Bland-Altman blot.
Results:
A total of 99 patients(99 eyes) were enrolled in the study. The WTW values obtained by Allegro Topolyzer, Pentacam HR and IOLMaster were 11.62±0.39mm, 11.52±0.39mm and 12.06±0.43mm respectively. A significant difference and linear correlation between any two devices were identified. The mean difference of Allegro Topolyzer versus Pentacam HR, Allegro Topolyzer versus IOLMaster, Pentacam HR versus IOLMaster was 0.10mm, -0.44mm and -0.54mm. The 95% limit of agreement (95%LoA) was from -0.26 to 0.46mm, -0.93 to 0.05mm, -0.97 to 0.11mm and maximum difference value of all cases within 95%LoA is 0.40, -0.90 and -0.90mm respectively.
Conclusion:
There is a good agreement of WTW values between Allegro Topolyzer and Pentacam HR, and they can be used interchangeably. The WTW values by Allegro Topolyzer and IOLMaster are not interchangeable, as well as that by Pentacam HR and IOLMaster.

PU-004

后巩膜收缩术治疗病理性近视的临床研究

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目的：观察后巩膜收缩术治疗病理性近视的疗效。**方法：**回顾性病例系列研究。对 20 例（48 眼）病理性近视患者行后巩膜收缩术治疗，观察其术前和术后 1 年的最佳矫正视力（best corrected visual acuity, BCVA）、眼轴、OCT 和电生理的变化情况以及出现的术后并发症。**结果：**患者术前眼轴长度为（30.54±1.97）mm，术后 1 天、1 月、3 月、6 月的眼轴长度分别是（28.61±1.93）mm、（28.99±2.37）mm、（29.23±2.37）mm、（29.37±2.25）mm、较术前明显缩短，且差异有统计学意义（*P<0.05*）。术后 1 年的眼轴长度为（29.52±2.53）mm 较术前缩短，差异无统计学意义（*P>0.05*）。OCT 示术前视网膜劈裂患者 12 人（19 眼），术后视网膜劈裂基本贴附 9 眼（47.37%），劈裂改善 10 眼（52.63%）。术前 BCVA（LogMAR 视力表）为 0.46±0.53，术后 1 年为 0.39±0.44，较术前有所增长，但差异无统计学意义（*P>0.05*）。术前电生理 a 波振幅为（-35.29±15.96）μV，术后 1 年为（-50.31±30.36）μV。术前 b 波振幅为（74.54±35.20）μV，术后 1 年为（101.63±32.55）μV。与术前相比，a 波、b 波振幅均较术前提高，且差异有统计学意义（*P<0.05*）。术前眼压为（14.34±3.07）mmHg，术后 1 年为（13.9±1.72）mmHg，差异无统计学意义（*P>0.05*）。后巩膜收缩术后无视网膜脱离、玻璃体积血等严重并发症出现。**结论：**后巩膜收缩术可以缩短眼轴，改善病理性近视患者的眼底病变和视功能，但其手术长期疗效仍然需要长时间、大样本的临床观察和对照试验来进一步论证。

PU-005

屈光参差与屈光参差性弱视的像差研究

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目的：本研究试图探究弱视患者与正常最佳矫正视力患者在排除一定低阶像差和其他影响因素的前提下，弱视患者于非弱视患者高阶像差间是否存在差异，本研究对屈光参差性弱视青少年与单纯性屈光参差青少年的高阶像差进行了比较
方法：从眼科门诊中选取 30 例远视性单纯屈光参差患儿(年龄 5~12 岁)作为正常组，30 例屈光参差性弱视儿童作为弱视组。所有受试者至少有半年的眼科检查记录。除常规检查外，角膜地形图和 HOAS 用 iTrace 测量，轴向长度用 IOLMaster 测量。
结果：远视性屈光参差与屈光参差性弱视间高阶像差无显着性差异(P>0.05)。在屈光参差性弱视儿童中，三级和四阶的高阶像差在主导眼与非主导眼之间有显着性差异(P<0.05)。此外，根据相关分析得出受试者的最佳矫正视力不仅与低阶像差有相关关系，而且还与高阶像差有相关关系。
结论：在消除屈光参差和低阶像差的影响下，屈光参差性弱视患者两眼间的高阶像差存在眼间差异，但单纯性屈光参差患者两眼间的高阶像差差异不明显，可以推测弱视患者发育过程中高阶像差也存在一定发育异常。

PU-006

Assessment of tear film optical quality in a young short tear break-up time dry eye

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Purpose: To evaluate the dynamic changes of tear film optical quality in a short tear break-up time (TBUT) dry eye by using a double-pass system.
Methods: Thirty-five short TBUT dry eye patients and 43 control subjects without dry eye were included in this study. The right eye for each subject was analyzed. The objective scatter index (OSI), modulation transfer function (MTF) and strehl ratio (SR) were recorded within a 20-second period with the subjects asked to blink freely, and 10 successive seconds of non-blinking immediately after a blink was recorded to analyze the tear film OSI. The mean tear film OSI in 10 successive seconds, ΔOSI and ΔOSI/time were evaluated. The correlation between tear film OSI and MTF, SR was also analyzed.
Results: Short TBUT dry eye patients showed significant deterioration of MTF and SR compared to control subjects. The mean tear film OSI in 10 successive seconds was significantly higher in dry eye patients than in control subjects. The mean OSI of the tear film (0-5s) and the mean OSI of the tear film (6-10s) were significantly higher in dry eye patients than in control subjects. Moreover, the ΔOSI was significantly higher in dry eye patients than in control subjects. The tear film OSI was significantly correlated with the MTF and the SR.
Conclusions: The tear film OSI of short TBUT dry eye patients is significantly increased in the early stage. Tear film instability in short tear break-up time dry eye patients has a significant effect on optical quality.

PU-007

形觉剥夺性高度近视豚鼠视网膜、巩膜形态改变及氧自由基的变化

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目的 观察形觉剥夺性高度近视（FDHM）豚鼠视网膜、巩膜形态结构变化，探讨氧自由基在高度近视中的作用。 **方法** 40 只 3 周龄花色豚鼠随机分为空白对照（I 组）和模型（II 组）各 20 只，II 组豚鼠右眼行眼睑缝合，左眼作为自身对照（III 组）。于造模前及造模后 8 周检查豚鼠屈光度，A 超进行生物测量。造模 8 周以后处死豚鼠，观察视网膜、巩膜形态和超微结构，测定丙二醛（MDA）的含量及超氧化物歧化酶（SOD）的活性。 **结果** 豚鼠形觉剥夺 8 周以后，屈光度从（+3.59±0.33）D 变为（-7.96±0.55）D，明显高于 I 组（+0.89±0.32）D、III 组（-0.55±0.49）D，差异均有统计学意义（均 *P*<0.05）；玻璃体腔深度（4.12±0.13）mm 明显高于 I 组（3.71±0.23）mm、III 组（3.93±0.04）mm，眼轴（8.93±0.22）mm 明显长于 I 组（7.95±0.37）mm、III 组（8.01±0.15）mm，差异均有统计学意义（均 *P*<0.05）。视网膜变薄，神经节细胞层、内核层、外核层细胞均减少，排列紊乱；视网膜膜盘肿胀、变形，内、外核层细胞膜不规则收缩，核染色质聚集。巩膜组织明显变薄，细胞外基质增多，成纤维细胞密度降低，胶原纤维平均直径减小。II 组视网膜、巩膜中 SOD 活性明显低于 I 组，MDA 含量明显高于 I 组，差异有统计学意义（均 *P*<0.05）。**结论** FDHM 豚鼠模型眼随着剥夺时间的延长近视度数明显增加，玻璃体腔深度增加，眼轴明显延长，视网膜、巩膜形态发生病理性改变，其中氧自由基可能参与了 FDHM 的形成。

PU-008
针刺对实验性近视豚鼠巩膜 MMP-2 及 TIMP-2 表达的影响

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目的：探讨针刺对近视豚鼠巩膜中 MMP-2 及 TIMP-2 表达的影响。方法：豚鼠分为正常对照（A）组、单纯近视模型(B)组及针刺+近视(C)组，后 2 组右眼配戴-10.00 D 透镜片，建立透镜诱导型近视模型，C 组戴镜同时给予针刺合谷穴和太阳穴。于实验 4 周后测量各组屈光度和眼轴，同时检测右眼巩膜组织 MMP-2 及 TIMP-2 mRNA 的相对表达量及蛋白含量。结果：造模 4 周后，与 A 组比较，B 组及 C 组豚鼠右眼屈光度增加（*P*=0.000），眼轴延长（*P*=0.000）；B 组和 C 组屈光度和眼轴比较差异均无统计学意义(均为 *P>0.05)*。与 A 组相比，B 组及 C 组后极部巩膜 MMP-2 的 mRNA 水平均显著增加（均 *P*=0.000），TIMP-2 的 mRNA 水平表达则均显著降低（均 *P*=0.000）；针刺后 MMP-2 的 mRNA 水平明显降低，TIMP-2 的 mRNA 水平明显升高（均 *P*=0.000）。Western Blotting 的结果与其结果相一致。结论：针刺合谷穴和太阳穴可以减少实验性近视豚鼠巩膜中 MMP-2 及增加 TIMP-2 表达。这可能是针刺改善近视患者裸眼视力的机制之一。

PU-009
儿童病理性近视后巩膜加固术的临床观察

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目的 通过对病理性近视儿童的屈光与眼部状况等分析后巩膜加固术的适应症，总结术后疗效。方法 回顾性分析 2018 年就诊于我院的病理性近视儿童 6 例（11 眼），对手术前后屈光状态、眼轴长度、眼底黄斑区血流状况等进行前后对照分析。结果 患儿术前等效球镜-8.75D(-7.25D,-11.0D)，最佳矫正视力（best corrected visual acuity, BCVA）Log MAR 0.2（0.2,0.3），眼轴长度 26.53mm(24.19mm,27.07mm),斯特列尔比（strehl ratio, SR）0.1936 (0.984,0.359)，黄斑厚度 210μm(202μm,234μm)，OCT 血管成像(OCT Angiography, OCTA)未见黄斑区明显的微血管病变。分别与术后 1mon、3mon 对比，均无明显统计学差异（P＞0.01）。观察期内调制传递函数(modulation

transfer function, MTF)曲线在 5cycl/degree 之前便出现了严重下滑，比正常人眼曲线下滑空间频率提前，下滑幅度加大，平滑性严重降低。结论 后巩膜加固术是目前儿童病理性近视防治的有效选择。

PU-010

Predictive role of vertical corneal asymmetry vector in Orthokeratology Lens Decentration for Chinese Myopic Patients

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Purpose: To explore treatment zone decentration of orthokeratology lens (Ortho-K lens) and its relationship with pretreatment corneal parameters in Chinese myopic patients.
Methods: The data were retrospectively collected from 47 myopia patients in 94 eyes, fitted with four-zone reverse geometry ortho-k lenses. Various corneal parameters before treatment were analyzed by corneal topography, including Zernike polynomials of anterior corneal elevation map, asymmetry vectors of sagittal height at alignment curve, flat K readings, corneal eccentricity (E values) of different meridians, horizontal visible iris diameter (HVID), spherical diopter and astigmatism. An accurate method was carried out using Matlab program to calculate treatment zone decentration after 1 week, 1 month, 3 months, 6 months, 9 months and 12 months. Correlation analyses were performed.
Results: Generally, inferotemporal decentration was the most common. The binocular mean magnitude and angle of lens decentration were presented referred to either corneal vertex or pupil center. It varied with time and stabilized after 6 months. No symmetrical pattern was found between both eyes. **V**ertical corneal asymmetry vector was the only parameter that significantly contribute to decentration and only in vertical direction at every follow-up time point. No other correlation was noticed.
Conclusion: Ortho-k lens decentration is a common phenomenon during lens treatment and mostly occur at the inferotemporal quadrant in Chinese myopic patients. It varies with time and would stabilize after 6 months. Corneal vertical asymmetry vector is a convenient but reliable method to predict lens decentration in vertical direction.

PU-011

2008 年及 2016 年泉州市盲校学生低视力病因与视力对比分析

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目的 探讨泉州市盲校学生时隔 8 年视力损伤的病因及残余视力的情况。方法 对泉州盲校 126 名学生进行病史采集，应用眼科常规检查方法对其行全面的眼科检查，对学生的主要病因进行诊断和分析。并对 2008 年及 2016 年两次调查结果进行比较和分析。结果 2016 年先天性白内障、早产儿视网膜病变为主要原因；早产儿视网膜病变是致盲的首要病因。有残余视力的学生有 86 名，其中 79 名在日常学习中习惯使用助视器来提高视力。结论 2016 年泉州市盲校的 126 名学生中，先天性或遗传性疾病是导致视力损伤的主要原因。在 2008 年和 2016 年导致泉州市盲校学生低视力的首要原因均为先天性白内障。目前早产儿视网膜病变是致盲的首要病因。对眼病早发现、早诊断，早治疗，有效降低儿童盲的发生率。视力在 0.02 以上的儿童应充分利用残余视力借助助视器进行学习或活动，提高生存质量及增强独立生活的能力。

PU-012

眼眶暴裂性骨折整复术中选择可吸收材料的生理优势

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目的 探讨可吸收材料在眼眶骨折整复术中的选择及优势；**方法** 总结 2016 年 1 月至 2018 年 12 月间收住我科的眼眶骨折术中选择可患吸收材料者 68 例，其中 18 岁以下未成年人 15 例，对材料有特殊要术的成人患者 7 例。小儿活瓣骨折 3 例，儿童眶底骨折 4 例，未成年人眶颧颌骨折 3 例，未成年人眶内下壁骨折 5 例。成人眼眶多发骨折 7 例。在进行骨折整复中应用可吸收材料进行骨折断端的固定。其余内侧壁、下壁、内下壁骨折均选择可吸收材料。**结果** 术后骨折接近解剖复位率 80%，术后骨折复位尚可 15%，术后骨折复位欠佳 5%。**结论** 可吸收材料在眼眶骨折整复术中适合于小儿活瓣骨折及儿童眶底及内侧壁骨折，成人的暴裂折性骨折选择可吸收材料手术易操作、手术风险小，材料吸收后可恢复骨壁生理特性，但在眶缘骨折错位的整复固定时固定效果欠佳，固定力度不够，特别在成人眼眶骨折的整复中慎用。

PU-013

眶尖区肿瘤摘除的风险防范

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目的 探讨眶尖区肿瘤的摘除方法及风险；**方法** 总结 2016 年 5 月至 2018 年 12 月间收住我科的眶尖区围视神经肿瘤 23 例，其中海绵状血管瘤 13 例,视神经脑膜瘤 5 例，滑膜肉瘤 1 例，上皮样血管瘤 2 例，视神经鞘囊肿 1 例，淋巴瘤 1 例。所有患者均采取外侧骨开眶肿瘤摘除术，其中 3 例视神经脑膜瘤开眶后采用内镜辅助下吸切器咬切摘除。术后视力同术前，无明显的上睑下垂、眼球活动障碍等并发症者 19 例，术后视力丧失 1 例，术后视力丧失 1 例伴上睑下垂及眼球活动障碍，术后视力眼前指数伴上睑下垂、眼球活动障碍及瞳孔散大光反射消失 1 例，术后视力为 0.05 伴瞳孔散大光反射消失 1 例。**结果** 手术成功率为 78.94%。手术严重并发症发生率为 21.06%，并发症主要表现为视神经损伤、动眼神经损伤及视网膜中央动脉痉挛或阻塞。**结论** 眶尖区围视神经肿瘤的摘除术存在极高的风险，肿瘤摘除极可能付出视力丧失的极大代价，术中也极易造成动眼神经的损伤，手术要权衡利弊慎重进行。

PU-014

眶腔矫正联合脂肪填充治疗外伤性眼球内陷

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目的 观察陈旧性眼眶骨折导致眼球内陷手术矫正的效果；方法 收集 2015 年 1 月至 2018 年 12 月间收住我科的陈旧性眼所骨折所导致的眼球内陷患者 28 例，眼球内陷 3mm-6mm，眼位异常者 9 例，均为眼球向内下斜或移，斜视度 5－15 度，眼球向内上活动受限者 7 例，其中眼眶内侧内侧壁及下壁骨折 18、下壁骨折 8 例、内侧壁骨折 2 例，所有患者均采用眶壁缺损钛板修复术加眶内组织脂肪填充术，术中根据骨折的情况分别采取眶内侧壁下壁联合修复术、眶下壁修复术及眶内侧壁修复术，取腹部或者大腿皮下脂肪及组织填充于眼眶内，填充量根据术中眼球复位情况决定。术后观察眼位、眼球突出度及眼动情况；结果 术后眼球内陷矫正良好(双眼眼突度相差在 1mm 以内)者 11

例，术后眼球内陷矫正欠佳者(双眼眼突度相差在 2mm 以内者)15 例，术后眼球内陷矫正欠不良(双眼眼突度相差大于 3mm)3 例，术后眼位正常者 18 例，眼位仍有异常者 3 例，所有患者眼动基本正常。结论 眶壁缺损钛板修复术加眶内组织脂肪填充术是矫正陈旧性眼眶骨折导致眼球内陷的有效方法。

PU-015

Stargardt 病患儿的影像学图像特征分析

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目的 分析儿童 Stargard 病的眼底荧光血管造影(fundus fluorescein angiography, FFA)、相干光断层扫描（optical coherence tomopraphy, OCT）及吲哚青绿血管造影(indocyanine green angiography, ICGA)的影像特征。
方法 选取 2018 年 4 月至 12 月在本院门诊确诊的 Stargard 病患儿 7 例(14 只眼)，对比分析其 FFA、OCT 及 ICGA 检查影像特征。
结果 FFA 图像显示黄斑区散在椭圆形的细小弱荧光，随时间延长，荧光逐渐增强，晚期呈现强荧光，部分病例 FFA 表现为脉络膜背景荧光遮蔽；OCT 图像表现为程度不等的黄斑区神经上皮层变薄，光感受器萎缩，视网膜色素上皮层（retinal pigment epithelial, RPE）高反射颗粒；ICG 晚期表现为弥漫分布的斑驳样低荧光灶。
结论 FFA、OCT 及 ICGA 在 Stargardt 病诊断中各具优势，上述方法联合应用可为 Stargard 病的发病机制提供研究资料，极大地提高了影像学检查的诊断价值。

PU-016

PPARγ 对豚鼠屈光发育和眼球生长的调控作用

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目的：本研究通过球旁注射特异性的过氧化物酶体增殖物激活受体 γ（PPARγ）激动剂和拮抗剂，研究 PPARγ 在正常豚鼠和形觉剥夺性近视豚鼠中的作用，探讨 PPARγ 在豚鼠近视发生发展中对缺氧以及胶原的作用。
方法：将正常三周龄三色豚鼠随机分成正常给药组和形觉剥夺给药组两个大组，每个大组都包含以下亚组：无注射组、溶剂对照组和给药组。两个注射组每天给以球旁注射 DMSO 或者 PPARγ 激动剂 GW1929、PPARγ 拮抗剂 GW9662，连续给药四周。于实验前、实验 2 周和实验 4 周检测屈光度、眼轴参数改变。实验两周时检测脉络膜厚度和血流改变。Westen blot 检测给以 PPARγ 激动剂和拮抗剂后 PPARγ 及下游靶基因，HIF-1α 和 1 型胶原表达情况。
结果：球旁注射 PPARγ 激动剂 GW1929 可抑制豚鼠形觉剥夺性近视的进展和眼轴的延长（$p<0.05$），但对正常豚鼠的屈光和眼轴无明显影响（$p>0.05$）。相反，给以 PPARγ 拮抗剂 GW9662 可促进正常豚鼠实验性近视形成 p<(0.001），玻腔和眼轴相应延长，而对形觉剥夺性近视豚鼠的屈光和眼轴无明显影响（p>005）。PPARγ 激动剂和拮抗剂对脉络膜厚度和血流无明显影响。PPARγ 激动剂可抑制 FD 巩膜 HIF-1α 表达的上调和 PPARγ，ME1 表达的下调。PPARγ 拮抗剂可使正常豚鼠巩膜 1 型胶原表达下调， PPARγ 激动剂可逆转 FDM 巩膜 1 型胶原的下调。
结论：球旁注射 PPARγ 激动剂 GW1929 可抑制形觉剥夺性近视形成，不影响正常豚鼠的屈光发育。球旁注射 PPARγ 拮抗剂 GW9662 能促进正常豚鼠近视进展但对 FDM 豚鼠近视进展无明显影响。PPARγ 受体活性可调控巩膜缺氧和胶原表达。PPARγ 在豚鼠正常屈光发育和形觉剥夺性近视形成过程中起一定的调控作用。

PU-017

Age maybe the only initial factor with orthokeratology to slow myopia progression in children

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Background: To investigate initial factors with orthokeratology (OK) influencing myopia progression in children.
Methods: A retrospective, single-center study. Right eyes data of children who wore OK for the first time from February 1, 2015 and August 31, 2017 were collected for this study. Gender, age, initial spherical equivalent(SE), axial length, Anterior and posterior corneal radius and Q-value, central corneal thickness(CCT), anterior chamber depth(ACD), horizontal corneal white-to-white distance(WTW) , pupil diameter and OK manufacturer as presumed factors were analyzed.
Results: Fifty-eight patients and fifty-eight eyes met the criteria and were involved in this study. Annual change of SE were -0.19±0.37D, 58.62%(34 eyes) of which were -0.25D or greater. Annual axial elongation were -0.12~0.73[0.14(0.07, 0.23)] mm, 58.62%(34 eyes) of which were 0.17mm or shorter. After univariate analyses, age and axial length were found to be factor associated with annual axial elongation. After multivariate Logistic analysis, initial axial length as independent variable was excluded, and age was the only initial factor.
Conclusion: This retrospective study confirms that the OK lens an effective treatment to control myopia progress in children. Age is probably the only initial factor with OK influencing axial elongation, and older age is associated with slower myopia progression.

PU-018

Recovery of cornea morphology after one-month cease of orthokeratology treatment

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Objective: to observe recovery of cornea morphology wafter one-month cease of orthokeratology treatment.
Methods: A retrospective, single-center study. Only right eyes data were involved. Initial group and final group were defined data before therapy and data after one-month cease of orthokeratology. Data of gender, age, refraction, Q-value(8mm), Rm(mean radius of curvature), Rper(mean radius of curvature in the 7mm to 9mm area), astigmatism of anterior and posterior corneal surface, CCT(central corneal thickness) were collected. Thibos vector analysis was performed for astigmatism. Paired t test and Wilcoxon test were used for comparison between initial group and final group, and independent samples t test, Pearson's correlation and Spearman's correlation were performed for univariate analysis of factors that maybe influence recovery of corneal morphology.
Result: Fifty-two eyes were involved. Annual SE change was -0.19±0.37D and annual AL change was 0.14(0.09, 0.23)mm. Compared to initial data, final anterior and posterior Q-values were increased with mean of difference 0.039, 0.055), anterior Rm values were increased with median of difference 0.060mm and posterior Rm values were reduced with mean of difference -0.024mm. Anterior Rper values showed no significant difference, while posterior Rper values were increased with mean of difference 0.039mm. There were no differences regarding anterior, posterior astigmatism J0 and J45 between two groups. Reduced CCT values were observed in final group with median of difference -6.5μm. Difference (final-initial) for anterior Q-value and Rm, posterior Q-value and Rm, or CCT did not show any correlation with gender, age, years of treatment, initial SE, initial AL, or orthokeratology manufacturers.

Conclusion: Corneal morphology after one-month cease of orthokeratology seemed not recovery to level of pre-therapy, in spite of small difference. Orthokeratology may elicit cornea to move backward as a whole, with posterior cornea surface protruding forward. Changes of corneal morphology were not associated with gender, age, years of treatment, initial spherical equivalent, initial axial length, or orthokeratology manufacturers.

PU-019

中央角膜厚度 4 种仪器测量值的比较

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目的：比较 Pentacam HR、前节光学相干断层扫描（ASOCT）、超声生物显微镜（UBM）、角膜内皮镜（SM）4 种仪器中央角膜厚度（CCT）测量值。
方法：回顾性分析 2016 年 11 月至 2018 年 12 月有晶状体眼人工晶体植入术前检查患者，仅取右眼资料。比较 Pentacam HR（德国 OCCULUS 公司）、ASOCT（德国 Zeiss 公司）、UBM（天津索维公司）、SM（日本 TOPCON 公司）4 种仪器 CCT 测量值。统计软件采用 MedCalc 18.5。Shapiro-Wilk 检验对连续资料进行正态分布分析。采用配对 t 检验、直线相关、Bland-Altman plot 对其均值比较、相关性、一致性进行分析。α=0.05。
结果：82 例 82 眼 Pentacam HR、ASOCT、UBM、SM 的 CCT 测量值分别为 526.24±32.45mm、510.28±33.53mm、503.66±34.94mm、495.89±37.09mm。两两比较，差异均有统计学意义。4 种仪器 CCT 测量值从大到小的顺序是 Pentacam HR、ASOCT、UBM、SM，任意二者之间均呈强的直线相关。Bland-Altman plot 分析，任意二者一致性差。差值（Pentacam HR – SM）最大；差值（Pentacam HR – UBM）次之；再次之是差值（Pentacam HR – ASOCT）与差值（ASOCT – SM），二者差异无统计学意义；最小的是差值（ASOCT – UBM）和差值（UBM-SM），二者差异无统计学意义。
结论：4 种仪器 CCT 测量值从大到小的顺序是 Pentacam HR、ASOCT、UBM、SM，任意二者之间存在强的直线相关性，但是不能直接互相替代。在所有差值中，Pentacam HR 与 SM 差值最大，ASOCT 与 UBM 差值、UBM 与 SM 差值最小。

PU-020

同种异体角膜基质透镜植入术矫正混合性屈光参差疗效分析

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目的： 分析同种异体角膜基质透镜植人术矫正混合性屈光参差的有效性和安全性
方法： 完善术前血液学检查和供体准备，对 4 例混合性屈光参差（一眼近视、另一眼远视）患者，行远视眼异体角膜基质透镜植入术，术后随访 6 个月，非接触式眼压计观察术眼眼压改变；角膜地形图检查（pentecam 地形图仪）检查手术前后角膜曲率、后表面高度、角膜厚度、前房深度；光学相干断层扫描仪(OCT)观察植片位置、厚度；测量术后 1 周、1 个月记录患者的裸眼视力、最佳矫正视力和电脑验光结果。
结果： 手术过程顺利，未有并发症。术后 1 周及 1 个月术眼裸眼远视力
较术前提高 1~2 行，裸眼近视力提高 2~3 行，术后 6 个月电脑验光平均球镜度数为(-0.523+0.34)D，较术前明显下降，术后 6 月 OCT 检查植片居中，未见褶皱。裂隙灯显微镜观察角膜透明，未见排异反应。pentecam 地形图仪检查显示前一周前表面曲率明显增高，一月后恢复正常，后表面高度、前房深度未见改变。

结论： 角膜基质透镜植入矫正混合性屈光参差中的远视眼，可预测性好，疗效确切，是一种安全有效的手术方式。

PU-021

青光眼患者脑视觉功能训练前后效果分析

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目的：青光眼患者进行短暂的视知觉训练（visual perception training, VRT）效果评价。
方法：收集门诊病情控制稳定的青光眼患者，进行 20 分钟短暂的视知觉功能训练，记录患者训练前后最佳矫正视力，眼压，视野平均敏感度（mean sensitivity, MS），平均缺损（mean defect, MD），区域化的视野损失值；并对视野进行功能分区，比较各功能区 MS 变化；训练前后脑视觉各参数；以及训练前后视觉体验。
结果：与训练前相比，患者最佳矫正视力提高，统计学无显著差异；眼压无明显变化；区域视野损失部分得以提高，平均 MD，MS 改善差异具有统计学意义；患者知觉眼位，粗糙立体视，精细立体视均得到改善；超过一半患者认为训练后视觉体验得以改善。
结论：青光眼患者视神经依然具有重塑性，脑知觉训练能显著改善患者的视野及精细立体视及运动立体视，改善患者的日常视觉体验。

PU-022

TORIC 与非 TORIC 人工晶体植入术后视觉质量对比

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目的：比较 toric 人工晶体和非 toric 人工晶体的视觉质量。**方法**：选择单纯年龄相关性白内障患者，分为 A、B 两组，A 组为植入 toric 人工晶体（SN6AT2-9，爱尔康人工晶体）30 眼，B 组为角膜散光对照组，植入非 toric 人工晶体（isert251，豪雅人工晶体）30 眼。 **结果**： Toric 组未矫正远（5m）视力（UDVA）较好，且脱镜率高；而未矫正 50cm 视力（U50cmVA）在非 Toric 组较好；两组未矫正近（30cm）视力（UNVA）、对比敏感度及视觉质量问卷均无显著差异。**结论**：对于相同角膜散光白内障患者，选择 toric 人工晶体可获得更好的裸眼远视力，降低眼镜依赖率，且视觉质量无影响。

PU-023

ICL 植入术矫正高度近视的短期临床观察

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目的：观察后房型有晶体眼人工晶体（*implantable contact lens, ICL*）植入术矫正高度近视术后早期的有效性和安全性。**方法**：观察于我院行 ICL 植入术的高度近视患者 18 例（36 眼），于术前，术后 1 周、1 个月、3 个月随访记录其裸眼视力（*uncorrected visual acuity , UCVA*），最佳矫正视力（*best corrected visual acuity , BCVA*），等效球镜（*spherical equivalent , SE*），前房深度（*anterior chamber depth , ACD*），眼内压（*intraocular pressure ,*

IOP），角膜内皮细胞密度（*endothelial cell density , ECD*）等指标，并对结果进行统计学分析。**结果:** 所有患者术后 3 个月裸眼视力和有效球镜度显著提高（t=-25.07，P<0.05）；前房深度较术前变浅，差异有统计学意义（t=65.9，P<0.05）；眼内压术后 3 个月与术前对比无明显差异（t=0.369，P>0.05）；角膜内皮细胞密度较术前减少，差异有统计学意义（t=8.99，P<0.05）。**结论：**ICL 植入手术矫正高度近视有效性高，短期内安全可靠。

PU-024

表皮生长因子抗体通过调节 EGFR/AKT/PI3K 通路抑制近视豚鼠眼轴延长的研究

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目的：探究玻璃体腔内应用表皮生长因子（EGF）抗体对近视豚鼠眼轴延长的抑制作用及其信号通路。
方法：将 50 只 2-3 周龄三色豚鼠随机分为空白对照组、EGF 抗体组和山羊血清抗体组（EGF 抗体提取自山羊血清）。对照组（n=10）未行任何处理，其余各组豚鼠双眼分别经-10D 透镜诱导近视 3 周，并于第 1、8、15 天行玻璃体腔内注射药物。EGF 抗体组右眼玻璃体腔内分别注射 EGF 抗体 5μg（n=10）、10μg（n=10）及 20μg（n=10），左眼均注射等量 PBS 溶液。山羊血清抗体组（n=10）右眼玻璃体腔内注射 20μg 山羊血清抗体，左眼注射等量 PBS 溶液。分别于操作前、每次注射时及末次注射后一周测量豚鼠的眼轴、屈光度、眼压、眼底照相和视网膜电图（ERG）。末次测量后处死豚鼠，摘除眼球分离视网膜行组织病理学检查、免疫荧光、Western Blot 及 Real-time PCR。
结果：诱导近视组的豚鼠眼轴明显长于对照组（*P*<0.05）。5μg EGF 抗体组和山羊血清抗体组的左右眼眼轴无明显差别（*P*>0.05），而 10μg 和 20μg EGF 抗体组右眼眼轴明显短于对侧眼（*P*<0.05）。EGF 抗体组豚鼠的眼底照相基本正常，其 ERG 检查 a 波和 b 波的潜伏期和振幅与对照组无明显差别（*P*>0.05）。病理学检查显示，EGF 抗体组右眼视网膜、脉络膜和巩膜厚度明显大于左眼（*P*<0.05）。免疫荧光显示 EGF 主要表达于视网膜内核层，而 Real-time PCR 结果显示，EGF 抗体可抑制视网膜内源性 EGF 及 EGFR 的 mRNA 表达（*P*<0.05）。Western Blot 结果进一步明确了 EGF 抗体组右眼的 EGF 及 EGFR 表达量明显低于左眼，且右眼 p-AKT 和 p-PI3K 的水平明显降低（*P*<0.05）。
结论：玻璃体腔内注射 EGF 抗体可通过调节 EGFR/AKT/PI3K 通路抑制近视豚鼠的眼轴延长

PU-025

Bruch 膜厚度及 RPE 细胞密度与眼轴关系的研究

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目的：最新研究表明，Bruch 膜的主动重塑可能在近视眼轴延长的过程中发挥重要的作用，本实验旨在探究近视豚鼠 Bruch 膜厚度与眼轴的关系。
方法：将 40 只 3-4 周龄豚鼠平均分为对照组和实验组，实验组豚鼠右眼佩戴-12.0 D 透镜 5 周，对照组豚鼠不作处理。在实验前后用 A 型超声分别测量每只豚鼠的双眼眼轴，5 周后处死豚鼠并摘除右眼眼球，行组织病理学检查，分别于锯齿缘、赤道部、后极部、赤道部与后极部中点测量各眼的 Bruch 膜厚度、RPE 细胞密度、视网膜厚度、脉络膜厚度及巩膜厚度。用独立样本 t 检验比较两组

豚鼠右眼的眼轴长度及光镜下各测量指标，应用线性相关分析检测 40 只豚鼠眼轴与 Bruch 膜厚度、RPE 细胞密度的关系。
结果：实验前，两组豚鼠的双眼眼轴均无明显差别（8.10 ± 0.11 mm versus 8.13 ± 0.08 mm; P = 0.33），实验后对照组豚鼠右眼眼轴明显短于实验组（8.91 ± 0.08 mm versus 8.74 ± 0.07 mm; P < 0.001）。两组在各个部位的 Bruch 膜厚度上无显著差异（锯齿缘: P = 0.41; 赤道部: P = 0.41; 赤道部与后极部中点: P = 0.13; 后极部: P = 0.89），眼轴长度与锯齿缘、赤道部、后极部、赤道部与后极部中点的 Bruch 膜厚度均无明显相关性（P > 0.05）。实验组赤道部、赤道部与后极部中点处的 RPE 细胞密度明显高于对照组（P < 0.05），眼轴长度与后极部、赤道部与后极部中点的 RPE 细胞密度呈负相关（P < 0.05）。
结论：近视眼轴的延长不伴有 Bruch 膜厚度的改变，但会伴有赤道后 RPE 细胞密度的降低。以上结果均表明，赤道后 Bruch 膜在近视眼轴延长的过程中可能发挥着重要的作用，其主动增殖重塑作用可能是近视眼轴延长的始动因素之一。

PU-026
干眼患者在滴入玻璃酸钠后 IOL-Master 700 参数的变化

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摘要：目的 研究滴入玻璃酸钠后 IOL-Master 700 参数的变化，为提高生物测量的准确性提出建议。方法 采用前瞻性观察研究，将自愿入组的门诊患者根据干眼相关检查的结果分为重度干眼组、轻中度干眼组和无干眼组，所有患者行 IOL-Master700 生物测量后，滴入 1 滴 0.1%的玻璃酸钠滴眼液（海露，德国），随机选择间隔时间为 5 min 、10min 或 15 min，再次行 IOL-Master700 生物测量，比较滴入玻璃酸钠前后眼轴长(AL)、中央角膜厚度（CCT）、角膜曲率（K）、人工晶体度数(D)的差异。结果 （1）对于重度干眼组，滴玻璃酸钠后 5min 及 10min，AL、CCT 及 D 有增大的趋势，K 有减小的趋势。晶体度数最大增大 1.0D。15min 后，IOL-Master 参数回到干预前水平。（2）轻中度干眼组，各时间组滴玻璃酸钠前后，IOL-Master 参数均无明显差异。（3）对于无干眼组，滴玻璃酸钠后 5min，AL、CCT、K 有增大的趋势，D 有减小的趋势。晶体度数最大减小 0.5D。随着时间的延长，滴玻璃酸钠后 10min 及 15min，除了 AL、CCT 增大的趋势有统计学差异，其他参数均无明显差异。结论：对于重度干眼患者，建议滴入 1 滴玻璃酸钠后 10min 再行生物测量，可能得到较优化的结果。但是对于尚未确诊干眼的患者，如果测量前贸然滴入玻璃酸钠滴眼液，反而可能增大生物测量的误差。

PU-027
Does the degree of dry eye affect the measurement of IOL-Master 700?

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Objectives: The purpose of this study was to assess the measurement of IOL-Master 700 in dry eye patients with different degrees.
Materials and Methods: Participants underwent IOL-Master 700 measurements and then were selected into severe eye group (group A), mild-moderate eye group (group B) and non-dry eye group (group C). The following parameters were evaluated: central axial length (AL), corneal thickness (CCT), corneal curvature in flat axis (K1), corneal curvature in steep axis (K2), corneal astigmatism (K2-K1) and predicted intraocular lens diopters (D).

Results: 120 right eyes of 120 patients were enrolled to the study with 40 patients in each group. The groups were similar in terms of age and gender. The CCT decreased and the K1K2 increased significantly in group A compared with group C (532.8±35.2μm vs. 550.1±27.5μm , P=0.021; 43.6±1.0 vs. 42.8±1.3, P=0.005; 44.4±1.2 vs. 43.7±1.4,P=0.032), whereas no significant difference was observed in group B (P = 0.114, P=0.094, P=0.675 vs. group C). The mean AL, corneal astigmatism(K2-K1) and D were 23.7±0.9,0.8±0.6,20.1±2.8; 23.7±1.1,0.9±0.6,19.9±2.9;23.7±1.0, 0.9±0.6, 20.6±2.5 in group A,B and C and no significant differences were noted between the 3 study groups(P＞0.05).
Conclusion: Decreased CCT and increased corneal curvature in several dry eyes could be noted in the measurement of IOL-Master 700.

PU-028

使用综合验光和快速散瞳验光两种方法评价青少年近视屈光度测定的效果

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目的：比较综合验光和散瞳验光对青少年近视屈光度的测定效果。
方法：选取我院 2017 年 12 月到 2018 年 12 月门诊就诊的已确定为真性近视的青少年患者 120 例，按照屈光度不同分为两组，近视度在-0.75~-400 度之间 78 例分为组 1，近视度数大于-400 小于-6.00 度之间 42 例分为组 2，散光在 0~-2.00 度之间，先后使用综合验光和快速散瞳验光测定近视屈光度。
结果：组 1 的综合验光得到的平均验屈光度为-2.25±0.75，复方托吡卡胺快速散瞳插片得到的平均屈光度为-1.75±0.50，综合验光仪验出的屈光度比散瞳插片验出的屈光度高；组 2 的综合验光得到的平均屈光度为-4.75±0.50，快速散瞳插片得到的平均屈光度为-4.50±0.50，综合验光仪得出的屈光度略高于散瞳验光结果。
结论：青少年调节能力强，电脑结果往往大于实际屈光度。在临床检查中，散瞳验光主要是利用散瞳药将睫状肌充分麻痹后再进行验光，其优点是能有效解除青少年睫状肌调节过强及痉挛，准确性更高，同时还可以治疗假性近视。综合验光法虽然可以通过雾试法等减少调节，但也需要通过患者的一些主观回答调整镜片度数，尤其不适用于初诊的青少年近视患者，但对于近视多年的并且屈光度在-400 度以上的青少年患者可以使用综合验光法验光配镜。

PU-029

黑色素镜片应用

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发明概要(目的）：本发明提供了一种用于吸收紫外线、可见光和近红外线的黑色素镜片。主要特点是黑色素作为光吸收色素在光学透镜或滤光器中的具体应用。
方法：利用黑色素吸收到塑料和玻璃光学透镜以保护眼睛和皮肤不受来自人造光源和自然光源的辐射造成的伤害,黑色素吸收的辐射波长最高达 2500 纳米，最低达到约 200 纳米,随着辐射波长缩短，黑色素吸收的辐射量不断增加,任何将黑色素放置于眼睛前部的镜片都对角膜及其晶体视网膜提供辐射防护作用

本发明是将与人晶状体中与晶状体的光透射谱相关的材料相同的合成材料吸收到塑料和玻璃光学透镜以及其它多种滤光器中
结果 ：本发明，天然黑色素或合成方法制备的黑色素或任何其它类型的黑色素都可以用于光吸收色素.

黑色素能够与超氧化物发生反应，从而防止超氧化物损害眼睛的角膜和/或晶状体。都可以防止超氧化物对眼部造成损伤以及上述的其它有害影响，本产品的另一个特点是具有耐光性。
结论 ：黑色素作为辐射防护介质中的光吸收色素的优点包括：
这种镜片能够较好地保护视网膜和晶状体，同时不对色觉产生干扰。
戴上一副黑色素 眼鏡就可以通過選擇性過濾來保護眼睛
Melanin 眼鏡－減少眩光，增強視覺感受
Melanijn 眼鏡過濾了會在眼睛中產生反射和散射光的紫外線與 HEV 光線，從而大大減少眩光並且增加視覺對比度
Melanin 眼鏡－通過吸收一定比例光線的頻譜，而不是簡單地阻隔高能量光線，從而減少有害 HEV 光線，並且不損害顏色的原有色彩

PU-030
青光眼患者脑视觉可塑性训练前后双眼视功能变化的研究

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目的：本研究旨在探讨青光眼患者脑视觉可塑性训练前后双眼视功能变化的情况
方法：
入选 42 例青光眼患者，对入选患者进行以下眼科基础检查,包括裸眼视力、矫正视力、裂隙灯，眼压，眼底照相、OCT、视野，头部 CT 或 MRI 排除颅内病变，随后进行脑视觉功能检查，个性化的脑视觉短期可塑检查。观察所有患者训练前后的各项指标，进行对比分析。采用 SPSS21.0 软件进行统计学分析，异 P<0.05 作为统计学差异标准。
结果： 42 例患者经过短期可塑性训练（取变化最大的眼睛训前训后数值分析，两个眼睛提升行数一样优先取视力较差眼，有视力下降优先取视力下降眼），一共取得了 34 个符合要求的样本，短期可塑性训练前视力均值 0.64，训练后视力均值 0.77，t 检查 p<0.0001.42 例患者经过脑视觉检查，其中精细立体视觉缺损最严重，占比 78.5%(33/42),水平知觉眼位异常患者占比 31.4%(11/42),垂直知觉眼位异常患者占比 45.7%(16/42),粗糙立体视异常患者占比 30.9%(13/42),运动立体视异常患者占比 42.8%(18/42).
结论：青光眼患者存在知觉眼位、精细、粗糙立体、运动立体视觉等脑视觉功能异常
青光眼患者知觉眼位垂直偏差损害大于水平偏差损害
脑视觉可塑性训练有可能改善青光眼患者的视功能

PU-031
双通道系统评估甲状腺相关眼病的视觉质量及相关因素分析

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目的：采用 OQAS 视觉质量分析仪评价甲状腺相关性眼病（TAO）的视觉质量并分析相关影响因素。
方法：共收集 TAO 患者 31 例作为 TAO 组，其中活动期 TAO 28 眼，非活动期 TAO 34 眼；正常的

受检者共 31 例。检查内容包括视力、眼压、睑裂高度、眼睑闭合不全程度、眼睑退缩量和眼球突出度并进行眼表 Schirmer I 试验和 BUT 测量。采用 OQAS 测量在 100%、20%、9%对比度下的 OQAS 值（即 OV100%、OV20%、OV9%），并检测客观散射指数（OSI）、调制传递函数截止频率（MTF cutoff）、斯特尔比值（Strehl ratio, SR）及反映泪膜的 OSI 平均值（Mean OSI）。**结果：**TAO 组 OSI、Mean OSI 均显著高于正常对照组，而 OV100%、OV20%、OV9%、MTF cutoff、SR 均显著低于正常对照组，差异均有统计学意义（均 *P*＜0.05）。非活动期和活动期 TAO 患者睑裂高度、眼睑闭合不全程度、眼睑退缩程度、BUT 时间、眼球突出程度、眼压之间差异均具有统计学意义（均 *P*＜0.05），所有视觉质量参数和 Schirmer I 差异均无统计学意义。TAO 患者 OSI 与睑裂高度呈负相关（r=-0.296, P=0.020），与 NO SPECS 分级、年龄、Mean OSI 呈正相关(r=0.469, P＜0.001；r=0.429, P=0.001；r=0.836, P＜0.001)；Mean OSI 与睑裂高度呈负相关（r=-0.252, P=0.048），与 NO SPECS 分级、年龄、眼压呈正相关(r=0.404, P=0.001；r=0.347, P=0.006；r=0.311, P=0.014)。**结论：**TAO 患者活动期和非活动期的视觉质量均较正常人下降，干眼程度更重，且视觉质量与年龄、睑裂高度、NO SPECS 分级、Mean OSI 等有关。

PU-032

白内障术中手法剥除后囊下膜状物的临床观察

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目的：分析白内障患者后囊下膜状物存在的高危因素；观察白内障术中手法剥除膜状物的可行性与有效性。HE 染色及透射电镜下观察其超微结构。方法：收集 2017 年 1 月至 2018 年 1 月在我院接受白内障的患者术中发现存在后囊下膜状物者 11 例 13 眼。分析后囊下存在膜状物的白内障类型。13 眼均采用手法剥除膜状物。术后随访 3~14 月。显微镜下观察术中及术后远期并发症发生情况及后囊情况。结果：11 例 13 眼中，硅油眼并发性白内障 3 例 3 眼；外伤性白内障 2 例 2 眼；葡萄膜炎并发性白内障 2 例 2 眼；糖尿病性白内障 1 例 2 眼；先天性白内障 1 例 1 眼；青年白内障患者 2 例 3 眼。11 眼膜状物被完整撕除；2 眼因膜状物纤
细未细未完整撕除。13 眼术中均未发生悬韧带断裂、后囊破裂及玻璃体脱出等并发症。13 眼中 1 眼因葡萄膜炎未一期植入 IOL，余 12 眼均囊袋内植入 IOL。至末次随访时，完整剥膜状物的 11 眼均未再发生新的膜状物，且后囊无混浊及囊袋皱缩；植入 IOL 的 10 眼均未发生 IOL 的偏斜及移位。未完整剥除膜状物的 2 眼后囊下混浊范围无明显扩大，囊袋无皱缩，IOL 无偏斜及移位。HE 染色证实其结构为纤维结缔组织，电镜观察其结构为Ⅲ型胶原纤维。结论：硅油眼、眼外伤、葡萄膜炎、糖尿病、发病年龄早是白内障患者存在后囊下膜状物的高危因素。病理结果证实膜状物为Ⅲ型胶原纤维为主要成分的纤维机化膜。手法剥除膜状物安全可行。膜状物的成功剥除可避免 YAG 激光后囊切开术及前段玻切术对眼后节的扰动，且为功能性 IOL 的植入创造了条件。

PU-033

Closed Continuous-Loop Suture: A Novel Surgical Technique for Transscleral Fixation of Intraocular Lenses

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PURPOSE: To evaluate a novel surgical technique for transscleral Fixation of intraocular lens (IOL) with 4 hollow haptics using a closed continuous-loop suture.

METHODS: A closed continuous-loop suture fixation of an Akreos IOL was performed in 13 eyes of 12 patients with aphakia, insufficient capsule support and posteriorly dislocated Akreos IOL. Best-corrected visual acuity (VA), preoperative and postoperative astigmatism, intraocular pressure (IOP) and complications were determined.
RESULTS: The IOLs were fixed with exact centration and axial stability. The mean preoperative corrected distance visual acuity (CDVA) was 0.86 ± 0.74 logMAR，and it improved to 0.39 ± 0.32 logMAR at the final follow-up (P < 0.05). The mean preoperative astigmatism was 1.65 D (range 0.5 to 4 D) and the mean postoperative astigmatism was 0.88D (range 0.5 to 2.25D). The difference was statistically significant (P<0.05). No intraoperative complications were observed. Postoperative complications included transient vitreous hemorrhage in one eye, which was quickly absorbed without medical intervention. No suture erosion, suture loosening, hypotony, scleral atrophy, and chronic inflammation were observed in any of the patients.
CONCLUSION: We have developed a new technique for transscleral IOL Fixation. Closed continuous-loop suture technique has achieved a reliable and reproducible procedure with improved anatomic and visual outcomes, reduced complications, and decreased surgical times.

PU-034
准分子激光原位角膜磨镶术治疗薄角膜近视散光眼的疗效及远期角膜生物力学状态分析

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[摘要]目的：探讨准分子激光原位角膜磨镶术（LASIK）治疗薄角膜近视散光眼的疗效，以及患者远期角膜生物力学状态变化情况。方法：收集 2010 年 1 月-2012 年 1 月在我院采用 LASIK 治疗的 60 例（120 眼）薄角膜近视合并散光患者的临床资料，于 2018 年 1 月进行回访复查，平均随访时间（81.16±8.83）个月，结合临床资料及复查结果，比较 2 组患者术前、术后 6 个月、末次随访的眼视力、屈光度、角膜地形图参数及角膜生物力学参数。结果：L 术后 6 个月及远期回访患者的 SE、UCVA、AveK、CRG、CH 均明显低于术前水平（P<0.05），SRI 与术前无明显差异（P>0.05），SAI 水平明显高于术前水平（P<0.05）；但远期回访时患者的 SE、UCVA、AveK、SRI、SAI、CRG、CH 水平与术后 6 个月时指标相比均无明显差异（P>0.05）。结论：LASIK 治疗薄角膜近视合并散光眼效果显著，术后远期角膜生物力学指标虽有降低，但无明显改变，表明 LASIK 术后远期角膜生物力学指标稳定。

PU-035
翼状胬肉切除联合角膜缘干细胞移植术后角膜屈光状态的变化

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目的 探讨翼状胬肉切除联合自体角膜缘干细胞移植术后角膜屈光状态的变化。**方法** 选取我院 2016 年 10 月至 2018 年 12 月住院收治的翼状胬肉 90 例，术前测量胬肉进入角膜缘的范围大小，并应用角膜地形图、屈光度、检影验光法对术前术后角膜散光的变化和视力进行测量和分析。**结果** 所有 90 例翼状胬肉患者术前均存在不同程度的散光，以顺规性散光为主，且与胬肉进入角膜缘的范围大小成正比。术后 1 个月视力有明显提高，散光度明显下降，经统计学分析术前术后散光度变化有统计学意义（P<0.05）。术后 1 个月和术后 3 个月视力和散光度无明显变化，经统计学分析无统计学意义（P>0.05）。**结论** 翼状胬肉主要可引起角膜出现顺规散光，且散光度与胬肉进入角膜缘的范围大

小成正比。翼状胬肉切除联合自体角膜缘干细胞移植术后可以明显提高患者的视力、改善患者散光情况。术后 1 个月和 3 个月视力和散光度无明显变化。

PU-036

个体化角膜屈光手术患者围手术期干眼的相关研究

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目的：通过对屈光不正患者手术前后干眼检查结果的研究，为术前排除手术禁忌症，术后预防和减轻干眼的发生奠定基础。并为患者个体化治疗、用药提供理论基础，满足患者摘掉眼镜愿望的同时提高患者的视觉质量及术后舒适度。方法：对不同屈光不正患者进行干眼筛查，根据检查结果进行研究。方案：收集近视眼激光治疗中心屈光不正患者干眼的筛查结果、Schirmer Ⅰ试验,Schirmer Ⅱ试验,泪膜破裂时间(BUT)检测、荧光素染色及瞬目次数、光学相干断层扫描(coptical coherence tomography，OCT)、结板腺分析仪等干眼检查指标的变化，进行研究。结论：利用各种仪器，检查试验分析干眼的相关因素，干眼对屈光不正患者手术的影响，降低屈光不正患者干眼症发病率，提高干眼症的治愈率及减少干眼病症的发生，对目前角膜屈光性手术广泛的开展和技术不断改进、发展 、完善对手术前后干眼方面的研究有着重要的现实意义和深远的临床意义。

PU-037

电针干预对形觉剥夺弱视大鼠视觉诱发电位的影响

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目的：探讨电针干预对形觉剥夺弱视大鼠视觉诱发电位的影响。
方法：Long-Evans 大鼠，雌雄不限，随机分为 3 组，正常对照组、弱视模型组、弱视电针干预组。14 天龄时缝合右眼眼睑制备弱视模型，正常对照组不做任何处理。25 天龄时打开实验组右眼眼睑，弱视电针干预组选取太阳、合谷、百会、攒竹行电针干预，每天 30 分钟。正常对照组、弱视模型组除给予每天与电针干预组同样的捆绑。每周电针干预 5 次，分别于电针干预 15 次、30 次后行闪光视觉诱发动作电位（F-VEP）检查。
结果：1.电针干预 15 次后 F-VEP 结果显示：与正常对照组比，弱视模型组 N1P1、N2P2 波振幅显著降低，具有统计学差异。弱视电针干预组与弱视组比较差异无统计学意义。2.电针干预 30 次后 F-VEP 结果显示：与正常对照组比，弱视模型组 N1P1、N2P2 波振幅显著降低，具有统计学差异。弱视电针干预组与弱视组比较 N1P1、N2P2 波振幅显著增高，差异具有显著性。
结论：1.成功建立了形觉剥夺型弱视 LongEvans 大鼠模型。2.电针干预太阳、合谷、百会、攒竹可以明显改善弱视模型大鼠的视觉诱发电位。

PU-038

散瞳对低度近视青少年角膜水平直径及眼轴长度的影响

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目的：探讨散瞳对低度近视青少年角膜水平直径及眼轴长度的影响及其与年龄的相关性。
方法：选取 2018 年 6-7 月于郑州市第二人民医院眼科就诊的低度近视（≤-3.00D）青少年患者 120 例（240 只眼）作为研究对象，采用复方托吡卡胺滴眼液对患者双眼进行快速散瞳，分为散瞳前、散瞳后两组；依据患者年龄分为两组，分别为 A 组 9-18 岁，B 组 19-28 岁。采用 ZAISS IOL Master 700 测量患者散瞳前后的角膜水平直径和眼轴长度。
结果：A 组患者散瞳后测量的角膜水平直径较散瞳前增大，差异有统计学意义（P＜0.05）；眼轴长度较散瞳前无明显变化，差异无统计学意义（P＞0.05）。B 组散瞳后测量的角膜水平直径较散瞳前增大，差异有统计学意义（P＜0.05）；眼轴长度较散瞳前无明显变化，差异无统计学意义（P＞0.05）。并在散瞳前对 A、B 两组患者角膜水平直径进行比较，差异有统计学意义（P＜0.05）；对两组的眼轴长度进行比较，差异无统计学意义（P＞0.05）。
结论：在低度近视的青少年患者中，散瞳后患者的角膜水平直径较散瞳前增大，眼轴长度无变化；且随年龄增加角膜水平直径变小，二者呈负相关；眼轴长度与年龄相关性不大。

PU-039

Role and mechanism of an unidentified long non-coding RNA and its encoded peptide in regulating retinal cell differentiation

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During mammalian retinal development, the multipotent progenitors differentiate into all classes of retinal cells under the delicate control of various intrinsic and extrinsic factors. Recent studies have showed that long non-coding RNAs (lncRNAs) are an important intrinsic factor regulating retinal cell differentiation. However, the specific mechanism of lncRNAs in retinal development is largely unknown. In early experiments, We analyzed and screened a mass of lncRNAs differentially expressed during mouse retinal different developmental stages by RNA-seq analysis. Here, by using RNA in situ hybridization, gene overexpression, gene knockout, immunostaining and Western blot techniques, we aim to answer the scientific question that whether and how an unidentified lncRNA-we named as 18Rik regulates the differentiation of retinal cells. Our preliminary results showed that 18Rik was expressed in the progenitors during early retinal development, and widely expressed in retinal cells. Overexpression of 18Rik promoted the generation of amacrine, horizontal, and Müller glial cells at the expense of photoreceptors. By analyzing the sequence, we found that there was a short open reading frame (V2sORF, 144 bp) in 18Rik sequence. We hypothesize that V2sORF of 18Rik could code protein, and play a key role in the development process of retinal cells. Further experiments in vitro showed that V2sORF could encode a peptide and colocalized with the marker of mitochondrion, indicating that it is a mitochondrial protein. Furthermore, we showed that misexpressed V2sORF was sufficient to promote the generation of amacrine, horizontal, Müller glial cells at the expense of photoreceptors. Our results suggest that 18Rik may be involved in the differentiation of retinal cells through V2sORF-encoded protein. This project is expected to reveal the new mechanism of lncRNA in regulating retinal development, and provide a scientific basis for establishing lncRNA as a new target for the treatment of retinal diseases.

PU-040

The variation of glutamate and GABA expressions in normal and myopic eye development of guinea pigs

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Objective Information transmission in neural circuits depends on the balance of the inhibitory and excitatory. However, there is an unknown aspect of how the balance in the retina changes in the development of the normal eyes and myopia. To study this issue, in the present study, by observing the normal development of guinea pigs and establishing the model of lens-induced myopia (LIM) in guinea pigs, we studied the changes of the molecule content in retina which could mediate the inhibitory and excitatory. **Methods** 168 three week-old healthy guinea pigs were randomly divided into 0、2、4、6 weeks of normal, myopia of 2 、4、6 weeks (n=8), the both eyes of normal groups were not treated ,while the right eyes of the myopia group were wearing -10D lens and the fellow eyes do not treatment as a control. The refraction and axial length were measured in all groups at the beginning and before death. The guinea pigs were sacrificed in the end of experiment，and the retina were isolated. The expressions of glutamate、GABA and its receptors in retina were assayed by real-time PCR, ELISA and HPLC. **Results** As previously reported, the expression of GABA was up-regulated in the retina of normal and myopia eyes, but the content in the myopia eyes was higher than that in the normal eyes. In addition, our results shown that the glutamate content has the same change trend. Moreover, more importantly, we found that the ratio of the glutamate to GABA also increased, and the ratio of myopia eyes was also higher than that of normal. In addition, the ratio of the normal and myopia group had better correlation with the axial length and the diopter, but the correlation was higher than that of the single glutamate and GABA. **Conclusion** In short, our results show that the normal eyes development relies on the balance of the excitatory and inhibitory, and the abnormal visual information transmission mediated by the broken balance of the inhibitory and excitatory is the main source of myopia signal trigger in the retina.

PU-041

负透镜诱导豚鼠视网膜中谷氨酸及其受体的表达

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目的 观察谷氨酸及其离子型受体 N-甲基-D-天冬氨酸受体 (N-methyl-D-aspartate receptor，NMDAR)功能亚单位 NR2A 在近视豚鼠视网膜上的动态表达，探讨其在近视发病机制中的作用。**方法** 入组前与处死前均进行屈光度及眼轴长度检测，腹腔注射过量水合氯醛处死，并分离视网膜，采用 HPLC 检测视网膜中谷氨酸的含量变化，实时荧光定量 PCR 以及酶联免疫吸附测定（ELISA）分别检测豚鼠视网膜中 NR2A mRNA 及其蛋白水平的表达变化。**结果** HPLC、PCR 及 ELISA 结果：视网膜中谷氨酸及其 NR2A 的表达量，正常组之间差异无统计学意义(P>0.05)。各近视组右眼视网膜中谷氨酸含量逐渐增加，戴镜 2 周与 4 周时相比差异有统计学意义(t=36.23, P<0.01)；近视眼与对侧眼相比差异有统计学意义（t=-23.24, P<0.05; t=-53.69, P<0.01, 配对 t 检验）。近视组右眼视网膜 NR2A mRNA 及蛋白表达随造模时间延长明显上调(P<0.01)，与自身对照眼比较差异有统计学意义（t=-15.086，P<0.005；t=-43.276，P<0.001）（t=-2.365，P<0.05；t=-5.518，P<0.01）。**结论** 负透镜诱导性近视（LIM）豚鼠视网膜中谷氨酸及其 NMDAR 受体亚单位 NR2A 在透镜诱导眼中表达上调，并随透镜诱导时间的延长和近视程度的加深而增加。

PU-042

豚鼠眼球正视化过程中 T-PA 在脉络膜中表达的变化

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目的 研究豚鼠正视化过程中组织纤溶酶原激活物（Tissue plasminogen activator，T-PA）在脉络膜上表达的变化规律。**方法** 选取 3 周龄健康三色豚鼠 40 只，采用随机数字表法分为 4 组，分别于 3 周龄、5 周龄、7 周龄、9 周龄处死，并分离脉络膜，入组前与处死前进行屈光度及眼轴长度检测。采用 SYBR Green I 实时荧光定量 PCR 检测豚鼠脉络膜中 T-PA mRNA 的表达变化，酶联免疫吸附测定 ELISA 监测脉络膜中 T-PA 蛋白水平的表达变化。**结果** 屈光度及眼轴长度：入组前豚鼠屈光状态为远视状态，各组间屈光度及眼轴长度比较差异均无统计学意义（均为 P>0.05）。随着周龄的增加，3、5、7、9 周龄远视屈光度逐渐降低（5.00±0.54，3.46±0.40，2.50±0.30，1.57±0.34）D，眼轴逐渐增加（7.95±0.10，8.31±0.02，8.51±0.03，8.72±0.03）mm，两两比较差异具有统计学意义（均为 P<0.01），各组屈光度及眼轴长度较入组前差异均具有统计学意义（均为 P<0.05）。PCR 及 ELISA 结果：脉络膜中 T-PA mRNA 及蛋白水平各组总体比较差异有统计学意义（P<0.01、P<0.05），且均在豚鼠发育到 5 周龄时表达量增加，与 3、7、9 周龄相比差异均有统计学意义（均为 P<0.05），3 周龄表达量分别与 7、9 周龄相比较差异无统计学意义（均 P>0.05），7 周龄 mRNA 及蛋白表达量与 9 周龄相比差异同样没有统计学意义（P>0.05）。**结论** 在豚鼠眼球发育和正视化过程中，脉络膜 T-PA 在 5 周龄时表达量显著增加，但在之后发育过程中表达量逐渐下降，9 周龄时回落至 3 周龄时的水平。

PU-043
不同散光分型对单眼弱视患者治疗效果的分析研究

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目的：探讨不同类型、度数的散光对单眼弱视患者的疗效影响。**方法：**选取 2014—2018 年间来山西省眼科医院就诊的单眼弱视患儿作为研究对象，回顾其连续 4 年的随访视力作为疗效评价指标。统计分析采用 SPSS23.0 软件，不同散光分组间 4 年随访的患者视力对比采用重复测量方差分析。**结果：**按照散光轴位分为 3 组，顺规散光，逆规散光，斜轴散光；按照散光度数分为 3 组，0D，0.25D～2.00D，大于 2.00D。不同类型、度数的散光分型，组间效应差异均无统计学意义，但时间效应均有统计学意义（P<0.001），图形进一步显示无论哪种散光分型，弱视患者的随访视力均呈现逐年上升趋势。**结论：**不同类型、度数的散光分型对单眼弱视治疗效果的差异无统计学意义，故可采用相同的弱视治疗方案指导治疗不同类型散光的单眼弱视患者。

PU-044
视知觉学习方法与传统弱视治疗仪治疗弱视患者效果分析

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目的：回顾分析对比研究弱视患者采用视知觉学习方法和传统弱视治疗仪二种方法进行治疗的临床效果。 方法：抽取我院收治的弱视疾病患者 56 例（年龄 4-11 岁，平均 6.0 岁），分为对照组和治疗组，平均每组 23 例。对照组采用传统弱视治疗仪治疗，治疗组采用视知觉学习方法进行治疗。对比二组患者治疗前后视力和立体视、弱视治疗总有效率、视力恢复时间、视力提高水平。 结果：治疗组患者在治疗前后视力和立体视总度大于对照组；治疗组视力恢复时间、视力提高水平高于对照组。 结论：弱视患者采用视知觉学习方法进行治疗，可以提高视力，利用人体的视觉焦点缩短治疗时间。

PU-045

ICL 术前/后视网膜厚度和视功能的变化与关系

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目的：探讨 ICL 手术前后视网膜厚度和视功能的变化和关系。
方法：通过上海市第一人民医院医学伦理批准，自 2017 年 9 月至 2017 年 12 月，对患有高度近视，且预行 ICL 手术的患者，在排除相关眼科及全身疾病后，进行了全面系统的检查，最终收录 33 例，包括 16 名男性和 17 名女性，且采取右眼为研究对象，全部患者签署知情同意书。我们对患者术前/术后一个月的黄斑周边半径为 0.5、1.5 和 3 毫米的圆形区域视网膜厚度进行测量。其他数据包括人口信息（年龄、性别）、调节幅度（AA）、等效球镜、眼轴长度。最后采用 T-检验、线性回归和相关分析统计相关数据。
结果：与术前相比，术后 1 个月视网膜厚度明显增厚（$p<0.01$），调剂幅度显著增加（$p<0.01$）。术前/后 1 个月，视网膜厚度（半径 0.5、1.5 和 3 毫米）的变化量均与等效球镜变化量呈正相关（$p<0.05$）。
结论：术后 1 个月，伴随视功能的提高，视网膜厚度明显增加。术前/后视网膜厚度变化与等效球镜变化相关。虽然变化的确切机制还不清楚，推测可能与调节放松相关。

PU-046

FSAK combine T-CAT for the correction of myopic astigmatism with high astigmatism and thin cornea：a case series

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Abstract
Background：Conventional corneal refractive surgeries is difficult to correct myopia and high astigmatism with thin cornea. Femtosecond laser-assisted astigmatic keratotomy (FSAK) and topography-guided custom ablations treatment(T-CAT) have been applied in clinic and achieved good outcomes.
Purpose：The purpose of this case series was to evaluate a strategy of application of FSAK to correct high astigmatism with thin cornea combine T-CAT for the correction of myopic astigmatism.
Case presentation：Five myopia patients with high astigmatism and thin cornea received FSAK performed with Wavelight FS200 Femtosecond. Subsequent T-CAT performed with contoura vision(CV) after more than three months of the FSAK.4 cases underwent T-CAT femtosecond-assisted laser in situ keratomileusis (T-CAT LASIK) and 1 case underwent T-CAT laser assisted subepithelial keratectomy(T-CAT LASEK).The FSAK showed a good efficacy of correcting high astigmatism.After the T-CAT,all cases reached good refractive status and get good uncorrected distance visual acuity (UDVA).
Conclusion：FSAK have a good efficacy of correcting high astigmatism. The nomogram determined by the size, shape and astigmatism type of cornea is a summary of experience, further studies is needed.Although most AK could introduce irregular astigmatism, subsequent T-CAT LASIK or T-CAT LASEK can solve this problem and corrected myopia.FSAK combine T-CAT provide a strategy to correct myopia astigmatism in patients who have high astigmatism with thin cornea. Further randomized and prospective studies with a larger population are needed.

PU-047

结膜松弛症的共聚焦显微镜研究

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目的: 用共聚焦显微镜探究结膜松弛症患者结膜组织的改变。
方法: 本研究用活体共聚焦显微镜研究了 10 例结膜松弛症患者结膜上皮和基质改变，与正常人的结膜组织做了对比。重点对结膜上皮细胞的形态、数量，杯状细胞数量，结膜基质中的纤维组织进行了分析。同时研究了结膜松弛严重程度与共聚焦显微镜下形态表现的相关性。
结果: 与非结膜松弛症患者相比，结膜松弛症患者结膜上皮厚度无变化。然而，杯状细胞明显减少;结膜松弛症球结膜上皮中的杯状细胞密度为(2.75 ±1.02)/100 个上皮细胞，对照组为(4.30 ±2.07)/100 个上皮细胞, 2 组间差异有统计学意义(P<0.05)。 随着结膜松弛症程度加重，球结膜杯状细胞密度降低。结膜基质中的纤维组织在结膜松弛症中变得稀疏、薄而紊乱。结膜松弛越严重的患者，其共聚焦显微镜下所见改变越明显。
结论: 共聚焦显微镜检查可客观反应结膜松弛症患者结膜发生的病理改变，并有可能为结膜松弛症分级的参考。

PU-048

3-15 岁先天性白内障手术前后视网膜神经纤维层厚度变化

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目的：用 OCT 测量评估 3～15 岁单眼和双眼先天性或发育性白内障患者一期人工晶状体植入术前和术后视盘周围视网膜神经纤维层厚度的动态变化，并与年龄匹配的正常儿童进行比较。
设计：前瞻性病例对照临床研究
方法：本研究共纳入 87 名（124 眼）3～15 岁的儿童：单眼先天性或发育性白内障患儿 25 名（50 眼）、双眼先天性或发育性白内障患儿 12 名（24 眼）、年龄匹配的正常儿童 50 名（50 眼）。所有的先天性或发育性白内障患眼均接受白内障摘除并一期人工晶状体植入术，并在术前、术后 1 周、术后 1 个月、术后 3 个月、术后 6 个月和术后 1 年进行 OCT 测量视盘周围视网膜神经纤维层厚度。对白内障患眼术前术后视网膜神经纤维层厚度的动态纵向分析，探究白内障手术对视盘周围视网膜神经纤维层厚度的影响及持续时间；将白内障患者术前和术后随访终点的视网膜神经纤维层厚度，与年龄匹配的对照组正常眼进行比较，探究排除手术影响因素后，先天性或发育性白内障患者的视盘周围视网膜神经纤维层厚度是否存在自身发育异常。
结果：先天性或发育性白内障患眼的视盘周围视网膜神经纤维层厚度在术后 1 个月和术后 3 个月时，较术前水平显著增厚，在术后 6 个月时基本恢复至术前水平。与年龄匹配的正常儿童眼鼻侧、颞下侧的视网膜神经纤维层厚度 相比，白内障患眼术前和术后 1 年鼻侧的视网膜神经纤维层厚度均明显更厚；白内障患眼术前和术后 1 年颞下侧的视网膜神经纤维层厚度均明显更薄。单眼白内障患者对侧“健眼”颞侧的视网膜神经纤维层发育也存在异常。
结论：年龄在 3～15 岁的先天性或发育性白内障患眼术后 1 个月和 3 个月视盘周围视网膜神经纤维层厚度明显增厚，直至术后 6 个月恢复至术前水平，表明手术对 RNFLT 的影响可能持续 3～6 个月。与年龄匹配对照组相比，先天性白内障患者的视网膜神经纤维层厚度较存在异常，形觉剥夺性弱视眼鼻侧较厚、颞侧较薄，单眼白内障对侧“健眼”颞侧较薄。

PU-049

表层角膜屈光术中上皮瓣的保留与否等因素对术后角膜上皮生长的影响

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目的：表层角膜屈光手术术中上皮瓣的保留与否，以及患者年龄、性别、术前屈光度、角膜曲率等因素对术后角膜上皮生长的影响。

方法：收集 2018 年 1 月至 2019 年 12 月于我院行表层角膜屈光手术（一眼保留上皮瓣，另一眼不保留上皮瓣）患者的年龄、性别、双眼术前屈光度、曲率、术后第一天主观疼痛评分，以及第二周、第一月、第三月、第六月的双眼主觉验光、角膜曲率、haze 等级、上皮厚度等数据，对同一患者两眼数据的差异进行比较，并对同一眼不同数据的相关性进行分析。

结果：同一患者两眼的数据存在差异。同一时间段内，不保留上皮瓣的眼术后角膜上皮生长厚度大于保留上皮瓣的眼，haze 等级亦低于保留上皮瓣的眼。术后角膜上皮的生长与患者年龄、患眼术前屈光度呈负相关，与其余因素无明显相关。

结论：表层角膜屈光手术术中，不保留上皮瓣有利于患者术后角膜上皮的生长。患者的年龄越小、术前屈光度越小，越有利于患者角膜上皮的生长。

PU-050

中央孔型有晶体眼人工晶体植入术和 SMILE 术后视觉质量的比较

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目的:对比研究有晶体眼后房型人工晶体植入术(ICL V4c)和全飞秒小切口基质透镜取出术(SMILE)两种屈光手术对视觉质量的影响。**方法:** 使用双通道视觉质量分析系统(OQAS)对我院 2017 年 6 月至 2018 年 8 月期间手术的有晶体眼人工晶体植入术 412 例, 全飞秒小切口基质透镜取出术 568 例屈光不正患者进行视觉质量的评价，两组均在术后 1 天、1 周、1 月随访时记录客观散射指数，调制传递函数，斯特列尔比。**结果:** ICL 和 SMILE 两组视觉质量评价。术后 1 天时调制传递函数值分别为 28.36±10.3, 25.13±9.15. 客观散射指数分别为 1.20±0.54, 1.20±0.64、斯特列尔比分别为 0.12±1.22,0.16±3.76。术后 1 周时调制传递函数值分别为 30.22±2.32, 28.06±1.56, 客观散射指数分别为 0.60±0.13 0.80±0.54、斯特列尔比分别为 0.18±1.07,0.17±3.14。术后 1 月时调制传递函数值分别为 38.45±1.23, 32.13±3.66, 客观散射指数分别为 0.40±1.22,0.50±0.87、斯特列尔比分别为 0.26±1.38,0.24±0.57。**结论**: 双通道视觉质量分析系统可以客观地评价术后患者的视觉质量，有晶体眼人工晶体植入术后视觉质量优于全飞秒小切口基质透镜取出术。

PU-051

蓝光光照对小鼠视网膜形态和功能的影响

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目的：探讨蓝光光照对 C57BL/6J 小鼠视网膜形态和功能的变化。
方法：将 20 只 8 周龄的 C57BL/6J 小鼠随机分为正常对照组和蓝光光照组。蓝光光照组暗适应 24h 后暴露于 10000lux 的光照强度下，对照组饲养于 12h/12h 正常的光照/黑暗周期。光照后所有小鼠进行 OCT 检查，所有小鼠安乐死后摘除眼球做冰冻切片进行免疫荧光染色。
结果：蓝光光照 5 天后小鼠行 OCT 检查，和正常对照组小鼠相比，距离视神经 3mm 的鼻侧、前部、后部及 5mm 的鼻侧、颞侧、前部、后部视网膜厚度均变薄（P<0.05）。冰冻切片行免疫荧光染色显示和对照组相比，视杆和视锥光感受器细胞结构都有所破坏。
结论：小鼠暴露于 5 天的蓝光光照诱导 RPE 细胞和光感受器的损伤引起的变化类似于非渗出性 AMD 患者的眼部表现，视网膜出现明显的形态和功能变化。这些发现表明该模型有助于研究非渗出性 AMD 发展所涉及的机制。

PU-052

功能性近红外光谱技术在疾病研究中的应用

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目的 阐述功能性近红外光谱技术(functional near-infrared spectroscopy, fNIRS)基本原理及在临床疾病中的应用，讨论其优势和不足，并对其在医学领域的研究前景提出展望。
方法 通过检索中国知网、PubMed 等数据库，查阅相关文献，进行资料的整合与分析。
结果 功能性近红外光谱技术是近年来新兴起的一种脑成像技术，其主要原理为将特定波长的近红外光直射于头皮表面，测定大脑皮质中散射光的强度，完成原始光学数据到血氧浓度的转换，实现特定区域氧合血红蛋白与脱氧血红蛋白浓度变化的多点同时测量，进而推知该脑区的血氧与血容量变化。脑的认知是指机体接收和加工信息的过程, 包括记忆、思维、精神、言语及智力和意识功能，目前功能性脑功能成像设备可应用于认知精神科，如视觉障碍、听觉障碍、认知障碍、阅读障碍等；在心理学领域，近红外脑功能成像也应用的非常广泛，如精神分裂症、抑郁症、双向情感障碍、创伤后应激障碍等；基于近红外脑功能成像设备的便携无痛的特点，可应用于特殊人群的疾病诊疗，如低龄儿童多动症或失去自理能力的患者，亦可部分替代 fMRI 或 EEG 功能；近红外脑功能成像设备在脑梗死、癫痫、注意缺陷多动症 (ADHD) 等神经病科的诊疗康复中也有着广阔的应用前景。
结论 近红外脑功能成像设备是一种基于近红外光谱技术研究大脑活动的手段，信息相对 fMRI 和 EEG 内容更加丰富，非常适合于实时监测受试者在执行认知任务过程中脑血氧变化的时间空间响应性，但是作为一种新兴技术，对脑部检测的深度尚有局限性。尽管存在一些不足，总体来说该技术具有较高的时间分辨率和相对适中的空间分辨率；且具有安全、无痛、便携的优势，具有较高的临床使用价值和应用前景。

PU-053

非斜视性双眼视功能异常的病例分析

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摘要：本文主要叙述关于非斜视性双眼视功能异常的相关病例分析与处理。其表现相对隐蔽，需要视光师对患者进行全面的视功能检查，才能做出准确诊断。非斜视性双眼视功能异常主要表现在两大方面：一、集合性视功能异常，包括集合不足和集合过度；二、调节性视功能异常，包括调节不

足、调节过度、调节灵活度下降。本文通过我在平时工作中积累的相对复杂、有代表性的实例介绍非斜视性双眼视功能的检查、分析以及处理。
目的：作为一名视光师，我们应该在工作过程中为患者灌输正确的用眼意识；同时，运用我们自身的专业知识，为患者解决眼部问题。并且，我们应该不断深入学习，汲取各个领域的知识，更好地为患者服务。
方法：双眼视功能包含两大方面：一方面是保持双眼调节与眼球运动的联动功能，另一方面是大脑中枢性的双眼融合功能。本文主要讨论第一方面所引起的症状。眼睛为了看清远近不同距离的物体，需要通过眼睛的调节以及眼肌的协调运动，由于调节与集合在生理功能上有着良好的协调性，在神经支配上有着相近途径，所以在看近时，会出现近反射三联动现象（眼睛的调节、集合、瞳孔缩小）。但是，当睫状肌调节状况不良、眼外肌的协动不良时，观看远近不同距离的物体时，会出现视觉障碍，例如，视物模糊、头痛、眼胀、复视或间歇性复视，视物不能持久，注意力无法集中等等。故而给患者的工作、学习带来影响，视光师需要为其进行精准的验光和视功能检查，并为其提供解决方案。
结果：通过分析，患者是由于集合不足而过多动用调节性集合来代偿，造成调节超前，长期过多使用调节导致了调节痉挛。因此，患者出现视远视近均模糊的症状。
结论：由于该患者 AC/A 数值低常，不适合附加球镜，此处不赘述附加球镜计算方法。

PU-054

Incidence of Posterior Vitreous Detachment after Congenital Cataract Surgery: An Ultrasound Evaluation

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PURPOSE It has been found that cataract surgery will increase the incidence and severity of posterior vitreous detachment (PVD) in adults. We hypothesized that the mechanism underlying this effect can also be found in congenital cataracts. So we investigated the development of PVD in children after congenital cataract surgery, as well as risk factors associated with these changes.
METHODS A prospective and cross-sectional study recruited children with congenital cataract who have undergone cataract surgery. The patients were divided into two groups depending on the extraction with/without IOL implantation. B-scan ultrasonography was performed before the surgery and 1, 3, 6, 9 and 12 months respectively after the surgery.
RESULTS Among the 85 eyes, 52 became aphakic and 33 pseudophakic. The overall postoperative PVD rate was 8% (7 of 85 eyes). Aphakic eyes underwent surgery at an early age compared with pseudophakic eyes ($p<0.01$). And the mean axial length (AL) of pseudophakic eyes (21.45±2.12mm) was significantly higher than that of aphakic eyes (19.26±1.92mm) ($p<0.01$). After 12 months, PVD occurred more frequently in eyes that have undergone cataract surgery with IOL implantation (18%, 6 of 33 eyes) as compared to eyes without IOL implantation (2%, 1 of 52 eyes).
CONCLUSIONS PVD develops in eyes that have undergone congenital cataract surgery, especially in those with IOL implantation. To our knowledge, this is the first study to analyze and investigate PVD after congenital cataract surgery. These findings may be clinically useful for predicting the progression of PVD.

PU-055

利用 hiPSC 诱导形成的类视网膜模型研究视网膜神经节细胞退行性疾病

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目的：青光眼及视神经萎缩等视网膜神经节细胞（retinal ganglion cells, RGC）退行性疾病是全球范围内导致失明的主要疾病。RGC 的衰老、损伤、变性和凋亡，直接导致了视功能的损害。本研究以遗传性常染色体显性视神经萎缩（autosomal dominant optic atrophy, ADOA）为例，利用病人特异性诱导多能干细胞（iPSC）形成的类视网膜模型深入研究视神经退行性疾病的发病机制，以及探索延缓病变的靶点，为治疗视神经损伤提供思路。
方法：通过诱导正常人及 ADOA 病人的尿液细胞形成 iPSC 细胞系；利用 3D 视杯培养法将 iPSC 诱导形成类视网膜结构，建立 ADOA 疾病模型；比较正常人和病人的类视网膜结构中 RGC 的形态、生理功能、分子调控网络差异；利用 CRISPR/Cas9 修复病人 iPSC 中致病突变位点，观察修复前后类视网膜结构中 RGC 的变化。
预期结果：病人 iPSC 形成的类视网膜结构中 RGC 的数量、形态结构、生理功能及分子调控机制与正常人的有差异；病人 iPSC 中致病突变位点修复后，能恢复病变 RGC 引起的差异指标。
意义：本研究的结果将对研究视神经退行性疾病的发病机制以及探索延缓视神经节细胞的衰老、损伤及病变的靶点等提供基础。

PU-056

Use hiPSC-Derived Retinal Organoids to Study Retinal Ganglion Cell Degenerative Diseases

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Objective: Glaucoma, optic atrophy and some other retinal degenerative diseases which have retinal ganglion cell injury are the main causes of blindness in the world. The senescence, damage, degeneration and apoptosis of retinal ganglion cells (RGC) will directly harm vision. Taking hereditary autosomal dominant optic nerve atrophy (ADOA) as an example, in this research patient-specific hiPSC-derived retinal organoids were used to study the pathogenesis of optic nerve degenerative diseases and explore the target of delaying lesions. It provides ideas for the treatment of optic nerve injury.
Methods: Urine cells of healthy people and ADOA patients were reprogrammed to iPSC. iPSC was induced to generate retinal organoids through 3D optical cup culture method to establish ADOA disease model. The morphology, physiological function and molecular regulation network difference of RGC in the retinal organoids of healthy people and patients were compared. Using CRISPR/Cas9 to repair the pathogenic mutation sites in the iPSC of patients and observe the changes of RGC.
Expected results: The numbers, morphology, physiological function and molecular regulation network of RGC in the patient-specific iPSC-derived retinal organoids would be different from those of healthy people, and these features of RGC would be restored after the repair of pathogenic mutation sites in the patients' iPSC.
Significance: The results of this research will provide a basis for studying the pathogenesis of optic nerve degenerative diseases and exploring the target of delaying the aging, injury and lesion of optic ganglion cells.

PU-057

Globally Normal Bistable Motion Perception of Anisometropic Amblyopes May Profit From an Unusual Coding Mechanism

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Amblyopia is a neurodevelopemental disorder of the visual system, which caused by an imbalance in visual input during cortex development, mostly in infancy. Anisometropic amblyopia, the subtype we focused on in our study，is typically due to the presence of a chronic blur. These conditions result in a weakening or suppression of the input from the amblyopic eye, and thus, this input is processed abnormally within the visual cortex. Increasing evidence from recently studies has demonstrated that the neural deficits of amblyopes spread across visual areas, from the primary cortex up to higher brain areas, including motion coding structures such as MT. To investigate change in the underlying mechanisms of motion integration and segmentation, we used bistable plaid motion as the psychophysical paradigm, and compared the performing differences between anisometropic amblyopes and normal-sighted subjects.
The stimulus, that is the bistable plaid motion, comprised two rectangular-wave gratings presented through a circular aperture. All physical parameters of these two gratings were same, except the moving direction. Gratings moved in directions 90° apart. By adjusted the direction of each grating, the coherent pattern then perceived as moving upward or leftward, respectively. All subjects were told to passively report the percepts (coherent or transparent) by pressing two keyboard keys during 2 min of stimuli presentation.
By analyzing the frequency of perceptual switches and the duration of two percept type, data demonstrated mainly two results. First, our group of amblyopes globally exhibited normal bistable perception when compared to the control group. Second, decreased contrast led to a stronger increase in percept switched and decreased percept durations in control, while amblyopes exhibited no such change. To understand the role of noise and adaptation in such cases of bistable perception, we also analyzed predictions from a model and found that contrast indeed affect percept duration and switches as we found in control group.
All of our experimental and computational results suggested a different motion coding mechanism in the amblyopic visual system, with relatively little effect of stimulus contrast on amblyopes' bistable motion perception.

PU-058

染色质开放性分析揭示了人胚胎视网膜和人胚胎视网膜类器官发育过程中的动态变化

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人视网膜是由多种类型的神经元和神经胶质细胞组成的复杂而精致的神经感觉组织。目前关于哺乳动物视网膜发育的知识主要是从啮齿动物研究中推断出来的。迄今为止，人胚胎视网膜发育的直接分子机制研究仍然很少。源自人诱导多能干细胞的视网膜类器官为视网膜细胞治疗提供了潜在的机

会，并可以作为研究人胚胎视网膜发育和病症的模型。然而，视网膜类器官在多大程度上模拟了人胚胎视网膜发育仍然未知。在这项研究中，我们系统地描述了人胚胎视网膜和视网膜类器官发育过程的染色质开放性和转录组学。我们的研究结果表明，发展中的人胚胎视网膜显示出与视网膜发育相关的独特的染色质动力学特征，并且视网膜类器官在很大程度上重现了这一过程，同时也发现了部分不同的染色质特征。值得注意的是，通过对表观遗传学和转录组谱学的交叉分析，我们发现了人胚胎视网膜发育中必需的新的转录因子，并通过对视网膜类器官进行基因操作得到验证。进一步地，我们重建了体内控制人胚胎视网膜发育的转录调控网络。总结，我们的研究为人胚胎视网膜发育过程中的分子动力学提供了更深入的见解，为研究人胚胎视网膜在体内和体外发育的分子机制提供了平台，发现了新的人胚胎视网膜发育转录因子，并且在人胚胎视网膜发育的指导下提供了未来改进视网膜类器官培养的数据来源。

PU-059

Effect of simulated microgravity on the photopic negative response of flash ERG in adult mice

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Objective To observe the effect of simulated microgravity on the photopic negative response (PhNR) of full-field flash ERG in adult mice. **Methods** Thirty six adult male C57BL/6J mice (36 eyes) were randomly assigned to three model groups and three control groups of 6 each. Suspend the model group mice via tail-suspension for 15 or 30 days. Another model group was suspended for 30 days, and then followed by removing suspension for another 30 days. Three control groups maintained normal position for 15, 30 or 60 days. The model groups were immediately examined by ERG-PhNR and visually-guided behavior in vivo, and then sacrificed for retinal morphology. Independent sample *t*-test or one-way ANOVA with least significant difference (LSD) post hoc test was used for data comparison between or among groups. **Results** After 15-days suspension, the amplitude of the PhNR was (36±8) μV, 77% of the control level (*t*=-2.617, *P*＜0.05). After 30-days suspension, the PhNR showed an average size of (43±10) μV; compared with the control group (50±5) μV, no significant difference was found (*t*=-1.649, *P*＞0.05). All suspended groups showed normal retinal structure, similar inner retinal thickness and visually-guided behavior of healthy mice (*F*=1.638, 0.852, all at *P* ＞ 0.05). **Conclusion** Via tail-suspension, short-term simulated microgravity can affect the PhNR of flash ERG; however, the change is reversible and does not affect visual function of mice.

PU-060

icare 回弹式眼压计与非接触眼压计（NCT）对正常人眼压的测量比较

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目的：
非接触眼压计（NCT）近几十年来因其操作简单方便，在临床工作中广泛应用。icare 回弹式眼压计，设计体积轻巧，便于携带，操作方便，由于是手持式眼压计，携带便捷，较适合于下基层普查携带。本试验对 icare 回弹式眼压计与非接触眼压计对正常人眼压的测量结果及舒适度等主观评价做对比分析。

方法：对 2018 年 10-12 月间来我中心做常规屈光检查患者，排除眼前节异常及眼内手术的 166 人（332 只眼），行 icare 回弹式眼压计与 NIDEK 非接触眼压计眼压测量及主观问卷。并采用 SPSS-25 统计学软件对眼压数据进行成对样本 T 检验分析，P<0.05 为差异有统计学意义；用威尔克克森符号秩检验对两种检测方法舒适度进行非参数分析。
结果： icare 回弹式眼压计平均值为（16.58±4.158mmHg），非接触眼压计平均值为（16.27±4.088mmHg），T 检验 t=1.73，P=0.085，两者间差异无统计学意义。其中 icare 眼压计测量值>NCT 测量值 162 眼，icare 眼压计测量值<NCT 测量值 126 眼，测量值相等为 44 眼。
受试者对两者间舒适度评价 icare 眼压计舒适度优于 NCT 测量舒适度者 57 人，NTC 舒适度优于 icare 眼压计者 14 人，余 95 人舒适度评分相等。
结论：本试验结果表明非接触眼压计测量眼压与 icare 回弹式眼压计测量眼压具有较好的相关性，且二者的测量结果相对接近，。icare 回弹式眼压计在接近或高于正常眼压上限范围时，测量结果较非接触眼压计偏高，有假阳性可能。两者共同的优点符合正常人群体检以及高眼压和青光眼的筛查需求，当非接触式眼压计不能配合时，可以采用 icare 回弹式眼压计测量，其体积小巧、便携，测量舒适度良好；两种眼压计可以互补，均可为眼科常规眼压检查、高眼压的筛查以及眼科普查等精便服务。

PU-061

低度近视青少年配戴角膜塑形镜与配戴框架眼镜调节幅度的对比观察

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目的 为了探讨近视青少年配戴角膜塑形镜与配戴框架眼镜一年后对调节幅度的变化影响，以期寻找最有利于其双眼视功能的屈光矫正方案，为近视的青少年获得良好的双眼调节能力，精确的屈光矫正提供依据。**方法** 本文选取了 2014~2017 年来我视光中心验光配镜的 80 例近视的青少年，近视度数≤-3.00D，散光≤-1.00D，其中 40 例配戴角膜塑形镜，40 例单配戴框架眼镜，并且排除眼部疾患、无屈光参差，无明显斜视、无弱视，年龄 9~14 岁，矫正视力均≥1.0。分组按照初次应用综合验光仪验光配镜，常规进行单眼屈光、双眼平衡,并测量所有患者调节幅度量后,分为角膜塑形镜与框架眼镜调节幅度低于均值组和角膜塑形镜与框架眼镜调节幅度高于均值组，分别比较。观察一年后,两组患者调节幅度的变化，应用综合验光仪常规进行单眼屈光、双眼平衡,并测量所有患者调节幅度量。采用了两个独立样本 t 检验,进行统计学分析。**结果** 研究显示所筛查的 9~14 岁近视青少年，调节幅度低于均值的青少年配戴角膜塑形镜与配戴框架眼镜者一年后调节幅度的差异具有统计学意义（P＜0.05），调节幅度高于均值的青少年配戴角膜塑形镜与配戴框架眼镜者一年后调节幅度差异无统计学意义（P＞0.05）。**结论** 通过观察和分析证明,调节幅度低于均值的低度近视青少年配戴角膜塑形镜较配戴框架眼镜者调节幅度改善更加明显,为了近视青少年的视功能保持正常,生活阅读中减少视疲劳的产生，调节幅度需要有足够的储备,进而在近视发展阶段,调节幅度低于正常值的青少年选择配戴角膜塑形镜可更好改善调节幅度,获得更好的视觉效果。

PU-062

镜片折射率对戴镜舒适度的影响

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目的：为了提高配镜成功率，帮助顾客选择最佳折射率的镜片，了解镜片折射率对戴镜舒适度的影响。
方法：随机抽取 2014 年至 2017 年在本中心验配框架眼镜的 1000 名顾客，±4.00D 以内 1176 只眼，±4.25D-±8.00D654 只眼，±8.25D 及以上 170 只眼,结合顾客随访和售后反馈表,找出因折射率问题造成的不成功案例，及各折射率之间差异。
结果：1.初期看东西周围有彩虹边的感觉，经过两周左右适应期，最终适应的 15 人，其中镜片折射 率 1.56 的 3 人，1.6 的 4 人，1.67 的 7 人，1.74 的 1 人。 2.初期看东西周围有光晕的感觉，经过两周左右适应期仍然不能适应的 2 人，均为 1.67 折射率。3.所有因为折射率造成的不舒服者均为近视患者。
结论：1.折射率对凹透镜影响更大。2.一般情况下，折射率越大，阿贝数越小，色散越明显。3.如果折射率高，而阿贝数不变小，色散也会相应变小。4.新研制出的 1.71 折射率镜片，阿贝数比 1.56 和 1.67 折射率高，色散小。所以，度数偏高顾客可以考虑折射率为 1.71 的镜片，配镜成功率高。5.折射率对舒适度的影响因人而异，与自身敏感度和耐受性有关。

PU-063
多巴胺 D4 受体对小鼠正常屈光发育及形觉剥夺性近视的作用

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目的：应用多巴胺 D4 受体(D4R)激动剂 PD-168077 和拮抗剂 L-745870 探讨 D4R 在小鼠正常屈光发育以及形觉剥夺性近视（FDM）中的作用。 **方法：实验研究。 将** 4 周龄 C57BL/6 小鼠分为正常屈光发育组和 FDM 组（单眼剥夺，对侧眼为对照），每组又分为溶剂组和药物组（D4R 激动剂 PD-168077：1 mg/kg 和 10 mg/kg；D4R 拮抗剂 L-745870：1 mg/kg 和 10 mg/kg），所有动物给予 2 周的正常视觉环境或持续形觉剥夺及每日腹腔注射溶剂或药物，其中，正常屈光发育组在 5 周龄时给予视网膜电图*(ERG*）检测。所有动物均在实验前后测量屈光度、眼轴和角膜前表面曲率半径等生物学参数。采用配对 *t* 检验、单因素方差分析、重复测量方差分析对数据进行处理。**结果：**D4R 激动剂 PD-168077 不影响小鼠的正常屈光发育，而 D4R 拮抗剂 L-745870 只有在 10 mg/kg 时促进小鼠正常屈光发育往远视方向漂移（$P = 0.047$），但不影响眼轴等生物学参数。10 mg/kg PD-168077 在刺激强度为*-0.699 log cd s* m^{-2}时升高了暗视 ERG 的 OPs 振幅（$P = 0.04$），而 L-745870 对暗视、明视 ERG 的 a 波、b 波和 OPs 波振幅均无明显影响。PD-168077 促进小鼠的 FDM 进展（$P = 0.004$），伴随着玻璃体腔深度和眼轴的延长； L-745870 可以抑制小鼠的 FDM 进展（$P < 0.001$），同时抑制了玻璃体腔深度和眼轴的延长。前房深度、晶状体厚度、角膜曲率半径等参数不受实验因素的影响。**结论：**D4R 激动剂 PD-168077 或拮抗剂 L-745870 对小鼠的正常屈光发育无明显作用；反之，D4R 激动剂 PD-168077 促进而 D4R 拮抗剂 L-745870 抑制小鼠的 FDM 进展，提示激动 D4R 促进而拮抗 D4R 抑制小鼠的近视进展。

PU-064
激活多巴胺 D2 受体对小鼠形觉剥夺性近视的双向调控作用

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目的：动物模型上的很多研究都表明视网膜多巴胺是一类能调控眼球生长发育与近视进展的一类神经递质。在本课题中，我们研究多巴胺 D2 受体（dopamine D2 receptor, D2R）的激动剂 quinpirole 对小鼠形觉剥夺性近视（form-deprivation myopia, FDM）的作用，以及利用多巴胺 D2 受体敲除（*knockout, KO*）小鼠来研究 quinpirole 是否作用于多巴胺 D2 受体而发挥对近视的调控作用。

方法：D2RKO 和同窝仔的野生型（*Wild-type, WT*）小鼠在出生后的 28~56 日龄内给以持续的形觉剥夺以及每日腹腔注射溶剂或者 quinpirole 药物（高剂量：10 mg/kg/day；低剂量：1 mg/kg/day）。实验前后分别测量各组的体重、屈光、角膜曲率半径以及眼轴长度等生物学参数。
结果：与我们之前的报道一致，与 WT 小鼠相比，D2RKO 延缓了 FDM 的进展。在 WT 小鼠上，高剂量和低剂量的 quinpirole 表现出对 FDM 发展的双向调控作用：高剂量抑制近视进展，而低剂量促进近视的进展。quinpirole 对 WT 小鼠 FDM 的双向调控作用在 D2RKO 小鼠上消失了。与屈光的改变相匹配的是，quinpirole 对 FDM 的双向作用伴随着玻璃体腔深度和眼轴长度一致的变化。而且，在 D2RKO 小鼠上，quinpirole 或者溶剂并不影响 FDM 导致的玻璃体腔和眼轴长度延长的变化。
结论：Quinpirole 能通过激活 D2R 而起着对 FDM 剂量依赖的双向调控作用。由于 D2R 是一类与各种信号转导通路相耦合并且能调制不同反应的 G 蛋白偶联受体，导致 D2R 激动剂对 D2R 的激活会有剂量依赖性的不同作用。

PU-065

Cockayne 综合征

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目的：了解 cockayne 综合征在眼部的表现
方法：通过讲授的形式使大家了解 cockayne 综合征这一罕见病。
结果：分析 cockayne 综合征病因、遗传方式、临床表现、诊断和预后等相关知识。
结论：掌握其以早老为其特征，婴儿期正常，两岁后发病。面容苍老，眼球内陷，身材矮小，背躬，肢体屈曲，肌肉瘦削，皮肤对光敏感性增加，暴露部位常发生水泡;视网膜变性、视神经萎缩及传导性耳聋;脑组织及颅内血管有广泛钙化;所有病人均有精神发育迟滞。瞳孔对散瞳药反应不良。

PU-066

Sp1 转录因子在豚鼠实验性近视眼巩膜重塑中对 I 型胶原表达的调控作用

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目的：研究近视巩膜重塑中 Sp1（specificity protein 1,转录活性蛋白 1）作为 TGF-β1 下游信号转录基因的表达情况和调节 I 型胶原(collagen I)表达的作用。 **方法：**出生 1 周的三色豚鼠 75 只，6 号半透明乳胶气球作为头套诱导形觉剥夺性近视动物模型。随机分为正常对照组、形觉剥夺（FDM）组和自身对照组。分别测量记录豚鼠不同时空点的屈光度及眼轴长度。采用蛋白印记技术、RT-PCR 法检测豚鼠正视眼和实验眼巩膜中在 2 周、4 周、6 周及遮盖 4 周去遮盖 1 周时间点 Sp1 和 collagen I 的动态变化以及两者相互关系。 **结果：**FDM 组豚鼠眼由遮盖前远视状态随着遮盖时间延长，逐渐变为近视状态，相应的眼轴也逐渐增长。与对照组相比，FDM 组巩膜内 Sp1 和 collagen I 的蛋白和 mRNA 表达均下调，且随遮盖时间的延长，其表达也在不断减弱（$p<0.05$）。另外，Sp1 与 I 型胶原呈明显正相关（均 $r=1$; $P<0.05$）。 **结论：**Sp1 作为 TGF-β1 的下游信号转录因子可能参与近视巩膜重塑中Ⅰ型胶原合成的调控，提示 Sp1 信号转录因子可能通过 $TGF\beta_1$- Sp1 信号通路在近视巩膜重塑中发挥重要作用。

PU-067

smile 手术联合 ICL 植入术治疗超高度近视的临床观察

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摘要：有晶体眼后房型人工晶体植入术（EVO ICL）是矫正高度近视的主要治疗方法。但对于一些超过-20D 的病人，术后常常会残留近视或近视散光度数，为了获得更好的视力效果，往往需要再联合角膜激光手术矫正残余性近视和散光。目的：观察 smile 手术联合 ICL 植入术治疗超高度近视术后残余性近视或近视散光的疗效和安全性。方法：对超高度近视术前等效球镜大于-20D 的病人，接受普通型 ICL 术后六个月仍残留近视或近视散光者 3 人 5 眼，术眼进行 Pentacom 验光等全套检查排除禁忌症后行 smile 手术，术后随访 6 个月，比较 smile 术前术后裸眼视力，角膜内皮计数及拱高等变化，评价 smile 手术联合 ICL 植入术矫正超高度近视术后残余性近视散光的有效性和安全性。结果：5 眼 smile 手术均顺利，术后裸眼视力较 ICL 术前矫正视力提高 2 行者 3 眼，3 行者 1 眼，4 行者 1 眼，较 ICL 术后矫正视力均提高 1 行以上。角膜帽平整，层间清，术后角膜内皮及拱高均无明显变化。结论：smile 手术联合 ICL 手术治疗超高度近视具有良好的疗效和安全性，远期效果有待进一步观察。

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PU-068

先天性青光眼术后弱视的治疗

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【摘要】**目的** 研究先天性青光眼术后的随访及视功能恢复治疗的意义。**方法** 2008 年 1 月至 2018 年 1 月我院采用小梁切开联合小梁切除术治疗先天性青光眼 116 例 188 眼进行回顾性研究及观察。**结果** 观察 1-7 年，指标包括矫正视力、眼压、滤过泡、前房深度及并发症，术后随访时间及弱视遮盖时间。其种 58 例单眼患儿由于患眼最佳矫正视力低于 0.02，遮盖后严重影响患者日常生活，未行遮盖及弱视训练。术后弱视遮盖时间及随访时间与术后视力提高呈正相关性。**结论** 对先天性青光眼手术成功的主要因素除了应早期手术和无手术并发症以外，更重要因素是：患儿家长对早期治疗措施的认知程度、术后弱视训练的治疗及长期随访观察的连续性等。为了保证有效治疗先天性青光眼术后弱视，应该在整个治疗期间由一专业组进行监控先天性青光眼手术后的弱视治疗情况和随访质量。

PU-069

有晶状体眼后房型人工晶状体植入术治疗二次 LASIK 手术后屈光回退一例

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患者，男，48 岁，因“二次 LASIK 手术 6 年，视力下将 3 年”来我院就诊。患者首次于 2010 年 5 月 18 日就诊于我院，因高度近视预行 LASIK 手术。术前检查：视力：右眼 0.06，左眼 0.15；眼压：右眼 20mmHg（1 mmHg=0.133 kPa）；散瞳验光：右眼 0.8 -14.00DS-1.50DC*175；眼轴：右眼 30.76 mm，角膜厚度：右眼 575μm，患者术后 1 天复诊，视力：右眼 0.8，术后 4 个月复诊，视力：

右眼 0.15。综合验光：右眼 0.8^{+} -3.00DS-1.25DC*160 。术后 1 年 7 个月后复诊，视力：右眼 0.12；角膜测厚:右眼 436μm；眼轴:右眼 30.81mm；综合验光:右眼 0.8 -4.50DS-0.75DC*180。诊断为 LASIK 术后屈光回退，患者要求再次行 LASIK 手术。经完善的术前检查后，于 2012 年 12 月 7 日进行第二次 LASIK 手术。术后 7 天复诊，视力：右眼 0.6。眼轴：右眼 30.70mm。综合验光：右眼 0.8 -1.75DS-0.50DC*180。患者二次 LASIK 手术后 5 年半再次复诊，视力：右眼 0.3；综合验光：右眼 1.0 -3.25DS。诊断为右眼二次 LASIK 术后屈光回退。患者要求手术治疗，建议 ICL 治疗。右眼术前检查：眼轴 32.25mm；前房深度 3.95mm；晶状体厚度 4.91mm；角膜厚度 411μm；角膜内皮计数 3100 个/mm^2 。白到白距离 11.6mm。UBM、眼科 B。彩色眼底照相示、OCT 结果符合手术指征，于 2018 年 8 月 8 日行右眼 ICL 手术，手术顺利，术后 1 天右眼视力检查 0.4。术后 14 天复诊，视力检查：右眼 0.8；综合验光：右眼 1.0 +0.25DS+1.25DC*73；眼压：右眼 10mmHg；拱高（OCT 测量）：右眼 372μm，视力达到预期，眼压、拱高等各项检查指标正常[1-3]。

PU-070

Changes in choroidal thickness and choroidal blood perfusion in guinea pig myopia

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Purpose: To study changes in choroidal thickness (ChT) and choroidal blood perfusion (ChBP) and the correlation between them in guinea pig myopia.**Methods:** We first verified the effectiveness of OCTA in measuring ChT and ChBP of guinea pigs by actively reducing the choroidal blood supply. Then investigated the changes of ChT and ChBP in the myopia models (include spontaneous myopia group (n = 9), form deprivation myopia (n = 14), lens-induced myopia (n = 14) and after 4 days of recovery group of the latter two). Each group underwent biometric measurements, including refraction, axial length, ChT and ChBP (by Spectralis HRA+OCT). The images of OCTA B-scan were processed by Matlab to measure the ChT and ChBP.**Results:** In the active reduction of choroidal blood supply groups, the reduction of ChT and ChBP were verified by OCTA. In the spontaneous myopia group, ChT and ChBP decreased by 25.2% and 28.5% respectively. In FDM group, ChT and ChBP decreased significantly compared to the fellow eyes and increased after 4 days of recovery (fellow vs. FDM vs. R-FDM: ChT: 76.72 ± 9.22 vs. 64.33 ± 11.35 vs. 78.09 ± 11.91 μm; ChBP: 40.79 ± 6.16 vs. 32.45 ±5.81 vs. 39.31 ± 6.18 ´ 10^3). LIM group also had the similar changes. Inter-ocular differences in ChT and ChBP were correlated in each group (FDM R = 0.86, p < 0.001; LIM R = 0.49, p < 0.001).**Conclusions:** In guinea pig myopia, ChT and ChBP significantly decreased and both increased during the recovery. Changes in ChT were positively correlated with changes in ChBP. We speculate that thinning of the ChT in myopia may be partially caused by the decrease in ChBP.

PU-071

先天性黄斑缺损患儿偏心注视训练一例

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患儿，男，6 岁，足月顺产，母亲孕期感染史不明确，生后 1 岁发现畏光，频繁眨眼就诊，诊断“倒睫”，2017 年因双眼视力差就诊我院，诊断为“双眼黄斑缺损”。查体：发育正常，无指趾畸形，家长表示家中无类似患者。屈光矫正（散瞳验光后配镜）右眼-0.75ds/-3.25dcx15-0.05，左眼-0.50ds/-2.00dcx157-0.1,对比敏感度检查右眼重度异常，左眼中度异常，双眼中度异常，眼位正位、无明显

震颤，眼前节正常，屈光介质透明。双眼眼底：视盘边界清晰、色淡红，黄斑部可见椭圆形脉络膜-视网膜缺损区。入院行微视野计（MR-3）检查双眼注视区域为上方。处理方式视功能训练-旁中心优选视网膜注视点训练，通过微视野计检测患者固视方式，进行优选视网膜注视训练，选择改变注视目标方式，就行视力表对比检测，结果视力表提升 3 字，阅读辨认速度较无改变注视目标迅速。

PU-072

视觉训练在集合不足问题中的应用

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目的：通过大量临床观察，选取 3 个案例就视觉训练在集合不足有关问题中的应用进行分析。
方法：列举 3 个与集合不足有关的案例，包括单纯集合不足，调节不足引起的集合不足以及集合不足引起的调节过度，进行一系列的视光检查以及视功能检查，给出最佳矫正方案并进行每周一次，为期十二次的视觉训练，其中，第六次训练后做一次复查，其结果与初始结果对比，第十二次训练后做一次复查，其结果与第六次复查结果对比。对比的内容包括视功能结果数值，患者本身的症状，以及视疲劳调查问卷。
结果：三组均为第六次视功能检查结果优于初始值趋近于正常值，症状较初始检查时减轻，疲劳问卷分数较初始时降低，第十二次视功能检查结果可达正常值，症状基本消失，疲劳问卷分数较第六次检查时降低。
结论：在集合不足相关问题中，视觉训练可提升其视功能至正常值，对于缓解集合不足相关问题的症状有明显作用。

PU-073

光的非视觉效应与近视

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随着健康照明领域的不断发展，光的非视觉效应在 LED 照明对人体影响的研究也日益受到重视。照明光中的蓝光会通过人眼中的非视觉细胞--内在光敏视网膜神经节细胞（ipRGC）抑制松果体分泌褪黑色素，进而影响全身激素分泌，影响生物节律、全身激素分泌和机体的发育，这称为光的非视觉效应（Non-Visual Effects of Light)，主要是波长在 446-477nm 这段蓝光。
光的非视觉效应=蓝光占比×光的强度×照射时间。光线越白，含蓝光越多；亮度越高，含蓝光自然更多。蓝光影响内源性激素分泌，导致儿童普遍性早熟，眼轴发育生长过快，这可能与近视发展有关。光线越白，蓝光占比越多，若以烛光的蓝光占比设为 1，以前的钨丝灯泡是 1.4，白色荧光灯是 8.8，中午日光及夜间月光均 8.8，手机/电脑屏达 16。现在家庭及教室夜间都是灯火通明，其非视觉效应是古人的 1500 倍，60 年前人类的 130 倍。人类夜间对光的生理需求是“黑暗”，但心理需求是“明亮”，现所有照明显示的标准，几乎只考虑到人类的心理需求，因此，近代照明显示起到了加速近视形成的作用。当前我国的青少年接触的光线有以下三个主要问题，一是光谱不是全光谱，全是冷光源，缺少红外光；二是每天接触光的时间过长，尤其是含有大量蓝光的 LED；三是白天的光和夜间的光没有差别，均是又白又亮。没有做到 CIE（国际照明委员会）倡导的，在正确的时间照正确的光线。我们对近视成因和防治的观点是：1）光的非视觉效应可能导致儿童性早熟与近视有关，2）不健康的 LED 光照明与近视的发生发展有关，3）正确指导儿童对光的认识，不要使用过强的白光，夜间减少 LED 光照明，4）重视光源中蓝光的损害，开发健康光源。

PU-074

飞秒激光辅助 LASIK 联合预防性角膜胶原交联术矫正特殊近视眼的临床研究

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目的 评估飞秒激光辅助 LASIK（FS-LASIK）联合预防性角膜胶原交联术（CXL）矫正有圆锥角膜风险的近视眼的安全性和有效性。
方法 前瞻性研究。收集 FS-LASIK 联合预防性 CXL 矫正圆锥角膜风险因子大于 1 的近视眼患者共 23 例（男 15 例，女 8 例，共 45 只眼）。飞秒激光（IntraLase 750）制作角膜瓣（瓣厚度为 95 或 100mm）后，使用 Amaris 750S 准分子激光仪（德国 Schwind 公司）进行基质切削，再进行预防性 CXL 术：点 0.25%核黄素溶液 92.67±5.39 秒后，使用 KXL 快速交联仪（美国 Avedro 公司）的 365nm 紫外线连续照射（辐照度 30mW/cm^2，总能量 2.33±0.26J/cm^2），最后复位角膜瓣。比较术后 1 年与术前的视力、屈光状态、角膜形态的差异。
结果 术后 1 年时，平均裸眼视力从术前的 1.07±0.44 提高到-0.05±0.05（logmar），有效性指数为 1.10±0.15；平均最佳矫正视力从术前的-0.01±0.03 提高到-0.02±0.04（*P=0.04*），但丢失 1 行的有 2 只眼，安全性指数为 1.03±0.08；平均等效球镜值为 0.33±0.34 D；平均角膜最薄点后表面高度值从术前的 8.91±3.94 mm 变化为 4.53±4.45 mm（*P＜0.001*）。
结论 FS-LASIK 联合预防性 CXL 矫正有圆锥角膜风险的近视眼在 1 年内是安全和有效的，未发现继发性圆锥角膜迹象。

PU-075

电针对透镜诱导性近视豚鼠视网膜 γ-氨基丁酸及受体的影响

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目的 探讨电针对透镜诱导性近视豚鼠视网膜 γ-氨基丁酸（GABA）及受体亚型表达的影响。**方法** 将 63 只 3 周龄健康豚鼠随机分为 3 组，即近视模型组、近视电针组、近视假穴组，每组 21 只，造模时间为 4 周。各组右眼戴-10 D 透镜，左眼作为自身对照眼。近视电针组与近视假穴组右眼戴镜的同时每天给予电针刺激相应穴位。造模完成后进行眼球屈光度和眼轴的测量，高效液相色谱法检测视网膜 GABA 含量及实时荧光定量 PCR、酶联免疫吸附试验、免疫组化检测视网膜 GABA 受体表达。
结果 实验 4 周后，近视模型组右眼视网膜 GABA 含量及 $GABA_A$、$GABA_C$ 受体 mRNA 较左眼明显增加（*P* = 0.009、0.007、0.004）；近视电针组右眼与近视模型组右眼比较，GABA 含量及 $GABA_A$、$GABA_C$ 受体 mRNA 表达降低（*P* = 0.007、0.008、0.006）。近视假穴组右眼与近视电针组右眼比较，GABA 含量及 $GABA_A$、$GABA_C$ 受体 mRNA 表达明显增高（*P* = 0.005、0.009、0.002）。免疫组化结果显示，视网膜 GABA 三种受体亚型均分布于内外丛状层、内外核层及神经节细胞层。近视眼视网膜 $GABA_{Aa1}$ 受体在内丛状层荧光强度与自身对照眼比较明显增强，但电针后近视眼荧光强度明显降低；而近视假穴组右眼视网膜 $GABA_{Aa1}$ 免疫荧光强度与近视眼无明显差异。视网膜 $GABA_Cr2$ 受体免疫荧光结果表明，近视眼视网膜的内外核层及内丛状层荧光强度明显增强，电针后荧光强度降低恢复到正常水平，而近视假穴组右眼与近视眼比较 $GABA_Cr2$ 受体免疫荧光无变化。酶联免疫吸附试验法检测结果与 PCR 结果一致。**结论** 电针可以阻止近视眼视网膜 GABA 及 $GABA_A$ 与 $GABA_C$ 受体 mRNA 表达的升高；电针假穴对近视眼 GABA 及 $GABA_A$ 与 $GABA_C$ 受体 mRNA 表达无影响。结果提示针刺治疗近视可能与视网膜 GABA 的变化密切相关。

PU-076

1 例单眼外伤性白内障术后人工晶体眼近附加的验配

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目的：探讨单眼白内障术后人工晶体眼近附加的验配
方法：分析一名 48 岁中年男性患者，右眼白内障术后人工晶体眼三个月后视近不清，要求配近用眼镜。对其行眼科常规检查，验光，近附加，正、负相对调节检查。最后给出配镜处理。
结果：远用度数 R:+0.25/-1.00X30---1.0-；L：-3.00----1.0。近用度数：右眼 ADD=+2.00D，NRA/PRA=±2.00D；左眼：ADD=+1.25D，NRA=+1.00D，PRA=-0.75D ；双眼检查 ADD：+2.00D；NRA/PRA=±2.00D。①. 双眼给予+2.00D 近附加，患者诉右眼 40cm 处的文字能看清楚，左眼模糊，需要将距离调近才能看清；②.双眼给予+1.25 近附加，患者诉左眼 40cm 处文字能看清，右眼需要将距离调远才能能看清；③. 右眼给予+2.00D，左眼给予+1.25D，同在视近 40cm 的条件下试戴 10 分钟，患者反馈两眼清晰度一致且无其他不适症状，遂给予此度数作为该患者的近用附加度数。戴镜后三个月回访，患者感觉良好。
结论：单眼外伤性白内障患者在配近用眼镜时我们需要单眼检查 ADD 和正负相对调节，根据检查结果对左右眼分别给出近附加，这与常规近附加验配时需双眼同时检查及双眼 ADD 一致的情况是不同的。

PU-077

蔡司成长乐镜片对青少年遗传性近视发展控制的疗效观察

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目的 周边清晰成像镜片对青少年遗传性近视发展控制的疗效观察。
方法：随机抽取来我院验光配镜的近视患者 14 名，平均年龄（11.86±2.28）岁。将父母双方至少有一位为近视的 7 名患者分为第一组；父母均无近视的 7 名患者分为第二组；两组均配戴周边清晰成像镜片。半年后对复查结果作统计学分析，观察等效球镜和眼轴长度的变化。
结果：1、半年后，右眼等效球镜（D）及眼轴长（mm）平均增加 0.51±0.50，P=0.002； 0.31±0.21，P=0.000，左眼平均增加 0.48±0.51,P=0.004； 0.26±0.22，P=0.001。2、第一组：右眼平均增加 0.39±0.23，P=0.004；0.26±0.11，P=0.001；左眼平均增加 0.36±0.30，P=0.02; 0.20±0.16，P=0.016。3、第二组：右眼平均增加 0.63±0.67，P=0.049； 0.36±0.28；左眼平均增加 0.61±0.66，P=0.050；0.32±0.27，P=0.200
结论：周边清晰成像镜片对遗传性近视的患者控制效果明显好于非遗传近视患者。

PU-078

生理性大视杯与早期开角型青光眼的临床鉴别特征

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目的：探讨生理性大视杯与早期开角型青光眼引起的视杯扩大的临床特征，为发现早期青光眼提供临床依据。

方法：回顾性分析生理性大视杯（C/D≥0.6）10 例(18 眼)，确诊的早期开角型青光眼（C/D≥0.6）17 例(23 眼)，所有患者均行眼底照相、OCT、24h 眼压、电生理检查及视野检查。用 SPSS17 软件对电生理 PVEP 检查中的 P100 波幅值及峰时、PERG 中 P50 及 N95、OCT 检查中的视神经纤维层厚度、单眼 24h 眼压差值进行统计分析。
结果：单眼 24h 眼压差值生理性大视杯组为（5.11±2.79）mmHg, 青光眼组为（10.81±3.67）mmHg, 青光眼组较大视杯组眼压差值高 5.70 mmHg，差异具有统计学意义（P＜0.05）；其他各组数据对比差异均无统计学意义（P＞0.05）。
结论：24h 眼压差值能为生理性大视杯及早期开角型青光眼（C/D≥0.6）的诊断，提供临床依据。

PU-079
急性区域性隐匿性外层视网膜病变的脉络膜厚度分析

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目的：分析急性区域性隐匿性外层视网膜病变(AZOOR)患者的脉络膜厚度变化情况。
方法：回顾性研究 2017 年 9 月至 2018 年 9 月期间在中国科学技术大学(USTC)附属第一医院眼科诊断为 AZOOR 的 8 例单眼发病患者。测量 8 例患者双眼黄斑中心凹、中心凹鼻侧 500μm、中心凹颞侧 500μm 处的脉络膜厚度，进行综合分析。
结果：6 例患者各测量点处脉络膜厚度患侧眼大于对侧眼；在黄斑中心凹鼻侧 500 μm 处，对侧眼脉络膜厚度与患侧眼脉络膜厚度呈正相关（r=0.727，p＜0.05）；在黄斑中心凹及中心凹颞侧 500μm 处没有发现相关性。
结论：AZOOR 患者黄斑中心凹鼻侧 500 μm 处，对侧眼脉络膜厚度与患侧眼脉络膜厚度呈正相关（r=0.727，p＜0.05）。患侧眼脉络膜厚度增加可能是其特征之一。

PU-080
不同手术切口治疗原发性闭角型青光眼合并白内障的疗效对比

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目的：探讨表面麻醉下单一手术切口与双切口白内障超声乳化人工晶状体植入联合小梁切除术治疗原发性闭角型青光眼的临床效果对比。方法：收治原发性闭角型青光眼合并白内障患者 64 例 72 眼,随机分成单切口组和双切口组,常规降眼压治疗后，单切口组行巩膜隧道切口白内障超声乳化人工晶状体植入联合小梁切除术,双切口组采取透明角膜切口白内障超声乳化人工晶状体植入联合小梁切除术。随访 3mo,观察术后眼压、最佳矫正视力及前房炎症,对比两种术式的疗效。结果：（1）眼压：双切口组眼压改善情况较单切口组更明显，双切口组手术后形成功能滤过泡的概率明显高于单切口组，并发症发生率明显低于单切口组，差异均具有统计学意义（P〈0．05）。（2）最佳矫正视力：术后 1d 视力,双切口组 0.34±0.25,单切口组 0.21±0.23,组间差异有统计学意义（P〈0.05）;术后 1wk;1mo 和 3mo 随访视力,两组比较无统计学意义（P〉0.05）。（3）术后前房炎症：术后 1d 双切口组前房渗出明显较单切口组少,两组间差异有统计学意义(P〈0.05);通过抗炎治疗,术后 1wk;1,3mo 组间差异无统计学意义（P〉0.05）。结论：双切口白内障超声乳化人工晶状体植入联合小梁切除术较单切口白内障超声乳化人工晶状体植入联合小梁切除术在治疗原发性闭角型青光眼合并白内障方面不仅具有较好的疗效，还具有较高的安全性。

PU-081
虾青素对辐射导致大鼠晶体损伤保护的初步研究

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目的：研究口服虾青素是否能够保护辐射导致的大鼠晶体的损伤。
方法：选择雄性 SD 大鼠 30 只，随机分成 3 组。空白对照组：该组大鼠不进行 x 线照射，单纯用橄榄油灌胃，共灌胃 24 天；模型组：2.0Gy X 射线照射大鼠 1 小时后橄榄油灌胃，共灌胃 24 天；虾青素组：2.0Gy X 射线照射 1 小时后用 20mg/kg/d 灌胃 24 天。24 后大鼠脱颈椎处死，将大鼠晶体取出进行免疫组化（capase-3）以及化学分析（超氧化物歧化酶 SOD 和谷胱甘肽还原酶 GSH 活性以及氧化产物 MDA 的含量）。
结果：模型组 GSH 和 SOD 活性显著降低，MDA 含量显著增高。虾青素治疗后明显提高了 GSH 和 SOD 的活性并明显降低了 MDA 的含量。免疫组化结果显示，对照组 caspase-3 阳性细胞较少，模型组 caspase-3 阳性细胞和对照组相比明显减少，虾青素治疗后 caspase-3 阳性细胞明显减少。
结论：虾青素是一种强有效的抗氧化物，能够保护射线对大鼠晶体的氧化损伤。

PU-082

成人屈光参差性弱视治疗 5 例观察

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目的：探讨成人屈光参差性弱视治疗的临床效果。方法：回顾分析 5 例接受治疗的成人屈光参差性弱视患者的临床资料。3 例患者在对屈光状态进行矫正的基础上，均行单眼遮盖，在遮盖条件下进行精细训练，如描红、串珠、涂色等。结果：随访半年，5 例患者（16 岁、16 岁、21 岁、24 岁、31 岁）视力均有不同程度提高，分别由 0.15、0.3、0.2、0.15、0.3-提高至 0.6+、0.6、0.5、0.4 和 0.6。
结论：传统观点认为屈光参差性弱视治疗的敏感期为 12 岁以内，12 岁之后视觉系统发育成熟，可塑性小，治疗基本无效。但是近年来有人提出，人的视觉系统终生可塑，弱视终生可治。本报道中 5 例患者年龄均远超传统观念的治疗敏感期，经过半年的遮盖及精细训练，视力仍有提高，因此我们认为对于弱视患者的治疗，在任何年龄都不应轻易放弃。但是在治疗前应同患者进行充分交流，讲明治疗的必要性，坚定患者治疗的决心；同时告知患者治疗可能存在的困难，使其有充分心理准备，提高治疗的依从性。

PU-083

新型 SS-OCT 和 Scheimpflug 成像技术在角膜多区域形态测量中的比较研究

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目的：评估基于扫频光学相干断层成像原理的 CASIA 和 Scheimpflug 成像原理的 Pentacam 在儿童眼角膜多区域形态测量中的重复性、再现性和两者对比的一致性。
方法：本研究共纳入 91 名儿童（91 只受试眼）分别用 CASIA 和 Pentacam 对纳入儿童进行角膜生物参数测量，主要参数包括中央角膜厚度 CCT、最薄点角膜厚度 TCT、平均角膜曲率和散光向量。旁中央和周边区的角膜厚度、曲率分别通过测量距角膜顶点 2mm 和 5mm 圆周处的上、下、鼻、颞四个位点而获得。两位熟练的测量者分别使用两种仪器对同一受试者均进行三次重复连续测量，两种仪器之间的测量一致性采用 Bland-Altman 图和 95%一致性区间（limits of agreement）进行评估。

结果：CASIA 和 Pentacam 测量所得的角膜中央、旁中央和周边区的厚度、曲率值均有很高的精确性。CASIA 在测量角膜厚度方面较 Pentacam 精确性更高，而后者在测量角膜曲率方面更显优势。虽然 CASIA 所测得的角膜厚度值小于 Pentacam 且有统计学差异（P<0.001），但两者测得的 CCT 和 TCT 值仍具有高度一致性。两种仪器在中央区角膜曲率的测量上具有高度一致性，而在旁中央和周边区的测量一致性稍有下降。
结论：CASIA 在测量儿童眼角膜厚度方面展现出很好的精确性，而 Pentacam 则在角膜曲率测量方面更加精准。两种仪器在角膜中央区的厚度和曲率测量上具有良好的一致性，在临床测量中可相互替代。

PU-084
i-Trace 视觉功能分析仪在视觉质量不佳病因诊断中的应用价值

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目的 探讨 Itrace 视觉功能分析仪在视觉质量不佳病因诊断中的应用价值。**方法** 回顾性病例研究。收集无眼部器质性病变、无斜视与弱视、规范验光并足矫配镜后仍主诉严重视觉质量不佳的患者 14 例，利用 Itrace 视觉功能分析仪对此类患者进行波前像差检查，根据检查报告中的高阶像差值、高阶像差存在部位、模拟矫正视力等结果来分析患者视觉质量不佳的具体原因，同时对患者的后续诊疗提出有依据的指导方案，并总结出针对此类患者的诊疗思路与流程。**结果** 通过 Itrace 视觉功能分析仪的检查，所有患者均得到高阶像差超出正常值、模拟矫正视力不佳的结果。该结果一定程度上解释了此类患者视觉质量不佳的原因，且对其后续诊疗有显著指导意义，并通过现有案例，总结出了对此类患者的诊疗思路与流程。**结论** Itrace 视觉功能分析仪对视觉质量不佳患者的病因诊断与后续治疗具有指导意义与应用价值。

PU-085
TransPRK 治疗高度近视远期角膜后表面形态的变化

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目的 比较分析高度近视患者 TransPRK 和飞秒 LASIK 术后远期疗效和角膜后表面形态变化，探讨 TransPRK 治疗高度近视的远期安全性。
方法 回顾性研究，收集接受 TransPRK 和飞秒 LASIK 手术二年以上的高度近视患者 64 人，其中 TransPRK 27 人，飞秒 LASIK 37 人，Petancam 眼前节分析系统检查分析术前和术后角膜后表面平均曲率和角膜后表面高度的变化。每一患者采用一眼数据进行统计，采用配对 t 检验比较两组手术前后的变化以及组间的差异。
结果 TransPRK 组和飞秒 LASIK 组的术前等效球镜分别为-8.03±1.23D 和-7.67±1.05D，2 年后复查等效球镜分别为 0.14±0.48D 和 0.12±0.39D，有效性指数分别为 1.01 和 1.00，安全性指数分别为 1.00 和 1.01。两组术后 2mm、4mm 和 6mm 角膜直径后表面高度与术前相比均无显著性差异（p>0.05），两组间亦无统计学上的差异（p>0.05）。
结论 TransPRK 术后远期未出现角膜后表面形态的改变，是矫治高度近视眼的有效手术方式。

PU-086
三种手术方式矫治高度近视术后视觉质量及效果对比分析

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目的：比较准分子激光原位角膜磨镶术（LASIK），飞秒激光微小切口角膜基质透镜取出术（SMILE）和后房型人工晶体植入术（ICL）矫治高度近视术后的视觉质量和效果。
方法：观察 2017 年 6 月--2018 年 6 月在我院接受手术矫正高度近视患者 90 例（180 眼）术后的视觉效果。将其分成三组，三种手术方式各选 30 例（60 眼）术前度数均在-6D—-10D，观察期为半年至一年。应用尼德克屈光分析仪 OPD-Scan 分析三组患者术后的视力、等效球镜、对比敏感度、高阶相差、慧差、球差、三叶草及术后并发症，对其进行比较。
结果：三种手术患者术后视力均达到预期水平及以上，手术均顺利术中术后均没有出现并发症。术后裸眼视力与术前相比均显著提高。ICL 术后裸眼视力更高，高阶像差和球差较 SMILE 和 FS-LASIK 减少更明显，三组手术术后像差值虽略有差别但均无统计学差异。
结论：LASIK、SMILE 和 ICL 植入术都是矫正高度近视的有效的方法,术后视觉质量均较好。

PU-087

手术矫正先天性眼震联合视功能训练的疗效分析

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目的：研究先天性眼震双眼动态和大范围立体视生物模型，探索该类患者视觉中枢高级通道层面的残留双眼关系和临床表征之间的联系。探讨视感知觉训练对该类患者的视功能修复作用。
方法：2015 年 1 月至 2017 年 12 月就诊的有手术指征的先天性眼震患者 27 例，年龄 5 至 19 岁，男 12 例，女 15 例，均行手术治疗纠正扭转角。于术前、术后 1 周至 3 月行常规三级视功能检查及生物模型立体视检查。患者在双眼分视条件下观看，记录上述两种模型下残留双眼立体视情况（抑制，注视稳定性，远近精细、动态及二阶立体视），对数据进行分析。并给予视感知觉训练，观察视功能修复情况。
结果：27 例患者常规双眼三级视功能均缺失；生物模型检查 2 例存在残留动态立体视，10 例存在残留大范围立体视，15 例无残留立体视。术后经过训练，27 例患者，立体视均有不同程度的修复。
结论：先天性眼震患儿双眼视功能缺损严重。残留立体视生物模型可用于先天性眼震患者双眼间立体视能量关系的测量，明确该类患者高级通道层面残留的双眼关系，对该类患者的临床亚型分类有帮助，手术矫正扭转角联合视感知觉训练，可能为个体化视感知觉靶向治疗开辟新途径。

PU-088

原发性翼状胬肉患者对比敏感度功能及视觉相关生活质量研究

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目的：探讨原发性翼状胬肉患者围手术期对比敏感度功能以及视觉相关生活质量变化规律。
方法：40 例原发性翼状胬肉患者（平均年龄：46.6±9.2 岁，男女比例：22:18）和正常志愿者 20 例（平均年龄：40±5.2 岁，男女比例：10:10）。根据胬肉侵入角膜范围（*Eye & Contact Lens, 2015*）分为 I 级组 16 例（胬肉侵入小于角膜直径 1/3）、II 级组 14 例（胬肉侵入至瞳孔缘外）和 III 级组 10 例（胬肉侵入瞳孔内），所有患者均接受翼状胬肉切除联合自体结膜瓣移植术，术前及术后不同

时间点（1、3、6m），通过 VFQ-25 视觉问卷评估视觉相关生活质量，快速 CSF（QCSF）评估对比敏感度功能、眼表综合分析仪（Keratograph 5M）分析泪膜功能、视觉质量分析系统（OQAS）分析光学视觉质量。

结果：翼状胬肉分级与散光度数相关，I 级为 0.30±0.07DS，II 级为 2.68±0.59DS（$P_{I级 VS II级}$ = 0.0059），III 级为 6.25±1.06 DS（$P_{II级 VS III级}$ = 0.0021）。II 级以上的胬肉与正常组相比对比敏感度截止空间频率和 log 下的面积显著下降。泪膜破裂时间呈现逐渐下降的趋势，光学视觉质量中的散射指数、调制传递函数也呈现相同趋势。VFQ-25 提示视觉质量影响因素联动特征为：VFQ=93.46-0.401*临床评分-0.278*散光度数-0.279*散射指数+0.165* 第一秒泪膜破裂时间。在术后 1、3、6 不同时间点，对比敏感度、泪膜功能、VFQ 评分术后逐渐与正常基线水平趋同。

结论：原发性翼状胬肉患者视觉相关生活质量与泪膜稳定性、对比敏感度密切关联，且与胬肉分级严重程度相关，手术后 6 月逐渐恢复眼表稳态及视觉质量。

PU-089

近视儿童戴屈光矫正镜后调节变化规律探究

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目的：通过观察近视儿童戴屈光矫正眼镜一段时间前后的屈光度差异，探讨戴镜对儿童近视性调节痉挛的改善作用。

方法：由 3 位医师随机选取 200 位近视-1.0D 以上且未曾戴镜 7~10 岁儿童，经检影和雾视插片后确定屈光度 A 并予试戴镜 30 分钟，再次检影和插片确定屈光度 B，赛飞杰散瞳后检影和插片确定屈光度 C。统计学方法比较 A、B、C 组的差异。均以右眼为分析眼别。

结果：1.200 位患者中，有 32 位屈光度 C 较屈光度 A 减少 0.50D 以上，对应这 32 位的屈光度 B 与屈光度 A 行配对 t 检验，差异有统计学意义（t＝7.351，p＝0.00），屈光度 B 较屈光度 A 减少 0.25D 以上占 78.1%（25/32）。2.有 43 位屈光度 C 较屈光度 A 较少 0.25D，对应这 43 位的屈光度 B 与屈光度 A 行配对 t 检验，差异有统计学意义（t＝2.213，p＝0.01），屈光度 B 较屈光度 A 减少 0.25D 占 67.4%（29/43）。3.有 125 位患者屈光度 C 较屈光度 A 差异小于 0.25D,对应这 125 位的屈光度 B 和屈光度 A 行配对 t 检验，差异无统计学意义，屈光度 B 等同于屈光度 A 占 98.4%（123/125）。

结论：儿童戴屈光矫正镜一段时间后，能改善调节痉挛的程度，戴镜自我调整后的屈光度更接近散瞳下的真实屈光度。

PU-090

Assessment of binocular alignment using perceptual eye position test for intermittent exotropia

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Purpose: To measure the perceptual eye position (PEP) in patients with intermittent exotropia (IXT) and compare the difference between PEP test and synoptophore to evaluate deviation of eye position.

Methods: 119 IXT patients and 134 controls were recruited into this prospective study. A detailed ophthalmic examination was conducted on each patient and control. The eye position was evaluated by PEP test and synoptophore. The stereoacuity was measured by Randot stereoacuity test both in near and medium distance.

Results: The mean eye deviation was significantly higher in patients with IXT than those in control evaluated by both PEP test and synoptophore. There was no significant difference in the abnormality ratio of horizontal misalignment between the two methods (*P* = 0.262). However, the abnormality ratio of vertical misalignment was significantly higher measured by PEP test than those did by synoptophore (PEP: 45.38% versus synoptophore: 2.52%, P< 0.001). Furthermore, the medium distance stereopsis was better in patients with normal vertical eye position than those with abnormal vertical eye position (*P* = 0.030). There was no association between refractive error and vertical eye deviation (*P* = 0.840).
Conclusion: Our results demonstrated that the PEP test has advantage over synoptophore to detect vertical eye deviation in IXT patients, suggesting that PEP test might be a precise method to evaluate binocular alignment for IXT patients.

PU-091
CALLISTO eye 数字导航系统在散光矫正型有晶体眼人工晶体植入手术中的应用

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目的：评价 CALLISTO eye 数字导航系统行散光矫正型有晶体眼人工晶体植入手术中进行轴位标记的准确性和有效性。

方法：回顾性分析 2018 年 9 月至 2019 年 1 月于上海和平眼科医院行 Toric ICL 植入手术的近视患者共 74 例（145 眼），其中观察组 38 例（73 眼），行 CALLISTO eye 数字导航系统辅助下 Toric ICL 植入术，对照组 36 例（72 眼）术前裂隙灯手动标记法定位，行常规 Toric ICL 植入术。分别于术后 1 天、1 周、1 个月、3 个月记录患者 logMAR 视力、残留散光度，散瞳后进行眼前节照相，应用 Photoshop 软件进行图像分析，比较两组患者术后不同时间点的裸眼视力、残留散光度以及 Toric ICL 实际轴位与目标轴位的偏差值。

结果：两组患者术后裸眼视力较术前均显著提高，观察组术前视力（logMAR，以下同）为 0.92±0.17，术后为 0.06 ±0.05（P =0.001）；对照组术前视力为 0.71 ±0.33，术后为 0.20 ±0.14（P =0.039）。术前预计残留散光度两组之间差异无统计学意义；术后观察组实际残留散光度为（0.22 ± 0.18）D，对照组为（0.64 ± 0.24）D，二者之间差异具有统计学意义（P =0.010）。术后 Toric ICL 轴位偏差，观察组为 3.42° ±2.24°，明显小于对照组的 8.01° ±2.85°，二者差异有统计学意义（P =0.008）。

结论：CALLISTO eye 数字导航系统辅助下进行 Toric ICL 植入手术，ICL 轴位放置更准确，术后残余散光度更小，术后患者能够获得较好的裸眼视力。

PU-092
角膜塑形镜联合框架眼镜控制青少年高度近视的临床观察

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目的：观察夜戴型角膜塑形镜联合白天配戴框架眼镜治疗青少年高度近视的临床疗效。方法 ：回顾分析本院门诊就诊的 8~14 岁等效球镜度在-6.00~-8.00 D 的青少年 51 例(102 只眼),其中,角膜塑形镜和框架眼镜联合配戴者 25 例、单纯配戴框架眼镜组 26 例,分别于戴镜前、戴镜后 3、6、12 个月测量并比较两组间眼轴长度的变化；同时比较戴镜前及 1 年后两组的等效球镜度。结果角膜塑形镜联合框架眼镜组戴镜 1 年后停戴 1 个月等效球镜度为(-7.52±0.62)D,框架眼镜组 1 年后为(-8.02±0.63)D,角膜塑形镜联合框架眼镜组、框架眼镜组 1 年等效球镜度分别增加(-0.25±0.12)、(-1.05±0.45)D,两组比较差异有统计学意义(P <0.01)；眼轴增长分别为(0.16±0.05)、(0.80±0.11)mm,两组比较差异有统计学意义(P <0.01)。结论夜戴型角膜塑形镜联合白天配戴框架眼镜能有效减轻高度近视患者的近视增长及眼轴变长,在一定程度上可以控制近视发展。

PU-093

Contralateral Eye Comparison between Two Cap Thicknesses in Small Incision Lenticule Extraction: 110 μm versus 130 μm

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Purpose: To evaluate posterior corneal elevation (PCE) and biomechanical changes after small incision lenticule extraction (SMILE) at depths of 110 μm and 130 μm.
METHODS: 116 eyes from 58 patients who underwent SMILE were recruited for this prospective consecutive study. Each patient underwent SMILE, with one eye to a depth of 110 μm and the other eye to a depth of 130 μm. Pentacam and Hartmann-Shack WASCA aberrometer was used to assess PCE and wavefront aberrations, respectively. Corvis-ST was used to evaluate biomechanics.
Results: In both groups the PCE was shifted backward significantly at the apex and 2 mm annulus at 1 month after surgery, especially for the 110-cap group. At 3 months postoperatively, the 110-cap group was still shifted backward significantly, while the displacement at apex in 130-cap group had disappeared.
Conclusion: Superficial lenticule might cause the displacement of PCE to be more persistent.

PU-094

过夜配戴角膜塑形镜后角膜生物力学变化特征分析

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目的: 探讨青少年近视儿童配戴角膜塑形镜后角膜生物力学测量参数变化特征及相关因素分析。
方法: 收集我院配戴配角膜塑形镜的中低度近视患者 30 例（60 眼），男 11 例，女 19 例，年龄 8～18 岁，球镜-1.25～-5.00D，平均球镜-3.45±1.26D。在配戴前以及戴镜后 1 周、1 月、3 个月、6 个月、12 个月分别进行裸眼视力、综合验光，德国 OCULUS 公司 Corvis ST 检查患者角膜生物力学相关参数 DA Ratio、ARTh、SP-A1、CBI，及 pentacam 检查角膜参数，包括角膜曲率，中央角膜厚度(CCT)。
结果: 所有患者在配戴角膜塑形镜后裸眼视力明显提高，1 周时均达到 1.0。患者配戴角膜塑形镜后角膜生物力学参数下降，球镜度数越大，生物力改变越明显,1 月内角膜生物力学呈现下降并逐步回弹的趋势，3 个月时趋于稳定；配戴角膜塑形镜后角膜生物力学改变与屈光度呈正相关，与角膜厚度呈正相关，与角膜曲率无明显相关性。

结论：配戴角膜塑形镜会降低角膜生物力学参数，拟降度数越高，角膜生物力学改变越明显，并与角膜厚度呈正相关。

PU-095

硬性透气性角膜接触镜矫正角膜移植术后不规则散光后 不同对比度视力和高阶像差的临床观察

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目的 观察硬性透气性角膜接触镜（RGPCL）矫正角膜移植术后不规则散光后不同对比度视力的临床效果。
方法 角膜移植术后患者 19 例（19 眼）， 采用多功能视力测量仪 MFVA100 分别测试 19 例角膜移植术后患者裸眼（UCVA）、最佳框架矫正（BSCVA）和 RGPCL 矫正状态下 100%、25%、10% 和 5%的 4 种对比度视力（contrast visual acuity，CVA)，及配戴 RGPCL 前后角膜前表面和 RGPCL 前表面高阶像差的数据等，并采用非参数检验中的 K 检验进行统计分析。
结果 19 眼在 100%、25%、10%和 5%对比度下平均 UCVA 分别为 0.801±0.215、1.181± 0.266、1.363±0.062、1.400±0，平均 BSCVA 分别为 0.390±0.135、0.706 ±0.182、0.952±0.223、1.239±0.186，平均 RGPCL 矫正视力分别为 0.255 ±0.133、0.488±0.168、0.737±0.159、0.993±0.234，随着对比度的降低，视力逐渐下降，BSCVA 及 RGPCL 均可不同程度的改善不同对比度视力。在 100%、25%、10%、5%对比度下 RGPCL 的矫正视力均优于 UCVA 和 BSCVA（P 均=0.000）。配戴 RGPCL 后各项泽尼克像差球差 Z^{4}_{0} 由 3.734±1.061μm 降低为 2.622±0.725μm，垂直慧差 Z^{3}_{-1}、水平慧差 Z^{3}_{+1} 分别由 1.693±1.010μm、2.195± 1.387 μm 降低为 1.462±1.068μm、1.898±1.248μm。
结论 RGPCL 可有效矫正角膜移植术后不规则散光，明显提高角膜移植术后患者 100%、25%、10%、5%不同对比度下的矫正视力，降低角膜移植术后中低对比度视力丢失，改善患者视觉质量及生活质量，这种提升可能是通过高阶像差的改善实现的。

PU-096

Pentacam HR 与前节光学相干断层扫描对高度近视中央前房深度测量值的比较

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目的：比较 Pentacam HR 与前节光学相干断层扫描（Optical coherence tomography，OCT）对高度近视中央前房深度（anterior chamber depth，ACD）的测量值，为临床提供参考。方法：回顾分析 2015 年 5 月至 2018 年 5 月我院有晶体眼人工晶体植入术前检查的高度近视患者资料，仅取右眼资料，分析 Pentacam HR（OCCULUS 公司）与前节 OCT（ZEISS 公司）的 ACD 测量值。统计软件采用 MedCalc18.5。连续资料的正态性检验采用 S-W 检验。连续资料的组间比较采用配对 t 检验，相关性采用简单直线相关，一致性分析采用 Bland-Altman plot。α=0.05。结果：91 例 91 眼纳入分析。Pentacam HR 与前节 OCT 的 ACD 测量值分别是 3.20±0.24mm、3.25±0.25mm，二者比较，t=4.958，P<0.01，差异具有统计学意义。二者具有强的正相关，r=0.93。Bland-Altman plot，差值均数是-0.05mm，95%LoA（-0.23,0.14）mm。结论：Pentacam HR 对高度近视 ACD 的测量值小于前节 OCT，但差异很小，二者具有强的正相关，一致性较好。

PU-097

25G 玻璃体切割联合 IOL 巩膜层间固定术的 临床疗效评价

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目的分析评价 25G 玻璃体切割联合人工晶体（IOL）巩膜层间固定术临床疗效及安全性。**方法**临床检查确诊各种原因引起的晶状体脱位、IOL 脱位、无晶体眼患者，共 39 例 39 只眼纳入研究。手术方法采用 25G 玻璃体切割联合人工晶体巩膜层间固定术治疗无囊膜支撑的复杂白内障。对比观察手术前后视力差异、眼压差异、角膜内皮数量差异、IOL 位置，以及术后 IOL 复位率、IOL 脱位再发生率及并发症等情况，两组之间的统计分析采用配对 T 检验，多组之间的统计分析采用方差分析。**结果**手术后 1 周，所有患眼 IOL 均在位，位置居中，占 100.0％。术后 1 个月，IOL 在位、位置居中 36 眼，占 92.3％；IOL1 袢暴露于结膜下 1 眼，占 2.6％；IOL 脱位需再次行 IOL 复位手术 2 眼，占 5.1%。手术后 3 至 6 月，IOL 在位、位置居中 36 眼，占 92.3％。术后 1 周、1 月、3 月和 6 月平均 LogMAR 视力分别为 0.63±0.43、0.52±0.38、0.44±0.33 和 0.38±0.36，与术前比较差异均有统计学意义（P＜0.05，t 值分别为：9.70，11.25，12.45，13.26）。手术后 1 周、1 月、3 月、6 月平均眼压分别为 15.94±4.11、16.22±4.93、15.64±4.75 和 16.12±4.90mmHg，与术前比较差异均有统计学意义（P＜0.05，t 值分别为：3.14，3.29，3.76，3.32）。
结论 25G 玻璃体切割联合 IOL 巩膜层间固定术治疗无囊膜支撑的 IOL 植入疗效佳、安全性好，值得临床推广。

PU-098

先天性白内障患儿术后黄斑变化的观察

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目的 观察晶状体切除联合后囊膜切开联合前段玻璃体切除联合囊袋内人工晶体植入术对黄斑区视网膜厚度的影响。
方法 收集 2016 年 6 月至 2018 年 7 月就诊于温州医科大学附属眼视光医院先天性白内障患儿 41 例 53 眼，年龄相匹配的正常儿童 45 例 45 眼，均行海德堡频域光学相干断层扫描仪检查（SD-OCT），内置软件自动按照国际标准 ETDRS 黄斑分区法记录黄斑九分区视网膜厚度数值。所有患儿均行晶状体切除联合后囊膜切开联合前段玻璃体切除联合囊袋内人工晶体植入术。配合完成术前、术后 1 月、3 月、6 月、12 月 SD-OCT 检查的共计 30 例 40 眼，其中单眼患者 20 例 20 眼，双眼患者 10 例 20 眼。[1] 比较先天性白内障患儿黄斑区视网膜厚度与年龄相匹配的正常儿童有无差异，以及手术后先天性白内障患儿黄斑区视网膜厚度的变化。
结果 先天性白内障患儿外环黄斑区视网膜厚度均较正常儿童厚且差异有统计学意义（p<0.05），黄斑中心凹及内环两者厚度无明显差异。先天性白内障患儿术后早期黄斑区视网膜厚度较术前逐渐增加，至术后 3 月时达到峰值，而后逐渐降低，至术后 12 月时回落至术前水平。其中，单眼先天性白内障患儿术后黄斑区视网膜厚度较健眼明显增厚，至术后 12 月时差异消失，厚度恢复至术前水平（P>0.05），健眼的黄斑九分区视网膜厚度在各随访时间点均无明显变化。
结论 先天性白内障患儿的外环黄斑区厚度厚于正常儿童，手术使黄斑区视网膜厚度增厚，持续约 3 月后逐渐恢复。23G 微创玻璃体切割手术对先天性白内障患儿黄斑的影响较小，有较好的应用前景。

PU-099

甲状腺功能障碍性视神经病变诊断与检测中视觉诱发电位的应用

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目的：探讨图形视觉诱发电位（pattern visual evoked potential，PVEP）在甲状腺功能障碍性视神经病变(dysthyroid optic neuropathy，DON)早期诊断和检测的应用价值。
方法：回顾性研究，收集 2017 年 7 月-2018 年 9 月 74 例行 PVEP 检查的甲状腺眼病（thyroid ophthalmopathy，TO）患者，Ⅰ组包括 12 例明确有临床症状的 DON 患者，Ⅱ组包括 13 例亚临床 DON 患者（P100 波潜伏期延长），和Ⅲ组包括 49 例没有临床症状的 DON 患者。36 名健康受试者作为对照组。分别记录每组三个视角（60′，30′，15′）图形 VEP P100 和 N75 波的振幅和潜伏期。随访收集 50 例治疗前后甲状腺功能障碍性视神经病变患者 PVEP 的变化。
结果：与对照组相比，60′，30′，15′三种视角 PVEP 中，TO 患者 P100 和 N75 的平均潜伏期明显延迟，振幅无明显差异，30′，15′中 P100 和 N75 的平均潜伏期差异有统计学意义；第Ⅲ组分别与第Ⅰ组和第Ⅱ组相比较，PVEP 中 P100 和 N75 的平均潜伏期延迟，振幅变化不明显，其中只有 15′中 P100 的平均潜伏期差异有统计学意义。经治疗后的 50 例甲状腺功能障碍性视神经病变，60′，30′，15′三种视角 PVEP 中，患者 P100 和 N75 的平均潜伏期均有缩短，振幅无明显差异，30′15′中 P100 的平均潜伏期差异有统计学意义。
结论：PVEP 可以有效的诊断和监测甲状腺功能障碍性视神经病变，甚至可以用于检测无临床症状的甲状腺功能障碍性视神经病变；针对亚临床 DON 病变，使用 PVEP 能够提前检测出从而更有效的进行治疗。在 PVEP 监测中， P100 波的潜伏期更敏感，N75 波潜伏期差异不大。

PU-100

多焦软性隐形眼镜矫正青少年近视性屈光参差对双眼视觉的影响

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目的 探讨多焦软性隐形眼镜矫正青少年近视性屈光参差对双眼视觉的影响及临床价值。**方法** 回顾性分析 2017 年 1 月～2018 年 1 月在我院接受多焦软性隐形眼镜治疗，随访资料完整的 22 例（34 眼）屈光参差患者，随访时间 12～24 个月，观察治疗前后裸眼视力（UCVA）、最佳矫正视力（BSCVA），屈光度数变化及双眼视觉。**结果** 治疗后 1 年时裸眼视力（UCVA）达到或超过治疗前最佳矫正视力（BSCVA）的百分比为：97%（33 眼）。治疗前双眼屈光参差度数为（3.46±1.51D），治疗后为（0.24±0.58D），较治疗前明显降低。治疗后近视加深度数 1 年时高度数眼平均增长 0.24±0.43D，低度数眼平均增长 0.30±0.49D。治疗前 2 例有正常近立体视，4 例为亚正常立体视，16 例为立体盲。治疗后 1 年时，17 例患者有正常近立体视，5 例为亚正常立体视。治疗后 1 年的近立体视结果与治疗前比较差异有统计学意义（P<0.05）。治疗后 1 年的立体视结果与治疗前戴框架镜比较也有明显的改善。**结论** 多焦软性隐形眼镜治疗青少年近视性屈光参差不仅提高患者的日间视力，控制屈光度数的加深，并改善双眼视觉功能，恢复正常或部分立体视。

PU-101

双眼视觉训练对儿童功能性视力不良的疗效观察

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目的 观察功能性视力低下儿童视觉训练对其治疗效果 方法 取 2018 年 1 月至 6 月在我科就诊患儿 22 例，男 12 例，女 10 例，平均年龄 7.5±0.8 岁，行眼前节及眼底检查，排除弱视、眼部器质性疾病及全身疾病引起的视力低下者，再行双眼视功能检查。对屈光度球镜为±1.00D 间、伴有低于 1.00D 散光或不伴有散光者，根据检查结果，针对性进行视觉训练。对训练前后视力、屈光度及双眼视功能检查采用配对 t 检验进行统计学分析。结果 训练前患儿平均裸眼视力 0.732±0.136，矫正视力 1.018±0.059，训练后分别提升到 1.05±0.157 及 1.145±0.15；差异有统计学意义（P<0.05）。而训练前后屈光度分别为-0.011±0.573D, -0.057±0.338D，无统计学意义（P=0.633）。DLP 训练前后的平均值分别为-3±2.97△、-1.18±1.6△，无统计学意义（P=0.089）。训练前后的 NLP 平均值分别为-6.27±4.56△、-2.82±2.56△；NPC 分别为 7.73±2.15cm、3.05±0.69cm；AC/A 分别为 2.00±1.55△/D、3.64±0.5△/D。三者前后比较有统计学意义（p<0.05）。训练前的 NRA 及 PRA 分别为 1.61±0.41(D)、-1.98±0.71(D),训练后分别为 2.09±0.23 (D)、-3.89±0.71 (D)；BCC 在训练前为 0.09±0.38D，训练后提升至 0.39±0.13D；AMP 训练前后分别为 9.55±2.54D 与 11.55±1.13D；BAF 分别为 3.36±2.73cmp 与 9.64±1.5cmp。所有的调节功能指标在训练前后比较均有统计学意义（P<0.05）。结论 儿童功能性视力不良者，在屈光检查的前提下，进行双眼视觉功能检查是必要的；针对性视觉训练治疗，可提高视力及改善双眼调节及集合功能。

PU-102

低龄儿童斜视术后双眼视功能重建的相关问题探讨

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目的：了解低龄儿童斜视术后远期立体视功能的重建情况及其影响因素。

方法：分析性横断面研究，观察 54 例 3～5 岁的共同性水平斜视患儿，术后 3 年的近立体视重建情况，分析相关影响因素。采用 Titmus 检查患儿近立体视。
结果： 37 例患儿（68.5%）的近立体视得到了不同程度的重建，其中 22 例（40.7%）恢复了黄斑中心凹立体视；斜视类型和发病年龄均对术后立体视觉的重建无影响（*P*=0.635； *P*=0.256）；手术年龄对术后立体视觉的重建有显著影响（*P*=0.031）。
结论：低龄患儿及早行斜视手术矫正眼位，术后立体视功能重建率高；对于早发病、晚治疗及伴屈光参差、单眼视力差的患儿，须采取积极的视功能训练及弱视治疗。

PU-103

人工智能视觉重塑系统--Revital vision 视觉训练在大龄弱视、屈光术后、白内障术后中的应用前景

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目的 在明确传统治疗在大龄弱视、屈光术后、白内障术后等方面治疗效果的基础上，综述目前人工智能视觉重塑系统在大龄弱视、屈光术后、白内障术后中应用前景的研究进展。

方法 通过文献管理器图书馆检索了 1999 年至今有关国内外人工智能视觉重塑系统在大龄弱视、屈光术后、白内障术后的治疗效果的文献，共计 46 篇，仔细阅读后分析、整理及总结。

结果

传统视功能训练侧重眼内和眼外肌肉运动感知及双眼协调和融合，训练内容包括调节放松、集合发散、追踪扫描以及立体知觉等，但对于成人弱视没有明显治疗效果。最新治疗原则无论患者的年龄大小都应该进行治疗。以美国、以色利和新加坡为首的国家近几项研究表明人工智能视觉重塑系统-Revital vision 治疗可能成为大龄弱视、屈光术后（光晕、眩光及回退等）、白内障术后治疗的新靶点。众所周知，**人的视觉主要取决于以下两方面：眼睛接收图像和大脑处理图像。Revital vision 关注的是大脑处理图像，这种视觉知训练更侧重于大脑皮层的认知。**通过 Revital vision 刺激训练（1）视知觉训练能提高裸视，提高了患者的对比敏感度，但不改变屈光度（2）视知觉训练能提高裸视时只能在“模糊”情况下提高，一旦视物清晰（屈光矫正）时就没作用了（3）视知觉训练提高裸视维持的时间是有限的，且程度有限。此外，研究还表明：Revital vision 视觉训练在老视、低视力、低度近视方面也有显著疗效。通过训练可以延缓 4 年老视戴镜时间，还可提高低度近视患者裸眼视力。**这篇综述重点介绍了**人工智能视觉重塑系统-Revital vision 视觉训练在大龄弱视、屈光术后、白内障术后等中的效果，并讨论了未来的治疗的发展方向以及视觉训练的优劣性。

结论 目前，关于大龄弱视、屈光术后、白内障术后，提高裸眼视力及视觉敏感度的治疗已成为研究的热点和难点，阐明各种因素及治疗效果及机制在其中的作用为未来提供发展的方向。

PU-104

OCT 在 NAION 动物模型中的应用价值

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目的 研究与病理组织学相比，OCT 在大鼠非动脉炎性前部缺血性视神经病变(NAION)模型中的指导意义。**方法** 实验研究。采用孟加拉玫瑰红(RB)联合激光光动力法制作大鼠 NAION 模型。按随机数字表法将 33 只 SD 大鼠随机分成 4 组，正常对照组 6 只，单纯激光组 6 只，单纯 RB 注射组 6 只，NAION 模型组 15 只。每组随机编号，所有 SD 大鼠均取右眼为实验眼。不同时间点进行 OCT 检查(1d、3d、10d、1m)，并与视网膜 HE 染色(造模后 1d、3d、10d、1m)相对比，观察模型中视网膜组织形态变化特点。**结果** OCT 结果显示造模后第一天视盘即出现水肿，视盘周围视网膜厚度及 GCC 厚度增加，第三天时厚度降低，第 10 天时厚度较正常对照组轻度变薄，1 个月时厚度明显变薄；单纯激光对照组及单纯光敏剂对照组厚度无明显变化。视网膜 HE 染色结果显示造模后 1d 可见 RGC 细胞水肿，10 天后 RGC 水肿消退、细胞丢失，1m 时轴突间隙增宽明显，RGC 细胞数明显减少，与 OCT 上改变相吻合。**结论** OCT 检查能客观反映 NAION 模型中病理变化特点，与病理组织学上改变相吻合，可部分替代组织病理学检查

PU-105

透镜诱导豚鼠双眼近视模型的观察研究

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目的：观察透镜诱导的豚鼠双眼近视模型，并进行评价。
方法：2 周龄健康英国种三色短毛豚鼠 45 只，体重 120±10g，雌雄不限，随机分成 3 组，即单眼近视组（n=15），双眼近视组（n=15），空白对照组（n=15）。实验组戴-10D 透镜进行近视诱导，空白组不做任何处理。造模时间分别在 1 周、2 周、4 周时进行体重、屈光度及眼轴长度检测。4 周后取材行病理切片 HE 染色观察巩膜结构变化。

结果：戴-10D 透镜产生远视性光学离焦可成功诱导出豚鼠单眼及双眼近视模型；进行近视造模 1 周时实验组豚鼠近视眼屈光度增加，眼轴延长，2 周、4 周时实验组豚鼠近视眼屈光度及眼轴与空白对照组相比，差异具有显著性(P<0.05)；实验组近视眼病理切片 HE 染色观察巩膜厚度较对照组眼变薄，差异有统计学意义(P<0.05)；双眼组与单眼组观察指标差异无统计学意义(P>0.05)。
结论：戴-10D 透镜产生远视性光学离焦可成功诱导出豚鼠单眼及双眼近视模型，双眼与单眼近视模型观察无明显差异性。

PU-106
补肾益气明目方对肾阳虚近视豚鼠眼球屈光度、眼轴长度的影响

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目的：基于“肾-脑-目”系统理论，构建肾阳虚证近视豚鼠模型，采用补肾益气明目方治疗后，分析屈光度、眼轴长度的变化，探讨肾阳虚体质与近视之间的关系，为肾阳虚近视患者新的中药治疗提供依据。
方法：选取 2 周龄英国种健康雄性三色、短毛豚鼠 36 只，随机分为正常组（n = 12 只）、假喂药组（n = 12 只）和喂药组（n = 12 只）。实验组豚鼠腹腔注射氢化可的松注射液，同时右眼戴-10.00D 透镜诱导肾阳虚近视模型，实验组左眼及正常对照组双眼均不做任何处理。造模前及肾阳虚近视造模 2 周后分别测量各组豚鼠的眼屈光度、眼轴长度。第 3 周开始，喂药组于每日 9:00~10:00 及 16:00~17:00 分别喂服补肾益气明目方水煎剂，生药量剂量为 13.5 g/kg/d，连续 4 周；假喂药组于同一时间喂服等量的生理盐水，其余不作任何处理；喂药期间继续佩戴-10.00D 透镜、腹腔注射氢化可的松注射液维持肾阳虚近视状态。喂服补肾益气明目方水煎剂 4 周后，测量各组豚鼠屈光度、眼轴长度的变化。
结果：喂服补肾药 4 周后：
与正常组相比，假喂药组体重明显减轻差异有统计学意义；与假喂药组相比，喂药组体重上升明显，差异有统计学意义。2、与正常组相比，假喂药组豚鼠血清中激素 FT3、FT4 和 T 的浓度明显下降，E2 浓度明显上升，差异有统计学意义；与假喂药组相比，喂药组豚鼠血清中激素 FT3、FT4 和 T 的浓度上升明显，E2 浓度下降明显，差异有统计学意义。
3、与正常对照组比较，假喂药组实验眼近视屈光度明显增加，眼轴明显延长，差异有统计学意义；与假喂药组比较，喂药组实验眼近视屈光度明显降低，眼轴长度明显缩短，差异有统计学意义。
结论：肾阳虚近视豚鼠补肾益气明目方喂服后，近视屈明显降低，眼轴长度明显缩短，提示补肾益气明目方可通过改善肾阳虚体质而延缓近视发展。

PU-107
马凡氏综合症飞秒超乳联合区域折射晶体植入(附手术录像）

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患者，女性，58 岁，以“双眼无痛性遂渐视物不清 40 余年”为主诉入院。四肢细长，蜘蛛指（趾）。眼专科检查：右眼视力：指数 / 20cm，眼压：11mmHg，瞳孔圆，直径约 3mm，对光反射灵敏，散瞳下可见瞳孔圆，直径约 6m，品状体棕黑色混浊，向上偏位，下方悬切带可见，眼底窥不进：左眼视力：指数 / 10cm，眼压：10mHg，結膜无充血，角膜透明，前房中深，向上偏位，
下方悬切带可见，眼底窥不进。
诊疗经过：表麻下进行左眼飞秒激光辅助白内障 phaco＋区域折射非球面植入张力环植入术，
结果：术后随访三个月裸眼视力远 0.5 中 0.5 近 0.5

PU-108

穿通伤白内障继发青光眼的 2 次手术治疗（附录像）

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25 岁，以“右眼被竹签刺伤后
视物不清 1 周”为主诉入院。曾在外院入院给予消炎对症治疗；患者
因右眼视物不清加重，伴有畏光，眼痛不适至我院就诊，专
科检查：右眼视力：手动 / 10cm，矫正无效，眼压：32 mmhg，结膜充血，角膜中央偏上可见一穿刺口，闭合良好，余角膜透明，前房浅，周边前房约 1 / 3CT，房闪（＋），瞳孔欠圆，直径约 4mm 对光反射消失，品状体前囊膜破裂，皮质溢出，品状体白色全混浊，眼底红光反射不可见，眼底窥不清；入院后行晶体吸出术可见前囊膜三角形就撕裂 ，后囊完整。矫正视力 0．6（＋13．0DS），眼压：13mmHg，结膜轻度充血，切口闭合良好，后出院。三月后入院行二期人工晶体植入术，植入三焦点人工晶体。术后随访 1 月视力裸眼远 1.0 中 1.0 近 0，8

PU-109

心理护理在眼科手术患者护理中的应用分析

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目的：探讨心理护理对眼科手术患者的影响
方法：将 100 例眼科手术患者分为两组，对照组 50 例给予常规护理及术前护理指导，实验组 50 例给予加强心理护理，比较两组人员在术前术中术后的心理状态、心率和血压，术中术后对疼痛的耐受情况术中的配合程度以及术后的自我护理意识。
结果：术前术中患者的血压及心率实验组低于对照组，对手术疼痛的耐受实验组高于对照组，差异均有统计学意义。术中配合程度术后自我护理意识实验组高于对照组。
结论：眼科手术患者的心理状态主要为恐惧、焦虑和悲观心理，通过有效的心理护理能有效降低患者对手术的应激反应，减轻和消除病人的恐惧、焦虑心理，加强患者的配合意识。加强心理护理，能加强患者的手术质量及术后恢复情况，建立良好的护患关系，提高患者满意度。

PU-110

莱菔硫烷通过激活 Nrf2/ARE 通路抑制 NLRP3 炎症小体的形成对糖尿病视网膜病变的保护作用研究

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目的：莱菔硫烷(sulforaphane，SFN)是一种异硫氰酸盐，探讨 SFN 参与调节 DR 患者的视网膜 Nrf2/ARE 信号通路和 NLRP3 炎症小体活性，进一步研究 SFN 能够阻止 DR 的发展。**方法**：1、莱菔硫烷通过激活 Nrf2/ARE 通路对糖尿病大鼠视网膜病变的保护作用研究：2、莱菔硫烷通过抑制 NLRP3 炎症小体的形成对糖尿病大鼠视网膜病变的保护作用研究。**结果**：SFN 对糖尿病大鼠的视网膜有保护作用同样，SFN 对高糖诱导的 Müller 细胞炎症和氧化应激损伤同样有一定的抑制作用。SFN 也激活了 Müller 细胞的 Nrf2 信号通路并抑制了 NLRP3 炎性小体的形成。**结论**：SFN 可以通过激活抗氧化 Nrf2 信号通路，抑制 NLRP3 炎症小体的功能以减轻高糖诱导的视网膜炎症和氧化应激反应，从而减轻糖尿病视网膜病变程度。

PU-111

儿童下睑赘皮对散光影响的研究

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目的 为了探讨眼睑发育和眼睑结构异常对散光形成的影响机制，本课题拟通过研究下睑赘皮对学龄前儿童散光发生的影响因素和下睑赘皮不同程度与眼屈光状态的相关性，探讨下睑赘皮导致散光形成的机制，以期为下睑赘皮的分级临床诊疗和儿童散光和近视防控提供依据。

资料与方法 1 通过随机整群抽样方法，对北京市某区内的共 2281 名初幼儿园新生进行问卷调查，屈光检查及下睑赘皮诊断。分析学龄前儿童的散光危险因素。

2 以眼科门诊确诊的 64 名年龄 3-10 岁 的下睑赘皮儿童为研究对象，将下睑赘皮的程度进行分级，分析下睑赘皮的分级与眼屈光状态关系。

3 与 18 名正常儿童对照，经眼科门诊确诊的 10 名年龄 3-10 岁的下睑赘皮儿童为研究对象，分析近距离阅读对角膜表面参数、角膜屈光力和角膜散光的影响。

结果 1 散光≥1.0 D 者 439 例，患病率为 22.6%；下睑赘皮儿童 497 例，患病率 46.3%。下睑赘皮、高龄产妇和每天使用电子产品时间>60 分钟是散光发病的三个危险因素，比值比分别为 2.459、2.585 和 2.038。而高度散光的危险因素仅有下睑赘皮，其比值比为 3.597。

2 a 类Ⅲ、Ⅳ级下睑赘皮的散光绝对值显著高于Ⅰ、Ⅱ级下睑赘皮（*P<0.001*），a 类Ⅲ、Ⅳ级下睑赘皮的年龄显著小于Ⅰ级下睑赘皮（*P=0.035*）。b 类Ⅲ级下睑赘的散光绝对值显著高于Ⅰ、Ⅱ级下睑赘皮（*P=0.007*）

3 与正常儿童相比，近距离阅读 15 分钟后，下睑赘皮儿童的角膜表面规则指数与正常儿童的差异有统计学意义（*P=0.048*）。对于下睑赘皮儿童，近距离阅读 15 分钟后比阅读前 ，角膜垂直屈光度、平均角膜屈光度、角膜散光的绝对值显著减少（*P=0.032，P=0.044，P=0.028*），角膜表面规则指数明显增高（*P=0.047*）。

结论 下睑赘皮是散光和高度散光的危险因素，下睑赘皮程度越深散光值也越高，眼睑对角膜异常的机械作用力是下睑赘皮儿童伴发散光的可能机制。

PU-112

Comparison of the Clinical Outcomes between Echelette Extended Range of Vision and Diffractive Bifocal Intraocular Lenses

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PURPOSE To compare the clinical outcomes of echelette extended range of vision (ERV) and diffractive bifocal intraocular lenses (IOLs).
METHODS This is a prospective clinical trial. Patients received the implantation of echelette ERV IOL (ZXR00) or diffractive bifocal IOL (ZMB00). Visual acuities, defocus curves, contrast sensitivities, optic path difference (OPD) scans, and subjective evaluations were carried out in follow-up visits.
RESULTS ZXR00 showed better distance and intermediate visual acuities while ZMB00 was better at distance-corrected near visual acuity. Multivariate analyses indicated the correlation between worse intermediate vision and longer axial length in ZMB00. ZXR00 demonstrated smoother defocus curve and higher contrast sensitivities. ZXR00 received better outcomes in subjective evaluations.
CONCLUSIONS ZXR00 proved to be remarkable in distance and intermediate vision, defocus curve smoothness, contrast sensitivity and visual comfort, while ZMB00 achieved better near vision. Patients with relatively longer axial length might receive less favorable intermediate vision after ZMB00 implantation.

