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一個關於心血管手術術中自體血回輸有效性的 Meta 分析隨機試驗
The Efficacy of an Intraoperative Cell Saver During Cardiac Surgery: A Meta-Analysis of Randomized Trials
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背景：在心血管手術中也許可以通過自體血回輸來避免同種異基因輸血。也有人提出，從脫落細胞中清除碎片可改善病人的預後，但這也可能會增加中風或神經意識功能障礙的風險。在這次的研究中，我們試圖通過系統性的回顧已發表的隨機控制性試驗，並加以 Meta 分析，來明確在心血管手術中進行自體血回輸的整體安全性和有效性。

方法：我們進行了全面的檢索，找出了關於心血管手術中應用自體血回輸技術的所有隨機試驗。截止到 2008 年 11 月的 MEDLINE, Cochrane 圖書館，EMBASE 和摘要資料庫已被檢索完全。所有將心血管手術中自體血回輸技術應用與否進行比較，並且報導至少一個明確的臨床結果的隨機試驗均被列為研究物件。隨機效應模型被用來依次計算比值比（OR，95%可信區間），二分法加權平均差（WMD，95%可信區間）和連續變數。

結果：包括 2282 位患者在内的 31 個隨機試驗最終被作為研究物件進行 Meta 分析。在心血管手術中，進行術中自體血回輸減少了接觸任何同種異基因血製品（比值比 0.63，95%可信區間：0.43-0.94，P=0.02）以及紅細胞（比值比 0.60，95%可信區間：0.39-0.92，P=0.02）的概率，也降低了平均每位患者輸注同種異基因血製品的總量（加權平均差 -256 mL，95%可信區間：-416 to -95 mL，P=0.002）。但在以下幾個方面進行自體血回輸組與未進行自體血回輸組之間並無差異，包括：院內死亡率（比值比 0.65，95%可信區間：0.25-1.68，P=0.37），術後中風或短暫性缺血性發作（比值比 0.59，95%可信區間：0.20-1.76，P=0.34），房顫（比值比 0.92，95%可信區間：0.69-1.23，P=0.56），腎功能衰竭（比值比 0.86，95%可信區間：0.41-1.80，P=0.70），感染（比值比 1.25，95%可信區間：0.75-2.10，P=0.39），患者接受新鮮冰凍血漿治療（比值比 1.16，95%可信區間：0.82-1.66，P=0.40）以及患者接受血小板輸注治療（比值比 0.90，95%可信區間：0.63-1.28，P=0.55）。

結論：現有的證據表明應用自體血回輸技術可減少心血管手術中患者血製品或紅細胞的輸注。進一步的分析認為，自體血回輸可能只有在用於脫落細胞和（或）或剩餘細胞，或者在整個手術過程中應用時才是有利的。如果只是在心切開術的心肺旁路期應用自體血回輸技術吸引血液，對於血液保存和增加新鮮冰凍血漿輸注是沒有明顯效應的。

（單嘉琪譯 薛張綱校）

BACKGROUND: Cell salvage may be used during cardiac surgery to avoid allogeneic blood transfusion. It has also been claimed to improve patient outcomes by removing debris from shed blood, which may increase the risk of stroke or neurocognitive dysfunction. In this study, we sought to determine the overall safety and efficacy of cell salvage in cardiac surgery by performing a systematic review and meta-analysis of published randomized controlled trials.

METHODS: A comprehensive search was undertaken to identify all randomized trials of cell saver use during cardiac surgery. MEDLINE, Cochrane Library, EMBASE, and abstract databases were searched up to November 2008. All randomized trials comparing cell saver use and no cell saver use in cardiac surgery and reporting at least one predefined clinical outcome were included. The random effects model was used to calculate the odds ratios (OR, 95% confidence intervals [CI]) and the weighted mean differences (WMD, 95% CI) for dichotomous and continuous variables, respectively.

RESULTS: Thirty-one randomized trials involving 2282 patients were included in the meta-analysis. During cardiac surgery, the use of an intraoperative cell saver reduced the rate of exposure to any allogeneic blood product (OR 0.63, 95% CI: 0.43-0.94, P =
0.02) and red blood cells (OR 0.60, 95% CI: 0.39-0.92, P = 0.02) and decreased the mean volume of total allogeneic blood products transfused per patient (WMD -256 mL, 95% CI: -416 to -95 mL, P = 0.002). There was no difference in hospital mortality (OR 0.65, 95% CI: 0.25-1.68, P = 0.37), postoperative stroke or transient ischemia attack (OR 0.59, 95% CI: 0.20-1.76, P = 0.34), atrial fibrillation (OR 0.92, 95% CI: 0.69-1.23, P = 0.56), renal dysfunction (OR 0.86, 95% CI: 0.41-1.80, P = 0.70), infection (OR 1.25, 95% CI: 0.75-2.10, P = 0.39), patients requiring fresh frozen plasma (OR 1.16, 95% CI: 0.82-1.66, P = 0.40), and patients requiring platelet transfusions (OR 0.90, 95% CI: 0.63-1.28, P = 0.55) between cell saver and noncell saver groups.

CONCLUSIONS: Current evidence suggests that the use of a cell saver reduces exposure to allogeneic blood products or red blood cell transfusion for patients undergoing cardiac surgery. Subanalyses suggest that a cell saver may be beneficial only when it is used for shed blood and/or residual blood or during the entire operative period. Processing cardiotomy suction blood with a cell saver only during cardiopulmonary bypass has no significant effect on blood conservation and increases fresh frozen plasma transfusion.

BACKGROUND: In this study, we investigated the effects of propofol infusion on hepatic and pancreatic enzymes and acid-base status compared with baseline values in children undergoing craniotomy who were receiving phenytoin for antiepileptic prophylaxis.

METHODS: In this prospective clinical study, we measured the serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma-glutamyl...
transpeptidase (GGT), alkaline phosphatase (ALP), pancreatic amylase, lipase, and triglyceride levels of 30 children ranging from 4 to 12 yr. All children received propofol anesthesia and were taking phenytoin for antiepileptic prophylaxis. Patients already receiving phenytoin were continued on their medication. Peroral 5 mg x kg(-1) x d(-1) phenytoin was started in patients who were not receiving phenytoin. Serum AST, ALT, GGT, ALP, bilirubin, pancreatic amylase, lipase, and triglyceride levels were studied on admission to the hospital, 1 day before surgery, and on postoperative Days 1, 3, 5, and 7. Arterial blood gas samplings were taken after tracheal intubation, during the operation (2nd and 4th h), just after extubation, and 1, 2, 6, and 12 h after extubation.

**RESULTS:** Serum AST, ALT, GGT, ALP, pancreatic amylase, lipase, and triglyceride levels were increased significantly in the postoperative period compared with baseline with a peak value on postoperative Day 1 and returned to normal values within a week. Base excess levels after extubation were significantly decreased compared with baseline. They were in the normal range, however, and returned to baseline values by 6 h after surgery. There were no clinical signs of hepatitis or pancreatitis. Bilirubin levels were normal. None of the children developed complications related to the liver or pancreas during the 4-6 mo after surgery.

**CONCLUSIONS:** Despite the slightly increased pancreatic and hepatic enzyme levels during the postoperative period, anesthesia maintenance with propofol in children undergoing craniotomy had no significant clinical effect on the acid-base status or pancreas or liver enzymes.
BACKGROUND: There is controversy regarding the relative perioperative benefits of desflurane versus sevoflurane when used for maintenance of anesthesia in the ambulatory setting. Although studies have consistently demonstrated a faster emergence with desflurane (versus sevoflurane), the impact of this difference on the later recovery end points has not been definitively established. Furthermore, the effect of desflurane (versus sevoflurane) on the incidence of coughing is also controversial.

METHODS: We randomized 130 outpatients undergoing superficial surgical procedures requiring general anesthesia to one of two maintenance anesthetic treatment groups. All patients were induced with propofol, 2 mg/kg IV, and after placement of a laryngeal mask airway, anesthesia was maintained with either sevoflurane 1%-3% or desflurane 3%-8% in an air/oxygen mixture. The inspired concentration of the volatile anesthetic was varied to maintain hemodynamic stability and a Bispectral Index value of 50-60. Analgesia was provided with local anesthetic infiltration and ketorolac (30 mg IV). Antiemetic prophylaxis consisted of a combination of ondansetron (4 mg), dexamethasone (4 mg), and metoclopramide (10 mg) at the end of surgery.

Assessments included recovery times to eye opening, response to commands, orientation, fast-track score of 14, first oral intake, sitting, standing, ambulating unassisted, and actual discharge. Patient satisfaction with anesthesia, the ability to resume normal activities on the first postoperative day, adverse side effects (e.g., coughing, purposeful movement, oxygen desaturation <90%, sore throat, postoperative nausea, and vomiting), and the requirement for postoperative analgesic and antiemetic drugs were recorded in the early postoperative period and during the initial 24-h period after discharge.

RESULTS: The two study groups had comparable demographic characteristics. Although the overall incidence of coughing during the perioperative period was higher in the desflurane group (60% versus 32% in the sevoflurane group, P < 0.05), the incidences of coughing during the actual administration of the volatile anesthetics (i.e., the maintenance period) did not differ between the two groups. Emergence from anesthesia was more rapid after desflurane; however, all patients achieved fast-track recovery criteria (fast-track score >or=12) before leaving the operating room. Finally, the time to discharge home (90 +/- 31 min in sevoflurane and 98 +/- 35 min in desflurane, respectively) and the percentage of patients able to resume normal activities on the first postoperative day (sevoflurane 48% and desflurane 60%) did not differ significantly between the two anesthetic groups.

