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多極血凝集監測儀 (Multiplate®)測定體外迴圈患者低溫和魚精蛋白誘導的血小板功能障礙

Point-of-Care Assessment of Hypothermia and Protamine-Induced Platelet Dysfunction with Multiple Electrode Aggregometry (Multiplate®) in Patients Undergoing Cardiopulmonary Bypass

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背景：體外迴圈（CPB）之後出現凝血疾病較爲常見，且血小板功能障礙是失血過多的主要原因。低溫可能會加劇血小板功能障礙。本研究通過多極血凝集監測儀 (Multiplate®; Verum Diagnostica GmbH, Munich, Germany)測定來評估深低溫期間及之後血小板功能。
方法：20 例因慢性肺動脈高壓擬行肺動脈內膜切除術的患者需在體外迴圈期間降溫至 20℃，此深低溫停迴圈模式便於手術操作。在體外迴圈期間及之後共 12 個時間點對全血細胞樣本進行血小板凝集功能進行分析。分別在患者即時體溫(AUC-CT)和複溫至 37℃(AUC-37)狀態下，通過凝血酶受體激發血小板凝集（TRAPtest)。此外，經魚精蛋白 20 μg (0.067 μg/μL)進行體外培養 2min 後，在 2 個時間點檢測樣本的血小板凝集功能。結果用曲線下面積（AUC）表示。
結果：低溫導致血小板凝集功能顯著下降，隨著體溫降至 20℃時 AUC-CT 也到達最低點--20.5（95%置信區間 CI 8.9-32.1）。當體溫≤28℃時，AUC-CT 與基礎值 (92.8, 95% CI 82.5-103.1)存在顯著差異($P < 0.001$)，然而 AUC-37 的變化僅在最低溫時較爲顯著(59.4, 95% CI 41.3-77.4)。當複溫至 36℃，AUC-CT 和 AUC-37 分別恢復至 67.6(95% CI 53.9-81.3) 和 71.1(95% CI 52.5-90.8)。從 28℃開始降溫至升溫到達 24℃期間（包括 28℃和 24℃），AUC-CT 平均值顯著低於 AUC-37 平均值；降溫時 AUC-CT 和 ACU-37 之間的體溫關係顯著不同(回歸係數 4.7 [95% CI 4.2-5.2] vs 1.3 [95% CI 0.7-1.9]；$P < 0.0001$）。在給予魚精蛋白後，平均凝集 AUC 均顯著下降，分別爲 38.2 (95% CI −27.9 - −48.5; $P < 0.001$) 和 44.5 (95% CI −58.5 - −30.5; $P < 0.001$)。同樣當給予肝素後和 CPB 結束時，離體樣本加入魚精蛋白可導致平均凝集分別下降 35.1 (95% CI −71.0-0.8; $P = 0.055$)和 56.5 (95% CI −94.5 - −18.5; $P = 0.005$) 。
結論：通過多極血凝集監測儀 (Multiplate)來評估血小板凝集功能，發現全身深低溫時其受到嚴重影響。複溫後凝集功能部分恢復，且與 CPB 期間血小板凝集功能普遍下降截然不同。魚精蛋白同樣可在活體或離體狀態下顯著降低血小板凝集。
（黃萍　譯　陳傑　校）

BACKGROUND: Coagulopathy is common after cardiopulmonary bypass (CPB), and platelet dysfunction is frequently considered to be a major contributor to excessive bleeding. Exposure to hypothermia may exacerbate the platelet function defect. We assessed platelet function during and after deep hypothermia with multiple electrode aggregometry (Multiplate®; Verum Diagnostica GmbH, Munich, Germany).
METHODS: Twenty adult patients undergoing pulmonary endarterectomy for chronic pulmonary hypertension were cooled on CPB to 20℃ and deep hypothermic arrest was used to facilitate surgery. We analyzed platelet aggregation in whole blood samples at 12 measuring points during and after the procedure. Platelet aggregation was stimulated via the thrombin receptor (TRAPtest) at the patient's actual body temperature (AUC-CT) and after rewarming the samples to 37℃ (AUC-37). In addition, we tested samples at 2 time points after 2 minutes of in vitro incubation with 20 μg protamine (0.067 μg/μL). Results are expressed as area under the aggregation curve (AUC).

RESULTS: Cooling resulted in a marked decrease of platelet aggregation to a minimum AUC-CT of 20.5 (95% confidence interval [CI] 8.9–32.1) at 20°C body temperature. AUC-CT was significantly different from baseline (92.8, 95% CI 82.5–103.1) for temperatures of ≤28°C ($P < 0.001$), whereas the change in AUC-37 only became significant at the lowest body temperature (59.4, 95% CI 41.3–77.4). After rewarming to 36°C, AUC-CT and AUC-37 had recovered to 67.6 (95% CI 53.9–81.3) and 71.7 (95% CI 52.5–90.8), respectively. The mean AUC-CT was significantly lower than the mean AUC-37 from cooling at 28°C to warming at 24°C inclusive, and the relationship with temperature during cooling was significantly different between AUC-CT and AUC-37 (regression coefficients 4.7 [95% CI 4.2–5.2] vs 1.3 [95% CI 0.7–1.9]; $P < 0.0001$). After administration of protamine, mean aggregation decreased significantly for both measurements by 38.2 (95% CI −27.9 to −48.5; $P < 0.001$) and 44.5 (95% CI −58.5 to −30.5; $P < 0.001$), respectively. Similarly, adding protamine in vitro resulted in a decrease of mean aggregation by 35.1 (95% CI −71.0 to 0.8; $P = 0.055$) when measured after administration of heparin, and 56.5 (95% CI −94.5 to −18.5; $P = 0.005$) at the end of CPB.
CONCLUSION: Platelet aggregation, assessed by multiple electrode aggregometry (Multiplate), was severely affected during deep, whole-body hypothermia. This effect was partially reversible after rewarming, and was distinct from a general decline of platelet aggregation during CPB. Protamine also caused a significant decrease in platelet aggregation in vivo and in vitro.

技術交流：來自外科磁性手術單對心臟起搏器的磁性干擾

Technical Communication: Magnetic Interference of Cardiac Pacemakers from a Surgical Magnetic Drape

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無菌磁性手術單被頻繁用於需要在無菌區固定金屬器械的手術。磁性區域可能潛在影響心血管植入性電子儀器如起搏器和植入除顫儀的功能。本研究評估磁性手術單對起搏器功能的潛在磁性干擾。共 50 例患者在心臟門診就診時，將一塊含有 70 個磁鐵的手術單近中心部分放置於他們的起搏器之上，在證實起搏器出現磁性干擾後，將手術單向尾側拉，每次 3cm 直至干擾消失。如果無干擾，則將手術單折疊置於起搏器上方。同時檢測維持對起搏器的磁性干擾所需要的磁鐵數量。在 47 例患者中觀察到存在對起搏器的磁性干擾（94%）：35 例的手術單不需折疊而 12 例手術單經折疊。手術單未經折疊就發生磁干擾的患者體重比那些沒有磁干擾的患者小（68±15 kg 和 81±19 kg; P = 0.016)。54%患者起搏器磁性干擾在手術單向尾側移動 3cm 後消失。在向尾側移動 15cm 後，沒有起搏器出現磁性干擾。磁性手術單可能導致心臟起搏器出現磁干擾，而干擾在手術單向尾側拉 15cm 後消失。磁干擾可能更容易在低體重病人中發生，在對裝有心血管植入性電子儀器的病人使用磁性手術單時應該仔細檢測心率和心電圖，注意有無非同步起搏的發生。
（瞿亦楓　譯　陳傑　校）

Sterile magnetic drapes are frequently used during surgery to hold metal instruments on the sterile field. Magnetic fields may potentially interfere with the function of cardiovascular implantable electronic devices such as pacemakers and implantable cardioverter defibrillators. In

this study, we evaluated the potential magnetic interference of magnetic drapes on pacemaker function. A magnetic drape with 70 magnets was placed with its approximate center over the pacemaker of 50 patients during their visit to the cardiology clinic. In those pacemakers that demonstrated magnetic interference, the drape was pulled caudally in 3-cm increments until the interference ceased. If there was no interference, the drape was folded in 2 over the pacemaker. The number of magnets necessary to maintain magnetic interference with the pacemaker was also tested. Magnetic interference was observed in the pacemakers of 47 (94%) patients: 35 with the unfolded drape and another 12 with the folded drape. Patients whose pacemakers had interference with the unfolded drape weighed less (68±15 kg vs 81±19 kg; $P = 0.016$) than those who had no interference. In 54% of patients, magnetic interference ceased when the drape was pulled 3 cm caudally and at 15 cm, no pacemaker had magnetic interference. Magnetic drapes may cause magnetic interference with cardiac pacemakers, and this interference ceases at a caudal distance of 15 cm. Magnetic interference seems more likely in patients with lower body weight. Careful monitoring of the pulse and electrocardiogram for asynchronous pacing activity should be considered when magnetic drapes are used in patients with cardiovascular implantable electronic devices.

在丙泊酚－瑞芬太尼麻醉過程中複合變異指數對標準化傷害刺激的反應

The Response of the Composite Variability Index to a Standardized Noxious Stimulus During Propofol-Remifentanil Anesthesia

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背景：最近複合變異指數（CVI）被用於對傷害進行量化研究。該指數衍生自腦電雙頻指數（sBIS）和肌電圖（SEMG）的標準差值。本研究主要目的爲比較一個傷害性刺激前後CVI的變化。次要目的爲考察瑞芬太尼對 CVI 的影響，並測試了在不同瑞芬太尼濃度情況下 CVI 預測傷害性刺激後病人體動的能力。此外在傷害性刺激後，比較 CVI 與其他臨床變數（BIS，sBIS，sEMG，心率[HR]和收縮壓[BPsys]）的增幅差異。
方法：24 名無心臟疾病史的患者納入研究。使用靶控輸注丙泊酚進行麻醉誘導。在增加或減少瑞芬太尼效應室濃度(Ce_{remi})狀態下，對尺神經應用一個標準化的傷害性電刺激（50HZ，70mA，30s）。研究 CVI，BIS，sBIS，HR 和收縮壓值的基線和受刺激後的變化。使用預測概率（PK）來評價傷害性刺激後各參數對體動的預測能力。
結果：在瑞芬太尼的效應室濃度爲 0,1,2 或者 3ng/ml 時，給予一個傷害性刺激後所有參數（除了收縮壓）均顯著增加。刺激後最高參數值與體動之間的相關性表現如下：心率 P_K =0.81，肌電圖 P_K =0.78，複合變異指數 P_K =0.72（複合變異指數兩兩差異不顯著）。Δ 肌電或 ΔCVI（刺激後參數值減去基線值）與體動之間的相關性（P_K 分別 = 0.76 和 0.75）較 ΔHR 與體動間的相關性（P_K＝0.53）更高（分別爲：P = 0.008 和 P = 0.01）。ROC 分析表明 ΔCVI 和 ΔSEMG 的體動閾值分別爲> 0.39（敏感度 0.71，特異性 0.74）和> 0.31（敏感度 0.68，特異性 0.78）。.
結論：在可接受的敏感度和特異性前提下，ΔsEMG 和 ΔCVI 應用于癱瘓患者有助於識別鎮痛不足。神經阻滯對 CVI 的深遠影響有待進一步研究。

（鄭華容　譯　陳傑　校）

BACKGROUND: Recently the Composite Variability Index (CVI) was developed to quantify nociception. This index is derived from the standard deviations (s) of the Bispectral Index (sBIS) and the electromyogram (sEMG). The primary aim of our study was to compare CVI before and after a noxious stimulus. As secondary end points, we investigated the influence of remifentanil on the CVI and tested the ability of the CVI to indicate patient movement after a noxious stimulus under changing remifentanil concentrations. Furthermore, we measured the increase in CVI after a noxious stimulus in comparison to other clinical variables (BIS, sBIS, sEMG, heart rate [HR], and systolic blood pressure [BP_{sys}]).

METHODS: Twenty-four patients without a history of cardiac disease were investigated. Anesthesia was induced with propofol administered by target-controlled infusion. A standardized noxious electrical stimulus was applied (50 Hz, 70 mA, 30 seconds) to the ulnar nerve at increasing or decreasing remifentanil effect-compartment concentrations (Ce_{remi}). Changes in baseline and poststimulus CVI, BIS, sBIS, sEMG, HR, and BP_{sys} were investigated. Parameters' ability to indicate movement after a noxious stimulus was evaluated with the prediction probability (P_K).

RESULTS: All investigated parameters (except BP_{sys}) increased significantly after a noxious stimulus at 0, 1, 2, or 3 ng·mL^{-1} Ce_{remi}. The association between poststimulus maximal parameters and movement were P_K = 0.81 for HR, P_K = 0.78 for sEMG, and P_K = 0.72 for CVI (pairwise difference to CVI statistically nonsignificant). The association between ΔsEMG or ΔCVI (poststimulus value minus baseline value) and movement was significantly higher (P_K = 0.76 and 0.75, respectively) compared with ΔHR (P_K = 0.53) (P = 0.008 and P = 0.01, respectively). Receiver operating characteristic analysis revealed a threshold value for movement for ΔCVI of >0.39 (sensitivity of 0.71, specificity of 0.74) and for ΔsEMG of >0.31 (sensitivity of 0.68, specificity of 0.78).

CONCLUSION: In paralyzed patients, ΔsEMG and ΔCVI might help identify inadequately low levels of analgesia with an acceptable sensitivity and specificity. The impact of profound neuromuscular block on the CVI should be investigated in further studies.

