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ATP 敏感鉀通道參與七氟烷和丙泊酚對大鼠糖代謝的不同作用

The Involvement of Adenosine Triphosphate-Sensitive Potassium Channels in the Different Effects of Sevoflurane and Propofol on Glucose Metabolism in Fed Rats

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背景：最近，本研究組報導了七氟烷和丙泊酚對糖代謝影響具有顯著差異：七氟烷損害了葡萄糖利用，而丙泊酚卻不然。β 胰島細胞的 ATP 敏感鉀離子通道的開放減少胰島素分泌，而阻斷 β 胰島細胞的 ATP 敏感鉀離子通道可增加胰島素分泌。據報導吸入性麻醉藥可使 ATP 敏感鉀離子通道開放，而丙泊酚阻斷此離子通道。在正常血容量和血容量減少情況下，本研究圍繞胰島素的分泌，觀察七氟烷和丙泊酚對糖代謝的影響。
方法：所有大鼠接受七氟烷誘導麻醉（1L/ml 氧流量，3%濃度）。術前準備後，大鼠被分爲兩組。第一組接受七氟烷吸入維持麻醉（1L/ml 氧流量，2%濃度），第二組接受丙泊酚維持麻醉（負荷劑量爲 30mg/kg，維持劑量爲 30 mg $\cdot kg^{-1} \cdot h^{-1}$）。每一組再分爲三個亞組：沒有經過預處理，用格列苯脲預處理以及用尼可地爾預處理。經過 30 分鐘穩定階段後，抽出 15 mL/kg 的血液導致低血容量。本研究通過測定血糖水準和血漿胰島素水準，來評估正常血容量以及低血容量情況下糖代謝情況。
結果：在正常血容量以及低血容量情況下，七氟烷麻醉大鼠血糖水準明顯高於丙泊酚麻醉大鼠，且七氟烷麻醉大鼠血漿胰島素水準明顯低於丙泊酚麻醉大鼠。格列苯脲，作爲一種 ATP 敏感的鉀離子通道阻滯劑，明顯降低七氟烷麻醉狀態下血糖水準並明顯增加胰島素水準。這表明七氟烷通過開放 β 胰島細胞的 ATP 敏感鉀離子通道抑制胰島素分泌。格列苯脲同樣明顯降低丙泊酚麻醉狀態下血糖水準並明顯增加胰島素水準；然而用格列苯脲預處理組中，丙泊酚麻醉狀態下大鼠的胰島素水準高於七氟烷麻醉狀態下大鼠。同時，未行預處理的丙泊酚麻醉大鼠的胰島素水準似乎等於甚至高於經格列苯脲預處理的七氟烷麻醉大鼠。這些結果提示：七氟烷與丙泊酚通過調節 β 胰島細胞的 ATP 敏感鉀離子通道，對胰島素分泌作用有顯著差異。尼可地爾，一種 ATP 敏感的鉀離子通道開放劑，對於七氟烷及丙泊酚麻醉狀態下的糖代謝皆無明顯影響。
結論：通過 β 胰島細胞的 ATP 敏感鉀離子通道調節的胰島素分泌參與(或至少部分參與)七氟烷與丙泊酚對糖代謝的不同作用。
（龔寅　譯　陳傑　校）
BACKGROUND: Recently, we reported marked differences in the effects of sevoflurane and propofol on glucose metabolism; glucose use is impaired by sevoflurane, but not by propofol. Opening of adenosine triphosphate-sensitive potassium channels (K_{ATP} channels) in β islet cells attenuates insulin secretion, while inhibition of K_{ATP} channels in β islet cells increases insulin secretion. It is reported that volatile anesthetics open K_{ATP} channels, whereas propofol inhibits K_{ATP} channels. In this study, we examined the effects of sevoflurane and propofol on glucose metabolism under normovolemic and hypovolemic conditions, focusing on insulin secretion.

METHODS: Anesthesia was induced with sevoflurane (3% in 1 L/min oxygen) in all rats. After surgical preparation, rats were assigned to 2 groups. Anesthesia was maintained with sevoflurane (2% in 1 L/min oxygen) in the 1st group, and with propofol (a bolus dose of 30 mg/kg followed by continuous infusion at a rate of 30 mg $\cdot kg^{-1} \cdot h^{-1}$) in the 2nd group. Each group was divided into 3 subgroups: rats without pretreatment, rats pretreated with glibenclamide, and rats pretreated with nicorandil. After a 30-minute stabilization period, we withdrew 15 mL/kg of

blood to induce hypovolemia. We evaluated glucose metabolism under both normovolemic and hypovolemic conditions by measuring blood glucose levels and plasma insulin levels.
RESULTS: Under both normovolemia and hypovolemia, glucose levels in rats anesthetized with sevoflurane were significantly higher than those in rats anesthetized with propofol, and insulin levels in rats anesthetized with sevoflurane were significantly lower than those in rats anesthetized with propofol. Glibenclamide, a K_{ATP} channel inhibitor, significantly decreased glucose levels and significantly increased insulin levels under sevoflurane anesthesia, suggesting that sevoflurane decreases insulin secretion by opening K_{ATP} channels in β islet cells. Glibenclamide significantly decreased glucose levels and significantly increased insulin levels under propofol anesthesia as well; however, insulin levels in rats pretreated with glibenclamide under propofol anesthesia were much higher than those in rats pretreated with glibenclamide under sevoflurane anesthesia. Furthermore, insulin levels in rats without pretreatment under propofol anesthesia seemed to be equal to or higher than those in rats pretreated with glibenclamide under sevoflurane anesthesia. These results suggest that there are marked differences in the effects of sevoflurane and propofol on insulin secretion regulated by K_{ATP} channels in β islet cells. Nicorandil, a K_{ATP} channel opener, produced no significant effects on glucose metabolism under both sevoflurane and propofol anesthesia.
CONCLUSIONS: Insulin secretion regulated by K_{ATP} channels in β islet cells is involved, at least in part, in the different effects of sevoflurane and propofol on glucose metabolism.

綜述：麻醉中的閉合回路系統：閉合回路式的液體管理和血流動力學最佳化可否實現？

Review Article: Closed-Loop Systems in Anesthesia: Is There a Potential for Closed-Loop Fluid Management and Hemodynamic Optimization?

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閉合回路（自動化）控制器在現代化生活中各方面，從空調到宇宙飛行，隨處可見。儘管這些系統無所不在，但由於生理系統非常複雜且從病人中得到可靠的回饋資料較難，故很少用於麻醉學上。儘管存在這些挑戰，關於應用在醫療方面的閉合管路系統的研究和改進越來越多。兩項最新研究使液體管理的閉合回路控制成爲可能。首先，對液體反應性的動態預測指標的進一步描述和發展爲指導液體管理提供了一項有力的控制參數。第二，無創傷性心輸出量監測和其他血流動力學參數的快速發展使靶向治療能應用於臨床各種環境下的各種患者。此文章回顧了臨床使用的閉合回路控制裝置的歷史，討論了對液體反應性的動態預測指標目前的理解及局限，以及試驗如何將這些參數整合入閉合回路式的液體管理系統中。
（丁佳　譯　陳傑　校）
Closed-loop (automated) controllers are encountered in all aspects of modern life in applications ranging from air-conditioning to spaceflight. Although these systems are virtually ubiquitous, they are infrequently used in anesthesiology because of the complexity of physiologic systems and the difficulty in obtaining reliable and valid feedback data from the patient. Despite these challenges, closed-loop systems are being increasingly studied and improved for medical use. Two recent developments have made fluid administration a candidate for closed-loop control.

First, the further description and development of dynamic predictors of fluid responsiveness provides a strong parameter for use as a control variable to guide fluid administration. Second, rapid advances in noninvasive monitoring of cardiac output and other hemodynamic variables make goal-directed therapy applicable for a wide range of patients in a variety of clinical care settings. In this article, we review the history of closed-loop controllers in clinical care, discuss the current understanding and limitations of the dynamic predictors of fluid responsiveness, and examine how these variables might be incorporated into a closed-loop fluid administration system.