CONCLUSIONS: Use of desflurane for maintenance of anesthesia was associated with a faster emergence and a higher incidence of coughing. Despite the faster initial recovery with desflurane, no significant differences were found between the two volatile anesthetics in the later recovery period. Both volatile anesthetics should be available for ambulatory anesthesia.
一項對 SVV- Vigileo™/FloTrac™ 系統和主動脈多普勒超聲心動圖測定心搏量變異的比較
A Comparison of Stroke Volume Variation Measured by Vigileo™/FloTrac™ System and Aortic Doppler Echocardiography
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背景：這個研究的目的是比較兩種方法測定心搏量變異（SVV），經外周動脈使用 Vigileo™/FloTrac™ 測定 SVV 系統(SVV-FloTrac)，與心臟旁主動脈多普勒超聲心動圖（SVV-Doppler）相比較。

方法：30 名病人行肝移植手術的病人參與此項研究，同時使用 SVV-FloTrac 和 SVV-Doppler 兩種方法分別在容量擴張前後測定 SVV 的值。

結果：SVV-FloTrac 和 SVV-Doppler 在血容量擴張前平均的偏倚為 0.7%，95%的置信區間為 –4.2% 到 5.5%。測定對擴容有無反應的受試者工作曲線的曲線下面積發現，使用 SVV-FloTrac 和 SVV-Doppler 兩種方法測定的結果沒有差異。

結論：SVV-FloTrac 和 SVV-Doppler 顯示的的偏移和置信區間是可以接受的，對於肝移植手術的病人，通過它們測定機體對擴容反應是相似的。

（陳珺珺譯 薛張綱校）

BACKGROUND: The goal of this study was to compare stroke volume variation (SVV) assessed from a peripheral artery with the Vigileo™/FloTrac™ system (SVV-FloTrac) with SVV derived close to the heart by aortic Doppler (SVV-Doppler).

METHODS: Thirty patients undergoing liver transplantation underwent simultaneous SVV-FloTrac and SVV-Doppler measurements before and after intravascular volume expansion.

RESULTS: SVV-FloTrac and SVV-Doppler comparison before intravascular volume expansion showed a mean bias of 0.7%, and 95% limits of agreement of –4.2% to 5.5%. The areas under the receiver operating characteristic curves generated to discriminate responders and nonresponders to intravascular volume expansion were not different for SVV-FloTrac and SVV-Doppler.

CONCLUSIONS: SVV-FloTrac and SVV-Doppler measurements show acceptable bias and limits of agreement, and similar performance in terms of fluid responsiveness in patients undergoing liver transplantation.

原發性肺癌行射頻消融時出現大面積空氣栓塞
Massive Systemic Air Embolism During Percutaneous Radiofrequency Ablation of a Primary Lung Tumor
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我們報導一例原發性肺癌行射頻消融期間出現大面積空氣栓塞的病例。在手術近結束時，患者突然出現心肌梗塞，併發室顫，心臟驟停和腦梗塞。胸部 CT 提示左房，左室，主動脈弓和冠狀動脈有氣液平。頭顱 CT 提示額頂部有梗塞灶。通過心肺復蘇及高壓氧療治療心梗和腦梗是有效的。該種治療腫瘤的方法可能出現嚴重威脅生命的併發症，這就要求訓練有素的麻醉醫生參與麻醉。
We report the case of a systemic air embolism occurring during pulmonary radiofrequency ablation. At the end of the procedure, the patient experienced a sudden myocardial infarction, complicated by ventricular fibrillation, cardiac arrest, and cerebral infarction. Thoracic computed tomography showed an air-blood level inside the left atrium and ventricle, the aortic arch, and the coronary arteries. Cerebral computed tomography showed an infarct in the frontoparietal area. Myocardial infarction and stroke responded to resuscitation measures, including hyperbaric oxygenation. The occurrence of this life-threatening event confirms the need to train experienced anesthesiologists in these new invasive approaches to cancer treatment.

The Effect of Intravenous Alanyl-Glutamine Supplementation on Plasma Glutathione Levels in Intensive Care Unit Trauma Patients Receiving Enteral Nutrition: The Results of a Randomized Controlled Trial

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Background: We sought to investigate the effect of IV alanyl-glutamine supplementation on plasma glutathione levels in severely traumatized patients receiving enteral nutrition.

METHODS: Forty adult patients with severe trauma according to the Injury Severity Score >20 were enrolled in this randomized, controlled study. The patients were assigned to two groups: Group G received 0.5 g · kg⁻¹ · d⁻¹ of alanyl-glutamine dipeptide supplementation IV, and Group C received a control solution without alanyl-glutamine for 7 days. Blood samples were taken for analysis of glutathione before the initiation of supplementation and on the 3rd, 7th, and 10th days of feeding.

RESULTS: Total plasma glutathione levels significantly increased in Group G when compared with Group C on Days 7 and 10 (1.34 ± 0.20 µM vs 1.13 ± 0.14 µM, and 1.38 ± 0.19 µM vs 1.12 ± 0.16 µM) (P < 0.001).

CONCLUSIONS: This study demonstrates that IV alanyl-glutamine supplementation for 7 days increases total plasma glutathione levels in critically ill trauma patients receiving standard enteral nutrition.

A Randomized Trial of the Traditional Sitting Position Versus the Hamstring Stretch Position for Labor Epidural Needle Placement

Background: In a randomised trial: In the use of lumbar epidural needle when compared with traditional sitting position and hamstring stretch position.

Methods: Forty adult patients with severe trauma according to the Injury Severity Score >20 were enrolled in this randomized, controlled study. The patients were assigned to two groups: Group G received 0.5 g · kg⁻¹ · d⁻¹ of alanyl-glutamine dipeptide supplementation IV, and Group C received a control solution without alanyl-glutamine for 7 days. Blood samples were taken for analysis of glutathione before the initiation of supplementation and on the 3rd, 7th, and 10th days of feeding.

Results: Total plasma glutathione levels significantly increased in Group G when compared with Group C on Days 7 and 10 (1.34 ± 0.20 µM vs 1.13 ± 0.14 µM, and 1.38 ± 0.19 µM vs 1.12 ± 0.16 µM) (P < 0.001).

Conclusions: This study demonstrates that IV alanyl-glutamine supplementation for 7 days increases total plasma glutathione levels in critically ill trauma patients receiving standard enteral nutrition.
BACKGROUND: Anecdotal and experimental evidence suggest that a sitting position with maximum knee extension, hip adduction, and forward lean (hamstring stretch position) may produce better reversal of the lumbar lordosis than a traditional sitting position.

METHODS: In a randomized trial during initiation of epidural labor analgesia, we compared the traditional versus hamstring stretch positions. The primary outcome was the number of needle-bone contacts.

RESULTS: The groups were equivalent with respect to the number of needle-bone contacts.

CONCLUSIONS: The hamstring stretch position is equivalent to the traditional sitting position in terms of the number of needle-bone contacts encountered when placing labor epidural needles.

The Long-Term Effects of Mild to Moderate Hypothermia on Gray and White Matter Injury After Spinal Cord Ischemia in Rats
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BACKGROUND: The long-term effects of mild to moderate hypothermia on gray and white matter injury after spinal cord ischemia in rats were investigated.

METHODS: Male Sprague-Dawley rats were divided into four groups based on the levels of cooling (32°C, 35°C, and 38°C) and the duration of hypothermia (2 or 28 days). The groups were further divided into two subgroups, one with spinal cord ischemia and the other with sham operation. The spinal cord was evaluated using histological techniques.

RESULTS: The rats in the 32°C group showed better recovery of motor function and had fewer signs of injury compared to the other groups.

CONCLUSIONS: Mild to moderate hypothermia is effective in reducing the long-term effects of spinal cord ischemia in rats.
Background: The short-term effects of hypothermia on gray matter injury after spinal cord ischemia (SCI) have been established. We sought to investigate the long-term effects of mild to moderate hypothermia on gray and white matter injury after SCI.

Methods: Ninety-five rats were randomly divided into eight groups according to body temperature during SCI (32°C, 35°C, or 38°C) and reperfusion interval (2 or 28 days). SCI was conducted for 15 min using a balloon catheter and blood withdrawal. After assessing the hindlimb motor function, gray and white matter injury was assessed using the number of normal neurons and the extent of vacuolation, respectively.

Results: Hindlimb motor function at 2 and 28 days was significantly better in hypothermic groups of 32°C and 35°C than in the normothermic group. The number of normal neurons at 2 and 28 days was significantly higher in the hypothermic group of 32°C than in the normothermic group. The percentage areas of vacuolation at 2 and 28 days were significantly lower in hypothermic groups of 32°C and 35°C than in the normothermic group.

Conclusions: The neuroprotective effects of intraischemic mild to moderate hypothermia on gray and white matter injury are mostly sustained for a long-term period of 28 days after SCI.

延時持續後路腰叢阻滯對髖關節成形術後健康相關生活品質的影響：一項前瞻性，一年隨訪的隨機、三盲、安慰劑對照研究

Health-related quality of life after hip arthroplasty with and without an extended-duration continuous posterior lumbar plexus nerve block: a prospective, 1-year follow-up of a randomized, triple-masked, placebo-controlled study.

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背景：我們曾報導過，髖關節成形術後，將原本持續一夜的連續後路腰叢阻滯延長至 4 天可以在術後一段時間內提供明顯的好處。然而延時輸注是否可以提高其後健康相關的生活品質還不得而知。

方法：接受髖關節成形術的患者從手術直至第二天早上被施予後路腰叢阻滯，用 0.2% 羅呱卡因神經周圍輸注。其後患者被隨機分成兩組，一組繼續給予羅呱卡因 (n=24)，另一組給予生理鹽水 (n=23)，這項研究實行雙盲。患者帶著導管和可攜式輸注泵出院，在術後第四天拔除導管。健康相關生活品質的衡量使用術前，7 天內，還有術後 1，2，3，6 和 12 個月的西安大略和麥克馬斯特大學骨關節炎 (WOMAC) 指數。WOMAC 指數評價三維的健康相關的生活品質，比如疼痛，僵硬和身體功能障礙（全球評分從 0 到 96 分，較低的評分表明較低程度的症狀和身體殘疾）。為了初步分析，我們需要 6 個時間點中的 3 個，包括第 7 天，第 3，6，12 月中的兩個。

結論：兩個治療組有相似的全球 WOMAC 評分，曲線下平均面積計算（兩組間曲線下平均面積差異點估計【延時輸注組-對照組】=0.8，95%置信區間：-5.3—+6.8【-5.5%—+7.1%】；P=0.80），在所有獨立的時間段（P>0.05）。

背景：We previously reported that extending an overnight continuous posterior lumbar plexus nerve block to 4 days after hip arthroplasty provides clear benefits during the perineural infusion in the immediate postoperative period. However, it remains unknown whether the extended infusion improves subsequent health-related quality of life.