通過 Fastrach 型喉罩使用 VivaSight Single Lumen™進行氣管插管的可行性研究：一項 50 例的初步報告

A Feasibility Study Using the VivaSight Single Lumen™ to Intubate the Trachea Through the Fastrach Laryngeal Mask Airway: A Preliminary Report of 50 Cases

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背景：VivaSight Single Lume™(SL)是一種新型氣管導管，在其末端有攝像機和光源用於持續觀察氣道。此項研究驗證使用 VivaSight SL 通過 Fastrach 型喉罩(FT-LMA)進行氣管插管的可行性。

方法： 50 名正常氣道，擬在全麻下行擇期手術，需氣管插管的患者被納入研究。插入 FT-LMA 後一旦通氣量足夠，則在可視條件下將 VivaSight SL 通過 FT-LMA 插入氣管。以下標準用於對喉部暴露情況進行評分：1 級：勺狀軟骨和聲門完全可見；2 級：會厭，勺狀軟骨或聲門開放部分可見，聲帶結構難以觀察；3 級：僅能看見一個開放的暗區；4 級：不能看到喉部任何部分。
結果： 49 例患者中首次嘗試就成功置入 FT-LMA。研究中僅一例因 2 次置入 FT-LMA 嘗試通氣失敗而被剔除。49 例成功完成 VivaSight-SL 插管（95%可信區間爲 0.89—0.99）,47 例在首次嘗試時成功（95%可信區間爲 0.83–0.98），2 例在第二次嘗試時成功。使用 FT-LMA 建立有效通氣所需時間爲 28.8 ± 5 秒（均數±標準差）。VivaSight-SL 是否正確插入通過直視隆突來確認。從拿起 VivaSight-SL 進行插管至呼末二氧化碳出現的時間定義爲成功氣管插管時間爲 45 ± 7 秒。將 VivaSight-SL 沿 FT-LMA 所建立的通道插入氣管時，插管條件如下：18 例患者爲 1 級可見，18 例爲 2 級，4 例爲 3 級，9 例爲 4 級。
結論：通過 FT-LMA 行 VivaSight-SL 氣管插管具有高（單次）成功率，使得這項技術具有前景和可行性。
（諸琳婕　譯　陳傑　校）

BACKGROUND: The VivaSight Single Lumen™ (SL) is new endotracheal tube with a video camera and a light source in the tip allowing continuous visual observation of the airway. In this study, we checked the feasibility of endotracheal intubation with a VivaSight-SL through the Fastrach Laryngeal Mask Airway® (FT-LMA).
METHODS: We studied 50 patients with normal airways, scheduled for elective surgery during general anesthesia requiring endotracheal intubation. The FT-LMA was inserted and once adequate ventilation was achieved, the VivaSight-SL was passed through the FT-LMA into the trachea under visual control. The following criteria were used to score the laryngeal view: grade 1: full view of the arytenoids and glottis; grade 2: epiglottis, arytenoids or glottic opening are partly visible, the structure of cords is difficult to see; grade 3: dark areas indicating an open space; and grade 4: no part of the larynx can be identified.
RESULTS: The FT-LMA was placed successfully in 49 patients at the first attempt. One patient was excluded from the study after 2 failed attempts to ventilate with the FT-LMA. All 49 patients were successfully intubated with the VivaSight-SL, (95% confidence interval [CI] 0.89–0.99), 47 patients at the first attempt (95% CI, 0.83–0.98) and 2 patients at the second attempt. (95% CI, 0.004–0.13). The time to achieve an effective airway with the FT-LMA was 15.4 ± 6 (mean ± SD) seconds. The time to achieve a laryngeal view with the VivaSight-SL was 28.8 ± 5 seconds. Correct position of the VivaSight-SL was confirmed with visualization of the carina. Time of successful intubation with VivaSight-SL from picking up the VivaSight-SL to observing a end-tidal CO_2 curve was 45 ± 7 seconds. After introducing the VivaSight-SL through the intubating channel of the FT-LMA, a grade 1 view was obtained in 18 patients, grade 2 in 18 patients, a grade 3 in 4 patients, and grade 4 in 9 patients.
CONCLUSION: The high first-attempt intubation success rate using the VivaSight-SL to intubate the trachea through a FT-LMA makes this technique an attractive and promising concept.

套囊充氣法對喉鏡直視下經鼻插管的輔助作用：三種氣管導管的比較

Cuff Inflation-Supplemented Laryngoscope-Guided Nasal Intubation: A Comparison of Three Endotracheal Tubes

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背景：經鼻插管時，軟氣管導管比硬 PVC 導管更難以在口咽部進行引導。套囊充氣法在經鼻盲插管中被用於引導 PVC 管進入喉部入口，但該方法在喉鏡直視下經鼻插管卻未經嘗試。本研究評估套囊充氣法對三種不同硬度的氣管導管在經鼻插管中的引導作用。同時評估和比較了在套囊充氣法輔助喉鏡直視下經鼻插管時這些導管的可操縱性和鼻腔損傷的發生率。
方法：162 名接受經鼻氣管插管的成人按導管類型隨機被分爲傳統 PVC（n=54），鋼絲加強型（WR; n=54），或尖端矽樹脂/鋼絲加強型（SWR; n=54）三組。插管難度分別在從鼻腔進入口咽部，從口咽部進入喉入口（套囊充氣法，如需要）及從喉入口進入氣管三個階段進行評估。另一非知情觀察者評估鼻腔損傷發生率。
結果：所有導管都被成功插入氣管，162 例中的 71 例可以在套囊不充氣的情況下將導管從口咽部插入喉部入口，剩下 91 例無法在套囊不充氣情況下將導管送入喉部入口，而其中 86 例採用套囊充氣法後則成功。因此，總共 157 例在採用套囊充氣法情況下使導管插入喉入口（總成功率[157]和非套囊充氣法成功率[71]差異的 95%可信區間是 53%[45%-61%]）。剩下的 5 例不得不在 Magill 鉗幫助下將導管插入。SWR 管的鼻出血發生率最低（比率差異 95%可信區間]，SWR 對 PVC 爲 27%[8-45%]，SWR 對 WR 爲 20%[1-38%]，WR 對 PVC 爲 7%[-12-26%]）
結論：套囊充氣技術均能改善三種不同硬度的氣管導管在喉鏡直視下經鼻插管的成功率，在套囊充氣技術的幫助下，在經鼻插管的可操縱性和減少鼻腔損傷方面，SWR 導管似乎比 PVC 和 WR 導管更具優勢。
（詹愷誕　譯　陳傑　校）
BACKGROUND: Softer endotracheal (ET) tubes are more difficult to navigate in the oropharynx than the stiffer polyvinyl chloride (PVC) tubes during nasotracheal intubation (NTI). Cuff inflation has been used to guide PVC tubes into the laryngeal inlet during blind NTI, but it has not been tested when performing NTI under direct laryngoscopic guidance. We assessed the role of cuff inflation in improving oropharyngeal navigation of 3 ET tubes of varying stiffness during direct laryngoscope-guided NTI. Simultaneously, we also assessed and compared the nasotracheal navigability and incidence of nasal injury with these ET tubes during cuff inflation-supplemented, laryngoscope-guided NTI.
METHODS: One hundred sixty-two adults were randomized to undergo NTI with either a conventional PVC (*n* = 54), wire reinforced (WR; *n* = 54) or a silicone-tipped WR (SWR; *n* = 54) ET tube. Ease of insertion of these tubes was assessed during passage from nose into oropharynx, from oropharynx into laryngeal inlet aided by cuff inflation if needed, and from laryngeal inlet into trachea. Nasal morbidity was assessed by a blinded observer.
RESULTS: All ET tubes could be inserted into the trachea. Seventy-one of 162 ET tubes could be inserted from the oropharynx into the laryngeal inlet without cuff inflation. Eighty-six of the remaining 91 tubes that did not enter the laryngeal inlet without cuff inflation could be inserted when using the cuff inflation technique. Thus, a total of 157 ET tubes could be inserted into the laryngeal inlet with cuff inflation (95% confidence interval of difference of proportions between

total number of tubes passed [157] and those without cuff inflation [71]: 53% [45%–61%]). The remaining 5 tubes had to be inserted with the help of Magill forceps. The incidence of epistaxis was lowest with the SWR tube (difference of proportions [95% confidence interval] SWR versus PVC 27% [8%–45%]; SWR versus WR 20% [1%–38%]; WR versus PVC 7% [−12% to 26%]). **CONCLUSIONS:** The cuff inflation technique consistently improved the oropharyngeal insertion of the 3 ET tubes of varying stiffness during direct laryngoscope-guided NTI. Supplemented with the cuff inflation technique, the SWR ET tube seems to be better than the PVC and WR ET tubes in terms of complete nasotracheal navigability and less perioperative nasal injury.

在一私立醫院進行的硬膜外鎮痛與腰硬聯合鎮痛的隨機對照比較: 分娩時第一, 第二產程時的疼痛評分

Randomized Controlled Comparison of Epidural Analgesia and Combined Spinal-Epidural Analgesia in a Private Practice Setting: Pain Scores During First and Second Stages of Labor and at Delivery

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背景: 到目前爲止還沒有對腰硬聯合(CSE)鎮痛在私立醫院中應用情況的前瞻性評估,並且只有很少的研究關注於分娩第二產程中的疼痛緩解。這次隨機對照實驗比較了在一家繁忙的私立婦產醫院接受 CSE(腰硬聯合)鎮痛或傳統硬膜外鎮痛的產婦在分娩第一產程及第二產程時的口述疼痛評分。
方法: 要求行分娩鎮痛的健康足月產婦接受硬膜外或腰硬聯合鎮痛。0.125%布比卡因與 2ug/ml 的芬太尼共 15ml 用於硬膜外鎮痛；鞘內注射布比卡因 3.125mg 以及芬太尼 5ug 用於腰硬聯合麻醉。隨後，這兩組病人使用含有 0.125%布比卡因及芬太尼（2ug/ml）的硬膜外鎮痛泵用進行自控鎮痛。在產程的第一階段結束時及分娩結束即刻，用 0 分到 10 分的口述疼痛評分評估“典型”疼痛。
結果：資料來源於 389 例接受硬膜外鎮痛的產婦和 402 例接受 CSE（腰硬聯合）鎮痛的產婦。在 CSE(腰硬聯合)組，典型口述疼痛評分在第一產程低於硬膜外組（平均：1.4 分 vs1.9 分；P<0.001；99.5%置信區間[CI]爲: −0.92 到 −0.14）。CSE 組與硬膜外組在第二產程的疼痛評分分別爲 1.7 與 1.9（*P* = 0.17; 99.5% CI 爲: −0.82 到 0.28)，在分娩即刻時評分相同均爲 2.0（*P* = 0.77; 99.5%CI 爲: −0.73 到 0.59) 。與硬膜外組（25.6%）相比，CSE 組中較少產婦接受了硬膜外追加劑量（16.4%）：*P* = 0.002; 99.5% CI 爲: −17.0%到−1.0%。硬膜外導管更換的比例在 CSE 組爲 1.2%，硬膜外組爲 2%（*P* = 0.39; 99.5% CI 爲−3.3%到 1.8%）。
結論：對比于傳統的硬膜外分娩鎮痛，CSE 鎮痛提供了更好的第一產程鎮痛，儘管在 CSE 組有少部分產婦接受了硬膜外追加劑量。
（王苑　譯　陳傑　校）
BACKGROUND: There has been no prospective evaluation of combined spinal-epidural (CSE) analgesia in a private practice setting and few studies have focused on pain relief during the

second stage of labor and at delivery. In this randomized controlled trial, we compared verbal pain scores during the first and second stages of labor and at delivery in women receiving CSE or traditional epidural analgesia at a busy private maternity hospital.
METHODS: Healthy, term parturients received epidural or CSE analgesia for labor pain upon request. Epidural analgesia was initiated with 0.125% bupivacaine plus 2 μg/mL fentanyl, 15 mL; CSE analgesia was initiated with intrathecal plain bupivacaine 3.125 mg plus 5 μg fentanyl. Thereafter, patient-controlled epidural analgesia with 0.125% bupivacaine plus 2 μg/mL fentanyl was used for maintenance analgesia in both groups. The primary outcome was an assessment of "typical" pain, using a verbal rating pain score from 0 to 10, made at the end of the first stage of labor and shortly after delivery.
RESULTS: Data from 398 epidural and 402 CSE subjects were analyzed. The typical verbal rating pain score during the first stage was lower in the CSE group (mean: 1.4 vs 1.9; $P < 0.001$; 99.5% confidence interval [CI] for difference: −0.92, −0.14). Pain scores during the second stage of labor (1.7 vs 1.9; $P = 0.17$; 99.5% CI for difference: −0.82, 0.28) and at delivery (2.0 vs 2.0; $P = 0.77$; 99.5% CI for difference: −0.73, 0.59) were the same between groups. Fewer patients received an epidural top-up dose in the CSE group (16.4% vs 25.6%; $P = 0.002$; 99.5% CI for difference: −17.0%, −1.0%). Epidural catheters were replaced in 1.2% CSE vs 2% in the epidural group ($P = 0.39$; 99.5% CI for difference: −3.3%, 1.8%).
CONCLUSIONS: Compared with traditional epidural labor analgesia, CSE analgesia provided better first-stage analgesia despite fewer epidural top-up injections by an anesthesiologist.

