



# 2019

## 第21届中国南方国际心血管病学术会议

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## 第21届中国南方国际心血管病 学术会议论文摘要汇编

THE ABSTRACT OF THESIS OF THE 21<sup>ST</sup> SOUTH  
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## 导管消融术在左心室顶部心律失常的应用

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左心室顶部顾名思义,位居左心室外膜之最高点,座落在前室间沟和左心室出口近主动脉区之上,此一三角区域正好位于冠状动脉左前降支和左回旋支近端分叉处,并进一步由大心静脉分隔出二个部分:其一于内上方靠近三角区域的顶点处,因为是接近冠状动脉主干且有外膜脂肪故又称作“不易接近区域”;另外较为外侧三角之底部处则是称作为“容易接近区域”。而顶部在心外膜位置的下方则是介在左心室出口基底处接近心室中膈和左冠状动脉瓣。这附近所发出的心律失常可以来自左心室顶部、顶部下心内膜区或者左冠状动脉瓣,甚至于左前降冠状动脉中膈分支和前室间静脉中膈源头等皆为定位与消融路径之所在。

这里的心律异常十二导程心电图通常以右束支传导阻滞型态表现,但也有些是左束支传导阻滞;主要心轴向下,第三导程的R波相较于第二导程来的高大;另外源自于心外膜,胸前导程最早的转折(伪三角波) $\geq 34$ 毫秒,胸前V2导程起始至R波间隔(本体转折时间) $\geq 85$ 毫秒,QRS起始至正转或负转间隔最短(最大转折指数) $\geq 0.55$ ,胸前导程起始至最早QRS波谷处(最短RS复合体) $\geq 121$ 毫秒。而R波的型态在胸前V2导程是个分水岭,比V1和V3更小意味着接近于前室间沟包括左前降冠脉和前室间静脉。

在消融治疗策略上的选择,有经皮心外膜进入方式、外科冷冻消融、内视镜机器人手臂心外膜消融术、以及逆行性经冠状窦静脉酒精注射或射频消融术。

一位47岁男性主诉间歇性心悸和头晕数月,曾有冠心病接受过心导管治疗,在24小时连续性

心电图监测下发现心室期前收缩高达超过40000支每天,体表心电图表现为左束支传导阻滞,心轴向下,胸前导程R波以V2为分界,伪三角波长44毫秒,本体转折时间56毫秒,最大转折指数0.7,最短RS复合体140毫秒;心脏核磁共振延迟含钆造影多处阳性反应,心脏超音波左心室射出分率为47%。透过导管做多处电位激活标志定位包含冠状静脉窦、右心出口中膈区域、左冠状动脉瓣等皆有早期诱发讯号,在尝试多处消融术后仍有复发的情形下,我们将目标透过逆行性冠状静脉系统直指左心室顶部区域,在成功消融术后追踪病人24小时连续性心电图监测只剩下1219支心室期前收缩,大幅减少了心律失常且解除了病人相关症状。

左心室顶部是常见自发性心室心律失常的来源之一,且此处使用导管消融术具有高度挑战性与高风险性,往往须藉助体表心电图与导管多处电位激活标志定位来判定,而无论是酒精注射或者导管电烧消融术,也要留意因顶部靠近冠状动脉主干以及经冠状静脉分支路径狭窄等潜在的问题和风险。

## 儿童肥厚型心肌病诊断的专家共识解读

李自普

肥厚型心肌病(Hypertrophic cardiomyopathy, HCM)是儿童常见的遗传性心血管疾病,是儿童及青壮年心脏性猝死的最重要原因之一。迄今为止尚未有儿童肥厚型心肌病的诊断和治疗建议、共识或指南。2018年9月在西安召开的中华医学会儿科分会心血管学组儿童心肌病精准诊治协作组会议上,拟定了“儿童肥厚型心肌病诊断的专家共识”。

目前我国小儿心肌病分类的建议将儿童肥厚型心肌病分为原发性和继发性两种。儿童HCM的病因方面,约50%~60%于青春期或青壮年发病的HCM以肌小节蛋白基因突变为,主要是常染色体显性遗传,余为非肌小节蛋白基因突变引起,亦有少数常染色体隐性遗传。1岁以下HCM婴儿,50%为特发性。

ACC/AHA和ESC指南中儿童HCM的诊断标准是左心室壁厚度增加超过同年龄、同性别和同体表面积儿童左心室壁厚度平均值加2个标准差(即Z值>2),并除外负荷增加。

目前儿童HCM的诊断方法包括以下方面:(1)HCM患儿心电图变化出现较早,可先于临床症状,对疑似病例都应行常规12导联心电图或动态心电图检查。(2)HCM患儿X线胸片可见左心室增大,但亦可在正常范围;肺部常有肺部瘀血,但严重肺水肿少见。(3)超声心动图是诊断HCM的金标准之一。由于不同年龄小儿超声心动图的测定值变化较大,相同年龄小儿受遗传、种族、性别、身高、体重、生长速度、生活习惯和疾病等影响也存在差异。国内尚缺乏小儿超声心动图定量分析指南或共识,缺乏适合国情的、权威的小儿超声心动图测量指标Z值计算方法。(4)心脏磁共振成像在儿童与成人间不同,影响了心脏核磁共振成像在儿童HCM中的应用。(5)心导管和造影检查等也是HCM诊断的方法。儿科HCM临床诊断需心血管、代谢、神经、遗传等多学科专家的共同参与。以下是本次拟定的儿童HCM病因诊断流程图。

遗传学检测和遗传咨询的建议:(1)遗传学检测基因诊断对于遗传性/家族性HCM有明确的诊断价值。家系研究是HCM致病基因研究的另一个新的挑战和机遇。对有遗传风险的儿童HCM患者的直系亲属和其家庭成员进行评估是儿童HCM管理的重要组成部分。(2)遗传咨询应在专门从事遗传性心肌病的中心进行,应由训练有素的多学科医生实施,应充分考虑患者的自愿性、保密性和心理社会伤害等问题,尤其需仔细考虑在幼儿中行预测性基因检测是否适当的问题。

由于儿童HCM的病因与成人明显不同,本共识目的是为儿童HCM的诊断提供一个简单、可行的思路,尤其是儿童HCM的遗传学检测方面,尚需要进一步累积临床和实验室资料。

## 法洛氏四重症患者的心肺运动功能测试

花玉娟

人体的心脏血管系统在运动时(特别是从事渐进性的有氧运动时)会有下列反应:心跳加速、心搏输出量增加、心输出量增加、周边动脉扩张、以及收缩压上升的现象。这些反应过程中一定会增加心脏的负担,但对心脏而言其实是一种“训练”,长期下来有助于提升生理与心理的健康。

运动的好处大家都知道,可是有先天性心脏病的孩子很可能从小就不太被鼓励做运动,长大之后即使自己想运动、却也可能不知道该选择什么样的运动。家长与患者最担心的,不外乎这三个问题:(1)先天性心脏病患者的体力是不是都比较差?(2)先天性心脏病患者做运动时是不是会增加猝死的风险?(3)先天性心脏病患者要如何选择运动的种类和强度?

以最常见的发展性先天性心脏病——法洛氏四重症为例,医学照护的进展已经让法洛氏四重症的开刀成功率到达98%以上。临床上也真的观察到有些患者术后能够恢复到与正常人的体能近乎相同的程度。然而,受限于一些术后常见的并发症以及患者本身的因素,包括较晚接受矫正手术、肺动脉逆流、右心室肌肉质量较低、以及局部心室异常与纤维化等诸多因素,不论是国外的资料或是台大的研究,这群患者的体能平均值(最大摄氧量)还是落在健康者预测值的60~70%。然而,即使体能较差,并不代表就不能做运动。对法洛氏四重症患者而言,只要排除有冠状动脉异常、或是具有高度危险的心室心律不整症候群,绝大

多数的患者是不会因运动而增加猝死风险的。若刚开始不知道该做什么运动时,大原则就是选择动态运动成分较高、等长运动成分较低的运动。除了大原则,个人化的建议则可以更精确的知道适合每个人的运动建议。

心肺运动测试对于法洛氏四重症而言,具有评估治疗效果、预测疾病预后、乃至给予个人的量化的体能及运动风险评估。近十几年来,有越来越多重度肺动脉逆流的患者需要接受肺动脉瓣置换。肺动脉瓣置换对于这群患者而言,的确可以有效地改善右心室扩大的情况。然而,国内外的研究都指出,术后对于运动功能的改善,却没有一定的效果。很多患者仍旧照着原本的自然病程逐渐出现体能下滑的状况。或许这样的结果反映出肺动脉瓣置换的黄金时机已错过。有鉴于此,台大儿童医院的临床追踪上,会针对这群患者安排例行的影像追踪(特别是心脏核磁共振),而心肺运动测试原则上是每3年追踪一次,期能透过多方位定期的评估,让患者在最适当的时机接受进一步的介入性治疗,期能改善患者长期的心肺功能,并且进一步提升生活质量。透过正确的运动观念以及完整的运动评估,不但能获得运动带来的好处,并且避免不当运动可能带来的风险。除此之外,未来我们更希望能发展运动复健,让这群患者透过运动训练,维持更好的心脏功能,甚至在换过瓣膜后持续训练复健,或许还能让加成瓣膜置换所带来的帮助。

## 急性心衰的病因、诱因、诊断及评估

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急性心衰是由多种病因引起的急性临床综合征,心衰症状和体征迅速发生或急性加重,伴有血浆利钠肽水平升高,常危及生命,需要立即进行医疗干预。根据《2018中国心力衰竭诊断和治

疗指南》对急性心衰的病因、诱因、诊断及评估推荐如下:

### 一、急性心衰的病因和诱因

对于急性心衰患者,应积极查找病因和诱因。新发心衰的常见病因为急性心肌坏死和/或损伤和急性血流动力学障碍。慢性心衰急性失代偿常有一个或多个诱因,如血压显着升高、急性冠状动脉综合征、心律失常、感染、治疗依从性差、急性肺栓塞、肾功能恶化、药物等。

### 二、急性心衰的诊断和评估

应根据基础心血管疾病、诱因、临床表现以及各种检查(心电图、胸片、超声心动图、利钠肽)作出急性心衰的诊断,并做评估严重程度、分型和预后。

#### (一)临床表现

急性心衰的临床表现是以肺淤血、体循环淤血以及组织器官低灌注为特征的各种症状及体征。

1. 病史、症状及体征:大多数患者既往有心血管疾病及心血管病危险因素。呼吸困难是最主要的表现。查体可发现心脏增大、舒张早期或中期奔马律、 $P_2$ 亢进、肺部湿啰音、干啰音、体循环淤血体征。

2. 急性肺水肿。

3. 心源性休克:在血容量充足的情况下存在低血压(收缩压 $<90$  mmHg),伴有组织低灌注的表现[(少尿 $<0.5$  ml $\cdot$ kg $^{-1}\cdot$ h $^{-1}$ )、四肢湿冷、意识状态改变、血乳酸 $>2$  mmol/L,代谢性酸中毒(pH $<7.35$ )]。

#### (二)急性心衰的初始评估

##### 1. 院前急救阶段

尽早进行无创监测,包括经皮动脉血氧饱和度( $SpO_2$ )、血压,呼吸及连续心电监测。若 $SpO_2$  $<90\%$ ,给予常规氧疗。呼吸窘迫者可给予无创通气。根据血压和/或淤血程度决定应用血管扩张剂和/或利尿剂。尽快转运至最近的大中型医院。

##### 2. 急诊室阶段

到达急诊科时,应及时启动查体、检查和治疗。应尽快明确循环呼吸是否稳定,必要时进行循环和/或呼吸支持。迅速识别出需要紧急处理的临床情况,如急性冠状动脉综合征、高血压急症、



严重心律失常、心脏急性机械并发症、急性肺栓塞,尽早给予相应处理。

### (三)辅助检查

1. 所有患者均需急查心电图、利钠肽水平、肌钙蛋白、尿素氮(或尿素)、肌酐、电解质、血糖、全血细胞计数、肝功能检查、促甲状腺激素、D-二聚体、胸片(I,C)。利钠肽有助于急性心衰诊断和鉴别诊断(I,A)。所有急性呼吸困难和疑诊急性心衰患者均推荐检测血浆利钠肽水平(详见心衰的诊断和评估中生物标志物部分)。血清中cTn水平可持续升高,为急性心衰的危险分层提供信息,有助于评估其严重程度和预后。怀疑并存感染的患者,可检测降钙素原水平指导抗生素治疗。

2. 超声心动图和肺部超声:对于血流动力学不稳定的急性心衰患者,推荐立即进行超声心动图检查;对心脏结构和功能不明或临床怀疑自既往检查以来可能有变化的患者,推荐在48 h内进行超声心动图检查(I,C)。床旁胸部超声检查可发现肺间质水肿的征象。

3. 动脉血气分析:血气分析视临床情况而定,不能通过指脉氧仪监测氧合情况,需要明确酸碱状态、CO<sub>2</sub>分压情况时可进行检测,尤其是伴有急性肺水肿或有慢性阻塞性肺疾病(COPD)者。心源性休克患者应行动脉血气分析(IIa,C)。

### (四)监测

1. 无创监测:急性心衰患者需要严密监测血压、心率、心律、呼吸频率、SpO<sub>2</sub>(I,C),监测出入量及每日体重(I,C),每日评估心衰症状和体征变化(I,C)。出院前可检测利钠肽水平以评估预后。

2. 血流动力学监测:血流动力学监测分为无创性和有创性两类。有创性血流动力学监测包括动脉内血压监测、肺动脉导管、脉搏波指示连续心排量(pulse indicator continuous cardiac output, PiCCO)等,主要适用于血流动力学状态不稳定,病情严重且治疗效果不理想的患者。

### (五)急性心衰的分型和分级

根据是否存在淤血和外周组织低灌注情况的临床表现,可将急性心衰患者分为4型:“干暖”、“干冷”、“湿暖”和“湿冷”。大多数急性心衰患者表现为收缩压正常或升高(>140 mmHg,高血压性

急性心衰),只有少数(约5%~8%)表现为收缩压低(<90 mmHg,低血压性急性心衰)。低血压性急性心衰患者预后差,尤其是同时存在低灌注时。急性心肌梗死出现急性心衰时可应用Killip分级,因其与患者的近期病死率相关。

## 困难性股动脉完全阻塞

王大荣

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股动脉完全阻塞一直以来都是血管介入治疗的一个难题,但随着介入治疗仪器的进步,这类型的病兆的成功率已慢慢提升,今天要为大家的案例是一个严重钙化的股动脉完全阻塞。从血管摄影上我们可以看到,病患的股动脉从中段就完全阻塞,到才恢复血流。除此之外我们可以看到,患者的病灶钙化的很厉害,不管事导丝、微导管还是球囊都很难穿过该病兆。因此我们选用多管鞘的治疗策略为患者治疗,首先我们在对侧的股动脉安装第一个管鞘,利用开鞘来进行血管摄影。第二支管鞘安装在病灶侧的股动脉,以之进行顺行性的治疗。第三支管鞘安装在病兆侧的后胫动脉,以之进行逆行性的治疗。在经过一连串的穿刺后,顺行和逆行的导丝已经可以在病灶内交会,但是因为病兆太硬,所以球囊和微导管皆无法传送到病灶内进行球囊卡特处理(CART technique)。因此我们在病灶内再放入一个管鞘,利用推穿处理(Pull-through technique),先将后段的完全阻塞打通。接这利用卡特处理(CART technique)将顺行的导丝送至后胫动脉。并利用先前建立的推穿系统,将球囊穿过病灶进行扩张。最后为病患安装4之覆盖支架,同时为病患止血和维持血流,完成这个复杂的病灶。

多管鞘策略和推穿技巧可以很有效地克服严重的钙化病灶,多管鞘策略可以帮助我们了解正个病兆的型态,同时可以使降低导丝回到血管真腔的难度。推穿技巧可以帮我们增加系统的支撑力,使我们能够顺利地将球囊送到病兆中进行扩

张。但是这种治疗策略不好止血,所以最好能利用覆盖支架来维持血流,也可减少止血所需的时间。

## 胎儿结构心脏病宫内干预思考

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2012年中华人民共和国卫计委公布《中国出生缺陷防治报告》显示胎儿先天性心脏病已成为我国最主要的出生缺陷类型,占新生儿非感染性疾病死亡的首位。随着超声设备和技术的不断进步,90%~95%的先心病可以在产前获得早期诊断,部分复杂先心病检出率也明显提高。复杂严重先心病给家庭和社会带来沉重的精神和经济负担,但终止妊娠是否是胎儿复杂心脏畸形最佳选择,值得我们思考。

对于右心发育不良等严重先心病,如胎儿期给予恰当干预,可在一定程度及早中断疾病进展,避免心衰引起的胎儿水肿、宫内死亡或自发流产,无疑对降低新生儿死亡率、满足社会医疗需求发挥巨大推动作用。1991年Maxwell等报道首例经皮胎儿球囊主动脉瓣成形术(FAV)以来,国外超声引导下经皮胎儿心脏介入治疗临床研究工作正积极发展,主要在以下三种疾病:室间隔完整的肺动脉闭锁(PA/IVS)伴右心发育不良综合征(HRHS)、严重主动脉瓣狭窄(AS)伴左心发育不良综合征(HLHS)和HLHS伴完整(或高度限制性)房间隔缺损(IAS/RAS)中可能受益,治疗效果已得到美国心脏病协会认可。近几年来国内也逐步开展相关技术,并取得一系列突破性进展。

与国外不同的是,AS-HLHS和HLHS-IAS/RAS国内发病率低,且生后预后不佳,根据卫计委出生缺陷综合防治方案建议终止妊娠。目前PA/IVS-HRHS是国内FCI主要防治病种。对于该疾病需借助胎儿超声心动图明确诊断,判断右心发育不良严重程度,决定进一步干预治疗方案:终止妊娠、生后救治、宫内治疗。FCI治疗对胎儿及孕妇存在潜在风险,目前资料显示部分轻中度右心

发育不良胎儿生后可通过介入治疗、外科手术等措施实现双心室循环,对于这部分胎儿积极FCI治疗是否适合值得思考。PA/IVS胎儿宫内介入治疗需要把握合适的适应症,我们将探讨FCI干预的超声评估指征,介绍我中心手术操作经验及并发症处置。与国外资料一致,我中心数据资料显示FPV治疗对PA/IVS胎儿右心室发育、功能指标均明显改善:10例胎儿随访2周超声心动图示胎儿TV/MV、RV/LV、PA/AV及TID/CC由术前0.81、0.56、0.69、0.35升至0.92、0.83、0.98、0.45,差异存在统计学意义( $P<0.05$ ),三尖瓣反流速度(TR)由术前3.9 m/s降至3.2 m/s,差异存在统计学意义( $P<0.05$ )。目前已出生3例胎儿,均足月剖宫产娩出,1例生后行经皮肺动脉瓣成形术及动脉导管支架置入术,随访4月SpO<sub>2</sub> 98%,最近一次随访三尖瓣Z值-1.3。2例生后监测血氧饱和度95%以上,跨肺动脉瓣压力梯度分别为55 mmHg、52 mmHg,三尖瓣Z值分别为-2.0、-2.3,动脉导管持续开放,实现双心室循环。

若先心病胎儿伴有遗传综合征,FCI术后仍不能获得正常生活质量,同期遗传学筛查不可或缺。复习国内外资料,选择准确有效的细胞、分子生物学技术及合适时机对先心病胎儿进行产前遗传学诊断可最大程度避免遗传性先心病胎儿出生,对于提高人口质量具有重大现实意义。染色体非整倍体是最早被确认的胎儿先心病致病原因之一,染色体核型分析是诊断染色体数目和结构异常的遗传学检查技术,但检测周期长、分辨率低。荧光原位杂交技术是检测微缺失、微重复的金标准,但FISH每次只能检测有限的预先选定的区域,实验操作过程繁琐,且价格昂贵,临床应用受限。染色体微阵列分析(CMA)具有高通量和高敏感性等优势,目前已广泛应用于复杂性先心病研究中,2013年美国妇产科学医师协会提议为CHD胎儿首选检测方法,但CMA通量具有一定的限制,只能对已知位点进行检测分析。无创DNA检测对胎儿染色体非整倍体异常检出率近100%,但无法准确检测染色体结构异常。任何一项检查各有利弊并不能全面评估遗传信息,需互相搭配完成CHD胎儿遗传筛查。

# 心科护士于急性心肌梗塞临床路径之角色功能

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质量改善,已然成为医疗界之趋势,澳门也不例外。仁伯爵综合医院于2012年10月通过澳洲医疗服务标准委员会(ACHS)评审并获得认证;因应ACHS专家之建议,于2016年7月接受ACHS再认证时,推出《医院关键绩效指标管理政策》,同年10月开始执行“急性心肌梗塞临床路径AMI clinical pathway”,设立绿色通道,协助AMI病人于关键时刻获得实时、完整、安全良好的医疗处置。心科护士于AMI clinical pathway 发挥多种

角色功能。

因应AMI clinical pathway之实施,心科护士专注于急性心肌梗塞临床路径之关键质效指针(KPI),精确记录个案之Timing data,系统地对数据进行统计、分析流程可改善之每一环节,定期回顾审核、提供改进之量化指标与改善成效之比较;将做得好的、正面的信息回馈给同事作为支持鼓励,甚至与病人、家人、社会分享,有助增加其对医疗之信心及医患关系之改善。

非与药物治疗相关之KPI,其测量可以每一项目之Elapsed time来代表。经统计,2018年CCU共收治AMI病人82例,其中STEMI-ACS 65例,进行Fibrinolytic therapy 9例、Primary percutaneous coronary intervention (PPCI) 76例。各Timing见下表:

Items	Actual time (Elapsed time)
Time of ECG done	1 - 84 min (Mean: 8.57)
Time of calling Cardiologist	1 - 180 min (Mean: 33.95)
Time of Aspirin given	1 - 182 min (Mean: 30.31)
Time of transfer to CCU	17 - 240 min (Mean: 90.09)
Time of PCI (Door - to - balloon time)	21 - 240 min (Mean: 83.22)
Time of Thrombolysis (Door - to - needle time)	23 - 343 min (Mean: 91.78)

## 减少院内延误时间

院内延误时间直接与医护质量相关,反映医院的整体素质。AMI发病急、病情重,病死率高,且其死亡50%发生在发病后最初的1小时之内;其短期和长期预后及其生活质量与病人是否得到及时、适当的处理有着密切关系,可以说「时间就是心肌」,心肌再灌注的效果具高度时间依赖性。AMI的急救是与时间赛跑,从病人求诊那一刻开始,医护人员分分秒秒在跟时间作战,如何让病人能达“Time of Thrombolysis (Door- to- needle time) < 60 min”,“Time of PCI (Door- to- balloon time) < 90 min”之目标时间,团队的合作是关键,良好的沟通是成功的基石,由是,心科护士不定期对同事开展一些ECG判读技巧课程,尤其针对不同部位急性心梗之ECG快速判读;并组织主导每年团队各层级人员一起进行急性心梗病人之临床抢救演练。

## 进行第一期之心脏复健运动

鉴于澳门尚未有跨专业团队之心脏复健部门,心科护士在现有资源下,利用床边/遥测心电监护仪,透过心绞痛指数、费力指数、气喘指数等一系列实证科学工具,为住院病人进行第一期之心脏复健运动,并辅以转变健康生活模式之促进教育,为他们康复回归家庭社会作好身心准备。

## 授人以鱼,不如授之以渔

心科护士走入小区,对民众推行一些纠正不良健康行为、建立健康生活模式之活动,以从源头减少民众冠心病之危险因素。如灌输民众「多喝水、少盐、少糖、少油脂、多蔬菜、全谷」的均衡营养、健康饮食之理念,推动民众积极进行运动、并持之以恒;教导民众预防、自行监测、控制三高:血压、血糖、血脂。

Items	Total time lapsed		
	minimal time	maximal Time	Mean Time
Time of symptoms onset	18	4320	436
Time of arrival			
Time of PCI (Door-to-balloon time)	60	9751	668.71
Time of Thrombolysis (Door-to-needle time)	55	343	156.56

注: \* $P<0.05$ , \*\* $P<0.01$ , \*\*\* $P<0.001$

### 研究院前延误因素

推行 AMI clinical pathway 以来,经统计,病人由症状发作至到院求诊之时间、以及由症状发作至以溶栓药物或球囊/支架开通冠状动脉之时间见下表,较邻近地区高,如香港病人由症状发作至到院求诊之时间平均约为3小时。

孟子曰:“是不为也,非不能也”。虽院前延误时间因素为医护人员所难以控制,然心科护士藉此为契机,将病人之院前延误时间与其社会人口学数据、疾病史、发作时之症状等因素进行比较分析,发现病人之院前延误时间与其发作时之症状有较强之相关性( $P<0.01$ ),具体如下:

factors	min	max	mean	Delay time(min)	P-value
Age(years)	32	88	60.86	436	0.049**
Medical history DM		yes		216	0.054*
		no		117	
Acute symptoms		typical		52	0.007**
		atypical		298	

### 减少院前延误时间

针对研究结果,心科护士推动市民参与一些讲座,提高市民心血管疾病的预防保健知识及对心梗严重性的认识,教导民众及时知觉先兆症状、及早就诊之重要性;灌输民众认识若目睹旁人失去意识,实时对其行使“自动体外心脏除颤器 Automated External Defibrillator, AED”及进行 CPR 之重要性;最终理想是推动民众能自如地使用 AED 及进行 CPR 之技巧;另思考如何更完善院前急救系统,俾能将 AMI 病人快速、安全、及时地运送至医院接受治疗。

由于“预后差、易反复、死亡率高、医疗花费高”等特点,被比喻作希腊神话中的九头蛇,足见它的凶狠。患者在一次次的接受依赖被抽离,希望被破灭,等待被断绝,未来被扼制的痛苦中。反复的发病,多次住院严重影响着患者的生活质量,甚至对患者家庭幸福也会产生巨大影响。许多患者出现抑郁、焦虑等心理问题,这些心理障碍又反过来加重心力衰竭的病情,增加心衰患者的不良事件发生,影响心力衰竭的预后。因此,应该倍加关注心力衰竭患者的心理问题。

#### 一、心衰患者合并心理障碍的表现

(一)患者出现与体征及检查检验不相符合的呼吸困难,胸闷、腹胀、乏力等症状,多次反复就诊,对利尿剂等常规心衰治疗效果不佳。

(二)急性发作时生不如死,症状缓解后恐惧死亡。

(三)患者心境低落,食欲下降,少语懒言意志消沉。

(四)患者情绪激动,惊恐易怒,坐立不安。

## 心力衰竭患者的双心管理

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心力衰竭作为各类心血管疾病的晚期阶段,

(五)睡眠障碍,如失眠、早醒,或睡眠过多。

## 二、心力衰竭患者心理障碍的原因

(一)疾病原因:

(二)患者原因:

(三)社会原因:

(四)医疗模式原因:

## 三、心脏重症患者心理障碍对机体的影响

焦虑等心理障碍会使交感神经张力增加,心率增快,血压升高,神经内分泌激活,诱发急性心力衰竭,或者使心力衰竭难以纠正。

## 四、心力衰竭中心理障碍的识别

(一)首先对心力衰竭进行规范的诊断评估

心力衰竭患者伴发心理障碍的识别固然重要,但是对心力衰竭评估更加重要。这是对心内科医师基本功的考虑,也是诊断疾病的基本思路,切不可本末倒置,延误疾病治疗。

(二)筛查心力衰竭中的心理障碍患者

采用简短的三问法,初步筛出可能有问题的患者。

(三)心理量表测试

中国康复学会心血管病专业委员会 中国老年学学会心脑血管病专业委员会发布的《在心血管科就诊患者的心理处方中国专家共识》推荐了《躯体化症状自评量表》、《患者健康问卷-9项(PHQ-9)》、《广泛焦虑问卷7项(GAD-7)》、《综合医院焦虑抑郁量表(HAD)》等,可用于初学者及非心理专业评估。

## 五、心力衰竭患者的心理障碍预防及管理

(一)心力衰竭的恰当处理

(二)去除心理障碍的影响因素

(三)高效的心理治疗

1. 了解患者心结:

2. 倾听患者的内心感受与患者良好沟通

3. 寻找正性资源:

4. 鼓励患者战胜疾病。

5. 为患者简要讲解心衰的医学知识,使其疾病有新的认识,增强信心。

## 六、配合运动康复

研究证实了慢性心衰运动康复的安全性和有效性,其可降低慢性心衰患者的病死率和再住院

率,改善患者运动耐量和生活质量,合理控制医疗成本。应推荐心衰患者进行有规律的有氧运动,以改善症状、提高活动耐量。

## 七、抗精神病药物的应用

有安全性证据用于心血管病患者的抗抑郁焦虑药物包括以下几种:①选择性5-羟色胺再摄取抑制剂(SSRI):如氟西汀、帕罗西汀、舍曲林、西酞普兰等。②苯二氮卓类:如地西泮(安定)、劳拉西泮(罗拉)、艾司唑仑(舒乐安定)用于焦虑症和失眠的治疗。③氟哌噻吨美利曲辛(黛力新):该药是一个复合制剂,含有神经松弛剂(氟哌噻吨)和抗抑郁剂(美利曲辛),其中美利曲辛含量为单剂量的1/10~1/5。适用于轻中度焦虑抑郁症、躯体形式障碍患者。

## 抗精神药物应用中的注意事项

①诊断要确切,避免无谓的副作用。②根据患者的症状特点、年龄、躯体状况、药物的耐受性、有无合并症,经济状况个体化用药;用药期间严密观察患者的反应随时增减药物用量,或者换药。③剂量逐步递增,采用最低有效量,使不良反应降到最低,告知患者可能出现的副作用,提高治疗的依从性。④一般药物治疗在2周左右开始起效,给患者做好解释工作,要有耐心,治疗的有效率与时间呈线性关系,如果足量治疗6-8周无效,考虑换药。与患者有效的沟通治疗的方法、药物的性质、作用、可能的不良反应及对策,增加患者治疗的依从性。

# 心源性休克的监测及治疗

孙志军

## 1. 心源性休克的定义

心源性休克(Cardiogenic shock, CS)是指心脏原因引起的心输出量显著下降,导致组织低灌注从而发生临床和生化改变的一种状态。

## 2. 心源性休克的临床诊断标准

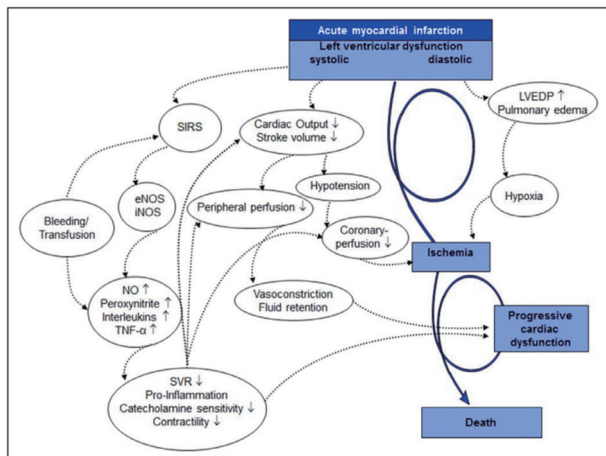
SHOCK 试验*	IABP-SHOCKII+	ESC 心衰指南
<b>临床标准:</b> SBP<90 mmHg 持续≥30 min 或支持治疗下 SBP≥90 mmHg  且终末器官灌注不足(尿量)<30 mL/h 或肢端冷)  <b>血液动力学标准:</b> CI≤2.2 L·min <sup>-1</sup> ·m <sup>-2</sup> 且 PCWP≥15 mmHg	<b>临床标准:</b> SBP<90 mmHg 持续≥30 min 或儿茶酚胺维持 SBP>90 mmHg  且存在临床肺充血和终末器官灌注不足(精神状态改变,皮肤和肢端冷而粘湿、尿量<30 mL/h 或乳酸>2.0 mmol/L)	SBP<90 mmHg,且存在充分的组织灌注不足的临床或实验室指征  临床:冷肢,少尿,精神错乱,眩晕,脉压减小  实验室:代谢性酸中毒,血清乳酸升高,肌酐升高

备注:SPB,收缩压; CI,以及指数; PCWP,肺毛细血管楔压; SVRI,全身血管阻力指数; \*,心梗伴左室功能障碍; +, 心肌梗死

### 3. 心源性休克的发病机制

经典的范式理论认为心源性休克是螺旋发展,进行性恶化的恶性循环。心肌梗死导致心肌功能障碍,使心脏出现收缩功能不全和舒张功能不全。收缩功能不全是心脏搏出量下降,系统的灌注下降,外周血管代偿性收缩维持血压。外周血管收缩使后负荷增加,进一步影响心功能,心功能恶化导致死亡。搏出量下降,血压下降,冠脉灌注压下降,使心肌缺血进一步加重,心功能受损加重。受损的心功能使搏出量进一步下降,冠脉血流减少,出现恶性循环。

新的范式认为 AMI 后导致 SIRS, 诱导炎症因子的释放,各种炎症因子如 TNF- $\alpha$ , IL-1 诱导很多细胞表达诱导性一氧化氮合酶(iNOS)。NO 合成增加使血管扩张,降低 SVR。且 NO 能被氧化为衍生物过氧亚硝酸盐,具有细胞毒性。



### 4. 心源性休克的病因

(1) 心肌原因导致的心源性休克主要包括:急性心肌梗死、急性失代偿性心衰、心包切开术后、流出道梗阻、心脏骤停后顿抑、脓毒性休克或 SIRS 时的心肌抑制以及心肌挫伤。其中急性心肌梗死是最重要的病因。(2) 其他:瓣膜原因、电活动原因、心外原因等。

### 5. 心源性休克的临床表现

根据血容量状态和外周循环将心源性休克分为四种类型,其中三分之二的心梗所致心源性休克是湿冷型。

		血容量状态	
		容量性心源性休克	血管舒张性休克 (非心源性休克)
外周循环	典型的心源性休克	(↓CI; ↑SVRI; ↑PCWP)	(↓CI; ↑SVRI; ↔PCWP)
	血管舒张性心源性休克 或 混合型休克	(↓CI; ↓/↔SVRI; ↑PCWP)	(↑CI; ↓SVRI; ↓PCWP)

CI(心脏指数):为反应每分钟心脏搏血的供需关系,正常值约 3~7 L/min/m<sup>2</sup>。PCWP(肺毛细血管楔压):反应肺毛细血管内的压力,通常此压力与左房压基本相等。是左心前负荷的重要指标。正常值:0.80~1.60 kPa(6~12 mmHg)。SVRI(全身血管阻力指数):反映左心室后负荷大小。

a 湿冷型是心源性休克最常见的表现,约占心肌梗死相关心源性休克的 2/3。

b. 干冷型是对利尿剂尚有反应的慢性心衰急性失代偿期患者的常见症状,但 28% 急性心梗相关心源性休克也表现为干冷型。与湿冷型心源性休克相比,干冷型心源性休克通常 PCWP 较低,且既往常无心梗史或慢性肾脏疾病史。

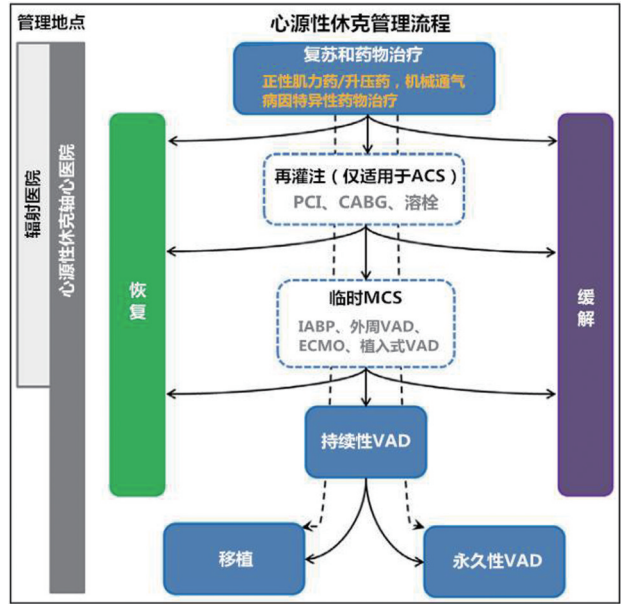
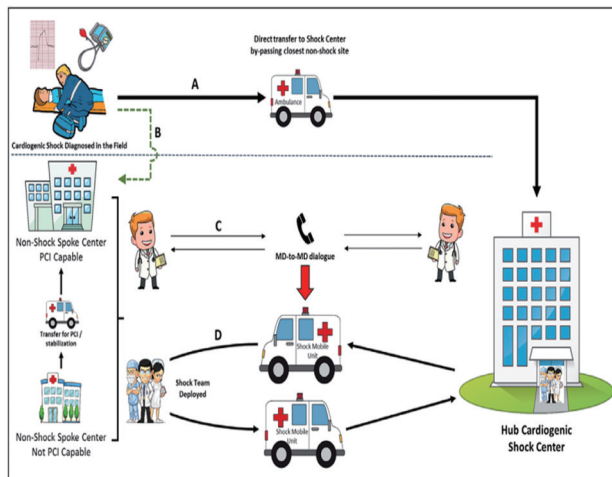
c. 暖湿型可见于心肌梗死后全身炎症反应综合征和血管舒张反应后,此型心源性休克体循环血管阻力较低,脓毒血症和死亡的风险较高。

d. 血压正常型心源性休克尽管 SBP  $\geq 90$  mmHg,但存在外周灌注不足的表现,与血压降低型心源性休克相比,体循环血管阻力显著升高。

e. 右心室梗死型心源性休克占心梗相关心源性休克的 5.3%,其具有较高的中心静脉压。

病因/诱因	处理原则
急性心肌梗死	
> 伴低血压与休克	主动脉内球囊反搏 (IABP) 尽快行冠脉造影检查+血运重建 (溶栓、PCI 或 CABG)
> 并发心脏破裂、严重急性二尖瓣反流等	心外科急诊手术
> 右室梗死	积极补液治疗
急性心包填塞	紧急心包穿刺
严重快速型心律失常	血液动力学不稳定——电复律 血液动力学稳定——抗心律失常药物治疗
严重缓慢型心律失常	药物治疗——阿托品、异丙肾上腺素 辅助装置——临时心脏起搏器
暴发性心肌炎	心脏辅助装置+IABP
心脏瓣膜病	具有手术适应征者可考虑外科急诊手术治疗

### 6. 心源性休克的管理流程



### 7. 心源性休克监测指标

无创监测		
监测, 脉搏血氧测定, 呼吸频率	连续	心律失常、呼吸机障碍和肺水肿发生率高
重症监护室监测	护士患者比例 1:1	血流动力学恶化和多系统器官衰竭发生率高
有创监测		
动脉血压监测	连续	考虑持续监测直到停用血管活性药物后 12-24 h
CVP	连续	输注血管活性药物
中心静脉血氧饱和度和	每 4h	其变化趋势可用来帮助监测心输出量的趋势
尿量	每 1h	尿量和血清肌酐是肾脏灌注和急性肾损伤的标志物
PAC 或非侵入性心输出量监测	选择性应用	对初始治疗无反应的患者或者诊断/治疗存在不确定性的患者可考虑早期使用

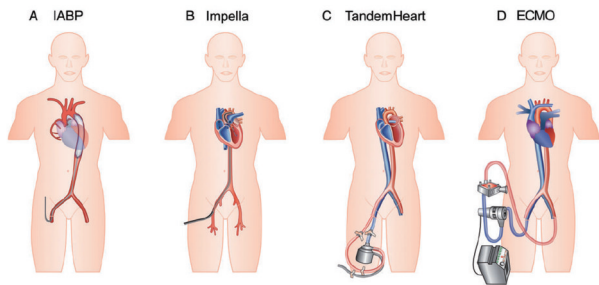
实验室检查		
全血细胞计数	每 12-24 h	CS 合并出血或出血高危患者可更频繁
血清电解质	每 6-12 h	根据肾衰和电解质紊乱存在与否或是否高危调整频率
血清肌酐	每 12-24 h	尿量和血清肌酐是肾脏灌注和急性肾损伤的标志物
肝功能	每日	监测充血性肝病和灌注不足
乳酸	每 1-4 h	乳酸清除是终末器官灌注不足改善的标志物, 清除率低于死亡风险升高相关
凝血	抗凝治疗者每 4-6 h 检测一次直到治疗稳定, 未抗凝者每 24 h 一次	药物清除改变和频繁使用机械支持装置需要进行凝血监测

### 8. 心源性休克的药物治疗

药物	常规输液剂量	结合受体				血流动力学效应
		α1	β1	β2	多巴胺	
升压药/正性肌力药						
多巴胺	0.5-2 μg·kg <sup>-1</sup> ·min <sup>-1</sup>	-	+	-	+++	↑CO
	5-10 μg·kg <sup>-1</sup> ·min <sup>-1</sup>	+	+++	+	++	↑↑CO, ↑SVR
	10-20 μg·kg <sup>-1</sup> ·min <sup>-1</sup>	+++	++	-	++	↑↑SVR, ↑CO
去甲肾上腺素	0.05-0.4 μg·kg <sup>-1</sup> ·min <sup>-1</sup>	++++	++	+	-	↑↑SVR, ↑CO
肾上腺素	0.01-0.5 μg·kg <sup>-1</sup> ·min <sup>-1</sup>	++++	++++	+++	-	↑↑CO, ↑↑SVR
去氧肾上腺素	0.1-10 μg·kg <sup>-1</sup> ·min <sup>-1</sup>	+++	-	-	-	↑↑SVR
加压素	0.02-0.04 U/min	刺激血管平滑肌中的 V1 受体				↑↑SVR, ↔PVR

9. 心源性休克的器械治疗

类型	适应证	禁忌证
主动脉内球囊反搏 (IABP)	①心源性休克 (且不能由药物治疗迅速纠正) ②出现血流动力学障碍的严重冠心病 (急性心梗合并机械并发症) ③顽固性肺水肿	①严重的外周血管疾病 ②主动脉瘤 ③主动脉瓣关闭不全 ④活动性出血或其他有抗凝禁忌证 ⑤严重血小板缺乏
机械通气治疗	①心跳呼吸骤停进行心肺复苏时 ②严重呼吸衰竭经常规治疗不能改善者,特别是出现明显呼吸性和代谢性酸中毒并影响到意识状态时	无创性机械通气方式在心源性休克时不宜选用
ECMO 或体外生命支持	①进展性或难治性休克 (顽固性乳酸酸中毒、低心排、需大剂量儿茶酚胺治疗、肾和/或肝功能衰竭) ②心脏骤停 (有血流) 合并晚期慢性心脏病且无心脏移植禁忌证者	①不能全身抗凝及存在无法控制的出血 ②存在中、重度慢性肺病、恶性肿瘤、多器官功能衰竭、中枢神经系统损伤等
心脏移植	符合心脏移植条件的终末期失代偿性心衰患者	



(1) 主动脉内气囊反搏 (IABP)

◆ 主动脉内气囊反搏 (IABP) 是机械辅助循环装置之一, 是将特制气囊导管插至降主动脉内,

气囊通过与心动周期同步地充放气, 达到辅助循环的作用。

◆ 血管活性药物不能改善临床情况: HR 快, 肢端湿冷, 心衰发作, 少尿, 尤其是多巴胺 > 10~15 μg/kg/min

◆ 出现机械并发症更依赖 IABP

乳头肌断裂

室间隔穿孔

心脏破裂

(2) Impella

◆ 血液从左心室流入心室辅助装置, 从升主动脉流出

◆ 根据阿基米得螺旋原理, 轴流泵从左心室抽吸血液直接泵入升主动脉, 提供最大流量 2.5 L/min

◆ 减轻左心室后负荷

(3) TandemHeart

◆ TandemHeart 又称经皮跨房间隔左室辅助装置 (PTVA)

◆ 通过离心泵将左心房氧合血泵入动脉系统, 产生连续非搏动性血流

◆ 降低右心室后负荷及左心室前负荷, 减少心脏做功及氧耗, 增加血流灌注

适应证: 左室泵衰竭合并心源性休克, 经常规治疗和 IABP 治疗后:

SBP < 70 mm Hg

PCWP > 20 mm Hg

CI < 1.5 L/min · m<sup>2</sup>

并发症: 栓塞, 出血, 右心衰竭, 感染

(4) ECMO

◆ PCI 术中应用 ECMO 通常采用经皮静脉-动脉模式, 一般选用股动静脉插管, 静脉插管尖端直接伸入右心房, 动脉插管置于腹主动脉, 来自右心房的静脉血在体外经膜氧合器和热交换器氧合后, 再泵回动脉系统。

◆ 血流动力学支持: CI > 4.5 L/min

◆ 增加前负荷和后负荷



## 心衰竭患者的营养状态评估

简世杰

观察研究显示心脏衰竭(HF)患者有三分之一到四分之一营养不良的情形,此一高比例的现象仍导因于厌食、吸收障碍和高分解代谢率等。营养不良的HF患者表现为肌肉萎缩和身体完整性改变,导致运动不耐受和身体虚弱。慢性营养不良会增加分解代谢儿茶酚胺(去甲肾上腺素,肾上腺素,皮质醇)和促炎细胞因子的激活,以及皮质醇蛋白。TNF- $\alpha$ 是导致骨骼肌组织血流减少的部分原因,加重了内皮功能障碍。IL-6产生急性期反应,维持需要过量的必需氨基酸,以生物蛋白质损失为代偿。这最终会使个体的生理性和功能性恶化到HF的不可逆阶段,称为心脏恶病体质。

尽管HF和营养问题之间长期存在着重要的相关性,但临床上仍尚未确定哪种指标可以最正确反应患者的营养状况。目前提出的各种建议的营养指标来评估营养状况并在临床上帮助进行风险预测,这些营养评分(指数)通常是由多方面营养评估的整合:包括人为测量指标(如:体重指数[BMI]),抽血参数(如:血清白蛋白[SA])和饮食状况。

尽管BMI被广泛用于许多营养指数中来反应整体营养状况。BMI传统上用于定义身材比例。许多证据也显示,过重型态的BMI被认为是和身体潜在发炎相关、易有较多的心血管危险合并症、以及更差的心脏功能。因此,目前有许多研究已认为良好的体适能能改变用BMI来做HF with reduced ejection fraction (HFrEF)患者的预后结果。由于良好的营养是体适能健全的基础,特别是在

心收缩功能未减弱的HFpEF其重要性可能会更早于体适能的表现。因此我们研究了以各种循环生物标志物的营养评估,特别是那些以SA为其基础的营养指标[如:prognostic nutritional index、Controlling Nutritional Status (CONUT)值]对于HF with preserved ejection fraction (HFpEF)族群的结果,并测试其对BMI的交互作用。

我们回溯性收集了1120位HFpEF的患者加以分析。其平均年龄为 $77.2 \pm 12.6$ 岁,39.4%为男性。其平均白蛋白值为 $3.3 \pm 0.6$  g/dL, PNI为 $40.2 \pm 8.7$ 和CONUT值为 $5.5 \pm 2.1$ 。多变量效应正显示营养较好的状态:即较高SA、较高PNI和较低CONUT值和较低的死亡率相关。若以营养状态和BMI高低来区分为四组,BMI高和营养状态好的患者有最低的死亡率。相对的,BMI低而营养状态差的有最高的死亡率。有趣的是,若以限制性立方样条来图示BMI的剂量相关死亡效应(dose-dependent effect)可以发现:只有在养状况良好情况下,BMI高和较低的死亡率相关;在营养状况低的患者(SA <3.5 g/dl, PNI <38, CONUT >3)BMI高、低就不影响死亡率。由此可知良好的营养状态可以用来做病人的危险分级外,基础营养更是HF患者代谢缓冲的基础和其重要性。

最后,目前许多治疗指引已建议列入营养部份为HF多元治疗和预防中重要的一环。正确且适当评估营养缺乏的HF病患并尽早识别而积极给予营养支持,以减缓HF的进展。而营养的介入应该依不同个体给予不同的目标,并同时考虑含卡路里、巨量营养素(macronutrients)、微量营养素(micronutrients)等多方面的支持。以促进病人的健康和体适能,并进而提升生活质量及改善预后。

## · 高血压的防治及药物治疗研究 ·

## Association between non-high-density lipoprotein cholesterol and increased arterial stiffness in Chinese hypertensive patients: insights from China Stroke Primary Prevention Trial (CSPPT)

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**Objective** This study aimed to investigate the role of non HDL cholesterol in the development of arterial stiffness in Chinese hypertensive patients.

**Methods** A total of 14071 hypertensive participants in the China Stroke Primary Prevention Trial (CSPPT) were enrolled in the present study. Peripheral blood samples, blood pressure and drug administrations were recorded. Arterial stiffness was assessed using brachial ankle pulse wave velocity (baPWV). We performed multiple regression analysis to test the association between lipid level and baPWV.

**Results** Patients were assigned to 4 equal groups according to baPWV level. After adjusting for age, sex, BMI, and other cardiovascular risks, non-HDL-C was positively related to baPWV [ $\beta=0.12$ ,  $P=0.001$ ]. Furthermore, this was more significant in male patients and in the SBP<160 mmHg group [males:  $\beta=0.21$ ; females:  $\beta=0.07$ ; SBP<160 mmHg,  $\beta=0.20$ , SBP $\geq$ 160 mmHg,  $\beta=0.05$ ].

**Conclusions** These results suggested that non-HDL-C had a predictive significance for baPWV, especially in the SBP<160 mmHg and male hypertensive patients.

## Metabolically Healthy Obesity Increase Risk for Hypertension in Chinese population: A Retrospective Cohort Study

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**Objective** In recent years, different subphenotypes of obesity have been described, including metabolically healthy obesity (MHO), in which a proportion of obese individuals, despite excess body fat, remain free of metabolic abnormalities and increased cardiometabolic risk. However, it can be debated whether MHO individuals are really healthy and the clinical relevance of MHO for hypertension risk remains controversial. The purpose of this study was to investigate the association between the MHO phenotype and the risk of hypertension.

**Methods** This is a retrospective cohort study of 7,974 Chinese subjects ( $44.8\pm 11.1$  years, 47.5% men) in 2012 and re-evaluated in 2016. Subjects were excluded if they were hypertensive, with cardiovascular diseases, or were receiving medications for dyslipidemia in 2012. The subjects were cross-classified into four groups according to their baseline metabolic health and obesity status: metabolically healthy normal weight (MONW), metabolically obese normal weight (MONW), MHO and metabolically unhealthy obese (MUO). We compared cumulative incidences of hypertension over 4 years among the four groups, and calculated odds ratios (ORs) for hypertension by multivariate regressions.

**Results** Among total subjects, 1579 (19.8%) subjects were MHO phenotype at baseline. During 4 years follow-up, hypertension occurred in 791 (9.9%) participants and the MHO subgroup carried increased cumulative incidences of hypertension (11.6% vs 7.0%,  $P<0.001$ ) compared to MHNW individuals. In fully adjusted multiple logistic regression models, the adjusted ORs (95% confidence intervals) for hypertension in MHO, MONW and MUO phenotypes compared with MHNW

subjects were 1.53 (1.26–1.89), 2.46 (1.79–3.36) and 2.93 (2.32–3.71), respectively. Moreover, unit increases in BMI were mild associated with 4-year risk of hypertension (adjusted OR 1.11, 95% CI 1.07 to 1.14), whereas metabolic status (normal to metabolic syndrome) conferred an approximate 2-fold adjusted risk of hypertension (OR 1.91, 95% CI 1.56 to 2.35).

**Conclusions** The MHO phenotype confers increased risk for hypertension, and both metabolic health status and obesity status were independently associated with an increased risk of hypertension in Chinese population. Great attention should be paid for MHO subjects for prevention and treatment of hypertension.

## 肾动脉去交感神经射频消融术治疗难治性高血压的疗效观察及术式改良

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**目的** 探讨肾动脉去交感神经射频消融术(RDN)治疗难治性高血压(RHTN)的适应证选择、临床疗效及安全性,并对RDN术式进行探索和改良。

**方法** 纳入2016年9月至2018年9月经福建医科大学附属第一医院心血管内科确诊的RHTN患者21例,其中顽固性高血压15例,行RDN治疗,进行为期3–24个月的随访,记录手术前后血压、肾功能、降压药物数量、降压药物强度指数、日均降压药费,及手术方式、术中消融参数、手术操作相关并发症。

**结果** 术后1周、1月、3月、6月、12月、18月、24月家庭自测收缩压和舒张压均有明显下降,动态血压随访数据术后血压均较术前逐渐下降。术后药物数量逐渐减少,降压药物强度指数、日均降压费用较术前下降。全部患者中,1例术后出现穿刺处血肿,1例出现穿刺处假性动脉瘤,1例术中出现左侧肾动脉逆向夹层,1例术中出现右侧肾动脉狭窄。不同术式的比较:使用新型肾动脉消融导管GL-6W更具有操作便利性和低血管创伤性。

**结论** RDN有助于难治性高血压的血压控制,尤其是对降压治疗失败且合并终末期肾病的RHTN患者,其术后血压平稳下降,降压药物及费用减少,手术对肾功能影响无差异,相对安全。使用新型消融导管进行消融较三维重建下

使用较高功率单极导管血管内四象限逐点消融的操作方案可能更加安全可靠,且两者降压效果无明显差别。

## Relationship between components of metabolic syndrome and arterial stiffness in hypertensives

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**Objective** Arterial stiffness is an important marker which reflexes the arterial vasodilation. Carotid-femoral pulse wave velocity (cfPWV), a gold standard method reflexes the central arterial stiffness, is strongly associated with age and blood pressure. Subjects with metabolic syndrome (MS) showed increased risk of cardiovascular events. We investigated the relationship between components of metabolic syndrome and arterial stiffness in hypertensives.

**Methods** A total of 680 subjects (aged  $58.44 \pm 11.67$  years, male 63.53%, hypertension 65.00%) were divided into five groups based on the number of known components of metabolic syndrome (MSCs) according to the criteria of 2010 Chinese Guidelines for Prevention and Management of Hypertension (0MSCs:  $n=86$ ; 1MSCs:  $n=153$ ; 2MSCs:  $n=201$ ; 3MSCs:  $n=148$ ; 4/5MSCs:  $n=92$ ). Body weight, height, waist circumference, hip circumference, blood pressure and clinical biochemical tests were measured. Carotid-femoral pulse wave velocity (cfPWV) was measured using a non-invasive automatic device (Complior Analysis, France).

**Results** The level of cfPWV was significantly increased with the increase of the number of components of metabolic syndrome even after adjusting for age, gender ( $8.20 \pm 1.54$  vs  $8.72 \pm 1.48$  vs  $9.34 \pm 1.77$  vs  $9.64 \pm 1.86$  vs  $9.91 \pm 2.19$  m/s,  $P < 0.05$ ). In subjects with hypertension ( $n=442$ ), cfPWV was higher than in those without hypertension ( $n=238$ ) after adjusting for age, gender ( $9.59 \pm 1.90$  vs  $8.49 \pm 1.50$  m/s,  $P < 0.05$ ). Stepwise multiple regression analysis revealed that age, gender, the number of components of metabolic syndrome, heart rate as well as the level of serum uric acid were determinants for cfPWV ( $P < 0.05$ ). In the subgroups stratified by age, systolic blood pressure correlated with cfPWV in hypertensives under 55 years old, while in the non-hypertensives correlation be-

tween systolic blood pressure and cfPWV was found after 60 years old.

**Conclusions** The arterial stiffness became significant with the increasing of the metabolic components numbers, which was independent of age, gender and blood pressure. And the presence of hypertension played the most important role in the progress of arterial stiffness even compared with age.

## Comparative Evaluation of Various Adiposity Indices as Predictors of Risk for Hypertension Among Chinese Population

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**Objective** Our study aimed to compare the associations of various adiposity indices (body mass index, BMI; waist circumference, WC; waist-to-height ratio, WHtR, a body shape index, ABSI, visceral adipose index, VAI; body fat percentage, BFP) with hypertension among Chinese adults.

**Methods** We conducted the community-based cross-sectional survey during 2013–2014. A total of 14,573 participants were included in the study. Multivariate logistic regression analysis was performed to assess the odds ratios (ORs) and 95% confidence intervals (CI) for the association between different adiposity indices (BMI, WC, WHtR, ABSI, BFP and VAI) and hypertension by sex and age groups.

**Results** All six adiposity indices were positively associated with hypertension risk in a dose response fashion. Each SD increase of adiposity indices except ABSI was associated with greater risk of hypertension by sex and age (all  $P < 0.05$ ). WHtR, BFP and VAI had significantly larger AUCs than other adiposity indices (BMI combined with WC, WC, BMI and ABSI) for both genders (all  $P < 0.01$ ). In males, no significant difference were found in AUCs among WHtR and BFP (0.653 vs. 0.647,  $P = 0.4774$ ). While WHtR had larger AUCs than BFP in females (0.689 vs. 0.677,  $P = 0.032$ ). No significant difference were found in AUCs among BFP and VAI for both genders (all  $P > 0.1$ ).

**Conclusions** In summary, all six adiposity indices (BMI, WC, WHtR, ABSI, VAI and BFP) were positively and significantly associated with hypertension risk in a dose response fashion. Moreover, the discriminating power of each adiposity index for hypertension consistently declines with age in both genders. WHtR could represents the best predictor of identifying hypertension, followed by BFP and VAI, especially in younger (15–44 and 45–64 year) males and females. Our results discourage the use of the BMI. These findings indicate that in order to predict incident hypertension WHtR could be considered as an alternative to established body adiposity measures. Future prospective studies with a larger population can further validate the usefulness, as well as the limitations, of WHtR as a marker for risk stratification.

## 老年人24小时动态舒张压的危险因素及其对10年生存预后影响的探讨

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**目的** 探讨老年人24小时动态舒张压的危险因素及其对10年生存预后的影响。

**方法** 选择广州军区广州总医院2003年1月–2008年12月长期居住广州的 $\geq 65$ 岁住院离退休老年患者787例进行健康普查,并行动态血压、诊室血压的监测和尿酸、肌酐、尿素氮等的测定,然后按照24小时动态舒张压水平分为 $< 70$  mmHg、70–80 mmHg、 $> 80$  mmHg三组人群,比较各组患者的年龄(65–79岁、 $\geq 80$ 岁)、合并疾病、应用多因素Logistic逐步回归分析老年人24小时动态舒张压的相关危险因素以及随访10年间的临床死亡事件等情况。

**结果** 老年人的24小时动态舒张压为 $71.1 \pm 7.9$  mmHg。其中,65–79岁老年人中24小时动态舒张压为 $72.5 \pm 7.9$  mmHg,而 $\geq 80$ 岁老年人中24小时动态舒张压为 $69.1 \pm 7.6$  mmHg,差异均具有统计学意义( $P < 0.05$ )。多因素Logistic回归分析显示年龄、BMI、心率、血红蛋白、24小时全天收缩压为24小时动态舒张压危险因素( $P < 0.05$ )。三组24小时动态舒张压分组中,冠心病、心肌梗塞、高血压病的患病率存在统计学差异( $P < 0.05$ )。在24小时动态舒张压达到70–80 mmHg的时候,观察到的死亡风险是最低的,尤

其对于心肌梗死更是如此。达到较高的舒张压 (>80 mmHg) 与中风、心肌梗死的死亡高风险相关。较低的舒张压 (<70 mmHg) 的死亡风险是最高的,且都有统计学差异 ( $P<0.05$ )。24小时动态舒张压水平>80 mmHg组相较于另外两组,其10年生存时间是最高的,而<70 mmHg组是最低的,且具有统计学差异 ( $P<0.05$ )。

**结论** 老年人舒张压水平随着年龄增大而增大;老年人舒张压水平受到年龄、BMI、心率、血红蛋白、24小时全天收缩压的影响,在冠心病、心肌梗塞、高血压病的发病中起着重要作用;对于老年人来说,其舒张压控制在70–80 mmHg可能是比较合适的;老年人舒张压水平能影响老年人10年生存时间。

## Impact of achieved systolic blood pressure on renal function in hypertensive patients

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**Objective** There is strong evidence for the association of high blood pressure (BP) with depressed renal function. Although high BP at baseline is associated with greater progression of chronic kidney disease (CKD), randomized trials in CKD patients have found no significant relationship between more intensive BP control and glomerular filtration rate (GFR) decline. However, the relationship of GFR and change in GFR over time to lower achieved systolic BP (SBP) in hypertensive patients undergoing treatment is unclear.

**Methods** Baseline estimated GFR (eGFR) and change in eGFR during follow-up were examined in relation to average on-treatment SBP in 878 hypertensive patients with ECG left ventricular hypertrophy (LVH) randomly assigned to losartan- or atenolol-based treatment.

**Results** Patients with average on-treatment SBP  $\leq 130$  mmHg and average SBP between 131 and 141 mmHg were compared with patients with average SBP  $\geq 142$  mmHg. Patients with an average on-treatment SBP  $\leq 130$  mmHg had significantly lower baseline eGFR than those with average SBP between 131 and 141 or average SBP  $\geq 142$  mmHg ( $65.5 \pm 14.3$  vs.  $69.3 \pm 14.3$  vs.  $69.0 \pm 14.5$  mL/min/1.73 m<sup>2</sup>,  $P < 0.001$  us-

ing analysis of covariance adjusting for age, sex, randomized treatment, prior antihypertensive treatment, history of diabetes, myocardial infarction, ischaemic heart disease or heart failure, smoking status, baseline serum glucose, total and HDL cholesterol, albuminuria, and baseline LVH). However, the decrease in eGFR between baseline and Year 4 was significantly lower among patients with average SBP  $\leq 130$  mmHg ( $-6.3 \pm 10.3$  vs.  $-7.9 \pm 11.1$  vs.  $-9.2 \pm 10.6$  mL/min/1.73 m<sup>2</sup>,  $P=0.001$ ). These differences in eGFR change persisted even after adjusting for baseline eGFR, and there were no significant interactions with randomized treatment, sex, race, or baseline presence of proteinuria.

**Conclusions** Lower average on-treatment SBP ( $\leq 130$  mmHg) was associated with a lower baseline eGFR but with a slower reduction in eGFR during 4-year follow-up in hypertensive patients with ECG LVH, independent of other possible risk factors for decreased GFR. Further study is necessary to determine whether randomized treatment to lower SBP goals is more protective of renal function than treatment to standard SBP goals.

## Changes of renal function in patients with hypertension complicated with diabetes and non-diabetes mellitus

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**Objective** Chronic kidney disease (CKD) complicates hypertension and diabetes. Knowledge of the deterioration rate of CKD may anticipate adjustment of therapies with renal elimination. This study evaluates the rate of annual deterioration of renal function in hypertensive patients either with type 2 diabetes (DM2) or without it (non-DM) followed for 5 years and relates it with blood pressure (BP) and glycemic control.

**Methods** This study aimed to evaluate the rate of annual deterioration of renal function in a large cohort of hypertensive patients either with (DM2) or without (non-DM) diabetes fol-

lowed for 5 years in a reference outpatient hospital clinic of hypertension and to relate it with BP and glycemic control. 923 patients (194 non-DM and 229 DM2, 13% female, aged  $62.1 \pm 10.2$  years) were evaluated over 5 years for the annual evolution of renal function (estimated glomerular filtration rate [eGFR], Modification of Diet in Renal Disease) ambulatory 24-hour blood pressure and metabolic parameters.

**Results** DM2 and non-DM did not differ for age, mean 24-hour BP levels, nighttime BP, albuminuria, and body mass index. DM2 versus non-DM showed a higher ( $<0.02$ ) prevalence of stage 3 CKD (24.0% vs 18.0%, eGFR 30–59), stage 4 (5.4% vs 2.7%, eGFR 15–29), and stage 5 (0.8% vs 0.5%, eGFR  $<15$ ). Average annual decline of eGFR was  $3.3 \pm 8.2$  in DM2 versus  $2.4 \pm 7.7$  in non-DM ( $=0.12$ , nonsignificant). Annual changes of eGFR and of albuminuria correlated ( $=0.578$ ,  $<0.001$ ). In multivariate analysis, age, nighttime BP, double inhibition of renin angiotensin system, albuminuria, and HbA1c  $>8.0\%$  in DM2 predicted the decline in eGFR. On average, 16.2% of DM2 and 13.1% of non-DM moved each year toward a more severe stage of CKD. For initial eGFR  $<90$  mL/min/1.73 m, 26.4% of DM2 and 18.1% of non-DM patients showed a reduction per year  $>10\%$  from the previous eGFR value ( $=0.042$ ).

**Conclusions** Progressive deterioration of renal function each year is frequent in hypertensive diabetic and non-diabetic patients. Beyond aging, this is particularly dependent on BP control particularly at nighttime, on drug therapy, and on highly abnormal glucose control.

## 内皮源性外泌体靶向调控 ESM1 在高血压血管重构中的作用机制

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**目的** 高血压是脑卒中、心肌梗死、冠心病、心力衰竭等心血管疾病的最常见危险因素,严重威胁人类健康,其重要病理特征是血管重构。血管平滑肌细胞(VSMC)表型转化是高血压血管重构的一个关键过程。大量相关性研究证实内皮特异分子1(ESM1)在高血压病中升高,可能与血管重构有关。为了阐明 ESM1 调控 VSMC 表型转化参与高血

压血管重构的分子机制,开拓高血压血管重构新机制探索,为寻找抑制血管重构药物提供新思路,设计了本项目。主要(1)探讨 ESM1 是否参与了 VSMC 的表型转化及其涉及的分子机制;(2)探讨内皮源性外泌体通过细胞通讯直接调控 ESM1 表达;(3)内皮源性外泌体是否与 ESM1 形成新的通路参与调节 Ang II 诱导的血管平滑肌表型转化。

**方法** (1)建立 Ang II 诱导的血管平滑肌表型转化细胞模型和 Ang II 诱导小鼠高血压血管重构模型;Real-time PCR 和 Western-blot 分别检测  $\alpha$ -SMA、SM22 $\alpha$ 、OPN 和 ESM1 的蛋白表达;(2)siRNA 沉默 ESM1, Western-blot 分别检测  $\alpha$ -SMA、SM22 $\alpha$ 、OPN 和 ESM1 蛋白表达;划痕、Transwell 检测 VSMC 迁移功能,MTS 和 EDU 检测 VSMC 增殖功能;(3)内皮源性外泌体分离提纯、建立外泌体作用的细胞模型和动物模型,观察其对 ESM1 和 VSMC 表型转化的作用,Western-blot 分别检测了  $\alpha$ -SMA、SM22 $\alpha$ 、OPN 和 ESM1 蛋白表达;划痕、Transwell 检测 VSMC 迁移功能,MTS 和 EDU 检测 VSMC 增殖功能;(4)内皮细胞和血管平滑肌细胞共培养,进一步阐明外泌体细胞通讯传递的 miR-4262 是其调控靶点。

**结果** (1)Ang II 可以诱导 VSMC 表型转化(收缩表型标志物  $\alpha$ -SMA、SM22 $\alpha$  的蛋白表达下调,而合成表型标志物 OPN 的蛋白表达上调)(2)沉默 ESM1,明显抑制 Ang II 诱导的 VSMC 的表型转化和增殖,其机制涉及 Erk/p38MAPK 信号通路。(3)内皮细胞和血管平滑肌细胞通过外泌体传递 miR-4262 可以靶向调控 ESM1,逆转 VSMC 表型转化。

**结论** (1)ESM1 可能介导了 Ang II 诱导的 VSMC 的表型转化和增殖过程,其机制可能涉及 Erk/p38MAPK 信号通路。(2)内皮细胞和血管平滑肌细胞通过外泌体发生细胞通讯(3)Ang II 诱导平滑肌细胞 ESM1 表达上调与抑制 miR-4262 的表达有关。

## 经治疗老年高血压患者隐匿性未控制高血压和白大衣未控制高血压的 10 年死亡风险

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**目的** 隐匿性未控制高血压(MUCH)和白大衣未控制高血压(WCUH)在老年人中很常见,这些高血压表型的死亡预后作用在这个亚群中没有完全确定。在这种情况下,我们通过动态血压监测来评估 MUCH 和 WCUH 的预后。

**方法** 我们分析了2003年至2008年间在南部战区总医院住院并完成24 h动态血压和诊室血压监测的611例经治疗老年高血压患者的数据。根据诊室和24 h动态血压数据分为以下几类:

已控制高血压(CH)定义为诊室血压 $< 140/90$  mmHg和24 h动态血压 $< 130/80$  mmHg; MUCH定义为诊室血压 $< 140/90$  mmHg和24 h血压 $\geq 130$ 和/或 $\geq 80$  mmHg; WCUH定义为诊室血压 $\geq 140$ 和/或 $\geq 90$  mmHg和24 h血压 $< 130/80$  mmHg; 持续性高血压(SUCH)定义为诊室血压 $\geq 140$ 和/或 $\geq 90$  mmHg和24 h血压 $\geq 130$ 和/或 $\geq 80$  mmHg。用Cox回归模型进行分析,根据临床和24小时动态血压以及混杂因素进行调整。

**结果** 在总人群中,发现MUCH患者127例(占总人群20.79%)和59例WCUH患者(占总人群9.66%)。在平均10年的随访期间,总共发生了192起全因死亡事件。在分层分析各危险因素对高血压表型与全因死亡的影响作用时,发现他汀类药物服用史存在显著的交互作用( $P_{\text{interaction}}=0.045$ )。在对各种协变量进行调整后,对比已控制高血压,MUCH与全因死亡率更显著相关(HR 1.56, 95%CI 1.04–2.35,  $P=0.032$ ), WCUH对预后不良,增加死亡风险23%(HR 1.23, 95%CI 0.70–2.17,  $P=0.46$ )。

**结论** 在动态血压和诊室血压监测评估的经治疗老年高血压患者中,与CH患者相比,MUCH患者的10年死亡风险显著升高,WCUH患者的预后不良,增加23%的死亡风险。此外,他汀类药物服用史可能为影响不同高血压分型对全因死亡的作用特殊人群。

## Nocturnal blood pressure burden: a novel blood pressure assessment index for obstructive sleep apnea

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**Objective** Obstructive sleep apnea (OSA) causes nocturnal blood pressure (BP) surges, potentially elicit sleep-onset cardiovascular events. BP changes have been found to be associated with sleep parameters, but methodology or indices for BP measurements remained inconsistent.

**Methods** The consecutive OSA patients were enrolled between January 2017 and April 2017. Overnight portable moni-

toring and beat-to-beat BP monitoring were applied simultaneously. The OSA-related nocturnal BP burden was determined by measuring the oxygen desaturation event-associated area upon the beat-to-beat BP curve from pre-event baseline.

**Results** A total of 30 consecutive patients (24 men and 6 women) were included with mean value of age  $54.9 \pm 11.7$  years, oxygen desaturation index (ODI) 16.7 (8.9, 50.6) events/h, and nocturnal systolic BP (SBP) burden 6274.9 (3419.1, 14591.8) mmHg\*s/h.

**Conclusions** The 'nocturnal BP burden', which reflects the nighttime BP fluctuations caused by OSA, showed a strong association with sleep parameters. It might be a novel indicator better than average or variability of BP for OSA.

## 描述性分析高血压群体中糖化血红蛋白与血管动脉硬化的关系

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**目的** 本研究旨在建立中国非糖尿病群体中糖化血红蛋白与血管动脉硬化参数的关系,颈动脉参数包括颈动脉股动脉脉搏波速度(Carotid-femoral artery pulse wave velocity, CF-PWV), 踝血管指数(cardio ankle vascular index, CAVI), 踝臂指数(ankle brachial index, ABI)。

**方法** 我们的研究共纳入了369名受试者(男性183名,女性186名)。CF-PWV, CAVI和ABI均采用自动化设备和标准方法获得。对于所有动脉硬化的指标,我们选择了右侧进行了分析。

**结果** 在CF-PWV、CAVI较高组,ABI较低组中,年龄和血压显著高于正常组( $P<0.05$ )。然而,BMI,HR,DBP,FPG,HbA1c,Hs-CRP,TC,TG和LDL水平也高于正常组,但统计学差异不显著( $P>0.05$ )。单因素线性回归分析显示HbA1c和CF-PWV之间呈线性正相关( $B=0.443$ ,  $P=0.001$ )。完全调整混杂因素后,线性关系消失( $B=0.020$ ,  $P=0.464$ )。研究发现HbA1c与ABI呈独立的线性负相关( $B=-0.033$ ,  $P=0.000$ )。在HbA1c较高的患者中,ABI较低的风险为0.551(95%CI:0.365–0.830,  $P<0.05$ )。

**结论** 年龄和收缩压是主要影响动脉硬化的因素。HbA1c与CF-PWV呈线性正相关,与ABI呈独立的线性负相关,因此HbA1c可能影响血管功能及结构,引起高血压患者的动脉硬化,狭窄或闭塞。

## 高血压合并高尿酸血症患者动脉硬化指标与血压变异性指标的相关性

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**目的** 探讨高血压患者合并高尿酸血症患者动脉硬化指标与血压变异性的相关性。

**方法** 选取2018年1月1日至2018年5月31日南部战区总医院心血管内科高血压患者79例,按尿酸水平分为尿酸升高组40例和尿酸正常组39例。计算体重指数和血压变异性指标。应用SPSS 24.0统计软件进行分析。

**结果** 与尿酸正常组相比,合并高尿酸血症的高血压患者的尿素氮、甘油三酯和左心室舒张末期径显著升高,差异有统计学意义( $P<0.05$ )。两组间的血压变异性指标无统计学意义。高血压患者的血尿酸浓度与脉压、SBP<sub>24h\_SV</sub>、SBP<sub>day\_SV</sub>、SBP<sub>night\_SV</sub>、DBP<sub>night\_VIM</sub>、SBP<sub>night\_ARV</sub>、SBP<sub>day\_ARV</sub>、SBP<sub>24h\_ARV</sub>、SBP<sub>24h\_SD</sub>呈正相关( $P<0.05$ )。

**结论** 收缩压血压变异性指标能较好反映出高血压患者合并高尿酸血症的动脉硬化情况。

## 精准医学时代高血压的诊疗策略

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**目的** 医学已从直觉医学时代,走过循证医学时代,目前正在跨入精准医疗时代,这是不以意志为转移的发展规律。高血压及其心血管疾病更需要精准医疗,需要根据每个个体情况,给予个性化精准治疗。

**方法** 二、降压药物的临床精准应用

高血压精准医疗体系构建应解决两个主要问题,即不同个体敏感性和同一疾病不同发病原因。

1. 不同个体同药不同敏感性问题

中国高血压指南已明确钙拮抗剂、血管紧张素转换酶抑制剂、血管紧张素受体拮抗剂、利尿剂以及 $\beta$ 受体阻滞

剂作为高血压的一线用药。如何根据患者发病特征选用降压药物也必须遵循精准医学的原则:(1)以最小化的医源性损害,最低的医疗成本,最经济适用效价比,获得最好的康复医疗效果,这是精准医疗的重要标准;(2)不同个体药物的敏感性有很多差异,要根据个体化治疗;(3)坚持以患者是一个整体的理念,重视精神心理对人体器官的主导作用;(4)尊重患者意愿、权益、尊严及隐私,让患者获得最舒适、满意、长远的健康效益,从而大大提高其生活和生命质量,这是精准医疗的最终目标。

**同病不同因问题** 如中国人中最为常见的H型高血压,即血压升高并伴有血浆同型半胱氨酸(Hcy)水平增高,与中国在饮食上的特点、烹饪方式等方面均无强化叶酸饮食,导致叶酸水平普遍偏低、个体血浆叶酸水平较低,因此,易患H型高血压。研究显示H型高血压人群并发脑卒中风险较Hcy水平正常的高血压人群显著升高。

**结果** 三、结语

对于高血压防治的精准医疗,我们要理性看待、冷静思考,我们期待随着将来各组学和技术的发展,利用大数据整合分析技术,提高高血压相关指标的统计效力并挖掘出可能具有重要作用的罕见基因,最终实现高血压的早期预警、早期诊断与精准干预,全面提升高血压病防控能力。

**结论** 高血压

## Association between Subjective Sleep Duration on Workdays or Non-workdays and Uncontrolled Blood Pressure in Southern China

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**Objective** Uncertainty remains regarding the association between sleep duration and blood pressure (BP) control. Therefore, this study aimed to examine the association between sleep duration on workdays or non-workdays and unsatisfactory BP control in southern China.

**Methods** We analyzed 4,370 hypertensive patients, including their self-reported sleep duration on workdays or non-workdays and their BP. Unsatisfactory BP control was defined as systolic BP (SBP) of  $\geq 140$  mmHg or diastolic BP (DBP) of  $\geq 90$  mmHg. Multivariate logistic regression analyses were



performed to evaluate the association between sleep duration and unsatisfactory BP control. To eliminate potential confounders such as age, sex, and BMI, we tested for interactions between sleep duration and potential confounders by including cross-product interaction terms in the corresponding multivariate logistic regression models.

**Results** A total of 4,370 hypertensive participants with an average age of 64.5 (SD, 12.8 years) were included in the current analysis. Of these, 1,880 (43.0%) were men, and 2,624 (60.0%) participants came from urban areas. Overall, the multivariable-adjusted ORs of unsatisfactory BP control risk were 1.59 (95% CI, 1.14–2.22) for 9–10 h of sleep on workdays and 1.47 (95% CI, 1.07–2.03) for  $\geq 10$  h of sleep on non-workdays compared with a sleep duration of 5–9 h. No association between a short sleep duration and unsatisfactory BP control was noted. The association between a longer sleep duration ( $\geq 10$  h) and unsatisfactory BP control was more pronounced among women aged 65–70 years, with a BMI  $\geq 24$  kg/m<sup>2</sup>.

**Conclusions** In conclusion, hypertensive individuals who slept 9–10 h on workdays and  $\geq 10$  h on non-workdays were more likely to have unsatisfactory BP control when compared with people with a sleep duration of 5–9 h. The strength of the association varied by age, sex and BMI. These findings indicate a longer sleep duration might be a way to predict uncontrolled BP in hypertensive adults.

## 中国农村成人高甘油三酯腰围表型及动态变化与高血压的关联

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**目的** 评估中国农村人群高甘油三酯腰围表型以及高甘油三酯腰围表型的动态变化与高血压的关联。

**方法** 本研究选择河南省新安县两个镇为研究现场,以村为单位,采用整群抽样的方法,在2007年到2008年对招募的20,069名参与者(年龄 $\geq 18$ 岁)进行问卷调查、体格测量、血糖和血脂检查。经过6年,在2013–2014年有17,265名研究对象完成同基线相同的随访调查。排除基线高血压和妊娠高血压,基线没有身高,腰围,甘油三酯值,或者在基线调查前两周使用降脂药者,最终有9,962名参与者进入本次研究。运用Logistic回归模型分析高甘油三酯腰

围及其动态变化与高血压之间的关联。

**结果** 本地区成人高甘油三酯腰围表型的患病率为12.12%,高血压的累积发病率为19.60%(男性:41.01%)。高甘油三酯腰围表型与高血压的关联仅仅在男性中存在。高甘油三酯腰围表型发生高血压的风险为正常甘油三酯腰围表型的1.53倍(RR=1.53, 95%CI=1.05–2.22)。甘油三酯腰围表型的动态变化也是高血压发生的危险因素,其中正常甘油三酯腰围表型转化为高甘油三酯腰围表型发生高血压的风险是一直保持正常甘油三酯腰围表型的3.57倍(RR=3.57, 95%CI=1.95–6.52)。

**结论** 在中国农村人群,高甘油三酯腰围表型增加了男性高血压的发病风险,高甘油三酯腰身比表型的动态变化可能是男性高血压发病的预测因子。

## 利用点尿法及24小时尿收集法估算高血压患者24小时尿钠钾排泄量的应用比较

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**目的** 探讨利用点尿法及24 h尿收集法估算高血压患者24 h尿钠钾排泄量的应用比较。

**方法** 收集2017年2月至2018年1月就诊于新疆医科大学第一附属医院高血压科的高血压患者共264例。收集患者24 h尿及相应的清晨空腹点尿,分别测定所有尿样的钠、钾、肌酐水平。采用Tanaka、Kawasaki和INTERSALT公式分别估算24 h尿钠钾排泄量,采用配对样本秩和检验法比较公式估算值与测量值的差异;利用Spearman相关分析评价各公式估算的24 h尿钠钾排泄量与实测24 h尿钠钾排泄量的相关关系。

**结果** Tanaka公式估算的24 h尿钠值(167.99 mmol/d)高于实际24 h尿钠值(157.73 mmol/d),差异无统计学意义( $z=-0.23, P>0.05$ );Kawasaki公式估算的24 h尿钠值(217.66 mmol/d)亦高于实际24 h尿钠值(157.73 mmol/d),差异有统计学意义( $t=-8.81, P<0.05$ );INTERSALT公式估算的24 h尿钠值(154.71 mmol/d)低于实际24 h尿钠值(157.73 mmol/d),差异有统计学意义( $t=-3.53, P<0.05$ )。Tanaka、Kawasaki和INTERSALT公式估算的24 h尿钠值与实际24 h尿钠值的相关系数分别为0.68、0.55、0.58(均 $P<0.000$ );Tanaka公式估算的24 h尿钾值(39.51 mmol/d)低于实际测量值(42.90 mmol/d),差异有统计学意义( $z=-3.47, P<0.05$ ),相关系数为0.50( $P<0.000$ )。

**结论** 在高血压患者中, Tanaka公式法估算的24 h尿钠排泄量与实际测量值不存在差异, INTERSALT和Kawasaki公式法估算的24 h尿钠排泄量与实际测量值存在不同程度的低估与高估, Tanaka法估算的24 h尿钾排泄量与实际测量值之间存在低估, 且相关性低。利用点尿法估算高血压患者24 h尿钠钾排泄量存在一定的不准确性和局限性。

## 透过柯氏音的时间位置看无创血压测量的科学性

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**目的** 一直以来, 血压测量只有方法而缺乏理论和试验支持, 没有人清楚无创血压测量法是否正确, 测量的结果是否准确。作为血压测量判定标识的柯氏音既用来判定无创收缩压, 又用来判定无创舒张压的做法本身就是自相矛盾的。按照教科书对血压的定义: 收缩压是收缩期的最高血压, 舒张压是舒张期的最低血压, 那么, 只要能够明确柯氏音出现在心动周期的时间位置就可以判定无创血压测量的科学性与否。

**方法** 几乎所有人都可以听到柯氏音, 因而研究对象不设条件, 不要求例数, 只要能听到柯氏音即可入选。我们用心音图描记设备(包括立式水银血压计、心音传感器及相应的软件、计算机)于右肱动脉血压听诊处描记听诊血压时所发生的一切。在对描记到的图形命名上, 为了好理解, 更为了与心音图相呼应, 于浅表动脉上描记的波形称动脉脉音图: ①将心音传感器固定于右肱动脉血压听诊处, 描记未测量血压时和测量血压时肱动脉脉音图; ②将一只心音传感器固定于右肱动脉血压听诊处, 另一只心音传感器固定于心前区心尖搏动最强处, 描记未测量血压时和测量血压时肱动脉脉音和心音的同步图(研究者提出设计的专用同步描记设备)。测压时要同时听诊心脏和血压。

**结果** 未测压脉音图上最高大的波称为主峰, 紧邻其前的小波称为前峰, 紧邻其后的小波为后峰, 它们皆为无声波; 测压脉音图上更高大且亦明显区别于主峰的波称为血压听诊音波, 在描记脉音图的同时可听到与该波一致的血压听诊音亦即柯氏音, 为有声波; 在未测压时动脉脉音和心音的同步图上, 主峰稍错后于第一心音且二者呈对应关系, 后峰稍错后于第二心音且二者呈对应关系; 在测压时动脉脉音和心音的同步图上, 血压听诊音波亦稍错后于第一心音且二者也呈对应关系。作为常识, 自第

一心音到紧邻的第二心音的区域是心动周期的收缩期, 而自第二心音到下一个第一心音的区域是心动周期的舒张期。该试验确认了柯氏音只出现在心动周期的收缩期内。

**结论** 既然试验明确了柯氏音在心动周期中出现在收缩期的时间位置, 结合教科书有关收缩压和舒张压的定义, 我们不难做出柯氏音法(包括其它无创血压测量法)只能测量无创收缩压而不能测量无创舒张压的结论。亦即无创收缩压的测量是正确的, 而无创舒张压的测量是错误的。这一结论将改变医学界对所谓的无创舒张压的认知, 使得血压测量和对测压结果的解读更科学。本实验尚无法对无创收缩压测量结果的准确性做出评判。

## 通过血压测量运行模型的建立计算测压速度对无创血压测量值的影响

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**目的** 由于血压的波动性, 人们无法知晓某个因素对无创血压测量值的影响程度。我们依据王氏提出的血压测量共振理论建立了血压测量运行模型, 并计算测压速度的因素对测压结果的影响程度。

**方法** 首先设计柯氏音分布模拟图。心动周期的收缩期和舒张期之比为3:5, 但为了数学推算的简单化, 我们把整个心动周期均分成六个时段, 以黄、红、绿三个高彩色柱组成收缩早、中、晚期压力柱; 以黑、紫、粉三个矮彩色柱组成了舒张早、中、晚期压力柱, 每个时段各占时0.167秒。共振理论认为柯氏音与第一心音同源, 第一心音约占时0.14秒, 照此看来, 因为声音的传导延迟现象正好落在收缩中期压力柱上(红色压力柱上), 这也意味着只有收缩中期才是收缩压值读取区, 从而读出收缩压, 而其它任何区域读不出血压值; 其次, 在柯氏音分布模拟图的基础上设计血压测量运行模拟图并运算整理出测压运行计算公式:  $vS_n = 150 - v * (N - 1) \pm v * B / 6$ 。按教科书的测压法规定, 分别以高出预计收缩压20 mmHg的收缩早、中、晚期和舒张早、中、晚期6个部位为放气时点, 以测压速度分别为1-10 mmHg/心搏时各自画出6条平行的斜线(称虚拟测压线), 都会相交于后续的某几个相关的心搏形成的6个压力柱上, 只

有首先与柯氏音(红色柱)相交时虚拟测压线的压力值(即袖带内压力)才可以读取出来而被认可为收缩压测量值。

**结果** 经过缜密计算得出:当测压速度是1 mmHg/每心搏,一个理想血压为X mmHg的人,只可测量出X和X-1两个收缩压值;但当测压速度是2 mmHg/每心搏,一个理想血压为X的人,可测量出X、X-1和X-2三个收缩压值,同时还可以对另一个理想血压为X+1的人;测量出(X+1)、(X+1-1)和(X+1-2)三个收缩压值;也可以对另一个理想血压为X-1的人,测量出(X-1)、(X-1-1)和(X-1-2)三个收缩压值,即柯氏音血压测量法无法区分理想血压差值很小的不同个体的真实血压情况,除非连续多次测量多次发现相同高值。往后测压速度越快情况则越复杂,当测压速度为10 mmHg/每心搏时,可以读出至少17个收缩压值,意味着测量误差会因测压速度增加而增加。另外,运行模拟图显示读不出舒张压。

**结论** 王氏血压测量共振理论认为柯氏音起源于心脏瓣膜关闭产生的振动与受压变形的肱动脉发生共振的结果。血压测量运行模拟图告诉我们:无创血压测量法只能测量收缩压,不能测量舒张压,其对收缩压测量的误差会因测压速度增。

## Aberrant cystatin C sets alarm to reverse dipping blood pressure pattern in hypertensive patients

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**Objective** The reverse dipper of blood pressure pattern is associated with the increasing risk of target organ damage and cardiovascular events in hypertensive patients. However, the risk factor in reverse dipping blood pressure pattern is poorly identified. This study aimed at finding out the risk factor in hypertensive patients with reverse dipping blood pressure pattern.

**Methods** 311 patients were qualified in this cross-sectional study. They were divided into 3 groups based on decline rate of blood pressure and their parameters were compared. The clinical parameters of these patients were subject to univariate analysis and multivariate logistic regression analysis for screen the risk factor. The receiver operating characteristic (ROC) curve

was used to determine the optimal cut-off point of the cystatin C by using Youden's index. The relationship between two continuous variables was assessed by bivariate correlation analysis (Pearson's correlation).

**Results** The hypertensive patients showed reduction in estimated glomerular filtration rate (eGFR), especially more reduce in reverse dipper. Reverse dipper were in older (63.0 [SD 11.8] vs. 56.9 [SD 11.6] vs. 51.1 [SD 14.3] years,  $P < 0.001$ ), had high level of cystatin C (1.12 (0.94-1.32) vs. 1.08 (0.82-1.19) vs. 0.99 (0.90-1.17) mg/L,  $P = 0.071$ ) and lower eGFR (75.56 [SD 21.40] vs. 82.99 [SD 18.00] vs. 86.65 [SD 17.50] mL/min/1.7 m<sup>2</sup>,  $P = 0.001$ ). It compared with dipper and non-dipper respectively, OR of cystatin C were 2.660 (95CI: 1.039 to 6.815,  $P = 0.041$ ) and 2.757 (95CI: 1.286 to 5.912,  $P = 0.009$ ), OR of eGFR (60-89 mL/min/1.7 m<sup>2</sup>) were 9.963 (95CI: 1.957 to 50.725,  $P = 0.006$ ) and 4.303 (95CI: 1.747 to 10.594,  $P = 0.002$ ), OR of eGFR (<60 mL/min/1.7m<sup>2</sup>) were 12.301 (95CI: 1.928 to 78.497,  $P = 0.008$ ) and 5.533 (95CI: 1.742 to 17.576,  $P = 0.004$ ). The results indicated that aberrant cystatin C level is a risk factor. The area under the curve of cystatin C was 0.572 with an optimal cut-off point of 1.355 mg/L [specificity: 90.5%; sensitivity: 25.0%]. Cystatin C was positively correlative with decline of nocturnal systolic blood pressure ( $r = 0.196$ ,  $P = 0.001$ ).

**Conclusions** Hypertensive patient with reverse dipping BP pattern is significantly associated with renal function loss. Aberrant cystatin C level is an independent risk factor in those patients.

## 用血压指数评价24小时血压状态

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**目的** 血压波动性是一种已经明确的血压现象,但至今尚不知道其波动幅度有多大。实际上,每一次心脏搏动产生的血压都是不同的,只是正常个体波动的幅度小些,而高血压个体波动的幅度大些。考虑血压测量的偶然性和血压波动的必然性,血压指数可全面评价个体24小时的血压状态。

## 方法

### 1. 计算血压率

24小时内多次测量个体在静息、运动中(可能的话)和运动后的血压,不低于30次,不设上限。按照中国高血压防治指南2010的诊断标准(只采用收缩压指标),计算血压率:血压率=A(24小时内测得的某一血压区间值的次数)/B(该时段内测量的血压总次数)×100%

血压区间值包括正常血压区间值、高值血压区间值、一级高血压区间值、二级高血压区间值和三级高血压区间值,相对应的是正常血压率、高值血压率、一级高血压率、二级高血压率和三级高血压率,后四个统称异常血压率。

### 2. 编制血压指数评分表

将四个异常血压率各自以20%的梯度分成5档,再按照从左到右,从重到轻的顺序排列组合制成101档的血压指数评分表,即血压指数从0到100分,分值越高代表血压越正常(附评分表)。

### 3. 血压指数评分表的使用

多次测量血压后归类计算四种异常血压率的百分数,按照三级、二级、一级和高值血压率的顺序,于表内查出相对应的血压指数分值。

**结果** 依据血压指数评价表把血压分成三种状态:

1. 理想血压:任意时刻收缩压 $\leq 120$  mmHg,只1档,血压指数为100,是血压的完美状态。可再分为静态理想血压、动态理想血压和全状态理想血压三种。

2. 亚理想血压:一、二、三级高血压率指标均为零,且 $120$  mmHg<任意时刻收缩压< $140$  mmHg。高值血压率分为5档,血压指数评分区间为99-95。可再分为静态亚理想血压、动态亚理想血压和全态亚理想血压三种,是可以接受的血压状态,是一道是否治疗的分水岭。高值血压人群4年内转变成高血压者比例极大,高值高者比例更大,故积极治疗获益更多。

3. 高血压:任意时刻只要有一次收缩压 $\geq 140$  mmHg。更细化了高血压的分类并准确地定位高血压的严重程度,高血压率分为95档,血压指数评分区间为94-0。这是一种病理性血压,是不可接受的血压。血压达到该级别的个体必须立即接受药物治疗,否则风险极大。

**结论** 在高血压的诊断和疗效评价中,运用血压指数评分会比单次血压测量更准确、更稳定、更全面、更直观、更真实,能反映地反映人体全天候的血压状态,提升科研对比的可行性。

## 老年高血压患者的降压治疗与衰弱的关系分析

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**目的** 分析老年高血压患者的降压治疗与衰弱的关系。

**方法** 通过对2016年广州军区离退休干部体检筛选出561例年龄65~100岁的老年高血压患者,依据国际营养和衰老学会采用衰弱问卷式评分(FRAIL标准)分为衰弱组142例和非衰弱组419例,同时进行健康问卷调查,对社区高血压人群衰弱的发生率及与降压药物的关系进行分析。FRAIL标准包括以下5项:疲劳感:上周多数时间感到做每件事都很费力;阻力感:上一层楼都困难;活动少:不能行走一个街区;多病共存>5种病;体质量下降:1年内体质量下降>5%。符合3项或以上即为衰弱。

**结果** 老老年高血压患者衰弱的发生率高于老年高血压患(26.9% & 13.4%,  $X^2=5.679$ ,  $P<0.05$ );高血压患者服用2种以上降压药物衰弱组较非衰弱组增多,差异有统计学意义( $P<0.05$ )。

**结论** 衰弱在老老年高血压患者中更多见,2种以上降压药物可能增加衰弱的发生。

## 失眠对高血压患者血压的影响幅度

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**目的** 探讨失眠对高血压患者血压的影响幅度。

**方法** 入选康华医院心血管中心门诊和长安社区门诊就诊的高血压合并失眠的患者,采用患者睡眠良好状态下两次稳定血压的均值及失眠状态下血压的自身前后对比,睡眠障碍诊断标准按《睡眠状况自评量表(SRSS)》,选择量表积分小于20的轻度睡眠障碍的高血压患者。

**结果** 收集到门诊高血压伴轻度失眠的患者108例,失眠前后收缩压/舒张压差变化范围在10-48/6-18 mmHg,失眠前后收缩压差均值为26.33 mmHg,舒张压均值为14.07 mmHg;无高血压的睡眠障碍患者55人,失眠前后收缩压/舒张压变化范围在8-31/6-19 mmHg,收缩压前后差21.53 mmHg,舒张压前后差12.07 mmHg。收缩压最大波动31 mmHg,舒张压最大波动19 mmHg,前后对比,值均 $<0.001$ ,

差异有统计学意义。

**结论** 失眠对高血压患者的血压升高幅度有明显影响。

## 原发性高血压患者醛固酮水平与体重指数的相关性分析

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**目的** 研究原发性高血压患者醛固酮水平与体重指数的相关性。

**方法** 选用2015年2月至2016年11月新疆维吾尔自治区乌鲁木齐市、阜康市、喀什地区、塔城地区初次确诊的1205例初治原发性高血压患者作为研究对象,进行受试者醛固酮水平与BMI相关性分析。

**结果** 不同醛固酮组的体重指数存在显著差异( $t=-7.77, P<0.05$ ),高醛固酮组的BMI高于低醛固酮组,醛固酮与BMI呈正相关( $r=0.159, P<0.05$ ),年龄、收缩压、舒张压、血钾、血钠、血管紧张素1、2之间的差异也具有统计学意义( $P<0.05$ ),高醛固酮组的年龄和血钾水平低于低醛固酮组,收缩压、舒张压、血清钠、血管紧张素1、2大于低醛固酮组,多元线性回归分析中,BMI、年龄、血清钠、钾对醛固酮的高低有显著影响( $P<0.05$ )。

**结论** 醛固酮水平与BMI具有相关性,表现为醛固酮与BMI呈正相关,BMI升高,醛固酮随之增加。

## 高血压患者心率控制及β受体阻滞剂使用情况分析

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**目的** 高血压患者心率控制及β受体阻滞剂使用情况分析。

**方法** 选取2017年在我院参加离退休干部体检和社区健康体检的高血压患者875例,进行横断面调查,调查表内容涵盖性别、年龄、既往疾病史、生命体征、身高、体重、吸烟史、实验室检查、β受体阻滞剂使用情况等。按照血<140/90 mmHg、140-159/90-99 mmHg、160-179/100-109 mmHg、≥180/110 mmHg分为血压正常组、1级高血压组、

2级高血压组、3级高血压组;按照年龄小于65岁、65-79岁、≥80岁分为中年组、老年组、高龄组,以心率<80次/分为心率达标;高血压合并冠心病时以心率<60次/分为心率达标。

**结果** 本研究875例高血压患者平均心率为72.03±10.53次/分。按照血压水平分组后各组心率达标率分别为77.63%(236/304例)、79.10%(280/354例)、71.27%(129/181例)、66.66%(24/36例);中年组、老年组、高龄组心率达标率分别为84.43%(103/122例)、75.24%(155/206例)、75.14%(411/547例);高血压合并冠心病患者心率达标率只有13.58%(58/427例)。所有高血压患者中β受体阻滞剂使用率为22.40%(196/875例),其中与钙离子拮抗剂联合使用最多;各血压水平分组β受体阻滞剂使用率分别为24.01%(73/304例)、20.34%(72/354例)、21.55%(39/181例)、33.33%(12/36例),差异有统计学意义;各年龄分组β受体阻滞剂使用率分别为17.21%(21/122例)、21.36%(44/206例)、23.95%(131/547例),差异有统计学意义;心率达标组β受体阻滞剂使用率高于心率未达标组(23.02%vs 20.38%),但差异没有统计学意义;高血压合并冠心病患者β受体阻滞剂使用率28.81%(123/427例),高于单纯高血压患者,差异有统计学意义。

**结论** 本研究人群心率达标率较高,但在高血压合并冠心病时心率达标率低,且β受体阻滞剂使用率较低,建议在高血压患者随访中应加强心率管理,提高心率达标率以减少心血管事件发生。

## Th17/Treg细胞在妊娠期高血压疾病中的作用及其研究进展

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**目的** 了解Th17/Treg细胞在妊娠期高血压发生发展中的可能机制,为妊娠期高血压的防治提供参考。

**方法** 利用相关数据库(Medline, Pubmed, Web of science, 中国知网,万方网等)检索Th17/Treg细胞及妊娠高血压相关文献,并对相关文献进行综述。

**结果** 妊娠期高血压是妊娠期特有的疾病,严重威胁母婴安全,其发病原因至今未明。妊娠是一个类似于同种异体移植的复杂生理过程,母胎之间的免疫耐受是妊娠得以维持的关键因素。新近发现的调节性T细胞(Treg)和辅助性T细胞17(Th17)在妊娠期高血压疾病中起着重要的作用。Treg细胞介导的免疫耐受能力下降和Th17细胞介导

的免疫反应增强是导致妊娠期高血压疾病发生的重要原因,它们之间平衡的打破可能是多种疾病发生的关键因素。近年来,Treg细胞“主动”抑制机制在免疫耐受中的作用越来越受到重视。而利用特异性IL-17单克隆抗体体内干预自身免疫性疾病、器官移植以及肿瘤也是研究的热点。

**结论** 深入研究Th17/Treg细胞平衡在妊娠免疫耐受中的作用对于揭示妊娠期高血压疾病的机制意义重大,对于临床预防将产生深远的影响。

## 原发性高血压患者中心动脉压及外周血压与左心室肥厚的相关性研究

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**目的** 探讨原发性高血压患者中心动脉压(Central arterial pressure, CAP)及外周血压与左心室肥厚(Left ventricular hypertrophy, LVH)的相关性。

**方法** 采集在新医大一附院心脏中心高血压科住院的患者497例。根据测定的左心室质量分为2组,即左心室质量正常组(男性LVMI<115 g/m<sup>2</sup>,女性LVMI<95 g/m<sup>2</sup>,n=367)和左心室肥厚组(男性LVMI≥115g/m<sup>2</sup>,女性LVMI≥95 g/m<sup>2</sup>,n=130)。收集这些患者的一般临床资料、中心动脉压相关指标、24h动态血压,分析上述指标与左心室质量的相关性和影响因素。

**结果** 两组患者的BMI、空腹血糖、总胆固醇、高密度脂蛋白、载脂蛋白A1、载脂蛋白B、肌酐、尿素氮、血清胱抑素C、入院脉压、中心动脉脉压水平比较,差异均无统计学意义( $P>0.05$ )。而两组患者的性别、年龄、甘油三酯、入院收缩压、舒张压及中心动脉收缩压、中心动脉舒张压、24 h收缩压、24 h舒张压、24 h脉压比较差异均有统计学意义( $P<0.05$ )。Pearson相关性分析显示,LVH与入院收缩压、入院舒张压、中心动脉收缩压、中心动脉舒张压、中心动脉脉压、24 h收缩压、24 h舒张压、24 h脉压呈正相关, ( $r=0.341, P<0.01$ ;  $r=0.237, P<0.01$ ;  $r=0.362, P<0.01$ ;  $r=0.240, P<0.01$ ;  $r=0.236, P<0.01$ ;  $r=0.236, P<0.01$ ;  $r=0.185, P<0.05$ ;  $r=0.268, P<0.05$ )。在调整年龄、性别后,多元逐步回归分析显示,中心动脉收缩压与左心室质量的关系比相应的24 h收缩压更为密切。

**结论** 原发性高血压患者人群中,左心室质量指数与中心动脉收缩压密切相关,比室内血压和24 h收缩压的关系更为密切。

## 老年患者动态血压对比诊室血压的10年死亡风险及预测模型构建

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**目的** 动态血压对预后影响的证据主要来自基于人群的研究和一些相对年轻患者的临床调查。这项研究调查了诊室血压对比24 h动态血压与住院老年患者的全因死亡率之间的关系,并择最具预测价值的血压参数构建死亡风险预测模型。

**方法** 我们分析了2003年至2008年间在南部战区总医院住院并完成24 h动态血压和诊室血压监测的老年患者的795例数据。用Cox回归模型进行分析各血压参数的死亡风险,根据临床和24小时动态血压以及混杂因素进行调整。采用nomogram列线图构建死亡预测模型,根据时间依赖的AUC曲线拟合图和C指数评估模型10年风险的区分度、根据Calibration curve(校准曲线)评估校准度、临床决策曲线分析(Decision Curve Analysis, DCA)评估临床效用并采用重采样 resampling(bootstrap)1000次的方法对模型进行内部验证。

**结果** 在平均10年的随访时间中,发生了241起全因死亡事件。在包括24 h动态和诊室血压参数的模型中,24 h动态收缩压与全因死亡率有更强的相关性(血压每增加1-SD,HR 1.13;95%CI 0.94-1.33,经诊室血压调整后)对比诊室收缩压(HR 1.06;95%CI 0.90-1.26,经调整24小时血压后)。夜间动态收缩压每增加1-SD的相应危险比为1.18(95%CI 0.92-1.51,经诊室和日间血压调整后),日间动态收缩压为0.97(95%CI 0.75-1.26,经诊室和夜间血压调整后)。以夜间动态血压及各心血管危险因素构建预测模型 nomogram 列线图,时间依赖的AUC曲线拟合图随月份的增加而较稳定从0.782增长至0.796、C指数0.7311(95%CI 0.6974-0.7647),模型具有良好的区分度;校准度评价当观察到的死亡事件发生率10%-30%时,预测与实际风险值一致;夜间血压预测模型获益比极端曲线高,存在明显的净获益。1000次重采样后的完整模型AUC=0.777,和构建模型无明显区别,仍具有良好的预测价值。

**结论** 动态血压比诊室血压监测更能预测全因死亡,尤其夜间血压预测能力最强。以夜间动态血压及相关心血管危险因素构建死亡风险预测模型 nomogram 列线图具有良好的区分度、校准度、临床有效性,具有较好的预测价值。

## 高血压患者脉压与早期动脉硬化指标的关系

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**目的** 探讨高血压患者外周脉压包括诊室脉压、24小时平均脉压(24 hMPP)和中心动脉脉压(CAPP)与早期动脉硬化指标的关系。

**方法** 收集遵义医科大学附属医院高血压门诊未经治疗的高血压患者临床资料412例,测量诊室脉压、24 hMPP、CAPP,测定踝肱指数(ABI)、肱踝脉搏波传导速度(baPWV)、颈股脉搏波传导速度(cfPWV)、增强指数(Alx)。

**结果** 本研究高血压患者中诊室脉压、24 hMPP和CAPP中男性宽脉压者分别占37.4%、41.2%、20.6%;女性分别占62.6%、58.8%、79.4%( $P<0.05$ )。诊室脉压、24 hMPP、CAPP均随年龄增大而增大,老年组脉压增大更明显( $P<0.05$ )。与非宽脉压组比较,诊室脉压、24 hMPP、CAPP宽脉压组患者的ABI、Alx、baPWV、cfPWV均增高( $P<0.05$ )。偏相关分析显示,诊室脉压、24 hMPP、CAPP与baPWV、cfPWV均呈正相关,且诊室脉压、24 hMPP与ABI、CAPP与Alx亦呈正相关,余均无相关性。Bland-Altman分析显示,与诊室血压、脉压比较,24小时平均血压、脉压与中心动脉压和脉压的一致性较好。

**结论** 高血压患者脉压随年龄增大而增大,女性的脉压变化较男性更为显著;脉压与ABI、baPWV、Alx、cfPWV均呈正相关,且24 hMPP与baPWV及cfPWV、CAPP与Alx的相关性较好,24 hMPP与CAPP的一致性和相关性均较诊室脉压更好。

## 原发性高血压患者24小时尿钠排泄量与血压的关系

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**目的** 探讨原发性高血压患者尿钠排泄量与血压的关系。

**方法** 方法选择成人原发性高血压195例,通过24 h尿钠排泄量测定钠盐摄入量,将入选人群分为低尿钠组( $n=$

47),中间尿钠组( $n=84$ ),高尿钠组( $n=64$ )。测量诊室血压,24小时动态血压水平。分析患者每日盐摄入量与血压的相关性。

**结果** 三组患者24hDBP、dDBP、nDBP和诊室DBP比较,差异有统计学意义( $P<0.05$ )。24小时尿钠排泄量是24hSBP、24hDBP、dSBP、dDBP、nSBP、nDBP的影响因素。同时BMI对24hSBP、dSBP、nSBP的影响有统计学意义,24小时尿钾排泄量与24hSBP、dSBP、nSBP呈反比关系。年龄与24hDBP、dDBP、nDBP呈反比关系。( $P<0.05$ )。

**结论** 患者盐摄入量与血压水平呈正相关,控制高血压患者盐摄入量对控制患者血压水平具有重要的临床意义。

## 抗高血压药物的研究

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**目的** 为其他抗高血压药物开发和高血压的合理治疗提供参考。

**方法** 以“高血压”“药物”“抗高血压药”等为关键词,组合查询2004年1月-2019年3月在中国知网、万方、维普等数据库中的相关文献,对目前抗高血压药物进行综述。

**结果** 抗高血压药物治疗是近年来学术界研究的一个热点。目前临床常用抗高血压药物包括利尿剂、 $\beta$ 受体阻滞剂、血管紧张素转换酶抑制剂和血管紧张素II受体拮抗剂、长效钙拮抗剂及 $\alpha$ -受体阻滞剂。由于各种抗高血压药物作用部位的特异单一性,且均有一定的不良反应。因此近年来开发新型抗高血压药物及方法研究较为活跃,包括联合用药及其他新型抗高血压药物如阿利克林及中药降压等,达到了增效减毒的目的。

**结论** 目前抗高血压药物效果仍待继续研究,而通过对高血压的机制研究来提高现有药物的疗效及开发其他抗高血压药物是今后工作的重点方向。

## The hypoxic burden of sleep apnea assesses nocturnal blood pressure fluctuations

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**Objective** Patients with obstructive sleep apnea (OSA) are known to experience striking blood pressure (BP) fluctuations at night. The relationship between apnea-hypopnea index (AHI) or oxygen desaturation index (ODI) and nocturnal blood pressure changes appears inconsistent, potentially be-

cause the AHI/ODI, a frequency measure, does not adequately reflect OSA burden.

**Methods** Thirty OSA patients (24 men and 6 women) underwent overnight portable monitoring and beat-to-beat BP monitoring simultaneously between January 2017 and April 2017.

**Results** Thirty OSA patients (24 men and 6 women) underwent overnight portable monitoring and beat-to-beat BP monitoring simultaneously between January 2017 and April 2017.

**Conclusions** The 'hypoxic burden', an easily derived signal from overnight sleep study is able to comprehensively reflect the characteristics of oxygen desaturation events. Drastic increase of this novel index is associated with nocturnal fluctuations in OSA patients, and may be used to predict poor cardiovascular outcomes.



## · 冠心病及动脉粥样硬化的研究 ·

## The impact of focal inflammatory in myocardial infarction with non-obstructive coronary arteries (MINOCA) patients: An Optical Coherence Tomography Study

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**Objective** The latest Expert Consensus about definition of myocardial infarction reveal that myocardial infarction (MI) with nonobstructive coronary arteries (MINOCA) occurs in 5% to 10% of all patients with myocardial infarction. Coronary atherosclerosis has been regarded as a potential mechanism of MINOCA. Recent studies suggested that not all culprit lesion are born equal and part of them might be caused by inflammatory or non-inflammatory mechanisms. Our retrospective study aimed at compared the intravascular imaging characteristics between MINOCA patients caused by inflamed or non-inflamed culprit lesion.

**Methods** A total of 713 patients were included in this study, we enrolled 53 patients with acute coronary symptom (ACS) and did not have any lesion with  $\geq 50\%$  diameter stenosis on coronary angiography at the site of the culprit stenosis identified by optical coherence tomography (OCT). Patients were divided into two cohorts according to the presence of macrophage at OCT analysis. The severity of plaque inflammation was established by assessing macrophage infiltration (MØI) in OCT images. Thirty-four (64%) patients had MØI at the site of culprit lesion, whereas 19 (36%) patients had no evidence of MØI.

**Results** MINOCA with MØI had a trend of smaller minimal lumen area (MLA) ( $3.5 \pm 2.4 \text{ mm}^2$  vs.  $4.1 \pm 1.6 \text{ mm}^2$ ,  $P=0.049$ ) compared with those without MØI. MØI group showed a significantly longer lipid length ( $13.7 \pm 7.0 \text{ mm}$  vs.  $7.2 \pm 7.4 \text{ mm}$ ,  $P=0.002$ ), higher present lipid index ( $2168.5 \pm 1557.2$  vs.  $996.1 \pm 1197.2$ ,  $P=0.004$ ) and higher mean lipid arc ( $140.9 \pm 58.7^\circ$  vs.  $85.5 \pm 70.0^\circ$ ,  $P=0.012$ ). Furthermore, the group with MØI exhibited a significantly higher rate of lipid-rich plaques (91.2% vs.

57.9%,  $P=0.01$ ), a higher rate of Cholesterol crystal (47.1% vs. 10.5%,  $P=0.007$ ) compared with those without MØI.

**Conclusions** MINOCA can be caused by predominant inflammatory or non-inflammatory mechanisms, inflamed MINOCA can get more sufficient lumen profile and had evidence of a more vulnerable phenotype as compared with noninflamed MINOCA characterized by a high rate of lipid plaques and multifocal inflammation.

## Metabolomics Implicates Metabolic Disturbances on Outcomes of Coronary Artery Disease Partially Attributed to Heart Malfunction

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**Objective** This study sought to assess the contribution of metabolite profiles to the risk of death or major adverse cardiovascular events (MACE) in patients with coronary artery disease (CAD).

**Methods** A two-stage prospective study in CAD cohorts with 1564 Chinese patients was conducted, plasma metabolite profiles was identified through widely-targeted metabolomic profiling and targeted biomarkers was validated using quantitative liquid chromatography-tandem mass spectrometry.

**Results** A total of 1040 patients and 524 patients were enrolled as the discovery cohort (mean [SD] age, 63.03 [10.04] years; 828 [79.62%] male) and the validation cohort

(62.07 [9.83] years; 411 [78.44%] male), respectively. Among the 202 targeted metabolites, 24 and 19 metabolites were significantly associated with death and MACE risk, respectively (adjusted  $P < 0.05$ , False Discovery Rate  $< 0.05$ ), increased d-sorbitol,  $\beta$ -pseudouridine and l-kynurenine and decreased ibuprofen, 3,3',5-triiodo-l-thyronine and benzoylformic acid were independent predictors of death risk. Meanwhile, high 5-methyluridine and l-kynurenine and low lysoPC 20:2 and l-tryptophan were independent predictors of increased MACE risk. An eight-metabolite panel, together with clinical factors, dramatically enhanced the predictive efficacy for death risk, compared with trimethylamine N-oxide plus traditional risk factors or traditional risk factors only (area under the curve of 86.3% vs. 74.8% vs. 72.8%). Increased l-kynurenine independently predict high death risk (hazard ratio [HR], 1.69; 95% CI, 1.07-2.65;  $P = 0.0233$ ) and left ventricular malfunction (estimate [SE], -2.90 [0.65];  $P = 1.01E-05$ ), while, increased tryptophan predicted low death risk (HR, 0.60; 95% CI, 0.36-0.99;  $P = 0.0472$ ) and good left ventricular function (estimate [SE], 1.89 [0.85];  $P = 0.0255$ ), both were robustly validated.

**Conclusions** A prognostic model based on the novel multiple metabolite biomarkers and clinical factors was powerful for risk stratification of CAD patients. Tryptophan metabolism dysregulation is the key metabolic pathway underlying CAD progression, and potentially indicate new targets for prevention and reduction of left ventricular malfunction and death.

## 区域协同救治体系建设改变了什么? ——中国最早的胸痛中心单中心数据分析

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**目的** 通过分析中国最早的以区域协同救治体系为依托的胸痛中心的单中心数据, 评价胸痛中心建设对直接经皮冠状动脉介入治疗(PPCI)的急性ST段抬高型心肌梗死(STEMI)患者的救治时间和院内死亡率的影响。

**方法** 从2010年1月1日至2017年12月31日, 我院共收治了STEMI患者2782例, 其中有1570例接受了PPCI的患者符合入选条件, 根据不同年份, 将患者分为8个组, 比较

不同年份患者的救治时间及院内死亡率的变化。

**结果** 8组患者在性别、年龄、高血压史、罪犯血管、住院天数及住院费用等方面差异无明显统计学意义( $P > 0.05$ )。8组患者发病到首次医疗接触(S-to-FMC)时间从2010年116分钟降至2017年的85分钟( $P=0.002$ ); 患者的首次医疗接触到球囊开通血管时间(FMC-to-B)从2010年的264分钟降至2017年的163分钟( $P < 0.001$ ); 患者的门球时间(D-to-B)从2010年109分钟降至2017年43分钟( $P < 0.001$ ); 患者的发病到球囊开通血管(总缺血)时间(S-to-B)从2010年402分钟降至2017年的285分钟( $P < 0.001$ )。胸痛中心成立后, 心衰发生率总体呈现下降趋势( $P = 0.082$ ); 患者的院内死亡率从2010年10.7%下降至2017年3.4%( $P=0.025$ )。

**结论** 区域协同救治体系下, 胸痛中心模式显著缩短了接受PPCI的STEMI患者的救治时间, 尤其是PPCI院内救治时间和医疗系统的延误, 从而有效降低了STEMI患者的院内死亡率。未来应该在政府和卫计委的支持下, 加强公众教育及鼓励拨打120入院, 缩短发病到首次医疗接触时间; 同时鼓励基层医院加入到胸痛中心建设中来, 普及对基层医院的培训教育, 缩短基层医院救治延误和转运时间延误, 进一步缩短患者的救治时间。

## 注射用尼可地尔预处理对非ST段抬高型急性冠脉综合征患者无复流现象的预防效果

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**目的** 分析在非ST段抬高型急性冠脉综合征患者(Non-STEMI ACS)冠脉支架介入手术(PCI)前使用尼可地尔预处理, 从而减少PCI术中慢血流以及无复流的总体效果。

**方法** 选自2017年1月到2017年12月在中国人民解放军总医院接受PCI手术的非ST段抬高型急性冠脉综合征患者共1460例, 随机分为两组, 一组是注射用尼可地尔药物干预组( $n=728$ ), 另一组是对照组( $n=732$ )。其中尼可地尔药物干预组是在术前使用注射用尼可地尔(瑞科喜)预处理24小时, 以每小时2 mg的速度静滴, 在PCI术中观察患者支架植入后的冠脉血流灌注情况, 评估靶向血管开通后远端前向血流(TIMI血流分级), 术后复查血生化结果并进行统计学分析, 观察患者住院期间的手术并发症情况。

**结果** 入组患者的平均年龄为61岁,76.1%(1111/1460)的患者为男性,14.9%的患者为急性非ST段抬高型心肌梗死(217/1460),两组患者在心血管主要危险因素以及血生化指标之间没有显著差异。静脉注射尼可地尔预处理干预组术中无复流的发生率较干预组明显下降(2.34% vs. 4.37%,  $P < 0.05$ ),同时围术期心肌损伤的发生率较对照组也明显下降(5.91% vs. 8.74%,  $P < 0.05$ )。

**结论** 术前使用注射用尼可地尔预处理可以有效预防术中出现无复流事件,在围术期有效保护心肌组织。

## The efficacy and safety of levosimendan combined with IABP in patients with acute myocardial infarction complicated with cardiogenic shock

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**Objective** Acute myocardial infarction with cardiogenic shock is currently the biggest challenge of cardiovascular problems; short-term mechanical assistance in time to open culprit vessel is the most important treatment. However, after the opening of the criminals the existence of a large number of myocardial stunned, for several hours to several days, will affect the entire heart function. Levosimidon has the effect of increasing myocardial systolic function and vasodilator effect, can play a benign effect in patients with acute myocardial infarction, improve the suppression of myocardial injury, reduce myocardial cell apoptosis and inflammatory response, and no malignant effect. The goal of this study was to evaluate efficacy and safety of levosimendan combined with IABP in patients with acute myocardial infarction complicated with cardiogenic shock.

**Methods** Between May 2017 and December 2018, we conducted a prospective, two-arm, cluster observational study. The study population consisted of 42 patients with acute myocardial infarction complicated with cardiogenic shock who received emergency PCI and implantation of IABP assisted circulation and satisfied the inclusion criteria. Levosimendan was given as a continuous infusion of 0.1  $\mu\text{g}/\text{kg}/\text{min}$  for 24 h, and the remaining 20 patients received placebo treatment. The

study included multiple primary end points were IABP use time, intensive care unit days, hospital mortality rate and length of hospital stay, the incidence of major adverse events in 30 days after myocardial infarction: recurrent myocardial infarction, stroke, revascularization, death and rehospitalization rate.

**Results** In total, 42 patients were enrolled (levosimendan + IABP group 22 patients, IABP + traditional drugs 20 patients). The IABP use time, intensive care unit days and length of hospital stay in the levosimendan + IABP group was lower than that in placebo group ( $3.2 \pm 1.8$  d vs.  $5.5 \pm 2.6$  d,  $P = 0.042$ ), ( $5.8 \pm 3.2$  d vs.  $7.5 \pm 4.3$  d,  $P = 0.038$ ), ( $10.2 \pm 3.4$  d vs.  $13.8 \pm 3.2$  d,  $P = 0.035$ ). Moreover, the hospital mortality rate was similar between the 2 groups (9.1% vs. 15.0%,  $P = 0.586$ ). The incidence of major adverse events in 30 days after myocardial infarction in the levosimendan + IABP group was lower than that in placebo group (22.8 vs. 35%, HR 1.212, 95% CI 1.021–1.892,  $P = 0.045$ ), the mortality rate at 6 months was similar between the 2 groups (9.1% vs. 15.0%, HR 0.824, 95% CI 0.452–1.268,  $P = 0.527$ ).

**Conclusions** Short-term intravenous infusion of levosimendan appears to be more effective than placebo for treating patients with IABP in patients with acute myocardial infarction complicated with cardiogenic shock.

## AT1受体在同型半胱氨酸导致动脉粥样硬化斑块不稳定性中的作用

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**目的** 探究血管紧张素 II I型受体(Angiotensin II I receptor, AT1)在同型半胱氨酸(Homocysteine, HCY)导致动脉粥样硬化斑块不稳定性中的作用。

**方法** 以载脂蛋白 E 基因敲除小鼠(Apolipoprotein E knocked out, ApoE<sup>-/-</sup>)作为动脉粥样硬化模型,喂养含1.5%的蛋氨酸饲料作为高同型半胱氨酸血症的模型,替米沙坦阻断At1受体。将21只8周龄雄性ApoE<sup>-/-</sup>小鼠,称重按照随机数字表分为三组,分别为对照组、高同型半胱氨酸

(Hyperhomocystein, HHCY)、HHCY+替米沙坦干预组(1.5%蛋氨酸+替米沙坦5 mg/kg 灌胃治疗);共治疗18周,治疗前后测量各组体重、血压。饲养18周后,摘眼球取血,检测血脂和HCY。油红“O”染色测量主动脉根部斑块面积、免疫组化SP法检测斑块内炎性因子白介素-6(interleukin-6, IL-6)、单核细胞趋化蛋白-1(Monocyte drive protein-1, MCP-1)、巨噬细胞表面分子(Macrophage surface molecules, mac-3)、基质金属蛋白酶-9(Matrix metalloproteinase-9, MMP-9)的表达水平,Masson染色胶原蛋白。

**结果** 三组血脂水平无统计学意义;HHCY组的主动脉根部斑块面积、炎性因子、MMP-9的水平均高于对照组,替米沙坦治疗组斑块面积、炎性因子、MMP-9的表达水平明显降低,胶原蛋白生成增加。

**结论** HCY具有促动脉粥样硬化斑块发展和不稳定性的作用,而替米沙坦可以逆转HCY这一作用,说明其机制可能是通过At1受体。

## The association between CMTM5 gene and atherosclerosis and the relative mechanism studys

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**Objective** To elucidate the correlation between CMTM5 gene and the risk of coronary artery disease and detect the effects of CMTM5 gene expression changes on the adhesion and migration of THP 1 cells.

**Methods** Using a case-control study, A total of 700 hospitalized patients were enrolled. Coronary artery diseases (CAD) were diagnosed by coronary angiography. Using ELISA method to detect plasma CMTM5 levels. Using adhesion and Transwell experiments to evaluate the chemotactic capability of CMTM5 gene on THP-1.

**Results** CMTM5 gene expression is closely related to the CAD, CMTM5 level was associated with a significant coronary artery three lesions ( $P<0.05$ ), the adhesion and migration of THP-1 of CMTM5 gene over-expression group is significantly higher than control group and the CMTM5 low expression group ( $P<0.001$ ).

**Conclusions** CMTM5 gene is closely related to atherosclerosis, and significantly associated with coronary artery three le-

sions. CMTM5 promotes the adhesion and migration of THP-1, which maybe the mechanism of to promote the development of Atherosclerosis.

## Bioinspired platelet-liposome loaded with rapamycin enhance anti-atherosclerosis effect via targeting plaque

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**Objective** Atherosclerosis is a chronic inflammatory disease with macrophage, platelet involving in its progression. However, no effective therapeutics are available to inhibit and stabilize plaque. Inspired by roles of platelets in atherosclerosis, here we established a platelet-bioinspired, rapamycin-loaded targeted delivery system to precisely inhibit inflammation and stabilize plaque.

**Methods** Rapamycin was loaded into liposome (Lipo) to get Rap-liposome (Rap-Lipo) through filming-rehydration method, platelet membrane (P) was extracted through freeze-thaw cycle and extruded with Rap-Lipo to get Rap-P-Lipo. Fusion of P and Lipo was tested by Fret analysis. Nanoparticle characteristics were analyzed through TEM, DLS. Pharmacokinetic and drug releasing analysis were conducted in vivo and in vitro through HPLC. Atherosclerosis was established in ApoE<sup>-/-</sup> mice with high fat diet and qualified with oil red O staining. In vitro and ex vitro targeting analysis was conducted after respectively incubation of P-Lipo and Lipo with human carotid plaque and lavage of mice aorta through IVIS, stereoradioscopy and confocal microscopy. In vivo targeting was evaluated after intravenous injection of P-Lipo and Lipo. Target mechanisms were analyzed through immunofluorescence co-localization analysis and further demonstrated by selective binding and co-localization between P-Lipo and several components of plaque.

**Results** Fret analysis demonstrated the fusion of P and Lipo. TEM and DLS indicated no significant morphologic and physical differences between P-Lipo and Lipo. Pharmacokinetic and releasing analysis indicated common short release of both particles whereas P-Lipo presented much longer circulation

and releasing time. In vivo and in vitro targeting analysis demonstrated P-Llipo could significantly target to human and mice atherosclerotic plaque. Further analysis revealed platelet membrane in P-Llipo selectively bind to several components of plaque.

**Conclusions** Here, we exploited a bioinspired Rap delivery system with targeted binding of platelet to plaque. This study succeeded in precisely and efficiently inhibiting inflammation and stabilizing plaque whereas reduced adverse effects of Rap in circulation, and is promising to make further clinic use in anti-atherosclerosis.

## 冠心病患者替格瑞洛停药原因及停药对临床转归的影响分析

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**目的** 分析冠心病患者替格瑞洛停药原因及停药对临床转归的影响。

**方法** 连续募集2018年1月至2018年10月在新疆医科大学第一附属医院住院并接受替格瑞洛抗血小板治疗的冠心病患者642例,分析患者3个月内替格瑞洛停用的发生情况及停药原因。对入选患者经皮冠状动脉介入术(PCI)后随访6个月,比较患者3个月内停用替格瑞洛与持续服用该药发生缺血事件[包括主要缺血事件和次要缺血事件及出血终点事件的差异]。

**结果** 本研究中164例(25.55%)患者分别在住院期间(42例,25.61%)、出院当天(7例,4.27%)和出院至随访3个月时(115例,70.12%)停用替格瑞洛。停药患者在不同冠心病诊断中的分布为不稳定型心绞痛占78.05%、ST段抬高型心肌梗死(STEMI)占13.41%、非ST段抬高型心肌梗死(non-STEMI)占4.27%和稳定型冠心病占4.27%。院内或出院时替格瑞洛停用的原因主要为替格瑞洛相关呼吸困难(32.65%)、出血(22.45%)和非复杂病变的PCI术(18.37%);院外停用替格瑞洛的原因主要为当地无法购买替格瑞洛(68.70%)和经济原因(16.52%)。停药后,除2例死亡患者,其余患者均在医师指导下更改抗栓治疗方案,其中153例转为氯吡格雷联合阿司匹林抗血小板治疗,1例单独阿司匹林治疗。对完成6个月随访的PCI术后冠心病患者(n=499)分析发现,3个月内停用替格瑞洛患者发

生主要缺血终点事件(4.58% vs 0.82%, HR 6.62, 95%CI 1.17~37.36, P=0.032)及联合缺血事件(11.45% vs 4.89%, HR 2.46, 95%CI 1.03~5.89, P=0.043)的风险均显著高于持续该药治疗的患者。两组患者联合出血终点事件的发生率差异无统计学意义(16.03% vs 17.12%, HR 0.92, 95%CI 0.49~1.73, P=0.795)。

**结论** 替格瑞洛停药在冠心病患者中多见,院内及出院当天停药主要由于替格瑞洛相关呼吸困难、出血副作用及非复杂冠状动脉病变的PCI术,院外停药主要是无法获取药物和经济原因。与未停药患者相比,冠心病患者PCI术后3个月内停用该药可能增加主要缺血事件和联合缺血事件的发生风险。

## Efficacy and safety of different antiplatelet strategies in survivors of myocardial infarction with acute coronary syndrome

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**Objective** Acute coronary syndromes (ACS) is one of the manifestations of cardiovascular diseases considered to be life threatening. ACS remain the most common cause of death globally and in China. The current standard of care for stent thrombosis prophylaxis is dual antiplatelet therapy (DAPT), which involves the use of aspirin together with another antiplatelet agent with a different mechanism of action to enhance platelet inhibition. Although treatment improvements in ACS patients have been accomplished over the past decade, patients with previous ACS are at higher risk for recurrent cardiovascular events following the first event, with about 1% to 9% of ACS patients having subsequent cardiovascular events. Investigating more details in patients with recurrent events can provide more evidence for physicians and patients on how best to monitor patients' progress.

For patients with recurrent events, it's generally considered that this part patients usually at high risk, antiplatelet strategy adjustment may play important role in the process. Ticagrelor is an oral, direct-acting, reversible P2Y12 inhibitor that provides more intense platelet inhibition with more rapid

onset and offset compared with clopidogrel, which involved 18,624 ACS patients, ticagrelor and clopidogrel were compared for the prevention of cardiovascular events, and the results showed that ticagrelor significantly reduced the number of composite ischemic endpoint events, cardiac death and myocardial infarction without an increased rate of major bleeding.

There are limited data available about the antiplatelet strategies for recurrent cardiovascular events in China. In this retrospective study aims to explore if different antiplatelet agents could change the prognosis recurrent acute coronary syndrome in patients with ACS in China.

**Methods** Patients diagnosed with recurrent ACS that underwent a PCI in our hospital were continuously enrolled. A total 13206 post-PCI patients from April 2012 to March 2016 were enrolled, 1608 of them were identified with previous myocardial infarction according to their medical history records. After filtering with the exclusion criteria and informed consent was signed, 1242 patients were enrolled into two groups according to their antiplatelet strategies: clopidogrel group (clopidogrel 75 mg daily plus aspirin 100 mg daily), ticagrelor group (ticagrelor 90 mg twice daily plus aspirin 100 mg daily). During the following 2-year follow-up, 159 patients lost information and 1083 patients were finally included in our trial. The exclusion criteria included any history of surgical procedures within the past year (no including coronary artery bypass grafting (CABG)), hematological disorders, concomitant therapy with a strong cytochrome P-450 3A4 inhibitor or inducer, and pregnancy. The study was approved by the institutional ethics committee, and all participants provided written informed consent. All authors vouch for the accuracy and completeness of the data and analyses.

We continuously recruited 1083 acute coronary syndrome patients diagnosed with previous myocardial infarction undergoing PCI. Among 1083 patients with intact follow-up information, 560 were assigned to clopidogrel group, 523 to the ticagrelor group.

**Results** The primary endpoint of MACCE events at 24 months post-PCI occurred in 74 patients (13.2%) in the clopidogrel group, 55 patients in the ticagrelor group (10.5%). The difference in the 24-month MACCE rates in the ticagrelor group was lower than that in the clopidogrel group (hazard ratio [HR]: 1.252, 95%CI: 1.141-1.683,  $P=0.023$ ), demonstrating the superiority of the ticagrelor strategy over that of clopidogrel one. It was showed that the cumulative Kaplan-Meier estimates of efficacy endpoints. Patients received ticagrelor

therapy suffered lower cumulative risk of MACE ( $P<0.001$ ), all-cause death ( $P=0.001$ ), the risk of MI, TVR, stent thrombosis and stroke did not differ significantly between the two groups. The risk of TIMI-defined major bleeding was found no difference in both clopidogrel and ticagrelor group (HR: 1.231, 95%CI: 0.586-1.896,  $P=0.14$ ), indicating that ticagrelor did not increase the risk of major bleeding, the risk of TIMI-defined minor bleeding was also higher comparing with clopidogrel group (HR: 0.654, 95%CI: 0.421-0.743,  $P=0.008$ ). Survival analysis indicated that clopidogrel contributed to lower major and minor bleeding rate ( $P=0.015$ ,  $<0.001$ , respectively).

#### Subgroup analysis of endpoints

In the following analysis, we applied an interaction effect to figure out the relationship of different clinical factors to different antiplatelet strategies and the impact on efficacy and safety endpoints. For the efficacy endpoints, we first identified the potential clinical factors associated with MACCE using a COX multivariate analysis. Five factors, including age, diabetes, left main artery involved, triple vessel artery disease, and GPIIb/IIIa usage were revealed to be associated with MACCE. The stratified analyses revealed that participants older than 70 years old had a lower ischemic rate in the ticagrelor group than that in the clopidogrel group (HR: 1.089, 95%CI: 1.008-1.363,  $P=0.042$ ). In addition, patients diagnosed with diabetes could also benefit from ticagrelor therapy (HR: 1.154, 95%CI: 1.092-1.367,  $P<0.001$ ). Similar results were also observed in patients with triple vessel artery disease, left main artery involved and GPIIb/IIIa usage ( $P=0.003$ , 0.028 and 0.011, respectively). For the safety endpoints, three factors including age, tirofiban usage and LMWH usage were identified to be related with bleeding events. Participants aged >70 years old accounted for a lower bleeding rate in the clopidogrel group (HR: 0.622, 95%CI: 0.315-0.799,  $P<0.001$ ). Additionally, patients receiving tirofiban and LWMH suffering a lower rate of bleeding risk in the clopidogrel group (HR: 0.708, 95%CI: 0.369-0.905,  $P=0.011$ ; HR: 0.445, 95%CI: 0.321-0.809,  $P=0.029$ ).

#### SAQ

With respect to the quality of life according to SAQ in the treatment subgroups. There was abundant evidence of significant differences for patients with clopidogrel or ticagrelor usage through the whole follow-up process ( $P<0.05$ ). Regarding other subscales of this questionnaire, we did not find any difference in the first half year, but we could find difference gradually in the following observation period.

**Conclusions** This is a novel study to investigate the relationship between antiplatelet strategies and nonfatal recurrent MI in ACS patients who were treated with PCI. Generally, ticagrelor could reduce the risk of MACCE with the minor but not major bleeding risk increasing. Age, tirofiban and LWMH usage were three key factors responsible for the bleeding endpoints.