方法：Patients undergoing hip arthroplasty received a posterior lumbar plexus perineural infusion of ropivacaine 0.2% from surgery until the following morning, at which time patients were randomized to continue either perineural ropivacaine (n = 24) or normal saline (n = 23) in a double-masked fashion. Patients were discharged with their catheter and a portable infusion pump, and catheters were removed on postoperative Day 4. Health-related quality of life was measured using the Western Ontario and McMaster Universities Osteoarthritis (WOMAC) Index preoperatively and then at 7 days and 1, 2, 3, 6, and 12 mo after surgery. The WOMAC evaluates three dimensions of health-related quality of life, such as pain, stiffness, and physical functional disability (global score of 0-96, lower scores indicate lower levels of symptoms or physical disability). For inclusion in the primary analysis, we required a minimum of three of the six timepoints, including Day 7 and at least two of Months 3, 6, and 12.

結果：The two treatment groups had similar global WOMAC scores for the mean area under the curve calculations (point estimate for the difference in mean area under the curve for the two groups [extended infusion group-overnight infusion group] = 0.8, 95% confidence interval: -5.3 to +6.8 [-5.5% to +7.1%]; P = 0.80) and at all individual timepoints (P > 0.05).

結論：This investigation found no evidence that extending an overnight continuous posterior lumbar plexus nerve block to 4 days improves (or worsens) subsequent health-related quality of life between 7 days and 12 mo after hip arthroplasty.

腹腔鏡子宮切除術後地塞米松的有效鎮痛劑量
The Effective Analgesic Dose of Dexamethasone After Laparoscopic Hysterectomy
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BACKGROUND: Apart from being antiemetic, glucocorticoids have an analgesic property. The optimal dose of dexamethasone in the management of pain after surgery has not been established. In this placebo-controlled, dose-finding study, we evaluated the analgesic effect of three doses of dexamethasone after laparoscopic hysterectomy.

METHODS: We randomized 129 women scheduled for laparoscopic hysterectomy to receive placebo, dexamethasone 5 mg (D5), 10 mg (D10), or 15 mg (D15) IV before the induction of anesthesia. The patients were anesthetized with propofol and remifentanil in a standardized manner. Until the first postoperative morning, postoperative pain was managed with IV oxycodone using patient-controlled analgesia. The visual analog scale scores for pain and side effects, and the amounts of the analgesics were recorded for 3 days after surgery.

RESULTS: The total dose of oxycodone (0-24 h after surgery) was smaller in the D15 (0.34 mg/kg [0.11-0.87]) group than in the placebo group (0.55 mg/kg [0.19-1.13]) (P = 0.003). The doses of oxycodone during Hours 0-2 after surgery were smaller in the D10 (0.17 mg/kg [0.03-0.36]) and D15 (0.17 mg/kg [0.03-0.35]) groups than in the placebo (0.26 mg/kg [0.03-0.48]) group (P < 0.001, D10 versus placebo; P < 0.001, D15 versus placebo). During Hours 2-24 after surgery, however, the doses of oxycodone were equal in the placebo, D5, D10, and D15 groups (0.31 mg/kg [0.03-0.78], 0.22 mg/kg [0.03-0.92], 0.24 mg/kg [0.05-0.87], and 0.20 mg/kg [0.06-0.65], respectively). The visual analog scale scores for pain at rest, in motion, or at cough did not differ in the study groups. The incidence of dizziness was lower in the D15 group than in the placebo group (P = 0.001), the D5 group (P = 0.006), and the D10 group (P = 0.030) during the first 24 h after surgery. During the later course of recovery, the incidence of dizziness did not differ among the four study groups.

CONCLUSIONS: IV dexamethasone 15 mg before induction of anesthesia decreases the oxycodone consumption during the first 24 h after laparoscopic hysterectomy.
During first 2 h after surgery, dexamethasone 10 mg reduces the oxycodone consumption as effectively as the 15 mg dose.

**kappa阿片受體激動劑對初級感覺神經元上的抗河豚毒鈉通道的影響**

*The effect of kappa-opioid receptor agonists on tetrodotoxin-resistant sodium channels in primary sensory neurons.*

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**背景**: 在動物及人體試驗中已有報導 kappa阿片受體激動劑(kappa-ORAs)可抑制脊髓背根神經節(DRGs)的非阿片受體介導的鈉通道，產生抗傷害作用。在此研究中，我們仔細觀察不同結構 kappa-ORAs 對成年鼠 DRGs 上的抗河豚毒(TTX-r)鈉通道的抑制作用。

**方法**: 記錄試驗用成年鼠脊髓背根神經節(DRGs)完整細胞的抗河豚毒(TTX-r)鈉離子流。研究不同結構 kappa-ORAs 抑制 TTX-r 鈉通道的能力。

**結果**: 消旋的 kappa-ORA，(+/-)U50,488，通過電壓依賴方式抑制 TTX-r 鈉離子流，半抑制濃度 IC(50)在 49 和 8μM 之間，分別在-100 和 -40 mV 產生預電位。此外，我們發現 kappa-ORA U50,488 的活性異構體 1S,2S U50,488 和非活性異構體 1R,2R U50,488 對 TTX-r 鈉離子流的抑制效力相同。然而，鈉通道抑制剤和 kappa-ORA 的構效關係有明顯不同，因為另外一種 kappa-ORA (ICI 204,488) 對 TTX-r 鈉通道無效。我們通過研究(+/-)U50,488 發現這類複合物對鈉通道的阻滯作用是通過優先與 TTX-r 鈉通道相互作用使其處於慢性失活狀態並妨礙其復活。

**結論**: 我們的結果暗示 TTX-r 鈉通道可被多種 kappa-ORAs 通過非阿片受體依賴性機制抑制。雖然通過抑制鈉通道產生的的效力明顯弱于阿片受體介導的作用，但這類複合物仍可起到一定的抗傷害作用。

（張釗譯 薛張綱校）

**BACKGROUND**: A non-opioid receptor-mediated inhibition of sodium channels in dorsal root ganglia (DRGs) by kappa-opioid receptor agonists (kappa-ORAs) has been reported to contribute to the antinoceptive actions in animals and humans. In this study, we examined structurally diverse kappa-ORAs for their abilities to inhibit tetrodotoxin-resistant (TTX-r) sodium channels in adult rat DRGs.

**METHODS**: Whole-cell recordings of TTX-r sodium currents were performed on cultured adult rat DRGs. Structurally diverse kappa-ORAs were studied for their abilities to inhibit TTX-r sodium channels.

**RESULTS**: The racemic kappa-ORA, (+/-)U50,488, inhibited TTX-r sodium currents in a voltage-dependent manner, yielding IC(50) values of 49 and 8 μM, at prepulse potentials of -100 and -40 mV, respectively. Furthermore, we found that both the kappa-ORA U50,488 active enantiomer 1S,2S U50,488 and the inactive enantiomer 1R,2R U50,488 were equally potent inhibitors of TTX-r sodium currents. Structurally related kappa-ORAs, such as BRL 52537 and ICI 199,441 also inhibited TTX-r sodium currents. However, sodium channel inhibition and kappa-opioid receptor agonism have a distinct structure-activity relationship because another kappa-ORA (ICI 204,488) was inactive versus TTX-r sodium channels. We further investigated the sodium channel block of this class of compounds by studying (+/-)U50,488. (+/-)U50,488 was found to preferentially interact with the slow inactivated state of TTX-r sodium channels and to retard recovery from inactivation.

**CONCLUSION**: Our results suggest that TTX-r sodium channels can be inhibited by many kappa-ORAs via an opioid receptor-independent mechanism. Although the
potency for sodium channel inhibition is typically much less than apparent affinity for opioid receptors, sodium channel block may still contribute to the antinociceptive effects of this class of compounds.

Preinsertion Paramedian Ultrasound Guidance for Epidural Anesthesia

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BACKGROUND: Ultrasound is receiving growing interest for improving the guidance of needle insertion in epidural anesthesia. Defining a paramedian ultrasound scanning technique would be helpful for correctly identifying the vertebral level. Finding surrogate measures of the depth of the epidural space may also improve the ease of scanning.

METHODS: We examined 20 parturients with pre-epidural ultrasound in the paramedian plane, and the predicted depth was compared with the actual midline depth. The actual depth was also compared with subject biometrics, depth of transverse process, and thickness of lumbar fat.

RESULTS: The scanning technique allowed the depth of the epidural space to be measured in all subjects. The depth measured in ultrasound was strongly correlated to the actual depth ($R^2 = 0.8$ and 95% limits of agreement $–14.8$ to $5.2$ mm), unlike patient biometrics ($R^2 < 0.25$), the depth of the neighboring transverse processes ($R^2 = 0.35$ and 95% limits of agreement $–13.8$ to $19.1$ mm), or the thickness of overlying fat ($R^2 = 0.66$). The duration of the ultrasound scan was 10 min at the beginning of the trial and 3 min for the last subjects.

