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CARDIOVASCULAR ANESTHESIOLOGY:

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

單嘉琪譯 薛張綱校

The Efficacy of an Intraoperative Cell Saver During Cardiac Surgery: A Meta-Analysis of Randomized Trials

Guyan Wang, Daniel Bainbridge, Janet Martin, and Davy Cheng

Anesth Analg 2009 109: 320-330.

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

彭中美 譯 馬皓琳 李士通 校

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

Rien A. J. M. Huybregts, Roel de Vroege, Evert K. Jansen, Anne W. van Schijndel, Herman M. T. Christiaans, and Willem van Oeveren

Anesth Analg 2009 109: 331-339.

PEDIATRIC ANESTHESIOLOGY:

應用苯妥英的開顱手術患兒輸注丙泊酚對其肝、胰功能及酸城平衡狀態的影響

范羽譯 薛張綱校

The Effects of Propofol Infusion on Hepatic and Pancreatic Function and Acid-Base Status in Children Undergoing Craniotomy and Receiving Phenytoin

Hatice Türe, Arzu Mercan, Ozge Koner, Bora Aykac, and Ugur Türe

Anesth Analg 2009 109: 366-371.

患嬰兒神經元蠟樣質脂褐質沉積症的兒童在麻醉期間低體溫和心動過緩的風險增加

王宏 譯，馬皓琳，李士通 校

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

Ning Miao, Sondra W. Levin, Eva H. Baker, Rafael C. Caruso, Zhongjian Zhang, Andrea Gropman, Deloris Koziol, Robert Wesley, Anil B. Mukherjee, and Zenaide M. N. Quezado

Anesth Analg 2009 109: 372-378.

AMBULATORY ANESTHESIOLOGY:

地氟烷與七氟烷用於門診病人手術麻醉維持時近期和遠期蘇醒狀態以及嗆咳反應的對比

黃劍譯 薛張綱校

Desflurane Versus Sevoflurane for Maintenance of Outpatient Anesthesia: The Effect on Early Versus Late Recovery and Perioperative Coughing

Paul F. White, Jun Tang, Ronald H. Wender, Roya Yumul, O. Jameson Stokes, Alexander Sloninsky, Robert Naruse, Robert Kariger, Evelyn Norel, Steven Mandel, Tom Webb, and Alan Zaentz

Anesth Analg 2009 109: 387-393.

ANESTHETIC PHARMACOLOGY:

失血性休克對豬模型中異丙酚的腦動電流描記和止動效應的影響

唐李雋 譯 馬皓琳 李士通 校

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

Tadayoshi Kurita, Kotaro Takata, Koji Morita, Yoriko Morishima, Masahiro Uraoka, Takasumi Katoh, and Shigehito Sato

Anesth Analg 2009 109: 398-404.

阿瑞吡坦或其前體藥物福沙吡坦對健康受試者 QTc 間期無影響

周雅春 譯 李士通 馬皓琳 校

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

Thomas C. Marbury, Bo Jin, Deborah Panebianco, M. Gail Murphy, Hong Sun, Judith K. Evans, Tae H. Han, Marvin L. Constanzer, James Dru, and Craig R. Shadle

Anesth Analg 2009 109: 418-425.

TECHNOLOGY, COMPUTING, AND SIMULATION:

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

陳珺珺譯 薛張綱校

A Comparison of Stroke Volume Variation Measured by Vigileo™/FloTrac™ System and Aortic Doppler Echocardiography (Brief Report)

Matthieu Biais, Karine Nouette-Gaulain, Stéphanie Roullet, Alice Quinart, Philippe Revel, and François Sztark

Anesth Analg 2009 109: 466-469.

PATIENT SAFETY:

在機器人輔助的根治性前列腺切除手術中傾斜度較大的頭低腳高位對眼內壓的影響

姜旭暉譯，馬皓琳，李士通校

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

Hamdy Awad, Scott Santilli, Matthew Ohr, Andrew Roth, Wendy Yan, Soledad Fernandez, Steven Roth, and Vipul Patel

Anesth Analg 2009 109: 473-478.

原發性肺癌行射頻消融時出現大面積空氣栓塞

陳珺珺譯 薛張綱校

Massive Systemic Air Embolism During Percutaneous Radiofrequency Ablation of a Primary Lung Tumor (Case Report)

Aude Jeannin, Pierre Saignac, Jean Palussière, Jean-Pierre Gékière, Edouard Descat, and Fabrice Lakdja

Anesth Analg 2009 109: 484-486.

CRITICAL CARE AND TRAUMA:

醫院前氣管插管和死亡率：1 級創傷中心的觀察

黃佳佳譯，馬皓琳，李士通校

Prehospital Intubations and Mortality: A Level 1 Trauma Center Perspective

Miguel A. Cobas, Maria Alejandra De la Peña, Ronald Manning, Keith Candiotti, and Albert J. Varon

Anesth Analg 2009 109: 489-493.

靜脈給予丙氨酸－穀氨醯胺來補充重症監護室中行場內營養的創傷病人血漿谷胱

陳珺珺譯 薛張綱校

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 (Brief Report)

Ahmet Eroglu

Anesth Analg 2009 109: 502-505.

重症監護室內的持續腦電監測

黃麗娜 譯 馬皓琳 李士通 校

Continuous Electroencephalogram Monitoring in the Intensive Care Unit (Review Article)

Daniel Friedman, Jan Claassen, and Lawrence J. Hirsch

Anesth Analg 2009 109: 506-523.