6% 羥乙基澱粉 (130/0.4)用於重症患者的液體復蘇：一項最新系統性綜述和薈萃分析

Fluid Resuscitation with 6% Hydroxyethyl Starch (130/0.4) in Acutely Ill Patients: An Updated Systematic Review and Meta-Analysis

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背景: 最新研究顯示 6% 羥乙基澱粉 (HES) 130/0.4 已成爲全球範圍最常用於液體復蘇的液體之一。 評估其使用的回顧性研究提出有必要對其安全性和有效性的證據進行重新評估。
方法: 選取了未被召回的隨機對照試驗，內容爲比較 6% 羥乙基澱粉（130/0.4）與其他膠體或晶體對重症或圍術期患者死亡率、急性腎損傷/衰竭以及出血情況的影響，並以此完成系統性綜述及薈萃分析。敏感度分析也納入了那些研究的資料。
結果: 所有的 36 項研究中 2149 名參與者符合選擇標準，其中 11 項研究被重研究(*n* = 541)。餘下的 25 項研究中，17 項有嚴重的偏倚風險；19 項(*n* = 1246)對象爲圍術期患者，6 項(*n* = 362)則著眼于重症患者。16 項研究報告了死亡率：1184 名參與者中有 104 例死亡。死亡相對危險度爲 0.95 (95%置信區間 0.64–1.42, I^2 = 0%, *P* = 0.73)；若加上重新評估的研究中 14 名死亡病例，相對危險度則爲 0.92 (95%置信區間 0.63–1.34, I^2 = 0%, *P* = 0.95)。急性腎損傷、紅細胞輸注及出血情況的資料因數量和品質不足而未進入薈萃分析。
結論: 已出版研究品質欠缺，且其事件報導過少以至於無法可靠評估輸注 6% 羥乙基澱粉（130/0.4）後的收益或風險。無論是否納入重新評估的研究，結論均是如此。考慮到 6% 羥乙基澱粉（130/0.4）的廣泛應用，迫切需要含有大量事件報導的高品質研究結果。
（俞劼晶　譯　陳傑　校）
BACKGROUND: Recent research suggests that 6% hydroxyethyl starch (HES) 130/0.4 is one of the most frequently used resuscitation fluids worldwide. The retraction of studies evaluating its use necessitates a reevaluation of available evidence regarding its safety and efficacy.
METHODS: We performed a systematic review and meta-analysis of unretracted randomized controlled trials comparing the effects of 6% HES 130/0.4 with other colloid or crystalloid

solutions on mortality, acute kidney injury/failure, and bleeding in acutely ill or perioperative patients. A sensitivity analysis including the data from retracted studies was also conducted.
RESULTS: Overall, 36 studies reporting 2149 participants met the inclusion criteria, of which 11 (n = 541) have been retracted. Of the remaining 25 studies, there was a high risk of bias in 17 studies; 19 studies (n = 1246) were conducted in perioperative patients and 6 (n = 362) in critically ill patients. Sixteen studies reported mortality: 104 deaths in 1184 participants. The relative risk of death was 0.95 (95% confidence interval 0.64–1.42, I^2 = 0%, P = 0.73); including the retracted studies added a further 14 deaths and the relative risk was 0.92 (95% confidence interval 0.63–1.34, I^2 = 0%, P = 0.95). The data reporting acute kidney injury, red blood cell transfusion, and bleeding were of insufficient quantity and quality and not amenable to meta-analysis.
CONCLUSIONS: Published studies are of poor quality and report too few events to reliably estimate the benefits or risks of administering 6% HES 130/0.4. This same conclusion is reached with or without the retracted studies. Given the widespread use of 6% HES 130/0.4, high-quality trials reporting a large number of events are urgently required.

熱點綜述：產科麻醉的模擬訓練

Focused Review: Simulation in Obstetric Anesthesia

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模擬訓練可以被用來教授技術，評價臨床醫生的操作水準，幫助評估監護環境的安全性，提高團隊合作意識。所有這些已成功應用於產科麻醉的模擬。硬膜外置管、插管失敗、失血量估計的類比裝置均可提高麻醉醫生操作的水準。可以對一個住院醫師在處理急診剖腹產中的表現進行測試和評估並考察其在同行中的水準。在分娩病區（現場訓練）進行急診模擬可以幫助確認和糾正潛在的安全隱患（潛在錯誤），並避免使病人受到隱患所造成的危害。最後，模擬訓練可以有效評估和培養團隊手段和行爲。然而現在還不清楚在模擬環境中學習到的技術如何轉化爲臨床上更好的應對和護理，以及模擬是否可以提高病人的預後，需要更多的研究來幫助回答這些問題。
（範逸辰　譯　陳傑　校）
Simulation can be used to teach technical skills, to evaluate clinician performance, to help assess the safety of the environment of care, and to improve teamwork. Each of these has been successfully demonstrated in obstetric anesthesia simulation. Task simulators for epidural placement, failed intubation, and blood loss estimation seem to improve performance. Resident performance in an emergency cesarean delivery can be measured and assessed against his/her peers. Running simulated crises on a labor and delivery unit (in situ drills) can help to identify and correct potential safety concerns (latent errors) without exposing patients to the risks associated with these concerns. Finally, simulation can effectively assess and teach teamwork tools and behaviors. It is unclear, however, how well the lessons learned in the simulated environment translate into improved behaviors or better care in the clinical setting, or whether simulation improves patient outcomes. More research is needed to help answer these questions.

鞘內注射 Nav1.8 阻滯劑對辣椒素和外周缺血引起的機械痛敏和熱痛覺過敏在誘導期和維持期的不同效應

The Differential Effect of Intrathecal Nav1.8 Blockers on the Induction and Maintenance of Capsaicin- and Peripheral Ischemia-Induced Mechanical Allodynia and Thermal Hyperalgesia

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背景：據報導，選擇性阻斷 Nav1.8 鈉離子通道是一種無副作用鎮痛藥發展的方向。但是，脊髓 Nav1.8 對持續性疼痛的確切作用，如機械痛敏（MA）和熱痛覺過敏(TH)仍然不明。本研究設計用於探討脊髓 Nav1.8 是否與辣椒素誘導的及外周缺血引起的 MA 和 TH 有關。
方法：在足底注射辣椒素之前或之後鞘內注射 Nav1.8 阻滯劑，即 A-803467 或氨溴索。爲了評估辣椒素誘導的脊髓神經元活性，本研究量化背角的 Fos 免疫反應細胞的數量。在血栓引起的缺血性疼痛模型中，研究測定 A-803467 在 MA 誘導期或維持期的不同效應。
結果：在足底注射辣椒素之前鞘內注射 A-803467 (10, 30, 100 nmol)或氨溴索(241, 724, 2410 nmol)可劑量依賴性地預防 MA 和 TH 的反應。然而，足底辣椒素之後鞘內注射 A-803467（100 nmol）和氨溴索（2410nmol）不能減輕已經出現的 MA，但可以顯著抑制辣椒素誘導的 TH。此外，通過預處理給予 Nav1.8 阻滯劑能顯著減少辣椒素誘發的脊髓 Fos 免疫反應細胞增加，而通過後處理給予則不可。在血栓引起的缺血性疼痛的大鼠中，在誘導期重複給予 A-803467 也可以阻礙 MA 的發展，但在維持期給予 A-803467 對預防和減輕 MA 的治療是無效的。
結論：這些結果表明脊髓 Nav1.8 的啓動參與 MA 誘導期的調節，但對 MA 維持期沒有作用。但鞘內注射 Nav1.8 阻滯劑對 TH 的誘導和維持期都有調節作用。這些研究結果表明，誘導早期使用 Nav1.8 阻滯劑在炎症和缺血性疼痛相關的慢性 MA 的臨床管理中是一個重要的因素。
（滕淩雅　譯　陳傑　校）

