# Table of Contents

# September 2010

## Cardiovascular Anesthesiology



## Ambulatory Anesthesiology

(黃丹譯　陳傑校)

**A Prospective Clinical Registry of Ultrasound-Guided Regional Anesthesia for Ambulatory Shoulder Surgery**

- Spencer S. Liu,
- Michael A. Gordon,
- Pamela M. Shaw,
- Sarah Wilfred,
- Teena Shetty,
- and Jacques T. YaDeau

*Anesth Analg September 2010 111:617-623; published ahead of print August 4, 2010*

# Anesthetic Pharmacology

動脈交叉鉗夾和再灌注在豬體中由於全身和局部血流重分配而導致微血管的氧合水準下降。

(黃劍譯 薛張綱校)

**Arterial and Venous Pharmacokinetics of Morphine-6-Glucuronide and Impact of Sample Site on Pharmacodynamic Parameter Estimates**

- Erik Olofsen,
- René Mooren,
- Eveline van Dorp,
- Leon Aarts,
- Terry Smith,
- Jan den Hartigh,
- Albert Dahan,
- and Elise Sarton

*Anesth Analg September 2010 111:626-632; published ahead of print June 14, 2010*

靜脈注射加巴噴丁對貓吸入異氟醚時最低肺泡氣有效濃度的影響

(劉伍譯，馬皓琳、李士通校)

**The Effects of Intravenous Gabapentin Administration on the Minimum Alveolar Concentration of Isoflurane in Cats**

- Patrick Reid,
- Bruno H. Pypendop,
- and Jan E. Ilkiw

*Anesth Analg September 2010 111:633-637; published ahead of print June 14, 2010*

氟呱利多對於長 QT 綜合症的細胞和電腦模型的動作電位時程的亞型特異性影響

(黃丹譯　陳傑校)

**The Subtype-Specific Effects of Droperidol on Action Potential Duration in Cellular and Computational Models of Long QT Syndrome**

- Alexander P. Schwoerer,
- Julia Kebernik,
- Heimo Ehmke,
- and Patrick Friederich

*Anesth Analg September 2010 111:638-646; published ahead of print July 2, 2010*

# Technology, Computing, and Simulation

兒科氣道管理器械的電腦模型和原型製作

(毛慧譯，薛張剛校)

**Computational Modeling and Prototyping of a Pediatric Airway Management Instrument**

- Alan Gonzalez-Cota,
- Grant H. Kruger,
- Padmaja Raghavan,
- and Paul I. Reynolds

*Anesth Analg September 2010 111:649-652; published ahead of print June 25, 2010*

一瞥監測：在手術室對麻醉醫生的隱蔽觀察

(徐妍君譯　馬皓琳 李士通校)

**At-a-Glance Monitoring: Covert Observations of Anesthesiologists in the Operating Room**

- Simon Ford,
- Elina Birmingham,
- Ashlee King,
- Joanne Lim,
- and J. Mark Ansermino

*Anesth Analg September 2010 111:653-658; published ahead of print June 25, 2010*

# Patient Safety

肝部分切除手術中中心靜脈壓合適的參考零點是什麼？

(周姝婧譯　陳傑校)

**What Is the Preferred Central Venous Pressure Zero Reference for Hepatic Resection?**

- Chris Giordano,
- Lori A. Deitte,
- Nikolaus Gravenstein,
- and Mark J. Rice

*Anesth Analg September 2010 111:660-664; published ahead of print December 2, 2009*

系統性紅斑狼瘡：一篇麻醉學家的綜述

(陳珺珺譯 薛張綱校)

**Review Article: Systemic Lupus Erythematosus: A Review for Anesthesiologists**

- Erez Ben-Menachem

*Anesth Analg September 2010 111:665-676; published ahead of print July 2, 2010*

# Critical Care, Trauma, and Resuscitation

在美國退伍軍人事務醫院引入快速應答系統可減少心搏驟停

(龔寅譯 馬皓琳 李士通校)

**Introduction of a Rapid Response System at a United States Veterans Affairs Hospital Reduced Cardiac Arrests**

- Geoffrey K. Lighthall,
- Layla M. Parast,
- Lisa Rapoport,
- and Todd H. Wagner

*Anesth Analg September 2010 111:679-686; published ahead of print July 12, 2010*

在危重患者中使用簡易床邊肺部超聲檢查可顯著減少 X 線攝片和電腦斷層掃描的次數

(周姝婧譯　陳傑校)

**The Use of Point-of-Care Bedside Lung Ultrasound Significantly Reduces the Number of Radiographs and Computed Tomography Scans in Critically Ill Patients**

- Adriano Peris,

- Lorenzo Tutino,
- Giovanni Zagli,
- Stefano Batacchi,
- Giovanni Cianchi,
- Rosario Spina,
- Manuela Bonizzoli,
- Luisa Migliaccio,
- Lucia Perretta,
- Marco Bartolini,
- Kevin Ban,
- and Martin Balik

*Anesth Analg September 2010 111:687-692*

急性低氧性呼吸衰竭的救治方法

(姚敏敏譯　薛張綱校)

**Special Article: Rescue Therapies for Acute Hypoxemic Respiratory Failure**

- Linda L. Liu,
- J. Matthew Aldrich,
- David W. Shimabukuro,
- Kristina R. Sullivan,
- John M. Taylor,
- Kevin C. Thornton,
- and Michael A. Gropper

*Anesth Analg September 2010 111:693-702; published ahead of print July 12, 2010*

動態上呼吸道阻塞模型中採用不同頻率的聲門上型噴射通氣時的固有呼氣末正壓

(楊秀娟譯 馬皓琳 李士通校)

**Brief Reports: Intrinsic Positive End-Expiratory Pressure at Various Frequencies of Supraglottic Jet Ventilation in a Model of Dynamic Upper Airway Obstruction**

- Gerald C. Ihra,
- Ching-Ju Tsai,
- and Oliver Kimberger

*Anesth Analg September 2010 111:703-706; published ahead of print July 2, 2010*

簡報：肝臟疾病患者肌肉生成抑制蛋白水準增高可能引起骨骼肌萎縮

(趙嫣紅譯　陳傑校)

**Brief-Reports: Elevated Myostatin Levels in Patients with Liver Disease: A Potential Contributor to Skeletal Muscle Wasting**

- Paul S. García,
- Amy Cabbabe,
- Ravi Kambadur,
- Gina Nicholas,
- and Marie Csete

*Anesth Analg September 2010 111:707-709; published ahead of print August 4, 2010*

# Obstetric Anesthesiology

體位性血壓改變和脊麻下剖宮產手術中低血壓的風險：一項觀察研究

(張玥琪譯 薛張綱校)

**Positional Blood Pressure Change and the Risk of Hypotension During Spinal Anesthesia for Cesarean Delivery: An Observational Study**

- Young-Tae Jeon,
- Jung-Won Hwang,
- Mi-Hyun Kim,
- Ah-Young Oh,
- Kyo Hoon Park,
- Hee-Pyoung Park,
- Younsuk Lee,
- and Sang-Hwan Do

*Anesth Analg September 2010 111:712-715; published ahead of print August 4, 2010*

# Pediatric Anesthesiology

將研究的風險及益處呈現給父母：形式有關係嗎？

(黃麗娜譯 馬皓琳 李士通校)

**Presenting Research Risks and Benefits to Parents: Does Format Matter?**

- Alan R. Tait,
- Terri Voepel-Lewis,
- Brian J. Zikmund-Fisher,
- and Angela Fagerlin

*Anesth Analg September 2010 111:718-723; published ahead of print August 4, 2010*

住院醫生對心臟手術嬰幼兒患者行股靜脈穿刺置管：超聲引導與標記定位技術的比較

(趙嫣紅譯　陳傑校)

**Femoral Vein Cannulation Performed by Residents: A Comparison Between Ultrasound-Guided and Landmark Technique in Infants and Children Undergoing Cardiac Surgery**

- Marie T. Aouad,
- Ghassan E. Kanazi,
- Faraj W. Abdallah,
- Farah H. Moukaddem,
- Massud J. Turbay,
- Mounir Y. Obeid,
- and Sahar M. Siddik-Sayyid

*Anesth Analg September 2010 111:724-728; published ahead of print July 2, 2010*

# Neuroscience in Anesthesiology and Perioperative Medicine

癲癇發作病史患者圍術期的癲癇發作

(朱蘭芳譯，薛張綱校)

**Perioperative Seizures in Patients with a History of a Seizure Disorder**

- Adam D. Niesen,
- Adam K. Jacob,
- Lucyna E. Aho,
- Emily J. Botten,
- Karen E. Nase,
- Julia M. Nelson,
- and Sandra L. Kopp

*Anesth Analg September 2010 111:729-735; published ahead of print June 14, 2010*

創傷性顱腦損傷後對處理顱內壓增高的手術途徑

(滕凌雅譯 馬皓琳 李士通校)

**Review Article: The Surgical Approach to the Management of Increased Intracranial Pressure After Traumatic Brain Injury**

- Lucia M. Li,
- Ivan Timofeev,
- Marek Czosnyka,
- and Peter J. A. Hutchinson

*Anesth Analg September 2010 111:736-748; published ahead of print August 4, 2010*

# General Article

減壓病的加壓和輔助治療: 一項隨機對照試驗的系統性回顧

(懷曉蓉譯　陳傑校)

**Recompression and Adjunctive Therapy for Decompression Illness: A Systematic Review of Randomized Controlled Trials**

- Michael H. Bennett,
- Jan P. Lehm,
- Simon J. Mitchell,
- and Jason Wasiak

*Anesth Analg September 2010 111:757-762; published ahead of print March 23, 2010*

# Analgesia

## Pain Medicine

高速即時 CT 透視顯像引導下行經皮射頻三叉神經離斷術

(陳珺珺譯 薛張綱校)

**Technical Communication: Percutaneous Radiofrequency Mandibular Nerve Rhizotomy Guided by High-Speed Real-Time Computed Tomography Fluoroscopy**

- Shiro Koizuka,
- Shigeru Saito,
- Masaru Tobe,
- Kenichi Sekimoto,
- Hideaki Obata,
- and Yoshinori Koyama

*Anesth Analg September 2010 111:763-767; published ahead of print August 4, 2010*

## Pain Mechanisms

### 利多卡因減少培養的大鼠神經小膠質細胞內細胞外三磷酸腺苷誘導的前炎症細胞因數產物

(王海濤譯，馬皓琳 李士通校)

**Lidocaine Attenuates Proinflammatory Cytokine Production Induced by Extracellular Adenosine Triphosphate in Cultured Rat Microglia**

- Diansan Su,
- Yang Gu,
- Zhenhong Wang,
- and Xiangrui Wang

*Anesth Analg September 2010 111:768-774; published ahead of print August 4, 2010*

### 局麻藥可通過細胞內鹼化使大鼠背根神經節神經元細胞線粒體膜電位去極化

(懷曉蓉譯　陳傑校)

**Local Anesthetics Depolarize Mitochondrial Membrane Potential by Intracellular Alkalization in Rat Dorsal Root Ganglion Neurons**

- Shin Onizuka,
- Ryuji Tamura,
- Nobuko Hosokawa,
- Yuko Kawasaki,
- and Isao Tsuneyoshi

*Anesth Analg September 2010 111:775-783; published ahead of print August 4, 2010, doi:10.1213/ANE.0b013e3181e9f03b*

### 脈衝射頻應用於樹膠脂毒素誘導出異常的機械性疼痛的大鼠的效果

(陳珺珺譯 薛張綱校)

**The Effect of Pulsed Radiofrequency Current on Mechanical Allodynia Induced with Resiniferatoxin in Rats**

- Nobuhiko Tanaka,
- Masaharu Yamaga,
- Shingo Tateyama,
- Takeshi Uno,
- Isao Tsuneyoshi,
- and Mayumi Takasaki

*Anesth Analg September 2010 111:784-790; published ahead of print July 2, 2010*

## Regional Anesthesia

在布比卡因造成的心臟停跳後運用脂類藥物復蘇過程中注射腎上腺素：兔子的迴圈短暫的恢復

(唐亮譯 馬皓琳 李士通校)

**Epinephrine Injection in Lipid-Based Resuscitation from Bupivacaine-Induced Cardiac Arrest: Transient Circulatory Return in Rabbits**

- Martyn Harvey,
- Grant Cave,
- Gaynor Prince,
- and Daniel Lahner

*Anesth Analg September 2010 111:791-796; published ahead of print June 14, 2010*

在婦科癌症手術中腹橫肌平面阻滯對多模式鎮痛無附加益處

(曹強譯　陳傑校)

**Transversus Abdominis Plane Block Does Not Provide Additional Benefit to Multimodal Analgesia in Gynecological Cancer Surgery**

- James D. Griffiths,
- Justine V. Middle,
- Fiona A. Barron,
- Sarah J. Grant,
- Phillip A. Popham,
- and Colin F. Royse

*Anesth Analg September 2010 111:797-801; published ahead of print June 14, 2010*

一項關於腰段交感神經節阻滯發生腰肌和血管內注射的前瞻性評估

(陳珺珺譯 薛張綱校)

**A Prospective Evaluation of Psoas Muscle and Intravascular Injection in Lumbar Sympathetic Ganglion Block**

- Ji H. Hong,
- Ae R. Kim,
- Mi Y. Lee,
- Yong C. Kim,
- and Min J. Oh

*Anesth Analg September 2010 111:802-807; published ahead of print August 4, 2010*

使用 **2%**利多卡因 **1ml** 在超聲引導下行腋路法臂叢神經阻滯的阻滯特性的一項臨床評定

(周潔譯　馬皓琳　李士通校)

**Brief Reports: A Clinical Evaluation of Block Characteristics Using One Milliliter 2% Lidocaine in Ultrasound-Guided Axillary Brachial Plexus Block**

- Brian O'Donnell,
- John Riordan,
- Ishtiaq Ahmad,
- and Gabriella Iohom

*Anesth Analg September 2010 111:808-810; published ahead of print August 4, 2010*

簡報：區域麻醉穿刺針會引導超聲凝膠進入組織

(曹強譯　陳傑校)

**Brief Reports: Regional Anesthesia Needles Can Introduce Ultrasound Gel into Tissues**

- David Belavy

*Anesth Analg September 2010 111:811-812; published ahead of print May 27, 2010*

機器人輔助局麻：一項模擬示教

(陳珺珺譯 薛張綱校)

**Technical Communication: Robot-Assisted Regional Anesthesia: A Simulated Demonstration**

- Patrick J. Tighe,
- S. J. Badiyan,
- I. Luria,
- Andre P. Boezaart,
- and S. Parekattil

*Anesth Analg September 2010 111:813-816; published ahead of print June 25, 2010*

血小板或高濃度的Ⅷ因數複合物可減弱硫酸魚精蛋白的抗凝效應

**The anticoagulant effect of protamine sulfate is attenuated in the presence of platelets or elevated factor VIII concentrations.**

Bolliger D, Szlam F, Azran M, Koyama K, Levy JH, Molinaro RJ, Tanaka KA
Department of Anesthesiology, Emory University School of Medicine, 1364 Clifton Road NE, Atlanta, GA 30322, USA.
Anesth Analg. 2010 111(3):601-8.

