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*Anesth Analg August 2010 111:568-572; published ahead of print June 7, 2010*

**一项观察性研究——运用血栓弹力描记图预测心脏手术术后过度失血**

**The Incremental Value of Thrombelastography for Prediction of Excessive Blood Loss After Cardiac Surgery: An Observational Study**

Marcin Wasowicz, MD, Stuart A. McCluskey, MD, Duminda N. Wijeyesundera, MD, Terrence M. Yau, MD, Massimiliano Meinri, MD, W. Scott Beattie, MD and Keyvan Karkouti, MD

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**背景：**准确的危险度分层对减少心脏手术术后过度失血有所帮助。在此项研究中作者在现有的危险预测模型基础上，增加血栓弹力图指标，观察对心脏手术术后过度失血的预测是否有更大价值。

**方法：**434 例行体外循环（CPB）下心脏手术患者入组此项观察性研究。在 CPB 前及 CPB 期间进行血栓弹力图描记，术后过度失血的风险通过一个现有的危险预测模型来计算。患者在术后 5 天内禁用氯吡格雷及华法林。术后过度失血的定义为 CPB 结束至术后一天内输注红细胞 $\geq 5$  单位。分别建立包含一个现有的危险预测模型叠加或不叠加血栓弹力描记法的 logistic 回归模型。通过该实验中数据曲线下面积和重评估的改善净值来评估风险预测是否有所改良。

**结果：**在 434 例患者中 59 例发生术后出血量过多(13.6%)。唯一一项改善危险分层的为 CPB 期间血栓弹力描记图的最大振幅，这一最大振幅反映了最大血凝块弹力强度。虽然在预测模型中加入这一变量并未明显影响曲线下面积(曲线下面积增加 0.780-0.784;  $P = 0.8$ )，但这一血栓弹力的变量使重评估的改善净值增加了 12% ( $P = 0.05$ )，主要改善了对于那些高风险病例术后过度出血风险的诊断。

**结论：**将 CPB 中的血栓弹力描记图数据加入这一现存的患者-手术-相关变量的危险预测模型中可以改善心脏手术术后过度出血的危险预测分层，然而我们需要更为大量的多中心研究来证实这一发现以建立一个新的危险预测模型。

(赵嫣红 译 陈杰 校)

**BACKGROUND:** Accurate risk stratification 分层 may help reduce the burden 负担 of excessive blood loss after cardiac surgery. We measured the incremental value of thrombelastography to an existing risk prediction model for excessive blood loss in cardiac surgery.

**METHODS:** This observational study included 434 patients who underwent cardiac surgery with cardiopulmonary bypass (CPB) and had thrombelastographic measures before and during CPB, their risk of excessive blood loss could be calculated with an existing risk prediction model and they had not received clopidogrel or warfarin within 5 days of surgery. Excessive blood loss was defined as transfusion of  $\geq 5$  U of red blood cells from termination of CPB to 1 day after surgery. Logistic regression models including an existing risk prediction model without and with thrombelastographic measures were constructed. Improvement in risk prediction was measured by the area under the curve and net reclassification improvement.

**RESULTS:** Excessive blood loss occurred in 59 of 434 patients (13.6%). The only thrombelastographic measure that improved risk stratification was maximum amplitude during CPB, which reflects maximum clot strength. Although the addition of this variable to the existing prediction model did not have a material effect on the area under the curve (increased from 0.780 to 0.784;  $P = 0.8$ ), it did improve the net reclassification improvement by 12% ( $P = 0.05$ ), primarily by improving the detection of high-risk cases.

**CONCLUSIONS:** Risk stratification for excessive blood loss after cardiac surgery is improved when on-CPB thrombelastography is added to an existing risk prediction model that incorporates readily 便捷的 available patient- and surgery-related variables, but large, multicenter trials are needed to verify this finding and create a new risk prediction model.

月经周期对喉镜检查及气管内插管时血流动力学反应的影响

### **Brief Report: The Effects of the Menstrual Cycle on the Hemodynamic Response to Laryngoscopy and Tracheal Intubation**

Volkan Hancı, MD\*, Serhan Yurtlu, MD\*, Sedat Hakimoğlu, MD\*, Mensure Yılmaz, MD†, Hilal Ayoğlu, MD\*, Mustafa Başaran, MD‡, Gülay Erdoğan, MD\*, Raşan Dilek Okyay, MD\* and Işıl Özkoçak Turan, MD\*

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此项研究的目的是确定月经周期对气管插管（TI）血流动力学改变的影响。入组患者为 62 例 ASA 为 I 级的女性患者，根据处于何种月经周期分为两组：卵泡期组（F 组）31 例及黄体期组（L 组）31 例。所有患者静脉输注丙泊酚及罗库溴铵诱导下气管插管。在静脉输注麻醉药物前及 TI 后记录患者血流动力学改变并且计算患者心率-收缩压乘积。实验结果：两组患者人口学数据无显著差异性，L 组的心率-收缩压乘积在 TI 后一分钟显著增加且增加值高于 F 组 ( $P < 0.001$ )。结论：女性患者处于何种月经周期对于 TI 后血流动力学反应是一项重要影响因素。

（赵嫣红 译 陈杰 校）

We designed this study to determine the effect of the menstrual cycle on the hemodynamic response to tracheal intubation (TI). Sixty-two ASA I women who were either in the follicular phase (group F,  $n = 31$ ) or luteal phase (group L,  $n = 31$ ) of their menstrual cycle were included in the study. Patients received propofol and rocuronium for intubation. Hemodynamic variables were recorded before administration of the IV anesthetic, as well as after TI. Rate pressure products were calculated. Groups were similar in terms of demographic data. Rate pressure products values at the first minute after TI were significantly increased in group L than were those in group F ( $P < 0.001$ ). We conclude that the phase of the menstrual cycle is an important factor in the hemodynamic response to TI.

### **评估麻醉消退期患者的瑞芬太尼-七氟醚响应曲面模型：应用七氟醚效应室浓度的改良模型**

#### **An Evaluation of Remifentanyl-Sevoflurane Response Surface Models in Patients Emerging from Anesthesia: Model Improvement Using Effect-Site Sevoflurane Concentrations**

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**简介：**作者曾报道瑞芬太尼-七氟醚减弱疼痛刺激的协同作用的特别模型。本文初步评估了该模型对麻醉消退的预测作用，以及患者恢复室需要镇痛时胫骨压力反应的预测。作者假设，模型的预测与观察到的反应相一致。同时假设在非稳态条件下，对七氟醚效应室浓度和呼吸末浓度之间的滞后时间的计算能够提高预测能力。

**方法：**20例患者应用七氟醚-瑞芬太尼-芬太尼复合麻醉。麻醉恢复中以两种方法记录预测能力，即以呼气末浓度为基础或以效应室浓度为基础。同样记录患者在恢复室初次需要镇痛药物时，两种方法对于伤害性刺激的反应的预测能力。在时间和空间两方面对模型的预测和实际观察进行比较。

**结果：**当患者麻醉时，模型预测结果对大部分患者没有反应（ $\geq 99\%$ ），显示出较高的似然比。然而，麻醉结束后，在消退期模型出现了宽泛的预测（ $1\% \sim 97\%$ ）。虽然预测较宽泛，基于效应室浓度的预测，比呼吸末浓度为基础的预测，有一更好的分布百分比。对于呼气末浓度为基础的模式，50%模型预测可能没有反应的患者中，45%患者在2min内苏醒，而65%患者4min时苏醒。以效应室浓度为基础的模型中，50%模型预测可能没有反应的患者中，45%在1min内苏醒，而85%在3.2min内苏醒。基于效应室和呼气末浓度两种预测模式，恢复室中对于疼痛刺激反应的预测大致相同。

**讨论：**结果证实了作者研究假说的一部分；七氟醚效应室浓度和呼气末浓度之间滞后时间的计算，提高了预测能力，但对恢复室中伤害性刺激的反应的预测没有影响。这些模型临床意义在于预测活动可能有效，今后需进行大规模评估以利于此模型的完善。

（怀晓蓉 译 陈杰 校）

**INTRODUCTION:** We previously reported models that characterized the synergistic interaction between remifentanyl and sevoflurane in blunting responses to verbal and painful stimuli. This preliminary study evaluated the ability of these models to predict a return of responsiveness during emergence from anesthesia and a response to tibial pressure when patients required analgesics in the recovery room. We hypothesized that model predictions would be consistent with observed responses. We also hypothesized that under non-steady-state conditions, accounting for the lag time between sevoflurane effect-site concentration (Ce) and end-tidal (ET) concentration would improve predictions.

**METHODS:** Twenty patients received a sevoflurane, remifentanyl, and fentanyl anesthetic. Two model predictions of responsiveness were recorded at emergence: an ET-based and a Ce-based prediction. Similarly, 2 predictions of a response to noxious stimuli were recorded when patients first required analgesics in the recovery room. Model predictions were compared with observations with graphical and temporal analyses.

**RESULTS:** While patients were anesthetized, model predictions indicated a high likelihood that patients would be unresponsive ( $\geq 99\%$ ). However, after termination of the anesthetic, models exhibited a wide range of predictions at emergence ( $1\% - 97\%$ ). Although wide, the Ce-based predictions of responsiveness were better distributed over a percentage ranking of observations than the ET-based predictions. For the ET-based model, 45% of the patients awoke within 2 min of the 50% model predicted probability of unresponsiveness and 65% awoke within 4 min. For the Ce-based model, 45% of the patients awoke within 1 min of the 50% model predicted probability of unresponsiveness



and 85% awoke within 3.2 min. Predictions of a response to a painful stimulus in the recovery room were similar for the Ce- and ET-based models.

**DISCUSSION:** Results confirmed, in part, our study hypothesis; accounting for the lag time between Ce and ET sevoflurane concentrations improved model predictions of responsiveness but had no effect on predicting a response to a noxious stimulus in the recovery room. These models may be useful in predicting events of clinical interest but large-scale evaluations with numerous patients are needed to better characterize model performance.

### 健康志愿者中平痛新对于寒颤增益和最大强度的效应

#### The Effects of Nefopam on the Gain and Maximum Intensity of Shivering in Healthy Volunteers

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**背景:** 亚低温已被证实可以改善心脏骤停后神经功能的预后。平痛新, 作用于中枢, 具有非镇静性镇痛, 降低寒颤的阈值, 而无血管收缩作用, 从而可能成为合适的治疗性低温的诱导药。然而, 除了阈值, 寒颤的增益和最大强度也为一个药物的体温调节特性, 对于临床都很重要。因此, 作者拟评价应用两个不同剂量的平痛新和安慰剂时的寒颤增益和最大强度。

**方法:** 7例健康志愿者随机分成3个研究日: (1) 对照组(生理盐水), (2) 小剂量平痛新(50 ng/mL), (3) 大剂量的平痛新(100 ng/mL)。在所有研究日, 对志愿者通过中心静脉输注冷的液体, 使得平均皮肤温度维持在31°C。记录鼓膜的中心体温。寒颤的阈值, 增益和最大强度, 通过耗氧量进行评估。

**结果:** 50 ng/mL 和 100 ng/mL 平痛新均显著降低寒颤的阈值和增益: 寒颤阈值: 35.6 °C ± 0.2 °C (对照组); 35.2 °C ± 0.3 °C (小剂量); 34.9 °C ± 0.5 °C (大剂量), P 值 0.004; 寒颤增益: 597 ± 235 mL · min<sup>-1</sup> · °C<sup>-1</sup> (对照组); 438 ± 178 mL · min<sup>-1</sup> · °C<sup>-1</sup> (小剂量); 301 ± 134 mL · min<sup>-1</sup> · °C<sup>-1</sup> (大剂量), P 值 0.028。三种治疗之间寒颤的最大强度没有显著性差异。

**结论:** 平痛新显著降低寒颤增益。这一减少结合了寒颤阈值的降低, 将允许临床医师在需要低温治疗可以给患者进一步降温。

(怀晓蓉 译 陈杰 校)

**BACKGROUND:** Mild hypothermia has been shown to improve neurologic outcome after cardiac arrest. Nefopam, a centrally acting, nonsedative analgesic, decreases the threshold of shivering, but not vasoconstriction, and thus might be a suitable drug for induction of therapeutic hypothermia. However, not only the threshold but also the gain and maximum intensity of shivering define the thermoregulatory properties of a drug and thus are clinically important. Therefore, we evaluated the gain and maximum intensity of shivering at 2 different doses of nefopam and placebo.

**METHODS:** Seven healthy volunteers were randomly assigned to 3 study days: (1) control (saline), (2) small-dose nefopam (50 ng/mL), and (3) large-dose nefopam (100

ng/mL). On all study days volunteers were cooled using central venous infusion of cold IV fluid while mean skin temperature was maintained at 31°C. Core temperature was recorded at the tympanic membrane. Threshold, gain, and maximum intensity of shivering were evaluated using oxygen consumption.

**RESULTS:** Both 50 and 100 ng/mL nefopam significantly reduced the shivering threshold as well as the gain of shivering: shivering threshold: 35.6°C ± 0.2°C (control); 35.2°C ± 0.3°C (small dose); 34.9°C ± 0.5°C (large dose),  $P = 0.004$ ; gain of shivering: 597 ± 235 mL · min<sup>-1</sup> · °C<sup>-1</sup> (control); 438 ± 178 mL · min<sup>-1</sup> · °C<sup>-1</sup> (small dose); 301 ± 134 mL · min<sup>-1</sup> · °C<sup>-1</sup> (large dose),  $P = 0.028$ . Maximum intensity of shivering did not differ among the 3 treatments.

**CONCLUSIONS:** Nefopam significantly reduced the gain of shivering. This reduction, in combination with a reduced shivering threshold, will allow clinicians to cool patients even further when therapeutic hypothermia is indicated.

### Airway Scope 和 Macintosh 喉镜在躺在地上患者气管插管的比较

#### Airway Scope and Macintosh Laryngoscope for Tracheal Intubation in Patients Lying on the Ground

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**背景:** 对躺在地上患者行直接喉镜较为困难, 原因在于插管者头部远高于患者头部, 难以使插管者视轴线和患者气管轴线成一直线。Airway Scope 是一种使用时不要求口、咽、气管三轴对齐, 方便于气管插管的喉镜。作者假设 Airway Scope 较传统 Macintosh 喉镜更适用于躺在地上患者的插管。

**方法:** 入组对象为成年外科手术患者。麻醉诱导后, 使用直接喉镜插管并评价气道特征。患者随机分为 Airway Scope 插管组 (n=50) 或 Macintosh 插管组 (n=50)。插管者站在与手术床平齐的桌子上行气管插管, 以模拟躺在地上插管情景。另一非盲的观察者记录总体插管成功率、插管时间、尝试次数及插管相关气道并发症。其中插管时间是主要评估指标。

**结果:** 总体插管成功率分别为: Airway Scope 组 98%, Macintosh 组 100%。

Airway Scope 组 (平均 18 秒, 标准差 4 秒) 的插管时间较 Macintosh 组 (平均 35 秒, 标准差 16 秒) 快 17 秒。两组尝试时间相似。两组气道并发症相似, 均无低氧 (SpO<sub>2</sub> <95%) 发生。

**结论:** 对于有经验的操作者, 使用 Airway Scope 或 Macintosh 喉镜对充分肌松条件下仰卧位的躺在地上患者行气管插管均有较高的成功率。但 Airway Scope 插管时间更短。

(於章杰 译 陈杰 校)

**BACKGROUND:** Direct laryngoscopy of a patient lying on the ground is difficult because the intubator's head is far above the head of the patient, making alignment of the

intubator's visual axis with the patient's tracheal axis difficult. The Airway Scope is a laryngoscope designed to facilitate tracheal intubation without requiring alignment of the oral, pharyngeal, and tracheal axes. We thus tested the hypothesis that intubation with the Airway Scope is faster than with the Macintosh laryngoscope in subjects lying on the ground.