BACKGROUND: It has been reported that the selective blockade of Nav1.8 sodium channels could be a possible target for the development of analgesics without unwanted side effects. However, the precise role of spinal Nav1.8 in the induction and maintenance of persistent pain, e.g., mechanical allodynia (MA) and thermal hyperalgesia (TH), is not clear. We designed this study to investigate whether spinal Nav1.8 contributes to capsaicin-induced and peripheral ischemia-induced MA and TH.
METHODS: The Nav1.8 blockers, A-803467 or ambroxol, were injected intrathecally either before or after intraplantar capsaicin injection. To evaluate capsaicin-induced neuronal activation in the spinal cord, we quantified the number of Fos-immunoreactive cells in the dorsal horn. In the thrombus-induced ischemic pain model, we determined the differential effect of A-803467 on the induction phase or maintenance phase of MA.
RESULTS: Intrathecal injection of A-803467 (10, 30, 100 nmol) or ambroxol (241, 724, 2410 nmol) before intraplantar injection of capsaicin dose dependently prevented the induction of both MA and TH. However, posttreatment with A-803467 (100 nmol) and ambroxol (2410 nmol) did

not reduce the MA that had already developed, but did significantly suppress capsaicin-induced TH. Moreover, the capsaicin-induced increase of spinal Fos-immunoreactive cells was significantly diminished by pretreatment, but not posttreatment with Nav1.8 blockers. In thrombus-induced ischemic pain rats, repetitive treatments of A-803467 during the induction period also prevented the development of MA, whereas A-803467 treatments during the maintenance period were ineffective in preventing or reducing MA.
CONCLUSIONS: These results demonstrate that spinal activation of Nav1.8 mediates the early induction of MA, but not the maintenance of MA. However, both the induction and maintenance of TH are modulated by the intrathecal injection of Nav1.8 blockers. These findings suggest that early treatment with a Nav1.8 blocker can be an important factor in the clinical management of chronic MA associated with inflammatory and ischemic pain.

簡報：超聲引導下腘窩坐骨神經阻滯時向脛腓神經分叉處頭向和尾向注射的效果比較：一項前瞻性隨機研究

Brief Report: A Comparison of an Injection Cephalad or Caudad to the Division of the Sciatic Nerve for Ultrasound-Guided Popliteal Block: A Prospective Randomized Study
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背景：對於超聲引導下腘窩坐骨神經阻滯局麻藥注射的最佳位置仍存在爭議。
方法：患者隨機分爲兩組：A 組患者在脛腓神經分叉處頭向圍繞坐骨神經注射 25 毫升 0.75%羅呱卡因（N =51），B 組在分叉處的尾向注射同樣的局麻藥（N= 51）。每 5 分鐘評估感覺和運動阻滯直至注射局麻藥後 30 分鐘。
結果：完全的感覺阻滯和手術麻醉成功率方面，B 組顯著優於 A 組（P <0.0001）。
結論：尾向技術提供了更好的手術麻醉。
（孫曉瓊　譯　陳傑　校）
BACKGROUND: The optimal site for local anesthetic injection during ultrasound-guided sciatic popliteal block remains controversial.
METHODS: Patients were randomized to receive 25 mL ropivacaine 0.75% around the sciatic nerve cephalad to the peroneal-tibial division in group A (*n* = 51) or caudad to the division in group B (*n* = 51). The sensory and motor blocks were evaluated every 5 minutes up to 30 minutes.
RESULTS: Rates of complete sensory block and surgical anesthesia were superior in group B (*P* < 0.0001).
CONCLUSION: The caudad technique provided better surgical anesthesia.

特殊文章：惡性高熱患者從 ASC 轉移到接收醫院過程中的指南

Special Article: Creation of a Guide for the Transfer of Care of the Malignant Hyperthermia Patient from Ambulatory Surgery Centers to Receiving Hospital Facilities
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臨床問題：揮發性麻醉藥和/或琥珀可能引發潛在的致命的惡性高熱事件需要緊急護理危機管理。如果在 ASC 發生惡性高熱，病人需要轉移到接收醫院。2010 前，沒有臨床指南的制定一個具體的轉移計畫。

機制的產生：13 個來自美國的惡性高熱協會的代表經過 18 個月的協商達成共識，在門診手術的基礎上，聯合動態麻醉學會，學會學術急診醫學，和急救醫學協會成立了本指南。

指南的依據：指南的大部分內容是根據 13 位元代表的臨床經驗和科學知識。代表名單出現在附錄 1。轉移病人前建議靜脈注射丹曲林，臨床研究也證實這種做法，轉移病人前每延遲使用丹曲林 30 分鐘會增加 50%的併發症的發生。（Anesth Analg 2010；110:498–507）。

聲明：本指南包括一系列潛在的臨床治療的問題和干預措施，來協助各 ASC 在發展自己獨特的病人轉移計畫中借鑒。要點包括接受醫療保健設施的能力，病人指標的的穩定性和必要的資料報告，轉運小組的顧慮和能力，實現轉移的決定，和各 ASC 之間的協調溝通，接收醫院，和運輸隊。見附錄 2 的指導。

（陸麗虹譯 薛張綱校）

Clinical Problem: Volatile anesthetics and/or succinylcholine may trigger a potentially lethal malignant hyperthermia (MH) event requiring critical care crisis management. If the MH triggering anesthetic is given in an ambulatory surgical center (ASC), then the patient will need to be transferred to a receiving hospital. Before May 2010, there was no clinical guide regarding the development of a specific transfer plan for MH patients in an ASC.

Mechanism by which the statement was generated: A consensual process lasting 18 months among 13 representatives of the Malignant Hyperthermia Association of the United States, the Ambulatory Surgery Foundation, the Society for Ambulatory Anesthesia, the Society for Academic Emergency Medicine, and the National Association of Emergency Medical Technicians led to the creation of this guide.

Evidence for the statement: Most of the guide is based on the clinical experience and scientific expertise of the 13 representatives. The list of representatives appears in Appendix 1. The recommendation that IV dantrolene should be initiated pending transfer is also supported by clinical research demonstrating that the likelihood of significant MH complications doubles for every 30-minute delay in dantrolene administration (Anesth Analg 2010;110:498–507).

Statement: This guide includes a list of potential clinical problems and therapeutic interventions to assist each ASC in the development of its own unique MH transfer plan. Points to consider include receiving health care facility capabilities, indicators of patient stability and necessary report data, transport team considerations and capabilities, implementation of transfer decisions, and coordination of communication among the ASC, the receiving hospital, and the transport team. See Appendix 2 for the guide.

肝硬化大鼠異丙酚 ED50 和恢復時間變化

ED50 and Recovery Times After Propofol in Rats with Graded Cirrhosis.ft

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背景：終末期肝病患者對全身麻醉的敏感性增加。在這項研究中，我們試圖在肝硬化的大鼠模型身上，對異丙酚靈敏度進行了量化並作爲肝病肝功能程度的評估。
方法：對3個研究小組分別注射6、9或12周的四氯化碳，並誘發出肝病。對照組和四氯化碳組一樣注射了相同時間表的生理鹽水。第二個控制組（相比較）在飲用9周含巴比妥和10%酒精的水後，用苯巴比妥治療一周。肝功能是由肝功能試驗和肝臟組織學病理評分進行評估的。
結果：逐漸惡化的肝硬化依據組織學標準，脾亢、肝體比值、肝功能試驗進行長期四氯化碳治療有關。主要的結果是輕度肝病（脂肪變性或纖維化）與對丙泊酚敏感性增加無關，但是丙泊酚負荷劑量和輸注後，對於有嚴重肝纖維化的大鼠，恢復時間顯著增加。
結論：輕度肝病並不顯著影響丙泊酚的敏感性，和臨床觀察相似，但終末期肝病（纖維化）顯著延長丙泊酚輸注後的恢復時間。這項研究中所使用的累進型肝病的模型，對嚴格的研究麻醉劑敏感性作爲肝細胞纖維化肝病的肝功能程度的研究是有幫助的。
（侯文婷譯 薛張綱校）

BACKGROUND：Patients with end-stage liver disease have increased sensitivity to general anesthetics. In this study, we sought to quantify sensitivity to propofol as a function of the degree of liver disease, in a rat model of cirrhosis.
METHODS: Liver disease was induced by carbon tetrachloride (CCl(4)) injections for 6, 9, or 12 weeks in 3 study groups. Control rats received saline injections on the same schedule as CCl(4)-injected rats. A second control (comparison) group was treated with phenobarbital for a week followed by 9 weeks of phenobarbital and 10% ethanol in drinking water. Liver function was assessed by liver function tests and pathologic scoring of liver histology.
RESULTS: Progressively worse cirrhosis was associated with longer CCl(4) treatment by histologic criteria, by hypersplenism, liver to body weight ratios, and liver function tests. The major findings were that mild liver disease (either steatosis or fibrosis) was not associated with increased propofol sensitivity, but recovery times after propofol bolus and propofol infusion were significantly increased in rats with more severe liver fibrosis.

