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**A Randomized Clinical Trial Investigating the Relationship Between Aprotinin and Hypercoagulability in Off-Pump Coronary Surgery**

Pranjal H. Desai, MD<sup>\*</sup>, Dinesh Kurian, BS<sup>\*</sup>, Nannan Thirumavalavan, BA<sup>\*</sup>, Sneha P. Desai, MD<sup>\*</sup>, Pluen Ziu, MD<sup>\*</sup>, Michael Grant, BS<sup>†</sup>, Charles White, MD<sup>‡</sup>, R. Clive Landis, PhD<sup>§</sup>, and Robert S. Poston, MD<sup>\*</sup>

From the <sup>\*</sup>Department of Cardiothoracic Surgery, Boston University School of Medicine, Boston, Massachusetts; Departments of <sup>†</sup>Surgery, and <sup>‡</sup>Radiology, University of Maryland, School of Medicine, Baltimore, Maryland; and <sup>§</sup>Edmund Cohen Laboratory for Vascular Research, Chronic Disease Research Center, University of the West Indies, Bridgetown, Barbados.

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**背景：**不停跳冠状动脉旁路(OPCAB)手术与高凝状态相伴随，其中血小板凝血酶受体，即蛋白酶活化受体-1(PAR-1)，在隐静脉搭桥中传导了凝血酶爆发。抑肽酶，在心胸外科手术中使用主要是因为它的抗纤维蛋白溶解的性质，也由于凝血酶节省了血小板 PAR-1 激活。我们假定 PAR-1 拮抗的性质提供了 OPCAB 手术中抗血栓形成的益处。

**方法：**在 OPCAB 术中患者被随机分为静脉给予盐水( $n = 38$ )或改良足量法的抑肽酶( $n = 37$ )。围术期从冠状窦、皮肤伤口、体循环抽取血液标本来分析凝血和血小板功能。主要心血管不良事件用在 24h 时获取肌钙蛋白 I (心肌梗死)、预放电计算机断层扫描血管造影(静脉搭桥血栓形成)和卒中临床检查来监测。

**结果：**OPCAB 术后即刻得到的冠状窦血显示抑肽酶组中激活作用显著减弱，判断依据为血小板-白细胞螯合物形成减少( $P < 0.02$ )和血小板衍生的微粒减少( $P < 0.05$ )。抑肽酶组显示了凝血酶(而非二磷酸腺苷)诱导的血小板聚集受到抑制( $P = 0.007$ )。抑肽酶显著减少在冠状窦而非皮肤切口的凝血酶产生(用 F 1.2 级定义)。主要心血管不良事件在抑肽酶治疗组患者中显著减少(5.4%比 29.7%,  $P < 0.05$ )。抑肽酶通过红细胞输注的减少( $P < 0.04$ )和术后血液丢失的减少( $603 \pm 330$ 比  $810 \pm 415$  mL,  $P < 0.004$ )还证明了其抗纤维蛋白溶解性质。

**结论：**本研究证明了抑肽酶通过减少凝血酶诱导的血小板激活和隐静脉搭桥中的凝血酶产生，及同时保持系统性止血和抗纤维蛋白溶解的益处，来保护 OPCAB 手术患者免于高凝状态。这些结果支持对 OPCAB 术中抑肽酶和其他 PAR-1 拮抗物的进一步研究。

(唐李隽 译 马皓琳 李士通 校)

**BACKGROUND:** Off-pump coronary artery bypass (OPCAB) surgery is associated with a hypercoagulable state in which the platelet thrombin receptor, protease-activated receptor-1 (PAR-1), helps propagate a thrombin burst within saphenous vein grafts. Aprotinin, used in cardiothoracic surgery mainly for its antifibrinolytic properties, also spares platelet PAR-1 activation due to thrombin. We hypothesized that this PAR-1 antagonistic property provides an antithrombotic benefit during OPCAB surgery.

**METHODS:** Patients were randomly assigned to receive saline ( $n = 38$ ) or a modified full-dose regimen of aprotinin ( $n = 37$ ) IV during OPCAB surgery. Blood sampled perioperatively from the coronary sinus, skin wounds, and systemic circulation was analyzed to test coagulation and platelet function. Major adverse cardiovascular events were monitored by obtaining troponin I at 24 h (myocardial infarction), pre-discharge computed tomography angiography (vein graft thrombosis), and by clinical examination for stroke.

**RESULTS:** Coronary sinus blood obtained immediately after OPCAB surgery showed significantly less activation in the aprotinin group, as judged by reduced formation of platelet-leukocyte conjugates ( $P < 0.02$ ) and platelet-derived microparticles ( $P < 0.05$ ). The aprotinin group showed inhibition of platelet aggregation induced by thrombin ( $P = 0.007$ ) but not adenosine diphosphate. Thrombin generation, defined by F1.2 levels, was significantly reduced by aprotinin in the coronary sinus but not in skin wound incisions. Major adverse cardiovascular events were significantly reduced in aprotinin-treated patients (5.4% vs 29.7%,  $P < 0.05$ ). Aprotinin also demonstrated antifibrinolytic

properties through diminished red blood cell transfusion ( $P < 0.04$ ) and reduced blood loss postoperatively ( $603 \pm 330$  vs  $810 \pm 415$  mL,  $P < 0.004$ ).

**CONCLUSION:** This study demonstrates that aprotinin protects patients undergoing OPCAB surgery from a hypercoagulable state by diminishing thrombin-induced platelet activation and thrombin generation within saphenous vein grafts, while maintaining systemic hemostatic and antifibrinolytic benefits. These results support further investigation of aprotinin and other PAR-1 antagonists in OPCAB surgery.

### 儿童术中知晓发生率：儿童知晓和回忆评估

#### The Incidence of Intraoperative Awareness in Children: Childhood Awareness and Recall Evaluation

Shobha Malviya, MD\*, Jeffrey L. Galinkin, MD, FAAP†, Carolyn F. Bannister, MD, FAAP†, Constance Burke, BSN, RN\*, Jeannie Zuk, PhD, RN†, Mark Popenhagen, PsyD†, Samatha Brown, RN†, and Terri Voepel-Lewis, MSN, RN\*

From the \*Department of Anesthesiology at University of Michigan Health Systems, Ann Arbor, Michigan; †University of Colorado, Denver, Colorado; and ‡Emory University, Atlanta, Georgia.

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**背景：**已报道的麻醉下儿童知晓的发生率存在相当大的差异（0.2%-2.7%）。在这个前瞻性、观察性、队列研究中，我们评估了 1) 在三种情况下，儿童在全身麻醉期间的知晓发生率、2) 促使知晓的因素和 3) 知晓的短期心理学影响。

**方法：**研究包括了进行全身麻醉的 5-15 岁儿童，并且前瞻性地收集所有的围术期资料（包括麻醉药）。术后，使用半结构化问卷对儿童进行三次访视。与儿童的医护人员讨论所有的可能或很可能知晓的病例，从而确定或否定其记忆。达到不同网点的研究者间的内部一致，并且由三个外部的访视者对这些病例和其他的随机选择病例进行访视。基于这个研究目的，把可能或很可能知晓定义为：内部一致和至少三分之二的外部访视者之间意见相同的病例。

**结果：**1784 名儿童至少接受一次访视。32 个病例至少被一个实体（内部意见一致或一个外部访视者肯定）认定为可能或很可能知晓，其中的 14 个病例符合可能或很可能知晓的定义，使知晓发生率为 0.8%。有知晓的 14 个儿童中，有 6 个儿童（43%）记得在手术期间感到恐惧，有 3 个（21%）感到痛。该组中的 2 个儿童（14%）称“如果不得不二次手术，会感到更加糟糕”。这与无回忆儿童（15%）的报告无明显差异。术中知晓儿童无一需要心理学随访。内镜检查的操作有较高的知晓风险（相对危险度=4.5[置信区间 1.5—13.6]）。

**结论：**在这项研究中，尽管 0.8% 儿童经历了可能或很可能知晓，但是并没有儿童遭受了短期的心理学困扰。

（王海涛 译 马皓琳 李士通 校）

**BACKGROUND:** There is a considerable discrepancy between the reported incidences of awareness under anesthesia in children (0.2%–2.7%). In this prospective, observational, cohort study we evaluated 1) the incidence of awareness during general anesthesia in

children across three settings, 2) factors contributing to awareness, and 3) short-term psychological effects of awareness.

**METHODS:** Children (aged 5–15 yr) who underwent general anesthesia were included, and all perioperative data including anesthetic drugs were collected prospectively. Children were interviewed three times postoperatively using a semistructured questionnaire. All cases of possible or probable awareness were discussed with the child's care providers to confirm or refute the memories. Internal consensus among investigators across sites was reached, and these cases and a random selection of others were reviewed by three external reviewers. For the purpose of this study, possible/probable awareness was defined as cases with agreement between the internal consensus and at least two of the three external reviewers.

**RESULTS:** One thousand seven hundred eighty-four children completed at least one interview. Thirty-two cases were coded as possible or probable awareness by at least one entity (i.e., either the internal consensus or one of the external reviewers). Fourteen of these cases met the definition for possible/probable awareness, making the incidence of awareness 0.8%. Six of the 14 children with awareness (43%) remembered feeling scared during their surgery and three (21%) reported hurting. Two children in this group (14%) said they would feel worse if they had to have surgery again, which was not significantly different from reports of children with no recall (15%). None of the children with awareness required psychological follow-up. Endoscopic procedures were associated with a higher risk for awareness (relative risk = 4.5 [confidence interval 1.5–13.6]).

**CONCLUSIONS:** Although 0.8% of children experienced possible/probable awareness in this study, none experienced short-term psychological distress.

### 5-HT<sub>3A</sub> 和 5-HT<sub>3B</sub> 受体基因(*HTR3A* and *HTR3B*)内的变异会影响术后呕吐的发生吗?

#### Do Variations in the 5-HT<sub>3A</sub> and 5-HT<sub>3B</sub> Serotonin Receptor Genes (*HTR3A* and *HTR3B*) Influence the Occurrence of Postoperative Vomiting?

Henrik Rueffert, MD, Volker Thieme, MD, Jan Wallenborn, MD, Nicole Lemnitz, BA, Astrid Bergmann, BA, Kristina Rudlof, MD, Markus Wehner, MD, Derk Olthoff, MD, and Udo X. Kaisers, MD

From the Department of Anesthesiology and Intensive Care Medicine, Medical Faculty, University of Leipzig, Leipzig, Germany.

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**背景:** 术后恶心和呕吐是全麻令人不适的副作用。除了已知的危险因素(女性、非吸烟者、既往史以及阿片类)外, 5-羟色胺受体系统对恶心呕吐发展的遗传性影响已经被反复提及。因此, 在本试验性研究中, 我们探讨了 5-羟色胺受体亚单位 A 和 B 的基因(*HTR3A* 和 *HTR3B*)的遗传性变型。

**方法:** 我们采纳了 95 例全麻后发生术后呕吐 (POV) 的患者以及 94 例对照病例。在提取 DNA 后, 筛查整个 *TR3A* 和 *HTR3B* 编码区、5' 侧翼区以及外显子/内含子分界的遗传性变型。经鉴定的遗传性变型与 POV 之间的相关性用逻辑回归来判定。

**结果：**我们鉴定了 *HTR3A* 基因中的 16 个和 *HTR3B* 基因中的 19 个不同的变型。通过采用一个多变量逻辑回归模型（其中也包括经典的危险因素），*HTR3A* 变型 t c1377A>G 有明显较高的 POV 风险（比值比 [OR] 2.972; 95% 可信限 [CI] 1.466–6.021;  $P = 0.003$ ）。而 *HTR3B* 变型 c5+201\_+202delCA (OR 0.421; 95% CI 0.257–0.69;  $P = 0.001$ ) 和 c6-137C>T (OR 0.034; 95% CI 0.003–0.332;  $P = 0.004$ ) 有较低的 POV 风险。不过，所有明显的遗传性变型都位于各自基因的非编码区。

**结论：***HTR3A* 和 *HTR3B* 基因中的遗传性变型似乎与 POV 发展的不同危险相关。在 POV 多因素起源中它们的影响有多强，还需要在具有适当样本数的额外研究中去探讨。

（黄施伟 译，马皓琳 李士通 校）

**BACKGROUND:** Postoperative nausea and vomiting are unpleasant side effects of general anesthesia. Besides known risk factors (female gender, nonsmoker, history, and opioids), a genetic influence of the serotonin receptor system on the development of nausea and vomiting has repeatedly been proposed. In this pilot study, we therefore investigated the genes of the serotonin receptor subunits A and B (*HTR3A* and *HTR3B*) for genetic variants.

**METHODS:** We included 95 patients who had suffered from postoperative vomiting (POV) after general anesthesia and 94 control patients. After DNA isolation, the entire *HTR3A* and *HTR3B* coding regions, the 5' flanking regions, and exon/intron boundaries were screened for genetic variants. Correlation of identified genetic variants with POV was determined by logistic regression.

**RESULTS:** We identified 16 different variants in the *HTR3A* gene and 19 in the *HTR3B* gene. By using a multivariate logistic regression model that also included classical risk factors, the *HTR3A* variant c1377A>G was associated with a significantly higher risk (odds ratio [OR] 2.972; 95% confidence interval [CI] 1.466–6.021;  $P = 0.003$ ) and the *HTR3B* variants c5+201\_+202delCA (OR 0.421; 95% CI 0.257–0.69;  $P = 0.001$ ) and c6-137C>T (OR 0.034; 95% CI 0.003–0.332;  $P = 0.004$ ) were associated with a lower risk for POV. However, all significant genetic variants were located in noncoding regions of their gene.

**CONCLUSIONS:** Genetic variations in the *HTR3A* and *HTR3B* gene seem to be associated with the individual risk of developing POV. How strong their influence is within the multifactorial genesis of POV needs to be investigated in additional studies with an appropriate sample size.

### 围手术期静脉注射利多卡因对术后疼痛和免疫功能的影响

#### The Effect of Perioperative Intravenous Lidocaine on Postoperative Pain and Immune Function

Israel Z. Yardeni, MD<sup>\*</sup>, Benzion Beilin, MD<sup>\*</sup>, Eduard Mayburd, MD<sup>\*</sup>, Yuri Levinson, MD<sup>\*</sup>, and Hanna Bessler, PhD<sup>†</sup>

From the <sup>\*</sup>Department of Anesthesiology and <sup>†</sup>Research Institute, Rabin Medical Center, Hasharon Hospital, Sackler School of Medicine, Tel Aviv University, Israel.

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**背景：**手术相关性组织损伤导致伤害感受和炎症反应，伴随促炎细胞因子生成增加。这些细胞因子可以诱导外周和中枢致敏，导致疼痛增强。最近一种常用的局部麻醉药利多卡因被介绍作为围术期疼痛管理技术的一部分。除了它的镇痛效应，利多卡因还具有抗炎特性，能够减少促炎细胞因子的向上调节。我们的研究集中在切口前和术中静脉注射利多卡因对术后疼痛的强度和免疫反应的影响。

**方法：**65 位择期行经腹子宫切除的女性病人（ASA 评级 I-II 级）被收入本随机、安慰剂对照研究。处理组的 32 个病人在手术开始前 20 分钟起接受静脉注射利多卡因，而对照组（33 例病人）接受等量的盐水注入。两组在术后均接受病人自控硬膜外镇痛。在手术前、术后 24、48 和 72 小时分别取得血样检测白介素-1（IL-1）受体拮抗剂 IL-1ra 和 IL-6 的活体内细胞因子产生，以及淋巴细胞对植物凝血素-M 的促丝裂反应。使用 10cm 视觉模拟评分对静息和咳嗽后的疼痛强度进行评级。

**结果：**利多卡因+病人自控硬膜外镇痛组病人术后 4 小时和 8 小时的疼痛较轻（视觉模拟评分静息时 4/3.7，咳嗽中 5.3/5，而安慰剂组静息时 4.5/4.2 咳嗽中 6.1/5.3）。IL-1ra 和 IL-6 的活体内生成没有显著减少，但是对照组淋巴细胞对植物凝血素-M 的增殖反应维持得更好。

**结论：**本发现表明术前和术中静脉注射利多卡因能改善术后即刻疼痛管理并减少收缩诱导的免疫学改变。

（颜涛译，马皓琳 李士通校）

**BACKGROUND:** Surgery-associated tissue injury leads to nociception and inflammatory reaction, accompanied by increased production of proinflammatory cytokines. These cytokines can induce peripheral and central sensitization, leading to pain augmentation. Recently, a frequently used local anesthetic, lidocaine, was introduced as a part of a perioperative pain management technique. In addition to its analgesic effects, lidocaine has an antiinflammatory property, decreasing the upregulation of proinflammatory cytokines. We focused on the effects of preincisional and intraoperative IV lidocaine on pain intensity and immune reactivity in the postoperative period.

**METHODS:** Sixty-five female patients (ASA physical status I-II) scheduled for transabdominal hysterectomy were recruited to this randomized, placebo-controlled study. Thirty-two patients in the treatment group received IV lidocaine starting 20 min before surgery, whereas the control group (33 patients) received a matched saline infusion. Both groups received patient-controlled epidural analgesia during the postoperative period. Blood samples were collected before, 24, 48, and 72 h after surgery to measure *ex vivo* cytokine production of interleukin (IL)-1 receptor antagonist (IL-1ra) and IL-6, as well lymphocyte mitogenic response to phytohemagglutinin-M. A 10-cm visual analog scale was used to assess pain intensity at rest and after coughing.

**RESULTS:** Patients in the lidocaine + patient-controlled epidural analgesia group experienced less severe postoperative pain in the first 4 and 8 h after surgery (visual analog scale 4/3.7 at rest and 5.3/5 during coughing versus 4.5/4.2 and 6.1/5.3, respectively, in the placebo group). There was significantly less *ex vivo* production of IL-1ra and IL-6, whereas the lymphocyte proliferation response to phytohemagglutinin-M was better maintained than in the control group.

**CONCLUSION:** The present findings indicate that preoperative and intraoperative IV lidocaine improves immediate postoperative pain management and reduces surgery-induced immune alterations.

### ATP 敏感钾通道在丙泊酚预处理肾缺血再灌注细胞模型中的作用

#### The Role of $K_{ATP}$ Channels on Propofol Preconditioning in a Cellular Model of Renal Ischemia-Reperfusion

Alexandra R. Assad, MD, PhD<sup>\*</sup>, João Marcos A. Delou, MS<sup>†</sup>, Leonardo M. Fonseca, MS<sup>†</sup>, Nivaldo R. Villela, PhD<sup>\*</sup>, José Hamilton M. Nascimento, PhD<sup>†</sup>, Nubia Verçosa, PhD<sup>\*</sup>, Anibal Gil Lopes, PhD<sup>†</sup>, and Márcia A.M. Capella, PhD<sup>†</sup>

From the <sup>\*</sup>Programa de Pós-Graduação em Cirurgia Geral—Setor de Anestesiologia, Hospital Universitario Clementino Fraga Filho, and <sup>†</sup>Instituto de Biofísica Carlos Chagas Filho, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil.

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**背景:** 已有研究显示丙泊酚 (2,6-二异丙基苯酚) 保护多种器官 (包括肾) 免于缺血再灌注 (I-R) 诱导的损伤。虽然丙泊酚可以影响非肾脏组织的三磷酸腺苷敏感钾 ( $K_{ATP}$ ) 通道, 但其保护肾脏细胞免除这种损伤的机制尚不清楚。在本研究中, 我们探讨了丙泊酚是否可以通过  $K_{ATP}$  通道这一通路, 产生预处理保护肾脏的作用。

**方法:** 先可逆地耗尽 LLC-PK1 细胞内 ATP (抗霉素 A), 再给予细胞所需物质使其恢复 ATP 储存, 用这个模型在体外模拟肾的缺血再灌注。使用溴化二甲噻唑-二苯四唑和台盼蓝染料排除试验分析评定细胞生存率。用钙磷脂结合蛋白 V-异硫氰酸酯荧光素染色和流式细胞技术和免疫荧光技术观察细胞的凋亡。在不同时间段开始丙泊酚处理: 缺血前 1 或 24、只在缺血时或只在再灌注时。为研究丙泊酚保护作用的机制, 在一些丙泊酚预处理实验中使用了特异性的  $K_{ATP}$  抑制剂和激动剂。

**结果:** 缺血再灌注 1 或 24 小时前或恢复的过程中, 给予丙泊酚均能降低 LLC-PK1 细胞缺血再灌注损伤, 但只在缺血时给予丙泊酚并没有这种保护作用。丙泊酚预处理明显可以保护 LLC-PK1 细胞免除缺血再灌注诱发的凋亡。丙泊酚的保护作用可以被格列本脲 (一种肌浆 ATP 依赖的钾通道阻滞剂) 消除, 被 5-hydroxidecanoic acid (一种线粒体 ATP 依赖的钾通道阻滞剂) 降低, 但二氮嗪 (一种选择性 ATP 敏感钾通道开放剂) 对其没有影响。

**结论:** 丙泊酚保护细胞免于缺血再灌注引发的细胞凋亡。这种保护作用可能是由于丙泊酚预处理, 而且至少部分是由  $K_{ATP}$  通道介导。

(张莹译 马皓琳 李士通校)

**BACKGROUND:** Propofol (2,6-diisopropylphenol) has been shown to protect several organs, including the kidneys, from ischemia-reperfusion (I-R)-induced injury. Although propofol affects adenosine triphosphate-sensitive potassium ( $K_{ATP}$ ) channels in nonrenal tissues, it is still not clear by which mechanisms propofol protects renal cells from such damage. In this study, we investigated whether propofol induces renal preconditioning through renal  $K_{ATP}$  channels.

**METHODS:** A reversible ATP depletion (antimycin A) followed by restoration of substrate supply in LLC-PK1 cells was used as an *in vitro* model of renal I-R. Cell viability was assessed by dimethylthiazol-diphenyltetrazol bromide and trypan blue dye exclusion test assays. Apoptosis was evaluated by annexin V–fluorescein isothiocyanate staining by flow cytometry and immunofluorescence. Propofol treatments were initiated at various time intervals: 1 or 24 h before ischemia, only during ischemia, or only during reperfusion. To evaluate the mechanisms of propofol protection, specific  $K_{ATP}$  channel inhibitors or activators were used in some experiments during propofol pretreatment.