全麻下行機械通氣的肺部健康患者潮氣量複張/過度通氣的監測

Detection of Tidal Recruitment/Overdistension in Lung-Healthy Mechanically Ventilated Patients Under General Anesthesia

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背景：容量依賴的單室模型（VDSCM）已用於鑒定接受機械通氣的急性肺損傷患者的肺過度膨脹。這項觀察性研究評估 VDSCM 在鑒定由潮氣量（VT）和呼氣末正壓（PEEP）引起的潮氣量複張/過度膨脹方面的作用。
方法：15 名（ASA I–II）擇期行乳房整形手術的全麻患者，以容量控制通氣(VCV)的方式進行機械通氣，設置 Vt 爲 8 $mL•kg^{-1}$ ，PEEP 爲 0 cm H_2O。在這些設置下，通氣模式在 VCV 或壓力控制通氣模式（PCV）間隨機調換，PEEP 相繼從 0cmH_2O 調整到 5cmH_2O，再到 10cmH_2O,每 5 分鐘調節一次。之後，PEEP 降至 0cmH_2O。VT 增加到 10 $mL•kg^{-1}$,並且保持分鐘潮氣量不變，PEEP 也相繼增加至 5cmH_2O 和 10cm H_2O。連續記錄氣道壓力和氣流量，並且在考慮或不考慮流量依賴情況下與 VDSCM 相匹配。用衍生自 VDSCM 的膨脹指數(%E_2)來評估潮氣量和 PEEP 引起的肺複張/過度膨脹。%E_2 正負值分別提示潮氣量過度膨脹或補潮氣量複張。另外，計算線性呼吸系統順應性。將每個不同的 PEEP 值，VT 設置，通氣模式前提下的各參數間進行對比，考慮或者不考慮流量依賴的回歸模型採

用配對樣本的 Wilcoxon 符號秩和檢驗（$P < 0.05$）。使用 Bonferroni 方法校正多重比較。評估嘈雜變數的相關改變用來作爲優化模型的指數。

結果：在幾乎所有的實驗條件下，包括流量依賴參數的 VDSCM 明顯改善預計嘈雜變數（11.2 to 71.4，95%置信區間下限的最小值和上限的最高值）。在相似的 VT 和 PEEP 水準，當流量依賴包含在回歸模型中時，VCV 和 PCV 之間沒有發現$\%E_2$差異。和 VCV 模式相比，忽略系統性的流量依賴參數導致了 PCV 的$\%E_2$的低估（所有 $P < 0.02$）。在既定的 VT 下，PEEP 爲 0 cm H_2O 時$\%E_2$爲陰性，並且隨著 PEEP 的上升而明顯上升，在 PEEP 爲 5cm H_2O 時$\%E_2$幾乎爲 0。在既定的 PEEP 水準，%ET 明顯隨著 VT 的增加而增加。

結論：衍生自流量依賴的 VDSCM 的膨脹指數，似乎能確認由 VT 和 PEEP 引起的潮氣量複張/過度膨脹，且與擁有健康肺的麻醉患者的流量波形無關。

（馬霄雯　譯　陳傑　校）

BACKGROUND: The volume-dependent single compartment model (VDSCM) has been applied for identification of overdistension in mechanically ventilated patients with acute lung injury. In this observational study we evaluated the use of the VDSCM to identify tidal recruitment/overdistension induced by tidal volume (Vt) and positive end-expiratory pressure (PEEP) in lung-healthy anesthetized subjects.

METHODS: Fifteen patients (ASA physical status I–II) undergoing general anesthesia for elective plastic breast reconstruction surgery were mechanically ventilated in volume-controlled ventilation (VCV), with Vt of 8 $mL \cdot kg^{-1}$ and PEEP of 0 cm H_2O. With these settings, ventilatory mode was randomly adjusted in VCV or pressure-controlled ventilation (PCV) and PEEP was sequentially increased from 0 to 5 and 10 cm H_2O, 5 min per step. Thereafter, PEEP was decreased to 0 cm H_2O, Vt increased to 10 $mL \cdot kg^{-1}$ and, keeping minute ventilation constant, PEEP was similarly increased to 5 and 10 cm H_2O. Airway pressure and flow were continuously recorded and fitted to the VDSCM with or without considering flow-dependencies. A "distension index" ($\%E_2$) derived from the VDSCM was used to assess Vt and PEEP-induced recruitment/overdistension. Positive and negative values of $\%E_2$ suggest tidal overdistension or tidal recruitment, respectively. In addition, the linear respiratory system elastance was calculated. Comparisons among variables at each PEEP value, Vt setting, ventilatory mode, and regression model considering or not considering flow-dependencies were performed with the Wilcoxon-sign rank test for paired samples ($P < 0.05$). Multiple comparisons were corrected with the Bonferroni method. The relative change in the estimated noisy variance was used as an index of the goodness of fit of the models.

RESULTS: VDSCM including the flow-dependent parameter significantly improved estimated noisy variance in almost all experimental conditions (11.2 to 71.4, smallest of the lower and highest of the upper 95% confidence intervals). No differences in $\%E_2$ were observed between VCV and PCV, at comparable Vt and PEEP levels, when flow-dependencies were included in the regression model. The negligence of the flow-dependent parameter systematically led to an underestimation of $\%E_2$ in PCV compared to VCV mode (all $P < 0.02$). At a given Vt, $\%E_2$ was negative at a PEEP of 0 cm H_2O and significantly increased with PEEP, being almost 0 at a PEEP of 5 cm H_2O. At a given level of PEEP, $\%E_2$ significantly increased with Vt.

CONCLUSIONS: The distension index $\%E_2$, derived from the VDSCM considering flow-dependencies, seems able to identify tidal recruitment/overdistension induced by Vt and PEEP independent of flow waveform in healthy lung-anesthetized patients.

有氧和阻力鍛煉誘導的抗傷害過程中中樞和外周 α2 腎上腺素受體的差異

Differential Involvement of Central and Peripheral α2 Adrenoreceptors in the Antinociception Induced by Aerobic and Resistance Exercise

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背景：數項研究已經驗證了鍛煉誘導抗傷害作用；然而，這種效果的詳細機理並沒有被很好的理解。因此，作者研究了大鼠和小鼠由鍛煉產生抗傷害作用的 α2 腎上腺素受體（α2-ARs）變化。
方法：雄性 Wistar 大鼠進行了急性有氧（AA）和急性阻力鍛煉，而 α2A/α2C-Ars 基因敲除小鼠及其野生型小鼠也進行了 AA。
結果：在經過該方案鍛煉後，大鼠和野生型小鼠的疼痛閾值提高了（不包括基因敲除小鼠）。該效果可以被如下藥物逆轉：育亨賓，一種非選擇性 α2-Ars 拮抗劑（4 mg/kg, 皮下注射）；蘿芙素，一種選擇性（4 mg/kg, 皮下注射）；BRL 44408，一種選擇性（4 mg/kg, 皮下注射）；胍乙啶，一種選擇性腎上腺素傳導神經的傳導抑制劑（30 mg/kg，腹腔注射）。此外，當鞘內注射或者側腦室注射給藥時，育亨賓不會改變鍛煉誘導的鎮痛效果。另外，AA 和急性阻力鍛煉後大鼠腦內的 α2-Ars 表達不會改變。
結論：這些結果暗示了有氧和阻力鍛煉誘導的抗傷害作用爲外周 α2-Ars 效應。
（孫曉瓊　譯　陳傑　校）

BACKGROUND: Several studies have demonstrated antinociception induced by exercise; however, the specific mechanisms for this effect are not well understood. Thus, we investigated the involvement of α2-adrenergic receptors (α2-ARs) in the antinociceptive effect produced by exercise in rats and mice.
METHODS: Male Wistar rats performed acute aerobic (AA) and acute resistance exercise protocols, and male α2A/α2C-ARs knockout mice and their wild-type mice were also submitted to AA.
RESULTS: After the exercise protocols, the nociceptive threshold of rats and wild type was increased, (except in knockout mice). This effect was reversed by yohimbine, a nonselective α2-ARs antagonist (4 mg/kg, subcutaneously [s.c.]); rauwolscine, a selective α2C-ARs antagonist (4 mg/kg, s.c.); BRL 44408, a selective α2A-ARs antagonist (4 mg/kg, s.c.) and guanethidine, a selective inhibitor of transmission in adrenergic nerves (30 mg/kg, intraperitoneal). Furthermore, when given intrathecally or intracerebroventricularly, yohimbine did not alter antinociception induced by exercise protocols. In addition, α2-ARs expression in rat brains did not change after AA and acute resistance exercise.
CONCLUSION: These results suggest a peripheral involvement of α2-ARs in the antinociception induced by aerobic and resistance exercise.

簡報：0.1%羅呱卡因和 0.2%羅呱卡因分別在肩部手術後連續肌間溝注射的隨機比較研究

Brief Report: A Randomized Comparison of Ropivacaine 0.1% and 0.2% for Continuous Interscalene Block After Shoulder Surgery

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背景：目前還不清楚羅呱卡因用於肩部手術後連續肌間溝注射的最佳濃度。
方法：56 名患者在肩部手術後接受 0.1%羅呱卡因或者 0.2%羅呱卡因連續 48 小時的神經注射。評估疼痛評分作爲主要終點，同時用追加鎮痛藥、羅呱卡因的消耗、運動阻滯、副作用和病人的滿意度作爲次要終點。
結果：在注射期間疼痛評分均無統計學差異；然而，接受 0.1%羅呱卡因組在第一個 24 小時（64%比 28%，P=0.022）追加鎮痛的消耗要稍高一些。其他次要終點在統計學上無意義。
結論：這些結果表明 0.2%羅呱卡因在肩部手術後第一個 24 小時的連續肌間溝注射比 0.1%羅呱卡因提供了更有效的鎮痛。
（孫荔莉　譯　陳傑　校）
BACKGROUND: The optimal concentration of ropivacaine for continuous interscalene block after shoulder surgery is currently unknown.
METHODS: Fifty-six patients received a perineural infusion of either ropivacaine 0.1% or 0.2% for 48 hours after shoulder surgery. We assessed pain scores as primary end points and supplemental analgesia, ropivacaine consumption, motor block, side effects, and patient satisfaction as secondary end points.
RESULTS: Pain scores were not statistically different during the infusion periods; however, supplemental analgesia consumption was higher in the group receiving ropivacaine 0.1% during the first 24 hours (64% vs 28%, *P* = 0.022). Other secondary end points were statistically inconclusive.
CONCLUSIONS: These results suggest that ropivacaine 0.2% provides more effective analgesia than ropivacaine 0.1% during the first 24 hours for continuous interscalene block after shoulder surgery.

腦電雙頻譜指數與呼末麻醉濃度指導在快通道心臟手術拔管時間上的作用對比

The impact of bispectral index versus end-tidal anesthetic concentration-guided anesthesia on time to tracheal extubation in fast-track cardiac surgery.

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背景：一直以來，都有報導證實根據腦電雙頻譜指數（BIS）的提示拔管能縮短氣管拔管時間。然而，目前還沒有試驗把通過 BIS 來提示拔管的作用與通過呼末麻醉濃度（ETAC）指示拔管的作用進行對比。我們假設在快通道心臟手術患者中，通過 BIS 指導的拔管時間相比通過 ETAC 指導的拔管時間有明顯的縮短。
方法：這項研究的患者來自單個機構，它是通過大量、多中心的"BIS 和麻醉氣體減少重吸收"（BAG－RECALL）臨床試驗比較分別通過 BIS 和 ETAC 指導麻醉的患者術後意識這項研究的副實驗。接受心臟手術的患者被隨機分爲 BIS 組（n＝361）和 ETAC 組（n＝362）分別指導麻醉。揮發性麻醉劑滴定濃度，保持在 BIS 值在 40－60 之間（BIS 組）；或是根據年齡調整的最低肺泡濃度在 MAC0.7－1.3（ETAC 組）。在 ETAC 組中，麻醉醫生接受 BIS 值的盲法。在這項副研究中，氣管拔管時間在兩組間相比較。Cox 回歸曲線對可能的暫態拔管時間進行預測。
結果：兩組患者氣管拔管時間無明顯差異（優勢比爲 1.04，95％可信區間〔0.88－1.23〕，P＝0.643）。此外，按此方法分組並沒有影響暫態拔管時間（P＝0.433）。降低暫態拔管預測值的因素包括高體重指數（P＝0.001）、高 EuroSCORE（P＝0.015）、手術類型複雜（P＝0.034）以及手術在夜間完成（P＝0.03）。
結論：與基於 ETAC 的麻醉管理相比，在接受快通道心臟手術的患者中基於 BIS 的麻醉管理並不能明顯提前氣管拔管的時間。患者的自身特點和圍術特徵相較於 ETAC 和 BIS 監測來說更能決定拔管時間。
(郭晨躍譯 薛張綱校)

BACKGROUND:Bispectral Index (BIS)-guided anesthesia administration has been reported to reduce the time to tracheal extubation. However, no trials have compared the ability of BIS guidance to promote earlier tracheal extubation relative to guidance by end-tidal anesthetic concentration (ETAC). We hypothesized that BIS-guided anesthesia would result in earlier tracheal extubation compared with ETAC-guided anesthesia in fast-track cardiac surgery patients.
METHODS:This study consisted of patients at a single institution who were enrolled in the larger, multicenter BIS or Anesthesia Gas to Reduce Explicit Recall (BAG-RECALL) clinical trial that compared rates of postoperative awareness for patient whose anesthetic was guided by BIS versus ETAC. Patients undergoing cardiac surgery were randomized to BIS (n = 361) or ETAC (n = 362) guided anesthesia. Volatile anesthetic was titrated either to maintain a BIS value of 40 to 60 (BIS group), or an age-adjusted minimum alveolar concentration of 0.7 to 1.3 (ETAC group). In the ETAC group, anesthesiologists were blinded to the BIS values. In this substudy, time to tracheal extubation was compared between groups. Cox regression identified predictors affecting the instantaneous probability of tracheal extubation.
RESULTS:Time to tracheal extubation was not significantly different between groups (odds ratio 1.04, 95% confidence interval, 0.88-1.23, P = 0.643). In addition, group assignment did not influence the instantaneous probability of tracheal extubation (P = 0.433). Predictors decreasing the instantaneous probability of tracheal extubation included higher body mass index (P = 0.001), higher logistic EuroSCORE (P = 0.015), complex surgery type (P = 0.034), and surgery completion in the evening (P = 0.03).