PU-113

ADD 处方在由初次配戴角膜塑形镜引起的调节灵活度异常中的应用

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目的：通过看近配戴 ADD 处方眼镜来放松初次配戴角膜塑形镜后的调节力，从而提高远裸眼视力。
方法：收集 9-16 岁初次配镜患者 10 人，球镜为-1.0—-4.00DS,柱镜为 0- -1.0DC,共 19 只眼。眼部无器质性病变，均进行快散验光，小瞳下视功能检查均为调节灵活度异常。在角膜塑形镜配前检查合格后，均配戴角膜塑形镜。配戴一个月后复查，眼表无异常，角膜塑形镜配适状态良好；视功能检查：眼位无异常，调节灵活度检查，单眼 0-4cpm（+）有 6 只眼，4-8cpm(+)有 8 只眼，9-12cpm(+)有 5 只眼，远裸视力 0.7-0.8 有 8 只眼，0.9-1.0 有 6 只眼，1.0 以上有 5 只眼。针对以上情况，根据不同患者的调节力及屈光度，给予单光 ADD 处方眼镜，只在其近距离用眼时配戴，建议其一个月后复查裸眼视力及调节灵活度。
结果：一个月复查，眼表无异常，配适状态良好。调节灵活度检查，单眼 6-10cpm（+）有 10 只眼，11cpm(+)以上 9 只眼，远裸视力均为 1.0 以上。
结论：当戴上角膜塑形镜后，相当于在短时间产生大于等于 3D 的调节刺激，对于初次戴镜调节功能较差的儿童青少年来说，由于短时间产生的调节刺激过强，会导致睫状肌放松不了的体征，即出现调节灵活度异常的情况，而导致远矫正视力不良。此时配戴单光 ADD 处方眼镜，可以直接有效的放松调节，从而提高配戴角膜塑镜后的远裸眼视力。当调节灵活度恢复正常后，此类眼镜即可停戴。

PU-114

角膜塑形镜联合小度数眼镜控制青少年高度近视的临床观察

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目的:探讨角膜塑形镜联合小度数眼镜控制青少年高度近视的效果。

方法: 57 例 104 眼的青少年高度近视患者纳入本研究，其年龄为 10-16 岁，屈光度-6.00D~-9.00D；A 组为佩戴角膜塑形镜+小度数眼镜组，B 组为佩戴眼镜组；18 个月后测量并记录 A（角膜塑形镜期停止佩戴 3 周后）、B 组的屈光度、眼轴长度。
结果:A 组的近视进展率为 32.2%，B 组的近视进展率为 75%，两组有显著的统计学差异（p＜0.001），
结论:角膜塑形镜联合小度数眼镜是控制青少年高度近视进展的一种安全可靠的方法。

PU-115

关于调节紊乱病例分享一例

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目的：利用双眼视功能训练缓解成年人视物不适症状。
材料及方法：一女性患者，29 岁，企业职工，工作以视近为主。于外院诊断外院诊断眼干及角膜炎，使用表皮生长因子及玻璃酸钠一月余，无明显缓解于本院就诊。因双眼视物涨疼或伴头晕，排除其器质性病变，进行双眼视功能检查。通过 1：药物：施图伦及复方托吡卡胺；2：配戴眼镜；3：翻转拍训练（±1.5D）；4：内聚训练。进行双眼视功能训练。
结果：初查：主诉眼睛酸胀，或伴有头晕，睁眼感到疲劳，睡觉后没有明显缓解。裸眼视力：右眼：1.0-，左眼：1.0。散瞳验光：右眼：+2.75DS=1.0，左眼：+0.75DS=1.0。小瞳下复查双眼 NRA：+0.25D，PRA：-0.75D，BCC：-1.25D。flipper：右眼：0.5cpm，正镜难以通过；左眼：6cpm；双眼：0.5cpm，正镜难以通过，AC/A=2。右眼 AMP：-1.25D，左眼：-2.25D，双眼：-2.50D。NPC：12cm。三个月后：主诉基本无酸胀感，右眼不戴镜看东西比以前模糊。右眼：1.0（矫正），0.8（裸眼）；左眼：1.0。NRA：+1.50D，PRA：-2.50D，BCC：-0.25D，AC/A=5。flipper：右眼：8cpm，左眼：12cpm，双眼：14cpm。右眼 AMP：-2.5D，左眼：-3.0D，双眼：-3.5D。NPC：7cm。
结论：门诊病人中经常会遇到视觉功能异常的病人，且 20~35 岁人群发病率逐渐增加，与该年龄阶段患者的用眼习惯有一定关系。双眼裸眼视力良好的患者其视功能也可能异常，易漏诊，可通过双眼视功能训练达到改善不适的目的。

PU-116

需求侧管理在手术排程中移峰填谷的作用

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目的 探讨需求侧管理对手术排程中移峰填谷的效果。方法 选取 2017 年 1-5 月共 10840 例手术和 2018 年 1-5 月 12029 例手术分别作为对照组和观察组，2017 年 9 月实施需求侧管理，内容包括：通过评估手术医生手术日安排需求,分析产生手术高峰期原因,制定医生手术日排班制度，对效果进行评价，比较两组手术数量、医生数量和护士加班时间，并做重复测量资料的方差分析。结果 平均医生数量：星期二和星期四两个手术高峰日比实施前减少，星期一和星期五手术低谷日比实施前增加，差异有统计学意义（P＜0.05）；手术数量：星期二手术高峰日比实施前减少，星期一、星期三、星期四和星期五手术日比实施前增加，差异有统计学意义（P＜0.05），手术量由 10920 例增加到 12189 例，手术量增长了 11.6%；护士加班时间由 1358h 降低到 1072h，降低了 21.6%。结论 手术室需求侧管理在手术排程中起到移峰填谷的作用，平衡了手术室资源，提高了手术室效率。

PU-117

雾视验光在调节超前患者配镜中的应用

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目的：评估雾视验光在调节超前患者配镜中的应用。
方法：收集 2018 年在我院就诊，年龄 8-35 岁的患者 28 例（56 只眼）。眼部无器质性病变，矫正视力≥1.0，调节功能检查：单眼 NRA‹+2.00D，单眼 BCC 为负值，单眼 Flipper 拍正片通过困难，聚散功能正常，根据检查结果诊断为调节超前的患者。记录患者小瞳下的验光度数。以上患者均进行充分雾视放松处理，双眼前加正镜片，雾视视力单眼 0.2 不提高，双眼 0.4，雾视时间 3-10 分钟，充分雾视至视力不提高，然后去雾视至最佳视力。对比雾视前后患者屈光度的变化情况。
结果：雾视 3-10 分钟后，对患者进行去雾视，至最佳视力，雾视前后屈光度变化为+0.39±0.13D。
结论：调节超前的患者，验光过程中雾视不充分有可能会出现近视度数偏高，远视度数偏低。雾视验光可以有效地放松调节，获得患者的真实屈光度。

PU-118

双眼视功能正常患者的隐斜量对视觉质量的影响

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【目的】研究青少年患者的视远隐斜量对双眼视远时视觉清晰度的影响。
【方法】2018 年 1 月—2018 年 8 月我院收入患者 40 例，选择 10--18 岁的青少年（无器质性眼病，双眼三级视功能存在，双眼视功能正常）屈光不正患者，远眼位≥1ΔBI，用 VonGrafe 法测量患者的远眼位。测量患者双眼视远时的最佳矫正视力。使用“融合十字”视标确定患者所需要加入的棱镜，加入棱镜后测量患者的双眼视远时的最佳矫正视力（使用 logmar 视力表用分数进行视力的记录）。观察并分析患者加入棱镜前与加入棱镜后双眼视力分数的对比情况。
【结果】通过对患者的检查及数据的收集分析，1ΔBI 即可对患者视远时双眼的最佳矫正视力产生影响，1ΔBI 的患者加入棱镜后双眼视远时的最佳矫正视力分数较不加棱镜前的双眼视远时最佳矫正视力分数提高≥1 分，2ΔBI 的患者加入棱镜后双眼视远时的最佳矫正视力分数较不加棱镜前的双眼视远时最佳矫正视力分数提高≥2±1 分。
【结论】轻微的隐性斜视患者双眼三级视功能不受到影响，但是会影响患者双眼视远时的最佳矫正视力，随着患者隐性斜视度的增加对双眼的最佳矫正视力影响越大。对于隐性斜视的患者可以通过三棱镜的验配来提高患者的双眼最佳矫正视力。

PU-119

青少年视功能调节不足散瞳前后屈光度对比

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【目的】研究青少年视功能检查调节不足散瞳前和散瞳后屈光度对比
【方法】收取何氏眼科视光中心 2017 年 8 月-2018 年 10 月的青少年初诊散瞳患

者 800 例 1600 只眼，年龄 9~16 岁，屈光度-0.50~-6.25D，散光-0.50~-2.00D,无眼部疾病，矫正视力≥0.8 视功能检查是调节不足或调节不持久。散瞳前进行裸眼视力、矫正视力、屈光度（MPMVA）、视功能检查，进行快速散瞳，散瞳后进行裸眼视力、矫正视力、屈光度并在进行瞳孔恢复后复验屈光度

【结果】通过对数据的检查与结果分析，散瞳后检查屈光度没有变化的 512 只眼占 32%，屈光度变化 0.25D 的 960 只眼，占 60%，屈光度变化 0.50D 的 128 只眼，占 8%；瞳孔恢复后再次进行小瞳下复验屈光度没有变化的 708 只眼占 44.25%，屈光度变化 0.25D 的 812 只眼，占 50.75%，屈光度变化 0.50D 的 80 只眼，占 5%,散瞳前后屈光度变化≤0.25D 占 92%，屈光度变化≥0.25D≤0.50D 占 8%;瞳孔恢复后再次进行小瞳下复验屈光度变化≤0.25D 占 95%，屈光度变化≥0.25D≤0.50D 占 5%，

【结论】对于视功能检查当中调节能力比较弱的青少年散瞳前后及小瞳下复验屈光度变化不大，可以在临床当中进行雾视验光。

PU-120

Compliance and hygiene practice of RGP fitting among optometrists and technicians: A cross-sectional study in China

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Objective: Hygiene practice is thought to play an important role in safety and quality control of RGP fitting, especially in preventing cross-infection. This study is to investigate the scope of hygiene and non-compliant behaviors among optometrists and technicians during RGP fitting.

Methods: Optometrists and technicians specializing in RGP fitting working in 11 major optometric centers from 5 cities in China (including Shanghai, Chongqing, Fuzhou, Hefei, Yueqing) were included. A set of interviewer-administered questions was used to subjectively assess the compliance and hygiene practice (hand hygiene habits, procedure of RGP fitting, storage and sterilization of lens and lens care accessories). The environment and sterilization of the fitting room is also evaluated.
Results: A total of 18 optometrists or technicians agreed to participate in this study, the majority of participators were female, with a mean age of 30.17±3.2 years. Median of practice time is 7.50 years.
Main forms of non-compliance of hygiene practice includes lack of replacement of lens care solution after fitting (72.2%), insufficient cleaning of lens accessories (72.2%), lack of replacement of lens accessories (44.4%) and infrequent sterilization of air(33.3%). Meanwhile, inappropriate flushing of lens with tap water (6%) is a worth-noting high risk factor for CL-related AK. No specific socio-demographic factors were found to be associated with reported non-compliance.
Conclusion: A significant number of optometrists or technicians exhibited poor levels of hygiene and compliance with contact lenses and lens care systems. An all-around supervision system and professional education should be strengthened to regulate and guarantee the safety of RGP fitting.

PU-121

不同 E 值患者配戴角膜塑形镜的疗效分析

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目的：对比不同 E 值患者配戴角膜塑形镜的疗效。
方法：选取 2018 年 1 月至 2019 年 1 月来我院验配角膜塑形镜的患者，排除眼部器质性病变，屈光度-3.00—-4.00D，顺规散光小于-1.75D，逆规散光小于-0.75D，年龄 8-15 岁，进行角膜塑形镜试戴评估。从中选取适合配戴的患者 36 例 70 眼按不同 E 值进行分组，A 组 8 例 15 眼，E 值 0.30-0.39；B 组 16 例 32 眼，E 值 0.40-0.59；C 组 12 例 23 眼，E 值 0.60-0.75。各组均每天配戴角膜塑形镜，平均睡眠时间 7-8 小时，对比戴镜后的次日、一周、两周裸眼视力变化情况。
结果：次日复查
裸眼视力
组别 0.2-0.30.4-0.60.7-0.80.9 以上
A 组（8 人 15 眼）50%37.5%12.5%0
B 组（16 人 32 眼）18.8%56.2%25%0
C 组（12 人 23 眼）8.3%41.7%83.3%16.7%
一周复查
裸眼视力
组别 0.2-0.30.4-0.60.7-0.91.0 以上
A 组（8 人 15 眼）012.5%62.5%25%
B 组（16 人 32 眼）012.5%37.5%50%
C 组（12 人 23 眼）0025%75%
两周复查
裸眼视力
组别 0.2-0.40.5-0.70.8-0.91.0 以上
A 组（8 人 15 眼）025%37.5%37.5
B 组（16 人 32 眼）0018.8%81.2%
C 组（12 人 23 眼）0016.7%83.3%
结论： E 值低塑形效果较慢，达到理想视力时间较长；e 值高塑形较快，达到理想视力时间短。

PU-122

集合过度患者配戴多焦点镜片与配戴单焦点镜片配合视觉训练改善视疲劳的疗效对比

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目的：对比集合过度患者配戴多焦点镜片改善视疲劳与配戴单焦点镜片配合视觉训练改善视疲劳情况哪种方法更加快速有效。
方法：选取我院 2016 年 1 月至 2018 年 10 月视疲劳症状明显（填写视疲劳调查问卷）的患者，排除眼部器质性病变，年龄 18-35 岁，进行眼屈光及视功能检测。检查项目包括裸眼视力、矫正视力、Worth 四点、立体视、Flipper、NPC、DLP、NLP、AC/A、NRA、BCC、PRA、远近 BI/BO。从中选取集合过度患者 58 例 116 眼进行分组，A 组 32 例 64 眼，验配渐进多焦点镜片不做训练；B 组 26 例 52 眼验配普通单焦点镜片并配合视觉训练，训练为每周一次，每次 30 分钟，主要进行散开方面的训练。三个月复查视功能及视疲劳改善情况。
结果：A 组 32 例 64 眼中 29 例 58 眼集合过度情况明显改善，视功能基本恢复正常，占 91%，其余 3 例 6 眼集合过度情况减轻，偶有视疲劳症状，占 9%；B 组 26 例 52 眼中 17 例 34 眼视功能基本恢复正常，无明显视疲劳症状，占 65%，其余 9 例 18 眼集合过度情况减轻，偶有视疲劳症状，占 35%。
结论： 对于集合过度的患者，渐进多焦点镜片与视觉训练均可改善视疲劳症状，但渐进多焦点镜片更加快速有效。

PU-123

A 型肉毒毒素治疗儿童共同性斜视的短期疗效

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目的：观察比较 A 型肉毒毒素（BTA）注射与手术治疗儿童共同性斜视的疗效，分析 BTA 应用于儿童共同性斜视的安全性和有效性。方法：本研究为前瞻性非随机对照研究。连续入选 2018 年 4 月至 2018 年 8 月我院就诊的 18 岁以下有手术指征的共同性斜视患儿，根据家长意愿分为注射组和手术组，分别给予 BTA 注射及手术治疗。合并垂直斜视、A/V 型斜视或垂直分离型斜视、眼球震颤、神经系统疾病、眼部其他器质性疾病、眼部手术史、拒绝签署同意书、不能按期随访者排除入组。眼位检查以三棱镜于 6m 及 33cm 测量斜视度，双眼视觉功能以同视机及 RDS 立体视图册检查。术后以斜视度≤10△为眼位正位。结果：共收集了 62 名患儿数据。注射组共 21 人（7 名女性），平均年龄 9.57±2.69 岁（4~13 岁），手术组共 41 人（20 名女性），平均年龄 6.46±1.80 岁（3~11 岁）。注射组内有 20 名间歇性外斜视和 1 名部分调节性内斜视患儿，手术组包括 35 名间歇性外斜视、3 名部分调节性内斜视、2 名交替性内斜视及 1 名共同性内斜视患儿。注射组中，术前斜视度为 36.78±10.10△，3 月后复查斜视度平均为 6.01±10.01△，成功率 76.19%，而手术组术前斜视度平均为 39.82±8.41△，术后 3 月为 10.77±9.693△，成功率 65.85%，两组成功率无统计学差异（P=0.403）。注射组中，10%的患儿有融合功能的重建，14%的患儿有远立体视的重建以及 38%的患儿近立体视得到了改善，而手术组中，有 41%的患儿得到了融合的重建，24%的患儿远立体视得以重建，30%的患儿发现近立体视有所改善。结论：BTA 注射治疗儿童共同性斜视与手术治疗有着相当的短期效果，在眼位控制上，BTA 甚至要优于手术治疗，同时，BTA 治疗患儿的双眼视觉功能也有所改善。由于本研究样本数量及随访时间有限，BTA 长期疗效尚未证实，未来还需要大样本、长期随访的结果。

PU-124

The relation between Implantable Collamer Lens (ICL), postoperative pupil size and lens vault

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Purpose: To assess the changes in postoperative pupil size due ICL implantation and its impact on lens vault in eyes with high myopia.

Methods: A total of 60 eyes of 30 consecutive patients with high myopia undergoing implantation of V4c (Star, Switzerland) ICL were retrospectively assessed. Visual acuity (VA), pupil diameter (PD) (Pentacam), anterior chamber depths (ACD) (Pentacam), intraocular pressure (IOP) and ICL vault were examined at the preoperative, postoperative at 1-month, and 3-month stages. The preoperative and postoperative pupil diameter were also compared with each other to note the differences between them. The correlations between the change in postoperative pupil diameter and ICL vault were analysed.

Results: Preoperative mean PD was 3.10±0.57mm and postoperatively at 1-month and 3-month it decreased to 2.83±0.44mm ($p<0.001$) and 2.62±0.42mm ($p<0.001$) respectively. The coloration between change in postoperative PD and ICL vault was at 1-month ($R=53.01$; $p<0.001$) and 3-months ($R=45.05$; $p<0.001$) respectively; Correlation between preoperative ACD and ICL vault at

1-month and 3-month postop was: R=38.06; p<0.001 and R=45.29; p<0.001 respectively. Correlation between postoperative IOP and PD change at 1-month (R=44.07) and 3-month (R=46.10) were significant.
Conclusions: PD tends to decrease at the 1-month and 3-month stages after ICL implantation and the significant coloration between increase in IOP and PD change suggests that reduction of PD may be caused by possible contact between the ICL and the posterior iris surface affecting the flow of aqueous humor in such a small space leading an increased pressure to the posterior surface of the iris and thereby affecting the pupil. Biometric parameter such as the ACD can possibly be used to predict the vault after ICL implantation using a new regression equation and machine learning.

PU-125

2 岁以下双眼先天性白内障 I 期及 II 期 IOL 植入临床效果比较的研究

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目的：评估 2 岁以下双眼先天性白内障 I 期及 II 期 IOL 植入的临床效果。**方法：**回顾 2010 年 7 月至 2016 年 12 月因双眼先天性白内障在我院行 I 期及 II 期 IOL 植入术后随访大于 12 月的 40 例 80 眼 2 岁以下患儿病例资料。观察指标包括白内障摘除年龄、I 期及 II 期 IOL 植入年龄、末次最佳矫正远视力（BCDVA）、术后 3 月内及末次随访等效球镜度数(spherical equivalent, SE)、近视漂移度数、末次随访屈光参差、不良事件。采用 SPSS 17.0 统计软件进行数据处理。**结果：** 2 岁以下（≤24 月）I 期 IOL 植入有 34 眼（A 组），2 岁以下（≤24 月）II 期 IOL 植入有 22 眼（B 组），2 岁以上（>24 月）II 期 IOL 植入有 24 眼（C 组）。A 组获得较差视力结果（>0.5LogMar）的风险较 B 组低，B 组较 C 组低，差异均有统计学意义（P<0.05）。对于 PCO 发生率、瞳孔变形发生率、青光眼发生率、二次手术率，A 组与 B 组、B 组与 C 组之间无显著性差异（*p*>0.05）。**结论：** 2 岁以下（≤24 月）I 期 IOL 植入获得的视力结果最好，但需扩大样本量和长期随访。

PU-126

局麻下手术中调整眼位治疗大角度共同性外斜视的疗效观察

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摘要 目的 探讨在局麻下采用常量手术，术中调整眼位方法治疗共同性外斜视的疗效。 **方法** 对 40 例≥-40△，≤-60△的共同性外斜视患者按照常量手术设计在局麻下行单眼外直肌后退联合内直肌截除术,术中调整眼位以手术眼注视，未手术眼遮盖联合三棱镜中和法，检查 33cm 眼位，至正位后结束手术。观察术后 24h、1 个月及 6 个月眼位。 **结果** 术中达到眼位正位,术后随访 6 个月手术成功 92.5%。 **结论** 局麻下手术的共同性外斜视,术中调整眼位至正位，采用术眼注视联合三棱镜交替遮盖，可以减少局麻药物及术中操作对眼位影响，提高了手术成功率。

PU-127

暗室瞳孔直径下 Nd：YAG 激光后囊膜切开术后屈光状态及视觉质量的变化

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目的 探讨暗室瞳孔直径下 Nd:YAG 激光后囊膜切开术后的屈光状态、高阶像差、视觉相关生活质量变化特点。方法 收集 2017 年 8-11 月在我院行 Nd：YAG 激光治疗的 PCO 患者 57 例 73 眼。后囊膜切开直径为暗室下瞳孔直径（3-4mm），手术前后均行主觉验光、KR-1W 视觉质量分析仪检查并填写 Catquest-9SF 量表。结果 Nd:YAG 激光后囊膜切开术后最佳矫正视力（0.095±0.020）较术前（0.550±0.039）显著提高，差异有统计学意义（P<0.05）；术前球镜、等效球镜分别为（-0.938±0.209）D、（-1.581±0.207）D，术后分别为（-0.658±0.218）D、（-1.204±0.213）D，手术前后差异有统计学意义（P<0.05）；术后 Catquest-9SF 量表总分及各问题得分均较术前显著提高，差异有统计学意义（P<0.05）；4mm、6mm 瞳孔直径下的全眼及眼内总高阶像差、3 阶像差、4 阶像差、三叶草像差、慧差、2 阶散光术后较术前显著降低，差异有统计学意义（P<0.05）。结论 暗室瞳孔直径下 Nd：YAG 激光后囊膜切开术后，屈光状态呈远视漂移，高阶像差明显降低，视力及视觉相关生活质量问卷评分显著提高，患者视觉质量明显改善。

PU-128

长期夜戴角膜塑形镜对角膜内皮细胞及角膜厚度的影响

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目的：观察连续夜戴角膜塑形镜 5 年以上近视患者角膜内皮细胞及角膜厚度的变化
方法：回顾性病例研究。收集 2013 年 1 月年至 2019 年 1 月在我院视光中心验配角膜塑形镜，连续配戴时间≥5 年的青少年近视患者 30 例，共 60 只眼。平均年龄 10.68 岁（8~15 岁），近视屈光度 -0.75D~-5.00D，散光≤1.50D。常规检查并验配角膜塑形镜，戴镜期间每年定期复查角膜内皮镜及角膜厚度。
结果：连续戴镜 5 年后，患者的平均角膜内皮细胞密度为 3065.15±35.23/mm^2，较戴镜前无明显差异（P>0.05）;平均细胞面积 294.32±21.63μm^2，较戴镜前无明显差异（P>0.05）六边形细胞比例由戴镜前的 68.35%±6.45%，降为 55.63%±9.87%，较戴镜前明显减少（P=0.032）；变异系数由戴镜前的 23.11%±1.68%，增长为 33.48%±3.92%，较戴镜前明显增高（P=0.014）；平均角膜厚度 523.58±9.34 μm，较戴镜前无明显差异（P>0.05）。
结论：连续夜戴角膜塑形镜 5 年后角膜内皮细胞密度及角膜厚度均无明显改变，长期戴镜安全、有效。

PU-129

双眼调节功能对弱视患者矫正视力的影响

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目的 双眼调节功能对轻度弱视患者矫正视力影响的临床观察。方法 选择 5-8 岁临床患者 100 名，收集所有患者医学验光、矫正视力、调节功能三项检查结果，分为实验组和对照组，对照组进行常规弱视训练，实验组进行常规弱视训练结合调节功能训练，2 个月后患者收据的收集并针对实验组和对照组检查结果进行对比分析。结果 弱视训练结合调节训练的实验组(A)视力提升与只进行弱势训练的对照组(A)无明显差异;弱视训练结合调节训练的实验组(B)84%视力提升较只进行弱势训练的对照组(B)60%有明显提高；弱视训练结合调节训练的实验组(C)84.6%视力提升较只进行弱势训练的对照组(B)61.5%有明显提高。结论 影响弱视患者视力提升最常见的因素是双眼视功能障碍，其中最

主要的是调节功能异常，调节功能异常主要包括调节不足、调节过度和调节灵敏度不良，且三者都可引起轻度弱视患者矫正视力提升困难，可导致轻度弱视患者矫正视力停滞不前。调节功能训练对于轻度弱视患者矫正视力有明显帮助，长期有效的调节功能训练能较好提高患者矫正视力。

PU-130
使用 flipper 训练提升配戴角膜塑形镜视力不良患儿的临床观察

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目的：回顾性研究低度数近视患儿配戴角膜塑形镜视力不佳，排除配适及泪液质量等相关因素，通过改善调节功能异常对视力提升的临床观察。
方法：抽取 2017-2018 年门诊配戴角膜塑形镜患儿 10 例，20 眼，年龄 10~16 岁，-1.00D≤等效球镜≤-3.00D，配戴前患儿每年近视度数平均增长≥-0.75D，经检查符合角膜塑形镜验配指针。采取角膜塑形镜验配原则均为 4 弧设计，根据患者度数、角膜曲率及角膜地形图参数设计最大幅度降低近视度数的塑形镜片，且配适皆良好。分别收集角膜塑形术前患者裸眼视力以及最佳矫正视力。双眼配戴角膜塑形镜后一个月患者裸眼视力未达到最佳矫正视力，荧光染色及角膜地形图显示塑形后各参数皆在正常范围内且配适良好，经检测患者调节功能异常，调节灵敏度低，考虑到调节功能的影响，给予患者一周 2 至 3 次，一次单眼 3 分钟双眼 4 分钟的 flipper 训练以及针对不同调节异常患者制定个性化的调节功能训练，同时坚持角膜塑形镜每天 8 到 10 小时的配戴时间，并嘱患者一个月后复查。
结果：患者调节功能得到明显改善，检查矫正视力均有提升，通过进一步的 flipper 训练，视力皆达到最佳矫正视力。
结论：对于调节功能异常导致的角膜塑形镜配戴患者视力未达到正常，通过调节功能训练，改善患者调节功能从而提高患者视力。

PU-131
Tomey OA-2000 、 IOL Master 700 及 A 超角膜测厚仪测量近视患者中央角膜厚度的比较

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目的 比较 Tomey OA-2000、IOL Master700 及 A 超角膜测厚仪测量近视患者中央角膜厚度的差异性和一致性。方法 选取我院门诊拟行角膜屈光手术的近视患者 56 人(112 眼) ，分别用 Tomey OA-2000、IOL Master700 及 A 超角膜测厚仪（NIDEK US-500）测量双眼中央角膜厚度，三种仪器均测量 3 次，取平均值。对三种仪器的测量结果进行统计学分析。 结果 112 眼的中央角膜厚度测量结果：A 超测量值为(542.23 ± 26.88) μm，Tomey OA-2000 为(521.75 ± 26.51)μm，IOL Master 700 为(519.53 ± 28. 15)μm。三种仪器测量值总体间比较差异有统计学意义(F = 23.737，P ＜ 0. 01) ，三者间两两比较差异均有统计学意义(P ＜ 0.05) 。Pearson 相关分析显示：三种仪器测量值均呈高度相关（r = 0.953 、 0.930、 0.927，P＜0.01）。一致性分析显示：Tomey OA-2000 、IOLMaster 700 测量值与 A 超相比一致性均较好。结论 这两种光学生物测量仪测量中央角膜厚度的结果与 A 超相比具有良好的相关性和一致性，但其结果存在微小的差异，三者之间不能简单的互相替代。

PU-132

巩膜 RXRα 在近视形成过程中的调控作用及其机制的研究

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目的：为了更深入探讨 RXRα 对近视的调控机制，我们分别采用人巩膜成纤维细胞和巩膜特异性敲除小鼠为研究对象，通过体外和体内验证 RXRα 对 I 型胶原合成及对成纤维细胞分化的调控作用，为进一步了解 RXRα 参与近视形成的机制提供理论依据。

方法：1.在体实验：利用 RXRα-LoxP 小鼠，通过 Tenon's 囊下注射包装有 Cre 重组酶序列的 AAV8 病毒获得巩膜特异性敲减 RXRα 小鼠，用来研究 RXRα 对屈光发育的影响。
2.体外实验：以原代人巩膜成纤维细胞为研究对象，通过 RXRα 激动剂激活 RXRα 的功能，利用 RT-PCR、Western blot 等实验技术，检测 I 型胶原、α-SMA 以及调控胶原合成与降解途径相关基因表达。

结果：1.巩膜 RXRα 条件性敲减后小鼠屈光向近视方向偏移，但眼轴长度、玻璃体腔深度等眼球生物学参数无明显变化；胶原和 α-SMA 在 mRNA 和蛋白水平均无明显变化；
2.RXRα 的激动剂 9-cisRA 处理人巩膜成纤维细胞，可上调胶原的表达。其中参与调控胶原合成的相关基因包括 TGF-β2 表达上调, PLAT 的增加可诱导潜在的 TGF-β 水解活化；参与胶原降解相关的基因包括 MMP-2，MMP-14 和 PAI-1 表达无明显变化。

结论： RXRα 减少可能影响胶原的合成途径进而促进近视的形成。

PU-133

准分子术后视功能重建一例病例报告

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目的：探讨术前视功能检查的重要性、近视眼准分子术后视功能的改变以及术后出现视功能异常进行视觉训练的重要性。**方法：**选取一例 90 刀 LASIK(W)术后主诉视远视物模糊的患者为对象进行病例报告分析 。眼前节：正常。眼底：正常。视功能检查：Worth4 点 5，AMP：OD12.5 OS12.5，Flippe：OD0(+) OS0(+) OU0(+)，遮盖外→中，集合近点＞15 厘米，其他视功能参数均不能正常进行检查。根据正镜通过困难，集合近点远移，遮盖试验初步诊断外斜、集合不足。视觉训练：使用训练产品镜片阅读、镜卡组合（翻转拍规格为±1.50、±2.00、±2.50，视力卡规格为 20/40、20/30）、聚散球、脱抑制卡、偏正图、红绿阅读单位、VT 训练图、远近字母表做调节放松+调节灵敏度+脱抑制训练 8 次结合一个月家庭训练。**结果：**近视眼准分子术后所需的调节增加，斜视失代偿，调节与集合的平衡打破，出现视疲劳、矫正视力不佳。8 次训练室视觉训练＋一个月家庭训练后复查视功能，视功能参数未完全恢复，但可以正常测试出参数值：worth4 点正常，近水平眼 20△BI，AC/A3.5，正负相对调节恢复正常 NRA+2.25，PRA-3.00，AMP：OD11 OS10.5，集合近点移近：NPC10cm，调节灵敏度提升 Flipper：OD5.5（+） OS 4（+） OU5（+）。患者表述视物清晰，眼位可控。嘱其继续以集合不足的诊断继续训练，随访，双眼未有不适感。**结论：**近视眼术前近视不需要过多调节，术后镜眼距消失，调节需求比术前增加，术后出现了调节和集合的不平衡，从而导致了术后的视疲劳。屈光手术前应考虑患者的调节和集合功能，对可能有调节功能异常的患者进行全面的调节功能检测，必要时建议患者手术前进行适当的视功能训练，不出现不适时再进行手术。

PU-134

不同年龄阶段近视儿童佩戴角膜塑形镜的临床疗效观察

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目的：分析不同年龄阶段近视儿童佩戴角膜塑形镜的效果。
方法：选取 2016 年 7 月至 2017 年 7 月在我院眼科佩戴角膜塑形镜的 56 例（100 眼）近视儿童，根据年龄分为 3 组：8 岁-10 岁（A 组）、11 岁-12 岁（B 组）、13 岁-14 岁（C 组），比较患儿戴镜前与戴镜后 1 年的裸眼视力、屈光度、眼轴长度及不良反应的情况。
结果：治疗 1 年后：A 组的裸眼视力明显优于 B、C 组(P <0.05)；A 组近视度数增长、眼轴长度明显低于 B、C 组(P <0.05)；各组的不良反应发生率无统计学意义(P>0.05)。
结论：配戴角膜塑型镜能有效降低眼轴长度变化程度，具有较高的安全性，且对于 8 岁-10 岁低年龄近视儿童的疗效比较明显。

PU-135

血管活性肠肽影响形觉剥夺性弱视幼猫的视觉诱发电位观察

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摘要 目的：将图形视觉诱发电位（Pattern visual evoked potential, PVEP）作为评判标准，评估血管活性肠肽（Vasoactive intestinal peptide，VIP）对形觉剥夺性弱视幼猫的治疗效果。 **方法**：健康 3 周龄家猫 30 只，将其随机分为正常对照组（10 只），单眼剥夺组（20 只）。剥夺组腹腔注射麻醉后，于眼眶处缝合黑色不透光眼罩遮盖右眼。所有幼猫始终饲养在光照充足环境中，室内温度维持在（27±1）℃。6 周龄时经 PVEP 检测，有 18 只剥夺组幼猫单眼弱视形成。将 18 只弱视幼猫去除遮盖，随机分为 VIP 干预组（6 只）、辛酸单甘油酯（Sefsol）干预组（6 只）、弱视非干预组（6 只），同时 10 只正常幼猫继续饲养仍作为正常对照组。VIP 干预组每日予以 10ugVIP / 40 ul(含 10％Sefsol+40％异丙醇)经鼻给药，Sefsol 干预组每日予以 10％Sefsol 和 40％异丙醇经鼻给药，弱视非干预组和正常对照组不做任何处理。10 周龄时比较各组 PVEP 检测结果。 **结果**：6 周龄时，剥夺组右眼的 P_{100} 波振幅低于对侧眼和对照组右眼（P<0.05），潜伏期长于对侧眼和对照组右眼（P<0.05），证明剥夺组单眼弱视已形成。10 周龄时，VIP 干预组幼猫右眼 P_{100} 波振幅高于弱视非干预组右眼和 Sefsol 干预组右眼（P<0.05），而低于正常对照组右眼（P>0.05）;潜伏期短于弱视非干预组右眼和 Sefsol 干预组右眼（P<0.05），而长于正常对照组右眼（P<0.05）。其中 Sefsol 干预组与弱视非干预组 P_{100} 波振幅和潜伏期比较,差异均无统计学意义，排除 Sefsol 和异丙醇作为渗透促进剂对实验结果带来的干扰。 **结论**：VIP 经鼻粘膜给药安全有效，同时 VIP 可以改善弱视幼猫的视功能，对形觉剥夺性弱视幼猫有一定治疗效果。

PU-136

天津市 133 例幼儿视力、屈光状态及集合功能的调查分析

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目的：了解天津市 133 例幼儿的视力健康,及早发现异常、及时诊治,以保证儿童视力的正常发育。

方法：2018 年 11 月对天津市卫计委幼儿园 133 例 3～4 岁儿童，采用儿童视力表和对数视力表检测视力；应用手持电脑验光仪检查屈光状态；应用 IOL-Master 测量眼轴长度，Tomy 角膜地形图仪测量角膜屈光度及变化趋势。
结果：4 岁组视力 95%参考区间为 0.39~0.89，3 岁组视力 95%参考区间为 0.33~0.84，低于正常视力者 4 岁组占 18.0%, 3 岁组占 13.1%；比较各组眼轴发现，4 岁组眼轴 95%参考区间为 20.68mm~23.36mm，3 岁组眼轴 95%参考区间为 20.18mm~23.62mm；通过角膜地形图观察各组角膜屈光状态发现，4 岁组 Ks 值 95%参考区间为 40.98D~47.45D,3 岁组 Ks 值 95%参考区间为 41.38D~47.66D；4 岁组 Kf 值 95%参考区间为 40.11D~45.99D，3 岁组 Kf 值 95%参考区间为 40.29D~46.06D；4 岁组集合近点≤6cm 者占 75.8%，超过 6cm 或不稳定者占 24.2%，3 岁组集合近点≤6cm 者占 51.5%，超过 6cm 或不稳定者占 48.5%。各指标两年龄间比较差异均无统计学意义（p>0.05）
结论：3～4 岁幼儿是眼健康发育的关键时期，对视力、屈光状态、视功能等相关检查，有利于及时发现并干预由屈光不正引起的视觉发育不良，能避免儿童低视力的发生发展。

PU-137
D1 受体拮抗剂在小鼠形觉剥夺近视过程中对 GJD2 基因 mRNA 水平与其编码蛋白 CX36 含量改变的影响

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背景：本研究的主要目的是通过构造小鼠形觉剥夺近视模型，并腹腔注射 D1 受体拮抗剂，探索 GJD2 基因和 DA 在形觉剥夺性近视发生发展过程中的关联。
方法：将四周龄健康 C57BL/6 小鼠随机的分为对照组和形觉剥夺近视组。并且将各组再分为空白对照组，溶剂组和 SCH39166 组。形觉剥夺组右眼用自制的半透明眼罩遮盖四周，左眼不做任何处理，作为自身对照。对照组左右眼均不做任何处理，在 SPF 级别环境中饲养。溶剂组和 SCH39166 组每日腹腔注射药物。空白对照组不注射药物。分别在造模起始点，造模两周和四周时间点测量相关眼部参数，用于监测两组的近视进展。造模四周后，提取视网膜中的 GJD2 基因 DNA，以 tublin 做内参，进行实时定量 PCR 实验和 Western Blot 实验，比较形觉剥夺组和自然对照组小鼠 GJD2 的 mRNA 含量和 CX36 蛋白的表达含量的相对改变。
结果：在造模 2 周和 4 周之后，形觉剥夺组均比自然对照组表现出更明显的近视漂移，而且眼轴长度比对照组长（P<0.05)。而对照组中，溶剂组和 SCH39166 组生物学参数差异无统计学意义。形觉剥夺组中，SCH39166 组较溶剂组近视偏移较高。此外，在造模四周的时间点，FD 组中 SCH39166 组较溶剂组和空白对照组，GJD2 的 mRNA 水平降低。，CX36 的表达含量明显升高，而 WT 组 SCH39166 组 mRNA 和 CX36 含量较溶剂组和空白对照组差异不大。
结论：相对于野生型小鼠的正视化过程，C57/BL6 小鼠在形觉剥夺四周之后表现出了明显的近视化改变，而 SCH39166 能够促进形觉剥夺性近视的发展，说明 D1 受体拮抗可能在近视模型的构造中起着至关重要的作用。同时，SCH39166 能够使 FD 条件下的 CX36 的表达水平升高，提示 CX36 的表达可能与 D1 受体的拮抗有关。

PU-138
幼年圆锥角膜病例一例

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患者男性，七岁。验光结果：OD:+1.50/—3.00X10=0.5-，OS:+0.25/-0.75X170=0.9，角膜地形图：双眼病变位置均为下方非对称蝶形. 右眼角膜散光3.1D，最大K值是48.90D，左眼角膜散光1.30D，最大K值是47.00D，有明显形态学改变。角膜内皮细胞密度：OD:3053，OS: 2894.25，六角形比例：OD：73%，OS：57%。眼底照相检查:无异常，初步诊断圆锥角膜。
根据国外Rabinowitz等人建议标准：（1）角膜中央屈光度＞46.5D。（2）下方与上方角膜曲率值（I-S值）＞1.00D。（3）双眼角膜屈光度差＞0.92D。[1]依据此诊断标准来分析此患者，该患者裸眼视力： OD：0.4 ， OS:0.6，框架眼镜矫正: OD：-3.00X10=0.5，OS:-0.25/-0.75X170=0.9 ，角膜地形图显示：右眼角膜散光3.1D，最大K值是48.9D，左眼角膜散光1.3D，最大K值是47.00D，有明显形态学改变。下方与上方角膜曲率值（I-S值）＞1.00D。中心角膜厚度：右眼488μm， 左眼 470μm 诊断：双眼圆锥角膜。处理：双眼均验配RGPCL：OD:7.40mm/-1.25D/9.0mm=1.0,OS:7.50mm/-1.75D/9.0mm=1.0。戴镜后坚持复查，从8个月复查时，角膜散光可见降低。
圆锥角膜属于一类疑难性高度屈光不正的角膜变性，矫正和治疗均非常棘手，而目前能达到这一理想疗效的非手术方法非RGPCL（透气性硬性角膜接触镜）技术莫属。[5]国外一些学者提出99%的圆锥角膜患者均应首选接触镜进行矫正、治疗。[6]
幼年圆锥角膜临床罕见，如遇到无明显圆锥角膜体征但有高度角膜散光、SimK＞47.00D,且角膜规则性轻度下降,曲率也较正常人群高，近视、散光进行性增长的青少年儿童，[3]应引起临床医生注意。

PU-139

特殊角膜验配 CRT 案例分析 1 例

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目的 报告1例特殊角膜患者（平角膜、大直径、高E值、中高度近视）在配戴OK镜（Paragon CRT®100品牌）后获得良好的裸眼视力及稳定的镜片定位等情况。
方法 本患者为初次验配角膜塑形镜（OK镜），给予CRT OK镜验配，观察CRT在特殊角膜（平角膜、大直径、高E值、中高度近视）情况下，在视力稳定、镜片定位及角膜健康等方面的优势。患者为15岁女性，双眼屈光度：R：-4.25=1.0+ L：-4.25/-0.50×161=1.0+；角膜直径：OD 12.4mm，OS 12.3mm；角膜曲率检查：R：FK 39.00@170 SK：39.75@80，L：FK 39.00@170 SK：40.00@80；E值：R:0.61/0.62 L:0.72/0.68。对其进行CRT常规验配，增加镜片直径至11mm，观察视力、镜片定位、角膜健康等情况；根据初次复查情况进行镜片调整，再次增加镜片直径至11.5mm，观察视力、镜片定位、角膜健康等情况；最后综合两次镜片参数在初次验配的参数上使用CRT-E，维持镜片直径在11mm，观察视力、镜片定位、角膜健康等情况。
结果：患者配戴11mmCRT常规片，视力稳定，镜片定位前期不稳定，随着配戴时间延长，定位趋于稳定，角膜无点染；改用11.5mmCRT常规片，较初次验配的基础上，视力及镜片定位没有得到明显的改善，角膜边缘频繁点染，且患者主诉戴镜难受，难以继续戴镜；改用CRT-E，视力及镜片定位得到明显的改善，角膜无染色。
结论：针对特殊角膜（平角膜、大直径、高E值、中高度近视）患者，CRT-E较CRT常规镜片更有优势。但这种效果是否具备普遍性，还需要更多样本支持。

PU-140

多媒体网络训练治疗弱视的效果观察

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目的：回顾性分析多媒体网络训练治疗不同程度弱视的治疗效果。方法：选取首次进行治疗的 156 例（214 眼）3-10 岁弱视患儿，随机分为两组。试验组 87 例（106 眼），对照组 69 例（108 眼）。试验组采用多媒体网络训练系统治疗，对照组采用传统综合方法治疗，1 月、2 月、3 月对视力、视功能等复查。通过两组结果比较分析多媒体网络训练治疗弱视的有效性。结果：试验组治愈率（97.5%）高于对照组治愈率（95.8%）。结论：多媒体网络训练治疗弱视疗效优于传统综合方法。多媒体网络训练治疗弱视效果好，安全性高。

PU-141

散瞳的目的和注意事项以及对诊断屈光不正的作用

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散瞳验光的目的是通过药物使眼内睫状肌充分麻痹，消除睫状肌收缩引起的正常调节作用，从而使验光结果更客观准确可靠。注意事项：1.散瞳之后会有怕强光的情况，一般室内不会有明显不适，尽量避免外出；2.散瞳之后由于睫状肌麻痹，看近处无法调节，所以会有看近处模糊的症状，而看远处影响不大，所以散瞳之后不要看书、写字、看电视、看电脑等近距离用眼。

PU-142

Measuring topographic indices and pachymetry in healthy adolescents based on Sirius

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Purpose: To determine the normal values for the Sirius corneal topography, of some topographic indices and corneal pachymetry, in a healthy young adolescent population.
Methods: A total of 147 students (mean age12.97 ± 0.83 years) took part in this study. 294 eyes were imaged through Sirius. Anterior and posterior meridi-ans, mean pupillary power, central corneal thickness, minimum corneal thickn-ess, and anterior and posterior asymmetry indices were analyzed. Correlations between corneal parameters and differences between anterior and posterior corn-eal surfaces were evaluated.
Results: Average anterior meridian was 43.37 D(± 1.46); average posterior me-ridian was 6.16 D(± 0.24); central corneal thickness was 550.82 ± 29.86 micr-on,minimum corneal thickness was 547.35 ± 29.94 micron; mean pupillary po-wer was 42.95 ± 1.46 D, SIf was - 0.035 ± 0.46, and SIb was 0.012 ± 0.091.Anterior and posterior corneal curvatures correlated negatively with MPP(r =–0.99; p = 0.000 and r =–0.85 p = 0.000,respectively). Anterior curvature corr-elated positively with posterior curvature (r = 0.891; p = 0.000). Positive corr-elations were found for SIf and SIb (r = 0.58; p = 0.000). Negative correlatio-ns were found for SIf and corneal pachymetry (r =–0.23; p = 0.000) and fo-r SIb and corneal pachymetry (r =–0.18;p = 0.012). The difference between anterior meridian average and posterior meridian average was 1.29 ± 0.12 and was significative (p < 0.001). No differences between genders were found.
Conclusions: These results provide normal standards for corneal values in ado-lescents and could represent a useful tool for future comparative studies in thisage group population.

PU-143

Purpose: To compare clinical and visual quality outcomes between TransPRK and off-flap Epi-LASIK in moderate to high myopia patients with or without astigmatism. Methods: This prospective study included 72 eyes of 36 patients who randomly underwent TransP

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Purpose: To compare clinical and visual quality outcomes between TransPRK and off-flap Epi-LASIK in moderate to high myopia patients with or without astigmatism.
Methods: This prospective study included 72 eyes of 36 patients who randomly underwent TransPRK in one eye and off-flap Epi-LASIK in the contralateral eye. Excimer laser corneal ablation was performed using AMARIS 750s (SCHWIND eye-tech-solutions GmbH). Patients were followed up 3 days and 1, 3, 6 and 12 months postoperatively. Clinical and visual quality outcomes were compared between groups.
Results: TransPRK eyes had significant faster re-epithelialization than off-flap Epi-LASIK eyes (3.78±1.12 days versus 3.94±1.17 days，P=0.03). No significant difference in pain scores was noted. There were no significant differences in UCVA, BCVA and haze scores at any postoperative interval. At 1 month postoperatively, TransPRK-treated eyes showed better contrast sensitivity compared with off-flap Epi-LASIK eyes(P＜0.05)The off-flap Epi-LASIK-treated eyes revealed larger and significant increasing amplitude in HOAs at 1-,3- and 6-month follow-up(P＜0.05)
Conclusions: TransPRK offers comparable epithelial recovery, pain perception, haze score, but better visual quality in comparison with off-flap Epi-LASIK.

PU-144

不同光照强度对豚鼠屈光发育的影响及巩膜上 BMP-2 的表达

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目的：观察不同光照强度对负透镜诱导性近视豚鼠屈光发育的影响及巩膜上 BMP-2（骨形态发育蛋白-2）的表达的变化，研究其在巩膜重塑中的作用。
方法：选择 2 周龄的 SPF 级三色豚鼠 30 只，随机分为三组，分别给予 10000Lux、 500Lux、 5Lux 三种强度光照。每只豚鼠右眼予以-700 度透镜干预，左眼为自身对照眼。造模后分别于第一周、第二周、第三周、第四周，测量豚鼠屈光状态和眼轴长度。在实验第四周，处死豚鼠，取出豚鼠双眼眼球，分离巩膜组织，提取组织蛋白，用 Western blot 法对豚鼠巩膜 BMP-2 进行定量分析。
结果：光照前，三组组间眼球各生物学参数比较，差异无统计学意义（P>0.05）。随着光照时间的延长，三组豚鼠的眼轴长度均逐渐延长，而屈光度均逐渐降低，其中强光组分别与弱光组和正常光照组比较，强光组的眼轴长度增长趋势明显缓慢，屈光度下降明显减缓。光照后各时间点，三组组间比较，屈光度及眼轴长度的差异均具有统计学意义（P<0.05）。光照和右眼透镜干预第四周后 BMP-2 蛋白相对表达量，强光组：左眼 1.2178 右眼 *2.5375* ；正常光组：左眼 0.0000 右眼 0.3358，弱光组：左眼 0.2109 右眼 1.8477 。各组巩膜上 BMP-2 的表达相互比较，强光组与正常光照组、弱光组与正常光照组之间差异有统计学意义（P<0.05）。

结论：强光可以延缓豚鼠眼轴的增长，减慢屈光度向近视方向发展，最终使豚鼠的正视化进程减慢；强光和弱光照可使巩膜上BMP-2蛋白的表达增加；而正常光照对巩膜上BMP-2的表达无明显影响。透镜诱导眼（右眼）巩膜中 BMP2 比自身对照眼表达增加，在不同光照下 BMP-2 参与巩膜重塑作用的具体机制有待进一步研究。

PU-145

Abnormal intra-network architecture in extra-striate cortices in amblyopia: a resting state fMRI study

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PURPOSE: Amblyopia (lazy eye) is one of the most common causes of monocular visual impairment. Massive investigates have shown that amblyopes suffer not only deficits in the primary visual cortex but also from a range of visual abnormalities corresponding to the extra-striate visual cortex. However, the deficits of brain processes in large-scale information network, especially the visual network deficits, in amblyopia are still unclear. Therefore, the purposes of the current study are to research the functional connectivity and efficiency of the brain visual processing networks in anisometropic amblyopic patients using resting state functional magnetic resonance imaging (rs-fMRI).

METHODS: Participants include 18 adult anisometropic amblyopes and 18 normal controls. Resting state images were acquired using a 3.0-T (Signa HDx; GE Healthcare, Illinois, United States) scanner, with an 8-channel head coil. AFNI software tools were used to perform preprocessing of the fMRI data. We defined 19 ROIs taken from the primary visual network (PVN), higher visual network (HVN), and visuospatial network (VSN) from the Willard 499 ROIs as nodes. Functional connectivity between ROIs were calculated by using the multivariate distance correlation. We analyzed both intra-network connectivity and inter-network connectivity, values from each intra-network and inter-network matrix were averaged to produce a mean Fisher-transformed correlation value for each network or network pair for each subject.
To characterize the network efficiency, the local efficiency (LE) of each visual ICN node was computed as a function of the minimum path length between regions. A series of sparsity threshold ($0.2 \leq$ sparsity ≤ 0.8, interval = 0.05) were applied to measure the individual correlation matrices, for there was no gold standard for selecting a proper single sparsity threshold. The LE at each sparsity was calculated and the area under the curve (AUC) for LE was employed to be a summarized scalar.

RESULTS: The functional connectivity analysis indicated that both normal controls and amblyopic patients had more positive correlations within each network than those between networks. Furthermore, amblyopic patients showed generally reduced correlations within networks as well as between networks compared with normal controls. To further investigate the effects of amblyopia within the visual ICNs, we conducted a local efficiency analysis, and results revealed that small-world network architecture and the local efficiencies at the extra-striate cortices were significantly decreased in amblyopes.

CONCLUSIONS: In summary, we compared the visual ICNs of amblyopes with those of normal observers and found decreased intra-network functional connectivities and local efficiency in some brain areas within the visual ICNs. These findings suggested that amblyopes suffered from a reduction of both internal neural functional connectivity and local efficiency within extrastriates and visuospatial networks.

PU-146
体外研究 PPARα 对成纤维细胞分化和 I 型胶原合成的调控作用

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目的：
为了更深入探讨 PPARα 对近视的调控机制，我们分别采用人巩膜成纤维细胞和小鼠皮肤成纤维细胞，体外验证 PPARα 对 I 型胶原合成及对成纤维细胞分化的调控作用，为进一步了解 PPARα 参与近视形成的机制提供理论依据。
方法：
（1）以原代分离的人巩膜成纤维细胞为研究对象，通过 PPARα 激动剂、拮抗剂分别激活或抑制 PPARα 功能，以明确 PPARα 对人巩膜成纤维细胞胶原的调控作用和对细胞分化的影响。
（2）利用原代分离的小鼠皮肤成纤维细胞（分为野生型小鼠和 PPARα 全身敲除小鼠），明确 PPARα 对小鼠皮肤成纤维细胞胶原的调控作用和对细胞分化的影响。
结果：
（1）PPARα 激动剂对人巩膜成纤维细胞的 I 型胶原及 α-SMA 的调控作用均不明显；PPARα 拮抗剂可下调人巩膜成纤维细胞的 I 型胶原及 α-SMA；
（2）与野生型小鼠相比，PPARα 全身敲除小鼠皮肤成纤维细胞的胶原及部分下游靶基因表达上调，α-SMA 表达下调。
结论：
与野生型小鼠相比，PPARα 全身敲除小鼠的皮肤成纤维细胞 I 型胶原含量上调，α-SMA 下调，提示 PPARα 可能对成纤维细胞分化和 I 型胶原合成具有调控作用。

PU-147
先天性白内障患儿视网膜微循环的血流 OCT 研究

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目的： 1. 探究先天性白内障患儿的黄斑区和视盘的血流密度、视网膜厚度、中心凹无灌注区（Foveal Avascular Zone，FAZ）变化；
2．观察参数间的联系，以及其与视力的相关性；
3．探究视网膜微循环与先天性白内障引起的弱视的关系。
方法： 本研究为横断面研究。选取先天性白内障患儿的 31 眼和正常同龄儿童 60 眼进行比较。所有受试者都进行验光、眼压、IOL-master、血流成像 OCT 等辅助检查。检测指标包括：患儿手术年龄、检查年龄、最佳矫正视力(Best Corrected Visual Acuity ， BCVA)、眼轴、血流密度及视网膜厚度、中心凹无血管区面积（FAZ）。

结果：实验组的黄斑区 3mm×3mm 范围的的浅层毛细血管层和深层毛细血管层的血流密度显著低于对照组，其中，实验组的旁中心凹（3mm 环形区域）血流密度在 SCP 显著低于对照组（P=0.002）。实验组旁中心凹视网膜厚度为 332.13±13.52μm，对照组为 319.09±13.81μm，实验组显著厚于对照组(P=0.041)。
实验组根据 BCVA 分为两个亚组，弱视组和非弱视组 SCP 的黄斑区 3mm×3mm 范围和旁中心凹的血流密度显著低于对照组（P＜0.05），旁中心凹的视网膜厚度均显著厚于对照组（P=0.042，P＜0.001）。弱视组和非弱视组之间所有参数差异无统计学意义。
黄斑区 SCP 和 DCP 的血流密度与中心凹视网膜厚度均呈显著正相关，相反，FAZ 区面积与中心凹视网膜厚度呈显著负相关（r=-0.756）。
结论：1. 先天性白内障患儿黄斑区视网膜浅层、深层血流密度较正常眼显著降低。
2. 黄斑区视网膜厚度与中心凹血流密度、FAZ 显著相关。
3. 先天性白内障引起的弱视和非弱视眼的 SCP 黄斑区 3mm×3mm 范围和旁中心凹的血流密度低于正常眼，早期先天性白内障引起的形觉剥夺对视网膜血管发育的影响可能是永久的，仍需进一步研究证实。

PU-148

视网膜多巴胺 D1 受体活性 对小鼠屈光发育的影响

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目的：近视是目前发病率最高的一种屈光不正。前人多采用药理学方法研究多巴胺受体与近视的关系，提示多巴胺 D1 类受体参与近视的形成但结果却不一致。这可能归因于药物的特异性不足和/或扩散部位的不确定性。因此，本研究采用化学遗传学手段（即 DREADD 技术）来明确视网膜多巴胺 D1 受体（DRD1）在小鼠屈光发育中的作用。本实验将改造后的毒蕈碱受体反向装载到腺相关病毒中，再将其注射到 D1-Cre 小鼠视网膜下，使其特异性表达于 DRD1 阳性细胞内，再通过腹腔注射配体氯氮平-N-氧化物(CNO)激活受体，引起 DRD1 下游信号通路的激活或抑制，从而明确视网膜多巴胺 D1 受体活性在小鼠屈光发育中的作用。

方法：本研究分为两部分，分别模拟视网膜多巴胺 D1 受体激活和抑制。筛选出双眼屈光参差<3D 的 4 周龄 D1-Cre 小鼠，右眼视网膜下注射 AAV8-DIO-hM3Dq（激活实验部分）或 AAV8-DIO-hM4Di（抑制实验部分），左眼不做任何处理。注射一周后，每部分实验小鼠各随机分为两组：对照组，腹腔注射生理盐水（Saline，1mg/kg）组；实验组，腹腔注射 CNO(1mg/kg)组。出生后第 4、6、8、10 周时分别测量 EIR、OCT 等眼球生物学参数，在出生后第 6 周利用 Micro IV 进行眼底拍照，第 9 周检测视网膜电图（ERG），第 10 周 EIR、OCT 测量结束后取小鼠视网膜、角膜、晶体、巩膜检测 hM3Dq 或 hM4Di 表达量等。

结果： 1、视网膜下腔注射 AAV8-DIO-hM4Di 或 AAV8-DIO-hM3Dq 均未对视网膜结构产生损伤，眼轴等生物学参数无明显差异，ERG 结果无明显变化。
2、qRT-PCR 结果显示：与对侧眼相比，hM3Dq 在注射眼的视网膜、角膜及巩膜中广泛表达（p 值均小于 0.01）；hM4Di 在注射眼的视网膜、晶状体中显著表达（p 值均小于 0.01）。

PU-149

通过 DREADD 技术研究视网膜多巴胺 D1 受体活性对小鼠屈光发育的影响

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目的：近视是目前发病率最高的一种屈光不正。前人多采用药理学方法研究多巴胺受体与近视的关系，提示多巴胺 D1 类受体参与近视的形成但结果却不一致。这可能归因于药物的特异性不足和/或扩散部位的不确定性。因此，本研究采用化学遗传学方法来明确视网膜多巴胺 D1 受体（Drd1）在小鼠屈光发育中的作用。

方法：本研究分为两部分，分别模拟视网膜 Drd1 激活和抑制。筛选出双眼屈光参差<3D 的 4 周龄 D1-Cre 小鼠，右眼视网膜下注射 AAV8-DIO-hM3Dq（激活部分）或 AAV8-DIO-hM4Di（抑制部分），左眼不做任何处理。注射一周后，每部分实验小鼠各随机分为两组：对照组，腹腔注射生理盐水（Saline，1mg/kg）；实验组，腹腔注射氯氮平-N-氧化物(CNO，1mg/kg)激活受体发挥激活或抑制作用。出生后 4、6、8、10 周时分别测量屈光度、眼轴长度等眼球生物学参数，在出生后 6 周进行眼底拍照，9 周记录视网膜电图（ERG），10 周测量结束后取小鼠视网膜、角膜、晶体、巩膜，qRT-PCR 检测 hM3Dq 或 hM4Di 表达量。

结果：1、视网膜下注射 AAV8-DIO-hM4Di 或 AAV8-DIO-hM3Dq 均未损伤眼底，ERG 结果无明显变化；
2、与对侧眼相比，hM3Dq 在注射眼的视网膜、角膜及巩膜高表达（P<0.01）；hM4Di 在注射眼的视网膜、晶状体中高表达（P<0.01）；
3、注射 AAV8-DIO-hM4Di，相对于 Saline 组，CNO 组屈光向近视方向发展（P<0.05）；注射 AAV8-DIO-hM3Dq，相对于 Saline 组，CNO 组屈光向远视方向发展（P<0.05）。

结论：增强视网膜多巴胺 D1 受体的激活水平导致小鼠出现远视，反之则出现近视。这一结果提示，视网膜 D1 受体活性降低可能是近视发生的原因，升高其活性可能是潜在的近视治疗方法之一。

PU-150
比较 SMILE 和 TPRK 治疗高度近视术后角膜高阶像差及角膜生物力学的改变

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目的：本研究意在对 SMILE 和 TPRK 矫正高度近视后角膜高阶像差及角膜生物力学随时间的改变，对比阐明两种屈光手术方式术后角膜高阶像差及角膜生物力学的变化特点。
方法：前瞻性对照病例研究。纳入共 41 例接受 SMILE 和 TPRK 手术治疗高度近视患者，其中 SMILE 组 37 只眼，TPRK 组 41 只眼。所有患者接受常规术前术后检查，并接受角膜地形图仪及可视化角膜生物力学分析仪测量术前，术后 1 周，术后 1 月，术后 3 月，术后 6 月的角膜像差及角膜生物力学的相关参数。利用独立 t 检验和重复测量方差分析对数据进行研究分析。
结果：两组间术后裸眼视力在术后 1 周时有显著差异，SMILE 组优于 TPRK 组，术后 1 月开始，两组裸眼视力之间无差异并都达到术前最佳矫正视力水平。术后 SMILE 组术后三叶草无明显改变，HOAs、慧差、初级球差、次级像散、次级慧差、次级球差、三级像散和 TPRK 组三叶草的 RMS 值均明显高于术前水平。术后 1 周时 TPRK 组次级慧差、三级像散高于 SMILE 组，术后 1 月和 3 月时，TPRK 组次级球差高于 SMILE 组，术后 6 月时，两组各参数之间无差异。术后两组 bIOP、SP-A1、AT1 较术前明显下降，术后 1 月时,TPRK 组 bIOP、AT1 高于 SMILE 组，DA 低于 SMILE 组，术后 6 月时，bIOP 和 AT1 两组之间无差异。术后 1 月时 TPRK 组 DA 与术前无差异,其余术后时间点高于术前。SMILE 组 DA 术后高于术前。

结论：SMILE 和 TPRK 在术后 1 月后均可获得令人满意的视力。SMILE 和 TPRK 均会导致术后角膜高阶像差增加，增加最大像差的都是球差和慧差。SMILE 手术术后早期恢复快，稳定性好；TPRK 术后早期部分像差增高比 SMILE 显著，但在 6 月时两种手术方式之间无显著差别。两种手术方式在术后早期都会造成角膜硬度、对抗形变的能力、眼内压下降，在术后半年时两种手术之间没有明显差异。

PU-151

三种屈光手术角膜后表面不同区域曲率及散光的变化研究

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目的：本研究通过前瞻性分析分别行 TPRK、FS-LASIK、SMILE 三种屈光手术的患者术后 6 月随访期内角膜后表面不同区域的角膜曲率及散光分量的变化情况，并从角膜生物力学和角膜愈合方面探讨不同术式之间的差异。
方法：获取行角膜屈光手术并完成术前、术后（1 周、1 月、3 月、6 月）完整随访的患者的角膜地形图（Pentacam）数据，经 Zernike 表达式拟合及散光矢量分解后获得角膜后表面不同区域（中央区：直径 0-3 mm，旁中央区：直径 3-6 mm，周边区：直径 6-9 mm）的角膜曲率（M）及散光分量（J0/J45）的数据，分析三种不同手术方式在术后随访期内的变化趋势及与术前相比较的变化差异，并分析曲率和散光的变化情况与手术切削深度、剩余基质床厚度、矫正屈光度数之间的关系。
结果：共纳入 166 例（TPRK 50 例，FS-LASIK 66 例，SMILE 50 例；平均年龄 26.0±5.5 岁）行屈光手术的患者，将三组研究对象的年龄、术前眼内压（IOP）、术前中央角膜厚度（CCT）、术前等效球镜度（SE）进行匹配，匹配后三组之间均无统计学差异（P ＜ 0.05）。术后 6 月三组后表面中央区均变平坦。三组之中 FS-LASIK 组变化幅度最大。而周边区呈现相反的变化趋势，三组均表现为变陡峭（P ＜ 0.05）。三组角膜后表面中央区的散光分量（J0/J45）在 6 个月的随访期内均无明显变化（P ＞ 0.05）。
结论：三种术式后表面不同区域的曲率变化量小但术后与术前的差异具有统计学意义（P ＜ 0.05）。由于中央角膜板层切削，角膜失去原有的生物力学平衡，生物力学的重新分布使周边角膜拉伸中央角膜，使中央角膜变平坦，周边角膜变陡峭。受角膜愈合因素的影响，TPRK 组在术后表现出的波动性在三者之中最大。角膜后表面中央区的散光分量（J0/J45）三组均无明显变化。后表面曲率和散光的变化与手术相关参数之间无明显相关性。

PU-152

The impact of angle kappa upon the Quality of Vision (QOV) and visual acuity in patients withImplantable Collamer Lens (ICL) implantation.

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Purpose:
To evaluate changes and impact of angle kappa after Implantable Collamer Lens (ICL) implantationin high myopic patientsquality of vision (QOV).

Setting:

Shenyang He Eye Hospital, Shenyang, Liaoning, China.
Methods: V4c (Staar, Switzerland) ICL implantation was carried out in 60 eyes of 30consecutive patients and were retrospectively analysed. During preoperative and postoperative 3-month assessment, anterior chamber depth visual acuity, angle kappa and QOV questionnaire were assessed.
Results: The was a significant decrease in angle kappa value postoperatively ($p<0.05$). Postoperative angle kappa significantly correlated with glare and halo symptoms ($R=0.306$, $P<0.001$) and ($R=0.412$, $P<0.001$) respectively and night vision problems ($R=0.370$, $P<0.001$). The preoperative angle kappacorelated significantly with glare and halo symptoms ($R=0.251$, $P<0.001$ and $R=0.293$, $P<0.001$ and) and night vision problems ($R=0.224$, $P<0.001$). There was no significant correlation between pre or postoperative visual acuity and angle kappa.

Conclusions: Values of angle kappa decreased significantly after ICL implantation at 3-months assessment. Angle kappa might may play a role in the occurrence of photic phenomena after ICL implantation, however the visual acuity of the patients did not correlatewith pre or postoperative angle kappa. Preoperative angle kappa along with other ocular biometric parameters may be used to predict the postoperative QOV in high myopic patients undergoing ICL implantation.

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PU-153

夜戴型角膜塑形镜并发症的观察及相关因素分析

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目的 观察青少年近视患者佩戴夜戴型角膜塑形镜的并发症，分析其相关影响因素。方法 选择 2017 年 1 月至 2017 年 12 月我科门诊佩戴角膜塑形镜的 8 ～ 12 岁青少年近视患者 85 例(158 只眼)，观察戴镜后 1 天、1 周、1、3 和 6 个月并发症发生情况并分析其相关因素。结果 本组病例在复诊的不同时期出现了与角膜、泪膜及视觉质量相关的并发症，分析其相关因素包括镜片配适、患者知识缺乏、取戴护理操作等方面。结论 角膜塑形镜可有效矫正视力，但其并发症亦不容忽视，临床应针对引起并发症的相关因素进行防范以减少并发症的发生。

PU-154

斜视手术患者临床特征分析

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目的：探讨四川大学华西医院斜视手术患者情况及就诊特点。**方法**：回顾性分析 2018 年 1 月至 12 月四川大学华西医院 517 名同一手术医生斜视手术患者的临床病例资料，对年龄、性别、疾病类型等进行统计分析。**结果**：在 517 名斜视患者中，男性患者 258 名（49.9%），女性患者 289 名（50.1%）。患者年龄为 8 月~74 岁，其中 7 岁及以下患者 53.2%，大于 7 岁患者 46.8%。其中外斜视患者占斜视患者总人数 40.2%，内斜视患者占 29.0%，斜肌相关斜视 27.5%，其他类型斜视占 3.3%。间歇性外斜视占外斜视患者总人数 49.5%，先天性外斜视、恒定性外斜视等占 40.5%。在外斜视和内斜视发病率方面，患者性别及年龄差异均无统计学意义（$P>0.05$）。外斜视患者与内斜视患者、斜肌相关斜视患者及其他类型斜视患者发病率比较，差异均有统计学意义（$P<0.05$）。间歇性外斜视患者

发病率与其他类型外斜视患者发病率比较，差异均有统计学意义（P＜0.05）。**结论**：在斜视手术患者中，外斜视患者相对较多，其中患者发病更多见于间歇性外斜视。对于斜视的发病原因，目前尚未明确，但由于斜视会影响患者视觉功能，一般建议患者尽早手术。在本次研究中，学龄前行手术的患者占 53.2%，对于部分学龄后患者，其发病年龄较早，但就诊治疗时间较晚，可能会影响患者术后视觉功能恢复。

PU-155
Altered brain network centrality in patients with retinitis pigmentosa in middle-age : A resting-state fMRI study

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Objective: The purpose of this study is to explore the underlying functional network brain-activity changes of patients with retinitis pigmentosa (RP) and the relationship with clinical features when the voxel-wise degree centrality (DC) method was used. Methods: Here a total of 16 patients with RP, (11 men, 5 women), and 16 healthy controls (HCs; 11 men, 5 women). These people who participated in the experiment basically matched in terms of gender, age, weight and handedness. We use the DC method to assess spontaneous brain activity. At the same time we use the receiver operating characteristic (ROC) curve analysis to distinguish between RP and HC.
Correlation analysis was used to examine the relationship between mean DC values and behavioral performance in various brain region.
Results: Compared with HCs, the DC value of patients with RP is reduced in the right Medial Frontal Gyrus, bilateral Cuneus, bilateral Precuneus, the left Superior Frontal Gyrus and the right Superior Frontal Gyrus, and increased DC values in the right Cerebellum Posterior Lobe, the left Inferior Temporal Gyrus, and the right Fusiform Gyrus. However, we found there is no correlation between mean DC values and behavioral performance in any brain region.
Conclusions: Patients in middle-age with retinitis pigmentosa are associated with abnormal brain network activity in various brain regions, and we can speculate that this may explain the pathological mechanism of RP.

PU-156
MiR-146s 调控靶蛋白 Samd4 对剥脱综合征眼部疾病的作用研究

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目的 探讨 miR-146s 调控其靶蛋白 Samd4 在剥脱综合征眼部疾病发生过程中的表达水平和作用意义。 **方法** 采用实时荧光定量 PCR 法检测 miR-146a、miR-146b 在 16 例剥脱综合征眼部疾病患者、16 例正常人群外周血白细胞层中的表达水平，同时采用免疫印迹检测 32 例样本外周血白细胞层中 Samd4 蛋白的表达。 结果 剥脱综合征眼部疾病患者 miR-146a 的表达水平显著低于正常人群，差异有统计学意义（*t*=4.768，*P*<0.01）。miR-146b 在剥脱综合征眼部疾病患者的表达也显著低于正常人群，差异有统计学意义（*t*=3.439，*P*<0.01）。Western 印迹检测 Samd4 蛋白结果显示：

剥脱综合征眼部疾病患者 Samd4 蛋白表达量为 0.710±0.059，正常人群为 0.260±0.058，剥脱综合征患者高于正常人群，差异具有统计学意义（*t*=21.904，*P*<0.01）。 **结论** miR-146s 及其靶蛋白 Samd4 在剥脱综合征眼部疾病患者外周血白细胞层中的表达均异常；miR-146s 的差异表达可能负调控 Samd4 蛋白参与剥脱综合征眼部疾病的发病过程。

PU-157
角膜基质透镜植入联合板层角膜移植治疗 BKC 并角膜穿孔一例

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目的：介绍一例角膜基质透镜（SMILE 术中取出）再利用的案例
方法：患者青年女性，因右眼视物模糊伴眼红 3 月，加重 10 天入院。专科检查：视力：右眼 0.8，左眼 1.2，双眼眼压正常。双眼睑缘肥厚、充血，睫毛部分脱失，见鳞屑、痂皮，睑板腺开口黄白色脂栓堵塞，结膜混合充血。右眼 8 点位近角膜周边可见一穿孔口，约 2.5mm×2.5mm 大小，虹膜嵌顿，溪流征（-），周边有浅层新生血管长入，前房清、Tyndall 征（-），无积脓；左眼下方周边角膜可见薄云雾样混浊，可透见虹膜，周边角膜见新生血管，余未见异常
结果：眼表综合分析仪示：双眼睑板腺开口阻塞，脂质层薄、分布不均，睑板腺大部分丢失。入院诊断：双眼睑缘炎相关角结膜病变并右眼角膜穿孔。双眼局部予以睑缘清洁、热敷按摩、抗炎抗感染等治疗，行右眼角膜基质透镜植入联合板层角膜移植术
讨论：飞秒激光小切口角膜基质透镜取出术 SMILE 术中取出的完整的角膜基质透镜被丢弃，随着人们对 SMILE 深一步探索研究发现，角膜基质透镜组织（Refractive lenticule, RL）经过低温保存和特殊处理后可重复利用。采用异体 SMILE 术中取出的角膜基质透镜组织修补角膜组织缺损，再行异体板层角膜植片覆盖植床的手术方式，恢复角膜组织的完整性，相对避免了角膜供体来源匮乏的限制，再利用了角膜基质透镜组织。

PU-158
睑缘炎相关角结膜病变并角膜穿孔一例

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目的：介绍一例严重的睑缘炎相关角结膜病变继发角膜穿孔的案例
方法：患者青年女性，因右眼视物模糊伴眼红、眼干 5 月，加重 3 天入院。专科检查：视力：右眼 0.6，左眼 1.0，双眼眼压正常。双眼睑缘肥厚、充血，睫毛部分脱失，睫毛根部隆起，见鳞屑、痂皮，睑板腺开口见黄白色脂栓形成，结膜混合充血。右眼 4-5 点位角膜周边可见一穿孔口，约 2.5mm×2。5mm 大小，对应虹膜嵌顿，溪流征（-），周边有浅层新生血管长入，前房清、Tyndall 征（-），无积脓；左眼下方周边角膜可见薄云雾样混浊，可透见虹膜，周边角膜见新生血管，余未见明显异常
结果：眼表综合分析仪示：双眼睑板腺开口阻塞，脂质层薄、分布不均，睑板腺大部分丢失。共焦显微镜检查发现双眼睫毛根部螨虫虫体。入院诊断：双眼蠕形螨睑缘炎，双眼睑缘炎相关角结膜病变并右眼角膜穿孔。双眼局部予以睑缘清洁、热敷按摩、抗炎抗感染等治疗后行右眼双板层角膜移植术
讨论：睑缘炎相关角结膜病变是一种由睑缘炎引起的角结膜慢性炎症性疾病，临床主要表现为结膜充血、结膜滤泡及乳头增生、睑缘肥厚、鳞屑痂皮、结膜脱落、泡性角结膜炎、角膜点状上皮糜烂、角膜溃疡、角膜瘢痕及新生血管长入，甚至继发角膜穿孔。目前 BKC 的病因及发病机制尚不清楚，

可能与睑缘的细菌感染、炎性反应、免疫反应、睑板腺功能障碍及蠕形螨感染等有关。睑缘炎为诊断 BKC 的前提，在病情发展过程中相互影响，共同促进病理过程的进展，眼表与睑缘视为一个整体同时进行治疗，才能彻底根治 BKC

PU-159

一例睑缘炎相关角结膜病变误诊为病毒性角膜炎

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目的：鉴别睑缘炎相关角结膜病变与病毒性角膜炎，提高诊断率，避免增加患者痛苦及医疗资源浪费。
方法：患者青年男性，因右眼视物模糊伴眼红、眼干 3 月，加重 10 天入院。3 月前无明显诱因出现双眼视物模糊伴眼红眼痛、眼干等不适，多次在外院就诊，诊断为病毒性角膜炎，予以更昔洛韦眼液、玻璃酸钠眼液、妥布霉素地塞米松眼液治疗，效果不佳，反复发作。专科检查：视力：右眼 0.7，左眼 0.8，双眼眼压正常。双眼睑缘肥厚、充血，睫毛部分脱失，睫毛根部隆起，见鳞屑、痂皮，睑板腺开口见黄白色脂栓形成，结膜混合充血。右眼 8 点位角膜周边可见一穿孔口，约 2mm×2mm 大小，对应虹膜嵌顿，溪流征（-），周边有浅层新生血管长入，前房清、Tyndall 征（-），无积脓；左眼下方周边角膜可见薄云雾样混浊，可透见虹膜，周边角膜见新生血管，余未见明显异常
结果：眼表综合分析仪示：双眼睑板腺开口阻塞，脂质层薄、分布不均，睑板腺大部分丢失。共焦显微镜检查发现双眼睫毛根部螨虫虫体。入院诊断：双眼蠕形螨睑缘炎，双眼睑缘炎相关角结膜病变并右眼角膜穿孔。双眼局部予以睑缘清洁、热敷按摩、抗炎抗感染等治疗后行右眼双板层角膜移植术。
讨论：睑缘炎相关角结膜病变（Blepharokeratoconjunctivitis, BKC）是一种由睑缘炎引起的角结膜慢性炎症性疾病，因其反复发作，临床表现多样、缺乏特殊性，临床上易误诊为病毒性角膜炎。BKC 与病毒性角膜炎均有反复发作病史，眼红眼痛、眼干、异物感、烧灼感、流泪、眼痒伴视力下降等症状，前者常双眼发病，有睑缘炎病史，角膜浸润好发于周边角膜 2、4、8、10 点位，角膜病灶及结膜囊分泌物微生物检查可发现葡萄球菌等，而后者多单眼病变，有感冒、疲劳、精神紧张等诱因，无睑缘病变，角膜病变部位不定，角膜病变微生物检查可发现单纯疱疹病毒，血清学检查可发现病毒抗体，无明显疼痛感，抗病毒治疗有效。

PU-160

儿童急性泪囊炎并发眶蜂窝织炎一例

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目的：介绍一例儿童急性泪囊炎并发眶蜂窝织炎的疑难病例
方法：患儿因左眼溢泪伴脓性分泌物 7 天，眼睑红肿 3 天急诊入院。患儿于 7 天前有鼻塞，打喷嚏，咽喉部疼痛，低热症状。查体：体温：37.6℃，生命体征平稳。专科检查：左眼视力 0.6，眼压不配合。左眼上、下睑红肿，下睑明显，压痛（-），质软，未触及结节；内眦及泪囊区红肿，压痛明显，质硬，内眦及上下睫毛处可见脓性分泌物，挤压泪囊区不配合。上、下睑结膜充血明显，球结膜无充血，余无特殊。眼球各方向运动正常。
结果：初步诊断：1）左眼眶蜂窝织炎 2）左眼急性泪囊炎？3）左眼麦粒肿？眼眶 CT：左眼眶周围及左侧泪囊区软组织密度灶，考虑炎性病变 2）多组鼻窦炎。血象正常。确诊：1）左眼急性泪囊炎 2）左眼眶蜂窝织炎 3）多组鼻窦炎。全麻下行鼻内窥镜下左鼻腔泪囊吻合+泪道置管术，术后抗炎

抗感染治疗。术后第四天左眼泪囊区及下睑内侧皮肤红肿隆起，病情反复，行左眼泪囊区脓肿穿刺抽吸治疗后好转。
讨论：眶蜂窝织炎是眼科急重症，由于儿童患者免疫抵抗力较差，主诉不清，查体配合度差，临床表现复杂，病情进展迅速，因此较成人更为凶险，临床医师需高度重视。

PU-161
龙胆泻肝汤加减对肝胆火炽型前葡萄膜炎患者外周血中炎性因子的影响

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目的 探讨龙胆泻肝汤加减对肝胆火炽型前葡萄膜炎患者的治疗作用及对其外周血中炎性因子的影响。**方法** 肝胆火炽型前葡萄膜炎患者 86 例随机分为 2 组，44 例患者采用龙胆泻肝汤加减联合西药治疗，42 例患者采用单纯西药治疗，观察其疗效。并用 ELISA 检测两组患者治疗前后外周血中 IFN-γ、IL-17、IL-10 的表达。**结果** 观察 6 个月后发现，龙胆泻肝汤治疗组治愈率明显优于西药治疗对照组，视力提高类于西药治疗对照组，复发率明显低于西药治疗对照组。龙胆泻肝汤治疗组外周血中 IFN-γ、IL-17 的含量治疗后明显降低，与对照组比较差异均具有统计学意义（P<0.05），IL-10 的含量治疗后明显升高，与对照组比较差异均具有统计学意义（P<0.05）。**结论** 龙胆泻肝汤加减治疗肝胆火炽型前葡萄膜炎可以明显提高患者的视力，提高治愈率，减少患者的复发，可能是通过调控肝胆火炽型前葡萄膜炎患者外周血中炎性因子的表达达到治疗作用。

PU-162
AIDS 合并巨细胞病毒性视网膜炎的临床分析

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目的：探讨获得性免疫缺陷综合征(AIDS)合并巨细胞病毒性视网膜炎的眼底表现特点、全身症状及治疗预后。
方法：对 11 例（22 只眼）AIDS 并发 CMV 性视网膜炎病人进行间接检眼镜检查，分析其眼底、视力、荧光素眼底血管造影及 $CD4^+$T 细胞计数进行分析，并对其中 3 例(6 只眼)行更昔洛韦玻璃体腔注药治疗。
结果：14 只眼的眼底表现为视网膜出血及棉絮斑，5 只眼伴有血管炎表现，玻璃体透明或反应轻微。2 只眼的眼底呈晚期表现,玻璃体浑浊明显，视网膜血管硬化、狭窄，1 只眼视网膜脱离。6 只眼玻璃体注药后视力均显著提高。眼底病变明显消退，出血吸收。
结论：巨细胞病毒性视网膜炎多发生于 AIDS 晚期患者，多数患者视力未发生改变时，其眼底就发生病变，对 $CD4^+$ T 细胞低下而眼部无症状的 AIDS 患者应常规行眼底镜检查，对于改善巨细胞病毒性视网膜炎的预后有重要意义。

PU-163
环境烟草烟雾对小鼠泪膜功能和角膜上皮组织结构的影响

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目的：观察环境烟草烟雾对小鼠泪膜功能和角膜上皮组织结构的影响。 **方法：** 12 只雄性 5～6 周龄 c57BL 小鼠，随机分为 A、B 两组，每组 6 只。A 组不做干预，B 组进行烟草烟雾染毒，每天 3 次，一次 30min。在干预前及干预 12w 时对各组小鼠进行泪膜功能检测包括泪膜破裂时间(BUT)、荧光素染色(FL)及荧光素染色评分，观察干预 12w 后苏木精和伊红染色下的角膜上皮情况。**结果:** 干预 12w 时后，A 组 BUT、FL 较干预前无明显变化，差异无统计学意义（P＞0.05)，而 B 组 BUT、FL 较干预前明显恶化，差异有统计学意义（P＜0.05) 。干预 12w 后，A 组上皮细胞层数为（5±1），而 B 组上皮细胞层数为（7±1），差异有统计学意义（P <0.05）。与 A 组比较，B 组角膜荧光素染色明显增加，角膜上皮细胞层损伤，层数增厚。**结论:** 环境烟草烟雾会影响小鼠泪膜功能，损伤小鼠角膜上皮的组织结构。

PU-164
Tofacitinib has preventive and therapeutic effects for uveitis in mice model

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Purpose: To explore the roles of tofacitinib in the treatment of uveitis and the underlying mechanisms.
Methods: The first group of experimental autoimmune uveitis (EAU) mice were intraperitoneally injected with different dose of Tofacitinib (30 mg/kg,10mg/kg,5mg/kg) on alternate days, from the day of the induced immunization until euthanasia on postoperative day(day 28). The second group of EAU mice were treated with the exact same way after the onset of uveitis(day 14 to day 28). The clinical signs of the uveitis were evaluated by fundus opthalmoscope, histological examinationa and recorded according to a previously published system. Proinflammatory cytokines expression in serum were detected by histology, western blot, and real-time PCR. The Th17/Treg balance and other subtypes lymb cell levels in mice model are tested by flow cytometry in vivo. We also explore the mechanisms of tofacitinib on Th17/Treg balance in vitro.
Results: In comparison with the control group, treatment with tofacitinib significantly prevents uveitis from happening in EAU mice. Moreover, tofaticinib treatment alleviated fundus inflammation in vivo and in vitro, as characterized by downregulated CD4(+) IFN-γ(+) IL17(+) TNF(+)cells frequency,upregulated CD4(+) Foxp3(+) CD25(+) cells frequency, and related RNA levels of pro-inflammatory mediators. It reduced serum levels of other proinflammatory cytokines and interferon responses in splenocytes and lymph gland tissue.
Conclusions: Our results demonstrate that tofacitinib, a JAK inhibitor approved by FDA, plays a positive role in prevention and teatment in EAU mice. These findings indicate that tofaticinib might be a potential alternative treatment for uveitis, providing further evidence for clinical application.

PU-165
龙胆泻肝汤对实验性自身免疫性葡萄膜炎大鼠免疫调节作用的分子机制研究

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目的：探讨龙胆泻肝汤对实验性自身免疫性葡萄膜炎大鼠关键炎症细胞因子的免疫调节作用。**方法：**Lewis 大鼠随机分为对照组、EAU 组和 LXT 组。光感受器间维生素 A 结合蛋白免疫 EAU 组和 LXT 组大鼠，对照组大鼠注射等量不含 IRBP 的乳化液。使用实时荧光定量 PCR 及 ELISA 方法检测血液、淋巴结和脾脏中 IFN-γ、IL-17、TNF-α 和 IL-10 细胞因子在 EAU 大鼠体内治疗前后的变化情况。**结果：**LXT 组大鼠全血中 IFN-γ mRNA 表达在第 8 天虽然高于对照组（P=0.000），但已显著低于 EAU 组（P=0.000）；LXT 组 IL-17 mRNA 在第 12 天达峰值，显著低于 EAU 组（P=0.000），且均显著高于对照组（P=0.000）；TNF-α mRNA 仅在第 12 天显著高于对照组（P=0.000），但低于 EAU 组（P=0.000）；IL-10 mRNA 表达在第 16 天高于 EAU 组（P=0.042）。LXT 组大鼠淋巴结和脾脏中 IFN-γ、IL-17 和 TNF-α mRNA 表达在第 12 天显著低于 EAU 组（均为 P=0.000）；LXT 组淋巴结中 IL-10 mRNA 表达在第 8 天开始显著高于对照组（P=0.001），且在整个炎症期均维持在较高水平；LXT 组脾脏 IL-10 mRNA 表达在第 12 天达峰值，且高于对照组和 EAU 组（均为 P=0.000）。LXT 组大鼠血清中 IFN-γ、IL-17 和 TNF-α 蛋白表达水平在第 12 天和第 16 天均低于 EAU 组（均为 P<0.05）；EAU 组和 LXT 组血清中 IL-10 蛋白表达在第 12 天均高于对照组（均为 P<0.05），第 16 天达峰值，但 LXT 组 IL-10 蛋白含量更高。**结论：**龙胆泻肝汤通过抑制 IFN-γ、IL-17 和 TNF-α 相关炎症因子的表达发挥其抗炎作用，促进 IL-10 的表达，加速自身免疫炎症的恢复。龙胆泻肝汤可通过多种途径在 EAU 的治疗中发挥免疫调节作用。

PU-166
基于质谱的实验性自身免疫性葡萄膜炎血清蛋白质组学的研究

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目的：葡萄膜炎的发生发展与蛋白质的异常表达变化有关。然而，葡萄膜炎中的异常表达蛋白及其相关信号通路还不是很清楚。本文旨在建立实验性自身免疫性葡萄膜炎（EAU）的大鼠模型，探讨血清中的异常表达蛋白谱的改变及与之相关的信号通路，为临床治疗葡萄膜炎提供思路。**方法：**首先通过注射 IRBP 乳靡液诱导大鼠发生葡萄膜炎，免疫后第 12 天达炎症高峰时，收集外周血，分离血清，采用液相色谱-串联质谱技术，通过对比，研究 EAU 大鼠与正常对照组大鼠血清蛋白表达谱的变化；同时，采用生物信息学方法，对差异表达的蛋白进行相关系列分析，主要包括基因本体富集（GO）分析、京都百科全书的基因和基因组（KEGG）通路分析和数据库注释，可视化和集成发现（DAVID）分析等。**结果：**结果显示，在 EAU 大鼠血清中有 62 种蛋白上调、106 种蛋白下调。GO 分析表明，EAU 大鼠中的差异表达蛋白主要参与代谢过程和免疫系统过程；KEGG 分析表明，差异表达蛋白与补体和凝血级联反应途径、代谢途径、吞噬途径密切相关分析，PI3K-Akt 信号通路、Toll 样受体信号通路密切相关；DAVID 分析表明，与补体有关的差异表达蛋白处于关键的蛋白质相互作用节点上。**结论：**EAU 的病理机制和发展与多种蛋白异常表达有关，这些差异表达的蛋白涉及多个信号通路的活化，其中，补体蛋白起主要作用，提示葡萄膜炎的发生发展与补体信号通路的活化有关。

PU-167
龙胆泻肝汤抑制 Notch 信号通路活化在治疗葡萄膜炎大鼠中的作用研究

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目的 探讨龙胆泻肝汤对实验性自身免疫性葡萄膜炎大鼠 Notch 信号通路活化的抑制作用及其对 Th17、Treg 细胞表达水平的影响。**方法** 用随机数字表法将雌性 Lewis 大鼠分为正常对照组、EAU 模型组和 LXD 干预组。EAU 模型组和 LXD 干预组大鼠诱导 EAU，免疫后 LXD 干预组大鼠每天给予 LXD 灌胃处理，EAU 模型组大鼠给予等量生理盐水灌胃。免疫后 12 天观察大鼠眼部炎症表现，取三组大鼠眼球进行病理切片，观察病理学变化；Q-PCR 和 ELISA 检测免疫后 12 天三组大鼠脾脏、淋巴结及眼组织中 Notch1、DLL4、IL-10 和 IL-17 mRNA 及蛋白的表达；流式检测三组大鼠各组织中 Th17、Treg 细胞的水平。**结果** 病理结果表明，LXD 对 EAU 大鼠眼部组织结构有明显的保护作用。PCR 和 ELISA 检测发现，与正常对照组相比， LXD 干预组大鼠脾脏、淋巴结和眼组织中 Notch1、DLL4、IL-10、IL-17 mRNA 和蛋白表达水平升高，但明显低于 EAU 模型组（均有 $P<0.05$）；流式细胞仪检测发现，EAU 模型组大鼠的各组织中 Th17/Treg 比例均高于正常对照组，经 LXD 干预后，Th17 细胞水平表达下降，Treg 水平表达升高，两者比例趋向于平衡。**结论** EAU 大鼠脾脏、淋巴结及眼组织中 Notch1、DLL4 表达水平明显升高，Th17 细胞水平增加，提示 EAU 疾病的发生与 Notch 信号通路的活化有关。与 EAU 模型组相比，LXD 可有效降低葡萄膜炎大鼠各组织中 Notch1、DLL4、IL-10 和 IL-17 的 mRNA 和蛋白的表达水平，明显减少 Th17 细胞的表达、提高 Treg 细胞的水平，改善 Th17/Treg 细胞比例的平衡，从而有效减轻 EAU 大鼠的眼部炎症，保护眼部组织结构，调节全身及眼局部的免疫状态。

PU-168

rno-miR-30b-5p 对葡萄膜炎大鼠 Notch1 和 Dll4 基因表达的调控作用研究

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目的探讨 rno-miR-30b-5p 对 Notch1 和 Dll4 基因表达的调控作用及其在实验性自身免疫性葡萄膜炎中的表达变化。**方法**通过双荧光素酶表达报告系统，探讨 rno-miR-30b-5p 对 Notch1 和 Dll4 基因表达的调控作用。EAU 模型组大鼠注射 200 μL 含 IRBP、TB 、CFA 和无菌 PBS 的乳糜液以诱导葡萄膜炎，对照组大鼠注射等体积的 TB 和 CFA 的乳糜液。免疫后 12 d，分离大鼠的脾脏、淋巴结和眼组织，收集 T 细胞，Q-PCR 检测 rno-miR-30b-5p、Notch1 和 Dll4 基因的表达水平；ELISA 检测 Notch1 和 Dll4 蛋白的表达变化；流式检测 Th17 和 Treg 细胞的表达水平。**结果**双荧光素酶表达报告检测结果表明，Notch1 和 Dll4 为 rno-miR-30b-5p 调控的靶基因；Q-PCR 分析结果显示，相比于正常对照组(1.00)，免疫后 12 d，rno-miR-30b-5p 在 EAU 模型组大鼠脾脏、淋巴结和眼组织中的相对表达水平为 0.41 ± 0.12、0.37 ± 0.09 和 0.25 ± 0.07，呈显著下调表达，而 Notch1 和 Dll4 呈显著上调表达，且差异具有统计学意义($P<0.05$)；ELISA 检测结果显示，免疫后 12 d，EAU 模型组大鼠脾脏、淋巴结和眼组织中 Notch1 和 Dll4 蛋白的表达水平明显高于对照组（$P<0.05$）；流式检测发现，免疫后 12d, EAU 模型组大鼠中 Th17 水平明显升高，而 Treg 细胞水平明显降低。**结论** rno-miR-30b-5p 可负调控 Notch1 和 Dll4 基因的表达。在 EAU 模型组大鼠的脾脏、淋巴结和眼组织中，rno-miR-30b-5p 的下调表达可使 Notch1 和 Dll4 基因的表达水平显著升高，并使 Th17/Treg 比例发生紊乱，从而影响葡萄膜炎的发生发展。本研究为临床治疗葡萄膜炎提供新的思路。

PU-169

感染性角膜炎患者对侧未感染眼激光扫描共焦显微镜下改变

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目的：评价当单眼发生感染性角膜炎时，患者对侧未感染眼角膜上皮细胞、角膜内皮细胞、树突状细胞及角膜神经的改变。
方法：研究 2018 年 1 月至 2018 年 8 月于我院就诊的单眼患有感染性角膜炎的患者，分为病毒、细菌、真菌性角膜炎三组实验组，以及正常对照组。使用共聚焦显微镜（In vivo confocal microscopy，IVCM ）观察此类患者未感染眼角膜上皮细胞、角膜内皮细胞、树突状细胞的形态，并测算三种细胞以及角膜神经总干和分支的数量和密度，进行汇总分析。病毒、细菌、真菌性角膜炎三组实验组未感染眼的角膜神经总干和分支的密度与正常对照组间比较采用方差齐性检验，两两比较采用 Bonferroni 法对检验水准进行调整；角膜上皮细胞、角膜内皮细胞及树突状细胞密度及角膜神经数量，与正常对照组间比较采用 Kruskal-Wallis H 检验，两两比较采用 Dwass-Steel-Critchlow-Fligner 方法，检验水准取 0.05。
结果： 病毒、细菌、真菌性角膜炎三组实验组患者未感染眼的角膜上皮细胞密度、角膜神经总干密度与正常对照组相比均显著减少，而病毒及细菌性角膜炎树突状细胞密度有所增加。病毒性及细菌性角膜炎组未感染眼树突状细胞密度大于真菌性角膜炎组；病毒性角膜炎组未感染眼的角膜内皮细胞密度小于细菌性角膜炎和真菌性角膜炎组；病毒性角膜炎组未感染眼的角膜神经总干的数量与密度，小于细菌性角膜炎患者组。
结论：单眼发生感染性角膜炎时，其对侧未感染眼的角膜上皮细胞、角膜内皮细胞，免疫细胞树突状细胞、及角膜神经密度也同时会发生相应改变。该发现可证实角膜的免疫和神经系统在双眼之间存在紧密的联系。

PU-170

Interleukin-32 induced thymic stromal lymphopoietin plays a critical role in the inflammatory response in human corneal epithelium

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Purpose. *To assess the functional association of IL-32 with TSLP in the control of pro-inflammatory cytokine levels in the corneal epithelium.*
Methods. *Human corneal tissue specimens and human corneal epithelial cells (HCECs) were administered different concentrations of IL-32 in the presence or absence of various inhibitors to assess TSLP levels and localization, as well as the molecular pathways that control pro-inflammatory cytokine production. TSLP mRNA levels were determined by real time RT- PCR, while protein levels were quantitated by ELISA and immunohistochemical staining. TSLP protein expression was examined in donor corneal epithelium samples. The effects of IL-32 on cell proliferation and apoptosis were investigated by MTT assays and RT-PCR, respectively.*
Results. *IL-32 significantly upregulated TSLP and pro-inflammatory cytokines (TNFα and IL-6) in HCECs at the gene and protein levels. The production of pro-inflammatory molecules by IL-32 was increased by recombinant TSLP. Interestingly, both NF-κB (quinazoline) and caspase-1 (VX-765) inhibitors suppressed the IL-32-related upregulation of pro-inflammatory cytokines (TNFα and IL-6). In addition, cell proliferation of HCECs did not change significantly after IL-32 administration compared with untreated control cells while IL-32 decreased the mRNA level of caspase-9.*
Conclusions. *IL-32 and IL-32-induced-TSLP are critical cytokines that participate in inflammatory responses through the caspase-1 and NF-κB signalling pathways in the corneal epithelium. IL-32 does not affect cell proliferation but inhibits apoptosis of HCECs. These findings suggest new molecular targets for inflammatory diseases of the ocular surface.*

PU-171

The role of Mincle in innate immune to fungal keratitis

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Introduction: This study aimed to detect the early expression of macrophage-inducible C-type lectin (Mincle) and investigate its role in the innate immune response of fungal keratitis (FK).
Methodology: Wistar rats were used to make fungal keratitis models. The inflammatory responses and corneal lesions were observed by slitlamp microscope.RT-PCR, immunohistochemistry, and immunofluorescence were used to detect the expression of Mincle in the rat corneal epithelium. The expression of eight cytokines (CXCL1, CXCL2, IL-1β, IL-6, IL-10, TNF-α, CCL2, CCL3) were detected by real-time RTPCR and immunohistochemistry. Lastly, corneal epithelium of 54 patients with *Aspergillus fumigatus* keratitis and 13 ocular trauma patients were collected to detect expression of Mincle by real-time RT-PCR, and 12 FK and 10 ocular trauma paraffin samples were collected to confirm expression of Mincle by immunohistochemistry.
Results: The expression of Mincle was significantly upregulated at 4, 8, 16, and 24 hours after fungal infection. There were significant
differences in the expression of the eight inflammatory cytokines between the blank control group and the fungus-infected group. Mincle expression was correlated with the expression of TNF-a, IL-1β, IL-10, and CCL3 in the cornea. The mRNA expressions of Mincle in the corneas of both normal and FK patients were significantly different.
Conclusions: The expression of Mincle increases significantly during the early period of *Aspergillus fumigatus* infection, while expression of eight corresponding cytokines changes. Mincle, as a pattern recognition receptor, may play a role in the early innate immune response of the corneal resistance against fungus.

PU-172

Role of vasoactive intestinal peptide in Aspergillus fumigatus-infected cornea

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AIM: *To investigate the anti-inflammatory role of vasoactive intestinal peptide (VIP) in Aspergillus fumigatus (A. fumigatus) ketatitis.*
METHODS: *Expression of VIP was tested by polymerase chain reaction (PCR) in C57BL/6 and BALB/c normal and A. fumigatus infected corneas. C57BL/6 mice were pretreated*
with recombinant (r) VIP, while BALB/c mice were pretreated with VIP antagonist, and then infected with A. fumigatus. Clinical score was recorded. Expression of pro- and anti-inflammatory cytokines, toll-like receptor 4 (TLR4), lectin-like oxidized low-density lipoprotein receptor 1 (LOX-1), and neutrophil infiltration were tested by PCR, enzyme-linked immunosorbent assay (ELISA), and myeloperoxidase (MPO) assay.
RESULTS: *VIP mRNA expression in BALB/c cornea was higher than C57BL/6 cornea at 1 and 3d post infection (p.i.). rVIP treatment of C57BL/6 mice showed alleviated disease and down-regulated expression of interleukin-1β (IL-1β) and tumor necrosis factor-α (TNF-α), while IL-10 expression was up-regulated. Neutrophil infiltration and TLR4, IL-17 expression were decreased after rVIP treatment, while LOX-1 expression*

was up-regulated in C57BL/6. VIP antagonist pretreatment showed increased disease and higher IL-1β, TNF-α, TLR4, IL-17 and MPO levels, while IL-10 and LOX-1 levels were down-regulated in BALB/c mice.
CONCLUSION: *rVIP alleviate disease response of C57BL/6 mice. VIP antagonist resulted in worsened disease of BALB/c mice. VIP proposed anti-inflammatory role in A. fumigatus keratitis.*

PU-173

The role of Dectin-1/Raf-1 signal cascade in innate immune of human corneal epithelial cells against Aspergillus fumigatus infection

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AIM: *To investigate the expression of the v -raf -1* murine leukemia viral oncogene homolog 1 (Raf-1) and its role in the innate immune response of human corneal epithelial cells (HCECs) infected by Aspergillus fumigatus.
METHODS: HCECs were cultured in vitro. They were randomly divided into 4 groups, including control group, group, GW5074 (an inhibitor of Raf -1) group and Laminarin [an inhibitor of Dendritic-cell-associated C -type lectin 1 (Dectin -1)] group. The protein expression level of total Raf-1 and p-Raf-1 was measured by Western blot. The expression of IL -6 and IL -8 mRNA in each group was detected by real -time polymerase chain reaction.
RESULTS: In Aspergillus fumigatus group, total Raf-1 protein levels in HCECs remained unchanged at 5, 15, 30 and 45min after infection, while p-Raf-1 expression was significantly enhanced at 30min after infection compared with control group. However, the expression of p-Raf-1 was apparently declined after treated with GW5074 or Laminarin compared with Aspergillus fumigatus group. The expression levels of IL -6, IL -8 mRNA were significantly increased after stimulation with fumigatus compared with control group. Pre -treated with GW5074 significantly inhibited Aspergillus fumigatus-induced upregulation of IL-8 and IL-6.
CONCLUSION: Aspergillus fumigatus stimulation can elevate the expression of p -Raf -1 in HCECs in vitro. Dectin-1/Raf-1 signal pathway may play a role on regulating the expression of inflammatory cytokines, including IL-6 and IL-8.

PU-174

泪道通畅的慢性泪囊炎

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目的：介绍一例泪囊憩室致慢性泪囊炎。
方法：患者女性，52 岁，因左眼异物感、溢泪 2 年于 2019 年 1 月 2 日入院。于 2 年前无明显诱因出现左眼异物感、溢泪，伴少量黏液性分泌物，无其他不适，曾多次于外院就诊未果。既往无眼部外伤、手术史，无类似疾病。入院查体：裸眼视力：OD 1.0，OS 0.8；眼压：右眼 13.4mmHg（1mmHg=0.133kPa），左眼 14.1mmHg。左眼泪囊区无红肿，压痛（-），挤压泪囊区无分泌物溢出，下睑近内眦处皮肤无潮红；泪道冲洗：下冲及上冲大部分入咽，少量黏液性分泌物自上及下泪小点溢出，余眼前节检查（-）。右眼前节检查无明显异常。

结果：入院诊断：左眼慢性泪囊炎：黏液性？左眼鼻泪管狭窄？于 2019 年 1 月 3 日在局麻鼻内窥镜下行鼻腔泪囊吻合术，术中凿开泪囊骨壁，见泪囊组织挤压缩小，其鼻上方有一囊性肿物，触之柔软，挤之见黏脓性分泌物自上、下泪小点溢出，予以肿物切开，见大量黏脓性分泌物，未找到囊性肿物与泪囊组织相连的瘘管；同时切开泪囊，形成鼻腔泪囊、泪囊憩室吻合口。确诊为左眼泪囊憩室。
结论：泪囊憩室临床上少见，主要表现为溢泪及泪囊区肿物，主要采取手术治疗，摘除憩室及其与泪囊相沟通的瘘管。

PU-175

红芪多糖干预内毒素诱导的大鼠葡萄膜炎机制的研究

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目的 探讨红芪多糖在内毒素诱导的大鼠葡萄膜炎发病中的作用及对 Toll 样受体 4 信号转导通路中关键分子 TRAF6 及 TRIF 表达的影响。**方法** 选用 SPF 级健康成年 Wistar 大鼠 40 只，随机分为内毒素诱导的葡萄膜炎动物模型组（EIU），炎症模型红芪多糖治疗组（HPS+LPS），红芪多糖对照组（HPS），正常(空白)对照组（ NC） 4 组。采用霍乱弧菌内毒素 1mg/kg 皮下注射的方法，建立大鼠急性前葡萄膜炎动物模型。HPS+LPS 组在内毒素注射前 1 小时给予腹腔注射红芪多糖 400 mg/kg。HPS 组大鼠只注射红芪多糖 400 mg/kg。每 2h 用裂隙灯观察大鼠眼前节炎症反应，注射后的 0h、6h、12h、 18h、 24h 对各组进行评分。注射后 24h 组织病理学检查炎症反应水平。实时定量 PCR 检测 NF-kB、TRAF6 及 TRIF mRNA 的表达。**结果** 成功建立急性前葡萄膜炎动物模型。NC 组大鼠 24h 内眼前节未见炎症反应。注射后 24h,EIU 组可见虹膜血管扩张明显，瞳孔区大量白色渗出,HPS 组仅可见虹膜血管扩张，未见其他眼部炎症反应,HPS+LPS 组大鼠可见虹膜血管扩张和瞳孔缘少量渗出。比较不同组间的大鼠临床评分可见，差异均有统计学意义(均为 $p<0.001$）。PCR 结果显示红芪多糖可降低 NF-kB m RNA 和 TRAF6 mRNA 的表达（$p<0.001$），红芪多糖对 TRIF 的表达无明显影响（$p=0.236$）。**结论** 红芪多糖可能通过抑制 TRAF6 核酸的表达缓解内毒素诱导的大鼠急性前葡萄膜炎炎症反应,红芪多糖对 TRIF 的表达无明显影响。

PU-176

Thelazia callipaeda infection in a 3-month-old infant

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Thelazia callipaeda, which is the main causative organism in thelaziasis, commonly infects orbital cavities and associated tissues. Thelazia callipaeda infectin is rarely reported in humans, especially in infants. Here we reported a case about a 3-month-old male infant infected thelazia callipaeda. Mother found something squirmed in the right eye when breastfeeding the baby without secretions and redness. On examination under the slit lamp, we found the creamy thread-like mobile worm in the conjunctival sac in the right eye. During surgical opration, 2 worms were extracted from the right eye. No recurrence during 3-month follow-up. Here presented the life of Thelazia callipaeda, the detailed clinical and morphological information. The case indicates us to identify differential diagnosis of ocular surface diseases, especially in infant patients.

PU-177

利用飞秒激光基质透镜联合羊膜移植治疗浅、中层难治性角膜溃疡的短期临床疗效

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目的评价利用飞秒激光基质透镜联合羊膜移植（Amniotic Membrane Transplantation，AMT）治疗浅中层难治性角膜溃疡的短期临床疗效。
材料和方法：13 例（13 眼）角膜浅层溃疡（深度<1/3 角膜厚度）患者接受飞秒激光基质透镜修补术+AMT 治疗角膜溃疡。术后通过角膜荧光素染色检测溃疡愈合时间，记录视力、角膜知觉、植片透明度、排斥情况等短期疗效，并用激光扫描共聚焦显微镜和前段光学相干层析术(AS-OCT)观察层间愈合情况。
结果：主要疾病有病毒性角膜炎(5 眼)、不明原因的角膜溃疡(4 眼)、角膜植片溃疡(1 眼)、蚕食复发性溃疡（1 眼）、碱烧伤（1 眼）、外伤所致板层裂伤合并感染（1 眼）。所有的基质瓣在手术后都完好无损，没有脱落或移位。平均溃疡愈合时间为 12.4±3.6 天，治愈率 91%。视力均有提高（从指数到 0.5），术后 2 个月通过共聚焦显微镜观察有无炎性细胞浸润和角膜基质水肿情况，角膜知觉明显降低（从 54mm 到 35mm），其中角膜溃疡 1 眼在术后 12 个月再次出现角膜植片混浊、角膜溃疡，共焦显微镜及角膜刮片结果均未见菌丝、未见细菌。所有患者均未出现严重并发症，随访 1 年期间未出现植片排斥现象。
结论：利用飞秒激光小切口角膜基质透镜取出术中获得的角膜基质透镜经冰冻保存后用于治疗浅中层角膜溃疡是可行有效的。

PU-178

胸腺瘤所致的复视

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目的：报道 1 例以复视为首发症状的胸腺瘤病例，来阐述重症肌无力与胸腺瘤的关系。
方法：患者，男，50 岁，因双眼复视伴头晕 10 天收住院。患者 10 天前无明显诱因下出现双眼复视，伴头晕，无其他不适，于外院就诊，未予特殊治疗，入院时检查生命体征平稳，否认外伤史、糖尿病史。眼科检查：双眼裸眼视力 1.0，眼压正常，眼球转动不受限，双眼红绿玻片试验：周边像是左眼，物象左侧颞下分离最大。双眼角膜透明，前房中深，瞳孔直径 3mm,等大同圆，对光反应正常，晶体密度增高，眼底无殊。外院颅脑 CT 平扫未见异常。
结果：入院后急诊行头颅 CTA，并予以地塞米松 5mg 全身静滴，扩血管，营养神经，对症支持治疗。颅内动脉 CTA 检查未见明显异常。入院后第 3 天患者诉复视好转，左眼出现上眼睑下垂（图 A），休息后好转。考虑诊断为：重症肌无力。急诊申请胸部 CT，胸部 CT 提示：胸腺瘤考虑（图 C）。遂急诊转胸外科就诊，在全麻下行胸腔镜下前纵隔肿瘤切除术，病理证实为 B2 型胸腺瘤（图 D），手术顺利，术后全身抗炎、预防感染治疗。术后未诉复视及眼睑下垂。
结论：胸腺瘤与自身免疫紊乱密切相关，重症肌无力是胸腺瘤患者最常见伴随疾病，30%～70%患者伴有重症肌无力。重症肌无力(myasthenia gravis，MG)是体液免疫为主，细胞免疫为辅，补体参与的自身免疫性疾病。B 细胞活化及自身免疫性抗体如乙酰胆碱受体(AChR)抗体的产生是 MG 发病

的中心环节。重症肌无力(MG)患者 80％～90％存在胸腺异常，其中 65％～70％伴有胸腺淋巴滤泡性增生，0％～15％合并胸腺瘤。胸腺瘤有局部侵袭及恶化的可能，合并重症肌无力病情重，如呼吸肌受累可导致呼吸困难，需要紧急抢救。通过该病例的学习提醒我们：加强基本功训练，掌握相关学科知识。考虑常见病、多发病时也应想到少见病、罕见病的可能，抓住主诉的微小差别，行相关检查，尽量避免临床工作中误诊、漏诊及延误病情。

PU-179

赖特综合征与葡萄膜炎

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目的：报道 1 例赖特综合征，以期提高专科医生对复杂疾病的认识，减少误诊和漏诊。
方法：患者，女，70 岁，于 2017 年 1 月 28 日因右眼葡萄膜炎收入我院眼科治疗，既往诊断为强直性脊柱炎相关葡萄膜炎，多次激素治疗后好转出院。此次入院后 2 天患者出现右膝关节出现红肿，压痛阳性，浮髌试验阳性，膝关节活动受限; 患者同时出现尿频、尿急、尿痛。追问病史，患者入院时大小便正常，人院前 3 天腹泻两次，伴里急后重感。全身疲乏，发热 38.0℃。实验室检查：血常规 Hb 10.8g / L，RBC4.01x 10^{12} / L，WBC 19.68×10^{9} / L，N 85.6％，L 10％，M 3.6％，血沉 106mm / h，C-反应蛋白 6.51mg/dl,类风湿因子阴性，抗核抗体阴性。遗传标记 HLA—B27 阳性。RPR、HIV 均阴性。骶髂关节 CT：两侧骶髂关节改变，符合强直。结合以上临床表现及检查结果，修正诊断为 Reiters 综合征（赖特综合征）。
结果：治疗—应用喹诺酮类药物静滴，同时给予非甾体类药物口服，全身激素并眼部局部应用用药，住院治疗，症状逐渐缓解，好转出院。随访 3 个月，赖特综合征未再复发。
结论：赖特综合征尚无根治方法，但如能及时诊断及合理治疗，可以控制症状并改善预后。

PU-180

VIP 对单纯疱疹病毒性角膜炎的作用研究

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目的：研究 VIP 对单纯疱疹病毒性角膜炎的作用。方法：应用免疫荧光、PCR、流式细胞术、芯片等方法研究 VIP 是否对单纯疱疹病毒性角膜炎有影响。结果：VIP 能减轻 HSV-1 小鼠的初发感染但对病毒的复制没有明显影响。通过芯片结果发现与对照鼠相比，结膜下注射 VIP 后 IL-10\IL-23\IFNg 的含量明显升高。结论：VIP 能减轻单纯疱疹病毒性角膜炎的初发感染症状。

PU-181

TIPE2 suppresses Pseudomonas aeruginosa keratitis by inhibiting NF- B signaling and the infiltration of inflammatory cells

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Background: The role of tumor necrosis factor (TNF)-a-induced protein 8-like-2 (TIPE2) in *Pseudomonas aeruginosa* (PA) keratitis is explored.
Methods: Eight-week-old TIPE2 knockout (TIPE2$^{-/-}$) C57BL/6 mice and their wild-type littermates (WT) were used. Corneal disease was graded at 1, 2, and 3 days post-infection, and slit lamp, clinical score, histopathology, and immunostaining were performed in the infected corneas. Corneas were harvested, and mRNA levels of TNFa, IL-1b, IL-6 were tested. ELISA determined the protein levels, and NF-kB signaling molecules (phosphorylated TAK1, phosphorylated p65, phosphorylated IkBa) were tested by Western-blot. Inflammatory cell infiltration was determined by flow cytometry. In vitro human corneal epithelial cells (HCECs) were used to determine the relationship between TIPE2 and TAK1. HCECs were treated with TIPE2 siRNA and LPS to test the NF-kB signaling molecules by Western-blot.
Results: PA infection induced a decreased expression of TIPE2 in mouse corneas 2 days post-infection. Compared to the control group, TIPE2-deficient mice were susceptible to infection with PA and showed increased corneal inflammation. Reduced NF-kB signaling and inflammatory cell infiltration are required in the TIPE2-mediated immune modulation.
Conclusions: TIPE2 promoted host resistance to PA infection by suppressing corneal inflammation via negatively regulating TAK1 signal and inhibiting the infiltration of inflammatory cells.

PU-182

误用糖皮质激素对真菌性角膜炎临床特征及治疗预后的影响

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目的：观察误用糖皮质激素对真菌性角膜炎临床特征、病程进展的特点以及治疗转归和预后的影响。
方法： 回顾性分析 2014 年 12 月至 2015 年 12 月于山东省眼科医院确诊的真菌性角膜炎患者 211 例（211 只眼），其中 36 例患者（36 只眼）有近期明确误用糖皮质激素的病史，将其作为主要研究对象，为误用激素组；其余 175 例（175 只眼）患者为未用激素组。通过问诊误用激素组患者病史了解既往诊断、发病诱因、使用激素情况以及病程进展速度等。观察药物治疗后病灶的变化情况。根据角膜病灶情况选择不同治疗方案，观察误用激素组和未用激素组给予常规治疗后的结局有无不同。分析糖皮质激素对真菌性角膜炎治疗方案的选择及预后的影响。
结果：误用激素组和未用激素组患者的临床表现对比：误用激素组的病灶平均直径为 6.7mm，未用激素组为 4.8mm，其中浸润深度>1/3 角膜的患者误用激素组有 31 例（86.1%），未用激素组有 102 例（58.2%）（χ^2=9.921 *P*=0.002）；误用激素组和未用激素组治疗结局分别为：行穿透性角膜移植术的患者误用激素组 22 例（61.1%），未用激素组 55 例（31.4%）(χ^2=11.351 *P*=0.001)；行板层角膜移植术的患者误用激素组 7 例（19.4%），未用激素组 34 例（19.4%）(χ^2=0.011 *P*=0.998)；行角膜病灶切除术的患者误用激素组 4 例（11.1%），未用激素组 48 例（27.4%）(χ^2=4.281 *P*=0.039)；药物治愈的患者误用激素组 1 例（2.8%），未用激素组 34 例（19.4%）(χ^2=5.983 *P*=0.014)；真菌复发的患者误用激素组 4 例（11.1%），未用激素组 3 例（1.7%）(χ^2=8.542 *P*=0.003)，两者之间差异有统计学意义。
结**论：**真菌性角膜炎误用糖皮质激素后会加快病情进展，抗真菌药物不易控制，增加了穿透性角膜移植、真菌复发的概率。

PU-183

儿童眼外伤眼内炎的临床特征与转归

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背景 眼外伤一直以来都是儿童视力损伤以及致盲的首要原因，眼内炎是眼外伤的最严重的并发症，其致盲率极高，威胁儿童的成长、学习、生活。目的 总结儿童外伤性眼内炎临床特征和治疗转归，以指导临床治疗。方法 回顾性研究山东省眼科医院院 2014 年 4 月到 2017 年 4 月收治 26 例(26 眼)儿童外伤性眼内炎患儿，总结分析包括受伤的原因、年龄、性别、特征、手术治疗和伤眼视力等，并探讨与预后相关的高危因素。结果 儿童外伤性眼内炎占我院儿童开放性眼外伤的 10.36%，本组儿童受伤原因较多，主要是金属锐器刺伤（53.85%），微生物培养阳性率较低，为 23.08%，菌种以革兰式阳性球菌为主（66.67%）。治疗方式以手术治疗为主（100%），主要方法为玻璃体腔注射抗生素和玻璃体切除术；26 眼中共保留晶状体 2 眼。愈后视力≥0.3 者 6 眼（33.33%）。伤后延误就诊时间越长，愈后越差（P＜0.05），伤后 24h 内就诊的患儿愈后优于超过 24h 就诊的患儿。伤后接受玻璃体切除手术的时间越晚，愈后越差（P＜0.05），伤后接受玻璃体切除手术的时间 7 天内的患儿愈后优于超过 7 天的患儿。结论 儿童外伤性眼内炎危害严重，其愈后与就诊时间、接受玻璃体切除手术的时间等有关。早期玻璃体手术是决定儿童眼内炎预后的关键。

PU-184

双醋瑞因对眼科临床常见耐药菌株的体外抑菌活性分析

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目的 探究与分析抗炎药双醋瑞因滴眼液对 61 例革兰阳性球菌中耐甲氧西林葡萄球菌株(MRS 株）19 例、耐甲氧西林 Meca 阴性葡萄球菌株（MRS-Meca 阴性株）4 例、产广谱 β-内酰胺酶葡萄球菌株（产 β-Lac 株）5 例、产广谱 β-内酰胺酶 Meca 阴性葡萄球菌株（产 β-LacMeca 阴性株）3 例、产广谱 β-内酰胺酶 Meca 阳性葡萄球菌株（产 β-LacMeca 阳性株）1 例等 32 株临床眼科常见耐药菌株的体外抑菌活性。
方法 选取双醋瑞因原料药制备药液，依据 CLSI 标准，初步采用纸片琼脂扩散法（K-B 法）测双醋瑞因滴眼液对革兰阳性球菌中 MRS 株、MRS-Meca 阴性株、产 β-Lac 株、产 β-LacMeca 阴性株、产 β-LacMeca 阳性株等 5 类菌株的抑菌直径并参考相应的标准菌株实验结果，再采用肉汤稀释法观察双醋瑞因滴眼液对其相应的抑菌活性，测定其相应的最小抑菌浓度（MIC）。
结果 双醋瑞因滴眼液对 MRS 菌株 、产 β-Lac 菌株、产 β-LacMeca 阴性菌株、产 β-LacMeca 阳性菌株、MRS-Meca 阴性菌株等 5 种耐药菌株的抑菌直径分别为 26.05±7.98mm，26.00±7.16mm，22.60±7.77mm， 21.67±1.53 mm， 21.00±0.00 mm； MIC 值分别为 9.10±7.43μg/ml，14.40±10.43μg/ml，18.67±12.22μg/ml，8.00±0.00μg/ml，66.00±71.59μg/ml。
结论 双醋瑞因滴眼液对 5 种眼科临床常见的耐药菌都有较好的抑菌效果，其中 MRS 葡萄球菌株的抑菌效果最为明显，MRS-Meca 阴性葡萄球菌株的抑菌效果次之，其次为产 β-Lac 葡萄球菌株。本研究结果对眼部感染 MRSA 的临床治疗具有重要的参考价值。

PU-185

以视神经炎为首发的梅毒合并 HIV 感染一例

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目的 观察以视神经炎为首发的梅毒合并 HIV 感染一例。

方法 回顾报道我院诊治的一例以视神经炎为首发的梅毒合并 HIV 感染的临床症状与体征、实验室检查治疗及预后，并复习相关文献。
结果 患者，男，38 岁。2017 年 12 月，因右眼视力下降、视物变形一月余至我院就诊。查体：右眼 0.4，左眼 1.0，晶状体轻度混，眼底视盘边界不清、水肿，周围片状出血，无明显渗出；视网膜静脉增粗、迂曲，动脉无明显改变。B 超示右眼视盘轻度隆起。视觉诱发电位示右眼 P 波潜伏期延长，波幅降低。OCT 示黄斑区局限神经上皮层脱离。视野检查示右眼生理盲点扩大。患者半月前获知人免疫缺陷病毒（HIV）抗体阳性，梅毒阳性。诊断为梅毒性视神经炎。给予标准驱梅治疗后视物变形减轻，视力好转。本例患者合并有 HIV 感染及梅毒螺旋体感染。甲苯胺红不加热血清实验结果为 1:32，梅毒螺旋体抗体阳性。CD4 细胞基数为 149/μL。头 MRI 检查未见明显异常。在梅毒眼病发病前，全身无其他不适。
结论 在 20 世纪 50 年代，梅毒在我国得到了较好的控制。近年来，随着静脉吸毒、不洁性行为及同性间传播的增加 ，梅毒发病率逐年增高，且多合并 HIV 感染，眼部梅毒的发病率也随之增加。梅毒眼病表现多样，缺乏特异性的表现。提示临床医师遇到视神经炎的中青年患者，且无其他明显诱因时，应及时完善梅毒、HIV 相关检查，以尽早诊断、治疗，使患者获得较好的预后。

PU-186
特异性促炎症消退介质 MaR1 在自身免疫性葡萄膜炎中的作用研究

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目的：特异性促炎症消退介质（Specialized pro-resolving mediators,SPM）是多不饱和脂肪酸在特异酶的催化下形成的内源性的脂质调控介质，MaR1 是最新发现的 SPM 家族成员，既往研究证明 SPM 在固有免疫和适应性免疫中均发挥重要作用，可以通过抑制白细胞浸润，促进胞葬作用等多重机制达到抗炎和促进炎症消退双重作用。在多个自身免疫性疾病，如类风湿性关节炎中，发现 MaR1 可以通过调节 Treg/Th17 的平衡，降低炎症反应，而在自身免疫性葡萄膜炎中的作用尚未见文献报道，本试验拟探索 MaR1 对 EAU 小鼠模型的治疗作用。
方法：参照 Rachel R.Caspi 的方法，建立 EAU 模型，取 EAU 模型小鼠的淋巴结细胞，加入 hIRBP1-20 和 100nM 的 MaR1/空白对照干预，培养 72h，利用流式细胞仪检测 TNF-α、IFN-γ、Treg 及 Th17 的表达水平。
结果：经过 3 天共培养后， MaR1 组与对照组相比，淋巴结细胞中 IL-17 的表达显著降低（P=0.042）,Treg 的表达显著升高（P=0.013）。同时，MaR1 组的 TNF-α 及 IFN-γ 的表达显著低于对照组（P=0.035, P=0.026）。
结论：特异性促炎症消退介质 MaR1 可以通过抑制 TNF-α、IFN-γ 的生成，调节 Treg/Th17 的平衡参与葡萄膜炎的治疗，有望成为自身免疫性葡萄膜炎的新的治疗方法。

PU-187
Drp1 介导的线粒体分裂与 NADPH 氧化酶协同参与角膜碱烧伤的作用机制

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目的：探索 Drp1 介导的线粒体分裂与 NADPH 氧化酶协同在碱烧伤所致角膜组织损伤发生发展过程中的作用机制，从而为临床上发掘角膜碱烧伤治疗的新靶点提供理论基础和实验依据。
方法：选用 C57BL/6 小鼠右眼建立碱烧伤模型。RT-PCR、WB 或免疫荧光检测粒体形态调节蛋白 Drp1、Mfn1/2、OPA-1 和 NADPH 氧化酶在正常和碱烧伤角膜组织中的表达水平。荧光探针检测正常组、角膜碱烧伤组、应用 Drp1 抑制剂和 Drp1 RNAi 角膜组织中 ROS 的表达水平；qPCR 检测各组炎症因子的表达水平。WB 检测 IκBα 蛋白磷酸化及 ChIP 检测 NF-κB 与 NADPH 氧化酶启动子的结合研究 NF-κB 信号通路激活。心脏灌注 FITC-dextran 检测正常组、角膜碱烧伤组及角膜碱烧伤后应用 Drp1 抑制剂 Mdivi-1 和 NADPH 氧化酶抑制剂 Apo 各组角膜新生血管形成；qPCR 检测各组炎症因子（TNF-α, IL-1β, IL-6）表达水平。
结果：WB 显示碱烧伤组 Drp1、NOX-2、NOX-4 蛋白表达水平相比正常组明显升高，Mfn2 表达明显降低。碱烧伤后 Drp1 的 mRNA 水平明显增加。免疫荧光显示角膜碱烧伤 Drp1 磷酸化水平上调。角膜碱烧伤后应用 Drp1 抑制剂 Mdivi-1，NOX-2 及 NOX-4 的表达显著下降，提示碱烧伤角膜中 Drp1 可上调 NADPH 氧化酶的表达。角膜碱烧伤后 ROS、炎症因子与 IκBα 蛋白磷酸化明显上调，提示角膜碱烧伤后激活了 NF-κB 通路且引起氧化应激与炎症反应，基因沉默和 Mdivi-1 抑制 Drp1 可有效抑制上述反应发生。应用 Drp1 抑制剂 Mdivi-1、NADPH 氧化酶抑制剂可抑制角膜碱烧伤炎症反应与病理性新生血管的产生，且联合应用后效果更明显。
结论：Drp1 介导的线粒体分裂与 NADPH 氧化酶协同参与了角膜碱烧伤，并为临床上更好地治疗角膜碱烧伤提供新的治疗靶点和理论依据。

PU-188

角膜胶原交联术治疗暴露性角膜病变

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目的 评价角膜胶原交联术治疗暴露性角膜病变的效果。方法 回顾性分析 2017 年 1 月—2018 年 3 月本院暴露性角膜病变 14 例（14 眼）的临床资料，利用角膜胶原交联术治疗，术后随访 7-14 个月。结果 随访期间，所有患者均无原发病复发，角膜溃疡愈合后形成角膜斑翳，且无并发症出现。所有患者术后 1 周较术前无统计学差异（$P>0.05$），术后 2 周起，开始明显改善，具有明显统计学差异（$P<0.001$），术后 3 个月较术前有显著提高，具有明显统计学差异（$P<0.001$）；术后 3 个月时，14 眼染色均呈阴性，角膜上皮愈合良好；经眼前段 OCT 检查，手术区域角膜厚度术后 1 周较术后 3 个月时厚，具有统计学差异（$P<0.01$），术后 1 月时可观察到交联线，大约位于（298±75.61）μm 处。结论 利用角膜胶原交联术治疗暴露性角膜病变效果良好。

PU-189

Interactions of thymic stromal lymphopoietin with TLR2 and TLR4 regulate anti-fungal innate immunity in Aspergillus fumigatus-induced corneal infection

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Thymic stromal lymphopoietin is an interleukin 7-like four helix bundle cytokine that plays diverse roles in the regulation of immune responses.TSLP downstream signaling molecules can upregulate TLR2 and MyD88/NF kappa B-p65 signaling. In mouse fungal keratitis induced by *Aspergillus fumigatus*, TSLP is mainly expressed in the epithelium as well as some infiltrated immune cells in stroma in a time-dependent manner. Exogenous TSLP with *Aspergillus* led to severe keratitis and

worsen corneal recovery with higher level of TLR2, TLR4, IL-6, and IL-8 as well as increased neutrophil infiltration. On the other hand, when TSLP suppressed by siRNA, fungal keratitis was mild with higher levels of antimicrobial peptides such as human beta-defensin . Taken together, our data revealed an unreported function of TSLP in mediating anti-fungal inflammatory response through the upregulation of TLRs and AMPs.

PU-190

Reactive uveitis, retinal vasculitis and scleritis as ocular end-stage of acanthamoeba keratitis –a histological study

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Purpose: *Histological analysis of two Acanthamoeba keratitis eyes with anterior and posterior segment inflammation and blindness.*
Patients and Methods: *Two eyes of 2 patients (age 45 and 51 years) with acanthamoeba keratitis (PCR of epithelial abrasion positive) were analysed. Patients underwent triple-topical therapy (polyhexamethilen-biguanide, propamidin-isethionat and neomycin) without recovery, subsequent crosslinking therapy, corneal cryotherapy, repeat penetrating keratoplasties and amniotic membrane transplantations. However, the epithelial defects further persisted and the patients developed ocular hypotony with central vein/artery occlusion and retinal/choroidal detachment. As the patients had no light perception at this time point, the inflamed eyes were enucleated 13 and 10 months after onset of the disease. Histological analysis was performed using haematoxilin-eosin (HE), periodic acid- Schiff (PAS) and Gömöri-methenamine silver (GMS) stainings.*
Results: *The superficial corneal stroma pertained trophozoites and cysts in one of the eyes, but we could not verify these in the second globe or other ocular tissues. Histological examination revealed uveitis, retinal vasculitis and scleritis with lymphocytic infiltration.*
Conclusions: *In long-course acanthamoeba keratitis, uveititis, retinal vasculitis and scleritis may occur and result in blindness, even without further persistence of acanthamoeba trophozoites or cysts. However, the etiology of these inflammatory complications is unclear. Immune response to acanthamoebae and the long-term intensive antiamoebic topical treatment may be important causes.*

PU-191

眼前房植入环孢素 A 缓释片对虹膜-睫状体屏障功能的影响

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目的：虹膜-睫状体屏障功能对于维持眼内免疫微环境的稳定具有重要作用。我们的前期研究证实，前房植入 CsA 缓释片（Cyclosporine A drug-delivery system，CsA DDS）有助于维持眼内免疫微环境的稳定。而关于免疫排斥及 CsA DDS 对虹膜-睫状体屏障功能的影响却鲜有报道，本研究着重观察该方面内容。
方法：建立小鼠穿透性角膜移植模型，设立同系及异系移植组。借助血管造影观察虹膜-睫状体血管通透性的变化；通过分子生物学手段比较虹膜-睫状体内炎性细胞因子、紧密连接相关蛋白的表达量差异；检测虹膜-睫状体内免疫细胞的浸润情况，分析虹膜-睫状体的 NF-κB 活性。进一步，通过兔高危角膜移植模型检验前房植入 CsA DDS 对虹膜-睫状体屏障功能的影响。

结果：与同系移植组相比，异系移植组虹膜-睫状体的血管腔扩大，血管通透性升高；炎性细胞因子，包括 interferon-gamma (IFNg)， interleukin-15 (IL-15)， IL-1β，IL-6 和 IL-12 的 mRNA 表达水平均上调；紧密连接相关蛋白，包括 zonula occludens-1（ZO-1），Occludin 及 LSR 的表达水平均下降；虹膜-睫状体内的 NF-κB 处于激活状态。在高危角膜移植中，前房植入 CsA DDS 能有效降低虹膜-睫状体的血管通透性，减轻房水内炎细胞的聚集，上调虹膜-睫状体内紧密连接相关蛋白 ZO-1、LSR 等的表达，显著改善虹膜-睫状体的屏障功能。
结论：角膜移植免疫排斥过程中，虹膜-睫状体的屏障功能受损，前房植入 CsA DDS 有助于维持虹膜-睫状体的屏障功能，这可能是其防治高危角膜移植免疫排斥反应的机制之一。

PU-192
雷公藤红素纳米粒调控 TLR4/NFkB 信号通路抑制角膜移植排斥实验研究

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目的：制备雷公藤红素正离子纳米胶束，评估其对大鼠角膜移植排斥模型角膜植片生存的影响，及其对巨噬细胞和 TLR4/NFkB 信号的调控。
方法：超声乳化方法制备负载雷公藤红素的 PEG-b-PCL-g-PEI 正离子纳米胶束，并对其表征进行评估。扫描电镜测其形貌，粒径仪测负载前后纳米胶束的粒径，并测量其表面电位。采用 Wistar-SD 大鼠角膜移植排斥动物模型，局部给予雷公藤红素正离子纳米胶束，评估其对角膜植片生存的影响，术后第 8 天，组织病理学评估角膜组织内巨噬细胞的浸润，免疫荧光检测巨噬细胞及 TLR4 表达情况。Cytokine array 测定角膜组织内细胞因子的蛋白表达，RT-PCR 评估角膜组织内细胞因子 mRNA 的表达。体外研究评估雷公藤红素正离子纳米胶束对巨噬细胞分泌细胞因子，及其对巨噬细胞 TLR4/NF-kB 信号通路的影响。
结果：制备的雷公藤红素正离子纳米胶束呈均相透明的橙红色胶束溶液，丁达尔现象阳性，电镜显示胶束呈圆形，平均粒径为 24 纳米，表面电位 11mV。动物实验显示，雷公藤红素治疗组明显延长角膜植片的生存时间，各组在角膜透明度、水肿及新生血管评分具有明显差异，差别具统计学意义。术后第 8 天，病理学显示治疗组角膜组织内巨噬细胞的浸润明显减少，荧光显微镜显示对照组角膜组织内大量 CD68 及 TLR4 双标染色阳性的细胞浸润，药物治疗组明显减少。治疗组角膜组织内 TNFa 等多种细胞因子的 mRNA 及蛋白表达明显下调。体外研究进一步显示，雷公藤红素纳米胶束抑制 LPS 诱导的巨噬细胞 TNF-a 等多种细胞因子的表达，下调 TLR4 及 NF-kB 的表达。
结论：制备的雷公藤红素正离子纳米胶束增加了雷公藤红素的表观溶解度，局部给予雷公藤红素正离子纳米胶束明显延长角膜植片生存时间，其机制可能与下调巨噬细胞分泌细胞因子，抑制 TLR4/NFkB 信号通路有关。

PU-193
巨噬细胞 JAK3/STAT6 通路调节真菌性角膜炎瘢痕化

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真菌性角膜炎是一种治疗棘手的致盲性眼病，近年来在该病的发病机制、抗真菌药物研究领域都取得了可观的进展。真菌感染后角膜组织瘢痕化是影响预后的另一主要因素，是患者视力受损的重要原因，然而，对其发生机制并不清楚，仍然有待进一步的探索。本研究采用 6-8 周雄性 C57BL/6j 小鼠建立腐皮镰孢菌真菌性角膜炎模型，实验遵守动物伦理。经 western blot 检测真菌性角膜炎中

JAK3/STAT6、TGF-β、α-SMA 表达水平，角膜整铺片免疫荧光观察 JAK3/STAT6 的表达与来源，流式细胞术分析感染后角膜组织中巨噬细胞亚型的变化。分离小鼠原代巨噬细胞与热灭活的真菌共培养研究感染后巨噬细胞分子改变，应用 CP692550 阻断 JAK3/STAT6 通路观察其对角膜瘢痕化的影响。真菌性角膜炎感染后角膜组织 TGF-β 从 72h 开始显著增加（$P < 0.05$），在第 7 天达到峰值，随后维持在较高水平直到 15 天。与此同时，JAK3/STAT6（$P < 0.05$）和 α-SMA（$P < 0.05$）表达水平显著增加，并且 JAK3/STAT6 的增加 TGF-β 及 α-SMA 呈正相关。角膜整铺片免疫荧光显示 JAK3/STAT6 主要表达在巨噬细胞细胞。而热灭活真菌刺激后巨噬细胞 JAK3/STAT6 表达显著增加（$P < 0.05$），TGF-β 分泌增加（$P < 0.05$）,应用 CP692550 后热灭活真菌刺激后巨噬细胞未能引起 TGF-β 分泌增加，同时巨噬细胞 CCR2 比例下调。进一步的体内验证发现 CP692550 抑制真菌性角膜炎模型中 JAK3/STAT6 激活（$P < 0.05$），抑制角膜组织瘢痕化（$P < 0.05$）。真菌性角膜炎中，感染引起的巨噬细胞 JAK3/STAT6 激活导致 TGF-β 表达增加，最终引起角膜组织瘢痕化，阻断 JAK3/STAT6 通路可以有效的遏制角膜组织瘢痕化。JAK3/STAT6 通路可能是真菌性角膜炎瘢痕化的潜在干预靶点。

PU-194

Metabolic profile analysis of free amino acids in experimental autoimmune uveoretinitis rat plasma

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AIM: To determine the differences of amino acid (AA) levels in experimental autoimmune uveoretinitis (EAU).
Methods: AA analysis of the plasma samples in EAU rats induced by interphotoreceptor retinoid-binding protein emulsion were performed with high performance liquid chromatography (HPLC) and phenylisothiocyanate (PITC) pre-column derivation methods were performed. Using partial least squares discriminant analysis (PLS-DA), the potential biomarkers were identified in EAU rat plasma, and the metabolic pathways related to EAU were further analyzed.
Results: The method results showed that linear (r≥0.9957), intra-day reproducible [relative standard deviation (RSD)=0.04%-1.33%], inter-day reproducible (RSD=0.06%-2.07%), repeatability (RSD=0.03%-0.89%), stability (RSD=0.05%-2.48%) and recovery (RSD=1.98%-4.39%), with detection limits of 0.853-11.4 ng/mL. The metabolic profile in EAU rats was different from that in the control groups five AAs concentrations were increased and nine AAs were reduced. Moreover, five metabolic pathways were related to the development of EAU.
Conclusion: The developed method is a simple, rapid and convenient for determination of AAs in EAU rat plasma, and these findings will provide a comprehensive insight on the metabolic profiling of the pathological changes in EAU.