## 血管紧张素 II 激活 STAT3/microRNA-21 信号通路促进人微血管内皮细胞的血管新生

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**目的** 血管紧张素 II 是促进动脉粥样硬化斑块内血管新生的关键因素,本研究探讨 microRNA-21 在血管紧张素 II 诱导血管新生中的作用及其机制。

**方法** 采用实时荧光定量 PCR 技术 (RT-qPCR) 检测 microRNA-21 在不同浓度血管紧张素 II 处理后的 HMECs 中的表达情况。利用 Western Blot 技术检测 microRNA-21 上游转录因子 STAT3、下游靶基因 PTEN 的表达水平。利用 ChIP-PCR、荧光素酶报告系统验证 microRNA-21 与上游转录因子 STAT3 和下游靶基因 PTEN 的结合。并应用 STAT3 磷酸化活性抑制剂 Stattic 及 microRNA-21 的反义 miR (microRNA-21 inhibitor) 对血管紧张素 II 诱导的血管新生进行调控并进一步检测相应指标的变化情况。CCK-8、EDU 增殖检测、划痕实验、体外基质胶管腔形成实验,将用来评估 HMEC-1 在血管紧张素 II 刺激下的增殖、迁移、血管新生情况。小鼠体内基质胶栓实验将用来评估血管紧张素 II 对体内血管新生的影响。

**结果** 一定浓度的血管紧张素 II 能使转录因子 STAT3 的磷酸化水平增加,进而上调 microRNA-21 的水平,最终减少靶基因 PTEN 的表达从而促进 HMECs 的血管新生。Stattic 和 microRNA-21 inhibitor 能分别通过减少 STAT3 的磷酸化和拮抗 microRNA-21 来降低 microRNA-21 的表达从而抑制血管紧张素 II 诱导的 HMECs 的增殖、迁移和管腔形成。

**结论** 血管紧张素 II 的促血管新生作用与 STAT3 对 microRNA-21 的活化及 microRNA-21 对下游靶基因 PTEN 的抑制相关。运用反义 miR 拮抗 microRNA-21 的表达可能为斑块内血管新生的治疗提供新的方向。

## Prognostic value of spot testing urine pH as a novel marker in patients with ST-segment elevation myocardial infarction

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**Objective** Previous studies have shown that low urinary pH (UpH) is related to the incidence of metabolic syndrome, uric acid stone, and chronic kidney disease (CKD), which are the important risk factors for STEMI. However, few studies have focused on the association between UpH and clinical outcomes in patients with STEMI undergoing PCI. Thus, we evaluated the relationship between UpH and clinical outcomes.

**Methods** A prospective observational study was conducted at cardiac care unit of the Guangdong General Hospital between January 2010 and June 2016. Patients with acute STEMI undergoing PCI were enrolled. The primary outcome was all-cause mortality in hospital and during follow-up. The secondary outcomes were MACEs, including all-cause mortality, nonfatal myocardial infarction, target vessel revascularization or cerebrovascular events, during the observation period of hospitalization. The other secondary outcome was acute kidney injury (AKI), defined as either an increase in SCr by 0.3 mg/dL within 48 hours compared with the baseline according to the Kidney Disease: Improving Global Outcomes (KDIGO) criteria.

**Results** There were 833 patients with UpH<6.0, 934 patients with 6.0≤UpH<7.0, and 314 patients with UpH≥7.0. The incidence of in-hospital all-cause mortality and major adverse cardiac events (MACEs) was significantly higher in low UpH group. Multivariate analysis found that the low UpH (<6.0) was an independent predictor of in-hospital all-cause mortality (OR, 2.85, 95% CI, 1.64-4.96, P<0.001) and MACEs (OR, 2.39, 95% CI, 1.54-3.71, P<0.001). After a median follow-up of 2.7 years, the Kaplan-Meier analysis

showed that patients with  $UpH < 6.0$  had a significantly higher rate of all-cause mortality. Multivariate cox analysis demonstrated that low UpH was an independent predictor of long-term all-cause mortality (HR, 2.57, 95%CI, 1.63–4.06,  $P < 0.001$ ).

**Conclusions** UpH, which can be obtained at the time of presentation, is a useful and powerful marker to predict in-hospital death and MACEs in patients with STEMI. These results could play an important role in the early identifying of high-risk patients with STEMI patient and contribute to effective patient management.

## Placental Growth Factor Locus is Associated with Decreased Risk of Coronary Artery Disease

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**Objective** Recent studies have shown that placental growth factor (PIGF) levels are elevated in coronary artery disease (CAD) patients and are associated with adverse cardiac events. Although PIGF is an important cytokine involved in angiogenesis, cardiac remodeling and inflammation, it is not known whether the association between PIGF levels and CAD outcomes is causal. To address this question, we carried out a genome-wide association study (GWAS) to identify genetic determinants controlling PIGF levels and then evaluated association of the variants with CAD.

**Methods** We conducted a GWAS for log-transformed PIGF levels using 9.4M genetic variants in 3,455 subjects from the GeneBank cohort, after adjusting for age, sex, Framingham

ATP III risk score, and CAD-status. Secondly, we examined whether identified variant was also associated with CAD-related phenotypes using publicly available summary level data. Lastly, we performed a Two-sample Mendelian randomization analysis to evaluate causality of PIGF raising alleles to the risk of CAD.

**Results** We identified one locus (PGF) that was significantly ( $P=1.2 \times 10^{-11}$ ) associated with increased PIGF levels in 3,455 subjects in the GeneBank cohort. The lead SNP (rs4903273) on chromosome 14q24.3 was also associated with decreased risk of CAD and MI using summary level data in >500,000 subjects from CARDIoGRAM+C4D Consortium and UK Biobank. Moreover, PGF variant was even more significantly associated with decreased systolic blood pressure (SBP) in 442,771 subjects from UK Biobank, but not with other traditional risk factors, such as plasma lipid levels. Mendelian randomization analysis using summary level data with 2 independent PGF associated SNPs showed a significant inverse causal association with PGF variants and SBP (IVW test  $\beta = -0.074$ ,  $SE = 0.009$ ,  $P = 9.2 \times 10^{-16}$ ), suggesting a biological pathway for the genetic association between PGF and CAD.

**Conclusions** We performed a GWAS for PIGF levels in 3,455 subjects from the GeneBank cohort and identified one locus (PGF) that was significantly associated with plasma PIGF levels. The PGF locus (not the lead SNP) has previously been linked with PIGF levels, but not with other traits or phenotypes at the genome-wide significance level. Additionally, we evaluated whether the PGF locus was associated with the risk of CAD or CAD-related traits using publicly available summary level data. The minor allele (MAF=0.49) of rs4903273 on chr14q24.3 was not only associated with increased levels of PIGF and decreased risk of CAD and MI, but also with decreased levels of SBP. Mendelian randomization analysis showed an inverse causal association between PGF variants and SBP, an established risk factor for CAD, suggesting a biological mechanism between PGF and CAD. These observations were somewhat unexpected since previous studies show that higher levels of PIGF are clinically associated with increased risk of CAD or cardiovascular mortality. Thus, additional studies will be needed to determine the biological mechanism for the opposite associations we observe between genetic determinants of serum PIGF and risk of CAD.



## Aspirin for primary prevention of cardiovascular events in patients with diabetes: A global systematic review and meta-analysis

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**Objective** The use of aspirin for primary prevention of cardiovascular events in patients without previous atherosclerotic cardiovascular disease still remained controversial. Recently, the results of several global randomized trials have challenged the use of aspirin for primary prevention of cardiovascular events in patients with diabetes. Previous randomized controlled trials and meta-analyses of aspirin specifically in patients with diabetes failed to consistently show the efficacy and safety in primary prevention of cardiovascular events. Therefore, we aimed to perform a global systematic review and meta-analysis to obtain a clear conclusion.

**Methods** We searched Ovid MEDLINE (1948 to September 2018), EMBASE (1974 to September 2018), and Cochrane Central databases of randomized Controlled Trials and meta-analyses. The search was conducted without any language restriction. The bibliographies of the included studies and previous meta-analyses on the same topic were also assessed for studies not involved by this search protocol. Eligible studies were prospective, randomized controlled trials and meta-analyses of aspirin for primary prevention in patients with diabetes. Two authors independently screened studies for inclusion, consulting with a third author where necessary to resolve discrepancies. We used the Cochrane Collaboration risk of bias tool to assess the included studies, and used the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) approach. Data analysis was performed by computing the risk ratio (RR) with 95% confidence interval (CI).

**Results** 9 trials included 1181633 individuals with diabetes. Aspirin therapy was associated with a significant reduction in major cardiovascular events (relative risk [RR] 0.86, 95% confidence interval [CI] 0.79–0.93,  $P=0.21$ ) compared to placebo therapy, with moderate heterogeneity ( $I^2=26.4%$ ). In con-

trast, Aspirin therapy increased gastrointestinal bleeding (relative risk [RR] 1.29, 95% confidence interval [CI] 1.04–1.54;  $P=0.17$ ), with moderate heterogeneity ( $I^2=43.8%$ ).

**Conclusions** Aspirin therapy prevented cardiovascular events in patients with diabetes, but it also increased risk of gastrointestinal bleeding. Its net benefit and safety in primary prevention still remains controversial and further large-scale trials are urgently needed.

## 川崎病所致缺血性心肌病患儿的临床特点与转归

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**目的** 川崎病所致冠状动脉病变已成为后天性心脏病的主要原因,曾患川崎病的患儿在成年后可出现心脏病、心肌缺血、心肌梗死等严重并发症,然而合并冠状动脉巨大瘤的患儿在儿童时期即可出现上述并发症。本文拟总结单中心儿童川崎病所致缺血性心肌病的临床特点与转归,以提高对此类疾病的认识以及对治疗进行探讨。

**方法** 收集2008年1月至2018年12月在广州市妇女儿童医疗中心诊断川崎病巨大瘤合并缺血性心肌病的11例患儿的临床资料。回顾性分析该11例患儿的临床特征、辅助检查(心电图、超声心动图、心脏CT和心导管造影)、治疗经过及转归。

**结果** 11例患儿中男8例,女3例,8例发生在2013年12月前;患川崎病年龄为3月至7岁8个月,中位年龄为19月;10例患儿急性期存在冠状动脉巨大瘤,1例为冠状动脉中瘤;9例患儿在急性期或亚急性期曾使用丙种球蛋白治疗,使用时间为发病第7天至第19天,中位丙种球蛋白使用时间为第10天,2例对丙种球蛋白抵抗而使用第2剂,1例同时采用血浆置换,另1例加用静脉甲强龙治疗。急性期给予阿司匹林抗凝,4例联合氯吡格雷治疗,1例在亚急性期出现血栓的患儿同时使用低分子肝素,3例联合使用华法林抗凝。患病至缺血性心肌病的时间为2.3月至5.7年,中位时间为10.3月;3例曾出现胸痛、心功能不全、心肌梗死的表现,其中1例患川崎病2.5年后复查心脏彩超提示冠状动脉内膜增粗而自行停药并未复查,停药2年后

出现心肌梗死;其余8例无临床症状,心电图发现心肌缺血(ST-T改变、病理性Q波)证据或心律失常,心脏彩超提示心功能下降、室壁运动异常或室壁瘤,心脏CT或冠脉造影提示冠脉闭塞;3例有症状患儿给予肝素抗凝、尿激酶溶栓治疗,其余无症状患儿加用华法林和/或氯吡格雷治疗。随访时间为2月至10年,中位随访时间7.6年;所有患儿均无明显自觉症状并存活;未发现冠状动脉瘤破裂,4例患儿仍存在左室收缩功能低下(EF40-50%),4例患儿心脏造影提示有侧枝形成;所有患儿仍在服用阿司匹林联合华法林或氯吡格雷治疗。

**结论** 缺血性心肌病在儿童时期较少见,但是川崎病最严重的并发症之一,多出现在冠脉巨大瘤的患儿和延迟使用丙种球蛋白的患儿,多数患儿无明显临床表现,但由于患儿不能清晰表述症状,川崎病的患儿应规律复诊,规范使用抗凝药和抗血小板药,对存在冠脉损害的患儿停药应慎重,停药前详细评估冠脉情况,长期甚至终身随访。

## A novel biomarker of long-term mortality, white blood cell counts to high-density lipoprotein cholesterol ratio (WHR), for coronary artery disease undergoing percutaneous coronary intervention

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**Objective** White blood cell counts (WBC) and high-density lipoprotein cholesterol (HDL-C) are widely available in clinical practice but utility as potential risk factors for cardiovascular disease (CVD) is uncertain. This study firstly assessed the prognostic value of WBC to HDL-C ratio (WHR) in patients with coronary artery disease (CAD) undergoing primary percutaneous coronary intervention (PCI).

**Methods** 6050 patients with CAD after PCI from a retrospective cohort study (identifier: ChiCTR-INR-16010153) were evaluated initially. 371 patients were excluded due to HDL cho-

lesterol data not available, malignancy, dementia, psoriasis or eczema, systemic connective tissue disorders, multiple sclerosis, chronic liver disease, chronic obstructive pulmonary disorder, alcohol problems. Finally, 5679 patients were included in the study. The primary outcome was long-term mortality after PCI. Secondary endpoints were mainly major adverse cardiovascular and cerebrovascular events (MACCEs) defined as a combination of stroke, cardiac death, stent thrombosis, recurrent myocardial infarction, and target vessel revascularization. The mean follow-up time of this study was  $35.9 \pm 22.5$  months. According to the different types of CAD, patients were divided into acute coronary syndrome (ACS) group and stable CAD group.

We found the best cut-off value according to the receiver operating curve (ROC), and then patients were divided into high and low WHR groups according to the value of each type.

**Results** Overall, there were 293 long-term mortality during the following up. According to the cut-off value, 1901 ACS patients were divided into high WHR group (N=724) and low WHR group (N=1177), and their long-term mortality were 40 (5.5%) vs. 42 (3.6%), cardiac death were 34 (4.7%) vs. 34 (2.9%) and MACCES were 112 (15.5%) vs. 160 (13.6%) respectively. The incidences of stable CAD long-term mortality were 95 (6.6%) in high WHR group (N=1432) and 116 (4.9%) in low WHR group (N=2346). Cardiac death and MACCES were 71 (5.0%), 208 (14.5%) in the high group, and 96 (4.1%), 328 (14.0%) in the low group. In each type, the long-term mortality incidences were significantly higher in the high group compared to that in the low group. There was significant difference in the incidences of cardiac death between the two group in ACS ( $P=0.042$ ). However, the incidences of MACCES were found not significantly. The multivariate Cox proportional hazards model showed that increased WHR level was independently correlated with the long-term mortality. When in the high WHR group, the incidence of mortality would be increased two times in ACS (adjusted HR=2.036 (1.258-3.296),  $P=0.004$ ), and 1.5 times in stable CAD (adjusted HR=1.586 (1.178-2.136),  $P=0.002$ ). The risk of cardiac death increased significantly in ACS (adjusted HR = 2.305 [1.360-3.907],  $P=0.002$ ).

**Conclusions** The present study indicated that increased-WHR concentration was independently associated with long-term mortality in CAD patients underwent PCI and it could be a novel biomarker for poor prognosis.

## Predictive value of NLR in patients with coronary heart disease of clinical outcomes after PCI

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**Objective** To explore the predictive value of neutrophil-lymphocyte ratio (NLR) in patients with coronary heart disease after percutaneous coronary intervention (PCI) of the clinical outcomes.

**Methods** A retrospective study was used to collect clinical follow-up data from a total of 6050 patients. Which who have coronary heart disease complicated with PCI were selected from the heart center in the first affiliated hospital of Xinjiang medical university during the period from January 2008 to December 2016, including 4495 males and 1551 females. The average age was  $58.50 \pm 10.84$  years old. According to the NLR level, 6046 patients were divided into 3 groups by age:  $NLR < 2.20$  group;  $2.20 \leq NLR < 3.33$  group;  $NLR \geq 3.33$  group. The incidence of cardiovascular adverse events such as all-cause mortality and MACE events occurred within 1 year after PCI. The correlation between NLR and clinical outcomes after PCI in patients with coronary heart disease was discussed through multivariate COX regression analysis, and the predictive value of NLR in clinical outcomes after PCI was determined.

**Results** There were 81 cases (4.1%) of ACM in group 1, 104 cases (5.1%) of ACM in group 2, 124 cases (6.1%) of ACM in group 3, so higher NLR group with the probability of ACM occurrence was obviously greater than that in lower NLR group, the difference was statistically significant ( $P < 0.05$ ). Multivariate analysis showed that group 2 compared with group 1: ( $P = 0.161$ ,  $OR = 1.240$ , 95% CI: 0.918–1.675), group 3 compared with group 2: ( $P = 1.762$ ,  $OR = 1.308$ , 95% CI: 0.971–1.762), the difference was not statistically significant ( $P > 0.05$ ). The Kaplan-Meier survival curve analysis chart made clear that the longer the follow-up period, the group 1 patients with the higher survival rate. In spite of the lower survival rate of the patients in group 2 and 3, but there was no significant difference between the two groups.

**Conclusions** NLR is an independent risk factor for ACM after PCI of patients with coronary heart disease, it is related to the clinical outcome of patients with coronary heart disease after PCI, but it can not be used in patients with coronary heart

disease after PCI as an independent predictor of clinical outcome.

## Baseline monocyte counts to apolipoprotein A1 ratio associated with long-term mortality in patients with coronary artery disease after percutaneous coronary intervention

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**Objective** Previous studies have shown that the ratio of baseline monocyte counts to high density lipoprotein (MHR) is associated with clinical outcomes in patients with coronary artery disease (CAD) after percutaneous coronary intervention (PCI). However, the relationship between the ratio of monocyte to Apolipoprotein A1 (MAR) and the long-term prognosis of patients with CAD after PCI has not been investigated.

**Methods** All the patients were from the CORFCHD-PCI, a retrospective cohort study (Identifier: ChiCTR-INR-16010153), which included a total of 6050 CAD patients after PCI from January 2008 to December 2016. We excluded the subjects with no baseline monocyte counts and/or ApoA1, hematological disease, malignancy, active infection, renal or hepatic insufficiency, severe valvular disease, and hyperthyroidism or hypothyroidism. Finally, 5678 patients with CAD after PCI were recruited the present study in the First Affiliated Hospital of Xinjiang Medical University. The patients were divided into 3 groups according to the MAR tertiles: lower group ( $MAR < 0.34$ ,  $n = 1881$ ), medium group ( $0.34 \leq MAR < 0.50$ ,  $n = 1859$ ), and higher group ( $MAR \geq 0.50$ ,  $n = 1938$ ). The primary endpoint was the long-term mortality including all-cause death (ACM) and cardiac death (CM). The main second endpoints were the incidence of major adverse cardiac events (MACE) and major adverse cardiovascular and cerebrovascular events (MACCE). The mean follow-up time was  $35.9 \pm 22.6$  months.

**Results** There were 78 (4.1%) deaths in the lower group, 90 (4.8%) deaths in the medium group, and 125 (6.4%) deaths in the higher group. The difference is significant ( $P=0.004$ ). We also found significant difference among these three groups in the incidence of CM ( $P=0.012$ ), MACEs ( $P=0.008$ ), and MACCEs ( $P=0.012$ ). Using 0.535 as an optimal cutoff value, we found patients with a  $MAR \geq 0.535$  had a 40.5%, and 39.9% increased risk of ACM and CM compared to the patients with a  $MAR < 0.535$ . After adjustments of confounders, the differences remained significant (ACM, HR=1.447, 95% CI: 1.139–1.838,  $P=0.003$ ; CM, HR=1.424, 95% CI: 1.089–1.862,  $P=0.010$ ).

**Conclusions** The present study indicated that baseline MAR is an independent predictor of long-term mortality in CAD patients underwent PCI.

## Correlation between a scoring system based on arteriosclerosis monitoring and baseline indicators and target organ damage in patient

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**Objective** Cardiovascular disease has become a major disease that threatens the health of residents. Cardiovascular and cerebrovascular diseases have become major diseases that threaten the health of residents. According to statistics, the number of people dying from cardiovascular disease each year in China is about 3 million, accounting for about 45% of the total number of deaths. It is the number one killer of Chinese residents' health, and coronary heart disease is one of the most important culprit in the death of patients with cardiovascular and cerebrovascular diseases. Arteriosclerosis is the most important risk factor for cardiovascular disease. Carotid atherosclerosis is a local manifestation of systemic atherosclerosis and serves as a sensitive window for the systemic atherosclerotic oral cavity. Color Doppler flow imaging is a good reflection of arterial conditions. Therefore, CDFI has a high clinical val-

ue in the diagnosis of carotid atherosclerosis and should be the first choice for examination. Combine gender, age, medical history, biochemical index, arteriosclerosis detection parameters, ultrasound index correlation analysis and multiple stepwise regression analysis, establish regression equation, obtain a scoring system based on arteriosclerosis index, and further analyze changes with target organs such as heart and blood vessels. Relevance provides a reliable basis for the prevention and treatment of clinical cardiovascular disease. The aim was to explore the use of noninvasive, easy-to-use, low-risk assessment methods for early intervention and long-term monitoring of target organ changes. As the heart and blood vessels of patients with coronary heart disease, delay the occurrence of cardiovascular events.

**Methods** Lasso-logistic regression analysis.

**Results** Pearson correlations between various arteriosclerosis monitoring parameters and baseline indicators and cervical vascular plaque indicate that Diastolic pressure, ABI.R, Cystatin C, glycosylated hemoglobin, FT4, Total IMT.R, sinus IMT.R, Total IMT.L, sinus IMT.L are associated with scoring. Lasso-logistic regression analysis was performed on the parameters and scores correlated with the scores in the sample. The results showed: The scores (cervical vascular plaque) =  $-0.01053 \text{diastolic.pressur} - 0.007 \text{ABI.R} = 0.739889 \text{Cys-tatin.C} + 0.048668 \text{glycosylated.hemoglobin} - 0.03556 \text{FT4} + 5.735591 \text{Total.IMT.R} + 0.977486 \text{sinus.IMT.R} + 0.434219 \text{Total.IMT.L} + 0.822769 \text{sinus.IMT.L}$

**Conclusions** A new scoring system was obtained by Lasso-logistic regression analysis. The cervical plaque was associated with organ changes such as heart and blood vessels. The higher the score, the more severe the changes in heart and vascular organs.

## Effect of resistance exercise on atherosclerotic vulnerable plaque in exhausted swimming mice

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**Objective** To investigate the effects of exhaustive swimming inducing atherosclerotic plaque rupture and resistance exercise on the morphology and stability of atherosclerotic vulnerable plaque.

**Methods** 30 ApoE<sup>-/-</sup> mice were randomly divided into control group (group C), exhaustion group (group E) and resistance & exhaustion group (group R), whole-course high-fat feeding. After left carotid cannulation group E performed exhaustive swimming for 2 weeks, the group R performed 8 weeks resistance exercise followed by that. The body weight of the mice before and after the experiment was compared. Common carotid arteries were made into paraffin and frozen sections. HE, Masson and oil red O staining were used to observe plaque size, collagen components and lipid deposition. The fiber cap thickness was measured and the plaque vulnerability index was calculated. Local expression of smooth muscle cells and macrophages were detected by immunohistochemistry. Serum was measured for TG, TC, LDL-C, HDL-C by ELISA.

**Results** Before experiment the body weight of the three groups was  $22.93 \pm 1.26$  ( $P > 0.05$ ), that increased after experiment. The increase in group C ( $27.46 \pm 1.59$ ) and group E ( $27.46 \pm 1.59$ ) was more than that in group R ( $25.74 \pm 0.75$ ),  $P < 0.05$  ( $P = 0.009$ ). TG, TC, LDL-C and HDL-C were compared in three groups. Group C TC ( $16.91 \pm 0.25$ ), TG ( $1.14 \pm 0.47$ ), LDL-C ( $18.94 \pm 2.64$ ), HDL-C ( $5.54 \pm 0.53$ ), group E TC ( $16.97 \pm 0.22$ ), TG ( $1.15 \pm 0.44$ ), LDL-C ( $18.91 \pm 2.56$ ), HDL-C ( $5.47 \pm 0.48$ ), and group R TC ( $15.69 \pm 0.63$ ), TG ( $0.89 \pm 0.40$ ), LDL-C ( $16.43 \pm 3.08$ ), HDL-C ( $5.99 \pm 0.56$ ). ( $P < 0.05$ ,  $p$  was 0.00, 0.00, 0.00, and 0.033, respectively). The plaque size of Group C ( $131.12 \pm 2.91$ ), group E ( $178.94 \pm 3.74$ ), group R ( $94.84 \pm 3.74$ ) was statistically significant ( $P = 0.000$ ). The fiber cap thickness of group E ( $1.31 \pm 0.04$ ) is thinner than that of group C ( $3.07 \pm 0.12$ ) and group R ( $5.65 \pm 0.25$ ),  $P < 0.05$  ( $P = 0.00$ ). In group E the vulnerability index was significantly higher than group C and group R ( $P < 0.05$ ). The expression of macrophages in group E ( $2.68 \pm 0.51$ ) was more than that in group C ( $1.48 \pm 0.23$ ) and group R ( $1.90 \pm 0.23$ ), conversely, SMCs were least in group E,  $P < 0.05$  (0.000, 0.012 and 0.000, respectively).

**Conclusions** Exhaustive swimming may induce rupture of vulnerable plaque in atherosclerosis. Resistance exercise plays a role in stabilizing vulnerable plaque.

## Nocturnal cardiac sympathetic burden of obstructive sleep apnea may risk-stratify patients with coronary artery disease

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**Objective** An altered balance of cardiac autonomic function has been suggested in obstructive sleep apnea (OSA). This may account for the high incidence of cardiovascular events in patients with coronary artery disease (CAD) complicated by OSA. Although natriuretic peptides have been implicated as biomarkers of adverse cardiovascular outcomes, little has been done with the relationship between cardiac autonomic activity and the levels of N-terminal pro B-type natriuretic peptide (NT-proBNP). Hence, by introducing a novel index of cardiac autonomic function of OSA, named 'sympathetic burden', we aimed to investigate its predictive value for risk of adverse cardiovascular outcomes reflected by increased levels of NT-proBNP in CAD patients.

**Methods** The consecutive patients with CAD were prospec-

tively enrolled between January 2015 and February 2019. Portable respiratory monitoring was applied to facilitate the diagnosis of sleep apnea with simultaneous electrocardiography (ECG) recording for heart rate analyses. Conventional metrics of OSA severity including respiratory events index [REI] or 3% oxygen desaturation index [ODI] were evaluated and scored. The sympathetic burden was determined by measuring the respiratory event-associated area under the beat-to-beat heart rate curve from pre-event baseline. Linear regression and correlation analyses were used to explore the association between the sympathetic burden and NT-proBNP, both of which were log-transformed to achieve a more normal distribution.

**Results** A total of 626 consecutive patients was included with mean value of NT-proBNP  $4.83 \pm 1.64$   $\mu\text{g/L}$ , sympathetic burden  $10.56 \pm 1.10$   $\text{bpm} \cdot \text{s}$ , 3%ODI  $22.41 \pm 16.75$  events/h and REI  $18.25 \pm 15.61$  events/h. Correlation and linear regression analyses demonstrated that the sympathetic burden, as compared with 3%ODI and REI, was the most significantly associated factor of NT-proBNP levels (correlation coefficients were 0.214, 0.210 and 0.167, respectively; regression coefficients were 0.317, 0.02 and 0.018 respectively;  $P < 0.05$  for all).

**Conclusions** The 'sympathetic burden', derived from collected ECG signals of overnight sleep study, is a novel measure of nocturnal cardiac autonomic function. The measurement of this index may be of great clinical value in early risk stratification in patients with CAD based on increased levels of NT-proBNP, but more robust evidence is needed.

## The predictive risk factors of ventricular aneurysm formation among patients with first-onset acute myocardial infarction treated by percutaneous coronary intervention

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**Objective** Left ventricular aneurysm (LVA) formation is one of the severe complications after acute myocardial infarction (AMI), which is frequently associated with poor prognosis due to high risk of embolic events and poor ventricular systolic function. However, predictive risk factors contributing to LVA formation are inadequately defined nowadays with the advent of more invasive reperfusion therapy. The goal of this study was to evaluate predictive risk factors associated with LVA formation during early period of post-AMI.

**Methods** Of 1,568 first-onset AMI patients who underwent percutaneous coronary intervention, 78 patients (mean age  $65.9 \pm 13.1$  years) eligible for inclusion and exclusion criteria were identified with LVA by echocardiography from 2014 to 2019 in the First Affiliated Hospital of Jinan University. The data of these patients were compared with those of 156 patients (mean age  $58.5 \pm 12.9$  years) without LVA. All statistical analysis was performed by SPSS 25.0. Normal distribution was evaluated according to Kolmogorov-Smirnov test. Continuous parameters with normal distribution are presented in mean  $\pm$  standard deviation, while categorical variables are presented as frequencies and percentages. Data with non-normal distribution are displayed by median and interquartile interval. Testing for difference of each variable was performed with univariate logistic regression analysis. Unconditional logistic regression analysis (Forward selection) was used to determine independent predictors of LVA formation.

**Results** In multivariate analysis, the most striking risk factors contributing to LVA formation were motion abnormality of left ventricular anterior wall [odds ratio (OR) 8.46, 95% confidence interval (CI) 1.66–43.04,  $P=0.010$ ] and apex (OR 6.35, 95% CI 1.73–23.31,  $P=0.005$ ). In addition, female (OR 2.88, 95% CI 1.19–6.93,  $P=0.019$ ), left ventricular ejection fraction (OR 0.96, 95% CI 0.92–0.99,  $P=0.008$ ) and peak N terminal pro brain natriuretic peptide (NT-pro BNP)/1000 (OR 1.16, 95% CI 1.05–1.28,  $P=0.004$ ) remain independent determinants of LVA formation among patients with first-onset AMI.

**Conclusions** Female, left ventricular ejection fraction, peak NT-pro BNP/1000 and hypokinesis of left ventricular anterior wall and apex were independently associated with LVA formation in patients with first-onset AMI.

## 生长分化因子-15 预测经皮冠状动脉介入治疗患者的主要不良心脏事件:系统评价和 Meta 分析

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**目的** 最近的研究表明,生长分化因子-15(GDF-15)可能是冠心病(CHD)预后的潜在预测因子。本研究的目的是通过荟萃分析系统评估患者合并高血浆 GDF-15 在经皮冠状动脉介入治疗(PCI)后的主要不良心脏事件(MACE)发生情况。

**方法** 在明确了纳入和排除标准后,我们在 Ovid MEDLINE, EMBASE 和 Cochrane Central 三大数据库的中进行搜索,不限制时间或种族。每一个纳入研究都经过两位作者独立筛选,若存在差异则与第三位专家协商以解决。计算风险比(HR)和 95% 置信区间(CI)来进行数据分析。使用漏斗图和 Egger 测试测试发表偏倚。

**结果** 一共有 5 项符合条件的研究被纳入,共包含接受 PCI 的 8743 名 CHD 患者。随访的最长持续时间为 6 个月至 5 年。通过使用随机效应模型用于分析,我们发现高 GDF-15 与接受 PCI 的患者 MACE 风险较高相关(风险比(HR), 1.69; 95% 置信区间(CI), 1.26-2.28)。

**结论** 与低血浆 GDF-15 水平相比,高血浆 GDF-15 水平与接受 PCI 的患者 MACE 风险增加有关。这表明血浆 GDF-15 水平可能作为一个预测因子来预防冠状动脉血运重建后的 MACE 事件。

## ABO 血型与冠状动脉慢性完全闭塞病变患者侧支循环形成的相关性

王顺利

郑州大学第二附属医院

**目的** 探讨 ABO 血型与冠状动脉慢性完全闭塞病变患者侧支循环形成的相关性。

**方法** 选取 2015-09-01 至 2018-09-01 在郑州大学第二附属医院心内科病房住院择期行冠状动脉造影术且至少 1 支主要冠状动脉 CTO 的冠心病患者 1209 例,根据 Cohen-Rentrop 法评估 CCC 形成程度,分为不良组(442 例)和良好组(767 例),分析研究 ABO 血型与冠状动脉慢性完全闭塞病变患者侧支循环形成的关系。

**结果** 本研究显示,与冠状动脉慢性完全闭塞病变患者侧支循环形成的不良组相比,侧支循环形成的良好组中 O 型血较常见(32.3% vs 24.7%), A 型血者较为少见(31.7% vs 24.9%)。同时,我们发现 O 型血患者的致动脉粥样硬化性胆固醇包括总胆固醇和低密度脂蛋白胆固醇明显低于非 O 型血患者( $P < 0.05$ )。多因素 Logistic 回归分析表明,校正年龄、性别、体重指数、高血压、糖尿病、吸烟、促甲状腺激素、游离三碘甲状腺原氨酸(FT3)、游离甲状腺素(FT4)、亚临床甲状腺功能减退(SCH)、低密度脂蛋白胆固醇及 C 反应蛋白、血沉、纤维蛋白原、D-二聚体、内皮心肌功能等因素后,O 型血可独立预测 CTO 患者 CCC 侧支循环形成的发生[比值比(OR)=1.49, 95% 可信区间(CI): 1.10~2.05],非 O 型血则不利于 CTO 患者 CCC 侧支循环形成的发生(比值比(OR)=0.65, 95% 可信区间(CI): 0.48~0.80)。多因素 Logistic 回归分析模型显示,糖尿病[比值比(OR)=0.142%, 95% 可信区间(CI): 0.027~0.761]、吸烟[比值比(OR)=0.128%, 95% 可信区间(CI): 0.019~0.861]、游离三碘甲状腺原氨酸(FT3)[比值比(OR)=0.170%, 95% 可信区间(CI): 0.043~0.671]也是 CTO 患者 CCC 形成不良的独立危险因素( $P < 0.05$ )。

**结论** ABO 血型与与冠状动脉慢性完全闭塞病变患者侧支循环形成有关。其中,O 型血有利于 CTO 患者 CCC 侧支循环形成的发生,而 A 型血、糖尿病、吸烟、游离三碘甲状腺原氨酸(FT3)、则不利于 CTO 患者 CCC 侧支循环形成的发生。

## 血浆同型半胱氨酸水平与急性ST段抬高型心肌梗死(STEMI)患者梗死相关动脉自发再通的相关性研究

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**目的** 探讨血浆同型半胱氨酸水平对急性ST段抬高型心肌梗死(STEMI)患者梗死相关动脉(IRA)自发再通(SR)的预测价值。

**方法** 回顾性分析2015年12月至2018年06月于我院确诊为STEMI并在12h内急诊行冠脉造影的患者262例。根据梗死相关动脉是否自发再通将患者分为非自发再通组(NSR组, n=209)和自发再通组(SR组, n=53),比较两组患者临床资料以及经皮冠脉介入治疗(PCI)前各项检查结果。采用多因素logistic回归分析筛选冠脉自发再通的预测因素,采用受试者工作特征曲线(ROC)评价FAR预测冠脉自发再通的价值。

**结果** NSR组与SR组患者在年龄[(61.43±11.84) vs (60.01±9.52),  $P=0.372$ ]、男性比率[69.4% (145/209) vs 81.1% (43/53),  $P=0.220$ ]、高血压比率[48.3% (101/209) vs 50.9% (27/53),  $P=0.220$ ]、吸烟比率[56.5% (118/209) vs 54.7% (29/53),  $P=0.499$ ]、糖尿病比率[47.4% (99/209) vs 41.5% (22/53),  $P=0.520$ ]等方面差异无统计学意义。SR组患者FAR水平显著低于NSR组[(11.02±2.75) vs (8.20±1.85),  $t=8.790$ ,  $P<0.0001$ ]。多因素logistic回归分析结果显示, FAR(OR=0.494, 95%CI: 0.354~0.686,  $P<0.001$ )和hs-CRP(OR=0.776, 95%CI: 0.614~0.975,  $P=0.030$ )均是STEMI患者梗死相关动脉自发再通的独立预测因素。ROC曲线结果显示, FAR预测梗死相关动脉自发再通的曲线下面积为0.809(95%CI: 0.630~0.758,  $P<0.0001$ ), 诊断临界值9.25, 敏感度为77.9%, 特异度为75.4%。

**结论** 血浆同型半胱氨酸水平是STEMI患者的梗死相关动脉自发再通独立预测因素, 对预测冠脉自发再通具有一定价值。

## Bilirubin Nanoparticle Protects Against Cardiac Ischemia/Reperfusion Injury

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**Objective** Acute myocardial infarction (AMI) is the majority of cardiovascular-related deaths, despite of early thrombolysis medication and percutaneous coronary intervention (PCI) mostly attenuated myocardial infarct size, myocardial ischemia/reperfusion (I/R) injury reduces the efficacy of myocardial reperfusion. Myocardial I/R injury induced the generation of reactive oxidative stress (ROS) which contributes to myocardial apoptosis and inflammation, and leads to heart failure and worsened clinical prognosis. Recently, more and more new therapeutic strategies has been investigated, moreover, clinical attention has been paid to the use of antioxidants to reduce the harmful effects of excessive free radicals. However, the therapy of myocardial I/R remains a crucial challenge in clinical therapy. Myocardial ischemia/reperfusion (I/R) injury remains a crucial challenge in clinical therapy coronary heart disease, reactive oxidative stress (ROS) and inflammation play key roles in I/R pathology process. Bilirubin was reported as an endogenous antioxidant. Therefore, we recently investigated the effect of BRNP in cardiac I/R mice.

**Methods** C57BL/6 mice were conducted I/R operation and BRNP treatment. After IR 2 weeks, echocardiography and pressure-volume loop (PV-Loop) were used to analysis the cardiac function, after 1 day, TTC staining evaluated the infarction size, DHE and TUNEL staining investigated the ROS and apoptosis, the mRNA level of MCP-1 and TNF- $\alpha$  by RT-PCR were measured to assessment the inflammation.

**Results** Echocardiography and PV-Loop detected BRNP obviously improved cardiac function deduced by I/R after 2 weeks, EF, FS, CO and SW were obviously improved compared with the IR mice, the dosage of 30 mg/kg was more significant than 10mg/kg. In addition, the results showed that BRNP treatment markedly attenuated the myocardial infarct areas compared with PBS 1 day after I/R. Moreover, DHE staining and TUNEL staining revealed BRNP significantly reduced the cardiac ROS and apoptosis induced by I/R. Furthermore, BRNP apparently lessened MCP-1 and TNF- $\alpha$  mRNA level caused by I/R.

**Conclusions** Our findings suggested that BRNP protects against cardiac I/R injury by inhibiting myocardial ROS, apoptosis and inflammation. BRNP may be a great potential therapeutic medication for myocardial I/R injury.



## 合并缺血性脑卒中史的老年急性心肌梗死患者院内不良事件分析

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**目的** 探讨合并缺血性脑卒中史的老年急性心肌梗死患者临床特点及导致院内不良事件的独立危险因素。

**方法** 选择2010年1月~2017年12月在首都医科大学附属北京安贞医院心内科监护室收治的急性ST段抬高型心肌梗死519例,根据既往缺血性脑卒中史分为缺血性脑卒中组患者105例,对照组414例,分析临床特点和院内不良事件,采用多元logistic回归分析2组发生院内不良事件的主要独立危险因素。

**结果** 与对照组比较,脑卒中组年龄、高血压和糖尿病比例明显升高,收缩压、LVEF水平明显降低( $P<0.05$ ,  $P<0.01$ )。脑卒中组院内死亡、心源性休克、恶性心律失常、多器官功能衰竭比例明显高于对照组(8.6% vs 2.4%, 15.2% vs 7.7%, 8.6% vs 3.1%, 18.1% vs 5.6%,  $P<0.05$ ,  $P<0.01$ )。脑卒中组接受主动脉内球囊反搏、机械通气、持续性肾脏替代治疗比例明显高于对照组(35.2% vs 19.8%, 10.5% vs 4.6%, 3.8% vs 0.2%,  $P<0.01$ )。logistic回归模型分析发现,缺血性脑卒中、高血压、糖尿病、心功能Killip分级Ⅲ~Ⅳ级、年龄 $\geq 65$ 岁、LVEF $\leq 50\%$ 、收缩压 $\leq 90$  mmHg是合并缺血性脑卒中急性ST段抬高型心肌梗死患者发生院内不良事件的独立危险因素( $P<0.05$ ,  $P<0.01$ )。

**结论** 合并有缺血性脑卒中史的老年急性心肌梗死患者院内不良事件发生率高。

## 频域心电图诊断心肌缺血的临床价值

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**目的** 分析和探讨频域心电图诊断心肌缺血的临床价值

**方法** 高血压患者伴有胸闷、心悸、心慌、心前区不适等临床症状者进行同步记录频域心电图、心电向量图及十二导联心电图;选择频域心电图异常及伴有缺血性T环改变为分析对象共81人,男性28人,女性53人,年龄37~91岁,平均 $65\pm 11.29$ 岁。

**结果** 一、频域心电图异常表现为①自功率谱Gyy、Gxx基谐波比例失调,1N基波低小或消失,4/3N即第3或第4谐波低小或消失;传递函数(相移超限)D,波折过大过多W;互相关函数PT段平坦或倒置,RD远离O点;按其出现频率的高低排列为PT段(67.9%)、Gxx(65.43%)、Gyy(62.96%)、D(59.26%)、RD(22.22%)、4/3N(17.28%)、1N(6.17%)、W(3.7%);PT段、Gxx、Gyy及D出现的概率最高,显示其阳性检出率最高,敏感性最好。②频域心电图各项指标均以不同的形式组合出现,其中二项12例,三项41例,四项28例,组合中的核心指标95.06%来自于PT段、Gxx、Gyy及D,这四大指标在心肌缺血的诊断上起到极为重要的关键性作用,其技术含金量最高、特异性最强,诊断率最准确。

二、缺血性T环改变(心电向量图中均须 $\geq 2$ 个面)表现为①T环过小(振幅 $\leq 0.3$  Mv)及伴有T环变形(环体扭曲、隆突、凹陷、小圆形等,变形常导致T环长/宽比异常)共81例;②T环移位(T环角度异常),T环位于右前上方9例,右前下方12例,右后上方4例,右后下方3例,左后上方25例;T环右移常伴 $\angle R-T$ 增大;③T环运转方向异常22例;上述T环变化完全符合经典的心肌缺血诊断标准。三、频域心电图的PT段、Gxx、Gyy、D、RD、3/4N等指标常随心电信号的偏离、离散度和形态畸变(如ST段抬高或降低,T波平坦或倒置)而发生相应性的改变,均反映心电信号的周期性被破坏,心电活动不一致性,传导功能的协调失衡,心脏舒缩功能不均一性,可致使心肌呈缺血、缺氧的状态。缺血性T环的改变验证和支持了频域心电图诊断心肌缺血的准确性、有效性和应用性。

**结论** 频域心电图与心电向量图诊断心肌缺血具有相同的功能,二者特征性的表现为早发现、早诊断、早干预提供可靠的信息而具有极高的临床应用价值。

## 高血压患者HCY水平与冠心病患病及冠脉病变严重程度的关系

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**目的** 研究高血压患者血浆同型半胱氨酸(HCY)水平与冠心病患病率及冠脉病变严重程度的关系。

**方法** 入选2016年5月~2017年6月诊治的154例高血压患者,所有患者均行冠状动脉造影检查,依据血浆HCY的水平分为研究组(HCY $\geq 15$   $\mu\text{mol/L}$ )和对照组(HCY $< 15$   $\mu\text{mol/L}$ )。统计两组临床特征及冠心病患病的差异,分析HCY水平与冠脉Gensini积分的相关性。

**结果** 两组糖尿病史、卒中史、体质指数(BMI)、血压、低密度脂蛋白(LDL)之间无统计学差异;研究组男性、吸烟史、饮酒史比例及年龄、尿酸(UA)、血肌酐(Cr)水平均高于对照组。研究组冠心病患病率及冠脉 Gensini 积分明显高于对照组(96.8% vs 72.8%,  $P=0.000$ ;  $51.91 \pm 44.43$  vs  $33.38 \pm 39.01$ ,  $P=0.007$ );采用 Spearman 相关性分析显示, HCY 与 Gensini 积分存在正相关( $r=0.330$ ,  $P=0.000$ );控制性别、吸烟史、饮酒史、年龄、尿酸(UA)、血肌酐(Cr)等危险因素后,多元线性回归分析显示,在高血压患者中,HCY 是 Gensini 积分评分的影响因素( $B=1.339$ ,  $P=0.001$ )。

**结论** 高血压伴 HCY 升高者,冠心病患病率更高,HCY 水平越高,提示冠脉病变越严重。

## Ticagrelor versus clopidogrel on thrombus inflammation in ST-elevation myocardial infarction patients

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**Objective** Ticagrelor provides more rapid, potent and consistent anti-platelet efficacy than clopidogrel. This randomised trial aimed to evaluate the anti-inflammation effects of ticagrelor versus clopidogrel on thrombus aspirated from the ST-elevation myocardial infarction (STEMI) patients.

**Methods** The study was approved by the ethics committee of the First Affiliated Hospital of Harbin Medical University (201525) and registered at <https://clinicaltrials.gov/> (NCT02639143). Patients were eligible for inclusion in the trial if they had symptoms suggesting acute myocardial ischemia lasting more than 30 minutes, ST-segment elevation of more than 0.1 mV in two or more leads on the electrocardiogram (ECG), arrival at the hospital within 12 hours of the onset of symptoms, and the intention to perform PCI. A total of 98 patients with STEMI and intended percutaneous coronary intervention (PCI) were randomly assigned to receive clopidogrel (600 mg loading dose) or ticagrelor (180 mg loading dose), of whom 55 with large thrombus burden underwent thrombus aspiration during PCI. Thrombus specimens were successfully aspirated from 49 patients. Finally, 24 patients in the

clopidogrel group and 23 in the ticagrelor group completed the study. Inflammatory cells within thrombi were assessed by hematoxylin-eosin and immunohistochemistry stainings.

**Results** Compared with the clopidogrel group, the number of total inflammatory cells per mm<sup>2</sup> thrombus area in the ticagrelor group was decreased by 28% ( $P=0.009$ ). The numbers of neutrophils, and myeloperoxidase-positive cells per mm<sup>2</sup> thrombus area in the ticagrelor group were respectively decreased by 35% ( $P=0.016$ ) and 28% ( $P=0.047$ ), as compared with those in the clopidogrel group. Moreover, ticagrelor treatment reduced the ratio of monocytes number higher than 250 per mm<sup>2</sup> thrombus area compared with clopidogrel treatment (4% versus 29%,  $P=0.048$ ).

**Conclusions** In patients with undergoing PCI for STEMI, the loading dose ticagrelor regimen was associated with a reduction in inflammatory cell infiltration within thrombus compared with the loading dose clopidogrel regimen. P2Y<sub>12</sub> receptor inhibitors exert additional anti-inflammation benefits at the initiate stage of thrombosis beyond inhibition of platelet.

## 吸烟与冠心病患者认知功能障碍的相关性

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**目的** 探讨吸烟与冠心病患者认知功能障碍的关系。

**方法** 选择2016年5月~2017年6月郴州市第一人民医院老年心血管内科收治的经冠状动脉造影确诊的冠心病患者135例,依据是否吸烟分为暴露组27例(每天至少吸烟1支,并持续1年以上)和对照组108例(不吸烟)。比较2组临床特征及认知功能障碍患病率的差异,并分析冠心病患者认知功能障碍的危险因素。

**结果** 2组年龄、糖尿病、脑卒中、高血压、文化水平(文盲与否)、职业(农民与否)、体质量指数、尿酸、肌酐、LDL水平比较,差异无统计学意义( $P>0.05$ )。暴露组男性、饮酒及同型半胱氨酸水平明显高于对照组[100.0% vs 58.3%,  $P=0.000$ ; 63.0% vs 9.3%,  $P=0.000$ ;  $(21.27 \pm 15.38) \mu\text{mol/L}$  vs  $(15.06 \pm 3.16) \mu\text{mol/L}$ ,  $P=0.047$ ]。暴露组认知功能障碍患病率明显高于对照组(44.4% vs 18.5%,  $P=0.005$ )。单因素 logistic 回归分析显示,吸烟史、年龄、糖尿病、脑卒中史、肌酐是认知功能障碍危险因素。控制年龄、糖尿病、脑卒中史、肌酐等混杂因素后,多元 logistic 回归分析显示,吸烟仍

是冠心病患者认知功能障碍的危险因素( $OR=5.909$ , 95%  $CI: 2.022\sim 17.268$ ,  $P=0.001$ )。

**结论** 吸烟与冠心病患者认知功能障碍相关,是冠心病患者认知功能障碍的危险因素。

## The efficacy and safety of different antiplatelet strategies in postmenopausal females with Multi-vessel coronary artery disease undergoing PCI

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**Objective** Cardiovascular disease is well recognized as the leading cause of death in women. It is estimated that the lifetime risk for developing coronary artery disease (CAD) in women after 40 years of age is 32%. Cardiovascular disease is well recognized as the leading cause of death in women. It is estimated that the lifetime risk for developing coronary artery disease (CAD) in women after 40 years of age is 32%. Epidemiological studies have clearly shown that in premenopausal women the onset of coronary artery disease occurs, on average, 10 years later than in men, with myocardial infarction occurring 20 years later. The incidence of CAD in women increases markedly after menopause, suggesting that CAD is related to declining estrogen levels. Increasing clinical evidence demonstrates that about 40–65% of patients with ST-elevation myocardial infarction (STEMI) have angiographically-documented MVD. We compared the efficacy and safety of clopidogrel and ticagrelor in postmenopausal women with MVD undergoing a percutaneous coronary intervention (PCI).

**Methods** In this retrospective trial, we compared ticagrelor and clopidogrel for the prevention of cardiovascular events in 789 ACS female patients admitted to the hospital with a Multi-vessel coronary artery disease undergoing PCI. 541 male peers were also involved to verify the idea of postmenopausal women suffered higher risk. The health status of all patients was assessed using the Seattle Angina Questionnaire (SAQ), which is a 19-item questionnaire that measures five domains of health status related to coronary artery disease.

**Results** At 12 months, ticagrelor did not show any advantage

over clopidogrel in MACCE endpoints except myocardial infarction ( $P=0.037$ ). At 24 months, a survival analysis showed that ticagrelor decreased the incidence of all-cause death ( $P=0.026$ ), myocardial infarction ( $P=0.040$ ), target vessel revascularization (TVR) ( $P=0.028$ ) and stent thrombosis ( $P=0.037$ ). A Seattle Angina Questionnaire analysis also indicated that ticagrelor and double-dose clopidogrel improved in this outcome. As for the bleeding events, ticagrelor attributed to higher rate of bleeding events than clopidogrel. Cox and interaction analysis revealed that patient age, body mass index, renal function and LMWH usage were responsible to the high bleeding risk. Comparing with male, postmenopausal female indeed suffered higher ischemic risk.

**Conclusions** In ACS postmenopausal female patients with MVD undergoing PCI, the ticagrelor antiplatelet strategy significantly reduced the MACCE rate and increased quality of life but the bleeding risk was higher than those receiving clopidogrel.

## 急性心肌梗死伴动态的左室流出道梗阻1例

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**目的** 急性心肌梗死是冠状动脉粥样硬化性心脏病的严重病变,对于急性心肌梗死后出现收缩期心脏瓣膜杂音,在高度警惕室间隔穿孔、乳头肌断裂等常见并发症外,需考虑有无左室流出道梗阻可能。

**方法** 本例患者急性心肌梗死,开通血运重建后出现胸骨左缘第四肋间闻及收缩期3级粗糙杂音,立即行心脏彩超检查排除室间隔穿孔、二尖瓣脱垂等相关常见并发症,结合病史及体征,考虑为动态的左室流出道梗阻,心脏彩超在Valsalva动作时可观察到左室流出道峰值压力阶差相对平静呼吸时增加。

**结果** 心脏彩超示:静息状态下左室流出道峰值血流速度:123 cm/s,左室流出道峰值压力阶差:6 mmHg。Valsalva动作时左室流出道峰值血流速度:285 cm/s,左室流出道峰值压力阶差:33 mmHg。考虑患者诊断为急性心肌梗死并动态左室流出道梗阻,为室间隔增厚且血容量下降等综合因素所致可能性大,予控制心率,适当扩容补液后杂音消失,患者胸闷、气促症状有所好转,考虑治疗有效。

**结论** 患者既往有高血压、室间隔增厚病史,此次急性心肌梗死后心衰,予加强利尿减轻心脏负荷治疗,出现动态左室流出道梗阻,予控制心率、适当控速补液,解除加重左室流出道梗阻诱因,杂音逐渐消失,二尖瓣关闭不全亦有明显好转。对于急性心肌梗死后出现收缩期心脏瓣膜杂音,在高度警惕室间隔穿孔、乳头肌断裂等常见并发症外,需考虑有无左室流出道梗阻可能。对于出现动态的左室流出道梗阻患者,应尽快查明病因,解除危险因素及联合药物治疗可取得良好的治疗效果。

## 冠心病尿液代谢组学

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**目的** 代谢物进行了组学的发展,代谢组学方法已成为医学实践和医学研究的热点。本研究利用液质联用的代谢组学研究平台对冠心病患者尿液代谢轮廓进行分随着代谢在诊断价值的特征代谢标志物。同时对在临床病例研究中如何运用代谢组学方法研究疾病发生发展的内在机制、寻找可用于监测和评估疾病进程的特征析,并筛选出具有潜初步探讨。

**方法** 采用基于液相色谱-质谱联用的方法对冠心病(coronary atherosclerotic heart disease)患者和正常对照人群的尿液进行分析,筛选冠心病患者尿液中差异代谢物,选择冠心病患者尿液标本22例,15例疾病组及7例健康对照组,采用UPLC质谱串LTQ-Orbitrap velos (Thermo Fisher Scientific, San Jose, CA, USA)质谱对尿液代谢进行分析,采用主成分分析(PCA)对两组代谢物进行分类,组间差异变量通过OPLS-DA模型获取的VIP值进行筛选,VIP值大于1的变量认为是组间显著性差异变量。并对它们进行鉴定;并筛选特征代谢物,将鉴定得到的差异性变量进行代谢通路分析,分析与疾病相关性较强的代谢通路。

**结果** 冠心病组和健康对照组尿液代谢物谱能得到很好的区分,发现VIP>1代谢物61个,初步鉴定得到25个,参与通路主要是磷脂、甘油酯代谢通路,此结果和文献中报道的血浆代谢组学的通路结果具有一定的吻合性。有15个变量在冠心病病人尿液中的含量显著向正常人水平回调,经过鉴定得到2个糖苷代谢物,可能在冠心病发生发展中有重要作用。

**结论** 利用代谢轮廓分析方法所找到的特征代谢物具有很好的区分冠心病患者与健康人群的能力,可以作为潜在的疾病诊断标志物及新治疗靶点在临床领域做进一步研

究。代谢组学变化可能反应冠心病早期的病理生理变化,可能有助于冠心病患者进行危险分层。

## 替格瑞洛相关呼吸困难的调查分析

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2. 新疆医科大学第一附属医院影像中心

**目的** 观察新疆医科大学第一附属医院近6个月替格瑞洛临床应用和替格瑞洛相关呼吸困难的发生情况

**方法** 收集新疆医科大学第一附属医院2018年1月至2018年10月使用替格瑞洛患者的资料,包括患者临床特征和替格瑞洛相关呼吸困难发生情况,比较替格瑞洛相关呼吸困难与无药物相关呼吸困难患者的临床特征。

**结果** 413例患者中男315例(76.3%),急性心肌梗死患者215例(52.1%),冠状动脉造影明确为左主干和(或)多支病变患者334例(80.9%),急慢性闭塞病变患者128例(31.0%),左主干狭窄>50%患者37例(9.0%)。替格瑞洛相关呼吸困难患者26例(6.3%),其中停药患者2例(0.5%)。替格瑞洛相关呼吸困难患者与无药物相关呼吸困难患者相比,年龄差异有统计学意义[(58.3±6.5)岁比(57.3±11.6)岁, $P=0.002$ ];性别、高血压病、糖尿病、高脂血症、冠状动脉病变严重程度等比较,差异无统计学意义(均 $P>0.05$ )。

**结论** 替格瑞洛主要用于急性冠状动脉综合征和冠状动脉复杂病变经皮冠状动脉介入治疗高危患者,6.3%的患者发生替格瑞洛相关呼吸困难,仅少数患者需要停药。

## 冠心病患者替格瑞洛相关呼吸困难预测因素的分析

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**目的** 探讨冠心病(CHD)经皮冠状动脉介入治疗(PCI)患者在服用替格瑞洛期间发生呼吸困难的预测因素。

**方法** 选择293例行PCI服用替格瑞洛的CHD患者,58例(19.8%)发生替格瑞洛相关呼吸困难(A组),235例(80.2%)未发生替格瑞洛相关呼吸困难(B组);2组在年龄、性别、吸烟、贫血方面,差异有统计学意义( $P<0.05$ );与未发生出血事件的患者相比,发生出血事件的患者呼吸困难的发生率明显升高(35.3%:16.5%,单因素分析OR=1.973, $P=0.035$ )。多因素logistic回归分析显示年龄、吸烟、贫血、出血事件与呼吸困难发生呈正相关。

**结果** PCI治疗的CHD患者应用替格瑞洛出现替格瑞洛相关呼吸困难的风险较高,年龄、吸烟、贫血、出血事件为发生呼吸困难的预测因素。

**结论** PCI治疗的CHD患者应用替格瑞洛出现替格瑞洛相关呼吸困难的风险较高,年龄、吸烟、贫血、出血事件为发生呼吸困难的预测因素。

## “双心医学”模式对冠心病伴焦虑和抑郁患者的临床研究

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**目的** 探索“双心医学”模式在冠心病伴焦虑和抑郁患者中的临床应用。

**方法** 采用患者健康问卷抑郁量表(patient health questionnaire depression scale-9, PHQ-9)、广泛性焦虑问卷量表(generalized anxiety disorder scale-7, GAD-7)对2016年1月至2018年12月在江西省人民医院心内科住院治疗的冠心病患者均行冠脉造影检查确诊,且至少一支冠脉狭窄 $\geq 50\%$ ,并进行筛查出120例合并焦虑、抑郁的患者为研究对象,按照随机数字表法将研究对象随机分为常规治疗组60例和干预组60例。常规治疗组给予冠心病二级预防药物治疗,干预组在规范化药物治疗基础上,给予心理疏导及黛力新抗焦虑、抑郁等“双心医学”干预,1个月后比较两组患者主要躯体化症状、PHQ-9、GAD-7评分的差异。

**结果** 与常规治疗组相比,1个月后,干预组主要躯体化症状明显改善,差异有统计学意义( $P<0.05$ ),干预组PHQ-9、GAD-7评分明显降低,差异有统计学意义( $P<0.01$ )。

**结论** “双心医学”模式可显著冠心病患者的主要躯体化症状,同时改善焦虑、抑郁状况,有较好的临床效果。

## 高龄冠心病患者行部分血运重建介入治疗的近、远期疗效

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**目的** 经皮经腔冠状动脉介入术(PCI)与冠状动脉旁路移植术(CABG)是两种主要的血管重建方法,PCI具有创伤小、恢复快的优点,但高龄冠心病患者的冠状动脉病变特点呈多支、慢性闭塞病变,行PCI治疗具有较大的风险。本院根据冠状动脉造影和心电图等检查,对需支架置入的患者行介入治疗,只干预当前影响心肌供血的病变血管,未全部开通所有病变血管,以探讨高龄高危冠心病患者行部分血运重建介入治疗的近、远期疗效。

**方法** 回顾性分析100例高龄冠心病患者的临床资料,其中A组48例接受完全血运重建,B组52例接受部分血运重建,比较两组近远期主要心脏事件发生率。

**结果** 两组近期非致死性AMI、急诊CABG、死亡发生无统计学意义( $P>0.05$ ),远期非致死性AMI、再狭窄率、再次血运重建、死亡发生率无统计学意义( $P>0.05$ ),B组远期心绞痛复发率明显高于A组( $P<0.05$ )。

**结论** 部分血运重建介入治疗并不会明显降低高龄冠心病患者的近远期预后,临床效果较好。

## Interleukin-25 increases in human coronary artery disease and is associated with the severity of coronary stenosis

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**Objective** Interleukin (IL) 25, also known as IL-17E, is an inflammatory cytokine and has been demonstrated to be closely related to cardiovascular diseases by regulating immunity and inflammation, including angiogenesis and atherosclerosis. This study was aimed to evaluate the IL-25 expression in patients with coronary artery disease (CAD).

**Methods** In this study, IL-25 expression in normal (n=6)

and atherosclerotic (n=10) human coronary arteries was detected by immunofluorescent staining. In addition, the serum IL-25, IL-6 and tumor necrosis factor (TNF)  $\alpha$  concentrations in stable angina pectoris (SAP, n=44), unstable angina pectoris (UAP, n=46), acute myocardial infarction (AMI, n=34) and non-CAD (control, n=36) were measured by enzyme-linked immunosorbent assay (ELISA) kits. A Spearman's correlation was used to evaluate the correlations between IL-25, IL-6, and TNF- $\alpha$  and other clinical characteristics. A MANOVA was used to examine the relationship between serum IL-25 levels and individual risk factors for CAD. Simple linear regression analyses and subsequent binary logistic regression analyses were used to identify whether IL-25 was an independent predictor of the CAD.

**Results** IL-25 was significantly increased in coronary arteries of CAD patients when compared with normal coronary arteries, with macrophages and T lymphocytes being the sources of IL-25, especially macrophages. Moreover, the serum concentrations of IL-25, IL-6 and TNF- $\alpha$  were markedly elevated in CAD patients and gradually increased in SAP, UAP and AMI groups. In addition, IL-25 levels were positively correlated with the Gensini Score in CAD patients. A positive correlation between IL-6, TNF- $\alpha$  and IL-25 was observed. Simple linear regression analysis and binary logistic regression analysis showed that IL-25 was independent negatively correlated with the occurrence of CAD.

**Conclusions** IL-25 is increased markedly in the coronary arteries and serum of CAD patients when compared with controls. Moreover, IL-25 is also associated with the severity of coronary stenosis and the occurrence of CAD. IL-25 may be one of potential biomarker of CAD.

## 老年原发性高血压患者动态动脉硬化指数临床特点及影响因素探讨

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**目的** 分析老年原发性高血压患者的动态动脉硬化指数临床特点、影响因素。

**方法** 选择广州军区广州总医院2017年5月-2017年12月长期居住广州的住院离退休老年原发性高血压患者348

例,进行动态血压监测和尿酸、肌酐、白蛋白等的测定,分析该人群动态动脉硬化指数临床特点、影响因素,然后分别按照年龄、高血压病程、醒前2小时收缩压、收缩压昼夜节律水平分组,比较各组间动态动脉硬化指数水平。

**结果** 老年原发性高血压患者总体人群动态动脉硬化指数为 $0.37\pm 0.21$ ,其中老年人(65-80岁)77例(22%)动态动脉硬化指数为 $0.33\pm 0.20$ ,而老老年(>80岁)277例(78%)动态动脉硬化指数为 $0.38\pm 0.21$ ,两者并无统计学意义( $P=0.15$ );按高血压病程是否大于2年分为高血压长久组(>2年)和高血压短时组( $\leq 2$ 年),高血压长久组316例(91%)动态动脉硬化指数为 $0.37\pm 0.21$ ,高血压短时组32例(9%)为 $0.29\pm 0.21$ ,差异具有统计学意义( $P<0.05$ );按醒前2小时收缩压(时间定义为5:00)分为血压达标组(<130 mmHg)和血压未达标组(>130 mmHg),血压达标组动态动脉硬化指数 $0.35\pm 0.20$ ,血压未达标组为 $0.40\pm 0.22$ ,差异具有统计学意义( $P<0.05$ );按收缩压昼夜节律(日间血压平均值-夜间血压平均值)构型组与反构型两组,构型组140例(40%)动态动脉硬化指数为 $0.34\pm 0.23$ ,反构型组208例(60%)为 $0.39\pm 0.20$ ,差异具有统计学意义( $P<0.05$ );多元线性回归分析显示收缩压昼夜节律、醒前2小时收缩压、高血压病程是该人群动态动脉硬化指数的独立影响因素,且具有统计学意义( $P<0.05$ )。在各个分组中,心血管事件的发生并未体现出统计学意义,但是脑血管事件的发生在醒前2小时收缩压与收缩压昼夜节律分组中有统计学意义( $P<0.05$ )。

**结论** 老年原发性高血压患者动态动脉硬化指数可能为 $0.36\pm 0.01$ ,且随着年龄增大其值会相应增大,同时高血压病程长、夜间血压升高、凌晨醒前血压过高均会引起动态动脉硬化指数升高。高血压病程、醒前2小时收缩压、收缩压昼夜节律对动态动脉硬化指数具有显著影响。且醒前2小时收缩压、收缩压昼夜节律在脑血管事件中发挥着重要作用,而AASI在其中可能起着一定的作用。

## 温胆汤对急性冠脉综合征患者脂蛋白磷脂酶A2的影响

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**目的** 探讨温胆汤对急性冠脉综合征(ACS)患者的治疗效果及脂蛋白磷脂酶A2(lipo-protein-associated phospholipase A2, LP-PLA2)的干预作用。

**方法** 110例ACS患者随机分为常规治疗组和加用温胆汤治疗组各55例,同期非ACS患者共63例作为正常对照组。常规治疗组给予常规双抗加降脂治疗(阿司匹林+波立维+立普妥);加用温胆汤治疗组在常规治疗的基础上,加用药用温胆汤加减,每天一次,持续30天。比较3组基础LP-PLA2、低密度脂蛋白(LDL-C)、尿酸(UA)等水平,检查颈动脉斑块面积情况。观察两治疗组前后LP-PLA2水平的变化。

**结果** ACS患者UA、颈动脉斑块面积与正常对照组比较偏高,但差异无统计学意义( $P>0.05$ ),而LP-PLA2、LDL-C水平明显升高,差异有统计学意义( $P<0.05$ )。两治疗组30天后LP-PLA2水平较基础值明显降低,有明显统计学意义( $P<0.05$ ),加用温胆汤治疗组患者血浆LP-PLA2水平降低幅度大于对照组,但差异无统计学意义( $P>0.05$ )。

**结论** ACS患者LP-PLA2、LDL-C水平明显升高,温胆汤一定程度上可以降低血浆LP-PLA2水平。

## 年轻人急性心肌梗死患者临床特点分析

于建才

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**目的** 分析年轻人急性心肌梗死患者临床特点。

**方法** 回顾2015年-2018年沧州市中心医院心内二科收治的84例年轻急性心肌梗死患者的临床特点,分析其年龄,性别,吸烟史,BMI,合并高血压、糖尿病、高脂血症,冠心病家族史,入院心电图表现,冠状动脉造影病变特点及介入治疗等因素,寻找相关危险因素。

**结果** 在84例患者中,年龄均在40岁以下,男性占92.9%(78例);吸烟者占86.9%(73例);超重者占40.5%(34例),肥胖者占25%(21例);合并高血压、糖尿病、高脂血症比率分别为11.9%(10例)、7.1%(6例)、27.4%(23例);有冠心病家族史者占3.6%(3例);心电图提示STEMI者占45.2%(38例),NSTEMI者占54.8%(46例);STEMI患者接受急诊PCI占47.4%(18例),择期介入治疗者占36.8%(14例),药物保守治疗者占15.8%(6例),梗死部位为前壁者占63.1%(24例),下壁者占36.9%(14例);NSTEMI患者接受介入治疗者占65.2%(30例),药物保守治疗者占34.8%(16例)。所有接受介入治疗的62患者冠脉造影提示梗死相关血管为LAD者占48.4%(30例),LCX占22.6%(14例),RCA占29%(18例)。

**结论** 本研究中年轻急性心肌梗死患者绝大多数为年轻男性,其中吸烟,肥胖等危险因素所占比例高,高血压、糖尿病,冠心病家族史所占比例低,提示不同于传统危险因素,肥胖、吸烟可能是年轻急性心肌梗死患者的重要危险因素,另外血管病变以单支常见,梗死部位以前壁居多,梗死血管以LAD多见,此信息可对该人群介入治疗提供参考。

## 参元丹胶囊干预不稳定性心绞痛择期PCI围手术期心肌损伤的随机、双盲、安慰剂、对照研究

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**目的** 旨在评估SYD减少不稳定性心绞痛患者择期PCI围手术期心肌损伤的有效性、安全性以及潜在的作用机制。

**方法** 采用随机、双盲、安慰剂、对照的观察方法,共有76名满足纳入标准的患者在常规治疗基础上被随机分到SYD组(术前3天口服SYD,每日三次,每次4粒,[n=36])或安慰剂组(术前3天口服安慰剂,每日三次,每次4粒,[n=40])。于术前12小时、术后4小时、术后24小时、术后1周动态检测血清肌钙蛋白T(cTnT)、炎症反应指标(高敏C反应蛋白(hs-CRP)、白细胞介素-6(IL-6))和氧化应激指标(超氧化物歧化酶(SOD)、丙二醛(MDA))水平。以术后血清cTnT升高大于正常上限2倍为PMI诊断标准。主要观察指标是评估SYD减少PMI发生率的有效性和安全性,次要观察指标是观察SYD对PCI前后血清氧化应激指标和炎症反应指标的影响。

**结果** 主要观察指标方面,SYD组发生PMI例数(n=3)低于安慰剂组(n=8),但差异不具有统计学意义(8.3% vs 20%, $P=0.149$ )。研究过程中,两组均未发生明显不良事件。次要观察指标方面,两组氧化应激指标水平和炎症指标水平相较术前在术后4小时和术后24小时均出现改变,SYD组的变化程度有低于安慰剂组的趋势。SYD组MDA水平在术后24小时低于安慰剂组的差异( $3.65\pm 0.40$  mmol/mL vs  $4.60\pm 0.21$  mmol/mL, $P=0.026$ )具有统计学意义。两组间血清hs-CRP、IL-6以及SOD水平在各时间点均未见显著统计学差异( $P>0.05$ )。对术后4小时或术后24小时大于hs-CRP正常上限水平(5 mg/L)进行计数资料统计,SYD组术后hs-CRP阳性率低于安慰剂组,差异具有统计学意义(35% vs 65%, $P=0.012$ )。

**结论** 本研究初步提示SYD可能具有潜在的PCI围手术期

心肌保护作用,并且安全性较好,该心肌保护作用可能与抗氧化应激和减轻炎症损伤相关,但需要在合理样本量基础上开展进一步研究。

## Physiological serum concentration of gamma-glutamyl transferase reversely associated with long-term mortality in coronary artery disease after percutaneous coronary intervention: Results from a 10-year follow-up of CORFCHD-PCI study

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**Objective** The monocyte to high-density lipoprotein cholesterol ratio (MHR) has recently been proposed as a new marker and has revealed as an indicator of coronary artery diseases (CAD). The aim of this study was to investigate the association between MHR and the outcome of patients with CAD treated with percutaneous coronary intervention (PCI).

**Methods** A total of 5668 CAD patients after PCI from CORFCHD-PCI, a retrospective cohort study (Identifier: ChiCTR-INR-16010153) were included the study and divided into tertiles according to MHR values. The primary outcome was long-term mortality after PCI. The main secondary endpoints were stroke, readmission, and major adverse cardiovascular events (MACEs) defined as the combination of cardiac death, stent thrombosis, recurrent myocardial infarction, and target vessel reconstruction. The average follow up time is  $35.9 \pm 22.6$  months.

**Results** Patients were divided into 3 groups according to MHR tertiles: 1st tertile (MHR < 0.4; n=1290), 2nd tertile (MHR  $\geq$  0.4 U/L to 0.61 U/L; n=1878) and 3rd tertile (MHR > 0.61 U/L; n=1870). Overall, there were 293 all-cause mortality (ACM) during the following up. The incidence of ACM in the 1st tertile is 80 (4.2%), 2nd tertile is 91

(4.8%), and 3rd tertile is 122 (6.5%). The ACM incidence was significantly lower in 1st and 2nd tertile compared to that in the 3rd tertile (adjusted HR = 0.658 [0.408–0.903],  $P=0.009$  and HR = 0.712 [0.538–0.941],  $P=0.017$ , respectively). Cardiac mortality (CM) occurred in 235 patients: 60 (3.1%) in the 1st tertile group, 74 (3.9%) in the 2nd tertile and 101 (5.4%) in the 3rd tertile group. There was significant difference in the CM incidence between the 1st tertile group and 3rd tertile group (HR = 0.581 [0.406–0.832],  $P=0.003$ ), there was also difference in the CM incidence between the 2nd tertile group and 3rd tertile group in the CM incidence (HR = 0.690 [0.506–0.940],  $P=0.019$ ). MACE occurred in 861 patients: 258 (13.4%) in the 1st tertile group, 276 (14.7%) in the 2nd tertile and 327 (17.4%) in the 3rd tertile group. We did not find significant difference in the incidence of MACEs among these three groups.

**Conclusions** The present study indicated that increased MHR was independently associated with long-term mortality in CAD patients underwent PCI.

## Moderate serum $\gamma$ -glutamyl transferase level is beneficial for heart failure after percutaneous coronary intervention

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**Objective** Previous studies suggested that elevated serum  $\gamma$ -glutamyl transferase (GGT) level is an independent predictor of coronary artery disease (CAD) and heart failure (HF). However, whether serum GGT level has a predictive role for HF after PCI remains unclear. The present study aimed to evaluate the association of GGT with HF after PCI in a Chinese population.

**Methods** The present study is a part of the Clinical Outcomes and Risk Factors of Patients with Coronary Heart Disease after PCI (CORFCHD-PCI) study carried out in Department of Cardiology, First Affiliated Hospital of Xinjiang Medical University. The details of the design have been registered on <http://www.chictr.org.cn> (Identifier: ChiCTR-INR-



16010153). The CORFCHD-PCI study was designed to evaluate the clinical outcomes and risk factors of CAD patients after PCI. We collected the demographic data, clinical characteristics, risk factors, blood samples, biochemical data, data of ECG, echocardiography, coronary angiography and PCI procedure, short-term and long-term outcomes for CAD patients who underwent PCI in the First Affiliated Hospital of Xinjiang Medical University from January 2008 and December 2016. Inclusion criteria were CAD patients including non-ST segment elevation acute coronary syndrome (ACS), ST-segment elevation ACS, and stable angina, undergoing coronary angiography and showing the stenosis  $\geq 70\%$  and at least one stent being implanted. 5638 patients were divided into 3 groups according to GGT tertiles: 1st tertile (GGT < 19.6 U/L; n=1875), 2nd tertile (GGT  $\geq 19.6$  U/L to 32.9 U/L; n=1880) and 3rd tertile (GGT  $\geq 32.9$  U/L; n=1883). There were 165 (2.9%) HFs during a long-term follow-up. The average follow-up time was  $35.9 \pm 22.6$  months.

**Results** The incidence of HF in the 1st tertile is 62 (3.3%), 2nd tertile is 38 (2.0%), and 3rd tertile is 65 (3.5%). The HF incidence was significantly lower in 2nd tertile compared to that in the 1st tertile or in the 3rd tertile (Both  $P < 0.05$ ). AU-shaped curve was observed according to quintiles (Q1: 3.4%, Q2: 3.0, Q3: 1.6%, Q4: 2.9%, Q5: 3.7%,  $P = 0.042$ ). The multivariate Cox proportional hazards model showed after adjustment of confounders, the association remains significant ( $P = 0.046$ ).

**Conclusion** The present study indicated that serum GGT concentration was independently associated with HF after PCI. The baseline serum GGT level less than 19.6 or  $\geq 32.9$  increases HF risk in coronary artery disease patients underwent PCI.

## White blood cell counts to High-Density Lipoprotein Cholesterol Ratio (WHR), a novel biomarker of long-term mortality for Coronary Artery Disease undergoing percutaneous coronary intervention

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**Objective** White blood cell counts (WBC) and high-density lipoprotein cholesterol (HDL-C) are widely available in clinical practice but utility as potential risk factors for cardiovascular disease (CVD) is uncertain. This study firstly assessed the prognostic value of WBC to HDL-C ratio (WHR) in patients with coronary artery disease (CAD) undergoing primary percutaneous coronary intervention (PCI).

**Methods** A total of 6050 CAD patients after PCI from CORFCHD-PCI, a retrospective cohort study (Identifier: ChiCTR-16010153) were evaluated. 371 patients were excluded due to no HDL-C data available. Finally, 5679 patients were enrolled. The primary outcome was long-term mortality after PCI. The main secondary endpoints were readmission, main adverse cardiovascular and cerebrovascular events (MACCE) defined as the combination of stroke, cardiac death, stent thrombosis, recurrent myocardial infarction, and target vessel reconstruction. The average follow up time is  $35.9 \pm 22.6$  months.

**Results** Patients were divided into 3 groups according to WHR tertiles: 1st tertile (WHR < 6.11; n = 1891), 2nd tertile (WHR  $\geq 6.11$  to 8.70; n = 1890) and 3rd tertile (WHR > 8.70; n = 1898). Overall, there were 293 all-cause mortality (ACM) during the following up. The incidence of ACM in the 1st tertile is 74 (3.9%), 2nd tertile is 98 (5.2%), and 3rd tertile is 121 (6.4%). The ACM incidence was significantly higher in 3rd tertile compared to that in the 1st tertile ( $P = 0.003$ ). Cardiac mortality (CM) occurred in 235 patients: 64 (3.4%) in the 1st tertile group, 76 (4.0%) in the 2nd tertile and 95 (5.0%) in the 3rd tertile group. There was significant difference in the CM incidence between the 1st tertile group and 3rd tertile group ( $P = 0.041$ ). Also, there were also significant differences in the incidence of MACCE between the three groups, 239 (12.6%) in the 1st tertile, 281 (14.9%) in the 2nd tertile, 288 (15.2%) in in the 3rd tertile group. The multivariate Cox proportional hazards model showed that increased WHR level was independently correlated with the ACM (adjusted HR = 2.046 [1.467-2.853],  $P < 0.001$ ) and CM (adjusted HR = 1.800 [1.248-2.596],  $P = 0.002$ ). We did not found significant difference in the incidence of MACCEs (adjusted HR = 1.216 [0.997-1.482],  $P = 0.054$ ), stroke, bleeding events and readmission among these three groups.

**Conclusions** The present study indicated that increased WHR value was independently associated with long-term mortality in CAD patients underwent PCI and it could be a novel biomarker for poor prognosis.

## 基于系统药理学探究通冠胶囊治疗冠心病的作用机制

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**目的** 利用系统药理学方法探究通冠胶囊治疗冠心病的作用机制。

**方法** 借助中药分子机制生物信息学分析工具(BATMAN-TCM)获取通冠胶囊的药物成分和作用靶蛋白,构建成分-靶点网络;基于CTD和Genecards数据库筛选与冠心病相关的疾病靶点,将疾病相关靶点与化合物靶点进行对比得到交集靶点,通过David数据库对交集靶点进行GO分析和KEGG分析,最后用IGEMDOCK软件验证靶标基因与活性成分的结合活性。

**结果** 本研究共获得141个化合物,对应301个化合物靶点,其中与冠心病相关的靶点有19个,涉及信号通路25条,分子对接表明化合物与靶点具有良好的结合性。

**结论** 本研究从系统药理学层面初步揭示了通冠胶囊对冠心病具有多成分、多靶点、多途径的作用机制,与现代临床用药规律契合,其作用机制可能是通过调控一氧化氮生物合成、脂质代谢、血压调节等生物学过程以及HIF-1信号转导通路、cGMP-PKG、cGMP-PKG信号通路等通路对冠心病进行干预,为下一步实验研究和临床应用提供了理论基础和新的思路。

## 脂蛋白(a)与低密度脂蛋白胆固醇在首发急性心肌梗死中的交互作用

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**目的** 评价脂蛋白(a)(Lp(a))与低密度脂蛋白胆固醇(LDL-C)在首发急性心肌梗死(AMI)中的交互作用。

**方法** 连续入选2010~2013入住苏州大学附属第一医院心内科3213例患者,其中1522例首发AMI者为病例组,1691例冠脉造影排除冠心病者为对照组。将研究对象按Lp(a)的五分位(Q1-Q5)以及LDL-C=2.6 mmol/L分为4组:1)参照组:Lp(a)位于Q1且LDL-C<2.6 mmol/L;2)单纯LDL-C增高组:Lp(a)位于Q1且LDL-C≥2.6 mmol/L;3)单纯Lp(a)增高组:Lp(a)位于Q2-Q5且LDL-C<2.6 mmol/L;4)Lp(a)与LDL-C合并增高组:Lp(a)位于Q2-Q5且LDL-C≥2.6 mmol/L。应用stata15.0分析数据。采用Logistic回归分析各组AMI风险,用相加模型和相乘模型评价Lp(a)与LDL-C在AMI中的交互作用。校正因素:年龄、性别、吸烟、饮酒、2型糖尿病、原发性高血压、体重指数、高密度脂蛋白胆固醇、甘油三酯、白蛋白、肌酐。

**结果** 经多因素校正后与参照组相比:单纯LDL-C增高组的OR(95% CI) 2.66(1.78-3.99);单纯Lp(a)增高组中Lp(a)位于Q2-Q5的OR(95% CI)分别为1.51(1.07-2.15)、1.84(1.28-2.64)、1.86(1.30-2.67)、2.66(1.88-3.76);Lp(a)与LDL-C合并增高组中Lp(a)位于Q2-Q5的OR(95% CI)分别为3.95(2.64-5.92)、3.20(2.21-4.64)、5.64(3.80-8.36)、7.48(4.90-11.44),从Lp(a)的Q3开始OR呈明显增加趋势。Lp(a)在Q4、Q5, RERI(95% CI)分别为1.78(0.12-3.44)、3.01(0.58-5.44)。LDL-C和Lp(a)的乘积项P值始终>0.05。

**结论** 中国汉族人群中,LDL-C与Lp(a)在首发AMI中存在相加交互作用,同时暴露于高Lp(a)与高LDL-C的AMI风险远远大于单独暴露于两者的风险之和。建议对于LDL-C与Lp(a)均升高的中国汉族人,应以降低LDL-C为基础,兼顾降低Lp(a);若LDL-C难以控制,可将Lp(a)控制在90 mg/L以下,以加强对AMI的一级预防。

## Association of Serum HMGB2 Levels with Spontaneous Reperfusion of Infarct-related Artery in Patients with ST-segment Elevation Myocardial Infarction

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**Objective** Although the replacement of bare-metal stents with drug-eluting stents has led to a significant reduction in the rate of angiogenic in-stent restenosis (ISR), ISR occurs in 3% to 20% of patients with a drug-eluting stent, depending on lesion characteristics and patient risk factors. High-mobility group box 2 (HMGB2) is a novel inflammatory protein that has been positively related to cardiovascular disease. However, information regarding the role of HMGB2 in spontaneous reperfusion (SR) of infarct-related artery in patients with ST-segment elevation myocardial infarction (STEMI) is limited. The present study was designed to evaluate the association of serum HMGB2 levels with SR of infarct-related artery in this high-risk population.

**Methods** We measured serum HMGB2 in 1080 consecutive STEMI patients who were recruited between October 2014 and October 2018 using an enzyme-linked immunosorbent assay kit. Blood samples were obtained on admission and before primary percutaneous coronary intervention (pPCI). According to thrombolysis in myocardial infarction (TIMI) results, patients were divided into SR (TIMI 2-3,  $n=248$ ) and non-SR (TIMI 0-1,  $n=832$ ) groups. Logistic regression analysis was performed to define the independent predictors of SR.

**Results** Serum HMGB2 was significantly lower in patients with SR compared to patients with non-SR ( $[3.01 \pm 1.24]$  ng/ml vs.  $[6.36 \pm 1.32]$  ng/ml,  $P=0.013$ ). A cut off HMGB2 value of 2.75 ng/ml had a predictive value of 83% to identify patients with SR (sensitivity = 87%). Logistic regression analysis showed that serum HMGB2 level is an independent predictor of SR (odds ratio = 4.25, 95% confidence interval: 1.58 to 7.69,  $P = 0.005$ ) for STEMI patients.

**Conclusions** Serum HMGB2 levels were associated with ISR in patients. Lower serum HMGB2 level is an independent and novel predictor of SR for STEMI patients. Detection of serum HMGB2 level is promoted to predict SR in STEMI patients. These findings support the use of HMGB2 as a biomarker of atherosclerosis in this high-risk group.

双侧输卵管切除术+盆腔粘连分离术+肠粘连松解术,术后36小时30分出现急性心肌梗死及肺栓塞

**方法** 病史特点:女性,40岁,因“检查发现宫腔占位4年”入院。4年前于外院行经腹子宫肌瘤切除术,体查:BP:132/85 mmHg, P:78次/分, R:20次/分, T 37.3℃,又肺未闻干湿性啰音,心界不大,心率78次/分,律齐,各瓣膜听诊区无杂音。辅助检查:盆腔增强MRI:子宫粘膜下多发肌瘤-大小39×34 mm.ECG:正常。入院诊断:子宫内膜息肉,粘膜下子宫肌瘤。

**治疗** 经过:患者行腹腔镜下子宫次全切除术+双侧输卵管切除术+盆腔粘连分离术+肠粘连松解术,术后36小时30分,患者起床活动时突发晕厥,四肢僵硬伴抽搐,数秒后症状缓解,体查:BP:74/49 mmHg, P72次/分, SO<sub>2</sub>:70%,血糖11.7 mmol/L,双肺未闻及湿啰音,心率72次/分,律齐,无杂音。ECG:ST II/III/AVF抬高,ST I/AVL/V2-V4压低,D-II聚体:7.92 μg/L,高敏肌钙蛋白0.9920 μg/L,CK-MB23 U/L(正常),急诊冠脉造影:LAD远段完全闭塞,予LAD PTCA术成功,左室造影示左室下壁收缩不协调,收缩力减弱。肺血管CT:左右肺动脉主干远端、双肺上叶、右肺中叶及双肺下叶多支肺动脉内栓塞灶。心脏彩超:ASD(中央型),诊断:急性下壁心肌梗死,肺栓塞。予氯吡格雷75 mg QD,利伐沙班15 mg BID。

**结果** 治疗7天后复查肺血管CT,肺动脉血栓较前明显减少,双下肢静脉B超未见异常,治疗8天后D-II聚体1.63 μg/mL,患者无胸闷胸痛症状出院。

**结论** 早期识别外科术后病人的急性心肌梗死及肺栓塞至关重要,可挽救患者生命,而预防外科术后深静脉血栓的形成是基础,值得医务人员的重视。

## 空腹血糖,糖尿病对冠心病SYNTAX评分的影响

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**目的** 探讨空腹血糖,糖尿病与冠状动脉SYNTAX评分(SYNTAX score)的相关性。

**方法** 207名因胸痛住院患者,平均年龄(57.82±9.39),所有患者均接受冠脉造影检查,及血液学检查,对影响冠状动脉SYNTAX score的严重程度进行单因素,多因素分析。

**结果** 空腹血糖正常组与空腹血糖损害组比较,SYN-

## 一位年轻女性妇科术后的恶梦——急性心肌梗死及肺栓塞1例

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**目的** 介绍一位年轻女性经历腹腔镜下子宫次全切除术+

TAX score 没有明显差异;非糖尿病组和糖尿病组比较 SYNTAX score 没有明显差异,两组肌酐,肌酐清除率,高血压患病率有明显差异,糖尿病组肌酐高,肌酐清除率高,糖尿病组高血压患病率高;年龄,C反应蛋白,糖尿病与 SYNTAX score 明显相关, ( $r=0.138, P=0.048; r=0.219, P=0.002; r=0.173, P=0.013$ );空腹血糖(fasting blood glucose, FPG)同 SYNTAX score ( $r=0.098, P=0.162$ )没有明显相关关系。性别,年龄,糖尿病史是 SYNTAX score 的独立危险因素 ( $B=4.071, P=0.016; B=0.178, P=0.020; B=4.025, P=0.012$ )。

**结论** 糖尿病是冠状动脉 SYNTAX score 的独立危险因素,空腹血糖与 SYNTAX score 没有直接关系。提示我们糖尿病对冠心病严重程度的影响是长期和多方面的。

## 乐脉丸治疗心脏 X 综合征临床观察

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**目的** 观察乐脉丸治疗心脏 X 综合征的临床疗效及安全性评价。

**方法** 选取临床确诊为心脏 X 综合征患者 87 例,随机分为对照组及治疗组,所有受试者纳入后给予常规西医治疗,口服  $\beta$  受体阻断剂、钙通道阻断剂等,根据症状、血压、心率调整药物至靶剂量;对照组 42 例,给予常规西医治疗。治疗组 45 例,在对照组基础上口服乐脉丸至少一个疗程,观察两者的临床疗效及不良反应。

**结果** 乐脉丸治疗组在心绞痛症状缓解、活动平板心电图改变等方面疗效优于对照组,治疗组药物不良反应较对照组没有明显差别。

**结论** 对于心血淤阻、肝气郁结、气滞血瘀所致的胸痹心痛病,临床确诊为心脏 X 综合征患者,在常规西药治疗基础上加服乐脉丸疗效显著,事半功倍,值得临床推广,而且安全性良好。

## 感染对于急性 ST 段抬高型心肌梗死患者临床预后的影响

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**目的** 感染对急性 ST 段抬高型心肌梗死行经皮冠状动脉

介入治疗患者临床预后的影响仍未明确。因此,本研究拟评估感染对此类患者住院死亡率和主要不良心血管事件的影响。

**方法** 我们前瞻性收集 2010 年 1 月到 2016 年 6 月就诊于我院的急性 ST 段抬高型心肌梗死且行经皮冠状动脉介入治疗的患者。收集所有患者基线、手术以及感染相关的详细资料。采用多因素回归分析评估感染对此类患者临床预后的影响。主要不良心血管事件包括住院死亡、靶血管血运重建、再发心肌梗死、脑血管意外。

**结果** 研究最终纳入 2284 例患者,其中 459 例发生感染 (20.1%),大多数表现为单一部位感染,最常见的为肺部感染。与非感染患者相比,感染患者合并更多的心血管疾病(分别为,高血压:60.1% vs. 50.1%;糖尿病:36.6% vs. 24.3%;慢性肺部疾病:1.6% vs. 0.6%,所有  $P<0.05$ )。而且,发生感染患者的住院死亡率(校正比值比=6.2;95%可信区间:3.9-9.7,  $P<0.001$ )和主要不良心血管事件显著升高(校正比值比=6.9;95%可信区间:4.6-10.2,  $P<0.001$ )。

**结论** STEMI 患者常并发感染,并且使临床预后显著变差。早期识别感染的高危患者并降低其感染风险显得尤其重要。

## 血糖控制水平对冠心病患者氯吡格雷不同反应性的影响

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**目的** 氯吡格雷抵抗容易引起不良心血管事件,而其中糖尿病有可能是氯吡格雷抵抗的危险因素。

**方法** 通过应用 VerifyNow P2Y12 评估冠心病 PCI 术后患者的血小板功能,并检测空腹和餐后两小时胰岛素、血糖、C 肽水平及糖化血红蛋白水平,观察血糖控制水平对氯吡格雷抵抗的影响。

**结果** 与氯吡格雷非抵抗组相比,糖尿病患者氯吡格雷抵抗的发生率较高 (50.9% vs. 32.4%,  $P=0.036$ );而空腹胰岛素水平及空腹 C 肽水平可能影响不同的抗血小板效应(空腹胰岛素水平, CR 组 vs. NCR 组:  $56.5 \pm 12.2$  pmol/L vs.  $114.3 \pm 42.2$  pmol/L,  $P=0.001$ ;空腹 C 肽水平, CR 组 vs. NCR 组:  $10.12 \pm 1.89$  nmol/L vs.  $7.25 \pm 2.21$  nmol/L,  $P=0.028$ );如果血糖控制良好,则糖尿病患者的抗血小板效应明显

改善。

**结论** 糖尿病及其血糖控制水平可能是氯吡格雷抵抗的危险因素。

## 心肌梗死合并多部位栓塞1例

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患者男性, 50岁, 既往有“高血压病”病史多年, 最高收缩压 180 mmHg, 具体治疗及血压控制不详, 既往有“隐性梅毒, 肝硬化”病史, 未正规诊治, 吸烟史多年, 约 40支/天, 已戒烟 2年。本次因“突发胸腹痛 2小时”入院。入院体查: Bp 160/110 mmHg, 神志清楚, 双肺呼吸音粗, 双下肺闻及少许湿性啰音。心界向左扩大, 心率 100次/分, 律齐, 各瓣膜听诊区未闻及病理性杂音, 腹平软, 上腹压痛, 无明显反跳痛; 右侧肢体活动障碍, 肌力 0-1级。外院心电图见心肌缺血, 高敏肌钙蛋白 T 539 ng/L。考虑急性冠脉综合征。

患者经由急诊绿色通道直接被送入了导管室行急诊冠脉造影; 行冠脉造影见: LM、LCX 无明显狭窄, LAD 近中段无明显狭窄, 远段见血栓影并管腔次全闭塞。插入 6FJL3.5 指引导管, SION 导丝顺利通过 LAD 病变段到达远段, 以抽吸导管反复抽吸, 可抽出血栓, 经指引导管注入替罗非班氯化钠 15ml, 复查造影见 LAD 远段管壁光滑, 遂结束手术。

## sd LDL-C 与冠心病发病的相关性研究

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**目的** 通过对比观察冠状动脉粥样硬化性心脏病(冠心病)患者与非冠心病患者体内的小而密的低密度脂蛋白胆固醇(sd LDL-C)的水平, 进而研究小而密的低密度脂蛋白胆固醇(sd LDL-C)与冠心病之间的关系。

**方法** 选取 2017 年 3 月至 2018 年 6 月期间, 因反复活动后

胸闷、胸痛等不适症状在杭州师范大学附属医院住院治疗的患者, 选取其中冠脉造影(CAG)确诊为冠心病的 58 例患者为实验组, CAG 除外冠心病的 47 例患者列为对照组。采用 Lipoprint 脂蛋白分类检测系统, 对 LDL 亚组份进行定量检测, 根据 sd LDL-C 的含量不同, 将患者分为 LDL 表型正常和表型异常组, 同时筛选出对 sd LDL-C 水平有影响的因素, 采用多元逐步回归来进行分析, 了解冠心病危险因素对 sd LDL-C 的影响。

**结果** 1. 冠心病组 LDL 表型异常者有 (40 人), 而对照组表型异常者 (14 人) (OR 5.24  $P < 0.001$ ), 提示血浆 sd LDL-C 含量与冠心病的发生呈显著正相关; 2. 冠心病组的血浆 LDL 直径为 (25.24 ± 1.08), 明显小于对照组 (27.07 ± 1.49) ( $P < 0.01$ ); 3. 根据多元逐步回归分析的结果: 甘油三酯 (TG)、BMI、年龄、高密度脂蛋白胆固醇 (HDL-C) 可能与 sd LDL-C 的水平有关, ( $P < 0.01$ ), 进一步校正影响因素后, sd LDL-C 仍然与冠心病有密切相关性 ( $r = 0.3817$ ,  $P < 0.01$ )。  
**结论** sd LDL-C 水平与冠心病发生密切相关, 是冠心病的独立危险因素, 早期检测血浆 sd LDL-C 水平有助于冠心病危险性的判断。

## Fibrinogen as long-Term Prognostic Markers in Patients with Coronary Artery Disease undergoing percutaneous coronary intervention

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**Objective** The aim of this study was to explore the effects of plasma fibrinogen levels in patients with coronary artery disease undergoing primary percutaneous coronary intervention (PCI) to assess the prognostic value of fibrinogen.

**Methods** 6050 CAD patients after PCI were evaluated initially from CORFCHD-PCI (Identifier: ChiCTR- INR-16010153). 492 patients were excluded for coagulation parameter data not available, acute infections, malignancies, hepatobiliary disease, alcohol abuse or blood disease. 5558 CAD patients after PCI were finally analyzed. Plasma fibrinogen (FIB) levels were calculated by ROC (receiver operator charac-

teristic curve) and categorized into two groups (Low FIB < 4.11 mmol/L; High FIB  $\geq$  4.11 mmol/L). The primary endpoint was long-term mortality after PCI. The main secondary endpoints were bleeding events, readmission, TVR (Target Vessel Revascularization), heart failure, and main adverse cardiovascular events (MACEs) defined as the combination of cardiac death, recurrent myocardial infarction, and target vessel reconstruction, and cerebrovascular events (MACCEs) defined as MACEs plus stroke. The average follow up time is median 32 months.

**Results** There was significant difference in diabetes, creatinine, uric acid, fasting blood glucose, total cholesterol between the two groups ( $P < 0.05$ ). Overall, all-cause mortality (ACM) was present in 280 patients. The incidence of ACM in the Low FIB group is 192 (4.3%), High FIB group is 88 (8.2%). The ACM incidence in the High FIB group was significantly higher than in the Low FIB group ( $P < 0.0001$ ). Cardiac mortality (CM) was present in 225 patients: 150 (3.3%) in the Low FIB group, 75 (7.0%) in the High FIB group. There was significant difference in the CM incidence between the two groups ( $P < 0.0001$ ). In addition, there were significant differences in the incidence of Heart failure, Readmission, TVR, MACCEs and MACEs as well between the two groups ( $P < 0.05$ ). Kaplan-Meier survival analysis indicated that the patients in the High FIB group were tended to have increased accumulated risk in ACM, CM, MACEs, MACCEs and heart failure. After adjusting for diabetes, creatinine, uric acid, fasting blood glucose and other confounding factors, the multivariate Cox proportional hazards model revealed that increased FIB level was independently correlated with the ACM (adjusted HR = 1.691 [1.299-2.201],  $P < 0.001$ ), CM (adjusted HR = 1.838 [1.374-2.459],  $P < 0.001$ ), MACCEs (adjusted HR = 1.375 [1.166-1.623],  $P < 0.001$ ) and MACEs (adjusted HR = 1.373 [1.155-1.632],  $P < 0.001$ ). However, it was nonsignificantly correlated with the incidence of heart failure (adjusted HR = 1.406 [0.984-2.008],  $P = 0.061$ ) between the two groups.

**Conclusions** The baseline level of FIB is an independent predictor for ACM, CM, MACEs and MACCEs in post-PCI CAD patients.

## Effect of estimated glomerular filtration rate (eGFR) on clinical outcome on Coronary Artery Disease undergoing percutaneous coronary intervention (PCI)

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**Objective** The aim is to investigate the effect of estimated glomerular filtration rate (eGFR) on clinical outcome of patients with coronary artery disease (CAD) undergoing percutaneous coronary intervention (PCI).

**Methods** A total of 6050 patients who with CAD undergoing PCI in the cardiology center of Xinjiang Medical University first affiliated hospital from Jan, 2008 to Dec, 2016 were enrolled in the study. The patients were divided into three groups according to eGFR: Group 1: (eGFR < 60 mL/min/1.73 m<sup>2</sup>, n = 323), Group 2: (60 mL/min/1.73 m<sup>2</sup>  $\leq$  eGFR < 90 mL/min/1.73 m<sup>2</sup>, n = 2216) and Group 3: (eGFR  $\geq$  90 mL/min/1.73 m<sup>2</sup>, n = 3329). The general characteristics including gender, age, smoking, alcohol, body mass index, hypertension, diabetes mellitus, systolic pressure, diastolic blood pressure, heart rate, serum creatine, urea nitrogen, uric acid, blood glucose, TG and eGFR on admission were recorded. Results of coronary angiography were recorded. All the patients were given ten years regular follow-up after PCI. The primary destination is mortality rate including all-cause mortality and cardiac mortality, secondary destination is major cardiovascular events (MACE).

**Results** There was statistically significant difference in age, gender, smoking, alcohol, systolic pressure, diabetes mellitus, hypertension, urea nitrogen, creatinine, uric acid, blood glucose, TG and comparison between eGFR groups, ( $P < 0.05$ ). Overall, there were 297 all-cause mortality (ACM) during the following up. The incidence of ACM in the low eGFR group (1) is 33 (10.2%), the moderate eGFR group (2) is 133 (6.0%), and the high eGFR group (3) is 131 (3.9%). Cardiac mortality (CM) occurred in 239 patients: 28 (8.7%) in the low eGFR group (1), 104 (4.7%) in the moderate eGFR group (2) and 107 (3.2%) in the high eGFR group (3). Incidence of total MACE in low eGFR group was significantly higher than that high eGFR group, MACE risk in the low eG-

FR group (1) was 1.220 times higher than that in the high eGFR group (3), (RR=1.220, 95%CI [0.889-1.673],  $P<0.05$ ), the moderate eGFR group (2) was 1.086 times higher than that in the high eGFR group (3), (RR=1.086, 95%CI [0.924-1.275],  $P<0.05$ ).

**Conclusions** Decreased eGFR increased the risk of CAD patients after PCI postoperative MACCE incidents, decreased eGFR serves as an independent predictor for MACE.

## 白细胞计数对冠心病PCI术后患者临床结局的影响

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**目的** 冠心病主要心血管不良事件仍是PCI术后死亡的主要原因。目前国内部分研究发现白细胞计数可以预测冠心病、冠脉病变程度以及心血管事件, CHD的大部分研究集中在寻找特异性炎症因子或其他标记物, 然而常规外周血WBC计数则因为特异性不高而研究不是很深入, 鲜有与冠心病PCI术后临床结局的相关性研究报道。

**方法** 本研究收集了2008-2018年经PCI治疗的冠心病患者6051例, 均来自中国冠心病预防控制中心回顾性队列研究(注册号: ChiCTR-INR-1601053), 排除6例缺少白细胞计数的患者, 最后纳入6045例患者。主要的临床结局是长期死亡率, 次要的终点事件是发生MACCE、卒中、出血、再入院。平均随访的时间为35.9±22.6月。

**结果** 根据白细胞计数三分位数将患者分为三组: 第1组(wbc: 2.51-6.14\*10<sup>9</sup>/L; n=2012), 第2组(wbc: 6.14-7.81\*10<sup>9</sup>/L; n=2006), 第3组(wbc: 7.81-23.61\*10<sup>9</sup>/L; n=2027); 在随访期间发生ACM事件的有309例, 第1、2、3组分别为79例(3.9%)、101例(5.0%)、129例(6.4%), 有251例发生CM事件, 第1、2、3组分别有65例(3.2%)、85例(4.2%)、101例(5.0%); 单因素分析发现白细胞计数与PCI术后发生ACM ( $P=0.002$ )、CM ( $P=0.02$ )事件有统计学意义,  $P<0.05$ , 白细胞计数组间与卒中、出血、再入院等事件无显著差异; 多因素COX比例风险模型调整多个混杂因素后发现白细胞计数组间与ACM独立相关(1 vs 2: HR=1.883 [1.109-3.197],  $P=0.019$ ; 1 vs 3: HR=2.403 [1.429-4.041],  $P=0.001$ )、CM独立相关(1 vs 3: HR=2.221 [1.298-3.801],  $P=0.004$ )、MACCE独立相关(1 vs 3: HR=1.394 [1.038-1.873],  $P=0.028$ )、

MACE独立相关(1 vs 3: HR=1.414 [1.033-1.937],  $P=0.031$ )。

**结论** 白细胞计数是冠心病患者PCI术后发生ACM、CM、MACCE、MACE的独立危险因素, 白细胞计数越高, PCI术后患者发生不良事件的风险越高, 为冠心病PCI术后患者的临床治疗、评估预后提供实验室依据。

## 平均血小板体积对冠心病PCI术后临床结局的影响

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**目的** 平均血小板体积(MPV)与血小板活化相关, 并且最近已成为心血管疾病的潜在标志物, 尽管之前的研究表明MPV与心血管疾病的长期预后之间可能存在关联, 但可能由于样本量较小, 研究的结果仍然存在矛盾和不确定性, 本研究是首次纳入较大样本量探究平均血小板体积(MPV)与冠心病患者PCI术后不良事件之间的关系。

**方法** 采用回顾性队列研究的方法, 入选2008年1月-2016年12月期间于新疆医科大学第一附属医院心脏中心经冠状动脉造影术确诊为冠心病并行经皮冠状动脉支架植入术(PCI)的患者总共6046例, 根据入院MPV水平进行二分类(cutoff值=10.5 fL), 比较2组冠心病患者PCI术后长期预后及其影响因素, 采用多因素COX回归分析法评估MPV水平与冠心病患者PCI术后不良事件发生率之间的关系及其影响因素

**结果** 高血压、糖尿病、血糖、MPV二分类计数组间对比均有统计学差异,  $P<0.05$ , 随访期间共计发生CM共计251例, 其中1组共计142例(4.7%), 2组共计109例(3.6%), MPV水平较高组发生CM事件率明显高于MPV水平较低组, 差异具有统计学意义  $P<0.05$ , 通过COX回归模型分析, 在调整了其他危险因素的干扰后, 以CM作为因变量, MPV水平较低组(1组)发生CM风险是MPV水平较高组(2组)的1.048倍(OR=1.048 [0.807-1.361],  $P>0.05$ )。

**结论** 并没有明确的证据证明MPV水平与患者长期不良事件发生相关。

## 估算肾小球滤过率对冠心病PCI术后患者临床结局的影响

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**目的** 研究肾小球滤过率对冠心病经皮冠状动脉介入术(PCI)后患者临床结局的影响。

**方法** 入选2008年1月-2016年12月期间于新疆医科大学第一附属医院心脏中心行经皮冠状动脉支架植入术(PCI)的6050例冠心病患者为研究对象,根据估算肾小球滤过率(eGFR)分为三个组,低eGFR组( $eGFR < 60 \text{ mL/min/1.73 m}^2$ ,  $n=323$ ),中eGFR组( $60 \text{ mL/min/1.73 m}^2 \leq eGFR < 90 \text{ mL/min/1.73 m}^2$ ,  $n=2216$ ),高eGFR组( $eGFR \geq 90 \text{ mL/min/1.73 m}^2$ ,  $n=3329$ )。记录患者一般资料,包括年龄、性别、BMI、吸烟、饮酒、收缩压、舒张压、心率、糖尿病、高血压发生情况、入院血肌酐、尿素、尿酸、eGFR。记录冠状动脉造影结果及冠状动脉病变情况。最长随访10年,首要终点为随访期间死亡率,包括全因死亡及心源性死亡,次要终点为主要心血管不良事件(MACE)。

**结果** 年龄、性别、吸烟、饮酒、收缩压、糖尿病、高血压、尿素氮、尿酸、肌酐、血糖、TG、eGFR组间对比均有统计学差异,  $P < 0.05$ ,随访期间共计发生死亡536例,其中心源性死亡239例,其中1组共28例(8.7%),2组共104例(4.7%),3组共107例(3.2%)。全因死亡297例,其中1组共33例(10.2%),2组共133例(6.0%),3组共131例(3.9%)。发生MACE共计754例,其中1组共54例(16.7%),2组共304例(13.7%),3组共396例(11.9%)。肾小球滤过率低组发生MACE事件率明显高于肾小球滤过率高组,差异具有统计学意义,  $P < 0.05$ 。通过COX回归模型分析,以MACE作为因变量,eGFR低组(1组)发生MACE风险是eGFR高组(3组)的1.220倍( $RR=1.220$ ,  $95\%CI(0.889-1.673)$ ,  $P < 0.05$ ),eGFR中组(2组)发生MACE风险是eGFR高组(3组)的1.086倍, ( $RR=1.086$ ,  $95\%CI(0.924-1.275)$ ,  $P < 0.05$ )。

**结论** 肾小球滤过率越低,冠心病患者PCI术后发生MACE事件风险越大,eGFR下降是冠心病患者PCI术后发生心血管不良事件的独立预测因素。

## 动脉血乳酸水平是急性心肌梗死短期内不良心血管事件独立预测因素

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**目的** 探讨动脉血乳酸水平是否可作为判断急性心肌梗死短期预后的独立预测因素。

**方法** 入组2017年3月至2018年5月于我院住院且行急诊冠脉造影的急性心肌梗死(AMI)患者,术前经桡动脉抽取动脉血行血气分析,测量乳酸水平。分析乳酸水平不同的患者在住院期间(7天内)心血管不良事件的发生率(死亡,心源性休克,心功能KILLIP $\geq 2$ 级,室颤,住院期间再血管化)有无差异。

**结果** 共入组168例急性心肌梗死患者。根据ROC曲线确定动脉乳酸水平2.95 mmol/L为最佳界定值。Lac $< 2.95$  mmol/L组139例,Lac $\geq 2.95$  mmol/L组29例。Lac $\geq 2.95$  mmol/L组的血压明显低于Lac $< 2.95$  mmol/L组,STEMI的比例明显增高,且肌酸激酶的峰值(CKmax)与入院时随机血糖的水平明显高于Lac $< 2.95$  mmol/L组。与Lac $< 2.95$  mmol/L组相比,Lac $\geq 2.95$  mmol/L组的pH值及PaCO<sub>2</sub>明显降低( $P < 0.01$ )。Lac $< 2.95$  mmol/L组梗死相关血管为LM病变的比例低于Lac $\geq 2.95$  mmol/L组,梗死相关血管为LAD的比例高于Lac $< 2.95$  mmol/L组,但两组梗死相关血管无明显统计学差异。Lac $< 2.95$  mmol/L组的心血管不良事件为12.2%,Lac $\geq 2.95$  mmol/L组为58.6%,两组间具有显著的统计学差异( $P < 0.001$ )。其中Lac $\geq 2.95$  mmol/L组死亡率为13.8%,明显高于Lac $< 2.95$  mmol/L组(1.4%)( $P=0.001$ ),心源性休克的发生比率明显高于Lac $< 2.95$  mmol/L组(34.5% vs. 4.3%,  $P < 0.001$ ),KILLIP $\geq 2$ 级和室颤的比率也是明显增高(58.6% vs. 11.5%,  $P < 0.001$ ; 13.8% vs. 2.2%,  $P=0.004$ )。Logistic回归分析显示:动脉血乳酸水平及随机血糖是急性心肌梗死短期内心血管不良事件的独立预测因素。

**结论** 动脉血乳酸水平增高是急性心肌梗死短期内心血管不良事件的独立预测因素。

## 肌酐清除率及绝经年限与老年女性急性冠脉综合征患者SYNTAX评分的相关性研究

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**目的** 探讨肌酐清除率及绝经年限对老年女性急性冠脉综合征患者的冠脉病变狭窄程度的影响。

**方法** 入选2017年8月到2018年5月以来我院诊断为ACS的女性患者122例为实验组,并对其冠脉病变行SYNTAX积分。同期住院行冠脉造影正常的女性患者83例为对照



组。比较两组患者的临床特点及实验组患者肌酐清除率,绝经年限与SYNTAX积分的相关性。

**结果** 1. 实验组与对照组比较年龄、绝经年限、红细胞分布宽度、血小板分布宽度、纤维蛋白原、肌酐清除率、高密度脂蛋白胆固醇、低密度脂蛋白胆固醇、糖尿病比例具有显著性差异[(68.89±7.83)岁 vs (65.18±7.88)岁, (20.08±8.09)年 vs (15.90±7.81)年, (13.57±1.21)% vs (13.28±0.85)%, (13.94±2.88)% vs (12.22±1.87)%, (3.70±1.05)g/L vs (3.32±0.03)g/L, (54.66±19.77)mL/min vs (66.88±20.35)mL/min, (1.29±0.26)mmol/L vs (1.44±0.29)mmol/L, (3.45±0.96)mmol/L vs (2.83±0.75)mmol/L, (59.8%) vs (41%);  $P < 0.05$ ]。2. Pearson 相关分析显示:年龄、绝经年限与SYNTAX积分正相关( $r=0.237, 0.326; P < 0.01$ ),肌酐清除率与SYNTAX积分负相关( $r=-3.03; P < 0.01$ )。3. 多因素 logistic 回归分析显示糖尿病、血小板体积分布宽度、肌酐清除率、高密度脂蛋白胆固醇、低密度脂蛋白胆固醇为老年女性ACS的独立危险因素(OR=1.98; 1.26; 0.974; 0.09; 2.49;  $P < 0.05$ )。

**结论** 老年女性ACS患者的绝经年限与SYNTAX积分正相关,肌酐清除率是老年女性ACS患者的独立危险因素并与SYNTAX积分呈负相关。

## 急性心肌梗死合并心源性休克急诊PCI患者住院转归影响因素分析

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**目的** 分析2009年1月至2018年12月宁夏医科大学总医院AMI合并CS行急诊PCI患者的资料,探讨我院AMI合并CS急诊PCI患者住院死亡率及其影响因素。

**方法** 通过病案检索,收集所有患者的病例资料数据,采用描述性方法分析AMI合并CS患者的临床特点、住院转归,探索住院死亡率及影响因素。

**结果** 269例经急诊介入治疗的AMI合并CS患者的住院死亡率为43.9%(118例)。将全部变量进行多因素 logistic 回归分析显示年龄( $R=1.073, 95\% CI: 1.041-1.105$ )、入院时血糖( $R=1.052, 95\% CI: 1.002-1.105$ )、入院时动脉血乳

酸( $R=1.105, 95\% CI: 1.020-1.198$ )、入院时肌酐( $R=1.008, 95\% CI: 1.002-1.013$ )、入院首次LVEF( $R=0.023, 95\% CI: 0.001-0.618$ )、术后TIMI血流 $<3$ 级( $R=10.634, 95\% CI: 4.274-26.459$ )、合并前壁梗死( $R=3.327, 95\% CI: 1.713-6.460$ )是住院死亡率增加的独立危险因素。受试者工作特征曲线(ROC)分析该回归模型有较高的判别死亡高危患者的能力,ROC下面积为0.840( $95\% CI: 0.792-0.887$ )。

**结论** 1. AMI合并CS患者即使行急诊PCI治疗,住院死亡率仍然很高。2. 年龄、入院时血糖、入院时动脉血乳酸、入院时肌酐、入院首次LVEF、术后TIMI血流 $<3$ 级、合并前壁梗死是影响AMI合并CS行急诊PCI治疗患者住院死亡率的独立危险因素。

## 平板运动实验作为高龄老年人群冠心病常规筛查手段的可行性分析

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**目的** 分析平板运动实验作为高龄老年人群( $\geq 70$ 岁)门诊冠心病筛查方法的可行性。

**方法** 选取45例疑似冠心病的高龄老年患者,先行平板运动实验检查,后进一步完善冠脉造影术,以冠状动脉造影为金标准,分析平板运动实验结果作为冠心病诊断的准确性、特异性、阳性预测和阴性预测。

**结果** 平板运动实验对高龄老年人群冠心病检出率达69.57%,特异性、准确度、阳性预测和阴性预测分别为68.18%、68.89%、69.57%和71.42%。对三支血管病变的检出率高于双支血管和单支血管病变, $P < 0.05$ ,差异有统计学意义。双支血管病变检出率高于单支血管病变, $P < 0.05$ ,差异有统计学意义。对前降支病变血管和回旋支病变血管检出率高于右冠病, $P < 0.05$ ,差异有统计学意义。

**结论** 平板运动实验可作为高龄老年人群冠心病筛查的常规检查方法。

## 血浆脂蛋白相关磷脂酶 A2 对不同性别冠心病患者的预测价值

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**目的** 探讨不同性别冠心病患者中血浆脂蛋白相关磷脂酶 A2(Lp-PLA<sub>2</sub>)与各型冠心病的病变支数、狭窄程度主要不良心脏事件(MACE)的相关性。

**方法** 入组 170 例收住我院行冠状动脉造影的患者,其中确诊冠心病 134 例(男性 78 例,女性 56 例),冠脉造影正常者 36 例(男性 15 例,女性 21 例)。冠心病患者的确诊依据世界卫生组织诊断标准和中华医学会的相关指南。根据冠状动脉造影结果计算 Gensini 积分。所有患者术前采集血标本,用酶联免疫吸附(ELISA)法分别测定 Lp-PLA<sub>2</sub>浓度,根据 Lp-PLA<sub>2</sub>四分位水平分组,随访 1 年,观察 MACE 发生情况。

**结果** ①男性患者中,冠心病组与对照组的 Lp-PLA<sub>2</sub>水平差异有统计学意义( $P<0.05$ ),单因素 Logistic 回归分析结果显示,Lp-PLA<sub>2</sub>为男性冠心病的独立危险因素( $OR=0.963$ , $95\%CI:0.855 \sim 0.985$ , $P<0.05$ );在男性冠心病患者中,急性心肌梗死(AMI)、不稳定型心绞痛(UA)患者 Lp-PLA<sub>2</sub>水平高于稳定型心绞痛(SAP)患者,差异有统计学意义( $P<0.05$ )。随着病变支数的增加,Lp-PLA<sub>2</sub>水平呈现逐渐升高的趋势,但无明显统计学意义( $P>0.05$ )。②女性患者中,Lp-PLA<sub>2</sub>活性水平与年龄相关( $P<0.05$ ),冠心病组与对照组的 Lp-PLA<sub>2</sub>水平无明显差异( $P>0.05$ ),冠心病不同类型患者之间 Lp-PLA<sub>2</sub>水平差异无统计学意义( $P>0.05$ )。③随访 1 年,男性及女性 Lp-PLA<sub>2</sub>水平高四分位间距的 MACE 发生率增加( $P<0.05$ )。

**结论** Lp-PLA<sub>2</sub>是男性冠心病患者的独立危险因素,女性中未见这种相关性。高水平 Lp-PLA<sub>2</sub>对男性及女性患者 1 年内发生 MACE 的预测均有一定的价值。

## 冠状动脉左主干急性完全闭塞致心肌梗塞 17 例临床分析

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**目的** 背景:左主干病变导致的急性心肌梗塞在临床上相对少见的危急重症,而由急性完全性左主干闭塞造成的急

性心肌梗死更为罕见,由于缺乏侧枝循环的建立以及无血管再通,故大部分患者常表现为猝死,而就诊的患者中常常合并有心源性休克等状况,而不能耐受外科搭桥手术,急诊经皮冠脉动脉成形术常常是这部分患者可能的治疗方案,但能否带来获益目前仍缺乏证据。目的:本次应用回顾性分析 17 例临床明确有心肌梗塞患者,行冠脉造影检查确诊急性左主干闭塞病例,探讨其中的临床特点,以及影响预后的相关因素。

**方法** 收集 2002 年 1 月到 2016 年 12 月期间确诊由于左主干完全闭塞导致的急性心梗患者 17 名,分析住院期间的患者及病例资料,进行回顾性分析。

**结果** 7 例患者中,男性 16 名(94.11%),平均年龄为  $57.41 \pm 13.46$  岁,其中 7 例患者临床表现为心源性休克(41.17%),17 例患者均完成了 PCI 术,但术后 7 例出现术后冠脉慢血流(41.17%),术后 30 天,17 例患者中 4 例死亡,14 例存活。死亡组与存活组两组对比,死亡组患者(4 人)相较于存活组患者(13 人)存在更高的心源性休克发生率(50% vs. 38%)、IABP 植入率(100% vs. 61.53%)、室颤发生率(50% vs. 7.6%),相关分析提示在术中发生心脏骤停、曾行心肺复苏史是预后不良的因素之一。

**结论** 急性左主干完全闭塞导致的心肌梗死出现心源性休克及室颤是预后不良的影响因素。

## 脂蛋白(a)对低密度脂蛋白达标冠心病患者介入治疗预后的影响

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**目的** 冠心病的发生与血脂异常密切相关,国内外指南均认可低密度脂蛋白(LDL)作为冠心病血脂干预的首个靶标。经皮冠脉支架植入(percutaneous coronary intervention, PCI)技术的广泛应用,特别是药物支架的应用极大地提高患者生活质量及改善患者预后,但在接受 PCI 治疗并 LDL-C 达标后,仍存在残余风险的问题,直接影响患者预后,其中部分原因可能与脂蛋白 a 水平(Lp(a))的升高相关。本研究采用回顾性分析,探讨脂蛋白 a 水平对 Lp(a)对 LDL 低密度脂蛋白达标冠心病患者介入治疗术后远期预后的影响。

**方法** 选取2011年01月至2013年12月行冠心病介入治疗且低密度脂蛋白水平小于1.8 mmol/L的患者共350例作为研究对象,并根据研究人群基础Lp(a)中位值将其分为Lp(a)高水平组及Lp(a)低水平组,收集两组患者的临床资料,对比两组间基线资料及术后主要心血管事件(心源性死亡,再发心肌梗塞、及缺血性脑卒中、再次血运重建)的发生率。

**结果** 两组间患者性别构成、年龄、合并高血压病占比、合并糖尿病占比、左室射血分数(LVEF)、合并用药、肾功能、心率控制方面情况、年龄等构成上相近,差异无统计学意义( $P>0.05$ );血脂指标总胆固醇(TC)、甘油三酯(TG)、LDL、高密度脂蛋白(HDL)差异无统计学意义( $P>0.05$ )。

低Lp(a)水平组患者吸烟比例要高于高水平组(45.2% vs 33.5%),左主干病变发生率低于高水平组(12.1% vs 20.5%)差异有统计学意义( $P<0.05$ )。预后方面,两组间在心源性死亡,再发心肌梗塞及缺血性脑卒中上差异无统计学意义,但Lp(a)高水平组在再次血运重建、主要心血管事件总发生率明显高于低水平LPA组(13.3 vs. 6.9%, 21.0% vs. 12.1%),差异有统计学意义( $P<0.05$ )( $P$ 值均小于0.05)。

**结论** 低密度脂蛋白小于1.8 mmol/L的冠心病介入治疗患者中,Lp(a)水平对预测患者再次血运重建发生率有一定帮助。

## Domestic New-generation Drug-eluting Stents Versus Imported New-generation Drug-eluting Stents in China

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### Objective

**Aims:** Data on how domestic Gn-DESs perform compared to imported Gn-DESs was still limited. This study aimed to compare domestic Gn-DESs with imported Gn-DESs on long-term safety and efficacy in an unrestricted, real-world, single-center cohort in China.

**Methods** A total of 7,316 consecutive cases with Gn-DESs implantation in a single center throughout 2013 were prospectively collected. Two-year clinical outcomes were evaluated between patients implanted with imported and domestic Gn-DESs.

**Results** During 2-year follow-up, the rates of all-cause death, cardiac death, myocardial infarction, stroke and stent thrombosis were not significantly different between two groups. However, the rate of revascularization was significantly higher in domestic Gn-DES group, shown as higher rates of overall revascularization, target vessel revascularization (TVR) and target lesion revascularization (TLR) (8.4% vs. 6.4%,  $P=0.001$ ; 5.0% vs. 3.2%,  $P<0.001$ ; 4.2% vs. 2.1%,  $P<0.001$ , respectively). Accordingly, major adverse cardiac events (MACE) rate was significantly higher in domestic Gn-DES group (10.9% vs. 8.6%,  $P=0.001$ ). Multivariable Cox regression analysis indicated that domestic DES was an independent risk factor of MACE (HR [95% CI]: 1.23 [1.05–1.43]), overall revascularization (HR [95% CI]: 1.30 [1.09–1.55]), TVR (HR [95% CI]: 1.61 [1.27–2.04]) and TLR (HR [95% CI]: 1.98 [1.50–2.61]). After propensity score matching, the rates of overall revascularization, TVR and TLR were

still significantly higher in domestic Gn-DES group, and domestic DESs was still predictive of overall revascularization, TVR and TLR in multivariate COX regression analysis. Subgroup analysis revealed the consistent results except for patients older than 65, in which domestic Gn-DES was not independently associated with overall revascularization risk (HR [95% CI]: 1.19 [0.81–1.73]).

**Conclusions** Domestic Gn-DESs showed the same safety as imported Gn-DESs in this real-world cohort. But patients implanted with domestic Gn-DESs had a higher risk of revascularization than imported Gn-DESs, except for patients older than 65.

## Outcomes of chimney technique for aortic arch diseases: a single-center experience with 226 cases

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**Objective** The aim of present study is to report our single-center experience with chimney technique for aortic arch diseases and the early- and mid-term outcomes in these patients.

**Methods** From August 2012 to October 2017, 226 patients (mean age  $54 \pm 12$  years; 197 men) with aortic arch diseases underwent thoracic endovascular aortic repair combined with chimney stents. Pathologies included type B aortic dissection (n=185), aortic arch aneurysm / descending thoracic aortic aneurysm (n=13), aortic arch pseudoaneurysm (n=10), penetrating aortic ulcer (n=7), intramural hematoma (n=7), and aortic rupture (n=4).

**Results** The aortic stent-grafts were deployed in zone 0 (n=22), zone 1 (n=13), and zone 2 (n=191). A total of 230 chimney stents were deployed (innominate artery, n=21; right common carotid artery, n=1; left common carotid artery, n=13; left subclavian artery, n=195). The technical success

rate was 84% (189/226) and immediate type Ia endoleak occurred in 37 (16%) patients. In the early-term, four patients died, of which from aortic rupture (n = 1), ventricular fibrillation (n = 1) or major stroke (n = 2). Four major strokes occurred (two patients died and two recovered), but no reintervention was recorded. Spinal cord ischemia developed in three patients. The mean duration of follow-up was 22 ± 16 months. Late type Ia endoleaks were recorded in two patients. Chimney stent occlusions were recorded in six patients. During follow-up, five patients died, of which from aortic rupture (n = 3), cerebral hemorrhage (n = 1) or rectal cancer (n = 1). Two major strokes occurred (one patient died and one recovered) and reintervention performed in one case.

**Conclusions** The chimney technique for aortic arch diseases is safe and feasible. And long-term follow-up observation is needed.

## 经心外膜下侧支循环逆向介入治疗冠状动脉慢性完全闭塞病变的有效性与安全性分析

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**目的** 目前少有文献研究经心外膜下侧支循环逆向介入治疗冠状动脉慢性完全闭塞病变(CTO PCI),本研究专门探讨经心外膜下侧支循环CTO PCI的有效性与安全性。

**方法** 入选标准:从2011年8月至2017年12月于本中心住院,经正向导丝技术失败后、室间隔支尝试失败或者不合作为逆向通道而心外膜下侧支循环符合一定条件的CTO患者。最终纳入经心外膜下侧支循环CTO-PCI患者156例。收集所有患者临床资料、PCI术中基本情况、相关手术并发症和住院期间主要不良心血管事件(MACE)。

**结果** 患者平均年龄为(60.3±10.7)岁,日本多中心CTO注册研究评分(J-CTO)为(2.8±1.1)分。127例(81.4%)逆向导丝成功通过心外膜下侧支循环,123例(78.8%)经心外膜下侧支循环成功行CTO PCI。7例失败后调整策略成功(4例改为经室间隔支侧支循环CTO PCI,3例改为正向导丝技术),总体CTO PCI成功率为83.3%。16例(10.3%)出现侧支循环损伤:6例予弹簧圈封堵术可稳定;5例(3.2%)出现心包填塞后紧急行心包穿刺置管引流术与弹簧圈封堵

术,其中4例可稳定,1例因心包穿刺损伤心脏后外科止血成功;4例观察稳定无需处理;1例予微导管内注射器保持负压后可稳定。15例(9.6%)出现靶血管损伤:2例(1.3%)出现心包填塞后紧急行心包穿刺置管引流术与覆膜支架植入术后可稳定;2例直接予覆膜支架植入术后可稳定;11例予延时球囊扩张压迫后可稳定。1例(0.6%)出现急性肾损伤,予连续肾脏替代治疗后肾功能恢复正常。住院期间患者无心源性死亡、急性心肌梗死及靶血管再次血运重建等MACE事件。

**结论** 经正向导丝技术失败后、室间隔支尝试失败或者不合作为逆向通道,而心外膜下侧支循环符合一定条件时也可作为逆向通道用于逆向PCI,可以有效开通CTO病变。但手术风险相对较高,要求术者谨慎选择技术策略和手术方案,尽量避免对侧支循环血管和靶血管的损伤,同时应及时发现和应对严重并发症。

## Effect of alprostadil on preventing contrast-induced nephropathy in diabetic patients with renal insufficiency

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**Objective** At present, with the development of diagnostic technology and interventional therapy, contrast medium is widely used during radiation intervention, especially in coronary angiography (CAG), and contrast-induced nephropathy (CIN) caused by the contrast agent has attracted clinicians' attention. CIN has a variety of high-risk factors, including renal dysfunction and diabetes. Studies have shown that in patients with diabetes, the incidence of CIN is approximately 5.7%–29.4%. As is known, diabetes mellitus is a disease that will damage multiple organs and systems, especially the kidney and small vessels. Therefore, patients with diabetes often have renal insufficiency. Once CIN occurs, the incidence rate of cardiovascular and renal adverse events and the short-term and long-term mortality rates will significantly increase, which will seriously impact patient survival. Except for hydration, there are no other effective methods or drugs that can prevent CIN. Therefore, the search to find an effective prevention program for CIN has become very important. Our study sought to assess

the effect of alprostadil on preventing CIN in diabetic patients with renal insufficiency.

**Methods** 124 diabetic patients with renal insufficiency who were undergoing coronary angiography (CAG) and/or percutaneous coronary intervention (PCI) were enrolled in this study. Standard hydration was administered to both groups (the alprostadil group and the control group). In the alprostadil group, patients were intravenous administered alprostadil for 12~24 hours before and 24 hours after CAG and/or PCI. Serum creatinine (Scr), cystatin C and the glomerular filtration rate (eGFR) were measured before as well as 24 hours, 48 hours and 72 hours after contrast media injection. The incidence of CIN and six months major cardiovascular events (MACE) was also evaluated in both groups.

**Results** Scr, cystatin C and the eGRF in the alprostadil group were better than those in the control group after 24 hours (OR: 0.68, 95% CI: 0.42-0.78; OR: 0.72, 95% CI: 0.52-0.82; OR: 1.4 95% CI: 1.12-1.68, respectively), 48 hours (OR: 0.58, 95% CI: 0.38-0.76; OR: 0.62, 95% CI: 0.53-0.85; OR: 1.9, 95% CI: 1.32-2.02, respectively) and 72 hours (OR: 0.78, 95% CI: 0.68-0.92; OR: 0.75, 95% CI: 0.68-0.96; OR: 2.12, 95% CI: 1.68-2.32, respectively). The incidence of CIN (8.56% vs 17.29%) and MACE (12.65% vs 22.36%) in the alprostadil group was significantly lower than that in the control group ( $P < 0.05$ ).

**Conclusions** Our study suggests that alprostadil could reduce the incidence of CIN and MACE in diabetic patients with renal insufficiency who are undergoing CAG and/or PCI.

## The relationship between bilirubin level and contrast induced acute renal injury in acute coronary syndromes patients after percutaneous coronary intervention

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**Objective** Studies have shown that elevated bilirubin levels can reduce the risk of CI-AKI and long-term cardiovascular events in patients after percutaneous coronary intervention (PCI). At present, there is few study focused on the relationship between preoperative bilirubin level and contrast induced acute renal injury (CI-AKI) in patients with acute coronary syndromes (ACS) in China. Our purpose is investigate the relationship between preoperative bilirubin level and contrast induced acute renal injury (CI-AKI) in patients with acute coronary syndromes (ACS).

**Methods** 186 ACS patients processed PCI were enrolled. General information, surgical procedures, imaging results, preoperative and postoperative renal function were collected. According to the occurrence of CI-AKI, patients were divided into CI-AKI group ( $n=15$ ) and non-CI-AKI group ( $n=153$ ). According to total bilirubin levels, patients were divided into elevated bilirubin ( $n=52$ ) and bilirubin normal group ( $n=116$ ). According to the total bilirubin tertile, patients were high bilirubin ( $n=55$ ), medium bilirubin ( $n=57$ ), low bilirubin ( $n=56$ ) three groups. The bilirubin and renal function of CI-AKI group and non-CI-AKI group were compared. CI-AKI rate was compared between bilirubin elevated group and bilirubin normal group and bilirubin tertile group. Logistic analysis was used to analyze the relationship between elevated bilirubin and CI-AKI.

**Results** 1) Preoperative total bilirubin levels in the CI-AKI group were significantly lower than those in the non-CI-AKI group ( $12.07 \pm 4.68$  vs  $15.95 \pm 6.75$ ,  $P = 0.003$ ). 2) The incidence of CI-AKI in patients with elevated bilirubin group was lower than that in patients with normal bilirubin group (1.92% vs 12.07%,  $P = 0.033$ ). 3) After adjusting for age, sex and other factors, elevated bilirubin reduced the risk of CI-AKI (OR = 0.105, 95% CI 0.013-0.818,  $P = 0.031$ ).

**Conclusions** Elevated bilirubin levels in patients with ACS undergoing PCI reduce the risk of CI-AKI.

Our study shows that preoperative higher total bilirubin is a protective factor for CI-AKI in ACS patients undergoing PCI, which indirectly confirms that oxidative stress is involved in the pathogenesis of CI-AKI. The results of this study need to be further clarified in a prospective study.

## Outcomes of endovascular treatment for type B aortic dissection with an isolated left vertebral artery

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**Objective** The coexistence of ILVA and aortic dissection is exceedingly rare. There is no consensus on the best management strategy for these conditions. The aims of present study is to report our single-center experience of thoracic endovascular aortic repair (TEVAR) and concomitant procedures in patients with type B aortic dissection (TBAD) with an isolated left vertebral artery (ILVA) and the early to mid-term outcomes in these patients.

**Methods** Between March 2011 and June 2018, 31 patients (27 males; median age 55 years, range 31–66 years) with TBAD and an ILVA received TEVAR and concomitant procedures in our center. Demographics, coexisting medical conditions, imaging features, operation details and follow-up outcomes in these patients were retrospectively collected and analyzed. Aortic computed tomography angiography was conducted at 1, 3, 6 and 12 months and annually thereafter to assess the patency of stent-graft or bypass and the aorta morphology.

**Results** All patients received aortic stent-grafts, 9 patients also received chimney stent, and 10 patients received aortic arch bypasses. The technical success rate was 96.8% (30/31) with only one patient (3.2%) showing immediate type Ia endoleak. One patient experienced transient neurologic deficit, and a puncture related femoral artery pseudoaneurysm was observed in 1 patient; both recovered completely prior to their hospital discharge. There was no mortality in the early-term. The median duration of follow-up was 33 months (range 2–90 months). Reintervention for a type II endoleak by using coils to seal the origin of the left subclavian artery was performed in one (3.1%) case 72 months postoperatively. One (3.2%) death occurred 42 months postoperation due to rectal cancer. No neurological deficits, chimney stent occlusions or bypass occlusions were observed during the follow-up period.

**Conclusions** Our limited experience reveals that TEVAR and concomitant procedures are relatively safe and viable for treatment of TBAD with an ILVA. Further studies with larger samples of patients and longer follow-ups are needed to confirm the present findings.

## Outcomes of Hybrid Technique for Aortic Arch Diseases in 379 Consecutive Patients over A 12-Year Period

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**Objective** Several studies have reported the outcomes of hybrid technique in aortic arch diseases, but they were limited to small series with a short-term follow-up. The aim of this retrospective study is to report our single-center experience with hybrid technique for aortic arch diseases and the early- and long-term outcomes in these patients.

**Methods** From January 2006 to August 2018, 379 patients (mean age  $54 \pm 11$  years; 347 male) with aortic arch diseases underwent hybrid repair composing of supra-aortic debranch and thoracic endovascular aortic repair (TEVAR). Pathologies included type B aortic dissection ( $n = 307$ ), aortic arch aneurysm ( $n = 23$ ) / descending thoracic aortic aneurysm ( $n = 20$ ), aortic arch pseudoaneurysm ( $n = 10$ ), post-TEVAR type Ia endoleaks ( $n = 8$ ), penetrating aortic ulcer ( $n = 4$ ), intramural hematoma ( $n = 1$ ), and aortic rupture ( $n = 6$ ). Demographics, coexisting medical conditions, imaging features, operation details and follow-up outcomes in these patients were retrospectively collected and analyzed. Computed tomography scanning was performed at 1, 3, 6 months and annually thereafter.

