



## ON THE COVER:

The effects of anesthetics on diaphragmatic function and muscles which maintain airways patent and how these contribute to postoperative pulmonary complications are reviewed in this issue (*Photo Credit: Admir Hadzic, M.D.*):

- Gropper: Postoperative Respiratory Muscle Dysfunction: Only the Strong Survive, p. 783
- Sasaki *et al.*: Postoperative Muscle Dysfunction: Pathophysiology and Preventative Strategies, p. 961

## THIS MONTH IN ANESTHESIOLOGY

9A

## EDITORIAL VIEWS

- |   |  |
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| <p><b>MA</b> <b>2012 Emery A. Rovenstine Memorial Lecture: The Genesis, Development, and Future of the American Society of Anesthesiologists Evidence-based Practice Parameters</b><br/><i>Jeffrey L. Apfelbaum, Richard T. Connis, and David G. Nickinovich</i></p> <p><b>MA</b> <b>The Expanding Genetic Toolkit for Exploring Mechanisms of General Anesthesia</b><br/><i>Stuart A. Forman</i></p> <p><b>Anesthesia for Fetal Surgery: Miles to Go before We Sleep</b><br/><i>Kha M. Tran, Richard Smiley, and Alan Jay Schwartz</i></p> <p><b>CME</b> <b>Estimated Glomerular Filtration Rate: More Bang for the Buck</b><br/><i>John G. T. Augoustides, Mark D. Neuman, and Lee A. Fleisher</i></p> <p><b>Hyperosmolar Therapy and the Brain: A Hundred Years of Hard-earned Lessons</b><br/><i>Michael M. Todd</i></p> <p><b>Procedure-specific Pain Management: The Road to Improve Postsurgical Pain Management?</b><br/><i>Girish P. Joshi and Henrik Kehlet</i></p> <p><b>MA</b> <b>Postoperative Respiratory Muscle Dysfunction: Only the Strong Survive</b><br/><i>Michael A. Gropper</i></p> | <p>767</p> <p>769</p> <p>772</p> <p>775</p> <p>777</p> <p>780</p> <p>783</p> |
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## PERIOPERATIVE MEDICINE

- |   |            |
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| <p><b>MA</b> <b>Forebrain HCN1 Channels Contribute to Hypnotic Actions of Ketamine</b><br/><i>Cheng Zhou, Jennifer E. Douglas, Natasha N. Kumar, Shaofang Shu, Douglas A. Bayliss, and Xiangdong Chen</i></p> | <p>785</p> |
|---|------------|

Selective deletion of HCN1 channels in principal neurons of the mouse forebrain results in diminished sensitivity to loss-of-righting reflex produced by ketamine, establishing forebrain HCN1 channels as a behaviorally relevant neural/molecular substrate for ketamine-induced hypnosis.

<p>◇ Refers to This Month in Anesthesiology</p> <p>◆ Refers to Editorial Views</p> <p>MA Meeting Article</p>	<p>See Supplemental Digital Content</p> <p>CME CME Article</p>
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◆ **Anesthetic Techniques for Fetal Surgery: Effects of Maternal Anesthesia on Intraoperative Fetal Outcomes in a Sheep Model** 796

*Pornswan Ngamprasertwong, Erik C. Michelfelder, Shahriar Arbabi, Yun Suk Choi, Christopher Statile, Lili Ding, Anne Boat, Pirooz Eghtesady, Katherine Holland, and Senthilkumar Sadhasivam*

In sheep, compared to high-dose desflurane anesthesia, low-dose desflurane supplemented with propofol and remifentanyl IV anesthesia provides better fetal acid–base status and maternal hemodynamics.

CMR ◆◆◆ **Preoperative Estimates of Glomerular Filtration Rate as Predictors of Outcome after Surgery: A Systematic Review and Meta-analysis** 809

*John F. Mooney, Isuru Ranasinghe, Clara K. Chow, Vlado Perkovic, Federica Barzi, Sophia Zoungas, Martin J. Holzmann, Gijs M. Welten, Fausto Biancari, Vin-Cent Wu, Timothy C. Tan, Alan Cass, and Graham S. Hillis*

Estimated glomerular filtration rate is a powerful and consistent predictor of risk of mortality, cardiovascular events, and acute kidney injury after surgery. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

MA **Anesthetics Interfere with Axon Guidance in Developing Mouse Neocortical Neurons *In Vitro* via a  $\gamma$ -Aminobutyric Acid Type A Receptor Mechanism** 825

*C. David Mintz, Kendall M. S. Barrett, Sarah C. Smith, Deanna L. Benson, and Neil L. Harrison*

Anesthetics interfere with axon guidance, a critical process in brain circuit formation during development.