**RESULTS:** Propofol attenuated I-R injury on LLC-PK1 cells when present either 1 or 24 h before initiated I-R, and also during the recovery period, but not when added only during ischemia. Propofol pretreatment significantly protected LLC-PK1 from I-R-induced apoptosis. The protective effect of propofol was prevented by glibenclamide (a sarcolemmal ATP-dependent  $K^+$  channel blocker) and decreased by 5-hydroxidecanoic acid (a mitochondrial ATP-dependent  $K^+$  channel blocker), but it was not modified by diazoxide (a selective opener of ATP-sensitive  $K^+$  channel).

**CONCLUSION:** Propofol protected cells against apoptosis induced by I-R. This protection was probably due to a preconditioning effect of propofol and was, at least in part, mediated by  $K_{ATP}$  channels.

### 挥发性麻醉剂弱化氧化应激所致的谷氨酸转运蛋白-3 活性降低

#### Volatile Anesthetics Attenuate Oxidative Stress-Reduced Activity of Glutamate Transporter Type 3

Soon-Ae Lee, MD, PhD<sup>\*†</sup>, Jun-Gwon Choi, MD<sup>†</sup>, and Zhiyi Zuo, MD, PhD<sup>\*</sup>

From the \*Department of Anesthesiology, University of Virginia, Charlottesville, Virginia; †Department of Anesthesiology and Pain Medicine, Center for Liver Cancer, National Cancer Center; and ‡Department of Anesthesia and Pain Medicine, Ilsan Dongguk University Hospital, Goyang-si, Gyeonggi-Do, Republic of Korea.

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**背景：**挥发性麻醉剂增加谷氨酸转运蛋白-3（也称为兴奋性氨基酸转运蛋白-3，EAAT3，一种主要的兴奋型氨基酸）的活性。除了谷氨酸外，EAAT3也能够摄取L-半胱氨酸（合成谷胱甘肽的限速底物）。我们在先前的研究中发现氧化性应激能抑制谷氨酸诱导的EAAT3活性。本研究中我们力图确定氧化应激能否降低L-半胱氨酸诱导的EAAT3活性，以及这种降低能否被挥发性麻醉剂减弱。

**方法：**把大鼠EAAT3表达于爪蟾卵母细胞上。采用双电极电压钳技术记录L-半胱氨酸及L-谷氨酸诱导的膜电流。因为通过EAAT转运底物是电源性的，所以电流峰值能够定量反映所转运的底物的总量。

**结果：**卵母细胞暴露于5 mM 器官氧化剂叔丁基过氧化氢中10 min，L-半胱氨酸诱导的EAAT3的 $V_{max}$ 降低，但对 $K_m$ 没有影响。叔丁基过氧化氢能降低L-半胱氨酸及L-谷氨酸诱导的EAAT3活性，浓度1%至3%的挥发性麻醉剂异氟烷、七氟烷和地氟烷均能减弱这种降低。

**结论：**我们的研究结果显示，氧化应激时挥发性麻醉剂能保护 EAAT3 转运 L-半胱氨酸及 L-谷氨酸的功能，这可能是挥发性麻醉剂神经保护作用的一个机制。

(江继宏 译 马皓琳 李士通 校)

**BACKGROUND:** Volatile anesthetics enhance the activity of glutamate transporter Type 3 (also called excitatory amino acid transporter Type 3, EAAT3), the major neuronal EAAT. In addition to glutamate, EAAT3 can also uptake l-cysteine, the rate-limiting substrate for the synthesis of glutathione. Our previous study showed that oxidative stress inhibited glutamate-induced EAAT3 activity. We determined whether oxidative stress would reduce l-cysteine-induced EAAT3 activity and whether this reduction would be attenuated by volatile anesthetics.

**METHODS:** Rat EAAT3 was expressed in *Xenopus* oocytes. l-glutamate- and l-cysteine-induced membrane currents were recorded using the 2-electrode voltage clamp technique. The peak current was quantified to reflect the amount of transported substrates because transport of substrates via EAATs is electrogenic.

**RESULTS:** Exposure of oocytes to 5 mM *tert*-butyl hydroperoxide, an organic oxidant, for 10 min reduced the  $V_{max}$ , but did not affect the  $K_m$ , of EAAT3 for l-cysteine. The volatile anesthetics isoflurane, sevoflurane, and desflurane at concentrations from 1% to 3% attenuated the *tert*-butyl hydroperoxide-reduced EAAT3 activity for l-glutamate and l-cysteine.

**CONCLUSIONS:** Our results suggest that volatile anesthetics preserve EAAT3 function to transport l-glutamate and l-cysteine under oxidative stress, which may be a mechanism for the neuroprotective effects of volatile anesthetics.

### 使用两种中心实验室分析仪在酸碱诊断中 Stewart 参数的可重现性

#### The Reproducibility of Stewart Parameters for Acid-Base Diagnosis Using Two Central Laboratory Analyzers

Ba-Vinh Nguyen, MD<sup>\*†</sup>, Jean-Louis Vincent, MD, PhD<sup>†</sup>, Jean Baptiste Hamm, MD<sup>†</sup>, Jean-Hervé Abalain, PhD<sup>‡</sup>, Jean-Luc Carre, MD, PhD<sup>§</sup>, Emmanuel Nowak, PhD<sup>||</sup>, Mehdi Ould Ahmed, MD<sup>\*</sup>, Charles C. Arvieux, MD, PhD<sup>†</sup>, and Gildas Gueret, MD, PhD<sup>†</sup>

From the \*Department of Anesthesiology and Critical Care, Clermont Tonnerre Military Hospital, Brest, France; †Department of Anesthesiology and Critical Care, CHU, Brest, France; ‡Department of Intensive Care, Erasme Hospital, Université Libre de Bruxelles, Brussels, Belgium; §Department of Biochemistry and Molecular Biology, CHU, Brest, France; and ||INSERM CIC 0502, CHU, Brest, France.

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**背景：**酸碱紊乱能用 Stewart-Fencl 方法解释，包括计算表面强离子差

(SIDapp)、有效强离子差 (SIDeff) 和强离子间隙 (SIG)。这些计算需要检测多个变量。我们假设因为检测值的差异，用不同分析仪计算出的 SID 和 SIG 是不可重现的。



**方法：**这项前瞻性观察性研究在生化实验室进行，我们在超过 3 个月期间使用两台自动化血液化学分析仪 LX20 (Beckman) 和 Modular (Roche) 连续分析了 179 份常规血样。比较从两台分析仪检测和计算的参数。

**结果：**虽然测得值的相关性是满意的，但是两台分析仪间得出的计算值一致性限值有很大的差异 (SID<sub>app</sub>: 9.6 mEq/L, SID<sub>eff</sub>: 6.4 mEq/L, SIG: 11.7 mEq/L)，且分析仪间的相关性很弱 (SID<sub>app</sub>:  $r^2 = 0.54$ , SIG:  $r^2 = 0.12$ )。

**结论：**Stewart-Fencel 方法解释酸碱状态的结果由于使用不同的分析仪而不同。这种差异可能有重要的临床和研究意义。

(王宏 译，马皓琳，李士通 校)

**BACKGROUND:** Acid-base derangements can be interpreted using the Stewart-Fencel approach, which includes calculation of the apparent strong ion difference (SID<sub>app</sub>), the effective SID (SID<sub>eff</sub>), and the strong ion gap (SIG). These calculations require the measurement of several variables. We hypothesized that the SID and SIG calculated by different analyzers would not be reproducible because of variability in the measured values.

**METHODS:** In this prospective observational study conducted in a biochemistry laboratory, we analyzed 179 routine blood samples from consecutive patients over a 3-mo period using two automated blood chemistry analyzers, the LX20 (Beckman) and the Modular (Roche). Measured and calculated parameters from the two analyzers were compared.

**RESULTS:** Although the correlation between measured values was satisfactory, there were large differences in the limits of agreement for calculated values (SID<sub>app</sub>: 9.6 mEq/L, SID<sub>eff</sub>: 6.4 mEq/L, and SIG: 11.7 mEq/L) and a weak correlation (SID<sub>app</sub>:  $r^2 = 0.54$  and SIG:  $r^2 = 0.12$ ) between the analyzers.

**CONCLUSIONS:** The results of the Stewart-Fencel approach for interpretation of acid-base status can vary according to the analyzer used. These differences may have important clinical and research implications..

### 在伊朗心脏手术患者中使用的物质及其对短期预后的影响

#### Substance Use Among Iranian Cardiac Surgery Patients and Its Effects on Short-Term Outcome

Mitra Azarasa, MD, Rasoul Azarfarin, MD, Ali Changizi, MD, and Azin Alizadehasl, MD

From the Cardiovascular Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

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**背景：**我们评估伊朗西北部进行冠脉搭桥和瓣膜手术患者中使用物质的流行率。我们评估物质依赖和滥用的患者的术后并发症和住院死亡率。

**方法：**在这个前瞻性、观察性研究中，我们对 600 名伊朗西北部三等教学医院患者进行了术前访视。根据 DSM-IV 标准来定义物质滥用和依赖。因为物质（烟草、

阿片和酒精) 依赖和滥用的术后并发症和住院死亡率与对照组没有使用这些物质的对照患者进行比较。

**结果：**在 600 名患者中，吸烟的比例为 42.1%(以往吸烟的比例 26.0%和现时吸烟者的比例 16.1%)，阿片使用的比例 12.0% (阿片滥用的比例 7.0%和阿片依赖的比例 5.0%)，和酒精的饮用比例 8.1% (酒精滥用的比例 7.4%和酒精依赖的比例 0.7%)。男性吸烟的比例 58.9%而女性的比例 7.6% ( $P = 0.001$ )。术后心脏并发症在现时吸烟者(21.5%)和既往吸烟者(20.5%)与对照组(28.2%)之间没有显著性差异。肺部并发症在现时吸烟者(24.7%)和既往吸烟者(17.9%)与对照组 (26.8%) 之间也没有显著性差异( $P = 0.196$ )。然而在男性患者中，肺部并发症比例在现时吸烟者中高于对照组( $P = 0.044$ )。在阿片和酒精依赖和滥用者中，术后并发症与对照组没有显著性差异(所有  $P$  值  $>0.05$ )。这些物质的使用并没有增加患者的住院死亡率。

**结论：**在伊朗西北部的心脏手术患者与西方国家相比，吸烟者的比例相对较低(女性非常低)，酒精的使用也是这样。然而，阿片使用是那里的两倍。我们发现在男性吸烟者中的肺部并发症的比例较高，但是术后心肺并发症和住院死亡率在滥用阿片和酒精的患者中并没有增加。

(唐亮 译 马皓琳 李士通 校)

**BACKGROUND:** We assessed the prevalence of substance use among patients undergoing coronary artery bypass graft and valve surgery in northwest Iran. We evaluated the postoperative complications and in-hospital mortality of patients with substance dependence and abuse.

**METHODS:** In this prospective, observational study, we interviewed 600 patients during the preoperative visit in a tertiary referral educational hospital in northwest Iran. The definition of substance abuse and dependence was according to DSM-IV criteria. Postoperative complications and in-hospital mortality of patients with substance (cigarette, opium, and alcohol) dependence and abuse were compared with those in control patients who did not use these substances.

**RESULTS:** In 600 studied patients, the prevalence of cigarette smoking was 42.1% (ex-smokers 26.0% and current smokers 16.1%), prevalence of opium use was 12.0% (opium abuse 7.0% and opium dependence 5.0%), and alcohol consumption was 8.1% (alcohol abuse 7.4% and alcohol dependence 0.7%). The prevalence of cigarette smoking was 58.9% in men and 7.6% in women ( $P = 0.001$ ). Postoperative cardiac complications in current smokers (21.5%) and ex-smokers (20.5%) were not significantly different from the control group (28.2%). Also, pulmonary complications were not different in current smokers (24.7%) and ex-smokers (17.9%) from the control group (26.8%;  $P = 0.196$ ). However, in men, pulmonary complications in current smokers were more prevalent than in the control group ( $P = 0.044$ ). In opium and alcohol dependents and abusers, postoperative complications were not statistically different from the control group (all  $P$  values  $>0.05$ ). No increase was observed regarding in-hospital mortality in patients with substance use.

**CONCLUSIONS:** In cardiac surgery patients in northwest Iran, the prevalence of cigarette smoking is relatively low (very low in women), as is alcohol use, compared with Western countries; however, opium use is twice as prevalent. We found higher pulmonary complication rates in men who smoked, but no increase in postoperative

cardiopulmonary complications and in-hospital mortality rates in patients who abused opium and consumed alcohol.

## 实验性内毒素血症性休克中变力性药物的运用：第二部分，比较左西孟旦和多巴酚丁胺

### Inotropic Support During Experimental Endotoxemic Shock: Part II. A Comparison of Levosimendan with Dobutamine

Dorij Cunha-Goncalves, MD<sup>\*</sup>, Valeria Perez-de-Sa, MD, PhD<sup>†</sup>, Anders Larsson, MD, PhD<sup>†</sup>, Johan Thörne, MD, PhD<sup>§</sup>, and Sten Blomquist, MD, PhD<sup>\*</sup>

From the <sup>\*</sup>Departments of Cardiothoracic Anesthesia and Intensive Care, and <sup>†</sup>Pediatric Anesthesia and Intensive Care, Lund University Hospital, Sweden; <sup>‡</sup>Department of Anesthesia and Critical Care, Uppsala University Hospital, Sweden; and <sup>§</sup>Department of Surgery, Helsingborg Hospital, Sweden.

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**背景：**我们比较了左西孟旦联合去甲肾上腺素和多巴酚丁胺联合去甲肾上腺素在内毒素血症性休克早期中维持全身和肝脏灌注的效果。

**方法：**将二十只小猪 ( $26.8 \pm 0.5$  kg) 连接流量探测器和导管来监测全身和区域性灌注情况，实验方法与我们同事在同本期刊发表的论文中一致。两只小猪被剔除了，因为它们发生了外科并发症。用间接的热量测定法测得氧耗量( $VO_2$ )。在仪器启动后 1 小时，给予内毒素输注 (大肠杆菌脂多糖  $2 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{h}^{-1}$ ) 300 分钟。开始给予内毒素后 60 分钟，对小猪进行了液体复苏治疗 (20 mL/kg 的右旋糖苷 70 灌注了)；120 分钟时把这些小猪随机分成三组 (每组六只)：左西孟旦组 ( $25\text{--}50 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{h}^{-1}$ )、多巴酚丁胺组 ( $10\text{--}20 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ ) 和对照组。当前两组中小猪的平均动脉压  $\leq 65$  mm Hg 时再加入去甲肾上腺素 ( $0.5\text{--}2 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ )。给予晶体液来维持充盈压  $\geq$  基准值。数据被随机分成两个亚群：前组 (0-120 分钟，所有动物) 和后组 (120-300 分钟，三组)，并用方差分析进行分析。 $P < 0.05$  为差异具有统计学意义。

**结果：**在 120 分钟时，心输出量增加了 15% ( $P < 0.001$ )，全身血管阻力降低了 30% ( $P < 0.001$ )，平均动脉压降低了 12.5% ( $P = 0.004$ )；肝动脉、肠系膜上动脉和门静脉的血流量分别增加了 100% ( $P = 0.004$ )，60% ( $P < 0.001$ ) 和 20% ( $P < 0.001$ )。在 120-300 分钟内对照组心输出量和全身氧输送量降低了 50% ( $P < 0.05$ )，左西孟旦组没有变化，多巴酚丁胺组增高了 60% ( $P = 0.05$ )。对照组平均动脉压 ( $P = 0.043$ ) 和氧耗量 ( $P = 0.001$ ) 降低了 20%。在 300 分钟时门静脉血流量对照组下降了 50%，左西孟旦组下降了 30% ( $P < 0.001$ )，因此多巴酚丁胺组较高 ( $P = 0.003$ )。肝脏和肠氧输送量在左西孟旦组分别下降了 50% 和 30% ( $P < 0.001$ )，对照组分别降低了 70% 和 45% ( $P < 0.05$ )，因此区域性的氧输送量在多巴酚丁胺组较高 ( $P < 0.05$ )。在多巴酚丁胺组，维持混合静脉血和肝静脉血氧饱和度；且肝静脉血氧饱和度的值比其他两组高 ( $P < 0.05$ )。虽然多巴酚丁胺组的动脉、门静脉和肝静脉乳酸盐浓度没有变化，但是左西孟旦组的这三个浓度值增加了两倍 ( $P$  分别 = 0.020、0.020 和 0.034)。

**结论：**在液体复苏的内毒素血症小猪中，无论左西孟旦联合去甲肾上腺素还是多巴酚丁胺联合去甲肾上腺素都能维持全身血流量、氧输送量和氧耗量。但是只有多巴酚丁胺和去甲肾上腺素的组合可以维持门静脉血流，从而保护了内脏和肝脏氧自身调节，稳定了乳酸浓度。

（姜旭晖译，马皓琳 李士通校）

**BACKGROUND:** We compared the association of levosimendan or dobutamine with norepinephrine for the maintenance of systemic and hepatosplanchnic perfusion during early endotoxemic shock.

**METHODS:** Twenty anesthetized pigs ( $26.8 \pm 0.5$  kg) were instrumented with flow probes and catheters to monitor systemic and regional perfusion as described in our companion article in this issue of the journal. Two animals were excluded because of surgical complications. Oxygen consumption ( $\text{VO}_2$ ) was measured by indirect calorimetry. Starting 1 h after instrumentation, an endotoxin infusion (*Escherichia coli* lipopolysaccharide,  $2 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{h}^{-1}$ ) was administered for 300 min. Sixty minutes after the start of endotoxin, the animals were fluid resuscitated (20 mL/kg dextran 70); at 120 min, they were randomized into three groups of six animals each: levosimendan ( $25\text{--}50 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{h}^{-1}$ ), dobutamine ( $10\text{--}20 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ ), and control. In the first two groups, norepinephrine ( $0.5\text{--}2 \mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ ) was added when mean arterial blood pressure (MAP)  $\leq 65$  mm Hg. Crystalloids were given to maintain filling pressures  $\geq$  baseline. The data were divided into two subsets: before (0–120 min, all animals) and after (120–300 min, three groups) randomization, and analyzed by analysis of variance.  $P < 0.05$  was considered significant.

**RESULTS:** At 120 min, cardiac output was 15% higher ( $P < 0.001$ ), systemic vascular resistance was 30% lower ( $P < 0.001$ ), and MAP decreased 12.5% ( $P = 0.004$ ); blood flow in the hepatic artery, superior mesenteric artery, and portal vein had increased by 100% ( $P = 0.004$ ), 60% ( $P < 0.001$ ), and 20% ( $P < 0.001$ ), respectively. Between 120 and 300 min, cardiac output and systemic oxygen delivery decreased 50% in control animals ( $P < 0.05$ ), remained unchanged in the levosimendan group, and increased 60% with dobutamine ( $P = 0.05$ ). MAP ( $P = 0.043$ ) and  $\text{VO}_2$  ( $P = 0.001$ ) decreased 20% in the control group. Portal vein flow decreased in the control (50%) and levosimendan (30%) groups ( $P < 0.001$ ) and was therefore higher in the dobutamine group ( $P = 0.003$ ) at 300 min. Hepatic and gut oxygen deliveries decreased in the levosimendan (50%, and 30%, respectively,  $P < 0.001$ ) and control groups (70% and 45%, respectively,  $P < 0.05$ ); thus, regional oxygen deliveries were greater in the dobutamine group ( $P < 0.05$ ). In this group, mixed venous and hepatic vein oxygen saturation were maintained; the latter variable was higher than in the other groups ( $P < 0.05$ ). Although unchanged with dobutamine, arterial ( $P = 0.020$ ), portal ( $P = 0.020$ ), and hepatic vein ( $P = 0.034$ ) lactate concentrations increased twofold with levosimendan.

**CONCLUSION:** In volume-resuscitated endotoxemic pigs, the association of either levosimendan or dobutamine with norepinephrine preserved systemic blood flow, oxygen delivery, and  $\text{VO}_2$ . However, only dobutamine-norepinephrine maintained portal blood flow, which was associated with preservation of splanchnic and hepatic oxygen homeostasis and stable lactate concentrations.

## 小剂量重比重布比卡因用于剖宫产腰硬联合麻醉的随机比较

### A Randomized Comparison of Low Doses of Hyperbaric Bupivacaine in Combined Spinal-Epidural Anesthesia for Cesarean Delivery

Serene Leo, MMED, Ban Leong Sng, MMED, FANZCA, Yvonne Lim, MMED, and Alex T. H. Sia, MMED

From the Department of Women's Anaesthesia, Kandang Kerbau Women's and Children's Hospital, Singapore.

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**背景：**我们这项研究的目的在于研究鞘内 7mg、8mg 和 9mg 重比重布比卡因用于剖宫产腰硬联合麻醉的阻滞特征，从而阐明产生足够感觉神经阻滞用于手术的基础上，可以使低血压、高位神经阻滞发生率及术中硬膜外添加量的需要最低化的最佳剂量。

**方法：**60 位选择性剖宫产妇随机分至三组。7、8、9 组产妇分别接受 7、8、9mg 重比重布比卡因鞘内注射。3 组产妇均在腰硬联合麻醉开始时接受 100ug 吗啡鞘内注射和羟乙基淀粉 15ml/kg 静脉注射。无痛平面到达 T4 时手术开始。由一位不知情的医生监测患者的阻滞特点和副作用。我们的初期结果为最高感觉神经阻滞平面。

**结果：**3 组患者在最高感觉神经阻滞平面间存在差异（7 组：中位数 T2（四分位距 T2-T3）；8 组：中位数 T2（T1-T2）；9 组：中位数 T1（C8-T2）； $P = 0.02$ ）。然而，三组间到达 T4 所需的时间相似。需要血管收缩药的低血压发生率三组间存在差异（7 组 30%，8 组 55%，9 组 70%； $P = 0.04$ ）。没有患者发生阻滞不全。三组间新生儿情况无差异。

**结论：**最低剂量的重比重布比卡因（7mg）可以提供起效快且有效的剖宫产麻醉，并且比 8mg 和 9mg 组低血压的发生率低。然而，由于麻醉持续时间较短，这仅在硬膜外导管可以持续加药加强阻滞的基础上才可行。

（黄佳佳 译 马皓琳 李士通校）

**BACKGROUND:** The aim of our study was to investigate the block characteristics of intrathecal hyperbaric bupivacaine 7, 8, or 9 mg administered during combined spinal-epidural anesthesia for cesarean delivery and to elucidate the dose that produces adequate sensory blockade for surgery while minimizing the incidence of hypotension, high neuroblockade, and the need for intraoperative epidural supplementation.