CONCLUSIONS: Paramedian ultrasound can be used to estimate the midline depth to the epidural space. The surrogate measures are not sufficiently correlated with the depth to the epidural space to recommend them as a replacement for the actual depth to the epidural space measurement.
布比卡因與 Pegylated 脂質體結合
Bupivacaine Binding to Pegylated Liposomes

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背景：局麻藥比如布比卡因過量可以造成嚴重毒性。脂質體乳液被提出用來治療這類併發症。脂質體因為它的特殊結構和表面電荷使其有很高的親和力，因此可以使布比卡因從溶劑中清除從而達到治療局麻藥過量的作用。

方法：我們研究了離體緩衝液中，單層、多層的陰離子聚合體外層包裹的脂質體結合布比卡因的能力，從而評估其藥物親和力。同時在人血清中進行該項結合試驗，從而和能與藥物分子結合的血清蛋白相比較。

結果：1.45 和 2.9 mg/mL 的單層脂質體分別從緩衝液種分離了 60%–65% 和 77%–85%的布比卡因。在各種濃度下，增加脂質負荷都可以增加藥物的攝取。(在 5, 20, 35, and 50 µM 的 P 值分別 = 0.001, 0.002, <0.001, 和 0.003 )。多層脂質體每單位體積結合更多藥物，磷脂濃度為 1.45 mg /mL 時結合了 71%–90% 的布比卡因。我們比較了 1.45 mg/mL 濃度下的單層和多層脂質體,多層脂質體對於四種藥物濃度中的三種有較好的作用(在濃度為 5, 20, 35 和 50 µM 時，P 分別 = 0.002, 0.001, 0.001 和 0.08)。在人血清樣本中，在布比卡因的濃度為 5, 20, 35, and 50 µM 時,單層脂質體(2.9 mg/mL 濃度的脂質體)分別降低了未結合(游離)藥物 36% (P = 0.037), 56% (P = 0.022), 47% (P = 0.042),和 50% (P = 0.018)。

結論：在緩衝液和人血清中，陰離子 pegylated 脂質體可以很好的結合布比卡因。這一結果提示，通過藥物重分佈，靜脈注射脂質體可以用來治療布比卡因中毒。

（陳珺珺譯 薛張綱校）

BACKGROUND: Local anesthetic drugs, such as bupivacaine, can cause severe toxicity. Lipid emulsions have been proposed and used clinically for treating such cases. Liposomes may be an alternative for overdose treatment because of their unique structures and surface charges, which allows them to act as high affinity drug "sinks" and remove bupivacaine from solution.

METHODS: We conducted in vitro experiments with unilamellar and multilamellar anionic, polymer-coated liposomes to determine the amount of bupivacaine bound to liposomes in buffer solutions as a means of assessing the liposome-drug affinity. Binding experiments were also done in human serum to determine the liposomes’ ability to compete with serum proteins for binding drug molecules.

RESULTS: Unilamellar liposomes sequestered 60%–65% and 77%–85% of bupivacaine from buffer at 1.45 and 2.9 mg lipid/mL, respectively. The increased lipid loading increased the drug uptake at all drug concentrations measured (P = 0.001, 0.002, <0.001, and 0.003 for 5, 20, 35, and 50 µM, respectively). Multilamellar liposomes bound more drug per unit mass, with 71%–90% of the total bupivacaine bound at a phospholipid concentration of 1.45 mg lipid/mL. When comparing unilamellar and multilamellar liposomes at 1.45 mg lipid/mL, the multilamellar liposomes were significantly better at 3 of the 4 drug concentrations measured (P = 0.002, 0.001, 0.001, and 0.08 for 5, 20, 35, and 50 µM, respectively). In human serum samples, unilamellar liposomes (2.9 mg lipid/mL) reduced the unbound (free) drug by 36% (P = 0.037), 56% (P = 0.022), 47% (P = 0.042), and 50% (P = 0.018) for bupivacaine concentrations of 5, 20, 35, and 50 µM, respectively.

CONCLUSIONS: The anionic, pegylated liposomes exhibit high binding for bupivacaine, both in buffer and in human serum. These results suggest that an IV
injection of liposomes could be useful for the treatment of bupivacaine toxicity through drug redistribution.

The Association of Hemodilution and Transfusion of Red Blood Cells with Biochemical Markers of Splanchnic and Renal Injury During Cardiopulmonary Bypass

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BACKGROUND: Hemodilution is the main cause of a low hematocrit concentration during cardiopulmonary bypass. This low hematocrit may be insufficient for optimal tissue oxygen delivery and often results in packed cell transfusion. Our objective in this study was to find a relationship between intraoperative hematocrit and allogeneic blood transfusion on release of postoperative injury markers from the kidneys and the splanchnic area.

METHODS: Fifty consecutive patients undergoing coronary artery bypass grafting with cardiopulmonary bypass were included. Systemic tissue hypoxia was assessed by lactate concentrations. Kidney and splanchnic ischemia were assessed by the measurement of N-acetyl-β-D-glucosaminidase (NAG) and intestinal fatty acid binding protein (IFABP) in urine. Patients were retrospectively placed into groups according to their lowest hematocrit concentration on bypass (<24% or ≥24%).

RESULTS: The intraoperative lactate and the postoperative NAG and IFABP concentrations were higher in the low hematocrit group (<24%) than in the high hematocrit group (≥24%; P < 0.05). Low hematocrit correlated with higher lactate concentrations (R² = 0.150, P < 0.01) and with higher NAG concentrations (R² = 0.138, P < 0.01) and IFABP concentrations (R² = 0.107, P < 0.01) postoperatively. Transfusion of packed cells during cardiopulmonary bypass correlated with higher lactate (R² = 0.089, P < 0.05), NAG (R² = 0.431, P < 0.01), and IFABP concentrations (R² = 0.189, P < 0.01).

CONCLUSIONS: The results support the concept that hemodilution below an intraoperative hematocrit of 24% and consequently transfusion of red blood cells is related to release of injury markers of the kidneys and splanchnic area.
Children with Infantile Neuronal Ceroid Lipofuscinosis Have an Increased Risk of Hypothermia and Bradycardia During Anesthesia

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BACKGROUND: Neuronal ceroid lipofuscinoses (NCLs) are a group of autosomal recessive neurodegenerative diseases characterized by lysosomal accumulation of autofluorescent material in neurons and other cell types. The infantile NCL (INCL) subtype is rare (1 in >100,000 births), the most devastating of childhood subtypes, and is caused by mutations in the gene CLN1, which encodes palmitoyl-protein thioesterase-1.

METHODS: To investigate the incidence of hypothermia and bradycardia during general anesthesia in patients with INCL, we conducted a case-control study to examine the perianesthetic course of patients with INCL and of controls receiving anesthesia for diagnostic studies.
RESULTS: Eight children with INCL (mean age 25 mo [range, 10-32] at first anesthetic) and 25 controls (mean age 44 mo [range, 18-92]) underwent 62 anesthetics for nonsurgical procedures. Patients with INCL had neurologic deficits including developmental delay, myoclonus, and visual impairment. Patients with INCL had lower baseline temperature (36.4 ± 0.1 vs 36.8 ± 0.1, INCL versus controls, \( P < 0.007 \)), and during anesthesia, despite active warming techniques, had significantly more hypothermia (18 vs 0 episodes, \( P < 0.001 \)) and sinus bradycardia (10 vs 1, \( P < 0.001 \)) compared with controls. INCL diagnosis was significantly associated with temperature decreases during anesthesia (\( P < 0.001 \)), whereas age, sex, and duration of anesthesia were not (\( P = \text{NS} \)).

CONCLUSIONS: We report that patients with INCL have lower baseline body temperature and during general anesthesia, despite rewarming interventions, are at increased risk for hypothermia and bradycardia. This suggests a previously unknown INCL phenotype, impaired thermoregulation. Therefore, when anesthetizing these children, careful monitoring and routine use of warming interventions are warranted.

失血性休克對豬模型中異丙酚的腦電流描記和止動效應的影響

The Influence of Hemorrhagic Shock on the Electroencephalographic and Immobilizing Effects of Propofol in a Swine Model

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背景：失血性休克增加了異丙酚的催眠作用，但失血性休克對異丙酚的止動效應的影響尚無定論。

方法：24 只用異氟烷吸入麻醉的豬 (30.3 ± 3.6 kg) 被隨機分到對照組 (n = 12) 或失血性休克組 (n = 12)。休克組的動物流血至平均動脈壓達到 50mmHg，且維持在這一水準 60 分鐘。在異氟烷吸人停止後，異丙酚以 50 mg · kg⁻¹ · h⁻¹ 輸注直到每 2 分鐘應用懸蹄鉗夾法覓察無體動。測量異丙酚濃度的動脈血樣在每次鉗夾懸蹄前收集，同時監測腦電雙頻指數 (BIS)。用 BIS 比作用部位濃度的 S 形曲線抑制最大效應模型和體動的機率比作用部位濃度的對數回歸分析進行藥效動力學分析。

結果：達到比基礎 BIS 值減少 50% 及有害刺激後無體動所需要的異丙酚劑量因失血性休克分別減少 54% 和 38%。失血性休克減少了產生 50% 的 BIS 最大效應的作用部位濃度（從 11.6 ± 3.8 到 9.1 ± 1.7 µg/mL）及產生 50% 體動的機率的作用部位濃度（從 26.8 ± 1.0 到 20.6 ± 1.0 µg/mL）。

結論：結果顯示失血性休克增加了異丙酚的催眠和止動效應，是因為藥代學和藥效學的改變，其中兩種效應的藥效學變化程度相似。

（唐李雋 譯 馬皓琳 李士通 校）

BACKGROUND: Hemorrhagic shock increases the hypnotic effect of propofol, but the influence of hemorrhagic shock on the immobilizing effect of propofol is not fully defined.

METHODS: Twenty-four swine (30.3 ± 3.6 kg) were anesthetized by inhalation of isoflurane and randomly assigned to either a control (n = 12) or a hemorrhagic shock (n = 12) group. Animals in the shock group were bled to a mean arterial blood pressure of 50 mm Hg and maintained at this level for 60 min. After isoflurane inhalation was stopped, propofol was infused at 50 mg · kg⁻¹ · h⁻¹ until no movement was observed after application of a dewclaw clamp every 2 min. Arterial samples for measurement of the propofol concentration were collected just before each use of the dewclaw clamp.
and the Bispectral Index (BIS) was also recorded. Analysis of the pharmacodynamics was performed using a sigmoidal inhibitory maximal effect model for BIS versus effect-site concentration and a logistic regression analysis for the probability of movement versus effect-site concentration.

