

◆ THIS MONTH IN ANESTHESIOLOGY

9A

◇ EDITORIAL VIEWS

- CME** **Risk Stratification, Risk Adjustment, and Other Risks** 1001
Fredrick K. Orkin
- CME** **Risk Stratification Index: An Important Advance in Comparing Health Care Apples to Oranges** 1004
Norman A. Cohen and Alexander A. Hannenberg
- This Is No Humbug: Anesthetic Agent-induced Unconsciousness and Sleep Are Visibly Different** 1007
Nancy L. Chamberlin and Matthias Eikermann
- Neostigmine versus Sugammadex: Which, When, and How Much?** 1010
Aaron F. Kopman
- Is There Transfusion-related Acute Renal Injury?** 1012
Beth H. Shaz and Christopher D. Hillyer
- Femoral Nerve Block for Analgesia in Patients Having Knee Arthroplasty** 1014
Admir Hadzic, Timothy T. Houle, Xavier Capdevila, and Brian M. Ilfeld
- Active, Personalized, and Balanced Coagulation Management Saves Lives in Patients with Massive Bleeding** 1016
Michael T. Ganter and Donat R. Spahn

■ SPECIAL ARTICLES

- Frank J. Murphy, M.D., C.M., 1900–1972: His Life, Career, and the Murphy Eye** 1019
John E. Forestner
Around 1940, Frank J. Murphy added the “Murphy eye” to the endotracheal tube to decrease the risk of airway occlusion under anesthesia. National standards and regulation of the specialty greatly affected Murphy’s career after World War II.

■ PERIOPERATIVE MEDICINE

- CME** **◇** **◆** **◆** **Broadly Applicable Risk Stratification System for Predicting Duration of Hospitalization and Mortality** 1026
Daniel I. Sessler, Jeffrey C. Sigl, Paul J. Manberg, Scott D. Kelley, Armin Schubert, and Nassib G. Chamoun
The authors developed broadly applicable and robust risk-stratification systems for assessing hospital length of stay and mortality for surgical patients based solely on administrative data. SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

Continued on page 16A

◇ Refers to This Month in Anesthesiology
◆ Refers to Editorial Views

◆ See Supplemental Digital Content
CME CME Article

- ◆ **Breakdown of within- and between-network Resting State Functional Magnetic Resonance Imaging Connectivity during Propofol-induced Loss of Consciousness** 1038
 Pierre Boveroux, Audrey Vanhauudenhuysse, Marie-Aurélië Bruno, Quentin Noirhomme, Ir., Séverine Lauwick, André Luxen, Christian Degueudre, Ir., Alain Plenevaux, Caroline Schnakers, Christophe Phillips, Ir., Jean-François Brichant, Vincent Bonhomme, Pierre Maquet, Michael D. Greicius, Steven Laureys, and Mélanie Boly
Using resting-state functional magnetic resonance imaging connectivity analyses, the authors show that propofol-induced unconsciousness is associated with a marked disorganization of spontaneous brain activity temporal architecture, predominant in higher-order frontoparietal cortices. SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT
- ◆ **Sugammadex and Neostigmine Dose-finding Study for Reversal of Shallow Residual Neuromuscular Block** 1054
 Stefan J. Schaller, Heidrun Fink, Kurt Ulm, and Manfred Blobner
Sugammadex, 0.22 mg/kg, and neostigmine, 34 µg/kg, are able to accelerate the recovery from train-of-four ratio of 0.5 to 0.9 or higher in an average of 2 min, or within 5 min for 95% of all treated patients.
- ◇ **Short-term Memory Impairment after Isoflurane in Mice Is Prevented by the $\alpha 5$ γ -Aminobutyric Acid Type A Receptor Inverse Agonist L-655,708** 1061
 Bechara J. Saab, Ashley J. B. MacLean, Marijana Kanisek, Agnieszka A. Zurek, Loren J. Martin, John C. Roder, and Beverley A. Orser
Postanesthetic memory deficits represent an undesirable and poorly understood adverse effect of general anesthetics. Anesthetics modulate γ -aminobutyric acid (GABA) receptors and the inhibitory $\alpha 5$ subunit-containing GABA subtype A receptors ($\alpha 5$ GABA_A) are known to play a critical role in memory processes. The authors hypothesized that inhibiting the activity of $\alpha 5$ GABA_A receptors during isoflurane anesthesia would prevent memory deficits after anesthetic exposure in mice. Mice were conditioned in fear-associated contextual and cued learning paradigms including freezing behavior. After anesthetic exposure, a robust deficit in contextual fear memory persisted for at least 24 h. The $\alpha 5$ GABA_A receptor inverse agonist, L-655,708, completely prevented memory deficits without changing the immobilizing dose of isoflurane. This study suggests an isoflurane interaction at $\alpha 5$ GABA_A receptors may contribute to memory impairment during the early postanesthesia period in patients.
- Does Central Venous Oxygen Saturation-directed Fluid Therapy Affect Postoperative Morbidity after Colorectal Surgery? A Randomized Assessor-blinded Controlled Trial** 1072
 Ib Jammer, Atle Ulvik, Christian Erichsen, Olav Lødemel, and Gro Østgaard
Patients (n = 241) scheduled for bowel surgery were randomly assigned to receive fluid therapy following a traditional fluid scheme or aimed at Scvo₂ of at least 75%. Postoperative complications occurred in 42% of the patients in both groups.
- Brain Networks Maintain a Scale-free Organization across Consciousness, Anesthesia, and Recovery: Evidence for Adaptive Reconfiguration** 1081
 UnCheol Lee, GabJin Oh, Seunghwan Kim, GyuJung Noh, ByungMoon Choi, and George A. Mashour
The induction of general anesthesia is associated with numerous local changes in the temporal organization of neural networks, but a global order persists.
- Hydroxyethyl Starch 6% (130/0.4) Ameliorates Acute Lung Injury in Swine Hemorrhagic Shock** 1092
 Xanthippi Balkamou, Theodoros Xanthos, Konstantinos Stroumpoulis, Dimitrios-Anestis Moutzouris, Georgios Rokas, Georgios Agrogiannis, Theano Demestiha, Efstathios Patsouris, and Lila Papadimitriou
The current experimental data indicate that resuscitation after hemorrhagic shock with hydroxyethyl starch led to less edema and less microvascular permeability in swine lungs.
- Lower Isoflurane Concentration Affects Spatial Learning and Neurodegeneration in Adult Mice Compared with Higher Concentrations** 1099
 Ana M. Valentim, Pierpaolo Di Giminiani, Patricia O. Ribeiro, Paula Rodrigues, I. Anna S. Olsson, and Luis M. Antunes
Concerns regarding the effects that anesthesia may have in the brain are increasing. With an interdisciplinary approach (behavior and histopathology), this work reports on the influence of different isoflurane concentrations in adult mice.