OBSTETRIC ANESTHESIOLOGY:

一項隨機試驗：在行腰段硬膜外穿刺時使用傳統坐位與腘繩肌腱伸展體位的比較

陳珺珺譯 薛張綱校

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

Kyle S. Fisher, Alan T. Arnholt, Michal E. Douglas, Scott L. Vandiver, and Daniel H. Nguyen

Anesth Analg 2009 109: 532-534.

NEUROSURGICAL ANESTHESIOLOGY AND NEUROSCIENCE:

全麻中原始腦電圖波形的實用性：藝術和科學

裘毅敏譯，馬皓琳、李士通校

Practical Use of the Raw Electroencephalogram Waveform During General Anesthesia: The Art and Science (Special Article)

Cambell Bennett, Logan J. Voss, John P. M. Barnard, and James W. Sleigh

Anesth Analg 2009 109: 539-550.

輕至中度灰白質低溫對大鼠脊髓缺血後的長期療效

姚敏敏譯 薛張綱校

The Long-Term Effects of Mild to Moderate Hypothermia on Gray and White Matter Injury After Spinal Cord Ischemia in Rats

Toshinori Horiuchi, Masahiko Kawaguchi, Naoko Kurita, Satoki Inoue, Mitsutoshi Nakamura, Noboru Konishi, and Hitoshi Furuya

Anesth Analg 2009 109: 559-566.

七氟醚和地氟醚麻醉用於開顱幕上手術患者的比較

朱 慧譯 馬皓琳 李士通校

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

Giuseppina Magni, Italia La Rosa, Guido Melillo, Angela Savio, and Giovanni Rosa

Anesth Analg 2009 109: 567-571.

ANALGESIA:

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

俞佳譯 薛張綱校

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

Brian M. Ilfeld, Scott T. Ball, Peter F. Gearen, Edward R. Mariano, Linda T. Le, Krista Vandenborne, Pamela W. Duncan, Daniel I. Sessler, F. Kayser Enneking, Jonathan J. Shuster, Rosalita C. Maldonado, and R. Scott Meyer

Anesth Analg 2009 109: 586-591.

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

張瑩譯 馬皓琳 李士通校

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

Inge E. Lamé, Madelon L. Peters, Jacob Patijn, Alfons G. Kessels, José Geurts, and Maarten van Kleef

Anesth Analg 2009 109: 592-599.

腹腔鏡子宮切除術後地塞米松的有效鎮痛劑量

張玥琪譯，薛張綱校

The Effective Analgesic Dose of Dexamethasone After Laparoscopic Hysterectomy

Ritva M. Jokela, Jouni V. Ahonen, Minna K. Tallgren, Pia C. Marjakangas, and Kari T. Korttila

Anesth Analg 2009 109: 607-615.

靜脈注射右美托咪啶對大鼠結直腸擴張誘導的內臟痛的鎮痛效應：阿片受體的作用

黃施偉 譯，馬皓琳 李士通 校

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

Fatma Ulger, Ayhan Bozkurt, S. Sirri Bilge, Fatih Ilkaya, Ahmet Dilek, M. Ömer Bostanci, Engin Çiftcioglu, and Fuat Güldogus

Anesth Analg 2009 109: 616-622.

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

張釗譯 薛張綱校

The Effect of □-Opioid Receptor Agonists on Tetrodotoxin-Resistant Sodium Channels in Primary Sensory Neurons

Xin Su, Neil A. Castle, Brett Antonio, Rosemarie Roeloffs, James B. Thomas, Douglas S. Krafte, and Mark L. Chapman

Anesth Analg 2009 109: 632-640.

大鼠背角疼痛特異性神經元比廣動態範圍神經元對止動劑量揮發性麻醉劑的抑制作用更加敏感：一種可被阿片受體拮抗劑納洛酮部分逆轉的效應

顏濤 譯， 馬皓琳 李士通校

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

Linda S. Barter, Earl E. Carstens, Steven L. Jinks, and Joseph F. Antognini

Anesth Analg 2009 109: 641-647.

穿刺前旁正中超聲指導硬膜外麻醉

朱蘭芳譯 薛張綱校

Preinsertion Paramedian Ultrasound Guidance for Epidural Anesthesia

Denis Tran, Allaudin A. Kamani, Victoria A. Lessoway, Carly Peterson, King Wei Hor, and Robert N. Rohling

Anesth Analg 2009 109: 661-667.

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

唐亮 譯 馬皓琳 李士通 校

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

Marie-Christine Desgagnés, Simon Lévesque, Nicolas Dion, Marie-Josée Nadeau, Dany Coté, Jean Brassard, Pierre C. Nicole, and Alexis F. Turgeon

Anesth Analg 2009 109: 668-672.

布比卡因與 **Pegylated** 脂質體結合

陳珺珺譯 薛張綱校

Bupivacaine Binding to Pegylated Liposomes

Brett A. Howell and Anuj Chauhan

Anesth Analg 2009 109: 678-682.

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 位患者在內的 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.

應用苯妥英的開顱手術患兒輸注丙泊酚對其肝、胰功能及酸堿平衡狀態的影響

The effects of propofol infusion on hepatic and pancreatic function and acid-base status in children undergoing craniotomy and receiving phenytoin.