**背景**：作爲肝素的特異拮抗劑，過量使用硫酸魚精蛋白也可產生微弱的抗凝效應。

**方法**：此次研究共選取 6 名健康志願者，通過測量組織因數或肌動蛋白啓動後貧血小板血漿和富血小板血漿中凝血酶原時間與稀釋印度蝰蛇毒磷脂時間的改變，及貧血小板血漿和全血中血栓彈力圖的變化來評估不同濃度下魚精蛋白（0-24 微克/毫升）抑制凝血酶增殖的效應。重組Ⅶa 因數或Ⅷ因數/血管性血友病因數複合物對於過量魚精蛋白的逆轉作用也需被檢測。

**結果**：硫酸魚精蛋白可劑量依賴性地延長凝血酶原時間和稀釋印度蝰蛇毒磷脂時間。硫酸魚精蛋白還可增加延滯時間並降低組織因數或肌動蛋白啓動後貧血小板血漿中凝血酶的生成峰值。在擁有 50-200×$10^3$/微升血小板的富血小板血漿中，魚精蛋白（24 微克/毫升）可延長延滯時間，但對凝血酶的生成峰值無影響。只有在Ⅷ因數/血管性血友病因數複合物（1.5-3.0 單位/毫升）逆轉魚精蛋白（24 微克/毫升）的貧血小板血漿中，硫酸魚精蛋白才減少延滯時間並提高肌動蛋白啓動後凝血酶生成的峰值。重組Ⅶa 因數的治療濃度（60nM）僅對肌動蛋白啓動後凝血酶生成的延滯時間有影響。此外，通過血栓彈力圖的比較，與全血相比，硫酸魚精蛋白可顯著提高貧血小板血漿的凝血時間。

**結論**：此次試驗證明硫酸魚精蛋白可影響凝血酶的生成，但該作用可被血小板或高濃度的Ⅷ因數/血管性血友病因數複合物部分逆轉。現有資料表明，在嚴重的血小板減少症或低Ⅷ因數情況下，過量的魚精蛋白可潛在增加出血風險。

（范羽譯 薛張綱校）

**BACKGROUND**: Protamine sulfate is the antidote for heparin, but in excess it exerts weak anticoagulation.

**METHODS**: We evaluated the effects of increasing protamine concentrations (0 to 24 microg/mL) on prothrombin time and diluted Russell's viper venom time measurements on thrombin generation in platelet-poor and platelet-rich plasma after activation by tissue factor or actin, and on thromboelastometry in platelet-poor plasma and whole blood from 6 healthy volunteers. The reversibility of excess protamine (24 microg/mL) by recombinant factor VIIa or factor VIII/von Willebrand factor concentrate was also tested.

**RESULTS**: Protamine prolonged prothrombin time and Russell's viper venom time, concentration dependently. Protamine also increased lag time and decreased peak of thrombin generation in platelet-poor plasma after tissue factor and actin activation. In platelet-rich plasma with platelets at 50 to 200 x 10(3)/microL, protamine (24 microg/mL) prolonged the lag time, but had no effect on peak thrombin generation. The addition of factor VIII/von Willebrand factor (1.5-3.0 U/mL) to platelet-poor plasma with protamine (24 microg/mL) decreased lag time and increased peak thrombin generation with actin activation. A therapeutic concentration of recombinant factor VIIa (60 nM) only affected the lag time of thrombin generation triggered with actin. In agreement, protamine increased coagulation time evaluated by thromboelastometry significantly more in platelet-poor plasma than in whole blood.

**CONCLUSIONS**: We demonstrated that protamine affects the propagation of thrombin generation, which is partially reversed by platelets or increased factor VIII/von Willebrand factor concentrations. The present data suggest that excess protamine might potentially increase bleeding in the case of severe thrombocytopenia or low factor VIII.

動脈交叉鉗夾和再灌注在豬體中由於全身和局部血流重分配而導致微血管的氧合水準下降。

**Arterial and venous pharmacokinetics of morphine-6-glucuronide and impact of sample site on pharmacodynamic parameter estimates.**

Olofsen E, Mooren R, van Dorp E, Aarts L, Smith T, den Hartigh J, Dahan A, Sarton E.
Department of Anesthesiology, Leiden University Medical Center, P5-Q, 2300 RC Leiden, The Netherlands.

Anesth Analg. 2010111(3):626-32.

**背景**：在藥代動力學－藥效學的模型研究中，靜脈血漿樣本常用來計算藥效學模型的參數。本研究中將定量分析動靜脈血中嗎啡-6-葡萄糖苷酸藥物濃度的差別。在比較靜脈血和動脈血濃度與作用的關聯時，我們使用了模擬研究來估算藥效學模型參數的偏倚。

**方法**：17名健康志願者在90秒內靜脈注射0.3mg/Kg的嗎啡-6-葡萄糖苷酸。分別採集橈動脈和肱靜脈的血樣標本。此外，根據動脈和靜脈的房室建立一個擴展的藥效學模型。使用NONMEM進行模型研究以探索和估計藥效學模型參數的偏倚。用一級作用與抑制S形模型來類比M6G的作用。由於M6G的動脈血漿-靶位平衡半衰期T(1/2)k(E0)時間爲5-240分鐘，因此以多種不同的數值來摸擬M6G的作用。

**結果**：動靜脈血藥物濃度差別顯著。在靜脈注射後即刻動脈血藥物濃度較靜脈血高，在接下來的超過60分鐘時間裏，靜脈血M6G濃度逐漸上升並超過動脈血藥物濃度。擴展的藥代動力學模型很好地描述了這些資料的變化。這一模型由3個動脈室，1個中心靜脈室和1個外周靜脈室組成。類比研究顯示，由靜脈血藥物濃度資料得到的模型參數存在巨大偏倚。偏倚的大小取決於t(1/2)k(E0)的值。假設M6G的t(1/2)k(E0)的真實值範圍是120-240分鐘(取決於測量的終點)，那麼使用靜脈血漿標本進行分析的話，我們將低估t(1/2)k(E0)達到30%，同時，效能參數將被高估達40%。

**結論**：由於M6G的動靜脈血藥物濃度間存在巨大差異，在使用傳統的效應室模型進行靜脈血藥濃度與效應的關聯估計時，藥效學模型參數中的藥物濃度部分將存在巨大的偏倚。

（黃劍譯 薛張綱校）

**BACKGROUND**: In pharmacokinetic-pharmacodynamic modeling studies, venous plasma samples are sometimes used to derive pharmacodynamic model parameters. In the current study the extent of arteriovenous concentration differences of morphine-6-glucuronide (M6G) was quantified. We used simulation studies to estimate possible biases in pharmacodynamic model parameters when linking venous versus arterial concentrations to effect.

**METHODS**: Seventeen healthy volunteers received an IV 90-second infusion of 0.3 mg/kg morphine-6-glucuronide (M6G). Arterial and venous blood samples, from the radial artery and cubital vein, respectively, were obtained. An extended pharmacokinetic model was constructed linking arterial and venous compartments. The extent of bias in pharmacodynamic model parameter estimates was explored in simulation studies with NONMEM, simulating M6G effect using first-order effect-compartment-inhibitory

sigmoid E(MAX) models. M6G effect was simulated at various values for the arterial blood-effect-site equilibration half-lifes (t(1/2)k(E0)), ranging from 5 to 240 minutes. **RESULTS**: Arteriovenous concentration differences were apparent, with higher arterial plasma concentrations just after infusion, whereas at later times (>60 minutes) venous M6G concentrations exceeded arterial concentrations. The extended pharmacokinetic model adequately described the data and consisted of 3 arterial compartments, 1 central venous compartment, and 1 peripheral venous compartment. The simulation studies revealed large biases in model parameters derived from venous concentration data. The biases were dependent on the value of t(1/2)k(E0). Assuming that the true values of M6G t(1/2)k(E0) range from 120 to 240 minutes (depending on the end point measured), we would have underestimated t(1/2)k(E0) by 30%, whereas the potency parameter would have been overestimated by about 40%, when using venous plasma samples. **CONCLUSIONS**: Because of large arteriovenous differences in M6G plasma, concentration biases in pharmacodynamic model parameters will occur when linking venous concentration to effect, using a traditional effect-compartment model.

## 兒科氣道管理器械的電腦模型和原型製作

**Computational Modeling and Prototyping of a Pediatric Airway Management Instrument**

Alan Gonzalez-Cota, MD,* Grant H. Kruger, PhD,† Padmaja Raghavan, MS,‡ and Paul I. Reynolds, MD§
From the *Department of Anesthesiology, University of Michigan Health System; †S.M. Wu Manufacturing Research Center, College of Engineering, University of Michigan; ‡College of Engineering, University of Michigan; and §Department of Pediatric Anesthesiology, University of Michigan Health System.
Anesth Analg 2010;111:649–52

**背景**：以前兒科纖支鏡插管時壓舌是爲了增加上氣道的開放度,用Magill鉗作爲舌拉鉤可以做到，但是舌頭往往不固定而且容易受傷。我們的研究就是應用電腦輔助工程改進以獲得穩定的舌拉鉤。
**方法**：我們運用解析和試驗方法分析標準Magill鉗的幾何學和機械性能。這項設計應用電腦輔助設計技術可獲得3維立體模型利於進一步進行幾何精煉和數學測試，使原型能夠速成。
**結論**：在試驗發現的基礎上我們調整設計約束以優化舌拉鉤。老套的原型設計生產出一個部分功能塑膠模型以進一步評估功能和設計改進對人類環境改造學的作用。爲減少常規Magill鉗對舌頭的壓力，我們整合（1）增大頂端直徑已獲得更好的舌部壓力分佈圖，（2）設計棘輪以穩固這個壓力，（3）便於抓握的柔軟可塑性好的頂部。
**結論**：電腦輔助工程可用來重新設計並製作出一個簡單的氣道管理工具模型。基於電腦模型，我們在保留最初的幾何學和通用性上改良了Magill鉗以獲得穩定的收縮力度，它應用於人體及在兒科纖支鏡插管中的實用性還有待於研究。
（毛慧譯，薛張剛校）

**BACKGROUND**: Anterior retraction of the tongue is used to enhance upper airway patency during pediatric fiberoptic intubation. This can be achieved by the use of Magill forceps as a tongue retractor, but lingual grip can become unsteady and traumatic. Our objective was to modify this instrument using computer-aided engineering for the purpose of stable tongue retraction.
**METHODS**: We analyzed the geometry and mechanical properties of standard Magill forceps with a combination of analytical and empirical methods. This design was captured using computeraided design techniques to obtain a 3-dimensional model allowing further geometric refinements and mathematical testing for rapid prototyping.
**RESULTS**: On the basis of our experimental findings we adjusted the design constraints to optimize the device for tongue retraction. Stereolithography prototyping was used to create a partially functional plastic model to further assess the functional and ergonomic effectiveness of the design changes. To reduce pressure on the tongue by regular Magill forceps, we incorporated (1) a larger diameter tip for better lingual tissue pressure profile, (2) a ratchet to stabilize such pressure, and (3) a soft molded tip with roughened surface to improve grip.
**CONCLUSION**: Computer-aided engineering can be used to redesign and prototype a popular instrument used in airway management. On a computational model, our modified Magill forceps demonstrated stable retraction forces, while maintaining the original geometry and versatility. Its application in humans and utility during pediatric fiberoptic intubation are yet to be studied.

## 系統性紅斑狼瘡：一篇麻醉學家的綜述

**Systemic Lupus Erythematosus: A Review for Anesthesiologists**

Erez Ben-Menachem, MBCHB, MBA, FANZCA
From the Department of Anesthesia, Sheba Medical Center, Tel Hashomer, Israel.
Anesth Analg 2010 111:665-676

系統性紅斑狼瘡(SLE)是一種慢性免疫系統的結締組織疾病，有不同臨床表現。疾病嚴重程度從輕到重不等；其嚴重程度取決於受累的器官。這種疾病最早在 12 世紀中期由一名叫 Rogerius 的大夫描述，稱一種面頰部疹爲狼瘡，在 1872 年 Moric Kaposi 首先描述了這種疾病的全身表現。SLE 因爲其多器官受累、凝血功能異常和複雜的治療，因此圍手術期處理是麻醉醫生的巨大挑戰。自愛這篇文章中我們詳細介紹了 SLE 的診斷和治療，並討論麻醉醫生圍手術期的管理。

（陳珺珺譯 薛張綱校）

Systemic lupus erythematosus (SLE) is a chronic autoimmune connective tissue disorder, with a heterogeneous presentation. Disease severity is wide ranging, with most suffering milder forms; however, it is potentially fatal depending on organ involvement. The disorder was recognized as early as the Middle Ages, with the 12th-century physician Rogerius being the first to apply the term lupus to the classic malar rash, and in 1872, Moric Kaposi first recognized the systemic nature of the disease. Perioperatively, SLE

can present major challenges to the anesthesiologist because of accrued organ damage, coagulation defects, and complex management regimes. In this article I highlight adult SLE manifestations and treatments pertinent to the anesthesiologist and discuss perioperative management of these complex patients.

## 急性低氧性呼吸衰竭的救治方法

**Rescue Therapies for Acute Hypoxemic Respiratory Failure**

Linda L. Liu, MD, J. Matthew Aldrich, MD, David W. Shimabukuro, MDCM, Kristina R. Sullivan, MD, John M. Taylor, MD, Kevin C. Thornton, MD and Michael A. Gropper, MD, PhD
From the Department of Anesthesia and Perioperative Care, University of California San Francisco, San Francisco, California
Anesth Analg 2010 111:693-702

最近 H1N1 大流行造成了多人死亡,這主要是由於急性呼吸衰竭.我們綜述了目前救治嚴重低氧血症的策略.策者略中包括了高頻震盪通氣,氣道壓力釋放通氣,吸入血管擴張劑和體外生命支援.所有的策略都旨在改善氧和,而氧和的改善和生存率的提高有關.並對這些策略的危險、優點和成本效益進行了比較。
(姚敏敏譯　薛張綱校)
The recent H1N1 epidemic has resulted in a large number of deaths, primarily from acute hypoxemic respiratory failure. We reviewed the current strategies to rescue patients with severe hypoxemia. Included in these strateges are high-freency oscillatory ventilation, airway pressure release ventilation, inhaled vasodilators, and the use of extracorporeal life support. All of these strategies are targeted at improving oxygenation, but improved oxygenation alone has yet to be demonstrated to correlate with improved survival. The risks and benefits of these strategies, including cost-effectiveness data, are discussed.