Continued on page 18A

Intrathecal Injection of Hepatocyte Growth Factor Gene-modified Marrow Stromal Cells Attenuates Neurologic Injury Induced by Transient Spinal Cord Ischemia in Rabbits 1109

Enyi Shi, Xiaojing Jiang, Lingling Wang, Satoshi Akuzawa, Yoshiki Nakajima, and Teruhisa Kazui
Prophylactic transplantation of hepatocyte growth factor gene-modified marrow stromal cells induced powerful neuroprotective effects against ischemia-reperfusion injury in spinal cords and was more therapeutically efficient than transplantation of marrow stromal cells only.

Effect of Anesthetic Technique on Serum Vascular Endothelial Growth Factor C and Transforming Growth Factor β in Women Undergoing Anesthesia and Surgery for Breast Cancer 1118

Micheal Looney, Peter Doran, and Donal J. Buggy
In this randomized controlled trial of women with primary breast cancer undergoing surgery, anesthetic technique was found to influence serum concentrations of factors associated with angiogenesis, a prerequisite of metastases.

CRITICAL CARE MEDICINE

◆◆ **Does Erythrocyte Blood Transfusion Prevent Acute Kidney Injury? Propensity-matched Case Control Analysis** 1126

Milo Engoren
In acute lung injury, the use of erythrocyte blood transfusions has no effect on the subsequent rise in serum creatinine or the incidence of acute kidney injury.

🌐 **Critical Role of the Small GTPase RhoA in the Development of Pulmonary Edema Induced by *Pseudomonas aeruginosa* in Mice** 1134

Michel Carles, Mathieu Lafargue, Arnaud Goolaerts, Jérémie Roux, Yuanlin Song, Marybeth Howard, David Weston, John T. Swindle, Joe Hedgpeth, Fanny Burel-Vandenbos, and Jean-Francois Pittet
The small GTPase RhoA plays a critical role in mediating lung injury associated with Pseudomonas aeruginosa pneumonia in mice. Blocking RhoA signaling could attenuate lung damage caused by P. aeruginosa in critically ill patients. SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

PAIN MEDICINE

◆ **Femoral Nerve Block Improves Analgesia Outcomes after Total Knee Arthroplasty: A Meta-analysis of Randomized Controlled Trials** 1144

James E. Paul, Aman Arya, Lindsay Hurlburt, Ji Cheng, Lehana Thabane, Antonella Tidy, and Yamini Murthy
Single-shot femoral nerve block is a good alternative for postoperative analgesia for patients having total knee arthroplasty and the addition of either a continuous femoral nerve block or sciatic nerve block requires further study.