**METHODS:** Sixty women presenting for elective cesarean delivery were randomly assigned to one of the 3 groups. Group 7 received intrathecal hyperbaric bupivacaine 7 mg, Group 8 received 8 mg, and Group 9 received 9 mg. Women in all 3 groups received intrathecal morphine 100  $\mu$ g and IV hydroxyethyl starch 15 mL/kg at the time of initiation of combined spinal-epidural anesthesia. Surgery began when a sensory level of T4 was achieved. Patients were monitored for block characteristics and side effects by a blinded observer. Our primary outcome was the maximum cephalad sensory block height.

**RESULTS:** There was a difference in the maximum extent of cephalad sensory block among groups (Group 7: median T2 [interquartile range T2–T3]; Group 8: median T2 [T1–T2]; Group 9: median T1 [C8–T2];  $P = 0.02$ ). However, the time taken to reach T4 was similar in all 3 groups. The incidence of hypotension requiring vasopressors was different among groups (30% in Group 7, 55% in Group 8, and 70% in Group 9;  $P = 0.04$ ). No patient had inadequate anesthesia. Neonatal outcomes were similar in all 3 groups.

**CONCLUSION:** The lowest dose of hyperbaric bupivacaine (7 mg) provided equally rapid onset and effective anesthesia for cesarean delivery while reducing the incidence of hypotension compared with 8 and 9 mg. However, because of its shorter duration of anesthesia, it may be feasible only when the block can be reinforced using a functional epidural catheter.

### 子宫切除后应用加巴喷丁和氯胺酮用于急性和慢性疼痛的比较

#### A Comparison of Gabapentin and Ketamine in Acute and Chronic Pain After Hysterectomy

Huseyin Sen, MD<sup>\*</sup>, Ali Sizlan, MD<sup>†</sup>, Omer Yanarates, MD<sup>†</sup>, Hakan Emirkadi, MD<sup>\*</sup>, Sezai Ozkan, MD<sup>\*</sup>, Guner Dagli, MD<sup>\*</sup>, and Alparslan Turan, MD<sup>‡§</sup>

From the <sup>\*</sup>Department of Anesthesiology and Reanimation, Gülhane Military Medical Academy, Haydarpaşa Training Hospital, Üsküdar, İstanbul; <sup>†</sup>Department of Anesthesia and Reanimation, Gülhane Military Medical Academy, Ankara, Turkey; <sup>‡</sup>Department of Anesthesiology and Perioperative Medicine, University of Louisville, Louisville, Kentucky; and <sup>§</sup>Department of Outcomes Research, The Cleveland Clinic, Cleveland, Ohio.

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**背景:** 加巴喷丁和氯胺酮是常用的镇痛辅助药，用于改善围手术期疼痛管理。我们设计了这一双盲、安慰剂对照的实验，以验证和比较应用加巴喷丁和氯胺酮对择期全子宫切除术后的早期和慢性疼痛的预防作用。

**方法:** 60 名行腹式全子宫切除术的病人随机分入以下 3 组中的一组：对照组，口服安慰剂胶囊，推注加输注生理盐水；氯胺酮组，口服安慰剂胶囊，并在划皮前静脉推注氯胺酮 0.3 mg/kg，并以 0.05 mg·kg<sup>-1</sup>·h<sup>-1</sup> 的速度输注氯胺酮直至手术结束；加巴喷丁组，口服加巴喷丁 1.2g，推注和输注生理盐水。麻醉技术是标准的，术后评价包括口诉言辞评分法评价疼痛和镇静、静脉应用吗啡、恢复质量的评价、肠功能恢复、正常活动恢复时间以及病人对疼痛管理的满意度。手术后 1、3 和 6 个月，评价病人的慢性术后疼痛。

**结果:** 相比于氯胺酮和对照组，加巴喷丁组的术后疼痛评分显著较低，相比于对照组，两个处理组病人自控术后镇痛的吗啡需要量明显降低 ( $P < 0.001$ )。与对照组相比，氯胺酮组和加巴喷丁组总的病人自控镇痛吗啡用量分别减少 35% 和 42% ( $P < 0.001$ )。与对照组相比，氯胺酮组和加巴喷丁组病人对疼痛管理的满意度显著改善 ( $P < 0.001$ )。与氯胺酮组和对照组相比，加巴喷丁组切皮疼痛的发生率以及 1、3、6 月随访的相关疼痛评分显著较低 ( $P < 0.001$ )。

**结论：**加巴喷丁和氯胺酮在改善早期疼痛管理和减少阿片类镇痛药的使用方面是相似的，但是，加巴喷丁更能预防术后 6 个月内的慢性疼痛。

(黄丽娜 译 马皓琳 李士通 校)

**BACKGROUND:** Gabapentin and ketamine are popular analgesic adjuvants for improving perioperative pain management. We designed this double-blind, placebo-controlled study to test and compare the preventive effects of perioperative ketamine and gabapentin on early and chronic pain after elective hysterectomy.

**METHODS:** Sixty patients undergoing abdominal hysterectomy were randomly assigned to 1 of the following 3 groups: control group received oral placebo capsules and bolus plus infusion of saline; ketamine group received oral placebo capsules and, before incision, 0.3 mg/kg IV bolus and 0.05 mg·kg<sup>-1</sup>·h<sup>-1</sup> infusion of ketamine until the end of surgery; and gabapentin group received oral gabapentin 1.2 g and bolus plus infusion of saline. The anesthetic technique was standardized, and the postoperative assessments included verbal rating scales for pain and sedation, IV morphine usage, quality of recovery assessment, recovery of bowel function, resumption of normal activities, and patient satisfaction with their pain management. Patients were questioned at 1, 3, and 6 mo after surgery for chronic postoperative pain.

**RESULTS:** Postoperative pain scores were significantly lower in the gabapentin group compared with the ketamine and control groups, and patient-controlled analgesia morphine use was significantly reduced in both treatment groups (versus control group) ( $P < 0.001$ ). Total patient-controlled analgesia morphine use was decreased by 35% and 42% in the ketamine and gabapentin groups, respectively, compared with the control group ( $P < 0.001$ ). Patient satisfaction with pain treatment was significantly improved in the ketamine and gabapentin groups compared with the control group ( $P < 0.001$ ). The incidence of incisional pain and related pain scores at the 1-, 3-, and 6-mo follow-up were significantly lower in the gabapentin group compared with the ketamine and control groups ( $P < 0.001$ ).

**CONCLUSION:** Gabapentin and ketamine are similar in improving early pain control and in decreasing opioid consumption; however, gabapentin also prevented chronic pain in the first 6 postoperative months.

### 胸段脊髓阻滞对有害电刺激大鼠后爪诱发的腰段脊髓 Fos 表达的影响

#### The Effect of a Thoracic Spinal Block on Fos Expression in the Lumbar Spinal Cord of the Rat Induced by a Noxious Electrical Stimulus at the Hindpaw

Janneke L. P. Giele, MSc<sup>\*</sup>, Anneke F. Nabers, MSc<sup>†</sup>, Jan G. Veening, PhD<sup>†</sup>, Jan van Egmond, PhD<sup>\*</sup>, and Kris C. P. Vissers, MD, PhD, FIPP<sup>\*</sup>

From the Departments of \*Anesthesiology, Pain and Palliative Medicine, and †Anatomy, Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands.

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**背景：**假设电刺激大鼠后爪诱发的腰段脊髓 Fos 表达，可能源于三个来源：受有害刺激直接感觉输入、脊髓局部交互作用和脊髓上区域调制信号输入。本实验研究目的是通过消除脊髓上输入来区分这些来源。

**方法：**因此，雄性 Wistar 大鼠中胸段水平鞘内置管，注入局麻药（布比卡因）产生脊髓阻滞作用。该胸段脊髓阻滞完全抑制伤害性刺激诱发的撤退反射。对脊髓 L4 水平所有板层中的 Fos 免疫反应性（Fos-IR）进行定量。

**结果：**伤害性刺激产生的同侧脊髓背侧角中的 Fos-IR 广泛且强烈增加，主要集中在 I、II 和 V 板层。胸段脊髓阻滞明显增加 V 板层中的 Fos-IR 的数量，但是对 I 和 II 板层中的 Fos-IR 没有明显影响。

**结论：**脊髓 V 板层 Fos-IR 增加可能是由于来自脑的疼痛调制下行机制被阻断所造成的。目前已知的下行痛觉调控系统是 5-羟色胺系统，受水管周灰质调控。这个系统抑制浅表板层神经元。另一个非 5-羟色胺系统起源于前顶盖前核。后者对脊髓浅表板层中的神经元有易化作用，而对 V 板层中的神经元有抑制作用。我们得出结论，这两个系统可能均参与本模型中观察到的外周伤害性刺激的作用。

（杨斌 译 马皓琳 李士通 校）

**BACKGROUND:** Fos expression in the lumbar spinal cord, resulting from a noxious electrical stimulus at the hindpaw, is hypothesized to originate from three sources: direct sensory input of the noxious stimulus, local interactions in the spinal cord, and input of modulating signals from supraspinal regions. Our aim in this study was to discriminate among these sources by eliminating the supraspinal input.

**METHODS:** Therefore, a spinal block was administered in male Wistar rats by administering a local anesthetic (bupivacaine) through an intrathecal catheter at the mid-thoracic level. This thoracic spinal block completely suppressed the noxious stimulation-induced withdrawal reflex that is normally elicited by electrical stimulus. Fos immunoreactivity (Fos-IR) was quantified in all laminae of the L4 segment of the spinal cord.

**RESULTS:** Noxious stimulation resulted in a general and strong increase in Fos-IR in the ipsilateral dorsal horn, mainly in Laminae I, II, and V. Thoracic spinal block caused a remarkable increase in the amount of Fos-IR in Lamina V, but had no significant effect on the Fos-IR in Laminae I and II.

**CONCLUSIONS:** The increase in Fos-IR in Lamina V may have resulted from the interruption of a pain-modulating descending mechanism from the brain. A known modulating descending mechanism is the serotonergic system, controlled by the periaqueductal gray. This system inhibits the neurons in the superficial laminae. Another nonserotonergic system originates in the anterior pretectal nucleus. The latter facilitates neurons in the superficial laminae, while neurons in Lamina V are inhibited. We conclude that both systems are probably involved in the observed effects of the peripheral noxious stimulation given in the present model.

**极低量纳洛酮加入利多卡因或利多卡因-芬太尼合液延长腋路臂丛神经阻滞时间**

**An Ultra-Low Dose of Naloxone Added to Lidocaine or Lidocaine-Fentanyl Mixture Prolongs Axillary Brachial Plexus Blockade**

Ali Movafegh, MD, Behrang Nouralishahi, MD, Mustafa Sadeghi, MD, and Omid Nabavian, MD



From the Department of Anesthesiology and Critical Care, Dr. Ali Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran.

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**背景：**在这个前瞻、随机、双盲试验中，评价极低量纳洛酮加入利多卡因和芬太尼合液在腋路臂丛神经阻滞的起效时间和持续时间。

**方法：**112例择期在腋路臂丛神经阻滞下行前臂手术的患者，随机分四组，分别接受34mL1.5%利多卡因加3mL等张生理盐水（对照组， $n = 28$ ）、34mL1.5%利多卡因加2mL芬太尼（100  $\mu\text{g}$ ）和1mL生理盐水（芬太尼组， $n = 28$ ）、34mL1.5%利多卡因加2mL生理盐水和100 ng纳洛酮（纳洛酮组， $n = 28$ ）或34mL1.5%利多卡因加2mL芬太尼（100  $\mu\text{g}$ ）和100ng(1 mL)纳洛酮（纳洛酮加芬太尼组， $n = 28$ ）。所有患者都应用一种多重刺激技术。实施神经阻滞，在5、15和30 min时记录桡神经、正中神经、肌皮神经和尺神经的感觉和运动阻滞情况。感觉和运动神经阻滞的起效时间定义为最后一次注射分别到针刺反应完全消失和完全瘫痪的时间。感觉和运动神经阻滞的持续时间被认为是完全阻滞到术后出现首次疼痛和运动功能完全恢复的时间。

**结果：**纳洛酮组（感觉起效时间  $15 \pm 3$ ，运动起效时间  $21 \pm 4$ ）和纳洛酮加芬太尼组感觉和运动阻滞起效时间比对照组和芬太尼组长（感觉起效时间对照组  $10 \pm 3$  min，芬太尼组  $10 \pm 4$  min，纳洛酮加芬太尼组  $17 \pm 3$  min，运动起效时间对照组  $15 \pm 5$  min，芬太尼组  $14 \pm 7$  min，纳洛酮加芬太尼组  $17.3 \pm 3.4$  min， $P < 0.001$ ）。到术后首次疼痛时间和运动阻滞持续时间纳洛酮组( $92 \pm 10$  和  $115 \pm 10$  min)和纳洛酮加芬太尼组( $98 \pm 12$  和  $122 \pm 16$  min)明显比对照组( $68 \pm 7$  和  $89 \pm 11$  min)和芬太尼组( $68 \pm 11$  和  $90 \pm 12$  min)延长( $P < 0.001$ )。术后首次疼痛时间纳洛酮和纳洛酮加芬太尼组明显比对照组或芬太尼组长( $P < 0.001$ )。

**结论：**1.5%利多卡因中加入极低量纳洛酮（不管是否加芬太尼）在腋路臂丛阻滞中都会延长到术后出现首次疼痛的时间和运动阻滞时间，但同时也延长起效时间。

（朱慧译 马皓琳 李士通校）

**INTRODUCTION:** In this prospective, randomized, double-blind study, we evaluated the effect of an ultra-low dose of naloxone added to lidocaine and fentanyl mixture on the onset and duration of axillary brachial plexus block.

**METHODS:** One hundred twelve patients scheduled for elective forearm surgery under axillary brachial plexus block were randomly allocated to receive 34 mL lidocaine 1.5% with 3 mL of isotonic saline chloride (control group,  $n = 28$ ), 34 mL lidocaine 1.5% with 2 mL (100  $\mu\text{g}$ ) of fentanyl and 1 mL of isotonic saline chloride (fentanyl group,  $n = 28$ ), 34 mL lidocaine 1.5% with 2 mL saline chloride and 100 ng (1 mL) naloxone (naloxone group,  $n = 28$ ), or 34 mL lidocaine 1.5% with 2 mL (100  $\mu\text{g}$ ) of fentanyl and 100 ng (1 mL) naloxone (naloxone + fentanyl group,  $n = 28$ ). A multiple stimulation technique was used in all patients. After performing the block, sensory and motor blockades of radial, median, musculocutaneous, and ulnar nerves were recorded at 5, 15, and 30 min. The onset time of the sensory and motor blockades was defined as the time between the last injection and the total abolition of the pinprick response and complete paralysis, respectively. The duration of sensory and motor blocks was considered as the time

interval between the complete block and the first postoperative pain and complete recovery of motor functions.

**RESULTS:** Sensory and motor onset times were longer in the naloxone (sensory onset time:  $15 \pm 3$ , and motor onset time:  $21 \pm 4$ ) and naloxone + fentanyl group than control or fentanyl groups (sensory onset time:  $10 \pm 3$  min in control group,  $10 \pm 4$  min in fentanyl group, and  $17 \pm 3$  min in naloxone + fentanyl group, motor onset time:  $15 \pm 5$  min in control group,  $14 \pm 7$  min in fentanyl group, and  $17.3 \pm 3.4$  min in naloxone + fentanyl group) ( $P < 0.001$ ). The duration of time to first postoperative pain and motor blockade was significantly longer in the naloxone ( $92 \pm 10$  and  $115 \pm 10$  min) and naloxone + fentanyl groups ( $98 \pm 12$  and  $122 \pm 16$  min) than control ( $68 \pm 7$  and  $89 \pm 11$  min) and fentanyl groups ( $68 \pm 11$  and  $90 \pm 12$  min) ( $P < 0.001$ ). The time to first postoperative pain was significantly longer in the naloxone and naloxone + fentanyl groups than in the control or fentanyl groups ( $P < 0.001$ ).

**CONCLUSIONS:** The addition of an ultra-low dose of naloxone to lidocaine 1.5% solution with or without fentanyl solution in axillary brachial plexus block prolongs the time to first postoperative pain and motor blockade but also lengthens the onset time.

### 大鼠心肌再灌注期间紧急美沙酮治疗通过 $\delta$ -阿片受体减少急性心肌梗塞的面积 Acute Methadone Treatment Reduces Myocardial Infarct Size via the $\delta$ -Opioid Receptor in Rats During Reperfusion

Eric R. Gross, MD, PhD<sup>\*</sup>, Anna K. Hsu, BS<sup>†</sup>, and Garrett J. Gross, PhD<sup>†</sup>

From the <sup>\*</sup>Department of Anesthesiology, Stanford University, Stanford, California; and <sup>†</sup>Department of Pharmacology and Toxicology, Medical College of Wisconsin, Milwaukee, Wisconsin.

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**背景:** 美沙酮是阿片受体的激动剂, 常用于急慢性疼痛的处理。本文作者拟确定美沙酮是否和吗啡一样, 减少心肌梗塞面积并具有剂量依赖性, 机制是否通过 $\delta$ 受体媒介。另外作者拟验证心肌梗塞面积的减少是否因美沙酮的给予时机和诱发缺血的时程不同而不一。

**方法:** 外科操作完成后, 雄性 SD 大鼠分成三组, 第一组分几小组, 每一小组在缺血 30min 前分别给予美沙酮(0.03–3 mg/kg)或吗啡 0.03–3 mg/kg)或生理盐水(安慰剂), 第一组动物在给予美沙酮(0.3 mg/kg)、吗啡(0.3 mg/kg)、安慰剂之前可以给予 $\delta$ 受体的拮抗剂 naltrindole (5 mg/kg), 第二组分几小组, 每一小组在再灌注 5min 之前或 10 秒钟之后给予美沙酮(0.3 mg/kg), 这两组的动物通过左降支动脉闭塞致心肌缺血 30min, 然后再灌注 2 小时, 第三组动物再灌注前 5min 给予安慰剂, 美沙酮(0.03–3 mg/kg), 吗啡 (0.03–3 mg/kg) 并接受通过左降支动脉闭塞致心肌缺血 45min 然后再灌注 2 小时, 心肌梗塞的面积通过心肌组织氯化三苯染色法评估并以危险区域百分比(平均值 $\pm$ 标准差)来计算。

**结果:** 在心肌梗塞之前给予美沙酮和吗啡可以减少心肌梗塞面积, 最有效的剂量为 0.3 mg/kg (美沙酮  $46\% \pm 1\%$ ,  $P < 0.001$ , 吗啡  $47\% \pm 1\%$ ,  $P < 0.001$ , 安慰剂,  $61\% \pm 1\%$ )。Naltrindole(5 mg/kg)阻断美沙酮(0.3 mg/kg)和吗啡(0.3 mg/kg)产生的心肌保护作用(naltrindole + 美沙酮,  $58\% \pm 1\%$ , 与美沙酮比  $P < 0.001$ ; naltrindole +

吗啡,  $58 \pm 1\%$ , 与吗啡比  $P < 0.001$ )。在再灌注 5 min 之前给予美沙酮(0.3 mg/kg)可以减少心肌梗塞的面积但 10 秒钟后给药无此效应。30min 缺血组和 45min 缺血组相比, 心肌缺血面积并没有显著的差异。缺血时间延长至 45min 将削弱美沙酮和吗啡引起的心肌梗塞面积减少的作用。

**结论:** 上述研究表明: 美沙酮和吗啡可以产生相似的通过 $\delta$ 受体媒介的减少心肌梗塞面积的效应并依赖缺血时程。

(刘世文 译 陈杰 校)

**BACKGROUND:** Methadone is an opioid agonist often given to manage acute and chronic pain. We sought to determine whether methadone compared with morphine dose dependently reduces myocardial infarct size (IS) and whether the mechanism is  $\delta$ -opioid receptor mediated. Furthermore, we examined whether myocardial IS reduction varies with the timing of methadone administration or duration of induced ischemia.

**METHODS:** After surgical instrumentation, we divided male Sprague-Dawley rats into 3 sets. The first set was divided into groups, which received methadone (0.03–3 mg/kg), morphine (0.03–3 mg/kg), or water (placebo) 30 min before ischemia. Some animals of the first set also received the  $\delta$ -opioid antagonist naltrindole (5 mg/kg) before methadone (0.3 mg/kg), morphine (0.3 mg/kg), or placebo administration. The second set of animals was divided into groups that received methadone (0.3 mg/kg) 5 min before reperfusion or 10 s after reperfusion. These 2 sets of animals were subjected to 30 min of myocardial ischemia by left anterior descending coronary artery occlusion and then 2 h of reperfusion. The third set of animals received placebo, methadone (0.3 mg/kg), or morphine (0.3 mg/kg) 5 min before reperfusion and were subjected to 45 min of ischemia by left anterior descending coronary artery occlusion with 2 h of reperfusion. Myocardial IS was assessed by staining myocardial tissue with triphenyltetrazolium chloride and expressed as a percentage of the area at risk (mean  $\pm$  sem).

**RESULTS:** Methadone or morphine administered before ischemia reduced myocardial IS. The greatest effect was achieved at a dose of 0.3 mg/kg (methadone,  $46\% \pm 1\%$ ,  $P < 0.001$  and morphine,  $47\% \pm 1\%$ ,  $P < 0.001$  versus placebo,  $61\% \pm 1\%$ , respectively). Naltrindole (5 mg/kg) blocked methadone-induced (0.3 mg/kg) and morphine-induced (0.3 mg/kg) cardioprotection (naltrindole + methadone,  $58\% \pm 1\%$ ,  $P < 0.001$  versus methadone; and naltrindole + morphine,  $58\% \pm 1\%$ ,  $P < 0.001$  versus morphine). Methadone (0.3 mg/kg) reduced myocardial IS when given 5 min before reperfusion ( $46\% \pm 1\%$ ,  $P < 0.001$  versus placebo) but not 10 s after reperfusion ( $60\% \pm 1\%$ ,  $P = 0.675$  versus placebo). No significant myocardial IS differences were seen for placebo when comparing the 45-min ischemia group ( $64\% \pm 1\%$ ) with the 30-min ischemia group ( $60\% \pm 1\%$ ,  $P = 0.069$ ). The longer ischemia time of 45 min abrogated methadone-induced IS reduction ( $64\% \pm 2\%$ ,  $P = 0.867$  versus 45-min ischemia placebo group) and morphine-induced IS reduction ( $65\% \pm 1\%$ ,  $P = 0.836$  versus 45-min ischemia placebo group).