## 體位性血壓改變和脊麻下剖宮產手術中低血壓的風險：一項觀察研究

**Positional blood pressure change and the risk of hypotension during spinal anesthesia for cesarean delivery: an observational study.**

Jeon YT, Hwang JW, Kim MH, Oh AY, Park KH, Park HP, Lee Y, Do SH.
Department of Anesthesia and Pain Medicine, Seoul National University Bundang Hospital, 300 Gumidong, Bundang, Seongnam, Kyonggi 463-707 South Korea.
Anesth Analg 2010 111:712-715

**背景**：我們研究了術前體位性動脈血壓變化是否可預測脊麻下剖宮產中低血壓的發生及是否需要麻黃素。
**方法**：測量了 66 名接受脊麻下剖腹產手術且右側仰臥位的婦女的動脈血壓。 體位性血壓變化指右側仰臥位時血壓與平均動脈壓的差異。 記錄低血壓（<80%的基準）和需要麻黃素治療的嚴重低血壓（<70%的基準）。
**結果**：體位性血壓變化的平均值（範圍）爲 11（3-29）毫米汞柱，而低血壓的發生率是 41%。 體位性血壓和心率的變化與低血壓（P <0.001）和麻黃素的需求（P

= 0.004）相關。 體位性血壓變化低血壓患者高於無低血壓患者（平均值（標準差），17（6）vs7（2）毫米汞柱，P<0.001）。
**結論**：在體位變化後的術前血壓升高也許能很好地預測脊麻下剖宮產過程中低血壓發生情況。
（張玥琪譯 薛張綱校）
**BACKGROUND**: We investigated whether preoperative positional arterial blood pressure change predicted hypotension and ephedrine requirement during spinal anesthesia for cesarean delivery.
**METHODS**: Arterial blood pressure was measured in 66 women undergoing cesarean delivery in the supine and the right lateral positions. Positional blood pressure change was defined as the difference between mean blood pressure in the right lateral and supine positions. Hypotension (<80% baseline) was recorded, and severe hypotension (<70% baseline) was treated with ephedrine.
**RESULTS**: The mean (range) positional blood pressure change was 11 (3-29) mm Hg, and the incidence of hypotension was 41%. Positional blood pressure change and heart rate correlated with hypotension (P < 0.001 for both) and ephedrine requirement (P = 0.004). Positional blood pressure change in those who developed hypotension was higher than for those without hypotension (mean (SD), 17 (6) vs. 7 (2) mm Hg, P < 0.001).
**CONCLUSIONS**: A preoperative increase in blood pressure after position change may be a good variable to predict hypotension during spinal anesthesia for cesarean delivery.

## 癲癇發作病史患者圍術期的癲癇發作

**Perioperative Seizures in Patients with a History of a Seizure Disorder**
Adam D. Niesen, MD, Adam K. Jacob, MD, Lucyna E. Aho, RN, Emily J. Botten, RN, Karen E. Nase, RN, Julia M. Nelson, RN and Sandra L. Kopp, MD
From the Department of Anesthesiology, Mayo Clinic College of Medicine, Rochester, Minnesota
Anesth Analg 2010 111:729-735

**背景**：既往存在癲癇發作病史的患者圍術期的癲癇發作並不確定。有幾個圍術期特有的因素可增加患者手術期間癲癇發作的風險，包括使用的藥物，給藥間隔時間，抗癲癇藥物劑量錯誤以及睡眠剝奪。我們設計了這項回歸性病例分析研究來評估既往存在癲癇發作病史的患者圍術期癲癇發作的頻率。
**方法**：回顧性查閱從 2002 年 1 月 1 日至 2007 年 12 月 31 日期間所有接受過麻醉並且資料顯示有癲癇發作病史的患者的醫療檔。接受門診手術或顱內手術、ASA 分級爲 V 級、孕婦以及小於 2 歲的患者除外。每位患者均爲 24 小時內首次住院並在此期間接受麻醉。記錄患者人口統計學資料、癲癇發作的特點、手術操作細節以及圍術期（麻醉後 3 天內）癲癇發作的臨床表現。
**結果**：在 6 年的研究期間，641 名有資料顯示癲癇發作病史的患者在接受麻醉後至少 24 小時內被確認納入研究。22 名患者經歷了圍術期的癲癇發作，整體發作頻率爲 3.4%（95%可信區間 2.2%–5.2%）。術前癲癇發作頻率(P < 0.001)和最近癲癇發作的時限(P < 0.001)均被發現與圍術期癲癇發作可能性明顯相關。隨著抗癲癇藥物

數量的增加，圍術期癲癇發作頻率也增加(P < 0.001)。手術類型和麻醉方式（全麻、局部麻醉或麻醉監護）都不影響這些患者圍術期癲癇發作的頻率。
**結論**：我們得出結論爲既往存在癲癇發作病史的患者圍術期大多數癲癇發作與患者基礎病情最相關。麻醉和手術類型不影響癲癇發作頻率。因爲在基本狀態下頻繁發作癲癇的患者圍術期更易經歷癲癇發作，所以不管何種手術過程或麻醉技術，作好治療癲癇發作的準備都是必要的。
（朱蘭芳譯，薛張綱校）

**BACKGROUND**: The occurrence of perioperative seizures in patients with a preexisting seizure disorder is unclear. There are several factors unique to the perioperative period that may increase a patient's risk of perioperative seizures, including medications administered, timing of medication administration, missed doses of antiepileptic medications, and sleep deprivation. We designed this retrospective chart review to evaluate the frequency of perioperative seizures in patients with a preexisting seizure disorder.

**METHODS**: We retrospectively reviewed the medical records of all patients with a documented history of a seizure disorder who received an anesthetic between January 1, 2002 and December 31, 2007. Patients excluded from this study include those who had an outpatient procedure or intracranial procedure, ASA classification of V, pregnant women, and patients younger than 2 years of age. The first hospital admission of at least 24 hours during which an anesthetic was provided was identified for each patient. Patient demographics, character of the seizure disorder, details of the surgical procedure, and clinically apparent seizure activity in the perioperative period (within 3 days after the anesthetic) were recorded.

**RESULTS:** During the 6-year study period, 641 patients with a documented seizure disorder were admitted for at least 24 hours after an anesthetic. Twenty-two patients experienced perioperative seizure activity for an overall frequency of 3.4%(95% confidence interval, 2.2%–5.2%). The frequency of preoperative seizures ($P < 0.001$) and the timing of the most recent seizure ($P < 0.001$) were both found to be significantly related to the likelihood of experiencing a perioperative seizure. As the number of antiepileptic medications increased, so did the frequency of perioperative seizures ($P < 0.001$). Neither the type of surgery nor the type of anesthetic (general anesthesia, regional anesthesia, or monitored anesthesia care) affected the frequency of perioperative seizures in this patient population.

**CONCLUSIONS:** We conclude that the majority of perioperative seizures in patients with a preexisting seizure disorder are likely related to the patient's underlying condition. The frequency of seizures is not influenced by the type of anesthesia or procedure. Because patients with frequent seizures at baseline are likely to experience a seizure in the perioperative period, it is essential to be prepared to treat seizure activity regardless of the surgical procedure or anesthetic technique.

## 高速即時 CT 透視顯像引導下行經皮射頻三叉神經離斷術

**Percutaneous Radiofrequency Mandibular Nerve Rhizotomy Guided by High-Speed Real-Time Computed Tomography Fluoroscopy**

Shiro Koizuka, Shigeru Saito, Masaru Tobe, Kenichi Sekimoto, Hideaki Obata and Yoshinori Koyama
From the Department of Anesthesiology and the Department of Diagnostic Radiology and Nuclear Medicine, Gunma University Graduate School of Medicine, Maebashi, Japan.

Anesth Analg 2010 111:763-767

我們介紹的這種技術是通過高速即時 CT 透視顯像引導下，通過經皮射頻下頜神經離斷術緩解下頜區域疼痛。11 名（13 次）原發性三叉神經痛患者進行了上述試驗。CT 透視顯像在一個螢光影像中同時顯示三個圖像（頭尾向每 1mm 間隔一張），準確定位穿刺針的位置。所有患者的三叉神經痛症狀均緩解，且沒有出現嚴重的併發症。平均疼痛強度評分(±SD)從 6.5 分(±1.8, 治療前)下降到 1.8 (±1.7,治療一個月後)和下降到 0.9 (±1.0, 治療 3 個月後)。我們有限的病例提示在 CT 顯像引導下穿刺的優越性，但是上述發現有待於進一步隨機對照及大樣本量的研究。

（陳珺珺譯 薛張綱校）

We present a new method of percutaneous radiofrequency mandibular nerve rhizotomy for pain relief in the mandibular region, in which needle placement is guided by high-speed real-time computed tomography (CT) fluoroscopy. Eleven patients (13 procedures) with idiopathic trigeminal neuralgia underwent the procedure. CT fluoroscopy simultaneously provided 3 slices (1-mm interval series, craniocaudally) in 1 fluoroscopic view, allowing for accurate needle placement. Trigeminal neuralgia improved in all patients without severe complications. The mean numerical rating scales of pain intensity (±SD) decreased from 6.5 (±1.8, pretreatment) to 1.8 (±1.7, 1 month after treatment) and to 0.9 (±1.0, 3 months after treatment). Our limited-case series suggests potential advantages for the new CT fluoroscopy guidance, but these findings await confirmation from randomized controlled trials and large-case series.

## 脈衝射頻應用於樹膠脂毒素誘導出異常的機械性疼痛的大鼠的效果

**The Effect of Pulsed Radiofrequency Current on Mechanical Allodynia Induced with Resiniferatoxin in Rats**

Nobuhiko Tanaka, MD,Masaharu Yamaga, MD,Shingo Tateyama, MD,Takeshi Uno, MD, Isao Tsuneyoshi, MD and Mayumi Takasaki, MD
From the Department of Anesthesiology and Intensive Care, Faculty of Medicine, University of Miyazaki, Miyazaki; and Department of Anesthesiology and Pain Clinic, Junwakai Memorial Hospital, Miyazaki, Japan.

Anesth Analg 2010 111:784-790

**背景**：脈衝射頻（PRF）是一種很流行的疼痛治療方式。目前 PRF 應用于神經性疼痛尚沒有詳細研究。 我們研究了通過樹膠脂毒素(RTX)誘導出異常的機械性疼痛的大鼠，通過 PRF 治療該疼痛的效果，特別是比較 PRF 前和 PRF 後對異常疼痛的耐受時間。

**方法**：成年雄性 SD 大鼠（體重在 250-400 克）腹腔內注射 RTX（200ug/kg）後吸入 2%至 3%的七氟醚麻醉。 $S_2$ 組大鼠（n＝5）在注射 RTX 後 1 周接受右坐骨神經 PRF 治療 2 分鐘，$M_2$ 組大鼠（n＝6）在注射 RTX 後 3 周接受 PRF 治療 2 分鐘，$L_2$ 組大鼠（n＝7）在注射 RTX 後 5 周接受 PRF 治療 2 分鐘，$S_4$ 組大鼠（n＝5）在注射 RTX 後 1 周接受 PRF 治療 4 分鐘，$S_6$ 組大鼠（n＝5）在注射 RTX 後 1 周接受 PRF 治療 6 分鐘，$S_0$ 組大鼠（n＝3）沒有進行 PRF 治療。分別在 RTX 前及注射 RTX 後每週及 PRF 治療後 1、2、3、4、5 周對所有的大鼠進行如下評估：通過 von Frey filaments 測定機械刺激的敏感性，通過溫度測試儀測定熱刺激敏感性，通過定位及抓握反射測定運動功能。

**結果**：各組兩後爪縮爪的閾值在注射 RTX 後 1 周組均顯著低於 RTX 前的基準值。在 $S_2$，$S_4$，$S_6$ 和 $M_2$ 組，PRF 治療後同側縮爪閾值明顯增加，兩者間有統計學差異。在 $S_2$ 組 PRF 後，同側－對側退爪的閾值均高於 $M_2$ 和 $L_2$ 組。$M_2$ 和 $L_2$ 組，在 PRF 後第 1，2，4 和 5 周有顯著差異。PRF 後 5 周，$S_6$ 組同側-對側退爪閾值均高於 $S_2$ 和 $S_4$ 組。$S_2$ 和 $S_4$ 間在任何時間點沒有統計學差異。在 PRF 後的各時間點，任何組均沒有觀察到對溫度刺激的退爪閾值的影像及運動障礙。

結論：PRF 治療在大鼠身上應用與機械性異常疼痛早期（1 周）是有效的。增加 PRF 暴露的時間，從 2 到 6 分鐘可以有顯著的對抗異常疼痛的作用，且沒有運動功能損傷。我們提出應在異常疼痛出現後儘早性行 PRF 治療 6 分鐘。

（陳珺珺譯 薛張綱校）

**BACKGROUND**: Pulsed radiofrequency (PRF) is a popular pain treatment modality. The effect of PRF current on neuropathic pain has not been examined in detail. We investigated the effect of PRF current on mechanical allodynia induced with resiniferatoxin (RTX) in rats, especially regarding the influence of the duration of allodynia before PRF procedures and that of exposure time to PRF.

**METHODS**: Adult male Sprague-Dawley rats (weighing 250–400 g) received a single intraperitoneal injection of RTX (200 μg/kg) under 2 to 3% sevoflurane anesthesia. Rats in group $S_2$ (n = 5) were assigned to receive PRF current to the right sciatic nerve for 2 minutes 1 week after RTX treatment; rats in group $M_2$ (n = 6), PRF current for 2 minutes 3 weeks after RTX treatment; rats in group $L_2$ (n = 7), PRF current for 2 minutes 5 weeks after RTX treatment; rats in group $S_4$ (n = 5), PRF current for 4 minutes 1 week after RTX treatment; rats in group $S_6$ (n = 5), PRF current for 6 minutes 1 week after RTX

treatment; and rats in group $S_0$ (n = 3), no PRF current was delivered. Instead, the needle and electrode were inserted at proper points for 6 minutes 1 week after RTX treatment. All rats were evaluated for sensitivity to mechanical stimulation with von Frey filaments and to thermal stimulation with a thermal testing apparatus and for motor function using placing and grasping reflexes before injection of RTX, every week after injection of RTX, and 1, 2, 3, 4, and 5 weeks after PRF treatment.

**RESULTS**: The paw withdrawal thresholds of both hind paws 1 week after RTX treatment were significantly lower than the pre-RTX baseline in all groups. In groups $S_2$, $S_4$, $S_6$, and $M_2$, after PRF procedures, the ipsilateral paw withdrawal thresholds significantly increased. A statistically significant difference was detected between the PRF-treated and PRF-untreated hindpaws. The ipsilateral–contralateral paw withdrawal thresholds after PRF procedures in group $S_2$ were significantly higher than those in groups $M_2$ and $L_2$. Between groups $M_2$ and $L_2$, significant differences were found 1, 2, 4, and 5 weeks after PRF procedures. The ipsilateral–contralateral paw withdrawal thresholds in group $S_6$ were significantly higher than those in groups $S_2$ and $S_4$ 5 weeks after PRF procedures. No significant difference was found between groups $S_2$ and $S_4$ at any time. After PRF procedures, no difference in the withdrawal latency after heat stimulation and no motor disturbance were observed at any time in all groups.

**CONCLUSIONS**: PRF treatment was more effective when applied in the early stages of mechanical allodynia (1 week) in rats. Increased exposure time to PRF current from 2 to 6 minutes showed a significant antiallodynic effect without motor impairment. We propose the application of PRF current for 6 minutes adjacent to the nerve as soon as possible when allodynia appears.