**Results** Hybrid operation was technically successful in 98.7% (374/379) of the patients. Perioperative complications included death: 6.1% (23/379), stroke: 5.0% (19/379), paraplegia: 2.1% (8/379), aortic rupture: 2.6% (10/379), and reintervention in 0.8% (3/379) of patients. After a mean follow-up of 46 (range, 0–156) months, the overall mortality

was 13.5% (51/379), with Kaplan–Meier survival estimate of  $91.2\pm 1.5\%$ ,  $88.3\pm 1.7\%$ ,  $85.9\pm 2.0\%$  and  $81.5\pm 2.7\%$  at 1, 3, 5 and 10 years, respectively. During the follow-up, the incidences of complication were as follows: endoleaks occurred in 17.6% (62/353) of patients, aortic rupture in 5.1% (18/353), strokes in 2.3% (8/353), reintervention in 4.2% (15/353) and vascular graft infection in 1.4% (5/353). The estimated freedom from extra-anatomic bypass occlusion at 1-year, 5-year and 10-year was  $98.8\pm 0.6\%$ ,  $96.4\pm 1.1\%$  and  $90.4\pm 3.4\%$ , respectively.

**Conclusions** Hybrid technique is a safe and feasible option for aortic arch diseases. The long-term outcomes demonstrate high rates of survival and graft patency.

## The Association between Post-procedural Oral Hydration and Risk of Contrast-induced Acute Kidney Injury among ST-elevation Myocardial Infarction Patients undergoing Primary Percutaneous Coronary Intervention

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**Objective** Oral hydration with water may be inexpensive and effective in the prevention of contrast-induced acute kidney injury (CI-AKI), but its efficacy among ST-elevation myocardial infarction (STEMI) patients undergoing primary percutaneous coronary intervention (PCI) remains unknown.

**Methods** This was a prospective, single-center, observational study. We consecutively enrolled 308 ST-elevation myocardial infarction patients undergoing primary percutaneous coronary intervention. All patients drank unrestricted amounts of fluids freely, whose volume was recorded until 24 hours following primary percutaneous coronary intervention. Oral hydration volume/weight ratios (OHV/W) were calculated. Adequate oral hydration was defined as a ratio over 12 ml/kg within 24 hours

after primary percutaneous coronary intervention. The primary outcome measure was contrast-induced acute kidney injury, defined as a  $>25\%$  or 0.5 mg/dL increase in serum creatinine from baseline during the first 48–72 hours post-procedure. The association between adequate post-procedural oral hydration and contrast-induced acute kidney injury was assessed using multivariable logistic analysis.

**Results** Post-procedural prophylactic oral hydration was implemented in 90.91% (280/308) of ST-elevation myocardial infarction patients undergoing primary percutaneous coronary intervention. There was no statistically significant difference in the age, sex, baseline renal function and the volume of contrast medium used during the coronary procedures between groups ( $P>0.05$ ). The incidence of contrast-induced acute kidney injury was much higher in the inadequate oral hydration group ( $<12$  mL/kg) than the adequate group ( $\geq 12$  mL/kg) (55.56% vs. 21.79%,  $P=0.0003$ ). Multivariate logistic regression showed inadequate oral hydration ( $<12$  mL/kg) was the independent predictor associated with contrast-induced acute kidney injury (OR=2.869, 95% CI 1.208–6.817,  $P=0.0170$ ), after adjusting confounders, including age, female gender, baseline serum creatinine, diabetes mellitus, use of diuretics, congestive heart failure and intravenous hydration volume.

**Conclusions** Our study determined the association of post-procedural adequate oral hydration on contrast-induced acute kidney injury following primary percutaneous coronary intervention, which was a potential strategy for contrast-induced acute kidney injury prevention among patients with ST-elevation myocardial infarction at very high risk.

## Efficacy of Post-procedural Oral Hydration Volume on Risk of Contrast-induced Acute Kidney Injury Following Primary Percutaneous Coronary Intervention: Secondary Analysis for the AT-TEMPT RESCIND-1 Study

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**Objective** Contrast-induced acute kidney injury (CI-AKI) contributes toward unfavourable clinical outcomes. Oral hydration with water may be inexpensive and effective in the prevention of CI-AKI, but its efficacy among patients undergoing primary percutaneous coronary intervention (PCI) remains unknown.

**Methods** Our study is a secondary analysis for Aggressive Hydration in Patients with ST-Elevation Myocardial Infarction undergoing Primary Percutaneous Coronary Intervention to Prevent Contrast-induced Nephropathy, the First Study for Reduction of Contrast-induced Nephropathy following Cardiac Catheterization (ATTEMPT RESCIND-1 study); we enrolled 560 ST-elevation myocardial infarction (STEMI) patients undergoing primary PCI. Eligible patients received peri-procedural aggressive (left ventricular end-diastolic pressure guided) or routine ( $\leq 500$  mL) intravenous hydration with an isotonic solution (0.9% NaCl) with randomization. The primary endpoint was CI-AKI, defined as a  $>25\%$  or 0.5 mg/dL increase in serum creatinine from baseline during the first 48–72 hours post-procedurally. All patients drank unrestricted amounts of fluids freely, whose volume was recorded until 24 hours following primary PCI.

**Results** The odds ratios of CI-AKI for quartile with different OHV/W ratios (cut-off values determined by the quartiles) were estimated using univariate and multivariate logistic regression analyses. Multivariable logistic regression models were developed to adjust for clinical characteristics (e. g. age, sex, estimated glomerular filtration rate, LVEF, the use of an intra-aortic balloon pump, chronic heart failure, anaemia, diabetes mellitus, intravenous hydration), and the Mehran risk score was calculated. All variables that are univariately associated with this outcome measure will be entered as possible predictors in a multivariable logistic regression analysis.

**Conclusions** Oral hydration has a practical value in daily life. It is easy to administer, allows better use of hospital resources due to shorter hospital stays, does not require intravascular cannulation, is less expensive, and is more comfortable for the patient. Our study will determine the association between post-procedural oral hydration and the decreasing incidence of CI-AKI following primary PCI, as well as the risk factors among quartiles of OHV.

## Association of Hypertension with Contrast-Induced Acute Kidney Injury in Patients Undergoing Cardiac Catheterization

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**Objective** Mehran risk score was widely accepted in clinical practices for predicting contrast-induced acute kidney injury (CI-AKI). Hypotension was a significant risk factor in this predictive model. However, the potential value of hypertension for CI-AKI in patients undergoing elective coronary angiography or intervention is unclear. According to the previous systematic review and meta-analysis, hypertension showed no value of predicting CI-AKI. The aim of this study was to investigate whether hypertension is an independent predictor of CI-AKI.

**Methods** We conducted a prospective observational study at the Guangdong Cardiovascular Institute of the Guangdong Provincial People's Hospital. A total of 1970 consecutive patients undergoing elective coronary angiography or intervention were enrolled. The indications of coronary angiography or intervention were based on the American College of Cardiology/American Heart Association/Society for Cardiovascular Angiography and Interventions 2005 guideline for PCI. The primary endpoint was the development of CI-AKI, defined as an absolute increase of  $\geq 0.3$  mg/dL or  $\geq 50\%$  from baseline serum creatinine with 48 hours after contrast medium exposure. Serum creatinine was evaluated in all patients at hospital admission and on days 1, 2, and 3 after cardiac catheterization. All patients received nonionic, low-osmolality contrast medium. Whether conducting hydration therapy or not was determined by interventional cardiologists. Receiver-operating characteristic (ROC) curves were used to identify the optimal cutoff value of hypertension for detecting CI-AKI. Multivariable logistic regression was used to evaluate whether hypertension is an independent risk factor for CI-AKI.

**Results** The incidence of CI-AKI was 12.1%. ROC curves revealed that hypertension was not significantly different from the Mehran risk score in predicting CI-AKI (area under the curve

[AUC]=0.587 vs 0.767 Figure 1). Multivariable logistic regression demonstrated that hypertension (odds ratio=1.14; 95% confidence interval, 0.89–1.46;  $P=0.30$ ) failed to show relation with CI-AKI.

**Conclusions** In our study, we demonstrated that hypertension is not an independent risk factor for predicting CIN after CAG or PCI.

## The relationship between Galectin-3 and acute kidney injury in acute myocardial infarction patients after emergency revascularization

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**Objective** Acute kidney injury (AKI) is a frequent complication in acute myocardial infarction (AMI) patients, leading to high morbidity and mortality in this subset of the population. Our aim was to assess the relationship between Galectin-3 and acute kidney injury in acute myocardial infarction patients after emergency revascularization and its predictive value.

**Methods** 62 patients with AMI and undergoing emergency revascularization in the department of cardiology of our hospital were selected. Emergency revascularization was treated with emergency PCI according to the 2017 ECS guidelines for the management of acute myocardial infarction patients. Blood samples were taken for Gal-3 and kidney function immediately after admission, kidney function was also measured in 3 and 5 days after emergency revascularization. Patients can be divided into the AKI group and non-AKI group, evaluate the relationship between Galectin-3 and acute kidney injury in acute myocardial infarction patients after emergency revascularization and its predictive value. Statistical analyses were performed using SPSS Statistics 22.0. We used logistic regression analysis to assess the independent predictors of AKI in AMI patients.

**Results** 1. Compared with the non-AKI group, the gal-3 level was increased in the AKI group, which respectively was  $98.79 \pm 3.73$  (pg/ml) vs  $91.8 \pm 9.95$  (pg/ml), there were statisti-

cally significant differences between two groups ( $P = 0.013$ ).

2. Multivariate Logistic regression analysis showed that the gal-3 level at admission was an independent predictor of AKI (OR=1.099, 95% CI 1.006–1.200). Meanwhile, GRACE score was also an independent predictor of AKI (OR=1.051, 95% CI 1.004–1.100). Further ROC curves showed that the area under the ROC curve of gal-3 predicted AKI was 0.738, which had a high predictive value. The area under the ROC curve of GRACE score predicted AKI was 0.730, and its predictive value was lower than gal-3.

**Conclusions** In patients with AMI who underwent emergency revascularization, the increased gal-3 level at admission was associated with AKI. The gal-3 level can be used as an independent predictor of AKI after emergency revascularization, and its predictive value was higher than the GRACE score.

## PRECISE-DAPT评分对行经皮冠状动脉介入治疗的急性ST段抬高型心肌梗死患者院内临床结果的预测价值

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**目的** PRECISE-DAPT评分被推荐用于评定患者在双抗血小板治疗期间的院外出血风险。然而,该评分对接受经皮冠状动脉介入治疗(percutaneous coronary intervention, PCI)患者院内临床结果的预测价值仍不清楚。本研究的目的是验证PRECISE-DAPT评分对接受PCI治疗的急性ST段抬高型心肌梗死(ST-segment elevation myocardial infarction, STEMI)患者的预测价值。

**方法** 本研究前瞻性收集我院2010年1月至2016年6月期间接受PCI治疗的STEMI患者。研究主要终点是根据心肌梗死溶栓治疗(TIMI)分类评估的院内出血率(包括大出血和轻微出血);次要终点是院内死亡和主要不良临床事件(major adverse clinical events, MACEs)。并分别使用C统计量和拟合优度检验评估该评分的判别和校准能力。

**结果** 本研究共纳入 1213 名患者, 院内出血发生率为 13.2%, 其中大出血占 3.0%。PRECISE-DAPT 评分对院内出血率的预测价值相对较低, C 统计量为 0.63 (95% CI: 0.59–0.68,  $P < 0.001$ ); 但对院内死亡 (AUC: 0.74, 95% CI: 0.68–0.81) 和 MACEs (AUC: 0.77, 95% CI: 0.73–0.82) 表现出良好的预测价值。此外, 在糖尿病和高血压亚组中, 本评分显示出中等的判别能力。

**结论** 在接受 PCI 治疗的 STEMI 患者中, PRECISE-DAPT 评分对院内全因死亡和 MACEs 具有良好的预测价值, 而对院内出血的预测价值较低。

## Gamma- glutamyl transferase to albumin ratio (GAR) as a novel predictor of long- term mortality and bleedings in patients after percutaneous coronary intervention: a retrospective cohort study

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**Objective** Background: Both gamma- glutamyl transferase (GGT) and albumin have been reported to be associated the risk and mortality of coronary artery disease (CAD) with or without percutaneous coronary intervention (PCI). GGT is an important enzyme in glutathione (GSH) metabolism and has been found to be involved in the pathogenesis of CAD. Albumin is the major protein in human plasma and has generally been used as a quantitative measure of nutritional status. Recently, serum albumin concentrations were reported to be associated with increased risk for the development of myocardial infarction (MI), CAD and stroke. Therefore, the ratio of GGT to albumin (GAR) may be a powerful predictor for outcomes in cardiovascular disease. However, the relation between GGT to albumin ratio (GAR) and outcomes in CAD patients after PCI has not been investigated.

**Methods** In the present study, we enrolled 5638 CAD patients underwent PCI who were from the Clinical Outcomes and Risk Factors of Patients with Coronary Heart Disease after PCI (CORFCHD-PCI) study. The detailed protocol of the CORF-

CHD-PCI study have been registered on <http://www.chictr.org.cn> (Identifier: ChiCTR-INR-16010153). The patients with serious heart failure, rheumatic heart disease, valvular heart disease, congenital heart disease, pulmonary heart disease, and serious dysfunction of liver or kidney were excluded from the present study. 5638 patients were divided into two groups according to GAR (GAR < 0.62, n=2712 and GAR ≥ 0.62, n=2926). The primary outcome was long-term mortality including all-cause mortality (ACM) and cardiac mortality (CM) after PCI. The average follow-up time is 35.9±22.6 months.

**Results** We found there was significant difference between the two groups in the incidence of all-cause mortality ( $P = 0.016$ ) and bleeding events ( $P = 0.010$ ). Multivariate Cox regression analyses suggested that compared to the patients in the lower GAR, the risk of ACM and bleeding events were decreased 23.8% (Hazard risk [HR] = 0.762 95% CI: 0.601–0.966,  $P = 0.025$ ), and 39.4% (HR = 0.616, 95% CI: 0.446–0.852,  $P = 0.003$ ) in the higher GAR group, respectively, during the long-term follow-up.

**Conclusions** The present study indicated that GAR is an independent and novel predictor of mortality and bleeding events in CAD patients underwent PCI.

## An Intravenous Ultrasound- guided Coronary Intervention Without Heparin, Contrast Medium or Implant for In- stent Restenosis- A Case Report

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**Objective** Percutaneous coronary intervention (PCI) in patients with contradictions of contrast medium is challenging due to unvisualized complications without the guidance of angiography. The aim of our report is to present a challenging and complex circumstance of PCI for in-stent restenosis and how to make clinical choices after taking careful consideration into the conditions of patients.

**Methods** We report a complicated clinical situation of intravascular ultrasound (IVUS)-guided PCI facilitated with drug-

eluting balloon and bivalirudin, performed in a patient with in-stent restenosis, thyrotoxicosis and high bleeding risk. A 6F EBU 3.5 guiding catheter was engaged and a guidewire was creating a road map for PCI. Then, IVUS was performed by pull-back from distal LAD, and the plaque and stent morphology as well as reference segment sites were determined. IVUS showed severe neointimal hyperplasia and restenosis in the stents, and inadequate stent expansion of the distal segment. Afterward, noncompliant balloons of different size were dilated inside the original stent effectively, as confirmed by IVUS. The suboptimal stent expansion was improved, with hyperplasia and restenosis well alleviated. After pre-dilation, a paclitaxel-eluting balloon was dilated at the site of neointimal hyperplasia. Final IVUS was performed in LCX and potential lesions were excluded.

**Results** During the procedure, symptoms were relieved, and monitoring ECG and hemodynamics displayed no complication. The cardiac function following PCI was normal (left ventricular ejection fraction: 66%). The patient was discharged after comprehensive assessment and two uneventful stays. Our report suggests the short-term safety and feasibility of performing zero contrast PCI under the guidance of IVUS in this complex circumstance. Nonetheless, the long-term safety and outcomes of our approach requires to be tested in future follow-ups.

**Conclusions** IVUS-guided zero contrast PCI strategy in patients with thyrotoxicosis may be applicable. The decision-making between bivalirudin vs. heparin and DCB vs. DES or combined strategy for high risk of bleeding and in-stent restenosis needs to be determined by future trials in a larger series of patients.

## Follow-Up of Percutaneous Transcatheter Closure of Pulmonary Arteriovenous Fistulas: Experiences from a Single Center

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**Objective** Pulmonary arteriovenous fistula (PAVF) is abnormally dilated vessels that bypass the lung capillary bed, providing a direct right-to-left shunt. The clinical manifestations of PAVF can vary from asymptomatic to dyspnea on exertion, fatigability, cyanosis, and neurological complications. Patients with congenital PAVF are often associated with hereditary hemorrhagic telangiectasia (HHT) and congenital heart disease. The primary aim of treatment—through transcatheter techniques or surgery—is to reduce or abrogate abnormal shunt and to prevent severe complications. The development of medical apparatus and instruments has expanded the indications of interventional closure of PAVF. However, data on the efficacy and safety of transcatheter closure of PAVFs is still lacking.

**Methods** This was a retrospective observed study including 13 patients (seven males, six females) aged 1–59 years with a diagnosis of PAVF who underwent heart catheterization and (or) transcatheter closure of PAVF at Guangdong Cardiovascular Institute (Guangdong, China) between April 2006 and September 2016.

**Results** Thirteen consecutive patients (median age:  $22.3 \pm 15.7$  years; range: 1–55 years) with PAVFs underwent heart catheterization and ten patients had successful transcatheter closure. Three patients were diagnosed with a PAVF that was associated with hereditary hemorrhagic telangiectasia. During a mean follow up of  $7.1 \pm 2.7$  years (range: 3–12 years), two patients (2/10) underwent a re-intervention procedure. One patient (1/10) underwent a lobectomy due to recanalization, and two patients underwent reperfusion from an untreated adjacent pulmonary feeding artery. The recanalization and reperfusion rates were 30% (3/10), respectively. Three patients with closure or without closure developed pulmonary hypertension (PH) during the follow-up. Two patients developed central nervous system complications from cerebral infarction. The rate of complications such as cerebral infarction, PH, recanalization, and even death during the follow-up that was associated with PAVF was 46% (6/13).

**Conclusions** Percutaneous transcatheter is an effective and safe therapeutic method for PAVFs in both adult and pediatric populations. The occurrence rate of complications associated with occlusion and (or) PAVF and the recanalization rate were relatively high. Therefore, patients with a PAVF need more prudent treatment and more rigorous follow-up.

## Personalized antiplatelet therapy guided by a novel detection of platelet aggregation function in stable coronary artery disease patients undergoing PCI: a randomized controlled clinical trial

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**Objective Background:** Dual antiplatelet therapy (DAPT) plays an important role in the treatment of coronary artery disease (CAD) after percutaneous coronary intervention (PCI). Previous studies indicated that ticagrelor can significantly reduce the incidence of ischemic events after PCI compared to clopidogrel. However, the increase in bleeding events during ticagrelor administration cannot be ignored. How to balance the risk for hemorrhage and ischemic events is a major challenge facing cardiologists. Platelet function tests can easily identify people at high risk for bleeding or ischemia, and they are used to guide personalized antiplatelet therapy. In this study, we used a new platelet function test to guide antiplatelet therapy in CAD patients after PCI.

**Methods** In the present randomized controlled trial, a total of 2237 patients with stable coronary artery disease (CAD) undergoing PCI were randomly chosen to be administered personalized antiplatelet therapy (personalized group;  $n = 1123$ ) or standard antiplatelet treatment (standard group;  $n = 1114$ ). In the personalized group, antiplatelet therapy was performed according to the platelet maximum aggregation rate (MAR). In the standard group, the patients were administered standard DAPT without detection of MAR. The primary endpoint was the net clinical benefit, defined as the composite of cardiac death, myocardial infarction, urgent revascularization, stent thrombosis, stroke, or major bleeding events (Bleeding Academic Research Consortium (BARC) definitions type 2, 3, or 5), at 180 days after PCI.

**Results** The primary endpoint was achieved in 57 patients in the personalized group, compared with 83 patients in the standard group (5.1% vs. 7.5%, HR: 0.684, 95% CI: 0.488–0.958,  $P = 0.020$ ). We also found that the net clinical adverse events (including ischemic and bleeding events) were signifi-

cantly reduced in the personalized group at 30 days after PCI compared to the standard group (1.5% vs. 3.0%, HR: 0.510, 95% CI: 0.284–0.915,  $P=0.020$ ). The secondary endpoints, including ST in 30 days (0.3% vs. 0.9%, HR: 0.297, 95% CI: 0.082–1.079,  $P=0.05$ ) and TVR (0.4% vs. 1.3%, HR: 0.265, 95% CI: 0.088–0.800,  $P=0.011$ ) in 180 days after PCI, were also decreased significantly in the personalized group compared to the standard group. We did not find a significant difference in major bleeding events during at either the 30-day (0.5% vs. 0.3%,  $P=0.322$ ) or 180-day (2.1% vs. 1.6%,  $P=0.364$ ) follow-up between the two groups.

**Conclusions** The present study suggests that personalized antiplatelet therapy according to MAR can significantly improve the net clinical benefit at a 180-day follow-up after PCI.

## The new SHSMA<sup>®</sup> Patent Ductus Arteriosus Occluder: Single Center Experience

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Children's Heart Center, The Second Affiliated Hospital and Yuying Children's Hospital, Institute of Cardiovascular Development and Translational Medicine, Wenzhou Medical University

**Objectives** To evaluate the feasibility, safety, and efficacy of the SHSMA<sup>®</sup> PDA occluder for closure of patent ductus arteriosus (PDA).

**Methods Background** The new type single-rivet SHSMA<sup>®</sup> PDA occluder is novel, self-shaping nitinol wire device with nano fabric patches integrated into the shank of the device to assure a better obturation of the ductus. The SHSMA<sup>®</sup> PDA occluder has undergone animal test.

**Methods** A prospective, randomized pilot study was started in August 2014. 13 patients were included until June 2017. Patients weighing less than 6 kg or those with associated cardiac anomalies that required surgery were excluded. All patients were followed up by transthoracic echocardiography, electrocardiogram, and chest radiographs at 24 hours, 30, 90, 180, 360 and 720 days after implantation. Complications at the puncture site, residual shunt, migration, erosion and other complications, including embolization, fistula, device-induced left pulmonary artery stenosis and aortic coarctation were

monitored. All occluders were delivered via 7–9F long sheaths and PDA closures were performed following standard techniques.

**Results** Thirteen patients (6 nano fabric single-rivet/ 7 double-rivet), were included. All the 13 patients were closed successfully using SHSMA<sup>®</sup> ductal occluder, 5 patients (83.3%) in nano fabric single-rivet group, and 7 patients (100%) had immediate and complete closure on angiography. Within 24hours, color Doppler revealed complete closure in all 13 patients, 100% at 30days, and in 100% of patients at 2 years. There was no device embolization, hemolysis, or obstruction to the pulmonary artery or descending aorta.

**Conclusion** The new SHSMA<sup>®</sup> PDA is feasible, safe and effective.

## Procedural, In-Hospital and Long-term Outcomes of Epicardial collateral channel for retrograded recanalization of chronic total occlusion percutaneous coronary intervention

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**Objective** The benefit of successful recanalization of chronic coronary total occlusions (CTOs) on prognosis remains under debate. Limited data exist regarding epicardial collateral channel for retrograded recanalization of chronic total occlusion percutaneous coronary intervention (PCI).

The purpose of this study was to evaluate procedural, In-Hospital and long-term clinical outcomes after retrograde PCI recanalization epicardial collateral channels (CCs).

**Methods** Consecutive eligible patients who underwent PCI of CTOs via epicardial CCs at our centre between August 2011 and October 2018 were prospectively enrolled and followed. Detailed baseline clinical and angiographic data, procedural success, and in-hospital complications were analysed. Major adverse cardiac events (MACE) were compared between patients with successful and failed PCI of CTO via epicardial CCs for pertinent co-variables by the Cox models.

**Results** The study enrolled 191 patients with attempted epicardial CCs PCI of CTO and the midterm follow-up time was  $24.03 \pm 19.18$  months. Successful CCs PCI of CTO was achieved in 161 (84.8%) patients. Procedural complications occurred in 45 (23.6%) patients. And MACEs occurred in 18 patients (9.4%) at 1-year follow-up. Kaplan-Meier curves showed that successful revascularization was associated with significantly lower 1-year MACE-free rates than unsuccessful revascularization (unadjusted hazard ratios (HR): 0.121; 95% confidence intervals (CI): 0.03 to 0.46,  $P=0.002$ ). The multivariate Cox regression analysis identified the age of patient (HR: 1.05; 95% CI: 1.002 to 1.095;  $P=0.039$ ) and Epi-CTO score  $\geq 2$  (HR: 7.86; 95% CI: 2.91 to 21.23;  $P<0.001$ ) as significant independent predictors of midterm MACEs.

**Conclusions** Our study shows that Successful recanalization of CTOs through Epicardial collateral channel was associated with a reduction in midterm MACE as compared with failed recanalization attempts. Moreover, of whose Epi-CTO scores more higher, became more likely to failure. According to the experience of our center, CCs of CTO PCI was associated with favorably high success and acceptable complication rates.

## Age, creatinine, and ejection fraction (ACEF) score: a simple pre-operative risk-stratified method for patients with type B aortic dissection undergoing thoracic endovascular aortic repair

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**Objective** Older age, renal and cardiac dysfunction are predictors of poor outcome in aortic dissection. This study aimed to investigate the prognostic significance of the age, creatinine and ejection fraction (ACEF) score in patients with type B aortic dissection (TBAD) undergoing thoracic endovascular aortic repair (TEVAR).

**Methods** The study involved 605 patients, who were classified into three groups according to the tertiles of ACEF score: Tertile 1 ( $\leq 0.77$ ,  $n=204$ ), Tertile 2 (0.77 to 0.96,  $n=205$ ) and Tertile 3 ( $>0.96$ ,  $n=196$ ). The association between ACEF and AGEF (age, glomerular filtration rate and ejection fraction) score with adverse events was analyzed. The accuracy of ACEF and AGEF score in predicting mortality was assessed by receiver-operating characteristic (ROC) curve analysis and their areas under the curve (AUCs) were compared.

**Results** The in-hospital mortality was 3.0%, which was significantly higher in Tertile 3 (1.5% vs. 1.0% vs. 6.6%,  $P=0.001$ ). The in-hospital MACE rate represented an increase across all the ACEF score groups (3.9% vs. 4.9% vs. 15.3%,  $P<0.001$ ). After a median 3.4 years follow-up after TEVAR, 63 (10.4%) patients died. Multivariable Cox survival analysis revealed that ACEF score (per 1-point increase) was independently associated with long-term mortality (adjusted hazard ratio=3.00; 95% confidence interval, 1.65–5.44;  $P<0.001$ ). ACEF and AGEF score had similar predictive ability for both in-hospital (0.725 vs. 0.685,  $P=0.209$ ) and long-term death (0.703 vs. 0.673,  $P=0.196$ ). The in-hospital mortality (1.5% vs. 1.0% vs. 6.6%,  $P=0.001$ ) and major adverse clinical events (3.9% vs. 4.9% vs. 15.3%,  $P<0.001$ ) were significantly higher in Tertile 3. In addition, cumulative long-term mortality in Tertile 3 was significantly higher than that in Tertile 1 and 2 (Log-Rank=23.74;  $P<0.001$ ).

**Conclusions** ACEF, a simple score, was found to be an independent predictor for long-term mortality for TBAD patients undergoing TEVAR, and could thus be considered as a method for pre-TEVAR risk stratification. In addition, ACEF and AGEF score had similar discriminative ability for in-hospital and long-term death.

## 非急性心梗的慢性肾脏病患者或许无法从冠脉介入治疗中获益

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**目的** 随着冠心病发病率的不断上升,经皮冠状动脉介入治疗(PCI)已成为全球最常见的介入诊疗措施之一,仅在

中国每年就有超过70万次。尽管在所有接受PCI的患者中,有超过40%的患者合并慢性肾脏病(CKD),然而,这些患者被常规排除在许多关于心肌血运重建的临床试验之外,PCI给他们带来的获益尚不明确。因此,本研究拟探讨心肌血运重建是否会降低非急性心梗的慢性肾脏病患者的死亡率。

**方法** 本文共纳入1440例接受冠状动脉造影(CAG)或经皮冠状动脉介入治疗(PCI)的确诊冠心病的CKD患者。根据其是否接受PCI分为PCI组( $n=970$ )和非PCI组( $n=470$ )。CKD定义为肾小球滤过率(eGFR) $<90$  ml/(min· $1.73$  m $^2$ )。研究主要终点为全因死亡率,定义为入组后记录到的任何原因所导致的患者死亡。文章采用多变量logistic回归和Cox比例风险回归分析,以探讨心肌血运重建与长期死亡率之间的关系。

**结果** 总的来说,在 $3.34\pm 0.02$ 年的平均随访期间,PCI组和非PCI组的死亡率分别为5.1( $n=49$ )和5.7%( $n=27$ )。多变量logistic回归分析显示,CKD IV期(eGFR 15–30 ml/min/ $1.73$  m $^2$ ) [HR=7.043 (95% CI: 3.385–14.656)]、糖尿病 [HR=1.849 (95% CI: 1.119–3.053)]、术前低血压 [HR=2.498 (95% CI: 1.099–5.677)]、心力衰竭 [HR=2.460 (95% CI: 1.475–4.102)]和使用 $\beta$ 受体阻滞剂 [HR=0.428 (95% CI: 0.261–0.701)]与长期死亡率显著相关。PCI组与非PCI组全因死亡率无差异。[HR=1.594 (95% CI: 0.927–2.739)  $P>0.05$ ]。

**结论** 心肌血运重建不能降低患有慢性肾脏病的非急性心梗死患者的死亡率。

## 吸烟量与不同年龄急性ST段抬高型心肌梗死患者罪犯血管痉挛的相关性研究

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**目的** 探讨吸烟量与急性ST段抬高型心肌梗死(ST-segment Elevated Myocardial Infarction, STEMI)患者罪犯血管痉挛的关系及其在不同年龄人群中的差异性。

**方法** 以2014年12月至2018年3月连续收治于广州军区总医院并行冠状动脉造影(Coronary Artery Angiography, CAG)的STEMI患者为研究对象,按造影结果分为痉挛组和非痉挛组,再按年龄分为青年(年龄 $\leq 45$ 岁)、中年(年龄

46~59岁)和老年(年龄 $\geq 60$ 岁),回顾性分析吸烟量与不同年龄急性ST段抬高型心肌梗死患者罪犯血管痉挛的相关性。

**结果** 1. 吸烟量与STEMI患者罪犯血管发生痉挛正相关:在STEMI患者中,与不吸烟者相比,吸烟2级者罪犯血管发生痉挛的风险为6.397倍[95%可信区间(CI):2.278-17.963],吸烟3级者罪犯血管发生痉挛的风险为6.926倍(95% CI:3.148-15.239)。2. 大量吸烟是青年STEMI患者罪犯血管发生痉挛的主要危险因素:青年和中年组中大量吸烟(吸烟2级+3级)与罪犯血管痉挛呈正相关,相关系数分别为 $r=0.321$  ( $P<0.01$ ),  $r=0.127$  ( $P<0.01$ ),此种相关性在青年组中最强;大量吸烟(吸烟3级)的STEMI人群中,青年组罪犯血管发生痉挛的风险为中年组的2.778倍(95% CI:0.169-0.765),为老年组的5.495倍(95% CI:0.076-0.435)。

**结论** 吸烟量与STEMI患者罪犯血管发生痉挛正相关,且此种关系在青年人人群中最为显著,控烟是我国STEMI防治的重要工作内容,尤其针对青年人人群的控烟工作已迫在眉睫。

## 钙离子拮抗剂对冠状动脉支架术后联合氯吡格雷患者支架内血栓的影响

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**目的** 探讨应用钙离子拮抗剂(Calcium channel antagonists, CCB)对冠心病行经皮冠状动脉支架术后服用氯吡格雷患者住院期间支架内血栓发生率的影响。

**方法** 纳入2013年1月至12月于阜外医院药物洗脱支架术后且服用氯吡格雷的共6301例,患者根据是否服用钙离子拮抗剂分为2组,分析CCB对氯吡格雷抗血小板作用的影响,采用多因素分析研究CCB对2组患者住院期间支架内血栓的影响。

**结果** 共3166(50.2%)例患者服用CCB。CCB组血小板高反应性的发生率与非CCB组相比无显著差异(28.3% vs 29.3%,  $P=0.106$ )。CCB组住院期间支架内血栓与非CCB组无显著差异(0.3% vs 0.2%,  $P=0.449$ )。多因素分析显示服用CCB不是住院期间支架内血栓的独立危险因素(OR=1.466, CI 0.509-4.106,  $P=0.488$ )。

**结论** CCB不影响冠心病联用氯吡格雷患者支架术后住院期间支架内血栓发生率。

## Early clinical experience with Guidezilla for transradial interventions in China

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**Objective** Anatomic variations, calcified, tortuous, angulated lesions, and lack of support increase the complexity of transradial intervention (TRI). Guidezilla is a mother-and-child catheter enabling increased support during complex interventions. As there are few published reports on its use, we describe our experience using this device to assist TRI in Chinese patients. The purpose of this study was to describe our preliminary clinical experience with Guidezilla for back-up support and balloon and stent delivery in the treatment of complex coronary lesions via the transradial approach report at a single center in China.

**Methods** Thirty-two consecutive patients with coronary artery disease (CAD) and TRI procedures utilize Guidezilla at between June 2015 and August 2017. All had undergone angiography and all had failed conventional techniques. The study was approved by the ethics committee of West China Hospital and complied with ethical principles of the Declaration of Helsinki. All patients gave written informed consent before enrollment. Patient demographics, target vessel, ACC/AHA lesion type, lesion complexity, access site, procedure success and complications, and in-hospital outcome were recorded. Data collected and reviewed by two cardiologists experienced in analysis of quantitative coronary arteriography. Indications for use of the Guidezilla GCES included: 1) anomalous or angulated take-off of native coronary arteries, 2) proximal tortuous vessels, 3) extreme calcification or long lesions, 4) for back-up support of delivery of balloons, stents, rotational atherectomy or aspiration devices, 5) or failure with other techniques. Success was defined as stent placement in the target lesion with residual stenosis of less than 20% and TIMI 3 flow. Procedural success was defined as technique success without major Guidezilla-related complications. Deep intubation was defined as depth more than 2 cm.



**Results** The patients were  $59.44 \pm 10.48$  years of age and 26 (81%) were men. The most frequent target vessels were the RCA (34%) and LAD (31%), patients had complex type C (53%) or B (47%) lesions, severely tortuous (41%) and angulated (22%). With the use of Guidezilla, technique success was 100%, and procedural success was 94%. The mean diameter of the deployed stents was  $2.97 \pm 0.37$  mm, and the length was  $27.19 \pm 8.14$  mm. The estimated mean distance of Guidezilla intubation into the target vessel was  $7.66 \pm 2.29$  cm.

**Conclusions** The Guidezilla catheter extension safely facilitated successful completion of TRI in complex coronary artery lesions. This device can help interventionalists successfully perform difficult procedures.

## Q-Wave Presence in Myocardial Infarction in Patients Treated by Primary PCI

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**Objective** Acute myocardial infarction (MI) is currently classified as either ST-segment elevation (STEMI) or non ST-segment elevation (NSTEMI) myocardial infarction, and ultimately develops into Q-wave (QMI) or non Q-wave (NQMI) MI. Although traditionally QMI and NQMI have been regarded as transmural and nontransmural MI respectively, emerging evidence argues against transmural itself as a determinant of Q wave appearance. Nonetheless, infarct size, extent of sub-endocardial involvement, and transmural proportion seem more severe in QMI than NQMI. QMI therefore is more likely to be associated with poorer outcomes than NQMI, as demonstrated in previous studies associating QMI with increased mortality and lower left ventricular (LV) function, and Q-wave presence with superior poor outcome predictability than time from symptom-onset to-STEMI. This study evaluated the clinical impact of Q-wave presence on ECG at presentation of patients with STEMI undergoing primary PCI.

**Methods** From March 2016 to April 2017, 658 consecutive STEMI patients who underwent primary PCI within 12 hours of chest pain onset were retrospectively evaluated. Patients were grouped according to the presence (Q positive, n=357) or absence (Q negative, n=301) of Q waves on initial ECG at emer-

gency room presentation. Major adverse cardiac events (MACE) and stent thrombosis (ST) were evaluated for 1 year. Risk factors for MACE and Left ventricular ejection fraction (LVEF) by echocardiography were also evaluated.

**Results** Baseline characteristics, including reperfusion time and infarct location, were similar between the groups. The MACE rate at 1 year was higher in the Q-positive group (69, 19.3%) than in the Q-negative group (26, 8.6%,  $P=0.000$ ). Independent risk factors for MACE were the presence of Q-wave ( $P=0.000$ , Odds ratio 4.692) and no-reflow phenomenon ( $P=0.0064$ , Odds ratio, 3.245). The Q-positive group had lower LVEF on baseline echocardiography (37.5%) compared with patients with the Q-negative group (43.8%,  $P=0.038$ ). At 12 months of follow-up, the Q-positive group had still lower LVEF (41.5%) compared with patients with the Q-negative group (49.3%,  $P=0.024$ ). Patients with Q-wave regression displayed significantly larger LVEF improvement in 12 months (7.8%) as compared with both persistent Q-wave MI (3.8%) as well as non-Q-wave MI (5.2%,  $P=0.042$  for both comparisons).

**Conclusions** The presence of Q waves in ECG of patients presenting with STEMI undergoing primary PCI provides an independent prognostic marker of clinical outcomes and Left ventricular ejection fraction. In addition, Q-wave regression is associated with the largest improvement of LVEF.

## 冠状动脉旁路移植术后复发性心绞痛患者药物治疗与PCI治疗的长期疗效比较

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**目的** 探讨冠状动脉旁路移植术后心绞痛复发患者接受冠状动脉介入治疗(PCI)的比例、血管病变特征和药物治疗与PCI的远期疗效。

**方法** 选取既往在安贞医院接受搭桥手术,再次因为心绞痛入住安贞医院心内科(2007.7-2017-7)的患者,根据纳入标准,一共有1369例患者纳入此项研究,按治疗方法分为药物组和PCI组。

**结果** 在1369例冠状动脉旁路移植术后复发性心绞痛患

者中,52.89%的患者接受了PCI,两组患者主要分布在冠状动脉旁路移植术后1~10年内。PCI组患者更易患糖尿病(49.9%)、既往急性心肌梗死史(16.9%)、心电图Q波改变(73.9%)和稳定型心绞痛(40.75%)。药物组患者发生移植血管慢性完全闭塞病变(CTO)的比例明显高于PCI组(83.3% vs 76.8%,  $P=0.002$ );原位血管发生Type C型冠状动脉病变的患者比例为75.5%,而PCI组为61.5% ( $P<0.001$ );CTO病变(57.2% vs 49.9%,  $P=0.041$ ),弥漫性病变(35.0% vs 15.1%,  $P<0.001$ )。PCI组患者术后24 h发生心绞痛(2.5% vs 4.8%,  $P=0.022$ ),出血事件(1.0% vs 0.2%,  $P=0.049$ )较高。两组患者中位随访时间为4.84年,随访结果显示PCI组心源性死亡事件(6.5% vs 5.0%,  $P=0.104$ )和心衰事件(11.8% vs 12.0%,  $P=0.536$ )和心肌梗死事件(12.7% vs 16.4%,  $P=0.328$ )的未有明显降低,PCI组患者发生血运重建事件发生率(10.4% vs 18.2%,  $P<0.001$ )明显升高。

**结论** 搭桥术后心绞痛复发的患者中有52.89%接受PCI治疗,对于弥漫性和CTO血管病变患者(47.11%)很难进行PCI。与接受药物治疗的患者相比,在长期随访结果显示PCI不能降低CABG后心绞痛复发患者的主要不良心血管事件(MACE),包括心源性死亡、心肌梗死、心力衰竭、血运重建和中风。

## 不同发病时间急性心肌梗死冠脉内血栓成分与直接PCI术中支架植入后冠脉血流的相关性研究

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**目的** 研究急性心肌梗死冠脉内血栓成分与直接PCI术中支架植入后冠脉血流的相关性。

**方法** 选取我院2016年1月至2018年11月急性心肌梗死发病12小时内,高血栓负荷,术中使用血栓抽吸导管抽吸血栓的直接PCI患者154人,男85人,女69人,年龄36岁至81岁。根据发病时间分为小于3小时组、3至6小时组和6至12小时组。将抽出血栓病理切片,显微镜观察血栓成分并记录,根据血栓成分分为白血栓组和红血栓组。根据DSA影像数据记录PCI术中支架植入后TIMI血流情况,统计各组发生无复流及慢血流例数。根据发病时间、血栓成分和TIMI血流等数据进行统计学分析。

**结果** 急性ST段抬高型心肌梗死组与非ST段抬高型心肌梗死抽出的血栓成分存在显著性差异( $P<0.01$ )。发病小于3小时,抽出白血栓和红血栓组支架植入后无复流和慢

血流发生无显著性差异;发病3~6小时和6~12小时,抽出白血栓和红血栓组支架植入后发生无复流和慢血流存在显著性差异( $P<0.01$ )。发病时间与术中无复流和慢血流发生存在显著的相关性( $P<0.01$ )。

**结论** 直接PCI术中根据患者发病时间和冠脉内抽出血栓的成分,预测PCI术中支架植入后是否发生无复流和慢血流具有一定的指导作用。

## 永存左上腔植入CRTD

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**目的** 伴有永存左上腔的CRTD适应证患者,通常植入技术难度大。此例患者采用特殊方法成功植入CRTD。

**方法** 病例。

**结果** 病例。

**结论** 《2008年心脏节律异常装置治疗指南》心脏再同步化治疗/心脏再同步化治疗除颤器(CRT/CRT-D)适应证:最佳药物治疗基础上心功能NYHA分级Ⅲ级或Ⅳ级的心力衰竭患者,符合LVEF $\leq$ 35%、LBBB、QRS时限 $\geq$ 120 ms、窦性心律者置入有/无ICD功能的CRT。因此,患者为CRT-D适应证。

永存左上腔静脉(PLSVC)占正常人口的0.3%~0.5%,1.5%~10%患者合并其他先天性心脏异常。Horrow等报道,PLSVC发生率为先天性心脏病患者的2.1%~4.3%,使PLSVC成为最常见的先天性心脏静脉异常。大部分情况,永存左上腔静脉通过扩大的冠状窦口进入右心房。

## FFR指导下完全血运重建对非ST段抬高型急性冠脉综合征多支血管病变患者心功能及预后的影响

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**目的** 探讨血流储备分数(FFR)指导下完全血运重建对非ST段抬高型急性冠脉综合征(NSTE-ACS)多支血管病变患者心功能及预后的影响。

**方法** 入选我院2016年1月-2018年1月120例NSTE-ACS多支血管病患者随机分为FFR指导下功能性完全血运重建组(FFR组)和单纯冠状动脉造影(CAG)指导下完全血运重建组(CAG组),比较两组人均支架植入数量、住院费用等经皮冠状动脉介入(PCI)资料;患者术后随访12个月,比较两组心绞痛发作次数、左室射血分数(LVEF)、PRO-BNP和主要不良心血管事件(MACEs)发生率。采用SPSS 17.0统计学软件分析处理数据,组间比较采用t检验或卡方检验。

**结果** FFR组人均支架植入数量[(2.0±1.6 vs (3.6±1.5)枚,  $P<0.01$ ]和住院费用[(44508±25 242) vs (68 656±22 5249)元,  $P=0.03$ ]较CAG组显著降低;术后1个月心绞痛发作次数[(2.2±0.6) vs (4.5±0.5)次]( $X^2=2.65$ ,  $P<0.01$ )和LVEF[(62.8±6.2)% vs (48.6±5.8)%]( $t=2.62$ ,  $P<0.05$ )改善情况优于CAG组;术后12个月PRO-BNP降低值优于CAG组[(2345.6±54.5)% vs (648.6±22.8)]( $t=5.65$ ,  $P<0.01$ );术后12个月FFR组再次血运重建[8.4%(5/60) vs 16.7%(10/60),  $P=0.02$ ]和MACEs发生率[6.7%(4/60) vs 18.3%(11/60),  $P=0.04$ ]较CAG组显著降低。

**结论** FFR指导下功能性完全血运重建减少支架植入数量和住院费用,有效改善术后1个月心绞痛症状和心功能,降低术后12个月MACEs发生率,NSTE-ACS多支血管病患者短期获益明显,长期获益还有待于进一步观察。

## SYNTAX积分及EURO积分双高冠心病高危患者PCI与药物治疗对照研究

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**目的** SYNTAX积分>27及Euro积分>6分双高冠心病高危患者,通过比较经皮冠状动脉介入治疗(PCI)或药物治疗后不良心血管事件发生率,指导心内科临床医生,协助制订适宜我国Syntax积分及Euro积分双高冠心病高危患者的个体化治疗策略。

**方法** 回顾性分析研究2016年1月至2018年12月江西省人民医院心内科冠脉造影证实为左主干病变和(或)三支病变,SYNTAX积分>27分及Euro积分>6分(简称:SE双高积分)的冠心病高危患者100例。根据患者选择治疗方法的不同,分为单纯口服药物治疗组(简称:药物治疗组50例)和PCI组(50例)。通过查阅住院病历,门诊或电话随

访,记录患者出院后发生不良心血管事件的时间和类型。分别计算PCI治疗组和药物治疗组主要不良心血管事件发生率和次要不良心血管事件发生率。

**结果** 1随访到18个月时,药物治疗组发生主要不良心血管事件(MACE)17例(占药物治疗组34.0%),PCI组发生MACE 6例(占PCI组12%),两组MACE发生率差异有统计学意义, $P=0.008$ ,PCI组MACE发生率低于药物治疗组。药物治疗组发生心功能减退20例(占药物治疗组40.00%),PCI组发生心功能减退10例(占PCI组20.0%),两组心功能减退发生率有统计学意义, $P=0.014$ ,PCI组心功能减退发生率低于药物治疗组;药物治疗组发生心源性再入院25例(占药物治疗组50.00%),PCI组发生心源性再入院11例(占PCI组22.0%),两组心源性再入院发生率有统计学意义, $P=0.003$ ,PCI组心源性再入院发生率低于药物治疗组;药物治疗组发生再发心绞痛21例(占药物治疗组42.00%),PCI组发生再发心绞痛9例(占PCI组18.0%),两组再发心绞痛发生率有统计学意义, $P=0.005$ ,PCI组再发心绞痛发生率低于药物治疗组。2 Kaplan-Meier结果显示:药物治疗组无不良心血管事件生存时间平均值9.720±0.854月,95%置信区间(7.868-11.452月),PCI组无不良心血管事件生存时间平均值12.852±0.753月,95%置信区间(11.252-14.356月)。

**结论** SYNTAX积分及Euro积分双高冠心病高危患者在采用PCI治疗后,与药物治疗组比,长期随访(≥6个月)发现主要和次要不良心血管事件发生率都有明显降低。

## 完全与部分血运重建对多支病变的缺血性心肌病患者的疗效影响比较

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**目的** 比较完全性血运重建及部分性血运重建对存在包括前降支在内多支病变的缺血性心肌病(ICM)患者的疗效。

**方法** 2016年1月-2018年12月在江西省人民医院心内科住院的120例经选择性冠状动脉造影(SCAG)证实存在包括前降支在内多支病变的ICM患者行冠状动脉介入(PCI)治疗,按是否在前降支行支架植入血运重建基础上对其他病变冠脉(回旋支、右冠状动脉)行血运重建分为完全性血运重建组(完全重建组)及部分性血运重建组

(部分重建组)各60例。术后随访1年,比较两组PCI术中并发症发生率、术前和术后1年的血浆前体B型利钠肽(Pro-BNP)浓度、左心室舒张末期内径(LVDd)、左心室射血分数(LVEF)及心血管不良事件发生率。

**结果** 部分重建组PCI术中并发症发生率低于完全重建组,差异有统计学意义( $P<0.05$ );两组术后1年的血浆ProBNP浓度较术前降低,LVDd较术前减小,而LVEF较术前增加,差异均有统计学意义( $P<0.05$ );但两组之间术前和术后1年的血浆ProBNP浓度、LVDd及LVEF比较,差异均无统计学意义( $P>0.05$ );两组心血管不良事件发生率比较,差异均无统计学意义( $P>0.05$ )。

**结论** 对于存在包括前降支在内多支病变的ICM患者,前降支选择性部分血运重建及完全性血运重建均能有效改善患者的心功能,且前者PCI术中并发症发生率更低。

## 碎裂QRS波群在经皮冠状动脉介入治疗急性前壁心肌梗死病人中的预测价值

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**目的** 探讨经皮冠状动脉介入治疗急性前壁心肌梗死病人心电图碎裂QRS波群对预后的判断价值。

**方法** 回顾性纳入了200例经皮冠状动脉介入治疗的急性前壁心肌梗死病人,根据病人出院前心电图是否存在碎裂QRS波群,将病人分为碎裂QRS波群组(107例)和非碎裂QRS波群组(106例)。碎裂QRS波定义为标准12导联心电图至少存在对应冠状动脉供血区域2个或2个以上连续导联的QRS波群上存在多种RSR'波型( $\geq 1$ 个R'波,R波的顶部或S波的底部出现顿挫波),伴有或不伴有Q波。

**结果** 两组平均随访时间对比差异无统计学意义( $P=0.319$ )。经过1年的临床随访,本研究主要复合终点事件发生率在两组间比较差异有统计学意义( $P=0.001$ );全因病死率在碎裂QRS波群组为7.48%,在非碎裂QRS波群组为0.94%( $P=0.019$ );心源性病死率在碎裂QRS波群组和非碎裂QRS波群组分别为5.61%和0.94%( $P=0.098$ );随访期间两组再发性急性冠脉综合征发生率和冠状动脉血运重建率对比具有相似的发生率。心力衰竭发生率在两组之间也相似。

**结论** 在经皮冠状动脉介入治疗急性前壁心肌梗死病人中,出院时心电图存在碎裂QRS波的病人主要复合终点事件发生率明显高于非碎裂QRS波的病人,其中全因病死率在存在碎裂QRS波的病人中明显升高。

## 右冠状动脉闭塞PTCA术后右室室壁瘤破裂1例

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**目的** 心肌梗死后心脏破裂是一种少见而凶险致命的疾病。一旦出现,如不及时处理,死亡率达到100%,快速进行外科开胸修补是唯一有效的治疗方法。

**方法** 外科开胸修补。

**结果** 通过我科与心外科两科医生通力合作,争分夺秒,该病例得以成功救治。

**结论** 心肌梗死后心脏破裂是一种少见而凶险致命的疾病。一旦出现,如不及时处理,死亡率达到100%,快速进行外科开胸修补是唯一有效的治疗方法。通过我科与心外科两科医生通力合作,争分夺秒,该病例得以成功救治。心梗后心脏破裂为早期少见但严重并发症,常在发病1周内出现,而该患者发病20余天,心梗时间不明确,心电图,心肌标志物正常。开通血管后出现心脏破裂,考虑再灌注性损伤所致,通过该病例提示,一旦血运重建后,出现心包填塞,复查造影无冠状动脉穿孔,考虑心脏破裂,立即心外科手术手术治疗。

## 支架精确定位后造影发现一条白线?

杨巍

哈尔滨医科大学附属第四医院

刘某,56岁,女,主诉:阵发性胸痛10年,加重1周。患者于10年前劳累后出现胸前区疼痛,呈闷痛,阵发性,休息数分钟后可缓解。1周前,患者自觉症状加重,发作频

繁,来我院就诊。高血压病史30年,最高180/110 mmHg,血压控制尚可,否认糖尿病病史,否认吸烟、饮酒史。手术策略:成角 $>70^\circ$  LM远端斑块负荷不重 病变主要集中于LAD近段 考虑精确定位,微凸LM的LAD单支架技术:避免分支受累及多层支架梁覆盖等问题。IVUS未见血栓,发现支架梁进入LCX约1.5 mm,考虑白线部分为支架梁进入LCX在血液冲刷后引起的涡流,同时患者LM、LCX有斑块负荷,决定于LM-LCX补一枚支架,改做分叉。

考虑白线为涡流。

## 动脉粥样硬化性肾动脉狭窄伴高血压肾动脉支架植入1例

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**目的** 据估计,肾动脉狭窄(RAS)的患病率在高血压人群中为1%~3%,而在继发性高血压人群中可达20%。在老年人群中,RAS相当常见,一项国外的研究表明,年龄 $>65$ 岁的高血压患者中有6.8%合并RAS,以此推测我国RAS的患病人群数量巨大<sup>[2]</sup>。

对单侧肾动脉狭窄的病人,过去往往采用一侧肾切除的方法,随着医疗技术水平提高,肾动脉重建手术和经皮腔内动脉成形术(PTA)已成为治疗此病的较好方法,它们可“立竿见影”地使血压恢复正常。患高血压而用药效果不佳的人,应做进一步详细检查,以免误诊误治。

**方法** 报告1例老年高血压患者,肾动脉超声提示肾动脉狭窄(RAS)给予“硝苯地平控释片30 mg bid,培哚普利10 mg qd,吲达帕胺缓释片1.5 mg qd,琥珀酸美托洛尔缓释片47.5 mg qd,”等治疗。血压控制不理想。行肾动脉造影术,造影示右肾动脉血管光滑,未见狭窄,左肾动脉近段开口处85%狭窄。加注肝素6000 U,送指引导丝Versa Turm F于左肾动脉分支远段。送PTA球囊导管3.0×20 mm以6-10 atm压力扩张左肾动脉狭窄病变处,左肾动脉内注射硝酸甘油100  $\mu$ g,在左肾动脉近中以6-9 atm植入Medtronic肾动脉支架:5.0×20 mm于病变处,再以支架内球囊8 atm后扩支架近段,造影示支架贴壁良好。

**结果** 术前血压200/73 mmHg,术后血压第2天105/81 mmHg,随访血压正常,不需服用降压药,肝肾功能正常。

**结论** 在高血压人群中,筛查RAS的目标人群,经皮腔内动脉成形术(PTA)已成为治疗此病的较好方法。

## 回旋支闭塞,术中前降支急性闭塞1例

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**目的** 通过讨论对LCX行PCI时候是否需要保护LAD,避免产生不良后果。

**方法** 对LCX闭塞的PCI时候,给予LAD导丝保护。

**结果** 通过该病例,提示,遇到此类病变,首先保证LAD供血,LAD是生命线,可于LAD先置入导丝保护,狭窄程度重,先置入支架,然后再处理LCX,LCX预扩回撤球囊时,先将球囊往远端送,再回拉,使血栓往远端走,避免出现次类事故发生。

**结论** 该病例术中出现LAD急性闭塞,考虑可能LCX球囊预扩后,回撤球囊时,将血栓带入LAD,导致LAD急性闭塞,使整个左侧冠状动脉无血液供应,导致心源性休克,术后合并消化道出血,加重病情,虽经积极处理,仍不能挽救患者生命。通过该病例,提示,遇到此类病变,首先保证LAD供血,LAD是生命线,可于LAD先置入导丝保护,狭窄程度重,先置入支架,然后再处理LCX,LCX预扩回撤球囊时,先将球囊往远端送,再回拉,使血栓往远端走,避免出现次类事故发生。

## 血管内超声与冠状动脉造影指导的经皮冠状动脉介入治疗左主干病变安全性和有效性的Meta分析

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**目的** 本研究通过已发表的随机对照或队列研究,比较血管内超声(IVUS)与冠状动脉造影指导的经皮冠状动脉介入治疗(PCI)在左主干病变中的安全性和有效性。

**方法** 计算机检索中英文数据库PubMed、EMBASE、The Cochrane Library (2017年12期)、CBM、CNKI、VIP和Wan-Fang,并追踪已获文献的参考文献,手工检索国际上重要

会议论文集,检索时间至2017年12月。采用随机效应模型或固定效应模型,应用RevMan5.3软件进行Meta分析。我们评估的主要结局指标:心源性死亡、心肌梗死、主要不良心血管事件、支架内血栓形成、总体死亡、靶病变血运重建、靶血管再血管化的发生率。

**结果** 共纳入文献7篇,总样本量7777例,IVUS指导PCI 3115例,冠状动脉造影指导PCI 4572例。与冠状动脉造影指导PCI相比,IVUS指导PCI的心源性死亡[OR=0.45, 95%CI(0.34, 0.61),  $P<0.00001$ ]、心肌梗死[OR=0.67, 95%CI(0.53, 0.84),  $P=0.004$ ]、主要不良心血管事件[OR=0.46, 95%CI(0.34, 0.61),  $P<0.00001$ ]、支架内血栓形成[OR=0.20, 95%CI(0.10, 0.37),  $P<0.00001$ ]、总死亡[OR=0.54, 95%CI(0.44, 0.67),  $P<0.00001$ ]发生率均降低( $P$ 均 $<0.05$ )。IVUS指导PCI与冠脉造影指导PCI的靶病变血运重建[OR=0.98, 95%CI(0.70, 1.37),  $P=0.89$ ]和靶血管再血管化[OR=1.13, 95%CI(0.83, 1.53),  $P=0.45$ ]的差异无统计学意义。

**结论** 与冠状动脉造影相比,IVUS指导的PCI治疗左主干病变可降低心源性死亡、心肌梗死、主要不良心血管事件、支架内血栓形成、总死亡的发生率,但对靶病变血运重建和靶血管再血管化发生率无影响。

## IVUS检查在冠脉CTO病变介入治疗中的应用

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**目的** 冠脉慢性完全闭塞病变(Chronic total occlusion, CTO)病变是指原位冠状动脉粥样硬化导致血管完全闭塞,正向TIMI血流0级,病变血运重建困难较大。通过血管内超声(intravascular ultrasound, IVUS)检查在冠脉介入术中的应用提高冠脉CTO病变的成功开通率及优化支架植入方案,提高整体介入治疗技术。减少后期心血管不良事件的发生。

**方法** 2018年1月至12月冠脉CTO病变介入治疗122例,男105例,平均年龄 $61.85\pm 6.72$ 岁;女17例,平均年龄 $72.53\pm 3.61$ 岁。其中使用血管内超声(IVUS)检查的36例,使用的机器为飞利浦公司的Xper FD20和Xper FD10机、波科H749IILAB220C270型和美国Volcano s5 Imaging System血管内超声系统。常规冠脉造影检查,找到闭塞的靶血管。通过IVUS实时观察CTO病变的特点及CTO介入

治疗过程中各种血管损伤特点,确定导丝位置,判断真假腔。真腔具备三层结构、并且分支汇入,而假腔不具备以上特点。指导导丝通过无残端CTO病变的入口和指导假腔内的导丝穿刺进入真腔,仔细判读IVUS图像,确定假腔起始位置和真腔的位置、形状。将IVUS探头置于假腔起始位置,调整导丝寻找穿刺进入真腔。由于慢性闭塞性血管开通后,均存在血管废用性的萎缩,从冠脉造影影像上判读血管直径常常偏小。根据IVUS图像病变性质、测量病变长度及血管远端和近端参考血管直径,指导选择合适的治疗策略,术后评价支架的贴壁及覆盖病变情况,进一步优化治疗效果。成功开通闭塞的血管。

**结果** 全年CTO成功开通率为81.15%。经IVUS优化治疗的病例术后血管内影像均为病变覆盖完整,支架两端无血管内夹层且支架贴壁良好。有待于进一步随访观察有、无IVUS优化治疗的CTO病变的远期心血管事件的发生及支架内再狭窄的发生率。

**结论** IVUS指导CTO病变介入治疗过程,评价冠状动脉支架术的效果,有利于术者及时发现和纠正支架植入后存在的问题,以达到最佳的介入治疗效果。减少并发症的发生,同时大大减少对比剂的用量,减少曝光时间。

## 两种国产支架治疗冠心病疗效和再狭窄率的回顾性研究

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**目的** 评价冠心病患者在植入国产生物可降解涂层支架(EXCEL)的疗效及再狭窄率方面是否优于国产不可降解涂层支架(PARTNER)。

**方法** 将111例冠状动脉病变并行PCI术的患者纳入到本项回顾性对照研究中。其中54例仅植入EXCEL可降解药物洗脱支架,57例仅植入PARTNER永久聚合物药物洗脱支架。随访6~30个月,观察两组主要不良心脏事件(MACE)以及再发心绞痛、晚期支架内血栓形成、支架内再狭窄率、支架内管径丢失,心脏衰竭等。

**结果** 两组患者在基线特征、基本临床数据以及冠脉造影及PCI情况等方面比较的无统计学差异(均 $P>0.05$ )。临床随访6~30个月,平均 $(13.6\pm 6.8)$ 个月,两组MACE以及再发心绞痛、晚期支架内血栓形成、支架内再狭窄率、支架内管径丢失、心脏衰竭等差异无统计学意义(均 $P>0.05$ ),但EXCEL组的支架内管径丢失 $\geq 30\%$ 发生率低于PARTNER组( $P<0.05$ )。

结论 EXCEL 支架与 PARTNER 支架在治疗冠状动脉粥样硬化性心脏病的治疗中有相似的安全性及有效性。但本研究发现 EXCEL 药物洗脱支架的支架内管径丢失率低于 PARTNER 组,今后需要多中心、更大样本的研究来进一步论证此结论。

## 左主干狭窄并双支血管 CTO 开通治疗一病例体会

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**目的** 探索在冠脉介入治疗中如何应用新技术、新方法提高冠脉介入成功率,规避介入并发症。

**方法** 为了确保患者安全,应用了 IABP,为了通过闭塞病变,不断使导丝升级,直到通过病变,术中应用了互照技术、Step Crush 技术、反向 Crush 技术、POT 技术。

**结果** 患者双支血管 CTO 开通,左主干狭窄消失,术后患者症状好转,恢复好。

**结论** 单纯左主干狭窄患者 PCI 术难度高,风险大,本例患者在左主干狭窄的前提下,并双支血管 CTO,难度及风险又进一步提高,本例患者 PCI 时为了确保患者安全,应用了 IABP,为了通过闭塞病变,不断使导丝升级,直到通过病变,应用了互照技术、Step Crush 技术、反向 Crush 技术、POT 技术,如此可保证手术的顺利,减少 CTO 开通时间,提高了 PCI 成功率。

## Outcomes of Chronic Total Occlusions in Coronary Arteries According to Three Therapeutic Strategies: A Meta-analysis with 6985 Patients from 8 Published Observational Studies

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**Objective Aims:** Chronic total occlusion (CTO) has been reported to be approximately 30 % of patients with coronary heart disease. Currently, the management of CTO has remained a challenge. Three strategies of managements of CTO including coronary artery bypass grafting (CABG), percutaneous coronary intervention (PCI), and medical treatment (MT) have been utilized usually, but which strategies is the best choice remains controversial. This study aimed to perform a systematic review and meta-analysis of studies comparing coronary artery bypass grafting (CABG), percutaneous coronary intervention (PCI), and medical treatment (MT) in patients with chronic total occlusions (CTO). This study aimed to perform a systematic review and meta-analysis of studies comparing coronary artery bypass grafting (CABG), percutaneous coronary intervention (PCI), and medical treatment (MT) in patients with chronic total occlusions (CTO).

**Methods** We identified eligible observational studies published in CNKI, PubMed, EMBase, Google Scholar, Cochrane Library, Web of Science, and "Clinical trials" registration websites from 1999 through October 2018. Main outcome measures were all-cause mortality, cardiac death, major adverse cardiac events (MACE), and myocardial infarction (MI).

**Results** There were Eight observational studies including 6985 patients, of whom 2958 received MT, 3157 received PCI and 613 received CABG, in the present meta-analysis. Mean age of the study participants was 64.4 years. The mean follow-up time was 4.3 years. Our meta-analysis showed that, relative to MT, PCI was associated with decreased all-cause mortality (Odd ratio (OR): 0.46, 95% confidence interval (CI): 0.36 to 0.60;  $P < 0.001$ ), cardiac death (OR: 0.40; 95%CI: 0.31-0.52;  $P < 0.001$ ), MACE (OR: 0.55, 95%CI: 0.43-0.71;  $P < 0.001$ ), and MI (OR: 0.40, 95% CI: 0.26 to 0.62;  $P < 0.001$ ). Similarly, comparing to MT, CABG was associated with lower all-cause mortality (OR: 0.50, 95% CI: 0.36 to 0.69;  $P < 0.001$ ) and MACE (OR: 0.50, 95% CI: 0.26 to 0.96;  $P = 0.04$ ), but was not associated with MI (OR: 0.23, 95% CI: 0.03 to 1.54;  $P = 0.13$ ) and cardiac death (OR: 0.83, 95%CI: 0.51 to 1.35). Comparing to CABG, PCI was not associated with decreased risk for outcomes mentioned above.

**Conclusions** Our meta-analysis suggested that revascularization (PCI or CABG) was associated with better clinical outcome in patients with CTO. However, PCI is not better than CABG in decreasing the mortality, MI, cardiac death, and MACE in the coronary CTO patients.

## Long-term dual antiplatelet therapy increased adverse events after PCI

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**Objective** Dual antiplatelet therapy (DAPT) is the standard therapy for coronary artery disease (CAD) patients after percutaneous coronary intervention (PCI). However, the optimal DAPT duration after PCI remains controversial. Current guidelines recommend DAPT for at least 12 months for acute coronary syndrome (ACS) if there are no contraindications. The guidelines of the 2017 ESC recommend a DAPT duration longer than 12 months should be considered if patients can tolerate DAPT without bleeding events. Although guidelines recommend DAPT should be continued for at least 12 months in all ACS patients, however, the cardiovascular risk after ACS is still high at 12 months. The present study aimed to investigate the efficacy and safety of long-term DAPT (>18 months) after PCI.

**Methods** A total of 4447 CAD patients after PCI from CORF-CHD-PCI, a retrospective cohort study (Identifier: ChiCTR-16010153) were divided into 3 groups (No antiplatelet therapy group [NAPT group, n=1242], Monotherapy of aspirin or clopidogrel group [SAPT group, n=2188], and DAPT group, n=1017) according to antiplatelet therapy situation after administration of 18-month DAPT. All the patients were followed-up for at least 24 months and the longest follow-up time is 120 months. The primary endpoint was the mortality and the secondary endpoints were the major adverse cardiac events (MACEs) and bleeding events.

**Results** The all-cause mortality (ACM) and cardiac mortality (CM) were significantly increased in the NAPT group compared to that in the DAPT group (15.6% vs. 0.6%,  $P<0.001$ ; and 12.1% vs. 0.3%,  $P<0.001$ , respectively) or in the SAPT group (15.6% vs. 0.6%,  $P<0.001$ ; and 12.1% vs. 0.5%,  $P<0.001$ , respectively). We did not find significant difference in mortality (ACM or CM) between the SAPT group and the DAPT group ( $P=0.611$  or  $P=0.328$ ). The incidence of MACEs was significantly increased in the DAPT group compared to SAPT group (16.3% vs. 9.4%,  $P<0.001$ ). We also found DAPT increased the bleeding events compared to SAPT (4.6% vs. 2.4%,  $P<0.001$ ).

**Conclusions** The present study suggests that long-term dual antiplatelet therapy longer than 18 months significantly increased the incidence of MACEs and bleeding events after PCI.

## 局部麻醉下经皮植入 ACP 左心耳封堵器的可行性和安全性观察

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**目的** 观察局部麻醉下植入 ACP 左心耳封堵器的安全性及有效性。

**方法** 入选口服抗凝药治疗相对禁忌或出现不良反应的非瓣膜性心房颤动患者,于局部麻醉下经皮植入 ACP 左心耳封堵器。

**结果** 共入选 47 例患者,其中男性 29 例(61.7%),平均年龄  $70.5 \pm 9.0$  岁,CHA<sub>2</sub>DS<sub>2</sub>-VASc 评分  $4.9 \pm 1.3$  分,HAS-BLED 评分  $3.2 \pm 0.8$  分,34 例(72.3%)既往卒中或 TIA 史。所有患者均成功植入 ACP 左心耳封堵器,7 例(14.9%)少量残余分流  $\leq 3$  mm,手术时间及 X 线曝光时间为  $68.7 \pm 21.4$  min 及  $8.8 \pm 4.7$  min,未见手术相关严重并发症。术后 45 天复查经食道超声,未发现封堵器移位及封堵器表面血栓,4 例(7.0%)少量残余分流  $\leq 3$  mm。平均随访  $1.8 \pm 0.5$  年,未出现血栓栓塞事件。

**结论** 在局部麻醉下经皮植入 ACP 左心耳封堵器是安全、可行的。

## Drug-eluting stents improve clinical outcomes in ST-elevation myocardial infarction patients hospitalized more than 12 hours after symptom onset

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**Objective** It is unclear whether late reperfusion with DES implantation on patients with ST-elevation myocardial infarction STEMI is beneficial or not. This study was performed to confirm the hypothesis that reperfusion with drug-eluting stent (DES) implantation at > 12 hours after symptom onset can improve clinical outcomes in patients with ST-elevation myocardial infarction (STEMI).

**Methods** A retrospective single-center cohort study was performed in 493 patients aged 21 to 93 years who were admitted to a high-volume percutaneous coronary intervention (PCI) center. They presented at least 12 h after symptom onset (one third presented at > 48 h after onset) and STEMI was diagnosed. Clinical outcomes at 30 days were compared between patients with or without PCI and hazard ratios for survival were analyzed by using a Cox regression model.

**Results** The 30-day survival rate was significantly higher in patients undergoing PCI with DES implantation (n=322) than in non-PCI patients who were treated conservatively (n=171) (95.0% versus 73.1%,  $P < 0.001$ ). Cox regression analysis showed that PCI, younger age, lower Killip class, early onset time and lower serum creatinine level had a significant influence on 30-day survival, with PCI being the most important factor (HR=0.144,  $P < 0.001$ ). The 30-day incidence of major adverse cardiac events (MACE) was lower in the PCI group. In patients presenting > 48 h after symptom onset, only PCI and lower CK-MB contributed significantly to 30-day survival. Among the patients presenting from 12 h to 48 h after symptom onset, the incidence of heart failure and cardiac rupture during hospitalization was significantly lower ( $P < 0.01$ ) in the PCI group than in the non-PCI group, and the 30-day incidence of MACE was also lower in the PCI group, but not significantly ( $P = 0.072$ ). With patients presenting > 48 h after symptom onset, PCI and lower Killip class were still positively correlated with survival.

**Conclusions** PCI with DES dramatically improves the clinical outcome of STEMI patients presenting at > 12 hours after symptom onset.

## 应用 Amplatzer III 型血管塞介入治疗瓣周漏效果分析

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**目的** 评价应用 Amplatzer III 型血管塞治疗瓣周漏(PVL)的可行性及近中期效果。

**方法** 采用回顾性研究方法,分析2017年3月至2018年10月在我中心试行 AVP III 介入治疗 PVL 的连续 21 例患者治疗效果。对术前资料,术中及术后的近中期结果进行分析评价。

**结果** 患者平均年龄( $54.9 \pm 11.7$ )岁,男性占 57.1% (12 例)。其中二尖瓣置换术 8 例,主动脉瓣置换术 4 例,双瓣置换术 9 例(双机械瓣 7 例)。14 例为二尖瓣 PVL, 6 例为主动脉瓣 PVL, 1 例为双瓣 PVL。其中 18 处缺损(81.8%)成功完成介入封堵,二尖瓣及主动脉瓣 PVL 技术成功率分别为 80% 和 86.7%。瓣周反流量级由术前(大量 16 例, 94.1%)显著下降为中量及以下(中量 2 例, 11.7%) ( $P < 0.01$ ), 心功能 NYHA 分级从术前 III 级(58.8%)及以上改善为术后 II 级(29.4%)及以下( $P < 0.01$ )。术后无新发溶血或溶血加重。1 例术后发生入路股动脉假性动脉瘤,通过外科修复。无封堵器移位、影响心腔或瓣叶等并发症发生。

**结论** 应用 AVP III 治疗 PVL 技术可行,近中期效果肯定。

## 经远端桡动脉入径行冠状动脉介入治疗的可行性及安全性研究

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**目的** 探讨经远端桡动脉入径行冠状动脉介入治疗(PCI)的可行性及安全性。

**方法** 入选 2018 年 6 月-2019 年 1 月我院心血管内科收治的经桡动脉穿刺行 PCI 患者 75 例、经远端桡动脉穿刺行 PCI 患者 75 例。所有 150 例患者术前均采用彩色多普勒超声诊断仪测量双侧桡动脉、远端桡动脉内径大小。记录两组患者临床基本资料、穿刺成功率、手术成功率、穿刺时间、压迫止血时间、术后住院时间以及术后并发症的发生率。

**结果** 1. 通过彩色多普勒超声检测,所有患者右侧远端桡动脉内径( $2.344 \pm 0.405$ )mm 小于右侧桡动脉内径( $2.502 \pm 0.446$ )mm,左侧远端桡动脉内径( $2.353 \pm 0.398$ )mm 小于左

侧 桡动脉内径( $2.499\pm 0.443$ )mm, 均有统计学差异( $P<0.05$ ); 但 83.67% 患者其远端桡动脉内径大于或等于 6F 鞘管外径, 50.33% 患者其远端桡动脉内径大于或等于 7F 鞘管外径。2. 远端桡动脉组平均穿刺时间( $7.299\pm 1.117$ )min 高于桡动脉组( $5.252\pm 1.259$ )min, 差异具有统计学意义( $P<0.05$ ), 远端桡动脉组压迫止血时间( $6.219\pm 0.715$ )h 低于桡动脉组( $6.628\pm 0.650$ )h, 差异具有统计学意义( $P<0.05$ ), 两组穿刺成功率、手术成功率、术后住院时间比较, 差异未见统计学意义( $P>0.05$ )。3. 远端桡动脉组的术后并发症如术后手臂疼痛(1.33% vs 10.67%)、手臂肿胀(0% vs 9.33%)、桡动脉闭塞(0% vs 8.00%)发生率低于桡动脉组, 差异具有统计学意义( $P<0.05$ ), 两组桡动脉痉挛、局部血肿发生率比较, 差异未见统计学意义( $P>0.05$ )。

**结论** 远端桡动脉内径小于桡动脉内径, 但大部分人群选择经远端桡动脉入径行 PCI 使用 6F 鞘管是安全可行的, 部分人群使用 7F 鞘管也是安全可行的。与桡动脉入径行 PCI 相比, 经远端桡动脉入径行 PCI 同样安全有效, 且可降低术后并发症发生率, 术后临床护理也更为方便。

## 分叉型覆膜支架应用在高危、高领的腹主动脉瘤破裂 1 例

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**目的** 探讨分叉型覆膜支架在高危、高领患者的腹主动脉瘤和髂动脉治疗效果

**方法** 一个高领, 高危的 3 型主动脉夹层合并腹主动脉瘤破裂患者选择分叉型覆膜支架植入治疗, 男, 87 岁, 因突发胸腹部疼痛 2 天于 2019-02-18 入院。平时身体健康, 既往无糖尿病、冠心病 高血压等病史。入院 2 天前, 患者无明显诱因出现胸腹部疼痛, 症状持续, 撕裂样疼痛, 无憋气, 大汗淋漓, 无压榨感及濒死感, 无味血、黑便等不适。当时就诊本市黔南州中医院, 行胸腹部 CT: 慢性支气管炎并肺部感染, 双侧肺气肿。主动脉、冠状动脉硬化, 考虑主动脉弓后缘(胸 11、12 椎体平面)动脉瘤并血栓形成, 腹主动脉(腰 2、3 椎体平面)动脉瘤或夹层并血栓形成, 周围腹腔积液。

**结果** 在全身麻醉下行腹主动脉瘤支架植入术及腔内隔绝术。术中在双侧肾动脉开口下缘 1 cm 处将 26×94 mm 主体覆膜支架置入, 将 12×20 mm, 13×14 mm 髂支覆膜支架置入分别置入左右髂内动脉上, 手术成功。

**结论** 覆膜支架治疗腹主动脉瘤具有微创、便捷、恢复快和疗效确切的优点, 临床应用前景良好, 尤其是分叉型覆

膜支架技术, 特别适合一般状态差、高危、高领患者, 是当前治疗腹主动脉瘤的最佳方法之一。

## Baseline white blood cell count to apolipoprotein A1 ratio (WAR) as a novel predictor of long-term adverse outcomes in patients after percutaneous coronary intervention: a retrospective cohort study

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**Objective** Previous studies suggested that baseline white blood cell count and apolipoprotein A1 levels were associated with clinical outcomes in patients with coronary heart disease (CAD) after PCI. However, the ratio of baseline white blood cell count to apolipoprotein A1 level (WAR) and CAD after PCI have not been investigated. This study aimed to investigate the effect of baseline WAR on long-term outcomes after PCI in patients with CAD.

**Methods** All the patients were from the CORFCHD-PCI, a retrospective cohort study (Identifier: ChiCTR- INR-16010153), which included a total of 6050 CAD patients after PCI from January 2008 to December 2016. A total of 6050 patients with CAD who underwent PCI were included in the study. Of these, 373 patients were excluded because of no available baseline white blood cell counts and apolipoprotein A1 data, malignancies, and other diseases. Finally, 5678 patients were enrolled the present study and were divided into 3 groups according to WAR: lower group:  $WAR<5.25$  ( $n=1889$ ), median group:  $5.25\leq WAR\leq 7.15$  ( $n=1892$ ) and higher group:  $WAR\geq 7.15$  ( $n=1897$ ). The primary endpoint was the long-term mortality including all-cause mortality (ACM) and cardiac mortality (CM) after PCI. The average follow-up time is  $35.9\pm 22.6$  months.

**Results** A total of 293 patients developed ACM, including 85 (4.5%) in the lower group, 90 (4.8%) in the median group, and 118 (6.2%) in the higher group. Compared to the

patients in the lower group, the risk of ACM, CM, MACCEs, and MACEs were increased 0.626 (Hazard risk [HR] =1.626, 95% CI: 1.214- 2.179,  $P=0.001$ ), 0.455 (HR=1.455, 95% CI: 1.051- 2.014,  $P=0.024$ ), 0.212 (HR=1.212, 95% CI: 1.011-1.454,  $P=0.038$ ), and 0.238 times (HR=1.238, 95% CI: 1.025- 1.495,  $P=0.027$ ) after multivariate Cox regression analyses. Patients with a MAR  $\geq 4.635$  had a 92.3%, 81.3%, 58.1% and 58.2% increased risk of ACM, CM, MACCEs and MACEs compared to the patients with a MAR $<4.635$ . In addition, every increase of 1 in MAR was associated with a 3.4%, 3.2%, 2.0% and 2.2% increased risk of ACM, CM, MACCEs and MACEs at 10-year follow-up, respectively.

**Conclusions** The present study indicated that baseline MAR is an independent predictor of adverse long-term outcomes in CAD patients underwent PCI.

## 尼可地尔对急性心肌梗死PCI术后患者心肌损伤标志物水平的影响

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**目的** 探讨尼可地尔对急性心肌梗死PCI术后患者心肌损伤标志物水平的影响。**方法** 选择在我院行PCI术治疗的92例急性心肌梗死患者,随机分两组,各46例。对照组采用硝酸异山梨酯治疗,研究组采用尼可地尔治疗,对比两组术后CK-MB、hs-CRP水平。结果 术后,研究组CK-MB峰值与曲线下面积均低于对照组;术后1 d、2 d时,研究组hs-CRP水平均低于研究组,差异显著( $P<0.05$ )。结论 尼可地尔可有效减轻急性心肌梗死PCI术后患者的心肌损伤与炎症反应,对心肌具有一定保护作用。

**方法** 选择在我院行PCI术治疗的92例急性心肌梗死患者,随机分两组,各46例。对照组采用硝酸异山梨酯治疗,研究组采用尼可地尔治疗,对比两组术后CK-MB、hs-CRP水平。

**结果** 术后,研究组CK-MB峰值与曲线下面积均低于对照组;术后1 d、2 d时,研究组hs-CRP水平均低于研究组,差异显著( $P<0.05$ )。

**结论** 尼可地尔可有效减轻急性心肌梗死PCI术后患者的心肌损伤与炎症反应,对心肌具有一定保护作用。

## 性别差异对经桡动脉路径冠状动脉介入治疗的预后分析

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**目的** 本研究旨在比较接受经桡动脉路径冠状动脉介入治疗(transradial intervention, TRI)的患者中,不同性别的患者临床预后的差异。

**方法** 本研究为回顾性研究,共连续纳入了自2006年至2011年在阜外医院行TRI的患者20008例,其中男性15903例,女性4105例,对男性患者与女性患者的临床特点、造影与介入相关信息、临床预后进行比较。

**结果** 与男性患者相比,女性患者的平均年龄较高(62.6岁 vs. 56.6岁),患有糖尿病(29.9% vs. 22.7%)、高血压(61.5% vs. 55.4%)的比例也较大。女性患者开口病变(10.6% vs. 11.8%)、分叉病变(34.3% vs. 35.9%)及慢性完全阻塞病变(8.4% vs. 11.1%)的比例均低于男性(以上 $P<0.05$ )。女性患者的院内(1.6% vs. 1.4%,  $P=0.335$ )和1年(2.4% vs. 2.4%,  $P=0.955$ )主要不良心血管事件(包括心源性死亡、心肌梗死、靶血管血运重建)与男性患者无差异,但女性患者院内穿刺点并发症(9.1% vs. 6.4%,  $P<0.001$ )及大出血(8.5% vs. 5.8%,  $P<0.001$ )发生率更高,且1年随访心绞痛再发率(13.9% vs. 9.8%,  $P<0.001$ )也高于男性。

**结论** 不同性别患者接受TRI的院内和1年临床结局无明显差异,但女性患者的穿刺点并发症和出血风险较高,应从这两点着手,改善和提升女性经桡动脉介入质量。

## 冠脉内注射尼可地尔对急性非ST段抬高型心肌梗死(NSTEMI)经皮冠状动脉介入治疗术(PCI)术中慢血流无复流的改善作用

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**目的** 观察冠脉内注射尼可地尔对急性非ST段抬高型心肌梗死(NSTEMI)患者PCI术中慢血流/无复流现象的防治作用。

**方法** 选取2016年12月~2018年12月我院接受PCI术治疗的NSTEMI患者80例作为研究对象,结合术后是否出现

慢血流或无血流(NRP)将其分为常规组40例与试验组40例,比较两组药物作用效果。

**结果** 试验组靶血管校正的TIMI帧数(CTFC)显著低于常规组;试验组ST段完全回复率、术后1周左心室射血分数(LVEF)均明显高于常规组;术后随访3个月中,试验组主要心脏不良事件(MACE)发生率为4.0%,较低于常规组(10%)。

**结论** 冠脉内注射尼可地尔有助于改善NSTEMI患者PCI术中慢血流/无复流后的冠状动脉血流,改善心功能,且具有良好的安全性。

## Comparison of intraosseous access and central venous catheterization in Chinese adult emergency patients: A prospective, multicenter, randomized study

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**Objective** Establishing traditional peripheral intravenous (IV) access in adult emergency patients can be difficult. We compared the success rates at the first attempt, procedure time, satisfaction of operators on the instruments used, pain score and complications between intraosseous (IO) access and central venous catheterization (CVC) in critically ill Chinese patients, in which twice attempts to establish peripheral venous access had failed or delayed treatment.

**Methods** In this prospective clustered randomized controlled trial, eight hospital centers were randomly divided into the IO group versus CVC group. Patients who needed emergency vascular access according to the inclusion criteria were included. From April 1, 2017 to December 31, 2018, each center consecutively included 12 patients. We established IO access or CVC according to the measures allocated by the patient's center. We recorded data mentioned above.

**Results** 96 adult patients from eight hospital centers were enrolled into the study, 48 subjects in each intervention group. There was no significant statistical difference between the two study groups regarding gender, age or BMI. The success rate on first attempt for IO (91.7%) versus the CVC (50.0%) was statistically significant ( $P<0.001$ ). The lower insertion time

with the IO versus the CVC was statistically significant (77.7 s versus 1017.7 s;  $P<0.001$ ). There was no significant statistical difference between the two groups regarding satisfaction of operators at the instruments used. During this study, 48 patients were conscious. There were significant statistical differences between both the two groups regarding pain score (IO insertion  $5.9\pm 3.7$  versus CVC insertion  $2.9\pm 1.4$ ,  $P=0.018$ ; IO infusion  $2.9\pm 3.6$  versus CVC insertion  $0.3\pm 0.9$   $P=0.03$ ). Complications were not observed during the study period in the two groups.

**Conclusions** Intraosseous access is a safe, rapid, and effective technique for gaining vascular access in critically ill adults with inaccessible peripheral veins in the emergency department. Intraosseous access can be used as an alternative bridging method to quickly establish vascular access in emergency situations.

## 尼可地尔对冠状动脉介入治疗术后患者肾功能的保护作用

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**目的** 探讨尼可地尔联合水化对经皮冠状动脉介入治疗(PCI)术后肾功能的影响。

**方法** 前瞻性连续入选2016年1月至2017年6月行PCI的冠心病患者300例,随机将其分为对照组(150例)和尼可地尔组(150例),尼可地尔组于PCI术前1d及术后3d,每日给予患者口服尼可地尔10mg,每天3次;对照组仅给予常规治疗;2组患者均于术前12~24h给予静脉点滴0.9%氯化钠溶液水化。观察两组患者PCI术前及术后48h、72h的血清肌酐(Scr)、血尿素氮(BUN)、肾小球滤过率估算值(eGFR)、胱抑素C(Cys-C)指标的变化,并记录两组患者CIN的发生情况。

**结果** 两组患者术前血Scr、BUN、eGFR、Cys-C水平比较,差异无统计学意义( $P>0.05$ )。两组术后48h、72h血Scr、BUN、Cys-C水平均较术前升高( $P<0.05$ ),尼可地尔组Scr、Cys-C水平低于对照组( $P<0.05$ ),尼可地尔组eGFR水平高于对照组( $P<0.05$ )。尼可地尔组CIN发生率为2.7%,对照组CIN发生率为8.7%,两组比较差异有统计学意义( $P<0.05$ ,  $\chi^2=-3.31$ )。多元Logistic回归分析果显示,尼可地尔是对比剂肾病的独立保护因素( $OR=0.180$ ,  $95\%CI 0.041\sim 0.788$ ,  $P=0.023$ )。

**结论** 尼可地尔对保护冠心病患者介入治疗后肾功能可能具有一定作用。

## The preventive effect of nicorandil on contrast-induced nephropathy in patients with coronary heart disease undergoing percutaneous coronary intervention

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**Objective** The aim of this study is to explore the preventive effect of nicorandil on contrast-induced nephropathy (CIN) in patients with coronary heart disease undergoing percutaneous coronary intervention (PCI).

**Methods** a total of 300 patients were randomly divided into two groups(nicorandil group or control group)

**Results** The incidence of CIN was 3.3% (5/150) in the nicorandil group and10.7% (16/150) in the control group. The nicorandil group had lower Cys-C and higher Ccr at 48 and 72 h after PCI compared with the control group. At 48h and 72 h following the operation, Cys-C was lower in the nicorandil group compared with the control group but Ccr was higher. Logistic regression analysis showed that nicorandil was an independent protective factor for CIN (OR=0.180, 95% CI 0.041 ~ 0.788, P=0.023).

**Conclusions** Prophylactic administration of nicorandil may prevent CIN in patients with coronary heart disease undergoing percutaneous coronary intervention.

## PCI术中冠脉穿孔致急性心包填塞的临床分析及抢救体会

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**目的** 分析经皮冠状动脉介入治疗(PCI)术中发生冠脉穿孔致急性心包填塞的临床特点,并总结其处理方法。

**方法** 回顾性分析2016年9月至2018年4月在我院行PCI手术治疗且术中发生冠脉穿孔致急性心包填塞6例患者的临床资料,总结分析术中发生冠脉穿孔致急性心

包填塞的原因,冠脉病变特点,心包填塞临床表现、抢救措施及结果等。

**结果** 6例患者均在术中出现呼吸困难、血压下降、心率加快等体征,术中造影见冠脉穿孔,急诊床旁B超显示心包填塞。确诊后立刻给予球囊低压封堵或可吸收明胶海绵封堵冠脉、心包穿刺置入猪尾导管引流等抢救措施,6例患者均抢救成功,痊愈出院。

**结论** 冠脉穿孔致急性心包填塞是PCI术中较为少见但病情严重的并发症,临床需密切关注患者生命体征变化,一旦确诊立即迅速做出反应,有效进行封闭穿孔和心包穿刺,最大限度挽救患者的生命安全。

## 儿童先天性心脏病1026例经导管介入治疗中远期疗效的单中心回顾性研究

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广西医科大学第一附属医院

**目的** 通过回顾性分析我科13年间住院儿童先天性心脏病(先心病,CHD)介入治疗的临床资料及随访数据,总结归纳其临床特点及预后,以提高对先心病介入治疗的认知。

**方法** 回顾性分析从2005年1月至2018年12月期间我科经导管介入治疗先心病共1026名病人的临床资料,其中手术主要包括动脉导管未闭(PDA)封堵术,室间隔缺损(VSD)封堵术,房间隔缺损(ASD)封堵术,肺动脉瓣狭窄(PS)扩张术,主动脉瓣狭窄(AS)扩张术及其他联合手术。收集病人的一般信息包括性别,年龄,体重,以及临床相关资料心电图,胸片,超声心动图,心导管检查,心血管造影,封堵器大小,球囊大小,手术时间,透视时间,并发症的发生情况,采用频率,百分比及平均值来表示。

**结果** 共收集病例1026例,其中男性485人(47%),女性541人(53%),平均年龄 $4.93 \pm 3.29$ 岁(42天~17岁),平均体重 $15 \pm 8.37$  kg(3.9~54 kg)。其中,PDA 362例(35.3%),VSD 324例(31.6%),ASD 238例(23.2%),PS 78例(7.6%),AS 3例(0.3%),联合畸形21例(2.0%)。总体成功率为97.4%(n=999),失败率为2.6%(n=27)。平均手术时间为 $70 \pm 29.7$ 分钟(20~210分钟),透视时间为 $12.4 \pm 11.4$ 分钟(2.1~83分钟)。在1026例成功手术中,共有50例患者发生早期不良反应,其中3例(0.5%)发生严重的并发

症:封堵器脱落,感染性心内膜炎和三度房室传导阻滞(AVB),余下47例患者轻微不良反应(7.3%)。没有发生因手术导致死亡的病例。中位随访14个月(1~120个月)期间共发生46次轻微不良并发症(7.5%),无死亡及严重并发症病例。

**结论** 先天性心脏病介入治疗创伤小,恢复快,并发症少,早期及中长期疗效良好。严重的不良反应发生率很低,早期和晚期不良反应发生率低。表明经导管先心病介入治疗具有良好的有效性和安全性。但是,本研究病例数特别是复合畸形病例数少,随访时间较短,仍需更大样本量和更长期的随访。

## 经导管室间隔缺损介入封堵术后左束支传导阻滞1例随访

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**目的** 回顾分析我院经导管室间隔缺损介入封堵术后出现左束支传导阻滞治疗及随访。

**方法** 回顾分析我院经导管室间隔缺损介入封堵术后出现左束支传导阻滞1例患儿处理及预后。

**结果** 病例:吴××,男,4岁5月,因发现心脏杂音4年余于2018年08月19日入院。查体:心率106次/分,律齐,心音有力,L3-4可闻3/6级收缩期喷射样杂音。辅助检查示:心脏彩超:室间隔缺损(膜周型)心电图未见异常。治疗经过:2018-08-20行左右心导管+室间隔缺损封堵术。心导管检查结果:PA 24/10(16)mmHg, AO 101/62(75)mmHg Pp/Ps=0.24, Qp/Qs=1.85。术中造影测量VSD直径约4.5mm。术中植入6mm对称封堵器(先健)。随访:术后第1天心电图:完全性右束支传导阻滞,予白蛋白(10g),甲强龙(10mg/kg\*3天)及营养心肌等治疗,术后第2-4天心电图:完全性右束支传导阻滞。术后第6天因呕吐再次入院,8-26心电图示:几乎完全性房室传导阻滞室性逸搏偶见心室夺获伴完全性右束支传导阻滞,予白蛋白10g\*3d,异丙肾上腺素静脉滴注(26/8-30/8),甲强龙10mg/kg\*3d、5mg/kg\*2d、2mg/kg\*2d,后改口服强的松30mg\*2d、20mg\*1d,营养心肌、抗凝等对症。8-28心电图示:不完全性左束支传导阻滞一度房室传导阻滞频发交界性早搏(部分未下传心室)QT间期延长;9-3心电图示:不完全性右束支传导阻滞不完全性左束支传导阻滞。2018-9-5转外科行“室间隔缺损修补+封堵器取出+起搏导线安置术”,

术后第2天心电图:不完全性右束支传导阻滞ST段改变。9-10动态心电图提示:频发室性早搏不完全性右束支传导阻滞。术后随访3月恢复良好。

**结论** VSD封堵术后出现LBBB,经过激素治疗1周左右即使恢复正常,应密切随诊,若不恢复,最好及时取出封堵器。

## Growth Differentiation Factor-15 Predicts Major Adverse Cardiac Events in Patients Undergoing Percutaneous Coronary Intervention: A Systematic Review and Meta-analysis

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3. Guangdong Provincial Cardiovascular Institute

**Objective** Growth differentiation factor-15 (GDF-15) might be a predictive cytokine for the prognosis of coronary heart disease (CHD). The aim of this study was to evaluate Major Adverse Cardiac Events (MACEs) after Percutaneous Coronary Intervention (PCI) in patients with high GDF-15.

**Methods** Publication searches of the Ovid MEDLINE, EMBASE and Cochrane Central databases were performed without any time or ethnicity restrictions. The inclusion and exclusion criteria were clearly addressed. Two authors independently screened studies for inclusion, consulting with a third author where necessary to resolve discrepancies. Data analysis was performed by computing the hazard ratios (HR) with 95% confidence interval (CI).

**Results** We identified five eligible studies including a total of 8743 CHD patients undergoing PCI following the inclusion criteria. Random effects models were used for the analysis and we found that high GDF-15 was associated with a higher risk of the MACEs in patients undergoing PCI (hazard ratios (HR), 1.69; 95% confidence interval (CI), 1.26-2.28).

**Conclusions** High plasma GDF-15 levels are associated with an increased risk of the MACEs in patients undergoing PCI.

## Clinical, Sonographic Characteristics and Long-term Prognosis of Valvular Heart Disease in Elderly Patients

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**Objective** Valvular heart disease (VHD) is expected to become more prevailing as the population ages and disproportionately affects older adults. However, direct comparison of clinical characteristics, sonographic diagnosis, and outcomes in valvular heart disease patients aged over 65 years is scarce. The objective of this study was to evaluate the differences in clinical characteristics and prognosis in these two age-groups of geriatric patients with valvular heart disease, and determine how advanced age and comorbidities affect prognosis, including long-term major adverse cardiac events (MACEs).

**Methods** We retrospectively enrolled consecutive individuals aged  $\geq 65$  years from Guangdong Provincial People's Hospital and screened for valvular heart disease using transthoracic echocardiography (TTE) or transesophageal echocardiography (TEE). Finally, 260 (48.9%) patients were in the 65–74 years group, and 272 (51.1%) were in the  $\geq 75$ -year group. Factors that affected long-term survival was explored. A multivariable Cox hazards regression was performed to identify the predictors of major adverse cardiac events (MACEs) in each group.

**Results** In our population, the older group were more likely to have chronic obstructive pulmonary disease (COPD), degenerative VHD, but with less rheumatic valvular heart disease, aortic stenosis (AS) and mitral stenosis (MS). Compared with those aged 65–74 years, the older group had a higher incidence of all-cause death (10.0% vs. 16.5%,  $P=0.027$ ), ischemic stroke (13.5% vs. 20.2%,  $P=0.038$ ) and MACEs

(37.3% vs. 48.2%,  $P=0.011$ ) at long-term follow-up. In multivariable Cox regression analysis, mitral regurgitation (MR), a history of chronic obstructive pulmonary disease, chronic kidney disease, diabetes, hypertension, atrial fibrillation and New York Heart Association (NYHA) functional class were identified as independent predictors of major adverse cardiac events in the older group.

**Conclusions** In geriatric patients with valvular heart disease, there were apparent differences between the 65–74 years old group and the  $\geq 75$ -year old group. Patients aged  $\geq 75$  years had a worse prognosis and reduced survival than the 65–74 years old group. Comorbidities in the elderly are frequent and profoundly affect long-term outcomes.

## Association of age at menopause and type 2 diabetes: A systematic review and dose-response meta-analysis of cohort studies

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**Objective** Type 2 diabetes mellitus (T2DM) is a major risk factor for cardiovascular diseases, with high rates of morbidity and mortality throughout the world. Early age at menopause has been associated with increased incidence of type 2 diabetes mellitus (T2DM), but the quantitative association between age at menopause and T2DM was unclear. A quantitative compre-

hensive assessment of the dose-response association between age at menopause and T2DM is needed. We performed a meta-analysis to assess the dose-response association between age at menopause and T2DM.

**Methods** PubMed, Embase and Web of Science were searched up to January 5, 2019 for cohort studies that evaluated the association of age at menopause and risk of T2DM. Relative risks (RRs) and 95% confidence intervals (95% CIs) were pooled by using the random-effects models. Restricted cubic spline model was used to evaluate the linear or nonlinear relation. The heterogeneity among studies was evaluated by Cochran Q and  $I^2$  statistic test. Sensitivity analysis was performed to evaluate the stability and reliability of this meta-analysis by excluding one study at a time. Begg's test was used to test for publication bias.

**Results** We identified 6 studies for the meta-analysis (267284 women and 19654 cases of T2DM). The pooled RR for risk of T2DM in the latest age at menopause group as compared with the earliest age group was 0.64 (95% CI 0.44-0.94) with no significant publication bias by Begg's test ( $P=0.851$ ). The risk of T2DM was reduced by 10% (RR=0.90, 95% CI, 0.84-0.98) with each 5-year increment in age at menopause. We found an inverse linear association between age at menopause and T2DM with restricted cubic splines analysis.

**Conclusions** Our results from this meta-analysis provided quantitative evidence suggested a negative linear association between age at menopause and risk of T2DM with a restricted cubic spline model. Our results suggest that later age at menopause was associated with lower risk of T2DM.

## 分侧肾静脉取血在肾素瘤诊断中的作用

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**目的** 通过分享一例12岁儿童肾素瘤病例的诊治经过,引证分侧肾静脉取血在肾素瘤诊断中的作用。

**方法** 12岁女性患者,因“发现血压高3天”入院。入院血压152/93 mmHg(右上肢),四肢血压对称,踝臂指数正常,其余查体无明显异常。之后相继完善了血、尿、粪常规、血及尿电解质、游离甲状腺素、皮质醇、甲氧基肾上腺素、

甲氧基去甲肾上腺素、醛固酮、肾素活性等生化检验,以及24小时动态血压,心、腹、颈动脉及肾动脉超声、胸腹部CTA、肾上腺CT等辅助检查,结果提示血钾低:3.01 mmol/L,醛固酮(卧位)高:69.7 ng/dl,肾素活性(卧位)高:>17.48 ng/ml/h,尿微量白蛋白/肌酐比值高90.56 mg/g,24小时动态血压提示全天空平均收缩压139 mmHg,舒张压90 mmHg;白天平均收缩压140 mmHg,舒张压92 mmHg;夜间平均收缩压137 mmHg,舒张压84 mmHg,余生化及辅助检验结果均未见明显异常。结合患者年龄小以及“三高一低”症状高度怀疑有继发性因素,进一步行双侧肾脏薄层增强CT扫描,结果示:右肾上极实质等密度小结节,无明显强化,考虑囊肿性病变,结合腹部MRI检查结果:右肾小囊肿,直径5.8 mm。虽然CT及MRI均回报右肾上极小结节为小囊肿,但结合患者病史及相关辅助检查,考虑右肾小囊肿为肾素瘤可能性极大,于是在征得患者及家属同意后在局麻下对患者行分侧肾静脉取血,以评估右侧肾脏肾素分泌情况,手术取血顺利成功,结果示右侧肾脏肾素活性远超过检测上限,其水平明显高于左侧肾脏。根据分侧肾静脉取血结果基本可确诊为肾球旁细胞瘤。后患者转入泌尿外科在全麻下行腹腔镜右侧肾脏肿物切除术。术中可见右肾上极肾脏表面一灰白色似珍珠样肿物,手术成功剔除肿物。

**结果** 腹腔镜术后病理诊断提示该肿物为肾球旁细胞瘤。瘤体切除当天血压恢复到正常水平(115/68 mmHg)。术后第6天:肾素(卧位)0.03 ng/ml/h,醛固酮(卧位)12.45 ng/dl,血钾4.28 mmol/L,三项指标均恢复到正常水平。

**结论** 肾素瘤容易漏诊,在临床工作中遇到高度怀疑肾素瘤的患者时,应仔细阅读影像图像,避免漏诊。另外,当影像学检测手段无法确定肿物性质时,分侧肾静脉取血可作为一种有价值的定性定位诊断方式。

## 社会支持对冠脉介入患者术后焦虑情绪的影响

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**目的** 了解冠脉介入患者术后社会支持和焦虑情况,探讨其相关性,并分析其焦虑发生的影响因素。

**方法** 采用社会支持评定量表(SSRS)和焦虑自评量表(SAS)对我院心内科住院的235例冠脉介入患者术后进行问卷调查。



**结果** 235例冠脉介入患者术后焦虑发生率为24.68%,其中无焦虑177例(75.32%),轻度焦虑28例(11.91%),中度焦虑18例(7.66%),重度焦虑12例(5.11%);焦虑组与非焦虑组患者在性别、年龄、婚姻状况、经济状况、是否为急性心肌梗死方面比较差异均有统计学意义( $\chi^2=7.751, 5.524, 23.395, 16.220, 10.508, P=0.005, 0.019, 0.000, 0.000, 0.001$ );社会支持总分( $38.68 \pm 7.96$ )分;其中客观支持得分( $8.83 \pm 3.57$ )分,主观支持得分( $21.98 \pm 5.56$ )分,对支持的利用度得分( $7.19 \pm 1.78$ )分;社会支持总分,客观支持、主观支持及支持利用度均为焦虑组低于非焦虑组( $t=-4.317, -2.094, -4.935, -2.508, P=0.000, 0.037, 0.000, 0.013$ );Logistic回归分析显示冠脉介入患者术后焦虑的发生与性别、经济状况、有无急性心肌梗死及社会支持等因素相关。

**结论** 冠脉介入患者术后焦虑发生与社会支持存在相关性,且受性别、经济状况、有无急性心肌梗死及社会支持的影响,护理人员应加强其术后心理干预并提高其社会支持水平,减少其术后焦虑的发生。

## Combination of 5-aminolevulinic acid and iron prevents skin fibrosis in murine sclerodermatous graft-versus-host disease

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**Objective** Scleroderma or systemic sclerosis (SSc) is a clinically heterogeneous rheumatological autoimmune disease affecting the skin, internal organs and blood vessels. There is at present no effective treatment for this condition.

Our study investigated the effects of 5-aminolevulinic acid (5-ALA), which is a precursor of haem synthesis, on graft-versus-host disease (GVHD)-induced SSc murine model. Lymphocytes were intravenously injected from donor mice (B10.D2) into recipient BALB/c mice (recombination-activating gene 2 (Rag-2) -null mice) deficient in mature T and B cells to induce sclerodermatous GvHD (scl-GvHD).

To investigate the effect of 5-ALA on scl-GvHD, combination of 5-ALA and sodium ferrous citrate (SFC) was orally administered to the recipient mice for 9 weeks. 5-ALA/SFC treatment significantly reduced progressive inflammation and fibrosis in the skin and ears. Furthermore, 5-ALA/SFC suppressed mRNA expression of transforming growth factor- $\beta$ , type I collagen and inflammatory cytokines.

These results indicate that the 5ALA/SFC combination treatment has a protective effect against tissue fibrosis and inflammation in a murine scl-GvHD-induced skin and ear inflammation and fibrosis. Furthermore, the efficacy of 5-ALA/SFC suggests important implications of HO-1 protective activity in autoimmune diseases, and therefore, 5-ALA/SFC may have promising clinical applications. These findings suggested that the 5-ALA/SFC treatment may be the potential strategies for SSc.

**Methods** Scleroderma or systemic sclerosis (SSc) is a clinically heterogeneous rheumatological autoimmune disease affecting the skin, internal organs and blood vessels. There is at present no effective treatment for this condition.

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## Exercise training attenuates hypertension and cardiac hypertrophy via time-related regulation on ACE and ACE2 axes

Wenwen Peng, Lin Hong, Guoying Liu, Yanxia Pan  
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**Objective** Appropriate exercise training (ExT) has been shown to lower high blood pressure. However, prehypertension ExT has rarely been concerned. This study tested whether prehypertension ExT protects against hypertension and cardiac remodeling in spontaneously hypertensive rats (SHR), and explored the underlying mechanisms by examining cardiac angiotensin converting enzyme (ACE) and ACE2 axes.

**Methods** Male 5-wk old SHR and normotensive WKY rats were randomly divided into sedentary (S) and exercise training (E) groups, consisting of 4 groups as: SHR-S, SHR-E, WKY-S and WKY-E, n=10 for each group. The trained rats ran on a treadmill with low-to-moderate intensity for either 8 or 16 weeks. (60 min/d, 18-20 m/s, 5 d/wk). Systolic Blood pressure (BP) was measured weekly by the tail-cuff method. Cardiac function and remodeling were assessed, and ACE and ACE2 axes were determined after the final ExT.

**Results** The results showed that there were no significant difference in systolic blood pressure between 5-wk SHR and age-matched WKY before exercise. Prehypertension ExT slowed

down the onset and progression of hypertension in SHR. In parallel, the hypertrophy in hypertensive heart was attenuated, myocardial fibrosis was reduced, and the impairment of left ventricular diastolic function was relieved. In SHR myocardium, the elements of ACE-AngII-AT1 axis were homogeneously and progressively increased, whereas those of ACE2-Ang(1-7)-MAS axis were heterogeneously decreased. Different time-related responses were observed for the key effectors, Ang II and Ang(1-7). Myocardial Ang II was increased progressively in SHR, and was reduced consistently by ExT. In contrast, Ang(1-7) was decreased only after 16-week sedentariness, which was abolished by ExT. Besides, 16-week ExT increased Ang(1-7) in normotensive control rats.

**Conclusions** In summary, prehypertension ExT attenuates hypertension and cardiac remodeling. Down-regulation of Ang II seems to serve as a protective mechanism throughout ExT, while up-regulation of Ang(1-7) is involved after a relatively long period of ExT. This work was supported by the National Natural Science Foundation of China (No. 81372111).

## Evaluation of the effect of “Psycho-cardiology” teaching mode in clinical teaching of medical students

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**Objective** Psycho-cardiology, also known as psychocardiology or behavioral cardiology, is the science of studying and dealing with emotional, social, and behavioral problems associated with heart disease. The “Psycho-cardiology” model is a discipline that has evolved and established with the deep transition from the traditional “biomedical” model to the “social-psychological-biological” integrated medical model. Our study is to evaluate the effect of “psycho-cardiology” teaching model in medical students’ clinical teaching.

**Methods** Two undergraduate classes in the 2013 5-year system were selected as experimental subjects, and the two classes were randomly divided into a control group and an experimental group. The control group conducted regular teaching and clinical practice. The experimental group increased the

clinical theory and practical teaching content of psycho-cardiology medicine on the basis of the control group. After the cardiovascular practice, the two groups of students were evaluated for the effect of psycho-cardiology medical teaching, including the psycho-cardiology medical theory examination, clinical practice examination, and the teacher’s teaching of clinical teaching scores.

**Results** The control group included 45 students and the experimental group included 46 students. There was no significant difference in gender and age between the two groups. At the end of the observation, the results of the psycho-cardiology medical theory examination showed that the experimental scores of students in the experimental group were significantly higher than those in the control group ( $91.39 \pm 5.40$  vs.  $73.82 \pm 7.71$ ,  $P < 0.01$ ). The practical examination results showed that the experimental group students were significantly higher than the control group in all aspects ( $P < 0.01$ ). Comparing the scores of clinical teaching scores between the two groups of students showed that the experimental group students were significantly higher than the control group in all aspects ( $P < 0.01$ ).

**Conclusions** The results of this study show that the implementation of the “Psycho-cardiology” training model can effectively compensate for the lack of students’ dual-heart medical knowledge system and improve students’ “Psycho-cardiology” knowledge and clinical application practice. The implementation of the “Psycho-cardiology” model can help the clinical teaching teacher to better explain the diagnosis and treatment plan of many patients with double heart disease, improve some problems in teaching, and improve the teaching ability of teachers. Medical students can more serve patients with double heart disease after understanding and understanding of double heart medicine, and can also extend the concept of double heart medicine to the diagnosis and treatment of other diseases. The “Psycho-cardiology” teaching mode is an indispensable part of the clinical teaching of cardiovascular disease, which can effectively promote teaching and improve the clinical diagnosis and treatment thinking of medical students.

## 自我管理教育在心衰患者心脏康复中的应用

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**目的** 探讨分析自我管理教育在慢性心衰患者康复过程中的影响。

**方法** 将160例慢性心衰患者随机分为干预组和对照组,每组均为80例,将对照组给予常规的护理健康宣教,干预组在给予常规的健康宣教基础上进行有针对性的自我管理教育,其主要方面包括:纠正其不良的生活习惯,定期评价遵医行为,能引起心衰加重的危险因素的控制,并及时给予指导,患者出院后进行定期电话随访以及门诊复查等形式,运用健康相关的SF-36量表评价生活质量,比较两组患者再住院率以及健康行为情况的差异。

**结果** 通过自我管理教育大大提高了患者疾病相关知识的知、信、行水平,增强了患者自我保健意识,促进了其主动参与学习自我管理教育的方法,在慢性心衰患者心脏康复中起到了重要作用,与对照组比较,两组差异有统计学意义( $P<0.05$ )。

**结论** 自我管理教育有效的提高了患者的健康知识水平和对疾病的自我管理能力和预后,降低了再住院率,临床效果明显,对心衰患者康复具有积极意义。

## 广州地区健康儿童心肺运动试验生理指标先期研究

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**目的** 研究广州地区儿童及青少年心肺运动试验(CPET)的生理指标及其变化规律,以期建立我国儿童CPET的正常参考值提供依据。

**方法** 采用运动平板按照线性递增模式的Bruce方案对75例健康儿童进行CPET,按年龄分为3组:6-8岁(30例)、>8-12岁(30例)和>12-16岁(15例)。检测指标包括 $VO_{2peak}/Kg$ 、峰值摄氧量占预计值比例 $VO_{2peak}(\% \text{ of pred})$ 、达到无氧阈时的摄氧量( $VO_2/Kg @AT$ )、最大氧脉搏(Peak  $O_2/HR$ )、无氧阈时二氧化碳当量( $VE/VCO_2@AT$ )、二氧化碳当量斜率( $VE/VCO_2 \text{ slope}$ )、峰值呼吸交换率( $RER_{peak}$ )、摄氧效率斜率(OUES)、 $VO_2$  percentage AET、峰值心率( $HR_{peak}$ )、1分钟恢复心率比值(HRR1 percentage)。

**结果** 6-8岁、9-12岁和13-16岁男童 $VO_{2peak}/Kg$ 分别为( $45.8 \pm 5.7$ ) ml/kg/min、( $45.2 \pm 8.7$ ) ml/kg/min、( $48.4 \pm 4.5$ ) ml/kg/min,  $VO_2/Kg @AT$ 分别为( $30.1 \pm 5.1$ ) ml/kg/min、( $29.3 \pm 5.7$ ) ml/kg/min、( $30.3 \pm 6.3$ ) ml/kg/min; 三组女童 $VO_{2peak}/Kg$ 分别为( $44.7 \pm 3.7$ ) ml/kg/min、( $44.1 \pm 5.5$ ) ml/kg/

min、( $41.3 \pm 5.3$ ) ml/kg/min;  $VO_2/Kg @AT$ 分别为( $29.6 \pm 2.2$ ) ml/kg/min、( $28.2 \pm 6.8$ ) ml/kg/min、( $21.5 \pm 2.4$ ) ml/kg/min。 $VO_{2peak}/Kg$ 在不同年龄组间差异无统计学意义,但存在性别差异,男童高于女童( $P<0.05$ ); $VO_2/Kg @AT$ 存在性别差异( $P<0.05$ ),女童组发现12-16岁年长儿较之婴幼儿低,差异有统计学意义( $P<0.05$ )。而 $VO_{2peak}(\% \text{ of pred})$ 在不同年龄组和性别间都不存在差。HRR1 percentage在年幼儿童大于年长儿童( $P<0.05$ )。 $VE/VCO_2 \text{ slope}$ 随年龄增大而降低,差异有统计学意义( $P=0.001$ ),性别差异不明显。线性回归分析提示年龄对 $VE/VCO_2 \text{ slope}$ 、心率恢复、VE、OUES有影响。

**结论**  $VO_{2peak}/Kg$ 和 $VO_{2peak}(\% \text{ of pred})$ 不存在年龄差异,提示可这两项指标作为评估运动能力的指标。

## 6MWT与CPET在主动脉外科术后患者运动处方制定中的比较分析

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**目的** 探究6MWT是否能替代CPET制定主动脉外科术后患者早期的运动处方。

**方法** 随机选择15例行主动脉外科手术的患者,在出院前分别行6MWT与CPET,两个试验的先后顺序随机。主要收集6MWT中患者步行的总距离,每分钟的心率、血压、血氧、Borg评分,以及CPET中的 $VO_{2Peak}$ 、METs、心率、血压、血氧、Borg评分;次要收集CPET中的无氧阈、氧脉搏、二氧化碳通气当量斜率。将两种试验的相关指标进行分析比较。

**结果** 患者CPET的METs明显高于6MWT中的Mets( $P<0.05$ );CPET中的峰值心率、峰值血压、峰值血氧明显高于6MWT( $P<0.05$ );6MWT与CPET在主动脉外科术后患者早期制定的运动处方差异有统计学意义。

**结论** 6MWT低估了患者的早期运动能力,CPET仍是制定主动脉外科术后患者早期运动处方的金标准。

## 161例感染性心内膜炎患者临床特征及预后因素分析

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**目的** 探讨感染性心内膜炎(infectious endocarditis, IE)患者的临床特征及相关危险因素,为该疾病的临床治疗及预后提供科学依据。

**方法** 选择2016年1月~2018年10月我院收治的161例IE患者的临床资料,回顾性总结分析患者的临床特征,采用单因素方差分析和多因素logistic回归分析,运用SPSS 20.0软件分析影响IE患者的预后因素。

**结果** 161例IE患者中,有基础心脏疾病者15346例,占95.0%,病变位置在左心者129例(80.1%),在右心者18例(11.2%),左右心均累及8例(5.0%)。临床表现以发热、贫血、心功能不全为主,分别占57.1%、53.4%、52.8%。161例IE患者中,共计142例(88.2%)检出赘生物,105例(65.2%)患者行心脏外科手术治疗。单因素方差分析结果显示,血红蛋白<90 g/L、栓塞、脾大、心功能IV级、外科手术干预是影响IE患者预后的因素( $P < 0.05$ )。多因素logistic回归分析结果表明,血红蛋白<90 g/L、急性生理与慢性健康评分(APACHE-II)是IE患者的独立危险因素( $P < 0.05$ ),外科手术干预治疗是IE患者的独立保护因素。

**结论** 先天性心脏病是引起IE的主要心脏基础疾病,贫血、心功能不全、外科手术干预是影响IE预后的独立因素,外科手术干预可改善IE患者的预后。

## 12例心肌淀粉样变性临床特点及预后分析

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**目的** 探讨心肌淀粉样变性患者的临床特征及预后。

**方法** 回顾性分析2011年~2018年我院收治的12例经病理活检确诊为心肌淀粉样变性患者的临床资料,分析患者的临床表现、心电图、超声心动图检查及预后等临床特征。

**结果** 心肌淀粉样变性患者主要表现为进行性、难治性心功能不全,其中,9例(75.0%)以右心衰竭为主,NYHF心功能IV级6例(50.0%),临床上主要表现为胸闷、气短和肾脏损害;合并房颤4例(33.3%),低血压6例(50.0%),多浆膜腔积液7例(58.3%),巨舌2例(16.7%),皮肤紫癜3例(25.0%),心电图呈肢体导联低电压9例(75.0%),前壁导联R波递增不良例6例(50%),超声心动图均提示不同程度的室间隔或左室室壁增厚,心肌回声明显增强不均匀11例(91.7%),其中7例(58%)患者心肌内可见颗粒样强回

声或闪光点。12例患者均进行了病理或组织检查,分别为心内膜活检、骨髓活检、肾脏穿刺活检、皮肤黏膜活和舌体活检,结果均为阳性。12例患者误诊为肥厚型心肌病5例(41.7%),住院期间死亡3例,自动出院2例。

**结论** 心肌淀粉样变性患者临床表现复杂,以难治性心力衰竭为主,心电图表现为肢体导联低电压、超声心动图可见心肌内颗粒样强回声是心肌淀粉样变性的特征性改变。该病病情复杂,容易漏诊和误诊,肌钙蛋白和BNP与患者预后密切相关。

## 短信健康教育对冠心病介入术后出院患者满意度的影响

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**目的** 探讨短信健康教育是否可以提高冠心病介入术后出院患者满意度。方法:100例首诊冠心病住院接受介入术的患者入选,出院时随机分为实验组(出院时接受常规健康宣教,出院后开始接受为期1个月的短信健康教育)和对照组(仅出院时接受常规健康宣教),在出院1个月时实施电话回访,采用“武汉大学人民医院患者对护士工作满意度调查表”进行测评,采集患者满意度基线及终点观察资料。

**方法** 1.分组及健康教育方法:100例冠心病介入术后出院患者按随机数字表法随机分为实验组(出院时接受常规健康宣教,出院一个月后开始接受为期1个月的短信健康教育)和对照组(仅出院时接受常规健康教育)。选取科室N2、N3护士统一培训,规范常规健康宣教。常规健康教育内容包括:①住院期间向患者及家属讲解冠心病介入术相关知识(包括手术相关知识介绍,)和实施护理(包括手术前准备工作和心理护理、术后护理);短信健康教育内容包括:①患者出院时登记一般资料,记录手机号码,每例患者住院期间相关资料均单独记录在登记本上,由责任护士收存并告知患者出院后有关短信健康教育事宜;②一名专职护士通过院内计算机网络将出院患者资料导入回访软件系统;③患者出院后主管护士分析患者住院资料,根据患者的具体情况及不同需求,有针对性地发送相关教育内容或提醒信息(包括自我监测血压、遵医嘱用药、长期规律用药及饮食控制四个方面)。每例病人短信健康教育的实施周期为一个月,出院后每天给予短信健康教育的发送,并且通过系统可以确保短信发送给对方。

2. 满意度调查评估方法 分别在出院1个月后评估出院患者满意度,采用“武汉大学人民医院患者对护士工作满意度问卷调查表”(是不是要把点查表放进来)进行测评。该问卷分为6个项目,21个内容,采用李克特5级标度的奇数分级,每项应答内容设为“很满意、满意、一般、不满意、很不满意”,分别给予5、4、3、2、1分。

3. 统计学方法 评分结果以均数±标准差表示,采用SPSS 19.0软件进行统计分析,对于通过正态性检验的数据,两组均数的比较采用两独立样本 $t$ 检验进行;对于非正态分布的数据,两组均数的比较采用Wilcoxon Mann-Whitney法。

**结果** 终止教育1个月后实验组患者满意度评分明显高于对照组( $P<0.01$ )。

**结论** 短信健康教育可以提高冠心病介入术后出院患者满意度。

## 《心肌缺血致间歇性完全性左束支传导阻滞1例》

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**目的** 探讨间歇性完全性左束支传导阻滞对心肌缺血的临床意义。

**方法** 对无明显诱因出现胸闷、活动后气促的患者,行常规十二导联心电图检查,冠状动脉造影术检查。

**结果** 急诊十二导联心电图示完全性左束支传导阻滞,收入心内科时十二导联心电图示正常心电图,考虑是一例间歇性完全性左束支传导阻滞。冠脉造影示右冠优势型,左主干无明显狭窄,左前降支可见弥漫性斑块,远段可见弥漫性狭窄病变,狭窄最重处约90%,前向血流TIMI 3级;左回旋支可见散在性斑块,分出钝缘支后可见弥漫性狭窄病变,狭窄最重处约95%,前向血流TIMI 3级;对角支可见散在斑块,未见明显狭窄病变,前向血流TIMI 3级;右冠脉可见散在斑块,中远段可见局限性狭窄约40%,前向血流TIMI 3级。

**结论** 间歇性完全性左束支传导阻滞对心肌缺血具有重要的临床意义。

## 替格瑞洛抗血小板治疗致呼吸困难患者特征分析

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**目的** 分析替格瑞洛抗血小板治疗引发呼吸困难的特征。

**方法** 选取替格瑞洛抗血小板治疗引发的呼吸困难患者40例,回顾分析呼吸困难规律、表现、时间及胸部平片检查、血气检查、左心室射血分数(LVEF)、B型尿钠肽(BNP)与呼吸困难的关联。

**结果** 替格瑞洛引发呼吸困难性别及年龄差异无显著性,用药后最快在2小时内引发呼吸困难,24小时内引发11例(27.5%),24~72小时引发17例(42.5%),4~7天引发9例(22.5%),7天以上3例(7.5%)。立位诱发呼吸困难3例(7.5%),卧位诱发4例(10.0%),立、卧位诱发呼吸困难33例(82.5%);8:00~20:00发作21例(52.5%),20:00~8:00发作19例(47.5%)。发现呼吸困难后暂停用药,症状得到缓解和控制,其中<6小时者1例(2.5%),6~24小时者24例(60.0%),24+48小时者13例(32.5%),>48小时者2例(5.0%)。患者呼吸困难前后未见明显的呼吸功能差异,BNP、LVEF等差异无显著性( $P>0.05$ )。发生呼吸困难前后均未见有心包积液、胸腔积液、肺部感染等。

**结论** 替格瑞洛的使用所引发的呼吸困难患者主要表现为憋闷、叹息样呼吸、窒息等症状,没有明显的体位影响和昼夜时间关联,且呼吸困难发生前后没有明显的BNP、LVEF、呼吸功能变化,发现呼吸困难后暂停用药6~24小时症状得到缓解和控制。

## 健康教育在县医院内科开展的方法及效果评价

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广东省人民医院

**目的** 分析探讨健康教育在提高患者治疗知晓率中的应用效果。

**方法** 选择2017年12月~2018年6月在县医院内三住院50名患者为对照组(干预前),选择2018年6月~2018年12月在县人民医院内三50名患者为观察组(干预后)。两组均实施常规健康教育。观察组在此基础上,通过“提高患

者健康教育知晓率”为主题的健康讲座系列的实施,比较实施前后患者健康知晓率的提高及实施质量持续改进效果。

**结果** 观察组实施6个月后,患者对健康教育的知晓率在用药知识、合理饮食、风险防范以及出院注意事项方面明显高于对照组。两组比较,差异有统计学意义( $\chi^2$ 值分别 $P < 0.05$ ),同时护士在健康知识运用,科室团结协作,解决问题能力及自我信心、沟通协调能力和患者满意度等无形成果有很大提高。

**结论** 临床上对开展健康讲座能有效提高健康宣教内容的掌握、配合治疗和护理。有利于改善患者的健康行为以及疾病知识知晓率,降低护理风险,促进患者早日康复,值得推广。

## Hepatic and Renal Dysfunction as the Main Manifestations of the Abdominal Aortic Aneurysm and Arteriovenous Fistula in A Critically Ill Patient: A Case Report and Review of the Literature

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**Objective** Arteriovenous fistula (AVF) is a very rare complication of the abdominal aortic aneurysm (AAA) and is a life-threatening condition with complex clinical features. However, arteriovenous fistula and abdominal aortic aneurysm usually cause no symptoms except when they rupture. Our case study demonstrated that ultrasonography was a rapid and non-invasive method for the initial assessment of abdominal aortic aneurysm and arteriovenous fistula.

**Methods** A 65-year-old man was admitted to intensive care unit with hepatic and renal dysfunction. His presenting complaints was fatigue and oliguria for nine days without abdominal pain. He had a history of hypertension for ten years, with-

out the history of alcohol intake, viral hepatitis or chronic kidney disease. He had not taken any drugs that definitely caused liver and kidney damage recently. On presentation, he had a heart rate of 100 beats per minute and a blood pressure of 120/60 mmHg. Laboratory tests in local hospital suggested severe impaired liver and renal function (alanine transaminase (ALT) 2037 U/L, aspartate transaminase (AST) 1479 U/L, total bilirubin (TBIL) 123.4  $\mu\text{mol/L}$ , direct bilirubin (DBIL) 70.7  $\mu\text{mol/L}$ , serum creatinine (SCr) 378.9  $\mu\text{mol/L}$ , blood urea nitrogen (BUN) 16.6 mmol/L) with unknown cause.

**Results** Under the critical condition, the patient was referred to the intensive care unit (ICU). Physical examination revealed an abdominal vascular murmur and bilateral toe discoloration. Focused ultrasound was routinely performed for vascular screening in intensive care unit, as well as echocardiography and lung ultrasonography. Ultrasound examination revealed an abdominal aortic aneurysm and the right common iliac artery aneurysm with an arteriovenous fistula located between the right common iliac artery and inferior vena cava. The latter led to a similar pathophysiological abnormality of portal hypertension that explained hepatorenal dysfunction. A computed tomography scan confirmed the sonographic findings. The patient underwent continuous renal replacement therapy (CRRT) and liver protection therapy. Unfortunately, he died of the ruptured abdominal aortic aneurysm on admission day.

**Conclusions** We proposed that ultrasound should be used more commonly as part of the initial evaluation of the potential and established vascular diseases.

## 心衰患者康复教室的建立及实践

于淑艳

吉林大学第一医院

**目的** 探讨心衰患者康复教室成立的应用效果及作用。

**方法** 疗区内成立心衰康复教室,制定康复计划,安排康复训练内容,组织有计划、科学合理的康复项目及活动;对患者和家属进行康复训练指导。对100例心衰患者采用特质应对方式问卷和心衰患者社交焦虑量表,分别在入院当日及出院当日进行效果评价。

**结果** 出院与入院时相比,疗程结束时患者积极应对评分显著增高,差异有统计学意义( $P < 0.01$ );而消极应对评分及社交焦虑评分均明显降低,差异有统计学意义( $P < 0.01$ )。

**结论** 建立心衰康复教室,并制定康复计划,安排康复训练内容,组织有计划、科学合理的康复项目及活动,对患者和家属进行康复训练指导。可有效提高心衰患者的住院适应性及出院后社交主动性。

## Risk Factors and Clinical Characteristics of Peripartum Cardiomyopathy

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Lanzhou University Second Hospital

**Objective** To analyze the clinical characteristics and risk factors of peripartum cardiomyopathy (PPCM) in Gansu province of China by retrospective randomized controlled study.

**Methods** A retrospective survey was conducted among 104 hospitalized patients diagnosed with peripartum cardiomyopathy in Gansu province from January 2010 to August 2018, 104 perinatal women during the same period were randomly selected for comparison. All statistical analysis processes were completed with SPSS 22.0 software.

**Results** The total sample size was 208 cases. (1) The age of patients with PPCM ( $28.42 \pm 5.304$ ) higher than the control group ( $26.36 \pm 4.279$ ), PPCM patients with older age, longer hospitalization days and higher hospitalization expenses. (2) The pulse, systolic blood pressure, body mass index, triglyceride, of mean  $\pm$  standard deviation of the case group is higher than the control group ( $P < 0.05$ ), left ventricular ejection fraction, of mean  $\pm$  standard deviation is lower than the control group ( $P < 0.05$ ). (3) The related risk factors of peripartum cardiomyopathy including advanced age, primiparity, cesarean section, instrumental delivery and complicated other diseases (preeclampsia, gestational hypertension, previous history of hypertension, gestational diabetes, hyperlipidemia, suspected respiratory infection, thyroid disease, anemia). (4) Risk factors related to PPCM included advanced age (OR=3.941; 95% CI, 1.524–10.195), primiparity (OR=17.377); 95% CI, 2.104–143.517, cesarean section (OR=3.509; 95% CI, 1.693–7.271), instrumental delivery (OR=6.936; 95% CI, 1.906–25.244); preeclampsia (OR=3.884); 95% CI, 1.299–11.614), gestational hypertension (OR=5.813); 95% CI, 1.206–28.018), previous history of hypertension (OR=6.588); 95% CI, 1.402–30.963), gestational diabetes (OR=8.583);

95% CI, 1.054–69.909), hyperlipidemia (OR=2.103; 95% CI, 1.119–3.952), thyroid disease (OR=6.098; 95% CI, 1.317–28.239), anemia (OR=3.897; 95% CI, 1.762–8.619), suspected respiratory infection (OR=11.516; 95% CI, 3.952–33.558), triglyceride (OR=1.331; 95% CI, 1.018–1.740), body mass index (OR=1.107; 95% CI, 1.003–1.221) ( $P < 0.05$ ). (5) BNP and D-dimer in PPCM patients were higher than normal, the majority of 44 patients with cardiac function grade III (42.3%) in the cardiac function classification, majority of 27 patients with mild anemia (69.2%) among anemia patients. 49 cases were diagnosed in the second month postpartum (47.16%) among the PPCM diagnosis time, the majority of 45 patients with secondary school (43.27%) in patients with PPCM degree.

**Conclusions** PPCM patients with older age, longer hospitalization days and higher hospitalization expenses. The related risk factors of peripartum cardiomyopathy including advanced age, primiparity, cesarean section, instrumental delivery, preeclampsia, gestational hypertension, previous history of hypertension, gestational diabetes, hyperlipidemia, suspected respiratory infection, c-reactive protein, thyroid disease, anemia, triglyceride, low density lipoprotein, right ventricular anteroposterior diameter, left atrial anteroposterior diameter, body mass index; BNP and D-dimer in PPCM patients were higher than normal, and PPCM patients were mainly cardiac function grade III, mild anemia, diagnosed in the second month postpartum and less than high school education.

## Role of Zebrafish *fhl1A* in Satellite Cell and Skeletal Muscle Development

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**Objective Background:** Four-and-a-half LIM domains protein 1 (FHL1) mutations are associated with human myopathies. However, the function of this protein in skeletal development remains unclear.

**Methods** Whole-mount in situ hybridization and embryo immunostaining were performed.

**Results** Zebrafish *Fhl1A* is the homologue of human FHL1. We showed that *fhl1A* knockdown causes defective skeletal muscle development, while injection with *fhl1A* mRNA largely recovered the muscle development in these *fhl1A* morphants. We also demonstrated that *fhl1A* knockdown decreases the number of satellite cells. This decrease in satellite cells and the emergence of skeletal muscle abnormalities were associated with alterations in the gene expression of *myoD*, *pax7*, *mef2ca* and *skMLCK*. We also demonstrated that *fhl1A* expression and retinoic acid (RA) signalling caused similar skeletal muscle development phenotypes. Moreover, when treated with exogenous RA, endogenous *fhl1A* expression in skeletal muscles was robust. When treated with DEAB, an RA signalling inhibitor which inhibits the activity of retinaldehyde dehydrogenase, *fhl1A* was downregulated.

**Conclusion** *fhl1A* functions as an activator in regulating the number of satellite cells and in skeletal muscle development. The role of *fhl1A* in skeletal myogenesis is regulated by RA signalling.

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retinoic acid (RA) signalling caused similar skeletal muscle development phenotypes. Moreover, when treated with exogenous RA, endogenous *fh11A* expression in skeletal muscles was robust. When treated with DEAB, an RA signalling inhibitor which inhibits the activity of retinaldehyde dehydrogenase, *fh11A* was downregulated.

**Conclusion** *fh11A* functions as an activator in regulating the number of satellite cells and in skeletal muscle development. The role of *fh11A* in skeletal myogenesis is regulated by RA signaling.