**METHODS:** Adult surgical patients were enrolled. After anesthesia induction, direct laryngoscopy was performed and airway characteristics noted. Patients were randomly assigned to tracheal intubation by either the Airway Scope ( $n = 50$ ) or the Macintosh laryngoscope ( $n = 50$ ). The intubator performed tracheal intubation from a table positioned at the same height as that of the operating table, thus simulating intubating on the ground. An unblinded observer recorded overall intubation success rate, time required for intubation, the number of attempts required for successful intubation, and airway complications related to intubation. Of these, the primary end point was time required for intubation.

**RESULTS:** Overall intubation success rates were 98% with the Airway Scope and 100% with the Macintosh laryngoscope. Intubation was 17 s faster with the Airway Scope (mean, 18 (SD, 4) seconds) versus the Macintosh laryngoscope (35 (16) seconds). The number of intubation attempts was similar with each device. The incidences of airway complications were similar, with no hypoxia ( $\text{SpO}_2 < 95\%$ ) occurring in either group.

**CONCLUSIONS:** Both the Airway Scope and the Macintosh laryngoscope offer high success rates in adequately prepared paralyzed patients lying supine at ground level in the hands of a skilled practitioner. However, the Airway Scope facilitated faster tracheal intubation.

### ICU 镇痛、镇静及谵妄治疗指南化可改善疼痛和亚谵妄发生率

#### Protocolized Intensive Care Unit Management of Analgesia, Sedation, and Delirium Improves Analgesia and Subsyndromal Delirium Rates

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**背景：**ICU 的镇静药、镇痛药使用，尤其当剂量达到患者意识改变时可导致谵妄和死亡。ICU 病人可监测疼痛、烦乱和谵妄。这些症状以相关治疗指南出台为分界，分为指南前（PRE）和指南后（PRE）。比较两个时期的镇痛镇静水平、昏迷谵妄发生率、停留时间、转入社区康复治疗率和死亡率。作者假设减少医源性昏迷可能降低谵妄发生率，因为两个疾病似乎是有联系的。

**方法：**入组患者为连续病例，分别为进入 ICU 指南前组(2003 年 8 月至 2004 年 2 月,610 名患者)和指南后组(2005 年 4 月至 2005 年 11 月,604 名患者)。在 2004 年 2 月至 2005 年 4 月期间，试点并进行个体化非药理学策略和基于镇静、镇痛和谵妄评分的镇痛、镇静、抗精神病药物滴定法给药的培训。测定的预后指标分别为：昏迷、谵妄、住院时间、死亡率和转入社区康复治疗率。

**结果：**指南后组得益于较好的镇痛，相比指南前组（ $90.72 \pm 207.45$  吗啡等效量/天），阿片药物使用量更少（ $22.93 \pm 40.36$  吗啡等效量/天）（ $P = <0.0001$ ）。尽管两组镇静状态类似，指南后组有更短的机械通气时间。指南后组的药物相关昏迷发生率（ $18.1\%$  vs  $7.2\%$ ， $P < 0.0001$ ）更低，ICU 和住院时间更少，出院时依赖度更低。亚谵妄显著减少；谵妄发生类似。30 天死亡危险率两组分别为： $29.4\%$ （指南前）vs  $22.9\%$ （指南后）（对数秩检验， $P = 0.009$ ）。

**结论：**经过初步综合系统管理的治疗指南培训，包括非药物处理、个体化镇静镇痛药物应用和个体化谵妄治疗，可带来更好的预后。

（於章杰 译 陈杰 校）

**BACKGROUND:** Sedatives and analgesics, in doses that alter consciousness in the intensive care unit (ICU), contribute to delirium and mortality. Pain, agitation, and delirium can be monitored in ICU patients. These symptoms were noted before (PRE) and after (POST) a protocol to alleviate undesirable symptoms. Analgesia and sedation levels, the incidence of coma, delirium, length of stay (LOS), discharge location, and mortality were then compared. We hypothesized that the likely reduction in iatrogenic coma would result in less delirium, because these 2 morbid conditions seem to be linked.

**METHODS:** All patients were consecutively admitted to an ICU PRE-protocol (August 2003 to February 2004, 610 patients) and POST-protocol (April 2005 to November 2005, 604 patients). Between February 2004 and April 2005, we piloted and taught individualized nonpharmacologic strategies and titration of analgesics, sedatives, and antipsychotics based on sedation, analgesia, and delirium scores. We measured the following outcomes: coma, delirium, LOS, mortality, and discharge location.

**RESULTS:** The POST group benefited from better analgesia, received less opiates ( $90.72 \pm 207.45$  vs  $22.93 \pm 40.36$  morphine equivalents/d,  $P = <0.0001$ ), and, despite comparable sedation, had shorter duration of mechanical ventilation. Medication-induced coma rates ( $18.1\%$  vs  $7.2\%$ ,  $P < 0.0001$ ), ICU and hospital LOS, and dependency at discharge were lower in the POST-protocol group. Subsyndromal delirium was significantly reduced; delirium was similar. The 30-day mortality risk in the PRE cohort was  $29.4\%$  vs  $22.9\%$  in the POST cohort (log-rank test,  $P = 0.009$ ).

**CONCLUSION:** Educational initiatives incorporating systematic management protocols with nonpharmacologic measures and individualized titration of sedation, analgesia, and delirium therapies are associated with better outcomes.

### 术中应用右美托咪定对接受扁桃体和腺样体切除术的小儿的术后镇痛和镇静效应

#### The Effect of Intraoperative Dexmedetomidine on Postoperative Analgesia and Sedation in Pediatric Patients Undergoing Tonsillectomy and Adenoidectomy

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**背景：**扁桃体切除术和腺样体切除术是小儿外科最常见的手术，而这些手术后即刻的处理通常非常困难。此时经常伴有剧烈的疼痛，但由于术后气道水肿以及对呼

吸抑制剂阿片类药物的敏感性增加，容易导致气道梗阻和低氧血症的发生。一种处理方法是应用非甾体类抗炎药以减少阿片类药物的使用量，但此类手术后应用非甾体类抗炎药容易引起术后出血增加。右美托咪定有轻微的镇痛作用，发挥镇静作用时不会引起呼吸抑制，而且对凝血功能没有影响。作者设计了一项前瞻性、双盲、随机对照研究以证实术中应用右美托咪定对接受扁桃体切除术和腺样体切除术的小儿的术后恢复的作用，包括术后镇痛、镇静和血流动力学。

**方法：**109 位患儿随机分为 4 组，分别在气管内插管后 10min 后给予右美托咪定 0.75ug/kg、右美托咪定 1ug/kg、吗啡 50ug/kg 或者吗啡 100ug/kg。

**结果：**4 组患者在人口统计学、ASA 分级、术后阿片类药物需要量、镇静评分、麻醉后复苏室内供氧时间以及入室至转出 PACU 时间方面没有明显的统计学差异。术后首次需要镇痛的平均时间在右美托咪定（1ug/kg）组和吗啡（100ug/kg）组的患儿没有明显的差异，但是与右美托咪定 0.75ug/kg 组和吗啡 50ug/kg 组患儿相比，前者明显长于后者（ $P<0.01$ ）。此外，右美托咪定 0.75ug/kg 组患儿其术后需要大于 1 次追加镇痛剂量的患者的数量明显多于右美托咪定 1ug/kg 组和吗啡 100ug/kg 组的患儿，但与吗啡 50ug/kg 组患儿没有明显差异。与应用吗啡的患儿相比，应用右美托咪定的患儿其术后首个 30min 内心率明显低于应用吗啡的患儿（ $P<0.05$ ）。各组间患儿的镇静评分没有明显的差异。

**结论：**在接受扁桃体切除术的患儿中，无论术中应用右美托咪定还是吗啡，其术后镇痛阿片类药物的总需要量相似。然而，右美托咪定 1ug/kg 组和吗啡 100ug/kg 组在术后镇痛方面更有优势，表现在患儿术后首次需要镇痛的时间明显较长，并且术后需要追加镇痛药物的剂量更少，且并不增加在 PACU 内停留的时间。

（周姝婧 译 陈杰 校）

**BACKGROUND:** The immediate postoperative period after tonsillectomy and adenoidectomy, one of the most common pediatric surgical procedures, is often difficult. These children frequently have severe pain but postoperative airway edema along with increased sensitivity to the respiratory-depressant effects of opioids may result in obstructive symptoms and hypoxemia. Opioid consumption may be reduced by nonsteroidal antiinflammatory drugs, but these drugs may be associated with increased bleeding after this operation. Dexmedetomidine has mild analgesic properties, causes sedation without respiratory depression, and does not have an effect on coagulation. We designed a prospective, double-blind, randomized controlled study to determine the effects of intraoperative dexmedetomidine on postoperative recovery including pain, sedation, and hemodynamics in pediatric patients undergoing tonsillectomy and adenoidectomy.

**METHODS:** One hundred nine patients were randomized to receive a single intraoperative dose of dexmedetomidine 0.75  $\mu\text{g}/\text{kg}$ , dexmedetomidine 1  $\mu\text{g}/\text{kg}$ , morphine 50  $\mu\text{g}/\text{kg}$ , or morphine 100  $\mu\text{g}/\text{kg}$  over 10 minutes after endotracheal intubation.

**RESULTS:** There were no significant differences among the 4 groups in patient demographics, ASA physical status, postoperative opioid requirements, sedation scores, duration of oxygen supplementation in the postanesthetic care unit, and time to discharge readiness. The median time to first postoperative rescue analgesic was similar in patients receiving dexmedetomidine 1  $\mu\text{g}/\text{kg}$  and morphine 100  $\mu\text{g}/\text{kg}$ , but significantly longer compared with patients receiving dexmedetomidine 0.75  $\mu\text{g}/\text{kg}$  or morphine 50  $\mu\text{g}/\text{kg}$  ( $P < 0.01$ ). In addition, the number of patients requiring  $>1$  rescue analgesic dose was

significantly higher in the dexmedetomidine 0.75 µg/kg group compared with the dexmedetomidine 1 µg/kg and morphine 100 µg/kg groups, but not the morphine 50 µg/kg group. Patients receiving dexmedetomidine had significantly slower heart rates in the first 30 minutes after surgery compared with those receiving morphine ( $P < 0.05$ ).

There was no significant difference in sedation scores among the groups.

**CONCLUSIONS:** The total postoperative rescue opioid requirements were similar in tonsillectomy patients receiving intraoperative dexmedetomidine or morphine. However, the use of dexmedetomidine 1 µg/kg and morphine 100 µg/kg had the advantages of an increased time to first analgesic and a reduced need for additional rescue analgesia doses, without increasing discharge times.

### 在沙滩椅位或侧卧位实施的肩关节镜检查术中通过近红外光谱法评估脑氧去饱和事件

#### Cerebral Oxygen Desaturation Events Assessed by Near-Infrared Spectroscopy During Shoulder Arthroscopy in the Beach Chair and Lateral Decubitus Positions

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**背景:** 在沙滩椅位 (BCP) 接受肩部手术的患者可因脑缺血而有发生神经系统并发症的危险。因此, 作者试图寻求在 BCP 或侧卧位 (LCP) 接受肩关节镜检查的患者中发生脑低去饱和事件 (CDEs) 的发生率。

**方法:** 124 位在 BCP (61 位) 或 LDP (63 位) 位接受择期肩关节镜检查的患者中收集实验数据。所有患者均接受标准化麻醉。用近红外光谱法定量区域脑组织氧饱和度 (SctO<sub>2</sub>)。在患者改变体位前, 测得患者的基础心率、平均动脉压、动脉氧饱和度和 SctO<sub>2</sub>, 然后在术中每隔 3min 间断监测。当 SctO<sub>2</sub> 低于临界阈值 (较基础值下降 20% 或者绝对值 ≤ 55% 长于 15s) 定义为 CDE, 此时, 以术前制定的方案给予治疗。记录术中发生 CDE 的次数, 以及应对低 SctO<sub>2</sub> 的干预类型。同时评估术中 CDEs 和术后恢复不良的相关性。

**结果:** LDP 组患者更多地实施了肌间沟阻滞, 除此之外, BCP 组和 LCP 组患者的麻醉方式相似。两组患者术中血流动力学变量没有明显的差异。术中 BCP 组患者的 SctO<sub>2</sub> 更低 ( $P < 0.0001$ )。BCP 组患者 CDEs 的发生率更高 (BCP 组 80.3%, LDP 组 0%), 每位患者发生 CDEs 的次数也更多 (BCP 组均次: 4, 间距: 0-38 次, LDP 组均次 0, 间距: 0-0 次; 均  $P < 0.0001$ )。在所有未接受肌间沟阻滞的患者中, 术中发生 CDEs 的患者其恶心和呕吐的发生率 (50.0% 和 27.3%) 明显高于术中未发生 CDEs 的患者 (6.7% 和 3.3%) ( $P = 0.0001$  和  $P = 0.011$ )。

**结论:** 相比于 LDP 位, BCP 位实施肩部手术会显著增加脑氧饱和度降低的发生率。

(周姝婧 译 陈杰 校)

**BACKGROUND:** Patients undergoing shoulder surgery in the beach chair position (BCP) may be at risk for adverse neurologic events due to cerebral ischemia. In this investigation, we sought to determine the incidence of cerebral desaturation events (CDEs) during shoulder arthroscopy in the BCP or lateral decubitus position (LDP). **METHODS:** Data were collected on 124 patients undergoing elective shoulder arthroscopy in the BCP (61 subjects) or LDP (63 subjects). Anesthetic management was standardized in all patients. Regional cerebral tissue oxygen saturation (SctO<sub>2</sub>) was quantified using near-infrared spectroscopy. Baseline heart rate, mean arterial blood pressure, arterial oxygen saturation, and SctO<sub>2</sub> were measured before patient positioning and then every 3 minutes for the duration of the surgical procedure. SctO<sub>2</sub> values below a critical threshold ( $\geq 20\%$  decrease from baseline or absolute value  $\leq 55\%$  for  $>15$  seconds) were defined as a CDE and treated using a predetermined protocol. The number of CDEs and types of intervention used to treat low SctO<sub>2</sub> values were recorded. The association between intraoperative CDEs and impaired postoperative recovery was also assessed. **RESULTS:** Anesthetic management was similar in the BCP and LDP groups, with the exception of more interscalene blocks in the LDP group. Intraoperative hemodynamic variables did not differ between groups. SctO<sub>2</sub> values were lower in the BCP group throughout the intraoperative period ( $P < 0.0001$ ). The incidence of CDEs was higher in the BCP group (80.3% vs 0% LDP group), as was the median number of CDEs per subject (4, range 0–38 vs 0, range 0–0 LDP group, all  $P < 0.0001$ ). Among all study patients without interscalene blocks, a higher incidence of nausea (50.0% vs 6.7%,  $P = 0.0001$ ) and vomiting (27.3% vs 3.3%,  $P = 0.011$ ) was observed in subjects with intraoperative CDEs compared with subjects without CDEs. **CONCLUSIONS:** Shoulder surgery in the BCP is associated with significant reductions in cerebral oxygenation compared with values obtained in the LDP.