## 一項關於腰段交感神經節阻滯發生腰肌和血管內注射的前瞻性評估

**A Prospective Evaluation of Psoas Muscle and Intravascular Injection in Lumbar Sympathetic Ganglion Block**

Ji H. Hong, MD, PhD, Ae R. Kim, MD, PhD, Mi Y. Lee, MD, PhD, Yong C. Kim, MD, PhD and Min J. Oh, MD
From the Department of Anesthesiology and Pain Medicine, and the Department of Preventive Medicine, Keimyung University Dong San Hospital, School of Medicine, Daegu, Korea, and the Department of Anesthesiology and Pain Medicine, Seoul National University Hospital, Seoul, Korea.
Anesth Analg 2010 111:802-807

**背景**：在腰段交感神經節阻滯(LSGB)期間，局麻藥注入靜脈及肌肉可以導致診斷阻滯效果的假陽性和假陰性結果。在這項研究中，我們前瞻性評估了 LSGB 期間局麻藥注入肌肉或血管的發生率及可能的因素。

**方法**：我們評估了 83 名患者行 216 次 LSGBs。一名作者通過 3 針技術完成了所有的 LSGBs。最終穿刺針的位置通過 x 透視顯像確定，進行了抽吸試驗，並注射了

1ml 對比劑。我們通過靜態即時 x 線透視評估了腰肌內注射、回血、和血管內對比劑擴散的發生。

**結果**：腰肌內注對比劑的發生率爲 21.3%(46/216) ，它的發生與注射節段(L2)密切相關($\chi^2$ = 14.773, P = 0.001)。血管內注射對比劑的發生率爲 12.5% (27/216)。在 27 例血管內注射的病例中，5.1% (11/216)的患者對比劑擴散的區域是同時假定交感神經節和血管區域，7.4% (16/216) 的患者只在血管中見對比劑。回抽試驗和靜態 x 線顯像的敏感度分別爲 40.7% 和 70.4%。

**結論**：相比於在 L3 和 L4 水平行 LSGB，在 L2 水平行 LSGB 腰肌注射的發生率最低。LSGB 期間，通過回抽試驗及靜態 x 線顯像經常會不能顯示血管內注射的情況。
（陳珺珺譯 薛張綱校）

BACKGROUND: Intravascular and intramuscular injection of local anesthetics during lumbar sympathetic ganglion block (LSGB) can cause false positive or negative results in a diagnostic block, and complications. In the present study, we prospectively evaluated the incidence and possible factors causing intravascular and IM injection during LSGB.

**METHODS**: We evaluated 216 LSGBs in 83 patients. All LSGBs were performed by 1 of the authors using a 3-needle technique. After final needle position was confirmed by biplanar fluoroscopy, an aspiration test was conducted, and 1 mL of contrast was injected sequentially. Incidences of psoas muscle injection, blood flashback, and the presence of intravascular contrast spread on static and real-time fluoroscopy were assessed.

**RESULTS**: The incidence of psoas muscle injection of contrast was 21.3% (46/216), and it was associated with the level of injection (L2) significantly ($\chi^2$ = 14.773, P = 0.001). The incidence of intravascular injection of contrast was 12.5% (27/216). Among 27 cases of documented intravascular injections, 5.1% (11/216) of patients showed contrast spread at the area where the sympathetic ganglion was presumed to be and to the vessels simultaneously, and 7.4% (16/216) of patients showed only intravascular injection of contrast. The sensitivity of the aspiration test and static radiography were 40.7% and 70.4%, respectively.

**CONCLUSIONS**: LSGB at the L2 level showed the lowest incidence of psoas muscle injection of contrast in comparison with LSGB at L3 and L4. The aspiration test and static radiography frequently missed the intravascular injection of contrast during LSGBs.

## 機器人輔助局麻：一項模擬示教

**Robot-Assisted Regional Anesthesia: A Simulated Demonstration**

Patrick J. Tighe, MD, S. J. Badiyan, MD, I. Luria, MS, Andre P. Boezaart, MD, PhD and S. Parekattil, MD

From the Department of Anesthesiology and the Department of Orthopaedics and Rehabilitation, University of Florida College of Medicine, Gainesville, Florida; Department of Urology, University of Florida COM.
Anesth Analg 2010 111:813-816

近年來機器人輔助遠端手術技術的開展使外科專家爲地理位置偏遠的患者提供服務成爲可能。同樣遠端麻醉也可以爲偏遠患者提供圍手術期管理。儘管很多關於遠端麻醉的調查尚在進行中，但還沒有涉及麻醉相關進程的具體操作。因此，我們描述了通過 da Vinci 多功能機器人系統在超聲引導下神經阻滯定位。我們成功地進行了單次注射和外周神經置管的操作。

（陳珺珺譯 薛張綱校）

Abstract

Recent advances in robotically assisted telesurgery offer expert surgical care for the geographically remote patient. Similar advances in teleanesthesia will be necessary to bring comparable perioperative care to the geographically remote patient. Although many preliminary investigations into teleanesthesia are underway, none involve remote performance of anesthesia-related procedures. Herein, we describe the placement of ultrasound-guided nerve blocks into an ultrasound phantom using the da Vinci multipurpose surgical robotic system (Intuitive Surgical, Sunnyvale, CA). Both single-injection and perineural catheter techniques were successfully performed

## 心臟移植過程中肝素誘發的血小板減少症患者在使用比伐盧定時靜脈貯血器中的一個血栓

**A Thrombus in the Venous Reservoir While Using Bivalirudin in a Patient with Heparin-Induced Thrombocytopenia Undergoing Heart Transplantation**

Jim K. Wong, MD*, Ying Tian, MD*, Paul Shuttleworth, BSN‡, Anthony D. Caffarelli, MD†, Bruce A. Reitz, MD† and Christina T. Mora-Mangano, MD*
From *Department of Anesthesia, Division of Cardiovascular Anesthesia, and †Department of Cardiothoracic Surgery, Stanford University, Stanford, California.
Anesth Analg 2011; 111(3): 609-612

在肝素誘發的血小板減少症患者的心肺轉流術中，直接凝血酶抑制劑具有替代肝素的抗凝作用。我們報導的病例是關於使用比伐盧定時在靜脈貯血器中形成了一個巨大血栓。本例提示術中血液淤滯和持續充滿的靜脈貯血器有關，導致在靜脈濾罐頂端形成了一個巨大血栓。此外，在使用直接凝血酶抑制劑時，活化凝血時間或許不能準確地反映抗凝的強度。

（唐李雋 譯 馬皓琳 李士通 校）

Direct thrombin inhibitors are heparin alternatives for anticoagulation during cardiopulmonary bypass in patients with heparin-induced thrombocytopenia. We report a case of a large thrombus forming in the venous reservoir while using bivalirudin. We suggest that blood stasis associated with the full venous reservoir maintained in this case

led to formation of a large thrombus at the top of the venous canister. Furthermore, activated clotting times may not accurately reflect the magnitude of anticoagulation when using direct thrombin inhibitors.

## 靜脈注射加巴噴丁對貓吸入異氟醚時最低肺泡氣有效濃度的影響

**The Effects of Intravenous Gabapentin Administration on the Minimum Alveolar Concentration of Isoflurane in Cats**

Patrick Reid, BA, Bruno H. Pypendop, DrMedVet, DrVetSci and Jan E. Ilkiw, BVSc, PhD
From the Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California, Davis, California.
Anesth Analg 2011; 111(3): 633-637

**背景：**加巴噴丁結構上與哺乳動物中樞神經系統的一種抑制性神經遞質γ-氨基丁酸相似。加巴噴丁正被越來越多地用於預防性的控制術後疼痛。因此，研究它與吸入麻醉藥之間的相互作用就有一定的臨床意義。在本研究中，我們檢查了加巴噴丁對貓吸入異氟醚時最低肺泡氣有效濃度（MAC）的影響，並提出加巴噴丁可能劑量依賴性地降低異氟醚 MAC 的假設。
**方法：**共有 6 只貓入選本研究。靜脈注射加巴噴丁使其血漿靶濃度達到 0 到 16μg/mL 之間，並記錄每個血漿濃度對應的異氟醚 MAC 值。抽取血漿樣本，使用液相色譜－質譜分析測定加巴噴丁的血漿濃度。使用用於球形假設違背的 Huynh-Feldt 校正檢驗對不同加巴噴丁血漿濃度下的 MAC 值進行重複測量的方差分析。
**結果：**靶濃度在 0、1、2、4、8 和 16 μg/mL 時分別對應的加巴噴丁實際濃度爲 0 ± 0、1.18 ± 0.23、2.25 ± 0.23、4.96 ± 1.19、10.63 ± 1.37 和 19.69 ± 3.97 μg/mL。靶濃度爲 0、1、2、4、8 和 16 μg/mL 時，本研究中的異氟醚 MAC 值分別爲 2.10%± 0.13%、2.10% ± 0.14%、2.13% ± 0.12%、2.06% ± 0.11%、2.11% ± 0.15%和 2.09% ± 0.25%。
**結論：**我們認爲加巴噴丁對貓吸入異氟醚的 MAC 值沒有明顯的影響。
（劉伍譯，馬皓琳、李士通校）

**BACKGROUND:** Gabapentin is a structural analog of γ-aminobutyric acid, one of the inhibitory neurotransmitters of the mammalian central nervous system. It is increasingly being used preemptively to control postoperative pain. Therefore, its interaction with inhaled anesthetics is of clinical interest. In this study, we examined the effects of gabapentin on the minimum alveolar concentration (MAC) of isoflurane in cats. We hypothesized that gabapentin would decrease the MAC of isoflurane in a dose-dependent manner.
**METHODS:** Six cats were included in the study. Gabapentin was administered IV to achieve target plasma concentrations between 0 and 16 μg/mL and the MAC of isoflurane was determined at each gabapentin concentration. Gabapentin concentrations were quantitated by liquid chromatography–mass spectrometry analysis of extracted plasma samples. MAC values at the different gabapentin plasma concentrations were analyzed by a repeated-measures analysis of variance using the Huynh-Feldt correction for violation of the sphericity assumption.

**RESULTS:** Actual gabapentin concentrations were 0 ± 0, 1.18 ± 0.23, 2.25 ± 0.23, 4.96 ± 1.19, 10.63 ± 1.37, and 19.69 ± 3.97 μg/mL for the target concentrations of 0, 1, 2, 4, 8, and 16 μg/mL, respectively. The MAC of isoflurane in this study was 2.10%± 0.13%, 2.10% ± 0.14%, 2.13% ± 0.12%, 2.06% ± 0.11%, 2.11% ± 0.15%, and 2.09% ± 0.25% at target plasma concentrations of 0, 1, 2, 4, 8, and 16 μg/mL, respectively.
**CONCLUSIONS:** We conclude that gabapentin did not have a detectable effect on the MAC of isoflurane in cats.

## 一瞥監測：在手術室對麻醉醫生的隱蔽觀察

**At-a-Glance Monitoring: Covert Observations of Anesthesiologists in the Operating Room**

Simon Ford, MB, ChB, FRCA*, Elina Birmingham, PhD†, Ashlee King, BSc‡, Joanne Lim, MASc‡ and J. Mark Ansermino, MBBCh, MSc(Inf), FFA‡
From the * Department of Anaesthesia, Morriston Hospital, Swansea, Wales, United Kingdom; † Division of Humanities and Social Sciences, California Institute of Technology, Pasadena, California; and ‡ Department of Anesthesiology, Pharmacology, and Therapeutics, University of British Columbia, Vancouver, British Columbia, Canada.
Anesth Analg 2011; 111(3): 653-658

**背景**：患者監測顯示幕是爲了提高患者的安全性，而對麻醉醫生如何與這些顯示幕相互影響仍不十分清楚。以前對臨床醫生行爲的研究是基於手術室中的監視器，但這樣會是使他們的行爲發生有意識的改變。因此，我們運用了一種隱蔽的監視技術，來觀察麻醉醫生在麻醉維持的不同階段查看監護儀顯示幕的頻率和持續時間，以及多人合作或伴隨其他活動（如閱讀）時是否會有改變。
**方法**：暗中拍攝了 5 名麻醉科醫生、2 名麻醉研究員、3 名麻醉住院醫師和 2 名醫學生的 10 例兩人麻醉病例和 10 例單人麻醉病例的麻醉全過程。之後將視頻分段（維持早期[誘導後 5 分鐘]、維持中期和維持晚期[掀敷料前]），統計麻醉醫生查看患者監護儀顯示幕的行爲、麻醉記錄單和其他書面材料。
**結果**：在麻醉維持的 3 個階段，麻醉醫生都頻繁查看監護儀，每次持續 1-2 秒。總的來說，麻醉醫生查看病人監護儀螢幕的時間只有所分析時間的 5%，比以前報導的要少。監測行爲持續貫穿於麻醉維持的各階段，與麻醉醫生人數和職務（受訓者或上級醫生）沒有明顯關係。相反的，在所分析的麻醉維持各個階段中，麻醉記錄行爲和其他書面材料察看發生了明顯的改變。
**結論**：由於“一瞥監測”的存在，病人監護儀顯示幕應運而生。必須開發顯示器以優化監測者從簡短的一瞥中獲得的資訊。
（徐妍君譯　馬皓琳 李士通校）

**BACKGROUND:** Patient monitoring displays are designed to improve patient safety, and yet little is known about how anesthesiologists interact with these displays. Previous studies of clinician behavior used an observer in the operating room, which may have altered behavior. We describe a covert observation technique to determine how often and for how long anesthesiologists actually look at the monitoring display during different segments of the maintenance phase of anesthesia, and to determine whether this changed with more than 1 anesthesia provider or during concomitant activities such as reading.

**METHODS:** Five staff anesthesiologists, 2 anesthesia fellows, 3 anesthesia residents, and 2 medical students were covertly videotaped across 10 dual anesthesia provider cases and 10 solo cases. Videotapes were later segmented (5 minutes postinduction [early maintenance], mid-maintenance, and immediately before the drapes came down [late maintenance]) and coded for looking behavior at the patient monitor, anesthesia chart, and other reading material.
**RESULTS:** Anesthesiologists looked at the monitor in 1- to 2-second glances, performed frequently throughout the 3 segments of maintenance anesthesia. Overall, the patient monitor was looked at only 5% of the analyzed time, which is less than has previously been reported. Monitoring behavior was constant across the segments of maintenance anesthesia and was not significantly affected by the number of anesthesia providers or role (trainee vs. senior). In contrast, charting behavior and other reading material viewing changed significantly over the analyzed segments of maintenance anesthesia.
**CONCLUSIONS:** The presence of "at-a-glance monitoring" has implications for the design of patient monitoring displays. Displays should be developed to optimize the information obtained from brief glances at the monitor.

## 在美國退伍軍人事務醫院引入快速應答系統可減少心搏驟停

**Introduction of a Rapid Response System at a United States Veterans Affairs Hospital Reduced Cardiac Arrests**

Geoffrey K. Lighthall, MD, PhD*†, Layla M. Parast, MS‡, Lisa Rapoport, MD, MS§ and Todd H. Wagner, PhD ‖ ¶

From the *Department of Anesthesia, §Critical Care Medicine, and ‖ VA Health Economics Resource Center, Stanford University School of Medicine, Stanford, California; †Department of Anesthesia, and ¶VA Health Economics Resource Center, Veterans Affairs Medical Center, Palo Alto, California; and ‡Department of Biostatistics, Harvard University, Boston, Massachusetts.