**CONCLUSIONS:** These findings demonstrate that methadone and morphine produce similar myocardial IS-sparing effects that are  $\delta$ -opioid receptor mediated and that are dependent on the duration of myocardial ischemia.

智障儿童的双频指数 (BIS) 值偏低

Lower Bispectral Index Values in Children Who Are Intellectually Disabled

Abraham J. Valkenburg, MSc<sup>\*†</sup>, Tom G. de Leeuw, MD<sup>†</sup>, Dick Tibboel, MD, PhD<sup>\*</sup>, and Frank Weber, MD<sup>†</sup>

From the Departments of \*Pediatric Surgery, and †Anesthesiology, Erasmus University Medical Center–Sophia Children’s Hospital, Rotterdam, The Netherlands.

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**背景：**很少有针对智障儿童的 BIS 监测数据。癫痫样脑电活动，潜在的病理基础，以及抗惊厥/解痉治疗等都可影响 BIS 的监测。作者这一研究目的是比较智障儿童与对照组 4 个不同麻醉阶段的 BIS 值；第二个目的是探讨智障儿童和对照组儿童在意识和无意识时的 BIS 值的差异。

**方法：**18 名智障儿童和 35 名对照组儿童，年龄 2-13 岁间。在整个手术过程中监测 BIS 值，重要事件和常规生命体征。用 BIS 值来区分有意识和无意识的状态，以特征工作曲线表示。

**结果：**智障儿童组 BIS 值中位数（四分位数范围）各期均显著低于正常儿童组，分别为清醒期（72 [48-77] vs 97 [84-98]， $P < 0.001$ ）；麻醉维持期（34 [21-45] vs 43 [33-52]， $P = 0.02$ ）；复苏期（59 [36-68] vs 73 [64-78]， $P = 0.009$ ）。清醒状态时两组间 BIS 特征曲线不同。智障儿童组，BIS 值区别有意识和无意识状态，低于正常临界值 28 个百分点。

**结论：**作者建议麻醉医生应注意智障儿童的 BIS 值可能较低，应避免在无意中误判智障儿童的意识状态。新的多中心研究必须规范化评估智障患者有无意识的最佳方法和确认他们的智力残疾的具体病因。

（叶乐译 陈杰校）

**BACKGROUND:** Very few data are available on the use of bispectral index (BIS) monitoring in children who are intellectually disabled. Epileptiform electroencephalogram activity, underlying cerebral pathology, or anticonvulsant/spasmolytic therapy might influence BIS monitoring.

Our aim in this exploratory study was to first compare BIS values at 4 different stages of anesthesia between intellectually disabled children and controls. Our second aim was to investigate the discriminative properties of BIS between consciousness and unconsciousness for intellectually disabled children and for controls.

**METHODS:** Eighteen intellectually disabled children and 35 control children, aged 2–13 yr, were included. BIS values, landmark events, and standard monitoring values of vital functions were recorded throughout the whole procedure. The performance of BIS in distinguishing between a conscious and unconscious state was assessed from receiver operating characteristic curves.

**RESULTS:** Median (interquartile range) BIS values for the intellectually disabled group were significantly lower than those for controls in the awake state (72 [48–77] vs 97 [84–98],  $P < 0.001$ ), during stable intraoperative anesthesia (34 [21–45] vs 43 [33–52],  $P = 0.02$ ), and during return of consciousness (59 [36–68] vs 73 [64–78],  $P = 0.009$ ). The discriminative properties of the BIS monitor for the state of consciousness were comparable between the 2 groups according to the receiver operating characteristic curves. Nevertheless, the optimal cutoff BIS value for discrimination between conscious and unconscious state was 28 points lower for the intellectually disabled group.

**CONCLUSIONS:** We advise anesthesiologists to be alert to possible lower BIS values in intellectually disabled children. There is a risk that they will inadvertently misinterpret the state of consciousness in intellectually disabled children. New multicenter studies must find the optimal manner of evaluating (un)consciousness in intellectually disabled patients with documented and confirmed specific etiologies of their intellectual disability.

### 肠镜检查镇静后的早期认知功能障碍：异丙酚加咪唑安定和/或芬太尼的影响

#### Early Cognitive Impairment After Sedation for Colonoscopy: The Effect of Adding Midazolam and/or Fentanyl to Propofol

Usha Padmanabhan, MBBS, FANZCA<sup>\*</sup>, Kate Leslie, MBBS, MD, MEpi, FANZCA<sup>\*†</sup>, Audrey SingYi Eer<sup>\*</sup>, Paul Maruff, PhD<sup>‡§</sup>, and Brendan S. Silbert, MBBS, FANZCA<sup>||¶</sup>

From the <sup>\*</sup>Department of Anaesthesia and Pain Management, Royal Melbourne Hospital;

<sup>†</sup>Department of Pharmacology, University of Melbourne; <sup>‡</sup>CogState Ltd; <sup>§</sup>Centre for

Neuroscience, University of Melbourne; <sup>||</sup>Centre for Anaesthesia and Cognitive Function,

Department of Anaesthesia, St. Vincent's Hospital; and <sup>¶</sup>Department of Surgery,

University of Melbourne, Melbourne, Australia.

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**背景：**，产生最少的认知功能障碍和肠镜检查过程中提供最佳操作条件的镇静药物的组合尚未确定。作者试图确定择期门诊结肠镜检查单独使用异丙酚的认知功能损害是否低于异丙酚联合咪唑安定和/或芬太尼麻醉后对认知功能的影响。

**方法：**择期门诊结肠镜成人患者200例随机接受单独使用异丙酚；异丙酚加咪唑安定；或异丙酚-咪唑安定-芬太尼或异丙酚-芬太尼四种方法之一的镇静。认知功能的基础值测定采用计算机化 CogState 测验(Cogstate™, Melbourne, Australia)，然后镇静。在程序中，记录镇静药物剂量，镇静深度（通过双频指数和观察员的警觉性评估/镇静评分），并发症以及可处理的数据。询问患者被立即从镇静中叫醒的认知情况，并且在患者出院再次进行认知测试。记录恢复的时间，恢复的质量和护理的满意度。

**结果：**在异丙酚加辅助药组，84例接受芬太尼50μg（25-100）（中位数[范围]）和57例接受咪唑安定2mg（0.5-10）。病人出院时认知功能不如基准水平。该两组在出院和基础之间认知功能的变化组间无显著差异。出院时，18.5%的患者认知功能受损的程度相当于血液中含有0.05%酒精浓度。异丙酚加咪唑安定和/或芬太尼比单独使用异丙酚能产生较好的手术镇静条件，并与较短的程序时间相关联。两组在恢复时间，唤醒、梦境，恢复质量和病人对护理的满意度也相似。应用咪唑安定大于2mg是出院时出现认知功能障碍的预测因子。

**结论：**在择期的门诊结肠镜手术时，患者出院时普遍存在认知功能障碍。异丙酚加咪唑安定和/或芬太尼镇静并没有比单独使用异丙酚产生更严重的认知功能障碍。此外，添加辅助药使结肠镜检查更轻松且不增加并发症的发生率或是延长早期恢复时间。

（张磊 译 陈杰 校）

**BACKGROUND:** The sedative drug combination that produces minimal cognitive impairment and optimal operating conditions during colonoscopy has not been determined. We sought to determine if the use of propofol alone results in less cognitive

impairment at discharge than the use of propofol plus midazolam and/or fentanyl in patients presenting for elective outpatient colonoscopy.

**METHODS:** Two hundred adult patients presenting for elective outpatient colonoscopy were randomized to receive propofol alone or propofol plus midazolam, and/or fentanyl for IV sedation. Baseline cognitive function was measured using the computerized CogState test battery (Cogstate™, Melbourne, Australia) before sedation. During the procedure, sedative drug doses, depth of sedation (via the bispectral index and observer's assessment of alertness/sedation score), complications, and treatability were recorded. Patients were interviewed about recall immediately after emerging from sedation, and cognitive testing was repeated at hospital discharge. Recovery times, quality of recovery, and satisfaction with care were also recorded.

**RESULTS:** In the propofol plus adjuvants group, 84 patients received fentanyl 50 µg (25–100) (median [range]) and 57 patients received midazolam 2 mg (0.5–10). Patients' cognitive function at discharge was worse than their performance at baseline. However, the changes in cognitive function between discharge and baseline were not significantly different between the two groups. At discharge, 18.5% of patients were cognitively impaired to an extent equivalent to a blood-alcohol concentration of 0.05%. Sedation with propofol plus midazolam and/or fentanyl produced better operating conditions than sedation with propofol alone and was associated with shorter procedure times. Recovery times, recall, dreaming, quality of recovery, and patient satisfaction with care were similar between the groups. Administration of >2 mg of midazolam was a predictor of impaired cognitive function at discharge.

**CONCLUSIONS:** Significant cognitive impairment was common at discharge from elective outpatient colonoscopy. However, the addition of midazolam and/or fentanyl to propofol sedation did not result in more cognitive impairment than the use of propofol alone. Furthermore, the use of adjuvants improved the ease of colonoscopy without increasing the rate of complications or prolonging early recovery times..

最大限度预测概率  $P_K$  作为可变半参数方法来估计血浆效应室平衡率  $k_{e0}$

**Maximizing Prediction Probability  $P_K$  as an Alternative Semiparametric Approach to Estimate the Plasma Effect-Site Equilibration Rate Constant  $k_{e0}$**

Richard K. Ellerkmann, MD, DESA<sup>\*</sup>, Joergen Bruhn, MD<sup>†</sup>, Martin Soehle, MD, DESA<sup>\*</sup>, Michael Kehrer, Cand. Med.<sup>\*</sup>, Andreas Hoeft, MD<sup>\*</sup>, and Sascha Kreuer, MD<sup>‡</sup>

From the <sup>\*</sup>Department of Anesthesiology and Intensive Care Medicine, University of

Bonn, Bonn, Germany; <sup>†</sup>Department of Anesthesia, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands; and <sup>‡</sup>Department of Anesthesiology and Intensive Care Medicine, University of Saarland, Homburg/Saar, Saarland, Germany. Anesth Analg 2009 109: 1470-1478.

**背景:**  $k_{e0}$  值是确定血浆或呼气末和效应室之间（例如，大脑）药物浓度平衡的一级反应速率常数。参数和半参数方法已被用于估算单独的  $k_{e0}$  值和描述药物响应曲线。在这项研究中，作者引进新的半参数方法，通过最大限度预测概率  $P_K$  计算异氟醚，七氟醚，地氟醚的  $k_{e0}$  值。

**方法:** 择期 45 例前列腺癌根治术的资料进行分析。腰椎硬膜外置管后，病人接受瑞芬太尼和异丙酚进行麻醉诱导。此后，开始硬膜外镇痛，异氟醚，七氟醚或地氟

醚（各 15 例）用以维持无意识状态。至少 45 分钟后，呼气末浓度呈现 0.5 到 2 个 MAC 值之间的不同值。通过优化预测概率  $P_K$  ( $P_K$ -based  $k_{e0}$ ) 或最小化在该区间的滞后回线 (area-based  $k_{e0}$ ) 估计每个患者单独的  $k_{e0}$  值。数据取平均值 $\pm$ 标准差。

**结果：**两种半参数方法产生类似的  $k_{e0}$  值：异氟醚为  $0.18 \pm 0.06 \text{ min}^{-1}$  (PK based) 和  $0.15 \pm 0.04 \text{ min}^{-1}$  (area based)，七氟醚为  $0.17 \pm 0.08 \text{ min}^{-1}$  (PK based)和  $0.16 \pm 0.11 \text{ min}^{-1}$  (area based)。地氟醚的  $k_{e0}$  值则是 PK based:  $0.30 \pm 0.17 \text{ min}^{-1}$ ; area based:  $0.32 \pm 0.25 \text{ min}^{-1}$ ，均显著高于异氟醚和七氟醚。

**结论：**最大限度预测概率  $P_K$  估计  $k_{e0}$  值似乎是一有前途的方法，可作一研究的基础。

(舒慧刚 译 陈杰 校)

**BACKGROUND:** The  $k_{e0}$  value is the first order rate constant determining the equilibration of drugs between plasma or end-tidal concentration and effect-site (e.g., brain) concentration. Parametric and semiparametric approaches have been used for estimating individual  $k_{e0}$  values and describing the drug-response curve. In this study, we introduce a new semiparametric approach calculating  $k_{e0}$  values for isoflurane, sevoflurane, and desflurane by maximizing the prediction probability  $P_K$ .

**METHODS:** Data from 45 patients scheduled for a radical prostatectomy were analyzed. After lumbar epidural catheterization, patients received remifentanyl and propofol solely for induction of anesthesia. Thereafter, epidural analgesia was initiated, and isoflurane, sevoflurane, or desflurane (15 patients each) was added to maintain unconsciousness. At least 45 min later, end-tidal concentrations were varied between 0.5 and 2 minimum alveolar anesthetic concentration. We estimated an individual  $k_{e0}$  value for each patient by optimizing the prediction probability  $P_K$  ( $P_K$ -based  $k_{e0}$ ) or by minimizing the area within the hysteresis loop (area-based  $k_{e0}$ ). Data are mean  $\pm$  sd.

**RESULTS:** Both semiparametric approaches led to comparable  $k_{e0}$  values with  $0.18 \pm 0.06 \text{ min}^{-1}$  ( $P_K$  based) and  $0.15 \pm 0.04 \text{ min}^{-1}$  (area based) for isoflurane and  $0.17 \pm 0.08 \text{ min}^{-1}$  ( $P_K$  based) and  $0.16 \pm 0.11 \text{ min}^{-1}$  (area based) for sevoflurane.  $k_{e0}$  values for desflurane ( $P_K$  based:  $0.30 \pm 0.17 \text{ min}^{-1}$ ; area based:  $0.32 \pm 0.25 \text{ min}^{-1}$ ) were significantly higher than for isoflurane and sevoflurane.

**CONCLUSION:** Maximizing the prediction probability  $P_K$  for estimating  $k_{e0}$  seems to be a promising method that researchers could use on an exploratory basis.

### 丙泊酚通过蛋白激酶 C 依赖的通路抑制脑缺血/复氧的星形胶质细胞模型中水通道-4 的表达

#### Propofol Inhibits Aquaporin 4 Expression Through a Protein Kinase C-Dependent Pathway in an Astrocyte Model of Cerebral Ischemia/Reoxygenation

Sheng-Mei Zhu, MD, PhD, Xiao-Xing Xiong, MS, Yue-Ying Zheng, MS, and Cai-Fei Pan, MS

From the Department of Anesthesiology, The First Affiliated Hospital, School of Medicine, Zhejiang University, Hangzhou, People's Republic of China.

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**背景：**水通道-4 (AQP4) 在维持中枢神经系统的水平衡方面发挥关键作用，其功能障碍可能导致脑水肿。以前的研究表明异丙酚可能通过防止脑水肿来参与神经保

护。在这项研究中，作者验证异丙酚对脑水肿的影响并评估其在人工培养的缺氧缺糖（ODG）的大鼠星形胶质细胞模型中的神经保护作用。并评估异丙酚对 AQP4 的表达和蛋白激酶 C（PKC）的可能作用途径。

**方法：**皮层星形胶质细胞暴露于缺氧缺糖的无氧密室里。星形胶质细胞经过6h 的 OGD 暴露后再进行24h 的再氧合。在该模型的 OGD 阶段给予异丙酚。通过光学显微镜评估细胞形态学变化。星形胶质细胞的生存能力的评估是通过测量3 - (4,5 - 甲基偶氮基) -2,5 - 联苯四唑的溴吸光度（光密度值）和受损的星形胶质细胞释放的乳酸脱氢酶的百分比。通过 Western blot 分析法评估 AQP4 的表达。为了研究异丙酚对 AQP4 的表达可能的影响机制，培养的星形胶质细胞用 PKC 激活剂进行预处理24h，即用12 - O 型佛波13酯分别对对异丙酚治疗前/OGD6小时/复氧24每小小时进行预处理。

**结果：**通过3 - (4,5 - 甲基偶氮基) -2,5 - 联苯四唑溴测试发现星形胶质细胞活力在 OGD 约4 h 后开始下降，暴露6小时后下降至60%。当 OGD6 小时后再进行24小时的在氧合，细胞的活力进一步下降。在暴露6小时后 AQP4 的表达减弱，但进入24 小时的复氧过程中，它的表达却发生逆转，超过了基准水平。乳酸脱氢酶测试表明异丙酚能剂量依赖性降低细胞的死亡 ( $P < 0.05$ )，10 $\mu$ M 的异丙酚能显著的降低经过6小时 OGD 和24小时再氧合处理的星形胶质细胞中 AQP4 的表达水平 ( $P < 0.01$ )。在 OGD 前长期（24小时）的12 - O 型佛波13酯预处理大大扭转了异丙酚对 AQP4 的表达水平的影响 ( $P < 0.01$ )。

**结论：**在 OGD 情况下，异丙酚具有神经保护作用并且能下调在 OGD/复氧情况下培养的大鼠星形胶质细胞模型中 AQP4 的表达水平。PKC 途径的激活可能会妨碍异丙酚的作用。

（丁俊云 译 陈杰 校）

**BACKGROUND:** Aquaporin 4 (AQP4) plays a key role in maintaining water balance in the central nervous system, and its dysfunction may lead to brain edema. Previous studies have suggested that propofol may be involved in neuroprotection by preventing brain edema. In this study, we examined the effects of propofol on edema and assessed its neuroprotective actions in an oxygen and glucose deprivation (OGD) model of cultured rat astrocytes. We assessed the effects of propofol on AQP4 expression and the possible role of the protein kinase C (PKC) pathway on this effect.

**METHODS:** Neocortical astrocytes were exposed to OGD in an anaerobic chamber. After 6 h of OGD exposure, astrocytes were subsequently subjected to 24 h of reoxygenation. Propofol was added during the OGD phase of the model. Cell morphology was assessed by light microscopy. Astrocyte viability was assessed by measuring 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide absorbency (optical density value) and the percentage of lactate dehydrogenase released by injured astrocytes. AQP4 expression was evaluated with Western blot analysis. To investigate the possible mechanism of propofol's effects on AQP4 expression, cultured astrocytes were pretreated for 24 h with the PKC activator, 12-O-tetradecanoylphorbol 13-acetate, before the propofol treatment/OGD 6 h/reoxygenation 24 h.

**RESULTS:** We found by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide testing that astrocyte viability began to decrease after about 4 h of OGD exposure and decreased to 60% after 6 h of OGD. When 6 h of OGD was followed by 24 h of



reoxygenation, cell viability was further decreased. AQP4 expression was attenuated after 6 h of OGD exposure but was reversed and exceeded baseline levels after 24 h of reoxygenation. Propofol dose-dependently reduced cell death assessed by lactate dehydrogenase test ( $P < 0.05$ ), and 10  $\mu\text{M}$  propofol significantly down-regulated AQP4 expression in astrocytes after 6 h of OGD followed by 24 h of reoxygenation ( $P < 0.01$ ). Prolonged (24 h) pretreatment with the phorbol ester, 12-O-tetradecanoylphorbol 13-acetate before OGD significantly reversed the effect of propofol on AQP4 expression ( $P < 0.01$ ).

**CONCLUSION:** Propofol, administered during OGD, provided neuroprotective effects and down-regulated AQP4 expression in the OGD/reoxygenation model of cultured rat astrocytes. Activation of the PKC pathway may block the effects of propofol.

### 肥胖病人在腹腔镜减肥手术过程中预防肺不张的通气策略

#### Intraoperative Ventilatory Strategies for Prevention of Pulmonary Atelectasis in Obese Patients Undergoing Laparoscopic Bariatric Surgery

Hesham F. Talab, MD\*, Ibrahim Ali Zabani, MBB§, FRCP, PEMBA, FACPE\*, Hassan Saad Abdelrahman, MD\*, Waleed L. Bukhari, MD†, Irfan Mamoun, MD‡, Majed A. Ashour, MD†, Bakr Bin Sadeq, MD§, and Sameh Ibrahim El Sayed, MD||

From the Departments of \*Anesthesiology, †General Surgery, ‡Radiology, §Biostatistics, and ||Cardiothoracic Surgery, King Faisal Specialist Hospital & Research Centre, Jeddah, Saudi Arabia.

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**背景：**全麻诱导后常发生肺不张，持续到术后，可能导致术后严重的并发症和额外的护理支出。有报道称腹腔镜手术与术后肺不张发生率的增加相关。资料显示全麻期间，肥胖病人比非肥胖病人有更高的肺不张发生的风险。预防肺不张对每个患者都很重要，但是对于肥胖的病人尤其重要。

**方法：**随机收集 66 例体重指数在 30-50  $\text{kg}/\text{m}^2$  行腹腔镜减肥手术的患者，并根据呼气末正压的应用分成 3 组。呼气末压力为 0 (ZEEP)组( $n = 22$ )插管后潮气量机控呼气末持续 7-8 秒。呼气末压力为 5 的组( $n = 22$ )插管后潮气量机控呼气末持续 7-8 秒应用压力为 5  $\text{cm H}_2\text{O}$ 。呼气末压力为 10 的组( $n = 22$ )插管后潮气量机控呼气末持续 7-8 秒应用压力为 10  $\text{cm H}_2\text{O}$ 。其他可变因素（例如：麻醉剂，和手术方式）相同。术中和术后在复苏室测定心率，无创平均动脉压，动脉血氧饱和度，和肺泡动脉氧分压梯度。记录在复苏室的停留时间和无创面罩通气(100%  $\text{Fio}_2$ )时间或者重新插管率。通过术前胸片和离开复苏室时胸片来评估肺不张。

**结果：**应用呼气末正压为 10  $\text{cm H}_2\text{O}$  患者在术中和术后在复苏室都有更好的氧合，通过胸片评估有更低的肺不张评分，相比无呼气末压力和呼气末压力为正压 5  $\text{cm H}_2\text{O}$  的组有更少的术后肺部并发症。三组病人中没有证据显示有气压性创伤。

**结论：**肥胖病人腹腔镜减肥手术，术中肺容量控制通气应用 PEEP 10  $\text{cm H}_2\text{O}$  能有效的预防肺不张和更好的氧合，缩短复苏室的停留时间和手术后期间更低的肺部并发症。

(陈灵科 译 陈杰 校)

**BACKGROUND:** Atelectasis occurs regularly after induction of general anesthesia, persists postoperatively, and may contribute to significant postoperative morbidity and

additional health care costs. Laparoscopic surgery has been reported to be associated with an increased incidence of postoperative atelectasis. It has been shown that during general anesthesia, obese patients have a greater risk of atelectasis than nonobese patients. Preventing atelectasis is important for all patients but is especially important when caring for obese patients.