## 排便支架在经股动脉行PCI术患者中的应用

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吉林大学第一医院

**目的** 本研究从全新的视角出发,设计了一种助排便支架,并检测其在经股动脉行PCI术后患者中的应用效果。

**方法** 选取2017年11月-2018年3月在某医院经股动脉行PCI术的患者108例,按照入院时间先后分为试验组58例,对照组50例,试验组使用自行设计的排便支架进行排便,对照组无排便支架,需要排便时由护士协助患者抬起臀部后放置便盆。观察患者术后72小时内骶尾部皮肤情况,腰腿部舒适度以及术肢血肿或假性动脉瘤的发生情况。

**结果** 试验组骶尾部皮肤破损发生例数显著低于对照组( $P < 0.01$ ),试验组腰腿部舒适度例数高于对照组( $P < 0.05$ ),两组患者术肢血肿或假性动脉瘤的发生率差异无统计学意义( $P > 0.05$ )。

**结论** 采用自行设计的助排便支架,应用于经股动脉行PCI术患者,可有效降低骶尾部皮肤损伤的发生率,提高患者术肢制动期间腰腿部的舒适度。

## 不同消融方式对心房颤动患者生活质量及心理状态的影响

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**目的** 通过评定心房颤动(房颤)患者消融手术前后生活质量及心理状态,探讨不同消融术式对其术后生活质量及

心理状态方面的影响。

**方法** 收集2017年1月至2018年2月就诊于河北医科大学第二医院心内二科行消融治疗的房颤患者,依据消融方式的不同分为射频消融组、冷冻消融组。于术前2天、术后3个月通过调查问卷的方式,进行36条简明健康状况调查(36-item short-form health survey, SF-36)量表、焦虑自评量表(Self-Rating Anxiety Scale, SAS)、抑郁自评量表(Self-Rating Depression Scale, SDS)等量表评估,评定患者消融手术前后生活质量及心理状态变化,探讨不同消融术式对患者生活及心理方面的影响。

**结果** 共有72例房颤患者入选,其中男37例、女35例,平均年龄 $61.3 \pm 22.2$ 岁。射频消融组患者40例,冷冻消融组患者32例。

消融术后,患者生活质量、心理状态均有所改善。其中SF-36评分显示除躯体疼痛无统计学意义外,生活质量的其他方面均有提高。反应心理状态的焦虑、抑郁等不良情绪有所下降,差异有统计学意义。

冷冻消融组与射频消融组相比,在生活质量中除躯体疼痛、情感职能差异无统计学意义,其他方面均提升。反应心理状态的焦虑、抑郁等不良情绪有所下降,差异有统计学意义。

**结论** 1. 射频消融术后,房颤患者生活质量(躯体疼痛除外)、心理状态有所改善。

2. 冷冻消融术后,房颤患者生活质量(躯体疼痛除外)、心理状态亦有改善。

3. 冷冻消融术在房颤患者生活质量以及心理状态等多个方面的改善与射频消融术相比更为显著。

## 谷草转氨酶/谷丙转氨酶比值与川崎病冠脉损害的关联

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温州医科大学附属第二医院、育英儿童医院儿童心脏中心,温州医科大学心脏发育与转化医学研究所

**目的** 探究谷草转氨酶(AST)/谷丙转氨酶(ALT)比值与川崎病静脉丙球无反应、冠状动脉损害、冠状动脉瘤发生之间的关系。

**方法** 回顾温州医科大学附属第二医院、育英儿童医院2005.1.1-2018.12.31收治的川崎病患者2768例,将其按照AST/ALT的中位数1.13分为低值组与高值组,比较两组之间的冠脉损害及丙球无反应发生率,同时比较两组间主要症状发生率。

**结果** 在低值组,发病后3-4周时冠状动脉损害、冠状动脉瘤、丙球无反应的发生率显著高于高值组(分别为24.11% vs. 17.83%  $P<0.001$ ; 3.78% vs. 1.52%  $P=0.003$ ; 29.87% vs. 21.63%  $P<0.001$ ),同时在临床主要症状皮疹、眼红、手足改变的发生率前者同样高于后者(分别为81.09% vs. 70.02%  $P<0.001$ ; 92.33% vs. 80.76%  $P<0.001$ ; 75.50% vs. 69.78%  $P=0.001$ )。低值组不完全川崎病比例低于高值组(17.83% vs. 31.61%  $P<0.001$ )。

**结论** 低AST/ALT值川崎病患者易并发冠状动脉损害、冠状动脉瘤以及丙球无反应,需提高警惕。

## 心外科住院医师手术技能培训模式的探索

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1. 中国医学科学院,北京协和医学院,国家心血管病中心,阜外医院,心外科

2. 中国医学科学院,北京协和医学院,国家心血管病中心,阜外医院,动物实验中心

**目的** 由于手术难度高,心外科医师培训是一个广泛存在的难题。目前在发达国家,外科操作技能的培训多采用一种模块化的新兵训练营(Boot Camp)模式。我们参考这种课程,为心外科住院医师探索建立了一种综合手术技能培训课程,并对其可行性和接受度进行评估。

**方法** 课程包括3个模块,培训内容由易到难,每个模块针对一项基本技术,模块一培训体外循环建立,模块二培训冠状动脉吻合,模块三培训胸腔镜下基本操作。模块内安排多轮培训,每轮培训时间为1周,学员可自由选择轮次,一个模块学习结束后再进入下一模块。所有课程均在模拟教学动物实验室进行。模块内每轮学习包括半天理论教学;半天操作录像和现场示教;每天至少5小时、持续4天的操作练习和1次在体动物实验。培训全程有一位高年资外科医生进行指导,每个学员保证足够的练习机会和时间。培训方法上,体外循环练习采用离体猪心模型,所有需要的管路材料均回收自其它动物实验;冠脉吻合练习同样使用离体猪心脏,以猪颈动脉作为桥血管材料;胸腔镜技术培训采用商品化的仿真胸腔镜模拟器系统进行练习。培训结束后使用问卷对部分学员进行调查,内容包括基本信息、课程满意度、操作信心的变化等。

**结果** 从2017年5月至2018年8月,共进行5轮50人次的培训。8位全程参与所有3模块培训的学员平均满意度是7.88分(满分10分)。三个单一模块的满意度依次是8.94

分(18人参与评价)、8.13分(8人参与评价)和7.63分(8人参与评价)。94.4%(17/18)的学员认为,体外循环技术训练对于住院医师是有必要的;全部被调查者(16/16)都认为冠脉吻合和胸腔镜训练对于住院医师是有必要的。操作信心方面,体外循环培训前仅22.2%的学员(2/9)认为自己能够独立完成插管操作,而培训后这一比例提高到55.6%(5/9,  $P=0.025$ );冠脉吻合培训前,仅有12.5%(7/8)的学员认为自己能在上级医师的帮助下完成操作,而培训后这一比例提高到了87.5%(7/8,  $P=0.005$ )。62.5%的受调查学员倾向于利用周末时间培训,仅有37.5%的人更喜欢全脱产集中培训。在建议增加的培训内容方面,最多的建议是瓣膜外科的基本技术、介入技术的基本操作和简单先心病手术技术。

**结论** 在心外科住院医师中开展多模块的综合手术操作培训是可行的,它能够有效提升住院医师的操作信心,加深对手术技术的理解。但是培训内容和时间安排有必要进一步改进。

## CACNA1D在子痫前期患者胎盘组织中的表达

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**目的** CACNA1D是编码Cav1.3L-型电压依赖性钙通道Alpha 1D亚基的基因,目前已知该基因变异与多种疾病相关,但CACNA1D与子痫前期(PE)的关系少有研究,本研究旨在讨论PE患者和正常产妇产盘中CACNA1D基因的定性和表达。

**方法** 1. 研究对象:福建省立医院妇产科2016.9到2018.9月分娩且资料完整的PE患者(31例)和正常分娩产妇(13例)。

2. 标本收集:收集所有研究对象的外周血和胎盘组织。

3. 应用sanger测序法检测所有研究对象的外周血CACNA1D基因是否存在变异;应用免疫组织化学技术检测所有研究对象胎盘母体面中CACNA1D基因的定性和表达情况;应用逆转录-聚合酶链反应(RT-PCR)及蛋白质印记技术(Western Blot)分别检测正常产妇、非基因变异PE患者胎盘母体面中CACNA1D基因mRNA及蛋白水平。

**结果** 1. 基因测序结果显示31例PE患者与13例正常产妇无CACNA1D基因变异,3例子痫前期患者具有该基因变异(变异位点分别为:CACNA1D c.A2242G/CACNA1D c.

A1697G/CACNA1D c.G2689A)。

2. 免疫组化结果显示:①所有胎盘母体面中均可见CACNA1D基因表达,见于合体滋养细胞、细胞滋养细胞、绒毛外滋养细胞、内皮细胞、平滑肌细胞;②PE患者胎盘CACNA1D蛋白表达均高于正常产妇( $P<0.05$ );其中基因变异位点CACNA1D c.G2689A的PE患者CACNA1D胎盘母体面蛋白表达明显高于未变异PE患者和正常产妇( $P<0.01$ 或 $P<0.005$ )。与未变异PE患者相比,携带基因变异位点CACNA1D c.A2242G/CACNA1D c.A1697G的PE患者胎盘母体面CACNA1D表达量无显著性差异。

3. RT-PCR、Western Blot结果显示:与正常产妇相比,非变异PE患者胎盘母体面CACNA1D mRNA水平显著增加( $P<0.005$ );胎盘母体面CACNA1D蛋白表达水平明显增加( $P<0.05$ ,由于变异患者仅留有胎盘蜡块,故未进行相关检测)。

**结论** PE患者胎盘母体面CACNA1D基因表达上调蛋白表达增加,其中CACNA1D c.G2689A位点变异可能导致该蛋白表达进一步增加。

## Clinical analysis of 9 cases of adult fulminant myocarditis

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**Objective** To investigate the clinical manifestations, early diagnosis and treatment of adult fulminant myocarditis.

**Methods** A retrospective review of 55 patients with acute myocarditis in the CCU of the Third Affiliated Hospital of Sun Yat-sen University in Guangzhou from January 2011 to January 2019, according to the diagnostic criteria of fulminant myocarditis, 9 eligible cases were screened. There were 5 males and 4 females, aged 19-66 years, with an average age of 32 years, hospitalized for 1 to 40 days, and an average hospitalization day of 14.4 days.

**Results** Of the 9 patients admitted to hospital, 7 had fever and 6 had gastrointestinal symptoms. All patients had significantly increased CRP and myocardial injury markers on admission, and LVEF decreased in all patients with cardiac color Doppler ultrasound. All patients had acute heart failure and heart. Source shock, 1 case complicated with III degree atrioventricular block, 6 cases with internal block, 4 cases with ventricular tachycardia, 1 case with ventricular fibrillation, 7

cases with multiple organ failure, 3 cases with heart Stopping; all patients were not treated with antiviral therapy, 8 patients were treated with gamma globulin + glucocorticoids, 9 patients were treated with dopamine, 6 patients were treated with norepinephrine, and 7 patients were treated with cardiotonin. For example, a temporary cardiac pacemaker was used, one used IABP, one used ECOM, and five used mechanical ventilation. 6 cases were cured and discharged, 1 case was transferred to hospital for further treatment, and then discharged, 2 cases died, 1 case died of sudden cardiac death, and 1 case died of multiple organ failure.

**Conclusions** Adult fulminant myocarditis has various clinical manifestations, rapid progress and high mortality. However, early active treatment can reduce mortality. In patients with myocarditis, an indoor conduction block on the electrocardiogram is an early sign of progression to fulminant myocarditis. Early use of gamma globulin, glucocorticoids, and positive inotropic drugs is effective for treatment.

## 成人暴发性心肌炎9例临床诊治分析

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**目的** 探讨成人暴发性心肌炎的临床表现、早期诊断和治疗。

**方法** 回顾性纳入广州市中山大学附属第三医院CCU自2011年1月至2019年1月救治的成人急性心肌炎患者55例,根据暴发性心肌炎的诊断标准,筛选出符合条件的9例,其中男5例,女4例,年龄19~66岁,平均年龄32岁,住院1~40 d,平均住院日14.4 d。

**结果** 入院时9例患者中7例有发热,6例有消化道症状;所有患者入院时CRP、心肌损伤标志物均明显增高,心脏彩超均可见LVEF降低,所有患者均并发急性心力衰竭及心源性休克,1例并发Ⅲ度房室传导阻滞,6例并发室内传导阻滞,4例并发室性心动过速,1例出现室颤,7例并发多器官功能衰竭,3例出现心脏停搏;所有患者均未使用抗病毒治疗,8例患者使用丙种球蛋白+糖皮质激素治疗,9例患者均有使用多巴胺,6例合并使用去甲肾上腺素,7例使用强心药,5例使用临时心脏起搏器,1例使用IABP,1例使用ECOM,5例使用机械通气。临床治愈6例好转出院,

1例转院继续治疗,后好转出院,2例死亡,1例为心源性猝死,1例死于多器官功能衰竭。

**结论** 成人暴发性心肌炎临床表现多样,进展迅速,病死率高,但经早期积极救治可降低死亡率。心肌炎患者心电图出现室内传导阻滞为进展成暴发性心肌炎的早期信号。早期使用丙种球蛋白、糖皮质激素以及正性肌力药对治疗有效。

## 意想不到的意识障碍一例

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**目的** 通过分析造影剂脑病、替罗非班诱导的急重度血小板减少症的病因,旨在学习两者的临床特点、鉴别诊断、防治措施等。

**方法** 李某,男,46岁,诊断“急性非ST段抬高型心肌梗死”,患者在PCI术中突发造影剂脑病,术后合并极重度血小板减少症,通过学习相关的文献,分析两者的病因、临床特点、鉴别诊断及防治措施

**结果** 1.意识障碍的分析:造影剂脑病(contrast induced encephalopathy, CIE)是在血管内使用造影剂后出现,多为短暂性,部分患者症状较重,甚至死亡<sup>[1]</sup>。经常发生于注射造影剂后2~12 h,一般在24~72 h内症状消失<sup>[2]</sup>。本患者术中使用的造影剂为碘海醇,具有相对亲水性高、化学低毒性、安全性较好等优点,但也有不良反应,如蛛网膜下腔出血、失语<sup>[3]</sup>等,临床表现绝大部分呈一过性病程。CIE是一个排除性诊断,需要排除其他病因所致神经系统症状,才能确诊,症状轻的CIE影像学无特异性改变。患者术中突发昏迷,呼之不应,无明确的神经系统定位体征,术后复查头颅CT未见明显改变,急性脑血管病的可能性不大。因此,昏迷的病因主要考虑为造影剂脑病。CIE是一个可逆性疾病,经水化及对症治疗,预后好,神经功能缺损症状及体征可快速恢复,本患者意识障碍迅速恢复,无后遗症,预后良好。

2.极重度血小板减少症的分析:患者既往无血小板减少病史,排除原发性血小板减少症可能,考虑为药物引起的继发性血小板减少症。患者术中、术后使用的抗血小板聚集药物包括阿司匹林、氯吡格雷和替罗非班,抗凝药物包括肝素、达肝素钠注射液。随访1年,患者一直规律服用阿司匹林和氯吡格雷,血小板计数未见下降,因此阿司匹林和氯吡格雷起的水小板减少可能性不大。因此,血小

板减少的原因主要考虑肝素诱导的血小板减少症(Heparin-induced thrombocytopenia, HIT)和血小板糖蛋白Ⅱb/Ⅲa受体拮抗剂所致的水小板减少症(GⅡb/Ⅲa induced thrombocytopenia, GIT)。

**结论** 临床医生应严密警惕造影剂脑病的发生,严格掌握替罗非班的使用指证。造影剂脑病与极重度血小板减少症之间是否存在内在联系,仍期待更多的临床报告,进一步分析。

## Mindfulness Meditation Ameliorates Symptoms Associated with Chest Pain in Patients with Coronary Heart Disease after Percutaneous Coronary Intervention

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**Objective** To assess the efficacy of the addition of a Mindfulness-Based Stress Reduction (MBSR) program to usual optimal medications for patients with CHD after PCI.

**Methods** A total of 95 patients with CHD after PCI were randomized into either a treatment group (n=52) receiving the 8-week the MBSR program plus usual optimal medications, or a control group (n=41) receiving only usual optimal medications. The MBSR intervention followed the format of the traditional program, meeting for weekly 2.5-hour sessions for eight weeks.

**Results** Both groups did not differ in baseline characteristics including age, sex, coronary artery stents, medical, or outcome variables. The MBSR program significantly reduced perceived stress, sleep problems, fatigue, and symptom severity at the post-program assessment (all  $P < 0.05$ ). Serious adverse events were not statistically different (the treatment group, 15%; the control group, 13%;  $P = 0.25$ ).

**Conclusions** MBSR alleviated some of the major symptoms of associated with chest pain in patients with CHD after PCI and reduced subjective illness burden.

## · 先天性心脏病学研究 ·

## Early Outcomes in Asymptomatic Patients Undergoing Surgical Versus Transcatheter Pulmonary Valve Replacement after Repair of Tetralogy of Fallot

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**Objective** Favorable thirty-year survival rate of Tetralogy of Fallot (TOF) is achieved by classical surgical repair, which ultimately leaves pulmonary regurgitation (PR). Successful improvement in surgical and transcatheter pulmonary valve replacement to deal with PR has been applied to a growing population of adult patients with repaired TOF (rTOF). Our study aims to investigate the differences between surgical and transcatheter pulmonary valve replacement (SPVR vs TPVR) regarding to physiological and perioperative-related variables, and occurrences of major adverse cardiovascular events (MACE).

**Methods** In this prospective case-control study, totally 41 asymptomatic patients with severe pulmonary regurgitation confirmed mainly by cardiac magnetic resonance were included, among whom 22 underwent SPVR and 19 underwent TPVR at our surgical department in Fuwai hospital between 2014 and 2018. The MACE is defined as the composite of arrhythmias, valvar dysfunction, death and secondary operation. The physiological and perioperative-related variables include right ventricular ejection fraction (RVEF), right ventricular end-diastolic volume (RVEDVI) and right ventricular end-systolic volume (RVESVI), duration of hospitalization, duration of Intensive Care Unit (ICU) and mechanical ventilation time.

**Results** No death was recorded during hospitalization or follow-up visit. Five patients developed postoperative atrial flutter (2 in SPVR vs 3 in TPVR). Valvar dysfunction (2/19) and secondary operations (5/19) were only seen in TPVR group. Concomitant tricuspid valvoplasty was conducted in 8 patients of SPVR group (8/22). Both postoperative RVEF and RVESVI were found improved in two groups (SPVR,  $37.80 \pm 10.04\%$  vs TPVR,  $39.86 \pm 9.56\%$ ,  $P=0.508$ ; SPVR,  $65.99 \pm 30.56$  vs TPVR,  $61.50 \pm 17.73$ ,  $P=0.563$ ), while RVEDVI decreased in

two groups (SPVR,  $102.87 \pm 36.11$  vs TPVR,  $101.48 \pm 19.48$ ,  $P=0.877$ ). Significantly lower postoperative right ventricular outflow tract pressure was recorded in TPVR group (TPVR,  $12.53 \pm 6.60$  mmHg vs SPVR,  $19.44 \pm 9.57$  mmHg,  $P<0.05$ ). However, the duration of hospitalization was significantly shorter in TPVR group (TPVR,  $6.89 \pm 3.35$  days vs SPVR,  $17.18 \pm 7.64$  days,  $P<0.001$ ). The similar reduction was seen in the ICU length of stay (LOS) and mechanical ventilation time (TPVR,  $0.47 \pm 0.91$  days vs SPVR,  $2.5 \pm 2.01$  days,  $P<0.001$ ; TPVR,  $2.47 \pm 4.28$  hours vs SPVR,  $20.86 \pm 17.96$  hours,  $P<0.001$ ).

**Conclusions** Both SPVR and TPVR could distinctly improve patients' right ventricular function. Although TPVR might increase the risk of MACE, it could promote a shorter hospitalization duration, a shorter ICU LOS, and a shorter mechanical ventilation time.

## A novel, missense mutation of the FLNC gene, associated with hypertrophic cardiomyopathy in a Chinese family

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**Objective Background** Mutations in the *FLNC* gene are linked to hypertrophic cardiomyopathy (HCM) and increase the risk of ventricular arrhythmia and sudden death. Cell-based studies have indicated that these mutations result in cytoplasmic protein aggregations but it is not known whether findings from myoblasts translate to human cardiomyocytes.

**Objective** The first objective is to identify a novel, missense mutation in the *FLNC* gene in a Chinese family with hypertrophic cardiomyopathy. The second objective is to study the pathogenic mechanism in human cardiomyocytes (AC16 cells).

**Methods** The subject had familial HCM of unknown cause. Genetic screening of the proband, two affected family members

and two controls was performed using next generation sequencing and data was confirmed by Sanger sequencing. Next generation sequencing identified a variant (*FLNC* c.G5935A (p.A1979T)) in the gene that encodes the sarcomeric protein, filamin C, which segregates with the disease in this family. The *FLNC* mutant and wild type genes were introduced into AC16 cells (human cardiomyocytes). We used a western blot to analyze the prevalence of filamin C in subcellular fractions and used the confocal microscope to observe the subcellular distribution of the protein.

**Results** The *FLNC* A1979T mutation is a novel, missense mutation associated with HCM. Filamin C expression levels were equivalent in both wild type and p.A1979T cardiomyocytes. Wild type filamin C expression resulted in a cytoplasmic distribution and absence of aggregate formation. However, expression of the mutant protein resulted in cytoplasmic protein aggregations.

**Conclusions** In this family suffered from hypertrophic cardiomyopathy, we found the *FLNC* A1979T mutation is a new pathogenic variant associated with HCM. In the AC16 cell model it reproduces key cellular features of other HCM-associated *FLNC* mutations. The described *FLNC* mutation extends the cardiac spectrum of cardiomyopathies. We propose that sudden cardiac death in the family that harbored the *FLNC* mutation results from incidental malignant arrhythmias.

## 三维斑点追踪成像技术评价法洛四联症术后患者心室间相互作用的研究

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**目的** 应用三维斑点追踪成像技术对法洛四联症患者中期随访阶段的双心室功能进行研究,并比较右心室功能降低与功能正常范围的两组患者,了解其左心功能的差异,并与正常对照组相比较,以发现心室间的相互作用关系。

**方法** 在横断面研究中,46名术后法洛四联症患者被纳入了研究,其中65%为男性,患者的平均年龄为 $4.72 \pm 2.33$ 岁,平均随访时长为 $3.78 \pm 2.02$ 年,24名健康儿童被设置为对照组。对采集到的双侧心室超声图像进行后处理分析,

应用TomTec后处理分析软件,获得双心室径线、容积、功能等参数,重点获取左心室应变参数。比较法洛四联症术后右心室射血分数减低患者、射血分数正常患者以及对照组在各参数间的差异。多组均值的比较采用单因素方差分析,组间两两比较采用Games-Howell法。

**结果** 中期随访阶段,本组患者中有33%出现右心室射血分数减低,左心室射血分数均在正常范围。此外,左心室整体长轴应变( $-17.1 \pm 7.8$  vs  $-19.9 \pm 5.3$  vs  $-21.7 \pm 3.8$ )、整体环向应变( $-24.2 \pm 7.1$  vs  $-26.5 \pm 5.0$  vs  $-25.1 \pm 3.9$ )等参数与对照组比较无统计学差异。节段性分析中,长轴应变在基底水平前室间隔、乳头肌水平前间隔、后间隔和下壁,法洛四联症术后患者较之对照组减低。在环向应变中,基底水平前间隔、后间隔、后侧壁、前侧壁及乳头肌水平的前侧壁rTOF两组与对照组比较均有统计学差异。在径向应变中,基底水平后间隔三组间两两比较均有统计学差异,基底水平前间隔、乳头肌水平后间隔及下壁rTOF两组与对照组比较均有统计学差异。

**结论** 在rTOF中期随访时,部分rTOF患者会出现右心功能减低,未发现左心整体功能减低的病例。对左心室进行节段性分析时发现室间隔从长轴、环向、径向三个方向上均发生形变能力降低,而左心室游离壁的部分节段出现了环向、径向应变的代偿性增强。

## Performance and Validation of R-CHA2DS2VASc Score for Thromboembolism in Patients with Hypertrophic Cardiomyopathy

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**Objective** Thromboembolism is known to occur as complication of hypertrophic cardiomyopathy (HCM). Comprehensive risk stratification is a tough issue and remains to be resolved. R-CHA2DS2VASc score was developed from the original CHA2DS2-VASc score, comprising all its primordial variables plus two renal function parameters (glomerular filtration rate and blood urea nitrogen), presence of atrial fibrillation and performance of a revascularization procedure. The aim of this study is to validate the modified R-CHA2DS2VASc score and compare its performance with CHA2DS2-VASc score in HCM patients.

**Methods** A total of 446 HCM patients were enrolled in our study, 31 (6.95%) patients experienced thromboembolic events during the follow-up time of 1786.7 person-years. The association between R-CHA2DS2VASc/CHA2DS2-VASc score and thromboembolism was assessed by Cox's proportional hazard analysis. To evaluate R-CHA2DS2-VASc model performance, we first used the Hosmer-Lemeshow test to assess model goodness-of-fit. Receiver operating characteristic curves analysis was performed and the area under the curve (AUC) was calculated to evaluate discriminatory power. The same analysis was performed for CHA2DS2-VASc model. We further assessed the clinical impact of the R-CHA2DS2-VASc model by reclassification using the net reclassification improvement (NRI).

**Results** The Hosmer-Lemeshow test *P* value was 0.435 for R-CHA2DS2VASc score and 0.087 for CHA2DS2VASc score. The R-CHA2DS2VASc score was well calibrated with 0.84 thromboembolic events per 100 person-years in the predefined low risk (R-CHA2DS2VASc score  $\leq 2$ ) group, 1.84 in the low to moderate risk (R-CHA2DS2VASc score 3-4) group, 4.67 in the moderate to high risk (R-CHA2DS2VASc score 5-7) group, and 17.54 in the high risk R-CHA2DS2VASc score  $\geq 8$ ) group. Hazard ratios for thromboembolism were 3.615 for low to moderate versus low risk group, 8.493 for moderate to high versus low risk group, and 22.924 for high versus low risk group. The AUC was 0.713 for R-CHA2DS2VASc score and 0.674 for CHA2DS2-VASc score ( $P=0.14$ ). Inclusion of the 4 new parameters, especially AF status and renal function in the modified R-CHA2DS2VASc score resulted in net reclassification improvement of 23.11% ( $P=0.018$ ).

**Conclusions** The R-CHA2DS2VASc score has shown good calibration and discriminative power in the prediction of thromboembolism for HCM patients. It should be considered as an improved decision support tool for HCM patients during clinical practice.

## Combined measurements of high-sensitivity cardiac troponin T and coronary atherosclerosis are useful for predicting adverse cardiovascular events in hypertrophic cardiomyopathy

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**Objective** Patients with hypertrophic cardiomyopathy (HCM) may have elevated serum high-sensitivity cardiac troponin T (hs-cTnT) and coronary atherosclerosis. Both hs-cTnT and coronary atherosclerosis are prognostic indicators in HCM patients. However, it is unknown that whether the measurements of both hs-cTnT and coronary atherosclerosis might supplement each other and become more reliable prognostic markers in HCM patients.

**Methods** We studied 162 HCM patients from a tertiary referral center in China. The primary end points of this study were any major adverse cardiovascular events (MACEs) defined as a composite of cardiovascular death, thrombo-embolic event and myocardial infarction/percutaneous coronary intervention. In order to evaluate the associations of combined measurements of the two markers with the primary end points, the patients were divided into four new defined groups: those with normal hs-cTnT and coronary artery, those with normal hs-cTnT and coronary atherosclerosis, those with elevated hs-cTnT and normal coronary artery, and those with elevated hs-cTnT and coronary atherosclerosis.

**Results** During a follow-up period of 632.3 person-years (median 3.7 years, IQR: 2.4-5.6 years), there were 24 (14.8%) MACEs. Patients with elevated hs-cTnT or coronary atherosclerosis had more MACEs than the corresponding patients with normal hs-cTnT or normal coronary artery (all log-rank  $P<0.05$ ). Multivariate Cox analysis showed that the two markers tended to be positively associated with MACEs. When groups were allocated according to the two markers, this improved the prognostic values. The clinical course was significantly worse in the elevated hs-cTnT and coronary atherosclerosis group (log-rank  $P=0.003$ ), with an incidence (events per 100 person-years) of 10.4 (95% CI: 4.3-16.6), much higher than other groups. With the normal hs-cTnT and coronary artery group as reference, adjusted HR was 6.3 (95% CI: 1.0-38.7,  $P=0.047$ ) for the elevated hs-cTnT and coronary atherosclerosis group.

**Conclusions** In HCM patients, combined measurements of hs-cTnT and coronary atherosclerosis are more reliable predictors of MACEs than measurement of single marker, and this finding may be considered to guide risk management among HCM patients.



## 经皮介入治疗儿童肺动脉分支狭窄的疗效观察

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**目的** 评估儿童肺动脉分支狭窄经皮介入治疗的安全性和有效性。

**方法** 回顾性分析2012年1月至2017年12月在广东省心血管病研究所确诊并接受了经皮介入治疗的40例18岁以下肺动脉分支狭窄患儿的病例资料。对一般临床资料、超声心动图、心脏增强CT、心导管检查、相关并发症、随访结果和预后进行分析。

**结果** 40例患儿中男28例,女12例,年龄1至17岁(4.7±3.6岁)。32例行经皮支架置入,6例行经皮球囊成形术。狭窄处压差明显降低,狭窄处直径明显增加。随访时间为1个月至5年,有一例支架处形成血栓,其余支架处血流通畅,球囊成形术随访压差无明显上升。

**结论** 对于治疗儿童肺动脉分支狭窄的经皮支架置入术和球囊成形术疗效可靠,安全性高。

## 儿童遗传性心律失常的诊治——10年单中心经验

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**目的** 分析及总结儿童常见遗传性心律失常的10年单中心诊治经验,探讨其最佳的治疗方法。

**方法** 回顾性分析广东省人民医院心儿科从2008年1月至2018年12月期间确诊为长QT综合征(LQTS)、Brugada综合征(BrS)、儿茶酚胺敏感性室性心动过速(CPVT)、肥厚型心肌病(HCM)和致心律失常性右室心肌病(ARVC)的30例患儿的治疗以及随访结果。治疗包括:药物、植入埋藏式心脏复律除颤器(ICD)、射频消融术及左心交感神经切除术。除3例BrS外,余27例均因晕厥入院。通过定期门诊及电话随访,了解患儿出院后的一般情况、心律失常事件发生情况及ICD工作情况。

**结果** 30例患儿中,男19例,女11例,初次发病年龄为(129.5±40.16)月。19例有基因检测,中位数随诊时间为40个月。植入ICD 15例全部存活,药物治疗10例死亡4

例,未行特殊治疗3例死亡1例,家属放弃治疗2例均死亡。

**结论** ①遗传性心律失常猝死率极高;②基因检测是重要的诊断手段,对高危患者家族的筛查必不可少;③原发性心律失常需与癫痫相鉴别,药物治疗效果多不理想,ICD是目前最有效、最可靠的治疗方法,但需谨慎。

## 253例儿童先天性室间隔缺损介入封堵术的疗效评估与中远期随访

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**目的** 临床回顾分析经导管治疗先天性室间隔缺损,并对其效果进行评价。

**方法** 收集2011年1月至2015年12月在温州医科大学附属第二医院经导管介入治疗的室间隔缺损的患儿253例,(男126例,女127例);平均年龄(4.8±4.4)岁,平均体重(18.6±9.5)kg。行左心室造影术,确定室间隔缺损位置、形状及大小,缺损直径(3.5±1.4)mm。行室间隔缺损封堵术,封堵后再次左心室及升主动脉造影;术后3天、1月、3月、6月、12月、1年、2年、3年、4年、5年复查经胸超声心动图、心电图及胸部X线,观察疗效。

**结果** 1.临床疗效:全组手术成功率为99.6%,平均手术时间(1.9±0.6)小时,平均住院时间(9.8±2.7)天。2.术后并发症:术后37例发生心律失常,其中14例完全性右束支传导阻滞,8例完全性右束支传导阻滞,3例左束支传导阻滞,12例左前分支传导阻滞;4例出现溶血;13例出现瓣膜反流。3.介入封堵术前后胸片及经胸超声心动图各指标变化:术后6月心胸比由(53.3±4.2)%缩小至(51.8±4.2)%;左室舒张末内径由(35.6±5.1)mm缩小至(33.7±3.8)mm,三尖瓣反流压差(31.0±11.6)mmHg下降至(20.4±5.1)mmHg,具有统计学差异( $P<0.05$ )。

**结论** 介入封堵治疗室间隔缺损安全有效,手术成功率高,并发症少,疗效肯定。

## 运动对改良 Blalock-Taussig 分流术后血流动力学影响的计算模拟分析

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**目的** 改良 Blalock-Taussig 分流术是一种用于小儿先天性心脏病姑息治疗的手术方法, 常常作为紫绀型先天性心脏病的一期首选治疗方案。本研究通过计算流体力学模拟, 分析研究运动对改良 Blalock-Taussig 术后分流管道内血流动力学参数的影响。

**方法** 采集患儿术后 CT 影像数据, 利用医学三维建模软件, 体外重建患儿个体化改良 Blalock-Taussig 分流术后分流区域血管解剖模型。基于术后心脏超声数据, 以一个心动周期内平均心输出量为参照, 虚拟假设随着患儿运动量逐渐增加, 平均心输出量以 5% 递增, 并以此为计算流体力学模拟边界条件, 探究改良 Blalock-Taussig 分流术分流区域内血流动力学随运动变化的规律。

**结果** 随着虚拟心输出量的成倍增加, 体肺循环分流比、左右肺的血流分配比均未发生明显变化; 但分流管道中的平均血流速度, 平均压力梯度及平均壁面切应力皆出现明显增加, 低流速区域逐渐增大; 能量损失随心输出量的增加, 而呈非线性显著增长。

**结论** 改良 Blalock-Taussig 分流术后, 随着患儿运动量的增加, 心输出量的变化对体肺循环的血供及左右肺的血流分配比没有明显的影响, 但对分流管道内血流动力学参数的变化影响显著; 分流区域内壁面切应力的增高、低流速区域的扩大增加了术后血栓形成的风险。利用计算流体力学模拟开展对患儿术后血流动力学变化的虚拟研究, 对临床患儿运动量及生活质量的个体化评估预测具有重要的指导意义。

## 产前咨询对先天性心脏病胎儿的围产期结局和产后早期存活率的影响

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**目的** 探讨产前咨询对先天性心脏病(先心病)胎儿的围

产期结局和产后早期存活率的影响。

**方法** 通过注册病历网络将可疑的先心病胎儿从地区医院转至我院心脏中心进行超声心动图检查。以 2013 年 12 月开始咨询时间作为分界线, 把 2011 年-2015 年确诊的先心病胎儿分成两组(2011 年-2013 年 vs 2014 年-2015 年)。比较这两组之间的围产期结局和早期生存情况, 并探讨了终止妊娠的危险因素。

**结果** 共纳入 1032 例先心病胎儿。经产前咨询后, 先心病胎儿的活产率明显升高(56.6% vs. 46.5%, 校正 OR=1.59, 95%CI: 1.10-2.29), 而单一心脏缺陷先心病胎儿的终止率较低。出生后存活率无显著差异。与活产相比, 从地区医院转诊是一种新发现的独立的终止危险因素。

**结论** 产前咨询可以提高先心病胎儿的围产期结局, 特别是单一心脏缺陷的先心病胎儿。地区医院进行标准化简单先心病咨询和合理转诊严重或多发性先心病母亲的教育对进一步提高先心病胎儿的结局至关重要。

## 室间隔缺损介入治疗血管径路优化的临床研究

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**目的** 对比分析经桡动脉联合股静脉入路和传统经股动脉联合股静脉入路行室间隔缺损(VSD)封堵术的疗效和安全性。

**方法** 入选 2017 年 5 月至 2018 年 3 月在上海长海医院行经皮 VSD 封堵术的患者 30 例, 根据手术入路的不同随机分为股动脉组(n=15)和桡动脉组(n=15), 对比分析两组患者一般情况、手术时间、透视时间、术后并发症等临床资料。

**结果** 两组患者在年龄、性别、体重、VSD 大小等方面差异均无统计学意义( $P>0.05$ )。股动脉组 15 例(100%)封堵成功, 植入封堵器直径( $6.7\pm 1.9$ )mm, 手术时间( $46.9\pm 14.0$ )min, 透视时间( $13.7\pm 6.2$ )min, 术后卧床时间( $268.0\pm 24.0$ )min, 术后出现完全性右束支传导阻滞 1 例。桡动脉组 14 例(93.3%)封堵成功, 1 例因导丝无法通过缺损而转行外科手术, 2 例术中发生桡动脉痉挛; 植入封堵器直径( $8.4\pm 3.4$ )mm, 手术时间( $48.7\pm 9.5$ )min, 透视时间( $13.6\pm 4.7$ )min, 术后卧床时间( $103.6\pm 13.4$ )min。所有患者康复出院, 术后平均随访( $10.8\pm 2.4$ )个月, 两组患者均未发生封堵器脱落、明显残余分流、房室传导阻滞、主动脉瓣返流等并发症。两组在手术时间、透视时间、植入封堵器直径方面差异无统

计学意义( $P>0.05$ ),桡动脉组患者术后卧床时间短于股动脉组( $P<0.05$ )。

**结论** 经桡动脉联合股静脉入路行VSD封堵术可明显缩短患者术后卧床时间,避免股动脉穿刺相关的血管并发症,增加患者舒适度,且不增加操作难度,值得临床推广应用。

## 探讨心电图在诊断左冠脉异常起源于肺动脉中的价值

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**目的** 探讨心电图在鉴别左冠脉异常起源于肺动脉与冠状动脉-肺动脉瘘患者中的价值。

**方法** 一组为2004年12月至2016年9月间在我院住院,经手术证实的左冠状动脉异常起源于肺动脉患者16例,另一组为2012年8月至2015年10月在我院收治的15例经冠状动脉造影术诊断的冠状动脉-肺动脉瘘患者,分为两组进行一般情况及心电图特征分析。

**结果** 两组间性别无显著性差异,年龄及心电图特征存在显著性差异,左冠状动脉起源于肺动脉患者心电图主要表现为I aVL导联异常Q波及ST-T改变,而冠状动脉-肺动脉瘘患者心电图多无特征性表现。

**结论** 左冠状动脉起源于肺动脉患者发病年龄较冠状动脉-肺动脉瘘早,前者心电图特征明显,在诊断左冠状动脉异常起源于肺动脉中有其重要价值,有助于疾病的初步判断,避免误诊。

## MTUS1新发突变通过改变微管稳定性致心肌致密化不全的机制探讨

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**目的** 探讨新发突变基因MTUS1通过改变微管稳定性导致心肌致密化不全发生的机制。

**方法** 构建过表达慢病毒突变组MTUS1、野生组MTUS1及空载组(分别记为突变组、野生组及空载组)CP15-5a细胞模型,Real-time PCR检测各组MTUS1及RhoA的mRNA表达水平,Western blot检测各组RhoA蛋白表达水平,细胞免疫荧光检测各组 $\alpha$ -tubulin荧光表达强度,并对各组细胞进行细胞划痕实验,检测各组细胞迁移情况。

**结果** 成功构建过表达慢病毒突变组、野生组及空载组细胞模型。与野生组相比,突变组细胞 $\alpha$ -tubulin荧光强度表达下降( $P=0.022$ )。Real-time PCR及Western blot结果显示,与野生组相比,突变组RhoA的mRNA及蛋白表达水平明显增高( $P<0.05$ )。划痕实验结果显示,与野生组相比,突变组细胞迁移速率增快( $P<0.05$ )。

**结论** MTUS1新发突变是保护性突变,其通过降低CP15-5a细胞微管稳定性,并调节RhoA表达增强细胞迁移,从而减低心肌致密化不全的发生率。

## 法洛四联症术后肺动脉瓣中大量返流无症状患者瓣膜置换时机及指征的研究

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**目的** 探讨法洛四联症术后肺动脉瓣返流患者瓣膜置换的时机及指征。

**方法** 2014年6月至2018年4月,共81例法洛四联症术后患者符合入组标准并纳入前瞻性病例对照研究。41例患者纳入肺动脉瓣置换(PVR)组,40例患者纳入药物治疗(M)组。入组时行磁共振、心脏超声、心电图及全胸片,两组分别予以手术治疗及药物治疗。六个月后再次复查上述检查。随访并评估两组内、组间治疗前后心脏功能变化。

**结果** 平均随访时间 $33.1 \pm 10.0$ 月。PVR组患者均无死亡且无心衰症状,一例患者随访期间再次行PVR,31例患者恢复正常右室容积,7例患者恢复正常右室功能;M组患者三例死亡,一例心脏移植,三例患者随访患者行PVR,2例患者出现心衰症状,两例患者恢复正常右室容积。PVR组恶性事件发生率显著低于M组( $P=0.023$ ),右室功能显著改善( $P<0.05$ )。二分类logistics回归分析发现术前右室收缩末期容积指数(RVESVI)是PVR术后右室能否恢复正常

容积的独立危险因素(10 ml/m<sup>2</sup> increment,  $P=0.009$ , odds ratio 0.64, 95% confidence interval 0.457–0.893)。ROC 曲线分析提示术前 RVESVI 120 ml/m<sup>2</sup>(曲线下面积 0.819, 敏感性 90.3%, 特异性 70%)是术后右室能否恢复正常容积的阈值。

**结论** 法洛四联症术后肺动脉瓣中大量返流无症状患者行 PVR 是切实可行的,可显著减小右室容积并恢复右室功能。RVESVI<120 ml/m<sup>2</sup>行 PVR 患者获益大。

## External validation of the model of thrombo-embolic risk in hypertrophic cardiomyopathy patients

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**Objective** As an important complication of hypertrophic cardiomyopathy (HCM), thrombo-embolism (TE) is associated with adverse clinical outcomes and reduced survival. In some previous studies, TE showed an incidence of 1.0% per year and was more common in patients with atrial fibrillation (AF). Recently, a new risk model was developed, namely hypertrophic cardiomyopathy risk for cerebrovascular accident (HCM Risk-CVA), for estimating the risk of TE in HCM patients. There is no study about the external validation of the risk model. This study was to evaluate the performance of HCM Risk-CVA by external validation in a relatively large HCM patient cohort derived from a tertiary referral center.

**Methods** We evaluated the performance of the model for predicting TE in 417 HCM patients recruited between 2008 and 2016, from a tertiary referral center. The primary outcome was 5-year TE, and the risk of TE in 5 years for an individual HCM patient could be calculated using the HCM Risk-CVA formula:  $P_{TE, at 5 years} = 1 - 0.9999874^{\exp(\text{prognostic index})}$ , where the prognostic index =  $0.030417476 \times \text{age (years)} + 2.129977874 \times \text{AF (yes=1/no=0)} - 0.027069595 \times \text{age} \times \text{AF} + 1.288557829 \times \text{TE prior (yes=1/no=0)} + 0.224673046 \times \text{NYHA class II (yes=1/no=0)} + 0.728180341 \times \text{NYHA class III/IV (yes=1/no=0)} + 0.032251831 \times \text{LA diameter (mm)} + 0.3735254 \times \text{MWT (mm)} - 0.008324216 \times \text{MWT}^2 \text{ (mm)} + 0.512492795 \times \text{vascular disease (yes=1/no=0)}$ . Discrimination was assessed by Harrell's C-index; for assessing the accuracy of calibration,

graphical comparisons of the observed and predicted TE at 5 years by risk groups were performed.

**Results** During a follow-up period of 1601.2 person-years (median 3.5 years, IQR: 2.1–5.7 years), 25 (6.0%) patients reached the primary outcome from the first evaluation (20 ischemic stroke and 5 peripheral embolism), and 22 (5.3%) reached the primary outcome in the first 5 years (17 ischemic stroke and 5 peripheral embolism). For the whole cohort, the incidences of TE (events per 100 person-years) were 1.1 (95% CI: 0.5–1.7) for the low risk group (< 3.0%), and 3.4 (95% CI: 1.3–5.5) for the high risk group ( $\geq 3.0\%$ ), respectively. Kaplan-Meier curves illustrated that the model could differentiate between those with high risk and those with low risk (log-rank  $P=0.006$ ). The C-index at 5-year follow-up was 0.67 (95% CI: 0.55–0.79), indicating a helpful discrimination. However, the calibration was not perfect, which translated into an underestimation of 5-year TE risk. For the subgroup without AF ( $n=351$ ) based on a follow-up period of 1163.2 person-years (TE=12), the findings showed that the incidence was higher in the high risk group than in the low risk group (log-rank  $P=0.023$ ), and the C-index at 5-year follow-up was 0.67 (95% CI: 0.51–0.83), indicating a helpful discriminative ability. The calibration curves were similar to the whole cohort. In the subgroup with AF ( $n=66$ ), based on 210.2 person-years of follow-up and 10 adjudicated TE, the incidence of TE (events per 100 person-years) was 4.8 (95% CI: 1.9–7.7). For the relatively small sample size of patients with AF, we did not perform the further analysis.

**Conclusions** HCM Risk-CVA demonstrated a possibly helpful discrimination for TE when applied in a new set of HCM patients. However, the accurate estimation of the absolute risk should be explored in future studies.

## 先天性左心耳瘤的诊断与治疗

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**目的** 探讨先天性左心耳瘤的早期诊断与治疗的临床价值。

**方法** 回顾分析我院 2016 年 3 月至今经超声心动图首诊的先天性左心耳瘤 4 例,总结其发病及临床特征,超声心

动图诊断征象、鉴别诊断要点及相关影像学诊断特点。同时回顾分析MEDLINE search1922-2007年的文献报道先天性左心耳瘤78例,总结其发病年龄、临床特征、诊断学方法、并发症以及相应治疗手段及疾病预后转归情况。

**结果** 本院4例病人,发病年龄为4个月到10岁,男2例,女2例,首诊症状分别约心脏增大、心律失常、心功能减低及外院二尖瓣反流术后。既往诊断中无对左心耳情况的描述及诊断,仅是对症治疗效果不满意。文献回顾78例病人,发病年龄多见10岁以上,发病无明显性别倾向,大多独立发病,绝大多数在儿童时期由于瘤体小,没有症状,偶然检查中发现,瘤体扩大到一定程度出现症状,大多成年发病,表现为心悸,胸痛,运动后呼吸困难,中风等。室上性心律失常发病率60%,脑栓塞事件发生率18%,95%病人行外科手术切除瘤体。4例未行手术病人:1例68岁,存在药物控制的室上性心律失常及肺静脉异位引流,没有血栓形成;1例拒绝外科手术,最终发生室上性心律失常及脑栓塞;1例死于瘤体破裂并发症;1例死于大面积脑梗塞。78例病人均经超声心动图首诊,经食道超声心动图显示左心房与左心耳的交通口及血栓有优势,但具侵入性,有致瘤体破裂和血栓形成的风险,必要时CT、MRI、放射性核素血管成像、心导管造影对诊断及鉴别诊断有帮助。并提出诊断标准:成人左心耳长度超过3 cm,儿童不同年龄的正常值不同,超过左心房长度的1/2,超过5 cm为“巨大瘤”。超声表现有:①起源于左心房;②与左房交通-特征性表现;③瘤体内血流缓慢;④左房或/及左室受压,左室舒缩活动受限;⑤部分液性暗区内见弱或略强回声光团-血栓或血栓机化。手术治疗根据瘤体大小,可选择微创、小切口及体外循环术式,手术风险低,无死亡报道,术后症状消失,无复发,预后良好。

**结论** 超声心动图是诊断左心耳瘤安全、有效的首选方法,一经确诊,因其高发严重致命并发症,应尽早手术治疗,对提高患儿的生存率具有重要的临床意义。

## Hyperuricemia: Risk Factor of Thromboembolism for Hypertrophic Cardiomyopathy Patients

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**Objective** Hyperuricemia has been regarded as a risk factor

for cardiovascular diseases, including cerebral and perivascular thromboembolism, which are known to occur as complication of hypertrophic cardiomyopathy (HCM). However, the role of hyperuricemia in HCM patients hasn't been studied. The aim of this study was to investigate the association of hyperuricemia and thromboembolism in patients diagnosed with HCM.

**Methods** A total of 433 adult HCM patients were enrolled in this study at West China Hospital, Sichuan University from 12-05-2008 to 13-05-2016. Uric acid level was measured at baseline. Hyperuricemia was defined as >6 mmol/L in women and >6.8 mmol/L in men. The association between hyperuricemia and thromboembolism was analyzed by univariate and multivariate Cox's proportional models after adjusting confounding risk factors, such as age, sex, atrial fibrillation (AF), hypertension and diabetes. Interactions and stratified analysis were conducted to further illustrate the role of hyperuricemia played in HCM patients.

**Results** During the follow-up of 1724.8 patient years, 31 (7.16%) patients developed thromboembolic events. Hyperuricemia was significantly associated with thromboembolism in HCM patients [adjusted hazard ratio (HR): 3.19, (95% confidence interval, CI: 1.38-7.37),  $P=0.007$ ].  $P$  value for interaction between AF and hyperuricemia was 0.000. Stratified analysis revealed that hyperuricemia was only significantly associated with thromboembolism in HCM-AF patients and lost statistical significance in those without AF. The HR of hyperuricemia for thromboembolism in HCM-AF patients was 6.73 (95%CI: 1.55-29.27),  $P=0.011$ . Hyperuricemia and AF had synergic effects in predicting thromboembolic events. HCM patients with both risk factors at baseline were at 13.22 times higher risk to develop thromboembolism than normouricemic subjects without AF. The risk was 1.99 times for HCM patients with only AF and 1.75 times for HCM patients with only hyperuricemia when compared to AF-free and normouricemic individuals.

**Conclusions** Hyperuricemia significantly predicts thromboembolism in HCM patients, especially those complicated with AF. Normal serum uric acid could potentially offset the adverse outcomes brought by AF. Therefore, prospective and large scale studies are encouraged to investigate whether urate-lowering agents could help to prevent thromboembolism in those patients.

## 房间隔缺损并重度肺动脉高压靶向药物联合介入封堵治疗一例

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**目的** 报道房间隔缺损并重度肺动脉高压靶向药物联合介入封堵治疗体会。

**方法** 患者女, 22岁, 住院号0923044, 因活动后气促半年于2017年7月1日入院。查体: T36.4°R 20次/分 HR111次/分 Bp130/82 mmHg, 心率111次/分, 律齐, 心界不大, 胸骨左缘第二、三肋间可闻及III/6级收缩期吹风样杂音, P2亢进, 伴固定分裂, 双肺呼吸音清, 未闻及干湿性啰音, 腹软, 肝肋下未及, 双下肢无水肿。经胸超声心动图: 先天性心脏病, 房间隔缺损, 缺损大小约28 mm, 双向分流, 肺动脉压101 mmHg。经食道超声心动图: 先天性心脏病, 房间隔缺损, 缺损大小约29 mm。诊断: 先天性心脏病, 房间隔缺损, 重度肺动脉高压 心功能II级。经心导管检查提示肺血管阻力及肺动脉压力高, 予以波生坦62.5 mg 每日2次, 西地那非20 mg 每日3次治疗, 连续服用9个月, 患者自觉活动后气促症状较前好转, 复查心脏彩超提示肺动脉压力下降, 于是再行心导管检查提示肺血管阻力明显下降, 行介入封堵术。

**结果** 予以波生坦联合西地那非治疗9个月后, 再行心导管检查提示肺血管阻力明显下降, 肺动脉压力有所下降, 说明波生坦联合西地那非治疗肺动脉高压是有效的。据经胸及食道心脏超声选择A38 mm房间隔封堵器于房缺处成功封堵, 术后心脏彩超示封堵器位置固定, 形态正常, 无残余分流, 二、三尖瓣未受影响。

**结论** 靶向药物治疗联合介入治疗房间隔缺损并重度肺动脉高压在临床上可行的。

## 氨基末端脑钠肽前体(NT-pro-BNP)水平在左冠状动脉异常起源于肺动脉(ALCAPA)患者中的表现

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**目的** 左冠状动脉异常起源于肺动脉(ALCAPA)是一种罕

见的先天性心脏病, 其病情严重程度与侧支循环的代偿水平相关, 但尚无明确的判断标准。在儿童和成人心力衰竭的诊疗中, 氨基末端脑钠肽前体(NT-pro-BNP)是重要的生物标志物。既往研究揭示了NT-pro-BNP在部分先天性心脏病中的价值。然而, NT-pro-BNP在ALCAPA患者血浆中的水平尚未确定。这项回顾性研究试图了解NT-pro-BNP与ALCAPA患者病情严重程度的相关性。

**方法** 这项研究收集了23例ALCAPA患者术前血浆NT-pro-BNP测值以及超声心动图检查报告并进行了统计学分析。

**结果** 对比NT-pro-BNP小于300 pg/mL的患者, NT-pro-BNP大于300 pg/mL的患者的左室射血分数(LVEF) ( $P < 0.0001$ ) 和年龄 ( $P < 0.0001$ ) 均有统计学意义的下降。当NT-pro-BNP大于300 pg/mL时, 线性回归显示年龄 ( $r = 0.399$ ,  $P = 0.012$ ) 和LVEF ( $r = 0.403$ ,  $P = 0.011$ ) 与NT-pro-BNP的测值存在有统计学意义的相关性。在所有患者中, NT-pro-BNP与LVEF呈负相关 ( $r = 0.570$ ,  $P = 0.0001$ )。在Spearman等级相关性检验中, 二尖瓣返流(MR)分级与NT-pro-BNP无显著相关性 ( $r = 0.383$ ;  $P = 0.071$ )。

**结论** 对于ALCAPA患者来说, 当NT-pro-BNP在300 pg/mL以上时, 其水平与年龄、LVEF呈负相关, 在300 pg/mL以下时则与年龄、LVEF无相关性。MR分级和NT-pro-BNP水平之间是否存在相关性仍需进一步的研究来确定。

## 动脉导管未闭介入封堵术对儿童左心功能及形态的影响

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苏州大学附属儿童医院

**目的** 探讨动脉导管未闭(patent ductus arteriosus, PDA)患儿介入封堵术后心脏形态和功能的变化, 并进一步分析可用于预测介入封堵术后心功能变化的指标。

**方法** 以2016年01月~2018年12月于苏州大学附属儿童医院确诊的194例PDA患儿为研究对象。患儿分别于经导管封堵动脉导管术前、术后24小时、术后1个月、3个月及术后6个月进行彩色多普勒超声心动图检查, 测量左心室舒张末内径、左心室收缩末内径、左心房内径等参数、计算左心室射血分数。

**结果** 本研究中所有患儿术中、术后24小时心超检查均未见残余分流。介入封堵次日左心室舒张末内径、左心室收

缩末内径、左心房内径均较术前明显缩小,同时左心室射血分数较术前也出现下降,部分儿童(27例)甚至出现心功能不全,但至术后3个月均恢复到正常水平;相关性分析显示:PDA内径、PDA内径/主动脉根部内径比值(PDA/AO比值)以及术前LVEF水平,均与术后LVEF下降程度呈正相关;经ROC曲线评价分析,PDA肺动脉端内径大于3.35 mm,PDA/AO比值大于0.28,术前LVEF小于62.50%,均为术后出现心功能不全的界值。

**结论** 经导管介入封堵儿童动脉导管未闭后左心房及左室内径明显缩小,术后可出现短暂心功能下降。PDA肺动脉端内径大小、PDA/AO比值、术前LVEF可能作为预测术后出现心功能不全的指标。

## Loss of the Nodal modulator *Nomo* results in chondrodysplasia in zebrafish

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**Objective Background** Transforming growth factor- $\beta$  (TGF- $\beta$ )/nodal signaling is involved in early embryonic patterning in vertebrates. Nodal modulator (Nomo, also called pM5) is a negative regulator of nodal signaling. Currently, the role of *nomo* gene in cartilage development in vertebrates remains unknown.

**Methods** *Nomo* mutants were generated in a knockout model of zebrafish by clustered regularly interspaced short palindromic repeats (CRISPR)/CRISPR-associated protein 9 (CRISPR/Cas9) targeting of the fibronectin type III domain. The expression of related genes, which are critical for chondrogenesis, was analyzed by whole-mount *in situ* hybridization and qRT-PCR. Whole-mount alcian staining was performed to analyze

the cartilage structure.

**Results** *nomo* is highly expressed in various tissues including the cartilage. We successfully constructed a zebrafish *nomo* knockout model. *nomo* homozygous mutants exhibited varying degrees of hypoplasia and dysmorphism on 4 and 5 dpf, which is similar to chondrodysplasia in humans. The key genes of cartilage and skeletal development, including *sox9a*, *sox9b*, *dlx1a*, *dlx2a*, *osx*, *col10a1*, and *col11a2* were all downregulated in *nomo* mutants compared with the wildtype.

**Conclusion** Our data demonstrated that the key genes of cartilage and skeletal development were all downregulated in *nomo* mutants compared with the wildtype and the *nomo* gene is essential for cartilage development in zebrafish.

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## 儿童肺动脉吊带的临床特点及预后分析

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**目的** 探讨儿童肺动脉吊带的临床特征及预后。

**方法** 回顾性分析北京儿童医院2009年1月至2017年12月76例住院治疗肺动脉吊带患儿的病历资料, 进行统计学分析。

**结果** 本组肺76例动脉吊带患儿, 年龄2天-15岁5月, 中位年龄7.5月, 体重3.27-40.0 kg, 中位体重7.9 kg, 男42例, 女34例, 男女比为1.24:1。主要临床症状为反复咳喘、呼吸困难、反复呼吸道感染。主要阳性体征为肺部高调哮鸣音、肺部湿啰音、三凹征。超声心动图表现为肺动脉分叉消失, 主肺动脉直接延续为右肺动脉, 左肺动脉自右肺动脉发出。多层螺旋CT可显示左肺动脉起源于右肺动脉主干, 走行于气管及食管之间; 气道重建可见气管支气管狭窄、气管发育畸形。纤维支气管镜见主支气管外侧壁受压内突, 可检出环状气管软骨环。本组76例患儿, 52例(68.4%)生存, 20例(26.3%)放弃进一步治疗, 4例(5.3%)死亡。应用卡方检验对手术组与非手术组预后进行分析( $P<0.01$ ), 有统计学差异; 应用Logistic回归对生存组、死亡组预后影响因素进行分析, 手术治疗、气道环形狭窄为预后的影响因素( $P<0.05$ )。应用超声心动图随访肺动脉吊带矫治术后患儿, 比较术后与术前左肺动脉内径, 差异有统计学意义( $P<0.01$ )。

**结论** 肺动脉吊带多在婴幼儿期以呼吸道症状就诊, 无典型症状、体征, 合并气道狭窄率高。超声心动图、CT、支气管镜在肺动脉吊带诊断中各有优势。肺动脉吊带死亡和放弃治疗的首要原因是难治的呼吸衰竭, 明确诊断后, 早期手术治疗是增加患儿生存几率。合并气道环形狭窄患儿预后不良。肺动脉吊带矫治术后大部分患儿气道压迫症状得以缓解, 左肺动脉发育情况得到改善。

## 先天性心脏病: 双孔型房间隔缺损封堵治疗

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**目的** 房间隔缺损(ASD)为临床上常见的先天性心脏畸形,是原始房间隔在胚胎发育过程中出现异常,致左、右心房之间遗留孔隙。房间隔缺损可单独发生,也可与其他类型的心血管畸形并存,女性多见,男女之比约1:3。由于心房水平存在分流,可引起相应的血流动力学异常。其中大部分为单孔型,少数可为双孔型,甚至多孔型。本文旨在探讨双孔型房间隔缺损封堵术一例。

**方法** 常规消毒铺巾,穿刺股静脉,分别置入8F鞘,肝素4000 u,测量房间隔缺损大小约8 mm,靠近上腔,右心导管测肺动脉压31/14 mmHg,右室动脉压为34/9 mmHg,经皮血氧饱和度100%,建立股静脉→右房→左房→左肺静脉的轨道,将普通钢丝交换为加硬导丝并保留,经导丝送入8F长鞘,选用徐州亚创12 mm房缺封堵器,在彩超和透视下堵闭ASD,彩超证实封堵器位置可,释放封堵器,再次复查心脏彩超,可见封堵伞旁异常彩色血流,再次建立股静脉→右房→左房→左肺静脉的轨道,将普通钢丝交换为加硬导丝并保留,经导丝送入8F长鞘,选用徐州亚创14 mm房缺封堵器,在彩超和透视下堵闭ASD,彩超证实封堵器位置可,释放封堵器,再次复查心脏彩超,未见异常血流,撤出输送系统,压迫止血,术中、术后监测超声:未见残余分流。结束手术,送回病房。

**结果** 术后复查心脏彩超无残余分流。

**结论** 在房间隔缺损分类中,单孔型房间隔缺损最常见。因部分患者存在两个孔没有完全同时暴露,这类患者可先行一个封堵器封堵后判断是否还有遗漏的孔。根据心脏彩超结果准确确定封堵部位,然后再根据缺损的形态、入口与出口大小及多个出口间的距离选择封堵器。多孔房间隔缺损如分布集中,可选择相对较大的缺损建立轨道释放封堵伞。本病例中,患者诊断明确,有手术指证,无明显手术禁忌症,该患者术前心脏彩超仅发现一个孔,常规行封堵术后复查心脏彩超发现封堵伞旁异常彩色血流,再次放入第二把封堵术,术后复查心脏彩超未见残余分流,术毕。嘱患者抗凝治疗半年。

## 左上肺静脉释放法封堵大房间隔缺损的疗效与观察

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**目的** 评价应用左上肺静脉释放法经导管介入治疗巨大继发孔型房间隔缺损(ASD)的疗效和安全性。

**方法** 全组13例,年龄15-49(30±9)岁。术前心脏彩超及食道超声均提示:ASD(继发孔型),最大直径28-34(30±2) mm,并排除其他合并先天畸形,其中11例缺损边缘距下腔静脉、房室瓣、冠状窦及心房顶部均≥5 mm,2例缺损距心房顶部约3-4 mm。介入方法:常规穿刺股静脉,置入6F动脉鞘,行右心导管检查,测得右室压及肺动脉压。建立股静脉—右房—ASD—左房—左上肺静脉轨道,将普通导丝交换为加硬导丝并保留,经导丝送入14F长鞘,封堵器直径按心脏超声测量的最大缺损直径加4-6 mm,选择对直径大于34 mm,残端较软,封堵器直径还可适当增加。将输送长鞘置入左上肺静脉,在左上肺静脉内打开左房伞,左心房内打开腰部和右房伞,封堵器呈葫芦状,轻轻回拉输送杆和输送长鞘,左房伞在左心房内弹开,右房伞在右心房内弹开,两侧盘片完全打开,与房间隔帖服良好,X线下推拉输送杆位置无变化,超声显示封堵器位置良好,无残余分流,对二尖瓣和三尖瓣均无影响,遂释放封堵器。

**结果** 13例应用的封堵器大小36 mm 8个,40 mm 5个,13例均手术成功。1例出现完全性右束支传导阻滞,术后给予激素治疗,一周后恢复。术后一天,1、3、6个月随访心脏彩超均显示封堵器无移位,无残余分流,增大的右房右室较术前有不同程度缩小,而且无心包填塞、完全性房室传导阻滞等手术相关并发症发生。

**结论** 左上肺静脉法主要适用于大ASD,因为封堵大ASD时封堵器易斜跨在房间隔上,左右封堵伞不能很好地帖服于房间隔两侧,本组患者ASD虽缺损巨大,但上下缘残端均有足够长度,保证了较强的支撑力,避免了封堵后封堵器的脱落,封堵伞两盘片呈葫芦状时,需要有足够长度,否则封堵伞两盘片有可能均在左房内打开,使封堵器不能到位。与右上肺静脉释放法相比更直观简便,应用该方法应尽量争取一次性成功,以减少对肺静脉内皮的损伤。13例巨大ASD患者应用左上肺静脉释放法介入封堵均获成功。术后随访疗效可靠,安全性好,创伤小,为患者避免了外科手术并节省了费用。由于病例数较少,远期疗效尚需进一步随访观察。

## 经卵圆孔未闭行左心耳封堵术的可行性和安全性观察

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**目的** 左心耳封堵术是预防心房颤动患者血栓栓塞事件

的新技术。部分患者合并卵圆孔未闭。本研究拟观察经房间隔缺损行左心耳封堵术的可行性及安全性。

**方法** 入选口服抗凝药治疗相对禁忌或出现不良反应的非瓣膜性心房颤动患者,拟行经皮左心耳封堵术,且术前进食道超声心动图检查提示卵圆孔未闭。

**结果** 共入选 18 例患者,其中男性 9 例(50%),平均年龄  $70.4 \pm 6.4$  岁,CHA2DS2-VASc 评分  $4.2 \pm 1.3$  分,HAS-BLED 评分  $2.8 \pm 1.0$  分,8 例(44.4%)既往卒中或 TIA 史。所有患者均成功完全经卵圆孔未闭植入左心耳封堵器,同时完成卵圆孔未闭封堵术,3 例(16.7%)少量残余分流  $\leq 3$  mm,手术时间及 X 线曝光时间为  $81.2 \pm 25.3$  min 及  $10.2 \pm 4.5$  min,未见手术相关严重并发症。术后 45 天复查经食道超声,未发现左心耳封堵器及卵圆孔未闭封堵器移位及封堵器表面血栓,2 例(11.1%)少量残余分流  $\leq 3$  mm。

**结论** 经房间隔缺损行左心耳封堵术是安全、可行的。

## 复杂先天性心脏病婴儿术后早期蛋白质供应剂量的研究

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**目的** 先天性心脏病(CHD)的婴儿体外循环(CPB)术后的合理的营养治疗是整个术后监护治疗中很重要的一部分。因为,CPB 会使机体发生激素和代谢紊乱,分解代谢类激素降低。因此,患者不仅处于高新陈代谢和高分解代谢状态,而且无法充分利用营养物质。有证据显示,营养不良与免疫损伤、感染、伤口愈合不良、骨骼肌和心肌退化(心脏病)、心脏与其他脏器功能障碍等的发病和死亡密切相关。因此,术后营养情况是否达标很大程度上决定了临床预后。但是几乎没有数据能够指导 CPB 术后婴儿的营养治疗方案。本课题的目的就是根据实测的每日静息能量消耗(REE)指导摄入合理的能量的基础上,研究了复杂性 CHD 病儿童术后早期蛋白质需要量,为合理的营养治疗提供更多的数据支持。

**方法** 38 例复杂 CHD 婴儿随机分为三组:对照组(NP)仅用普通的乳制品提供营养;中蛋白组(MP)通过额外添加纯乳清蛋白粉剂,提供的蛋白质为  $2.5$  g/kg/day;高蛋白组(HP)提供蛋白质为  $4$  g/kg/day。术后每日使用间接测热法定时监测患儿的 REE,并以此为基础计算每日的营养配

方。营养治疗的途径都是肠内营养,从术后 6 h 起开始连续进行 5 天。每日精确计算患儿的氮平衡情况,记录临床实验室指标和体格检查指标。

**结果** 3 组每日的 REE 及能量摄入情况,连续 5 日都没有明显的统计学差异( $P > 0.1$ )。通过氮平衡的计算可以看出,HP 组仅有术后前 2 日是负氮平衡,第 3 日起变为正氮平衡;而 NP 与 MP 组直到第 5 日仍然处于负氮平衡状态,并且 3 组之间的结果具有统计学意义( $P < 0.001$ )。另外,3 组之间肠内营养不耐受的情况没有明显的统计学差异。而 HP 组的血浆中的一些游离氨基酸出现了有益的变化。上臂围和三角肌皮褶厚度的 Z 值也有明显的改善。最后,三组之间肝功能和肾功能的临床监测指标没有显著差异。

**结论** 复杂性 CHD 婴儿在 CPB 术后的蛋白质摄入量需要达到  $4$  g/kg/day 才能满足患儿的需要。这个结果要明显高于现行的美国肠内肠外营养学会关于重症儿童营养治疗的指南要求。并且从术后 6 小时开始进行肠内营养是安全可靠的。而高蛋白质营养对体内游离氨基酸和临床体格检查指标都有益。但是还需进一步的研究来明确合适的能量和蛋白质营养方案与 CHD 婴儿临床预后的关系。

## Mechanism of pulmonary arteriovenous fistula after cavo-pulmonary Artery shunt surgery

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**Objective** The aim of this study is to investigate the relationship between the development of pulmonary arteriovenous fistula and nitric oxide overproduction after Glenn surgery. Cavo-pulmonary artery shunt is a very important palliative surgery for congenital heart disease. It is mainly used for treating single ventricle and functional single ventricle patients, including tricuspid atresia. Improving the performance of hypoxic cyanosis and achieving the purpose of physiological palliative circulation. Commonly procedures include: Glenn and Fontan surgery. Because they do not reach the level of anatomical correction, lots of complications may affect the prognosis of children. After Glenn, the hepatic blood flow did not enter the lungs. Therefore, pulmonary arteriovenous fistula is inevitable. There

is no sufficient oxygen in artery blood, then return to the left atrium, so cyanosis gradually aggravated, The activity of the patients decreased significantly. It is valueable of research and analysis.

**Methods** 2 adult Beagles, weighing 8.2 kg, 8.5 kg. under intraperitoneal injecting anaesthesia, right fourth intercostal approach, Superior vena cava and right atrium bypass, Glenn procedures. The animals were kept for 16 weeks after operation. By lethal injection of excessive anesthetic, we get the fresh lung tissues and frozen them. Pathological and chemical reagents were performed respectively.

**Results** Pathological revealed: Pulmonary arteriovenous fistula can be seen in the section of the right lung tissue. Presenting typical with thin wall, flexion and dilatation. No fistula detect in left lung tissue. Chemical reagents: nitric oxide in right lung tissue  $12.251 \pm 3.673 \mu\text{mol/g}$  tissue, in left lung  $7.225 \pm 2.824 \mu\text{mol/g}$  tissue. The difference was statistically significant ( $t=2.525, P=0.033$ ). Nitric oxide synthetase in right lung tissue  $27.353 \pm 3.682 \text{ nmol/g}$  tissue, in left lung  $10.672 \pm 2.861 \text{ nmol/g}$  tissue. The difference was statistically significant. ( $t=2.473, P=0.025$ ).

**Conclusions** with extension of time after Glenn shunt, The abnormal dilatation of small vessels gradually appeared in the lungs, classical pulmonary arteriovenous fistula. nitric oxide and nitric oxide synthetase increasing in these lung tissue.

## 支架植入治疗儿童特纳综合征合并主动脉缩窄一例

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**目的** 探讨儿童特纳综合征合并主动脉缩窄的治疗方法。

**方法** 回顾分析1例儿童特纳综合征合并主动脉缩窄的临床资料,分析其疗效。

**结果** 患儿女,9月9日,因“生长发育落后”来我院就诊,查体身高:129 cm,体重:32 kg,SpO<sub>2</sub> 98%,血压:右上肢132/92 mmHg 右下肢132/88 mmHg 左上肢138/96 mmHg 左下肢135/90 mmHg 胸骨左缘可闻及II/3级收缩期杂音,心

脏彩超:主动脉缩窄(狭窄处内径6.9 mm,血流速度3.4 mm/s,压差46.24 mmHg);心脏MRI:主动脉缩窄,左室增大;心电图:窦性心律;心脏三位片:左室增大,符合主动脉缩窄改变,FISH检测:XO30%,XX70%。诊断“特纳综合征合并主动脉缩窄”。入院后完善各项相关检查后,在全麻下行左心导管术+降主动脉造影术+经皮主动脉缩窄支架植入术,术后导管测压无压差,彩超测压差降至13 mmHg,随访两年,效果良好。

**结论** 支架植入术是治疗儿童特纳综合征合并主动脉缩窄的有效手段。

## 局麻经胸超声引导下经皮房间隔缺损封堵术

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**目的** 现今先心病的治疗越来越趋于微创化。我们的研究旨在探讨不需要X线设备、不需要全身麻醉、完全经胸彩超引导下经皮房间隔缺损封堵术治疗房间隔缺损的可行性。

**方法** 收集自2015年10月到2018年10月期间,在我院心脏大血管外科住院的房间隔缺损患者,共45例。45例患者均采用不需要X线设备、不需要全身麻醉、完全经胸彩超引导下经皮房间隔缺损封堵的方法进行治疗。术后规律随访12个月以上。

**结果** 45例入组患者全部封堵成功,术后未出现封堵伞移位、残余分流、传导阻滞、血管损伤、心包积液等并发症。45例患者中男性15例,女性30例,平均年龄 $37.1 \pm 11.3$ 岁,术前经胸超声测得的房缺最大径为 $19.6 \pm 5.8$  mm,术中应用封堵伞直径为 $26 \pm 5.4$  mm,手术时间 $101.4 \pm 41.7$ 分钟,术后住院日数 $2.9 \pm 1.1$ 天。术后随访12个月亦未出现相关并发症。

**结论** 不需要X线设备、局麻下完全经胸彩超引导下经皮房间隔缺损封堵术是可行且安全有效的,其创伤更小,住院时间更短,但是患者的选择还需要慎重,目前我们选择的患者超声显示房缺最大径为27 mm,应用的房缺封堵伞最大为34 mm,对于较大的房缺我们还是倾向于经胸封堵术。

## LncRNA 调控第二生心区细胞分化的机制研究

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**目的** 我国每年有12~20万先心病患儿出生,其中30%为复杂先心病,导致流产、围生期死亡和儿童残疾的几率非常高,目前对复杂先心病的发病机制了解甚少。第二生心区(SHF)细胞的分化异常会导致流出道及右心室发育异常,最终导致复杂而严重的先心病,但其具体机制尚不清楚。

**方法** 采用化学诱导法诱导人胚胎干细胞(Embryonic stem cell, ESC)定向心肌细胞分化,采用锁核苷酸(LNA)技术 knock-down Carmen 并检测 SHF 细胞的变化。采用 ATAC-Seq (Chromatin Isolation by RNA Purification) 检测 ESC 向 SHF 分化过程中染色质开放区域。采用 ChIRP-seq 分析 Carmen 与基因组 DNA 特异性结合的位点,综合分析 Carmen 对 SHF 细胞分化的转录调控机制。

**结果** ESC 能有效分化成跳动的心肌细胞,大部分是 Nkx2.5/Is11/Flk1 阳性的 SHF 细胞。LNA 技术敲低 Carmen 后发现,心脏中胚层标志基因 Mesp1 的表达受 Carmen 敲低的影响,但 SHF 细胞标志基因 Nkx2.5/Is11/Flk1 等的表达水平降低,搏动的心肌细胞面积减少。CHIRP-seq 结果分析显示 Carmen 与 Foxc1 的启动子区域有结合位点,敲低 Carmen 也会直接下调 Foxc1 的水平,导致搏动细胞减少。

**结论** 调控心脏中胚层发育的非编码 RNA Carmen 可通过调控 SHF 转录因子 Foxc1 的表达来促进心肌细胞分化。Carmen/Foxc1 轴是否调控胚胎心脏流出道发育尚需进一步研究。

## The effect of maternal folic acid supplementation in the 1st trimester of pregnancy on congenital heart disease in offspring

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**Objective** The effect of maternal folic acid supplementation (FAS) during periconceptional and pregnancy periods on congenital heart disease (CHD) in offspring is controversial among the previous studies. The aim of this study is to evaluate the effect of maternal folic acid supplementation in the 1<sup>st</sup> trimester of pregnancy on overall CHD and CHD types in offspring.

**Methods** This is a case-control study based on Guangdong Registry of Congenital Heart Disease (GRCHD). In this study, we included confirmed CHD cases in GRCHD from 2004 to 2016 and their controls. We defined FAS during the 1<sup>st</sup> trimester of pregnancy as "yes" when the mothers reported they took 0.4mg folic acid at least three days in a week continuously during the 1<sup>st</sup> trimester of pregnancy. we constructed the directed acyclic graph (DAG) based on our data and knowledge to make assumptions explicit and identifies the minimally sufficient set of variables needed to account for confounding of the exposure-outcome relationship. the effect of FAS in total CHD, CHD subtypes, CHD phenotypes were examined in three models. Model 1: no adjustment; Model 2: Adjusting sufficient adjustment sets for estimating the total effect of FAS on CHD according to DAG; Model 3: Adjusting all covariates that are statistically associated with CHD or FAS.

**Results** Totally, 8379 CHD cases and 6918 controls and their mothers were included in this study. Maternal FAS in the 1<sup>st</sup> trimester presented a protective effect on total CHD (OR, 95% CI=0.78 (0.71-0.86), 0.72 (0.64-0.80), 0.65 (0.58-0.72) in model 1, 2 and 3, respectively). This protective effect is more significant in critical CHD and multiple-lesion CHD than in minor CHD and isolated-lesion CHD (Figure 1). For CHD subtypes, we found significant protective effect of maternal FAS in the 1<sup>st</sup> trimester of pregnancy for conotruncal defects (TGA, ToF, DORV), AVSD, CoA, Ebstein anomaly and isolated VSD (Table 1).

**Conclusions** Maternal FAS in the 1<sup>st</sup> trimester of pregnancy can prevent their offspring from CHD, especially critical CHD and multiple-lesion CHD.

## 胎儿心脏横纹肌瘤的随访研究

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**目的** 探讨胎儿心脏横纹肌瘤的治疗转归以及与结节硬化症的关系。

**方法** 2013年1月至2018年12月广东省妇幼保健院心脏中心门诊通过胎儿超声心动图诊断疑为胎儿心脏横纹肌瘤的孕妇共91例, 年龄20-38岁, 就诊胎龄20-37 w。共出生34例(37.4%), 其中手术3例; 引产32例(35.2%); 失访25例(27.4%)。出生患儿均完善超声心动图、胸片和心电图检查, 部分完善头颅B超、头颅MRI、眼底检查及TSC1/TSC2基因检测, 共随访1-55个月。

**结果** 出生患儿中横纹肌瘤单发22例, 多发12例。随访中2例(5.8%)患儿横纹肌瘤消失; 20例(58.8%)呈减小趋势; 12例(35.2%)大小基本不变; 无增大病例。3例患儿因肿瘤阻挡右室流出道或阻挡三尖瓣血流造成三尖瓣关闭不全行外科手术治疗, 其中2例病理确诊为横纹肌瘤, 1例病理确诊为血管瘤。共10例(29.4%)完善基因检测, 1例TSC1阳性, 3例TSC2阳性, 6例基因阴性。共13例(38.2%)行头颅MRI检查, 3例提示头颅可见结节, 10例头颅MRI正常。共13例行眼底检查, 2例眼底可见结节, 11例眼底无异常。随访中1例在1岁出现神经症状; 均无皮肤色素脱失斑。

**结论** 胎儿横纹肌瘤生后会缩小甚至消失, 若没有血流动力学影响可继续观察, 若造成血流动力学影响, 应尽早手术干预。胎儿横纹肌瘤与结节性硬化症密切相关, 在胎儿时期应完善基因监测并给予合理家庭指导。

## Multimodal image technologies in diagnose of unilateral absence of the right pulmonary artery: a review of six cases

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**Objective** To highlight the variation in clinical manifestations, imaging and management of six cases of unilateral absence of right pulmonary artery.

**Methods** Six patients with UARPA were referred to our hospital from 2013 to 2018. They underwent a series of investigations, including chest X-ray, echocardiography, contrast-enhanced computed tomography, pulmonary angiography and aortography.

**Results** Four of the six patients were found to have abnormalities by chest X-ray examination, Five patients were diagnosed as UARPA by echocardiography, and another was misdiagnosed. All patients were eventually diagnosed as UARPA by chest contrast-enhanced computed tomography and pulmonary angiography. All patients had combined with other cardiovascular structural abnormalities which confirmed by echocardiography and chest contrast-enhanced computed tomography. Echocardiography revealed three patients with pulmonary hypertension (PHT), two of which were confirmed by right heart catheterization.

**Conclusions** UARPA has a non-specific presentation. Earlier detection of this condition can lead to earlier diagnosis, with multimodal image technologies making an important contribution.

## Fabrication of Engineered Nanoparticles on Biological Macromolecular (PEGylated Chitosan) composite for bio-active Hydrogel System in Cardiac Repair Applications

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**Objective** The development of advanced nano-mediated biological macromolecular (PEGylated Chitosan) hydrogel materials is a vital approach to enhance the efficiency of cardiac tissue applications for treatment of cardiac tissue repair. Definite properties of PEG and chitosan hydrogel matrixes including swelling, mechanical stability and porosity need to be further improved with effective and non-toxic nanoparticles to promote the cell adhesion and organization of cardiac cells. In the current study, we fabricated engineered spherical TiO<sub>2</sub> nanoparticles into the biologically active macromolecular (PEG/CTS) hydrogel matrixes with enhanced physico-chemical and biological properties. The morphological improved spherical TiO<sub>2</sub> NPs have been highly dispersed in the porous hydrogel structure and effectively promoted young modulus and swelling properties and also exhibited favorable cell adhesion and organization with the cardiomyocytes cells. The stained fluorescence images of TiO<sub>2</sub>-PEG/CTS hydrogels on the cardiomyocytes cells show the excellent cell-hydrogel matrix interactions.

**Methods** The development of advanced nano-mediated biological macromolecular (PEGylated Chitosan) hydrogel materials is a vital approach to enhance the efficiency of cardiac tissue applications for treatment of cardiac tissue repair. Definite properties of PEG and chitosan hydrogel matrixes including swelling, mechanical stability and porosity need to be further improved with effective and non-toxic nanoparticles to promote the cell adhesion and organization of cardiac cells. In the current study, we fabricated engineered spherical TiO<sub>2</sub> nanoparticles into the biologically active macromolecular (PEG/CTS)

hydrogel matrixes with enhanced physico-chemical and biological properties. The morphological improved spherical TiO<sub>2</sub> NPs have been highly dispersed in the porous hydrogel structure and effectively promoted young modulus and swelling properties and also exhibited favorable cell adhesion and organization with the cardiomyocytes cells. The stained fluorescence images of TiO<sub>2</sub>-PEG/CTS hydrogels on the cardiomyocytes cells show the excellent cell-hydrogel matrix interactions.

**Results** The development of advanced nano-mediated biological macromolecular (PEGylated Chitosan) hydrogel materials is a vital approach to enhance the efficiency of cardiac tissue applications for treatment of cardiac tissue repair. Definite properties of PEG and chitosan hydrogel matrixes including swelling, mechanical stability and porosity need to be further improved with effective and non-toxic nanoparticles to promote the cell adhesion and organization of cardiac cells. In the current study, we fabricated engineered spherical TiO<sub>2</sub> nanoparticles into the biologically active macromolecular (PEG/CTS) hydrogel matrixes with enhanced physico-chemical and biological properties. The morphological improved spherical TiO<sub>2</sub> NPs have been highly dispersed in the porous hydrogel structure and effectively promoted young modulus and swelling properties and also exhibited favorable cell adhesion and organization with the cardiomyocytes cells. The stained fluorescence images of TiO<sub>2</sub>-PEG/CTS hydrogels on the cardiomyocytes cells show the excellent cell-hydrogel matrix interactions.

**Conclusions** The development of advanced nano-mediated biological macromolecular (PEGylated Chitosan) hydrogel materials is a vital approach to enhance the efficiency of cardiac tissue applications for treatment of cardiac tissue repair. Definite properties of PEG and chitosan hydrogel matrixes including swelling, mechanical stability and porosity need to be further improved with effective and non-toxic nanoparticles to promote the cell adhesion and organization of cardiac cells. In the current study, we fabricated engineered spherical TiO<sub>2</sub> nanoparticles into the biologically active macromolecular (PEG/CTS) hydrogel matrixes with enhanced physico-chemical and biological properties. The morphological improved spherical TiO<sub>2</sub> NPs have been highly dispersed in the porous hydrogel structure and effectively promoted young modulus and swelling properties and also exhibited favorable cell adhesion and organization with the cardiomyocytes cells. The stained fluores-

cence images of TiO<sub>2</sub>-PEG/CTS hydrogels on the cardiomyocytes cells show the excellent cell-hydrogel matrix interactions.

## A Prospective, Randomized, Controlled Trial of Trimetazidine versus Placebo for Prevention of Acute Mountain Sickness

Geng Qian

Chinese PLA General Hospital

**Objective** Aims: To explore the efficacy of trimetazidine versus placebo in preventing acute mountain sickness (AMS).

**Methods** Methods: 79 healthy young Chinese men residing at low altitude were randomly assigned to groups receiving trimetazidine or placebo after the collection of baseline data. After 6 days of receiving the drug or the placebo regimen, the subjects were taken to an elevation of 4000 m over the course of 40 hours, during which time routine blood testing, blood biochemical testing, blood gas analysis, and treadmill exercise testing were performed. Primary outcome measure was the incidence of acute mountain sickness. Participants used to self-evaluate their state of acute mountain sickness using the classic version of Lake Louise Questionnaire, which lists 5 symptoms: headache, gastrointestinal symptoms (anorexia, nausea, or vomiting), fatigue/weakness, dizziness/lightheadedness, and difficulty sleeping. Each symptom can be rated from 0-3 points according to severity, and the scores for all five of the symptoms are added together to produce the final AMS score. AMS is defined by a total score  $\geq 3$  in the presence of a headache. Secondary outcome measures were the results of the tests performed.

**Results** Results: The incidence of AMS was significantly lower in the treatment group than in the placebo group (30.6% vs. 54.3%,  $P=0.043$ , odds ratio 0.37, 95% confidence interval 0.14 to 0.98). Among the four symptoms of AMS, the incidence of weakness in the treatment group was lower than in the placebo group (38.9% vs. 65.7%,  $P=0.024$ , odds ratio 0.33, 95% confidence interval 0.13 to 0.87). The HDL cholesterol level was significantly higher in the treatment group ( $P=0.022$ ). There were no significant differences between the two groups with regard to the results of routine blood tests, blood

gas analysis, pulse oxygen saturation measurement, or treadmill exercise tests at high altitudes.

**Conclusions** Conclusions: Trimetazidine was found to be effective in reducing the incidence of AMS, especially reducing the incidence of the symptom of weakness.

## Effect of cardiomyopeptidin on left ventricular function in patients with acute inferior myocardial infarction

Geng Qian

Chinese PLA General Hospital

**Objective** Cardiomyopeptidin plays cardio-protective and injury repair roles. To investigate the cardioprotective effect of cardiomyopeptidin in patients with acute inferior myocardial infarction receiving percutaneous coronary intervention therapy.

**Methods** We conducted a randomised, two-blinded study enrolling 98 consecutive patients with acute myocardial infarction who received primary PCI therapy at CCU of China PLA general hospital between 2016 and 2017. These patients were randomized to either cardiomyopeptidin group (n=49) or control group (n=49). Patients in cardiomyopeptidin group received, while the control group were given routine medication. The left ventricular ejection fraction (LVEF) was evaluated with Doppler echocardiography. A 5F thermistor-tipped catheter was inserted into the femoral artery of the patient. A double-lumencentral venous catheter was inserted into the internal jugular vein. Three central venous injections of 15-mL boluses of cold isotonic saline were injected within 7 seconds, PiCCO was measured at each of these time points, and the values analyzed were the average of these 3 consecutive measurements. The cardiac index (CI), global end-diastolic index (GEDI), and extravascular lung water index (ELWI) were measured by PiCCO. All operations were performed by CCU physicians under the supervision of fellows, and all catheter positions were confirmed via standard portable chest radiograph.

**Results** There was no significant differences of patients characteristics and presentation between two groups. Likewise, baseline levels of myocardial enzyme (including CK, CK-MB and c-TnT) are similar for two groups ( $P>0.05$ ). Cardiomyo-

peptidin treatment significantly decreased the serum levels of CK and CRP in contrast to that of control group. In contrast to control group, the post-PCI level of LVEF increased significantly in cardiomyopeptidin group ( $P<0.05$ ). There was no significant differences of CVP and CI for two groups post-PCI ( $P>0.05$ ). Cardiomyopeptidin treatment increased GEDV and ELWI markedly (GEDV:  $2105.367\pm 657.411$  mL vs.  $1262.959\pm 465.887$  mL,  $P<0.05$ ; ELWI:  $11.939\pm 4.413$  vs.  $9.245\pm 2.594$  mL/kg,  $P<0.05$ ).

**Conclusions** Cardiomyopeptidin could improve cardiac function in acute myocardial infarction patients after primary PCI.

## 异常高表达 miR-331 导致心脏功能异常

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**目的** microRNA(miR)作为一类重要的非编码RNA,在心脏的病理、生理过程中发挥重要的调控作用。近期研究发现 miR-331 在房颤患者后代和无二尖瓣脱垂的马凡综合征患者的血浆,miR-331-3p 表达上调。但是其具体生理作用和机制未知。本课题拟研究 miR-331 在心脏中发挥的作用,为丰富心脏中 microRNA-mRNA 相互作用机制提供新的证据。

**方法** 主动脉弓缩窄手术(TAC)构建心肌肥厚模型,qPCR 检测 miR-331-3p 表达情况。SD 成鼠心肌细胞过表达 miR-331,利用全细胞膜片钳结合共聚焦显微镜观察细胞钙电流的变化。通过生物信息学方法,分析预测 miR-331 的靶基因。通过荧光素酶报告基因、qPCR、Western Blot 等方法研究 miR-331 的靶基因。利用基因重组技术构建 miR-331 转基因大鼠,应用超声心动图观察大鼠心脏功能。使用全细胞膜片钳结合共聚焦显微镜分析 miR-331 转基因大鼠心肌细胞兴奋收缩耦联效率以及心肌细胞收缩功能的变化。

**结果** TAC 术后 4 个月大鼠心脏左室后壁厚度较假手术组显著增厚( $2.95\pm 0.02$  mm vs.  $1.92\pm 0.03$  mm,  $P<0.01$ ),且心肌组织 miR-331-3p 表达水平显著升高( $P<0.05$ )。SD 大鼠心肌细胞过表达 miR-331 后,细胞兴奋收缩耦联效率显著下降( $P<0.05$ )。

通过生物信息学方法发现 miR-331 与 JPH2(Junctophilin2)基因相关。荧光素酶报告基因实验发现 miR-

331-3p 与 JP2 的 3' 非翻译区均无明显靶效关系。通过分析 JPH2 的 mRNA 序列发现,编码区存在 miR-331-3p 的结合位点。荧光素酶报告基因实验显示 miR-331-3p 下调插入 JPH2 编码区的报告基因质粒的荧光素酶表达。

为了探究 miR-331 对整体心脏功能的影响,构建了 miR-331 的转基因大鼠。miR-331 过表达大鼠的心脏收缩功能下降(短轴收缩率,  $33.6\pm 2.63\%$ ,  $33.2\pm 4.19\%$  vs  $44.9\pm 4.47\%$ ,  $P<0.01$ )。转基因鼠心肌细胞水平 L 型钙通道与基膜网膜上的兰尼丁受体之间的耦联效率显著下降( $P<0.05$ )。

**结论** miR-331 异常高表达下调 JPH2 的表达水平,导致心肌细胞兴奋收缩耦联效率下降,进而导致心脏收缩功能受损。本研究为 microRNA 与 mRNA 相互作用研究提供了新证据。

## Urban-Rural Comparisons in Profiles, Management, and Outcomes for Patients Hospitalized for Heart Failure in China—The China PEACE Retrospective Heart Failure Study

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**Objective** We aim to compare profiles, management and outcomes for patients hospitalized for heart failure in urban and rural area of China in 2015, and compare variations of quality of care for patients hospitalized for heart failure within urban hospitals and rural hospitals.

**Methods** In a retrospective analysis of hospital records from 2015, we created a nationally representative cohort of admissions for HF in China, using a 2-stage random sampling design in 2 urban and 3 rural strata. We compared demographic and clinical characteristics, treatment patterns, guideline-



based performance measures (left ventricular ejection fraction assessment during hospitalization,  $\beta$  blocker for eligible patients at discharge, angiotensin-converting-enzyme inhibitors or angiotensin receptor blockers for eligible patients at discharge, scheduled appointment at discharge and a composite performance measure averaging these measures) and in-hospital outcomes (major complications, length of stay and in-hospital mortality) between urban and rural hospitals. Adjusted performance measures and outcomes were compared after accounting for demographic features and comorbidities. Moreover, we calculated median odds ratio of risk-standardized performance measures and outcomes for each hospital by accounting for clustering of patients within hospitals and compare variations of quality of care for heart failure within urban and rural hospitals.

**Results** The final sample included 4358 (43.7%) and 5619 (56.3%) admissions for heart failure in 84 (44.9%) urban hospitals and 103 (55.1%) rural hospitals respectively. Patients admitted to urban hospitals were more likely to have a history of smoking (24.29% vs. 19.67%,  $P<0.001$ ) and alcoholism (4.61% vs. 3.36%,  $P=0.0015$ ). Patients admitted to urban hospitals were complicated with more comorbidities and more likely to receive angiotensin-converting-enzyme inhibitors (31.21% vs. 28.87%,  $P=0.0156$ ), angiotensin receptor blockers (23.37% vs. 15.27%,  $P<0.0001$ ),  $\beta$  blocker (48.21% vs. 35.29%,  $P<0.0001$ ), aldosterone (60.51% vs. 55.01%,  $P<0.0001$ ), diuretics (97.99% vs. 96.76%,  $P=0.0002$ ) and inotropes (55.01% vs. 52.27%,  $P=0.0064$ ) during hospitalization. Patients in urban hospitals underwent more procedures than rural hospitals during hospitalization. Performance measures were consistently more applied in urban hospitals than rural hospitals. Patients in urban hospitals experienced higher major complication rate (3.12% vs. 1.65%,  $P<0.0001$ ), longer length-of-stay (10 vs. 9,  $P<0.001$ ), and higher mortality rate (3.56% vs. 2.78%,  $P=0.0269$ ) compared with rural hospitals. While disparities persisted in  $\beta$  blocker (OR=1.5, 95% CI 1.01–2.23,  $P=0.0475$ ), left ventricular ejection fraction assessment (OR=2.4, 95% CI 1.69–3.41,  $P<0.0001$ ), composite performance measures (OR=1.64, 95% CI 1.26–2.12,  $P=0.0002$ ), major complication rate (OR=1.91, 95% CI 1.27–2.87,  $P=0.0022$ ) and length of stay (coefficient=0.13,  $t=4.44$ ,  $P<0.0001$ ) after adjusting for demographic and comorbidities, no significant difference was detected in all performance measures and outcomes after adjusting individual and hospital characteristics. Higher median odds ratio and/or intra-

class coefficient in all risk standardized performance measures and mortality rates were observed among rural hospitals, whereas urban hospitals demonstrated greater one in risk standardized major complication rate and length of stay.

**Conclusions** Our study manifested more severe profiles of comorbidities in patients hospitalized for heart failure in urban than rural hospitals. Urban-rural disparities in adherence to guideline-based performance measures and outcomes were observed and could be explained by difference in patient profiles and hospital characteristics. Despite so, substantial gaps in quality of care persisted in both settings. Greater variations in adherence to guideline-based performance measures were detected within rural hospitals than urban hospitals.

## Potential mechanisms of Shen-su-yin, a traditional herbal medicine, attenuating lipopolysaccharide-induced septic cardiomyopathy in rats

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**Objective** To research the effects of therapy with Shen-su-yin (SSY) on lipopolysaccharide (LPS)-induced septic cardiomyopathy (SCM) in rats and the underlying molecular mechanisms.

**Methods** 48 rats were randomly divided into 4 groups ( $n=12$ /group): control (Ctrl), SCM, low- (SSY-LD, 10 ml/kg) and high- (SSY-HD, 30 ml/kg) dose SSY-treated SCM group. SSY was prepared beforehand and administered immediately after LPS (7.5 mg/kg) injection in SSY-treated groups. At 24h, blood was collected for blood gas analysis and determination of lactate, cardiac troponin-I (cTnI) and brain natriuretic peptide (BNP). Cardiac function evaluation through echocardiography and invasive hemodynamic measurement [central venous pressure (CVP), heart rate (HR), systemic blood pressure (SBP), left ventricular systolic/end-diastolic pressure (LVSP/LVEDP) and their first derivative with respect to time ( $\pm dp/dt_{max}$ )] via internal jugular vein and carotid catheter were performed. Then, all rats were euthanized and heart samples were

collecting for histopathological analyses and assessing levels of inflammatory/anti-inflammatory cytokines (TNF- $\alpha$ , IL-1 $\beta$ , IL-6, CXCL2 and IL-10), oxidative/anti-oxidative factors ( $\cdot$ OH, H<sub>2</sub>O<sub>2</sub>, malondialdehyde and SOD) and myocardial apoptosis (TUNEL staining). Western blotting was further used to evaluate the expression of NF- $\kappa$ B (P-IKK $\beta$ /IKK $\beta$ , P-IKB $\alpha$ /IKB $\alpha$  and P-p65/p65), Keap1-Nrf2-ARE (Keap1, Nrf2, HO-1, GCLC and NQO1) and Caspase-3 (Bcl-2, Bax and cleaved-caspase-3) cell signaling pathway.

**Results** SSY stabilized hemodynamic disorders, decreased blood lactate and myocardial injury levels, improved PaO<sub>2</sub>/FiO<sub>2</sub> index, cardiac function and myocardial pathological changes in SCM rats. In addition, SSY reduced levels of apoptosis, pro-inflammatory and oxidative mediums while increased levels of anti-inflammatory and anti-oxidative activity in cardiac tissues. Moreover, SSY suppressed the NF- $\kappa$ B and Caspase-3 signalling pathway while activated the Keap1-Nrf2-ARE signalling pathway. Interestingly, all the effects caused by SSY were more effective in the SSY-HD group than those of SSY-LD group.

**Conclusions** We demonstrated that SSY has dose-dependently cardioprotective effects in SCM rats through its anti-inflammation, anti-apoptosis and anti-oxidation effects by regulating NF- $\kappa$ B, Caspase-3 and Keap1-Nrf2-ARE signalling pathway respectively.

## 蒙特利尔认知评分对心力衰竭患者预后的预测价值

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**目的** 心力衰竭患者中认知功能减低发生率较高, 本研究旨在探讨中国心衰患者中认知功能对预后的影响。

**方法** 一项多中心注册研究在中国 24 家医院连续入组 990 例患者, 记录患者基线资料, 对所有患者均进行蒙特利尔认知评估 (MoCA), 按 MoCA 分值将患者分为 <26 分组 (628 例) 和  $\geq$ 26 分组 (362 例), 分析其在人口学、心衰病情、危险因素、合并症、用药等方面的情况, 并进行 1 年随访。应用单因素及多因素 Cox 回归, 分析心衰患者认知功能对 1 年全因死亡、心血管死亡、主要不良心血管事件 (MACE)、因心衰再住院等终点的影响。

**结果** 63.4% 的心衰患者存在认知功能减低。与 MoCA  $\geq$ 26 分组相比, <26 分组年龄更大 ( $P < 0.001$ ), 女性 ( $P < 0.001$ ) 及 NYHA III-IV 级 ( $P = 0.005$ ) 的比例更高, 具有较低的教育程度 ( $P < 0.001$ )、较低的医疗保险率 ( $P < 0.001$ )、较低的 BMI ( $P = 0.001$ )、较高的收缩压 ( $P < 0.001$ )、较高的 COPD 合并率 ( $P = 0.042$ )、较低的介入治疗 ( $P = 0.001$ )、器械植入 ( $P = 0.043$ ) 和心脏外科手术史 ( $P = 0.029$ )、 $\beta$  受体阻滞剂 ( $P < 0.001$ ) 和 RAAS 抑制剂 ( $P = 0.032$ ) 的使用率均明显减低。随着 MoCA 分值的降低其 1 年全因死亡 (10.2% vs 2.2%,  $P < 0.001$ )、心血管死亡 (5.9% vs 0.8%,  $P < 0.001$ ) 和 MACE (9.6% vs 2.5%,  $P < 0.001$ ) 均升高。多因素 Cox 及 Logistic 回归分析显示, 与  $\geq$ 26 分组相比, MoCA <26 分组是心衰患者 1 年全因死亡 [HR (95% CI): 3.686 (1.712-7.934),  $P = 0.001$ ], 心血管死亡 [HR (95% CI): 7.835 (2.343-26.196),  $P = 0.001$ ]、MACE [OR (95% CI): 3.633 (1.741-7.581),  $P = 0.001$ ] 发生的独立危险因素。

**结论** 心衰患者中合并认知功能障碍的比例较高, 心衰患者认知功能不良是 1 年全因死亡、心血管死亡和 MACE 的独立预测因素, 可能与患者人口学特征、医疗保健获得困难、自我照顾能力降低、依从性减低等多因素有关。建议对心衰患者常规进行认知功能评估, 积极干预。

## 慢性心力衰竭患者康复评估与康复治疗

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慢性心力衰竭 (CHF) 所造成的身体活动能力减退无疑是一种导致身体“残疾”的类型, 所以康复训练必须作为 CHF 的一项基本的治疗手段。

### 心力衰竭与康复

研究证实运动康复作为一个治疗方法对心衰患者机体与心血管系统均有明显的作用, 主要是: ①提高并改善骨骼肌对氧的摄取能力及利用能力, 提高机体的最大摄氧量, 改善血流动力学; ②康复运动可交感神经的激活程度下降和迷走神经的程度加强; ③促进冠脉侧支形成和冠脉舒缩, 增加心搏量和冠脉血流量; ④改善呼吸肌的耐力。

### 心力衰竭患者的康复评估

患者评估与康复运动的选择 实施康复治疗前必须根据患者心功能状态作全面评估,排除禁忌症,对病情达到稳定状态的 NYHA 分级在 II~III 级之间的心衰患者进行运动训练是安全可行的。目前,评估患者身体状况的方法主要有:6 分钟步行试验、心肺运动试验和气体代谢运动试验。CHF 患者康复运动的方法。

(1) 康复运动方法 确定康复运动方法要作一下考量:

①耐力锻炼,如步行、跑步、游泳、爬楼和蹬车,能增加患者的最大氧耗量,是一种有氧运动;②弹力锻炼,可以改善关节的运动范围;③阻力锻炼,需要借助一定的器械,心衰患者一般不建议选用。

(2) 运动处方 ①运动强度:应低于无氧阈值,以  $VO_2$  峰值的 50%~70% 为指标,或靶心率为最大心率的 60%~80%;②运动持续时间:开始 10~20 分钟/次,逐渐增至 30~40 分钟/次;③运动频率:每周 3~5 次。制定运动处方直接关系到运动的效果和安全性,因此,根据患者状况掌握合适的运动强度是制订及执行慢性心力衰竭有运动处方的关键。

(3) 康复运动方案的实施 提倡三期锻炼方案:① I 期:是间断运动锻炼,可先行慢走运动,运动强度建议为 25%~60% 的  $VO_{2max}$ ,运动中需要严密监测患者的生命体征,应预先准备好抢救药品及心肺复设施;② II 期:是完成 I 期锻炼后,应重新测定最大氧耗量,以新的  $VO_{2max}$  的 60% 为起始量,根据患者的耐量逐步增加运动的时间和强度,为期 4~6 周;③ III 期:主要是制定家庭运动计划定期随访。

#### 4. 展望

康复运动可以改善 CHF 患者的血流动力学状态,提高最大心排量、心率、每搏量,也可以提高内皮舒张能力、增加细胞氧化酶活性、调节神经内分泌功能,从而加强心力衰竭患者的运动耐力,提高日常生活能力,从而改善生活质量。通过家庭——社区——医院三位一体管理与康复运动相结合将是心力衰竭患者治疗的新模式。

## 血液超滤在利尿剂抵抗的失代偿性心力衰竭患者中疗效及安全

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**目的** 血液超滤 (ultrafiltration, UF) 作为替代利尿剂治疗失代偿性 HF 患者有效而安全的治疗手段。然而,目前国内对于 UF 在利尿剂抵抗的失代偿性 HF 患者中的疗效及安全性如何,相关研究甚少及结论存在争论。本研究将

评估 UF 在利尿剂抵抗的失代偿性 HF 患者中的疗效及完全性。

**方法** 将连续收集 2017 年 3 月—2018 年 3 月在武汉亚洲心脏病医院接受大剂量利尿剂后 (80 mg/d 以上呋塞米,使用至少 48 小时) 仍存在明显液体滞留患者,分为超滤组和继续利尿剂组。

**结果** 最终入选 56 例利尿剂抵抗的失代偿性心力衰竭患者,其中 30 例患者接受超滤治疗,26 例患者继续接受利尿剂治疗。治疗 48 小时后,相比利尿剂组,超滤组患者尿量较低 (1258 ml vs. 1896 ml,  $P=0.0052$ ), 液体丢失更多 (4826 ml vs. 1358 ml,  $P=0.0002$ ) 及体重下降更为明显 (4.8 kg vs. 1.3 kg,  $P=0.024$ )。另外,超滤组患者住院时间明显降低 (4.5 天 vs. 7.5 天,  $P=0.028$ )。两组患者 30 天内因心力衰竭急诊就医及再次住院无统计学差异;90 天内,超滤组患者急诊就医次数更少 (1.8 次 vs. 3.2 次,  $P=0.048$ ), 再次住院次数更少 (1.5 次 vs. 2.8 次,  $P=0.046$ )。标准 EQ-5D-3L 健康调查问卷评分,超滤组患者在出院时评分降低更多 (2.8 分 vs. 1.9 分,  $P=0.032$ ), 30 天 (2.6 分 vs. 1.2 分,  $P=0.028$ )。超滤组患者在治疗期间未发现不良事件。

**结论** 血液超滤在利尿剂抵抗的失代偿性心力衰竭患者中疗效肯定及安全可靠。

## 射血分数保留心衰患者肺功能异常特征

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**目的** 此研究中,我们探索 HFpEF 中肺功能异常的频率、类型及严重程度。

**方法** 我们在 138 个新诊断的症状性 HFpEF 门诊患者中,测定用力肺活量、静态肺容积、肺弥散量 (DLco) 及动脉血气。

**结果** 我们发现 94% 患者测得的肺功能中至少一项异常: 59% 肺活量异常【轻、中、重度分别为: 30 (23%)、36 (27%)、12 (9%)】、83% CO 弥散量 (DLco) 异常【轻、中、重度分别为: 63 (48%)、38 (29%)、8 (6%)】及 62% 动脉低血氧【轻、中、重度分别为: 46 (35%)、28 (21%)、7 (5%)】。其严重程度在患者间不同,在 NYHA 心功能分级 II (59%) / III 级 (39%) 患者更常见,且大多数未被诊断及治疗。

**结论** HFpEF 患者中肺功能异常极常见,肺活量异常、CO 弥散量异常及动脉低血氧十分常见,应该加以关注,临

床医生对肺功能更好理解,有助于改善患者管理和健康状况。

## Allicin Protect Against Cardiac Fibrosis In Mice Model After Myocardial Infarction

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**Objective** Myocardial infarction (MI) is the leading cause of death in the worldwide, which is characterized by myocardial remodeling processes involving left ventricular (LV) dilation, cardiomyocyte hypertrophy, arrhythmias, and cardiac fibrosis, leading to heart failure. A finding particularly relevant to the present work is allicin post-conditioning induced cardio-protection against myocardial ischemia-reperfusion injury in this catheter-based porcine model of AMI. To evaluate whether allicin can prevent myocardial fibrosis in mice model after acute myocardial infarction (AMI). What key role that allicin plays in the pathogenesis of MI and how exactly allicin takes its actions have not been completely investigated. Thus, the mechanism of allicin regulates myocardial fibrosis remain unknown.

**Methods** Healthy male C57BL/6 mice were randomized into 3 groups: sham-operation group (n=8), control group (n=10), and allicin group (n=10). The left descending coronary artery (LAD) was ligated with a nylon suture at 2 mm below the border between left atrium and ventricle to induce myocardial infarction. MI was detected by significantly S-T segment elevation in ECG. The sham-operated mice for control under went the same procedure as the MI group but without ligation of LAD. The mice were measured for echocardiography and hemodynamic measurements 2 and 4 weeks after MI. The ascending aortic artery was clamped for transfection of allicin. The allicin was injected into the left ventricular chamber and was forced into the coronary arteries when aortic artery was clamped for 15 s. Sham group mice received DMEM for control. After 15 min of injection, myocardial infarction was induced. The hearts were collected 4 weeks after the procedure and fixed in formalin liquid for 24 h, embedded with paraffin, then cut the center of the fibrotic scar into thick cross-sectional slices. The slices were stained by Masson trichrome. Fibrotic tis-

sue was stained blue and myocardium stained red. The fibrotic areas are calculated with image analysis software. We used the percentage of fibrotic tissue area to the myocardial surface area and fibrotic area to obtain the collagen volume fraction for evaluation of the cardiac fibrosis. NMCFs were isolated from 2-day-old mice with trypsin and cultured in DMEM. At 90% confluence they were treated with allicin after free serum for 24 h. Cell viability was assessed by measuring the mitochondrial dependent reduction of MTT. Total protein samples were extracted from 3 groups of mice. We measured the level of collagen I and collagen III both in protein and mRNA, Immunoblotting analysis was performed, and the total protein was electrophoresed on SDS-PAGE. Total RNA samples were collected from neonatal mouse CFs, and qRT-PCR was performed.

**Results** Allicin has a preventive effect on the mice model of cardiac fibrosis after myocardial infarction. Fibrosis as key contributors to scar formation, and it is crucial for tissue repair after MI.

**Conclusions** As the consequence of fibrosis, millions of people suffer subsequent coronary events after MI, leading to further loss of cardiac muscle and additional deposition of collagen in ECM. Due to the limitation of technology molecular mechanism and the signalling pathways of allicin is still uncertain. Thus far, allicin merits further detailed studies for its potential as a therapeutic target for reversing cardiac fibrosis.

## 沙库巴曲缬沙坦对 50 例扩张性心肌病心力衰竭患者的临床疗效观察

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**目的** 探讨沙库巴曲缬沙坦治疗扩张型心肌病心力衰竭患者的疗效和安全性。

**方法** 选取 2017 年 9 月至 2018 年 6 月治疗的 50 例扩张性心肌病心力衰竭患者。首先采用血管紧张素转化酶抑制剂、 $\beta$ 受体阻滞剂及利尿剂等进行治疗,同时安排患者卧床休息,适度吸氧;再停用血管紧张素转化酶抑制剂 36 小时,改用沙库巴曲缬沙坦钠片 (Novartis Pharma Schweiz AG, H20170362, 50 mg/片),口服,50 mg/次,2 次/天,依据患者的病情变化及耐受情况,剂量调整为 200 mg/d 并

至最大耐受量。连续治疗3个月。观察患者的收缩压、左心射心分数(LVEF)、左室舒张末期内径(LVEDD)、肌酐、肾小球清除率、总蛋白、总胆红素、总胆固醇、低密度脂蛋白、血红蛋白、血小板、红细胞压积、血小板压积、血红蛋白/红细胞压积、血小板/血小板压积的变化及临床有效性。**结果** 治疗的总有效率为72%。患者治疗前后的收缩压( $P=0.016$ )、LVEDD( $P=0.04$ )、血红蛋白( $P=0.015$ )均出现降低,LVEF出现提高,差异有统计学意义( $P<0.05$ )。患者治疗前后的肌酐、肾小球清除率、总蛋白、总胆红素、总胆固醇、低密度脂蛋白、血小板、红细胞压积、血小板压积、血红蛋白/红细胞压积、血小板/血小板压积,差异无统计学意义( $P>0.05$ )。

**结论** 沙库巴曲缬沙坦治疗扩张型心肌病心力衰竭有效,安全可靠,值得临床推广应用。今后使用沙库巴曲缬沙坦治疗心力衰竭的同时要关注患者血红蛋白的变化从而采取预防性措施。同时呼吁更多医生在使用沙库巴曲缬沙坦药物时,在病人能耐受的情况前提下尽量达到最大目标剂量。

## 老年心力衰竭患者生活质量及影响因素

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**目的** 了解和评估老年心力衰竭患者生活质量的现状,并分析其影响因素。

**方法** 采用便利抽样法,抽取长春市2所三级甲等医院200例老年心力衰竭患者,使用生活质量调查问卷和生活质量评价指数(GOHA1)进行调查,使用单因素分析和多元逐步回归分析对患者生活质量的影响因素进行分析。

**结果** 老年心力衰竭患者生活质量总分为( $33.98\pm 3.62$ )分,老年心力衰竭患者的生活质量受到其自身特点(病程长短、文化程度、经济状况)和患者自身行为(是否积极社交、是否及时就医)的影响。

**结论** 老年心力衰竭患者的生活质量受到其自身特点(病程长短、文化程度、经济状况)和患者自身行为(是否积极社交、是否及时就医)的影响。我国老年心力衰竭患者的生活质量有待提高。护理人员应多关注病程长、收入低、文化程度较低的患者。

## 新活素、米力农对治疗心力衰竭治疗效果比较分析

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**目的** 研究心功能分级Ⅲ-Ⅳ级心力衰竭患者对新活素(冻干重组人脑利钠离肽 以下均称为新活素)与米力农治疗效果比较分析。

**方法** 收集吉林大学第一医院心力衰竭患者(心功能分级Ⅲ-Ⅳ级)90例(患者BNP均在2000-3000,年龄40-60岁,左室舒末径 $\geq 60$  mm,射血分数 $\leq 45\%$ ),常规治疗心力衰竭基础上分别给予米力农治疗30例、新活素治疗30例及仅用常规心力衰竭治疗30例对比治疗效果。比较3组治疗前后B型利钠肽(BNP)下降趋势、及治疗3天后BNP下降趋势以及3月内院外死亡率。

**结果** 应用新活素及米力农组患者射血分数及BNP改善结果较对照组比较显著提高,具有统计学意义( $P<0.01$ ),治疗前后新活素组与米力农组射血分数及BNP均具有统计学意义( $P<0.05$ ),新活素组与米力农组射血分数比较无统计学意义( $P>0.05$ ),新活素组与米力农组BNP下降比较具有统计学意义( $P<0.05$ )。3月内院外死亡率比较新活素组小于米力农组。

**结论** 应用新活素及米力农相比较常规治疗组均对心力衰竭有明显效果,新活素对比于米力农组具有更好的治疗效果,明显改善患者预后。

## Prognostic Significance of Hyperuricemia in Chronic Heart Failure Patients with Either Reduced or Mid-Range Ejection Fraction

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**Objective** Hyperuricemia often coexists with chronic heart failure (CHF) and is proved to be associated with adverse outcomes in HF with reduced ejection fraction (EF, HFrEF). However, its prognostic value for HF with mid-range EF (HFmrEF), a newly proposed HF category in the 2016 European Society of Cardiology (ESC) HF guidelines, is little de-

tailed. We sought to investigate the long-term prognostic implications of hyperuricemia in HFmrEF versus HFrEF, in the same registry of patients with stable CHF.

**Methods** This was a two-center study involving 235 consecutive adult subjects, screened from the Xianyang CHF Prospective Cohort. The subjects were assigned to 2 subgroups: HF with reduced EF (< 40%) and mid-range EF (40–49%). Hyperuricemia was defined as serum uric acid (UA) > 420  $\mu\text{mol/L}$  (7 mg/dl) at baseline. The primary endpoints were all-cause death, HF rehospitalization, and a composite event of both.

**Results** Among 158 HFrEF and 75 HFmrEF cases, 17.2% were found to suffer hyperuricemia. The mean serum UA value among individuals was  $327.8 \pm 90.3 \mu\text{mol/L}$ . During the mean follow-up of 30.8 months, the HFrEF group had more adverse outcomes than HFmrEF: all-cause death 32.3% versus 12.0% ( $P=0.001$ ), rehospitalization for HF 61.7% versus 52.7% ( $P=0.197$ ), and all-cause death or HF rehospitalization 70.9% versus 54.7% ( $P=0.015$ ). In patients with HFrEF, hyperuricemia was associated with the composite endpoint in univariate analysis (HR 2.308, 95% CI 1.261–4.225;  $P=0.007$ ) and multivariable adjustment (HR 2.208, 95% CI 1.196–4.077;  $P=0.011$ ); The Kaplan–Meier survival curves showed consistently worse outcomes in HFrEF patients with hyperuricemia compared to those with normal serum UA. Conversely, no similar significant correlations were observed in HFmrEF patients.

**Conclusions** In conclusion, for patients with stable CHF in rural areas of western China, hyperuricemia presented a relatively low prevalence, and it is independently associated with long-term adverse outcomes in patients with HFrEF, but not in HFmrEF.

## 肾素血管紧张素系统抑制剂对风湿性心脏病二尖瓣置换术患者预后的回顾性分析

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**目的** 探讨肾素血管紧张素系统抑制剂 (renin angiotensin system inhibitors, RSI) 对风湿性心脏病 (rheumatic heart disease, RHD) 二尖瓣置换术患者预后的影响。

**方法** 研究对象来源于广州心血管疾病队列, 采用回顾性队列研究方法, 纳入诊断为 RHD 并且有单纯二尖瓣置换术病史的患者, 根据有无服用 RSI, 将患者分为 RSI 组和非 RSI 组, 随访并分析两组患者全因死亡、因心衰住院或死亡事件和心脏彩超各心腔内径变化的差异。进一步地, 把 RSI 和基线纳入的变量分别进行单因素和多因素 Cox 回归分析, 了解与患者全因死亡和因心衰住院或死亡事件相关的危险因素。

**结果** 研究平均随访时间 12 年, 共纳入 191 例患者。生存分析结果显示, RSI 组患者生存率和无因心衰住院或死亡事件生存率均高于非 RSI 组患者,  $P < 0.05$ 。各心腔内径每年变化差值在组间均无差异,  $P > 0.05$ 。多因素 Cox 回归分析结果显示, 年龄增加和换瓣年限延长是患者全因死亡的危险因素; 地高辛治疗、左房内径增大、LVEF 降低是患者因心衰住院或死亡事件的危险因素; RSI 治疗降低患者全因死亡风险 (校正 HR=0.445, 95% CI: 0.235~0.843;  $P=0.005$ ) 和因心衰住院或死亡事件风险 (校正 HR=0.541, 95% CI: 0.337~0.870;  $P=0.005$ )。

**结论** RSI 能改善 RHD 二尖瓣置换术患者生存率, 降低患者全因死亡和因心衰住院或死亡事件风险。

## Activation of $\text{Na}^+ - \text{HCO}_3^-$ cotransporter promotes heart failure by deteriorating calcium homeostasis in pressure overload mice

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**Objective** We recently clarified the effects of  $\text{Na}^+ - \text{HCO}_3^-$  cotransporter (NBC1) on myocardial infarction induced cardiac remodeling. The actual role of NBC1 on heart failure caused by transverse aorta contraction (TAC) remains unknown. The aim of this study is to address influence of NBC1 on TAC-induced failing heart.

**Methods** We generated NBC1 transgene mice (Tg) and created pressure overload model by TAC in both Tg and wildtype (WT) mice. Heart function indicated by echocardiography and left ventricle (LV) hemodynamic was measured in mice 5 weeks after TAC. In vitro study, we isolated and cultured adult mouse ventricular myocytes (AMVMs) from sham and TAC treated mice and overexpressed NBC1 by adenovirus. We then measured calcium kinetics, myocyte contractile function and endoplasmic reticulum (ER) stress of AMVMs.

**Results** NBC1 protein expression was significantly increased at 5 weeks after TAC in C57/BL6 mice. The Tg mice showed a higher mortality rate, larger exponential time constant of relaxation ( $\tau$ ), lower LV dp/dt max and the contractility index compared to WT mice at 5 weeks after TAC, while there are no statistically differences between WT and Tg mice in LV posterior wall diastolic thickness, LV dimensions, LV systolic function including ejection fraction and fractional shortening. In vitro, AMVMs obtained from TAC mice presented a markedly lower calcium transient and sarcomere shortening (SS), more prolonged raise phase constant of calcium transient (time to peak,  $T_{peak}$ ) and decay phase constant of calcium transient ( $\tau_d$ ), higher concentration of intracellular sodium  $[Na^+]_i$ , calcium  $[Ca^{2+}]_i$  and level of C/EBP homologous protein (CHOP) and glucose related protein 78 (GRP78) than from sham mice. while overexpression NBC1 further aggravated these effects. All above alterations were attenuated by co-treatment with NBC1 inhibitor S0859.

**Conclusions** Activation of NBC1 promotes heart failure by deteriorating calcium homeostasis in pressure-overload mice. As thus, NBC1 should be considered as a potential target for treating pressure-overload induced heart failure.

## 老年人中心衰和1型心肾综合征之间关系的认识

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**目的** 本综述的目的在于分析和总结老年人1型肾病综合征的发病机制、诊断、治疗及预后,从而为老年人1型肾病综合征临床诊疗提供思路。

**方法** 通过研究国内外心肾综合征的进展,综合各家所长,提供新认识。

**结果** 心脏和肾脏作为人体必不可少的器官,二者相辅相成,相互影响,如果简单的将其中一器官抛开可能会忽略另一器官的功能受损,从而导致多个器官受累。

**结论** 在老年人患者中心衰和肾功能障碍更难获得恢复,二者愈后显得更加重要,通过对二者在血流动力学方面、炎症机制、免疫等方面的研究可以更加深入的解释其发病机制。虽然目前在1型肾病综合征的诊疗上缺少统一临床指南。但进一步明确其在发病机制、早期诊断及治疗方案上的研究,将为进一步提高患者生存率和改善其预后方面提供重要的依据。

## The relationship between thyroid function, iron deficiency in patients with chronic heart failure

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**Objective** To evaluate the relationship between thyroid function, iron deficiency in patients with chronic congestive heart failure.

**Methods** Selected 335 cases of chronic congestive heart failure except primary hypothyroidism and hyperthyroidism. According to the course of heart failure, the target population was divided into short-term (<3 months), chronic (3 months-2 years), long-term (2-5 years), and extremely long-term (>5 years) groups. Its baseline at admission (thyroid function, complete blood cell analysis, ferritin, BNP, left ventricular end diastolic diameter, ejection fraction) were compared. The data were analyzed by t-test, logistic, regression and multivariate linear. A value of  $P < 0.05$  was considered significant in double-sided tests.

**Results** Among the 335 patients (mean age  $65.7 \pm 9.5$  years, 62% women), 49 cases have abnormal thyroid function (14.6%), and 26 cases have anemia (7.76%). In the long-term and extremely long-term groups, the level of triiodothyronine (T3) decreased, the level of hemoglobin decreased, and the distribution width of red blood cells CV was significantly wider than the other two groups (21.7%, 23.5% vs 14%, 17.8%,  $P < 0.01$ ). There was no difference in thyroid stimulat-

ing hormone (TSH), total iron binding capacity, and BNP level among the four groups. The ferritin level in long-term ( $78.2 \pm 15.67$  ng/mL) and extremely long-term groups ( $87.9 \pm 10.94$  ng/mL) significant higher than in short-term ( $28.2 \pm 5.67$  ng/mL) and chronic-term groups ( $27.1 \pm 7.94$  ng/mL). The transferrin saturation in four groups (22.9%, 24.6%, 18.4%, 17.3%) have no significant difference ( $P=0.063$ ). The levels with low thyroxine (T4) and free T4 level in extremely long-term groups than other 3 groups. However, T3 levels in each group were positively correlated with HB level and the distribution width of red blood cells. The free T4 levels were positively correlated with HB level and the distribution width of red blood cells. On the contrary, the T4 levels have no relevant with HB level and the distribution width of red blood cells. Linear and logistic regression models showed that there are significantly positive relationship between T3 level and the transferrin saturation.

**Conclusions** Low T3 status in patients with chronic congestive heart failure may have an effect on hematopoietic function.

## 新活素治疗收缩功能不全性心力衰竭的临疗效分析

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**目的** 本研究为探讨新活素治疗收缩功能不全性心力衰竭(HFrEF)临床疗效对照比较分析与安全性。

**方法** 分析从2018年2月至2019年2月入选86例收缩功能不全性心力衰竭(HFrEF)患者,随机分为新活素治疗(治疗组)43例,常规治疗组(对照组)43例,排除对新活素过敏及心源性休克或收缩压 $<90$  mmHg的患者,观察两组心脏功能的改善情况,病程中脑钠肽(BNP)下降程度,左室射血分数(LVEF)恢复程度及心率(HR)下降的变化水平及不良反应。

**结果** 治疗组有效率81.40%,治疗组脑钠肽(BNP),左室射血分数(LVEF)及心率(HR)的变化情况均优于对照组( $P<0.05$ ),药物所致副作用少,患者较好耐受。

**结论** 新活素作为一类新型抗心衰的药物,治疗收缩功能不全性心力衰竭病人可改善心脏功能,效果良好、安全。

## 半乳糖凝集素3对心力衰竭诊断价值的Meta分析

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**目的** 采用Meta分析评估半乳糖凝集素3对心力衰竭的诊断价值。

**方法** 检索PubMed、EMBASE、万方数据库和中国知网2018年11月30日之前收录的关于半乳糖凝集素3对心力衰竭(心衰)诊断效能的中英文文献并提取数据,使用诊断准确性研究的质量评价工具-2(QUADAS-2)对纳入文献进行质量评估,采用MetaDiSc1.4软件全面分析半乳糖凝集素3诊断心衰的价值。

**结果** 共纳入文献14篇,纳入研究存在非阈值效应引起的异质性,采用随机效应模型合并结果,合并灵敏度为0.78 [95% CI (0.76~0.80)];合并特异度为0.65 [95% CI (0.63~0.68)];合并阳性似然比为2.85 [95% CI (2.07~3.92)];合并阴性似然比0.28 [95% CI (0.21~0.39)];合并DOR为12.48 [95% CI (6.48~24.06)];ROC曲线下面积(AUC)为0.8531。

**结论** galectin-3对心衰有中等偏高程度的诊断价值,但仍需要设计合理的大样本研究来证明。

## 中国心衰治疗现况下沙库巴曲缬沙坦与依那普利在急性失代偿性心力衰竭患者中的成本效用分析

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**目的** PIONEER-HF研究结果显示在急性失代偿的住院射血分数减低型心衰(HFrEF)患者中,沙库巴曲缬沙坦与依那普利相比具有相同的安全性,且短期内降低患者NT-proBNP的疗效更佳。这提示在住院心衰患者达到血流动力学稳定之后及早应用沙库巴曲缬沙坦可能进一步改善HFrEF患者的预后。本研究旨在探究在中国心衰治疗现况下,沙库巴曲缬沙坦与依那普利在急性失代偿性HFrEF患者中的成本效用。

**方法** 从医疗保健系统角度出发,通过Markov模型(周期=2个月,总时间=20年)来模拟心衰进程,构建一个样本量



为8400人的模拟队列,分析沙库巴曲缬沙坦(200 mg, bid)和依那普利(10 mg, bid)在急性失代偿性HFrEF患者治疗中的直接医疗成本和效用(质量调整生命年, QALY)。进一步计算相应的增量成本效用比(ICER),并与意愿支付金额(WTP=178980元)相对比。模型相关参数主要来源于PIONEER-HF研究、PARADIGM-HF研究、中国国家统计局和中国疾病预防控制中心。另外对模型进行概率敏感性分析。

**结果** 模拟队列结果显示,经过20年的治疗,沙库巴曲组共有3320人死亡和4932次心衰相关再住院,依那普利组共有3596人死亡和6167次心衰相关再住院。与依那普利组相比,沙库巴曲缬沙坦组的治疗效果更好(6.79

QALYs vs. 5.86 QALYs),但治疗成本更高(226114元 vs. 34972元),每减少一例死亡需增加成本2908683元。ICER为204219元/QALY,高于WTP(178980元)。值得注意的是,模型模拟的时间越短,ICER越大(10年ICER=360760元/QALY,2年ICER=1248938元/QALY)。概率敏感性分析显示ICER为211033元/QALY,当WTP=178980元时,可接受度为45.7%,当WTP=400000元时,可接受度为53.8%。

**结论** 在中国心衰治疗现况下,与依那普利相比,沙库巴曲缬沙坦并不具有良好的成本效用。本研究有助于政府制定相应的医保政策、合理分配医疗资源及药品定价,未来仍需进行相应的真实世界的研究。

## 老龄化家兔左心房重构对房性心律失常的影响及其机制探讨

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**目的** 探讨老龄化左心房(ALA)电和结构重构对房性心律失常的影响及机制。

**方法** 实验选用健康雄性新西兰大耳白兔,分为青龄LAS组(兔龄6~9个月,体重2580±65 g)和老龄LAS组(兔龄25±2个月,体重4500±150 g)。利用记录在体左心房肌单相动作电位(MAP)和短阵快速刺激方法观察两组动作电位的静息膜电位(RMP)、幅度(APA)、最大上升速率( $Max_{dv/dt}$ )、平台期电位(Plateau)、复极化到30%、50%和90%时程( $APD_{30}$ 、 $APD_{50}$ 、 $APD_{90}$ )以及心律失常诱发率和持续时间;全细胞膜片钳技术记录各组L-型钙电流( $I_{Ca,L}$ );Masson染色观察各组左心房组织间质胶原纤维及其蛋白含量,透射扫描电镜观察左心房细胞内超微结构;Western-blotting技术测定各组左心房组织Cav1.2蛋白表达水平。

**结果** 与青龄LAS组比较,老龄LAS组心房肌动作电位的 $Max_{dv/dt}$ 、Plateau电位显著降低, $APD_{30}$ 和 $APD_{50}$ 明显缩短, $APD_{90}$ 显著延长( $P$ 均 $<0.01$ );其房性心律失常的诱发率明显增高,持续时间显著延长( $P$ 均 $<0.01$ )。在电压钳制方式下,与青龄LAS组比较,老龄LAS组左心房肌细胞 $I_{Ca,L}$ 电流密度在各钳制电压下均明显减小,其电流-电压曲线显著上抬;当钳制电位为+20mv时,老龄LAS组心肌细胞 $I_{Ca,L}$ 电流密度由青龄LAS组的(11.72±1.39)pA/pF减小为(6.08±0.98)pA/pF( $P<0.01$ )。与青龄LAS组比较,老龄LAS组心肌组织中胶原纤维明显增多,胶原蛋白含量显著增加( $P<0.01$ ),心房肌组织排列不规则。老龄LAS组心房肌细胞超微结构异常改变,心房肌细胞核固缩,线粒体排列杂乱,肿胀或出现空泡,肌小节损伤严重。ALA组织中Cav1.2蛋白表达水平明显小于青龄LAS组( $P<0.01$ ),其表达量与老龄LAS组 $I_{Ca,L}$ 电流密度减小呈显著正相关( $r=0.83$ ,  $P<0.005$ )。

**结论** ALA发生了明显的病理生理特征性改变而增加了老龄化AF发生的易损性和易感性,其机制与ALA的 $I_{Ca,L}$ 减小,超微结构改变和Cav1.2蛋白表达水平下降密切相关。

## · 心律失常及心脏起搏电生理的研究 ·

## High level of physical activity and incidence of atrial fibrillation in general population: A systematic review and meta-analysis

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**Objective** Atrial fibrillation (AF) is the common cardiac arrhythmia in general people. However, it remains undetermined whether the high level of physical activity (HPA) is involved in the incidence of atrial fibrillation (IAF). This study aimed to examine the effect of high level of physical activity on IAF.

**Methods** A systematically literature search was conducted in EMBASE, PubMed and Cochrane Library to identify all eligible studies till December 1, 2017. The board search terms using to retrieve literature included "atrial fibrillation", "intense/vigorous exercise" and "physical activity". Meanwhile, references of potential relevant reviews are checked for eligible studies. Review manager software, version 5.30 (RevMan5.30), designed by the Cochrane Collaboration, was performed for all statistical analysis.

**Results** Fourteen cohort studies, including at least 130,818 subjects, were eligible for current analysis. A randomized model for the association between HPA with IAF showed no significant results (RR=1.00, 95%CI: 0.93-1.07,  $P=0.93$ ). However, IAF was associated with gender difference—women had higher risk of IAF (RR 0.91, 95%CI: 0.87-0.95,  $P<0.0001$ ) than that in men (RR 1.06, 95%CI: 0.95-1.18,  $P=0.28$ ). Also, there was a protective effect on risk of IAF by practicing HPA (age $\geq 45$  years) (RR 0.93, 95%CI: 0.90-0.97,  $P=0.002$ ), especially in females (RR 0.90, 95%CI: 0.85-0.94,  $P<0.0001$ ). In subgroup analysis by type of physical activity, no risk of developing AF was shown in participants with high level of leisure-time physical activity (RR 0.95, 95%CI: 0.83-1.08,  $P=0.44$ ). Nevertheless, adverse outcome was found in the group of occupational physical activity (walking a lot, carrying heavy objects; exhausting workload etc.), showing increased risk of IAF (RR 1.18, 95%CI: 1.05-1.34,  $P=0.007$ ).

**Conclusions** Taken together, high level of physical activity is not associated with risk of IAF in general population. The middle aged and elderly people, especially in women, were encouraged to exercise for reducing the risk of AF. What's more, high level of occupational physical activity was associated with higher risk of IAF, while leisure time PA showed conversely.

## Nifekalant versus amiodarone for in-hospital shock-resistant ventricular fibrillation or tachycardia: a prospective, two-arm, cluster observational study

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**Objective** In accordance with the American Heart Association's Guide to Advanced Heart Life (ACLS), it is recommended that clinicians should consider the use of antiarrhythmic drugs after 2-3 times of defibrillation or cardioversion when the patient develops persistent ventricular tachycardia or ventricular fibrillation, Such as amiodarone, such as amiodarone ineffective may consider the use of lidocaine. To compare the efficacy and safety of nifekalant, a pure class III anti-arrhythmic drug, and amiodarone in patients with shock-resistant in-hospital ventricular fibrillation (VF) or ventricular tachycardia (VT).

**Methods** Between May 2017 and March 2018, we conducted a prospective, two-arm, cluster observational study, in which participating hospitals were pre-registered either to the nifekalant arm or the amiodarone arm. Patients were enrolled if they had in-hospital VF or VT resistant to at least two defibrillation shocks. Congenital or drug-induced long QT syndrome was excluded. The primary endpoint was termination of VF or VT with/without additional shock. The secondary end-points were return of spontaneous circulation (ROSC), 1-month survival and survival to hospital discharge. We also assessed the frequency of adverse events, including asystole, pulseless electrical activity and torsade de pointes.

**Results** In total, 48 patients were enrolled. After nifekalant, nineteen of 24 patients showed termination of VF or VT, as

compared with fourteen of 24 patients treated with amiodarone with/without additional shock (odds ratio (OR): 3.2; 95% confidence interval (CI): 1.3-8.5;  $P=0.042$ ). Eighteen of 24 patients given nifekalant showed ROSC, as compared with twelve of 24 patients given amiodarone (OR: 3.8; 95% CI: 1.5-9.8;  $P=0.02$ ). There was no difference in 1-month survival or survival to hospital discharge between the nifekalant and amiodarone arms. There was a higher incidence of asystole with amiodarone (4 of 24 patients) than with nifekalant (0 of 24 patients) ( $P=0.023$ ). Torsade de pointes was not observed.

**Conclusions** Nifekalant was more effective than amiodarone for termination of arrhythmia and for ROSC in patients with shock-resistant in-hospital VF or VT.