Anesth Analg 2011; 111(3): 679-686

**背景**：我們試圖確定快速應答系統對美國退伍老兵人群中的心搏驟停發生率以及死亡率的影響。
**方法**：我們對快速應答系統建立之前 9 月以及之後 27 個月裏的心搏驟停病例進行前瞻性分析，並且回顧性分析了系統建立前 3.5 年以及之後 27 個月的死亡率。這項研究包括了一家大學附屬美國退伍軍人事務醫學中心在實行快速應答系統前後的的所有病人，快速應答系統包括一個教學程式、病人呼叫標準以及一個內科醫生領導的醫療急救團隊。主要結果標準化到出院率的醫院廣泛的心搏驟停的發生率以及死亡率。運用方差分析比較在實施過程的不同時間段之間事件的發生率。
**結果**：在研究期間有 378 例患者呼叫到醫療急救團隊。與系統運用之前的時間點比較，心搏驟停的發生率減少 57%，相當於每 1000 名出院患者減少了 5.6 起心搏驟停的發生（$P < 0.01$）。干預期間的死亡率降低，但這是由於研究的所有階段都自然減少。

**結論**：應用這種干預後心搏驟停的發生率顯著降低，並且死亡率亦趨於降低。我們預計在研究期間內防止了 51 例心搏驟停的發生。我們的結果提示：使快速應答系統的擴展到整個退伍軍人事務網路中將可進一步降低死亡率。
（龔寅 譯 馬皓琳 李士通校）

**BACKGROUND:** We sought to determine the impact of a rapid response system on cardiac arrest rates and mortality in a United States veteran population.
**METHODS:** We describe a prospective analysis of cardiac arrests in 9 months before and 27 months after institution of a rapid response system, and retrospective analysis of mortality 3.5 years before the intervention and 27 months after the intervention. The study included all inpatients from a university-affiliated United States Veterans Affairs Medical Center, before and after implementation of a rapid response system, including an educational program, patient calling criteria, and a physician-led medical emergency team. Primary end points were hospital-wide cardiac arrests and mortality rates normalized to hospital discharges. Comparisons of event rates between various time points during the implementation process were made by analysis of variance.
**RESULTS:** Three hundred seventy-eight calls were made to the medical emergency team in the time period studied. Compared with preintervention time points, cardiac arrests were reduced by 57%, amounting to a reduction of 5.6 cardiac arrests per 1000 hospital discharges ($P < 0.01$). Mortality was reduced during the intervention, but this was attributable to a natural decrease occurring over all phases of the study.
**CONCLUSIONS:** A significant reduction in the rate of cardiac arrests was realized with this intervention, as well as a trend toward lower mortality. We estimate that 51 arrests were prevented in the timeframe studied. Our results suggest that further reductions in morbidity can be realized by expansion of rapid response systems throughout the Veterans Affairs network.

## 動態上呼吸道阻塞模型中採用不同頻率的聲門上型噴射通氣時的固有呼氣末正壓

## Intrinsic Positive End-Expiratory Pressure at Various Frequencies of Supraglottic Jet Ventilation in a Model of Dynamic Upper Airway Obstruction

Gerald C. Ihra, MD, Ching-Ju Tsai, MD and Oliver Kimberger, MD
From the Department of Anesthesia, General Intensive Care Medicine and Pain Therapy, Medical University Vienna, Vienna, Austria.
Anesth Analg 2011; 111(3): 703-706

**背景**：氣道狹窄部以上採用注射器通氣的聲門上型噴射通氣（JVs）可能無意中導致肺高壓。我們設計此研究以觀察動態的上呼吸道梗阻模型中，通過一個遠端注射器進行噴射通氣時的固有呼氣末正壓($PEEP_i$)。
**方法**：在使用一段豬的氣管和一取栓導管的充氣氣囊以模擬 60% 和 80%氣道阻塞的氣管肺模型中，記錄 JVs 期間的呼吸壓力-時間曲線。$JV_S$ 在不同的噴射頻率($F_{jet}$ 30 $min^{-1}$、60 $min^{-1}$和 100 $min^{-1}$)和驅動壓(1 bar 和 2 bar)下實施。
**結果**：$JV_S$引起 $PEEP_i$的產生，並且依賴於驅動壓、梗阻程度以及通氣頻率。
**結論**：存在動態上呼吸道塞時，通過遠端注射器進行的噴射通氣可能導致固有的呼氣末正壓通氣，而其在阻塞部前方監測氣道壓時就不能被檢測到。

（楊秀娟 譯 馬皓琳 李士通 校）

**BACKGROUND:** Supraglottic jet ventilation ($JV_S$) with injectors above airway stenoses may result in inadvertent high lung pressures. We designed this study to investigate intrinsic positive end-expiratory pressure ($PEEP_i$) during jet ventilation via a distant injector in a model of dynamic upper airway obstruction.
**METHODS:** Respiratory pressure-time curves were recorded during $JV_S$ in a tracheal lung model using a pig's trachea and an embolectomy catheter's air-filled balloon to simulate 60% and 80% airway obstruction. $JV_S$ was performed at various jet frequencies ($F_{jet}$ 30 $min^{-1}$, 60 $min^{-1}$, and 100 $min^{-1}$) and driving pressures (1 bar and 2 bar).
**RESULTS:** $JV_S$ was associated with generation of $PEEP_i$, which depended on driving pressure, the degree of obstruction, and on ventilatory frequency.
**CONCLUSIONS:** In the presence of a dynamic upper airway obstruction, $JV_S$ via a distant injector may result in $PEEP_i$, which cannot be detected when airway pressure is measured in front of the obstruction.

## 將研究的風險及益處呈現給父母：形式有關係嗎？

**Presenting Research Risks and Benefits to Parents: Does Format Matter?**

Alan R. Tait, PhD*, Terri Voepel-Lewis, MSN, RN*, Brian J. Zikmund-Fisher, PhD†‡ ‖ and Angela Fagerlin, PhD†§ ‖
From the *Department of Anesthesiology, the †Division of General Internal Medicine, and the ‡Department of Health Behavior and Health Education, University of Michigan, Ann Arbor; §Ann Arbor Veterans Affairs HSR&D Center for Practice Management and Outcomes Research, Ann Arbor, Michigan; and ‖ Center for Behavioral and Decision Sciences in Medicine, University of Michigan, Ann Arbor.
Anesth Analg 2011; 111(3): 718-723

**背景**：幾項研究提示許多父母和研究參與者對知情同意書的內容的理解較差，尤其是對於風險和益處。然而，一些資料提示研究風險和益處的格式和結構可能是是受試者理解的重要的決定性因素。我們研究了將研究的風險和益處用列表和圖示的方式展示對於患兒父母理解一個調查性研究的影響。
**方法**：擇期行外科手術的患兒的父母（$n$ = 408） 隨機通過文字、表格或統計圖表，接受關於術後疼痛控制的一項假研究的風險和益處的資訊，然後完成一個調查問卷以判斷他們對於該項資訊的要點（基本的）和逐字（實際的）瞭解程度。並記錄患兒父母的人口統計學資料以及他們的讀寫能力和計算能力。
**結果**：通過隨機法經由表格和統計圖表接受資訊的患兒父母對於要點和逐字內容的理解明顯好於那些通過標準的文字接受資訊的父母（$P < 0.025$）。在提高讀寫能力和計算能力較差的父母的理解力方面，表格和統計圖表也優於文字。
**結論**：許多父母和病人在同化以及解釋關於研究和處理的風險/益處資訊方面均存在困難。這些部分是和風險和益處的傳達方式有關，部分和個體的讀寫以及計算能力有關。該項研究的結果提示，一種簡單而實際的方式可以提高具有不同讀寫能力和計算能力的父母對於風險/益處統計學的理解。
（黃麗娜 譯 馬皓琳 李士通 校）

**BACKGROUND:** Several studies suggest that many parents and research participants have poor understanding of the elements of consent, particularly the risks and benefits. However, some data suggest that the format and framing of research risks and benefits may be an important determinant of subject understanding. We examined the effect of tabular and graphical presentation of risks and benefits on parents' understanding of a research study.
**METHODS:** Parents of children scheduled to undergo an elective surgical procedure (*n* = 408) were randomized to receive information about the risks and benefits of a sham study of postoperative pain control using text, tables, or pictographs and then completed a questionnaire to examine their *gist* (essential) and *verbatim* (actual) understanding of the information. Parent demographics were recorded and their literacy and numeracy skills measured.
**RESULTS:** Parents randomized to receive information using tables or pictographs had significantly ($P < 0.025$) greater gist and verbatim understanding than did parents who received the information using standard text. Tables and pictographs were also superior to text in promoting understanding among parents with low numeracy and literacy skills.
**CONCLUSIONS:** Many parents and patients have difficulty in assimilating and interpreting risk/benefit information for both research and treatment. This is due, in part, to the manner in which risks and benefits are communicated and to the literacy and numeracy abilities of the individual. The results of this study suggest a simple and practical method for enhancing understanding of risk/benefit statistics for parents with varying numeracy and literacy skills.

## 創傷性顱腦損傷後對處理顱內壓增高的手術途徑

**The Surgical Approach to the Management of Increased Intracranial Pressure After Traumatic Brain Injury**

Lucia M. Li, MB BChir, Ivan Timofeev, MRCS, Marek Czosnyka, PhD and Peter J. A. Hutchinson, PhD, FRCS, Surg Neurol
Academic Neurosurgery Unit, University of Cambridge/Addenbrookes Hospital, Cambridge, United Kingdom.
Anesth Analg 2011; 111(3): 736-748;

重度創傷性顱腦損傷後發生的顱內壓增高是一個常見而有潛在破壞性的現象。難以控制的顱內高壓已被明確證實是預後較差的一個特徵。目前理想的處理是基於一個連續的的結合醫療和手術治療策略的靶驅動方法。目前常用的手術措施包括外腦室引流插入和開顱減壓術。有證據表明這兩個措施可以降低顱內壓，但對預後尤其是長期預後的影響是模棱兩可的。現代腦創傷協會指南建議及時地去除塊狀損害，並明確提出了顱內壓監測的適應症，但開顱減壓術只被謹慎地推薦用於擇期手術病人。在這篇綜述中我們著重討論了關於開顱減壓術用於創傷性腦損傷後控制顱高壓的討論，包括最新的關於創傷性腦損傷後開顱減壓術降低顱內壓的效果以及相關的長期效果的文獻的綜述摘要。詳細討論了 RESCUEicp 和 DECRA 的研究。這兩個隨機對照研究評估了開顱減壓術短期和長期的效果，希望它們爲開顱減壓術控制腦外傷後顱內壓增高的作用提供了確鑿的證據。
（滕淩雅 譯 馬皓琳 李士通 校）

Increased intracranial pressure occurring after severe traumatic brain injury is a common and potentially devastating phenomenon. It has been clearly demonstrated that increased intracranial pressure that is refractory to initial medical measures is a poor prognostic sign. Current optimal management is based on a sequential, target-driven approach combining both medical and surgical treatment strategies. The surgical measures in current common practice include external ventricular drain insertion and decompressive craniectomy. There is evidence that both of these measures reduce intracranial pressure but the effect on outcome, particularly in the long term, is equivocal. Current Brain Trauma Foundation guidelines recommend timely evacuation of mass lesions and there is clear guidance regarding the indications for intracranial pressure monitoring; however, decompressive craniectomy is only cautiously recommended as a possible option for selected patients. In this review, we highlight the ongoing debate about the use of decompressive craniectomy to control intracranial pressure after traumatic brain injury; included is a summary of review of the most recent literature on the effect of decompressive craniectomy on increased intracranial pressure after traumatic brain injury and associated long-term outcome. The RESCUEicp and DECRA studies are discussed in detail. It is hoped that these 2 randomized controlled trials, which are evaluating the short- and longer-term outcomes of decompressive craniectomy, will provide conclusive evidence regarding the role of decompressive craniectomy in managing increased intracranial pressure after trauma.

## 利多卡因減少培養的大鼠神經小膠質細胞內細胞外三磷酸腺苷誘導的前炎症細胞因數產物

**Lidocaine Attenuates Proinflammatory Cytokine Production Induced by Extracellular Adenosine Triphosphate in Cultured Rat Microglia**

Diansan Su, MD, PhD*, Yang Gu, BA*, Zhenhong Wang, MD, PhD* and Xiangrui Wang, MD, PhD*
From the *Department of Anesthesiology, Renji Hospital, Shanghai Jiaotong University School of Medicine, Shanghai, China.
Anesth Analg 2011; 111(3): 768-774

**背景：**我們之前的研究已證實鞘內利多卡因治療能夠對慢性縮窄性損傷導致的痛覺過敏或痛覺異常產生持續的逆轉作用。實際上，鞘內利多卡因治療能明顯抑制功能亢進的神經小膠質細胞內 p38 細胞分裂素活化蛋白激酶（MAPK）的活性。在本實驗中，我們提出：利多卡因可能直接作用於神經小膠質細胞並且減少細胞因數的釋放。
**方法：**我們評估了利多卡因對培養的大鼠神經小膠質細胞內細胞外三磷酸腺苷（ATP）觸發的磷酸化 p38 MAPK、腫瘤壞子因數-α (TNF-α)、白介素-1beta (IL-1β)、IL-6 和細胞內鈣離子水準。我們實驗方法包括：免疫印跡法（Western blot）、即時逆轉錄—多聚酶鏈反應（real-time RT-PCR）、酶聯免疫吸附法（ELISA）和鈣離子成像。
**結果：**我們發現：利多卡因通過抑制三種細胞因數 mRNAs 的轉錄和減少它們各自蛋白濃度（TNF-α、IL-1β 和 IL-6，與 ATP 組比較，$P < 0.05$），明顯減少了 1 mM

ATP 觸發的 p38 MAPK 活性。SB203580（P38 拮抗劑）減少了小膠質細胞內 ATP 啓動的 TNF-α、IL-1β 和 IL-6 的高蛋白水準。添加 10 mM 利多卡因也減少了 ATP 誘導的細胞內高鈣離子（$[Ca^{2+}]i$）水準（與 ATP 組比較，$P < 0.05$）。
**結論：**這些發現表明利多卡因能直接作用於小膠質細胞。利多卡因通過抑制細胞內鈣離子的增加抑制了 p38 MAPK 活性並且減少了細胞外 ATP 觸發的培養的大鼠小膠質細胞內前炎症細胞因數產物（包括 TNF-α、IL-1β 和 IL-6）。
（王海濤 譯，馬皓琳 李士通 校）

**BACKGROUND:** Our previous studies demonstrated that intrathecal lidocaine treatment could produce prolonged reversal of established hyperalgesia or allodynia, both induced by chronic constriction injury. Indeed, intrathecal lidocaine treatment remarkably suppressed the activation of p38 mitogen-activated protein kinase (MAPK) in hyperactive microglia. In the present study we suggest that lidocaine may act directly on the microglia and attenuate the release of cytokines.
**METHODS:** We assessed the influence of lidocaine on the levels of phospho-p38 MAPK, tumor necrosis factor-α (TNF-α), interleukin-1beta (IL-1β), IL-6, and intracellular calcium triggered by extracellular adenosine triphosphate (ATP) in cultured rat microglia. Our experimental methods included Western blot, real-time reverse transcription–polymerase chain reaction, enzyme-linked immunosorbent assay, and calcium imaging.
**RESULTS:** We found that lidocaine (in a dose-dependent manner) significantly attenuated p38 MAPK activation triggered by 1 mM ATP, by inhibiting the transcription of 3 cytokine messenger RNAs and causing a decrease in their respective protein concentrations (TNF-α, IL-1β, and IL-6, $P < 0.05$, vs. the ATP group). SB203580, an antagonist of P38, attenuated ATP-activated elevation in protein levels of TNF-α, IL-1β, and IL-6 in the microglia. The high level of intracellular calcium ($[Ca^{2+}]i$) that is induced by ATP was decreased by the addition of 10 mM lidocaine ($P < 0.05$ vs. the ATP group).
**CONCLUSIONS:** These findings indicate that lidocaine can directly act on microglia. Lidocaine, by inhibiting the increase of intracellular calcium, also inhibited p38 MAPK activation and attenuated the production of proinflammatory cytokines (including TNF-α, IL-1β, and IL-6), which were triggered by extracellular ATP in cultured rat microglia.