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背景：此項研究針對以應用苯妥英為抗癲癇預防藥物的開顱手術患兒，探討輸注丙泊酚後，肝酶、胰酶及酸堿平衡狀態較之基線值的變化和影響。
方法：此次前瞻性臨床研究共測量 30 名 4 至 12 歲患兒血清中的穀草轉氨酶（AST）、穀丙轉氨酶（ALT）、γ-穀氨醯胺轉移酶（GGT）、鹼性磷酸酶（ALP）、胰澱粉酶、脂肪酶及甘油三酯水準。所有患兒均接受丙泊酚麻醉並使用苯妥英作為抗癲癇的預防用藥。對於已使用苯妥英者繼續其先前治療方案；尚未接受苯妥英的患兒則需以 5mg/kg/d 的初始劑量口服給藥。血清 AST、ALT、GGT、ALP、膽紅素、胰澱粉酶、脂肪酶及甘油三酯水準分別於入院後、術前 1 天及術後第 1、3、5、7 天進行測量。插管後、手術期間（第 2 和第 4 小時）、拔管即刻及拔管後第 1、2、6、12 小時需對動脈血氣進行採樣。
結果：與基線值相比，術後患兒血清中的 AST、ALT、GGT、ALP、胰澱粉酶、脂肪酶及甘油三酯水平均顯著提高，且術後第 1 天達到峰值，並於術後一星期內恢復正常範圍。堿剩餘在拔管後較基線值明顯下降，儘管仍處於正常值範圍內，但通常需手術後 6 小時才可恢復至原先基線水準。研究過程中所有患兒均未出現肝炎和胰腺炎的臨床徵象。膽紅素水準也屬正常。未有患兒在術後 4 至 6 月內發生肝胰相關的臨床併發症。
結論：對於實施開顱手術的患兒，儘管其術後肝酶、胰酶水準輕度增加，但應用丙泊酚進行麻醉維持並不會對肝酶、胰酶及酸堿平衡狀態產生顯著的臨床效應。（范羽譯 薛張綱校）

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.

地氟烷與七氟烷用於門診病人手術麻醉維持時近期和遠期蘇醒狀態以及嗆咳反應的對比

Desflurane versus sevoflurane for maintenance of outpatient anesthesia: the effect on early versus late recovery and perioperative coughing..

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背景：對於門急診手術病人麻醉維持中使用地氟烷與七氟烷孰優的問題，長久以來一直有著很大爭論。儘管有些研究已經堅定地認為與七氟烷相比地氟烷在急診手術中更優，但是在後期恢復上的一些問題使得這一觀點尚未完全得到公認。並且，與七氟烷相比，地氟烷發生嗆咳的機率更高，這也使得地氟烷飽受爭議。
方法：隨機挑選130名需在全麻下行淺表手術的病人，將之根據麻醉維持藥物不同分為2組。所有病人使用丙泊酚2mg/kg靜注誘導後放置喉罩，空氧混合加1%-3%七氟烷維持，或者加3%-8%地氟烷維持。調整吸入性麻醉氣體的濃度以獲得穩定的血流動力學指標並且維持腦電雙頻指數值在50-60之間。局部麻醉和酮咯酸30mg靜注鎮痛。手術結束時給予昂丹司瓊4mg,地塞米松4mg以及甲氧氯普胺10mg預防嘔吐。於手術結束開始觀察至出院後24小時，評價指標包括眼睛睜開，對指令有反應，定向力恢復，快速定位分數達到14分，首次進食，坐下，起立，獨立行走以及出院的時間。病人對麻醉是否滿意，術後首日能否恢復日常活

動，不良反應（如嗆咳，體動，血氧飽和度下降低於90%，咽喉痛，術後噁心嘔吐)，以及是否需要術後鎮痛止吐。
結果：兩組間具有可比性。總體上地氟烷組術間發生嗆咳率為60%，高於七氟烷組為32%，P<0.05，但是揮發性麻醉藥物麻醉維持期間嗆咳發生率在兩組間沒有顯著性差異。地氟烷麻醉後病人蘇醒更快，然而所有病人均能在離開手術室前達到快速恢復的標準，快速定向分數大於等於12分。最後，七氟烷組的出院時間為90+/-31分鐘，地氟烷為98+/-35分鐘；術後第一天能夠恢復日常活動能力病人的百分比為七氟烷組48%，地氟烷組60%。這兩項指標在兩組間均無顯著性差異。
結論：地氟烷用於麻醉維持具有快速蘇醒和易嗆咳的特點。除去早期的快速蘇醒之外，晚期蘇醒的效果在這兩種揮發性麻醉藥物間沒有差別。地氟烷與七氟烷均適用于門診手術病人。
（黃劍譯 薛張綱校）
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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Anesth Analg 2009 109: 466-469

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，這就要求訓練有數的麻醉醫生參與麻醉。

（陳珺珺譯 薛張綱校）
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.