一项前瞻性随机双盲实验：依他昔布和曲马多用于择期踝趾外翻术后镇痛的比较

### **Pain Management After Elective Hallux Valgus Surgery: A Prospective Randomized Double-Blind Study Comparing Etoricoxib and Tramadol**

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Anesth Analg August 2010 111:544-549;

**背景：**日间手术后疼痛是常见的不适症状，选择性 COX-2 抑制剂的使用仍然存在争议。在此次前瞻性随机双盲研究中，作者比较了依他昔布和曲马多缓释剂在择期踝外翻手术术后镇痛效果。

**方法：**100 例 ASAII-II 级女性患者随机分为 2 组，每组 50 例，口服依他昔布前 4 天每天一次，每次 120mg，第 5 至第 7 天每天一次，每次 90mg，或者口服曲马多缓释片每天 2 次，每次 100mg，一共 7 天。术后第一个 7 天里，对患者的疼痛、疼痛缓解、镇痛满意度、以及解救药物使用进行评估。术后 12 周通过计算机断层扫描评估骨的愈合情况。术后 16 周评估临床预后（愈合情况，活动度，病人满意度评估）。

**结果：**2名患者在出院前退出，98例患者，81例 ASA I级，17例 ASA II级（82例不吸烟，14例吸烟），平均年龄49（19-65）岁，平均体重64（47-83）kg，平均身高167（154-183）cm。总体镇痛效果良好，但依他昔布组的患者平均视觉模拟评分（VAS）在整个7天的研究期间显著低于另一组（ $12.5 \pm 8.3$  vs.  $17.3 \pm 11$ ,  $P < 0.05$ ）。且依他昔布组患者的疼痛缓解程度（ $92 \pm 12$  vs.  $85 \pm 15$ ,  $P < 0.05$ ），对止痛药的满意度（47/49 vs. 39/49,  $P < 0.05$ ）均更高。曲马多组患者报告的副作用明显较多，在所有曲马多组的患者中，有6例因副作用而结束实验（ $P < 0.05$ ）。术后14天，依他昔布组有1例，曲马多组有5例患者出现伤口区域小面积刺激症状。在术后12周通过计算机断层扫描发现82例患者骨愈合良好，其中依他昔布组43例，曲马多组39例。研究中发现有11例患者正在愈合中，其中依他昔布组4例，曲马多组7例。术后16周患者对健康生活质量的评估显示患者的整体满意度较高。每组中各有47例患者评价为满意。对生活质量的VAS评分平均值，依他昔布组6.2，曲马多组2.6。术后16周的临床随访显示了较好的功能，也没有任何病人有愈合不良的迹象或症状。

**结论：**作为择期踝外翻手术后多模式镇痛的组成部分，依他昔布与曲马多缓释片相比，具有更有效，副作用更少的优点。目前还没有与使用依他昔布相关的伤口或骨愈合不良的征象。

（黄丹 译 陈杰 校）

**BACKGROUND:** Pain is a common complaint after day surgery, and there is still a controversy surrounding the use of selective cyclooxygenase-2 (COX-2) inhibitors. In the present prospective, randomized, double-blind study we compared pain management with a selective (COX-2) inhibitor (etoricoxib) with pain management using sustained-release tramadol after elective hallux valgus surgery.

**METHODS:** One hundred ASA 1 to 2 female patients were randomized into 2 groups of 50 patients each; oral etoricoxib 120 mg  $\times$  1  $\times$  IV + 90 mg  $\times$  1  $\times$  day V–VII and oral tramadol sustained-release 100 mg  $\times$  2  $\times$  VII. Pain, pain relief, satisfaction with pain management, and need for rescue medication were evaluated during the first 7 postoperative days. A computed tomography scan evaluating bone healing was performed 12 weeks after surgery. A clinical evaluation of outcome (healing, mobility, and patient-assessed satisfaction) was performed 16 weeks after surgery.

**RESULTS:** Two patients withdrew before discharge from the hospital. Ninety-eight patients, 81 ASA 1 and 17 ASA 2 (82 nonsmokers and 14 smokers), mean age 49 years (19–65), weight 64 (47–83) kg, and height 167 (154–183) cm were evaluated. Overall pain was well managed, but the mean visual analog scale (VAS) was significantly lower among etoricoxib patients evaluated during the entire 7-day period studied ( $12.5 \pm 8.3$  vs.  $17.3 \pm 11$ ,  $P < 0.05$ ). patient's grading of pain relief ( $92 \pm 12$  vs.  $85 \pm 15$ ,  $P < 0.05$ ) and satisfaction with pain medication (47/49 vs. 39/49,  $P < 0.05$ ) was higher among etoricoxib patients. Patients receiving tramadol reported significantly more side effects. Six patients, all in the tramadol group, discontinued the study because of side effects ( $P < 0.05$ ). At 14-day follow-up 1 patient in the etoricoxib group and 5 patients in the tramadol group exhibited minor irritation in the wound area. The 12-week computed tomography scan showed good healing in 82 patients, 43 in the etoricoxib group, and 39 in the tramadol group. The study found ongoing healing in 11 patients, 4 in the etoricoxib group and 7 in the tramadol group. The 16-week patient-assessed Health Profile Quality



of life revealed high patient satisfaction overall; 47 patients in each study group rated the outcome as satisfactory and the mean change in the patient-assessed quality of life VAS score was 6.2 and 2.6 for the etoricoxib and tramadol groups, respectively. Clinical follow-up at 16 weeks showed high functionality and no signs or symptoms of improper healing in any patient.

**CONCLUSION:** Etoricoxib was found to be more effective and associated with fewer side effects in comparison with tramadol sustained release as a component of multimodal analgesia after elective hallux valgus surgery. There were no signs of impaired wound or bone healing associated with the use of etoricoxib.

### 超声评价神经刺激仪引导下肘部正中神经阻滞：局麻药的扩散、神经大小以及临床疗效的研究

#### An Ultrasonographic Assessment of Nerve Stimulation-Guided Median Nerve Block at the Elbow: A Local Anesthetic Spread, Nerve Size, and Clinical Efficacy Study

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**背景：**神经刺激是周围神经阻滞的一种有效方法。然而，这种盲法下局麻药（LA）的扩散仍未知，由此可解释一些的临床效应。

**方法：**100 例患者在神经刺激仪引导下进行了肘部正中神经阻滞。以最小刺激电流  $\leq 0.5$  mA (2 Hz, 0.1ms) 来确定针尖放置位置，后注入 1.5% 利多卡因+1：200000 的肾上腺素 6ml。用一个线性 5-13MHz 的探头（12L-RS）来测定正中神经的横断面，具体为：注射前后连续测量 3 次的横截面积，并且观察静态和纵向的局麻药向神经周围扩散情况。神经内注射的定义是采用迭代方法测定出神经区域离群值的增加。将 3 个神经区域的运动阻滞和感觉测试（冷和轻触）结果和影像学结果进行对比。在阻滞后的 3 天和 1 个月进行临床神经检测。

**结果：**43 例患者出现神经肿胀，横截面积增加  $\geq 75\%$ 。37 例患者同时具有神经肿胀和局麻药的环形扩散，其感觉阻滞成功率为 86%。没有观察到任何上述现象的 32 例病人中，感觉阻滞成功率为 34%。25 例病人无神经肿胀而有局麻药环形扩散，在 30min 的观察期内其感觉阻滞成功率为 76%。且没有出现严重的神经系统并发症。

**结论：**神经刺激仪不能防止神经内注射，在未有神经内注射的情况下，若借助影像学观察到局麻药环形扩散现象，预示在 30min 观察期内感觉阻滞的成功率将近 75%。

（黄丹译 陈杰 校）

**BACKGROUND:** Nerve stimulation is an effective technique for peripheral nerve blockade. However, the local anesthetic (LA) distribution pattern obtained with this blind approach is unknown and may explain its clinical effects.

**METHODS:** One hundred patients received a median nerve block at the elbow using a nerve stimulator approach. After correct needle placement defined by a minimal stimulating current  $\leq 0.5$  mA (2 Hz, 0.1 millisecond), 6 mL lidocaine 1.5% with epinephrine 1:200,000 was injected. A linear 5- to 13-MHz probe (12L-RS) was used to assess a cross-section area of median nerve, which was calculated by 3 consecutive measurements before and after injection, and LA circumferential spread around the nerve during static and longitudinal examination. Intra-neural injection defined as an increase in nerve area was detected using an iterative method for outlier detection. Results of sensory tests (cold and light touch) on 3 nerve territories and of motor blockade were compared with the imaging aspects. We performed clinical neurological examination at 3 days and 1 month after block.

**RESULTS:** Nerve swelling, considered significant when an increase in cross-sectional area was  $\geq 75\%$ , was observed in 43 patients. Nerve swelling associated with a circumferential LA spread image, present in 37 patients, was associated with a sensory success rate of 86%. The success rate was 34% for 32 patients in whom none of these signs was visualized. A circumferential spread around a nonswollen nerve, present in 25 patients, was followed by a sensory success rate of 76% within the 30-minute evaluation period. No major early neurological complications were observed.

**CONCLUSIONS:** Nerve stimulation does not prevent intra-neural injection. In the absence of intra-neural injection, the presence of circumferential LA spread image seemed predictive of successful sensory block in almost 75% of the cases within the 30-minute evaluation period.

### 胸外科医师协会和心血管麻醉医师协会心脏手术临床操作指南中围术期输血和血液保存对临床操作的的影响

#### Effect of the Perioperative Blood Transfusion and Blood Conservation in Cardiac Surgery Clinical Practice Guidelines of the Society of Thoracic Surgeons and the Society of Cardiovascular Anesthesiologists upon Clinical Practices

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**背景：**2007 胸外科医师协会和心血管麻醉医师协会关于心脏手术围术期输血和血液保存的临床操作指南最近被发布，并受到很多关注。利用心脏外科麻醉医师和灌注师的临床实践调查，我们旨在评估指南中所推荐的当前的灌注、麻醉和手术操作，同时确定指南对改变此类操作所起的作用。

**方法：**我们调查了心血管麻醉医师协会、美国心血管灌注学会、加拿大临床灌注协会和美国体外技术协会的非实习期成员，使用可检验临床操作和对指南回馈的标准化的调查工具。

**结果：**共收回来自 1061 个机构（主要是美国的 677 个机构和加拿大的 34 个机构）的 1402 个调查，应答率为 32%。指南广泛流传于麻醉医师和灌注师，78%的麻醉医师和 67%的灌注师报告已经阅读了指南的全部、部分或摘要。然而，仅 20%的应答者报告针对指南进行过机构内讨论，14%的应答者报告已经组成了机构监控小组。应答者报告的现行的术前检测、灌注、手术和药理学实践操作的差异性相当大。26%的应答者报告根据指南改变了一个或多个实践。据报告所做的这些变化对减少整体输血率存在高度（9%）或一点（31%）的效果。大于 5%的应答者报告，38 条指南推荐中只有 4 条已经根据指南被修改。

**结论：**本研究报道了心脏手术临床实践的广泛差异。胸外科医师协会/心血管麻醉医师协会指南对于临床实践的改变仅发挥出了很小的作用。

（唐李隽 译 马皓琳 李士通 校）

**BACKGROUND:** The 2007 Society of Thoracic Surgeons and the Society of Cardiovascular Anesthesiologists Clinical Practice Guideline for Perioperative Blood Transfusion and Blood Conservation in Cardiac Surgery was recently promulgated and has received much attention. Using a survey of cardiac anesthesiologists and perfusionists' clinical practice, we aimed to assess the current practices of perfusion, anesthesia, and surgery, as recommended by the Guidelines, and to also determine the role the Guidelines had in changing these practices.

**METHODS:** Nontrainee members of the Society of Cardiovascular Anesthesiologists, the American Academy of Cardiovascular Perfusion, the Canadian Society of Clinical Perfusion, and the American Society of ExtraCorporeal Technology were surveyed using a standardized survey instrument that examined clinical practices and responses to the Guidelines.

**RESULTS:** A total of 1402 surveys from 1061 institutions principally in the United States (677 institutions) and Canada (34 institutions) were returned, a 32% response rate. There was wide distribution of the Guidelines with 78% of anesthesiologists and 67% of perfusionists reporting having read all, part, or a summary of the Guidelines. However, only 20% of respondents reported that an institutional discussion had taken place as a result of the Guidelines, and only 14% of respondents reported that an institutional monitoring group had been formed. There was wide variability in current preoperative testing, perfusion, surgical, and pharmacological practices reported by respondents. Twenty-six percent of respondents reported 1 or more practice changes in response to the Guidelines. The changes made were reported to be highly (9%) or somewhat (31%)

effective in reducing overall transfusion rates. Only 4 of 38 Guideline recommendations were reported by >5% of respondents to have been changed in response to the Guidelines. **CONCLUSIONS:** Wide variation in clinical practices of cardiac surgery was reported. Little change in clinical practices was attributed to the Society of Thoracic Surgeons/Society of Cardiovascular Anesthesiologists Guidelines.

## 评估 TEG®和 RoTEM®两种方法在心脏手术患者的凝血弹性描记参数的临床互换性

### An Assessment of Clinical Interchangeability of TEG® and RoTEM® Thromboelastographic Variables in Cardiac Surgical Patients

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**背景：**床旁凝血弹性描记图的使用越来越多，但是 2 种主要系统 TEG®（血分光镜）和 RoTEM®（五角棱镜）的临床互换性评估还没有进行过。

**方法：**我们用白陶土 TEG® (kaoTEG)、天然性 TEG® (natTEG®)、内源性 RoTEM® (inTEM)和外源性 RoTEM (exTEM)方法检测了 46 名麻醉诱导后的心脏手术患者的血液样本。每个检测包括反应时间(R)、凝血时间(K)、最大振幅(MA)和角度(α)。使用 Bland-Altman 点图和混合模型分析。为了评估重复性，我们在 2 名志愿者中进行了 7 次重复性的快速连续检测。

**结果：**166 个检测可用来进行分析。kaoTEG®的反应时间 ( $345 \pm 102s$ , 平均数 ± 标准差)比 inTEM 的 ( $179 \pm 74s$ ,  $P < 0.001$ ) 和 exTEM 的 ( $55 \pm 28s$ ,  $P < 0.001$ )长。

kaoTEG®的凝血时间 ( $78 \pm 18s$ )和 inTEM 的 ( $75 \pm 52 s$ ,  $P = 0.60$ )没有明显差异，但是比 exTEM 的凝血时间 ( $61 \pm 24s$ ,  $P < 0.003$ )要长。kaoTEG®的最大振幅 ( $71 \pm 6.5 mm$ )大于 inTEM 的最大振幅 ( $67 \pm 5.2 mm$ ,  $P < 0.02$ )，而和 exTEM 的 ( $69 \pm 6.3 mm$ )相近。kaoTEG®的角度( $72^\circ \pm 4.1^\circ$ )和 inTEM ( $76^\circ \pm 7^\circ$ )、exTEM ( $79^\circ \pm 4.5^\circ$ )没有显著性差异。最大振幅和角度的变异度<10%。两个装置中反应时间和凝血时间的重复性很差，但是最大振幅和角度的重复性足够满足临床目的。

**结论：**TEG®和 RoTEM®检测方法在最大振幅和角度上相关性较好，而反应时间和凝血时间的相关性较差。kaoTEG®和 exTEM 两种检测方法有最好的一致性。因此 TEG®和 RoTEM®的测定结果不能够完全互换，在临床判断凝血弹性描记图数据的时候应该谨慎一些。

(唐亮 译 马皓琳 李士通 校)

**BACKGROUND:** Bedside thromboelastography is increasingly used, but an assessment of the clinical interchangeability of the 2 major systems, TEG® (Hemoscope) and RoTEM® (Pentapharm), has not been performed.