PU-195

隐匿性异物导致角膜及眼表损伤的临床观察

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目的 观察隐匿性异物导致角膜和眼表损伤的临床特征及治疗转归。
方法 回顾性分析 2015 年 12 月至 2016 年 12 月在我院因隐匿性异物（角膜、结膜、前房）导致眼表损伤的 12 例患者资料，对所选患者的病史、眼部体征、异物的位置及性质、治疗等情况进行记录。

结果 10 例患者主诉眼红肿、磨痛、睁眼困难等不适，3 例患者伴有下颌抬举、面转、侧视等代偿头位。漏诊、误诊的次数最少为 2-3 次（3 例），4-6 次共 7 例，大于 7 次 2 例。异物的性质分别为：透明薄片状塑料异物 3 例、铁质异物 2 例、缝线线头和线结 2 例，玻璃、板栗刺、蜜蜂刺、毛发、透明细丝状异物各 1 例。异物隐藏的部位分别为：睑板下沟 3 例、角膜 3 例，睑板腺出口处、泪小点开口处、上穹隆结膜皱襞、巩膜、外眦角、下方房角各 1 例。隐匿性异物导致的眼表损害主要累及单眼，表现为持续性结膜充血、水肿，并进行性加重；角膜上皮呈毛刷状、细线状粗糙，或顽固性角膜上皮缺损，药物治疗难以愈合；1 例房角异物导致角膜内皮细胞数量持续性下降。异物取出后 2-3d 眼红、磨痛、流泪等刺激症状消失，角膜上皮粗糙及缺损 1 周内逐渐愈合。

结论 隐匿性异物长期慢性刺激会导致持续性结膜充血水肿、顽固性角膜上皮粗糙、缺损、基质水肿等眼表损害。对于反复就诊的单眼红、磨痛、睁眼困难，药物治疗迁延不愈的患者，注意检查睑板下沟、睑板腺出口、泪小点开口、穹隆结膜、巩膜、房角等隐蔽部位，避免漏诊隐匿性异物。

PU-196

飞秒激光辅助的环状干细胞移植术治疗完全性角膜缘 干细胞功能失代偿

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目的：探讨飞秒激光辅助的环状干细胞移植术治疗完全性角膜缘干细胞功能失代偿（limbal stem cell deficiency, LSCD）的手术方法及治疗效果。

方法：回顾性分析 2016 年 11 月至 2017 年 11 月因完全性 LSCD 于山东省眼科医院行飞秒激光辅助的环状干细胞移植术的 10 例患者资料，对所选患者的最佳矫正视力、角膜上皮愈合情况、基质透明性、新生血管化程度、免疫排斥反应等情况进行记录。

结果：10 例患者均为男性，平均年龄 45.43±16.38 岁，术后随访 12-18 个月。术前最佳矫正视力 LP 2 例，HM/BE 3 例，FC/BE 5 例。7 眼角膜植片全部上皮化，平均上皮愈合时间为 8.57±1.37 天。随访期末最佳矫正视力达 20/100 者 2 例，20/50 者 3 例，20/40 者 3 例；10 眼角膜保持透明，角膜新生血管化分级较术前显著下降；随访中 7 例患者均未发生免疫排斥反应。

结论：飞秒激光辅助的环状干细胞移植术治疗完全性 LSCD 可使患者获得良好的视力预后，并大大缩短了手术时间，提高了手术效率。低浓度糖皮质激素滴眼液联合他克莫司滴眼液长期应用，可以有效避免发生免疫排斥反应。

PU-197

角膜胶原交联术治疗感染性角膜溃疡的临床观察

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目的：探讨角膜胶原交联术治疗感染性角膜溃疡的临床效果。

方法：收集 2017 年至 2018 年感染性角膜溃疡的病人 40 例，共 40 眼，分为角膜交联治疗组 22 眼，对照组常规药物治疗 18 眼。分别于治疗后 1w、1m、3m 检查视力、角膜厚度、溃疡灶大小，并记录患者眼部的症状变化。

结果：①视力：治疗组，经治疗 1w 后，14 只眼视力提高 1 排，1m、3m 后 22 只眼的视力均提高，与治疗后 1w 相比 $P<0.05$，有统计学意义；对照组，经治疗 1w 后，3 只眼视力提高，治疗 1m，10 只眼视力提高，8 只无效，治疗 3m 后，16 只眼视力提高，2 只无效，与治疗后 1w 周相比 $P<0.05$，

有统计学意义。②角膜厚度、溃疡灶大小：治疗组，1w 时溃疡灶开始缩小，角膜增厚，与治疗前相比，*P*>0.05，无统计学意义，治疗 1m 时，病灶区角膜厚度接近正常，溃疡灶进一步缩小，*P*<0.05，有统计学意义；治疗 3m 后，病灶区角膜正常，溃疡灶消失，*P*<0.05，有统计学意义；对照组，1w 时溃疡灶无明显改变，1m 时溃疡灶开始缩小，角膜增厚，与治疗前相比，*P*>0.05，无统计学意义，3m 时溃疡灶进一步缩小，角膜增厚，与治疗前相比，*P*<0.05，有统计学意义。③临床症状变化：治疗组，治疗 1w 后，22 只眼的眼部不适症状，如畏光、疼痛、流泪等明显减轻；治疗 1m 后，角膜溃疡灶消失，眼部不适症状消失；治疗 3m 后，病情无反弹。对照组，治疗 1w 后，3 只眼部不适症状减轻；治疗 1m 后，10 只眼不适症状减轻；治疗 3m 后，16 只眼的眼部不适症状明显减轻，2 只病情反复，症状加重。

结论：角膜胶原交联术可有效的控制角膜溃疡的发展，促进溃疡灶的消退，提高视力，改善临床症状，提高生活质量。角膜胶原交联术是一种治疗角膜溃疡安全有效的方法。

PU-198

板层角膜移植术治疗偏中心角膜穿孔 3 例

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目的 探讨部分板层角膜移植术治疗偏中心角膜穿孔的疗效。

方法 采用部分板层角膜移植术对 2017 年 8 月至今我院收治的 3 例不同原因造成角膜周边部位穿孔的患者进行治疗，观察术后患者角膜植片植床对合情况、植片的存活情况、前房形成情况以及角膜上皮修复情况等。

结果 3 例患者的原发疾病分别为角膜全层异物取出术后组织缺损、单纯疱疹病毒性角膜炎合并溃疡穿孔和穿透性角膜移植术后行二期白内障摘除术后植片植床交界处基质融解穿孔。其中 2 例穿孔发生于角膜中下方，1 例发生于上方角膜植片植床交界处。3 例患者角膜穿孔直径均大于 1mm，形状不规则。其中 1 例角膜植片为圆形，直径 4.25mm，术中前房注射无菌空气顶压植床；另外 2 例植片为与角膜组织缺损形状相符的不规则形状。3 例患者经过板层角膜移植术治疗均可形成密闭的前房，植片植床对合良好，无层间积液。因为术后患者存在较大的角膜散光，术后视力较术前无明显提高。

结论 在缺乏新鲜角膜供体材料的情况下，采用甘油冷冻材料行板层角膜移植术可以很好的解决偏中心角膜穿孔问题并且最大程度的保留患者自己的角膜内皮，可以作为角膜穿孔情况下保存眼球的优选治疗方案。因为术后存在较大的散光，患者术后视力可能较术前下降，角膜缝线拆除后有望改善。

PU-199

飞秒激光辅助的全板层角膜移植术治疗全周角膜缘损害的角膜疾病

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Purpose:探讨飞秒激光板层切削联合全板层角膜移植术治疗周边角膜病变的手术方法及治疗效果。

Methods:6 例于 2014 年 3 月~2017 年 3 月间在青岛眼科医院因周边角膜病变行飞秒激光板层切削联合全板层角膜移植治疗的患者。其中 2 例蚕食性角膜溃疡，3 例 Terrien 边缘变性，1 例 Pellucid 边缘变性。术前测量角膜中央光学区的直径，以确定飞秒激光板层切削的范围。飞秒激光边切角度为 90 度，边切深度至保留角膜厚度 100um~150um。

Results:6 例患者男性 4 例，女性 2 例，平均年龄 46.7±17.9 岁（range：22~68 岁）。术后随访 6~24 个月，平均 15.2±8.4 个月。术前最佳矫正视力 20/400 者 3 例，20/250 者 1 例，20/200 者 2 例。术后 6 个月时最佳矫正视力提高 2 行以上者 6 例，达 20/60 者 1 例，20/50 者 1 例，20/40 者 4 例。术后 6 个月时等效球镜较术前降低 4.8±2.7D（*t*=-3.705，*p*=0.014）。术后 6 个月时散光较术前降低 10.1±4.1D（*t*=6.037，*p*=0.002）。角膜植片上皮愈合时间平均为 8.5±3.3 天（范围 5-14 天）。角膜植片在随访过程中均透明。角膜基质层间光滑平整，无层间积液和积血。术后 6 个月时 OCT 检查：角膜植片中央厚度平均为 525±47um（范围 461~588um），角膜植床中央厚度平均为 189±119um（范围 102~419um）。术后角膜内皮损失率平均为 7.5±2.1%（范围 5.3%~11.7%）。无术中术后并发症发生。

Conclusions:飞秒激光辅助板层切削联合全板层角膜移植术治疗角膜周边病变可获得良好的临床效果，通过飞秒激光在角膜中央光学区制作平滑的光学切面可使患者获得良好的视力预后，并减少了机械剥除时导致角膜穿孔的风险，提高了手术的安全性。

PU-200

白芍总苷对 EAU 大鼠肝脏中 NKT 细胞表达的影响

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目的：探讨白芍总苷(TGP)对实验性自身免疫性葡萄膜炎（EAU）大鼠肝脏中 NKT 细胞基因表达的影响。**方法：**探索性实验研究。Lewis 大鼠采用随机法分为正常对照组、EAU 模型组和 TGP 干预组。EAU 模型组和 TGP 干预组注射含光感受器间维生素 A 结合蛋白（IRBP 1177-1191）的乳糜液以诱导大鼠葡萄膜炎，正常对照组注射等体积的不含 IRBP 多肽的乳糜液。于免疫后每天对各组大鼠进行裂隙灯显微镜观察眼前节炎症反应，记录发病程度，并进行炎症评分。免疫后第 12 天分别提取 3 组大鼠的眼球制成病理切片，并观察炎症反应。收集 3 组大鼠肝脏 $CD4^+$ T 细胞，流式细胞仪检测 NKT 细胞的表达水平，观察变化趋势；采用 RT-PCR 和 ELISA 分别检测 IL-4、IFN-γ 表达和蛋白表达情况。采用单因素方差分析、LSD-t 检验进行数据处理。**结果：**免疫后第 12 天，TGP 组炎症评分和病理分级明显低于 EAU 模型组，但是高于正常对照组组；与正常对照组相比，EAU 模型组和 TGP 组 NKT 表达水平明显升高，且 TGP 组高于 EAU 模型组；TGP 组大鼠肝脏中 IFN-γ 的 mRNA 表达显著低于 EAU 模型组，**差异有统计学意义**（***P=0.000***）;TGP 组大鼠肝脏中 IL-4mRNA 低于正常对照组（***P=0.000***），但明显高于 EAU 模型组（***P=0.000***）；TGP 组大鼠肝脏 IFN-γ 蛋白浓度高于正常对照组（***P=0.000***），低于 EAU 模型组（***P=0.01***）；TGP 组大鼠肝脏中 IL-4 蛋白表达高于 EAU 模型组，**差异有统计学意义**（***P=0.000***）。**结论：**TGP 可通过调节 EAU 大鼠 IL-4、IFN-γ 基因的表达水平，同时增加 EAU 大鼠中 NKT 细胞的表达数量，从而达到治疗葡萄膜炎的目的。

PU-201

首例辐毛小鬼伞所致角膜炎报道

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目的：报道首例辐毛小鬼伞所致人类真菌性角膜炎的临床特征和生物学特点。**方法：**患者为中年女性，于 40 天前因不慎被玉米叶划伤左眼后出现眼磨、伴视力下降，流泪、畏光，于当地医院就诊，诊断为角膜炎，予以药物治疗（具体不详），自诉症状明显好转。半月前无明显诱因下自觉眼磨、视力下降等症状明显加重，伴睁眼困难，遂再次于当地医院就诊，予以全身及局部抗感染治疗，自觉症状未见明显改善。为求进一步治疗，遂来我院就诊。入院检查，视力：右眼 0.8,；左眼 FC/20cm。眼压：右眼 19mmHg；左眼 30mmHg。左眼混合型充血，角膜中央瞳孔区可见约 5mm×5mm 灰白

色浅溃疡灶，余角膜透明度尚可。入院以后完善眼部相关影像学检查，及角膜刮片细胞学检查，同时对刮取的培养物进行体外培养。通过对 ITS 区域进行基因测序将培养出来的菌株鉴定菌种。利用液基微量稀释法对该菌进行体外药物敏感性实验。**结果**：眼部相关影像学检查结果。角膜 OCT 检查显示：左眼中央角膜溃疡深度约 100um；共焦显微镜检查显示：中量坏死物质堆积及大量菌丝结构浸润，可见菌丝中有大量厚壁孢子结构成串分布。涂片检查：10%KOH 湿片镜检可见大量完整菌丝，菌丝粗大，有隔，间生或端生大量厚壁孢子。刮取物培养后可见菌落生长，该菌在 SDA 培养基上生长较快，2～3 天即可见菌落生长。经过基因测序鉴定该菌为辐毛小鬼伞（Coprinellus radians）。体外药敏试验发现该菌对两性霉素 B、伏立康唑、泊沙康唑、伊曲康唑、氟康唑和 5-氟胞嘧啶的最低抑菌浓度分别为 0.25μg/ml、0.015μg/ml、0.25μg/ml、0.25μg/ml、16μg/ml 和>64μg/ml。**结论**：此文为辐毛小鬼伞所致人类角膜炎的首例报道。在治疗真菌性角膜炎的时候，我们应该做好鉴定工作，以指导临床用药。

PU-202

CFW 荧光染色法在眼部真菌感染诊断中的应用研究

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目的探讨 CFW(Calcofluor white)荧光染色法在眼部真菌感染的临床应用价值，评估 CFW(Calcofluor white)荧光染色法诊断真菌感染的阳性率、准确性和效率。**方法**收取临床疑似真菌性角膜炎的角膜刮片组织,同时进行 10%KOH 湿片镜检、真菌培养和 CFW 荧光染色法镜检,计算各自真菌检出阳性率,并对检测结果进行比对。**结果**在 135 例疑似为眼部真菌感染患者标本中，CFW 法镜检阳性率 77.8%，KOH 镜检阳性率 60%，真菌培养阳性率 60%。CFW 法、KOH 法镜检与真菌培养三组阳性率比较差异无统计学意义(P>0.05)，但 CFW 制片比 KOH 更加简单、快速,镜下显示的真菌更清晰易辨。**结论** CFW 荧光染色法是一种快速、简单、准确性较高的临床诊断方法，可以提高真菌性感染的阳性诊断率，降低假阴性率。

PU-203

Sub-tenon sustained controllable delivery of dexamethasone in the treatment of severe acute experimental uveitis

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Purpose: To evaluate the efficacy of dexamethasone (DXM) through sub-tenon sustained controllable drug delivery system (SSCDDS) in the treatment of severe acute experimental uveitis.
Methods: Severe acute experimental uveitis was induced by a unilateral intravitreal injection of 80ug Mycobacterium tuberculosis H37Ra antigen in preimmunized pigmented rabbits. 24 hours after uveitis induction, thirty-two rabbits were divided into two groups, the left eyes were treated either with DXM (treated group) or normal saline (control group) through SSCDDS. Clinical signs of uveitis were assessed by a masked observer who graded corneal haze, anterior chamber fibrin, vitreous opacity at days 1, 3, 5, 7, 14 after treatment. Histopathologic analyses were performed to evaluate inflammatory cell infiltration in the cornea, iris, ciliary body and retina on post-treatment days 7 and 14 by light microscopy.
Results: All signs of experimental uveitis were reduced by SSCDDS of DXM by clinical criteria, The treated group had significantly less inflammation than control group ($p<0.05$). Histopathologic

examination showed severe inflammation and marked inflammatory cell infiltration in control group, and minimal inflammation in treated group.
Conclusion: Sub-tenon sustained controllable delivery of DXM effectively suppresses severe acute inflammation in a rabbit model of uveitis. The proposed minimal invasive method might be a promising candidate for the treatment of severe acute uveitis.

PU-204

应用激光共聚焦显微镜分析 DC 细胞与炎症细胞在 HSK 内皮型中的作用

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目的：观察 DC 细胞与炎症细胞在 HSK 内皮型治疗过程中形态的变化，以指导临床治疗。
方法：收集 HSK 内皮型患者 110 例，所有患者的治疗均用了抗病毒药物联合糖皮质激素。裂隙灯和 OCT 观察角膜水肿的治疗转归，激光共聚焦显微镜（confocal）观察角膜上皮 DC 细胞与内皮炎症细胞在 HSK 内皮型治疗过程中 1-2 周，1 月、3 月、形态的变化。治疗后随访 2 年观察复发率。
结果：角膜 DC 细胞密度治疗前(148±26 cells/mm^2)与治疗后 1 月(100±14 cells/mm^2, P<0.001)相比，差异有显著统计学意义。治疗 3 月后，DC 细胞密度继续下降 44±11 cells/mm^2 (P<0.001)，细胞形态由高度活化转为低度活化。角膜内皮细胞密度(2011±173 cells/mm^2)较对侧正常眼(2472±233 cells/mm^2, P=0.002)明显下降。治疗 1-2 周后，角膜内皮面的炎症细胞明显减少，一个月左右时炎症细胞基本消失。随访两年的时间无患者复发。
结论：角膜 DC 细胞与炎症细胞在 HSK 内皮型治疗过程中数量、形态、分布都有改变，掌握这一特征对指导临床治疗很有意义。

PU-205

角膜移植术后早期应用糖皮质激素时机选择的初步研究

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目的：对真菌性角膜溃疡患者行角膜移植术后局部糖皮质激素应用的时机、用药剂量进行探讨，并分析糖皮质激素对角膜移植术后眼前段炎症、免疫排斥反应和真菌复发的影响。
方法：对 2009 年 1 月至 2014 年 4 月间在山东省眼科医院因真菌性角膜炎实施的 244 例(244 眼)角膜移植患者进行前瞻性观察研究。其中穿透性角膜移植术(PK,118 名患者)，板层角膜移植（Lk，126 名患者）。手术后 1 周开始应用局部糖皮质激素。随访 6 个月，观察应用激素前后眼部炎症变化，激素应用时机与抗炎效果的关系、真菌复发率和免疫排斥发生率。
结果：术后一周眼前段炎症加重，出现眼红、眼痛、畏光流泪，应用局部激素滴眼液后炎症 7.51 ± 1.76 天得到控制。3 眼应用激素 3-5 天出现真菌复发，其中 2 眼 PK 术后，1 眼 LK 术后，应用抗真菌药物复发得到控制。免疫排斥仅 8 例在 PK 术后患者出现，发生率 6.78%，Lk 术后患者无排斥发生。
结论：真菌性角膜炎角膜移植术后 1 周开始应用局部糖皮质激素有助于快速控制眼前段炎症，降低免疫排斥率，而且并未增加真菌复发率。

PU-206

Bilateral superinfectious keratitis after corneal collagen crosslinking for keratoconus

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A 22-year-old Chinese man presented with a 20-day history of pain and visual impairment of the bilateral eyes. He was diagnosed as bilateral keratoconus and underwent corneal collagen cross-linking (CXL) in the hospital. Two days after the corneal cross-linking, he felt pain and visual decrease of the bilateral eyes and was diagnosed as bacterial keratitis(gram positive coccus). Thus he received intensive antibiotic treatment. Eleven days after the treatment, he occurred pain and visual decrease of the bilateral eyes again. After confocal microscopy and lab examination, he was diagnosed as fungus keratitis. He received antifungal treatment, however, one eye did not show good response to the treatment. Then he received deep anterior lamellar keratoplasty (DALK). One month after these treatments, his visual acuity was OD 0.4 and OS 0.6. Two years follow up of this patient revealed that he kept satisfactory visual acuity.

PU-207

结核病相关性视神经病变

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目的：报告结核病相关性视神经病变。
方法：共纳入合并视神经病变的结核病患者 10 例，其中结核相关性视神经炎患者 4 例，乙胺丁醇中毒性视神经病变 6 例。
结果：结核相关性视神经炎和乙胺丁醇中毒性视神经病变的临床表现不同：前者可单眼或双眼发病，后者均为双眼发病。FFA：前者视盘有荧光素渗漏，后者视盘无荧光素渗漏。预后：前者视力预后较好，后者视力预后因患者而异，部分患者视力恢复良好，部分患者视力恢复差。
结论：对结核病患者合并的视神经病变，要注意区分结核相关性视神经炎和乙胺丁醇中毒性视神经病变，两者临床表现和预后不同。

PU-208

急性视网膜坏死合并病毒性脑炎

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目的：报告一例急性视网膜坏死合并病毒性脑炎患者的临床和影像学表现。
方法：病例报道
结果：患者，男，28 岁，因“左眼突然视物不见 1 天”就诊。眼科检查：视力：VOD:1.0，VOS：HM；双眼角膜透明，前房清、深，瞳孔药物性散大，眼底：视盘充血、水肿，视网膜弥漫性水肿，左眼伴小片状出血。既往有反复发作的口腔溃疡史。FFA：双眼视网膜血管弥漫性渗漏荧光素，伴小片状毛细血管无灌注区。初步诊断为白塞氏病可能，予静脉滴注甲强龙。4 天后双眼视力丧失，FFA：双眼视网膜血管弥漫性无灌注。TPPA、TORCH、肝炎、结核、HIV 均为阴性。再 2 天后出现癫痫和精神症状。颅脑 MRI 检查示双侧颞叶、岛叶和海马区 T2 高信号病灶。脑脊液压力正常，白细胞明显

升高。玻璃体穿刺抽液送检发现 HSV I 型 DNA、RNA 阳性。诊断为急性视网膜坏死合并病毒性脑炎。予阿昔洛韦和甲强龙静滴后患者癫痫和精神症状消失，但视力无改善。
结论：急性视网膜坏死合并病毒性脑炎极为罕见，视力预后极差。

PU-209
10 例人类免疫缺陷病毒(HIV)感染并发视网膜眼底病变患者的护理体会

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目的 总结了 10 例人类免疫缺陷病毒（HIV）感染并发视网膜眼底病变患者的护理。方法 护理要点：方法对 2018 年 1 月-209 年 1 月收治的 7 例人类免疫缺陷病毒（HIV）感染并发视网膜眼底病变的患者,在加强头痛、高热、眼部疾病护理基础上,还针对 HIV 感染的病症特点,从日常生活、饮食、安全、心理及不良反应等方面予以护理干预。
结果 结果 10 例患者中 2 例患者转入感染科继续治疗,9 例患者好转出院，医院内无交叉感染和医护人员职业暴露感染发生。
结论 对人类免疫缺陷病毒(HIV)感染并发视网膜眼底病变患者护理的关键是预见性的护理评估,HIV 的筛查与医务人员的全面防护。

PU-210
病毒性角膜炎的免疫机制及其对其预后的影响

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单纯疱疹性角膜炎（Herpes simplex keratitis，HSK）是临床常见的致盲性眼病，如未能得到及时有效的治疗，往往导致严重的视功能障碍甚至眼球丧失。HSK 的发病机制尚未完全清楚，其发病机制和严重程度很大程度上取决于 HSV-1 病毒株所编码的病毒基因与宿主免疫系统组成之间的相互作用。病毒复制是免疫炎症反应及血管新生的起始条件,但在病程后期 $CD4^+$ T 为主的适应性免疫应答则是介导角膜损伤的主要因素。局部炎症浸润达到临界值后造成组织结构破坏的同时释放 VEGF、MMPs 等因子启动血管、淋巴管形成，角膜血管、淋巴管生长屏障的破坏进一步破坏角膜的免疫特权。一旦角膜血管化（corneal vascularization，CV）形成，HSV-1 抗原特异性的 T 细胞通过角膜新生血管不断渗出。DC 细胞递呈病毒抗原给特异性 $CD4^+$ T 细胞，角膜基质异常活化的 $CD4^+$ T 细胞释放更多的炎症因子和趋化因子募集更多的 T 细胞，这种正反馈机制有助于免疫病理（immunopathogenesis）发生、角膜基质破坏和角膜新生血管。本报告从病毒性角膜炎的基础研究和应用基础研究的相关研究出发，综述病毒感染后 T 细胞等免疫细胞的激活情况，分析在感染过程中 $CD4^+$ T 细胞的迁移和运动，探索 $CD4^+$ T 细胞等异常活化和异常迁移对病毒性角膜炎预后的影响；进一步分析病毒性角膜炎时角膜缘血管稳态的失衡的影响因素和防控和病毒性角膜炎预后的关系。报告结合本眼科中心对病毒性角膜炎的应用基础研究，即相关调控因子对异常迁移活化的 $CD4^+$ T 细胞的作用，进一步探索病毒性角膜炎治疗新的可能治疗靶点。希望通过病毒性角膜炎免疫损伤机制的分析和总结，能让我们更好的理解病毒性角膜炎的免疫病理机制，期望能给临床探索病毒性角膜炎的防治策略带来启发。

PU-211

玻璃体腔注射抗血管内皮生长因子药物治疗葡萄膜炎继发黄斑水肿有效性及安全性的临床研究

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目的：探讨玻璃体腔注射抗血管内皮生长因子药物康柏西普(IVC)治疗葡萄膜炎继发黄斑水肿(UME)的有效性及安全性。
方法：临床检查确诊的 UME 患者 56 例 56 只眼纳入研究。所有患者均行眼科常规检查，主要评价指标包括：最佳矫正视力(BCVA)和黄斑中心凹视网膜厚度(CMT)。所有患者均为首次治疗，并且均行 IVC 0.05 ml。第 1 次为初始治疗，然后每个月复查，根据 BCVA 及 CMT 的变化按需进行同样剂量重复治疗。56 只眼共注射 82 次，平均注射次数为(1.46±1.71)次。治疗后 1 周及 1、3、6 个月重复行视力和 OCT 检查，对比治疗前后 BCVA、CMT 变化以及治疗后药物和治疗方式相关的心脑血管意外及全身不良反应和眼部并发症发生情况。采用直线相关分析法分析治疗后 6 个月 BCVA 与治疗前 BCVA、CMT 的相关性以及治疗前后各时间点 BCVA、CMT 的相关性。
结果：治疗后 1 周及 1、3、6 个月,患眼平均 logMAR BCVA 与治疗前平均 logMAR BCVA 比较，治疗后 1 周患眼平均 logMAR BCVA 无明显变化,差异无统计学意义(P>0.05)；治疗后 1、3、6 个月患眼平均 logMAR BCVA 显著提高，差异均有统计学意义(P<0.05)。治疗后 1 周及 1、3、6 个月，患眼平均 CMT 与治疗前平均 CMT 比较，治疗后各随访时间点患眼平均 CMT 均明显降低，差异有统计学意义(P<0.05)。相关性分析结果显示，患眼治疗后 6 个月 BCVA 与治疗前 BCVA 呈正相关(P<0.05)；与治疗前 CMT 无相关性(P>0.05)。患眼治疗前及治疗后 3、6 个月 BCVA 与 CMT 呈负相关(P<0.05)。随访期间未发现全身及眼部不良反应。
结论：玻璃体腔注射康柏西普治疗 UME 有效，并且相对较为安全，但仍需高质量的多中心、大样本、长期随访的随机对照试验进一步研究证实。

PU-212

老年甲状腺相关性眼病的临床分析和疗效观察

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目的 通过分析老年 TAO 患者的临床特点、影响病变严重程度的因素和不同免疫抑制治疗的疗效对比，为老年 TAO 的规范诊疗提供依据。**方法** 回顾性研究 106 例老年 TAO 患者临床资料，对其临床、影像学特征及甲功进行分析。CAS 评分评估 TAO 活动性，NOSPECS 分级评估 TAO 严重度，Spearman 法检验有关因素与 TAO 活动性和严重度的相关性；多项 Logistic 回归分析眼球突出和眼外肌受累的影响因素。将 90 例中重度患者依据治疗方法分为 3 组：静脉甲强龙冲击治疗组 39 例、球周注射曲安奈德+口服环孢素联合治疗组 35 例和球周注射曲安奈德组 16 例，比较各组疗效。**结果** 老年 TAO 患者双眼发病 95.28%，男：女=1.36：1，年龄 65.24±4.90y，病程 10.32±13.28m。主诉以眼睑肿胀和复视多见，眼球运动受限和眼球突出是最常见体征。眼眶 CT 示患者眼外肌受累 86.79%，受累频率下直肌 28.13%、内直肌 26.15%、上直肌 24.84%、外直肌 20.89%。患者伴发甲亢 74.53%，甲亢者突眼度、CAS 评分和 NOSPECS 分级均显著高于甲功正常者（*P*<0.05）。吸烟与 CAS 评分呈正相关（*P*<0.05），年龄与 NOSPECS 分级呈正相关（*P*<0.05）；甲亢、吸烟和病程是影响眼球突出的危险因素（*P*<0.05），甲亢是影响眼外肌受累的危险因素（*P*<0.05）。90 例患者治疗前后 CAS 评分均显著降低(*P*<0.05)，冲击治疗组与联合治疗组总有效率无差异(P<0.05)，且均显著高于球周注射组（*P*<0.05）。**结论** 老年 TAO 患者以双眼发病为主，最常见症状是眼球运动受限和眼球突出。甲亢、吸烟、年龄和病程是影响患者病变严重程度的危险因素。静脉激素冲击

治疗和局部激素+口服环孢素联合治疗是中重度患者的有效治疗方法，局部激素+口服环孢素联合治疗值得在老年 TAO 患者治疗中推广应用。

PU-213
SDF-1 信号通路在抗小鼠角膜移植免疫排斥反应中的作用机制

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目的：探讨 SDF-1 信号通路在小鼠角膜移植免疫排斥反应中的作用。
方法：建立小鼠角膜移植动物模型，小鼠角膜移植模型分为 3 组：（1）同系小鼠移植组，供体和受体均为 BALB/c 小鼠。（2）异系小鼠移植组，使用之前的方法利用 C57/BL 小鼠为供体，BALB/c 小鼠为受体建立小鼠角膜移植急性排斥动物模型。（3）异系小鼠移植组加用雷帕霉素滴眼液治疗组，建立小鼠角膜移植急性排斥动物模型后加入雷帕霉素滴眼液进行抗排斥治疗。
结果：观察期内，未发现同系小鼠移植组发生角膜排斥反应，异系小鼠移植组在术后 2 周开始发生角膜移植排斥反应，观察期内均发生排斥反应。异系小鼠移植组加用雷帕霉素滴眼液治疗组仅在 30 天时少量小鼠发生免疫排斥，观察期间 80%以上未发生排斥反应。通过免疫印迹检测方法，检测 SDF-1 和 CXCR4 在同系小鼠移植组、异系小鼠移植组和异系小鼠移植组加用雷帕霉素滴眼液治疗组的表达，发现异系小鼠移植组的 SDF-1 和 CXCR4 较同系小鼠移植组和异系小鼠移植组加用雷帕霉素滴眼液治疗组明显升高。
结论：证明在角膜移植排斥反应的发生可能与 SDF-1 和 CXCR4 的高表达存在正相关。

PU-214
活体共聚焦显微镜诊断角膜后部真菌感染的回顾性分析

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目的 探讨角膜共聚焦显微镜在诊断角膜后部真菌感染的价值。 **方法** 回顾性系列病例研究。收集 2009 年 11 月至 2017 年 12 月在山东省眼科研究所进行角膜共聚焦显微镜检查确诊为真菌性角膜炎患者 1369 例，选取其中根据角膜共聚焦图像表现诊断为角膜后部真菌感染的患者 18 例。其中男性 11 例，女性 7 例，年龄 23~73 岁，平均 53.5 岁。**结果** 角膜前部真菌感染和角膜后部真菌感染均通过角膜共聚焦显微镜检查获得明确诊断，为临床提供明确治疗依据。后部真菌感染患者通常角膜上皮完整，浅基质无明显病灶，即基质浅层未查见真菌菌丝，仅基质深层或角膜内皮面可见典型真菌菌丝。少数后部真菌感染病例的共聚焦显微镜检查图片中最终仅查见单根菌丝。 **结论** 活体共聚焦显微镜在真菌性角膜炎的诊断具有无创、快速、可重复进行等独到优势，但对于角膜后部真菌感染需要仔细识别，关键在于提高检查医师对真菌性角膜炎的理论和实践认识，提高共聚焦显微镜诊断真菌性角膜炎的能力，避免漏诊和误诊。

PU-215
一例 AIDS 合并巨细胞病毒性霜样树枝状视网膜血管炎患者的护理

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前言 巨细胞病毒性视网膜炎（CMVR）是 AIDS 患者最常见、最严重的的眼部并发症，会导致不同程度的视力下降，重者可致双眼失明，严重影响患者的生活质量。霜样树枝状视网膜血管炎是一种特殊类型的视网膜血管炎，多为双眼发病，少见单眼发病，以广泛的视网膜血管旁渗出为特征，多继发于获得性免疫缺陷巨细胞病毒视网膜炎。AIDS 合并 CMVR 患者出现霜枝状视网膜血管炎属于非特发性，这类患者要同时面对失去光明和生命的危险，无论生理上还是心理上都较其他眼病患者更复杂，护理难度更大。
目的 探讨 AIDS 合并巨细胞病毒性霜样树枝状视网膜血管炎患者临床护理方法，加强对这类特殊患者的护理，提高病人的生活质量，减少并发症的发生。
资料和方法 对我科一例 AIDS 合并巨细胞病毒性霜样树枝状视网膜炎住院患者行全身抗病毒抗炎治疗；左眼予玻璃体腔注入 2000ug/ml 更昔洛韦注射液 0.2ml，每 5 天 1 次，连续注射 6 次；全身治疗 1 个月后行 HAART；3.HAART1 个月后双眼 CMVR，左眼复发（图 3-5），继续全身抗病毒抗炎治疗，左眼玻璃体腔注入 4000ug/ml 更昔洛韦注射液 0.2ml，1 周 1 次，连续注射 4 次。护理要点：1.加强病情观察，及时发现 2.重视心理护理，了解心理动态，给患者正能量指导，加强沟通，注意保密。3.监控用药，观察药物反应。4.眼部护理：玻璃体穿刺术围手术期护理与个性化指导。5.严格职业防护。6.定期门诊复查，对比治疗 1 个月后患者的眼科检查：视力、眼底、OCT 等，随访半年。
结果 1.患者再次住院治疗随访半年后病情稳定（图 6），患者右眼视力 1.0，左眼视力光感，光定位不准。右眼黄白色浸润及出血完成吸收，黄斑 OCT 检查表现基本同前。2.患者及家属对治疗效果及护理工作满意。

PU-216

补体调控通路与葡萄膜炎的分子机制研究

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目的：葡萄膜炎（Uveitis）是一类常见的炎症致盲性眼病，发病机制复杂，补体系统的免疫调控被证实参与其中。我们的前期研究已初步完成补体基因与葡萄膜炎遗传谱系的绘制,首次发现并提出补体旁路因子 CFH、CFB 与葡萄膜炎发病相关，二者间存在累加效应。本研究将着眼下游补体通路，建立完整遗传谱系，探索补体通路在眼部炎症中的参与程度及可能的分子机制。
方法：基因学研究纳入近 300 例葡萄膜炎亚型及 293 个健康对照人群。采用 Targeted Gene Panel 分型技术，研究涉及下游重要补体调控因子 31 个 tagging-SNP 位点。细胞研究采用 CVF 诱导补体旁路的特异性高表达，观察 HLEs 在补体旁路触发后的微环境中发生的炎症路径的激活反应。
结果：补体下游基因 C5 与葡萄膜炎显著相关（P=0.0.35，OR=0.78），性别敏感性参与其中（P=0.004，OR=0.1.67Male），补体因子间存在累加效应，与疾病复发频次及前房炎症反应相关的表型标记物亦被发现(P=0.035;P=0.042)。AU 亚组中 HLA-B27 免疫分型显现出与补体基因的交互关系（P=0.041，OR=0.88）。补体基因 C1INH、C3 与葡萄膜炎及其亚型均未显现出明显的相关性。细胞研究显示 CVF 与健康人血清作用后所形成膜攻击复合物（MAC），可沉积于 HLEs 并可激活 NF-κB 通路，引起下游因子 ICAM-1、明胶酶表达的增加。
结论：我们的结果首次揭示补体系统及其分子因素在葡萄膜炎进程中起着至关重要的作用。补体旁路的特异性激活及其调节失衡诱发炎症反应，可能参与眼部炎症性疾病的发生与发展。

PU-217

血清补体 C3、C4 水平与糖尿病视网膜病变的相关性研究及其临床意义

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目的：我们之前的研究成功构建了补体调控体系与糖尿病视网膜病变（Diabetic Retinopathy，DR）的分子关联，本观察旨在观察 DR 患者血清补体水平的变化，并探讨其与 DR 发病机制的相关性及影响预后的因素。
方法：研究共纳入 532 例参与者，包括 144 例增殖性型 DR 患者（PDR）、135 例非增殖型 DR 患者（NPDR）及 253 例健康对照人群。免疫散射比浊法测血清补体 C3、C4、C 反应蛋白（CRP）表达水平，采集多项临床指标进行相关性分析，如年龄、性别、体重指数（BMI）、糖化血红蛋白、糖尿病病程、血压、血脂等。
结果：DR 患者补体 C3 和 C4 水平显著低于正常对照者(P<0.001)。在不同临床分期组别间，NPDR 及 PDR 组血清补体 C3 与如下指标呈明显正相关：BMI（r=0.452, p<0.01; r=0.452, p<0.01），舒张压（r=0.202, p=0.021; r=0.225, p<0.01），ALT（r=0.381, p<0.01; r=0.412, p<0.01），CRP（r=0.272, p=0.01; r=0.352, p<0.01），与 HDL 及糖尿病病程呈明显负相关，补体 C4 表达水平未发现明显相关性。
结论：DR 患者存在补体因子的差异性低表达，证明炎症调节因素参与其中，同时，相关性研究结果提示补体因子表达受脂质代谢，肝功能损伤、糖尿病病程等多因素影响。

PU-218

细菌感染微环境响应性药物传递体系构建及在眼内炎治疗中的应用

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细菌感染是影响人类健康的重要原因，细菌性眼内炎眼内致盲率最高的疾病之一。当患者怀疑或诊断为眼内炎时，必须根据实际的细菌感染种类选择抗菌药物，但是存在的问题是，感染的临床特征和培养结果往往没有足够的相关性来指导抗生素的选择，一般病原菌检测需要一到两天的时间进行确诊，这就大大延误了治疗的时机。本研究在常温下合成了一种 pH 响应性金属有机骨架化合物(MOFS)，通过合成的过程中添加聚丙烯酸钠盐(PAAS)增加其载药量和 pH 响应性，通过负载一种光敏剂甲苯胺蓝(TB)，使其具有 650nm 光响应在 650 nm 发挥光动力杀菌性能。光动力杀菌具有广谱抗菌的特性，因此可以有效降低细菌耐药性的发展，进一步通过靶向分子修饰，提高材料的精准杀菌能力，以此降低对正常组织的毒副作用。在表面原位修饰纳米银，使其具有双重抑菌[抑菌是控制细菌不生长的作用，表面通过修饰万古霉素（Van）靶向细菌。在防止耐药菌的情况下并且有更好的杀灭耐药菌的性能，并在表面修饰 mPEG-NH2 以防止纳米颗粒被免疫细胞吞噬。在保证其生物相容性良好的情况下，基于细菌感染微环境的变化，实现智能响应性药物释放，使其能够在未感染的情况下预防杀菌，在已经感染的情况下，延缓眼内炎发展的进程，为后续针对性治疗赢得宝贵的时间。

PU-219

LKP 和 PKP 治疗棘阿米巴性角膜炎的临床疗效观察

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目的：观察 LKP 和 PKP 治疗棘阿米巴性角膜炎的临床疗效。**方法**：收集青岛眼科医院确诊棘阿米巴性角膜炎患者 19 例，均行角膜移植术治疗，随访时间＞6 月。对于浸润深达后弹力层或累及内皮层的患者，选择行 PKP（9 例）；对于基质浸润未达后弹力层、未经激素治疗的患者行 LKP（10 例）。观察两组患者术后复发率、植片透明率、植片排斥率、术后视力等。**结果**：19 例患者（19 眼）中男 12 例（63.2%），女 7 例（36.8%）；平均随访时间为 23.1±16.0 月（9-54 个月）。PKP 组所有患者（9 例）均治愈；LKP 组 1 例复发（术前曾静脉滴注地塞米松），复发率 10%；末次随访 PKP 组 7 例（77.8%）患者植片透明，LKP 组 8 例（80.0%）患者植片透明；PKP 组 6 例（66.7%）术后发生角膜植片免疫排斥，LKP 组无一排斥；PKP 组中 6 例（66.7%）术后发生其他并发症，如并发性白内障，持续性角膜植片上皮缺损，角膜植片溃疡，外伤性角膜植片哆开等；LKP 组中只有 1 例（10%）术后植片缝线松动。末次随访时 PKP 组只有 2 例（28.6%）术后最佳矫正视力≥0.5，而 LKP 组有 8 例（88.9%）术后视力≥0.5。
结论：角膜移植术是治疗棘阿米巴性角膜炎的有效方法。对于重症棘阿米巴性角膜炎，PKP 可立即缓解疼痛、保存眼球，但术后并发症较多，术后视力较差。选择 LKP 术应严格掌握适应征，可获得较好的视力，术后并发症少。

PU-220

MMP-9 抑制剂阻断 RPE 表面 CD73 脱落而减轻 EAU

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目的 视网膜色素上皮细胞（RPE）在生理状态下高表达 CD73，转化 AMP 为具有免疫抑制功能的腺苷。当实验性自身免疫色素膜炎（EAU）发病时基质金属蛋白酶 9（MMP-9）由酶解的方式急剧降低 RPE 表面 CD73 的含量；使腺苷产生减少，免疫抑制作用减弱，促进眼底炎症的发生。本文旨在研究体内应用 MMP-9 抑制剂，可否阻断 CD73 脱落而防止 EAU。
方法 体外原代培养野生型及 $CD73^{-/-}$小鼠 RPE 细胞。以 LPS (50 ng/ml)及 TNF-α(2000 ng/ml)联合干预，同时给予或不予 MMP-9 抑制剂 CTK8G1150 (5.0 μmol/L)。Western blotting 及流式细胞术验证 CTK8G1150 可阻断 LPS/TNF-α 所诱发的 CD73 脱落。[3H]-TdR 掺入法检测不同组别 RPE 在有、无 AMP 加入时，对 CD4 细胞的增殖促进作用。过继免疫方式诱发 EAU，供体细胞取自 $IRBP_{1-20}$ 免疫后的野生型 B6 小鼠；野生型及 $CD73^{-/-}$小鼠分别作为受体小鼠。受体小鼠在过继免疫后第 4，7，10 天视网膜下腔注射 CTK8G1150（n=4）或溶媒（n=4）。眼底镜检测对 EAU 病情进行评分。
结果 LPS/TNF-α 干预可诱发 CD73 自 RPE 细胞表面脱落，此过程可被 CTK8G1150 所阻断。以 RPE 作为抗原递呈细胞来激活 CD4 细胞时，若有 AMP 加入，则 CTK8G1150 干预后的野生型 RPE 对 CD4 细胞的增殖刺激作用显著减弱。CTK8G1150 干预却不影响 $CD73^{-/-}$ RPE 对 CD4 细胞的增殖刺激作用。体内给予 CTK8G1150 可阻断 EAU 发病时 RPE 细胞表面 CD73 含量的降低，减轻野生型 B6 受体小鼠 EAU 病情；对 $CD73^{-/-}$受体小鼠则无显著作用。
结论 无论体外还是体内给予 MMP-9 抑制剂均可阻断 RPE 细胞表面 CD73 的脱落，减弱 RPE 对 CD4 细胞的增殖刺激作用，减轻 EAU 病情。

PU-221

角膜病眼痛患者脑活动的静息态功能性磁共振研究

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目的：利用静息态功能性磁共振成像(functional magnetic resonance imaging，fMRI)中的局部一致性（ReHo）技术探究角膜病眼痛患者的大脑功能活动变化。
方法：选择 25 名角膜病眼痛患者（15 名男性和 10 名女性）和在年龄、性别和教育方面相匹配的 30 名健康对照组（15 名男性和 10 名女性），对所有入选者进行静息态功能性核磁共振成像 ReHo 扫描，比较角膜病眼痛组与健康对照组大脑功能活动的 ReHo 值差异。
结果：1、与健康对照组相比，角膜病眼痛患者左中央前回/中央后回 ReHo 信号值明显降低，右中央前回/中央后回和左额中回 ReHo 信号值降低。
2、与健康对照组相比，角膜病眼痛患者左楔前叶（BA7）、左额上回（BA11）、右顶下小叶 ReHo 信号值显著升高。
结论：角膜病眼痛患者伴随双侧中央前回/中央后回、左额中回、左楔前叶、左额中回、右顶下小叶等脑区的神经元活动异常，这些脑区异常可能反映角膜病眼痛患者在躯体感觉、运动、认知及精神等方面可能存在功能紊乱。

PU-222

眼型玫瑰痤疮一例

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患者，男性，51 岁，双眼睑红肿伴异物感 1 周。视力：右眼 1.0，左眼 1.0，眼压：右眼 13mmHg，左眼 12mmHg。泪膜破裂时间：右眼 9 秒，左眼 10 秒。双眼睑缘充血肥厚，睑缘无内外翻，双眼睑散在针尖大小丘疹、脓疱，分泌物增多，且上睑少量脱屑。裂隙灯检查：双眼睑缘毛细血管扩张，结膜充血（右眼为重），右眼下方角膜基质铲形炎性浸润，左眼角膜透明。双眼共焦激光显微镜检查双眼睫毛毛囊内见虫体信号。双侧面颊、鼻部、上唇可见大面积水肿性红斑，界限清楚，其上可见散在粟粒至绿豆大丘疹、脓疱、油腻性鳞屑，面部毛囊蠕形螨阳性。诊断：眼型合并丘疹脓疱型玫瑰痤疮。治疗：多西环素 0.1g 日两次口服抗感染、复方甘草酸苷胶囊 40mg 日三次口服类激素抗炎、双氯芬酸钠滴眼液、加替沙星眼用凝胶日 4 次滴眼，0.75%甲硝唑凝胶面部皮损处外用，14 天后明显好转。

PU-223

甲基强的松龙联合曲安奈德治疗甲状腺相关性眼病患者的效果及对眼表疾病评分、临床活动度评分的影响

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目的 探究甲基强的松龙联合曲安奈德治疗甲状腺相关性眼病（Thyroid associated ophthalmopathy，TAO）患者的效果及对眼表疾病评分(Ocular surface disease index,OSDI)、临床活动度评分(Clinical actibity score, CAS)评分的影响。**方法** 选择 2017 年 10 月至 2018 年 9 月 TAO 患者 60 例，按照随机数表法分为两组：观察组、对照组。对照组患者使用甲基强的松龙治疗，观察组在对照组基础上使用曲安奈德治疗。通过统计学分析比较两组治疗后临床疗效和不良反应。检测并比较两组患者治疗前后的眼球突出度、眼裂宽度以及 CAS 评分和 OSDI 评分。 **结果** 观察组的临床疗效优于对照组（P<0.05）。治疗前两组眼球突出度和眼裂宽度无显著差异（P>0.05），治疗后均得到显著改善（P<0.05），治疗后观察组眼球突出度和眼裂宽度显著低于对照组（P<0.05）。治疗前两组 CAS 评分和 OSDI 评分无显著差异（P>0.05），治疗后均显著降低（P<0.05），治疗后观察组 CAS 评分和 OSDI 评分显著低于对照组（P<0.05）。两组不良反应总发生率无显著差异（P>0.05）。**结论** 对 TAO 患者使用甲基强的松龙联合曲安奈德具有更好的临床疗效，联合使用可以显著的降低炎症反应并改善 CAS 评分和 OSDI 评分具有更好的预后。

PU-224

Apremilast 在自身免疫性葡萄膜炎中的应用及机制研究

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背景与意义

自身免疫性葡萄膜疾病属全球致盲性眼病之一，目前临床尚无使用便捷、疗效显著持久和副作用小的治疗方法。寻找新的有效且低副作用的治疗药物已成为眼科学及免疫学界的共同问题。

Apremilast 是一种新型 PDE4 抑制剂，2014 年已被 FDA 批准用于银屑病性关节炎的治疗。广泛认为银屑病性关节炎是由于机体免疫状态失衡、淋巴细胞浸润、释放炎症因子所引起，与葡萄膜炎发病机制类似。本研究旨在探究 Apremilast 对实验室自身免疫性葡萄膜炎模型（EAU）的治疗效果，寻找治疗新手段。

研究方法首先对若干健康清洁的 C57 小鼠建立 EAU，造模第 14 天发病后将模型小鼠随机分为三组（空白组、溶剂组和 apremilast 治疗组）。相同条件下饲养 28 天后，利用视网膜成像系统和眼球 HE 染色进行临床评分和病理评分，观察并比较小鼠视网膜血管渗漏、视盘水肿等变化和视网膜各层结构变化以及炎症细胞浸润情况差异。取小鼠视网膜细胞和外周淋巴细胞，提取 RNA，行 qPCR 检测基因水平炎症因子 IL-17、IL-6、IL-10、TNF-α、IFN-γ 等表达变化情况；取小鼠引流淋巴结、肠系膜淋巴结及脾脏，分离提取淋巴细胞，行流式细胞分析检测细胞水平炎症因子 Foxp3、IL-17、TNF-α、IFN-γ 表达变化情况；收集外周血，提取血清，检测血清中炎症因子 IL-17、TNF-α、IFN-γ 的变化。

结果治疗组小鼠的临床评分及病理评分均低于空白组及溶剂组。qPCR 结果显示治疗组小鼠外周淋巴细胞及血清中炎症因子 IL-17、IL-1、IL-6、IL-10、TNF-α、IFN-γ 明显低于空白组和溶剂组小鼠。流式细胞检测结果显示治疗组 Th1 和 Th17 等外周淋巴细胞相对数量降低。差异均具有统计学意义。

结论 Apremilast 能降低炎症因子水平，延缓 EAU 病情发展。或将成为治疗自身免疫性葡萄膜炎的新的手段。

PU-225

只缘身在此山中

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郭某，主诉双眼干眼痛三年，伴视力下降 15 天。既往史：2012 年因再生障碍性贫血行造血干细胞移植，此后双眼视力逐年下降，近三年双眼干涩疼痛逐渐加重，此外患者皮肤十分干燥，是典型的慢性移植物抗宿主病表现。
查体：视力：右眼指数 1 米，左眼裸眼 0.1，眼压正常，双眼 schimer 实验为 0。右眼瞳孔区 C 型斑翳伴新生血管长入，左眼角膜透明而上皮粗糙。荧光素钠染色见双眼均呈现重度干眼导致的角膜上皮糜烂。
初步诊断为双眼重度干眼，右眼角膜斑翳，慢性移植物抗宿主病（cGVHD）；予绷带镜，人工泪液缓解干眼，低浓度的激素缓解炎症反应。
两天后患者诉双眼剧烈疼痛伴视力下降，双眼出现化脓环形浸润灶。“化脓性”排除病毒和自身免疫病，共聚焦显微镜未见真菌的菌丝或阿米巴滋养体，结合病情进展较快，初步考虑为细菌性角膜炎，摘绷带镜，停激素，并进行抗感染治疗。四天后，左眼中央瞳孔区出现溃疡。分析原因：1.感染性角膜炎由浸润期进展为溃疡期。2.存在其他的微生物感染；3.炎症反应太重持续性角膜上皮缺损导致角膜溃疡。4.抗感染治疗的药物毒性作用。复查共聚焦，仍未见任何病原体，次日见感染灶明显好转，而溃疡灶大小不变。
此时感染得到控制，主要矛盾已经由感染转变为炎症反应。于是当即调整治疗方案，双眼绷带镜，抗生素只用加替 4/日，加低浓度的激素。一周后患者双眼感染灶消失，角膜溃疡愈合、上皮修复，未见新增角膜瘢痕。双眼裸眼视力恢复至右眼 0.2，左眼 0.3。
总结与思考：
一、重度干眼伴角膜上皮糜烂，佩戴角膜绷带镜前需加用抗生素滴眼液；
二、可疑感染性角膜炎需行分泌物微生物培养及药敏实验，同时共聚焦显微镜检查排除真菌及阿米巴感染；
三、对于治疗细菌性的感染性角膜炎中激素的使用，需要我们在多读文献的同时，在临床的一个又一个病例中不断地去积累，加深对各个阶段主要矛盾的理解，争取在以后的每个病例中做到掌握出激素的使用与否及最佳用药时机。

PU-226

角膜炎的诊断及治疗

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各类角膜炎，诊断不及时及治疗效果不敏感，严重引起视力不可逆下降，甚至角膜穿孔、溶解，如何尽早诊断及有效的对症治疗至关重要
我院角膜炎患者，尽早给予真菌培养，细菌培养，真菌核酸荧光染色，药敏培养，结合病情病史及临床经验，尽早给予经验性治疗及临床针对性治疗，治疗后根据培养结果，评价治疗效果及药物敏感度
细菌性角膜炎比较好诊断，治疗效果也较好。真菌性及病毒性角膜炎鉴别诊断较难，治疗效果不佳，病情易反复，尽早诊断及对症治疗，提高了治疗效果，也可避免了角膜药物治疗毒性
真菌抗酸荧光染色加速了真菌培养的结果时间，可以及早诊断及治疗

PU-227

血小板及巨噬细胞对眼科常见丝状真菌的体外作用

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背景 真菌性角膜炎发病率高、预后差，主要病原菌是镰刀菌属和曲霉菌属为首的丝状真菌。前期实验观察到小鼠真菌性角膜炎模型病灶区有大量血小板与巨噬细胞聚集，但两者对丝状真菌的作用尚待进一步研究。
目的 研究血小板及巨噬细胞对眼科常见丝状真菌中的体外作用。
方法 将小鼠巨噬细胞（M）、真菌孢子（S）与小鼠血小板（PL）体外共培养，实验分为 S+M+PL 组、S+M 组、S 组与 M 组，按照相应浓度铺板后，放置于转盘共聚焦显微镜上并于相应时间点在各组随机选取视野拍照，计算 1h、2h、3h、4h 时 S+M+PL 组与 S+M 组巨噬细胞的吞噬率与吞噬指数及 S+M+PL 组、S+M 组与 S 组的真菌孢子出芽率，计算 4h、6h、8h 时 S+M+PL 组、S+M 组与 S 组的菌丝伸长度，并应用细胞功能分析仪实时测定 S+M+PL 组、S+M 组与 M 组的细胞毒性。
结果 S+M+PL 组巨噬细胞吞噬率和吞噬指数明显高于 S+M 组，于各时间点均有统计学差异（$P < 0.05$）。S 组的孢子出芽率在各时间点均最高，S+M 组次之，S+M+PL 组最低，各组间比较差异均有统计学意义（$P < 0.05$）。S 组菌丝伸长度在各时间点时均最高，S+M+PL 组于 6h、8h 时最低，除 4h 时 S+M+PL 组与 S+M 组相比无显著差异外，其余各组间比较差异均有统计学意义（$P < 0.05$）。M 组细胞毒性均低于 S+M 组和 S+M+PL 组，于 30h-48h 时 S+M 组与 M 组相比差异均有统计学意义（$P < 0.01$），S+M+PL 组与 S+M 组相比差异虽无统计学意义，但 30h-48h 时 S+M+PL 组细胞毒性均低于 S+M 组。
结论 在真菌感染过程中巨噬细胞可抑制真菌生长，血小板增强了巨噬细胞对真菌的吞噬和抑制作用，且血小板有拮抗真菌细胞毒性作用的趋势。

PU-228
配戴角膜接触镜不当引发角膜溃疡 2 例

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目的：提醒不恰当的配戴角膜接触镜存在不安全性，甚至会产生严重并发症。
方法：报道 2 例配戴过期角膜接触镜及长期过夜配戴角膜接触镜引发感染性角膜溃疡的诱因、症状、治疗及预后。
结果：2 例患者不恰当的配戴角膜接触镜导致结膜充血、角膜缘充血及新生血管形成、角膜上皮损害及基质水肿甚至出现感染性角膜炎。
结论：角膜接触镜要到正规的专业机构进行检查和验配，购买经过国家食品药品监督管理局注册的合格产品，使用有效期内的镜片，接受规范的配戴和护理指导，定期复查，从而确保角膜接触镜的安全使用。 角膜接触镜已广泛的应用于眼科各个领域，包括屈光不正、无晶体眼、圆锥角膜及角膜外伤、弱视、色盲、人工瞳孔等 。其中屈光不正已成为我国一大社会问题，而角膜接触镜因为具有增视、美观、方便及视物不变形等优点被人们广泛用于矫正近视、远视、散光。但由于患者缺乏良好的依从性、不良的配适、不良的个人卫生习惯及镜片本身吸附的沉积物等原因导致一些并发症的出现。

PU-229
载左氧氟沙星脱细胞角膜基质透镜的制备，药物缓释及抗菌性能的研究

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目的：探讨脱细胞角膜基质透镜载药能力、体外药物释放的特点及体外抑菌效果，评估脱细胞角膜基质透镜作为药物缓释载体的可行性。
方法：采用生物脱细胞方法，制作脱细胞角膜基质透镜；将脱细胞基质透镜浸泡 0.5%，3%两种浓度左氧氟沙星，浸泡时间 3h（常温）；将厚（直径 6.5mm,厚度 125um），薄（直径 6.5mm,厚度 125um）两种脱细胞角膜基质透镜放置于浓度为 30mg/ml 左氧氟沙星溶液中浸泡 3h（常温）；取出载药脱细胞角膜基质透镜片后分别放置于 PBS 溶液中，在 37±0.4℃的恒温箱中缓释 21 天；采用高效液相色谱分析法对 1d,7d,114d,21d 不同时间点进行药物浓度检测；采用琼脂糖培养基对 0.5%，3%，5%三种载左氧氟沙星角膜基质透镜进行体外抑菌实验，试验菌为金黄色敏感金葡菌，比较体外抑菌环的直径评估体外抑菌效果。
结果：左氧氟沙星体外药物释放及体外抑菌实验表明，载药脱细胞角膜基质透镜在体外药物释放时间可达 21 天。0.5%载药脱细胞角膜基质透镜与 3%载药透镜相比，3%较 0.5%的载左氧氟沙星角膜基质透镜载药量有显著性差异（***P***<0.05）。厚脱细胞角膜基质透镜与薄脱细胞角膜基质透镜相比，负载左氧氟沙星的释放量有显著性差异（***P***<0.05）。0.5%，3%，5%三种载药角膜基质透镜体外抑菌均有效果，0.5%与 3%，5%相比，平均体外抑菌环直径差异具有统计学意义（***P***<0.05）。
结论：脱细胞人角膜基质透镜片具有载药能力，能于体外能缓慢释放药物，可进一步考虑作为一种安全、有效的药物缓释载体用于治疗感染性角膜溃疡等疾病。

PU-230

双眼睑缘炎相关角结膜病变(BKC)致角膜穿孔一例

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目的: 报道一例双眼睑缘炎相关角结膜病变（ Blepharokeratoconjunctivitis，BKC)致右眼角膜穿孔患者诊治经过，探讨 BKC 鉴别诊断及治疗。
方法: 患者女，20 岁，因右眼反复眼红眼痛伴视力下降 12 年就诊，既往诊断为病毒性角膜炎，曾予以抗病毒治疗，病情反复。视力：VOD 0.05，VOS 0.1；NCT：OD 4.6mmHg，OS 10mmHg；双眼睑缘不平，充血，睑板腺开口阻塞，角膜上皮弥漫点染，角膜缘可见新生血管长入角膜中央区；右眼瞳孔缘 6 点位角膜穿孔，溪流征（+），虹膜嵌顿，角膜基质混浊。查睑缘螨虫（-）。行“右眼深板层角膜移植术”，术后右眼行角膜移植术后常规治疗，双眼予以睑缘清洁、卫生湿巾擦洗睑缘、强脉冲激光治疗、典必殊眼膏、氟米龙眼液等对症治疗。
结果: 术后第 1 天：VOD HM/30cm，VOS 0.1；术后 2 月：VOD:0.02，VOS 1.0，眼压正常，双眼睑缘情况可，角膜中央透明，周边新生血管好转。病情目前未复发，仍在清洁睑缘与随访中。
结论: BKC 误诊率高达 50％以上。临床最易与单纯疱疹病毒性角膜炎混淆，两者的主要鉴别要点为：1）BKC 通常双眼发病，而病毒性角膜炎通常单眼发病；2）BKC 常有睑缘炎，其角膜新生血管多发生在周边部，病毒性角膜炎角膜溃疡多发生角膜中央，角膜新生血管出现晚，抗病毒治疗有效。BKC 疗程长，常通过物理治疗联合药物治疗。

PU-231

Laquinimod 在过敏性结膜炎中的应用及机制研究

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目的：过敏性结膜炎(AC)是眼科临床上常见的眼部疾患之一，Ⅰ型超敏反应在 AC 病理过程中发挥重要作用，多种炎性细胞被激活并迁移到眼表，释放 IL-4、IL-13、TNF-α、IL-17 等炎性因子。Laquinimod 是一种经Ⅲ期临床试验证明口服有效的新型免疫调节剂，用于减缓多发性硬化患者的疾病进展并减少复发率。laquinimod 依赖于芳基烃受体通路发挥效应，抑制巨噬细胞及树突状细胞活化和转运，抑制 Th1/17 极化，促进 Treg 分化。本实验探究 laquinimod 对实验性过敏性结膜炎(EAC)的作用及机制，为过敏性结膜炎寻求新的治疗手段。

方法：小鼠随机分为三组（溶剂组、模型组以及治疗组），经卵清蛋白抗原致敏建立 EAC 模型。实验第 10~14 天，于激发前 30min，治疗组给予双眼结膜囊滴用 0.01% laquinimod 滴眼液，正常组与模型组用 0.01%DMSO 溶剂代替。点药后观察 laquinimod 滴眼液对眼表的影响，有无刺激症状及角膜上皮缺损，观察滴眼液有无晰出、沉淀。在裂隙灯下对结膜水肿、眼睑肿胀、流泪或分泌物、球结膜充血的过敏症状按照临床评分标准进行分级和评分。点药 30 分钟后，计数小鼠后肢抓挠眼部频次，持续 15 分钟。第 14 天时，取各组小鼠眼球，进行 HE 染色，计数结膜组织炎性细胞；取结膜组织，提取 RNA，检测结膜中炎症因子 IL-4、IL-5、IL-13、TNF-α 在转录水平的差异；取小鼠外周淋巴组织及脾脏，分离淋巴细胞，进行流式细胞分析。

结果：与溶剂组相比，模型组小鼠过敏症状，临床评分及前肢搔抓频次显著加重，与模型组相比，治疗组改善；HE 病理情况提示模型组炎性细胞浸润明显增多，治疗组炎性细胞浸润减少；结膜组织 q-PCR 结果显示 IL-4、IL-5、IL-13、TNF-α 等炎性因子的转录水平，治疗组较溶剂组和模型组明显降低。

结论：laquinimod 能缓解 EAC 症状，降低炎症表现。

PU-232

急性黄斑区神经视网膜病变

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患者，女，29 岁，因右眼眼前暗点 7+年于 2018 年 11 月 28 日至我院眼科门诊就诊。患者诉 7 年前无明显诱因突然出现右眼眼前中央出现暗点，否认视物变形及眼球转动痛。上呼吸道感染病史不详，曾多次外院就诊，诊断为右眼黄斑病变，用药后（具体不详）症状无明显缓解，否认外伤史、家族史，否认高血压、糖尿病史病史。全身检查无明显异常，头颅 MRI 未见异常，眼科检查：右眼裸眼视力 0．2，矫正视力 1．0^{-2}，左眼裸眼视力 0．4，矫正视力 1.0，右眼眼压 17.1 mmHg，左眼眼压 14.7mmHg (1mmHg=0．133 kPa)。双眼前节未见明显异常，玻璃体未见炎性细胞，直接检眼镜下左眼眼底未见明显异常，右眼黄斑中心凹可见色素。激光扫描检眼镜（scanning laser ophthalmoscope SLO）提示右眼黄斑区色泽轻微改变，光相干断层扫描(optical coherence tomography，OCT)结果示：近红外成像右眼黄斑偏鼻侧可见灰色病灶，对应区可见椭圆体带中断，嵌合体消失，外核层变薄，外丛状层、内核层和内丛状层下陷，双眼荧光素眼底血管造影(fundus fluorescein angiography, FFA)未见明显异常，双眼视野检查：左眼视野正常，右眼视野视为旁中心暗区，诊断为“右眼急性黄斑区神经视网膜病变”，给予弥可保口服，并定期随访观察。

AMN 患者多为年轻女性，急性发病。眼底表现多为黄斑区暗红色病灶。SD-OCT 表现多为黄斑区局灶性椭圆体带和嵌合带缺失，早期可伴有光感受器层高反射，晚期为椭圆体带和嵌合带的缺失、破坏。对本病的正确认识有助于向患者合理解释预后，避免误诊所造成的过度治疗以及过度治疗所产生的并发症。

PU-233

人 Tenon 囊成纤维细胞 TGF-β 信号通路的体外研究

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目的：探讨不同浓度紫杉醇对人 Tenon 囊成纤维细胞（HTF 细胞）细胞增殖及细胞活力、细胞周期分布以及 TGF-β1 表达的影响，进一步研究紫杉醇诱导 HTF 细胞凋亡的机制。
方法：通过实时细胞电子系统（RT-CES）和流式细胞仪研究不同浓度紫杉醇（即 0,10^{-8},10^{-7},10^{-6} mol / l）对人 Tenon 囊成纤维细胞（human tenon's fibroblast, HTF）细胞影响；实时荧光定量 PCR(Q-PCR)、酶联免疫吸附实验（ELISA）方法进一步测定不同浓度紫杉醇下转化生长因子-β1（transforming growth factor-β1,TGF-β1）和结缔组织生长因子（connective tissue growth factor, CTGF）的表达水平以及细胞外基质产生和胶原纤维收缩水平的作用情况。
结果：紫杉醇可明显抑制 HTF 细胞活力、诱导 HTF 细胞 S 期和 G2/M 期延长，下调 TGF-β1 和 CTGF 的表达。同时，紫杉醇治疗后纤维连接蛋白外结构域 A（fibronectin extra domain A ,EDA），胶原蛋白和胶原纤维收缩水平明显降低。总体而言，紫杉醇可明显抑制 HTF 细胞的增殖，导致 S 期和 G2/ M 期细胞周期停滞，减弱胶原蛋白和胶原纤维收缩，降低 TGF-β1，CTGF 和纤维连接蛋白 EDA 的表达。
结论：紫杉醇可抑制 HTF 细胞增殖，进一步诱导 HTF 细胞凋亡。紫杉醇对 HTF 细胞的抑制作用与 TGF-β1 信号通路有关。

PU-234

氯化锌抑制人晶状体上皮细胞转移和增殖的机制与 TGF-β1 和 TNF-α 信号通路相关

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目的：研究高浓度氯化锌对人晶状体上皮细胞增殖的影响及毒性作用，探讨高浓度氯化锌抑制人晶状体上皮细胞转移和增殖的分子机制。
方法：通过 MTT 实验、实时细胞电子分析（RT-CES）、倒置荧光显微镜、实时荧光定量 PCR、流式细胞仪、酶联免疫吸附试验（ELISA）等方法探讨高浓度氯化锌（zinc chloride,$ZnCl_2$）对晶状体上皮细胞增殖和转移的影响。进一步研究不同浓度的 $ZnCl_2$ 对胱天蛋白酶（caspase）-9 和 caspase-12，转化生长因子 β1（transforming growth factor-beta 1,TGF-β1），肿瘤坏死因子 α（tumor necrosis factor alpha, TNF-α）的影响。
结果：$ZnCl_2$ 可抑制 HLE B-3 细胞转移，并诱导细胞凋亡或坏死。同时，$ZnCl_2$ 可有效降低 caspase-9 和 caspase-12 的表达水平，增加 TNF-α 在基因和蛋白水平的表达，从而诱导细胞死亡。
结论：$ZnCl_2$ 可通过降低 TGF-β1 的表达，增加 TNF-α 的表达，抑制 HLE B-3 细胞的转移和增殖，最终导致 HLE B-3 细胞死亡，其作用机制与 TGF-β1 和 TNF-α 信号通路有关。

PU-235

rno-miR-30b-5p 对体外葡萄膜炎大鼠 T 淋巴细胞表达的 IL-10 和 TLR4 的调节作用研究

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目的研究 rno-miR-30b-5p 对葡萄膜炎大鼠 T 淋巴细胞分泌的 IL-10 和 Toll 样受体 4（TLR4）表达的调控作用。
方法使用双荧光素酶活性检测 rno-miR-30b-5p 对 IL-10 和 TLR4 基因表达的调控作用。首先制备实验性自身免疫性葡萄膜炎（EAU）大鼠模型，并每天观察 EAU 大鼠的眼前节的炎症表现，及眼组织的病理变化；使用定量 PCR（Q-PCR）检测眼、脾和淋巴结中的 rno-miR-30b-5p 的含量。使用 Q-PCR 和酶联免疫吸附（ELISA）技术分别测定脾和淋巴结中 IL-10 和 TLR4 含量。将 rno-miR-30b-5p 模拟剂和抑制剂分别转染纯化的 EAU 大鼠 T 细胞中，使用 Q-PCR、流式细胞术和 ELISA 技术检测 EAU 大鼠 T 细胞中 IL-10 和 TLR4 含量。
结果 EAU 大鼠造模第 12 天后前房积脓严重，病理学检测发现，EAU 大鼠虹膜、睫状体均有淋巴细胞浸润。rno-miR-30b-5p 在 EAU 大鼠眼、脾脏、淋巴结中下调表达，而 IL-10 和 TLR4 的 mRNA 和蛋白质水平上的表达上调。IL-10 和 TLR4 的水平与 rno-miR-30b-5p 水平呈负相关。体外细胞转染实验的结果表明，rno-miR-30b-5p 模拟物可使 EAU 大鼠的 T 细胞表达的 IL-10 和 TLR4 的 mRNA 和蛋白质水平受到抑制； 而经 miR-30b-5p 拮抗剂处理后 EAU 大鼠 T 细胞的 IL-10 和 TLR4 的 mRNA 水平上调，但 EAU 对照组和阴性对照组的大鼠脾脏和淋巴结中 T 细胞的 IL-10 和 TLR4 蛋白没有明显变化。流式细胞仪检测显示，rno-miR-30b-5p 模拟物可以减少 IL-10 和 TLR4 阳性细胞的数量，而 rno-miR-30b-5p 抑制剂可以增加 IL-10 和 TLR4 阳性细胞的数量。
结论 rno-miR-30b-5p 通过调节 EAU 大鼠 T 淋巴细胞中 IL-10 和 TLR4 阳性细胞的水平影响葡萄膜炎的发展。

PU-236

miR-22 在实验性自身免疫性葡萄膜炎中对 Th17 的调控作用

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目的 探讨 miR-22 在实验性自身免疫性葡萄膜炎（EAU）中对 $IRBP_{1-20}$ 特异性 Th17 的调控作用。
方法 构建 miR-22 过表达慢病毒载体并包装。$IRBP_{1-20}$ 免疫诱导构建 EAU 小鼠模型，取脾脏、淋巴结分离诱导 $IRBP_{1-20}$ 特异性 Th17 细胞（IRBP-Th17），经慢病毒介导 Th17 过表达 miR-22，48h 后收集细胞及上清，qPCR 检测 miR-22 和 Th17 细胞相关因子 mRNA 表达，Elisa 检测 IL-17 分泌水平；8 天后，应用流式细胞技术检测 Th17 的比率。分离培养小鼠骨髓来源树突细胞（DCs），经慢病毒介导 DCs 过表达 miR-22，qPCR 检测 miR-22 及促 Th17 分化细胞因子 mRNA 表达水平。将 miR-22 过表达 DCs 与 IRBP-Th17 细胞共培养，48h 后收集细胞及上清，qPCR 检测 Th17 相关因子 mRNA 表达，Elisa 检测 IL-17 分泌水平；共培养 8 天，应用流式细胞仪检测 Th17 的比率。
结果 miR-22 过表达载体构建成功，Th17 及 DC 中均可过表达 miR-22。miR-22 过表达 DC 中，IL-1β、IL-6、IL-23 和 TNF-α 等细胞因子 mRNA 相对表达量显著增高（$P<0.05$），IL-12 mRNA 相对表达无明显差异。与对照组相比，与 miR-22 过表达 DCs 共培养的 IRBP-Th17 细胞中 Th17 相关基因 IL-17、RORγt、IFN-γ 的 mRNA 表达水平显著增加，Elisa 检测 IL-17 分泌显著增多，流式细胞技术检测 Th17 细胞比率显著升高（均 $P<0.05$）。miR-22 过表达 IRBP-Th17 细胞中，Th17 相关基

因 RORγt mRNA 相对表达量增高而 IL-17 和 IFN-γ 表达水平无明显差异；与对照组相比，IL-17 分泌水平及 Th17 细胞比率亦无明显差异。
结论 miR-22 通过促进树突细胞分泌促 Th17 细胞极化因子，间接促进 EAU 中 Th17 细胞分化。

PU-237
miR-181a-5p 修饰的人脐带间充质干细胞来源外泌体对实验性自身免疫性葡萄膜炎 Th17 细胞的调控

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目的 探究 miR-181a-5p 修饰的人脐带间充质干细胞来源外泌体（exo-miR-181a-5p）对树突状细胞(DCs)分泌促炎性细胞因子的影响以及对实验性自身免疫性葡萄膜炎（EAU）Th17 细胞的调控作用。
方法 利用粒细胞-巨噬细胞集落刺激因子、白细胞介素-4 诱导小鼠骨髓细胞向 DCs 分化。诱导分化的第 6 天将 DCs 分三组，分别加入 PBS、exo 和 exo-miR-181a-5p。24h 后用 Q-PCR 检测三组 Th17 细胞分化相关因子 IL-23、TNF-a、IL-6 和 IL-1β mRNA 相对表达量。建立小鼠 EAU 模型，第 13 天分离 T 细胞，分别与 PBS、exo 和 exo-miR-181a-5p 处理过的 DCs 共培养，Th17 条件诱导。48h 后收上清，ELISA 检测 IL-17 的分泌。 **结果** Q-PCR 结果显示，exo 和 exo-miR-181a-5p 处理的 DCs 中 IL-23，IL-1β 和 TNF-α 相对表达量明显低于 PBS 组（$p<0.05$），而与 exo 组相比，exo-miR-181a-5p 组 IL-23，IL-1β 和 TNF-α 相对表达量较低，差异均有统计学意义（$p<0.05$）。ELISA 结果表明，与 PBS 组相比，exo 和 exo-miR-181a-5p 组 IL-17 分泌明显减少（$p<0.05$）；而与 exo 组相比，exo-miR-181a-5p 组 IL-17 分泌量较低，差异有统计学意义（$p<0.05$）。**结论** exo 与 exo-miR-181a-5p 均可通过抑制 DCs 分泌 IL-23,IL-1β 和 TNF-α 细胞因子从而抑制 Th17 细胞反应，其中 exo-miR-181a-5p 对 Th17 细胞反应的抑制作用更强。

PU-238
棘阿米巴角膜炎 29 例临床报告

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目的：对 29 例棘阿米巴角膜炎临床特征及治疗进行回顾性分析，以便进一步了解其临床特点并提高诊疗。
方法：本研究收集 2013 年 1 月至 2018 年 12 月于山东省眼科研究所（青岛眼科医院）住院诊疗的 29 例棘阿米巴角膜炎患者的致病诱因、发病时间、病原学检测手段及治疗方案，进行回顾性分析。
结果：29 例患者中，10 例自诉无明显诱因，6 例发生于异物入眼后揉眼，5 例发生于脏水入眼后，3 例发生于外伤后，3 例发生于劳累上火后，2 例发生于佩戴隐形眼镜后。在所有患者中，从自觉症状出现到于我院就诊的时间为 1 周~1 年，17 例患者于 1 月内就诊，11 例患者于 1-6 月内就诊，1 例患者于发病 1 年来我院就诊。29 例患者在共焦显微镜检查中，20 例明确查见阿米巴包囊，7 例查见可疑阿米巴包囊，2 例未查见阿米巴包囊。27 例行角膜涂片患者中 18 例查见阿米巴包囊，在 22 例行阿米巴培养患者中仅 3 例培养出阿米巴。在 21 例行病理检测患者中 17 例查出阿米巴包囊。共焦显微镜为确诊阿米巴角膜炎诊断的主要依据，在 9 例共焦显微镜未确诊病例中，其中 5 例依据角膜刮片+病理确诊，2 例患者依据病理确诊，2 例最终未能确诊，为疑似病例。其中 21 例患者接受角膜移植术，其中 12 例行 PKP 术（2 例复发），9 例行 LKP 术（3 例复发），8 例行药物治疗，1 例行眼内容摘除术。

结论：棘阿米巴角膜炎是由棘阿米巴原虫感染所致，为严重的感染性致盲性疾病之一，误诊率高。共焦显微镜为确诊阿米巴角膜炎早期、快速诊断有效方法之一，病理检测可有效辅助确诊。角膜移植术为治疗阿米巴角膜炎最有效的方案，但有一定的复发率。此病不典型，诊断及治疗困难，因此希望寻找早期、快速、准确病原学诊断手段，以便于一定程度上改善阿米巴角膜炎预后

PU-239
The effect of high-fructose diet on the course of fungal keratitis

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Objective In the present study, we aimed to observe the effect of high-fructose diet on the course of fungal keratitis. **Methods** 78 C57BL/6 male mice (free of eye disease) are 8~12 weeks old, SPF level. Animals were distributed into high-fructose diet group and control group randomly, each group has 78 eyes(n = 78), high-fructose diet group was provided with a 10% fructose solution, control group was normal water. We measured the weight and blood glucose of two groups mice every other day. 10 days later, we establish the FK model. At 24, 36, 48, 72, 96, 120, 168 hours, took photos using digital camera after fungal infections and assessed the clinical manifestations under slit-lamp microscope. Mice were euthanized by cervical dislocation at 24, 36, 48, 72, 96, 120, 168 hours after fungal inoculation, whole-mount immune-histology was conducted and we use 2 PH scanning microscopy to scan and picture the middle, paracentral, limbus parts of cornea, and to analyze the mount of neutrophils and macrophages. The corneal sections were prepared for the histopathological examination and perform HE and PAS staining, to observe changes in corneal inflammation and fungal load at different time points. The protein levels indicating cytokine interleukin-1β(IL-1β) production in the cornea were quantified using enzyme-linked immunosorbent assay(ELISA) kits. **Results** The clinical scores of the high-fructose diet group were significantly higher than the control group at each time point, and the differences were statistically significant. Corneal perforation rate of high-fructose diet group was 80%, control group was 43.3%, we used Chi-squared Test and difference among two groups was statistically significant(χ^2 = 8.531, P = 0.003). The number of neutrophil in high-fructose diet group was higher than control group at 24, 48, 72, 120, 168 hours, the difference among two groups was statistically significant(P < 0.05). At 72, 96, 120, 168 hours, the number of macrophage in high-fructose diet group was higher than control group, the difference among two groups was statistically significant(P < 0.05). Corneal histopathological examination showed that the inflammation reaction was more severe in the high-fructose diet group, and the corneal tissue destruction was earlier and more severe. The expression of IL-1β in high-fructose group was higher than control group at 24, 48 hours, the difference among two groups was statistically significant(P < 0.05). **Conclusion** High-fructose diet aggravates the severity of fungal keratitis infection, enhances the chemotaxis of neutrophils and macrophages, and promotes the secretion of IL-1β.

PU-240
Vogt-小柳-原田不同分期患者复发率和并发症情况的回顾分析

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目的 观察后葡萄膜炎期和前葡萄膜炎反复发作期 VKH 患者的疗效以及复发率和并发症情况。

方法 回顾就诊时患者为后葡萄膜炎期(<2 周)45 例 90 眼和前葡萄膜炎反复发作期(2 个月至数年)15 例 30 眼的临床资料。对患者行糖皮质激素及中药辨证论治,中西医结合治疗,并进行了平均 22 个月的随访观察,包括视力、复发率及并发症情况。
结果 后葡萄膜炎期与前葡萄膜炎反复发作期相比,提高视力明显,差异有统计学意义(P<0.05),复发率也明显降低,差异有统计学意义(P<0.01)。常见的并发症为并发性白内障、青光眼。而脉络膜新生血管(Choroidal neovascularization,CNV)和视神经萎缩仅见于前葡萄膜炎反复发作期患者。
结论 后葡萄膜炎期是治疗 VKH 重要的时间窗口。此时期积极治疗，视力预后和复发率以及并发症的发生都明显优于前葡萄膜炎反复发作期。

PU-241
龙胆泻肝汤治疗葡萄膜炎大鼠对 CD4、CD8 细胞转归的影响

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目的 研究龙胆泻肝汤对 EAU 大鼠 CD4、CD8 免疫细胞转归的影响。
方法 6~8 周龄雌性 Lewis 大鼠随机分为对照组 6 只、EAU 组 18 只和 LXT 组 18 只。EAU 组和 LXT 组注射 IRBP1177-1191、CFA 和 TB 混合的乳化液，对照组相同部位注射等量不含 IRBP 的乳化液。观察三组大鼠体温、摄食量和饮水量的变化；免疫后每天观察 EAU 大鼠眼部炎症变化，当 EAU 组开始出现葡萄膜炎症时给予 LXT 组龙胆泻肝汤灌胃处理。免疫后 4、8、12、16、20 天摘取大鼠淋巴结、脾脏，分离淋巴细胞，通过流式细胞仪检测 CD4/CD8 的比例变化。
结果 EAU 组在免疫后第 5 天开始出现炎症，体温在免疫后 1、7、10、12 天高于正常，EAU 组和对照组未见摄食和饮水量差异。免疫后 12 天 EAU 组淋巴结中 CD4/CD8 达峰值 5.95±0.51，随后逐渐下降至免疫前水平；LXT 组 CD4/CD8 为 4.52±0.54，与对照组相比未见统计学差异，与 EAU 组相比有统计学差异（P=0.002）。EAU 组脾脏 CD4/CD8 在免疫后 8、12、16 天均高于正常值（P=0.017、0.000、0.015），12 天达峰值 4.71±1.92；LXT 组仅在免疫后 12 天高于正常（P=0.028），值为 2.98±0.54；两组间差异有统计学意义（P=0.016）。
结论 龙胆泻肝汤能减轻大鼠 EAU 的发病并加速炎症消退，可通过抑制致葡萄膜炎性 CD4+ T 细胞分化发挥抗炎作用

PU-242
龙胆泻肝汤治疗葡萄膜炎大鼠对关键炎症因子表达的影响

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目的 研究龙胆泻肝汤对实验性自身免疫性葡萄膜炎（EAU）大鼠的相关炎症因子表达影响。
方法 6~8 周龄雌性 Lewis 大鼠随机分为对照组 6 只、EAU 组 18 只和 LXT 组 18 只。EAU 组和 LXT 组注射 IRBP1177-1191、CFA 和 TB 混合的乳化液，对照组大鼠相同部位注射等量不含 IRBP 的乳化液。观察三组大鼠体温、摄食量和饮水量的变化；免疫后每天观察 EAU 大鼠眼部炎症变化，当 EAU 大鼠开始出现葡萄膜炎症时给予 LXT 组大鼠龙胆泻肝汤灌胃处理。分别取 EAU 组和 LXT 组大鼠免疫后 4、8、12、16、20 天全血、淋巴结及脾脏，通过荧光定量 PCR 技术检测 IFN-γ、IL-17、TNF-α 和 IL-10 mRNA 的表达。心脏采血，收集血上清，ELISA 检测其中 IFN-γ、IL-17、TNF-α 和 IL-10 细胞因子的浓度。
结果 EAU 大鼠免疫后血、淋巴结和脾脏中 IFN-γ、IL-17、TNF-α 和 IL-10 表达并不完全一致，但均表现出与葡萄膜炎相关性，经龙胆泻肝汤治疗后 IFN-γ、IL-17 和 TNF-α 的表达下降，IL-10 表达增强。

结论 龙胆泻肝汤可通过抑制 Th1 和 Th17 相关炎症因子的表达发挥其抗炎作用。同时，龙胆泻肝汤能够促进 IL-10 mRNA 表达及分泌，加速自身免疫炎症的恢复。

PU-243

肺炎链球菌感染致先天性白内障晶状体摘除术后内源性眼内炎一例

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目的 探讨先天性白内障晶状体摘除术后内源性眼内炎的临床特征、易感因素、致病菌群以及如何预防处理等。
方法 搜集一例由肺炎链球菌感染致先天性白内障摘除术后内源性眼内炎的病例，分析其一般资料、临床表现、全身情况、实验室检查、影像学检查、预后情况等。
结果 此例内源性眼内炎患儿以高热、咳嗽的呼吸道感染症状就诊，在治疗原发疾病的过程中患儿母亲发现其眼部症状，如揉眼、发红、流白色脓液等，取患儿眼部脓性分泌物进行培养，结果显示为：肺炎链球菌。此时患者的眼部症状已经相当严重，角膜完全混浊水肿，前房大量积脓，虽然进行了前房冲洗术、玻璃体切除术以及多次的玻璃体腔注药术以挽救患儿的有用视力，但最终均以失败告终。期间为患儿进行手术时发现 1 点钟位靠近角膜缘处结膜有一 3mm 直径大小溃疡，虹膜变性，呈黑色，出院时溃疡已愈合。考虑到患儿年龄仅为 3 岁，若摘除眼球后极有可能因为卫生条件或护理不当造成感染，且出院时眼内情况较稳定，遂不予以眼球摘除，目前正在密切随访当中。
结论 内源性眼内炎起病急，发展迅速，且临床症状缺乏特异性，在就诊时常常因为原发疾病的严重性而忽略了眼部症状和体征，从而延误诊治，失去最佳治疗时间，最终导致视力严重下降甚至须摘除眼球。所以在患者就诊时除了重点观察其原发感染灶，也不应该忽视其可能发生的转移灶。内源性眼内炎常需与结膜炎、葡萄膜炎、巩膜炎、视网膜脉络膜炎等鉴别，在患者免疫力低下时，如使用免疫抑制剂、静脉吸毒、糖尿病、支气管炎、消化系统或泌尿系统感染、外科的创伤性操作等，应该考虑到眼内炎的发生。房水及玻璃体涂片或培养阳性是诊断眼内炎的金标准，但涂片和培养阴性，临床症状体征高度怀疑时不能排除眼内炎。在发生内源性眼内炎时，适时为患者进行前房冲洗、玻璃体腔注药甚至玻璃体切除术都是挽救患者视力的必要手段。

PU-244

巨细胞病毒性视网膜炎治疗病例

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摘要：巨细胞病毒性视网膜炎（CMVR）是免疫功能障碍者常见致盲性眼病。感染途径为：性传播、血制品、器官移植、子宫内或分娩过程中。诊断为临床症状体征，结合房水病原学检测（CMV DNA、CMV 抗体）。治疗方法为：（1）全身或局部玻璃体腔注射抗病毒药物治疗；（2）玻璃体手术清除混浊玻璃体、活体病毒、坏死组织、视网膜增殖膜等。经过积极治疗，患者可保持相对良好的视功能，维持正常生活。

PU-245

强脉冲光联合睑板腺按摩治疗蠕形螨感染相关睑板腺功能障碍的疗效观察

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方法：前瞻性自身对照研究。选择中山大学中山眼科医院门诊 2018 年 9 月-2019 年 01 月的蠕形螨感染相关 MGD 成年患者 15 例，无蠕形螨感染的 MGD 患者 15 例，年龄 19-55 岁。排除相关禁忌症并取得知情同意后，对右眼用强脉冲光进行双侧眶周能量为 12-15J/cm^2 的 IPL 治疗，隔周 1 次，共治疗 4 次。IPL 治疗后双眼行睑板腺按摩。主要观察指标为治疗前后睑板腺分泌能力；次要疗效指标为睑板腺长度，BUT，泪液分泌试验，SPEED 及 OSDI 评分。比较治疗眼和对照眼间、各随访间以及不同组间的治疗评价指标的差异。三次治疗后对蠕形螨感染组进行睫毛镜检，观察蠕形螨检出量

结果：蠕形螨感染相关 MGD 患者第二次治疗后自觉症状缓解（P＜0.05），蠕形螨感染相关 MGD 患者较对照组自觉症状改善较慢（P＜0.05），主观症状改善与无蠕形螨感染 MGD 改善无显著差异；蠕形螨感染相关 MGD 与对照组 MGD 患者治疗后睑板腺相关指标均有改善，且两者改善程度无明显差异；**两组**治疗眼泪膜破裂时间在第二次治疗后较基线增加(P＜0.05)。双眼 SPEED 问卷及 OSDI 问卷和荧光素染色较治疗后均降低。强脉冲光治疗后无视力下降，皮肤灼伤、眼内炎症性反应等相关并发症。3 次治疗后睫毛镜检蠕形螨数量下降(P＜0.05)

结论：强脉冲光联合睑板腺按摩可提高 MGD 患者的睑板腺分泌功能、稳定泪膜、改善患者自觉症状；治疗蠕形螨相关 MGD 有效缓解症状，并且蠕形螨感染并未削弱 IPL 治疗 MGD 的疗效。

PU-246

3 例 Leber 遗传性视神经病变患者的基因型与临床表型分析

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目的 应用聚合酶链反应-单链构象多态性（PCR-SSCP)技术检测 Leber 遗传性视神经病变（LHON）患者线粒体 DNA（mtDNA）突变位点，分析研究 LHON 患者基因型与临床表型的关系。 **方法** 选择 3 例在宁夏眼科医院就诊并明确诊断为 LHON 的患者作为研究对象。收集患者的临床资料，完善相关眼科检查。采集患者外周静脉血，提取 DNA，运用 PCR-SSCP 技术检测并确定致病性的 mtDNA 突变位点。分析 LHON 患者的基因型与临床表型。**结果** 3 例 LHON 患者均发现线粒体基因的改变，分别为 mtDNA 上的 14484(T>C)、11778（G＞A）、11696（G＞A）位点发生碱基突变。 **结论** PCR-SSCP 技术可以为具有高度临床异质性的 Leber 遗传性视神经病变的临床诊断提供准确、高效的遗传学依据，但基因检测需同时结合临床表型分析才能最终确定 LHON 的诊断。

PU-247

一个中国人眼白化病 1 型家系的致病基因突变研究

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目的对一个中国人 X 染色体连锁隐性遗传先天性眼白化病 1 型家系进行候选致病基因 GPR143 的突变筛查。**方法**对一个先天性眼白化病 1 型家系内所有成员均进行眼科详细检查，包括视力、裂隙

灯检查眼前节、眼位、眼底检查等，并对其临床资料进行分析。将包括先证者在内的每代各选一名患者及正常人进行候选基因 GPR143 的全部外显子进行测序。**结果** 此家系的 10 例患者均为男性，发病年龄均为出生后 6 个月内。所有患者都呈现很差的矫正视力、虹膜脱色素、眼球震颤、眼底脱色素以及黄斑发育不良。仅一例患者眼底有大片脉络膜缺损。家系内女性携带者呈现正常的视力，但有轻微的虹膜色素不均及眼底的点状脱色素，黄斑发育正常。家系患者 GPR143 基因存在 c.360+5G>T 半合子突变，为未知突变，临床意义未明。**结论** 本研究的 X 染色体连锁隐性遗传眼白化病 1 型家系的致病基因为 GPR143 基因，致病突变 c.360+5G>T。

PU-248

CRYAA 基因外显子区多态与年龄相关性白内障易感性

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目的：αA 晶状体蛋白(CRYAA)参与多种细胞功能，其外显子区点突变可导致不同类型年龄相关性白内障（ARC）发生。本研究探讨 CRYAA 基因 3 个外显子区单核苷酸多态性与不同类型 ARC 之间的关系。
方法：纳入 618 例不同类型 ARC 患者及 236 例正常对照。采集外周静脉血 5ml，提取全基因组 DNA 行 CRYAA 基因外显子测序，鉴定其外显子区 SNP 位点。分析相应 SNP 位点的等位基因频率及基因型频率在 ARC 组和对照组中的分布差异。
结果：CRYAA 第三位外显子区鉴定到 1 个 SNP 位点：rs76740365 G>A。该位点在 ARC 组与对照组间均存在显著差异（等位基因频率：P=0.0076, OR=1.911；基因型分布频率: P=0.0283）。进一步分析各亚组中该位点的分布，仅 PSC 组和对照组差异有统计学意义(P<0.001)。后囊下为主型白内障组年龄较其他两亚型分组年龄小(P<0.05)。
结论：CRYAA 外显子区的 SNP 位点（rs76740365 G>A）与后囊下为主型白内障（PSC）的易感性有关，可能会增加 PSC 患病风险。携带此位点的 PSC 可能存在相对早期发病的趋势。

PU-249

KIF21A mutation in two Chinese families with congenital fibrosis of the extraocular muscles

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Purpose: Congenital fibrosis of the extraocular muscles (CFEOM) is a hereditary ocular disease. In this study, we examined the pathogenic gene in two Chinese families with CFEOM by whole exome sequencing.
Methods: Two Chinese families with CFEOM were recruited. All members were subjected to comprehensive ophthalmic examinations. Genomic DNA was extracted from the leukocytes of venous blood samples from the two families. After whole exome sequencing of Genomic DNA, candidate genes were screened and verified by Sanger sequencing.
Results: A previously reported heterozygous missense mutation, c.2860C>T (p.R954W), in exon 21 of the *KIF21A* gene was identified in the two families, and this was cosegregated with the presence of the diseases in the two families, the normal members did not harbor the p.R954W mutation.
Conclusions: The p.R954W mutation of *KIF21A* was the causative mutation in two Chinese pedigree with CFEOM. The p.R954W mutation is also a hotspot in various ethnic patients with CFEOM, including Iranian, Swiss, and Turkish.

PU-250

Mutation in the MYOC gene in a Chinese family with primary open-angle glaucoma

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This study aims to identify whether the primary open-angle glaucoma (POAG) in a family collected recently is caused by the mutation of some candidate genes. A family with POAG (4-generation family with 26 members, 6 members were affected) was examined clinically, Polymerase chain reaction (PCR) was used to amplify the products and exert direct Sanger sequencing. The *MYOC* missense mutation of c.1309T>C (NM_000261) was detected in the affected members, but not found in the normal family members as well as 100 unrelated normal controls. Therefore, *MYOC* mutation might be the genetic pathogenesis for the family with POAG. The mutation was located in the third exon of *MYOC*, which leading the wild-type gene encoded tyrosine (Tyr or Y) to be replaced by histidine (His or H). Moreover, *MYOC* (c.1309T>C) mutation patients show elevated TGF-β2 in aqueous humor, which might be an important pathogenic mechanism in the progression of POAG.

PU-251

GANT1 基因新突变位点导致常染色体显性遗传夜盲症

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目的：明确一例先天性静止性夜盲症家系的致病基因。

方法：通过眼科临床彩色眼底照、自发荧光、OCT、电生理等技术全面检查患者眼底病状，并通过抽取患者及患者家属血液样本并进行全外显子组测序筛选致出 GNAT1 病突变位点。最后通过构建 GNAT1 突变质粒并包装 AAV 病毒，通过视网膜下注射到野生型 C57 小鼠。最后通过电生理检测小鼠视网膜功能。

结果：我们发现并报道了一汉族家系中多名患有先天性静止性夜盲症的患者，先证者双眼视力下降 10 年，伴夜间视力下降。其子夜视力差 30 余年，无进行性加重，色觉正常，眼底未见明显异常，ERG 检查暗适应 0.01ERG b 波呈熄灭型；暗视 3.0 ERG：a 波、b 波重度下降；明视 3.0 ERG：a 波、b 波重度下降。全外显子测序筛选出 GNAT1 基因 c.169T>G(p.Y57D)突变位点。通过构建 GNAT1(c.169T>G)突变质粒并包装成腺相关病毒，并通过视网膜下注射到 C57 小鼠。通过电生理检测发现 GNAT1(c.169T>G)突变体导致小鼠视网膜功能明显异常，特征与人类先天性静止性夜盲症患者电生理特征相似。

结论：本研究发现并验证 GNAT1 新致病突变位点导致常染色体显性遗传性夜盲症。

PU-252

PROM1 基因新突变位点导致常染色体隐性遗传性黄斑病变合并视杆细胞营养不良

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目的：明确一例常染色体隐性遗传性黄斑病变合并视杆细胞营养不良家系的致病突变位点。
方法：通过眼科裂隙灯显微镜检查、彩色眼底照、眼底自发荧光、OCT、电生理等技术全面检查患者眼底表现，并通过抽取患者及家属血液样本进行全外显子测序筛选出 PROM1 致病突变位点。最后通过构建 RPOM1 突变质粒并转染 293T 和 RAW246.7 细胞，通过激光共聚焦和桥式-PCR 证明以上突变对 PROM1 蛋白功能的影响。
结果：我们发现并报道了一例汉族家系中两名患者表现出进行性的视力损伤和夜盲症，眼底检查发现患者黄斑区出现严重的的黄斑及脉络膜萎缩并有色素沉积。电生理检查结果显示患者所有波形为几乎为熄灭型。全外显子测序筛选出 PROM1 基因 c.1902C>G(p.Y634X)及 c.1682+3A>G 符合杂合突变。通过构建 RPOM1（c.1902C>G）突变质粒转染 293 细胞系发现 c.1902C>G 位点突变后引起 PROM1 蛋白翻译提前终止并导致蛋白在细胞中定位错误。而 PROM1(c.1682+3A>G)突变后导致 mRNA 内含子无法成功被剪切，从而无法形成成熟的 PROM1 mRNA 及蛋白。
结论：本研究发现并验证 PROM1 两个新致病突变位点导致常染色体隐性遗传性黄斑病变合并视杆细胞营养不良。

PU-253

视网膜色素变性伴发症状的研究进展

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原发性视网膜色素变性（retinitis pigmentosa, RP）是眼科常见的遗传性致盲性疾病，其显著的遗传异质性和表型异质性对其相关致病机制和治疗方法的研究带来巨大挑战。RP 除了经典的视网膜病变特征以外，在眼部其它组织或眼外器官均可伴发多种病理性改变，但国内外却少见对此的综合报道。本文对国内外相关文献进行综述，旨在阐明 RP 伴发症状的研究进展，为其诊断和个体化治疗提供一定的参考。

PU-254

在一个视网膜色素变性家系中发现的 PRPF8 基因新突变位点

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目的为了明确一个视网膜色素变性家系的致病突变。
材料和方法
一个视网膜色素变性（RP）家系中共有 6 个人参加了这项遗传研究。我们分别对患者、他的妻子和患病的儿子进行了裂隙灯检查、眼底照相、光学相干断层扫描（OCT）、视网膜电图（ERG）等眼科检查。通过全外显子组测序对患者及其家属进行突变检测。用 Sanger 测序确认检测出的突变位点。
结果患病的个体呈现 RP 的临床症状，包括夜盲，进行性视力损害，视网膜色素沉着和 ERG 波幅异常等。在 17 号染色体上的 PRPF8 基因的外显子 42 中鉴定出杂合错义突变（c.6912C> A，p.F2304L），并通过 Sanger 测序证实，符合家系共分离现象。通过蛋白结构分析初步推测该突变位点的致病机理。

结论通过使用全外显子组测序，我们在 PRPF8 基因中发现了一种新的杂合错义突变，其可能与常染色体显性 RP 有关。这些发现可能为 RP 的病因和诊断提供新的见解，并对该家族的遗传咨询和临床管理起重要作用。

PU-255

A novel mutation in MBTPS2 gene presented as alopecia, hyperkeratotic follicular papules and photophobia in a Chinese child

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Mutations in the gene encoding the Membrane-Bound Transcription Factor Peptidase, Site 2 (MBTPS2) that has ability to regulate cholesterol balance and handle endoplasmic reticulum stress could lead to the occurrence of diseases which mainly characterized by ichthyosis, photophobia, sparse hair, such as Ichthyosis Follicularis, Atrichia, and Photophobia (IFAP), Keratosis follicularis spinulosa decalvans (KFSD), Olmsted syndrome (OS) and so on. We describe a child from China with a novel mutation in MBTPS2 protein who presents with the triad of performance including follicular hyperkeratosis, sparse hair and photophobia. Although, the other mutations of MBTPS2 have also been reported in previous studies globally. Further studies are needed to clarify the associations between the clinical features and pathomechanisms of the protein, and to discover the connection between phenotype and genotype.

PU-256

新型 Cas9/RecA 技术在体修复视网膜色素变性 rd1 小鼠视觉

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视觉是人类日常生活中获得信息的主要来源，视觉的损伤会严重影响患者的生活质量。视网膜色素变性是一种遗传性退行性疾病，患者后期临床表现为感光细胞的退化和死亡，从而导致视觉的丧失。Rd1 是广泛应用的视网膜色素变性疾病小鼠模型，该小鼠中 Pde6b 基因产生点突变，造成感光细胞凋亡。我们新建立一种 Cas9/RecA 基因编辑方法，可以在分裂和非分裂的感光细胞中通过同源重组的方法精准修复 Pde6b 基因点突变，且基因编辑效率较传统 CRISPR/Cas9 的同源重组效率高。我们发现 Cas9/RecA 可以在基因水平，mRNA 水平，蛋白水平提高野生型 Pde6b 的表达量，增加感光细胞存活的数量，以及在一定程度上修复 rd1 小鼠的视觉功能。该研究为视网膜退化疾病和其他遗传疾病提供了很好的治疗策略。

PU-257

CYP4V2 和 PRPF3 致病突变共存于一个多代视网膜色素变性家系的临床特征和遗传咨询

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目的：一个多代中国人视网膜色素变性家系（autosomal dominant retinitis pigmentosa，简称 adRP）的致病基因筛查和临床特征分析。
方法：采用高通量 2 代测序技术和经典的 Sanger 测序检测该家系的致病基因，同时在家系和正常人中进行验证。分析家系患者的致病基因突变和临床表型。
结果：检测到 2 个致病基因突变，先证者为 CYP4V2 基因复合杂合突变，而家系其他患者为 PRPF3 基因突变，其家系中患者的临床表型分为 2 种：先证者为典型 Bietti's 结晶样视网膜变性（Bietti's crystalline corneoretinal dystrophy，简称 BCD）表型，视力降低出现晚，夜盲出现晚，FERG 降低，而家系其他 PRPF3 基因突变临床表现为典型的 RP 特征，自幼出现夜盲，视野逐渐缩小，FERG 熄灭。
结论：该家系中 CYP4V2 和 PRPF3 共存，分别对应不同的基因突变类型和遗传模式并符合孟德尔遗传，提示对遗传性眼病家系患者进行精准表型分析、分子诊断和遗传咨询非常重要。

PU-258

γS- S39C 晶状体蛋白突变致先天性白内障的机制研究

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研究目的：先天性白内障（congenital cataract）是造成儿童视力损伤的主要原因，约四分之一的患者发病与遗传相关。研究统计晶状体蛋白突变是导致先天性白内障最多的蛋白家族，目前关于 γS-晶状体蛋白研究报道相对较少，其突变导致先天性白内障的具体机制值得深入研究。本研究选取浙二眼科中心最近发现的 γS-晶状体蛋白突变（S39C）为研究对象，探索 γS-晶状体蛋白突变对蛋白结构、蛋白稳定性的影响以及对环境应激的耐受能力，阐述相关致病机制，为相关白内障的药物治疗提供新思路。
研究方法：原核表达纯化外源重组蛋白，运用色氨酸荧光，ANS 探针荧光，圆二色谱、静态光散、SEC 等生物物理学方法研究突变对蛋白结构及蛋白稳定性的影响。同时，检测过氧化物处理及紫外线照射等应激条件下突变对蛋白稳定性的影响。构建白内障突变体细胞模型，运用免疫印迹，免疫荧光成像、细胞凋亡等方法研究突变蛋白的亚细胞定位及对细胞生理功能的影响。
研究结果：γS-晶状体蛋白突变 S39C 的内源性荧光和 ANS 外源性荧光与野生型无显著差异，说明突变对蛋白结构没有显著影响。然而，突变体溶解度降低，仅能维持野生型蛋白的 40%；突变体热稳定性降低，盐酸胍处理容易发生变性，而且在变性过程中产生新的折叠中间态。同时在过氧化氢氧处理后，突变体 S39C 蛋白结构稳定性降低，色氨酸微环境发生改变及蛋白质疏水性暴露增多,并产生沉淀。在细胞内突变体 S39C 少量聚集，并造成一定细胞毒性。
研究结论：γS-晶状体蛋白 S39C 突变对蛋白的二级、三级结构的影响较小，但突变降低了蛋白溶解度、热稳定性、氧化应激耐受能力及蛋白质折叠中间态，使得蛋白容易发生错误折叠产生聚集，从而导致晶状体混浊发生白内障。

PU-259

Identification of Novel RHO Mutations in Chinese RP Patients with Panel-based Genetic Diagnostic Testing

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Purpose: To explore genetic basis and further understand such diseases and enrich the existing database.

Methods: GEDi test with total of more than 200 known retina degeneration candidate genes and next-generation sequencing approach were used for screening genetic variations in Retinitis pigmentosa (RP) patients' samples from 72 unrelated Chinese families with uncertain inherited pattern. The identified variations were then validated with Sanger sequencing. In vitro function study was further performed by over expressing wild-type and c.82C>T mutant RHO in HEK293 cell, and then detecting RHO expression at both mRNA and protein levels with realtime-PCR and Western blot.
Results: Four RHO gene mutations were detected in 5 (10.4%) of the 72 RP families, including c.158C>G (p.P53R), c.551A>C (p.Q184P) in two families, c.34delC (p.P12NA) and c.82C>T (p.Q28*). The latter two mutations were novel. The homozygous c.82C>T (p.Q28*) was responsible for recessive RP, and the heterozygous carrier showed normal phenotype. Cells with mutant (c.82C>T) RHO gene showed no difference at mRNA level as compared to the wild-type RHO and the truncated rhodopsin protein was translated.
Conclusion: GEDi test is an efficient and cost-effective method to detect mutations in known genes for retina degeneration, and provide evidence for precise clinic diagnosis of such diseases. The RHO gene mutation was the most frequent one among these 72 Chinese RP patients. RHO homozygous mutant (c.82C>T) form truncated rhodopsin protein to induce RP.

PU-260

视网膜色素变性继发新生血管青光眼一例

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刘 XX，男性，41 岁，因"左眼视力下降 1 个月"来我院就诊。既往史：患者主诉双眼自幼视力差， 右眼眼球萎缩（右眼白内障术后逐渐失明，导致萎缩，具体原因不祥，否认外伤史）；否认高血压、糖尿病、全身传染病史否认家族遗传病史；否认传染病史。眼科检查：视力： 右眼 VOD=NLP，IOP 测不出 ，右眼结膜轻充血，角膜全白混浊，余不清，眼球萎缩；左眼 VOS=0.15，矫正无助 左眼 44.3mmHg， 左眼结膜充血明显，角膜水肿，前房中深，瞳孔欠圆，虹膜见大量新生血管，IOL 在位，玻璃体混浊，眼底模糊不清，隐见视盘色略淡。诊断：1.新生血管性青光眼 OS 2.IOL 眼 OS 3. 眼球萎缩 OD，入院后给予左眼给予抗 VEGF 药物治以及降眼压眼水控制眼压。左眼经过抗 VEGF 药物治疗后虹膜新生血管消退，眼压控制稳定，但玻璃体混浊（非血性混浊）明显，眼底不清，但 B 超提示左眼视网膜脱离、脉络膜脱离。因无法找到新生血管以及视网膜脱离原因，因此行 ICGA+FFA 检查，发现类似视网膜色素变性样 ICGA 改变，补充诊断左眼视网膜色素变性。因无法找到确切视网膜裂孔怀疑视网膜脱离可能为渗出性网脱，给予激素治疗。激素治疗后玻璃体混浊略减轻，详查眼底发现视网膜 3 点位、5 点位裂孔，给予玻璃体切除手术。术后眼底清晰，明确诊断视网膜色素变性，继发性视网膜脱离，继发性青光眼。基因检查：患者 RP9，LRP5，CRYAA 位点异常。

PU-261

基于全外显子捕获测序技术 GWAS 分析 AMD 和 PCV 的易感基因筛选

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目的：息肉状脉络膜血管病变(PCV)对视力的危害极大，但是针对其发病机制的研究还是不尽理想。现阶段眼科医师对于 PCV 发病机制的理解还不够深入，目前普遍认为，PCV 是年龄相关性黄斑变

性（AMD）的亚型，与 AMD 的发病机制相似。从基因多态性来说，经关联基因突变分析发现，PCV 与 AMD 有许多相同的突变基因。
对 AMD 和 PCV 的患者和正常人进行测序，通过全基因组关联分析(GWAS)分析，筛选 AMD 和 PCV 候选易感基因位点和 CNV 片段，进行人群水平功能学验证，从遗传学角度探讨 AMD 和 PCV 发病机制。
方法：提取 AMD 和 PCV 患者眼血液 DNA，利用外显子靶向测序技术，捕获外显子区域 DNA，进行全外显子组测序。对 21 例 nAMD 患者、20 例 PCV 患者和 20 例健康对照组进行全外显子组测序分析。通过生物信息学分析,结合 dbSNP、千人基因组、ExAC 数据库分析变异频率,确定突变位点和 CNV(DNA 拷贝数变异)片段区域。
结果：
1）.鉴定出与 AMD 和 PCV 显着相关的 9 个基因位点，分布在 CDC27，KRT4，SPATA31C1，HOXA1 基因的外显子区域。
´ 其中，CDC27 基因多个位点（rs1141701,rs77440865,rs80120716,rs76836956,rs79454290,rs77739281）和两种疾病高度相关。
2).chr17：44382626-44631065 片段 CNV 在 AMD 患者中显著增加,这个区域影响的基因有 ARL17A，LRRC37A，NSFP1，LRRC37A2。

PU-262
γD-晶状体蛋白 R15C、R15S 突变致先天性白内障的机制研究

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目的：先天性白内障（congenital cataract）是指出生前后已经存在，或者在出生后逐渐发展的晶状体浑浊，是儿童可治疗性失明的最常见原因之一[1]。目前唯一有效的治疗手段是手术[2]，只有阐明白内障的潜在机制，才能找到预防或治疗白内障的非手术方法[3]。所以本研究选取浙二眼科中心最近发现的 γD-晶状体蛋白突变（R15S）[4]和一个已报道的 γD R15C 突变为研究对象，探索 γD-晶状体蛋白突变对蛋白结构和稳定性的影响，阐述相关致病机制，为相关白内障的药物治疗提供新思路。
方法：通过原核表达重组蛋白，运用荧光光谱，紫外，Uncle 等生物物理学方法研究突变对蛋白结构及性质的影响。同时，检测氧化还原胁迫及紫外线照射等应激条件下突变对蛋白稳定性的影响。通过白内障细胞模型，运用 Western blot，细胞活力、细胞凋亡等方法研究突变蛋白在细胞的聚集及对细胞生理功能的影响。
结果：突变体 R15C、R15S 的内源性荧光和 ANS 外源性荧光与野生型无显著差异，说明突变对蛋白结构没有显著影响。然而，突变体溶解度下降 R15C<R15S<WT；而且突变体热稳定性降低 R15C<R15S<WT。同时在过氧化氢氧处理后，突变体 R15C、R15S 蛋白结构稳定性降低，色氨酸微环境发生改变及蛋白质疏水性暴露增多。在细胞实验内突变体 R15C、R15S 均匀分布，并没有明显聚集；而在应激条件下突变体稳定性的研究正在进展。
结论：γD-晶状体蛋白 R15C、R15S 突变对蛋白的二级、三级结构的影响较小，但突变降低了蛋白溶解度、热稳定性、氧化应激耐受能力及蛋白质折叠中间态稳定性，使得蛋白容易发生错误折叠产生聚集，从而导致晶状体混浊发生白内障。

PU-263
Neuroprotective effects of HSF1 in retinal ischemia-reperfusion injury

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Retinal ischemia, a common cause of several vision-threatening diseases, contributes to the death of retinal neurons, particularly retinal ganglion cells (RGCs). Heat shock transcription factor 1 (HSF1), a stress-responsive protein, has been shown to be important in response to cellular stress stimuli, including ischemia. However, its specific role in retinal neuronal injury remains unknown. Here we showed that expressions of HSF1 mRNA and protein were significantly increased in the retina in a mice model of retinal ischemia-reperfusion (IR) injury. By using transgenic mice carrying full-length human HSF gene, we further demonstrated that during IR, overexpression of HSF1 significantly induced chaperone protein Hsp70, alleviated endoplasmic-reticulum (ER) stress, leading to decreased tau aggregation and attenuated inflammatory response. As a result, IR-induced retinal neuronal apoptosis and necroptosis were abrogated, loss of retinal ganglion cells was decreased and their function was preserved in HSF1 transgenic mice. These data provide compelling evidence that HSF1 is neuroprotective against retinal IR injury and boosting HSF1 expression could be a beneficial strategy to limit neuronal degeneration in retinal diseases.

PU-264

康柏西普不同给药方案治疗视网膜分支静脉阻塞继发黄斑水肿

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目的:对比康柏西普 1+PRN 和 3+PRN 方案玻璃体腔注射治疗视网膜分支静脉阻塞（BRVO）继发黄斑水肿（ME）的短期临床疗效。方法：前瞻性随机对照研究，选取 BRVO 继发 ME 患者共 40 例，随机分入 1+PRN 组（18 例）和 3+PRN 组（22 例），对比两组最佳矫正视力(BCVA)和黄斑中心凹视网膜厚度（CMT）变化及平均注药次数，分析视力预后的影响因素。结果：经 6 月治疗后,3+PRN 组 BCVA(LogMAR)由 0.86±0.22 提高到 0.41±0.12,CMT 由 517.4±75.1 降低到 280.1±41.8, 1+PRN 组 BCVA 由 0.79±0.20 提高到 0.42±0.14,CMT 由 472.7±80.7 降低到 271.6±39.6,组间比较差异无统计学意义(P＞0.05)。3+PRN、1+PRN 组平均注药次数分别为 3.64±0.66、 2.78±0.94 针,差异无统计学意义(P＝0.121)。多元回归分析中，年龄、病程、基线 BCVA、椭圆体带完整性表现出和良好的视力预后有关。结论：康柏西普 1+PRN 和 3+PRN 方案治疗 BRVO 继发 ME 在短期内可以取得类似的疗效。

PU-265

Vps35 在视网膜神经节细胞变性中的机制研究

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目的：探索 Vps35 在视网膜神经节细胞变性中的作用机制。
方法：利用免疫荧光染色研究 Vps35、CDK5/p35、P- tau、lamp1、EEA1 及 UBE1 在视网膜神经节细胞的表达及共定位情况；在体实验利用大鼠视网膜谷氨酸兴奋性毒性模型，不同时间点取视网膜新鲜组织或者眼球制作石蜡切片，离体实验采用原代培养 RGCs 干扰或者过表达 Vps35，采用免疫蛋白印迹及 免疫共沉淀等方法对 Vps35 在视网膜神经节细胞变性的机制进行研究。
结果：抑制 Vps35 可以增加 CDK5/p35 活性，导致 p-tau s396 和 s404 表达量增加；抑制 CDK5 可以明显减少 Vps35 下调引起的 p-tau s396 表达增加；Vps35 和 p35、CDK5 和 p35 存在相互作用。

Vps35 下调可以减少 LAMP1、EEA1 表达，LAMP1 与 p35，Vps35 与 LAMP1 存在相互作用；Vps35 缺乏导致转运到溶酶体降解的 CDK5/p35 减少，细胞内 CDK5/p35 活性增强，进而导致 p-tau 增多。结论：本研究证实了 Vps35 减少会增强 CDK5/p35 激酶活性，导致视网膜 P-tau 增加，进而导致视网膜神经节细胞变性；进一步研究发现，Vps35 是通过影响 CDK5/p35 的溶酶体降解途径进而影响其活性的。

PU-266

人脐带血间充质干细胞源性微囊泡对高糖诱导下大鼠视网膜神经节细胞损伤的保护作用及机制

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目的 观察探讨人脐带血间充质干细胞源性微囊泡（hUMSC-MV）对高糖诱导下大鼠视网膜神经节细胞（RGC）损伤的保护作用及机制。**方法** 采用细胞计数 CCK-8 试剂盒测定各组 RGC 活性；膜联蛋白（Annexin）Ⅴ /碘化丙啶（PI）测量各组 RGC 凋亡率。实时荧光定量聚合酶链反应（RT-PCR）及蛋白免疫印迹法（Western blot）检测各组 RGC 内 B-细胞淋巴瘤/白血病-2（Bcl-2）、Bax、半胱天冬蛋白酶（Caspase）-3 mRNA 和蛋白的相对表达量。**结果** 超速离心法提取的 hUMSC-MV 形态为单个或成簇的圆形膜性囊泡样结构，直径约为 100~1000 nm。hUMSC-MV 表面高表达 CD44、CD29、CD73、CD105，阴性表达 CD49f、第二型人类白血球抗原、CD34、CD45。大鼠 RGC 与 hUMSCs-MV 良好内化。CCK-8 及 AnnexinV/PI 双染法检测结果显示，B 组细胞活性低于 A、C、D 组，B 组细胞凋亡率高于 A、C、D 组，差异均有统计学意义（*P*=<0.05）。RT-PCR 及 Western blot 检测结果显示，B、D 组 RGC 内 Bcl-2、Bax、Caspase-3 mRNA 和蛋白相对表达量高于 A、C 组，差异有统计学意义（*P*=<0.05）。进一步行 SNK-q 检验进行两两组间比较显示 D 组 RGC 内 Bcl-2 mRNA 和蛋白相对表达量高于 B 组，差异有统计学意义，B 组 Bax、Caspase-3 mRNA 和蛋白相对表达量高于 D 组，差异有统计学意义；B、D 组 RGC 内裂解的 Caspase-3 蛋白相对表达量高于 A、C 组，差异有统计学意义；B 组 RGC 内裂解的 Caspase-3 蛋白相对表达量高于 D 组，差异有统计学意义。**结论** hUMSC-MV 可通过降低高糖诱导下大鼠 RGC 内 Bax、Caspase-3 的表达及活化，增加 Bcl-2 表达发挥对 RGC 损伤的保护作用。

PU-267

兔眼二氧化碳激光辅助深层巩膜切除术 联合应用丝裂霉素 C 的安全性和有效性

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目的 探讨二氧化碳激光辅助深层巩膜切除术（CO_2 Laser-assisted Sclerectomy Surgery,CLASS）中丝裂霉素 C (Mitomycin C, MMC) 放置方式对兔眼眼压及睫状体超微结构的影响。 **方法** 将 18 只新西兰白兔随机分为 3 组，任选每只兔的一眼常规行 CLASS 手术。A 组术中不应用 MMC；B 组在巩膜瓣下放置 0.2 mg/mL MMC 海绵片 1 分钟后移除；C 组在巩膜瓣下和巩膜池内各放置 0.2mg/mL MMC 1 分钟。观察术后前房炎症情况并测量眼压。3 个月后,摘除眼球，用光学显微镜和透射电镜研究组织病理学变化。 **结果** A 组和 B 组前房炎症较轻，C 组有明显的前房炎症。A 组基线眼压 (18.32±0.12) mmHg（1mmHg＝0.133kPa） ,术后 90 天降至(14.33±0.33) mmHg (*P*<0.05)；B 组基线眼压(18.55±0.07) mmHg，术后 90 天降至(11.00±0.36)mmHg(*P*<0.05)；C 组基线眼压 (18.44±0.26)mmHg，术后眼压波动大且术后 90 天眼压升高为(24.17±2.05)mmHg(*P*<0.05)。三组均

可见疏松滤过间隙。A、B 组睫状体上皮均无明显异常。C 组睫状体非色素上皮脱落，参与细胞线粒体肿胀。**结论** CLASS 手术可有效降低眼压，术中巩膜瓣下应用 MMC 可提高手术效果且相对安全；巩膜瓣下及巩膜池内联合应用 MMC 的眼内毒性较大，可导致慢性睫状体损伤。

PU-268

糖尿病视网膜病变中微粒调节凝血功能的作用与意义

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糖尿病视网膜病变是糖尿病主要的微血管并发症之一，是成人致盲的首要原因，具有血管闭塞、微动脉瘤、出血斑点等病变特点。视网膜血管损伤常伴有凝血功能紊乱，但其机制仍不清楚。微粒是一类由活化或凋亡细胞出芽脱落细胞膜及细胞内器产生的颗粒，近年来，由微粒介导的细胞-细胞相互作用机制逐渐受到广泛的关注。研究报道显示，糖尿病视网膜病变病人及动物模型中可检测到数量明显升高的细胞微粒，其可促进新生血管生成、血管损伤及免疫炎症反应。目前，糖尿病视网膜病变中微粒调节凝血功能作用机制的报道较少，本文将重点综述由微粒促进凝血活性在糖尿病视网膜病变中的作用及其机制。糖尿病视网膜病变发生后，多种细胞来源的微粒可大量释放，并引起血管内皮功能障碍、免疫炎症反应、血眼屏障损伤、凝血功能紊乱等继发性损伤。同时，糖尿病视网膜病变具有高度促凝状态及微血栓形成的特点，可导致视网膜血管中 FXa 和 FIIa 等相关凝血因子水平升高，纤维蛋白形成，血小板-纤维蛋白原微血栓形成增加，凝血时间显著减少，微粒膜结构中的磷脂酰丝氨酸可能参与了凝血因子的激活。在糖尿病视网膜病变中，具有高促凝活性的微粒黏附于血管内皮，导致视网膜血管闭塞，然而，可导致促凝作用的微粒种类及各种类微粒的具体作用机制仍不清楚。微粒可能是糖尿病视网膜病变后介导并启动凝血级联反应的介质，其可通过细胞间转移引起凝血功能紊乱，从而影响视网膜血管的结构及功能。本文将探讨微粒介导凝血功能激活的发生机制，为微粒在糖尿病视网膜病变中对凝血的调节作用研究提供新的启示。

PU-269

Intravitreal Ets1 siRNA alleviates choroidal neovascularization in a mouse model of age-related macular degeneration

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Choroidal neovascularization (CNV) is the basic feature of neovascular age-related macular degeneration (AMD), the leading cause of blindness in the elders. Macrophages and microglia promote CNV via producing pro-angiogenic factors and inflammatory cytokines. Transcription factor E26 transformation specific-1 (Ets1) plays pro-angiogenic role via its pro-inflammatory function. In this study, Ets1 increased and localized in the macrophages and microglia of mouse laser-induced CNV region. ETS1 siRNA intravitreal injection ameliorated the leakage and area of CNV, as well as inhibiting the dysfunction of retinal pigment epithelium (RPE) cells and the activation of macrophages/microglia. Taken together, we provide a new insight into the molecular mechanism of CNV progression, in which Ets1 can be a new therapeutic target.

PU-270

炎症对糖尿病视网膜病变神经退行性改变的影响

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目的：探讨炎症对糖尿病视网膜病变神经退行性改变的影响，重点分析炎症对胶质细胞与神经元的影响，以期寻找早期有效的神经元保护方法。**方法：**收集并分析近 20 年来国内外关于糖尿病视网膜病变早期病理生理改变及炎症对糖尿病视网膜病变神经退行性改变方面的文献研究资料。**结果：**视网膜微血管与神经元及胶质细胞紧密关联，组成神经微血管单位。在糖尿病视网膜出现微血管障碍前，神经元就已经出现病理改变，提示糖尿病视网膜病变是一种由神经微血管单位损伤导致的神经血管性疾病。在糖尿病视网膜病变早期，炎症因子在患者血清、玻璃体和房水中的数目增加，这些炎症因子被证实可引起胶质细胞的活化，还可损害神经元甚至引起神经元的凋亡。胶质细胞在糖尿病视网膜病变早期活化后产生的炎症因子作用于神经元也引起神经元的凋亡。**结论：**糖尿病代谢改变引起的炎症反应不仅影响神经元和胶质细胞的发育，也影响胶质细胞的表达，从而破坏神经微血管单位，最终出现糖尿病视网膜病变神经退行性改变。

PU-271
miR-340 通过 KDM4A 调控糖尿病视网膜病“代谢记忆”的作用及机制研究

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目的 阐明 miR-340/KDM4A 通路在糖尿病视网膜病变（DR）“代谢记忆”中的作用及其机制。
方法 miRNA 表达谱芯片检测正常对照、高糖处理及“代谢记忆”组中 miRNA 表达水平，筛选高糖诱导“代谢记忆”相关 miRNA，结合生物信息学筛选出调控 KDM4A 的 miRNA；荧光素酶报告基因验证 miRNA 与靶基因的结合位点，qRT-PCR 及 Western blot 验证预测结果；构建 KDM4A siRNA 及 miRNA mimics 并转染细胞，观察上调 KDM4A 调控性 miRNA 后，对高糖诱导“代谢记忆”的影响及作用机制。
结果 （1）与正常对照组比较，高糖处理组及代谢记忆组中 miR-340 的表达显著下调（$P<0.01$），进一步的研究表明 KDM4A 是 miR-340 的下游靶基因；上调 miR-340 的表达后，代谢记忆组细胞中 NF-κB、MCP-1、IL-6 的表达水平及细胞凋亡水平显著降低，而 KDM4A 的表达显著降低。
结论 miR-340 可下调 KDM4A，抑制炎症因子 NF-κB、MCP-1、IL-6 的表达，进而抑制高糖诱发的视网膜组织细胞“代谢记忆”的发生；miR-340/KDM4A 通路是 DR“代谢记忆”的一个干预新靶点，在 DR 防治中有潜在的临床应用前景。

PU-272
EWS 蛋白抗高糖下视网膜微血管内皮氧化应激损伤的作用

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目的： 通过研究 EWS 蛋白在高糖下对视网膜微血管内皮氧化应激损伤的保护作用，探索 EWS 蛋白在糖尿病视网膜病变中的作用及机制，寻找疾病治疗的新靶点。
方法：（1）视网膜微血管内皮细胞（HREC）分别于正常糖（5.5mM）或高糖（30mM）全培养基中培养，通过腺病毒感染来过表达 EWS。（2）Western Blot 检测 HREC 中 EWS 蛋白的内源性表

达水平以及腺病毒感染后 EWS 的蛋白表达水平。（3）通过 DCFH-DA 探针标记，流式细胞仪检测细胞活性氧（ROS）水平。（4）通过细胞划痕及管腔形成实验观察 HREC 的细胞增殖迁移及血管生成能力。（5）链脲佐菌素（STZ 65mg/kg）腹腔注射建立糖尿病大鼠模型，玻璃体腔注射 Ad-E-OE 或 Ad-E-sh 过表达或抑制 EWS，免疫荧光检测视网膜组织 ROS 水平；伊凡思蓝检测视网膜血管通透性。

结果：（1）糖浓度的升高没有明显增加 EWS 的蛋白表达，但降脂药非诺贝特和糖酵解关键酶抑制剂 3PO 在高糖下增加其蛋白表达($p<0.05$)，腺病毒感染后，EWS 的蛋白水平明显升高。（2）EWS 蛋白明显降低高糖下 HREC 中 ROS 水平（$p<0.01$）。（3）EWS 可在正常糖培养下增加 HREC 的细胞增殖迁移能力（$p<0.001$），但对高糖下 HREC 的细胞增殖迁移以及血管的新生无明显影响。（4）抑制 EWS 表达增强了糖尿病大鼠视网膜 ROS 荧光强度及视网膜血管通透性，而过表达 EWS 后，糖尿病大鼠视网膜 ROS 荧光明显减弱 ($p<0.05$)。

结论：EWS 蛋白可以在体外视网膜微血管内皮细胞以及体内糖尿病大鼠视网膜组织中减轻高糖下血管内皮的氧化应激损伤，有望成为糖尿病视网膜病变的治疗的新靶点。

PU-273

GZ.1 家系致病基因筛查及其生物信息学分析

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目的：利用全外显子测序重新探索 GZ.1 家系的致病基因以及致病机制；方法：GZ.1 家系成员共 58 人，选其中患者 5 人，高眼压症者 1 人，健康者 1 人，家系外健康人 2 人，利用全外显子测序对其全血进行候选致病基因突变的筛选，参考千人基因组计划、dbSNP 和 ExAC 等基因数据库过滤找到可疑突变位点，进行生物信息学分析，推测突变位点导致的功能变化；结果：本实验共筛查出可疑致病基因突变位点共 12 家系 7 人中，5 位患者均存在 MYOC c.1109C>T 杂合突变（5/5），5 位患者及 1 位高眼压症者均存在 ABCC1 c.2530G>A 杂合突变（6/6），而这两个位点突变在家系内及家系外健康人中均未检测到（0/1，0/2）。生物信息学分析显示 MYOC 编码的糖蛋白在小梁网细胞中广泛分布，主要参与激活调节不同粘附细胞的信号通路，负责细胞及细胞外基质的粘附和迁移，而第三外显子 1109 位 C>T 的杂合突变会导致其蛋白折叠错误，进而无法正常分泌到细胞外而是积聚在细胞内，进而引发小梁细胞凋亡，最终引起眼压升高；ABCC1 编码细胞的一种跨膜转运蛋白，在眼组织中广泛分布，属于细胞的外排系统，介导有机阴离子和药物的输出、介导谷胱甘肽跨膜转运、氧化型谷胱甘肽及半胱氨酰白三烯等物质的外排；赋予抗癌药物的抗性，产生耐药等功能，参与上述物质的代谢通路，分析推测其第十九外显子 2530 位 G>A 杂合突变使其编码蛋白二级结构发生改变，进而影响其上述功能，引发氧化应激反应、神经元炎性损伤及钴胺素代谢障碍等病理改变，最终导致眼压升高及视神经损伤。结论：利用全外显子测序重新探索 GZ.1 家系的可疑致病基因突变，生物信息学分析帮助我们进一步推测筛选出的位点突变导致的功能改变，为今后进一步探索、验证其致病机制及基因治疗提供了客观的理论基础。

PU-274

抗 VEGF 药物对角膜新生血管的抑制作用

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目的：研究抗 VEGF 药物对角膜新生血管有无抑制作用。

方法：选用新西兰大白兔 20 只，缝线法诱导新生血管（CNV），随机分组为 4 组，每组 5 只。1、2 组分别于缝线 1 周后在角膜基质内注射 0.05ml 雷珠单抗，0.05ml 生理盐水。3.4 组分别于缝线 2

周后在角膜基质内注射 0.05ml 雷珠单抗，0.05ml 生理盐水。裂隙灯显微镜下观察并记录 CNV 的生长变化。图像处理软件测量 CNV 的长度、面积及管径。每组注射 1、2 周后取角膜行 HE 染色观察病理变化。
结果：缝线 1 周后，CNV 交叉长入角膜内。1 组注射 1 周后角膜新生血管明显减少。缝线 2 周后，CNV 变粗变长，呈网状生长。3 组注射 1 周后角膜新生血管明显减少。
结论：雷珠单抗能抑制角膜新生血管的生长，早期治疗效果优于晚期。

PU-275
Math5 对大鼠视网膜 Müller 细胞源性干细胞向神经节细胞转化的调控作用

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目的：研究 Math5 对大鼠视网膜 Müller 细胞来源的干细胞向神经节细胞分化过程的作用。
方法：取出生 10-21 天 SD 大鼠，分离视网膜，采用反复不完全胰酶消化法传代培养。取第三代视网膜 Müller 细胞，在去分化培养基中培养，诱导去分化。显微镜下观察细胞增殖状态，免疫荧光细胞化学、RT-PCR、Western blot 检测视网膜干细胞特异性表达产物 Pax6 和 Nestin 的表达；Edu 染色检测细胞增殖能力。构建 PCG-FU-Math5-GFP 慢病毒，在干细胞在分化培养基中用慢病毒转染视网膜干细胞，转染后置于分化培养基继续培养，采用免疫荧光化学检测神经节细胞特异性标志物 Brn3 并计数，采用单因素方差进行统计学分析。
结果：FACS 检测视网膜 Müller 细胞的纯度高达 98.01%。荧光显微镜 10 倍下选取 10 个非重叠视野，计算表达 GS 的细胞阳性率，GS 的阳性表达率为 98.5%±1.08%。RT-PCR 结果显示纯化的细胞高表达视网膜 Müller 细胞特异性表达物（GS、Vimentin、Clusterin、arbonic anhydrase），而视网膜中其他细胞的标志物无表达。去分化培养 3-7 天，细胞增殖聚集成球。免疫荧光细胞化学显示，神经球 Pax6 的阳性率为 92.94%±6.48%，Nestin 的阳性率 85.96%±6.04%；RT-PCR 及 Western blot 显示，神经球高表达 Pax6 和 Nestin 的 mRNA 及蛋白产物。PCG-FU-Math5-GFP 慢病毒转染组中神经节细胞阳性率为 50.40±8.22%，与对照组比较，差异具有显著意义。
结论：纯化的视网膜 Müller 细胞在去分化培养培养基中克隆形成神经干细胞，Müller 细胞是一种潜在的视网膜干细胞来源。Math5 对神经节细胞的分化有正向调控作用，能促进神经干细胞向神经节细胞分化。

PU-276
增值性糖尿病视网膜病变术前玻璃体内注射康柏西普的意义

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目的 探讨康柏西普辅助玻璃体切割术（pars plana vitrectomy,PPV） 在治疗增值性糖尿病视网膜病变 （proliferative diabetic retinopathy, PDR）中的效果及机制。方法 临床病例对照研究，收集临床诊断为增殖性玻璃体视网膜病变的患者 80 例 。根据术前有无玻璃体腔注射康柏西普分为单纯 PPV 组即 A 组(38 例 38 眼)和联合治疗组即 B 组(42 例 42 眼),其中联合治疗组于 PPV 术前 7d 进行玻璃体腔内注射。收集临床诊断为特发性黄斑裂孔的患者 15 例,作为对照组,采集玻璃体液 0.5 ml。 记录及分析术中及术后各项数据。 酶联免疫吸附实验测量玻璃体血管内皮生长因子(vascular endothelial growth factor, VEGF)， 色素上皮衍生因子的含量(pigment epithelium- derived factor,PEDF) 。结果 B 组手术时间短于单纯 PPV 组,硅油填充率低于 A 组,差异均有统计学意义

(P<0. 05);术后六个月视力 B 组优于 A 组，术后再积血的发生率也明显低于 A 组。A/B 两组的 VEGF 均高于对照组，PEDF 均低于对照组。B 组 PPV 时玻璃体 VEGF 含量低于单纯 PPV 组，PEDF 含量高于 A 组,差异均有统计学意义(P< 0.05)。结论 PPV 术前注射康柏西普治疗 PDR，能够有效提高术后 6 个月视力，减少术后再出血 。并且术前注射康柏西普后可降低玻璃体 VEGF，升高 PEDF 含量，提示 VEGF 和 PEDF 参与了增值性糖尿病视网膜病变的病理过程。

PU-277

Laquinimod 在青光眼视神经损伤中的作用机制探讨

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研究目的探讨 Laquinimod 在青光眼中对视网膜及 RGCs 的保护作用，并进一步探讨其可能的作用机制。**实验方法**选取 6-8 周 C57BL/6 小鼠，分为 sham 组，I/R 组和 Laquinimod 组。通过前房灌注建构建性高眼压模型， I/R 组给予 PBS 2uL 玻璃体腔注射，Laquinimod 组给予 Laquinimod 10mM/L 2uL 玻璃体腔注射，利用 HE 切片染色，荧光金上丘逆行标记 RGCs 计数。培养 BV2 小胶质细胞，LPS 100ng/ml 刺激 24h，利用 PCR 评估 Laquinimod 对小胶质细胞的抑制作用。**实验结果**视网膜 HE 切片染色，Laquinimod 组视网膜厚度（85.37±3.01%）和 I/R 组（78.84±4.22%）相比明显增厚，差异具有统计学差异（**P＜0.05）。荧光金上丘逆行标记 RGCs 计数，I/R 组有 60.26±3.93% RGCs 存活，Laquinimod 存活率为 70.83±4.33%，组间差异具有统计学意义（**P＜0.05）。Laquinimmod 干预组的 TNF-α、IL-1β 的表达同 LPS 组相比明显下调。**结论** Laquinimod 可能通过抑制小胶质细胞活性，可减轻青光眼视网膜及 RGCs 损伤，提高 RGCs 的存活。

PU-278

Pentraxin-3 在糖尿病性视网膜病变新生血管中的作用

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【目的】探讨 PTX3 对高糖环境下视网膜微血管内皮细胞（human retinal microvascular endothelial cells，HRMEC）成管、迁移及增殖能力的影响。
【方法】利用 RNA 干扰技术合成小干扰 RNA（siRNA），siRNA 转染 HRMEC 沉默目的基因 PTX3 的表达，通过 RT-PCR 及蛋白免疫印迹法（Western-Blot，WB）检测细胞中 PTX3 的下调情况，确立 siRNA 序列及最佳转染试剂浓度，并用于后续实验。将 HRMEC 分 4 组在不同条件下培养，分别为正常浓度葡萄糖、高浓度葡萄糖、高浓度葡萄糖+阴性对照、高浓度葡萄糖+siRNA。通过血管内皮细胞成管实验、划痕试验检测各组成管情况和迁移能力的差异；通过 Ki-67 免疫荧光染色检测各组细胞增殖能力的差异，通过 WB 检测细胞外调节蛋白激酶（extracellular regulated protein kinases，ERK）及成纤维细胞生长因子受体（fibroblast growth factor receptor， FGFR）活化水平。
【结果】与正常组相比，高糖组 PTX3 的蛋白及 mRNA 表达水平明显升高，差异性显著（P<0.05）。与高糖+阴性对照组相比，高糖+siRNA 组 FGFR、ERK1/2 的活化明显增多，差异性显著（P<0.05）。与高糖+阴性对照组相比，高糖+siRNA 组管腔形成明显增多。与高糖+阴性对照组相比，高糖+siRNA 组细胞迁移能力明显增强。与高糖+阴性对照组相比，高糖+siRNA 组细胞增殖能力明显增强。
【结论】 PTX3 表达抑制后 HRMEC 增殖、迁移及成管能力明显增强，PTX3 对于糖尿病性视网膜病变新生血管存在一定的抑制作用。PTX3 可能成为眼部新生血管性疾病治疗的一个新靶点。

PU-279
中药提取物毛兰素对大鼠角膜碱烧伤后新生血管抑制作用的研究

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Inhibitory effect of Chinese herbal extract, erianin, on neovascularization after corneal alkali burn in rats

目的：通过对角膜碱烧伤大鼠模型腹腔注射毛兰素，观察其对角膜新生血管（corneal neovascularization，CoNV）生长的影响，初步探讨毛兰素抑制大鼠 CoNV 生长的基本作用机制。
方法：建立碱烧伤诱导的 SD 大鼠 CoNV 模型，碱烧伤后第 1 天，将 72 只大鼠随机分为：25 mg• mL $^{-1}$ 毛兰素组 24 只、毛兰素溶剂组 24 只和 9 g•L^{-1}NaCl 组 24 只。 各组分别腹腔注射相应药物；观察并记录 CoNV 生长情况及角膜的形态变化。通过软件分析 CoNV 的长度及累及面积。碱烧伤后第 3 天、第 7 天、第 14 天、第 21 天和第 28 天 分别处死动物，取角膜标本采用免疫组织化学方法检测血管内皮生长因子 VEGF 、血管内皮生长因子受体-1VEGFR[A6] -1、血管内皮生长因子受体-2VEGFR-2 和基质金属蛋白酶-9MMP-9 的表达并进行统计学分析。
结果：与溶剂组和 9 g•L^{-1}NaCl 组，比较，腹腔注射 25 mg• mL -1 毛兰素组各时间点 CoNV 面积为（4.03±
0.21；10.22±0.53，12.32±0.64，较 NaCl 组（8.83±0.49，22.60±1.22，26.77±1.89）显著减少，差异具有显著性（P<0.01）。同时，毛兰素还能有效降低角膜组织中 VEGF, VEGFR-1, VEGFR-2 以及 MMP-9 的表达。
结论：毛兰素能显著抑制角膜碱烧伤后 CoNV 的生长，并且还能减轻碱烧伤后引起的炎症反应。

PU-280
以 S100A8/A9 蛋白相互作用为靶点的抗葡萄膜炎小分子化合物筛选

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目的：通过在现有大型小分子化合物库中筛选并体内验证靶向 S100A8/A9 蛋白的抑制剂，开发安全有效的小分子抑制剂，提高预后评估质量，指导最佳治疗方案。
方法：利用 ChemDiv 数据库、天然药物化合物库以及 FDA 批准小分子化合物库，通过基于分子对接的计算机虚拟筛选方法进行筛选。接着，利用 LPS 刺激的 RAW264.7 巨噬细胞炎症模型，进行基于体外模型的第二次小分子化合物筛选。进一步，利用 wistar 大鼠 LPS 诱导葡萄膜炎（EIU）动物模型，进行体内水平的筛选。裂隙灯下观察眼前节，对炎症反应程度评分。房水涂片计数细胞数量，ELISA 试剂盒检测 IL-6 和 TNF-α 的表达量。HE 染色观察虹膜睫状体的形态及炎症细胞浸润情况。
结果：叠合 S100A9 二聚化晶体结构（PDB ID:1IRJ）与 S100A8/A9 异四聚体晶体结构（PDB ID:1XK4），可知 S100A9 二聚化的抑制剂 CHAPS 可明显抑制 S100A8/A9 异四聚体中的 S100A9 二聚化，与 S100A9 的 C 末端 Trp88，His91，Glu92 存在空间位阻。因此，S100A9 二聚化的抑制剂在可单独抑制 S100A9 二聚化的同时，也将明显抑制 S100A8/A9 异四聚体中的 S100A9 二聚化，从而影响 S100A8/A9 异四聚体的形成与稳定。通过计算机虚拟筛选，筛选出 100 个可能有效的小分子化合物。通过细胞模型实验，我们进一步筛选到小分子化合物 1320288-19-4、1100598-32-0、1228585-88-3、E848-0926 和 V029-7772 能显著降低 LPS 刺激的 RAW264.7 细胞 IL-6 和 TNF-α 蛋白表达量水平。体内实验验证了 1228585-88-3 和 E848-0926 能有效减少 EIU 大鼠模型前房水中的的细胞数量。

结论：我们筛选的小分子化合物，或可替代激素类药物，可期待降低药物的副作用，对临床治疗葡萄膜炎具有重要意义。

PU-281

节律控制夜间光污染诱发负性情绪的神经环路机制

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光作为高级哺乳类，包括人类，生存环境中的重要因素，不仅仅参与视觉形成，也调控一系列不依赖于图像视觉的生理功能，包括节律、睡眠、瞳孔光反射、以及情绪，统称为非成像视觉功能[1]。之前的证据表明，光对情绪的调节有直接和间接两条途径，而视网膜中的第三类感光细胞——自感光视网膜神经节细胞（ipRGC），参与了光对情绪的直接调控[2]。在此基础上，我们建立了光干扰的小鼠模型，使用跨突触病毒追踪，光遗传和化学遗传学，膜片钳电生理和光纤记录，结合小鼠行为学范式，解析了直接介导夜间光干扰诱发负性情绪的神经环路，并且揭示了该环路中存在的节律门控现象，从而解释了夜间光有别于日间光照可对情绪产生负面作用的神经生物学基础。

PU-282

阿托伐他汀对体外培养的大鼠骨髓间充质干细胞 CXC 趋化因子受体 4 表达及迁移能力的影响

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目的 观察不同浓度阿托伐他汀（ATV） 对体外培养的大鼠骨髓间充质干细胞（BMSC）中 CXC 趋化因子受体 4（CXCR4）表达及迁移能力的影响。 **方法** 分离培养鉴定大鼠 BMSC。将第 4～6 代细胞分为对照组和 ATV 处理 0.1 nmol /L 组、1.0 nmol /L 组、10.0 nmol /L 组、100.0 nmol /L 组、1000.0 nmol /L 组。ATV 处理 12 h 后，细胞免疫荧光法、蛋白免疫印迹法（Western blot）检测各组细胞中 CXCR4 蛋白表达；实时定量聚合酶链反应（RT-PCR）检测各组细胞中 CXCR4 mRNA 表达；Transwell 小室法检测细胞迁移能力。组间细胞中 mRNA、蛋白表达和细胞迁移能力比较行独立样本 *t* 检验。**结果** 细胞免疫荧光法检测结果显示，1.0 nmol /L 组、10.0 nmol /L 组细胞中 CXCR4 蛋白表达量较对照组、0.1 nmol /L 组、100.0 nmol /L 组、1000.0 nmol /L 组明显增高；RT-PCR、Western blot 检测结果显示，10.0 nmol /L 组细胞中 CXCR4 mARNA、蛋白表达均较 1.0 nmol /L 组和对照组明显增高，差异有统计学意义（F_{mARNA}=20.36，*P=0.005* ；$F_{蛋白}$=33.17，*P=0.009* ）（；Transwell 小室法检测结果显示，10.0 nmol /L 组细胞迁移能力较 1.0 nmol /L 和对照组明显提高，差异有统计学意义（*F*=43.77，*P*=0.000 ）。**结论** 较低浓度 ATV 可呈剂量依赖性促进体外培养的 BMSC 中 CXCR4 表达并提高其迁移能力。

PU-283

Neuroprotective effect of insulin-loaded chitosan nanoparticles/PLGA-PEG-PLGA hydrogel (ICNPH) on diabetic retinopathy in rats

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To pursuit effective sustained release systems for insulin to treat diabetic retinopathy (DR), a novel insulin delivering system was developed via loading onto chitosan nanoparticles/PLGA-PEG-PLGA hydrogel (ICNPH). Examinations including electroretinography, hematoxylin-eosin (HE), transmission electron microscopy (TEM), terminal deoxynucleotidyl transferase dUTP nick-end labeling (TUNEL), immunofluorescence, western blot, and real-time PCR, were performed to evaluate the neuroprotective efficacy of ICNPH on DR by a single subconjunctival injection. Subconjunctival injection of ICNPH significantly reduced the decrease of scotopic B-wave amplitude, alleviated retinal micro- and ultrastructural changes and reduced retinal cells apoptosis caused in DR rats. Meanwhile, a significant reduction of vascular endothelial growth factor and glial fibrillary acidic protein expression as well as remarkably increased Occludin expression was also found in retinas with ICNPH treatment. The results reveal that ICNPH has sufficiently neuroprotective effect on retinas through subconjunctival injection in DR rats and facilitates controlled insulin delivery. It might be one of the therapeutic strategies for diabetic retinopathy in the near future.

PU-284

组氨酸对过氧化氢诱导人晶状体上皮细胞氧化损伤保护作用的实验研究

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目的 探讨组氨酸对过氧化氢(H_2O_2)诱导人晶状体上皮细胞（HLEC）氧化损伤的保护作用。
方法人晶状体上皮细胞系传代培养 24 h 后，分别加入不同浓度（5 μmol·L^{-1}、10 μmol·L^{-1}、20 μmol·L^{-1}、40 μmol·L^{-1}）组氨酸预处理 12 h 后，加入 100 μmol·L^{-1} H_2O_2 继续孵育 24h，倒置相差显微镜观察细胞形态改变，MTT 比色法检测组氨酸对 H_2O_2 诱导的 HLEC 活力的影响，流式细胞仪检测细胞凋亡率，比色法检测凋亡相关因子 caspses-3 及 caspase-9 的表达。
结果 氧化损伤可以诱导 HLEC 形态改变，组氨酸处理后，细胞形态逐渐得到改善。MTT 结果显示组氨酸对 HLEC 活性无抑制作用，组氨酸孵育 24 h 后细胞活性分别为 101.30±4.49%，100.31±3.53%，101.71±3.33%，99.30±3.00%，与对照组(99.67±2.67%)比较差异无统计学差异（P>0.05）；模型组 HLEC 经氧化损伤处理后，细胞活性明显下降(34.33%±3.71%)，用 20uM 及 40 uM 组氨酸处理后，晶状体上皮细胞活性分别提高到 23.00%±6.73%和 38.33%±7.91%，与模型组比较差异具有统计学意义（P<0.05）。流式细胞计数结果显示：正常对照组晶状体上皮细胞平均凋亡率为 1.99%±0.17%，经 H_2O_2 处理后，模型组晶状体上皮细胞凋亡平均率为 51.73%±4.97%，应用组氨酸后,高剂量组晶状体上皮细胞凋亡平均率为 26.55%±2.07%，与模型组比较，差异具有统计学意义（P<0.05）。此外组氨酸还可以减少 H_2O_2 所致 HLEC 内 caspses-3 及 caspase-9 的表达。
结论 组氨酸可以明显抑制 HLEC 凋亡，其抑制凋亡的作用可能是其防止和延缓白内障发生发展的细胞学基础，从而为寻求有效的防治白内障药物提供可靠的实验依据。

PU-285

Ahmed 青光眼引流阀表面改性对术后滤过泡纤维化的影响

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目的 选取天然蛋白页岩微米粒（Opal Shale microparticles，OS MPs）为载体，物理吸附丝裂霉素C（Mitomycin C，MMC）并研究其在抑制青光眼引流阀（Ahmed glaucoma valve，AGV）术后瘢痕化的作用。
方法 借助 OS MPs 物理吸附特性构建 AGV 药物缓释系统（Drug delivery system，DDS）；扫描电子显微镜观察 DDS 表面形态变化；紫外分光光度计检测 DDS 体外药物释放特性；CCK-8 法体外评估 DDS 对 HTFs 的毒性作用；制备 DDS 植入兔眼结膜下（n=6/组）分为 AGV-OS MPs-MMC 组、AGV-OS MPs 组和 AGV 组，分别记为实验组、对照组和空白组；术后 1 天、1 周、2 周、1 个月、2 个月、3 个月分别进行测量眼压、裂隙灯检查、AS-OCT 于固定位点活体测量滤过泡壁厚度和反光度；术后 3 个月对滤过泡行病理学检测。
结果 OS MPs 均匀吸附于 AGV 表面，平均可载 MMC 5.51 ± 0.08μg，体外释放时间持续 18 天；OS MPs 浓度在 0-250 μg/ml 范围内 HTFs 存活率无统计学差异（P＞0.05）；使用 Transwell 法细胞培养 7 天后，OS MPs 组与 OS MPs-MMC 组 HTFs 存活率分别为 75.7%和 9.7%；体内实验术后眼压实验组显著低于对照组和空白组（p＜0.05）； AS-OCT 显示术后 3 个月实验组滤过泡壁厚度显著低于对照组和空白组（p＜0.05）；滤过泡 HE 染色未见明显炎性细胞浸润；Masson 染色实验组滤过泡上壁、下壁胶原厚度均显著低于对照组和空白组（P＜0.05）；实验组滤过泡壁 α-SMA 和 PCNA 阳性比例显著低于对照组和空白组（P＜0.05）。
结论 以 OS MPs 为载体成功构建具有 MMC 缓释功能的 DDS；OS MPs 对细胞无明显毒性作用，MMC-OS MPs 体外可抑制 HTFs 增殖；MMC 缓释系统体内可减轻术后滤过道瘢痕形成。

PU-286
Conbercept combined with dexamethasone for macular edema following central retinal vein occlusion

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Background/Aims：To assess the efficacy and safety of intravitreal injections of 0.5 mg conbercept combined with 0.2 mg dexamethasone (DEX) sodium phosphate in macular edema following central retinal vein occlusion (CRVO).
Methods: Sixty-five patients were randomized 1:1 to receive intravitreal injections of 0.5 mg conbercept combined with 0.2 mg DEX or 0.5 mg conbercept alone at day 0 and until they were indicated for repeated treatment. The primary efficacy outcome measure was the mean change in best-corrected distance visual acuity (BCVA) from baseline to month 6. Secondary efficacy outcome measures included mean central retinal thickness (CRT) decrease from baseline to month 6, injection frequency and interval, percentage of patients who gained more than 15 Early Treatment Diabetic Retinopathy Study letters, and CRT less than 250 μm at month 6.
Results: Patients in both groups showed significant and comparable BCVA improvements and CRT reduction at the final follow-up. Patients in the conbercept+DEX group received the third and fourth intravitreal injection later than did those in the conbercept group (P < 0.01). The first injection interval was positively correlated with the second injection interval (r = 0.464, P = 0.002).The second injection interval in the conbercept+DEX group was longer than in the conbercept group (P < 0.001).
Conclusion: Both conbercept combined with DEX and conbercept alone can improve visual acuity and reduce CRT in macular edema following CRVO. Treatment interval was longer in the conbercept+DEX group, and the first injection interval was positively correlated with the second injection interval.

PU-287

PAMAM-雷帕霉素纳米给药体系对糖尿病小鼠视网膜神经元的保护作用

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目的：建立 PAMAM-雷帕霉素纳米给药体系，评估其对糖尿病小鼠视网膜神经元的作用。

方法：迈克尔加成反应合成 PAMAM-雷帕霉素纳米给药体系，傅立叶红外光谱分析和核磁共振氢谱分析表征纳米给药体系的基团和分子改变。 PAMAM-雷帕霉素与 ARPE-19 共培养，CCK8 法评价其不同浓度对细胞活性的影响，激光共聚焦显微镜观察细胞吞噬效率；qPCR 和 Western blot 分析纳米给药体系对 ARPE-19 细胞 mTOR、VEGF-A 表达的影响。构建 1 型糖尿病小鼠模型，眼内注射 PAMAM-雷帕霉素，观察其对视网膜组织病理的影响。

结果：红外光谱分析和核磁共振氢谱分析证实 PAMAM－雷帕霉素通过酰胺化反应接枝成功。当使用中低浓度（10^{-6}-10uM）PAMAM-Rapa 作用于 ARPE-19 细胞 24 小时，细胞活性无明显影响，而浓度增加至 100-500uM 时，细胞活性明显受到抑制。在与 ARPE-19 细胞共培养时，20um、50uM 的 PAMAM-Rapa-BODIP 都可以被细胞摄取，BODIPY 的荧光主要位于细胞质和细胞核。PAMAM－雷帕霉素抑制视网膜色素上皮细胞 mTOR 的磷酸化以及 VEGF－A 的表达。眼内注射 PAMAM-Rapa 可减少 1 型糖尿病小鼠视网膜神经元的损伤。

结论：PAMAM-雷帕霉素纳米给药体系可以抑制视网膜色素上皮细胞 VEGF-A 的表达，眼内注射具有保护糖尿病小鼠视网膜神经元的作用

PU-288

Branched polyethylene scaffold for tarsal plate repair: Preparation and evaluation.

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Objective:
To construct a branched polyethylene (Br-PE) scaffold and investigate its potential application in eyelid reconstruction.
Methods:
Br-PE scaffold was prepared using a porogen-leaching method, and wwas characterized by differential scanning calorimetry (DSC) and electron scanning microscope (SEM). The scaffolds and an Medpor control were further implanted in rabbits with eyelid defects.
Result
SEM showed that the Br-PE scaffolds had a porous structure, with interconnecting pores. Melting temperature data was obtained in DSC, indicating that Br-PE had a lower melting temperature (123.35°C) than Medpor (133.26 °C). After implanted in rabbit eyelid, Br-PE scaffolds provided satisfactory repair results with no obvious scar contracture deformities during eyelid damage repair in vivo. The histologic study showed a mild fibrous capsulation and biocompatibility to fibrovascular tissue infiltration compared to the Medpor control.
Conclusion
In summary, the tissue compatible Br-PE scaffolds show great potential for the development of tarsal defect repair in, accompanied by a moderate fibrous capsulation and rapid tissue integration.

PU-289

眼科药物非临床药代动力力学研究的重要性及案列分析

赵欣
1.Shenyang Xingqi Pharmaceutical Co.，Ltd.
2.Ltd.

眼科药物非临床药代动力力学研究的重要性及案列分析

药物的眼内过程主要研究药物在眼组织的吸收、分布、转化和排出的规律。由于人眼药代动力学样品收集难以实现，即使可以收集，但由于取样有限导致临床 PK 变异性大等原因，故难以预知靶组织中浓度-时间曲线和药代药效的关系。因此采用非临床药代动力力学研究预测人眼部的 PK 特性尤为重要。

案列 1.加替沙星单次多次给药兔眼药代动力学研究

采用 S-T 技术，给予迪友®兔眼组织中加替沙星不但可以迅速达峰，消除缓慢，且较少进入体循环；加替沙星在兔眼球后段较高的分布提示迪友®通过局部给药具有治疗球后感染潜在优势。

2.两种抗真菌药物的兔眼药代动力学研究

那他霉素较低的角膜渗透性提示其只仅用于眼表真菌感染的治疗；伏立康唑治疗深部感染更有优势；药理活性和角膜渗透性来看，伏立康唑优势更明显。

3.低浓度阿托品的非临床药代研究

药代动力学研究：幼龄兔组织单、多次眼组织分布动力学研究

幼龄兔单、多次给予 0.01%硫酸阿托品滴眼液后，药物在眼组织巩膜、虹膜、角膜和房水中均有明显分布，而在血浆中未见明显药物分布。幼龄兔单次给予硫酸阿托品滴眼液后，药物主要分布于角膜，然后依次为巩膜、虹膜和房水；幼龄兔多次给予硫酸阿托品滴眼液后，药物主要分布于角膜和巩膜，然后依次为虹膜和房水。幼龄兔连续给予硫酸阿托品滴眼液 14 天时，于给药 6 天后药物在眼组织中逐渐达到稳态，未见明显蓄积作用。

总之，眼科药物的非临床动力学研究是用数学分析手段定量研究药物在眼内的动态过程，可以实现药物的客观评价，对新药的设计、改进剂型、特别是对临床指导合理用药以及连续用药是否会在眼内发生蓄积，设计最优给药方案等有重大的实用价值。

PU-290

分子影像探针活体评价 Notch 信号通路调控 bFGF 诱导角膜新生血管生成的研究

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目的：本研究探讨分子影像探针活体评价 Dll4 在 bFGF 诱导角膜新生血管生成的调控机制和作用。方法：在 C57BL/6 小鼠的角膜基质层植入预先有 bFGF 的颗粒，免疫荧光评价角膜新生血管生成情况。VEGF-A、Dll4 和 Notch1 的 mRNA 水平应用 PCR 测定，蛋白水平应用 western blot 测定。角膜的基质细胞分别用抗 VEGF 抗体、地塞米松或 γ-分泌酶抑制剂（GSI）分别处理，分子影像探针活体评价角膜新生血管的生长情况。

结果：bFGF 植入后第 7 天角膜血管生成达到高峰。与对照组相比，诱导的动物模型中 VEGF-A、dll4 和 notch1 的 mRNA 和蛋白表达较高。在 bFGF 诱导的细胞中加入 GSI 24 小时后，与对照组相比，Notch1 和 dll4 的表达下调，而 VEGF-A 的表达水平上调。在 GSI 处理组分子探针标记较高，雷珠单抗和地塞米松治疗后降低了探针信号。

结论：Notch 信号通路在调节血管内皮生长因子表达、影响小鼠角膜血管生成中起作用。分子成像探针技术可以观察角膜缘血管生成中 VEGF-A 表达水平的变化。

PU-291
Nano-wafer 载药系统联合阿西替尼抑制抗角膜新生血管的研究

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目的：开发新型眼部缓释 Nano-wafer 载药系统，负载阿西替尼抑制角膜新生血管，探讨其抑制角膜新生血管的效果和分子机制。
方法：本研究应用碱烧伤角膜新生血管模型，筛选高分子聚合物联合药物复合体系，增强眼科用药的生物利用度，并减少毒副作用。选用负载阿西替尼从体内实验角度探讨其疗效及潜在的临床应用价值。
结果：获得半透明性 Nano-wafer，将阿西替尼溶解后放置于点阵排列的纳米级药物储存孔。药物自 Nanao-wafer 缓慢释放，增加药物在角膜表面的存留时间及吸收量，药物完全释放后，Nano-wafer 高分子支架完全溶解。经小鼠角膜碱烧伤诱发角膜新生血管模型验证抑制效果，提示经该载药体系负载的阿西替尼一日一次能有效抑制角膜新生血管生成，效率是其水溶液滴眼一日 2 次的 2 倍以上，同时减少毒副作用，并经分子水平验证抑制新生血管的分子机制。
结论：Nano-wafer 负载阿西替尼能有效抑制角膜新生血管，提高药物生物利用度，并减少药物的毒副作用，减少药物用量，该载药体系有望临床转化。

PU-292
原位可注射温敏性贝伐单抗/PECE 水凝胶用于治疗角膜新生血管的实验研究

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目的：构建一种原位可注射水凝胶长效制剂用于贝伐单抗的眼局部递送，期望能有效延长药物体内半衰期，增强药物生物利用度，最终为临床治疗角膜新生血管性疾病提供新的策略与方法。
方法：采用简单的物理混合方法，在 4℃条件下物理混合贝伐单抗溶液和 PECE 水溶液，获得装载贝伐单抗的 PECE 水凝胶体系；考察不同 PECE 浓度对于药物体外释放行为的影响；采用兔眼局部点眼给药途径，系统性考察 PECE 水凝胶的眼组织相容性以及药物代谢动力学参数；以角膜基质缝线埋置法构建兔角膜新生血管模型验证其体内抗新生血管疗效。
结果：通过简单的物理混合贝伐单抗溶液和 PECE 水溶液，在 37℃条件下成功构建一种原位可注射贝伐单抗/PECE 水凝胶。该水凝胶在体外药物释放实验中证实能够长效缓释贝伐单抗药物长达 28 天，同时药物的释放速度可以通过改变 PECE 浓度进行调控。单次眼结膜下注射 15%PECE 水凝胶可以在原位停留超过 3 周，且无明显的眼刺激性和毒副反应，具有良好的眼组织相容性。药物代谢动力学实验表明相比于单纯结膜下注射贝伐单抗溶液，结膜下注射贝伐单抗/PECE 水凝胶能够在角膜组织中提供更高的药物浓度。在兔角膜新生血管模型中，相比于贝伐单抗水溶液，结膜下注射贝伐单抗/PECE 水凝胶能够显著的减少角膜新生血管面积，从而拥有更好的治疗效果。
结论：PECE 水凝胶是一种安全、长效的新型眼局部药物递送系统，能够显著延长贝伐单抗药物在眼局部的滞留时间，从而达到长效抑制角膜新生血管。

PU-293

Short Synthetic Self-Assemble Peptide Amphiphiles for Contact-Lens Related Keratitis Treatment

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Objectives：Contact lens related microbial keratitis (CL-MK) is diagnosed to be ~ 4 and 20 in 10,000 for daily wear and extended wear, respectively. The overwhelming majority of CL-MK cases have been attributed to infection by Gram-negative bacteria; the other pathogen associated with CL-MK is fungi. An outbreak of fungi keratitis occurred in 2005–2006, and 31% of the confirmed cases required corneal transplantation. The challenge is to find the antimicrobial agents which can eradicate both bacteria and fungi. In recent years, antimicrobial peptides (AMPs) have received considerable attention as potent and broad-spectrum antimicrobial agents with the potential to overcome antibiotics resistance, AMPs eradicate both bacteria and fungi. We developed series of short synthetic self-assemble peptide amphiphilic with excellent antimicrobial activities and selectivities against various clinically relevant microorganisms, including Gram-positive, Gram-negative bacteria and fungi.
Method: In order to investigate the potential application of the peptides in keratitis treatment, contact lens-related fungal keratitis model was established in mice. The applications of synthetic peptides were evaluated for in vivo fungal keratitis treatment in comparison with the commercially available amphotericin B.
Results: It was found that the designed peptides are safe, and as effective as the clinically used amphotericin B. Compared to the costly and unstable amphotericin B, Our peptides are water-soluble, less expensive, stable, effectively clear Fungi biofilm and treat fungal keratitis in mice. Compared to the blank control group, 95% less fungal cells was found in the treated mice keratitis group. These results clearly demonstrated that peptides effectively eradicated fungi on contact lens and prevented contact lens related keratitis in mice eyes.
Conclusion: The peptides are presented as promising candidates for the treatment of fungal keratitis and have excellent potential antimicrobial agents to prevent contact lens related keratitis.