## 在布比卡因造成的心臟停跳後運用脂類藥物復蘇過程中注射腎上腺素：兔子的迴圈短暫的恢復

## Epinephrine Injection in Lipid-Based Resuscitation from Bupivacaine-Induced Cardiac Arrest: Transient Circulatory Return in Rabbits

Martyn Harvey, FACEM*, Grant Cave, FACEM†, Gaynor Prince, MBBS* and Daniel Lahner, MD*‡
From the *Emergency Department, Waikato Hospital, Hamilton; †Emergency Department, Hutt Hospital, Lower Hutt, New Zealand; and ‡Department of Anesthesiology, General Intensive Care, and Pain Medicine, Medical University of Vienna, Vienna, Austria.
Anesth Analg 2011; 111(3): 791-796

**背景**：靜脈注射脂肪乳劑已經證明能有效治療布比卡因導致的心臟毒性。然而，在毒性導致心臟停跳後使用脂肪乳劑的同時運用腎上腺素的作用還不是很清楚。我們假設在布比卡因造成的心臟停跳時靜脈注射脂肪乳劑來進行復蘇的兔子模型中，不使用腎上腺素會有更好的復蘇結果。

**方法**：20 只鎮靜過且連接儀器的新西蘭實驗白兔給予 10mg/kg 布比卡因的靜脈注射，造成心臟停跳。30 秒後開始進行機械通氣和胸外按壓。1 分鐘的時候，給予動物 5mL/kg 的 20%脂肪乳劑，此外給予四種中的一種額外的靜脈治療（所有組 $n=5$）：0.9%的鹽水、2.5μg/kg 腎上腺素、10μg/kg 腎上腺素或 100μg/kg 腎上腺素；所有組都是 1mL/kg。在 4 分鐘的時候再次給予脂肪乳劑的推注。自主血液迴圈和血流動力學指標達到 15 分鐘。在 15 分鐘的時候，鹽水組再給予大劑量腎上腺素（100ug/kg）治療，接著進行監測到 20 分鐘。

**結果**：與鹽水對照組比較，大劑量的腎上腺素的給予能夠增加血液迴圈恢復的比例（鹽水治療組 0/5 例； 2.5μg/kg 腎上腺素組 0/5 例；10μg/kg 腎上腺素組 3/5 例[P = 0.167]和 100μg/kg 腎上腺素組 4/5 例[P = 0.048]）。在 100μg/kg 腎上腺素組的 4/5 例中 15 分鐘內持續出現自主心跳，但是迴圈功能下降（$P = 0.048$）；15 分鐘時平均動脈壓爲：鹽水組 12.8(SEM 2.8)mmHg、2.5μg/kg 腎上腺素組 12.0(2.5)mmHg、10μg/kg 腎上腺素組 20.6(2.7)mmHg 和 100μg/kg 腎上腺素組 26.4(3.9)mmHg (P = 0.008)。鹽水治療組中 4/5 例在使用延遲的腎上腺素治療後出現自主迴圈的恢復(P = 0.048)。大劑量的給予腎上腺素後，在自主迴圈恢復之前會使冠狀動脈灌注壓顯著性增加。

**結論**：在布比卡因導致的心臟停跳的兔子模型中，腎上腺素似乎對自主迴圈的恢復是有必要的，但是隨後會出現血流動力學指標的下降。需要進一步的研究來確定腎上腺素在局麻藥導致的心臟停跳後進行脂類藥物復蘇時的作用。

（唐亮 譯 馬皓琳 李士通 校）

**BACKGROUND:** IV lipid emulsion has demonstrated to be effective therapy for bupivacaine-induced cardiotoxicity. However, the role of epinephrine when coadministered with lipid emulsion in toxin-induced cardiac arrest is unclear. We postulated superior resuscitation outcome in the absence of epinephrine in a rabbit model of bupivacaine-induced cardiac arrest resuscitated with IV lipid emulsion.

**METHODS:** Twenty sedated, instrumented New Zealand White rabbits received 10 mg/kg IV bupivacaine producing asystole. Mechanical ventilation and external chest compressions were commenced at 30 seconds. At 1 minute, animals received 5 mL/kg 20% lipid emulsion in addition to 1 of 4 additional IV treatments ($n = 5$ all groups): 0.9% saline, 2.5 μg/kg epinephrine, 10 μg/kg epinephrine, 100 μg/kg epinephrine; all at 1 mL/kg. Lipid emulsion bolus was repeated at 4 minutes. Return of spontaneous circulation and hemodynamic metrics were obtained to 15 minutes. Saline group animals additionally received high-dose epinephrine (100 μg/kg) treatment at 15 minutes, and were monitored to 20 minutes.

**RESULTS:** High-dose epinephrine administration was associated with increased rate of return of spontaneous circulation compared with saline control (0 of 5 saline-treated animals; 0 of 5 animals in the 2.5 μg/kg epinephrine group; 3 of 5 in the 10 μg/kg group [$P = 0.167$]; and 4 of 5 in the 100 μg/kg group [$P = 0.048$]). Spontaneous but decreasing circulation was maintained at 15 minutes in 4 of 5 animals in the 100 μg/kg group alone

(*P* = 0.048); mean arterial blood pressure at 15 minutes was 12.8 (SEM 2.8) mm Hg saline, 12.0 (2.5) mm Hg 2.5 μg/kg epinephrine, 20.6 (2.7) mm Hg 10 μg/kg epinephrine, and 26.4 (3.9) mm Hg 100 μg/kg epinephrine (*P* = 0.008). Four of five animals in the saline-treated group exhibited return of spontaneous circulation after delayed epinephrine treatment (*P* = 0.048). High-dose epinephrine administration was associated with a significant increase in coronary perfusion pressure before return of spontaneous circulation.
**CONCLUSIONS:** Epinephrine seemed to be necessary for return of spontaneous circulation, but was subsequently associated with declining hemodynamic variables in this rabbit model of bupivacaine-induced cardiac arrest. Further study is required to define the role of epinephrine in lipid-based resuscitation from local anesthetic-induced cardiac arrest.

## 使用 2%利多卡因 1ml 在超聲引導下行腋路法臂叢神經阻滯的阻滯特性的一項臨床評定

**A Clinical Evaluation of Block Characteristics Using One Milliliter 2% Lidocaine in Ultrasound-Guided Axillary Brachial Plexus Block**

Brian O'Donnell, MB, FCARCSI, MSc, John Riordan, MB, FCARCSI, Ishtiaq Ahmad, MBBS, FCARCSI and Gabriella Iohom, FCARCSI, MD, PhD
From the Department of Anaesthesia, Cork University Hospital and University College Cork, Cork, Ireland.
Anesth Analg 2011; 111(3): 808-810;

我們報導使用 2%利多卡因複合 1:200000 腎上腺素 1ml（局麻藥總量 4ml）在超聲引導下行腋路法臂叢神經阻滯的起效和持續時間。測定阻滯操作時間、阻滯起效時間、手術時間和阻滯持續時間。招募了 17 個連續的病人。阻滯操作和起效時間的平均數（SD）分別是 271(67.9)秒和 9.7(3.7)分鐘。阻滯平均持續時間是 160.8(30.7)分鐘。所有手術都只使用區域麻醉。對於大多數手外科門診手術的麻醉時間是足夠的。
（周潔 譯　馬皓琳　李士通　校）
We report onset and duration of ultrasound-guided axillary brachial plexus block using 1 mL of 2% lidocaine with 1:200,000 epinephrine per nerve (total local anesthetic volume 4 mL). Block performance time, block onset time, duration of surgery, and block duration were measured. Seventeen consecutive patients were recruited. The mean (SD) block performance and onset times were 271 (67.9) seconds and 9.7 (3.7) minutes, respectively. Block duration was 160.8 (30.7) minutes. All operations were performed using regional anesthesia alone. The duration of anesthesia obtained is sufficient for most ambulatory hand surgery.

## 一項前瞻性臨床記錄：超聲引導區域麻醉下行門診肩部手術

**A Prospective Clinical Registry of Ultrasound-Guided Regional Anesthesia for Ambulatory Shoulder Surgery**

Spencer S. Liu, MD, Michael A. Gordon, MD, Pamela M. Shaw, BS, Sarah Wilfred, BA, Teena Shetty, MD and Jacques T. YaDeau, MD, PhD
From the Department of Anesthesiology, Hospital for Special Surgery, New York, New York.
Anesth Analg September 2010 111:617-623;

**背景**：目前缺乏證明超聲引導下行區域麻醉的療效和安全性的臨床記錄資料。肌間溝神經阻滯對於肩關節鏡檢查是有效的，超聲引導可降低風險。另外，超聲引導下鎖骨上神經阻滯是肩部麻醉的一個新方法，相對肌間溝神經阻滯，產生神經症狀的風險更小。
**方法**：這項前瞻性臨床記錄包括了 1169 例超聲引導區域麻醉下門診行肩關節鏡檢查的患者。收集了標準的圍術期資料，包括術前神經功能篩查。由臨床團隊判斷後決定行肌間溝阻滯或是鎖骨上阻滯。在麻醉後復蘇室以及術後 1 周進行標準化隨訪。由一個對實驗未知的神經科醫生在 1 周後採用相同的篩查工具對患者的術後神經系統症狀（PONS）進行評估。
**結果**：超聲引導下肌間溝神經阻滯（n=515）和超聲引導下鎖骨上神經阻滯（n=654）均有很高的麻醉成功率（99.8%; 95%可信區間[CI], 99.4%–99.9%），穿刺到血管或血管內注射的發生率爲 0%（95% CI, 0%–0.3%）。鎖骨上阻滯後麻醉復蘇室內聲音嘶啞的發生率（22%，95% CI, 19%–26%）顯著低於肌間溝阻滯（31% ，95% CI, 27%–35%）。呼吸困難的發生率兩者相似（鎖骨上阻滯 7%，肌間溝阻滯 10%）。沒有一例出現明顯的氣胸。術後 PONS 的發生率非常低（0.4% ，95% CI, 0.1%–1%），永久性神經損傷的發生率爲 0%（95% CI, 0%–0.3%）。
**結論**：超聲引導下行肌間溝阻滯和鎖骨上阻滯對於肩關節鏡檢查是安全並有效的，暫時和永久的 PONS 的發生率很低。
（黃丹　譯　陳傑　校）
**BACKGROUND:** There is a lack of clinical registries to document efficacy and safety of ultrasound-guided regional anesthesia. Interscalene blocks are effective for shoulder arthroscopy, and ultrasound guidance may reduce risk. Furthermore, ultrasound-guided supraclavicular block is a novel approach for shoulder anesthesia that may have less risk for neurological symptoms than interscalene block.
**METHODS:** One thousand one hundred sixty-nine patients undergoing ultrasound-guided regional anesthesia for ambulatory shoulder arthroscopy were enrolled in our prospective registry. Standardized perioperative data were collected including a preoperative neurological screening tool. Either interscalene or supraclavicular block was performed at the discretion of the clinical team. Standardized follow-up was performed in the postanesthesia care unit and at 1 week. Postoperative neurological symptoms (PONS) were assessed at the 1-week follow-up with the same screening tool by a blinded neurologist.
**RESULTS:** Ultrasound-guided interscalene (*n* = 515) and supraclavicular (*n* = 654) blocks had excellent anesthetic success (99.8%; 95% confidence interval [CI], 99.4%–99.9%) with 0% (95% CI, 0%–0.3%) incidence of vascular puncture or intravascular injection. The incidence of hoarseness in the postanesthesia care unit was significantly less with supraclavicular (22% with 95% CI, 19%–26%) than interscalene block (31%

with 95% CI, 27%–35%). The incidence of dyspnea was similar (7% for supraclavicular vs 10% with interscalene). No patient had a clinically apparent pneumothorax. The incidence of PONS was very low (0.4% with 95% CI, 0.1%–1%), and there was a 0% (95% CI, 0%–0.3%) incidence of permanent nerve injury.
**CONCLUSIONS:** Ultrasound-guided interscalene and supraclavicular blocks are effective and safe for shoulder arthroscopy. Temporary and permanent PONS is uncommon.

## 氟呱利多對於長 QT 綜合症的細胞和電腦模型的動作電位時程的亞型特異性影響

**The Subtype-Specific Effects of Droperidol on Action Potential Duration in Cellular and Computational Models of Long QT Syndrome**

Alexander P. Schwoerer, MD*, Julia Kebernik, MS*, Heimo Ehmke, MD* and Patrick Friederich, MD†
From the *Department of Vegetative Physiology and Pathophysiology, University Medical Center Hamburg-Eppendorf, Hamburg, Germany; and †Department of Anesthesiology, Bogenhausen Hospital, Technische Universität München, Munich, Germany.
Anesth Analg September 2010 111:638-646;

**背景**：氟呱利多是治療術後噁心嘔吐一種高效的丁醯苯類藥物。它對於無心血管疾病史和長 QT 綜合症患者的心臟安全性是一個有爭議的問題。在這項研究中，作者探索了氟呱利多對於長 QT 綜合症的細胞和電腦模型是否具有特異性影響。
**方法**：從成年豚鼠的心臟中分離出左心室心肌細胞。長 QT1 型的採用色原烷醇 293B（10umol/L）進行藥理學誘導，長 QT2 型的採用 E4031（10umol/L）進行藥理學誘導。採用 Luo-Rudy 動態模型進行電腦分析，資料用均數±標準差來表示。
**結果**：在心肌對照組，氟呱利多以濃度依賴的方式延長動作電位，在 0.6 μmol/L 的濃度下最大的延長量爲 37%± 13%（$n$ = 4）。在長 QT1 型細胞中，氟呱利多（0.6 μmol/L）再延長動作電位 31% ± 6% ($n$ = 6)，但長 QT2 型細胞的動作電位縮短了 11% ± 2% ($n$ = 8)。電腦模型支援這一概念：氟呱利多除了迅速延遲 $K^+$電流，還能阻止去極化如 L 型 $Ca^{2+}$電流、$Na^+$-$Ca^{2+}$ 交換泵, 和 $Na^+$-$K^+$ ATP 泵。
**結論**：相對於長 QT2 型心肌細胞，氟呱利多對於長 QT1 型心肌細胞複極會產生更多不利影響 ，也就是表明對長 QT 綜合症的患者有亞型特異性的心臟毒性作用。氟呱利多的亞型特異性似乎是由於氟呱利多與多個不同的分子靶點產生的一個複雜的相互作用。這種相互作用值得進一步研究，以確定長 QT 綜合症患者圍術期管理的亞型靶向治療方法的可行性。
（黃丹　譯　陳傑　校）

**BACKGROUND:** Droperidol is a highly potent butyrophenone used for the therapy of postoperative nausea and vomiting. Its cardiac safety in cardiovascular-healthy patients and those with long QT (LQT) syndrome is a matter of debate. In this study, we investigated whether droperidol has subtype-specific effects in cellular and computational models of LQT syndrome.
**METHODS:** Left ventricular cardiac myocytes were isolated from adult guinea pig hearts. LQT1-like behavior was pharmacologically induced by chromanol 293B (10

μmol/L) and LQT2-like states by E4031 (10 μmol/L). Computational analysis was performed using the Luo-Rudy dynamic model. Data are given as mean ± SEM.
**RESULTS:** In control myocytes, droperidol lengthened action potentials in a concentration-dependent manner with a maximal prolongation of 37%± 13% (*n* = 4) at a concentration of 0.6 μmol/L. In LQT1-like myocytes, droperidol (0.6 μmol/L) further prolonged action potentials by 31% ± 6% (*n* = 6) but shortened action potentials of LQT2-like myocytes by 11% ± 2% (*n* = 8). Computational modeling supported the concept that droperidol, in addition to the rapid component of the delayed $K^+$ current, blocks depolarizing targets, such as the L-type $Ca^{2+}$ current, the $Na^+$-$Ca^{2+}$ exchanger, and the $Na^+$-$K^+$ adenosine triphosphatase.
**CONCLUSIONS:** Droperidol has more detrimental effects on cardiac repolarization of LQT1-like than of LQT2-like myocytes suggesting subtype-specific cardiotoxic effects in patients with LQT syndrome. The subtype specificity of droperidol seems to be caused by a complex interaction of droperidol with several different molecular targets. This interaction deserves further investigation to establish the feasibility of a subtype-directed approach in the perioperative management of patients with LQT syndrome.