**METHODS:** We measured blood samples from 46 cardiac surgical patients after induction of anesthesia with kaolin TEG® (kaoTEG), native TEG® (natTEG®), intrinsic RoTEM® (inTEM), and extrinsic RoTEM (exTEM). Each measurement consisted of reaction time (R), coagulation time (K), maximum amplitude (MA), and angle ( $\alpha$ ). Bland–Altman plots and mixed-model analysis were used. To assess repeatability, we made 7 replicated measurements in rapid succession in 2 volunteers.

**RESULTS:** One hundred sixty-six measurements were available for analysis. The R time of the kaoTEG® ( $345 \pm 102$  seconds, mean  $\pm$  sd) was longer than that of the inTEM ( $179 \pm 74$  seconds,  $P < 0.001$ ) and the exTEM ( $55 \pm 28$  seconds,  $P < 0.001$ ). The K time of the kaoTEG® ( $78 \pm 18$ s) was not different from that of the inTEM ( $75 \pm 52$  seconds,  $P = 0.60$ ) but was longer than the K time of the exTEM ( $61 \pm 24$  seconds,  $P < 0.003$ ). The MA of the kaoTEG® ( $71 \pm 6.5$  mm) was larger than the MA of the inTEM ( $67 \pm 5.2$  mm,  $P < 0.02$ ) and almost similar to that of the exTEM ( $69 \pm 6.3$  mm). The  $\alpha$  of the kaoTEG® ( $72^\circ \pm 4.1^\circ$ ) was not significantly different from that of both the inTEM ( $76^\circ \pm 7^\circ$ ) and the exTEM ( $79^\circ \pm 4.5^\circ$ ). The variability for MA and  $\alpha$  was  $<10\%$ . The repeatability of the R and K times was poor in both devices, whereas the repeatability of the MA and  $\alpha$  was sufficient for clinical purposes.

**CONCLUSIONS:** The TEG® and RoTEM® measurements demonstrated a close correlation for the MA, but the  $\alpha$  did not for the R and K variables. The kaoTEG® had the best agreement with the exTEM measurement. Therefore TEG® and RoTEM® measurements are not completely interchangeable, and the clinical interpretation of thromboelastographic data should be used with caution.

以房室和生理学为基础的异丙酚再循环药代动力学模型的表现：用推注、持续和靶控输注的数据比较

### The Performance of Compartmental and Physiologically Based Recirculatory Pharmacokinetic Models for Propofol: A Comparison Using Bolus, Continuous, and Target-Controlled Infusion Data

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**背景：**随着由药代动力学（PK）所得出的药物转运和/或药物咨询演示的越来越广泛应用，确认各种不同的剂量条件下能最好地描述异丙酚血浆浓度（Cp）的PK模型将会非常有用。我们应用来源于用不同输注方案的研究的浓度-时间数据，验证了3个房室模型以及1个以生理为基础的异丙酚再循环的PK模型预测异丙酚Cp的时间过程的精确度。

**方法：**异丙酚的三个房室PK模型（称为Marsh、Schnider、Schüttler模型）以及一个以生理学为基础的再循环模型（称为Upton模型），用来模拟异丙酚Cp的时间过程。为了验证这些模型的精确性，我们应用已经发表的测定的血浆浓度数据，这些数据来源于人为输注（推注和短时间的输注）以及电脑控制（靶控输注[TCI]或长时间的输注）异丙酚给药模式。异丙酚Cp的测定值与预测值得比值（M/P）组成了数据集。每一种模型的偏倚和不精确性分别用中位数预测错误（MDPE）和中位数绝对预测错误（MDAPE）评价。

**结果：**4个PK模型中，推注和短时间输注过程中的3个房室模型的M/P异丙酚Cp均表现出偏倚。在长时间输注的过程中，高浓度时Marsh和Schüttler模型的M/P异丙酚Cp较其它两个模型差。TCI过程中所有模型的M/P异丙酚Cp的偏倚较小。在推注组，推注1min后，所有3个房室模型的值在全部的5min内均被过高地估计了。然而，Schnider模型中，4分钟后，这些最初的错误解决了。在第1min内，Upton模型并不能准确地预测异丙酚Cp（较大的高估）。在推注和短时间注射的过程中，与其他3种模型相比，Marsh模型显示出较差的MDPE和MDAPE。在短时间输注的过程中，Schnider和Schüttler模型的MDAPE比Upton和Marsh模型更好。所有的模型在TCI过程中均能表现出相似的MDPE和MDAPE。在长时间输注过程中，Marsh和Schüttler模型均低估了较高的血浆浓度。

**结论：**当与不同的输注模式时的表现相联系时，Schnider模式，虽然仍不完美，仍是被推荐用于TCI和药物咨询演示的模式。

（黄丽娜 译 马皓琳 李士通 校）

**BACKGROUND:** With the growing use of pharmacokinetic (PK)-driven drug delivery and/or drug advisory displays, identifying the PK model that best characterizes propofol plasma concentration (Cp) across a variety of dosing conditions would be useful. We tested the accuracy of 3 compartmental models and 1 physiologically based recirculatory PK model for propofol to predict the time course of propofol Cp using concentration-time data originated from studies that used different infusion schemes.

**METHODS:** Three compartmental PK models for propofol, called the “Marsh,” the “Schnider,” and the “Schüttler” models, and 1 physiologically based recirculatory model called the “Upton” model, were used to simulate the time course of propofol Cp. To test the accuracy of the models, we used published measured plasma concentration data that originated from studies of manual (bolus and short infusion) and computer-controlled (target-controlled infusion [TCI] and long infusion) propofol dosing schemes. Measured/predicted (M/P) propofol Cp plots were constructed for each dataset. Bias and inaccuracy of each model were assessed by median prediction error (MDPE) and median absolute prediction error (MDAPE), respectively.

**RESULTS:** The M/P propofol Cp in the 4 PK models revealed bias in all 3 compartmental models during the bolus and short infusion regimens. In the long infusion, a worse M/P propofol Cp at higher concentration was seen for the Marsh and the

Schüttler models than for the 2 other models. Less biased M/P propofol Cp was found for all models during TCI. In the bolus group, after 1 min, a clear overprediction was seen for all 3 compartmental models for the entire 5 min; however, this initial error resolved after 4 min in the Schnider model. The Upton model did not predict propofol Cp accurately (major overprediction) during the first minute. During the bolus and short infusion, the Marsh model demonstrated worse MDPE and MDAPE compared with the 3 other models. During short infusion, MDAPE for the Schnider and Schüttler models was better than the Upton and the Marsh models. All models showed similar MDPE and MDAPE during TCI simulations. During long infusion, the Marsh and the Schüttler models underestimated the higher plasma concentrations.

**CONCLUSION:** When combining the performance during various infusion regimens, it seems that the Schnider model, although still not perfect, is the recommended model to be used for TCI and advisory displays.

### 在大鼠穹窿周围微量注入丙泊酚导致镇静并伴有大脑皮质乙酰胆碱释放减少

#### **Microinjection of Propofol into the Perifornical Area Induces Sedation with Decreasing Cortical Acetylcholine Release in Rats**

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**背景:** 在中枢神经系统的许多神经递质中, 已有研究表明胆碱能系统有助于丙泊酚的镇静/麻醉作用, 因为已证明胆碱酯酶抑制剂能逆转丙泊酚引起的人类无意识水平。已有研究报道, 腹腔内注射丙泊酚能引起镇静/麻醉作用, 并且减少大鼠大脑皮质乙酰胆碱 (ACh) 的释放。然而, 丙泊酚在胆碱能通路中的作用靶点和相关通路仍然不清楚。我们研究了采用微量注入法将丙泊酚注入胆碱能通路的核心和相关通路是否能导致镇静并减少大脑皮层 ACh 的释放。

**方法:** 37 只雄性 Wistar 鼠, 体重 270-320g。在实验开始前 5 天, 有 23 只大鼠采用戊巴比妥 (50 mg/kg) 麻醉, 每只大鼠都连接有脑电图 (EEG)、大脑皮层微透析管、一根腹膜内导管或一根微量注射导管连接到基底前脑 (BF)、穹窿周围区 (Pef) 或纹状体。对能自由活动的大鼠的大脑采用微量透析技术研究发现, 在躯体感觉皮层有乙酰胆碱的流出。一旦乙酰胆碱基础水平稳定, 每 20 分钟收集一次样本, 并采用高性能液体色谱法测定。在腹腔组, 丙泊酚逐渐增量 (10、30 和 100 mg/kg) 注入腹腔。在显微注射组, 丙泊酚 (40 ng / 0.2  $\mu$ L) 注入基底前脑、穹窿周围或纹状体 (控制组), 并监测 2 小时内大脑皮层 ACh 流出和 EEG 的变化。另外 14 只大鼠, 在经腹腔内、穹窿周围或纹状体注入丙泊酚后行镇静/麻醉评分。微量透析探针和显微注射管的头端位置均通过组织学检查来验证。

**结果:** 腹腔内注射丙泊酚剂量依赖性地减少 ACh 的流出, 并导致了轻度镇静到中度麻醉的状态。在丙泊酚 100 mg/kg 时可以观察到翻正反射的消失和相对  $\alpha$ -波的明显增多。微量注射丙泊酚至前脑组在实验开始 40-60 分钟时, 大脑皮层的 ACh 流出

量显著降低至 $-40.2\% \pm 19.9\%$ 。然而，2小时内BF组和对照组Ach流出总量没有区别。相反，在Pef显微注射丙泊酚到Pef组，在实验开始0-20分钟内Ach的流出立即减少，在100-120分钟时最大降到 $-59.3 \pm 20.4\%$ 。在Pef微量注入组Ach总流出量要比对照组明显减少。相同剂量的丙泊酚注入穹窿周围仅引起轻到中度的镇静。在BF或Pef和对照组之间相对EEG波段没有明显变化。

**结论：**穹窿周围核心至少部分与丙泊酚引起大鼠镇静有关。

(杨秀娟 译 马皓琳 李士通 校)

**BACKGROUND:** Among many neurotransmitter systems in the central nervous system, the cholinergic system has been shown to contribute to propofol's sedative/anesthetic effects, because it has been shown that cholinesterase inhibitor reverses the level of propofol-induced unconsciousness in humans. It has been reported that intraperitoneal injection of propofol induced sedative/anesthetic actions and decreased the release of acetylcholine (Ach) from the rat cortex. However, the sites of action of propofol in the cholinergic pathway and its related pathways remain unresolved. We studied whether microinjection of propofol into the nuclei in the cholinergic pathway and its related pathways may induce sedation and decrease Ach from the cortex.

**METHODS:** Thirty-seven male Wistar rats weighing 270 to 320 g were used. Almost 5 days before the experiments, 23 rats anesthetized with pentobarbital (50 mg/kg) were outfitted with an electroencephalogram (EEG) socket, a microdialysis cannula in the cortex, and an intraperitoneal tube or a microinjection tube into the basal forebrain (BF), the perifornical area (Pef), or the striatum. The Ach effluxes in the somatosensory cortex were detected using in vivo intracerebral microdialysis in freely moving rats. Once basal levels of Ach were stabilized, samples were collected every 20 minutes and measured by high-performance liquid chromatography. In the intraperitoneal group, propofol was cumulatively administered (10, 30, and 100 mg/kg) into the peritoneal cavity. In the microinjection groups, propofol (40 ng in 0.2  $\mu$ L) was administered into the BF, the Pef, or the striatum (control), and the cortical changes in Ach efflux and EEG were observed for 2 hours. In another 14 rats, the sedative/anesthetic score was obtained after intraperitoneal, Pef, or striatal injection of propofol. The placement of the tip of the microdialysis probe and the microinjection tube was confirmed by histological examination.

**RESULTS:** Intraperitoneal injection of propofol dose-dependently decreased the Ach efflux and induced light sedative to moderate anesthetic states. Loss of righting reflex was observed with significant increases in the relative  $\alpha$ -power band at 100 mg/kg propofol. Microinjection of propofol into the BF significantly decreased the cortical Ach efflux to  $-40.2\% \pm 19.9\%$  at 40 to 60 minutes. However, there was no difference in the total Ach efflux for 2 hours between BF and control groups. In contrast, microinjection of propofol into the Pef immediately decreased the Ach efflux at 0 to 20 min and maximally to  $-59.3 \pm 20.4$  at 100 to 120 minutes. The total Ach efflux in the Pef microinjection group was significantly less than that in the control group. The same dose of propofol injected into the Pef induced light to deep sedation. There was no significant change in the relative EEG power band between BF or Pef and control groups.

**CONCLUSION:** The nuclei in the Pef are, at least in part, responsible for the sedative action of propofol in rats.



## 经皮二氧化碳监测可以在长时间腹腔镜手术中准确预测动脉血二氧化碳分压

### Transcutaneous Carbon Dioxide Monitoring Accurately Predicts Arterial Carbon Dioxide Partial Pressure in Patients Undergoing Prolonged Laparoscopic Surgery

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**背景：**在腹腔镜手术中呼气末二氧化碳(Petco<sub>2</sub>)和动脉血二氧化碳分压(Paco<sub>2</sub>)之间可能存在着明显的差异。经皮二氧化碳监测(Ptcco<sub>2</sub>)可以持续无创地预测 Paco<sub>2</sub>。在此研究中我们评估了在长时间气腹的腹腔镜手术中用 Ptcco<sub>2</sub> 预测 Paco<sub>2</sub> 的准确性。**方法：**选择 16 例全麻下行腹腔镜胃癌或直肠癌根治术的患者。在气腹前后三个时间点测量他们的 Paco<sub>2</sub>、Petco<sub>2</sub>、和 Ptcco<sub>2</sub> 值。用 Bland-Altman 法评估测定值之间的一致性。

**结果：**得到 48 个样本。Paco<sub>2</sub>- Ptcco<sub>2</sub> 平均差值为 $-0.9 \pm 6.4$  mm Hg (平均值 $\pm$  2 倍标准差)。Paco<sub>2</sub> - Petco<sub>2</sub> 平均差值为  $7.5 \pm 7.0$  mm Hg(平均值 $\pm$  2 倍标准差)。88%的样本 Paco<sub>2</sub> - Ptcco<sub>2</sub> 的差值在 $\pm 5$  mm Hg 之内。而 17%的样本 Paco<sub>2</sub> - Petco<sub>2</sub> 的差值在 $\pm 5$  mm Hg 之内(P < 0.05)。

**结论：**在长时间的气腹腹腔镜手术中，经皮二氧化碳 (Ptcco<sub>2</sub>)比呼气末二氧化碳 (Petco<sub>2</sub>)能更准确地预测患者的动脉血二氧化碳分压(Paco<sub>2</sub>)。

(滕凌雅 译 马皓琳 李士通 校)

**BACKGROUND:** There may be large differences between measurements of end-tidal carbon dioxide partial pressure (Petco<sub>2</sub>) and arterial carbon dioxide partial pressure (Paco<sub>2</sub>) during laparoscopic surgeries. Transcutaneous carbon dioxide (Ptcco<sub>2</sub>) monitoring can be used to noninvasively and continuously estimate Paco<sub>2</sub>. In the present study we evaluated the accuracy of Ptcco<sub>2</sub> monitoring in predicting the Paco<sub>2</sub> during laparoscopic surgeries with prolonged pneumoperitoneum.