CONCLUSIONS:Compared with management based on ETAC, anesthetic management based on BIS guidance does not strongly increase the probability of earlier tracheal extubation in patients undergoing fast-track cardiac surgery. The decision to extubate the trachea is more influenced by patient characteristics and perioperative course than the assignment to BIS or ETAC monitoring.

簡報：比較評估局麻藥低共熔化合物與辣椒素化合物減輕靜脈穿刺注射痛的效果

Brief report: a comparative evaluation of local application of the combination of eutectic mixture of local anesthetics and capsaicin for attenuation of venipuncture pain.

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背景:局部應用辣椒素和局麻藥的低共熔混合物（EMLA）被認爲都可減輕靜脈穿刺痛，輸注辣椒後，局麻藥的叔銨和季銨衍生物可延長或顯著的阻滯痛覺感受器特異受體。假設：辣椒素和 EMLA 混合物比單獨應用二者效果好，混合液二者成分更低，副作用更少。
方法:120 人等分 4 組。對照組給予潤滑霜；EMLA 組給予 EMLA 膏；辣椒素組給予 Myolaxin 膏（成分：油性樹脂辣椒素=0.75%辣椒素，樟腦，樹脂等）；混合組給予 EMLA+Myolaxin。麻醉師用相關藥膏在穿刺區周圍 10 平方釐米區域勻塗，穿刺一小時前透明敷貼覆蓋藥膏區及穿刺區；後移去敷貼 18G 穿刺針穿刺，疼痛視覺評分判斷疼痛程度，0 爲無痛，10 分爲最痛。P 小於 0.05 有意義。
結果:對照組 0 分無痛人數爲 0,0/30；EMLA 組 32%, 9/28, 95% 可信區間爲 12%-57%, P = 0.0025)；辣椒素組(30%, 9/30, 10%-53%, P = 0.0031)；EMLA+辣椒素組(47%, 14/30, 25%-69%, P < 0.0001)。
結論:EMLA 和辣椒素混合物與分別應用二者的陣痛效果相同；結論還需要更大樣本驗證。
(韓敘譯 薛張綱校)

BACKGROUND: Topical capsaicin and eutectic mixture of local anesthetics (EMLA) have been found to be equally effective in minimizing the pain of venipuncture. After the injection of capsaicin, both tertiary amine local anesthetics and their quaternary ammonium derivatives can elicit a prolonged and predominantly sensory/nociceptor selective block. We hypothesized that the combined application of capsaicin and ELMA will be more effective than their individual effect, and lower concentrations of individual drugs in this mixture may also be associated with reduced side effects.
METHODS: One hundred twenty patients were randomized into 4 equal groups. The control group received plain lubricant cream; the EMLA group received EMLA cream; the capsaicin group received Myolaxin ointment (containing oleoresin capsaicin equivalent to capsaicin 0.075% w/w, methylsalicylate IP 20% w/w, menthol IP 10% w/w, camphor USP 5% w/w, and eucalyptus oil IP 5% w/w); and the EMLA + capsaicin group received EMLA cream and Myolaxin ointment mixed in equal amounts. An anesthesiologist applied the cream to a 10-cm(2) area (site of venous cannulation) on the dorsum of the nondominant hand of the patient 1 hour

before venipuncture and covered the area with an occlusive transparent dressing. Venipuncture was performed with an 18-gauge cannula after removing the dressing. Venipuncture pain was graded by the patient on a 0 to 10 visual analog scale, where 0 means no pain and 10 means worst imaginable pain. P values (after correction for multiple comparisons) of <0.05 were considered significant.
RESULTS: The incidence of no pain on venous cannulation (primary end point) was 0% in the control group (0/30). The incidence of no pain were significantly higher in the EMLA group (32%, 9/28, 95% corrected confidence interval for the difference 12%-57%, P = 0.0025), capsaicin group (30%, 9/30, 10%-53%, P = 0.0031), and EMLA + capsaicin groups (47%, 14/30, 25%-69%, P < 0.0001). Severity of venipuncture pain as assessed by visual analog scale median (interquartile range) was lower in the EMLA + capsaicin group 1 (2) compared with other groups 3 (1), 1.5 (3), and 1.5 (3) for control, EMLA, and capsaicin, respectively (P < 0.001, P = 0.04, and P = 0.04, respectively).
CONCLUSION: We observed that the combination of capsaicin and EMLA in a low concentration is as effective in managing venous cannulation as when applied as an individual drug alone. Larger studies with varying concentration of capsaicin and EMLA are recommended to more fully evaluate the potential advantages.

異氟醚麻醉在體內基因調控的微陣列分析：一個新的方法來識別潛在的預處理機制。
Microarray analyses of genes regulated by isoflurane anesthesia in vivo:
a novel approach to identifying potentialpreconditioning mechanisms.
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Anesth Analg March 2013 116:589-595

背景：雖然全身麻醉被確認爲有潛力使患者在手術過程中意識消失，但是暴露也可導致細胞損傷和保護的長期結果。至於後者，延遲麻醉藥預處理是一種進化上保守的生理反應，它可能對許多組織缺血再灌注損傷具有保護作用。雖然我們知道延遲預處理需要蛋白質從頭合成，但是麻醉調節基因的知識是不完整的。在這項研究中，我們使用預處理的保守性質來分析 3 組不同的大鼠組織中差異表達的基因。我們假設，我們可以在多種組織中選擇那些調節基因，我們可以開發一個集中的候選基因，它們可能參與延遲麻醉藥預處理。
方法：用 2％易氟烷與 98％空氣混合物麻醉年輕的成年雄性大白鼠 90 分鐘。麻醉劑曝露後，立即將動物處死，取出肝，腎，心臟提取所有 RNA。用大鼠寡核苷酸基因序列決定基因表達差異。我們通過分析序列資料來選擇在多種組織中具有顯著調節作用的基因。
結果：一個臨床相關的暴露於異氟醚的所有 3 種組織顯示存在不同的調控基因。 協調調控基因的分析產生了一個集中的 34 種潛在候選基因系列的一些本體論，包括調節炎症反應，調節細胞凋亡，調節離子梯度和維護能源途徑。
結論：對協同調控基因通過使用分析的方法，我們能夠產生一個可能與未來預處理研究有關的有趣的候選基因的集中列表。
(賀盼 譯 薛張綱校)
BACKGROUND: Although general anesthetics are recognized for their potential to render patients unconscious during surgery, exposure can also lead to long-term outcomes of both

cellular damage and protection. As regards the latter, delayed anesthetic preconditioning is an evolutionarily conserved physiological response that has the potential for protecting against ischemic injury in a number of tissues. Although it is known that delayed preconditioning requires de novo protein synthesis, knowledge of anesthetic-regulated genes is incomplete. In this study, we used the conserved nature of preconditioning to analyze differentially regulated genes in 3 different rat tissues. We hypothesized that by selecting those genesregulated in multiple tissues, we could develop a focused list of gene candidates potentially involved in delayed anesthetic preconditioning.
METHODS: Young adult male Sprague-Dawley rats were anesthetized with a 2% isoflurane/98% air mixture for 90 minutes. Immediately after anesthetic exposure, animals were euthanized and liver, kidney, and heart were removed and total RNA was isolated. Differential gene expression was determined using rat oligonucleotide gene arrays. Array data were analyzed to select for genes that were significantly regulated in multiple tissues.
RESULTS: All 3 tissues showed differentially regulated genes in response to a clinically relevant exposure to isoflurane. Analysis of coordinatelyregulated genes yielded a focused list of 34 potential gene candidates with a range of ontologies including regulation of inflammation, modulation of apoptosis, regulation of ion gradients, and maintenance of energy pathways.
CONCLUSIONS: Through using an analysis approach focusing on coordinately regulated genes, we were able to generate a focused list of interesting gene candidates with potential to enable future preconditioning studies.

技術交流：使用笑氣時 TaperGuard™氣管導管囊內壓力增加小於 Hi-Lo 導管：一項氣管模型的研究。

Technical Communication: The TaperGuard™ Endotracheal Tube Intracuff Pressure Increase Is Less Than That of the Hi-Lo™ Tube During Nitrous Oxide Exposure: A Model Trachea Study.

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背景：對新開發的錐形套囊與傳統的圓柱袖口的密封效果進行了對比研究。在這項研究中，我們比較袖口方面的差異，通過觀察兩者暴露在笑氣中氣囊內壓力的增加情況。
方法：兩種類型的袖口使用的模型氣管連接到機械肺的測試：高容量，低血壓袖帶（Mallinckrodt 公司的 Hi-LO（TM），Covidien 公司，都柏林，愛爾蘭）和錐形袖（Mallinckrodt 公司 TaperGuardTM）。囊內壓力設定在 20 釐米水柱，測量壓力的增加，機械通氣使用過程中使用濃度占 66％笑氣。暴露在笑氣中，囊內壓力分別在 5，10，15，30，45 和 60 分鐘後被記錄。
結果：在暴露於笑氣中的第 15 分鐘時，高容量，低壓力袖口的氣囊內壓力顯著高於錐形袖口的壓力（2 - 重複測量的方差分析，P <0.0001 內部直徑的 ID 7.0 和 7.5 毫米，P = 0.0004 爲 ID8.0 毫米，P = 0.0013 爲 ID8.5 毫米），並且在相互作用的時間和袖口類型上也有顯著的統計學差異（P <0.0001 ID 的 7.0，7.5，8.0，和 8.5 毫米）。各組的平均袖壓

力的差異在暴露於笑氣中 10 分鐘後是-18.5（SE，1.4; 99%可信區間，-22.8 至-14.2，P <0.0001）爲 ID 7.5 毫米。圓錐氣管內管袖口密封氣管隆突側用更少的凹陷。袖口上表面的凹陷可能增加表面積爲笑氣擴散。因此，較少的的凹陷就會減少表面積，從而減少笑氣的擴散。

結論：在使用笑氣的全身麻醉中，錐形氣管導管氣囊內壓力增加低於傳統的高容量，低壓力袖口導管。在笑氣的濃度達到 66%時，氣囊內壓力在兩種類型導管中均可迅速增高，因此建議連續或者頻繁監測。

（胡曉清譯 薛張綱校）

BACKGROUND: Studies have compared sealing effects of the newly developed tapered endotracheal tube cuff with the conventional cylindrical cuff. In this study, we compared the difference between cuffs with regard to the increase in intracuff pressure during nitrous oxide (N(2)O) exposure.

METHODS: Two types of cuffs were studied using a model trachea connected to a mechanical test lung: high-volume, low-pressure cuff (Mallinckrodt Hi-Lo(TM), Covidien, Dublin, Ireland) and tapered cuff (Mallinckrodt TaperGuardTM, Covidien). The intracuff pressure was set at 20 cm H(2)O, and the increase in pressure was measured during mechanical ventilation using 66% N(2)O. Intracuff pressures were recorded after 5, 10, 15, 30, 45, and 60 minutes of exposure to N(2)O.

RESULTS: The intracuff pressure recorded during the first 15 minutes of N(2)O exposure in high-volume, low-pressure cuffs was significantly higher than tapered cuffs (2-way repeated-measures analysis of variance, $P < 0.0001$ for internal diameters [IDs] 7.0 and 7.5 mm, $P = 0.0004$ for ID 8.0 mm, $P = 0.0013$ for ID 8.5 mm), and there were also statistically significant differences regarding interaction of time and cuff type ($P < 0.0001$ for IDs 7.0, 7.5, 8.0, and 8.5 mm). The difference in mean cuff pressures among groups after 10 minutes of N(2)O exposure was -18.5 (SE, 1.4; 99% confidence interval, -22.8 to -14.2; $P < 0.0001$) for ID 7.5 mm. Tapered endotracheal tube cuffs sealed the trachea with fewer dimples on the carina side of the cuff. Dimples on the cuff surface probably increase the surface for N(2)O diffusion. Therefore, fewer dimples result in a smaller surface area through which N(2)O can diffuse.

CONCLUSION: During general anesthesia with N(2)O, the intracuff pressure of tapered endotracheal tube cuffs did not increase as rapidly as it did in conventional high-volume, low-pressure cuffs. The pressure in both types of cuffs increased rapidly when exposed to 66% N(2)O, and hence continuous or frequent monitoring is recommended.

容量依賴的順應性：調節開放性肺呼氣末正壓的一項有用的參數

Volume-independent elastance: a useful parameter for open-lung positive end-expiratory pressure adjustment.