**METHODS:** We randomly allocated 66 adult obese patients with a body mass index between 30 and 50 kg/m<sup>2</sup> scheduled to undergo laparoscopic bariatric surgery into 3 groups. According to the recruitment maneuver used, the zero end-expiratory pressure (ZEEP) group ( $n = 22$ ) received the vital capacity maneuver (VCM) maintained for 7–8 s applied immediately after intubation plus ZEEP; the positive end-expiratory pressure (PEEP) 5 group ( $n = 22$ ) received the VCM maintained for 7–8 s applied immediately after intubation plus 5 cm H<sub>2</sub>O of PEEP; and the PEEP 10 group ( $n = 22$ ) received the VCM maintained for 7–8 s applied immediately after intubation plus 10 cm H<sub>2</sub>O of PEEP. All other variables (e.g., anesthetic and surgical techniques) were the same for all patients. Heart rate, noninvasive mean arterial blood pressure, arterial oxygen saturation, and alveolar-arterial Pao<sub>2</sub> gradient (A-a Pao<sub>2</sub>) were measured intraoperatively and postoperatively in the postanesthesia care unit (PACU). Length of stay in the PACU and the use of a nonrebreathing O<sub>2</sub> mask (100% Fio<sub>2</sub>) or reintubation were also recorded. A computed tomographic scan of the chest was performed preoperatively and postoperatively after discharge from the PACU to evaluate lung atelectasis.

**RESULTS:** Patients in the PEEP 10 group had better oxygenation both intraoperatively and postoperatively in the PACU, lower atelectasis score on chest computed tomographic scan, and less postoperative pulmonary complications than the ZEEP and PEEP 5 groups. There was no evidence of barotrauma in any patient in the 3 study groups.

**CONCLUSIONS:** Intraoperative alveolar recruitment with a VCM followed by PEEP 10 cm H<sub>2</sub>O is effective at preventing lung atelectasis and is associated with better oxygenation, shorter PACU stay, and fewer pulmonary complications in the postoperative period in obese patients undergoing laparoscopic bariatric surgery.

### 一种中心静脉持续输注给药的体外分析：多管设计与端口选择的影响

#### **An *In Vitro* Analysis of Central Venous Drug Delivery by Continuous Infusion: The Effect of Manifold Design and Port Selection**

David R. Moss, MD<sup>\*</sup>, Karsten Bartels, MD<sup>\*</sup>, Gregory L. Peterfreund, BA<sup>\*</sup>, Mark A. Lovich, MD, PhD<sup>†</sup>, Nathaniel M. Sims, MD<sup>\*</sup>, and Robert A. Peterfreund, MD, PhD<sup>\*</sup>

From the <sup>\*</sup>Department of Anesthesia and Critical Care, Massachusetts General Hospital; and <sup>†</sup>Department of Anesthesiology and Pain Medicine, Caritas St. Elizabeth's Medical Center, Boston, Massachusetts.

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**背景：**中心静脉导管广泛用于麻醉和重症监护。多管通道允许同步管理中心静脉导管多种药物共同注射。这种多管通道的结构有很大差别。在这项研究中，作者定量比较了持续的药物输注模型中，传统的多通道开关与及微量输注通道的药物释放动力学，以尽量减少无效容积。

**方法：**在重症监护病房常用注射泵低流量输注盐载体溶液（10ml/h），通过多管通道连接到一个标准的三腔 16#导管。该模型将甲基蓝（3ml/h）加入传统多通道开

关的第一，第二，第四开关或微量输注管的 2 个位置之一，是一种尽量减少无用体积的新设计。收集每分钟药物流出量，用分光光度计定量分析开始至结束时的液体量。

**结果：**传统的四通道开关的端口之间开始和结束时间显著不同。微量输注通道的 2 个端口之间有差异，但不显著。在微量输注通道两个端口产生的输入动力与 4 开关通道最下游的端口相似。每种通道的动态数据与无用体积之间有良好的相关性。

**结论：**使用传统的多通道开关，端口选择极大地影响连续注射药物输送动力。这个发现在一定程度上支持了一个观点，就是最关键的输液应加入最接近病人的通道端口。微量输注端口选择不太重要，其动力比多通道开关的第二和第四端口迅速。微量输注通道具有更少的无用容积，减少不必要的药物释放延迟及更精确控制药物持续输注。

（唐颖 译 陈杰 校）

**BACKGROUND:** Central venous catheters are used extensively in anesthesia and critical care. Multiport manifolds allow for simultaneous administration of multiple medication infusions into a common central venous catheter lumen. The structures of such manifolds vary considerably. In this study, we quantitatively compared, in a laboratory model of continuous drug infusion, the drug delivery dynamics of a traditional stopcock manifold and a microinfusion manifold constructed to minimize dead volume.

**METHODS:** A syringe pump infused a saline carrier solution at a low flow rate frequently used in an intensive care unit (10 mL/h) through a multiport manifold connected to the 16-gauge lumen of a standard 16-cm triple-lumen catheter. The model drug methylene blue (3 mL/h) joined the carrier flow at the first, second, or fourth stopcock of a traditional manifold or 1 of 2 positions in a microinfusion manifold, a new device designed to minimize dead volume. Effluent samples were collected every minute for quantitative spectrophotometric analysis of delivery onset and offset.

**RESULTS:** Onset and offset times differed significantly among individual ports of the traditional 4-stopcock manifold. There was also a significant difference between the 2 ports of the microinfusion manifold, but this was less pronounced. Both ports of the microinfusion manifold yielded delivery dynamics that were similar to the most downstream port of the 4-stopcock manifold. There was good correlation between dynamic data and dead volume for each of the manifolds.

**CONCLUSIONS:** Using a traditional stopcock manifold, port selection significantly affects drug delivery dynamics for continuous infusions. The findings provide quantitative support for the concept that the most critical infusion should join the system at the manifold port closest to the patient. Port selection was less important for the microinfusion manifold and dynamics were faster compared with the second and fourth ports of the stopcock manifold. The smaller dead volumes of the microinfusion manifold minimize unwanted delays in drug delivery onset and offset allowing more precise control over drug delivery by continuous infusion.

美国围术期失明的流行率：1996-2005 脊柱外科、整形外科、心外科和普外科的 10 年研究

**The Prevalence of Perioperative Visual Loss in the United States: A 10-Year Study from 1996 to 2005 of Spinal, Orthopedic, Cardiac, and General Surgery**

Yang Shen, MA, MS\*, Melinda Drum, PhD<sup>†‡</sup>, and Steven Roth, MD<sup>†</sup>

From the \*Pritzker School of Medicine, and Departments of †Anesthesia and Critical Care, and ‡Health Studies, The University of Chicago, Chicago, Illinois.

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**背景：**围术期失明发生于非眼科手术是极罕见却不可轻视的潜在并发症，但是它的发生率在普通住院手术病人中尚无明确。作者收集了全美国范围内的住院病人来衡量美国八大常见非眼科手术中围术期失明的发生率。

**方法：**该研究包括 1996-2005 年全美范围内的 560 多万各类手术病人，有膝关节成形术、胆囊切除术、臀部/股骨手术治疗、脊柱融合术、阑尾切除术、直肠切除术、椎板切除术、冠脉搭桥术、心脏瓣膜手术。围术期失明的定义使用国际疾病分类法、第九版本、缺血性视神经病变的临床修改版、皮质盲、视网膜血管阻塞来评估。一元和多元的分析潜在风险因素。

**结果：**心脏手术和脊柱融合手术的围术期失明率最高。全美围术期失明率心脏手术为 8.64/10000，脊柱融合术为 3.09/10000，相比之下阑尾切除术只有 0.12/10000。经历心脏手术、脊柱融合术、整形外科手术的病人缺血性视神经病变、视网膜血管阻塞或皮质盲的风险增加。未满 18 岁的人较易得皮质盲，因此围术期失明对于他们来说风险最大，而 50 岁以上的人主要是视神经缺血性病变和视网膜血管阻塞。可能引起围术期失明的其他因素有男性、Charlson 合并症指数、贫血、输血。医院手术量的上升不会增加患病风险。从 1996 年到 2005 年 10 年研究期间，围术期失明有整体下降的趋势。

**结论：**研究结果证实了临床猜测：心脏手术和脊柱融合手术的围术期失明率发生较高，本研究首次发现了这个综合症在下肢关节置换术的病人也有较高的发生率。1996 年到 2005 年，美国围术期失明的流行率在八大常见外科手术中有所降低。男性病人和某些合并症患者 POVL 风险较高意味目前风险因素并未改变。本研究结论受到资料精确性的限制，比如术中资料缺乏和不能通过出院资料中诊断编码来证实。

(杨秋娟 译 陈杰 校)

**BACKGROUND:** Perioperative visual loss (POVL) accompanying nonocular surgery is a rare and potentially devastating complication but its frequency in commonly performed inpatient surgery is not well defined. We used the Nationwide Inpatient Sample to estimate the rate of POVL in the United States among the eight most common nonocular surgeries.

**METHODS:** More than 5.6 million patients in the Nationwide Inpatient Sample who underwent principal procedures of knee arthroplasty, cholecystectomy, hip/femur surgical treatment, spinal fusion, appendectomy, colorectal resection, laminectomy without fusion, coronary artery bypass grafting, and cardiac valve procedures from 1996 to 2005 were included. Rates of POVL, defined as any discharge with an International Classification of Diseases, Ninth Revision, Clinical Modification code of ischemic optic neuropathy (ION), cortical blindness (CB), or retinal vascular occlusion (RVO), were estimated. Potential risk factors were assessed by univariate and multivariable analyses.

**RESULTS:** Cardiac and spinal fusion surgery had the highest rates of POVL. The national estimate in cardiac surgery was 8.64/10,000 and 3.09/10,000 in spinal fusion. By

contrast, POVL after appendectomy was 0.12/10,000. Those undergoing cardiac surgery, spinal fusion, and orthopedic surgery had a significantly increased risk of developing ION, RVO, or CB. Patients younger than 18 yr had the highest risk for POVL, because of higher risk for CB, whereas those older than 50 yr were at greater risk of developing ION and RVO. Other significant positive predictors for some diagnoses of POVL were male gender, Charlson comorbidity index, anemia, and blood transfusion. There was no increased risk associated with hospital surgical volume. During the 10 yr from 1996 to 2005, there was an overall decrease in POVL in the procedures we studied.

**CONCLUSIONS:** The results confirm the clinical suspicion that the risk of POVL is higher in cardiac and spine fusion surgery and show for the first time a higher risk of this complication in patients undergoing lower extremity joint replacement surgery. The prevalence of POVL in the eight most commonly performed surgical operations in the United States has decreased between 1996 and 2005. Increased odds of POVL with male gender and comorbidity index indicate that some risk factors for POVL may not presently be modifiable. The conclusions of this study are limited by factors affecting data accuracy, such as lack of data on the intraoperative course and inability to confirm the diagnostic coding of any of the discharges in the database.

**三种可视喉镜的比较：在病态肥胖病人插管时应用 Macintosh 喉镜片可以减少导引管芯的应用，但不能代替**

**A Comparison of Three Videolaryngoscopes: The Macintosh Laryngoscope Blade Reduces, but Does Not Replace, Routine Stylet Use for Intubation in Morbidly Obese Patients**

Ralph Maassen, MD<sup>\*†</sup>, Ruben Lee, BE<sup>†</sup>, Boukje Hermans, MD<sup>\*†</sup>, Marco Marcus, MD, PhD<sup>†</sup>, and André van Zundert, MD, PhD, FRCA<sup>\*§</sup>

From the \*Department of Anesthesiology, Catharina Hospital, Eindhoven; †Department of Anesthesiology, University Hospital, Maastricht; ‡Department of Biomechanical Engineering, Mechanical, Materials and Maritime Engineering, Delft University of Technology, Delft, The Netherlands; and §Department of Anesthesiology, University Hospital, Ghent, Belgium.

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**背景：**有不少厂家生产的可视喉镜（VLSs）有不同的规格、用户界面和几何形状。与临床相关的是要知道镜片的相对功能。在肥胖病人身上，声门和气管插管的可视性经常有困难（非常），新的视频技术，可提供更好的功能和性能。虽然有许多直接喉镜气管插管都是不插管芯的，但是在可视喉镜（VLSs）下插管建议使用管芯。在这项研究中，作者在接受择期手术的病态肥胖病人身上比较 3 种可视喉镜（VLSs），同时测试是否可不使用管芯插管。

**方法：**在连续 150 例成人病态肥胖患者中（体重指数大于 35 kg/m<sup>2</sup>）随机选择接受一种可视喉镜（VLS）：GlideScope®, Storz® V-Mac<sup>TM</sup>, and McGrath®。取得直接喉镜声门可视的最佳期，随后，用各自的可视喉镜（VLS），完成病人的气管插管。常规评估操作前（e.g., Mallampati grade）和操作中（Cormack-Lehane grade）困难插管的等级，以及插管时因插管时间，尝试次数和主观困难程度。

**结果：**全部 3 种 VLSs 测试提供了一个与传统的直接喉镜同等或更好的声门直视视野。必要的插管尝试次数在各种可视喉镜（VLSs）中有显著不同（GlideScope 平均  $2.6 \pm 1.0$  次, Storz 平均  $1.4 \pm 0.7$  次, and McGrath 平均  $2.9 \pm 0.9$  次）。平均插管时间分别为  $33 \pm 18$  s（GlideScope）,  $17 \pm 9$  s（Storz）和  $41 \pm 25$  s（McGrath）。  
**结论：**在这项研究中，与其他两种测试设备相比，与 Macintosh 镜片搭配的可视喉镜（Storz VLS）有一较好的总体满意度评分、插管时间、插管尝试次数以及需要的额外辅助设备应用等。

（张蕾 译 陈杰 校）

**BACKGROUND:** Many manufacturers are producing videolaryngoscopes (VLSs) with differing specifications, user interfaces, and geometry. It is clinically relevant to know the relative performance of the blades. Visualization of the glottis and intubation are often problematic in (extremely) obese patients, and the new video technology may offer better functionality and performance. Although many tracheal intubations with direct laryngoscopy are performed with an unstyletted endotracheal tube, it is recommended to use a stylet for intubation using videolaryngoscopy. In this study, we compared 3 VLSs in morbidly obese patients undergoing intubation for elective surgery and tested whether it is feasible to intubate the tracheas of morbidly obese patients without using a stylet.

**METHODS:** One hundred fifty consecutive adult morbidly obese patients (body mass index  $>35$  kg/m<sup>2</sup>) were randomly selected to receive one of 3 VLSs: GlideScope®, Storz® V-Mac™, and McGrath®. Direct laryngoscopy scored the best possible view of the glottis; subsequently, the respective VLS was used, and the patient's trachea was intubated. Common preprocedural (e.g., Mallampati grade) and intraprocedural (Cormack-Lehane grade) metrics of intubation difficulty were measured, as well as the dependent variables of intubation time, number of attempts, and subjective difficulty.

**RESULTS:** All 3 VLSs tested offered an equal or better view of the glottis compared with traditional direct laryngoscopy. The number of attempts necessary to intubate the trachea differed significantly among VLSs (average  $2.6 \pm 1.0$  attempts for the GlideScope,  $1.4 \pm 0.7$  for the Storz, and  $2.9 \pm 0.9$  for the McGrath VLS). The average intubation times were  $33 \pm 18$  s for the GlideScope,  $17 \pm 9$  s for the Storz, and  $41 \pm 25$  s for the McGrath VLS.

**CONCLUSIONS:** In this study, the VLS with the Macintosh blade (Storz VLS) had a better overall satisfaction score, intubation time, number of intubation attempts, and necessity of extra adjuncts, compared with the 2 other tested devices.

### 非创伤重症监护病人的迟发性呼吸机相关肺炎

#### Late-Onset Ventilator-Associated Pneumonia in Nontrauma Intensive Care Unit Patients

Arnaud Gacouin, MD\*, Nicolas Barbarot, MD\*, Christophe Camus, MD\*, Sylvain Salomon, MD\*, Sonia Isslame, MD\*, Sophie Marque, MD\*, Sylvain Lavoué, MD\*, Pierre-Yves Donnio, PhD†, Rémi Thomas, MD\*, and Yves Le Tulzo, MD\*

From the \*Service des maladies infectieuses et réanimation médicale, and †Laboratoire de bactériologie, Hôpital Pontchaillou, Rennes Cedex 9, France.

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**背景：**大多数对迟发性呼吸机相关肺炎（VAP）的相关因素的收集研究是通过研究

创伤性危重病人而实现的。因肠内营养（EN）的影响而增加发生 VAP 的危险性已经被提出。在这项研究中，通过这些病人，作者评估了非创伤危重病人罹患 VAP 的相关因素，并确定是否早期营养促进迟发性呼吸机相关肺炎的发生。

**方法：**作者在一所有 21 张 ICU 床位大学医院进行了前瞻性观察队列研究。

**结果：**为期 28 个月 361 例持续 6 天或以上机械通气（MV）的气管插管成年病人接受了研究。76 例病人（占 21%）被证实有迟发性 VAP，因其肺泡灌洗液中至少存在一种微生物且浓度 $\geq 10^4$  菌落/mL。回收组织液中，革兰阴性杆菌占 75%，金黄色葡萄球菌占 21%。迟发性 VAP 各独立因素是通过以下方面的多因素分析而得，包括：简化急性生理学评分 II 评分（优势比：1.021，95% 的置信区间[CI]：1.005-1.038， $P = 0.01$ ），机械通气的头五天急性呼吸窘迫综合征的发生率（优势比：1.98；95% CI 为：1.05-3.67； $P = 0.04$ ），以及气管导管型号 $\geq 7.5$ （优势比：2.06；95% CI 为：1.88-3.90； $P = 0.03$ ）。行机械通气者 48 h 内肠内营养后不是引起迟发性 VAP 的影响因素。

**结论：**非创伤患者人群，早期肠内营养与迟发性 VAP 没有相关性。在这些病人中，机械通气的前五天中疾病的严重程度似乎与迟发性 VAP 相关。此外，我们的结果表明，气管导管 $\geq 7.5$  号的病人与气管导管  $< 7.5$  号的病人相比，（前者）发生 VAP 的危险性更大。

（邹巧群 译 陈杰 校）

**BACKGROUND:** Most studies designed to determine the factors associated with the acquisition of late-onset ventilator-associated pneumonia (VAP) were performed in critically ill trauma patients. The impact of enteral nutrition (EN) on the risk of acquiring VAP has been discussed. In this study, we assessed factors associated with late-onset VAP in nontrauma patients and determined whether nutrition provided early was associated with development of late-onset VAP in this population.

**METHODS:** We performed a prospective observational cohort study in a 21-bed polyvalent intensive care unit in a university hospital.

**RESULTS:** Three hundred sixty-one intubated adult patients with a duration of mechanical ventilation (MV) of 6 days or more were admitted over a 28-mo period. Late-onset VAP was confirmed in 76 patients (21%) by the presence of at least one microorganism at a concentration  $\geq 10^4$  colony-forming units/mL on the bronchoalveolar lavage. Gram-negative bacilli represented 75% and *Staphylococcus aureus* 21% of recovered organisms. Factors independently associated with late-onset VAP by multivariate analysis included a high simplified acute physiology score II score (odds ratio: 1.021; 95% confidence interval [CI]: 1.005–1.038;  $P = 0.01$ ), development of acute respiratory distress syndrome during the first 5 days of MV (odds ratio: 1.98; 95% CI: 1.05–3.67;  $P = 0.04$ ), and size of the endotracheal tube  $\geq 7.5$  (odds ratio: 2.06; 95% CI: 1.88–3.90;  $P = 0.03$ ). EN started within 48 h of MV onset was not associated with a higher risk for late-onset VAP.

**CONCLUSION:** In our nontrauma patient population, early EN was not associated with development of late-onset VAP. In this population, severity of the disease during the first 5 days of MV seemed to be associated with late-onset VAP. In addition, our results suggest that the risk of late-onset VAP is higher in patients with a tube size  $\geq 7.5$  than in patients with a tube size  $< 7.5$ .

喷他佐辛与昂丹司琼对治疗剖宫产病人鞘内注射吗啡引起的瘙痒症的比较——随机对照试验

**A Randomized Controlled Trial of Pentazocine Versus Ondansetron for the Treatment of Intrathecal Morphine-Induced Pruritus in Patients Undergoing Cesarean Delivery**

Decha Tamdee, MSc<sup>\*</sup>, Somrat Charuluxananan, MD, MSc, FRCAT<sup>†</sup>, Yodying Punjasawadwong, MD, M.Med.Sc., FRCAT<sup>†</sup>, Chamaiporn Tawichasri, MSc<sup>\*</sup>, Jayanton Patumanond, MD, MPH, DSc<sup>\*</sup>, and Pin Sriprajittichai, MD, MSc, FRCAT<sup>†</sup>

From the <sup>\*</sup>Ph.D. Program in Clinical Epidemiology, Faculty of Medicine, Chiang Mai University, Chiang Mai; <sup>†</sup>Department of Anesthesiology, Faculty of Medicine, Chulalongkorn University, Bangkok; and <sup>‡</sup>Department of Anesthesiology, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand.