**METHODS:** Sixteen patients who underwent laparoscopic radical gastrectomy or radical proctectomy under general anesthesia were included in the study. Their Paco<sub>2</sub>, Petco<sub>2</sub>, and Ptcco<sub>2</sub> values were measured at 3 time points before and after pneumoperitoneum. Agreement among measures was assessed by the Bland-Altman method.

**RESULTS:** Forty-eight sample sets were obtained. The average Paco<sub>2</sub>- Ptcco<sub>2</sub> difference was  $-0.9 \pm 6.4$  mm Hg (mean  $\pm$  2 SD). The average Paco<sub>2</sub> - Petco<sub>2</sub> difference was  $7.5 \pm 7.0$  mm Hg (mean  $\pm$  2 SD). Paco<sub>2</sub> - Ptcco<sub>2</sub> was less than or equal to  $\pm 5$  mm Hg for 88% of the samples. Paco<sub>2</sub> - Petco<sub>2</sub> was less than or equal to  $\pm 5$  mm Hg for 17% of the samples (P < 0.05).

**CONCLUSIONS:** While undergoing long-term pneumoperitoneum laparoscopic surgery, Ptcco<sub>2</sub> monitoring is more accurate than is PETCO<sub>2</sub> monitoring in predicting the patients' Paco<sub>2</sub>.

## 头低脚高位以及呼气末正压通气对颈内静脉横断面积的影响

### The Impact of Trendelenburg Position and Positive End-Expiratory Pressure on the Internal Jugular Cross-Sectional Area

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背景：右颈内静脉横断面积（CSA）的增加可以便于置管并且减少并发症。头低脚高及呼气末正压通气（PEEP）等措施可以增加右颈内静脉的 CSA。我们测定不同的措施引起的 CSA 变化。

方法：通过二维超声测得 50 例接受心胸手术麻醉成年患者的右颈内静脉的 CSA。首先，在仰卧位没有接受正压通气时测得 CSA（对照组，S0）并且与 5 种不同随机顺序的方法时的 CSA 比较：（1）PEEP 通气 5 cm H<sub>2</sub>O（S5）、（2）PEEP 10 cm H<sub>2</sub>O（S10）、（3）头低脚高斜位 20°并且 PEEP 0 cm H<sub>2</sub>O（T0）、（4）头低脚高斜位 20°并且 PEEP 5 cm H<sub>2</sub>O（T5）和（5）头低脚高斜位 20°并且 PEEP 10 cm H<sub>2</sub>O（T10）。

结果：通过与对照组（S0）的比较，所有方法均能增加右颈内静脉的 CSA（所有 p<0.05）。S5 组增加 CSA 平均为 15.9%，S10 为 22.3%，T0 为 39.4%，T5 为 38.7%，T10 为 49.7%。

结论：通过比较运用不同的呼气末正压通气水平和/或头低脚高斜位对右颈内静脉切面面积的影响，头低脚高斜位的方法最为有效。

（龚寅 译，马皓琳 李士通 校）

**BACKGROUND:** Increasing the cross-sectional area (CSA) of the right internal jugular vein facilitates cannulation and decreases complications. Maneuvers such as the Trendelenburg tilt position and ventilation with a positive end-expiratory pressure (PEEP) may increase the CSA of the right internal jugular vein. We determined the changes in the CSA in response to different maneuvers.

**METHODS:** The CSA (cm<sup>2</sup>) of the right internal jugular vein was assessed in 50 anesthetized adult cardiothoracic surgery patients using 2-dimensional ultrasound. First, the CSA was measured in response to supine position with no PEEP (control condition, S0) and compared with 5 different randomly ordered maneuvers: (1) PEEP ventilation with 5 cm H<sub>2</sub>O (S5), (2) PEEP with 10 cm H<sub>2</sub>O (S10), (3) a 20° Trendelenburg tilt position with a PEEP of 0 cm H<sub>2</sub>O (T0), (4) a 20° Trendelenburg tilt position combined with a PEEP of 5 cm H<sub>2</sub>O (T5), and (5) a 20° Trendelenburg tilt position combined with a PEEP of 10 cm H<sub>2</sub>O (T10).

**RESULTS:** All maneuvers increased the CSA of the right internal jugular vein with respect to the control condition S0 (all P < 0.05). S5 increased the CSA on average by 15.9%, S10 by 22.3%, T0 by 39.4%, T5 by 38.7%, and T10 by 49.7%.

**CONCLUSION:** In a comparison of the effectiveness of applying different PEEP levels and/or the Trendelenburg tilt position on the CSA of the right internal jugular vein, the Trendelenburg tilt position was most effective.

### 危重患者发生急性呼吸窘迫综合症的术中危险因素

#### **Intraoperative Risk Factors for Acute Respiratory Distress Syndrome in Critically Ill Patients**

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Anesth Analg 2010; 111:464-467

**背景：**重症监护室（ICU）的患者发生急性呼吸窘迫综合征（ARDS）的相关危险因素包括液体正平衡、高潮气量、高气道压和血制品的输注。然而，检查术中因素（如液体复苏、机械通气策略和血制品的输注）对术后 ARDS 发生发展的影响的研究尚很不足。

**方法：**对于术后出现缺氧呼吸衰竭而入住 ICU 需要机械通气的患者，我们应用既定的临床和放射学标准对其术后 7 天 ARDS 的发生发展情况进行评估。从麻醉电子病历和医疗记录获取 ARDS 危险因素的相关数据。在对临床重要的协同变量进行调整后，运用对数回归分析检查术中液体复苏、单位理想体重的潮气量和血制品输注量与术后发生 ARDS 之间的独立相关关系。

**结果：**89 例术后呼吸衰竭的患者中，25 例发展为 ARDS。与以 <10 mL/kg/h 输液速度相比，术中以 >20 mL/kg/h 的速度输液的患者发展为 ARDS 的风险是前者的 3.8 倍 ( $P = 0.04$ )，以 10-20 mL/kg/h 的速度输注的患者则为其 2.4 倍 ( $P = 0.14$ )。本研究中，单位理想体重的潮气量和血制品输注量与 ARDS 的发生无关。

**结论：**本队列研究为揭示术中液体复苏与术后发生 ARDS 之间的关系提供了证据，但仍需要大型的前瞻性实验来确认这些发现。

（徐妍君 译 马皓琳 李士通 校）

**BACKGROUND:** Risk factors for the development of acute respiratory distress syndrome (ARDS) in the intensive care unit (ICU) include positive fluid balance, high tidal volumes (TVs), high airway pressures, and transfusion of blood products. However, research examining intraoperative factors such as fluid resuscitation, mechanical ventilation strategies, and blood administration on the postoperative development of ARDS is lacking.

**METHODS:** We assessed patients admitted to the ICU with postoperative hypoxemic respiratory failure requiring mechanical ventilation for the development of ARDS in the first 7 postoperative days using established clinical and radiological criteria. Data on risk factors for ARDS were obtained from the electronic anesthetic and medical records. Logistic regression was used to examine the independent association between fluid resuscitation, TV per ideal body weight, and number of blood products transfused during

surgery and the postoperative development of ARDS, adjusting for important clinical covariates.

**RESULTS:** Of the 89 patients with postoperative respiratory failure, 25 developed ARDS. Compared with those who received <10 mL/kg/h fluid resuscitation in the operating room, patients receiving >20 mL/kg/h fluid resuscitation had a 3.8 times higher adjusted odds of developing ARDS ( $P = 0.04$ ), and those receiving 10 to 20 mL/kg/h had a 2.4 times higher adjusted odds of developing ARDS ( $P = 0.14$ ). TV per ideal body weight and the number of blood units transfused were not associated with ARDS development in this study.

**CONCLUSIONS:** This cohort study provides evidence to suggest a relationship between intraoperative fluid resuscitation and the development of ARDS. Larger prospective trials are required to confirm these findings.

### 剖宫产后蛛网膜下腔吗啡与超声引导下腹横肌平面阻滞的镇痛效能比较：一个随机对照试验

#### The Analgesic Efficacy of Subarachnoid Morphine in Comparison with Ultrasound-Guided Transversus Abdominis Plane Block After Cesarean Delivery: A Randomized Controlled Trial

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**背景：**超声引导下腹横肌平面阻滞是剖宫产术后缓解疼痛的有效方法。椎管内吗啡是当前剖宫产后疼痛治疗的“金标准”。本研究中我们验证这样一个假设，即在择期剖宫产病人中蛛网膜下腔吗啡镇痛比腹横肌平面阻滞镇痛时间更长且效果更好。

**方法：**在这个前瞻、双盲研究中，57 个病人随机接受蛛网膜下腔吗啡镇痛（SAM 组； $n=28$ ）或腹横肌平面阻滞镇痛（TAP 组； $n=29$ ）。SAM 组病人接受布比卡因脊麻联合给予 0.2mg 吗啡而 TAP 组病人则给予盐水。手术结束时，SAM 组给予盐水 20ml 而 TAP 组给予 0.375% 的布比卡因加 5  $\mu\text{g}/\text{mL}$  的肾上腺素两侧各 20ml 完成双侧腹横肌平面阻滞。术后首个 24 小时镇痛包括按计划直肠给予双氯芬酸和静脉给予对乙酰氨基酚，镇痛不全则静脉给予曲马多治疗。第二个 24 小时，按计划直肠给予双氯芬酸，如病人要求则给予口服对乙酰氨基酚和静脉注射曲马多治疗。在麻醉后监护室中（时间 0 小时）及 2、4、6、12、24、36 和 48 小时对病人进行术后评估。主要结果测量是首次要求镇痛药的时间。

**结果：**SAM 组首次要求镇痛药的时间中位数（范围）比 TAP 组晚[8 (2–36) 小时对 4 (0.5 to 29) 小时 ( $P = 0.005$ )]。SAM 组 0-12 小时内接受曲马多注射的次数中位数（范围）是 0 (0-1) 比 TAP 组的 0 (0-2) 少 ( $p=0.03$ )。SAM 组术后首个 4 小时内平静和运动时的内脏痛评分比 TAP 组低，但在其它时间点没有差异。SAM 组中

重度恶心的发生率比 TAP 组高[13/28 (46%) 对 5/29 (17%) (P = 0.02)]。SAM 组发生瘙痒症要求治疗的病人数比 TAP 组多[(11/28 (39%) 对 0/29 (0%) (P < 0.001)]。

**结论：**作为多模式镇痛方法的一部分，剖宫产术后蛛网膜下腔吗啡比超声引导下腹横肌平面阻滞的镇痛效果更好，而代价则是增加的副反应。

(周洁 译 马皓琳 李士通 校)

**BACKGROUND:** Ultrasound-guided transversus abdominis plane block is an effective method of providing pain relief after cesarean delivery. Neuraxial morphine is currently the “gold standard” treatment for pain after cesarean delivery. In this study we tested the hypothesis that subarachnoid morphine would provide more prolonged and superior analgesia than would transversus abdominis plane block in patients undergoing elective cesarean delivery.

**METHODS:** In this prospective, double-blind study, 57 patients were randomly assigned to receive either subarachnoid morphine (group SAM; n = 28) or transversus abdominis plane block (group TAP; n = 29). Patients received bupivacaine spinal anesthesia combined with morphine 0.2 mg in group SAM and received saline in group TAP. At the end of surgery, bilateral transversus abdominis plane block was performed using saline in group SAM or using bupivacaine 0.375% plus epinephrine 5 µg/mL in group TAP with 20 mL on each side. Postoperative analgesia for the first 24 hours consisted of scheduled rectal diclofenac and IV paracetamol; breakthrough pain was treated with IV tramadol. For the next 24 hours, scheduled rectal diclofenac was given; oral paracetamol and IV tramadol were administered upon patient request. Patients were assessed postoperatively in the postanesthesia care unit (time 0 hours) and at 2, 4, 6, 12, 24, 36, and 48 hours. The primary outcome measure was the time to first analgesic request.

**RESULTS:** Median (range) time to first analgesic request was longer in group SAM than in group TAP [8 (2–36) hours versus 4 (0.5 to 29) hours (P = 0.005)]. Median (range) number of tramadol doses received between 0 and 12 hours was 0 (0–1) in group SAM versus 0 (0–2) in group TAP (P = 0.03). Postoperative visceral pain scores at rest and on movement during first the 4 hours were lower in group SAM than in group TAP, but were not different at any other time points. The incidence of moderate to severe nausea was higher in group SAM than in group TAP [13/28 (46%) versus 5/29 (17%) (P = 0.02)]. More patients developed pruritus requiring treatment in group SAM than in group TAP [(11/28 (39%) versus none (0%) (P < 0.001)].

**CONCLUSION:** As part of a multimodal analgesic regimen, subarachnoid morphine provided superior analgesia when compared with ultrasound-guided transversus abdominis plane block after cesarean delivery, yet at the cost of increased side effects.

在短暂全脑缺血小鼠模型中，异氟醚预处理通过减少泛素结合蛋白聚合体而产生神经保护作用

### **Isoflurane Preconditioning Induces Neuroprotection by Attenuating Ubiquitin-Conjugated Protein Aggregation in a Mouse Model of Transient Global Cerebral Ischemia**

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**背景：**本研究中，我们试图阐述抑制泛素结合蛋白聚合体在异氟醚预处理后短暂全脑缺血再灌注损伤小鼠模型神经保护效应形成中的作用。

**方法：**C57BL/6 小鼠随机分成 3 组：异氟醚预处理组 (IsoPC)、对照组 (Con) 和假手术组 (每组 24 只)。异氟醚预处理组和假手术组小鼠置于一室内并对其进行异氟醚预处理 5 天 (1.2% 异氟醚, 98% 氧气, 1 小时/天)。对照组小鼠置于相同室内，但是仅使用氧气预处理 5 天 (98% O<sub>2</sub>, 2% N<sub>2</sub>, 1 小时/天)。在最后一次预处理 24 小时后，IsoPC 组和 Con 组小鼠双侧颈总动脉闭塞 20 分钟建造全脑缺血模型。灌注后，通过神经学评估、免疫组织化学和免疫印迹法 (24 小时和 72 小时) 分别对总运动评分、海马 CA1 区活性神经元数目和结合泛素或游离泛素的表达水平进行评估。

**结果：**IsoPC 组比 Con 组总运动评分好 (P < 0.05)。形态学显示：IsoPC 组比 Con 组有更好的神经元结构。与 Con 组对比，通过异氟醚预处理明显增加了 CA1 区的活性神经元数目 (P < 0.05)。在异氟醚预处理后，CA1 区的 TUNEL 阳性神经元数目明显减少。IsoPC 组 CA1 区染色的结合泛素密度明显比 Con 组低 (P < 0.05)，并且 IsoPC 组结合泛素的表达也低于 Con 组 (P < 0.05)。

**结论：**在短暂全脑缺血再灌注损伤小鼠模型中，异氟醚预处理产生大脑缺血耐受，抑制结合泛素聚合体可能在此过程中起到必不可少的作用。

(王海涛译；马皓琳 李士通校)

**BACKGROUND:** In this study, we sought to clarify the role of inhibiting ubiquitin-conjugated protein aggregation in the formation of a neuroprotective effect after isoflurane preconditioning using a transient global cerebral ischemia-reperfusion injury mouse model.