## 肝部分切除手術中中心靜脈壓合適的參考零點是什麼？

**What Is the Preferred Central Venous Pressure Zero Reference for Hepatic Resection?**

Chris Giordano, MD*, Lori A. Deitte, MD†, Nikolaus Gravenstein, MD* and Mark J. Rice, MD*
From the Departments of *Anesthesiology, and †Radiology, University of Florida College of Medicine, Gainesville, Florida.
Anesth Analg September 2010 111:660-664;

**背景**：在肝部分切除手術中，維持中心靜脈壓（central venous pressure，CVP）低於 5mmHg 以減少失血量是一個麻醉慣例，但這同時可增加靜脈空氣栓塞（venous air embolism，VAE）的風險。當 CVP 爲 5mmHg 時，流體靜壓大約爲 7cm $H_2O$（1 mm Hg = 1.36 cm $H_2O$），而我們發現，肝臟的前後徑可遠遠長於 7cm。由此，作者著手此項研究，目的在於闡明肝臟前後徑長短的變化及對 CVP 感測器位置的影響，從而平衡出血與 VAE 的風險。
**方法**： 100 例成人患者中，通過靜脈注射造影劑，應用連續存檔的胸部 CT 攝片測量肝臟的前後徑，及它到其他解剖位置的距離。
**結果**：研究結果表明，肝臟前後徑及患者肝門處標準的解剖學標誌有著明顯的個體差異，其中肝門前後徑的範圍爲 12.0-28.5cm，均值爲 17.9±2.8cm。

**結論**：肝臟前後徑長以及肝臟手術部位的巨大差異，使我們重新考慮在肝臟手術中，應尋找合適的 CVP 探頭零點的水準。我們應更重視肝靜脈本身的壓力而不是 CVP，這樣才能同時減小 VAE 和出血的風險。文中作者還列舉了 2 種感測器歸零的方法。
（周姝婧　譯　陳傑　校）

**BACKGROUND:** The common practice of maintaining central venous pressure (CVP) below 5 mm Hg to reduce blood loss during hepatic resection increases the risk of venous air embolism (VAE). We initiated this study after observing that the anteroposterior (AP) diameter of the liver can be much larger than 7 cm, which is the approximate hydrostatic pressure corresponding to a CVP of 5 mm Hg (1 mm Hg = 1.36 cm $H_2O$). The purpose of this study was to characterize the liver AP diameter and thereby describe how this might affect the placement of the CVP transducer to balance the risks of bleeding and VAE.
**METHODS:** We measured the AP liver diameter and its distance from other anatomic sites using consecutive archived chest tomograms with IV contrast from 100 adults.
**RESULTS:** The results of our study demonstrate a large interindividual range in AP liver dimensions (17.9 ± 2.8 cm, range = 12.0–28.5 cm) and standardized anatomic landmarks relative to the portal triad.
**CONCLUSIONS:** The significant variability in AP liver diameter, along with the variability in the liver surgical site, suggests that we rethink the zero reference point for the CVP transducer during hepatic surgeries. By considering the actual hepatic venous pressure itself, rather than the CVP, we can minimize the risks of VAE and hemorrhage. Two methods for zeroing the reference transducer are suggested.

## 在危重患者中使用簡易床邊肺部超聲檢查可顯著減少 X 線攝片和電腦斷層掃描的次數

**The Use of Point-of-Care Bedside Lung Ultrasound Significantly Reduces the Number of Radiographs and Computed Tomography Scans in Critically Ill Patients**

Adriano Peris, MD*, Lorenzo Tutino, MD*, Giovanni Zagli, MD*, Stefano Batacchi, MD*, Giovanni Cianchi, MD*, Rosario Spina, MD*, Manuela Bonizzoli, MD*, Luisa Migliaccio, MD*, Lucia Perretta, MD*, Marco Bartolini, MD†, Kevin Ban, MD‡ and Martin Balik, MD, PhD§
From the *Anaesthesia and Intensive Care Unit of Emergency Department and †Diagnostic Imaging Department, Careggi Teaching Hospital, Florence, Italy; ‡Department of Emergency Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts; and Anaesthesia and Intensive Care, General Teaching Hospital, Prague, Czech Republic.
Anesth Analg September 2010 111:687-692;

**背景**：胸部 X 線攝片對重症監護病房（intensive care unit，ICU）內的危重患者的診斷價值很低，而胸部電腦斷層掃描（computed tomography，CT）需要患者被運送至 ICU 以外的地方，這增加了患者發生意外的風險。本研究中，作者評估了常規床邊胸部超聲檢查（lung ultrasound，LUS）在評估 ICU 內胸腔積液（pleural effusions，PE）的有效性。
**方法**：本研究納入了 2008 年 3 月至 2009 年 4 月間因重大創傷（46.3%）、內科病（41.5%）以及手術後併發症（12.2%）而在 ICU 內接受治療的 376 位患者。患者入住一家三級醫院的 ICU，由一組專業 ICU 人員實施常規 LUS 檢查，隨機分爲對照組（組 C）和研究組（組 S）。爲了減少研究偏倚，本次研究中實施 LUS 的人員均不瞭解研究目的。收集的資料包括患者人口學、診療經過以及接受過胸部 X

線攝片和 CT 掃描的次數。作爲研究的次要目的，作者另評價了 Balik 公式在 PE 評估中的可靠性。
**結果**：兩組患者在人口學和 ICU 內診療經過方面沒有明顯的統計學差異。S 組患者拍攝胸部 X 線片的總次數（-26%，P<0.001）和 CT 掃描的總次數（-47%，P<0.001）明顯少於 C 組患者。對 ICU 內的 LUS 方案進行 6 個月的隨訪後， PE 患者對放射檢查的需求呈時間依賴性減少。最後，用 LUS 和 Balik 公式評估的 PE 的量與抽吸得到的有效的胸水量有良好的相關性（r=0.65，P<0.0001）。
**結論**：ICU 內常規使用 LUS 可減少患者胸部 X 線攝片和 CT 掃描的次數。
（周姝婧　譯　陳傑　校）
**BACKGROUND:** Chest radiography has been reported to have low diagnostic accuracy in critically ill intensive care unit (ICU) patients, and chest computed tomography (CT) scans require patients to be transported out of the ICU, putting them at risk of adverse events. In this study we assessed the efficacy of routine bedside lung ultrasound (LUS) in the evaluation of pleural effusions (PE) in the ICU.
**METHODS:** Three hundred seventy-six patients admitted to the ICU for major trauma (46.3%), medical pathology (41.5%), and postsurgical complications (12.2%) (May 2008 to April 2009) were included in this study. Patients were placed into either the control group (group C) or the study group (group S), on the basis of the introduction of routine LUS performed by a single group of intensivists in 1 tertiary care ICU. To reduce provider bias, the physicians conducting the LUS were not aware of the study. Collected data included patient demographics, clinical course, and number of chest radiographs and CT scans performed. As a secondary goal, we assessed the reliability of Balik's formula in PE estimation.
**RESULTS:** No significant differences were found between the 2 groups with regard to their demographics and ICU clinical course. Group S had a significant reduction in the total number of chest radiographs obtained (−26%; $P < 0.001$) and CT scans (−47%; $P < 0.001$) in comparison with the comparison group C. A 6-month follow-up analysis of the ICU LUS protocol revealed a time-dependent decrease in the number of radiological examinations requested for patients with PE. Lastly, PE volume estimation using the LUS and Balik's formula correlates well with the effective volume drained ($r = 0.65$; $P < 0.0001$).
**CONCLUSIONS:** Routine use of LUS in the ICU setting can be associated with a reduction of the number of chest radiographs and CT scans performed.

## 簡報：肝臟疾病患者肌肉生成抑制蛋白水準增高可能引起骨骼肌萎縮

**Brief-Reports: Elevated Myostatin Levels in Patients with Liver Disease: A Potential Contributor to Skeletal Muscle Wasting**

Paul S. García, MD, PhD*, Amy Cabbabe, MD*, Ravi Kambadur, PhD†, Gina Nicholas, PhD‡ and Marie Csete, MD, PhD*§
From the *Department of Anesthesiology, Emory University School of Medicine, Atlanta, Georgia; †School of Biological Sciences, Nanyang Technological University, Singapore; ‡AgResearch, Hamilton, New Zealand; and §Organovo, Inc., San Diego, California.
Anesth Analg September 2010 111:707-709;

作爲終末期肝病（ESLD）的一項併發症-骨骼肌重量下降,我們對其並不十分瞭解。基於近期關於幹細胞的文獻，作者假設肌肉生成抑制蛋白（**Myostatin**）作爲骨骼肌的有效負調節蛋白在 ESLD 相關的骨骼肌萎縮方面起到主要作用。在此項初步研究中，作者對肝移植患者運用 ELISA 法測量評估其 **Myostatin** 水準。與健康對照組相比，ESLD 患者 **Myostatin** 水準顯著增高。這些資料表明應當對 **Myostatin** 進行進一步研究來闡明其作用靶點，以保持 ESLD 患者的骨骼肌重量。（趙嫣紅 譯　陳傑　校）

Loss of skeletal muscle mass is a poorly understood complication of end-stage liver disease (ESLD). Based on recent stem cell literature, we hypothesized that the potent negative regulator of muscle mass, myostatin, could play a role in the muscle loss associated with ESLD. In this preliminary investigation, we measured myostatin levels in patients undergoing liver transplant evaluation, using a novel enzyme-linked immunosensitivity assay. Myostatin levels were significantly elevated in patients with ESLD compared with healthy controls. These data suggest that myostatin deserves further investigation as a target for therapies designed to preserve muscle mass in patients with ESLD.

## 住院醫生對心臟手術嬰幼兒患者行股靜脈穿刺置管：超聲引導與標記定位技術的比較

**Femoral Vein Cannulation Performed by Residents: A Comparison Between Ultrasound-Guided and Landmark Technique in Infants and Children Undergoing Cardiac Surgery**

Marie T. Aouad, MD, Ghassan E. Kanazi, MD, Faraj W. Abdallah, MD, Farah H. Moukaddem, MD, Massud J. Turbay, MD, Mounir Y. Obeid, MD and Sahar M. Siddik-Sayyid, MD

From the Department of Anesthesiology, American University of Beirut, Beirut, Lebanon.

Anesth Analg September 2010 111:724-728;

**背景：**對嬰幼兒 患者行經皮股靜脈穿刺置管在技術上具有挑戰性，特別是由培訓階段的住院醫生進行操作時。在此項研究中，作者研究了實施心臟手術的嬰幼兒患者，應用超聲即時引導下行股靜脈穿刺置管是否優於傳統定位技術。

**方法：**所有患者事先隨機分爲兩組。在 LM 組中，應用傳統方法觸摸動脈搏動行股靜脈穿刺置管。在 US 組中，應用具有即時掃描功能的超聲探頭行股靜脈穿刺置管。比較兩組在完成穿刺置管的時間（主要結果）、成功率、穿刺次數，第一針穿刺置管成功率及併發症發生率的差別。

**結果：**共 48 例嬰幼兒患者入組。在兩組完成穿刺置管時間上，US 組要顯著短於 LM 組(155 [46–690] vs 370 [45–1620] 秒; P = 0.02)。在穿刺成功率上兩組相比基本相似(95.8%)。在穿刺次數上 US 組要顯著少於 LM 組(1 [1–8] vs 3 [1–21]; P = 0.001)。而在第一針穿刺置管成功率上，US 組要顯著高於 LM 組(18 vs 6; P = 0.001)。兩組患者在誤穿股動脈的發生率相似。

**結論**：當由高年資麻醉住院醫師對嬰幼兒患者實施超聲引導下行股靜脈穿刺置管，其在穿刺速度、穿刺次數等方面優於定位技術，並能顯著提高第一次穿刺成功率。

（趙嫣紅 譯　陳傑　校）

**BACKGROUND:** Percutaneous cannulation of the femoral vein, in the pediatric age group, can be technically challenging, especially when performed by residents in training. We examined whether the use of real-time ultrasound guidance is superior to a landmark technique for femoral vein catheterization in children undergoing heart surgery.
**METHODS:** Patients were prospectively randomized into 2 groups. In group LM, the femoral vein was cannulated using the traditional method of palpation of arterial pulse. In group US, cannulation was guided by real-time scanning with an ultrasound probe. The time to complete cannulation (primary outcome), success rate, number of needle passes, number of successful cannulations on first needle pass, and incidence of complications were compared between the 2 groups.
**RESULTS:** Forty-eight pediatric patients were studied. The time to complete cannulation was significantly shorter (155 [46–690] vs 370 [45–1620] seconds; $P = 0.02$) in group US versus group LM. The success rate was similar in both groups (95.8%). The number of needle passes was smaller (1 [1–8] vs 3 [1–21]; $P = 0.001$) and the number of successful cannulations on first needle pass higher (18 vs 6; $P = 0.001$) in group US compared with group LM. The incidence of femoral artery puncture was comparable between the 2 groups.
**CONCLUSIONS:** Ultrasound-guided cannulation of the femoral vein, in pediatric patients, when performed by senior anesthesia residents, is superior to the landmark technique in terms of speed and number of needle passes, with remarkable improvement in first attempt success.