靜脈給予丙氨酸－穀氨醯胺來補充重症監護室中行場內營養的創傷病人血漿谷胱甘肽水準：隨機對照試驗的結果

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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Anesth Analg 2009 109: 502-505

背景：對於嚴重創傷行腸內營養的病人，我們尋找靜脈給予丙氨酸－穀氨醯胺以補充血漿谷胱甘肽水準的治療效果。
方法：40 名嚴重創傷、創傷嚴重評分〉20 分的病人入選了這項隨機、對照研究。病人被分為兩組：G 組給予靜脈補充 0.5 $g \cdot kg^{-1} \cdot d^{-1}$ 的丙氨酸－穀氨醯胺，C 組給予不含丙氨酸－穀氨醯胺的對照液體，藥物給予 7 天。我們分別在給藥前、給藥後第三天、第七天和第十天抽取血標本測定血清谷胱甘肽水準。
結果：在第七、第十天，G 組血漿谷胱甘肽水平均明顯高於 C 組 (分別為 1.34 ± 0.20 μM vs 1.13 ± 0.14 μM, 和 1.38 ± 0.19 μM vs 1.12 ± 0.16 μM) ($P < 0.001$).
結論：該項試驗證明，對於嚴重創傷需給予標準腸內營養的病人，靜脈給予丙氨酸－穀氨醯胺七天可以增加血漿谷胱甘肽水準。
（陳珺珺譯 薛張綱校）
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 $g \cdot kg^{-1} \cdot d^{-1}$ 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.

一項隨機試驗：在行腰段硬膜外穿刺時使用傳統坐位與膕繩肌腱伸展體位的比較

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

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Anesth Analg 2009 109: 532-534.

背景：無對照的實驗證據提示在行硬膜外鎮痛時，採用坐位，關節儘量伸展、髖關節內收、人前傾（腘繩肌腱伸展體位），相比于傳統的坐位，可以逆轉腰段脊柱前凸。
方法：我們選擇了產科病人進行了這項隨機試驗，在行腰段硬膜外鎮痛操作時，分別採用了傳統體位和腘繩肌腱伸展體位，對兩者進行比較。原始結果是針和骨接觸的次數。
結果：兩組針和骨接觸的次數是一樣的。
結論：行腰段硬膜外穿刺時，腘繩肌腱伸展體位與傳統體位相比較，在針骨接觸次數方面兩者是沒有差異的。
（陳珺珺譯 薛張綱校）
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.

輕至中度灰白質低溫對大鼠脊髓缺血後的長期療效

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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Anesth Analg 2009 109: 559-566

背景：脊髓缺血後灰質低溫的短期療效已經確認。我們試圖觀察脊髓缺血後灰白質輕至中度低溫的長期療效。
方法：根據脊髓缺血時的體溫（32°C, 35°C, 或 38°C ）和再灌注時間(2或28天)將95只大鼠隨機分為8組。脊髓缺血模型通過球囊導管堵塞15分鐘和抽血實現。在評估完大鼠後肢運動功能後，灰白質的損傷通過各自正常神經元的數量和空泡變性的程度來評價。
結果： 32°C和35°C 低溫組第2天和第28天大鼠的後肢運動功能顯著好于正常體溫組。32°C和35°C 低溫組第2天和第28天大鼠正常神經元的數量顯著高於正常體溫組。32°C和35°C 低溫組第2天和第28天大鼠神經元空泡變性的範圍顯著小於正常體溫組。

結論：缺血時輕至中度低溫對灰白質損傷的神經保護作用最多可長至脊髓缺血後28天。

（姚敏敏譯 薛張綱校）

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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Anesth Analg 2009 109: 586-591

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）。

結論：這項研究發現沒有證據證明將繼續一夜的連續後路腰叢神經阻滯延長到 4 天可以提高（或降低）髖關節置換術後 7 天到 12 月的健康相關的生活品質。

（俞佳譯 薛張綱校）

BACKGROUND: 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.

METHODS: 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.

RESULTS: 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)。

CONCLUSIONS: 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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背景：除卻鎮吐作用，糖皮質激素還有鎮痛特性。地塞米松在術後鎮痛中的最佳劑量尚未確定。在這個安慰劑對照、劑量探索研究中，我們評估了腹腔鏡子宮切除術後三種劑量的地塞米松的鎮痛效果。
方法：我們隨機將 129 名擇期行腹腔鏡子宮切除術的婦女分成四組分別在麻醉誘導前接受安慰劑、5mg 地塞米松（D5）、10mg 地塞米松（D10）和 15mg 地塞米松（D15）。患者常規地由異丙酚和瑞芬太尼進行麻醉。至手術後第一日的早晨，術後疼痛由靜脈病人自控注射羥考酮控制。術後三天的視覺疼痛評分表、副作用和鎮痛藥用量被記錄下來。
結果：羥考酮的總劑量（術後 0-24 小時）D15 組（0.34 mg/kg [0.11-0.87])較安慰劑組(0.55 mg/kg [0.19-1.13])小(P = 0.003)。術後 0-2 小時羥考酮用量 D10 組(0.17 mg/kg [0.03-0.36])和 D15(0.17 mg/kg [0.03-0.35])組較安慰劑組 (0.26 mg/kg [0.10-0.48]) 小 (P = 0.001, D10 組 VS 安慰劑組; P < 0.001, D15 組 VS 安慰劑組)。術後 2-24 小時，羥考酮的劑量在安慰劑組、D5 組、D10 組和 D15 組卻是差不多的(分別為 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 [0-0.65])。休息、活動或咳嗽時視覺痛覺量表評分在各實驗組無差別。術後第一個 24 小時的眩暈發生率 D15 組較安慰劑組(P = 0.001)、D5 組(P = 0.006)和 D10 組(P = 0.030)低。在以後的恢復期中眩暈在各組的發生率無明顯差別。
結論：麻醉誘導前靜脈注射 15mg 地塞米松可減少腹腔鏡子宮切除術後 24 小時內羥考酮的用量。在術後的 2 小時內，地塞米松 10mg 和 15mg 對減少羥考酮的用量的效果是一致的。
（張玥琪譯，薛張綱校）

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 [0.10-0.48]) (P = 0.001, D10 versus placebo; P < 0.001, D15 versus placebo) group. 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 [0-0.65], 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 8muM 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，鈉通道抑制劑和 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 antinociceptive 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 muM, 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.