## 构建预测心脏再同步化治疗发生超反应的评分模型研究

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**目的** 心脏再同步化治疗(CRT)已被证实能够改善宽QRS波心力衰竭(心衰)患者的临床症状和预后,部分患者术后左室射血分数(LVEF)的恢复尤为明显,有学者定义为“超反应”。术前如果能够尽可能地识别潜在的CRT超反应者,对于筛选最为合适的患者、提升CRT的整体疗效、节约医疗-成本开支具有积极的意义。因此,本研究旨在构建预测CRT发生超反应的评分模型。

**方法** 连续入选2009年1月至2017年1月在阜外医院心律失常中心成功植入CRT患者455例。对于起搏器或除颤器升级为CRT、术后6个月内因非心脏原因死亡或研究期间失访的患者排除于研究之外。本研究短期终点事件为术后6个月发生超反应,定义为CRT术后6个月LVEF绝对值升高至少15%。长期终点事件为随访期发生心脏原因死亡或进行心脏移植、发生心衰再住院以及全因死亡。通过多因素Logistic回归筛选与超反应相关有统计学显著差异的术前指标,根据 $\beta$ 偏回归系数对各个独立因素进行赋值,以构建预测评分模型。多因素COX回归分析确定不同评分组终点事件发生的风险比。

**结果** 最终387例患者符合入排标准,其中109(28.2%)例术后达到超反应。多因素Logistic回归最终确定了5个独立预测因素:无碎裂QRS波(比值比(OR)=3.10 [1.39,

6.94]), QRS波时限 $\geq 170$  ms (OR=2.37 [1.35, 4.12]), 左束支传导阻滞(LBBB) (OR=2.57 [1.04, 6.37]), 左房前后径(LAD)  $< 45$  mm (OR=3.27 [1.81, 5.89])以及左室舒张末期内径(LVEDD)  $< 75$  mm (OR=4.11 [1.99, 8.48])。根据 $\beta$ 偏回归系数每个因素赋值1分。评分为0-3分、4分和5分组的术后超反应发生率分别为14.6%, 40.3%和64.1% ( $P < 0.001$ )。相比于0-3分组, 评分为5分组有着更低的心脏原因死亡或心脏移植风险(风险比(HR)=0.12 [0.02, 0.93],  $P=0.042$ )、心衰再住院风险(HR=0.29 [0.09, 0.99],  $P=0.048$ )以及全因死亡风险(HR=0.11 [0.01, 0.79],  $P=0.028$ )。

**结论** 根据术前心电图无碎裂QRS波、QRS波时限 $\geq 170$  ms、LBBB、LAD $< 45$  mm和LVEDD $< 75$  mm共5个指标构建的超反应评分模型在术前评价有CRT适应症患者超反应发生方面有一定的临床实用价值。

## 梅氏微创消融术治疗房颤合并左室功能受损患者的临床结果

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**目的** 研究梅氏微创消融术治疗房颤合并左室功能受损患者的临床结果。

**方法** 2010年6月至2017年12月, 86例房颤合并左室功能受损的患者接受了梅氏微创消融术, 阵发性房颤12例, 持续性房颤27例, 长程持续性房颤47例; 房颤病史(6.5 $\pm$ 4.8)年。CHA<sub>2</sub>DS<sub>2</sub>-VASc评分2.2 $\pm$ 1.1。患者左心房直径(46.9 $\pm$ 3.8)mm, 左室直径(51.7 $\pm$ 4.6)mm。术前患者左室射血分数(42.2 $\pm$ 4.7)%。所有患者全麻后接受梅氏微创消融术, 消融路线为3个环形消融加3条线性消融。使用切割闭合器切除左心耳。用消融笔消融Marshall韧带和心外膜自主神经节。

**结果** 86例患者顺利完成手术, 无中转开胸手术, 围手术期无死亡。77例(89.5%)出院时维持窦性心律。术后80例保持随访, 平均随访(27.2 $\pm$ 12.1)个月。72例患者维持窦性心律。术后总体左室射血分数(47.1 $\pm$ 6.2)%。术后窦律组的射血分数(48.2 $\pm$ 5.8)%, 非窦律组的射血分数是(41.6 $\pm$ 5.8)% ( $P < 0.05$ )。多因素回归分析, 左房直径(HR=1.485, 95%CI 1.157-1.906,  $P < 0.05$ )和射血分数提升是否超过10% (HR=18.800, 95%CI 1.674-189.289,  $P < 0.05$ )与房颤术后复发密切相关。Kaplan-Meier曲线分析进一步显示, 术后

射血分数提升超过10%的患者房颤复发率明显低于其他患者( $P < 0.05$ )。

**结论** 梅氏微创消融术对房颤合并左室收缩功能受损患者的治疗安全、有效, 可以恢复其窦律, 有助于对左室功能的改善, 减少心衰的发生, 从而防止房颤合并心衰的恶性循环。

## “一站式”或“分期”微创外科-导管杂交消融术对长程持续性房颤的疗效

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**目的** 探讨“一站式”或“分期”微创外科-导管杂交消融术在长程持续性房颤治疗中的应用, 并分析其治疗效果。

**方法** 2015年6月至2017年12月, 我们应用“一站式”或“分期”微创外科-导管杂交消融术治疗长程持续性房颤56例(女18例), 其中“一站式”杂交手术30例, “分期”杂交手术26例。平均年龄59.1 $\pm$ 6.9岁, 平均房颤病程5.9 $\pm$ 3.0年, 平均左心房直径45.4 $\pm$ 4.2 mm, 平均CHA<sub>2</sub>DS<sub>2</sub>-VASc评分为2.3 $\pm$ 1.2分, 14例患者既往曾接受过失败的房颤导管消融术。回顾分析患者临床资料, 评价“一站式”或“分期”微创外科-导管杂交消融术对长程持续性房颤的治疗效果。

**结果** 全组患者均顺利完成“一站式”或“分期”房颤杂交手术, 围术期无死亡病例。“一站式”杂交手术者, 24例(80%)消融术中即恢复窦性心律, 6例(20%)消融术后电复律恢复窦性心律; “分期”杂交手术者, 22例(84.6%)消融术中即恢复窦性心律, 4例(15.4%)消融术后电复律恢复窦性心律。杂交手术后随访6-36个月(平均20.3 $\pm$ 8.2个月), 全组患者有6例(10.7%)房颤复发, 50例(89.3%)维持窦性心律。其中, “一站式”杂交手术患者有4例(13.3%)房颤复发, 26例(86.7%)维持窦性心律。“分期”杂交手术患者有2例(7.7%)房颤复发, 24例(92.3%)维持窦性心律。全组患者中, 6例(10.7%)房颤复发者仍继续服用华法林抗凝、胺碘酮控制心律。出院后, 全组患者无死亡、无脑血管事件发生、无永久起搏器植入。

**结论** “一站式”或“分期”微创外科-导管杂交消融术可安全地应用于长程持续性房颤治疗中, 并获得满意的早、中期治疗效果。

## 超声心动图对预激性心肌病患儿射频消融术后的随访观察

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**目的** 应用超声心动图对预激性心肌病患儿射频消融术前及术后随访观察,评价患儿射频消融后左室的重构及逆转过程。

**方法** 入选2017.9-2018年所有在我院诊断预激性心肌病并进行射频消融手术的患者共8例,年龄2岁-9岁。其中男7例,女1例,术前LVEF31%-50%。所有患儿术前,术后定期进行超声心动图检查,除非常规心脏超声检查参数外,对矛盾运动的室壁范围、高度进行测量,应用频谱多普勒及应变等参数对双室,室内同步化指标进行测量。术前术后各项参数对比分析。

**结果** 所有患儿术前超声心动图均提示左室扩大,室间隔矛盾运动且变薄。左室及双室不运动不协调。双室射血时间差在术后第二天均小于40 ms。术后随访过程中左室舒张末期内径,室壁矛盾运动的范围,左室球形比,PSD逐步缩小;左射血分数主动脉VTI均逐步提升,随访时间达半年者EF均恢复正常水平,室间隔厚度逐渐增加。

**结论** 射频消融术能显著改善预激性心肌病患儿心脏不同步运动,逆转左室重构。通过超声心动图可对该类患者左室运动同步性进行定量分析。

## 植入全身扫描核磁兼容心脏再同步化治疗除颤器一例

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**目的** 本文就国内首次植入全身扫描核磁兼容心脏再同步化治疗除颤器(CRT-D)的病例进行报道。

**方法** 一老年患者,因“活动后胸闷、气促9月”入院。外院行心脏超声提示LVEF34%;心电图提示完全性左束支传导阻滞。心力衰竭药物治疗效果不佳。符合CRT-D植入I类适应证,考虑到患者既往有腰椎间盘突出史,后期有行MRI检查的需求,因而于2019-1-20日在局部麻醉下植入最新一代左室四级导线全身扫描核磁兼容CRT-D(Claria MRI™ DTMA2QQ,美国美敦力公司)。

**结果** 术中及术后测试各项起搏参数满意,患者心电图QRS时限由术前186 ms下降为术后134 ms,心衰症状缓解。

**结论** 对于有MRI扫描需求、存在左右心室收缩不同步的心衰患者,植入全身扫描兼容MRI的CRT十分重要。本例这款Claria系列的CRT-D增加了全新的MRI™ SureScan™功能。在MRI扫描全身前开启该功能,暂时修改起搏器的数据收集和监控程序,同时提供必要的心衰治疗功能。这款CRT是通过博鳌乐城国际医疗旅游先行区“临床急需”通道引入国内。相信在不久的将来,国内批准引进可兼容全身扫描核磁的CRT,造福更多有MRI需求的心衰患者。

## 75岁以上高龄心房颤动并心力衰竭患者的临床特征性调查研究

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**目的** 回顾性分析高龄心房颤动患者的抗凝治疗方案及合并心力衰竭的情况,探讨高龄房颤患者并发心衰的临床特点及治疗方案。

**方法** 收集407例高龄房颤住院患者的基本临床资料、并发疾病、心脏超声、相关实验室检验指标及治疗方案,探讨高龄房颤合并心衰的危险因素,明确房颤合并心衰治疗方案具体实施情况。

**结果** 本研究纳入407例高龄房颤患者,平均CHA<sub>2</sub>DS<sub>2</sub>-VASc评分为3.84±1.02分,抗凝比率偏低,仅为抗凝97例,其中口服利伐沙班抗凝为29例、达比加群抗凝为60例、华法林抗凝为8例。高龄房颤患者中约1/3合并心衰,共121例,且多以射血分数保留型心衰为主,平均心室率为74.16±17.31次/分,其中6例心室率≥100次/分,90~99次/分为10例,80~89次/分14例,70~79次/分33例,60~69次/分49例,50~59次/分9例。仅57例患者行抗心室率治疗,其中口服β受体阻滞剂51例(13例比索洛尔2.5 mg Qd,36例比索洛尔5 mg Qd,2例美托洛尔缓释片47.5 mg Qd),口服胺碘酮6例,未有口服洋地黄类及非二氢吡啶类钙拮抗剂。121例高龄房颤并心衰患者中,46例阵发性房颤,75例持续性房颤。平均年龄为87.53±4.91岁,CHA<sub>2</sub>DS<sub>2</sub>-VASc评分为4.32±1.05分。121例患者中,抗凝治疗共39例(利伐沙班13例,达比加群22例,华法林4例),未有出血、停用抗凝药物案例。经单因素Logistic回归分析得出高血压、2型糖尿病、高尿酸血症、高脂血症、肾功能不全可能与高龄房颤并心衰存在关联性。

**结论** 高龄房颤患者抗凝比例偏低,多合并射血分数保留型心衰,高血压、2型糖尿病、高尿酸血症、高脂血症、肾功能不全可能与高龄房颤并心衰存在关联性。

## 致心律失常性右室心肌病恶性终点事件的危险因素分析

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**目的** 致心律失常性右室心肌病(Arrhythmogenic right ventricular cardiomyopathy, ARVC)是一种主要由桥粒蛋白基因突变导致的以心肌细胞纤维脂肪化替代为主要病理表现的遗传性心肌病。ARVC患者以出现致命性心律失常和慢性心衰为主要临床表现。本研究旨在探究导致ARVC患者出现恶性终点事件的危险因素。

**方法** 本研究入选2001年1月至2018年8月348例在阜外医院就诊的ARVC患者。我们收集了所有患者首次入院的基线资料及治疗方式。排除58例首次住院即进行心脏移植或死亡的患者,对其余290例患者进行了随访。恶性终点事件为心脏移植或心血管死亡。通过对比有无发生恶性终点事件的两组患者首次住院时的临床基本资料找到相关危险因素。

**结果** 经过平均 $4.80 \pm 3.26$ 年随访,290例患者中34例(12%)患者发生恶性终点事件。与未发生恶性终点事件组患者相比,事件组患者有家族史( $P=0.003$ )的比例更高, NYHA $\geq 3$ ( $P<0.001$ )的患者更多,发生房颤( $P<0.001$ )、一度房室传导阻滞( $P=0.001$ )的患者更常见。通过超声心动图可以发现,事件组患者LVEF( $P<0.001$ )明显减小,出现二尖瓣中重度返流( $P<0.001$ )、三尖瓣中重度返流( $P<0.001$ )患者人数更多。单因素分析发现,家族史(OR: 3.034, 95% CI: 1.507-6.107,  $P=0.002$ )、NYHA $\geq 3$ (OR: 22.801, 95% CI: 10.005-51.960,  $P<0.001$ )、房颤(OR: 6.722, 95% CI: 3.353-13.477,  $P<0.001$ )、一度房室传导阻滞(OR: 4.063, 95% CI: 1.922-8.591,  $P=0.001$ )、LVEF $<40$ (OR: 10.014, 95% CI: 5.027-19.945,  $P<0.001$ )、二尖瓣中重度返流(OR: 12.639, 95% CI: 5.993-26.652,  $P<0.001$ )、三尖瓣中重度返流(OR: 7.146, 95% CI: 3.528-14.476,  $P<0.001$ )是ARVC患者移植和心血管死亡的独立危险因素。

**结论** 心力衰竭是我国ARVC患者的常见症状,对患者的预后具有重要影响。家族史、NYHA $\geq 3$ 、房颤、一度房室传导阻滞、LVEF $<40$ 、二尖瓣中重度返流、三尖瓣中重度返流是ARVC患者发生恶性终点事件的独立危险因素。

## 起搏器囊袋破溃感染3例经原位重置术治愈的经验体会

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**目的** 永久心脏起搏器囊袋感染率逐渐增高,保守治疗效果不满意,探讨保留电极原位重置深埋术及术后特殊处理治疗此类感染的可行性。

**方法** 纳入2018年4月-2018年9月曾在我院治疗的3例单纯起搏器囊袋感染病例,经抗感染、保留电极原位重置深埋术、持续负压引流、术后药物治疗及加强局部换药等处理。

**结果** 3例起搏器囊袋感染持续时间为1-3月,经保留电极原位重置深埋起搏器、术后加强管理等处理后,伤口恢复良好,平均15天拆线出院。通过随访2-4月,均无囊袋感染复发,疗效满意。

**结论** 对单纯起搏器囊袋感染患者,经加强抗感染、保留电极原位重置深埋术、持续负压引流、术后药物治疗及加强局部换药等处理,可以完全治愈起搏器囊袋感染,避免起搏器系统拔除。

## 伊布利特在心房颤动冷冻球囊消融中的有效性和安全性观察

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**目的** 通过对单中心收治的非瓣膜性心房颤动患者的回顾性分析,观察伊布利特对经过冷冻球囊导管消融达到完全肺静脉电位隔离后仍维持心房颤动的患者进行复律治疗的有效性和安全性。

**方法** 回顾分析单中心收治的,于冷冻球囊消融术中应用伊布利特的非瓣膜性心房颤动患者的住院和随访资料,将患者分为两组:伊布利特组,和伊布利特联合电复律组。术中观察终点为开始输注伊布利特后记录的引起血流动力学改变的心律失常事件。术后随访期观察终点为心血管事件的死亡、房颤复发和其它因心律失常引起的医疗干预。

**结果** 本研究入组38例的心房颤动患者,在最后一次冷冻消融程序结束时,均为房颤节律。23例患者经伊布利特直

接复律成功,15例患者仍需电复律转复窦性心律,伊布利特直接转复成功率为60.5%。术中心律失常并发症的发生率为10.5%(4/38),其中伊布利特组2例(8.7%),伊布利特联合电复律组2例(13.3%),两组间术中心律失常并发症的发生率无显著性差异( $P=1.00$ )。术后随访期内,伊布利特组和伊布利特联合电复律组中维持窦性心律的比例分别为82.6%和72.7%,房颤复发的风险比为0.56(95%置信区间,0.13~2.39, $P=0.44$ ),两组相比无显著性差异。

**结论** 对冷冻球囊导管进行肺静脉电位完全隔离后仍呈房颤的患者,应用伊布利特转复窦性心律的成功率较高,可减少电复律的使用,但需警惕伊布利特的致心律失常副作用。单用伊布利特与联合电复律的患者相比,在冷冻消融术后1年内两组的房颤复发率无显著性差异。

## 左束支区域起搏的单中心经验

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**目的** 通过观察左束支区域起搏与相应右室间隔面起搏QRS波时限的不同来分析双室心肌除极的同步性差异,同时分析左束支区域起搏的可靠性、并发症发生情况、手术时间以及射线量。

**方法** 采取常规起搏器植入流程,同时术前连接好电生理多导仪,同步12导体心电图,术中先通过3830起搏电极连接电生理多导仪,记录希氏束电位,然后在希氏束远端1~2 cm处旋入电极。术中依据体表心电图、腔内电图以及X光影像学特征判断起搏是否夺获左束支,术后常规进行彩超检查,验证起搏电极确已穿过右室间隔内膜放置到左室间隔内膜面下。

旋入前记录右室间隔面起搏的QRS波时限,成功旋入到左束支区域后再记录起搏QRS时限,记录术中夺获左束支阈值,低于1.0 V可以接受。QRS波时限均通过电生理多导仪和同步12导心电图测量。术后3、6月通过起搏器程控仪检查左束支电极夺获阈值等参数。

**结果** 左束支区域起搏更为生理,且短期随访安全、可靠

**结论** 左束支区域起搏无论在有效性,还是在可行性和安全性方面都有其独特的优势,是生理性起搏非常有前景的一种方法。

## 心外膜主动电极的使用体验

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**目的** 心外膜电极临床使用较为少见,通过2份特殊病例,讲述心外膜主动电极的使用指征,比较心外膜主动和被动电极的使用差异

**方法** case1,先天性心脏病Ebstein畸形患儿,行三尖瓣下移畸形纠治+双向Glenn术。手术经过:下移的瓣膜上提,缝合在真正的瓣环上。考虑右室收缩功能差,离断右房和上腔静脉,右肺动脉长轴做一3 cm切口,和上腔静脉远心端端侧缝合。术中发现三度AVB,心外膜缝合临时起搏导线,连接临时起搏器。case2,风湿性心脏病、二尖瓣+主动脉瓣换瓣术后、慢快综合征(病窦综合征+阵发房颤)、慢性心功能不全纵膈血肿机化,巨大右房,拟行纵膈血肿清除+起搏器植入术。

结合临床病例,讲述心外膜主动电极的使用指征及具体的使用方法,包括:切口选择、导线螺旋或缝合、测试参数、皮下隧道、连接起搏器;比较心外膜主动和被动电极的使用差异。

**结果** 相对于心外膜被动电极,心外膜主动电极在使用上具有如下优势:缩短手术时间:固定与旋出方便,无需缝线;创伤小,导线固定可靠:3.5 mm螺旋固定;双极电极:感知精确,起搏阻抗高;中层心肌起搏,可减少起搏电极引起的心律失常;安全有效。

**结论** 相比心外膜被动电极,心外膜主动电极使用上更为便捷,易于获得更为理想的起搏参数。

## “巨R波”心动过速的定义、诊断及临床意义

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**目的** 帮助了解“巨R波”心动过速的定义、鉴别诊断、临床意义以及如何识别“巨R波”心动过速。

**方法** 整理2例病例的临床诊断及心电图表现。

**结果** 2例病例的体表心电图均呈心动过速样,至少8个导联呈“巨R波”图形,或“巨R波”导联与对应导联ST改变形成的“巨S波”相加达到8个导联以上。

**结论** 当急性心肌梗死或冠状动脉痉挛,其体表心电图多个导联呈巨R波形ST段抬高,同时合并室上性快速心律失常,P波难分辨。此类心电图极易误诊为宽QRS波心动过速,特别是误诊为室性心动过速(室速)。急性心肌缺血或梗死的心电图一旦误诊为室速,按室速处理,相关治疗措施(电复律或抗心律失常药物)将恶化血流动力状况,延误心肌梗死和缺血的治疗。我们将此类心电图命名为“巨R波”心动过速,以助于临床诊断与鉴别。

## 经高度迂曲右髂动脉成功完成左室旁道消融一例

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**目的** 经过高度迂曲的髂动脉完成室上速射频消融手术

**方法** 在SWATZ鞘的帮助下,大头电极进入左室阻断左室高侧壁隐匿性旁道。

**结果** 患者手术成功,安返病房,无并发症发生。

**结论** 髂动脉高度迂曲,钢丝、大头电极、内鞘无法通过到达心脏。1. 交换长钢丝0.014英寸的长交换导丝反复尝试失败。2. 同样的钢丝(短)反复尝试只成功一次进入腹主动脉。3. 造影(逆向)右侧股动脉证实右髂内、髂总动脉高度迂曲。导引钢丝在真腔,但未能进入腹主动脉,提示前进操作安全正确。4. 改用PTCA专用超滑导丝0.014英寸成功进入胸主动脉。5. 在这根导丝引导下,SWATZ鞘仍不能进入腹主动脉,病人疼痛。6. 改用5F长鞘内鞘沿超滑导丝可进入腹主动脉,借此交换SWATZ鞘专用0.014英寸硬度更强的钢丝。7. 沿钢丝反复操作,才把SWATZ鞘送入腹主动脉。8. 成功送入大头电极,进入左室阻断左室高侧壁隐匿性旁道。9. 在大头电极保护下,撤出SWATZ鞘,压迫股动脉穿刺点,加压包扎,未发生血肿。10. 患者手术成功,安返病房。

## 永久起搏器植入术后患者出院后生活质量的影响因素分析

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**目的** 调查永久起搏器植入术后患者出院后生活质量、社会功能及其影响因素。

**方法** 采用一般资料调查表、社会支持评定量表、应对问卷以及社会功能缺失筛选调查表,对300例永久起搏器植入术后2年的患者进行跟踪问卷调查。

**结果** 本组患者社会功能缺失发生率为68%,在其从事专业特长及工作领域、家庭以外的社会活动、对外界事物的关心兴趣等方面达到正常水平的比例较低。影响其社会功能及生活质量的因素为对社会支持的利用度、压力应激、总体支持水平、睡眠质量( $P < 0.05$ )。

**结论** 本组患者社会功能缺失发生率为68%,在其从事专业特长及工作领域、家庭以外的社会活动、对外界事物的关心兴趣等方面达到正常水平的比例较低。影响其社会功能及生活质量的因素为对社会支持的利用度、压力应激、总体支持水平、睡眠质量( $P < 0.05$ )。永久起搏器植入术患者出院后社会功能及生活质量状况有待改善和提高,应针对个体因素采取干预手段,护理人员应重视改善此类患者远期社会功能及生活质量。

## Midterm safety and efficacy of second-generation cryoballoon ablation for treatment of persistent atrial fibrillation: a single-center experience and updated meta-analysis

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**Objective** Several recent studies reported a 1-year clinical success rate of 50~84%. However, the data in the China area is still limited. To investigate the one-year efficacy and safety of the second generation cryoballoon (2G-CB) for pulmonary vein isolation (PVI) in patients with persistent atrial fibrillation (PersAF), and to analyze predictors of atrial tachyarrhythmia recurrence. Data regarding the clinical outcome in persistent AF (PersAF) using 2G-CB ablation is fast increasing.

**Methods** The trial is a prospective, single-center, single-arm trial designed to assess outcomes of PVI using the cryoballoon. The primary endpoint was freedom from AF, atrial flut-



ter, or atrial tachycardia  $\geq 30$ -s after a 3-month blanking period. Data on procedural characteristics, safety, and midterm freedom from AF recurrence were analyzed. We further searched PubMed and the Web of Science, and did the meta-analysis for 1-year clinical success rates and complication rates using 2G-CB for ablation of patients with PersAF. The current meta-analysis includes 22 studies comprised of 2768 patients with PersAF.

**Results** A total of 118 patients with PersAF [75 men (63.6%), mean age  $58.62 \pm 9.84$  years] were included in this study. After mean follow-up of  $15.64 \pm 5.99$  months, 77 (65.3%) patients were, success rate including a 3 months blanking period. Procedure-related complications occurred in four (4.2%) patients. At the 12-month follow-up, after a 3-month blanking period, freedom from recurrences was achieved in 75.4%. Stepwise multivariable Cox regression analysis showed that early recurrence (HR=3.315, 0.95 confidence interval (CI) 1.622~6.775,  $P=0.001$ ), LA diameter (HR=1.145, 0.95CI 1.069~1.226,  $P<0.001$ ) and CHA2DS2-VASc score (HR=1.284, 0.95CI 1.059~1.509,  $P=0.002$ ) independently predicted recurrence. Meta-analysis included 22 studies comprised of 2768 patients with PersAF, and the overall 1-year success rate was 69%, while the complications rate was 4%.

**Conclusions** We further searched PubMed and the Web of Science, and did the meta-analysis for 1-year clinical success rates and complication rates using 2G-CB for ablation of patients with PersAF. The current meta-analysis includes 22 studies comprised of 2768 patients with PersAF.

## Enhanced $\beta 1$ adrenergic receptor autoantibodies levels are associated with atrial fibrillation and atrial structural remodeling

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**Objective** Our previous studies have proved that enhanced  $\beta 1$  adrenergic receptor antibodies could induce the atrial tachy-

cardia, but the inhomogeneity of conduction, the expression of the ion channel and communication junction connexin (Cx43, Cx40), the atrial structural remodeling are not clear yet.

**Methods** 24 New Zealand white rabbits the rats were divided into 2 groups randomly were immunized with a  $\beta 1$ AAR second extracellular loop peptide to raise  $\beta 1$ AAR antibody titers for 4 weeks. Rabbits divided into control group and immunological group. A catheter-based electrophysiologic study was performed on anesthetized rabbits before and after immunization. Atrial arrhythmia occurrence was determined in response to burst pacing. Echocardiography evaluated heart size and cardiac function. Western blots and RT-PCR were also performed to determine atrial muscarinic receptor, L-type calcium channel and acetylcholine activated potassium channel expression. Histopathological analysis was performed to assess atrial tissue architecture. The inhomogeneity and mean latency were determined by flexible epicardial multi-electrode array in vivo. HE stain of atrial were performed on all the animals. Each rabbit served as its own control.

**Results** Compared with control rabbits, the  $\beta 1$ AR group rabbits showed higher heart rates and the inducibility of AF ( $P<0.05$ ), AERP was significantly shortened ( $P<0.05$ ). The mRNA and protein levels of Kir3.1 genes and Cx40 in left atrium are up-regulated in  $\beta 1$ AR group compared with control rabbits, Cav1.2 and Cx43 are reduced ( $P<0.05$ ). The mRNA level and protein levels of TGF $\beta 1$ , Samd, Samd3, Collagen I and Collagen III are up-regulated in  $\beta 1$ AAR group compared with control rabbits ( $P<0.05$ ). The mRNA level and protein levels of Samd7 are up-regulated in  $\beta 1$ AAR group compared with control rabbits ( $P<0.05$ ).

The inhomogeneity and mean latency time of left atrial were significantly increased in  $\beta 1$ AAR group compared with control group. Angiogenesis, myocardial fibrosis, inflammatory infiltration, adipose degeneration were found on left atrial.

**Conclusions** Enhanced  $\beta 1$ AR-activating autoantibodies facilitate AF by changing the cardiac ion channel, atrial conduction, angiogenesis, myocardial fibrosis, inflammatory infiltration, adipose degeneration.

## Prognostic Factors for Arrhythmia Accompanying Right Ventricular Cardiomyopathy: A Single-Center Cohort Study

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**Objective** Arrhythmogenic right ventricular cardiomyopathy (ARVC), a rare inherited disease, is characterized by right ventricular (RV) dysfunction, ventricular arrhythmias (VAs), and an increased risk of sudden cardiac death (SCD). As the long-term survival data for patients with ARVC are limited, this study aimed to investigate the long-term prognostic value of risk factors for ARVC outcomes.

**Methods** This cohort study investigated the clinical characteristics and outcomes of 179 ARVC patients hospitalized during 2004–2013. The primary endpoint was all-cause mortality, and the secondary endpoint was cardiovascular mortality/cardiac transplantation. Kaplan–Meier survival curves and Cox regression analysis were used for statistical analyses.

**Results** With a mean follow-up of  $6.2 \pm 2.8$  years, 27 (15.1%) of the 179 patients had died and 2 (1.1%) underwent cardiac transplantation, including 21 from cardiovascular mortality. Patients with right ventricle (RV) diameter  $>30$  mm had higher all-cause mortality ( $\log$ -rank  $\chi^2=9.99$ ,  $P=0.002$ ) and cardiovascular mortality / cardiac transplantation rates ( $\log$ -rank  $\chi^2=16.64$ ,  $P<0.001$ ) than those with RV  $\leq 30$  mm. Patients with N-terminal pro-brain natriuretic peptide (NT-pro BNP)  $>914$  fmol/ml had higher all-cause mortality ( $\log$ -

rank  $\chi^2=25.82$ ,  $P<0.001$ ) and cardiovascular mortality/ cardiac transplantation rates ( $\log$ -rank  $\chi^2=23.13$ ,  $P<0.001$ ) than those with NT-pro BNP  $\leq 914$  fmol/ml, and patients with premature ventricular contractions (PVCs) had higher cardiovascular mortality/ cardiac transplantation rates ( $\log$ -rank  $\chi^2=9.82$ ,  $P=0.002$ ) than those without PVCs. Multivariable Cox proportional hazards regression analysis suggested that RV diameter [hazard ratio (HR), 1.061; 95% confidence interval (CI), 1.000–1.125;  $P=0.049$ ] and circulating NT-pro BNP (HR, 1.001; 95% CI, 1.000–1.001;  $P=0.035$ ) were independent predictors of all-cause mortality. Independent predictors of cardiovascular mortality/cardiac transplantation were RV diameter (HR, 1.092; 95% CI, 1.015–1.174;  $P=0.018$ ), PVCs (HR, 5.983; 95% CI, 1.079–33.179;  $P=0.041$ ), and circulating NT-pro BNP (HR, 1.001; 95% CI, 1.001–1.002;  $P<0.001$ ). The addition of NT-pro BNP to RV diameter increased the predictive value of all-cause mortality in ARVC patients, and the addition of PVCs or NT-pro BNP to RV diameter increased that of cardiovascular mortality/cardiac transplantation.

**Conclusions** RV diameter and circulating NT-pro BNP were independent predictors of all-cause mortality while RV diameter, PVCs, and circulating NT-pro BNP independently predicted cardiovascular mortality/cardiac transplantation in ARVC patients. ARVC patients with high circulating NT-pro BNP levels, PVCs, large RV diameter at admission indicated the future need for intensive treatment.

## 经皮植入 Watchman 左心耳封堵器后不同抗凝药物应用的安全性及有效性观察

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**目的** 观察经皮植入 Watchman 左心耳封堵器后 45 天不同抗凝药物应用的安全性及有效性。

**方法** 入选接受经皮植入 Watchman 左心耳封堵器的非瓣膜性心房颤动患者, 术后 45 天内服用抗凝药物, 抗凝药物包括华法林、达比加群酯和利伐沙班。

**结果** 共入选 212 名成功植入 Watchman 左心耳封堵器患者, 其中华法林组 60 例, 达比加群组 94 例, 利伐沙班组 58 例。三组患者均未发生围术期血栓栓塞事件以及死亡事

件。围术期出血事件比例(华法林组 5.0%, 达比加群酯组 2.1%, 利伐沙班组 1.7%), 以及术后残余分流比例(华法林组 20.4%, 达比加群酯组 19.3%, 利伐沙班组 20.4%)、封堵器表面血栓形成比例(华法林组 3.7%, 达比加群酯组 1.1%, 利伐沙班组 1.9%), 三组比例相当。

**结论** 经皮植入 Watchman 左心耳封堵器后 45 天内, 服用达比加群和利伐沙班在安全性和有效性上与华法林相当。

## The effects of short-term intervention with Homocysteine for late sodium current

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**Objective** To observe the effects of Hyperhomocysteine (Hcy) on late sodium current and intracellular calcium concentration in human atrial myocytes.

**Methods** Left atrial appendage was obtained from patients with atrial fibrillation (AF), and atrial myocytes were isolated and divided into the following groups: (1) control group (without any treatment); (2) HCY groups with different concentrations: atrial myocytes were cultured with HCY at the final concentration of 50, 100, 200 and 500  $\mu\text{mol/L}$  for 4 hours; (3) antioxidant (NAC) group: atrial myocytes was cultured with 10  $\mu\text{mol/L}$  NAC for 2 hours; (4) HCY+NAC group: atrial myocytes was cultured with 10  $\mu\text{mol/L}$  NAC for 2 hours, then added HCY with final concentration of 500  $\mu\text{mol/L}$  for 4 hours; (5) Specific sodium current inhibitor (ELE): atrial myocytes was added to 1  $\mu\text{mol/L}$  ELE for 2 hours; (6) HCY+ELE group: atrial myocytes was added with the stimulation of the final concentration of 500  $\mu\text{mol/L}$  Hcy for 4 hours, followed by 1  $\mu\text{mol/L}$  ELE for 2 hours. The changes of late sodium current and action potential were detected by Whole Cell Patch Clamp technique, and the concentration of intracellular calcium was measured by Flow Cytometry.

**Results** (1) The ROS level in HCY group was significantly higher than that of control group ( $P<0.05$ ) in a concentration-dependent manner. (2) The late  $\text{Na}^+$  current density in HCY group was higher than that in control group. The late  $\text{Na}^+$  current in drug group (HCY + ELE, HCY + KN-93) and NAC

group were significantly lower than that in Hcy group ( $P<0.05$ ). (3) The intracellular calcium concentration in HCY group was higher than that in control group ( $P<0.01$ ). The concentration of intracellular calcium in the drug group and NAC group were significantly lower than that of HCY group ( $P<0.05$ ).

**Conclusions** High Hcy can increase late sodium current in atrial myocytes of AF patients with the state of high oxidative stress, causing the accumulation of intracellular calcium, and ultimately trigger the pathological basis of abnormal electricity in atrial myocytes.

## 原发性高血压病程与性别在非瓣膜病房颤相关的首次体循环栓塞中的交互作用

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**目的** 探讨非瓣膜病房颤(NVAF)患者的原发性高血压(PH)病程长短在不同性别中对首次体循环栓塞(SE)风险的影响。

**方法** 本研究连续入选 2009–2018 入住九〇三医院心血管内科的 NVAF 患者 2372 例, 以 370 例首次发生 SE 的患者为病例组, 以 2002 例无 SE 的患者为对照组。根据患 PH 的病程长短(计算病例组的 PH 病程以首次发生 SE 截止)将所有研究对象按照无 PH、PH 病程 $\leq 10$ 年、PH 病程 $> 10$ 年进行划分, 再依据性别将所有研究对象分为 4 组: 1) 参照组: 无 PH 的女性; 2) 无 PH 的男性组: 无 PH 病史的男性; 3) 患 PH 的女性组: 患 PH 且 PH 病程 $\leq 10$ 年、PH 病程 $> 10$ 年的女性; 4) 患 PH 的男性组: 患 PH 且 PH 病程 $\leq 10$ 年、PH 病程 $> 10$ 年的男性。应用 stata15.0 分析数据。采用 Logistic 回归分析各组间的首次 SE 风险, 同时采用相加模型和相乘模型评价 PH 病程与性别在首次 SE 中的交互作用。校正的因素有: 心功能不全、年龄、2 型糖尿病、心肌梗死、动脉狭窄、血清肌酐、PT 国际标准化比值(INR)。

**结果** 经多因素校正后与参照组相比, 无 PH 男性组: OR (95% CI) 1.37 (0.99–1.90,  $P=0.061$ ); 患 PH 的女性组: PH 病程 $\leq 10$ 年的首次 SE 风险增加, OR (95% CI) 2.42 (1.70–3.43,  $P<0.001$ ), PH 病程 $> 10$ 年的 OR (95% CI) 1.71 (0.91–3.24,  $P=0.098$ ); 患 PH 的男性组的首次 SE 风险增加, PH

病程 $\leq 10$ 年的OR(95% CI) 2.55 (1.76–3.70,  $P < 0.001$ ), PH病程 $> 10$ 年的OR(95% CI) 4.30 (2.52–7.33,  $P < 0.001$ )。在男性中,PH病程越长,首次SE风险越高,而在女性中无这种趋势。当PH病程 $> 10$ 年,RERI(95% CI)为2.29 (0.06–4.52)。PH病程与性别在Logistic回归中的乘积项 $P$ 值始终 $> 0.05$ 。因此,PH病程与性别在NVAF相关的首次SE中存在相加交互作用,但未发现相乘交互作用。

**结论** PH病程与性别在NVAF相关的首次SE中存在相加交互作用,NVAF患者合并PH病程 $> 10$ 年的男性发生栓塞风险最高,约为无PH女性4倍(图1)。建议PH病程 $> 10$ 年的NVAF男性,即使CHA<sub>2</sub>DS<sub>2</sub>-VASc评分为1分,可能也需要更积极的抗凝治疗以加强对SE的一级预防。

## SMART SF 导管在房颤射频消融术中的应用研究

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**目的** 为进一步提高心房颤动(简称房颤)导管消融手术成功率并降低并发症,分别对比使用THERMOCOOL SMARTTOUCH SF导管与普通冷盐水灌注导管进行房颤导管消融。

**方法** 共纳入100例房颤患者,分为对照组(NaviStar,  $n=50$ )和研究组(Smart SF,  $n=50$ ),两组均在Carto三维标测系统下进行双侧环肺静脉隔离。采集两组患者的一般资料,经消融导管的液体灌注量,术前、术后左房压力、氨基末端脑钠肽前体(NT-proBNP)变化,观察术后窦性心律维持率,比较两组之间的差异。

**结果** 对照组与研究组消融前后液体灌注量( $1100 \pm 200$  ml,  $600 \pm 100$  mL), ( $P < 0.01$ )。对照组心功能I级组消融前、后左房压力分别为( $24.5 \pm 6.6$ ) cmH<sub>2</sub>O, ( $21.5 \pm 9.6$ ) cmH<sub>2</sub>O, ( $P < 0.01$ )。研究组心功能I级组消融前、后左房压力分别为( $23.9 \pm 6.4$ ) cmH<sub>2</sub>O, ( $20.8 \pm 8.2$ ) cmH<sub>2</sub>O, ( $P < 0.01$ )。对照组较研究组术后左房压力( $21.5 \pm 9.6$ ) cmH<sub>2</sub>O比( $20.8 \pm 8.2$ ) cmH<sub>2</sub>O无明显变化( $P > 0.05$ )。对照组心功能II、III级组消融前、后左房压力分别为( $26.4 \pm 7.1$ ) cmH<sub>2</sub>O, ( $29.5 \pm 8.4$ ) cmH<sub>2</sub>O, ( $P < 0.01$ )。研究组心功能II、III级组消融前、后左房压力分别为( $26.8 \pm 7.4$ ) cmH<sub>2</sub>O, ( $23.2 \pm 6.8$ ) cmH<sub>2</sub>O, ( $P < 0.01$ )。对照组心功能II、III级组消融后左房

压力升高且明显高于研究组术后左房压( $P < 0.01$ )。心功能II–III级的对照组患者NT-proBNP消融前后( $516.27 \pm 314.27$  pg/mL), ( $815.48 \pm 316.82$  pg/mL) ( $P < 0.01$ );心功能II–III级的研究组患者NT-proBNP消融前后( $521.57 \pm 316.21$  pg/mL), ( $376.24 \pm 242.84$  pg/mL) ( $P < 0.01$ );对照组术后NT-proBNP高于研究组, ( $815.48 \pm 316.82$  pg/mL), ( $376.24 \pm 242.84$  pg/mL) ( $P < 0.01$ )。研究组环肺静脉单圈隔离率95.56%,明显高于对照组56.84%。研究组术后3个月(47/50 vs 34/50),术后半年(46/50 vs 31/50)窦性心律维持率均优于对照组( $P < 0.01$ )。

**结论** SMARTTOUCH SF压力导管能减少心功能不全的发生,提高手术成功率。

## New Strategies for Arrhythmia Treatment

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**Objective** Arrhythmias are an important class of cardiovascular disease, the most common of which are impulsive mechanisms (automatic, triggering activities), impulsive conduction disorders (re-entry, blockade) or both. Arrhythmia may occur at any age and is characterised by a heartbeat that is either too slow ( $< 60$  beats per min) or too fast ( $> 100$  beats per min). Traditional arrhythmia treatment is divided into drug therapy and non-drug therapy. Non-pharmacological treatments include electric shock, heart rate adjustment, surgery and radiofrequency ablation. While these treatments can alleviate the symptoms of arrhythmia to some extent, the radical treatment cannot be achieved. This article briefly introduces several common arrhythmia diseases, and discusses the advantages and disadvantages of traditional arrhythmia treatment methods, focusing on new application strategies of gene therapy.

**Methods** Arrhythmias are an important class of cardiovascular disease, the most common of which are impulsive mechanisms (automatic, triggering activities), impulsive conduction disorders (re-entry, blockade) or both. Arrhythmia may occur at any age and is characterised by a heartbeat that is either too slow (<60 beats per min) or too fast (>100 beats per min). Traditional arrhythmia treatment is divided into drug therapy and non-drug therapy. Non-pharmacological treatments include electric shock, heart rate adjustment, surgery and radio-frequency ablation. While these treatments can alleviate the symptoms of arrhythmia to some extent, the radical treatment cannot be achieved. This article briefly introduces several common arrhythmia diseases, and discusses the advantages and disadvantages of traditional arrhythmia treatment methods, focusing on new application strategies of gene therapy.

**Results** Arrhythmias are an important class of cardiovascular disease, the most common of which are impulsive mechanisms (automatic, triggering activities), impulsive conduction disorders (re-entry, blockade) or both. Arrhythmia may occur at any age and is characterised by a heartbeat that is either too slow (<60 beats per min) or too fast (>100 beats per min). Traditional arrhythmia treatment is divided into drug therapy and non-drug therapy. Non-pharmacological treatments include electric shock, heart rate adjustment, surgery and radio-frequency ablation. While these treatments can alleviate the symptoms of arrhythmia to some extent, the radical treatment cannot be achieved. This article briefly introduces several common arrhythmia diseases, and discusses the advantages and disadvantages of traditional arrhythmia treatment methods, focusing on new application strategies of gene therapy.

**Conclusions** Arrhythmias are an important class of cardiovascular disease, the most common of which are impulsive mechanisms (automatic, triggering activities), impulsive conduction disorders (re-entry, blockade) or both. Arrhythmia may occur at any age and is characterised by a heartbeat that is either too slow (<60 beats per min) or too fast (>100 beats per min). Traditional arrhythmia treatment is divided into drug therapy and non-drug therapy. Non-pharmacological treatments include electric shock, heart rate adjustment, surgery and radio-frequency ablation. While these treatments can alleviate the symptoms of arrhythmia to some extent, the radical treatment cannot be achieved. This article briefly introduces several common arrhythmia diseases, and discusses the advantages and disadvantages of traditional arrhythmia treatment methods, focusing on new application strategies of gene therapy.

## 比索洛尔联合福辛普利治疗扩张型心肌病合并室性心律失常治疗的费用和临床经济学评价

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**目的** 为实施扩张型心肌病合并室性心律失常规范治疗,提高医疗质量,改善患者生存质量,节约医疗成本,降低扩张型心肌病合并室性心律失常患者医疗费用,进行扩张型心肌病合并室性心律失常的临床经济学评价。

**方法** 对东莞市厚街医院2015年1月~2018年12月收治的109例扩张型心肌病合并室性心律失常住院患者(低剂量比索洛尔联合福辛普利组治疗54例,高剂量比索洛尔联合福辛普利组治疗55例)的病例资料及费用明细数据进行回顾性分析和最小成本法分析。

**结果** 低剂量与高剂量的比索洛尔联合福辛普利治疗扩张型心肌病合并室性心律失常患者平均住院天数为9.57天和6.85天;平均住院次数为2.13次与1.40次;平均住院总费用分别为5708.88元和3216.14元,均有显著性差异。

**结论** 扩张型心肌病合并室性心律失常综合治疗费用较高,实施高剂量的比索洛尔联合福辛普利治疗后,住院天数、住院次数和平均住院总费用均降低;相同临床治疗效果下,高剂量的比索洛尔联合福辛普利治疗比低剂量比索洛尔联合福辛普利治疗要好。可见,高剂量的比索洛尔联合福辛普利治疗在临床经济学上更可行,且具有较好的推广应用价值。

## 耳穴压仔治疗良性快速心律失常85例

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**目的** 观察耳穴压仔对良性快速心律失常临床疗效及不良反应。

**方法** 选取患者167例,随机分为对照组及治疗组,对照组82例,口服琥珀酸美托洛尔片,治疗组85例,在对照组治疗基础上同时给予耳穴压仔,先将耳廓皮肤用75%的酒精局部消毒,再取胶布剪成0.5 cm×0.5 cm方形小块,中心黏

贴经过酒精消毒过的生王不留行仔1粒,对准耳穴贴压后,再用手指按摩2分钟,其强度以患者有酸麻胀痛尚可耐受为度,嘱患者每日自行按压3次,每次2分钟,每天更换一次,双耳交换治疗;10次一个疗程,共3个疗程。所选主穴为心、交感、内分泌、皮质下、降率穴,配穴神门、枕、小肠随症加减,每次取主穴3-4个,根据临床症状配穴1-2个。治疗四周后进行疗效判定。

**结果** 在不良性窦性心动过速治疗中,治疗组症状缓解总有效率为92.9%,对照组为86.6%,动态心电图总有效率为96.5%,对照组为89.0%,组间比较均有统计学意义( $P<0.05$ );在期前收缩治疗中,治疗组症状缓解总有效率为91.8%,对照组为81.7%,动态心电图疗效治疗组总有效率为95.3%,对照组为84.1%,组间比较均有统计学意义( $P<0.05$ )。

**结论** 耳穴压仔对于良性快速心律失常疗效肯定。

## 稳心颗粒联合胺碘酮治疗急性心肌梗死并发心律失常的临床效果体会

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**目的** 体会稳心颗粒联合胺碘酮治疗急性心肌梗死并发心律失常的临床效果。

**方法** 选择本院收治的98例急性心肌梗死并发心律失常患者,随机分为对照组( $n=49$ )和观察组( $n=49$ ),对照组使用胺碘酮治疗,观察组联用稳心颗粒和胺碘酮治疗,比较两组患者的治疗总有效率、不良反应发生率。根据显效和有效计算治疗总有效率,判定标准为:心律失常症状基本消失,心电图提示早搏或窦性心动过速时间减少90%以上,为显效;心律失常症状明显改善,早搏或窦性心动过速时间减少50%以上,为有效;心律失常症状无明显变化甚至恶化,早搏或窦性心动过速时间减少不足50%,为无效。

**结果** 观察组患者的治疗总有效率为89.80%(44/49),不良反应发生率为6.12%(3/49),均显著优于对照组( $P<0.05$ )。

**结论** 联合使用稳心颗粒、胺碘酮治疗急性心肌梗死并发心律失常,可以改善治疗效果,减少不良反应,具有较高的推广应用价值。

## 超重是装有植入型除颤装置的非缺血性心肌病患者死亡发生的保护性因素

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**目的** 既往多项研究揭示了体重指数(body mass index, BMI)对装有植入型除颤装置(implantable cardioverter defibrillator, ICD)的非缺血性心肌病患者临床结局的影响。然而,BMI对于装有ICD的非缺血性心肌病患者的临床结局的影响尚不明确。此项研究旨在研究BMI对装有ICD的非缺血性心肌病患者的临床结局的影响。

**方法** 此项研究回顾性分析中国心内植入型电子装置中家庭监测功能安全性及有效性的注册登记研究(SUMMIT)数据。480个有BMI数据的装有ICD的非缺血性心肌病患者被纳入研究。患者依据国内BMI分类标准分为:低体重( $BMI<18.5\text{ kg/m}^2$ ),正常体重( $BMI\ 18.5\text{--}24\text{ kg/m}^2$ ),超重( $BMI\ 24\text{--}28\text{ kg/m}^2$ ),肥胖( $BMI\geq 28\text{ kg/m}^2$ )。其中低体重人群占4.3%,肥胖人群占5%,被排除出研究,留下共435个患者。研究首要终点为全因死亡率,次要终点为接受恰当的ICD治疗的室颤/室速事件,接受恰当的ICD除颤治疗的室颤/室速事件。

**结果** 435个患者中,261个患者(60%)为正常体重,174个患者(40%)为超重。随访平均时间为57.7个月,63个患者(14.5%)死亡,158个患者(36.3%)发生了接受恰当的ICD治疗的室颤/室速事件,102个患者(23.4%)发生了接受恰当的ICD除颤治疗的室颤/室速事件。Kaplan-Meier生存分析发现,超重患者较正常体重患者死亡率下降(log-rank test:  $P=0.024$ ,  $\chi^2=5.028$ )。多因素Cox回归分析模型统计发现超重患者较正常体重患者死亡率下降( $HR=0.512$ , 95% CI 0.292-0.898,  $P=0.019$ )。然而,多因素COX回归模型统计发现超重患者和正常体重患者发生接受恰当的ICD治疗的室颤/室速事件及接受恰当的ICD除颤治疗的室颤/室速事件的风险是相当的(分别为 $HR=0.918$ , 95% CI 0.734-1.409,  $P=0.918$ ;  $HR=1.081$ , 95% CI 0.721-1.621,  $P=0.706$ )。

**结论** 对于装有ICD的非缺血性心肌病患者,与正常体重相比,超重能减少死亡率但对室性事件发生影响不大。

## 心脏再同步化治疗改善心肌传导

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**目的** 确定CRT反应与QRS缩短之间的关系。

**方法** 该项研究纳入自2002年1月至2012年12月期间植入心脏再同步化自动复律除颤器治疗(CRT-D)并随后进行发生器更换(GR)的连续性患者。到了GR的时候,我们将那些左室射血分数(LVEF)为50%或更高的患者定义为超级反应者,将LVEF为36-49%且增加超过5%的患者被定义为反应者,余下的则是无反应者。所有患者都是在CRT-D植入后的6个月和GR时进行评估。评估内容包括患者心衰症状,纽约心脏病协会心功能分级评估,体格检查,12导联心电图和经胸超声心动图等。通过对比各项指标的前后变化及分析QRS缩短在其中的联系,确定CRT反应对QRS缩短的影响。

**结果** 114例研究患者中,58例(50.9%)为无反应者,29例(25.4%)为无反应者,27例为无反应者(23.7%)超级反应者。在6个月时QRS缩短在超级反应者中显著( $175.4 \pm 21.4$ 至 $159.7 \pm 20.7$  ms,  $P=0.001$ )和响应者( $169.0 \pm 21.3$ 至 $157.7 \pm 17.6$  ms,  $P=0.008$ )。在GR时,只有超级反应者进一步缩短QRS( $159.7 \pm 20.7$ 至 $146.3 \pm 19.2$  ms,  $P<0.001$ )。6个月后的QRS持续时间变化与超级反应独立相关(QRS持续时间每缩小5毫秒的风险比为1.2;95%置信区间,1.06-1.38;  $P=0.005$ ),而且QRS缩短10毫秒或更多与GR后降低全因死亡率的风险相关。

**结论** 作为一个电标记,CRT后的持续性QRS缩短与CRT的超级反应相关。CRT植入后6个月QRS进一步缩短与GR后死亡风险降低相关。

## 心电图指标预测获得性长QT患者全因死亡率的研究

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**目的** 本研究拟通过纳入多项心电图指标,以探究心电图指标预测住院获得性长QT综合征患者的全因死亡率。

**方法** 连续纳入2013年9月至2014年2月在大连医科大

学第一附属医院住院的显著延长的获得性长QT综合征成年住院患者( $QTc \geq 500$  ms)进入实验组,并入选同时期成年(年龄 $>18$ 岁)QT间期正常的住院患者( $QTc \leq 440$  ms)进入对照组,按照性别、年龄及主要诊断与实验组患者匹配入组。所有心电图均由两名以上有经验的心内科医师同期双盲人工测量校正。使用独立样本 $t$ 检验及秩和检验(Mann-Whitney U检验)比较实验组和对照组的心电指标间是否存在差异,采用COX回归模型分析各心电指标与全因死亡的相关性。

**结果** 经人工筛选及手工测量后,共计纳入327名aLQTS患者。按照性别、年龄及主要诊断与实验组匹配共纳入624名患者进入对照组。aLQTS组恶性心律失常事件发生率及全因死亡率显著高于QT间期正常组(2.0% vs 0.2%,  $P=0.012$ ; 34.7% vs 19.4%,  $P<0.01$ )。独立样本 $t$ 检验及秩和检验结果显示:在aLQTS组和QT间期正常组住院患者中,P波、QRS波群、QT间期、QT离散度、JT间期、QTp间期、JTp间期、TpTe间期、QTc、JTc、QTpc、JTpc及TpTec等心电指标具有显著统计学差异。单因素cox回归分析结果表明:所有心电指标中与全因死亡率显著相关的心电指标有TpTe、QTc、JTc、QTpc、TpTec、TpTe/QT、TpTe/QTp、TpTe/JT和TpTe/JTp,将上述心电指标纳入多因素cox回归模型,同时采用将心电指标以四分位数分组,以首组( $<25$  th组)为组间参照组定义为G1组,25 th-50 th组定义为G2组,50 th-75 th组定义为G3组,末组( $>75$  th)定义为G4组。多因素校正后结果显示QTc G4组VS QTc G1组HR为2.053,可信区间1.382-3.049,  $P<0.001$ ; TpTec G4组VS TpTec G1组HR为1.759,可信区间1.168-2.649,  $P=0.007$ ; JTc G4组VS JTc G1组HR为1.676,可信区间1.109-2.534,  $P=0.014$ 。

**结论** QTc, TpTec和JTc延长是aLQTS患者全因死亡率的独立危险因素。心肌复极离散度的增加可能是增加aLQTS患者全因死亡的主要原因。

## 房颤负荷与缺血性脑卒中相关关系及房颤进展的危险因素分析

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**目的** 以起搏器作为房颤检测手段,分析房颤负荷与卒中发生的相关性及房颤进展的危险因素。

**方法** 连续入选自2013年1月至2017年12月期间大连医科大学附属第一医院术前有房颤的植入永久起搏器患者。在阵发性房颤患者中,对比卒中组与非卒中组,行多因素

回归分析,得出各因素与卒中发生的相关性,对比房颤持续时间超过48小时组与未超过48小时组,行多因素回归分析,得出各因素与持续性房颤发生的相关性。

对比阵发性房颤组与持续性房颤组临床资料,行多因素回归分析得出各因素与持续性房颤发生的相关性。

**结果** 阵发性房颤患者220例,持续性房颤及永久性房颤患者共136例,中位随访时间37个月,最长随访时间72个月。

阵发性房颤患者中卒中14例(6.4%)与非卒中206例(93.6%),CHA<sub>2</sub>DS<sub>2</sub>-VASc评分(OR 1.454, 95%CI 1.057-1.999,  $P=0.021$ )、房颤持续时间超过48小时(OR 12.104, 95%CI 3.373-43.441,  $P=0.000$ )与阵发性房颤患者卒中发生明显相关。

在阵发性房颤患者中超过48小时52例(23.6%),未超过48小时168例(76.4%),心房起搏比例(OR 0.969, 95%CI 0.957-0.982,  $P=0.000$ )、左房内径(OR 1.118, 95%CI 1.047-1.193,  $P=0.001$ )与房颤持续时间超过48小时相关。

阵发性房颤136例(38.2%)与持续性房颤220例(61.8%),年龄(OR 0.943, 95%CI 0.910-0.976,  $P=0.001$ )、心衰(OR 3.574, 95%CI 1.740-7.341,  $P=0.001$ )、心室起搏比例(OR 1.045, 95%CI 1.034-1.055,  $P=0.000$ )、右室流出道宽度(OR 1.124, 95%CI 1.019-1.239,  $P=0.019$ )、左房内径(OR 1.071, 95%CI 1.013-1.133,  $P=0.016$ )与持续性房颤发生相关。两组间新发卒中的发生率之间无明显统计学差异( $P=0.937$ )。

**结论** 1.房颤持续时间超过48小时、CHA<sub>2</sub>DS<sub>2</sub>-VASc评分是阵发性房颤的卒中发生的预测因素。2.阵发性房颤中心房起搏比例、左房内径与房颤持续时间超过48小时相关。3.年龄、心衰、心室起搏比例、右室流出道宽度、左房内径与持续性房颤发生相关。

## ZFH3基因在房颤发病机制的研究进展

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**目的** 房颤(AF)是临床上最常见的快速性心率失常,其发病率与死亡率正逐年增加,近年来研究发现,术后房颤(POAF)发生率也逐年上升,其中房颤射频消融术后复发率高达50%,AF及POAF的发生和发展机制一直不甚明确,因此探讨相关因素十分迫切,近几年发现基因多态性

有着不可忽视的地位,本文就ZFH3基因与AF发病机制相关性作一综述。

**方法** 检索PubMed数据库和中国知网数据库,以关键词“Atrial fibrillation”、“ZFH3”、“rs7193343多态性”和“Gene”进行检索。

**结果** 目前对AF的发病机制尚未完全明了,比较经典的有结构重构<sup>[23]</sup>、电重构<sup>[24]</sup>、神经重构<sup>[25]</sup>等学说。随着研究的不断深入,人们逐渐意识到AF也具有基因易感性,认为AF可能也是一种类似高血压和冠心病的多基因遗传疾病。目前的相关研究发现,AF的发生与肾素-血管紧张素-醛固酮系统基因、通道基因、基质金属蛋白酶基因、C反应蛋白基因等均有一定的相关性,其中ZFH3基因与POAF的发生具有显著的相关性。其作用机制:1.通过JAK/STAT信号通路介导炎症反应引起重构诱发AF;2.通过TGF $\beta$ 信号通路促纤维化引起重构诱发AF;3.通过调控NPPA的表达引起自主神经重构引起重构诱发AF;4.通过钙通道稳态失调引起多源折返环诱发AF;5.通过调控基因的表达影响RAAS信号通路诱发AF。

**结论** 综上,AF是目前常见且复杂的心律失常,其发生、发展及复发有多种机制共同参与,包括人们所了解的电重构、结构重构、炎症及基因遗传等多方面,目前虽然对AF的治疗取得了较大的进展,尤其是射频消融术已被推荐一线治疗方案,但是目前的研究的仍不全面,以至房颤术后复发率仍较高,这需要我们在今后的基础及临床研究中,从更多角度开展更多研究以进一步了解AF的发生发展机制,为治疗提供保障。

## 精准化药物续贯治疗可提高射频消融术后房颤转复率——基于中国成人心脏外科数据库华西分库报告

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**目的** 针对房颤发病机制,探讨精准化药物续贯治疗对射频消融术后房颤转复率影响。

**方法** 自2011年6月至2017年12月的中国成人心脏外科数据库华西医院分库,共有2668例因二尖瓣病变伴AF行二尖瓣瓣膜置换同期行双极射频消融术符合纳入标准的患者。记录出院时及随访相关临床及相关实验室检查数



据,主要包括性别、年龄、房颤持续时间、心电图及心脏彩超数据等。所有患者出院时完成心脏超声检查并根据病情及医生意愿使用或不使用ACEI及ARB药物。完成6月治疗及随访后评估患者心律情况。

**结果** 共2324例完成随访,其中MS组1650例,MR组674例。MS组内三组患者使用ACEI与使用ARB组患者,LAD、LVD均明显降低,差异有统计学意义( $P<0.05$ )。ACEI与ARB均可将对照组79.1%的房颤转复率分别提高至83.7%和82.8%( $P=0.03$ 和 $0.04$ ),差异有统计学意义。MR组内三组患者使用ACEI组患者与对照组相比,LAD、LVD、RAD、RVD、LVEF、LVFS之间的差异均为无统计学意义( $P>0.05$ ),而使用ARB组患者,LAD、LVD明显降低,差异有统计学意义( $P<0.05$ )。ACEI虽可将对照组76.1%的房颤转复率提高至77.2%, $P=0.62$ ,但差异无统计学意义;ARB可将对照组76.1%的房颤转复率提高至81.6%, $P=0.02$ ,差异有统计学意义。

**结论** 针对房颤发病机制进行精准化的抗结构重构药物续贯治疗能够进一步提高射频消融术后房颤的转复率。

## 零射线房间隔穿刺术治疗室性早搏的效果分析

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**目的** 分析无射线和有射线射频消融治疗室性早搏的差异。

**方法** 收集98例频发室性早搏患者,包括右室流出道和非右室流出道类型,在二维和三维CARTO系统操作下,根据是否使用X线分为二维射线组(a组)、三维射线(b组)和无射线三组(c组),统计分析三种手术方式在手术时间、放置电极时间、标测靶点时间、放电次数、曝光时间和手术并发症以及成功率方面有无差异。

**结果** a组手术时间长于b组和c组,b组长于c组,差异有统计学意义( $P<0.05$ );a组标在测靶点时间和放电次数上均多于b组和c组,差异有统计学意义( $P<0.05$ );a组曝光时间长于b组和c组,b组长于c组,差异有统计学意义( $P<0.01$ )。三组在电极放置时间、手术并发症、成功率方面对比,差异无统计学意义( $P>0.05$ )。

**结论** 三维系统射频方式不仅减少术中射线暴露时间和放电次数,还可进一步缩短手术时间。并且对比三维射线组,三维无射线组在曝光时间和缩短手术时间上更具优势,这还取决于术者对手术和三维系统熟练掌握程度。

## 儿茶酚胺敏感性室性心动过速2例报道并文献复习

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**目的** 提高对儿茶酚胺敏感性室性心动过速的临床和诊断特点的认识。

**方法** 报道2例儿茶酚胺敏感性室性心动过速的病例,并综合回顾文献。

**结果** 本文中有2例,1例为男性,因“1年半出现晕厥4次”入院,入院后患儿反复尖端扭转室性心动过速发作,结合既往反复晕厥病史及基因检测结果发现CASQ2基因突变,诊断儿茶酚胺敏感性室性心动过速;另1例为女性,因“突发晕厥3小时”,入院后查心电图示窦性心动过缓伴不齐,其他辅助检查均未见异常,结合既往病史及基因检测发现RyR2基因突变,诊断儿茶酚胺敏感性室性心动过速。回顾文章,包括本文中2例,共11例,年龄3~15岁,其中男7例,女4例,所有患儿病程中运动后或情绪激动后或不明原因下出现多次晕厥,心电图提示正常且及其他实验室检查均未发现异常,其中8例经运动压力测试及基因检测而确诊为儿茶酚胺敏感性室性心动过速。

**结论** 儿茶酚胺敏感性室性心动过速是一种少见的高度恶性的遗传性疾病,尤其在运动后、情绪激动后或不明原因出现晕厥,需警惕儿茶酚胺敏感性室性心动过速,及早进行运动压力检测及基因检测,从而采取有效的治疗措施以避免恶性事件的发生。

## Assessment of the True QT Interval in Pacemaker Patients with Stimulated Left Bundle Branch Block

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**Objective** QT prolongation has been proved to be associated with cardiovascular diseases and mortality. Pacemaker patients with stimulated left bundle branch block (LBBB) are common.

Widening of the QRS in LBBB causes false QT prolongation and thus makes true QT assessment difficult. Several formulae have been derived to assess the QT interval in LBBB. We aimed to test the correction accuracy of the prior formulae in pacemaker patients with stimulated LBBB by right ventricular (RV) pacing.

**Methods** Ninety-one ( $73 \pm 10$  years; 50% male) patients with RV apical pacing and sixty-two ( $65 \pm 13$  years; 50% male) patients with RV non-apical pacing were included. RR interval, QRS duration and QT interval were measures in sinus rhythm and during stimulated LBBB.  $QT_{LBBB}$  was modified by 4 prior formula (Wang, Yankelson, Bogossian, and Rautaharju formulae).

**Results**  $QT_c$  interval determined by the Wang formula was highly agreeable with the reference value ( $428 \pm 29$  vs.  $428 \pm 29$  ms;  $P=0.870$ ). The Yankelson formula performed well when  $QRS_{LBBB} < 170$  ms. The Bogossian formula overcorrected the QT interval ( $416 \pm 30$  vs.  $428 \pm 29$  ms;  $P<0.001$ ) while the Rautaharju formula slightly overestimates ( $439 \pm 27$  vs.  $428 \pm 29$  ms;  $P<0.001$ ). The sensitivity (90%) and specificity (98%) of  $QT_c$  interval derived from Wang formula in identifying delayed ventricular repolarization are pretty satisfying, followed by Yankelson formula (sensitivity 81%, specificity 98%). Bogossian formula is the least sensitive (48%) though the most specific (99%).

**Conclusions** The Wang formula is a reliable tool to estimate the true QT in stimulated LBBB. The Yankelson formula is simple to use in clinical setting, but seems somewhat arbitrary. The Bogossian formula underestimates the QT interval, while the Rautaharju formula slightly overestimates the QT interval. This is a pilot study, and further investigations with larger study population are necessary.

## 教育护士参与的阶段性康复训练对起搏器术后患者心脏康复的影响

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**目的** 探讨教育护士参与的阶段性康复训练对起搏器术后患者心脏康复的疗效

**方法** 选取50例起搏器术后患者分为观察组和对照组各25例,对照组术后接受常规术后指导,包括早期伤口观察,换药,肢体摆放,活动,观察组教育护士专科护士指导的阶段性康复训练,如增加患者早期康复知识宣教,睡眠指导,同时密切观察术后患者起搏器相关指标。

**结果** 观察组患者完成床上主动运动、下床活动时间、日常生活活动自理时间、步行200米时间均显著早于对照组;出院时,观察组6 min步行试验显著高于对照组(均 $P<0.01$ )。

**结论** 教育护士参与的阶段性康复训练能有效改善起搏器术后患者心脏功能,帮助患者建立信心恢复身心健康,尽快恢复日常生活能力,促进患者心脏早期康复。

## 15例 de Winter 型心电图的急性心肌梗死患者的临床观察

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**目的** 研究呈 de Winter 型心电图改变的急性心肌梗死患者的临床特征。

**方法** 连续收集北京潞河医院2017年6月-2018年12月经胸痛绿色通道收治的急性心肌梗死患者1245例,其中有15例患者的院前或急诊心电图呈 de Winter 型改变,分析这些患者临床资料和冠脉造影特征。

**结果** 15例呈 de Winter 型心电图患者中14例为男性(93.3%),平均年龄  $56.3 \pm 9.21$  岁。有4例患者(26.7%) de Winter 型心电图与 STEMI 心电图发生了相互演变,其中2例患者(13.3%)心电图由 de Winter 型演变成 STEMI,1例患者(6.7%)由 STEMI 演变成 de Winter 型,1例患者(6.7%)由 STEMI 演变成 de Winter 型后再次演变成 STEMI。15例患者均完成急诊冠脉造影:罪犯血管为左前降支(LAD)近段8例(53.3%),LAD中段1例(6.7%),1例患者(6.7%)LAD为慢性闭塞病变(CTO),右冠状动脉(RCA)的锐缘支(AM)为罪犯血管,三支血管弥漫性狭窄1例(6.7%)15例患者在急诊冠脉造影或 PCI 后 de Winter 心电图改变消失。

**结论** de Winter 型心电图常预示着 LAD 近中段病变, de Winter 型心电图可以和 STEMI 心电图相互演变,应及时识别和血运重建。

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## · 心血管病的外科治疗 ·

## 主动脉窦瘤破裂修补术后主动脉瓣反流的危险因素分析

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**目的** 外科手术是主动脉窦瘤(SVA)破裂主要的治疗方法。主动脉瓣反流是SVA破裂常见的合并疾病。术后新发或逐渐加重的主动脉瓣反流可能增加患者再次手术的风险并影响长期预后。我们通过回顾单中心的病例资料, 分析SVA破裂术后新发或主动脉瓣反流加重相关的危险因素, 探索其独立危险因素。

**方法** 回顾性分析2008年5月-2016年4月我院SVA破裂接受手术的成人患者的临床资料, 主动脉瓣病变的性质和程度通过术后和随访期间超声心动图确定, 通过电话及门诊就诊记录进行随访。收集相关资料进行统计分析。

**结果** 共253例病例纳入研究, 患者年龄范围从18岁到62岁(平均34.5岁)。结合术前超声检查和术中观察, 共有43.9%(111/253)患者合并主动脉瓣反流(少量57例、中量34例、大量20例)。术中同期行主动脉瓣置换术54例(机械瓣52例, 生物瓣2例), 主动脉瓣成形术10例。平均主动脉阻断时间 $80.0 \pm 40.4$ 分钟、体外循环时间 $113.2 \pm 51.1$ 分钟、术后住院时间 $7.5 \pm 2.3$ 天。术后无严重并发症发生, 无围术期死亡。98.8%病人出院心功能(NYHA)I或II级。随访时间1-128月, 平均47.1月。术后共37例病例发生终点事件(14.6%)。其中, 术后或随访期间新发主动脉瓣反流21例(中量4例、少量17例), 随访期间较术后早期主动脉瓣反流加重(或复发)16例(少量6例、少-中量5例、中量2例、中量以上3例)。3例中量以上的主动脉瓣反流患者中2例返院再住院行主动脉瓣置换术并顺利出院, 1例密切随访观察。根据既往研究并结合临床经验, 我们选取了14个潜在危险因素(性别、年龄、吸烟、肥胖、合并高血压、合并感染性心内膜炎、合并室间隔缺损、术前左室射血分数、术前瓣环直径、输血、体外循环时间、采用主动脉切口、窦瘤闭合方法、同期行主动脉瓣成形术)进行分析。经单因素分析共有性别( $P=0.065$ )和合并室间隔缺损( $P=0.018$ )2个变量入选( $P<0.1$ )。通过多因素logistic回归分析, 结果显示仅有1个变量, 即合并室间隔缺损( $OR: 2.29, 95\%CI: 1.111 \sim 4.708, P=0.025 < 0.05$ )为术后新发主动脉瓣反流或反流加重(或复发)的独立危险因素。

**结论** 主动脉瓣反流是术后常见的并发症, 也是导致再次手术的重要原因。合并室间隔缺损是导致术后新发主动脉瓣反流或反流加重(或复发)的独立危险因素。

## 体外膜肺氧合治疗心血管术后心源性休克: 同时联合主动脉球囊反搏效果更佳

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**目的** 静脉-动脉体外膜肺氧合(VA-ECMO)是治疗心血管术后心源性休克(PCS)的重要手段, 而目前影响VA-ECMO应用于PCS患者治疗效果的因素还不明确。我们的研究旨在分析VA-ECMO对PCS患者治疗效果及其影响因素。

**方法** 回顾分析阜外医院2005年1月至2017年12月阜外医院152例因PCS而接受VA-ECMO辅助循环的患者临床资料。对比生存出院(成功脱机并存活出院)患者与非生存出院(撤机后院内死亡和未成功脱机)患者的临床特征, Logistic回归分析生存出院的独立预测因子。

**结果** 接受VA-ECMO治疗的PCS患者平均年龄为49.514.1岁, 其中男性为主, 占73.7%。主要的心血管手术为心脏移植术(占32.2%)、冠状动脉旁路移植术(占17.0%)和心脏瓣膜手术(占11.8%)。有32.2%的患者, 在安装VA-ECMO同时启动了主动脉球囊反搏(IABP)辅助, 18.4%的患者在安装VA-ECMO前后启动了主动脉球囊反搏(IABP)辅助。VA-ECMO的总体脱机率为56.6%, 院内死亡率为52.0%。对比生存出院的患者与死亡患者, 我们发现生存出院者术前合并高血压比率较低(15.1% vs. 35.4%,  $P=0.004$ ), ECMO安装前二次开胸比例较低(19.2% vs. 39.2%,  $P=0.007$ ), ECMO安装前心跳骤停或室颤发生率较低(11.0% vs. 34.2%,  $P=0.001$ ), 床旁ECMO安装比例低(11.0% vs. 41.8%,  $P=0.001$ ), 心脏移植手术比例高(45.2% vs. 20.3%,  $P=0.001$ ), 同时启动IABP比例高(41.1% vs. 24.1%,  $P=0.025$ )。多因素logistic回归分析结果示同时启动IABP是生存出院的唯一独立保护因素( $OR=0.375, P=0.041, 95\%CI: 0.146 \sim 0.963$ )。我们还发现, 同时启动IABP的患者需要进行持续血滤治疗的比例较低(30.6% vs. 49.3%,  $P=0.039$ ), 出现神经系统并发症较少(8.2% vs.

22.7%,  $P=0.035$ ),但是血栓形成并发症出现率增高(18.4% vs. 2.7%,  $P=0.007$ )。

**结论** 在ECMO用于PCS治疗的患者中,同时启动IABP可以带来更好的生存获益,而且可以减少由于外周灌注不足引起的肾脏并发症。

## 改良升主动脉“*No Touch*”技术在升主动脉壁异常患者非体外循环冠脉旁路移植术中的应用及效果评价

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**目的** 探讨改良的升主动脉“*No Touch*”技术在升主动脉壁异常患者非体外循环冠脉旁路移植术中的应用,并评价其疗效。

**方法** 2012年01月至2017年12月,在非体外循环冠脉旁路移植术中应用改良升主动脉“*No Touch*”技术治疗升主动脉壁异常患者117例,男85例,女32例,年龄55~83岁。改良升主动脉“*No Touch*”技术主要包括:(1)乳内动脉-桡动脉或大隐静脉Y型复合桥血管技术;(2)双侧乳内动脉技术;(3)降主动脉-桡动脉或大隐静脉技术;(4)头臂干-桡动脉或大隐静脉技术。全部患者术前常规行冠状动脉造影明确冠状动脉病变的诊断,应用超声心动图或CTA解主动脉及头臂干管壁情况,并检查左心功能、肾肺功能、高血压及糖尿病等情况。结合患者术前检查资料及术中情况,针对性地选择合理、适宜的改良升主动脉“*No Touch*”技术。

**结果** 全组患者均顺利应用改良升主动脉“*No Touch*”技术完成非体外循环下冠脉旁路移植术。选择应用改良升主动脉“*No Touch*”技术的原因:(1)升主动脉钙化93例;(2)升主动脉非钙化斑块19例;(3)升主动脉血肿5例。改良升主动脉“*No Touch*”技术应用情况:(1)乳内动脉-桡动脉或大隐静脉Y型复合桥血管技术68例;(2)双侧乳内动脉技术12例;(3)降主动脉-桡动脉或大隐静脉技术26例;(4)头臂干-桡动脉或大隐静脉技术11例。靶血管再血管化数目:2支35例,3支61例,4支21例,全组桥血管远端吻合口共337个。术中流量测定显示各支桥血管流量满意(13 mL/min~162 mL/min);桥血管搏动指数满意(1.2~4.6)。术后早期全组死亡例(3/117, 2.56%),其中1例死于低心排,1例死于肺部感染,1例死于多脏器功能衰竭;其余114

例均顺利康复出院。围术期无心肌梗死、再次开胸止血、脑梗塞、主动脉夹层、切口愈合不良等严重并发症。出院前,复查冠脉CTA显示桥血管血流均通畅。术后随访6~78月,全组死亡2例(2/114, 1.75%),1例死于心力衰竭,1例死于肺癌。2例患者因右冠状动脉严重狭窄接受PCI术;桥血管远端吻合口阻塞7个(7/327, 2.14%)。

**结论** 对于升主动脉壁异常的患者,在非体外循环冠脉旁路移植术中合理选择改良升主动脉“*No Touch*”技术,不仅可以降低围术期脑梗塞、升主动脉夹层等严重并发症发生的风险,而且可以获得满意的冠脉再血管化效果。

## Conventional and Sutureless techniques for Surgical repair of Supracardiac Total Anomalous Pulmonary Venous Connection

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**Objective** Sutureless techniques has been applied to total supracardiac anomalous pulmonary venous connection for several years. Some studies suggested that sutureless techniques were suitable for infracardiac total anomalous pulmonary venous connection, with less incidence of postoperative pulmonary venous obstruction (PVO). This study aims at reviewing our experiences with conventional and sutureless techniques in patients with supracardiac total anomalous pulmonary venous connection.

**Methods** From January 2004 and January 2016, 150 patients with supracardiac total anomalous pulmonary venous connection underwent conventional or sutureless repair in Guangdong Provincial People's Hospital. The median surgical age was 70 (range from 1 to 6493) days, and median surgical weight was 4.6 (range from 1.8 to 37) kg. Patients were divided into three groups according to their surgical age, neonate group (0-30d, n=29), infant group (30-365 d, n=102) and children group (>365 d, n=20). Kaplan-Meier curve was used to demonstrate the survival estimates. Cox proportional hazard model was used to identify risk factors for mortality and postoperative PVO.

**Results** There were 9 in-hospital deaths and 2 late deaths. The survival rates at 30 days, 1 year, and 12 years were 94%, 93.3%, and 92.7%, respectively. Follow-up was com-

pleted in 95.7% of the survivors. Median follow-up was 47 months (range: 0 to 136 months). Twenty-one patients required reoperation for pulmonary venous obstruction. The survival rates in neonate group is significantly lower than that in infants and children group ( $P=0.026$ ). For those who were diagnosed with preoperative PVO, the survival rates (Conventional group 92.3% vs Sutureless group 93.9%,  $P=0.741$ ) and incidence of freedom from reoperation (Conventional group 55.6% vs sutureless group 90.9%,  $P=0.166$ ) in both the conventional and sutureless group were similar. Multivariable analysis showed that preoperative pulmonary venous obstruction ( $P=0.015$ ) and longer duration of ventilation ( $P=0.011$ ) were incremental risk factors for death. Aortic cross-clamp time ( $P=0.038$ ) was associated with postoperative pulmonary venous obstruction.

**Conclusions** Both the conventional and sutureless techniques in surgical repair for supracardiac total anomalous pulmonary venous connection can achieve satisfactory outcomes. Patients with preoperative PVO probably gain benefit from sutureless techniques though not significantly evidenced.

## 冠状动脉心肌桥的临床特征分析

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**目的** 分析冠状动脉心肌桥的临床特征。

**方法** 选取因胸闷、心悸等不适在我院接受冠状动脉造影的患者8104例,收集检出心肌桥的患者,尤其是孤立性心肌桥患者的造影图像、临床表现、动态心电图、平板运动试验。

**结果** 共检出心肌桥941例,检出率为11.62%,其中孤立性心肌桥319例。心肌桥患者的平均年龄( $60.93\pm 11.15$ )岁。心肌桥位于前降支中段者751例(79.80%),其中382例患者心肌桥合并近段血管粥样硬化。43.89%的孤立性心肌桥患者出现典型的心绞痛,27.59%的孤立性心肌桥患者出现典型的心律失常,6例孤立性心肌桥患者出现心肌梗死。

**结论** 冠状动脉心肌桥最常见于前降支中段。心肌桥患者的临床表现多种多样,部分可能为典型的心绞痛发作,少数患者可发展为心肌梗死,部分心肌桥患者可合并各种类型的心律失常,如频发室性期前收缩、房性期前收缩、房室传导阻滞等。

## Natural History of Aortic Stenosis: Atrial Fibrillation versus Sinus Rhythm Short title: Atrial fibrillation and mortality in aortic stenosis

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**Objective** Atrial fibrillation (AF) is common in patients with aortic stenosis (AS), but is not factored into indications and timing of aortic valve replacement (AVR). To examine the prognostic significance of AF versus sinus rhythm (SR) on the natural history and management of patients with severe AS.

**Methods** 1,847 consecutive patients at Mayo Clinic, Minnesota with severe AS (aortic valve area  $\leq 1.0$  cm<sup>2</sup> or aortic valve systolic mean Doppler gradient  $\geq 40$  mmHg or peak velocity  $\geq 4$  m/s) and left ventricular ejection fraction  $\geq 50\%$  were identified from January 1, 2008 to December 31, 2012. Vital status and cause of death following the index echocardiogram were determined from the medical records, Minnesota death report, and National Death Index (to December 31, 2016). Natural history, referral rates to AVR, overall survival with and without AVR in patients with severe AS stratified by rhythm (AF vs SR) during routine clinical practice.

**Results** Of the 1,847 patients 54% were male, 293 (16%) had AF and 1,554 (84%) SR; patients with AF were older ( $80\pm 9$  years vs  $75\pm 12$  years,  $P<0.0001$ ) with more prevalent heart failure (28% vs 13%,  $P<0.0001$ ), atrioventricular valve regurgitation (32% vs 7%,  $P<0.0001$ ) and right ventricular dysfunction (25% vs 6%,  $P<0.0001$ ). The survival rates at 5 years for persistent AF (37.2%) and paroxysmal AF (49.2%) were significantly lower than SR (65%) (age- and sex-adjusted HR=1.76 [1.45, 2.15],  $P<0.0001$  and HR=1.45 [1.08, 1.95],  $P=0.01$ ). In age- and sex-adjusted multivariable analyses, factors independently associated with overall mortality included heart failure (HR=1.38 [1.12-1.69],  $P=0.002$ ),  $\geq$  moderate MR (HR=1.78 [1.27-2.45],  $P=0.0008$ ), right ventricular systolic dysfunction (HR=1.97 [1.53-2.52],  $P<$

0.0001), and AVR (HR=0.43 [0.36, 0.51],  $P<0.0001$ ). Patients with AF were referred less often to AVR and symptoms were attributed to AF in 24% of non-referred AF patients.

**Conclusions** Associated structural cardiovascular abnormalities are more common in patients with AS and AF and AF confounds symptoms of AS. This combination explains the lower referral to beneficial AVR contributing to excess mortality in patients with AS and AF. Referral for consideration of AVR should be recommended in patients with AF who meet criteria for severe AS.

## 心脏瓣膜疾病心肌保护策略新思考

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**目的** 根据瓣膜患者疾病特点、左右冠脉分布优势、心肌氧供需平衡等参数实施个体化心肌保护策略,目的是加强瓣膜患者心脏保护效果,促进病人术后心肌恢复。

**方法** 收集2017-2018年30例心脏瓣膜置换或成型的患者。给予个体化灌注方案,年龄 $>45$ 岁行冠脉造影,根据造影结果判断左右优势(左优势为左冠2/3灌注液,右冠1/3;右优势为右冠2/3灌注液,左冠1/3;均衡型各为1/2),30分钟内可以开放升主动脉采用常规氧合血灌注,30-90分钟内使用Delnidol停跳液,时间 $>90$ 分使用HTK液体。合并冠脉有问题需要逆行性灌注的注意右心室低温保护。

**结果** 30例患者全部顺利复跳,停机顺利,术后没有发生心功能不全、传导阻滞等情况。

**结论** 个体化心脏停搏灌注方案可以有效的进行心肌保护,从理论角度来说更加科学规范。

## 器质性三尖瓣修复实践体会

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**目的** 探讨器质性三尖瓣病变外科修复的临床结果。

**方法** 回顾性分析2013年1月至2018年7月云南省心血管外科研究所收治的81例器质性三尖瓣病变患者的临床

资料及随访结果。男性44例,女性37例;年龄:2-61(31.5 $\pm$ 29.5)岁。Ebstein畸形矫治56例,三尖瓣腱索断裂13例,三尖瓣退行性病变3例,感染性心内膜炎2例,腱索发育异常7例。

**结果** 手术早期死亡0例(0%),术后发生Ⅲ度房室传导阻滞1例(1.23%)。63例获得随访,随访率为77.78%,随访时间1-64个月,无远期死亡。患者三尖瓣反流指数由术前3.7 $\pm$ 0.4降至术后1.4 $\pm$ 0.3。患者术后5年累积生存率为100%。

**结论** 器质性三尖瓣病变的手术治疗应尽可能以正常的三尖瓣及右心室结构为标准进行解剖矫治,以期获得良好的临床结果。器质性三尖瓣成形同样遵循Carpentier原则,除了运用成形环技术外,将二尖瓣修复的人工腱索技术、瓣叶技术、乳头肌技术、交界技术等个体化地运用于适应症患者。围术期经食道超声及经胸超声对瓣膜功能的定量评估是手术质量的重要保证。人工生物瓣膜的置换只作为最终无法修复或修复结果不好的次优策略。

## 手术:治疗心包囊肿的无奈之举

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**目的** 心包囊肿是临床少见病,临床一般无特殊症状,随着诊疗技术特别是胸部CT的普及,其诊断率有增高的趋势;国内尚无关于心包囊肿的诊疗规范,本文旨在推动心包囊肿的规范化治疗。

**方法**

1. 查阅病例报道及回顾性分析,整理总结心包囊肿现行的手术指征及治疗方案。

2. 回顾性分析我院近5年胸部CT报告,收集心包囊肿相关病例,分析囊肿类型,并作随访观察,利用流行病学研究方法,计算发病率。

3. 对于已采取手术治疗的患者,后效评估及随访观察。

**结果**

1. 国内部分单位,但凡发现囊肿即切除治疗,关于心包囊肿的手术指征过于宽松,有待规范。

2. 心包囊肿的治疗方案主要有:随访观察,经皮心包囊肿穿刺抽液术(注射硬化剂治疗),囊肿切除术(经胸及胸腔镜下)。

3. 共发现心包囊肿患者75人,约占全部影像检查人数的5/10000,较Le Roux等人报道的比例1/100000高。

4. 现有资料表明,所有囊肿在0-3年内均变化不大,除1例患者因囊肿巨大行手术治疗,其他患者均未行手术治疗,且暂未发现相关并发症。

#### 结论

1. 国内关于心包囊肿的手术指征有待规范。
2. 手术治疗心包囊肿疗效确切,罕见复发。
3. 心包囊肿罕见恶变,可随访观察。

## Completed video-assisted thoracoscopic atrial septal defect repair combine minimally incision myocardial bridge myotomy: a case of precise minimally invasive approach avoided median sternotomy

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**Objective** To explore precise minimally invasive cardiovascular operative techniques through completed video-assisted thoracoscopic atrial septal defect repair combine minimally incision myocardial bridge myotomy.

**Methods** Before a month, A 52-year-old middle-aged woman felt obvious Dyspnea after exercise, with chest tightness, palpitations and wheezing. Since the early 20 years before she had felt chest pain occasionally, which is aggravated after the activity, and It can be relieved after the rest. This considered to be a “stomach disease” and was diagnosed as “peptic ulcer” in the local hospital. The treatment was effective sometime, whereas the symptoms appear repeatedly. She’s recent transthoracic doppler echocardiography (TTE) showed atrial septal defect with moderate mitral regurgitation and moderate tricuspid regurgitation. Coronary angiography indicated there was a myocardial bridge in the middle segment of LAD, with 80% systolic compression. In order to make the operation more precise, we performed three-dimensional reconstruction according to the CT data of the patient, which marked the relative position of the myocardial bridge and the sternum for selecting the appropriate surgical incision. In this case, the marker position was at the middle of the left clavicle across the fifth and sixth intercostal space, at about 3-4 cm. In the operation, we firstly

handle the myocardial bridge of LAD through the left chest marked incision in off pump condition, afterwards, peripheral cardiopulmonary bypass was built, completed video-assisted thoracoscopic atrial septal defect repair, mitral valve repair and tricuspid valve repair were performed through the right chest wall incision: (1) Main operation port: the fourth intercostal space (2 cm); (2) Assist port: the third intercostal space (2 cm) of the anterior line; (3) the thoracoscopic port: the fifth intercostal space (1cm) to the middle line. After the surgery, left and right thoracic drainage tubes were placed, and the patient was returned to the ICU for further treatment.

**Results** Total operating room time: 300 min, cardiopulmonary bypass time 112 min, aortic clamping time: 55 min, tracheal intubation time: 17 hours, volume of left thoracic drainage after operation: 55 mL, volume of right thoracic drainage after operation: 220 mL, postoperative length of hospital stay: 10 days. There were no complications present such as malignant arrhythmia, acute myocardial infarction, pericardial tamponade, pulmonary infection, and poor wound healing. The coronary angiography was performed one week after surgery. The coronary angiography was performed one week after surgery, and the result show that systolic compression of the middle myocardial bridge of LAD was compressed by 20%. Postoperative Echocardiography showed no residual shunt was seen after operation, and no regurgitation was detected in the mitral and tricuspid valves.

**Conclusions** The completed video-assisted thoracoscopic atrial septal defect closure combine minimally incision myocardial bridge myotomy is practical, which can be a referential case for precise minimally invasive cardiovascular operative techniques.

## 53例杭州地区不同分型主动脉夹层患者的临床特征分析

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**目的** 通过分析一定时期内收住我院的主动脉夹层患者的临床资料,归纳总结其临床特点,以期进一步提高对此疾病的认识,为临床的诊断、治疗及预防工作给予帮助。

**方法** 回顾性分析我院2015年1月~2018年9月收治的主动脉夹层患者的一般情况、临床表现、实验室检查、心电图

及影像学检查、诊断及治疗情况、转归等资料。

**结果** 共收集到53例主动脉夹层患者的临床资料,男39例,女14例,男女比例2.8:1,平均年龄(56.45±18.65)岁。以Stanford系统进行分组,其中26例归为A型组,27例归为B型组。在临床表现上,胸背部疼痛不论在A型组还是B型组都占有很高的比例,分别达76.9%和81.5%,还发现,A型患者入院时低血压的发生率高于B型患者,而B型患者入院时高血压的发生率高于A型患者。在实验室检查方面,A型患者血D-二聚体、PT和肌酐水平均高于B型患者,且A型患者肌钙蛋白I>0.012 mg/mL的比例高于B型患者。在心电图与影像学检查方面发现,Stanford A型患者心电图ST段或T波改变的发生率高于B型患者,且A型患者升主动脉根部内径大于B型患者;而B型患者正常心电图、胸膜反应、左心舒张功能减低的发生率高于A型患者。彩超对主动脉夹层的诊断率为63.3%,且彩超对A型夹层的确诊率大于B型夹层。CTA对主动脉夹层的诊断率可达91.8%。53例主动脉夹层患者中,单纯药物治疗者21例,介入手术治疗者17例,开放性手术治疗者15例,住院期间共有19例患者死亡,与B型患者组相比,A型患者组的死亡率较高。经Logistic回归分析,筛选出女性和高D-二聚体为主动脉夹层患者住院死亡的危险因素。

**结论** 突发的严重胸痛或背痛是主动脉夹层最常见的症状。Stanford A型患者较B型患者入院时更易发生血压低,而B型患者较A型患者入院时更易发生血压高。CTA在临床诊断主动脉夹层方面意义重大。主动脉夹层患者病死率高,其住院死亡的新相关危险因素是女性和高D-二聚体。

## 风湿性二尖瓣病变行瓣膜成形手术的临床经验总结

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**目的** 收集报道本单位风湿性二尖瓣病变行二尖瓣成形手术的早期疗效分析及随访结果,总结报道临床经验。

**方法** 回顾性分析我院2018年01月至2018年12月在高州市人民医院心血管外科16例风湿性二尖瓣病变患者进行二尖瓣成形术的临床资料。手术方法:风湿性二尖瓣成形手术根据二尖瓣病变情况联合采用交界切开、瓣叶削薄、钙化剥除、腱索松解及乳头肌劈开方法,应用二尖瓣人工瓣环(Edwards-Physio II成形环)固定,从而增加二尖瓣

前瓣活动度和瓣叶对合高度,扩大瓣口面积。合并三尖瓣关闭不全才有人工瓣环(C型环)固定,合并心房颤动患者均采用迷宫射频消融(Maze-IV)术式进行射频消融。

**结果** 16例风湿性二尖瓣病变患者,男性6例,女性10例,年龄为26-69岁,平均(45.81±11.32)岁;经食道彩超检查及术中探查,二尖瓣病变以重度狭窄为主10例,以重度关闭不全为主6例。平均EF为(59.12±6.78)%,Euroscore II评分1.35%±0.41%。全组15例顺利完成瓣膜成形手术,1例(69岁,二尖瓣重度关闭不全)因术中成形复跳后出现二尖瓣重度关闭不全而中转行二尖瓣生物瓣置换术。体外循环时间(128.70±39.33)min、主动脉阻断时间(72.81±25.20)min,ICU停留时间(73.06±25.931)h,机械通气时间(26.62±19.85)h。术后无死亡、肺部感染、脑卒中、恶性心律失常、急性肾衰竭、低心排综合征等并发症。随访2~13月(7.0±3.0)个月,随访率100%,随访期间无不良事件发生。所有患者规则服用华法林抗凝,无再次手术及相关心血管事件。

**结论** 对于风湿性二尖瓣病变患者,往往行二尖瓣(机械瓣/生物瓣)置换手术,从而出现机械瓣的抗凝/出血风险,及生物瓣的毁损问题;但是随着瓣膜外科手术技术及理念不断发展,行风湿性二尖瓣病变成形手术,维持了二尖瓣结构的完整性,对维持左心功能起到良好作用,避免了行人工瓣膜置换。本中心行风湿性二尖瓣成形手术术后早期临床效果满意,对于远期效果需要长期随访总结。

## 高龄主动脉夹层的思考

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**目的** 现临床各种指南通常专注单种疾病,常常将患有合并症的老年参与者排除在外,从而导致研究的结果可能并不能直接用于老年人。老年人是一个特殊的群体,研究老年人群体的相关特点,然后针对老年人主动脉夹层患者制定最适宜的治疗方案。

**方法** 详细翻译和阅读解读2010年美国AHA《主动脉疾病指南》,2011年日本JCS《主动脉疾病指南》,2014年欧洲ESC《主动脉疾病指南》,2015年WHO《全球老龄化和健康评估报告》和2015年WHO《中国老龄化与健康国家评估报告》,并查询最新相关文献和评论,结合所有材料内容,调研高龄本身固有特点和属性,最后依据主动脉相关病变情况制定合理的、有效的和经济的治疗方案。



**结果** 高龄患者是一个身体各项机能衰老的过程,其特殊性表现为多样性,共患病,经济问题和虐待问题的特殊性。世界上大部分卫生系统都是按照急症照护模式建立的,而这与老年人主要的健康状况并不相符。临床上对老年人的评估通常只是从疾病病变角度出发,忽视了年龄相关的很多评估(如年龄相关性一般性评估,生存预测指标评估等等)。疾病治疗方面,对于疾病本身的治疗过于重视,而忽视了老年人的特殊性,进而导致很多治疗方案不适合老年人,应该根据血管病变病情和老年人的全面评估情况,区别对待年轻患者和老年患者的治疗方案。老年人的随访也存在仅仅针对医学病变治疗后的效果评估,缺乏针对老年人的生存效果随访。通过卫生服务,长期照护和环境这三方面理念和内容的改变,促进老年人内在能力的提升,进而使老年人的功能发挥最大化。

**结论** 确保高龄主动脉夹层患者获取所需的卫生服务时没有困难;高龄主动脉夹层患者重点并不是仅治疗主动脉的解剖病变,而是维持老年人的功能发挥最为重要;确保高龄主动脉夹层患者有尊严的活着。

## 一体化分支支架在复杂B型主动脉夹层中的应用

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**目的** 探讨一体化分子支架在复杂B型夹层中的临床效果,解决复杂B型夹层应用介入技术时锚定区不足的问题。

**方法** 本中心2017年1月-2018年12月就诊的复杂B型夹层患者,行主动脉CTA详细检查,评估血管病变情况,依据血管病变情况,术前设计合理的方案,依据患者个体化的解剖结构,选择合适的一体化分支支架,扩大患者锚定区至左颈总动脉后,避免这类病变行常规体外停循环手术,术后观察内漏,脑血管意外,二次手术等情况,评估这项技术的效果。

**结果** 本组数据无围手术期死亡,无围手术期严重并发症,术后CTA血管病变处理良好,无内漏,无二次手术患者。

**结论** 一体化分支支架可以安全在复杂B型主动脉夹层中的应用,并且避免了这类病变患者常规开胸手术的风险,社会和经济效益明显,但还需要长期随访观察远期效果。

## 超氧对主动脉夹层患者围术期红细胞氧化应激以及能量代谢的体外实验研究

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**目的** 研究的主要目的是观察不同剂量超氧对主动脉夹层病人围术期红细胞氧化应激以及能量代谢的影响,为临床应用超氧提供理论实验基础。

**方法** 收集本中心2016年3月到2016年8月20例主动脉夹层患者手术前后的血液标本进行不同浓度(0  $\mu\text{g}/\text{mL}$ , 40  $\mu\text{g}/\text{mL}$ , 60  $\mu\text{g}/\text{mL}$ , 80  $\mu\text{g}/\text{mL}$ , 160  $\mu\text{g}/\text{mL}$ )的超氧预处理。ELISA法测定氧化/抗氧化指标(MDA、SOD)以及能量代谢指标( $\text{Na}^+-\text{K}^+-\text{ATP}$ 、2,3-DPG)。

**结果** 术前组和术后组中40  $\mu\text{g}/\text{mL}$ , 60  $\mu\text{g}/\text{mL}$ , 80  $\mu\text{g}/\text{mL}$ 三组间MDA、SOD、 $\text{Na}^+-\text{K}^+-\text{ATP}$ 、2,3-DPG数值变化没有明显统计学差异( $P>0.05$ );但与0  $\mu\text{g}/\text{mL}$ 剂量组(MDA含量降低, SOD、 $\text{Na}^+-\text{K}^+-\text{ATP}$ 、2,3-DPG含量增加)和160  $\mu\text{g}/\text{mL}$ (MDA含量升高, SOD、 $\text{Na}^+-\text{K}^+-\text{ATP}$ 、2,3-DPG含量降低)剂量组相比,所有参数的变化均存在统计学意义( $P<0.05$ )。

**结论** 40-80  $\mu\text{g}/\text{mL}$ 的超氧可以提高RBCs膜抗氧化能力、降低氧化应激反应,提高RBCs膜的能量代谢,对RBCs存在益处。

## VV-ECMO联合俯卧位通气在儿童重症肺炎治疗中体会

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**目的** 探讨VV-ECMO联合俯卧位通气对儿童重症肺炎治疗中的护理影响。

**方法** 选择我院一例重症肺炎患儿,应用VV-ECMO联合俯卧位12小时/d,并观察俯卧位后治疗效果变化。

**结果** 经积极治疗,ECMO辅助13天,俯卧位机械通气10 d后顺利脱机拔管,住院33天痊愈出院

**结论** ECMO作为一种有效的呼吸支持治疗手段,广泛地用于重症呼吸衰竭患者的救治,在显著改善氧合及通气的同时,可使得肺脏休息后逐渐恢复功能,俯卧位机械通气

能改善重症肺炎患者治疗效果,二者的联合应用在重症肺炎治疗中意义重大。患者通过VV-ECMO联合俯卧位机械通气可以有效地改善重症肺炎病人的氧合状态,加速肺炎康复,此过程中的ECMO出凝血管理,气管插管管理,抗炎管理至关重要。

## 三尖瓣机械瓣置换术后血栓形成导致卡瓣的治疗

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**目的** 人工机械瓣功能障碍是心脏瓣膜置换术后严重的并发症之一,一旦确诊,必需尽早处理。三尖瓣位置机械瓣置换术后抗凝要求更高,一旦形成血栓造成卡瓣的处理根据指南要求必须尽早进行溶栓治疗。

**方法** 明确诊断机械瓣血栓形成后立即给予静脉肝素泵

入,尽早静脉应用重组人组织型纤溶酶原激酶衍生物(tPA)(两剂每次18 mg,间隔30分钟),同时继续口服华法林直至INR>3.0后停止静脉泵入肝素。

**结果** 经上述治疗2日后患者机械瓣膜开闭音复现,复查经胸超声显示机械瓣启闭接近正常,治疗过程中患者无出血并发症。

**结论** 人工瓣膜血栓形成(PHVT)是心脏机械瓣置换术后的并发症之一。抗凝不充分或停用抗凝剂是机械瓣血栓形成主要的危险因素。PHVT导致瓣膜功能障碍呈急性或亚急性起病,临床上患者常于病情稳定状态下突然出现心力衰竭或急性肺水肿,也可表现为进行性胸痛、晕厥或休克等心排量骤减所致的器官缺血症状。超声心动图是目前诊断PHVT和追踪治疗效果的最主要的手段。超声心动图检查时主要观察瓣叶形态和活动度、血栓直接影像和人工瓣狭窄及关闭不全的血流频谱。另外,听诊或患者自述原本机械瓣杂音消失也可作为诊断提供依据。2014年AHA瓣膜外科指南推荐右心系统PHVT经静脉应用肝素后血栓持续存在则需应用纤溶治疗,合理应用纤溶治疗及监测凝血功能不增加出血并发症发生几率,且可获得良好的临床效果。

## · 心血管病临床护理研究 ·

## Teach-back 健康教育法在慢性心力衰竭患者心脏康复中的应用研究

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**目的** 探讨 teach-back 健康教育方式对慢性心力衰竭患者自我护理及生活质量的影响研究, 通过实施 teach-back 健康教育方式, 提升患者的知-信-行, 降低再入院率, 促进心脏康复。

**方法** 选取2018年4月到10月在院的符合CHF诊断标准的慢性心力衰竭患者共100例, 心功能分级Ⅱ~Ⅲ, 随机分为干预组和对照组各50例。纳入标准: ①符合慢性心力衰竭诊断标准, 且诊断为慢性心力衰竭时间大于1年; ②有良好的认知沟通能力; ③充分了解本次实验, 患者及患者家属均知情同意并自愿参加本次研究, 排除有其他脏器严重功能损害的患者, 排除空巢独居患者。对照组采用常规的健康教育, 干预组采用 teach-back 健康教育方式。teach-back 健康教育 步骤为传递信息-评估效果-澄清纠正-确认理解。具体实施方式为通过对研究小组成员进行培训, 首先通过视频及图文并茂的宣教手册, 小组成员采用通俗易懂的语言避免患者无法正确理解的专业术语, 根据治疗阶段进行宣教, 每次宣教内容控制在患者可接受的范围内, 宣教结束后进行简短的提问。其次, 通过提问、知识测评、患者叙述自身理解记忆的宣教内容, 用 teach-back 法测评标准评价患者理解记忆的内容。再次, 分析患者理解认知偏差的原因, 进行澄清纠正, 直至最后患者可以正确的理解宣教内容。两组患者在住院期间、出院后3个月进行相关知识测评、生活质量量表(LHFQ)、心力衰竭自我护理指数量表(SCHF)测评。

**结果** LHFQ 评分住院期间干预组为81.33分, 对照组为78.76分, 出院三个月干预组为46.72分, 对照组为70.68分,  $P < 0.05$ , 得分越低说明患者生活质量越好; SCHFI 评分, 干预组高于对照组,  $P < 0.05$ , 评分越高说明患者自护行为越好, ; 两组出院三个月依从性比较干预组为44人, 对照组为27人,  $P < 0.05$ , 结果显示以上各维度条目比较差异有统计学意义。实验组自护能力、行为依从性、生活质量均优于对照组,  $P < 0.05$ , 差异有统计学意义。

**结论** 研究表明, teach-back 健康教育方式, 患者可以有效的接收心脏康复健康教育知识内容, 在这一过程中护

患得到有效沟通, 患者住院满意度也得到了提高, 提升患者的自我护理指数, 强化知-信-行, 改善生活质量, 促进心脏康复。

## 急诊PCI术后口服水化治疗预防造影剂肾病的水化用量选择与临床效果研究

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**目的** 观察急诊PCI术后不同口服水化用量的选择, 对于造影剂肾病的预防效果及临床价值。

**方法** 在2015年7月-2018年4月我院接收的急诊PCI的患者中随机选取150例展开探究。采用随机抽样的方式, 将所有患者平均对称分为观察组与对照组, 各75例。对照组实施术后6小时常规口服水化剂量(1 mL/kg/h), 观察组实施术后6小时强化口服水化剂量(3 mL/kg/h), 在术前、术后24小时、48小时、72小时分别观察患者的血肌酐值与尿素氮值, 并计算患者的肾小球滤过率估算值, 并统计术后72小时内造影剂肾病的发生率。

**结果** 观察组与对照组术前血肌酐与尿素氮比较无差异( $P > 0.05$ )。两组在术后血肌酐值与尿素氮值比较有差异( $P < 0.05$ )。两组术后造影剂肾病发生率比较有差异( $P < 0.05$ )。两组治疗效果比较有意义( $P < 0.05$ )。

**结论** 对急诊PCI术后患者实施口服水化治疗方式, 能够安全有效实现对血肌酐和尿素氮的控制, 而实施强化口服水化剂量(3 mL/kg/h)在降低患者造影剂肾病的发生率方面更优于常规口服水化剂量(1 mL/kg/h), 对于提高临床治疗效果具有重要的作用, 应用价值突出。

## 心脏移植受者服药依从性影响因素汇总分析

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**目的** 心脏移植已成为各种终末期心脏病患者首选的治疗方式,心脏移植术后受者对治疗的依从性,尤其是免疫抑制剂的服药依从性是维持生命,保证移植心脏健康存活和提高受者生活质量的重要保证。本文通过对影响心脏移植受者服药依从性因素进行汇总分析,对干预措施进行网状meta分析,旨在为心脏移植专科医护人员提供基于证据的提高服药依从性的策略。

**方法** 系统检索 Cochrane Library、PubMed、Embase、Science Direct、CINAHL、JBI、中国知网、万方数据库。收集所有涉及心脏移植患者服药依从性的随机对照研究、非随机对照研究、队列研究、横断面研究等。从心脏移植受者服药依从性的各影响因素、干预措施进行汇总分析。

**结果** 心脏移植受者服药不依从率为11%~40%,50%的晚期急性排斥反应与15%的移植植物功能丧失与依从性差有关。其中由于青少年服药依从性问题突出受到广泛关注。本文参考 Venkatesh 等学者将意义相近构念进行合并的研究方法,将影响心脏移植服药依从性的因素归纳为:人口统计学特征(年龄、健康素养)、社会经济状况(教育背景、年收入、家庭支持)、心理状况(感知有用性、自我效能、态度)、疾病因素(术后生存时间)、治疗因素(给药方案、用药负担、药物安全性)、健康照护体系(专业技能、医患沟通)等。干预措施分为三个层面:个人层面(教育/认知、行为/咨询及心理干预)、团队层面(医患沟通、家庭及社会支持)、医疗政策层面(医疗保健政策、用药方案制定等)。计算各干预措施效应值,按照Cohen's d对比标准,将所有因素分成大、中、小差异。

**结论** 心脏移植受者服药存在一定不依从现象,严重影响移植受者远期预后,医护人员应组建多学科医疗团队,为移植受者制定个性化的服药依从性促进措施,以改善其健康结局。

## APACHEII 评分和 MEWS 评分在心内科术后患者中的应用

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**目的** 探讨联合 APACHEII 评分和 MEWS 评分在心内科术后患者护理中的应用。

**方法** 回顾性分析 2016 年 10 月至 2017 年 10 月在我院心内科住院并行手术治疗,术后共 618 例患者的 APACHEII 评分和 MEWS 评分,筛选出 APACHEII 评分  $\geq 20$  分及

MEWS 评分  $\geq 4$  分的患者,通过绘制受试者工作特征曲线 ROC,分析出 APACHEII 评分及 MEWS 评分对术后患者不良预后(转入 ICU 或死亡)的预测价值和最佳界值,分析联合 APACHEII 评分及 MEWS 评分与患者转归的关系。

**结果** 618 例术后患者中有 138 例 APACHEII 评分  $\geq 20$  分,146 例 MEWS 评分  $\geq 4$  分;转入 ICU 患者 12 例,死亡患者 2 例,APACHEII 评分均  $\geq 22$  分,MEWS 评分均  $\geq 5$  分。

**结论** 单独应用 APACHEII 评分或 MEWS 评分均可对术后患者的预后及转归进行预测与提示预防性护理措施,而联合 APACHEII 评分和 MEWS 评分可以更好地帮助心内科护士预先评估患者手术后患者病情的严重程度,提前做出相应的护理干预措施,改善患者的预后。

## 体外循环术后患者应激性高血糖预后研究及临床实践原因分析

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**目的** 通过分析术后应激性高血糖与体外循环术后患者预后相关性,梳理护理实践现状,发现存在缺陷和风险,从而提出改善方案,为后续制定管控方案奠定基础。

**方法** 前瞻性收集 2017 年 1 月至 12 月某三级甲等医院收治的经体外循环手术患者资料,内容包含患者一般资料、患者预后指标、应激性高血糖达标时间、临床监测处理方法等。采用描述性分析、 $\chi^2$  检验、相关分析等进行预后及临床实践原因分析。

**结果** 本研究共纳入 368 例经体外循环术后患者,其中应激性高血糖患者 224 例(61.3%)。发生应激性高血糖患者在并发症发生率、机械通气时长、住院费用等方面均高于非高血糖组( $P < 0.05$ )。患者首次达到目标血糖值( $< 11.1$  mmol/L)平均时间为(15 $\pm$ 1.2)小时,且容易发生反复。临床实践存在刻板执行医嘱、未动态评估监测、胰岛素应用不规范、低血糖发生的缺陷。

**结论** 应激性高血糖与体外循环术后患者预后显著相关。基于临床现状,优化应激性高血糖闭环式处理流程,进一步提高护理评估处理能力,降低应激性高血糖发生率,保障患者安全至关重要。

## 衰弱评估与老年高血压患者生活质量的相关性研究

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**目的** 衰弱(frailty)是一种多维度的老年综合征,反映了机体生理储备的下降及对应激的易损性。衰弱可导致患者出现生活质量下降与功能残疾,使得患者的再就诊率和死亡率增加<sup>[1-3]</sup>。老年人存在心血管结构及功能改变<sup>[4]</sup>,血管结构改变会加重动脉硬化程度、减弱动脉顺应性,导致收缩压和舒张压出现年龄相关性改变<sup>[5]</sup>。正常情况下,<50岁人群舒张压会随年龄增长而升高,≥50岁人群舒张压会随年龄增长而降低<sup>[5]</sup>。近年有研究发现,老年衰弱患者血压并不随年龄增长而升高,且该类型患者心脑血管疾病发生风险较高、降压治疗获益较少或根本不获益。老年高血压患者治疗及自我管理是一个长期慢病管理的过程,研究衰弱评估与老年高血压患者生活质量的相关性并制定相关护理管理策略,可减少社会和家庭负担。因此,该研究分析2017年1月-12月在陆军军医大学第二附属医院心血管内科的老年高血压患者为研究对象,采用Fried衰弱量表对诊断为高血压的老年患者进行生活质量的相关性研究,并分析其影响因素。

**目的** 研究衰弱评估与老年高血压患者生活质量的相关性,探讨其预测价值。

**方法** 选取2017年1月-12月在陆军军医大学第二附属医院心血管内科住院高血压老年患者(65-79岁)376例,年龄65-79岁,平均(67.3±4.8)岁,根据Fried量表评估结果将患者分为两组,观察组(衰弱)103例,对照组(非衰弱)273例。比较两组患者的一般资料、营养评估量表(MNA-SF量表)、生活质量评定量表(QOL)及抑郁自评量表评分(SDS)等评估生活质量相关问题。

**结果** 观察组QOL评分、MNA-SF评分、SDS评分结果,与对照组相比,差异有统计学意义( $P<0.05$ ),在年龄、性别、吸烟饮酒史等方面与对照组相比,差异无统计学意义( $P>0.05$ )。

**结论** 老年高血压患者衰弱主要与生活质量下降、营养状况不佳、抑郁情绪有关,临床可制定相应的护理管理策略,以减少衰弱的发生。

## A Retrospective Analysis of Patients with Psycho-cardiological Disease

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**Objective** To analyze the clinical data of patients with psycho-cardiological disease retrospectively and explore the related factors.

**Methods** Patients with a diagnosis of coronary atherosclerotic heart disease and mental illness were retrieved by the electronic case system from Guangdong Provincial People's Hospital in Guangzhou in China. The start and end time of the screening is from January to December 2017 and finally we selected 132 patients with coronary heart disease and mental illness from 7460 cardiac patients. In the psycho-cardiological group, 91 patients with Full profile were selected. In the control group, 91 patients with coronary atherosclerotic heart disease without any mental illness were randomly selected. The clinical data of the two groups were compared for statistical differences.

**Results** The clinical detection rate of psycho-cardiological disease was 1.77%. Among 132 patients with coronary heart disease, the proportion of men and women with mental illness was basically the same. The different types of mental illness of patients with coronary heart disease were related to limb function, troponin T and B-type natriuretic peptide ( $P<0.05$ ). Between two groups, the proportion of patients with diabetes and hypertension was basically the same and the difference was not statistically significant ( $P>0.05$ ). Patients with psycho-cardiological disease were related to daily caregiver and medical payment ( $P<0.05$ ).

**Conclusions** The clinical detection rate of psycho-cardiological disease is low. Limb function, troponin T and B-type natriuretic peptide are risk factors associated with different type of negative emotions in patients with coronary heart disease. Daily caregiver and medical payment are related factors associated with psycho-cardiological disease. Future studies are needed to identify some psychology interventions for cardiac patients. It is suggesting that clinical medical staff should pay more attention to patients with psycho-cardiological disease in the future. Also, clinical medical staff should learn to identify psychological problems in patients with heart disease.

## 四例儿童植入型心律转复除颤器的护理体会

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**目的** 自1980年植入型心律转复除颤器(ICD)首次植入人体以来,全球每年植入ICD约20万台。但在国内,由于植入ICD费用昂贵,且医生、患儿对ICD的认识不深,故国内每年仅植入3000台。儿童植入ICD领域,由于医生技术的限制和患儿群体需求少,2013年前无儿童植入ICD的报道。

总结我科四例儿童植入型心律转复除颤器的护理体会,为大家提供经验。

**方法** 2013年9月至2018年1月在本院全麻下行ICD植入的患儿共4例(见表1)。患儿年龄6~15岁,平均年龄(11±4.24)岁,长Q-T综合征并发室速1例,长Q-T综合征并发气管狭窄1例,室速伴阿-斯综合征1例,ICD类型2例为单腔,2例为双腔,其中植入单腔ICD的2例术后发生电风暴。

**结果** 四例病例除了病例2合并气管狭窄导致呼吸困难并反复电风暴转PICU治疗,住院时间延长外,其余病例经历了囊袋感染关,镇静镇痛,恐惧等心理历程后,均在植入ICD后第七天顺利出院,出院时程控示ICD功能良好,囊袋无感染,手术切口愈合良好。

**结论** ICD是一项新技术,为恶性心律失常的患儿治疗开辟了一个新的领域。术前完善的准备、术中娴熟的配合、术后精心的护理、出院详细的告知,对保证患儿安全使用ICD至关重要。密切观察病情变化,积极处理ICD电风暴,做好医护患三者密切合作,重视伤口护理,加强心理护理,为患儿围术期提供全面的优质精心护理,更好地改善ICD患儿的生活质量。

## 多维度质量管理体系在全机器人手术患者围术期的应用

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**目的** 探讨全机器人手术患者围术期一种有效的护理质量管理方法。发挥医生、护士、技术员之间的协同作用,保证手术顺利进行,提升护理质量,改善患者术后生活质量,形成此领域的规范并普及推广,从而真正达到快速康复的目的。

**方法** 通过对我科65例行全机器人手术的患者,其中男性:23例,女性:42例;房间隔缺损:29例,室间隔缺损:12例,瓣膜病变:17例,冠心病:4例,粘液瘤:3例的护理经验总结,创建了适合全机器人手术患者的一套质量管理体系。从完善制度保证体系,重视人文关怀,实施个体化模块护理模式,3个维度同步推进,形成了初步护理规范并运用于临床。

**结果** 形成全机器人手术后护理规范,减少并发症的发生,加速快速康复。

**结论** 实践表明,注重质量管理的多维性,发挥医生、护士、技术员的协同性和扭住诊疗护理过程的关键点是开展一项新业务新技术,保证质量的核心。

## 儿童先天性心脏病介入术中肺不张快速复张的护理策略

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**目的** 探讨儿童先天性心脏病介入术中肺不张发生后快速复张的护理策略。

**方法** 回顾分析2例儿童先天性心脏病介入术中并发肺不张的护理措施。

**结果** 2例患儿均在术后24小时内成功复张。

**结论** 加强呼吸道分泌物抽吸,深吸痰清除痰栓;吸痰后给予膨肺;协助麻醉师调节呼吸参数阻止肺组织塌陷和气管道闭合;拔管后刺激患儿咳嗽等护理措施可有效快速促进肺复张。

## 品管圈活动在提高心内科心脏介入手术健康宣教知晓率中的应用

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**目的** 探讨品管圈活动在提高心内科心脏介入手术健康宣教知晓率中的应用效果。

**方法** 2017年2月在护理部品管圈活动的基础上,成立品

管圈小组,并随机抽取心内科心脏介入手术患者 300 例分为活动后试验组和活动前对照组,以“提高心内科心脏介入手术健康宣教知晓率”为活动主题,遵循 PDCA 循环,通过各种品管手法,对活动前健康宣教知晓率进行现状调查和原因分析,拟定对策并实施。比较两组健康宣教知晓率调查结果的差异。观察品管圈活动对介入手术健康宣教的改善情况。

**结果** 对照组和试验组各发放 150 份问卷,回收率 100%,试验组健康宣教知晓率高于对照组,实施品管圈活动后心脏介入手术健康宣教知晓率为 54%,较活动前 8% 明显升高,超出预期目标。此次活动的目标达成率为 135%。活动后圈员解决问题能力、责任心、沟通协调、自信心、团队凝聚力、积极性、品管手法、和谐度 8 项能力得分明显高于活动前。说明此次品管圈活动采取的措施是有效的。

**结论** 品管圈活动可有效提高心内科心脏介入手术健康宣教知晓率,同时可提高护理人员的解决问题能力、执行力和工作积极性,增强团队凝聚力。

## Effect of clinical rehabilitation nursing on anxiety, depression and quality of life of young and middle-aged patients with coronary heart disease

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**Objective** In recent years, with the quicker and quicker rhythm of life style, more and more fierce competition and pressure, coronary heart disease has become a common and frequently-occurring disease endangering human health. The population of patients with coronary heart disease in China has gradually tended to be younger and younger. The incidence of coronary heart disease among young and middle-aged people has increased year by year. This undoubtedly sounds an alarm bell to our medical staff and warns us that we must pay attention to young and middle-aged people. Coronary Heart Disease: A Critical Population. This study is to provide reference basis for the disease in patients with coronary heart disease, we observed the efficacy of rehabilitation nursing strategies on anxiety, depression and quality of life of young and middle-

aged patients with coronary heart disease (CHD).

**Methods** Sixty-four cases of young and middle-aged patients with coronary heart disease were randomly divided into control group (n=42) and observation group (n=42). The control group was given conventional nursing care and observation group was given health education guidance, rehabilitation motion therapy, music therapy and psychological care on the basis of conventional nursing. Hamilton anxiety scale (HAMA) and Hamilton depression scale (HAMD) were used to observe anxiety and depression state of all patients, and the Seattle angina questionnaire was used to evaluate the quality of life of patients before and after treatment.

**Results** Compared with control group, HAMA and HAMD scores decreased obviously, and SAQ score increased significantly when given rehabilitation nursing strategy in the observation group ( $P < 0.05$ ). **Conclusions** Application of rehabilitation nursing strategy in the process of treatment of coronary heart disease can significantly improve anxiety and depression state and quality of life of patients, which is an effective way of nursing practice.

**Conclusions** The comprehensive application of health education guidance, rehabilitation exercise therapy, active music therapy and psychological intervention nursing in rehabilitation nursing strategy can help patients gradually realize the importance of medical work, consciously establish behaviors conducive to the rehabilitation of coronary heart disease, actively adjust their bad moods, thereby improving their anxiety and depression, improving their quality of life and promoting disease. Recovery of illness, etc. In conclusion, it is very important and necessary to implement rehabilitation nursing strategy in the treatment of young and middle-aged patients with coronary heart disease, which is one of the nursing methods worthy of extensive use by medical staff.