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**背景** 昂丹司琼对鞘内注射吗啡引起的瘙痒症有效。有证据表明κ阿片受体有止痒作用。喷他佐辛是κ阿片受体激动剂，同时有部分激动μ受体的功能。因此作者进行了一项随机双盲试验旨在比较喷他佐辛与昂丹司琼对治疗剖宫产病人鞘内注射吗啡引起的瘙痒症的止痒效果。

**方法** 208名已经鞘内注射吗啡并引起瘙痒的临产妇随机分成两组：静脉注射喷他佐辛15mg( $n=104$ )和昂丹司琼4mg( $n=104$ )。给药5分钟后评价止痒效果（不痒或轻微瘙痒）和其他副作用，观察4小时内病人瘙痒复发情况。

**结果** 15min治疗效果喷他佐辛组（96.1%）高于昂丹司琼组（80.8%）（差异95%可信区间：7.0%，23.8%； $P=0.001$ ）。4小时内中重度瘙痒复发率喷他佐辛组（12.0%）低于昂丹司琼组（32.1%）（ $P=0.001$ ）。两组恶心/呕吐、镇静、战栗、疼痛评分、注射点疼痛比较无显著差异。未发现呼吸抑制。

**结论** 喷他佐辛15mg对于治疗鞘内注射吗啡引起的瘙痒症的疗效优于昂丹司琼4mg，且前者复发率更低，副作用轻微。

（李潺译 陈杰校）

**BACKGROUND:** Ondansetron is effective for the treatment of intrathecal morphine-induced pruritus. There is evidence that κ-opioid receptor agonists have antipruritic activity. Pentazocine is an agonist of κ-opioid receptors and partial agonist at μ-opioid receptors. We therefore performed a randomized, double-blind trial to compare the efficacy of pentazocine and ondansetron for the treatment of pruritus associated with intrathecal injection of morphine in patients undergoing cesarean delivery.

**METHODS:** Two hundred eight parturients who developed moderate to severe pruritus after the administration of intrathecal morphine were randomly allocated to 2 groups: IV pentazocine 15 mg ( $n=104$ ) and IV ondansetron 4 mg ( $n=104$ ). The successful treatment of pruritus (no or mild pruritus) and other adverse effects were determined 15 min after study drug administration, and patients were observed for recurrence of pruritus for 4 h.

**RESULTS:** The treatment success rate at 15 min was higher in the pentazocine group (96.1%) than in the ondansetron group (80.8%) (95% confidence interval of difference: 7.0%, 23.8%;  $P=0.001$ ). The recurrence rate of moderate to severe pruritus within 4 h



after treatment in the pentazocine group (12.0%) was lower than in the ondansetron group (32.1%) ( $P = 0.001$ ). There were no significant differences between groups in nausea/vomiting, sedation, shivering, pain scores, and pain at injection site. No respiratory depression was observed.

**CONCLUSIONS:** Pentazocine 15 mg is superior to ondansetron 4 mg for the treatment of intrathecal morphine-induced pruritus and has a lower recurrence rate. The side effects after treatment are mild.

### 开颅术后病人加巴喷丁作为预防性抗惊厥药物的镇痛效果：一项前瞻性随机研究

#### The Analgesic Effect of Gabapentin as a Prophylactic Anticonvulsant Drug on Postcraniotomy Pain: A Prospective Randomized Study

Hatice Türe, MD\*, Murat Sayin, MD\*, Geysu Karlikaya, MD†, Canan Aykut Bingol, MD†, Bora Aykac, MD\*, and Uğur Türe, MD†

From the Departments of \*Anesthesiology and Intensive Care, †Neurology, and ‡Neurosurgery, Ye dtepe University School of Medicine, Istanbul, Turkey.

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**背景：**作为一种抗惊厥药物，加巴喷丁对于急性术后疼痛也有镇痛作用。然而，对于行开颅手术的病人，给予预防性使用加巴喷丁这种抗癫痫药物的镇痛效果尚不明确。在这项研究中，作者对于小脑幕上肿瘤切除行开颅手术的病人，预防性给予加巴喷丁这种抗癫痫作用药物，同时评估该药对急性术后疼痛的术后疗效。

**方法：**80例因小脑幕上肿瘤切除行开颅手术的病人被随机分成2组。G组病人（n=40）接受口服加巴喷丁（3\*400mg）治疗，P组病人（n=40）接受口服苯妥英钠（3\*100mg）治疗，两组病人都使用标准麻醉方法。麻醉中以异丙酚和瑞芬维持。使用吗啡行病人自控镇痛，同时测定疼痛水平。并记录抗癫痫相关副作用，麻醉药用量，麻醉和手术时间维持，拔管时间，术后疼痛评分，吗啡用量以及镇静评分。

**结果：**G组37例病人，P组38例病人完成了这项研究。G组的术前阶段，1例病人有严重乏力症状，1例病人有严重的眩晕，另一个病人更改了手术过程。34例病人的血浆加巴喷丁的平均水平示34umol/L（范围23-51umol/ml）。P组病人，1例病人在术前退出了该研究，1例病人术后有暂时性的神经症状。

两个组的人口统计数据 and 麻醉平均时间和手术时间相似。G组的异丙酚、瑞芬总量（1847±548mg/3034±1334ug）比P组用药总量（2293±580mg/4287±1282ug）明显减少（ $P=0.01$ ）。然而，P组的拔管时间（4.5±2min）比G组的（16.6±22min）提前（ $P<0.001$ ）。

在15min、30min、1h时P组疼痛评分明显高于G组（ $P<0.001$ ）。P组的吗啡总量也明显高于G组（33±17mg vs 24±19mg）（ $P=0.01$ ）。在15min、30min、1h、2h的G组镇静评分明显高于P组（ $P<0.001$ ）。

**结论：**对于小脑幕上肿瘤切除行开颅手术的病人，给予加巴喷丁对于急性术后疼痛是有效的。它同时也能减少术后镇痛药物的用量。然而，它也可能导致一些副作用，比如拔管延迟和增加术后镇静。

（张婷译 陈杰校）

**BACKGROUND:** Gabapentin is an anticonvulsant drug that has analgesic properties for acute postoperative pain. However, the analgesic effect of gabapentin as an antiepileptic

prophylactic drug on patients undergoing craniotomy is unclear. In this study, we evaluated the postoperative effectiveness of gabapentin on acute postoperative pain when it is used for antiepileptic prophylaxis in patients undergoing craniotomy for supratentorial tumor resection.

**METHODS:** Eighty patients undergoing craniotomy for supratentorial tumor resection were randomly assigned into two groups. Patients in Group G ( $n = 40$ ) received oral gabapentin (3 x 400 mg), and patients in Group P ( $n = 40$ ) received oral phenytoin (3 x 100 mg) for 7 days before the operation and postoperatively. An identical anesthesia protocol was performed for both the groups. Anesthesia was maintained with propofol and remifentanyl infusion. Patient-controlled analgesia with morphine was used, and pain levels were measured. The antiepileptic-related side effects, anesthetic consumption, duration of anesthesia and surgery, tracheal extubation time, postoperative pain scores, morphine consumption, and sedation scores were recorded.

**RESULTS:** Thirty-seven patients in Group G and 38 patients in Group P completed the study. During the preoperative period in Group G, one patient had severe fatigue, one had severe dizziness, and one patient's surgical procedure was changed. The median plasma levels of gabapentin were 34  $\mu\text{mol/mL}$  (range, 23-51  $\mu\text{mol/mL}$ ) in 34 patients. In Group P, one patient withdrew from the study preoperatively and one developed transient neurological symptoms postoperatively.

The demographic data and mean duration of anesthesia and surgery were similar in both the groups. The total propofol and remifentanyl consumption in Group G ( $1847 \pm 548 \text{ mg}/3034 \pm 1334 \mu\text{g}$ ) was significantly less than that of Group P ( $2293 \pm 580 \text{ mg}/4287 \pm 1282 \mu\text{g}$ ) ( $P = 0.01$ ). However, tracheal extubation could be done earlier in Group P ( $4.5 \pm 2 \text{ min}$ ) than in Group G ( $16.6 \pm 22 \text{ min}$ ) ( $P < 0.001$ ). Pain scores were significantly higher in Group P at 15 min, 30 min, and 1 h ( $P < 0.001$ ). The total morphine consumption was also significantly higher in Group P ( $33 \pm 17 \text{ mg}$  vs  $24 \pm 19 \text{ mg}$ ) ( $P = 0.01$ ). The postoperative sedation scores were significantly higher in Group G at 15 min, 30 min, 1 h, and 2 h ( $P < 0.001$ ).

**CONCLUSIONS:** The administration of gabapentin to patients undergoing craniotomy for supratentorial tumor resection was effective for acute postoperative pain. It also decreased analgesic consumption after surgery. However, it may lead to side effects such as delayed tracheal extubation and increased sedation postoperatively.

### 反复椎旁注射局麻药和类固醇注射预防急性带状疱疹神经痛的疗效

#### The Effectiveness of Repetitive Paravertebral Injections with Local Anesthetics and Steroids for the Prevention of Postherpetic Neuralgia in Patients with Acute Herpes Zoster

Genlin Ji, MD, Jiyuan Niu, MD, Yuxiang Shi, MD, Lichao Hou, MD, PhD, Yan Lu, MD, PhD, and Lize Xiong, MD, PhD

From the Pain Clinic, Department of Anesthesiology, Xijing Hospital, Fourth Military Medical University, Xi'an, China.

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**背景：**带状疱疹神经痛（PHN）的治疗在临床疼痛中仍然是一个挑战。在随机对照研究中，作者评估了椎旁反复注射局麻药和类固醇对预防急性疱疹后神经痛的有效性。

**方法：**132 名 1-7 天出疹后确诊为急性带状疱疹的患者被随机分配接受任一标准治疗（口服抗病毒药物和镇痛药）。标准疗法附加椎旁反复注射法，每周注射 10 毫升 0.25% 布比卡因和 40 毫克甲强龙混合液 48 小时。选取 1，3，6，12 个疗程作为效果评估时间点。主要判断标准是每个疗程后组内带状疱疹引起的疼痛和/或异常疼痛患者比率。对意向治疗患者进行统计分析。

**结果：**完成 1 年的跟踪治疗的患者有 113 例。在一个疗程结束后椎旁注射组 13% 的患者口述有带状疱疹神经痛，标准治疗组则有 45% 患者口述有疼痛

（ $P < 0.001$ ）。3，6，和 12 个疗程后，椎旁注射组带状疱疹神经痛的发生率仍在显著低于标准组。两组生活质量的改善在时间节点时无显著差异。

**结论：**反复椎旁注射麻醉药与类固醇阻滞并辅以阿昔洛韦和镇痛药的标准治疗 PHN 的疗效显著优于单独标准化治疗。

（陈毓雯 译 陈杰 校）

**BACKGROUND:** The treatment of postherpetic neuralgia (PHN) continues to be a challenge in clinical pain management. In this randomized, controlled study, we assessed the effectiveness of repetitive paravertebral injections with local anesthetics and steroids for the prevention of PHN in patients with acute herpes zoster.

**METHODS:** One hundred thirty-two patients with acute herpes zoster diagnosed 1–7 days after the onset of the rash were randomly assigned to receive either standard therapy (oral antivirals and analgesics) or standard therapy with additional repetitive paravertebral injections of a mixture of 10 mL 0.25% bupivacaine and 40 mg methylprednisolone acetate every 48 h for a week. Efficacy was evaluated at 1, 3, 6, and 12 mo after the end of the treatments. The primary end point was the proportion of patients with zoster-associated pain and/or allodynia 1 mo after inclusion. Statistical analysis was performed based on the intent-to-treat population.

**RESULTS:** One hundred thirteen patients completed the 1-yr follow-up. At 1 mo posttherapy, 13% of patients in the paravertebral group reported zoster-related pain, compared with 45% in the standard group ( $P < 0.001$ ). At 3, 6, and 12 mo posttherapy, the incidence of PHN was still significantly lower in the paravertebral group than in the standard group. The quality of life improved in both groups at each follow-up time point with no significant difference between groups.

**CONCLUSION:** Repetitive paravertebral anesthetic block in combination with steroids plus standard treatment with acyclovir and analgesics significantly reduced the incidence of PHN than the standard treatment alone.

术前贫血与 N-B 型蛋白促尿钠肽的关系在预测血管外科手术患者术后心血管事件上的有效性

### The Interrelationship Between Preoperative Anemia and N-Terminal Pro-B-Type Natriuretic Peptide: The Effect on Predicting Postoperative Cardiac Outcome in Vascular Surgery Patient

Dustin Goei, MSc\*, Willem-Jan Flu, MD<sup>†</sup>, Sanne E. Hoeks, MSc<sup>†</sup>, Wael Galal, MD<sup>†</sup>, Martin Dunkelgrun, MD, PhD\*, Eric Boersma, PhD<sup>†</sup>, Ruud Kuijper, MD\*, Jan-Peter van Kuijk, MD<sup>†</sup>, Tamara A. Winkel, MD\*, Olaf Schouten, MD, PhD\*, Jeroen J. Bax, MD, PhD<sup>§</sup>, and Don Poldermans, MD, PhD\*

From the Departments of \*Vascular Surgery, †Cardiology, and ‡  
Anesthesiology, Erasmus Medical Center, Rotterdam; and §Department of  
Cardiology, Leiden University Medical Center, Leiden, The Netherlands.  
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**介绍：**N-B 型蛋白促尿钠肽（NT-proBNP）可用于预测血管外科手术患者不良心血管事件的发生。然而，一些情况可能会影响这一预测的价值，其中包括贫血。这项研究，我们就是要评估 NT-proBNP 对血管外科手术患者不良心血管事件的预测价值是否会受到贫血的影响。

**方法：**在血管外科手术前已获知了 666 位患者详尽的心血管系统病史、心超报告、血红蛋白和 NT-proBNP 水平。贫血的定义为，男性血清血红蛋白<13g/dL，女性<12g/dL。于术后 1、3、7、30 天以及任何有临床指针的情况下，监测肌钙蛋白 T 和 12 导联心电图。研究的主要终点包括术后 30 天内与心血管事件，非致死性心肌梗塞以及肌钙蛋白 T 释放。利用受试者特征曲线分析法来得出用于预测研究重点的 NT-proBNP 最佳终截值。利用多变递减分析法来获得 NT-proBNP 在预测非贫血与贫血患者术后心血管事件发生的额外价值。

**结果：**术前有 206 位患者（31%）被证实有贫血。血红蛋白水平与 NT-proBNP 水平呈反向相关（ $\beta$  相关系数= -2.242；P=0.025）。预测研究重点的 NT-proBNP 最佳终截值是 350pg/mL。经临床心血管风险因子调整，贫血（相对比率[OR]1.53；95%可信区间[CI]：1.07-2.99）和 NT-proBNP 水平增高（相对比率 4.09；95%可信区间：2.19-7.64）都是预测术后心血管事件的独立风险因素。然而在贫血患者组，NT-proBNP 水平增高却无法用于预测心血管不良事件的风险（相对比率 2.16；95%可信区间：0.90-5.21）。

**结论：**血管外科手术患者术后心血管事件风险增高与贫血及 NT-proBNP 独立相关。对于贫血患者而言，NT-proBNP 的预测价值减弱。

（单嘉琪译 薛张纲校）

**INTRODUCTION:** N-terminal pro-B-type natriuretic peptide (NT-proBNP) predicts adverse cardiac outcome in patients undergoing vascular surgery. However, several conditions might influence this prognostic value, including anemia. In this study, we evaluated whether anemia confounds the prognostic value of NT-proBNP for predicting cardiac events in patients undergoing vascular surgery.

**METHODS:** A detailed cardiac history, resting echocardiography, and hemoglobin and NT-proBNP levels were obtained in 666 patients before vascular surgery. Anemia was defined as serum hemoglobin <13 g/dL for men and <12 g/dL for women. Troponin T measurements and 12-lead electrocardiograms were performed on postoperative days 1, 3, 7, and 30 and whenever clinically indicated. The primary end point of the study was the composite of 30-day postoperative cardiovascular death, nonfatal myocardial infarction, and troponin T release. Receiver operating characteristic curve analysis was used to assess the optimal cutoff value of NT-proBNP for the prediction of the composite end

point. Multivariable regression analysis was used to assess the additional value of NT-proBNP for the prediction of postoperative cardiac events in nonanemic and anemic patients.

**RESULTS:** Anemia was present in 206 patients (31%) before surgery. Hemoglobin level was inversely related with the NT-proBNP levels ([beta] coefficient = -2.242; P = 0.025). The optimal predictive cutoff value of NT-proBNP for predicting the composite cardiovascular outcome was 350 pg/mL. After adjustment for clinical cardiac risk factors, both anemia (odds ratio [OR] 1.53; 95% confidence interval [CI]: 1.07-2.99) and increased levels of NT-proBNP (OR 4.09; 95% CI: 2.19-7.64) remained independent predictors for postoperative cardiac events. However, increased levels of NT-proBNP were not predictive for the risk of adverse cardiac events in the subgroup of anemic patients (OR 2.16; 95% CI: 0.90-5.21).

**CONCLUSIONS:** Both anemia and NT-proBNP are independently associated with an increased risk for postoperative cardiac events in patients undergoing vascular surgery. NT-proBNP has less predictive value in anemic patients. (C) 2009 by International Anesthesia Research Society.

### 儿童麻醉诱导反应的行为学分析

#### **Behavioral analysis of children's response to induction of anesthesia.**

Jill MacLaren Chorney, PhD\*, and Zeev N. Kain, MD, MBA<sup>†‡§</sup>

From the \*Department of Anesthesiology, Dalhousie University and the Division of Pediatric Anesthesiology, IWK Health Centre, Halifax, Nova Scotia, Canada; †Department of Anesthesiology and Perioperative Care, University of California, Irvine, California; ‡Department of Pediatrics, Children's Hospital of Orange County, Orange, California; and § Department of Psychiatry, Yale University, New Haven, Connecticut  
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**背景：**已证实，儿童在接受麻醉诱导时会感到窘迫，但人们却对这些儿童所表现出的特定行为的普遍性知之甚少。

**方法：**使用观测者 XT 软件及经审定的修订版围手术期儿童-成人医疗程序交互量表对 293 名门诊择期手术患儿的数字视听记录进行编码。运用多次逐秒的数据记录捕捉麻醉诱导期间患儿的行为学变化。

**结果：**超过 40% 的 2-10 岁儿童在麻醉诱导期间表现出窘迫行为，其中 17% 的患儿显露出巨大痛苦，同时超过 30% 的儿童在诱导期间存在抵抗麻醉医师的行为。麻醉诱导过程中患儿的窘迫和非窘迫行为可划分为四类形态：急性窘迫、预期窘迫、早期调节行为及进程参与。年长患儿在早期调节行为和进程参与方面拥有较高得分，相反，年幼患儿在急性窘迫方面得分更高。患儿的预期窘迫形态并未显出年龄差异。凭借形态学评分间的相互关系（诱导全程与前往手术室途中），行为形态的建构效度可有效评估麻醉诱导期间患儿的焦虑状态。

**结论：**接受麻醉的儿童可表现出一系列窘迫或非窘迫行为。现已发现，患儿前往手术室途中的一些表现与其在麻醉诱导过程中较少出现窘迫行为相关。上述数据可提供成为观察儿童潜在调节行为的第一项检查，但仍需更多详细的序贯分析来验证这些行为的特定功能。

（范羽译 薛张纲校）

**BACKGROUND:** It is documented that children experience distress at anesthesia induction, but little is known about the prevalence of specific behaviors exhibited by children.

**METHOD:** Digital audiovisual recordings of 293 children undergoing outpatient elective surgery were coded using Observer XT software and the validated Revised Perioperative Child-Adult Medical Procedure Interaction Scale. Multiple pass second-by-second data recording was used to capture children's behaviors across phases of anesthesia induction.

**RESULTS:** More than 40% of children aged 2-10 yr displayed some distress behavior during induction with 17% of these children displaying significant distress and more than 30% of children resisting anesthesiologists during induction. Children's distress and nondistress behaviors displayed four profiles over the course of anesthesia induction: Acute Distress, Anticipatory Distress, Early Regulating Behaviors, and Engagement with Procedure. Older children had higher scores on early regulating and engagement profiles whereas younger children had higher scores on Acute Distress. There were no differences across age in children's Anticipatory Distress. Construct validity of behavior profiles was supported via correlations of profile score (overall and on the walk to the operating room) with a validated assessment of children's anxiety at induction.

**CONCLUSIONS:** Children undergoing anesthesia display a range of distress and nondistress behaviors. A group of behaviors was identified that, when displayed on the walk to the operating room, is associated with less distress at anesthesia induction. These data provide the first examination of potentially regulating behaviors of children, but more detailed sequential analysis is required to validate specific functions of these behaviors.

### 小剂量3mg左布比卡因加10ug芬太尼选择性脊麻用于妇科门诊腹腔镜检查

#### Low-dose 3 mg levobupivacaine plus 10 microg fentanyl selective spinal anesthesia for gynecological outpatient laparoscopy

Jesus de Santiago, DESA, MD\*, Javier Santos-Yglesias, MD\*, Jorge Giron, MD\*, Francisco Montes de Oca, MD†, Alejandro Jimenez, PhD‡, and Pilar Diaz, PhD§

From the \*Departments of Anesthesiology, and †Gynaecology, Hospital USP La Colina, SC de Tenerife; ‡Research Unit Hospital Universitario de Canarias - University of La Laguna; and §Department of Pharmacy, Hospital Universitario Nuestra Señora de La Candelaria, SC de Tenerife, Tenerife, Spain.

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**背景：**利多卡因选择性脊麻用于短小妇科门诊腹腔镜检查非常有效。我们比较了左布比卡因-芬太尼与利多卡因-芬太尼分别用于短小妇科门诊腹腔镜检查时的术中麻醉效果，麻醉恢复时间以及患者的满意程度。

**方法：**本研究为双盲。52名欲接受输卵管结扎术的健康妇女随机分为2组。组I接受鞘内注射2%的利多卡因10mg+10ug芬太尼，组II鞘内注射0.5%的左布比卡因3mg+10ug芬太尼。两组均用无菌水稀释至总量3ml后推注。术中监测以下指标：麻醉起效时间，麻醉镇痛的补充量，镇静深度，手术操作条件及偶尔出现的血流动力学波动情况。术后测试患者的运动阻滞、本体感觉、振动觉、轻触觉及Romberg's 试验以评价患者是否能够安全地麻醉后苏醒室并且可以自己走回去。给予麻醉药物后5，10，15分钟测试感觉阻滞水平，并且之后每15分钟测试一次直至手术结束。感觉神经阻断消退有25分钟的时间差被认为是与临床相关。

**结果：**起效时间与手术操作条件在2组间具有可比性。没有需要改为全身麻醉的病例。所有病人均可安全离开麻醉后苏醒室。组I 27(18-45)分钟后可以下肢可以移动而组II则需要30(18-56)分钟(P=0.24)。脊麻完全消退时间组I为93(65-120)分钟，组II为105(78-150)分钟(P=0.019)。然而两组在可离院时间上没有显著性差异，分别为185(150-300)与188(125-300)(P=0.62)。总体的患者满意度在两组间也具有可比性。

**结论：**左布比卡因3mg+10ug芬太尼可代替10mg利多卡因+10ug芬太尼用于短小手术的脊麻。具有与其相当的感觉阻滞消退时间，良好的手术操作条件以及患者满意程度。

(黄剑译 薛张纲校)

**BACKGROUND:** Lidocaine selective spinal anesthesia has been effective for short-duration gynecological outpatient laparoscopy. We compared the intraoperative effectiveness, anesthetic recovery times, and patient satisfaction after levobupivacaine-fentanyl versus lidocaine-fentanyl spinal anesthesia during short-duration gynecological laparoscopy.