PU-294

角膜保护粘弹剂用于大白兔内眼手术应用价值观察

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目的
评价“角膜保护粘弹剂”在内眼手术中局部用于角膜表面，以防止因角膜干燥而损害上皮层的安全性和有效性。
方法
设计随机化动物实验。选用健康成年新西兰大白兔 20 只（20 只眼）行透明晶体摘除手术。随机分为试验组 10 只眼及对照组 10 只眼。试验组术中使用“角膜保护粘弹剂”覆盖并滋润角膜表面，避免角膜干燥并维持长时间的光学清晰度，对照组术中使用 Valeant Med Sp.z o.o.生产的“角膜保护剂”，本试验为非劣效设计。主要观察指标为术前、术后检查(1、3、7 天)包括泪膜破裂时间(BUT)、荧光素染色评分，Schirmer I 试验，（泪河高度、深度和面积）。同时评估术中角膜保护剂应用频率，术中光学清晰度保持时间，产品挤出及分散时间。

结果
试验组较对照组术中光学清晰度保持时间无统计学差异，试验组产品挤出及分散时间均短于对照组，有统计学差异，术后检查(1、3、7 天)包括泪膜破裂时间(BUT)、荧光素染色评分，Schirmer I 试验，（泪河高度、深度和面积）均无显著统计学差异。
结论
角膜保护粘弹剂可用于大白兔内眼手术动物模型术中保护角膜上皮，长时间维持光学清晰度安全、有效。

PU-295
载 FK506 带电纳米胶束的构建及对干眼的疗效评估

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目的：FK506 作为疏水性药物，泪液溶解度低、眼表滞留时间短、角膜透性差等缺点导致药物生物利用度低，临床用药效果不如预期。本研究根据临床干眼治疗的需要，以增加 FK506 角膜眼表滞留及渗透性以提高药物生物利用度为设计思路，构建具电荷响应的载 FK506 缓释带电纳米粒子。通过在体和离体兔角膜进行性能评价，干眼小鼠模型进行疗效评估。
方法：制备聚乙二醇-聚谷氨酸苄酯为载体基底材料 ，，将多肽化学键合至 HOOC 修饰。将 FK506 和共聚物自组装形成载 FK506 纳米粒子（FK506 NP）。应用激光粒度仪测定粒径、Zeta 电位等等。应用 UPLC-MS-MS 测定药物载药量和、包封率，、体外释药规律等，。CCK8 检测毒性。商品化 FK506 和游离 FK506 设为对照组。离体和在体角膜透过性实验，评价角膜渗透性。采用皮下注射东莨菪碱的方法，建立在 C57BL/6 雌性小鼠中建立的干眼模型，并评价药效。造模第 0、5 天，临床眼表评估，处死后分别组织取样进行 Tunel 细胞凋亡检测、 Real-time PCR 和 Western blot 对比分析炎症因子表达分析。
结果：1 纳米胶束粒径约为 350nm，PDI 约为 0.2。 2 与对照组相比，载 FK506 纳米胶束有很好的缓释效果，pH 响应。3 与对照组相比，载 FK506 纳米胶束眼表滞留时间更长，角膜渗透性更好，房水药物浓度聚集更久。4 在小鼠干眼模型疗效评估中，角膜荧光素钠染色评分显示带电纳米药物治疗组评分最低，治疗效果最佳，且该组 IL-2 等基因和蛋白表达量水平均显著下调，TUNEL 阳性染色细胞数显著减少。
结论：我们成功制备了具电荷响应的载 FK506 缓释带电纳米粒子，具高载药率和缓释作用。体内体外离体和在体实验证明表明该纳米粒子，与比对照组有相比，在更长的眼表停留时间更长、对更高的角膜有良好的渗透性，显著提高 FK506 生物利用度，增加对干眼动物模型具有良好的治疗效果。

PU-296
紫草素对人视网膜色素上皮细胞氧化损伤的保护作用

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探讨紫草素对人视网膜色素上皮（retinal pigment epithelium cells， RPE）细胞氧化损伤的保护作用及其机制。方法：RPE 细胞传代培养，分为对照组、氧化损伤组（100μmol/L 的 H_2O_2）、和紫草素（100 μmol/L、200 μmol/L）干预组。应用 MTT 比色法检测细胞增殖率，流式细胞技术测定细胞内活性氧（reactive oxygen species， ROS）表达，Hoechst33258 染色观察细胞核凋亡，Western-blot 检测 RPE 细胞内超氧物歧化酶（superoxide dismutase，SOD）及丙二醛（malondialdehyde，MDA）蛋白表达水平。结果：紫草素能明显抑制 H_2O_2 诱导的 RPE 细胞活性的下降，减少细胞内 ROS 生成，抑制细胞凋亡，紫草素组 SOD 的蛋白表达量显著高于氧化损伤组，MDA 的蛋白表达量

显著低于氧化损伤组（P<0.05）。结论：紫草素对 RPE 细胞氧化损伤具有抑制作用，其作用机制与上调 SOD 的表达及下调及 MDA 的表达有关，紫草素有望成为治疗视网膜病变的有效药物。

PU-297

Fabrication of a drug delivery system that enhances drug corneal penetration and therapeutic efficacy on fungal keratitis

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Abstract: Fungal keratitis (FK) remains a severe eye disease, and effective therapies are limited by drug shortages and critical ocular barriers[1,2]. Despite the high antifungal potency and broad spectrum of econazole (ECZ), its strong irritant insult and insolubility in water hinder its ocular application. We designed and fabricated a new drug delivery system based on a polymeric vector for ECZ in ocular antifungal application[3]. The novel system integrates the advantages of its constituent units and exhibits superior comprehensive performance after topical ocular administration. (Figure 1A) The results of in vivo and in vitro experiments demonstrated that the ECZ-loaded formulation exhibits significantly enhanced corneal penetration after a single instillation and excellent antifungal activity and good tolerance in rabbits. (Figure 1B) This novel drug delivery system might be a promising therapeutic approach for oculomycosis and as a candidate strategy for various hydrophobic drugs to overcome the barriers to treat many other ocular diseases.

PU-298

石菖蒲对栀子苷通过大鼠血-视网膜屏障的影响

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目的：观察芳香开窍药石菖蒲对栀子苷血-视网膜屏障通透性的影响。方法：将 40 只 SD 大鼠随机分为对照组、石菖蒲低、中、高剂量组，对照组给予栀子苷 5mg/kg 灌胃，石菖蒲低、中、高剂量组给予石菖蒲挥发油（15mg/kg、30mg/kg 和 60mg/kg）+栀子苷 5mg/kg 灌胃，5 天后收集各组房水，采用高效液相色谱法测定栀子苷含量。 结果：空白房水不存在干扰，栀子苷在 4.21μg/mL~67.36μg/mL 范围内线性关系良好（y=2.461x+1.018），定量限为 0.1263μg/mL，精密度、稳定性 RSD 值分别为 1.05%和 1.62%，对照组房水中栀子苷药物浓度（12.37±2.12）μg/mL 显著低于石菖蒲低剂量组（31.56±4.65）μg/mL、中剂量组（39.84±5.03）μg/mL 和高剂量组（45.22±5.13）μg/mL，且随石菖蒲剂量的增加，房水中栀子苷浓度增加，差异均有统计学意义（P <0.05）。结论：高效液相色谱法可准确测定房水中栀子苷的含量，石菖蒲挥发油可促进栀子苷透过大鼠血-视网膜屏障，增加其在前房内的药物浓度。

PU-299

聚乳酸壳聚糖纳米胶束对角膜上皮紧密连接的影响

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目的：前期在兔眼中发现聚乳酸壳聚糖纳米胶束能够穿透角膜上皮到达基质层，现考察其对角膜上皮紧密连接的作用。

方法：体外培养人永生化角膜上皮细胞(human corneal epithelial cells,HCEC)，细胞融合后加入聚乳酸壳聚糖纳米胶束共培养，激光共聚焦检测细胞紧密连接蛋白 ZO-1 和 Claudin-1 的结构变化，Western blot 分别检测紧密连接蛋白 ZO-1、Claudin-1，跨膜电阻仪检测上皮细胞跨膜电阻(transepithelial electrical resistance，TEER) 的变化。

结果：与对照组相比，聚乳酸壳聚糖纳米胶束能够使 HCEC 细胞单层中 ZO-1、Claudin-1 蛋白荧光强度显著减弱，并且分布呈不连续性，节点明显增多。Western blot 显示 HCEC 细胞紧密连接蛋白 ZO-1、Claudin-1 表达量明显下降，上皮细胞跨膜电阻(TEER) 降低。

结论： 聚乳酸壳聚糖纳米胶束能够打开角膜上皮紧密连接，或是其穿透角膜上皮的机制之一。

PU-300
Toxicological Assessment of Nanomaterials to Eyes

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The huge production and application of nanomaterials have grown tremendously during last few decades. The widespread exposure of nanoparticles to the public is provoking great concerns regarding their toxicity to human body. However, in comparison with the extensive studies carried out to examine nanoparticle toxicity to human body/organs, one especially vulnerable organ, the eye, is always neglected. Although it's a small part in the body, 90% of outside information is obtained via the ocular system. In addition, eyes usually directly interact with the surrounding environment, which may get severe damage from toxic nanomaterials compared to inner organs. Therefore the study of assessing the potential nanomaterials toxicity to the eyes is of great importance. In this review, we summarize the recent advance of some representative manufactured nanomaterials on eye toxicity. Firstly, we provide a brief introduction of eye anatomy and disorder related to particulate matter exposure. Following, the factors that may influence toxicity of nanoparticles to eyes are emphasized. Next, the studies of representative manufactured nanomaterials on eye toxicity are summarized and classified. Lastly, the limitations that are associated with current nanoparticle-eye toxicity research is proposed at the end of the review.

PU-301
对比水合氯醛在小儿给药时不同途径对眼科检查中的效果

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目的：探讨水合氯醛通过不同的给药途径在小儿眼科检查中的镇静效果。
方法：在我院随机抽取 2018 年 2 月到 2018 年 7 月 1-5 岁无法有效配合眼科检查的患儿共 80 人。随机分为试验组和对照组各 40 人。试验组为直肠给药，对照组为口腔给药。比较两组的起效时间，及维持时长。
结果：直肠给药起效时间明显快于口服给药（$p<0.05$）。直肠给药维持时长短于口服给药维持时长（$p<0.05$）。直肠给药成功率高于口服给药（$p<0.05$）。

结论：在婴幼儿进行眼科检查需要水合氯醛镇静时，可根据检查的项目和具体情况选择不同的给药方式，直肠给药成功率更高，起效时间更快，但维持时间短。口腔给药易造成胃肠道反应，但维持时间也更长。

PU-302

基于超声印压技术的离体角膜生物力学特性研究

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目的：利用超声印压技术探索离体兔眼角膜的生物力学特性。**方法**：选取 7 月龄兔眼球 7 只，制作完整离体角膜并固定于人工前房上。用微量注射泵给人工前房注水改变前房内的压力,并用压力传感器测量；在不同压力下，利用超声印压设备，在角膜顶点位置处进行印压实验，研究离体角膜力学参数与压力的关系。**结果**：离体角膜的加卸载曲线呈现非线性特点。前房内压力越大，角膜的加卸载曲线越陡峭。兔眼角膜的正切模量随压力升高而增大，在 7~45 mmHg 压力范围内，其数值范围为 0.30~1.55 MPa。随压力增大，滞回量大致呈现线性上升趋势。**结论**：基于超声印压技术获得的离体兔眼角膜切线模量随压力呈线性增大，滞回量等角膜粘弹特性参数与压力相关。

PU-303

基于网络药理学分析探讨清火柔肝方治疗 EAU 分子机制

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目的：基于网络药理学分析探讨清火柔肝明目方治疗实验性自身免疫性葡萄膜炎的药效学和分子机制。
方法：利用最新的网络药理学数据库查询并筛选复方清火柔肝明目方的有效的化学成分，同时进行网络拓扑分析药物可能的治疗靶点。再通过查询多个疾病靶点数据库，筛选自身免疫性葡萄膜炎的治疗靶点，并与有效成分治疗靶点构建出有效成分-疾病治疗靶点网络；拓扑分析关键节点参与的信号通路并进行富集分析，筛选出中药复方清火柔肝明目方治疗葡萄膜炎的可能信号通路。
结果：通过网络药理学分析清火柔肝明目方治疗葡萄膜炎显示主要通过影响 MAPK 信号通路、STAT3 和 NF-kappaB 信号通路，从而减少炎症因子的产生，调节机体免疫状况，调控葡萄膜炎的发生发展。动物实验结果证实免疫后第 12 天，药物干预组炎症评分和病理分级明显低于 EAU 模型组，但是高于正常对照组组，证实清火柔肝明目方具有治疗葡萄膜炎的的作用，同时 p38mapk、ERK、JNK mRNA:与 EAU 组比较，药物干预组表达降低,差异具有统计学意义(P<0.05);STAT3 mRNA:与正常组组比较,EAU 组表达降低,差异具有统计学意义(P<0.05)。药物干预组与 EAU 组比较表达显著降低,差异具有统计学意义(P<0.01)
结论：清火柔肝明目方主要是通过干扰 MAPK 通路、STAT3 通路和 NF-kappaB 信号通路，调节炎症因子，从而达到治疗葡萄膜炎。
关键词：清火柔肝明目方；葡萄膜炎；网络药理学

PU-304

常用防腐剂苯扎氯氨以及过硼酸钠诱导人结膜上皮细胞 DNA 损伤的研究

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目的：苯扎氯氨（benzalkonium chloride，BAC）是目前临床滴眼液中常添加的防腐剂，过硼酸钠是主要用于人工泪液中的新型氧化型低毒防腐剂。本研究拟探讨 BAC 和过硼酸钠对体外培养的人结膜上皮细胞 DNA 损伤、活性氧（reactive oxygen species，ROS）、细胞存活率的影响。
方法：将细胞分为二组，用浓度为 0.00001%、0.00005%、0.0001%、0.0005%及 0.001%的 BAC 和过硼酸钠分别作用于体外培养的人结膜上皮细胞 30 分钟。MTT 法检测细胞存活率；碱性彗星实验用于检测以 DNA 单链断裂（DNA single-strand breaks，SSBs）为主的 DNA 损伤；以乙酰乙酸双氯荧光素（DCFH-DA）为探针，应用流式细胞仪检测线粒体膜电位，细胞凋亡以及细胞内 ROS 水平。
结果：MTT 结果表明，0.0005-0.001%BAC 可导致显著的细胞存活率下降（P<0.001）。而碱性彗星实验则显示，0.00005%~0.001%的 BAC 均可导致显著的细胞核 SSBs（P<0.001），表明 BAC 可导致细胞核 SSBs 形成。随浓度的增加，BAC 所致的 DNA 损伤加重。流式细胞仪检测表明，不同浓度 BAC 处理后的人结膜上皮细胞内 ROS 水平较对照组增高，差异有显著性（P＜0.001）。与 DNA 损伤不同的是，0.001% 浓度组产生的 ROS 水平较 0.0005% 组低，这可能和细胞生存率的下降有关。而过硼酸钠作用于人结膜上皮细胞 30 分钟后细胞生存率无变化，0.001%浓度组可引起明显 SSBs，且可引起细胞内 ROS 水平增高，过硼酸钠在各个浓度组引起的 ROS 水平升高均小于 BAC。
结论：BAC 可导致人结膜上皮细胞细胞核 DNA 损伤并影响细胞活性，其 ROS 增加可能与 DNA 损伤相关。过硼酸钠不影响细胞生存率，高浓度可引起 DNA 损伤以及细胞内 ROS 水平增高。

PU-305

Exposure rate of hydroxyapatite orbital implants in enucleation surgery

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Objective To document the long-term exposure rate of unwrapped coralline hydroxyapatite (HA) orbital implants and explore possible risk factors.
Design This retrospective case series (May 2008–April 2013) reviewed the 234 patients with anophthalmia who underwent insertion of an unwrapped HA orbital implant by one of two different surgical closing techniques.
Results Of the 234 cases, 151 underwent a rectus end-to-end suturing closure technique and 83 underwent a rectus orthotopic suturing closure technique. The time of follow-up ranged from 25 months to 69 months (mean 41.9 months). Implant exposure developed in 11 cases. Three in the rectus end- to-end suturing closure group (2.0%) and eight in the rectus orthotopic suturing closure group (9.6%). In the rectus end-to-end suturing technique, a crosswisefixation of vascularised rectus muscle tissue is formed across the front of the implant; in this group the incidence of implant exposure was reduced (OR=8.11, p=0.013). Prior ocular surgery was found to be a factor increasing the incidence of HA exposure (OR=2.73, p=0.032).
Conclusions The placement of an unwrapped HA orbital implant with rectus end-to-end suturing in enucleation surgery was associated with a low rate of exposure in most cases. The end-to-end suturing creates a joint-like structure over the HA sphere, protecting the Tenon’s capsule and conjunctiva from its rough surface and reducing the risk of implant exposure. Prior ocular surgery may be another risk factor for HA exposure.

PU-306

聚富马酸丙二醇酯/甲基丙烯酸羟乙酯多孔支架材料的体内生物学效应及眼睑重建效果研究

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目的 分析评价组织工程 PPF-HEMA 多孔支架的体内生物相容性，同时观测其原位缺损重建修复效果，为睑板替代材料的构建提供新的思路和合成方法，为眼睑重建用组织工程睑板替代材料的临床应用奠定前期实验基础。

方法 构建兔全层睑板缺损动物模型，以去人脱细胞真皮基质作为对照，植入 PPF-HEMA 多孔支架材料。通过观察眼睑缺损修复效果、组织切片 H&E 染色和 Masson 染色观察炎症反应和材料－组织反应情况，评价 PPF-HEMA 多孔支架材料的可操作性和在体生物相容性。

结果 成功构建兔全层睑板缺损动物模型，术后 8 周 ADM 组和 PPF-HEMA 2 组眼睑缺损完全修复，未见任何成角畸形，PPF-HEMA 1 组可见轻度成角畸形，对比阴性对照组可见明显眼睑成角畸形及疤痕形成。组织学切片 H&E 染色可见术后 1 周各组炎症反应明显，同一时间实验组与对照组炎症反应评分无统计学差异，随植入时间增加各组炎症反应均明显减轻，术后 8 周与术后 1 周炎症反应评分有统计学差异。组织学切片 Masson 染色可见 PPF-HEMA 多孔支架材料孔隙内新生结缔组织长入，支架周围胶原纤维束包裹，ADM 组、PPF-HEMA 1 和 PPF-HEMA 2 组 Image J 测量其厚度分别为 28.0 ± 9.3 μm，65.2 ± 16.8 μm 和 63.5 ± 17.3 μm。

结论 组织工程 PPF-HEMA 多孔支架具有良好的体内生物相容性，在兔全层睑板缺损动物模型中 PPF-HEMA 2 组表现出更好的修复效果，较低的炎症反应以及较慢的降解速率，相比于 ADM 其炎症反应无明显差异，但长期稳定性更好。本研究结果为仿天然睑板结构与性能高分子材料的研究奠定了扎实的实验基础，为临床上眼表疾病的治疗提供了一条新的途径。

PU-307

眼眶整复用掺镁生物陶瓷支架生物力学及生物相容性研究

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目的 眶内植入材料的选择和使用是影响眼眶整复效果的关键因素之一。理想的眶内植入材料需具备可靠的力学强度，良好的生物相容性和生物活性，以及与缺损部位新骨生成相匹配的降解速率。本研究拟制备一种用于眼眶整复的掺镁生物活性陶瓷材料，并对其理化性质进行表征和优化。

方法 以化学共沉淀法及高温无压烧结法制备掺镁生物活性陶瓷。采用物相分析及元素分析明确材料组分，扫描电镜观察材料表面及断面微结构，万能测试机检测分析抗压强度、弹性模量、抗弯强度、杨氏模量和断裂韧性等力学性质，体外降解实验明确材料降解特性，模拟体液浸泡实验明确体外生物活性。并通过系统研究掺镁比例及烧结策略对材料理化性质的影响规律，优化掺镁生物活性陶瓷材料的制备参数。

结果 本研究采用化学共沉淀及无压烧结法成功制备了掺镁生物活性陶瓷，并通过系统研究掺镁比例和烧结条件对材料理化性能的影响规律，获得了该材料制备的最优化条件。稀掺杂镁可影响硅酸钙陶瓷的烧结特性，在显著增加力学强度的同时保持材料良好体外活性，且可通过掺镁量对材料降解速率进行调节。

结论 本研究成功制备了一种掺镁生物活性陶瓷材料。该材料具有可靠的力学性质，降解速率可控，且具有良好的体外活性，可作为眼眶整复植入体的候选材料。

PU-308
个体化定制眼眶修复生物活性多孔材料的制备及性能研究

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目的 我们以化学共沉淀及无压烧结法成功制备了掺镁生物活性陶瓷材料，并通过优化制备条件，使其成为眼眶整复的理想候选材料之一。本研究拟以掺镁生物活性陶瓷为建造原料，应用 3D 打印技术制备可基于个性化需求定制的生物活性多孔材料，并明确该技术方案的可行性。

方法 采用化学共沉淀法合成掺镁生物陶瓷粉体，球磨后以聚乙烯醇为粘结剂混合成“墨水材料”，采用自动注浆成型式三维打印设备制备生物陶瓷多孔支架。通过对打印参数的调控研究 3D 打印技术构建掺镁生物套餐多孔支架的可行性，系统研究了打印参数、孔径尺度、掺镁比例及烧结制度对多孔支架微结构及力学性质的影响规律，为个体化定制掺镁生物陶瓷多孔支架优化制备条件和参数。

结果 采用自动注浆成型式三维打印设备可成功构建生物陶瓷多孔支架，且通过对打印参数的调整可对支架进行孔径尺度和孔隙率的调节。在保持理想孔径尺度和较高孔隙率的前提下，镁稀掺杂能显著提高支架力学强度，抗压强度可达 120 MPa 以上，远高于以同样方式制备的镁黄长石、白硅钙石支架的力学强度。此外，烧结温度和烧结制度通过影响生物活性陶瓷中晶粒生长方式对支架力学强度产生影响。

结论 采用自动注浆成型式三维打印技术可成功构建基于个体化定制的掺镁生物活性陶瓷的多孔支架，并能通过调节打印参数对支架宏观孔径尺度、孔隙率及微观结构进行调控。本研究中构建的掺镁生物活性陶瓷多孔支架具有优越的力学性能，且能满足基于个体的定制需求，为眼眶整复材料提供了新的材料和构建方式。

PU-309
新型 SS-OCT 技术测量眼部结构的精确性和一致性研究

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目的：全面评估基于扫频源光学相干层析原理 SS-OCT 的新型光学生物测量仪（IOLMaster 700）在健康儿童、健康成人和白内障患者中的可靠性，并将其与被作为“金标准”的生物测量仪（IOLMaster 500）进行比较。
方法：前瞻性对照研究。两名经验丰富的观测者分别使用 IOLMaster 700 连续三次测量 301 名受试者的 301 只眼，并记录下眼轴长度 AL、角膜曲率 K、前房深度 ACD、晶状体厚度 LT、中央角膜厚度 CCT 以及角膜直径 WTW 的数值。IOLMaster 700 的可重复性和再现性研究采用重测 TRT、变异系数 CoV 和组内相关系数 ICC 进行分析。两种仪器之间的一致性研究采用 Bland-Altman 法。
结果：除了白内障患者的 WTW（TRT，0.27-0.44mm；ICC，0.86-0.95），SS-OCT 光学生物测量仪测量获得的眼部生物学参数在健康儿童、健康成人和白内障患者中均具有高度可重复性和再现性。三次测量平均值（TRT：AL=0.02mm，CCT=5.41μm，ACD=0.03mm，LT=0.03mm，Km=0.17D，WTW=0.22mm）比单次测量具有高度再现性（TRT：AL=0.04mm，CCT=7.43μm，ACD=0.06mm，

LT=0.05mm，Km=0.26D，WTW=0.35mm）。两种仪器在三组人群之中的一致性也较好，具有窄的95％LoAs。
结论：新型 SS-OCT 光学生物测量仪在测量健康儿童、健康成人和白内障患者眼部生物学参数方面具有良好的可重复性和再现性，且与被作为“金标准”的生物测量仪比较具有优异的一致性。

PU-310

Photoreceptor Protection by Mesencephalic Astrocyte-Derived Neurotrophic Factor (MANF)

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Purpose: Retinal degenerations are a major cause of vision impairment and blindness. Neuroprotective therapy is a promising therapeutic strategy for retinal degenerative diseases. In this study, we investigated a novel neurotrophic factor mesencephalic astrocyte-derived neurotrophic factor (MANF) in the retina.
Methods: The MANF expression levels of retinas were examined by Western blot analysis. Recombinant human MANF was expressed in *E. coli* and purified. The right eyes were injected with recombinant human MANF. The left eyes were injected with PBS and served as controls. ERGs were recorded with a UTAS system. Plastic sections were cut through the eyes were sectioned at 1 mm along the vertical meridian and were examined by light microscopy. For whole-mount stain, retinas were incubated with Alexa fluor 488-conjugate Peanut agglutinin (PNA), flat-mounted on slides and examined by confocal microscopy.
Results: MANF is expressed at a high level during postnatal development and the expression declines to a lower level as the retina matures. Müller cells are the major cells expressing MANF. It is also found in the retinal ganglion cells, in the inner nuclear layer (INL) neurons, and in retinal pigment epithelial (RPE) cells. Intravitreal injection of recombinant human (rh)MANF significantly protected rod and cone photoreceptors in rats carrying the rhodopsin S334ter mutation, and preserved electroretinograms (ERGs) in the *rd10* (*Pde6brd10/rd10*) mice.
Conclusions: MANF is a native protein in the retina and is a potent neurotrophic factor for photoreceptor protection.

PU-311

Topical Application of Paeonol Ameliorates Inflammatory Response in Experimental Dry Eye Model via Modulating NF-κB Pathway

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Purpose: To investigate the role of paeonol, a novel compound isolated from Chinese herb, in ocular surface damage of dry eye.
Methods: Topical applications of paeonol or vehicle were performed in the mice subjected to desiccating stress (DS). The phenol red cotton test was used to measure tear production, and Oregon green dextran staining was performed to assess corneal epithelial barrier function. PAS staining was used to quantify conjunctival goblet cells. Immunofluorescent staining, western blot and real-time quantitative RT-PCR were conducted to detect the expression of matrix metalloproteinase (MMP)-3 and -9 in corneal epithelium. Apoptosis of ocular surface was assessed by TUNEL staining,,immunofluorescent staining and western blot of the activation of caspase-3

and -8. Inflammation was evaluated by $CD4^+$T-cell infiltration and production of T helper (Th) cytokines, including IL-13, IL-17A, IFN-γ and TNF-α in conjunctiva. The total and phosphorylated NF-κB in conjunctiva were detected by Western blot.
RESULTS. Compared with vehicle control mice, paeonol-treated mice showed increased tear production, decreased goblet cell loss, and improved corneal barrier function. Topical paeonol decreased the expression of MMP-3 and -9 in corneal epithelium, and suppressed cell apoptosis in ocular surface under DS. Meanwhile, topical paeonol reduced $CD4^+$T-cell infiltration, with decreased production of IFN-γ, TNF-α and IL-17A and increased production of IL-13 in conjunctiva. Paeonol-treated group down-regulated NF-κB signaling pathway activated in experimental dry eye model.
CONCLUSIONS：Topical application of Paeonol effectively alleviated ocular surface damage via modulating NF-κB Pathway to suppress cell apoptosis and $CD4^+$ T-cell–mediated inflammation in ocular surface of dry eye.

PU-312
静电层层自组装法修饰的脱细胞猪角膜基质的制备及其性能研究

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目的:利用静电层层自组装法在脱细胞猪角膜基质(APCM)上修饰牛血清白蛋白(BSA)，并探索修饰后的生物工程猪角膜光学及理化性质。
方法:本研究以 BSA 作为组装蛋白经静电层层自组装技术，在 APCM 表面组装（壳聚糖-BSA-透明质酸）n 多层膜。我们通过连接 FITC 的 BSA 观察组装蛋白在 APCM 表面的分布，利用扫描电镜和透射电镜观察组装前后 APCM 表面和内部组装材料的分布和胶原纤维结构的变化；应用国家标准(YY0290.2-2009)对组装前后的 APCM 进行透明度检测；经组装后的 APCM 浸出液培养角膜上皮细胞，采用 CCK-8 法检测 APCM 的细胞毒性。组装 BSA 后的 APCM 置于 PBS 溶液中浸泡，0-7d 每天取样，检测并计算 BSA 累积释放量。
结果：FITC-BSA 作为组装蛋白经静电层层自组装后，APCM 上皮面、侧面、基质面均能观察到明显绿色荧光，而内部未观察到荧光信号。扫描电镜下可见对照组上皮面可见轮廓清晰的胶原纤维，表面覆盖平坦、光滑的前弹力层；组装组上皮面可见明显凹凸的膜状物覆盖，未见裸露的胶原纤维。透射电镜下对照组胶原纤维轮廓清晰，相邻板层胶原纤维相互垂直、排列规则；组装组胶原轮廓较模糊，胶原纤维间隙变小、排列紧密。组装后的 APCM 与对照组的透明度肉眼未见明显差异，在 400-800nm 波段内透光率亦无显著差异。角膜上皮细胞经组装后的 APCM 浸出液培养，细胞增殖与对照组无显著差异。BSA 释放曲线说明组装于 APCM 表面的 BSA 可缓慢释放，4 天左右达到平台，且累积释放蛋白量随组装时 BSA 浓度增高而增高。
结论：本研究利用静电层层自组装方法成功在 APCM 表面组装 BSA，内部胶原结构无明显影响，透明度符合国家标准，无明显细胞毒性，且组装后的 BSA 可持续释放 4 天以上。本研究为后续加载各类生长因子甚至药物提供了理想的模型，为拓宽生物工程角膜在复杂角膜疾病中的应用提供基础。

PU-313
新型纳米粒子优化转染 VEGF-siRNA 抑制视网膜新生血管的实验研究

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目的 研究新型纳米粒子作为基因载体在氧诱导视网膜病变动物模型中对视网膜新生血管的抑制作用。**方法** 用改良的 Smith's 法建立高氧诱导视网膜病 SD 大鼠模型,于 P14 天球内分别注射雷珠单抗、VEGF-siRNA 纳米粒子、纳米粒子 5ul。于 P18、P25 天各组中随机抽取两只小鼠 FITC-dextran 心脏灌注后行视网膜铺片观察视网膜血管形态的变化;分别于各组随机抽取两只小鼠,行 HE 染色,统计突破视网膜内界膜的血管内皮细胞核数;同时分别于各组随机抽取四只小鼠，west-blot 检测 VEGF，行 Real-time PCR 检测 VEGF-mRNA。**结果** 成功建立了氧诱导视网膜病变小鼠模型。FITC 心脏灌注后显示视网膜无灌注区及新生血管范围在雷珠单抗、VEGF-siRNA 纳米粒子组明显改善,两者效果相当。雷珠单抗、VEGF-siRNA 纳米粒子组均能有效抑制新生血管生成；行 VEGF 的 Western Blot 检测,玻璃体腔内注射后 6 天，雷珠单抗组、VEGF-siRNA 纳米粒子组较模型组 VEGF 蛋白降低,差异有显著性($P<0.05$)，两组间无显著性差异($P>0.05$)。Real-timePCR 检测 VEGF-mRNA 显示 VEGF-siRNA 纳米粒子组较其他组均明显降低($P<0.05$)。 **结论** 成功建立大鼠视网膜新生血管模型，该纳米粒子携带治疗基因可以减少视网膜新生血管的生成,与雷珠单抗作用相当，在体内可维持较长时间的治疗效果,具有临床应用的开发前景。

PU-314

Photothermal conversion hydrogel based mini-eye patch for relieving dry eye while long-term use of the light-emitting screen

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Purpose: The frequent usage of various lighting screens has made dry eye syndrome an increasingly serious phenomenon. To relieve this global problem, we have developed a photothermal conversion hydrogel based mini-eye patch.
Methods: Gold nanoparticles(GNRs) were synthesized by a seed-mediated method, and then used as the inner cores to grow Pd shell by PdCl42-reduction. Then, gelatin was added to prepare GNRs @ Pd hydrogel eye patch by genipin cross-linking. We implanted temperature sensitive ink (complex composed of amino resin & styrene maleic anhydride copolymer) in the eye patch, which could change color at different temperatures. Heating performance of the eye patch was accessed with an Infrared temperature profile and the circulating
temperature experiment. The safety assessment of the eye patch was conducted by H&E staining of the mouse's eyelid skin and CCK-8 assay. Keratograph 5M non-invasive ocular surface analyzer was used to assess the impact of eye patches on dry eyes.
Results: We found that GNRs @ Pd hydrogel eye patches could sense various visible light and responsed by heating up spontaneously. Results from CCK-8 assay and H&E staining showed that the eye patch has good safety performance. Measurements of the first noninvasive tear break-up time (NITBUT), the average NITBUT, the tear meniscus height (TMH), combined with red eye analysis, further demonstrated the patch's eye-protective properties.
Conclusion: After being pasted to the lacrimal gland, the hydrogel patch converts various light irradiations into heat and stimulated the lacrimal gland to produce more tears to relieve dry eye. The built-in temperature-sensitive ink can play an important role in warning people of their excessive eye usage. Because this recyclable strategy does not interfere with normal eye use, it is thus more environmentally friendly and convenient than ordinary infrared eyewear.

PU-315

氮掺杂石墨烯-生长因子药物体系在年龄相关性黄斑变性治疗中的应用和 机制探讨

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研究目的：年龄相关性黄斑变性（AMD）是全球第三位致盲疾病，可引起中心视力的不可逆性、急剧下降。目前临床针对 AMD 的治疗手段主要是在疾病中晚期，新生血管产生以后，施加抗血管内皮细胞因子药物抑制络膜新生血管的形成，防止疾病的进一步恶化。无法挽回不可逆的视力丧失。AMD 的主要致病原因之一是视网膜色素上皮细胞（RPE）受到氧自由基的攻击，发生氧化应激反应，导致细胞功能损伤或凋亡。而 RPE 细胞内含有脂褐质和较多长链不饱和脂肪酸，易受到自由基攻击。因此，如果能够在 AMD 疾病初期有效降低 RPE 细胞中的活性氧(ROS)浓度，那么就有望在疾病初期实现对于 AMD 的治疗干预，预防中心视力受损。本研究旨在利用氮掺杂石墨烯-生长因子药物体系消除 ROS, 从而在疾病初期进行治疗干预并探究具体机制。
方法：采用实验室自主发明的一步法边缘功能球磨法[1,2]，利用含氮生物分子碱性成纤维生长因子（bFGF）改性石墨烯，实现边缘氮掺杂，制备氮掺杂石墨烯（NG）[3]，并分别建立细胞和动物水平上 AMD 模型，考察药物体系对于 ROS 还原的催化能力和对体内抗氧化系统的激活作用。并深入探讨具体机制。
结果：ROS 的浓度相对于纳米材料处理前显著降低了 40%，RPE 细胞生存率也得到了明显的提高。
结论：合成了具有高催化性能的纳米复合材料，NG 和 bFGF 具有良好的协同作用，能够有效降低光损伤 RPE 细胞模型中的 ROS 水平。

PU-316

Short-Term Results of Acellular Porcine Corneal Stroma keratoplasty for herpes simplex Keratitis

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Background: Corneal transplantation is a common surgical intervention for restoring vision loss due to corneal damages. However, for cultural reasons, there is a huge shortage of donor corneas in China. Acellular porcine corneal stromas (APCSs) can be used as corneal substitutes in lamellar keratoplasty for corneal ulcers. This study was conducted to analyze the results of APCS use for herpes simplex keratitis (HSK).
Methods: The study involved HSK patients who underwent keratoplasty with APCSs from February 2016 to October 2017 in the second affiliated hospital of Zhejiang University. Patient data was collected at seven days, one month, three months, six months and at the last follow-up (7-25 months) postoperative. The corneal transparency, neovascularization, visual acuity, and graft stability were observed.
Results: Thirteen patients with HSK including five patients with corneal perforation were included in this study, nine patients underwent deep anterior lamellar keratoplasty (DALK) and five perforation patients underwent double lamellar keratoplasty. There were nine men and four women with an average age of 62.5±5.6 years old (ranging from 52 to 70 years old). The mean postoperative follow-up duration was 15.1±5.8 months (ranging from 7 to 25months). At the last visit, visual acuity improved in nine patients (69.2%) compared with preoperative (p=0.008).The grafts of seven individuals (53.8%) were completely transparent or slightly opaque; their corneal transparency score had improved significantly compared with before the surgery (p=0.010). Various degrees of neovascularization were present in 11 of the 13 patients (84.6%), most neovascularization gradually stabilized. Graft dissolution occurred in three eyes (23.1%) during the

observation period, two underwent regrafting, the other one became stable after treatment. Three patients underwent second allograft transplantation, two of which encountered APCS graft dissolution and one of the patients requested a human donor allograft transplantation due to transparency issues despite the absence of adverse issues.
Conclusion: APCS seems to be effective in the treatment of HSK and can be used in HSK with corneal perforation by using double lamellar keratoplasty in an emergency.

PU-317

ACT001 对于 NMO 动物模型治疗的机制研究

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视神经脊髓炎（NMO）诊断难，发病重，恢复差，致盲率高，患病后严重影响患者生活质量、给家庭及社会带来极大的负担。
然而，ON 的治疗目前在全球尚无突破性进展，NMO 的治疗目前主要包括急性期的治疗和缓解期的治疗。急性期治疗的目的在于尽量减少神经系统功能障碍并促进疾病的恢复，目前主要包括大剂量甲泼尼龙冲击治疗、血浆置换、静脉注射免疫球蛋白及环磷酰胺等；缓解期治疗的目的主要在于减少疾病复发的次数及减轻复发的严重性，主要为免疫抑制剂的应用，包括硫唑嘌呤、吗替麦考酚酯、米托蒽醌、甲氨蝶呤、利妥昔单抗等等。但是，目前现有的治疗手段均是广泛的抑制全身的免疫系统，减轻全身自身免疫反应，患者的全身副作用较大，有引发严重感染的风险，且治疗方法容易引发激素耐受从而导致治疗失效。
小胶质细胞是中枢神经系统一种重要的免疫细胞，有研究者认为其在 NMO 发病后期发挥了重要作用，与 NMO 患者的预后不良存在密切关联。因此小胶质细胞有望成为治疗 NMO 的全新靶点。
ACT001（含笑内酯二甲基胺富马酸）是我国拥有独立知识产权、自主研发的 1.1 类新化药。该化合物安全性好，具有能够通过血脑屏障的特点，同时可以抑制炎性通路 NF-kappaB。
鉴于 ACT001 安全性好，同时具有特异性颅内消炎的特点，我们对 ACT001 能否用于治疗 NMO 进行了系统性研究。我们发现，ACT001 在 10 μM 的浓度即可以显著抑制被 LPS（细菌脂多糖）激活小胶质细胞的炎性因子释放（TNF-α、IL-6）。同时，NMO 疾病动物模型显示，ACT001 在 60 mg/kg 的剂量下，能够非常明显的改善 NMO 动物模型行为学评分，缓解 NMO 动物模型症状，与细胞实验结果完全一致。更为难得是，ACT001 在 NMO 疾病动物模型上体现了替代激素治疗的潜力（ACT001 治疗组效果优于激素治疗对照组），上述结果提示我们 ACT001 具有强大的应用于 NMO 临床治疗的潜力。

PU-318

Effects of Salidroside on Trabecular Meshwork Cell Extracellular Matrix Expression and Mouse Intraocular Pressure

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PURPOSE: Excessive accumulation of extracellular matrix (ECM) in the trabecular meshwork (TM) reduces aqueous humor outflow, which likely contributes to elevation of intraocular pressure (IOP) in primary open-angle glaucoma (POAG). Salidroside, a phenolic glycoside isolated from *R. rosea* is reported to prevent pro-fibrotic responses by inhibiting Smad signaling pathway activated by TGFβ in liver, lung, and kidney tissues. We tested if salidroside can (1) inhibit TGFβ2-induced ECM expression in cultured human TM cells, and (2) lower TGFβ2-induced ocular hypertension in the mouse.

***METHODS**: Cultured human TM cells stimulated with 5 ng/mL TGFβ2 for 48 h were treated with salidroside for 24 h. The expressions of fibronectin (FN), collagen type IV (COL-IV), laminin (LN) were evaluated by quantitative PCR, western blot, and immunocytochemistry. BALB/cJ mice were injected intravitreally with an adenoviral vector encoding a bioactive mutant of TGFβ2 (Ad.hTGFβ2$^{226/228}$) in one eye to induce ocular hypertension, with the uninjected contralateral or Ad.Empty-injected eyes serving as controls. Mice were treated with a daily intraperitoneal injection of 40 mg/kg salidroside. Conscious mouse IOP values were measured using a TonoLab rebound tonometer.*

***RESULTS**: In cultured human TM cells, treatment with TGFβ2 increased expressions of FN, COL-IV, and LN, as assessed by qPCR, western blot, and immunocytochemistry, all of which were significantly and completely ameliorated by 30 μM salidroside. Daily intraperitoneal injections of salidroside (40 mg/kg), starting either at Day 0 (same day as Ad.hTGFβ2$^{226/228}$ injection) or at Day 14, significantly lowered TGFβ2-induced ocular hypertension in the mouse. In contrast, salidroside did not affect IOP of control eyes.*

***CONCLUSIONS**: These results demonstrated that salidroside is capable of minimizing TGFβ2-induced ECM expression in cultured human TM cells. It also reduced TGFβ2-induced ocular hypertension in the mouse. These findings indicate that this phenolic glycoside may be useful as a novel treatment for POAG.*

PU-319

Lanosterol and 25-hydroxycholesterol dissociate crystallin aggregates isolated from cataractous human lens via different mechanisms

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Cataract, a crystallin aggregation disease, is the leading cause of human blindness worldwide. Surgery is the only established treatment of cataracts and no anti-cataract drugs are available thus far. Recently lanosterol and 25-hydroxycholesterol have been reported to redissolve crystallin aggregates and partially restore lens transparency in animals. However, the efficacies of these two compounds have not been quantitatively studied ex vivo using patient tissues. In this research, we developed a quantitative assay applicable to efficacy validations and mechanistic studies by a protocol to isolate protein aggregates from the surgically removed cataractous human lens. Our results showed that both compounds were effective for human cataractous samples with EC50 values at ten micromolar level. The efficacies of both compounds strongly depended on cataract severity. Lanosterol and 25-hydroxycholesterol were two mechanistically different lead compounds of anti-cataract drug design.

PU-320

开发一种壳聚糖/海藻酸钠凝胶缓释药物用于青光眼治疗

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目的：青光眼治疗一直是一个具有挑战性的问题，局部滴眼液是眼前段疾病最常用的治疗方法，其生物利用度低，仅为 1%~10%；此外，局部滴眼液的作用时间通常较短，因此需要经常使用滴剂。这可能导致患者因眼表毒性而感到不适，并且正确的给药方案高度依赖于患者的依从性。因此，本研究的目的是开发一种有较好生物相容性、可生物降解和缓释药物的壳聚糖/海藻酸钠凝胶传递系统。
方法：制备空白和载有马来酸噻吗洛尔的壳聚糖/海藻酸钠水凝胶，测定在体外药物释放曲线以及评估其体外降解行为、抗菌性能和细胞毒性；在体内研究中，将水凝胶植入新西兰白兔的结膜下，比较空白和载有药物的水凝胶降低眼压效果和进行组织学和免疫组织化学分析。
结果：在体外，壳聚糖/海藻酸钠水凝胶能够持续缓释马来酸噻吗洛尔大约 2 周，该载药体系降解性能良好，具有抗菌性能且细胞毒性小；在体内研究中，将带有空白或载有马来酸噻吗洛尔的壳聚糖/海藻酸钠水凝胶植入新西兰白兔的结膜下，与空白组比较载药组降低眼内压效果明显且可持续大约 2 周，进行组织学和免疫组织学分析，载药体系表现出较小的炎症反应及没有引起任何的不良反应。
结论：载有马来酸噻吗洛尔的壳聚糖/海藻酸钠水凝胶显示出良好的生物相容性，可行性和理想的持续药物释放曲线，并且具有一定抗感染作用的潜力。该药物缓释载体可适用于青光眼治疗。

PU-321

静电纺丝法制备复合载药膜片在大鼠视神经钳夹伤模型中的运用及其性能的表征

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实验目的：
为改善外伤性视神经病变（TON）造成的视神经损伤修复障碍，利用静电纺丝法制备具有三维立体构架和药物缓控释的神经修复载药膜片。初步探明复合载药膜片对视神经损伤修复的疗效。
实验方法：
1. 以聚乳酸-羟基乙酸共聚物（PLGA）和胶原（COL）为原材料，通过静电纺丝技术制备具有微孔结构纳米纤维层作为视神经修复复层载药膜片支架。
2.运用 transwell 板共培养实验，评价复合载药膜片的细胞相容性及药物对 RGCs 细胞存活率和形态的影响。
3. 将所制备复合载药视神经修复膜片植入到大鼠视神经损伤模型中，通过免疫荧光染色视网膜铺片计数，病理组织 HE 切片，免疫组化表达分析，评估复合载药修复膜片对损伤后视神经的修复效果。
实验结果：
1.具有合适的断裂伸长率与弹性模量的 PLGA/COL（3/1）电纺纤维作为里层材料，其良好的亲水性可作为脂溶性药物的载体；良好的力学支撑的 PLGA 电纺膜作为外层材料，其疏水性特征可作为亲水性药物的载体，制作复合载药修复膜片。
2. 原代 RGCs 细胞与复合载药膜片运用 transwell 板共培养，RGCs 细胞生长状态良好，说明载药膜片具有良好的生物相容性。具有延缓视网膜神经节细胞凋亡的效果，有利于轴突生长。
3. 将复合载药膜片植入大鼠视神经钳夹伤模型，视网膜免疫荧光铺片结果提示复合载药膜片在短期内能延缓视网膜神经节细胞的凋亡，能有效的减缓损伤后炎症，提高 GAP-43 神经生长相关蛋白的表达。
实验结论：

1.静电纺丝技术制备复合载药修复膜片具有较好的亲水性、机械性能和生物相容性，且能对所包载的药物起到缓控释效果。
2.复合载药膜片与视网膜神经节细胞体外共培养能延缓视网膜神经节细胞的凋亡。
3.初步研究显示包载药物的复合载药膜片通过在视神经损伤处在短期内可改善和控制损伤处的炎症反应，增加神经生长相关蛋白的表达，延缓视网膜神经节细胞的凋亡。

PU-322

载左氧氟沙星交联脱细胞角膜基质透镜的制备及体外药物释放实验研究

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目的：比较交联脱细胞角膜基质透镜与脱细胞角膜基质透镜载药能力及体外药物释放效果。
方法：1. 采用生物脱细胞方法，制作脱细胞角膜基质透镜；将脱细胞角膜基质透镜（平均角膜厚度137.35um，平均直径6.37mm） 分为A组（对照组，不行化学交联）、B组（0.01 mmol EDC/mg脱细胞角膜基质透镜），每组样本量N=4。
2.采用化学交联法进行胶原交联，交联剂为 1-（3-二甲氨基）丙基二亚胺，N-羟基丁二酰亚胺（EDC/NHS），将 EDC/NHS 5:1 溶解在 2ml MES 缓冲溶液（PH 6）中，交联时间：4h,室温，完毕后用 PBS 冲洗。3.将两组样本均放置于浓度为 50mg/ml 左氧氟沙星 溶液中浸泡 3h（常温）；取出载药脱细胞角膜基质透镜后分别放置于 1mlPBS 溶液中，在 37℃的恒温箱中孵化时间长达 21 天；采用高效液相色谱分析法对 1d, 7d,14d,21d 不同时间点进行药物浓度检测。
结果：脱细胞交联角膜基质透镜与脱细胞角膜基质透镜相比，不同时间点左氧氟沙星的平均释放浓度有显著性差异（***P***<0.05）。
结论:体外实验研究表明，左氧氟沙星在脱细胞交联角膜基质透镜中的缓释作用较脱细胞角膜基质透镜缓释效果更好，可作为理想的眼表用药的缓释载体。

PU-323

星点设计-效应面法优化雷公藤红素纳米结构脂质载体处方

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目的： 采用星点设计-效应面优化法（Central Composite Design and Response Surface Methodology, CCD-RSM）筛选雷公藤红素纳米结构脂质载体（CEL-NLC）最佳处方。
方法: 首先，通过测定雷公藤红素在各种脂质中的溶解度，筛选出最佳脂质。然后采用微乳法制备CEL-NLC，以粒径（Y1）、包封率（Y2）和载药量（Y3）为评价指标，采用 CCD-RSM 考察固体脂质质量（*X*1）、液体脂质质量（*X*2）、表面活性剂/助表面活性剂质量比（*X*3）为考察对象，对结果进行多元线性和二项式方程拟合，得到理论的最优处方，并对其进行实验验证。
结果： 采用星点设计-效应面优化法获得雷公藤红素纳米结构脂质载体的最优处方及工艺，按最优处方制备的 CEL-NLC 包封率为(75.28 ±3.44%)，载药量为(0.45±0.02%)，粒径为(18.66±2.63) nm，多分散指数（PDI）为 0.39±0.03。

结论：星点设计-效应面优化法能精确获得雷公藤红素纳米结构脂质载体的最佳处方，且其包封率高，粒径小，稳定性好，方法可靠，为进一步的药动学研究奠定基础。
关键词：雷公藤红素； 纳米结构脂质载体； 星点设计-效应面法

PU-324

Cation instructed steroidal prodrug supramolecular hydrogel

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Purpose: To propose an ionic coordination strategy for the design of a steroidal prodrug supramolecular hydrogel.

Materials and methods: The hydrogel composed of nanofibril networks formed spontaneously by the introduction of divalent cations to a succinated dexamethasone (Dex-SA) aqueous solution at room temperature.

Results: A rheological analysis indicated that the formed Ca2+/Dex-SA supramolecular hydrogel exhibits dominant elastic and thixotropic properties. The formed Ca2+/Dex-SA supramolecular hydrogel allowed the gradual release of Dex and Dex-SA in vitro. Storage stability studies showed the Dex-SA xerogel was quite stable in storage at -20 °C for 35 days. The supramolecular hydrogel caused negligible cytotoxicity against HCEC and L-929 cells at drug concentrations up to 2 mM. Additionally, the proposed Ca2+/Dex-SA supramolecular hydrogel displayed a comparable anti-inflammatory efficacy with Dexp.

Conclusion: Overall, the cation instructed steroidal prodrug supramolecular hydrogel might be a promising ophthalmic drug delivery system for anti-inflammatory therapy.

PU-325

四种不同大鼠晶状体固定方法对比研究

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目的对比研究四种固定大鼠晶状体的方法，优化大鼠晶状体固定方法。**方法** 选择 4 种常用固定液（FAS 眼球固定液、Davison's 固定液、10%中性甲醛固定液、4%多聚甲醛），固定大鼠晶状体组织，并制成石蜡切片，经 HE 染色后在显微镜下观察。**结果** FAS 眼球固定液固定的晶状体组织切片无碎裂，Davison's 固定液的晶状体组织中央区碎裂，10%中性甲醛、4%多聚甲醛固定液固定的晶状体组织可见严重皱缩、空隙和空泡形成。**结论** FAS 眼球固定液固定的大鼠眼球晶状体组织石蜡切片质量效果优于 Davison's 固定液、10%中性甲醛固定液和 10%中性甲醛固定液。

PU-326

Comparison of fixation effects of four different complex fixatives on rat lens tissue

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To compare the effects of four kinds of fixative solutions on paraffin section of mouse lens tissue and optimize the fixing-method of paraffin section in mouse lens tissue.**Methods** Four kinds of conventional fixatives were selected for the test,including FAS eyeball fixative, Davison's solution,10% neutral buffered formalin,4%Paraformaldehyde.Rat eyeball tissues were fixed with four different fixatives,embedded,sliced and then stained with HE method.The paraffin slices were observed under the light microscope.**Results** The structures of lens in FAS eyeball fixative were clear and intact,and the cells were arranged regularly and compactly.There was tissue fragmentation in the central region of lens.The ones fixed in 10% neutral buffered formalin and 4%Paraformaldehyde showed eyeball distortion and contraction,space and spherules.**Conclusion** The rat lens slides made from tissues fixed by FAS eyeball fixative are better than fixed by Davison's solution,10% neutral buffered formalin and the 4%Paraformaldehyde ones.

PU-327

聚嘧啶束结合蛋白相关剪接因子通过活化 Nrf2/HO-1 信号通路抑制氧化应激诱导的新生血管形成的作用研究

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目的: 探讨玻璃体腔注射聚嘧啶序列结合蛋白相关剪接子（PSF）慢病毒对氧诱导的视网膜病变的小鼠模型（OIR）模型小鼠新生血管的抑制作用及相应机制。**方法：**将实验动物随机分对照组，OIR 模型组，OIR 模型+慢病毒空载体组（Vec 组），OIR 模型+ PSF 慢病毒组（PSF 组）。12 日龄，Vec 组小鼠玻璃体腔注射 1ul 空载体病毒；PSF 组小鼠玻璃体腔注射 1ul 的 PSF 慢病毒；模型组小鼠不作任何处理。17 日龄，收集各组样本，经石蜡切片苏木精-伊红染色计数突破视网膜内界膜的血管内皮细胞核；视网膜铺片观察各组小鼠荧光素眼底血管造影及视网膜无灌注区相对面积；qPCR 法比较各组细胞中 NF-E2 相关因子 2（Nrf2）和血红素氧合酶 1(HO-1)的相对表达量; WB 检测视网膜中 Nrf2 和 HO-1 蛋白表达含量。**结果:** HE 染色结果中，PSF 组中突破内界膜的视网膜新生血管内皮细胞核数与模型组及 Vec 组相比显著性减少，差异具有统计学意义（*P1*=0.0102; *P2*=0.0011）；视网膜铺片结果显示，PSF 组中无灌注区总面积较模型组及 Vec 组显著性减少，差异具有统计学意义（*P1*<0.0001, *P2*<0.0001）。qPCR 结果显示，PSF 组与模型组及 Vec 组相比，Nrf2 及 HO-1 的 mRNA 表达量均显著升高，差异具有统计学意义（$P_{Nrf2}1$=0.0066，$P_{Nrf2}2$=0.0067；$P_{HO\text{-}1}1$=0.0025，$P_{HO\text{-}1}2$=0.0027）; WB 结果显示，PSF 组、模型组及 Vec 组相比，Nrf2 及 HO-1 的蛋白表达量均显著升高，差异具有统计学意义（$P_{Nrf2}1$<0.0001，$P_{Nrf2}2$<0.0001；$P_{HO\text{-}1}1$<0.0001，$P_{HO\text{-}1}2$=0.0009；$P_{PSF}1$=0.0002，$P_{PSF}2$<0.0001）。**结论**: PSF 通过上调 Nrf2 及 HO-1 的表达，抑制氧化应激诱导的新生血管形成。

PU-328

丁基苯酞对过氧化氢诱导下视网膜色素上皮细胞损伤的作用研究

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目的：探讨经过氧化氢对视网膜色素上皮细胞进行氧化应激刺激时，丁基苯酞（NBP）对细胞凋亡的保护作用。**方法：**以人 RPE 细胞系为实验细胞，以 H_2O_2 模拟氧化应激损伤，并在刺激同时加入 NBP 进行干预。通过 MTT 法检测细胞受到氧化应激刺激后的细胞活力；经苏木-伊红染色对 RPE 的细胞形态进行观察；使用 Hoechst33258 染色法观察 RPE 细胞凋亡形态；使用线粒体膜电位检测（JC-1）观察细胞膜电位改变及细胞早期凋亡变化；使用 DCFH-DA 染色观察细胞内活性氧自由基(ROS)生成堆积情况；经细胞免疫荧光和免疫印迹分析 NBP 对血红素氧合酶 1(HO-1)表达的影响。**结果：**NBP 干预可显著提高氧化应激刺激后 RPE 细胞的生存能力；；24h 分组中，模型组细胞生存力 0.36±0.03，治疗组细胞生存力 0.47±0.04，两组相比较差异具有统计学意义（t=4.857,*P*=0.0007）；48h 分组中，模型组细胞生存力 0.45±0.05，治疗组细胞生存力 0.82±0.06，两组相比较差异具有统计学意义（t=9.225,*P*<0.0001）。运用 HE 染色以及 Hoechst33258 染色观察发现，经 NBP 治疗能保护细胞维持生理形态并缓解凋亡；JC-1 染色结果显示 NBP 处理可有效抑制细胞早期凋亡；经 DCFH-DA 染色发现，NBP 能显著逆转细胞内 ROS 的堆积；细胞免疫荧光提示 NBP 处理组的 HO-1 荧光染色强度明显高于对照组，(t=10.27，*P*=0.0005)，差异均具有统计学意义，而免疫印迹结果显示 NBP 可通过时间(F=238.9，*P1*=7.307,*P2*=11.05,*P3*=0.0025)依赖性的方式上调 HO-1 的表达水平，且差异均具有统计学意义。**结论：**氧化应激损伤可下调 RPE 细胞的生存力并诱导其出现凋亡，NBP 通过上调 HO-1 的表达，有效提高 RPE 细胞抗氧化能力，减轻细胞损伤并抑制细胞凋亡。

PU-329

Dkk-1 对鼠视网膜 Müller 细胞去分化而来的干细胞分化为光感受器细胞的作用及机制

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目的：探讨 Dkk-1 在鼠视网膜 Müller 细胞来源的干细胞向光感受器样细胞分化过程的作用及机制。**方法：**取原代培养的 SD 大鼠第三代纯化视网膜 Müller 细胞在去分化培养基（含 1×N2, 2×B27，20ng/ml EGF,10ng/ml bFGF）诱导去分化，倒置相差显微镜下观察去分化后细胞的形态特征，免疫荧光组织化学、qPCR 以及 Western blotting 检测 Nestin 以及 Pax6 的表达情况，Edu 染色检测视网膜干细胞的增殖活性。采用 150ng/ml Dkk-1 处理视网膜干细胞，在培养的第 7 天和 14 天，计算 Rhodopsin 抗体染色阳性的光感受器样细胞占总细胞数的比例，并检测视网膜干细胞和分化细胞中的 Crx、Nrl、total β-catenin 和 nuclear β-catenin 蛋白的表达差异。统计学软件采用 SPSS 23.0，选择 Student's t- test 进行统计学分析，取 *P* <0.05 有统计学意义。**结果：**视网膜 Müller 细胞去分化培养 3-7 天，细胞增殖聚集成球。免疫荧光细胞化学显示，神经球 Nestin 的阳性率为 93.52%±4.12%，PAX6 的阳性率 87.63%±5.36%；qPCR 及 Western blot 显示，神经球高表达 PAX6 和 Nestin 的 mRNA 及蛋白产物。Edu 染色显示神经球内细胞核阳性率为 85.20±6.22%，表明细胞具有增殖能力。Dkk-1 组光感受器样细胞阳性率为 52.33%±7.01%；对照组为 23.30%±4.45% (t=3.056，P＜0.05)，qPCR 和 Western-blot 检测结果显示， Dkk-1 组 Nrl、Crx 蛋白的表达上调， total β-catenin 和 nuclear β-catenin 的表达下调。**结论：** Dkk-1 通过抑制 β-catenin 对视网膜干细胞向光感受器的定向分化有促进作用。

PU-330

RPE 细胞和间充质干细胞外泌体与 AMD 发病机制的相关研究

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目的: 观察蓝光诱导及氧化应激下 RPE 细胞外泌体对于正常 RPE 细胞 NLRP3 炎性体、VEGF-A 及 Akt 等细胞因子表达，将间充质干细胞外泌体作用于蓝光诱导 RPE 损伤模型及大鼠脉络膜新生血管模型，证实其抗 VEGF 效果。

方法: Western blot 检测 RPE 细胞外泌体表面 CD63 及 IL-1β、IL-18、caspase-1 等蛋白相对表达水平。将损伤及正常 RPE 细胞外泌体作用于正常 RPE 细胞分别作为实验组及对照组，利用 MTT 法检测 ARPE-19 细胞的细胞活力。提取间充质干细胞外泌体以不同浓度及时间作用于蓝光诱导 RPE 模型，Western blot 及 RT-PCR 检测 VEGF-A 蛋白及 mRNA 表达；将干细胞外泌体以不同剂量对大鼠 CNV 模型行玻璃体腔注射，观察 FFA 渗漏及病理结构改变。

结果: 光损伤 RPE 细胞外泌体中 IL-1β、IL-18、caspase-1 蛋白表达量明显高于对照组，（P＜0.05）；损伤 RPE 细胞外泌体作用下， IL-1β、IL-18、caspase-1 蛋白表达量及 NLRP3 mRNA 表达明显高于对照组（P＜0.05）。氧化应激损伤 RPE 外泌体作用组与对照组比较，细胞在波长 570 nm 处的 A 值明显降低（P＜0.05）；VEGFA 蛋白及 mRNA 相对表达量升高，Akt 蛋白及 mRNA 相对表达量降低（P＜0.05）。干细胞外泌体处理蓝光损伤 RPE 细胞后，VEGF-A 蛋白及 mRNA 表达均有下降（P<0.05），干细胞外泌体处理大鼠 CNV 模型，随注射剂量增加，改善渗漏效果越显著且 VEGF-A 蛋白表达下降（P<0.05）。

结论: 蓝光诱导 RPE 细胞外泌体可使 NLRP3 炎性体相关细胞因子 IL-1β、IL-18、caspase-1 蛋白和 NLRP3 mRNA 表达上调。干细胞外泌体能够有效降低蓝光诱导的人 RPE 细胞的 VEGF-A 表达，有效改善大鼠 CNV 模型渗漏及 VEGF-A 表达。

PU-331
FSTL1 在增殖性糖尿病视网膜病变疾病进程中潜在作用机制探索

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目的 根据前期 RNA-Seq 检验结果，观察缺氧条件下 FSTL1 在 PDR 患者发病过程中所起作用。方法 收集临床 PDR 及正常患者血样标本，应用 PCR 及 ELISA 对 FSTL1 以验证 FSTL1 在 PDR 进展中潜在作用。随后体外培养人视网膜血管内皮细胞，将其分为对照组、缺氧组，应用 MTT 实验以分别构建缺氧模型，分别模拟正常及 PDR 患者缺氧条件下体内微血管细胞状态，在模型下应用 PCR 检验 FSTL1 及相关因子表达情况，同时构建猴视网膜血管内皮细胞细胞构建高糖模型应用 PCR 进行验证，应用 ELISA 对细胞上清液及细胞免疫荧光进行验证。结果 PDR 患者血样标本中相关 mRNA 表达量为 FSTL1：1.58±0.70，TGFβ1：0.99±0.18，CTGF：1.85±0.69，VEGF：1.38±0.44，与正常患者血样标本相比差异均具有统计学意义（P <0.05）。PDR 组和正常组患者血清中 FSTL1，TGFβ1 的蛋白表达水平表达差异具有统计学意义（P<0.05）。HRCEC 在乏氧 3h 因子表达上调，与空白对照组相比差异具有统计学意义。ELISA 结果显示：HRCEC 细胞上清液中，正常、低氧 3 小时、低氧 6 小时条件下 FSTL1 和 TGFβ1 表达上调，FSTL1 蛋白表达量分别为 172.27±3.44ng/ml，183.70±5.39ng/ml， 176.38±15.87ng/ml， TGFβ1 蛋白表达量分别为 775.53±8.29ng/l，845.40±23.83ng/l，841.30±32.36ng/l，正常组与低氧 3 小时组差异均具有统计学意义（P<0.05）。高糖条件下 FSTL1，VEGF，TGFβ1mRNA 表达水平显着高于正常组，与空白对照组相比差异具有统计学意义（P<0.05）。细胞免疫荧光结果与 PCR 结果一致。结论 FSTL1 在 PDR 患者血样中表达具有显著差异，为减缓 PDR 病程进展治疗提供新思路。

PU-332

platelet-derived exosomes mediate hyperglycemia-induced retinal endothelial injury via targeting TLR4 signaling pathway

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Purpose: In this study, we aim to investigate whether platelet-derived exosomes (PDEs) could regulate hyperglycemia-induced retinal injury via targeting TLR4 signaling pathway.
Methods: We studied the effects of PDEs on retinal endothelial injury in diabetic rats and human retinal endothelial cells (HRECs) in vitro. Isolated PDEs were observed by transmission electron microscopy and flow cytometry. Plasma samples were obtained from the retinas of rats and HRECs after treatment for analysis of reactive oxygen species. Immunofluorescence and Western blotting were conducted to assess the levels of adhesion molecules and TLR4 signaling pathway. Content of CXCL10 in PDEs were analysed by western blot.
Results: The level of Plasma PDEs was greatly increased in diabetic rats. In cultured HRECs, PDEs induced the production of malonyldialdehyde(MDA) and reactive oxygen species(ROS), inhibited the activity of superoxide dismutase(SOD). Further analysis showed that TLR4 pathway activated by PDEs played a pivotal role in regulating inflammation. The inhibition of the TLR4 pathway by TAK-242 had a greatly protective effect on PDEs-induced retinal endothelial injury in vitro and vivo. In addition, PDEs-derived CXCL10 lead to retinal endothelial injury, and antagonizing CXCL10 using CXCL10-neutralizing antibody dramatically attenuated such injury.
Conclusions: In summary, CXCL10 expression in PDEs mediate hyperglycemia-induced retinal endothelial injury by upregulating the TLR4 signaling pathway.

PU-333

视网膜变性微环境中 CD117+细胞 niche 结构分析

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目的：研究视网膜生理和变性微环境中 $CD117^+$细胞的增殖和分化变化，以及异常增生的 Müller 细胞对其的作用及机制，进一步阐明 $CD117^+$细胞的激活机制。
方法：取 4 周龄野生型和视网膜变性小鼠，免疫荧光染色 CD117、Müller 细胞标记（GS）、无长突细胞标记（GAD 65&67、ChAT）、紧密连接蛋白（connexins 43）。共聚焦聚焦显微镜下观察 $CD117^+$细胞周围细胞类型以及比较 $CD117^+$细胞微环境构成有无变化。
结果：成年小鼠视网膜中 CD117 配体干细胞因子（SCF）阳性细胞围绕 $cd117^+$细胞，并且 SCF^+细胞均为 Müller 细胞，然而并不是全部 Müller 细胞为 SCF 阳性。$CD117^+$细胞和 SCF^+细胞之间有细胞缝隙连接蛋白 Connexin 43 的表达。细胞紧密连接蛋白 laminin 标记显示，$CD117^+$细胞与周围细胞存在紧密连接关系。通常在内核层 $CD117^+$细胞没有和任何一类成熟细胞双标，但现发现有很少比例的 $CD117^+$细胞和谷氨酸脱羧酶 65&67（GAD 65&67）这一 GABA 能无长突细胞的标记共染，推

测 CD117⁺细胞分化过程中可能中间过渡状态表达 GAD 65&67。除此之外，我们还发现视网膜变性小鼠模型中部分 CD117⁺细胞仍可表达增殖细胞核抗原（PCNA），说明其在成年后仍可能持续进行低水平的对称分裂。还有一部分 CD117⁺细胞与 PCNA 阳性细胞相连，提示 CD117⁺细胞同时可能进行不对称分裂。
结论：我们发现 CD117⁺细胞所处的 niche 结构为：CD117⁺细胞被表达配体 SCF 的 Müller 胶质细胞所围绕，细胞间存在细胞缝隙连接蛋白和细胞紧密连接蛋白的表达。CD117⁺细胞向下一级细胞分化时，其过渡状态可能表达 GAD 65&67。在视网膜变性环境中，CD117⁺细胞可能存在低水平的对称分裂和不对称分裂。

PU-334
Study on the Regulation mechanism of miR-206 for the Epithelial-Mesenchymal Transition of RPE cells

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Purpose: The epithelial-mesenchymal transition (EMT) of retinal pigment epithelial cells (RPE) is an important pathological process in the development of Proliferative vitroretinopathy (PVR) and AMD. MicroRNAs (miRNAs) possess important regulating effects in the process of EMT, proliferation, migration and apoptosis. In this study, we investigated the role of microRNA-206 (miR-206) in the regulation of EMT of RPE.

Methods: RPE cells were treated with TGF-β2 to induce EMT as a model for PVR. The mRNA levels of miR-34a and EMT markers were examined by real-time quantitative polymerase chain reaction (qPCR). MiR-206 antagomir was transfected into RPE. Western blot analysis and qPCR were used to examine the expression of EMT markers at protein and mRNA levels.
Results: The expression of miR-206 was up-regulated in TGF-β2 induced EMT of RPE. Down-regulated the expression of miR-206 could down-regulate the expression of fibronectin, a-smooth muscle actin, and vimentin.
Conclusions: MiR-206 is up-regulated in EMT of RPE. Down-expression of miR-206 can inhibit EMT of RPE cells. Our results suggested that miR-206 is involved in the regulation of RPE cells.

PU-335
生长激素释放肽对紫外线诱导人晶状体上皮细胞氧化损伤保护作用的实验研究

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目的 探讨生长激素释放肽对紫外线诱导人晶状体上皮细胞（HLEC）氧化损伤的保护作用。**方法** 人晶状体上皮细胞系传代培养 24 h 后，分别加入不同浓度（2.0μg·L^{-1}、20.0μg·L^{-1}）生长激素释放肽预处理 12 h 后，紫外线照射下 30min 后将细胞放入培养箱中继续培养，流式细胞仪检测细胞凋亡率，比色法检测凋亡相关因子 caspses-3 及 caspase-9 的表达，透射电镜观察超微结构变化。**结果** 紫外线照射可以诱导 HLEC 形态改变，生长激素释放肽处理后，细胞形态逐渐得到改善。流式细胞计数结果显示：正常对照组晶状体上皮细胞平均凋亡率为 3.75%±0.36%，经紫外线照射后，阳性对

照组晶状体上皮细胞凋亡平均率为 38.34%±3.19%，应用生长激素释放肽后，高剂量组晶状体上皮细胞凋亡平均率为 14.19%±3.41%，与阳性对照组比较，差异具有统计学意义（*P*<0.05）。此外，生长激素释放肽还可以减少紫外线所致 HLEC 内 caspses-3 及 caspase-9 的表达，并且，伴随生长激素释放肽作用时间的延长其表达量呈下降趋势。**结论** 生长激素释放肽可以明显抑制紫外线诱导的晶状体上皮细胞的凋亡，其抑制凋亡的作用可能是其防止和延缓白内障发生的细胞学基础。

PU-336
Therapeutic effects of mesenchymal stem cells derived exosomes on dry eye mice

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Purpose: The aim of this study was to investigate the therapeutic effects of human umbilical cord mesenchymal stem cells derived exosomes (MSC-Exo) on a mouse model of dry eye .
Methods: Thirty-two healthy adult male BALB/c mice were selected in this study and divided into four groups randomly (A,B,C and D), with each group consisting of 8 mice. The dry eye model was induced by eye drop of 0.1% benzalkonium chloride and established in group A, group B and group C. Group D served as the normal control without any treatment. The A group was given MSC-Exo eye drop, while the B group was given PBS eye drop, each treatment was performed three times per day for 1 week and the C group were not received anything as the negative control. The Schirmer I test, tear break-up time (BUT), and corneal fluorescein staining (FL) were evaluated before and after dropping eyes for 1 day, 4 day and 7. The cornea samples of all mice were collected on day 7 for histological investigation of corneal epithelium using hematoxylin and eosin staining, and ultrastructure of corneal epithelial cells was further examined by transmission electron microscopy(TEM).
Results: There were no statistical changes in tear volume, BUT, FL staining before therapy among A, B, C three groups (*P*＞0.05). Significantly more tear volume（*P*<0.05）, longer BUT（*P*<0.05）, lower FL score（*P*<0.05）were shown on day 4 and day 7 in group A . But, there were no significant difference in tear volume, BUT, FL staining in group B after therapy (*P*＞0.05). TEM showed that the number of corneal chondriosome/desmosomes was obviously increased （*P*<0.05）in group A and the morphological features of microvilli and desmosomes closed the normal group, the group B still presented the shorter and flattened, disordered corneal epithelial microvilli, and looser intercellular desmosomes.
Conclusions: The exosomes derived from mesenchymal stem cells exhibit signicantly therapeutic effects on dry eye mice model, which suggest that MSC-Exo administration is a promising method for the treatment of dry eye.

PU-337
眼睑皮脂腺癌突变特征的初步分析

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目的：初步分析眼睑皮脂腺癌的突变特征，探讨其分子发病机制。**方法**：应用下一代测序技术对 3 例眼睑皮脂腺癌及正常组织的冰冻标本进行外显子组测序，进行 SNV、Indel、LOH、CNV 检测的注释，易感基因分析，驱动基因分析，基因通路富集分析，突变基因互作网络分析和靶向药物预测分析。**结果**：眼睑皮脂腺癌的体细胞突变频率较低，分别为 1.2 个/Mb、1.3 个/Mb 和 1.9 个/Mb，插入/缺失均小于 30%。应用 MutSigCV 分析驱动基因，3 例均存在 TP53 和 ZNF750 基因突变，2 例均有 OR4L1 突变。对胚系突变分析发现皮脂腺癌存在 DNA 修复功能障碍，其中 2 例存在 MLH1 突

变。应用 Cytoscape 进行通路富集和分析，皮脂腺癌存在细胞周期、先天免疫、GCPR 信号通路和 DNA 修复等功能的异常；突变基因交互网络分析显示存在细胞衰老、Fanconi 贫血通路、泛素介导的蛋白水解和钙粘连蛋白通路的异常。1 例预测的靶向药物是核苷代谢抑制剂 trifluridine，另 2 例没有结果。**结论**：眼睑皮脂腺癌具有肿瘤一般的突变特征，比如均有 TP53 或 Rb 体细胞突变，也具有自身的特点，如存在 DNA 错配修复基因（MLH1）胚系突变，ZNF750 和 OR4L1 基因突变等。本研究样本量少，还需要进一步的研究对眼睑皮脂腺癌突变特征做出更为详细的描述。

PU-338

Generating an Antiangiogenic Endothelial Progenitor Cell Line using Endostatin Gene Transfer

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Endothelial progenitor cells (EPCs) have been investigated as a treatment option in neovascularisation (NV). Endostatin inhibits angiogenesis and is responsible for the suppression of vascular leakage. The aim of present study was to generate transgenic EPCs with antiangiogenic effects for treating ocular NV. EPCs were obtained from rat peripheral blood samples and verified. A Lentiviral-Endostatin-GFP recombinant construct was produced and infected with EPCs, and these transfected cells were then subjected to puromycin selection. Quantitative real-time polymerase chain reaction (qRT-PCR) and Western blot assay were applied to determine endostatin mRNA and protein level, respectively. VEGF expression levels were also detected to observe the antiangiogenic effect of the endostatin-transfected EPCs. After puromycin (1ug/ml) selection for 4 days, a stable endostatin-transfected EPC line was generated. In this stable endostatin-transfected EPC line, expression levels of endostatin increased and expression levels of VEGF decreased. Results showed that EPCs can be genetically modified to overexpress endostatin and may have an antiagiogenic effect through increased secretion of endostatin and decreased secretion of VEGF. EPCs genetically modified with endostatin may be potentially used in ocular NV therapy.

PU-339

Grx2 维持 UVB 辐射损伤人晶状体上皮细胞线粒体功能研究

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目的：谷氧还蛋白 2（Glutaredoxin 2，Grx2）是特异性存在于线粒体中的硫醇转移酶的同工酶，具有显著的抗氧化修复功能。前期的研究证实其与年龄相关性白内障形成密切相关，本研究进一步探讨 UVB 辐射损伤人晶状体上皮细胞（HLEC）过程中 Grx2 维持细胞存活的线粒体功能机制。
方法：建立 UVB 辐照损伤 HLEC-B3 细胞模型，构建 HLEC-B3 Grx2 高表达细胞模型和 Grx2 干涉细胞模型，观察细胞形态，CCK-8 和 TUNEL 法检测细胞存活与凋亡；通过免疫荧光染色共聚焦显微镜观察 Grx2 与 HLEC 线粒体共定位；电镜观察 UVB 辐照前后 HLEC 线粒体数目、径长、嵴横径的异同；mRNA 水平检测线粒体分裂融合相关基因；流式细胞技术检测 JC-1 信号，动态监测线粒体膜电位，ATP 含量和耗氧量变化。
结果：HLEC 中 Grx2 与线粒体存在共定位，UVB 辐照损伤后 Grx2 干涉细胞细胞与空质粒转染细胞比较线粒体径长变短，嵴横径变长，mRNA 水平检测线粒体分裂融合相关基因高表达；通过检测 JC-1 信号，Grx2 干涉细胞的膜电位变化较空质粒转染细胞中膜电位变化大，ATP 生成量减少，耗氧量减少。

结论：首次利用 UVB 辐射损伤 HLEC 模型，证实 Grx2 是通过保护氧化损伤修复作用及线粒体功能来维持 HLEC 存活，为 Grx2 在白内障形成中的作用及机制研究提供了重要的实验依据。（国家自然科学基金项目：81570823）

PU-340

泪器占位病变的临床发病特点与病理学分析

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目的：分析 96 例泪器占位性病变的发病特点（其中 91 例泪腺区占位，5 例泪囊区占位），疾病组织病理学分类及临床特征，为泪器肿瘤的诊断提供参考。**方法：**回顾分析 2014 年 1 月-2018 年 11 月入本院行手术治疗的泪器占位性疾病患者的临床资料。**结果：**共纳入 96 例患者，所有病例均有一种以上影像学检查结果及病理组织学诊断结果。其中男性 48 例（50%），女性 48 例（50%），年龄分布于 1 岁 1 个月-72 岁之间，平均年龄 42.8 岁。良性肿瘤：62 例（64.6%），发病前三位的是多形性腺瘤 45 例（46.9%），皮样囊肿 7 例（7.3%），炎性假瘤 6 例（6.3%）；恶性肿瘤：34 例（35.4%），发病前三位的是腺样囊性癌 15 例（15.6%），腺癌 6 例（6.3%），淋巴瘤 5 例（5.2%）。最常见的就诊原因是眼球突出，共 51 例（53.1%）；其次是发现眉弓部包块，合计 25 例（26.1%）；第三常见的就诊原因是眼及眼周围部疼痛，共 9 例（9.4%）。双眼发病患者 11 例（11.5%），其中 6 例为炎性假瘤，5 例为淋巴瘤，其余 85 例（88.5%）均为单眼发病患者。但部分双眼发病怀疑炎性假瘤的病人住院后注射糖皮质激素后病情好转，未进行手术，缺乏病理学资料支持，所以对于双眼发病的病人资料统计上存在一定偏倚。**结论：**泪器占位性疾病种类繁多，多形性腺瘤和腺样囊性癌分别是最常见的良性和恶性泪器占位性疾病。双眼发病的泪器占位性疾病中最常见的炎性假瘤，单眼发病的疾病中最常见的是多形性腺瘤。

PU-341

曲酸通过 NF-κB 及 p21 通路抑制人角膜内皮细胞的衰老

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目的：角膜的透明是外界光线进入眼内在视网膜上成像的基础，而角膜无血管状态以及角膜内皮的正常功能共同维持角膜的透明性。衰老能够引起角膜内皮细胞（HCEC） 密度的下降及角膜内皮功能下降，HCEC 细胞的衰老与 Fuchs 角膜内皮营养不良及角膜移植失败相关。曲酸是由多种真菌或细菌菌株产生的天然物质，曲酸及其衍生物具有强大的生理功能，但其抗衰老作用尚未得到证实。在本研究中，我们将探讨曲酸对 HCEC 的抗衰老功能及作用机制。
方法：MTT 细胞活性实验检测曲酸对 HCEC 细胞活性的影响，迁移实验探讨细胞迁移的能力，衰老相关 β-半乳糖苷酶染色（SA-β-Gal）实验评价细胞衰老。免疫印迹法及免疫荧光法分析衰老相关蛋白的表达。通路抑制剂及基因沉默技术用于研究抗衰老的作用机制。成管实验和出芽实验检测人脐静脉内皮细胞（HUVEC）的血管生成。
结果：曲酸能够抑制 HCEC 的衰老，其特点是：促进细胞迁移，降低 SA-β-Gal 染色、半乳糖凝集素 8、层粘连蛋白 α1、层粘连蛋白 α2、层粘连蛋白 γ1 和 p21 的水平，增加衰老的 HCEC 中 p-NF-κB 的水平。p-NF-κB 抑制剂能逆转曲酸的抗衰老作用，p21 siRNA 与曲酸具有相似的抗衰老作用。此外，曲酸还可以减轻衰老的 HCEC 诱导的 HUVEC 的成管作用，而 p-NF-κB 抑制剂可以逆转这一过程。p21 siRNA 可减轻衰老的 HCEC 诱导的 HUVEC 的出芽作用。

结论：曲酸可能通过 NF-κB 及 p21 信号通路抑制 HCEC 的衰老及衰老诱导的血管生成，并下调半乳糖凝集素 8 和层粘连蛋白。因此，曲酸可能作为一种有前途的药物治疗 HCEC 衰老一类疾病如 Fuchs 角膜内皮营养不良及角膜移植失败。

PU-342

眼内淋巴瘤一例

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患者，女，53 岁。右眼红视力下降 2 周。既往 2015 年发现中枢神经系统弥漫大 B 细胞淋巴瘤，行“美罗华”化疗，头颅放疗等治疗。2016 年 12 月因孔源性网脱行右眼白内障超乳联合玻璃体切割联合硅油填充术。查体：右眼视力指数/40cm，左眼视力 0.15。右眼角膜后 KP(++)，玻璃体混浊。双眼视盘边界清，右眼颞上周边网膜灰白，可见片状出血，中央色白，左眼后极及颞侧网膜可见黄白点片状病灶。FFA 检查静脉期双眼后极部及颞侧弥漫点片状强荧光团分布在分支血管处，晚期荧光渗漏。北京同仁医院诊为双眼内淋巴瘤。给予甲氨蝶呤 400ug/0.1ml 治疗,每周 1 次，双眼各 6 次。2017 年 9 月复查，双眼视网膜病灶萎缩。2018 年 12 月复查，FFA 检查左眼视盘鼻侧血管分支处可见数处点状高荧光，原病灶脉络膜萎缩斑。右眼压 40mmHg，左眼压 18mmHg。2019 年 1 月复查，视力右眼手动/眼前，左眼 0.04。右眼后极部网膜灰白混浊加重，颞下静脉分支走形迂曲，黄斑下方点片状出血，左眼网膜病变萎缩局限。FFA 检查右眼静脉早期视盘鼻侧高荧光，后极多处点状高荧光及颞下静脉分支走形迂曲，后期大片荧光渗漏。房水检测 IL-6:1141.4pg/ml（1.0-50pg/ml），IL-10：2725.0 pg/ml（0-5 pg/ml），IL-10/IL-6:2.39（＜1）。诊断：右眼内淋巴瘤复发，中枢神经系统弥漫大 B 细胞淋巴瘤。治疗：拟继续行拟行甲氨蝶呤 400ug/0.1ml 眼内注射。

讨论 眼内淋巴瘤多为弥漫大 B 细胞淋巴瘤，易被误诊为葡萄膜炎，眼底病变常随全身情况的好转或恶化有所改变。主要以眼内局部化疗及眼眶放疗为主。本例病人是中枢神经系统弥漫大 B 细胞淋巴瘤，眼部发现淋巴瘤后，头部淋巴瘤复发，给予全身治疗，双眼甲氨蝶呤球内注射各 6 次，病情好转后右眼又复发。眼内淋巴瘤恶性程度高，预后差，早期诊断治疗至关重要。

PU-343

儿童垂体瘤一例

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患者，男，10 岁。2017 年 12 月左眼视力下降 2 个月来诊。查体：视力右眼 0.12，左眼手动/60cm，矫正右 1.0，左矫正不应。双眼视盘边界清，右颞侧色淡，左淡白。测眼压:右 17mmHg，左 18mmHg。FFA 检查无异常。视野检查:右眼颞侧及鼻下偏盲，左眼全盲。颅脑 MRI：冠状及矢状面扫描垂体窝扩大,垂体增大,鞍区囊实性混杂异常信号影,束腰征,2.5x3.8x3.4cm,鞍上池被填充,右侧颈内动脉变窄、移位、被包绕,蝶窦骨质破坏,垂体炳移位,视交叉上抬。动态增强检查垂体实质早期明显不均匀, 病变延时后逐渐强化,囊变区未见强化改变。实验室检查:PRL8772ug/L(3-18ug/L)。诊断：垂体瘤(泌乳素分泌型)。治疗:多巴胺激动剂（短效制剂溴隐亭）。2018 年 1 月复查 PRL28ug/L。视野检查 2017 年 12 月右眼视野无缺损，左眼视野颞下略好转、2018 年 1 月右眼视野无改变，左眼视野颞侧及鼻侧均有好转、2018 年 4 月右眼视野无改变，左眼视野鼻下明显好转眼。2018 年 9 月 MRI 检查：垂体瘤明显缩小。

讨论 垂体瘤典型视野缺损顺序颞上、颞下、鼻下、鼻上象限,临床常见双颞侧偏盲。视野检查可了解视功能受损情况、对早期诊断、病情监测起指导作用。垂体瘤的治疗以手术为主，辅以药物治疗、

放射治疗。根据瘤的大小、激素分泌、并发症及共患疾病、年龄、是否有生育要求、经济情况制定个体化的治疗方案。泌乳素型肿瘤，多巴胺激动剂（溴隐亭，卡麦角林）控制 PRL 水平，瘤体积缩小，逐渐增加溴隐亭剂量，PRL 水平降至正常，调整剂量长期维持。本例患者是儿童，视力减退 2 个月首诊眼科，及时进行视野、MRI 及 PRL 检查得以确诊，给予及时治疗，病情逐渐好转。Tokumaru 等证实视觉功能的恢复与病程相关。早期诊断、早期治疗，原因不明的单侧或双侧视神经萎缩,应排除垂体瘤的可能。

PU-344

线粒体靶向肽 SS31 对氧化应激损伤下 ARPE-19 细胞的保护作用

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目的：建立 H2O2 对 ARPE-19 细胞的氧化损伤模型，初步探讨 SS31 对氧化损伤下 ARPE-19 细胞的保护作用。**方法：**培养 ARPE-19 细胞。分别用 150、200、250uM 的 H2O2 处理 ARPE-19 细胞 24h，建立损伤模型并在倒置相差显微镜下观察细胞形态。用 MTT 法检测细胞活性，筛选 H2O2 的最佳损伤浓度。再将实验分为空白组、H2O2 损伤组、10nMSS31+H2O2 组、100nMSS31+H 组、1uMSS31+H 组,用 MTT 法选出 SS31 最佳保护浓度并镜下观察。最后将实验分为空白组、200uMH2O2 组、1uMSS31+H 组，在荧光显微镜下检测细胞线粒体中活性氧的产生及细胞核形态学变化，用流式细胞仪检测各组膜电位的改变。**结果：**不同浓度 H2O2 处理细胞后，损伤组活性均降低，并呈浓度依赖性，均有统计学差异(P<0.05)。其中，200uMH2O2 组较空白组细胞活性下降了约 60%，选取此浓度建立模型。各浓度 SS31+H 组较损伤组细胞存活率均增高,其中 1uMSS31+H 组升高最明显。除了 10nMSS31+H 组，差异具有统计学意义(P<0.05)。在镜下观察示：空白组细胞数目较多形态正常，随 H2O2 的浓度增加，数目逐渐减少，形态逐渐皱缩。随 SS31 浓度增加，形态趋于正常。荧光显微镜下示活性氧水平，空白组细胞线粒体内示微弱的红色荧光，H2O2 组明显增强，1uMSS31+H 组弱于 H2O2 组。DAPI 染色后，空白组细胞核均匀淡染，H2O2 组出现强荧光点，1uMSS31+H 组荧光强度较损伤组明显减弱。流式细胞仪检测膜电位结果发现，H2O2 损伤组红/绿荧光强度比值较空白组有明显下降，1uMSS31+H 组红/绿荧光强度比值上升。结论：初步发现 SS31 对氧化损伤下的 ARPE-19 细胞具有保护作用，其作用机制是抑制细胞凋亡，减少细胞线粒体内 ROS 产生，阻止线粒体膜电位下降，提高存活率。

PU-345

线粒体靶向肽对过氧化氢诱导的 661W 细胞程序性坏死的保护作用及其机制的研究

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目的：线粒体靶向肽 SS31 对过氧化氢诱导的 661W 细胞程序性坏死的保护作用及机制研究。**方法：**MTT 法检测不同浓度 H_2O_2 损伤 661W 细胞的最佳浓度、不同浓度 SS31 细胞存活率及不同浓度程序性坏死特异性阻断剂 necrostatin-1 细胞存活率, 建立氧化损伤模型，选择 SS31 及 Nec-1 最佳保护浓度。将细胞分为空白组、SS31 组、Nec-1 组、H_2O_2 组、SS31(100nM)+H_2O_2 组，SS31(100nM)+Nec-1（50uM）+H_2O_2 组,Nec-1+H_20_2 组，用 MTT 法检测其细胞活性,观察细胞形态，用流式检测线粒体膜电位变化,MitoSOX 染色在荧光显微镜下检测各组活细胞线粒体中产生 ROS 情况及用 Annexin V/PI 检测细胞坏死率。**结果：**将细胞分为空白组、H_2O_2 处理组、SS31(100nM)+H_2O_2

组、SS31(100nM)+Nec-1(50uM) +H_2O_2 组、Nec-1+H_2O_2 组，MTT 结果发现： SS31+H_2O_2、SS31+Nec-1+H_2O_2、Nec-1+ H_2O_2 药物组干预后,细胞存活率较 H_2O_2 组明显升高，细胞存活率的差异有统计学意义($P<0.05$)。在倒置相差显微镜下观察 H_2O_2 组细胞数目减少，细胞肿胀、漂浮和核固缩，SS31+H_2O_2 组，SS31+Nec-1+ H_2O_2 组，Nec-1+H_2O_2 组损伤细胞明显减少。SS31+H_2O_2 、SS31+Nec-1+H_2O_2、Nec-1+H_2O_2 药物组处理 661W 细胞，细胞存活率升高，坏死率下降，线粒体 ROS 生成及线粒体膜电位丢失均减少。**结论：**线粒体靶向肽 SS31 对 H_2O_2 诱导 661W 细胞的氧化损伤具有保护作用，其作用机制是抑制细胞凋亡和程序性坏死,清除 ROS，阻止线粒体膜电位的下降，提高细胞存活率。线粒体靶向肽 SS31 可部分通过抑制程序性坏死保护 661W 细胞，对抗氧化应激引起的损伤。

PU-346

通过吸烟的方法构建 AMD 小鼠模型

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目的：世界上约 60%的男性和 20%的女性吸烟，吸烟对人类健康危害极大，是多数疾病包括某些眼部疾病的危险因素，更是老年性黄斑变性（age-related macular degeneration ,AMD）的唯一可控影响因素。AMD 是西方国家老龄人口中最常见的致盲性眼病，其发病机制不清，治疗方法有限，动物模型对于 AMD 发病机制及新的治疗方法的研究是必不可少的，但以往 AMD 动物疾病模型构建时间长，通常为 6 个月-2 年，因此，本研究的目的是通过给予小鼠新型吸烟模式干预进行 AMD 模型的构建。
方法：将 8 周龄 C57BL/6 小鼠固定于特制的容器内，使其口鼻部暴露于烟雾中，采用经鼻吸烟的方式给予小鼠 2.5 小时/天，5 天/周的频次吸烟 12 周，同龄对照组小鼠不予吸烟处理按普通饲养条件饲养 12 周。12 周后，小鼠安乐死，取其眼球做冰冻切片，并进行组织免疫荧光、油红 O 染色和 TUNEL 凋亡检测，检测吸烟组小鼠和对照组小鼠眼底补体 C3 的表达情况、眼底脂质沉积情况和视网膜细胞凋亡情况。
结果：吸烟组小鼠眼底发生了 AMD 样改变，可见 RPE 下有 C3b 和脂质沉积形成，RPE 细胞发生凋亡，并且视网膜内核层及外核层细胞也大量凋亡。而对照组小鼠 RPE 下无 C3 及脂质的沉积，眼底组织结构正常，视网膜细胞几乎无凋亡。
结论：本研究结果表明经鼻吸烟能够缩短 AMD 小鼠模型构建时间；吸烟能使小鼠眼底发生 AMD 样改变，并且可能通过干扰小鼠眼底局部补体激活和脂质代谢等通路导致 AMD 的发生。

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吸烟对小鼠角膜细胞的影响

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目的：角膜是眼球屈光介质之一，正常的角膜功能对维持良好的视觉质量有重要作用，角膜与外界环境直接接触，最易受到外界环境中各种刺激因素的影响。吸烟是世界范围内的公共卫生问题，可导致包括眼部疾病在内的多种疾病的发生，吸烟不仅通过有害物质吸收入血而影响角膜细胞功能，还可经烟雾直接刺激的方式损害角膜上皮细胞，因此，为探讨吸烟对角膜细胞的影响，我们进行了以下试验。
方法：将 8 周龄 C57BL/6 雄性小鼠置于特制的容器内，保持其口鼻部及眼部位于容器开口处，将此容器与有持续稳定香烟烟雾通过的管道连接，予以小鼠 2.5 小时/天，5 天/周的频次吸烟 3 个月。同

周龄对照组小鼠不做处理，按普通饲养条件饲养 3 个月。3 个月后取小鼠眼球做冰冻切片，并进行 TUNEL 凋亡检测。
结果：吸烟小鼠的大部分角膜上皮细胞发生凋亡，对照组小鼠角膜组织结构正常，未发现凋亡的角膜上皮细胞。
结论：吸烟能损害小鼠角膜组织，引起大量角膜上皮细胞发生凋亡，从而可能影响正常的角膜功能，导致视觉质量下降等。

PU-348
线粒体靶向短肽 SS31 探针的构建、表征及特异性定位检测的研究

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目的：构建荧光探针 FITC-SS31，研究 FITC-SS31 分子探针在正常及病理细胞中对线粒体的靶向性,探索其在青光眼等线粒体异常疾病的临床应用价值。
方法：用异硫氰酸荧光素(FITC)对线粒体靶向短肽 SS31 进行标记，高效液相色谱法和质谱仪检测其纯度及分子量；体外培养 661W 小鼠视网膜感光细胞，流式细胞仪检测荧光探针 FITC-SS31 与细胞的结合能力；分子探针 FITC-SS31 与线粒体荧光探针 Mito Tracker 共定位，激光共聚焦显微镜观察 FITC-SS31 在正常及病理细胞内与线粒体的融合情况；MTT 法评价其细胞毒性。
结果：合成的 FITC-SS31 纯度为 97.76% ，分子量为 1142.2；将浓度为 1uM 的 FITC-SS31 与 661W 细胞分别孵育 2h、4h, 流式细胞仪检测显示荧光探针 FITC-SS31 能与 661W 细胞结合（平均荧光强度值高于空白组），4h 组细胞荧光强度值高于 2h 组；将浓度为 1uM、10uM 的 FITC-SS31 分别与 661W 细胞孵育 2h 后流式细胞仪检测细胞阳性率显示，浓度为 10uM 组[（82±4.54）%]大于浓度为 1uM 组 [（46.53±7.97）%]。
结论：成功合成 FITC 标记的线粒体靶向短肽 SS31 可与细胞结合，FITC-SS31 浓度为 10uM；孵育时间为 4h 时探针与细胞结合率较高。

PU-349
基质细胞衍生因子-1 及其受体 CXCR4 在翼状胬肉患者中的表达及意义

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目的:探讨基质细胞衍生因子-1（stromal cell-derived factor，SDF-1）及其受体 CXCR4 在不同年龄翼状胬肉患者中的表达及意义。
方法:收集 2018 年 1 月至 2018 年 10 月在中国人民解放军第四七四医院行原发性翼状胬肉切除术的手术标本 60 例 60 只眼（其中年龄小于 50 岁 30 只眼，年龄大于 50 岁 30 只眼），同期收集年龄匹配的行斜视矫正术和视网膜脱离复位术患者的正常结膜组织 30 例（其中年龄小于 50 岁 15 例 15 只眼，年龄大于 50 岁 15 例 15 只眼）。采用 HE 染色和免疫组织化学法检测 SDF-1/CXCR4 在翼状胬肉组织标本中的表达和定位，并分析二者的表达与患者临床特征的关系。并使用 IPP 软件定量测定 SDF-1/CXCR4 的平均光密度值。

结果:SDF-1/CXCR4 在正常结膜组织中仅见结膜上皮基底层细胞有阳性表达或不表达，翼状胬肉中上皮全层细胞和血管内皮细胞均有阳性表达，其表达水平有显著性差异。以基底层细胞中表达更为明显，呈现明显极性。翼状胬肉组织中 SDF-1/CXCR4 的表达量均高于正常结膜组织差异有统计学意义（$P<0.05$）；年龄小于 50 岁中患者的 SDF-1/CXCR4 表达量大于年龄大于 50 岁的患者表达量，差异有统计学意义（$P<0.05$）。

结论:SDF-1/CXCR4 的表达上升提示与翼状胬肉的发生和发展有关，提示检测 SDF-1/CXCR4 可能作为翼状胬肉发生和发展、术后复发及疗效评估的观察指标之一，也可能成为翼状胬肉的治疗靶点。

PU-350
Knockdown of LINC00167 induces RPE dedifferentiation in AMD

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AIMS:
To evaluate the effect of long non-coding RNA LINC00167 on RPE dedifferentiation.
METHODS:
LINC00167 expression in AMD patients as well as during RPE differentiation were confirmed by microarray. Western blot and immunofluorescence were utilized to monitor RPE markers after LINC00167 knockdown. Elisa and flow cytometry were used to determine VEGF secretion and apoptosis respectively.
RESULTS:
LINC00167 was down-regulated in RPE-choroid samples of AMD compared to controls, and was up-regulated during RPE differentiation. ARPE-19 cells exhibited dedifferention after LINC00167 knockdown by showing attenuated expression of RPE markers, less VEGF secretion and unchanged apoptosis. LINC00167 mainly located in cytoplasm and acted as a sponge for miR-203-3p which targets gene SOCS3.
CONCLUSIONS:
Our study demostrated that LINC00167 could act as a protective role in AMD through maintaining RPE differentiation.

PU-351
Generation of Human Induced Pluripotent Stem Cells from Corneal Stromal Cells

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Purpose
In this study, we established a human corneal stroma induced pluripotent stem cell (HCSiPSC) line from primary cultured human corneal fibroblasts.
Methods
Human limbal corneal stromal cells (HLCSCs) which were obtained from corneal rim of a 24-year-old healthy male subject were reprogrammed with the reprogramming genes, Oct4, Sox2, Lin28, L-Myc, and Klf4. We characterized for pluripotency of hiPSC line by PCR, WB and embry bodys.
Results

We established the hiPSC line (HMUi004-A-1 hiPSC) which was got from human cornea, may easliy differentiated to corneal cells.
Conclusion
In this study, we established an integration- free human iPSC line derived from corneal fibroblasts , a useful resource for specific differentiating into the corneal cells, by a more efficient method.

PU-352

Decorin exerts anti-apoptotic and anti-oxidative effects on HLE-B3 cells under diabetic condition via suppressing p22phox-p38 MAPK signaling pathway

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Purpose The purpose of this study was to determine the effect of decorin on the apoptosis and oxidative stress of HLE cells under high-glucose condition.
Methods Human len epithelium (HLE) cells were divided into control group, mannitol group, high-glucose group with or without decorin and p22phox downregulating group with high-glucose. The apoptosis was evaluated by flow cytometry and western blotting. The oxidative stress was evaluated by measuring the generation of reactive oxygen species (ROS), glutathione peroxidase (GSH) and superoxide dismutase (SOD). p38 mitogen-activated protein kinase (MAPK) phosphorylation and the expression level of p22phox protein were evaluated by western blotting and small interfering RNA transfection to p22phox was also performed on HLE cells.
Results High-glucose significantly increased the apoptotic ratio of HLE cells and the action of oxidative stress. Decorin reversed these effects, prevented the activation of p38 MAPK and the expression level of p22phox protein induced by high-glucose. Silence of p22phox by RNA interference also inhibited the increased apoptosis and oxidative stress induced by high-glucose.
Conclusions Increased oxidative stress induced by high-glucose was prevented by decorin through suppression of p22phox-p38 MAPK signaling pathway, which could present a new therapeutic strategy for the prevention of diabetic cataract.

PU-353

USP22 在视网膜母细胞瘤中的表达及意义的研究

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目的：视网膜母细胞瘤是儿童时期最常见的恶性眼内肿瘤，至今仍缺乏有效的治疗。这种肿瘤细胞的存在归因于端粒酶活性的增高，它已被证实为肿瘤标志物和治疗靶点。USP22 是抑制肿瘤生长的一个重要靶点，但其通过抑制 TERT/P53 信号通路而产生对端粒酶、肿瘤细胞的生存、以及对视网膜母细胞瘤的衰老和凋亡的作用机制并未明确。方法：MTT 用于描述细胞增殖，Western blot 用于检测 USP22, TERT 和 P53 的蛋白表达水平。RT-qPCR 用于检测 USP22 mRNA 水平，然后用 TRAP 法检测端粒酶活性。流式细胞术和彗星测定用于定量细胞凋亡和 DNA 损伤。结果：USP22 的过度表达可以显著增强细胞增殖能力，提高 TERT 表达水平，增强端粒酶活性，抑制 p53 表达，降低细胞凋亡或 DNA 损伤。USP22 的降低会产生相反的效果。结论：USP22 在视网膜母细胞瘤细胞的增殖、衰老、凋亡中发挥重要作用。通过抑制 TERT/P53 信号通路，USP22 的下调促进人视网膜母细胞瘤细胞凋亡。因此，USP22 可以作为治疗视网膜母细胞瘤的靶向目标。

PU-354

COPB2 siRNA 抑制视网膜血管内皮细胞增殖和迁移及其机制研究

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目的：研究衣被蛋白复合物 β 亚基 2(COPB2)对脉络膜视网膜内皮细胞增殖和迁移的影响及其机制研究。
方法：本实验分 3 组：慢病毒转染 siRNA-COPB2 组、慢病毒阴性对照组和正常组。采用 qRT-PCR 和 Western blot 法验证，细胞计数试剂盒（CCK-8）法，流式细胞术，平板克隆观察， Transwell 小室迁移实验， Western blot 验证。
结果：siRNA-COPB2 在 qRT-PCR 和 Western blot 法验证中的干扰效率分别为（82.5±5.78）%和（63.6±8.33）%。CCK-8 检测显示随着培养时间延长，RF/6A 细胞增生值（吸光度，A 值）均明显增加，但 siRNA-COPB2 转染组在 3d、4d、5d 时间点细胞增生值均明显低于阴性对照组和正常组。siRNA-COPB2 组、阴性对照组和正常组细胞周期的 S 期百分比分别为（24.6±2.56）%、（36.7±4.12）%、（32.98±1.56）%，；三组凋亡率分别为（26.13±3.2）%、（7.45±1.12）%、（8.34±1.45）%，；siRNA-COPB2 组、阴性对照组和正常组克隆数分别为 6.32±2.13、23.12±3.45、25.45±5.21，；siRNA-COPB2 组、阴性对照组和正常组 Transwell 细胞迁移数量分别为 20.45±2.34、70.32±6.21、81.76±6.21。最后利用 Western bolt 法， siRNA-COPB2 组中 Cyclin D1、P27KiP1、P21Waf1/Cip1、CDK4 和 P18INK4C 蛋白表达均明显减弱。
结论：COPB2 siRNA 转染后能在体外抑制脉络膜视网膜内皮细胞增殖和迁移，有望为解决增殖性视网膜病变提供新思路。

PU-355

线粒体靶向多肽 SS-31 在晶状体抗氧化损伤中的机制研究

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目的：晶状体氧化损伤是年龄相关性白内障（age-related cataract，ARC）发生的重要机制，年龄相关性白内障的发病机制较为复杂，是各种因素长期综合作用的结果。现已证实晶状体上皮细胞（human lens epithelial cell，HLEC）的氧化损伤是除先天性白内障外其他各种白内障发生的主要分子基础，因氧自由基导致的 HLEC 凋亡在其中起到关键性作用。研究白内障的发病机理并研制安全有效的抗氧化损伤药物，将会带来巨大的社会效益和经济效益。方法：通过构建 HLEC 和 ARC 小鼠的晶状体氧化损伤的体内外模型，并评估 SS-31 修复 ARC 氧化损伤的干预作用，分析细胞形态和氧化损伤相关通路的蛋白表达，如 Bax/Bcl-2 通路等的改变，应用流式细胞术 AnnexinV-FITC/PI 双染法和 JC-1 线粒体膜电位染料，检测细胞凋亡水平，评估 Nrf2-Keap1-ARE 信号通路表达和甲基化水平，进行 ARC 动物表型分级研究。结果：SS-31 能够通过改善细胞增殖状态，减少 DNA 氧化损伤，抑制 Nrf2-Keap1-ARE 信号通路异常激活，抑制细胞凋亡和坏死，稳定线粒体膜电位和 Bax/Bcl-2 通路正常水平等途径，有效逆转 HLEC 和 ARC 的晶状体氧化损伤。结论：通过体外细胞和晶状体氧化损伤检测结合亚硒酸钠小鼠 ARC 模型的策略，明确了线粒体凋亡途径在 ARC 中的作用机制，线粒体靶向多肽药物 SS-31 对晶状体氧化损伤具有一定的防护意义。

PU-356

一种新的小鼠睑板腺功能障碍模型

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目的：构建一种新的睑板腺功能障碍（MGD）模型，以更好地研究 MGD 的病理机制。

方法：选取健康的 7-8 周龄 C57BL/6 小鼠，麻醉后利用液氮冷冻方式损伤其睑板腺，分别于 d0、d3、d7、d14 和 d28 取材观察睑板腺的损伤修复情况。同时利用裂隙灯和荧光素钠染色观察小鼠的眼表状况，利用酚红棉线检测小鼠的泪液分泌；通过 HE 染色观察睑板腺的整体形态；油红染色检测睑板腺的脂质分泌状况；K10 检测小鼠的眼表角质化，EdU 和 K14 染色检测小鼠睑板腺的增殖情况。

结果：通过不同时间点的观察发现液氮冷冻处理后小鼠近睑缘部分睑板腺腺泡明显萎缩，睑板腺缺失明显，部分部位有整条腺管缺失的现象。眼睑横向和纵向组织切片的 HE 染色结果与此一致，这与临床中部分 MGD 患者表现相似。油红染色也发现冷冻处理后眼睑的油红阳性区域显著减少；腺管上皮中 K6 的表达也有减少。随建模后时间的延长，小鼠角膜的荧光素钠染色逐渐增加，同时酚红棉线检测发现小鼠泪液分泌逐渐减少；K10 染色发现，在睑板腺冷冻处理后小鼠角膜逐渐出现 K10 的阳性染色，并且睑结膜也有部分表达。这与现有的 MGD 相关干眼患者的眼表表现一致。此外我们观察到，冷冻处理两周后 EdU 和 K14 的染色逐渐增加，部分睑板腺区域逐渐恢复；而同期给予抗炎处理组的小鼠睑板腺恢复变慢。

结论：我们建立了一个新的小鼠 MGD 模型，并表现出临床 MGD 患者类似的眼表改变，可能用于 MGD 治疗药物的评估；炎症在睑板腺损伤修复中可能扮演重要作用。

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PU-357

机械牵拉力对人小梁细胞影响的研究

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背景：青光眼是世界上第一位不可逆性致盲眼病，临床中大多数患者需要手术进行治疗。Schlemm 成形术是近年来出现的一种抗青光眼手术，术中扩张的 schlemm 管除通过物理性的作用降低房水流出阻力外，其带给小梁细胞的向心牵拉力，这 可能会引起小梁细胞的生物活性的改变，共同参与到眼压调节的过程中。
方法：使用 22%的最大延伸比例对体外培养的小梁细胞细胞施加机械牵拉力。分别收集拉力作用后 12h、24h 的细胞。观察小梁细胞活力改变、凋亡及与房水流出调节相关的基质金属蛋白酶/抑制剂和 IL6 在牵张力作用下的变化情况。
结果：在长时间的机械牵拉作用下，小梁细胞未发生明显的凋亡，同时促进细胞存活的 akt 信号通路有明显的上调。作为机械敏感型受体的整合素-fak 信号通路也出现上调。同时，参与调节房水流出的基质金属蛋白酶、IL6 在牵拉作用下，表达均出现了显著的升高。
结论：高强度的机械牵拉能够增加小梁细胞的活性，促进房水流出调节相关因子的分泌。这可能是 schlemm 管成形术降低眼压的机制之一。

PU-358

LncRNA H19 调控 RPE 细胞增殖的功能与机制研究

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研究目的：视网膜色素上皮 (retinal pigment epithelium, RPE) 细胞在眼的发育和视觉功能中发挥着关键作用。在正常情况下，成熟的 RPE 细胞在体内处于相对静止状态，但在增生性玻璃体视网膜病变（PVR）、RPE 撕裂和 VKH 病等病理情况下，RPE 细胞可重新进入增殖状态。目前对于 RPE 细胞增殖调控的分子机制尚未完全清楚，本课题旨在寻找可能对 RPE 细胞增殖调控起作用的 LncRNA 分子，并探究其潜在的作用机制。
研究方法：对原代培养的两种不同增殖状态的小鼠 RPE 细胞进行 RNA-seq 分析，得到差异表达的 LncRNA 表达谱，其中包含本课题所关注的 LncRNA H19 在原代培养的 RPE 细胞中高表达。通过 qPCR 验证 H19 在原代培养小鼠 RPE 细胞和人 ARPE-19 细胞中的表达情况。在 ARPE-19 细胞系中干扰 H19 后,利用细胞计数、MTT、免疫荧光、细胞周期等技术检测细胞的增殖情况。通过 Western blot 技术检测干扰 H19 后 ARPE-19 细胞中增殖相关蛋白的表达改变。
研究结果：H19 表达于 RPE 细胞中并在增殖状态的 RPE 细胞中高表达。在 ARPE-19 细胞中干扰 H19 的表达后，细胞计数量减少、MTT 生长曲线可见生长速率减慢、Ki-67 阳性率下降等，表明干扰 H19 的表达可显著抑制细胞增殖。此外，Western blot 显示细胞增殖调控相关蛋白 E2F1、p-ERK 等的表达量下降，提示 H19 可能作用于 E2F1、p-ERK 等蛋白的表达来调控 RPE 细胞的增殖。
研究结论：LncRNA H19 参与 RPE 细胞的增殖调控，其机制之一可能是通过影响 E2F1、p-ERK 等相关蛋白的水平从而调控 RPE 细胞的增殖过程。本研究证明一个新的 LncRNA 分子在 RPE 细胞的增殖调控中起着重要的作用。

PU-359

Circular RNA hsa_circ_0005044 promotes retinal pigment epithelial migration by controlling VEGF-A expression in diabetic retinopathy

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Diabetic retinopathy (DR) is one of the most common microvascular complications of diabetes, but its underlying pathogenesis remains poorly understood. Retinal pigment epithelium (RPE), a polarized monolayer of pigment cells located between the neural retina and the choroid, is responsible for the balance of ocular angiogenesis by secreting key regulatory factors such as VEGFA and PEDF. Moreover, it is associated with other crucial physiological functions likely involved in the pathophysiology of DR. In order to identify the relevant molecular targets and novel pathways in the pathogenesis of DR, we constructed a diabetic mouse model of DR and performed sequencing and bioinformatic analysis of the expression profiles of circRNA and mRNA in the RPE layer. The ceRNA signaling network map was constructed and the hsa_circ_0005044-mir377-VEGFA ceRNA network was selected to probe the regulatory roles of hsa_circ_0005044 in the DR mouse model. The results of real-time PCR and Western blot showed that in high glucose cultured RPE cells, the expression levels of circRNA_0005044 and VEGFA were significantly higher than that of the normal glucose control group, while the expression level of miRNA377 was lower than that of the normal glucose control group. After knockdown of circRNA_0005044 expression in high

glucose cultured RPE cells, the expression of miRNA377 was up-regulated and the expression of VEGF, a target of miRNA377, was down-regulated. Additionally, circRNA_0005044 knockdown effectively reversed the enhancement of RPE migration under high glucose culture conditions. Therefore, the circ0005044-mir377-VEGFA ceRNA network established in this work may serve as a novel molecular target for the treatment of DR.

PU-360

The Mechanism of Olfactory Ensheathing Cells Inhibit Gliosis of the Müller Cell during Retinal Degeneration

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Propose: Retinal regeneration and self-repair, whether in response to injury or degenerative disease, are severely impeded by glial scar formation by Müller cells (specialized retinal macroglia). We have previously demonstrated that the activation of Müller cells and gliosis in the degenerative retina are significantly suppressed by the subretinal transplantation of a mixture of olfactory ensheathing cells (OECs) and olfactory nerve fibroblasts. However, the underlying molecular mechanism has remained elusive.
Methods: Here we transplanted purified rat OECs into the subretinal space of pigmented Royal College of Surgeons (RCS) rats, a classic rodent model of retinal degen-eration. Using Molecular, Histological, behavioral testing and electroretinography the effect has been evalu-ated
Results: Using behavioral testing and electroretinography, we confirmed that the grafted OECs preserved the visual function of rats for 8 weeks, relative to vehicle controls (phosphate-buffered saline). Histological evalu-ation of outer nuclear layer thickness and composition demonstrated that more photoreceptors and ON-bipolar cells were preserved in the retinas of OEC-treated RCS rats than in controls. The grafted OECs migrated into the outer plexiform layer, inner nuclear layer, and inner plexiform layer. They interacted directly with Müller cells in the retina of RCS rats, in three distinct patterns, and secreted matrix metalloproteinases 2 and 3 (MMP-2 and MMP-3). Previous studies have demonstrated that rat OECs express delta-like ligand (DLL), while Müller cells express Notch3, the receptor for DLL. Here we found that the grafted OECs significantly decreased the expression, by retinal cells, of Notch signaling pathway components (including Notch3, Notch4, DLL1, DLL4, Jagged1, Hes1, and Hes5) 2 weeks after the cell transplantation and that this effect persisted for a further 2 weeks.
Conclusion: Based on these findings, we suggest that transplanted OECs inhibit the activation of Müller cells and the associated gliosis, at least partly through suppression of the Notch pathway

PU-361

骨髓 Sca-1+亚群干细胞对视网膜组织作用的体外研究

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目的：此研究旨在体外常氧和缺氧培养条件下观察骨髓来源的干细胞亚群对视网膜组织细胞的作用及机制。
方法：提取 C57BL/6 小鼠骨髓，利用干细胞抗原-1（Stem cell antigen-1，Sca-1）对骨髓干细胞进行分选，细胞免疫荧光鉴定 Sca-1 标记；qPCR 和 Elisa 检测不同骨髓亚群干细胞 FGF2，IGF-1，CNTF，NGF，FGF1，SCF 及 NDNF mRNA 和蛋白表达；将 $Sca\text{-}1^{+}$与 $Sca\text{-}1^{-}$干细胞分别与视网膜

组织于常氧或缺氧条件下共培养，TUNEL 检测组织细胞凋亡，Western blotting 检测 FGF2 蛋白和 Akt 通路变化。

结果：细胞免疫荧光显示 Sca-1$^+$细胞染色阳性，Sca-1$^-$细胞阴性；qPCR 显示 Sca-1$^+$细胞 FGF2，IGF-1，CNTF，NGF，FGF1，SCF 和 NDNF mRNA 表达水平高于 Sca-1$^-$细胞（P<0.01，P<0.05，n=4-6/组），而 FGF2 mRNA 水平升高尤为显著；Elisa 显示 FGF2 蛋白在 Sca-1$^+$细胞培养基和细胞裂解物中表达显著高于 Sca-1$^-$细胞（P<0.01，n=4/组）；体外共培养模型中，TUNEL 显示缺氧可引起共培养组织片细胞凋亡增加，与 Sca-1$^-$细胞相比，Sca-1$^+$细胞能够减少视网膜植片细胞凋亡（P<0.01，n=6/组），培养基中加入 FGF2 抗体中和后，这种抗凋亡作用被削弱（P＞0.05，n=6/组）。Western blotting 显示缺氧使 FGF2 表达增多，Akt 磷酸化增加，与 Sca-1$^-$细胞相比，Sca-1$^+$细胞更能增加 FGF2 表达，促 Akt 磷酸化（P<0.01，n=3/组）；加入 FGF2 抗体后，Sca-1$^+$ 细胞引起的 FGF2 增多受抑制，Akt 磷酸化受抑制。

结论：骨髓 Sca-1$^+$亚群干细胞能够促进视网膜细胞存活；FGF2/Akt 通路在骨髓 Sca-1$^+$亚群干细胞对视网膜损伤保护中发挥重要作用。

PU-362

Generation and Characterization of Clinical-grade Retinal Tissues from Human Pluripotent Stem Cells

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Purpose:
Retinal cells derived from human pluripotent stem cells (hPSCs) hold huge promise to treat retinal diseases. A reliable, efficient method for producing clinical-grade retinal tissues is highly desirable. This study aims to develop a clinical-grade culture method to efficiently generate retinal tissues from hPSCs for clinical applications.

Methods：
hPSCs were maintained in a Feeder-free and Xeno-free culture conditions. The retinal induction was conducted with reagents that meet the requirement of clinical application. Cell morphological changes were observed under inverted microscope. Retinal cell fates were evaluated by immunocytochemistry and RT-PCR with retinal specific markers.

Results:
Under optimized clinical-grade induction conditions, hPSCs could successfully differentiate into retinal organoids with neural retina and retinal pigment epithelium (RPE).The neural retina gradually developed distinguishable layers containing all major retinal cell types, including retinal ganglion cell located in the innermost and photoreceptor cells in outermost of the retina. After long-term culture in suspension (more than 120 days), highly mature photoreceptors such as rods and cones were also acquired. The efficiency and reproducibility of obtaining retinal organoids under the clinical-grade culture conditions are similar to those reported previously.

Conclusion:
We optimized an effective induction protocol using clinical-grade reagents to generate retinal tissues from human PSCs. The retinal tissues would serve as source for retinal cell replacement therapy.

PU-363

眼睑肿瘤术中冰冻切片病理诊断分析

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目的 分析冰冻切片在眼睑良恶性肿瘤病理诊断中的应用价值，为临床诊断和治疗眼睑肿瘤提供参考依据。 **方法** 选取 2015 年 10 月—2019 年 1 月在我院进行眼睑肿瘤切除治疗且行术中冰冻切片检查和术后石蜡切片病理检查的患者 31 例，回顾性分析所有患者的临床资料，分析患者术中冰冻切片和术后石蜡切片病理诊断的结果和报告。**结果** 31 例患者中男性 15 人，女性 16 人，年龄 32 岁—85 岁，平均 63.9 岁。经术中冰冻切片病理诊断，确诊 25 例，确诊率为 80.64%，其中完全符合 19 例（76.00%）、基本符合 6 例（24.00%）；不能确诊 4 例，占 12.90%；延迟诊断 1 例，延迟诊断率 3.23%（后经石蜡切片诊断为睑板腺癌）；1 例患者误诊为假阳性，误诊率 3.23%。本研究中 31 例患者最终诊断为恶性肿瘤 20 例，交界性肿瘤 1 例，良性肿瘤 10 例，恶性肿瘤中最常见的是基底细胞癌（11 例），其次是睑板腺癌（6 例）。术中冰冻切片病理诊断平均耗时（30.22±11.05）min。**结论** 术中冰冻切片病理诊断准确率相对较高且耗时短，应加强正确的取材方法，积累经验教训，进一步提升该方法在眼睑肿瘤临床诊治中的应用价值。

PU-364

GDF5 promotes the differentiation of retinal stem cells into neurons via Atoh8

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Retinal degeneration diseases are characterized by the degeneration of retinal neural cells, and are the main cause of blindness. Although the development of stem cell including retinal stem cell therapies raise hope for retinal neuron replacement, currently, there is still no efficient method to regenerate retinal neurons. To realize the full potential for the production of retinal neurons, neurotrophic factor direct the differentiation of retinal stem cells should be extensively identified. In this article, we characterized GDF5, which caused the activation of Smad signaling, can induce neurogenesis and neurite outgrowth in retinal stem cell differentiation. Moreover, a bHLH transcription factor, Atoh8 modulates the effects stimulated by GDF5. These data suggested that GDF5 regulates neuron differentiation through mediating Atoh8 and help us to understand the pathophysiological function of GDF5 in retinal regeneration.

PU-365

Adenocarcinoma of the Retinal Pigment Epithelium mimicking a malignant melanoma

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Background: Adenocarcinoma of the retinal pigment epithelium (RPE) is extremely rare and difficult to diagnose clinically that can simulate other pigmented tumors such as choroidal melanoma. We describe a case of RPE adenocarcinoma that initially diagnosed as choroidal malanoma and exprienced enucleation after an unsuccessful I-125 brachytheray.
Case: A 43-year old woman presented to Beijing Tongren Eye Center in April 2016 with an mushroom-shaped tumor nasal to the optic disc in the left fundus, pigmented clumps and slight hemorrhages made an relatively opaque vitreous cavity. Refer to untypically results by magnetic resonance imaging with high intensity on T1 and T2-weighted images, contrast enhanced ultrasound has been performed in which the mushroom-shaped solidity showed fast wash in and

fast wash out on intensity-time curve and fullfilled by microbubbles. Colored Doppler Imaging reveald irregular reflectivity with hollow sign, it's defined in border and 5.5 × 5.8 mm in size. We gave a diagnosis of choroidal malanoma on the left eye clinically and I-125 brachytheray has been executed soon. But when tumor showed no shrink and a severe vitreous hemorrhage along with apparent introcular inflammation has developed in October 2016, the eyeball was enucleated in June 2017 due to untreatable neovascularized glucoma and extensive loss of visual function. Histopathological examination indicated a part of tumor cells invading the choroid and it was composed of cords and tubules of slightly pigmented spindle-shaped cells. Atypical nuclei and many vacuoles with melanin granules are seen throughout the tumor. Tumor cells were immunoreactive for melanocytic markers (HMB45 and S-100 protein), melan-A, vimentin, and cytokeratin. Accordingly, the final diagnosis was Adenocarcinoma of RPE.
Conclusion: It's diffcult to differentiate RPE adenocarcinoma between choroidal melanoma clinically, especially when there's lack of exduates and presenting mushroom configuration. It's more challenging to manage it and associated complications because tumor can be nonresponse to radiotherapy. Resection may be optimized for a think of eye-conservation and histopathological identificantion.

PU-366

FPR2 介导 Resolvin D1 促进糖尿病角膜上皮损伤修复和角膜敏感度修复的研究

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目的 探究脂质消退介质 Resolvin D1（RvD1）的受体 FPR2 对糖尿病角膜上皮和角膜敏感度损伤修复的影响和机制研究。
方法 链脲佐菌素（streptozotocin, STZ）腹腔注射是诱导 1 型糖尿病动物模型的经典方法。正常和糖尿病小鼠行角膜中央上皮刮除术，刮除后用 100ng/mL RvD1 和它的受体（FPR2）拮抗剂 WRW4（1mg/mL）处理糖尿病小鼠。荧光素钠染色评价角膜上皮的愈合情况，β3-tubulin 抗体全角膜神经染色评价角膜神经再生情况。H.E.染色（炎症细胞浸润）、ELISA（MPO 活性、TNF-α 和 IL-1β 含量）和免疫荧光染色（巨噬细胞含量）检测炎症反应水平。荧光探针孵育检测 ROS 和 GSH 的表达水平。免疫荧光染色和 Western blot 评价氧化应激相关蛋白的表达水平。
结果 局部应用 FPR2 拮抗剂 WRW4 可抑制正常角膜上皮及神经的再生，局部应用 RvD1 可激活上皮再生相关信号通路和炎症转归，从而促进糖尿病角膜上皮再生。此外，RvD1 可直接减少 ROS 和 NOX2/4 的积累，提高 GSH 的表达，并激活在糖尿病角膜上皮内损伤的 Nrf2-ARE 信号通路。更有趣的是，局部应用 RvD1 可促进角膜神经再生和促进糖尿病角膜敏感度的恢复。并且，RvD1 促进糖尿病角膜上皮损伤修复的作用可被 FPR2 拮抗剂 WRW4 抑制。
结论 局部应用 RvD1 可促进糖尿病角膜上皮和角膜敏感度损伤修复，与它对炎症转归的调节、激活上皮再生相关信号通路以及减弱氧化应激相关，RvD1 促进糖尿病角膜上皮损伤修复的作用可被 FPR2 拮抗剂 WRW4 抑制。

PU-367

p16INK4a-STAT3 通路调控炎症环境下角膜上皮干细胞活性及对角膜上皮损伤修复的影响

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目的：研究炎症环境对角膜上皮损伤修复的影响及 p16INK4a-STAT3 通路的调控作用机制。
方法：通过小鼠角膜缘干细胞缺乏模型及体外培养角膜上皮干细胞模型，研究炎症因子 IL-1β（10ng/ml）及 TNF-α（10ng/ml）处理对角膜上皮损伤修复的影响。实时荧光定量 PCR、免疫荧光及 Western Blot 实验检测体内外炎症因子处理条件下 p16INK4a 基因的的表达情况，STAT3 通路的活化情况。并通过比较 p16INK4a 基因缺失小鼠与正常小鼠角膜损伤修复能力，验证小鼠角膜上皮细胞中 STAT3 细胞通路的活化结果。
结果：炎症因子 IL-1β 及 TNF-α 处理显著抑制小鼠角膜上皮的损伤修复能力，并能降低角膜上皮干细胞的迁移能力，影响角膜上皮干细胞的细胞干性。并且，炎症因子处理后，角膜上皮细胞 p16INK4a 基因的表达显著增强，并伴随 STAT3 信号通路活化的抑制。与正常小鼠相比，p16INK4a 基因缺失小鼠具有更强的损伤修复能力及更高的 STAT3 活化水平。
结论：p16INK4a-STAT3 通路能够调控炎症环境下角膜上皮干细胞活性及对角膜上皮损伤修复能力。

PU-368
Nicotinamide inhibits corneal endothelial mesenchymal transition and accelerates wound healing

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Corneal endothelial cells (CECs) maintains the clarity of the cornea through the barrier and pump function. *Ex vivo* culture or injury may cause corneal endothelial-mesenchymal transition (EnMT) and lead to loss of function. Here we explored the effects of nicotinamide (NIC) on the wound healing of rabbit corneal endothelium and the proliferation, migration and EnMT of cultured human CEC line. The animal results showed that corneal clarity was rapidly recovered within 7 days through topical application of NIC in the rabbit with mechanical injury of corneal endothelium, while the control cornea remains edema and cloudy. The whole-mounted corneal staining found the expressions of Na^+/K^+-ATPase, AQP-1 and ZO-1 were mainly localized to the boundaries of regenerated endothelium in NIC-treated eyes, in contrast to the scattered staining in vehicle-treated eyes. Interestingly, we found that NIC application inhibited the expression of typical EnMT marker α-SMA, which appeared in the rabbit corneal endothelial wound healing. *In vitro*, NIC promoted the proliferation, but not the migration of cultured human CECs. Moreover, NIC effectively inhibited TGF β1-induced corneal EnMT and decreased the level of EnMT regulator snail and slug. Therefore, our study indicates that NIC enhances corneal endothelial wound healing through the promotion of proliferation and the inhibition of EnMT, which may provide a potential pharmaceutical agent for treating corneal endothelial dysfunction.

PU-369
MiR-216a-5p/HK2 通过有氧糖酵解调控葡萄膜黑色素瘤生长

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葡萄膜黑色素瘤是最常见的原发性眼内恶性肿瘤，死亡率高。尽管临床上在化疗、放疗和手术方面取得了一些进展，但患者 5 年生存率仍然很低。因此，研究 UM 发生的分子机制并寻找新的治疗靶点具有重要意义。
有氧糖酵解是肿瘤细胞代谢的共同特征， HK2 是有氧糖酵解的关键酶，在多种人类肿瘤中均过度表达，提示不良的生存预后，而 HK2 发挥作用的分子机制尚不清楚。miRNA 通过参与多种生物学过

程参与肿瘤的发生，以往研究发现 miR-216a-5p 对肿瘤的发生发展中有重要影响，本研究从有氧糖酵解的角度研究其在 UM 中的调控作用。
本研究选用 A375 和 MUM-2B 细胞系，将 miR-216a-5p mimics 转入细胞，同时给予 2.5mM 2-DG 处理，CCK8 显示转染组细胞增殖水平较低，能够明显抑制细胞增殖。WB 和 qRT-PCR 检测发现过表达 miR-216a-5p mimics 抑制细胞中 HK2 的表达；反之，低表达 miR-216a-5p 则增加 HK2 的表达。通过免疫印迹和 qRT-PCR 检测发现，miR-216a-5p mimics 过表达抑制细胞中的 HK2 表达，进行双荧光素酶实验，结果表明 miR-216a-5p 通过直接靶向葡萄膜黑色素瘤细胞中的 3'-UTR 来抑制 HK2 的表达。我们进行葡萄糖摄取、乳酸水平、ATP 测定，提示 miR-216a-5p mimics 使葡萄糖摄取降低，减少乳酸和 ATP 的产生，并且降低细胞外酸化率（ECAR），增加了氧气消耗率（OCR）。综上，miR-216a-5p 抑制葡萄膜黑色素瘤细胞中的有氧糖酵解，从而抑制肿瘤细胞增殖。从机制上看，HK2 是 miR-216a-5p 作用的潜在新靶标。miR-216a-5p 通过直接靶向 HK2 来抑制葡萄膜黑色素瘤细胞的糖酵解和生长。

PU-370
铁皮石斛多糖对高糖状态下眼表上皮细胞活力及凋亡的调控

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目的 通过检测高糖和铁皮石斛多糖培养对高糖状态下大鼠眼表角膜上皮及结膜上皮细胞活力和凋亡的调控，探讨铁皮石斛多糖保护糖尿病引起的角膜结膜上皮损伤的机制。**方法** 原代培养的大鼠角膜及结膜上皮细胞用高糖(25mmol/ L)孵育 48 h 诱导损伤,同时用铁皮石斛多糖(100、200 和 400 ug/ ml)处理细胞 48 h。实验分 8 组,分别是正常对照组、铁皮石斛多糖(低、中、高剂量)对照组、高糖模型组、低、中、高剂量铁皮石斛多糖处理高糖组。采用 MTT 法和流式细胞术分别检测细胞活力和细胞凋亡,并计算细胞凋亡率。**结果** 与对照组相比，高糖组眼表上皮细胞活力显著降低(P<0.05)，细胞凋亡率显著增加(P<0.05)，铁皮石斛多糖(100、200 和 400 ug/ ml)没有显著影响眼表上皮细胞活力和细胞凋亡(均 P>0.05)，与高糖组相比,高糖+铁皮石斛(100、200 和 400 ug/ ml)组眼表上皮细胞活力显著增加(P<0.05)，细胞凋亡率显著降低(P<0.05)。**结论** 铁皮石斛多糖可能通过提高眼表上皮细胞活性，减少眼表上皮细胞的凋亡，达到保护高糖状态下眼表上皮损伤的作用。

PU-371
miRNA-23a 调控年龄相关性黄斑变性发生的分子机制及杞灵颗粒的干预作用

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目的：探讨 miRNA-23a 调控 AMD 发生的分子机制及杞灵颗粒的干预作用。方法：利用可见光照射联合氢醌饲料喂养模拟 AMD 发病诱因，建立 AMD 小鼠模型。小鼠随机分为：正常组、模型组、叶黄素组和中药组。采用病理学、透射电镜技术、眼电生理及 TUNEL 等方法观察视网膜组织形态、超微结构、视功能及细胞凋亡情况，采用 Real-time PCR、免疫荧光检测 miRNA-23a，Nrf2，Keap1 基因表达情况。结果：与模型组比较，中药组可保护视网膜结构，提高感光细胞数量，改善视觉功能，抑制细胞凋亡；基因表达分析表明杞灵颗粒可上调 miRNA-23a 的表达，下调 KEAP1 的表达，上调 Nrf2 的表达。结论：杞灵颗粒对小鼠 AMD 模型的氧化应激损伤具有显著的保护作用，其作用机制可能是通过 miRNA-23a 调控 Nrf2 /Keap1 /ARE 信号通路实现的。

PU-372

Discrepant Expression of exosomal MicroRNAs from normal and UVB-irradiated SRA01/04

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Background: Ultraviolet-B (UVB) irradiation attributes to the formation of age-related cataract (ARC), which is mediated with DNA damage. DNA damage, an important factor for pathogenesis of ARC, is induced by UVB, and is generally regulated by DNA damage repair genes. Previous studies of us show that the discrepant expression of DNA damage repair genes may be an important pathogenesis of ARC which can be regulated by miRNAs. MiRNAs can be released via exosomes, which can protect miRNAs from degradation and deliver miRNAs into the cytoplasm of target cell, thus modifying the target cell's physiological state. The interactions of released exosomes with or uptake by the recipient cells are common forms of intercellular communication. It is essential to explore the potential functions of miRNAs in exosomes released by UVB-irradiated SRA01/04(human lens epithelial cell).
Results: We observed that the amout of exosomes from UVB-irradiated SRA01/04 notablely increased than normal control. More than 100 different miRNAs were identified in the exosomes. We also noticed that the expression of 88 miRNA was significantly higher and 84 miRNA was significantly lower in exosomes from the UVB-irradiated SRA01/04 than the normal SRA01/04.
Conclusions: These findings suggest an orchestrated mechanism triggered by UVB radiation where the concurrent association of exosomes, specific miRNAs and repression of DNA repair genes expression. Taken together, with the similar changes in the LECs from ARC patients, our data unveiled a possible mechanism of epigenetic modification of DNA repair gene in the pathogenesis of ARC.

PU-373

急性氧化应激初期衰老标记蛋白 30（SMP30）对人晶状体上皮细胞（HLEC）株 SRA01/04 增殖、抗氧化能力的影响

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目的：探讨衰老标记蛋白 30（senescence marker protein 30，SMP30）对处于急性氧化应激初期的人晶状体上皮细胞（Human lens epithelial cell, HLEC）株 SRA01/04 增殖、抗氧化能力的影响。

方法：使用含体积分数 10%胎牛血清的 1640 培养基培养 SRA01/04，获得对照（Control,CON）组细胞，慢病毒转染 SRA01/04 获得实验组细胞：SMP30 过表达（Over Expression，OE）组、SMP30 过表达相应空载（Negative Control Over Expression，NCOE）组、SMP30 沉默（Knock Down，KD）组、SMP30 沉默相应空载（Negative Control Knock Down，NCKD）组。待五组细胞生长达 70%-80%融合度时加入含 300μmol/L H_2O_2 的培养基继续培养 2 h，获得处于急性氧化应激下的细胞模型，通过 Brdu 法及超氧化物歧化酶(Superoxide Dismutase, SOD)定量检测试剂盒检测细胞增殖能力及抗氧化能力。

结果：相对 CON 组（5.62±0.30）和 NCOE 组（5.88±0.39），OE 组（7.68±0.49）增殖能力升高（$p<0.05$），相对 NCKD 组（5.49±0.07），KD 组（4.78±0.75）增殖能力降低（$p<0.05$）；与

CON 组（11.99±0.36）及 NCOE 组（10.73±0.65）比较，OE 组（17.52±0.97）SOD 活性增高（p＜0.05），与 NCKD 组（10.78±0.46）相比，KD 组（8.15±0.51）SOD 活性降低（p＜0.05）。

结论：当 SRA01/04 处于 H_2O_2 诱导的急性氧化应激初期时，SMP30 可通过调节细胞增殖能力和 SOD 活性减弱由 H_2O_2 诱导的氧化损伤，且此作用可能随 SMP30 含量的增加而增强。

PU-374
叶黄素对转化生长因子-β2(TGF-β2)诱导的视网膜色素上皮细胞发生上皮间质转化（EMT）的影响

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目的建立视网膜下纤维化的上皮-间质转化(epithelial-mesenchymal transformation，EMT)RPE 细胞模型，探讨叶黄素对转化生长因子β2 (TGF-β2)诱导的人视网膜色素上皮(retinal pigment epithelium，RPE)细胞 EMT 的作用及其机制。
方法 体外培养 ARPE-19 细胞，分为空白组、TGF-β2 组、TGF-β2+叶黄素组、叶黄素组。Real-time PCR 法检测各组细胞 α-平滑肌肌动蛋白(α-smooth muscle actin,α-SMA)、纤维连接蛋白(fibronection，FN)、Ecadherin mRNA 的表达。Western blotting 法检测各组细胞中 α-SMA、Occludin、FN 蛋白表达。免疫荧光检测 α-SMA 的表达。同时用 Western blotting 检测 TGF／Smad 通路下游 Smad3 的磷酸化水平。
结果叶黄素干预组 EMT 程度有明显减轻趋势。纤维化指标 α-SMA、FN 的 mRNA、蛋白表达下降，与 TGF-β2 组相比差异有统计学意义（均 P<0.05）。同时，叶黄素对上皮细胞相关蛋白有保护作用，Ecadherin mRNA、Occludin 蛋白的表达上调（均 P<0.05）。在免疫荧光中，叶黄素可以明显抑制上皮细胞转化为肌成纤维细胞。TGF-β2 刺激 ARPE-19 细胞发生 EMT 时，Smad3 的磷酸化水平升高。叶黄素干预后，Smad3 的磷酸化程度较 TGF-β2 显著下降（均 P<0.05）。
结论叶黄素可以通过调控 TGF-β2／Smad 信号通路来抑制 EMT，可能有抑制视网膜下纤维化的作用。

PU-375
Induction of fibroblast senescence during corneal wound healing

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Purpose: To investigate the role of fibroblast senescence in the dynamic process of corneal wound healing involving stromal cells apoptosis, proliferation and differentiation.
Methods: Corneal wound healing model was performed with epithelial debridement in C57BL/6 mice. The corneas were stained with TUNEL, Ki67 and α-SMA as markers of apoptosis, proliferation and myofibroblastic differentiation. Cellular senescence was confirmed by senescence associated β-galactosidase (SA-β-gal) and $p16^{Ink4a}$ staining. The response to growth factor bFGF or PDGF-BB and gene expression were compared among normal, hydrogen peroxide (H2O2)-induced senescent fibroblasts and TGFβ-induced myofibroblasts *in vitro*. The senescence was further evaluated in mouse models of corneal scarring, alkali burn, and syngeneic penetrating keratoplasty (PKP).
Results: The apoptosis and proliferation of corneal keratocytes were found to peak at 4 h and 24 h after epithelial debridement. The SA-β-gal staining was observed clearly in the anterior stromal

cells at 3-5 days. The senescent cells displayed $p16^{Ink4a+}$Vimentin^{+}α-SMA^{+} representing the origin of corneal fibroblasts. H2O2-induced fibroblasts recapitulated the characteristics of senescent cells *in vivo*. Senescent fibroblasts possessed reduced proliferation capacity in response to bFGF or PDGF-BB. Moreover, they exhibited increased MMP3/13 and decreased fibronectin and collagen1 expression than either normal fibroblasts or myofibroblasts. Cellular senescence was also found in the mouse corneal scarring, alkali burn and PKP models.
Conclusions: Corneal epithelial debridement induced the senescence of corneal fibroblasts after apoptosis and proliferation. The senescent cells displayed a nonfibrogenic phenotype and may be involved in the fibrosis limitation of corneal wound healing.

PU-376
SMILE、FS-LASIK 术后角膜形变与角膜生物力学变化的研究

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目的：探讨 SMILE、FS-LASIK 前后角膜生物力学参数的变化及组织去除厚度、组织去除厚度百分比（PTA）对角膜生物力学的影响，寻求每种手术方式组织去除厚度的相对安全范围，并比较两种手术方式对生物力学影响影响的差异。方法：临床观察研究。入选 2017 年 1 月至 2017 年 12 月在山东省眼科医院行 SMILE、FS-LASIK 的屈光不正患者分别为 68 例（132 眼）、74 例（142 眼），于术前、术后使用 Corvis ST 测量。对术前各生物力学参数与 CCT 进行线性回归分析；对各生物力学参数变化量与角膜组织去除厚度、PTA 进行非线性回归分析，以最佳拟合曲线五阶多项式函数进行计算和分析。结果：各生物力学指标术后较术前差异明显，有统计学意义(P＜0.05);SMILE 组于术后 1 月生物力学趋于稳定；FS-LASIK 组于术后 3 月趋于稳定。术前 A1-length、A2-length、ARTH、SP-A1 与 CCT 呈正相关，A1-velocity、A2-velocity、HC-PD、HC-DA、HC-radius、DA ratio 2mm 与 CCT 呈负相关。非线性回归分析发现：随着组织去除厚度增加，ΔHC-DA、ΔSP-A1 及 DA ratio 2mm 均增加。FS-LASIK 组中，当去除厚度为 48~120μm 时，ΔHC-DA、ΔSP-A1 及 DA ratio 2mm 变化率较小，当去除厚度超过 120μm 时，变化率较大；SMILE 组中，随去除厚度增加，其变化率无明显变化。PTA 变化趋势同组织去除厚度相似。结论：SMILE 及 FS-LASIK 术后角膜生物力学特性下降，SMILE 组较 FS-LASIK 组更早趋于稳定。CCT 越薄，组织去除厚度越大，术后生物力学下降越明显；SMILE 组，组织去除厚度在不超过 141μm、PTA 不超过 28%时相对安全;FS-LASIK 组，组织去除厚度不超过 120μm、PTA 不超过 25%时相对安全。

PU-377
The mechanism of mitochondrial dynamics mediated by Drp1 in radiation induced optic neuropathy

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Objective: To investigate the mechanism of mitochondrial dynamics mediated by Drp1 in radiation induced optic neuropathy（RION）.

Methods: R28 retinal neuronal-like cells were exposed to 6Gy x-irradiation. The cells were randomly divided into the normal group, radiation group, radiation + Drp1-negative control (NC) group (dealt with NC siRNA), radiation + Drp1-RNAi group (dealt with Drp1-RNAi siRNA), radiation + DMSO (solvent of Roscovitine) group and radiation + Roscovitine (inhibitor of Cdk5) group. Mitochondrial morphology was detected by using immunofluorescence staining, production

of reactive oxygen species (ROS) using ROS Detection Assay Kit and the apoptotic R28 cells were determined by using TUNEL staining. Moreover, proteins were extracted and subjected to electrophoresis and western blotting for various proteins involved in Cdk5/Drp1 signaling pathway (including Drp1 S616, Drp1 S637).

Results: Compared to the normal and radiation + Drp1-RNAi group, radiation + Roscovitine group, Drp1 S616 protein level was increased in the radiation group, radiation + Drp1-negative control (NC) group, and radiation + DMSO group. On the contrary, the expression level of Drp1 S637 was decreased in these groups. Mitochondrial morphology was more significant fragmented in the radiation group, radiation + Drp1-negative control (NC) group, and radiation + DMSO group than in the normal and radiation + Drp1-RNAi group, radiation + Roscovitine group. And the production of ROS and the positive rate of apoptotic R28 cells were increased in the radiation group, radiation + Drp1-negative control (NC) group, and radiation + DMSO group, compared with the normal and radiation + Drp1-RNAi group, radiation + Roscovitine group.

Conclusion: Radiation causes mitochondrial fission and R28 cells apoptosis could be promoted by Drp1 S616 through Cdk5/Drp1 signaling pathway.

PU-378

Agrin 通过调控 Hippo-Yap 信号通路在角膜损伤后修复中的作用研究

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研究目的：本研究的目的是在细胞与组织水平探究重组 Agrin 蛋白对于角膜缘干细胞增殖的作用、验证其在角膜上皮损伤后是否具有治疗效应。同时探究重组 Agrin 蛋白是否通过调控角膜缘干细胞中的 Yap1 的去磷酸化并促进 Yap1 的核转位，促进 Cyclin D1 等细胞周期相关蛋白的转录，最终激活角膜缘干细胞的增殖能力，并在角膜上皮损伤后发挥保护作用。
方法：提取原代角膜缘干细胞，体外分离培养，同时加入不同浓度重组 Agrin 蛋白，利用 CCK-8、免疫荧光染色、Western Blot 等方法验证其对于角膜缘干细胞增殖调控的影响。
结论：重组 Agrin 蛋白可促进体外培养的原代角膜缘干细胞的增殖，同时促进角膜上皮损伤的修复。
研究意义：本研究的意义在于从细胞和组织水平上探究重组 Agrin 蛋白对于角膜缘干细胞增殖能力及角膜上皮损伤后修复的影响。同时探究重组 Agrin 通过调控 Hippo-Yap 信号通路激活角膜缘干细胞增殖能力的分子机制，为临床角膜上皮反复剥脱、缺损及角膜缘干细胞功能障碍的治疗提供新的治疗策略及靶点。

PU-379

Hippo/YAP 信号通路与细胞增殖及相关信号通路的调控

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Hippo 信号通路是在进化过程中高度保守的信号通路，最初发现于果蝇中，在近些年的研究中，被发现在哺乳动物中也起到高度保守的调节作用。Hippo/YAP 信号通路通过调控细胞增殖及凋亡的比例，从而达到调控器官大小的用，并起到了至关重要的作用。Hippo / YAP 途径是细胞表面介导的信号的主要整合者，并调节发育和肿瘤发生过程中的关键过程。Hippo/YAP 信号通路作为重要的转录

共激活分子，与许多调控细胞增殖的信号通路有着密切的相互作用，本文就这些信号通路间的相互作用综述如下。

PU-380

OPTN E50K+/+骨髓亚群干细胞对视网膜作用的体外研究

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目的：CRISPR-Cas9 技术构建 OPTN $^{E50K+/+}$点突变小鼠模型，研究 OPTN $^{E50K+/+}$突变小鼠各亚群骨髓细胞中细胞因子表达的变化，及其对体外培养视网膜组织的影响。**方法：**通过 CRISPR-Cas9 技术构建 OPTN $^{E50K+/+}$突变纯合子小鼠，PCR 测序验证。免疫磁性分选 WT 和 OPTN $^{E50K+/+}$小鼠骨髓细胞，以获得各组 Sca-1^{+}亚群、Sca-1^{-}亚群和全骨髓干细胞，qPCR 和 Western blot 检测各组骨髓细胞亚群中 FGF-2、IGF-1、CNTF、BDNF mRNA 和蛋白的表达水平；将 WT 和 OPTN $^{E50K+/+}$小鼠骨髓干细胞及分选的 Sca-1^{+}、Sca-1^{-}亚群干细胞分别与 OPTN $^{E50K+/+}$小鼠视网膜共培养，Western blot 检测各组细胞-组织共培养模型中培养基和组织中 FGF-2、IGF-1、CNTF、BDNF 蛋白的表达，以及视网膜组织凋亡通路 Bcl-2 的表达变化。**结果：**基因测序鉴定 OPTN $^{E50K+/+}$突变体纯合子构建成功。qPCR 和 Western Blot 显示 WT 小鼠骨髓干细胞经免疫磁性分选后，Sca-1^{+}组细胞和培养基中的 FGF-2、IGF-1、CNTF、BDNF 的 mRNA 和蛋白表达都分别明显高于 Sca-1^{-}组和全骨髓细胞（P＜0.01）；OPTN $^{E50K+/+}$- Sca-1^{+}组四种细胞因子 mRNA 和蛋白表达较 WT 的 Sca-1^{+}组均降低（P＜0.05）；共培养的视网膜组织中，WT 的 Sca-1^{+}组 Bcl-2 蛋白表达高于 Sca-1^{-}组和全骨髓细胞（P＜0.05），OPTN $^{E50K+/+}$的 Sca-1^{+}组 Bcl-2 蛋白表达较 WT 的 Sca-1^{+}组降低（P＜0.05）。**结论：**OPTN（E50K）突变影响骨髓亚群干细胞表达细胞因子水平，在 OPTN（E50K）致视网膜细胞凋亡过程中可能起到重要作用。

PU-381

Mir-93-5p 在泪腺腺样囊性癌中的表达情况及作用机制研究

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目的 ：泪腺腺样囊性癌(LACC)是泪腺最常见的恶性肿瘤之一，其恶性程度高，具有早期难发现、嗜神经侵袭、易复发和远处转移等特点。大量研究证实 miRNAs 在多种癌症的发生、侵袭及转移中发挥调控作用。故探索 LACC 的发生、发展以及侵袭转移过程中新的治疗靶点是临床工作中困扰我们的难题，也是目前医学研究中的重点课题。进行相关研究对于改善 LACC 患者的预后，缓解患者的痛苦，具有宝贵的、深远的临床意义和巨大的社会价值。miR-93 可通过调控癌基因或抑癌基因的表达，进而影响结肠直肠癌、乳性癌、胰性癌、肺癌和肝细胞癌的细胞活性、增殖、迁移和侵袭等生物学功能。 然而，miR-93 对泪腺腺样囊性癌的恶性生物学行为的影响和潜在的分子机制仍然未知。本课题将研究 miR-93 靶向调控 BRMS1L 基因对泪腺腺样囊性癌生物学行为的影响及其机制，为腺样囊性癌的治疗提出可能的新靶点。结论 ：miR-93-5p 通过靶向下调 BRMS1L 来调控 Wnt 信号通路，促进 LACC 细胞迁移、侵袭和增殖

PU-382

Biocompatibility of fibrin adhesives with human corneal fibroblasts

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Objective：To study the biocompatibility of FS and human corneal fibroblasts (HCFs).
Method：The growth of HCFs on FS surface was observed. The proliferation of HCFs in FS extract and complete medium was then compared by MTT method. The apoptosis of HCFs in FS extract and complete medium was compared by acridine orange (AO) / ethidium bromide (EB) double staining and Annexin V-FITC / PI flow cytometry.
Results：1. HCFs grew well on FS surface and the morphology was normal.2. MTT assay showed that HCFs in the extract group and the complete medium group had similar proliferation tendency (P > 0.05), and the toxicity index of HCFs in the extract group was grade 0-1 at 0-72 H.3. After AO/EB staining, the HCFs in the extract group and the complete medium group were normal, and only a small amount of early apoptotic cells were observed.4. Flow cytometry showed that the apoptosis rates of the extract group and the complete medium group were 2.88% + 0.66%, 3.66% + 1.35% and 4.96% + 1.09%, respectively, with no significant difference (P > 0.05).
Conclusion：FS has no in vitro cytotoxicity and has good biocompatibility with HCFs.

PU-383

人原代角膜内皮体外扩增培养研究进展

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目的：人角膜内皮细胞（hCEC）因其在体内和体外的增殖能力极度有限。因此，在细胞的损伤或功能异常很容易因大泡性角膜病变导致失明。目前，唯一的治疗方法是移植健康的供体角膜内皮。然而，目前全球角膜供体严重短缺，此临床需求尚未得到满足。工程化角膜内皮也因种子细胞来源、内皮强度、免疫反应等问题受到限制。此次汇报就现有角膜内皮细胞的体外培养、扩增及分子生物学研究进展进行阐述。

方法：查阅相关文献，总结不同培养底物、基础培养基、添加物等对培养原代角膜内皮细胞的影响。

结果：Collagen IV 对于维持 CEC 正常表型、粘附和扩张和抑制内皮-间充质转化(EMT)非常重要；Laminin-511 和-521 在 Descemet s 膜和角膜内皮中表达，这些层粘连蛋白显著增强了 HCECs 的体外黏附、增殖和分化能力；基础培养基 DMEM,、DMEM and F12、Ham’s F12 and M199、Opti-MEM-I、EGM-2 endothelial growth medium 等对原代 hCEC 的不同优点和局限性；添加物 bFGF、EGF、LIF、NGF、TGFβ 抑制剂、ROCK 抑制剂等对 CEC 的体外粘附、迁移、扩增、贴壁、抑制 EMT 也有不同的影响。除此之外，供体角膜的年龄对体外也有重要影响，年轻供体的 hCEC 增殖明显优于年老供体。根据我们自己的研究物理因素如基底硬度对于 CEC 的体外培养也有影响。近些年，还有通过眼周间充质前体(POMP)、脐带来源间充质干细胞等方法诱导出 CEC-like 细胞作为角膜内皮组织工程的种子细胞来源。

结论：通过总结近年来 CEC 体外扩增和组织工程角膜内皮移植的最新进展，证明通过人工培养的 HCECs 的组织工程角膜内皮移植替代尸体角膜内皮来源仍然是未来治疗内皮功能障碍的可靠解决方法，有望短时间内缓解全球角膜供体组织短缺的问题。

PU-384

高钙状态下衰老标记蛋白 30 对人晶状体上皮细胞系 SRA01/04 增殖、凋亡的影响

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目的：研究在高钙培养状态下，衰老标记蛋白 30（senescence marker protein 30, SMP30）对人晶状体上皮细胞（human lens epithelial cell，HLEC）系 SRA01/04 细胞增殖、凋亡的影响。**方法**：实验分 4 组：SMP30 高表达组（overexpression, OE）、SMP30 沉默组（knockdown, KD）及对应的阴性对照组（negative control , NCOE and NCKD）。用实验前期构建成功的 SMP30 高表达、沉默及阴性对照的慢病毒载体分别转染 SRA01/04 细胞。用含 15mmol/L $CaCl_2$ 的完全培养基培养各组细胞 24 小时，以建立高钙应激细胞模型。Brdu-ELISA 法检测细胞增殖，Annexin V-APC 试剂盒法检测细胞凋亡率。**结果**：荧光显微镜下可见各组转染细胞有大量绿色荧光蛋白表达，转染效率为 70-80%，细胞状态良好，提示慢病毒转染 SRA01/04 细胞成功。在高钙状态下，OE 组 (3.89±0.20) 相对细胞增殖活力较 NCOE 组（2.82±0.34）增加（P<0.05），KD 组 (2.42±0.08) 相对细胞增殖活力较 NCKD 组（2.95±0.08）降低（P<0.05）；OE 组（1.68±0.21）细胞凋亡率较 NCOE 组（2.36±0.22%）下降，KD 组（6.11±0.03%）较 NCKD 组（1.82±0.51%）显著升高（P<0.05）。**结论**：在高钙状态下，SMP30 可增加 HLEC SRA01/04 细胞的增殖活力，并抑制细胞凋亡的加剧，提示 SMP30 可能对 HLEC 具有保护作用，增加 SMP30 的表达或许可以预防和延缓白内障的形成。

PU-385

microRNA 在脉络膜黑色素瘤中的研究进展

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脉络膜黑色素瘤是成人最常见的原发性眼内恶性肿瘤，其特点是肿瘤恶性程度高，易于转移，一旦转移预后极差，数月内多数患者死亡。目前脉络膜黑色素瘤发病机制尚不明晰，缺乏有效治疗手段。microRNA 是一类长 21-23 个碱基的单链非编码 RNA，通过与靶基因 mRNA 的 3'非翻译区碱基配对，引导沉默复合体降解 mRNA 或阻碍其翻译。研究表明，microRNA 与肿瘤关系密切，可以调控肿瘤的增殖、转移、耐药等多种生物学行为。本文将对近年来 microRNA 在脉络膜黑色素瘤中的研究进展进行综述。**目的**：就 microRNA 与脉络膜黑色素瘤的增殖、凋亡、侵袭、转移及临床应用等方面进行综述和展望。**方法**：查找近 5-10 年国内外相关文献，综合影响因子及被引用次数等指标进行筛选，最后将关键信息进行提炼汇总。**结果**：microRNA 的异常表达，尤其是低表达是脉络膜黑色素瘤的发病机制之一，可通过调控 MITF, c-Met, CDK6, Bcl-2, cyclin D2 等靶基因及 PI3K/AkT 和 ERK1/2 等下游通路，进而影响上皮-间质转化、血管再生、肿瘤微环境等，从而对脉络膜黑色素瘤起到抑制作用。在临床应用方面，microRNA 作为肿瘤标记物，可应用于脉络膜黑色素瘤的早期诊断、转移风险预测及预后评估等方面，而通过药物调控 microRNA 或是借助纳米技术实现 microRNA 的精确转染也为脉络膜黑色素瘤的治疗提供了新思路。**结论**：microRNA 在脉络膜黑色素瘤中异常表达，并通过抑制或促进下游靶基因的表达参与调控肿瘤的多种生物学行为。随着对分子机制研究的不断深入，有理由相信 microRNA 在脉络膜黑色素瘤诊疗中具有广泛的应用前景。

PU-386

泪腺腺样囊性癌芯片数据挖掘及生物信息学分析

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目的 使用生物信息学方法筛选关于泪腺腺样囊性癌发生高级别转化的相关基因与信号通路，从分子水平探讨泪腺腺样囊性癌的进展机制，为后续研究提供新思路。方法 使用 miRNA 芯片对 12 例泪腺腺样囊性癌样本（包括 6 例去分化癌，6 例未去分化癌）进行检测分析。在 c-Bioportal 数据库筛选泪腺腺样囊性癌突变基因，对突变基因进行 GO 分析和 Pathway 分析。在 GEO 数据库筛选腺样囊性癌与正常组织的差异基因，并对靶基因进行 GO 分析和 Pathway 分析。将 miRNA 芯片分别与两个数据库中的靶基因，信号通路取交集，对重合的靶基因和信号通路进行分析。结果 利用 miRNA 芯片筛选出 24 个差异表达 miRNA，574 个靶基因，其中与 c-Bioportal 数据库重合的靶基因有 ABCA1，CDK12，NOTCH2，UBE2D1，重合的信号通路有 22 条。miRNA 芯片与 GEO 数据库重合的靶基因有 22 个，重合的信号通路有 5 条。miRNA 芯片与 c-Bioportal、GEO 数据库三者重合的主要有 PI3K-Akt 信号通路与 ECM-受体相互作信号通路。结论 本文通过 miRNA 芯片与 c-Bioportal 数据库，获取了 4 个与泪腺腺样囊性癌发生、发展相关的关键基因，分别为 ABCA1，CDK12，NOTCH2，UBE2D1。这些基因主要参与转录，蛋白质磷酸化等生物学过程，而且通过 Cox 回归分析，发现 NOTCH2 与患者生存和预后密切相关，可作为后续研究靶点。Notch 通路与 PI3K/Akt/mTOR 信号通路可作为研究泪腺腺样囊性癌进展的重要通路。而且通过涎腺 ACC 细胞系作为泪腺 ACC 的备用细胞系得出的结论需谨慎应用。

PU-387
棕榈酰乙醇酰胺(PEA)抑制 Müller 细胞在增殖性视网膜病变小鼠模型中的活化

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目的:Müller 细胞是在增生性视网膜病变和视网膜变性中细胞因子和炎症因子的重要来源。本研究的目的是探究增殖性视网膜病变中，内源性过氧化物酶体增殖激活受体 α(PPARα)受体激动剂--Palmitoylethanolamide(PEA)对 Müller 细胞活化和 Müller 细胞释放细胞因子在的作用，并确定其分子作用机制。

方法:采用大鼠 Müller 细胞系 rMC-1 和氧诱导视网膜病变模型。将 PEA(30mg/kg)腹腔注射到 OIR 小鼠体内，从 P12 到 P17。采用 RT-RCR 和 Western blot 检测 Muller 细胞活化标志物 GFAP，炎性细胞因子,如 TNFα、ICAM-1 和 VEGF 免疫印迹和免疫组织化学分析进行评估。采用 TUNEL 法检测凋亡细胞。采用异凝集素 IB4 的方法对全视网膜视网膜血管进行染色。原纤维化的细胞因子 TNF-β2 测量通过 RT-PCR 和免疫印迹分析。PPARα 水平测量通过 RT-PCR 和免疫印迹分析。

结果:PEA 治疗减少 rMC-1 细胞凋亡,由叔丁基过氧化氢(TBHP)处理后的炎性细胞因子如 TNF-α 表达降低。在 OIR 视网膜,PEA 显著抑制 Müller 细胞激活，并在 mRNA 和蛋白水平降低 TNF-αICAM-1 和 VEGF 的表达减少。同时，PEA 在程度上抑制视网膜细胞凋亡，减少 OIR 视网膜的无血管区和新生血管。此外,PEA 治疗减少 Müller 细胞释放原纤维化细胞因子 TNF-β2,以及视网膜水平的 TNF-βRII phosphor-Smad2/3, Smad2/3 和 α-SMA。此外，在 PEA 治疗下，细胞和 OIR 视网膜中 PPARα 的 mRNA 和蛋白质水平均升高。

结论:PEA 通过增加视网膜 PPARα 水平，抑制 Müller 细胞的激活,降低 Müller 细胞介导细胞因子释放。PEA 可能是视网膜神经胶质瘤相关视网膜疾病的潜在治疗方法。

PU-388

Correlation of axial length with the aqueous humor concentration of cytokines in eyes with congenital cataracts

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Purpose: To investigate the association between the components of the aqueous humor (AH) in congenital cataract patients and the growth of axial length.
Methods: Aqueous humor samples were collected from 25 eyes of 17 congenital cataract patients who underwent congenital cataract extraction and intraocular lens implantation. 0.1 ml of the AH of each patient was collected during the surgery. Multiplex enzyme-linked immunosorbent assays (ELISAs) and the Luminex xMAP technology were used for assessing cytokines/chemokines, matrix metalloproteinases (MMPs), and acute-phase proteins in the cohort for identification. Axial length was respectively measured before the surgery and 3 months, 6 months and 1 year after the surgery.
Results: There was a negative correlation between the aqueous humor level of vascular endothelial growth factor (VEGF) and the preoperative axial length ($r^2 = 0.2615$, $p<0.01$). Similar trends were observed in the aqueous humor levels of GM-CSF and CCL11/Eotaxin; the levels decreased with the increase in the axial length ($r^2 = 0.2456$, $p = 0.01$; $r^2 = 0.1758$, $p = 0.037$). And a negative correlation was found between the level of PDGF-BB and the change of the axial length within 1 year after surgery ($r^2 = 0.2133$, $p = 0.02$). There was no correlation between the axial lengths and the changes of axial lengths ($p>0.05$).
Conclusions: Axial length was significantly negatively correlated with the aqueous humor levels of VEGF, GM-CSF and CCL11/Eotaxin. And the level of PDGF-BB was negatively correlated with the change of the axial length within 1 year after surgery. The components of the AH may be of predictive value for axial prediction in congenital cataract patients and thus may serve as be a useful prognostic modality.