RESULTS: The propofol doses needed to reach a 50% decrease from baseline BIS, and no movement after noxious stimuli were reduced by hemorrhagic shock by 54% and 38%, respectively. Hemorrhagic shock decreased the effect-site concentration that produced 50% of the maximal BIS effect from 11.6 ± 3.8 to 9.1 ± 1.7 µg/mL and that producing a 50% probability of movement from 26.8 ± 1.0 to 20.6 ± 1.0 µg/mL.

CONCLUSIONS: The results show that hemorrhagic shock increases both the hypnotic and immobilizing effects of propofol due to pharmacokinetic and pharmacodynamic alterations, with the changes in pharmacodynamics occurring to a similar extent for both effects.

Lack of Effect of Aprepitant or Its Prodrug Fosaprepitant on QTc Intervals in Healthy Subjects

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背景: 单次 115mg 剂量的福沙吡坦——NK1 受体拮抗剂阿瑞吡坦前体药物的静脉制剂与 125mg 口服的阿瑞吡坦生物效价相等。迄今, 福沙吡坦/阿瑞吡坦对 QTc 间期未显示有临床意义的作用。本研究旨在证实上述发现。

方法: 本次双盲、有效对照、随机、三阶段交叉研究是评估 200mg 福沙吡坦对年轻健康受试者 QTc 间期的作用。每阶段受试者按照随机顺序接受 400mg 莫西沙星口服、200mg 福沙吡坦静脉注射或安慰剂。通过 12 小时心电图 (ECGs) 评估福沙吡坦对 QTc 间期的作用。每位受试者在每个阶段的 QTc 间期基础值为给药前 ECGs 中提取 5 个重覆基础 QTc 间期的平均值。给药前、给药后 2、5、10、15、20、30、45 分钟及 1、1.5、2、3、4、6 和 8 小时测定 ECGs。通过一个适用于交叉研究设计的重复测定混合模型评估个体 QTc 间期相对于基础值的改变值。计算福沙吡坦相对于安慰剂和莫西沙星对安慰剂在不同时点对于 QTc 间期与基础值的实际差异的双侧 90%可信限 (CI)。

结果: 给予福沙吡坦 200mg 后, 在 Tmax 平均 (95%CI) QTc 间期与基础值差值为 –1.45 (–4.67 to 1.77) ms, 安慰剂校正平均 (90%CI) QTc 间期与基础值差值为 s –1.37 (–4.78 to 2.05) ms。α=0.05 时两者都不具有统计学意义。给予 400mg 莫西沙星后 2 小时平均 (95%CI) QTc 间期与基础值差值为 9.71 (6.49–12.93) ms, 给予莫西沙星 Tmax 时安慰剂校正平均 (90%CI) QTc 间期与基础值差值为 10.50 (7.09–13.92) ms。α=0.05 时两者均具有统计学意义。给予福沙吡坦 200mg 后阿瑞吡坦的最高血药浓度为 6300 ng/mL (比历史上给予 115mg 福沙吡坦 [3095 ng/mL]、125mg 阿瑞吡坦 [1600 ng/mL] 和 40mg 阿瑞吡坦 [675 ng/mL] 后测得的血药浓度分别约 2 倍、4 倍和 9 倍)。

结论: 在接受福沙吡坦 200mg 的受试者中未发现有任何时间点有任任何有临床意义的 QTc 间期延长, 并且给予莫西沙星 400mg 后在接近莫西沙星 Tmax 时和附加的时间点发现 QTc 间期延长。如此大剂量的福沙吡坦和随之而来的阿瑞吡坦高血浆浓度却未造成 QTc 延长, 该现象支持临床剂量的福沙吡坦或阿瑞吡坦与 QTc 间期显著延长无关的预期。

（周雅春 譯 李士通 馬皓琳 校）
BACKGROUND: A single 115-mg dose of fosaprepitant, the IV prodrug of the NK₁ receptor antagonist aprepitant, is bioequivalent to a 125-mg dose of oral aprepitant. Thus far, fosaprepitant/aprepitant has not shown a meaningful effect on QTc intervals; in this study, we sought to confirm these findings.

METHODS: This double-blind, active-controlled, randomized, three-treatment, three-period, crossover study in healthy young subjects evaluated the effect of a 200-mg dose of fosaprepitant on QTc prolongation. In each period, subjects received 400 mg moxifloxacin per os, 200 mg fosaprepitant IV, or placebo in randomized sequence. The effect of fosaprepitant on QTc interval was assessed by 12-lead electrocardiograms (ECGs). The baseline value for QTc interval for each subject during each period was defined as the average of five replicate baseline QTc intervals extracted from predose ECGs. ECGs were performed at predose, 2, 5, 10, 15, 20, 30, 45 min; and 1, 1.5, 2, 3, 4, 6, and 8 h postinfusion. Values for individual QTc change from baseline were evaluated in a repeated-measures mixed model appropriate for a crossover design. A two-sided 90% confidence interval (CI) for the true difference in QTc interval change from baseline at each timepoint was calculated for fosaprepitant versus placebo and for moxifloxacin versus placebo.

RESULTS: After fosaprepitant 200-mg administration, the mean (95% CI) QTc interval change from baseline at $T_{\text{max}}$ was $-1.45 (-4.67$ to $1.77)$ ms, and the placebo-corrected mean (90% CI) QTc interval change from baseline was $-1.37 (-4.78$ to $2.05)$ ms. Neither was statistically significant at $\alpha = 0.05$. After 400 mg moxifloxacin administration, the mean (95% CI) QTc interval change from baseline at 2 h was $9.71 (6.49–12.93)$ ms, and the placebo-corrected mean (90% CI) QTc interval change from baseline at moxifloxacin $T_{\text{max}}$ was $10.50 (7.09–13.92)$ ms. Both were statistically significant at $\alpha = 0.05$. The maximum aprepitant concentration after fosaprepitant 200 mg administration was $6300$ ng/mL (approximately twofold, fourfold, and ninefold higher than that observed historically with fosaprepitant 115 mg [3095 ng/mL], aprepitant 125 mg [1600 ng/mL], and aprepitant 40 mg [675 ng/mL]).

CONCLUSIONS: In subjects receiving fosaprepitant 200 mg, no clinically meaningful increases in QTc were seen at any timepoint, whereas after moxifloxacin 400 mg, increases were observed at the approximate $T_{\text{max}}$ of moxifloxacin and additional timepoints. The lack of QTc increase at this high dose of fosaprepitant and resulting aprepitant plasma exposures support the expectation that clinical doses of fosaprepitant or aprepitant will not be associated with significant QTc prolongation.

在機器人輔助的根治性前列腺切除術中傾斜度較大的頭低腳高位對眼內壓的影響

The Effects of Steep Trendelenburg Positioning on Intraocular Pressure During Robotic Radical Prostatectomy

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方法：在本次前瞻性研究中，我們對30位接受機器人輔助前列腺切除術的病人通過特大號的張力記錄筆（Tono-pen®）測量了眼內壓。我們測量了病人麻醉前清醒仰臥位時（基礎值T1）、麻醉後水平臥位時（T2）、麻醉後腹部充入二氧化碳（CO₂）後(T3)，麻醉後處於傾斜度較大的頭低腳高位時（T4）、手術結束時位於傾斜度較大的頭低腳高位時(T5)、蘇醒前仰臥位時(T6)、蘇醒後一小時位於仰臥位時(T7)的眼內壓。

結果：傾斜度較大的頭低腳高位結束時（T5）的眼內壓平均值比仰臥位 T1 值高了13.3 ± 0.58 (平均值±標準誤) mm Hg (P < 0.0001)，以 mm Hg 為單位的各時點眼內壓值的最小二乘方評估值如下：T1 = 15.7, T2 = 10.7, T3 = 14.6, T4 = 25.2, T5 = 29.0, T6 = 22.2, T7 = 17.0。通過單變數混合效應模型來研究 T1–T5 的時間段，氣道壓峰值、平均動脈壓、ETco₂ 和時間是眼內壓增加的顯著預測因數，而年齡、體重指數、失血量、靜脈輸液量、平均氧飽和度和麻醉藥的濃度對眼內壓沒有預測性。術後手術時間（單位 min）和 ETco₂ 值是僅有的能顯著預測眼內壓升高的因數。校正手術時間後，ETco₂ 每升高 1 mm Hg 眼內壓平均增加 0.21 mm Hg。校正 ETco₂ 後，手術每用時 1 min，眼內壓平均增加 0.05 mm Hg。

結論：眼內壓值在傾斜度較大的頭低腳高位結束時（T5）達到峰值，比麻醉前誘導（T1）值平均高了 13 mm Hg。在頭低腳高位時（T4到T5 時段），手術持續時間和 ETco₂ 值是眼內壓升高的僅有的顯著預測因素。

（姜旭暉譯，馬皓琳，李士通校）

BACKGROUND: Intraocular pressure (IOP) increases in steep Trendelenburg positioning, but the magnitude of the increase has not been quantified. In addition, the factors contributing to this increase have not been studied in robot-assisted prostatectomy cases. In this study, we sought to quantify the changes in IOP and examine perioperative factors responsible for these changes while patients are in the steep Trendelenburg position during robotic prostatectomy.

METHODS: In this prospective study, we measured IOP using a Tono-pen® XL in 33 patients undergoing robot-assisted prostatectomy. The IOP was measured before anesthesia while supine and awake (baseline T1), anesthetized and supine (T2), anesthetized after insufflation of the abdomen with carbon dioxide (CO₂) (T3), anesthetized in steep Trendelenburg (T4), anesthetized in steep Trendelenburg at the end of the procedure (T5), anesthetized supine before awakening (T6), and 1 hr after awakening in the supine position (T7).