穿刺前旁正中超聲指導硬膜外麻醉

Preinsertion Paramedian Ultrasound Guidance for Epidural Anesthesia

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背景：超聲指導硬膜外麻醉穿刺正獲得越來越多的益處。定義旁正中超聲掃描技術可能有助於更準確的識別脊椎水準。尋找硬膜外間隙深度的代理測量方法也可能提高掃描技術。

方法：在旁正中水準用硬膜外超聲對 20 名孕婦進行測量，並比較預測的硬膜外間隙深度與實際正中的深度。也比較受試者生物測定學值、橫突深度和腰部脂肪厚度與各對應實際值。

結果：掃描技術可以測量所有個體的硬膜外間隙深度。超聲測得的深度與實際深度非常接近(R^2 = 0.8、95%可信區間–14.8 to 5.2 mm)，這與患者的生物測定學值(R^2 < 0.25)、相鄰橫突深度(R^2 = 0.35、95%可信區間–13.8 to 19.1 mm)以及表層的脂肪厚道不同(R^2 = 0.66)。試驗之初超聲掃所需時間為 10 分鐘，但到最後只需 3 分鐘。

結論：旁正中超聲可以用來估計正中距硬膜外間隙的深度。然而，代理測量與硬膜外間隙深度的相關度還不足以建議可以用它們的測量值來代替硬膜外間隙測量的實際深度。

（朱蘭芳譯 薛張綱校）

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 of –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 of –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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Anesth Analg 2009 109: 678-682

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.

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% or ≥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（$R^2 = 0.150$, $P < 0.01$）、術後高 NAG 濃度($R^2 = 0.138$, $P < 0.01$) 和高 IFABP 濃度 ($R^2 = 0.107$, $P < 0.01$)都相關。體外迴圈期間血細胞輸注與高乳酸($R^2 = 0.089$, $P < 0.05$)、高 NAG ($R^2 = 0.431$, $P < 0.01$)和高 IFABP ($R^2 = 0.189$, $P < 0.01$)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。

（彭中美 譯 馬皓琳 李士通 校）

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 ($R^2 = 0.138$, $P < 0.01$) and IFABP concentrations ($R^2 = 0.107$, $P < 0.01$) 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.

患嬰兒神經元蠟樣質脂褐質沉積症的兒童在麻醉期間低體溫和心動過緩的風險增加

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

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背景：神經元蠟樣脂褐質沉積症（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類型細胞的溶酶體內自身螢光物質蓄積。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圍麻醉過程。

結果：8 個 INCL 患兒（在接受首次麻醉時平均年齡 25 個月[範圍：10-32 月]）和 25 個對照（平均年齡 44 個月[範圍：18-92 月]）進行 62 次麻醉用於非手術性操作。INCL 患兒有包括發育延遲、肌陣攣和視覺障礙的神經病學缺陷。INCL 患兒的基礎體溫的較低(36.4 ± 0.1 比 36.8 ± 0.1, INCL 患兒相對于對照, $P < 0.007$)，且在麻醉期間儘管給予積極地保溫技術， INCL 患兒仍然比對照出現明顯更多的低體溫(發生病例 18 比 0, $P < 0.001$)和竇性心動過緩（10 比 1，$P < 0.001$）。INCL 診斷顯著地與麻醉期間體溫降低相關($P < 0.001$)，而與年齡、性別和麻醉持續時間無相關性(P = NS)。

結論：我們報導 INCL 患兒的基礎體溫較低，且在全麻期間儘管給予複溫干預，低體溫和心動過緩的風險仍然增高。這提示是一個以前未知的 INCL 顯型，具有受損的體溫調節。因此，當麻醉這些兒童時，必須保證細心的監護和常規使用保溫干預。

（王宏 譯，馬皓琳，李士通 校）

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 = 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動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。在異氟烷吸入停止後，異丙酚以 50 $mg \cdot kg^{-1} \cdot h^{-1}$ 輸注直到每 2 分鐘應用懸蹄鉗夾法觀察無體動。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，是由於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 $mg \cdot kg^{-1} \cdot h^{-1}$ 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.