PU-389

Senescence-associated secretory phenotype in senescent RPE cells and the senolytic effects of dasatinib and quercetin in senescent RPE cells

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Purpose*: Age-related macular degeneration (AMD) is a leading cause of blindness in the elderly. Retinal pigment epithelial (RPE) cell senescence is critically implicated in AMD pathogenesis and progression. Emerging evidences show that the senescent RPE cells not only lost physiological*

functions but also promotes the deleteriousness of the adjacent photoreceptors. However, the exact mechanism is largely undefined. Senescent cells can produce proinflammatory and proimmune factors, known as senescence-associated secretory phenotype (SASP), which reinforce the senescence arrest and alter the microenvironment of the senescent cells. Clearing senescent cells have been shown enhanced health span and delayed multiple age-related disorders in mice. In the present study, we are aimed to delineate the SASP in senescent RPE cells and to determine the senolytic effects of two well studied drugs in senescent RPE cells.

Methods: *The premature senescence RPE model was established by exposure of ARPE-19 cells to oxidant tert-butylhydroperoxide (tert-BHP) or X-ray irradiation. The cellular senescence was confirmed by senescence-associated β-galactosidase (SA-β-gal) activity, p21 upregulation and existence of DNA damage. Global gene expression alteration during RPE senescence was determined by RNA-seq and SASP genes were validated by quantitative RT-PCR (qRT-PCR) analysis. To test the senolytic effects of dasatinib and quercetin, quiescent or senescent ARPE or RPE1 cells were treated with different doses of drug alone or in combination. Cell viability was determined by CCK8 analysis.*

Results: *In senescent RPE cells, genes involved in cell cycle, DNA replication and repair were dramatically downregulated. On the other side, most genes involved in cytokine-cytokine receptor interaction were upregulated. Genes composing the SASP are significantly upregulated during RPE senescence. These SASP components included inflammatory and immune-modulatory cytokines and chemokines, growth factors, shed cell surface molecules and matrix degradation factors. However, dasatinib and quercetin either treated alone or in combination exhibited no significant senolytic effects on RPE cells.*

Conclusion: *Senescent RPE cells is characterized by typical SASP. To clear senescent RPE cells, new senolytic drug development is needed.*

PU-390

兔角膜基质细胞植入脱细胞猪角膜基质的相关研究

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【目的】本实验尝试通过体外培养原代兔角膜基质细胞（Corneal stromal cells，CSCs ），以脱细胞猪角膜基质（Acellular porcine corneal stroma，APCM）为支架材料构建组织工程角膜基质，探讨打入 CSCs 后的 APCM 在兔角膜深板层移植中的生长情况，为后期组织角膜工程的研究提供实验基础。

【方法】体外分离培养原代兔 CSCs，波形蛋白细胞免疫组化鉴定 ；用经慢病毒转染的增强型绿色荧光蛋白（Enhanced green fluorescent protein，EFGP）标记兔 CSCs；体外动物实验，以 APCM 为支架材料，行兔角膜深板层移植。取新西兰大白兔 12 只，分为 3 组,实验组:APCM+兔 CSCs；对照组 A:APCM 组；对照组 B：兔角膜原位缝合组。术后 8 周，各组行眼前段照相及荧光素染色、眼前段 OCT、冰冻切片免疫荧光及 GFP 免疫组化检测。

【结果】 成功分离培养出兔 CSCs，细胞鉴定结果为阳性。术后 8 周，实验组角膜上方长入少量新生血管，角膜清亮，未见明显瘢痕，荧光素染色示植片中央区域有着色；对照组 A 植片中中央区域荧光素染色着色；对照组 B 角膜上方可见些许新生血管，角膜透明，荧光素染色示角膜点状着色。眼前段 OCT 实验组基质信号较均匀，基质融合好；对照组 A 角膜基质层信号欠均匀，可见移植的 APCM 与原基质间有明显的界限，融合欠佳；对照组 B 基质层灰度均匀；术后测各组中央角膜厚度分别为：323μm、166μm、324μm。冰冻切片免疫荧光实验组可见绿色对照组 A/B 均未见荧光；GFP 免疫组化实验组可见少量棕色着色，对照组 A/B 均只可见细胞核蓝染。

【结论】体外动物实验证明注射进APCM的兔CSCs经兔角膜深板层移植后，角膜基质细胞在APCM上生长良好，APCM具有生物活性与兔角膜融合良好，且APCM未发生溶解，厚度未发生明显改变。

PU-391

MicroRNA-203 regulates cocl2-induced apoptosis in human retinal pigment epithelial cells through SOCS-3

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Abstract

PURPOSE. The apoptosis of human retinal pigment epithelial cells (RPEs) plays a critical role in the pathogenesis of diabetic retinopathy (DR), but the molecular mechanisms underlying this phenomenon remain unclear. The purpose of this study was to investigate the cellular localization and the expression of microRNA-203 (miR-203) and its potential role in cocl2-induced RPEs apoptosis.

METHODS. The cellular localization of miR-203 was assessed by in situ hybridization. Target prediction was performed using the TargetScan algorithm. Luciferase reporter assays were performed to predict the direct target SOCS-3. RPEs were transfected with miR-203 mimics or miR-203 inhibitors then treated with cocl2. Apoptosis was evaluated by TdT-mediated dUTP Nick-End Labeling (TUNEL) and Flow Cytometry. Expression levels of miR-203 was analyzed by RT-PCR, SOCS-3 and apoptosis related protein was analyzed by Western blot.

RESULTS. We found that miR-203 were primarily localized in the RPEs of the retinas from normal and diabetic rats. We identified that SOCS-3 is a direct target of miR-203. Cocl2 treatment resulted in upregulation of miR-203 and downregulation of SOCS-3 in RPEs; while transfection of miR-203 mimics resulted in significant downregulation of SOCS-3 and improved cocl2-induced apoptosis of RPEs, overexpression of SOCS-3 partially reversed the pro-apoptotic effect of miR-203, suggest that a positive regulation of miR-203 on cocl2-induced RPEs apoptosis through SOCS-3.

CONCLUSIONS. We uncovered a novel regulator of RPEs apoptosis through SOCS-3. Our data support that miR-203 is a new therapeutic target for treatment of DR and other diabetic complications.

PU-392

乙酰胆碱酯酶抑制剂对乙酰胆碱酯酶敲除小鼠的影响

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目的：评估不同浓度的AchE抑制剂他克林（Tacrine）和多奈哌齐（Donepezil）对不同年龄的129-AchEtm1loc/J小鼠视网膜的保护作用。

方法：分别将0.1mg/ml、0.2 mg/ml 、0.4 mg/ml Tacrine和Donepezil腹腔注射到2月龄、4月龄的AchE+/-和野生型的S129小鼠体内，连续注射7天，PBS作为空白对照组，30天后处死小鼠，体外心脏灌注取视网膜样本，分别制成冰冻切片和提取蛋白，用HE染色、免疫荧光、Western blot印迹检测方法分别观察视网膜形态，RPE层AchE的表达变化及蛋白的变化。

结果：AchE+/-型小鼠的视网膜较野生型S129小鼠视网膜更薄，2月龄时视网膜结构尚完整，随着年龄的增大，AchE+/-型小鼠视网膜发育较野生型的迟缓，经腹腔注射Tacrine后的AchE+/-小鼠较

野生型小鼠视网膜 AchE 的表达下降（p＜0.01），且在 0.4 mg/ml Tacrine 作用时保护效果最显著。经腹腔注射 Donepezil 的 AchE+/-小鼠的视网膜 AchE 的表达和 Tacrine 组无显著差异（p＞0.01），较野生型组 AchE 的表达下降（p＜0.01）。
结论：Tacrine 和 Donepezil 在体内可以抑制 AchE 的表达，且视网膜中 AchE 的表达下降后有利于视网膜的结构稳定。

PU-393

337 例眼附属器淋巴组织增生性病变的病理分析

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目的 探讨眼附属器淋巴组织增生性病变的病理特征，以期提高病理诊断质量，规范临床治疗。
方法 回顾性临床病例研究。2006 年 1 月至 2017 年 12 月在华西医院眼科手术、并经组织病理学检查证实的眼附属器淋巴组织增生性病变患者共 337 例 369 眼，分析其病理类型、组织学形态、免疫表型特点，探讨病理诊断要点。
结果 337 例患者中男性 205 例，女性 132 例，年龄 7-95 岁(平均 54.8 岁)。病程 20 天至 10 年。眼眶 291 例，同时累及眼眶和结膜 19 例，眼睑 15 例，结膜 12 例。病理类型包括：淋巴瘤 207 例，淋巴组织反应性增生 64 例，IgG-4 相关眼眶病 46 例和非典型淋巴增生性病变 20 例。淋巴瘤的具体分型包括：结外边缘区粘膜相关淋巴组织淋巴瘤（MALT 淋巴瘤）153 例，大 B 细胞淋巴瘤 17 例，结外 NK/T-细胞淋巴瘤-鼻型 14 例，套细胞淋巴瘤 11 例；慢性 B 细胞淋巴细胞性白血病/小淋巴细胞性淋巴瘤 3 例(1.4%)，前 B 淋巴母细胞性淋巴瘤 2 例(1.0%)，此外，高分化 B 细胞淋巴瘤、间变性大细胞淋巴瘤、T/null 细胞型、滤泡细胞淋巴瘤、淋巴浆细胞性淋巴瘤、周围 T 细胞性淋巴瘤、髓样肉瘤和 Hodgkin 淋巴瘤（结节硬化型）各 1 例。其中 2 例 IgG-4 相关眼眶病合并淋巴瘤。12 例眼眶 MALT 淋巴瘤、眼眶间变性大细胞淋巴瘤、小淋巴细胞性淋巴瘤、淋巴浆细胞性淋巴瘤和髓样肉瘤均继发于其他部位的淋巴瘤。基因重排检测显示 83.6%的淋巴瘤出现 IgH 基因重排；AtLP 和 IgG4-ROD 的基因重排率则分别为 20%和 22.2%；而反应性淋巴组织增生没有 IgH 重排。
结论 组织形态学结合免疫组化和基因重排检测是眼附属器淋巴组织增生性病变病理诊断的重要手段，MALT 淋巴瘤是最常见的类型，IgG-4 相关眼眶病值得关注。

PU-394

miR-21 在人角膜基质细胞纤维化中的作用

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目的 研究 miR-21 对人角膜基质细胞的纤维化是否有调控作用，探讨其调控作用的分子机制。
方法 体外培养原代人角膜基质细胞，通过在细胞中过表达 miR-21 并检测纤维化相关细胞因子的表达，探讨 miR-21 对人角膜基质细胞的纤维化的影响。
结果 通过实时定量检测发现，体外培养的人角膜基质细胞在 miR-21 过表达的条件下 SMA、COL3、FN、PTEN、PDCD4 等的表达量均有增加，其中 SMA 与 FN 的表达量显著增加。
结论 在人角膜基质细胞中 miR-21 表达量的增加促进了细胞的纤维化，这提示 miR-21 及其下游基因可能参与了细胞纤维化的调控过程，其具体调控机制有待进一步研究。

PU-395

烟酰胺通过调控 Nox4 抑制贝伐单抗诱导的视网膜色素上皮细胞上皮间质转化

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目的 探讨烟酰胺对贝伐单抗诱导视网膜色素上皮(retinal pigment epithelium, RPE)细胞发生上皮间质转化（epithelial-mesenchymal transition, EMT）的抑制作用及可能的机制，为临床抑制抗 VEGF 治疗后出现眼底新生血管纤维化提供可能的干预手段。
方法 体外培养人视网膜色素上皮细胞（ARPE-19），分别用贝伐单抗（0.25g·L^{-1}）和烟酰胺（10mM）进行处理，并检测 EMT 相关指标以及 Nox4、TGFβ1、p-smad2/3 的表达情况。通过检测细胞内 ROS、H2O2 的表达以及细胞总抗氧化能力评价各组 ARPE-19 细胞的氧化应激情况。使用两种 Nox4 抑制剂 VAS2870 和 GKT137831 与贝伐单抗共同处理细胞，检测下调 NOX4 对贝伐单抗引起的 ARPE-19 细胞 EMT 及氧化应激反应的抑制作用。
结果 烟酰胺能够显著抑制贝伐单抗引起的 ARPE-19 细胞的 EMT，表现为抑制贝伐单抗引起的间质标志物 fibronectin、α-SMA 和 vimentin 的上调、上皮标志物 ZO1 表达的下降以及细胞迁移速度的增加。烟酰胺能够显著抑制贝伐单抗导致的 ARPE-19 细胞 ROS、H2O2 及细胞总抗氧化能力的升高。贝伐单抗能显著促进 RPE 细胞 Nox4 的表达，而烟酰胺处理后这种促进作用被显著地抑制。Nox4 抑制剂 VAS2870、GKT137831 与烟酰胺一样可以抑制贝伐单抗对 ARPE-19 细胞 EMT、氧化应激的促进作用。烟酰胺与 Nox4 抑制剂可以下调与 EMT 密切相关的信号通路 TGFβ1、p-smad2/3 的活化。
结论 烟酰胺能通过抑制 Nox4 来调控 RPE 细胞的氧化应激，从而有效抑制贝伐单抗引起的 RPE 细胞的 EMT，TGFβ1/p-smad2/3 信号通路在其中发挥重要调控作用。烟酰胺可能可以成为抑制抗 VEGF 治疗引起的眼底新生血管纤维化的有效干预药物。

PU-396

STAT3 信号通路在小鼠干眼发病中的作用及其机制

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目的：以不同小鼠干眼模型为对象，探讨信号转导和转录激活因子 3（STAT3）信号通路在干眼发病中的作用及机制。
方法： 以苯扎氯铵诱导、泪腺摘除诱导及睑板腺缺失 Tabby 小鼠为干眼模型，采用免疫组化及 western blot 检测眼表上皮 *p*-STAT3 表达情况，以不同 STAT3 抑制剂对干眼模型鼠进行治疗，通过 PCR、ELISA、PAS 染色、免疫荧光、TUNEL 染色等检测眼表炎症及细胞凋亡情况，并与 STAT3 上游 JAK 抑制剂的治疗作用进行比较。
结果：三种干眼模型均出现角膜上皮荧光素钠着色和泪液分泌量下降的典型特征，免疫组化及 western blot 发现干眼小鼠眼表上皮 *p*-STAT3 表达水平明显高于正常小鼠。局部使用 STAT3 抑制剂明显减轻角膜上皮荧光素钠着色，泪液分泌量和结膜杯状细胞密度明显改善，显著改善了干眼症状。同时，眼表组织 IL-1β、IL-6、IL-17、IFN-γ 等炎症因子表达量显著下调，角膜及结膜上皮凋亡细胞显著减少。与 STAT3 抑制剂相比，其上游 JAK 抑制剂治疗效果欠佳。
结论：小鼠干眼发病过程中，眼表上皮 STAT3 活化水平显著过强，其抑制剂可有效改善眼表干眼症状。

PU-397

靶向线粒体抗氧化剂对糖尿病小鼠眼表病变的作用及机制研究

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目的：糖尿病引起干眼、角膜上皮损伤延迟愈合及神经再生延迟等眼表功能障碍，氧化应激可能是重要发病机制，本研究以 STZ 诱导的Ⅰ型糖尿病小鼠为体内模型，以 TKE2 细胞为体外模型，探讨线粒体靶向抗氧化剂 MnTBAP、SS31 对糖尿病小鼠眼表病变的作用及机制。
方法：通过泪液分泌、虎红染色、PAS 染色检测小鼠干眼情况，透射电镜观察泪腺超微结构变化；刮除小鼠角膜全层上皮，ROS、GSH 染色检测氧化应激状态，免疫荧光检测线粒体 DNA 氧化损伤标记 8-OHdG 表达，MnSOD、NQO-1、Catalase 表达，*p*-AKT、Sirt1 表达及神经再生情况；JC-1 染色检测线粒体功能变化；并追踪角膜上皮刮除前后神经敏感度的变化。
结果：与正常对照小鼠相比，STZ 小鼠泪液分泌量、结膜杯状细胞密度、角膜敏感度显著降低，角膜虎红着色程度增加，SS31 点眼 14 天显著改善上述糖尿病小鼠干眼症状，回调角膜敏感度，透射电镜检测显示 STZ 小鼠泪腺腺泡细胞线粒体空泡样变性，内部嵴断裂，结构松散模糊，而 SS-31 治疗组线粒体发达，内部嵴结构清晰；STZ 小鼠角膜上皮刮除后，修复明显延迟，角膜上皮 8-OHdG 持续强阳性表达，结膜下注射 MnTBAP、SS-31 显著促进上皮修复，降低 ROS 水平及 8-OHdG 表达，提高 GSH 水平及 MnSOD、NQO-1、Catalase 表达，且角膜上皮 *p*-AKT、 Sirt1 表达上调，另外 MnTBAP 显著回调高糖处理组 TKE2 细胞损失的线粒体膜电位；STZ 小鼠上皮刮除后 7 天角膜基质神经密度显著降低，结膜下注射 MnTPAB、SS-31 显著改善神经密度，并提高 STZ 小鼠神经敏感度。
结论：糖尿病干眼、角膜上皮损伤延迟愈合及神经再生延迟等眼表功能障碍可能与线粒体 DNA 氧化损伤有关，靶向线粒体抗氧化剂 MnTPAB、SS-31 能显著改善上述糖尿病眼表病变，其机制可能与 *p*-AKT、 Sirt1 表达上调有关。

PU-398

雷公藤红素纳米胶束抑制视网膜母细胞瘤新生血管实验研究

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目的：制备雷公藤红素纳米胶束，评估其对小鼠模型视网膜母细胞瘤的生长及其对肿瘤新生血管形成的影响。
方法：超声乳化方法制备负载雷公藤红素的 PEG-b-PCL 纳米胶束，并对其表征进行测定。扫描电镜测其形貌，粒径仪测负载前后纳米胶束的粒径，并对其包封率和载药量以及体外缓释行为进行评估。采用 NOD-SCID 小鼠建立视网膜母细胞瘤动物模型，腹腔注射雷公藤红素纳米胶束，评估其对视网膜母细胞瘤生长的影响，组织病理学研究其对肿瘤新生血管生长的影响。体外研究鸡胚模型研究雷公藤红素纳米胶束对血管形成的影响，以及对内皮细胞迁移和侵袭行为的影响，评估对低氧诱导下血管内皮细胞 HIF-1α 及 VEGF 蛋白表达的影响。
结果：制备的雷公藤红素纳米胶束呈均相透明的橙红色胶束溶液，丁达尔现象阳性，电镜显示胶束呈圆形，平均粒径为 48 纳米，包封率 91.46%，载药量为 7.36%。体外释放行为表示呈现两阶段释放模式，即起初雷公藤红素的快速释放和接下来几周的缓慢释放。动物实验显示，雷公藤红素药物治疗组明显抑制视网膜母细胞瘤的生长，治疗组瘤体体积及瘤体重量明显减少，差别具统计学意义。病理组织学研究显示，瘤体内肿瘤新生血管的密度明显减少。体外研究显示，雷公藤红素纳米胶束明显抑制鸡胚模型视网膜母细胞瘤诱导的新生血管，随药物浓度增加，新生血管数量明显减少，具有剂量依赖性。模拟肿瘤低氧微环境，雷公藤红素纳米胶束明显抑制低氧诱导的血管内皮细胞的迁

移及侵袭能力。Western Blot 进一步显示，雷公藤红素纳米胶束抑制低氧诱导下血管内皮细胞 HIF-1α 及 VEGF 蛋白表达。差别具统计学意义。
结论：制备的雷公藤红素纳米胶束大大增强了雷公藤红素的表观溶解度，具有缓释行为。明显抑制视网膜母细胞瘤的生长，明显抑制肿瘤新生血管形成，可能与其抑制 HIF-1α 信号通道及 VEGF 蛋白表达有关。

PU-399

Activation of autophagy in the retina after optic nerve crush injury in rats

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Aim: To investigate the activation of autophagy in the rat retina after optic nerve crush (ONC) and evaluated its relationship with RGC apoptosis.
Methods: The ONC model was established. Western blots were used to detect expression of p62, Beclin-1 and LC3. Transmission electron microscopy was used to discover the autophagosomes in the retina after ONC. Immunohistochemistry was used to confirm the distribution of LC3. TUNEL was to further confirm the association between autophagy and RGC apoptosis.
Results: We demonstrate that p62:Beclin-1 ratio was declined shortly after ONC until to day 7 following ONC and then returning to a normal level on day 21. There was an opposite change in the LC3-II/LC3I ratio in the retina compared to the p62:Beclin-1 ratio. Increased autophagosomes were found after ONC using transmission electron microscopy, and most of the LC3-immunoreactive cells colocalized with RGCs and Müller cells. More LC3-immunoreactive cells and apoptotic RGCs were found on day 7 following ONC.
Conclusions: These results suggest possible activation of autophagy in RGCs after ONC; autophagy mainly occurred in RGCs and Müller cells, and the apoptosis of RGCs after ONC may be partly associated with autophagic activation.

PU-400

环状 RNA-cZNF609 在视网膜血管新生中的调控作用研究

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目的：视网膜血管新生是众多眼科疾病的共有病理机制，包括 ROP 和糖尿病视网膜病变等。环状 RNA 是许多生理过程和病理过程的重要调控分子。本研究着重研究环状 RNA-cZNF609 在视网膜血管新生中的调控作用。
方法与结果：采用定量 PCR 检测发现，cZNF609 在 ROP 病变和内皮细胞损伤进程中发生差异表达；视网膜平铺片、Evans Blue 和 ELISA 等实验检测发现，cZNF609 的表达沉默显著地减少视网膜血管的损伤，抑制病理性的血管新生；MTT、EdU、Transwell 和 martrigel 等实验发现，cZNF609 的表达沉默调控内皮细胞的活力、增殖、迁移和成管等功能。RNA pull down、荧光素酶和生物信息学等实验发现，cZNF609/miR-615-5p/MEF2A 构成调控网络，影响内皮细胞的功能。
结论：环状 RNA-cZNF609 通过 ceRNA 调控网络影响视网膜血管新生的进程，该分子有望成为治疗视网膜微血管病变的新靶点。

PU-401

Clinical analysis of cataract complicated with intraocular tumors

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Objective To observe the clinical manifestations and imaging features of cataract with intraocular tumors，improve the clinical diagnostic level and avoid misdiagnosis. **Methods** 36 cases of cataract with intraocular tumors were analyzed retrospectively. For all patients, regular ophthalmic examination, including visual acuity, slitlamp microscopy , mydriatic fundus examination, B-type ultrasound examination were recommended.17 patients were received fundus fluorescein angiography (FFA) and indocyanine green angiography (ICGA). 26 patients underwent CT or MRI examination. **Results** 36 cases of cataract with intraocular tumors mainly showed painless and progressive visual impairment.27 cases of malignant tumors in intraocular tumors，including 12 cases of choroidal melanoma (44.4%), 8 cases of choroidal metastatic carcinoma (29.6%) and 7 cases of retinoblastoma(25.9%). There were 9 cases of benign tumors, including iris cyst choroidal hemangioma and choroidal osteoma. Different types of intraocular tumors have different fundus and imaging findings. **Conclusions** We should strengthen the comprehensive examination of cataract patients with refractive interstitial opacity before operation，Improve the understanding of intraocular tumors. To avoid misdiagnosis, Fundus examination combined with multiple imaging analysis is helpful for the diagnosis of intraocular tumors.

PU-402

Caveolin-1 regulates human trabecular meshwork cell adhesion and autophagy

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Background: Impaired trabecular meshwork (TM) outflow is implicated in the pathogenesis of primary open-angle glaucoma (POAG). We previously identified the association of a caveolin-1 (*CAV1*) variant with POAG by genome-wide association study. Here we report a study of *CAV1* knockout (KO) effect on human TM cell properties.
Methods: The *CAV1* gene was knocked-out in human TM cells by the CRISPR/Cas9 technology. Cell adhesion, apoptosis and endocytosis were evaluated in the *CAV1*-knockout human TM cells. The expressions of extracellular matrix (ECM) and autophagy-related genes were also determined.
Results: we found that the *CAV1*-KO TM cells less adhered to the surface coating than the wildtype TM cells by 69.34% ($p < 0.05$), but showed no difference in apoptosis. Higher endocytosis ability of dextran and transferrin was also observed in the *CAV1*-KO TM cells ($p < 0.001$), compared to the wildtype TM cells. Moreover, the *CAV1*-KO TM cells had higher expression of extracellular matrix degrading enzyme genes (*ADMTS13* and *MMP14*) as well as autophagy-related genes (*ATG7* and *BECN1*) and protein (LC3B-II) than the wildtype TM cells.
Conclusion: In summary, results from this study showed that the *CAV1*-KO TM cells have reduced adhesion with higher ECM degrading enzyme expression, but increased endocytosis and autophagy activities, indicating that caveolin-1 could be involved in the regulation of adhesion, endocytosis
and autophagy in human TM cells.

PU-403

Toxicity of mesoporous silica (MSNs) on the cornea and and it relationship with Dry eye

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Purpose: To evaluate the cytotoxicity of MSNs and Ag+ loaded MSNs (MSNs-Ag+) on human corneal epithelial cells (HCECs) and mouse cornea, and its relationship with Dry eye (DE).
Methods: The CCK-8 and flow cytometry were used to determine cytotoxicity. Corneal damages were investigated by fluorescein sodium staining, anterior segment OCT and TUNEL assay. The tear break-up time was used to detect DE.
Results: MSNs and MSNs-Ag+ exert cytotoxicity on hCECs and increased corneal thickness. MSNs exposure caused sporadic damage, whereas MSNs-Ag+ exposure caused a flake corneal damage and mainly damaged the superficial corneal epithelial cells. Short-term repeated exposures to MSNs and MSNs-Ag+ shortened the break-up time to less than 10s, indicating DE.
Conclusion: MSNs and MSNs-Ag+ exposures caused cytotoxicity, cornea damage and tear-film instability, which lead to DE.

PU-404

AChE 缺失或抑制可减少碘酸钠诱导的视网膜色素上皮及感光细胞凋亡与 caspase 3 表达

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目的:本研究旨在研究 AchE 在碘酸钠诱导的 RPE 及感光细胞凋亡中的表达情况,并探究 AchE 基因敲除与抑制剂对细胞凋亡的作用。
方法:对 C57BL/6 小鼠尾静脉注射较高剂量 NaIO3(50 毫克/千克),分别在第 6 小时、第 1 天、3 天、7 天猝死取眼球进行蛋白印迹与免疫荧光。对小鼠分别灌胃给予不同剂量的多奈哌齐(0.5、2.5、12.5 毫克/千克)预处理 3 天与不同剂量的柚皮苷(30、60 毫克/千克)1 天,NaIO3 注射后持续给药 3 天,猝死小鼠取眼球进行蛋白印迹与免疫荧光。分别对 AChE+/+和 AChE+/-小鼠尾静脉注射较低剂量 NaIO3(25 毫克/千克),在第 3 天猝死取眼球进行蛋白印迹与免疫荧光。采用 TUNEL 标记感光细胞凋亡情况,免疫荧光技术观察 Caspase3 的表达情况,同时采用蛋白印迹技术检测 AchE 的表达情况。
结果:较高剂量 NaIO3 注射显著诱导细胞凋亡,TUNEL 染色发现注射后 6 小时即出现 RPE 凋亡,随后的感光细胞凋亡在第 3 天达到高峰,第 7 天有所回降。同时,蛋白印迹分析与免疫荧光结果表明 AChE、Caspase3 的表达也是显著升高的。AChE+/-碘酸钠注射组的 TUNEL 阳性细胞与 AChE+/+碘酸钠注射组相比具有明显差异(P<0.01)。与 PBS 灌胃组相比,给予乙酰胆碱酯酶抑制剂会显著降低凋亡细胞的程度(P<0.01)。而且不同浓度之间具有统计学意义(P<0.01)。免疫荧光显示在 AChE 基因敲除与抑制剂抑制凋亡的同时可见 caspases-3 的激活受抑。
结论:AChE 可能是个促凋亡因子,抑制 AChE 表达可减少感光细胞凋亡。AChE 基因敲除与抑制剂主要抑制 caspases-3 的激活达到抑制凋亡的效果。总之,我们研究结果说明 AChE 抑制剂可能为将来临床上治疗视网膜退行性疾病提供一个思路。

PU-405

CCAAT/增强结合蛋白 β 介导血管内皮生长因子对氧诱导视网膜新生血管的调控作用

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目的：评价 CCAAT/增强蛋白结合 β（C/EBP β）在氧诱导视网膜病变（OIR）模型中对视网膜新生血管的调控作用。
方法：将 SD 大鼠置于缺氧和高氧交替环境中 14 天诱导构建 OIR 模型。OIR 大鼠被随机注射携带 C/EBP β 慢病毒（LV.shC/EBPβ）或空病毒（LV.shScrambled）。本研究共分为四组：空白对照组，OIR 组，LV.shScrambled 组以及 LV.shC/EBP β 组。通过视网膜荧光素-葡聚糖灌注、视网膜 ADP 酶染色和过碘酸-雪夫（PAS）染色来观察视网膜无灌注区、新生血管形成以及血管周细胞的情况。采用荧光定量聚合酶链反应（qRT-PCR）和蛋白质免疫印迹法测定 C/EBP β 和血管内皮生长因子（VEGF）的 mRNA 和蛋白表达。
结果：在 OIR 大鼠中，C/EBP β 和 VEGF 的表达水平在 mRNA 和蛋白水平均有显著提高（P<0.01）。同时，与正常对照组比较，OIR 大鼠的视网膜周边无灌注区面积明显增加，周边可见新生血管芽形成，视网膜血管中周细胞显著丢失，闭锁血管数量增加。而在注射携带 C/EBP β 慢病毒后，LV.shC/EBP β 组的视网膜无灌注区域、新生血管数量以及周细胞丢失的血管数量均较 OIR 大鼠和 LV.shScrambled 组大鼠明显改善。在 LV.shC/EBP β 组中，VEGF 的表达也比 OIR 大鼠和 LV.shScrambled 组（P<0.01）显著降低。
结论：降低 C/EBP β 的表达可显著抑制 OIR 中的视网膜新生血管的形成。因此，我们推断在缺血缺氧性视网膜疾病中 C/EBP β 的过度表达加速了 VEGF 的转录，可能是导致视网膜新生血管形成的潜在机制。C/EBP β 有望成为预防视网膜新生血管形成的一个新的治疗靶点。

PU-406

胰岛素对人视网膜微血管内皮细胞中 Cip/Kip 家族蛋白表达的影响

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目的： 针对高糖环境下，不同浓度的胰岛素对人视网膜微血管内皮细胞中 Cip/Kip 家族蛋白表达的影响以及相应的细胞病理生理状态进行研究。
方法：将人视网膜微血管内皮细胞分为正常组、高糖组、高糖+1nM 胰岛素组、高糖+10nM 胰岛素组和高糖+100nM 胰岛素组分组培养 48h，通过 western blot 对各组细胞中 Cip/Kip 家族蛋白表达状况进行研究，并通过 real time PCR 对各组表达水平有变化的蛋白的 mRNA 水平进行检测，使用流式细胞仪对细胞的细胞周期和细胞生存率进行研究。
结果：正常组与高糖+1nM 胰岛素组 HRECs 内 $p21^{cip1}$ 蛋白表达水平无显著统计学差异（p>0.05）。高糖组、高糖+10nM 胰岛素组和高糖+100nM 胰岛素组 HRECs 中的 $p21^{cip1}$ 蛋白表达量较正常组明显下降（p< 0.05）。所有各研究组间 $p27^{kip1}$ 蛋白表达水平无明显差异（p>0.05）。高糖+1nM 胰岛素组 $p21^{cip1}$ mRNA 表达水平较正常组及高糖组显著升高（p<0.05），高糖+10nM 胰岛素组和高糖+100nM 胰岛素组 $p21^{cip1}$ mRNA 表达水平较正常组显著降低（p<0.05）。高糖组、高糖+10nM 胰

岛素组和高糖+100nM 胰岛素组较正常组细胞周期状态具有显著性差异（p<0.05）。高糖组、高糖+10nM 胰岛素组和高糖+100nM 胰岛素组细胞存活率相对正常组和高糖+1nM 胰岛素组显著下降（p<0.05）。

结论：在高糖环境下，不同浓度的胰岛素对 HRECs 中 $p21^{cip1}$ 蛋白及 mRNA 表达水平的影响不同，低浓度（1nM）胰岛素可上调 HRECs 中 $p21^{cip1}$ 蛋白及 mRNA 表达水平，高浓度胰岛素（10nM 和 100nM）可抑制 $p21^{cip1}$ 蛋白及 mRNA 表达，但对 $p27^{kip1}$ 蛋白及 mRNA 表达水平无显著影响，伴随着 $p21^{cip1}$ 蛋白水平下降，细胞周期推进，细胞存活率下降。

PU-407

UBE2I induces stabilization of CtBP2 to maintain its function in lens epithelial cells

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PURPOSE Exposure to ultraviolet radiation (UVR) is a recognized risk factor for age-related cataract. C-terminal binding protein 2 (CtBP2) has been implicated in a variety of diseases as a transcriptional repressor, and has been shown to be functionally modulated by post-translational modifications. The purpose of this study was to investigate the pathways that control CtBP2's function and the role of CtBP2 in the development of age-related cataract (ARC).
METHODS Western-blot and qRT-PCR analysis were used to detect the expression of indicated genes in human lens capsules tissues and human lens epithelial cell line (SRA01/04). Gain- and loss-of-function approaches by overexpression and short hairpin RNAs (shRNA) technology were used to determine the effect of Ubiquitin Conjugating Enzyme E2 I (UBE2I) on CtBP2 expression and function. Immunoprecipitates was performed to detect the binding of UBE2I to CtBP2.
RESULTS UBE2I was important to maintain CtBP2's stability and expression. In UV-treated cells and lens capsules tissues from ARC patients, CtBP2 and UBE2I exhibited reduced expressions, and the decreased UBE2I binding to CtBP2 was also found.
CONCLUSIONS Our findings demonstrated the association of UBE2I with CtBP2, and the effect of UV-irradiation on UBE2I binding, point to an additional level in the regulation of CtBP2 SUMOylation under different growth conditions as well as in response to pathogenesis of ARC.

PU-408

Expression profile of inflammatory cytokines in congenital cataract after Lensectomy and Anterior Vitrectomy

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Purpose: The research was to evaluate the relationship between the cytokine profile in aqueous humor and the state of capsule after Lensectomy and Anterior Vitrectomy.Methods: We followed a cohort of 58 eyes with congenital cataract from Wenzhou medical university, 26 eyes without cataract surgery and 33 eyes with congenital cataract was after lensectomy and anterior vitrectomy. Aqueous humor (100–200 μl) was aspirated from each patient by means of limbic paracentesis with the use of 30 gauge needle before the surgery. The procedure was performed under a surgical microscope. Levels of various inflammation-related cytokines in the aqueous humor of using multiplex immunoassay.Results: The mean concentration of IL-6 (6.64±12.57pg/mL) was significantly higher in eyes after surgery compared to the controls (2.25±5.87pg/mL; P =0.000) and the mean concentration of IL-2 (50.68±21.50 pg/mL) was significantly higher in eyes after surgery than in the controls (42.63±13.83pg/mL; P=0.012). Furthermore, the IP-10, IL-10 and IL-2 were

also higher in in eyes after surgery. There were no differences in the concentration of TGF-beta 2, TNF-α, IL-1β, PDGFBB, IFNγ, IL1α, MIP1α, MIP1β, IL-4, IL-17a, IL-5, Eotaxin. Furthermore, we divided the 33 eyes after surgery into three groups based on the shrinkage level of capsular bag.The concentration of IL-6 was higher in capsular bag with severe constriction. While the aqueous humor was no significant changes in synechia iridis eyes. Conclusions: Higher preoperative levels of IL-6, IL-2 in aqueous humor were associated with capsular constriction, which indicated the inflammation state after lensectomy and anterior vitrectomy may affect the reconstruction of capsular bag.

PU-409

花色苷对微波损伤视锥细胞的 Nrf2 信号通路的作用研究

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目的：明确花色苷如何通过 Nrf2 信号通路对视锥细胞微波损伤发生作用。
方法：选择对数生长期的 661W 细胞进行随机分组：空白组不进行微波辐射；对照组进行辐射不加入花色苷；实验组加入花色苷后进行微波辐射。采用 RT-PCR 法检测 Nrf2 及 Nrf2 信号通路可能调控的下游抗氧化酶和解毒酶基因：HO-1、CAT、SOD1、NQO1、γ-GCS、MRP2，评估微波辐射对该信号通路的影响，以及具体对哪些下游基因产生作用。
结果：①对照组 Nrf2 、HO-1、CAT、SOD1、NQO1、γ-GCS、MRP2 基因均较空白组升高。②实验组 Nrf2 、HO-1、SOD1、MRP2 基因较对照组升高。差异有统计学意义（均 $P<0.05$）。
结论：①视锥细胞通过 Nrf2 信号通路对微波损伤起到调控作用。②花色苷通过 Nrf2 信号通路对视锥细胞微波损伤起到调控作用，具体靶基因为 HO-1、SOD1、MRP2。

PU-410

嗅鞘细胞抑制视网膜变性过程中 Müller 细胞胶质化及其机制研究

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Propose: To explore the mechanism of OECs on the retinal gliosis of RCS rats.
Methods: Molecular, Histological, behavioral testing and electroretinography the effect has been evaluated
Results: More photoreceptors and ON-bipolar cells were preserved in the retinas of OEC-treated RCS rats than in controls. The grafted OECs interacted directly with Müller cells in the retina of RCS rats, in three distinct patterns, and secreted matrix metalloproteinases 2 and 3 (MMP-2 and MMP-3). The grafted OECs significantly decreased the expression, by retinal cells, of Notch signaling pathway components (including Notch3, Notch4, DLL1, DLL4, Jagged1, Hes1, and Hes5) 2 weeks after the cell transplantation and that this effect persisted for a further 2 weeks.
Conclusion: It suggests that transplanted OECs inhibit the activation of Müller cells and the associated gliosis, at least partly through suppression of the Notch pathway

PU-411

Oxidative DNA damage and repair in aqueous humor of different type glaucoma

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PURPOSE: To evaluate the changes of oxidative DNA damage and repair in aqueous humor with glaucoma in different type and age-related cataract (ARC) as control. **METHODS:**A total of 54 patients with different type glaucoma and 36 ARC patients were enrolled in the study. The glaucoma group included 34 patients with primary angle-closure glaucoma (PACG), 9 patients with primary open angle glaucoma (POAG) and 11 patients with neovascular glaucoma (NVG). The aqueous humor samples were analyzed for 8-hydroxy-2'-deoxyguanosine (8-OHdG), a marker of oxidative damage, and human 8-oxoguanine DNA glycosylase 1 (hOGG1), a DNA base-excision repair protein by ELISA assay. **RESULTS:** The mean levels of 8-OHdG in aqueous humor were significantly higher in glaucoma group, compared to the control group (96.32±11.50 ± 1.40 vs. 82.47±10.79) ng/ml, (*t*=-5.8086, *P*=0.000). The mean levels of hOGG1 were also significantly higher in glaucoma group, compared to the control group, (18.90±2.68 vs. 17.84±2.21) ng/ml, (*t*=-2.0496, *P*=0.0435). The mean levels of 8-OHdG was not a significantly difference among PACG, POAG and NVG (94.24±12.16, 97.28±8.41, 101.97±10.29) ng/ml，(*F*=1.99, *P*=0.1475). The mean levels of hOGG1was a significantly difference among PACG, POAG and NVG (94.24±12.16, 18.96±2.90, 20.79±3.17) ng/ml, (*F*=4.12, *P*=0.022). There was a significant positive correlation between the levels of 8-OHdG and hOGG1 in glaucoma group. **CONCLUSIONS:** These results supported that oxidative stress-induced DNA damage and repair were increased in aqueous humor of patients with glaucoma.

PU-412

先天性白内障 hiPS 细胞模型建立及 NHS 致病基因的功能学研究

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目的：建立先天性白内障（先白）患儿体细胞来源的人诱导多能干细胞（hiPSC）模型以深入研究其致病基因的功能及具体机制。
方法：收集临床确诊为先白患儿及其直系亲属血样本进行芯片捕获高通量测序，收集测序后经生物信息学分析出已知或可疑致病基因的患儿新鲜尿液样本，进行肾上皮细胞分离及扩增，利用 CytoTune2.0 仙台病毒重编程试剂盒感染细胞重编程为 hiPSC，进行多能标志物鉴定及核型鉴定；同时以相同方法建立正常儿童 hiPSC。共同诱导分化为晶状体上皮细胞，进行功能分析。
结果：7 组散发型白内障家庭的血样本测序分析显示 2 组阳性结果，基因突变均定位于 *NHS* 基因上，收集已知 *NHS* 突变位点（c.2774_2775dup）的患儿尿液，及同龄正常儿童尿液，成功建立先白患儿来源及对照 hiPSC 模型。诱导分化为晶状体上皮细胞，先白来源组较对照组细胞形态不规则、偏大，ZO-1 及罗丹明标记的鬼笔环肽染色显示疾病组细胞间连接及细胞内骨架蛋白显著减少，CCK-8、划痕实验及 Fluo 4-AM 染色显示疾病组细胞增殖、迁移能力及细胞内钙离子浓度显著下降。与 *NHS* 敲减慢病毒感染 SRA01/04 细胞系结果一致。
结论：首次成功建立先白患者尿液来源的 hiPSC 模型，不仅无创，而且稳定携带遗传背景，为该领域研究提供了很好的细胞模型和研究思路。*NHS* 致病基因可能通过改变晶状体细胞间连接、细胞内骨架蛋白及钙离子浓度，影响细胞迁移、增殖，最终导致晶状体发育异常。

PU-413

青光眼保护与免疫炎症

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介绍青光眼保护与免疫炎症的相关性：1）青光眼神经损害 ONH astrocyte 和视网膜 glia 活化，2）活化胶质细胞释放炎性因子 TNF-α、TGF-β2、 iNOS、COX-2/PGE2, toll 样受体激活，C3 补体免疫防御增强，3）炎性因子参与筛板 ECM 的重构和功能改变，ONH 胶质化，继发性影响视网膜神经节细胞成活，4）重视青光眼早期免疫炎性因子作用的研究，有利于青光眼药物研发。

PU-414

Ultra-violet B irradiation leads to dysregulation of plasma membrane calcium ATPase1 and disturbed calcium homeostasis in human lens epithelial cells

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Objective: Ultraviolet B (UVB) can lead to human lens epithelial cell (HLEC) apoptosis and be hypothesized to be one of the important factors of cataractogenesis. In the human lens, Ca^{2+}-ATPase is a major determination of calcium homeostasis. Plasma membrane calcium ATPase1 (PMCA1) is a putative "housekeeping" isoform and is widely expressed in many tissues and cells, which plays an important role in calcium homeostasis and in the regulation of the second messenger Calcium ion (Ca^{2+}) level. However, the effects of UVB-irradiation on the expression of PMCA1 and the cellular calcium homeostasis are still unclear. In the present study, we investigated the effects of UVB irradiation on the expression of PMCA1 at mRNA and protein levels and on their activities.
Methods: we cultured human lens epithelial cells (HLE B-3) *in vitro* and investigated the effects of UVB irradiation on the expression of PMCA1 and the intracellular calcium homeostasis using real-time cell electronic sensing system, flow cytometry, fluo-3/AM probes, real-time quantitative PCR and enzyme-linked immunosorbent assay (ELISA) techniques.
Results: The results indicated that UVB irradiation could induce human lens epithelial cell death, cause intracellular calcium ion elevation, inhibit Ca^{2+}-ATPase activity and decrease the expression of PMCA1 at gene and protein levels.
Conclusion: UVB irradiation-initiated HLE B-3 cell apoptosis may be involved in complicated mechanisms, including the dysregulation of calcium homeostasis and the relevant protein expression such as PMCA1. The downregulation of PMCA1 and the disruption of calcium homeostasis maybe play important roles in UVB-induced HLE B-3 cell apoptosis.

PU-415

低浓度 ZnCl2 对紫外线诱导的人晶状体上皮细胞损伤的保护作用研究

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目的：探讨低浓度 $ZnCl_2$ 对紫外线(UVB) 诱导的人晶状体上皮细胞(HLE B-3)损伤的保护作用。
方法：用 MTT 法检测空白对照组、紫外照射组和 2.0 mg/L、3.0 mg/L、4.0 mg/L 的 ZnCl2 预处理后 UVB 照射(实验组)HLEC B-3 的生存率；实时细胞电子分析系统(RT-CES)动态监测各组 HLEC B-3 细胞增殖情况；DAPI 染色法检测各组细胞核的变化；Q-PCR 和 ELISA 检测 caspase-12 mRNA 和蛋白水平表达变化。
结果：MTT 结果表明，单纯紫外照射组和 ZnCl2 (2.0 mg/L、3.0 mg/L、4.0 mg/L)预处理实验组 24 h 细胞生存率分别为 34. 47% ± 9. 31%、65. 91% ± 12. 46%、64. 30% ± 16.24% 和 46.36% ±6.28%；48 h 细胞生存率分别为 8. 31% ± 1.38%、53.82% ± 11.34%、59.25% ± 7.58%和 36.57% ± 8.41%; 72 h 细胞生存率分别为 6.75% ± 3.71%、48.29% ± 10.06%、56.53% ± 8.47%和 39.57% ± 8.93%。RT-CES 分析结果显示，$ZnCl_2$(2.0 mg/L、3.0 mg/L、4.0 mg/L)预处理可明显抑制 UVB 照射诱发的 HLEC B-3 的坏死和凋亡；DAPI 染色结果表明，$ZnCl_2$ 可减少 UVB 照射引起的 HLEC B-3 细胞核固缩和碎裂；RT-CES、Q-PCR 和 ELISA 检测结果表明，$ZnCl_2$ 可抑制 UVB 照射诱发的 caspase-12 mRNA 和蛋白质的表达升高。
结论：低浓度的 $ZnCl_2$ 可显著抑制 UVB 照射后 HLEC B-3 中 caspase-12 的表达上调，发挥由 UVB 照射引起的 HLEC B-3 细胞损伤的保护作用。

PU-416

Nox4 Regulates Retinal Gliosis and Fibrosis in Diabetic Retinopathy via Modulating LRP6/β-catenin Signaling

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Purpose: Nicotinamide adenine dinucleotide phosphate oxidase 4 (Nox4) plays a pivotal role in retinal pathophysiology. We previously reported that Nox4 promoted to retinal vascular leakage and neovascularization in a mouse model of diabetic retinopathy (DR). Active gliosis and fibrosis are two hallmarks in late stage of DR. Previous study also demonstrated that oxidative stress is involved in glial activation and collagen synthesis. In this study, we investigate Nox4-derived ROS in the context of retinal gliosis and fibrosis during development of DR.
Methods: A Mouse model of DR was set up by peritoneal injection of streptozotocin in both Nox4 deficient mice ($Nox4^{-/-}$) and wild type mice ($Nox4^{+/+}$). GKT137831, a Nox1/Nox4 dual inhibitor, was administrated to diabetic mice by rodent diet. Retinal Nox4 expression were determined by quantitative RT-PCR and western-blot analysis. Retinal oxidative stress were evaluated by detection of ROS generation with the fluorescence probe CellRox. Retinal reactive gliosis were detected with immunostaining of GFAP. Expression of fibrotic markers including collagen I were determined by flatmount staining. Activation of LRP6/β-catenin signaling were examined by western-blot analysis.
Results: Nox4 expression was upregulated in retinas of diabetic mice, concomitantly with intensive ROS generation, increased LRP6 phosphorylation and β-catenin accumulation, activated gliosis and fibrosis development. However, $Nox4^{-/-}$ or GKT137831-treated diabetic mice displayed less retinal ROS generation, reduced LRP6 phosphorylation and β-catenin accumulation. Notably,

GFAP were highly increased in Müller cell processes and extended from inner to outer retinas in wild type diabetic mice, which was diminished by Nox4 deficiency or GKT137831 treatment. Furthermore, retinal expression of collagen was mainly colocalized with retinal vasculature and significantly increased in wild type diabetic mice. However, Nox4$^{-/-}$ or GKT137831-treated diabetic mice showed less expression of collagen.
Conclusions: Inhibition of Nox4 attenuated retinal reactive gliosis and fibrotic response in diabetic mice. Nox4 may affect retinal fibrosis at least partially via regulating LRP6/ β-catenin signaling.

PU-417

角膜塑形术对兔角膜炎症介质表达的影响

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目的：探究角膜塑形术对兔角膜组织中炎症介质表达水平的影响。
方法：建立兔眼角膜塑形模型，左眼对照，右眼戴角膜塑形镜。每晚戴镜 8 小时，连续戴镜 1 周后处死取角膜标本，并剪成中央、中周部和周边部（直径 4mm，4-8mm，8-11mm）三部分。提取角膜组织 RNA，采用定量 PCR 技术检测组织中炎症介质 IL8，MMP2 和 MMP9 的表达水平。
结果：定量 PCR 结果示对照眼周边角膜组织的 IL8 水平显著高于中央（均值±标准差 11.58±1.41 vs 1.01±0.2，p<0.001），戴镜眼角膜周边 IL8 的表达显著高于对照组（均值±标准差 26.55±2.15 vs 11.58±1.41，p<0.001），中央和中周部的 IL8 在 2 组中无显著差异；对照眼周边角膜组织的 MMP2 水平显著高于中央（均值±标准差 17.49±2.09 vs 1±0.05，p<0.001），戴镜眼角膜周边 MMP2 显著低于对照组（均值±标准差 3.05±0.03 vs 17.49±2.09，p<0.001），中周部 MMP2 表达显著高于对照组（均值±标准差 5.42±0.28 vs 2.06±0.27，p<0.01），中央区的表达 2 组间无显著差异；对照眼周边角膜组织的 MMP9 水平显著低于中央（均值±标准差 0.73±0.02 vs 1±0.03，p<0.001），戴镜眼角膜周边 MMP9 的表达则显著高于对照组（均值±标准差 1.46±0.05 vs 0.73±0.02，p<0.001），中央 MMP9 表达显著低于对照组（均值±标准差 0.65±0.04 vs 1±0.03，p<0.001），中周部的表达 2 组间无显著差异。
结论：戴角膜塑形镜后角膜中央 MMP9 下调，中周部 MMP2 上调，周边部 MMP9 和 IL8 上调，MMP2 下调。同时对照眼周边部较中央 MMP2 和 IL8 上调，MMP9 下调。可见角膜塑形对角膜各分区炎症介质表达产生复杂的改变且同时影响对照眼炎症介质的表达。

PU-418

Rho 激酶抑制剂对小梁细胞的增殖作用研究

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目的： Rho 激酶抑制剂是第一个直接作用于小梁细胞的降眼压药物，主要通过影响细胞骨架增加房水流出，降低眼压。而眼内很多组织存在 Rho 激酶的表达，以往研究表明 Rho 激酶抑制剂对角膜内皮细胞具有促进增殖的作用，所以本文将进一步探索 Rho 激酶抑制剂（Y27632）对小梁细胞的增殖作用。
方法：1. 利用不同浓度的 Rho 激酶抑制剂 Y27632（0，10，30，100，200μM）分别作用于正常人小梁细胞系（iHTM）和青光眼患者小梁细胞系（GTM$_3$）4h，共聚焦显微镜观察细胞骨架 F-actin 的变化；2.CCK8 检测不同浓度 Y27632 处理后 iHTM 和 GTM$_3$ 的细胞增殖活性；3. 分离原代人小梁细胞（hpTM）和原代小鼠小梁细胞（mpTM），经 100μM Y27632 分别作用 24、48h 后观察细胞形态，通过免疫荧光法检测 Ki67 细胞的阳性率，分析统计学差异。
结果：与正常对照组 iHTM 和 GTM$_3$ 中 F-actin 细胞骨架相比，不同浓度的 Y27632（10，30，100，200μM）均使细胞骨架的形态发生变化，且随着药物浓度的升高，细胞骨架形态变化越明显；2.与正

常对照组 iHTM 相比，100μM Y27632 处理后 iHTM 450nm 的吸光度有统计学差异（$P<0.05$），而不同浓度 Y27632 处理的 GTM_3 和正常对照相比均有统计学差异（$P<0.05$）；3.与正常对照组相比，100μM Y27632 分别处理 24h、48h 的 hpTM 和 mpTM 细胞体积缩小，且作用时间越长，变化越明显；经 Y27632 分别处理 24、48h 的 hpTM 与正常对照 hpTM 的 Ki67 细胞阳性率的有明显差异（$P<0.05$）；而 mpTM 间的 Ki67 细胞阳性率的无明显差异（$P>0.05$）。
结论： Y27632 对青光眼患者小梁细胞系的促增殖作用较正常小梁细胞系明显，对原代人小梁细胞的增殖也有明显促进作用，而对原代小鼠小梁细胞有促进增殖的趋势。

PU-419
超低温存储 hESC-RPE 细胞对 RCS 变性大鼠治疗效果的评估

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摘要：人胚胎干细胞（hESC）或诱导多能干细胞（iPSC）来源的视网膜色素上皮细胞（RPE）临床试验在世界范围内已经开展，并且来自于临床级的 hESC-RPE 细胞治疗已被证明安全有效。因 hESC-RPE 细胞诱导的长时性以及未来临床试验的大规模需求性，研究供体 hESC-RPE 细胞经超低温存储后移植 RCS 变性大鼠的安全性和有效性就显得非常有必要。我们通过对超低温存储的 hESC-RPE 细胞形态学，特异基因表达，成熟度以及视网膜下腔移植治疗 RCS 变性大鼠后视功能的减弱的程度进行分析。结果显示，与直接诱导的 hESC-RPE 细胞相比较，细胞光学形态，免疫荧光分析，特异性基因表达均无显著差异，通过体外色素含量分析细胞成熟度表明经超低温存储的 hESC-RPE 细胞色素积累程度相对减弱，体内实验 fERG 检测表明，仅在短时间（移植后 4W）内表现为经超低温存储的 hESC-RPE 细胞视功能（b 波）有差异，但长期效果无差异。结论：经超低温存储的 hESC-PRE 细胞仍然可作为视网膜退行性疾病的治疗细胞。

PU-420
细胞与变性视网膜微环境的互动及其对干细胞命运的影响

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干细胞移植是治疗视网膜变性最具有前景的方法，目前已在 AMD, RP 等致盲性眼病中进行临床研究。移植到变性视网膜中的干细胞较其在正常视网膜中存活期短，神经分化困难，多向胶质细胞分化等问题。既往观点认为移植干细胞的命运是由其移植的微环境所确定的。变性的视网膜以慢性炎症、胶质细胞增生、兴奋性氨基酸堆积等为特点。现有的移植策略一般注重干细胞的纯化和分化，较少注意在移植干细胞的同时改善微环境。我们采用联合移植等方法，将视网膜前体细胞和间充质干细胞或嗅鞘细胞等联合移植，可显著延长干细胞移植的治疗时间，这可能是因为间充质干细胞具有显著的免疫调节能力，可改善变性微环境的慢性炎症，联合移植的嗅鞘细胞可显著改善变性微环境的胶质疤痕增生。近来我们的研究发现，视网膜干细胞除了受变性微环境调控决定其增殖和分化命运外，还可主动改善变性微环境的慢性炎症和胶质疤痕增生，这可能与视网膜干细胞能分泌特殊的免疫调节因子有关。干细胞与变性微环境的互动决定了植入视网膜干细胞的存活、分化和整合命运。

PU-421

Acetylcholinesterase as an important link in stress responses in the retina and its transcriptional regulation

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Acetylcholinesterase (AChE) is indispensable for terminating acetylcholine-mediated neurotransmission at cholinergic synapses. In addition, evidence suggests that acetylcholinesterase contributes to various physiological processes by regulating cell proliferation, differentiation, apoptosis, and survival. Apoptosis has been detected in many retinal diseases, such as age-related macular degeneration, diabetic retinopathy, and Ischemia/reperfusion. At the same time, caspase-3 expression is highly correlated with activation of the apoptotic pathway. AChE is expressed in some cells in the normal human retina; however, the AChE protein level significantly increases during apoptosis. AChE deficiency or inhibition decreases apoptosis, which strongly suggests that AChE plays a key role in apoptosis. This mini-review highlights the advances in the investigation of the role of apoptosis in retinal diseases and AChE in cell proliferation and apoptosis.

PU-422

Nrf2 与 ATF4 的相互作用在氧化-内质网联合应激条件下 保护人晶状体上皮细胞的机制研究

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目的：探索 Nrf2（核因子 NF-E2 相关因子）在过氧化氢（H_2O_2）诱导的人晶状体上皮细胞（hLEC）氧化-内质网联合应激状态下的保护机制，同时求证 Nrf2 与 ATF4（激活转录因子 4）是否在联合应激过程中发生相互作用，为延缓年龄相关性白内障发生发展寻找新的药物靶点。
方法：hLEC 在 400μM H_2O_2 中预培养 24h 建立联合应激损伤模型，通过细胞转染分别上调、下调 hLEC 中 Nrf2 和/或 ATF4 表达。光镜下分析细胞形态、CCK-8 法评估细胞存活率、检测 H_2O_2 含量，流式细胞仪检测细胞内活性氧 ROS 水平。Western Blot 检测内质网应激通路蛋白表达程度、RT-PCR 在 RNA 水平同步验证；分离细胞质及细胞核蛋白，检测 Nrf2、ATF4 及其相关蛋白表达水平、利用 Co-IP 法检测转录水平上 Nrf2 和 ATF4 相互作用程度。分别检测经过 Nrf2 或 ATF4 上调或下调的 hLEC 在联合应激中细胞总抗氧化能力、GSH、SOD、过氧化氢酶及各项下游Ⅱ相抗氧化酶表达水平。
结果：1.Nrf2 增加 hLEC 在联合应激中存活，降低 H_2O_2 和 ROS 含量。2 .H_2O_2 培养诱导内质网应激 3 条途经激活，Nrf2 和 ATF4 在 PERK 途径的转录过里发生相互作用。3.Nrf2 和 ATF4 都可以增强 hLEC 在联合应激下的抗氧化能力，但 Nrf2 是 hLEC 抵御应激的必要条件，ATF4 在过程中起重要的辅助作用。
结论：Nrf2 与 ATF4 的相互作用在氧化-内质网联合应激条件下保护 hLEC。

PU-423

表没食子儿茶素没食子酸酯对紫外线诱导人视网膜色素上皮细胞氧化损伤保护作用的实验研究

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目的 探讨表没食子儿茶素没食子酸酯（epigallocatechin gallate, EGCG）对紫外线诱导人视网膜色素上皮（retinal pigmental epithelium, RPE）细胞氧化损伤的保护作用。方法 RPE 细胞系传代培养 24 h 后，分别加入不同浓度（1 μmol·L^{-1}，10 μmol·L^{-1}）EGCG 预处理 12 h 后，紫外线照射下 30min 后将细胞放入培养箱中继续培养，流式细胞仪检测细胞凋亡率，比色法检测凋亡相关因子 Caspses-3 及 Caspase-9 的表达，透射电镜观察超微结构变化。**结果** 紫外线照射可以诱导 RPE 细胞形态改变，EGCG 处理后，细胞形态逐渐得到改善。流式细胞计数结果显示: 正常对照组 RPE 细胞平均凋亡率为 2.09%±0.57%，经紫外线照射后，阳性对照组 RPE 细胞凋亡平均率为 46.44%±5.76%，应用 EGCG 后，高剂量组 RPE 细胞凋亡平均率为 13.54%±2.55%，与阳性对照组比较，差异具有统计学意义（*P*<0.05）。此外，EGCG 还可以减少紫外线所致 RPE 细胞内 Caspses-3 及 Caspase-9 的表达，并且，伴随 EGCG 作用时间的延长其表达量呈下降趋势。**结论** EGCG 可以明显抑制紫外线诱导的 RPE 细胞的凋亡，其抑制凋亡的作用可能是其防止和延缓年龄相关性黄斑变性发生的细胞学基础。

PU-424

ARMS2 interference leads to decrease of proinflammatory mediators

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Background: Age-related macular degeneration (AMD) is a major cause of irreversible blindness among elderly people in developed countries. Many studies suggest that age-related maculopathy susceptibility 2 (ARMS2) is the second major susceptibility gene for AMD. Recent progress in research on AMD has provided increasing evidence that inflammatory processes and oxidative stress contribute to the pathogenesis of AMD. Meanwhile, the mechanisms underlying the contributions of ARMS2 to the pathogenesis of AMD remain unclear. The purpose of the current study is to elucidate the relationship between ARMS2 gene and those proinflammatory mediators so as to further assess the associated biologic effects.
METHODS: SiRNA was used to knock down ARMS2 mRNA, and western blot and reverse real-time PCR were used to detect the effect of siRNA on the expression of ARMS2 in ARPE-19 cells. The expression of C3, C5, IL-6, IL-8 and TNF-αafter si-RNA knockdown were evaluated by SYBR Green I Real-time PCR and ELISA.
RESULTS: Transcription accumulative indexes (TAI=$2^{-\text{delta delta CT}}$) of ARMS2 by real-time PCR revealed that the transfection rate in the positive control group was 72.0% (±2.07, P＜0.01). The ratio of absorbance values of AMRS2 to β-actin was 0.85±0.122, 0.87±0.143, and 0.61±0.240 in the blank control group, scrambled ARMS2-siRNA group, and ARMS2-siRNA group by western blot, respectively (F=42.53, P< 0.01). The secreted protein levels of C3, C5, IL-6, IL-8, and TNF-α were detected by ELISA, and in the siRNA-ARMS2 group were reduced by 34.24±1.812%, 37.15±2.021%, 35.11±1.751%, 30.11±2.191%, and 34.33±2.182%, respectively (P<0.05). Compared with the blank control group, the TAI of C3, C5, IL-6, IL-8, and TNF-α in the ARMS2-siRNA group was reduced by real-time PCR.
CONCLUSION: This study produced evidence supporting the notion that the ARMS2 risk allele for AMD is linked directly or indirectly to proinflammatory mediators. More importantly, our data indicated that the change in ARMS2 may affect C3, C5, IL-6, IL-8, and TNF-α levels, and this may be one of the mechanisms of AMD development.

PU-425

Serum microRNA-221 as a biomarker in diabetic retinopathy associated with type 2 diabetes mellitus

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Purpose: To identify the candidate microRNA (miRNA), miR-221 as a novel biomarker for occurrence and progression of diabetic retinopathy (DR) in patients with type 2 diabetes mellitus (T2DM).
Methods: Cross-sectional study. The subjects enrolled in the study were classified into four groups: healthy control participants, healthy control (HC) group, no diabetic retinopathy (NDR) group, non-proliferative diabetic retinopathy (NPDR) group and proliferative diabetic retinopathy (PDR) group. Serum miR-221 was validated by real-time quantitative reverse-transcription polymerase chain reaction. Also, serum angiotensin II (Ang II) and vascular endothelial growth factor (VEGF) were examined by enzyme-linked immunosorbent assay. In addition, receiver operating characteristic (ROC) curve was performed to explore the diagnostic accuracy of miR-221, Ang II and VEGF for DR in patients with T2DM. Moreover, Spearman's rank correlation coefficient was executed to estimate the correlations of serum miR-221 with metabolic parameters and serum markers in patients with T2DM.
Results: Primarily, serum miR-221, Ang II and VEGF were significantly up-regulated in patients with T2DM compared to HC participant respectively, and further gradually increased in NDR, NPDR and PDR groups ($P < 0.001$). Additionally, serum miR-221 was remarkably positively correlated with metabolic parameters such as glycated hemoglobin ($r = 0.310$, $P = 0.002$) and homeostasis model assessment for insulin resistance ($r = 0.413$, $P < 0.001$), as well as serum markers for instance Ang II ($r = 0.667$, $P < 0.001$) and VEGF ($r = 0.499$, $P < 0.001$). Furthermore, serum miR-221 (AUC, 0.894; 95% CI, 0.833-0.955; $P < 0.001$), Ang II (AUC, 0.888; 95% CI, 0.828-0.949; $P < 0.001$) and VEGF (AUC, 0.785; 95% CI, 0.695-0.875; $P < 0.001$) had evidently diagnostic accuracy for DR, in which miR-221 is the most powerful.
Conclusion: The current study implies that serum miR-221 as a novel biomarker could be associated with occurrence and progression for DR in patients with T2DM. However, a prospective, high-quality, large sample, long-term clinical trial coincided with experimental research is warranted to be further investigated.

PU-426

Serum microRNA-211 as a biomarker for diabetic retinopathy via modulating Sirtuin 1

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Purpose: In this current thesis, we screened serum specific microRNA (miRNA) in patients with diabetic retinopathy (DR) in clinical study section, and detected the expression of candidate miRNA and its target gene in retina of diabetic rats in vivo experimental research section, meanwhile validated the targeting regulation of candidate miRNA on its target gene in hyperglycemic human umbilical vein endothelial cells (HUVEC) in vitro experimental research section. The purpose of the current thesis is to investigate the theoretical principle of serum miRNA as a biomarker for occurrence warning, diagnosis stage and prognostic assessment in patients with DR.
Methods: In clinical study section, miRNA microarray analysis was used to screen a serum specific miRNA expression profile in patients with DR; Venn diagram analysis was used to determine the candidate miRNAs of serum specific miRNA expression profile in patients with DR; real-time quantitative PCR (qPCR) was used to measure the expression level of serum candidate miRNAs in patients with DR; receiver operating characteristic (ROC) curve was used to evaluate the

diagnostic accuracy of serum candidate miRNAs for patients with DR; bioinformatic analysis was used to predict the biological function and signaling pathways of target genes of serum candidate miRNAs in patients with DR. In vivo experimental research section, adenosine diphosphatase (ADPase) staining was used to observe retinal morphological characteristics of diabetic rat; hematoxylin-eosin (HE) staining was used to observe retinal histologic characteristics of diabetic rat; qPCR was used to measure the expression level of candidate miRNA and its target gene mRNA in retinal tissue of diabetic rat; western blot was used to measure the expression level of target gene protein of candidate miRNA in retinal tissue of diabetic rat. In vitro experimental research section, dual-luciferase reporter assay was used to validate targeting binding effect between candidate miRNA and its target gene; Cell Counting Kit-8 (CCK-8) was used to detect the effect of candidate miRNA on cell viability of HUVEC in hyperglycemic environment; flow cytometry was used to detect the effect of candidate miRNA on cell apoptosis of HUVEC in hyperglycemic environment; qPCR was used to detect the effect of candidate miRNA on the expression level of its target gene mRNA of HUVEC in hyperglycemic environment; western blot was used to detect the effect of candidate miRNA on the expression level of its target gene protein of HUVEC in hyperglycemic environment.

Results: In clinical study section, miRNA microarray analysis indicated that there was a serum specific miRNA expression profile in patients with DR; Venn diagram analysis indicated that 4 candidate miRNAs of serum specific miRNA expression profile in patients with DR, in which the expression level of serum miR-18b, miR-19b and miR-211 were up-regulated, while the expression level of serum miR-23a was down-regulated; qPCR indicated that the expression tendency of serum miR-18b, miR-19b and miR-211 were consistent with those in serum specific miRNA expression profile, while the expression tendency of serum miR-23a was not consistent with it in serum specific miRNA expression profile; ROC curve indicated that serum miR-18b, miR-19b and miR-211 revealed significant diagnostic accuracy for patients with DR, in which miR-211 is the most powerful, while serum miR-23a revealed no diagnostic accuracy for patients with DR; bioinformatic analysis indicated that 2081 target genes were predicted by miR-18b, miR-19b and miR-211 in all, and Sirtuin 1 (SIRT1) may be a target gene of miR-211; biological process of target genes predicted by candidate miRNA involved transcription, DNA-templated, positive regulation of transcription from RNA polymerase II promoter and regulation of transcription, DNA-templated, etc., cellular component of target genes predicted by candidate miRNA involved cytoplasm, nucleus and plasma membrane, etc., molecular function of target genes predicted by candidate miRNA involved protein binding, metal ion binding and DNA binding, etc.; signal pathway of target genes predicted by candidate miRNA involved axon guidance signal pathway, adrenergic signaling in cardiomyocytes signal pathway and endocytosis signal pathway, etc. In vivo experimental research section, ADPase staining indicated that the density of neovascularization was significantly increased in the retina of diabetic rat, and aggravated gradually associated with the diabetic duration; the number of preretinal neovascular cell nuclei was significantly increased in the retina of diabetic rat, and aggravated gradually associated with the diabetic duration; qPCR indicated that the expression level of miR-211 was significantly up-regulated in retinal tissue of diabetic rat, and increased gradually associated with the diabetic duration; qPCR indicated that the expression level of SIRT1 mRNA was significantly down-regulated in retinal tissue of diabetic rat, and decreased gradually associated with the diabetic duration; western blot indicated that the expression level of SIRT1 protein was significantly down-regulated in retinal tissue of diabetic rat, and decreased gradually associated with the diabetic duration. In vitro experimental research section, dual-luciferase reporter assay indicated that miR-211 and its target gene SIRT1 represent as target binding effect; CCK-8 indicated that the cell viability of HUVEC transfected with antagomiR-211 was significantly increased in hyperglycemic environment; flow cytometry indicated that the cell apoptosis of HUVEC transfected with antagomiR-211 was significantly decreased in hyperglycemic environment; qPCR indicated that the expression level of SIRT1 mRNA was significantly up-regulated in HUVEC transfected with antagomiR-211 in hyperglycemic environment; western blot indicated that the expression level of SIRT1 protein was significantly up-regulated in HUVEC transfected with antagomiR-211 in hyperglycemic environment.

Conclusions: The current clinical study and experimental research imply that there was a serum specific miRNA expression profile in patients with DR; serum miR-211 as a novel biomarker with

high sensitivity and specificity could be associated with occurrence and progression of DR via targeting SIRT1.

PU-427

TRPM2 介导 Ca2+内流在激活线粒体自噬及促进角膜上皮细胞损伤修复的作用和机制研究

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角膜易受外界损伤导致严重眼结构和功能毁损，故角膜自我修复具有重要意义。我们已报道 EGF 可刺激受损角膜上皮产生 ROS，促进细胞增殖及创伤修复。本项目采用免疫荧光、激光共聚焦等方法，在体外角膜损伤模型中明确了 EGF 活化 TRPM2 激活线粒体自噬启动，进一步研究发现 EGF 促使损伤细胞产生低浓度内源性 ROS 可激活角膜上皮细胞膜阳离子通道 TRPM2，引起 Ca2+内流，进而活化 Parkin/Bnip3 通路启动线粒体自噬的分子机制；抑制 TRPM2 导致线粒体自噬蛋白 PARK2 等表达下调并加重细胞损伤，提示 TRPM2 介导 Ca2+可能参与激活线粒体自噬及修复损伤细胞，为治疗角膜损伤疾病提供潜在的全新靶点。

PU-428

雌激素拮抗 MNU 诱导 661W 细胞凋亡机制的研究

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目的：利用 MNU（N-甲基-N 亚硝脲）诱导的小鼠视网膜 661W 细胞凋亡模型，研究 MNU 特异性诱导感光细胞凋亡的机制及 17β-雌二醇（17β-Estradiol，βE2）保护视网膜细胞的抗凋亡分子机制。
方法：1）凋亡模型建立：用不同浓度的 MNU（0、100、200、300、400μg/ml）刺激 661W 细胞 24h，通过细胞活力、 尼氏小体及细胞凋亡检测，确定 MNU 的最佳作用浓度，建立 MNU 诱导细胞凋亡的模型；2）雌激素干预：首先应用不同浓度 βE2（0、5、10、15、20μM）作用 661W 细胞 24h，观察对细胞活力的影响；然后进行雌激素预保护，即在 MNU 作用之前，βE2 预保护 661W 细胞不同时间（0.5、1、2h），使用 MNU 最佳作用浓度处理细胞后，观察细胞活力和细胞凋亡的变化，确定 βE2 预保护的最佳作用时间；最后观察雌激素的治疗作用，即在 MNU 作用 661W 细胞不同时间（3、6、8、12h），直接加入 10μM 的雌激素一直作用到凋亡分析前,确定 βE2 治疗的最佳时间； 3）βE2 对 PI3K / AKT 通路的影响：通过使用 PI3K/AKT 通路抑制剂 LY294002（LY）观察 βE2 对 PI3K / AKT 通路的影响。
结果：1）MNU 呈浓度依赖性的降低 661W 的细胞活力，且 400μg/ml MNU 能显著诱导细胞凋亡，故选择 400μg/ml 浓度为最佳作用浓度；2)10μM 的 βE2 预处理 661W 细胞未观察到 βE2 对 MNU 诱导 661W 凋亡的预保护作用；3）在 MNU 作用 6h、8h 后，用 10μM 的 βE2 治疗至 24h 均可使细胞免受 MNU 诱导的细胞活力降低及凋亡；4）βE2 的治疗作用会被 PI3K / AKT 通路的抑制剂 LY 所抑制，表现为细胞活力的显著降低。
结论：MNU 可诱导 661W 细胞的凋亡，βE2 的干预能有效提高细胞活力，减少细胞凋亡， PI3K / AKT 通路可能参与了 βE2 保护 MNU 诱导 661W 细胞凋亡的过程。

PU-429

Role of autophagy in uveal melanoma is BRAF status dependent

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Background:
Autophagy plays a dual role in cancer development and progression: cytoprotective or cell death. So far, little is known about the role of autophagy in uveal melanoma. In the present study, we looked to investigate the autophagic process, as well as its effect on cell survival in uveal melanoma cell lines under stressed conditions (starvation).
Methods:
Two human uveal melanoma cell lines, OCM1A and Mel 290, which harbor BRAF V600E mutation and BRAF wild type, respectively, were used. Autophagy level was determined by western blot assay with/without combination of autophagic flux inhibitor (bafilomycin A1). Cell proliferation was assessed by an MTT assay.
Results:
Starvation triggered autophagy in BRAF V600E mutant OCM1A cells but not in BRAF wild type Mel 290 cells. Enhanced autophagy helped BRAF V600E mutant uveal melanoma cells survived under stressed conditions. BRAF inhibitor (vemurafenib) up-regulated autophagy through suppressing PI3K/Akt/mTOR/p70S6K pathway in BRAF V600E mutant uveal melanoma cells. Autophagy inhibition impaired the treatment efficacy of vemurafenib in BRAF V600E mutant uveal melanoma cells. Conclusions:
Our study demonstrates that starvation-trigged autophagy, which is BRAF V600E dependent, helps cancer cell survive in uveal melanoma. Vemurafenib induces autophagic cell death rather than adaptive cell survival in BRAF V600E mutant melanoma.

PU-430

整体视网膜血管铺片技术评判糖尿病视网膜病变的病理改变

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目的：应用整体视网膜血管铺片技术评判糖尿病模型鼠的视网膜微细血管的改变
方法：不同培养阶段的糖尿病大鼠猝死，取眼球组织，仔细分离视网膜与脉络膜，取视网膜组织消化，谨慎吹打视网膜组织，使其仅剩余视网膜血管组织，染色及铺片观察。观察糖尿病鼠眼视网膜血管的微细变化。
结果：通过整体视网膜血管铺片技术，观察视网膜血管内皮细胞及周细胞的改变。对于野生型大鼠高碳水化合物饮食的糖尿病
模型视网膜病变观察。
结论：整体视网膜血管铺片技术可以全面的反应视网膜血管的整体变化，而且能够发现微细血管变化。野生型大鼠高碳水化合物饮食的糖尿病模型,是目前最接近 II 型糖尿病病变的动物模型，它的视网膜变化最接近人的视网膜病变，对于研究糖尿病视网膜病变血管的变化是有意义的探索。

PU-431

PDR 患者泪液中细胞因子表达的研究

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目的 研究 PDR 患者与正常人相比泪液中 VEGF-A、TNF-α 含量的变化。**方法** 采用分组对照研究，将 2015 年 7 月至 2017 年 7 月，在徐州市第一人民医院眼科就诊的 PDR 患者 40 例（40 眼）纳入 PDR 组，正常人 40 例（40 眼）纳入对照组。PDR 组，先采集无刺激泪液 12～15μl，在玻璃体腔注射雷珠单抗 0.5mg/0.05ml 后 7 天，再次采集无刺激泪液 12～15μl；对照组，采集无刺激泪液 12～15μl。利用 Luminex 200 液相芯片系统检测所采集的泪液中细胞因子 VEGF-A、TNF-α 的含量。采用 STATA SE 12.0 统计软件进行统计分析，以 $P<0.05$ 认为有统计学意义。**结果** PDR 组术前泪液中细胞因子 VEGF-A 的含量为（1699.1±1157.6）pg/ml，对照组泪液中细胞因子 VEGF-A 的含量为（1194.5±767.6）pg/ml，两组间的差异有统计学意义（$P=0.038$）。PDR 组 TNF-α 含量（73.2±29.6）pg/ml 较对照组无统计学差异（$P=0.078$）。PDR 组玻璃体腔注射雷珠单抗 0.5mg/0.05ml 后 7 天，泪液中 VEGF-A 含量为（1244.0）pg/ml， PDR 组术前术后泪液中 VEGF-A 含量差异无统计学意义（$P=0.828$）；PDR 组玻璃体腔注射雷珠单抗 7 天后，泪液中 TNF-α 含量为（51.6±38.1）pg/ml，与术前相比差异无统计学意义($P=0.406$)。**结论** 1.PDR 患者泪液中细胞因子 VEGF-A 的表达较正常人明显升高。2.PDR 患者泪液中 TNF-α 的含量虽有升高，但无显著差异。3. PDR 患者玻璃体腔注射雷珠单抗后 7 天泪液中细胞因子 VEGF-A 的表达无显著性降低。4. PDR 患者玻璃体腔注射雷珠单抗后 7 天泪液中细胞因子 TNF-α 的表达无显著性降低。

PU-432

表没食子儿茶素没食子酸酯对于小鼠视网膜氧化低密度脂蛋白表达水平的影响

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目的：探讨绿茶提取物表没食子儿茶素没食子酸酯（EGCG）对于小鼠视网膜氧化低密度脂蛋白（oxLDL）表达水平的影响
方法：应用 8 周健康雄性 BALB/c 小鼠作为研究对象，分为 EGCG 组及对照组，分别连续 7 天腹腔注射 EGCG（50mg/kg）及同等容量的生理盐水,收集两组小鼠视网膜，提取蛋白质并测量 oxLDL 含量，两组间 oxLDL 表达水平比较应用 t 检验进行统计学分析。
结果：EGCG 组小鼠网膜中 oxLDL 的平均水平（nm/mg）明显低于对照组，分别为 47.75±26.08，118.46±38.51 ，两者比较差异具有显著性，P＜0.05。
结论：EGCG 可以通过降低小鼠视网膜 oxLDL 的表达水平来发挥其抗动脉硬化、抗凋亡等多种生物学作用。

PU-433

LncRNA 在眼科疾病中的研究

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LncRNA 具有编码蛋白质基因上游启动子区、干扰下游基因的表达、介导染色质重构及组蛋白修饰、与转录因子结合、与特定蛋白质结合及作为小分子 RNA 的前体分子等多种复杂的调控机制。本文拟对眼科疾病相关 LncRNA 简要综述。

1.角膜病：Huang 等建立碱烧伤小鼠模型，通过测序比较碱烧伤组和正常角膜组差异表达的 LncRNA。有学者利用 RNA 高通量测序，检测出圆锥角膜与对照组表达差异的 LncRNA。2.青光眼：在 POAG 中，因 CDNK2A/2B 的表达下降，可致 CDK 活性降低，从而 RGC 更易凋亡，这一理论在青光眼小鼠模型中也得到确定。3.白内障：MIAT 在 ARC 中表达升高，并且相对于其他眼病而言，可以作为 ARC 的特异性生物标记。在 MIAT 表达下调的 LECs 中通过 H_2O_2 刺激后，其活性、增殖能力相对于对照组明显下降。4.PVR：Yang 等证实在 TGF-β 诱导产生的 RPE 间充质化模型中，下调 MALAT1 可以显著抑制 ARPE19 细胞系的迁移及增殖，进而影响细胞迁移及 RPE 细胞增殖。5.DR：Yan 等研究表明,高糖可以显著上调 MIAT 的表达水平。下调 MIAT 可减轻糖尿病诱导产生的视网膜新生血管形成、血管渗漏和炎症反应。6.AMD：在湿性 AMD 患者房水中检测到 Vax2os1 和 Vax2os2 显著性高表达，与此同时，PEDF 表达量显著降低。7.Rb：BANCR 高表达的患者生存率低于低表达的患者，因此，BANCR 是预后不佳的指标。

结论 随着基因组学和蛋白质组学的研究，到目前已发现多种 LncRNA 参与眼病的发生发展。因此我们可以以这些 LncRNA 为切入点，进一步明确相关眼病发病的分子机制，为其诊断、治疗提供新的靶点。

PU-434

豚鼠形觉剥夺性近视巩膜赖氨酸氧化酶的变化及其对胶原表达的影响

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目的：探讨豚鼠形觉剥夺性近视巩膜赖氨酸氧化酶(LOX)表达的变化及其对巩膜胶原纤维、巩膜生物力学的影响。方法： 2 周龄有色豚鼠随机分为 4 组，A 组(10 只)：空白对照组，左右眼均不作处理；B 组(10 只)：单纯形觉剥夺组，右眼不透明眼罩遮盖，左眼不作处理；C 组(10 只)：右眼眼罩遮盖+赋形剂（0.9%NaCl，每 3d 玻璃体腔注射），左眼不作处理；D 组(10 只)：右眼眼罩遮盖+抑制剂组(β-氨基丙腈，每 3d 玻璃体腔注射)，左眼不作处理。4 周后睫状肌麻痹验光。 qRT-PCR,免疫荧光，Western-blot 技术检测豚鼠巩膜 LOX 及胶原的表达,电子显微镜观察巩膜胶原形态的变化，生物材料机测量巩膜生物力学的改变。结果：形觉剥夺 4 周后，B 组诱导眼成功诱导出 (-4.08±1.11)D 相对近视； C 组诱导出(-3.94±1.17)D 相对近视；D 组诱导出(-5.75±1.12)D 近视度；D 组所诱导的近视度数高于 B 组和 C 组(P<0．05)，B 组和 C 组近视高于 A 组；差异有统计学意义(P<0．05)。B 组和 C 组诱导的近视度数相近，差异无统计学意义(P>0．05)。和对照眼相比，形觉剥夺眼巩膜 LOX,胶原纤维表达明显减少，其中 D 组诱导眼巩膜 LOX，I 型胶原表达量明显低于 B 组、C 组，差异有统计学意义(P<0．05)。电镜结果显示形觉剥夺眼巩膜小直径胶原纤维明显增多。巩膜生物力学结果显示形觉剥夺眼巩膜极限应力减小，极限应变增大，弹性模量减小，差异有统计学意义(P<0．05)，β-氨基丙腈抑制 LOX 活性后，巩膜极限应力，弹性模量进一步减小，弹性模量进一步增大，差异有统计学意义(P<0．05)。

结论：豚鼠形觉剥夺性近视巩膜赖氨酸氧化酶表达下调。β-氨基丙腈抑制巩膜赖氨酸氧化酶表达，减少巩膜胶原纤维的交联，小直径胶原增多，巩膜生物力学强度下降，近视进一步发展。

PU-435

Microglia derived from stem cell integrates into 3D retinal organoids

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Purpose: To establish a model that contains neuroectodermal lineage and mesodermal-derived microglia mimicking the yolk-sac derived microglia migrate into retinal tissue *in vivo.*
Methods: Characterization of microglia was identified by RT-qPCR, whole-transcriptome sequencing, flow cytometry, immunostaining and live-cell imaging. Microglia-like cells were co-cultured with retinal organoid at different stages.
Results: Here we show that cells exhibit typical microglial morphology and express microglial signature genes. Microglia-like cells also obtain microglial function, such as secretion of cytokines, phagocytosis of bacteria and response to ATP stimulation. Microglia cells have a rounded morphology in retinal organoid at early stage and become ramified after longer co-culture.
Conclusion: We show that microglia cells derived separately from stem cells can integrate into 3D retinal organoids.

PU-436

缺氧诱导人视网膜色素上皮细胞上皮间质化

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目的：缺氧条件下观察视网膜色素上皮细胞上皮间质化过程。
方法：在 5%O2 条件下培养人视网膜色素上皮细胞 0h，6h，12h，24h，72h。CCK-8 测量人视网膜色素上皮细胞增殖。细胞划痕实验检测细胞迁移能力变化。Western-blot，realtime-PCR 检测上皮细胞标记物 N-cadherin 及间质细胞标记物 a-SMA 表达变化。
结果：缺氧条件下，视网膜色素上皮细胞增殖能力增强，24h 及 72h 较 0h 差异有统计学意义。缺氧 24h 细胞迁移能力增强。N-cadherin 蛋白及 mRNA 表达减少，24h 及 72h 较 0h 差异有统计学意义。a-SMA 表达增加。
结论：在缺氧条件下，人视网膜色素上皮细胞发生上皮间质化。可能与增殖性玻璃体视网膜疾病机制有关。

PU-437

LicI 诱导脉络膜黑色素瘤内质网应激的分子机制研究

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目的:研究 GSK3β 抑制剂 LicI 是否具有诱导脉络膜黑色素瘤细胞内质网应激的能力。
方法:1. Western Blot 检测不同浓度 LicI(0 mmol/l, 10 mmol/l, 20 mmol/l , 40mmol/l)作用于脉络膜黑色素瘤细胞 36h 后，内质网应激系统各蛋白的表达情况。2.克隆成形检测不同浓度 LicI(0 mmol/l, 1 mmol/l, 2 mmol/l , 4mmol/l) 作用于脉络膜黑色素瘤细胞 36h 后，克隆形成情况。
结果:1，licl 以浓度梯度依赖的方式上调脉络膜黑色素瘤细胞内质网应激标志蛋白 IRE1α、Bip、ATF4、p-eIF2α 的表达。2. licl 以浓度梯度依赖的方式抑制脉络膜黑色素瘤细胞克隆成型能力。
结论: LicI 可抑制脉络膜黑色素瘤细胞克隆成型能力，内质网应激可能参与这种抑制作用。关于 LicI 诱导的脉络膜黑色素瘤细胞内质网应激分子机制的研究有助于为抗肿瘤药物开发提供新的靶标。

PU-438

LicI 对脉络膜黑色素瘤的作用机制研究

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目的 研究 GSK3β 抑制剂 Licl 是否对脉络膜黑色素瘤具有抗肿瘤作用。**方法** BALB/C 裸鼠 10 只，随机分成对照组和实验组，每组实验动物 5 只。脉络膜黑色素瘤细胞（M619）300×10^6 个/只，皮下注射于裸鼠侧腹部。瘤体长至直径约 5-10mm 时，实验组每日给予 Licl（141.3mg/kg）腹腔注射，对照组每日给予相同体积的生理盐水腹腔注射。每隔 3 天测量瘤体大小和裸鼠体重。连续给药 14 天，颈椎脱臼处死裸鼠取出瘤体。分别采用 Western Blot 和免疫组化法检测 MCL1 和 NOXA 的表达情况。**结果** 1.生理盐水组瘤体体积平均 622.88mm^3，给药组瘤体体积平均 373.00mm^3，平均体积减少 249.88 mm^3；生理盐水组瘤重平均为 0.37g，给药组瘤重平均为 0.21g，平均瘤重明显减轻 0.16g。2. Western Blot 结果显示，抗凋亡蛋白 Mcl-1 表达下调，促凋亡蛋白 NOXA 表达上调。**结论** 1.Licl 抑制脉络膜黑色素瘤的生长；2. Mcl-1/ NOXA 轴参与 Licl 抗肿瘤作用的调控；Licl 对脉络膜黑色素瘤抗肿瘤作用的机制研究有助于提供新的临床肿瘤治疗策略。

PU-439

HUMSCs 联合那他霉素对感染早期和感染晚期小鼠真菌性角膜炎的疗效对比研究

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目的 应用那他霉素的基础上，联合应用人脐带间充质干细胞（human umbilical cord mesenchymal stem cells，HUMSCs）治疗感染早期和晚期的小鼠真菌性角膜炎（Fungal Keratitis，FK），探索脐带间充质干细胞对真菌性角膜炎疾病进展及预后的影响。
方法 本研究采用 6-8 周的雄性 C57BL/6J 小鼠，并选用对那他霉素敏感的腐皮镰孢菌标准株制作 FK 模型，于模型后 18h 应用裂隙灯判定模型成功。将入选小鼠分为 A、B、C、D、E 五组并于 18h 开始应用那他霉素治疗，A 组为模型+那他霉素组，B 组为模型+那他霉素+早期 HUMSCs 治疗组，C 组为模型+那他霉素+早期培养基对照组，D 组为模型+那他霉素+晚期 HUMSCs 治疗组，E 组为模型+那他霉素+晚期培养基对照组。早期和晚期即分别于模型 1 天和 7 天开始结膜下注射 HUMSCs 或培养基。于模型后 3d、5d、7d、9d、15d 对角膜病变面积、角膜透明度、角膜新生血管、角膜穿孔率等指标进行评分。
结果 在模型后各个时间点，B 组的病变面积评分均低于 A 和 C 组，且在 3d、5d 和 15d 差异有统计学意义；在模型后 3d，B 组角膜透明度评分低于 A 和 C 组，其余时间点角膜透明度评分无统计学差异；A 和 C 组自模型 3d 出现角膜新生血管，而 B 组自模型 7d 才出现新生血管，说明在感染早期应用 HUMSCs 治疗可以减轻 FK 病变程度并减缓该病进展。在模型后 9d 和 15d，D 组病变面积评分略低于 E 组，但差异无统计学意义；D 和 A、E 组相比，各项指标评分均无统计学差异。B 和 D 组的病变面积及角膜透明度评分也无差异。A、B、C、D、E 组角膜穿孔率依次为 50%、33.3%、80%、66.7%、66.7%，感染早期应用 HUMSCs 治疗，穿孔率明显低于其它组。
结论 早期联合应用那他霉素和 HUMSCs 能够减轻 FK 角膜病变程度，降低角膜穿孔率，效果优于晚期 HUMSCs 治疗组。

PU-440

玻璃体腔注射雷珠单抗与曲安奈德治疗增殖型糖尿病性视网膜病变前后玻璃体细胞因子的变化

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目的：观察行玻璃体切割手术 PDR 患者术前玻璃体腔注射雷珠单抗、曲安奈德前后玻璃体细胞因子的变化。**方法：**确诊 PDR 为患者 112 例 112 只眼纳入研究。依照随机方法将分为雷珠单抗治疗组 57 眼，曲安奈德治疗组 55 眼。两组分别于注药前抽取 0.5ml 玻璃体液后，玻璃体腔注入 0.5mg 雷珠单抗或 4mg 曲安奈德；注药后 7d 行玻璃体切割手术，抽取玻璃体液 0.5ml。ELISA 方法测定玻璃体 PIGF 的浓度。Luminex200 液相芯片分析系统检测 MCP-1、MCP-3、IL-6、IL -8、PDGF-AB/BB、VEGF-A 的浓度。**结果：**雷珠单抗组治疗后 PIGF、VEGF-A 分泌较治疗前减少，差异有统计学意义（*P*<0.001）；IL-6、IL-8 表达较治疗前增加，差异有统计学意义（*P*=0.027）。MCP-1、MCP-3、PDGF-AB/BB 表达在治疗前后无明显改变，（*P*=0.496、0.403、0.573）。曲安奈德组治疗后 PIGF 表达较治疗前显著增加，差异有统计学意义（*P*=0.007）；MCP-1 分泌较治疗前较少，差异有统计学意义（*P*=0.01）。MCP-3、IL-6、IL-8、PDGF-AB/BB、VEGF-A 表达在治疗前后无明显改变（*P*=0.656、0.075、0.857、0.987、0.08）。曲安奈德组与雷珠单抗组相比较：雷珠单抗可减少玻璃体中 PIGF、VEGF-A 的表达，差异有统计学意义（*P*<0.01），而 IL-8 的分泌则较曲安奈德治疗组增加，差异有统计学意义（*P*=0.041）；曲安奈德组治疗后 PIGF 表达较雷珠单抗治疗组增加，差异有统计学意义（*P*<0.01），MCP-1 表达降低，差异有统计学意义（*P*=0.04）。**结论：**玻璃体腔注射雷珠单抗 1 周后 PIGF、VEGF-A 明显降低，IL-6、IL-8 分泌增加。玻璃体腔注射曲安奈德 1 周后 MCP-1 降低，PIGF 分泌增加。

PU-441

晶状体小体（LBs）与小鼠晶状体基因表达谱的对比研究

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目的：对比研究晶状体小体（LBs）与小鼠胚胎期及发育期晶状体基因表达谱异同。
方法：通过团队独创的“荷包蛋法”将 iPSCs 定向分化成 LBs，即通过 noggin 处理 6 天使 iPSCs 分化为神经外胚层细胞，通过不同分化状态细胞的切割分离进行纯化筛选，再加入 bFGF、BMP4 及 BMP7 天获得初级 LBs，最后用 bFGF 及 wnt3a 处理获得成熟 LBs。处理通过基因芯片检测 LBs 的基因表达谱，根据文献检索获得小鼠胚胎期 15.5 天、胚胎期 18 天、乳鼠第 0 天、乳鼠第 3 天、乳鼠第 6 天及乳鼠第 9 天的基因表达谱并分别与 LBs 比对，比对工具为 VENNY 2.1 (http://bioinfogp.cnb.csic.es/tools/venny/)。
结果：比对结果显示有 1000 个左右的基因在 LBs 及小鼠晶状体中表达一致，占总表达基因的 1/3。在小鼠胚胎期第 18 天的晶状体中，LBs 基因谱的表达与其一致度最高。
结论：LBs 的基因表达谱有近 1/3 与小鼠晶状体一致，提示 LBs 作为体外再生晶状体的具有较高成熟度，其与小鼠胚胎期第 18 天的晶状体的一致度最高，提示其可能所处的发育阶段。

PU-442

肥大细胞在胬肉组织和结膜组织中的分布比较及其对胬肉增殖作用的研究

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目的：研究肥大细胞在胬肉组织和正常结膜组织中的分布差异并研究肥大细胞释放的组胺对胬肉增殖的影响。
方法：通过将胬肉组织和结膜组织固定包埋并切片后用甲苯胺蓝染色法对肥大细胞进行染色并计数单位面积内稳定状态的肥大细胞以及激活状态的肥大细胞数目。通过实时半定量 PCR（RT-qPCR）以及琼脂糖凝胶电泳来检测胬肉组织以及结膜组织上组胺受体的表达差异。通过胰酶消化法将胬肉纤维细胞和结膜纤维细胞从胬肉组织以及结膜组织中消化下来并持续培养，用不同浓度组胺处理后用 MTT 实验检测其对两类纤维细胞的增殖影响，并通过加入相对应受体拮抗剂来检测组胺对其作用机制。
结果：胬肉组织中稳定状态的肥大细胞以及激活状态的肥大细胞均比结膜组织中多。肥大细胞释放的组胺对胬肉纤维细胞和结膜纤维细胞均有促进增殖的作用，组胺对胬肉纤维细胞的起始有效浓度为 10μM，而结膜纤维细胞的起始有效浓度为 100μM。胬肉组织中组胺受体表达显著多于结膜组织。组胺对胬肉纤维细胞和结膜纤维细胞的增殖作用均可被 H1 受体拮抗剂阻断。
结论：肥大细胞在胬肉组织中明显增多，其分泌的组胺对胬肉纤维细胞的作用浓度显著低于结膜纤维细胞，且该作用均是通过 H1 受体实现的。

PU-443

Baf 在 ARPE-19 细胞的 EMT 过程中的作用研究

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目的：探究 Baf 在 ARPE-19 细胞的 EMT 过程中的作用及其分子机制
方法：采用 TGF-β 诱导 ARPE-19 细胞的 EMT 模型，检测 EMT 相关蛋白 ColⅠ、ColⅣ、α-SMA、FN 等表达水平，Baf 与 TGF-β 共处理 ARPE-19 细胞，检测细胞迁移活性，关键 EMT 标志物 ColⅠ、ColⅣ、α-SMA、FN 的表达水平
结果：TGF-β 可以有效诱导 ARPE-19 细胞的 EMT 过程，24h 关键 EMT 标志物 ColⅠ、ColⅣ、α-SMA、FN 的表达水平相比对照组明显升高，细胞迁移活性明显增加；同时，Baf 与 TGF-β 共处理 ARPE-19 细胞组，其细胞迁移活性明显低于单纯 TGF-β 处理组，ColⅠ、ColⅣ、α-SMA、FN 的表达水平也明显降低
结论：Baf 可以有效抑制 TGF-β 诱导 ARPE-19 细胞的 EMT 过程，其对于 PVR 的形成可能也有相应的抑制作用

PU-444

在 EAU 中肝脏和脾脏的 NKT 细胞抑制 Th1、Th17 细胞分化的研究以及抗原免疫对 NKT 细胞影响的研究

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目的： NKT 细胞是一种特异性 T 细胞，对多种自身免疫性疾病具有免疫调节能力。实验证明不同器官中的 NKT 细胞含量不同并且不同器官中的 NKT 细胞功能不同。本实验用 C57BL/6 小鼠诱导的实验性自身免疫性葡萄膜炎（EAU）模型来研究肝脏和脾脏中 NKT 细胞对 Th1、Th17 细胞分化的

抑制作用以及初步探讨免疫抗原刺激对小鼠体内 NKT 细胞的影响作用，为进一步开展对葡萄膜炎疾病的发病机制研究奠定基础。
方法：
1. 研究肝脏和脾脏中 NKT 细胞对 EAU 小鼠 Th1、Th17 细胞的抑制作用是否不同。
体外混合培养，将 NKT 和特异性 T 细胞混合培养，检测 Th1、Th17 细胞的分化情况从而评价 NKT 细胞对 Th1、Th17 细胞的抑制作用。体内细胞转移，向 EAU 小鼠体内注射 NKT 细胞后，检测 NKT 细胞对 EAU 小鼠 Th1、Th17 细胞分化的抑制作用。
2. 探讨抗原免疫后不同时期的小鼠体内 NKT 细胞的变化以及小鼠体内对生成 NKT 细胞是否具有记忆效应。
检测免疫后不同时期的 EAU 小鼠，肝脏和脾脏中 NKT 细胞的变化情况。检测免疫后的小鼠再次接受免疫后肝脏和脾脏中 NKT 细胞的变化情况，从而探讨小鼠免疫后对 NKT 细胞生成的变化情况。
结果：
1. 肝脏和脾脏中的 NKT 细胞抑制 Th1、Th17 细胞分化的能力不同。
2. 肝脏和脾脏中的 NKT/T 细胞的比率在免疫后不同时间点的变化不同步。
3. EAU 小鼠肝脏和脾脏对生成 NKT 细胞具有记忆效应。
结论：
1. 肝脏和脾脏中的 NKT 细胞抑制 Th1、Th17 细胞分化的功能不同。
2. 肝脏和脾脏中的 NKT/T 细胞的比率在免疫后不同时间点的变化显著不同。
3. 小鼠肝脏和脾脏对生成 NKT 细胞具有记忆效应。

PU-445

小鼠组织工程角膜上皮细胞片的构建及评估

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目的：体外构建小鼠组织工程角膜上皮细胞片并对其生物学特性进行评估。
方法：在改良的小鼠角膜上皮细胞培养方法的基础上，应用 insert 及空气暴露培养的方法，尝试构建小鼠组织工程角膜上皮片；同时应用免疫荧光，qPCR 及电镜技术检测上皮片的生物学特性及微观形态。
结果：培养在 insert 上的角膜上皮约 1 周后融合，经过约 2-3 周的空气暴露培养，形成含 3-4 层细胞的上皮片。扫描电镜结果显示细胞表面具有微绒毛结构；透射电镜显示上皮片全层细胞均呈扁平状，细胞间连接不紧密，虽然 qPCR 及免疫荧光结果显示上皮片高表达并全层表达细胞紧密连接蛋白 ZO1 及 E-cadherin。细胞增殖相关的标记物 P63，K15，K19 主要表达于上皮片的基底层，而 K14 几乎表达于全层；其中，K14 与 K19 的表达量较体内明显升高， P63 的表达量较体内有所降低。上皮分化的标记物 K12，K13 及 K10 均未检出； 虽然角膜上皮特异性标记物 pax6 的表达水平较体内有所下降，但表达于除表层外的几乎所有上皮细胞中。
结论：通过优化细胞培养条件，我们在体外成功构建了小鼠原代组织工程角膜上皮片，为小鼠角膜上皮细胞体外研究的开展奠定了基础。

PU-446

阿托伐他汀预处理大鼠骨髓间充质干细胞治疗糖尿病大鼠视网膜病变的实验研究

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目的：应用阿托伐他汀（ATV）预处理大鼠骨髓间充质干细胞（BMSCs），通过玻璃体腔注射到糖尿病（DM）大鼠体内后，观察处理后 BMSCs 对 DM 大鼠视网膜病变（DR）是否具有更好的治疗作用。 **方法：**1. 利用不同浓度的 ATV 处理 BMSCs，通过免疫荧光、western-blotting、RT-PCR、MTS 细胞增殖实验、流式细胞仪、transwell 小室对其检测；确定最佳预处理浓度及时间。2.STZ 诱导建立 DM 大鼠模型。4w 后，将 ATV 预处理的 BMSCs(5 μl, 3×10^4 cells)注射到大鼠玻璃体腔。注射后 1w、2w、3w 观察各组视网膜石蜡切片 HE 染色病理组织学变化，western-blotting 和免疫组织化学法检测大鼠视网膜组织中 Rhodopsin、NSE 及炎症因子 IL-6、TNF-α 蛋白表达变化。**结果：**1. 通过 ATV 处理后，BMSCs 可过表达 CXCR4 基因，细胞增殖及凋亡没有差异（$p>0.05$），迁移能力有明显提高（$p<0.05$）。最佳预处理浓度 10nM/L，最佳预处理时间为 12h。2. 和对照组相比，玻璃体腔移植 ATV-BMSCs 后视网膜炎症程度明显减轻；并且视网膜组织中 Rhodopsin、NSE 蛋白表达升高，IL-6、TNF-α 蛋白表达降低。**结论：**ATV 预处理的 BMSCs，可提高 CXCR4 的表达来显著增加迁移、归巢能力。可减轻 DM 大鼠视网膜炎症程度。

PU-447

miR-138 通过 Sirt1/Tristetraprolin 参与糖尿病视网膜病变炎症导致视网膜上皮细胞损伤的机制

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目的：验证 miR-138 通过 Sirt1 调节 TTP 参与 DR 炎症，进而导致 REC 损伤，以探明 DR 发生机制并寻找新的治疗靶点。
方法：首先利用患者标本及糖尿病模型 db/db 小鼠，检测 miR-138 、炎性因子、REC（REC）标记蛋白的表达，分析 miR-138 的表达与炎性因子表达的关系。观察高糖对培养的 REC 中的 miR-138、Sirt1、TTP、炎性因子及 REC 标记蛋白的表达水平的影响，并利用 miR-138 的类似物或抑制物，在 REC 中检测 miR-138 在高糖导致的炎症反应造成 REC 损伤中的作用。在正常糖浓度下培养的 REC 中，加入适量的 TTP 特异 siRNA 干扰片段，减少 TTP 的表达；同时加入 miR-138 的类似物，观察 TTP 减少的情况下，miR-138 对下游炎性因子及 REC 标记蛋白的表达影响。在高糖培养的 REC 中，进行过表达 TTP 慢病毒的处理，观察下游炎性因子及 REC 标记蛋白的表达，以确定 miR-138 通过 TTP 参与高糖诱导炎症反应造成的 REC 损伤。利用过表达 Sirt1 的慢病毒或特异 siRNA 干扰片段，以及 P38-MAPK 特异性抑制剂，观察 Sirt1 对 TTP、炎性因子的表达调控作用。
结果：1. DR 患者玻璃体液组织、血标本及高糖培养 RECmiR-138 及炎性因子表达增多，Sirt1 与抗炎蛋白 Tristetraprolin(TTP)表达下降。2.抑制 miR-138 表达可导致 RECSirt1 与 TTP 表达增多；而抑制 Sirt1 表达后，TTP 表达减少，炎性因子增多。3.后续数据待补充
结论：miR-138 参与了 DR 炎症造成 REC 损伤过程，抑制 miR-138 可保护 DR 中的 REC，其通过 Sirt1/P38-MAPK 调节 TTP 的表达而达到保护作用。本实验为探明糖尿病视网膜病变发生机制并寻找新的治疗靶点提供新视角和科学实验依据。

PU-448

OPTN（E50K）突变影响 TARDBP 代谢致 RGCs 凋亡

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目的：利用点突变小鼠研究 OPTN（E50K）突变对视网膜细胞自噬水平及 TARDBP 代谢的影响，探讨该突变导致小鼠 RGCs 凋亡可能的机制。
方法：利用 CRISPR/Cas9 技术构建 OPTN（E50K）突变型纯合子小鼠，选取 16 月龄小鼠进行实验，以 E50K 突变纯合子小鼠作为实验组，野生型（WT）小鼠作为对照组进行研究；icare 眼压计测量小鼠眼压，flash-VEP 及明暗穿梭实验检测小鼠视觉功能，OCT 检测小鼠视网膜厚度；Western Blot 检测两组小鼠视网膜 caspase-3 蛋白量；RT-PCR 检测两组小鼠视网膜 miR-9 的表达水平，Western Blot 检测两组小鼠视网膜 OPTN、TARDBP、LC3、P62 表达水平；IF 及 co-IP 检测蛋白之间的互作关系。
结果：E50K 组与 WT 组小鼠平均眼压无明显差异；flash-VEP 结果显示 E50K 组 P2 幅值较 WT 组明显降低；明暗穿梭实验结果显示，E50K 组小鼠在明箱中停留时间较 WT 组小鼠明显延长；OCT 结果显示，E50K 组小鼠视网膜厚度低于 WT 组；Western Blot 显示与 WT 组相比，E50K 组视网膜 caspase-3 表达水平明显升高，LC3-II 减少，p62 增多，胞浆内 TARDBP 表达增多；qPCR 结果显示 E50K 组小鼠视网膜内 miR-9 表达水平降低；IF 结果显示，在小鼠视网膜 RGCs 胞浆内 OPTN 与 LC3 及 TARDBP 均存在共定位关系，且 E50K 组小鼠视网膜内共定位关系增强，LC3II 及胞浆内 TARDBP 均增多；co-IP 结果显示 OPTN 与 LC3 及 TARDBP 之间存在蛋白互作关系，且 E50K-OPTN 与 TARDBP 互作增强。
结论：OPTN（E50K）突变能够导致小鼠视网膜变薄，视功能异常，可能通过抑制细胞自噬，影响 TARDBP 代谢，导致胞浆内 TARDBP 的异常聚集，进而引起了 miR-9 表达减少，RGCs 凋亡。

PU-449

地塞米松与雷帕霉素对 3D 视网膜类器官在眼内移植后免疫排斥的抑制作用的比较

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目的：由于基础疾病的存在及移植手术过程中造成的损伤，移植后，由人来源的诱导多能干细胞（hiPSCs）诱导而来的 3D 视网膜类器官将存在于一个有害的环境中。选择一种能有效抗炎抗排斥且对移植物影响较小的免疫抑制剂，能有效提高移植后 3D 视网膜的存活率。本研究主要探讨地塞米松与雷帕霉素对 hiPSCs 来源的 3D 视网膜在体内外实验中的影响。
方法：（1）体外比较地塞米松和雷帕霉素对小胶质细胞和 3D 视网膜类器官的影响：检测两种药物对活化的小胶质细胞的抑制率、炎症因子及活性氧的产生的影响；比较 3D 视网膜类器官在药物的作用下其存活、生长及进一步分化的影响。（2）体内实验比较两种药物的抗排斥作用：将 3D 视网膜类器官分别移植到健康的和高眼压造模的恒河猴视网膜上，术后随机选择一高眼压造模术眼打入 Ozurdex（含 700mg 地塞米松的载药缓释剂），一造模术眼每周经玻璃体腔注射雷帕霉素（20μg/ml），另外一健康术眼及造模术眼每周经玻璃体腔注射 PBS 0.1ml，然后每周进行眼底彩照及 OCT 检查，8 周后取材检测，观察移植物的生长情况及移植后炎症反应情况。
结果：雷帕霉素与地塞米松对活化后的小胶质细胞有相近的抑制作用；对 3D 视网膜的组织爬片染色、荧光定量 PCR、流式细胞术的检测显示，与正常对照组相比，雷帕霉素及地塞米松都会对 3D 视网膜中神经细胞轴突的有一定的影响，且两者的影响程度相当，但该类器官仍能继续生长及向神经细胞方向分化；体内实验显示，眼内移植后，健康术眼及术后用 Ozurdex 的造模眼中，移植物能在体内存活并分化，但单用雷帕霉素及未用药的造模术眼中的移植物均未能检测到移植细胞并移植部位显示纤维化的情况。
结论：（1）慢性高眼压的环境会诱导移植后的免疫反应；（2）与雷帕霉素相比，Ozurdex 可以有效抑制移植以后的排斥反应，使移植物在宿主眼内存活，并进行分化。

PU-450

持续 VEGF-A 剥夺对小鼠视网膜功能学及形态学影响

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目的：研究 VEGF-A 剥夺后 1 个月及 3 个月，小鼠视网膜功能学和形态学改变。
方法：以鼠新鲜胎盘组织提取的 cDNA 为模板，构建重组腺相关病毒 rAAV.sFLT-1。将 99 只 C57/6J 小鼠随机分为 3 组,每组 33 只，玻璃体腔内分别注射 2μL rAAV.sFLT-1，rAAV.mCherry 和 磷酸盐缓冲液，设为实验组，模型对照组和正常对照组。三组各随机选出 5 只于给药后 2 周建立激光诱导脉络膜新生血管模型，建模后 14 天，通过 FFA 及脉络膜铺片法，观察小鼠视网膜新生血管的变化情况。三组各随机选出 2 只采用冰冻切片免疫荧光染色，视网膜铺片观察病毒转染情况及 sFLT-1 视网膜各层分布。分别于 1 个月，3 个月，三组各随机选出 3 只，Western-blotting 法检测 V5 表达水平；每组 10 只于电生理 ERG，VEP，SD-OCT，眼底照相观察后分别进行 TUNEL 检测，CTB 传导检测。
结果：rAAV.sFLT-1 组较模型对照组和正常对照组，荧光渗漏明显减少，脉络膜铺片病灶面积明显减少，差异有统计学意义（P＜0.01）。视网膜铺片、冰冻切片可见 V5 高表达，病毒转染神经节细胞效率高， 3 个月时仍高表达。rAAV.sFLT-1 组给药后 1 个月，VEP N1-P2 波及 ERG a，b 波幅无明显异常，3 个月后， 各波幅均明显减小，差异有统计学意义（P＜0.05），但眼底照相及 SD-OCT 均无明显差异。实验组给药后 1 个月，视网膜 tunel 阳性细胞明显增加（P＜0.001），3 个月时，阳性细胞数进一步增加（P＜0.01），且主要分布于神经节细胞层；给药后 1 个月，三组上丘 CTB 荧光强度无明显差异，3 个月后,实验组 CTB 荧光强度明显减少（P＜0.001）。
结论：腺相关病毒介导 sFLT-1 能有效抑制脉络膜新生血管。持续 VEGF 剥夺可能会引起视网膜损伤。

PU-451

Collagen / Hyaluronic Acid Composite Nanofiber Membrane for The Reconstruction of Human Conjunctival Epithelium

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Purpose: To investigate the effects of collagen/ hyaluronic acid composite nanofiber membrane(CHCNM) on the reconstruction of human conjunctival epithelium.

Methods: A nano-scale membrane which was composed of collagen and hyaluronic acid was fabricated by electrospinning technology. A immortalized human conjunctival epithelial cell line was seeded on the membrane at the concentration of 2.1 × 10^4 cells cm^{-2}. Cells were allowed to grow for 1 to 5 days and the morphology were observed by LCEM and SEM. Proliferation of cells was measured by the MTT test.

Results: 24 hours after incubation, cells displayed a cobblestone morphology on the membrane, while the cells existed as a flattened monolayer, generating adherent contact by thin lamellipodia 5 days later. MTT test showed that cells proliferated gradually with time increasing.

Conclusion: CHCNM promotes the adhesion and proliferation of human conjunctival epithelial cells, which may be a good matrix in conjunctival epithelial reconstruction.

PU-452

The diagnostic value of CA153 in breast cancer ocular metastases

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Object: Ocular metastases (OM) in breast cancer (BC) patients always suggests poor prognosis. In the present study, we explored differences in tumor markers from BC patients with and without OM and attempted to figure out risk factors of OM in BC patients.
Methods: There were 629 BC patients involved in this study. Patients' clinical features were tested by Chi-square test, Student's t-test and nonparametric rank sum test. These parameters were analyzed by binary logistic regression to obtain risk factors of OM. ROC (receiver operating characteristic) curve was then established to access the diagnostic value for OM.
Results: There were no differences in age, gender, menopausal state and pathological type. More axillary lymph node metastases could be seen in OM group compared with non-ocular metastases (NOM) group ($p<0.001$). CA153 was found to be an independent risk factor of OM in BC patients ($p<0.001$). The cutoff value of CA153 was 43.00 u/ml, with a sensitivity of 96.15% and a specificity of 96.02%.
Conclusion: CA153 is a risk factor for OM in BC patients. High level of CA153 is correlated with OM in BC patients

PU-453

The predictive value of high-density lipoprotein for ocular metastases in colorectal cancer patients

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Purpose: Colorectal cancer (CRC) is a common tumor of the digestive tract that tends to metastasize and leads to high mortality. Ocular metastases (OM) from colorectal cancer are being increasingly diagnosed, and they can lead to a poor prognosis. Serum lipids are a known risk factor for cardiovascular disease, and are also relevant to the occurrence of CRC. In this study, we examined the levels of serum lipids and tried to determine whether there were correlations with the occurrence of OM in patients with colorectal cancer, in order to determine whether serum lipid levels may be a risk factor for OM in this patient population.
Patients and methods: Records from a total of 703 patients treated for colorectal cancer from August 2005 to August 2017 were involved in this study. Student's t-tests, nonparametric rank sum tests, and Chi-square tests were applied to describe whether there were significant differences between the OM group and non-ocular metastases (NOM) group. We used binary logistic regression analysis to determine the risk factors and receiver operating curve (ROC) analyses to assess the diagnostic value for OM in CRC patients.
Results: There were no significant differences in gender, age, histopathology type, or tumor classifications between the OM and NOM groups. The levels of serum TC, HDL, and LDL were significantly different between patients with and without lymph node metastases as well as male and female patients. The OM group had higher serum HDL levels compared to the NOM group. Binary logistic regression indicated that HDL was a risk factor for OM in colorectal cancer patients. The ROC curves showed that the AUC of HDL was 0.660. The cutoff value of HDL was 1.27 mmol/L, with a sensitivity of 0.619 and a specificity of 0.650.

Conclusion: HDL levels are correlated with ocular metastases in colorectal cancer patients.

PU-454

Role of benzalkonium chloride in DNA strand breaks in human corneal epithelial cells

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Purpose: To investigate the toxic effects of benzalkonium chloride (BAC), a preservative commonly used in ophthalmic preparations, on DNA single- and double-strand breaks in immortalized human corneal epithelial cells (HCEs).
Methods: HCEs were treated with BAC in concentrations ranging from 0.00005% to 0.001% for 30 min. Cells were examined immediately after BAC exposure and after 24 h recovery. Alkaline comet assay was used to detect DNA single-strand breaks (SSBs). Immunofluorescence microscope detection of the phosphorylated form of histone variant H2AX (γH2AX) foci indicated DNA double-strand breaks (DSBs). Cell viability was measured by the MTT test.
Results: A significant increase of SSBs, detected by alkaline comet assay, was observed in a dose-dependent manner with BAC exposure in HCEs at concentrations of 0.00005% and higher. Such BAC treatment also exhibited a dose-dependent increase in DSBs, evaluated by number of γH2AX foci. In addition, a significant change of the relative cell survival rate in HCEs was observed after exposure to 0.001% BAC for 30 min. Although the toxic effects of BAC could be repaired partly after 24 h of cell recovery, there were still existed SSBs and DSBs in HCEs after BAC removal.
Conclusions: The results demonstrate that exposure to BAC in HCEs even at low concentrations could induce DNA strand breaks which existed after BAC removal. Cell survival analyses indicate that BAC-induced DNA damage is correlated with the cytotoxic effects.

PU-455

壳聚糖基电荷驱动自组装载阿霉素（DOX）纳米粒子抑制脉络膜黑色素瘤研究

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实验目的：脉络膜黑色素瘤是主要的原发性眼内恶性肿瘤，在成人中发病率较高。治疗时往往需要长期、多次反复给药。频繁地局部注射容易造成视网膜脱离以及其他一些并发症。因此，设计一种具有药物缓释功能的载药体系，减少用药频次，增加药物生物利用度在眼内疾病的治疗中显得尤为关键。壳聚糖（CS）是优良的生物医用材料。本研究拟制备壳聚糖基纳米粒子用于眼内肿瘤抑制的研究。

实验方法：由于肿瘤具有高表达 legumain 的特性，利用其底物（PEP）将 DOX 桥接至 CS 骨架上，形成带正电 CS 修饰 DOX 前药（CS-PEP-DOX）。利用聚乙二醇末端氨基诱导谷氨酸-N-环内酸酐开环聚合，并进一步在碱性条件下去除苄基，生成聚乙二醇-聚谷氨酸（PEG-PGA）。由于多肽的两性解离性质，PGA 部分在 pH>3.0 的缓冲液体系中带负电。我们将 CS-PEP-DOX 与 PEG-PGA 在 MES 缓冲液（pH 5.0）中混合，电荷驱动下，自组装形成 legumain 响应型载 DOX 纳米粒子。利用 ^{1}H-NMR 进行分子结构分析，用 CCK-8 试剂盒法进行纳米粒子抑制脉络膜黑色素瘤细胞（Mum-2c）效果评价和对正常角膜上皮细胞（HCEC）生物毒性评价。并用激光共聚焦显微镜和流式细胞仪进一步分析肿瘤细胞和正常细胞载 DOX 的纳米粒子的摄取行为，和摄取后的亚细胞分布规律。

实验结果：^{1}H-NMR 进行分子结构分析证明成功制备 PEG-PGA，相较与游离 DOX， DOX 纳米粒子对 Mum-2c 具有明显更强的抑制作用，且对正常细胞毒副作用更低。细胞摄取实验表明，纳米粒子包载能够显著促进细胞对药物摄取。

实验结论：我们成功制备了 CS 基 legumain 响应的载 DOX 纳米粒子。初步研究结构表明，该载药纳米粒子比游离药物具有较高的抗癌活性和较低毒副作用。

致谢

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PU-456

鼻眼过敏患者泪液和鼻分泌物中降钙素基因相关肽（GCRP）浓度分析

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目的：对比 GCRP 在过敏性鼻结膜炎、过敏性鼻炎、过敏性结膜炎患者和健康对照组泪液和鼻分泌物中的浓度。

方法：纳入 2018 年 9-11 月就诊于北京同仁医院的鼻眼过敏患者，按血清学及临床症状诊断标准分为 4 组：过敏性鼻结膜炎组（ARC），过敏性结膜炎组（AC），过敏性鼻炎组（AR）和健康对照组（HC），每组 10 人。使用毛细管收集泪液，使用膨胀海绵收集鼻分泌物。标本收集完成后，采用 ELISA（CUSABIO，武汉）法检测泪液和鼻分泌物中的 GCRP 水平，并用 BCA 法（碧云天，上海）检测标本中总蛋白水平，用分析物检测值与总蛋白水平的比值（ng/g）使用 SPSS22.0 进行单因素方差分析。

结果：ARC、AC、AR 和 HC 组的鼻分泌中 GCRP 浓度分别为 89.23±40.48ng/g、67.71±36.34ng/g、81.98±54.87ng/g 和 11.12±6.47ng/g；泪液中 GCRP 浓度分别为 88.98±64.10ng/g、176.17±30.25ng/g、90.20±31.13ng/g 和 8.73±2.25ng/g。除对照组外的三组鼻分泌物中 GCRP 水平无显著差异，均显著高于对照组（$p<0.05$）；AC 组泪液中 GCRP 水平显著高于其他三组（$p<0.01$），ARC 组和 AC 组泪液中 GCRP 水平无明显差异，均明显高于对照组（$p<0.01$）。ARC 组的鼻分泌和泪液中 GCRP 水平无明显差异，AC 组和 AR 组的泪液中 GCRP 水平均高于鼻分泌物中 GCRP 水平，其中 AC 组中两者存在显著差异（$P<0.01$）。

结论：GCRP 在 ARC、AC、AR 的患者的泪液和鼻分泌物中均有显著升高，提示鼻部和眼部过敏存在相互影响，同时 GCRP 浓度可作为鼻眼过敏性疾病的重要标志物；AC 组泪液中 GCRP 水平显著高于其他组泪液中 GCRP 水平，且显著高于 AC 组鼻分泌物中 GCRP 水平，提示 GCRP 在眼部过敏性疾病中有更重要的意义。

PU-457

NETs 在碱烧伤后角膜自溶中的作用机制

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目的：研究中性粒细胞胞外陷阱在碱烧伤后角膜自溶中发挥的作用，探讨可调控该过程的因素及其对角膜碱烧伤病程的影响。
方法：使用氢氧化钠溶液刺激中性粒细胞，进行免疫荧光染色后观察是否产生 NETs 结构，定量比较不同浓度氢氧化钠溶液刺激产生的 NETs 的差异；选取最佳碱液刺激浓度后，选取不同浓度的甾体类及非甾体类消炎药干预上述过程，定性以及定量地观察消炎药在这一过程中发挥的效应。之后共培养角膜上皮细胞和 NETs，采用不同的细胞染色试剂观察中性粒细胞与角膜上皮细胞的粘附情况。
结果：我们证实了碱液会刺激中性粒细胞形成 NETs，并且 NETs 的形成量随着碱液浓度的增高和刺激时间的延长而增加。而高浓度乙酰水杨酸（ASA）明显抑制碱液刺激的 NETs 形成，说明 ASA 能够调控碱液刺激的 NETs 产生；然而，地塞米松对碱液刺激的 NETs 形成没有明显影响。随后，我们发现 NETs 结构在碱液刺激后的中性粒细胞粘附角膜上皮细胞过程中起关键作用，因为 DNase 降解 NETs 结构后中性粒细胞粘附的数量也明显降低。
结论：明确了 NETs 在碱烧伤后角膜炎性损伤中的作用，确定了非甾体类消炎药通过调控 NETs 产生减轻角膜损伤、促进修复中的作用，具有良好的科学意义和潜在应用价值。

PU-458

流体切应力对人脐带血间充质干细胞（HUC-MSCs）形态、黏附及增殖能力的影响

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目的 本文通过比较不同梯度的流体切应力（shear stress，SS）对人脐带血间充质干细胞（human umbilical cord blood mesenchymal stem cells，HUC-MSCs）形态、黏附及增殖能力的影响，为诱导 HUC-MSCs 向人角膜内皮细胞定向分化奠定理论基础。**方法** 将体外培养的 HUC-MSCs 置于流动小室系统中，分别施加不同强度(1、2、3、4dye/cm^2）的流体切应力作用 2h、6h，以未施加切应力的 HUC-MSCs 为静止对照组，相差显微镜下比较不同组细胞形态改变；Real-time PCR 检测细胞间黏附因子（intercellular adhesion molecule-1，ICAM-1)、Ki67 mRNA 表达水平的差异。**结果** 与静止状态杂乱无章细胞相比，流体作用后 HUC-MSCs 细胞顺着流体方向排列；免疫荧光（IF）结果显示，流体作用后细胞骨架蛋白 F-actin 肌丝延长，相比于 1dye/cm^2，2dye/cm^2 作用 2h 后细胞骨架被进一步拉长，而作用时间延长至 6h 细胞骨架则呈现松散；Real-time PCR 结果显示不同梯度流体作用后（1、2、3、4dye/cm2）细胞表面 ICAM-1 基因 mRNA 表达显著上调，且 2dye/cm2 上调最显著；细胞增殖 marker Ki67 在相对低流体（1,2dye/cm2）作用后无明显差异，而随着切应力的增大(3，4dye/cm2)，Ki67 表达明显受到抑制。**结论** 流体作用 HUC-MSCs 后，细胞顺流体方向排列，梯度流体切应力（1、2、3、4dye/cm2）作用 2h 可促进 HUC-MSCs 黏附，且 2dye/cm^2 黏附能力最强，随着流体作用强度增加，细胞增殖受到抑制。

PU-459

单用化学药物点眼治疗巨大眼表鳞状瘤

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目的 探究单独应用化疗药物局部点眼治疗非浸润性巨大眼表鳞状瘤（OSSN）的疗效。
方法 收集 2018-5/2018-9 哈医大一院眼科一病房收治的非侵入型巨大 OSSN 2 例 2 眼，根据发病过程、典型的裂隙灯表现和非侵入性手段（OCT、眼前节共聚焦检查、结膜印记等）结果给予如上初步诊断。试验性应用五-氟尿嘧啶（5-FU）和干扰素 α2b（IFNα2b）进行局部周期点眼，密切定期随访以观测肿瘤消退情况、药物疗效及副作用、及复发情况。
结果 选取我院我科收治的 2 例 2 眼非侵入性巨大 OSSN 患者的临床资料，平均年龄 71 岁。患眼肿瘤均累及角膜、角膜缘及结膜，平均肿瘤最大直径为 13.1mm。OCT 和共聚焦示肿瘤仅累及结膜上皮层和角膜前弹力层，正常角膜上皮与病变组织边界清楚。故应用 5-Fu 和 IFN-α2b 联合治疗。1%浓度的 5-Fu 周期以“用药 1 周——停药 3 周”周期局部点眼，QID.100 万 IU/ml 浓度的 IFN-α2b 每日持续局部点眼，QID.同时辅以玻璃酸钠滴眼液及维生素 A 眼膏。告知患者每月随访，届时依据肿瘤消退情况决定是否启用下一点眼周期。结果显示两个患者对药物反应性均十分明显。截止目前，一名患者局部联合应用化疗药 4.5 个月后肿瘤完全消退，进入停药随访阶段。另一名患者肿瘤用药三月余，肿瘤大体消退，前节 OCT 示尚残存少许薄层肿瘤组织，仍处于持续用药阶段。一名患者使用 5-FU 后出现眼红、眼部轻度刺激症状，停药后副反应消失。证据表明无化疗相关的干细胞缺乏、巩膜变薄或角膜混浊等副反应。
结论 近年来，OSSN 的治疗有从手术转向单纯局部化疗的趋势。局部化疗创伤小、并发症少，却可以收到等同于手术治疗的治疗效果。有学者建议采用单纯局部化疗替代传统的肿物切除和冷冻疗法治疗非浸润型 OSSN。局部治疗肿瘤消退平均需 3~7 个月，复发高峰期为治疗后的 8~22 个月，因此长期密切随访对于继续评估各种治疗方案的疗效均非常重要。

PU-460

3D 共培养模型对体外培养兔角膜缘干细胞的影响

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目的：探讨三维共培养模型（three-dimensional co-culture model,3D 共培养模型）对体外扩增兔角膜缘干细胞(limbal stem cells,LSCs)的作用。**方法：**体外培养兔 LSCs，以牙周膜干细胞(human periodontal stem cell,HPDLSCs)作为饲细胞建立共培养模型，根据载体不同分组，纤维蛋白胶组将兔 LSCs、HPDLSCs、纤维蛋白胶 3D 共培养；羊膜组将兔 LSCs、HPDLSCs、羊膜 3D 共培养；对照组将兔 LSCs、HPDLSCs 共培养。共培养 5d 后，用倒置显微镜、HE 染色、扫描电镜观察兔 LSCs 的细胞形态，采用免疫荧光染色检测各组兔 LSCs 阳性标志物 p63 的表达,并比较各组阳性率。**结果：**共培养 5d 后，倒置显微镜、HE 染色观察细胞形态，羊膜组、纤维蛋白胶组细胞排列紧密，呈大小不等的团块状集落，细胞大小基本一致；对照组细胞排列相对稀疏；扫描电镜下观察见纤维蛋白胶组、羊膜组细胞与载体贴附良好。免疫荧光染色显示纤维蛋白胶组、羊膜组和对照组 LSCs 的 p63 阳性率分别为（69.93±8.76）%、（78.36±8.56）%和（58.59±8.31）%，三组间总体比较差异有统计学意义（F=9.43，*P*=0.00）。两两比较中纤维蛋白胶组、羊膜组 LSCs 的 p63 阳性率均大于对照组，差异均有统计学意义（均为 $P<0.05$）。纤维蛋白胶组、羊膜组的 p63 阳性率比较，差异无统计学意义（$P>0.05$)。**结论：** 以纤维蛋白胶、羊膜作为载体，HPDLSCs 作为饲细胞的 3D 共培养模型有助于体外扩增兔角膜缘干细胞。

PU-461

膜补体调节蛋白和补体 H 因子在人胚胎干细胞源性视网膜色素上皮细胞中的表达

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目的：人胚胎干细胞来源的视网膜色素上皮细胞(hESC-RPE)已在一些临床试验中移植入年龄相关性黄斑变性(AMD)的患者体内，然而许多重要问题尚未阐明，例如视网膜局部的病理变化对移植细胞的影响及 hESC-RPE 的免疫原性等。以往的研究表明，AMD 的发病与局部补体系统的异常激活有关，其导致了视网膜下腔的免疫豁免状态受损，这可能影响移植细胞的存活和功能。本研究了分析了 hESC-RPE 细胞膜表面补体调节蛋白和补体 H 因子(CFH)的表达情况，以期帮助我们更好的了解移植细胞是否能够保护自身免受补体攻击。
方法：已用于临床试验中的自发分化来源的 hESC-RPE(spontaneously differentiated, sdRPE)，和利用生长因子与小分子药物诱导分化产生的 hESC-RPE(induced differentiated, iRPE)，在第 3 代培养至第 28-35 天后进行鉴定，提取总 RNA 和蛋白质。采用 RT-qPCR、免疫荧光、Western Blot 和 ELISA 检测补体调节蛋白 CD46，CD55，CD59 和 CFH 的表达水平。统计学分析采用双侧 t 检验。
结果：在 sdRPE 和 iRPE 中均检测到补体调节蛋白 CD46、CD55、CD59 及 CFH 的表达。 CD55 在 iRPE 中的表达水平高于 sdRPE (P=0.0019)，而 CD46 (p=0.0797)和 CD59 (p=0.1954)的表达水平没有显著性差异。sdRPE 的 CFH 表达水平高于 iRPE (p<0.01)，但与 CD55 和 CD59 相比，两者的 CFH 表达水平均较低(p<0.01)。
结论：我们的结果显示两种分化来源的 sdRPE 与 iRPE 均表达 CD46，CD55 和 CD59，这提示 hESC-RPE 可能具有保护自身免受补体攻击的能力。然而，hESC-RPE 中 CFH 较低的表达水平带来的影响还需要进一步研究。

PU-462
基于光遗传学技术调控 mESC 膜特性促进神经分化的研究

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解放军总医院第一医学中心

目的：干细胞移植替代疗法非常有望用于多种以神经元损失为特征的神经系统变性疾病，然而，干细胞分化为神经元细胞的效率低下是制约这一疗法的瓶颈问题。提高神经元的分化效率可有效解决这一问题。
方法：运用慢病毒转染方法构建光基因化的 ChR2-GFP-mESC，通过免疫荧光染色、Realtime PCR、流式分析技术检测光刺激对 ChR2-GFP-mESC 自我更新及分化的影响。
结果：光刺激可抑制 ChR2-GFP-mESC 的自我更新核心转录因子 Oct4、Nanog、c-MYC 以及 KLF4 等的转录表达从而抑制自我更新，启动细胞分化，与对照组相比较，光刺激还可提升神经元的分化比例。
结论：体外实验表明，光刺激可抑制 ChR2-GFP-mESC 自我更新，有效促进向神经元分化，为干细胞临床转化治疗神经变性疾病提供新的理论依据。

PU-463
嘌呤相关受体 P2X3R 参与视网膜色素变性后期突触重塑的研究

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目的：视网膜色素变性后期的突触重塑是制约该疾病治疗的一个重要因素，阐明突触重塑相关的调控机制非常关键。

方法：通过免疫荧光染色、电生理检测 ERG 以及 Realtime-PCR 检测 RCS 大鼠视网膜色素变性 15d、30d、60d、90d 以及 120d 不同时间点 P2X3 受体的表达定位及表达水平。
结果：与对照组相比较，P2X3 受体在 RCS 大鼠视网膜内的表达水平逐渐升高，免疫荧光染色结果显示，在 30d 时 P2X3 受体主要定位 INL 以及 IPL 层，在 90d 时 IPL 层还可见大量节细胞来源的神经纤维高表达 P2X3 受体。
结论：视网膜感光细胞坏死消失后，内层神经元丧失传入信号，内部发生明显重塑，P2X3 受体参与这一过程。

PU-464

Sumoylation Ligase-Mediated Apoptosis Contributes to Cataractogenesis

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Purpose: We and others have shown that stress-induced apoptosis of lens epithelial cells is a common cellular mechanism mediating non-congenital cataract formation. More recently, we have shown that sumoylation is essential in regulating eye development. To determine if sumoylation is linked to pathogenesis, we have analyzed the major sumoylation enzymes in the eye and the possible functions of the ligase PIAS1 in lens epithelial cells.
Methods: Lenses were carefully dissected out from mouse eyes and cultured in M199 medium for 12 hours. Subsequently, the transparent lenses (without surgical damage) were selected for experimentation. The transparent lenses were irradiated with UVA irradiation or treated with glucose oxidase (GO) to induce cataract formation. Five sumoylation enzymes in the lens epithelial cells from control lenses or treated lenses were analyzed with qRT-PCR and Western blot analysis. The role of the ligase 3 PIAS1 was analyzed by overexpression, knockdown and cell flow cytometry.
Results: UVA irradiation and GO treatment can induce cataract formation in the in vitro cultured mouse lenses. And the mRNAs and proteins for the 5 sumoylation enzymes were all significantly altered. PIAS1 is implicated in control of apoptosis in lens epithelial cells.
Conclusions: Sumoylation is implicated in control of cataractogenesis. (Supported by grants from National Natural Science Foundation of China, 81570824, 81770910, and 81700821 as well as the Fundamental Funds from the State Key Laboratory of Ophthalmology, Zhongshan Ophthalmic Center, Sun Yat-sen University).

PU-465

Laminins in an in vitro anterior lens capsule model established using HLE B-3 cells

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Cataracts are the most common eye disease to cause blindness in patients. The abnormal deposition of laminins (LMs) in the lens capsule and the disruption of capsular epithelium contribute to cataract development, although the mechanism by which this occurs is currently unclear. The present study aimed to reproduce HLE B-3 basement membranes (BMs) using HLE B-3 cells and to analyze the similarities of LM expression between HLE B-3 BMs and human anterior lens capsule (ALC). Immunohistochemistry
(IHC), ELISA, western blot analysis and immunoprecipitation (IP)-western blot analysis were used to detect total LMs, LM trimers and 11 LM subunits in HLE B-3 cells, HLE B-3 BMs and human ALCs. In IHC staining, HLE B-3 cells and human ALCs were positive for LMs. In LM ELISA, all

samples analyzed were positive for LMs. Western blot analysis detected all LM subunits except for LMγ3 in HLE B-3 cell lysate, 4 subunits (LMα4, LMα2, LMα1 and LMγ1) in HLE B-3 cell culture supernatant, 5 subunits (LMα4, LMα2, LMα1,
LMβ3 and LMγ1) in HLE B-3 BMs, and 3 subunits (LMα4, LMγ2 and LMγ1) in human ALCs. The results of IP-western blot analysis revealed that the LM411 trimer was detected in HLE B-3 cell culture supernatant. These results indicated that HLE B-3 BMs were similar to human ALCs in terms of LM expression. Therefore, HLE B-3 BMs could be used as an in vitro ALC model to determine the role of LMs in ALC in the pathogenesis of cataracts and to select potential anti-cataract drugs.

PU-466

HMGB1 and Caveolin-1 related to RPE cell senescence in age-related macular degeneration

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Abstract
Accumulation of lipofuscin in the retinal pigment epithelium (RPE) is considered a major cause of RPE dysfunction and senescence in age-related macular degeneration (AMD), and N-retinylidene-N-retinylethanolamine (A2E) is the main fluorophore identified in lipofuscin from aged human eyes. Here, human-induced pluripotent stem cell (iPSC)-RPE was generated from healthy individuals to reveal proteomic changes associated with A2E-related RPE cell senescence. A novel RPE cell senescence-related protein, high-mobility group box 1 (HMGB1), was identified based on proteomic mass spectrometry measurements on iPSC-RPE before and after A2E treatment. Furthermore, HMGB1 upregulated Caveolin-1, which also related RPE cell senescence. To investigate whether changes in HMGB1 and Caveolin-1 expression under A2E exposure contribute to RPE cell senescence, human ARPE-19 cells were stimulated with A2E; expression of HMGB1, Caveolin-1, tight junction proteins and senescent phenotypes were verified. Migration of RPE cells was evaluated using wound-healing and transwell assays. Notably, A2E less than or equal to 10 μg/ml induced both HMGB1 and Caveolin-1 protein upregulation and HMGB1 translocation, while Caveolin-1 expression was downregulated when there was more than 10 μg/ml A2E. Our data indicate that A2E upregulation of HMGB1 and Caveolin-1 may relate to RPE cell senescence and play a role in the pathogenesis of AMD.

PU-467

SIRT4 介导 Muller 胶质细胞线粒体功能调节兴奋性谷氨酸酶的细胞毒性

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目的：确定 SIRT4 对 Muller 胶质细胞的线粒体功能的调节及对兴奋性谷氨酸酶细胞毒性的调控机制。

方法：在体内，NMDA 处理诱导正常成年 SD 大鼠神经兴奋毒性损伤模型，蛋白质免疫印迹法（WB）分析各组视网膜中相关蛋白 SIRT4、GS、Vimentin、GFAP 的表达。NMDA 处理 MIO-M1 和 r MC-1. NMDA 处理质粒转染 MIO-M1 过表达 Sirt4 模型和慢病毒感染 MIO-M1 干扰 Sirt4 的模型。BrdU 处理 24h，WB 分析线粒体相关蛋白和胶质细胞标记蛋白，细胞免疫荧光染色（IF）检测细胞形态和增殖标记 BrdU，CCK-8 试剂盒检测细胞活性、谷氨酸检测试剂盒检测对应的谷氨酸含量代谢活性改变，线粒体膜电位检测线粒体功能。
结果：1、体内损伤模型，WB 发现 SIRT4,GS,Vimentin,GFAP 表达增加，IF 发现视网膜结构紊乱，神经纤维层变薄，神经节细胞数量减少。2、NMDA 处理 MIO-M1 和 r MC-1 蛋白结果与体内的相一致。3、NMDA 处理慢病毒干扰 SIRT4 表达的 MIO-M1，IF 发现细胞形态发生改变，长出伪足。相关蛋白 SIRT4、GS、PCNA 降低，CCK-8 试剂盒检测细胞活力降低，谷氨酸试剂盒检测发现细胞表面谷氨酸摄取减少，线粒体膜电位升高。4、NMDA 处理质粒转染过表达的 MIO-M1,相关蛋白 SIRT4、GS、PCNA 增加，细胞活力增加，细胞表面谷氨酸摄取增加，线粒体膜电位降低。5、IF 检测增殖标记 BrdU 的情况，发现质粒过表达模型中，BrdU 阳性细胞百分数明显比正常组增加。
结论：SIRT4 的丧失导致膜电位升高和谷氨酸摄取降低,更容易受到细胞兴奋性毒性诱导的死亡。过表达 SIRT4 则能促进谷氨酸摄取和增强线粒体功能而具有抗兴奋毒性损伤的神经保护作用。

PU-468

白藜芦醇减少视网膜缺血再灌注损伤视网膜神经细胞凋亡机制的相关研究

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目的：研究白藜芦醇对视网膜缺血再灌注(I/R)诱导的视网膜神经节细胞（RGC）死亡以及相关的胶质细胞增生活化和炎症的影响。
方法：选取 20 只正常成年雄性 SD 大鼠的右眼作为实验模型组，通过将眼内压升高至 110mmHg 持续 60 分钟，在成年雄性 Sprague Dawley 大鼠中诱导右视网膜缺血，并将维持在常压的左眼用作对照。从 I / R 损伤前后连续 3 天腹腔注射白藜芦醇或对照缓冲液，评价并比较保护作用。通过注射到上丘中，用 Fluoro-Gold 逆行标记 RGC。通过 TUNEL 染色检测细胞凋亡。 Bax，Bcl-2 和 Caspase-3 的 Western 印迹和免疫染色用于探索 Bax 相关的凋亡途径。蛋白质免疫印迹和用抗胶质纤维酸性蛋白（GFAP）抗体对视网膜横切面进行免疫染色来评估胶质增生。
结果:在该研究中，白藜芦醇治疗显着减少了视网膜损伤和 RGC 损失，如第 7 天 HE 染色中相对完整的组织结构和第 14 天 RGC 的 Fluoro-Gold 标记增加所证明的。我们发现白藜芦醇显示出抗细胞凋亡作用，如通过减少 TUNEL 染色，抑制细胞凋亡相关蛋白 Bax 的早期上调表达和 caspase-3 降低。但是，它没有影响 Bcl-2 水平。此外，在 I / R 损伤模型中，反应性神经胶质增生和相关炎症的联合反应，通过早期诱导促炎介质和随后增加的 GFAP 水平证明，在白藜芦醇治疗后显着减弱。
结论：白藜芦醇可以通过阻断 Bax-caspase-3 依赖性细胞凋亡途径来抑制 RGC 死亡，并且在 I / R 损伤后抑制视网膜相关的胶质细胞增生、活化和炎症

PU-469

PRMT5 抑制剂在视网膜母细胞瘤内的抗癌作用

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蛋白质甲基化一般指精氨酸或赖氨酸在蛋白质序列中的甲基化，它是翻译后修饰的一种重要形式。在本研究中，主要涉及到的是精氨酸甲基化，精氨酸可被精氨酸甲基转移酶甲基化成为一甲基精氨酸，非对称性甲基精氨酸、对称性甲基精氨酸。蛋白精氨酸甲基转移酶 PRMTs 分为三大类：Ⅰ型包括 PRMT1、PRMT2、PRMT3、PRMT4、PRMT6 和 PRMT8，催化的形式为单甲基 （MMA）和不对称双甲基（aDMA）；Ⅱ型催化形式为对称性双甲基，包括 PRMT5 及 PRMT9；本课题主要是涉及 PRMT5.PRMT5 是蛋白质精氨酸甲基转移酶家族的重要成员之一，催化不同蛋白质底物精氨酸残基发生对称性双甲基化，在转录后调节、RNA 的加工，细胞的增殖、分化、凋亡以及肿瘤的形成中发挥重要作用。越来越多的研究发现 PRMT5 在多种肿瘤内高表达，且其对肿瘤的发生发展起到重要的作用。本研究也通过一系列的实验（去 PCR、MTT、克隆形成、流式细胞周期分析）证实了 PRMT5 基因在视网膜母细胞瘤细胞内的表达水平较正常细胞高，且其抑制剂 EPZ015666 对肿瘤细胞的增殖及细胞周期产生影响。

PU-470

G 蛋白偶联受体 LGR4 在视网膜色素上皮细胞中的调控及功能研究

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目的：LGR4 是 G 蛋白偶联受体家族成员，与小鼠发育过程密切相关，但其在视网膜色素上皮细胞（retinal pigment epithelium,RPE）中的功能还不清楚。另外，我们发现 LGR4 的表达可能受到 miR-34a 的调控，而 miR-34a 可以调控 RPE 细胞的多种重要功能。因此本研究将深入探讨 LGR4 对 RPE 细胞重要功能的影响，并确定其是否受到 miR-34a 的调控。

方法：使用 MTS 检测 miR-34a 和 LGR4 对 RPE 细胞增殖能力的影响；使用流式细胞周期检测转染 miR-34a 和干扰 LGR4 对细胞周期的影响；使用划痕和 Transwell 实验检测 miR-34a 和 LGR4 对 RPE 细胞迁移能力的影响；使用 Western blotting 实验和免疫荧光方法检测 miR-34a 和 LGR4 对 RPE 细胞 EMT 相关分子蛋白的影响。

结果：

1.在 ARPE-19 细胞中转染 miR-34a 后，LGR4 的表达量明显下降。

2.MTS 实验和流式细胞周期实验结果说明转染 miR-34a 或干扰 LGR4 可以部分抑制 ARPE-19 细胞的增殖能力，且存在 G1 期阻滞。

3.Transwell 和划痕实验结果发现，转染 miR-34a 或干扰 LGR4 可以部分抑制 ARPE-19 细胞的迁移能力。

4.Western blotting 实验和免疫荧光实验结果说明转染 miR-34a 和干扰 LGR4 可以显著抑制 ARPE-19 细胞的 EMT 过程。

结论：LGR4 调控 RPE 细胞的增殖迁移，而且是 miR-34a 的下游靶标。 miR-34a 和 LGR4 都可以调控 RPE 细胞的 EMT 过程。RPE 细胞的增殖、迁移及 EMT 与多种疾病密切相关，如增生性糖尿病视网膜病变、增生性玻璃体视网膜病变、年龄相关性黄斑变性等，因此，miR-34a 和 LGR4 有望成为治疗这些疾病的靶标，具有潜在应用价值。

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PU-471

大鼠视网膜缺血再灌注损伤中硫化氢及相关酶作用研究

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目的：探讨诱导大鼠视网膜缺血再灌注损伤对大鼠视网膜的影响，深入研究青光眼缺血再灌注损伤的发病机制及为青光眼防治寻找新目标及新靶向。方法：SD 大鼠 80 只，随机将大鼠分为正常对照组（C 组）8 只，视网膜缺血再灌注损伤组（R 组）72 只。R 组采用前房灌注生理盐水升高眼压法建立模型。正常对照组不做任何处理。造模成功后处死大鼠，取出完整眼球，冰上去除角膜及晶状体，剩余部分沿矢状面分为两部分：1/2 病理学固定后检测；余 1/2 分离出视网膜，匀浆后通过酶联免疫吸附实验测定法检测组织硫化氢含量，用逆转录聚合酶链式反应及蛋白免疫印迹法检测胱硫醚-β-合成酶（cystathionine-β- synthase，CBS）,胱硫醚-γ-裂解酶（cystathionine-r-lyase，CSE）,半胱氨酸氨基转移酶（Cysteine aminotranferase，CAT）及 3-巯基丙酮酸硫基转移酶（3-Mercaptopyruvate sulfurtransferase，3-MST）的信使核糖核酸（Messenger Ribonucleic Acid，mRNA）及蛋白表达。结果：RIRI 后与硫化氢含量下降相关的酶可能是 CBS、CAT、3-MST。其中下降最明显的为 CBS，做为辅助硫化氢生成的主要酶，可能 CBS 在 RIRI 后引起的硫化氢生成减少起到主导作用。

PU-472

眼眶恶性黑色素瘤的影像学特征及临床特点的研究

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目的：分析和总结眼眶恶性黑色素瘤的影像学特征和临床特点，并回顾国内外相关文献及报道，得到相关结论，使眼科医生更加全面地了解这种罕见的恶性肿瘤，并做到早期发现，早期诊断和早期治疗。
方法：回顾性分析自 2016 年 1 月至 2018 年 9 月就诊于首都医科大学附属北京同仁医院并经手术及术后病理证实的 5 例眼眶恶性黑色素瘤的临床特点、影像学表现、组织病理特征及治疗方法。同时，通过对上述病例的分析以及回顾国内外相关文献，总结眼眶不同部位恶性黑色素瘤的影像学特征及临床特点。
结果：上述 5 例眼眶恶性黑色素瘤分别累及眼眶的泪囊区，结膜，眼睑以及肌锥内间隙。位于不同位置的病变，可有不同的临床表现。
结论：MRI 是诊断眼眶恶性黑色素瘤最有效的影像学方法之一，具有一定的特征性。眼眶恶性黑色素瘤的发生是多变的，恶性程度高，值得我们关注。

PU-473

罕见的视神经来源的神经鞘瘤一例

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神经鞘瘤是由神经鞘膜细胞增生而形成的肿瘤，常发生有神经鞘膜细胞包裹的颅神经（嗅神经和视神经除外）、周围神经以及植物神经，而来源于视神经的神经鞘瘤十分罕见，国内目前尚未见报道，查阅国外文献报道发现三例。现报道一例我院收治的眶内神经鞘瘤患者，考虑视神经来源可能性大。
方法：行左眼眶内肿物摘除术，术式选择外侧开眶，术中见肿物位于深部眶内，边界欠清，与视神经等组织粘连较紧密，将肿物切除，送病理。

结果：病理示梭形细胞软组织肿瘤，结合免疫组化考虑神经鞘瘤。术后患者左眼视力手动，左眼瞳孔散大，对光反射消失，眼底视乳头水肿，眼球运动正常，予激素、营养神经、改善微循环、对症抗炎治疗，术后 1 月复查左眼视力有提高，目前仍在继续随访中。
结论：本例患者结合影像学检查及术中所见、术后临床表现，可诊断为视神经来源的神经鞘瘤。该疾病为罕见病，且预后不定，因此对于术中、术后可能出现的并发症等应引起重视，并注意术后定期随访。此外，我们还应加大对于罕见病的宣教工作，做到早发现、早诊断、早治疗。

PU-474

What is the intrinsic HLA class I expression of human uveal melanocyte?

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Purpose: High HLA class I expression is associated with a worse prognosis in uveal melanoma, which is opposite to other malignancies. However, the baseline expression of HLA class I of normal uveal melanocytes is unknown.
Materials and methods: Eleven right eyes (used for cornea transplantation, without eye diseases) from 11 donars were collected, fixed in formaldehyde, embedded in paraffin block and cut into sections. The lens, iris, ciliary body, choroid and retina were examined with immunofluorescence, using B2M (light chain of HLA class I) and Mart-1/Melan-A (melanocyte markers) , and HCA2 (HLA-A), HC10 (HLA-B,C), B2M antibodies. The staining was scanned and the images were analyzed. The immune cells within the eye were positive control.
Results: Mart-1/Melan-A positive uveal melanocytes did not express B2M in all eyes. The triple staining of HCA2, HC10 and B2M did not show posive HLA class I expression neither.
Conclusion: HLA class I expression is absent in human uveal melanocytes, possibly due to the immnue privilege characteristic of the eye. We need be more cautious of using immunotherapy for uveal melanoma since high HLA class I expression is an abnormal status of the eye.