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背景：一項全肺替換後減少 PEEP 的試驗用來調節包含呼氣末時最低的 PEEP（開放性肺的 PEEP）。對於潮氣量接近 0，最小 PEEP 時呼吸系統的順應性理論上相當於壓力容量環數學拐點時的壓力，似乎是符合遞減 PEEP 試驗中開放性肺的 PEEP。然而，PEEP 是與潮氣量相關，且隨著潮氣量的減少而增加的。爲了避免這個依賴性，我們計畫用二階模式，容量依賴的順應性有利於設置開放性 PEEP。
方法：遞減 PEEP 試驗中壓力容量環和肺複張在 24 只急性肺損傷的 Wistar 大鼠中以 6ml/kg 和 12ml/kg 的潮氣量，包括腹腔內注射和腹腔內滴注大腸桿菌內毒素。在 8 只控制動物中，在 PEEP 試驗後通過外科手術取出了前胸壁，這一提議反復使用。氣道壓和流量持續地獲得，通過線性單室模型和容量依賴的順應性模式得以滿足。每個模式中，最小 PEEP 時呼吸系統的順應性和容量依賴的順應性得以認定並且與每個數學拐點比較。最小容量依賴的順應性 PEEP 和最小 PEEP 時呼吸系統的順應性在數學拐點是通過偏見和緊密來進行評估的。而配對 t 檢驗與對照組前後胸壁切除和不同的 Vt 組內，組間比較進行配對 t 檢驗。所有 P 值是通過 Bonferroni 過程多重比較來修正的。
結果：所有實驗組中，PEEPminErs，但不 PEEPminE1 的，呈下降趨勢，爲 Vt 增加。展出在??MIP 和 PEEPminE1 之間的差異在 MIP 和 PEEPminErs 的之間的差異（P <0.001）相比，在較低的偏置。PEEPminE1 是始終顯著高於在 PEEPminErs（7.7 比 3.8，P <0.001），更好地接近 MIP（7.7 和 7.3 釐米 H2O 在低 Vt，P = 0.04，7.8 和 7.1 釐米 H2O 與 P <0.001 高 Vt）。
結論：PEEPminE1 可以更好地識別肺開放 PEEP 獨立地調整後的 Vt 的，並且可以是一個實用的，更個性化的方法的 PEEP 滴定。
(孫莉萍譯 薛張綱校)
BACKGROUND: A decremental positive end-expiratory pressure (PEEP) trial after full lung recruitment allows for the adjustment of the lowest PEEP that prevents end-expiratory collapse (open-lung PEEP). For a tidal volume (Vt) approaching zero, the PEEP of minimum respiratory system elastance (PEEP(minErs)) is theoretically equal to the pressure at the mathematical inflection point (MIP) of the pressure-volume curve, and seems to correspond to the open-lung PEEP in a decremental PEEP trial. Nevertheless, the PEEP(minErs) is dependent on Vt and decreases as Vt increases. To circumvent this dependency, we proposed the use of a second-order model in which the volume-independent elastance (E1) is used to set open-lung PEEP.
METHODS: Pressure-volume curves and a recruitment maneuver followed by decremental PEEP trials, with a Vt of 6 and 12 mL/kg, were performed in 24 Wistar rats with acute lung injury induced by intraperitoneally injected (n = 8) or intratracheally instilled (n = 8) Escherichia coli lipopolysaccharide. In 8 control animals, the anterior chest wall was surgically removed after PEEP trials, and the protocol was repeated. Airway pressure (Paw) and flow (F) were continuously acquired and fitted by the linear single-compartment model ($Paw = Rrs \cdot F + Ers \cdot V + PEEP$, where Rrs is the resistance of the respiratory system, and V is volume) and the volume-dependent elastance model ($Paw = Rrs \cdot F + E1 + E2 \cdot V \cdot V + PEEP$, where $E2 \cdot V$ is the volume-dependent elastance). From each model, PEEPs of minimum Ers and E1 (PEEP(minE1)) were identified and compared with each respective MIP. The accuracy of PEEPminE1 and PEEPminErs in estimating MIP was assessed by bias and precision plots. Comparisons among groups were performed with the unpaired t test whereas a paired t test was used between the control group before and after chest wall removal and within groups at different Vts. All P values were then corrected for multiple comparisons by the Bonferroni procedure.

RESULTS: In all experimental groups, PEEPminErs, but not PEEPminE1, tended to decrease as Vt increased. The difference between MIP and PEEPminE1 exhibited a lower bias compared with the difference between MIP and PEEPminErs ($P < 0.001$). The PEEPminE1 was always significantly higher than the PEEPminErs (7.7 vs 3.8, $P < 0.001$) and better approached MIP (7.7 vs 7.3 cm H2O with $P = 0.04$ at low Vt, and 7.8 vs 7.1 cm H2O with $P < 0.001$ at high Vt).
CONCLUSIONS: PEEPminE1 better identifies the open-lung PEEP independently of the adjusted Vt, and may be a practical, more individualized approach for PEEP titration.

高選擇性 β1 受體拮抗劑導致大鼠血液稀釋後腦灌注呈劑量依賴性減少

Treatment with a Highly Selective β1 Antagonist Causes Dose-Dependent Impairment of Cerebral Perfusion After Hemodilution in Rats

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背景：急性 β 阻滯與不良預後之間存在正向劑量依賴性，包括中風和死亡。急性失血增加這些不良事件的發生率。爲了研究急性失血和 β 阻滯所致風險的相關性，動物實驗研究表明，急性 β 阻滯劑減少血液稀釋後的腦灌注。通過檢驗假設，我們擴展了這些結果，特異性 β1 阻滯劑（奈必洛爾）導致在血液稀釋期間劑量依賴性腦缺氧。
方法：大鼠和小鼠麻醉後，在血液稀釋至血紅蛋白濃度 60 克/升前，隨機接受安慰劑或奈必洛爾（1.25 或 2.5 毫克/公斤）靜脈注射。血液稀釋前後監測藥物濃度、心率（HR）、心輸出量（CO）、局部腦血流量(Rcbf,鐳射多普勒)和腦微血管氧分壓（PBrO2）。Western blot 測定內皮型一氧化氮合酶（NOS），神經元型 NOS（nNOS），誘導型 NOS，缺氧誘導因數（HIF）- 1α。HIF -α 表達還使用 HIF-(ODD)-螢光素酶小鼠模型評估。資料進行方差分析，$P < 0.05$ 有意義，所有分析採用校正 P 值。
結果：奈必洛爾治療導致劑量依賴的血藥濃度。在安慰劑組，血液稀釋後 CO 和 rCBF ($P < 0.010$)增加，PBrO2 降低至 45.8 ± 18.7mm Hg (校正 $P < 0.001$; 95% CI 29.4–69.7)。同等劑量後奈必洛爾降低 HR，而且減弱 CO 對血液稀釋的反應($P < 0.012$)。低劑量奈必洛爾並未改善 rCBF 或在血液稀釋後進一步降低 PBrO2。高劑量奈必洛爾減弱 rCBF 對血液稀釋的反應，並引起 PBrO2 進一步降低至 28.4 ± 9.6 mm Hg (校正 $P = 0.019$; 95% CI 17.4–42.7)。所有劑量的奈必洛爾都增加 NOS 蛋白水準。血液稀釋後在高劑量奈必洛爾組中，腦組織 HIF-1α，誘導型一氧化氮合酶，和 nNOS 蛋白水準與腦缺氧誘導因數螢光素酶活性升高（$P < 0.032$）。
結論：我們的資料表明：奈必洛爾導致腦組織氧分壓下降和缺氧蛋白反應（HIF-1α 和 nNOS）增加，反應血液稀釋後腦氧輸送呈劑量依賴性下降。血液稀釋後低劑量奈必洛爾

治療並沒有導致組織缺氧惡化，對 HR 和 CO 的影響也差不多。這些資料支援這一假設：高度特異性 β1 受體拮抗劑進行 β-阻斷導致血液稀釋時劑量依賴性的急性腦灌注減少。
(郁玲玲譯 薛張綱校)

BACKGROUND: Acute β-blockade has been associated with a dose-dependent increase in adverse outcomes, including stroke and mortality. Acute blood loss contributes to the incidence of these adverse events. In an attempt to link the risks of acute blood loss and β-blockade, animal studies have demonstrated that acute β-blockade impairs cerebral perfusion after hemodilution. We expanded on these findings by testing the hypothesis that acute β-blockade with a highly β1-specific antagonist (nebivolol) causes dose-dependent cerebral hypoxia during hemodilution.
METHODS: Anesthetized rats and mice were randomized to receive vehicle or nebivolol (1.25 or 2.5 mg/kg) IV before hemodilution to a hemoglobin concentration near 60 g/L. Drug levels, heart rate (HR), cardiac output (CO), regional cerebral blood flow (rCBF, laser Doppler), and microvascular brain Po2 (PBrO2, G2 Oxyphor) were measured before and after hemodilution. Endothelial nitric oxide synthase (NOS), neuronal NOS (nNOS), inducible NOS, and hypoxia inducible factor (HIF)-1α were assessed by Western blot. HIF-α expression was also assessed using an HIF-(ODD)-luciferase mouse model. Data were analyzed using analysis of variance with
significance assigned at $P < 0.05$, and corrected P values are reported for all post hoc analyses.
RESULTS: Nebivolol treatment resulted in dose-specific plasma drug levels. In vehicle-treated rats, hemodilution increased CO and rCBF ($P < 0.010$) whereas PBrO2 decreased to 45.8 ± 18.7 mm Hg (corrected $P < 0.001$; 95% CI 29.4–69.7). Both nebivolol doses comparably reduced HR and attenuated the CO response to hemodilution ($P < 0.012$). Low-dose nebivolol did not impair rCBF or further reduce PBrO2 after hemodilution. High-dose nebivolol attenuated the rCBF response to hemodilution and caused a further reduction in PBrO2 to 28.4 ± 9.6 mm Hg (corrected $P = 0.019$; 95% CI 17.4–42.7). Both nebivolol doses increased brain endothelial NOS protein levels. Brain HIF-1α, inducible NOS, and nNOS protein levels and brain HIF-luciferase activity were increased in the high-dose nebivolol group after hemodilution ($P < 0.032$).
CONCLUSIONS: Our data demonstrate that nebivolol resulted in a dose-dependent decrease in cerebral oxygen delivery after hemodilution as reflected by a decrease in brain tissue Po2 and an increase in hypoxic protein responses (HIF-1α and nNOS). Low-dose nebivolol treatment did not result in worsened tissue hypoxia after hemodilution, despite comparable effects on HR and CO. These data support the hypothesis that acute β-blockade with a highly β1-specific antagonist causes a dose-dependent impairment in cerebral perfusion during hemodilution.

麻醉藥對乳腺癌術後慢性疼痛的影響。

The effects of anesthetics on chronic pain after breast cancer surgery.

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背景：乳腺癌術後慢性疼痛的發生率及預測因素已被廣泛研究。因爲它負面影響病人的日常生活中，應制定方法以防止和減少慢性疼痛及其嚴重程度。我們以往的研究表明，丙

泊酚麻醉對瑞芬太尼引起的痛覺過敏具有抗痛覺過敏作用，並且與七氟醚相比，它能減少急性疼痛。在這項研究中，我們假設，丙泊酚能防止乳腺癌術後的慢性疼痛及急性疼痛的發展和嚴重程度。

方法：我們對 2007 年 3 月至 2008 年 12 月間接受乳腺癌手術的 175 名女性（丙泊酚組 n = 86，七氟醚組 n= 89）進行回顧性研究。年齡分佈爲 20 至 65 歲。2011 年 7 月對患者進行電話隨訪。分析丙泊酚和七氟醚兩組之間慢性疼痛的發病率，嚴重程度和持續時間。嚴重程度分爲輕度、中度和重度疼痛。慢性疼痛持續時間分爲 3 組，各間隔 1 年時間。此外，還確定了與乳腺癌術後慢性疼痛的發病率及嚴重程度相關的危險因素。

結果：與丙泊酚組相比，乳腺癌術後的慢性疼痛更可能發生在七氟醚組（95％置信區間[CI]爲 1.146-1.809，P= 0.007）。在患有慢性疼痛的患者中，七氟醚和異丙酚兩組間的嚴重程度（95％CI 0.516-7.419）及持續時間（95％CI 0.106-1.007）無明顯差異。慢性疼痛發展的預測因素爲年紀輕（95％CI 0.907-0.992，P = 0.021），行腋窩淋巴結清掃術（95％CI 1.204-1.898，P = 0.003），術後 24 小時嗎啡消費量（95％CI 1.004-1.116，P = 0.036）和七氟醚（95％CI 1.146-1.809，P = 0.007）。術後 24 小時嗎啡用量越多，慢性疼痛越是嚴重（95％CI 1.001-1.379，P = 0.049）。

結論：這項研究表明，與七氟醚麻醉相比，丙泊酚麻醉下的乳腺癌術後慢性疼痛的發病率較低。然而，在慢性疼痛的嚴重程度和持續時間上丙泊酚組與七氟醚組沒有顯著的差別。需要進一步的前瞻性研究來證實這些具有爭論的結果的真實性。

（周玲譯 薛張綱校）

BACKGROUND: The incidence and predictive factors for chronic pain after breast cancer surgery have been widely studied. Because it negatively affects patients' daily lives, methods to prevent and reduce chronic pain and its severity should be developed. Our previous study showed that propofol anesthesia has an antihyperalgesic effect under remifentanil-induced hyperalgesia and reduced acute pain compared with sevoflurane anesthesia. In this study, we investigated the hypothesis that propofol would prevent the development and severity of chronic pain after breast cancer surgery, as in acute pain.