阿瑞吡坦或其前體藥物福沙吡坦對健康受試者 QTc 間期無影響

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

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背景：單次 115mg 劑量的福沙吡坦——NK_1 受體拮抗劑阿瑞吡坦前體藥物的靜脈製劑與 125mg 口服的阿瑞吡坦生物效價相等。迄今，福沙吡坦/阿瑞吡坦對 QTc 間期未顯示有臨床意義的作用。本研究旨在證實上述發現。
方法：本次雙盲、有效對照、隨機、三種治療方案、3 階段交叉研究是評估 200mg 福沙吡坦對年輕健康受試者 QTc 間期延長的作用。每階段受試者按照隨機順序接受 400mg 莫西沙星口服、200mg 福沙吡坦靜脈注射或安慰劑。通過 12 導聯心電圖（ECGs）評估福沙吡坦對 QTc 間期的作用。每位受試者在每個階段的 QTc 間期基礎值為從給藥前 ECGs 中提取 5 個重複基礎 QTc 間期的平均值。給藥前、給藥後 2、5、10、15、20、30、45 分鐘及 1、1.5、2、3、4、6 和 8 小時測定採集 ECGs。通過一個適用於交叉研究設計的重複測定混合模型評估個體 QTc 間期相對於基礎值的變化值。計算福沙吡坦對於安慰劑和莫西沙星對安慰劑在不同時點對於 QTc 間期與基礎值的實際差值的雙側 90％可信限（CI）。
結果：給予福沙吡坦 200mg 後，在 T_{max} 平均（95％CI）QTc 間期與基礎值差值為–1.45 (–4.67 到 1.77) ms，安慰劑校正平均（90％CI）QTc 間期與基礎值差值為 s –1.37 (–4.78 to 2.05) ms。α= 0.05 時兩者都不具有統計學意義。給予 400mg 莫西沙星後 2 小時平均（95％CI）QTc 間期與基礎值差值為 9.71 (6.49–12.93) ms，給予莫西沙星 T_{max} 時安慰劑校正平均（90％CI）QTc 間期與基礎值差值為 10.50 (7.09–13.92) ms。α= 0.05 時兩者均具有統計學意義。給予福沙吡坦 200mg 後阿瑞吡坦的最高血藥濃度為 6300 ng/mL（比歷史上給予 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]後測得的血藥濃度分別高約 2 倍、4 倍和 9 倍）。
結論：在接受福沙吡坦 200mg 的受試者中未發現在任何時間點有任何有臨床意義的 QTc 間期延長，而給予莫西沙星 400mg 後在接近莫西沙星 T_{max} 時和附加的時間點發現 QTc 間期延長。如此大劑量的福沙吡坦和隨之而來的阿瑞吡坦高血漿濃度卻未造成 QTc 延長，該現象支持臨床劑量的福沙吡坦或阿瑞吡坦與 QTc 間期顯著延長無關的預期。
（周雅春 譯 李士通 馬皓琳 校）

BACKGROUND: A single 115-mg dose of fosaprepitant, the IV prodrug of the NK_1 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_{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_{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_{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手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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背景：眼內壓在傾斜度較大的頭低腳高體位時會增加，但是增加的幅度卻沒有人加以定量。而且在機器人輔助的前列腺切除手術中影響眼內壓增加的因素也沒有得到研究。在本次研究中，我們試著對在機器人械輔助前列腺切除術中處於傾斜

度較大的頭低腳高位的病人眼內壓變化進行定量並檢測對這些變化影響大的術前因素。
方法：在本次前瞻性的研究中，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（CO_2）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、$ETco_2$ 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、平均氣道壓和地氟醚麻醉藥的濃度對眼內壓沒有預測性。從 T4 到 T5 時段，其中沒有任何體位和圍術期的介入，我們通過多變數分析評估了眼內壓升高的預測因素。在較穩定並長時間的頭低腳高體位時，手術持續時間（單位 min）和 $ETco_2$ 值是僅有的能顯著預測眼內壓升高的因素。校正手術時間後，$ETco_2$ 每升高 1mm Hg 眼內壓平均增加 0.21 mm Hg。校正 $ETco_2$ 後，手術每用時 1min，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 $ETco_2$ 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 (CO_2) (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, $ETco_2$, 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 $ETco_2$ 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 $ETco_2$ 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 $ETco_2$.

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 $ETco_2$ were the only significant predictors of IOP increase in the Trendelenburg position (T4–T5).

醫院前氣管插管和死亡率：1 級創傷中心的觀察

Prehospital Intubations and Mortality: A Level 1 Trauma Center Perspective

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背景：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。
方法：我們對 2003 年 8 月到 2006 年 6 月期間接受過緊急醫院前氣道管理且入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。
結果：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。
結論：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。
（黃佳佳譯，馬皓琳，李士通校）

BACKGROUND: Ryder Trauma Center is a Level 1 trauma center with approximately 3800 emergency admissions per year. In this study, we sought to determine the incidence of failed prehospital intubations (PHI), its correlation with hospital mortality, and possible risk factors associated with PHI.
METHODS: A prospective observational study was conducted evaluating trauma patients who had emergency prehospital airway management and were admitted during the period between August 2003 and June 2006. The PHI was considered a failure if the initial assessment determined improper placement of the endotracheal tube or if alternative airway management devices were used as a rescue measure after intubation was attempted.
RESULTS: One-thousand-three-hundred-twenty patients had emergency airway interventions performed by an anesthesiologist upon arrival at the trauma center. Of those, 203 had been initially intubated in the field by emergency medical services personnel, with 74 of 203 (36%) surviving to discharge. When evaluating the success of the intubation, 63 of 203 (31%) met the criteria for failed PHI, all of them requiring intubation, with only 18 of 63 (29%) surviving to discharge. These patients had rescue

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.