PU-475

分子诊断的意义——从二个病例说开去

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目的：随着分子生物学的飞速发展，目前对疾病及其发生机制的认识已经深入到基因水平，分子诊断有助于指导临床个性化治疗，作者以两个典型病例的诊治过程来说明从分子水平认识疾病的临床意义。
方法：整理两个病例的临床表现特征和临床诊断、治疗的困惑。病例 1：26 岁男性，自觉右眼视野变窄 2 年。双眼矫正视力 1.0，右眼压 45 mmHg 左眼压 52 mmHg。双眼角膜透明，周边前房裂隙状，C/D 比右眼 0.95，左眼 0.8。散瞳下发现周边视网膜椒盐状眼底改变，伴色素沉着。诊断：双眼闭角型青光眼：原发性视网膜色素变性？中间葡萄膜炎？病例 2：33 岁女性，左眼视力下降伴胀痛 2 天，反复发作 2 年。既往强直性脊柱炎病史。检查：左眼矫正视力 0.05，眼压 30mmHg，左眼角膜雾状水肿，色素性羊脂状 KP，虹膜萎缩，瞳孔变形，杯盘比 0.3。角膜共焦显微镜未发现内皮细胞鹰眼状改变。诊断：左眼继发性青光眼：病毒感染性前葡萄膜炎？HLA-B27 相关性葡萄膜炎？

结果：通过基因分析、房水检测最终确定诊断，给两位患者选择了合适的治疗方案，长期随访视功能和眼压均控制良好。
结论：从分子水平诊断疾病，认识疾病的性质和生物学特性，从而使患者得到精准治疗。

PU-476
不同血清型 rAAV 病毒载体在大鼠小梁网表达水平的比较研究

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目的：以绿色荧光蛋白 (green fluorescent protein, GFP) 作为标记基因，探索比较不同腺相关病毒（AAV）病毒载体介导报告基因 GFP 在大鼠前房角小梁网上的表达水平及持续时间。
方法：选择健康成年雄性 SD 大鼠随机分为 5 组，经腹腔麻醉后，分别在眼科手术显微镜下用 Hamilton-10μL 微量注射器斜行进入前房注射 5 种不同血清型 rAAV 病毒载体（rAAV-1、2、5、8、9）。实验组大鼠均进行右眼前房注射 1×10^{12} vg/ml 的病毒载体 5μL，左眼作为对照眼。再通过活体动物可见光成像系统（Berthold LB983）和小动物视网膜影像系统（Micron Ⅲ）在活体上每天观察大鼠前房及前房角荧光表达情况。于一定时间内取材，冰冻切片，通过荧光显微镜观察前房角组织切片。
结果：鼠眼术后注射五种 rAAV-GFP 病毒载体后未见细菌感染及明显免疫反应。第 10 天，动物视网膜影像系统拍照结果显示 rAAV5-EGFP 注射组房角对应部位均可见绿色荧光表达，同时用活体成像系统检测荧光表达情况，模型眼可见荧光而对照眼没有荧光表达，两种仪器检测结果一致，排除了假阳性。第 12 天小动物视网膜影像系统检查显示 rAAV5-EGFP 注射动物荧光皆已消失，其他 rAAV- GFP 病毒载体组无荧光表达。
结论：前房注射 rAAV5-GFP 病毒，可在前房角小梁网上表达报告基因 GFP，rAAV5 病毒载体有望用于对小梁网进行基因治疗的新病毒载体表达系统。

PU-477
外酶 C3 转移酶在视网膜缺血再灌注损伤中的神经保护作用研究

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目的: 外酶 C3 转移酶的视神经保护作用已经在兴奋性氨基酸模型中已经通过 RGC 计数，TUNEL，视网膜切片形态分析等证实，并已发表。本研究拟观察 C3 基因治疗视神经保护的可行性。
方法: 制备装载 C3 基因的慢病毒载体（LV-C3）。首先在 SD 大鼠的玻璃体腔注射 5μl 的 LV-C3 或 LV 空白载体，5 天后分别对其进行 110mmHg 的前房高眼压灌注，并维持 90 分钟。在灌注后第 10 天进行视网膜铺片，并通过 TUNEL 染色检测 RGC 凋亡的数目，视网膜石蜡切片利用 H&E 染色进行形态分析，观察 IPL 厚度。
结果：TUNEL 染色结果显示相对于 LV-C3 组（49±26 cells/mm2），LV 组急性高眼压模型的视网膜出现了大量绿色荧光标记的凋亡细胞（1241±452 cells/mm2），而对照组则几乎无 TUNEL 阳性细胞，差异有统计学意义（P<0.001，LV 组对比 LV-C3 组）。H&E 染色结果表明 LV-C3 组急性高眼压模型的 IPL 层虽出现变薄，但相对 LV 组急性高眼压模型的 IPL 有明显缓解。
结论：本研究证实经由慢病毒载体介导的 C3 同样有明确的神经保护作用，加上我们之前的研究结果显示 C3 具有降眼压的作用，因此 C3 在青光眼的治疗上可能具有极大的潜力。

PU-478

一个 X 连锁视网膜色素变性家系的基因突变分析及 X 染色体失活在其发病机制中的作用研究

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目的：探讨一 X 连锁视网膜色素变性（XLRP）家系的分子机制以及分析其基因型-表型间的相关性。
方法：对该家系的所有受试者进行完整的眼科检查。采用包含 57 个已知的视网膜色素变性(RP)致病基因的多基因芯片，对先证者进行靶向捕获和下一代测序(NGS)，包括 RP1、RP2、RPGR、RHO、PRPH2、CRB1 等。通过 PCR 扩增和 Sanger 测序对其余家系成员进行了验证。提取血 DNA 用于 X-染色体失活(XCI)分析和检测有症状和无症状携带者的 RP2 和 AR 甲基化。
结果：本研究共收集了来自中国西南部的一个四代家系，共 41 人，其中 7 名患病男性。该家系的所有患者均被诊断为 RP。男性患者从第一个十年开始出现症状，而女性携带者在第二个十年或更晚些时候出现症状。在所有受男性患者和一些女性携带者中发现存在 RPGR 基因中的移码突变 c.345_348delTGAA。通过 X 染色体失活（XCI）分析，发现他们的表型与其 X 染色体的甲基化状态之间很少或没有相关性。
结论：在一 X 连锁 RP 家系中发现了 RPGR 基因上存在新突变 c.345_348delTGAA，扩大了 XLRP 的 RPGR 突变谱，并进一步扩展了相关临床表型。在这个家系中，表型延伸到女性携带者，其表型比半合子男性温和且有延迟。虽然缺乏与 X 失活的相关性的直接证据，尚不能得出任何关于 X 失活对疾病严重程度影响的结论，但是携带者女性中明确存在较轻的、可变的影响仍然可以反映家系内相关个体的视网膜中可能存在 X 失活模式。

PU-479

蛋白组学在葡萄膜黑色素瘤中的研究进展

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葡萄膜黑色素瘤可累计虹膜、睫状体和脉络膜。肿瘤起源于葡萄膜的黑色素细胞。葡萄膜黑色素瘤是一种最常见的成人眼内原发恶性肿瘤，发病率仅次于视网膜母细胞瘤。肿瘤转移主要经血液至肝脏，转移以后患者平均生存期约半年。蛋白质组学以细胞内全部蛋白质的存在及其活动方式为研究对象，高通量地筛选肿瘤不同发展阶段基因表达的蛋白质。现蛋白质组学方法愈发成熟高效，通过比较肿瘤组织与正常葡萄膜组织蛋白表达的不同，可筛选出病变组织与相同起源正常组织的差异表达蛋白，可以寻找到能够辅助诊断葡萄膜黑色素留的一些蛋白标志物，以及潜在的一些可以用于治疗的靶标蛋白，以便辅助临床上对该疾病的诊断和治疗。因此，本文中笔者对近年来葡萄膜黑色素瘤蛋白质组学研究进展进行综述。

PU-480

抑制 Notch 信号通路促进小鼠视网膜 Muller 胶质细胞增殖的体外实验研究

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目的：相对低等的脊椎动物如斑马鱼的视网膜中，Muller 胶质细胞在视网膜受损后能重新形成完整且有功能的视网膜，但更高等的哺乳动物 Muller 胶质细胞的再生功能受限。Notch 信号通路是调节细胞增殖与分化的经典通路。我们猜想 Notch 信号通路参与小鼠视网膜 Muller 胶质细胞增殖，并利用小鼠视网膜 Muller 胶质细胞受 EGF 刺激增殖的模型探究 Notch 信号通路的作用。
方法：出生后 12 天的小鼠（GFP 标记 Muller 胶质细胞）取视网膜进行体外培养，除基础培养基外，根据实验需要加入或不加入 EGF，加入或不加入不同浓度 Notch 通路抑制剂：gamma 分泌酶抑制剂（L685，458）。培养 7 天后收获视网膜，并进行组织形态学分析，统计 Muller 胶质增殖的情况。
结果：绝大部分视网膜在经历 7 天体外培养后尚保存相对完好的组织形态，冰冻切片 EdU 染色结果显示未加入 EGF 及 gamma 分泌酶抑制剂的体外培养视网膜仅有极少细胞增殖，仅加入 gamma 分泌酶抑制剂的视网膜仅有极少量细胞增殖，仅加入 EGF 的视网膜有较多细胞增殖，同时加入 EGF 及 gamma 分泌酶抑制剂的视网膜有更多细胞增殖。EdU 染色阳性细胞与 GFP 及 GFAP，GS，sox9 三种 Muller 细胞标记存在共定位，并表达 Nestin 及 Pax6。增殖细胞位置不局限于 Muller 细胞原本所在的内核层。
结论：EGF 能促进幼年小鼠视网膜 Muller 胶质细胞增殖，且促增殖作用可以被 Gamma 分泌酶抑制剂增强。增殖中的 Muller 胶质细胞表现出细胞干性。Wnt 信号通路与 EGF 通路共同调节 Muller 胶质细胞的再生功能。

PU-481
The Histone Deacetylase inhibitor Trichostatin A induces c-Myc expression in retinoblastoma WERI-Rb1 Cells

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Retinoblastoma (RB) is the most common intraocular cancer of childhood. Previous studies have demonstrated that c-Myc, a proto-oncogene, is associated with tumorigenesis. However, the expression profile and bioactivity of c-Myc in RB remain unclear. Here, we demonstrated that c-Myc was expressed at low levels in the RB cell line, WERI-Rb1. The histone deacetylation (HDAC) inhibitor trichostatin A (TSA) could significantly induce the expression of c-Myc mRNA and protein in WERI-Rb1 cells. The activity of the c-Myc promoter was significantly increased in WERI-Rb1 cells by TSA. In addition, c-Myc could be differentially regulated by other HDAC inhibitors, including vorinostat (SAHA), valproic acid sodium salt (VPA) and entinostat (MS-275). Interestingly, although c-Myc was silenced in another cell line, Y79, TSA could not induce its upregulation in Y79 cells. However, our data indicated that exogenous c-Myc could also have a mild inhibitory effect on WERI-Rb1 and Y79 cells by transfecting exogenous c-Myc. Therefore, our data provide new insight into the expression mechanism of c-Myc in RB cells, and c-Myc may become a therapeutic target for the treatment of RB.

PU-482
人脐带血间充质干细胞条件培养基对兔角膜内皮细胞增殖的影响

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目的：观察人脐带血间充质干细胞条件培养基（human umbilical mesenchymal stem cells conditional medium,huMSC-CM）对兔角膜内皮细胞(corneal endothelial cells,CECs)增殖的影响。方法:采取揭取角膜后弹力层联合酶消化法分离培养兔 CECs;分别用浓度为 0%、10%、30%、50%、70%、100%的 huMSC-CM 作用于体外培养的兔 CECs。然后于 24h、48h、72h、96h 观察含不同浓度的 huMSC-CM 对兔 CECs 的影响。采用倒置显微镜观察细胞形态及数目的变化，以及 MTT 检测方法测定在 490nm 处各吸光度(A 值)来判断 CECs 的增殖状况。采用 RT-PCR 检测相关功能基因的表达。采用克隆形成实验检测细胞增殖能力。结果：在倒置显微镜下观察到不同浓度 huMSC-CM 作用后的兔 CECs 均可增殖，且以 100%huMSC-CM 作用后的兔 CECs 增殖最为明显。MTT 检测结果显示 10%、30%、50%、70%、100%的 huMSC-CM 作用后各个时间点均能使 CECs 的吸光度发生改变,同一时间点 100%的 huMSC-CM 对细胞增殖的作用最为显著,各浓度的 huMSC-CM 对兔 CECs 作用后 96h 吸光度改变最明显(OD 值分别为:0%：1.017；10%：1.127；30%：1.279；50%：1.411；70%：1.723；100%：1.998)。RT-PCR 显示相关功能基因表达增加。克隆形成实验显示 100%CM 克隆形成率明显高于 0%CM。结论：100%的 huMSC-CM 对兔 CECs 有明显的促进增殖的作用。

PU-483

A temperature-sensitive phase-change hydrogel of Topotecan achieves long-termly sustaining and antitumor effect of Topotecan in Retinoblastoma cells

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PURPOSE: Retinoblastoma (Rb) is one of the most common malignancy of children and the clinical outcomes or prognosis of Rb is promising good when treatment is provided following early diagnosis of children. However, the prognosis or survival rates of patients with late-stage diagnosis Rb is still poor. Current therapeutic strategies of advanced Rb is mainly using advanced chemotherapeutic options and the efficiency of these strategies are still not satisfactory. It is valuable to develop novel strategies to archive more effective antitumor effect on late-stage Rb.
METHODS: Topotecan was dissolved in PBS and prepared to a temperature-sensitive phase-change hydrogel (named Topo-Gel) which is a liquid at room temperature and transforms to a hydrogel at near body temperature. Moreover, Topo-Gel was injected into tumor tissues in nude mice formed by Y79 cell, a Rb cell line, to examine the long-term releasing and long-acting antitumor effect of Topo-Gel on Rb tumors.
RESULTS: Topo-Gel can transform from liquid-status to hydrogel-status at near body temperature (phase change temperature [$T_{1/2}$] is) and maintain slow-releasing of Topotecan in Rb tumor tissues. When Topo-Gel were injected subcutaneously, once administration of Topo-Gel archived long-acting antitumor activation on tumor growth and relieved the side effects of Topotecan.
CONCLUSIONS: Topo-Gel, a temperature-sensitive phase-change hydrogel, is a slow-releasing system archiving Topotecan to be long-term sustaining in Rb tissues and preserving the efficiency of Topotecan in a long term.

KEYWORDS: late-stage retinoblastoma, temperature-sensitive phase-change hydrogel, slow-releasing, long-acting antitumor effect

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PU-484

A temperature-sensitive phase-change hydrogel of topotecan achieves a long-term sustained and antitumor effect on retinoblastoma cells

Yan Huo,Qun Wang,Ying Liu,Yifei Huang,Liqiang Wang
Chinese PLA General Hospital

PURPOSE: Retinoblastoma (Rb) is one of the most common malignancies among children, and the clinical outcomes or prognosis of Rb is promisingly good when treatment is provided following early diagnosis in children. However, the prognosis or survival rates of patients with a late-stage diagnosis of Rb are still poor.Current therapeutic strategies for advanced Rb involve mainly using advanced chemotherapeutic options, and the efficacy of these strategies is still not satisfactory. It is valuable to develop novel strategies to achieve a more effective antitumor effect on late-stage Rb.
METHODS: Topotecan was dissolved in PBS and prepared into a temperature-sensitive phase-change hydrogel (named Topo-Gel), which is a liquid at room temperature and transforms into a hydrogel at near body temperature. Moreover, Topo-Gel was injected into tumor tissues in nude mice formed by Y79 cells, an Rb cell line, to examine the long-term release and long-acting antitumor effect of Topo-Gel on Rb tumors.
RESULTS: Topo-Gel can transform from a liquid to a hydrogel at near body temperature (phase change temperature [T1/2] is 37.23±0.473 ℃), and it maintains the slow release of topotecan in Rb tumor tissues. When Topo-Gel was injected subcutaneously, administration achieved long-acting antitumor activation on tumor growth and relieved the side effects of topotecan.
CONCLUSIONS: Topo-Gel, a temperature-sensitive phase-change hydrogel, is a slow-releasing system that allows topotecan to be sustained long-term in Rb tissues and it preserve the efficiency of topotecan in the long term.

PU-485

视网膜下输送干细胞的研究进展

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与玻璃体内注射相比，视网膜下注射对视网膜下间隙（SRS，sub-retinal space）的靶向细胞有更直接的影响。这为玻璃体视网膜疾病提供了一种新的治疗方法，尤其是干细胞治疗。到目前为止，视

网膜下给药已被科学家和临床医生广泛应用于基因治疗和细胞治疗中，作为一种更精确和有效的眼部药物传递途径。包括在许多退变性玻璃体视网膜疾病中干细胞的注入，这些疾病有：视网膜色素变性（RP）、年龄相关性黄斑变性（AMD）和 Leber 先天性黑朦症。然而，临床医生在进行视网膜下注入时应注意不良事件和可能的并发症。本文综述了视网膜下输送干细胞治疗的基础研究和临床试验中的应用和研究进展，及其优点和面临的挑战。

PU-486

人角膜缘干细胞原代培养的研究

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摘要： 目的 探讨人角膜缘干细胞原代培养的方法。 方法 （1）组织块培养法：无菌条件下将人角膜缘组织剪成 2mm^2 大小，直接贴附于直径为 35 mm 的培养皿底部，加入少许培养液，培养液每 3d 更换 1 次。（2）酶消化法：将分离好的人角膜缘组织浸没于 0．25％胰蛋白酶一 O．02％EDTA，吹打数下，37℃孵育 5～10 min，消化成单个细胞，中止消化，1 000 r/min 离心 5 min，弃上清，加入培养液，吹打均匀，以 1.5×10^5 个/cm^2 的密度接种于 35mm 培养皿中，置于培养箱中培养，待细胞贴壁生长后开始换液。 结果 （1）组织块贴壁法：人角膜缘组织块上皮面朝下静置 2h 后贴壁良好，培养的细胞 7d 后从组织块周边爬出形成“沙滩样”移行带，细胞从移行带向外生长，形成生长晕，相互连接呈膜状，10-12d 细胞大量生长，14-15d 形成良好的细胞单层。 （2）酶消化法 消化细胞 24 h 贴壁，约 1/2 细胞漂浮，3—4 d 形成细胞克隆团，20％培养皿中有角膜缘上皮细胞贴壁生长，80％培养皿中未见细胞贴壁生长。结论 组织块培养法和酶消化法均可以体外培养角膜缘上皮细胞，组织块培养法的成功率较高。

PU-487

SUMO 家族成员在碘酸钠诱导的视网膜色素上皮变性过程中的表达量变化研究

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目的：检测 SUMO 家族成员在碘酸钠诱导的大鼠 RPE 细胞变性过程中的表达变化, 为后续眼底病与 SUMO 化相关研究提供一定的理论依据。
方法：
1. 使用 RT-qPCR 的方法检测 ARPE-19 及 293 细胞中 SUMO 家族成员表达模式；
2. 使用 RT-qPCR 的方法检测大鼠神经视网膜细胞中 SUMO 家族成员表达模式；
3. 使用免疫荧光的方法检测大鼠 RPE 细胞中是否表达 SUMO 家族成员，及其表达模式；
4. 建立碘酸钠诱导的大鼠 RPE 细胞变性动物模型，使用 RT-qPCR 的方法检测在碘酸钠诱导的大鼠 RPE 细胞变性过程中的表达变化。
结果：
1. ARPE-19 及 293 细胞中 SUMO1，SUMO2，SUMO3 表达模式相同，其相对表达量从高到低分别为 SUMO2，SUMO1，SUMO3.
2. 大鼠的视网膜色素上皮-玻璃膜-脉络膜-毛细血管复合体(RBCC)及神经视网膜中均有 SUMO1，SUMO2，SUMO3 表达且表达模式相同。其相对表达量同上。

3. 免疫荧光结果显示在正常大鼠视网膜中 SUMO2 的表达量高于 SUMO1，且 SUMO1 与 SUMO2 均在 RPE 细胞层中检测到。
4. 在碘酸钠模型处理过程中 SUMO1 的表达量在处理 1h 后增加，2h 时后迅速下降，之后开始持续上升，直至 9h。统计学分析显示 SUMO1 的变化有统计学意义。SUMO2 则在处理 1h 后有轻微下降直至 6h 均为一个相对较低的状态，在处理 9h 后升高。但统计学分析显示其变化无统计学意义。相较于与 SUMO1 与 SUMO2，SUMO3 的表达量最低，在碘酸钠处理迅速上升，后下降，之后一直维持一个相对低的表达水平直至 9h。
结论：
在碘酸钠制作的视网膜色素上皮细胞变性过程中，SUMO2 的表达量变化无统计学意义，SUMO1 的表达量呈现为先升高再降低的趋势，可能是在碘酸钠处理后 RPE 细胞首先为代偿状态，之后表现为失代偿。我们认为视网膜色素上皮变性过程中 SUMO 化修饰可能起着重要作用。

PU-488

miR-34a-5p 通过 Nrf2/KEAP1 信号通路介导年龄相关性白内障氧化应激

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目的 本研究旨在探讨 miR-34a-5p 通过调节 Nrf2/Keap1 信号通路介导老年性白内障的氧化应激
方法 在患者透明晶状体前囊及人晶状体上皮细胞氧化应激模型中检测 miR-34a-5p 和靶基因表达，用 2', 7'-二氯荧光黄双乙酸酯（DCFH-DA）荧光探针检测人晶状体上皮细胞内活性氧（ROS）活性。将 miR-34a-5p 模拟物、模拟物对照、miR-34a-5p 抑制剂和抑制物对照分别转染人晶状体上皮细胞，然后 400μmol/L H2O2 作用 1h 后 RT-qPCR 和 Western 印迹检测相应基因和蛋白质表达，MTS 法检测细胞增殖活性。
结果 年龄相关性白内障晶状体组织和人晶状体上皮细胞氧化应激模型中，miR-34a-5p 显著升高，靶基因（NRF2）显著降低，内源性 ROS 水平显著升高（P 均<0.001）。miR-34a-5p 模拟物转染人晶状体上皮细胞后，miR-34a-5p 显著升高，NRF2 显著降低，内源性 ROS 水平显著升高，细胞增殖活性显著降低（P<0.001），然而，miR-34a-5p 抑制剂转染人晶状体上皮细胞后， miR-34a-5p 显著降低，NRF2 显著升高，内源性 ROS 水平显著降低，细胞增殖活性显著升高（P<0.001）。最后，双荧光素酶报告分析证实 Nrf2 是 miR-34a-5p 的直接靶点。
结论 年龄相关性白内障囊组织中 miR-34a-5p 表达上调。MiR-34a-5p 通过调节 Nrf2/Keap1 信号通路减弱晶状体上皮细胞抗氧化应激，抑制晶状体上皮细胞的增殖，从而参与老年性白内障的发生过程。

PU-489

间充质干细胞在眼表损伤的应用

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目的：间充质干细胞是一类广泛存在于多种组织中的成体干细胞，除了具有自我更新和多向分化潜能外，间充质干细胞在炎性环境下具有独特的免疫调节能力和抗炎能力，能够分泌相关细胞因子或定向迁移到炎症组织损伤部位，起到免疫调控和炎症调节能力，因此间充质干细胞在免疫和炎性相关疾病的治疗中具有广泛十分广阔的临床应用前景。利用间充质干细胞的这些特性，间充质干细胞以应用于眼表损伤，角膜移植排斥和干眼症的研究。本研究探讨了眼袋来源的脂肪间充质干细胞，

并比较了不同年龄眼袋来源干细的特性和角膜损伤修复的影响，为间充质干细胞在眼科领域的研究和应用奠定了坚实基础。
方法:本研究选取三个年龄组（7-75 岁）眼袋脂肪间充质干细胞，比较了年龄因素对脂肪间充质干细胞的增殖、克隆形成能力、抗原特性、多向分化能力、分泌因子能力和组织修复能力。
结果：采用外植体培养法分离培养了眼袋脂肪间充质干细胞，并发现年龄因素影响干细胞的增殖能力、骨分化能力、软骨分化能力和损伤修复能力。而脂肪分化能力和表面抗原 CD90 的表达随着年龄的增长显著增高。
结论：年龄因素显著影响眼袋脂肪间充质干细胞的体外增殖能力，骨和软骨的分化能力；随着年龄的增长，眼袋脂肪间充质干细胞的修复能力显著下降。由此可见，眼袋来源的脂肪间充质干细胞能够通过分泌细胞因子而促进角膜上皮细胞损伤再生，而其中年龄因素是影响眼袋来源脂肪间充质干细胞功能的重要指标之一，本研究为眼袋来源的间充质干细胞在眼表应用提供了一个新的干细胞来源，可以作为治疗眼部免疫性疾病细胞来源的筛选指标。因此，临床应用自体脂肪间充质干细胞进行治疗时应充分考虑供体的年龄等影响因素。

PU-490
曲安奈德／聚乳酸己内酯(PLCA)载药静电纺丝膜青光眼滤过泡支架抗瘢痕化作用的研究

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摘要：小梁滤过术联合巩膜层间填充载药聚乳酸-己内酯（PLCA）静电纺丝膜，用于治疗青光眼巩膜瓣增殖作用的研究。实验方法：利用静电纺丝技术制备曲安奈德(Triamcinolone acetonide, TA)/PLCA 静电纺丝膜，扫描电镜检测静电纺丝膜结构，高效液相色谱检测载药膜体外的缓释时间。前房注射卡波姆制备新西兰白兔急性青光眼模型。新西兰白兔 32 只随机分为 4 组，每组各 8 只，每组兔的青光眼行非穿透性小梁切除术。A TA/PLCA 载药静电纺丝膜植入组；B 保存羊膜植入组；C PLCA 静电纺丝膜组；D 百利特阳性药对照组。观察各组眼压变化、滤过泡形成与内部结构。实验结果：TA/PLCA 载药静电纺丝纤维直径 0.5~1.5um，体外药物缓释时间 14 天。卡波姆制备青光眼动物模型，7 天后眼压稳定 31±0.5 mmHg (p=0.007，p＜0.05）。各组实验动物小梁滤过术治疗青光眼 12 周后眼压分别为 13±0.9 mmHg、21±0.9 mmHg、26±1 mmHg，统计检测各组之间具有明显的差异 (p =0.001, p =0.012, p =0.0007, p＜0.05)，病理结果显示 12 周后，A 组巩膜床空隙明显，巩膜瓣滤过道表面上皮化，基本没有炎症反应与纤维增殖，载药静电纺丝膜降解，眼压保持稳定。B 组巩膜床存在轻微的空隙，纤维增殖严重，炎症反应较轻，眼压回升。C 组巩膜床空隙消失，增殖严重，眼压回升。小梁滤过术联合巩膜层间填充 TA/PLCA 载药静电纺丝膜具有明显抑制小梁滤过道增殖的作用，从而有效的治疗青光眼控制眼压。
PLCA 作为聚乳酸的升级产品，具有降解炎性小、生物相容性好等特点。本研究利用 PLCA 静电纺丝膜具有较强的载药、缓释性能，制备具有缓释曲安奈德的生物膜。PLCA 缓释生物具有较强的抗瘢痕能力，能够较好的保存青光眼术后滤过道的完整性。同时可以在其它手术中垫付与组织中间、包裹组织，防止粘连等功效。

PU-491
低浓度 ZnCl2 对 UVB 照射损伤人晶状体上皮细胞的保护作用机制研究

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目的:锌离子对维持机体正常生理功能具有重要意义,过量 UVB 照射会损伤人晶状体上皮细胞（HLEC）。本研究主要探讨低浓度 $ZnCl_2$ 对 UVB 照射损伤 HLEC 的保护作用及机制。
方法：用 MTT 法检测空白对照组、紫外照射组和 2.0 mg/L、3.0 mg/L、4.0 mg/L 的 $ZnCl_2$ 预处理后 UVB 照射组 HLEC 的生存率；实时细胞电子分析系统(RT-CES)动态监测各组 HLEC 增殖情况；DAPI 染色法检测各组细胞核变化；Q-PCR 和 ELISA 检测 caspase-12 mRNA 和蛋白水平表达变化。
结果：MTT 表明，单纯紫外照射组和 $ZnCl_2$ (2.0 mg/L、3.0 mg/L、4.0 mg/L)预处理组 24 h 细胞生存率分别为 34. 47% ± 9. 31%、65. 91% ± 12. 46%、64. 30% ± 16.24% 和 46.36% ±6.28%；48 h 细胞生存率分别为 8. 31% ± 1.38%、53.82% ± 11.34%、59.25% ± 7.58%和 36.57% ± 8.41%; 72 h 细胞生存率分别为 6.75% ± 3.71%、48.29% ± 10.06%、56.53% ± 8.47%和 39.57% ± 8.93%。RT-CES 分析显示，$ZnCl_2$(2.0 mg/L、3.0 mg/L、4.0 mg/L)预处理可明显抑制 UVB 照射诱发 HLEC 的坏死和凋亡，低浓度 $ZnCl_2$（2.0 mg/L）效果更明显；DAPI 染色表明，低浓度 $ZnCl_2$（2.0 mg/L）可减少 UVB 照射引起的 HLEC 细胞核固缩和碎裂；RT-CES 和 ELISA 检测表明，低浓度 $ZnCl_2$（2.0 mg/L）对 UVB 照射诱发的 caspase-12 mRNA 和蛋白质的表达升高具有抑制作用。
结论：低浓度 $ZnCl_2$（2.0 mg/L）对 UVB 照射后 HLEC 中 caspase-12 的表达上调具有抑制作用，其可能的作用机制是通过抑制 caspase-12 信号通路对 UVB 照射损伤 HLEC 发挥保护作用。

PU-492
micro RNA-29 靶向调控 Smac 在晶状体上皮细胞凋亡中的影响

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目的：探讨 mircro RNA-29 对晶状体上皮细胞 LECs 凋亡的影响，以及靶向调节 Smac 的机制。**方法**：通过生物学软件预测 Smac 和 miRNA 存在靶向调节关系，体外培养 HLE-B3 人晶状体细胞系，利用 H_2O_2 制作凋亡模型模拟人晶状体上皮细胞凋亡，利用 miR-29 mimic 和 miR-29inhibitor 分别模拟或抑制 miR-29 在晶状体细胞系中的表达，观察 Smac 的表达变化。然后将细胞分为模型对照组、miR-29 拟似物组、拟似物对照组、miR-29 拮抗物组、拮抗物对照组，未用 H_2O_2 处理的 LECs 作为正常对照组。流式细胞仪检测各组细胞的凋亡率；q-PCR 和 Western blot 检测 LECs 中 smac mRNA 和蛋白的相对表达量。**结果**：生物学软件预测，Smac 可能为 miR-29 的靶基因，模型对照组的细胞凋亡率明显高于正常对照组，差异有统计学意义，miR-29 拟似物组细胞凋亡率明显低于拟似物对照组，差异有统计学意义，miR-29 拮抗物组细胞凋亡率显著高于拮抗物对照组，差异有统计学意义。q-PCR 和 Western blot 法检测结果显示，模型对照组细胞中 smac mRNA 及蛋白的相对表达量明显高于正常对照组，差异均有统计学意义；miR-29 拟似物组细胞中 smac mRNA 和蛋白的相对表达量低于拟似物对照组，差异均有统计学意义；miR-29 拮抗物组 smac mRNA 的相对表达量高于拮抗物对照组，差异均有统计学意义。**结论**：miR-29 和 Smac 可能存在靶向调节关系，miR-29 下调 Smac 抑制 LECs 的凋亡，从而对年龄相关性白内障发挥抗氧化损伤作用。

PU-493
CYP51A1,LSS,DHCR24 三种基因诱导老年性白内障和视网膜病变的发生

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目的：
胆固醇合成途径中间产物被证实参与多种生理生化反应，如炎症、肿瘤细胞转移等，因此它的生物合成和代谢转变以及转运一直是生物学家关注焦点之一。其过程大致为：乙酰 CoA →甲羟戊酸→二甲烯丙基焦磷酸→鲨烯→胆固醇。近几年有研究发现，胆固醇合成途径中间产物在眼部疾病中发挥重要作用，如羊毛甾醇可缓解白内障等，为眼部疾病的治疗提供了新思路。前期研究中发现在胆固醇合成通路中 CYP51A1,LSS,DHCR24 三种蛋白酶在视网膜与晶状体内表达量受年龄影响，故望通过探究 CYP51A1,LSS,DHCR24 突变引起老年性白内障或视网膜病变的机制，找寻白内障及类似蛋白质相关疾病的治疗新思路。
方法：
通过构建小鼠基因敲除模型，运用免疫组化等方法确定 CYP51A1,LSS,DHCR24 突变对老年性白内障的影响。通过白内障细胞模型，运用 western blot，免疫荧光等方法明确其在细胞中的具体作用机制。通过给予本实验组发现的小分子药物到白内障细胞模型中，明确小分子药物是否可对该类型白内障有潜在治疗作用。
结果：
在老龄晶状体与视网膜中，CYP51A1,LSS,DHCR24 mRNA 的表达量均下降，蛋白质含量也下降。CYP51A1,LSS,DHCR24 三中蛋白质在细胞质中表达。CYP51A1 与 LSS 之间存在共定位，CYP51A1 与 DHCR24 之间不存在共定位。对视网膜细胞培养液中加入羊毛甾醇，三种蛋白质的表达含量下调。在三种小鼠基因敲除模型中，小鼠表现出白内障现象。

结论：
随着年龄的增加，CYP51A1,LSS,DHCR24 三种蛋白质在晶状体与视网膜中下调表达。在胆固醇合成途径中，CYP51A1 与 LSS 分别是羊毛甾醇的上游催化酶与下游催化酶。实验结果显示 CYP51A1 与 LSS 存在共定位表明两种蛋白质可能相互结合，存在协同作用。因而视网膜细胞在羊膜甾醇逆境下，三种蛋白质含量均表现为下调。

PU-494

Effect of Resveratrol on Sirtuins, OPA1, and Fis1 Expression in Adult Zebrafish Retina

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PURPOSE: We determined whether sirtuins (SIRT1-SIRT7) are expressed in the zebrafish retina, evaluated the modulatory effect of resveratrol in the normal retina, and examined N-Methyl-D-aspartic acid (NMDA)-induced zebrafish retinal damage associated with mitochondrial sirtuins and mitochondrial fusion and fission mediators, OPA1 and Fis1.
METHODS: Sirtuins, OPA1, and Fis1 mRNA expression was analyzed by RT-PCR and quantitative real time PCR (qPCR) in adult zebrafish (AB type) retina and liver. qPCR showed an effect of resveratrol on SIRTs (SIRT1, 3, 4, 5) and OPA1 and Fis1 in low and high concentrations (5 and 50 mg/L) at different time points (24 and 48 hours) in the retina. Western blots were performed to examine the expression of SIRTs and OPA1 proteins under high concentrations of resveratrol for 24 hours. Hematoxylin and eosin staining, qPCR and mitochondrial copy number, and DNA damage assays then were used to confirm the protective effects of resveratrol on NMDA-induced retinal damage.

RESULTS: The seven sirtuins and OPA1 were highly expressed in zebrafish retina compared to the liver. Treatment with resveratrol promoted SIRT1, mitochondrial sirtuins, and OPA1 gene and protein expression, and improved mitochondrial DNA repair in adult zebrafish retina. Interestingly, the effect of resveratrol on SIRT4 gene and protein expression was significantly higher in the zebrafish retina. Importantly, resveratrol offered protection against NMDA-induced retinal damage by activating the SIRT1 gene and subsequent protein expression. Mitochondrial sirtuins and OPA1 genes likely had a role in regulating mitochondrial dynamics.
CONCLUSIONS: To our knowledge, our study is the first composite analysis of sirtuins in adult zebrafish retina and provides sufficient evidence that resveratrol, as an activator of SIRT1, protects NMDA-induced zebrafish retinal damage by potentially mediating mitochondrial sirtuins and OPA1 genes.

PU-495
circHIPK3 表达改变在糖尿病白内障中的作用机制研究

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研究目的
为了分析糖尿病白内障中 circHIPK3 的表达是否改变及 circHIPK3 靶向结合的 miRNA 对晶状体上皮细胞的功能是否产生影响。
研究方法
通过 TargetScan 搜索与目的基因 CACNA1C 可能结合的 miRNA。通过收集实验组糖尿病白内障患者的晶状体囊膜及对照组老年性白内障患者的晶状体囊膜，使用 qrtPCR 分别测定 circHIPK3 的表达。在人晶状体上皮细胞系 SRA01/04 中添加 miRNA mimics，并测定目的基因 CACNA1C 的 mRNA 表达改变，以研究 circHIPK3-miRNA-mRNA 在糖尿病白内障中的发病机制。
结果
circRNA 的高通量测序发现白内障囊膜上有 101 个表达改变的 circRNA，其中 circHIPK3 的表达改变是有显著差异的。老年性白内障中 circHIPK3 表达显著下调；而以老年性白内障为对照，circHIPK3 在糖尿病白内障中表达更低。通过 TargetScan 得出可能与 CACNA1C 有结合位点的 miRNA 有 3 个：miRNA-29a、29b 及 338。在人晶状体上皮细胞系 SRA01/04 中添加上述 3 中 miRNA mimics，测出 CACNA1C 的 mRNA 表达下降。
结论
糖尿病白内障中，可能通过 circHIPK3-miRNA（29a、29b 及 338）-CACNA1C mRNA 的作用途径使晶状体上皮细胞发生变性。CACNA1C 基因编码细胞钙通道蛋白，其功能抑制可引起细胞内 Ca^{2+} 代谢异常，引起线粒体功能障碍，导致细胞变性或坏死。circHIPK3-miRNA-mRNA 的研究有望进一步揭示糖尿病中白内障发生发展的机制和功能。

PU-496
七叶亭对人胚胎巩膜成纤维细胞表达 MMP-2、Collagen-1 蛋白的影响

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目的: 探讨七叶亭对人胚胎巩膜成纤维细胞(human fetal scleral fibroblast，HFSF)基质金属蛋白酶 2(MMP-2)、Ⅰ型胶原蛋白（CollagenⅠ）表达的影响，为七叶亭防治近视提供实验依据。

方法：对 HFSFS 细胞进行复苏培养，在倒置相差显微镜下观察其细胞生物学特征；分别用 0、0.78、1.56、3.13、6.25、12.5、25、50uM 七叶亭作用于 HFSF 细胞 6h、8h、12h、24h、48h，cck-8 法检测七叶亭对 HFSF 细胞增殖的影响；用浓度 6.25uM 的七叶亭作用于 HFSF 细胞达 24h，实时荧光定量逆转录聚合酶链反应(qRT-PCR)检测七叶亭对 HFSF 细胞表达 MMP-2、COL1A1、COL1A2 基因的影响；免疫印迹法（western blot）七叶亭对 HFSF 细胞基质金属蛋白酶 2（Matrix metalloproteinase 2, MMP-2）、Ⅰ型胶原蛋白（Collagen Ⅰ）的影响。

结果：体外培养的成熟人胚胎巩膜成纤维细胞多呈梭形，束状或旋涡状排列；cck-8 结果显示七叶亭促进 HFSF 细胞生长，在浓度 6.25uM、培养 24h 时细胞的增殖率最高; qRT-PCR 检测的结果显示七叶亭作用 HFSF 细胞后，细胞 MMP-2、COL1A1、COL1A2 基因表达量的改变没有统计学意义;Western Blot 检测的结果显示七叶亭作用 HFSF 细胞后，下调其 MMP-2 蛋白的表达，而细胞 Collagen Ⅰ蛋白的表达未检测出。

结论：七叶亭促进体外培养 HFSF 细胞的生长，并具有抑制 MMP-2 蛋白表达的作用。

PU-497

FGF9-FGFR3 signaling pathway promote the wound healing of corneal epithelium

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Purpose：To investigate the role of FGF9-FGFR3 signaling pathway in the wound healing of corneal epithelium.

Methods： The expression of FGF9 and FGFR3 was detected by RT-qPCR, agarose gel electrophoresis,Western blot and immunohistochemical staining. The mouse corneal epithelium cell line TKE2 and corneal epithelial clone culture was treated with rhFGF9 at different concentration and evaluated by CCK8 assay. C57BL/6 mice corneal epithelial wounding was generated by trephine and scraping followed by rhFGF9 treatment, and the wound healing was verified by slit-lamp microscopic photograph and H&E staining.

Results：*FGF9 was mainly expressed in the limbal corneal epithelium, especially in basal layer epithelium. FGFR3 was expressed in all the corneal epithelium. During corneal epithelium wound healing, both FGF9 and FGFR3 were upregulated in the limbal corneal epithelium, while was downregulated in the central corneal epithelium. rhFGF9 promotes viability and proliferation of TKE2 cells. Both FGF9 and FGFR3 was expressed in corneal epithelial clone culture. The clone size and clone forming efficiency was increased under the treatment of rhFGF9. In vivo, rhFGF9 promotes corneal epithelial wound healing in mice while maintain the normal morphology of corneal epithelium.*

Conclusions: *FGF9 helps maintain the stemness of corneal limbal stem cells and active stem cell during corneal epithelial would healing.*

PU-498

紫外线或氧化应激状态下 α 晶状体蛋白在晶状体内的保护调控机理研究

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目的：白内障疾病可被广泛定义为晶状体的浑浊，是致盲的主要原因之一。随着年龄的增长，晶状体会受到外界各种刺激，如紫外线辐射和氧化应激等，紫外线辐射造成的蛋白损伤是年龄性白内障的致病因素之一，而外伤、手术、全身代谢性疾病、药物、过量饮酒及吸烟等都能引起晶状体氧化损伤及生化改变，造成晶状体蛋白损伤累积，甚至不可溶，形成白内障。晶状体中 90%的可溶性蛋白是晶状体蛋白，而 α-晶状体蛋白是哺乳动物晶状体的主要蛋白，具有分子伴侣功能，可以帮助不可逆蛋白正确折叠，维持晶状体透明。本课题拟在研究在紫外线和氧化应激条件下，α-晶状体蛋白保护晶状体的具体机制，为白内障防治提供理论依据。**方法：**从细胞生物学和生物物理学角度，对野生型 *α*-晶状体蛋白与 N 端截短型、C 端截短型进行体外大量表达和纯化，在紫外线和氧化应激条件下，研究野生型和截短体作为分子伴侣功能区别。然后通过体外细胞系和体内晶状体上皮细胞研究在这两种应激条件下 *α*-晶状体蛋白的分子伴侣功能,这些可以更加明确白内障的发生过程。**结果：**体外纯化得 N 端截短型、C 端截短型 *α*-晶状体蛋白会失去分子伴侣的功能，而本课题前期研究发现在氧化应激条件下，α-晶状体蛋白可在细胞核周与核内形成均匀的点状，猜测这是 α-晶状体蛋白发挥保护作用而形成的。**结论：**紫外线和氧化应激条件下，α-晶状体蛋白暴露于紫外光下不会引起蛋白质四级结构的显著重排、低聚物聚集或溶解性丧失,且 α-晶状体蛋白分子伴侣样活性可保护 *b*-和 *g*-晶体蛋白抵抗非特异性聚集，另外 α-晶状体蛋白可与其他蛋白质或核酸相互作用发挥保护晶状体的功能。

PU-499

角膜基质损伤愈合动物模型的建立

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目的 探索相对制作简单、稳定性强、一致性好的兔角膜基质损伤动物模型。为角膜基质损伤愈合的临床和基础研究提供理想的动物模型。
方法 选择 54 只白兔随机分成 A、B、C 3 组。3 组动物右眼均制备角膜穿孔伤模型。分别为：角膜 2.0mm 环钻穿通组(A 组 18 只)；角膜 1.3mm 环钻穿通组(B 组 18 只)；角膜 1.6mm 三菱针穿通组(C 组 18 只),术后氧氟沙星滴眼液 4 次/天点眼预防感染。分别于 3d、5d、7d、14d、21d、30d 用裂隙灯生物显微镜测量角膜瘢痕形成和上皮愈合情况，荧光定量 PCR(qPCR)检测 nidogen-1、nidogen-2、col4、Laminin3、HSPG2、αSMA 基因的表达，并记录上述指标。
结果 角膜浑浊程度 A 组＞C 组＞B 组（$p<0.05$）。荧光素钠发现角膜上皮愈合率 B 组＞C 组＞A 组（$p<0.05$），RT-PCR 检测发现，A、B、C 3 组术后 3d、5d、7d、14d、21d、30d，nidogen-1、nidogen-2、col4、Laminin3、HSPG2、αSMA 基因相对表达量均明显高于空白对照组并有统计学意义（$p<0.05$），且每个基因的相对表达量 A 组＞C 组＞B 组（$p<0.05$）。

结论 2.0mm 环钻角膜切除术用于在切除后获得所需的角膜面积并产生足够的角膜混浊。利用 2.0mm 环钻穿通角膜成功地建立起可靠的兔角膜基质损伤模型，为角膜基质损伤愈合的进一步研究奠定了基础。

PU-500

无血清骨髓间充质干细胞培养基重编程角膜内皮细胞的再生机制探讨

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目的：探讨无血清骨髓间充质干细胞培养基重编程角膜内皮细胞的再生机制，为筛选重编程角膜内皮细胞再生检测点提供基础。
方法：100um 过氧化氢作用于小鼠角膜内皮细胞建立 G1 期停滞氧化应激模型，以无血清骨髓间充质干细胞培养基诱导的原代 C57BL/6 小鼠第二代角膜内皮细胞为研究对象，加入培养基后在倒置显微镜下观察细胞形态的变化；通过免疫荧光和 Real-time PCR 检测角膜内皮细胞及前体细胞相关标志（ZO-1、Na+-K+-ATPase、AQP1、COL8A1、LGR5、P75、SOX9、TFAP2B）和骨髓间充质干细胞相关标志（CD29、CD34）的表达变化情况；借助 CCK8 检测细胞增殖能力。
结果：倒置显微镜下角膜内皮细胞在培养的第 11 天逐渐出现类似骨髓间充质干细胞的长梭形改变，第 12 天开始呈漩涡状排列，第 15 天角膜内皮细胞形状基本丢失。ZO-1、Na+-K+-ATPase、AQP1、COL8A1 随表型向骨髓间充质干细胞方向转变逐渐减弱，而前体细胞标志未见明显增加。CD29 及 CD34 则在第 12 天表达开始增强。细胞增殖能力自第 4 天明显增加。
结论：条件培养基可以诱导角膜内皮细胞的再生重编程，此研究为进一步筛选角膜内皮细胞再生重编程检测点奠定了基础。

PU-501
Trends in research related to keratoconus from 2008-2018: bibliometric and knowledge mapping analysis

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Objective: *To map publication trends and explore research hotspots of keratoconus study.*
Methods: *A bibliometric analysis based on Web of Science Core Collection (WoSCC) was conducted to investigate the publication trends of research related to keratoconus. The records extracted were analyzed and knowledge map was constructed by VOSviewer v.1.6.5 to visualize the annual publication number, the distribution of countries, international collaborations, author productivity, source journals, intellectual base and hotspots in this field.*
Results: A total of 3,317 literatures were retrieved on keratoconus from 2008 to 2018, and the annual research output increased with time. United States ranked highest in the countries with most publications and the most active institution was Federal University of São Paulo. Alio JL contributed the most publications in this field. *Cornea* was the most prolific journal in keratoconus research. The top cited references mainly focused on corneal collagen cross-linking. The keywords formed 6 clusters: (1) pathogenesis of keratoconus; (2) corneal collagen cross-linking; (3) management for early-stage keratoconus; (4) cornea parameters measurement; (5) surgical treatment of keratoconus; (6) corneal biomechanics related researches.
Conclusions: *Based on the raw data from WoSCC, the quantity and quality of publications on keratoconus study were assessed using bibliometric techniques. The 6 major research hot spots could provide an insight into keratoconus study and valuable information for researchers to identify new perspectives on potential collaborators and cooperative institutions.*

PU-502
增殖性糖尿病视网膜病变枢纽基因的生物信息分析研究

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目的：运用生物信息学分析方法，探索增殖性糖尿病视网膜病变的潜在治疗靶点。
方法：分析 GEO 数据库中的三个微阵列数据集（GSE53257、GSE60436 和 GSE94019），使用 GEO2R 工具筛选出糖尿病纤维增殖膜和正常视网膜组织之间的差异表达基因。利用数据库进行 GO

和 KEGG 及基因组通路富集分析，识别差异基因参与的通路和功能注释，进而构建蛋白互作网络并筛选网络中的枢纽基因。
结果：共发现 91 个基因显著上调，参与的生物过程有与血管生成相关的功能亚群、应激反应、代谢、细胞分化、细胞外基质等，其中富集程度最高的是与血管生成相关的基因，包括 ANGPT2, ANXA2P1, APLN, CD34, DLL4, MMP9, NES,ROBO4, SEMA3F, THY1, CDH5, ESM1。
结论：与正常视网膜组织相比，部分枢纽基因在糖尿病纤维增殖膜中过度表达，需要进一步研究其在治疗糖尿病视网膜病变中的价值。

PU-503

Analysis of Corneal Spherical Aberrations in Cataract Patients with High Myopia

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Purpose: To evaluate the d corneal spherical aberrations in cataract patients with and without high myopia and to identify the associated factors.
Design: Retrospective case series.
Setting: Eye and ENT Hospital of Fudan University, Shanghai, China.
Participants: Patients scheduled for cataract surgery from July 10 to December 21, 2017 were recruited.
Mehtods: Corneal biometric data and axial length were measured with Pentacam and IOLMaster. Patients were divided into the high myopia group and the control group by axial length at 26 mm.
Main Outcome Measures: Axial length, steep keratometric, central corneal thickness power, corneal astigmatism, and corneal primary and secondary spherical aberration.
Results:A total of 2002 eyes of 2002 patients were enrolled in this study: 1500 in the control group and 502 in the high myopia group (60.18 ± 15.72 years old vs. 55.76 ± 13.10 years old, $p < 0.001$). Both the anterior and total corneal primary spherical aberrations were lower in the high myopia group than in the control group (0.317 ± 0.215 vs 0.338 ± 0.148 μm, $p = 0.043$; and 0.281 ± 0.207 vs 0.314 ± 0.153 μm, $p < 0.001$). The incidence of eyes with negative total corneal primary spherical aberration increased slightly as axial length increased in the high myopia group (0.00%, 1.74%, and 5.79% in 26-28 mm, 28-30 mm and >=30 mm axial length categories, respectively), and the overall incidence was higher in the high myopia group than in the control (2.59% vs 1.47%). The absolute value of the total corneal secondary spherical aberration was slightly smaller in the high myopia group (−0.015 ± 0.041 vs −0.009 ± 0.045 μm, $p = 0.002$). Age correlated positively with the primary spherical aberration and negatively with the secondary spherical aberration (all with $p < 0.001$).
Conclusions: Cataract patients with high myopia had a lower corneal primary spherical aberration. The incidence of negative primary corneal spherical aberrations increased with increasing axial length. An aspheric IOL with a low negative or zero primary spherical aberration is recommended for cataract patients with high myopia. Negative total ocular primary spherical aberrations resulting from aspheric IOL implantation should be avoided in extremely high myopic eyes.

PU-504

Analysis of Corneal Spherical Aberrations with Astigmatism in Cataract Patients

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Purpose: To clarify the distribution of corneal spherical aberrations (SAs) in cataract patients with different corneal astigmatisms and to recommend the aspheric
parameters to be considered in the selection of an aspheric toric intraocular lens (IOL).
Settings: Department of Ophthalmology and Vision Science at the Eye and ENT Hospital of Fudan University, Shanghai, China.
Methods: The axial lengths, corneal SA, and other corneal biometrics were determined in cataract patients with Pentacam and IOLMaster. The statistical analysis of the corneal SAs was based on the stratification of patients according to their axial lengths and anterior corneal astigmatism.
Results: In patients with astigmatism of < 2 D, the total and anterior SAs decreased as the axial length increased (P < 0.001). No significant differences in SA were detected with different axial lengths among patients with astigmatism of ≥ 2 D. The total corneal SAs of patients with astigmatism of 2–3 D stabilized at around 0.29 μm, whereas those of patients with anterior corneal astigmatism ≥ 3 D tended to vary. Age and anterior corneal astigmatism had positive and negative effects, respectively, on SA in the regression model.
Conclusions: Care should be taken in the design of the correction of ocular SAs in patients undergoing toric IOL implantation. Individualized SA adjustments are essential for patients with anterior corneal astigmatisms of 1–2 D or ≥ 3 D. Toric IOLs with a negative SA of −0.20 μm are recommended for patients with anterior corneal astigmatisms of 2–3 D if no customized therapy is warranted.

PU-505

Toric 人工晶状体矫正低度数角膜散光的临床研究

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目的：研究年龄相关性白内障患者使用 Toric 人工晶状体矫正低度数角膜散光的临床效果。
方法：回顾性临床对照研究。纳入于我院行白内障超声乳化吸除联合 IOL 植入的年龄相关性白内障患者 57 例（62 眼），纳入标准：1.00D≤角膜顺规散光≤1.50D 或 0.50D≤角膜逆规散光/角膜斜轴散光≤1.00D。研究组：植入 Alcon Toric IOL, 28 例（31 眼），使用 the Alcon online Toric IOL calculator with the Barrett Toric algorithm 在线计算公式行 Toric IOL 计算;对照组：植入 Alcon SN60WF IOL,29 例（31 眼）。采集术前的角膜散光、眼轴长度，术中植入的晶体度数，术后 3 月的裸眼远视力、残留散光度数、等效球镜度数、IOL 轴位偏差。使用 SPSS19.0 统计分析软件，组间两两比较采用成组 *t* 检验，*P*<0.05 为差异有统计学意义。
结果：研究组使用 Toric T2 人工晶状体 29 枚，T3 人工晶状体 2 枚。研究组和对照组的年龄、术前角膜散光、眼轴长度、术后 3 月 IOL 轴位偏差、术后 3 月绝对等效球镜度数分别为 68.23±7.53 岁、0.92±0.06D、23.45±1.41mm、5.39±2.11°、0.51±0.13D 和 69.16±7.28 岁、1.02±0.08D、23.39±1.37mm、5.21±1.89°、0.54±0.09D，差异均无统计学意义（*P*<0.05）。术后 3 月，研究组和对照组的裸眼远视力（logMar）分别为 0.09±0.02 和 0.13±0.03，差异有统计学意义（*t*=2.22,*P*<0.05）；残留散光度数分别为 0.38±0.05D 和 1.13±0.10D，差异有统计学意义（*t*=3.46,*P*<0.05）。
结论：对于年龄相关性白内障合并低度数角膜散光患者，术中使用 Toric 人工晶状体比使用普通非球面人工晶状体术后临床效果更佳。

PU-506

Noninvasive stiffness assessment of the human lens nucleus with anisometropia and aging by using an ultrasound elastography system： a feasibility study

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Purpose: To investigate the significance of ultrasound elastography for evaluating stiffness of the human lens nucleus in volunteers with different ages and in patients with anisometropia.
Methods: 78 volunteers (lens transparency, uncorrected visual acuity ≥0.5, intraocular pressure: 14–19 mmHg) were divided into Group A (26 people, 10 male and 16 female, 26 eyes, median age: 81±5.5 years，mean axial lengths 23.8±0.5 mm); Group B (26 people, 12 female and 14 male, 26 eyes, median age: 44±3.2 years，mean axial lengths 23.8±0.4 mm);); and Group C (26 people, 13 male and 13 female, 26 eyes, median age: 21±2.5 years，mean axial lengths 23.9±0.3 mm). In addition, 14 patients (28 eyes) with anisometropia were enrolled. The difference in refractive status between two eyes ≥-4.0 diopters (D) and the difference in length of the eyes was ≥3 mm. There were 5 males and 9 females with an average age of 62±3.3 years. The test data of the long-axial length eye of each patient was included in group D (14 eyes), and test data of the eye with relative short-axial length was included in group E. All participants gave informed consent. Lens nuclear stiffness was measured by Free-hand qualitative elastography by independent operators. Strain gray scale and color-coded elastography maps were recorded. In each case, three consecutive detections were performed and strain ratio was used for statistical analysis. Data were analyzed by SPSS 13.0 software. The measurement data were expressed by mean ± standard deviation, and the ratio of strain rate between groups was analyzed by one-way analysis of variance, and differences with P<0.05 were considered statistically significant.
Results: Elastography analysis showed excellent diagnostic performance for lens sclerosis.
1. Lens strain ratio was lowest (0.02±0.08)% in Group A and highest (1.95±0.85) in
Group C. Lens strain ratio was moderate (0.69±0.12) in Group B. There were significant differences between these three groups (P<0.05). The lens nucleus strain rate changes with age. With aging, the lens nucleus strain rate and resilience decrease, demonstrating harder texture.
2. In the long axial length group, the strain rate in the nucleus of the lens was (0.16±0.08)%; in the short axial length group, the strain rate in the nucleus of the lens was (0.54±0.16)%. Independent sample *t*-test analyses showed that the long-axial length group lens had a significantly smaller nuclear strain rate than the relatively short-axial length group, *P*<0.05.
Conclusions: The relationship between human lens stiffness and age and anisometropia were demonstrated by ultrasound elastography. Older age was associated with lower strain ratio and less resilience of the lens. Whereas, long-axial length is associated with lower strain ratio and less resilience of the lens. Ultrasound elastography can yield quantitative information on elastic distribution of the lens *in vivo*. By measuring strain rate of the lens, we can understand lens stiffness, quantify the stiffness index, and further classify the nuclear stiffness of the lens, which provides a valuable method for clinical grading. (Supported by National Natural Science Foundation of China No: 81600720; NO:8137099)

PU-507

Automatic diabetic retinopathy diagnosis using Deep learning artificial intelligence software

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Purposes: To describe the development and validation of an artificial intelligence–based, deep learning algorithm (DeepDR) for the detection of diabetic retinopathy (DR) in retinal funds photographs.
Methods: All the funds images are transmitted to be analyzed, including localization of optic disk and macular, vessel segmentation, detection of lesions, and grading of DR. And the multi-level iterative method of convolutional neural network and the strategy of enhanced learning are used to improve the accuracy of the system (DeepDR), so as to grading DR. The final grading results are tested based on the funds images provided by the hospitals.
Results: Detection of micro aneurysm, hemorrhage and hard exudates has accuracy of 99.7%, 98.4% and 98.1% respectively. The current algorithm accuracy is 0.96. A total of 20,000 funds images were selected and 7593 photos of poor quality were excluded according to quality standards. Accuracy of accurate staging of funds photos: Accuracy: 0.9179, F1 Score: 0.83743, Recall rate: 0.80584, Area under the curve (AUC): 0.9327.
Conclusions: This artificial intelligence–based DeepDR can be used with high accuracy in the detection of DR in retinal images. This technology offers potential to increase the efficiency and accessibility of DR screening programs.

PU-508

Gender-specific differrences of the assiciation bewteen lipid metabolism with retinal vascular caliber

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Purpose: To explore the gender-specific effects of lipid metabolism on retinal vascular calibers in Chines male and female in a large community-based study.
Methods:A total of 2,462 participants were recruited from a community-based study. Retinal arteriolar caliber and retinal venular caliber were measured computer-assisted. Lipids profiles (TG, HDL-C, LDL-C and TC) were obtained by blood sample of participants after a 12-hour fasting at least. Covariance analysis was used to analyze the correlation between lipid profiles and retianal vasscular calibers.
Results: LDL-C and TC were associated with retinal arteriolar caliber and arterio-venous ratio negatively, and TG was positively associated with retinal venular caliber in both female and male. TC was associated positively with retinal venular in male and HDL-C was was associated negatively with retinal arteriolar caliber in female.
Conclusion:LDL-C, TC and TG has significant effect on retinal arteriolar in Chinese male and female. TC has negatinve effect on retinal venular in Chinese male not in female and HDL-C has positive effect on retinal arteriolar.

PU-509

Gender-specific differrences of the assiciation bewteen blood glucose level and insulin resistance with retinal vascular caliber

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Purpose: To explore the assiciation of blood glucose level and insulin resistancewith retinal vascular calibers in Chines male and femalein a large community-based study.
Methods: A total of 3,070 participants aged 18 to 80 years were recruited from a community-based study. Retinal arteriolar caliber and retinal venular caliber were measured computer-assisted. Fasting blood sample was tested for fasting plasma glucose, fasting insulin, hemoglobin A1c and triglyceride. Insulin resistance was assessed with HOMA. Associations of glycemic blood indices and insuin resistance with retinal microvascular caliber were assessed by multivariable liner regression analysis.
Results:Hemoglobin A1c was associated with retinal arteriolar caliber and arterio-venous ratio negatively in female rather than in male. Fast insulin and insulin resistance were only associated with smaller retinal arteriolar and arterio-venous ratio, and larger retinal venular in female as well.
Conclusion: Hemoglobin A1c has significant effect on retinal venular in female. Insulin resistance may affect retinal arteriolar and venular significantly in female not in male.

PU-510

The significance of MMP-VEGF axis in the diagnosis and prognosis of retinoblastoma: a bioinformatics analysis and meta-analysis

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Purpose: No in-depth systematic evidence is available for assessing retinoblastoma malignancy and eligibility for subsequent treatment.

Methods: The Cochrane Library, EMBASE, PubMed, Web of Science, and China Biology Medicine databases were searched and 16 studies comprising 718 retinoblastoma patients were included. Pooled odds ratios (ORs) and summary correlation coefficients (r) with 95% confidence intervals (CIs) in random-effects, fixed-effects or quality-effects models were calculated using Review Manager 5.3 and MetaXL. GO functional annotation and KEGG pathway analysis were done using GO and STRING database.

Results: We observed significant associations between the expression of MMP/VEGF and the clinicopathological features of retinoblastoma, including high levels of MMP-1 (OR, 4.21; 95% CI, 1.86-9.54), MMP-2 (OR, 11.18; 95% CI, 4.26-29.30), MMP-9 (OR, 10.41, 95% CI, 4.26-25.47), and VEGF (OR, 8.09; 95% CI, 4.03-16.20) with tumor invasion; high levels of MMP-1 (OR, 3.58; 95% CI, 1.48-8.71), MMP-2 (OR, 2.96; 95% CI, 1.32-6.64), MMP-9 (OR, 5.49; 95% CI, 3.55-8.48) and VEGF (OR, 5.30; 95% CI, 2.93-9.60) with poor differentiation; and overexpression of MMP-9 (OR, 5.17; 95% CI, 2.85-9.38) with advanced clinical stages. Moreover, MMP-9 and VEGF expression were positively correlated (r, 0.61; 95% CI, 0.38-0.77). Multiple GO terms are enriched associated with MMP-1, MMP-2, MMP-9 and VEGF, and they are closely associated to pathways, proteoglycans and microRNAs in cancer.

Conclusions: MMP-1, MMP-2, MMP-9 and VEGF play important roles in the development and progression of retinoblastoma. High levels of MMP-1, MMP-2, MMP-9 and VEGF are credible implications for increased malignancy, thus the need for more aggressive treatments.

PU-511

AI 兴起，眼科如何站在巨人的肩膀上看更远

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目的：
人工智能是计算机科学研究中的重要分支，近几年被认为计算机领域中的技术高地，已经在医学领域的各个方面发挥应用价值。人工智能在图像识别中有着得天独厚的优势，在自动识别皮肤癌，肺癌等影像识别中取得良好进展。眼科疾病中，如糖尿病视网膜病变、白内障等疾病的诊断中也有不俗表现。那么，人工智能在眼科领域中都取得了哪些进步？我们将对此进行综述。
方法：
通过关键词查询 pubmed、embase 等数据库
结果：
截止到完稿日期，人工智能技术利用眼部现有的检查手段，包括但不限于眼底照相、OCT、OCTA、荧光素造影在糖尿病视网膜病变、青光眼、白内障、AMD 的疾病的诊断、治疗方案选择、预后判断的等方面均得到了理想的结果，为这一计算机技术早日应用到临床工作中提供了大量的可行性基础。
结论：
人工智能作为计算机科学研究中的中重要的前沿领域，在医学领域中同样应用广泛。眼球位于体表，屈光间质透明，眼部的可视化特征有利于病变的直接活体观察，使得眼科图像的量化数据成为白内障、角膜病和视网膜疾病等主要致盲眼病筛查和诊断的主要依据。
将眼部形态学信息转换成为数字信息的过程中，需要大量的数据计算。AI 能够快速将影像学信息、数字化图像、计算机技术相互交联，进行有效分析利用。基于 AI 在图像识别方面的优势，临床突破通常以检测并学习大量图像特征帮助临床医生识别特异性病变为主，同时关联相关特征获得创新的科学观点；并且可以自动诊断疾病、识别解剖结构、预测临床转归。
人工智能在疾病的诊断和判断预后等方面显示出了极大的优势，使个性化治疗和大规模智能管理成为可能。能够极大改变眼科常见疾病诊断和治疗方式；推动诊疗进步；对医疗数据进行高效、安全、妥善管理；帮助眼科医生在临床工作中提供高质量的诊疗方案。

PU-512

人工智能在光学相干断层成像领域的研究进展与思考

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目的 近年来，人工智能（AI）在眼科领域的研究取得突破性进展。机器学习、深度学习是现今许多人工智能应用的基础，由于其在图像识别上的优势，在眼科领域的应用研究，尤其在光学相干断层成像（OCT）领域应用成为近年来的热点。本文旨在概括人工智能在光学相干断层成像（OCT）领域应用的研究成果及存在问题，思考 AI 在光学相干断层成像（OCT）领域应用的限制因素及未来研究方向，增加眼科医师对人工智能技术在 OCT 应用的认识。
方法 总结自 2009 年至今，基于机器学习、深度学习的人工智能技术在光学相干断层成像领域应用发表的相关研究成果，概括其发展史及对眼前节、眼后节不同眼科疾病诊断应用中的相关研究进展及发展限制因素。
结果 回顾发现，人工智能技术在光学相干断层成像领域的应用能够辅助临床，高精度地检测和诊断与眼前节、眼后节相关的多种眼科疾病，并对疾病的预后发展及疗效评估进行有效预测，目前研究

多集中在眼前节 OCT（角膜、前房炎症、房角分析等方向）及眼后节 OCT（视网膜分层、黄斑水肿、视神经纤维层、视盘等方向），其在自动图像分析方面表现巨大优势；但在临床推广之前，需要对人工智能模型进行前期临床验证，且由于智能模型建立对图片的样本量要求高及需大量专业标定的输入，成为目前研究的主要限制因素。

结论 尽管目前人工智能在光学相干断层成像领域的应用存在局限性和挑战，但随着研究的进展，智能模型在对 OCT 图像的疾病诊断技术的敏感性、特异性与疾病预测精确性均有提高，未来希望能在无人工标定图像及三维图像分析领域的人工智能技术有新的突破，让人工智能在眼科的 OCT 领域应用继续巩固、改进和发展。

PU-513

Finite element analysis of four methods of internal fixation of the Zingg B zygomaticomaxillary complex fracture

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Objective: To compare the biomechanical characteristics of four methods of internal fixation for the treatment of Zingg B zygomaticomaxillary (ZMC) complex fracture by modeling, and virtual reconstruction with finite element analysis, and provide some theoretical basis and reference to select the best internal fixation for clinical treatment of ZMC complex.

Methods: The CT scan was performed in 1 case with ZMC fracture. Three-dimensional digital models were established using Mimics 10.01 software. Upon validation, 4 fracture models with different internal fixations were developed: a: fixed zygomaticofrontal suture (ZFS), b. fixed infraorbital rim (IOR), c: fixed ZFS and IOR, d: fixed ZFS and IOR and zygomaticomaxillary suture (ZMS). In these models, a load of 120 N was applied and the none-line solution was analyzed by using finite element analysis method, and the Von Mises stresses and displacements were obtained.

Results: (1) The peak stress at the distal end of the fracture was (Mpa): a: 14, b: 15, c: 10.5, d: 10.3. (2)The peak stress of the titanium plates was (Mpa): a: 1008, b: 580, c: 676/361, d: 548/328/75. (3)The peak displacement of the fracture model was (mm): a: 0.09, b: 0.11, c: 0.05, d: 0.03. (4)The peak displacement of the intenal fixation system was (mm): a: 0.08, b: 0.04, c: 0.05/0.02, d: 0.03/0.01/0.008.

Conclusions: Analysis of data suggests that three-point fixation allows for virtually no diaplacement, and in some cases one-point fixation provide acceptable stability. Fixations of IOR and ZFS+IOR+ZMS satisfy the stress and displacement requirements, which are recommended for clinical fixation. When fixing ZMS+IOR at two points, the stress of titanium plate in ZFS is so high that there is a risk of deformation after operation. If a surgeon want to choose this internal fixation method, titanium alloy material with high tensile strength is recommended. This study provides some theoretical basis and reference to select the best internal fixation for clinical treatment of ZMC complex and lays a mechanical foundation for the further study.

PU-514

基于移动云计算的儿童和青少年近视防控大数据平台实践

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目的：研究基于移动云计算技术构建儿童和青少年近视防控大数据平台的工作实践。

方法:通过联接区域卫生信息系统，构建基于移动云计算的青少年近视防控大数据平台，实现向平台中不同类型的终端用户提供实时的移动数据和应用服务。

结果：实现南京市儿童和青少年近视防控大数据平台的眼健康大数据实时共享和学校与医院近视防控的信息协同。
结论：移动云计算能够实时采集分析儿童和青少年近视的眼健康大数据，实时动态监测学校与医院的近视协同防控效果，提高青少年近视早期筛查效率与干预成效。

PU-515

Quantitative Assessment of Retinal Thickness and Vascular Changes in Patients with Diabetes Using Optical Coherence Tomography Angiography

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PURPOSE. To assess the optical coherence tomography angiography (OCTA) retinal vessel density and thickness in diabetic patients and compare potential pathologic early changes in this population to healthy age-matched controls.
METHODS. 181 patients were included in the study: control subjects (n=81) and patients with diabetes (n=100). OCTA was performed using AngioVue (Optivue).Optical coherence topography angiographic parameters were as follows: vessel density (%) (in superficial and deep retinal vessel plexus) and thickness (μm) (in superficial and deep retinal vessel plexus of macular) were taken into analysis. Among the studied diabetic patients there were assessed codependences regarding the investigated foveal and parafoveal parameters and selected potential predictors, i.e. patient's age (years), diabetes duration time (years), mean level of glycated hemoglobin (HbA1C) (%), and blood pressure(mmHg).
RESULTS. In deep retina, vessel density in DR (31.03%) were decreased significantly as compared to NDR(41.53%) and control subjects (51.39% ,$P < 0.01$). Retinal thickness in superficial retina（ILM-IPL）of DR patients were increased compared to controls ($P=0.004$). Superficial vessel density significantly correlated with full retinal thickness in parafovea ($r = 0.43$, $P <0.01$) and with outer retinal thickness in parafovea ($r = 0.35$, $P < 0.05$) of healthy subjects. Systolic blood pressure and ocular perfusion pressure significantly correlated with deep vessel density in NDR ($r = 0.45$, $P < 0.02$; $r = 0.46$, $P < 0.01$), but not in controls.
CONCLUSIONS. Deep retinal vessel density of diabetic patients without diabetic retinopathy is decreasedcompared to healthy subjects.

PU-516

诊断糖尿病性角膜病变的研究进展

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目的：糖尿病性角膜病变是最常见的糖尿病并发症之一，但目前对此类病变缺乏有效的诊断方法，因此难以确诊。本文归纳了近年来包括成像技术、实验室检测在内的诊断糖尿病性角膜病变的方法及其优缺点，以期为未来对该疾病的研究打下理论基础。
方法：回顾了诊断糖尿病性角膜病变可采用的诊断技术及方法，归纳了包括成像技术、实验室检测在内的诊断技术的优缺点及研究现状。

结果：角膜的微循环改变可能成为诊断糖尿病性角膜病变的参考依据，OCTA 可以对糖尿病角膜病变患者角膜的血管情况进行评估，从而对糖尿病角膜病变的早期诊断提供依据。
结论：糖尿病患者相关的角膜病变的诊断仍有很多问题尚未探明和解决，探究并寻找敏感而特异的标准诊断方法对糖尿病性角膜病变的早期诊断具有重大的临床意义。

PU-517
Retaron 治疗睑板腺功能障碍相关干眼患者的疗效评估

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目的：探究膳食补充剂 Retaron 对睑板腺功能障碍相关干眼的治疗效果
方法：选取轻中度睑板腺功能障碍相关干眼患者 60 例，将其分为 4 组：(1) A 组 15 例：轻度睑板腺功能障碍相关干眼患者，予眼部热敷+海露（4 次/日）+膳食补充剂 Retaron（1 粒/日）；(2) B 组：中度睑板腺功能障碍相关干眼患者 15 例，予眼部热敷+海露（4 次/日）+膳食补充剂 Retaron（1 粒/日）；(3) C 组：轻度睑板腺功能障碍相关干眼患者 15 例，予眼部热敷+海露（4 次/日）；(4) D 组：中度睑板腺功能障碍相关干眼患者 15 例，予眼部热敷+海露（4 次/日）。对所有受试者随访 3 月，每月进行 OSDI 问卷评分、FL 染色及 BUT 试验，并对睑板腺功能、分泌物性状进行评分，并记录相关数据。
结果：各组患者接受干预后 3 月，与干预前相比，OSDI 问卷评分明显降低，FL 染色评分、睑板腺功能评分、分泌物性状评分明显降低，差异有统计学意义（$p<0.05$）；干预后 3 月，A 组与 C 组相比，FL 染色评分、睑板腺功能评分、分泌物性状评分明显降低，BUT 时间明显增加，差异有统计学意义（$p<0.05$）；干预后 2 月、3 月，B 组与 D 组相比，FL 染色评分、睑板腺功能评分、分泌物性状评分明显降低，BUT 时间明显增加，差异有统计学意义（$p<0.05$）。
结论：相较于单纯使用玻璃酸钠滴眼液治疗 MGD 所致干眼患者，膳食补充剂 Retaron 对 MGD 所致干眼患者的眼表症状、睑板腺炎症情况、睑板腺功能、睑板腺分泌物性状的改善情况更为显著。

PU-518
结缔组织生长因子通过促进 Müller 细胞纤维化导致增殖性玻璃体视网膜病变

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目的: 基于 RNA-seq 的转录组学分析，研究结缔组织生长因子(CTGF)对视网膜 Müller 细胞的影响并探索增殖性玻璃体视网膜病变的治疗靶点。
方法: 将 Müller 细胞分为对照组和 CTGF 刺激组，运用 RNA-seq 对两组细胞进行全转录组测序及分析。基于转录组数据，筛选出两组间差异表达倍数位于前二十的基因，并在原细胞模型中运用 RT-PCR 对这些基因的表达进行验证。
结果: 通过 RNA-seq 获得了 CTGF 诱导 Müller 细胞的差异基因表达谱，比较两组的测序结果发现，共有 325 个差异表达基因，其中上调表达 152 个，下调表达 173 个。GO 分析显示差异基因主要集中表现在细胞外基质的合成等方面。Pathway 分析显示差异表达比较明显的是 TGF-β 信号通路、胰岛素信号通路等。此外，很多与神经系统间信号传递、细胞间黏附相关的通路也受到了影响。经过

在原细胞模型中的验证，我们从中筛选出四个基因，BMP4,TGFB3、INHBC、SCUBE2，其均位于TGF-β 通路，可导致细胞纤维化的发生，从而影响 Müller 细胞的功能。
结论：CTGF 可通过影响 Müller 细胞增殖、移行、分化以及细胞外基质合成等多方面，对 PVR 的发生发展产生影响。通过分析转录组数据并联合验证结果，后续实验中我们将选择 BMP4,TGFB3、INHBC、SCUBE2 进行功能验证，进一步挖掘其作为增殖性玻璃体视网膜病变治疗靶点的分子依据。

PU-519
RNA-seq 及 miRNA-seq 双层组学分析二甲双胍对抗 VEGF 药物的辅助作用

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目的：基于 miRNA-seq 和 RNA-seq 双层组学分析技术，探索二甲双胍联合抗 VEGF 用药较单一使用抗 VEGF 药物对于血管内皮细胞的影响。
方法：将高糖刺激下的视网膜微血管内皮细胞（RF-6A）分为抗 VEGF 组和抗 VEGF 联合二甲双胍组，通过细胞增殖及迁移实验对两组细胞进行检测，运用 miRNA-seq 及 RNA-seq 双层组学分析技术对两组细胞进行测序、差异表达基因及功能富集分析。
结果：细胞增殖及迁移实验显示联合用药组与单一用药组相比，其 OD 值及迁移率显著性下降，表明联合用药较单一用药更能抑制新生血管的形成，以及说明该细胞模型的成功建立。比较两组的 miRNA-seq 测序结果发现，共有 121 个差异表达 miRNA，其中上调 66 个，下调 55 个。RNA-seq 结果显示，共有 9325 个差异表达 RNA，其中上调 4789 个，下调 4536 个。这些差异表达的 miRNA 及基因参与了分子生物学过程，影响细胞的增殖过程、炎症反应等。其中 COL1A1、GERM1、FTL、NDRG1、ACTG1、miR-503-5p、miR-532-5p 等与细胞的增殖过程相关，PPP1R3B、DKK1、PPP1R18、miR-21-5p、miR-146a-5p 等与炎症反应相关。差异基因的 Pathway 显著性富集分析结果发现，主要基中在 PPAR 信号通路、AMPK 通路、MAPK 通路、mTOR 通路等。
结论：二甲双胍对于抗 VEGF 药物的辅助效果是作用于多层次、多方面的，主要是通过抑制细胞增殖及抑制炎症反应等，从而影响视网膜血管内皮细胞的功能，进一步为糖尿病视网膜病变的临床用药提供新思路。

PU-520
人工智能在睑板腺功能障碍(MGD)领域的新应用

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目的 人工智能（AI）凭借其在医学影像方面的应用价值，已广泛地应用于多个医学学科。但目前人工智能在眼科的应用，多集中在糖尿病视网膜病变、青光眼、年龄相关性黄斑变性及白内障筛查等疾病，在干眼症(尤其 MGD 引起的干眼症)的领域研究相对罕见。本研究旨在建立一种睑板腺智能评估模型，以满足日益剧增的睑板腺功能障碍患者的快速疗效评估。
方法 本研究基于 Oculus Keratograph 眼表综合分析仪 Meibo-scan 增强对比模式拍摄的睑板腺图像，采用背景及噪声的图像筛选、图像归一化、图像数据扩增、图像分割等图像预处理方法，应用自动图像处理后的图片集对深度学习算法进行学习训练，建立一种全新的睑板腺智能评估模型，对睑板腺面积、缺失率、扭曲率及治疗前后变化情况进行定量评估。

结果 本研究获得了初步结果，人工智能的应用将会在合并 MGD 的干眼症治疗前评估、治疗方案设计及治疗后效果评估等产生积极意义，可以将睑板腺面积缺失情况由传统的定性评估转向定量评估，提高合并 MGD 的干眼症患者的精准化治疗。
结论 该智能评估模型的应用可以为人工智能在睑板腺功能障碍的评估及疗效观察提供新的应用方法及思路。

PU-521

探索基于 AI 辅助技术的筛查流程优化

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目的：防盲工作具有人群集中、时间密集、病种广泛等特点，常要求在短时间内对大量筛查人群做出涉及眼专科多病种的早筛判断。相比之下，三级医院对于防盲工作的人员投入常受到院内正常工作秩序的限制，加上许多基层医院眼科科室专业技术和亚专科领域的薄弱，制约了防盲工作效率和早筛准确度的提升。在防盲工作中引入现代计算科学技术，促进工作流程再造、提高效率、减少时间和人力成本，是值得探索的方向。
方法：我们通过构建基于分布式诊断的远程影像会诊平台，引入人工智能辅助诊断，对筛查工作的流程进行适当的调整如下：筛查影像数据的联网归档；AI 对病情（是/否）需要进一步判断做出分类；根据不同的分类权重和优先级转入人工诊断；诊断回执和 AI 的再学习。
结果：在进行探索的实际工作中发现，通过引入新技术调整工作流程，可以减少单次诊断时间并取的更好的诊断精度，可以减少亚专科医师在防盲工作中投入的时间成本，可以间接促进基层眼科科室的技术发展，筛查人群的随机抽样满意度调查中总体满意度得到提升。AI 技术在流程优化中提升了效率，减少了人力成本投入，但也有其不足，主要表现在：
虽然当前神经网络使用大样本训练的单一类型影像诊断 AI 模型已经可以达到 95%以上甚至更高的预测准确率，但是对于医学诊断来说，漏诊误诊所产生的责任和伦理问题不能忽视；现有 AI 模型对复合型多病种的数据理解还有很大的不足；筛查数据的联网归档需要设备支持与投入。
结论：结合远程会诊网络，运用人工诊断为主，AI 分类诊断为辅的方法，对防盲筛查工作流程进行优化，有助于提高工作效率和诊断精度，是一个值得继续探索改进的方向。

PU-522

A Multicenter Study on Automatic Classification of Keratoconic and Normal Corneas with Corneal Visualization Scheimpflug Technology

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PURPOSE: To determine an optimal parameter set to separate keratoconus from normal corneas and to explain the rationale behind determining it.
METHODS: This study evaluated 123 eyes (71 normal corneas and 52 keratoconus) and a validaion set of 35 eyes (20 normal corneas and 15 keratoconus). 29 biomechanical parameters were divided into geometry group (15 parameters), kinematics group (10 parameters) and dynamics group (4 parameters) according to their nature. Hybrid group (9 parameters) was

selected from first two groups. Tolerance (TOL) and the variance inflation (VIF) were used to assess multicollinearity. Multivariate logistic regression equation was established in each group. AUC, sensitivity and specificity were compared in these 4 groups and then the optimal parameter set was obtained.
RESULTS: Both geometry and kinematics groups performed well in classification (best cut-off point = 0.40 and 0.43, AUC= 98.8% and 95.7%, sensitivity= 94.2% and 90.4%, specificity= 94.4% and 88.7%, overall correct detection rate= 94.3% and 89.6%, respectively). However, the sensitivity, specificity, overall correct detection rate and AUC further improved when we combined selected parameters from geometry or kinematics groups (best cut-off point= 0.52, AUC= 99.1%, sensitivity= 96.2%, specificity= 97.2%, overall correct detection rate= 96.7%).
CONCLUSIONS: The hybrid group demonstrated the highest sensitivity, specificity, overall correct detection rate and AUC to distinguish keratoconus from normal corneas.

PU-523

Keratoconus Recognition Using A Parameter Set Determined from IOP-Matched Scenario

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PURPOSE: Among the current practices for keratoconus recognition using biomechanical parameters from corneal visualization Scheimpflug technology (Corvis ST), matching intra-ocular pressure (IOP) is often required to eliminate the biasing influence; as a result, the combined biomechanical parameters determined from IOP-unmatched scenario possibly bring in confounding influence. This paper was therefore designed to introduce a novel compatible parameter set (CPS) determined from IOP-matched scenario, hopefully could show its compatibility and superiority for recognizing keratoconus in both IOP-matched and not scenarios.
METHODS: A total of 335 eyes were included. Among them, 70 eyes (35 keratoconus and 35 normal eyes; pairwise matching for IOP) were used to determined CPS by forward logistics regression, 62 eyes (31 keratoconus and 31 normal eyes; pairwise matching for IOP) were used to validate CPS in IOP-matched scenario, and resting 203 eyes (112 keratoconus and 91 normal eyes; not pair matching for IOP) were used to validate CPS in IOP-unmatched scenario. To analyze its superiority, CPS was also compared with other two reported Biomechanical Indexes (aCBI [6,7] and DCR [8]) in both scenarios. Receiver operating characteristic curves (ROC), accuracy, FI, sensitivity and specificity were used to access and compare the performance of these three parameter sets in both scenarios.
RESULTS: The resulting CPS was comprised of only 3 biomechanical parameters: DA Ratio Max 1mm (DRM1), the first applanation time (AT1) and an energy loading parameter (Eload). In the IOP-matched validation, the area under ROC (AUC) reached 95.73%, with an accuracy of 95.2%, sensitivity of 93.5% and specificity of 96.8% (leave one out cross-validation). All these indicators reached 96.54%, 95.1%, 95.6% and 94.6% respectively, in the IOP-unmatched validation (leave one out cross-validation). Surprisingly, CPS performed better than other two parameter sets on a whole.
CONCLUSIONS: The parameter set determined from IOP-matched scenario indeed exhibit its superiority for differentiation of keratoconus and normal corneas, regardless of IOP-matched or not.

PU-524

基于计算机文本挖掘的白内障氧化应激相关基因功能富集及药物治疗分析

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目的 利用计算机工具和已知的数据库进行挖掘和分析进而确定与白内障和抗氧化应激相关的基因集及信号通路，并进行白内障可能的有效治疗药物的预测和探索。**方法** 利用文本挖掘工具 pubmed2ensembl 对于白内障和抗氧化应激均相关的基因进行初步筛选，得到的基因集利用 GeneCodis 工具进行基因功能的富集分析和京都基因与基因组百科全书(Kyoto Encyclopedia of Genes and Genomes, KEGG)通路分析，富集的结果则应用 STRING 工具进行进一步蛋白质-蛋白质相互作用分析，选取相互作用紧密的基因，最后使用 DGIdb 工具得到基因-药物相互作用的结果，然后对药物进行进一步的筛选，确定可能有效的白内障治疗药物。**结果** 通过文本挖掘得到包含 103 个基因的与白内障和抗氧化应激均相关的基因集，通过对这些基因的生物学过程的功能富集分析，筛选出 22 个基因，KEGG 工具的进一步筛选确定了 11 个基因，通过蛋白质-蛋白质相互作用分析得到 9 个紧密联系的基因，与之对应的基因-药物相互作用分析筛选出了 31 种药物。**结论** 利用文本挖掘和基因功能富集等生物信息学工具可以进一步探索白内障的发病机制，并且能够很方便的预测可能有效的治疗药物，为白内障的临床治疗提供新的线索。

PU-525

人工智能视障康复与助视器适配应用研究

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针对低视力和盲儿童和老年人，研究视功能障碍评估和辅具适配等方面特点及康复需求数据分析，**依据《关于功能、残疾和健康的国际分类》（ICF）中视功能障碍的理念和框架，**研发结合个性化弥补参数的功能障碍评估和辅具适配及康复训练等功能模块，开发线上和线下相结合的视觉康复服务支持系统，为不同程度、不同环境下的视力障碍患者提供视觉功能障碍评估、视觉辅具适配、视觉康复训练等支持服务和指导，建立视功能障碍者辅具适配与康复效果追踪、随访、监测闭环连续服务系统，将解决我国基层数量庞大的低视力和盲儿童和老年人群体的基本康复专业服务需求。

PU-526

内镜导航系统在甲状腺相关性眼病眶减压手术中的应用

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目的：将内镜导航系统应用于眼眶减压手术中，分析眼眶骨性容积增加量以及眼球回退量的相关因素，为临床手术方案的制定提供参考，在其引导和监控下进行眼眶减压手术，评价其安全性、精确性和有效性。

材料与方法：本研究共完成 11 例（17 眼）眼眶减压手术，所有患者均进行了术前设计、术中引导和术后分析，术后随访 3 个月。在手术前后分别对患者进行眼眶形态学测量，并进行相关性研究分析。

结果：11 例甲状腺相关眼病患者在内镜导航系统辅助下完成了眼眶减压术，术前眼球突出度与术前眼眶软组织容积和术前软组织-眶腔比正相关；眼球回退量与骨性眼眶容积改变量和眼眶中段宽度改变量正相关；骨性眼眶容积改变量与外、内侧壁减压面积、术前眼眶软组织容积、术前骨性眼眶容积及术前软组织-眶腔比正相关；外侧壁减压可以获得最大的减压空间；在 9 例术前视力下降的患者中，视力与术前软组织-眶腔比负相关；5 例术后视力改善的患者中，视力改变量与底壁减压面积和底壁体积增加量正相关。

结论：内镜导航技术可以为甲状腺相关眼病眶减压手术提供重要分析参数，同时可以通过术前设计、术中引导和术后分析，实现精确、安全和有效的眼眶减压。

PU-527

基于 Pentacam 角膜散光测量的 Toric IOL 度数精准测算

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如果白内障患者想获得满意的视觉质量，除了矫正球镜屈光不正，角膜散光的矫正亦至关重要。临床上广泛应用的角膜散光值由角膜前表面曲率半径及角膜屈光指数计算所得，严格意义上，真实角膜散光应由角膜前表面散光和后表面散光组成，因此，模拟角膜散光值忽视了角膜后面散光的存在及个体差异，从而也忽视了的临床意义及影响。Pentacam 眼前节分析仪是应用 Scheimpflug 光学原理进行断层扫描、三维测量的非接触性眼用图像诊断仪。可以测量角膜的前、后表面曲率半径及角膜厚度，并提供模拟角膜屈光力、净角膜屈光力、全角膜屈光力、等效角膜屈光力以及对应的角膜散光值，我们在临床中结合角膜后表面散光及总角膜散光评估散光的大小及规则性，个性化的测算 Toric IOL 度数，获得良好的临床效果。

PU-528

超声乳化术源性散光（SIA）的矢量计算及软件开发

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如果白内障患者想获得满意的视觉质量，除了矫正球镜屈光不正，角膜散光的矫正亦至关重要。残余散光对裸眼视力有明显影响，通常 0.50 D 散光相当于 0.25 D 的球镜，大约在标准对数视力表上会影响一行的视力；最近，Villegas 等研究显示为保证良好视觉质量，角膜散光需矫正的最小值为 0.50D，即大于 0.50D 的散光均需处理。超声乳化手术的手术源性散光（surgically induced astigmatism,SIA）大约为 0.2~1.0D，目前大部分研究仅对 SIA 的大小进行分析比较，而对 SIA 的轴向及所带来的影响的研究并不多见，SIA 与其它散光一样，是一个矢量值，包括大小和轴位，临床中若仅考虑 SIA 的大小，从原理上将会导致计算误差。比如目前临床医生测量 SIA 常用是通过 www.doctor-hill.com 网站等方式，得出的 SIA 仅为大小数据，并无轴位。国内关于 SIA 矢量分析研究也极少， Toric IOL 计算公式中仅采用 SIA 大小，其科学性和准确性值得商榷，因此，SIA 的相关研究急待进一步深入化和精细化。我们通过对 centriod SIA(质心 SIA)的研究，分析 SIA 的大小及轴位，更科学的评估术源性散光，我们也制作了网络 app 软件，对矢量 SIA 进行描述和分析，为广大医生提供有效 SIA 评估的技术。通过临床应用，进一步优化 Toric IOL 计算公式。

PU-529

基于 SQLite 数据库平台的白内障临床数据库的建立

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目的：初步建立以 SQLite 数据库为平台，项目全面、储存及处理能力强大并可与其他不同类型数据库相互转换的白内障临床数据库，实现白内障患者临床资料的专项信息化管理。
方法：复习文献制定白内障患者临床资料登记表，运用 MicrosoftSQLite 2010 数据库作为后台支持建立白内障患者临床数据库，录入数据后进行相应统计，结果与 SPSS 17.0 对照验证。
结果：1、白内障 SQL ite 临床数据库成功建立，录入患者临床数据后对多个项目进行统计，结果与 SPSS 17.0 一致。2、数据库简介：数据库界面分为首页、基本情况、入院及随访记录、手术记录、辅助检查、查询、统计等 8 个界面，包括新增、删除、修改、查询、打印、统计、导出 8 大功能。数据库页面组成包括白内障患者完整诊治过程的全部信息，其中包括 4 个必选项目和其他可选项目，界面有增加、修改、删除、查询功能，可以选择或添加方式录入；信息录入方式简单，且可根据患者随访情况增加随访信息。手术信息界面：包括手术时间及双眼手术间隔，手术切口方式、位置及大小，术源性散光；人工晶体类型和功能；手术方式及手术并发症等。3、数据编辑：本数据库由医院数据库管理培训人员监督管理，信息编辑由专人负责，实时动态进行数据录入，录入信息由管理人员进行复核。4、数据查询：查询功能包括单一条件查询及多条件查询，显示内容可根据用户需要自行选择，并可以 excel 表格形式导出、保存及打印。5、数据统计：有简单的统计功能，可对患者性别、年龄、出入院视力、手术方式、家庭住址、保险种类、文化水平、生活情况等进行统计，结果以三线表形式呈现，方便与其他统计软件所得结果进行比较。
结论：白内障 SQLite 临床数据库操作简便，项目全面，原始资料完整，文本和图像兼有；统计内容全面，功能强大。既是白内障诊治的重要辅助手段，也是白内障临床、教学和科研工作的良好工具。

PU-530

线形角膜瘢痕与散光之间相关性的矢量分析

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目的 探讨角膜穿孔伤后角膜散光的性质及程度与伤口部位及瘢痕长度之间的相关性，并列出其相关的一元线性方程。**方法** 测量线形角膜伤口所在部位的弦长长度，依据三角函数及弧长公式，计算出瘢痕所在的弧长，并用 OrbscavⅡ、角膜曲率计及检影验光法检测伤口愈合并拆除缝线 3 个月后的散光度，应用矢量分析的方法，并根据简化眼模型理论，分析弧形瘢痕类型、长度和部位与散光性质及散光度之间的关系。对 30 只角膜中周部位的匀弧形角膜瘢痕的患眼进行统计学处理，应用直线回归方程进行分析，列出瘢痕弧长长度与散光度之间的一元线性回归方程。**结果** 角膜中周部位的弧形瘢痕散光的性质与瘢痕长轴与角膜缘切线的关系有关，散光度与长度之间存在线性关系，两者间线性回归方程为：Y=1.703+0.478X 。**结论** 外伤性角膜弧形瘢痕与散光的类型有一定的关系，其弧形瘢痕长度与散光度呈正相关。

PU-531

人工智能在眼科的应用及其前景

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人工智能是近年来一门新兴学科，是计算机科学的一个分支科学。本文对人工智能的概念和基本原理，其在医学应用的发展历程进行概述，在眼科方面如：在糖尿病视网膜病变、年龄相关性黄斑变性、新生儿视网膜病变、青光眼、白内障、眼肿瘤等方面的应用的现状及其在泪道及鼻内窥镜的导航系统方面；眼科远程医疗方面：建立智能平台；在眼科循证医学方面；眼科手术机器人；参与视觉辅助系统的研究等方面的应用前景，最后提出了人工智能发展可能存在的诸多问题：例如伦理、人文、心理、社会等方面的问题，以及对眼科应用提高眼科疾病诊断的效率；提高眼科常见病、多发病诊断的正确率及节约时间等意义。进一步明确了人工智能在眼科的发展方向，即与 AI 工程师强强合作，收集大量相关数据、检查报告和图片资料，充分满足人工智能机器学习和深度学习的需要，为人工智能提供强大的基础动力。

PU-532
手术室 6-Σ DMAIC 流程管理模式在眼科手术护理管理中的应用

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目的 分析 6-Σ DMAIC 流程管理模式在手术室眼科护理管理中应用的价值。方法 以 2016 年 1 月至 2017 年 12 月我院眼科手术 178 例作为研究对象，按入院时间分为两组，对照组采用常规护理管理，研究组采用 6-Σ DMAIC 流程管理模式。对比两组患者护理效果和护理满意度并比较此管理模式实施前后手术室眼科护理质量及护士工作满意度。结果 研究组患者术前术中用药交接核查质量、安全转运交接率明显高于对照组（P＜0.05），不良事件发生率为 3.37%明显低于对照组的 13.48%（P＜0.05），护理满意度为 95.51%明显高于对照组的 83.15%（P＜0.05），实施此管理模式后护士护理质量评分明显高于实施前（P＜0.05），工作满意度为 97.30%明显高于实施前的 78.38%（P＜0.05）。结论 6-Σ DMAIC 流程管理模式在手术室眼科护理管理中应用不仅能提高患者护理质量及满意度，同时也提高了护士护理质量和满意度。

PU-533
内蒙古地区屈光不正患者角膜生物力学参数数据库平台 建立和圆锥角膜早期诊断技术平台建设

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目的：建立内蒙古地区屈光不正患者角膜生物力学参数数据库平台和内蒙古地区圆锥角膜筛查及早期诊断的规范化分级医疗网络系统。
方法：制作电脑版、手机版病例收集软件及纸质版病例收集资料，在内蒙古自治区范围内进行屈光不正及圆锥角膜相关宣教，并对本项目相关病例收集规范，对现有病历资料进行整理并完善相关信息。选取屈光不正患者 800 眼（其中包括亚临床期和临床期圆锥角膜），其中蒙古族（三代以内均为蒙古族），分为正常对照组、亚临床圆锥角膜组和圆锥角膜组；汉族同样分为正常对照组、亚临床圆锥角膜组和圆锥角膜组。所有研究对象均无血缘关系，蒙古族患者无异族通婚史, 20≤年龄≤70，

至少三代（祖父/母、父/母和子/女）从小生活在调查所在地区。采用 Pentacam、Orbscan-Ⅱ和 Corvis ST 进行检测。
结果：Pentacam 的测量指标包括角膜最薄点厚度（TP）、前表面最小曲率（K1）、前表面最大曲率（K2）、角膜前表面最佳拟合球面曲率半径（ABFS）、角膜后表面最佳拟合球面曲率半径（PBFS）、角膜前表面高度（前 Diff 值）及角膜后表面高度（后 Diff 值）。Orbscan-Ⅱ的检测参数包括角膜最薄点厚度（TP）、最小模拟角膜曲率（SimK's Min）、最大模拟角膜曲率（SimK's Max）、角膜前表面最佳拟合球面曲率半径（ABFS）、角膜后表面最佳拟合球面曲率半径（PBFS）、角膜前表面高度（前 Diff 值）及角膜后表面高度（后 Diff 值）。
结论：获得内蒙古地区屈光不正患者的角膜生物力学参数数据；建立内蒙古地区圆锥角膜早期诊断、早期预防疗效评估平台；建立内蒙古地区圆锥角膜筛查及早期诊断的规范化分级医疗网络系统；进一步规范内蒙古地区屈光手术适应症选择，提高内蒙古地区屈光手术安全性。

PU-534

市区与郊区白内障患者眼生物学参数的分布特点

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目的：比较上海市区与郊区老年白内障患者的眼生物学参数
方法：回顾性分析来自上海市区（1918 例）与郊区（2245 例），年龄不小于 50 岁的白内障患者眼部生物学参数的记录。通过使用部分相干激光干涉测量法（IOLMaster，Zeiss）测量包括轴长（AL），前房深度（ACD），角膜屈光力（K，包括陡/平/平均 K），散光以及轴位等眼部生物学参数，该研究仅分析了每位患者的右眼记录。
结果：市区 1918 例患者的平均年龄为 70.62±9.04 岁，郊区 2245 例患者的平均年龄为 72.78±7.84 岁。部分相干激光干涉测量给出以下总体平均值：市区患者的 AL，ACD 和 K 分别为 24.22±2.19mm，3.05±0.66mm，43.70±1.64D，郊区患者分别为 23.60±1.73mm，3.09±0.55mm，44.87±1.69D。与郊区患者相比，市区患者的轴长（AL）更长，前房深度（ACD）更深（P <0.05），角膜屈光力（K，包括陡峭 K，平坦 K 和平均 K）更小（P <0.01）。郊区患者的角膜散光较高（市区 1.08D，郊区 1.16D，P <0.05），郊区患者的顺规散光多于市区患者（市区 1.06D，郊区 1.26D，P <0.01），但是两组之间没有逆则散光或斜向散光的差异。
结论：这些结果表明，市区与郊区老年白内障患者眼生物学参数具有差异。郊区老年白内障患者具有较短轴长，较浅的前房和更多的顺规散光的特点值得进一步研究。

PU-535

基于深度迁移学习方法自动分类眼底照片

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目的 为缓解人工标注彩色眼底照片易疲劳性和主观性、提高诊断过程的客观性、应对眼科医生少和高发病率的眼科疾病等问题，本文提出一种基于计算机辅助筛查眼底病变的工作。方法 首先，对获取的彩色眼底照片进行预处理和数据增强；其次，基于深度学习中的迁移学习方法，保留预训练模型中所有卷积层的参数，仅替换最后一层全连接层，结合模型微调对眼底图片进行正常和异常分类。结果 实验结果表明，本文所用的方法对眼底图片有无病变的分类准确率达到 85.21%，特异度和灵

敏度分别为 93.62%和 78.57%，并且具有较好的泛化性和鲁棒性。 结论 利用深度学习中的迁移学习方法，能够在极少的数据集和较短的时间内实现眼底图像正常和异常的分类任务，避免了人工检测和诊断的主观性且缓解了医疗压力，可实现大面积的眼科疾病筛查工作。

PU-536

全眼光学相干断层高速成像装置的设计及全眼生物学结构参数测量研究

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目的：探讨全眼 OCT 高速成像系统，进行角膜、晶状体、视网膜全眼结构进行高速成像，及生物学参数测量的可行性与测量精度。
方法：在 SD-OCT 的基础上，集成高速 CMOS 线阵相机与高速双通道图像数据采集卡，提高系统成像速度;增加扫描通道数,通过控制扫描振镜,切换 OCT 系统参考臂长度(轴向位移 0mm、11mm、25mm、37mm），增加 SD-OCT 系统的成像深度。通过扫描平面镜获取 PSF 点扩散函数（Point Spread Function），PSF 波形的 FWHM 半高全宽（Full Width at Half Maxima）显示系统纵向分辨率。系统扫描模型眼，验证系统横向及纵向成像范围。扫描测试正常志愿者，获取眼球不同深度位置的横截面结构图像；系统软件对采集到的不同深度位置的多幅图像进行叠加，最终得到覆盖全眼范围的横截面结构图像。
结果：系统单参考臂平面镜扫描测试成像深度达 12mm，四通道切换成像深度超过 35mm；图像采集速度达到 120 000 fps；PSF 点扩散函数的 FWHM 显示系统纵向分辨率在空气中可达 7.5um；模型眼测试，显示系统成像范围覆盖全眼；人眼在体成像测试，系统对眼球角膜、晶状体、视网膜结构可以有效成像。配合图像分析软件，可有效进行角膜中央厚度、瞳孔直径、晶状体前表面曲率半径及眼轴长度等人体生物学参数测量，以及眼调节过程中各项参数变化的重复性评价，各项参数重复性系数 COR 达到 0.3%-3.9%，测量结果与 IOLMaster 采集数据统计结果相关性系数 R^2>0.98。
结论：采用高速线阵 CMOS 相机结合参考臂自动切换装置的全眼高速 OCT，提高了成像速度，减轻了眼动对成像质量的影响，拓展成像深度实现对全眼前后段的扫描；为全眼结构成像和生物学参数测量提供了新的平台。

PU-537

Bone wax migrates to the orbit in a patient with an unusual intracranial anatomy: A case report

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Background
Bone wax is the most widely used hemostatic bone sealant because of its availability, ease of use, immediate action, and minimal adverse effects. Several complications have been reported to be associated with the use of bone wax, such as infection, osteohypertrophy, pain, granuloma formation, allergic reaction, and thrombosis. Here, we present a rare complication, namely, bone

wax migration, which developed after a craniotomy on a patient who had an unusual intracranial anatomy.

Case presentation

A 51-year-old woman complained of pain and swelling in her left eye accompanied by difficulty opening the left eyelid after undergoing a craniotomy. An examination revealed left eye proptosis with ptosis, eyelid swelling, and increases in intraorbital pressure and intraocular pressure (IOP). According to a CT and an MRI of the orbit, we found that the intraoperative bone wax had migrated to the orbit, thereby causing compression. We also found that the basal frontal sinus of the patient was congenitally defective, which may have induced the migration of the bone wax. Given that the patient recently underwent a craniotomy and given the risks associated with orbital surgery, she refused to undergo a surgery to remove the bone wax. Thus, the patient was administered mannitol intravenously daily, accompanied by topical Timolol, to reduce the intraorbital pressure and IOP. This treatment led to a gradual decrease in IOP and intraorbital pressure, and these parameters remained stable after treatment ended. During the 6-month follow-up, the best corrected visual acuity improved, and ptosis and restricted eye movements also improved significantly.

Conclusions

We report a case of bone wax migration that developed after a craniotomy on a patient who had a congenital defect in the basal frontal sinus. Extra caution should be taken when using bone wax, and a comprehensive understanding of the patient's intracranial anatomy is important for decreasing the incidence of bone wax migration. Additionally, when a patient presents with symptoms of ocular compression, bone wax migration should be considered in addition to typical radiological changes.

PU-538

白内障超乳手术中小瞳孔的处理

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目的 观察白内障手术中因各种病因造成的小瞳孔的处理方式，总结和探讨不同病因小瞳孔的适用方法。
方法 通过观察不同病因（假性剥脱（PXF） 、虹膜粘连（外伤，葡萄膜炎，房角关闭，ICE, 手术史）、糖尿病 、高龄 、霍纳综合征、长期的缩瞳治疗（青光眼）、麻醉剂、虹膜松弛综合征（IFIS））所致小瞳孔的形成及病理生理机制，对比不同手术方式、对手术操作及术中术后并发症的影响，比较几种方法的优劣，总结白内障超乳手术中小瞳孔问题的处理原则及注意事项。
结果 术中采取不同方式（粘弹剂扩张（内聚型） 、虹膜粘连分离术、瞳孔拉伸、 瞳孔扩张器 、括约肌剪开术）等，必要时应用显微虹膜拉钩及张力环可减少对虹膜及囊袋损伤，术后瞳孔形态及功能均能达到满意效果。
结论 术前做好自我准备和病人准备，为小瞳孔调整手术技巧，尽量少对虹膜进行操作，只做必要的（粘弹剂扩张等）；对虹膜的操作越多，就会有更多炎症，虹膜越松弛；超乳：垂直劈核或刻深槽，可能需要双手 I/A 手柄，切记基本要领。

PU-539

探讨眼科护士护理技术操作存在问题与解决办法

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1.山东省济南市明水眼科医院

眼科护士每年参加护理技术操作比赛（眼部冲洗、皮内实验心肺复苏呼吸气囊的使用），可以规范自己的护理操作流程，避免差错事故的发生，在操作中找出自己的不足，提高自己的护理技术操作水平，遵守操作规程，避免不良事件的发生，做一名合格的眼科护理人员。

PU-540

探讨眼科护士护理技术操作存在的问题与解决办法

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眼科护士参加护理技术操作比赛（皮内实验、眼部冲洗、人工呼吸气囊使用、心肺复苏），可以规范自己的护理操作流程，避免差错事故的发生，在操作中找出自己的不足，提高自己的护理技术操作水平，规范自己的工作流程，对新护士来讲，能更快的适应工作环境，得到病人和同事的认可。

PU-541

眼科护理不良事件分析及防范措施

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护理不良事件是指在护理过程中发生的、不在计划中的、未预计到的或通常不希望发生的事件，包括患者在住院期间发生的跌倒、用药错误、走失、误吸或窒息、烫伤及其他与患者安全相关的、非正常的护理意外事件[1]。护理不良事件是护理管理的重要组成部分，是护理防范措施的重要环节。如何提高其防范意识，预警不良事件的发生一直以来是众多护理专家的关注热点。

PU-542

展神经麻痹 4 例之病因分析

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目的：报道 4 例展神经麻痹临床案例，探讨展神经麻痹常见病因
方法：例 1，48 岁男性，双眼视物成双 5 天来诊，糖尿病 3 年，查 MRI 未见明显异常，按糖尿病展神经麻痹治疗 2 月后基本恢复；例 2，51 岁男性，高处坠落伤后视物成双 1.5 月，MRI 水成像序列证实，左侧展神经离断，拟定择期行斜视矫正术；例 3，33 岁男性，右耳痛咽痛 18 天，面瘫伴复视 12 天，伴发热，最高 37.6℃，给予抗生素口服及左氧氟沙星+地塞
米松滴耳后，效果一般。6 天后症状加重，出现右侧面神经，麻痹及复视，右耳廓淡红色透明疱疹。诊断：1.Ramsy-Hunt 综合征 2.面神经麻痹（右，HB Ⅳ级）3.展神经麻痹（右）。经抗病毒治疗好转。例 4，46 岁女性，左眼外展不能伴左侧面部麻木 1 月，逐渐加重，伴同侧额部、上颌、下颌皮

肤麻木，咀嚼肌肌力减退。既往：糖尿病病史。多发性骨髓瘤行骨髓移植术后 6 年。MRI 提示斜坡及左侧鞍旁占位，考虑多发性骨髓瘤复发。目前积极化疗中，病情渐改善。
结果：4 例展神经麻痹病因各不相同，治疗方案各异，分别为糖尿病性展神经麻痹；外伤性展神经离断；Ramsy-Hunt 综合征；多发性骨髓瘤转移
结论：对于展神经麻痹要尽可能明确病因，这样治疗才会有好的效果，治病求本，追根溯源

PU-543

成人型眼眶皮样囊肿一例

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目的：回顾性分析一例成人型眼眶皮样囊肿的诊疗过程，以供临床学习；**方法：**病史患者男性，31 岁，因“左眼眼球向外突出 6 年余”就诊我院，眼科：VOD 0.8，VOS 0.8，右眼未见明显异常；左眼眶腔轻度扩大，眶压较饱满，眼睑内眦部睑裂外移，眼睑无内外翻，结膜轻度充血，内眦部结膜下可触及一囊性肿物，无触痛，质稍硬，巩膜无黄染，角膜透明，眼前节（-），眼底：视盘界清，黄斑区视网膜轻度皱褶；眼球向外突出，向外偏斜 15°,眼压：右眼 15mmHg,左眼 18mmHg。辅助检查：眼球突出度检查 眶距：112mm,右眼 21mm,左眼 28mm;低头试验阴性，听诊器未见异常杂音；外院眼眶 CT 示：左侧肌锥外混杂密度占位，约 3.0×2.5cm；彩超示：左眶内低回声占位性病变，畸胎瘤可能性大；磁共振扫描眼眶（平扫+增强）：左侧眼眶内侧肌锥外畸胎瘤。电脑视野：左眼生理盲点扩大。诊断：眼眶肿物（左） 畸胎瘤？择日于全麻下行左眼眼眶肿物切除+眶隔修补术。**结果：**术中见肿物囊壁呈白色，靠近鼻侧偏上方，肿物一侧与眶上壁黏连紧密，剥离时致囊壁破裂，大量乳白色奶酪样物质流出，并有大量毛发可见，清除后完整剥离肿物，见肿物约 3×2cm 大小，囊壁呈肉色。送病检。术后病检：左眼眶囊肿。故诊断：左侧眼眶皮样囊肿。出院时：VOD:0.8,VOS:0.8,左眼结膜充血，缝线在位，切口对合良好，眼前节及后节（-），复查眼球突出度检查 眶距：112mm,右眼 21mm,左眼 22mm;**结论：**眼眶皮样囊肿好发于儿童，但 30-50 岁年龄段为发生第二高峰，本例病例属于后者。术中体会：因肿物多发生于骨缝处，囊壁多与眶壁黏连紧密，剥离时需避免其破裂，肿物过大时可抽取内容物后再进一步剥离，减少损失。注意保护邻近眼肌。

PU-544

4 例白内障术后眼内炎的临床诊治分析

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目的 分析 2016 年到 2018 年白内障超声乳化术后发生眼内炎 4 例患者的临床特征和诊治体会。 **方法** 4 例白内障术后眼内炎患者，1 男 3 女；术前无糖尿病或高血压病史；年龄分别为 70 岁、80 岁、73 岁、78 岁；发病时间分别为术后 20 天、7 天、1 月、半月；入院视力分别为指数/10cm、手动/10cm、光感、光感。4 例患者均进行玻璃体液和前房液的抽取和细菌培养加药敏及玻璃体腔注药（10g/L 万古霉素（1mg/0.1ml）、20g/L 头孢他啶（2mg/0.1ml）、地塞米松（0.4mg/0.1ml）。其中 2 例患者行玻璃体切割术。**结果** 1、玻璃体液培养结果有两例为无菌生长，其中 1 例行玻璃切割手术 ，出院时视力为 0.3；1 例行玻璃体腔注药术，出院视力为 0.5 2、玻璃体液培养结果有 1 例为嗜麦芽窄食单胞菌，该患者经过 3 次玻璃腔注药，2 次眼前节 YAG 激光，出院视力为 0.3。3、玻璃体液培养结果有 1 例为真菌曲霉菌感染，经过两次玻璃体切割，加大扶康 、伏立康唑 局部和全身

使用，炎症未能控制。**结论** 1、针对疑似病例、早期病例，应尽早进行玻璃体液和前房液的抽取及时送检进行细菌培养及药敏和玻璃体内注药等初期治疗。2、初期治疗后无效的病例应及时进行玻璃体切割术， 再根据细菌培养及药敏或细菌特异性 PCR 的结果，采取不同的药物治疗方案。

PU-545

Transgenic Mice Over-Expressing Serum Retinol-Binding Protein Develop Progressive Retinal Degeneration through a Retinoid-Independent Mechanism

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Introduction: Serum retinol-binding protein (RBP4) is the sole transport protein for retinol in the blood, and was recently recognized as an adipokine that contributes to insulin resistance and type 2 diabetes. We previously demonstrated that RBP4 induces inflammation in human retinal capillary endothelial cells through a retinol-independent mechanism, indicating increased RBP4 may contribute to pathogenesis of diabetic retinopathy. Yet the effect of increased levels of RBP4 on the retina has not been studied. In the current study, we use transgenic mice over-expressing RBP4 (*RBP4-Tg*) to evaluate the physiologic effects of serum RBP4 elevation on the retina.

Methods: *RBP4-Tg* mice with 10-fold increase in serum RBP4 levels and wild-type controls from 1 to 9 months of age were used in this study. Electroretinography (ERG) and histological analyses were performed to assess retinal function and structure, respectively. Retinal retinoid levels were quantified by high performance liquid chromatography (HPLC). Proinflammatory cytokine expression was measured by quantitative RT-PCR and western blotting.

Results: *RBP4-Tg* mice maintain normal body mass, blood glucose, triglyceride, and insulin levels. *RBP4-Tg* mice showed progressive retinal dysfunction and degeneration, characterized by a predominant loss of inner retinal neuron photoresponse and cell number. *RBP4-Tg* mice have photoreceptor ribbon synapse deficiency detectable by 1-month of age, and subsequent rod and cone bipolar cell loss. HPLC analyses revealed normal ocular retinoid and bis-retinoid levels in *RBP4-Tg* mice, suggesting that retinal degeneration occurs through a retinoid-independent mechanism. *RBP4-Tg* mice have early-onset retinal microglia activation and increased expression of interleukin-18 mRNA and protein in retina, which indicates neuroinflammation is an underlying mechanism of retinal degeneration.

Conclusion: These studies reveal that *RBP4-Tg* mice develop retinal neuroinflammation and neurodegeneration in the absence of retinal vascular pathology, obesity, dyslipidemia, and hyperglycemia.

PU-546

急性黄斑区神经视网膜病变一例

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目的：在临床学习的过程中，笔者遇到急性黄斑区神经视网膜病变患者一例，本病在国内相关报道较少，报道病例数不多，故分享此病例与广大眼科同道。
方法：通过对患者住院期间病情观察分析，整理成文，分享给各位同仁。
结果：本病的发病机制尚不清楚，在以往的报道中可知，本病具有一定程度的自限性。
结论：通过中医药口服治疗，以期缩短病程。

PU-547

3D 玻璃体切割手术应用体会

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目的：探讨 3D 玻璃体切割术的可行性及手术效果。**方法**：前瞻性临床病例观察，随机采用 3D 玻璃体切割手术及常规玻璃体切割手术，比较两组的术后视力、手术时间及术后并发症。**结果**：3D 组 30 例均顺利完成手术，手术时间 40-90 分钟，平均（64±17.76）分钟。30 眼中 8 眼采用表面麻醉+球筋膜下麻醉，22 眼采用表面麻醉+球后麻醉。30 眼中 19 只眼需剥除视网膜增殖膜或内界膜，均能顺利剥除。患者术前最佳矫正视力(1.26±0.54) logMAR，术后第五天最佳矫正视力(0.78 ±0.56) logMAR，与术前相比 24 眼视力提高，3 眼不变，3 眼下降。常规组 30 例均顺利完成手术，手术时间 40-100 分钟，平均（68.13±22.53）分钟。30 眼中 10 眼采用表面麻醉+球筋膜下麻醉，20 眼采用表面麻醉+球后麻醉。 30 眼中 18 只眼需剥除视网膜增殖膜或内界膜，均能顺利剥除。患者术前最佳矫正视力(1.31±0.50) logMAR，术后第五天最佳矫正视力(1.13±0.55)logMAR，与术前相比 21 眼视力提高，5 眼不变，4 眼下降。二组手术并发症包括一过性眼压升高(3D 组 2 例，常规组 4 例)，两组均未发生感染性眼内炎、医源性视网膜裂孔及视网膜脱离、脉络膜脱离以及切口持续性渗漏等并发症；两组手术时间相比(t=-0.786,P=0.028<0.05)，差异有统计学意义，术后视力相比(t=-0.574,P=0.580>0.05)，差异无统计学意义, 3D 组术者感觉舒适度更高。 **结论**：采用 3D 玻璃体切割手术与常规手术相比,手术时间更短，术后视力相当，无学习曲线,更有助于教学，且其独有的视觉优势及抬头操作，使术者在手术过程中更为舒适和高效。

PU-548

Mikulicz 病患者的临床观察及护理

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Mikulicz 病为临床罕见病,其临床特征为双侧对称性泪腺和唾液腺肿大。本病在组织学上以广泛淋巴细胞增生和浸润为特征，腺组织逐渐萎缩而被肉芽组织和结缔组织所取代。本病予糖皮质激素类药物治疗效果明显，但也有复发。由于病变内主要为淋巴细胞浸润，也可局部放射治疗。另外，由于肿物位置靠前，肿块较为局限，当临床诊断困难时，亦可给予手术切除，术后辅以糖皮质激素类药物治疗。由于本病可能导致吞咽困难、视力下降等并发症，因此治疗过程中密切观察及有针对性的护理具有重要意义。

PU-549

高原红细胞增多症（High Altitude Polycythemia，HAPC）致视网膜中央静脉阻塞（Central Retinal Vein Occlusion，CRVO）1 例

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目的：探讨 CRVO 可能的病因及诱因
方法：询问 CRVO 患者的病史、观察其视力、眼压、FFA、黄斑 OCT、血常规等指标
结果：FFA 及黄斑 OCT 和普通的 CRVO 患者一致；血常规中红细胞计数（RBC）、血红蛋白（Hb）、红细胞压积（HCT）明显升高。
结论：HAPC 是缘于生活在高原(海拔在 3000m 以上)的某些人因低氧应激刺激，引起造血功能或其调节机制发生紊乱的一种病理性改变[1]。高原红细胞增多症如不合并心脑系统并发症则预后较好，移居平原生活，脱离缺氧环境则可以完全恢复。伴眼底改变者一般不影响视力，偶有视物模糊和偏盲，所以对于伴有眼底改变的 HAPC 患者主要以解除机体的缺氧状态，以减少红细胞及血红蛋白的生成，以减少血容量及改善血液高粘稠状态，眼底改变也会随之改善。

PU-550

黑碳颗粒刺激对人角膜上皮细胞 NLRP3 炎症小体通路的作用

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目的：探讨黑碳（Black carbon，BC) 颗粒和臭氧处理的黑碳（ozone-oxidized BC，O_3BC）颗粒对人角膜上皮细胞(HCECs)的毒性作用及其对 NLRP3 炎症小体通路的影响。
方法：通过检测不同浓度的 BC 颗粒或 O_3BC 颗粒刺激对 HCECs 的细胞抑制作用，计算其相应的半抑制浓度（IC50）；以 IC50 为依据，检测不同浓度的 BC 颗粒或 O_3BC 颗粒刺激 HCECs 对 NLRP3 炎症小体通路转录水平的影响，主要检测 NLRP3 炎症小体各聚合成分(NLRP3、ASC、Caspase-1)和 IL-1 βmRNA 的相对表达量。
结果：BC 颗粒刺激 HCECs 24h 的 IC50 是 295.5μg/ml；100ppm 和 200ppb 处理 O_3BC 颗粒刺激 HCECs 24h 的 IC50 分别是 224.6μg/ml 和 272.9μg/ml。以无处理组为对照，200μg/ml 的 BC 颗粒、100ppm 和 200ppb 处理 O_3BC 颗粒 200μg/ml 均使 HCECs 的 NLRP3mRNA 和 IL-1 βmRNA 表达升高（$P<0.05$）；100ppm 和 200ppb 处理 O_3BC 颗粒 200μg/ml 作用下，HCECs 的 ASC mRNA 表达升高（$P<0.05$），200μg/ml 的 BC 对 HCECs ASC mRNA 的表达无显著影响（$P>0.05$）；200μg/ml 的 BC 颗粒、100ppm 和 200ppb 处理 O_3BC 颗粒 200μg/ml 均未对 HCECs 的 Caspase-1mRNA 表达产生显著影响（$P>0.05$）。
结论：BC 颗粒或 O_3BC 颗粒刺激对 HCECs 存在细胞抑制作用，一定浓度和作用时间条件下可增加 NLRP3、ASC 和 IL-1βmRNA 的相对表达量，提示炎症小体通路在 BC 颗粒及其臭氧处理产物对 HCECs 的毒性作用中的重要作用机制。

PU-551

急性闭角型青光眼合并晶体脱位的治疗探讨

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目的：通过临床病例分析，探讨急性闭角型青光眼合并晶体脱位的治疗方案。
方法：选取临床 UBM 检查明确的晶体脱位的急性闭角型青光眼，入院后给予降低眼压及抗炎等对症治疗，待眼压平稳后，根据房角镜检查房角关闭范围及晶体脱位范围进行个性化治疗。具体治疗方案如下，房角粘连 <1/2 的患者 ：晶状体脱位＜ 1 象限，行激光虹膜周切术或超声乳化白内障吸除联合人工晶状体植入术；房角关闭范围＜1/2 以及晶状体脱位范围在 1～2 个象限的患者，行超声乳化白内障吸除+囊袋张力环+人工晶状体植入手术；房角关闭范围＞1/2 以及晶状体脱位范围在 1～2 个象限，选择小梁切除联合超声乳化白内障吸除+囊袋张力环+人工晶状体植入手术。囊袋张力环植入方向根据脱位方位而定。
结果：对于脱位范围＜1/2 范围，眼压控制良好，瞳孔缩小病人，行激光虹膜周切术后，眼压控制良好，视力无明显下降，治疗风险小。对于脱位 1～2 个象限，眼压难以控制的患者，行囊袋张力环辅助的超声乳化白内障吸除+人工晶状体植入手术，或小梁切除术+超声乳化白内障吸除 + 人工晶状体植入手术，术后人工晶体位置稳定，眼压控制良好，无后囊破裂并发症。
结论：急性闭角型青光眼合并晶体脱位的患者，根据晶体脱位范围、房角关闭情况，眼压选择合适治疗方案，术中辅助囊袋张力环植入，可达到降低眼压、植入人工晶体的手术效果，提高视力的效果。

PU-552
慢性中心性浆液性脉络膜视网膜病变的眼底影像学检查

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目的：分析慢性中心性浆液性脉络膜视网膜病变的眼底影像学检查特点，探讨其病理改变发生机制
方法：回顾性分析在青岛眼科医院诊断为慢性中心性浆液性脉络膜视网膜病变患者的一般资料及眼底影像学检查资料，包括眼底彩色照相、荧光素眼底血管造影（FFA）、吲哚菁绿脉络膜血管造影（ICGA）、光相干断层扫描（OCT）及血管成像 OCT（AngioOCT）。
结果：37 例患者符合纳入标准，眼底像可见色素紊乱、神经上皮脱离及色素上皮脱离，偶见视网膜下纤维素样渗出；FFA 表现为点状透见荧光或遮蔽荧光，也可呈片状荧光素渗漏、带状透见荧光区及 PED 形成的均匀高荧光片；ICGA 早期可见脉络膜血管扩张，晚期多表现为片状低荧光，可见高荧光斑点；OCT 表现为神经上皮脱离以及不同形态、不同大小的 PED、神经上皮下可有不同形态的高反射；AngioOCT 检查中 5 眼显示 I 型脉络膜血管、相应处 B 扫描见 RPE 光带下异常血流信号；2 眼显示点状异常血流信号
结论：慢性中心性浆液性脉络膜视网膜病变神经上皮脱离多由于脉络膜血管扩张所致，但有些情况下可能与继发的脉络膜新生血管有关。

PU-553
Cell-Derived Microparticles Shedding in Vitreous Fluid from Proliferative Vitreoretinopathy

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PUEPOSE. Proliferative vitreoretinopathy (PVR) is a common complication in patients with open globe injuries and rhegmatogenous retinal detachment. Microparticles (MPs) are small vesicles

that are released by budding of the plasma membrane during cellular activaton and apoptotic cell breakdown. The aim of the study was to find whether MPs shedding was higher in the vitreous of patients with proliferative vitreoretinopathy (PVR).**METHODS.** Standardized flow cytometry methods were used to analyze the following vitreous microparticle types and levels: phosphatidylserine-expressing MPs, photoreceptor cell derived MPs, microglial derived MPs and monocyte derived MPs. Samples were obtained from 22 patients with eye injury, 32 patients with rhegmatogenous retinal detachment and 11 patients as control.**RESULTS.** Vitreous fluid from patients and control contained comparable numbers of microparticles, which originated from photoreceptor cells, microglial cells and monocytes. Vitreous photoreceptor, microglial and monocyte microparticles levels were increased in eye injury and rhegmatogenous retinal detachment patients in comparison with the control group. In eye injury patients, the photoreceptor and monocyte derived microparticles were much higher in thoes with proliferative vitreoretinopathy than in patients without proliferative vitreoretinopathy.**CONCLUSIONS.** Our study demonstrates that vitreous fluid contains high numbers of microparticles derived from photoreceptor cells, microglial cells and monocytes. Vitreous microparticles levels are increased in patients with proliferative vitreoretinopathy, where they could contribute to disease progression.

PU-554

Activated coagulation factor X (FXa) contributes to the development of traumatic Proliferative vitreoretinopathy

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Purpose: Proliferative vitreoretinopathy (PVR) is a severe blinding complication of ocular trauma, marked by severe bleeding and fibrotic response. Uncontrolled coagulation reactions are responsible for pathological fibroproliferation in several organs. In the present study, we used experimental trials to understand whether FXa plays a role in promoting fibrosis by affecting retinal pigment epithelial (RPE) cells, and hence contributes to the progression of PVR.
Methods: In this study, the rabbit open and closed globe ocular trauma models were established, the vitreous and aqueous humor were collected in certain periods after injury. The concentration of FXa in the vitreous and aqueous humor was measured by ELISA. *In vitro* experiments were used to analyze the effects of FXa in regulating RPE cells phenotype. The proliferation of RPE cells was evaluated by BrdU test. The migration rate was evaluated by Transwell assay. Gene expression was evaluated by real-time PCR. Protein expression was evaluated by Western blotting.
Results: Our results showed an induction of FXa in both open and closed globe injured eyes. We further found a dramatic elevation of FXa in closed globe ocular trauma model comparing with the open one. Functionally, we found that FXa promoted the proliferation and migration of RPE cells, and induced an epithelial-mesenchymal transition of RPE cells, indicated by an upregulated expression of α-SMA and collagen type I in response to FXa stimulation.
Conclusions: Our results suggest that ocular trauma leads to an induction of FXa, which promotes the proliferation, migration and epithelial-mesenchymal transition of RPE cells, and contributes to the progression of proliferative vitreoretinopathy.

PU-555

HO-1G143H 突变体转基因小鼠作为 ARC 动物模型的效果观察

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目的：通过观察 HO-1G143H 突变体转基因小鼠白内障的发生发展情况，评估该小鼠作为年龄相关性白内障（age related cataract, ARC）动物模型的效果及可行性。
方法：采用裂隙灯显微镜观察不同月龄小鼠的晶状体混浊程度的变化，并使用前节拍照系统进行记录。选用托吡卡胺滴眼液对小鼠进行散瞳，随后在非麻醉状态下对其进行观察、拍照、评分及记录。小鼠的几个年龄组分别为 1，2，3，4，及 5 月龄，各组对应的眼球数量如下：20（1 月龄），20（2 月龄），20（3 月龄），18（4 月龄），18（5 月龄）。采用晶状体混浊分类系统Ⅱ(Lens Opacities Classification System Ⅱ,LOCSⅡ)[1]对小鼠的白内障进行分级及评分。其细则见表 1。本文中每只眼的白内障评分由晶状体核、皮质和后囊下混浊程度的得分相加得出，各月龄小鼠的白内障评分以平均数表示。
结果：各月龄小鼠的晶状体混浊情况如图 1 所示，可见 3 月龄的 HO-1G143H 突变体转基因小鼠开始出现白内障，且主要表现为晶状体皮质的混浊；而 4、5 月龄小鼠的晶状体核也逐渐出现混浊。

各月龄小鼠患白内障的比例及白内障评分如表 2 所示，可知 3 月龄的小鼠开始出现晶状体的混浊，且白内障严重程度随月龄增长而增加。
结论：HO-1G143H 突变体转基因小鼠模型可产生可遗传性的白内障，突变小鼠发生的白内障随时间推移而加重。该 ARC 小鼠模型的成功建立为下一步研究与白内障相关的信号通路提供了良好的基础。

PU-556
年龄相关性白内障合并黄斑变性患者白内障手术时机的探讨

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目的：白内障和黄斑变性均为年龄相关性疾病，临床上白内障需要手术的患者常合并有黄斑变性，如何选择手术和黄斑病变玻璃体药物治疗的时机，是临床上面临的问题
方法：为陕西省 9 家医院眼科多中心、前瞻性研究，将年龄相关性白内障需要手术患者分为玻璃体腔注射抗 VEGF 后 2 周即刻手术组（即刻治疗组）和黄斑变性注射 1-3 次抗 VEGF 后 1-3 月后（稳定组），再行白内障超声乳化手术，观察术后 12 月黄斑病变的进展，以 BCVA 和黄斑区 CRT 为主要观察指标，FFA\ICG 确定新生血管面积和渗漏情况，评价手术时机的选择。
结果：共入组 19 例，男 12 例，女 7 例，平均年龄 72.9 岁，即刻治疗组术后黄斑区 CRT 较术前增加 40%；末次随访期，手术前后视力提高值与稳定组比较存在显著性差异(P<0.05)。稳定组末次随访期黄斑区 CRT 增加小于术前 30%，但 5 例患者在 12 月内再次出现黄斑区渗漏，CRT 增加 60%。手术增加黄斑区渗漏的病例与新生血管的面积和活动性相关。
结论：黄斑病变稳定组白内障术后黄斑区视网膜厚度变化小，视力稳定。但对于进展期黄斑病变患者，白内障手术有增加黄斑区渗漏的风险。（陕西省科技厅和卫生健康计划委员会临床重点支撑计划联合项目 2016）

PU-557
黄斑裂孔内界膜撕除术后视网膜内层远期形态改变的影像学观察

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目的：探讨黄斑裂孔内界膜撕除术后视网膜内层远期的形态学改变特点
方法：回顾性病例研究。回顾性分析随访时间大于 1 年以上的诊断为黄斑裂孔行内界膜撕除术的 17 例患者 19 只眼。通过光学相干断层扫描技术，获得视网膜厚度地形图，视网膜节细胞复合体厚度地形图及概率图，黄斑区视网膜 Angio/en face 图像，综合分析观察术后视网膜内层形态学改变的影像学特点。
结果：共纳入特发性黄斑裂孔术后患者 17 例 19 只眼，其中男性 4 例（23.5%），女性 13 例（76.4%），平均年龄 62.74±5.15(55-74)岁，平均随访时间 21.05±9.66（12-48）月。患眼术后黄斑裂孔闭合率为 100%，神经纤维层松解样外观改变（Dissociated optic nerve fiber layer appearance，DONFL）发生于于术后 19 眼（100%），enface 图像上同轴黄斑区暗点（concentric macular dark spots, CMDS）发生于术后 19 眼（100%），黄斑区节细胞复合体变薄发生于术后 19 眼（100%），2 眼（10.5%）可见明显的视网膜浅层及深层毛细血管密度减低。
结论：黄斑裂孔内界膜撕除术后视网膜内层远期形态改变显著，黄斑区神经节细胞复合体萎缩明显，部分可出现视网膜毛细血管密度的减低。

PU-558

黑龙江省“白内障复明工程”光明行动心得

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[目的]本体会通过应用“白内障复明工程”光明行动，方式体会老年白内障患者对手术的态度和意见，深入了解老年人白内障患者手术治疗率低的根本原因，以便掌握黑龙江省地区农村老年白内障患者接受手术治疗的障碍：同时就如何提高老年白内障患者手术治疗率进行分析，探索其干预途径。
[对象和方法]在黑龙江省农村地区了解到白内障患者认知度，了解病情的程度进行分析 500 人，其年龄范围为 55 岁至 86 岁，单眼视力≤O．1。“白内障复明工程”光明行动。进行访谈沟通探讨，并在探讨后短时间内记录资料，利用定性资料分析年龄、病情变化、认知程度等方面因素，进行提炼和总结，直到找到最有核心价值的观点和结论体会。让参加者对拒绝手术治疗的原因、知道白内障及手术的途径、吸引老年白内障患者手术治疗的措施。
[结果]经济问题是制约老年白内障患者接受手术的最主要的障碍，患者对白内障认知的缺乏、迷信观念影响着老人们接受手术的决定：交通的制约性不突出：对手术疼痛和并发症的担忧对其影响不大。拒绝手术原因重要程度排序：经济问题，支付能力不足：年纪状况差，承受不了手术：交通不便，手术医院离家远：担心住院期间没人照顾：恐惧手术：自觉病情轻，改善视力紧迫度不高。知道白内障及手术的途径重要程度排序：亲戚朋友告知：医生告知或医院派发小传单：电视电影：报纸杂志：收音机广播：互联网。吸引老年人手术措施的重要程度排序：减免手术费用：提供便捷交通：帮助住院期间陪护：与术后患者交流：观看手术录像。
[结论] “白内障复明工程”光明行动的形式对老年白内障患者接受手术治疗的障碍心得体会，证明“白内障复明工程”光明行动在老年人群体中是可行的。通过“白内障复明工程”光明行动了解制约农村老年患者手术治疗的影响因素，为制定相应的干预措施及有效的解决方案提供了依据。

PU-559

超声乳化联合人工晶体植入术治疗急性闭角型青光眼的临床分析

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目的：分析白内障超声乳化联合人工晶体植入术治疗急性闭角型青光眼的临床效果。
方法：回顾性分析我院 2017-12/2018-12 期间收治的急性闭角型青光眼患者 35 例，经及时降眼压后行白内障超声乳

化手术治疗的临床效果。
结果：1.术后全部患者眼压均得到有效控制，部份患者眼压一度低于 10mmHg，均可顺利恢复。2.全部患者瞳孔未

复圆，瞳孔括约肌功能未恢复。3.术后视力在 0.25-0.8 之间。
结论：超声乳化联合人工晶体植入术，是治疗急性闭角型青光眼的有效方案。临床上需要重视以下环节的处理质

量：1.降眼压的及时性和有效性。2.角膜内皮水肿的处理。3.术前房角镜的检查。4.术后处理。

PU-560
The follow-up observation of low corneal endothelial cells density after cataract phacoemulsification surgery

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Purpose The essay compares ECD, CCT values between preoperative ECD less than and more than 2000/mm^2 group after phacoemulsification. **Methods** Collecting 59 patients experienced phacoemulsification and IOL implantation in each group. ECD and CCT values were recorded 1,3,12 months postoperatively and compared in each groups. **Results** ECD was less in low ECD group and decreased with time($P<0.05$). It is no statistical significance in comparison between groups and time variation in CCT groups. CCT increased and then restored to the baseline. CCT was more in low ECD group. No statistical difference in cell loss,cell loss(%) and CCT increase,CCT increase(%) was found between groups. No bullous keratopathy occurred in all patients during the follow-up period. **Conclusions** Endothelial damage after phacoemulsification in low ECD was comparable to that in control eyes, indicating that phacoemulsification performed in low ECD eyes could get safe and great results.

PU-561
不同亚型巨噬细胞调控骨髓来源细胞在视网膜新生血管中的作用及机制

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目的：探讨不同亚型巨噬细胞（MΦ）调控骨髓来源细胞（BMCs）参与视网膜新生血管（RNV）发展的作用和机制。
方法：生后第一天（P1）的小鼠辐照后回输绿色荧光蛋白（GFP）的 BMCs 进行骨髓移植，P7-P12 置于 75%氧箱中建立氧诱导的视网膜病变模型。P12 将 M1 和 M2 型 MΦ 注射到玻璃体中，P17 行

视网膜铺片和免疫荧光观察 RNV 的程度、GFP^+BMCs 向 RNV 处的募集及 BMCs 向 $CD31^+$内皮细胞(ECs)和 α-SMA^+平滑肌细胞(SMCs)的分化情况。在体外，使用 M0/M1/M2 型 MΦ 的条件培养基（CM）分别培养骨髓间充质干细胞（BMSCs），采用 qRT-PCR、Western Blot 等检测其分化为 ECs、SMCs 及表达组织蛋白酶 L 的情况。Transwell 研究不同亚型 MΦ 对 BMSCs 迁移的影响。检测不同亚型 MΦ 及其条件培养基下的 BMSCs 表达趋化因子 SDF-1/CXCR4 及血管生成因子 VEGF 等的情况。给与 CXCR4 受体拮抗剂 AMD3100 阻断 SDF-1 信号通路后观察不同亚型 MΦ 对 BMSCs 的迁移情况。

结果：动物实验显示，P17 时 M2 型 MΦ 组的 RNV 簇、无血管区的面积、募集的 GFP^+BMCs 及其分化的 ECs、SMCs 多于 M1 型和对照组。在体外，M2-CM 培养的 BMSCs 表达 CD31、α-SMA 及组织蛋白酶 L 的 mRNA 和蛋白水平较 M1 组高。Transwell 也显示 BMSCs 向 M2-CM 中迁移的数量明显高于 M1-CM 组。同时，M2 型 MΦ 及 M2-CM 培养的 BMSCs 表达 SDF-1、VEGF 等的 mRNA 和蛋白水平较 M1-CM 更高。且阻断 SDF-1 信号通路后，不同亚型 MΦ 对 BMSCs 的迁移数目均减少。

结论：不同亚型 MΦ 均可调控 BMCs 参与 RNV 的形成，但 M2 型 MΦ 对 RNV 的促进、募集及分化 BMCs 的程度更高。且是通过上调 SDF-1、VEGF 等相关因子促进 BMCs 参与 RNV 的发生。

PU-562

玻璃体积血伴视网膜分支静脉阻塞一例

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目的：患者于 2017 年 11 月 12 日，起床后出现右侧肢体活动不利，言语不能，家属呼叫患者可睁眼示意，左侧肢体活动正常。急呼 120，急查头颅 CT，示左侧基底节区出血，后急送急救中心，患者意识模糊，行头颅核磁检查，考虑脑出血，约中午 12 点行头颅穿刺引流术。15 号再次行头颅穿刺引流术，术后患者意识模糊未见明显改善。20 日患者意识清醒后右眼视力无光感。来我科就诊，眼科检查：视力：（右眼：无光感，左眼裸眼视力 0.25；）右眼角膜透明，角膜反射正常，前房深度正常，房水清，晶状体透明；眼底：窥不入；眼压：右眼 15.3mmHg，左眼 13.4mmHg。

方法：患者玻璃体积血影响视力较重，眼底情况窥不清，因此行手术治疗。建立常规玻璃体切除三通道，灌注口位于颞下，术中见：玻璃体血性混浊，机化，血池形成，切除浑浊的玻璃体，见视乳头及上方视网膜前膜，牵拉出血，局部视网膜浅脱离，视网膜血管闭塞呈白线，未见视网膜裂孔，电凝止血，激光光凝出血点及周边视网膜 3-6 排，8/0 线缝合巩膜结膜切口，指测眼压正常，球旁注射 DG 合剂。

结果:患者术后视力恢复到手动/30cm。患者有脑出血的病史，出血后发生玻璃体积血，符合 Terson 综合征的诊断 Terson 综合征即眼-脑综合征。根据眼内出血量的多少，患者可有不同程度的视力障碍术前 B 超显示右眼玻璃体积血混浊机化，牵拉形成，由于积血严重，术前眼底镜检查未能发现视网膜分支静脉阻塞。术后使用止血针 3 天，术后 5 天行 B 超检查，未见新出血灶及网脱。

结论：Terson 引起的玻璃体内的积血可慢慢吸收，但常需几周或几月，甚至长达 1 年左右时间。积血的吸收一般从周边向中央积血吸收后患者的视力常能恢复正常。应积极治疗原发病和对症处理。必要时进行玻璃体手术。本例患者玻璃体积血至无光感，符合手术指征，因此行右眼玻璃体切除，眼内光凝电凝，气液交换术。

PU-563

护理危险原因的分析及防备对策

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目的：通过查找并消除危险因素，保障护理安全，为患者提高优质护理服务。
方法：1.从业务知识、技术技能、健康宣教以及评估等多方面加强对眼科护理人员的培训，从而提高整体护理素质。
2.护士长通过加强对护理人员的管理，规范执行医嘱，做到认真及时，严格查对制度;操作时严格操作规范。不断学习和更新知识，拓宽知识面，并善于思考、善于总结，只有扎实的理论基础知识和操作技能，才能有效的防范护理差错，避免护理纠纷。
3.护士长在管理上要做到严格，避免人情等因素。严把护理质量控制关，科内质控小组要加大监控力度，发现问题及时纠正处理。严格落实各项核心制度，规范各项操作。加强薄弱环节的排班，实行护理弹性排班。加强管理，落实各项核心制度。
4. 做好患者的心理护理。患者入院后，护士要耐心的与病人沟通，及时了解患者生活及心理需求，安抚患者，讲解疾病相关的健康知识，积极配合治疗的重要性，消除病人恐惧、焦虑等不良情绪，提高病人对治疗的信心。
结果：提高了护士的整体护理素质，加强了工作的责任心，端正了工作态度。更好的落实了各项核心制度，加强对患者的管理。
结论：护理安全作为护理工作的关键环节，是防止护理差错、纠纷的安全保障。随着护理优质服务的开展，眼科良好的护理服务，进一步加大了患者对护理服务的满意度，护理不良事件明显降低。在注重护理安全危险因素防范的同时护理人员的安全意识也得到了提高，自觉查找安全隐患，积极采取防范措施，责任感明显增强。护理安全是护理管理的根本，它始终贯穿活动的各个环节和过程中，我们必须持续地注重护理安全的薄弱环节，明确护理危险因素及存在的范围和对象，制定出合理、有效防范措施，有效落实风险管理，控制关键环节，将其消除在萌芽状态中;并运用科学管理的手段及现代的护理质量管理方法，使护理安全管理制度化、标准化、规范化，确保护理安全。

PU-564

合并黄斑前膜的 IVRAN 综合征 1 例

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患者，女性，42 岁，1 年前单位体检时发现眼底异常来我院就诊。患者否认既往病史和家族史。当时查体时情况，双眼 BCVA：OU：1.0，双眼前节未见明显异常，眼底检查，视盘边界不清，盘周较厚白色机化膜，视盘周围可见少量出血和大量黄白色渗出，黄斑区可见渗出和前膜，当时请患者完善 FFA 等相关检查，患者以不影响视力为由拒绝进一步诊治。近 3 个月来，患者自觉视物模糊遂来我院。查体情况：BCVA：OU：0.8，双眼前节未见明显异常，前房及玻璃体未见炎症反应，此次就诊的眼底荧光造影检查及 OCT 检查见下图 2 和 3。本例患者根据荧光素眼底血管造影检查可见视神经乳头和视网膜动脉处的血管瘤，视网膜血管的炎症造成视网膜血管壁的渗漏及视乳头周围黄白色硬性渗出和黄斑前膜，以及视网膜周边毛细血管闭塞，形成视网膜广泛的无灌注区，诊为 IVRAN 综合征成立。同时我们根据 Samuel 等的分期标准，此患者诊为 IVRAN 综合征二期，行周边视网膜无灌注区的光凝治疗。本病早期多无视力损伤，容易漏诊，本例患者是在体检时发现异常，也是因对视力无明显影响而一再拖延诊治疗。尽管目前大多数的个案报道视力损伤不大，但是长期的随访还是可以看到新生血管形成造成的严重并发症。目前全身的皮质类固醇激素治疗并无明显的改善，及时的 PRP 治疗或者玻璃体切割手术仍是主要的治疗手段，长期随访预防并发症的发生是视力获益的关键。

PU-565

Rush poppers 致双眼急性闭角型青光眼 1 例

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1 病例资料

患者男性，20 岁，高校在读学生。主诉：双眼视物模糊伴眼部胀痛、眩晕半日。现病史：半日前在家因吸入 Rush poppers（简称 Rush）眼前出现小块淡黄色斑影，视物不清伴眼胀、眼眶周围疼痛，无视物变性、无恶心呕吐。起初未与重视，未见明显好转遂来我院就诊。患者否认外伤史、青光眼家族史、眼部手术史、食物药物过敏史。眼专科检查：VAsc od：4.9，Vos4.9^{-2}；眼压 od29.6mmHg，os：31.5mmHg。双眼眼睑未见明显异常；双眼眼位正，眼球运动不受各向限制；双眼混合性充血(+),角膜水肿，色素性 kp(+),前房浅，周深＜1/3CT，前房闪辉(++),虹膜纹理欠清，瞳孔中度大欠圆，d≈5mm，对光反射迟钝；晶体透明，隐约见双眼眼底视乳头色淡，界尚清，C/D0.3；视网膜平伏，黄斑中心凹反光可见。辅助检查：双眼视敏度普遍降低(视野计)。初步诊断：(1)双眼急性闭角型青光眼(急性发作期)；处置：(1)20%甘露醇注射液，250ml，ivgtt，st；(2)硝酸毛果芸香碱滴眼液，1 次/15min×3→tid；(3)随访。

PU-566

151 例患者远视力检查结果正确性分析

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目的：调查分析患者远视力检查结果的正确性。
方法：制定远视力检查正确性调查表，随机对 151 例（302 眼）患者的远视力进行再次检查，对两次远视力检查结果进行总结分析。
结果：经过总结分析本组患者远视力检查结果正确率为 96.58%。
结论：视力检查是发现眼部疾病并进行诊断的重要依据，是眼科患者进行诊治的第一环节。远视力检查存在一定的主观判断，受外界影响因素诸多，比如说：患者的配合程度、患者的病情、患者的情绪、环境、光线、视力表清晰程度等原因，但本次的检查结果显示，排除患者主观因素的影响外，检查人员跟视力检查正确性有密不可分的关系。视力检查人员必须严格执行视力检查的操作规程，掌握视力检查的注意事项，规范记录检查结果，确保视力检查的正确性。

PU-567

Case report: a rare congenital oculonasal clefts, Moran Ⅰ

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Purpose: Orbitofacial clefts(OFCs) is a kind of craniofacial abnormalities, and is mainly characterized by abnormalities of bone or soft tissues from orbits, eyelids, inner or outer canthus and lacrimal apparatus. Among which the oculonasal clefts- also known as Moran Ⅰ-is the most common type. In this case, we are going to discuss a Moran Ⅰ type, but whose patterns are particularly with the eyelids defect.
Methods: Case report. Clinical features, images and surgical outcomes are presented.

Results: In this case, a 8-month-old male with eyeiid colobomas . We can easily observe an angulation deformity at 120° of the inner canthus skin in the right eye and 90° in the left. Besides, there is a triangular full-thickness skin defect about the size of 9*3mm in the left eye. Further more, the upper and lower lacrimal punctums do existed, while the upper lachrymal duct dose not. The diameter of the left corneal is about 8mm with a corneal degeneration. After surgery, we rebuild the eyelid and inner canthus of the left eye to improve the appearance.
Conclusions: Orbitofacial clefts clefts(OFCs) is a rare disease worldwide, among which oculonasal clefts is the most common type. And if it is the eyelid that is monopoly affected, we call it eyeiid colobomas. Ophthalmoplasties, such as blepharoplasty, canthoplasty and so on, are applied to improve the patients'appearances by oculists. But what to do to protect their visual function still needs further researches.

PU-568

儿童感染性眼内炎临床分析

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摘要:**目的**:探讨儿童感染性眼内炎发生的病因、临床特点、治疗方案及愈后。**方法**:回顾性研究我院2013.6-2018.6 期间收治 14 岁以下儿童确诊为感染性眼内炎 18 例 18 眼的治疗方法及结果。14 例患儿入院后立即行患眼的玻璃体切除+注药（万古霉素 1mg/0.1mL+头孢他啶 2.25mg/0.1mL+地塞米松 0.4mg/0.1mL)，其中联合晶体摘除 10 例，单纯急症行玻璃体腔内注药(万古霉素 1mg/0.1mL+头孢他啶 2.25mg/0.1mL+地塞米松 0.4mg/0.1mL)4 例,其中 3 例最终仍行玻璃体切除手术,玻璃体切除术后,充填硅油者 10 例、无菌空气者 6 例、灌注液者 2 例。**结果:**术后随访 6 月,所有病例炎症控制,4 例眼球萎缩(3 例硅油眼)。7 例硅油眼已取出硅油并植入 IOL。BCVA:<0.02 者 11 例,0.02~0.1 者 4 例,0.15~0.3 者 1 例,0.5~1.0 者 2 例。16 例(70%)较入院视力提高,4 例 (17%)不变,3 例(13%)下降,1 例不配合 。**结论**:及时行玻璃体腔内注射广谱抗生素、玻璃体切除术能改善儿童外伤性眼内炎的预后。合并眼内异物的外伤患儿Ⅰ期异物取出术后联合玻腔注射抗生素可降低眼内感染。

PU-569

正常眼压性青光眼的循证眼科治疗体会

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目的：使用循证眼科的方法诊断和治疗 1 例正常眼压型青光眼（NTG）患者，并在此过程中对 NTG 相关诊断和治疗文献进行总结和分析。方法：首先采集诊治所需临床资料，依照形成问题、寻找证据、文献评价、临床应用、回顾评审的循证眼科步骤，检索 Cochrane Library、EMbase、MEDLINE、PubMed、CBM、CNKI（以上时间限定 1990 年 ～ 2015 年）。按照证据强度高低，首先查找临床指南，Cochrane 图书馆系统评价，其它数据库系统评价，Meta 分析，设计良好的随机对照试验，若没有则查找临床对照研究，单个的临床观察或报告。英文检索词包括：normal-tension glaucoma、normal-pressure glaucoma、intraocular pressure、RCT、meta-analysis、systematic review、drug、surgery。中文检索词包括：正常眼压型青光眼、系统评价、Meta 分析、随机对照试验、药物、手术。结果：通过以上方法检索出正常眼压型青光眼治疗的临床指南 4 篇，相关的诊治随机对照试验 93 篇，Meta 分析及系统评价 9 篇。根据检索结果及现有医疗条件，制定了该例患者的治疗方案，并应用循证眼科的方法评价随访期间的治疗效果。

结论：借助循证眼科的方法能合理及有效的治疗正常眼压型青光眼，应用欧洲青光眼协会推荐的随访评估方法能较好的指导临床治疗。

PU-570

分期手术治疗急性闭角型青光眼合并白内障的疗效评估

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目的：探讨在急性原发性闭角型青光眼（APACG）合并白内障患者中，分期手术与青光眼白内障联合手术的疗效与安全性。**方法**：通过回顾性病例研究，选取就诊于我院的 APACG 合并白内障患者 41 例 43 只眼，分期手术组先行小梁切除术，择期行白内障手术，而联合手术组同期行青光眼白内障联合手术。对两种方案进行术前及术后观察并进行统计学分析。**结果**：两组患者的年龄、入院测得最高眼压及用药后术前眼压具有可比性，两组内视力、房角、基础性疾病具有均衡性。两组术后眼压、视力与组内术前相比差异有统计学意义（P <0.05），组间术后眼压、视力相比差异无统计学意义（P >0.05），至随访期结束，两组并发症的发生差异有统计学意义（P <0.05）。**结论**：术后 3 个月的临床观察表明，两种策略均能有效的降低眼压和提高视力，疗效差异无统计学意义。与联合手术相比，分期手术无明显严重并发症。初步显示采用分期行青光眼和白内障手术安全可行，可作为解决 APACG 合并白内障的有效手段。

PU-571

Ex-PRESS 引流钉植入术治疗复杂性青光眼的临床观察

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目的：探讨 Ex-PRESS 引流钉（P200 型）植入术治疗复杂性青光眼的临床疗效及其安全性。方法：收集自 2016 年 7 月至 2018 年 2 月于本院确诊为复杂性青光眼，并行 Ex-PRESS 青光眼微型引流钉植入术治疗的 37 例(40 眼)患者的临床资料，对其进行回顾性分析。比较分析术前、术后 3d、术后 1 w、以及术后 1 、2 、3 、6mon 的视力、眼压、手术成功率、使用降眼压药物种类数目以及并发症情况。结果：术后 3 d、术后 1 w 以及术后 1 、2 、3 、6 mon 的手术成功率分别为 95%、87.5%、54.1%、46.2%、54.5%、66.7%。术后各随访时间点：术后 3d、术后 1w 及术后 1 、2、3、6 mon 的平均眼压分别为 10.95 mmHg、15.41mmHg、23.56mmHg、24.52 mmHg、24.32mmHg、19.58mmHg，与术前的平均眼压 39.49mmHg 相比，差异均具有统计学意义 (P<0.05)。术前与术后 1mon 应用青光眼药物的种类数目差异有统计学意义(c2=21.618，P<0.05)。术前与术后的视力比较，差异无统计学意义(c2=0.111，P=0.739)。单纯 EX-PRESS 引流钉植入术组与联合 Phaco+IOL 植入术手术组的比较，术后 1mon 的视力差异有统计学意义(c2=5.064，P<0.05)，术前的视力差异未见统计学意义(c2=3.061，P=0.080)。并发症：2 眼出现一过性低眼压，1 眼出现前房出血，3 眼出现滤过泡功能不良，1 眼出现虹膜堵塞引流器管口，2 眼再次行青光眼手术。其余无其他严重的并发症发生。结论：Ex-PRESS 青光眼微型引流器植入术治疗复杂性青光眼是安全有效的，纵然存在部分并发症。Ex-PRESS 引流钉联合 Phaco+IOL 植入术治疗复杂性青光眼能有效控制眼压，提高视力，可作为 Ex-PRESS 引流钉植入术的另一个适应证。

PU-572

双氯芬酸钠联合维生素 c 对 TPRK 术后不适症状的缓解效果

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目的 评估双氯芬酸钠滴眼液联合口服维生素 C 缓解 TPRK 术后不适症状的临床效果。**方法** 前瞻性随机对照研究。选取 2018 年 2－6 月来青岛眼科医院行 TPRK 手术患者 70 例，分为 2 组：观察组和对照组，每组 35 例，观察组除了给予双氯芬酸钠滴眼液联合口服维生素 c 之外，其余同对照组，于术后第 1 天、第 3 天或第 4 天观察症状和体征，对眼部刺激症状进行问卷评分，包括：疼痛感、异物感、流泪、畏光、睁眼不适情况。**结果** 术后疼痛感、异物感、流泪两组患者之间差异均有统计学意义（疼痛：F=10.219，P<0.01，异物感：F=8.637，P<0.01，流泪：F=5.108，P<0.05，重复测量方差分析），术后当日及术后 1 天上述指标两组之间差异有统计学意义（P<0.05），至术后 2 天时差异无统计学意义（P>0.05）。畏光及睁眼不适感两组之间差异无统计学意义（畏光：F=3.626，P>0.05；睁眼：F=2.778，P>0.05），眼部总体不适感两组差异有统计学意义（F=7.785，P<0.01）。**结论** 双氯芬酸钠滴眼液联合口服维生素 c 可以较为简单安全的控制 TPRK 术后的疼痛感，减轻患者的不适感觉。

PU-573

内置缝线重建眼轮匝肌与下睑缩肌的粘连矫正先天性下睑内翻

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目的：轻度的先天性下睑内翻一般不需手术处理，部分症状较重的患者需要手术矫正，通常行部分眼睑皮肤及眼轮匝肌的切除来矫正睑内翻，术中有时不易把握切除的量，术后存在矫正不足或过矫的可能性。本研究通过内置缝线重建眼轮匝肌与下睑缩肌的粘连矫正先天性睑内翻，观察其矫正先天下睑内翻的效果。
方法：于下睑缘下约 1.5mm 平行睑缘作皮肤切口，两侧均超出下睑内翻的范围约 2mm，切除 2-3mm 的眼睑赘皮及轮匝肌。于睑板下缘分离暴露出下睑缩肌，切口上下缘分离出眼轮匝肌游离缘，6-0 可吸收线将分离出的上下眼轮匝游离缘水平褥式固定缝合于切口下方的下睑缩肌，观察睑缘位置，如睑缘位置理想，连续缝合皮肤切口。
结果：患者的睑内翻都能得到有效的矫正，术前的眼部刺激症状消失，外观满意，短期随访尚未见复发患者。
结论：通过内置缝线重建眼轮匝肌与下睑缩肌的粘连能有效矫正先天性下睑内翻。远期效果需进一步随访。

PU-574

Hyperlipidemia affects structure and function of corneal endothelium

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Purpose: To investigate the pathological changes of corneal endothelium and related mechanism in hyperlipidemic murine models.
Methods: Hyperlipidemic murine model was generated by feeding 4-week-old male wild type (WT) and Apolipoprotein E knockout ($ApoE^{-/-}$) mice with high fat diet (HFD). Control group was fed with

standard diet (SD). Body mass, cholesterol levels and fasting blood sugar concentrations were quantified after 16 weeks. Corneal endothelium density was evaluated by in vivo confocal microscopy (IVCM). Corneal endothelial tissue sections were subjected to scanning electron microscopy (SEM), transmission electron microscopy (TEM), and immunostaining for zonula occludens-1 (ZO-1), N-cadherin, sodium-potassium adenosine triphosphatase (Na^+-K^+ -ATPase), 4-Hydroxynonenal (4-HNE), 8hydroxy-2'-deoxyguanosine (8-OHdG) and NADPH oxidase 4 (NOX4). The gene expression of ZO-1, N-cadherin and Na^+-K^+ -ATPase in corneal endothelium were evaluated by qRT-PCR. Corneal whole-mount tissues were subjected to Oil Red O staining to demonstrate lipid deposition. Corneal endothelium damage model was used to observe the corneal endothelium function after injuring. Aqueous humor was extracted and subjected to mass spectrometric identification. To mimic invivo hyperlipidemia, primary cultures of rabbit corneal endothelial cells (rCECs) were treated with varying concentrations of palmitate. After 24h of palmitate treatment, CCK8 viability assay and immunofluorescence staining for ZO-1, N-cadherin, Na^+-K^+ -ATPase, translocase of the mitochondrial outer membrane 20 (TOM20) and mitochondrial inner membrane 23 (TIM23) were performed. The gene expression of ZO-1, N-cadherin, Na^+-K^+ -ATPase, NOX4, NFE2L2 (Nrf2), superoxide dismutase 1 (SOD1), catalase (CAT) and glutathione peroxidase 1 (GPX1) were evaluated by qRT-PCR.
Results: Hyperlipidemia was induced in both WT mice fed with HFD and *ApoE*$^{-/-}$ mice fed with SD or HFD mice. Oil Red O staining showed accumulation of lipid droplets in corneal endothelial cells (CECs) of hyperlipidemic mice. Reduced CECs density, decreased corneal edema recovery ability, cell junction disruptions, functional marker downregulation, activation of oxidative stress and changes in mitochondrial ultra-structures were observed in CECs of hyperlipidemic mice. Palmitate levels in aqueous humor significantly increased in hyperlipidemia mice. Dose-dependent cytoxicitiy of palmitate, disrupted cell morphology and function were observed in vitro hyperlipemia model.
Conclusion: Our results revealed that hyperlipidemia induced oxidative stress, ultimately leading to pathological changes in CECs. If this finding is confirmed by larger clinical studies, hyperlipidemia may become a risk factor for corneal endothelial dysfunctions and patients with hyperlipidemia or related disorders such as atherosclerosis, hypertension should be advised for routine ophthalmic examinations to prevent ocular disorders.