## 射频消融术后患者疾病不确定感及影响因素分析

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吉林大学白求恩第一医院

**目的** 调查分析射频消融术后患者的疾病不确定感状况及其影响因素,为评估患者疾病不确定感和提出针对性的干预措施提供依据。

**方法** 采用自制的一般资料问卷、Mishel 疾病不确定感量表(MUIS-A)对 80 例行射频消融术治疗严重心律失常的患者进行调查,分析其影响因素。

**结果** 80 例射频消融术后患者的疾病不确定感总分在 65~120 分,平均(79.56±8.16)分,其中 19 例属于低水平疾病不确定感,53 例属于中水平疾病不确定感,8 例属于高水平疾病不确定感。按疾病不确定感个维度平均得分由高到低排序:不明确性(32.87±4.36)分,复杂性(18.51±2.98)分,信息缺乏(17.32±4.36)分,不可预测性(11.52±2.18)分。不同性别、年龄、文化程度、家庭人均月收入、户口所在地、医保形式的射频消融术后患者疾病不确定感得分比较,差异无统计学意义。不同病程,不同文化程度的射频消融术后患者疾病不确定感得分比较,差异有统计学意义( $P<0.05$ )。

**结论** 80 例行射频消融术的患者中,66.25%的患者疾病不确定感处于中等水平,23.75%的患者疾病不确定感处于低水平,10.00%的患者疾病不确定感处于高水平。多元线性回归分析显示,患者疾病不确定感的水平主要受病程和文化程度影响,病程越长,文化程度越高,疾病不确定感越低。护士应根据患者的疾病不确定感水平,给予针对性的信息支持,并提供护理措施,进而降低患者的疾病不确定感。

## 20 例体外循环心脏术后延迟拔管病人俯卧位通气的临床护理体会

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**目的** 探讨俯卧位通气在体外循环心脏术后病人肺功能恢复中的应用及护理要点,总结俯卧位通气的相关经验。

**方法** 对 20 例心脏术后延迟拔管病人给予俯卧位通气,规范俯卧位的呼吸道管理,对比治疗前后的血气分析结果,观察动脉血氧分压 $P(O_2)$ ,动脉血二氧化碳分压 $P(CO_2)$ /FiO<sub>2</sub>、氧合指数 $P(O_2)$ ,监测生命体征,观察疗效。

**结果** 20 例病人经过俯卧位通气后氧合状态明显改善,

成功拔除气管插管,顺利转出 ICU,安全返回病房继续治疗。

**结论** 规范的俯卧位通气及通气前后的相关护理措施能够改善呼吸系统顺应性,促进肺复张,有利于痰液引流,促进肺功能的恢复,缩短呼吸机使用时间,降低体外循环心脏术后延迟拔管病人的监护时长,在促进心脏术后病人恢复的整体过程中能够达到良好的效果。

## 维生素 B6 注射液预防急性冠脉综合征患者行急诊 PCI 术中呕吐的效果分析及护理对策

任春晖

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**目的** 探讨应用维生素 B6 注射液预防急性冠脉综合征患者行急诊 PCI 术中呕吐的疗效及护理对策。

**方法** 选择 2017 年 1 月至 2018 年 12 月于我科行急诊 PCI 的急性冠脉综合征患者 100 例,随机分为观察组和对照组。观察组穿刺桡动脉置入桡动脉鞘管成功后,经静脉输液通路以静脉注射的方式预防性给予维生素 B6 注射液 100 mg 预防术中呕吐的发生;对照组穿刺桡动脉置入桡动脉鞘管成功后,未经静脉输液通路以静脉注射的方式预防性给予维生素 B6 注射液 100 mg 预防术中呕吐的发生,患者术中一旦发生呕吐,立刻经静脉输液通路以静脉注射的方式给予维生素 B6 注射液 100 mg,针对呕吐症状进行治疗。分别观察 2 组患者术中呕吐的病例数、呕吐次数、呕吐持续时间、呕吐严重程度。针对急性冠脉综合征患者行急诊 PCI 术中发生呕吐的患者,护理对策:术前评估患者术中发生呕吐的概率;备好吸痰器、急救药品及物品;熟知手术配合流程,掌握急救仪器及药品的正确使用;疏导患者紧张、恐惧的不良心理反应;指导患者正确的呕吐姿势,俯卧位,头偏向一侧,避免窒息,头下放置呕吐物收集袋;正确收集呕吐物,避免污染无菌的手术台面;观察并记录呕吐物的量、颜色、气味等;全程监测生命体征变化、监护病情变化;做好术中并发症护理。

**结果** 观察组术中发生呕吐病例 9 例(18%)、呕吐次数为(1.01±0.32)次、呕吐持续时间为(4.86±1.63)min、呕吐严重程度(依 WHO 恶心呕吐分级标准)Ⅰ级 41 例,Ⅱ级 5 例,Ⅲ级 4 例,恶心呕吐评分为(0.89±1.07)分;对照组术中发生呕吐病例 21 例(42%)、呕吐次数为(2.52±1.15)次、呕吐持



续时间为(6.92±2.57)min、呕吐严重程度(依WHO恶心呕吐分级标准)Ⅰ级29例,Ⅱ级15例,Ⅲ为6例,恶心呕吐评分为(1.68±1.03)分。观察组术中发生呕吐病例数、呕吐次数、呕吐持续时间、呕吐严重程度均显著低于对照组,差异均有统计学意义( $P<0.05$ )。

**结论** 急性冠脉综合征患者行急诊PCI经静脉输液通路以静脉注射的方式预防性应用维生素B6注射液,可显著地降低术中呕吐的发生率、缩短呕吐持续时间、减轻呕吐严重程度。全方位的护理措施,可减轻患者因呕吐带来的痛苦及恐惧,减少术中并发症的发生,缩短手术时间,利于手术顺利进行。

## 一例心房颤动一站式术中心脏压塞的抢救和护理

王荣蓉

天津医科大学总医院

**目的** 总结一例射频消融联合左心耳封堵术(心房颤动一站式治疗)过程中患者发生左心耳穿孔心脏压塞后的抢救和护理。

**方法** 密切观察病情变化及监测生命体征,保持呼吸道通畅,配合术者迅速给予心包穿刺引流,临时起搏术,药物升压扩容并中和肝素化,同时快速联系外科给予支持快速妥善转运病人行开胸左心耳修补术。

**结果** 经过快速、准确、有效的抢救及护理,患者抢救成功,转危为安。

**结论** 心房颤动一站式治疗较单一的射频消融术或LAOO术程更为复杂,手术并发症风险相应增加,心脏压塞是最为凶险的手术并发症之一,这对护理工作提出了新的挑战,了解一站式手术过程中容易出现心脏压塞的关键步骤,熟悉心脏压塞的早期症状并实施预见性护理和发现心脏压塞后给予及时有效的抢救,可以提高手术和抢救的成功率。保证手术及患者生命安全。

## 心血管护士心理韧性现状调查及影响因素研究

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**目的** 本研究旨在了解心血管内外科护士心理韧性现状及其主要影响因素。

**方法** 采用Connor-Davidson韧性量表,对116名从事心血管专业的护士进行心理韧性调查,并采用多元线性回归法分析其影响因素。

**结果** 本组心血管护士的心理韧性总均分(53.52±14.10)分,处于中等(满分100分)的心理韧性水平;各维度得分从高到低依次为力量、坚韧、乐观;多元线性回归分析显示,从事心血管专业的护士心理韧性的影响因素包括工作满意度,应对工作压力的能力( $P<0.01$ )。

**结论** 护理管理者应该充分了解每个护士的性格特点,针对心血管护士心理韧性的影响因素,制定有效的干预措施,提高其心理韧性水平,保持心血管护理队伍的稳定性。

## 1例患儿心外摸起搏器植入术后胸腔积液的护理

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广东省人民医院

**目的** 总结1例患儿心外摸起搏器植入术后胸腔积液的护理,护理要点包括:胸腔穿刺术配合,伤口、管道、饮食、心理护理,指导出院后日常生活的家庭护理。术后恢复好,顺利出院。

儿童永久起搏器治疗指征:1.缓慢型心律失常:包括症状性窦性心动过缓;心动过缓、心动过速综合征;先天性或手术后引起的严重二度或三度房室阻滞;2.儿童心室再同步治疗;3.预防儿童心源性猝死,其中包括儿童LQT综合征;儿童肥厚性心肌病;儿童儿茶酚胺敏感性室速;儿童Brugada综合征。随着起搏技术不断发展,患者安装起搏器后生活明显提高,一定程度上预防了心源性猝死的发生。术后并发症偶有发生将直接影响手术效果、降低患者的生活质量。

**方法** 胸腔穿刺术配合,伤口、管道、饮食、心理护理,指导出院后日常生活的家庭护理。

**结果** 术后恢复好,顺利出院。

**结论** 心外摸起搏器植入术后发生胸腔积液的原因有:出血、胸膜炎反应、感染、伤口愈合不良、心功能以及胸导管和细淋巴管损伤。护士熟练配合医生做好胸腔穿刺,做好病情观察、管道护理及饮食宣教是手术成功及减少并发症发生的关键,在很大程度上也减轻了患者的痛苦,促进康复。

## 双心护理对冠心病介入治疗患者心理应激、意外事件和生活质量的影响研究

周小香, 冯丽钦  
中山大学附属第三医院

**目的** 探讨双心护理对冠心病介入治疗患者心理应激、意外事件和生活质量的影响,为制定心理康复干预方案、开展心理健康教育提供科学依据和有效建议。

**方法** 选择中山大学附属第三医院心血管内科和CCU病区冠心病患者进行调查,采用随机数字表法分为观察组和对照组。对照组给予心血管介入治疗常规护理,观察组在常规护理的基础上实施双心护理,采用一般资料调查表,焦虑自评量表(SAS)、抑郁自评量表(SDS)和生活质量量表(SF-36)对两组患者实施相应护理前后心理应激指标和生活质量进行评价,并比较两组患者桡动脉穿刺成功率、并发症发生情况及介入意外事件发生率。

**结果** 护理前两组患者均存在不同程度的焦虑、抑郁等心理应激反应,组间SAS、SDS评分比较,差异无统计学意义( $P>0.05$ )。经护理干预后,两组患者心理负面情绪均得到改善,观察组SAS和SDS评分明显较对照组低( $P<0.05$ );观察组桡动脉穿刺成功率高于对照组( $P<0.05$ );介入治疗并发症及意外事件发生率低于对照组( $P<0.05$ )。生活质量量表,观察组提高较对照组明显( $P<0.05$ )。

**结论** 双心护理能够有效缓解冠心病介入治疗患者焦虑、抑郁、紧张情绪,降低心理应激程度,提高桡动脉穿刺成功率,降低血管痉挛、穿刺部位血肿等意外事件发生率,提高生活质量。

## 教育护士参与的阶段性康复训练对高龄冠脉介入术后患者心脏康复的影响

吴湘兰, 吴小莉  
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**目的** 探讨阶段性康复训练对高龄冠脉介入术后患者心脏康复的疗效。

**方法** 选取60例冠脉介入术后患者分为观察组和对照组各25例,对照组术后接受常规术后指导,包括早期伤口观察,换药,肢体摆放,活动,饮食指导,水化治疗等,观察组教育护士专科护士指导的阶段性康复训练,如增加患者早期康复知识宣教,睡眠指导,同时密切观察术后患者心梗三项,BNP等相关指标。

**结果** 观察组患者完成床上主动运动、下床活动时间、日常生活活动自理时间、步行200米时间均显著早于对照组;出院时,观察组6 min步行试验显著高于对照组(均 $P<0.01$ )。

**结论** 阶段性康复训练能有效改善冠脉介入术后患者心脏功能,帮助患者建立信心恢复身心健康,尽快恢复日常生活能力,促进患者心脏早期康复。

## 双心护理干预对房颤射频消融术患者焦虑程度的影响研究

黄淑萍  
广东省人民医院

**目的** 了解房颤射频消融术患者的焦虑现状,降低患者的焦虑程度。

**方法** 本研究采用临床随机对照干预试验及问卷调查等研究方法,选取广东省人民医院心内科《焦虑自评量表SAS》测试,分数50分以上,符合纳入标准的80名有焦虑的房颤拟行射频消融术患者作为研究对象,按随机对照分别分为对照组和试验组,分别给予常规护理和双心护理干预。通过调查研究患者入院时和出院后1个月,3个月及半年后焦虑状况,实施“双心护理”,验证“双心护理”对降低房颤射频消融术患者焦虑程度的有效性。

**结果** 实施双心护理干预后,与对照组比较,实验组患者焦虑自评量表评分降低。

**结论** 对焦虑的房颤射频消融术患者实施双心护理干预,能有效降低其焦虑程度。

## 介入手术室的发展趋势与护士的角色作用

陈玲玲

湖北医药学院附属十堰市太和医院

**目的** 文章分析了介入手术室有介入手术中心、介入复合手术室和心脑血管病急诊绿色通道3大发展趋势,并提示护士作为介入手术室的管理者、协调者和护理者,应紧跟学科的发展步伐,加强业务学习,提供专业化、科学化的护理服务,这是推动介入学科建设和发展的必由之路。

**方法** 文章分析了介入手术室有介入手术中心、介入复合手术室和心脑血管病急诊绿色通道3大发展趋势,并提示护士作为介入手术室的管理者、协调者和护理者,应紧跟学科的发展步伐,加强业务学习,提供专业化、科学化的护理服务,这是推动介入学科建设和发展的必由之路。

**结果** 文章分析了介入手术室有介入手术中心、介入复合手术室和心脑血管病急诊绿色通道3大发展趋势,并提示护士作为介入手术室的管理者、协调者和护理者,应紧跟学科的发展步伐,加强业务学习,提供专业化、科学化的护理服务,这是推动介入学科建设和发展的必由之路。

**结论** 文章分析了介入手术室有介入手术中心、介入复合手术室和心脑血管病急诊绿色通道3大发展趋势,并提示护士作为介入手术室的管理者、协调者和护理者,应紧跟学科的发展步伐,加强业务学习,提供专业化、科学化的护理服务,这是推动介入学科建设和发展的必由之路。

## 微信平台的构建在冠心病介入治疗患者心脏康复延续性护理管理中的应用

黄杏

吉林大学白求恩第一医院

**目的** 探讨基于移动社交网络平台实施远程、精细化的延续性护理对经皮冠状动脉介入治疗患者心脏康复的影响。

**方法** 开展针对经皮冠状动脉介入治疗心脏康复专题微信公众号,抽取2018年1月至2018年6月于本院进行介入治疗的100例冠心病患者作为研究对象,随机分为干预组和对照组,每组50例,对照组仅接受术后常规健康宣教与出院指导,干预组在此基础上应用基于微信平台的心脏康复的延续性护理,分析、评价两组的护理效果。

**结果** 出院后4个月,干预组患者心脏康复知识水平高于对照组,心脏事件发生率低于对照组,有统计学意义( $P<0.05$ )。

**结论** 微信平台的构建提高了经皮冠状动脉介入治疗患者术后的生存质量及预后信心,应用于心脏康复管理中效果较理想,应推广采纳。

## 预见性加压包扎在肺栓塞溶栓中的应用及效果评价

张影

吉林大学白求恩第一医院

**目的** 探讨预见性加压包扎在肺栓塞溶栓中继发皮下出血的应用效果。

**方法** 对我院60例肺栓塞溶栓患者进行分组研究,随机平均分为实验组和对照组。实验组在常规溶栓过程中密切观察穿刺处情况下,于患者开始溶栓时即给予穿刺处弹力绷带加压包扎。对照组常规在溶栓过程中继发皮下出血后再给予弹力绷带加压包扎。观察两组在溶栓后第1h、2h、4h、8h、24h继发皮下出血的疼痛程度、出血时间、皮下出血的例数以及血肿面积。

**结果** 实验组5个时间节点继发皮下出血的疼痛程度均低于对照组,差异有统计学意义( $P<0.05$ );实验组5个时间节点发生继发皮下出血的时间均迟于对照组,差异有统计学意义( $P<0.05$ );实验组5个时间节点继发皮下出血的例数少于对照组,差异有统计学意义,血肿面积小于对照组,差异有统计学意义( $P<0.05$ )。

**结论** 预见性加压包扎可有效控制肺栓塞患者在溶栓过程中继发皮下出血的程度,保护患者皮肤和血管,减轻患者痛苦,对肺栓塞溶栓后继发皮下出血有预防和控制作用。

## 重庆市心血管专科护士培训教学探讨

张艺

陆军军医大学新桥医院

**目的** 探讨培养高素质的心血管专科护士以适应心血管专科发展的教学方法。

**方法** 申请并成立重庆市心血管专科护士培训基地,招收重庆市心血管科护士并按心血管专科护士培训模式制订培训计划,进行分阶段有侧重点培训和考核。

**结果** 心血管专科理论和实践护理配合质量、护理管理、教学能力得到系统全面的提高。

**结论** 心血管专科护士培训提高护士的专科综合素质,有利于提高心血管专科护士的行业地位,从而促进心血管护理学的专业发展。

随着现代社会的快速发展和医疗科技水平的不断提高,护理事业正朝着专科化、专业化发展,这是现代化医院发展的需要,也是培养护理高级人才的需要,是护理学与国际接轨,与国际护理学同步发展。《中国卫生事业发展纲要(2005-2010年)》明确提出,在我国要大力发展“专业护士”。我国于2000年开始不断探索专科护士(advanced practice nurse, APN)的培养,先后开展了糖尿病、伤口/造口护理、重症监护、急诊等多项专科护士培训。目前我国大部分医疗机构培养的专科护士是指在某一专业领域受过特定的专业教育并具有实践经验的注册护士。2014年我院被重庆市正式确立为重庆市心血管专科护士培训基地,这是心血管专科护士将致力于对接国际标准打造高水平的专科护士的需要。从此将每年招收培训一批重庆市心血管专科护士,目前第1期共55名、第2期共56名、第3期57名、第4期55名、第5期56名学员已经结业,探索一套科学有效的心血管专科护士在职培训模式,取得较好的效果。

## 品管圈在降低心内科介入术后出血并发症的研究

张艺

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**目的** 心脏介入手术已经取得了长足的发展,心脏疾病介入治疗已成为与药物治疗、外科手术并驾齐驱的治疗手段,

介入治疗的安全性和有效性也已达到了一个较高水平。但仍有发生各种并发症甚至危及到生命。根据国内外报道其危险因素有:年龄、体重、高血压、高血脂症、糖尿病、性别、凝血功能、心理应激反应等资料及病历记录。对发生的介入术后伤口并发症发生率进行分析整理,查找原因及对策,制定相关术后伤口护理规范流程,从而减少并发症发生率,如:穿刺处血肿、假性动脉瘤、动静脉瘘等。2016年我科成立“术后伤口观察质量控制小组”,使患者主动配合治疗及护理,以提高患者术后恢复效果,减少术后护理不良事件及护患纠纷,增加患者对护理工作及护理人员的满意度,缩短患者住院天数、加快床位周转率及减少患者经济负担等方面持续质量改进,取得较满意效果。

**目的** 探讨品管圈管理工具在降低心血管介入术后出血并发症发生率的作用。

**方法** 运用品管圈对心血管介入术后出血并发症的发生进行质量分析、改进,并对实施品管圈活动前、后状况进行比较。

**结果** 心血管介入术后出血并发症发生率由实施品管圈活动前的9%降低至实施后的2.5%。

**结论** 应用品管圈质量改进工具可降低心血管介入术后出血并发症发生率,同时能保障介入围手术期安全、提高圈员运用品管圈管理工具解决实际问题的能力、该方法值得介入室及CCU推广应用。

## 冠脉介入术后出血并发症的护理进展

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**目的** 冠状动脉介入诊治术是现今诊治冠心病的重要方法,具有创伤小、安全、成功率高、患者容易接受等优点。但是随着冠脉介入治疗的广泛开展,各种并发症的发生率也随之增加,尤其是出血并发症值得关注。介入治疗术中需要应用普通肝素抗凝,术后需双联抗血小板,长期应用阿司匹林、氯吡格雷治疗。围手术期需要应用低分子肝素抗凝,及血小板糖蛋白Ⅱb/Ⅲa受体拮抗剂抗血小板治疗,因此介入治疗术后的出血并发症是最常见的并发症之一。由于冠脉内新植入的金属支架仍需要继续强化抗血小板治疗,因此严重出血并发症处理起来非常困难。出血并发症可以在短期内导致血容量下降、低血压,有时甚至需要输血治疗来挽救生命。关键器官的出血即使得到及时的治

疗,有时还会导致永久性的后遗症,甚至导致住院期间死亡率的增加。这些为临床护理增加了难度。

**目的** 术前做好风险评估,详细了解患者一般情况,制定个体化的抗血栓治疗方案,尽量避免严重出血并发症的发生。

**方法** 制定详细的介入术后系统管理方案,专人看护,巡视观察穿刺点、术侧肢体皮温、有无肿胀等,发现病情变化及时汇报。

**结果** 对于冠脉介入手术的患者,术前需要详细评估患者的整体出血风险,抗凝及抗血小板药物应选择合理的方案和合适的剂量。对于出血高危的患者,药物剂量及联合治疗一定要谨慎。对于已经发生出血事件的患者,需要监测临床症状和血色素的变化,针对消化道出血、腹膜后出血、脑出血等不同病因的出血,采取相应的治疗和护理。

**结论** 术前做好风险评估,针对各种危险因素进行针对性护理措施,可以减少介入术后出血并发症的发生,也可提高心内科患者对医护人员的满意度,缩短患者住院天数、加快床位周转率及减少患者经济负担,具有良好的社会效益。

## 高血压慢病管理对高血压患者服药依从性的影响因素分析

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**目的** 随着社会和经济的发展,人民生活水平的提高和生活方式的改变,人类的疾病谱发生了重大变化,慢性病已成为影响居民健康的主要问题,严重影响生活质量与健康,给个人、家庭、社会带来沉重的经济负担,对医疗卫生服务系统也造成巨大的压力。慢性病又称慢性非传染性疾病,主要指以高血压、糖尿病、心脑血管疾病、肿瘤、慢性阻塞性肺疾病等慢性疾病。其中高血压的患病率最高,高血压可以导致脑中风、心力衰竭、心肌梗死和冠心病,是独立引发心脑血管疾病的重要危险因素,也是导致患者死亡的第一大危险因素。国目前已有高血压患者2亿多人,到2025年世界高血压患者将超过15亿人。临床研究和实践已证明,高血压是可控的,终身服药和干预是控制高血压患者血压水平、减少心血管事件、脑卒中以及改善患者生活质量、降低疾病负担和死亡率的有效方法。在我国高血压病的患者人群中,在接受降压治疗的患者中,仍然约有75%患者血压尚未达到控制水平。科学而又有效的慢病管理模式,为合理有效的控制血压水平,避免或减缓相关并发症的发生,提升患者的生活质量提供依据。

**目的** 探讨高血压慢病管理对高血压患者服药依从性和血压控制处理的影响因素,为高血压慢病管理模式有效的控制血压提供依据。

**方法** 2016年9月至2017年5月在我科诊断为高血压的587名患者进行问卷调查,测量工具包括基本情况调查表(含一般社会人口学资料与疾病相关资料)、简易疾病认知问卷、综合医院焦虑抑郁问卷、慢性病管理评价量表。采用SPSS 13.0统计软件进行数据统计分析。利用统计方法包括统计描述、*t*检验、单因素方差分析、Pearson相关分析及多元线性逐步回归分析高血压服药依从性的影响因素。

**结果** 通过针对高血压患者采用高血压慢病管理模式,使高血压患者的服药依从性较前提高。

**结论** 慢性病管理越到位,患者的服药依从性水平越好。

## 信息化管理在PCI术后患者慢病管理中的探索与实践

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**目的** 随着现代医学的发展,经皮冠状动脉介入治疗(percutaneous coronary intervention, PCI)因具有疗程短,创伤小,疗效显著等优点,在临床上广泛开展。PCI虽然改善了心肌缺血,减少了心血管事件的发生,但没有改变动脉粥样硬化的基础,需要终身服药,监测、预防再狭窄等。因此PCI术后的患者需要长期服药、健康饮食、合理运动、保持乐观心态、戒烟限酒、监测生命体征等慢病照护的长效机制,预防和避免发生心脏事件及危急重症状态。

传统的慢病管理模式引入临床作为优质护理服务延伸项目有利于全面掌握患者资料,制定个性化的健康教育计划,对患者出院后发生的不良情况及时干预减少并发症发生,提高患者生活质量减轻患者经济负担提升服务满意度,但是传统的慢病管理模式还是存在着时间、地点及成本等局限。随着国家愿景与政策支持,通过全民健康纲要,冠心病PCI术后的患者可以根据无线网络、互联网和多媒体技术等信息资源,运用智能手机等移动设备,通过网络APP软件克服时间、地点、成本等局限性,通过文字、图片、视频等简单有趣表达形式为患者提供快捷、方便的医疗护理健康知识。医护人员与患者之间沟通将更加方便灵活,不受时间、地点的限制,更好地为患者随时沟通,答疑解惑,健康宣教。因此利用互联网+医疗护理而实现医-护-养一体化信息沟通交流管理平台,从而达到医院、社区、家庭的合作互赢。

**目的** 探讨信息化慢病管理模式对PCI术后患者的影响。

**方法** 将2016年2月-2017年2月因冠状动脉粥样硬化性心脏病入院并行PCI的患者随机分为试验组(100例)和对照组(100例),两组皆采用常规治疗和慢病管理模式,试验组在此基础上实施信息化慢病管理。包括下载慢病管理app,建立患者档案,针对患者情况进行药物处方、饮食处方、运动处方、戒烟处方、心理处方这五大处方管理,且定期提醒患者服药、复诊等,进行为期12个月的跟踪随访。

**结果** 试验组患者冠状动脉粥样硬化性心脏病相关知识和危险因素知晓率、焦虑抑郁状态均优于对照组,具有显著差异。

**结论** 信息化慢病管理能够提高PCI术后患者的自我管理意识,树立良好的生活习惯,减少并发症的发生,提高患者生活质量,并且提高患者满意度。

## 肺动脉高压伴阻塞性睡眠呼吸暂停综合征的护理体会

张艺

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**目的** 肺动脉高压(Pulmonary Arterial Hypertension, PAH)是由于肺动脉循环血流限制后肺循环阻力增高导致的一种综合征,最终会导致右心衰竭。多发于20-45岁年龄组,以女性居多,治疗较困难。阻塞性睡眠呼吸暂停综合征(obstructive sleep apnea syndrome, OSAS)是指各种原因导致睡眠状态下反复出现呼吸暂停,引起低氧血症、高碳酸血症、睡眠中断,从而使机体发生一系列病理生理改变的临床综合征。多项研究已经证明阻塞性睡眠呼吸暂停综合征是肺动脉高压的独立危险因素,据报道15%阻塞性睡眠呼吸暂停综合征的患者合并肺高压。因阻塞性睡眠呼吸暂停综合征患者在夜间睡眠中,反复发生的缺氧情况,可能会增加低氧收缩反应,将会对小气道的功能产生一定的影响,导致其出现异常情况,从而造成节段性肺缺氧,导致相应区域内肺血管开始收缩,在这两种因素的共同作用下,肺血管重构会不断加重,最终发展至持续性肺动脉高压。我科2015年1月-2015年12月收治的6例肺动脉高压伴阻塞性睡眠呼吸暂停综合征患者,通过积极治疗和精心护理,取得了良好的效果。

**方法** 总结6例肺动脉高压伴阻塞性睡眠呼吸暂停综合征患者的护理。

**结果** 护理重点为做好病情观察、氧疗护理、睡眠监测、健康知识学习及教育、重视用药护理、康复指导等。经过精心治疗和护理,6例患者全部症状改善后出院。

**结论** 护理重点为做好病情观察、氧疗护理、睡眠监测、健康知识学习及教育、重视用药护理、康复指导等。经过精心治疗和护理,6例患者全部症状改善后出院。

## 高危病人介入术前进行心理干预对预后影响相关性研究

代芬

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**目的** 介入治疗经过10多年的发展,特别是近几年来,随着术者技术经验的积累和成熟,导管器械的不断改进和完善,影像设备的进步和新技术的应用,适应症不断扩大,成功率不断提高,以往认为不适用或危险性较高的病历均可成功地进行介入治疗,这些病历包括高龄、肥胖、高血压、高血脂症、糖尿病、血小板低、耐受度差等。高危病人行介入治疗意味着术中术后发生危险的可能性增大,所以加强对高危病人的术前心理干预对提高手术成功率及减低此类病人术后风险至关重要。

**目的** 探讨高危病人介入术前进行心理干预对预后的影响。

**方法** 选择2013年10月至2016年6月在我科列入高危病人行介入术共274例病人为研究对象,按随机将其分为观察组(n=141)和对照组(n=133)。观察组病人术前一天填写Hamilton焦虑量表(HAMA)、Hamilton抑郁量表(HAMD)测评,确定病人焦虑、抑郁程度,采用针对性心理干预。对照组病人接受传统的介入术后护理。两组病人在介入术后第3天进行康复状态评估。两组病人在介入术前1天采用自制《介入术前护理评估单》;术后第3天采用自制《介入术后护理评估单》进行测评,根据指标进行评价。

**结果** 介入术前1天,两组病人评分的差异无统计学意义( $P>0.05$ );术后第3天,两组病人评分差异均有统计学意义(均 $P<0.05$ )。

**结论** 高危病人在介入术前进行心理干预可减少并发症的发生率具有重要意义。

## 护理风险管理在心内科重症患者中应用效果的系统评价

代芬

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**目的** 目前有研究显示,在心血管内科中,最为严重的护理事件就是患者可能会出现护理风险事件,由于护理风险事件的存在,对患者的身体健康会产生极为严重的危害。因此减少护理风险事件对医院和患者都大有裨益。我国心血管病患病率处于持续上升阶段。目前,估计全国有心血管病病人2.9亿,每5个成人中有1人患心血管病。心血管病已成为我国第一位死因,占比超过40%。心内科患者以中老年人群为多,病情重、变化快,老年人在生理、心理各方面具有其特殊性,疾病本身及外界环境的改变,严重影响其安全性。随着公众健康意识和维权意识的日益增强,“医疗护理风险无处不在”已经成为医疗护理界的共识。因此,如何有效预防、及时发现和妥善处理护理过程中的各类风险确保高质量的护理已经成为心内科护理管理所面临的新课题。已有报道将护理风险管理应用于心内科重症患者可以取得良好的效果,但目前尚未发现护理风险管理在心内科重症患者中应用效果的系统评价,纳入的研究中RCT5篇,CCT3篇,下面将分组对其效果进行系统评价。

**目的** 系统评价护理风险管理在心内科重症患者中的应用效果。

**方法** 检索EMBASE、PUBMED、Cochrane图书馆、中国知网数据库、万方数据库从建库至2017年1月12日,在心内科重症患者中应用护理风险管理的研究,筛选出合格文献。应用Cochrane评价员手册进行偏倚风险评价,应用RevMan5.3软件进行Meta分析。

**结果** 符合纳入标准的文献共8篇,包含2070例研究对象,其中随机对照试验(RCT)5篇,临床试验(CCT)3篇。Meta分析结果显示,应用护理风险管理的观察组与应用常规护理的对照组相比,RCT组护理满意率OR值=10.36,95%CI(5.10,21.05)差异有统计学意义( $P<0.0001$ );就风险事件发生率而言RCT组OR值=0.18,95%CI(0.07,0.42),CCT组OR值=0.25,95%CI(0.13,0.48),差异均有统计学意义( $P<0.0001$ )。

**结论** 护理风险管理在心内科重症患者中应用的效果较明显,但由于本系统评价纳入研究的总体质量较低,尚需要更多设计严格,高质量、多中心、大样本的试验来进一步验证其效果。

## 心理干预在肺栓塞患者中的应用效果观察

代芬

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**目的** 急性肺栓塞(Pulmonary embolism, PE)是由于人体深部静脉血栓形成并脱落,脱落的栓子随血流堵塞在肺动脉及其分支上,造成患者肺循环障碍。由于肺动脉堵塞后,肺血管阻力增加和肺动脉压力升高,导致右心室向肺血管泵血困难,因而出现右心衰、血压下降或休克,甚至猝死,同时流经肺部的血液明显减少,使身体内的代谢废物二氧化碳无法经肺排出体外,而身体急需的氧气不能充分进入肺血管供应全身,从而出现全身缺氧症状。美国致死性和非致死症状性静脉血栓栓塞症发生例数每年超过90万,其中有约29.64万例死亡,我国每年仅约40-53/10万人确诊PE。及时有效的对患者进行心理干预及康复指导可提高生存质量,延长患者生命。有效的心理干预可减轻焦虑、恐惧症状、减少并发症的发生,从而改善患者的心理状态、治疗效果及生存质量,增加患者对生活的信心与希望。

**目的** 探讨心理干预在肺栓塞患者中的应用效果。

**方法** 采用Zung焦虑和抑郁自评量(SAS,SDS)对2013年2月至2014年2月陆军军医大学新桥医院心内科收治入院诊断为肺栓塞患者共29例为研究对象,针对各项心理因素分析进行心理干预。

**结果** 通过对肺栓塞患者进行心理干预,缓解其焦虑、抑郁情绪,可使患者积极配合治疗及护理,全部经治愈后出院。

**结论** 在治疗肺栓塞的同时进行心理干预,可以缓解患者的焦虑、抑郁情绪,积极配合治疗及护理,促进医护患之间有效配合,使患者安全度过了危险期,恢复了健康。

## CCU老年心力衰竭合并II型呼吸衰竭患者使用无创呼吸机的安全管理

张璐

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**目的** 无创呼吸机是临床治疗过程中的重要医疗器械,具有操作简便,不良反应少,不需要插管或气管起开就能实

现人工气道通气等优点。近年来,无创呼吸机已被广泛应用于临床,同时也易被患者及其家属接受,主要应用于治疗心力衰竭及早期呼吸衰竭。但无创呼吸机在治疗过程中可能会出现不适症状,因此强化无创呼吸机使用中的安全管理非常重要。我院心血管内科CCU于2016年12月至2017年10月对使用无创呼吸机治疗的97例老年心力衰竭合并II型呼吸衰竭患者实施强化安全管理,效果满意。

**目的** 分析CCU老年患者使用无创呼吸机的安全隐患,提出管理对策。

**方法** 将190例老年心力衰竭合并II型呼吸衰竭患者分为对照组93例和干预组97例,对照组行常规安全管理,干预组在常规安全管理的基础上强化安全管理。比较两组治疗效果和不良反应的发生率。

**结果** 干预组不良反应(鼻面部压疮、胃肠胀气、窒息)发生率由实施前22.6%降至3.1%( $P<0.05$ );两组使用无创呼吸机72h后动脉血气分析比较,差异有统计学意义(均 $P<0.05$ )。

**结论** 在无创呼吸机使用过程中强化安全管理可提高CCU老年患者心力衰竭合并II型呼吸衰竭治疗效果,明显降低不良反应的发生。

**目的** 系统评价临床护理路径在PCI(经皮冠状动脉介入治疗)病人中应用的效果。

**方法** 检索EMBASE、PUBMED、MEDLINE、AMED、CINAHL、Cochrane图书馆、中国知网数据库、万方数据库、中国生物医学文献数据库从建库至2016年4月12日行PCI的病人应用临床护理路径的随机对照试验研究,筛选合格研究。应用Cochrane评价员手册进行偏倚风险评价,Jadad评分法进行质量评价。应用RevMan5.3软件进行Meta分析。

**结果** 符合纳入标准的文献共21篇。Meta分析结果显示,PCI病人应用临床护理路径观察组与对照组相比,住院时间均数差mean difference MD=-2.75,95%可信区间 confidence interval CI(-3.24, -2.25)差异有统计学意义( $P<0.0001$ );住院费用MD=-0.84,95%CI(-1.08, -0.60)差异有统计学意义( $P<0.0001$ );满意率比值比Odds Ratio, OR=4.86)95%可信区间CI(2.68, 8.79)差异有统计学意义( $P<0.0001$ )并发症发生例数OR值=0.23,95%CI(0.18, 0.31)差异有统计学意义( $P<0.0001$ )。

**结论** 临床护理路径在PCI病人中应用的效果显著。但由于本系统评价纳入研究的总体质量较低,研究的数量和样本量均较小,尚需要更多设计严格,高质量、多中心、大样本、的随机对照试验来进一步验证其效果。

## 临床护理路径在经皮冠状动脉介入治疗(PCI)病人中应用效果的系统评价

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**目的** PCI是一种冠状动脉灌注重建的有效方法,可以有效、及时地疏通血管,保证心肌供血,从而降低致残率、病死率。目前经皮冠状动脉介入治疗(PCI)已成为冠心病最有效及最主要的治疗方法。2015年中国大陆冠心病介入总病例数已达567 583例。尽管PCI相对其他手术具有较好的疗效,但是病人面临疾患、手术风险、手术费用、术后服药长期性等多种因素,不可避免的产生一定压力,而术前焦虑不仅会影响到手术质量,还能影响病人术后恢复情况。已有研究报道,将临床护理路径应用于行PCI的病人可以取得良好的效果。目前尚未发现临床护理路径在行PCI的病人中应用的系统评价。因此,收集近年来行PCI的病人应用临床护理路径的随机对照试验研究,并对其应用效果进行系统评价。

## 对慢性心力衰竭患者采取针对性护理干预的临床价值

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**目的** 对慢性心力衰竭患者应用针对性护理干预的效果及临床价值。

**方法** 抽取来我科就诊的62例慢性心力衰竭患者,按随机法分对照组、研究组,各31例,其常规护理设为对照组,予针对性护理为研究组。对比心功能指标左室射血分数(LVEF)、左室舒张末期内径(LVEDd)及6 min步行测试(6MWT)区别。

**结果** 干预前,研究组心功能指标左室射血分数(LVEF)、左室舒张末期内径(LVEDd)及6 min步行测试(6MWT)较差。干预后,研究组心功能指标左室射血分数(LVEF)、左室舒张末期内径(LVEDd)及6 min步行测试(6MWT)较优,与对照组比差异有统计学意义( $P<0.05$ )。

**结论** 利用针对性护理干预慢性心力衰竭患者,可提高临床疗效,改善其心功能及生活质量,值得临床推广应用。



## 集束化护理模式在冠状动脉造影围手术期生活质量和情绪影响效果研究

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**目的** 本文已在探讨集束化护理模式在冠状动脉造影围手术期患者生活质量和情绪影响中的应用效果。

**方法** 选取吉林大学第一医院心血管疾病诊疗中心2018年5月至7月冠状动脉造影围手术期的患者共80例作为本次研究对象,对照组和观察组各40例。对照组采用常规性围手术期指导,观察组在对照组的护理基础上采取集束化的护理模式。患者在出院前进行抑郁、焦虑状况以及生活质量的评价,应用量表进行分数的计算分析,以及患者及家属的满意度。

**结果** 观察组患者出院前SAS评分为(40.22±1.98)分,低于对照组患者的(49.67±8.35), $P<0.05$ 差异具有统计学意义;观察组患者的SDS评分为(38.34±9.87)低于对照组患者(49.54±10.92), $P<0.05$ 差异具有统计学意义。观察组患者家属的满意度也远高于对照组患者。

**结论** 集束化护理模式能显著提升患者的生活质量;缓解患者紧张焦虑的情绪;使患者在围手术期能够有效的调节自己的情绪;有利于患者的身心健康。

## 一例冠状动脉慢性完全闭塞支架植入术后迟发造影剂过敏反应的护理

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**目的** 探索冠状动脉慢性完全闭塞支架植入术后迟发造影剂过敏反应的护理方法。造影剂过敏反应根据发生时间的快慢,可分为急性(注射造影剂1h以内),迟发性(注射造影剂1h至1周之间)以及晚发不良反应(注射1周以后)发生率为0.6%~2%,严重过敏反应发病率为0.01%~0.02%。

**方法** 冠状动脉支架植入术后的护理及并发症的观察。造影剂重度过敏引起低血压、窦性心动过缓、面色苍白、全身大汗淋漓、恶心、呕吐以及呼吸困难等。且来势凶,症状

重,血流动力学障碍,持续时间长,且对阿托品、输液等治疗效果差。尽早处理,可降低患者的死亡率,提高其抢救的成功率。

**结果** 患者经过积极的抢救及有效治疗和精心护理治愈出院。

**结论** 冠状动脉造影是目前诊断冠心病最直接的检查方法,优点是创伤少、直观,但必须向冠状动脉内注射造影剂以显示血管影像,而造影剂所致过敏反应难免发生。造影剂是目前影像学诊断与介入治疗领域使用最广泛的造影剂,据统计每年约有7500万人次注射碘造影剂进行临床诊断与治疗。碘造影剂是三碘苯甲酸衍生物的高浓度溶液。其化学惰性使得绝大多数患者在使用碘造影剂时表现出良好的耐受性,但也有发生不良反应的报道,发生率为0.6%~2%。细致的观察,精心的护理,掌握患者过敏反应的临床表现,结合实际情况,实施预见性护理,做好预防及积极治疗应对患者造影剂过敏反应等措施降低患者不良反应所带来的损害。

## 医护合作型聚焦解决模式在改善经股动脉造影术后患者情绪及治疗依从性中的应用

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**目的** 本文已在探讨医护合作型聚焦解决模式在改善经股动脉造影术后患者术后情绪管理及治疗依从性中的应用。

**方法** 选择吉林大学第一医院心血管疾病诊疗中心2018年5月至12月60例换着玩为研究对象。分为对照组和实验组,对照组的患者应用常规的术后护理模式进行护理,观察组在常规的护理基础上依据聚焦解决模式五个步骤进行护理干预,比较两组患者术后治疗及服药依从性,以及紧张焦虑情绪的改善。

**结果** 根据科室及患者实际情况自制量表对患者的术后相关护理进行评分(自制量表包括疼痛相关评分及术后活动度、出血情况等),并在患者出院前以问卷调查的形式进行统计比较,实验组明显低于对照组,差异具有统计学意义( $P<0.05$ );实验组患者的治疗依从性、服药依从性明显高于对照组,差异具有统计学意义( $P<0.05$ )。

**结论** 医护合作型聚焦解决模式可以有效的改善患者术后的紧张焦虑情绪,减少患者术后活动不善而引起的出

血、提高患者的治疗依从性及服药依从性;促进患者的术后康复,提高患者的疾病相关知识的知晓率。

## 医院-社区-家庭联动对改善PCI术后患者院外生活质量的影响

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**目的** 探讨医院-社区-家庭联动模式对经皮冠状动脉介入术(PCI)术后患者院外生活质量的影响

**方法** 选取2018年2月至7月我院急性心血管病救治中心行PCI术的患者共120例,随机分为观察组和对照组各60例,纳入标准:1.在武汉市居住,在知情同意原则下自愿参加本次实验;2.符合美国心脏协会的冠心病诊断标准,成功进行PCI术;3.会使用智能手机,实验期间联系未中断,配合完成全程研究;4.年龄不超过65岁,有认知理解能力。排除标准:1.有恶性肿瘤及严重肝肾功能衰竭者;2.有精神病患者;3.无除患者意外的其他家庭成员;4.居住地无社区卫生服务中心者。两组患者一般资料差异无统计学意义,随机分为观察组和对照组各60例。对照组给予常规的出院宣教随访指导,观察组给予医院-社区-家庭联动的护理干预模式,两组均在出院2周及出院6个月后进行健康状况问卷(SF-36)调查及西雅图心绞痛调查表(SAQ)。

**结果** 出院两周内观察组与对照组评分差异无统计学意义,出院6个月观察组SF-36及SAQ分值均高于对照组, $P<0.05$ 差异有统计学意义。

**结论** 研究表明80%~90%死于冠心病的患者至少有一个与生活方式有关的危险因素,经皮冠状动脉介入治疗(PCI)通过扩张、疏通闭塞或狭窄的冠状动脉,能有效改善心肌缺氧缺血症状,从而提高患者生活质量,使患者更好地回归社会。但随着出院时间的延长,患者的治疗依从性及遵医行为逐渐下降,不良生活方式也重新回到患者生活中,其生存质量也有下降趋势。医院-社区-家庭的联动可以降低慢性病病人再入院率,改善病人生活质量,当前我国医疗机构对病人的延续服务仅呈现雏形,社区与医院之间缺乏互动,存在信息盲点易产生多种问题。不同级别医疗机构服务者之间的相互合作、协调和信息共享,给病人提供无缝隙链接服务,在医院、社区、家庭三大主体的联合作用下,采用联动模式,最终显著改善PCI术后患者出院后患者院外的生活质量。

## 镇静评分在心血管疾病危重患者中的应用

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吉林大学第一医院

**目的** 适宜的RASS评估频率和目的效果指导下,可应用于心血管疾病患者机械通气、镇静剂的应用、疾病导致的疼痛不安、患者躁动、谵妄以及其他心血管疾病危重症患者中。

**方法** Richmond躁动-镇静评分(Richmond Agitation and Sedation Scale, RASS)是目前全世界多项医学指南推荐的镇静效果评价工具,RASS在心血管疾病危重症患者镇静效果评价中具有明显的优势,在适宜的RASS评估频率和目的效果指导下,可应用于心血管疾病患者机械通气、镇静剂的应用、疾病导致的疼痛不安、患者躁动、谵妄以及其他心血管疾病危重症患者中。通过实施个体化、有针对性的镇静效果评估及护理方案,可缩短机械通气时长,降低患者病死率,降低不良事件发生率等。

**结果** 可缩短机械通气时长,降低患者病死率,降低不良事件发生率等。

**结论** 通过实施个体化、有针对性的镇静效果评估及护理方案,可缩短机械通气时长,降低患者病死率,降低不良事件发生率等。因此,本文对使用RASS进行镇静效果评价的研究,意在进一步推广RASS的标准应用,提升心血管疾病危重症患者镇静护理的质量。

## 立体化护理干预框架在慢性心力衰竭心脏康复中的应用研究

李皓月, 水小兰, 亓蕾蕾, 余冰, 李玉琼, 刘玲  
武汉大学人民医院

**目的** 探索建立立体化护理干预框架在慢性心力衰竭心脏康复中的应用及效果

**方法** 以临床路径为横轴线,医院、患者、家庭成员、社区护理为纵轴,以患者为核心,当路径偏离轨道时运用循证护理分析,使患者在院内护理及院外延续护理达到精准个性化护理干预。将100例符合CHF诊断标准的慢性心力衰竭患者,随机分为干预组和对照组,每组各50例,排除有其他脏器有严重功能损害的患者。干预组采用立体化护理干预模式,进行院内及院外延续护理,对照组采用常

规护理,出院后给予常规随访,两个组患者在出院时及出院半年内进行自我护理能力、行为依从性评估,并调查半年内再住院率,采用SPSS 20.0进行数据处理与统计分析,配对 $t$ 经验。

**结果** 出院后干预组行为依从性及自我护理能力、生活质量均优于对照组,半年内再住院率干预组低于对照组,干预组与对照组各维度比较,均 $P<0.05$ ,差异有统计学意义

**结论** 研究表明通过建立立体化护理干预模式,能够对慢性心力衰竭患者进行全程无缝隙护理,可以有效提升患者的自我管理能力和行为依从性,提升疾病认知,改善生活质量,促进心脏康复,降低再住院率。

## 探讨精密输液器应用于输注胺碘酮注射液中的可行性

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吉林大学白求恩第一医院

**目的** 探讨静脉输注胺碘酮注射液时选用精密密闭式输液能有效的减少静脉炎的发生。

**方法** 选取我科2018年8月-2019年1月心律失常应用胺碘酮注射液患者60例,其中男35例,女25例,平均年龄 $49\pm 0.5$ ,均无高血压,糖尿病,肾病综合征等合并症,差异无统计学意义( $P>0.05$ ),具有可比性。随机分为实验组和对照组,其中实验组30人,对照组30人,输液速度均为20滴/分,平均每30分钟巡视一次。实验组选用 $0.9\text{ mm}\times 25\text{ mm}$ 蓝色套管针并应用精密输液器,其过滤介质孔径为 $5.0\text{ }\mu\text{m}$ ,20滴蒸馏水=1 mL $\pm 0.1\text{ mL}$ ,30分钟后观察患者无疼痛以及静脉炎的发生,1小时后再次观察实验组患者仍无并发症的发生,2小时后仅有4名患者发生静脉炎。对照组常规选用 $0.9\text{ mm}\times 25\text{ mm}$ 蓝色套管针应用普通输液器,其过滤介质一般为 $15\text{ }\mu\text{m}$ ,20滴蒸馏水1 mL $0.1\text{ mL}$ ,30分钟后观察患者无疼痛以及静脉炎的发生,1小时后再次观察,有8名患者血管走行处有条索状红线或条索状白线的发生,2小时后共有11名患者发生红、肿、热、痛,不同程度的静脉炎。

**结果** 应用精密输液器的患者静脉炎的发生率为13.3%,而应用普通输液器静脉炎发生率为36.7%, $P<0.05$ ,有统计学意义,应用精密输液器能有效的降低静脉炎的发生。

**结论** 因诱发静脉炎的因素有多种原因:输液微粒、穿刺部位、输注滴速、穿刺针的管径大小、以及患者自身情况等多种原因。其中输液微粒是一种液体中存在的颗粒性杂质,一般直径为 $1\sim 15\text{ }\mu\text{m}$ ,可随药液进入血液后引起血管

收缩、变硬、引起静脉炎的发生。普通输液器过滤膜为纤维素滤膜,孔径为 $15\text{ }\mu\text{m}$ ,只能过滤 $\geq 15\text{ }\mu\text{m}$ 的不溶性微粒;精密输液器过滤器为核孔膜,孔径有多种我院常选用 $1.2\text{ }\mu\text{m}$ ,固 $\geq 1.2\text{ }\mu\text{m}$ 的有效颗粒均能有效虑过,减少微粒对血管内皮的刺激有效地降低了静脉炎的发生,减轻患者痛苦,减少住院天数,值得推广。

## 需求前移系统化干预对心脏体外循环术后口渴管理的效果

赵孝英

陆军军医大学大坪医院

**目的** 探讨需求前移系统化干预措施对心脏体外循环手术患者术后带气管插管期间、禁食水期间口渴管理效果。

**方法** 对2016年9月至2018年3月我科收治的风湿性心脏病行瓣膜置换手术的患者178例随机分为对照组和观察组。其中观察组90例,男性42例,女性48例,年龄 $42\sim 70$ 岁( $45.27\pm 1.27$ )岁。对照组88例,男性45例,女性43例,年龄 $38\sim 69$ 岁( $42.43\pm 1.54$ )岁。两组患者术后心功能均为III~IV级,术者、术式、体外循环时间、手术时间、术中失血量、气管插管时间、术后电解质补充量等方面具有可比性。制定严格的纳入及排除标准,对照组:术期充分宣教告知患者术后禁食水及控制饮水的目的,可能引起口渴的原因。患者带气管插管期间清醒后示意口渴时给予棉签润唇,拔除气管插管后常规给予漱口。观察组:在术期充分宣教告知患者禁食水及控制饮水的目的,可能引起口渴的原因的基础上,教会患者口渴测量尺的使用方法及护士对口渴的处理方法等。带气管插管期间患者清醒后无需等待示意口渴即用清水给予冲洗口腔,每4小时循环给予一次,以缓解口腔干燥等不适,达到湿润口腔、缓解口渴的目的。拔除气管插管后常规给予漱口并让患者咀嚼木糖醇,之后根据患者需求在禁食禁饮或控制入量期间间断给予漱口+咀嚼木糖醇。采用视觉模拟评分法对两组患者在相同的时间段口渴得分及口腔舒适度进行统计,观察效果。

**结果** 观察组在清醒后拔除气管插管之间各时间段及拔除气管插管后禁食水期间各时间段口渴评分均低于对照组,两组患者在带气管插管期间观察组患者口腔舒适度明显提高,由42%提高到97.8%。

**结论** 需求前移系统化干预对心脏体外循环术后患者口渴缓解方面效果明显,易于接受且便于实施。

## A study with the current situation of KBP of cardiopulmonary resuscitation in caregivers of patients with Coronary heart disease

Huimin Zhang

Xinqiao Hospital of Army Medical University

**Objective** To investigate and analyze the current situation of CPR among caregivers of hospitalized patients with CHD, so as to propose effective improvement measures. Coronary heart disease (CHD) has the highest disability and fatality rate in the cardiovascular disease. 60% death of coronary heart disease patients is caused by sudden cardiac death, the direct cause of sudden cardiac death is cardiac arrest. The study found that high-quality cardiopulmonary resuscitation (CPR) within 3–5 minutes after cardiac arrest can increase the survival rate to more than 70% and greatly improve the prognosis of CHD. Most of the cardiac arrest occurs outside the hospital, with 67% of witnesses. Among them, 72% are caregivers, according to the study. Many researchers believe that the low success rate of cardiac arrest rescue in China is largely due to the lack of knowledge, belief and practice of witnesses, which delayed the best rescue opportunity.

**Methods** From June 2017 to June 2018, 228 cases of CHD patients hospitalized in the hospital were selected as the observation subjects. The self-made questionnaire was applied to investigate the general information of the patients' caregivers, the Knowledge about CPR, the training situation of CPR, the training and the implementation intention and the counter measures were analyzed.

**Results** According to the survey, the relative awareness rate, the emergency treatment methods, the judgment methods of respiratory and cardiac arrest, was lower in 288 patients' caregivers and the difference was statistically significant ( $P < 0.05$ ). The Caregivers show a high willingness to learn the knowledge and and train the skills related to CPR, and the difference was statistically significant ( $P < 0.05$ ). The participation rate of knowledge training of caregivers was lower than that of non-participants, and the difference was statistically significant ( $P < 0.05$ ). The average score of knowledge, attitude and behavior about CPR were  $(11.03 \pm 2.03)$ ,  $(25.61 \pm 3, 32)$  and  $(29.93 \pm 4.71)$ , respectively.

**Conclusions** The caregivers of hospitalized patients with CHD has a poor understanding and low training rate about CPR but they have a high willingness to accept it. Multiple intervention measures can be taken to promote the formation of the concept of first aid, improve the training mechanism and strengthen relevant training for the caregivers and ensure the implementation of high-quality CPR as fast as they can to effectively save the lives of patients.

## Application of quality control circle in cardiopulmonary resuscitation training for families with coronary heart disease

Huimin Zhang

Xinqiao Hospital of Army Medical University

**Objective** To investigate and analyze the application of quality control circle in CPR training for families with coronary heart disease. coronary heart disease (CHD) has the highest disability and fatality rate in the cardiovascular disease. 60% death of coronary heart disease patients is caused by sudden cardiac death, the direct cause of sudden cardiac death is cardiac arrest. The study found that high-quality cardiopulmonary resuscitation (CPR) within 3–5 minutes after cardiac arrest can increase the survival rate to more than 70% and greatly improve the prognosis of CHD. According to the study, There are two main reasons for the low success rate of cardiac arrest rescue in China. Firstly, the lack of knowledge and experience of CPR, what's more, The rate of early recognition of cardiac arrest is low, both of them delayed the best rescue opportunity.

**Methods** From June 2017 to June 2018, 228 cases of CHD patients hospitalized in the hospital were selected as the observation subjects. The self-made questionnaire was applied to investigate the general information of the patients' caregivers, the Knowledge about CPR, the training situation of CPR, the training and the implementation intention and the counter measures were analyzed.

**Results** According to the survey, the relative awareness rate, the emergency treatment methods, the judgment methods of re-

spiratory and cardiac arrest, was lower in 288 patients' caregivers and the difference was statistically significant ( $P < 0.05$ ). The Caregivers show a high willingness to learn the knowledge and and train the skills related to CPR, and the difference was statistically significant ( $P < 0.05$ ). The participation rate of knowledge training of caregivers was lower than that of non-participants, and the difference was statistically significant ( $P < 0.05$ ). The average score of knowledge, attitude and behavior about CPR were ( $11.03 \pm 2.03$ ), ( $25.61 \pm 3.32$ ) and ( $29.93 \pm 4.71$ ), respectively.

**Conclusions** The caregivers of hospitalized patients with CHD has a poor understanding and low training rate about CPR but they have a high willingness to accept it. Multiple intervention measures can be taken to promote the formation of the concept of first aid, improve the training mechanism and strengthen relevant training for the caregivers and ensure the implementation of high-quality CPR as fast as they can to effectively save the lives of patients.

## 医护康患一体化心脏康复模式对冠脉支架植入术后患者的影响

宋龄

吉林大学第一医院

**目的** 探讨医护康患一体化心脏康复模式对冠脉支架植入术后患者的影响。

**方法** 选取2018年3月至6月在我院心内科经冠脉造影术确诊为冠心病并接受支架治疗的120例患者作为研究对象。按照随机数表法进行分组。两组患者均按照冠心病护理路径进行护理,并接受常规的心脏康复护理。实验组在此基础上给予医护康患一体化的心脏康复干预策略,主要是以整体护理为指导思想,运用新的康复理念,创新护理服务模式,改进心脏康复流程,建立心脏康复病例,让医生、护士、康复师、患者四者之间形成无缝式连接,制定具有针对性系统化的心脏康复策略,研究时间为6个月。采用临床生理指标(总胆固醇、甘油三酯、高密度脂蛋白胆固醇、低密度脂蛋白胆固醇、血糖、糖化血红蛋白、血压、BMI)、冠心病自我管理行为量表(CSMS)及生活质量评定简表(SF-36)来评定两组患者的区别。

**结果** 实验组临床生理指标与对照组比较,干预3个月后收缩压、舒张压、总胆固醇、高密度脂蛋白差异有统计学意义( $P < 0.05$ );干预6个月后,两组患者临床生理指标(除低密度脂蛋白)比较差异均有统计学意义( $P < 0.05$ )。实验组自我管理得分均高于对照组,差异有统计学意义( $P < 0.05$ )。实验组生活质量得分均高于对照组,差异有统计学意义( $P < 0.05$ )。

**结论** 医护康患一体化心脏康复有助于改善患者的临床生理指标及生活质量,提高患者自我管理水平。

## 协同饮食干预对StanfordA型夹层术后胃肠功能恢复的效果

赵孝英

陆军军医大学大坪医院

**目的** 探讨营养师与护士协同饮食干预模式对StanfordA型夹层患者术后胃肠功能恢复的效果,减少夹层复发的诱发因素,提高患者术后生活质量。

**方法** 对照组:按照一般术后饮食护理模式。观察组:术后24小时病情平稳后协同营养师早期介入制定个性化复合膳食纤维,给予复合膳食纤维30g+温开水50ml兑成水状口服(未拔除气管插管者鼻饲),每日3次,连续服用5天。观察两组患者肠鸣音恢复时间、首次肛门排气排便时间及有无便秘、腹泻情况发生。结果 观察组患者胃肠功能恢复优于对照组,表现在肠鸣音恢复时间、首次肛门排气排便时间均早于对照组;观察组无一例患者发生便秘,极大减少了患者不适及由于腹压增高引起血压一过性增高而导致的夹层复发的可能性。

**结果** 观察组在患者肠鸣音恢复 首次肛门排气排便时间均优于对照组。对照组便秘发生率为39.29%;两组患者均无腹泻发生,因此,早期个性化肠内营养不会增加腹泻的风险。

**结论** StanfordA型夹层患者由于手术创伤大、机械刺激、麻醉镇静时间长、术后使用呼吸机时间长等因素影响导致肠麻痹、便秘发生的可能性大,可诱发夹层复发,影响术后生存率及生活质量。早期协同饮食干预模式的应用可有效促进胃肠功能早期恢复,达到快速外科康复的效果。

## 跌倒风险分级护理在心内科患者防跌倒预防管理中的应用

王伟

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**目的** 心内科常见病包括冠心病、心律失常、高血压、心衰、心肌梗死、心脏病等,该类疾病特点病情严重、变化快、普遍高龄等,此外部分患者可能存在行动不便情况,可能导致跌倒事件发生。跌倒是科室存在的安全问题,对患者生理、心理等造成较大影响,加重基础病情、增加医疗纠纷发生率,影响护患关系,跌倒风险分级护理在心内科患者防跌倒预防管理中的应用。

**方法** 采用电脑随机法将我院于2018.1月-2018.12月间心内科收治的51例患者(跌倒风险分级护理),纳入观察组;纳入2017.1月-2017.12月间51例患者(常规护理),纳入常规组,评价两组患者跌倒情况与护理质量评分。

**结果** 观察组51例患者住院期间跌倒发生率2例(3.92%);常规组51例住院期间跌倒发生率7例(13.73%),( $\chi^2=5.980, P=0.014$ )。观察组患者对护理质量评分均高于常规组, $P<0.05$ 。

**结论** 采用跌倒风险分级护理可有效降低心内科患者跌倒发生率,提高护理质量。

## PDCA 循环管理模式对急性心肌梗死介入治疗护理作用

李庆波

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**目的** 探讨PDCA管理模式对急性心肌梗死(AMI)患者经皮介入治疗(PCI)临床效果评价,解决PCI治疗护理过程存在问题,为病人提供完整、严谨的护理服务,保障其生命安全,提高患者的对护理工作的满意度,关注患者情感变化,解决患者健康问题。

**方法** 选取2017年5月-2019年2月于我院治疗的AMI患者100例,55例为实施PDCA循环管理模式之前为对照组,45例为实施PDCA循环管理模式后为观察组,分析施行PDCA管理模式前后我科护理人员专业知识知晓率、患者AMI健康教育覆盖率,患者AMI知识知晓率、不良事件发生率、患者对护理人员的满意度、自我护理能力、服药依从

性、自我效能感、PCI手术并发症发生率。

**结果** PDCA循环管理法实施后术中及术后并发症发生率明显减低,患者及其家属对护理人员满意度明显提高,患者生活质量、药依从性明显提高,自我护理能力、生活质量评分(西雅图量表)及自我效能感、护理人员专业知识知晓率、护士参与解决问题的人员比率也明显提高,焦虑自评量表计、分临床锐器的发生例数、理人员不良事件发生率则明显减少 $P<0.05$ 。

**结论** PDCA循环在心血管内科患者护理管理中可以提升护理人员专业能力、规范护理程序、强化高质量护理执行能力,对促进患者的临床疗效及提高术后生活质量起很大作用,PDCA循环管理模式对患者能够明显降低PCI并发症的发生率,提高患者的生活质量,增加患者的自我效能感,对护理人员能够提高护士专业水平及服务能力,提高患者对护士的满意度,促进患者的病情康复。

## CCU 患者给予鼻导管中低流量吸氧期间实施氧气不湿化处理的可行性分析

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**目的** 分析CCU患者给予鼻导管中低流量吸氧期间实施氧气不湿化处理的可行性。

**方法** 将我院CCU于2017年2月~2018年10月收治的266例患者按照随机数字表法分为研究组和对照组,每组133例。两组患者均实施经鼻导管低流量或中流量吸氧,其中对照组仍对氧气实施湿化处理,研究组则不对氧气进行湿化处理、仅在常规温度和湿度的病房环境下进行直接吸氧。对比两组患者T1(吸氧少于24h)、T2(吸氧24~48h)、T3(吸氧超过48h但少于72h)、T4(吸氧72h以上)的鼻腔干燥、咽喉干燥感觉模拟评分,对比两组护理人员执行氧疗操作的平均所需时间。

**结果** 两组患者T1、T2、T3、T4的鼻腔干燥感觉模拟评分与咽喉干燥感觉模拟评分相比无显著差异( $P>0.05$ ),研究组护理人员执行氧疗操作的平均所需时间显著低于对照组( $P<0.05$ )。

**结论** CCU患者给予鼻导管中低流量吸氧期间实施氧气不湿化处理不会引发显著的呼吸道不适,且可显著提升护理人员的执行氧疗操作耗时,降低患者住院费用,可行性显著。

## 移动健康教育平台对慢性心力衰竭患者自我护理能力及生存质量的影响

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**目的** 探讨移动健康教育平台在慢性心力衰竭患者中的应用效果。

**方法** 选取2016年6月~2017年09月在我院心内科住院的符合纳入标准的慢性心力衰竭患者116例, 试验组58例, 对照组58例。试验组实施基于移动平台的健康教育管理, 随时对患者的病情变化、医嘱执行情况、护理措施的落实情况实施动态监控, 及时调整治疗护理方案, 针对患者提出的问题给予有效意见。并及时与患者及家属互动, 找出患者不良的生活习惯, 并给予动态监测, 制定家居生活列表, 与患者及家属共同探讨居家护理内容。对照组给与常规健康宣教。

**结果** 两组患者自我护理能力、生存质量比较差异有统计学意义( $P < 0.05$ )。

**结论** 基于移动平台的健康教育模式可提高慢性心力衰竭患者自我护理能力, 强化其健康信念、建立健康的行为与生活方式, 改善生存质量。

## 低分子肝素皮下注射护理规范的循证实践

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**目的** 评价低分子肝素皮下注射时推注时间、按压时间对注射部位皮下出血发生率的影响

**方法** 检索国内外公认的中英文数据库, 纳入关于“推注时间对注射部位皮下出血的影响的随机对照试验”及“按压时间对注射部位皮下出血的影响的随机对照试验或类试验”, 根据文献的类型对结果分别采用meta分析、约翰霍普金斯循证实践方法。

**结果** 推注时间方面, 共纳入5篇文献, Meta分析结果显示, 低分子肝素皮下注射时推注30 s较推注10s降低了注

射部位皮下出血的发生率(优势比为0.59, 95%可信区间为0.50~0.70,  $P < 0.01$ )。按压时间方面, 通过霍普金斯文献评价及汇总, 同时结合临床实践经验, 最终推荐低分子肝素皮下注射后无需按压。

**结论** 低分子肝素皮下注射时延长推注时间可降低皮下出血的发生率, 且注射后是否按压对皮下出血发生率没有影响。

## 射频消融术后患者疾病不确定感及其影响因素分析

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**目的** 调查分析射频消融术后患者的疾病不确定感状况及其影响因素, 为评估患者疾病不确定感和提出针对性的干预措施提供依据。

**方法** 采用自制的一般资料问卷、Mishel疾病不确定感量表(MUIS-A)对80例行射频消融术治疗严重心律失常的患者进行调查, 分析其影响因素。

**结果** 80例射频消融术后患者的疾病不确定感总分在65~120分, 平均(79.56±8.16)分, 其中19例属于低水平疾病不确定感, 53例属于中水平疾病不确定感, 8例属于高水平疾病不确定感。按疾病不确定感个维度平均得分由高到低排序: 不明确性(32.87±4.36)分, 复杂性(18.51±2.98)分, 信息缺乏(17.32±4.36)分, 不可预测性(11.52±2.18)分。不同性别、年龄、家庭人均月收入、户口所在地、医保形式的射频消融术后患者疾病不确定感得分比较, 差异无统计学意义。不同病程, 不同文化程度的射频消融术后患者疾病不确定感得分比较, 差异有统计学意义( $P < 0.05$ )。

**结论** 80例行射频消融术的患者中, 66.25%的患者疾病不确定感处于中等水平, 23.75%的患者疾病不确定感处于低水平, 10.00%的患者疾病不确定感处于高水平。多元线性回归分析显示, 患者疾病不确定感的水平主要受病程和文化程度影响, 病程越长, 文化程度越高, 疾病不确定感越低。护士应根据患者的疾病不确定感水平, 给予针对性的信息支持, 并提供护理措施, 进而降低患者的疾病不确定感。

## 院后随访对高血压和心衰患者的管理

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**目的** 对于出院后高血压和心衰患者在家用药和活动指导及自我监管,减少患者再入院率疾病死亡率。

**方法** 采用统计学方法抽取我疗区2018年3月份至11月984位出院患者,其中心衰患者572例,高血压患者412例,将以上两种病患者均分为对照组和观察组。以上两组患者出院一周后,由责任护士做电话随访。对照组给予患者用药和活动指导及了解患者自我监管程度。观察组在对照组的随访基础上给予心理护理。

**结果** 经过为期8个月电话随访后,观察组的电话随访的患者再入院和病死率显著降低。对照组患者疾病再入院率及病死率明显升高。观察组优于对照组( $P<0.05$ )。

**结论** 经过专业的护理人员对于患者在家用药、活动及自我监管指导和心理护理,明显降低患者疾病的进展及病死率的发生。

## 心内科医用黏胶相关性皮肤损伤的原因分析及护理对策

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**目的** 了解心内科老年患者医用黏胶相关性皮肤损伤(MARSI)的情况,分析MARSI发生原因和影响因素,探讨针对性的护理对策和预防措施。

**方法** 回顾性分析2017年1月-2018年12月本院心内科263名老年住院患者发生医用黏胶相关性皮肤损伤34例患者的临床资料,了解其MARSI发生原因并进行分析,对30名护理人员相关知识掌握情况进行调研。

**结果** 263例老年患者中有34例发生MARSI,发生率12.93%,其中机械型的MARSI为15例,皮炎型的MARSI为8例,其他型的MARSI为11例,罹患者和未罹患者的Braden评分差异有统计学意义( $P<0.001$ );约70%护理人员对MARSI了解较少。

**结论** 应关注心内科MARSI发生情况,提高护理人员的水准,并探索科学的防治护理对策。

## 急性心梗术后合并心衰的延续性护理

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**目的** 急性心梗术后合并心衰病情危重,进展快,病死率高达30.0%,正确诊断、有效治疗、科学护理是降低急性心梗术后合并心衰复发率及病死率的主要措施。因急性心梗术后合并心衰患者出院后需继续在家治疗,其护理能力直接影响着预后。目的主要是分析急性心梗术后合并心衰的延续性护理应用效果。

**方法** 选取我院收治的70例急性心梗术后合并心衰患者,随机分为对照组( $n=35$ )及观察组( $n=35$ ),分别行常规护理、延续性护理;比较两组患者自护能力。

**结果** 观察组护理后SASE评分高于对照组,心血管不良事件发生率2.86%低于对照组的22.86%,有统计学意义( $P<0.05$ )。

**结论** 强化急性心梗术后合并心衰的延续性护理,可提高患者自护能力,效果显著。

## 危机管理在先天性心脏病患儿静脉输液中的应用

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**目的** 探讨危机管理在先天性心脏病患儿静脉输液中的应用效果。

**方法** 将174例先天性心脏病患儿随机分成观察组和对照组各87例。对照组按常规进行静脉输液,观察组在静脉输液中引入危机管理机制,比较两组一次性穿刺成功率、输液并发症、护患纠纷及静脉并发症发生率、家长满意度情况。

**结果** 观察组一次性穿刺成功79例,静脉并发症4例,护患纠纷3例,输液并发症2例,家长满意度93.10%。对照组一次性穿刺成功54例,静脉并发症12例,护患纠纷15例,输液并发症8例,家长满意度64.37%。两组各指标比较差异均有统计学意义( $P<0.05$ 或 $P<0.01$ )。

**结论** 先天性心脏病患儿由于心脏和血管的发育异常,导致血流动力学不稳定。在静脉输液中引入危机管理机制,可有效避免护理纠纷、静脉输液并发症的发生,家长的满意度得到明显提高。



## 一例慢性心力衰竭、慢性阻塞性肺气肿合并鹅口疮的个案护理

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**目的** 对1例慢性心衰、慢性阻塞性阻肺疾病合并发鹅口疮作个案护理,为临床护理工作提供参考。

**方法** 回顾1例慢性心衰、慢性阻塞性阻肺疾病合并发鹅口疮在治疗护理过程中,加强对患者感染指标的测定,及时调节抗生素及抗真菌的药物。针对鹅口疮配置漱口液,遵医嘱进行漱口。盐水500 mL加制霉菌素50万单位三餐前漱口,并吞服。雾化吸入后及三餐后先用盐水250 mL加碳酸氢钠250 mL漱口,后用康复新一瓶加盐水380 mL加利多卡因20 mL加制霉菌素500万单位漱口后吐掉。患者血红蛋白及白蛋白低,根据医嘱使用白蛋白及肠外营养,并进行饮食的宣教。根据疾病的特点,针对性对病情观察及用药,鹅口疮导致的疼痛,心功能Ⅲ级的活动指导,心理护理,静脉炎的预防及护理,排便及皮肤进行专科优质护理。

**结果** 患者气促、咳嗽症状及感染指标逐渐恢复正常,肺部感染及口腔真菌感染得到控制。

**结论** 对慢性心衰、慢性阻塞性阻肺疾病合并发鹅口疮加强护理,有利于促进患者的康复。

## 延续护理对PCI术后患者自我管理能力及生活质量的影响

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**目的** 探讨延续护理对PCI术后患者自我管理能力及生活质量的影响。

**方法** 将2018年1月-6月于我科住院行PCI治疗的冠心病患者110例随机分为对照组和实验组,对照组55例,实验组55例。两组患者均采用常规护理,包括:住院期间病情观察、用药、饮食、康复锻炼指导,出院时发放心血管疾病健康知识指导手册,指导患者出院后1月、3月、6月定期门诊复诊,不适随诊。对照组给予常规护理,实验组在常规护理的基础上实施院外延续护理,通过制定冠心病PCI术后延

续护理随访手册,由随访护士以微信+电话的形式对实验组患者进行院外一对一的指导。两组患者在出院后1月、3月、6月回院复诊时回病房进行《冠心病自我管理量表》和《中国心血管病人生活质量评定问卷》的调查填写。

**结果** 出院1月对照组和实验组在自我管理能力和生活质量评分没有差异( $P>0.05$ );出院后3月及6月,实验组患者自我管理能力和生活质量评分明显高于对照组( $P<0.05$ );出院后3月及6月,实验组患者生活质量评分明显高于对照组( $P<0.05$ )。

**结论** 院外延续护理能提高PCI术后患者自我管理能力和维持较高的健康水平和生活质量。

## 抗阻运动与2型糖尿病患者心血管风险的研究进展

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**目的** 长期的抗阻运动和有氧运动对不同糖代谢人群(正常血糖、糖尿病前期和糖尿病)血糖、血脂、人体成分等指标的影响,并分析不同运动方式对改善糖尿病人群心血管功能的影响,探讨出一套简单易学的运动模式,并将其推广到社区广泛应用,从而更好地控制糖尿病前期患者的相关代谢指标,预防心血管事件的发生。

**方法** 将糖尿病前期和糖尿病患者以及糖代谢正常人在健康饮食的基础上,随机分配到2个组:有氧运动组和抗阻运动组,并制定相应的运动方案。

**结果** 在糖尿病患者众多死亡原因中,心血管疾病并发症占首位,高达60%。因此,抗阻运动能够降低空腹血糖、改善胰岛素抵抗、改善血脂水平及有效地降低血压,同时还可以降低心血管事件发生率。

**结论** 糖尿病虽是一种代谢性疾病,但是主要损害表现为血管病变,近40%初诊糖尿病患者已发生斑块,故糖尿病患者本身即被认为具有心血管病高风险,同型半胱氨酸水平升高与动脉粥样硬化疾病相关。研究证实,抗阻运动能够降低空腹血糖、改善胰岛素抵抗、改善血脂水平及有效地降低血压,在目前的研究中,大多是对高血压、脑卒中等老年心血管风险的评估,针对2型糖尿病人群心血管风险评估的研究甚少,尤其缺乏运动干预后对心血管风险评估的研究,这将是今后研究的一个方向。

## 临床不良事件情境模拟教学对CCU实习护生临床实践能力的影响

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**目的** 探讨采用不良事件情境模拟教学法,提升实习护生临床综合实践能力的效果。

**方法** 将2017-2018年度的36名护生:有第一至六、共6个轮回,每个轮回6名学生,均为本科生,每轮回周期为2个月。随机将单数轮回作为对照组,双数轮回作为模拟组,每组各18名护生。每两周授课一次,对照组采用常规教学法授课。实验组采用临床不良事件情境模拟教学法授课,每次授课完即组织护生对临床真实案例的护理不良事件进行情境模拟、角色扮演;然后集体讨论、必须人人发言,在教师引导下让学生对不良事件的各个因素进行剖析、反思,最后进行经验总结,使护生印象深刻、牢记于心。培训2月后,比较两组综合考核评分。采用中文版评判性思维力量表(CTDI-CV)对学生培训前、后进行评定并对两组的教学满意度进行评价。

**结果** 实验组综合考核评分、评判性思维总分及5个因子分显著高于对照组(均 $P<0.05$ );实验组对教学模式满意度的评分显著高于对照组( $P<0.01$ )。

**结论** 不良事件情境模拟教学法能够有效提升学生的临床操作和思维能力,提高临床教学质量。

## 冠心病合并糖尿病的管理

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**目的** 降低冠心病的病发率和糖尿病的并发症。加强冠心病合并糖尿病患者对饮食和用药的自我监管和自我调控。

**方法** 采取统计学方法抽取我科2017年1月至2018年12月4896名患者,从中抽取患心脏病合并糖尿病患者1894名,将其分为对照组和观察组,对照组在住院期间给予常规的护理措施和健康宣教,观察组采用常规的护理措施和健康宣教外,定期给予院外追踪随访。在随访中掌握患者的饮食和用药情况,了解患者的心理变化。给予心理护理。

**结果** 观察组在出院追踪随访后,患者对于饮食、运动和用药的依从性较好;血糖的波动幅度较小,相对平稳。冠心病的病发率也明显降低。对照组患者院后饮食、运动和用药的依从性较差,血糖的波动较大。观察组患者病发率明显优于对照组。 $(P<0.05)$

**结论** 冠心病合并糖尿病患者定期有专业的护理人员给予院后追踪随访,有利于提高患者自我监管能力,很大程度上降低了病发率。

## 探究维生素C、葡萄糖酸钙、以及生理盐水对预防一次性电极片过敏的效果评价

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**目的** 探索局部应用维生素C、葡萄糖酸钙对预防心电图监护电极片过敏患者的效果评价。

**方法** 应用随机数字表法随机选取某三甲医院CCU患者500人(男362例,女138例,年龄 $50\pm 5$ 岁)。纳入标准:既往无头孢、青霉素等药物过敏史、食物过敏史,皮肤完好,且预计CCU监护时间超过24小时。排除标准:既往有过敏史、皮肤水肿等问题,以及拒绝参与研究者。患者入院后均在局部酒精脱脂后,使用一次性电极片给予五导联心电图监护。分别为所有患者左上电极片粘贴位置涂抹维生素C,右上电极片粘贴位置涂抹葡萄糖酸钙,以及剑突下电极片粘贴位置涂抹生理盐水,然后再粘贴电极片,电极片每日清晨更换,更换前仍然按上述方法进行涂抹,针对涂抹手法对护士进行统一培训,对比两种方法预防电极片过敏反应(皮肤红,瘙痒,疼痛等症状有一项即视为阳性)的效果。

**结果** 再研究对象中,给予维生素C局部涂抹最不易产生过敏反应(在发生过敏反应的105人中发生在维生素C涂抹处的未发生过敏反应18人,占17.1%),给予葡萄糖酸钙局部涂发生过敏反应87人(占82.9%),使用维生素C预防电极片过敏反应效果显著( $P<0.05$ )。

**结论** 在给予患者贴电极片前对皮肤给予少量维生素C涂抹,有利于患者预防局部过敏反应的发生,在做24小时动态心电图以及监护室应用一次性电极片过程中可以有效减少患者过敏反应的发生,增加患者舒适度,减少护士工作量以及节约医疗资源。值得推广利用。

## Evaluation of Clinical Comprehensive Health Guidance in Patients With Intravenous Indwelling Needle in Coronary Care Unit

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**Objective** In clinical practice, due to various reasons, the blood vessels placed in the indwelling needle may have complications such as inflammatory reaction, tube occlusion, indwelling needle detachment, leakage, and phlebitis. The indwelling needle fails to achieve the expected indwelling time and affects the use effect, which not only increases the patient's medical expenses, but also affects the patient's and family's cooperation, satisfaction and doctor-patient relationship. Therefore, our study is to explore the application effect of comprehensive medical health guidance in patients with venous indwelling needles in coronary care unit (CCU). To provide some reference for future application of CCU intravenous indwelling needles.

**Methods** From January 2017 to December 2018, 412 CCU patients in Renmin Hospital of Wuhan University were randomized into 206 patients in the control group and 206 in the observation group. Routine missions were given to the control group, and a comprehensive health guides were given to the observation group. The venous indwelling needle indwelling time, mastery of indwelling knowledge, patient satisfaction, and indwelling related complications were compared between the two

groups.

**Results** Compared with the control group, patients in the observation group had longer venous retention times ( $84.54 \pm 6.54$  h vs.  $64.12 \pm 5.22$  h), higher retention of knowledge ( $56.43 \pm 3.07$  vs.  $46.56 \pm 4.43$ ), better patient satisfaction ( $25.31 \pm 2.75$  vs.  $18.04 \pm 2.75$ ), the differences were statistically significant ( $P < 0.05$ ). The incidence of complications with indwelling in observation group was significantly lower than these of the control group (blocking pipe: 37 vs. 8), (hematoma: 30 vs. 11), (swelling: 30 vs. 8), (phlebitis: 26 vs. 8), the differences were statistically significant ( $P < 0.05$ ).

**Conclusions** Health care comprehensive health education is a kind of educational activity that combines doctors with nurses with targeted, planned, organized strategies, systematic norms and evaluation indicators. Comprehensive health education can encourage patients and their families to consciously accept and adopt healthy behaviors to improve, maintain and promote the health of the body. In the treatment of CCU patients undergoing intravenous indwelling needles, a comprehensive system health education that integrates medical care can enable patients and their families to obtain relevant basic knowledge, improve the success rate of intravenous indwelling needles, improve the acceptance rate of medical treatment and medical care. Satisfaction, eliminate the concerns of patients and their families, and reduce the incidence of retention-related complications. Therefore, the popularization of venous indwelling needle health education in CCU patients is a favorable medical behavior worthy of promotion.

## · 心血管病学相关基础研究及新技术研究 ·

## 血小板微粒对 ApoE<sup>-/-</sup> 小鼠动脉粥样硬化斑块形成及稳定性的影响

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**目的** 探讨 C57BL/6 小鼠来源血小板微粒 (platelet microparticles, PMPs) 对载脂蛋白 E 基因敲除 (apolipoprotein E knockout, ApoE<sup>-/-</sup>) 小鼠动脉粥样硬化 (atherosclerosis, AS) 斑块形成及稳定性的影响。

**方法** 选取 8 周龄雄性 ApoE<sup>-/-</sup> 小鼠 40 只, 采用高脂饲料饲养 4 周后, 按随机数字表分为 4 组 (每组 10 只), 分别给予 PBS (PBS 组)、不含 PMPs 的上清液 (supernatants, SUP 组)、低剂量 PMPs (low-dose PMPs, LDP 组)、高剂量 PMPs (high-dose PMPs, HDP 组), 均由尾静脉注射, 每周 1 次, 共 8 周。实验结束时, 检测小鼠血常规、血脂、肝肾功能和血清炎症因子 (CRP、IL-1 $\beta$ 、TNF- $\alpha$ ) 水平, 并留取 ApoE<sup>-/-</sup> 小鼠主动脉和头臂干动脉用于 AS 方面的病理检测, 包括油红 O 染色、HE 染色、Masson 染色、免疫组化检测 (CD68、MMP-9、 $\alpha$ -SMA), 对 AS 斑块的形成及稳定性进行评估。

**结果** 4 组间小鼠体质量差异无统计学意义, 血常规 (WBC、RBC、PLT、HGB)、血脂 (TG、TCH、LDL、HDL)、肝功 (ALT、AST)、肾功能 (UN、Cr) 等指标差异均无统计学意义。LDP 组和 HDP 组的血清 CRP、IL-1 $\beta$ 、TNF- $\alpha$  水平显著高于 PBS 组或 SUP 组 ( $P < 0.05$ )。LDP 组和 HDP 组主动脉 AS 斑块的总面积显著高于 PBS 组或 SUP 组 ( $P < 0.05$ )。与 PBS 组相比较, 其它 3 组的斑块内脂质核心占斑块总面积的比例均显著增加 ( $P < 0.05$ ); 斑块部位的胶原含量和平滑肌细胞在 HDP 组均显著低于 PBS 组 ( $P < 0.05$ ), 而巨噬细胞则有显著增加 ( $P < 0.05$ )。

**结论** PMPs 可促进高脂饲养 ApoE<sup>-/-</sup> 小鼠 AS 斑块的形成以及斑块局部的巨噬细胞浸润和炎症反应, 减少其中胶原和平滑肌细胞的含量, 从而进一步降低斑块的稳定性。

## Improvement of oxidative stress status by lipoprotein apheresis in patients with familial hypercholesterolemia

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**Objective** Familial hypercholesterolemia (FH) characterized by severe high blood cholesterol levels usually presents an imbalance of systemic oxidative stress, which might play an important role in promoting the emergence of atherosclerosis and premature cardiovascular disease. Lipoprotein apheresis is the most effective therapy to reduce cholesterol levels in FH, however, the role of lipoprotein apheresis in altering oxidative stress remains unclear. Our study aims to assess the impact of lipoprotein apheresis on oxidative stress status in patients with FH.

**Methods** Patients with FH and planning to receive lipoprotein apheresis were consecutive enrolled at our Lipid ward from Nov, 2017 to Nov, 2018. Free oxygen radicals test (FORT), free oxygen radicals defense (FORD) values were determined using the free oxygen radical monitor and kit (Catellani Group, Parma, Italy) immediately before and after lipoprotein apheresis. Plasma lipids, high-sensitivity C-reactive protein (hsCRP), immunoglobulins were measured at the same time points using conventional methods (enzymatic assay and turbidimetric immunoassay). Data were analyzed by paired t test or Wilkerson rank sum test and Pearson's correlation analysis using SPSS statistics software version 25.

**Results** A total of 27 patients (19 males, 8 females, age: 12-69 years) were included in our study. Besides plasma levels of triglyceride (TG), total cholesterol (TC), low density lipoprotein cholesterol (LDL-C) and lipoprotein (a) [Lp(a)] significantly decreased (all  $P < 0.01$ ), the oxidative stress status showed that FORTs were significantly decreased and FORD values significantly enhanced immediately after Lipoprotein apheresis compared with immediately before lipoprotein apheresis (both  $P < 0.01$ ). In addition, the correlation analysis showed that the FORT values were positively related to LDL-C levels at the time point of immediately after lipoprotein apheresis ( $r = 0.43$ ,  $P = 0.025$ ). However, the concentrations of hsCRP were not influenced immediately before and after lipoprotein apheresis ( $P > 0.05$ ).

**Conclusions** The present study indicated, besides effectively lowering plasma lipid levels, lipoprotein apheresis could significantly improve oxidative stress status in patients with FH.

## Circular RNA circRNA\_000203 aggravates cardiac hypertrophy via suppressing miR-26b-5p and miR-140-3p

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**Objective** Circular RNAs (circRNAs) are involved in gene regulation in a variety of physiological and pathological processes. The present study aimed to investigate the effect of circRNA\_000203 on cardiac hypertrophy and the potential mechanisms involved.

**Methods** CircRNA\_000203 was shown upregulated in the myocardium of Ang-II-infused mice and in Ang-II-induced neonatal mouse ventricular cardiomyocytes (NMVCs) with a pattern of specific cytoplasmatic location. Enforced-expression of circRNA\_000203 could enhance cell size and expressions of atrial natriuretic peptide (ANP) and  $\beta$ -myosin heavy chain (MHC) in NMVCs. In vivo, heart function was impaired and cardiac hypertrophy was aggravated in Ang-II-infused myocardium-specific circRNA\_000203 transgenic mice (Tg-circ203). Dual luciferase reporter assay indicated that miR-26b-5p, -140-3p could interact with circRNA\_000203. Meanwhile, RNA pull-down and RT-qPCR assay verified that circRNA\_000203 could specifically sponge miR-26b-5p, -140-3p in NMVCs. Further dual luciferase reporter assay showed that miR-26b-5p, -140-3p could interact with 3'UTRs of Gata4 gene, and circRNA\_000203 could block the above interactions. Additionally, Gata4 expression could be transcriptionally inhibited by miR-26b-5p, -140-3p mimic in NMVCs, but enhanced by over-expression of circRNA\_000203 in vitro and in vivo. Functionally, miR-26b-5p, -140-3p, as well as Gata4 siRNA, could reverse the hypertrophic growth in Ang-II-induced NMVCs. Moreover, miR-26b-5p, -140-3p and Gata4 siRNA could also eliminate the pro-hypertrophic effect of circRNA\_000203 in NMVCs. Furthermore, we demonstrated that NF- $\kappa$ B signaling mediates the upregulation of circRNA\_000203 in NMVCs exposed to Ang-II treatment.

**Results** CircRNA\_000203 was shown upregulated in the myocardium of Ang-II-infused mice and in Ang-II-induced neonatal mouse ventricular cardiomyocytes (NMVCs) with a pattern

of specific cytoplasmatic location. Enforced-expression of circRNA\_000203 could enhance cell size and expressions of atrial natriuretic peptide (ANP) and  $\beta$ -myosin heavy chain (MHC) in NMVCs. In vivo, heart function was impaired and cardiac hypertrophy was aggravated in Ang-II-infused myocardium-specific circRNA\_000203 transgenic mice (Tg-circ203). Dual luciferase reporter assay indicated that miR-26b-5p, -140-3p could interact with circRNA\_000203. Meanwhile, RNA pull-down and RT-qPCR assay verified that circRNA\_000203 could specifically sponge miR-26b-5p, -140-3p in NMVCs. Further dual luciferase reporter assay showed that miR-26b-5p, -140-3p could interact with 3'UTRs of Gata4 gene, and circRNA\_000203 could block the above interactions. Additionally, Gata4 expression could be transcriptionally inhibited by miR-26b-5p, -140-3p mimic in NMVCs, but enhanced by over-expression of circRNA\_000203 in vitro and in vivo. Functionally, miR-26b-5p, -140-3p, as well as Gata4 siRNA, could reverse the hypertrophic growth in Ang-II-induced NMVCs. Moreover, miR-26b-5p, -140-3p and Gata4 siRNA could also eliminate the pro-hypertrophic effect of circRNA\_000203 in NMVCs. Furthermore, we demonstrated that NF- $\kappa$ B signaling mediates the upregulation of circRNA\_000203 in NMVCs exposed to Ang-II treatment.

**Conclusions** Our data demonstrated that circRNA\_000203 exacerbates cardiac hypertrophy via suppressing miR-26b-5p and miR-140-3p by targeting the same target of Gata4.

## Survivin protects neonatal mouse cardiomyocytes from CVB3-induced apoptosis in a caspase-dependent manner

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**Objective** Viral myocarditis (VMC) is a kind of inflammatory cardiomyopathy mainly affecting children and young adults and resulting in heart failure due to dilated cardiomyopathy or cardiac arrest. Cardiomyocyte apoptosis has been shown to play

a critical role in the pathogenesis of coxsackievirus B3 (CVB3) induced VMC and blocking of this process may contribute to the therapeutic effect towards VMC. Therefore, the aim of this study was to examine whether survivin, one of the strongest antiapoptotic proteins, participates in the apoptotic activity after CVB3 infection and further reveal its related mechanisms.

**Methods** Here the cultured neonatal mouse cardiomyocytes (NMCs) were exposed to CVB3 to establish the cell model of VMC and we found a time-dependent manner of survivin expression after CVB3 infection by Western Blot. Lentivirus was next used to mediate survivin expression thereby examine the function of survivin in CVB3-infected NMCs. TUNEL assay demonstrated that survivin overexpression interrupted CVB3-induced apoptosis and significantly decreased the apoptotic rate at 36 h and 60 h after CVB3 infection. It was next examined whether caspase-3 and -9 were involved in the antiapoptotic pathway initiated by survivin via Western Blot. The results showed a reverse relationship between survivin expression and cleaved caspase-3 and -9 expression, suggesting that survivin may inhibit apoptosis by restraining the activity of caspase-3 and -9. Moreover, the supernatant from cultured NMCs was extracted to detect the quantitation of released LDH and a sharp decrease was shown in survivin overexpressed group compared to CVB3 infected group, indicating a protective role of survivin in CVB3-induced cell damage.

**Results** Here the cultured neonatal mouse cardiomyocytes (NMCs) were exposed to CVB3 to establish the cell model of VMC and we found a time-dependent manner of survivin expression after CVB3 infection by Western Blot. Lentivirus was next used to mediate survivin expression thereby examine the function of survivin in CVB3-infected NMCs. TUNEL assay demonstrated that survivin overexpression interrupted CVB3-induced apoptosis and significantly decreased the apoptotic rate at 36 h and 60 h after CVB3 infection. It was next examined whether caspase-3 and -9 were involved in the antiapoptotic pathway initiated by survivin via Western Blot. The results showed a reverse relationship between survivin expression and cleaved caspase-3 and -9 expression, suggesting that survivin may inhibit apoptosis by restraining the activity of caspase-3 and -9. Moreover, the supernatant from cultured NMCs was extracted to detect the quantitation of released LDH and a sharp decrease was shown in survivin overexpressed group compared to CVB3 infected group, indicating a protective role of survivin in CVB3-induced cell damage.

**Conclusions** In the present study, we demonstrated that survivin was triggered by CVB3 infection in NMCs in a time-dependent manner and executed its antiapoptotic effects via caspase-3- and caspase-9-dependent signaling pathway.

## A Genome Wide Association Study Identified Variants Associated with Lipoprotein (a) Level and Severity of Coronary Artery Disease in Chinese Han Patients

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**Objective** Lipoprotein (a) (Lp[a]) is one of the strongest genetic risk factors to coronary artery disease. Due to ethnic differences, most studies on Asians failed to replicate Lp(a) associated SNPs identified in Europeans. There is no genome wide association study (GWAS) carried out on Lp(a) in Chinese Han population by far. Therefore, we performed a genome wide association study to identify variant associated with serum Lp(a) level in Chinese Han subjects with coronary artery disease (CAD) and undergone percutaneous coronary intervention therapy.

**Methods** A total of 1403 subjects were included and genotyped with illumina global screening array. Fasting blood Lp(a) concentration was determined by biochemical methods on the second day of each patient's admission. Synergy between PCI with TAXUS and cardiac surgery (SYNTAX) score, counts of heavy calcified lesion and long-range lesion in coronary arteries were evaluated by coronary angiography. A GWAS were carried out to identified Lp(a) associated variants, and linear or logistic regression analyses were performed to evaluate association among Lp(a) level, Lp(a) associated variants and CAD severity.

**Results** Firstly, we observed that elevated Lp(a) levels showed a significant association with high CAD severity, presented by increases in SYNTAX score, count of long-range lesions and heavy calcified lesions. Then, we discovered three independent SNPs, rs7770628, rs73596816 and rs6926458, to be genome wide significantly associated with Lp(a) levels

by GWAS. Further, we found rs7770628 and rs73596816 to some extent associated with increased risk in developing serious lesions in CAD. An increase in minor allele dose of rs7770628 was associated with an increase in risk of high SYNTAX score (adjusted odds ratio [95% CI]: 1.32 [1.03–1.69],  $P=0.0277$ ). And carrying minor alleles of rs7770628 and rs73596816 were estimated to have a higher risk of harboring long-range lesions (adjusted odds ratio [95% CI]: 1.41 [1.11–1.81],  $P=0.0058$  and 1.59 [1.14–2.23],  $P=0.0066$  respectively).

**Conclusions** Our study was the first GWAS on Lp(a) level and identified race specific loci in Chinese Han Population. And we also presented the relations of Lp(a) and Lp(a) loci to CAD severity. These findings highlighted the importance and potential of Lp(a) intervention and extended the understanding of in CAD prevention and treatment.

## FTY720 induces nitric oxide and prostaglandin I-2 release in endothelial cells through different S1PRs pathways

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**Objective** Endothelial cells are involved in the regulation and homeostasis of the vasculature, and its damage can lead to atherosclerosis. Sphingosine 1-phosphate as a bioactive lysophospholipid, stimulates endothelium to release nitric oxide (NO) and prostacyclin (PGI<sub>2</sub>). Fingolimod (FTY720), a compound used as an immunomodulator of S1P receptors (S1PRs), has recently been shown to improve endothelial function and antiatherosclerosis. However, the function of FTY720 remains unclear.

**Methods** HUVECs Crl-1730 was cultured in DMEM with 10% fetal bovine serum. HUVECs were pre-incubated with different inhibitors including JTE013, VPC23019, GSK690693, SCH772984 before FTY720 treatment. Nitric oxide content was determined by assessing the amount of nitrite accumulated in the culture media using Griess Reagent. HUVECs were treated with FTY720 (5 nM) in different time, to measure 6-keto-PGF<sub>1α</sub> production by competitive ELISA. Total RNA from ex-

perimental cells was isolated by Ultrapure RNA Ki and cDNA was synthesized by TransScript II One-Step gDNA Removal and cDNA Synthesis SuperMix. mRNA expression of different genes was analysed by real-time qPCR using the qPCR SuperMix. The COX2 and eNOS expression were detected by western blotting. Blot signals were then detected by Chemstar High-sig ECL Western Blotting Substrate. We quantified the absolute intensity of the bands using the IMAGEJ 1.48 software.

**Results** In this study, we found that FTY720 promoted NO and PGI<sub>2</sub> release from endothelial cells. By detecting the expression of eNOS and COX2, the key enzymes of NO and PGI<sub>2</sub> production, we confirmed that FTY720 could increase PGI<sub>2</sub> level by promoting COX2 expression.

However, phosphorylated eNOS involved in FTY720-mediated NO production.

VPC23019 (an inhibitor of S1PR1 and S1PR3) and GSK690693 (an inhibitor of AKT) significantly attenuated NO and eNOS phosphorylation level in FTY720-treated endothelial cells. However, results showed that JTE013 (a S1PR2 inhibitor) and SCH772984 (an inhibitor of ERK) significantly decrease COX2 expression in FTY720-treated endothelial cells.

**Conclusions** In conclusion, this study has demonstrated that FTY720 can promote NO and PGI<sub>2</sub> release by different S1PRs activity.

## MicroRNA-384-mediated Herpud1 upregulation promotes Angiotensin II-induced endothelial cell apoptosis

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**Objective** Atherosclerosis is the leading cause of death and disability worldwide and is characterized by chronic inflammation of the arterial wall. Endothelial cells (ECs) line the inner surface of blood vessels and it is well established that the initial qualitative change in the development of atherosclerosis is damage to ECs. Angiotensin II (Ang II), the main active effector of the rennin-angiotensin system, would induce damage to ECs. However, the mechanisms underlying Ang II-induced EC apoptosis remains to be fully elucidated. MicroRNAs (miR-

NAs) are small, non-coding RNAs involved in post-translational regulation of gene expression and have been reported to serve important roles in a variety of pathophysiologic processes, including cell proliferation, apoptosis, and cardiovascular disease. This study aimed to investigate the role of miR-384 in Ang II-induced ECs apoptosis.

**Methods** The expression of five various miRNAs (including miR-200c, miR-143, miR-181a, miR-384, and miR-590-5p, which have been reported to be associated with atherosclerosis) in Ang II-treated human umbilical vein endothelial cells (HUVECs) were detected by qPCR. The Ang II-induced apoptosis of HUVECs was determined by flow cytometry, TUNEL staining and western blot. Endoplasmic reticulum (ER) stress markers were detected by western blot analysis. The target gene of miR-384 was determined by bioinformatics analyses and luciferase report assay. qPCR, western blotting and immunofluorescence were performed to determine the expression level of homocysteine inducible ER protein with ubiquitin like domain 1 (Herpud1).

**Results** Among the five miRNAs, miR-384 expression level was significantly decreased in Ang II-treated HUVECs. A decreased rate of HUVEC apoptosis and a decreased rate of ER stress (as evidenced by increased CHOP, IRE1, and GRP78 expression levels) were observed following restoration of miR-384 expression. Above data indicated that downregulation of miR-384 promoted Ang II-induced ER stress and apoptosis of HUVECs. In addition, Herpud1 expression levels were increased in HUVECs treated with Ang II, and upregulated Herpud1 was observed to be located in the cytoplasm and ER. Conversely, the expression levels of Herpud1 were decreased after overexpression of miR-348 mimics. Mechanistically, the luciferase report assay revealed that miR-384 directly targets the 3'-untranslated region of Herpud1. We then found that the effects of miR-384 on HUVECs apoptosis and ER stress were at least partly reversed by knockdown of Herpud1 expression.

**Conclusions** The results of the present study collectively indicated that miR-384 expression level was downregulated in Ang II-treated HUVECs and miR-384 overexpression protected HUVECs against Ang II-induced apoptosis by negatively regulating Herpud1. These findings point towards new strategies by which apoptosis of ECs can be suppressed.

## Polydatin ameliorates diabetic cardiomyopathy via Sirt3 activation

Mingming Zhang

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**Objective** Diabetic cardiomyopathy is identified as cardiac ventricular dysfunction induced by an insulin shortage in diabetic patients. Our previous studies have shown that Polydatin (PD) alleviates cardiac dysfunction after myocardial infarction (MI) injury. Nevertheless, the mechanism by which PD regulates diabetic cardiomyopathy has not been reported.

**Methods** In this study, we demonstrated the effects and described the mechanisms of PD in diabetic cardiomyopathy in both adult mouse hearts and neonatal mouse cardiomyocytes. We injected streptozotocin (STZ) to induce the DM model in wild-type (WT) and Sirt3 knockout (Sirt3<sup>-/-</sup>) mice. Mitochondrial bioenergetics in diabetic mice were detected by measuring citrate synthase activity and ATP content. The extent of autophagy regulation by PD was investigated by detecting the levels of Beclin 1, Atg5, LC3 and p62.

**Results** Compared to the WT mouse hearts, hearts from the diabetic mice exhibited better cardiac function and a higher level of autophagy. Moreover, mitochondrial function in the diabetic mouse hearts was improved after PD treatment. PD treatment significantly increased ATP content and CS activity in the cardiomyocyte mitochondria in the diabetic mice, indicating a functional improvement in the cardiac mitochondria. However, PD treatment had no effect on the Sirt3 knockout diabetic mouse hearts. Additionally, PD increased autophagy flux in the cardiomyocytes that were cultured in high-glucose medium for 48 h. High glucose results in the accumulation of swelled and disarranged mitochondria. Moreover, in the Sirt3 knockdown cells cultured with HG, the mitochondrial disorganization became more severe, as evidenced by the appearance of vacuoles in some mitochondria. PD treatment alleviated these mitochondrial abnormalities induced by HG but not in Sirt3 knockdown cells. In addition, PD had no effects on the cardiomyocytes under high-glucose conditions when we down-regulated Sirt3.

**Conclusions** The present study provides basic evidences to support the positive effects of PD in DCM and implicates a new role for Sirt3 as a promising target for the treatment of diabetes-induced cardiac dysfunction. The cardioprotective effect of PD



is mediated by its ability to up-regulate autophagy and improve mitochondrial bioenergetics through Sirt3 activation. We may view PD as a possible drug to treat diabetic cardiomyopathy in the future.

## Ferroptosis as a novel target for protection against cardiomyopathy

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**Objective** Cell death is a fundamental physiological process involved in development, aging, and tissue homeostasis, and often dysregulated in various pathological conditions. Death of terminally differentiated cardiomyocytes is a crucial pathogenic factor in the development of heart disease, which is the leading cause of death worldwide. However, mechanisms of cardiomyocyte death remain unclear. Here, we discovered and demonstrated that ferroptosis, a programmed iron-dependent cell death, as a novel mechanism in murine models of cardiomyopathy.

**Methods** We used two classic cardiomyopathy models induced by ischemia-reperfusion or by doxorubicin treatment, and generated *Ripk3*<sup>-/-</sup>, *Mkl1*<sup>-/-</sup>, *Fadd*<sup>-/-</sup> *Mkl1*<sup>-/-</sup>, and *Nrf2*<sup>-/-</sup> mice. Cardiac function, iron contents, mitochondrial morphology, lipid peroxidation and other ferroptosis indicators were measured. All animal procedures were approved by the Animal Care and Use Committee of Zhejiang University. Except where indicated otherwise, all summary data presented as the mean ± sem. The Student's t-test was used to compare two groups, and the log-rank test was used to analyze the survival curves. Differences with a *P*-value <0.05 were considered statistically significant.

**Results** In canonical apoptosis and/or necroptosis-defective *Ripk3*<sup>-/-</sup>, *Mkl1*<sup>-/-</sup> or *Fadd*<sup>-/-</sup>; *Mkl1*<sup>-/-</sup> mice, DOX-treated cardiomyocytes showed features of typical ferroptotic cell death. Consistently, compared to dexrazoxane (DXZ), the only FDA-approved drug for treating DOX-induced cardiotoxicity, inhibition of ferroptosis by ferrostatin-1 significantly reduced DOX-cardiomyopathy. RNA-sequencing results revealed that heme oxygenase-1 (Hmox1) was significantly upregulated in DOX-treated murine hearts. Administering DOX to mice induced cardiomyopathy with a rapid, systemic accumulation of non-heme

iron via heme degradation by Nrf2-mediated upregulation of Hmox1, which effect was abolished in Nrf2-deficient mice. Conversely, zinc protoporphyrin IX, a Hmox-1 antagonist, protected the DOX-treated mice, suggesting free iron released on heme degradation is necessary and sufficient to induce cardiac injury. Given that ferroptosis is driven by damage to lipid membranes, we further investigated and found that excess free iron accumulated in mitochondria and caused lipid peroxidation on its membrane. Mitochondria-targeted antioxidant Mito-TEMPO significantly rescued DOX-cardiomyopathy, supporting oxidative damage of mitochondria as a major mechanism in ferroptosis-induced heart damage. Importantly, ferrostatin-1 and iron chelation also ameliorated heart failure induced by both acute and chronic I/R in mice.

**Conclusions** In summary, we report a novel mechanism by which ferroptosis mediates the pathogenesis of DOX-induced cardiotoxicity and I/R-mediated cardiomyopathy via the Nrf2/Hmox1 axis. Our findings suggest that selectively inhibiting ferroptosis in cardiomyocytes may represent a feasible new therapeutic approach for managing DOX-induced cardiac injury without compromising the drug's anti-cancer properties. Moreover, our *in vivo* data support the notion that decreasing mitochondrial iron accumulation and/or inhibiting lipid peroxidation is cardioprotective during both acute and chronic cardiac I/R. From a clinical perspective, these findings indicate that treating cardiomyopathy by inhibiting ferroptosis may help prevent iron overload-induced heart failure. Future studies are needed in order to test the potential clinical implications of this novel therapeutic strategy.

## A novel p.Thr449Asn MYH7 mutation in twins of familial dilated hypertrophic cardiomyopathy with sinus bradycardia

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1. Zunyi Medical University

2. Sichuan Provincial People's Hospital

**Objective Aims:** We investigated the pathogenesis of MYH7

p.Thr449Asn mutation in twins of familial dilated hypertrophic cardiomyopathy with sinus bradycardia.

**Methods Methods:** A four-generation family from the Sichuan Province of China was enrolled for our study, detailed clinical information was obtained from each subject. A novel beta-myosin heavy chain (MYH7) missense variant c.1346G>T, p.T449N was discovered in the twins using next-generation panels. Subsequently, this variant was verified by Sanger sequencing.

**Results Results:** The proband (Ⅲ:4) and her twin sister (Ⅲ:5) featuring sinus bradycardia and NYHA grade Ⅲ, a first degree atrioventricular conduct block and nonspecific intraventricular block, inverted T-waves and ST-segment depression in ECG, dilated left ventricle, declined left ventricular ejection fraction in echocardiography. The proband presented paroxysmal atrial fibrillation, non-sustained ventricular tachycardia and sinus bradycardia, a double-chamber implantable cardiac defibrillator (ICD) was implanted, and she died as a consequence of cardiac shock and multiple organ dysfunction at 42 years of age. Four additional affected family members and cosegregation of mutations were identified. Among those with the MYH7 p.T449N mutation, the proband's mother (Ⅱ:3) showed sinus bradycardia, depressed ST segment and interventricular septum hypertrophy, however, she developed mild symptoms. The proband's older sister (Ⅲ:1) was confirmed to be HCM patient and she proved to be clinically severe affected, a dual chamber pacemaker (DDD) was subsequently implanted. A first degree atrioventricular conduct block and nonspecific intraventricular block were noted on ECG. Echocardiography exhibited increased biatrial and LV size, moderate-to-severe mitral and tricuspid regurgitation, local thickening of the myocardium, and decreased LVEF (32%). And all of the proband's nephews (Ⅳ:1, Ⅳ:2, Ⅳ:3 and Ⅳ:4) displayed more severe LV hypertrophy, but they didn't present any clinical manifestation.

**Conclusions Conclusion:** To the best of our knowledge, the present study is the first report of dilated left ventricle and sinus bradycardia in familial HCM patients with a MYH7 mutation. Therefore, our findings extend the mutation spectrum of the MYH7 gene and have important implications for genetic counseling for the family.

## 趋化因子CCL17是病理性心肌肥厚和心衰新的标志物和靶点

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**目的** 炎症因子的广泛表达和炎症通路的持续激活参与心衰的发生发展。CCL17是趋化因子的一种,但它在心脏中的功能仍然未知。本研究旨在探索CCL17在血管紧张素II(AngII)诱导的病理性心肌肥厚中的作用。

**方法** 通过招募200名不同年龄段的健康志愿者,使用蛋白质组学检测与年龄相关的血清蛋白表达水平。选取雄性8-12周龄的C57BL/6J同窝野生型和Ccl17敲除小鼠,利用AngII(1.3 mg/kg/d)缓释泵诱导心肌肥厚。更进一步地,AngII加泵的野生型小鼠腹腔注射CCL17中和抗体。检测上述小鼠心肌肥厚、心功能、纤维化、T细胞亚群比例以及炎症因子表达水平。最后,比较慢性心衰患者与健康人以及慢性心衰急性加重患者治疗前后循环中CCL17的水平。

**结果** 200名不同年龄段健康志愿者的血清蛋白质组学显示,随着年龄的增加,血清中CCL17的变化水平显著。该结果也得到了北京顺义地区800多名社区人群的验证。小鼠肥厚心肌以及血清中存在CCL17水平增高。敲除Ccl17后,心肌肥厚、纤维化以及收缩功能都得以改善。有趣的是,使用CCL17的中和抗体也可以达到相应效果。正常小鼠加泵后,T淋巴细胞比例增加,Th1/Th2降低,Th7/Treg增加,以及促纤维化的Th2炎症因子表达增加,敲除CCL17后上述指标均明显改善。更进一步的,慢性心衰患者的CCL17显著高于健康人;慢性心衰急性加重患者经过规范治疗后,CCL17的表达水平降低。

**结论** 病理性刺激下,趋化因子CCL17通过影响T淋巴细胞亚群比例及其炎症因子的表达促进心肌细胞肥大、纤维化产生以及心功能不全。上述研究表明,CCL17是病理性心肌肥厚和心力衰竭的潜在生物标志物和靶点。

## P53 Signal Participate in the Process of Cardiac Remodeling in vitro and in vivo

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**Objective** As terminally differentiated cells, cardiomyocytes

stop proliferation soon after birth. However, it can re-enter into cell cycle as stimulated by some pathologic stimulation, then the synthesis of nucleic acid and protein in the cardiomyocytes will increase, which eventually result in hypertrophy. The tumor suppressor p53 is a transcription factor that regulates cell cycle, proliferation and apoptosis of cells. Accumulation of p53 results in the transactivation of several sets of target genes, such as p21<sup>WAF1/CIP1</sup>, which plays critical role in cell cycle as a negative regulator. However, the mechanism of p53 and p53-p21 signal pathway in cardiac hypertrophy remain unclear.

**Methods** Neonatal rat ventricular myocytes (NRVM) were isolated and infected with p21-Ad or p53-Ad, or transfected with siRNA to block the expression of p21 or p53. The cell size was measured after staining with rhodamine-labeled phalloidine. NRVMs were subjected to immunofluorescence observed intracellular expression levels of p21. Twenty mice were randomly divided into four groups and received vehicle (control), isoproterenol (Iso, 40 mg/kg, s.c.), p53 inhibitor (pifithrin- $\alpha$ , 2 mg/kg, ip, qd) for 14 days or treated with  $2 \times 10^7$  TU p53-Ad via femoral vein injection, respectively. The mRNA and protein expression levels of p21, p53,  $\beta$ -MHC and PCNA in NRVMs and left ventricle were detected by Real-time PCR and Western blot techniques. The pathological morphology changes were observed after lectin, HE and Masson's trichrome staining.

**Results** The surface area of the NRVMs, mRNA and protein expression levels of p21, p53,  $\beta$ -MHC elevated significantly after angiotensin II stimulation. The heart weight index, myocardium injury, inflammatory cell infiltration, cross-sectional area, mRNA and protein expressions of p21, p53,  $\beta$ -MHC, PCNA in the ISO group were increased significantly by comparison to those in control group. p21 expression increased significantly and transfer from the cytoplasm to the nucleus after treated with p53-Ad transfection or AngII treatment, while it was down-regulated by p53 siRNA infection. Heart weight index increased obviously after treatment of p53 adenovirus. Meanwhile, p21 or p53 adenovirus transfection could aggravate the increase of cell size and expression elevation of p21, p53, and  $\beta$ -MHC induced by AngII stimulation. On the contrary, p21 or p53 siRNA could effectively attenuate the hypertrophic responses and abnormal gene expressions in NRVM.

**Conclusions** p53-p21 signaling pathway activation is involved in the process of cardiac remodeling in vitro and in vivo, and inhibition of the activity of p53-p21 signal can effectively attenuate cardiac hypertrophy.

## Heterogeneity of adult masseter muscle satellite cells with cardiomyocyte differentiation potential

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5. Department of Cardiac Surgery, Guangdong Cardiovascular Institute, Guangdong General Hospital, Guangdong Academy of Medical Sciences, Guangzhou, China

**Objective** Although resident cardiac stem cells have been reported, regeneration of functional cardiomyocytes (CMs) remains a challenge. The present study identifies an alternative progenitor source for CM regeneration without the need for genetic manipulation or invasive heart biopsy procedures. Unlike limb skeletal muscles, masseter muscles (MM) in the mouse head are developed from Nkx2-5 mesodermal progenitors. Adult masseter muscle satellite cells (MMSCs) display heterogeneity in developmental origin and cell phenotypes. The heterogeneous MMSCs that can be characterized by cell sorting based on stem cell antigen-1 (Sca1) show different lineage potential. While cardiogenic potential is preserved in Sca1+ MMSCs as shown by expression of cardiac progenitor genes (including Nkx2-5), skeletal myogenic capacity is maintained in Sca1- MMSCs with Pax7 expression. Sca1+ MMSC-derived beating cells express cardiac genes and exhibit CM-like morphology. Electrophysiological properties of MMSC-derived CMs are demonstrated by calcium transients and action potentials. These findings show that MMSCs could serve as a novel cell source for cardiomyocyte replacement.

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## The bHLH Protein Nulp1 is Essential for Femur Development Via Acting as a Cofactor in Wnt Signaling in Drosophila

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**Objective Background:** The basic helix-loop-helix (bHLH) protein families are a large class of transcription factors, which are associated with cell proliferation, tissue differentiation, and other important development processes. We reported that the Nuclear localized protein-1 (*Nulp1*) might act as a novel bHLH transcriptional factor to mediate cellular functions. However, its role in development in vivo remains unknown.

**Methods:** *Nulp1* (*dNulp1*) mutants are generated by CRISPR/Cas9 targeting the Domain of Unknown Function (DUF654) in its C terminal. Expression of Wg target genes are analyzed by qRT-PCR. We use the *Top-Flash* luciferase reporter assay to response to Wg signaling.

**Results:** Here we show that *Drosophila Nulp1* (*dNulp1*) mutants, generated by CRISPR/Cas9 targeting the Domain of Unknown Function (DUF654) in its C terminal, are partially homozygous lethal and the rare escapers have bent femurs, which are similar to the major manifestation of congenital bent-bone dysplasia in human Stuve-Weidemann syndrome. The fly phenotype can be rescued by *dNulp1* over-expression, indicating that *dNulp1* is essential for fly femur development and survival. Moreover, *dNulp1* overexpression suppresses the notch wing phenotype caused by the overexpression of *sgg/GSK3 $\beta$* , an inhibitor of the canonical Wnt cascade. Furthermore, qRT-PCR analyses show that seven target genes positively regulated by Wg signaling pathway are down-regulated in response to *dNulp1* knockout, while two negatively regulated Wg targets are up-regulated in *dNulp1* mutants. Finally, *dNulp1* overexpression significantly activates the *Top-Flash* Wnt signaling reporter.

**Conclusion:** We conclude that bHLH protein dNulp1 is essential for femur development and survival in *Drosophila* by acting as a positive cofactor in Wnt/Wingless signaling.

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## Myocyte enhancer factor 2A regulates hydrogen peroxide-induced senescence of human umbilical vein endothelial cells via PI3K/AKT signaling pathway

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**Objective** The present study was designed to elucidate the signaling pathways involved in MEF2A-mediated senescence in human umbilical vein endothelial cells.

**Methods Cell culture** The HUVEC was isolated from human umbilical vein. HUVEC was cultured in M199 medium supplemented with 5% fetal bovine serum, streptomycin (100 mg/mL) and penicillin (100 U/mL) at 37°C in a 5% CO<sub>2</sub> humid incubator. 293 cells and THP1 cells were cultured with DMEM, supplemented with 10% fetal bovine serum (FBS) and 1% antibiotic in a humidified incubator of 5% CO<sub>2</sub> at 37°C.

### Quantitative real-time PCR (qRT-PCR)

Total RNA was extracted from cells 48 h after siRNA or plasmid transfection. For examination of the mRNAs (including MEF2A, PI3KCA, PI3KCG, Sirt1, and  $\beta$ -actin mRNAs), total RNA was extracted with TRIzol reagent, according to manufacturer's protocol, and then the first cDNA was synthesized using Fastking cDNA dispelling RT supermix. Real-time PCR was performed with RealUniversal color premix (SYBR Green). Relative levels of the mRNAs were normalized to that of  $\beta$ -actin mRNA.

### Western blotting

Cells were washed with iced PBS and then lysed in RIPA buffer containing proteinase inhibitor, and the protein content was measured with a BCA protein assay kit. Afterward, the equal amount of protein samples (10  $\mu$ g) was loaded to 10% SDS-polyacrylamide gel electrophoresis. The isolated proteins in gel were transferred to polyvinylidene fluoride membrane. After blocked in 5% non-fat milk in TBST (10 Mm Tris-HCl, Ph 8.0, 150 Mm NaCl, 0.1% Tween-20) for 1h at room temperature, the membrane were incubated respectively in primary anti-body overnight at 4°C. Following rinsed thoroughly with TBST, and the membranes were incubated in a 1:5000 dilution of anti-IgG antibodies for 1 hour at 37°C. Finally, the New super chemiluminescence (ECL) Kit was added to magni-

fy the HRP signals, which was detected with western blotting detection system.

### Plasmid construction and luciferase reporter assay

MEF2A binding sites in human PI3KCG and PI3KCA promoter region were predicted using an online algorithm (LASAGNASearch 2.0: ([http://biogrid.lasagna.engr.uconn.edu/lasagna\\_search](http://biogrid.lasagna.engr.uconn.edu/lasagna_search))). Based on this prediction, different lengths of human PI3KCG and PI3KCA promoter region were amplified by PCR using Human macrophages genomic DNA as a template. Then the fragments were separately inserted between Kpn I and Bgl II sites of pGL3-basic vector.

For luciferase reporter assays, the above plasmids were separately co transfected with the renilla luciferase expression vector pRL-sv40 into 293 cells using Lipofectamine 3000 according to the manufacture's protocol. After 6 h incubation, the cell were exchanged new 10% FBS DMEM for 48h. The cells were then harvested for the detection of luciferase activity using the dual-luciferase assay kit according to the manufacturer's instructions. Firefly luciferase activity was normalized to that of renilla luciferase activity. All transfection experiments were performed in duplicates and repeated at least three times.

### ChIP assay

ChIP assays were performed using the ChIP Assay Kit according to the manufacturer's instructions. Briefly, RAW cells confluences reached 90%, and then incubated with formaldehyde at a final concentration of 1% (v/v) for 10 min at 37°C to cross-link the nuclear proteins to DNA. Subsequently, the cells were harvested by centrifugation at room temperature for 5 min at 3000 $\times$ g, and then lysed in 100  $\mu$ l SDS lysis buffer (1% SDS, 10 mM EDTA and 50 mM Tri-HCl (pH 8.1)). Chromatin sonication was performed to shear the DNA to an average length of 200–1000 bp, followed by the immunoprecipitation with the antibody against MEF2A, taking IgG as a control. The precipitated DNA was extracted and subjected to PCR amplification using the primer pair spanning the MEF2A in PI3KCG promoter region.

### Cell viability assay

CellTiter 96<sup>®</sup> Aqueous one solution cell proliferation assay was performed for cell viability. Suspended cells were seeded into 96-well plates at a density of 6 $\times$ 10<sup>3</sup> cells/well. After adherence overnight, cells were treated with different concentrations. 10  $\mu$ l of MTS solution was added to each well. Plates were incubated at 37°C for additional 3h and xx was used to record the absorbance at 490 nm. Cell viability was plotted as a percentage of untreated control cells.

### SA-β-Gal assay

SA-β-Gal activity was measured by a senescence β-Galactosidase Staining Kit. Briefly, cells were washed in PBS and fixed in 0.5% glutaraldehyde for 15 min at room temperature. After washed in PBS, cells were incubated in SA-β-Gal stain solution according to the kit instructions. and cells were examined under a light microscope.

**Results** After HUVECs were transfected with siRNA-MEF2A, the mRNA and protein levels of PI3KCG, p-AKT and SIRT1 dropped with interference of MEF2A. Interfering with HUVECs stimulated the expression of SA-β-gal and decreased the cell viability of HUVECs. Overexpression of endothelial MEF2A promoted the expression of PI3KCG, p-AKT and SIRT1. Overexpressing with HUVECs decreased the expression of SA-β-gal and increased the cell viability of HUVECs. To determine whether endothelial cell senescence was regulated by MEF2A via PI3K/AKT signaling pathway, we induced senescence in human umbilical endothelial cell by 100 μM hydrogen peroxide treatment. Senescent HUVECs exhibited decreased MEF2A, PI3KCG, p-AKT, SIRT1 activity, them of which are alterations implicated in coronary artery disease. Overexpressing with MEF2A of senescent HUVECs attenuated cell senescence, decreased the expression of SA-β-gal, promoted cell proliferation and increased the expression of PI3KCG, p-AKT and SIRT1. Dual luciferase assay data and ChIP assay showed that MEF2A promoted the transcriptional activity of PI3KCG.

**Conclusions** PI3KCG may be a target gene of MEF2A. Enhancing the endothelial expression and function of MEF2A attenuates cell premature senescence and maintains endothelial cell function. MEF2A may regulate Human umbilical vein endothelial cell senescence induced by hydrogen peroxide via PI3K/AKT/SIRT1 signaling pathway, thus representing promising drug for cardiovascular diseases.

## Platelet membrane-coated nanoparticles target sclerotic aortic valves in apolipoprotein E-deficient (ApoE<sup>-/-</sup>) mice by multiple binding mechanisms under pathological shear stress

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**Objective** Calcific aortic valve disease (CAVD) is the most common valvular heart disease leading to valve replacement and there is no effective pharmacological therapy for CAVD. The high mechanical stress at the aortic valves impaired the targeting efficiency. In this study, we developed platelet membrane-coated poly (DL-lactide-co-glycolide) (PLGA) nanoparticles (PNPs) to target the sclerotic aortic valves of apolipoprotein E-deficient (ApoE<sup>-/-</sup>) mice based on the platelets' multiple sites binding capacity under high shear stress *in vitro* and *in vivo*.

**Methods** The PLGA nanoparticles and PNPs were synthesized by a nanoprecipitation method. The formulated PLGA cores, PNPs, and NPs were characterized for their morphology, particle size, polydispersity and surface charge (zeta potential) using transmission electron microscopy and dynamic light scattering detector. Key membrane glycoproteins of PNPs were identified by western blotting method and flow cytometry. Coated culture dishes (with vWF, collagen, or fibrin) were assembled in a parallel flow circular chamber under varying shear stresses for binding study *in vitro*. To evaluate the targeting ability of PNPs to sclerotic aortic valves *in vivo*, the ApoE<sup>-/-</sup> mice were intravenously injected respective nanoparticles.

**Results** In the present study, the spherical morphology and range size of the NPs and PNPs within 100nm and stable in 7 days. Western blot and flow cytometry analysis verified that similar membrane protein retention and enrichment was observed between PNPs and platelet vesicles. Platelet membrane-coated nanoparticles (PNPs) effectively adhered to vWF, collagen and fibrin under different shear stresses *in vitro*. Under shear stress condition of 25 dyn/cm<sup>2</sup>, PNPs bound density was about 1.61-fold of that at static state. In a sclerotic aortic valves model established in apolipoprotein E-deficient mice, PNPs enabled good targeting of sclerotic aortic valves by mimicking platelet multiple adhesive mechanisms.

**Conclusions** These results demonstrated PNPs could provide a promising platform for the molecular diagnosis and target treatment of CAVD, thus improving the prognosis of patients.

## Evaluation of Long-term Inflammatory Responses after implantation of The Fully Bioabsorbable Scaffold

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**Objective** The fully bioabsorbable scaffold (FBS) is known as the fourth revolution in the intervention history of coronary heart diseases, and it has multiple advantages with its complete degradation. At present, the research of bioabsorbable scaffold composites focuses mainly on poly-L-lactic acid (PLLA) composites, such as Absorb scaffold developed by Abbott Company in USA, Igaki scaffold in Japanese, Xinsorb scaffold in China and MeRES scaffold in India. All of these scaffolds are made of single PLLA material. Although PLLA can be degraded and has certain supporting performance, its supporting performance is still poor than that of metal scaffolds due to its own limitations. Our previous studies have confirmed the superior biocompatibility of the poly-L-lactic acid/amorphous calcium phosphate (PLLA/ACP) scaffolds compared to PLLA scaffolds at 1 month. In the present study, the long-term inflammatory responses of PLLA/ACP scaffolds in a porcine coronary model have been explored.

**Methods** The 24 PLLA scaffolds and 24 PLLA/ACP scaffolds were implanted into the coronary arteries of 24 miniature pigs. Serum levels of ALT, AST and CRP were measured before operation, as well as 1 month, 6 months, 12 months and 24 months after operation. The vascular segments of scaffolds were taken for pathomorphological observation. HE staining was used for inflammatory score and fibrosis score. Immunohistochemical staining detected positive expression indexes of MMP-9 and NF- $\kappa$ B. The expression of inflammation related proteins of IL-1 and IL-6 was detected by Western Blot in surrounding tissues of scaffolds.

**Results** There was no significant difference between the two groups in ALT, AST, UR at different time points ( $P < 0.05$ ). The inflammation score in PLLA/ACP group was lower than that in PLLA group at 6-month, 12-month and 24-month ( $P < 0.05$ ), and the fibrosis score was reduced in PLLA/ACP group than that in PLLA group at 12-month and 24-month ( $P < 0.05$ ). The expression of MMP-9 and NF- $\kappa$ B in PLLA/ACP

group was significantly less than that of PLLA group at 6-months, 12-month and 24-month ( $P < 0.05$ ). The protein expression of IL-1 in PLLA/ACP group was significantly decreased than that in PLLA group at 12-month and 24-month ( $P < 0.05$ ). Furthermore, the protein expression of IL-1 was significantly lower than that in PLLA group at 6-months, 12-month and 24-month ( $P < 0.01$ ).

**Conclusions** In this study, the inflammatory response to the vascular tissue around the scaffold was gradually increased as the time of implantation was prolonged in PLLA scaffolds. The integration of small dose ACP nanocomposite could reduce the long-term chronic inflammatory response after the implantation of PLLA scaffolds. The novel bioabsorbable PLLA/ACP scaffold has good biological safety and biocompatibility, and accompanied by slight inflammatory reaction. Therefore, the application of novel bioabsorbable PLLA/ACP scaffold is more optimistic, which can widen new ideas for the development of fully bioabsorbable scaffolds in the future.

## Transplantation of endothelial progenitor cells in the treatment of coronary artery microembolism in rats

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**Objective** OBJECTIVE: As the impairment of myocardial micro-environments due to coronary micro-embolization (CME) compromises the treatment effect of percutaneous coronary intervention and leads to adverse prognosis, we hypothesized that endothelial progenitor cells (EPCs) transplantation could improve cardiac function in the condition of CME.

**Methods** MATERIALS AND METHODS: Low ( $2 \times 10^5$ ) and high ( $2 \times 10^6$ ) dose rat bone marrow-derived EPCs were transplanted in a model of CME. To develop a CME model, rats were injected with autologous micro-blood clots into the left ventricle. Echocardiography was examined before and 1, 7, 28 days after EPCs transplantation, serum cTNI, vWF, and cardiac microRNA expression was examined 1 day after EPCs transplantation. Morphology of heart and expression of VEGF, vWF and bFGF examined 1 day after EPCs transplantation.



**Results** RESULTS: After 10 days of culture inductions, BM-EPCs have high purity as confirmed by flow cytometry. cardiac function reflected by LVEF significantly decreased after CME treatment and rescued by low dose EPC. Compared to the sham group, cTNI and vWF serum levels increased significantly after CME treatment and rescued by low dose EPC and high dose EPC. Low dose EPC treatment decreased myocardial necrosis and fibrosis, elevated cardiac expression of VEGF and vWF, while decreased the cardiac expression of bFGF. Low dose EPC treatment significantly suppressed cardiac expression of microRNA-19a but significantly enhanced microRNA-21, microRNA-214, and microRNA-486-3p expression. In conclusion, our results indicate that low-dose EPCs transplantation may play a pro-angiogenic, anti-fibroblast, anti-fibrosis, and anti-necrosis role, and enhance cardiac function in a rat model of CME, through microRNA related pathway.

**Conclusions** In conclusion, our results indicate that low-dose EPCs transplantation may play a pro-angiogenic, anti-fibroblast, anti-fibrosis, and anti-necrosis role and enhance cardiac function in a rat model of CME through a microRNA-related pathway. Thus, it is uncertain how long this protective effect would be sustained. Considering this, future studies are required in a more accurately mimicked animal model.

## Expression profile analysis of long non-coding RNA in contrast-induced acute kidney injury by microarray and bioinformatics

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**Objective** Contrast-induced acute kidney injury (CI-AKI) is a common complication of coronary angiography (CA) and

percutaneous coronary intervention (PCI), which affects between 1% and 2% of the general population and up to 50% of high-risk subgroups following CA or PCI. Although the pathological mechanisms of CI-AKI is still unclear. A series of molecules are recognized to participate in the genesis and progression of CI-AKI including microRNAs. Long non-coding RNAs (lncRNAs) are lacking significant ORFs and over 200 nt in length, which can serve as sponge to bond many microRNAs or mRNAs. Recent studies indicate that lncRNAs may play a key role in pathogenesis of acute kidney injury. But little is known about the expression and function of lncRNAs in CI-AKI.

**Methods** We employed a novel rat model of CI-AKI by using a nonionic low-osmolar iodine contrast medium Ultravist. Kidney tissues were collected from the model and control group. Five pairs of CI-AKI rats model and the control groups were screened by microarray. All differentially expressed mRNAs were analyzed by the GO and KEGG pathway analyses. Through coexpression analysis, differentially expressed transcripts were divided into modules, and lncRNAs were functionally annotated. The expressions of the differentially expressed lncRNAs were confirmed by Quantitative Real-time Reverse Transcription-Polymerase Chain Reaction (RT-qPCR).

**Results** Volcano plots were used for assessing gene expression variation between five pairs of CI-AKI rats model and the control groups. Of the 203 detected lncRNAs, 69 lncRNAs showed differentially expression in CI-AKI, with 41 down-regulated (fold change < 0.5, p value < 0.01) and 28 up-regulated (fold change > 2, p value < 0.01). Of the 369 detected mRNAs, 39 mRNAs displayed differentially expression, including 24 down-regulated and 15 up-regulated in the kidneys of CI-AKI rats model. GO analysis showed that immune system process, apoptosis and autophagy are the most remarkable biological processes among the differentially expressed mRNAs. In the KEGG pathway analysis, the down-regulated and up-regulated mRNAs were found to be mostly enriched in one carbon pool folate and MAPK signaling pathway, respectively. The expression of 5 lncRNAs, NONRATG009508, XLOC\_018096, XLOC\_014559, NONRATG020666 and XLOC\_007581405063 were validated by RT-qPCR. Further analysis showed that NONRATG009508 might affect the oxidative stress and endoplasmic reticulum stress in the process of CI-AKI. Analysis also indicated that XLOC\_018096 might participate in the modulating of cell apoptosis and NONRATG020666 might be a key

regulator in cell autophagy in the pathogenesis of CI-AKI.

**Conclusions** The identified 69 lncRNAs were differently expressed in the kidneys of CI-AKI rats model, which hold the potential to serve as new biological markers and novel therapeutic targets for CIN. But the biological functions of those lncRNAs need to be further validated.

## Direct EPO and EPCs injection in critical limb ischemia (CLI) area restored CLI area blood flow and rescued remote AMI-induced LV dysfunction

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**Objective** This study tested the hypothesis that intramuscular injections of erythropoietin (EPO) and endothelial progenitor cells (EPC) to critical limb ischemia (CLI; primary treatment site) could also improve heart function in rat after acute myocardial infarction (AMI; remote ischemic organ).

**Methods** Approach and Results: Adult-male SD rats (n=40) were equally categorized into group 1 (sham-operated control), group 2 (CLI-AMI), group 3 [CLI-AMI+EPO (10 mg/kg)], group 4 [CLI-AMI+EPCs (1.2×10<sup>6</sup>)] and group 5 (CLI-AMI+EPCs+EPO). By day 21 (end of study period), 2-D echo and Laser doppler showed that left-ventricular injection fraction (LVEF) and the ratio of ischemic to normal blood flow were highest in group 1, lowest in group 2, significantly higher in group 5 than in groups 3 and 4, but not different in the latter two groups (all  $P<0.0001$ ). Flow cytometry and ELISA demonstrated that circulating angiogenesis factors were significantly progressively increased from groups 1 to 5

(all  $P<0.001$ ). The number of small vessels and protein (CD31/eNOS)/cellular (vWF) expressions reflecting integrity of endothelium exhibited an identical pattern to LVEF whereas protein (VEGF/SDF-1 $\alpha$ )/cellular (VEGF) expressions were significantly progressively increased from groups 1 to 5 in quadriceps and heart tissues (all  $P<0.0001$ ). Protein expressions of apoptotic (Bax/caspase-3/PARP)/inflammatory (MMP-9) and microscopic findings of ischemic/fibrotic/collagen-deposition areas and DNA-damage marker ( $\gamma$ -H2AX+) were lowest in group 1 and significantly progressively decreased from groups 2 to 5 in quadriceps and heart tissues (all  $P<0.0001$ ).

**Results** Approach and Results: Adult-male SD rats (n=40) were equally categorized into group 1 (sham-operated control), group 2 (CLI-AMI), group 3 [CLI-AMI+EPO (10 mg/kg)], group 4 [CLI-AMI+EPCs (1.2×10<sup>6</sup>)] and group 5 (CLI-AMI+EPCs+EPO). By day 21 (end of study period), 2-D echo and Laser doppler showed that left-ventricular injection fraction (LVEF) and the ratio of ischemic to normal blood flow were highest in group 1, lowest in group 2, significantly higher in group 5 than in groups 3 and 4, but not different in the latter two groups (all  $P<0.0001$ ). Flow cytometry and ELISA demonstrated that circulating angiogenesis factors were significantly progressively increased from groups 1 to 5 (all  $P<0.001$ ). The number of small vessels and protein (CD31/eNOS)/cellular (vWF) expressions reflecting integrity of endothelium exhibited an identical pattern to LVEF whereas protein (VEGF/SDF-1 $\alpha$ )/cellular (VEGF) expressions were significantly progressively increased from groups 1 to 5 in quadriceps and heart tissues (all  $P<0.0001$ ). Protein expressions of apoptotic (Bax/caspase-3/PARP)/inflammatory (MMP-9) and microscopic findings of ischemic/fibrotic/collagen-deposition areas and DNA-damage marker ( $\gamma$ -H2AX+) were lowest in group 1 and significantly progressively decreased from groups 2 to 5 in quadriceps and heart tissues (all  $P<0.0001$ ).

**Conclusions** Direct injection of EPO-EPC into CLI effectively restored blood flow in the CLI area and also preserved remote heart function.

## FoxC1 and eNOS have synergistic effects on survival and myocardial repair of endothelial progenitor cells in the aged vascular niche

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**Objective** Endothelial progenitor cells (EPCs) in aged individuals have reduced regenerative potential and lack the capacity to myocardial repair. Foxc1 is a critical regulator of stem/progenitor cell niche formation. The role of FoxC1 in maintaining the aged niche after myocardial infarction has not been directly determined to date. In this study, we determined to explore the possible roles and mechanisms of FoxC1 on old EPCs survival and function in the ischemic niche.

**Methods** FoxC1 transfection rats were used, and ischemic hearts (IHs) was established in this study. Old endothelial cells (ECs) were cocultured with EPCs under hypoxia. ECs were divided into two transfection groups: *Foxc1* or  $\beta$ -catenin. Old IHs were divided into *Foxc1*<sup>+/+</sup> old IHs and *Foxc1* null old IHs by myocardial injection of *Foxc1* vectors or null vectors. The *Foxc1*<sup>+/+</sup> old IHs randomly received myocardial injection of eNOS vector or *si*.eNOS; young IHs randomly received myocardial injection of *si*.eNOS or null vector.

**Results** We identified eNOS as a key regulator of endothelial FoxC1 signaling. FoxC1 created a vascular niche that improved old EPCs survival and capacity under hypoxia. eNOS promotes the expression of the FoxC1-mediated proangiogenic cytokines and anti-apoptotic factors in old EPCs exposed to hypoxia or ischemia, promoting angiogenesis, inhibiting inflammation and fibrosis. Importantly, these effects were generally magnified by upregulation of FoxC1 and eNOS induced by FoxC1 or eNOS overexpression, and the greatest improvements were elicited after co-overexpressing FoxC1 and eNOS; overexpressing one transcription factor while silencing the other canceled this increase, and FoxC1 or eNOS silencing abolished these effects. eNOS-mediated FoxC1 signaling in the vascular niche can activate survival and angiogenesis of engrafted old EPCs, impeding the development of heart failure, preserving left ventricu-

lar function and dimensions, and preventing infarct expansion.

**Conclusions** These results definitively implicate FoxC1 signaling in maintaining ischemic vascular niche, while uncovering a previously unidentified role for eNOS-mediated signaling in survival and function of old EPCs. Activation of eNOS-mediated FoxC1 signaling may be helpful in myocardial repair induced by old EPC therapy.

## eNOS improves myocardial repair of old mesenchymal cells in ischemic niches by adjusting the dual roles of $\beta$ -catenin signaling

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**Objective** Mesenchymal cells (MSCs) in aged individuals have reduced regenerative potential and lack the capacity to myocardial repair.  $\beta$ -catenin signaling plays a critical role in regulating neural stem/progenitor cell self-renewal and differentiation. The role of  $\beta$ -catenin in maintaining aged MSCs in the ischemic niche has not been directly determined to date. In this study, we determined to explore the possible roles and mechanisms of  $\beta$ -catenin signaling on old MSCs survival and function in the ischemic niche.

**Methods**  $\beta$ -catenin transfection rats were used, and myocardial infarction (MI) model was established in this study. Old endothelial cells (ECs) were cocultured with EPCs under hypoxia. ECs were divided into two transfection groups: *eNOS* or  $\beta$ -catenin. Old infarcted hearts (IHs) were divided into  $\beta$ -catenin<sup>+/+</sup> old IHs and  $\beta$ -catenin null old IHs by myocardial injection of  $\beta$ -catenin vectors or null vectors. The  $\beta$ -catenin<sup>+/+</sup> old IHs randomly received myocardial injection of eNOS vector or *si*.eNOS; young IHs randomly received myocardial injection of *si*.eNOS or null vector.

**Results** We identify eNOS as an endothelial transcriptional effector that promotes activation of  $\beta$ -catenin signaling in the

niche and in old EPC vascular stability. We also show that eNOS is required for  $\beta$ -catenin signaling *in vitro* and *in vivo*. eNOS controls the expression of the  $\beta$ -catenin-mediated proangiogenic cytokines and the inflammatory/fibrotic factors in old EPCs exposed to hypoxia or ischemia, promoting angiogenesis, inhibiting inflammation and fibrosis, impeding the development of heart failure, preserving infarcted heart function and dimensions, and preventing infarct expansion. Importantly, eNOS was required for  $\beta$ -catenin-mediated old MSCs angiogenesis in the hypoxic niches. eNOS-mediated  $\beta$ -catenin signaling in the vascular niche can activate survival and angiogenesis of engrafted old MSCs, promoting myocardial repair. Inhibiting eNOS abolished these effects.

**Conclusions** These results definitively implicate eNOS signaling in  $\beta$ -catenin-mediated ischemic vascular niche. The regulation of eNOS on  $\beta$ -catenin-mediated dual roles in old MSCs and will have novel pathophysiological implications for the repair of infarcted myocardium.

## MicroRNA-188 attenuates contrast-induced renal cell apoptosis by targeting SRSF7

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**Objective** Contrast medium (CM) is widely used in cardiac catheterization, however, it may induce acute kidney injury or renal failure which severely increases cardiovascular and renal morbidity and mortality. Modern frameworks show that in the pathophysiology of contrast-induced acute kidney injury (CI-AKI) hemodynamic injury, oxidative stress and direct CM toxicity are the 3 major interacting pathways which result in renal tubular epithelial cell apoptosis and renal function loss, but

the underlying molecular mechanisms and regulatory networks of renal cell apoptosis in CI-AKI are still unclear. MicroRNAs can act as key regulation factors of cell apoptosis by modulating downstream molecules. Our previous next generation sequencing and analyses shows microRNA-188 is significant elevated both in the kidney and plasma of CI-AKI rat models. Based on our previous results, this study aims to use double luciferin reporter gene assay and other methods to investigate the role of microRNA-188 in CI-AKI, which may help us to understand the specific molecular regulation mechanisms underlying the process of contrast-induced acute kidney injury.

**Methods** We employed a rat model of CI-AKI by injection of a nonionic low-osmolar iodine contrast medium Ultravist into Sprague-Dawley rats. The plasma of 50 patients who underwent coronary angiography or percutaneous coronary intervention and developed CI-AKI with those of 50 matched controls were collected. Quantitative reverse transcription polymerase chain reaction (RT-qPCR) was performed in the plasma and kidney tissues of CI-AKI rat model to validate the microRNA-188 expression. Western blot analysis of the apoptosis regulator protein and terminal deoxynucleotidyl transferase dUTP nick-end labeling (TUNEL) assay were used to evaluate apoptosis. Bioinformatics and double luciferin reporter gene assay were performed to predict and to confirm the interaction between microRNA-188 and SRSF7. The expression levels of microRNA-188 and SRSF7 were detected in patients' plasma to verify the expression correlation and regulatory relationships between microRNA-188 and SRSF7.

**Results** Our previous sequencing and analyses of kidney tissues in CI-AKI rat models showed microRNA-188 is significant elevated with fold change 3.1 and p value <0.01. RT-qPCR confirmed microRNA-188 increased 1.73 times in the plasma of CI-AKI patients ( $P < 0.01$ ). Western blot analysis and TUNEL assay showed the apoptosis level in CM treated HK-2 cell was significantly higher than the control group, while overexpression of microRNA-188 inhibited cell apoptosis significantly. Using bioinformatics approach, we identified a series of genes regulating cell apoptosis as putative microRNA-188 targets such as SRSF7, RICTOR, MEF2C. Double luciferin reporter gene assay revealed microRNA-188 attenuates contrast-induced renal cell apoptosis by targeting SRSF7. The expression level of SRSF7 also inversely correlated with the expression of miR-188 in the plasma of CI-AKI patients.

**Conclusions** This study demonstrates that microRNA-188 exerts antiapoptosis effects, via downregulation of SRSF7 in the process of CI-AKI, which hold the potential to serve as new therapeutic targets for contrast-induced acute kidney injury.

## RAGE induces renal tubular epithelial cell apoptosis through PI3K/Akt pathway in contrast-induced acute kidney injury

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**Objective** Iodine contrast media are essential components for cardiac catheterization. But an important potential side effect is contrast-induced acute kidney injury (CI-AKI) which remains responsible for a third of all hospital-acquired acute kidney injury (AKI). The key mechanism related to CI-AKI is renal tubular epithelial cell apoptosis induced by contrast media (CM). But the pathways and regulatory networks modulating renal tubular epithelial cell apoptosis in CI-AKI are still unknown. Receptor for advanced glycation end products (RAGE) is a multiple ligands receptor which can mediate many cell effect including apoptosis. Our previous next generation sequencing identified 41 differently expressed microRNAs in the kidneys of CI-AKI rats model. GO and KEGG analysis predicted AGE-RAGE signaling pathway may be important mechanism in the CI-AKI development. But the role RAGE plays in the genesis and progression of CI-AKI is still unclear. This research aims to demonstrate the specific regulating effect of RAGE and provide novel evidence to explain the mechanism underlying contrast induced acute kidney injury.

**Methods** Western blot were performed both in the kidney tissue of CI-AKI rat models and HK-2 cells treated with CM in order to determine the expression of RAGE and downstream molecules including PI3K, PIP3 and Akt. The plasma of 50 patients undergoing coronary angiography or percutaneous coronary intervention and developed CI-AKI with those of 50 matched controls were collected for clinical specimen verification. Quantitative real-time polymerase chain reaction (RT-qPCR) were also performed to validate the expression of RAGE. Terminal deoxynucleotidyl transferase dUTP nick-end labeling (TUNEL) assay were used to evaluate apoptosis. Bioinformatics analysis and co-immunoprecipitation were performed to predict and to confirm the interaction between RAGE and PI3K. PI3K inhibitor LY294002 was injected into CI-AKI rat model to verify the activation of PI3K/Akt pathway and to explore the potential drug targets for contrast-induced acute kidney injury.

**Results** Western blot shows the expression level of RAGE in CI-AKI rat model is 2.1 times higher than the control group ( $P < 0.01$ ) and the potential downstream molecules including PI3K, PIP3 and Akt are also significant lower. TUNEL and western blot demonstrated that upregulating RAGE can induce renal tubular epithelial cell apoptosis in HK-2 cell treated with CM. Using bioinformatics we identified a series of downstream molecules of RAGE such as PI3K, NOX-1, FOXN2, RICTOR. Co-immunoprecipitation and TUNEL assay confirmed RAGE induces renal tubular epithelial cell apoptosis through PI3K/Akt pathway in CI-AKI. The level of serum creatinine and cystatin C are significantly lower in CI-AKI rat injecting LY294002 comparing to CI-AKI rat model. Western blot also shows LY294002 can alleviate renal tubular epithelial cell apoptosis in CI-AKI rat model, which suggest that PI3K/Akt pathway may be the key drug target and PI3K inhibitor LY294002 may be the novel medicine for prevention and treatment of CI-AKI. Moreover, the expression level of soluble RAGE (sRAGE) is also significantly increased in the plasma of CI-AKI patients comparing with the control group, which may be a new potential biomarker for CI-AKI.

**Conclusions** This study demonstrates that RAGE induces renal tubular epithelial cell apoptosis through PI3K/Akt pathway in CI-AKI. PI3K/Akt may be the key pathway and the novel therapeutic targets, as well as PI3K inhibitor LY294002 may be the novel medicine for CI-AKI. Soluble RAGE in plasma may also serve as novel biomarker for contrast-induced acute kidney injury.

## 长链非编码 RNA SRRM2-AS1 通过促进川崎病内皮细胞 EndMT 参与冠脉损害的研究

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**目的** 探讨在川崎病患儿血清特异性升高的长链非编码 RNA (long noncoding RNA, lncRNA) SRRM2-AS1 在川崎病冠脉损害中的作用及其机制, 尤其是对内皮间充质转化 (Endothelial to mesenchymal transition, EndMT) 的影响。

**方法** 1. 使用 Arraystar 人类 lncRNA 芯片筛选川崎病血清特异性升高的 lncRNA, 使用 RT-PCR 方法进行再验证; 2. 在人冠脉内皮细胞 (HCAEC) 的体外模型中, 通过慢病毒转染上调 SRRM2-AS1, 验证其功能, 通过 EDU 法检测细胞增殖、transwell 的方法检测细胞迁移、TUNEL 法检测细胞凋亡; 3. 上调 SRRM2-AS1 后, 采用 Western blot 检测内皮细胞 EndMT 相关蛋白的变化, 同时检测信号通路 SRRM2-AS1/SRRM2/UBC/PI3K/Akt/GSK-3 $\beta$ / $\beta$ -catenin 蛋白变化; 4. 采用双荧光素酶报告基因检测 SRRM2-AS1 与靶基因 SRRM2 结合情况。

**结果** 1. 通过对 KD 急性期病人、恢复期病人、发热病人及健康儿童血清中 SRRM2-AS1 的检测, 发现 KD 急性期病人血清中 EMTRL 的水平明显高于其他各组; 2. 通过慢病毒上调 SRRM2-AS1 后, 发现 SRRM2-AS1 可明显促进 HCAEC 细胞的迁移, 对细胞的凋亡及增殖无明显影响; 3. 上调 SRRM2-AS1 后, 促进 EndMT 的相关蛋白 N-cadherin、 $\beta$ -Catenin 表达明显上调, 内皮表型蛋白 Claudins 蛋白明显下调; 4. 双荧光素酶报告基因确认 SRRM2 确实是 SRRM2-AS1 的靶基因; 5. 下游信号通路验证表明, 过表达 SRRM2-AS1 可降低 UBC 蛋白表达, 同时 PI3K 蛋白、Akt 蛋白、 $\beta$ -catenin 蛋白表达明显上调, GSK-3 $\beta$  明显下调。

**结论** SRRM2-AS1 可以通过 SRRM2/UBC/PI3K/Akt/GSK-3 $\beta$ / $\beta$ -catenin 途径促进川崎病内皮细胞 EndMT 进程, 参与了冠脉损害的发生。

## The role of miRNA in Cardiomyocyte Proliferation and Cardiac Regeneration

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**Objective** Currently clinical regenerative therapies are hampered by insufficient ability of mammalian adult heart to replenish cardiomyocytes (CMs) lost during myocardial infarction (MI) due to cell cycle withdrawal in early postnatal development. Although neonatal mouse can regenerate its heart through pre-existing CM dedifferentiation and proliferation, it is unclear whether the underlying mechanism employed during the neonatal period can be manipulated in the adult heart to activate endogenous CM proliferation and facilitate cardiac regeneration. Given the pivotal roles played by microRNAs (miRNAs) in cardiac biology, we searched for cardinal miRNAs implicated in governing heart growth during homeostasis and injury.

**Methods** Mouse hearts were harvested at postnatal days 1, 7, and 28 (P1, P7, and P28) and analyzed to screen the miRNA involved in postnatal CM proliferation. The percentage of proliferative CM (Ki67<sup>+</sup>) in mouse hearts was significantly decreased between P7 and P28, whereas expression of miR-128 progressively increased. Gain- and loss-of-function approaches using genetic mouse models were then developed to delineate how miR-128 regulates cardiac homeostasis. Cell dedifferentiation, DNA synthesis, mitosis, and cytokinesis were analyzed by immunostaining. Cell cycle associated protein expression was analyzed by Western blotting.

**Results** In mice, overexpression of miR-128 impaired CM proliferation in early postnatal stage. In contrast, deletion of miR-128 extended proliferation window of postnatal CM, as quantified by increased Edu<sup>+</sup> CM population. Moreover, CDK inhibitor (p27) transcription was epigenetically silenced by miR-128 deletion through targeting SUZ12 in hearts, leading to the activation of positive cell cycle regulators (Cyclin E and CDK2). Finally, postnatal deletion of miR-128 was sufficient to induce CM reentry into the cell cycle leading to reduced fibrosis, improved post-injury remodeling, and heart function recovery following myocardial infarction in adult mice.