**METHODS:** In this double-blind study, 52 healthy women scheduled to undergo tubal sterilization were randomly assigned to receive either intrathecal 10 mg lidocaine 2% plus 10 microg fentanyl (Group I) or intrathecal 3 mg levobupivacaine 0.5% plus 10 microg fentanyl (Group II), each solution made to a total volume of 3 mL with sterile water. The following variables were monitored intraoperatively: anesthesia onset time, need for anesthesia-analgesia supplementation, depth of sedation, surgical conditions, and occurrence of hemodynamic events. After surgery, motor block, proprioception, vibration sense, light touch, and Romberg's test were performed to evaluate whether the patients could bypass the postanesthesia care unit and be allowed to walk by themselves. Sensory block level was determined at 5, 10, and 15 min after anesthetic injection, and then every 15 min until resolution was complete. A difference of 25 min in sensory block resolution time was considered clinically relevant.

**RESULTS:** Onset time and intraoperative conditions were comparable in both groups. No patient required general anesthesia to complete surgery. All patients from both groups bypassed the postanesthesia care unit. Ambulation took place after 27 (18-45) min in Group I and 30 (18-56) min in Group II (P = 0.24). Complete regression of spinal anesthesia occurred after 93 (65-120) min in Group I and 105 (78-150) min in Group II (P = 0.019); however, no differences were observed in time for home discharge 185 (150-

300) min in Group I and 188 (125-300) min in Group II (P = 0.62). Global patient satisfaction was comparable between both groups.

**CONCLUSIONS:** Levobupivacaine 3 mg plus 10 microg fentanyl may be used as a suitable alternative to 10 mg lidocaine plus 10 microg fentanyl for spinal anesthesia of short duration. It achieved a clinically equivalent time for resolution of sensory block, similar intraoperative conditions, and comparable patient satisfaction..

### 七氟醚和丙泊酚在给氧条件下对鼠的葡萄糖代谢的影响

#### **The effects of sevoflurane and propofol on glucose metabolism under aerobic conditions in fed rats.**

Kitamura T, Ogawa M, Kawamura G, Sato K, Yamada Y.

Takayuki Kitamura, MD, Makoto Ogawa, MD, Gaku Kawamura, MD, Kanako Sato, MD, and Yoshitsugu Yamada, MD, PhD

From the Department of Anesthesiology, Faculty of Medicine, The University of Tokyo, Bunkyo-ku, Tokyo, Japan.

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**背景：**最近研究报告外科手术中的高血糖是手术死亡和术后并发症的独立风险因素。挥发性麻醉剂，例如七氟醚，会削弱葡萄糖分解，有可能会导导致外科手术中发生高血糖。然而，静脉麻醉剂，例如丙泊酚，对葡萄糖代谢影响的研究还很贫乏。因此，我们通过给氧的实验鼠比较七氟醚和丙泊酚对葡萄糖代谢的影响。

**方法：**我们首先测定了接受 S 形结肠开口术的鼠在七氟醚、七氟醚/丁丙诺啡、丙泊酚和丙泊酚/丁丙诺啡麻醉下时血糖的变化。然后我们对经葡萄糖管理之后的清醒鼠、七氟醚麻醉鼠以及丙泊酚麻醉鼠的血糖变化进行血糖变化的测定。

**结果：**七氟醚麻醉鼠行 S 形结肠开口术后血糖水平明显升高，并且其升高不能通过丁丙诺啡预防。丙泊酚麻醉鼠在高麻醉剂量下行 S 形结肠开口术后血糖无变化，但在低剂量及中间剂量的麻醉下血糖会有轻微的升高，这轻微的升高可由丁丙诺啡完全预防。但是经葡萄糖管理的鼠在七氟醚麻醉下血糖的变化比清醒鼠的更好，而丙泊酚麻醉下的鼠则类似于清醒鼠。

**结论：**在手术期间，七氟醚和七氟醚/丁丙诺啡麻醉下可观察到高血糖症，而丙泊酚和丙泊酚/丁丙诺啡麻醉下血糖水平相对稳定。但是七氟醚可增加葡萄糖的不耐受，丙泊酚对葡萄糖耐受性无影响。我们推测丙泊酚的这个特点对本项研究中观察到的稳定的葡萄糖代谢至少起了部分作用。本项研究的结果证实了七氟醚和丙泊酚对葡萄糖代谢的影响有着明显区别。

(李莹译 薛张纲校)

**BACKGROUND:** Recent studies reported that intraoperative hyperglycemia is an independent risk factor for mortality and morbidity related to surgery. Volatile anesthetics, such as sevoflurane, impair glucose use, suggesting their possible contributions to intraoperative hyperglycemia. However, the effects of IV anesthetics, such as propofol, on glucose metabolism are poorly understood. Thus, we compared the effects of sevoflurane and propofol on glucose metabolism under aerobic conditions in fed rats.



**METHODS:** We first examined changes in blood glucose levels in rats undergoing sigmoid colostomy under sevoflurane, sevoflurane/buprenorphine, propofol, and propofol/buprenorphine anesthesia. We then examined changes in blood glucose levels after glucose administration using awake rats, rats under sevoflurane anesthesia, and rats under propofol anesthesia.

**RESULTS:** Blood glucose levels increased markedly after sigmoid colostomy under sevoflurane anesthesia; the marked increases could not be prevented by the coadministration of buprenorphine. Under propofol anesthesia, blood glucose levels did not change after sigmoid colostomy at the highest dose, but increased slightly at the lowest and intermediate doses; the slight increases were completely prevented by the coadministration of buprenorphine. Whereas changes in blood glucose levels after glucose administration in rats under sevoflurane anesthesia were significantly greater than those in awake rats, the changes in rats under propofol anesthesia were similar to those in awake rats.

**CONCLUSIONS:** During surgery, hyperglycemia was observed under sevoflurane and sevoflurane/buprenorphine anesthesia, but blood glucose levels were relatively stable under propofol and propofol/buprenorphine anesthesia. Whereas sevoflurane exaggerates glucose intolerance, propofol has no significant effects on glucose tolerance. We speculate that this feature of propofol contributes, at least in part, to the stable glucose metabolism during surgery observed in this study. The results of this study confirm the marked difference in the effects of sevoflurane and propofol on glucose metabolism.

### 异氟醚诱导的翻正反应和呼吸改变受 RGS 蛋白调控

#### Isoflurane-Induced Changes in Righting Response and Breathing Are Modulated by RGS Proteins

Eduardo E. Icaza, BS<sup>\*</sup>, Xinyan Huang, PhD<sup>†</sup>, Ying Fu, PhD<sup>†</sup>, Richard R. Neubig, MD, PhD<sup>†</sup>, Helen A. Baghdoyan, PhD<sup>\*†</sup>, and Ralph Lydic, PhD<sup>\*</sup>

From the Departments of <sup>\*</sup>Anesthesiology, and <sup>†</sup>Pharmacology, University of Michigan, Ann Arbor, Michigan.

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**背景:** 近期研究显示 G 蛋白偶联受体, 尤其是连接于  $G_{\alpha_1}$  上的可能与麻醉反应有关。G 蛋白信号转导调节 (RGS) 蛋白与  $G_{\alpha_1}$  结合使之活化来抑制信号转导。敲入对 RGS 不敏感的  $G_{\alpha_{12}}$  G184S ( $G_{\alpha_{12}}$  GS) 等位基因小鼠显示出增强的  $G_{\alpha_{12}}$  信号转导, 并提供了全麻中观察  $G_{\alpha_{12}}$  信号转导和 RGS 蛋白的新途径。

**方法:** 我们用异氟醚麻醉了  $G_{\alpha_{12}}$  GS/GS 纯合子小鼠和野生型小鼠 (WT), 计数它们失去及恢复翻正反应的时间 (秒)。在异氟醚麻醉恢复期, 两组小鼠的呼吸以体积描记法计算得出。

**结果:**  $G_{\alpha_{12}}$  GS/GS 小鼠失去翻正反应的时间显著少于野生型, 恢复翻正反应的时间显著多于野生型。在异氟醚麻醉恢复期,  $G_{\alpha_{12}}$  GS/GS 小鼠显示出更为显著的呼吸抑制。Poincaré 分析显示与野生型小鼠相比, GS/GS 小鼠的呼吸变异度变小。

**结论：**RGS 蛋白调控的  $G_{\alpha_{12}}$  信号转导改变觉醒的丧失和恢复，以及呼吸中状态依赖的改变。

(姚敏敏译 薛张纲校)

**BACKGROUND:** Recent evidence suggests that G protein-coupled receptors, especially those linked to  $G_{\alpha_i}$ , contribute to the mechanisms of anesthetic action. Regulator of G protein signaling (RGS) proteins bind to activated  $G_{\alpha_i}$  and inhibit signal transduction. Genomic knock-in mice with an RGS-insensitive  $G_{\alpha_{12}}$  G184S ( $G_{\alpha_{12}}$  GS) allele exhibit enhanced  $G_{\alpha_{12}}$  signaling and provide a novel approach for investigating the role of  $G_{\alpha_{12}}$  signaling and RGS proteins in general anesthesia.

**METHODS:** We anesthetized homozygous  $G_{\alpha_{12}}$  GS/GS and wild-type (WT) mice with isoflurane and quantified time (in seconds) to loss and resumption of righting response. During recovery from isoflurane anesthesia, breathing was quantified in a plethysmography chamber for both lines of mice.

**RESULTS:**  $G_{\alpha_{12}}$  GS/GS mice required significantly less time for loss of righting and significantly more time for resumption of righting than WT mice. During recovery from isoflurane anesthesia,  $G_{\alpha_{12}}$  GS/GS mice exhibited significantly greater respiratory depression. Poincaré analyses show that GS/GS mice have diminished respiratory variability compared with WT mice.

**CONCLUSION:** Modulation of  $G_{\alpha_{12}}$  signaling by RGS proteins alters loss and resumption of wakefulness and state-dependent changes in breathing.

## 两个中心实验室酸碱诊断的 Stewart 参数的再现性

### The Reproducibility of Stewart Parameters for Acid-Base Diagnosis Using Two Central Laboratory Analyzers

Ba-Vinh Nguyen, MD\* , Jean-Louis Vincent, MD, PhD , Jean Baptiste Hamm, MD , Jean-Hervé Abalain, PhD , Jean-Luc Carre, MD, PhD , Emmanuel Nowak, PhD||, Mehdi Ould Ahmed, MD\*, Charles C. Arvieux, MD, PhD , and Gildas Gueret, MD, PhD

From the \*Department of Anesthesiology and Critical Care, Clermont Tonnerre Military Hospital, Brest, France; Department of Anesthesiology and Critical Care, CHU, Brest, France; Department of Intensive Care, Erasme Hospital, Université Libre de Bruxelles, Brussels, Belgium; Department of Biochemistry and Molecular Biology, CHU, Brest, France; and ||INSERM CIC 0502, CHU, Brest, France.

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**背景：**酸碱平衡可以使用 Stewart-Fencl 方法来解释，该方法包含了表观强离子差 (SIDapp)，有效强离子差 (SIDeff)，和强离子间隙 (SIG) 的计算。这些计算要求测量若干个变量。我们假定 SID 和 SIG 通过不同的方法计算不会由于测量值的可变性而再现。

**方法：**这个在生化实验室里进行的前瞻性研究中，我们分析了 3 个月内一系列病人的 179 个常规血液样本，分别使用了两种自动血液化学分析仪：LX20 (Beckman) 和 Modular (Roche)。两种分析仪的测量和计算参数进行了比较。

**结果：**虽然两种测量值的相关性令人满意，但是两者计算值一致性的极限存在很大的差距 (SIDapp: 9.6 mEq/L, SIDeff: 6.4 mEq/L, and SIG: 11.7 mEq/L) 和弱相关性 (SIDapp:  $r^2 = 0.54$  and SIG:  $r^2 = 0.12$ )。

**结论：**用 Stewart-Fencl 方法的结果来解释酸碱状态可以根据使用分析仪的不同而发生变化。这些差距可能有重要的临床和研究意义。

(俞佳译 薛张纲校)

**BACKGROUND:** Acid-base derangements can be interpreted using the Stewart-Fencl approach, which includes calculation of the apparent strong ion difference (SIDapp), the effective SID (SIDeff), and the strong ion gap (SIG). These calculations require the measurement of several variables. We hypothesized that the SID and SIG calculated by different analyzers would not be reproducible because of variability in the measured values.

**METHODS:** In this prospective observational study conducted in a biochemistry laboratory, we analyzed 179 routine blood samples from consecutive patients over a 3-mo period using two automated blood chemistry analyzers, the LX20 (Beckman) and the Modular (Roche). Measured and calculated parameters from the two analyzers were compared.

**RESULTS:** Although the correlation between measured values was satisfactory, there were large differences in the limits of agreement for calculated values (SIDapp: 9.6 mEq/L, SIDeff: 6.4 mEq/L, and SIG: 11.7 mEq/L) and a weak correlation (SIDapp:  $r^2 = 0.54$  and SIG:  $r^2 = 0.12$ ) between the analyzers.

**CONCLUSIONS:** The results of the Stewart-Fencl approach for interpretation of acid-base status can vary according to the analyzer used. These differences may have important clinical and research implications..

## 环状软骨压迫导致下咽喉部压缩：食管位置无相关性

### **Cricoid Pressure Results in Compression of the Postcricoid Hypopharynx: The Esophageal Position Is Irrelevant**

Mark J. Rice, MD\*, Anthony A. Mancuso, MD†, Charles Gibbs, MD\*, Timothy E. Morey, MD\*, Nikolaus Gravenstein, MD\*, and Lori A. Dettie, MD†

From the Departments of \*Anesthesiology, and †Radiology, University of Florida College of Medicine, Gainesville, Florida.

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**背景：** Sellick 将环状软骨压迫描述为捏环状软骨与颈椎之间的食管。最近一项研究显示在环状软骨压迫下，超过 90% 以上的时候食管位置横向移动，质疑了这个模型的效果。我们设计这个实验来精确定义 Sellick 模型的解剖并调查其效果。

**方法：** 24 名未镇静的成人志愿者行颈部磁共振检查给予或不给予环状软骨压迫。在环状软骨压迫时衡量环后咽部，气道压缩度和侧向位移的环状环。回顾相关解剖。

**结果：** 下咽（而非食道）位于环状软骨环背面并被环状软骨压迫这一措施压缩。远端下咽，环状软骨水平的消化道，被环状软骨环充填而非移位。有环状软骨压迫，下咽平均前后直径减少了 35%，这压缩，即使是环状软骨环压向外侧椎体仍然存在。

**结论：** 食管的位置与移动与环状软骨压迫在防止胃食管返流的效果无相关性。下咽与环状软骨一起移动，形成一个解剖单位。这个关系对于环状软骨压迫的效果和可靠性是至关重要的。磁共振显示压迫消化道与环状软骨相对椎体中线和侧向移动是一起发生的。

（张玥琪译，薛张纲校）

**BACKGROUND:** Sellick described cricoid pressure (CP) as pinching the esophagus between the cricoid ring and the cervical spine. A recent report noted that with the application of CP, the esophagus moved laterally more than 90% of the time, questioning the efficacy of this maneuver. We designed this study to accurately define the anatomy of the Sellick maneuver and to investigate its efficacy.

**METHODS:** Twenty-four nonsedated adult volunteers underwent neck magnetic resonance imaging with and without CP. Measurements were made of the postcricoid hypopharynx, airway compression, and lateral displacement of the cricoid ring during the application of CP. The relevant anatomy was reviewed.

**RESULTS:** The hypopharynx, not the esophagus, is what lies behind the cricoid ring and is compressed by CP. The distal hypopharynx, the portion of the alimentary canal at the cricoid level, was fixed with respect to the cricoid ring and not mobile. With CP, the mean anteroposterior diameter of the hypopharynx was reduced by 35% and the lumen likely obliterated, and this compression was maintained even when the cricoid ring was lateral to the vertebral body.

**CONCLUSIONS:** The location and movement of the esophagus is irrelevant to the efficiency of the Sellick's maneuver (CP) in regard to prevention of gastric regurgitation into the pharynx. The hypopharynx and cricoid ring move together as an anatomic unit. This relationship is essential to the efficacy and reliability of Sellick's maneuver. The magnetic resonance images show that compression of the alimentary tract

occurs with midline and lateral displacement of the cricoid cartilage relative to the underlying vertebral body.

### 实验性中毒性休克中的强心支持：第一部分.左西孟旦对内脏灌注的影响

#### Inotropic support during experimental endotoxemic shock: part I. The effects of levosimendan on splanchnic perfusion.

Doris Cunha-Goncalves, MD\*, Valeria Perez-de-Sa, MD, PhD<sup>†</sup>, Edgars Grins, MD\*, Peter L. Dahm, MD, PhD<sup>†</sup>, Johan Thörne, MD, PhD<sup>§</sup>, and Sten Blomquist, MD, PhD\*

From the \*Departments of Cardiothoracic Anesthesia and Intensive Care, and †Pediatric Anesthesia and Intensive Care, Lund University Hospital; ‡Department of Anesthesia and Intensive Care, Ystad Hospital; and § Department of Surgery, Helsingborg Hospital, Sweden.

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**背景：**感染性休克可引起内脏高灌注。我们假设左西孟旦能改善中毒性休克期间全身和肝脏的血流灌注。

**方法：**对 16 只麻醉好的实验用猪(31.4 +/- 3.4 kg)进行颈静脉、颈动脉、肺动脉（温度稀释法）、肝门静脉和肝静脉插管，用来监测血流动力学和采集血样。在肝门静脉、肝动脉和肠系膜上动脉(SMA)附近放置超声血流探测仪。在给于 30 mL/kg 右旋糖酐 70 的基础上，所有动物在实验期间应静脉给于 10 mL x kg(-1) x h(-1)的液体。以 2 microg x kg(-1) x h(-1)的速度持续向猪体内输注内毒素 300 分钟，在开始输注 100 分钟后，随机将猪分为实验组和对照组，前者接受左西孟旦(50 microg x kg(-1) x h(-1), n = 8)，后者接受安慰剂(n = 8)。为评估内毒素血症的独立因素，将所有的数据在随机分组前放在同一组中。对数据进行方差分析并以均数加减标准差来表示。

**结果：**在开始输注内毒素 90 分钟后，全组数据显示全身血管阻力(SVR, 2526 +/- 203 to 1946 +/- 122 dyn x s x cm(-5), P = 0.003) 和平均动脉压(MAP, 109 +/- 6 to 84 +/- 3 mm Hg, P < 0.05)均有降低，但同时心率(66 +/- 4 to 98 +/- 8 bpm)和肺动脉楔压(MPAP, 20 +/- 1 to 38 +/- 2 mm Hg)升高，P < 0.001。心输出量(CO, 3.4 +/- 0.2 L/min)和全身氧气的输送(414 +/- 33 mL/min)无改变，但肠系膜上动脉的血流(575 +/- 34 to 392 +/- 38 mL/min)和肝门静脉的血流(881 +/- 62 to 568 +/- 39 mL/min)均降低，P < 0.001。虽然肝动脉血流增加(36 +/- 8 to 219 +/- 38 mL/min)，但消化道(114 +/- 11 to 84 +/- 7 mL/min)和肝脏(94 +/- 11 to 67 +/- 8 mL/min)的氧气输送降低, P < 0.05。在输注内毒素 300 分钟后，实验组的 MPAP (39 +/- 3 vs 49 +/- 2 mm Hg, P = 0.025), SVR (2158 +/- 186 vs 3069 +/- 370 dyn x s x cm(-5), P = 0.052)和 MAP (55 +/- 9 vs 87 +/- 9 mm Hg, P < 0.001)均较对照组显著降低。两组动物的 CO，门静脉和肝动脉血流均减少(P < 0.001)。在 300 分钟时，左西孟旦组的均值分别为 2.0 +/- 0.4 L/min, 390 +/- 83 mL/min, and 36 +/- 12 mL/min。肠系膜上动脉的血流仅在左西孟

且组减少(432 +/- 40 to 320 +/- 78 mL/min, P < 0.001), 但内脏氧气的输送在两组均有降低, 左西孟旦组为 85 +/- 12 to 63 +/- 12 mL/min, P < 0.001, 对照组为 83 +/- 6 to 59 +/- 3 mL/min, P = 0.03。

**结论:** 用实验猪建立中毒性休克模型, 在适当的液体复苏的同时给予左西孟旦可防止远期肺动脉楔压的升高, 维持较低的全身血管阻力。然而, 对于心排量和平均动脉压的降低无明显改善。左西孟旦既无法阻止休克的进展, 也不能改善肝脏血流的灌注。

(张钊译 薛张纲校)

**BACKGROUND:** Septic shock may cause splanchnic hypoperfusion. We hypothesized that levosimendan would improve systemic and hepatosplanchnic perfusion during endotoxemic shock.

**METHODS:** In 16 anesthetized pigs (31.4 +/- 3.4 kg), a jugular vein, a carotid artery, the pulmonary artery (thermodilution), the portal vein, and a hepatic vein were cannulated for hemodynamic monitoring and blood sampling. Ultrasonic flowprobes were placed around the portal vein, the hepatic artery, and the superior mesenteric artery (SMA). In addition to 30 mL/kg of dextran 70 given before baseline, all animals received 10 mL x kg(-1) x h(-1) of IV fluids throughout the experiment. An endotoxin infusion (2 microg x kg(-1) x h(-1)) was given for 300 min; 100 min after the start of endotoxin, the pigs were randomized to receive levosimendan (50 microg x kg(-1) x h(-1)), n = 8) or placebo (n = 8). To evaluate the isolated effects of endotoxemia, all data before randomization were pooled into one group. Data were analyzed by analysis of variance and presented as mean +/- sem.