PU-575

原发性闭角型青光眼持续高眼压下复合式小梁切除术的临床观察

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目的：探讨急性闭角型青光眼急性大发作患者在高眼压状态下行小梁切除术，术中粘弹剂保持前房稳定、小梁下切除虹膜根部的临床疗效。**方法**：回顾析了 53 例 53 眼急性闭角型青光眼急性大发作的患者，术前应用全身及局部降眼压药物规范化降压治疗 48~72 分小时后，眼压仍≥30mmHg 的 A 组 26 眼，眼压<30mmHg 的 B 组 27 眼，均行复合式小梁切除术，术中应用粘弹剂保持手术过程中前房稳定，行小梁下虹膜根部切除后再行小梁切除，可调线紧密缝合，记录观察手术效果，对比两组患者术后 12 个月时眼压控制情况、术后并发症，特别是术后浅前房、恶性青光眼发生率的差异。**结果**：53 例患者均顺利完成手术，无爆发性脉络膜出血、恶性青光眼发生，术后浅前房发生率为 A 组 5.8%，B 组 6.7%，两组差异无统计学意义（p>0.05）。至随访结束，两组患者术后视力均有不同程度提高，眼压控制良好。**结论**：原发性闭角型青光眼患者高眼压状态下行复合式小梁切除术，术中采用前房注射粘弹剂保持前房稳定、行小梁下虹膜根部切除后再行小梁切除，可有效避免术后并发症的发生。

PU-576

眼前节重建术治疗全角膜化脓性角膜炎的临床观察

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目的 探讨眼前节重建术治疗全角膜化脓性角膜炎的临床治疗效果。
方法 回顾性分析 2016 年 6 月至 2017 年 6 月于山东省眼科医院因累及角膜缘的全角膜溃疡行眼前节重建术患者 18 例，对其病史、视力变化、眼部体征及术后治疗转归进行临床分析。主要指标包括：最佳矫正视力（BCVA）、治疗效果、复发率及角膜植片免疫排斥反应等并发症。
结果 18 例（18 眼）患者，年龄范围 27~73 岁，平均（55.6±11.4）岁，其中男性 15 例，女性 3 例；所有患者均为单眼患病全角膜感染，13 例真菌性角膜溃疡、5 例细菌性角膜溃疡。随访时间为 12~24 个月，平均 （16.9±4.0）个月，术后 BCVA≥0.3 5 例；0.1~0.3 5 例；0.05~0.1 4 例；FC 4 例，脱盲率为 77.8%；随访期内，复发 1 例（5.6%），6 例（33.3%）患者发生角膜植片免疫排斥反应，15 例（83.3%）患者发生并发性白内障，术后最后一次随访角膜内皮计数为 625~2347 个/mm²，平均为 1858 个/ mm²。无患者发生继发性青光眼。
结论 尽管眼前节重建术后免疫排斥反应发生率高于常规非高危角膜移植手术，但仍然是治疗严重感染并累及角膜缘的全角膜溃疡的有效治疗方法，可挽救眼球并保存一定视力。

PU-577

Analysis on rabbit eyes biometry results by contact A-scan ultrasound

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Purpose To analyze the biometry results on rabbit eyes including axial length (AL) and lens thickness (LT). **Methods** It was an experimental study. We selected nine healthy male Chinese domestic rabbits (17 eyes). Contact A-scan ultrasound was adopted to measure the AL and LT of rabbit eyes (recorded as S_{L1} and S_{A1} respectively). Then the eyeball was cut open to be measured isolated maximum AL (S_{A2}), and the LT (S_{L2}), the intravital data were served as living group and the other as isolated group. The sound velocity was calculated using the formula Velocity=Space/Time(V=S/T), the mean sound velocities of ocular (V_{A2}) and lens (V_{L2}) in real living state were calculated using the formula $S_{A1}/V_{A1}= S_{A2}/V_{A2}$, $S_{L1}/V_{L1}=S_{L2}/V_{L2}$ under the assumption that the echo time of two groups was the same (V_{A1} 1550 m/s and V_{L1} 1641 m/s were the default mean sound velocities of living ocular and lens respectively). Statistical Package for Social Sciences (SPSS) 19.0 program was used for statistical analyses. **Results**：Mean S_{A1} was (15.60±0.39) mm, S_{A2} was (13.73±0.56) mm, showing significant difference between the two groups (t=4.835, P<0.05), the living group was much longer. Compared to S_{L2} (5.47±0.19) mm, the average S_{L1} (6.30±0.23) mm in the living group was longer, and the difference was statistically significant (t=2.833, P<0.05). Mean V_{A2} (1380.67±61.37) m/s and V_{L2} (1452.0±10.88) m/s were slower than the default V_{A1} (1550 m/s) and V_{L1} (1641 m/s) respectively. **Conclusion**：Actual sound velocities of domestic rabbit ocular and lens were faster than the default values. Biometry results of rabbit eyes should apply the actual sound velocities to ensure the accuracy of the results.

PU-578

超声生物显微镜在窄角眼房角检查中的应用价值

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目的 探究超声生物显微镜在正常眼压窄角眼房角检查中的应用价值，了解窄角眼房角的解剖形态特征。**方法** 回顾 2017 年 1 月至 2018 年 6 月于内蒙古医科大学附属医院接受治疗的 92 例（96 眼）正常眼压老年患者为研究对象，根据房角镜检查结果将患者分为两组，其中检查为窄房角的 42 例患者（46 眼）为观察组，宽房角的 50 例患者（50 眼）为对照组。分别使用 A 超和超声生物显微镜对两组患者进行检查。比较两组患者 A 超检查下前房深度、晶体厚度、眼轴长度以及相对晶体位置；比较两组患者超声生物显微镜检查下前房深度、晶体厚度、睫状体厚度、小梁虹膜角、房角开放距离、虹膜厚度以及虹膜晶体接触距离；比较两组患者点 1%匹罗卡品滴眼液前后眼前段结构变化。**结果** A 超检查发现，观察组患者前房深度（2.50±0.28） mm、晶体厚度（4.96±0.47） mm、眼轴长度（21.23±0.87） mm、相对晶体位置（2.18±0.13），对照组患者前房深度（3.40±0.31） mm、晶体厚度（4.21±0.45） mm、眼轴长度（23.50±0.79） mm、相对晶体位置（2.35±0.11），两组数据比较差异具有统计学意义（*P*<0.05）。超声生物显微镜检查发现，观察组患者前房深度、睫状体厚度、小梁虹膜角、房角开放距离以及虹膜厚度均低于对照组患者，虹膜晶体接触距离高于对照组患者，两组数据比较差异具有统计学意义（*P*<0.05）。点 1%匹罗卡品滴眼液前后两组患者超声生物检查镜结果比较差异均具有统计学意义（*P*<0.05），两组患者点 1%匹罗卡品滴眼液前后前房深度差值、小梁虹膜角差值以及房角开放距离差值比较差异具有统计学意义（*P*<0.05）。**结论** 正常眼压窄角眼房角表现为前房浅、晶体厚、眼轴变短、晶状体相对位置靠前、小梁虹膜角变窄等特点，使用超声生物显微镜能够对眼前段结构进行很好的检查。

PU-579

Intravitreal injection of Conbercept or Ranibizumab during cataract surgery in patients with diabetic macular edema.

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Purpose: The aim of this study was to compare the efficacy of intraoperative intravitreal Conbercept or Ranibizumab injection in patients with diabetic macular edema (DME) and cataract undergoing phacoemulsification and intraocular lens (IOL) implantation.
Methods: Twenty-six eyes with cataract and diabetic macular edema were retrospectively reviewed. These eyes underwent phacoemulsification with IOL implantation and intravitreal Conbercept or Ranibizumab injection at the same setting between January 2016 and June 2018. Demographic data, best-corrected visual acuity (BCVA), central macular thickness (CMT) measured by optic coherence tomography (OCT), and adverse events were recorded.
This retrospective study included diabetic patients with cataract and DME who underwent phacoemulsification and intraocular lens implantation with a 0.5-mg Conbercept i.v.t injection (ivC) (16eyes) or with a 0.5-mg Ranibizumab i.v.t injection (ivR) (controls,12eyes).
Results: Intraoperatively and during the follow-up of 27-492 days, there were no complications related to the intravitreal application of **Conbercept or Ranibizumab** combined with cataract surgery, such as wound dehiscence and leakage, delayed wound healing, corneal edema, dislocation of the pseudophakos, rupture of the posterior lens capsule, or rhegmatogenous retinal detachment.
Conclusions: The short-term results suggest that phacoemulsification with Intravitreal injection of Conbercept or Ranibizumab safely reduces macular edema and improves visual acuity for cataract and DME in diabetics. Significant improvement in best-corrected Early Treatment Diabetic Retinopathy Study visual acuity was observed after treatment, likely because of cataract removal.

PU-580

干眼程度与 Corvis 角膜生物力学的相关性研究

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目的：观察分析患者干眼程度与角膜生物力学的相关性。

方法：收集拟于我院行角膜屈光手术的患者手术前资料，共计 60 例 120 眼，其中男性 25 人，女性 35 人，平均年龄 27.65±6.01 岁。泪液分析仪（OCULUS DK-20）检查患者泪液，根据患者术前检查干眼程度分为 3 组：level0 正常组，第 1 次泪膜破裂时间 10 秒，平均破裂时间 14 秒；level1 临界组，第 1 次泪膜破裂时间 6-9 秒，平均破裂时间 7-13 秒；level2 干眼组，第 1 次泪膜破裂时间 5 秒，平均破裂时间 7 秒；每组 20 例 40 眼。采用单因素方差分析比较各组干眼指标、角膜生物力学相关指标角膜变形幅度（DA）和硬度参数（SP-A1）的差异性。

结果：各组患者之间干眼指标差异有统计学意义（P＜0.05）。level2 干眼组的 DA 值明显高于 level0 正常组，差异具有统计学意义（P＜0.05），其余各组之间 DA 值差异无显著性。level2 干眼组的 SP-A1 值明显低于 level0 正常组，差异具有统计学意义（P＜0.05），其余各组之间 SP-A1 值差异无显著性。患者角膜地形图与角膜生物力学测量的角膜中央厚度差异无显著性。

结论：泪液分析仪（OCULUS DK-20）对于评估干眼程度的分级是有意义的。角膜屈光手术前干眼程度对于角膜生物力学具有一定的影响，可通过角膜生物力学相关指标检测。对于不同手术方式术后干眼程度与角膜生物力学的关系尚待进一步研究。角膜地形图与角膜生物力学对于角膜中央厚度的测量具有可比性。

PU-581

非甾体类药物在白内障围手术期预防瞳孔缩小的作用

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目的 探讨白内障超声乳化手术围手术期应用非甾体类药物（双氯芬酸钠、普拉洛芬）预防术中瞳孔缩小的机制及作用。
方法 通过收集和分析患者全身病史、用药史、白内障程度、术前用药频次、术前散瞳及术中瞳孔直径、术后 2 周房水状态等临床资料，总结对比两种不同药物在白内障超声乳化术前及术中对瞳孔直径的影响。
结果 术中瞳孔缩小与患者全身情况及疾病史、药物应用史、外伤史关系密切，两种药物均对白内障围手术期降低眼内 PGE2 的浓度，有减少术中瞳孔缩小的作用。
结论 术前应用非甾体类药物均有助于减少术中瞳孔缩小的作用。

PU-582

多焦点人工晶体的使用经验分享

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目的 探讨在白内障手术中植入多焦点人工晶状体的使用经验及注意事项。

方法 通过观察和分析 2018 年于我院施行的 50 例白内障联合多焦点人工晶状体植入手术，围手术期患者出现的并发症及术后视觉质量评估，总结手术要点和注意事项。
结果 大部分（90%）患者术后满意度较高，未诉明显视觉质量差异。
结论 早期严格按照适应症及相对禁忌症选择患者，合理选择 IOL 和术后屈光状态，注意手术切口及位置选择，确保 MIOL 长期居中，术前术后使用合理药物，可以达到较为理想的术后效果。

PU-583

视网膜分支静脉阻塞继发黄斑水肿玻璃体腔注雷珠单抗不同治疗方案疗效对比研究

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目的 比较视网膜分支静脉阻塞继发黄斑水肿玻璃体腔注雷珠单抗 1+PRN(Pro re nate, PRN)与 3+PRN 方案的临床疗效及安全性。
方法 根据所接受的治疗方案不同，将患者分为两组，患者接受玻璃体腔注雷珠单抗 1+PRN 方案（1+PRN 组）或 3+PRN 方案（3+PRN 组），开始治疗后每月复查视力、眼压、光学相干断层扫描等检查，随访观察 12 月。比较两组患者最佳矫正视力提高、中心凹视网膜厚度（Central retinal thickness, CRT）变化、中心凹脉络膜厚度（Central choroid thickness, CCT）变化、并发症发生情况，对比两种治疗方案的临床疗效及安全性。
结果 观察终点时（12 月），1+PRN 组 BCVA 较基线提高了 0.42±0.42 （P＜0.01），CRT 较基线降低了（385.96±344.23）μm （P＜0.01），CCT 较基线降低了（13.03±54.46）μm （P＞0.05），3+PRN 组 BCVA 较基线提高了 0.43±0.39（P＜0.01），CRT 较基线降低了（524.74±339.20）μm（P＜0.01），CCT 较基线降低了（5.00±28.04）μm （P＞0.05），两组间 BCVA、CRT、CCT 三者变化对比无统计学意义（P=0.9，P=0.09，P=0.45）； 观察期间内 1+PRN 组平均 IVR 注射次数 3.47± 1.02 次，3+PRN 组 IVR 次数 4.20±0.71 次，两者有统计学意义（P=0.01）。
结论 IVR 1+PRN 及 3+PRN 两种方案对 BRVO-ME 短期疗效显著，安全性较好；两种治疗方案对于短期内提高 BCVA、减少 CRT，减轻 ME 疗效相似，但 1+PRN 需要注射的次数低于 3+PRN；BRVO-ME 患者两种方案治疗前后 CCT 无明显变化。

PU-584

翼状胬肉切除术后角膜溃疡临床分析

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目的 分析翼状胬肉术后发生角膜溃疡的原因及临床特征，探讨治疗方案。
方法 收集继发于翼状胬肉术后角膜溃疡患者 39 例（39 眼）。仔细追溯患者术前全身及局部病史，翼状胬肉切除的手术方式及术后处理等，记录角膜溃疡病变的大小、位置、深浅，角膜缘干细胞是否受损，有无睑球粘连，有无巩膜缺血及溶解，有无病原学感染等。观察患者角膜溃疡的治疗及愈后。
结果 治疗前最佳矫正视力为光感～0.6。追溯病史，22 例行单纯翼状胬肉切除术（56.4%），14 例患者胬肉切除术中联合自体干细胞移植术（35.9%），2 例（5.1%）术中联合睑内翻矫正术，1 例

（2.6%）术中联合使用抗代谢药物。39 例患者中 22 例（56.4%）为无菌性角膜溃疡，病原学检测为阴性。17 例（43.6%）为感染性角膜溃疡，包括真菌感染 8 例（20.5%），单纯疱疹病毒感染 4 例（10.3%），细菌感染 2 例（5.1%），病原学不明化脓性角膜溃疡 3 例（7.7%）。除 4 例单纯疱疹病毒性角膜溃疡外，其余 35 例（89.7%）角膜溃疡中心均位于原翳肉附着处，27 例（69.2%）累及角巩膜缘，8 例（20.5%）合并严重巩膜缺血、坏死。经药物治疗 3 例溃疡愈合，余患者手术治疗。其中非感染性角膜溃疡 17 例（43.6%）术中联合自体干细胞移植术，感染性角膜溃疡 9 例（23.1%）将附近结膜移行覆盖。经治疗后 35 例（89.7%%）患者溃疡得到治愈，4 例出现并发症，再次手术后治愈。溃疡愈合后最佳矫正视力较治疗前明显提高（Z=-4.291 p=0.000）。

结论 继发于翼状胬肉切除术后的角膜溃疡多发生于胬肉附着处，可伴随角膜缘干细胞损伤、睑球粘连、巩膜缺血坏死等，彻底清除局部病灶，通过角膜移植手术等保证角膜的完整性及恢复角膜缘干细胞功能是治疗角膜溃疡的有效手段。

PU-585
781 名空军青少年航空学校新生视力及屈光状态横断面调查

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目的：通过对 2016 年、2018 年空军青少年航空学校新学生入校前、后视力及屈光状态进行研究，为空军青航校学生医学选拔及近视防控提供数据支持和理论依据。**方法：**选取未修改入校视力及屈光选拔标准时的 2016 级和修改后的 2018 级 2 个年级共 781 名新生作为研究对象。使用配对 t 检验对学生入校前、的视力水平进行统计分析，分别使用秩和检验和 t 检验对不同年级入校视力和屈光状态进行对比。**结果：**2018 级学生入校后视力较前显著提高（P<0.001），与前期研究一致。视力下降至 0.8 以下的 7 只眼，散瞳验光近视屈光改善（P=0.006）。2018 级学生入校复查，视力优于 2016 级学生（P<0.01）。2018 级学生屈光状态较 2016 级呈远视屈光（P<0.001）。**结论：**修改空军招收青少年航空学校学生视力及屈光标准后，2018 级学生合格入选标准后，入校复查视力优于往年，2018 级学生远视储备更大，，部分学生仍存在用眼不健康状态，视力维护需进一步加强。

PU-586
Palpebral odontogenic choristoma in a Chinese infant: a rare case report

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Purpose
To describe a case of palpebral odontogenic choristoma in a Chinese infant.

Methods
This is a case report.

Results
In March 2018, a 7-month-old baby girl was referred to our hospital for further management of congenital tumor and malformation in the lower inner eyelid of the left eye. The girl was a premature infant. There was no family history of ocular diseases or ocular trauma.
On examination at our clinic, slit-lamp examination showed a 15x15 mm, soft and mobile lower eyelid globoid mass with involvement of the eyelid margin and loss of eyelashes. A punctum-like

structure was observed and mucinous secretions outflow from the structure when press the mass(Figure 1A). CT scan of the orbit showed an abnormal high-density shadow with calcification near the left lacrimal sac and stricture of nasolacrimal duct(Figure 1E).
With a suspected clinical diagnosis of congenital tumor and malformation, the mass was removed totally under general anesthesia and sent for pathologic examination. Palpebral dissection revealed a tooth. (Figure 1C). Pathologic examination showed that adjacent to the tooth was some chronic inflammatory cells. The punctum-like structure was a fistula and lined by nonkeratinizing squamous epithelium. (Figure 1F).
In August 2018, we tried to obtain a panoramic dental x-ray at visit. But it was failed because the infant could not cooperate.

Conclusion
To our knowledge, this is the forth case report of palpebral odontogenic choristoma in the world and not been previously reported in a Chinese population in the literature. Congenital benign masses in the lower-inner eyelid should consider the possibility of the palpebral odontogenic choristoma. CT showed that abnormal high density shadow with calcification near the lacrimal sac, which is of significance for diagnosis.

PU-587

驱螨治疗在儿童霰粒肿患者中的疗效观察

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目的 探讨驱螨药物治疗在儿童霰粒肿治疗中的作用效果
方法 将螨虫阳性的睑板腺囊肿患儿根据治疗方法不同分成 A、B 两组，A 组为保守药物治疗，B 组为手术治疗。A 组根据是否加入除螨药物再分为 a1 组和 a2 组，a1 组为常规抗生素滴眼液治疗，a2 组为抗生素滴眼液治疗联合除螨治疗，进行电话随访，记录两组患儿治疗结果，进行统计学分析。B 组根据术后是否加入除螨药物再分为 b1 组和 b2 组，b1 组为术后常规抗生素滴眼液治疗配合热敷，b2 组为抗生素滴眼液治疗联合除螨治疗配合热敷，术后随访 2w、4w、6w、8w，记录两组患儿术后复发率，进行统计学分析。
结果 加入除螨药物组儿童霰粒肿患者治愈率明显高于对照组；加入除螨药物组儿童霰粒肿患者术后复发率明显低于对照组
结论 驱螨治疗可提高儿童霰粒肿患者的治愈率，降低复发率，减轻患儿痛苦及家庭的心理及经济负担

PU-588

急性中心性浆液性脉络膜视网膜病变多波长炫彩图像特征观察

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目的 应用多波长炫彩成像技术对急性中心性浆液性脉络膜视网膜病变（CSC）患者的黄斑区进行扫描，观察其图像特征。 **方法** 回顾性病例研究。2017 年 8 月至 2018 年 1 月在武汉大学人民医院眼科中心确诊的 34 例急性 CSC 患者 34 只眼纳入研究。其中，男性 21 例 21 只眼，女性 13 例 13 只眼，年龄 26~61 岁，平均年龄 45.1 岁，发病时间 5~45 天，平均发病时间 19.1 天。采集患眼彩色眼底像（CFP）、荧光素眼底血管造影（FFA）联合吲哚箐绿血管造影（ICGA）、多波长炫彩成像（MC）、光学相干断层扫描（SD-OCT）图像。对比分析同一患眼的 MC、CFP、FFA、ICGA 和 SD-OCT 的影像特征。**结果** 浆液性视网膜神经上皮脱离区，在标准 MC 像和蓝绿加强像上表现为边

界清晰的绿色反光区 33 只眼，占 97.06%，1 只眼可见浆液性神经上皮脱离但边界不清，占 2.94%。在 BR 上呈弱反光区 17 只眼，占 50%；在 GR 上呈边界清晰的弱反光区 32 只眼，占 94.11%；在 IR 上呈边界清晰的弱反光区 33 只眼，占 97.06%。在 SD-OCT 上，FFA 荧光素渗漏点对应处表现为微小 PED、RPE 光带粗糙和较大 PED 分别为 19 只眼（55.88%）、12 只眼（35.29%）和 3 只眼（8.82%）。RPE 渗漏部位，在标准 MC 和蓝绿加强像上表现为神经上皮脱离区内的红色斑驳样改变 29 只眼，占 85.29%；在 BR 上呈强反光斑点 2 只眼，占 5.88%；在 GR 上表现为强反光斑点 5 只眼，14.70%；在 IR 上表现为弱反光区中夹杂强反光斑点 33 只眼，占 97.05%。**结论** 标准 MC 像、蓝绿加强像和 IR 像均能较好的观察急性 CSC 病灶的渗漏点和视网膜神经上皮层脱离，GR 像能较好的观察急性 CSC 视网膜神经上皮脱离，利用各波长不同的成像特点，可作为该病的辅助诊断手段。

PU-589

多波长炫彩成像在黄斑囊样水肿诊断中的应用价值

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目的 观察黄斑囊样水肿（CME）在多波长炫彩成像图像（MC）的影像特征，并评估 MC 在 CME 诊断中的应用价值。
方法 描述性研究。2017 年 8 月至 2018 年 6 月在武汉大学人民医院眼科确诊的 CME 患者 37 例 42 只眼纳入研究。其中，DR11 例 14 只眼，CRVO13 例 14 只眼，BRVO8 例 8 只眼，葡萄膜炎 3 例 4 只眼，Eales 病 2 例 2 只眼。采集患眼彩色眼底照相、荧光素眼底血管造影（FFA）、MC、光学相干断层扫描（SD-OCT）检查。与 SD-OCT 对比分析，对彩色眼底照相和 MC 图像进行评分。采用 Friedman M 检验和 Wilcoxon 符号秩检验进行统计学处理。
结果 标准 MC 和蓝绿加强像见黄斑区片状蓝绿色隆起或花瓣状外观，周围环绕绿色隆起反射，边界清晰。BR 像见黄斑区低反射区。GR 像上可见黄斑区片状或囊样低反射暗区，周围环绕稍高反射区。IR 像上可见黄斑区片状或囊样高反射区，周围环绕低反射暗区，边界清晰。彩色眼底照相和多波长炫彩各图像评分总体比较，差异有统计学意义（c^2=151.50，P＜0.05）。标准 MC（3.02±1.02）、蓝绿加强像（2.88±1.06）、IR（2.55±1.27）、GR（1.95±1.25）评分均明显高于彩色眼底照相（1.19±0.94），其差异具有统计学意义（P＜0.05）。BR 像评分低于彩色眼底照相，差异有统计学意义（P＜0.05）。
结论 MC 成像质量明显优于彩色眼底照相，作为 CME 诊断的辅助手段，为临床医师提供更全面的信息，提高临床诊断水平。

PU-590

CICARE 流程化沟通模式与眼位训练相结合在 FS－LASIK 手术中的应用价值

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目的 探讨 CICARE 流程化沟通模式与眼位训练相结合在 FS－LASIK 手术中的应用价值。方法 将 2017.1-2018.6 在我院行 FS－LASIK 的手术患者 200 名（400 眼)进行随机分组，实验组进行 CICARE 流程化沟通与眼位训练相结合的护理干预，对照组实施眼科常规护理，比较两组手术患者的 SAS 焦虑程度、满意度、术中配合度及术后六个月的视力情况。结果 实验组 SAS 焦虑程度(见表 1)、满意

度（见表 2）、术中配合程度及术后六月视力（见表 3）均优于对照组，两组间差异均有统计学意义（<0.05）。结论 CICARE 流程化沟通模式与眼位训练相结合可以有效改善患者的心理状况，提高患者满意度、术中配合程度，在术后视力访视中具有良好的效果，值得推广。

PU-591

睑板腺功能障碍导致角膜塑形镜使用过程中的问题研究

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目的：在使用角膜塑形镜期间出现轻度睑板腺功能障碍问题的处方法
方法：回顾分析历史性病例 2013-2018 年塑形镜使用患者 38 例 68 只眼配戴角膜塑形镜在复查过程中发现因轻度睑板腺功能障碍导致患者不舒适感，镜片定位不良，视力波动出现重影，镜片蛋白沉积不易清洁，角膜上皮散在点染。处理方法：热敷：使用热毛巾一般控制在 42℃左右，时间大概 15 分钟。早晚各一次，热敷以后，睑板腺分泌的油脂液化，睑缘的清洁：可以采用无菌棉签沾取妥舒（涂布霉素与地塞米松）滴眼液来回檫拭睫毛根部以及内侧的睑缘，早晚各一次。药物治疗：补充无防腐剂人工泪液，清洁完睑缘及时滴入眼内，避免油脂进入眼内刺激角膜上皮。
结果：塑形镜患者在使用期间出现轻度睑板腺功能障碍，此方法简单易行，便于患者自己操作，提高了塑形镜使用过程中因镜片的清洁度，导致镜片定位不良导致视力波动及引起角膜上皮的安全，以及油脂分泌刺激角膜结膜带来的眼红，干涩及异物感。
结论：在使用角膜塑形镜期间出现轻度睑板腺功能障碍问题以上处理方法安全有效，为患者增加继续使用塑形镜的机会。

PU-592

OCTA 观察视网膜中央静脉阻塞继发黄斑水肿治疗效果

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视网膜中央静脉阻塞 （CRVO）继发黄斑水肿（CME）是临床常见的疾病，我们应用血管成像 OCT（OCTA）观察一例治疗效果，现报告如下。
01.病历摘要
患者 XXX,女，48 岁，因“左眼视力下降 10 余天”入院。眼部检查： VOS：0.3，最佳矫正视力（BCVA）0.4。眼压：NCT OS 13.0mmHg。左眼前节未见异常；眼底：黄斑区色素紊乱，视网膜静脉血管迂曲，静脉血管末端可见点片状出血。右眼未见异常。眼底荧光血管造影：左眼动静脉充盈时间 (14 秒，18 秒)，静脉血管迂曲扩张，造影早期开始视盘呈强荧光，视网膜血管管壁着染，黄斑部呈花瓣状强荧光，全视网膜可见散在片状出血遮蔽荧光，未见明显新生血管及无灌注区，晚期荧光渗漏。OCTA 示：视网膜黄斑中心凹厚度（CMT）312 um，黄斑区脉络膜血流 1.930 mm^2。入院诊断：1、左眼视网膜中央静脉阻塞 2、左眼黄斑囊样水肿 3、双眼年龄相关性白内障 4、双眼屈光不正 。治疗方案：左眼玻璃体注射曲安奈德(TA) 2mg，术后第 7 天行微脉冲激光光凝术（微脉冲参数：5%*200um*200mw*180ms*441 点） 。
注药术后第 10 天：BCVA 0.8， CMT 235 um，黄斑区脉络膜血流 2.008 mm2；术后半个月：BCVA 1.0，CMT 228 um，黄斑区脉络膜血流 1.954 mm2；术后 2 个月：BCVA 1.0，CMT 216 um，黄斑区脉络膜血流 1.960 mm2；术后 3 个月：BCVA 1.0，CMT 217 um，黄斑区脉络膜血流 1.941 mm2。
02.讨论

眼内注射 TA 可减轻炎症反应，保护血-视网膜屏障，减轻黄斑水肿；有研究表明，微脉冲激光治疗黄斑水肿是有效和安全的[1-3]。本文中应用 OCTA 明确观察到视网膜水肿消退、黄斑区脉络膜血流改变，提示 OCTA 可作为观察 CRVO 继发 CME 治疗效果的客观依据。

PU-593
角膜电刺激对于糖尿病前部缺血性视神经病变大鼠的影响

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目的 观察并评估角膜电刺激对糖尿病前部缺血性视神经病变大鼠的影响。**方法** 大鼠 40 只，随机抽出 8 只作为正常大鼠组。余下 32 只先予以链脲佐菌素腹腔注射建立糖尿病大鼠模型，将成模的大鼠随机抽出 8 只作为糖尿病组，余下 24 只成模糖尿病大鼠采用孟加拉玫瑰红联合 532nm 激光方法建立前部缺血性视神经病变大鼠模型。将上述成模的视神经病变大鼠随机分成三组，每组 8 只，分别为糖尿病前部缺血性视神经病变组，不予任何处理；电刺激组，予以角膜电刺激（刺激参数为：电流 1mA,频率 20HZ,波宽 1ms/phase,刺激时间 1 小时，隔日 1 次，刺激 2 周）；假电刺激组，电极安放位置与电刺激组相同，仅不接通电源。2 周后 5 组大鼠进行眼底照相检查、光学相干断层扫描、视觉诱发电位，处死后行视网膜及视神经冰冻切片，苏木精伊红染色观察。**结果** 五组在视盘上半部平均视网膜厚度变化上存在显著的差异（F=5.055，P<0.05）。其中糖尿病 AION 组视盘上半部平均视网膜厚度高于正常组、糖尿病组、电刺激组；电刺激组低于糖尿病组、糖尿病 AION 组、假电刺激组，差异均有统计学意义（P<0.05）；正常组与糖尿病组未见明显差异（P>0.05），糖尿病 AION 组与假电刺激组未见明显差异（P>0.05）。视觉诱发电位示糖尿病 AION 组 N1 潜伏期较电刺激组延长，差异有统计学意义（t=2.09,P＜0.05）；糖尿病 AION 组 P1 潜伏期较正常组、糖尿病组、假电刺激组延长，差异有统计学意义（t=2.08、t=2.46、t=3.26,P＜0.05）；电刺激组 N1-P1 波幅大于假电刺激组（t=3.49,P＜0.05），差异有统计学意义。**结论** 角膜电刺激能促进糖尿病前部缺血性视神经病变大鼠肿胀的视盘变薄，加速视盘水肿的消退，同时在一定程度上改善视功能。

PU-594
眼部转移性乳腺癌 1 例

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患者女性，41 岁，因左眼上睑肿胀 3 月伴疼痛 20 天，于 2017 年 6 月以“左眼球内肿物”入院。既往于 2012 年 4 月行右侧乳腺癌根治术，病理诊断：乳腺浸润性导管癌，伴腋窝淋巴结转移。

PU-595
小鼠糖尿病相关干眼的发病进程研究

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目的 采用链脲菌素（Streptozotocin，STZ）腹腔注射诱导的 1 型糖尿病小鼠模型，研究随着糖尿病病程延长干眼相关症状的发生发展进程。 **方法** 正常 6-8 周龄雄性 C57BL/6 小鼠 60 只，随机分为

对照组和糖尿病组。在末次 STZ 注射后 1、2、4 月时，比较 2 组小鼠平均体重、血糖浓度、泪液分泌量、泪腺重量、眼表虎红染色、角膜敏感度、结膜杯状细胞密度等指标的变化，并分析其与泪液分泌量变化的关系。 **结果** 糖尿病组小鼠在 STZ 注射后 1-4 月内维持高血糖水平，体重不再增加，与同龄对照组小鼠相比差异有统计学意义（均 $p < 0.05$）。在 STZ 末次注射后 1 月，小鼠泪液分泌量即开始下降，泪腺重量不再增加，与同龄对照组小鼠相比差异有统计学意义（均 $p<0.05$）。在 STZ 末次注射后 2 月，眼表虎红染色出现阳性着色，角膜敏感度开始下降，与同龄对照小鼠相比差异有统计学意义（均 $p<0.05$）。在 STZ 末次注射后 4 月，小鼠结膜杯状细胞密度出现下降，泪腺组织出现显著的纤维化和炎性细胞浸润。 **结论** STZ 诱导的 1 型糖尿病小鼠早期主要表现为泪液分泌量下降，随糖尿病病程延长逐渐加重，后期出现眼表着色、泪腺结构变化、杯状细胞密度下降等现象。

PU-596

关于最新版 ICMJE 推荐规范的几点认识

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《学术研究实施与报告和医学期刊编辑与发表的推荐规范》（Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals）即 ICMJE 推荐规范。2018 年 12 月推出最新版的 ICMJE 推荐规范。ICMJE 推荐规范为科技期刊编辑对于科技文章的编辑和加工以及科研工作者撰写科研论文起到指导作用。作为一名科技期刊编辑，从最新版的 ICMJE 推荐规范，对科技论文的撰写提出几点建议：

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科研论文的撰写是科学研究的最后一环。在前期的实验/试验设计、实施等环节就要严格遵守各项伦理规定。科学研究的初心是扩展确凿无误的知识并让知识服务于人类社会。科研工作者肩负社会责任，要把握好自己所从事的科学活动成为一项造福人类的事业。2018 年 11 月 26 日，深圳科学家贺建奎宣布全球首例免疫艾滋病的基因编辑婴儿在中国诞生，引起极大的伦理争议。

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PU-597

Influence of pars plana vitrectomy on ocular surface using noninvasive Keratograph 5M

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Background: The noninvasive Keratography has been used in evaluating surgery-induced ocular surface changes, while few were known about the influence of pars plana vitrectomy (PPV) on ocular surface. This study aimed to evaluate the influence of PPV on ocular surface using Keratograph 5M.

Methods: 30 patients (30 eyes) undergoing primary PPV were recruited in the study. Ocular Surface Disease Index (OSDI) questionnaire was performed. Ocular surface parameters, including tear meniscus height (TMH), noninvasive tear break up time (NITBUT) and bulbar redness score were obtained preoperatively, at 1 week, 2 weeks, 4 weeks, 8 weeks and 12 weeks postoperatively by Keratograph 5M. Correlations between all the clinical parameters were analyzed further.
Results: The percentages of both photophobia and gritty within 4 weeks after PPV were significantly higher than preoperation, while they decreased to the preoperative levels at both 8 weeks and 12 weeks postoperatively. The percentage of sore eyes within 2 weeks postoperatively was significantly higher than preoperation, but there were no significant differences between the percentages of preoperation and 4 weeks, 8 weeks and 12 weeks postoperatively. OSDI score increased significantly within 8 weeks postoperatively, but it returned to the preoperative level at 12 weeks. TMH was increased significantly at the first week after PPV, and recoverd to preoperative level at 2 weeks postoperatively. Both NITBUT-first and NITBUT-average shortened significantly within 8 weeks postoperatively, but they gradually improved to the preoperative levels at 12 weeks. Bulbar redness score was significantly higher than preoperative level within 4 weeks postoperatively, but it returned to the preoperative level at 8 weeks. NITBUT-first and NITBUT-average had a significant positive correlation at each visit. OSDI score had a significant positive correlation with bulbar redness, and TMH had a significant positive correlation with NITBUT-average at both 1 week and 2 weeks postoperatively.
Conclusions: Keratograph 5M can provide a reliable noninvasive method to assess the influence of PPV on ocular surface. PPV may cause various changes in both symptoms and signs of ocular surface damages at an early stage, while all these changes will return to preoperative levels gradually at 12 weeks postoperatively.

PU-598

白内障患者合并 Fuchs 角膜内皮营养不良行白内障超声乳化手术的临床观察

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目的 白内障是常见的致盲性眼病,目前主流的手术方式主要为白内障超声乳化吸除、人工晶体植入术。若白内障患者同时合并 Fuchs 角膜内皮营养不良,角膜内皮计数远低于正常同龄人角膜内皮计数值,则术后易出现角膜水肿，且要考虑角膜内皮失代偿风险。此文探讨了白内障患者合并 Fuchs 角膜内皮营养不良行白内障超声乳化手术的可行性。
方法 由同一手术医师对 2017 年 9 月-2018 年 9 月于我院同一地点使用同类型器械对 3 人(6 眼)的白内障(核硬度Ⅱ-Ⅳ级)合并 Fuchs 角膜内皮营养不良（赘疣期）患者于局麻下行白内障超声乳化吸除、人工晶体植入术。术后观察视力变化及角膜状态（有无角膜水肿，有无角膜后弹力层皱褶），术后每日观察角膜水肿程度及范围，并比较术前与术后一月的角膜内皮计数。
结果 6 眼术后第 1 天角膜均出现不同范围雾状水肿及角膜后弹力层皱褶，术后使用左氧氟沙星滴眼液、妥布霉素地塞米松滴眼液、眼膏及重组牛碱性成纤维细胞生长因子眼用凝胶点眼，术后每日观察水肿范围，可见角膜水肿明显减轻，水肿范围缩小，均呈好转趋势。术后一周 5 眼角膜透明，1 眼仅余小范围局限性角膜雾状水肿,但均有角膜后弹力层皱褶存在。术后 1 月角膜水肿及皱褶均消退。术后 1 月 6 眼视力均较术前显著提高。术后 1 月角膜内皮平均丢失率为 17.4%，无病例出现角膜内皮失代偿。
结论 在术前充分完善检查了解病情，对晶体核硬度及角膜情况做到心中有数，评估悬韧带情况并排除晶体脱位，术中使用高效能粘弹剂保护角膜，手术操作熟练轻柔，超乳晶体时尽量减少超声能量的使用，术后合理用药，白内障合并 Fuchs 角膜内皮营养不良行白内障超声乳化手术也是可行的。

PU-599

巩膜外黄斑外垫压术治疗硅油填充术后复发性超高度近视黄斑裂孔性网膜脱离

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目的 探讨巩膜外黄斑外垫压术治疗硅油填充术后复发性超高度近视黄斑裂孔性网膜脱离(macular hole retinal detachment, MHRD) 的可行性及疗效。
方法 回顾性分析 2016 年 6 月至 2018 年 1 月玻切硅油填充术后的复发性超高度近视性 MHRD 患者 10 例(10 眼)，所有患者均由同一术者行巩膜外黄斑外垫压术，将 MEDPOR 种植体＋人造血管＋环扎条带制成的“三明治加压块”固定垫压于黄斑区，术后行眼眶 CT 检查明确加压块位置。术后随访 18 个月，6-12 个月取出硅油，观察记录术后并发症、视网膜脱离复位情况、黄斑裂孔闭合情况、术后视力、眼轴长度等指标。
结果 CT 显示 10 眼加压块均位于黄斑区；末次随访 SD-OCT 示 10 眼视网膜完全复位，7 眼黄斑裂孔完全闭合，3 眼黄斑裂孔部分闭合；9 眼术后最佳矫正视力(best correct visualacuity，BCVA)较术前提高，1 眼提高不明显；术前患者 BCVA 为(1. 55± 0.26) logMAR，术后三个月 BCVA 为(0. 99 ±0. 05) logMAR，与术前比较差异均有统计学意义(P < 0. 001)；术前患者眼轴长度为(31.27 ± 1. 18) mm，术后三个月为(28. 81 ± 0.87) mm，与术前比较差异均有统计学意义(P < 0. 001)。所有患眼均未发生眼底出血、眼内炎、涡静脉回流障碍、眼前部缺血综合征等并发症。
结论 巩膜外黄斑外垫压术是治疗硅油填充术后复发性超高度近视 MHRD 安全有效的手术方法，能提高视网膜解剖复位率、黄斑裂孔闭合率及视力。

PU-600

不同浓度多西环素对大鼠角膜碱烧伤 TGF-β1 和 MMP-9 表达的影响

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目的 探讨不同浓度多西环素对碱烧伤大鼠角膜组织中 TGF-β1 和 MMP-9 表达的影响。方法 SD 大鼠制备成右眼角膜碱烧伤模型，随机分为眼液溶媒组（对照组）、0.5 $g•L^{-1}$ 多西环素组和 1.0 $g•L^{-1}$ 多西环素组，每组 15 只。于碱烧伤后第 3 天、第 7 天、第 14 天行 RT-PCR 和 ELISA 检测角膜组织中 TGF-β1 和 MMP-9 的表达情况。结果 碱烧伤后第 3 天、第 7 天、第 14 天，0.5 $g•L^{-1}$ 多西环素组（0.56±0.09，0.66±0.03，0.58±0.07）（86.93±3.48，88.93±3.35，85.36±3.09 pg/ml）、1.0 $g•L^{-1}$ 多西环素组 TGF-β1 mRNA 及蛋白相对表达量（0.36±0.06，0.44±0.04，0.31±0.08）（71.76±2.10，77.05±4.46，70.95±4.68 pg/ml）均较对照组（1.01±0.20，1.03±0.26，1.01±0.14）（115.27±3.82，120.27±7.37，104.44±2.98 pg/ml）低；碱烧伤后第 3 天、第 7 天，0.5 $g•L^{-1}$ 多西环素组（0.40±0.03，0.60±0.04）（588.79±54.49，974.41±97.60 pg/ml）、1.0 $g•L^{-1}$ 多西环素组 MMP-9 mRNA 及蛋白相对表达量（0.30±0.03，0.43±0.03）（427.35±57.46，765.06±36.31 pg/ml）均较对照组（1.00±0.11，1.01±0.18）（1005.15±17.23，1210.76±29.67 pg/ml）低。浓度越高差异越明显，上述差异均有统计学意义（P＜0.05）。结论 多西环素作用于碱烧伤大鼠角膜可下调 TGF-β1 和 MMP-9 的表达，促进角膜愈合，并呈一定程度的剂量依赖性。

PU-601

L-carnitine alleviates oxidative stress-related damage by MAPK signaling in human lens epithelial cells exposure to H2O2

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Purposes: L-carnitine (LC) is well-known for its anti-oxidative properties. In present study, we aimed to evaluate the effect of LC on the human lens epithelial cells (HLECs) and its regulatory mechanism on cataractogenesis. **Methods:** HLE B-3 cells were cultured with hydrogen peroxide (H_2O_2) in the presence or absence of LC. CCK-8 assay was used to determine the cell viability. DCFH-DA staining was carried out to determine the reactive oxygen species (ROS) production induced by H_2O_2 and LC. RT-PCR and Western Blot were performed to detect the expression levels of oxidative damage markers and antioxidant enzymes. **Results:** ROS overproduction was found when exposed to H_2O_2, LC supplementation significantly decreased the ROS through activation of antioxidant enzymes FoxO1, PRDX4 and CAT. LC suppressed the cell apoptosis and inflammation, the expression of caspase3 and IL-1 were inhibited. LC promoted the PCNA, CDK2 and CDK4 expression to rescue the cell proliferation after HLECs incubated with H_2O_2. EMT occurred when ROS accumulation, whereas the reversion of AQP1 and vimentin expression could be observed with LC supplementation. LC restored the oxidant/antioxidant balance and the cell damage through MAPK signaling pathway. **Conclusions:** In conclusion, LC has the protective role in curbing oxidative damage and thus may be a potential therapeutic agent for cataract.

PU-602

40 例门诊糖尿病患者糖尿病视网膜病变筛查情况的调查研究

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目的: 为了指导对糖尿病患者的防盲宣教工作，进行了此项调查研究。
方法: 2018 年 6 月 4 日至 6 月 7 日期间，每日在中国人民解放军总医院内分泌科门诊抽查 10 例来诊的糖尿病患者，在经患者同意后，进行问卷调查，内容包括：性别、年龄、糖尿病病程、是否定期做眼科检查、是否已确诊糖尿病视网膜病变、对糖尿病视网膜病变是否了解，是否愿意做糖尿病视网膜病变筛查。记录资料并分析。
结果: 40 例门诊糖尿病患者中，糖尿病病程在 0-10 年的占 57.5%，11-20 年的占 30%，大于 20 年的占 12.5%。患病后从未做过眼科检查的有 45%，没有患者自诉已经确诊为糖尿病视网膜病变，了解糖尿病视网膜病变的占 77.5%，愿意进一步做糖尿病视网膜病变筛查的占 65%。在对不愿意进步一做筛查的患者进行糖尿病视网膜病变的简单宣教后，仍不予以重视的有 3 人。
结论: 糖尿病视网膜病变早期并没有明显的视力下降、视物模糊等症状，加之糖尿病患者对糖尿病视网膜病变的医学知识的缺乏，导致难以实现糖尿病患者在确诊糖尿病后自觉尽早做眼科查体并遵医嘱定期复查。应加强对全民进行医疗知识的科普工作，社区应定期组织糖尿病患者交流会并充分利用社区板报宣传栏进行图文教育，医院应定期开设糖尿病视网膜病变的公益讲座，提高患者的重视程度，尽可能对糖尿病视网膜病变患者做到早发现、早治疗，降低该病致盲率。

PU-603

晶状体超声乳化术治疗早期闭角型青光眼

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目的 评价晶状体超声乳化术治疗早期原发性闭角型青光眼的临床效果。**方法** 回顾性分析 2016 年 9 月至 2018 年 2 月收治的原发性慢性闭角型青光眼 47 例（54 眼）。患者随机分为两组：A 组 23 例(29 眼)行超声乳化人工晶状体植入术；B 组 24 例(25 眼)行周边虹膜切除术。随访 6 个月。**结果** A、B 两组术前眼压分别为（22.72±7.85）mmHg 和（22.48±6.95）mmHg（1 mmHg=0.133kPa），差异无统计学意义（t=0.124,P=0.905），术后两组各时间点眼压均较术前下降，差异有统计学意义（P＜0.05）。A 组术后 3 天及术后 6 个月视力均较术前提高，差异有统计学意义(t=-7.710,P=0.000;t=-7.012,P=0.000)。B 组术后 3 天及术后 6 个月视力与术前相比，差异无统计学意义（t=0.184,P=0.855;t=0.744,P=0.460）。A 组术后中央前房深度与术前相比显著加深，差异有统计学意义（t=-24.021，P=0.000），A 组术后周边前房深度与术前相比明显加深，差异有统计学意义（H=28.310，P=0.000）。**结论** 超声乳化人工晶状体植入治疗早期原发性闭角型青光眼，可以降低眼压、改善视力。

PU-604

徐州市中心城区和城乡结合区糖尿病患者中糖尿病视网膜病变患病率及其影响因素的对比分析

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目的 研究徐州市中心城区和城乡结合地区糖尿病患者中糖尿病视网膜病变(DR)的患病率及影响因素的差异。**方法** 采用横断面调查的方法，以整群抽样的方式调查 2018 年 5 月前在徐州市和平社区卫生服务中心（中心城区）和城西社区卫生服务中心（城乡结合区）辖区内建立电子健康档案并确诊为Ⅱ型糖尿病的所有患者，进行体格测量，采集血液尿液检测，进行验光、眼压、眼底照相、Angio-OCT 检查、裂隙灯检查等眼科检查，收集一般信息、生活习惯、病史情况，分析两个区之间、各区 DR 组及非 DR 组之间差异，研究各地区 DR 的危险因素。**结果** 本次调查完成所有检查的糖尿病患者共 1279 例，中心城区 929 例，DR 患病率 13.5%，男性 44.2%，年龄(66.33±9.62)岁。城乡结合区 350 例，DR 患病率 18.6%，男性 39.7%，年龄(63.93±9.23)岁。中心城区糖尿病患者年龄、糖尿病病程、腰臀比、文化程度、平均睡眠时间及职工医保、使用降糖药、自己测血糖频率、认为控制血糖效果好、高血脂、冠心病、糖尿病肾病的比例高于城乡结合区，空腹血糖、平均动脉压、高密度脂蛋白胆固醇、尿微量白蛋白及配偶或子女同住、关灯后看电子产品、糖尿病足的比例低于城乡结合区，差异有统计学意义。中心城区 DR 的影响因素有文化程度、糖尿病确诊年龄、空腹血糖、糖化血红蛋白、尿微量白蛋白、使用降糖药，城乡结合区 DR 的影响因素有晚上关灯后看电子产品、平均每晚睡眠时间、糖尿病病程、腰臀比、糖化血红蛋白、尿微量白蛋白、使用降糖药。**结论** 中心城区糖尿病居民 DR 患病率低于城乡结合区，糖化血红蛋白水平高、尿微量白蛋白水平高、使用胰岛素或者联合用药是患 DR 的共同的独立危险因素，在中心城区文化程度低、糖尿病确诊年龄低、空腹血糖高也是患 DR 的独立危险因素，而在城乡结合区晚上关灯后看电子产品、平均每晚睡眠时间少、糖尿病病程长、腰臀比高也是患 DR 的独立危险因素。

PU-605

从脾胃论治温胆汤加减治疗小儿反复发作胞生痰核病案心得

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目的：目前临床上儿胞生痰核常常多发，且易反复发作，且病程长，发展缓慢，儿童与成年均可患病，成年人治疗多以手术治疗为主，但针对儿童手术不易配合，全麻下手术患儿家属难以接受，且术后易于复发，中医药治疗本病可达到满意疗效，并可以减少病情复发。此外还介绍了其他医家治疗本病的方法，希望能为临床治疗本病提供可资借鉴的资料及思路。
方法：通过对患儿病情，用药治疗的追踪随访，整理论文心得，以此分享得每位眼科同仁。
结果：中医药治疗本病可达到满意疗效，并可以减少病情复发。
结论：结合小儿的生理病理特点，从脾胃论治，先清解后健运，标本兼顾，在临床实践中取得了良好的疗效。

PU-606
Tat-Beclin1 多肽对慢性青光眼大鼠视神经的保护作用研究

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目的：自噬在青光眼的病理生理过程发挥重要作用。本文研究自噬诱导剂 Tat-Beclin1 多肽对慢性青光眼大鼠视神经的保护作用及机制。
方法：SD 大鼠右眼前房内单次少量注射 Tenon's 囊成纤维细胞制作大鼠青光眼模型，随机分对照和治疗组。10 天后，对照组大鼠右眼玻璃体内注射 5ul 100uM 乱序（scrambled）Tat-Beclin1，治疗组大鼠右眼玻璃体腔内分别注射 5ul 50uM、100uM 和 200uM 的 Tat-beclin1。观察大鼠眼部反应并用 TonoLab 眼压计测量大鼠眼压。2 个月后处死大鼠，用荧光金逆行标记法计数存活的视网膜神经节细胞(RGC)，苏木精和伊红（H&E）染色视网膜切片观察视网膜病理变化以及视网膜厚度改变。提取大鼠全视网膜蛋白，Western blot 分析测定自噬相关蛋白 beclin1 和 LC3 的表达。
结果：大鼠前房注射成纤维细胞后眼压显著升高。与对照组相比，荧光金染色显示 50uM（1292±296.1 个/mm2） 和 100uM Tat-Beclin1（1253±116.6 个/mm2）治疗组的 RGC 计数显著高于对照组（985.6±124.1 个/mm2，P 值均小于 0.05），200uM Tat-Beclin1（725.8±177.3 个/mm2）治疗组显著低于对照组（P<0.05）。视网膜厚度改变情况与此相似。 Western blot 结果显示，Tat-Beclin-1 治疗组中 LC3Ⅱ/Ⅰ的比值与对照组相比显著上调。
结论：Tat- Beclin1 玻璃体内注射诱导慢性青光眼大鼠视网膜产生自噬反应，低浓度的 Tat-Beclin1 有抑制 RGC 凋亡的作用，高浓度促进 RGC 凋亡。

PU-607
眼科日间手术护理服务模式的时间流程、并发症及其效果观察

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目的 了解眼科日间手术护理服务模式的时间流程、并发症以及效果。**方法** 选择 2017 年 11 月至 2018 年 11 月我院眼科病房实施日间手术治疗 58 例患者，实施精细化的手术护理服务流程及管理，观察日间手术患者治疗效果及并发症的发生率。**结果** 日间手术患者在整个治疗过程中仅存在 1 例患者出现眼部微弱疼痛，1 例恶心呕吐，并发症总出现率为 3.45%；患者在治疗后显效患者有 32 例，占比 55.17%，治疗有效患者有 25 例，占比 43.10%，显示无效患者有 1 例，占比 1.72%，治疗总

有效率为 98.28%。**结论** 对于眼科日间手术护理服务模式，可利用科学、有效的护理流程对患者实施优质护服务，减少患者并发症的发生，同时加强其治疗效果。

PU-608

合并原发性黄斑前膜的白内障手术疗效分析

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目的：合并原发性黄斑前膜的白内障患者，单纯行晶状体超声乳化抽吸+人工晶状体植入术的术后疗效观察。
方法：选择 2017 年 10 月至 2019 年 1 月收治的老年性白内障合并原发性黄斑前膜患者中的 82 例进行本次治疗探析，根据术前 OCT 检查结果按早期、增殖期、牵拉期予以分组，分别于术前、术后（1 周、3 个月）检测患者裸眼视力、最佳矫正视力，OCT 检测黄斑中心凹视网膜厚度及视网膜组织变化情况并予以比较。
结果：所有患者术后 1 周裸眼视力及最佳矫正视力较术前均有不同程度提高。术后最佳矫正视力早期组≥0.5 者 100％，增殖期组 ≥0.5 者 76％，牵拉期组 ≥0.15 者 48％。术后 3 个月，OCT 检测黄斑中心凹视网膜厚度较术前变化均无统计学意义，牵拉期组患者 3 例最终行玻璃体切除+黄斑前膜剥离术。
结论:晶状体超声乳化抽吸+人工晶状体植入术对于伴有原发性黄斑前膜的白内障患者可以提高视力、改善生活质量，并不会加重原有眼底病变，是一种安全有效的治疗方法。但对于原发性黄斑前膜已处于牵拉期的白内障患者，单纯白内障手术对术后视力改善有限，建议联合或再行眼底手术治疗。

PU-609

先天性虹膜一脉络膜缺损合并瞳孔异常的白内障治疗 1 例

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先天性虹膜脉络膜缺损是一种罕见的先天性畸形，多是虹膜、脉络膜缺损或发育不良，多发生于下方。一般为双侧性，单侧较为少见。
表现为常染色体显性遗传。主要症状除畏光外，常伴有显著视力下降、弱视、眼球震颤、小角膜、白内障、黄斑发育不良等；如若晶状体、黄斑区无明显病变，视力一般也不如常人。
本病无特殊治疗方法，初期可佩带有色眼镜减轻畏光症状；若发生白内障可行白内障手术，术中考虑后囊及悬韧带发育不良的情况，需谨慎操作；若发生视网膜脱离可行玻切手术治疗，术中注油注气依情况而定，一般注油后不再取油以防复发视网膜脱离。

PU-610

继发性青光眼病例报道 1 例

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一般原发性青光眼多为双眼发病，对于双眼房角结构不一的患者，要仔细询问病史、多方面考虑病情，外伤、炎症因素、药物因素、晶状体等原因都会引起继发性青光眼，治疗措施也因人因病而已，及时找出病因能尽早确定治疗方法、更好的保住患者的视力及生活质量。

PU-611

前房注气治疗白内障术后后弹力层脱离临床效果

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目的 观察前房注气术治疗白内障超声乳化手术导致角膜后弹力层脱离的临床效果。
方法 回顾分析我院近 2 年间,通过前房注气术治疗白内障超声乳化手术导致角膜后弹力层脱离的患者 26 例.其中大于 1/2 角膜面积的广泛后弹力层脱离 12 例,大于 1/3 并小于 1/2 角膜面积的后弹力层脱离 6 例,小于 1/3 角膜面积的后弹力层脱离 8 例.所有患者均于术毕前前房注入无菌空气,利用气泡顶压脱离的后弹力层复位；后弹力层复位不良或空气吸收后仍未复位者,以同样方法再次注气.
结果 26 例术后角膜全部透明，后弹力层复位，视力明显改善， 前房内空气于术后 3～5d 吸收。
结论 角膜后弹力层脱离是超声乳化术后可能会导致角膜失代偿的一种严重并发症。小范围脱离可自行复位，轻中度脱离可采用气体或黏弹剂复位，较大范围脱离则采取角膜缝合，对于常规治疗再次发生后弹力层脱离的特殊情况可采用穿刺放液联合前房注气术，对于角膜后弹力层脱离，进行早期诊断，积极治疗，对恢复角膜透明，改善术后视力有积极的作用。

PU-612

白内障超声乳化并人工晶体植入联合房角分离治疗闭角型青光眼临床观察

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目的 观察白内障超声乳化并人工晶体植入联合房角分离治疗闭角型青光眼的治疗效果
方法 回顾性分析我院近两年合并有白内障的闭角型青光眼患者 53 例（60 眼），术前常规行 A 超测量眼轴、晶体厚度、前房深度、视野、前房角镜检查及 UBM 等。房角关闭范围≤180°有 42 眼，房角关闭范围＞180°有 18 眼。所有患者均由同一手术医生在表面麻醉下行白内障超声乳化并人工晶体植入联合房角分离术。术后随访 3 天、7 天、1 月，对其眼压、视力、前房深度进行对比。
结果 术后 52 例患者眼压降至正常，有 8 例患者眼压控制不佳，其房角关闭范围＞180°，经局部降眼压药物治疗降至正常。所有患者房角检查较术前加深。
结论 白内障超声乳化并人工晶体植入联合房角分离治疗闭角型青光眼，能有效控制眼压，拉开房角。

PU-613

临床研究一体化平台提高临床研究的质量

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目的 充分利用我国丰富的临床医疗资源，克服临床数据整合的技术壁垒，更好地利用诊疗数据，将其转化为临床研究资源，探索临床研究的质量控制体系。**方法** 根据某专院十多年临床试验的管理经验，利用一体化临床研究平台，探讨研究者发起的临床研究项目质量控制的关键点。**结果** 在质量管

理中主要研究者和管理机构起关键作用，两者要一致协作，研究助理是各方的纽带，把握细节。**结论** 质量管理工作应贯穿于整个临床研究过程的始终，临床研究一体化管理提高临床研究的质量。

PU-614

经巩膜层间 flange 人工晶体固定新手术方法的临床研究

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目的:经巩膜层间内人工晶体固定术的临床效果报告。
设计:前瞻性、非比较性、植入性病例
研究对象:18 例无晶状体、晶状体脱位或半脱位患者的 18 只眼睛，研究后房型人工晶体经巩膜层间形成膨大末端固定植入术的临床特点研究。
方法:采用 30G 针平行于角膜缘进行两种角度的切口,烧热的针接触人工晶体攀外缘，形成 flange，并推回并固定在巩膜隧道中。
主要观察指标:最佳矫正视力(VA)、角膜内皮细胞密度、眼压情况及出现并发症和其转归情况。
结果:人工晶体固定准确，轴向稳定性好。术前平均矫正效果最好 VA 是 0.46 ±0.16;术后病情明显好转，术后 15 天、3 月及 6 月裸眼视力 0.48 ±0.16, 0.6 ±0.23, 0. 6 ±0.12；最佳矫正视力 0.64 ±0.64, 0.84 ±0.45, 0.86 ±0.64。角膜平均内皮细胞密度降低从术前的 1856 个细胞/mm2 术后 15 天，3 月及 6 月术后的内皮分别为 1650 个细胞/mm2,1534 个细胞/mm2,1723 个细胞/mm2，分别 P < 0.01, P < 0.01, P < 0.01,术后并发症包括人工晶体夹持 1 眼(5%)，人工晶体偏位 2 眼(11%)。术后患者眼压较平稳，未发生视网膜病变脱离、眼内炎、玻璃体积血、黄斑水肿或人工晶体脱位。
结论:这种新的巩膜内人工晶体固定技术是一种简单、微创的，获得精确的和牢固的人工晶体固定方法，术后并发症较较常见的有人工晶体夹持及人工晶体偏位。

PU-615

间断缝合与连续缝合对翼状胬肉切除联合游离自体结膜瓣移植术后疼痛程度的影响

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目的 研究间断缝合与连续缝合对翼状胬肉切除联合游离自体结膜瓣移植术后疼痛程度的影响。**方法** 回顾性病例研究。将 2015 年 8 月至 2016 年 10 月就诊于赤峰朝聚眼眼科医院手术治疗的 78 例双眼原发性翼状胬肉患者共 156 眼，根据结膜瓣的缝合方式分为：右眼行间断缝合组，左眼行连续缝合组，通过视觉模拟评分法评估患者术后 2h,1d,10d 时疼痛程度。**结果** 患者左眼术后各时间点的疼痛程度评分均明显低于右眼(P<0.01)。**结论**：原发性翼状胬肉患者手术连续缝合较间断缝合术后疼痛程度明显降低。

PU-616

预劈核技术联合 IOL 植入术对 PEX 合并白内障患者的疗效

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目的：探究预劈核技术联合 IOL 植入术对 PEX 合并白内障患者的疗效。
方法：纳入 2017 年 1 月至 2018 年 10 月在我院治疗的 PEX 合并白内障患者 90 例（90 眼）作为研究对象，随机分为对照组（n=45）和观察组（n=45），对照组予以超声乳化 IOL 植入术，观察组予以预劈核技术联合 IOL 植入术。观察对比两组患者手术时间、术中并发症、角膜内皮细胞丢失情况、术后视力恢复情况、角膜水肿程度以及泪液炎症因子水平。
结果：观察组手术时间显著短于对照组,差异有统计学意义（P<0.05）；观察组患者术中未出现并发症，而对照组出现 2 例悬韧带断裂，但差异无统计学意义（P>0.05）；观察组患者角膜内皮细胞丢失率显著低于对照组，差异具有统计学意义（P<0.05）；术后 3d、7d，观察组患者视力恢复情况优于对照组，差异有统计学意义（P<0.05）；观察组术后 7d 泪液 IL-6 和 TGF-β 水平均低于对照组，差异有统计学意义（P<0.05）；术后 1d 和 7d，观察组角膜水肿 2-3 级患者数量均显著少于对照组，差异有统计学意义（P<0.05）。
结论：使用预劈核技术联合 IOL 植入治疗 PEX 合并白内障患者，能缩短手术时间，减少并发症，降低角膜水肿程度，减少角膜上皮损伤，降低泪液炎症因子水平，促进视力恢复。

PU-617
玻璃体腔注射亚甲基蓝对大鼠急性高眼压模型视网膜保护作用的研究

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目的：亚甲基蓝（methylene blue，MB）是一种潜在的神经保护剂[1]。体外细胞实验研究已表明 MB 可在缺氧环境下，通过防止线粒体功能障碍来减少大鼠原代视网膜神经节细胞的凋亡[2]。为了探索青光眼的神经保护治疗策略，本研究评价并探讨了大鼠玻璃体腔注射 MB 的安全性及其对急性高眼压后损伤的保护作用。
方法：大鼠的右眼玻璃体腔注射 6μL 药物浓度分别为 0.0035%、0.01%、0.035%和 0.35%的 MB，左眼注射等量的生理盐水作为对照。注射前及注射后 3 天、7 天、14 天和 28 天通过视网膜电图（electroretinogram，ERG）、光学相干断层扫描（optical coherence tomography，OCT）、眼底检查、视网膜形态学综合评估玻腔注射 MB 对视网膜的影响以确定安全注射浓度。采用前房灌注法将大鼠眼压升高至 110mmHg 1h，造模结束后立即玻璃体腔注射 MB，注射前及注射后 7 天、14 天、28 天行 ERG、OCT、眼底检查、视网膜形态学观察综合评估大鼠视网膜，神经逆行示踪法检测视网膜神经节细胞（retinal ganglion cells，RGCs）存活状况，DNA 断裂的原位末端标记法（TUNEL）检测视网膜组织细胞凋亡。
结果：与对照眼相比，0.0035%浓度组实验眼在整个实验过程中所有检查均未出现明显异常。急性高眼压损伤造成严重的全视网膜层结构破坏；玻璃体腔注射 MB 可在急性高眼压损伤后维持一定的视网膜厚度（28 天：190.5±*13.382* μm vs 185.0 ± *12.673* μm，P<0.05），促进因瞬时眼压升高引起的 ERG 损伤的恢复（vs 对照组，P<0.05），增加 RGCs 存活。损伤 24 小时后，MB 玻璃体腔注射组 TUNEL 标记的凋亡细胞数目较对照组减少。
结论：0.0035%MB 可以预防急性高眼压损伤后的引起的 RGCs 丢失，减少视网膜神经元凋亡，对视网膜起到保护作用。

PU-618
眼眶骨折伴眼球脱位 1 例

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目的：眼眶骨折是常见的一类眼外伤，眶内软组织易嵌顿或疝出于骨折裂口处，造成眼球内陷移位，肌肉嵌顿，眼球运动障碍或复视，进而影响患者的生活质量和面部外观。本文报道云南省第二人民医院收治的 1 例罕见的刺激性眼眶骨折伴眼球内后脱位的病例，总结其临床特点及治疗方式，以期为临床同行提供借鉴。方法：视力：右眼：眼球脱位入筛窦视力无法检测，左眼：0.8（裸眼）。查体：右眼上睑下垂，肌力为 0 级，眼球内陷向内下方移位，眼球固定，前节检查未见异常，瞳孔大小 3*3mm，直接、间接对光反射未见异常，眼底检查无法配合。左眼前节及眼底检查未见异常。CT 检查提示：右眼眶窝凹陷，眼球部分内陷入右筛窦腔内，内直肌嵌顿于眶内壁裂口处，下直肌嵌顿于下壁裂口处与周围组织粘连紧密，视神经眶内段迂曲成角，眶内下侧壁陈旧性骨折。拟对患者进行手术治疗。术中见眼球嵌顿于筛窦内，将眼球回纳于眼眶，整复眶壁、修补眶膈、清理眼眶积血、缝合皮肤，临时缝合眼睑。结果：术后眼球内陷得到有效矫正，外观改善明显，双眼眶饱满度基本对称，右眼皮肤切口对合好，眼睑缝合睁眼受限，右眼开睑测视力：0.15（裸眼）。术后患者诉右眼可视外物，但存在复视。术后复查 CT 提示：右眼内陷较前改善，内侧壁内固定术后改变，视神经眶内段迂曲较前改善。讨论：面部外伤常累及眼眶，并发眼眶爆裂性骨折，尤其是眼眶下壁、内壁骨折，主要表现为眼球内陷、视物重影、眼球运动障碍和眶下神经功能障碍等。其诊断并不困难，一般根据患者外伤史、症状、体征及影像学检查即可做出初步诊断。眼眶骨折早期可给药物治疗，以减轻局部软组织肿胀。伤后 2 周左右，眼眶部水肿消退，淤血吸收，解剖层次易于暴露时可行手术复位，以解除组织嵌顿，恢复眼球运动，改善面部外观。本例病人病程长达 18 年，嵌顿肌肉纤维化、瘢痕粘连严重，术后眼球转动恢复可能性不佳，手术的第一目的也仅仅只是改善了患者外观。

PU-619

Two-year incidence and factors associated with mild visual impairment in type 2 diabetes

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Purpose: To determine the 2-year incidence of mild visual impairment in Chinese patients with type 2 diabetes, and to reveal the associated factors of unexplained mild visual impairment.
Methods: The prospective community-based cohort study included 715 patients with type 2 diabetes who had normal vision in 2014. Demographic information, systemic examination results, and ophthalmological test results were collected for each participant. Mild visual impairment, defined as BCVA < 20/25 but ≥ 20/63. The association between each potential risk factor and mild visual impairment was analyzed.
Results: The person-specific and eye-specific 2-year incidences of mild visual impairment were 18.04% (129/715) and 17.13% (245/1,430), respectively. Patients
with longer-duration were more likely to have mild visual impairment (OR=1.113, P<0.0001). Cataracts were the leading cause, followed by diabetic retinopathy and then macular degeneration in mild visual impairment. The person-specific and eyespecific 2-year incidences of unexplained mild visual impairments were 4.06% (29/715) and 2.59% (37/1,430), respectively. Patients with higher hemoglobin A1c levels (OR=2.240, P<0.0001) and more obvious choroidal thickness change in the central foveal circle (OR=1.024, P=0.003), the parafoveal inferior region (OR=1.022, P=0.0021), and the parafoveal temporal region (OR=1.015, P=0.03) were more likely to have unexplained mild visual impairment.
Conclusions: Healthcare workers should pay attention to mild visual impairment in patients with type 2 diabetes. We suggest that the choroid thickness change in the macular area be used as a surveillance index to monitor progression of mild visual impairment, as well as the effects of therapy on the condition

PU-620

OPD 引导下 160 例 TORIC 人工晶体植入效果研究

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目的：对我院 252 例 TORIC 人工晶体植入白内障患者行手术前后术眼视觉质量分析仪（OPD）检测,观察视觉质量分析仪对 TORIC 植入前的指导作用及植入后的随诊观察意义。方法：收集 2016 年 9 月至 2018 年 12 月期间 160 例院内白内障手术患者，行手术前后术眼视觉质量分析仪检测，指导 TORIC 晶体选择及植入方位，结合术后 3 个月患眼矫正视力综合验光结果及检测植入 TORIC 人工晶体散光轴向，分析其对术后视力恢复的指导意义。结果：患眼术后矫正视力均有不同层次提高，术后综合验光显示散光在 100 度以内者达 80.5%，160 例 TORIC 晶体术后 3 个月内均未发生散光轴向偏移。结论：OPD 引导下 160 例 TORIC 人工晶体植入效果肯定，术后随诊检测晶体散光轴向方便可行。

PU-621

不同眼轴长白内障患者术后视觉质量、眼高阶相差及角膜内皮组织变化的对比研究

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目的：研究不同眼轴长白内障患者中视觉质量、眼高阶相差及角膜内皮组织的对比变化。
方法：150 例白内障患眼按眼轴长不同分为 22mm≤A<24mm 组、24mm≤A<26mm 组及 26mm≤A 组。所有患者术前及术后三个月行人工晶状体度数测量、角膜内皮计数及眼高阶相差测量。
结果：视力：各组患者术后视力均有不同程度提升，但在眼轴大于 24mm 的两组患者中，还是有部分患者术后最佳矫正视力低于 0.3。斯特列尔比：三组患者手术前后 strehlrate 均有不同程度提高，但仅眼轴 22mm-24mm 组的变化有统计学意义。眼高阶相差：三组患眼术后角膜的总高阶相差均有增加，但仅眼轴正常组中角膜的总高阶相差增加有统计学意义；三组患眼全眼及眼内相差均有减少趋势，除眼轴 24mm-26mm 组变化无统计学意义外，另外两组手术前后变化差异均有统计学意义。角膜内皮细胞：三组患眼手术前后内皮细胞均有减少，且变化均有统计学差异。
结论：白内障手术在眼轴长正常组白内障患者中术后视力视觉质量有明显提升，优于眼轴偏长及超长组；白内障手术会影响角膜高阶相差的改变，对不同轴长白内障患者角膜内皮细胞均有损伤，但与眼轴长无关联。

PU-622

飞秒激光辅助白内障手术联合 TORIC 人工晶体植入效果研究

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目的：对我院 85 例 TORIC 人工晶体植入白内障患者行手术前后术眼 OPD-SCANⅢ检测,联合飞秒激光辅助白内障手术，观 TORIC 人工晶体植入效果。方法：收集 2016 年 1 月至 2017 年 12 月期间 85 例院内飞秒激光辅助白内障手术患者，行手术前后术眼视觉质量分析仪检测，指导 TORIC 晶体选择及植入方位，结合术后 3 个月患眼矫正视力综合验光结果及检测植入 TORIC 人工晶体散光

轴向，分析其对术后视力恢复的指导意义。结果：患眼术后矫正视力均有不同层次提高，术后综合验光显示散光在 125 度以内者达 78.2%，100 例 TORIC 晶体术后 3 个月内均未发生散光轴向偏移。结论：飞秒激光辅助联合 OPD-SCANⅢ引导 TORIC 人工晶体植入效果肯定。

PU-623

飞秒激光辅助白内障手术联合 1.8mm 微切口博士伦 MI60 型人工晶体植入效果观察

袁媛
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目的：对我院 220 例 1.8mm 微切口博士伦 MI60 型人工晶体植入白内障患者行手术前后术眼 NIDEK OPD-SCANⅢ检测,联合飞秒激光辅助白内障手术，观察手术效果。方法：收集 2016 年 9 月至 2018 年 12 月期间 220 例院内白内障手术患者，行手术前后术眼视觉质量分析仪检测，联合飞秒激光辅助白内障手术，指导 1.8mm 微切口博士伦 MI60 型晶体选择及术后效果观察。结果：患眼术后视力均有不同层次提高，手术源性散光小，80.2%患者 Polar K< 0.2。结论：飞秒激光辅助白内障手术联合 OPD-SCANⅢ引导 1.8mm 微切口博士伦 MI60 型人工晶体植入效果肯定。

PU-624

角膜不规则散光对视觉质量的影响

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目的：对白内障手术患者行手术前后术眼视觉质量分析仪（TOPCON 公司 KR-1W）检测,回顾性分析视觉质量分析仪对白内障患者术后视觉质量恢复的指导意义。方法：收集 2016 年 9 月至 2018 年 11 月期间 603 例院内白内障手术患者，行手术前后术眼视觉质量分析仪检测，结合术前角膜不规则散光（CIA）及术后 3 个月患眼矫正视力，分析其对术后视力恢复的指导意义。结果：术后矫正视力 0.9 及以上患眼比例与 CIA 的增加成反比趋势，即随着 CIA 的增高，患眼术后恢复至 0.9 以上的比例减少。结论：术前对白内障患者行视觉分析仪检测角膜不规则散光大小有助于对患眼术后视力进行预测。

PU-625

巨细胞病毒阳性的青光眼睫状体炎综合征患者应用更昔洛韦治疗的临床观察

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目的：观察 CMV 阳性的青光眼睫状体炎综合征的临床特征，评价应用更昔洛韦对其治疗的有效性。方法：回顾性分析 2013-2015 年在我院经治的青光眼睫状体炎综合征患者，取房水行 CMV DNA 的 PCR 检测，根据 CMV(+)及 CMV(-)进行分组，进行两组对比。所有的 CMV(+)青睫患者均进行 2% 更昔洛韦眼液治疗，观察疗效。结果：CMV(+)的青光眼睫状体炎综合征有更严重的内皮细胞缺失（p

＜0.05)，在随访期间，经过 2%更昔洛韦眼液治疗的患者需更少的抗青光眼药物治疗即可达到相同的眼压（p=0.35）。结论：更昔洛韦对于 CMV+的青睫综合征的治疗是有效地，可以帮助控制眼压和保护内皮细胞。

PU-626

三种生物测量仪在不同眼轴进行眼部生物测量的比较

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目的 比较 Lenstar LS900 及 IOLMaster500 与 OA2000 在不同眼轴长度区间，测量眼球生物参数的差异性和一致性，为临床医生提供参考。**方法** 前瞻性研究。选取我院白内障患者 479 例（479 眼），术前行三种仪器检查。获得眼轴长度（AL）、前房深度（ACD）、角膜曲率（K）：最小角膜屈光力径线上角膜曲率(Kf)、最大角膜屈光力径线上角膜曲率(Ks)等参数。按 IOLMaster500 测得的 AL 将患者分为 4 组：短眼轴组 AL≦22mm（55 眼）、正常眼轴组 22<AL≦25 mm（283 眼）、长眼轴组 25<AL≦28.5 mm（74 眼）、超长眼轴组 AL>28.5 mm（67 眼）四组。应用单因素方差分析进行比较，Bland - Altman 法分析一致性。**结果** 三种生物测量仪测得的 AL, ACD, Kf, Ks 差异均无统计学意义（*P*>0.05）。三种设备各组 AL 一致性良好。OA2000 和 Lenstar LS900 获得的 ACD，95%一致性界限（LoA）上下限最大绝对值分别为 0.32mm、0.41mm、0.29mm、0.11mm，一致性较好，其中超长眼轴一致性最好。多数组 K 的 95%LoA 较宽大于 1D，一致性较差。**结论** IOLMaster500、Lenstar 和 OA2000 对于 AL 的测量可相互替代。ACD 的测量在 OA2000 和 Lenstar LS900 之间尤其是超长眼轴一致性良好，与 IOLMaster500 较差。而对于 K 三个仪器临床上不能相互替代。

PU-627

Evaluation of the Swept-Source Coherence Tomography OA-2000 biometer for measurements in the High Myopia Patients with Cataract

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Objective To evaluate measurement acquisition, operability and agreemnet measured by the OA-2000 (Tomey, Nagoya，Japan) and to compare them with those measured by the Lenstar (Haag-Streit, Koeniz，Switzerland) and the IOLMaster500 (Carl Zeiss Meditec, Jena, Germany) in cataract patients with high myopia. **Methods** Prospective study. High myopia cataract patients who were examined in Wuhan Aier Eye Hospital from October 2017 to October 2018 were conducted. OA-2000, IOLMaster500 and Lenstar were obtained preoperatively. Measurement acquisition were recorded. Total ophthalmic exam, the duration of patient data entry and the actual measurement process and the time from intraocular lens power calculation to printout were calculated. Ocular biometric parameters, including anterior chamber depth (ACD), axial length (AL), keratometry for the flattest meridian(Kf) and keratometry for the steepest meridian(Ks) were obtained. SPSS and MedCalc software were applied for statistical analyses. **Results** This study comprised 1030 eyes of 780 patients [male:480, female:300,age: 39~78（63.90±11.70）years]. Measurement acquisition: 94.95% for OA-2000, 83.98% for IOLMaster500 and 83.01% for Lenstar（both *P*<0.001）. Operability: Total ophthalmic exam with OA-2000 (mean difference

109.34±2.22 s) took significantly shorter than that of IOLMaster500 (114.47±9.50s) and Lenstar (135.64±5.55s) (both *P* <0.05). Agreement：AL value were（28.78±1.77）mm, （28.78±1.76）mm and（28.85±1.77）mm; ACD value were（3.48±0.36）mm,（3.54±0.38）mm,（3.48±0.37）mm; Kf value were（43.14±2.47）D、（43.15±2.49）D and（43.13±2.53）D; Ks value were（44.18±2.63）D,（44.19±2.68）D and（44.17±2.70）D based on OA-2000, IOLMaster500 and Lenstar, respectively. **Conclusions** In terms of cataract patients with high myopia, OA-2000, IOLMaster500 and Lenstar all have excellent correlation and agreement. The OA-2000, a new SS-OCT based biometer, outperformed both IOLMaster500 and Lenstar in terms of measurement acquisition and operability.

PU-628

Outcomes following vitreoretinal surgery for proliferative diabetic retinopathy in young patients

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Purpose To evaluate the outcomes following vitreoretinal surgery for proliferative diabetic retinopathy (PDR) in patients who are less than 45 years of age.
Methods This is a retrospective case series study. A total of 116 eyes of PDR who underwent vitrectomy surgeries were enrolled in this study. The mean follow-up period was 11.41 months (1-24 months).
Results The patients were divided into two groups: 18 to 44 year-old patients (study group, 58 eyes) and those older than 45 years old (control group, 58 eyes). The average age when these patients received vitrectomy surgery was 37.52±5.80 years old in the study group and 57.60±9.06 years old in the control group, respectively (P<0.001). The final visual acuity increased in 41 eyes (70.7%), stable in 9 eyes (15.5%) and decreased in 8 eyes (13.8%) in the younger patients. In the control group, it increased in 47 eyes (81.0%), stable in 2 eyes (3.4%) and decreased in 9 eyes (15.5%). Postoperative complications mainly included rehemorrhage (24.1%), retinal detachment (3.4%), and neovascular glaucoma (27.6%) in study group. The rehemorrhage and neovascular glaucoma (NVG) account for 19.0% and 1.7% respectively in control group, and none of the retinal detachment have occurred .
Conclusions Younger patients who underwent vitrectomy for PDR had a higher rate of postoperative adverse complications, with NVG taking up a majority of that. In young patients, the visual acuity of whom with young-onset type 2 diabetes is lower, and the prognosis is worse than type 1.

PU-629

鼻内窥镜下泪囊鼻腔吻合术治疗 236 例泪囊炎 相关因素及手术效果分析

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目的: 探讨鼻内窥镜下泪囊鼻腔吻合术治疗泪囊炎的手术效果，总结分析影响手术效果的相关因素，为提高该手术的远期疗效提供有效的改进方案。**方法：**将本院于 2015 年 11 月～2018 年 5 月所收治的 236 例(245 眼)泪囊炎患者作为研究对象，所有患者施行鼻内窥镜下泪囊鼻腔吻合术，术后随访 3-12 个月，进行鼻内镜检查及泪道冲洗。**结果：**患者 236 例 245 眼术后随访 3 个月至 1 年，治愈患者 225 例(95.34%)、复发 11 例(4.66%)。**结论：**采用鼻内镜下行泪囊鼻腔吻合术治疗泪囊炎，

组织损伤小，术中出血少，术后恢复快，面部不遗留瘢痕，可早期治疗急性泪囊炎，缩短治疗时间。泪囊大小、骨窗大小及位置、止血材料的选择等都是影响手术疗效的重要因素。

PU-630

深圳市 2018 年南山区中小学生视力不良状况分析

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目的 根据不同评价标准，探讨深圳市 2018 年南山区中小学生视力不良状况。**方法** 采用分层整群抽样法，选取 3 所小学及 3 所初中的一、三、五、七年级学生筛查，随机抽取自愿进行睫状肌麻痹下验光的 3402 名学生，进行眼科常规检查、视力、睫麻前后屈光度等，分别根据 2018 国家卫生部等八部委、中华医学会眼科学分会斜视与小儿眼科学组等制定的有关近视筛查标准进行统计分析比较。同时按不同年龄段、裸眼视力＜5.0 且非睫状肌麻痹下电脑验光等效球径＜-0.75D 的标准筛选数据进行统计分析。**结果** ≤6 儿童视力不良率为 10.6%，其中近视儿童占 5.0%；7~8 岁儿童视力不良率为 19.2%，其中近视儿童占 10.8%；≥9 岁青少年视力不良率为 60.1%，其中近视儿童占 49.7%。各年龄段，学组不良视力标准筛查近视率与八部委筛查标准近视率无差异（*P*＞0.05）；≤6 岁儿童，睫麻后近视率与八部委近视筛查标准近视率相比，差异有统计学意义（*P*＜0.05），但与学组不良视力标准筛查近视率相比差异无统计学意义（*P*＞0.05）；＞6 岁儿童，睫麻后近视率与学组不良视力筛查近视率、八部委规定近视筛查标准近视率相比较接近，差异仍有统计学意义（*P*＞0.05）；各年龄段，裸眼视力＜5.0 且非睫状肌麻痹下电脑验光等效球径＜-0.75D 近视率与睫麻后验光近视率相似，差异无统计学意义（*P*＞0.05）。**结论** 视力不良率不能代表近视率，睫状肌麻痹下验光是确定近视的金标准。八部委制定的近视眼普（初）查标准的可行性与科学性较高。

PU-631

不同剂量曲安奈德球结膜下注射治疗角膜新生血管的研究

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目的 观察球结膜下注射不同剂量（0.025ml、0.05 ml、0.1 ml、0.15ml）曲安奈德对角膜新生血管的抑制及其副作用的关系。**方法** 健康新西兰白兔 40 只，采用缝线伤法制备新西兰白兔角膜新生血管模型，随机分为四组（A、B、C、D 组，每组各 10 只），球结膜下注射曲安奈德量，A 组：0.05ml B 组：0.1 ml C 组：0.15 ml D 组：0.2 ml。监测基础眼压后，于缝线后 1 周、2 周、3 周、4 周，观察角膜新生血管侵入角膜缘内直径、晶体混浊程度、眼压。**结果** 缝线法后，角膜新生血管侵入角膜内最大直径与球结膜下注射曲安奈德剂量呈反比，C、D 组于 2 周左右时新生血管逐渐褪去，A、B 组于 4 周左右时新生血管逐渐褪去；眼压增高程度与球结膜下注射曲安奈德剂量呈正比，A、B 组无明显眼压增高，C、D 组眼压增高程度较为明显；A、B 组无晶体混浊发生，C 组有 1 只发生，D 组有 2 只发生晶体混浊。**结论** 球结膜下注射曲安奈德可抑制新西兰白兔角膜新生血管，但不容忽视其副作用，本实验研究表明，球结膜下注射剂量 0.05 ml 曲安奈德治疗角膜新生血管较为安全，无明显眼压增高、晶体混浊等并发症，必要时可重复注射。

PU-632

固定棉片加压包扎治疗浅前房

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目的 探讨应用“固定棉片”加压包扎治疗青光眼术后浅前房的疗效和安全性。**方法** 回顾性研究青光眼术后发生浅前房患者（因滤过过强），用散瞳睫状肌麻痹剂、脱水剂后对眼部进行加压包扎。对照组：2002.01-2009.01 我科治疗青光眼浅前房的方法，将无菌棉球搓成枣核形，加置在眼睑皮肤面外，用医用胶布固定，绷带缠绕进行轻加压包扎；观察组：2009.01-2016.01 我科治疗青光眼浅前房的方法，将“枣核形”更换为“固定棉片”（本人设计）进行加压包扎。观察患者加压包扎后前房成形率、眼压变化、视力及并发症（角膜皱褶、浅前房恶化）情况。**结果** 对照组：加压包扎次日前房成形率 75.0%，角膜皱褶、水肿 31.8%，前房延缓形成及浅前房恶化形成恶性青光眼 11.4%，1 周眼压平均为（25. 9 ± 11. 2）mm Hg，术后 1 个月眼压平均为（20. 5 ± 8. 5）mm Hg，此后眼压平稳，术后 12 个月眼压平均为（17. 8± 10. 4）mm Hg。观察组：加压包扎次日前房成形率 89.4%，角膜皱褶、水肿 10.6%，前房延缓形成及浅前房恶化形成恶性青光眼 9.1%，1 周眼压平均为（23.4 ± 9. 2）mm Hg，术后 1 个月眼压平均为（20. 5 ± 8. 5）mm Hg，此后眼压平稳，术后 12 个月眼压平均为（17. 8± 10. 4）mm Hg。**结论** 固定棉片加压包扎较传统加压包扎法，前房成形率高，无明显严重并发症。固定棉片加压包扎是治疗因青光眼术后浅前房（因滤过过强）安全而有效的治疗方法之一。

PU-633
筋膜囊间隙完整联合绷带式眼镜佩戴预防翼状胬肉术后复发

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目的:老年人易患翼状胬肉，本文探讨翼状胬肉切除术中，保留 Tenon 囊间隙完整的手术方式辅以绷带式眼镜佩戴治疗翼状胬肉的临床疗效。**方法**: 对 60 例 72 眼实施翼状胬肉切除术，术中自角膜缘内浸润麻醉剪开胬肉表层组织，先分离表层结膜，剪除结膜下增生胬肉，尽量保留结膜，避免扩大切除胬肉组织导致筋膜囊间隙打开，、保留 Tenon 囊间隙，术后佩戴绷带式眼镜，观察术后角膜上皮修复及翼状胬肉复发等情况。**结果:**随访观察术后 12mo，胬肉的复发率为 1.1％，角膜上皮恢复时间为 1.1±2.3d，无其他并发症发生。**结论**: 翼状胬肉术后角膜创面愈合时间及角膜缺氧状态延长，易产生血管生长因子，使胬肉复发率增高，翼状胬肉切除、保留 Tenon 囊间隙完整，术后佩戴绷带式眼镜治疗翼状胬肉疗效可靠，该手术取材方便、术后恢复快、炎症反应轻、复发率低，是治疗翼状胬肉比较理想的术式。

PU-634
配戴周边远视性离焦设计 RGP 后出现异常头位的案例报道

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目的：观察并分析配戴周边远视性离焦设计 RGP 后出现异常头位的现象。
方法：病例 1， 男 ，11 岁， 2018 年 7 月至我院，5 岁时因“右眼先天性上睑下垂”行“右眼额肌悬吊术”。主诉：双眼视力下降 2 月。扩瞳验光： 右眼 -1.25DS/-0.50DC×180→1.0，左眼 -2.25DS/-0.50DC×170→1.0。诊断：双眼屈光不正。处理：予周边远视性离焦设计 RGP 矫正。戴镜 1 月后患者诉双眼红。复查时见患者双眼结膜充血（+），视物时喜偏头抬颌注视。检查见双眼镜片上偏。将双眼镜片直径由 10.4mm 缩小至 10.2mm，镜片定位略改善，位于上偏位，患者仍偏头抬颌注视。

改为配戴非球面设计单焦 RGP，患者头位改善。病例 2， 男 ，3 岁， 2018 年 10 月至我院就诊。主诉：体检发现双眼视力差 1 月。扩瞳验光：右眼 -4.75DS/-0.50DC×5→0.2，左眼 -1.00DS/-1.25DC×10→0.4。诊断：双眼屈光不正。处理：予周边远视性离焦设计 RGP 矫正。戴镜 1 月后家长诉患儿双眼红、戴镜后喜斜眼、歪头注视。复查时见患者双眼结膜充血（+），戴镜视物时面左倾、双眼右侧转，摘镜后头位、眼位正常。改为配戴非球面设计单焦 RGP 仍无改善，摘镜后头位、眼位正常。

结果:病例 1 患者通过改为配戴单焦 RGP 镜片后头位改善。病例 2 患者改为配戴框架眼镜矫正屈光不正。

结论:两例患者配戴周边远视性离焦设计 RGP 后均出现异常头位注视。病例 1 将镜片更换为单焦设计 RGP 后头位改善，考虑可能为 RGP 上偏造成瞳孔区镜片光度改变，通过改变头位使上睑偏下垂位，镜片位置下移，从而改善镜片上偏造成的光度改变。而单焦 RGP 镜片偏位不会引起瞳孔区光度的明显改变，故不需通过改变眼睑及头部位置代偿。而病例 2 中患者无论配戴周边离焦或单焦设计 RGP 均出现异常头位及眼位，摘镜后好转，考虑为配戴镜片后的不适感所致，故改为框架眼镜矫正。

PU-635

先天性泪道畸形种种

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目的：总结临床常见的先天性泪道畸形的特点，从发育角度明确畸形产生的原因，为临床治疗提供有力的帮助。

方法：收集临床所见各种先天性泪道畸形的患者资料，查阅国内外文献，试图从胚胎发育异常的角度分析畸形产生的原因。

结果：泪道引流发育异常存在两种机制：鼻颧凹陷与表皮外胚层分离不完全或存在异常，上皮索不完全管化。分为以下几种情况：a.如果上下泪小管、泪点均受到影响则会出现发育不全或闭锁，更多见于下泪小管；b.泪小管发育不全，泪道上皮索的不完全式异常迁移，它是泪点缺如的一个更极端的表现，极少出现，主要由于迁移过程中形成的瘢痕；c.多泪点式泪小管，见于内眦皮肤结膜交接处的发育异常，常有一小段较短的泪小管融入正常的泪小管；d.泪道瘘管，通常是泪道上皮索向下眼睑异常融合所致，通常表现为在内眦韧带下方的针孔样皮肤凹陷处渗漏且几乎总是与泪道管相连，如无症状可永久存在，若鼻泪管引流能力差则会间歇排出眼泪；e.先天性泪囊和鼻泪管异常，20%的新生儿有溢泪症状，只要不出现严重的并发症（如感染性泪囊炎和长久不愈的湿疹）大部分出生后可自然管化；f.如果外胚层的旧板在融入上颌骨的过程中出现问题或者旧板部分下陷则会出现皮肤瘘。

结论：先天性泪道畸形种类繁多，不一而论。需结合病人的实际情况和临床特征施治。

PU-636

经角膜缘 3 切口的 PHPV 玻璃体手术

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目的 探讨经角膜缘 3 切口玻璃体手术治疗永存原始玻璃体增生症的临床效果。 **方法** 永存原始玻璃体增生症患儿，年龄 18 个月，应用角膜缘 3 切口玻璃体手术，行晶状体摘出联合玻璃体切除术，观察术中情况。 **结果** 术中经过顺利，无睫状体扁平部穿刺口导致的术中并发症，无明显出血，无明显周边部视网膜和玻璃体基底部扰动。 **结论** 用角膜缘切口玻璃体手术治疗永存原始玻璃体增生症是一种安全有效的方法，并发症少，术后反应轻。

PU-637

超声生物显微镜检查(UBM)在青光眼疾病中的应用

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目的：探讨超声生物显微镜检查（UBM）在青光眼疾病诊断及治疗中的临床应用价值。
方法：对我院就诊的青光眼患者，无论是开角性还是闭角性青光眼，在术前给予进行超声生物显微镜检查（UBM），观察房角开闭情况，进行动态和静态记录，并可作定量测量，对于睫状体的形态，周边虹膜，后房形态及生理病理变化，进行实时记录。从而选择最适合患者的治疗方案。
结果：通过超声生物显微镜检查（UBM）结果，可以根据情况为患者提供一个较为安全科学的治疗手段。为临床青光眼疾病的早期诊断，病情分期及治疗手段，预后分析均有重要的价值。
结论：超声生物显微镜检查（UBM）在青光眼诊断治疗中提供了更好的诊断依据，在治疗的方法选择上更准确。选择最适合患者的最佳临床路径。

PU-638

电生理检查在白内障疾病中的应用

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目的：电生理检查为白内障患者尤其晶状体混浊较重，不能窥见眼底的病人，更好的判断术后视力恢复情况。
方法：对我院就诊的白内障患者，若晶状体混浊程度较轻者，只能够看到部分眼底。尤其对于偏远及水质特殊，医疗条件相对较差的地区的白内障患者，白内障患者晶状体混浊程度较重，核瓷白，对于眼底情况一概不知。术前对这类患者进行电生理检查，了解视神经及视网膜功能情况，为临床白内障手术前，初步判断预后视功能情况，对白内障术后视力恢复给予客观的评估。
结果：通过电生理检查预计白内障术后视力情况，对于患者的眼底损害程度，治疗效果及预后做出客观评估。为白内障手术患者高度负责，对于手术医生判断手术效果保驾护航。
结论：电生理对于白内障尤其晶状体混浊程度较重者，估计预后视力恢复情况起到了重要的作用。

PU-639

白内障患者手术前后干眼症的临床观察

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目的：观察白内障患者手术前后干眼症临床表现与检查结果的变化。方法：选取白内障手术患者分为两组，A 组为术前存在轻度干眼症的患者，B 组为术前无干眼症的患者。两组患者均行透明角膜切口手术，手术方式均为白内障超声乳化联合人工晶体植入术。分别于术前 3 天，术后第一天，第二天，术后第七天， 第三十天进行干眼症相关症状调查，干眼症相关仪器检查。结果：术后患者不适症状均加重，检查结果显示有差异。结论：白内障术后可在短期影响患者泪膜和眼表，术后有效干预可缓解。

PU-640

Hyperlipidemia induces Meibomian gland dysfunction

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Purpose: To investigate the pathological changes of meibomian gland (MG) and ocular surface tissues in Apolipoprotein E knockout ($ApoE^{-/-}$) mice and wild type mice fed with high fat diet, and to illustrate the effect of hyperlipidemia on meibomian gland function.
Methods: The ocular surface of $ApoE^{-/-}$ male mice and age and sex matched wild type mice fed with standard diet or high fat diet was observed under slit lamp microscope. MG tissue sections underwent H&E staining, Oil Red O staining, TUNEL assay, and immuno-fluorescence staining for K10, Fabp5, Ki67, K6a, p63, PPAR-g, NF-kB p65, p-NF-kB p65, caspase 3, caspase 8, and immune-histochemical staining for CD45. Real-time RT-PCR and Western blot was performed to detect above mentioned gene expression in MG tissues. Lipid metabolism related genes expression in MG were also detected by real-time RT-PCR.
Results: Eyelid thickening, keratinization and corneal neovascularization occurred in $ApoE^{-/-}$ mice at the age of 5 months, and the changes were more obvious at 7 months. H&E staining showed hypertrophy of the meibomian gland acinus, and Oil red O staining showed accumulation of lipid in MG acinus of $ApoE^{-/-}$ mice. Both K10 and Fabp5 expression were increased, while Ki67, K6a, p63 were decreased in $ApoE^{-/-}$ mice compared to the wild type mice. Cytoplasmic and nuclear expression of PPAR-g was decreased, NF-kB p65, p-NF-kB p65, caspase 3, and caspase 8 expression was higher in the $ApoE^{-/-}$ mice compared to the wild type mice. TUNEL assay showed more positive cells in the meibomian gland acinus of $ApoE^{-/-}$ mice. CD45 positive cell infiltration increased from 5 months to 7 months in $ApoE^{-/-}$ mice. Lipid metabolism related genes such as FFAR1, PAR3, ACSL3, and LIPC were decreased in $ApoE^{-/-}$ mice compared to the wild type mice. Wild type mice fed with high fat diet showed similar pathological changes as $ApoE^{-/-}$ mice.
Conclusion: Hyperlipidemia could induce abnormal meibomian gland acinar cell proliferation, differentiation, and lipid metabolism. Hyperlipidemia condition may be an important pathogenesis factor of meibomian gland dysfunction.

PU-641

单眼急性中心性浆液性脉络膜视网膜病变 患者双眼脉络膜血管光相干断层扫描 血管成像观察

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目的 观察单眼急性中心性浆液性脉络膜视网膜病变（CSC）患者双眼黄斑区结构及脉络膜毛细血管层血流密度变化。
方法 前瞻性横断面研究。临床检查确诊的单眼急性 CSC 患者 24 例 48 只眼（病例组）纳入研究。将病例组患者的患眼、对侧眼分别设为 CSC 组、对侧眼组，均为 24 只眼。选取同期年龄、性别匹配的健康志愿者 21 名 21 只眼作为正常对照组。采用 OCT 及 OCT 血管成像（OCTA）观察受检眼黄斑区结构，并测量黄斑区半径 1 mm 圆形范围内脉络膜毛细血管层血流密度。采用 t 检验比较三组受检眼之间脉络膜毛细血管层血流密度的差异。
结果 OCT 检查结果显示，CSC 组所有患眼均可见黄斑区神经上皮层浆液性脱离，伴或不伴 RPE 脱离分别为 20、4 只眼。对侧眼组 24 只眼中，厚脉络膜性 RPE 病变（PPE）13 只眼（54.2%）。

正常对照组受检眼黄斑区未见视网膜、脉络膜结构异常。OCTA 检查结果显示，CSC 组、对侧眼组、正常对照组受检眼脉络膜毛细血管层血流密度分别为 1.759±0.132、1.924±0.463、1.940±0.033。与对侧眼组、正常对照组受检眼比较，CSC 组患眼脉络膜毛细血管层血流密度明显降低，差异有统计学意义（t=6.611、6.474，P=0.000、0.000）；对侧眼组、正常对照组受检眼脉络膜毛细血管层血流密度比较，差异无统计学意义（t=1.328，P＞0.05）；对侧眼组中 PPE 眼与无 RPE 改变眼脉络膜毛细血管层血流密度比较，差异无统计学意义（t=0.806，P＞0.05）。

结论 单眼急性 CSC 患者 54.2%的对侧眼存在 PPE；患眼脉络膜毛细血管层血流密度较对侧眼及正常眼降低。

PU-642

首诊视盘出血的埋藏型视盘玻璃疣临床特征

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目的：分析以视盘出血为首发体征的埋藏型视盘玻璃膜疣临床特征。
材料与方法：
收集 2015 年 12 月至 2017 年 12 月期间 23 例以视盘出血为首发体征的疑似埋藏型玻璃膜疣患者 23 眼。所有患者行视力，眼压，眼 A/B 超，眼底照相，自发荧光检查，视盘光学相干断层扫描（OCT），部分患者行 VEP 和视野检查评估视神经受损程度。
结果：
23 例患者 23 眼，女性 14 例，男性 9 例。患者年龄 11～55 岁，平均年龄 29.3 岁，其中 13 岁以下儿童 9 例。双眼 19 例，单眼 4 例。首诊时误诊为视神经炎 2 例 2 眼，视盘血管炎 3 眼，视网膜中央静脉阻塞 1 眼，黄斑水肿 1 眼。所有患者的视盘 C/D 均小于 0.4，视盘拥挤，10 眼视盘表面和周围血管迂曲。单纯视盘表面出血 14 眼，平均视力 0.64，视盘出血合并玻璃体积血 3 例 3 眼，平均视力 0.25，视盘表面出血合并视盘周围视网膜深层出血 6 眼，平均视力 0.48。高眼压 3 眼。视野正常 16 眼，出现视野改变 7 眼，VEP 检测 P100 振幅和潜时正常 12 眼，VEP 检测 P100 振幅降低和潜时延长 6 眼，VEP 检测 P100 振幅降低和潜时正常 3 眼，VEP 检测 P100 振幅正常和潜时延长 2 眼。8 眼视盘周围 3.0 直径 RNFL 厚度明显变薄。单纯视盘出血吸收平均 2.9 周。
结论：
区分埋藏型视神经乳头玻璃膜疣导致的视盘出血非常重要。埋藏型视神经玻璃膜疣发病隐匿，可引起视野严重缺损，视网膜神经纤维层薄变，并可伴有血管并发症。早期诊断,密切随访和积极治疗合并症十分必要。

PU-643

Ex-PRESS 引流钉植入术治疗新生血管性青光眼的短期疗效观察

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目的：观察 Ex-PRESS 青光眼引流钉植入术在新生血管性青光眼治疗中的短期疗效及探讨其安全性。
方法：收集 2016 年 1 月至 2017 年 6 月在长沙爱尔医院行 Ex-PRESS 引流钉植入术新生血管性青光眼患者 30 例 32 眼，观察术后 3 天、1 周、半月、1 月、2 月、3 月的视力、眼压、并发症的情况，将结果与术前比较，分析其手术效果。
结果：（1）Ex-PRESS 青光眼引流钉植入术后 3 天、1 周、半月、1 月、2 月、3 月视力与术前相比无统计学差异（P＞0.05）；（2）Ex-PRESS 青光眼引流钉植入术后 3 天、1 周、半月、1 月、2

月、3 月平均眼压分别为（8.6±3.2），（9.1±4.1），（10.8±4.4），（11.1±3.8），（10.6±4.7），（12.2±4.5）mmHg，与术前平均眼压（45.9±7.2）mmHg 明显降低，具有统计学差异（P＜0.05）；（3）Ex-PRESS 青光眼引流钉植入术后出现并发症共 3 眼（9%），包括浅前房 2 眼，浅前房合并脉络膜脱离 1 眼。
结论：Ex-PRESS 引流钉植入术是治疗新生血管性青光眼的一种安全、有效的手术方法，可以有效降低眼压，术后并发症少，对视力损伤小。

PU-644

飞秒激光角膜基质内切割术治疗老视前后角膜生物力学的特性变化

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目的 探讨飞秒激光角膜基质内切割术（INTRACOR）治疗老视前后角膜生物力学变化情况。方法 采用前瞻性临床自身对照研究设计。对老视患者 24 例 24 眼采用飞秒激光 INTRACOR 进行治疗，观察术前和术后 12 个月的裸眼远视力、裸眼近视力、等效球镜度。采用 Corvis ST 角膜生物力学分析仪检测患者术前和术后 1、3、6、12 个月的角膜生物力学参数，包括眼压、中央角膜厚度（CCT）、最大压陷时峰距（HC-PD）、最大压陷时曲率半径（HC-R）、最大压陷时变形幅度（HC-DA）；采用 Orbscan-IIz 角膜地形图检测角膜中央 3 mm 区屈光力和 6 mm 区非球面指数。结果 术前和术后 12 个月 UCNVA （LogMAR 视力）分别为 0.5（1.0，0.3）和 0.2（0.4，0.0），差异有统计学意义，术后 12 个月 UCDVA 与术前值比较，差异无统计学意义。术后 12 个月 SE 为（-0.37±0.29）D，与术前比较有轻度近视转换漂移 ，差异有统计学意义。术前与术后 1、3、6 和 12 个月眼压、CCT、HC-PD 比较，差异均无统计学意义；术前与术后 1、3、6、12 个月 HC-R、HC-DA 值比较，差异均有统计学意义，术后各时间点 HC-R 值均小于术前值，HC-DA 值均大于术前值，差异均有统计学意义（均 P＜0.05），术后各时间点 HC-R 值和 HC-DA 值两两比较差异均无统计学意义（均 P＞0.05）。术后 12 个月，角膜中央 6 mm 区非球面指数为-0.28±0.10，较术前的-0.16±0.09 负性增加，中央区手术前后角膜最大曲率差异值（diff-K 值）为（2.55±0.81）D。结论 INTRACOR 治疗老视可有效提高近视力，术后角膜 HC-R 减小和 HC-DA 增加，角膜中央曲率增加，非球面指数负性增加，提示手术降低了中央区角膜生物力学强度，角膜中央区前凸形成非球面多焦形态达到增加近视力目的。

PU-645

长期尾部悬吊模拟失重诱发大鼠视网膜不可逆性损伤

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目的 眼损伤/颅内压综合征（*visual impairment intracranial pressure, VIIP*）是国内外航天医学工作者们关注的重要问题之一。据文献报道[1]部分航天员航天飞行后出现的视觉功能下降在飞行后的数年内仍无法改善，本研究拟探索长期尾部悬吊模拟失重所致大鼠眼部病变是否可逆，为更好的应用该模型奠定基础。
方法 将 *24* 只正常雄性 *SD* 大鼠随机分为实验组（*M* 组）和对照组（*C* 组），*n=12*。*M* 组采用 *30°* 尾部悬吊后肢去负荷的方法进行微重力效应的模拟，*C* 组大鼠在同样的环境中单笼饲养，尾部悬吊

方法同实验组，但并不呈*-30°*头低位。尾部悬吊 *8* 周后，去除尾部悬吊干预，恢复正常体位。于造模第 *8* 周及恢复正常体位 *4* 周时，分别采用视网膜电图（*ERG*）检测视网膜功能，采用 *OCT* 观察视网膜形态。

结果 尾部悬吊处理 *8* 周后，大鼠视网膜功能及形态发生明显改变，具体表现为 *ERG* 暗适应 *3.0* 反应振幅明显下降（*183.21± 24.36 vs. 659.16 ± 73.90μV, C* 组 *vs.M* 组，*P < 0.05*），*OCT* 观察眼底可见其外核层变薄*(36.20 ± 2.14 vs. 22.82 ± 1.56 μm, C* 组 *vs.M* 组，*P < 0.05)*。恢复正常体位 *4* 周后，*M* 组大鼠 *ERG* 暗适应 *3.0* 反应振幅为 *168.90 ± 23.55μV*，*OCT* 观察视网膜外核层厚度为 *21.66 ± 1.85 μm,* 与造模第 *8* 周结果无统计学差异。

结论 *SD* 大鼠尾部悬吊 *8* 周可以很好地模拟长期微重力环境暴露所致视网膜损伤，且这种损伤为不可逆性改变，为下一步应用该模型进行防护措施有效性评估奠定了实验基础。

PU-646

IRVAN 综合征的临床特征

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摘要 目的：探讨 IRVAN 综合征的临床特征
方法：回顾 2005 年~2018 年在我院确诊的 7 例 14 眼 IRVAN 综合征的临床资料，对其临床表现、眼底彩照及超广角眼底造影、OCT 等特征进行分析。结果：7 例均为女性，年龄 9 岁~40 岁，平均 28.57±11.81 岁。所有患者均未发现全身病的阳性体征和异常的辅助检查指标。均为双眼发病，视力：HM/BE1 眼，FC/BE1 眼，LP1 眼，0.1-0.3 有 5 只眼，0.4-1.0 有 6 只眼。眼底彩照：13 眼视盘表面有明显的动脉瘤样扩张(92.85%)，11 眼伴有盘周、3 眼伴中周、3 眼伴周边视网膜瘤样扩张动脉，动脉瘤均位于视网膜动脉分叉处；13 眼视盘周/黄斑周均伴有硬性渗出(92.85%)；3 眼黄斑区视网膜下有圆形的结节样病灶其周伴浓密的黄白色渗出；1 例伴玻璃体积血，1 例伴牵拉向视网膜脱离。眼底荧光血管造影显示：13 眼视盘表面有荧光渗漏，14 眼周边视网膜大片毛细血管无灌注，5 眼伴周边视网膜点状片状荧光渗漏，1 眼伴颞上分支动脉阻塞；OCT 显示，13 眼(92.85%)视盘表面均有增殖膜，2 眼黄斑中心凹可见神经上皮脱离。7 例 14 眼均接受了周边无灌注区的眼底激光治疗，4 例予以皮质类固醇治疗视力略提高但反复发作。随访了平均 65 个月，视力：1 眼 FC/BE，1 眼 LP，3 眼 0.1-0.3，9 眼 0.4-1.0。 5 例 7 眼接受了微创玻璃体手术治疗，与手术前视力相比 6 眼视力提高，1 眼因中心凹下陈旧性瘢痕手术后视力没有变化：7 眼中动脉瘤完全消失，6 眼视盘周黄斑周硬性渗出完全消失，1 眼明显减轻。结论：IRVAN 综合征好发于中青年女性，双眼发病，其临床特征为视盘表面及其周动脉瘤样扩张、视盘周/黄斑区渗出、周边视网膜毛细血管无灌注，当发生视神经视网膜炎、黄斑区渗出、玻璃体积血、牵拉性视网膜脱离、继发性青光眼等并发症时将影响视功能。玻璃体手术去除了玻璃体后皮质可以很好控制病情，提高视力。

PU-647

1 型和 2 型糖尿病性白内障发病过程中的异常代谢研究

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目的 研究“快速”进展的 1 型糖尿病性白内障（type 1 diabetic cataract, T1DC ）和缓慢发展的 2 型 DC（T2DC）晶状体内代谢（尤其是葡萄糖代谢）改变，探索 DC 发生发展的分子机制。

方法 通过诱导大鼠 1 型和 2 型 DC 模型，取早期白内障晶状体和对照组透明晶状体。通过改进的双向荧光差异凝胶电泳、SDS-PAGE 以及各种质谱为基础的蛋白质组学方法、同位素标记技术，定量分析各代谢通路在高糖环境下的变化。

结果 T1DC 晶状体浑浊出现的比 T2DC 更早，发展更快，程度较重；T1DC 的特点为外周皮质大量的囊泡、裂隙以及晶状体纤维肿胀，而 T2DC 的特征性表现为散在点状皮质/核/后囊下浑浊。与 T1DC 相比，在 T2DC 晶状体内山梨醇通路激活程度较低，醛糖还原酶的表达和活性增加的程度较小，山梨醇积聚比 T1DC 轻，渗透损伤较轻；糖酵解各种酶含量在 1 型 DC 晶状体明显减少，ATP 合成也显著减少，糖酵解途径明显被抑制，T2DC 晶状体糖酵解未受到明显抑制，尽管 ATP 含量也一定程度减少（较正常晶状体），这与消耗较多有关。三羧酸循环途径在 T1DC 和 T2DC 激活，以补偿（部分）晶状体内 ATP 不足；DC 晶状体磷酸戊糖途径受到抑制，NADPH 合成不足，还原型谷胱甘肽（GSH）含量显著减少，抗氧化能力较差，这种情况在 T1DC 更显著；另外，T2DC 晶状体内含有更多的发生修饰或截断的晶状体蛋白的交联/聚集体，尽管 T2DC 发展较慢、程度较轻。
结论 糖酵解途径的严重抑制、渗透损伤、以及抗氧化能力的明显下降，导致 1 型 DC 比 2 型发展较快，混浊特征不同而且严重，而 T2DC 的形成与晶状体蛋白翻译后修饰和/或蛋白质交联、聚集更密切。

PU-648

Changed Expression of Long Non-Coding RNAs in proliferative diabetic retinopathy membranes after intravitreal conbercept injections

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Purpose: To evaluate the effect of conbercept on the expressions of Long Non-Coding RNAs (lncRNAs) and mRNAs in the fibrovascular membranes of proliferative diabetic retinopathy (PDR) patients.
Methods: Twenty patients, who were diagnosed with PDR and underwent pars plana vitrectomy (PPV), were recruited for this study. Ten patients were treated for PPV alone (Control Group), and the others received conbercept injections before PPV (Treated Group). The fibrovascular membranes were harvested during surgery. Expressions of lncRNAs and mRNAs in the membranes were tested using LncRNA Arrays. Bioinformatics analyses were performed to identify the related biological modules and pathways of the differentially expressed genes. LncRNA/mRNA coexpression network was built to identify the correlations between lncRNAs and mRNAs. Real-time PCR was conducted to verify the microarray results.
Results: We identified 427 differentially expressed lncRNAs, of which 263 were upregulated and 164 were downregulated. GO analysis indicated that these lncRNAs-coexpressed mRNAs targeted various metabolic processes, especially the gluconeogenesis. KEGG results indicated that 16 pathways had significant differences in gene expression, including gluconeogenesis, HIF-1 signaling pathway, NOD-like receptor pathway, etc. The lncRNA/mRNA coexpression network showed that many differentially expressed lncRNAs were enriched in the HIF-1, TNF-α, and NOD-like receptor pathways. LincRNAs were the largest category and further bioinformatics analysis implied that these lincRNAs-coexpressed mRNAs were mainly involved in PDR-related biological processes and pathological pathways.
Conclusion: Conbercept treatment can obviously change the expression profiles of lncRNAs and mRNAs in the fibrovascular membranes of PDR patients. A complete understanding of the relationship between lncRNAs and anti-VEGF drugs may contribute to new therapeutic regimen for PDR.

PU-649

西藏左贡县白内障防盲手术中人工晶体度数的优化配置

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目的：调查西藏左贡县白内障防盲手术中人工晶状体度数的分布状态，为特定地区防盲手术前期准备工作中人工晶状体的优化配置提供科学数据。
方法：统计我院 2013 年 8 月前往西藏左贡县免费施行白内障手术的 156 例（156 眼）资料，记录术前人工晶状体度数的测量值、术中实际植入度数和患者术后 1d 的视力。统计分析人工晶状体度数的分布状态，及人工晶状体实际植入度数与测量值之间的差异。
结果：术前测量人工晶状体最小度数为 10.0D，最大为 26.0D。以 22.0D（25 枚）、22.5D（18 枚）、23.0D（17 枚）及 23.5D（21 枚）IOL 频率最高，分别为 16.0%、11.5%、10.9%及 13.5%。术中植入人工晶状体 10.0D≤IOL≤16.5D 共 6 枚（3.8%），17.0D≤IOL≤18.5D 共 9 枚（5.8%），19.0D≤IOL≤21.0D 共 33 枚（21.2%），21.5D≤IOL≤23．5D 共 100 枚（64.1%），24D≤IOL≤26.0D 共 8 枚（5.1%），其中以 22.0D（36 枚）IOL 频率最高 23.1%。术中植入的人工晶状体度数与术前测量值完全相符（差值为 0）的为 120 例，占 76.9%；相差 0.5D~1.0D 的为 29 例，占 18.6%；相差 1.5D~2.0D 的为 6 例，占 3.8%；相差≥2.5D 的为 1 例，占 0.6%。
结论：在本次西藏左贡县防盲行动中，人工晶体总量及常用度数晶体量的配置基本合理，<17D 和>23.5D 的人工晶体配置欠合理，缺如大部分≤10D 的人工晶体但尚有各种不足之处需要改进。应根据特定地区人工晶状体的分布状态，优化人工晶状体的配置，对提高手术效果，改善患者术后视力有重要的临床意义。

PU-650

ICF-CY 在低视力青少年筛查中的运用

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传统的视力筛查模式通常为短时间内进行大规模普查，并需进行相关统计分析，筛查过程需要投入较大的人力物力。《国际功能、残疾与健康分类（儿童和青少年版）》(Intemational Classification of Functioning，Disability and Health Children and Youth Version，简称 ICF-CY）以广泛的类目用于描述儿童和青少年的功能和健康状况。本文从 ICF-CY 在低视力青少年筛查的运用情况中，提出作为筛查的主检者不能仅局限于眼病诊断及视力评估，而应该着眼患者的整体健康状况，以身体功能结构、活动参与和背景因素 3 个角度，统筹协调家长、老师、校医和医生参与逐步筛查，进行兼顾低视力青少年现状和发展性的评估，探索更加科学合理的筛查方法。

PU-651

急性闭角型青光眼合并白内障超乳术后的屈光误差及其相关影响因素的分析

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目的：对比急性闭角型青光眼合并白内障患者及单纯白内障患者行 PHACO+IOL 术后 3mon 的屈光误差，并分析影响两组术后屈光误差相关的眼球生物学参数(眼轴、角膜曲率、前房深度、眼压)。

方法：随机性病例对照研究。 APACG 合并白内障组为试验组，单纯白内障组为对照组,每组各 26 例 26 眼，测量术（前、后）眼压、眼轴长度、角膜曲率、前房深度，利用 SRK-Ⅱ公式计算预留屈光度。采用配对样本 t 检验分别比较两组术前术后相关参数的差异。
结果：白内障组术后的平均屈光误差为-0.38±0.57D；APACG 组术后的平均屈光误差为+0.67±0.59D，两组术后屈光误差的差异具有统计学意义(P<0.05)。 两组内的术前术后生物参数比较：白内障组术前眼轴长度 23.46±0.38mm，术 后 23.48± 0.40mm，眼轴长度变化差异无统计学意义(P>0.05)； APACG 组术后的眼轴长度 21.43±0.44mm，较术前的眼轴长度(22.23±0.48mm)变短，差异有统计学意义(P< 0.05)。 白内障组术后前房深度 3.89±0.38mm，较术前前房深度(2.74±0.23mm)明显增加，差异有统计学意义(P< 0.05)；APACG 组术后的前房深度 3.65±0.43mm，较术前前房深度(1.78±0.23mm)明显增加，差异有统计学意义 (P<0.05)。 白内障组术前平均角膜曲率 43.78±0.87D，术后 43.82±0.92D，平均角膜曲率变化差异无统计学意义 (P>0.05)；APACG 组术前平均角膜曲率 43.87±0.74D，术后 43.75±0.65D，平均角膜曲率变化差异无统计学意义(P>0.05)。
结论： APACG 合并白内障患者行 PHACO+IOL 术后的屈光误差较单纯白内障患者大，且呈远视漂移，与术后眼轴变短及前房深度增加相关，眼轴增加与眼压降低和脉络膜增厚相关

PU-652
改良式超声乳化治疗过熟期及硬核白内障临床疗效的分析

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目的 观察过熟期及硬核白内障患者采用改良式超声乳化吸除术的临床效果。
方法 回顾性分析 2017 年 1 月至 2018 年 9 月在我院行过熟期白内障 23 例(23 眼)，连续环形撕囊后冲洗出液化皮质，硬核（Ⅳ-Ⅴ级）白内障 18 例（18 眼），进行刻槽一分为二劈核后，晶体核与后囊之间注入粘弹剂，然后植入软质人工晶状体于晶状体核后的囊袋内，原位超声乳化晶状体核，观察术后视力及并发症。
结果 40 眼(97.5％)顺利完成手术；后囊破裂者 1 眼(2.5％)；术后第一天角膜水肿者 3 眼(7.4％)；术后 7d，35 眼(85.36％)的裸眼视力≥0.5；5 眼（高度近视）的裸眼视力≥0.1,1 眼（黄斑水肿）的视力无提高，无角膜内皮失代偿发生，无人工晶体移位等并发症。
结论 过熟期及硬核白内障患者先植入人工晶状体然后再行超声乳化可减少后囊破裂的发生率，术后能够较快恢复视力。

PU-653
合并闭青的白内障超乳手术风险与早期疗效

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目的：探讨合并闭角型青光眼的白内障患者行超声乳化白内障摘除手术中可能出现的并发症，以及预防及处理技巧。
方法：研究对象为合并闭角型青光眼的白内障患者，具备白内障超声乳化摘除及人工晶状体植入手术指针，术前经降眼压治疗、眼压控制在 21mmHg 以下者进行手术，术前常规散瞳。观察术中常见并发症及手术风险及预防处理措施，观察术后 1 周视力、眼压、瞳孔、人工晶状体位置、角膜水肿、前房炎症反应、晶状体后囊完整情况等。

结果：纳入符合标准的手术患者共 60 例（66 只眼），术中常见风险及并发症包括浅前房、小瞳孔、悬韧带松弛、囊袋不全脱位、囊袋阻滞综合征等。处理措施和手术技巧包括，灌注瓶高和负压的调控，瞳孔扩张器、虹膜拉钩和囊袋张力环的使用，应用虹膜后连续环形撕囊技术，选择合适的角膜隧道切口长度和人工晶体类型等。所有患者术后视力均有不同程度提高，裸眼视力:0.6～1.0 者 50 只眼(75.8％)，0.3～0.5 者 10 只眼(15.1％)，0.1～0.3 有 6 只眼(9.1％)。术后眼压均恢复正常。术后主要并发症有角膜水肿、术后葡萄膜炎性反应、瞳孔变形、人工晶体测量误差等。无一例患者发生后囊膜破裂。
结论： 对合并闭角型青光眼的白内障患者行超声乳化手术，需要认真的术前评估，选择好适应证，制定个性化手术方案，手术是安全有效的。

PU-654

角膜移植术后继发青光眼病例分析

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目的：通过临床病例分析，探讨角膜移植术后继发性青光眼的病因、临床表现、诊断标准和治疗方案。
方法：选取临床角膜移植术后继发性青光眼的病例进行分析。通过 4 个典型病例：真菌性角膜溃疡行 PKP 术后 20 天高眼压、真菌性角膜溃疡角膜溃疡 3 次 PKP 术后继发性青光眼、左眼陈旧性化学伤 26 年继发性青光眼和 ICE 综合征 PKP 术后继发性青光眼，进行综合分析：1.研究角膜移植术后继发青光眼的危险因素；2. 角膜移植术后诊断继发性青光眼的评价标准；3.探讨可行性治疗方案。
结果：1. 角膜移植术后继发青光眼的概率为 21.5-34.0%；2. 危险因素包括：原发病、家族史和手术次数等；3. 角膜移植术后眼压不易观察，诊断标准尚无定论，根据眼压诊断指标分为 3 类：①术后眼压 25mmHg, 术后眼压较术前升高>10mmHg；②术前患有青光眼，术后应用药物种类或次数增多；③术后应用抗青光眼药物≥1 种，降眼压药物控制超过 4 周；4. 治疗：首先去除病因，51-62%患者药物可控制，必要时可青光眼手术治疗。5.角膜移植术后高眼压更易导致角膜移植手术失败。
结论：角膜移植术后继发性青光眼病因复杂、诊断困难，需在视功能未受损前尽早控制眼压。

PU-655

病毒感染继发性青光眼病例分析

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目的：通过临床病例分析，探讨病毒感染引起的继发性青光眼的诊断和治疗方案。
方法：选取临床病毒感染引起的继发性青光眼病例：男性，60 岁，因双眼突发胀痛伴视力下降 3 天入院。查体发现患者双眼角膜雾状水肿，前房浅，初步考虑患者急性闭角型青光眼，给予患者降眼压治疗。治疗后患者眼压再次升高，房角检查发现患者房角窄，但全周开放，瞳孔散大不明显，患者角膜后可见尘状 KP（+），前房闪辉（+）。入院后行房水病毒检查，以明确诊断。给予患者降眼压药物、抗炎、抗病毒药物治疗。治疗前患者双眼眼压波动在 28-44mmHg，综合治疗后双眼眼压波动在 12-19mmHg，眼底检查未见明显青光眼视功能改变。
结果：1. 通过各项检查和诊断性治疗，考虑患者病毒感染继发性青光眼。2.患者房水病毒（RV，CMV,HSV,EB）检测呈阴性，给予房水聚合酶链反应(PCR)测试病毒 DNA 和血清病毒学检查，确认患者眼部病毒感染。3.进行抗病毒等综合治疗有效。

结论：病毒感染可引起双眼急性眼压升高，行房角检查和房水病毒检查可明确病毒感染继发性青光眼诊断，需进行抗病毒等综合治疗。

PU-656
9 例各类黄斑水肿病人使用 Ozurdex（傲迪适）的临床观察

章征
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目的：观察 ozurdex 在视网膜静脉阻塞伴黄斑水肿、糖尿病视网膜病变伴黄斑水肿以及肾病性视网膜病变伴黄斑水肿病人使用的临床效果。
方法：收集我院眼科 2018.3----2018.6 期间 9 例使用 ozurdex 治疗的病例，其中 CRVO2 例，BRVO4 例，BRVO 伴玻血行玻切内界膜剥离术后 1 例，糖网 1 例，肾病性视网膜病变 1 例，以上病例均有黄斑水肿，均行 Ozurdex 玻腔注射。术后每个月随访，观察矫正视力、眼压、眼底情况、oct 黄斑中心凹厚度以及眼内注入的药栓情况。
结果：9 例病人中 8 例病人矫正视力提高，9 例病人黄斑中心凹厚度不同程度降低，个别病人眼压在术后 2-3 月时升高超过正常上限，使用降眼压药控制于正常范围，未出现其他严重并发症。
结论：Ozurdex 对于减轻 RVO 性黄斑水肿疗效确切，病程小于 90 天患者，起效快，疗效显著。病程短、术前视力好的患者术后视力恢复较好。Ozurdex 对于糖网黄斑水肿、肾病性视网膜病变黄斑水肿也有较好的疗效。

PU-657
比较非液体浸润式和液体浸润式飞秒激光平台的操作性及临床效果

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目的：比较非液体浸润式飞秒激光平台 LenSX 与液体浸润式飞秒激光平台 LensAR 的操作性及临床效果。方法：前瞻性随机对照性研究，纳入于我院行飞秒激光辅助白内障手术的患者 90 例 93 眼，所有患者随机分为 LenSx 组(46 例 48 眼),和 LensAR 组（44 例 45 眼）。对两个飞秒激光平台的操作性及时间参数（对接时间、一次对接成功率、尝试对接的次数、晶状体前囊膜切开时间、预劈核时间、负压吸引时间、飞秒激光总耗时长）、临床效果（结膜下出血率、眼压升高、晶状体前囊膜切开完整（是/否）、IOL360°光学覆盖（是/否）、前囊口圆度）进行分析和比较。结果：1.操作性及时间参数：LensAR 组的对接时间、尝试对接的次数、晶状体前囊膜切开时间、预劈核时间分别是 9.47±4.33s、1.0（1-2）、3.00（2.00-4.00）、12.48±3.69 优于 LenSX 组 11.99±5.78s、1.0（1-4）、13.00（9.00-22.00）、16.47±3.13，有统计学差异（p<0.05）；LenSX 组负压吸引时间、飞秒激光总耗时分别是 97.28±21.14、109.27±23.65 较 LensAR 组 123.76±16.81、133.22±17.47 更短，有统计学差异（p<0.05）；2.临床效果：LensAR 组结膜下出血率（6.5%）较 LenSX 组（22.5%）低，LensAR 组激光术后眼压升高值（6.1±6.0mmHg）较 LenSX 组（3.7±5.3mmHg）更明显，均有统计学差异（ 均 p＜0.05）。结论：两种飞秒激光平台均安全、有效，可以获得理想的前囊膜完整游离率、前囊口圆度；LensAR 易操作，学习曲线短；LenSX 组激光操作总时长更短，激光前后眼压变化更平稳。

PU-658

短眼轴白内障超声乳化手术分析

宋超
上海新视界中兴眼科医院

目的：观察比较两种术士短眼轴白内障超声乳化手术的临床疗效。
方法：回顾性分析我院 2018 年 1 月至 10 月期间 23 例（30 只眼）眼轴在 18.56mm-20.88mm 的患者行白内障超声乳化术，随机分成 2 组：观察组：飞秒激光辅助下超声乳化术，11 例（16 只眼）。对照组行超声乳化组术，12 例（14 只眼）。观察两组患者视力、角膜内皮细胞计数及并发症。
结果：两组术后视力均较术前有不同程度的提高，无显著性差异。观察组激光撕囊均成功，对照组前囊撕裂 2 眼，囊口不圆及偏位 4 眼。术后 3 个月角膜内皮细胞计数对照组较观察组有下降，有显著性差异。两组术中均未出现后囊破裂及玻璃体脱出。
结论：飞秒激光辅助下短眼轴患者白内障手术并发症少，手术安全可靠，值得推广应用。

PU-659

1 例偏瘫患者行玻璃体切割手术前后的护理

廖明燕
陆军军医大学西南医院

目的：探讨偏瘫患者行玻璃体切割术前术后护理的重要性及术后体位的依从性。
方法：对 2018 年 3 月 30 日我科收治 1 例玻璃体切割手术合并偏瘫患者通过给予术前健康教育、手术前准备、术后全麻护理、体位护理、皮肤护理、饮食护理等护理措施，观察术后效果；树立患者的信心，提高保持体位的依从性。
结果：通过对玻璃体切割手术合并偏瘫患者围手术期的护理，患者视网膜复位,术前视力较术后视力提高，特殊姿势训练，以及对疾病的发生、发展，防止了并发症，且治疗效果和护理效果均得到患者及家属的满意。
结论：通过对此例病人的护理，要有强烈的责任心，耐心地做好患者及家属的心理疏导工作和认真的术前、术后护理，这每一细节都十分关键；护士对此病人的细致、全面、积极有效地护理，是杜绝并发症的发生，促进疾病康复的关键环节之一；采取针对性有效的护理措施，对患者康复有重要意义。

PU-660

早产儿视网膜病变患儿围手术期的护理

廖明燕
陆军军医大学西南医院

目的: 探讨早产儿视网膜病变患儿围手术期最佳护理方法及措施。

方法: 通过对 5 例早产儿视网膜病变患儿术前 ROP 筛查 RetCamⅡ检查的配合、健康宣教、术前建立静脉留置针、预防感染、饮食护理、术后全麻护理、术眼护理、预防感冒、出院指导等护理措施，取得了良好的效果。
结果: 5 例早产儿视网膜病变患儿围手术期的护理，术后术眼恢复好，未出现任何并发症。
结论: 加强早产儿视网膜病变患儿的围手术期护理是早产儿视网膜病变患儿眼部手术成功和减少术后眼部并发症的有力保证。

PU-661

眼科患者术后俯卧位舒适度的护理

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目的：改变视网膜脱离患者行玻璃体切除联合腔内填充术后的舒适度，以达到术后手术效果及体位要求，提高护理质量。
方法：由于长时间保持俯卧位姿势，给患者身体带来极大的痛苦及不适，通过术前指导患者俯卧位练习；术后监督患者保持正确体位的依从性情况等一系列护理措施，提高患者俯卧位的舒适度。
结果：患者舒适度得到满足，依从性得到提高，手术效果得到保证，提升了患者满意度。
结论：采取有效的护理对策，提高了俯卧位患者舒适度及依从性，为手术的成功率奠定了坚实基础。

PU-662

Adherent leucoma following deep anterior lamellar keratoplasty: two case report.

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ningbo eye hospital

Deep anterior lamellar keratoplasty (DALK) has become a popular surgical alternative to penetrating keratoplasty (PK) for the treatment of keratoconus (KC) and corneal stromal pathologies1-2. The patient successfully responded to intensive topical antifungal therapy with the maintenance of visual acuity. Interface keratitis following DALK frequently needs graft lift/interface wash due to deep location, rapid spread and poor penetration and efficacy of topical medications3. In view of a paracentral location, modified debulking with topical therapy resulted in a satisfactory outcome in our case thereby avoiding the need for more invasive treatments.
Ocular trauma, caused by bacteria, fungus infection of the cornea ulcer, acid alkali chemical injury and thermal burns may cause corneal perforation, perforation if failed to do after the formation of penetrating keratoplasty, while microperforation of DM commonly allows for the completion of predescemetic DALK (pdDALK) by lamellar dissection (LD) after decompression of the anterior chamber, macroperforations measuring more than 1 mm require conversion to PK4. which in some cases the final cannot keep eye, also some cases forms adhesive leukoma patient with long endure of mental and physical pain as a result of complications and appearance, also face the loss of eyeball caused by infection and slight trauma. Adherent leucoma following DALK is a rare occurrence. We report two case of adherent leucoma following DALK that successfully responded to modified debulking and medical treatment.

PU-663

非侵入性眼表综合分析仪评估屈光不正儿童干眼的特点

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目的：利用非侵入性眼表综合分析仪评估屈光不正儿童干眼的特点。
方法：选取 2018 年 10 月至 2019 年 2 月于重庆医科大学附属永川医院确诊为屈光不正且合并干眼的儿童 85 例(160 眼)，完成病史及眼表疾病指数(ocular surface disease index,OSDI)问卷、非侵入性眼表综合分析仪检查及睫状肌麻痹验光。
结果：显示非侵入性眼表综合分析中第一次非侵入性泪膜破裂时间(first noninvasive tear film break-up time,NITBUT),平均非侵入性泪膜破裂时间(average noninvasive tear film break-up time,NITBUTav)与 OSDI 均呈正相关性,NIBUT 与 NIBUTav 呈高度正相关性(均为 P <0. 05)。泪膜脂质层厚度(lipid layer thickness,LLT)与 NIBUTav 呈正相关性。不同程度屈光不正儿童中各参数无明显差异(P <0. 05)。
结论：屈光不正儿童干眼患者中 NITBUT 及 NITBUTav 时间缩短，泪膜脂质层厚度变薄较睑板腺萎缩更明显，不同程度屈光不正儿童的干眼程度无显著差异；非侵入性眼表综合分析仪以客观准确评估屈光不正儿童干眼的特点。

PU-664

24H 眼压患者网络预约住院平台的设计及应用

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陆军军医大学西南医院

目的：优化 24H 眼压预约流程，减少患者在院滞留时间，合理利用医院资源。
方法：2018 年 5 月至今开展实行 24H 眼压网络预约流程，主要针对需要进行 24H 眼压测量的患者进行床位预约。具体实施为：1、根据我科床位的流动情况，拟定利用周末的空置床位进行 24H 眼压测量。2、依靠我科的微信公众号，进行专业设计，搭建日间患者自助网上预约平台；上传电子版入院宣教须知，须患者浏览、答题后，方可进入预约界面。3、医生开具需要进行 24H 眼压测量的住院证后，患者根据自身病情及医嘱，随时随地在网上完成测量时间的预约。4、患者选定预约日期后，跳转至入院宣教界面，再次给患者强调入院须知。5、工作人员根据患者预约情况，提前统计床位。6、患者按照预约日期，到病房办理入院手续，进行 24H 眼压测量。
结果：2018 年 5 月-11 月，共计预约 368 人次，流程畅通，无不良反馈。
结论：患者自行在网络预约平台进行 24H 眼压预约，可有效减少患者在院滞留时间，缓解患者的不良情绪，提高了患者满意度；患者根据自身的安排，选定合适的时间进行测量，可有效减少患者的爽约率，增加了空置床位的利用率；预约全程由患者自行操作、宣传资料上网，使整个流程更便捷，也节约了人力及物力，减少了资源浪费。

PU-665

自理能力评估单在青光眼患者的应用

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目的：分析自理能力评估单在青光眼患者中的应用，使其提高护理质量，优化护理模式，提高工作效率。

方法：入院时青光眼患者在电子护理病历中的患者自理能力评估单进行评分。评估内容 10 项，分别是 1 进食、2 洗澡、3 修饰、4 穿衣、5 控制大便、6 控制小便、7 入厕、8 床椅移动、9 平地行走、10 上下楼梯。10 项内容分别为完全独立、需部分独立、需极大帮助、完全依赖。每项分值所对应 4 个项目分值不一样，总分 100 分。根据分值确定患者自理能力等级，共三个等级，根据等级有针对的制定护理计划和护理措施。

结果：眼科患者在使用了自理能力评估单后提高了工作模式，优化了护理程序。
结论：使用自理能力评估单后护士能更好、更准确的为青光眼患者提供全方位的护理。

PU-666

21 三体综合征合并角膜溃疡患者护理体会

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目的 减少或消除 21 三体综合征角膜溃疡患者的疼痛。**方法**采用 Wong-Banker 面部表情量表法做好疼痛评估，从心理、用药、安全、饮食和健康教育等几方面给予患者对症支持治疗。**结果** 21 三体综合征角膜溃疡患者的疼痛得到缓解和消除。**结论**从心理、用药、安全、饮食和健康教育等方面给予 21 三体综合征角膜溃疡患者护理，其疼痛得到缓解和消除。

PU-667

医护一体化护理模式在白内障日间手术患者中的应用效果研究

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目的：探讨医护一体化护理模式在白内障日间手术患者中的应用及临床效果，提高此类患者手术配合依从性。**方法**：采取随机分组筛选法分组进行，对照组给予常规工作模式予以护理；观察组给予医护一体化护理模式护理。由一个责任护士负责患者住院期间的一切护理活动和出院后的随访与指导工作，比较两组患者手术配合的依从性。结果：两组患者从心理焦虑程度、健康宣传内容的掌握程度和对护士的满意度三方面比较，差异均有统计学意义，（$P<0.05$）。观察组的病人按医生要求配合手术治疗的行为明显优于对照组。**结果**：对白内障日间手术患者给予医护一体化护理模式，能够使病人减轻心理焦虑，能够更好的掌握自我护理方法，能够提高患者手术配合的依从性。**结论**：对进入白内障日间手术流程的患者实施医护一体化护理模式，能够提高患者配合手术的依从性，保证白内障日间手术安全顺利进行并提高护理满意度。

PU-668

青光眼术后浅前房的观察与护理

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目的：探讨青光眼滤过术后浅前房的原因及处理方。
方法：回顾性分析对 142 例 165 只眼青光眼患者行滤过手术后发生浅前房原因及处理方法。
结果:发生浅前房共 17 例 21 只眼，发生率为 12.3%

结论：青光眼术后容易发生浅前房，如不及时处理，会给术眼带来严重的损害。因此，术后积极配合医生，加强观察及护理是手术成功的关键。

PU-669

54 例眼外伤继发性青光眼患者的临床分析

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目的：探讨眼外伤早期继发性青光眼患者的临床诊治分析。
方法：收集 2016 年 11 月—2017 年 9 月收治的眼外伤早期继发性青光眼 54 例（62 只眼）患者的临床资料，回顾分析临床资料及相应的治疗措施。
结果：治疗结束后随访 3 个月，其中眼压正常且不用降眼压药物而治愈 49 例（79.04%）好转 10 例（16.13%）未愈 3 例（4.83%）。
结论：采取针对性的治疗措施可以有效提高眼外伤早期青光眼患者的治疗效果，减少并发症的发生。

PU-670

水合氯醛不同的给药途径在患儿眼科检查的效果研究

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目的：探讨水合氯醛通过不同的给药途径在小儿眼科检查中的镇静效果。
方法：在我院随机抽取 2018 年 2 月到 2018 年 7 月 1-5 岁无法有效配合眼科检查的患儿共 80 人。随机分为试验组和对照组各 40 人。试验组为直肠给药，对照组为口腔给药。比较两组的起效时间，及维持时长和给药成功率。
结果：直肠给药起效时间明显快于口服给药（$p<0.05$）。直肠给药维持时长短于口服给药维持时长（$p<0.05$）。直肠给药成功率高于口服给药（$p<0.05$）。
结论：在婴幼儿进行眼科检查需要水合氯醛镇静时，可根据检查的项目和具体情况选择不同的给药方式，直肠给药成功率更高，起效时间更快，但维持时间短。口腔给药易造成胃肠道反应，但维持时间也更长。

PU-671

儿童日间斜视矫正术恐惧心理的护理干预

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目的：探讨儿童日间斜视矫正术恐惧心理的护理对策，减轻斜视患儿恐惧心理的产生，降低斜视患儿治疗过程中不良情绪的发生率，促使斜视患儿能更好的配合医护人员完成疾病的治疗。
方法：在我院随机抽取 2018 年 2 月到 2019 年 1 月的日间斜视手术患儿共 100 人。将 2018 年 2 月到 7 月的 50 例日间斜视患儿作为对照组。对照组的日间斜视患儿按照常规整体护理模式进行护理。将 2018 年 8 月到 2019 年 1 月的 50 例日间斜视患儿作为试验组。试验组的日间斜视患儿除采取常

规整体护理外，还加强患儿和家长的健康宣教，和相应的恐惧心理护理。（如了解患儿恐惧心理的来源，针对其原因做出相应的护理措施。手术前一日由指定的日间责任护士，带患儿及家属熟悉病区环境。责任护士在进行健康宣讲的同时与患儿进行互动，减轻患儿对医院及医护人员的陌生感和恐惧心理。以游戏的方式对患儿进行双眼纱布遮盖，以适应术后患眼遮盖的不适。指导患儿家长如何增强患儿安全感，以及转移患儿对疾病的注意力，分散患儿对疾病的关注度。指导家长鼓励和激励患儿克服治疗过程中的不适。）
结果：试验组哭闹及拉扯纱布的情况比对照组低 $p<0.05$。
结论：围手术期有效的护理干预能降低日间斜视矫正术患儿的恐惧心理，可以降低日间斜视患儿治疗过程中不良情绪的发生率，还可以使日间斜视患儿更好的配合医护人员进行治疗。

PU-672

眼科护理中存在的风险及对策分析

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目的：探讨眼科护理中存在的风险及其干预对策。
方法：回顾性分析笔者所在医院眼科护理中存在的风险因素，根据分析结果制定了风险护理干预措施，并将其应用于临床中。选择我科 2017 年--2018 年收治的 182 例患者作为研究对象，按照随机分组法分为两组，对照组给予常规护理，观察组则给予风险预防护理干预，比较两组意外事件发生率、护理质量、眼科健康知识知晓率及护理满意度。
结果：观察组眼部感染、摔倒、烫伤等意外事件发生率明显低于对照组。观察组患者对基础护理、病房环境管理及护理服务态度等护理质量评价指标评分明显高于对照组。观察组患者眼部健康知识知晓率及护理满意度均高于对照组。
结论：风险预防护理能有效预防意外事件发生，提高患者健康知识知晓率及护理满意度。

PU-673

视网膜母细胞瘤相关危险因素的病例对照研究

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目的：调查重庆地区视网膜母细胞瘤患儿发病相关危险因素，为视网膜母细胞瘤的防治提供科学依据。
方法：通过 1:1 配对的病例对照研究，对 133 例视网膜母细胞瘤患儿及设立配对的正常对照组 133 例，采用问卷形式，自拟影响因素调查表，收集患儿相关因素，录入数据库，采用 SPSS17.0 对 266 人的资料先进行单因素分析，然后采用多因素非条件 Logistic 回归模型筛选主要危险因素。
结果：单因素分析显示父母受教育程度、父母职业、父母孕前 6 个月有害化学物接触史、孕前母亲盆腔炎史、父母生育史、本次妊娠时父母年龄、孕前 6 月父亲用药史、父母居住地、母亲居住地污染、父母业余爱好这 17 个因素在病例组和对照组间的构成差异存在统计学意义（$P<0.05$），多因素相关非条件 Logistic 回归分析显示父母居住地、母亲孕前 6 个月饲养宠物、父亲在孕前 6 个月接触毒性化学品均具有统计意义（$P<0.05$），在影响小孩发病是否为双眼的危险因素分析中，父亲既往病史，母亲既往病史，母亲孕期用药具有统计意义（$P<0.05$）。
结论：就纳入本研究的因素而言，影响 RB 发病为多因素共同作用的结果，父母居住地、母亲孕前 6 个月饲养宠物、父亲在孕前 6 个月接触毒性化学品在一定程度上影响着 RB 的发生。

PU-674

白内障术后远期后发障的手术处理---- 一种保留后囊膜的方法

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目的：探索白内障术后处理远期后发障的一种保留后囊膜的新方法，并评估手术后眼高阶像差、客观视觉质量。
方法：6 例 7 眼后发障，白内障术后 11 月-7 年（平均 3.28 年）就诊。行手术处理（手术视频 1），方法：9 点或 12 点位行透明角膜主切口（垂直于 IOL 的长轴位），前房注入粘弹剂，器械分离、松动 IOL 光学部与周边前囊、中央后囊，不波及 IOL 袢。粘弹剂注入 IOL 光学部与囊袋之间，器械将后囊前混浊组织剥离，I/A 吸除，IOL 与后囊贴合。手术前后检查裸眼视力、行眼前节照相；OPD：后像图显示 IOL 偏心、检查总高阶像差、眼内像差、三叶草、慧差和球差；OQAS 检查 MTF 值、OSI。
结果：7 眼手术顺利，未出现后囊破裂等并发症。术后视力不同程度提高（P＜0.05），前节照相：后囊前混浊消失（图 1）；OPD：后像图显示 IOL 无偏心（图 2），眼总高阶像差、眼内像差明显降低（P＜0.05，表 1），其中三叶草、慧差明显下降（P＜0.05，表,2），球差增加。OQAS：MTF 值明显增加、OSI 显著降低（均 P＜0.05，表 3）。
结论：通过此手术方法，完整保留后囊膜，后囊前混浊组织清除效率高。术后眼高阶像差减轻，客观视觉质量增加。

PU-675

Clinical histopathology of intra-choroidal splitting in open-globe injury–a retrospective case series of 4 patients

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Purpose: To observe the characteristics of intra-choroidal splitting (ICS) associated with choroidal detachment due to
open-globe injury.Methods: A retrospective observational case series study of 165 patients enrolled in the Eye Injury Vitrectomy Study (EIVS) that were diagnosed with choroidal detachment, 4 of whom exhibited ICS. The in vivo pathologic changes of the ICS were recorded during surgery. Four specimens were obtained from the inner part of the ICS region. One specimen was stained with hematoxylin and eosin; one specimen was examined under electron microscopy, and the other two specimens were examined under transmission electron microscopy.Results: All four patients presented with vortex vein rupture associated with large-scaled mid-peripheral ICS. The
histopathologic observations indicated that ICS occurred between the medium-sized and large-sized choroidal vessel
layers. Large vascular indentations and medium-sized choroidal vessels were observed on the inner part of the split
interface. Postoperative outcomes of the four patients were poor. Vision in all four patients was no light perception
before or after surgery. Three eyes became atrophic with band-keratopathy, and one eye was eventually enucleated
for cosmetic reasons.Conclusions: ICS can occur during open-globe injury. The outcome of ICS with choroidal detachment was poor.

PU-676

Histopathologic analysis of choroidal neovascular membrane (CNV) in eyes with hemorrhagic age-related macular degeneration (hAMD).

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Purpose: To classify the surgically excised CNV specimens and to compare the histopathologic differences of CNV membrane between anti-VEGF treated eyes and treatment naive eyes with hemorrhagic age-related macular degeneration (hAMD).
Methods:Forty-three CNV specimens were captured from 43 eyes with hAMD during autologous simple RPE sheet transplantation surgery, including 6 patients failed to response to anti-VEGF therapy before surgery and 37 treatment naïve patients. All specimens were processed by HE, PAS and Masson staining before applying light microscope observation.Transmission electron microscope was also applied to analyze the components of the specimens
Results: The specimens of PCV are mainly composed of blood clot, the diameter of the vasculopathy are big with thickened walls, the choroidal melanocytes were also observed; occult CNVM specimens were mainly neovascular membrane lesions; degenerated thickened Bruch membrane were observed both in PCV and AMD eyes.The specimens in treatment naive group were divided into 4 groups: 1)neovascular vessels dominant with small amount of collagen fibers.2) collagen fibers dominant with small amount of neovascular tissue.3) blood clot dominant. 4） degenerated thickened Bruch membrane dorminant with basal laminar deposit in it. In the group with anti-VEGF treatment, density of macrophages was significantly higher; dendritic cells and fibroblast cells were also observed, and neovascular lumen closed dramatically.
Conclusion:CNV pathology with anti-VEGF therapy is characterized by high cellular proliferative activity and dramatic appearance of neovascular lumen closure. The high density of macrophages along with dendritic cells and lymphocytes might have an effect on stabilizing CNV formation.

PU-677

白内障护理门诊对提高患者术后自我保健能力的临床研究

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目的：观察白内障专病护理门诊是否能有效提高老年性白内障术后患者的自我保健意识和保健能力
方法：2018 年 1 月至今开展白内障专病护理门诊，主要针对老年性白内障术后患者进行门诊处理。具体实施为：1、围手术期护理诊治。包括术后复查时的眼部用药护理、眼部清洁以及敷料更换；2、术后自我保健宣教。包括术后自我用药宣教、日常护眼用眼宣教、眼部疾病防护宣教和心理健康宣教；3、术后基本检查；包括视力、眼压、基本眼表状况以及前房炎症初查；4、术后并发症分诊处理；根据基本检查结果和患者病情自述分诊患者至白内障专病医师门诊复查或者相应眼病专病门诊复查，整理患者病史以及检查资料并与白内障手术医师共同制定患者术后诊疗方案。随即抽取 2018.01-2018.12 共计 100 名老年性白内障患者作为实验组，回顾性分析其自我保健量化测评表，满意度量化调查表评分情况。随即抽取 2017.01-2017.12 共计 100 名接受普通门诊护理的老年性白内障患者作为对照组，比较分析两组得分情况。
结果：实验组男性 64 名，女性 36 名，平均年龄 64.8±13.5；对照组男性 72 名，女性 28 名，平均年龄 66.8.1±15.3。实验组自我保健量化测评表得分 96.9±3.1，对照组满意度评分查表得分 86.7±6.7

（P<0.01），有显著性统计学差异;实验组满意度评分查表得分 98.2±1.8，对照组满意度评分查表得分 90.5±3.6（P<0.05），有统计学差异。
结论：白内障专病护理门诊能有效提高老年性白内障患者术后自我保健意识和能力，可有效促进术后恢复，同时提高患者就诊满意度。护理门诊在对患者进行基本筛查护理的同时能提高患者术后并发症的检出率，但是专病护理门诊对主管护师的职业素养以及专业技术水平提出了更高的要求。

PU-678

高度近视白内障术后屈光漂移及影响因素

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目的：探讨高度近视眼白内障超声乳化吸除联合人工晶状体植入术后，屈光漂移及其影响因素。方法：回顾性临床对照研究,收集 2017 年 1 月至 2018 年 5 月,在上海和平眼科医院接受白内障超声乳化吸除联合人工晶状体植入术的近视患者 105 例(共 136 只眼)，眼轴长(axial length, AL) AL24mm-26mm 的中低度近视为 A 组(35 例 42 只眼)，AL 26mm-30mm 高度近视为 B 组(36 例 48 只眼)，超高度近视 AL>30mm 为 C 组(34 例 46 只眼)。术后随访 3 个月。对比术前与术后 3 个月的裸眼视力、最佳矫正视力、眼轴、平均角膜曲率、角膜散光、前房深度、等效球镜屈光度数的变化,分析各项观察指标对屈光漂移的影响。结果：三组患者术后 3 月裸眼视力、最佳矫正视力均较术前提高，差异有统计学意义(P <0.05)，术后 3 月最佳矫正视力，A 组优于 B 组, B 组优于 C 组，差异均有统计学意义(P<0.05)。三组患者术后的眼轴、平均角膜曲率 K 值、角膜散光与术前比较，无显著性差异(P>0.05)。三组患者术后 3 月前房深度较术前明显增加，差异有统计学意义(P<0.05)。术前目标屈光度数与术后等效球镜度数差异：A 组术后 3 月等效球镜度数与术前目标屈光度数差异,预测准确性达 85%左右，B 组和 C 组术后 3 月预测准确性达 65%左右。A 组向远视状态漂移(0.42±0.17)D，B 组向远视状态漂移(0.73±0.34)D，C 组向远视状态漂移(0.95±0.41)D。结论：高度近视白内障术后屈光漂移不但受术前人工晶状体度数计算准确程度的影响，也与术前、术后前房深度的变化有关。

PU-679

Comparability of three intraocular pressure measurement: iCare Pro rebound, non-contact and Goldmann applanation tonometry

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Purpose: To evaluate the agreement of IOP measured by non-contact tonometer (NCT), iCare pro rebound tonometer (iCare), and Goldmann applanation tonometer (GAT).
Methods: This was a hospital-based cross-sectional study. Two hundred subjects were enrolled in this study. All subjects underwent IOP measurement using a NCT–iCare–GAT sequence. Bland-Altman and Pearson correlation analysis were performed using Graphpad prism 5.0 software.
Results: The mean difference (Δ) of NCT–GAT did not differ form (Δ) iCare–GAT in IOP < 10 and 10–21 mm Hg group. However, (Δ) NCT–GAT was significantly higher than (Δ) iCare–GAT in IOP 22–30 and > 30 mm Hg group (P<0.05). Bland–Altman analysis showed significant agreement between the three devices (*P* < 0.01). IOP measurements of the three methods were significantly correlated with CCT (*P* < 0.01).

Conclusions: The agreement between iCare and GAT is similar to NCT and GAT in a low (< 10 mm Hg) to normal (10–21 mm Hg) IOP range, whereas NCT shows a greater overestimate of IOP in moderate (22–30 mm Hg) and high (> 30 mmHg) IOP group. The variability of IOP measurements over a wide range of CCT is GAT< iCare < NCT.