**Conclusions** These results suggest that miR-128 serves as a critical regulator of endogenous cardiomyocyte proliferation,

and could provide a promising therapeutic option for heart repair after injury.

## Histamine/HR 信号在巨噬细胞向肌成纤维细胞转化和心梗后心肌纤维化中的作用机制研究

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**目的** 阐明组胺合成关键酶——组氨酸脱羧酶(histidine decarboxylase, HDC)在心梗小鼠心脏的表达模式和 histamine/HR 信号轴在心肌纤维化中的作用机制。

**方法** 应用示踪组氨酸脱羧酶(histidine decarboxylase, HDC)的 HDC-EGFP 转基因小鼠鉴定 GFP 在心梗前后的组织表达;应用他莫昔芬(Tamoxifen)诱导的 HDC-Cre-ERTM: Rosa26mTmGFP 转基因小鼠进一步谱系追踪(Lin-eage tracing), 示踪 HDC 是否在心脏的前体细胞及其子代细胞表达;流式细胞术分选 HDC-GFP 和 HDCKO 小鼠骨髓内 CD11b<sup>+</sup>不同髓系亚群,以细胞因子 m-CSF 100 ng/ $\mu$ L+IL13 50 ng/ml 培养 4-6 天诱导其转分化。肌成纤维细胞和成纤维细胞从细胞形态和相关基因表达水平进行鉴定。

**结果** (1)应用 HDC-EGFP 小鼠发现 HDC 不在心脏的心肌细胞、血管内皮细胞、平滑肌细胞和成纤维细胞表达, HDC/GFP 主要在骨髓和脾脏内约 90% 的 CD11b<sup>+</sup>髓系细胞表达,尤其是 CD11b<sup>+</sup>Gr-1<sup>+</sup>不成熟髓系细胞高表达;AMI 促进大量的 GFP+CD11b<sup>+</sup>细胞自骨髓动员入血和浸润梗死心肌。(2)两次他莫昔芬注射 HDC-CreERTM: Rosa26mTmGFP 转基因小鼠,谱系追踪结果与 HDC-EGFP 小鼠荧光显影结果一致,进一步证明 HDC 和组胺主要来源于骨髓和脾脏的 CD11b<sup>+</sup>髓系细胞。HDC 表达前体细胞可以向心肌间质肌成纤维细胞(Myofibroblast)转化并增殖。(3)从 HDC-GFP 小鼠骨髓用流式细胞仪分选 CD11b<sup>+</sup>GFP<sup>+</sup>和 CD11b<sup>+</sup>GFP<sup>-</sup>细胞后,加入 m-CSF 和 IL13 共培养 4-6 天诱导转分化,镜下细胞形态检测证明 HDC/GFP+CD11b<sup>+</sup>髓系免疫细胞可转分化为细胞较大,呈突起纺锤形或星形扁平状结构、Vimentin 阳性的成纤维细胞;(4)HDCKO 小鼠骨髓分离的 CD11b<sup>+</sup>细胞较 WT 小鼠分离细胞更易向  $\alpha$ -SMA+ 肌成纤维细胞分化。

**结论** 内源性组胺缺失促进 CD11b<sup>+</sup>髓系免疫细胞转分化为肌成纤维细胞和心梗后心肌纤维化,以 histamine/

HR 及其相关通路为靶标,为防治心肌纤维化提供了新思路。

## APEX1 protects cardiomyocyte apoptosis induced by oxidative damage

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**Objective** Oxidative stress is thought to serve as second messengers to implicate in plenty of pathological processes, such as cardiac ischemia-reperfusion injury. Apurine/pyrimidine-free endonuclease 1 (APEX1) is a multifunctional enzyme that contributes oxidize DNA cleaved base excision repair and redox activation of transcription factors. It has been demonstrated that APEX1 protect against oxidant induced cell death by reducing DNA damage and preventing cell apoptosis. However, the role of APEX1 on oxidative stress injury in the cardiomyocytes still remains unclear. This study aims to explore whether APEX1 protects cardiomyocytes induced by oxidative damage.

**Methods** Oxidative damage was established by cardiac ischemia-reperfusion injury model (30 minutes ischemia, 24 hours reperfusion) in mice or hydrogen peroxide treatment (24 hours) in neonatal rat cardiomyocytes. Quantitative real-time PCR and Western Blot were used to evaluate the expression levels of APEX1, Caspase 3 and Bax, respectively. Lentiviral vector was constructed to overexpress the APEX1 level while small interfering RNA was designed to knock-down the endogenous APEX1 expression level. The efficiency of APEX1 overexpression and knock-down was further validated.

**Results** The mRNA and protein levels of APEX1 were down-regulated in cardiac ischemia-reperfusion injury model of mice. Furthermore, the expression of APEX1 in neonatal rat cardiomyocytes treated with hydrogen peroxide was also decreased. Cardiomyocytes apoptosis evaluated by Caspase 3 and Bax showed that APEX1 knockdown aggravated apoptotic indexes in cardiomyocytes treated with hydrogen peroxide. However, APEX1 overexpression reversed hydrogen peroxide induced oxidative damage as evidenced by the decreases in the

protein levels of Caspase 3 and Bax.

**Conclusions** APEX1 participates in cardiomyocytes apoptosis induced by oxidative damage and APEX1 effectively inhibited hydrogen peroxide induced cell death via negatively regulating Bax and Caspase 3. The results of this study indicate that APEX1 contributes to the protective effect of oxidative damage, suggesting that APEX1 may be a unique protective strategy for cardiac ischemia-reperfusion injury.

## 亚精胺通过上调 Sirt1 抑制血管钙化的机制研究

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**目的** 血管钙化常见于慢性肾病患者。既往研究表明亚精胺具有心血管保护作用。然而亚精胺是否具有抗血管钙化的作用并不清楚。本研究旨在从细胞、血管组织和动物整体三个层面分别探讨亚精胺能否改善血管钙化。

**方法** 采用钙化培养基诱导大鼠血管平滑肌细胞钙化和血管环钙化模型,以肾切除术诱导大鼠慢性肾衰模型,采用茜素红染色和钙离子定量分析检测细胞和组织钙化,Western blot 检测血管平滑肌细胞成骨样分化基因 Runx2 和 BMP2 的蛋白表达水平。

**结果** 茜素红染色和钙离子定量分析结果均表明亚精胺可剂量和时间依赖性减轻血管平滑肌细胞钙化。Western blot 结果显示亚精胺可下调 Runx2 和 BMP2 的蛋白表达水平。

另外,亚精胺可抑制大鼠血管环钙化。Mico-CT 和茜素红染色以及钙定量结果都表明亚精胺可明显改善慢性肾病大鼠主动脉钙化。最后,我们发现亚精胺可上调 Sirt1 的表达水平,而使用 Sirt1 抑制剂和 Sirt1 siRNA 后可明显阻断亚精胺对血管平滑肌细胞钙化的抑制作用,提示 Sirt1 参与了亚精胺抑制细胞钙化的过程。

**结论** 我们首次证明了亚精胺可通过上调 Sirt1 的表达抑制血管钙化,可为亚精胺在血管钙化的防治方面提供实验证据。

## 急性心肌梗死患者血清 CHOP 蛋白、caspase-12 酶活性表达水平与 LDL-C 的相关因素研究

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**目的** 分析急性心肌梗死患者发病 24 h 内 LDL-C 血清表达与 CHOP 蛋白、caspase-12 酶活性表达水平等相关因素分析。

**方法** 急性心肌梗死入院的患者 67 例,患者发病 24 h 内留取外周静脉血,采用酶联免疫吸附法(ELISA)方法测定血清 CHOP 蛋白、caspase-12 酶活性表达水平。根据 LDL-C (mmol/L) 水平,按 LDL-C 表达水平的中位数分为 2 组: <2.63 mmol/L 组(低表达组, n=33)和 ≥2.63 mmol/L 组(高表达组, n=34)。收集临床基本资料、实验室检验资料和影像资料并进行单因素分析、多因素分析、指标间相关性分析。

**结果** 资料和影像资料并进行单因素分析、多因素分析、指标间相关性分析。结果: 1. 单因素分析中发现 LDL-C (mmol/L) 水平与与 TC、尿酸、caspase-12 (μg/mL)、CHOP 蛋白 (ng/mL) 呈正相关  $R=0.369$ ,  $R=0.343$ ,  $R=0.417$ ,  $R=0.595$ , 分别  $P<0.01$ ,  $P<0.01$ ,  $P<0.01$ ,  $P<0.01$ ; 2. 采用多因素 Logistic 回归模型进行多因素分析,发现的 caspase-12 [OR95%CI 为 1.116 (1.013-1.228),  $P<0.05$ ]; CHOP 蛋白 [OR95%CI 为 4.255 (1.129-16.037),  $P<0.05$ ], caspase-12 酶活性和 CHOP 蛋白表达水平是急性心肌梗死患者 LDL-C 表达的相关因素。

**结论** LDL-C 血清表达水平作为危险因素参与了凋亡分子 CHOP 蛋白、caspase-12 的表达。

## Effects of pretreatment with nicorandil on myocardial inflammation and apoptosis after coronary microembolization in swine

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**Objective** Nicorandil is used to treat angina and is an effective medicine for ischemic heart disease. In recent years, a



large number of studies have confirmed that nicorandil has a protective effect on cardiac ischemia reperfusion injury, and its mechanism may be related to the inhibition of the release of inflammatory factors and the reduction of cardiac apoptosis. Nicorandil has been thought to have multiple cardiovascular benefits, including anti-inflammatory and anti-apoptotic. The present study was undertaken to determine whether nicorandil pretreatment could attenuate myocardial apoptosis and inflammation, and then improve cardiac function in a swine model of coronary micro-embolization (CME).

**Methods** The swine were randomly distributed into three groups as follows: the sham surgery group (control, n=5), CME group (CME, n=5), nicorandil pretreatment group (nicorandil group, n=5). The nicorandil group was pretreated with nicorandil 24 h (3  $\mu\text{g}/\text{kg}/\text{min}$ ) and high-loading-dose of nicorandil (150  $\mu\text{g}/\text{kg}$ ) 60min before microsphere injection and lasted 12 h (nicorandil 3  $\mu\text{g}/\text{kg}/\text{min}$ ) after the CME. Swine CME was induced by intra-coronary injection of inertia plastic microspheres (diameter 42  $\mu\text{m}$ ) into left anterior descending coronary, with or without pretreatment of nicorandil. Echocardiologic measurements, Terminal-deoxynucleotidyl Transferase Mediated Nick End Labeling (TUNEL) staining and western blotting were applied to assess their functional, morphological and molecular effects in CME.

**Results** The expression levels of tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and caspase-3 were increased in cardiomyocytes following CME. Downregulation of caspase-3 and TNF- $\alpha$  with nicorandil pretreatment was associated with improved cardiac function and attenuated serum troponin I (cTnI) and high-sensitivity c-reactive protein (hs-CRP). In addition, through Pearson correlation analysis, the left ventricular ejection fraction (LVEF) negatively correlated with caspase-3, TNF- $\alpha$  and cTnI.

**Conclusions** This study demonstrated that nicorandil pretreatment could significantly inhibit CME-induced myocardial apoptosis and inflammation, and then improve cardiac function. The data generated from this study may be available provide a rationale for the development of myocardial apoptosis and inflammation-based therapeutic strategies for CME-induced myocardial injury.

## 人脐血间充质干细胞旁分泌通过PI3K-Akt通路抑制缺氧诱导的H9C2细胞凋亡

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**目的** 探讨人脐血间充质干细胞(human umbilical cord blood mesenchymal stem cells, UCBMSCs)旁分泌在缺氧诱导的H9C2细胞凋亡中的作用及机制。

**方法** 制备正常氧及缺氧预处理UCBMSCs条件培养基, 抗体芯片检测各组条件培养基中细胞因子表达差异, CCK-8检测各组UCBMSCs活性; Western blot检测CD63、电镜及纳米微粒示踪技术(NTA)鉴定并比较两组UCBMSCs外泌体形态、数量的差异; 正常氧和缺氧预处理UCBMSCs条件培养基, 正常氧和缺氧预处理UCBMSCs外泌体, PI3K抑制剂LY294002及mTOR抑制剂雷帕霉素分别处理H9C2细胞, CCK-8检测细胞活性, Hoechst染色及Annexin V-FITC/PI双染流式细胞术检测细胞凋亡, Western blot检测caspase-3、LC3B、P62、Beclin-1、PI3K、Akt、p-Akt、mTOR及p-mTOR等相关蛋白表达。

**结果** 缺氧预处理后, UCBMSCs活性先减低后升高, 缺氧48 h活性最高。蛋白芯片结果显示, 缺氧预处理UCBMSCs条件培养基与正常氧UCBMSCs条件培养基相比, 所检测的120种细胞因子中, 存在45种细胞因子表达差异, 二者PI3K-Akt通路差异显著; 缺氧预处理后UCBMSCs外泌体分泌明显增多; 正常氧和缺氧预处理UCBMSCs条件培养基及外泌体均可减少H9C2细胞凋亡, 增强细胞活性, 且缺氧预处理UCBMSCs条件培养基及外泌体作用更明显; 正常氧和缺氧预处理UCBMSCs条件培养基及外泌体均可使cleaved caspase-3、LC3B II/I、Beclin-1表达降低, P62表达升高, 且缺氧预处理UCBMSCs条件培养基及外泌体作用更明显; 缺氧预处理UCBMSCs条件培养基及外泌体可使PI3K、P-Akt/Akt及P-mTOR/mTOR升高, 加入LY294002后, 细胞凋亡增加, 活性降低, 自噬减少, PI3K、P-Akt/Akt及P-mTOR/mTOR降低, 加入雷帕霉素后, 细胞凋亡增加, 活性降低, 自噬增加, p-mTOR/mTOR降低。

**结论** 缺氧预处理可以增强UCBMSCs旁分泌作用; UCBMSCs旁分泌可以通过激活PI3K-Akt通路, 调节细胞自噬, 从而抑制缺氧诱导的H9C2细胞凋亡。

## 瑞舒伐他汀治疗高血脂并高尿酸血症患者的效果与安全性

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**目的** 探讨瑞舒伐他汀治疗高血脂并高尿酸血症患者的效果与安全性。

**方法** 选取112例我院于2017年1月至2017年12月所收治的高血脂并高尿酸血症患者,将其随机分为对照组和观察组,分别给予阿托伐他汀和瑞舒伐他汀进行治疗,观察并比较两组患者治疗前后的血脂及血清尿酸水平的变化情况及不良反应的发生情况。

**结果** 两组患者治疗后的各项血脂指标(除HDL-C)及血清尿酸(UA)水平较治疗前均明显下降( $P < 0.05$ );观察组患者治疗后TC水平较对照组明显更低( $P < 0.05$ );两组患者治疗后UA水平比较无明显差异,不具统计学意义( $P > 0.05$ );两组不良反应的发生率比较(8.93%vs10.71%)无明显差异( $P > 0.05$ )。

**结论** 瑞舒伐他汀治疗高血脂并高尿酸血症具明显疗效,且安全性较高,可于临床当中推广应用。

## The role of SGLT1 in high glucose induced human cardiac fibroblast MMP-2 expression

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**Objective** Cardiac fibrosis is thought to be one of the major pathological manifestations of DCM, leading to cardiac remodeling, cardiac dilatation and congestive heart failure. Human cardiac fibroblasts (HCF) are the predominant cell type in the heart, and MMPs/TIMPs are involved in the process of cardiac fibrosis. However, whether high glucose could affect the expression of MMPs/TIMPs in CHF is not clear. SGLTs inhibitors have been developed as novel therapeutic agents for the treatment of patients in these years and the anti-DCM effect of SGLTs inhibitors has been demonstrated by some studies. Whether, SGLTs inhibitors could protect the diabetic heart by directly inhibit SGLTs in HCF other than lowering blood glucose levels has not been tested.

**Methods** The cells were divided into 6 groups: Control group; Glu 30 mM group; Phlorizin 10  $\mu$ M group; Phlorizin 100  $\mu$ M group; Dapagliflozin 10  $\mu$ M group; Dapagliflozin 100  $\mu$ M group. RT-PCR was used to test the expression of MMP-2 and TIMP-1 in the HCF. And western blot was used to test the expression of SGLT1 in each groups.

**Results** In this study, We found that MMP-2 expression was increased in the HCF in response to high glucose which could be reversed by phlorizin (inhibit both SGLT1 and SGLT2) but not dapagliflozin (inhibit SGLT2). In addition, we further found that SGLT1 was existed in the HCF and high glucose could increase the expression of SGLT1 in HCF which could also be attenuated by phlorizin.

**Conclusions** In summary, inhibition of MMP-2 expression has been suggested to be cardiac protective in diabetes. In the current study, we demonstrated that MMP-2 expression was increased in the HCF in response to high glucose which could be reversed phlorizin but not dapagliflozin. In addition, we further found SGLT1 was existed in the HCF and high glucose could increase the expression of SGLT1 in HCF which could also be attenuated by phlorizin. So, we concluded that high glucose induced MMP-2 expression in HCF maybe by up-regulation of SGLT1.

## Anti-inflammatory activity of ATP in LPS-stimulated human umbilical vein endothelial cells by negatively regulating TLR4-MyD88 signaling

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**Objective** To detect the effect of ATP on inflammatory cytokines expression induced by LPS in human umbilical vein endothelial cells (HUVECs) and elucidate its mechanism, so as to provide a new strategy for maintaining immunological balance and an insight into its application in the therapy of some inflammatory diseases such as atherosclerosis.

**Methods** Immortalized human umbilical vein endothelial cells (HUVEC) were purchased from ATCC. we performed Semi-quantitative RT-PCR to detect the mRNA expression

of IL-1 $\beta$ , MCP-1, TLR4 and its adaptor protein CD14, MyD88 in HUVECs; Western-blot was used to detect the protein expression of TLR4 and its adaptor protein CD14, MyD88. All experiments were performed at least three times, and all Data are expressed as the mean  $\pm$  standard error (SEM). Differences between groups were compared using student *t*-test, and *P*<0.05 was considered statistically significant.

**Results** LPS up-regulated the gene expression of MCP-1, IL-8 and IL-1 $\beta$  in a dose-dependent manner in HUVECs and up-regulated the protein expression of TLR4, MyD88 and CD14 in a time-dependent manner within 1 h. ATP at low concentration of 1 and 10 $\mu$ M inhibited the expression of inflammatory cytokines IL-1 $\beta$  and MCP-1 induced by LPS in HUVECs and down-regulated the mRNA expression of TLR4 and its adaptor protein CD14, MyD88. The inhibition of ATP on LPS-induced inflammatory cytokines was not blocked by Suramin, a P2 receptor antagonist. On the contrary, Suramin synergized with low concentration of ATP inhibited LPS-induced inflammatory cytokine expression.

**Conclusions** Activation of TLR4-MyD88-NF- $\kappa$ B signaling by LPS induced the expression of inflammatory cytokines such as IL-1 $\beta$ , IL-8 and MCP-1 in a dose-dependent manner in umbilical vein endothelial cells. ATP at low concentration abrogated LPS-induced inflammatory response by inhibiting the TLR4-MyD88-CD14 pathway but not via P2 receptors. The specific mechanism needs further and more detailed studies to elucidate. In conclusion, we investigated a negative feedback regulation mechanism of TLR4 signaling in inflammatory and immunological response, which may provide a potential therapeutic strategy for the therapy of inflammatory diseases such as atherosclerosis.

## Effect of RAGE gene polymorphisms and inflammatory factors on susceptibility to the degree of coronary artery stenosis in the Chinese Han population

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**Objective** This study aimed to investigate the association of the RAGE gene polymorphisms with pro-inflammatory (NF- $\kappa$ B and MCP-1) markers on susceptibility to the degree of coronary artery stenosis in the CAD patients.

**Methods** The allele frequencies and genotype distribution combinations of the -429T/C, 1704G/T and G82S polymorphisms of the RAGE gene were compared in 128 cases of mild/moderate coronary stenosis (MCS), 138 cases of serious coronary stenosis (SCS) and 161 control subjects. PCR-RFLP was used for detection of genotypic variants. The level of nuclear factor kappa B (NF- $\kappa$ B) p65 measurement and monocyte chemoattractant protein (MCP)-1 were measured.

**Results** The S allele frequency of the G82S polymorphism was higher in the SCS (*P* < 0.001, *P*<sub>corr</sub> < 0.003) group when compared with the control group. Meanwhile, the G82S variant was associated with increased pro-inflammatory (NF- $\kappa$ B and MCP-1) markers as well as serum CRP levels, which are positively correlated with the degree of coronary artery stenosis in the CAD patients.

**Conclusions** Subjects carrying the RAGE gene 82S allele could aggravate progression of coronary stenosis possibly via NF- $\kappa$ B mediated inflammatory pathway.

## 右美托咪定和咪达唑仑对心血管介入手术患者围术期应激反应的影响

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**目的** 研究右美托咪定和咪达唑仑对心血管介入手术老年患者围术期应激反应的影响。

**方法** 选取我院2018年8月至2018年11月行心血管介入手术的老年患者46例,采用计算机随机数字表法分为D组和M组,每组23例。D组采用0.6 $\mu$ g/kg右美托咪定辅助麻醉诱导,M组采用0.04mg/kg咪达唑仑行麻醉诱导。入室后,面罩吸氧,开放外周静脉通路。监测心率(HR)、无创动脉血压(NIBP)、脉搏血氧饱和度(SpO<sub>2</sub>)。两组患者分别给予右美托咪定和咪达唑仑后,两组均给予舒芬太尼0.5 $\mu$ g/kg、顺阿曲库铵0.2mg/kg,充分肌松后完成气管插管,连接麻醉机行机械通气,呼吸机参数设定为:潮气量6~8mL/kg,呼吸频率为12~15次/min。术中通过持续泵注

丙泊酚( $100\sim 200\ \mu\text{g}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ )和瑞芬太尼( $0.02\sim 1.00\ \mu\text{g}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ )维持麻醉。本研究采用盲法,行麻醉诱导的麻醉医生对预注药名称不知情。观察2两组患者诱导前1 min、插管前即刻、插管后1 min和5 min血流动力学指标、皮质醇和血糖的变化情况。采用SPSS 24.0统计软件进行数据分析,计量资料以均数 $\pm$ 标准差( $\bar{x}\pm\text{SD}$ )表示,组间比较采用单因素方差分析;计数资料以率表示,组间比较采用 $\chi^2$ 检验。 $P<0.05$ 为差异有统计学意义。

**结果** 两组患者麻醉诱导前1 min和插管后5 min血流动力学比较差异无统计学意义( $P>0.05$ ),插管前即刻和插管后1 min血流动力学比较差异有统计学意义( $P<0.05$ )。两组患者各时点皮质醇和血糖变化比较差异无统计学意义( $P>0.05$ )。D组总不良反应率(10.22%)与M组(13.15%)比较差异无统计学意义( $P>0.05$ )。

**结论** 右美托咪定和咪达唑仑相比,右美托咪定行麻醉诱导插管在老年心血管介入手术中血流动力学更加稳定,同时能够有效抑制插管引起的应激反应,且不良反应少,值得临床推广使用。

## 超声心动图评估小鼠急性心梗模型的构建

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**目的** 建立小鼠急性心梗模型,并使用超声心动图对模型的构建进行评估。

**方法** SPF级C57BL/6雄性小鼠12只,经气管插管后开胸,显微镜直视条件下结扎冠脉左前降支。建模前1d及术后1d先用超声检测心功能相关数据,对比心脏各项指标的变化。

**结果** 经超声评估建模成功率100%。左室射血分数由术前的( $56.68\pm 5.158$ )%下降到( $28.24\pm 2.445$ )%;左室短轴缩短率由术前的( $29.75\pm 3.238$ )%下降到( $13.07\pm 1.251$ )%;左室收缩末期径由( $2.64\pm 0.160$ )mm上升到( $3.64\pm 0.156$ )mm;左室舒张末期径由( $3.65\pm 0.099$ )mm上升到( $4.15\pm 0.169$ )mm;左室收缩末期前壁厚度由( $1.09\pm 0.076$ )mm下降到( $0.78\pm 0.107$ )mm。

**结论** 经超声心动图评估后,本次实验构建的小鼠急性心梗模型稳定可靠。

## Urine Metabolomics of Coronary Heart Disease

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**Objective** With the development of histology, metabolomic method has become a hot spot in medical practice and research. In this study, the metabolic profile of urine of patients with coronary heart disease was divided into characteristic metabolic markers along with the metabolic value in diagnosis using the combined use of liquid metabolomics research platform. At the same time, how to use metabolomics method to study the intrinsic mechanism of disease occurrence and development in clinical case study, to search for the feature analysis that can be used to monitor and evaluate the disease process, and to screen out the feature that has latent preliminary discussion.

**Methods** Methods: Based on liquid color spectrum-mass spectrometry method for coronary heart disease (coronary atherosclerotic heart diseases) patients and healthy controls people's urine were analyzed, and the differences metabolites in urine screening of coronary heart disease (CHD) patients. Choose urine specimens of 22 patients with coronary heart disease (CHD), 15 cases of disease group and 7 cases of healthy controls, the string of LTQ UPLC mass spectrometry-Orbitrap velos (Thermo Fisher Scientific, San Jose, CA, USA) mass spectrometry analysis of urine metabolism, using principal component analysis (PCA) on two groups of metabolites are classified, the difference between group variables through the OPLS-DA model for VIP value filtering, VIP value greater than 1 variables considered a significant difference between groups.

**And** identify them; The characteristic metabolites were screened and the identified differential variables were analyzed to analyze the metabolic pathways, which were highly correlated with the disease.

**Results** urine metabolites of the coronary heart disease group and the healthy control group were well distinguished, 61 of which were identified as VIP>1 metabolites, and 25 were preliminarily identified. The pathways involved were mainly phospholipids and glycerol metabolism pathways. There were 15 variables in the urine of patients with coronary heart disease that were significantly reversed to the level of normal people, and 2 glucoside metabolites were obtained after identification,

which may play an important role in the occurrence and development of coronary heart disease.

**Conclusions** The characteristic metabolites found by metabolic profile analysis have a good ability to distinguish patients with coronary heart disease from healthy people, and can be used as potential diagnostic markers and new therapeutic targets for further research in the clinical field. The changes of metabolomics may reflect the early pathological and physiological changes of coronary heart disease and may help the patients with coronary heart disease to carry out risk stratification.

## Antioxidant N-acetylcysteine loaded on Magnetic Nanoparticles Attenuates Cytotoxicity Induced by Iron Oxide Nanoparticles in hypoxia/Reoxygenation cardiomyocytes

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**Objective** Magnetic iron oxide nanoparticles (MNPs) are widely used in the cardiovascular field. However, oxidative stress injury caused by MNPs on myocardium is a potential risk. Here, we explored whether N-acetylcysteine (NAC) loading into magnetic mesoporous silica nanoparticles (M-MSN@NAC) can attenuate cytotoxicity in a model of Hypoxia/Reoxygenation (H/R) cardiomyocytes.

**Methods** Neonatal rat cardiomyocytes were randomly divided into different exposure groups and then incubated with 1mL of MNPs, M-MSNs, MSNs and M-MSN@NAC for 24h following H/R procedure, respectively. The ROS levels of cardiomyocytes were detected by DHE 24 hours after the injection. The lipid peroxidation products (MDA and 8-iso-PGF2 alpha), DNA peroxidation products (8-OHDG), the antioxidant enzyme system (SOD, CAT, GSH-Px) and GSH were detected by ELASA and biochemical methods. The expression levels of endoplasmic reticulum stress protein CHOP and GRP78, autophagy related protein P62, LC3-I and LC3-II were measured by Western Blot. Apoptosis of cardiomyocytes was detected by Annexin V-FITC and PI staining.

**Results** Both MNPs and M-MSNs significantly aggravate oxidative stress injury of H/R cardiomyocytes, evidenced by elevated concentrations of MDA, 8-iso-PGF2 $\alpha$  and 8-OHDG and reduced concentrations of SOD, CAT, GSH-Px and GSH through ELASA and biochemical tests. Western Blot results showed that MNPs and M-MSNs further induced an up-regulated expression of CHOP, GRP78, p62 and LC3-II proteins, indicating that hyper-activation of ER stress and autophagy were involved. Flow cytometry analysis revealed that there was no significant difference in cell apoptosis among the MNP, M-MSN and H/R groups ( $P>0.05$ ). Interestingly, M-MSN@NAC did not increase oxidative stress injury, characterized by the comparable levels of ROS, oxidant/anti-oxidant capacity, ER stress, autophagy and cell apoptosis relative to H/R cardiomyocytes, indicating that M-MSN@NAC can effectively mitigate oxidative damage mediated by iron oxide NPs to provide a short-term protective effect.

**Conclusions** M-MSN@NAC can reverse the MNPs or M-MSNs induced oxidative stress injury of H/R cardiomyocytes after 24 h exposure through releasing effective antioxidant NAC. These results indicate the potential of using NAC modifying MNPs as a promising strategy of improving biocompatibility of MNPs, potentially expanding the clinical use and relevance of these exciting systems.

## Effects of hypoxia on oxidative stress, autophagy and apoptosis in cardiomyocytes

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**Objective** Coronary heart disease (CHD) is a hypoxia related disease. However, the relationship of the hypoxia-induced oxidative stress, autophagy and apoptosis in cardiomyocyte remains unclear. To date, researchers have obtained a good understanding of individual pathological processes induced by hypoxia. However, very little is known about the molecular relationships among these processes. This lack of information has limited our understanding of the roles of oxidative stress, autophagy and apoptosis in the progression of human diseases.

es. The aim of this study is to investigate the relationships among hypoxia-induced oxidative stress, autophagy and apoptosis in cardiomyocytes of CHD.

**Methods** In this study, we used  $\text{CoCl}_2$  to mimic hypoxic conditions in H9c2 cardiomyocytes. Cells were subsequently incubated in serum-free  $\text{CO}_2$ -independent DMEM supplemented with various concentrations of  $\text{CoCl}_2$  (300, 600, 900 or 1, 200  $\mu\text{M}$ ) for 16 h. Normoxic control cells were incubated under the same conditions in a normal atmosphere. Normoxic cells received normal serum and no  $\text{CoCl}_2$  treatment, and the hypoxic cells were then incubated in a hypoxic chamber. And study the effects of  $\text{CoCl}_2$ -induced hypoxia on oxidative stress, apoptosis and autophagy, as well as the relationships among these processes. Cell viability and levels of ROS, LC3-II, p62, caspase-3 and PARP were assessed.

**Results** The viability and morphology of H9c2 cardiomyocytes were affected by hypoxia, and hypoxia increased of ROS levels and the levels of the LC3-II, p62, caspase-3 and PARP proteins in H9c2 cells in a dose-dependent manner. ROS levels gradually increased in the presence of hypoxia; however, ROS levels decreased in the presence of higher levels of hypoxia. Caspase-3 and PARP levels gradually increased as hypoxia increased. LC3-II levels were increased and p62 levels were concomitantly decreased in hypoxic cells, indicating that autophagy increased as the level of hypoxia increased.

**Conclusions** Based on these results, hypoxia induces oxidative stress, apoptosis and autophagy in H9c2 cells. Cells may enhance autophagy to alleviate intracellular oxidative stress in the presence of increasing levels of hypoxia, and excess autophagy is likely to promote the apoptosis of hypoxic cells.

## 自身免疫机制在鼠巨细胞病毒(MCMV)诱导BALB/c鼠心肌炎室性心律失常中的作用

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**目的** 对自身免疫机制在鼠巨细胞病毒(MCMV)诱导BALB/c鼠心肌炎室性心律失常中的作用进行分析。

**方法** 选择无病原体4周龄BALB/c鼠共60只作为实验对象,均由本省医学实验动物中心提供。按照数字随机表方

法进行分组,对照组、实验组中分别纳入30只BALB/c鼠作为实验对象。对比观察小鼠模型接种鼠巨细胞病毒后10周内心肌炎发病及致死情况,心律失常发病情况,心肌病理及炎性因子表达,鼠巨细胞病毒诱导抗 $\beta_1$ 受体抗体,以及抗 $\beta_1$ 受体抗体对小鼠模型心室肌细胞电生理影响进行观察分析。

**结果** 接种10周后,观察组小鼠模型心肌炎累积发病20只,发病率为66.67%(20/30),致死4只,致死率为13.33%(4/30);对照组小鼠模型心肌炎累积发病12只,发病率为40.00%(12/30),致死0只,致死率为0.00%(0/30)。观察组小鼠模型感染鼠巨细胞病毒后第6周~10周血清抗 $\beta_1$ 受体抗体滴度检出值显著高于对照组( $P<0.05$ ),差异具有统计学意义。接种10周内,观察组小鼠模型心律失常累积发病16只,发病率为53.33%(16/30)。最早发病小鼠模型出现在感染鼠巨细胞病毒后3d。加入1:100抗 $\beta_1$ 受体抗体对动作静息电位、超射无显著影响,但动作电位时程明显延长,其中观察组小鼠模型APD50时程延长30.10%,APD90时程延长19.60%,与对照组对比差异显著( $P<0.05$ ),差异具有统计学意义。预先给予小鼠模型浓度1.0 $\mu\text{mol/L}$ 剂量美托洛尔,加入1:100抗 $\beta_1$ 受体抗体对动作静息电位、超射无显著影响,动作电位时程延长不明显,其中观察组小鼠模型APD50时程延长15.30%,APD90时程延长5.80%,与对照组对比无显著差异( $P>0.05$ ),差异不具有统计学意义。加入1:100抗 $\beta_1$ 受体抗体对心室肌细胞L型钙通道电流有显著增加趋势,与对照组对比差异显著( $P<0.05$ ),差异具有统计学意义。预先给予小鼠模型浓度1.0 $\mu\text{mol/L}$ 剂量美托洛尔,加入1:100抗 $\beta_1$ 受体抗体心室肌细胞L型钙通道电流无明显影响,与对照组对比无显著差异( $P>0.05$ ),差异不具有统计学意义。

**结论** 鼠巨细胞病毒可能通过诱导抗 $\beta_1$ 受体自身抗体产生并增加心室肌细胞L型钙通道电流水平的方式诱导心肌炎室性心律失常的发生。

## 柯氏音的起源和共振性质的实验验证

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**目的** 运用心音图的描记设备验证柯氏音是否起源于心脏瓣膜关闭产生的振动及其是否为共振性质,以验证王氏

提出的血压测量共振理论的正确性。

**方法** 实验仪器:台式水银血压计,心音传感器及其配套软件和计算机。

**实验对象:**随机选取15名社区居民,记录部位为右肱动脉血压听诊处、右颈动脉和心前区。

**实验方法:**按照以下4个方法分别记录研究对象的血压听诊处的肱动脉脉音图以及心脏、肱动脉、颈动脉任意两处的动脉脉音(包括柯氏音)和/或心音的同步图。①将一只心音传感器绑缚于右肱动脉血压听诊处并连接计算机,分别记录未测量血压时和测量血压时肱动脉脉音和/或血压听诊音波形;②将一只心音传感器绑缚于右肱动脉血压听诊处,将另一只心音传感器绑缚于心前区心尖搏动最强处,连接计算机,分别记录未测量血压时和测量血压时肱动脉脉音(和/或血压听诊音)和心音的同步图;③将一只心音传感器绑缚于心前区心尖搏动最强处,而将另一只心音传感器绑缚于颈动脉搏动最强处,连接计算机,记录未测量血压时颈动脉脉音和心音的同步图,同时听诊颈动脉脉音;④将一只心音传感器绑缚于颈动脉搏动最强处,将另一只心音传感器绑缚于右肱动脉血压听诊处,连接计算机,记录未测量血压时这两处动脉脉音的同步图。

**结果** 我们把用心音图描记设备在浅表动脉上记录到的声音和/或振动波形进行命名:心音图描记设备记录到的图形称为脉音图;在未测量血压时的脉音图上,最高大的波形称为主峰,主峰之前并紧邻主峰的较小的波形称为前峰,主峰之后并紧邻主峰的较小的波形称为后峰(图一);在测量血压时的脉音图上,更高大的波形称为血压听诊音波形,经同时血压听诊处听诊确认,此波形与柯氏音同步,说明柯氏音存在波形形态(图二);在同步图上,特别是心音和肱(颈)动脉脉音同步图上,主峰波形与第一心音几乎同步出现,说明它源于房室瓣关闭产生的振动(图三);柯氏音波形亦与第一心音几乎同步出现,说明它亦来源于房室瓣关闭产生的振动(图四);在测压时肱动脉脉音图上,其大部分的柯氏音波形呈现的有无到有、由小到大、由大变弱、由弱变无符合物理学上的共振现象,从而证明了柯氏音的共振性质(图五)。

**结论** 王氏提出了血压测量的共振理论,认为血压听诊音(柯氏音中的敲击样声音成分)是由于从心脏传来的瓣膜关闭产生的振动与受压后产生了形状改变的肱动脉(固有频率发生改变)发生共振的结果。实验验证了共振理论的正确性,并把柯氏音的起源精确定位于以二尖瓣为主的房室瓣。

## 父代饮酒致子代小鼠心脏发育异常的组蛋白乙酰化修饰机制

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**目的** 探讨父代饮酒对子代心脏发育的影响,并探讨其组蛋白乙酰化修饰机制。

**方法** 雄性c57小鼠给予连续酒精(浓度40%,10 μL/g/天)暴露6周,分别设空白对照组(无处理)及阴性对照组(生理盐水灌胃)。干预后雌雄小鼠合笼,收集新生子代小鼠及心脏组织。测新生小鼠出生体重;心肌细胞电镜检测;Tunel法检测心肌细胞凋亡水平;Q-PCR检测凋亡基因caspase3及抗凋亡基因Bcl2 mRNA表达水平;Western Blot法检测 active-caspase3、caspase3及Bcl2蛋白表达水平;ChIP-PCR法检测 caspase3及Bcl2基因启动子上组蛋白H3K9及H3K27乙酰化水平。

**结果** 父代饮酒小鼠子代出生体重明显较对照组降低;电镜下见实验组新生小鼠心肌细胞出现肌丝溶解、肌浆网扩大、肌丝排列紊乱;同时其凋亡细胞较对照组明显增多;酒精组凋亡基因 caspase3 mRNA 表达较对照组显著升高( $P<0.05$ ), active-caspase3 蛋白水平较对照组显著升高( $P<0.05$ ), caspase3 蛋白水平较对照组显著下降( $P<0.05$ );抗凋亡基因 Bcl2 mRNA 及蛋白均较对照组显著降低( $P<0.05$ ); caspase3 基因启动子组蛋白 H3K9 乙酰化水平较对照组显著升高( $P<0.05$ ); Bcl2 基因启动子组蛋白 H3K27 乙酰化水平较对照组显著降低( $P<0.05$ )。

**结论** 父代饮酒可以引起子代小鼠心脏发育异常,组蛋白乙酰化修饰可能介导了子代小鼠心肌细胞凋亡过程。

## PICC 专科护士实践内容的质性研究

于水

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**目的** 探索研究 PICC 专科护士的实践内容,研究其专业领域内的实践、培训、考核方式方法。

**方法** 采用质性研究的方式方法,对12名本院PICC专科护士和2名PICC护士长进行访谈,探索研究PICC专科护士的实践内容,研究其专业领域内的实践、培训、考核方式方法。

**结果** PICC专科护士的实践内容可归纳为直接护理实践、专家型的教育以及培训、考核、领导者角色以及管理者角色、指导与合作、科研与讨论。

**结论** PICC专科护士的实践内容可归纳为直接护理实践、专家型的教育以及培训、考核、领导者角色以及管理者角色、指导与合作、科研与讨论。PICC专科护士的实践内容能体现出专科护士独特的角色与不可替代的作用,但是目前的实践内容具有较大的局限性,迫切需要规范PICC专科护士的实践内容,引领专科领域的发展和提升。

## C-reactive protein aggravates myocardial ischemia/reperfusion injury through inhibiting mitoK<sub>ATP</sub> channels and promoting mPTP opening

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**Objective** Ischemia/reperfusion injury (IRI) is an inflammatory response that occurs when tissue is reperfused following a prolonged period of ischemia. Several studies have indicated that C-reactive protein (CRP) might play an important role in inducing IRI. However, the effects of CRP on myocardial IRI and the underlying mechanisms have not been fully elucidated. This study aimed to investigate the association between CRP and myocardial IRI and the underlying mechanisms.

**Methods** We simulated ischemia/reperfusion using oxygen-glucose deprivation / reoxygenation (OGD/R) in neonatal Sprague-Dawley rat cardiomyocytes; reperfusion injury was induced by three hours of hypoxia with glucose and serum deprivation followed by one hour of reperfusion. Cell viability was tested with 3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium (MTS) assays, and cardiomyocyte damage was evaluated by lactate dehydrogenase (LDH) leakage. Mitochondrial membrane poten-

tial was measured using tetramethylrhodamine ethyl ester (TMRE) and mitochondrial permeability transition pore (mPTP) opening was measured using calcein/AM; both TMRE and calcein/AM were visualized with laser scanning confocal microscopy. In addition, we studied the signaling pathways underlying CRP-mediated ischemia/reperfusion injury via Western blot analysis.

**Results** Compared with the simple OGD/R group, after intervention with 10 μg/mL CRP, cell viability decreased markedly (82.36% ± 6.18% vs. 64.84% ± 4.06%,  $P = 0.0007$ ), and the LDH leakage significantly increased (145.3 U/L ± 16.06 U/L vs. 208.2 U/L ± 19.23 U/L,  $P = 0.0122$ ). CRP also activated mPTP opening and reduced mitochondrial membrane potential during myocardial ischemia/reperfusion. Mitochondrial K<sub>ATP</sub> channel opener diazoxide and mPTP inhibitor cyclosporin A can offset the effects of CRP in this process. The level of phosphorylated extracellular-signal-regulated kinase (ERK) 1/2 was significantly higher after pre-treatment with CRP compared with the OGD/R group (170.4% ± 3.00% vs. 93.53% ± 1.94%,  $P < 0.0001$ ).

**Conclusions** Our results suggested that CRP directly aggravates myocardial IRI in myocardial cells and that this effect is primarily mediated by inhibiting mitochondrial ATP-sensitive potassium (mitoK<sub>ATP</sub>) channels and promoting mPTP opening. Furthermore, one of the mechanisms of CRP-induced ischemia reperfusion injury may be related to the sustained activation of the ERK signaling pathway.

## Targeted next-generation sequencing identifies a novel frameshift mutation (c.248\_252delTACTC) in EMD gene in a chinese family with Emery-Dreifuss muscular dystrophy

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**Objective** Emery-Dreifuss muscular dystrophy (EDMD) is a rare X-linked disease characterized by the clinical triad of early childhood joint contractures, progressive weakness in muscles and cardiac involvement, which can result in sudden death. Genetically, EDMD was associated with *EMD*, *LMNA*, *FHL1*, *SYNE1*, *SYNE2*, *LUMA* and *SUN1* gene mutations, the most common gene mutations are *EMD*, *LMNA* and *FHL1*.

**Methods** Herein, a three-generation Chinese family with EDMD were included in this research. Targeted next-generation sequencing (NGS), Electrocardiograph (ECG), Ultrasonic Cardiogram (UCG), 24-h Holter, cardiac MR and muscle MR were performed for proband. The members of family were received the targeted next-generation sequencing.

**Results** The proband presented with joint contracture and muscle weakness along with increased circulating creatine kinase began at childhood. Then electrocardiogram at adulthood showed sinus bradycardia (40 bpm), junctional escape rhythm and atrial flutter and ultrasonic cardiogram showed the serious enlargement of right atrium (RA, 97.51×76.16 mm) and right ventricular (RV, 51 mm). The muscle magnetic resonance presented partially fatty in the soleus muscle of both thighs. The cardiac magnetic resonance showed thinning of the anterior wall of left ventricular, moderate tricuspid insufficiency and regurgitation. Genetic sequencing identified a novel homozygous mutation (c.248\_252TACTC) of exon 3 in *EMD* gene of proband, the consequence of the mutation was a frameshift and encoded a truncated protein termed emerlin with 84 amino acids, causing a reduction in size of the hydrophobic nucleoplasmic and the absence of the transmembrane region and C-terminal tail, influencing the functions of emerlin. The proband's mother had the heterozygous mutation without clinical symptom, and father of the proband without such mutation, which indicated the EDMD in the present study was inherited in the form of X-linked recessive.

**Conclusions** In conclusion, the novel gene mutation (c.248\_252TACTC) in *EMD* had not been reported, and our study enriches the *EMD* gene mutation database. Genetic testing provides not only accurate for the clinical diagnosis but also valuable for genetic counseling for families.

## 心肌肥厚分子机制的研究进展

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**目的** 通过讨论最新的心肌肥厚的分子机制研究,为心血管疾病的预防与治疗提供新思路。

**方法** 心肌肥厚是心血管疾病最为常见的并发症之一,是心脏在早期为保护和维持正常心脏功能而对多种应激的有机反应。心肌肥厚是使心血管疾患病死率升高的一个独立危险因素,心肌肥厚的特点是在没有细胞分裂的情况下,心肌细胞体积增大。这种情况被认为是由于心脏后负荷增强导致的心壁应力的适应性反应。心功能障碍是老年人发病和死亡的主要原因之一,其发病机制往往与心肌肥厚引起的心肌重构有关。心脏由肌细胞和非肌细胞组成,如成纤维细胞、血管细胞和血细胞,这些细胞通过各种自分泌或旁分泌介质直接或间接地相互通信,这种肥厚多认为是不可逆的,但也有研究表明这种非后在一定条件下是可以逆转的,本文通过讨论最新的心肌肥厚的分子机制研究,为心血管疾病的预防与治疗提供新思路。

**结果** 心肌肥厚是心血管疾病最为常见的并发症之一,是心脏在早期为保护和维持正常心脏功能而对多种应激的有机反应。心肌肥厚是使心血管疾患病死率升高的一个独立危险因素,心肌肥厚的特点是在没有细胞分裂的情况下,心肌细胞体积增大。这种情况被认为是由于心脏后负荷增强导致的心壁应力的适应性反应。心功能障碍是老年人发病和死亡的主要原因之一,其发病机制往往与心肌肥厚引起的心肌重构有关。心脏由肌细胞和非肌细胞组成,如成纤维细胞、血管细胞和血细胞,这些细胞通过各种自分泌或旁分泌介质直接或间接地相互通信,这种肥厚多认为是不可逆的,但也有研究表明这种非后在一定条件下是可以逆转的,本文通过讨论最新的心肌肥厚的分子机制研究,为心血管疾病的预防与治疗提供新思路。

**结论** 本文通过对心肌肥厚发病机制和生物标志的探讨为心肌肥大疾病提供依据,虽其分子机制非常复杂,但随着研究的逐渐深入,了解参与心肌肥厚的分子机制,可能有助于识别治疗心肌肥厚的新分子靶点。通心肌肥厚的改善,可以降低心血管疾病的危险性,通过对

心肌肥厚分子机制的深入研究,将为药物干预及防治心肌肥厚提供全新的思路,对心肌肥厚和心力衰竭防治将有重要意义。

## Protective Effect of Membrane Sealant Poloxamer 188 on Myocardial Ischemia/ Reperfusion Injury of Rat

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**Objective** On mimic membrane model made of two kinds of phospholipid, poloxamer 188 (P188) has been proved to insert to ruptured membrane. This study is to explore mechanism of P188's influence on biological membrane and investigate the effect of membrane sealant P188 on myocardial ischemia/reperfusion injury.

**Methods** In vitro, membrane integrity was evaluated by optical density and microscopy. In vivo, Sprague-Dawley rats were randomly divided into sham operation group, normal saline (NS) group, and P188 group (n = 5, per group). A model of myocardial ischemia / reperfusion was established by temporarily ligating the left anterior descending coronary. Before reperfusion, 15% P188 was injected into tail vein by 250 mg / kg in P188 group. Analyze the ischemic/risk area ratio, the ejection fraction (EF) and left ventricular shortening rate (FS), the content of supersensitive cardiac troponin I (hs-cTn I) in plasma and apoptosis rate. Observe rat kidney under light microscopy.

**Results** The rupture rate of Triton-X 100 with P188 was lower than that of Triton-X 100. Intact cells still could be seen in with 2-hour incubation but not found with 12-hour. The infarction/ risk area ratio in P188 group was lower than those in NS group. There was not difference in the change of FS and EF between NS and P188. Apoptotic rate and hs-cTn I in P188 group were lower than that in NS group. Renal proximal convo-

luted tubule cells in P188 group were slightly swollen, and vacuolar degeneration was observed inside while no obvious signs of necrosis observed.

**Conclusions** P188 effectively reduced the membrane rupture but did not reverse the rupture in a persistent destruction. P188 not only repaired myocardial membrane of rat directly but also reduced the secondary membrane changes in ischemia/ reperfusion injury, which are related to the apoptosis pathway. It was lack of evidence to support that P188 contributed to cardiac function restore in m-mode ultrasound. P188 accelerated the degeneration of renal cells but did not caused necrosis.

## Siva1 Regulates The Stability of Single-stranded Dna-binding Protein 3 Isoforms

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**Objective** The assembly of LIM-homeodomain (LIM-HD) transcriptional complex plays important roles in early neuronal development. The stability of LIM-HD is controlled by single-strand binding protein 3 (SSBP3) via a cascade mechanism protecting it from proteasomal degradation. The expression level of SSBP3 has to be precisely regulated. Although a decrease of SSBP3 level is associated with several diseases, the mechanism of SSBP3 downregulation and whether SSBP3 itself is subject to proteasomal degradation remain largely unknown. Two strongly conserved transcripts of the *SSBP3* gene, *SSBP3a* and

*SSBP3c*, were cloned from a human brain cDNA library. By RT-PCR, we show that *Ssbp3c* is continuously expressed in both embryonic and adult mouse brain, whereas *Ssbp3a* is restricted to embryonic brain tissue. By co-IP and GST pulldown assays, we identified SIVA1 as a novel SSBP3-binding factor. In a ubiquitination assay, we show that SIVA1 enhances the ubiquitination of SSBP3 and regulates its abundance. Our findings reveal the proteasomal degradation of SSBP3 for the first time and provide a rationale for an SIVA1-SSBP3-dependent mechanism for the disassembly of LIM-HD multiprotein complexes.

**Methods** The assembly of LIM-homeodomain (LIM-HD) transcriptional complex plays important roles in early neuronal development. The stability of LIM-HD is controlled by single-strand binding protein 3 (SSBP3) via a cascade mechanism protecting it from proteasomal degradation. The expression level of SSBP3 has to be precisely regulated. Although a decrease of SSBP3 level is associated with several diseases, the mechanism of SSBP3 downregulation and whether SSBP3 itself is subject to proteasomal degradation remain largely unknown. Two strongly conserved transcripts of the *SSBP3* gene, *SSBP3a* and *SSBP3c*, were cloned from a human brain cDNA library. By RT-PCR, we show that *Ssbp3c* is continuously expressed in both embryonic and adult mouse brain, whereas *Ssbp3a* is restricted to embryonic brain tissue. By co-IP and GST pulldown assays, we identified SIVA1 as a novel SSBP3-binding factor. In a ubiquitination assay, we show that SIVA1 enhances the ubiquitination of SSBP3 and regulates its abundance. Our findings reveal the proteasomal degradation of SSBP3 for the first time and provide a rationale for an SIVA1-SSBP3-dependent mechanism for the disassembly of LIM-HD multiprotein complexes.

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## ZNF424 induces apoptosis and inhibits proliferation in lung carcinoma cells

Wenbang Liu<sup>1</sup>, Wuzhou Yuan<sup>1</sup>, Jian Zhuang<sup>3</sup>, Xiaoyang Mo<sup>1</sup>, Guo Dai<sup>1</sup>, Yuequn Wang<sup>1</sup>, Jimei Chen<sup>3</sup>, Yongqi Wan<sup>1</sup>, Yongqing Li<sup>1</sup>, Yu Chen<sup>1</sup>, Shifeng Luo<sup>1</sup>, Zhigang Jiang<sup>1</sup>, Yan Shi<sup>1</sup>, Fa Chen<sup>1</sup>, Linghui Cao<sup>1</sup>, Xiangli Ye<sup>1</sup>, Xiongwei Fan<sup>1</sup>, Ping Zhu<sup>3</sup>, Kai Zhang<sup>2</sup>, Xiushan Wu<sup>1</sup>

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**Objective** We reported that *ZNF424*, a Zinc finger-containing transcription factor, inhibited the transcriptional activity of p21. However, its role in tumorigenesis remains unknown. We therefore investigated the clinic correlation between expression of *ZNF424* and tumorigenesis of lung cancer. The results with immunohistochemistry suggested that expression level of *ZNF424* in 43 out of 60 lung cancer tissue was significantly lower than that in adjacent tissue. Flow cytometry assay indicated that overexpression of *ZNF424* induced apoptosis in human lung carcinoma A549 cells. Meanwhile, it also indicated that overexpressing *ZNF424* significantly increased the number of G1 phase cells but obviously decreased the number of S phase cells, suggesting that *ZNF424* may inhibit the proliferation of A549 cells. Western Blot analyses showed that overexpression of *ZNF424* may decreased the protein level of the MAPK signaling proteins P- P38 and P- ERK in A549 cells. We are the first time to show the correlation between *ZNF424* and tumorigenesis and the inhibiting role of *ZNF424* in lung cancer, which suggesting *ZNF424* may serve as a possible marker that has potential diagnostic value in lung tumorigenesis.

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## PDZD8 alleviates cardiac hypertrophy by modulating mitochondrial $Ca^{2+}$

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**Objective** Pathological cardiac hypertrophy arises as a response of the heart to many different pathological stimuli that challenge its work. Mitochondrial  $Ca^{2+}$  ( $Ca^{2+}_m$ ) overload is a main contributor to mitochondrial damage hence cardiomyocyte death in the pathological cardiac hypertrophy. PDZD8 is required for calcium ion ( $Ca^{2+}$ ) uptake by mitochondria, but its concrete role in pathological cardiac hypertrophy remains elusive yet. This study aimed to investigate the protective effect of PDZD8 against angiotensin II (Ang-II) induced pathological cardiac hypertrophy with a focus on  $Ca^{2+}_m$ .

**Methods** Specific small interfering RNAs against PDZD8 or adenovirus-based plasmid with PDZD8 were delivered into left ventricles or incubated with neonatal murine ventricular myocytes (NMVMs) for 48 h. Then, mice were rendered to pathological cardiac hypertrophy by chronic infusion of Ang-II with a mini-osmotic pump for 28 days, meanwhile NMVMs were cultured with Ang-II for 48 h. Cardiac function, myocardial fibrosis, collagen deposition, hypertrophic maker genes, cardiomyocytes size, and  $Ca^{2+}_m$  were determined by echocardiography, Masson staining, qRT-PCR, western blot,  $\alpha$ -actinin staining and laser confocal microscopy, respectively.

**Results** Herein, we showed that mitochondrial PDZD8 was decreased in hypertrophic myocardium ( $P<0.05$ ) and NMVMs ( $P<0.01$ ). The genetic ablation of PDZD8 exacerbated pathological cardiac hypertrophy both *in vivo* and *in vitro*, evidenced by impaired cardiac function ( $P<0.01$ ), enlarged cardiomyocytes ( $P<0.05$ ), deteriorated myocardial fibrosis ( $P<0.01$ ),

elevated collagen deposition ( $P<0.01$ ) and increased hypertrophic maker genes ( $P<0.05$ ). In contrast, PDZD8 supplementation alleviated cardiac function ( $P<0.01$ ), decreased the cell surface of cardiomyocytes ( $P<0.01$ ), ameliorated interstitial fibrosis ( $P<0.01$ ), attenuated collagen deposition ( $P<0.01$ ) and decreased the expression of ANP/BNP/ $\beta$ -MHC ( $P<0.01$ ). Moreover, excessive  $Ca^{2+}_m$  accumulation following PDZD8 deficiency observed *in vitro* ( $P<0.01$ ), whereas PDZD8 overexpression exhibited an opposite effect ( $P<0.01$ ), which was significantly reversed through  $Ca^{2+}_m$  buffering by mitoPV ( $P<0.01$ ).

**Conclusions** Our findings provide the first direct evidence that upregulated PDZD8 preserves cardiac function in pathological cardiac hypertrophy, suggesting that increasing the expression of PDZD8 may be a pharmacological approach to ameliorate pathological cardiac hypertrophy.

## MD1 敲除激活 MAPK 信号通路恶化小鼠心梗后心脏结构重构

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**目的** 髓样分化蛋白 1 (MD1) 表达于心脏, 是抗炎因子。我们课题组前实验发现 MD1 过表达可改善压力负荷诱导的心脏重构, MD 敲除可恶化该效应。然而关于 MD1 在心肌梗死后心脏重构的作用机制尚不明确。本文主要目的是探索 MD1 在心肌梗死后心脏重构中的关键调节作用。

**方法** 选取 22-28 克 MD1 过表达的小鼠及其同窝的野生型小鼠, 结扎左前降支进行造模。一周后, 计算小鼠的生存率, 利用心脏超声评估心脏功能, HE 染色评估心肌细胞形态, Masson 染色评估梗死后纤维化面积, 最后通过 Western Blot 和 PCR 技术评估纤维化和肥厚相关指标及其相关的 MAPK 信号通路。

**结果** 在心肌梗死组, MD1-KO 的生存率低于 MI-WT 组, 但是没有显著性差异。此外, 超声心动图显示 KO-MI 组的左室显著扩大 (LVESd, LVEDd), 左室射血分数 (LVEF) 显著下降, 然而, 在假手术中, KO 组与 WT 组没有明显差异。HE 染色发现, MI 组的心肌细胞横截面积显著增加, 心肌细胞形态不规则, Masson 染色显示 MI 组的左室纤维化面积高于假手术组, 并且 KO-MI 组显著大于 WT-MI 组。与病

理结果一致,PCR结果显示KO-MI组小鼠的肥厚指标(ANP, BNP, b-MHC)和纤维化指标(CTGF, Collange I和III)显著升高。最后我们检测MAPK信号通路,Western Blot发现(ERK、JNK、P38)总蛋白水平无差异,然而磷酸化水平却显著升高(图1)。

**结论** 我们研究发现,MD1敲除可加重心肌梗死后心脏结构重构。机制上MD1敲除可能激活MAPK信号通路促进心梗后心脏重构。MD1可作为改善心肌梗死后心脏重构的治疗靶点。

## 靶向干细胞对于损伤心肌的免疫调功能

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复旦大学附属中山医院

**目的** 心肌缺血再灌注损伤后会伴有强烈的免疫反应,参与组织损伤的修复。干细胞具有强大的免疫调节能力,但细胞归巢效果不良限制了其功能的发挥。因此我们想通过提高干细胞的归巢能力,促进其在损伤区发挥免疫调节作用,从而提高干细胞对损伤心肌的结构和功能修复。

**方法** 将骨髓间充质干细胞与归巢肽(CREKA)修饰的脂质体进行膜融合,获得CREKA-MSCs;体外和体内检测CREKA-MSCs对于纤维蛋白靶向性和结合力;并且通过多重手段检测心梗区域相关炎症因子的分泌以及炎症细胞的分布;最后通过影像学和组织学检查心肌组织结构和功能的修复情况。

**结果** 归巢肽的修饰能显著增强MSCs与纤维蛋白结合的能力,促进其在大鼠损伤心肌中的归巢率;同时减弱心梗区的促炎免疫水平,提高了抑炎免疫水平;并且损伤心肌在结构和功能方面均得到了一定程度的修复。

**结论** 归巢肽修饰MSCs有利于其向心肌损伤区域的归巢和滞留,而后提高干细胞在目标区域发挥独特的免疫调节能力,促进受损心肌结构与功能的修复。研究证明纤维蛋白是促进移植细胞向受损心肌归巢的新靶点,通过纤维蛋白靶向给药系统为再生医学提供了治疗新思路。

## 敲除 Rab27a 抑制外泌体释放对心肌细胞及成纤维细胞的影响

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**目的** 探讨通过敲除Rab27a抑制外泌体(EXs)释放对心肌细胞(CMs)及成纤维细胞(CFs)的影响。

**方法** 运用TALEN技术构建Rab27a敲除小鼠模型。提取野生型(WT)及Rab27a<sup>-/-</sup>(KO)小鼠乳鼠原代CMs和CFs,Western blot检测RAB27A蛋白的表达。分离CMs和CFs的EXs,通过纳米颗粒跟踪分析仪(NTA)检测他们的水平。通过MTS和EdU检测CFs的增殖及PCNA蛋白的表达,用流式细胞术检测心肌细胞凋亡,Western blot(WB)检测凋亡及自噬相关蛋白的表达。

**结果** (1)WB结果表明,与WT相比KO小鼠CMs和CFs的RAB27A蛋白表达量明显下降(2)KO小鼠CF-EXs及CM-EXs水平与WT相比明显降低(3)与WT相比,KO小鼠CFs增殖能力降低(4)降低Rab27a依赖性CM-EXs的分泌不影响CMs凋亡,但上调了Belcin-1和LC-3 II/I水平和下调了p62水平。

**结论** Rab27a依赖性CM-和CF-EXs分泌的降低使CFs的增殖降低,CMs的自噬增加。

## 冠心病合并高血压病患者PCI后PTS分子标志物变化意义

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**目的** 观察合并高血压病的冠心病患者行冠状动脉介入术(PCI)治疗后血栓形成前状态(PTS)分子标志物的变化并分析其意义。

**方法** 选择32例冠心病患者(A组)及38例冠心病伴发高血压病患者(B组)进行PCI,分别在PCI前与治疗20 min、24 h及7 d采血测定血栓形成前状态分子标志物、脂质过氧化物、及内皮源性舒张因子指标,并观察术后6个月内冠脉再狭窄事件发生情况。

**结果** 1.冠脉造影显示,B组病变明显重于A组;2.与术前比较,A组术后20 min血清vWF、VIII:Ag、AT III、血浆GMP-140、F. II a、血浆Fbg、血清Plg、血浆t-PA、PAI、D-Di-

mer水平及术后24 h vWF、蛋白C(PC)、Fbg、Plg、PAI、D-Dimer水平均有明显改变,差异均有统计学意义( $P < 0.05$ 或 $P < 0.01$ );术后7 d各PTS分子标志物与术前无明显变化,差异无统计学意义( $P > 0.05$ )。B组术后20 min、24 h、7 d vWF、Ⅷ:Ag、ATⅢ、GMP140、PC、F.Ⅱa、Fbg、PAI、D-Dimer水平均较术前有明显变化,差异均有统计学意义( $P < 0.05$ 或 $P < 0.01$ )。术后20 min、24 h、7 d, B组与A组vWF、Ⅷ:Ag、ATⅢ、GMP140、F.Ⅱa、Fbg、Plg、D-Dimer水平差异均有统计学意义( $P < 0.05$ 或 $P < 0.01$ )。3. 两组术后脂质过氧化物、内皮源性舒张因子水平也有明显变化,但在B组变化更加明显,至术后第7天,A组基本恢复至术前水平,但B组仍有明显变化。

**结论** 冠心病患者PCI后出现血栓形成前状态分子标志物、脂质过氧化损伤以及内皮功能等一系列变化,这种变化在合并高血压病的患者中更加明显,表明冠心病患者PCI术后存在明显的血栓形成前状态,而高血压可以促进这一状态产生。随访半年发现B组有3例患者发生在狭窄,可能与血栓前状态密切相关。

## 冠心病并高血压病患者血小板ADP受体拮抗剂治疗后PTS分子标志物变化及意义

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**目的** 观察冠心病(CAD)并高血压病(HBP)患者经过血小板ADP受体拮抗剂治疗后体内血栓形成前状态(PTS)分子标志物的变化并分析其意义。

**方法** 选择稳定性心绞痛(SA)患者36例(SA组)、不稳定性心绞痛(UA)患者38例(UA组)、UA合并HBP患者38例(HBP组),分别在检测血小板ADP受体拮抗剂——氯吡格雷抵抗后给予氯吡格雷75 mg/d,连续治疗10天,并分别在治疗前、后测定PTS分子标志物水平。

**结果** 1. 药物治疗前HBP组体内PTS分子标志物vWF、Ⅷ:Ag、GMP-140、F.Ⅱa、Plg、PAI、D-Dimer、TXB<sub>2</sub>明显高于UA组和SA组,而ATⅢ、PC、t-PA、6-K-PGF<sub>1</sub>α明显低于UA组及SA组;UA组vWF、Ⅷ:Ag、GMP-140、F.Ⅱa、Plg、PAI、D-Dimer、TXB<sub>2</sub>也明显高于SA组,而ATⅢ、PC、t-PA、6-K-PGF<sub>1</sub>α也明显低于SA组,Plg在各组均无明显差异。2. 药物治疗后各组PTS分子标志物vWF、Ⅷ:Ag、GMP-

140、F.Ⅱa、Plg、PAI、D-Dimer、TXB<sub>2</sub>明显低于治疗前,而ATⅢ、PC、t-PA、6-K-PGF<sub>1</sub>α明显高于治疗前,Plg治疗前后无明显差异。3. 112例中氯吡格雷抵抗者共17例,无抵抗者95例。其中,无抵抗者药物治疗后PTS分子标志物vWF、Ⅷ:Ag、GMP-140、F.Ⅱa、Plg、PAI、D-Dimer、TXB<sub>2</sub>较治疗前明显降低,而ATⅢ、PC、t-PA、6-K-PGF<sub>1</sub>α较治疗前明显升高,Plg治疗前后无明显差异。有抵抗者药物治疗前后各种PTS分子标志物指标均无明显变化。

**结论** 合并高血压病的冠心病患者体内存在明显的血栓形成前状态,并且较非合并高血压病的冠心病患者更加明显。采用血小板ADP受体拮抗剂氯吡格雷治疗可以干预各型冠心病患者的血栓形成前状态,但对于氯吡格雷抵抗患者这种干预效果则不佳,可能是其预后不良的重要原因。

## 三维超声斑点追踪成像技术评估右室容积、射血分数及纵向应变的可行性及准确性:与核磁共振对比性研究

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**目的** 由于右室复杂的几何形态,三维方法较二维方法更适合右室功能评估。近来新的三维超声斑点追踪追踪技术(3D-STE)应用于右室功能评估日益增多,但是有关其评估准确性和可行性的研究甚少。因此本研究的目的与心脏核磁共振(CMR)相比,证实3D-STE技术评估RV容积、射血分数及纵向应变的可行性和准确性。

**方法** 本研究纳入122例同时行CMR和3D-STE检查的门诊或住院患者。3D-STE及CMR分别评估RV舒张末及收缩末容积、射血分数和RV游离壁纵向应变。应用相关分析及Bland-Altman分析评估两种技术之间的一致性。

**结果** 116例(95%)患者纳入3D-STE分析。3D-STE和CMR的相关分析表明,RV容积、射血分数和RV游离壁纵向应变均具有较好的相关性(RV舒张末容积, $r=0.94$ ;RV收缩末容积, $r=0.95$ ;RV射血分数 $r=0.94$ ;RV纵向应变 $r=0.82$ ;  $P < 0.001$ )。与CMR相比,3D-STE测量的RV舒张末容积、收缩末容积分别低估 $7.2 \pm 29.5$  mL、 $13.1 \pm 28.1$  mL,RVEF高估 $3.5 \pm 5.4\%$ ,RV纵向应变高估 $2.7 \pm 4.5\%$ 。与

RVEF>30% 患者相比, RVEF<30% 患者 3D-STE 测量的 RV 容积、射血分数和纵向应变与 CMR 测量结果的相关性显著增高(RV 舒张末容积,  $r=0.86$  vs  $0.92$ ; 右室收缩末容积,  $r=0.83$  vs  $0.93$ ; 右室射血分数,  $r=0.78$  vs  $0.86$ ; 右室游离壁纵向应变,  $r=0.50$  vs  $0.69$ ;  $P<0.001$ )。

**结论** 与核磁共振技术相比较, 3D-STE 是一种可行的, 有效的准确评估右室容积、功能及形变的新技术, 3D-STE 尤其在 RV 功能重度异常患者中准确性更高。

## Right Ventricular Volumes, Ejection Fraction and Longitudinal Strain Assessed by Three-Dimensional Speckle Tracking Echocardiography: Comparisons with Cardiac Magnetic Resonance Imaging

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**Objective** Given the right ventricular (RV) complex structure, three-dimensional (3D) methods would be more suitable for assessing RV volumes and function than two-dimensional methods. Recently, 3D speckle tracking echocardiography (3D-STE) has been increasingly used to quantify RV function and longitudinal strain. However, direct comparisons of 3D-STE and cardiac magnetic resonance imaging for evaluation of RV function and longitudinal strain are limited. The aim of this study was to test the feasibility and accuracy of 3D-STE using comparison with cardiac magnetic resonance imaging.

**Methods** We enrolled 122 patients who agreed to undergo both cardiac magnetic resonance imaging and 3D-STE on the same day. RV end-diastolic volume (RVEDV), RV end-systolic volume (RVESV), ejection fraction (EF) and longitudinal strain of RV free wall were obtained from 3D-STE and cardiac magnetic resonance imaging. cardiac magnetic resonance imaging was the reference standard. The Pearson correlation coefficient and Bland-Altman analysis were used to assess inter-technique agreement.

**Results** 3D-STE was feasible in 116 patients (95%). 3D-

STE-determined RV volumes, EF and longitudinal strain correlated strongly with cardiac magnetic resonance imaging values (RVEDV,  $r=0.94$ ; RVESV,  $r=0.95$ ; RVEF,  $r=0.94$ ; RV longitudinal strain,  $r=0.82$ ;  $P<0.001$  for all). Compared with cardiac magnetic resonance imaging reference, 3D-STE-derived RVEDV and RVESV were underestimated by  $7.2 \pm 29.5$  ml and by  $13.1 \pm 28.1$  ml, respectively. 3D-STE-derived RVEF and RV longitudinal strain were overestimated by  $3.5 \pm 5.4\%$  and  $2.7 \pm 4.5\%$ , respectively. Compared with patients with RVEF>30%, 3D-STE-determined RV volumes, EF and longitudinal strain had better correlations with cardiac magnetic resonance imaging values in patients with RVEF<30% (RVEDV,  $r=0.86$  vs  $0.92$ ; RVESV,  $r=0.83$  vs  $0.93$ ; RVEF,  $r=0.78$  vs  $0.86$ ; RV longitudinal strain,  $r=0.50$  vs  $0.69$ ;  $P<.001$  for all). 3D-STE to measure RV volumes, EF and longitudinal strain was highly reproducible.

**Conclusions** 3D-STE is highly feasible, accurate and reproducible, and it correlates highly with the cardiac magnetic resonance imaging method, especially in patients with severe RV dysfunction.

## 血府逐瘀汤对携带 CYP2C19\*2 等位基因的心血瘀阻型不稳定性心绞痛患者疗效的影响

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**目的** 心血瘀阻型不稳定性心绞痛患者, 如携带 CYP2C19\*2 等位基因, 则氯吡格雷抵抗及心血管不良事件显著增加, 而西医治疗效果各异。中医的血府逐瘀汤对其的影响仍不确切。

**方法** 回顾性分析 2014 年 1 月至 2016 年 10 月宁波市第一医院心内科住院的患者。基因检测为 CYP2C19\*2 的共 60 例, 随机分成两组, A 组为治疗组, 即在西医治疗基础上加用血府逐瘀汤治疗 4 周, B 组为对照组, 进行正规西医治疗。观察分析比较两组患者的疗效情况、血小板功能指标和血液流变学指标的变化; 并进行为期 1 月和 1 年的随访, 比较两组心血管事件的发生率。

**结果** 经过 28 天的血府逐瘀汤联合西医的治疗, 我们发现相较于 B 组, A 组疗效更佳, 差异具有统计学意义 ( $P=$



0.030);同时,A组患者治疗前后PRU明显下降(治疗前 vs. 治疗后:280.26±31.56 vs. 249.42±27.55;  $P=0.012$ ),抑制率明显升高(治疗前 vs. 治疗后:0.119±0.055 vs. 0.187±0.097;  $P=0.023$ ),血液流变学指标中血浆黏度、全血粘度、纤维蛋白原明显降低。

**结论** 对于携带CYP2C19\*2等位基因的心血瘀阻型不稳定性心绞痛患者,血府逐瘀汤可以改善其血小板功能,降低血液粘稠度,进而提高这类不稳定性心绞痛患者的临床治疗效果。

## Nicotinic agonist inhibits cardiomyocyte apoptosis in CVB3 induced myocarditis via $\alpha 3\beta 4$ -nAChR/PI3K/Akt-dependent survivin upregulation

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**Objective** Cardiomyocyte apoptosis is critical for the development of coxsackievirus B3 (CVB3) induced myocarditis, which is a common cardiac disease that may result in heart failure or even sudden death. Previous studies have associated CVB3 induced apoptosis with the downregulation of antiapoptotic proteins. Here, attempts were made to examine whether nicotinic acetylcholine receptors (nAChRs), especially  $\alpha 3\beta 4$ -nAChRs, were novel therapeutic antiapoptotic targets via activation of survivin, a strong antiapoptotic protein, in viral myocarditis (VMC).

**Methods** In the present study, we demonstrated that nAChRs,  $\alpha 3\beta 4$ -nAChR subunits, in particular, were present and up-regulated in CVB3 infected neonatal rat cardiomyocytes (NRC) and H9c2 cells by RT-qPCR. The function of  $\alpha 3\beta 4$ -nAChRs was next examined using its specific blocker  $\alpha$ -CTX AuIB in vitro. The results of TUNEL Assay and Western Blot experiments showed that the block of  $\alpha 3\beta 4$ -nAChRs abro-

gated nicotine-mediated protection of NRC from CVB3 induced apoptosis and this effect displayed a substantial correlation with the protein expressions of pAkt, survivin, and Cleaved Caspase-3. Hence, the involvement of the PI3K/Akt pathway was further verified by LY294002, a selective inhibitor of PI3K. As a result, nicotine-mediated induction of pAkt and survivin was abolished by LY294002 and meanwhile, apoptotic NRC were increased accompanied by an increase of Cleaved Caspase-3 expression. Regarding CVB3 infected BALB/c mice, the  $\alpha$ -CTX AuIB and LY294002 treated groups had the lower survival rate, deteriorative ventricular systolic function, and more severe inflammation than the nicotine-treated group and the modulation of pAkt, survivin, Cleaved Caspase-3 protein expressions was similar to that in CVB3 infected NRC. In addition, we found that nicotinic agonist reduced CVB3 replication in a dose-dependent manner in vitro, which indicates that nAChRs activation may serve as a possible protective mechanism of CVB3 induced myocarditis.

**Results** (结果与方法部分已合并,故填写的内容与方法部分一致,请参考附件)In the present study, we demonstrated that nAChRs,  $\alpha 3\beta 4$ -nAChR subunits, in particular, were present and up-regulated in CVB3 infected neonatal rat cardiomyocytes (NRC) and H9c2 cells by RT-qPCR. The function of  $\alpha 3\beta 4$ -nAChRs was next examined using its specific blocker  $\alpha$ -CTX AuIB in vitro. The results of TUNEL Assay and Western Blot experiments showed that the block of  $\alpha 3\beta 4$ -nAChRs abrogated nicotine-mediated protection of NRC from CVB3 induced apoptosis and this effect displayed a substantial correlation with the protein expressions of pAkt, survivin, and Cleaved Caspase-3. Hence, the involvement of the PI3K/Akt pathway was further verified by LY294002, a selective inhibitor of PI3K. As a result, nicotine-mediated induction of pAkt and survivin was abolished by LY294002 and meanwhile, apoptotic NRC were increased accompanied by an increase of Cleaved Caspase-3 expression. Regarding CVB3 infected BALB/c mice, the  $\alpha$ -CTX AuIB and LY294002 treated groups had the lower survival rate, deteriorative ventricular systolic function, and more severe inflammation than the nicotine-treated group and the modulation of pAkt, survivin, Cleaved Caspase-3 protein expressions was similar to that in CVB3 infected NRC. In addition, we found that nicotinic ago-

nist reduced CVB3 replication in a dose-dependent manner in vitro, which indicates that nAChRs activation may serve as a possible protective mechanism of CVB3 induced myocarditis.

**Conclusions** Our study demonstrated that  $\alpha 3\beta 4$ -nAChR subunits are essential in nicotine-mediated antiapoptotic effect of protecting cardiomyocytes from CVB3 induced apoptosis in vivo and in vitro. This protection correlated with the PI3K/Akt pathway and the inducement of antiapoptotic protein, survivin. A combination of these mechanisms serves a novel protective response to treat viral myocarditis.

## Association of serum Fibulin-3 and flow-mediated dilation in patients with essential hypertension

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**Objective** It is believed that vascular endothelial dysfunction may be one of the causes of hypertension and may also be involved in the occurrence, development and prognosis of hypertension. Also, it is reported that hypertension can weaken the protective mechanism of endothelium, which leads to endothelial dysfunction and endothelial integrity. Endothelial dysfunction and hypertension promote each other. The vascular endothelial function is often measured by flow-mediated dilation (FMD). Fibulin-3 is proved to be a protective factor of arteries. Whether serum Fibulin-3 is associated with vascular endothelium injury of essential hypertension has not been determined.

**Methods** In the cross-sectional study, 100 patients with essential hypertension (EH group) and 30 gender- and age-matched healthy peoples (control group) were included to measure the flow-mediated dilatation. The serum fibulin-3 was examined by enzyme-linked immunosorbent assay (ELISA). And the serum Angiotensin II (AngII) was assessed by radioimmunoassay (RIA). Informations were gathered on body mass index, smoking status, fasting blood glucose,

HbA1c, lipids and indicators of renal function. Differences in means were assessed by t-tests. Associations were assessed by Pearson correlation analysis.

**Results** Our results elucidated that the EH group had significantly lower level of serum fibulin-3 compared to the control group ( $52.0 \pm 28.8$  vs  $67.9 \pm 29.8$  ng/mL,  $P < 0.05$ ). Meantime, the level of FMD of EH group was lower than that of control group ( $3.27 \pm 2.04$  vs  $4.60 \pm 2.29\%$ ,  $P < 0.05$ ). However the EH group had significantly higher levels of serum AngII compared to the control group ( $52.91 \pm 5.95$  vs  $48.57 \pm 2.46$  ng/L,  $P < 0.05$ ). In Pearson correlation analysis, the level of fibulin-3 was positively correlated with FMD ( $r=0.255$ ,  $P=0.023$ ) and negatively correlated with AngII ( $r=-0.431$ ,  $P=0.02$ ) in essential hypertension patients.

**Conclusions** Low expression of serum Fibulin-3 is associated with more severe vascular endothelial injury and high expression of AngII in EH patients. Further studies are needed to determine the exact role of Fibulin-3 in endothelial injury in patients with essential hypertension.

## 小鼠左室重建术模型的探讨与构建

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**目的** 探讨并构建小鼠左室重建术模型以弥补左室重建术基础研究领域的空白。

**方法** 构建小鼠心肌梗死模型, 开胸结扎左冠状动脉前降支, 心电图提示 ST 段抬高即成功, 空白对照组仅开胸不结扎血管。术后 4 周行超声心动图评估心脏结构及功能, 包括左室收缩和舒张末期容积、内径及前后壁厚度、左室射血及缩短分数、室间隔厚度、右室游离壁厚度和舒张末期内径、肺动脉压力、二尖瓣 E/A 峰值、等容舒张期时间等指标。对部分超声提示左室前壁室壁瘤形成、心腔扩大、射血及缩短分数下降、无肺动脉高压及左室舒张功能异常的心梗鼠行左室重建术, 余指标相似心梗鼠不作处理, 记为单纯心梗组。针对左室重建组, 腹腔注射戊巴比妥钠麻醉后气管插管维持呼吸, 左侧第 4、5 肋间开胸暴露心脏; 明确室壁瘤范围后钝性分离粘连心包与胸壁; 用 6 号带线缝合针对左右线性缝合室壁瘤, 穿针时保证持针器稳定、时间尽可能短, 避免穿及瘢痕组织; 止血后用 5 号带线缝合针缝合关闭胸腔。术后 1 周及 3 周再次行超声心动图评

估上述指标并对比空白对照组、单纯心梗组及左室重建术。

**结果** 与空白对照组相比,心梗小鼠的左室前壁收缩期厚度( $0.69\pm 0.03$  vs  $0.42\pm 0.36$ ,  $P=0.0002$ )、射血分数( $43.33\pm 3.66$  vs  $15.31\pm 2.54$ ,  $P<0.0001$ )及缩短分数( $21.44\pm 2.2$  vs  $6.98\pm 1.21$ ,  $P<0.0001$ )明显下降,左室收缩末期内径( $3.48\pm 0.14$  vs  $4.65\pm 0.23$ ,  $P=0.0068$ )及容积( $50.91\pm 5.24$  vs  $104.8\pm 11.9$ ,  $P=0.0139$ )显著增加,提示心室重构和心功能的下降。左室重建术后与空白对照组相比,单纯心梗组的上述指标持续恶化或维持相似水平,而左室重建组较前明显好转,提示心室重构过程的减缓及心功能的好转,三组有统计学差异。1周及3周左室前壁收缩期厚度分别为 $0.67\pm 0.02$  vs  $0.31\pm 0.03$  vs  $0.38\pm 0.05$  ( $P<0.0001$ )、 $0.77\pm 0.03$  vs  $0.36\pm 0.03$  vs  $0.50\pm 0.06$  ( $P<0.0001$ ),左室射血分数分别为 $42.68\pm 4.58$  vs  $11.68\pm 1.75$  vs  $19.65\pm 2.82$  ( $P<0.0001$ )、 $42.02\pm 2.48$  vs  $14.25\pm 2.756$  vs  $27.98\pm 3.05$  ( $P<0.0001$ ),缩短分数分别为 $21.21\pm 2.62$  vs  $5.21\pm 0.80$  vs  $8.904\pm 1.30$  ( $P<0.0001$ )、 $20.6\pm 1.4$  vs  $6.55\pm 1.30$  vs  $13.26\pm 1.56$  ( $P<0.0001$ ),左室收缩末期内径分别为 $3.52\pm 0.27$  vs  $5.35\pm 0.30$  vs  $4.31\pm 0.36$  ( $P=0.03$ )、 $3.63\pm 0.20$  vs  $5.78\pm 0.26$  vs  $4.79\pm 0.23$  ( $P<0.0001$ ),容积分别为 $54.01\pm 9.81$  vs  $141.3\pm 16.36$  vs  $87.52\pm 15.64$  ( $P=0.002$ )、 $56.73\pm 7.83$  vs  $167.5\pm 15.57$  vs  $108.5\pm 12.11$  ( $P<0.0001$ )。观测过程中,三组间左室舒张功能、肺动脉压力及右室游离壁厚度等无统计学差异,提示左室重建术未引起左室舒张功能障碍、肺动脉高压、右室代偿性肥厚等并发症。

**结论** 左室重建术后心梗合并室壁瘤小鼠的心室重构及心功能指标较同期心梗合并室壁瘤鼠明显好转,提示小鼠左室重建术模型初步构建成功,后期可基于此模型开展左室重建术相关的基础研究。

## Progress in research on new cardiovascular drugs

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**Objective** Cardiovascular disease is a kind of disease with a high incidence in the middle-aged and elderly population. The treatment is mostly symptom control and drug treatment is one of the main treatment methods. At present, the drugs used in clinical can no longer meet the needs of the development of cer-

tain diseases, so we hope to find new therapeutic drugs to improve the therapeutic effect.

**Methods** We searched the literature on the development of new drugs for cardiovascular disease treatment on the web of science, PubMed and other websites, and searched for more promising therapeutic targets to start new drug research. Based on this therapeutic target, a corresponding small molecule inhibitor is sought and developed. In addition, our research group is dedicated to the study of traditional Chinese medicine, high-throughput screening technology was used to select the Chinese medicine monomers with good ROMK inhibiting activity from small molecular compound libraries, and screening for better-active compounds as lead compounds by MTT assay, and the lead compound is structurally optimized to obtain a small oral active molecule with good diuretic effect.

**Results** We found that ROMK inhibitor, a new classification of diuretic, can effectively control blood pressure and relieve edema in mice, and does not cause electrolyte imbalance in the body. In addition, pyridazinone analog is a small molecule of ROMK inhibitor with good activity, the mouse experiments showed that it can lower blood pressure and control the symptom of heart failure effectively. And it may be a promising candidate compound for patients with hypertension or heart failure.

**Conclusions** The development of new drugs for cardiovascular diseases has always been a hot spot for medical researchers. The treatment drugs with less side effects for these patients need long-term medication can not only significantly improve the quality of life and compliance of patients, but also helpful for medical workers better manage cardiovascular patients.

## 普罗布考经 p-ERK /p-JNK-caspase 3 途径对糖尿病大鼠对比剂肾病的抗细胞凋亡作用

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**目的** 对比剂肾病是一个重要的临床问题,尤其对于需要进行冠脉造影介入治疗的患者,然而它的病理机制尚不完善,该实验我们探讨了普罗布考对糖尿病大鼠造影剂急性肾损伤(CIAKI)的保护作用及其抗凋亡机制。

**方法** 将雄性SD大鼠经腹腔单剂量注射链脲佐菌素建立糖尿病模型,8周后随机分为三组:糖尿病对照组(D组)、对比剂肾病模型组(糖尿病+造影剂,DC组)和普罗布考干预组(糖尿病+造影剂+普罗布考,DCP组),每组各6只,普罗布考连续灌胃2周(500 mg/kg)。10周后经股静脉注射60%泛影葡胺(10 mL/kg),连续2d造模,24 h后处死大鼠。检测大鼠注入链脲佐菌素前后的血糖,处死前的血糖、体重、尿量;免疫组化检测肾内凋亡相关蛋白caspase-3的表达;western blotting定量分析Bcl-2、Bax以及p-ERK、p-JNK蛋白在肾内的表达水平。

**结果** 三组大鼠各时期的血糖、体重及尿量无统计学差异。与对比剂肾病组相比,普罗布考干预组病理肾小管损害明显改善,血清肌酐显著降低( $88.10 \pm 8.78$  vs  $103.89 \pm 9.01$ ,  $P < 0.05$ ),肌酐清除率升高( $2.14 \pm 0.49$  vs  $1.49 \pm 0.33$ ,  $P < 0.05$ );肾内凋亡相关蛋白caspase-3表达下降,促凋亡Bax蛋白表达减低,而抗凋亡Bcl-2蛋白表达增多(均 $P < 0.05$ );并且,上游的p-ERK1/2表达增加,而p-JNK表达则显著降低(均 $P < 0.05$ )。

**结论** 普罗布考对糖尿病CIAKI具有肾保护作用,其机制可能是通过促进上游p-ERK表达,降低p-JNK表达而传递调控信息来抑制肾细胞经线粒体caspase-3途径发生凋亡。

## 自泵式大鼠脑低温低灌注模型的制备

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**目的** 模拟主动脉夹层术中脑灌注状态,设计一种可以用于认知功能评价的动物模型,为探索主动脉夹层脑保护方法提供实验动物平台。

**方法** 成年SD大鼠,SPF级,体质量300~350 g。模型的制备分为两个阶段。第一阶段,以主动脉夹层术中脑灌注的各要素为标准,探索实现脑低血流量、低灌注压、低温和血液稀释的方法。应用超声实时外周血管血流量仪探测颈总动脉血流量,在限制颈总动脉直径,观察经总动脉血流量和血压变化情况;通过体表诱导降温法控制降低大鼠体温,记录大鼠降温前后心率、血压和血气生化指标的变化;

通过股动脉和股静脉放血同时补液的方法完成血液稀释。第二阶段,脑低温低灌注模型的建立和评价,大鼠12只,分为两组( $n=6$ ),分别是建模组和对照组,建模组手术行低温和血液稀释,持续脑低灌注30分钟,对照组只进行麻醉和手术操作过程同建模组,但不降温、血液稀释和脑低灌注。观察比较建模组和对照组大鼠的术后脑功能情况,对两组大鼠进行神经行为学测试。

**结果** 第一阶段,通过限制颈动脉直径可降低脑灌注,自制血管限流器可以快速有效调节颈总动脉血流量,间断绑扎的方法可逐级降低颈动脉远端血压,体表诱导降温可以控制大鼠体外在设定范围,降温后大鼠表现出轻度的代谢酸中毒并可自行恢复;放血同时补液的方法可以实现血液稀释,放血6 mL是相对有效和安全的放血量。第二阶段,建模组大鼠持续低温低灌注30分钟,无死亡,术后出现心率、血压下降的循环改变,并有代谢性酸中毒,经输血、复温、纠酸等治疗,大鼠生命征稳定,恢复好。术后可完成神经行为学测试。测试结果显示,建模组大鼠术后运动和感觉无对称性偏差,穿梭箱实验和水迷宫实验显示,建模组大鼠学习记忆能力较对照组明显下降,提示低灌注手术导致大鼠认知功能损伤。

**结论** ①自泵式大鼠脑低温低灌注模型操作简单、成功率高,可以模拟主动脉夹层术中低温、低流量、低灌注压和血液稀释的脑灌注状态;②自泵式大鼠脑低温低灌注模型可用于脑认知功能评价;③自泵式大鼠脑低温低灌注模型具有简单、经济、稳定的特点,是一种可供选择的脑功能保护研究动物模型。

## 氢气在硝酸酯耐药氧化应激中作用的实验研究

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**目的** 硝酸酯类药物在冠心病和心力衰竭的治疗中发挥重要作用,硝酸酯耐药的出现值得我们关注和研究。氢气作为一种具有治疗作用的气体分子,有非常鲜明的优点。本研究目的在于:观察饮用氘水对硝酸酯耐药大鼠血管舒张功能及生存时间的影响;探讨氢气是否可以通过抗氧化来延缓或逆转硝酸酯耐药。

**方法** 60只成年雄性SD大鼠随机分为正常对照组、硝酸甘油耐药组、氘水+硝酸甘油耐药组。皮下注射硝酸甘油20 mg/kg,一日三次,共6.5天。模型建立过程中除去死亡大鼠,正常对照组(Ctr组, $n=10$ )、硝酸甘油耐药组(GTN

组, n=15)、氢水+硝酸甘油组(GTN+H<sub>2</sub>, n=15)。给予氢水灌胃 5 mL/kg, 一日三次, 共3天。3.5-6.5天每天观察大鼠一般状态。实验 6.5 天后, 测定大鼠主动脉环对 GTN 的舒张反应及主动脉环的浓度-效应曲线, 检测环磷酸鸟苷含量, 测定组织丙二醛含量, 检测活性氧, 测定血管组织中内皮源性一氧化氮合酶、核因子相关因子-2、NADPH 氧化酶-4、NADPH 氧化酶-2 蛋白的表达。

### 结果

(1) GTN 组及 GTN+H<sub>2</sub> 组大鼠主动脉环对硝酸甘油的舒张反应均明显下降, 血管舒张 50% 时所对应的 GTN 浓度值明显增加。GTN+H<sub>2</sub> 组对硝酸甘油的舒张反应明显增加, EC<sub>50</sub> 明显减少。

(2) GTN 组及 GTN+H<sub>2</sub> 组大鼠主动脉环浓度-效应曲线均明显右移。GTN+H<sub>2</sub> 组主动脉环浓度-效应曲线明显左移。

(3) GTN 组及 GTN+H<sub>2</sub> 组 ROS 含量明显增加, GTN+H<sub>2</sub> 组 ROS 含量下降 7.14%。

(4) GTN 组及 GTN+H<sub>2</sub> 组 MDA 含量明显增加, GTN+H<sub>2</sub> 组 MDA 含量明显下降。

(5) GTN 组 cGMP 含量明显减少, GTN+H<sub>2</sub> 组 cGMP 含量明显增加。

(6) GTN 组 eNOS 含量下降 13.39%, GTN+H<sub>2</sub> 组 eNOS 含量明显增加; GTN 组及 GTN+H<sub>2</sub> 组 Nrf2 含量均明显增加, GTN+H<sub>2</sub> 组 Nrf2 含量明显增加; GTN 组 NOX4 含量均明显增加; GTN+H<sub>2</sub> 组 NOX4 含量明显减少。GTN 组 NOX2 含量增加 12.17%, GTN+H<sub>2</sub> 组 NOX2 含量下降 10.43%, GTN+H<sub>2</sub> 组 NOX2 含量明显下降。

**结论** 1. 氢气可以改善硝酸甘油诱导的大鼠耐药模型血管平滑肌的舒张反应性;

2. 氢气可以通过其抗氧化作用直接抑制氧化应激, 减少脂质过氧化反应;

3. 氢气可能通过基因调控间接诱导抗氧化系统, 从而发挥抗硝酸酯耐药作用。

## 链霉素通过抑制 calpain-1 活性减少心衰大鼠室性心律失常发生的机制研究

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**目的** 本实验探讨链霉素是否能够通过减少 desmin 水解减少心衰大鼠室性心律失常的发生及其机制。

**方法** 雄性 SD 大鼠 60 只随机分为三组, 分别为对照组、心衰组、链霉素组, 饮食均正常。其中心衰组、链霉素组通过动静脉瘘手术构建心衰模型。通过定期心脏彩超检测确定是否达到心室非同步运动。待心衰非同步模型构建成功后, 链霉素组腹腔注射链霉素 300 mg/kg/日。待一周后, 行心律失常在体检测, 留取心肌组织, Western Blot 分析 desmin、Serca2 蛋白表达; 免疫组化检测 desmin、serca2 的表达; 电子显微镜观察心肌细胞超微结构改变; ELISA 试剂盒测定心肌细胞内 calpain-1 活性。

**结果** 在体心律失常检测结果: 心衰大鼠室性心律失常发生明显增加, 链霉素治疗能够减少室性心律失常的发生。与对照组相比, Western Blot、免疫组化检测 desmin、serca2、蛋白在心衰组中的表达明显降低, 但链霉素组中可以逆转 desmin、serca2 蛋白的低表达 ( $P < 0.05$ ,  $P < 0.01$ )。电子显微镜结果提示: 心衰组较链霉素组、对照组心肌纤维排列明显紊乱伴有断裂。链霉素组心肌纤维排列紊乱程度较轻, 未见断裂。ELISA 结果提示: 心衰组较对照组 calpain-1 的活性明显增强, 链霉素可以降低 calpain-1 的活性。HE 结果显示 HF 组心肌纤维溶解坏死, 细胞核偏移, 固缩, 纤维组织增生, 大量炎性细胞浸润。链霉素组病理改变较 HF 组均有所改善。

**结论** 链霉素可通过抑制 calpain-1 的激活减少 desmin 的水解, 从而对心肌的结构具有保护作用, 减少室性心律失常的发生。

## 原发性肉碱缺乏症

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**目的** 探讨原发性肉碱缺乏症所致心肌病的临床特点、基因突变情况及疾病转归, 分析左旋肉碱的治疗剂量及心肌恢复情况, 提高人们对于原发性肉碱缺乏症杂合子突变所致心肌病的认识。

**方法** 对 2016 年在温州医科大学附属第二医院住院的 1 例原发性肉碱缺乏症患儿的临床资料进行整理, 回顾性分析患儿基因突变特点, 左旋肉碱治疗前后临床症状、心电图、心脏超声、血清游离肉碱水平等结果变化。

**结果** 入院时患儿存在肝大、高氨血症; 心脏超声提示心肌肥厚: 左室舒张期后壁厚度为 8.0 mm, 左室内径明显增大: 左室舒张末期前内径为 38 mm, 左室射血分数为 58%; 胸片提示心胸比增大为 57.8%; 伴心电图 T 波高尖改变; 血清

游离肉碱浓度降低至  $1.19 \mu\text{mol/L}$ , 同时伴多种酰基肉碱缺乏。

治疗后2周: 患儿血氨恢复正常; 心脏超声提示左室舒张期后壁厚度进一步增厚至  $9.0 \text{ mm}$ , 左室舒张末期内径逐渐缩小至  $36 \text{ mm}$ , 左室射血分数值提高至  $79\%$ ; 血清肉碱浓度上升至正常水平。

治疗后3月: 心脏超声提示左室舒张期后壁厚度减小至  $7.5 \text{ mm}$ , 左室舒张末期内径缩小至基本正常, 左室射血分数维持在  $70\%$  以上; 心电图提示校正 QT 间期延长, 为  $473 \text{ ms}$ 。

治疗后6月: 患儿心超各参数值明显改善, 左室舒张期后壁厚度缩小至正常 ( $6.7 \text{ mm}$ ), 左室舒张末期内径维持在正常范围大小 ( $32 \text{ mm}$ ), 校正 QT 间期降至正常时限 ( $407 \text{ ms}$ )。

治疗后1年: 患儿所有临床症状均消失, 心超各参数值基本稳定在正常范围内, 心电图恢复正常, 心胸比回缩至正常大小 ( $50\%$ ), 血清各种酰基肉碱浓度均处于正常范围。

治疗后2年: 患儿无任何不良反应, 血清游离肉碱浓度在正常范围内波动。

患儿(包括患儿父母及患儿弟弟)均进行了 SLC22A5 基因检测, 最终发现患儿为 SLC22A5 基因外显子 4 上的杂合突变, 突变位点为新发位点:  $c.806A>G$  (P.Tyr269Cys)。患儿弟弟及母亲均为同一位点上的纯合突变, 患儿父亲为该位点上的杂合突变。

结论 PCD 是引起儿童心肌病的病因之一, 串联质谱法是 PCD 的首选筛查方式, 而 SLC22A5 基因检测是确诊 PCD 的重要手段。

PCD 杂合子携带者是否发病取决于多种因素的影响, 目前关于是否需要补充肉碱预防这一点上尚无共识。因此, 我们仍需要对 PCD 杂合子携带者进行长期随访, 避免不良事件发生。

结合本例患儿长期随访资料发现持续服用左旋肉碱在治疗 PCD 方面可以获得良好而肯定的中远期效果。

## 冠心病并糖尿病 PCI 患者 GPIIb/IIIa 受体拮抗剂干预后 PTS 分子标志物变化

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目的 探讨急性心肌梗死 (AMI) 患者及 2 型糖尿病

(T2DM) 合并 AMI 患者行冠状动脉介入 (PCI) 术的过程中, 使用血小板糖蛋白 IIb/IIIa (GP IIb/IIIa) 受体拮抗剂替罗非班治疗后血栓形成前状态 (PTS) 分子标志物、血小板变化、血栓形成事件术和出血风险情况

方法 选择 AMI 患者 117 例, 包含 60 例 AMI 患者、57 例 AMI 并 T2DM 患者 2 组, 符合 PCI 术指征。将 2 组患者随机分成各自的治疗组与对照组, 即 A 组 29 例与 B 组 31 例, C 组 29 例与 D 组 28 例。A 组为 PCI 术中经冠脉注射替罗非班及常规治疗的 AMI 患者; B 组为 PCI 术中常规治疗的 AMI 患者; C 组为 PCI 术中冠脉注射替罗非班及常规治疗 AMI 合并 T2DM 患者; D 组为 PCI 术中常规治疗的 AMI 合并 T2DM 患者。所有患者均在术前及术后分别静脉采血检测其 PTS 分子标志物。比较各组术后支架内血栓发生情况, 及用药期间至术后 48 小时内血小板减少及出血情况。

结果 (1) 干预治疗前, AMI 合并 T2DM 患者体内 TpP、vWF、GMP-140 水平明显高于 AMI 患者, 而 AMI 合并 T2DM 患者体内 t-PA、AT III 水平明显低于 AMI 患者 (均  $P < 0.05$  或  $P < 0.01$ )。 (2) 替罗非班干预治疗后, A 组、C 组的 PTS 指标与自身干预前及同期常规干预对照组 B 组、D 组相比均得到明显改善, 表现为 TpP、vWF、GMP-140 水平明显下降, 而 t-PA、AT III 水平明显升高 ( $P < 0.05$  或  $P < 0.01$ )。 (3) 与 C 组相比, A 组使用替罗非班干预治疗前、后的 PTS 分子标志物水平变化较 C 组治疗前、后 PTS 的相应指标变化更大, 表现 TpP、vWF、GMP-140 明显降低, t-PA、AT III 明显升高, 差别有统计学意义。 (4) 对照组 (B 组、D 组) 和替罗非班治疗组 (A 组、C 组) 相比, 其术后血栓形成率明显增加 ( $6.779\%$ ,  $0\%$ ,  $P = 0.044$ )。 (5) 使用替罗非班开始至术后 48h 的治疗组与同期常规治疗对照组的血小板变化及出血情况相比者差异无统计学意义。

结论 合并 T2DM 的 AMI 比单纯 AMI 患者体内存在更加严重的 PTS, 在该类患者行 PCI 术治疗时, 采用替罗非班治疗可以通过调节 PTS 分子标志物来阻碍其血栓的发展, 降低术后血栓形成率, 且不明显增加出血风险, 但与单纯 AMI 者对比, 其效果相对较劣。

## H9C2 心肌细胞培养液对诱导性多能干细胞定向心肌细胞分化影响研究

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目的 研究 H9C2 心肌细胞培养液对诱导性多能干细胞定

向心肌分化的影响,以建立一种安全有效的体外诱导iPS分化为心肌细胞的实验方法。

**方法** 以1:0、1:1、1:2不同体积比(去除LIF的诱导性多能干细胞培养液(mL):H9C2细胞培养液(mL)配制不同浓度H9C2心肌分化培养液,同时悬滴悬浮法形成拟胚体(EBs),不同浓度H9C2心肌分化培养液诱导培养14d。利用免疫细胞学标记观察多向分化潜能基因OCT-4荧光猝灭情况以及心肌 $\alpha$ -横纹肌辅肌动蛋白( $\alpha$ -actinin)是否表达;RT-PCR检测 $\beta$ -MHC、GATA4、Mef2C、NCX-1等mRNA的表达。

**结果** 不同浓度H9C2分化培养液均可在第7天显著减少小鼠诱导性多能干细胞OCT-4表达,但对各心肌基因表达诱导作用不一,以1:2体积比的H9C2分化培养液最佳。

**结论** H9C2心肌细胞培养液可有效诱导miPSC向心肌细胞分化,提供了一种新型安全的定向诱导心肌的方法。

## MicroRNAs expression profile by next generation sequencing in novel rat model of contrast-induced nephropathy

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**Objective** The classic rat models of contrast-induced nephropathy (CIN) are induced by a contrast medium, Omnipaque, which was not used in cardiac catheterization. We established a novel practical CIN rat model by using a nonionic low-osmolar iodic contrast medium, Ultravist, which was frequent-

ly used in catheterization. This study aims to use next generation sequencing and analyses of gene ontology categories to investigate the microRNAs (miRNAs) expression in this novel rat model of CIN.

**Methods** We established a new method to induce a practical CIN rat model by using furosemide and a nonionic low-osmolar iodic contrast medium Ultravist novelly. Kidney tissues were collected from the CIN rats model group and the control group. MiRNAs microarray assays were used to detect miRNAs in the kidney tissues by next generation sequencing. Real-time PCR were performed to validate results of the microarray assays. All significant differently expressed miRNAs were subjected to analyses of gene ontology (GO) categories and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathways.

**Results** Of the 173 detected miRNAs, 22 were down-regulated and 19 were up-regulated in the kidneys of CIN rats according to fold change > 2,  $P < 0.001$ , which included novel differentially expressed miRNAs, such as miRNA-1949 and miR-3558. Analyses of gene ontology categories shows some biological process such as fatty acid metabolism, galactose metabolism of which the correlations with CIN are still unreported is significantly involved in the process of CIN. GO analysis predicts fatty acid and galactose metabolism may be important underlying mechanisms of CIN and the blood glucose and lipids levels of patients undergoing percutaneous coronary intervention may be crucial factors affecting the occurrence of CIN, which still need more clinical and fundamental researches to validate the association and the mechanisms between fatty acid, galactose metabolism and contrast induced nephropathy. KEGG analysis also indicates some new regulatory pathways are implicated in CIN such as AGE-RAGE signaling pathway, of which the role in contrast induced nephropathy is still unclear.

**Conclusions** We established a new method to induce a practical CIN rat. And next generation sequencing identified 41 miRNAs were significantly differently expressed in the kidneys of novel rats model of CIN, which hold the potential to serve as new biological markers and novel therapeutic targets. GO and KEGG analysis provide novel evidences for CIN, that fatty acid, galactose metabolism and AGE-RAGE signaling pathway may be important parts in the disease development and still need more research to demonstrate the association and mechanism.

## 尼古丁通过乙酰胆碱受体 A7 影响人绒毛膜滋养层细胞侵袭力

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**目的** 尼古丁是烟草的主要组成成分,是先天性心脏病的主要危险因素之一。有研究表明,主动吸烟或被动吸烟会导致婴儿心室间隔缺损和右侧阻塞性缺陷。有文献报道尼古丁可通过氧化应激反应而引起DNA损伤。我们猜测尼古丁可能在受精卵发育过程中损伤滋养层细胞,从而诱导先天性心脏病的发生。

**方法** 培养 HTR-8/Svneo 细胞,加入 0.1、0.5、1、10  $\mu\text{m}/\text{mL}$  的尼古丁,分别用乙酰胆碱受体 A7 特异性抑制剂 MLA 及受体抑制剂 HEXA 处理后,用 MTT 检测细胞增殖情况,划痕实验确定尼古丁对细胞侵袭力的抑制作用,提取 RNA,运用 RT-PCR 方法检测人绒毛膜滋养层细胞中刺激前后 nAChRs 受体单位的表达情况。

**结果** RT-PCR 结果显示刺激前  $\alpha 3$ 、 $\alpha 4$ 、 $\alpha 7$ 、 $\alpha 9$ 、 $\beta 1$ 、 $\beta 2$  6 个 nAChRs 亚单位均有表达,而刺激后  $\alpha 7$  nAChRs 亚单位下降;尼古丁不影响 HTR-8/Svneo 细胞的增值,但明显抑制其侵袭力。采用  $\alpha 7$  nAChR 特异性抑制剂 MLA 能阻断尼古丁的这种作用。

**结论** 尼古丁可通过乙酰胆碱受体 A7 抑制 HTR-8/Svneo 细胞的侵袭力,因而影响正常胎盘的形,这可能是导致胎儿先天性心脏病的机制之一。

## 人巨细胞病毒 UL135 蛋白抑制内皮细胞的迁移

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**目的** 探究人巨细胞病毒 UL135 蛋白对人血管内皮细胞的功能影响。

**方法** 真核表达载体使血管内皮细胞表达 UL135 蛋白,

CCK8 实验检测细胞增殖,流式检测凋亡和细胞周期,细胞划痕和 Transwell 实验检测细胞迁移能力,以及小管形成实验检测血管生成能力。免疫共沉淀法探究 UL135 蛋白相互作用蛋白,蛋白质免疫印迹验证。同源重组构建不同位点突变的质粒进一步探究其主要作用机制。

**结果** 1. CCK-8 结果显示实验组的内皮细胞增殖受到抑制 ( $P < 0.05$ ),细胞凋亡和细胞周期没有差异 ( $P > 0.05$ )。划痕和 Transwell 实验得出 UL135 抑制内皮细胞的迁移 ( $P < 0.05$ ),小管形成实验证明抑制内皮细胞的血管生成能力。2. 免疫荧光明确 UL135 蛋白定位在核周以及细胞膜,以及重构细胞的细胞骨架。3. 免疫共沉淀和蛋白质免疫印迹证明 CD2AP 与 UL135 蛋白存在相互作用。4. SiRNA 干扰 CD2AP 促进内皮细胞的增殖和迁移。5. UL135 主要由其 151-213 的区域结合 CD2AP,发挥抑制内皮细胞功能的作用。  
**结论** 人巨细胞病毒 UL135 蛋白通过与 CD2AP 结合抑制内皮细胞的增殖和迁移。

## 薤白皂苷影响 ADP 诱导血小板源性细胞外囊泡炎症反应

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**目的** 探讨薤白皂苷对 ADP 诱导血小板源性细胞外囊泡炎症反应的影响。

**方法** 筛选人群入组,抽取其外周血进行离心分离提取血小板,洗涤血小板,并进行以下分组:①阳性对照组;②空白对照组;③薤白皂苷低浓度组;④薤白皂苷高浓度组;上述各组经药物预处理后由 ADP 诱导激活炎症反应,通过高速离心提取血小板源性细胞外囊泡;同时将上述血小板源性细胞外囊泡与内皮细胞共培养;NTA 法鉴定血小板源性细胞外囊泡;Western blot 法、ELISA 法、qPCR 检测血小板源性细胞外囊泡及内皮细胞 CD40L 和 VCAM-1、ICAM-1 等细胞因子以及 P-JNK、P-P38、P-NF- $\kappa$ B、IKB- $\alpha$  等炎症相关通路蛋白的表达。

**结果** 与空白对照组比较,薤白皂苷下调血小板源性细胞外囊泡及内皮细胞中 CD40L、VCAM-1、ICAM-1 及 P-JNK、P-P38、P-NF- $\kappa$ B、IKB- $\alpha$  等表达 ( $P < 0.05$ )。

**结论** 薤白皂苷抑制 ADP 诱导血小板源性细胞外囊泡炎症反应,并通过血小板源性细胞外囊泡抑制内皮细胞的炎症反应,其机制可能与 CD40L/JNK/P38/NF- $\kappa$ B 炎症相关信号通路相关。



## Akt plays a protective role in adverse left ventricular responses to volume overload induced by aortic regurgitation in mice

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**Objective** Although aortic regurgitation (AR) is a clinically important condition that is becoming increasingly common due to the aging world population, few relevant murine model exist for this condition. Here, we characterize the physiological and molecular changes over time in mice with surgery-induced AR.

**Methods** AR was induced by puncturing the aortic valve leaflets in C57BL/6J mice under echocardiography. Before and at 1, 2, 4, 8 weeks after surgery, the structural, functional and molecular changes of the left ventricle (LV) were serially examined. The role of several signaling effectors (Akt, CaMKII, and  $\beta$ -arrestin-2) in AR-induced volume overload LV remodeling was interrogated by using their specific antagonists.

**Results** As early as 1 week following AR, the left ventricles (LV) displayed marked impairment of diastolic function and coronary flow reserve as well as cardiac hypertrophy and chamber dilation at both end-systole and end-diastole. Systolic dysfunction, LV free wall thickening and cardiomyocyte hypertrophy in LV was observed 2 weeks following of AR while a decline in ejection fraction was not seen until after 4 weeks. ANP and BNP increased with time, in conjunction with prominent

Akt activation as well as slight CaMKII activation and biphasic changes in  $\beta$ -arrestin-2 expression. Treatment of AR mice with the Akt inhibitor, wortmannin, exacerbated the eccentric hypertrophy, while neither inhibition of CaMKII nor  $\beta$ -arrestin-2 overexpression influenced the response to AR.

**Conclusions** In summary, we characterized the progressive evolution of LV eccentric hypertrophy and failure in a novel mouse model of volume overload surgically induced by puncture of aortic valves. The process of the LV remodeling we described here was structurally, functionally and molecularly different from that well documented in pressure overload models such as transverse aortic constriction. We further found that Akt, rather than  $\beta$ -arrestin-2 or calcium handling proteins, may be a useful therapeutic target for this kind of volume overload. Although the specific molecular drivers of eccentric hypertrophy remain to be further elucidated, our present work may shed important light on eccentric hypertrophy mechanisms and have the potential to differentiate pharmaceutical options for different types of cardiac hypertrophy.

## 大鼠不同部位脂肪来源干细胞生物学特性及其在心肌梗死中作用的实验研究背景及目的

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**目的** 皮下脂肪组织来源的干细胞和内脏脂肪来源的干细胞研究均为分别研究两种来源脂肪干细胞,尚无系统比较两种来源脂肪干细胞在缺血性心脏病治疗中心肌保护作用方面的研究。本实验研究的目的是评价两种来源的脂肪干细胞是否能够对心肌梗死后心脏功能改善提供长期效果。

**方法** 通过提取大鼠皮下脂肪组织和腹腔内脏脂肪组织获取脂肪干细胞。对皮下脂肪组织和内脏脂肪组织来源干细胞的形态学、细胞表面标志物、产率、增殖能力、分化能力、细胞因子分泌进行测定和比较。为了评价两种来源脂肪干细胞的心肌保护能力,通过结扎大鼠前降支制作大鼠心肌梗死模型,结扎后1周再次开胸,在心肌梗死周围分别注射皮下脂肪组织来源干细胞(S-ASCs, n=11),内脏脂肪来源干细胞(V-ASCs, n=11),改良的伊格格培养基(DMEM, n=10)。心脏功能的评价应用核磁共振检查,大

鼠心脏功能随访评价最长在细胞移植后6个月进行。心肌梗死面积及移植的干细胞追踪通过组织学染色、铁染色或免疫荧光成像技术评价。

**结果** 从1克内脏脂肪组织获取的内脏脂肪组织来源于干细胞(S-ASCs)数量明显高于从1克皮下脂肪组织获取的皮下脂肪组织来源于干细胞(V-ASCs)。另一方面,皮下脂肪组织来源的干细胞增殖能力及克隆形成能力方面明显好于内脏脂肪组织来源的干细胞。同时,无论是随访4周组还是随访6个月组,应用两种来源的脂肪干细胞治疗心肌梗死后,大鼠心脏左室射血分数明显好于DMEM治疗组。应用两种来源的脂肪干细胞治疗的大鼠心肌梗死面积明显小于DMEM治疗组。通过核磁共振检查我们发现在干细胞植入大鼠心脏6个月后仍可发现移植的干细胞。

**结论** 尽管两种来源脂肪组织干细胞在细胞产率、细胞增殖能力、克隆形成能力方面有所差别,但是两种来源脂肪组织干细胞治疗后均可以使梗死大鼠心脏收缩功能得到长期稳定的提高。皮下脂肪组织来源干细胞和内脏脂肪组织来源干细胞在心衰治疗中具有相似的作用。

## 风湿性心脏病心房颤动患者心房肌TGF- $\beta$ 1信号通路表达改变的研究

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**目的** 研究风湿性心脏病心房颤动患者心房肌TGF- $\beta$ 1信号通路表达情况,揭示TGF- $\beta$ 1信号通路在心房颤动演变过程的作用机制。

**方法** 组织样本来自于90例开胸风心病瓣膜置换术患者,其中心房颤动组50例,窦性心律组40例。应用Realtime-PCR和Western blot方法检验TGF- $\beta$ 1信号传导通路中各信号因子的mRNA和蛋白表达水平,它们包括:非smad信号通路中ERK1/2, JNK和p38; Rac1信号通路中Rac1, connexin 43和N-cadherin,并分析上述6种蛋白与I型胶原蛋白的关系。

**结果** Realtime-PCR结果显示与窦律组比较,在房颤组中ERK1/2( $P=0.007$ )、p38( $P=0.028$ )、connexin 43( $P=0.040$ )和N-cadherin( $P=0.003$ ) mRNA表达上调。JNK( $P=0.210$ )、Rac1( $P=0.463$ )房颤组与窦律组比较无明显差异,没有统

计学意义。Western blot显示与窦律组比较,在房颤组中Col I( $P<0.001$ )、ERK1/2( $p=0.015$ )、p38( $P=0.013$ )、connexin 43( $P=0.036$ )和N-cadherin( $P=0.003$ )蛋白表达上调,有统计学意义。JNK( $P=0.081$ )、Rac1( $P=0.753$ )房颤组与窦律组比较无明显差异,没有统计学意义。其结果和mRNA表达一致。另外,通过相关性分析发现6种检测因子的蛋白表达均与Col I蛋白表达存在正相关。相关系数分别为(0.578, 0.353, 0.568, 0.345, 0.488, 0.490)和P值分别为(0.009, 0.024, 0.015, 0.038, 0.036, 0.044)。

**结论** 在风心病房颤的心房中存在明显的I型胶原纤维堆积,可能与心房颤动的发生密切相关。风湿性心脏病心房颤动患者心房肌中TGF- $\beta$ 1下游信号分子ERK1/2、p38、connexin 43和N-cadherin存在过表达,可能与风湿性心脏病心房颤动的发生、发展有关。6种目的蛋白均与Col I蛋白存在正相关关系,可能与风心病心房纤维化、心肌胶原增多有关。

## 核磁共振检测压力超负荷猪左室心肌肥厚模型的建立

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**目的** 探讨压力超负荷猪左室肥厚模型的可行性及核磁共振技术检测心脏结构及心功能的可靠性。

**方法** 将10头猪随机分为假手术组、手术组,造模方法:分离升主动脉根部,应用内置缝线的硅树脂管环绕升主动脉,随着猪生长主动脉管径逐渐增加,固定直径的硅树脂管导致升主动脉管径渐进性的缩窄。假手术组不用硅树脂管造成缩窄。应用核磁共振检测猪术后0周、4周、8周的左室收缩末期室壁厚度指标,并于术后8周比较两组猪左室射血分数及左室重量占全心重量比率。

**结果** 与假手术组(1.15 cm $\pm$ 0.13 cm)比较,手术组左室收缩末期室壁厚度(1.59 cm $\pm$ 0.22 cm)明显增加( $P<0.05$ ),手术组射血分数(58.44 $\pm$ 5.87)较对照组(75.34 $\pm$ 2.58)低( $P<0.05$ ),左室重量占全心重量比率手术组(0.58 $\pm$ 0.04)明显增加( $P<0.05$ )。

**结论** 核磁共振的应用为无创性测量和评价心脏收缩功能及心脏结构提供了新的选择。

## 血栓素 B2 对急性主动脉夹层鉴别诊断的价值

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**目的** 探讨血栓素 B2 对主动脉夹层鉴别诊断的价值。

**方法** 本实验选取我院 2016 年患者血浆样本 36 例:急性主动脉夹层患者 (Acute Aortic dissection, AAD) 12 例,其中 A 型主动脉夹层 (AAD-A) 6 例, B 型主动脉夹层 (AAD-B) 6 例;急性心肌梗塞患者 (Acute Myocardial Infarction, AMI) 12 例,其中 ST 抬高 (AMI-ST) 6 例,非 ST 抬高 (AMI-NST) 6 例;急性肺栓塞患者 (Acute Pulmonary Embolism, APE) 6 例;健康对照者 (Health Control, HC) 6 例。采用酶联免疫吸附法 (ELISA) 测定血浆血栓素 B2 (Thromboxane B2, TxB2) 的浓度。

**结果** AAD-A 组 TxB2 浓度 [11194.5 (6444.5, 13096.7) pg/mL,  $P < 0.001$ ] 显著高于其他组; AAD-B 组 TxB2 浓度 [5488.3 (3186.1, 5686.0) pg/mL,  $P < 0.001$ ] 显著低于 AAD-A 组; AMI-ST 组 TxB2 浓度 [7047.7 (4406.6, 7551.5) pg/mL,  $P < 0.005$ ] 显著高于 HC 组、显著低于 AAD-A 组; AMI-NST 组 TxB2 浓度 [6699.1 (4912.3, 6929.7) pg/mL,  $P < 0.005$ ] 显著高于 HC 组、显著低于 AAD-A 组; APE 组 TxB2 浓度 [5766.6 (2951.5, 6343.36) pg/mL,  $P < 0.001$ ] 显著低于 AAD-A 组; HC 组 TxB2 浓度 [4222.4 (1929.9, 4308.4) pg/mL,  $P < 0.005$ ] 显著低于 AAD-A 组、AMI-ST 组、AMI-NST 组。

**结论** 血浆 TxB2 对于急性 A 型主动脉夹层的鉴别诊断具有潜在的意义,需扩大样本量验证。

## Exosomes derived from cardiomyocytes after acute myocardial infarction can induce renal tubular epithelial cell apoptosis

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**Objective** The incidence of acute myocardial infarction (AMI) in China is 32-99/100,000, and the mortality rate is 56-70/100,000, which is still rising continuously. Our previous multi-center clinical researches showed that over 22% AMI patients would develop acute kidney injury (AKI), and the risk of 1-year death among AKI after AMI patients increased 8 times. United States data showed that the incidence of AKI among AMI patients was 36.9%, while the risk of death in the hospital and dialysis increased by 7 times and by 20 times respectively. but AKI lacked effective treatment after AMI. AKI after AMI has a high incidence, poor prognosis, and lack of effective treatment. Researches show the development of AKI after AMI is related to hemodynamic change, inflammatory immune activation, and neurohormonal feedback. But the specific molecular regulating network in AKI after AMI is still unclear. Exosome is a kind of 30-100 nm, enveloped by cell membranes microparticles secreted by cells. Recently many studies demonstrated exosomes participated in the development of many diseases including diabetes mellitus and atherosclerosis. This study aims to reveal the crosstalk between heart and kidney in AKI after AMI and to investigate the role exosomes playing in the acute kidney injury after acute myocardial infarction.

**Methods** The AMI cardiomyocyte model was constructed by ischemia-anoxia human cardiomyocyte AC16 cell line. Exosomes were extracted from the cell culture medium of the AMI cardiomyocyte model by ultracentrifugation. Density gradient centrifugation and BCA protein assay was used to purify and quantify exosomes. Nanoparticle tracking analysis (NTA), Electron microscopic observation and exosome marker proteins (TSG101, Syntenin1) tested by western blot were performed to identify exosomes. Exosomes extracted from AMI cardiomyocyte were added to HK-2. TUNEL, western blot and flow cytometry were ordered to determine the apoptosis level. PKH26 labeled exosomes tracking assay and exosomes blocking experiment with secretion inhibitor GW4689 were also performed to validate the exosome-derived cells and target cells.

**Results** Exosomes extracted from the AMI cardiomyocyte exhibit typical exosomal characteristics, mainly concentrated in

with 30–100nm according to NTA, both positive in TSG101 and Syntenin1 through western blot as well as demonstrating typical tea dish-like structure in electron microscopy. Comparing with the HK-2 treated with exosomes extracted from normal AC16, the HK-2 adding AMI cardiomyocyte exosomes shows higher apoptosis levels according to TUNEL. Western blot find significant upregulate of Bax and flow cytometry also find higher early-stage apoptosis is higher than control. PKH26 labeled exosomes tracking assay and exosomes blocking experiment with secretion inhibitor GW4689 verify the AMI cardiomyocyte can secrete the exosomes and the HK-2 can endocytose these. Therefore, we find exosomes secreted by cardiomyocytes after acute myocardial infarction can induce renal tubular epithelial cell apoptosis.

**Conclusions** Our study demonstrates that cardiomyocytes after acute myocardial infarction will secrete exosomes which can be endocytosed by renal tubular epithelial cell. These AMI cardiomyocytes derived exosomes can induce renal tubular epithelial cell apoptosis, which may be the key mechanism underlying AKI after AMI. Therefore, by revealing the novel effect exosomes exert in the crosstalk between heart and kidney, our research provides a new direction for the mechanism of AKI after AMI. But what component in these exosomes mediates renal tubular epithelial cell apoptosis still need more research to investigate.

## 活性氧和 pH 双重响应性雷帕霉素纳米粒靶向抑制颈动脉球囊损伤后新生内膜形成

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**目的** 建立一种具有主动靶向和缓释作用的活性氧(ROS)和 pH 双重响应性系统给药的雷帕霉素(RAP)载药纳米粒(T-RAP/OAbCD NP);探讨其药物释放规律、体内外靶向分布特异性和生物相容性,评价其在 SD 鼠颈动脉再狭窄模型中的疗效,为经皮腔内血管成形术(PTA)后血管再狭窄的防治提供新的思路。

**方法** 基于  $\beta$ -环糊精(bCD),采用缩醛反应合成酸响应性

材料(AcbCD)作为 pH 敏感性载体材料,通过在 bCD 上键合氧化敏感响应性基团 PBAP 得到 ROS 响应性载体材料(OxbCD),优化 OxbCD 和 AcbCD 含量为 80wt% 和 20wt%,并与靶向血管内皮下 IV 型胶原的多肽(Col-IV-peptide)共同修饰,采用纳米沉淀自组装技术,建立 ROS 和 pH 双响应性靶向纳米粒(T-RAP/OAbCD NP),通过动态光散射及透射电镜对其理化性质进行表征,HPLC 检测其包封率、载药量等,并观察体外药物释放规律。CCK-8 法观察 T-RAP/OAbCD NP 的细胞毒性以及对血管平滑肌细胞(VSMCs)的生长抑制作用。建立 SD 鼠颈动脉球囊损伤模型,应用活体成像仪对损伤血管进行荧光成像,观察载药纳米粒的体内分布情况,评价 T-RAP/OAbCD NP 抑制 PTA 术后血管新生内膜增生的疗效。

**结果** ROS 和 pH 双响应 RAP 载药纳米粒平均粒径约 150 nm,核壳结构,具备极好的生物相容性和可生物降解的特性,足够的药物负载能力,在细胞外正常生理条件下最小的药物释放,而在氧化应激和炎性微环境条件下,能实现程序性降解并快速释放完整的 RAP。CCK-8 检测和激光共聚焦分析表明,基于  $\beta$ -环糊精构建的靶向药物递送系统具有良好的细胞相容性以及由靶向血管内皮下 IV 型胶原介导的对损伤血管的靶向能力,可以显著提高 RAP 抑制 VSMCs 增殖和迁移能力。在尾静脉注射后,靶向 IV 型胶原的 T-OAbCD NP 能更多地聚集在球囊损伤后大鼠颈动脉的受损部位。在鼠动脉再狭窄模型中,与聚乳酸-羟基乙酸共聚物(PLGA)为载体材料的非响应性负载 RAP 的纳米粒以及 ROS 或 pH 单一响应性载体材料制备的负载 RAP 的纳米粒相比,静脉注射 T-RAP/OAbCD NP 能更有效地抑制血管新生内膜的增生。

**结论** 这种基于 ROS 和 pH 双响应性靶向药物递送系统平台作为一种系统性的按需递送治疗方式,可能为 PTA 术后再狭窄的防治带来潜在的临床获益,具有良好的应用前景。

## TRPC3 基因多态性与高血压合并 OSAHS 的易感性关系

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**目的** TRPC3 基因多态性与高血压合并 OSAHS 之间的相关性研究。

**方法** 选择2015-2017年在我院就诊的高血压合并OSAHS的患者302例为病例组,单纯高血压患者72例为对照组,收集静脉血(EDTA抗凝),提取DNA,利用Sequenom MassArray方法,检测全部受试者TRPC3通道蛋白rs953691,rs10518289,rs2292232,rs4995894,rs951974等五个SNP位点的基因型。

**结果** rs953691,rs10518289,rs2292232,rs4995894,rs951974位点的基因型和等位基因频率在两组间的差异无统计学意义。而rs10518289位点的基因型GG和等位基因G频率在病例组中显著高于对照组(均 $P<0.05$ ),同时基因显性模型(GG/CG+CC)分布,隐性模型(CC/CG+GG)分布在两组之间有显著性统计学差异( $P<0.05$ )。并进行多因素Logistic回归分析,结果显示,rs10518289基因位点的GG基因型(OR=2.835,95%CI:1.316-6.108, $P=0.008$ )、显性模型(OR=1.925,95%CI:1.036-3.578, $P=0.038$ )、隐性模型(OR=0.463,95%CI:0.243-0.883, $P=0.019$ )与高血压合并OSHAS发生相关联。

**结论** TRPC3通道蛋白rs10518289的基因多态性位点与高血压合并OSHAS的发生密切相关。

## 辣椒素对高盐诱导大鼠肾小球损害及TGF- $\beta$ 1/Smads通路的影响

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**目的** 探讨膳食辣椒素对高盐诱导肾小球损害的作用和机制。

**方法** 雄性Wistar大鼠36只,随机分为:普食组( $n=12$ ,0.5%正常盐饲料)、高盐组( $n=12$ ,4%高盐饲料)、辣椒素组( $n=12$ ,4%高盐+0.02%辣椒素饲料)。每4周用智能无创鼠尾动脉血压仪监测尾动脉压;生化方法测定24h尿微量白蛋白(MAU)、血尿肌酐;HE、Masson染色观察肾小球形态及胶原纤维;real-time PCR法检测肾脏皮质区转化生长因子- $\beta$ 1(TGF- $\beta$ 1)、Smad2、Smad3、Smad7的mRNA表达,Western-blot法检测皮质区瞬时受体电位通道香草醛亚型-1(TRPV1)、TGF- $\beta$ 1、磷酸化Smad2/3(p-Smad2/3)、Smad7、I型胶原(Col I)的蛋白表达。

**结果** 与普食组相比,高盐组的大鼠颈动脉收缩压升高[(145.8 $\pm$ 5.8)比(118.1 $\pm$ 8.3) mm Hg, $P<0.05$ ],肾小球纤维化指数[(23.2 $\pm$ 2.4)比(13.6 $\pm$ 1.1), $P<0.05$ ]明显增高,24h尿MAU明显增高,肌酐清除率(Ccr)降低;肾脏皮质区

TGF- $\beta$ 1(236.1 $\pm$ 43.5比100 $\pm$ 13.8)、Smad2(312.4 $\pm$ 54.1比100 $\pm$ 10.1)、Smad3(294.6 $\pm$ 48.5比100 $\pm$ 13.2)、Smad7(258.6 $\pm$ 32.1比100 $\pm$ 8.4)的mRNA表达升高,TGF- $\beta$ 1[(0.41 $\pm$ 0.08)比(0.25 $\pm$ 0.04), $P<0.05$ ]、p-Smad2/3[(0.57 $\pm$ 0.12)比(0.28 $\pm$ 0.1), $P<0.05$ ]、Smad7[(0.87 $\pm$ 0.12)比(0.49 $\pm$ 0.13), $P<0.05$ ]蛋白表达增高,Col I蛋白表达增高、TRPV1蛋白表达降低。辣椒素干预后,大鼠颈动脉收缩压较高盐组明显降低[(125.5 $\pm$ 6.81)比(145.8 $\pm$ 5.8) mm Hg, $P<0.05$ ],肾小球纤维化指数[(16.5 $\pm$ 1.4)比(23.2 $\pm$ 2.4), $P<0.05$ ]明显降低,24h尿MAU明显降低,TRPV1蛋白表达增高[(0.75 $\pm$ 0.07)比(0.30 $\pm$ 0.05), $P<0.05$ ],Col I蛋白表达下降,上述TGF- $\beta$ 1/Smads通路各基因和蛋白表达也显著降低(均 $P<0.05$ )。

**结论** 辣椒素能改善高盐诱导肾小球损害,其机制可能与激活TRPV1、抑制TGF- $\beta$ 1/smads通路有关。

## 血管紧张素转化酶2激动剂对去氧皮质酮-盐敏感性高血压大鼠血压组分及血压变异性的影响

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**目的** 探讨血管紧张素转化酶2(angiotensin converting enzyme2, ACE2)特异性激动剂乙酰甘氨酸重氮苯胺(diminazen acetate, DIZE)对去氧皮质酮(DOCA)-盐敏感性高血压大鼠血压组分及血压变异性(blood pressure variability, BPV)的影响。

**方法** 36只雄性Sprague-Dawley大鼠随机分为Sham组( $n=10$ ),DOCA组[ $n=13$ ,DOCA 50 mg/(kg $\cdot$ w)],DIZE组[ $n=13$ ,DOCA 50 mg/(kg $\cdot$ w)+DIZE 15 mg/(kg $\cdot$ d)]。采用Softron BP-98A无创血压仪测大鼠尾动脉血压,1次/周,共8周;以标准差(SD)、变异系数(CV)作为短时BPV(数分钟变异)及长时BPV(数周间变异)的指标。

**结果** 与Sham组比较,DOCA组大鼠尾动脉收缩压、舒张压、平均动脉压均在实验第1周时升高,脉压于第3周一过性增高、于第5周再升高,持续至实验第8周;长时收缩压变异性于0~1周时增高、长时舒张压变异性增高于0~4周、长时平均动脉压变异性0~2周时增高、长时脉压变异性0~5周时升高,持续至实验第8周。与DOCA组比较,

DIZE组大鼠尾动脉收缩压于第2周,舒张压与平均动脉压在第4周时降低,长时收缩压变异性于0~2周时降低、长时平均动脉压变异性0~4周时降低,持续至实验第8周。各组大鼠短时BPV差异无统计学意义。

**结论** DOCA-盐敏感性高血压大鼠各血压组分、长时血压变异性均增高;DIZE降低收缩压、舒张压、平均动脉压,同时降低长时收缩压变异性及长时平均动脉压变异性,且对收缩压及长时收缩压变异性的影响更早。

## L-精氨酸缓解阿霉素诱导的血管功能障碍的机制研究

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**目的** 使用多柔比星(Dox)治疗的患者有发生血管毒性反应的高风险,但其机制尚不明确。L-精氨酸是一氧化氮(NO)的产生底物。在使用多柔比星抗癌治疗的患者中精氨酸-NO代谢水平的降低与血管损伤程度的增加相关。因此,我们对Dox引起的血管功能障碍机制进行了研究,并验证补充L-精氨酸是否可以缓解这种血管毒性作用。

**方法** 在注射Dox的小鼠模型(5 mg/kg, 2或4周)中,我们对血管舒张功能、血压、血管内NO生成水平,细胞凋亡以及氧化应激进行了测定。同时我们也对Dox诱导的小鼠服用L-精氨酸(1.5 mg/g/天,4周)后对的血管舒张压,血管NO生成水平,细胞凋亡以及氧化应激的影响进行了评估。

**结果** Dox引起内皮依赖性血管功能障碍与血管内氧化应激(ROS)增加和NO产生减少密切相关,进而使平滑肌细胞和内皮细胞凋亡。在小鼠模型中注射Dox后会使得血压升高,但对血管炎性反应和纤维化没有影响。L-精氨酸通过增强血管内NO产生和减轻ROS介导的细胞凋亡来缓解Dox引起的血管功能障碍。

**结论** 我们首次证实了L-精氨酸通过明显增加血管内NO释放和抑制细胞凋亡来缓解Dox引起的血管功能障碍。我们的研究结果为评估Dox治疗引起的血管功能障碍提供了治疗靶点和循环标记,并让我们了解了Dox引起的血管功能障碍的机制。

## 长期高盐饮食对Wistar大鼠血压变异性的影响

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**目的** 观察长期高盐饮食对Wistar大鼠血压变异性(BPV)的影响。

**方法** 雄性Wistar大鼠53只随机分为2组:对照组( $n=12$ , 饲以0.5% NaCl饲料饲养)和高盐组( $n=41$ , 饲以8% NaCl饲料饲养),共饲养24周。采用尾动脉测压仪分别测定Wistar大鼠实验前(0周)和实验3、5、6、7、9、11、13、15、17、19、21、23、24周时尾动脉压。实验24周时,依据血压水平将高盐组分为高盐血压正常组(HSN组,  $n=7$ )和高盐高血压组(HSH组,  $n=34$ ),计算各组短时、长时BPV。

**结果** 与对照组相比,高盐组大鼠血压、短时收缩压变异性(SBPV)、短时舒张压标准差(DSD)、长时SBPV和长时舒张压变异性(DBPV)均增高( $P<0.05$ );HSN组大鼠仅长时SBPV[SSD:( $9.20\pm 2.39$ )比( $5.16\pm 1.63$ )mm Hg, SCV:( $8.14\pm 2.23$ )比( $4.77\pm 1.56$ )]增高( $P<0.05$ );HSH组大鼠血压、短时SBPV、长时SBPV[SSD:( $15.46\pm 5.38$ )比( $5.16\pm 1.63$ )mm Hg, SCV:( $12.14\pm 3.50$ )比( $4.77\pm 1.56$ )]、短时DSD、长时DBPV[DSD:( $16.19\pm 4.57$ )比( $8.93\pm 2.30$ )mm Hg, DCV:( $17.30\pm 4.65$ )比( $10.99\pm 3.14$ )]均增高( $P<0.05$ )。与HSN组大鼠相比,HSH组大鼠长时SSD、SCV于实验0~3周增高并先于收缩压增高(实验第6周),长时DSD于实验0~5周增高并先于舒张压增高(实验第9周)。

**结论** 长期高盐饮食可致高盐高血压Wistar大鼠长时SBPV、DBPV增高且早于其血压升高;高盐血压正常Wistar大鼠仅长时SBPV增高。

## HIF-1介导远端缺血预适应诱导血浆外泌体对HUVECs氧化应激损伤的保护作用

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**目的** 探讨远端缺血预适应(RIPC)诱导的外泌体对内皮细胞氧化应激损伤的作用及HIF-1是否介导了远端缺血

预适应诱导外泌体的释放。

**方法** 首先建立大鼠远端缺血预适应模型,然后采集远端缺血预适应模型大鼠及正常大鼠的血浆,通过差速超高速离心的方法分离外泌体,并对外泌体进行鉴定,然后分别加入内皮细胞共培养24小时,接着给予1mM的H<sub>2</sub>O<sub>2</sub>处理,通过检测LDH、CCK8及凋亡情况综合判定远端缺血预适应诱导的外泌体对氧化应激损伤的内皮细胞的作用,同时为了判断HIF-1在远端缺血预适应诱导外泌体释放过程中的作用,我们预先给予大鼠注射HIF-1的抑制剂,然后再给予远端缺血预处理,采集血浆外泌体,通过纳米颗粒跟踪分析仪检测HIF-1的抑制剂是否能够减少远端缺血预适应诱导的外泌体的释放。

**结果** 在本研究中,我们观察到RIPC后大鼠血清中的外泌体数量多于RIPC之前。并且来自大鼠血浆的外泌体可以被人脐静脉内皮细胞(HUVEC)摄取。此外,我们发现RIPC诱导外泌体能够减少内皮细胞的氧化应激损伤。另外在体内实验中表明,RIPC诱处理后大鼠双下肢的肢体中HIF-1的表达水平显著增加,并且当给予大鼠注射HIF-1的抑制剂后抑制大鼠RIPC诱导外泌体的释放,同时远端缺血预适应诱导的外泌体对内皮细胞氧化应激损伤的保护作用也被HIF-1的抑制剂所阻断了。

**结论** 我们的研究表明,远端缺血预适应诱导的外泌体能够减少双氧水诱导的内皮细胞损伤,并且初步证明了HIF-1介导了RIPC诱导外泌体释放。

## Legumain/Smad3在大鼠动脉粥样硬化斑块中的研究

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**目的** 通过大鼠模型,观察动脉粥样硬化的胸主动脉组织中Legumain的表达,探讨Legumain与动脉粥样硬化斑块的关系。

**方法** 30只健康雄性大鼠,取血后随机分为对照组(n=10,普通饮食)和实验组(n=20,高脂饮食)建立胸主动脉粥样硬化模型。造模12周后取血和胸主动脉,应用血清学、免疫组化、Western-Blot、RT-PCR等方法测定Legumain。

**结果** (1)两组间动脉粥样硬化指数和体重在12周有统计学差别(P<0.05);(2)血清Legumain在12周时实验组高于

对照组(P<0.05);(3)12周处死动物病理显示造模成功,大鼠胸主动脉形成动脉粥样硬化斑块;(4)免疫组化显示Legumain实验组表达高于对照组(P<0.05);(5)Western-Blot、RT-PCR显示Legumain在实验组高于对照组(P<0.05)。

**结论** Legumain在动脉粥样硬化斑块表达增高,Legumain可能参与了动脉粥样硬化及相关的炎症反应。

## Pretreatment with a combination of ligustrazine and cycloviobuxin-D improves cardiac function in rats with coronary microembolization

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**Objective** To evaluate the beneficial effects of a combination of ligustrazine and CVB-D in a rat model of coronary microembolization

**Methods** SD rats were treated with ligustrazine, CVB-D, ligustrazine+CVB-D, or clopidogrel for 2 weeks. When the treatment completed, CME was induced by injection of sodium laurate into the left ventricular, while obstructing the ascending aorta. All rats were intubated for hemodynamic measurements.