**METHODS:** C57BL/6 mice were randomly assigned to 3 groups (isoflurane preconditioning [IsoPC] group, control [Con] group, and sham group, n = 24 in each group). Mice in the IsoPC group and sham group were placed in a chamber and pretreated with isoflurane (1.2% isoflurane, 98% O<sub>2</sub>, 1 hour/day) for 5 days. Mice in the Con group were placed in the same chamber but pretreated with oxygen only (98% O<sub>2</sub>, 2% N<sub>2</sub>, 1 hour/day) for 5 days. Twenty-four hours after the last preconditioning day, bilateral common carotid artery occlusion was performed as a model of global cerebral ischemia for 20 minutes in the IsoPC group and Con group. The total motor scores, number of viable neurons in the CA1 region of the hippocampus, and expression levels of conjugated ubiquitin or free ubiquitin were assessed by neurological assessment, immunohistochemistry, and Western blotting (at 24 and 72 hours) after reperfusion, respectively.

**RESULTS:** The total motor scores in the IsoPC group were better than the Con group (P < 0.05). Morphological observations showed that the IsoPC group had better neuron structure than in the Con group. The numbers of viable neurons in the CA1 region were significantly increased by isoflurane preconditioning compared with those in the Con group (P < 0.05). The numbers of TUNEL-positive neurons in the CA1 region were

significantly decreased after isoflurane preconditioning. The density of conjugated ubiquitin staining in the CA1 region of the IsoPC group was significantly lower than in the Con group ( $P < 0.05$ ) and the expression of conjugated ubiquitin in the IsoPC group was lower than in the Con group ( $P < 0.05$ ).

**CONCLUSION:** Inhibition of ubiquitin-conjugated protein aggregation may have an essential role in inducing cerebral ischemic tolerance by isoflurane preconditioning in a transient global cerebral ischemia-reperfusion injury mouse model.

### 下颌神经酒精阻滞治疗三叉神经痛的长期影响

#### **The Long-Term Outcome of Mandibular Nerve Block with Alcohol for the Treatment of Trigeminal Neuralgia**

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Anesth Analg 2010; 111:550-553

本前瞻性研究中，98 位病人接受 160 次下颌神经(V3)酒精阻滞治疗三叉神经痛。根据 Kaplan-Meier 分析，治疗后 1、2、3 和 7 年的无痛概率分别是 90.4%、69%、53.5% 和 33%。重复或单次 V3 酒精阻滞后的无痛持续时间和并发症无明显差别。我们推断，单次和重复 V3 酒精阻滞治疗三叉神经痛能够提供长时间的疼痛缓解。(江继宏 译 马皓琳 李士通 校)

Ninety-eight patients received 160 mandibular nerve (V3) blocks with alcohol for the treatment of trigeminal neuralgia in this prospective study. According to the Kaplan-Meier analysis, the probabilities of remaining pain free for 1, 2, 3, and 7 years after the procedures were 90.4%, 69%, 53.5%, and 33%, respectively. There was no significant difference in the probability of pain-free duration and complications between patients with repeat versus single V3 block with alcohol. We conclude that single and repeat V3 alcohol block for trigeminal neuralgia can provide long-lasting pain relief.

### 40Mg 和 60Mg 高比重 2%丙胺卡因与 60Mg 等比重 2%丙胺卡因比较用于门诊手术中鞘内麻醉的一个前瞻、双盲、随机、临床试验

#### **A Prospective, Double-Blinded, Randomized, Clinical Trial Comparing the Efficacy of 40 Mg and 60 Mg Hyperbaric 2% Prilocaine Versus 60 Mg Plain 2% Prilocaine for Intrathecal Anesthesia in Ambulatory Surgery**

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**背景：**在本前瞻、双盲、随机试验中，我们将 60mg 和 40mg 的 2% 高比重丙胺卡因与 60mg 的 2% 等比重丙胺卡因比较用于择期短时 (<60 分钟) 手术的门诊患者中脊麻感觉阻滞起效时间。

**方法：**入选 90 例患者，随机分别接受 3 种处理方法中的一种。盲法记录感觉和运动阻滞起效时间、达到最高感觉阻滞平面的时间、首次排尿的时间、达到 Bromage 评分为 0 的时间以及副作用。不知道分组的观察者在脊麻后 24 小时好 7 天询问患者有无一过性神经症状。

**结果：**感觉阻滞平面达到 T10 的平均时间在 3 组之间相近。然而，20% 的接受等比重的患者未达到 T10 水平。2 个高比重剂量 (60mg 和 40mg) 均比等比重丙胺卡因显示出显著较快地运动阻滞起效 (分别为  $P = 0.0091$ 、 $P = 0.0097$ )、达到最高感觉阻滞平面 ( $P = 0.0297$ 、 $P = 0.0183$ )、运动阻滞减退 ( $P = 0.0004$ 、 $P < 0.0001$ ) 及首次排尿 ( $P = 0.0013$ 、 $P = 0.0002$ )。在研究中未观察到较严重的不良反应或一过性神经症状。

**结论：**用 60mg 或 40mg 的 2% 高比重丙胺卡因脊麻与 60mg 的等比重丙胺卡因在感觉阻滞达到 T10 的起效方面相当。高比重溶液显示较快的运动阻滞起效和较短的手术阻滞持续时间，提示其用于门诊手术麻醉的优越性。

(马皓琳 译 李士通 校)

**BACKGROUND:** In this prospective, double-blind, randomized trial we compared 60 mg and 40 mg of 2% hyperbaric prilocaine with 60 mg of 2% plain prilocaine for spinal anesthesia in terms of sensory block onset in outpatients undergoing elective short-duration (<60 minutes) surgery under spinal anesthesia.

**METHODS:** Ninety patients were enrolled and randomly allocated to receive 1 of the 3 treatments. Times to sensory and motor block onsets, time to the maximum sensory block level, readiness for surgery, time to first urinary voiding, time to Bromage's score 0, and side effects were registered blindly. A blinded observer also questioned patients about transient neurological symptoms 24 hours and 7 days after spinal anesthesia.

**RESULTS:** Mean times to achieve a T10 level of sensory block were comparable in the 3 groups. However, 20% of patients receiving plain prilocaine did not achieve a T10 level. The 2 hyperbaric dosages (60 mg and 40 mg) showed significantly faster times to motor block onset ( $P = 0.0091$ ,  $P = 0.0097$ ), to the maximum sensory block level ( $P = 0.0297$ ,  $P = 0.0183$ ), to motor block offset ( $P = 0.0004$ ,  $P < 0.0001$ ), and to first urinary voiding ( $P = 0.0013$ ,  $P = 0.0002$ , respectively) than did plain prilocaine. No major adverse reactions or transient neurological symptoms were observed in the study.

**CONCLUSIONS:** Spinal anesthesia with 60 mg or 40 mg of 2% hyperbaric prilocaine is comparable to 60 mg of 2% plain prilocaine in terms of onset of sensory block at T10. The hyperbaric solution showed faster times to motor block onset and shorter duration of surgical block, suggesting its superiority for the ambulatory setting.

**术前他汀类药物与心脏外科术后急性肾损伤发生率的下降无关**

**Preoperative statin therapy is not associated with a reduced incidence of postoperative acute kidney injury after cardiac surgery.**

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**背景：**此项试验旨在研究接受体外循环的心外科手术患者术前他汀类药物治疗与术后急性肾损伤（AKI）发生率之间的关系。

**方法：**本试验回顾研究了 2002 年 1 月至 2006 年 12 月间 10648 名陆续接受体外循环下冠状动脉旁路手术和/或心脏瓣膜手术的患者。根据患者术前他汀类药物的治疗方案将其分成 2 组。本试验的主要结果为基于 RIFLE 标准（危险、损伤、衰竭、肾功能丧失及终末期肾病）的患者术后急性肾损伤的发生率。而术后血液透析的需求量及住院死亡率为该试验的次要结果。运用多元 Logistic 回归模型对主要及次要结果进行分析。为了控制他汀类药物治疗所产生的相关选择偏倚，一项倾向性评分被用于行贪婪配对。

**结果：**术后急性肾损伤的发生率为 12.1%（n=1286）。相比术前接受他汀类药物治疗患者 13.31% 的急性肾损伤发生率（6152 名患者中共发生 819 例），术前未服用他汀类药物的患者其急性肾损伤的发生率为 10.41%（4487 名患者中共发生 467 例）（ $P < 0.001$ ）。术后血液透析的发生率为 1.71%（n=182）。在接受他汀类药物治疗的患者中，其术后透析的需求量为 1.75%（6157 名患者中共发生 108 例），而非他汀类药物治疗的患者其需求量为 1.65%（4491 名患者中共发生 74 例）（ $P = 0.68$ ）。术后 1.71% 的患者在住院时发生死亡（n=182）。其中，接受他汀类药物治疗的患者其死亡率为 1.71%（6157 名患者中共发生 105 例），与非他汀类药物治疗患者 1.71% 的死亡率没有差别（4491 名患者中共发生 77 例）（ $P = 0.97$ ）。在多元 Logistic 回归分析中，术前他汀类药物治疗与术后急性肾损伤（相对危险度 [OR] 为 0.97，95% 置信区间 [CI] 为 0.84-1.12； $P = 0.68$ ）、术后血液透析（OR 为 0.80，95% CI 为 0.55-1.18； $P = 0.23$ ）及住院死亡率（OR 为 0.803，95% CI 为 0.56-1.16； $P = 0.24$ ）无关。在 2646 对倾向性配对中，他汀类药物治疗组术后急性肾损伤的发生率为 12.0%，而非他汀类药物治疗组为 12.8%（ $P = 0.38$ ）。他汀类药物治疗组术后透析的发生率为 1.63%，而非他汀类药物治疗组为 2.08%（ $P = 0.22$ ）。在同一倾向性配对中，他汀类药物治疗组其住院死亡率为 1.63%，而非他汀类药物治疗组为 2.1%（ $P = 0.19$ ）。

**结论：**上述结果表明，先前关于术前接受他汀类药物治疗可降低心脏手术患者围手术期死亡率的报道可能并不是通过减少其术后急性肾损伤的发生而介导的。

（范羽译 薛张纲校）

**BACKGROUND:** Our objective was to examine the association between preoperative statin therapy and the prevalence of postoperative acute kidney injury (AKI) in patients undergoing cardiac surgery with the use of cardiopulmonary bypass.

**METHODS:** We performed a retrospective investigation of 10,648 consecutive patients undergoing coronary artery bypass grafting using cardiopulmonary bypass and/or valve surgery between January 2002 and December 2006. Patients were divided into 2 groups depending on preoperative therapy with statin drugs. The primary outcome was postoperative AKI based on the RIFLE (Risk, Injury, Failure, Loss, End-stage) criteria. Secondary outcomes included requirement for postoperative dialysis and hospital mortality. Multivariable logistic regression models were developed for the primary and secondary outcomes. To control for selection bias related to statin therapy, a propensity score was developed using a greedy matching technique.

**RESULTS:** The incidence of AKI was 12.1% (n = 1286). AKI occurred in 13.31% of patients receiving preoperative statins (819 of 6152 patients) versus 10.41% in the no statin group (467 of 4487 patients) (P < 0.001). The incidence of postoperative dialysis was 1.71% (n = 182). Postoperative dialysis was needed in 1.75% of patients in the statin group (108 of 6157 patients) compared with 1.65% of patients (74 of 4491 patients) in the no statin group (P = 0.68). Hospital mortality after surgery occurred in 1.71% (n = 182) of patients. The incidence of mortality for patients in the statin group was 1.71% (105 of 6157 patients) and this was not different from mortality in the no statin group of 1.71% (77 of 4491 patients) (P = 0.97). In multivariate logistic regression analysis, statin therapy was not associated with AKI (odds ratio [OR] 0.97, 95% confidence interval [CI] 0.84-1.12; P = 0.68), postoperative dialysis (OR 0.80, 95% CI 0.55-1.18; P = 0.23), or hospital mortality (OR 0.803, 95% CI 0.56-1.16; P = 0.24). In 2646 propensity-matched pairs, the incidence of AKI was 12.0% in the statin group versus 12.8% in the no statin group (P = 0.38). The statin group had a 1.63% incidence of postoperative dialysis versus 2.08% in the no statin group (P = 0.22). In the same propensity-matched population, hospital mortality occurred in 1.63% of patients in the statin group compared with 2.1% in the no statin group (P = 0.19).

**CONCLUSION:** These results suggest that previously reported reductions in perioperative mortality for patients taking preoperative statins and undergoing cardiac surgery is likely not mediated through a reduction in postoperative AKI.

动脉交叉钳夹和再灌注在猪体中由于全身和局部血流重分配而导致微血管的氧合水平下降。

**Aortic cross-clamping and reperfusion in pigs reduces microvascular oxygenation by altered systemic and regional blood flow distribution.**

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**背景：**本研究验证了这样一种假设：大动脉交叉钳夹和再灌注由于改变了正常的血流动力学和氧合作用，会引起肠道与肾脏微循环氧合与灌注的重分配变化。

**方法：**15头麻醉后的猪被随机分为两组：大动脉交叉钳夹(ACC)组有10头，进行肠系膜上动脉以上的动脉交叉钳夹45分钟；另一对照组有5头，与ACC组进行时间上同步的但不涉及肠系膜上动脉操作的手术。在再灌注后的4小时内，监测整个循环系统的、肠道的和肾脏的血流动力学以及氧合情况。使用Pd-卟啉磷光法测量肠道浆膜和粘膜面以及肾皮质的微血管氧分压。使用空气张力测定法测量肠腔二氧化碳分压，正交极化光谱显像法测定浆膜微血管的血流。

**结果：**脏器的血流以及肾脏和肠道系统的微循环氧分压值在ACC期显著下降，而肠道的氧释放和二氧化碳分压上升。肠道在ACC后的再灌注期发生了持续性的充血反应，但是在肾脏则未观察到此现象。尽管有持续性的高氧供，浆膜微血管的氧分压值的基线水平与4小时的再灌注期相比较，结果为（中位数[间距]）49[41-

67]mmHg VS 37[27-41]mmHg;P<0.05。并且灌注微血管的绝对数值较ACC前有所下降，同时伴有肠道二氧化碳分压的变化(17[10-19]mmHg VS 23[19-30]mmHg;P<0.05)。与此相反，肾脏的则表现为进行性的氧供下降伴有肾皮质氧合水平下降(70[52-93]mmHg VS 57[33-64]mmHg;P<0.05)。

**结论：**动脉交叉钳夹后全身系统性和局部组织的血流灌注增加并不能保证满足所有脏器的局部灌注需求和微循环氧合。

(黄剑译 薛张纲校)

**BACKGROUND:** In this study, we tested the hypothesis that aortic cross-clamping (ACC) and reperfusion cause distributive alterations of oxygenation and perfusion in the microcirculation of the gut and kidneys despite normal systemic hemodynamics and oxygenation.

**METHODS:** Fifteen anesthetized pigs were randomized between an ACC group (n = 10), undergoing 45 minutes of aortic clamping above the superior mesenteric artery, and a time-matched sham surgery control group (n = 5). Systemic, intestinal, and renal hemodynamics and oxygenation variables were monitored during 4 hours of reperfusion. Microvascular oxygen partial pressure (microPo<sub>2</sub>) was measured in the intestinal serosa and mucosa and the renal cortex, using the Pd-porphyrin phosphorescence technique. Intestinal luminal Pco<sub>2</sub> was determined by air tonometry and the serosal microvascular flow by orthogonal polarization spectral imaging.