RESULTS: On average, IOP was 13.3 ± 0.58 (mean ± se) mm Hg higher at the end of the period of steep Trendelenburg position (T5) compared with supine position T1 (P < 0.0001). The least square estimates for each time point in mm Hg were as follows: T1 = 15.7, T2 = 10.7, T3 = 14.6, T4 = 25.2, T5 = 29.0, T6 = 22.2, T7 = 17.0. Using univariate mixed effects models for the T1–T5 time periods, peak airway pressure, mean arterial blood pressure, ETco₂, and time were significant predictors of the IOP increase, whereas age, body mass index, blood loss, volume of IV fluid administered, mean airway pressure, and desflurane concentration were not predictive. In T4–T5, which involved no significant positional or perioperative interventions, we performed a multivariate analysis to evaluate predictors of IOP increases. Surgical duration (in minutes) and ETco₂ were the only significant variables predicting changes in IOP during stable and prolonged Trendelenburg positioning. On average, IOP increased 0.21 mm Hg per mm Hg increase in ETco₂ after adjusting for time. An increase of 0.05 mm Hg in IOP per minute of surgery on average was observed during this period in the Trendelenburg position after adjusting for ETco₂.
CONCLUSIONS: IOP reached peak levels at the end of steep Trendelenburg position (T5), on average 13 mm Hg higher than the preanesthesia induction (T1) value. Surgical duration and ETco2 were the only significant predictors of IOP increase in the Trendelenburg position (T4–T5).

Background: Ryder 創傷中心是一個每年接受將近 3800 名急診病人的 1 級創傷中心。在本研究中，我們希望測定醫院前氣管插管 (PHI) 的失敗發生率，它和醫院內死亡率的關係以及和 PHI 有關的可能危險因素。

Methods: 我們對 2003 年 8 月至 2006 年 6 月期間接受過緊急醫院前氣道管理且人院的創傷患者做了一項前瞻性觀察研究。PHI 定義為嘗試插管後初次評估確定氣管內插管位置不正確或者需要採取其他氣道管理設備來作為急救措施。

Results: 1320 名患者一抵達創傷中心便由一位麻醉醫生進行了緊急氣道干預。其中 203 名最初是由急救醫療中心的人員在事發地點就進行氣管插管的，203 名中的 74 名 (36%) 得以倖存到出院。評估氣管插管的成功率時，203 名中有 63 名 (31%) 達到了醫院前氣管插管失敗的標準，它們都需要再次氣管插管，63 名中只有 18 名 (29%) 得以倖存到出院。這些病人通過雙腔通氣管 (Combitube®) (n = 28)、喉面罩導氣管 (Laryngeal Mask Airway®) (n = 6)，或者環甲膜切開 (n = 4) 得到緊急的氣道管理。63 名患者中的另外 25 名 (12%) 在到達創傷中心時進行的初次氣道評估中才被發現導管在食道裏。我們發現正確插管和沒有正確插管的患者之間死亡率沒有差別。其他指標包括年齡、性別、體重、受傷機制、有無面部損傷以及急救醫療服務都和氣管插管失敗發生率增加之間沒有聯繫。

Conclusion: 這項前瞻性研究顯示在一個大城市創傷中心中的醫院前氣管插管失敗發生率為 31%。我們發現正確插管和沒有正確插管的患者之間死亡率沒有差別。我們支持在醫院外的條件下不能迅速氣管插管的重症創傷病人中使用皮囊活瓣面罩是適當的氣道管理方法。
airway management provided either via Combitube® (n = 28), Laryngeal Mask Airway® (n = 6), or a cricothyroidotomy (n = 4). An additional 25 of 63 patients (12%) had unrecognized esophageal intubations discovered upon the initial airway assessment performed on arrival. We found no difference in mortality between those patients who were properly intubated and those who were not. Several other variables, including age, gender, weight, mechanism of injury, presence of facial injuries, and emergency medical services were not correlated with an increased incidence of failed intubations. **CONCLUSION:** This prospective study showed a 31% incidence of failed PHI in a large metropolitan trauma center. We found no difference in mortality between patients who were properly intubated and those who were not, supporting the use of bag-valve-mask as an adequate method of airway management for critically ill trauma patients in whom intubation cannot be achieved promptly in the prehospital setting.

**Continuous Electroencephalogram Monitoring in the Intensive Care Unit**

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Because of recent technical advances, it is now possible to record and monitor the continuous digital electroencephalogram (EEG) of many critically ill patients simultaneously. Continuous EEG monitoring (cEEG) provides dynamic information about brain function that permits early detection of changes in neurologic status, which is especially useful when the clinical examination is limited. Nonconvulsive seizures are common in comatose critically ill patients and can have multiple negative effects on the injured brain. The majority of seizures in these patients cannot be detected without cEEG. cEEG monitoring is most commonly used to detect and guide treatment of nonconvulsive seizures, including after convulsive status epilepticus. In addition, cEEG is used to guide management of pharmacological coma for treatment of increased intracranial pressure. An emerging application for cEEG is to detect new or worsening brain ischemia in patients at high risk, especially those with subarachnoid hemorrhage. Improving quantitative EEG software is helping to make it feasible for cEEG (using full
scalp coverage) to provide continuous information about changes in brain function in real time at the bedside and to alert clinicians to any acute brain event, including seizures, ischemia, increasing intracranial pressure, hemorrhage, and even systemic abnormalities affecting the brain, such as hypoxia, hypotension, acidosis, and others. Monitoring using only a few electrodes or using full scalp coverage, but without expert review of the raw EEG, must be done with extreme caution as false positives and false negatives are common. Intracranial EEG recording is being performed in a few centers to better detect seizures, ischemia, and peri-injury depolarizations, all of which may contribute to secondary injury. When cEEG is combined with individualized, physiologically driven decision making via multimodality brain monitoring, intensivists can identify when the brain is at risk for injury or when neuronal injury is already occurring and intervene before there is permanent damage. The exact role and cost-effectiveness of cEEG at the current time remains unclear, but we believe it has significant potential to improve neurologic outcomes in a variety of settings.

全麻中原始腦電圖波形的實用性: 藝術和科學
Practical Use of the Raw Electroencephalogram Waveform During General Anesthesia: The Art and Science
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Quantitative electroencephalogram (qEEG) monitors are often used to estimate depth of anesthesia and intraoperative recall during general anesthesia. As with any monitor, the processed numerical output is often misleading and has to be interpreted within a clinical context. For the safe clinical use of these monitors, a clear mental picture of the expected raw electroencephalogram (EEG) patterns, as well as a knowledge of the common EEG artifacts, is absolutely necessary. This has provided the motivation to write this tutorial. We describe, and give examples of, the typical EEG features of adequate general anesthesia, effects of noxious stimulation, and adjunctive drugs. Artifacts are commonly encountered and may be classified as arising from outside the head, from the head but outside the brain (commonly frontal electromyogram), or from within the brain (atypical or pathologic). We include real examples of clinical problem-solving processes. In particular, it is important to realize that an artifactually high qEEG index is relatively common and may result in dangerous anesthetic drug overdose. The anesthesiologist must be certain that the qEEG number is consistent with the apparent
state of the patient, the doses of various anesthetic drugs, and the degree of surgical 
stimulation, and that the qEEG number is consistent with the appearance of the raw 
EEG signal. Any discrepancy must be a stimulus for the immediate critical examination 
of the patient's state using all the available information rather than reactive therapy to 
"treat" a number.

A Comparison Between Sevoflurane and Desflurane Anesthesia in Patients 
Undergoing Craniotomy for Supratentorial Intracranial Surgery

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BACKGROUND: Desflurane in neurosurgery may be beneficial because it facilitates 
postoperative early neurologic evaluation. However, its use has been debated because 
of its capacity to promote cerebral vasodilatation. Sevoflurane has been extensively 
used in neurosurgical patients. In this prospective clinical trial, we compared early 
postoperative recovery and cognitive function in patients undergoing craniotomy for 
supratentorial expanding lesions and receiving sevoflurane or desflurane anesthesia.

METHODS: One hundred twenty patients, ASA physical status I–III (66 men), 
Glasgow Coma Scale 15, undergoing craniotomy for supratentorial expanding lesions 
were enrolled in the study. Patients were randomly allocated to two anesthetic regimens. 
In Group S (60 patients, 52 ± 16 yr), anesthesia was maintained using sevoflurane with 
end-tidal of 1.5%-2% and was age adjusted to obtain approximately 1.2 minimum 
alveolar anesthetic concentration. In Group D (60 patients, 60 ± 14 yr), anesthesia was 
maintained using desflurane with end-tidal of 6%-7% and was age adjusted to obtain 
approximately 1.2 minimum alveolar concentration. Emergence time was measured as 
the time from drug discontinuation to the time at which patients opened their eyes;
tracheal extubation time was measured as the time from anesthetic discontinuation and tracheal extubation. Recovery time was measured as the time elapsing from discontinuation of anesthetic and the time when patients were able to recall their name and date of birth. Cognitive behavior was evaluated with the Short Orientation Memory Concentration Test. In the postanesthesia care unit, a blinded observer monitored the patients for 3 h; the incidence of hemodynamic events, pain, nausea, and shivering requiring rescue medication was recorded.

RESULTS: The mean emergence time (12.2 ± 4.9 min in Group S vs 10.8 ± 7.2 min in Group D; \( P = \text{ns} \)) was similar in the two groups, whereas the mean extubation time and recovery time were longer in Group S (15.2 ± 3.0 min in Group S vs 11.3 ± 3.9 min in Group D and 18.2 ± 2.3 min in Group S vs 12.4 ± 7.7 min in Group D, respectively; \( P < 0.001 \)). The Short Orientation Memory Concentration Test score differed between the two groups only at the earliest assessment (15 min after extubation). No difference between the two groups was found in pain, shivering, nausea, vomiting, and incidence of postoperative hemodynamic events.