CONCLUSION: Propofol sensitivity is not significantly affected in the setting of mild liver disease, similar to clinical observations, but end-stage liver disease (fibrosis) is associated with significantly prolonged time to recovery after propofol infusion. The progressive liver disease model used in these studies is useful for rigorously studying anesthetic sensitivity as a function of degree of hepatocellular-fibrotic liver disease.

行大手術患者上呼吸道損傷的流行病學

The Epidemiology of Upper Airway Injury in Patients Undergoing Major Surgical Procedures

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背景：呼吸道損傷是麻醉期間潛在的嚴重的、增加費用的併發症。但是呼吸道損傷的流行病學特點尚沒有文獻報導。
方法：全美外科品質改進計畫（NSQIP）是一項多中心、前瞻性、結果-來源於患者行外科手術的原始資料的研究。利用 NSQIP 的 2005 年至 2008 年的資料，我們分析了呼吸道損傷的發生率及危險因素。
結果：我們研究了 163,190 名患者，1202 (0.2%)名患者出現的呼吸道損傷。最常見的呼吸道損傷是唇撕裂傷/血腫(61.4%)，其他常見的爲牙齒損傷(26.1%), 舌撕裂傷(5.7%), 咽裂傷(4.7%)，和喉裂傷(2.1%)。多因素回歸分析提示 Mallampati 分級 III 級患者增加出現呼吸道損傷的風險(調整的 odds 值[OR], 1.69，99% 的置信區間爲[CI], 1.36–2.11, 相比於 Mallampati 分級 I 及 II 的患者) 或 IV 級患者(調整的 OR 值爲 2.6， 99% CI, 1.52–4.02)，患者年齡大於等於 80 歲(調整的 OR 值爲 1.50， 99% CI 爲 1.02–2.19，相比於年齡在 40 至 49 歲患者)。
結論：患者手術過程中出現呼吸道損傷的風險大約爲 1:500。Mallampati 分級爲 III 及 IV 級的患者常提示有困難氣道，會增加呼吸道損傷的風險。
（黃劍譯 薛張綱校）
BACKGROUND: Airway injury is a potentially serious and costly adverse event of anesthesia care. The epidemiologic characteristics of airway injury have not been well documented.
METHODS: The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) is a multicenter, prospective, outcome-oriented database for patients undergoing major surgical procedures. Using the NSQIP data for the years 2005 to 2008, we examined the incidence of, and risk factors for, airway injury.
RESULTS: Of the 563,190 patients studied, 1202 (0.2%) sustained airway injury. The most common airway injury was lip laceration/hematoma (61.4%), followed by tooth injury (26.1%), tongue laceration (5.7%), pharyngeal laceration (4.7%), and laryngeal laceration (2.1%). Multivariable logistic modeling revealed an increased risk of airway injury in patients with Mallampati class III (adjusted odds ratio [OR], 1.69; 99% confidence interval [CI], 1.36–2.11, relative to patients with Mallampati classes I and II) or class IV (adjusted OR, 2.6; 99% CI,

1.52–4.02), and in patients aged 80 years or older (adjusted OR, 1.50; 99% CI, 1.02–2.19, relative to patients aged 40 to 49 years).
CONCLUSIONS: The risk of airway injury for patients undergoing major surgical procedures is approximately 1 in 500. Patients with difficult airways as indicated by Mallampati classes III and IV are at significantly increased risk of sustaining airway injury during anesthesia for major surgical procedures.

使用神經軸索分娩鎮痛在種族和民族間的差異

Racial and ethnic disparities in neuraxial labor analgesia.

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摘要：對於疼痛的治療在種族和民族間的差異已有記錄，證據證實這種差異也存在于神經軸索分娩鎮痛中。本研究的目的是在即將分娩的西班牙、非裔美國和高加索婦女中，分析使用及預期使用神經軸索分娩鎮痛在種族或民族間的差異，並從社會統計學、臨床、決策方面評估這些婦女實際和希望使用神經軸索分娩鎮痛的預測因素。
方法：在大城市教學醫院中即將分娩的婦女都會被面對面訪視來確定可能影響分娩鎮痛選擇的個人因素。在分娩後，分娩鎮痛的方式被記錄。記錄下的主要方式是神經軸索分娩鎮痛。多變數 logic 回歸模型被建立來檢驗是否不同種族和民族與使用神經軸索分娩鎮痛、預期使用神經軸索分娩鎮痛或產時決定使用神經軸索分娩鎮痛顯著相關。
結果：種族和民族與實際或預期使用神經軸索分娩鎮痛間單變數相關。但是在產時決定使用神經軸索分娩鎮痛與種族和民族不相關。在控制混雜因素後，實際使用神經軸索分娩鎮痛與種族和民族沒有保持顯著性差異（調整後的優勢率：西班牙對比高加索婦女 0.66，95%置信區間：0.24 到 1.80；非裔美洲對比高加索婦女 0.93，95%置信區間：0.31 到 2.77）。相對而言, 甚至是控制混雜因素後，西班牙婦女仍比高加索婦女較少願意使用神經軸索分娩鎮痛（調整後的優勢率 0.40，95%置信區間：0.20 到 0.82）。
結論：在控制混雜因素後，西班牙婦女仍比其他種族和民族婦女較少願意使用神經軸索分娩鎮痛；但是實際使用情況在各組間類似。
（任雲譯 薛張綱校））

BACKGROUND:Racial and ethnic disparities in the treatment of pain have been well documented, and there is evidence of such disparities in neuraxial analgesia use. Our objectives of this study were to analyze racial/ethnic disparities in neuraxial analgesia use, as well as anticipated use, among laboring Hispanic, African-American, and Caucasian women, and to evaluate sociodemographic, clinical, and decision-making predictors of actual and anticipated neuraxial analgesia use among these women.
METHODS:Laboring women, in a large urban academic hospital, were interviewed using a face-to-face survey to determine individual factors that may influence choice of labor analgesia. After delivery, the type of labor analgesia used was recorded. The primary outcome was use of neuraxial analgesia. Multivariable logistic regression models were estimated to test the

likelihood that race and ethnicity were significantly associated with neuraxial analgesia use, anticipated neuraxial analgesia use, and the intrapartum decision to use neuraxial analgesia.
RESULTS:There was a univariate association between race/ethnicity and anticipated as well as actual use of neuraxial analgesia. However, there was no association between race/ethnicity and the intrapartum decision to use neuraxial analgesia. After controlling for confounders, the association between race/ethnicity and actual use of neuraxial analgesia no longer remained significant (adjusted odds ratio: Hispanic versus Caucasian women 0.66, 95% confidence interval [CI]: 0.24 to 1.80; African-American versus Caucasian women 0.93, 95% CI: 0.31 to 2.77). In contrast, Hispanic women were less likely than Caucasian women to anticipate using neuraxial analgesia even after controlling for confounders (adjusted odds ratio 0.40, 95% CI: 0.20 to 0.82).
CONCLUSIONS:After controlling for confounding variables, Hispanic women anticipated using neuraxial analgesia at a lower rate than other racial/ethnic groups; however, actual use was similar among groups.

右美托嗪啶鎮靜作用對兒童心血管的影響。

Cardiovascular effects of dexmedetomidine sedation in children.