**RESULTS:** Organ blood flow and renal and intestinal microPo<sub>2</sub> decreased significantly during ACC, whereas the intestinal oxygen extraction and Pco<sub>2</sub> gap increased. The intestinal response to reperfusion after ACC was a sustained reactive hyperemia but no such effect was seen in the kidney. Despite a sustained high intestinal O<sub>2</sub> delivery, serosal microPo<sub>2</sub> (median [range], 49 mm Hg [41-67 mm Hg] versus 37 mm Hg [27-41 mm Hg]; P < 0.05 baseline versus 4 hours reperfusion) and the absolute number of perfused microvessels decreased along with an increased intestinal Pco<sub>2</sub> gap (17 mm Hg [10-19 mm Hg] versus 23 mm Hg [19-30 mm Hg]; P < 0.05). In contrast, the kidney showed a progressive O<sub>2</sub> delivery decrease accompanied by a decrease in renal cortex oxygenation (70 mm Hg [52-93 mm Hg] versus 57 mm Hg [33-64 mm Hg]; P < 0.05).

**CONCLUSION:** Increased systemic and regional blood flow and oxygen supply after ACC does not ensure adequate regional blood flow and microcirculatory oxygenation in all organs.

### 苏醒室患者对疼痛的感知和反应的响应面预测模型：一项对应用异氟醚和芬太尼麻醉患者的评估

#### Response Surface Model Predictions of Emergence and Response to Pain in the Recovery Room: An Evaluation of Patients Emerging from an Isoflurane and Fentanyl Anesthetic

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**介绍：**七氟醚-瑞芬太尼相互作用模型预测了择期手术患者的反应性并对疼痛刺激的反应进行了评估。预测模型的预评估同对应用七氟醚、瑞芬太尼和芬太尼麻醉的病人的观察结果一致。此项研究表明了将七氟醚-瑞芬太尼相互作用模型的预测性应用于异氟醚-芬太尼麻醉的可行性。我们假设异氟醚和芬太尼预测模型同被观察病人的反应一致，与先前七氟醚-瑞芬太尼/芬太尼麻醉预测模型观察结论相同。

**方法：**25个择期手术病人给予芬太尼-异氟醚麻醉。苏醒室里，对预测模型中无应答个体在其出现反应时进行记录，而对伤害性刺激有反应的个体在其第一次需要镇痛时进行记录。预测模型同图形及时间分析结论进行对比。结论与之前给予七氟醚-瑞芬太尼/芬太尼麻醉后的预测也进行对照。

**结论：**尽管患者都接受了麻醉，但预测模型显示患者无应答的可能性很大（ $\geq 99\%$ ）。终止麻醉之后，预测模型苏醒中反应良好的患者被定义为受观察者中实际有反应的个体。预测模型中50%可能无应答的患者有半数在2分钟之内苏醒，70%在4分钟内苏醒。同样，对伤害性刺激反应的预测性同苏醒室里需要芬太尼的病人数量也是一致的。异氟醚-芬太尼麻醉预测模型同七氟醚-瑞芬太尼/芬太尼麻醉预测模型结论是一致的。

**讨论：**此结论证实了我们的研究设想；模型对无应答及对疼痛刺激无反应的预测适用于异氟醚-芬太尼，同观察结果一致。这些结论同之前患者接受七氟醚-瑞芬太尼/芬太尼麻醉后进行观察的对照预测模型都是一致的。

(毛慧译，薛张纲校)

**INTRODUCTION:** Sevoflurane-remifentanyl interaction models that predict responsiveness and response to painful stimuli have been evaluated in patients undergoing elective surgery. Preliminary evaluations of model predictions were found to be consistent with observations in patients anesthetized with sevoflurane, remifentanyl, and fentanyl. This study explored the feasibility of adapting the predictions of sevoflurane-remifentanyl interaction models to an isoflurane-fentanyl anesthetic. We hypothesized that model predictions adapted for isoflurane and fentanyl are consistent with observed patient responses and are similar to the predictions observed in our previous work with sevoflurane-remifentanyl/fentanyl anesthetics.

**METHODS:** Twenty-five patients scheduled for elective surgery received a fentanyl-isoflurane anesthetic. Model predictions of unresponsiveness were recorded at emergence, and predictions of a response to noxious stimulus were recorded when patients first required analgesics in the recovery room. Model predictions were compared with observations with graphical and temporal analyses. Results were also compared with our previous predictions after the administration of a sevoflurane-remifentanyl/fentanyl anesthetic.

**RESULTS:** Although patients were anesthetized, model predictions indicated a high likelihood that patients would be unresponsive ( $\geq 99\%$ ). After the termination of the anesthetic, model predictions of responsiveness well described the actual fraction of patients observed to be responsive during emergence. Half of the patients woke within 2 min of the 50% model-predicted probability of unresponsiveness; 70% woke within 4 min. Similarly, predictions of a response to a noxious stimulus were consistent with the number of patients who required fentanyl in the recovery room. Model predictions after

the administration of an isoflurane-fentanyl anesthetic were similar to model predictions after a sevoflurane-remifentanyl/fentanyl anesthetic.

**DISCUSSION:** The results confirmed our study hypothesis; model predictions for unresponsiveness and no response to painful stimuli, adapted to isoflurane-fentanyl were consistent with observations. These results were similar to our previous study comparing model predictions and patient observations after a sevoflurane-remifentanyl/fentanyl anesthetic.

### 等二氧化碳过度通气法缩短异氟醚麻醉后的苏醒室停留时间

#### Isocapnic Hyperpnoea Shortens Postanesthetic Care Unit Stay After Isoflurane Anesthesia

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**背景** 本实验为前瞻性随机对照的临床试验，旨在研究等二氧化碳过度通气法（IH）对接受异氟醚麻醉（时长为 1.5~3h）的患者在手术室（OR）和苏醒室（PACU）中苏醒时间的影响。

**方法** 30 例 ASA I~III 级，拟行择期妇科手术的患者，在手术结束时随机分成 IH 组或常规苏醒组（对照组）。6 例麻醉时间 < 90min 的患者在分析时予以剔除。麻醉给药方案包括丙泊酚、芬太尼、吗啡、罗库溴铵和空氧混合的异氟醚。比较两组苏醒时间指标的差异时采用不成对的 t 检验和方差分析。

**结果** IH 组和对照组的麻醉持续时间分别为 140.8±32.7min 和 142±55.6 min (P = 0.99)。与对照组相比，IH 组的拔管时间更短 (6.6±1.6 (SD) min vs. 13.6±3.9 min; P < 0.01)，睁眼时间更短 (5.8±1.3 vs. 13.7±4.5 min; P < 0.01)，能离开手术室的时间更短 (8.0±1.7 vs. 17.4±6.1 min; P < 0.01)，离开 PACU 的时间亦更短 (74.0±16.5 vs. 94.5±14.7 minutes; P < 0.01)。有关两组患者恢复的其他指标无显著差异。

**结论** IH 能加快时长 1.5~3h 的异氟醚麻醉的苏醒，并缩短在 OR 和 PACU 的停留时间。

(吴少勇译 薛张纲校)

**BACKGROUND:** We conducted a prospective controlled clinical trial of the effect of isocapnic hyperpnoea (IH) on the times-to-recovery milestones in the operating room (OR) and postanesthetic care unit (PACU) after 1.5 to 3 hours of isoflurane anesthesia.

**METHODS:** Thirty ASA grade I–III patients undergoing elective gynecological surgery were randomized at the end of surgery to either IH or the conventional recovery (control). Six patients with duration of anesthesia of <90 minutes were excluded from the analysis. The anesthesia protocol included propofol, fentanyl, morphine, rocuronium, and

isoflurane in air/O<sub>2</sub>. Unpaired t tests and analyses of variance were used to test for differences in times-to-recovery indicators between the two groups.

**RESULTS:** The durations of anesthesia in IH and control groups were  $140.8 \pm 32.7$  and  $142 \pm 55.6$  minutes, respectively ( $P = 0.99$ ). The time to extubation was much shorter in the IH group than in the control group ( $6.6 \pm 1.6$  (SD) vs.  $13.6 \pm 3.9$  minutes, respectively;  $P < 0.01$ ). The IH group also had shorter times to eye opening ( $5.8 \pm 1.3$  vs.  $13.7 \pm 4.5$  minutes;  $P < 0.01$ ), eligibility for leaving the OR ( $8.0 \pm 1.7$  vs.  $17.4 \pm 6.1$  minutes;  $P < 0.01$ ), and eligibility for PACU discharge ( $74.0 \pm 16.5$  vs.  $94.5 \pm 14.7$  minutes;  $P < 0.01$ ). There were no differences in other indicators of recovery.

**CONCLUSION:** IH accelerates recovery after 1.5 to 3 hours of isoflurane anesthesia and shortens OR and PACU stay.

### 患者特征和麻醉技术是成功监测运动诱发电位的叠加而非协同因素

#### Patient Characteristics and Anesthetic Technique Are Additive but Not Synergistic Predictors of Successful Motor Evoked Potential Monitoring

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**背景:**脊髓监测与矫形手术后显著降低的神经损害相关,同时在颈、胸、腰部手术中显示出了其预测价值。下肢运动诱发电位对麻醉药和生理改变及其敏感,且基线值难以获得。麻醉医生常常被要求改变麻醉深度来获得电位信息。虽然是显而易见的,但是高龄、体重指数、糖尿病、和(或)高血压、外科操作和麻醉技术和它的相关性未被描述。

**方法:**我们对2001年8月1日开始至2005年12月31日所有行脊髓手术并进行下肢运动诱发电位监测的患者进行回顾性研究。术前存在下肢瘫痪的患者排除在外。对糖尿病、高血压、麻醉技术、年龄、性别、体重指数和外科操作进行单因素分析,观察其分布是否存在差异。运用 $\chi^2$ 检验和两样本的t检验分析运动诱发电位状态和可能的危险因素之间的联系。运用Cochran-Armitage检验以四分位数来分析体重指数和年龄的趋势。每种麻醉技术下有糖尿病和高血压的患者和两者都无的患者的不同效应均有呈现。数据的双变量分析应用Breslow-Day检验比值比的同质性来分析糖尿病、高血压、麻醉技术之间潜在的负性协同作用。运用逐步选择的logistic回归分析建立信息模型。

**结果:**共回顾了256份病史。单因素分析显示糖尿病、高血压、麻醉技术、年龄及体重指数和不能获得运动诱发电位显著相关。双变量分析显示各因素之间没有协同作用。高血压、糖尿病和麻醉技术是不能获得运动诱发电位的独立危险因素,他们的共同作用有叠加但非协同作用。

**结论：**糖尿病、高血压和麻醉技术是不能获得下肢运动诱发电位信号的重要患者危险因素。这些结果有助于麻醉医生需要运动诱发电位监测时根据患者的合并症制定麻醉计划。

（姚敏敏译 薛张纲校）

**BACKGROUND:** Spinal cord monitoring is associated with a significantly lower rate of neurologic deficits after deformity surgery, and has been shown to have predictive value in cervical, thoracic, and lumbar surgery. Lower extremity motor evoked potentials (MEPs) are particularly sensitive to anesthetics and physiologic change, and can be difficult to obtain at baseline. The anesthesiologist is often required to modify the maintenance anesthetic to facilitate signal attainment. Although intuitive, the predictive significance of increasing age, body mass index (BMI), presence of diabetes and/or hypertension, surgical procedure, and anesthetic technique has not been well delineated.

**METHODS:** We conducted a retrospective chart review of the anesthetic records of all patients who underwent spine surgery and MEP monitoring of the lower extremities from August 1, 2001 to December 31, 2005. Patients with preexisting paralysis of the lower extremities were excluded. Univariate analysis was performed to examine the distribution of diabetes, hypertension, anesthesia technique, age, gender, BMI, and surgical procedure. The  $\chi^2$  test and the 2-sample t test were used to test associations between MEP status and potential risk factors. Cochran-Armitage test was used to analyze trends in BMI and age by quartile. The effects of diabetes and hypertension, compared with patients with neither, were presented for each anesthetic technique. Bivariate analysis of the data was performed to analyze a potentially synergistic deleterious effect of diabetes, hypertension, and anesthetic technique using the Breslow-Day test for homogeneity of the odds ratios. Logistic regression analysis through stepwise selection was performed to form a model of the data.

**RESULTS:** Two hundred fifty-six charts were reviewed. The univariate analysis showed that diabetes, hypertension, anesthesia technique, age, and BMI were significantly associated with failure to obtain MEP signals. None of the variables were found to have a synergistic effect on MEP signal attainment in the bivariate analysis. Hypertension, diabetes, and anesthetic technique were independent factors for MEP failure and their joint effects were additive not synergistic.

**CONCLUSIONS:** Diabetes, hypertension, and anesthetic technique were the most important patient risk factors associated with failure to obtain lower extremity MEP signals. These results will improve anesthesiologists' ability to tailor anesthetic regimen to patient comorbidity when MEP monitoring is planned.

**随机对照试验中的混杂因素：鉴定，影响和潜在的解决方案**

### **Practice Misalignments in Randomized Controlled Trials: Identification, Impact, and Potential Solutions**

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在一个随机对照试验队列中选择一个合适的对照组对于实验结果是至关重要的。对照组理想地包括并现实地反映了医学实践。这个目的可在常规的标准疗法的研究中被挑战。为了消除临床试验设计中的异质性，最近对传统疗法的调查中采取随机分配给患者固定的剂量。虽然这种方法可能会产生显著差异，结果可能无法可解释或普及应用。

在这个队列设计中，随机化扰乱了重要临床征象与滴定疗法之间的正常关系，并形成了各临床研究的患者组，他们接受了不符合当前临床实践理论的治疗剂量。这些不合常规的组可能得到比传统治疗更差的结果。实践偏差可以发生在任何现有治疗方法的临床试验中，这些疗法通常是根据疾病严重程度或病人特点而调整的。在这项研究中，我们回顾最近 3 个随机对照试验来演示偏倚如何影响安全、结果及随机对照试验的结论的。此外，我们讨论可前瞻性地识别滴定疗法和病人疾病的特性之间的关系的方法。最后，我们回顾试验设计方案，他们可能会减少偏倚的发生和对实践的影响。由于这些设计可能会限制临床试验的可行性，一个传统疗法特征对于确定这些设计中哪一个可以用来保护病人的安全是有必要建立的。

(张玥琪译，薛张纲校)

Appropriate control group selection in a randomized controlled trial (RCT) is a critical factor in generating results, which are both interpretable and generalizable. Control groups ideally encompass and realistically reflect prevailing medical practices. This goal can be challenging in investigations of standard therapies that are routinely titrated. To eliminate the heterogeneity in clinical practice from the trial design, recent investigations of titrated therapies have randomized patients to fixed-dose regimens. Although this approach may produce statistically significant differences, the results may not be interpretable or generalizable.

In this trial design, randomization disrupts the normal relationship between clinically important characteristics and therapy titration, thereby creating subgroups of patients within each study arm that receive levels of therapy inconsistent with current practices outside of the clinical study. These misaligned subgroups may have worse outcomes than usual care. Practice misalignments can occur in any clinical trial of a preexisting therapy that is typically adjusted based on severity of illness or other patient characteristics.

In this study, we review three recent RCTs to demonstrate how practice misalignments can affect the safety, results, and conclusions of RCTs. Furthermore, we discuss methods to prospectively identify potentially important relationships between therapy titration and patient- and disease-specific characteristics. Finally, we review trial design options that may minimize the occurrence and impact of practice misalignments. Because these designs may limit the feasibility of a clinical trial, a thorough characterization of usual care is necessary to determine whether one of these designs should be used to protect patient safety.