CONCLUSION: Patients who received desflurane had a shorter extubation and recovery time but similar intraoperative and postoperative incidence of complications compared with those who received sevoflurane.

災難化想法是否可預測 I 型慢性複雜區域疼痛綜合徵患者行脊髓刺激治療的預後？

Can the Outcome of Spinal Cord Stimulation in Chronic Complex Regional Pain Syndrome Type I Patients Be Predicted by Catastrophizing Thoughts?

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背景：在本研究中，我們探討了疼痛災難化是否可預測 I 型複雜區域疼痛綜合徵 (CRPS-I) 患者行脊髓刺激治療 (SCS) 的預後。

方法：32 名慢性 CRPS-I 患者參與了此次前瞻性研究，對測試刺激有正回應後接受永久性脊髓刺激。測試刺激前先進行基線值評估，包括關於一般情況變數、疾病資訊、疼痛強度、疼痛災難化以及健康相關的生活品質 (QOL) 的問題。植入刺激器 9 個月後行訪評估，包括疼痛強度、感知的總效應 (GPE) 以及 QOL。成功的脊髓刺激定義為：視覺類比評分得出疼痛強度至少降低 50% 或 GPE 為“有很大改善”或“完全無痛”。

結果：9 個月後，38% 和 53% 的患者分別在疼痛強度降低和 GPE 方面有成功的預後。此外，QOL 有幾項明顯提高。儘管如此，我們沒有發現疼痛災難化對脊髓刺激在降低疼痛強度、GPE 或 QOL 方面的有效性有預測價值。

結論：這個研究顯示疼痛災難化不能預測脊髓刺激對定義明確的慢性 CRPS-I 患者在降低疼痛強度、GPE 和 QOL 方面的有效性。因此我們得出結論，CRPS-I 患者發生高水準的疼痛災難化並不是脊髓刺激療法的禁忌證。

（張瑩譯 马皓琳 李士通校）

BACKGROUND: In this study, we examined whether pain catastrophizing is a predictor of spinal cord stimulation (SCS) outcome in patients with complex regional pain syndrome type I (CRPS-I).

METHODS: Participants in this prospective cohort study were 32 patients with chronic CRPS-I, who received permanent SCS after a positive response to test stimulation. Baseline assessment was performed before test stimulation and included questions on
demographic variables, disease information, pain intensity, pain catastrophizing, and health-related quality of life (QOL). Follow-up assessment was performed 9 mo after final implantation and included pain intensity, global perceived effect (GPE), and QOL. Successful SCS outcome was defined as a reduction of pain intensity of at least 50% on a visual analog scale or "much improved" or "total pain relief" on GPE.

**RESULTS:** After 9 months, 38% of the patients had a successful outcome in reduced pain intensity and 53% of the patients in GPE. In addition, improvements were apparent on several of the domains of QOL. However, no evidence was found for the predictive value of pain catastrophizing on the efficacy of SCS in reduction of pain intensity, GPE, or QOL.

**CONCLUSIONS:** This study showed that the efficacy of SCS in reduction of pain intensity, GPE, and QOL in a well-defined chronic CRPS-I population was not predicted by pain catastrophizing. Therefore, we conclude that a high level of pain catastrophizing in patients with CRPS-I is not a contraindication for SCS treatment.

**The Antinociceptive Effects of Intravenous Dexmedetomidine in Colorectal Distension-Induced Visceral Pain in Rats: The Role of Opioid Receptors**

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**BACKGROUND:** In comparison with cutaneous pain, the role of α2-adrenoceptor (α2-AR) agonists in visceral pain has not been extensively examined. We aimed to characterize the antinociceptive effect of IV dexmedetomidine on visceral pain in rats and to determine whether antinociception thus produced is mediated by opioid receptors.

**METHODS:** Male Sprague Dawley rats (250–300 g) were instrumented with a venous catheter for drug administration and with enameled nichrome electrodes for electromyography of the external oblique muscles. Colorectal distension (CRD) was used as the noxious visceral stimulus, and the visceromotor response to CRD was
quantified electromyographically before and 5, 15, 30, 60, 90, and 120 min after dexmedetomidine or clonidine administration. Antagonists were administered 10 min before dexmedetomidine. After confirmation of normal distribution of data, one-way analysis of variance with the Tukey-Kramer post hoc test was used for multiple comparison.

RESULTS: IV administration of dexmedetomidine (2.5–20 µg/kg) and clonidine (10–80 µg/kg) produced a dose-dependent reduction in visceromotor response with 50% effective dose values of 10.5 and 37.6 µg/kg, respectively. Administration of the nonspecific α2-AR antagonist yohimbine (1 mg/kg), but not the peripherally restricted α2-AR antagonist MK-467 (1 mg/kg), abolished the antinociceptive effect of dexmedetomidine (10 µg/kg). In addition, inhibition of opioid receptors by naloxone (1 mg/kg) attenuated the antinociceptive effect of dexmedetomidine.

CONCLUSION: Our data indicate that IV dexmedetomidine exerts pronounced antinociception against CRD-induced visceral pain and suggest that the antinociceptive effect of dexmedetimidine is mediated in part by opioid receptors, but peripheral α2-ARs are not involved.

Rat Dorsal Horn Nociceptive-Specific Neurons Are More Sensitive Than Wide Dynamic Range Neurons to Depression by Immobilizing Doses of Volatile Anesthetics: An Effect Partially Reversed by the Opioid Receptor Antagonist Naloxone
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背景：揮發性麻醉劑產生止動效應的機制和在脊髓內的作用部位未明。尚未有研究直接比較其對有脊髓內介導疼痛資訊傳遞的特殊功能性特點的神經元的麻醉效應。

方法：成年雄性大鼠麻醉後行腰段脊髓背角細胞外單位記錄。鑒別疼痛特異性（NS）和廣動態範圍（WDR）神經元，在0.8和1.2倍肺泡最低麻醉藥有效濃度（MAC）的氟烷或異氟烷麻醉下評價熱痛誘發的神經元尖峰頻率。在另外的研究組，評價0.8、1.2MAC氟烷和1.2MAC氟烷加靜脈納洛酮（0.1mg/kg）時熱痛誘發的NS神經元反應。

結果：將氟烷劑量從0.8MAC增加到1.2MAC使NS神經元（n=9）對熱痛反應由827 ± 122次/分（均數±標準誤）減至343 ± 48次/分（P < 0.05），但不減少熱誘發的WDR神經元反應（n=9）（由617 ± 79次/分變為547 ± 78次/分）。將異氟烷劑量從0.8MAC增加到1.2MAC使NS神經元（n=9）對熱痛反應由890 ± 339減到188 ± 97次/分（P < 0.05），而不改變WDR神經元（n=9）的反應（誘發棘波頻率從576 ± 132次/分變為601 ± 119次/分）。在另外分開的一組中，當氟烷劑量從0.8MAC增加到1.2MAC時，NS神經元反應由282 ± 60次/分減至74 ± 32次/分（P < 0.05）。靜注納洛酮使其對熱痛的反應增加至155 ± 46次/分（P < 0.05）。

結論：在1MAC左右增加氟烷和異氟烷的劑量能抑制脊髓腰段背角NS神經元而非WDR神經元。這種抑制作用（至少是氟烷）可部分被阿片拮抗劑納洛酮所逆轉。由於阿片受體不可能與揮發性麻醉藥產生止動作用的機制有關，本結果提示，儘管神經元的抑制程度很大並且與止動作用同時發生，但它可能在麻醉最終效應的產生中並非起主要作用。

（顏濤譯，馬皓琳李士通校）
BACKGROUND: The mechanism and site of action within the spinal cord by which volatile anesthetics produce immobility are not well understood. Little work has been done directly comparing anesthetic effects on neurons with specific functional characteristics that mediate transfer of nociceptive information within the spinal cord.

METHODS: Adult male rats were anesthetized and prepared for extracellular single-unit recordings from the lumbar dorsal horn. Nociceptive-specific (NS) and wide dynamic range (WDR) neurons were identified and noxious heat-evoked neuronal spike rates evaluated at 0.8 and 1.2 anesthetic minimum alveolar anesthetic concentration (MAC) halothane or isoflurane. In another group, noxious heat-evoked responses from NS neurons were evaluated at 0.8, 1.2 MAC halothane, and 1.2 MAC halothane plus IV naloxone (0.1 mg/kg).

RESULTS: Increasing halothane from 0.8 to 1.2 MAC reduced the heat-evoked neuronal responses of NS neurons \((n = 9)\) from \(827 \pm 122\) (mean \(\pm\) se) to \(343 \pm 48\) spikes/min \((P < 0.05)\) but not WDR neurons \((n = 9)\), \(617 \pm 79\) to \(547 \pm 78\) spikes/min. Increasing isoflurane from 0.8 to 1.2 MAC reduced the heat-evoked neuronal response of NS neurons \((n = 9)\) from \(890 \pm 339\) to \(188 \pm 97\) spikes/min \((P < 0.05)\) but did not alter the response of WDR neurons \((n = 9)\) in which evoked spike rate went from \(576 \pm 132\) to \(601 \pm 119\) spikes/min. In a separate group, the response of NS neurons went from \(282 \pm 60\) to \(74 \pm 32\) spikes/min \((P < 0.05)\) when halothane was increased from 0.8 to 1.2 MAC. IV administration of naloxone increased the heat-evoked response to \(155 \pm 46\) spikes/min \((P < 0.05)\).

CONCLUSIONS: NS but not WDR neurons in the lumbar dorsal horn are depressed by peri-MAC increases of halothane and isoflurane. This depression, at least with halothane, can be partially reversed by the opioid antagonist naloxone. Given that opioid receptors are not likely involved in the mechanisms by which volatile anesthetics produce immobility, this suggests that, although the neuronal depression is of substantial magnitude and occurs concurrent to the production of immobility, it may not play a major role in the production of this anesthetic end point.