PU-680

伴有活动性脉络膜新生血管的高度近视黄斑裂孔性视网膜脱离两例

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目的：探讨伴有活动性 CNV 的高度近视黄斑裂孔性网脱的临床特点及治疗方案
摘要：患者，男，76 岁，因“左眼白内障术后出现中心暗点 1 月余”来我院就诊。术前高度近视（具体度数不详）。专科体检：左眼矫正视力指数，后极部见局限性黄斑裂孔性网脱，黄白色萎缩灶，网脱范围边缘见网膜下出血。眼轴长 28.69mm，OCT 示局限性黄斑裂孔性网脱、CNV 及黄斑前膜。FFA 证实了网脱范围内 CNV 的存在。诊断为：左眼病理性近视、黄斑裂孔性网脱、黄斑前膜、脉络膜新生血管。行“左眼 23g 玻切+内界膜剥除+硅油+抗 VEGF 药物玻璃体腔注射”手术，术后复查网脱复位，黄斑裂孔愈合，中心暗点变小，矫正视力指数。另一例患者，女，46 岁，高度近视（具体度数不详），专科体检：左眼后极部见局限性黄斑裂孔性网脱，灰白色 CNV 病灶周围小片出血，裂孔位于 CNV 颞上方。OCT 示黄斑裂孔性网脱及 CNV。FFA 证实活动性 CNV 的存在。该患者拒绝手术，失访。
讨论：眼轴>26.5mm 高度近视中 CNV 发病率 5.2%，而黄斑裂孔发生率随眼轴增长而显著增加，眼轴>29mm 时极易发生黄斑裂孔。有学者发现高度近视黄斑裂孔常发生于 CNV 萎缩期，出现在陈旧性 CNV 和周围脉络膜萎缩灶的边界上。作者的两例均为高度近视黄斑裂孔性网脱伴活动性 CNV，较为少见。病例一白内障术前可能已经存在 CNV，白内障手术产生垂直方向的玻璃体牵拉，发生 CNV 与黄斑区视网膜的急性分离，并产生黄斑裂孔性网脱；黄斑裂孔可能较为新鲜，解除牵拉较为彻底，下方 CNV 起到类似填塞的桥梁作用，裂孔闭合良好。玻切手术联合抗 VEGF 注射对该病例效果良好。

PU-681

黄斑前膜自发缓解一例

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目的：探讨一例黄斑前膜自发缓解的可能机制。
病史：患者，女，69 岁，三年前因右眼视物模糊来院就诊，无视物变形，右眼矫正视力 0.5，否认外伤史、否认糖尿病高血压偏头痛等全身系统性疾病史，眼底检查可见后极部玻璃纸样反光，黄斑区皱褶，光学相干断层成像（OCT）示黄斑中央厚度增加至 421um，内界膜高低不平，中心凹形态消失，内界膜上方可见线状高反射膜状条带粘连，诊断为特发性黄斑前膜。三年后复查右眼矫正视力 0.5，自觉症状无明显变化，眼底检查可见后极部黄斑区皱褶较前减少，OCT 示黄斑中央厚度减少至 344um，中心凹形态重新出现，内界膜上方线状高反射膜状条带粘连范围明显变小。

讨论：黄斑前膜自发缓解的情况比较少见，文献报道黄斑前膜的自发缓解，能减少视网膜的垂直和切线方向的牵引，从而减轻视物变形。

PU-682

局灶性脉络膜凹陷的多模式成像研究

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目的：局灶性脉络膜凹陷（FCE）是指光学相干断层成像（OCT）上表现为脉络膜内局灶性的RPE/Bruch 膜复合体光带的凹陷，本研究利用多模式成像对 FCE 进行评估。
方法：对本眼科中心 2014 年 1 月到 2016 年 4 月间来我院就诊确诊为 FCE 的 60 例患者进行回顾性分析，多模式成像检查包括 OCT、眼底荧光素血管造影（FA）、吲哚青绿造影（ICGA）、光学相干断层成像血管扫描（OCTA）、自发荧光（FAF）、多光谱眼底成像。
结果：60 例 FCE 患者中包括 19 名中浆，OCT 检查发现 17 名中浆患者（4.8%）伴有 FCE，总计 21 处 FCE 病灶存在于 19 眼中。平均年龄 47.5± 11.2 岁。通过 OCT 检查，12 眼凹陷下方可见脉络膜高反射组织，在 OCTA 上表现为密集的血流信号，这 12 眼的中心凹下脉络膜厚度（338.1 ± 107.6 μm）明显薄于不伴有脉络膜高反射组织的 6 眼（441.0 ± 80.4 μm，$p<0.05$）。17 例患者中慢性中浆 8 例（47.1%），明显高于普通中浆患者中慢性中浆的比例（5%）。12 处凹陷（57.1%）在 FA 表现为不同程度的透见荧光，13 处凹陷在 FAF 上表现为不同程度低自发荧光，表明凹陷处色素上皮功能受损。15 名患者（88.2%）中凹陷位于或邻近荧光渗漏区域。ICGA 中凹陷更容易辨认，所有凹陷都表现为低荧光并被脉络膜高通透性的区域所包围，提示凹陷处的灌注障碍及周围的循环异常，OCTA 同样证实了这点，这种表现与慢性中浆非常相似。
结论：FCE 通常被认为是一种先天性脉络膜发育异常，常与脉络膜血管疾病有关，但具体机制不明。FCE 在中浆患者并不少见。多模式成像研究表明凹陷处脉络膜变薄和低灌注导致的脉络膜循环异常可能促使脉络膜液体从功能障碍的色素上皮处渗漏，从而引起凹陷类型由 conforming 向 nonconforming 的转变。

PU-683

重金属铬对角膜上皮细胞氧化损伤的作用机制探讨

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目的：六价铬[Cr(VI)]化合物被广泛应用于制革、纺织品生产、印染以及电镀等行业中，这些生产工业排放的废气、废水和废渣造成的铬污染问题已受到全世界的普遍关注。六价铬可导致眼红、畏光、流泪、刺痛、视力减退，严重时可导致角膜上皮剥落等，本研究主要探讨六价铬对角膜上皮细胞的毒性损伤及其作用机理。
方法：（1）通过研究六价铬对角膜上皮细胞内具有抗氧化及整合解毒作用的谷胱甘肽 GSH 水平、活性氧 ROS 水平、细胞活性及 DNA 损伤的影响，明确六价铬对体外培养的人角膜上皮细胞毒性效

应；（2）采用不同浓度的重铬酸钾 $K_2Cr_2O_7$（1.875、3.75、7.5、15、30μM）处理细胞，处理时间分别为 15、30、60min，以观察六价铬致人角膜上皮细胞毒性损伤的剂量效应关系。
结果：处理组 1.875、3.75、7.5、15、30μM 浓度的六价铬作用 60min 后均可导致角膜上皮细胞存活率的显著下降（P<0.05），7.5、15、30μM 浓度的六价铬还可以导致细胞 ROS 增加、GSH 降低和 DNA 损伤（P<0.05），且随着浓度和作用时间的增加损伤效应更为显著。
结论：六价铬通过增加角膜上皮细胞内活性氧 ROS 水平引发细胞氧化应激，导致 DNA 损伤和细胞活性的下降，最终致角膜上皮细胞的氧化损伤和凋亡。在电镀、制革、印染等化工行业作业过程中，应在做好职业暴露规范防护措施，减少角膜的氧化损伤。

PU-684

干眼症相关因素的临床分析

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目的：探讨眼部干涩、视力疲劳、异物感等不适症状与干眼的关系。
方法：对初次就诊于我院门诊,以视疲劳、异物感及眼干涩等症状为主诉的 155 例患者,进行裂隙灯、泪膜破裂时间、泪液分泌试验、角膜荧光素染色及睑板腺检查, 对患者性别、空调房暴露时间、屈光不正与否及每天视屏幕的时间等因素进行问卷统计，并对结果进行分析。
结果：155 例患者中,泪膜破裂时间异常者 51 例(32.9%),Schirmer I test 异常者 60 例(38.7%),角膜荧光素染色异常者 29 例(18.7%),睑板腺开口阻塞 12 例(7.7%)。女性患者 107 例（69%），空调房暴露时间长患者 81 例（52.2%），屈光不正患者 89 例（57.4%），每天视屏幕时间长者 137 例（88.4%）。确诊干眼的患者 64 例（41.3%）。
结论：干眼症状与多种因素有关,其中是屏幕时间长已成为比较突出的因素之一，以干眼症状为主诉的患者中被确诊为干眼的比例较高。这些结果值得引起临床和广大群众重视。

PU-685

康柏西普治疗病理性近视合并脉络膜新生血管临床观察

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目的: 观察玻璃体腔内注射康柏西普治疗病理性近视合并脉络膜新生血管(choroidal neovascularization，CNV) 的临床疗效及安全性。
方法：回顾性分析 13 例 15 眼病理性近视患者的临床资料。玻璃体腔内注射康柏西普抗 0.5 mg(0.05 mL) ，术后每个月行最佳矫正视力、眼底彩照、光学相干断层扫描(optical coherence tomography，OCT) 检查，术后 1 个月、3 个月、6 个月随访时行眼底荧光血管造影(fluorescence fundus angiography，FFA) 检查。随访过程中发现 CNV 部分消退或持续渗漏者则再次予以玻璃体内注射康柏西普。比较治疗前后矫正视力、OCT、眼底彩照及 FFA 检查结果，观察其临床疗效及安全性。
结果：术后 1 个月、3 个月、6 个月随访时，最佳矫正视力 均较术前明显提高(F = 10.267，P ＜ 0.05) ; 黄斑中心凹厚度均较术前明显降低(F = 5.368，P ＜0.05) 。术后 6 个月随访时，12 眼(80%)视力提高 2 行以上，3 眼(20%)视力稳定; 眼底彩照示所有患眼黄斑区出血吸收，FFA 检查示 11 眼(73.33%)CNV 完全消退，4 眼(26.67%)大部分消退。玻璃体腔内注射康柏西普平均次数为 2.7 次，其中 2 眼行 1 次，3 眼行 2 次，8 眼行 3 次，2 眼行 4 次。随访期间所有患者均未出现眼部及全身并发症。
结论：玻璃体腔内注射康柏西普治疗病理性近视合并 CNV 是安全有效的。

PU-686

超声睫状体成形术治疗难治性青光眼的疗效观察

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目的 观察超声睫状体成形术治疗难治性青光眼的临床疗效。
方法 收集我院确诊的难治性青光眼共 25 例 25 眼，研究对象均行 8 扇区超声睫状体成形术（UCP)。术后随访患者眼压、降眼压药物数量及眼部并发症的发生情况。研究中我们将治疗绝对成功定义为在不增加降眼压药物的前提下，IOP> 5 mmHg，并且≤21mmHg。根据虹膜有无新生血管，分为 NV 组及无 NV 组分别进行分析，SPSS19 进行数据分析。
结果 1.眼压情况：UCP 治疗术后 1 天眼压较术前无明显统计学差异，术后 1 周、1 月、 3 月眼压均较术前明显下降，差异均有统计学意义（均为 P ＜0.01），眼压下降比率为 20.1%，52.8%、48.2%、42.4%。NV 组和无 NV 组 UCP 治疗术前、治疗术后无统计学差异，UCP 治疗术后 3 月无 NV 组眼压低于 NV 组，差异具有统计学意义（P=0.001）。2.降眼压药物数量：UCP 治疗术后 1 天降眼压药物数量较术前无统计学差异，术后 1 周、1 月、3 月降眼压药物数量均较术前明显下降，差异有统计学意义（P＜0.05）.3.治疗绝对成功率：UCP 治疗术后成功率，术后 1 天、7 天、1 月及 3 月的成功率分别为 8.00%，64.00%，52.00%，39.13%；NV 组术后各时间段分别为 9.09%，63.63%，45.45%，18.18%；无 NV 组术后各时间段分别 7.14%，78.57%，71.43%，66.67%。4.并发症：主要包括结膜充血、前房闪辉、角膜水肿，巩膜环状充血，眼痛等，其中巩膜环状充血，持续时间长，随诊 3 月仍可见巩膜环状充血。在治疗过程中，有 2 例患者发生眼痛，其中一例疼痛严重，口服止痛药物治疗后好转。
结论 超声睫状体成形术治疗难治性青光眼，有良好的降眼压效果，安全性高，对于虹膜有新生血管的患者，治疗成功率低于无虹膜新生血管者。

PU-687

Large conjunctival autograft with continuous blanket suture for severe recurrent pterygium

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Purpose: To evaluate the efficacy and safety of large conjunctival autograft transplant with continuous blanket suture to treat severe recurrent pterygium accompanied by symblepharon.
Design：Retrospective, interventional case series.
Methods: Fifty-four eyes of 51 patients with recurrent pterygium accompanied by symblepharon who had completed a postoperative follow-up of at least 1 year were included in this study. The main surgical procedure included extend removal of pterygium, covering of the bare sclera with large conjunctival autograft, and sewing the graft with continuous blanket suture. Outcome measures includes recurrence rate, intraoperative and postoperative complications.
Results: With a mean follow-up of 26.3±7.4months (range 13.2-36.2 months), the recurrence rate is 9.26% for the cohort. The mean age was 61.7±8.2 (range, 47-81) years. The number of previous removals was an average of 1.57 ±0.79 (range, 1–4). 24 eyes measured uncorrected distance visual acuity (UDVA) improved by 2 lines or more in 29.2% (7 eyes) of patients, and 13 eyes (54.2 %) stayed within one line from pre-operation. The most common postoperative complications are the varying degrees of corneal scarring left in the primary corneal lesions, such as corneal nebula (42eyes, 20.0%), corneal macula (4eyes, 7.27%) and leucoma (2eyes, 3.63%). There were 2

patients with conjunctival granuloma hyperplasia after operation, which were excised by operation, and no recurrence was found during the follow-up period.
Conclusion: Large conjunctival autograft transplantation with continuous blanket suture for severe recurrent pterygium can effectively prevent it recurrent and reduce the postoperative complications.

PU-688

A Novel Repositioning and Suturing Technique for Dangling Dislocated Intraocular Lens through Corneal Microincisions

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PURPOSE*: To present our experiences in the management of repositioning dangling dislocated intraocular lenses (IOLs) through corneal microincisions without pars plana vitrectomy (PPV) and evaluate the visual outcomes and complications.*

DESIGN*: Retrospective observational case series.*

PATIENTS: *SETTING: Institutional practice. METHODS: Eight eyes of 8 patients who underwent a surgery of repositioning and suturing a posteriorly dislocated IOL were retrospectively evaluated. The indications were patients with a dislocated IOL dangling in the vitreous cavity, completely luxated into vitreous cavity but without adherence to the vitreous base or retina. MAIN OUTCOME MEASURES: Preoperative and postoperative best corrected visual acuity (BCVA), intraocular pressure (IOP), intraoperative and postoperative complications, decentration and tilt of the IOL.*

RESULTS: *The mean age of the patients was 50.1 years (median,54 years; range 25-73 years). The mean duration of follow-up after surgery was 13.9 months (median, 11.5 months; range, 3-27 months). The postoperative BCVA has a significant change noted (P < 0.001) compares to the preoperative BCVA. The main causes of limited postoperative BCVA were the preexisting corneal, retinal pathology. Complications included transitory bleeding during the surgery in 1 eye and transitory elevated IOP after surgery in 1 eye. There was no postoperative endophthalmitis, pupil capture of IOL, widely IOP fluctuations, redislocation, hyphema, vitreous hemorrhage, retinal tear or detachment, erosion or breakage of the sutures observed during the follow-up period.*

CONCLUSION: This novel technique is proved as an effective and simple method for managing a posteriorly dislocated IOL with favorable visual outcomes and few complications.

PU-689

Conjunctival Myxoid Stromal Tumor：a Distinctive Clinicopathologic and Immunohistochemical Study

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Background/Aims: To describe the clinicopathological and immunohistochemical characteristics of ten patients representing a new entity of benign conjunctival myxoid stromal tumors.
Methods: Retrospective review of clinical findings, histopathological and immunohistochemical studies identified ten cases of low-grade conjunctival myxoid stromal tumors. Secimens were routinely processed and stained with hematoxylin and eosin (H&E). Immunohistochemical stains for CD34, CD68, vimentin, S100, SMA (smooth muscle actin), myosin, desmin, actin, Bcl-2, and Ki-67 were performed. Specific stains for AB-PAS and aldehyde fuchsin stains were also performed.
Results: Ten patients with an average age of 45.6±11.1years had a tender white or faint yellow to red mass on the bulbar conjunctiva. All the lesions were completely removed and none of the patients relapsed. Histologically, all neoplasms consisted of spindle-shaped cells that showed signs of pseudonuclear inclusions, are multinuclei, and have no atypia. The stroma consists of a large amount of mucus and is infiltrated with delicate to ropey collagens, a few mast cells, and new vessels. Immunohistochemical stains were positive for CD34, vimentin, Bcl-2, partial positive for CD68, very low for Ki-67, and negative for S100,SMA, myosin,desmin and actin. AB-PAS suggested that the stroma was mucinous.
Conclusions: These rare benign mesenchymal conjunctival tumors are mostly unilateral, and occur in the bulbar conjunctiva. Complete resection is the radical treatment.These lesions are characterized by multiple spindle cells, a large number of mucus, and share similar basic histopathological features with conjunctival myxoma and conjunctival stromal tumor. So we suggest that name these lesions “conjunctival myxoid stromal tumor”.

PU-690

西北沙漠地区中小学生近视流行病学特征及相关影响因素

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目的 探讨西北沙漠地区中小学生近视流行病学特征及相关影响因素。方法 采用分层整群随机抽样的方法，随机选择武威地区民勤县两所中学（初中、高中）、 两所小学、两所幼儿园，共 6 所学校 24 个班级共 1550 名学生,（3100 眼）沙漠地区青少年。应用标准对数视力表对每位青少年进行远视力检查，采用自动验光仪进行连续 3 次的自动验光, 获取自动验光均值（由验光仪自动给出），使用自行设计的调查问卷收集学生年龄、性别、父母是否近视、学习时间、用电子产品时间、睡眠时间及户外活动的时间，分析近视眼的危险因素。结果 1550 名中小学生中近视眼患病率为 43.9%, 其中中学生近视率为 48.9%, 明显高于小学生的 33.8%, 差异有统计学意义 (P<0.05) ;中学生轻度近视率为 9.9%, 明显低于小学生的 22.3%, 差异有统计学意义 (P<0.05) ;中学生中度近视、重度近视率分别为 29.8%、10.2%, 均明显高于小学生的 12.4%、5.6%, 差异均有统计学意义 (均 P<0.05) 。近视学生年龄≥12 岁、父母近视、读书眼距≤30 cm、经常弱光下看书、看电脑或手机≥3 h/d 的比例均明显高于正常视力学生, 差异均有统计学意义 (均 P<0.05) 。Logistic 回归分析显示, 年龄≥12 岁、读书眼距≤30 cm、经常弱光下看书、看电脑或手机≥3 h/d 是中小学生近视发生的独立危险因素 (P<0.05) 。中学生近视率明显高于小学生（P<0.01）；逐步 logistic 回归分析结果显示，读书时看书距离<30 cm、不良读写习惯、不做眼保健操、每次读写时间≥1 h、每天睡眠时间<8 h 是民勤县中小学生近视发病的主要危险因素。结论 西北沙漠地市区中小学生近视眼患病率较明显增高, 应加强对读书眼距、照明情况以及电子等使用时间的控制, 增加睡眠时间和户外活动的时间和频率，降低近视率。应针对民勤县中小学生近视的主要危险因素采取预防与控制措施，改善学习环境。

PU-691

霰粒肿刮匙搔刮治疗泪小管炎的效果分析

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目的 探讨霰粒肿刮匙搔刮治疗泪小管炎的临床效果。**方法** 选取 2016 年 8 月至 2018 年 9 月期间就诊于常州市第一人民医院眼科门诊的泪小管炎患者 29 例，使用泪点扩张器扩张泪小点，将霰粒肿刮匙伸入泪小管搔刮泪小管内容物，治疗结束后应用抗生素眼药水滴眼 1 周，术后随访 3 个月。**结果** 所有患者均治愈，泪小点开放，未出现流脓，无红肿，泪道冲洗通畅，治疗有效率 100%。**结论** 应用霰粒肿刮匙搔刮治疗泪小管炎，方法简便，效果满意，是临床治疗泪小管炎的安全有效的方法之一。

PU-692

Serum Uric Acid Concentration is Associated with Hypertensive Retinopathy in Hypertensive Chinese Adults

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Background: This cross sectional investigation included 12966 subjects with hypertension, a cohort of the China Stroke Primary Prevention Trial (CSPPT), a randomized, multicenter clinical trial. This study aimed to explore the correlation between serum uric acid (SUA) concentration and hypertensive retinopathy in hypertensive adults.
Methods: Diagnosis of hypertensive retinopathy was determined by non-mydriatic fundus photography and classified with Keith-Wagener-Barker (KWB) system. The correlation of SUA levels with hypertensive retinopathy prevalence and severity was assessed by statistical analysis.
Results: 9848 (75.95%) subjects were diagnosed with hypertensive retinopathy with the following retinopathy grade distribution: grade 1: 58.80%, grade 2: 14.81%, and grade 3-4: 2.34%. SUA levels were significantly associated with hypertensive retinopathy prevalence. Patients with hypertensive retinopathy had higher SUA levels than those without hypertensive retinopathy. Patients in the highest uric acid quartile had an odds ratio for hypertensive retinopathy of 1.21 compared to patients in the lowest uric acid quartile (OR= 1.21, 95% CI: 1.05-1.40, P=0.008). When compared to the non-hyperuricemia group, those in the hyperuricemia group had an odds ratio for hypertensive retinopathy of 1.18(OR= 1.18, 95% CI: 1.05-1.33, P=0.004). Every 1 mg/dl increase in uric acid concentration was significantly associated with a 6% higher odds of hypertensive retinopathy (OR= 1.06, 95% CI: 1.02-1.10, P=0.002).
Conclusions: The prevalence of hypertensive retinopathy was high (75.95%) among hypertensives in our patients cohort. In addition, SUA concentration was significantly associated with hypertensive retinopathy.

PU-693

福建学生近视情况研究分析

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目的：通过对福建学生的视力、屈光度检查、眼表和眼压的检查，分析福建学生近视眼的屈光状况。

方法：我们的研究是一项基于人群为基础的横断面研究。我们抽取了福建省 63 所学校，总样本量 44792 人（其中包括小学 29264 人、初中 8371 人、高中 5524 人），排除眼部炎症、外伤、智力障

碍及不配合者，入选 43159 人，人数来源于闽西南的厦门、漳州和三明，闽东北的福州、莆田和南平。我们对这些学生进行国际标准“E”字视力表检查视力，对所有的小学生进行眼表、眼压和电脑验光的检查。我们采用的近视诊断标准是：右眼等效球镜（SE）≤-1.00D，SE 等于球镜加上 1/2 柱镜。
结果：我们对数据分析发现，在 43159 人中，1 年级学生 241 人，近视患病率 4.6%，2 年级 415 人，近视患病率 8.92%，3 年级 663 人，近似患病率 15.17%，4 年级 1251 人，近视患病率 25.22%，5 年级 1840 人，近视患病率 36.37%，6 年级 2420 人，近视患病率 49.15%，7 年级 2017 人，近视患病率 59.82%，8 年级 1672 人，近视患病率 66.11%，9 年级 1743 人，近视患病率 70.57%，高一年级 1312 人，近视患病率 67.80%，高二年级 1605 人，近视患病率 75.18%，高三年级 1097 人，近视患病率 75.45%。
小学生近视患病率 23.33%，初中近视患病率 64.89%，高中近视患病率 72.66%。
男生 22706 人，女生 20419 人，男生近视患病率 35.90%，女生近视患病率 39.80%。
随着年级的增加，男女生近视患病率无明显差异，直至 5 年级男女生近视开始出现差异，差异有统计学意义。
结论：福建学生随着年级的增长，近视的患病率基本会增加，女生的近视患病率高于男生。男女生近视患病率无明显差异，直至 5 年级开始出现差异。

PU-694

The Clinical Characteristics of Ocular Trauma in Hospitalized Patients

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Purpose: Ocular trauma is the leading cause of visual loss in hospitalized patients, causing great damages physically and financially on related families and society. This study aims to determine the status of ocular trauma in hospitalized patients in Shanghai General Hospital from Jan 2016 to Dec 2018.
Methods: This cross-sectional study was carried out on patients hospitalized with ocular trauma. Demographic factors including age, gender, occupations, education, timing of admission following accident, location of accident, and clinical data such as cause of injury,visual acuity(VA), location of injury, type of injury, damaging instrument, and types of required surgeries were collected and analyzed using SPSS 22.0 software by means of means± standard deviation, frequency, and percentage for descriptive data and t-test, Chi-square test for analysis at significance level of $p < 0.05$.
Results: In total, 206 patients were hospitalized due to ocular traumas. The majority of patients were male (182 patients, 88.35%). Penetrating injuries of eyeball was the most common cause (108patients, 52.43%) followed by blunt trauma(82 patients, 39.81%), work-related trauma was common in males(p=0.023), while collisions was significantly common in females(p=0.01). Work place was the most frequent incident location (111 patients,53.85 %), and sharp metallic objects or other cutting tools were mostly responsible for injuries(98 patients, 47.57%). All case of NLP (42 patients,20.39%) showed with rupture globe.Poor VA at first visit(p= 0.001),rupture globe (p= 0.019), retinal detachment (RD) (p= 0.002), and vitreous hemorrhage (VH) (p= 0.047) were considered as poor prognostic factors.
Conclusion: The majority of eye injuries occurred in young males and manual and industrial workers. Work place was the most common incident location. As the eyes play a vital role in daily life, and eye health is so crucial for individuals to maintain a normal family and community life, achieve a higher educational status and productivity, the public should be thoroughly educated about eye health and the use of protective measures, especially in occupational activities.

PU-695

High-fat diet induces dry eye-like ocular surface damages via activating oxidative stress in ocular surface

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Purpose: To investigate the effects of high-fat diet on murine ocular surface damages.

Methods: 4-week-old male C57BL/6 mice were fed with a standard-fat diet (10 kcal% Fat, SFD) or a high-fat diet (60 kcal% Fat, HFD) for 12 weeks. Tear production was measured by the phenol red cotton test. The Oregon green dextran (OGD) staining was performed to assess corneal epithelial permeability, and PAS staining was used to quantify conjunctival goblet cells. Squamous metaplasia in ocular surface was detected by immunofluorescent staining for K10. Immunofluorescent staining was also performed for the expression of matrix metalloproteinase (MMP)-3 and -9 in corneal epithelium. Oxidative stress status in ocular surface was evaluated by immunohistochemical detection of NADPH oxidase 4 (NOX4) and immunofluorescent staining of 4-hydroxy-2-nonenal (4-HNE). Infiltration of inflammatory cells in conjunctiva was assessed by CD4 immunochemistry and immunofluorescent staining of F4/80. TUNEL assay was conducted to evaluate the cell apoptosis in ocular surface.

Results: Compared with the SFD-treated mice, HFD-treated mice showed decreased tear production, obvious OGD staining and goblet cell loss. Increased expression of MMP-3 and -9 in corneal epithelium was observed in HFD-treated mice compared to SFD-treated mice. HFD induced squamous metaplasia in corneal epithelium. Prominent up-regulation of oxidative stress markers was displayed in ocular surface of HFD-treated mice. HFD induced infiltration of CD4+ T-cells and F4/80+ macrophages in conjunctiva. HFD induced obvious cell apoptosis in ocular surface.

Conclusions: High-fat diet activates oxidative stress, induces cell apoptosis and infiltration of inflammatory cells in murine ocular surface, therefore resulting in dry eye-like ocular surface damages in mice.

PU-696

Correlation Analysis between the vault and intraocular tension after Collamer lens implantation without viscoelastic agent

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AIM: Evaluation of the effect of vault on intraocular pressure after single-incision implantation of posterior chamber intraocular lens V4c with non- viscoelastic agent.
METHODS: Myopia and myopic astigmatism in 45 patients with 89 eyes with phakic intraocular lens non-viscous ammunition were divided into three groups according to the size of postoperative arch height (OCT measurement). Group A (100um<arch height ≤ 300 eyes) 34 eyes, group B (300um < arch height ≤ 600um) 39 eyes, group C (600um < arch height ≤ 900um) 16 eyes. The patients were followed up for 1 year. The intraocular pressure values before surgery, 1 week, 1 month, 3 months, 6 months, and 1 year were recorded. The results were analyzed.

RESULTS: The intraocular pressure value satisfies the spherical distribution hypothesis. There is no statistically significant difference in intraocular pressure between 1 week, 1 month, 1 month, 3 months, 6 months, and 1 year before and after surgery. There is no interaction between time and group. The time factor did not differ with the grouping; after multivariate analysis of variance P>0.05, there was no significant difference in the intraocular pressure between the three groups at each time point.
CONCLUSION: There is no effect on the intraocular pressure after the single-incision implantation of the posterior chamber intraocular lens V4c with non-viscous cataract. The height of the arch has no effect on the intraocular pressure. The high arch height of 600 um ~ 900 um will not cause postoperative high eye pressure.

PU-697

Choroidal Structural Changes Correlate with Severity of Diabetic Retinopathy in Diabetes Mellitus

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Background
This study aimes to investigate the choroidal thickness and choroidal vascularity index (CVI) and their correlation with severity of diabetic retinopathy (DR) in diabetes mellitus (DM) patients.
Methods
An observational cross-sectional study was conducted of 104 eyes, which were divided into 4 groups: Healthy controls (n = 38), DM with no PDR eyes (n = 22), NPDR eyes (n = 24), PDR eyes (n = 20). Optical coherence tomography was performed. The total choroidal area (TCA), stromal area (SA), the luminal areas (LA) and CVI were compared.
Results
The CVI values was 67.53 ± 6.20 in controls and 63.43 ± 4.47 in DM eyes (P < 0.001). But there were no statistically significant differences in RNFL, retinal thickness and SCT measurements between the two groups (P = 0.407, P = 0.654 and P = 0.849; respectively). The vessel density values were significantly different in DM with no PDR eyes, NPDR eyes and PDR eyes. (P < 0.001 for SCT, TCA and SA). The CVIs in the three groups were significant different CVI (P = 0.019).
Conclusion
Eyes of patients with DM showed decreased CVI compared with normal controls. Choroidal thickness and CVI significantly increased with severity of DR eyes compared with DM eyes and normal. Changes in CVI may predict DR development or recurrence before they are otherwise evident clinically.Choroidal blood flow deficit can be an early pathologic change in DR.

PU-698

黄斑病变眼内注射抗 VEGF 药物效果不良原因分析

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对于湿性 AMD,抗 VEGF 药物眼内注射是主要推荐的治疗方法，但是如果存在中心凹永久性结构损伤，就不建议再使用抗 VEGF 药物。目前对于晚期 AMD，出现机化瘢痕者，尚无有效治疗方法。下面是 1 个抗 VEGF 药物用药效果不良的病例，希望给医者以启示。
病例：患者祁某，男，85 岁，主诉：右眼视力下降 2 年半。高血压病史 10 年，否认糖尿病史。1 年前在外院诊为“右眼湿性 AMD”，行右眼球内注射雷珠单抗每月 1 次，连续 3 针。视力未见改善。遂

来我院就诊。查：视力：右眼 0.02，左眼 0.5，矫正不提高，右眼人工晶体在位，左眼晶体皮质混浊，眼底：右眼黄斑区可见 1.5PD 黄白色病灶，界清，左眼底黄斑区散见玻璃膜疣。OCT：右眼黄斑区色素上皮连续性破坏，可见边缘锐利的致密高反射机化病灶，无视网膜层间积液及出血。FFA 提示：右眼黄斑区可见盘状荧光着染，未见渗漏。诊断：右眼 AMD 晚期（机化），左眼 AMD（干性），查看既往眼底彩照及 OCT，发现 2 年前右眼底黄斑区出血，水肿及渗出，可惜的是当时患者并未接受抗 VEGF 治疗，错过了有效治疗时机。1 年前，患者抗 VEGF 药物治疗前的资料提示，黄斑区出血水肿已吸收，病灶已经机化瘢痕，这时已不具备抗 VEGF 药物的治疗适应症。再行抗 VEGF 药物注射，显然是无益的。而此时患者却接受了连续 3 次的雷珠单抗注射。注射后的结果是视力未见改善，OCT 显示黄斑区病灶未见改变。

通过这个病例，给我们很大的启示，掌握抗 VEGF 药物的应用时机非常重要。对于抗 VEGF 药物注射，在临床中应用时，应该根据眼病的具体情况具体分析，虽然是湿性老年性黄斑变性，但如果疾病已进入晚期，瘢痕化，就不应再行眼内注药了。

PU-699

3%硼酸溶液在睑缘相关性角膜炎患者中的护理效果

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目的：探讨硼酸溶液行睑缘清洗在睑缘相关性角膜炎患者中的护理效果。
方法：2018 年 1 月至今，选取我科睑缘相关性角膜炎患者 50 例，取 3%硼酸溶液，每日用棉签早中晚清洗 3 次，清洗上睑时嘱患者向下看，将棉签轻压上睑，从睫毛根部向外进行擦洗，清洗下睑时嘱患者往上看，清洗时动作轻柔，一次使用一根棉签，上下睑各两根棉签，清洗完毕之后观察患者眼部分泌物情况、患者的舒适度及医生的满意度。
结果：经过硼酸溶液清洗眼睑之后，患者眼睑及睫毛清洁无分泌物，患者的舒适度提高，同时，也取得了医生的一致好评，提高了医患的满意度。
结论：由于睑缘炎患者睑板腺功能障碍，导致睑缘分泌物多，诱发角膜炎甚至角膜溃疡，且每日晨点眼后，残余眼药及凝胶，既影响患者外观，同时也影响医生对患者眼部的观察，通过对患者用 3%硼酸溶液进行睑缘清洗，患者眼部分泌物减少，改善了患者的外观，提高了患者的舒适度，起到了治疗的作用，同时也取得了医生的一致好评。

PU-700

腕带标识对防范白内障日间手术患者眼别差错的应用体会

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目的： 探讨腕带标识在白内障日间手术患者中的应用效果。
方法：报告我院 2018 年接受白内障日间手术的 1800 例患者，病房白内障护士打印出次日手术患者的腕带，并核对信息表及病历上眼别，用记号笔在腕带上写上患者手术眼别。次日准备白内障患者手术的护士将腕带根据患者的手术眼别戴于患者术眼同侧腕部，左眼手术患者戴左手，右眼手术患者戴右手。护士再根据患者信息表将“十”标识画于手术眼上额部，查看腕带是否戴于术眼同侧，对 50 名手术患者、8 名病房护理人员及 2 名手术室护理人员发放调查表，查看满意度情况。
结果：全年无因护士查对不严造成患者手术眼别错误的不良事件发生，患者及工作人员满意度提高。
结论：白内障患者大多为老年人，术前反向查对眼别困难，且是双眼都要手术，为避免术后感染，双眼需分期进行手术，另一方面，由于患者住院时间短，从入院、手术、出院均在 24 小时内完成，

工作人员对病情不了解，有可能发生眼别查对失误，发生差错事故，通过腕带与术眼标识位于同侧的方法，不仅方便了各个环节查对，减少了因查对问题造成患者手术眼别错误的风险，提高了患者及工作人员的满意度。

PU-701

颜色标识在眼药水中的应用

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目的：探讨各种颜色标识在眼科无防腐剂眼药水中的应用
方法：针对我科有效期仅为 24 小时的双氯芬酸钠滴眼液，用红、橙、黄、绿、青、蓝、紫七种颜色的纸张，制作印有床号、姓名的标签纸，并依据七种颜色的顺序标上 1-7 七个数字，并将该标识贴于眼药水的瓶身并写上开瓶日期作为该眼药水的标识，每周七天均按此方案循环，每天使用不同颜色的标签，每天由夜班护士负责丢弃和更换。
结果：未再发生发生因漏换、错换眼药而引起患者眼部感染的情况。
结论：眼药水效期标识，方便护士查对，节约时间，避免了因错换漏换眼药水给患者造成伤害，降低感染率，同时也防止患者出院回家后出现使用过期眼药水的情况，方便患者使用，从而提高患者满意度。

PU-702

放液和不放液的巩膜外加压术治疗累及黄斑的孔源性视网膜脱离术后黄斑复位情况的临床观察

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目的 比较放液和不放液的巩膜外加压术治疗累及黄斑的孔源性视网膜脱离（RRD）术后黄斑复位情况的临床观察。
方法 纳入 2017 年 1 月至 2018 年 6 月于潍坊眼科医院诊断为孔源性视网膜脱离，脱离累及黄斑部，首次接受巩膜外加压术，并且术后视网膜脱离复位的患者 67 例（67 只眼）的临床资料，按照术中是否进行放液分为放液组（31 例）及不放液组（36 例），所有患者随访 4～24 个月，平均（13±3.8）个月，术后 1 周、1 月、3 月完善 OCT 检查，观察术后 1 周、1 月、3 月黄斑情况。
结果 放液组术后 1 周黄斑复位数 27 例，复位率 87.10%；术后 1 月黄斑复位数 29，复位率 93.55%；术后 3 月黄斑复位数 30，复位率 96.77%。不放液组术后 1 周黄斑复位数 12，复位率 33.33%；术后 1 月黄斑复位数 21，复位率 58.33；术后 3 月黄斑复位数 29，复位率 80.56%。术后 1 周、1 月、3 月放液组和不放液组黄斑复位率比较差异均具有统计学意义（P＜0.05）。
结论 放液组巩膜外加压术治疗累及黄斑的孔源性视网膜脱离术后 1 周、1 月、3 月的黄斑复位率均高于不放液组，对于累及黄斑的孔源性视网膜脱离是值得推荐的手术方法。

PU-703

人工玻璃体球囊在眼外伤硅油注入术后复发性视网膜脱离中的应用

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目的:探讨人工玻璃体球囊在眼外伤硅油注入术后视网膜脱离二次手术中的应用。
方法:对本院收治的眼外伤硅油注入术后仍然发生视网膜脱离的病人进行二次手术复位，确定视网膜残留较少、视功能无法改善的 16 例病例，通过 23G 巩膜穿刺口将玻璃体腔内硅油取出，扩大 23G 巩膜切口至 4mm，将玻璃体球囊折叠后经推注器植入玻璃体腔内，并通过球囊阀注入硅油，填充球囊。
结果:所有手术过程顺利，术中及术后未出现高眼压，球囊位置良好，术后硅油在球囊内稳定性好。
结论:玻璃体球囊及硅油注入可经扩大的 23G 巩膜切口完成，主要适用于严重眼外伤后硅油依赖眼患者，避免了反复取油及注油，减轻了患者的经济负担，防止硅油对眼组织产生损伤，完整保留了眼球正常结构，有效提高了患者的生活质量。为严重眼外伤患者提供了有效的治疗方案。

PU-704
人工晶体脱位患者眼内悬吊原人工晶体手术的疗效分析

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目的：探讨人工晶体脱位患者眼内进行使用原人工晶体的人工晶体悬吊术的疗效。
方法：回顾性分析 2017 年 6 月-2018 年 6 月在潍坊眼科医院就诊的 25 例不同原因导致的折叠式人工晶体脱位于玻璃体腔的患者的临床资料。术中切除玻璃体，显微镊夹取人工晶体于前房内，将悬吊线于上方 12 点位角膜缘后 2mm 处虹膜下穿入，自下方 6 点角膜缘后 2mm 处穿出，于 10 点透明角膜切口处将悬吊线勾出并剪断，人工晶体两襻分别自角膜缘切口处调出，悬吊线断端打结固定于人工晶体两襻后，将人工晶体调入睫状沟内，悬吊线固定于进针处。观察患者术后视力、人工晶体位置及并发症的出现情况。
结果：所有患者术后视力改善显著，与术前相比差异具有统计学意义（P<0.05）,随访 3 个月患者视力稳定，未出现严重散光，2 例出现人工晶体光学中心轻度偏位，未出现其他并发症。
结论：使用原人工晶体的人工晶体悬吊术治疗人工晶体脱位术中切口小，创伤小，术后散光小，人工晶体位置稳定，可显著改善患者的视觉质量，减轻患者经济负担。

PU-705
角膜绷带镜在眼球钝挫伤晶体脱位患者术后的疗效观察

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目的：通过观察博士伦 PureVision 纯视角膜接触镜在眼球钝挫伤致晶体脱位患者术后应用得临床效果，探讨绷带镜在眼外伤疾病中的应用价值及意义。

方法:选取眼球钝挫伤致晶体脱位的 30 例 30 眼纳入研究，行玻璃体切割联合晶体摘除术后随机分为戴镜组与不戴镜组，各 15 人。戴镜组术后配戴博士伦 PureVision 纯视角膜接触镜 2 周，观察术后 1 天，3 天，1 周，2 周舒适度、角膜上皮愈合情况、视力及不良反应情况。

结果:戴镜组时候 1 天、3 天、1 周舒适度优于不戴镜组，差异具有统计学意义（P 小于 0.05），术后 2 周舒适度无显著差异。戴镜组与不戴镜组术后 1 天、2 周角膜上皮愈合情况无显著差异，术后 3 天、1 周戴镜组明显优于不戴镜组，差异具有统计学意义（P 小于 0.05）。戴镜组与不戴镜组术后视力无显著差异。入组患者均为出现严重并发症。

结论:绷带镜能有效提高眼球钝挫伤致晶体脱位患者术后舒适度，加速持续性角膜上皮病变的愈合，缩短病程，可广泛应用于临床。

PU-706

Werner Syndrome

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A 53-year-old woman presented with blurred vision. Eye examinations revealed that her vision was 20/1000 in the left eye and 20/400 in the right eye, and there was lens opacity in both eyes. Upon questioning, she described a 7-year history of scleroderma, which was treated with azathioprine and tripterygium glycosides. Subsequent physical examination found underweight (42 kg), short stature (151 cm), tight skin, bird-like face, deformed fingers, flat feet, and healed ulcers on the left toes and ankle. Laboratory tests indicated dyslipidemia and nuclear medicine bone scan confirmed osteoporosis, leading to a diagnosis of Werner syndrome (diagnostic criteria available at http://www.wernersyndrome.org/registry/diagnostic.html). The patient was treated with phacoemulsification and intraocular lens implantation after discontinuation of medications for one week. After the surgery, her vision was 1.0 in both eyes, and she did not experience postoperative complications, such as cystoid macular edema, wound dehiscence or bullous keratopathy during the 6-month follow-up.
Cataracts can be caused by genetic or metabolic abnormalities, and are strongly associated with systemic diseases. 97.9% of patients with Werner syndrome have cataracts, which are typically the earliest disabling a feature in patients. Cataract surgery in patients with Werner syndrome, especially following extra capsular cataract surgery, carries potential for postsurgical complications. The risk of postoperative complications is reduced inphacoemulsification cataract surgery, but cystoid macular edema may occur spontaneously. This case highlights the importance of taking a complete history in patients presenting with normal cataract. Withdrawal of the immunosuppressive drugs in patients with Werner syndrome can improve the likelihood of favorable surgical outcomes after phacoemulsification.

PU-707

微创玻璃体切除术在复杂白内障手术中的应用

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合并浅前房甚至无前房、小瞳孔、后囊膜缺损等异常情况极大增加白内障手术的难度与风险。微创玻璃体切除术在这类患者行超声乳化白内障摘除术时的应用能有效地提高手术安全性，改善预后，本文将对以上问题进行阐述。

PU-708

给出院患者发放纸质版注意事项对患者的影响

吴雪梅
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目的：探讨给出院患者发放纸质版办理流程表及注意事项对患者出院后的影响。
方法：将 40 例出院患者随机分为观察组和对照组各 20 例，对照组采用常规出院宣教方法，即在出院前一日给患者讲解出院手续办理流程及回家后各项注意事项，观察组在给患者讲解后发放纸质版的资料。
结果：对照组出院后会忘记一部分宣教内容，而观察组效果明显高于对照组。
结论：在做出院宣教时，我们会一次性给患者讲解很多注意事项，而患者及家属不一定能完全记住所有内容，导致出院时再来反复提问，回家后也很容易忘记一些宣教内容，而发放纸质版的资料，可以让患者及家属在忘记时参照资料，增强记忆，从而提高护理质量及满意度。

PU-709

每日定时清洗睑缘对睑缘炎患者的影响

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目的：探讨每日清洗睑缘对睑缘炎患者的影响。
方法：选取 2018 年 6 月到 2018 年 12 月在我科住院的睑缘炎患者 40 例为研究对象，根据随机数字表将患者分为观察组及对照组各 20 例，观察组不采取措施，对照组每日定时用硼酸清洗睑缘，观察两组患者睑缘清洁状况。
结果：对照组眼部清洁情况明显高于观察组。
结论：每日定时清洗睑缘能有效提高睑缘炎患者眼部清洁状况，减少分泌物，让患者眼部更美观，从而提高护理质量及满意度。

PU-710

YAG 激光玻璃体消融术治疗视网膜前出血的疗效观察

苏兆安
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目的：研究 Uitra Q-YAG 玻璃体消融术治疗视网膜前出血患者的疗效及安全性。 方法：对在本医院眼科临床确诊为视网膜前出血患者 6 例 6 眼纳入研究，所有患者均行视力、眼压、裂隙灯、散瞳查眼底、B 超检查，Oct 检查并彩照记录视网膜前出血的形态，排除眼底病变。视网膜前出血的形态多为舟状，所有患者均由同一有经验医师行 YAG 玻璃体消融术激光治疗。结果：术后视力显著改善 6 眼，视网膜前出血被引流到玻璃体腔内，所有患者无 1 例并发症发生。结论：YAG 玻璃体消融术治疗视网膜前出血安全有效。对视网膜出血可以先尝试激光治疗，可以避免部分患者的玻璃体手术治疗。

PU-711

区域折射人工晶体在白内障合并特殊角膜散光中的应用

马健利
潍坊眼科医院

区域折射人工晶体在白内障合并特殊角膜散光中的应用
目的：探讨区域折射人工晶体在白内障合并特殊角膜散光患者中的应用

方法：根据患者特殊角膜散光的 pentacam 地形图，结合区域折射人工晶体的设计原理，重新计算合适的人工晶体度数及术中人工晶体植入位置，植入区域折射人工晶体，观察患者术后裸眼视力，远近视力、离焦曲线、视觉质量等指标。
结果：患者术后远近视力理想，离焦曲线满意，视觉质量好。
结论：部分伴有特殊角膜散光的患者，可以应用区域折射人工晶体实现全程视力，仍能获得良好的视觉质量。

PU-712

25G 玻璃体切割手术联合超声乳化治疗白内障伴有浅前房患者的疗效观察

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目的 探讨 25G 玻璃体切割手术联合白内障超声乳化手术治疗白内障伴有浅前房患者的疗效及安全性。
方法 选取 2014 年 2 月至 2017 年 2 月在潍坊眼科医院行白内障手术的伴有浅前房的白内障患者，随机分为两组：联合手术组：行 25G 玻璃体切割手术联合超声乳化手术，共 42 例(50 眼)；超声乳化组：单纯行超声乳化手术，共 44 例（50 只眼）。观察术前及术后 l 天、l 周及 3 个月最佳矫正视力、眼压，中央角膜厚度，术后 3 个月前房深度及角膜内皮细胞，观察术中及术后并发症。
结果 术后 1 天及 1 周，联合手术组最佳矫正视力优于超声乳化组 (均 P＜0.05)，术后两组比较无差异（p＞0.05）。两组患者术后眼压均较术前降低 (P＜0.05)，但两组患者术前及术后各个时间点眼压无明显差异（p＞0.05）。术后 1 天及 1 周联合手术组患者的中央角膜厚度变化小于超声乳化组(P<0.05)；术后 3 个月无明显差异(P＜0.05)。两组患者术后 3 个月前房深度较术前均有增加，且两组间比较差异有统计学意义（p＜0.05）。术后 3 个月，联合手术组角膜内皮细胞丢失率低于超声乳化组 (P＜0.05)。
结论 25G 玻璃体切割手术联合白内障超声乳化治疗伴有浅前房的白内障患者更安全，术后恢复更快。

PU-713

飞秒激光辅助白内障手术与常规超声乳化手术术后人工晶体的稳定性观察

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目的：观察飞秒激光辅助白内障手术与常规超声乳化手术术后人工晶体在囊袋内的稳定性
方法：使用 Pentacam 三维眼前节测量系统采集 Scheimpflug 图像，及散瞳后前房深度。使用 Image-pro plus 6.0 图像分析 IOL 倾斜度和偏心值，裂隙灯数码照相机照相评估 IOL 囊袋内旋转情况。
结果：2 组术后 1w 与术后 lmo 前房深度的比较均有统计学意义(P＜0.05)。2 组间前房深度比较无统计学意义(P＞0.05)。飞秒组较常规超声乳化组 IOL 偏心与倾斜在水平及垂直方向上小，差异有统计学意义(P＜0.05)，2 组间术后 lmo 与术后 1w 比较旋转度数的差异无统计学意义(P>0.05)。
结论：飞秒激光辅助白内障手术较常规超声乳化手术术后 IOL 囊袋内倾斜及偏心率小，两种手术方式术后人工晶体囊袋内旋转度无差异。

PU-714

飞秒激光在复杂白内障手术中的应用观察

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目的：探讨飞秒激光在复杂白内障手术中的应用情况。
方法：选取马凡综合征晶状体半脱位、膨胀期白内障、先天性白内障伴虹膜缺失需植入虹膜隔张力环、白内障伴睫状环阻滞性青光眼等复杂白内障患者实施飞秒激光白内手术，观察飞秒激在切口的制作、环形撕囊、劈核等方面的完成情况，探讨飞秒激光预处理对手术安全性等方面的影响。
结果：飞秒激光在以上病例中均顺利完成了切口制作、撕囊及劈核，切口钝性进入前房顺利，撕囊完整，劈核完整顺利。飞秒激光在密闭状态下完成切割撕囊，减少了传统手术中前房的变及撕囊时的剪切力对悬韧带的影响，术中对悬韧带的保护更好，没有悬韧带断裂的进一步加重。此外，完整的撕囊口具有良好的张力，植入带虹膜隔张力环顺利，无囊膜口撕裂等情况发生；在膨胀期白内障，飞秒激光能撕囊完整，无囊膜撕裂、撕囊口不连续等情况发生。
结论：飞秒激光辅助的白内障超声乳化手术可用于复杂白内障手术中，在一定程度上使得手术更安全。

PU-715
飞秒激光透明角膜切口联合飞秒激光角膜缘松解术角膜散光的矫正效果观察

马健利
潍坊眼科医院

目的：飞秒激光透明角膜切口联合飞秒激光角膜缘松解术对角膜散光的矫正效果。方法：观察组选取就诊于我院的行飞秒激光辅助超声乳化联合飞秒激光角膜缘松解手术的患者共 5 例(5 眼)，患者术前角膜散光均≥1.0D；对照组选取条件相似的患者 5 例(5 眼)行常规超声乳化手术，术中在最陡散光轴行透明角膜切口联合对侧单切口角膜缘松解术。结果：所有患者术后散光均有了明显的减少,术前与术后的散光值比较,差异有统计学意义(P＜0.05)；术后裸眼视力均有明显的改善,观察组术后 3 个月裸眼视力 0.8 的患者占 78.1%，对照组占 65.0%；观察组术后 1 天、1 周、1 月、3 个月角膜平均散光值为 0.31±0.18、0.33±0.16D、0.36±0.15D，0.37±0.14D，对照组平均散光值分别为 0.47±0.37D、0.52±0.34D、0.69±0.31D、0.71±0.30D，两组在术后矫正角膜散光的效果均有一定的回退，在 3 个月时基本稳定；各时间段两组残余角膜散光差异均有统计学意义(P＜0.05)。结论：采用飞秒激光透明角膜切口联合飞秒激光角膜缘松解是一种有效的矫正白内障术前角膜散光的方法

PU-716
白内障超声乳化术后角膜曲率变化

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目的:研究超声乳化白内障吸除联合人工晶体植入术后角膜曲率及散光的变化。
方法:收集我院行超声乳化白内障吸除联合人工晶体植入术 34 例 52 眼的资料，术前视力 FC/50cm 至 0.5，白内障分级 II 级至 IV 级，手术前后分别行裸眼视力和医学验光检测，并使用 Pentacam 行眼前节分析系统检测患者手术前后角膜前后表面曲率、散光及其轴位的变化。
结果: 术后患者裸眼视力均在 0.4-1.0 之间，其中，裸眼视力≥1.0 者 43 眼（82.69%）。术后 3 月超声乳化白内障患者角膜前表面曲率变化无统计学差异。手术前后角膜前表面角膜曲率及散光值无统

计学差异（*p*=0.734，*p*=0.427），角膜前表面散光值差异也无统计学意义（*p*=0.446）。白内障患者手术前后角膜后表面角膜曲率有明显统计学差异（*p*=0.022），角膜后表面散光值差异有统计学意义（*p*=0.000）。患者手术前后角膜前表面散光轴位倾向于顺时针旋转，角膜后表面散光轴位倾向于逆时针旋转，而总散光轴位均倾向于顺时针旋转。
结论:白内障超声乳化手术前后角膜前表面曲率及散光变化不具有显著性差异，而角膜后表面的曲率及散光变化差异具有统计学意义。

PU-717

额肌悬吊术治疗先天性上睑下垂术后护理要点

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目的 通过学习额肌悬吊术改良上睑下垂的护理方法，减少术后并发症的发生
方法 我院自 2017 年 10 月至 2018 年 10 月中旬共收治先天性上睑下垂患儿 23 例，其中单眼患儿 20 例，双眼患儿 3 例。对所有患者实施额肌悬吊术，术后给予患儿及家长心理护理及预防并发症等护理。出院前几日开始对家长进行家庭护理的健康宣教。
结果 22 例患儿及家长术后对术眼睑型、眼睑高度及术后恢复效果十分满意。1 例患儿家长对睑型较满意。
结论 上睑下垂术后护理是关键，通过精心的术后护理，未发生严重的上睑倒睫、暴露性角膜炎等并发症的发生。轻度的角膜炎经对症治疗及护理均已治愈。

PU-718

急性原发性房角关闭患者房水中基质金属蛋白酶水平与小梁切除手术成功率的相关性研究

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目的：本研究旨在定量分析急性原发性房角关闭（acute primary angle closure, APAC）患者房水中基质金属蛋白酶（matrix metalloproteinases, MMP）水平，并探讨其与小梁切除术后眼压控制结果的相关性。
方法：采用前瞻性研究方法，对 52 例 APAC 患者和 26 例白内障对照患者进行房水取样。用多重免疫分析试剂盒测定样本中 MMP-1、MMP-3、MMP-7、MMP-8、MMP-9、MMP-12 和 MMP-13 的浓度。入组 APAC 患者及白内障患者的眼压使用 Goldmann 眼压计测量。入组 APAC 患者的随访时间为术后 1 周及 1、3、6、12 和 18 个月。
结果：共 78 例患者 78 只眼纳入研究，年龄 70.0±10.2 岁。与白内障（26 眼）相比，APAC 患者房水样本（52 眼）的 MMP-1（p=0.003）、MMP-3（p<0.0001）、MMP-7（p=0.01）和 MMP-9（p=0.005）的浓度显著升高。根据小梁切除术后 18 个月的手术结果，将 APAC 眼分为手术成功组（37 眼）和失败组（15 眼）。在失败组中，房水中的 MMP-3、MMP-7、MMP-9 与成功组相比显著升高（P 值分别为 0.008，0.006，0.002）。
结论： APAC 患者房水中部分 MMP 水平是小梁切除术的预后因素。MMP 表达的调节可能对于提高 APAC 患者小梁切除术的成功率具有潜在的临床应用价值。

PU-719

临床护理干预减少眼底荧光造影剂注射后的皮下血肿

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目的 研究不同护理干预下，如何减少使用眼底荧光造影剂给患者带来皮下血肿的机会，进而避免二次伤害，缓解医患矛盾和医疗纠纷。
方法 将 200 例做眼底血管荧光造影(FFA）或荧光素钠吲哚氰绿血管造影（ICGA）患者随机分为 A 组和 B 组，A 组 100 例推注造影剂后按照一般静脉给药原则进行指导取针按压，嘱病人 2-3 分钟后不出血方可停止按压；B 组 100 例推注造影剂后嘱患者创口部位未出血后请仍继续按压 5-10 分钟，并对造影创口处皮肤张力等状态进行仔细观察。
结果 A 组患者在停止按压后皮肤逐渐隆起，出现皮下血肿；B 组患者造影创口处皮肤无明显隆起状态。
结论 由于眼底血管造影剂荧光素钠和吲哚氰绿对血管特殊的刺激作用，根据具体情况进行针对性的护理干预，可以有效地预防和减少给药后皮下血肿的形成，避免二次伤害，使检查获得最佳护理满意度，疗效显著，能更好的缓解医患紧张关系。

PU-720

不全脱位的人工晶体睫状沟缝线固定术治疗人工晶体不全脱位的临床观察

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目的：观察人工晶体-囊袋复合物睫状沟缝线固定术治疗人工晶体不全脱位的临床疗效。
方法：白内障超声乳化联合人工晶状体囊袋内植入术后因部分悬韧带离断致人工晶体-囊袋复合物不全脱位 26 例 26 眼，其中假性囊膜剥脱综合征 4 例 4 眼，陈旧性葡萄膜炎 2 例 2 眼，视网膜色素变性 2 例 2 眼，抗青光眼滤过术后 4 例 4 眼，高度近视 5 例 5 眼，白内障术后眼钝挫伤人工晶体不全脱位 9 例 9 眼。26 眼局麻下行人工晶体-囊袋复合物眼内原位睫状沟缝线固定术，使脱位的人工晶状体-囊袋复合物复位，观察术后视力、眼压、角膜散光、角膜内皮计数及并发症。
结果：术后 26 只眼人工晶状体位置正，无倾斜和旋转；4 只眼术后眼压增高，给予相应处理后眼压均正常；裸眼视力均较术前提高，术后视力 0.4-0.6 者 7 只眼，0.1-0.3 者 2 只眼，<0．1 者 1 只眼。术后三个月角膜散光和角膜内皮计数与术前无显著性差异。
结论：此方法能够使脱位的人工晶体-囊袋复合物复位，无需取出或更换人工晶体，术源性散光小，角膜内皮丢失率低，操作简便，省时，安全，效果好。

PU-721

A High Proportion of Sturge-Weber Syndrome in Port-wine Stain Patients: A retrospective study on the screening strategy, clinical features and surgical management

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Abstract:
Purpose: To investigate the proportion and clinical characteristics of Sturge-Weber syndrome (SWS) in the Port-wine stain (PWS) patients, the screening strategy and surgical management.
Design: Retrospective study.
Participants: A total of 279 PWS patients, with 294 vascular ectasia ipsilateral eyes, were enrolled in the current study.
Methods: Most of the PWS patients, who came to the orthopedics department of our hospital for cosmetic purposes, would be recommended to screen the eye problems at the ophthalmology department when the cutaneous angiomas involved their V1 (ophthalmic division of the trigeminal nerve) distribution. The intraocular pressure (IOP), cup to disk ratio (C/D), corneal condition and B scan were of essential detecting parameters to the screening of glaucoma or choroidal hemangioma. A collection was made of all the consecutive PWS medical records from 2011.9 to 2016.2 at the ophthalmology department to review their clinical features, screening methods and treatment preferences.
Main Outcome Measures: High proportion of SWS in V1 distribution PWS.
Results: A total number of 66 out of 279 PWS patients (23.7%) was confirmed SWS with glaucoma. The IOP of the vascular ectasia ipsilateral eye in PWS and SWS was 13mmHg (IQR: 9.75, 17.00) and 23mmHg (20.00, 32.00), respectively (p<0.001); the C/D in the ipsilateral eye, 0.3 (0.3, 0.35) and 0.7 (0.6, 0.8), respectively (p<0.001); and the cornea diameter in the ipsilateral eye, 11.22±0.64mm and 12.78±0.75mm, respectively (p<0.001). Of SWS cases with secondary glaucoma, 39 underwent trabeculotomy and 10 received Ex-press implantation. Between two groups, significant differences were observed in terms of age and IOP for ipsilateral and contralateral eyes (p<0.001).
Conclusions: A high proportion of SWS with glaucoma in V1 branch region of the trigeminal nerve affected PWS patients

PU-722

Altered intrinsic functional connectivity of the primary visual cortex in patients with retinal vein occlusion: a resting-state fMRI study

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Purpose: To investigate the differences of spontaneous functional connectivity (FC) of the primary visual cortex (V1) between patients with retinal vein occlusion (RVO) and healthy controls (HCs) using resting-state functional magnetic resonance imaging (rs-fMRI) data.
Methods: 21 patients with RVO in total (11 males, 10 females) and 21 HCs similarly analogue in age and sex background were enrolled and inspected with rs-fMRI. The difference in FC of V1 between two groups were compared using two-sample *t*-test. We used the receiver operating characteristic (ROC) curve to distinguish average FC values of RVO subjects from HCs. The interrelationships between FC signals of specific cerebrum regions and clinical features in RVOs were assessed with the Pearson's correlation analysis.
Results: Compared with HCs, FC in left V1 and right middle frontal gyrus increased significantly in RVO group, while FC in left V1 and right cuneus decreased significantly. Meanwhile, patients with RVO presented increased FC between the right V1 and right middle frontal gyrus, right superior

frontal gyrus, but declining FC between right V1 and right cuneus. The mean FC value between the right cuneus and the right V1 as well as the left V1 were negative correlated with the foveal thickness of RVO patients. ROC curve analysis of each brain regions showed the accuracy of AUC was perfect.
Conclusion: RVO involves aberrant FC in V1 in different brain areas including visual-related and cognitive-related region, which may assist to unveil the underlying neural mechanisms of impaired visual function in RVO.

PU-723
577 nm 微脉冲激光治疗中心性浆液性脉络膜视网膜病变

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1.目的:观察 577 nm 微脉冲激光治疗中心性浆液性脉络膜视网膜病变(central serous chorioretinopathy，CSC)的疗效和安全性。
2. 方法:本研究纳入 11 例 11 眼通过 SD-OCT 和 FFA、ICGA 确诊为 CSC 患者，均使用 577 nm 微脉冲激光对渗漏点及其周围进行多点光凝。治疗后随访 1 周、2 周、1 个月、3 个月,观察最佳矫正视力、黄斑中心凹视网膜厚度及视网膜下液吸收情况。
3. 结果：末次随访时，最佳矫正视力由基线水平的〈0.15±0.08〉LogMAR 提高到〈0.3±0.05〉LogMAR,差异有统计学意义(p=0.013)；黄斑中心凹视网膜厚度由基线水平的(405.32±125.17)um 下降到(212.55±25.06)um，差异具有统计学意义(P=0.002)；视网膜下液高度由基线水平的(187.28±113.40)um 下降到(25.25±14.90)um，差异具有统计学意义(P=0.002)。末次随访时，5 眼的视网膜下液已经完全消失，6 眼仍然有视网膜下液积存，但较基线水平有缓解的趋势。随访 3 个月，所有患眼均未见视网膜损伤。
4.结论：577 nm 微脉冲激光治疗中心性浆液性脉络膜视网膜病变安全有效。

PU-724
陈旧性视网膜脱离广泛增生性玻璃体视网膜病变伴视网膜下膜的术中处理

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背景：视网膜下膜常见于孔源性视网膜脱离，外伤性视网膜脱离，视网膜脱离复位术后。几乎一半以上的增生性玻璃体视网膜病变存在视网膜下膜。黄斑部或者后极部视网膜下膜对术后视力恢复影响大。
目的：探讨陈旧性视网膜脱离广泛增生性玻璃体视网膜病变视网膜下膜的术中处理方法和技巧。
方法：选取 11 例（11 眼）陈旧性视网膜脱离广泛 PVR（D1 至 D3 级）并伴有视网膜下膜患者，术眼视力介于光感至 HM/50cm 之间，红绿色觉正常，病程在 1 年到 15 年之间。11 例均使用 23G 玻切头切除玻璃体。自锯齿缘 12 点位起沿顺时针方向剥离视网膜前膜和增殖条带，并向后极部延伸，解除牵引，平复皱褶。注意剥离时保持视网膜增殖条带和前膜的连续性，避免其断离，导致残留。视网膜下膜的处理方法如下：1、经巩膜穿刺孔电凝 10 点位和 2 点位睫状体平坦部后缘的周边部视网膜，分别做一个裂孔，使得膜镊等手术器械能进入整个后极部视网膜下间隙；使用膜镊松解、分离及夹取视网膜下膜，完成视网膜复位术后，使用激光光凝医源性裂孔 2、在视网膜下膜附近远离后

极部处做电凝裂孔，同法取出视网膜下膜并光凝裂孔 3、对于原发性视网膜脱离患者，可尽量利用原有的上方裂孔进行视网膜下膜的取出，较少医源性损害 4、对于拟行医源性造孔附近视网膜隆起明显者，亦可以使用玻切头切开视网膜造孔；常规进行巩膜环扎以降低术后视网膜脱离复发的机率。**结果：**11 例患者中术后第一天视力恢复至 0.02 及以上者 3 人，无提高者 8 人。术后一周视力恢复至 0.1 及以上者 1 人，0.02 至 0.1 者 8 人，2 人视力较术前无改善。术后 3 月视力提高至 0.1 及以上者 2 人，0.02 至 0.1 者 8 人，1 人视力较术前无改善。
结论：陈旧性视网膜脱离术后效果欠佳，且视网膜下膜是影响术后视力和手术成功的主要因素之一。通过做医源性视网膜小裂孔，经裂孔夹取视网膜下膜，去除影响视网膜复位的因素，提高了手术后视力的恢复。

PU-725

眼科手术室护士心理韧性调查分析

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目的:了解眼科手术室护士心理韧性状况、影响因素并探索应对措施，为有效提高眼科手术室护士心理韧性提供依据。**方法:**采用一般资料问卷和中文版韧性量表（Connor Davidson Resilience Scale, CD-RISC），对浙江省三所眼科医院 81 名手术室护士进行调查。采用 5 级评分法，满分为 125 分，分数越高说明心理韧性越好。数据分析采用 SPSS19.0。**结果：**眼科手术室护士心理韧性的总均分为(4.06±0.74) 分；在坚韧、力量和乐观三个维度得分分别为 4.01±0.81、4.21±0.73、3.86±0.67。眼科手术室护士心理韧性在不同性别、不同工作时限、不同职称方面差异有统计学意义（P＜0.05）。男护士的心理韧性显著高于女护士（P=0.025）；工作 10 年以上护士心理韧性高于工作 10 年以下的护士（P=0.041）；护师及以上职称者心理韧性高于护士职称者（P=0.33）。**结论：**眼科手术室护士心理韧性良好，女性、低年资、初级职称的护士心理韧性较差，需要临床管理者予以重视，并有针对性地提供帮助，促进眼科手术室护士的身心健康，提高工作适应性。

PU-726

原发性可关闭房角眼在白内障摘除术或激光周边虹膜贯穿术后眼前段形态变化

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目的：在可疑房角关闭人群中，对比白内障摘除伴人工晶体植入术与激光虹膜贯穿术对眼前节形态的改变。
方法：前瞻性纳入 122 名 50 岁以上的原发性可疑房角关闭眼，按患者意愿分为白内障手术组（62 人）和虹膜激光贯穿术组（60 人）。于术前及术后 4 周行前节 OCT 及房角镜检查，并对眼压变化进行记录。
结果：白内障术后及虹膜激光贯穿术后，房角宽度测量指标均有明显增加（AOD500、AOD750、TIA、TISA500、TISA750）（P＜0.001）。但术后两组间对比可见，白内障术后以上房角宽度测量指标均明显大于激光术后（P＜0.001）。并且在激光术后，眼压与中央前房深度无明显改变，但白内障术后眼压明显下降（P=0.001），前房深度明显增加（P＜0.001）。在对两组的房角镜观察中发现，虹膜激光术后，仍有约 20％的患者术后仍有两个象限以上的房角关闭，但在白内障术后，所有房角全部开放。

结论：相比于虹膜激光贯穿术，白内障手术可以达到术后房角全部开放，从根本上阻断了闭角型青光眼进一步发生发展，且可以得到更宽的术后房角。

PU-727

白内障术后晚期 TASS 一例

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目的：报告白内障术后晚期 TASS 一例
方法：患者女，72 岁，因“双眼视力下降 3 年余”于我院行右眼白内障超声乳化联合人工晶体植入术，术后一周右眼裸眼视力由 CF/20cm 提高至 0.6.术后一月再次因“右眼白内障术后 1 月，眼胀伴视力下降 5 天”急诊入院。入院时查体：右眼视力 NLP，眼睑肿胀，结膜充血水肿，角膜雾状水肿，前房极浅，中央轴深<0.5CT，周边前房消失，虹膜与人工晶体后粘连，瞳孔欠圆，对光反射消失，人工晶体位正，表面色素沉着，玻璃体及眼底均窥不清，眼压 T+2。左眼视力 0.25，除晶体混浊，无明显异常。急诊诊断为恶性青光眼，予以对症处理，未见缓解。予以行双眼 UBM 检查（图 1），行右眼前房成形联合虹膜周切术，术后予以全身静脉使用激素及局部抗炎、扩瞳、预防感染及营养角膜治疗。术后前三日分别予以结膜下注射地塞米松 2.5mg，术后 3 日后静脉激素改为口服。
结果：前房成形术后 1 日右眼裸眼视力 CF/20cm，前房安静，轴深约 2CT。术后 20 日，右眼视力恢复至 0.3，前房平静，轴深>3CT，口服激素逐渐减量至停药。
结论：诊断：右眼前节毒性反应综合征（TASS）。此症是由进入前房的非感染性因素导致的术后无菌性炎症，包括术中使用的器械和药物等造成眼内组织的损伤，发生的原因包括：眼内灌注液的化学成分、防腐剂、消毒剂、高压蒸汽灭菌器中的水、细菌内毒素以及人工晶状体的抛光和消毒、眼内器械的反复使用、药物载体等。症状可表现为白内障手术后 1 天内或几个星期后发生的前房积脓，略有眼疼、结膜水肿充血、视力下降，裂隙灯检查发现前房积脓、玻璃体混浊、前房晶体表面有色素沉着、前房及玻璃体穿刺细菌培养阴性。需与感染性眼内炎鉴别，治疗原则为全身及局部予以抗炎、抗感染等治疗。6~12 小时后重新检查。若炎症反应不再继续加重，部分积脓吸收，可不诊断为感染性眼内炎。

PU-728

白内障术后继发晚期囊袋阻滞综合征一例

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[目的] 报告晚期囊袋阻滞综合征一例。
[病例报告] 患者男性，84 岁。因“左眼白内障术后 4 年余，视力下降 4 月余”，就诊于我院眼科。既往体健，2012 年 6 月于我院行左眼超声乳化白内障联合后房型人工晶状体植入术。入院查体: 视力右眼 0.5，左眼 0.3；眼压右眼 11.6mmHg，左眼 11.2 mmHg。左眼角膜透明。前房深浅正常，房水清晰。瞳孔圆形，直径约 3 mm，对光反应灵敏。散瞳后检查可见前囊直径约 5 mm，近圆形；撕囊区边缘与人工晶状体前表面贴附紧密，人工晶状体在位居中，晶状体与后囊膜之间可见灰白色液体填充（图 1）。眼底检查未见明显异常。右眼查体见晶体混浊，余未见明显异常。
主要诊断：左眼晚期囊袋阻滞综合征
诊疗经过：局麻下行左眼囊膜切开及囊袋内液体吸除术，术中吸除囊袋内混浊液体后可见后囊膜混浊，一个月后行左眼后囊 YAG 激光治疗，复查视力 0.4，矫正视力 0.6。

[结论] 囊袋阻滞综合征是白内障手术中 CCC 引起的一个较少见的并发症，根据发生的时机可分为术中、术后早期、术后晚期三种类型。亦有报道根据病因及发病机制分为无细胞型、炎症型及纤维型等分型。可行：YAG 激光后囊切开术，囊袋松解术等方法治疗。

PU-729

颈内动脉动脉瘤临床表现分析

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目的：分析颈动脉海绵窦瘘（carotid cavernous fistula，CCF）的眼部表现临床特点。
方法：回顾性分析 2013 年 1 月至 2019 年 1 月北京协和医院就诊的 11 例颈动脉海绵窦瘘患者的临床资料，分析伴眼部表现的颈动脉海绵窦瘘的眼部表现临床特点。
结果：11 例 CCF 患者中，8 例伴眼部表现，其中搏动性眼痛 7 例，眼眶杂音 4 例、结膜充血水肿 5 例、眼球突出 4 例、动眼神经麻痹 3 例、外展神经麻痹 2 例，伴有颅高压征象的有 3 例，有高血压病史 4 例。
结论 颈动脉海绵窦瘘指海绵窦段颈内动脉自身或分支发生破裂，形成与海绵窦之间的异常动静脉交通，根据解剖部位分为颈内动脉海绵窦瘘及硬脑膜海绵窦瘘。CCF 主要表现为患眼搏动性眼痛、眼眶杂音、结膜充血水肿、眼球突出、动眼神经麻痹、外展神经麻痹等，部分伴有颅高压及高血压病史。

PU-730

A Case report of Intracavernous carotid aneurysm presenting as isolated sixth nerve palsy

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Purpose： An observation of a case of an unruptured intracranial aneurysm leading to unilateral abducens nerve palsy. To investigate the effects of intracranial aneurysms on the cranial nerves related to the eye, as well as its treatment methods and complications.
Methods： A 80 year-old female presented with 5 months of diplopia. Visual acuity were 0.6/0.6. Abduction of the right eye beyond midline was severely limited. The remaining ophthalmic examinations were normal. Magnetic resonance imaging (MRI) and computed tomographic angiography (CTA) demonstrated a 1.8*1.6cm intracavernous carotid aneurysms (ICA). The patient was diagnosed with isolated right sixth nerve palsy secondary to a giant ICA.
Results： In this case, the patients developed diplopia due to pressure on the abducens nerve from the intracranial aneurysms . After admission, they underwent a brain digital subtraction angiography(DSA) plus an aneurysm embolization. The postoperative eye condition was stable.
Conclusion： Aneurysms can be found by the symptoms of cranial nerve damage. 15.4% of patients with unruptured intracranial aneurysms had cranial nerve defects. This patient present with isolated abducens nerve palsy caused by oppression of the internal carotid cavernous sinus aneurysm. The symptom was occult in onset and easily missed. Therefore, when unexplained cranial nerve palsy is found clinically, we should pay attention to the cause of the cranial nerve palsy and perform imaging examinations such as MRI, CTA, and DSA, to detect the presence of intracranial aneurysms as early as possible.

PU-731

DHMMR, a Chinese herbal formula, suppresses the progression of STZ-induced DR after laser photocoagulation in BN rats via down-regulating VEGF and up-regulating PEDF

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To analyze the effects of Danhuang Mingmu recipe (DHMMR) (a pharmaceutical preparation from herbs and having the function of replenishing vital essence, removing heat, promoting blood circulation and excreting pathogenic water) on diabetic retinopathy (DR) after laser photocoagulation, STZ-induced DR models were established in male Brown Norway (BN) rats, subsequently conducted laser photocoagulation at 12th week after STZ injection. And oral treatment with DHMMR on the day of DR after laser photocoagulation model induction were initiated and continued until four weeks. Treatments with DHMMR suppressed the severity of DR, showing dramatic reduction of serum levels of P-selectin, cAMP and cGMP. Fluorescein fundus angiography (FFA) and histopathological examinations revealed significantly suppression of retinal edema, fundus microvascular destruction and retinal destruction in the DHMMR-treated rats, distinguishing from the vehicle-treated rats. The relative expression of VEGF protein was markedly lower in the DHMMR-treated rats, and the relative expression of PEDF protein was dramatically higher in the DHMMR-treated rats to the contrary, compared with the vehicle-treated rats. DHMMR demonstrates pronounced suppressive effects on the progression of DR after laser photocoagulation, indicating that this herbal formula would be a potential candidate as a botanical drug for further investigation.

PU-732

广州糖尿病眼病研究： 亚临床型糖尿病黄斑水肿的特征及影响因素分析

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ZOC

目的：
探讨广州 II 型糖尿病患者亚临床型糖尿病黄斑水肿(subclinical diabetic macular edema, SC-DME)的特征，并了解其相关因素。
研究设计：
本研究样本来自广州糖尿病眼病研究，这是一个正在持续进行的人群流行病学研究。共招募了 1432 名 50 岁以上的 II 型糖尿病患者。所有受检者均接受详细的眼科检查，包括视力，眼压，眼前段照相，眼底照相，光学相干断层扫描(OCT)和光学相干断层血管成像(OCTA)。采用 IOLMaster 测量眼部生物学参数。根据英国国家筛查项目的分级标准，将糖尿病视网膜病变分为 R1、R2、R3 三个级别。SC-DME 定义为光相关断层扫描仪 (DRI-Atlantis)测量的黄斑中心点厚度(macular center point thickness, CPT)为 194~268μm，且排除眼底检查符合 DRCR 的临床显著的糖尿病黄斑水肿标准的眼。所有参与者需行药物散瞳后 7 方位眼底彩照用于糖尿病视网膜病变(Diabetic Retinopathy,DR)分级。采用问卷调查的方式收集患者的病史信息，包括糖尿病病程、治疗方式、其他全身病史等。眼底图片质量欠佳或不能配合检查的受检者不纳入本次研究分析。
结果：

在 1432 名受试者中，有 36 人因无眼底照片或缺失其他数据而被排除，最终 1399 人（97.5%）纳入了本次分析（平均年龄为 65.6±8.23 岁，58.9%为女性）。在 1396 人中，共有 291 人患有糖尿病视网膜病变。451 名患者的 669 眼符合 SC-DME 标准。多变量逻辑回归分析结果显示 SC-DME 与 R1 级 DR (OR=0.07，P<0.01)和长眼轴(OR=1.47，P=0.001)显著相关，而年龄、性别、血压与 SC-DME 无显著相关性。

结论：

R1 级 DR 和长眼轴是糖尿病患者发生 SC-DME 的独立危险因素。

PU-733

兔巩膜厚度光学相干断层扫描与组织学一致性的研究

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摘要：

目的：对比频扫光学相干断层扫描(DRI -OCT)与组织学测量兔巩膜厚度研究。

方法：新西兰大白兔 5 只，均使用均采用日本 Topcon 公司深度光相干断层扫描(DRI-OCT)仪器对兔视网膜巩膜区域进行断层扫描，测量结束后处死，制作常规 HE 染色病理切片后显微镜下观察并测量巩膜厚度进行比较。

结果：DRI-OCT 影像：正常新西兰大白兔使用频扫 OCT 图像可观察到脉络膜及视网膜组织以及巩膜组织。测量视盘盘周上、下、鼻、颞侧 5mm 的 4 个区域范围的巩膜厚度测量，平均厚度为：237±5.21；组织病理学检查：正常巩膜的组织由外向内分为三层：巩膜上组织，巩膜基质层，棕黑板层。HE 染色可见平行的胶原纤维束，胶原纤维排列整齐；平均厚度为：224.09±3.04 ；DRI-OCT 测量的兔眼巩膜厚度与组织学相比较，差异均无统计学意义(均为 P>0．05)。

结论：OCT 仪器测量的巩膜厚度与实际巩膜的组织病理学具有一致性。OCT 仪器扫描测量的巩膜厚度准确，适合临床推广使用。

PU-734

0.005% Preservative-Free Latanoprost Induces Dry Eye-Like Ocular Surface Damage via Promotion of Inflammation in Mice

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PURPOSE. *To investigate the side effects of preservative-free 0.005% latanoprost on the murine ocular surface.*

METHODS. *We applied 0.005% latanoprost or vehicle in mice in two patterns for 14 to 28 days. Tear production was measured by phenol red cotton test, and corneal epithelial barrier function was assessed by Oregon-green-dextran (OGD) staining. Periodic acid-Schiff (PAS) staining was used to quantify conjunctival goblet cells (GCs). The expression of matrix metalloproteinase (MMP)-3 and -9, occluding and zonula occludens (ZO)-1 in corneal epithelium was assessed by immunofluorescent staining and/or quantitative real-time PCR (qRT-PCR). Inflammation in conjunctiva was assessed by activation of P38 and NF-κB, infiltration of CD4+ T cells, and production inflammatory cytokines including TNF-α, IL-1β, IFN-γ, IL-17A, and IL-13. Apoptosis in ocular surface was assessed by TUNEL and immunofluorescent staining for activated caspase-3 and -8. Cell viability assay was performed in human corneal epithelial cells.*

RESULTS. *Topical latanoprost treatment decreased tear production, induced conjunctival GC loss, disrupted the corneal epithelial barrier, and promoted cell apoptosis in the ocular surface. Topical latanoprost treatment increased the expression of MMP-3 and -9, and decreased the expression of ZO-1 and occluding in the corneal epithelium. Topical application of latanoprost promoted activation of P38-NF-κB signaling and production of TNF-α and IL-1β in conjunctiva. Topical application of latanoprost increased CD4+ T cells infiltration, with increased production of IFN-γ and IL-17A and decreased production of IL-13 in conjunctiva.*
CONCLUSION. *0.005% latanoprost induced dry eye-like ocular surface damage via promotion of inflammation in mice.*
Keywords: latanoprost, dry eye, inflammation, ocular surface

PU-735

高度近视黄斑裂孔患者玻璃体切除联合晶状体术后屈光状态的变化

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目的 观察高度近视黄斑裂孔患者行玻璃体切除联合晶状体手术后屈光状态的变化并探讨其影响因素。
方法 回顾性分析 2017 年 1 月至 2019 年 1 月于山东中医药大学附属眼科医院确诊为黄斑裂孔的患者 46 例 46 眼的临床病例资料。高度近视定义为眼轴长度大于等于 26mm。根据眼轴长度的不同，患者分为 3 组，A 组（26mm≤眼轴长度< 28mm), B 组(28mm≤眼轴长度 <30mm), C 组(眼轴长度≥30mm)。三组患者均行玻璃体切除联合白内障超声乳化吸除联合人工晶体植入术，术后随访 6 个月。三组患者手术前后均测量最佳矫正视力（BCVA）并计算 LogMAR。三组患者术前测量眼轴长度及角膜曲率（术前检测值），根据这两项指标计算人工晶体度数和术前预测等效球镜度数（预测值）。人工晶体植入术后复测眼轴长度及角膜曲率（术后检测值）及实际等效球镜度数（实际值）。观察三组患者玻璃体切除术前和人工晶体植入术后 6 个月的等效球镜度数、眼轴长度、角膜曲率变化情况，对比分析三组患者手术前后等效球镜度数、眼轴长度、角膜曲率差值之间的差异，分析患者术后屈光预测误差与术前眼轴长度之间的关系。
结果 术后 6 月各组 LogMAR 视力均较术前提高，差异均有统计学意义（均 P＜0.05）。各组术后屈光较术前均向近视方向漂移，差异均有统计学意义(均 P＜0.05)，且随着眼轴长度的增长，屈光向近视漂移越大。各组术后 6 月眼轴长度、角膜曲率较术前均明显提高，差异均有统计学意义（均 P＜0.05）；简单线性回归分析显示患者术后 6 个月屈光预测误差与术前眼轴长度之间呈负相关（R^2 =0.947,P=0.000 < 0.05）。
结论 高度近视黄斑裂孔患者行玻璃切除联合晶状体手术后最佳矫正视力提高，术后屈光向近视方向漂移，且随着眼轴的增长屈光向近视方向漂移更明显；术后患者眼轴增长，角膜曲率增大。高度近视患者术前眼轴越长，术后屈光越向近视方向漂移。

PU-736

二氧化硅颗粒对眼表的影响及机制研究

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目的:探讨较高浓度的二氧化硅颗粒悬液对健康个体眼表结构、功能的影响及其机制研究。

方法:研究对象为 c57bl/6 小鼠(6-8 周)，未经特殊饲养。研究所用试剂为直径为 5-10μm 的二氧化硅颗粒配制的不同浓度梯度的悬浊液，分别为 0.1%，1%，5%，对照组为 1XPBS 溶液，以及空白对照组（未经任何处理）。小鼠固定于专用固定台上，每日处理 1 小时，被处理对象眼上方应用大小合适的眼罩粘连好，眼罩内加入对应浓度配制好的试剂。连续处理 4 日，每日进行裂隙灯照相荧光素钠染色，角膜光学相干断层扫描技术（OCT）观察，活体共聚集显微镜观察。4 日后进行角膜损伤修复试验，然后进行取材，进行角膜 HE 染色、免疫荧光染色、扫描电子显微镜观察、荧光定量 PCR 检测。其中免疫荧光染色用以检测角膜细胞的增殖及凋亡，PCR 检测几种关键的炎症指标，二者共同来确定颗粒对眼表的影响机制。
结果:经过二氧化硅悬液处理过后小鼠眼表，与未经处理组和 PBS 处理组相比，随着处理时间及试剂浓度的提升，其眼表面的荧光素钠染色缺损情况逐渐加重；角膜光学相干断层扫描技术（OCT）结果显示，随浓度升高角膜厚度逐渐增加；4 日后角膜修复试验为阳性；角膜 HE 染色结果有着与 OCT 相似的结果，角膜厚度逐渐增厚，二者可能与水肿程度增加有关；角膜活体共聚集显微镜结果可见角膜上皮各层次有不同程度的二氧化硅颗粒附着，并表现为典型的炎症外观；扫描电镜结果可见实验组角膜微绒毛排布紊乱，数量明显减少；免疫荧光染色显示，凋亡（TUNEL 染色）及细胞增殖（ki67 染色）均无明显变化；在炎症相关荧光定量 PCR 中，明显观察到多项炎症指标均有明显升高，如 IL1β，TNF-α，IL13，NF-κB 等，证明眼表损伤主要由炎症引起。
结论:本研究首次单独研究单一二氧化硅颗粒对眼表的影响和机制，较高浓度二氧化硅环境对眼表损伤明显，并涉及多种炎症因子的改变。

PU-737

重硅油治疗复发性视网膜脱离无菌性眼内炎 1 例

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患者女性，51 岁，因左眼视物遮挡 1 周感，于 2018 年 11 月 19 日入住青岛眼科医院眼底病外科。既往自幼高度近视，高血压病史 7-8 年，口服降压药物治疗，血压控制平稳。眼科检查：VOS=FC/BE（矫正不提高），IOP12.1mmHg，前节未见明显异常，玻璃体混浊，视盘颜色红润，边界清晰，鼻上及上方网膜脱离，上方视网膜见萎缩灶，其上见撕裂孔，颞下方网膜脱离，脱离边界见色素线环绕，颞下方周边变性区，其上见裂孔。诊断为：1.左眼孔源性视网膜脱离 2.双眼并发性白内障 3.双眼高度近视 4.高血压。入院后行玻璃体切除术+视网膜复位+硅油填充+冷凝术，术中见颞下方极其菲薄，周边可透见色素，术后视网膜复位。

出院后 10 余天颞下方视网膜再次脱离。眼科检查：左眼：VOS=0.02（矫正无助），IOP15mmHg，前节未见明显异常，玻璃体腔内硅油填充，眼底视盘色界可，颞下方视网膜脱离，脱离范围色素带环绕，周边见大裂孔。于 2018 年 12 月 04 日行左眼硅油取出术+视网膜光凝术+重硅油注入术，术中见原冷冻斑处视网膜哆开，见大裂孔，颞下方变性区处视网膜极薄，透见色素。

术后第一天，未诉眼痛。眼科检查：左眼：VOS=HM/BE，IOP12mmHg，结膜轻充血，角膜透明，房闪（++），细胞（+++）,瞳孔区见大片渗出膜，眼底模糊。给予加替沙星滴眼液 每半小时一次、夫西地酸滴眼液每 2 小时一次、溴芬酸钠滴眼液每天 2 次、1%泼尼松龙滴眼液每小时一次、妥布霉素地塞米松眼膏睡前一次、复方托比卡胺滴眼液每天 2 次点左眼。

术后第二天，未诉眼痛、畏光、流泪。眼科检查：VOS=HM/20cm，房闪（++），细胞（++），瞳孔区渗出膜较前吸收，眼底隐约见视网膜红润。

术后第三天，VOS=FC/20cm,房闪（+），细胞（+）,瞳孔区渗出膜吸收,眼底视网膜红润，下方见激光斑，病情好转出院。

PU-738

空气填充治疗原发孔源性视网膜脱离的疗效

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目的：探讨空气填充治疗原发孔源性视网膜脱离的可行性。
材料和方法：回顾性观察 2018.2 月~2018 年 11 月于青岛眼科医院接受玻切手术治疗原发孔源性视网膜脱离的一组连续性病例，共 35 眼 35 例，其中男 20 例，女 15 例，年龄平均 49.28±9.66 岁。手术指征：原发孔源性视网膜脱离，视网膜脱离范围大或隆起高，撕裂孔，玻璃体混浊，PVR C 级以下者。排除继发性视网膜脱离者，玻璃体混浊轻需要进行巩膜外手术者，黄斑裂孔性视网膜脱离者，伴发脉络膜脱离者。手术方式为 25G 玻璃体切除术，激光或冷凝封闭裂孔，术终填充消毒空气。术后采取面向下体位 3 天。术后检查包括视力，眼压，眼底检查。随访不小于 2 个月。视力转换为 LogMAR 进行统计分析。
结果：
视力：术前 LogMAR 视力 4.3597±0.6141，术后 LogMAR 视力 3.6412±1.0731，P=0.001。
视网膜脱离范围（以钟点数计）：3~12 个钟点，平均 6.0285±2.5144 个钟点。
视网膜裂孔形态：圆孔 8 眼，撕裂孔 19 眼，撕裂孔+圆孔 8 眼。
视网膜裂孔数量:1~3 个，平均 1.6857±0.8321 个。
术后视网膜复位情况：玻切术后 1 周 29 眼（82.8%）视网膜复位；5 眼（14.2%）下方视网膜小范围未复位，给予再次补充空气填充，1 周后全部复位。1 眼（2.8%）于术后 3 周发生视网膜脱离，再次手术填充硅油后视网膜复位。
结论：玻切联合短效气体填充治疗 PVR C 级以下视网膜脱离安全有效

PU-739

晶状体脱位的原因及其合并症的观察

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目的：分析引起晶状体脱位的原因。设计回顾性病例系列。研究对象 2013 年 5 月至 2018 年 05 月青岛眼科医院住院治疗的晶状体脱位患者 117 例(122 眼)。
方法：统计晶体脱位原因，发生年龄及有无外伤因素，晶状体状态、脱位范围，有无继发性青光眼、视网膜损伤、角膜内皮细胞减少等。主要指标视力、眼压、晶状体位置及并发症。
结果：104 例患者为单眼外伤后造成的晶体脱位（其中晶体脱位入玻璃体腔 34 例，晶状体半脱位 70 眼，） 同时合并角膜内皮细胞减少 50 眼，玻璃体积血及视网膜裂伤 33 眼；8 眼为老年患者无明显外伤史，5 例患者为先天性晶体脱位，双眼均有不同程度悬韧带断裂。
结论：外伤为晶状体脱位的主要原因，其中劈木柴时不慎被飞起的木块击伤为发生率最高的原因，外伤后常同时合并角膜内皮细胞减少及玻璃体积血、视网膜损伤；先天性晶体脱位容易导致视物重影，导致弱视发生，应尽早手术治疗；老年人晶体悬韧带老化断裂后可造成晶体脱位及继发性青光眼，应该定期检查双眼。

PU-740

视疲劳患者中近视力受损的发生率及影响因素

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目的：研究近视力受损在视疲劳患者中的发生率及其可能的影响因素。**方法**：临床病例系列研究，对 51 位视疲劳患者进行一般资料的统计及眼动参数测量，包括视力检查、主觉验光、双眼调节幅度、调节灵敏度、调节状态、远近距离（6m,40cm）水平隐斜、AC/A 值、负、正相对调节、水平聚散力。**结果**：51 名视疲劳患者中出现日常近视力受损 24 例（47.06%），两组在年龄、主觉验光、调节幅度、调节状态、远近聚散幅度上具有明显差异，差异有统计学意义（*P*<0.05）。**结论**:47.06%的视疲劳患者伴有日常近视力受损，年龄增大，远视状态，调节幅度降低及集合不足是近视力受损发生的可能影响因素。

PU-741

表皮生长因子抗体通过 PI3K/AKT 信号通路影响视网膜色素上皮细胞的增殖和迁移

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目的：表皮生长因子（egf）是与表皮生长因子受体（egfr）结合的主要配体。本研究旨在探讨表皮生长因子抗体对视网膜色素上皮（RPE）细胞增殖迁移的影响及其机制。
方法：用不同剂量的 EGF 和 EGF 抗体处理人 RPE 细胞系（arpe-19 细胞）。细胞计数试剂盒（CCK-8）检测细胞增殖，划痕法检测细胞迁移。用 Western blot 法检测了 pI3K/Akt 信号通路相关分子，包括 Akt、p-Akt、pI3K 和 p-Pi3K。
结果：表皮生长因子（egf）能显著促进 arpe-19 细胞的增殖和迁移，且呈剂量依赖性，而表皮生长因子（egf）抗体则具有相反的作用。EGF 抗体通过诱导 PI3K 和 AKT 蛋白的磷酸化来抑制细胞增殖。
结论：EGF 抗体通过 PI3K/AKT 信号通路抑制 RPE 细胞增殖和迁移。EGF 抗体可能是治疗 RPE 相关疾病（如增生性玻璃体视网膜病变）的潜在候选药物。

PU-742

石斛眼药水降眼压效果及药效观察

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目的：观察石斛眼药水对 TGFβ2 过表达腺病毒诱导的高眼压小鼠模型的降眼压作用以及其作用的药效时间。

方法:BALB/c 雄性小鼠单侧眼玻璃体腔注射 TGFβ2 过表达腺病毒构建高眼压模型，另一侧眼作为实验对照。模型组小鼠与实验对照组小鼠于造模后第一天开始每天滴加 1%浓度石斛眼药水一次，另外，阴性对照组小鼠每天滴一次 1%石斛眼药水溶剂，观察造模组小鼠眼压的改变。小鼠眼压升至高眼压稳定水平后滴一次石斛眼药水，分别测出滴眼后 1h、2h、4h、8h、12h、24h、36h、48h 各时间点小鼠眼压的改变。
结果：石斛眼药水滴眼后第 14 天左右小鼠眼压下降（19±1.5mmHg），且数值有统计学意义(P<0.05)，一次石斛眼药水滴眼后药效可维持 48h，滴眼后 12h 眼压下降（16±1.5mmHg）具有统计学意义(P<0.05)，24h 眼压降至最低。
结论：石斛眼药水可降低 TGFβ2 过表达腺病毒诱导的高眼压小鼠模型眼压，石斛眼药水滴眼后 24h 眼压降至最低，药效可维持 48h,所以每天只需给小鼠点眼一次。

PU-743

肝 X 受体通过 ABCA1/ABCG1 途径减少氧化磷脂沉积诱导的 CNV 形成

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目的 我们前期研究已证实视网膜下注射氧化低密度脂蛋白（Ox-LDL）可诱发脉络膜新生血管（CNV）形成。动脉粥样硬化（AS）中的研究证实肝 X 受体（LXR）激活后可通过调节脂代谢和减轻炎症反应减少粥样斑块的形成。鉴于 AS 和年龄相关性黄斑变性（AMD）的相似性，本研究目的是观察 LXR 激活对 Ox-LDL 诱发的 CNV 形成的影响，并探讨其作用机制。
方法动物实验：在玻璃体腔注射 Ox-LDL(50μg/ ml)联合激光光凝诱导的小鼠 CNV 模型中行玻璃体内注射 LXR 激动剂，采用脉络膜铺片、免疫组织化学染色和 WB 等方法，观察 CNV 面积、脂质沉积数量及炎症因子等表达的变化。
细胞实验：ARPE-19 细胞培养液中加入 Ox-LDL(25μg/ ml)处理 12 小时，再加入 LXR 激动剂 TO901317（20μM）处理 12 小时。通过 ELISA 和 PCR 等方法，观察炎症相关因子、血管新生相关因子表达。通过油红 O 染色检测细胞内脂质含量变化。通过 Western blot 检测 ABC 转运蛋白，胆固醇外流相关蛋白表达。
结果 在体实验中，LXR 激动剂注射组 CNV 面积和色素上皮层下氧化磷脂沉积均小于对照组，在细胞中 LXR 激动剂可降低 Ox-LDL 所致的炎症因子 IL-1β、IL-6、TGF-β、IFN-γ 等，趋化因子 CCR2、MCP-1，重要的血管形成因子 VEGF 及 PDGF 等因子表达。同时 LXR 激动剂可降低清道夫受体 CD36，且胆固醇外流相关蛋白 ABCA1 和 ABCG1 的表达显著升高，证明 LXR 可通过 ABCA1/ABCG1 减少脂质摄入和增加胆固醇外流而减少氧化磷脂的沉积，同时可以减少炎症相关因子和新生血管形成因子的释放，来抑制 CNV 的形成。
结论 LXR 激活后可以通过 ABCA1/ABCG1 等多种途径减少 CNV 的形成，提示 LXR 激动剂可能作为湿性 AMD 治疗的药物应用于临床。
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PU-744

泪腺炎性病变的临床病理分析及治疗方法的研究

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[目的]分析泪腺炎性病变的临床、血清学、影像学、病理特点，对给于给予的治疗措施进行研究，提高泪腺炎性病变的诊断及治疗效果。**[方法]**回顾性分析武警总医院眼眶病研究所 2012 年 1 月至 2016 年 12 月诊断为泪腺炎性病变患者 261 例，对其临床特征、血清学、病理诊断、影像学、治疗等方面分析疾病特点及随访观察疗效。**[结果]** 261 例病例以单侧或双侧泪腺区出现无痛性肿胀或肿物就诊，其中男性 78 例，女性 183 例。血清学检查，37 例嗜酸性粒细胞升高，占 14.17%；17 例 IgE 升高，占 6.51%；26 例 IgG 升高，占 9.96%；57 例 IgG4 升高，占 21.84%。眼部 B 超提示单侧或双侧泪腺体积增大，增大泪腺内中等偏低回声；CT 或核磁共振检查显示：单侧或双侧泪腺体积增大，突出眶缘。CT 中等密度，核磁 T1WI 中信号，T2WI 高信号，增强后明显强化。261 例患者给予药物或手术治疗：45 例患者口服糖皮质激素，116 例患者选择局部曲安奈德+地塞米松磷酸钠注射治疗。激素治疗效果欠佳的 24 例患者联合环磷酰胺免疫抑制剂治疗。治疗效果明显，表现为泪腺区肿胀明显缩小及血清 IgG4 浓度下降，影像学检查增大泪腺体积明显缩小。261 例中 78 例患者泪腺炎性病变治疗后仍反复发作或不能耐受糖皮质激素治疗者，入院行单侧或双侧眶部泪腺切除手术。78 例患者中，双侧眶部泪腺切除者 23 例，共收集病理标本 101 例。术后病理组织学检查结果：泪腺良性淋巴上皮病变 23 例，淋巴组织反应性增生 37 例，淋巴组织不典型增生 12 例，IgG4 相关性泪腺炎 28 例。

PU-745

以视网膜静脉瘀滞为首要眼底特征的慢性粒细胞白血病一例

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患者男，26 岁。因双眼视物模糊伴右眼视野缺损 2 周于 2017 年 5 月 11 日在我院眼科就诊，双眼视力、眼压、眼前节检查正常，玻璃体点状混浊；双眼底视盘隆起水肿，边界欠清，右眼较显著；双眼视网膜静脉迂曲怒张伴白鞘， 动静脉交叉征（+）。荧光素眼底血管造影（FFA）检查，双眼后部及周边弥漫点状强荧光，未见荧光素渗漏及无灌注区。血常规检查白细胞 610.12×10^9/L，考虑血液系统疾病引起的眼底改变，白血病可能性大，立即转入血液科治疗。经骨髓细胞检测和染色体检查确诊为慢性粒细胞性白血病（CML）。入院后先后进行水化、碱化、羟基脲，靶向药物治疗，随白细胞计数的下降，眼部症状逐渐好转，眼底静脉迂曲怒张及视盘水肿程度逐渐改善。治疗后 1 年 CML 缓解期间随访患者眼部症状及眼底异常表现消失。

PU-746

睑缘清洗对提高护理质量及患者满意度的影响分析

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目的：睑缘清洗对提高角膜病护理质量及满意度。
方法：选取 2018 年 1 月—2018 年 6 月我院眼科收治的 186 列角膜病患者作为研究对象，随机分为 93 列实施对照组（实施睑缘清洗）和观察组（未实施结睑缘清洗），对比两组患者对睑缘清洗的护理质量及治疗效果情况分析。
结果：患者实施结睑缘清洗后，促进了护患关系的和谐、对护理质量有显著提高（P<0.001）。
总结：对角膜病患者进行规范化、专业化、睑缘清洗，可提高患者满意度，巩固治疗效果。
关键字 睑缘清洗 角膜病

PU-747

三短六洁个人卫生有效预防和减轻眼科疾病的效果研究

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目的：做好三短六洁个人卫生，能够有效的预防和减轻眼科疾病。
方法：选取 2018 年 1 月—2018 年 7 月我院眼科收治的 546 列眼科病患者作为研究对象，随机分为 273 列实施对照组（实施三短六洁）和观察组（未实施三短六洁），对比两组患者三短六洁能有效的预防和减轻眼科疾病。
结论：患者实施三短六洁，有效的预防和减轻眼科疾病（P<0.001）。
总结：对眼科疾病患者督促、指导执行三短六洁可有效预防和减轻眼科疾病。
关键字： 三短六洁 预防和减轻眼科疾病

PU-748

基于零缺陷理论构建眼科优质护理流程

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目的：探索创建零缺陷病区管理模式，提高护理服务质量。
方法：选取我科 2018 年 1 月至 2018 年 6 月收治的 160 例眼科手术患者，按照随机分配的方法将其分为实验组和对照组各 80 例，对照组采用常规护理的方法，实验组在常规护理的基础上，对病人接待、检查、诊治、手术、出院等现有流程进行优化，同时在过程中对执行情况进行监督、反馈和评价。比较两组患者护理后的临床效果的优良率、住院天数、术后及随访期并发症，以及满意度。
结果：实验组的优良患者共 77 例，达 96.3%，并发症患者 3 例，占 3.7%，住院天数 2.5～11d，平均 7d，满意度达到 97.5%。对照组的优良患者共 63 例，占 78.8%，并发症患者 17 例，住院天数 3.5～20 d，平均 12 d，满意度为 85%。实验组患者的优良率、满意度明显高于对照组，差异具有统计学意义（P <0.05）实验组患者的住院天数、并发症率明显减少，与对照组比较差异具有统计学意义（P <0.05）。临床效果明显优于对照组，差异具有统计学意义（P <0.05）。
结论：基于零缺陷理论的全流程管理可以加强护士的整体服务意识，提高护理服务质量和效率，营造医、护、患和谐氛围，适应了现代优质护理服务的需求。

PU-749

医用凝胶眼贴在泪囊炎术后预防并发症中的应用

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目的：创新凝胶眼贴，预防缓解泪囊炎术后并发症，提高满意度。
方法：随机从 2018 年 5 月-10 月筛选了 50 名泪囊炎术后患者，分成实验组和对照组，两组患者各 25 名，实验组采用新型眼贴，对照组沿用传统冰敷袋，比较两组患者术后止血效果，眼睑肿胀情况，患者对冰敷方式满意度，分析两组护理效果。
结果：对照组 25 名患者中出现了 3 例术后冰敷止血效果不佳的现象，2 例术后眼睑肿胀，3 例对传统医用冰敷袋使用不满意（1 例患者觉得传统冰敷袋固定麻烦，2 例觉得传统冰敷袋过硬，佩戴不舒适）。实验组 25 名患者中 1 例冰敷止血效果不佳，0 例术后眼睑肿胀，25 例对冷凝式冰敷贴使用效果满意。实验组冰敷止血效果，眼睑消肿及满意度均优于对照组，差异具有统计学意义（P <0.05）。

结论：新型凝胶眼贴在泪囊炎术后护理方面可以有效减少并发症的发生，巩固治疗效果，提高患者满意度。

PU-750

2000 年至 2018 年浙江地区儿童青少年眼附属器官增生性病变病理学分类

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目的 探讨浙江地区儿童青少年眼附属器官增生性病变病理学分类

方法 收集浙江大学第二附属医院眼科中心 2000 年至 2018 年期间，741 例儿童青少年眼附属器官增生性病变患者资料，回顾性研究资料年龄、性别、病变部位、病理组织学诊断。

结果 741 例儿童青少年眼部增生性病变中，男性 385 例（51.9%），女性 356 例（48.1%）。患者就诊年龄 1 岁至 20 岁，良性病变 694 例，恶性病变 47 例。良性病变中，发病率前 3 位分别为皮样囊肿 115 例（15.5%），色素痣 92 例（12.4%），表皮样囊肿 66 例（8.9%）；恶性病变 47 例（6.3%），以视网膜母细胞瘤为主，达 42 例（5.6%）。按发病解剖学部位分类：眼睑肿瘤 246 例(33.2 %), 眼眶肿瘤 141 例(19.0%), 眼球表面肿瘤 230 例(31.0%)。

讨论： 儿童青少年眼部肿瘤增生性病变种类繁多，良性增生性病变以皮样囊肿为主，恶性肿瘤中，以视网膜母细胞为主。通过 2000 年至 2018 年所收集的病理资料分析，为浙江地区儿童青少年眼部疾病的诊治提供了参考依据。

PU-751

角膜高阶像差在白内障人群中的分布

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目的：观察白内障患者中，角膜各类高阶像差的分布特点，从而指导屈光性人工晶状体的应用，同时为评价白内障术后的视觉质量提供客观依据。
方法：回顾性分析 2017 年 9 月-2018 年 4 月于我院就诊的白内障患者 492 例（735 眼），采用 iTrace 像差分析仪分别扫描角膜 3.0mm 范围内和 6.0mm 范围内的总高阶像差和各阶相差。采用独立样本 t 检验的方法对比不同瞳孔下各类像差的分布特点。
结果：角膜 3.0mm 范围内，总高阶像差及各类相差均低于角膜 6.0mm 范围内，差异具有统计学意义（P<0.05）。角膜 3.0mm 范围内的高阶像差以三叶草为主，6.0mm 范围内的高阶像差以慧差、球差及三叶草为主。
结论：随着年龄的增加，角膜高阶像差也会显著增加。不同角膜范围下的高阶像差分布不同。通过掌握角膜高阶像差的分布，可指导不同类型屈光性人工晶状体在白内障患者中的应用，也为白内障术后视觉质量的评估提供了客观依据。

PU-752

慧差矫正在屈光性 IOL 植入术中的应用初步结果

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目的：评估飞秒辅助白内障术中联合单侧角膜松解切开对角膜慧差矫正的效果。
方法：收集 2017.12-2018.04 于我院行飞秒辅助白内障的患者 10 例，术前检查慧差大于 0.3。采用 iTrace 相差分析仪测量患者角膜表面 HOA 值。不同瞳孔直径与角膜总像差、慧差、球差和三叶草之间进行 Spearman 相关性分析。观察术后第一天、第一周、一个月、三个月的裸眼视力（UDVA）、矫正视力（CDVA）、散光残留度数、点扩散函数（PSF）、调制传递函数（MTF）及慧差和总高阶像差。
结果：术后第一天、第一周、一个月、三个月的 UDVA、CDVA 及角膜总像差较术前增高,对比敏感度增高，慧差显著降低（P<0.05）,术后各时间段对照无明显差异（P>0.05）。
结论：对于存在慧差的白内障患者，FLACS 术中联合 AK 进行矫正，效果确切、稳定性佳，且更为精准。术后 3mm 瞳孔下影响患者视力的主要为慧差，故术后角膜总高阶像差虽有一定增加，但患者视力不受影响。

PU-753

白内障手术患者健康教育知识

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目的：研究白内障手术患者健康教育知识。
方法：随机抽取 2018 年 4 月到 10 月选择了 400 余白内障手术患者。分成实验组和对照组，各组 200 余人，对照组按照常规的护理方法进行。实验组对患者进行了高血压、糖尿病患者进行了评估，并且进行了眼科专科检查、治疗、泪道冲洗、手术整个过程的健康教育知识。统一讲述相关的知识。同时患者可以提问，立即解决问题。整个流程同患者阐述清楚。对整个过程进行评估优化。比较两组患者的对手术的成果进行评价。
结果：对照组出现了 30 名患者不清楚办理出院流程和点眼注意事项。实验组 5 名患者不清楚手术的状况，手术视力恢复较满意。理解了白内障健康教育的重要性，并发症较少情况。
结论：白内障健康教育知识让更多的人了解白内障手术的重要性，恢复视力看清世界生活充满阳光。

PU-754

翼状胬肉手术前后角膜曲率及像差的变化

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目的：探讨翼状胬肉手术前后验光、角膜曲率及角膜像差的改变，了解翼状胬肉手术后患者视功能的变化，研究翼状胬肉合并白内障的患者如何选择晶体可以获得更好的视功能。
方法：回顾性病例队列研究。选取 2016 年 6 月至 2017 年 12 月在我院眼科 20 例（27 只眼）原发性翼状胬肉患者，均在我院行翼状胬肉切除联合自体结膜移植术。查找所有患者术前及出院后 1 月复查的验光、角膜地形图、pentacam 像差分析并进行对比，分析手术前后的变化。
结果：手术后对比手术前验光矫正视力（LogMar）变化不明显（P=0.264）。术后角膜前表面平均曲率对比术前平均角膜曲率有明显变化（P=0.000）。单眼发病患者术眼术后角膜曲率对比健侧眼术

前角膜曲率没有差异（P=0.096），角膜前表面散光较术后明显降低（P=0.000）。术后球差对比术前无明显改变（P=0.337），术后水平慧差及垂直慧差对比术前均明显降低（P=0.000,P=0.026）。**结论：**翼状胬肉患者手术前后角膜曲率有明显差异；术后水平及垂直慧差较术前明显降低，手术前后球差无明显变化，单侧发病患者术眼术后角膜曲率与健侧眼角膜曲率没有明显差异。

PU-755

角膜异物的临床分析及职业防护

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目的：总结并分析我科 2018 年 6 月开业 7 个月以来门诊诊断为“角膜异物”的病例职业相关因素、临床特点及职业防护。
方法：整理并统计我科 33 例门诊诊断为“角膜异物”的病历。
结果：33 例角膜异物均发生于男性，年龄跨度为 24-56 岁，其中青壮年 25 例（75.8%）。32 例（97%）为单眼单个角膜异物，左眼 17 例，右眼 15 例。1 例（3%）为双眼单个角膜异物。位于睑裂区角膜中心部直径 4mm 区域内为 14 只眼（41.2%），位于角膜中间部为 10 只眼（29.4%），位于角膜外周部及角膜缘为 10 只眼（29.4%）。所有病例均为金属性异物，伴有铁锈浸润，无角膜穿孔。仅 2 例（6.1%）患者于伤后 12 小时内我科门诊就诊。余 31 例（93.9%）首诊时间均大于伤后 24 小时，其中最长 1 例为伤后 7 天首诊。仅 8 例（24.2%）患者首诊后再次于我科门诊复诊。所有患者均予以角膜异物剔除术及局部抗感染治疗。31 例（93.9%）患者电话回访诉预后良好，2 例（6.1%）患者失访。所有患者职业分布情况为：23 例（69.7%）角膜异物发生在从事建筑业的工人，5 例（15.2%）发生于装修行业人员，3 例（9.1%）分别发生于汽车维修、金融行业与计算机软件行业人员，2 例（6%）患者未提供明确职业信息。在职业相关性分析中，29 例（87.9%）患者明确主诉角膜异物发生与其工作环境直接相关，并且均未佩戴防护眼镜，具体操作工具多为电砖 7 例（24.1%）和打磨机 6 例（20.7%）。
结论：我科门诊角膜异物发病情况明显与建筑及相关行业直接相关，高发于青壮年男性，但此病患群体就诊时间距离起病时间较长，复诊比例相对较低，反应其就医意识稍薄弱，且未在高危工作环境中重视眼保护措施，缺少安全防护意识。应加强该类病患眼相关职业防护知识及操作培训，从预防的角度根本减少该类疾病的发病率，促进职业相关眼健康防护事业。

PU-756

严重角膜碱烧伤患者足疗程局部使用皮质类固醇激素的临床疗效的研究

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目的：严重角膜碱烧伤患者足疗程局部使用皮质类固醇激素的临床疗效的研究。
方法：回顾性研究纳入了 2014 年至 2018 年我院 17 例严重角膜碱烧伤并接受治疗的患者中的 20 只眼。患者符合严重角膜碱烧伤的 Roper-Hall 分类，并用妥布霉素地塞米松滴眼液 4 次/天 治疗 1-2 周后，改为 0.1％氟米龙滴眼液 4 次/天，根据治疗效果逐渐减量。随访 3—12 个月，观察这些患者的临床疗效（上皮修复，视力，新生血管的变化、并发症发生情况等）。
结果：18 眼角膜上皮完全修复，平均持续时间为（1.53±0.74）月，而 2 眼角膜上皮无法完全修复。治疗后视力提高 16 只眼（0.1~0.3 2 眼，0.3~0.5 10 眼，≥0.5 4 眼）但仍有 4 眼在 0.1 左右。新生血管明显消退，其中新生血管消失 9 眼，10 只眼有不同程度的消退，1 眼无明显变化。并发症：

高眼压，睑球粘连，白内障，假性胬肉分别是 1 眼，1 眼，1 眼，2 眼。没有其他严重的并发症如葡萄膜炎，角膜穿孔，眼内炎甚至眼球萎缩等发生。
结论：对于严重角膜碱烧伤患者，早期和全程使用皮质类固醇可以缓解角膜炎症反应，抑制新生血管生长，改善视功能。

PU-757

1 例青光眼引流钉植入术后患者行飞秒激光白内障手术的护理体会

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目的：总结 1 例青光眼引流钉植入术后患者局麻下行飞秒激光辅助白内障手术的护理体会。**方法**：护理的重点是做好充分的术前准备，给予心理护理和健康宣教，准确安置体位，术中注意保暖；熟练掌握仪器的操作规程、手术步骤，按医嘱调节个性化的参数，术中密切关注手术进程和病情变化，积极预防并发症的发生，同时做好自身防护措施。**结果**：患者经过积极的治疗和精心的护理，于术后第二天顺利出院。**结论**：术前充分准备，术中团队精诚合作，做好个体化的观察和护理，是手术成功的重要保障。

PU-758

Cortical changes in early blindness : a case report and analysis

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Purpose: To investigate whether there is any difference between eyes-open and eyes-closed resting-state functional magnetic resonance imaging.
Methods: The patient was a right-handed, forty-three-year-old man, who was blind at 5 years old due to detachment of retina. Clinical examination (pupillary light response) and conscious awareness (‘Do you have any light perception when you are facing the sun?’) showed he had no residual vision. Also, he had no history of further neurological or psychiatric disorder and was informed consent to underwent functional magnetic resonance imaging. Data was acquired by a 3.0T GE MR750 system (GE healthcare, Waukesha, WI). Short-TR EO and EC rs-fMRI data and 3D T1-weighted image were collected. Differences in the regional homogeneity (ReHo) were compared using DPABI toolbox.
Results: The ReHo in eyes-open state is higher in both sides of temperal lobe, right frontal lobe, right inferior parietal lobule, right superior frontal gyrus ($P<0.05$), which is quite different from the previous results in normal subjects.
Conclusion: There are changes in the cortical level in early blindness, suggesting neuroplasticity in the cortical level.

PU-759

从视野辨识青光眼 plus

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【目的】本文通过几个典型病例分析，评估视野在青光眼合并视网膜、视神经及视路等这一类疾病（青光眼 plus）诊断中的作用。
【方法】对几个疑诊病例详细了解病史，进行眼科常规检查：视力、裂隙灯、眼底镜、眼压检查，辅助检查包括：视野、中央角膜厚度、光学相干断层成像术、视网膜电图、视觉诱发电位、头颅 MRI 等。
【结果】病例 1：患者男，44 岁，发现双眼眼压升高 5 年。眼部检查：压平眼压右眼 22mmHg，左眼 23mmHg，双眼前节无特殊，C/D=0.8。视野：双眼生理盲点扩大，右眼上方视野局限性缺损，左眼上方弓形暗点。最后诊断：右眼青光眼合并陈旧性视网膜脉络膜病变，左眼青光眼。病例 2：患者女，65 岁，右眼近期视野进行性缩窄。1 年前曾诊断为右眼色素性青光眼，视野表现为旁中心暗点，遵医嘱用药眼压控制好。眼部检查：双眼角膜透明，可见 Krukemberg 梭，虹膜透照试验阴性，前房、瞳孔及晶状体未见异常，右眼 C/D=0.3，左眼 C/D=0.4。视野：右眼下方弓形视野缺损。最后诊断：右眼青光眼合并视神经脑膜瘤。病例 3：患者女，64 岁，双眼前节无特殊，右眼 C/D=0.6，左眼 C/D=0.55。右眼眼压峰值 24.5mmHg,左眼眼压峰值 26mmHg。视野检查为双眼颞上方视野缺损。脑垂体 MRI 显示垂体微腺瘤。最后诊断：青光眼合并垂体微腺瘤、垂体上动脉盗血综合征。
【结论】临床上仔细辨析非典型青光眼视野改变，对于发现和确诊“青光眼 plus”这一类疾病非常重要。

PU-760

Schwartz-Matsuo 综合征两例

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目的：Schwartz-Matsuo 综合征是一种以孔源性视网膜脱离，高眼压和葡萄膜炎三联征为特征的疾病，我们报道两例 Schwartz 综合征以提高对其认识。方法：对临床确诊为 Schwartz-Matsuo 综合征的 2 例病例眼部体格检查及辅助检查进行回顾分析。结果：病例 1，男性，43 岁，诉“右眼视物模糊 1 月”，Vod 1.0，Tod 38mmHg，右眼角膜透明，前房深，房水闪辉弱阳性，瞳孔圆，视盘色红界清，C/D=0.4，鼻上方视网膜浅隆起，未见裂孔。病例 2，男性，16 岁，诉“左眼视物不清半年”，有左眼钝挫伤史。BCVA os 0.04，Tos 35mmHg，左眼角膜透明，前房深，房水闪辉阳性，瞳孔圆，无粘连，玻璃体可见色素细胞，后极部视网膜浅隆起，未见裂孔。B 超示左眼视网膜全周扁平脱离。眼压用药仍高于 25mmHg，行巩膜外环扎术后视网膜成功复位，术中取房水行电镜检查，发现光感受器细胞外节盘膜。随访 2 月至今，眼压控制正常，已停降眼压药。结论：Schwartz 综合征多为青年男性单眼发病，多有头面部钝挫伤史，易被误诊为原发性开角型青光眼，视网膜脱离通常只是轻度隆起，裂孔多位于锯齿缘、不易查见。眼压升高可能与房水中的光感受器外节盘膜有关，尽早手术复位视网膜，有助于控制眼压。还需注意与开角型青光眼合并视网膜裂孔鉴别。

PU-761

颈动脉海绵窦瘘合并青光眼的临床分析

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目的 分析合并青光眼的颈动脉海绵窦瘘的临床特征及诊断要点，以提高对本病的认识，减少误诊。方法 回顾性分析两例合并青光眼的颈动脉海绵窦瘘的临床资料，包括其病史、眼部症状、最佳矫正视力、眼压、眼前节照相、眼底照相、Humphrey 视野、眼部 B 超、颅脑 MRI、DSA 等。 结果 病例 1 为自发性颈动脉海绵窦瘘继发单眼青光眼；病例 2 为外伤性颈动脉海绵窦瘘合并双眼原发性闭角型青光眼。两例均以眼部症状首诊于眼科，检查均有眼压升高。其中病例 1 经介入手术治疗后，眼部症状好转，眼压下降；病例 2 经介入手术治疗后，眼部症状好转，但眼压仍高，一眼经小梁切除手术、另眼经激光周边虹膜切开术眼压控制。 结论 对于伴有结膜螺旋状充血且眼压升高的患者，要警惕颈动脉海绵窦瘘，需行眼部 B 超、颅脑 MRI 及 DSA 进一步确诊。颈动脉海绵窦瘘既可出现继发性青光眼，也能合并原发性闭角型青光眼，因此，需对颈动脉海绵窦瘘合并眼压高患者的致病因素及临床特征进行详细分析，避免误诊漏诊。

PU-762

视网膜色素变性合并支气管扩张 1 例

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目的：系统性视网膜色素变性是指累及包括肾脏、生殖系统、呼吸系统、神经系统等多个系统或组织的视网膜色素变性，我们报道 1 例累及听力系统、呼吸系统的视网膜色素变性，并结合文献回顾对其发病机制进行初步推。
方法：对临床确诊为视网膜色素变性的 1 例病例眼部体格检查及辅助检查进行回顾分析。
结果：患者男性，22 岁，诉“双眼自小暗处视力差伴视力下降”。自诉双耳自小听力差。4 年前右侧自发性气胸手术史。母亲双眼高度近视，余无特殊。眼部检查：BCVA ou 1.0，Tou 11mmHg，双眼前房常深，瞳孔等大等圆，直径 3mm，对光反射灵敏，晶状体透明，双眼玻璃体可见絮状浑浊，视盘色蜡黄，杯盘比 0.3，后极部可见弥散骨细胞样色素沉着，脉络膜萎缩，可透见下方血管。眼底自发荧光检查可见周边散在自发高荧光，以黄斑部位中心，视网膜血管弓以内范围可见相对赦免区，即中心凹周围环状高自发荧光——Robson-Holder 环。FFA 检查视网膜色素上皮层萎缩区域可透见高荧光，而周边色素沉着处呈遮蔽荧光；于大片弱荧光处可透见脉络膜血管。听力测试提示双耳听力减退，属于感音神经性耳聋。胸部 CT 检查可见双侧肺纹理质地粗糙，支气管较同级血管粗，符合支气管扩张表现。
结论：该患者 10 岁前即表现夜盲，眼底检查可见视网膜色素变性典型表现，AF 及 FFA 等检查亦支持视网膜色素变性诊断。同时合并听力减退及支气管扩张，属于综合征型视网膜色素变性。视网膜色素变性病例这种同时累及视网膜、呼吸系统及听力，可能与基因突变引起纤毛功能障碍有关，常见的纤毛相关基因包括 RPGR、RP1、CLRN1、MAK、USH2A、BBSs、NPHPs 及 MKSs。对于视网膜色素变性患者需注意排除全身并发症。

PU-763

双鼻侧视野偏盲的临床分析

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目的：双眼鼻侧偏盲，理论上是由于视交叉双外侧边缘来自双眼颞侧视网膜的神经纤维受损、抑或双颞侧视网膜病变所致，临床上常难以找到上述原因。本文通过 3 个病例分析，结合文献复习，浅析双鼻侧偏盲的特点以及临床意义。

方法：整理了 3 个双鼻侧偏盲的典型病例，分析其临床特征，视野表现，结合其他眼部辅助检查，借助神经影像学手段，明确了病因和诊断。并查阅文献，对双鼻侧视野偏盲的病因进行了总结分析。

结果：病例举例：女性，40 岁，因“双眼视物遮挡感 1 月”就诊，眼部检查：Vou 0.8 矫正无助，压平眼压：Tod 32mmHg ，Tos 25mmHg，前房深，瞳孔直径 3mm，对光反射灵敏，眼底：视盘边界清，C/D 0.75od 0.5os；视野检查：双眼鼻侧视野缺损；头颅 MRI：符合空蝶鞍表现。诊断：原发性开角型青光眼 ou，空蝶鞍。空蝶鞍造成双鼻侧偏盲的可能机制有：①视交叉被压向鞍内方向；②第三脑室前部部分疝入鞍内，引起视神经位置和形态的变化（如扭曲）；③视交叉嵌塞在鞍背嵴上。双鼻侧偏盲可表现为对称性损害，或不规则性缺损。

结论：双眼鼻侧偏盲尽管罕见但原因繁杂多样，应逐步有序地排查病因。全面的眼科检查，排除双眼颞侧视网膜病变和视神经疾病非常重要，同时也要考虑到颅内病变所致或合并颅内病变可能，因此建议常规行颅脑 MRI 检查。同时，不能因为没有查到病因就归结于“先天性”改变，仅依靠阴性检查结果得出结论容易掩盖真正的病因，长期随访跟踪非常必要。

PU-764

眼底病所致双颞侧偏盲浅析

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目的 分析眼底病所致双颞侧偏盲 4 例，分析其临床特点及可能的病理机制
方法 收集 4 个双颞侧偏盲患者的临床资料，全面的眼科体查，眼底照相、Humphrey 视野、OCT、眼底自发荧光、FFA、ERG、VEP 等，再完善头颅 MRI 检查，排除颅内疾病引起的双颞侧偏盲，分析其临床特点及可能的病理机制定位病变部位。
结果 病例 1 患者为年轻女性，右眼视力下降数月，瞳孔 RAPD 阴性，且无伴眼球转动痛，不符合球后视神经炎典型表现。双眼眼底以对称性局部脉络膜视网膜萎缩为主要表现，结合 OCT、FFA、ICG 及电生理检查提示病变部位主要位于光感受器及视网膜色素上皮层，病例 2 患者主诉双眼视野遮挡，散瞳后双眼眼底发现鼻侧周边视网膜病灶，骨细胞样色素沉着，病例 3 患者双眼外侧视野遮挡半年，散瞳后双眼眼底发现周边视网膜病灶：双眼视网膜鼻侧、鼻下方可见骨细胞样色素沉着，局部视网膜血管变细，双眼病灶呈对称性分布，病例 4 主诉双眼闪光感 7 年余，偶有视物变形，就诊时发现双眼底视盘鼻侧视网膜血管变细，视盘鼻侧视网膜颜色晦暗，视野较 7 年前双眼颞侧暗点范围稍扩大，OCT 扫描视盘鼻侧病灶部位见视网膜和脉络膜结构紊乱、RPE 层不连续，自发荧光及荧光造影示双眼视盘周围对称性病灶，电生理检查示双眼视杆细胞功能受损，四个病例视野均表现为双眼颞侧对称性的损害，均行头颅 MRI 排除颅内病变而最终诊断分别是 1 例陈旧性视网膜脉络膜炎和 3 例象限性视网膜色素变性。
结论 双颞侧偏盲不一定为视交叉受损，本文的四个病例均是由双鼻侧视网膜病变所致

PU-765

皮肤带状疱疹继发眼内炎在前房液监测下玻璃体腔注药痊愈病例分析

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目的 汇报一例皮肤带状疱疹患者继发眼内炎，在眼内液监测指导下经玻璃体注药 4 次痊愈一例，进而探讨此类疾病的早期诊断，抗病毒及激素药物的使用。
方法 患者，男，41 岁，主诉：左眼红痛、流泪伴视力下降 10 天。现病史：10 天前左眼红、刺痛，诊断“结膜炎”，予左氧氟沙星眼水、眼膏。6 天前，红痛无好转，视力下降，诊断“病毒性角膜炎、带状疱疹”，予更昔洛韦眼水、眼膏，皮肤科会诊。2 天前，视力进一步下降，今来我院。入科后，神志清，精神差，右额部面部皮肤变红，散在疱疹。眼部：Vos:0.05 Tos:38.6mmHg 左眼睫状充血，角膜混浊水肿，玻璃体混浊（++），余不清。抽取前房水进行病毒血及炎性因子监测。
结果 在房水检测，VZV-IgG 增高，IL-6, IL-8, IL-10 增高，经玻璃体腔内注药（更昔洛韦 2mg）4 次，IL-6, IL-8, IL-10 逐渐降至正常，口服强的松，伐昔洛韦 1 月，患者视力提高，玻璃体混浊减轻，炎症控制。**结论**眼内液监测指导下抗病毒及激素治疗是治疗病毒感染性眼内炎的一种有效方法。

PU-766

糖尿病性视网膜病变病例摘要

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男，64 岁，左眼视力无痛渐进性下降 3 个月。
患者自 3 个月前开始出现左眼视力下降，视力逐渐下降，视物逐渐模糊，眼前有黑影飘动，无眼红、眼痛、畏光、流泪、异物感等不适，未经特殊诊治，现患者为求进一步治疗，遂来我院。门诊拟“2 型糖尿病性视网膜病变（增殖期）（ 双）”收入院。近期患者睡眠可，大小便无明显异常，体重无明显变化。
初步诊断：1、玻璃体出血（左） 2、2 型糖尿病性视网膜病变（增殖期）（ 双） 3、并发性白内障（双） 4、2 型糖尿病
诊断依据：
1、左眼视力下降 3 个月
2、眼科：视力：右眼：0.2（小孔），左眼：指数/20cm，双眼眼眶无畸形，眼睑无内外翻，结膜无充血，巩膜无黄染，角膜透明，虹膜纹理清，前房深度正常，右眼瞳孔药物性散大，晶状体混浊，玻璃体稍混浊，视网膜可见散在激光光斑。左眼瞳孔大小正常，形态圆，D=3mm，对光反射（+），晶状体混浊，下方玻璃体可见出血，余窥不清。眼压：右眼：13mmHg，左眼：15mmHg。双眼泪道：通畅。
3、糖尿病病史 10 余年，皮下注射门冬胰岛素早晚各 15、13 单位，高血压病史 10 余年，口服药物治疗，具体不详。2016-07-22 在我院行玻璃体切除术（右）+视网膜激光光凝术（右）+玻璃体腔注药术（右）（雷珠单抗）。2016-07-22 术后至今曾于我院门诊行 6 次视网膜激光光凝术（双），具体不详。
诊疗经过：
入院后完善相关检查：血细胞分析、大小便结果基本正常。血糖，电解质四项（钾钠氯钙），血脂四项，肝肾功能结果基本正常。2018-12-14 在局麻下行玻璃体切除术（左）+玻璃体腔注药术（左）+硅油填充术（左）+黄斑前膜术（左）+复杂视网膜脱离修复术（左）+视网膜激光光凝术（左）。手术顺利，予以止血等对症治疗。

PU-767

一种新型的动物眼底成像系统设备评估糖尿病视网膜病变的眼底形态学变化

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目的: 利用视网膜成像系统观察诱导型 ZDF 大鼠糖尿病视网膜病变的眼底形态学变化，着重关注眼底荧光造影(FFA)渗漏情况。
方法： 购买北京维通利华实验动物技术有限公司 ZDF 大鼠 12 只，模型组 6 只高脂饲料诱导 2 个月，
正常组 6 只不做任何处理。实验前进行大鼠深度麻醉，双眼滴散瞳药、表麻药。待大鼠瞳孔完全散开后，并在角膜表面涂上一层凝胶，将大鼠右眼角膜置于视网膜成像系统前（Optoprobe,OPTO-RIS 北京心联光电科技有限公司）进行眼底彩照拍摄并尾静脉注射 1%，0.16ml/kg 的荧光素钠进行血管造（FFA）拍摄。
结果： 糖尿病组与正常组眼底彩照对比发现糖尿病组远离视盘部分区域有白色絮状硬性渗出现象（如红色箭头），正常组未发现。荧光素钠血管造影（FFA）显示糖尿病组出现有点状、棉絮状荧光堆积渗漏（如黄色箭头），但正常组眼底未见明显渗漏区域。
结论：视网膜成像系统能明显观察到诱导型 ZDF 大鼠视网膜荧光造影有明显渗漏情况，此模型鼠可作为糖尿病视网膜病变研究的动物模型。

PU-768

白内障术后应用人工泪液缓解干眼症的治疗效果分析

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目的：探究应用人工泪液对于缓解白内障术后干眼症的疗效分析
方法：选取我院 2017 年-2019 年白内障术后干眼患 156 人，随机分为对照组和实验组，对照组采用妥布霉素地塞米松眼液加双氯芬酸钠滴眼液眼液治疗，研究组采用布霉素地塞米松眼液加双氯芬酸钠滴眼液加玻璃酸钠眼液治疗，分析术前、术后 1 周和 1 个月泪液分泌和泪膜破裂时间。
结果：白内障术后使用布霉素地塞米松眼液加双氯芬酸钠滴眼液加玻璃酸钠眼液可以有效缓解术后干涩、疲劳的症状，对于增加泪液分泌、延长泪膜破裂时间有显著作用。
结论：干眼症是白内障患者手术后常见的一种并发症，围手术期不合理用药、术前麻醉药刺激、手术切口导致眼表神经末梢受到损伤等均可导致角膜上皮的微绒毛受到损伤，此外白内障患者年龄偏大、球结膜松弛亦导致手术后泪膜的稳定性受损。通过实验观察发现玻璃酸钠能够延长患者的泪膜破裂时间。玻璃酸钠是一种常用的人工泪液，具有保湿以及修复的功能，可以促进角膜上皮细胞微绒毛的修复，可以稳定角膜水样层减轻其它药物对角膜的刺激，促进角膜细胞的代谢，修复受损组织的效果，从而达到改善泪膜破裂时间和泪液分泌功能。综上所述，白内障术后增加玻璃酸钠眼液可以有效的缓解患者术后干涩、疲劳的症状，提高患者术后生活质量，因此可在临床上广泛推广应用。

PU-769

肠道真菌菌群失调对小鼠角膜创伤修复的影响

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目的：本研究旨在观察抗真菌药物诱导的肠道真菌菌群失调对小鼠角膜创伤修复的影响。**方法**：选用健康无眼疾的 C57BL/6J 雄性小鼠，将实验小鼠随机分为两组：对照组和两性霉素 B 组，对照组给予正常饮食，两性霉素 B 组给予添加两性霉素 B 的饮食，以诱导小鼠肠道真菌菌群失调，4 周后对两组小鼠角膜进行上皮创伤，小鼠麻醉后在解剖显微镜下利用直径 2mm 环钻在小鼠角膜中央的圆形区域标记，用高尔夫刀机械性的去除角膜上皮层，使用荧光素钠染色角膜创伤区域，动态观察上皮修复情况，并利用免疫荧光染色观察角膜上皮细胞、炎症细胞变化，通过 HE 染色进一步观察角膜厚度的变化。**结果**：两性霉素 B 组与对照组相比，再上皮化速度及创伤修复延迟，炎症细胞明显减少，角膜上皮厚度变薄。**结论**：肠道真菌菌群失调延迟角膜创伤的修复，降低角膜创伤后的炎症反应。

PU-770

Age-related macular degeneration associated peripapillary choroidal neovascularization in the era of anti-VEGF therapy

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Purpose: To characterize the natural history and response of age-related macular degeneration (AMD)-associated peripapillary choroidal neovascularization (PPCNV) to anti-vascular endothelial growth factor (VEGF) therapy.

Methods: This was a retrospective case series of patients with PPCNV secondary to neovascular AMD. All patients underwent complete ophthalmologic examination and retinal imaging including fluorescein angiography and spectral-domain optical coherence tomography at each visit. Eyes with sub or intra-retinal macular fluid were treated with anti-VEGF monotherapy using a modified as needed treatment algorithm.

Results: Thirty-three eyes of 27 patients were included. The median age was 82 years (range, 62-94) and the median duration of follow-up was 65 months (range, 6-165). Fourteen eyes (58%) without fovea-involving fluidat baseline subsequently developed exudation after a median observation period of 16 months (range, 4-107). Ten of 24 eyes (42%) without initial macular fluid remained dry during the entire follow-up. The median number of injections required until complete fluid reabsorption was 3 (range, 1-21) during the first treatment cycle. The median time to fluid recurrence was 6 months (range, 3-74).

Conclusion: PPCNV secondary to wet AMD has a slow progression, may not require treatment for a prolonged period and responds rapidly to anti-VEGF treatment with good visual outcomes.

PU-771

Association of Single Nucleotide Polymorphisms in IGF1R with Age-related cataract

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Background:The study aims to explore the correlations of the single nucleotide polymorphisms (SNPs) of insulin-like growth factor 1 receptor (IGF1R) with the risk of age-related cataract (ARC).

Methods:The study involved 1190 participants, comprising 690 ARC patients and 550 control subjects. Genomic DNA was extracted from peripheral blood leukocytes using a Simgen Blood DNA mini kit .The SNPs were genotyped by SNPscanTM .The association between the SNPs and ARC was examined under three different genetic models:dominant, recessive, and additive.A logistic regression analysis was conducted to evaluate the genetic effects of the IGF1R SNPs after adjusting for age and sex.

Results: Three tag SNPs (rs1546713, rs178297, rs2985821) were included in the study. Rs1546713 showed a significant relationship with a notable risk of total ARC under the dominant models(P=0.000, OR:1.606, CI:1.245，2.071). In the analysis of subgroup , no SNPs was found to have a significant effect on the subtype of cataract under three models.

Conclusion: Our study demonstrated that that IGF1R rs1546713 might correlated with the risk of age-related cataract.

PU-772

南充某地区 1204 名中小学生近视状况调查及影响因素

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目的：通过调查来分析此地区中小学生近视发病情况，旨在为近视防控提供更好的依据，更好的控制近视的发展 方法；通过整群抽样我市教学质量好、中、次三个等级的一年级至六年级的学生中作为研究对象，利用人工灯箱测视力及机测视力联合的方法来测定视力，并对研究对象的读书习惯、生活习惯、父母是否有近视等因素进行研究 结果：调查人数中近视率 32.7%，在教学质量好、中、次三个等级中近视均无明显差别，1-3 年级近视率为 12.76%，4-6 年级近视率为 19.94%，高年级的近视率明显高于低年级，对近视进行多因素非线性回归显示，父母均有近视、阅读习惯、生活习惯均是造成近视的高危因素 结论；我市某地的近视率在各等级学校间无明显差别，近视发生与遗传、阅读习惯、生活习惯关系密切，应通过多途径降低近视率

PU-773

Posterior communicating aneurysm characterized by ocular symptoms——initiating the attack of glaucoma

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Most intracranial aneurysms that causing ocular symptoms are usually located at the junction between the initial part of internal carotid artery and posterior cerebral communication,including the internal carotid arterial cavernous segment.Rarely,blocking of parasympathetic nerve that supplying to the sphincter pupillae caused by the aneurysm may initiate the attack of acute glaucoma.

CASE REPORT

A 57-year-old female complained a developping pain,tearing and blurred vision in right eye with a front headache for 20 days without any previous history of significant disease such as hypertension or diabetes.6 days ago,the patient felt hard to open the right eye and the eyeball couldn't move to the normal position suddenly,but she denied diplopia.the patient was admitted to our department as "Acute angle-closure glaucoma,Oculomotor paralysis".

Opthalmic examination:vision acuity of the right eye was 4.8 while there was a blepharoptosis of the upper eyelid,covering the lower edge of the cornea.The cornea was a mild edema and the anterior chamber angle was narrow.The pupil was round and fixed,6mm in diameter,while there was slight opacity of the lens,0.6 of the C/D ratio.Ocular motility was difficult in

upward,downward,and adduction movement,however the abduction was normal.Other abnormal findings in the left eye was narrow anterior chamber and increased C/D ratio.The intraocular pressure was normal in both eyes(20mmHg). A central scotoma could be shown on the both eyes.UBM showed a 30% anterior chamber angle closure in the right and anterior chamber angle was narrow but open throughout in the left.

Diagnosis and treatment: Several kinds of eye-drops were applied in the right eye in order to relieve the inflammatory reaction and narrow the pupil such as the tobramycin dexamethasone eye drops and pilocarpine nitrate eye-drops.6 hours after applying the medicines,the right pupil diameter had been constricted to 2mm,IOP in the right eye got to 15mmHg.However,the patient said that eye pain still persisted.We further examined the brain magnetic resonance imaging(MRI) and computed tomograph angiography(CTA),while there wasn't any abnormal findings on MRI,but CTA presented an lobulated aneurysm in the initial part of right posterior communicating artery,size of the aneurysm was about 5.70mm*2.48mm,diameter of its neck was 3.25mm.There existed a 2.65mm*5.08mm size daughter aneurysm at the top.Then the patient was transferred to the Neurosurgery department and received the double microcatheter adopted aneurysm intervened embolism under digital subtraction angiography(DSA).

Blepharoptosis of the right upper eyelid and ocular motility were significantly improved 6h after the surgery.Diameter of the pupil was about 3.5mm,slightly bigger than the left pupil,but a little slow in light reflex.The patient said that pain did significantly relieve.3 days after the operation,vision acuity in the right eye was 4.9,the cornea was transparent and the IOP got to 17mmHg.Ocular motility were almost full.That blepharoptosis of the upper eyelid covered the upper margin of the pupil.

One months after the surgery,vision acuity of the right eye was 4.9 ,the upper eyelid covered the upper edge of the pupil.The cornea was transparent and the pupil was round and 3.5mm in diameter,sensitive in light reflex.Ocular motility was almostly full.The intraocular pressure was normal in both eyes(18mmHg). The right eye had gotten normal eye position.No further visual field loss happened.

DICUSSION

Only about 10% of aneurysms develop clinical symptoms before rupture.Intracranial aneurysms that can cause ophthalmic symptoms mostly come from the junction between internal carotid artery and posterior communicating artery.Those aneurysms would compress the oculomotor nerve,then the eye pain, ipsilateral forehead pain, limited lifting of upper eyelid, pupillary light reflex slow or disappeared,eye movement paralysis would appear.

The patient in this case felt the pain in right eye first,and performed a typical clinical symptoms of acute angle-closure glaucoma,even though the physical signs didn't support it.It was hard to distinguish whether the problem was.Through ophthalmic examinations,the anatomic features of glaucoma in both eyes and the glaucoma lesions were identified,and the right eye was under attack.However,the IOP in right eye was almost normal,and anterior chamber closure was less than 50%,we couldn't know if the patient had ever been received some medicine to reduce the IOP.As we know,lateral fibers of the oculomotor nerve come from the E-W nucleus.when aneurysm compress the oculomotor nerve,the interruption of the parasympathetic supply to the sphincter pupillae muscle happened first.A mild dilated pupil in a person who has a narrow anterior chamber angle is the most common inducement of acute angle-closure glaucoma.In this case,the patient complained a glaucoma symptom first.In this case, the patient showed a complete oculomotor nerve paralysis symptom in a short time, that suggested the aneurysm was expanding with a risk of rupture at any time.The surgery reduced the risk of aneurysm rupture timely and saved the patient's life.

In the case there was a marked glaucoma symptoms and signs first,then a progressive oculomotor nerve palsy happened,which was rarely reported in the presence of a posterior communicating aneurysm. For a sudden symptom of oculomotor nerve paralysis with no significant incentives should be considered the existence of aneurysm.Angiography such as CTA,MRA and DSA are needed to be finished as soon as possible, to facilitate a early diagnosis and treatment.

PU-774

不同时间点行二次角膜交联术对兔眼角膜生物力学性能的影响评估

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目的：利用离体角膜膨胀实验的测量方法评估不同时间行二次角膜交联术对兔眼角膜生物力学性能的影响。
方法：将 50 只兔眼随机均分为 5 组，A 组进行一次角膜交联术 3 周后进行二次角膜交联术，二次交联时 B 组进行一次角膜交联术，C 组进行一次角膜交联术后 6 周进行二次角膜交联术，二次交联时 D 组进行一次交联术，E 组不进行处理。实验均采用经典角膜交联术：辐照度为 3mW/cm2 的紫外线（370nm）照射 30 分钟，总能量为 5.4J/cm2。在二次角膜交联术后 4 周对所有兔眼角膜进行角膜膨胀实验，并进行有限元模拟分析、逆向建模，获得应力-应变曲线及正切弹性模量。
结果：应力-应变曲线：实验组无论是一次交联还是二次交联，其应变均小于空白组，而 3 周及 6 周后的二次角膜交联与一次角膜交联的应变没有明显差异。正切弹性模量：在各个应力下，不管是 3 周组还是 6 周组，交联的兔眼角膜正切弹性模量明显大于空白组，而一次交联和二次交联之间并无明显区别。
结论：在一次角膜交联术后的不同时间点（3 周和 6 周）对兔眼角膜进行二次角膜交联术，通过离体角膜膨胀实验对其生物力学性能进行有效评估，较空白组而言，交联组生物力学性能有效提升，而短时间（3 周）内的二次交联不能有效提升兔眼角膜生物力学性能；再适当延后（6 周）对其进行二次交联也不能达到提升角膜生物力学性能的目的。获国家自然科学基金项目(81600712, 31771020)，浙江省自然科学基金项目(LY18A020008, LY16H120005)，温州市公益性科技计划项目(Y20170198)和浙江省医药卫生科技计划项目(2016ZHB012, 2018RC057)的联合资助。

PU-775

视锥视杆细胞营养不良并发症患病率及并发黄斑前膜相关危险因素分析

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目的 研究视锥视杆细胞营养不良（cone-rod dystrophy，CORD）患者并发症中黄斑前膜（epiretinal membrane, ERM）、黄斑水肿（macular oedema，ME）及白内障的患病率并分析并发 ERM 的相关危险因素。**方法** 横断面研究。收集临床诊断为 CORD 患者 60 人，光学相干断层扫描血管成像（optical coherence tomography angiography，OCTA）检测 ERM、ME，根据临床记录所见记录白内障。根据患者的年龄、性别、眼压及其他因素对并发 ERM 进行多因素分析。**结果** 60 名患者的 119 只眼中（其中 1 名患者 1 只眼瞳孔膜闭，OCTA 未能在黄斑处成像满意，未纳入统计），ERM 在 34（56.67%）位患者中出现，在 64（53.78%）只眼中出现。ME 和白内障分别在 13（10.92%）、52（43.70%）只眼中出现。在多变量分析中，ERM 与年龄相关（P=0.000，OR =1.096，95%CI 为 1.054-1.140），但与性别(P=0.153，OR =2.004，95%CI 为 0.773-5.197)、ME（P=0.837，OR =1.179，95%CI 0.246-5.647）、眼压（P=0.863，OR =1.179，95%CI 为 0.738-1.008）、白内障（P=0.153，OR =2.049，95%CI 为 0.766-5.481）无关。**结论** CORD 并发的可治疗并发症较高，年龄增大是

CORD 并发 ERM 的独立危险因素。但是这些并发症是可以治疗的，用 OCTA 筛查并随访这些并发症，进行早期干预，对临床患者是有益的。

PU-776

Vimentin、TGF-β1、E-Cadherin 在翼状胬肉组织中的 表达及相关性研究

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目的：探讨上皮间质转化（EMT）是否与翼状胬肉的侵袭性生长特性及复发有关
方法：通过免疫组化（SP 法）测定 30 例初发翼状胬肉组织、15 例复发翼状胬肉组织、15 例正常结膜组织中 Vimentin、TGF-β1、E-Cadherin 的表达，并比较其表达差异、进行相关性分析。
结果：Vimentin、TGF-β1 在翼状胬肉组织表达阳性率显著高于正常结膜组织，差异有统计学意义（P＜0.05）；E-Cadherin 在翼状胬肉组织中表达阳性率显著低于正常结膜组织，差异有统计学意义（P＜0.05）。Vimentin、TGF-β1 在复发翼状胬肉组织表达阳性率高于初发翼状胬肉组织，差异有统计学意义（P＜0.05）；E-Cadherin 在初发翼状胬肉组织中表达阳性率高于复发翼状胬肉组织，差异有统计学意义（P＜0.05），TGF-β1 在翼状胬肉组织中表达与翼状胬肉头部大小的差异有统计学意义（P＜0.05），其中胬肉头部≥4mm 的翼状胬肉组织 TGF-β1 阳性表达率高于胬肉头部＜4mm 的翼状胬肉组织。Vimentin 与 TGF-β1 表达呈正相关（r=0.318, P＜0.05），Vimentin 与 E-Cadherin 的表达呈负相关（r=-0.371, P＜0.05），TGF-β1 与 E-Cadherin 表达呈负相关（r=-0.463, P＜0.05）。
结论：Vimentin、TGF-β1、E-Cadherin 三者可能与翼状胬肉的发生发展及复发有关，TGF-β1 可能与翼状胬肉的侵袭性生长有关，且 Vimentin 与 TGF-β1 在翼状胬肉的发生发展中起协同作用。Vimentin、E-Cadherin 是 EMT 的标志蛋白，TGF-β1 是 EMT 的主要诱导剂，提示 EMT 可能与翼状胬肉的发生发展、复发及侵袭性生长有关，抑制 EMT 可能能延缓翼状胬肉的发生发展、降低其术后复发率。

PU-777

区域折射非球面人工晶体患者术后第一天视力的改善分析

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目的：分析区域折射非球面人工晶体（Oculentis IOLs）LS-313MF30（近附加度数为+3.00D）/MF15（近附加度数为+1.50D），患者术后第一天远、中、近视力的改善情况。
方法：选择 2018 年 9 月至 2019 年 1 月在苏州理想眼科医院行白内障超声乳化摘除术联合区域折射非球面人工晶体 LS-313MF30/MF15 植入的白内障患者 27 例 27 眼的临床资料，其中 MF30 患者 24 例，MF15 患者 3 例。晶体选择公式包括：SRK-T 公式，Barrett 公式、IOL-Master 公式，术后预测屈光度为：正视眼+0.11D~-0.30D，低中度近视-0.01D~-0.51D，超高度近视-0.60D~-1.15D。晶状体核硬度Ⅲ~Ⅳ级。视力采用标准对数视力表小数记录法，术后第一天检查远视力（5m）、中视力（80cm）、近视力（40cm)。
结果：患者 27 例 27 眼术后第一天视力均有明显改善，27 眼术前裸眼远视力平均为 0.1，矫正视力平均为 0.18，术后第一天平均视力：远 0.752 (0.4~1.0)，中 0.764 (0.32~1.0)，近 0.668 (0.32~1.0)。患者对远、中、近视力满意，无不适主诉。其中 MF15 近视力稍弱。

结论：1.区域折射非球面人工晶体 LS-313MF30 为患者带来了更好的远、中、近视力；区域折射非球面人工晶体 LS-313MF15 远中视力满意，近视力稍弱。视觉质量患者主观感觉满意。
2.在区域折射非球面人工晶体屈光度设计上，正视眼、远视及低度近视的患者术后预估度数预留+0.00D~-0.50D，高度近视特别是超高度近视术后预估度数预留-0.50D~-1.00D，甚至-1.50D，是比较理想的屈光度设计。

PU-778

Diabetic retinopathy in diabetics referred for ophthalmological care: preliminary findings from a community-hospital screening program

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OBJECTIVES
This study aims to explore the prevalence of diabetic retinopathy (DR) and its risk factors in a diabetic screening cohort referred from eighteen community health centers to diabetic retinopathy care in a tertiary center in Guangzhou, China.

METHODS
A total of 1919 adults aged 40-80 with newly-diagnosed diabetes from eighteen community health service centers in Yuexiu District, Guangzhou were enrolled at baseline. Patients were then referred to the Zhongshan Ophthalmic Center (ZOC), a tertiary center for comprehensive ophthalmological examinations. The prevalence of DR was calculated by gender, age, and type of diabetes. Chi-square test and multiple logistic regression analysis were used for data analysis.

RESULTS
Almost all patients (1918/1919) were type 2 diabetics. The prevalence of any diabetic retinopathy, mild DR, moderate DR, and severe DR were 20.1% (n=386), 14.6 % (n=281), 2.6% (n=50), and 2.9% (n=55), respectively. Significant predictors of any retinopathy were longer duration of diabetes, being on treatment for hypertension and use of diabetic medication (P<0.001).

CONCLUSION
Referral from community care to ophthalmological care for initial diabetic retinopathy screening may provide early prevention and treatment to control the course of disease. Physicians should also be aware of the risk factors for diabetic retinopathy identified in this cohort for tailoring the care package in follow-ups.

PU-779

针灸及电针治疗车祸后动眼神经麻痹 1 例

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目的：通过针灸及电针等治疗方法治疗车祸后动眼神经麻痹，改善眼球运动及上睑下垂不能提起等症状。
方法：患者 8 个月前因车祸导致左眼动眼神经麻痹，左眼上睑下垂，不能抬起，遂至我院针灸科针灸治疗数月，未见明显提高，后因左眼结膜脱垂于睑裂外至眼科就诊，收入院治疗。入院时见：视力：右：1.0 左：0.3，左眼上睑下垂，不能抬起，左眼外转正常，余各方位完全受限，余未见明显异常。入院后除常规治疗外加用针灸及电针日 1 次治疗以通络明目。具体穴位如下：

睛明（双） 攒竹（双） 瞳子髎（双） 丝竹空（双） 太阳（双）
承泣（双） 头维（双） 风池（双） 百会 四神聪
合谷（双） 光明（双） 足三里（双） 三阴交（双） 太冲（双）
平补平泻 30 分钟日 1 次。
电针为左睛明与左头维一组，左太阳与左风池一组，电量适中，30 分钟日 1 次。
同时配合我科室特色中药熏眼及直流电治疗。住院期间患者左眼结膜脱垂不能复位，久而久之易引起炎症反应，故适当时期行左眼结膜脱垂切除术，切除多余结膜、
结果：治疗数月后，患者左眼：视力：0.5，左眼上睑下垂，偶能抬起，最大睑裂 3mm，外传正常，余方位运动受限，各方位活动度约 2mm。经过治疗，患者信心大增，且患者自述在近期治疗过程中上睑抬起高度越来越高，时间越来越长，且越来越频繁，预后良好。
结论：针灸、中药熏眼及直流电治疗风牵偏视在我科室以运用良久，且效果显著，一直以来均受到广大患者一致好评，但该患者与其他患者不同，为车祸后导致的左眼动眼神经麻痹及左眼上睑下垂，不能抬起，常规治疗效果不显，针灸配合电针治疗则效果显著。动眼神经是人体的第三对颅神经，与滑车神经及外展神经共同支配眼球运动，同时还作用于提上睑肌与瞳孔，是眼运动神经里面重要的神经。通过此案列，我认为，车祸后动眼神经麻痹可通过针灸及电针进行改善与修复。

列题

LT-1

基于《关于功能、残疾和健康的国际分类》框架下视障康复的解析

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国际疾病分类(International Classification of Diseases，ICD)作为现有的眼科疾病分类标准，其根据疾病的某些特征进行编码分类，无法能够了解到眼病患者由于视障导致身体功能状态的改变。《关于功能、残疾和健康的国际分类》，又称国际功能分类（International Classification of Functioning, Disability and Health , ICF）由世界卫生组织提供了能统一和标准的反映所有与人体健康有关的功能和失能的状态分类，也是作为一个重要的眼健康评估指标。通过 ICF 框架中的身体功能和身体结构因素数据对视觉功能障碍进行评估，追踪其康复效果；通过对 ICF 框架中的活动与参与因素数据结合环境因素进行提炼分析，评价其康复效果；通过对 ICF 为框架活动与参与因素和环境因素助视器具的跟踪和评价。因此，基于 ICF 框架的视功能障碍分类统一和标准化，既方便推广，又和国际接轨，将广泛应用于视障康复。

LT-2

玻切青光眼阀植入术后白内障手术

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男性，60 岁，以“外伤后视物不清 1 年”为主诉入院。外伤后先后行外伤性视网膜脱离复位玻璃体切割术，继发性青光眼青光眼阀植入术。专科检食：右眼视力：0．12，矫正无效，眼压：14mmHg。晶体混，眼底视盘界清色淡，黄斑中心凹反光末星，可见激光斑、 网膜平复。
诊疗经过：表麻下行右眼飞秒激光辅助 Phaco＋区域折射人工晶体植入术，
术后第一天：右眼视力远：0．5，中：0．3，近：0．3，眼压：19mmhg

LT-3

不规则散光病人三焦点植入术

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女性，66 岁，以“视物不清 1 年”为主诉入院。专科检食：右眼视力：0．12，矫正无效，眼压：14mmHg。晶体混。角膜局限不规则散光大于 1.0D。
诊疗经过：表麻下行右眼飞秒激光辅助 Phaco＋三焦点人工晶体植入术。切口位于散光处
至随访一个月：右眼散光小于 1.0D。视力远：1.0，中：0．8，近：0．8，眼压：14mmhg

LT-4

SMILE 手术是否引起眼底改变？

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目的：介绍一例 SMILE 术后视神经水肿的案例
方法：患者年轻男性，欲行双眼近视手术来院。专科检查：右眼裸眼视力 0.08，矫正视力：-5.DS/-1.25DC×170→1.0；左眼裸眼视力 0.1，矫正视力：-6.75DS→1.0。双眼前节（-），眼底：双眼呈豹纹状眼底改变。
结果：诊断为双眼屈光不正，行双眼 SMILE。术后第 1 天视力：右眼 0.4、左眼 0.6。术后第 1 周：右眼视力 0.5，矫正 0.5^{+}，眼压 17.3mmHg；左眼视力 0.5，矫正 0.5^{+}，眼压 20.7mmHg。双眼角膜轻度水肿，予以降眼压抗炎治疗。术后第 2 周：右眼视力 0.6，验光：+0.75DS/-0.50DC×65→0.6^{+}，眼压 10.5mmHg；左眼视力 0.6^{-}，验光：-0.25DS/-0.50DC×100→0.6，眼压 12.9mmHg。双眼角膜轻度水肿，眼底无明显异常，停用降眼压药物及激素。术后 1 月：右眼视力 0.1，验光：-1.50DS/-0.75DC×105→0.3，眼压 22.9mmHg；左眼视力 0.1，验光：-2.25DS/-1.00DC×95→0.3，眼压 24.9mmHg。双眼前节（-），眼底（-），局部加用降眼压治疗后：右眼视力 0.6，矫正 0.7；左眼视力 0.3，矫正 0.7；眼压正常。眼底镜检查无明显异常，行眼底血管造影（FFA）示双眼造影晚期视盘荧光稍增强，右眼边界清、左眼边界稍模糊。术后 1 月 10 天：视力：右眼 1.0、左眼 0.8，眼压正常，双眼角膜透明，眼底无明显异常，FFA 示无异常。
讨论：SMILE 术中负压吸引导致眼内压暂时性升高，影响视网膜、视神经血液循环，导致双眼视盘轻度病变。SMILE 虽然术中吸引环的压力小，引起眼内压的波动小，负压持续时间短，但仍有影响视盘、视神经的可能，临床工作中需注意。

LT-5

我国眼科资源配置现况分析

买尔哈巴·米吉提,丁琳
新疆自治区人民医院

能够顺利完成防盲治盲和眼保健任务的重要前提是眼科资源的合理配置。虽然我国已经完善了省、市、县三级复明中心工作网络体系，但是由于受地域分布、经济发展、受教育程度的不平衡性,我国眼科资源的不公平性限制了我国防盲治盲工作的顺利开展。因此，有必要对我国眼科医疗机构的分布、眼科卫生人力、眼科设备以及白内障手术开展情况等方面进行综述，以便进一步整合和优化眼科资源，促进我国防盲治盲工作的进展。

LT-6

高眼压下行白内障超声乳化术治疗闭角型青光眼一例

王伟
达拉特旗朝聚眼科医院

患者 女性 74 岁 2018-8-7 主因“右眼胀痛，视物模糊，伴同侧头痛 1 天”就诊于外院诊断为“头痛”给予银杏叶、甘露醇静脉滴注，症状有所缓减，但眼部症状未缓解，今为进一步诊治就诊于我院，门诊以“双眼闭角型青光眼”收入院。既往体健、否认高血压、糖尿病等全身疾病、否认过敏史。眼科检查： 视力 右眼 远 手动/眼前，近 J7 窥不见，光感 红=红、绿≠绿、光定位正常、 眼压 66mmHg ， 眼睑轻度痉挛，球结膜混合充血（++） ，全角膜雾状水肿、上皮小泡样改变，KP(-), 前房轴深约 1/2CT,周边深度<1/5CT，房闪窥不清，虹膜纹理欠清，全周虹膜膨隆，瞳孔圆，直径约 5mm，对光反射消失，隐见晶状体震颤，晶状体呈棕色混浊，玻璃体、眼底窥不入；左眼 远 0.25 近 J1，光感 红=红 绿=绿 光定位正常，眼压 30mmHg ，球结膜无充血，角膜透明、KP(-), 前房轴深约 1CT,周边深度约 1/4CT，房闪（—）,虹膜纹理清，全周虹膜膨隆，瞳孔圆，直径约

3mm，对光反射稍迟钝，晶状体混浊，呈棕色约IV级，未见晶状体震颤，玻璃体眼底窥不入。诊断：1.双眼闭角型青光眼 (右眼急性发作期 左眼临床前期性期）2.双眼老年性白内障 3.右眼晶状体半脱位？