METHODS: A retrospective study was conducted with 175 women (n = 86 in the propofol group and n = 89 in the sevoflurane group) aged 20 to 65 years who underwent breast cancer surgery between March 2007 and December 2008. Patients were followed up by telephone in July 2011. Analysis included incidence, severity, and duration of chronic pain between propofol and sevoflurane groups. Severity was categorized into mild, moderate, and severe pain. Duration of chronic pain was also divided into 3 categories by 1-year time interval. Risk factors associated with the incidence and severity of chronic pain after breast cancer surgery were also identified.

RESULTS: Chronic pain after breast cancer surgery was more likely to occur in the sevoflurane group compared with the propofol group (95% confidence interval [CI] 1.146-1.809, P = 0.007). Among patients with chronic pain, neither the severity (95% CI 0.516-7.419) nor duration (95% CI 0.106-1.007) differed between patients receiving sevoflurane and propofol. Younger age (95% CI 0.907-0.992, P = 0.021), axillary lymph node dissection (95% CI 1.204-1.898, P = 0.003), 24-hour postoperative morphine consumption (95% CI 1.004-1.116, P = 0.036), and sevoflurane (95% CI 1.146-1.809, P = 0.007) were predictive factors for the development of chronic pain. Higher 24-hour postoperative morphine consumption (95% CI 1.001-1.379, P = 0.049) increased the severity of chronic pain.

CONCLUSIONS: This study showed that propofol anesthesia was associated with a lower incidence of chronic pain after breast cancer surgery than sevoflurane anesthesia. However,

propofol did not have a significant effect on severity and duration of chronic pain. Further prospective studies are needed to confirm the validity of these provocative findings.

鈣/鈣調蛋白依賴的蛋白激酶 II 在 1 型和 2 型糖尿病模型大鼠疼痛相關行爲的表達

Expression of Calcium/Calmodulin-Dependent Protein Kinase and Pain-Related Behavior in Rat Models of Type 1 and Type 2 Diabetes

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背景：目前發現，外周神經和背根神經節在實驗中的易激惹的糖尿病神經病變早期階段存在異常。鈣/鈣調蛋白依賴激酶 II 型（CaMKII）因其在鈣平衡中的作用可能在糖尿病神經病變中有調節能力。
方法：Ⅰ型糖尿病模型（DM1）由 55mg/kg 鏈脲佐菌素誘導而成，DM2 由低量鏈脲佐菌素（35 mg/kg）和高脂飲食誘導形成。疼痛相關行爲由熱刺激及機械刺激分析。在糖尿病大鼠誘導兩周及兩月後對其實施安樂死，使用免疫螢光技術分析 CaMKII 及其同工酶在背段神經根的表達。
結果：兩種類型的糖尿病模型均成功誘導形成並經檢測爲高血糖證實。在糖尿病誘導後 DM1 大鼠在 2 周內疼痛相關行爲明顯增加，而 DM2 大鼠卻無明顯增加。DM1 大鼠總 CaMKII 及其 α 磷酸化同工酶的表達均增加同時伴有疼痛相關行爲。DM1 大鼠總 CaMKII 的表達及 α, β, γ, 和 δ 型同工酶的表達及其所有分析酶在 DM2 大鼠中無改變。
結論：我們的發現可能表明，CaMKII 較早的參與了 DM1 的傳輸的傷害，但在 DM2 上未有該發現。CaMKII 可能是糖尿病一個合適的藥理學目標靶點。
（楊琰譯 薛張綱校）

BACKGROUND: Abnormalities in peripheral nerves and dorsal root ganglia are noticed in the early stage of experimentally provoked diabetic neuropathy. Enzyme calcium/calmodulin-dependent protein kinase II (CaMKII) may have a modulating role in diabetic neuropathy because of its role in calcium homeostasis.
METHODS:A model of type 1 diabetes mellitus (DM1) was induced with 55 mg/kg of the streptozotocin and for DM2 induction a combination of high-fat diet and low-dose streptozotocin (35 mg/kg) was used. Pain-related behavior was analyzed using thermal and mechanical stimuli. Two weeks and 2 months after induction of diabetes rats were euthanized, and the expressionof CaMKII and its isoforms in the dorsal root ganglia were analyzed using immunofluorescence.
RESULTS: Both types of diabetes were successfully induced, as confirmed by hyperglycemia. Increased pain-related behavior became evident in DM1 rats in 2 weeks after diabetes induction, but not in DM2 rats. The expression of total CaMKII and the phosphorylated α isoform of

CaMKII increased in DM1 animals concurrently with pain-related behavior. Expression of α, β, γ, and δ isoforms in DM1 animals and expression of total CaMKII and all of its analyzed isoforms in DM2 animals remained unchanged.
CONCLUSIONS: Our findings may indicate involvement of CaMKII in transmission of nociceptive input early in DM1, but not in DM2. CaMKII may be a suitable pharmacological target for diabetic neuropathy.

單次劑量應用抗凝血酶作爲晚期肝硬化重症患者連續腎替代療法中的潛在可選擇的抗凝劑：一項回顧性資料分析

Single-Dose Application of Antithrombin as a Potential Alternative Anticoagulant During Continuous Renal Replacement Therapy in Critically Ill Patients with Advanced Liver Cirrhosis: A Retrospective Data Analysis

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背景：充分抗凝是進行有效連續腎替代療法（CRRT）的前提。然而，對於晚期肝硬化的重症患者而言，由於並存出血功能障礙，這一目標難以達到。因此，有必要評價備選的抗凝劑。
方法：在本項回顧性研究中，我們分析了 2006 至 2008 年間收入內科重症監護病房的 16 名晚期肝硬化伴急性腎損傷的重症患者的 37 份 CRRT 資料，入組的患者在 CRRT 過程中以單次劑量的抗凝血酶（AT）或連續低劑量肝素作爲唯一抗凝藥。主要結果評價爲單個 CRRT 篩檢程式的壽命。
結果：13 個用於單次劑量 AT 抗凝患者（*n* = 6）的 CRRT 篩檢程式和 24 個用於連續低劑量肝素抗凝患者（(*n* = 10）的 CRRT 篩檢程式的資料可採用。AT 組單個篩檢程式的平均壽命顯著長於肝素組（45 ± 29 小時[95%可信區間 27–62 小時]比 26 ± 23 小時[95%可信區間 16–36 小時]; *P* = 0.03），但患者個體的篩檢程式平均壽命兩組相近似（中位數[第 25–第 75 百分位數] 30 小時[21–59 小時]比 28 小時[17–70 小時]; *P* = 0.79）。
結論：我們的資料提示，對於晚期肝硬化重症患者，CRRT 過程中單次應用 AT 抗凝或許可作爲連續低劑量肝素抗凝的替代方法。但證實此發現尚需進行進一步的對照試驗。
（陳彬彬 譯， 馬皓琳、李士通 審校）

BACKGROUND: Adequate anticoagulation is essential to achieve efficient and cost-effective continuous renal replacement therapy (CRRT). However, in critically ill patients with advanced liver cirrhosis, this goal is challenging because of the concomitant bleeding disorder. Therefore, the evaluation of alternative anticoagulants is necessary.
METHODS: In this retrospective study, we analyzed data of 37 CRRTs in 16 critically ill patients with advanced liver cirrhosis and acute kidney injury admitted to a medical intensive care unit between 2006 and 2008 and included patients undergoing CRRT with either single doses of antithrombin (AT) or continuous low-dose heparin as a sole anticoagulant. The primary outcome measure was lifetime of single CRRT filters.
RESULTS: Data were available for 13 CRRT filters for patients anticoagulated with single doses of AT (*n* = 6), and 24 CRRT filters for patients anticoagulated continuously with low-dose

heparin (n = 10). Means of single-filter lifetimes were significantly higher in the AT group compared with the heparin group (45 ± 29 hours [95% confidence interval 27–62 hours] vs 26 ± 23 hours [95% confidence interval 16–36 hours]; P = 0.03), whereas mean filter lifetimes of individual patients were comparable (median [25th–75th percentile] 30 hours [21–59 hours] vs 28 hours [17–70 hours]; P = 0.79).
CONCLUSIONS: Our data suggest that anticoagulation with single doses of AT may be an alternative to continuously administered low-dose heparin in critically ill patients with advanced liver cirrhosis during CRRT. However, additional controlled trials are necessary to confirm our findings.

一項經食道超聲心動圖技術用來定位腎臟及監測腎灌注

A Transesophageal Echocardiography Technique to Locate the Kidney and Monitor Renal Perfusion

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通過超聲監測腎動脈多普勒血流速度指數、阻力指數和搏動指數可能有助於預測腎功能障礙。然而,這樣的監測已經在術後重症監護室中間斷地由經皮超聲完成。在手術室，經食道超聲心動圖（TEE）是可代替經皮超聲獲得腎灌注指數的方法。然而，使用 TEE 定位右腎很困難。我們提議用新技術來定位左腎，以我們的經驗這是簡單易行的。我們相信，從經胃的左心室短軸視圖開始，左轉來定位腹主動脈，沿著它到左腎動脈的起源處可能有助於比以前介紹的技術更快地定位左腎。我們還提議在手術進行時用 TEE 進行的一項新技術來監測這些多普勒指數。
（王曉莉 譯 馬皓琳 李士通 校）
Monitoring the renal arterial Doppler flow velocity indices, the resistive index and pulsatility index, with ultrasound may help predict renal dysfunction. However, such monitoring has been done intermittently by transcutaneous ultrasound in the postoperative intensive care setting. In the operating room, transesophageal echocardiography (TEE) is an alternative to transcutaneous ultrasound for obtaining indices of renal perfusion. However, it is difficult to locate the right kidney using TEE. We propose a new technique to locate the left kidney that, in our experience, is simple and easy to perform. We believe, starting from a transgastric left ventricular short-axis view, turning left to locate the abdominal aorta, and following it to the origin of the left renal artery may help locate the left kidney faster than previously described techniques. We also propose a new technique to monitor these Doppler indices using TEE during the intraoperative period.

吡咯依託咪酯相似體碳依託咪脂有效地抑制人類 5 - HT_{3A} 受體的功能：與依託咪酯比較以及對於致嘔吐性的潛在影響

The Pyrrole Etomidate Analog Carboetomidate Potently Inhibits Human 5-HT_{3A} Receptor Function: Comparisons with Etomidate and Potential Implications for Emetogenesis

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背景：5 - 羥色胺的 3 型（5-HT_3）受體是興奮性的離子通道，屬於配體門控離子通道的半胱氨酸環家族。它們與機體的噁心、嘔吐相關，而它們的拮抗劑在臨床上被用作止吐藥。我們先前報導了進展的依託咪酯的一個新穎的吡咯相似體，（*R*）-乙基-1 -（1-苯乙基）-1*H*-吡咯-2-羧酸乙酯（碳依託咪脂），其中保留了依託咪酯合乎需要的麻醉和血流動力學性能，但缺乏其對促腎上腺皮質激素刺激的類固醇合成的強效抑制作用。此外，與依託咪酯不同的是，碳依託咪脂可強效抑制煙鹼型乙醯膽鹼受體。因爲煙鹼型乙醯膽鹼和 5-HT_3 受體有高度同源性，我們假設碳依託咪脂也可有效抑制 5-HT_3 受體，這對藥物的致吐性活動有潛在的重要意義。在目前的研究中，我們觀察和比較碳依託咪脂和依託咪酯對 5-HT_{3A} 受體的調製作用。
方法：5-HT_3 受體在人胚胎腎細胞上異源性表達。我們通過一個耦合到壓電元件的多通道表面灌流移液器給予藥物，並採用膜片鉗技術以全細胞式或膜外面向外式記錄電流。
結果：碳依託咪脂和依託咪酯抑制整體由 5-HT_{3A} 受體介導的電流，半抑制濃度分別爲 1.9 μM（95 %可信區間 [CI] = 1.4-2.7 μM）和 25 μM（95% CI = 17-37 μM）。這些值可以與相應的催眠濃度 5.4 μM 和 2.3 μM 相比較。這種抑制在峰值電流的幅度和脫敏率反映出催眠作用。減少電流峰值的半抑制濃度分別爲碳依託咪脂 34 μM （95% CI = 24-48 μM）和依託咪酯 171 μM （95% CI = 128-228 μM）。減少脫敏時間常數的半抑制濃度分別爲碳依託咪脂 3.5 μM （95%CI = 2.4-5.1 μM）和依託咪脂 36 μM（95% CI = 21-59μM）。
結論：與依託咪酯相反，碳依託咪脂在催眠濃度可抑制 5- HT_{3A} 受體介導的電流。這種抑制作用主要是脫敏率提高造成的結果。由於碳依託咪脂有效地抑制了 5-HT_{3A} 受體，它的致吐性可能比依託咪脂更低。
（余亦南 譯 馬皓琳 李士通 校）

BACKGROUND: 5-Hydroxytryptamine type 3 (5-HT_3) receptors are excitatory ion channels belonging to the cys-loop family of ligand-gated ion channels. They are involved in nausea and vomiting and their antagonists are used clinically as antiemetic drugs. We previously reported the development of a novel pyrrole analog of etomidate, (*R*)-ethyl 1-(1-phenylethyl)-1*H*-pyrrole-2-carboxylate (carboetomidate), which retains etomidate's desirable anesthetic and hemodynamic properties, but lacks its potent inhibitory effect on adrenocorticotropic hormone–stimulated steroid synthesis. Also in contrast to etomidate, carboetomidate potently inhibits nicotinic acetylcholine receptors. Because nicotinic acetylcholine and 5-HT_3 receptors are highly homologous, we hypothesized that carboetomidate might also potently inhibit 5-HT_3 receptors with potentially important implications for the drug's emetogenic activity. In the current studies, we investigated and compared modulation of 5-HT_{3A} receptors by carboetomidate and etomidate.
METHODS: 5-HT_3 receptors were heterologously expressed in human embryonic kidney cells. Drugs were applied with a multichannel superfusion pipette coupled to piezoelectric elements, and currents were recorded from cells in either the whole-cell or excised outside-out patch configuration of patch-clamp recordings.
RESULTS: Carboetomidate and etomidate inhibited integrated 5-HT_{3A} receptor–mediated currents with respective half-inhibitory concentrations of 1.9 μM (95% confidence interval [CI] = 1.4–2.7 μM) and 25 μM (95% CI = 17–37 μM). These values may be compared with respective hypnotic concentrations of 5.4 and 2.3 μM. This inhibition reflected hypnotic effects

on peak current amplitudes and desensitization rates. Half-inhibitory concentrations for reducing peak current amplitudes were 34 μM (95% CI = 24–48 μM) for carboetomidate and 171 μM (95% CI = 128–228 μM) for etomidate. Half-inhibitory concentrations for reducing the desensitization time constant were 3.5 μM (95% CI = 2.4–5.1 μM) for carboetomidate and 36 μM (95% CI = 21–59 μM) for etomidate.
CONCLUSIONS: In contrast to etomidate, carboetomidate inhibits 5-HT_{3A} receptor–mediated currents at hypnotic concentrations. This inhibition is primarily the result of enhancing the rate of desensitization. Because carboetomidate potently inhibits 5-HT_{3A} receptors, it may be less emetogenic than etomidate.