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背景：右美托嗪啶會影響成人心率、平均動脈壓、心輸出量、每搏輸出量、全身血管阻力指數。在這項研究中我們努力去探尋是否右美托嗪啶在兒童身上也會有相似的作用。
方法：在兒童行影像學檢查的同時靜脈給藥右美托嗪啶，觀察其血流動力學的變化。一組有8名兒童接受2mcg/kg 的衝擊劑量，在10分鐘內完成檢查。第2組有9名兒童除接受衝擊劑量外，還在需要鎮靜時接受1mcg/kg 的劑量，檢查時間超過10分鐘。我們使用一個持續無創心輸出量監測儀器來監測心輸出量、每搏輸出量、全身血管阻力指數。我們分別在10分鐘、20分鐘、離開（患者離開時 Aldrete 評分需 ≥9）時監測血流動力學的改變，並將其與基礎值比較。
結果：我們從第1組與第2組的實驗中獲得資料。在第1組，心率和心輸出量都降低了。其他的血流動力學變數沒有改變,在復蘇時期所有的血流動力學變數都會恢復到基礎值。在第2組中，心率和心輸出量在復蘇期都保持降低。另外，在復蘇期每搏輸出量降低，全身血管阻力指數升高。在兩組中平均動脈壓並沒有明顯改變。
結論：右美托嗪啶能降低兒童的心率，有累積作用。對兒童來說經過長時間的檢查，在復蘇期間其心率和心輸出量都會保持降低，同時伴每搏輸出量有降低和全身血管阻力指數有上升。
（翁梅琳譯 薛張綱校）

BACKGROUND:Dexmedetomidine (DEX) affects heart rate (HR), mean arterial blood pressure, cardiac index (CI), stroke index (SI), and systemic vascular resistance index (SVRI) in

adults. In this study we sought to determine whether similar effects occur in children undergoing DEX sedation.
METHODS:Hemodynamic changes in children were followed during IV DEX sedation for radiological procedures. One group of 8 patients (DEX-brief) received a bolus (2 mcg/kg bolus over 10 minutes) and completed the procedure within 10 minutes. The second group of 9 patients (DEX-prolong) received the bolus plus additional DEX as needed to maintain sedation for procedures lasting longer than 10 minutes (additional 1 mcg/kg/hr infusion with second bolus if needed). CI, SI, and SVRI were measured using a continuous noninvasive cardiac output monitor. Changes in hemodynamic variables at minutes 10, 20, and discharge (time at which patient achieved Aldrete Score ≥9) were compared to baseline by repeated measures ANOVA with effect sizes reported as mean [95% confidence interval].
RESULTS:Data were obtained during 8 DEX-brief and 9 DEX-prolong procedures. In DEX-brief, HR and CI decreased (18.9 [2.3 to 35.5] bpm and 0.74 [0.15 to 1.33] L/min/m(2); respectively) at T1. There was no change in any other hemodynamic variables and all hemodynamic variables returned to baseline at recovery. In DEX-prolong, both HR and CI remained decreased (24.0 [8.3 to 39.6] bpm, 1.51 [0.95 to 2.06] L/min/m(2); respectively) at recovery. In addition, SI was decreased (8.01 [1.71 to 14.31] mL/m(2)) and SVRI was increased (776.0 [271.9 to 1280.4] dynes-sec/cm(5)/m(2)) at recovery in the DEX-prolong group. There were no significant changes in mean arterial blood pressure in either group.
CONCLUSION:DEX decreases CI in children and has a cumulative effect. For patients undergoing prolonged procedures HR and CI remained decreased at the time of discharge together with a decrease in SI and an increase in SVRI.

靜脈注射瑞芬太尼導致短暫撤藥性痛覺超敏，與注射時間相關

Intravenous Infusion of Remifentanil Induces Transient Withdrawal Hyperalgesia Depending on Administration Duration in Rats

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背景:最近的研究顯示,同其他阿片類相似,瑞芬也可能導致痛覺超敏。我們進行了動物實驗來驗證臨床使用的注射模式是否會導致痛覺過敏，在何種情況下導致痛覺過敏。同時還研究了瑞芬誘導的痛覺超敏是否與胞外信號調節蛋白激酶（ERK1/2）的磷酸化相關。
方法:向雄性 SD 大鼠尾靜脈注射瑞芬太尼，注射時間分別爲 10 分鐘（30ug/kg/min），30 分鐘（0.1,1,10ug/kg/min），120 分鐘（0.1,1,3,10ug/kg/min），然後進行 von Frey 試驗和夾尾試驗以及免疫組化。同時研究鞘內預注胞外信號調節激酶抑制劑 U0126 是否抑制痛覺超敏。
結果:瑞芬太尼有劑量依賴性鎮痛作用但很快消失。10 或 30 分鐘瑞芬的注射並不導致痛覺超敏。然而，注射 120 分鐘瑞芬組的夾尾反射的潛伏期和機械疼痛閾明顯低於對照組，不管是何種劑量。痛覺超敏的時間小於 60 分鐘。雖然 U0126 本身不能抑制超敏，與 30 分鐘組未發生超敏者比較，120 分鐘痛覺超敏組大鼠的表面脊髓背側角觀察到了更多磷光體 ERK1/2 免疫反應神經元。

結論:靜脈注射瑞芬太尼在停止注射後導致短暫的撤藥性的痛覺超敏。這種痛覺超敏與暴露於瑞芬太尼的時間呈強相關。而與我們的假設相反，ERK1/2 本身並不是誘導產生痛覺超敏的必要因素。

（姚敏敏譯 薛張綱校）

BACKGROUND: Recent studies suggest that remifentanil, similar to other μ-opioid agonists, may induce hyperalgesia. We performed animal experiments to determine whether IV remifentanil infusion, the mode of administration used in clinical practice, induces hyperalgesia and the conditions in which this phenomenon occurs. We also determined whether remifentanil-induced hyperalgesia is related to extracellular signal-regulated protein kinase 1/2 (ERK1/2) phosphorylation.

METHODS: Remifentanil was administered through a catheter in the tail vein of male Sprague-Dawley rats for 10 minutes (30 $\mu g \cdot kg^{-1} \cdot min^{-1}$), 30 minutes (0.1, 1, and 10 $\mu g \cdot kg^{-1} \cdot min^{-1}$), or 120 minutes (0.1, 1, 3, and 10 $\mu g \cdot kg^{-1} \cdot min^{-1}$).

The von Frey test and a tail-flick test were performed, followed by ERK1/2 immunohistochemistry. We examined whether intrathecal preadministration of the mitogen-activated protein kinase inhibitor U0126 suppresses hyperalgesia.

RESULTS: Remifentanil had a dose-dependent antinociceptive effect that rapidly diminished. Ten- or 30-minute remifentanil infusion did not induce hyperalgesia. However, tail-flick latency and mechanical pain threshold after infusion termination were significantly lower in the 120-minute remifentanil administration group than those in the control group, regardless of dose. Hyperalgesia duration was no longer than 60 minutes. Significantly more phospho-ERK1/2-immunoreactive neurons in the superficial spinal dorsal horn were observed in the remifentanil 120-minute groups with hyperalgesia than in the 30-minute remifentanil groups without hyperalgesia, although U0126 did not suppress hyperalgesia.

CONCLUSIONS: IV remifentanil induces transient withdrawal hyperalgesia soon after its termination. This hyperalgesia is strongly associated with the duration of exposure to remifentanil. Contrary to our hypothesis, ERK1/2 by itself was not the essential factor involved in the induction of the hyperalgesia.

綜述：超聲引導下閉孔神經阻滯：平面內短軸技術

Brief reports: ultrasound-guided obturator nerve block: a proximal interfascial technique.

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Anesth Analg January 2012 114:236-239

背景：在這份報導中，我描述和評估了短軸超聲（US）引導下平面內注射局麻藥至恥骨肌的閉孔神經阻滯技術。

方法：超聲探頭傾斜尋找直至前恥骨支可見來識別和定位恥骨肌。在這個平面局麻藥在平面內注射至恥骨肌和閉孔神經間。

結果：識別注射點的時間是 4 秒（95%置信區間，3-5 秒）。運動阻滯起效的中位數時間是 4 分鐘（95%置信區間，3-5 分鐘）。所有病人（100%）的閉孔神經的前後支都被成功阻滯。

結論：超聲引導下的用平面內注射局麻藥至恥骨前支，在恥骨肌和閉孔肌之間，這是個實施閉孔神經阻滯的簡單而成功的方法。
（張玥琪譯 薛張綱校）
BACKGROUND: In this report, I describe and evaluate a proximal ultrasound (US)-guided obturator nerve block technique using an interfascial local anesthetic (LA) injection deep to the pectineus muscle.
METHODS: The pectineus muscle was identified and followed, while the US probe was tilted cranially until the superior pubic ramus was visualized. In this plane, LA was injected interfascially between the pectineus and obturator externus.
RESULTS: The median time required to identify the injection site was 4 seconds (95% confidence interval, 3-5 seconds). The median motor block onset was 4 minutes (95% confidence interval, 3-5 minutes). Both obturator nerve branches were blocked successfully in all patients (100%).
CONCLUSION: The US-guided obturator nerve block using interfascial LA injection inferior to the superior pubic ramus, between the pectineus and obturator externus muscles, was shown to be a simple and successful technique.