重症監護室內的持續腦電監測

Continuous Electroencephalogram Monitoring in the Intensive Care Unit

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因為近來技術的進步，目前已經可能同時連續記錄和監測許多重症病人的腦電圖（EEG）資料。連續 EEG（cEEG）監測可以提供腦功能的動態資訊，早期檢測到神經系統狀態的變化，這在臨床檢查有限時特別有用。無抽搐性癲癇在昏迷的重症病人中是常見的，並且會對受傷的腦組織有很多不良影響。這種病人的大部分癲癇發作不用 cEEG 是不能檢測出來的。cEEG 監測最常用於發現和指導無抽搐性癲癇的治療，包括驚厥性癲癇持續狀態。而且，cEEG 常用於指導治療顱內高壓藥理性昏迷的管理。目前研究的 cEEG 一個新的應用是發現高危病人新發生的或惡化的腦缺血，尤其是蛛網膜下腔出血的病人。改良的定量 EEG 軟體有助於 cEEG（覆蓋整個頭皮）能夠可行性地提供床旁即時腦功能變化的持續資訊，以提醒臨床醫生任何急性腦事件的發生，包括癲癇、缺血、顱內高壓、出血甚至影響腦功能全身性疾病如缺氧、低血壓、酸中毒及其他。監測僅需要幾個電極或覆蓋整個頭皮，可是沒有專家對原始的 EEG 的綜述，監測時必須及其謹慎，因為假陽性和假陰性是很平常的。一些中心正在進行顱內 EEG 記錄，以更好地發現癲癇、缺血和損傷周圍去極化，所有這些均促使繼發性損傷。當 cEEG 與經由多模式腦監測所得出的個性化和生理驅動的決策相結合，重症監護室的工作人員可以鑒別出何時大腦有損傷的風險或何時神經元損傷已經發生，並在產生永久性損傷前做出干預。當前 cEEG 的確切作用和成本效應仍不清楚，可是我們相信其在很多情況下有改善神經系統預後的顯著潛力。
（黃麗娜 譯 馬皓琳 李士通 校）

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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我們常使用定量腦電圖（qEEG）監測儀來評估全麻中的麻醉深度及術中知曉情況。與任何監測儀一樣，加工的數值輸出常產生誤導而必須結合當時的臨床環境來解釋。為了安全地臨床使用這些監測儀，我們有絕對的必要清楚地瞭解預測的原始腦電圖(EEG)模式的清晰記憶圖像以及一般的 EEG 偽像知識。這已提供了寫這份個別指導的動機。我們描述並列舉充分全麻下的典型 EEG 特徵、傷害性刺激及輔助藥物的作用。偽像常常遇到，並可分為來源於頭外部、頭內但腦外部（常為前額的肌電圖）或腦內部（典型的或病理性的）。我們包括了臨床解決問題過程的真實案例。尤其重要的是，我們須認識到偽像的高 qEEG 指數是相對常見的，可導致危險的麻醉藥物過量。麻醉醫生必須確信 qEEG 數值是與病人的表面狀態、不同麻醉藥物的劑量及外科手術刺激程度相一致的。任何不符合之處對於立即用所有可用的資訊來關鍵性地檢查病人狀態都必須是一種刺激，而不要反應性地治療來“處理”一個數值。

（裘毅敏譯，馬皓琳、李士通校）

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.

七氟醚和地氟醚麻醉用於開顱幕上手術患者的比較

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

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背景：地氟醚由於其促進術後早期神經評分而在神經外科手術中使用是有益的。然而，它使大腦血管擴張的作用使其受到爭論。七氟醚已在神經外科患者中廣泛應用。在這個前瞻性的臨床試驗中，我們比較幕上廣泛損害的開顱手術的患者接受地氟醚和七氟醚麻醉後的術後早期恢復和認知功能。
方法：選取 120 例患者，ASA 評分 I–III (其中 66 例男性)，Glascow 昏迷評分 15，行幕上廣泛損害的開顱手術。患者隨機分為兩個麻醉組。S 組(60 例, 52 ± 16 歲)，使用呼氣末 1.5%-2%七氟醚維持麻醉並按年齡調節至 1.2MAC。D 組(60 例, 60 ± 14 歲)，使用呼氣末 6%-7%地氟醚維持麻醉並按年齡調節至 1.2MAC。蘇醒時間記作從藥物停止到患者睜眼的時間，拔管時間記作從麻醉藥停止到拔管的時間。從麻醉藥停止到患者能想起自己的姓名和生日的這段時間為恢復時間。由短定向-記憶-注意測試評估認知行為。在麻醉後監護室中，由不知分組的觀察者監測患者 3 小時，記錄血液動力學事件的發生率、疼痛、噁心及顫抖需要藥物治療。
結果：平均蘇醒時間兩組相似(S 組 12.2 ± 4.9 min 對 D 組 10.8 ± 7.2 min; *P* = ns)，但 S 組的平均拔管時間(S 組 15.2 ± 3.0 min 對 D 組 11.3 ± 3.9 min)和恢復時間（S 組 18.2 ± 2.3 min 對 D 組 12.4 ± 7.7 min ，*P* < 0.001）較長。兩組之間的短定向-記憶-注意測試評分只在最初的評估中（拔管後 15min）有差異。兩組在疼痛、顫抖、噁心、嘔吐和術後血液動力學事件的發生率方面均無差異。
結論：接受地氟醚麻醉的患者拔管時間和恢復時間較短，但術中和術後併發症的發生率與接受七氟醚麻醉的患者是相似的。
（朱 慧譯 馬皓琳 李士通校）

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), Glascow 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* = 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征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征(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 個月後行隨訪評估，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 馬皓琳 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.