有丁醯膽鹼酯酶基因 K 變異體的患者對琥珀醯膽鹼的反應

Response to Succinylcholine in Patients Carrying the K-Variant of the Butyrylcholinesterase Gene

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背景：琥珀醯膽鹼通常很快被丁醯膽鹼酯酶代謝掉，但丁醯膽鹼酯酶的遺傳性變異體可能會延長其作用持續時間。K 變異體是丁醯膽鹼酯酶基因中最常見的突變，存在於 25%的高加索人中。目前尚未很好地研究過 K 變異體對琥珀醯膽鹼作用持續時間的重要性。我們的假設是具有 K 變異體基因型雜合子的患者中琥珀醯膽鹼的作用持續時間比正常基因型（野生型）的患者延長。
方法：我們選入 70 名接受琥珀醯膽鹼 1 mg/kg 用於行快速順序誘導的成年手術患者。使用尺神經刺激和加速度儀來行神經肌肉監測。琥珀醯膽鹼的作用持續時間定義爲到四個成串刺激的第一個肌顫搐恢復到 90%的時間（T_1 90%）。用 DNA 分析檢測丁醯膽鹼酯酶的活性和丁醯膽鹼酯酶 K 和 A 變異體的存在。
結果： 38 名患者存在野生型丁醯膽鹼酯酶，21 名患者雜合了 K 變異體。有雜合 K 變異體的患者的 T_1 90%的均值（標準差）是 11.6（3.5）分鐘，較野生型基因患者的 9.5（2.7）分鐘顯著延長（*P*=0.023），差值的均值（95%可信區間）是 2.1（0.3—4.0）分鐘。雜合 K 變異體患者的丁醯膽鹼酯酶活性是 5978 U/L，顯著低於野生型基因患者的 7703U/L（*P*=0.0045）。
結論：我們得出結論，有雜合 K 變異體等位基因患者的琥珀醯膽鹼的作用持續時間較野生型基金患者幾乎延長了 4 分鐘，但是這個差異相對于所有患者之間恢復時間的廣泛變異性和重疊而言卻是小的。
（方斌 譯 馬皓琳 李士通校）

BACKGROUND: Succinylcholine is usually metabolized quickly by the butyrylcholinesterase enzyme (BChE) but genetic variants of BChE may prolong the duration of action. The Kalow (K) variant is the most common mutation in the butyrylcholinesterase gene (*BCHE*), being present in 25% of Caucasians. The significance of the K-variant for the duration of action of succinylcholine has not been well studied. Our hypothesis was that the duration of action of

succinylcholine would be prolonged in patients heterozygous for the K-variant genotype compared with the normal genotype (wild-type).
METHODS: We included 70 adult surgical patients who received succinylcholine 1 mg/kg for rapid sequence induction. Neuromuscular monitoring was performed using ulnar nerve stimulation and acceleromyography. Duration of action of succinylcholine was defined as the time to 90% recovery of first twitch in train-of-four (T_1 90%), BChE activity was determined, and the presence of *BCHE* K and A (atypical) variants were determined using DNA analysis.
RESULTS: The wild-type *BCHE* was present in 38 patients, and 21 were heterozygous for the K-variant. Mean (SD) T_1 90% in patients heterozygous for the K-variant, 11.6 (3.5) minutes, was longer than in patients with the wild-type genotype, 9.5 (2.7) minutes ($P = 0.023$), with a mean (95% confidence interval) difference of 2.1 (0.3–4.0) minutes. Patients heterozygous for the K-variant had a BChE activity of 5978 U/L compared with 7703 U/L in the wild-type group ($P = 0.0045$).
CONCLUSION: We conclude that the mean duration of action of succinylcholine is prolonged for the patient heterozygous for the K-variant allele by at most 4 minutes relative to the wild-type, but this difference is small relative to the wide variability and overlap in recovery times among all patients.

重力驅動的微孔點滴靜脈輸注在“完全開放”流動過程中傳輸的藥物和液體容量

Medication and Volume Delivery by Gravity-Driven Micro-Drip Intravenous Infusion: Potential Variations During “Wide-Open” Flow

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背景：重力驅動的微孔點滴輸注裝置可以通過調節每分種滴數來控制給藥劑量。當滾輪調節器完全開放時，滴注室中液體的流動應該是連續不斷的液體柱而不是離散可數的液滴。我們假設處於這種“完全開放”狀態時，輸入的藥物劑量因依賴于微孔點滴設備的外在因素而很難預測。我們在一個離體的實驗室模型上進行實驗來研究不同的臨床相關條件下液體處於完全開放流動時輸入的量。
方法：接通生理鹽水袋的微孔點滴輸液器在遠端連接一個高流量的旋塞，旋塞再連接一個垂直方向的靜脈內導管（14-22 號）。鹽水袋的彎液面要高於出口 60—120cm。在所有的試驗中輸液器的滾輪調節器都是完全開放的，使滴注室的液體流動成連續不斷的液體柱。在每個條件下測量四次 1 分鐘裡的液體流量。爲了模擬載體流量的阻力效應，我們用一個定量輸液泵通過一個載體載體靜脈輸液器來輸送不同流率的生理鹽水到一個帶“背馱式”微孔點滴輸液器。我們也比較了 3 個不同廠家的微孔點滴輸液器的液體傳輸。
結果：在完全開放狀態下重力驅動的靜脈液體輸注量因輸液導管大小和液量高度的不同，其變化有 2.9 倍的差距（95%的可信區間爲 2.84—2.96）。帶旋塞和導管的微孔點滴輸液器的模型總阻力因流率不同而不同。背馱式微孔點滴輸液器隨著載體流量從 0 增加到 1998ml/min，輸入的液量減少了 29.7%± 0.8%（均數 ± 標準誤）。3 個不同廠家的微孔點滴輸液器的輸液特性相似。

結論：通過實驗室模擬重力驅動的微孔點滴輸液器在完全開放下的臨床情況，我們得出：液體輸注率（藥物和/或容量輸入）的大差距變化取決於導管的大小、液量的高度、以及載體流量等外在因素。多變的阻力意味著在微孔點滴輸注模型中液體的非層流流量很難做數學上的預測。這些發現支持以下觀點：使用機械泵取代重力驅動的微孔點滴法可以提高靜脈輸液尤其是血管活性藥輸注的精確性和安全性。
（王慧娟 譯 馬皓琳 李士通 校）

BACKGROUND: Gravity-driven micro-drip infusion sets allow control of medication dose delivery by adjusting drops per minute. When the roller clamp is fully open, flow in the drip chamber can be a continuous fluid column rather than discrete, countable, drops. We hypothesized that during this "wide-open" state, drug delivery becomes dependent on factors extrinsic to the micro-drip set and is therefore difficult to predict. We conducted laboratory experiments to characterize volume delivery under various clinically relevant conditions of wide-open flow in an in vitro laboratory model.

METHODS: A micro-drip infusion set, plugged into a bag of normal saline, was connected to a high-flow stopcock at the distal end. Vertically oriented IV catheters (gauges 14–22) were connected to the stopcock. The fluid meniscus height in the bag was fixed (60–120 cm) above the outflow point. The roller clamp on the infusion set was in fully open position for all experiments resulting in a continuous column of fluid in the drip chamber. Fluid volume delivered in 1 minute was measured 4 times with each condition. To model resistive effects of carrier flow, volumetric infusion pumps were used to deliver various flow rates of normal saline through a carrier IV set into which a micro-drip infusion was "piggybacked." We also compared delivery by micro-drip infusion sets from 3 manufacturers.

RESULTS: The volume of fluid delivered by gravity-driven infusion under wide-open conditions (continuous fluid column in drip chamber) varied 2.9-fold (95% confidence interval, 2.84–2.96) depending on catheter size and fluid column height. Total model resistance of the micro-drip with stopcock and catheter varied with flow rate. Volume delivered by the piggybacked micro-drip decreased up to 29.7% ± 0.8% (mean ± SE) as the carrier flow increased from 0 to 1998 mL/min. Delivery characteristics of the micro-drip infusion sets from 3 different manufacturers were similar.

CONCLUSIONS: Laboratory simulation of clinical situations with gravity-driven micro-drip infusion sets under wide-open flow conditions revealed that infusion rate (drug and/or volume delivery) can vary widely depending on extrinsic factors including catheter size, fluid column height, and carrier flow. The variable resistance implies nonlaminar flow in the micro-drip model that cannot be easily predicted mathematically. These findings support the use of mechanical pumps instead of gravity-driven micro-drips to enhance the precision and safety of IV infusions, especially for vasoactive drugs.

剖腹產手術抗生素預防性應用中的不統一：一項麻醉醫師的全國調查

Unwarranted Variability in Antibiotic Prophylaxis for Cesarean Section Delivery: A National Survey of Anesthesiologists

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背景：美國婦產科協會最新的指南推薦在剖腹產手術切皮前即刻預防性使用抗生素。本研究的目的即以全美麻醉醫師爲樣本來測試和描述此指南的執行相關情況。
方法：我們隨機邀請美國麻醉醫師協會的部分成員（*n*=1000）完成了一項網上調查。
結果：在 1052 名（10.5%）提供完整可供分析的資訊的應答者中，63.5%（95%CI 60.6%~66.3%，*n*=668）報告了切皮前預防性使用抗生素作爲監護標準應用於計畫剖腹產。28%（*n*=229）的醫師同意麻醉醫師必須對預防性使用抗生素的時機負主責。在多因素模型中，不同醫院類型（社區醫院比教學醫院，62%比 70%，*P*=0.004）、地域（西部比東南部，70%比 59%，*P*=0.01;西部比西南部，70%比 58%，*P*=0.02）以及應答者對於合適的切皮前使用時機的意見（80%的受試者主張常規切皮前給藥，17%主張常規在斷臍後給藥，47%主張隨從產科醫師的意願，43%認爲需要更多的資訊）（所有比較 *P*＜0.001）對於切皮前預防性應用抗生素存在顯著差異。在該模型中，最大的區別因數爲應答者關於合適的切皮前給藥時機的認識（受試者工作特徵曲線下面積變化=0.13 比其餘的≤0.02）
結論：對當前剖宮產預防性抗生素給藥指南的遵守不統一。教育的開展、 監管的實施和過程的改進應針對不遵守當前指南的麻醉醫師所在地。
（王贇 譯 馬皓琳 李士通 校）

BACKGROUND: Current guidelines from the American College of Obstetricians and Gynecologists recommend antibiotic prophylaxis for cesarean delivery immediately before incision. The purpose of this study was to measure and describe correlates of adherence to these guidelines in a sample of United States anesthesiologists.
METHODS: We invited a random sample of the membership of the American Society of Anesthesiologists (*n* = 10,000) to complete an online survey.
RESULTS: Of 1052 respondents (10.5%) with complete information for analysis, 63.5% (95% confidence interval 60.6%, 66.3%, *n* = 668) reported preincision prophylaxis as the standard of care for scheduled cesarean delivery. Twenty-eight percent (*n* = 299) agreed that the anesthesiologist should take primary responsibility for prophylaxis timing. In a multivariable model, significant variability in preincision prophylaxis was noted for hospital type (community versus teaching, 62% vs 70%, *P* = 0.004), region (West versus Southeast, 70% vs 59%, *P* = 0.01; West versus Southwest, 70% vs 58%, *P* = 0.02), and respondents' belief in appropriate preincision timing (those endorsing routine preincision administration [80%], routine after cord clamp administration [17%], at the discretion of the obstetrician [47%], and the belief that more information was needed [43%]) (*P* < 0.001 all comparisons). Respondents' belief about appropriate preincision timing was the strongest discriminator in the model (change in area under the receiver operating characteristic curve = 0.13 vs ≤0.02 for all others).
CONCLUSION: Adherence with current prophylactic antibiotic administration guidelines for cesarean delivery is not uniform. Education initiatives, regulatory maneuvers, and process improvement should be targeted at sites where anesthesiologists do not comply with current guidelines.