單次注射肉毒桿菌毒素降低局部和遠處位元點神經傳遞的安全閾值

A Single Injection of Botulinum Toxin Decreases the Margin of Safety of Neurotransmission at Local and Distant Sites

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背景：我們對單次注射肉毒桿菌毒素不僅在局部，而且遠處影響肌肉功能、生化特性和阿曲庫銨的藥效動力學這一假設進行了驗證。
方法：我們對麻醉後大鼠（n=26）一側脛骨肌注射肉毒桿菌毒素（2.5U）。另一側未注射的脛骨肌用作觀察肉毒桿菌毒素的遠處影響。對照組大鼠（n=25）注射生理鹽水。注射後 0、4 和 16 天分別評估脛骨肌的神經肌肉功能、藥理學及乙醯膽鹼受體(nAChRs)的表達，並同時與鹽水注射組進行比較。
結果：第 4 天時，肉毒桿菌毒素造成注射側的脛骨肌完全癱瘓，同時對側表現爲絕對肌顫搐張力的下降(1.8 N [1.6; 1.9]比 3.0 N [2.8; 3.1], 牛頓, $P < 0.05$)。第 16 天時，僅在注射側的脛骨肌上出現肌力減退，表現爲絕對肌顫搐強度的下降(0.6 N [0.6, 0.7]比 3.4 N [3.1, 3.7], $P < 0.05$)。注射側的脛骨肌在第 4 天(1.46 mg/g [1.43, 1.48]比 1.74 mg/g [1.72; 1.75], $P < 0.05$)和第 16 天(0.78 mg/g [0.76, 0.79] vs 1.73 mg/g [1.69; 1.77], $P < 0.05$)時均品質降低。第 16 天時遠離注射點的部位出現了變化，此時我們觀察到臨近的腓腸肌和比目魚肌也出現了萎縮。標準化到脛骨肌品質後，我們觀察到與對照組相比，注射毒素對側的脛骨肌特有的顫搐張力（張力/克肌肉）在第 4 天時下降，注射毒素側的下降則出現在第 16 天。第 16 天時，我們發現注射毒素側的脛骨肌對阿曲庫銨的敏感性增加，其證據是阿曲庫銨 ED_{50} 的降低(0.23 mg/kg [0.13, 0.33]比 0.72 mg/kg [0.63, 0.82], $P < 0.05$)以及輸注速率的降低(38 μL/kg/min [32, 43]比 135 μL/kg/min [126, 144], $P < 0.05$)，同時達到基礎（絕對）肌顫搐張

力下降到 50%穩態時所需的阿曲庫銨血漿濃度也出現降低(0.5 μg/mL [0.4, 0.7]比 4.5 μg/mL [3.8, 5.2], $P < 0.05$)。注射毒素對側脛骨肌阿曲庫銨的 ED_{50} 與對照組相比在第 16 天時也出現了下降。注射毒素側的脛骨肌 nAChRs 與時間配對的對照組相比，在第 4 天時增加至 123 fmol/mg [115, 131]比 28 fmol/mg [25, 29] ($P < 0.05$)，第 16 天到 378 [341, 413]比 27 fmol/mg [25, 29] ($P < 0.05$)。
結論：肉毒桿菌毒素在局部和遠處均能對肌肉產生作用。特有的肌顫搐張力減弱提示肌肉萎縮不能單獨解釋肌肉功能的變化，神經肌肉傳導同樣遭到了破壞。注射毒素側的肌肉對阿曲庫銨的敏感性增強，儘管 nAChRs 上調，這似乎是肉毒桿菌毒素特有的變化。
（劉伍 譯 馬皓琳 李士通 校）

BACKGROUND: We tested the hypothesis that a single injection of botulinum toxin not only has local, but also distant effects on muscle function, biochemistry, and pharmacodynamics of atracurium.
METHODS: Botulinum toxin (2.5 U) was injected into the tibialis muscle of anesthetized rats ($n = 26$). The contralateral side with no injection served to study distant effects. Control animals ($n = 25$) received a saline injection. Neuromuscular function, pharmacology, and expression of acetylcholine receptors (nAChRs) were evaluated in the tibialis at 0, 4, and 16 days after injection and in comparison with saline- injected controls.
RESULTS: On day 4, botulinum toxin caused complete paralysis of the tibialis, while its contralateral side showed a decrease in absolute twitch tension (1.8 N [1.6; 1.9] vs 3.0 N [2.8; 3.1], Newton, $P < 0.05$). On day 16, muscle weakness was only present on the toxin-injected side where absolute twitch tension was decreased (0.6 N [0.6, 0.7] vs 3.4 N [3.1, 3.7], $P < 0.05$). Tibialis mass was decreased on the toxin-injected side at day 4 (1.46 mg/g [1.43, 1.48] vs 1.74 mg/g [1.72; 1.75], $P < 0.05$) and on day 16 (0.78 mg/g [0.76, 0.79] vs 1.73 mg/g [1.69; 1.77], $P < 0.05$). Effects distant from the site of injection were seen on day 16, when muscle atrophy was also present in the adjacent gastrocnemius and soleus muscles. Normalized to tibialis mass, specific twitch tension (tension/g muscle) was reduced on the contralateral side at day 4 and on the toxin-injected side at day 16 in relation to saline controls. At day 16, an increased sensitivity to atracurium was seen on the toxin-injected side, evidenced as a decreased ED_{50} (0.23 mg/kg [0.13, 0.33] vs 0.72 mg/kg [0.63, 0.82], $P < 0.05$) and a lower infusion rate (38 μL/kg/min [32, 43] vs135 μL/kg/min [126, 144], $P < 0.05$), together with a reduced plasma concentration requirement of atracurium (0.5 μg/mL [0.4, 0.7] vs 4.5 μg/mL [3.8, 5.2], $P < 0.05$) to achieve a steady state 50% reduction in baseline (absolute) twitch tension. ED_{50} of atracurium was also decreased on the contralateral side at day 16 in relation to saline controls. The nAChRs in the tibialis were increased on the toxin-injected side to 123 fmol/mg [115, 131] vs 28 fmol/mg [25, 29] ($P < 0.05$) in time-matched saline-injected controls at day 4 and to 378 [341, 413] vs 27 fmol/mg [25, 29] ($P < 0.05$) at day 16.
CONCLUSIONS: Botulinum toxin has local and distant effects on muscle. The decrease in specific twitch tension indicates that the muscle atrophy alone cannot explain the functional changes; neuromuscular transmission is also impaired. An increased sensitivity to atracurium on the toxin-injected side, despite up-regulation of nAChRs, seems unique to botulinum toxin.