靜脈注射右美托咪啶對大鼠結直腸擴張誘導的內臟痛的鎮痛效應：阿片受體的作用

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

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背景：相對於皮膚痛而言，α2 腎上腺能受體（α2-AR）激動劑對內臟痛的作用尚未得到廣泛研究。我們的目的在於觀察靜脈注射右美托咪啶對大鼠內臟痛的鎮痛效應並確定這種效應的產生是否由阿片受體介導。
方法：雄性 SD 大鼠（250-300g），置入靜脈導管用於藥物注射並植入包漆的鎳鉻電極用於腹外斜肌的肌電圖描記。結直腸擴張（CRD）被用作傷害性內臟刺激，並於給予右美托咪啶或可樂定前、後 5、15、30、60 和 120 min 時用肌電圖定量對於 CRD 的內臟運動反應。在右美托咪啶靜注前 10min 給予拮抗劑。在確定資料呈正態分佈後，使用單因素方差分析和 Tukey-Kramer 事後檢驗進行多重比較。
結果：靜脈注射右美托咪啶（2.5-20 μg/kg）和可樂定（10-80 μg/kg）可以劑量依賴地減少內臟運動反應，其 50%有效劑量分別為 10.5 和 37.6 μg/kg。非特異性 α2-AR 拮抗劑育亨賓（1mg/kg），而不是外周特異性 α2-AR 拮抗劑 MK-467（1mg/kg），抵消了右美托咪啶（10 μg/kg）的鎮痛效應。此外，用納絡酮（1mg/kg）抑制阿片受體減弱了右美托咪啶的鎮痛效應。
結論：我們的資料顯示靜脈注射右美托咪啶對 CRD 誘導的內臟痛具有明顯的鎮痛作用，並提示其作用部分通過阿片受體介導，但與外周性α_2-ARs 無關。
（黃施偉 譯，馬皓琳 李士通 校）

BACKGROUND: In comparison with cutaneous pain, the role of α_2-adrenoceptor (α_2-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 α_2-AR antagonist yohimbine (1 mg/kg), but not the peripherally restricted α_2-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 dexmedotimidine is mediated in part by opioid receptors, but peripheral α_2-ARs are not involved.

大鼠背角疼痛特異性神經元比廣動態範圍神經元對止動劑量揮發性麻醉劑的抑制作用更加敏感：一種可被阿片受體拮抗劑納洛酮部分逆轉的效應

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 ± 122 (mean ± se) to 343 ± 48 spikes/min (P < 0.05) but not WDR neurons (n = 9), 617 ± 79 to 547 ± 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 ± 339 to 188 ± 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 ± 132 to 601 ± 119 spikes/min. In a separate group, the response of NS neurons went from 282 ± 60 to 74 ± 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 ± 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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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被報導有很好的成功率。我們假設在每個神經索上單獨注射局麻藥能增快完全感覺阻滯的起效。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 分鐘和每個時間間歇一直到 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：與在腋動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% or ≥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（$R^2 = 0.150$, $P < 0.01$）、術後高 NAG 濃度($R^2 = 0.138$, $P < 0.01$) 和高 IFABP 濃度 ($R^2 = 0.107$, $P < 0.01$)都相關。體外迴圈期間血細胞輸注與高乳酸($R^2 = 0.089$, $P < 0.05$)、高 NAG ($R^2 = 0.431$, $P < 0.01$)和高 IFABP ($R^2 = 0.189$, $P < 0.01$)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。

（彭中美 譯 馬皓琳 李士通 校）

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 ($R^2 = 0.138$, $P < 0.01$) and IFABP concentrations ($R^2 = 0.107$, $P < 0.01$) 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.

患嬰兒神經元蠟樣質脂褐質沉積症的兒童在麻醉期間低體溫和心動過緩的風險增加

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

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背景：神經元蠟樣脂褐質沉積症（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類型細胞的溶酶體內自身螢光物質蓄積。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圍麻醉過程。

結果：8 個 INCL 患兒（在接受首次麻醉時平均年齡 25 個月[範圍：10-32 月]）和 25 個對照（平均年齡 44 個月[範圍：18-92 月]）進行 62 次麻醉用於非手術性操作。INCL 患兒有包括發育延遲、肌陣攣和視覺障礙的神經病學缺陷。INCL 患兒的基礎體溫的較低(36.4 ± 0.1 比 36.8 ± 0.1, INCL 患兒相對于對照, $P < 0.007$)，且在麻醉期間儘管給予積極地保溫技術， INCL 患兒仍然比對照出現明顯更多的低體溫(發生病例 18 比 0, $P < 0.001$)和竇性心動過緩（10 比 1，$P < 0.001$）。INCL 診斷顯著地與麻醉期間體溫降低相關($P < 0.001$)，而與年齡、性別和麻醉持續時間無相關性(P = NS)。

結論：我們報導 INCL 患兒的基礎體溫較低，且在全麻期間儘管給予複溫干預，低體溫和心動過緩的風險仍然增高。這提示是一個以前未知的 INCL 顯型，具有受損的體溫調節。因此，當麻醉這些兒童時，必須保證細心的監護和常規使用保溫干預。

（王宏 譯，馬皓琳，李士通 校）

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 = 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.