## 減壓病的加壓和輔助治療: 一項隨機對照試驗的系統性回顧

**Recompression and Adjunctive Therapy for Decompression Illness: A Systematic Review of Randomized Controlled Trials**

Michael H. Bennett, MD, FANZCA*, Jan P. Lehm, MD, FANZCA*, Simon J. Mitchell, PhD, FANZCA† and Jason Wasiak, MPH‡
From the *Department of Diving and Hyperbaric Medicine, Prince of Wales Hospital and University of New South Wales, New South Wales, Australia; †Department of Anaesthesia, Auckland City Hospital and Faculty of Medicine and Health Sciences, University of Auckland, New Zealand; and ‡Victorian Adult Burns Service and School of Public Health and Preventative Medicine, Monash University, Alfred Hospital, Victoria, Australia.
Anesth Analg September 2010 111:757-762;

**介紹**: 減壓病(DCI)是由於環境壓力降低時血液或組織內氣泡形成而引起的。臨床上，DCI 可能引起包括從輕微症狀到麻痺、意識喪失、心血管功能障礙甚至死亡。複壓是 DCI 治療公認的治療標準。複壓延誤時，應用其他措施以改善預後。作者研究了複壓和輔助治療對 DCI 治療的效果和安全性。

方法：查閱 CENTRAL (Cochrane Central Register of Controlled Trials) (*The Cochrane Library* 2009, Issue 2); MEDLINE (醫學文獻分析與檢索線上系統) (1966-2009.7); CINAHL (Cumulative Index to Nursing and Allied Health Literature) (1982 -2009.7); EMBASE (Excerpta Medica Database) (1980 -2009.7); 高壓氧血中隨機對照試驗 (RCTs) (2009.7)，以及手動搜索的期刊和文本。納入 RCTs，比較任何複壓方案或者輔助治療複合一個標準加壓方案的效果，不受任何語言限制。三名作者獨立提取資料。評估每個試驗的有效性，並且通過討論解決分歧。資料登錄到 RevMan 5.0 軟體(Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2008)。
結果：兩個 RCTs 符合納入標準。資料的彙集不交叉。其中一個研究，沒有證據證明在常規複壓治療中加入非類固醇類抗炎藥物可以提高療效（6 周中，相對風險 1.04，95%可信區間[CI]: 0.90–1.20, *P* =0.58), 但在應用替諾昔康時，對於加壓治療的需求次數有所降低 (*P* = 0.01, 95% CI: 0–1)。在另一個研究中，與應用氧治療方案相比，應用一個氦氧混合氣(heliox)複合加壓的優勢比較小(相對風險 0.56, 95% CI: 0.31–1.00, *P* = 0.05).
討論：複壓治療是治療 DCI 的標準方法，但這並沒有 RCT 的證據。非類固醇類抗炎藥物(替諾昔康)的加入或者應用氦氧混和氣（heliox）可能降低加壓的需求次數，但是兩者均沒有提高恢復的優勢比。這些措施的應用可能是合理的。因研究人數有限需謹慎解釋。益處主要在經濟方面，但應進行經濟學分析。應進行一項方法嚴密的大樣本隨機試驗以確定在複壓期間應用合適的氣體和壓力。
（懷曉蓉　譯　陳傑　校）
**INTRODUCTION:** Decompression illness (DCI) is caused by bubble formation in the blood or tissues after a reduction in ambient pressure. Clinically, DCI may range from a trivial illness to paralysis, loss of consciousness, cardiovascular collapse, and death. Recompression is the universally accepted standard for the treatment of DCI. When recompression is delayed, a number of strategies have been suggested to improve the outcome. We examined the effectiveness and safety of both recompression and adjunctive therapies in the treatment of DCI.
**METHODS:** We searched CENTRAL (Cochrane Central Register of Controlled Trials) (*The Cochrane Library* 2009, Issue 2); MEDLINE (Medical Literature Analysis and Retrieval System Online) (1966 to July 2009); CINAHL (Cumulative Index to Nursing and Allied Health Literature) (1982 to July 2009); EMBASE (Excerpta Medica Database) (1980 to July 2009); the Database of Randomized Controlled Trials (RCTs) in Hyperbaric Medicine (July 2009); and hand-searched journals and texts. We included RCTs that compared the effect of any recompression schedule or adjunctive therapy with a standard recompression schedule and applied no language restrictions. Three authors extracted the data independently. We assessed each trial for internal validity and resolved differences by discussion. Data were entered into RevMan 5.0 software (Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2008).
**RESULTS:** Two RCTs satisfied the inclusion criteria. Pooling of data was not possible. In one study, there was no evidence of improved effectiveness with the addition of a nonsteroidal antiinflammatory drug to routine recompression therapy (at 6 weeks: relative risk 1.04, 95% confidence interval [CI]: 0.90–1.20, *P* = 0.58), but there was a reduction in the number of recompression treatments required when tenoxicam was added (*P* = 0.01, 95% CI: 0–1). In the other study, the odds of multiple recompressions were lower with a

helium and oxygen (heliox) table compared with an oxygen treatment table (relative risk 0.56, 95% CI: 0.31–1.00, $P = 0.05$).
**DISCUSSION:** Recompression therapy is the standard for treatment of DCI, but there is no RCT evidence. The addition of a nonsteroidal antiinflammatory drug (tenoxicam) or the use of heliox may reduce the number of recompressions required, but neither improves the odds of recovery. The application of either of these strategies may be justified. The modest number of patients studied demands a cautious interpretation. Benefits may be largely economic, and an economic analysis should be undertaken. There is a case for large randomized trials of high methodological rigor to define any benefit from the use of different breathing gases and pressure profiles during recompression.

## 局麻藥可通過細胞內鹼化使大鼠背根神經節神經元細胞線粒體膜電位去極化

**Local Anesthetics Depolarize Mitochondrial Membrane Potential by Intracellular Alkalization in Rat Dorsal Root Ganglion Neurons**

Shin Onizuka, MD*, Ryuji Tamura, MD*, Nobuko Hosokawa, MD*, Yuko Kawasaki, MD* and Isao Tsuneyoshi, MD, PhD*
From the *Department of Anesthesiology and Faculty of Medicine, University of Miyazaki, Kiyotake, Miyazaki, Japan.
Anesth Analg September 2010 111:775-783;

**背景**：儘管已經有報導：局部麻醉藥，特別是利多卡因，具有細胞毒性，但機制尚不清楚。線粒體膜電位的去極化(ΔΨm)，是線粒體功能障礙的標誌之一，受質子電化學梯度(Δ $H^+$)調節。因此，細胞內 ph 值([pH]in)和線粒體 ph([pH]m)是調整 ΔΨm 的重要因素。然而，局麻藥對於[pH]in and [pH]m 的影響尚不清楚。爲了研究線粒體對於局麻藥的反應，作者同時檢測了[pH]m、 [pH]in 以及 ΔΨm。
**方法**：用比率計量螢光探針 JC-1 和 HPTS 同時測量大鼠背根神經節神經元的 ΔΨm 和 [pH]in。carboxy-SNARF-1 螢光探針用來測定[pH]m。評估對象爲利多卡因、甲呱卡因、布比卡因、普魯卡因、QX-314（利多卡因的一種帶電形式）以及氯化銨($NH_4Cl$)。
**結果**：應用利多卡因、甲呱卡因、布比卡因和普魯卡因時，ΔΨm 去極化，而 [pH]in 呈現劑量相關的增加。在灌注利多卡因、甲呱卡因、布比卡因、普魯卡因和 $NH_4Cl$ 時，ΔΨm 和 [pH]in 之間存在明顯聯繫。相反，灌注 QX-314 時，沒有改變 ΔΨm 和[pH]in。在低 ph 的溶液(pH6)，以及弱酸的環境中，利多卡因沒有增加 [pH]in 或者使 ΔΨm 去極化。灌注利多卡因、甲呱卡因、布比卡因、普魯卡因，以及氯化銨($NH_4Cl$)時也增加了 [pH]m。
**結論**：結果表明不帶電（原形）局麻藥導致 ΔΨm 去極化。原因之一是細胞內和線粒體的鹼化。
（懷曉蓉　譯　陳傑　校）

**BACKGROUND:** Although it has been reported that local anesthetics, especially lidocaine, are cytotoxic, the mechanism is unclear. Depolarization of the mitochondrial membrane potential (ΔΨm), one of the markers of mitochondrial failure, is regulated by the proton electrochemical gradient (Δ $H^+$). Therefore, intracellular pH ([pH]in) and

mitochondrial pH ([pH]m) are important factors for modifying ΔΨm. However, the effects of local anesthetics on [pH]in and [pH]m are unclear. To investigate mitochondrial responses to local anesthetics, we simultaneously measured [pH]m and [pH]in, along with ΔΨm.
**METHODS:** The ratiometric fluorescent probe JC-1 and HPTS were used for the simultaneous measurements of ΔΨm with [pH]in in rat dorsal root ganglion neurons. A carboxy-SNARF-1 fluorescent probe was used to measure [pH]m. Lidocaine, mepivacaine, bupivacaine, procaine, QX-314, a charged form of lidocaine, and ammonium chloride ($NH_4Cl$) were evaluated.
**RESULTS:** ΔΨm was depolarized and [pH]in was increased by lidocaine, mepivacaine, bupivacaine, and procaine in a dose-dependent manner. Significantly, a relationship between ΔΨm and [pH]in was observed for lidocaine, mepivacaine, bupivacaine, procaine, and $NH_4Cl$ perfusion. In contrast, QX-314 did not change ΔΨm or [pH]in. In low-pH saline (pH6) and in the presence of a weak acid, lidocaine failed to increase [pH]in or depolarize ΔΨm. The [pH]m was also increased by lidocaine, mepivacaine, bupivacaine, procaine, and $NH_4Cl$.
**CONCLUSION:** These results demonstrate that uncharged (base) forms of local anesthetics induce ΔΨm depolarization. One of the causes is intracellular and mitochondrial alkalization.

## 在婦科癌症手術中腹橫肌平面阻滯對多模式鎮痛無附加益處

**Transversus Abdominis Plane Block Does Not Provide Additional Benefit to Multimodal Analgesia in Gynecological Cancer Surgery**

James D. Griffiths, MB, BS, FANZCA, MEpi*, Justine V. Middle, BSc, MBBS, FRCA*, Fiona A. Barron, MBChB, FRCA*, Sarah J. Grant*, Phillip A. Popham, BSc, MBBS, FRCA, MD* and Colin F. Royse, MDBS†
From *Royal Women's Hospital, Parkville, Victoria, Australia; and †Anaesthesia and Pain Management Unit, Department of Pharmacology, University of Melbourne, and Royal Melbourne Hospital, Melbourne, Australia.
Anesth Analg September 2010 111:797-801;

**背景**：腹橫肌平面阻滯是一種最新的被描述爲在腹壁的腹內斜肌層和腹橫肌層間注射局部麻醉藥的新技術。它已被證實在多種臨床環境下在減少嗎啡用量及改善術後疼痛的緩解方面有效。
**方法**：作者對明確或懷疑是婦科惡性腫瘤並行腹正中線剖腹探查的成年女性病例在超聲定位下以注射 2×20ml 的 0.5%羅呱卡因和 0.9%生理鹽水行雙側腹橫肌阻滯來進行隨機對照試驗比較。兩組試驗物件均接受多模式靜脈鎮痛。本次研究的主要結果是通過確定是否有術後 2 小時用力呼吸的鎮痛不足（通過視覺類比評分法數值＞50mm 評定）及術後 2 小時及 24 小時的嗎啡總消耗量來評定。
**結果**：本次研究共包括 65 名患者的資料。各組年齡、體重、手術時間和術中嗎啡用量相匹配。在 2 小時鎮痛不足患者比例上對照組和實驗組無論是休息狀態（39%：22%，P=0.13）還是咳嗽狀態（61%：53%，P=0.54）無顯著性差異。對照組和實驗組在術後 2 小時嗎啡總用量（13.5mg：11.87mg，P=0.54）和 24 小時嗎

啡總用量（34mg：36.1mg，P=0.76）上也無顯著性差異。在阿片類藥物副反應及患者滿意度上兩組無顯著性差異。
**結論**：本次研究證明對於進行婦科癌症手術的女性患者，腹橫肌平面阻滯對於多模式鎮痛無附加益處。
（曹強　譯　陳傑　校）

**BACKGROUND:** The transversus abdominis plane (TAP) block is a recently described technique involving injecting local anesthetic between the internal oblique and transversus abdominis layers of the abdominal wall. It has been shown to be effective in reducing morphine consumption and improving postoperative pain relief in several clinical settings.
**METHODS:** We performed a randomized placebo-controlled trial comparing bilateral ultrasound-guided TAP blocks (2 × 20 mL 0.5% ropivacaine or 0.9% saline) in adult female patients undergoing midline laparotomy for known or presumed gynecological malignancy. Both groups received multimodal IV analgesia. The primary outcomes for the study were defined as the incidence of "inadequate" analgesia (defined as a score >50 mm on a visual analog scale) with forced expiration at 2 hours postoperatively and total postoperative morphine consumption at 2 hours and 24 hours.
**RESULTS:** Data from 65 patients were included in the study. The groups were comparable in terms of age, weight, surgical duration, and intraoperative morphine doses. There were no significant differences between the control and treatment groups in the proportion of patients with inadequate analgesia either at rest (39% vs. 22%, *P* = 0.13) or with coughing (61% vs. 53%, *P* = 0.54) at 2 hours. There was no significant difference in postoperative morphine consumption between the placebo and treatment groups at 2 hours (13.5 mg vs. 11.87 mg, *P* = 0.53) or 24 hours (34.0 mg vs. 36.1 mg, *P* = 0.76). There were no significant differences in the incidence of opioid side effects or patient satisfaction.
**CONCLUSION:** This study demonstrated that TAP blockade conferred no benefit in addition to multimodal analgesia in women undergoing major gynecological cancer surgery.

## 簡報：區域麻醉穿刺針會引導超聲凝膠進入組織

**Brief Reports: Regional Anesthesia Needles Can Introduce Ultrasound Gel into Tissues**

David Belavy, BMedSc, MBBS, FANZCA
From the Centre for Burns, Trauma and Critical Care, University of Queensland; and Department of Anaesthesiology and Perioperative Medicine, Royal Brisbane and Women's Hospital, Brisbane, Queensl*and, Australia.*
*Anesth Analg September 2010 111:811-812;*

**背景**：麻醉醫生在超聲引導的區域麻醉中會將穿刺針穿透超聲凝膠。在本次研究中，作者擬明確穿刺針能否將凝膠導入組織中。
**方法**：被染成藍色的超聲凝膠在豬肉薄皮上進行試驗。將 Tuohy 針和短錐穿刺針穿過凝膠和豬肉。然後證實穿刺針內有無超聲凝膠的存在。
**結果**：包括有管心針在內的所有穿刺針，針腔內都帶有凝膠和組織。

**結論**：在區域組織操作過程中，超聲凝膠會被注射到神經周圍或者神經中。需要進一步研究以明確其影響。
（曹強　譯　陳傑　校）
**BACKGROUND:** Anesthesiologists may insert needles through ultrasound gel when performing ultrasound-guided regional anesthesia. In this study, it was determined whether needles carry gel into tissues.
**METHODS:** Ultrasound gel dyed blue was applied to pork rashers. Tuohy and short-bevel needles were passed through the gel and pork. The needles were then assessed for the presence of ultrasound gel.
**RESULTS:** All needles, including those with stylets, carried gel and tissue within the lumen.
**CONCLUSIONS:** Ultrasound gel may be injected around (and perhaps in) nerves during regional anesthesia procedures. Studies are needed to determine the implications of this practice.