**Adult–Child Interactions in the Postanesthesia Care Unit: Behavior Matters** 834

*Jill MacLaren Chorney, Edwin T. Tan, and Zeev N. Kain*

According to behavioral observations and sequential analysis, adult behaviors influence whether children become distressed, stay distressed, or exhibit coping behavior in the postanesthesia care unit

**Limb Remote Ischemic Preconditioning for Intestinal and Pulmonary Protection during Elective Open Infrarenal Abdominal Aortic Aneurysm Repair: A Randomized Controlled Trial** 842

*Cai Li, Yun-Sheng Li, Miao Xu, Shi-Hong Wen, Xi Yao, Yan Wu, Chan-Yan Huang, Wen-Qi Huang, and Ke-Xuan Liu*

The authors demonstrate that limb remote ischemic preconditioning with three cycles of 5-min ischemia–reperfusion on the upper arm, a simple maneuver, attenuates pulmonary and intestinal injury in patients undergoing elective open infrarenal abdominal aneurysm repair.

**A Practical Tranexamic Acid Dosing Scheme Based on Population Pharmacokinetics in Children Undergoing Cardiac Surgery** 853

*Stanislas Grassin-Delyle, Roland Couturier, Emuri Abe, Jean Claude Alvarez, Philippe Devillier, and Saïk Urien*

This work describes for the first time the pharmacokinetics of tranexamic acid in children undergoing cardiac surgery with cardiopulmonary bypass, which was the basis for the proposal of an optimized dosing scheme.

**Effective Volume of Ropivacaine 0.75 through a Catheter Required for Interscalene Brachial Plexus Blockade** 863

*Catherine Vandepitte, Philippe Gautier, Daquan Xu, Emine A. Salviz, and Admir Hadzic*

The minimal volume 7 ml of ropivacaine 0.75% through the catheter is required for surgical anesthesia with interscalene brachial plexus block.

**Impact of Entropy Monitoring on Volatile Anesthetic Uptake** 868

*Tarek El Hor, Philippe Van Der Linden, Stephan De Hert, Christian Mélot, and Javad Bidgoli*

This study confirmed that monitoring the depth of anesthesia with M-Entropy (Datex-Ohmeda, Helsinki, Finland) was associated not only with a reduction in sevoflurane uptake by almost 30% – 1.41 ml/h (0.554; 2.26) – but also with a faster extubation.

**Reducing Wastage of Inhalation Anesthetics Using Real-time Decision Support to Notify of Excessive Fresh Gas Flow** 874

*Bala G. Nair, Gene N. Peterson, Moni B. Neradilek, Shu Fang Newman, Elaine Y. Huang, and Howard A. Schwid*

This article discusses application and evaluation of a decision support system to reduce consumption of inhalation anesthetics. Practitioners are provided with real-time alerts to reduce excess fresh gas flow to optimal levels.

**Preoperative Stroke and Outcomes after Coronary Artery Bypass Graft Surgery** 885

*Alex Bottle, Abdul Mozid, Hilary P. Grocott, Matthew R. Walters, Kennedy R. Lees, Paul Aylin, and Robert D. Sanders*

In this study the importance of time interval between stroke and subsequent coronary artery bypass graft surgery was investigated. The authors found no evidence that more recent preoperative stroke predisposed patients undergoing coronary artery bypass graft surgery to suffer adverse perioperative outcomes.

**Interaction between Nitrous Oxide, Sevoflurane, and Opioids: A Response Surface Approach** 894

*Hugo E. M. Vereecke, Johannes H. Proost, Bjorn Heyse, Douglas J. Eleveld, Takasumi Katoh, Martin Luginbühl, and Michel M. R. F. Struys*

Reanalyzing data of Katoh *et al.* reveals that a simple extension of the hierarchical response surface model is able to predict movement and hemodynamic responses after incision during 66 vol% nitrous oxide, opioids, and sevoflurane anesthesia.