在猪的心跳骤停模型中食管内检测装置产生的气管内负压导致气管壁塌陷

**Negative Intratracheal Pressure Produced by Esophageal Detector Devices Causes Tracheal Wall Collapse in a Porcine Cardiac Arrest Model**



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**背景：**食管内检测装置对气管或食管施加负压来验证气管内插管的位置。心跳骤停时食管下端括约肌的平滑肌发生时间依赖和不可逆的松弛。如果气管后壁肌肉也发生松弛，将使得气管因负压而容易发生内陷或塌陷，从而可能接受假阴性的结果（气管内插管，食管内检测装置显示为食管）。我们比较了3种食管内检测装置正确区分气管内和食管内插管的能力。

**方法：**将气管导管插入5只驯养家猪的气管和食管内，并且在测试3种食管内检测装置的同时用支气管镜显示气管。在诱导心跳骤停前后均监测气管壁的活动。用逐渐增加的负压给气管内的气管导管排气，并记录气管壁开始运动和管腔发生>50%的闭塞时的压力。测试在心跳骤停后4、8和12分钟时重复进行，并确定心跳骤停前后气管塌陷时的压力。心跳骤停前和骤停后6分钟、10分钟时也对食管内的气管导管进行检测。

**结果：**在一个封闭的系统内，每个食管内检测装置产生大于-100 cm H<sub>2</sub>O的压力。心跳骤停前气管塌陷的平均压力为-112 cm H<sub>2</sub>O。心跳骤停后4、8和12分钟时气管塌陷的平均压力分别为-68, -66和-54 cm H<sub>2</sub>O。一个食管内检测装置始终给出模棱两可的结果；剩余的2个在所有的对象中都给出精确的结果。尽管气管壁的活动在所有心跳骤停后的食管内检测装置测试中都有记录到，但大多数观察到的活动都不足以使检测装置失效。所有心跳骤停前后的食管内插管都被正确的判定出来。

**结论：**这些发现描述了心跳骤停时气管后壁张力下降产生假阴性结果的机制。需要进一步的研究来阐明影响它发生的因素和对食管内检查工具使用的影响。

（朱兰芳译，薛张纲校）

**BACKGROUND:** Esophageal detector devices (EDDs) impose negative pressure on the trachea or esophagus to verify endotracheal tube (ETT) position. In cardiac arrest, the smooth muscle of the lower esophageal sphincter relaxes in a time-dependent and irreversible manner. If relaxation also occurs in the muscular posterior tracheal wall, it could predispose tracheal invagination or collapse with negative pressure, potentially yielding false-negative (tracheal ETT, EDD indicates esophagus) results. We compared 3 different EDDs in their ability to correctly discriminate tracheal and esophageal intubation.

**METHODS:** ETTs were placed into the trachea and esophagus of 5 domestic swine, and bronchoscopy was used to visualize the trachea while 3 EDDs were tested. Tracheal wall activity was observed before and after induced cardiac arrest. Tracheal ETTs were aspirated with increasing negative force and pressures at initial wall movement and >50% tracheal lumen obliteration were recorded. Measurements were repeated at 4, 8, and 12 minutes postarrest and pressures at tracheal wall collapse pre- and postarrest were determined. EDDs were also tested on esophageal ETTs prearrest and at 6 and 10 minutes postarrest.

**RESULTS:** In a closed system, each EDD generated more than  $-100$  cm H<sub>2</sub>O pressure. Average prearrest pressure at tracheal collapse was  $-112$  cm H<sub>2</sub>O. Average postarrest collapse pressures were  $-68$ ,  $-66$ , and  $-54$  cm H<sub>2</sub>O at 4, 8, and 12 minutes postarrest. One EDD consistently gave equivocal results; the remaining 2 gave accurate results in all subjects. Most observed movement was insufficient to cause device failure although tracheal wall movement was noted in all postarrest EDD trials. Esophageal intubation was correctly determined at all times pre- and postarrest.

**CONCLUSION:** These findings describe a mechanism for false-negative results from decreased posterior tracheal wall tone during cardiac arrest. Further studies are required to elucidate factors contributing to its occurrence and impact on EDD use.

### 比较罗派卡因和布比卡因应用于产科镇痛

#### **Ropivacaine Versus Bupivacaine for Epidural Labor Analgesia**

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临产孕妇常使用椎管内镇痛的方法。很多年来，由于布比卡因作用时间较长、没有过度运动阻滞、且对胎儿及新生儿影响较小而被用来镇痛。然而，布比卡因的心脏毒性较大，且布比卡因的运动阻滞作用仍是问题。很多局麻药如布比卡因存在两种形式，即左旋及右旋。罗派卡因，一种酰胺类局麻药仅生产出左旋结构，从而避免了对布比卡因有所顾虑的问题。在这篇文章中，我们比较了罗派卡因和布比卡因应用于产科镇痛的各自优点。我们发现罗派卡因应用于产科镇痛并没有显著优点。

(陈珺珺译 薛张纲校)

Neuraxial analgesia is frequently administered to women in labor. For many years, bupivacaine has been used because of its long duration of action, lack of excessive motor block, and minimal fetal and neonatal effects. However, bupivacaine is one of the most cardiotoxic local anesthetics in current use and motor block is still a problem. Many local anesthetics such as bupivacaine exist in 2 forms, levorotatory and dextrorotatory. Ropivacaine, an amide local anesthetic produced in the pure levorotatory form addresses some of the concerns related to bupivacaine. In this article, we present the literature comparing ropivacaine and bupivacaine to determine whether there is an advantage to using one of these local anesthetics for labor analgesia. We found that there is no advantage to the routine use of ropivacaine for labor analgesia.

### 缺血预处理减弱单侧大腿止血带造成的缺血再灌注损伤所致的肺功能不全

#### **Ischemic Preconditioning Attenuates Pulmonary Dysfunction After Unilateral Thigh Tourniquet-Induced Ischemia-Reperfusion**

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**背景：**急性肺损伤是下肢缺血再灌注后常见的并发症，它在实验及临床处理主动脉手术中被证实。在矫形手术中使用止血带可以出现缺血再灌注损伤。我们研究了单侧大腿使用止血带后导致缺血再灌注损伤对肺功能的影响，及缺血预处理对于肺功能恶化起到的作用。

**方法：**30名ASA I或II级行下肢手术的患者随机分为两组：使用止血带造成下肢缺血再灌注损伤（缺血再灌注组，n=15）和使用止血带交替缺血及再灌注三个循环、每次5分钟的缺血预处理组（预处理组，n=15）。在止血带打气前、打气后1小时、2小时、6小时及24小时分别测定血气、血浆丙二醛、血清IL-6、IL-8、和IL-10。并计算动脉-肺泡氧分压比值、肺泡-动脉血氧分压差及呼吸指数。

**结果：**与基础值相比教，动脉血Po<sub>2</sub>和动脉血-肺泡氧分压比值均降低，而肺泡-动脉氧分压差和呼吸指数在使用止血带后6小时均增加(P<0.01)。然而，相比于比较缺血再灌注组，缺血预处理组上述变化较小(P<0.01)。同样，血浆丙二醛、血清IL-6、IL-8、和IL-10的增加在止血带打气后2小时到24小时变化较小。

**结论：**下肢手术使用止血带可以造成下肢缺血再灌注损伤，从而损伤肺气交换的能力。止血带缺血预处理可以减弱脂质过氧化及系统性炎症反应，从而减轻肺功能下降。

（陈珺珺译 薛张纲校）

**Background:** Acute lung injury is a recognized complication of lower limb ischemia-reperfusion that has been demonstrated experimentally and in the clinical setting of aortic surgery. The application of a tourniquet can cause lower limb ischemia-reperfusion in orthopedic surgery. We studied the effect of unilateral thigh tourniquet-induced lower limb ischemia-reperfusion on pulmonary function, and the role of ischemic preconditioning in attenuating pulmonary dysfunction.

**Methods:** Thirty ASA I or II patients scheduled for lower extremity surgery were randomized into 2 groups: a limb ischemia-reperfusion group with tourniquet application (ischemia-reperfusion group, n = 15) and an ischemia preconditioning group (preconditioning group, n = 15), in which patients received 3 cycles of 5 minutes of ischemia, alternating with 5 minutes of reperfusion before extended use of the tourniquet. Blood gas, plasma malondialdehyde, and serum interleukin-6 (IL-6), IL-8, and IL-10 levels were measured just before tourniquet inflation, 1 hour after inflation and 2 hours, 6 hours, and 24 hours after tourniquet deflation. Arterial-alveolar oxygen tension ratio, alveolar-arterial oxygen tension difference, and respiratory index also were calculated.

**Results:** In comparison with the baseline values, arterial Po<sub>2</sub> and arterial-alveolar oxygen tension ratio were decreased, while alveolar-arterial oxygen tension difference and respiratory index were increased significantly 6 hours after tourniquet deflation in both groups (P < 0.01). However, these changes were less significant in the ischemic preconditioning group than those in the lower limb ischemia-reperfusion group (P < 0.01). Similarly, the increases in the malondialdehyde, IL-6, and IL-8 from 2 hours to 24 hours

after release of the tourniquet in the lower limb ischemia–reperfusion group were attenuated by ischemic preconditioning.

**Conclusions:** Pulmonary gas exchange is impaired after lower limb ischemia–reperfusion associated with the clinical use of a tourniquet for lower limb surgery. Ischemic preconditioning preceding tourniquet-induced ischemia attenuates lipid peroxidation and systemic inflammatory response and mitigates pulmonary dysfunction.

从脊髓小胶质细胞释放的前列腺素 E<sub>2</sub> 和笑气是依赖于 p38 细胞分裂素活化蛋白激酶的激活

### Release of Prostaglandin E<sub>2</sub> and Nitric Oxide from Spinal Microglia Is Dependent on Activation of p38 Mitogen-Activated Protein Kinase

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**背景：**脊髓通过释放前列腺素(PGs), 氧化亚氮(NO)和细胞因子处理伤害性刺激小胶质细胞。小胶质细胞可能产生这些兴奋介质前体。小胶质细胞拥有 Toll 样受体 4 (TLR4)和神经激肽 1 (NK1) 受体, 这两个受体在外周神经损伤炎症介导的脊髓致敏方面起到重要作用。相应的, 我们测定了被各自靶目标激活的级联反应, 它促使培养的大鼠脊髓小胶质细胞释放 PGE<sub>2</sub>, 并增加亚硝酸盐(NO<sub>2</sub><sup>-</sup>) (NO 的一种标记)。

**方法：**从 Sprague–Dawley 新生鼠身上分离出来的脊髓小胶质细胞通过几种方式培养: 脂多糖(LPS)或 P 物质 (SP) 单独培养, LPS 和 SP 混合培养, LPS 和环氧合酶抑制剂 (COX)、NO 合酶 2 (NOS2)或 p38 细胞分裂素活化蛋白激酶(p38)或米诺环素中培养 24 小时和 48 小时。使用酶免疫测定法和比色法分别测定培养基表面的 PGE<sub>2</sub> 和 NO<sub>2</sub><sup>-</sup> 浓度。

**结果：**应用 of LPS (一种 TLR4 配位体, 0.1 到 10 ng/mL) 培养小胶质细胞可以生成剂量和时间依赖性增长的 PGE<sub>2</sub> 和 NO<sub>2</sub><sup>-</sup> 产物, 然而单独使用 SP 培养基 (一种 NK1 显效剂, 浓度到 10<sup>-5</sup> M) 或混合使用 LPS 没有观察到上述现象。对照试验使用 SC-560 (COX-1 抑制剂)和 SC-236 (COX-2 抑制剂)显示 LPS 导致的 PGE<sub>2</sub> 释放可以通过 COX-1 和 COX-2 增殖。LPS 导致的 NO 释放可以被 1400W, 一种 NOS2 抑制剂抑制。米诺环素, 一种阻断小胶质细胞活化的物质, SB203580, 一种 p38 抑制剂都可以减弱 LPS 导致的 PGE<sub>2</sub> 和 NO 释放。1400W, 在抑制 NO 释放的剂量也可以阻断 PGE<sub>2</sub> 释放。

**结论：**我们发现 (a) 通过 TLR4 而不是 NK1 受体激活的脊髓小胶质细胞可以产生 PGE<sub>2</sub> 和 NO; (b)通过 COX-1 和 COX-2 可以诱发释放 PGE<sub>2</sub>; (c) COX-PGE<sub>2</sub> 通路可以被 p38 和 NOS2 调节。通过我们先前的在体试验, 最近的发现强调了脊髓小胶质细胞表达的 p38 是调节前伤害性刺激的分子如 PGE<sub>2</sub> 和 NO 的关键。

(陈珺珺译 薛张纲校)

**BACKGROUND:** The spinal release of prostaglandins (PGs), nitric oxide (NO), and cytokines has been implicated in spinal nociceptive processing. Microglia represent a possible cell of origin for these proexcitatory mediators. Spinal microglia possess Toll-like receptor 4 (TLR4) and neurokinin 1 (NK1) receptors, and both receptors play a significant role in peripheral nerve injury- and inflammation-induced spinal sensitization. Accordingly, we examined the properties of the cascades activated by the respective targets, which led to the release of PGE<sub>2</sub> and an increase in nitrite (NO<sub>2</sub><sup>-</sup>) (a marker of NO) from cultured rat spinal microglia.

**METHODS:** Spinal microglia isolated from Sprague–Dawley neonatal rats were cultured with lipopolysaccharide (LPS) or substance P (SP) alone, with LPS in combination with SP, and with LPS in the presence of each inhibitor of cyclooxygenase (COX), NO synthase 2 (NOS2) or p38 mitogen-activated protein kinase (p38), or minocycline for 24 hours and 48 hours. Concentrations of PGE<sub>2</sub> and NO<sub>2</sub><sup>-</sup> in culture supernatants were measured using an enzyme immunoassay and a colorimetric assay, respectively.

**RESULTS:** Application of LPS (a TLR4 ligand, 0.1 to 10 ng/mL) to cultured microglia produced a dose- and time-dependent increase in PGE<sub>2</sub> and NO<sub>2</sub><sup>-</sup> production, whereas no effects were observed after incubation with SP (an NK1 agonist, up to 10<sup>-5</sup> M) alone or in combination with LPS. Antagonist studies with SC-560 (COX-1 inhibitor) and SC-236 (COX-2 inhibitor) showed that LPS-induced PGE<sub>2</sub> release was generated from both COX-1 and COX-2. LPS-induced NO release was suppressed by 1400W, an inhibitor of NOS2. Minocycline, an agent blocking microglial activation, and SB203580, an inhibitor of p38, both attenuated the LPS-induced PGE<sub>2</sub> and NO release. The 1400W, at the doses that suppressed NO release, also blocked increased PGE<sub>2</sub> release.

**CONCLUSIONS:** Our findings suggest that (a) activation of spinal microglia via TLR4 but not NK1 receptors produces PGE<sub>2</sub> and NO release from these cells; (b) the evoked PGE<sub>2</sub> release is generated by both COX-1 and COX-2, and (c) the COX-PGE<sub>2</sub> pathway is regulated by p38 and NOS2. Taken together with our previous in vivo work, the current findings emphasize that p38 in spinal microglia is a key player in regulating production of pronociceptive molecules, such as PGE<sub>2</sub> and NO.