人體血清白蛋白中阿片類藥物的結合位點

Opioid Binding Sites in Human Serum Albumin

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背景：人體血清白蛋白（HSA）是阿片類藥物的一個重要載體，但結合位點的位置仍然不明。在本研究中，我們利用多種生物化學和生物物理的技術來說明阿片類藥物與 HSA 之間相互作用的特點：（a）結合位點的位置；（b）是否納洛酮與嗎啡佔據同樣的結合位點；（c）是否阿片受體激動劑與全身麻醉藥佔據同樣的結合位點。
方法：我們應用洗脫色普法來測定總體的相互作用，應用色氨酸內螢光來確定阿片類藥物和 HSA 的局部相互作用。研究中應用等溫線滴定量熱法進行的競爭研究來確定阿片受體激動劑、拮抗劑及全身麻醉藥結合位點的重疊。一種計算自動對接的技術用於預測可能的結合位點以及評價分離研究的結果。
結果：在進行過洗脫色普法固化的 HSA 上，納洛酮、嗎啡和芬太尼的停留時間延長，但短於異丙酚。納洛酮所致的色氨酸螢光性的抑制不會被嗎啡或者芬太尼影響。丙泊酚和氟烷與 HSA 結合的測熱性熱特點有顯著改變，但是與嗎啡、納洛酮或者芬太尼不一致。與直接的結合研究一致，對接的結果顯示阿片類藥物與全身麻醉藥佔據同樣的位點；研究發現一個納洛酮的獨特的結合位點，它靠近 HSA 中唯一的色氨酸，而此位點不與嗎啡共用。
結論：與丙泊酚相比，阿片類藥物與 HSA 的相互作用較弱。納洛酮在 HSA 上有一個不與阿片類激動劑共用的獨特的結合位點。阿片類藥物和全身麻醉藥在 HSA 上佔用同樣的結合位點。
（毛祖旻 譯 馬皓琳 李士通 校）

BACKGROUND: Human serum albumin (HSA) is an important carrier for opioids. However, the locations of the binding sites remain unclear. In the present study, we have characterized opioid–HSA interactions using multiple biochemical and biophysical techniques to reveal: (a) the location of the binding site(s); (b) whether naloxone shares the binding site with morphine; and (c) whether opioid agonists share their binding site(s) with general anesthetics.
METHODS: Elution chromatography to determine the global interactions and tryptophan intrinsic fluorescence to determine the localized interactions of opioids with HSA were used. Competition studies using isothermal titration calorimetry were used to determine the overlap of binding site(s) among opioid agonists, antagonists, and general anesthetics. An automatic docking calculation was used to predict the possible binding sites and to assess findings of the solution studies.
RESULTS: For elution chromatography with immobilized HSA, the retention times of naloxone, morphine, and fentanyl were prolonged but shorter than that of propofol. The inhibition of tryptophan fluorescence by naloxone was not affected by morphine or fentanyl. The calorimetric heat profiles of propofol and halothane interaction with HSA were changed significantly, but not equally by morphine, naloxone, or fentanyl. Consistent with direct binding studies, docking results demonstrated that opioids share sites with general anesthetics; a distinct binding site for naloxone was revealed near the sole tryptophan in HSA that is not shared with morphine.

CONCLUSIONS: The interaction of opioids with HSA is weak in comparison with propofol. Naloxone has a distinct binding site in HSA not shared with opioid agonists. Opioids share binding sites with general anesthetics in HSA.

通過 I-gel™ 聲門上通氣道與 Fastrach™ 喉罩行氣管插管的比較：一項隨機對照試驗

Tracheal Intubation Through the I-gel™ Supraglottic Airway Versus the LMA Fastrach™: A Randomized Controlled Trial

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背景：i-gel™ 是一種不需要充氣氣囊即可實現長時間通氣的聲門上通氣道。這樣的設計爲氣管導管創造出一條無障礙的通道，先前已有研究證實該裝置有利於對準聲門開口。在這項前瞻性隨機試驗中，我們比較了使用 i-gel 以及 Fastrach™ 喉罩（LMA）進行盲插的成功率。
方法：160 例需要全麻和氣道管理的病人被隨機應用 i-gel 或 Fastrach LMA 行氣管插管。全麻誘導後置入所在組別的裝置，保證充足的肺通氣，然後嘗試盲插。評估第一次嘗試以及總的氣管插管成功率，記錄氣管插管次數。
結果：每個實驗組收集 80 例病人。69%的 i-gel 以及 74%的 LMA Fastrach 組在第一次氣管插管嘗試中即獲得成功(差別的 95%可信區間 [CI], −9%~19%, *P* = 0.60)。 i-gel 組總的氣管插管成功率低於 LMA Fastrach 組(73%比 91%, 差異的 95%可信區間, 7%~31%, *P* < 0.0001)。
結論：對於第一次氣管插管盲插嘗試，i-gel 和 LMA Fastrach 的成功率相當。然而當第一次盲插嘗試不成功時，在後續嘗試中應用 i-gel 並不明顯增加氣管插管的成功率。LMA Fastrach 可以產生更高的總體插管成功率。
（瞿亦楓 譯 李士通 馬皓琳 校）
BACKGROUND: The i-gel™ is a supraglottic airway device not requiring inflation of a cuff for lung ventilation. Its design allows for unobstructed passage of a tracheal tube and previous studies have demonstrated a favorable alignment with the glottic inlet. In this prospective randomized study, we compared the success rate of blind tracheal intubation using the i-gel and the laryngeal mask airway (LMA) Fastrach™.
METHODS: One hundred sixty patients requiring general anesthesia and airway management were randomized to tracheal intubation using the i-gel or the LMA Fastrach. After induction of general anesthesia, the allocated device was inserted and adequate lung ventilation was confirmed. Blind tracheal intubation was then attempted. First attempt and overall tracheal intubation success rates were evaluated and tracheal intubation times were measured.
RESULTS: Eighty patients were recruited in each study group. Successful tracheal intubation was obtained on the first attempt in 69% of patients with the i-gel and 74% of patients with the LMA Fastrach (95% confidence interval [CI] of difference, −9% to 19%, *P* = 0.60). The overall

intubation success rate was lower using the i-gel than it was using the LMA Fastrach (73% vs 91%, 95% CI of difference, 7% to 31%, $P < 0.0001$).
CONCLUSIONS: On first attempts, successful blind tracheal intubation was obtained at comparable rates using the i-gel and the LMA Fastrach. However, when the first attempt was unsuccessful, subsequent attempts through the i-gel did not significantly increase tracheal intubation success rate. The LMA Fastrach yielded a higher overall intubation success rate.

傷口連續輸注羅呱卡因與硬膜外注射嗎啡用於剖宮產術後鎮痛的比較：一項隨機對照試驗

Ropivacaine Continuous Wound Infusion Versus Epidural Morphine for Postoperative Analgesia After Cesarean Delivery: A Randomized Controlled Trial

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背景：在手術傷口輸注局部麻醉藥在術後疼痛的多模式管理中很有幫助。我們假設剖宮產術後在傷口輸注局麻藥比硬膜外注射嗎啡鎮痛的鎮痛效果更好。
方法：本項評估者設盲的隨機試驗納入物件爲擬擇期行剖宮產術的足月妊娠健康婦女。患者隨機分組接受鎮痛，通過置於傷口筋膜下的多孔導管輸注羅呱卡因（5mL/h，2mg/mL），或硬膜外間斷注射嗎啡（2mg/12h）鎮痛。兩種鎮痛方案均持續 48 小時。主要指標是術後 24 小時靜息狀態的疼痛，根據口頭疼痛等級評分（0-10 級）。疼痛強度、解救的鎮痛藥消耗量和副作用分別在剖宮產術後 2、6、24 和 48 小時由一名不知分組情況的觀察人員進行評估。出院後 3 個月，評估患者滿意度、殘留疼痛、手術傷口併發症。
結果：58 名婦女參加了本項試驗。24 小時的靜息口頭疼痛等級評分的中位數，在連續輸注組爲 0（四分位數間距：0-0），在硬膜外嗎啡組爲 3（四分位數間距：2-3；95%可信區間差異：1-3 單位，$P < 0.001$）。2、6、48 小時的靜息疼痛評分中位數和 2、6、24 小時運動疼痛評分中位數，連續傷口輸注組也低於硬膜外嗎啡組($P < 0.001$)。傷口輸注組的噁心、嘔吐、瘙癢和尿瀦留的發生率明顯更低，且腸功能恢復時間較短。在此 48 小時隨訪評價過程中，僅與鎮痛方案相關的護士訪視次數的中位數，在連續傷口輸注組爲 1（四分位數間距：1-2），在硬膜外嗎啡組爲 8（四分位數間距 7-10）（差異的 95%可信區間：6-8 次訪視；$P < 0.001$）。
結論：在剖宮產術後 48 小時連續傷口輸注羅呱卡因，與硬膜外嗎啡鎮痛相比，可產生更好的鎮痛效果，副作用發生率更低，護理需求更少，住院時間更短。
（陳彬彬譯 馬皓琳 李士通校）