■ CRITICAL CARE MEDICINE

◆ ◆ **Comparison of Equivolume, Equiosmolar Solutions of Mannitol and Hypertonic Saline with or without Furosemide on Brain Water Content in Normal Rats** 903

*Liang Chao Wang, Alexander Papangelou, Christopher Lin, Marek A. Mirski, Allan Gottschalk, and Thomas J. K. Toung*

Infusion of 25% mannitol reduced rat brain water content more effectively than did equivolume, equiosmolar infusion of 4.2% hypertonic saline. Administration of furosemide with hypertonic saline resulted in an effect similar to mannitol.

**Pulmonary Shunt Is Independent of Decrease in Cardiac Output during Unsupported Spontaneous Breathing in the Pig** 914

*Laszlo Vimlati, Anders Larsson, Goran Hedenstierna, and Michael Lichtwarck-Aschoff*

Pulmonary shunt was independent of cardiac output during unsupported spontaneous breathing but not during controlled mechanical ventilation and continuous positive airway pressure. This finding questions the role of pulmonary hypoxic vasoconstriction during unsupported spontaneous breathing.

🌐 **Effects of Intratracheal Mesenchymal Stromal Cell Therapy during Recovery and Resolution after Ventilator-induced Lung Injury** 924

*Gerard F. Curley, Bilal Ansari, Mairead Hayes, James Devaney, Claire Masterson, Aideen Ryan, Frank Barry, Timothy O'Brien, Daniel O' Toole, and John G. Laffey*

Intratracheal mesenchymal stromal cells therapy enhanced repair after ventilation-induced lung injury, *via* a paracrine mechanism, and was as effective as intravenous mesenchymal stromal cells therapy in restoring lung architecture and function. SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

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### ■ PAIN MEDICINE

- ◆◆🌐 **Pain Intensity on the First Day after Surgery: A Prospective Cohort Study Comparing 179 Surgical Procedures** 934

*Hans J. Gerbershagen, Sanjay Aduckathil, Albert J. M. van Wijck, Linda M. Peelen, Cor J. Kalkman, and Winfried Meissner*

Many patients still suffer from moderate to severe postoperative pain despite improvements in pain treatment. Identification of the types of surgery that may result in severe postoperative pain could lead to better postoperative pain therapy. The worst pain intensities since surgery, rated on the first postoperative day by 50,523 patients, were compared for 179 surgical groups. High levels of pain were observed after several common minor- to medium-level procedures because patients received no opioids or low doses thereof. On the other hand, comparatively low pain scores were observed after a number of major abdominal surgeries, often due to sufficient epidural analgesia. The quality of care after surgeries associated with high pain scores could be improved by better adherence to evidence-based pain-treatment recommendations. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

- Prophylactic and Antinociceptive Effects of Coenzyme Q10 on Diabetic Neuropathic Pain in a Mouse Model of Type 1 Diabetes** 945

*Yan Ping Zhang, Ariel Eber, Yue Yuan, Zhe Yang, Yiliam Rodriguez, Roy C. Levitt, Peter Takacs, and Keith A. Candiotti*

This study presents the concept that oxidative damage and reactive inflammation may be pathogenic in diabetic neuropathic pain. CoQ10 may inhibit oxidative stress, reduce inflammation and desensitize nociceptor function by down regulating proinflammatory factors.

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- Ultrasound Visualization of the Superficial Peroneal Nerve in the Mid-calf** 956  
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- 🌐 **Lateral Pterygoid Muscle and Maxillary Artery Are Key Anatomical Landmarks for Ultrasound-guided Trigeminal Nerve Block** 957  
*Antoun Nader, Hanna Schitteck, and Mark C. Kendall*

*SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

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#### REVIEW ARTICLE

- MA◆ **Postoperative Respiratory Muscle Dysfunction: Pathophysiology and Preventive Strategies** 961  
*Nobuo Sasaki, Matthew J. Meyer, and Matthias Eikermann*

Postoperative pulmonary complications are responsible for increases in hospital cost and patient morbidity and mortality. The authors review the role respiratory muscle function, and dysfunction, contribute to the pathophysiology and prevention of postoperative pulmonary complications.

#### MIND TO MIND

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*Alicia M. Kowalski*

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