成人心臟手術患者中腦近紅外光譜監測與神經功能預後的關係：一篇系統性綜述

Cerebral Near-Infrared Spectroscopy Monitoring and Neurologic Outcomes in Adult Cardiac Surgery Patients: A Systematic Review

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背景：近紅外光譜在心臟手術中被用來監測腦灌注的充分性。在本篇系統性綜述裡，我們評估了可用的成年患者的資料來確定（1）在心臟手術中腦血氧定量的減低是否與腦卒中、術後認知功能障礙（POCD）或譫妄有關，以及（2）針對糾正腦血氧定量減低的措施是否能夠改善神經功能的預後。
方法：我們搜索了 PubMed、Cochrane 和 Embase 資料庫，從起始到 2012 年 1 月 31 日，沒有語言限制。還檢查了每篇文章的參考文獻。如果文章沒有原始資料（例如綜述、評述），或沒有在等同於綜述類的雜誌上發表全文（例如只有摘要）將被排除在外。首先篩選識別出的摘要，然後由兩位獨立的研究人員審閱合格文章的全文。對於合格的文章，我們記錄了研究物件的數量、手術類型和神經功能研究終點的診斷標準。.
結果：我們找出了符合入選標準的 13 篇病例報告、27 篇觀察性研究和 2 篇前瞻性隨機干預試驗。病例報告和 2 篇觀察性研究包含的無對照證據表明局部的腦氧飽和度（$rSco_2$）監測可以被用來識別心肺轉流中的插管錯位。9 篇觀察性研究中的 6 篇報導了急性 $rSco_2$ 降低與 POCD 之間的關聯，其中 POCD 的測定基於簡易精神狀態檢查（*n*=3 項研究）或更詳細的認知功能測試（*n*=6 項研究）。兩項回顧性研究報導了 $rSco_2$ 降低與術後腦卒中或 I 型和 II 型術後神經功能損傷的關係。觀察性研究有很多限制，包括樣本量小、評估只能在術後即刻進行以及不能進行風險調整。兩項隨機研究評估了用於治療術中 $rSco_2$ 減低的干預的療效，但是其中一項研究方案執行性較差。另外一項研究顯示，干預治療 $rSco_2$ 減低與不進行干預相比，主要器官損傷較少，ICU 住院時間較短。
結論：心臟手術尤其在主動脈手術中 rSco2 的減低或許可以識別出心肺轉流中插管錯位。只有低級別的證據表明心臟手術中低 $rSco_2$ 導致術後神經功能的併發症，並且資料不足以表明通過干預措施改善 $rSco_2$ 的減低能夠防止腦卒中或 POCD。
（張怡 譯 馬皓琳 李士通校）

BACKGROUND: Near-infrared spectroscopy is used during cardiac surgery to monitor the adequacy of cerebral perfusion. In this systematic review, we evaluated available data for adult patients to determine (1) whether decrements in cerebral oximetry during cardiac surgery are associated with stroke, postoperative cognitive dysfunction (POCD), or delirium; and (2) whether interventions aimed at correcting cerebral oximetry decrements improve neurologic outcomes.
METHODS: We searched PubMed, Cochrane, and Embase databases from inception until January 31, 2012, without restriction on languages. Each article was examined for additional references. A publication was excluded if it did not include original data (e.g., review, commentary) or if it was not published as a full-length article in a peer-reviewed journal (e.g., abstract only). The identified abstracts were screened first, and full texts of eligible articles were reviewed independently by 2 investigators. For eligible publications, we recorded the number of subjects, type of surgery, and criteria for diagnosis of neurologic end points.

RESULTS: We identified 13 case reports, 27 observational studies, and 2 prospectively randomized intervention trials that met our inclusion criteria. Case reports and 2 observational studies contained anecdotal evidence suggesting that regional cerebral O_2 saturation ($rSco_2$) monitoring could be used to identify cardiopulmonary bypass cannula malposition. Six of 9 observational studies reported an association between acute $rSco_2$ desaturation and POCD based on the Mini-Mental State Examination (n = 3 studies) or more detailed cognitive testing (n = 6 studies). Two retrospective studies reported a relationship between $rSco_2$ desaturation and stroke or type I and II neurologic injury after surgery. The observational studies had many limitations, including small sample size, assessments only during the immediate postoperative period, and failure to perform risk adjustments. Two randomized studies evaluated the efficacy of interventions for treating $rSco_2$ desaturation during surgery, but adherence to the protocol was poor in one. In the other study, interventions for $rSco_2$ desaturation were associated with less major organ injury and shorter intensive care unit hospitalization compared with nonintervention.
CONCLUSIONS: Reductions in $rSco_2$ during cardiac surgery may identify cardiopulmonary bypass cannula malposition, particularly during aortic surgery. Only low-level evidence links low $rSco_2$ during cardiac surgery to postoperative neurologic complications, and data are insufficient to conclude that interventions to improve $rSco_2$ desaturation prevent stroke or POCD.

離體大鼠坐骨神經利多卡因吸收和清除動力學

Kinetics of Uptake and Washout of Lidocaine in Rat Sciatic Nerve In Vitro

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背景：臨床上用於外周神經阻滯而注射的局部麻醉藥的效價和效能很大程度上取決於神經藥物吸收的速度。然而，因爲通過血管系統擴散到周圍組織以及去除是體內利多卡因總體分佈的重要因素，所以必須研究去除那些干擾因數的真正的藥物/神經組織相互作用的動力學。
方法：吸收：我們將有鞘或去鞘離體大鼠坐骨神經暴露於[^{14}C]-利多卡因 0 到 180 分鐘後取出，然後分析神經和鞘內的利多卡因含量。清除：我們將離體神經浸泡於[^{14}C]-利多卡因內 60 分鐘，然後置於無利多卡因的溶液內 0 到 30 分鐘，並評估在不同時間取出的樣本內藥物含量。實驗變數包括神經外膜鞘、利多卡因的濃度、pH、CO_2-碳酸氫鹽的存在以及培養持續時間的影響。
結果：利多卡因的平衡吸收隨培養時間、濃度以及非離子形式中的分子分數的增加而增加。雖然吸收率不受藥物濃度的影響，但因神經外膜鞘的存在而大約減半，同時清除率卻減慢得較少。使用碳酸氫鹽-CO_2 緩衝液或非碳酸氫鹽緩衝液將 pH 從 6.8 到 7.4 的輕微鹼化能夠增強神經吸收，而且可到相同程度。利多卡因的清除在高濃度短時間培養後比低濃度長時間培養後吸收的等量利多卡因更快。
結論：利多卡因進入神經的過程不同于自由擴散，而是通過有輕微障礙的神經外膜鞘。考慮到在體外快速進入與在體內小得多且短暫的含量測量相比，利多卡因與神經在外周阻滯時達到平衡似乎不太可能。
（唐瑩 譯 李士通 馬皓琳 校）

BACKGROUND: The potency and efficacy of local anesthetics injected clinically for peripheral nerve block depends strongly on the rate of neural drug uptake. However, because diffusion into surrounding tissues and removal by the vascular system are major factors in the overall distribution of lidocaine in vivo, true kinetics of drug/neural tissue interactions must be studied in the absence of those confounding factors.
METHODS: Uptake: Ensheathed or desheathed isolated rat sciatic nerves were exposed to [^{14}C]-lidocaine for 0 to 180 minutes and then removed and the lidocaine content of nerve and sheath analyzed. Washout: Isolated nerves were soaked in [^{14}C]-lidocaine for 60 minutes and then placed in lidocaine-free solution for 0 to 30 minutes, with samples removed at different times to assess the drug content. Experimental variables included the effects of the ensheathing epineurium, lidocaine concentration, pH, presence of CO_2-bicarbonate, and incubation duration.
RESULTS: The equilibrium uptake of lidocaine increased with incubation time, concentration, and the fraction of molecules in the nonionized form. The uptake rate was unaffected by drug concentration, but was about halved by the presence of the epineurial sheath, with the washout rate slowed less. Slight alkalinization, from pH 6.8 to pH 7.4, by bicarbonate-CO_2 buffer or a nonbicarbonate buffer, enhanced the neural uptake, and to the same degree. The washout of lidocaine was faster after shorter incubations at high concentrations than when equal amounts of lidocaine were taken up after long incubations at low lidocaine concentrations.
CONCLUSION: Lidocaine enters a nerve by a process other than free diffusion, through an epineurial sheath that is a slight obstacle. Given the rapid entry in vitro compared with the much smaller and transient content measured in vivo, it seems highly unlikely that lidocaine equilibrates with the nerve during a peripheral blockade.

皰疹後神經痛的鼠類模型中真皮層去神經支配的嚴重程度與機械性異常性疼痛和痛覺過敏的發展之間的聯繫

Association of Denervation Severity in the Dermis with the Development of Mechanical Allodynia and Hyperalgesia in a Murine Model of Postherpetic Neuralgia

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背景：皰疹後神經痛（PHN）是帶狀皰疹的一種常見併發症，而且會遺留神經病理性疼痛的具有挑戰性的情況。異常性疼痛作爲皰疹後神經痛的一個顯著特點，會擴散到最初的皮疹面積以外的區域。在本研究中，我們通過使用 PHN 的鼠類模型研究了皮膚去神經支配與皰疹後異常性疼痛和痛覺過敏發展之間的聯繫。
方法：使用雌性 C57BL/6j 小鼠。將單純皰疹病毒 1 型(HSV1) 接種于單側小腿，這一區域主要是受 L3 背根神經節（DRG）神經元支配。在帶狀皰疹樣皮損癒合後，將小鼠按照在同側後肢足底方面的機械性異常性疼痛和痛覺過敏的表現來分類。用一種蛋白基因產物的抗體(PGP)9.5 將佈滿傷痕的腰（受 L2-4 DRG 神經元支配）和同側足底（受 L3-5 DRG 神

經元支配）的皮膚切片進行了免疫染色。分析在表皮和真皮中對 PGP9.5 有免疫反應（IR）的數量，用於皮膚神經支配的定量。
結果：在有疤痕的腰皮膚的表皮，有 PGP9.5 - IR 特性的個體內平均數量在接種 HSV1 的小鼠中明顯減少。有疤痕皮膚的表皮中 PGP9.5 - IR 的個體內最大和平均數量在有和沒有皰疹後異常性疼痛和痛覺過敏的小鼠之間沒有顯著差異。在有疤痕的腰皮膚的真皮層，有皰疹後異常性疼敏和痛覺過敏的小鼠的 PGP9.5 -IR 個體內最大和平均數量顯著下降，但這不適用於沒有這些症狀的小鼠。HSV1 的接種使真皮和表皮中有 PGP9.5 - IR 特性的個體內最低數量顯著減少。HSV1 接種使接種側表皮中有 PGP9.5 - IR 特性的個體內平均數目顯著減少，但真皮不受影響。
結論：本研究結果表明，有疤痕的皮膚真皮去神經支配的嚴重程度與皰疹後異常性疼痛敏和痛覺過敏的發展相關，它們的發展會超出最初的皮疹面積的邊緣。有疤痕的和刺激性皮膚的表皮神經密度的下降可能和皰疹後異常性疼痛和痛覺過敏沒有關聯。
（趙曉 譯　馬皓琳 李士通校）
BACKGROUND: Postherpetic neuralgia (PHN) is a common complication of herpes zoster and remains a challenging condition of neuropathic pain. Allodynia, a prominent feature of PHN, extends beyond the margins of the initial rash area. In the present study, we investigated the association between cutaneous denervation and the development of postherpetic allodynia and hyperalgesia by using a murine model of PHN.
METHODS: Female C57BL/6j mice were used. Herpes simplex virus type-1 (HSV1) was inoculated on the unilateral shin, a region that is predominantly innervated by L3 dorsal root ganglion (DRG) neurons. After the zoster-like skin lesions healed, mice were classified by the presence of mechanical allodynia and hyperalgesia in the plantar aspect of the ipsilateral hindpaw. Scarred lumbar (innervated by L2-4 DRG neurons) and the ipsilateral plantar (innervated by L3-5 DRG neurons) skin sections were immunostained with an antibody against protein gene product (PGP)9.5. The number of PGP9.5-immunoreactive (IR) profiles in the epidermis and dermis were analyzed for quantification of cutaneous innervation.
RESULTS: In the epidermis of the scarred lumbar skin, the intraindividual mean number of PGP9.5-IR profiles was significantly decreased in mice inoculated with HSV1. The intraindividual maximum and mean numbers of PGP9.5-IR profiles in the epidermis of the scarred skin were not significantly different between mice with and without postherpetic allodynia and hyperalgesia. In the dermis of the scarred lumbar skin, the intraindividual maximum and mean numbers of PGP9.5-IR profiles were significantly decreased in mice with postherpetic allodynia and hyperalgesia, but not in mice without these symptoms. The intraindividual minimum number of PGP9.5-IR profiles in the dermis and epidermis was significantly decreased by HSV1 inoculation. HSV1 inoculation significantly decreased the intraindividual mean number of PGP9.5-IR profiles in the epidermis, but not dermis, of the plantar skin on the inoculated side.
CONCLUSIONS: The present results suggest that the severity of dermal denervation in the scarred skin is associated with the development of postherpetic allodynia and hyperalgesia that extend beyond the margins of the initial rash area. The decrease of epidermal nerve density in the scarred and stimulation skins may not be associated with postherpetic allodynia and hyperalgesia.