**Results** Pretreatment with the combination of ligustrazine and CVB-D significantly improved cardiac function, and decreased myocardial necrosis, inflammatory cell infiltration, mi-

表1 使用JNJ0966前后各组大鼠的收缩压水平  
( $\bar{x} \pm s$ , n=6, mmHg)

组别	干预前血压值	干预后血压值	差值平均值 (干预后-干预前)
假手术组	111.777±6.90 <sup>a</sup>	114.189±8.495 <sup>a</sup>	2.412
模型对照组	153.457±10.024 <sup>b</sup>	171.107±15.616 <sup>b</sup>	17.651
低剂量组	145.055±5.320	138.961±2.741 <sup>ab</sup>	-5.134
高剂量组	150.814±8.520	133.882±10.540 <sup>ab</sup>	-16.933

注:与模型对照组比,<sup>a</sup>P<0.05;与假手术组比,<sup>b</sup>P<0.05。

crothrombosis and serum CK-MB levels in CME rats. In addition, this combination significantly decreased plasma ET-1 levels and von Willebrand factor, inhibited ADP-induced platelet activation, and reduced TNF $\alpha$ , IL-1 $\beta$ , ICAM-1 and RANTES levels in serum and heart tissues.

**Conclusions** The combination of ligustrazine and CVB-D significantly improved cardiac function in rat CME model via a mechanism involving antiplatelet and anti-inflammatory effects.

## 特异性抑制 MMP-9 的表达显著降低肾血管性高血压大鼠的血压水平

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**目的** 已明确肾血管性高血压发病与 RAAS 系统密切相关,但是否与基质金属蛋白酶9(MMP-9)增高有关尚不清楚。本研究通过检测肾血管性高血压大鼠模型血清及心肌组织中 MMP-9 蛋白水平并 MMP-9 特异性抑制剂 JNJ0966 对其血压的影响,探讨 MMP-9 在肾性高血压发病机制中的作用。

**方法** 4 只 SPF 级 8 周龄雄性 SD 大鼠,8 只为假手术,其余按双肾双夹法造模。术后第二周根据血压结果,将造模成功后的 18 只大鼠随机分配到模型对照组、低剂量组、高剂量组,每组 6 只,随机选出 6 只假手术鼠作为假手术组。所有大鼠于干预前 1 天用无创尾动脉血压计进行血压测量,低剂量组和高剂量组大鼠分别每天以 10 mg/kg 和 30 mg/kg 的 JNJ0966 溶解于 1 mL 20% 的增溶剂中,灌胃,持续 1 周。模型对照组和假手术组仅给予 20% 的增溶剂灌胃,1 mL/天,持续 1 周。干预 1 周后,在第 8 天进行血压测量,然后处死大

鼠并取材。免疫印迹法(Western blotting)检测心肌组织中 MMP-9 水平;ELISA 法检测血清 MMP-9、Ang II 水平。

**结果** 1. 使用 JNJ0966 可使肾血管高血压大鼠的血压下降经干预后,与假手术组相比,模型对照组血压明显增高( $P<0.05$ );低剂量组和高剂量组与假手术组之间有显著差异( $P>0.05$ )。与模型对照组相比,低剂量组和高剂量组血压水平明显降低( $P<0.05$ )。低剂量组和高剂量组之间无明显差异( $P>0.05$ )。(表 1,图 1)

**表 2** 各组大鼠血清中 MMP-9 及 Ang II 及心肌 MMP-9 蛋白水平的表达( $\bar{x}\pm s, n=6$ )

组别	血清	组织	
	MMP-9 (ng/mL)	Ang II (pg/mL)	MMP-9
假手术组	20.036 $\pm$ 5.989 <sup>a</sup>	21.575 $\pm$ 4.746 <sup>a</sup>	0.120 $\pm$ 0.230 <sup>a</sup>
模型对照组	37.831 $\pm$ 16.703 <sup>b</sup>	27.567 $\pm$ 4.716 <sup>b</sup>	3.941 $\pm$ 1.904 <sup>b</sup>
低剂量组	21.715 $\pm$ 4.660 <sup>a</sup>	22.032 $\pm$ 5.180 <sup>a</sup>	0.153 $\pm$ 0.127 <sup>a</sup>
高剂量组	21.890 $\pm$ 9.029 <sup>a</sup>	19.151 $\pm$ 3.347 <sup>a</sup>	0.003 $\pm$ 0.005 <sup>a</sup>

注:与模型对照组比<sup>a</sup> $P<0.05$ ,与假手术组比<sup>b</sup> $P<0.05$ 。

2. 肾血管性高血压大鼠心肌和血清 MMP-9 及血清 Ang II 表达量升高,使用 JNJ0966 后,心肌和血清 MMP-9 及血清 Ang II 表达量下降经干预后,与假手术组相比,模型对照组心肌组织及血清中 MMP-9 蛋白水平及血清 Ang II 均明显增高( $P<0.05$ );低剂量组和高剂量组与假手术组之间无明显差异( $P>0.05$ )。与模型对照组相比,低剂量组和高剂量组心肌组织中 MMP-9 蛋白水平均明显减少( $P<0.05$ )。低剂量组和高剂量组之间无明显差异( $P>0.05$ )。(表 2)

**结论** 特异性抑制 MMP-9 表达可以明显降低肾血管性高血压大鼠的血压, MMP-9 升高可能是肾血管性高血压的发病机制之一。



## ·心血管疾病流行病学调查·

## Does maternal ambient heat exposure during early pregnancy interact with medication use on congenital heart defects? ——A national population-based multicenter case-control study, National Birth Defect Prevention Study

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**Objective** We previously found that extreme heatwave event (EHE) in both summer and spring was associated with higher occurrence with congenital heart defect (CHD) using the U.S. National Birth Defect Prevention Study (NBDPS) data. However, no studies have evaluated the potential interactive effect between EHE and medication use on human health. Thus, this study was aimed to evaluate whether maternal EHE during early pregnancy interact with medication use on CHD.

**Methods** We identified 5848 CHD cases and 5742 controls (without major structural defects) from the National Birth Defects Prevention Study. EHEs were defined by using the 95th (EHE95) or 90th (EHE90) percentile of daily maximum temperature during postconceptional weeks 3–8. Specific drugs included were listed and classified into 3 levels of groups. Any heat-related drugs were categorized as level 1; level 1 drugs were then divided into 9 categories of level 2 drugs, including dehydration drugs, drugs decrease heart rate or contractility, drugs shift the fluid balance, antipsychotic drugs, drugs interfere with thermoregulation, drugs cause vasoconstriction, drugs increase metabolic heat production, any heat perception-related drug, and drugs reduce renal function. Furthermore, the specific type of drugs was classified as level 3 drug. Effect modifier was defined as a mother taking indicated medications at any level (Level 1–3) at least one day during the first and second month postconception (Yes/No), as these two months include the weeks 3–8 postconceptionally. We used a two-stage Bayesian hierarchical model to examine both regional and study-wide associations. Interaction between different category of medication use and EHE predicting CHD was evaluated on

both multiplicative and additive scales.

**Results** This study suggests that no interaction of studied medication use and EHE for the overall population. When stratified by region, use of any heat-related drug, any drug that may change heat perception, the renal function related drugs and the antipsychotic drug tended to increase the aOR (95% CI) of EHE90 from 1.12 (0.76, 1.65) to 3.37 (1.12, 10.18) in the Northeast and Southwest region. NSAID is the driven medication for the above categories. It is not likely NSAIDs exerted the modification effect on EHE90 because of concomitant maternal fever or other medications taking.

**Conclusions** This study suggests that no interaction of studied medication use and EHE for the overall population. However, at climate region level, maternal use of heat-related drugs, such as any drug that may change heat perception, antipsychotic drug, renal function related drug and NSAID, may modify the effect of heat wave on CHD in Northeast or Southwest regions.

## Ratio of triglycerides to high-density lipoprotein cholesterol level as a mediator between obesity and hypertension: The Rural Chinese Cohort Study

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**Objective** This study aimed to explore the association between TG/HDL-C ratio and risk of incident hypertension and whether TG/HDL-C ratio mediates the obesity-incident hypertension association by sex.

**Methods** This study analyzed 9679 participants from a rural Chinese population. Demographic and anthropometric and laboratory data were collected at both baseline (2007–2008) and follow-up (2013–2014) examinations. A multivariate logistic regression model was used to analyze the association between TG/HDL-C ratio and hypertension, estimating odds ratios (ORs) and 95% confidence intervals (CIs). Mediation analy-

sis was performed to examine the contribution of TG/HDL-C ratio to obesity-related hypertension, estimating direct effect and indirect effect and their 95% CIs.

**Results** During a median follow-up of 6.00 years, 1880/9679 (1109/5813 women) participants showed hypertension; the corresponding cumulative incidence of hypertension was 19.94% and 19.08% for men and women, respectively. Men showed no risk of incident hypertension with increasing TG/HDL-C ratio after adjusting for potential confounding factors, including baseline age, educational level, family history of hypertension, physical activity, smoking, drinking, SBP, TC, FPG and LDL-C ( $P$  for trend=0.250). For women, the risk of incident hypertension increased with increasing TG/HDL-C ratio in all three models ( $P$  for trend <0.010). With model 3, risk of incident hypertension for women was increased with TG/HDL-C ratio  $\geq 3.19$  versus <1.88 (OR=1.29, 95% CI=1.05-1.59). Mediation analysis was conducted for females. After adjusting for potential confounding factors, obesity was associated with TG/HDL-C ratio (path a). After adjusting for obesity and potential confounding factors, each additional unit of TG/HDL-C ratio increased the risk of incident hypertension (path b) (OR=1.05, 95% CI=1.01-1.10). The total effect of obesity on incident hypertension was significant (path c) (OR=1.49, 95% CI=1.20-1.84), which indicates that when considering only potential confounding factors rather than TG/HDL-C ratio, obesity was associated with incident hypertension. TG/HDL-C ratio partially mediated the obesity-related incidence of hypertension in women (indirect effect: OR=1.05, 95% CI=1.01-1.09; direct effect: OR=1.43, 95% CI=1.15-1.79). Overall, 10.33% of the total effect was explained by the specified mediator.

**Conclusions** TG/HDL-C ratio was associated with risk of incident hypertension in a rural Chinese female population. TG/HDL-C ratio was also a mediator in the obesity-hypertension association, which could be epidemiological evidence of a cause of the association between obesity and hypertension.

## 血脂异常不同临床分类患病情况及相关危险因素分析

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**目的** 了解2015-2016年浙江省35-75岁人群血脂异常流行状况,分析血脂异常不同临床分类的患病及相关危险因素分布情况。

**方法** 采用分层整群抽样原则选取浙江省6县(市、区)35-75岁常住户籍人群开展心血管病危险因素及常见心血管病患病情况调查。运用SAS 9.0统计软件进行卡方检验、单因素及多因素Logistic回归分析。

**结果** 2015年9月-2016年6月共调查浙江省6县(市、区)(杭州临安、绍兴诸暨、金华义乌、丽水庆元、台州玉环、湖州安吉)35-75岁常住居民40751人,其中血脂异常患者15020人,患病率为36.85%,标化患病率:34.58%。其中高胆固醇血症、高甘油三酯血症、低高密度脂蛋白血症和混合型高脂血症标化患病率分别为:16.11%、13.76%、10.37%和4.01%。高低密度脂蛋白血症标化患病率14.53%。血脂异常总体患病率城市高于农村(39.1% vs 36.1%,  $P < 0.001$ )。女性各类型血脂异常患病率均在50岁以后升高,以高胆固醇血症升高为主。男性40岁血脂异常患病率达高峰,以高TG和低HDL-C血症为主,50-55岁高TC和高LDL-C患病率达高峰。血脂异常相关危险因素分析提示:性别(男性)、年龄(增龄)、职业(就业)、婚姻(分居离异丧偶)、家庭收入(中等收入)、吸烟、BMI分组(肥胖超重)是血脂异常的相关危险因素。

**结论** 浙江省成人血脂异常分类中以高胆固醇血症为主,城市患病率高于农村,男性患病率年轻化,女性50岁后患病率显著升高。年龄和超重肥胖是血脂异常最主要危险因素。

## Age and gender difference in the association between sleep duration and obesity at 6-year follow-up: The Rural Chinese Cohort Study

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**Objective** Increasing studies have focused on sleep-obesity association in adults, however, obtained inconsistent results. Besides, previous prospective cohort studies have rarely focused on abdominal obesity and on the Chinese population. This study aimed to evaluate the association of sleep duration and general and abdominal obesity in a large cohort of rural Chinese adults, and whether the relationship differs by gender and age.

**Methods** We included a total of 12,446 adults aged 18–75 years old who completed baseline examination during 2007–2008 and follow-up during 2013–2014. Non-normally distributed continuous variables were presented as median (interquartile range) and categorical variables as number (percentage). Kruskal–Wallis H (K) and chi-square test were used to evaluate the differences in continuous skewed data and categorical data, respectively. We prospectively investigated the sleep-obesity relationship over an average of 6-year follow-up. Multi-variable logistic regression was performed to assess the odds ratios (ORs) and 95% confidence intervals (CIs) for new-onset general and abdominal obesity.

**Results** Compared with reference category of sleep duration (6.5–7.5 h), short sleep duration (<6.5 h) was significantly associated with increased risk of abdominal obesity (OR=1.60, 95% CI: 1.05–2.45) in men after controlling for multiple covariates. This similar relationship was also found in men aged >60 years (OR=2.68, 95% CI: 1.02–7.04), but not in women (OR=1.12, 95% CI: 0.74–1.70) and men ≤60 years (OR=1.43, 95% CI: 0.88–2.30). No significant association was observed between sleep duration and general obesity in both genders. The results were consistent after conducting sensitivity analysis by restricting to participants without cardiovascular diseases (CVDs), type 2 diabetes mellitus (T2DM) and cancer at baseline.

**Conclusions** Short sleep duration was significantly associated with abdominal obesity in rural Chinese adults, and this association varied across gender and age. However, no significant association was observed between sleep duration and general obesity. More researches are needed to explore the potential mechanism of gender disparity.

## Association of Age and Blood Pressure Among 2.3 Million Adults: Insights from Million Persons Project

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**Objective** Blood Pressure (BP) has a strong correlation with age. However, there is limited information on whether the relationship between age and BP varies across different socio-demographic subgroups. A greater understanding of the association between age and BP is important for developing countries with aging population to mitigate the burden of hypertension through identifying high risk populations. We aim to assess the heterogeneity in the association between systolic BP, diastolic BP and Pulse Pressure (PP) with age, across various socio-demographic subgroups.

**Methods** Cross-sectional study; data were collected from over 2.3 million adults, aged 35–75 years, from 141 primary health care sites (53 urban districts and 88 rural counties) from all 31 provinces in mainland China enrolled in the China PEACE (Patient-Centered Evaluative Assessment of Cardiac Events) Million Persons Project, from September 15, 2014 through June 20, 2017. A comprehensive subgroup analysis was conducted by defining more than 22,000 subgroups of individuals based on all possible combinations of socio-demographic variables, and linearly regressing systolic BP, diastolic BP and PP to age within each subgroup. BP was measured twice with the participant in a seated position, using an electronic BP monitor. If the difference between the two systolic BP measurements exceeded 10 mmHg, a third measurement was taken, and the average of the last two readings was used.

**Results** The study included 2,357,779 participants (59.7% women), with a mean age of 55.7 years (Standard Deviation (SD), 9.8). The mean (SD) systolic BP, diastolic BP and PP were 136.0 mmHg (20.2), 90.0 mmHg (11.2) and 55.0 mmHg (15.2) respectively. Mean systolic BP and PP were linearly and positively associated with age. However, mean diastolic BP showed an initial linear positive association, followed by a linear negative association for age >54 years. Overall, the increase of systolic BP ranged from 0.298 to 2.130 mmHg/year for 95% of the subgroups not taking antihypertensive medication. Among those taking antihypertensive medication, 95% of the coefficients were less than 0.0054 mmHg/year.

**Conclusions** The association of systolic BP and PP with age is positive across tens of thousands of population subgroups, whereas the diastolic BP shows a bimodal association. This information may be important to counter public health burden of hypertension in developing countries with aging population.

## Long-term exposure to PM<sub>1</sub> and CVD prevalence in Chinese adults

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**Objective** Study Aims: While several studies have explored the association between long-term exposure to particulate matter with aerodynamic diameter  $\leq 2.5 \mu\text{m}$  (PM<sub>2.5</sub>) and cardiovascular disease (CVD), evidence the cardiovascular effects of particulate matter with aerodynamic diameter  $\leq 1.0 \mu\text{m}$  (PM<sub>1</sub>) is very scarce. We aimed to investigate the associations between PM<sub>1</sub> and PM<sub>2.5</sub> and CVD prevalence in adults living in Northeastern China, and to compare the magnitudes of the associations of PM<sub>1</sub> and PM<sub>2.5</sub> with CVD prevalence.

**Methods** Methods: During 2009, we randomly recruited 24,845 adults at the age of 18–74 years from 33 communities in Northeastern China. CVD status was determined by self-report of doctor-diagnosed CVD. Three-year (2006–08) average concentrations of PM<sub>1</sub> and PM<sub>2.5</sub> were assigned using a satellite-based exposure. We used spatial Generalized Linear Mixed Models to evaluate the associations between air pollutants and CVD prevalence, adjusting for multiple covariates. Stratified and interaction analyses and sensitivity analyses were also performed.

**Results** Results: The prevalence of CVD was 4.0%. A  $10 \mu\text{g}/\text{m}^3$  increase in long-term exposure to ambient PM<sub>1</sub> levels was associated a 12% higher odds for having CVD (OR = 1.12; 95% CI=1.05–1.20). Compared to PM<sub>1</sub>, association between PM<sub>2.5</sub> and CVD was lower (OR = 1.06; 95% CI = 1.01–1.11). No significant association was observed for PM<sub>1–2.5</sub> ( $1–2.5 \mu\text{m}$ ) size fraction (OR = 0.98; 95% CI = 0.85–1.13). Stratified analyses showed greater effect estimates in men and the elder (eg, a  $10 \mu\text{g}/\text{m}^3$  increase in long-term exposure to ambient PM<sub>1</sub> levels was associated a 16% and 2% higher odds for having CVD in men and women, respectively; a  $10 \mu\text{g}/\text{m}^3$  increase in long-term exposure to ambient PM<sub>1</sub> levels was associated a 28% and 8% higher odds for having CVD in the older and the younger groups, respectively).

**Conclusions** Conclusion: Long-term PM<sub>1</sub> exposure was positively related to CVD, especially in men and the elder. In addition, PM<sub>1</sub> may play a greater role than PM<sub>2.5</sub> in associations with CVD. Further longitudinal studies are warranted to confirm our findings.

## Prevalence, Risk factors and Age threshold of atrial fibrillation in Southern China: Results from the Guangzhou Heart Study

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**Objective** The research is mainly to study the prevalence of atrial fibrillation (AF) and its associated risk factors. This established large population-based cross-sectional study will be rich resource for investigating the characteristics of AF in the Chinese population.

**Methods** A cross-sectional study of 12013 participants (4207 males and 7806 females) aged  $\geq 35$  years in geographically dispersed urban and rural regions of Guangzhou was conducted between July 2015 and August 2017. All participants received questionnaire, physical and blood examination. Univariate and stepwise multivariate logistic regression analysis were performed to evaluate the association between selected risk factors and AF. ROC curve was used to assess the predictive accuracy of age for AF occurrence.

**Results** Of the 12013 participants, 175 (1.46%) were diagnosed with AF. The prevalence was gradually elevated with advancing age groups (41–50, 51–60, 61–70, 71–80 years old) in both male (0.27% to 6.02%) and female (0.12% to 2.98%). Participants with AF has significantly higher prevalence of advanced age, hypertension, diabetes, heart failure, hyperlipidemia, history of stroke, COPD, valvular disease, hyperthyroidism and renal dysfunction (all  $P$ s < 0.01). Univariate and stepwise multivariate logistic regression analysis indicated that Glomerular filtration rate (GFR) < 60 (OR: 1.98, 95% CI: 1.38 to 2.83), valvular disease (OR: 9.50, 95% CI: 5.63 to 16.02), Myocardial infarction (MI) (OR: 2.22, 95% CI: 1.24 to 3.98) and age  $\geq 65$  (OR: 4.30, 95% CI: 3.01 to 6.16) were important risk factors for AF (all  $P$ s < 0.01). ROC curve on the basis of age for the prediction of AF occurrence shown that the cutoff value was 65 years. The  $c$ -index for age was 0.76 (95% CI 0.73 to 0.79).

**Conclusions** The prevalence of AF is 1.46% in the participants enrolled in the present study. GFR < 60, valvular disease, MI and age  $\geq 65$  were independent risk factors for AF. People over 65 years should screen for AF routinely.

## Cardiac rupture after acute myocardial infarction is related to heart rate and beta-blocker dose

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**Objective** Cardiac rupture is a serious complication of acute myocardial infarction, occurring in up to 6% of patients without reperfusion and accounting for 30% of in-hospital mortality. With the development of medical technique, the effective implementation of reperfusion therapy in patients with acute myocardial infarction, the incidence of cardiac rupture after myocardial infarction from 6.2% in 1977 to 1982, dropping to 3.2% between 2001 and 2006, but mortality of CR remains high (at least 70%). Due to its sudden onset and high mortality, clinical research is difficult. It is neither predictable nor effective treatment. In view of the lack of  $\beta$ -blockers in China to reduce the risk of cardiac rupture in patients with STEMI after primary PCI, this article aims to investigate the correlation between heart rate control and cardiac rupture events in STEMI patients and  $\beta$ -blockers. The timing of the agent's application to the prevention of cardiac rupture events further guides clinical work and reduces the incidence of this malignant event.

**Methods** The study consecutively included in the People's Liberation Army General Hospital from August 1993 to August 2017 for primary PCI in patients with ST-elevation acute myocardial infarction and 83 patients with cardiac rupture, selected from January 2010 to 2014. During the month, a total of 353 consecutive patients who underwent primary PCI for ST-elevation acute myocardial infarction and who had no heart rupture were included. We performed statistical analysis on the two groups of patients and screened out the risk factors associated with cardiac rupture in patients with STEMI after primary PCI, and then further logistic regression analysis to obtain independent risk factors.

**Results** By analyzing the patients we enrolled, we obtained six risk factors that independently predicted the risk of cardiac rupture events, including age (OR 1.049, 95% CI 1.008–1.091;  $P=0.017$ ), anterior MI (OR 0.032, 95% CI 1.093–7.582;  $P=0.032$ ), KILLIP stage (OR 3.885, 95% CI 2.285–6.606;  $P<0.001$ ), white blood cell count (OR 1.317, 95% CI 1.145–1.516;  $P<0.001$ ), doses of beta-blockers (OR 0.198, 95% CI 0.082–0.479;  $P<0.001$ ) and heart rate (OR 1.005,

95% CI 1.020–1.092;  $P=0.002$ ). Among them, by further analyzing the heart rate, the results showed that with the increase of heart rate, the relative risk of cardiac rupture events increased gradually, and the daily heart rate monitoring results showed that the risk of poor heart rate control increased the risk of heart rupture. Patients are also grouped according to the dose of beta-blockers, and the risk of heart rupture increases with the decrease in beta-blocker doses.

**Conclusions** Heart rate and beta-blocker dose was independently correlated with cardiac rupture after acute myocardial infarction.

## 血压变化与心血管疾病之间的关系

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**目的** 探究随访期间血压变化(BP)与心血管疾病发病风险(CVDs)之间的关系。

**方法** 我们的分析包括14364名合格的参与者 $\geq 18$ 岁来自6年随访队列研究的中国农村人口。分别于2007–2008年和2013–2014年收集基线和随访资料。多元logistic回归分析被用来评估血压(BP)之间的关系变化和心血管病事件的风险。

**结果** 平均随访时间为6.03年,共发生心血管疾病2576例。与基线和随访时血压正常的参与者相比,持续高血压患者心血管疾病的风险高于基线和随访时血压变化的其他类型的患者(调整后OR为3.23,95%CI 2.84–3.68)。与收缩压变化在20 mmHg范围内的参照组相比,其收缩压增加(SBP)超过40毫米汞柱时,发生中风的风险是最大,尤其是在年龄小于50岁的人群中(在男性中调整后的OR为7.89,95%CI 1.53–40.74;在女性中调整后的OR为4.53,95%CI 1.29–15.85)。但是与舒张压变化在10 mmHg范围内的参照组相比,仅仅当舒张压增加超过20毫米汞柱时,在年龄大于50岁的女性中心血管病风险才有意义,调整后的OR为1.88,95%CI 1.07–3.29。

**结论** 我们的研究表明,在中国农村地区,从基线到随访持续高血压患者有一个很高的心血管疾病患病风险。收缩压和舒张压变化与脑卒中、冠心病事件的风险呈连续、独立、直接的正相关关系。

## Prehypertension and risk of cardiovascular diseases: a meta-analysis of 47 prospective cohort studies

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**Objective** To assess the association of prehypertension (systolic blood pressure [SBP] 120–139 mmHg and/or diastolic blood pressure [DBP] 80–89 mmHg) and total cardiovascular diseases (CVDs), coronary heart disease (CHD), stroke, and myocardial infarction (MI).

**Methods** PubMed, Embase, and Web of Science were searched systematically for articles published up to November 7, 2018. Prospective cohort studies were included if reporting multivariate-adjusted relative risks (RRs) and 95% confidence intervals (CIs) of at least 1 of 4 outcomes associated with prehypertension and its two sub-ranges (low-range: SBP 120–129 mmHg and/or DBP 80–84 mmHg; high-range: SBP 130–139 mmHg and/or DBP 85–89 mmHg). RRs and 95% CIs were pooled using fixed-effects models. Subgroup analyses were conducted according to BP range, race/ethnicity, gender, age, sample size, follow-up duration. Moreover, meta-regression was conducted to estimate the heterogeneity between subgroups.

**Results** Twenty-seven articles (47 prospective cohort studies including 491,666 study participants) were included. Follow-up duration ranged from 2.7 years to 31.0 years. Prehypertension was associated with total CVDs (RR 1.40, 95% CI 1.34–1.46), CHD (RR 1.40, 95% CI 1.28–1.52), stroke (RR 1.66, 95% CI 1.56–1.76), and MI (RR 1.86, 95% CI 1.50–2.32). Only the association between low-range prehypertension and CHD was not observed (RR 1.24, 95% CI 0.89–1.73). Compared with normal BP (SBP <120 mmHg and DBP <80 mmHg), high-range prehypertension predicted an 81% (RR 1.81, 95% CI 1.56–2.10), 65% (RR 1.65, 95% CI 1.13–2.39), 99% (RR 1.99, 95% CI 1.68–2.36), and 99% (RR 1.99, 95% CI 1.59–2.50) higher risk of total CVDs, CHD, stroke, and MI, respectively. The population attributable risk percentages for the association of total CVDs, CHD, stroke, and MI with prehypertension were 12.09%, 13.26%, 19.15%, and 24.60%, respectively.

**Conclusions** Prehypertension, particularly at high-range, is

associated with increased risk of total CVDs, CHD, stroke, and MI. No association was found between CHD and low-range prehypertension. More than 10% CVDs cases would be prevented if prehypertension could be controlled.

## The relationships between ambulatory blood pressure rhythm and autoantibody against $\alpha_1$ -adrenoceptor, AT1-adrenoceptor and serum endothelial microparticles

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**Objective** 1. To investigate the relationships between non-dipping circadian pattern and autoantibody against  $\alpha_1$ -adrenoceptor and AT<sub>1</sub>-adrenoceptor as well as clinical common index such as heart rate, uric acid, HS-CRP and homocystiene. 2. To analyze the relations between ambulatory blood pressure rhythm and endothelial microparticles.

**Methods** Total 196 patients (non-dipping circadian pattern 59 and dipping circadian pattern 137), who were diagnosed essential hypertension, were included. The clinical characteristics and the biochemical indicators were analyzed. The relationships between ambulatory blood pressure rhythm and autoantibody against  $\alpha_1$ -adrenoceptor, AT<sub>1</sub>-adrenoceptor and serum endothelial microparticles were analyzed by unconditional logistic regression.

**Results** 1. There was no significant difference between non-dipping circadian group and dipping circadian group in gender, age, smoking, positive family history, body mass index, serum lipids, blood glucose, serum creatinine, total bilirubin, transaminase, casual blood pressure and 24 hours mean systolic blood pressure and diastolic blood pressure ( $P>0.05$ ). Compared with dipper group, the levels of HS-CRP, homocystiene, uric acid and heart rate were significantly higher in non-dipper group ( $P<0.05$ ). Compared with dipper group, nighttime mean systolic and diastolic blood pressure were significantly higher in non-dipper group ( $P<0.05$ ), and the rates

of decline in nocturnal systolic as well as diastolic blood pressure were significantly lower in non-dipper group ( $P < 0.05$ ).

2. The prevalence rate of autoantibody against AT<sub>1</sub> adrenoceptor in non-dipper group (42.3%) was higher than in dipper group (25.8%). Nevertheless, the prevalence rate of autoantibody against  $\alpha_1$ -adrenoceptor between non-dipping group and dipping group has no significant difference.

3. The number of endothelial microparticles in non-dipper group was higher than that in dipper group:  $917.9 \pm 293.4$  versus  $554.7 \pm 261.3$  ( $P < 0.05$ ).

4. The binomial unconditional logistic regression analysis showed that serum uric acid and the number of endothelial microparticles had independent relationship with nondipping circadian pattern ( $P < 0.05$ ).

**Conclusions** The autoantibody against AT<sub>1</sub> adrenoceptor, serum uric acid and endothelial microparticles may be potential therapeutic targets in patients with nondipping circadian.

## Region-specific Dose-response Association between Alcohol Drinking Pattern and Metabolic Syndrome: A Systematic Review and Meta-Analysis of Cohort Studies

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**Objective** This systematic review and meta-analysis aims to assess the association of alcohol drinking pattern (drinking volume, drinking frequency, and beverage-specific alcohol) and incident metabolic syndrome (MetS).

**Methods** Articles published up to March 21, 2018 were identified in PubMed and Embase. Random- and fixed-effect models were used to calculate pooled relative risks (RRs) and 95% confidence intervals (95% CIs) for high- and low-heterogeneity studies, respectively. Restricted cubic splines were used to model the dose-response association.

**Results** The systematic review and meta-analysis included 12 articles (16 studies), with 8,803 incident cases of MetS in 65,895 individuals. The relation between alcohol consumption

and MetS among all participants was not statistically significant. However, with each 10-g/day increment in alcohol consumption, the RRs (95% CIs) for MetS in Asia, the United States, and Europe were 1.05 (1.02–1.07), 0.95 (0.92–0.98), and 1.10 (0.96–1.27), respectively. In the dose-response analysis, the risk of MetS increased with alcohol consumption linearly in Asia and Europe (Asia:  $P_{nonlinearity} = 0.302$ , Europe:  $P_{nonlinearity} = 0.973$ ). The alcohol consumption-MetS association in the United States was nonlinear, with the lowest risk at approximately 20 g/day (RR=0.69, 95% CI: 0.58–0.81). Risk of MetS increased 33% with drinking > 10 times/month as compared with <1 time/month (RR=1.33, 95% CI: 1.02–1.72). The relation between beverage-specific alcohol consumption and MetS was not statistically significant.

**Conclusions** The risk of MetS associated with alcohol consumption varied in different regions. For studies in Asia, the risk of alcohol-induced MetS increased with alcohol consumption linearly, whereas for those in the United States, the relation was J-shaped, with the lowest risk at approximately 20 g/day. High drinking frequency may also contribute to the incidence of MetS. Further studies exploring the relation between beverage-specific alcohol consumption and incident MetS are still needed. Regional differences in the alcohol consumption-MetS association should be considered for the development of prevention strategies and measures for MetS.

## 红细胞计数与高血压发病在非老年高血压前期人群中的关联性研究

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**目的** 研究红细胞计数与发生高血压在非老年高血压前期人群中的关联。

**方法** 本研究为队列研究, 纳入人群为2004–2012年中南大学湘雅三医院20–60岁非老年高血压前期患者, 排除心、脑血管疾病以及糖尿病。对上述患者采集红细胞计数、血压、人口学资料(身高、体重等)、疾病史和生活方式等基线信息, 同时在随访时测量患者血压。高血压定义为收缩压 $\geq 140$  mmHg, 或舒张压 $\geq 90$  mmHg。根据患者基线资料中红细胞计数值的四分位数, 对患者进行分组, 并使用COX风险比例模型对四组患者红细胞计数值与高血压发病进行相关性分析。

**结果** 在平均为5.02年的随访期间内,本研究共随访1510人,其中有322人(21.99%)发生高血压。与红细胞计数值 $<4.19 \times 10^{12}/L$ (Q1)患者相比,红细胞计数 $>4.90 \times 10^{12}/L$ (Q4)患者具有更高的高血压发生率,校准年龄、性别、BMI、睡眠、吸烟、运动和饮酒因素后的风险比(HR)为2.10( $P < 0.05$ , 95%CI: 1.13–3.93)。

**结论** 红细胞计数 $>4.90 \times 10^{12}/L$ 是非老年高血压前期人群发生高血压的独立危险因素。

## Incidence, Management, and in-Hospital Mortality of Cardiogenic Shock Complicating ST-Elevated Myocardial Infarction in China: Insights from the China Acute Myocardial Infarction Registry

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**Objective** Limited data is available on the situation of cardiogenic shock complicating ST-elevated myocardial infarction (STEMI) in China. This study aims to disclose the incidence, management and in-hospital mortality (IHM) of patients with STEMI complicated by cardiogenic shock (STEMICS) in China and at different levels of hospitals (county-level, prefectural and provincial hospitals).

**Methods** We queried the 2013–2016 China Acute Myocardial Infarction (CAMI) registry databases to identify patients with STEMI and/or cardiogenic shock (developing before or during hospitalization). The overall and different hospital-level incidence of STEMICS and IHM were analyzed.

**Results** Of 28230 STEMI patients, 2273 patients (8.05%) had cardiogenic shock. The incidence of STEMICS in provincial, prefectural and county-level hospitals were 5.23%, 8.46% and 13.76% ( $P < 0.001$ ), respectively. Primary percutaneous coronary intervention (PPCI) was performed on 675 patients (29.7%) with STEMICS. The proportion of STEMICS patients undertaking PPCI in provincial, prefectural and county-level hospitals were 46.53%, 31.48% and 8.00% ( $P < 0.001$ ). The overall IHM rate of patients with STEMICS was

49.8% with no difference among the different hospital levels. However, the IHM rate of prehospital STEMICS (developing before hospitalization) in county-level hospitals were significantly higher than that in prefectural and provincial hospitals (42.3% versus 33.3% and 28.3%, respectively;  $P < 0.01$ ), while that of in-hospital STEMICS (developing during hospitalization) were similar among the different hospital levels (66.5%, 66.9% and 62.2%; provincial, prefectural and county-level hospitals, respectively). After adjustment, the difference of IHM in prehospital STEMICS between county-level hospitals and the other two levels no longer existed. However, once PPCI was excluded from the multivariable adjustment model, the IHM of prehospital STEMICS remained higher in county-level hospitals.

**Conclusions** The overall incidence and IHM rate of STEMICS in China are still high. Especially, higher IHM rate of prehospital STEMICS is observed in county-level hospitals, which may be attributed to the lower implementation rate of PPCI.

## An Investigation of Correlation-ship between Carotid Atherosclerosis and Mitral and Aortic Regurgitation in Chinese Population

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**Objective** To query a possible correlation-ship between the carotid atherosclerosis (CAS) and secondary mitral regurgitation (MR) and aortic regurgitation (AR) in Chinese population.

The Background: Atherosclerosis might lead to aortic and mitral insufficiency by increasing aortic pulse pressure, enlarging the aortic annulus and damaging the structure of aortic and mitral valve directly; Comorbid coronary atherosclerosis could cause mitral destructure, myocardial ischemia and dysfunction related mitral insufficiency further.

The hypothesis: Atherosclerosis impairs the structure and function of cardiac valves.



The aim:

**Methods** 1454 cases (529 male, 925female; age 35–77) were enrolled and underwent examination for the anatomical structure of their bilateral carotid arteries (BCA) and the presence of mitral and aortic regurgitation using two-dimensional color Doppler ultrasound. Based on the atherosclerosis classification, patients were divided into three groups: carotid atherosclerosis plaque (CAS plaque) group, intima-media thickness thickening (IMT thickening) group, and no-CAS group. The cases of identified MR and AR were graded on a five-point scale ranging from normal to severe according to European Society of Cardiology (ESC) guidelines based on visual assessment. Chi-square test was used for the clarification of rate difference with  $P$ -values  $< 0.05$  considered as significant, and contingency coefficient test was used to analyze for correlation between CAS and grade of MR and AR.

**Results** The carotid ultrasound exam revealed 39.0% ( $n=567$ ) with CAS plaques, 5.4% ( $n=78$ ) with IMT thickening and 55.6% ( $n=809$ ) with no CAS. MR incidence was 35.2% ( $n=512$ ; mild  $n=502$ , mild/moderate  $n=7$ , moderate  $n=3$ ) and AR incidence was 21.7% ( $n=316$ ; mild  $n=278$ , mild/moderate  $n=17$ , moderate  $n=20$ , severe  $n=1$ )

The carotid ultrasound exam also revealed: in the CAS plaque group ( $n=567$ ), the incidence of MR ( $n=222$ ) was 39.2% and AR ( $n=169$ ) was 29.8%; in the IMT thickening group ( $n=78$ ), the incidence of MR ( $n=35$ ) was 44.9% and AR ( $n=16$ ) was 20.5%; in the no-CAS group ( $n=809$ ), the incidence of MR ( $n=255$ ) was 31.5% and AR ( $n=147$ ) was 18.2%. The incidence of MR and AR in CAS plaque group and IMT thickening group was higher than that in no-CAS group.

Chi-square test revealed MR ( $P=0.003$ ) and AR ( $P<0.0005$ ) were significantly different among the three groups. The contingency coefficient was 0.09 between CAS and MR, and 0.132 between CAS and AR, respectively.

**Conclusions** CAS was statistically associated with secondary MR and AR among the surveyed Chinese population.

## 心脏介入治疗对先心病患儿生存质量与家庭影响状况的影响

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**目的** 评估先心病患儿介入治疗前、后先心病患儿及其家长的生存质量相关状况变化,为今后先心病患儿早期康复干预、营造良好成长环境、促进良好社会回归提供参考依据。

**方法** 采用流行病学队列研究,以儿童生存质量测定量表体系(PedsQL™)心脏病模块3.0儿童父母报告表、家庭影响模块2.0父母报告表为测量工具,对先心病患儿及家长进行生存质量相关状况基线调查与随访调查。

**结果** 介入治疗后先心病患儿生存质量总平均得分提高值是 $18.68\pm 15.19$ 分(配对 $t=20.10, P<0.001$ );其中男性、女性患儿得分提高值分别是 $21.00\pm 16.64$ 分(配对 $t=13.47, P<0.001$ )与 $16.96\pm 13.81$ 分(配对 $t=15.19, P<0.001$ )。且男性、女性患儿得分提高值间差异存在统计学意义( $t=2.11, P=0.036$ ),男性高于女性。先心病患儿在“心脏病症状及治疗相关问题”维度上总平均得分提高值是 $17.16\pm 14.91$ 分(配对 $t=18.80, P<0.001$ )。其中男性、女性患儿提高值分别为 $20.05\pm 16.07$ 分(配对 $t=13.32, P<0.001$ )与 $15.01\pm 13.65$ 分(配对 $t=13.60, P<0.001$ )。且男性、女性患儿得分提高值间差异存在统计学意义( $t=2.77, P=0.0061$ ),男性高于女性。介入治疗后患儿出现“经常或几乎总是感冒”状况的发生率降低了16.67%(配对 $\chi^2=22.54, P<0.001$ );出现“经常或几乎总是心跳很快”状况的发生率降低了18.63%(配对 $\chi^2=40.89, P<0.001$ )。家庭影响模块量表平均总得分提高值为 $24.49\pm 15.49$ 分(配对 $t=25.83, P<0.001$ )。其中患儿父母在“情感功能相关问题”维度平均得分提高值为 $32.62\pm 21.14$ 分(配对 $t=25.21, P<0.001$ )。与治疗前相比,介入治疗后患儿家长出现“经常或几乎总是感到焦虑”的发生率降低了25.32%(配对 $\chi^2=76.27, P<0.001$ );患儿家长出现“经常或几乎总是感到悲伤”的发生率降低了17.00%(配对 $\chi^2=50.41, P<0.001$ )。

**结论** 心脏介入治疗后,先心病患儿生存质量总平均得分得到提高,男性患儿提高值高于女性。先心病患儿出现影响正常活动或影响健康状况的发生率降低。心脏介入治疗后家庭影响模块量表平均总得分得到提高,患儿家长出现“情感功能相关问题”发生率降低。

## 成都市社区高血压现状调查

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**目的** 了解2017年成都市社区居民高血压的流行病学特征及其心血管疾病危险因素评估及多代谢异常的相关性调查。

**方法** 采用整群随机抽样,对成都市6个区县≥18岁5022名常住(≥1年)居民进行调查。对所有调查对象面访,进行问卷调查、体检、血压测量和血样采集。

**结果** 1. 2017年成都市社区居民经过年龄标化的高血压患病率为27.33%,高血压患病率随着年龄增加而升高。患病率女性高于男性(50.8% vs 49.2%,  $P<0.001$ ); 2. 高血压患者的知晓率为64.9%,治疗率为52.1%,控制率为25.0%,治疗控制率为41.2%。3. 与正常人群相比高血压人群在文化程度、婚姻状况、人均年收入、吸烟、饮酒、体育锻炼、油腻食物、睡眠烦恼这几个因素均有统计学意义,其吸烟率、饮酒率、腰腹围、心率、超重及肥胖率、睡眠障碍率均高于血压正常者;生化检查显示高血压患者总胆固醇、尿酸、空腹血糖、肌酐等水平明显高于血压正常者。4. 与我市社区降压药使用的种类仍以钙拮抗剂为主(73.1%)。

**结论** 与我市2008调查结果(患病率21.78%、知晓率50.6%、治疗率37.9%、控制率8.2%)相比我市社区高血压患病率增加,知晓率、治疗率及控制率均有提高,但总体仍低。高血压患者存在多代谢异常,多种心血管疾病危险因素不仅高于血压正常者且高于高血压前期患者。社区在降压同时对危险因素的治疗重视不够,对高血压患者应早起甚至在前期高血压即应进行心血管危险因素的筛查,采用改善生活方式与适当药物的综合干预措施。此外,指南推广有待加强,联合用药还需规范,高血压病人的诊疗率和控制率有待进一步提高。

## 比较XGBoost模型与Logistic模型对急性ST段抬高性心肌梗死患者院内不良心血管事件风险的预测效果

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**目的** 急性心肌梗死发病急骤,病死率较高,是临床常见的急危重症之一。提前对心梗患者进行不良心血管事件风险的评估,对高危人群进行早期干预以降低发生率无疑是当前亟待解决的问题。XGBoost其原理是通过弱分类器的迭代计算实现准确的分类效果,是兼具线性模型和Boosted Tree模型的一种优化模型,具有疏松的数据要求、自动变量选取、计算复杂度不高等优势。本文基于XG-

Boost模型对急性ST段抬高性心肌梗死(STEMI)患者院内不良心血管事件风险进行预测,为高危人群的早期筛查及预防提供参考依据,以期实现个性化医疗,提高医疗质量。

**方法** 研究对象及结局:“中国急性心肌梗死规范化救治项目”2015年至2017年纳入的4640名行院内PCI的STEMI患者。院内不良心血管事件包括院内死亡、再发非致死性心梗、支架内血栓、新发心衰或原有心衰加重、卒中、心脏骤停。

**分析方法**:本研究采用SAS 9.4版进行数据预处理, XGBoost 0.81版、Python3.6版开发工具构建模型。所有变量无缺失,均转化为数值型分类变量,随机将数据按照3:7划分成训练集和测试集。多分类变量采用One-Hot编码,将训练集数据送入XGBoost模型中训练最佳参数。另使用多因素Logistic回归分析建模,采用受试者工作特征曲线(receiver operating characteristic curve, ROC)评价模型的敏感度及特异度,同时与XGBoost模型的ROC曲线下面积(AUC)比较。

**结果** 通过GridSearchCV及迭代算法获取模型最优参数maxdeep=9, min\_child\_weight=3, gamma=0,模型特征重要评分排名前五位的多血管病变、前壁心梗、高血压史、近期吸烟史、院内检测甘油三酯。XGBoost模型在训练集的AUC为0.891,在测试集的AUC为0.871。多因素Logistic回归分析模型中,结果显示性别、高血压病史、接诊收缩压、接诊心率、首次心功能分级,发病24小时内测量总胆固醇值是院内不良心血管事件的影响因素( $P<0.05$ )。Logistic预测模型基于训练集的AUC为0.735,在测试集的AUC为0.639。

**结论** XGBoost算法构建的行PCI的STEM患者院内不良心血管事件的风险预测模型在预测效能方面相较于传统的多因素Logistic回归分析模型有显著优势,具有一定的临床应用价值。

## 评价可穿戴式运动手环人工智能心电算法诊断房颤的准确性

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**目的** 可穿戴式心电监测设备的出现,从一定程度上丰富了检测和筛查手段。但针对可穿戴设备,仍有待进行更多的临床研究,方能进一步明确其价值。本研究的主要目的是评价该手环的心电算法是否能准确区分窦性心律和异位心律(特指房颤),从而明确诊断房颤;同时评估手环自

动算法检测与动态心电图结果之间的相关性进行了分析,以评估人工智能心电检测算法的质量。

**方法** 采用单中心、双盲法随机抽取自2018年12月23日至2019年2月23日入住大连医科大学附属第一医院心律失常科的住院患者共36人,在行动态心电图检查的同时佩戴运动手环,收取不少于10分钟的心电数据,而后对人工智能心电算法得出的分析结果及动态心电图结果进行判别,并进行灵敏度、特异度及一致性分析,以评估人工智能心电检测算法的质量。

**结果** 在随机抽取的36名患者中(平均年龄63.3岁,男性55.6%),其中阵发性房颤患者22例(61.1%),持续性房颤患者14例(38.9%),共同时获得116例心电数据;在所有心电数据结果中,二者同时得出真阳性的房颤诊断例数为64例,真阴性的窦性心律诊断例数为48例。通过计算得出运动手环人工心电算法的准确率为96.6%;与动态心电图所示结果相比,人工智能心电算法诊断房颤的灵敏度为100.0%,特异度为92.3%,一致性k系数为0.93(95%置信区间为0.86-1.00)。

**结论** 当人工智能心电自动算法提供节律诊断时,与24h动态心电图相比,它能够准确地检测到房颤,具有很好的灵敏度和特异性,且具有良好的观察者间的一致性。

## 川崎病合并巨大冠状动脉瘤38例随访研究

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**目的** 川崎病已成为我国儿童后天性心脏病最常见的病因,巨大冠状动脉瘤是川崎病最严重的并发症。然而其来自我国的随访资料较少,本研究探讨川崎病合并巨大冠状动脉瘤的预后。

**方法** 收集2002年12月至2018年12月在广西医科大学第一附属医院住院诊断川崎病患者共725例。其中合并巨大冠脉瘤(内径绝对值 $\geq 8$  mm或Z值 $\geq 10$ )患儿38例,分析其随访期间人口统计学、药物治疗、冠状动脉内径、心脏干预和心脏预后资料。

**结果** 38例巨大冠状动脉瘤患儿中,男性31例占81.6%,女性7例占9.4%。发病中位年龄为2.5岁(范围0.3~13.1岁)。随访中位时间为30.5个月(范围1.7月~22.3年)。冠脉内径峰值中位数为9.5 mm(范围6.1~21 mm),最大冠脉内径Z值中位数为13.4(范围8.9~21.0)。分别有37(97.4%)、32(84.2%)及27(71%)例患儿接受人免疫球蛋白

白、抗血小板药及华法林治疗。口服华法林患儿中,1例消化道出血,1例鼻出血。16例患儿(42.1%)有冠状动脉血栓形成,其中2例发展为血栓性阻塞。15例(39.5%)患儿共接受尿激酶溶栓21次,16次(76.2%)血栓部分或完全溶解,1次(4.8%)因急性冠脉栓塞死亡,无溶栓主要不良反应病例。1年、2年、5年无血栓事件生存率分别为0.63、0.63、0.53。8例(21.1%)发生心肌梗死,其中2例死于血栓性阻塞、1例行冠脉搭桥术。1年、2年及5年无心肌梗死事件生存率分别为0.86、0.81、0.81,无冠脉完全回缩率分别为0.94、0.85、0.67。28例患儿(73.7%)可耐受轻度及以上的运动。

**结论** 川崎病合并巨大动脉瘤相关的严重心血管事件及冠脉内径回缩常发生于川崎病发病早期。长期抗凝、密切随访、及时溶栓、必要时行冠脉搭桥术,川崎病合并巨大冠状动脉瘤患者可获得无病生存期及较高的生活质量。

## 广州市2010~2014年单中心儿童川崎病流行病学特点及随访

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**目的** 探讨广州市单中心儿童川崎病患儿的发病情况、分布、流行病学特征及随访结果。

**方法** 采用描述性统计方法,回顾性分析对2010~2014年在广州市妇女儿童医疗中心诊断为川崎病患儿的临床资料进行流行病学分析。

**结果** 2010~2014年在广州市妇女儿童医疗中心诊断为川崎病患者1433例,男女之比为1.92:1,发病季节以夏、秋为发病高峰,发病高峰月份为4~9月;地域分布,患儿来自广州市为55.4%,广东省其他地级市为36.7%,外省来源为7.9%;发病年龄最小1月,最大15岁,其中1岁以下者占27.6%,3岁以下占74.1%,5岁以下占88.7%,大于5岁占11.3%;急性期超声心动图检查发现冠状动脉病变为240例,约占16.7%(240/1433),其中冠状动脉扩张109例,约占7.6%(109/1433),冠状动脉瘤116例,约占8.1%(131/1433),冠状动脉巨大瘤15例,约占0.9%(13/1433)。随访1年时间,240例冠状动脉病变中26例患儿失访(26/240,18.1%),214例患儿(214/240,81.9%)定期专科门诊随访,冠状动脉瘤107例,约占7.5%(107/1433),冠状动脉巨大瘤5例,约占0.35%(5/1433),合并血栓形成10例。复发37例,复发率为2.5%。本组病例未发现心肌缺血或心肌梗

死、冠状动脉狭窄,无发生缺血性心肌病,无死亡病例。

**结论** 川崎病目前已成为儿童最常见心血管疾病之一,发病人数逐年增加,应提高对该病的认识,早期诊断、治疗及定期随访观察,减少冠状动脉病变后遗症。

## 41例心脏术后死亡医疗纠纷成因分析

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**目的** 探究心脏外科手术死亡所致医疗纠纷形成的原因及特点分析,为此类案件的临床诊治和医疗纠纷防范提供参考依据。

**方法** 对中山大学法医鉴定中心2013-2018年受理的41例心脏外科术后死亡引发医疗纠纷的法医病理检案,从死亡原因、知情告知及医疗技术环节等方面进行回顾性分析。

**结果** 41脏手术后死亡原因有:手术操作失误,低排综合征、术后感染、术后血栓、自身其他疾病等;41案例中无医疗过错的有17例,存在医疗过错的24例

**结论** 心脏手术术后死亡医疗纠纷与术者操作技术、术后并发症密切相关。导致医疗过错的原因既有诊疗技术环节方面的缺陷也有知情告知及注意义务不足。

## 成都居民10年心血管疾病风险评估对比

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**目的** 本文通过收集2007和2017两个年度的成都高新区社区居民基本健康数据,来分析诱发心血管疾病危险因素的发展变化,从而分析10年间成都高新区社区居民心血管疾病发病风险的变化详情。

**方法** 以2007年和2017年成都市高新区常住人口为调查对象,通过问卷调查和实验室检测获得受访居民基本情况,共获得2274份有效调查结果。应用《国人缺血性心

管病(ICVD)十年发病危险度评估表》对居民CVD发病危险度进行评估计算,归纳出2007年、2017年成都社区居民心血管风险度数据,并筛选出高危人群,分析高危人群(ICVD危险度>10%)危险因素暴露情况的不同。

**结果** (1)2017年居民糖尿病患病率增加,超重肥胖和吸烟人群数量增加且呈年轻化。(2)2017年ICVD发病风险中危人群较2007年有所增加,并出现年轻化趋势,主要表现在40-50岁年龄段。(3)2017年ICVD绝对危险度>10%的高危人群比例较十年前总数差异不大,但高危人群的风险暴露因素中,糖尿病和吸烟人数占比增加表现突出。

**结论** 2017年成都市高新区居民较十年前吸烟人群增加,糖尿病患病率和肥胖超重人群比例持续增高,估算未来十年本市居民心血管发病率呈现增长趋势。因此切实开展防控工作和大力倡导健康生活是减少心血管疾病的发病率和死亡率具有至关重要的作用。

## Associations of Residential Greenness with Congenital heart diseases

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**Objective** we used a large population-based data of 14929 newborns to examine associations between residential greenness and CHDs.

**Methods** Population-based case control data for 2004/1/1 to 2016/12/12 were provided by GRCHD. We employed the Normalized Difference Vegetation index (NDVI) to determine greenness.

**Results** After exclusions, 8042 isolated CHDs and 6887 controls were eligible for analysis. The mean residential greenness NDVI value was  $0.342 \pm 0.160$  in buffer 500,  $0.342 \pm 0.154$  in buffer 1000. In the plus model that include street intersection, quartiles show an decrease Odds of CHDs, consistently (OR95%CI: 0.85(0.77, 0.93), 0.91(0.82, 1.00), 0.90(0.80, 1.00)).

**Conclusions** Our findings suggest that surrounding greenness consistently beneficial impact on newborns CHDs, during the critical window of embryogenesis and the occurrence of anly CHDs, mainly VSD, ASD, TGA, ToF, vPS, AVSD, and DORV.

## ·心血管疾病影像学研究·

## Preliminary Study on Ultrasound-mediated Microbubble Cavitation Improves Perfusion of Acute Ischemic Tissue And Its Mechanism

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**Objective** Ultrasound-mediated microbubble cavitation has been demonstrated to improve perfusion in the ischemic limb or myocardium, which is termed sonoperfusion. However, most studies of this have focused on animal models of chronic ischemia. We preliminarily investigated the effects of sonoperfusion on increasing local blood flow and the underlying signaling mechanism in an acute rat hindlimb ischemia model.

**Methods** Male Sprague-Dawley (SD) rats were used to establish an acute hindlimb ischemia model by ligating the external iliac artery. The rats were randomly divided into three treatment groups: intermittent high mechanical index pulses combined with lipid microbubbles (US+MB group), US alone (US group), or MB alone (MB group). After 10-minute exposure, contrast ultrasound perfusion imaging for both hindlimbs were performed immediately and at 5, 10, 15, 20 and 25 minutes. By inhibiting endothelial nitric oxide synthase (eNOS) by L-NAME, the role of nitric oxide (NO) pathway on increasing blood flow in acute ischemia tissue was evaluated.

**Results** After treatment, in US+MB group, microvascular blood volume (MBV) and microvascular blood flow (MBF) of ischemic hindlimb were significantly increased (MBV:  $41.824 \pm 7.836$  vs  $69.527 \pm 6.570$ ,  $P=0.000<0.05$ ; MBF:  $6.451 \pm 1.021$  vs  $13.078 \pm 1.967$ ,  $P=0.000<0.05$ ), while microvascular flux rate ( $\beta$ ) increased with not statistically significance ( $0.156 \pm 0.0249$  vs  $0.193 \pm 0.0414$ ,  $P=0.078>0.05$ ). While MBV,  $\beta$  and MBF slightly improved in US group ( $P>0.05$ ) and unchanged in MB group ( $P>0.05$ ). Most importantly, improvement of blood perfusion was mainly based on the growth of MBV. The acute effects of sonoperfusion in US+MB group was significant

immediately after treatment ( $P<0.05$ ), and disappeared after 25 minutes, while the acute effects in the US group peaked at 5 minutes ( $P<0.05$ ), and almost disappeared after 10 minutes; in MB group it was almost unchanged during treatment ( $P>0.05$ ) (see Figure 1). Inhibitory studies indicated the concentration of p-eNOS in the ischemic hindlimb increased on cavitation ( $180.93 \pm 16.31$  vs  $154.43 \pm 24.82$ ,  $P=0.021<0.05$ ), and significantly inhibited after eNOS inhibition with L-NAME ( $180.93 \pm 16.31$  vs  $139.07 \pm 27.60$ ,  $P=0.000<0.05$ ).

**Conclusions** Sonoperfusion increases local tissue perfusion in acute ischemia mainly by improving microcirculatory perfusion, which is largely based on the growth of MBV rather than  $\beta$  that described in chronic ischemia. These effects work immediately and can transiently reverse acute hindlimb ischemia in rats for 25 minutes instead of more than 24 hours in chronic ischemia. The eNOS/NO signaling pathway appears to be a critical mediator, with significant activation of eNOS and NO production.

## T1 mapping 和 ECV 技术在急性病毒性心肌炎临床应用

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**目的** 利用T1 mapping技术及细胞外容积分数(extracellular volume fraction, ECV)定量分析急性病毒性心肌炎组织特征,探讨其在诊断急性病毒性心肌炎应用价值。

**方法** 对27例急性病毒性心肌炎患者(病例组)和14例健康志愿者(对照组)行T1 Mapping序列扫描,测量心肌、血池T1值并计算平均T1值。比较病例组与对照组增强前后平均T1值、ECV值的差异,构建受试者工作特征(ROC)曲线,分析增强前T1、ECV区分病例组与对照组的曲线下面积(AUC)并计算增强前T1、ECV鉴别两组的敏感性、特异性、准确性。取 $P<0.05$ 为差异具有统计学意义。

**结果** 病例组心肌增强前平均T1值及ECV值大于均对照组,分别为( $1276.64 \pm 141.01$ )ms和( $48.15 \pm 8.52$ )%,心肌增强后平均T1值为( $382.71 \pm 39.17$ )ms小于对照组,增强前心

肌平均T1值、ECV区分病例组与对照组的AUC值分别为0.931、0.970,增强前平均T1值鉴别急性心肌炎组与对照组敏感性、特异性及准确性分别为88.9%、92.9%、92.7%,ECV值鉴别急性心肌炎组与对照组敏感性、特异性及准确性均在90%以上。

**结论** T1 Mapping技术及ECV能定量分析急性病毒性心肌炎组织特征,通过测量增强前T1值及ECV值大小可对病毒性心肌炎的损伤程度进行评估,提高病毒性心肌炎的早期诊断率。

## 终末期扩张型心肌病患者左、右室心肌应变与心肌纤维化的相关性:三维超声斑点追踪成像研究

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**目的** 探讨终末期扩张型心肌病患者左、右室三维心肌应变与心肌组织纤维化的相关性。

**方法** 纳入武汉协和医院35例终末期扩张型心肌病患者,心脏移植术前应用三维超声斑点追踪成像技术(3D-STE)评估扩张型心肌病患者左室整体纵向应变(GLS)、左室整体环向应变(GCS)、左室整体径向应变(GRS)及右室游离壁纵向应变(RV LS)。心脏核磁共振成像评估左室及右室射血分数(EF)。对左室及右室心肌取材,采用胶原容积分数(%)定量心肌纤维化程度。

**结果** 左室心肌胶原容积分数与GLS强相关( $r = 0.74, P < 0.001$ ),与GRS中等相关( $r = -0.66, P < 0.001$ ),与GCS弱相关( $r = 0.44, P < 0.01$ ),与左室射血分数无关。右室心肌胶原容积分数与RV LS强相关( $r = 0.71; P < 0.001$ ),与右室射血分数无关。与轻度心肌纤维化组相比,重度心肌纤维化组左室GLS、GCS、GRS及右室LS减低。LV GLS和RV LS检测重度心肌纤维化的准确性最高(LV GLS: AUC = 0.86, 95% CI: 0.73 to 0.99; RV LS: AUC = 0.85, 95% CI: 0.70 to 0.99)。多元回归分析显示LVGLS( $\beta = 0.740, P < 0.001$ )和RV LS( $\beta = 0.60, P < 0.0001$ )分别是左、右室心肌纤维化的独立预测因子。

**结论** 终末期扩张型心肌病患者心肌间质纤维化导致心肌收缩功能下降。左室GLS和RV LS是预测心肌纤维化的左、右室超声参数。

## Biventricular Myocardial Strain Correlates with Myocardial Fibrosis in Patients with End-stage Dilated Cardiomyopathy: A Study Using Three-dimensional Speckle Tracking Echocardiography

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**Objective** Previous results regarding the correlations of the myocardial strain with myocardial fibrosis were discordant. Therefore, the aim of our study was to evaluate the accuracy of biventricular strain by three-dimensional speckle tracking echocardiography (3D-STE) in predicting myocardial fibrosis in patients with end-stage dilated cardiomyopathy (DCM) undergoing heart transplantation.

**Methods** We studied 35 patients with end-stage DCM using echocardiography before heart transplantation. Left ventricular (LV) global longitudinal strain (GLS), global circumferential strain (GCS), global radial strain (GRS) and right ventricular (RV) free wall longitudinal strain (LS) were measured by 3D-STE. LV and RV ejection fraction (EF) were obtained from cardiac magnetic resonance (CMR) imaging. LV and RV tissue samples were obtained from all patients who underwent heart transplantation. The ratio of the fibrotic to the total sample area (collagen volume fraction, %) determined the extent of fibrosis.

**Results** LV myocardial fibrosis correlated strongly with GLS ( $r = 0.74, P < 0.001$ ), modestly with GRS ( $r = -0.66, P < 0.001$ ), weakly with GCS ( $r = 0.44, P < 0.01$ ), but not with CMR-derived LVEF; RV myocardial fibrosis was strongly associated with RV free wall LS ( $r = 0.71; P < 0.001$ ), but not with CMR-derived RVEF. Compared with patients with mild myocardial fibrosis, LV GLS, GCS and GRS, and RV LS decreased in patients with severe myocardial fibrosis. LV GLS and RV free wall LS had the highest diagnostic accuracy for detecting severe myocardial fibrosis (LV GLS: AUC = 0.86; 95% CI: 0.73 to 0.99; RV LS: AUC = 0.85; 95% CI: 0.70 to 0.99). Stepwise multivariate analysis showed that LV GLS ( $\beta = 0.740, P < 0.001$ ) and RV free wall LS ( $\beta = 0.60, P < 0.0001$ ) were independent predictors of LV and RV fibrosis respectively.

**Conclusions** Myocardial fibrosis lead to reduced systolic function in the end-stage DCM. LV GLS and RV free wall LS are the most accurate LV and RV global function measurements that correlate with the extent of myocardial fibrosis in patients with end-stage DCM.

## Speckle Tracking Echocardiography in Early Detection of Myocardial Injury in a Rat Model with Stress Cardiomyopathy

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**Objective** Studies on the usefulness of speckle tracking echocardiography (STE) in the evaluation of left ventricle in rats with stress cardiomyopathy (SCM) are limited. The aim of this study was to compare the pathophysiology and echocardiographic characteristics of rats with SCM to controls, and to investigate whether the strain values by STE combined with cTnI could predict early myocardial injury.

**Methods** SCM was induced in Sprague-Dawley female rats using immobilization (IMO) stress. A total of 53 rats, age of 30-weeks, were randomly divided into 3 groups. Biomarkers and echocardiographic parameters were evaluated and compared among the 3 groups. We defined myocardial injury as left ventricular ejection fraction <50%. Possible predictors of early myocardial injury were determined by univariate logistic regression, and independent predictors of early myocardial injury were investigated with multivariable logistic regression.

**Results** A total of 44 rats with a mean weight of  $426 \pm 33$  g were evaluated. Group 1 had the highest plasma epinephrine and norepinephrine levels ( $P < 0.001$ ), and the highest heart rate ( $P < 0.001$ ). On univariate logistic regression, cTnI (OR = 2.61 [1.02-10.25],  $P = 0.043$ ) and GLS (OR = 2.12 [1.12-6.16],  $P = 0.022$ ) were predictive of early myocardial. In ROC curve analysis for prediction of early myocardial injury, cTnI showed an AUC of 0.74 ( $P = 0.043$ ), and a cutoff of  $\geq 2.12$

ng/ml with a sensitivity of 96.4% and specificity of 50.7%. On the other hand, GLS provided a higher AUC of 0.89 ( $P = 0.022$ ), and a cutoff of -13.6% with a sensitivity of 78.5% and specificity of 98%. When GLS and cTnI were both included in a multivariate analysis, only GLS remained an independent predictor of early myocardial injury (OR=2.67 [1.14-14.76],  $P = 0.027$ ).

**Conclusions** In summary, abnormal catecholamine dynamics related to emotional distress seems to play a major role in the pathogenesis of SCM. STE is useful for quantitative detection of subtle myocardial abnormalities induced by IMO stress in rats with SCM. GLS is an appropriate parameter to detect early myocardial injury. This study provides the experimental foundation for future clinical trials in SCM.

## 冠脉CT心肌血流指数预测冠心病可行性分析

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**目的** 分析冠脉CT血流指数预测冠心病可行性研究。

**方法** 前瞻性连续性收集920例2018年7月至2018年9月门诊首诊疑似冠心病患者, GRACE院内死亡风险评分为低危, 标准测量心率、血压、身高、体重, 间隔10分钟, 测量三次, 取平均值, 行CCTA检查, 依据直径法筛选出冠状动脉狭窄程度 >70%患者357例, 运用后处理软件计算左心室心肌体积, 运用CT对比剂示踪技术, 计算心肌血流指数(CTMFI); 住院后进一步行冠状动脉造影检查68例; 以ICA为金标准, 以低于CT-MFI平均值2倍标准差为界值预测冠心病(狭窄程度 >70%), 与传统CCTA方法及经CTMFI矫正后CCTA比较, 分析三者与ICA相关性、预测冠心病准确性及ROC曲线。非参数资料行卡方检验,  $P < 0.05$  认为有显著性统计学差异。

**结果** 68例患者冠状动脉正常28例, 临界病变3例, 管腔重度狭窄37例。CCTA-MFI =  $0.132 \pm 0.0578$ ; CCTA-MFI平均值2倍标准差为0.116; 27例ICA管腔狭窄大于70%, ECG提示心肌缺血, 其CT-MFI < 0.116; 4例ICA管腔正常, ECG提示心肌缺血, 其CT-MFI < 0.116, 其中2例为肥厚性

心肌病; 37例ICA正常, CT-MFI  $\geq 0.116$ , 3例ECG提示心肌缺血。CCTA-MFI、CCTA、矫正后CCTA与ICA相关系数分别为-0.5991、0.9602、0.9750 ( $P < 0.0001$ ); ROC曲线下面积分别为0.806、0.638、0.651, Cutoff值分别为0.114、20%、65%, 三者敏感性与特异性分别为60.32%与100%、52.73%与100%、58.73%与100%。

**结论** 与传统CCTA比较, CT-MFI可能更多的反映心肌缺血, 对伴随CTMFI减低的冠心病患者可能需要积极干预。

## 经食管超声心动图在非瓣膜性心房颤动患者左心耳封堵术的应用

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**目的** 初步探讨经食管超声心动图(TEE)在非瓣膜性心房颤动患者行左心耳封堵术中操作指导及术后随访的应用价值。

**方法** 2016年1月至2018年6月于我院在TEE引导下左心耳封堵术的非瓣膜性心房颤动患者34例(CHA<sub>2</sub>DS<sub>2</sub>-VASc  $\geq 2$ 分)。术中TEE全程监测, 引导房间隔穿刺, 结合X线血管造影测量左心耳入口直径、锚定区直径以及最大深度, 选择封堵器型号, 引导封堵过程, 并及时评估疗效, 观察术中并发症的发生。术后3个月采用TEE进行有效性随访。

**结果** 34例患者均成功植入封堵器。TEE测量左心耳入口处平均直径(26.90 $\pm$ 3.28)mm, 锚定区平均直径(24.03 $\pm$ 3.95)mm, 最大深度(31.87 $\pm$ 5.88)mm。选用封堵器封堵盘(31.56 $\pm$ 3.44)mm, 固定盘(26.64 $\pm$ 2.35)mm。除1例患者术后封堵器边缘见大小3.94mm残余分流信号之外, 其余患者术后未见封堵器周围残余分流情况。术后3个月TEE随访, 封堵器形态位置良好, 边缘未见残余分流信号。与术前、术中比较, 左房、左室内径、左室射血分数( $P > 0.05$ )。除1例患者围手术期出现脑室出血之外, 其余患者无并发症或不良事件发生。

**结论** 对于非瓣膜性房颤有抗凝禁忌症的患者, 左心耳封堵术是预防血栓栓塞的可行治疗措施。经食管超声心动图在指导左心耳封堵术中具有不可或缺的作用, 使操作过程安全、有效。

## 儿童与成人肺动脉高压病因构成比及评估方法的不同

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**目的** 本研究比较分析儿童与成人肺动脉高压病因构成比及评估方法的不同, 帮助临床医师应用超声心动图技术分析诊断儿童肺动脉高压, 及引起儿童肺动脉高压的病因, 并准确评估肺动脉高压的程度。

**方法** 回顾性分析2010年1月-2018年12月首都医科大学附属北京儿童医院住院诊断PAH患儿5033例; 同期, 北京安贞医院住院诊断为PAH病例6334例。分别记录其年龄、性别、临床主要诊断、次要诊断等PAH相关疾病, 对成人及儿童病例进行对比分析, 分析其病因。另外总结成人与儿童应用超声心动图技术诊断PAH的方法和不同。

**结果** 儿童PAH男性2833例, 女性2200例, 男女比例约1.29:1; 成人PAH男性2345例, 女性3989例, 男女比例约1:1.7。儿童PAH中先心相关肺动脉高压3849例(76.5%)、肺部疾病相关肺动脉高压700例(13.9%)、新生儿持续性肺高压者186例(3.7%)、心肌受累疾患104例(2.0%), 原发性肺动脉高压63例(1.2%), 结缔组织病30例(0.6%)、门脉高压性10例(0.20%)、大动脉炎4例(0.07%)、肺动脉栓塞2例(0.04)、未明和或多因素(包括血液病、肾脏病、代谢病)85例(1.7%)。北京安贞医院数据显示, 成人PAH中, 左心疾病相关PAH占3192例(50.4%), 先天性心脏病相关肺高压1995例(31.5%), 肺血栓栓塞性肺动脉高压449例(7.1%), 肺部疾病相关肺动脉高压占335例(5.3%), 原发性肺动脉高压298例(4.7%), 结缔组织相关肺高压63例(1.0%)。儿童最常见的首发症状为活动后的呼吸困难、乏力、晕厥, 新生儿也可表现为生长受限和喂养困难, 而右心衰竭和周围水肿则常见于成人患者。超声诊断肺动脉高压主要通过三尖瓣反流、肺动脉瓣反流、心内分流压差、左心室偏心指数等。在评估时, 对成人以估测肺动脉收缩压、平均肺动脉压和偏心指数的绝对值大小来判断, 但是对新生儿、儿童等在评估时, 要考虑肺动脉过渡期生理性肺动脉压下降的自然过程, 要以超声估测的肺动脉收缩压与体循环压力作比较。

**结论** 引起儿童肺动脉高压的病因与成人明显不同, 有其独特的特点。另外, 在诊断和评估肺动脉压力时要考虑不同年龄儿童的生理特点, 需要与自身提循环压力做对比, 不能只依据估测的肺动脉压力绝对值进行评价。



## 主动脉瓣狭窄钙化的CT表现及TAVI术后瓣周漏的相关性初探

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**目的** 探讨主动脉瓣狭窄钙化的CT表现与TAVI术后瓣周漏相关性。

**方法** 对本院2018年25例主动脉瓣狭窄患者TAVI手术前后的多层螺旋CT和彩色多普勒超声影像资料进行回顾性分析。其中男性16例,女性9例,年龄62岁至87岁,平均74.5岁。使用飞利浦64层及256层螺旋CT和西门子双源CT增强扫描,行多种重建方法重组成像及VR三维重建。采用的彩色多普勒超声设备是:Philips iE33超声诊断仪。

**结果** 本组25例主动脉瓣狭窄病例,钙化评分0分2例,1分4例,2分6例,3分13例。术后并发主动脉瓣瓣周轻度反流8例(钙化评分3分8例),中度反流2例(钙化评分1分1例,3分1例),重度反流1例(钙化评分3分1例)。

**结论** 成年人单纯主动脉瓣狭窄的常见原因是退行性主动脉瓣钙化。其次风湿性主动脉瓣的病变。再就是主动脉瓣二瓣畸形(BAV)等先天性心脏病也常常出现瓣膜钙化。

主动脉瓣膜钙化程度按照钙化累及部位的标准分级评分,其标准为:0分(无钙化)为瓣膜无钙化;1分(轻度钙化)为瓣膜轻度增厚,局灶性点片状钙化;2分(中度钙化)为瓣膜增厚,主动脉窦部可见弥漫性斑点状及针状钙化,瓣环多呈灶状钙化;3分(重度钙化)为瓣膜明显增厚,瓣叶间粘连,主动脉窦内结节状钙化,瓣环区域钙化灶融合成“C”形,或钙化累及周围心肌组织。

术后瓣周漏是TAVI术后并不少见,约25%的患者发生在早期开展的TAVI术后,程度从轻度到重度不等。主要潜在原因为:原有瓣膜的严重钙化;瓣膜过小;置入瓣膜位置不正;人工瓣膜与原瓣环贴附不良。其中,瓣膜钙化是一个重要的原因,这种钙化瓣环为置入瓣膜留下一个不平整的平面。

多层螺旋CT能清楚显示瓣膜的钙化程度、分布及瓣膜粘连。钙化灶多分布在瓣叶边缘及瓣环周围,位于瓣叶的钙化灶易在瓣膜释放后遮蔽冠状动脉开口,导致急性冠状动脉综合征。瓣环周围的钙化灶易引起术中瓣环撕裂及术后瓣周漏等并发症。因此,术前常规多层螺旋CT检查,全面了解瓣膜的钙化情况,有助于TAVI术后并发症的预防。

## 基于影像学评估的扩大心肌切除术对左室中部梗阻HOCM患者的治疗策略及效果分析

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**目的** 本文旨在回顾性分析单一术者联合超声科医生对左室中部梗阻(MVO)患者的术前超声评估方法、手术方案制定过程及术后效果,并提出对合并MVO患者的手术治疗建议。

**方法** 在心尖三腔心切面下,定义主动脉瓣环与室间隔交界处到收缩期左室中部高速血流的最远端的距离为梗阻长度(OL),定义舒张期主动脉瓣环与室间隔交界处到肥厚向心尖累及的最远端的距离为形态学肥厚长度(MHL)(图1),通过术前测得的OL与MHL评估术中应该切除心肌的长度(图2),且对OL及MHL进行重复性检验;于二尖瓣水平短轴及乳头肌水平短轴确定前间隔最大厚度以确定术中切除厚度。经主动脉入路扩大心肌切除的过程中,尽量保持切除心肌组织的完整性,对切除心肌标本的长度与术前测得OL与MHL进行相关分析。回顾40例MVO患者的术前评估过程、术中手术策略及早期随访结果。

**结果** 患者术中切除的心肌组织长度与OL存在中度相关( $r=0.532$ ;  $P=0.002$ ),与MHL弱相关( $r=0.365$ ;  $P=0.007$ ),切除心肌组织样本的中位长度为50 mm(45,55),切除长度比OL平均长7.23 mm(-5.09,19.55)、比MHL短8.61 mm(-22.5,4.82)。OL与MHL重复性的检测:OL同一测量者两次测量结果的中位数分别为41.25(36.65-47.27)和40.80(38.18-45.63), $Z$ 值1.889( $P>0.05$ ),差值总体无统计学差异;MHL首次测量与再次测量的均数为59.16±8.49和60.67±7.39, $P=0.039$ ,MHL两次测量的结果有差异,但差值为1.95 mm;OL不同测量者间测量结果 $Z$ 值为1.687( $P=0.092$ ),两测量者首次测量结果无统计学差异,测量结果的中位差值为1.8 mm。OL同一测量者两次测量之间和不同测量者之间、MHL同一测量者两次测量结果间也体现出强相关性( $P$ 均 $<0.001$ , $r$ 分别为0.94,0.91,0.91,0.73)。本研究随访时间为19个月(13,54),术后早期及随访期间无死亡、完全心脏传导阻滞及医源性室间隔穿孔。

**结论** 使用术前超声测量可评估肥厚范围、帮助制定手术策略;其中OL和MHL具有良好的重复性,可作为肥厚心肌切除长度的可靠指标;切除长度应超过OL并尽量向心尖方向扩大,但应该低于MHL以避免医源性室间隔穿孔。

## 三维斑点追踪超声对高血压发生急性ST段抬高型心肌梗死患者左心室重构的预测价值

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**目的** 为评价三维超声对高血压患者发生急性ST段抬高型心肌梗死后左室重构的预测价值。

**方法** 选取2015年6月1日至2015年12月31日南部战区总医院心血管内科行急诊经皮冠状动脉介入治疗的高血压患者52例,按照左心室是否重构分为左心室重构组12例和左心室非重构组40例。比较两组基线水平和随访3月时的二维超声心动图和三维超声心动图参数。

**结果** 随访3月时,与左室非重构组3D-GLS(-13.7±2.7)相比,左室重构组3D-GLS(-10.1±2.5)显著减少,差异有统计学意义( $P<0.000$ )。Logistic回归分析结果显示年龄(OR=1.48, 95%CI: 0.97-2.26)、罪犯血管为前降支(OR=1587.19, 95%CI: 1.22-2057008.46)、2D-GLS(OR=1.91, 95%CI: 0.61-5.99)、3D-GLS(OR=14.73, 95%CI: 1.21-180.08)、3D-GRS(OR=1.01, 95%CI: 0.38-2.67)可能预测3月后左心室重构。

**结论** 3D-GLS可作为高血压患者发生急性ST段抬高型心肌梗死时的重要预测因子。

## Clinical associations of microvascular obstruction and intramyocardial hemorrhage on cardiovascular magnetic resonance in patients with acute ST segment elevation myocardial infarction (STEMI): an observational cohort study

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**Objective** Acute myocardial infarction (AMI) is recognized as being a life-threatening event. Both microvascular obstruction (MVO) and intramyocardial hemorrhage (IMH) have been recognized as poor prognostic factors in myocardial infarction (MI) since they adversely affect left ventricular remodeling. MVO refers to small vessels changes that prevent adequate tissue perfusion despite revascularization whereas IMH is a severe form of MVO. A limited number of studies have demonstrated the segmental intervention time and the clinical factors in the presence of MVO and IMH. Therefore, we aimed in this study to determine the correlations of the intervention-associated and clinical indexes with malignant cardiovascular magnetic resonance (CMR) signs in patients with AMI.

**Methods** Sixty-three patients with STEMI who underwent primary percutaneous coronary intervention (PPCI) within 12 h were included in this study. A 3.0-T CMR scan was prescribed, and the subsequent image analysis was conducted by researchers blinded to the clinical index results. Late-gadolinium enhancement (LGE) and T2\* sequences were mainly used for MVO and IMH identification and quantification.

**Results** Patients exhibiting both MVO and IMH had the highest level of LGE ( $P<0.001$ ) and were significantly more frequently assigned to a pre-PPCI thrombolysis in myocardial infarction (TIMI) flow class of 0 ( $n=25$ , 89.3%). The MVO size correlated positively with the IMH size ( $r=0.81$ ,  $P<0.01$ ). A pre-PPCI TIMI flow class of 0 was found to reliably predict the presence of IMH ( $P<0.001$ ). Patients who received the intervention 4-6 h after MI onset were more likely to exhibit MVO and IMH, although this trend was not statistically significant.

**Conclusions** We showed in our study that both MVO and IMH correlated with the degree of AMI and the pre-PPCI coronary flow, and both tended to occur more frequently in cases involving an interval of 4-6 h between the onset of MI and the intervention. CMR is a reliable method for assessing MVO and IMH and its imaging features following gadolinium administration are characteristic. These findings stress the importance of using CMR in evaluating and improving the outcome of the medical management.

## 超声心动图在威廉斯综合征诊断治疗及随访中的应用

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**目的** 探讨超声心动图在威廉斯综合征(Williams syndrome, WS)心血管系统病变诊断、治疗及随访中的应用价值。

**方法** 以北京儿童医院WS42例为研究对象,分析其心血管病变的超声心动图特点。根据是否行手术治疗分为手术组及非手术组,对比二者临床及超声资料,分析影响手术时机选择的相关因素。手术组于术后1天、6个月、1年、3年进行术后随访并与术前检查对比。非手术组确诊后1年、3年进行门诊随访,观察其心血管病变变化情况。

**结果** 42例WS均有主动脉瓣上狭窄,其中单纯性主动脉瓣上狭窄19例,合并肺动脉狭窄23例。手术组17例,非手术组25例,两组间各参数相比,主动脉瓣上狭窄程度及年龄与手术相关,其ROC曲线下面积分别为 $0.925 \pm 0.041$ 、 $0.836 \pm 0.065$ 。手术组术后主动脉瓣上狭窄解除,压差下降,与术前相比差异有统计学意义( $P < 0.05$ )。非手术组随访显示,主动脉瓣上狭窄程度无明显变化,差异无统计学意义( $P > 0.05$ ),肺动脉分支狭窄缓解,差异有统计学意义( $P < 0.05$ )。

**结论** WS可累及心血管、神经及内分泌等全身多个系统,临床主要表现为典型“小精灵”样面容、身材矮小、发育迟缓、轻度智力障碍、独特的认知特点、高钙血症等,尤以心血管系统受累多见,严重者可猝死。目前多采用Lowery评分及美国儿科学评分进行临床诊断,对于可疑人群,可通过基因检测以明确诊断。其中Lowery评分更适应我国国情,可在临床中用于WS的诊断。而美国儿科学评分法对生长发育迟缓、行为发育异常、典型面部特征、结缔组织表现都进行了更为详细的定义和描述,可作为Lowery评分的补充。80%的WS患者伴有心血管畸形,其中以主动脉瓣上狭窄最多见,其次为外周肺动脉狭窄,还可合并其他心血管畸形。根据Lowery评分,当患者同时具有特殊面容及主动脉瓣上狭窄时评分为5分,即可临床诊断WS。因此对有“小精灵”样面容的患者,其心血管病变诊断至关重要,对临床诊断该病有重大意义。主动脉瓣上狭窄程度及年龄是手术时机选择的相关因素。主动脉瓣上狭窄越重、确诊年龄越大,越倾向于手术治疗。主动脉瓣上狭窄手术效果好,未行手术者其严重程度随年龄增长无明显变化,肺动脉分支狭窄随年龄增长呈缓解趋势。总之,超声心动图在威廉斯综合征诊断、治疗及随访等方面有较大的应用价值。

## The application of “left innominate vein-aortic branches view” in prenatal diagnosis of congenital cardiovascular anomalies

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**Objective** Sonographic screening of fetal heart includes a series of standard views, which focus on the structure of cardiac chambers and great vessels. But little attention is paid to aortic branches and innominate veins. However, variations of these vessels can occasionally be detected and may provide a clue to diagnose certain congenital heart diseases (CHDs). In order to demonstrate the aortic branches and innominate veins, we suggest a new additional ultrasound plane in fetal heart screening, that is “left innominate vein-aortic branches (LINV-AoB) view”. This study aims to explore its value in the diagnosis of fetal CHDs.

**Methods** From Oct 2016 to Oct 2017, 2011 fetuses underwent echocardiography in our hospital. Based on 3VT view, moving the transducer slightly cranially to demonstrate the long axis of LINV and short axis of aortic branches, which is “LINV-AoB view”. The number, course, dimension, relative position, flow direction of LINV and aortic branches were carefully observed in “LINV-AoB view”. Meanwhile, other related intracardiac anomalies were also evaluated.

**Results** A total of 227 (227/2011, 11.29%) fetuses demonstrated abnormal findings in “LINV-AoB view” during the detailed echocardiography, including 131 cases (131/227, 57.71%) of LINV anomalies and 115 cases (115/227, 50.66%) of aortic branching anomalies. LINV anomalies included 103 cases of absent LINV (double SVC), 25 cases of anomalous courses of LINV (including 1, 10 and 14 cases of intrathymic LINV, subaortic LINV and PLSVC with absent RSVC, respectively), 3 cases of supracardiac-type APVC. Aortic branching anomalies included 37 cases of aberrant right subclavian artery, 42 cases of right aortic arch with aberrant left subclavian artery, and 36 cases of RAA with mirror-image branching. 19 fetuses (19/227, 8.37%) had multiple LINV and aortic branching anomalies. Fetal cardiac conventional views com-

bined with “LINV–AoB view” had obvious advantage in the demonstration of subaortic /intrathymic LINV.

**Conclusions** “LINV–AoB view” plays a vital role in the pre-natal diagnosis of congenital cardiovascular anomalies, it can help us detect different variations of LINV and aortic branches. Fetal cardiac conventional views combined with “LINV–AoB view” can improve the detection rate of subaortic/intrathymic LINV. We recommend to add this view into the routine fetal cardiac screening.

## Effect of trimetazidine on preventing contrast-induced nephropathy in patients undergoing elective percutaneous coronary intervention

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**Objective** Trimetazidine (TMZ) has been showed to prevent the risk of contrast induced nephropathy (CIN) in patients with renal dysfunction undergoing percutaneous coronary intervention. However, the effect of TMZ on CIN in unselected patients is unknown. We aimed to evaluate the effect of TMZ on preventing CIN in unselected patients undergoing PCI.

**Methods** A total of 2154 consecutive patients undergoing elective PCI were enrolled and divided into TMZ group (n = 529) and non-TMZ group (n=1625)。Patients in TMZ group received TMZ 20 mg thrice daily starting 24 hours at least before the procedure and continuing to the discharge. The primary end-point was CIN defined as an absolute increase in serum creatine >0.5 mg/dL or a relative increase 25% over the baseline values within 48 to 72 hours after contrast medium exposure (CIN total). The other CIN definitions included: (1) an absolute increase in SCr >0.5 mg/dL within 48–72 h (CIN 44.2); (2) a SCr increase of 25% from baseline within 48 h (CIN 25%). The secondary end-point was the occurrence of major adverse clinical events (MACEs), included all-cause

mortality, renal replacement therapy (RRT), target vessel revascularization (TVR), non-fatal myocardial infarction and stroke during the hospitalization.

**Results** CIN was observed in 197 (9.2%) patients. The incidence of CIN was not significantly different between the two groups (9.1% vs. 9.2%,  $P=0.13$ ). After adjusting other potential risk factors, TMZ did not significantly reduce the risk of CIN (odds ratio, 0.71, 95% CI, 0.46–1.09,  $P=0.119$ ). Similar results were also obtained when using the alternate CIN definitions and different subgroup analysis based on diabetes or chronic renal disease. Additionally, there were no significant inter-group differences with respect to in-hospital major adverse clinical events (1.89% vs. 1.66%;  $P>0.05$ ).

**Conclusions** TMZ did not exert significant renal protective effect on preventing CIN and major adverse clinical events in unselected patients undergoing PCI.

## The clinical prognosis of late gadolinium enhancement by cardiac magnetic resonance imaging in patients with hypertrophic cardiomyopathy: A single-center cohort study

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**Objective** Cardiac magnetic resonance (CMR) is an extremely useful imaging technique for cardiomyopathies. In particular, the presence and extent of late gadolinium enhancement (LGE) by CMR in cardiomyopathies are associated with adverse cardiovascular outcomes. However, few studies have investigated the relationship between LGE and the prognosis of patients with hypertrophic cardiomyopathy (HCM) in China. This large-sample study aims to investigate the prognostic value of the presence and location of LGE in Chinese HCM patients with long-term follow-up.

**Methods Design, Setting, and Participants:** This study was a single-center retrospective cohort study of 583 HCM patients who underwent CMR analysis for LGE upon admission between 2000 and 2013. Baseline demographic data, laboratory tests, electrocardiograms and echocardiography assessments were obtained shortly after admission.

**Main Outcome Measures:** The primary endpoint was all-cause mortality, and the secondary endpoint was cardiovascular mortality or cardiac transplantation. Both were assessed using Kaplan-Meier survival curves, and risk factors were assessed using Cox regression.

**Results** Of 583 HCM patients, 65.7% (n=383) had LGE, and 34.3% (n=200) had no LGE. In the subanalysis of the locations in patients with LGE, 182 patients had LGE in the interventricular septum (IVS-LGE), and 201 patients had LGE located beyond the interventricular septum (other than IVS-LGE). At a mean follow-up time of 72.3±35.7 months, 46 patients died (7.5%), and one patient was taken cardiac transplantation. Patients with LGE had higher all-cause mortality and cardiovascular mortality/cardiac transplantation rates than patients without LGE (log-rank  $\chi^2=11.430$ ,  $P=0.001$ ; log-rank  $\chi^2=12.833$ ,  $P<0.001$ , respectively). Multivariable Cox proportional hazards regression analysis suggested that age $\geq$ 60 years (HR: 1.06; 95% CI: 1.06-1.09;  $P<0.001$ ), LVEF<50% (HR 0.94, 95% CI: 0.92-0.97,  $P<0.001$ ) and LGE-CMR (HR: 8.93; 95% CI: 3.23-24.69;  $P<0.001$ ) at admission were independent prognostic predictors of all-cause mortality in the overall study cohort. There was no significant difference in all-cause mortality or cardiovascular mortality/cardiac transplantation between patients with LGE in the interventricular septum and those with LGE in locations other than the interventricular septum. The addition of LGE to LVEF significantly improved the risk predication and risk reclassification for all-cause mortality.

**Conclusions** LGE-CMR is an independent prognostic predictor for patients with HCM, and the addition of LGE-CMR to LVEF increases the predictive value and improves risk stratification for all-cause mortality and cardiovascular mortality/cardiac transplantation. A simple LGE location has no evident effects on all-cause mortality or cardiovascular mortality/cardiac transplantation in HCM.

## 超声心动图在迷走锁骨下动脉诊断中的应用价值

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**目的** 探讨超声心动图在迷走锁骨下动脉(ASA)诊断中的应用价值及成像要点。

**方法** 对2017年1月-2018年12月在我院或经超声心动图疑诊(确诊)、或CTA确诊、或手术证实的所有ASA的影像和临床资料进行回顾性分析,总结其影像学特征及目前超声心动图对其诊断的敏感性。

**结果** 研究对象共89例,男45例,女44例,年龄1天-16岁,中位年龄9个月;其中左迷走锁骨下动脉(ALSA)占51例(57%),右迷走锁骨下动脉(ARSA)占38例(43%);58例合并先心病(65%);89例中,超声漏诊30例,其中3例为ALSA,27例为ARSA;确诊病例中25例行手术治疗,其中22例为ALSA,3例为ARSA。

**结论** ASA是一种少见的主动脉弓分支畸形,文献报道发病率为0.5-2%,主要是由于胚胎期主动脉弓及其分支发育过程中本应退化的部分发生异常而引起的畸形,且易迷走至气管及食管的后方并跨越中线,故名为迷走锁骨下动脉。此畸形发现较早,1735年首次描述。据报道,无症状者占90-93%,确诊的病例中大多是由于合并了其它心血管畸形或周围器官疾患检查时意外发现的。目前CTA及超声心动图等影像学方法多用来诊断本病,CTA为金指标,不仅能清晰立体显示本畸形,对气管及食管的受压状况也能进行评价,超声心动图多为首诊,但有一定局限性,极易造成漏诊及误诊,若能提高超声疑诊率,并建议进一步CTA检查,对提高本病诊断率将有重大意义。

本病分为ALSA及ARSA。其中左ALSA一般均合并右位主动脉及左动脉导管(韧带)而形成血管环,造成气道狭窄,出现症状早,需积极手术治疗。ARSA均合并左位主动脉弓,一般不形成血管环,若合并Kommerell憩室,亦需择期手术治疗。

**超声成像要点:**首先,对此畸形的解剖、常见类型、常见症状及易合并的心血管畸形有全面的认识,检查时要有放矢。其次,重视对胸骨上窝主动脉弓分支的探查,常规探查主动脉弓第一分支有无分叉,若未探查到分叉,即可怀疑ASA可能,左位主动脉弓时,向右旋转探头方向,显示右颈总动脉,其下方可探及ARSA起自降主动脉近端;右位主动脉弓时,向左旋转探头方向,显示左颈总动脉,其下方可探及ALSA起自降主动脉近端。

主动脉瘤及主动脉夹层是本病的严重并发症,若能早期明确诊断,适时选择干预治疗对提高预后是很重要的。

## 二维超声斑点追踪成像技术评价蛛网膜下腔出血患者心脑功能损伤程度之临床价值初探

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**目的** 动脉瘤性蛛网膜下腔出血患者(Aneurysmal subarachnoid hemorrhage, a-SAH)心脑损伤是多变的且不易应用常规超声心动图检查识别,如射血分数(Ejection fraction, EF)。本研究目的为探讨二维斑点追踪成像(Two-dimension speckle tracking imaging, 2D-STI)评价 a-SAH 患者心脑功能损伤程度的临床价值。

**方法** 前瞻性纳入 40 例 a-SAH 患者。常规超声心动图检查评价 EF, 并且从 3 个心尖切面 18 个左室节段评价左室长轴应变。计算得出整体长轴应变(Global longitudinal strain, GLS)及每个节段应变达峰时间之变异程度(标准差, Dispersion)(图 1)。

**结果** 将入组患者分为两组:高 cTnI 组( $cTnI \geq 0.3$  ng/mL, 12 例, 30%)及低 cTnI 组( $cTnI < 0.3$  ng/mL, 28 例, 70%)。两组急性期晚期 GLS 与 Dispersion 值较急性期早期有明显改善。并且两组间这两个指标的改善程度具有明显的统计学差异,低 cTnI 组的改善程度较高 cTnI 组更为显著。

**结论** GLS 以及反映左室局部运动不协调的指标 Dispersion 与表现为 cTnI 升高的 a-SAH 心脑损伤密切相关。对比 EF 等常规超声指标评价 a-SAH 患者心脑损伤程度, GLS 与 Dispersion 更加敏感,可以为临床诊断及治疗提供更多的信息和支持。

## Clinical value of a functional stenosis predictor with coronary CT angiography comparing to invasive fractional flow reserve

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**Objective** To evaluate the diagnostic performance of coronary CT angiography-functional stenosis score (CCTA-FSS), a functional stenosis predictors derived from CCTA for the de-

tection of ischemia-inducing stenosis compared to invasive fractional flow reserve (FFR).

**Methods** 58 patients suspected of CAD underwent CCTA, followed by invasive coronary angiography (ICA) and invasive FFR within 1 week, and the patients with single lesion in the left anterior descending branch (LAD) were included in the study. The data was retrospectively analyzed. Quantitative CT measurements were performed using dedicated software. The diameter stenosis was evaluated with CCTA or ICA, and the functional stenosis was evaluated with CCTA-FSS or FFR. Using the threshold value (0.8) of invasive FFR as the gold standard, the correlation of CCTA, ICA or CCTA-FSS to invasive FFR and the diagnostic accuracy was evaluated. The independent sample data subjected to normal distribution underwent *t* test or single-factor variance analysis. Non-parametric data underwent chi-square analysis.

**Results** There was statistical difference for the regional myocardial function (RMF) between the anterior wall and the lateral wall ( $P < 0.0001$ ). There were 58 patients ( $59.88 \pm 10.136$  years, 67.24% males), including 30 patients with an FFR of  $\leq 0.80$  and 28 patients with an FFR of  $> 0.80$ . Among 58 coronary lesions, 41 (70.69%), 35 (60.34%), and 28 (48.28%) were considered significant stenosis owning a value of  $\geq 70\%$  respectively with CCTA, ICA and CCTA-FSS. Compared to invasive FFR, the diagnosis accuracy was 56.70%, 93.10%, and 96.55%, respectively; the *r* value was -0.01632 between CCTA and FFR, -0.4537 between ICA and FFR, and -0.7031 between CCTA-FSS and FFR. The sensitivity and specificity of CCTA, ICA, and CT-FSS for detecting hemodynamically significant lesions were 56.41% and 57.89%, 88.24% and 100%, 100% and 93.33%, respectively. Receiver operating characteristics analysis resulted in an area under the curve (AUC) of 0.528 for CCTA ( $Z = 0.3550, P = 0.7227$ ), 0.843 for ICA ( $Z = 5.9610, P < 0.0001$ ), and 0.951 for CCTA-FSS ( $Z = 8.5930, P < 0.0001$ ); there was a statistical difference for the ROC between CCTA and CCTA-FSS ( $Z = 4.413, P < 0.0001$ ), or between CCTA and ICA ( $Z = 3.217, P = 0.0013$ ) (See Fig. 3); there was no statistical difference for the ROC between ICA and CCTA-FSS ( $Z = 1.326, P = 0.1850$ ).

**Conclusions** Similar to ICA, CCTA-FSS can increase the diagnostic performance and discrimination over CCTA for the detection of hemodynamically significant stenosis, and it may be superior to ICA in the diagnostic of hemodynamically significant lesions.

## 100例经食管超声引导下先天性心脏病外科微创手术分析

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**目的** 回顾性分析汕头市中心医院100例经食管超声引导下外科微创先天性心脏病治疗手术临床资料,分析经食管超声引导下微创治疗先天性心脏病的手术方式选择,操作过程存在问题及临床疗效,为临床应用及推广提供更多的参考依据。

**方法** 分析2016年9月~2019年2月间汕头市中心医院经食道超声引导下经胸微小切口手术临床资料,比较术前、术中,术后超声心动图数据,进行全面客观的综合评价。

**结果** 100例拟行TEE引导下外科微创手术中,成功经胸封堵室间隔缺损(VSD)45例,经胸房间隔缺损(ASD)33例,动脉导管未闭(PDA)10例,经颈静脉封堵治疗ASD 6例,经胸微创肺动脉瓣狭窄(PS)球囊扩张术6例。经胸封堵失败2例,总成功率:97.67%,各型手术成功率分别为:VSD 97.76%,ASD 100%,PDA 100%,PS 100%,TEE准确率98%。术后并发症包括1例脑栓塞,1例恶性心律失常,1例残余分流,4例胸腔积液。经积极处理后经过明显好转,经1个月至1年随访,患者恢复快,疗效好。

**结论** 随着近年来的开展,外科经胸微创封堵术逐渐成熟,在不盲目扩张适应症及TEE的引导下,手术较安全,疗效逐渐提高,只要术前准确筛选合适患者,严格掌握手术适应症,术中TEE引导位置精确,手术过程不断总结经验,超声引导医生与心脏外科医生密切配合,准确选好封堵器类型及型号,可以有效缩短手术时间,准确完成封堵或扩张手术过程,并可以有效避免并发症发生。在不影响周围组织的情况下,予细腰大边OCC成功封堵。

## 微型经食管超声探头在低体质量先天性心脏病患儿外科手术中的应用评估

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**目的** 研究小型化多平面微型经食管心脏超声探头(The

Miniaturized Multiplane Micro-Transesophageal Echocardiographic Probe, micro-TEE)在新生儿及低体质量婴儿先天性心脏病外科矫治术中的应用价值,并对其诊断准确性及图像质量进行初步评估。

**方法** 2017年12月-2018年11月在我院进行先天性心脏病外科手术的患儿63例,术中行micro-TEE监测,并与经胸超声心动图比较,初步评估其诊断准确性。将患儿根据体重分为1组(<3.5 Kg)、2组(3.5-7.0 Kg)、3组(>7.0 Kg),对术中图像进行评分,根据心脏各部位(包括房间隔、室间隔、房室瓣、左室流出道及主动脉瓣、右室流出道及肺动脉瓣)普通二维、彩色多普勒及频谱多普勒显示的满意程度进行打分,分为满意(3分)、基本满意(2分)和不满意(1分)三个等级,将得分应用Kruskal-wallis检验,进行统计学分析,评估其图像质量有无显著性差异。

**结果** 63例术中micro-TEE监测,术前均与经胸超声检查结果、术中诊断基本一致,术后监测手术达到预期效果、无残余问题50例,发现残余问题13例,其中2例予以立即处理,1例延迟关胸,10例残余问题不影响手术效果,未予再次处理,术后床边经胸超声心动图检查发现残余问题18例,均无需再次手术处理。三组间图像得分比较结果显示,三组间图像质量有显著性差异( $P<0.05$ ),其中2组图像质量优于1组优于3组。

**结论** Micro-TEE术中监测是安全可行的,可即刻获得准确、有价值的诊断信息,指导手术治疗,在低体质量先天性心脏病患儿外科手术中有重要的应用价值。

## 二维斑点追踪技术评估川崎病早期颈动脉弹性功能

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**目的** 通过二维斑点追踪技术测量颈总动脉中段圆周方向峰值应变(CCS),结合颈动脉内中膜厚度(CIMT)评估KD急性期颈动脉血管形态和弹性功能变化,并分析其与KD冠脉损害及实验室指标的相关性,探讨CCS和CIMT对KD急性期血管功能评估的可行性和价值。

**方法** 2017年1月至2017年12月入我院确诊为KD患儿93例(KD组),急性期超声心动图检查冠脉扩张12例(KD CAL组),未扩张81例(KD nCAL组);同时选取性别年龄相

匹配的17例感染发热病人(发热对照组)和24例健康体检儿童(正常对照组)。测量急性期KD颈总动脉CCS、CIMT和颈动脉收缩率(CAR);KD组同时收集CRP、ESR、ALT、AST、TC、TG等实验室指标,分析CCS、CIMT和CAR在KD组、发热对照组和正常对照组间有无差异,及其与冠脉损害及实验室指标的相关性。

**结果** CCS在急性期KD患儿中明显减低,与发热对照组和正常对照组出现显著差异( $P<0.01$ ),CAR在KD组和发热对照组降低,两组与正常对照组相比有显著差异( $P<0.05$ )。CIMT在三组间未见明显统计学差异。CCS在KD组明显低于正常对照组;相关性分析显示CCS与CAR呈显著正相关( $P<0.001$ ),与CRP呈显著负相关( $P<0.01$ ),与ESR呈负相关( $P<0.05$ )。

**结论** 二维斑点追踪技术CCS可以评估KD急性期血管功能改变,CCS与KD组CAL、CRP相关性好,说明其可以反映KD急性期的冠脉损伤发生和疾病的严重程度,CCS是KD早期判断冠状动脉和外周血管功能的一个无创、方便的超声指标。

## 超声心动图诊断儿童肺动脉高压病例的病因学分析

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**目的** 探讨儿童肺动脉高压的病因学分析,为儿童肺动脉高压的早期诊断及治疗提供依据。

**方法** 采用回顾性分析研究方法,收集2009年3月-2019年2月于北京儿童医院就诊,行超声心动图检查并诊断肺动脉高压的病例,记录其年龄、性别、临床主要诊断、肺动脉高压相关症状,并根据三尖瓣或肺动脉瓣反流、右心大小及分流情况估测肺动脉高压程度,总结其肺动脉高压病因。考虑到儿童特殊的心肺血管发育特点,儿童肺动脉高压的发病机制与成人有所不同,因此采用一些学者提出的儿童肺动脉高压十分类法进行病因学分析、分组统计。

**结果** 10年间,超声心动图检查共诊断肺动脉高压患儿9525例:男5244例,女4281例,男女比例约1.22:1,年龄4小时~17岁8月,中位年龄4月。其中,先天性心脏病相关9145例(96.1%),常见疾病有:室间隔缺损、动脉导管未闭、房间隔缺损、肺静脉异位引流等;肺部疾病相关123例(1.3%),如重症肺炎、肺间质病变、肺栓塞、肺出血等;结

缔组织病相关22例(0.2%),如系统性红斑狼疮、多发性大动脉炎、皮炎等;其他:235例(2.4%),如慢性肾脏病、溶血性贫血、急性白血病、晕厥、心律失常等。另外,上述病例中临床考虑诊断新生儿持续性肺动脉高压患儿共2476例(26.0%),其中年龄 $\leq 7$ 天共1582例(16.6%),年龄7天~28天共894例(9.4%)。

**结论** 儿童肺动脉高压主要是由多种病因引起的相关性肺动脉高压,其中最常见的是先天性心脏病相关及结缔组织病相关病因。

## 儿童先天性冠状动脉疾病141例超声诊断分析

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**目的** 探讨儿童先天性冠状动脉疾病的病变特点及超声诊断要点,以提高超声诊断水平,为进一步评估和治疗儿童先天性冠状动脉病变提供精准信息。

**方法** 回顾性分析2009年1月至2019年1月在北京医科大学附属北京儿童医院收治的先天性冠状动脉疾病患儿141例(不包括复杂心脏畸形合并冠状动脉病变和后天性冠状动脉疾病患儿)的超声诊断及临床资料,分析病变特点及超声诊断要点。

**结果** 141例先天性冠状动脉疾病患儿,男75例,女66例,年龄1d~14岁。均行超声心动图检查,经CT明确诊断或手术证实。冠状动脉起源异常71例(50%),冠状动脉瘘70例(50%)。71例起源异常病例中,男40例,女31例,年龄1月~14岁。根据病变冠状动脉统计分析,左冠状动脉起源异常50例(70%),右冠状动脉起源异常21例(30%)。根据异常起源的部位统计:异常起源于肺动脉共有50例(70.4%),其中左冠状动脉起源于肺动脉45例(63.4%),右冠状动脉起源于肺动脉5例(7.0%);异常起源于主动脉的共有14例(19.7%),其中左冠状动脉起源于右冠窦3例(4.2%),左冠状动脉起源于左冠窦1例(1.4%),右冠状动脉起源于窦管交界上方1例(1.4%),右冠状动脉起源于左冠窦/左右窦之间9例(12.7%);异常起源于对侧冠状动脉者7例(9.9%),其中右冠状动脉起源于左冠状动脉6例(8.5%),左冠状动脉起源于右冠状动脉1例(1.4%)。70例冠状动脉瘘病例中,男35例,女35例,年龄1天~13岁,左冠状动脉瘘共有34例(48.6%),其中左冠-右室瘘16例



(22.9%),左冠-右房瘘12例(17.1%),左冠-左室瘘3例(4.3%),左冠-左房瘘2(2.9%),左回旋-右房瘘1例(1.4%);右冠状动脉瘘共有36例(51.4%),右冠-右室瘘32例(45.7%),右冠-右房瘘3例(4.3%),右冠状动脉左室瘘1例(1.4%)。根据瘘口发生部位统计分析,依次为右心室48例(68.6%)、右心房16例(22.9%)、左心室4例(5.7%)、左心房2例(2.9%)。

**结论** 儿童先天性冠状动脉疾病较少见,在临床超声诊断中了解冠状动脉解剖和先天性冠状动脉的病理解剖特点,通过适当的调节仪器条件,掌握超声检查的切面和超声诊断要点,可以提高超声诊断的准确率。超声心动图技术在儿童先天性冠状动脉疾病的诊断中发挥重要作用,与其他影像学技术比较有明显优势。

## 左冠状动脉异常起源于肺动脉外科矫治术后随访研究

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**目的** 探讨左冠状动脉异常起源于肺动脉(ALCAPA)的超声心动图及临床预后情况

**方法** 回顾性分析首都医科大学附属北京儿童医院从2007年6月至2018年8月间经手术治疗的33例ALCAPA患儿临床资料。所有患儿均经CT或手术证实。其中19例患儿进行术前及术后3个月定期超声心动图检查,10例患儿进行术前及术后6个月定期超声心动图检查。并对所有患儿进行长期电话随访。

**结果** 33例患儿,男20例,女13例,年龄1月至36月,平均年龄14月。经外科手术治愈26例(78.8%),术后围手术期死亡5例(15.2%),失访2例(6.0%)。进行术前及术后3个月定期随访的19例患儿,男11例,女8例,年龄1月至48月,平均年龄16月,术后左心室舒张末期容积较术前明显减小( $40.9 \pm 10.7$  mL vs  $35.8 \pm 6.3$  mL,  $P < 0.01$ ),术后左心室射血分数较术前有明显改善( $51.3 \pm 14.7\%$  vs  $57.9 \pm 10.5$ ,  $P < 0.01$ ),术后二尖瓣反流程度较术前明显改善[术前中度以上(48%)vs术后中度以上(27%)]。进行术前及术后6个月定期随访的10例患儿,其中男5例,女5例,年龄1月至48月,平均年龄18月,术后左心室舒张末期容积较术前明显减小( $43.35 \pm 5.5$  mL vs  $35.9 \pm 5.3$  mL,  $P < 0.01$ ),术后左心室射血分数较术前有明显改善( $50.0 \pm$

$14.1\%$  vs  $58.0 \pm 9.6\%$ ,  $P < 0.01$ ),术后二尖瓣反流程度较术前明显改善[术前中度以上(60%)vs术后中度以上(30%)]。随访28例患儿外科矫治术后2年以上预后情况,NYHA心功能指数I级(92.9%)。

**结论** 左冠状动脉异常起源于肺动脉患儿早期经外科矫治术后,患儿心功能明显改善,长期预后良好。

## 一例长期右心室起搏引起心衰患儿同步化治疗效果研究

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**目的** 一例长期右心室起搏引起心衰患儿同步化治疗效果研究。

**方法** 病史简介:患儿,男,9m时因先天性心脏病于外院行室间隔缺损修补术、主动脉瓣下隔膜切除术、右室流出道重建术,术后并发持续三度房室传导阻滞,植入双腔起搏器(右房、右室心尖部)。术后恢复良好。术后定期随访,超声心动图示左心室射血分数进行性降低,左心室进行性扩张。3y时患儿出现精神差、活动量减低、多汗等症状,但没有呼吸困难、水肿等其它表现。为求进一步诊治收入院,心电图示QRS间期为178ms,体表面积 $0.59$  m<sup>2</sup>,左室舒张末期内径40mm,左室射血分数30%,二尖瓣中量反流信号。左室室间隔中段及心尖段呈室壁瘤样突出,与后壁呈矛盾运动,室间隔及左室后壁收缩达峰时间差约100ms,左心室17节段应变达峰时间标准差(PSD)约120ms,双室射血前期时间差约44ms。根据患儿病史及超声心动图特点,分析患儿应为长期右室心尖部起搏造成室壁运动不协调,做功效率低下,左室射血分数减低,左心室扩张,室壁变薄,发生心肌重塑。我院进行心脏同步化治疗,增加左心室外膜起搏电极,将双腔起搏改为三腔起搏,术后1w,1m,4m,8m进行随访观察。

**结果** 超声心动图显示心脏运动同步性参数术后1w即明显好转,左心室心功能及左室大小均有显著改善。同步性参数较心功能恢复更快。术后患儿室间隔室壁瘤样改变消失,变薄心肌增厚,发生逆向重构。患儿心衰症状较前好转,生长发育也较前加快。

**结论** 传统单腔或双腔右室心尖部起搏器起搏,会造成心室运动不协调,继而引起心功能减低,心脏扩大等。

心脏同步化治疗(CRT)可以明显改善心脏运动同步性,改善心功能及心室大小。应用二维斑点追踪技术可以很好评估左心室运动同步性,协助判断左心室起搏器安装位置。

## 儿童永存左上腔静脉合并先天性心脏病的超声心动图分析

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**目的** 分析儿童永存左上腔静脉合并先天性心脏病类型的分布特征及发生率。

**方法** 对2013年至2017年北京儿童医院1676例永存左上腔静脉患儿的超声心动图资料及临床资料进行回顾性分析。

**结果** 永存左上腔静脉的检出率约0.79%(1676/212309),其中I型永存左上腔静脉最常见约占99.7%(1671/

1676)。永存左上腔静脉在先天性心脏病儿童中的检出率约3.0%(866/28403)。1676例永存左上腔静脉的患儿中,合并先天性心脏心脏病的患儿866例(51.7%),常见合并的先天性心脏病依次是室间隔缺损202例(23.3%)、房间隔缺损149例(17.2%)、法洛四联症73例(8.4%)、动脉导管未闭58例(6.7%)、主动脉该缩窄及主动脉缩窄复合畸形52例(6.0%)、心内膜垫缺损34例(4.0%)、右室双出口29例(3.3%)。

**结论** 永存左上腔静脉(persistent left superior vena cava, PLSVC)是最常见的胸部静脉畸形,于1738年由Le Cat教授首次描述。由于PLSVC患者往往无临床症状或被其他心脏病变症状掩盖,因此通常在行心血管影像学检查时被偶然发现。PLSVC可以单独存在,也可以合并其他畸形,先天性心脏病是最常见的伴发畸形,但关于PLSVC合并心脏畸形的种类及发生率的报道不近相同。超声心动图是一种经济、便捷的非侵入性检查方法,是临床上评估心脏结构和功能的首选影像学检查方法。在临床工作中应提高对永存左上腔静脉合并先天性心脏病类型分布特征的认识,行超声心动图检查时正确诊断永存左上腔静脉及其合并畸形能够为临床制定患儿治疗方案提供可靠依据。

## ·卒中及糖尿病等心血管相关疾病研究·

## HSP22 suppresses diabetes-induced endothelial injury by inhibiting mitochondrial reactive oxygen species formation

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**Objective** The induction of hyperglycemia by mitochondrial reactive oxygen species (mtROS) is a key event responsible for endothelial activation and injury. Heat shock protein 22 (HSP22) is a stress-inducible protein associated with cytoprotection and apoptosis inhibition. However, whether HSP22 prevents hyperglycemia-induced vascular endothelial injury remains unclear. Here, we investigated whether HSP22 protects the vascular endothelium from hyperglycemia-induced injury by reducing mtROS production.

**Methods** We used a high-fat diet and streptozotocin injection model to induce type 2 diabetes mellitus (T2DM, metabolic syndrome) and exposed human umbilical vein endothelial cells (HUVECs) to high glucose following the overexpression or silencing of HSP22 to explore the role of HSP22. Dihydroethidium (DHE) and 8-hydroxy-desoxyguanosine (8-OHdG) were used to determine reactive oxygen species (ROS) generation in diabetic mice. Confocal microscopy and flow cytometry assays using HUVECs and showed that HSP22 attenuated mtROS and mitochondrial dysfunction in hyperglycemia-stimulated endothelial cells. In addition, immunohistochemistry, immunofluorescence, western blot and real-time PCR were used to measure the expression of HSP22, ICAM1, VCAM1 and cytokine in hyperglycemia condition.

**Results** We found that HSP22 markedly inhibited endothelial cell activation and vascular lesions by inhibiting endothelial adhesion and decreasing the secretion of cytokines. DHE) and 8-OHdG were used to determine that HSP22 reduced reactive oxygen species (ROS) generation in diabetic mice. We also performed confocal microscopy and flow cytometry assays using HUVECs and showed that HSP22 attenuated mtROS and mitochondrial dysfunction in hyperglycemia-stimulated endothelial cells. Mechanistically, using the mtROS inhibitor MitoTEMPO, we demonstrated that HSP22 suppressed endothelial acti-

vation and injury by eliminating hyperglycemia-mediated increases in mtROS. Furthermore, we found that HSP22 maintained the balance of mitochondrial fusion and fission by mitigating mtROS *in vitro*.

**Conclusions** HSP22 attenuated the development of vascular lesions by suppressing mtROS-mediated endothelial activation in a T2DM mouse model. This study provides evidence that HSP22 may be a promising therapeutic target for vascular complications in T2DM.

## Cardiometabolic index as an effective discriminator for the risk of metabolic syndrome in Chinese population: A cross-sectional study

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**Objective** Recent studies have suggested that cardiometabolic index (CMI), a novel marker of visceral adipose tissue because of its integration of dyslipidemia and abdominal obesity, could be used in the evaluation of multiple cardiovascular risk factors. However, the potential utility and clinical significance of CMI in the discrimination of metabolic syndrome (MetS) remains uncertain. The purpose of this study was to investigate the usefulness of CMI in detecting MetS in the general Chinese population.

**Methods** This cross-sectional study involved a total of 73,413 participants (mean age: 44.1 years, 59.7% males) who participated in an annual physical examination in the Health Management Center of the Third Xiangya Hospital from January 2016 to December 2016. CMI was calculated by triglyceride to high density lipoprotein cholesterol ratio multiply waist-to-height ratio. Multivariate regressions were performed to determine CMI's association with MetS, and ROC analyses were employed to investigate CMI's discriminating ability for MetS.

**Results** The prevalence of MetS was 30.9% in males and 16.8% in females. A dose-response manner was detected for the presence of MetS, exhibiting a significantly increase from the lowest to the highest quartiles of CMI (3.7% to 69.6% in males and 0.9% to 54.3% in females). In fully adjusted multiple logistic regression models, the top quartiles of CMI had ORs of 25.67 (22.13–29.76) in males and 35.73 (26.91–47.46) in females compared with the bottom category. When assessed using ROC curve analyses, CMI exhibited an excellent diagnostic accuracy for identifying MetS, and the areas under the curves (AUC) in men and women were 0.850 (95% CI 0.846, 0.854) and 0.908 (95% CI 0.904, 0.913), respectively.

**Conclusions** CMI is significantly associated with the presence of MetS, and has a high diagnostic accuracy for identifying MetS in the general population. Monitoring and promoting achievement of dyslipidemia and abdominal obesity based on CMI may improve subclinical and cardiovascular outcomes.

## HyperTriglyceridemia is identified as a Independent risk factor of HyperGlycemia via Bayesian Network Inference

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**Objective** Whereas both hyperTriglyceridemia and hyperglycemia are known as risk factors for cardiovascular diseases, little is known regarding the association between them. In the present study, we made an attempt to explore whether elevated triglyceride can increase the risk for hyperglycemia or vice versa through Bayesian network inference. Additionally, we assessed the quantitative magnitude of such association by odds ratio provided by multivariate Logistic regression analysis.

**Methods** Datasets used for the analysis were obtained from a large-scale retrospective 4-year cohort study, which included 19886 subjects (age: 68.95±7.33; 9097 men) who took health examination in 2013 and 2016 at 10 regions in zhuji city, Zhejiang province, China, respectively. At the cross-sectional

level, We first performed Bayesian network inference to capture the intrinsically causal relationships among body mass index (BMI), smoking and drinking habits, total cholesterol (TC), triglycerides, fasting blood glucose (FBG), blood pressure (BP) and estimated glomerular filtration rate (eGFR) on health examination dataset in 2013, Then, we checked whether such network exhibited the similarity on dataset in 2016. Additionally, multivariate Logistic regression analysis was conducted to compare the results from Bayesian network inference with the adjustments of age, BMI, baseline TC, baseline triglycerides, baseline FBG, baseline BP and baseline eGFR.

**Results** According to the network obtained through Bayesian network inference, we identified that elevated triglycerides level would result in the increase of FBG. Consistent with results from Bayesian network inference, the results from multivariate Logistic regression analysis indicated that hypertriglycerides is an independent predictor for hyperglycemia (OR: 1.156 per mmol/L increase; 95% CI: [1.113, 1.200]).

**Conclusions** Elevated triglycerides increases the risk of high glucose, suggesting the potential significance for the prevention of diabetes mellitus through efficient triglycerides control. Additionally, Bayesian network inference is an efficient way to identify risk factors for clinic related events, which is free of time-consuming and costly prospective cohort studies since Bayesian network inference doesn't require any assumptions during the process of modelling.

## The Protective Effects of Glucagon-Like Peptide-1 on Cardiac Remodeling by Inhibiting Oxidative Stress through mTORC1/p70S6k Pathway in Diabetes

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**Objective** Although increased reactive oxygen species (ROS) generation is a major mechanism leading to cardiac remodeling in diabetes mellitus (DM), research into the effects

of antioxidation on diabetic cardiac remodeling remains scarce and controversial. Glucagon-like peptide-1 (GLP-1) was a hormone predominately synthesized and secreted by intestinal L-cells, which displays potential anti-oxidative effects besides lowering blood glucose. The objective of this research was to investigate the effects of GLP-1 on cardiac remodeling and the molecular mechanism involved in DM.

**Methods** Streptozotocin (STZ)-induced diabetic rats (n=30) were randomized to 12 weeks of treatment with vehicle or Exenatide (GLP-1 analog, 0.25  $\mu\text{g}/\text{kg}$ , twice daily). Before and after treatment, blood glucose levels and weight were assessed. Cardiac function was examined by echocardiographic measurements. The cardiac weight index was used to evaluate the hypertrophic response, which was calculated as the heart weight (g) / tibia length (mm). Masson's trichrome staining was conducted to analyze collagen fraction in myocardium. The ultrastructure of myocardium was observed by transmission electron microscope. Cardiomyocytes were cultured in medium alone (control) or medium containing glucose (25 mmol/L), GLP-1 ( $10^{-8}$  mmol/L), high glucose (25 mmol/L) plus GLP-1 ( $10^{-8}$  mmol/L). The lucigenin-enhanced chemiluminescence assay and dihydroethidine (DHE) staining were used to assess oxidative stress. Tunel staining was used to assess apoptosis of cardiomyocytes. Raptor siRNA was transfected into cardiomyocyte to silence Raptor. The protein expression of p-Raptor-S792, Raptor, p-mTOR-S2448, mTOR, p-p70S6K-T389, p70S6K was examined by western blot analysis.

**Results** Experimental DM exhibited impaired cardiac diastolic function, increased brain natriuretic peptide expression, and increased interstitial collagen deposition in myocardium, which were ameliorated by exenatide treatment for 12 weeks. Exenatide reduced myocardial ROS production and apoptosis in DM. Also, the mitochondria in myocardium from DM+vehicle group exhibited significant mitochondrial morphological defects, including disordered mitochondrial arrays, altered cristae density and aggregates of swollen mitochondria, while exenatide treatment attenuated the mitochondrial damage. In addition, high glucose-induced ROS generation and apoptosis in cardiomyocyte were inhibited by GLP-1, as well as the levels of mTORC1/p70S6k phosphorylation. Furthermore, GLP-1 treatment upregulated adenosine monophosphate activated protein kinase (AMPK) activity in high glucose-induced cardiomyocyte.

**Conclusions** GLP-1 protects the cardiomyocyte from oxidative stress and apoptosis in DM, which may contribute to the

improvement of cardiac remodeling. The cardiac protection of GLP-1 may be dependent on inhibition of mTORC1/p70S6K, via an AMPK-mediated pathway.

## 血清同型半胱氨酸和红细胞分布宽度对冠心病合并2型糖尿病相关性研究

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**目的** 探讨血清同型半胱氨酸(Hcy)、红细胞分布宽度(RDW)对冠心病合并2型糖尿病患者冠脉狭窄程度的关系。

**方法** 收集2017年11月至2018年10月于山西医科大学附属第一医院经介入治疗的拟诊断冠心病合并2型糖尿病患者110例。根据冠状动脉造影检查结果,将患者分为对照组(冠状动脉狭窄程度<50%)23例和实验组(冠状动脉狭窄程度 $\geq$ 50%)87例。实验组中按照病变支数分为3组(1组:单支病变;2组:双支病变;3组:多支病变)。对所有对象分别检测白细胞计数(WBC)、红细胞计数(RBC)、血红蛋白(Hb)、红细胞压积(HCT)、平均红细胞体积(MCV)、红细胞体积分布宽度(RDW)、血小板计数(PLT)、血小板分布宽度(PDW)、血小板平均体积(MPV)、血小板比积(PCT)、总胆固醇(TC)、甘油三酯(TG)、血清高密度脂蛋白(HDL)、血清低密度脂蛋白(LDL)、肌酐(Cr)、尿素氮(BUN)、尿酸(UA)、总胆红素(TBIL)、葡萄糖(GLU)、糖化血红蛋白(HbA1c)及同型半胱氨酸(Hcy),分析不同组间血清Hcy和RDW的差异及与冠状动脉狭窄程度的关系,应用ROC曲线评价RDW和Hcy对冠心病的诊断价值,应用多元Logistic回归分析冠心病的独立危险因素。

**结果** 与对照组比较,冠心病合并糖尿病组的血清Hcy和RDW水平明显升高,有统计学差异( $P<0.05$ )。单支病变组、双支病变组及多支病变组的血清Hcy和RDW水平进行组间相互比较,差异无统计学意义。Hcy和RDW的AUC分别为0.866(95%CI:0.793~0.938)、0.742(95%CI:0.634~0.850),二者中Hcy有较好的诊断价值。Hcy和RDW的最佳临界值分别为13.85  $\mu\text{mol}/\text{L}$ 和13.75%,此时的灵敏度分别为72.4%、43.7%,特异度分别为87.0%、91.3%。多元Logistic回归分析显示,Hcy、HbA1c和RDW进入回归模型,

回归系数分别为0.549、1.114、1.212。

**结论** 血清RDW和Hcy是冠心病合并糖尿病发生的独立危险因素,升高水平与冠状动脉病变严重程度未见明显相关。

## CircDLGAP4/miR-143 调节脑卒中致血脑屏障损伤中的作用

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**目的** 脑卒中是以局灶性神经功能缺失为特征的急性脑血管病。血脑屏障损伤是脑卒中发生发展的重要始动因素之一,miR-143参与血脑屏障功能调节,circDLGAP4转录本存在与miR-143结合的位点,研究circDLGAP4靶向miR-143调节脑卒中血脑屏障损伤分子作用机制,明确circDLGAP4/miR-143在脑卒中血脑屏障破坏中的作用,有助于更新现有脑卒中致血脑屏障损伤发生和治疗的理论。

**方法** 应用Real-time PCR检测miR-143和circDLGAP4表达水平;应用TTC和MRI方法检测tMCAO模型小鼠梗死体积;应用Evans Blue方法检测tMCAO脑卒中模型小鼠血脑屏障通透性;应用Luciferase验证circDLGAP4与miR-143相互结合作用;应用RNA pull down和原位杂交共定位实验验证circDLGAP4与miR-143存在相互结合;应用慢病毒转染和小鼠脑微注射技术,结合Western blot和免疫荧光染色技术,在离体和整体水平上验证circDLGAP4/miR-143/HECTD1轴在脑卒中致血脑屏障损伤中的作用。

**结果** 1)缺血性脑卒中引起miR-143上调、血脑屏障损伤;2)沉默miR-143缓解由脑卒中引起的血脑屏障损伤、紧密连接蛋白(claudin-5、occludin、ZO-1)降低和间充质转化标志物(collagen I、collagen III、 $\alpha$ -SMA)增加,减小梗死体积;3)circDLGAP4结合吸附miR-143,缺血性脑卒中引起circDLGAP4下调;4)整体水平上,过表达circDLGAP4缓解由tMCAO脑卒中模型引起的血脑屏障损伤、紧密连接蛋白降低和间充质转化标志物增加,减小梗死体积;5)细胞水平上,过表达circDLGAP4能够抑制由OGD/R造成的紧密连接蛋白降低和间充质转化标志物增加;6)细胞水平上,间充质转化抑制剂SIS3能够缓解miR-143引起的紧密连接蛋白降低和间充质转化标志物增加;7)miR-143通过靶向调控HECTD1调节内皮细胞间充质转化。

**结论** 在缺血性脑卒中条件下激活脑微血管内皮细胞内circDLGAP4/miR-143/HECTD1发生间充质转化导致血脑屏障损伤。沉默miR-143和过表达circDLGAP4能够缓解

脑卒中引起的血脑屏障损伤,对治疗脑卒中血脑屏障损伤提供新的视角和治疗策略。

## Associations between hyperuricemia and incident hyper-LDL cholesterolemia, hypertriglyceridemia and hypo-HDL cholesterolemia in Chinese population: A retrospective cohort study

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**Objective** Dyslipidemia is a strong risk factor for cardiovascular diseases and several epidemiology studies demonstrate a significant association between serum uric acid and dyslipidemia. However, a cross-sectional association cannot clarify a cause-effect relationship and there is unclear whether the presence of hyperuricemia predicts the development of unfavorable lipid status. In this study we tested the hypothesis that an elevated serum uric acid (SUA) can predict the development of hyper-LDL cholesterolemia, as well as hypertriglyceridemia and hypo-HDL cholesterolemia in Chinese population.

**Methods** This retrospective cohort study involved a total of 5,569 Chinese subjects (43.0±10.0 years, 36.6% men) who underwent health examination in 2012 and reevaluated in 2016 at the Third Xiangya Hospital. Subjects were included if they did not have hypertension, diabetes mellitus, dyslipidemia, chronic kidney disease, or if they were not on medication for hyperuricemia and/or gout at their baseline examination. The risk factors and adjusted odds ratios (ORs) for developing each component of dyslipidemia; 1) high LDL cholesterol 2) low HDL cholesterol, and 3) hypertriglyceridemia, were evaluated by univariate and multivariable logistic regression models with adjustments for age, body mass index, smoking and drinking habits, educational status, baseline eGFR, baseline SUA and each component of dyslipidemia (baseline LDL cho-

lesterol, HDL cholesterol, or triglycerides in each model).

**Results** During the 4-year follow-up period, 407 men (20.0%) and 664 women (18.8%), 661 men (32.5%) and 511 women (14.5%), 296 men (14.5%) and 828 women (23.4%) developed hyper-LDL cholesterolemia, hypertriglyceridemia and hypo-HDL cholesterolemia, respectively. The adjusted ORs of incident hyper-LDL cholesterolemia, hypertriglyceridemia and hypo-HDL cholesterolemia for hyperuricemia group compared with non-hyperuricemia group were 0.78 ( $P=0.257$ ) in men and 0.73 ( $P=0.409$ ) in women, 1.84 ( $P<$

0.001) in men and 5.05 ( $P<0.001$ ) in women, 1.20 ( $P=0.376$ ) in men and 1.16 ( $P=0.655$ ) in women, respectively. And we got similar results when using per 1 mg/dL increase of baseline SUA in both men and women.

**Conclusions** Hyperuricemia as well as a high baseline SUA level is strongly associated with developing hypertriglyceridemia, but can not predict incident hyper-LDL cholesterolemia and hypo-HDL cholesterolemia. This may shed light into the role of SUA in prevention and treatment of cardiovascular diseases.