**RESULTS:** Endotoxemia (t = 90 min, pooled data) decreased systemic vascular resistance (SVR, 2526 +/- 203 to 1946 +/- 122 dyn x s x cm(-5), P = 0.003) and mean arterial blood pressure (MAP, 109 +/- 6 to 84 +/- 3 mm Hg, P < 0.05), whereas heart rate (66 +/- 4 to 98 +/- 8 bpm), and mean pulmonary arterial pressure (MPAP, 20 +/- 1 to 38 +/- 2 mm Hg) increased (P < 0.001). Cardiac output (CO, 3.4 +/- 0.2 L/min) and systemic oxygen delivery (414 +/- 33 mL/min) were unchanged, but blood flows in the SMA (575 +/- 34 to 392 +/- 38 mL/min) and the portal vein (881 +/- 62 to 568 +/- 39 mL/min) decreased (P < 0.001). Although hepatic arterial blood flows increased (36 +/- 8 to 219 +/- 38 mL/min), gut (114 +/- 11 to 84 +/- 7 mL/min) and hepatic (94 +/- 11 to 67 +/- 8 mL/min) oxygen deliveries decreased (P < 0.05). At t = 300 min, the levosimendan group showed lower MPAP (39 +/- 3 vs 49 +/- 2 mm Hg, P = 0.025), lower SVR (2158 +/- 186 vs 3069 +/- 370 dyn x s x cm(-5), P = 0.052), and lower MAP (55 +/- 9 vs 87 +/- 9 mm Hg, P < 0.001) than the control group. In both groups, CO, portal vein, and hepatic arterial blood flows decreased (P < 0.001); the mean values for the levosimendan group at t = 300 min were 2.0 +/- 0.4 L/min, 390 +/- 83 mL/min, and 36 +/- 12 mL/min, respectively. SMA blood flow decreased only in the levosimendan group (432 +/- 40 to 320 +/- 78 mL/min, P < 0.001), whereas gut oxygen delivery decreased in the levosimendan (85 +/- 12 to 63 +/- 12 mL/min, P < 0.001) and in the control (83 +/- 6 to 59 +/- 3 mL/min, P = 0.03) groups.

**CONCLUSION:** Levosimendan administered after the establishment of endotoxemic shock to pigs receiving moderate fluid resuscitation prevented further increases in MPAP and maintained a low SVR. There were, however, no improvements in CO, MAP

decreased, and levosimendan neither prevented the development of circulatory shock nor improved hepatosplanchnic perfusion.

### 异氟烷预处理改善内毒素诱导大鼠急性肺损伤并降低死亡率

#### Isoflurane Preconditioning Ameliorates Endotoxin-Induced Acute Lung Injury and Mortality in Rats

Isoflurane Preconditioning Ameliorates Endotoxin-Induced Acute Lung Injury and Mortality in Rats

Qi Fang Li, MD, PhD, Ye Sen Zhu, MD, Hong Jiang, MD, PhD, Hui Xu, MD, and Yu Sun, MD

From the Department of Anesthesiology, Shanghai Ninth People's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China.

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**背景：**异氟烷预处理对内毒素诱导的严重急性肺损伤肺致炎因子和存活率的影响未得到过系统的研究，我们观察预先给予异氟烷对脂多糖诱导的大鼠急性肺损伤的影响。

**方法：**250-300g 的雄性 Sprague-Dawley 大鼠随机分为 4 组：纯氧预处理腹腔内注射生理盐水组；异氟烷预处理组；纯氧预处理腹腔注射脂多糖组和异氟烷预处理腹腔内注射脂多糖组。内毒素由腹腔内注射脂多糖产生。注射脂多糖前吸入 1.4% 的异氟烷 30 分钟。然后观察大鼠 6 小时，监测动脉压、心率和血气。急性肺损伤的严重程度由肺的湿/干比、渗出物伊文思蓝染色和组织学检查评估。对肺的 NO、NTF- $\alpha$ 、IL-1 $\beta$  和 IL-6 的水平也进行测量。另外，统计存活率并测定诱生一氧化氮合酶(iNOS)基因的表达。

**结果：**脂多糖引发严重的系统性低血压和急性肺损伤，急性肺损伤程度、肺功能损害以及肺 NO, TNF- $\alpha$ , IL-1 $\beta$  和 IL-6 的增加可以证明之一点。异氟烷预处理可以减轻系统性低血压和急性肺损伤的发展，也能减少脂多糖诱导的肺内硝酸盐/亚硝酸盐和致炎因子的释放，并改善重症败血症大鼠的存活率。脂多糖导致 iNOS 基因表达上调而异氟烷预处理可以减少基因表达。

**结论：**异氟烷预处理能减少肺致炎因子的释放，降低重症败血症的死亡率。早期的保护作用可能有部分通过抑制 iNOS-NO 途径的活性介导。

(朱兰芳译 薛张刚校)

**BACKGROUND:** The effects of isoflurane pretreatment on pulmonary proinflammatory cytokines and survival in severe endotoxin-induced acute lung injury (ALI) have not been studied systemically. We investigated the effect of preadministration of isoflurane on ALI induced by lipopolysaccharide (LPS) in rats.

**METHODS:** Male Sprague-Dawley rats weighing 250-300 g were randomly assigned to 1 of 4 groups: sham rats (injected intraperitoneally [IP] with saline) pretreated with vehicle (100% O<sub>2</sub>) (sham-vehicle); sham rats pretreated with isoflurane (sham-ISO); LPS rats (injected IP with LPS) pretreated with vehicle (vehicle-LPS); and LPS rats pretreated

with isoflurane (ISO-LPS). Endotoxemia was induced by IP injection of LPS. Isoflurane 1.4% was administered 30 min before LPS injection. The animals were then observed for 6 h. We monitored arterial blood pressure, heart rate, and blood gas. The extent of ALI was evaluated by lung wet/dry ratio, Evans blue dye extravasation, and histologic examination. We also measured pulmonary nitric oxide (NO), tumor necrosis factor (TNF)- $\alpha$ , interleukin (IL)-1 $\beta$ , and IL-6 levels. In addition, survival statistics and pulmonary inducible NO synthase (iNOS) gene expression were also determined.

**RESULTS:** LPS caused systemic hypotension and severe ALI, as evidenced by the increases in the extent of ALI, impairment of pulmonary functions, and increases in pulmonary NO, TNF- $\alpha$ , IL-1 $\beta$ , and IL-6. Isoflurane preconditioning mitigated systemic hypotension and the development of ALI. Isoflurane preconditioning also attenuated the LPS-induced increases in pulmonary nitrate/nitrite and proinflammatory cytokine release and improved survival of rats with severe sepsis. The expression of iNOS was upregulated by LPS and reduced by isoflurane pretreatment.

**CONCLUSIONS:** Isoflurane preconditioning can attenuate pulmonary proinflammatory cytokine release and decrease the mortality induced by severe sepsis. Early protection seems to be mediated partly through inhibition of iNOS-NO pathway activation.

### 轻度低温不会长期影响小鼠局部缺血的神经再生

#### Mild Hypothermia Has No Long-Term Impact on Postischemic Neurogenesis in Rats

Irina Lasarzik, MD\*, Uta Winkelheide, DVM\*, Serge C. Thal, MD\*, Natascha Benz, MD\*, Matthias Lörcher, MD\*, Antje Jahn-Eimermacher, Dipl Math†, Christian Werner, MD, PhD\*, and Kristin Engelhard, MD, PhD\*

From the \*Department of Anesthesiology, and †Institute of Medical Biostatistics, Epidemiology and Informatics, Medical Center of the Johannes Gutenberg-University, Mainz, Germany.

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**背景：**治疗性低温可以改善局部缺血部位的功能，这与缺血后神经再生有关。我们研究了是否轻度低温可以长期增加局部缺血处的神经再生。

**方法：**70 只雄性 Sprague Dawley 小鼠通过七氟醚麻醉后随机分为下述治疗组：模拟手术控制常温下缺氧，局部缺血时低温，局部缺血后低温。同时研究了 15 只实验小鼠的神经发生作为资料。通过双测颈动脉阻塞及低血压状态制造前脑缺血模型。在常温组，颅骨膜温度维持在 37.5℃。低温组维持在颅骨膜温度 33℃ 保持 45 分钟。所有的小鼠接受 5-溴-2-脱氧尿苷治疗 7 天。28 天后分析了组织病理学损伤情况及海马的 5-溴-2-脱氧尿苷正相关的神经元。

**结果：**低温没有影响固有的神经再生。不论颅骨膜温度如何，大脑缺血均增加了新神经元的数量。缺血开始前开始 45 分钟的低体温可以消除海马 CA1 和 CA3 区域的损伤量至 <10%，但是和常温相比，缺血开始后的低温并没有降低神经损伤。

**结论：**缺血过程中及缺血后低体温均不能增加缺血导致的内源性神经再生。缺血过程中低体温可以降低海马的损伤，而缺血后低温并不能预防组织病理学损伤。这表明，大脑缺血后 28 天，轻度缺血后低温并不能显著增加缺血后神经元的数量，并且不能影响组织病理学损伤的严重程度。



(陈珺珺译 薛张纲校)

**BACKGROUND:** Postischemic improvement of functional outcome by therapeutic hypothermia may be related to cerebral regeneration by postischemic neurogenesis. We investigated whether mild peri-ischemic hypothermia leads to a long-term increase in postischemic neurogenesis.

**METHODS:** Seventy male sevoflurane-anesthetized Sprague Dawley rats were randomly assigned to the following treatment groups: normothermic ischemia, intraischemic hypothermia, and postischemic hypothermia with corresponding sham-operated controls. Fifteen naive rats were investigated as reference for natural neurogenesis. Forebrain ischemia was induced by bilateral common carotid artery occlusion and hemorrhagic hypotension. In normothermic groups, the pericranial temperature was maintained at 37.5°C. Animals in the hypothermic groups were cooled to a pericranial temperature of 33°C for 45 min. All animals received 5-bromo-2-deoxyuridine for 7 days. Histopathological damage and 5-bromo-2-deoxyuridine-positive neurons of the hippocampus were analyzed after 28 days.

**RESULTS:** Hypothermia had no impact on natural neurogenesis. Cerebral ischemia increased the number of new neurons regardless of pericranial temperature. Forty-five minutes of hypothermia beginning before ischemia diminished hippocampal injury to <10% in the CA1 and CA3 regions, whereas 45 min of postischemic hypothermia beginning after reperfusion did not reduce neuronal injury compared with normothermia.

**CONCLUSIONS:** Neither intraischemic nor postischemic hypothermia affected the ischemia-induced increase in endogenous neurogenesis. Intraischemic hypothermia reduced hippocampal damage, whereas postischemic hypothermia as applied here did not prevent formation of histopathological injury. This indicates that, 28 days after cerebral ischemia, postischemic neurogenesis is not significantly increased by mild peri-ischemic hypothermia and not affected by the severity of histopathological damage.

### 比较 2007 年与 1992 年在急性疼痛方面的临床试验，研质量有所提高，而不是数量 Increase in Quality, but Not Quantity, of Clinical Trials in Acute Pain: 1992 Versus 2007

Mark D. Reeves, MBBS, FANZCA

From the Department of Anaesthesia, North West Regional Hospital, Burnie, Tasmania, Australia.

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背景：近 15 年来，每年在最影响的 6 本麻醉杂志发表的关于成年患者术后急性疼痛的临床试验的数量略有变化，从每年 16%（95% 置信区间：12-20）下降至每年 11%（95% 置信区间：9-15）。但是 2007 年发表的 70% 文章在研究方法的质量有所提高，表现在分析效能，盲法及特异性终点选择方面。研究的兴趣也从单一轴索镇痛变化为多模式镇痛。

(陈珺珺译 薛张纲校)

The annual number of published clinical trials in acute postoperative pain in adults has changed little in 15 yr and, as a fraction of all clinical trials published in the six highest impact journals in anesthesiology, has actually decreased from 16% (95% confidence

interval: 12-20) to 11% (95% confidence interval: 9-15). However, the methodological quality of reports has improved, with explicit statements on power analysis, allocation concealment, and specification of primary end points exceeding 90% of reports in 2007. There has been a shift in hypothesis interests away from neuraxial analgesia and toward multimodal analgesia.

分别通过超声引导下和神经刺激，比较使用 1.5% 甲哌卡因应用于臀下径路坐骨神经阻滞的最小有效麻醉容量

### **The Effects of Ultrasound Guidance and Neurostimulation on the Minimum Effective Anesthetic Volume of Mepivacaine 1.5% Required to Block the Sciatic Nerve Using the Subgluteal Approach**

Giorgio Danelli, MD, Daniela Ghisi, MD, Andrea Fanelli, MD, Andrea Ortu, MD, Elisa Moschini, MD, Marco Berti, MD, Stefanie Ziegler, MD, and Guido Fanelli, MD  
From the Department of Anesthesiology, Intensive Care and Pain Therapy, University Hospital, Parma, Italy.

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**背景：**我们为了验证如下假设：在臀下径路行坐骨神经阻滞时，相比于神经刺激，使用超声引导可以减少 1.5% 甲哌卡因的最小有效麻醉容量(MEAV<sub>50</sub>)。

**方法：**术前用药及单次股神经阻滞，60 名行膝内窥镜手术需坐骨神经阻滞的患者随机分为两组：神经刺激( $n = 30$ )或超声引导( $n = 30$ )。在超声引导组，坐骨神经定位于坐骨粗隆和大转子之间。在神经刺激组，肌肉的反应（足趾屈或内翻）被电刺激(1.5 mA, 2 Hz, 0.1 ms，维持 $\leq 0.5$  mA)引出。每个患者局麻药的用量逐步递增或减少，用量基于前一名病人的反应情况，初始剂量为 12ml。独立的观察者评估针刺觉及运动完全消失的发生：前一患者注射后 20min 观察阳性及阴性应答情况，后一患者减少或增加 2ml 用量。

**结果：**坐骨神经阻滞在超声引导组的平均 MEAV<sub>50</sub> 为 12ml (95% 置信区间[CI], 10–23 mL)，神经刺激组为 19 mL (95% CI, 15–23 mL)( $P < 0.001$ )。在超声引导组，95% 病例有效剂量为 14 mL (95% CI, 12–17 mL)；神经刺激组的 95% 有效剂量为 29 mL (95% CI, 25–40 mL)( $P = 0.008$ )。

**结论：**相比于神经刺激下坐骨神经阻滞，超声引导下使用 1.5% 甲哌卡因的 MEAV<sub>50</sub> 的剂量可减少 37%。

(陈珺珺译 薛张纲校)

**BACKGROUND:** We tested the hypothesis that ultrasound (US) guidance may reduce the minimum effective anesthetic volume (MEAV<sub>50</sub>) of 1.5% mepivacaine required to block the sciatic nerve with a subgluteal approach compared with neurostimulation (NS).

**METHODS:** After premedication and single-injection femoral nerve block, 60 patients undergoing knee arthroscopy were randomly allocated to receive a sciatic nerve block with either NS ( $n = 30$ ) or US ( $n = 30$ ). In the US group, the sciatic nerve was localized between the ischial tuberosity and the greater trochanter. In the NS group, the appropriate muscular response (foot plantar flexion or inversion) was elicited (1.5 mA, 2 Hz, 0.1 ms) and maintained to  $\leq 0.5$  mA. The volume of the injected local anesthetic was varied for consecutive patients based on an up-and-down method, according to the response of the previous patient. The initial volume was 12 mL. An independent observer evaluated the

occurrence of complete loss of pinprick sensation and motor block: positive or negative responses within 20 min after the injection determined a 2-mL decrease or increase for the next patient, respectively.

**RESULTS:** The mean MEAV<sub>50</sub> for sciatic nerve block was 12 mL (95% confidence interval [CI], 10–23 mL) in Group US and 19 mL (95% CI, 15–23 mL) in Group NS ( $P < 0.001$ ). The effective dose in 95% of cases was 14 mL (95% CI, 12–17 mL) in Group US and 29 mL (95% CI, 25–40 mL) in Group NS ( $P = 0.008$ ).

**CONCLUSIONS:** US provided a 37% reduction in the MEAV<sub>50</sub> of 1.5% mepivacaine required to block the sciatic nerve compared with NS.

### 创伤小鼠行电刺疗法对脾 Th1/Th2 细胞因子 mRNA 表达和 T 细胞丝裂原活化蛋白激酶信号传导通路的影响

#### The Effects of Electroacupuncture on Th1/Th2 Cytokine mRNA Expression and Mitogen-Activated Protein Kinase Signaling Pathways in the Splenic T Cells of Traumatized Rats

Kun Wang, MD, Huaxing Wu, MD, Guonian Wang, MD, Mingming Li, MD, Zhaodi Zhang, MD, and Guangying Gu, MD

From the Department of Anesthesiology, The Third Clinical Hospital, Harbin Medical University, Harbin, China.

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**背景:** 手术创伤可以导致术后免疫抑制, 从而增加感染的风险。电针疗法可以止痛, 从而调节免疫状态。然而电针疗法产生的免疫调节的机制并不是很清楚。因此我们研究电针疗法后 T 辅助细胞(Th)1/Th2 产生细胞因子及 mRNA 的表达, 从而评估电针疗法产生免疫调节的机制。

**方法:** 24 只小鼠随机分为 4 组: 对照组, 创伤 (T), 创伤 (T) + 假电针刺 (EA) 和 T + EA。EA 分别在术后 30 分钟、术后 1 到 5 天每天一次行足三里 (ST36) 和阑尾点 (Extra37) 针刺穴位。测定脾 T 细胞及其产物和 IL-2, 干扰素 $\gamma$ , IL-4 和 IL-10 的 mRNA 表达。此外还测定了丝裂原活化蛋白激酶的活性和 DNA 结合 NF- $\kappa$ B 和激活蛋白 (AP)-1 的活性。

**结果:** 在术后第 1 天到第 5 天, 相比于创伤组, T+EA 的撤药的域值和潜伏期显著增加, 第 1 天为 (撤药域值:  $5.8 \pm 0.7$  vs  $3.0 \pm 0.7$  g; ; 撤药潜伏期:  $7.0 \pm 0.8$  vs  $4.5 \pm 0.5$  s;  $P < 0.001$ ), 第 5 天为 ( $9.0 \pm 0.6$  vs  $5.5 \pm 0.6$  g;  $12.0 \pm 1.3$  vs  $7.0 \pm 0.8$  s;  $P < 0.001$ )。在术后第三天, 创伤小鼠 Th1 产生的细胞因子 (IL-2 和干扰素 $\gamma$ ) 及脾 T 细胞的 mRNA 表达显著减少 ( $P < 0.001$ , 创伤组 vs 对照组), 而 Th2 产生的细胞因子 (IL-4 和 IL-10) 及 mRNA 表达增加 ( $P < 0.001$ )。同时伴随细胞外调节蛋白激酶 (ERK) 1/2, p38, NF- $\kappa$ B 和 AP-1 活性的降低 ( $P < 0.001$ , 创伤组 vs 对照组)。给予 EA 可以增加 Th1 细胞因子蛋白质及 mRNA 的表达, 抑制 Th2 细胞因子及 mRNA 的表达 ( $P < 0.05$ , T + EA 组 vs 创伤组), 并可以增加 ERK1/2, p38, NF- $\kappa$ B 和 AP-1 的活性 ( $P < 0.001$ , T + EA 组 vs 创伤组)。

**结论：**EA 可以在蛋白质可 mRNA 水平调节脾 Th1 和 Th2 产生的细胞因子间的平衡，至少在一段时间与 ERK1/2, p38, NF- $\kappa$ B 和 AP-1 信号通路传导有关。这些发现提示 EA 可以改善手术创伤造成的免疫抑制。

(陈珺珺译 薛张纲校)

**BACKGROUND:** Surgical trauma contributes to postoperative immune suppression, which is associated with an increased susceptibility to subsequent infections.

Electroacupuncture (EA) can alleviate pain and exert immunoregulatory effects.

However, the mechanism underlying the immunomodulation effects of EA is not fully elucidated. Therefore, we investigated the effects of EA on T helper (Th)1/Th2 cytokine production and mRNA expression and evaluated the signaling regulatory mechanism of EA effects.

**METHODS:** Rats were divided into four groups ( $n = 24$  each): control, trauma, trauma (T) + sham EA, and T + EA. EA was applied to Zusanli (ST36) and Lanwei (Extra37) acupoints at 20 min after surgery for 30 min, and then performed once a day on postoperative days 1–5. Splenic T cells were isolated and the production and mRNA expression of interleukin (IL)-2, interferon- $\gamma$ , IL-4, and IL-10 were assayed. The activation of mitogen-activated protein kinase and the DNA binding activity of nuclear factor (NF)- $\kappa$ B and activator protein (AP)-1 were examined.

**RESULTS:** Paw withdrawal threshold and paw withdrawal latency were significantly increased in the T + EA group compared with the trauma group from postoperative day 1 (paw withdrawal threshold:  $5.8 \pm 0.7$  vs  $3.0 \pm 0.7$  g; paw withdrawal latency:  $7.0 \pm 0.8$  vs  $4.5 \pm 0.5$  s;  $P < 0.001$ ) to day 5 ( $9.0 \pm 0.6$  vs  $5.5 \pm 0.6$  g;  $12.0 \pm 1.3$  vs  $7.0 \pm 0.8$  s;  $P < 0.001$ ). Th1 cytokine (IL-2 and interferon- $\gamma$ ) production and mRNA expression in splenic T cells of traumatized rats were significantly decreased on postoperative day 3 ( $P < 0.001$ , trauma group versus control group), whereas Th2 cytokine (IL-4 and IL-10) production and mRNA expression were increased ( $P < 0.001$ ). This was accompanied with a significant depression in the activity of extracellular-regulated protein kinase1/2, p38, NF- $\kappa$ B, and AP-1 ( $P < 0.001$ , trauma group versus control group). EA administration increased Th1 cytokine protein and mRNA expression, suppressed Th2 cytokine protein and mRNA expression ( $P < 0.05$ , T + EA group versus trauma group), and increased the activity of ERK1/2, p38, NF- $\kappa$ B, and AP-1 ( $P < 0.001$ , T + EA group versus trauma group).

**CONCLUSIONS:** EA regulates a balance between Th1 and Th2 cytokines at protein and mRNA levels in splenic T cells, and, at least in part, involves the signaling pathways of ERK1/2, p38, NF- $\kappa$ B, and AP-1. The findings suggest that EA may improve immune suppression after surgical trauma.