超聲引導下單次或三次注射技術的鎖骨下阻滯的比較：一個前瞻性隨機對照研究

A Comparison of a Single or Triple Injection Technique for Ultrasound-Guided Infraclavicular Block: A Prospective Randomized Controlled Study

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Anesth Analg 2009; 109:668-672

背景：超聲引導下使用單次或多次注射局麻藥進行鎖骨下阻滯能被報導有很好的成功率。我們假設在每個神經索上獨立注射局麻藥能加快完全感覺神經阻滯的起效。我們設計這個前瞻性隨機研究來比較使用單次或三次注射局麻藥達到完全感覺神經阻滯的比率。

方法：計畫行手部、腕部或者肘部手術的患者列入研究範圍內。所有的阻滯都在超聲引導下進行。在 S 組（單次注射），30ml 的 1.5％甲呱卡因注射在腋動脈後部。在 T 組（三次注射），分別在腋動脈的後部、中部、側部注射 10ml 的 1.5％的甲呱卡因。感覺神經阻滯的評估每 3 分鐘一次，一直到阻滯後 30 分鐘。主要終點為在 15 分鐘時完全感覺神經阻滯的比率。
結果：49例和51例患者隨機分到S組和T組。在15分鐘和每個時間間隔一直到30分鐘時感覺阻滯完全的比率相當（15分鐘時S組84%，T組78%，P=0.61）。兩組之間的併發症發生率在統計學上沒有顯著性差異。

結論：與在鎖骨靜脈後部單次注射比較，三次注射局麻藥不能提高超聲引導下鎖骨下阻滯後完全感覺阻滯的成功率和增快起效。

（唐亮譯 馬皓琳 李士通校）

BACKGROUND: Good success rates have been reported with ultrasound-guided infraclavicular block using one or multiple injections of local anesthetic. We hypothesized that a separate injection of local anesthetics on each cord enhances the onset of complete sensory block. We designed this prospective randomized study to compare the rate of complete sensory block using one or three injections of local anesthetic.

METHODS: Patients scheduled for hand, wrist, or elbow surgery were included in this study. All blocks were performed under ultrasound guidance. In Group S (single injection), 30 mL of mepivacaine 1.5% was injected posterior to the axillary artery. In Group T (triple injections), 10 mL of mepivacaine 1.5% was injected on the posterior, medial, and lateral aspects of the axillary artery. Sensory block was evaluated every 3 min up to 30 min. The primary end point was the rate of complete sensory block at 15 min.

RESULTS: Forty-nine and 51 patients were randomized in Groups S and T, respectively. The rate of complete sensory block was comparable at 15 min (Group S: 84%, Group T: 78%, P = 0.61) and at each time interval up to 30 min. There was no statistically significant difference in the rate of complications between the two groups.

CONCLUSIONS: The success rate and the onset of complete sensory block after ultrasound-guided infraclavicular block are not enhanced by a triple injection of local anesthetic compared with a single injection posterior to the axillary artery.

在體外迴圈期間血液稀釋和紅細胞輸注與腎臟和脾臟損傷的生化標記的關係
The Association of Hemodilution and Transfusion of Red Blood Cells with Biochemical Markers of Splanchnic and Renal Injury During Cardiopulmonary Bypass

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背景：在體外迴圈期間血液稀釋是低紅細胞壓積的主要原因。這種低紅細胞壓積可能不足以用於最佳的組織氧運輸，常會導致血細胞輸注。本文主要研究術中紅細胞壓積和異體輸血之間的聯繫對術後腎臟和脾臟部位損傷標記釋放的影響。

方法：50例選擇性在體外迴圈下行冠脈搭橋術的病人。用乳酸鹽濃度評估全身組織缺氧情況。用尿N-乙醯-β-D-氨基葡萄糖苷酶(NAG)和腸脂肪酸結合蛋白(IFABP)測定來評估腎臟和脾臟缺血狀況。根據病人的最低紅細胞壓積回顧性分為兩組(<24%或≥24%)。

結果：術中乳酸和術後NAG和IFABP濃度在紅細胞壓積低於24%時比紅細胞壓積高於24%時高(P < 0.05)。低紅細胞壓積與高乳酸濃度(R² = 0.150, P < 0.01)、術後高NAG濃度(R² = 0.138, P < 0.01)和高IFABP濃度(R² = 0.107, P < 0.01)都相關。體外迴圈期間血細胞輸注與高乳酸(R² = 0.089, P < 0.05)、高NAG(R² = 0.431, P < 0.01)和高IFABP(R² = 0.189, P < 0.01)相關。

結論：本研究結果支持術中血液稀釋使術中血細胞比容低於24%以及隨後的輸血都與腎臟和脾臟部位損傷標記的釋放有關。
BACKGROUND: Hemodilution is the main cause of a low hematocrit concentration during cardiopulmonary bypass. This low hematocrit may be insufficient for optimal tissue oxygen delivery and often results in packed cell transfusion. Our objective in this study was to find a relationship between intraoperative hematocrit and allogeneic blood transfusion on release of postoperative injury markers from the kidneys and the splanchnic area.

METHODS: Fifty consecutive patients undergoing coronary artery bypass grafting with cardiopulmonary bypass were included. Systemic tissue hypoxia was assessed by lactate concentrations. Kidney and splanchnic ischemia were assessed by the measurement of N-acetyl-β-d-glucosaminidase (NAG) and intestinal fatty acid binding protein (IFABP) in urine. Patients were retrospectively placed into groups according to their lowest hematocrit concentration on bypass (<24% or ≥24%).

RESULTS: The intraoperative lactate and the postoperative NAG and IFABP concentrations were higher in the low hematocrit group (<24%) than in the high hematocrit group (≥24%; P < 0.05). Low hematocrit correlated with higher lactate concentrations ($R^2 = 0.150$, $P < 0.01$) and with higher NAG concentrations ($R^2 = 0.138$, $P < 0.01$) postoperatively. Transfusion of packed cells during cardiopulmonary bypass correlated with higher lactate ($R^2 = 0.089$, $P < 0.05$), NAG ($R^2 = 0.431$, $P < 0.01$), and IFABP concentrations ($R^2 = 0.189$, $P < 0.01$).

CONCLUSIONS: The results support the concept that hemodilution below an intraoperative hematocrit of 24% and consequently transfusion of red blood cells is related to release of injury markers of the kidneys and splanchnic area.

Children with Infantile Neuronal Ceroid Lipofuscinosi Have an Increased Risk of Hypothermia and Bradycardia During Anesthesia

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背景: 神經元蠟樣脂質沉積症（NCLs）是一組常染色體隱性遺傳的神經變性疾病，其特徵是在神經元和其他細胞類型的溶酶體內自體熒光物質蓄積。嬰兒NCL（INCL）亞型是罕見的（超過一百萬初生兒中有一例），最具災難性的兒童亞型，它是由編碼棕櫚醯蛋白硫酯酶-1的CLN1基因突變引起。

方法: 為研究INCL患兒在全麻期間低體溫和心動過緩的發生率，我們使用病例對照研究檢查INCL患兒和對照兒童接受麻醉進行診斷性研究的麻醉過程。
**Results:** 8 INCL patients (mean age 25 months [range: 10-32 months]) and 25 controls (mean age 44 months [range: 18-92 months]) underwent 62 anesthetics for non-surgical procedures. INCL patients had neurologic deficits including developmental delay, myoclonus, and visual impairment. INCL patients had lower baseline temperature (36.4 ± 0.1 vs 36.8 ± 0.1°C, INCL vs controls, *P* < 0.007), and during anesthesia, despite active warming techniques, had significantly more hypothermia (18 vs 0 episodes, *P* < 0.001) and sinus bradycardia (10 vs 1, *P* < 0.001) compared with controls. INCL diagnosis was significantly associated with temperature decreases during anesthesia (*P* < 0.001), whereas age, sex, and duration of anesthesia were not (*P* = NS).

**Conclusions:** We report that patients with INCL have lower baseline body temperature and during general anesthesia, despite rewarming interventions, are at increased risk for hypothermia and bradycardia. This suggests a previously unknown INCL phenotype, impaired thermoregulation. Therefore, when anesthetizing these children, careful monitoring and routine use of warming interventions are warranted.

**Background:** Neuronal ceroid lipofuscinoses (NCLs) are a group of autosomal recessive neurodegenerative diseases characterized by lysosomal accumulation of autofluorescent material in neurons and other cell types. The infantile NCL (INCL) subtype is rare (1 in >100,000 births), the most devastating of childhood subtypes, and is caused by mutations in the gene *CLN1*, which encodes palmitoyl-protein thioesterase-1.

**Methods:** To investigate the incidence of hypothermia and bradycardia during general anesthesia in patients with INCL, we conducted a case-control study to examine the perianesthetic course of patients with INCL and of controls receiving anesthesia for diagnostic studies.

**Results:** Eight children with INCL (mean age 25 months [range, 10-32] at first anesthetic) and 25 controls (mean age 44 months [range, 18-92]) underwent 62 anesthetics for non-surgical procedures. Patients with INCL had neurologic deficits including developmental delay, myoclonus, and visual impairment. Patients with INCL had lower baseline temperature (36.4 ± 0.1 vs 36.8 ± 0.1°C, INCL vs controls, *P* < 0.007), and during anesthesia, despite active warming techniques, had significantly more hypothermia (18 vs 0 episodes, *P* < 0.001) and sinus bradycardia (10 vs 1, *P* < 0.001) compared with controls. INCL diagnosis was significantly associated with temperature decreases during anesthesia (*P* < 0.001), whereas age, sex, and duration of anesthesia were not (*P* = NS).

**Conclusions:** We report that patients with INCL have lower baseline body temperature and during general anesthesia, despite rewarming interventions, are at increased risk for hypothermia and bradycardia. This suggests a previously unknown INCL phenotype, impaired thermoregulation. Therefore, when anesthetizing these children, careful monitoring and routine use of warming interventions are warranted.