BACKGROUND: The infusion of local anesthetic in the surgical wound is helpful in the multimodal management of postoperative pain. We hypothesized that local anesthetic wound infusion after cesarean delivery would provide better pain control than epidural morphine analgesia.
METHODS: Healthy, term women scheduled for elective cesarean delivery were included in this assessor-blinded, randomized study. Patients were randomly assigned to receive analgesia through a multiorifice wound catheter placed below the fascia and connected to a 5 mL/h ropivacaine 2 mg/mL infusion or an epidural bolus of morphine 2 mg every 12 hours. Both

analgesic regimens were continued for 48 hours. The primary outcome was pain at rest at 24 hours postoperatively using the verbal rating score for pain (0–10 scale). Pain intensity, rescue analgesia consumption, and side effects were assessed at 2, 6, 24, and 48 hours after cesarean delivery by an observer blinded to group allocation. Three months after discharge, patient satisfaction, residual pain, and surgical wound complications were assessed.
RESULTS: Fifty-eight women participated in the study. At 24 hours, the median rest verbal rating score for pain was 0 (interquartile range: 0–0) in the continuous infusion group and 3 in the epidural morphine group (interquartile range: 2–3; 95% confidence interval of difference: 1–3 units; $P < 0.001$). The median scores of the 2-, 6-, and 48-hour pain assessments at rest were also lower in the continuous wound infusion group than in the epidural morphine group, and at 2, 6, and 24 hours with movement ($P < 0.001$). The incidence of nausea, vomiting, pruritus, and urinary retention was significantly lower in the wound infusion group and time to recovery of bowel function was shorter. During the 48-hour follow-up evaluation, the median number of nurse visits attributed exclusively to the analgesic regimen was 1 (interquartile range: 1–2) in the continuous wound infusion group and 8 (interquartile range: 7–10) in the epidural morphine group (95% confidence interval of difference: 6–8 visits; $P < 0.001$).
CONCLUSIONS: Continuous wound infusion with ropivacaine for 48 hours after cesarean delivery was associated with better analgesia, a lower incidence of side effects, less need for nursing care, and shorter duration of stay compared with epidural morphine analgesia.

Salvinorin A 預處理通過細胞外信號調節激酶/促分裂原活化蛋白激酶（ERK/MARK）通路保護小豬腦缺氧/缺血性損傷後的腦血管自身調節功能

Salvinorin A Pretreatment Preserves Cerebrovascular Autoregulation After Brain Hypoxic/Ischemic Injury via Extracellular Signal-Regulated Kinase/Mitogen-Activated Protein Kinase in Piglets

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背景：嬰兒先天性心臟病手術中的腦缺氧/缺血現象並非罕見，並且能引起餘生持久的嚴重神經殘疾。缺氧/缺血所致的腦血管功能障礙被認爲是神經學損傷的重要原因，且尚未發現有藥物能夠預防。一般認爲分裂原活化蛋白激酶(MAPK)，包括細胞外信號調節激酶(ERK)、c-Jun 氨基末端激酶(JNK)以及 p38 在缺血預處理中起重要作用。我們探究唯一的天然非阿片類 κ 受體激動劑 salvinorin A 預處理是否能通過 MAPK 途徑保護軟腦膜動脈的自身調節作用。
方法：在給予或不給予 ERK 上游蛋白激酶抑制劑 U0126、JNK 抑制劑 sp600125 或 p38 抑制劑 sb203580 的情況下，於缺氧和缺血前後，監測裝備有封閉的頭顱視窗的小豬軟腦膜動脈對低血壓和高碳酸血症的反應。salvinorin A 處理組動物在缺氧/缺血前 30 min 給予 salvinorin A (10 μg/kg IV)。在注射 salvinorin A 之前和注射後 30 min 收集腦脊液樣本用於檢測 MAPK。採用重複測量方差分析法分析資料(n = 5)。
結果：缺氧/缺血處理後，軟腦膜動脈對低血壓和高碳酸血症的舒張反應變得遲鈍，但是 salvinorin A 預處理組則得到保護。U0126 而非 sp600125 和 sb203580 抵消 salvinorin A 對

低血壓和高碳酸血症的腦血管自身調節的保護作用。salvinorin A 預處理組動物腦脊液中 pERK/ERK 比值明顯增加，且能被 U0126 抑制。
結論：在小豬模型中，Salvinorin A 預處理通過 ERK 通路保護缺氧/缺血後軟腦膜血管對低血壓和高碳酸血症的自身調節功能。
（江繼宏 譯 馬皓琳 李士通 校）

BACKGROUND: Cerebral hypoxia/ischemia during infant congenital heart surgery is not uncommon and may induce devastating neurologic disabilities persistent over the lifespan. Hypoxia/ischemia-induced cerebrovascular dysfunction is thought to be an important contributor to neurological damage. No pharmacological agents have been found to prevent this. Mitogen activated protein kinase (MAPK), including extracellular signal regulated kinase (ERK), c-Jun-*N*-terminal kinase, and p38, is thought to contribute to ischemic preconditioning. We investigated whether pretreatment with salvinorin A, the only natural nonopioid κ receptor agonist, could preserve autoregulation of the pial artery via MAPK.
METHODS: The response of the pial artery to hypotension and hypercapnia was monitored in piglets equipped with a closed cranial window before and after hypoxia and ischemia in the presence or absence of U0126, an inhibitor for the protein kinase upstream of ERK, sp600125, an inhibitor of c-Jun-*N*-terminal kinase or sb203580, an inhibitor of p38. Salvinorin A (10 μg/kg IV) was administered 30 minutes before hypoxia/ischemia in salvinorin-treated animals. Cerebrospinal fluid samples were collected before and 30 minutes after salvinorin A administration for the measurement of MAPK. Data (n = 5) were analyzed by repeated-measures analysis of variance.
RESULTS: Pial artery dilation to hypercapnia and hypotension was blunted after hypoxia/ischemia but preserved well by pretreatment with salvinorin A. U0126, but not sp600125 or sb203580, abolished the preservative effects of salvinorin A on cerebral vascular autoregulation to hypotension and hypercapnia. The ratio of pERK/ERK in cerebrospinal fluid increased significantly in salvinorin-treated animals, which was inhibited by U0126.
CONCLUSIONS: Salvinorin A pretreatment preserves autoregulation of the pial artery to hypotension and hypercapnia after hypoxia/ischemia via ERK in a piglet model.

下腹部手術病人在超聲引導下行腹直肌鞘阻滯後血漿羅呱卡因濃度

Plasma Ropivacaine Concentrations After Ultrasound-Guided Rectus Sheath Block in Patients Undergoing Lower Abdominal Surgery

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腹直肌鞘阻滯可以爲正中切口的病人提供術後鎮痛。但是關於此阻滯中局部麻醉藥的藥代動力學的相關資訊較少。在這項研究中，我們詳細描述了此阻滯後羅呱卡因濃度的時間過程。39 名擇期行下腹部手術的病人被分成 3 組接受不同濃度的羅呱卡因腹直肌鞘阻滯。血漿峰濃度呈劑量依賴性，達到血漿峰濃度的時間沒有明顯差別。現有資料同時提示羅呱卡因腹直肌鞘阻滯後與其他間隔阻滯相比表現爲較慢的吸收動力學。
（張怡譯 馬皓琳 李士通校）

A rectus sheath block can provide postoperative analgesia for midline incisions. However, information regarding the pharmacokinetics of local anesthetics used in this block is lacking. In this study, we detail the time course of ropivacaine concentrations after this block. Thirty-nine patients undergoing elective lower abdominal surgery were assigned to 3 groups receiving rectus sheath block with 20 mL of different concentrations of ropivacaine. Peak plasma concentrations were dose dependent, and there were no significant differences in the times to peak plasma concentrations. The present data also suggested a slower absorption kinetics profile for ropivacaine after rectus sheath block than other compartment blocks.