Purinergic P2X Receptor Regulates N-Methyl-D-aspartate Receptor Expression and Synaptic Excitatory Amino Acid Concentration in Morphine-tolerant Rats 1163

Yueh-Hua Tai, Pao-Yun Cheng, Ru-Yin Tsai, Yuh-Fung Chen, and Chih-Shung Wong
Treatment of rodents with a P2X receptor antagonist diminished opioid tolerance in part by down-regulating glutamate receptors and inhibiting excitatory amino acid release.

Disrupted Sleep and Delayed Recovery from Chronic Peripheral Neuropathy Are Distinct Phenotypes in a Rat Model of Metabolic Syndrome 1176

Aaron R. Muncey, Adam R. Saulles, Lauren G. Koch, Steven L. Britton, Helen A. Baghdoyan, and Ralph Lydic
Rats selectively bred for low intrinsic aerobic capacity develop metabolic syndrome with phenotypes of disrupted sleep and enhanced nociception homologous to traits observed in obese humans.

Continued on page 21A

- Evaluation of Pregabalin as an Adjuvant to Patient-controlled Epidural Analgesia during Late Termination of Pregnancy** 1186
Patricia M. Lavand'homme and Fabienne Roelants
Oral pregabalin 150 mg/12 h is a helpful adjuvant to epidural analgesia during late termination of pregnancy. Modulation of both the visceral sensitization and the affective component of pain may contribute to the benefits observed.

EDUCATION

- CASE SCENARIO**
Emergency Reversal of Oral Anticoagulation 1192
Aristides Koutrouvelis, Amr Abouleish, Alexander Indrikovs, and Jack Alperin

- IMAGES IN ANESTHESIOLOGY**
Wandering Epidural Catheter 1198
Jason C. Brookman, Haris I. Sair, Claudia Benkwitz, and Padma Gulur

- ANESTHESIA LITERATURE REVIEW** 1199

REVIEW ARTICLES

- ◆ **Pathophysiology and Treatment of Coagulopathy in Massive Hemorrhage and Hemodilution** 1205
Daniel Bolliger, Klaus Görlinger, and Kenichi A. Tanaka
Coagulopathy after major surgery or trauma is of multifactorial nature affecting procoagulant as well as anticoagulant, profibrinolytic, and antifibrinolytic elements. Profound understanding of pathophysiological changes in coagulation is essential to optimally manage hemostatic therapies.

- Minimally Invasive Measurement of Cardiac Output during Surgery and Critical Care: A Meta-analysis of Accuracy and Precision** 1220
Phillip J. Peyton and Simon W. Chong
A review of the accuracy and precision of four methods for minimally invasive cardiac output measurement shows that the limits of agreement with thermodilution lie well outside the suggested 30% limits.

CLINICAL CONCEPTS AND COMMENTARY

- 🌐 **Regional Anesthesia and Eye Surgery** 1236
Emmanuel Nouvellon, Philippe Cuvillon, and Jacques Ripart
Changes in surgical techniques and research aimed at improved safety have resulted in the development of alternative, nonakinesia techniques, such as sub-Tenon block or topical anesthesia. SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

CORRESPONDENCE

- Risk Factors for Persistent Postherniorrhaphy Pain: Unresolved** 1243
Bijan Mohammadhosseini

In Reply
Eske K. Aasvang and Henrik Kehlet

- Neurotoxicity of Anesthetic Agents and the Developing Brain in Rodents and Primates: The Time Has Come to Focus on Human Beings** 1244
Tom G. Hansen and Steen W. Henneberg

- Isoflurane-induced Neuroapoptosis in the Neonatal Rhesus Macaque Brain: Isoflurane or Ischemia-Reperfusion?**
Jean Xavier Mazoit, Philippe Roulleau, and Catherine Baujard

In Reply
Ansgar M. Brambrink, Alex S. Evers, Michael S. Avidan, Nuri B. Farber, Catherine E. Creeley, and John W. Olney

Continued on page 22A

Postoperative Cognitive Decline: The Unsubstantiated Phenotype 1246
Michael S. Avidan, Chengjie Xiong, and Alex S. Evers

In Reply

David L. McDonagh, Joseph P. Mathew, William D. White, and Mark F. Newman

Permeability, Osmosis, and Edema 1250
Elana B. Lubit

In Reply

John C. Drummond

■ **ANESTHESIOLOGY REFLECTIONS**

The “Blue Light Anaesthesia” of Redard 1018
George S. Bause

The 2-cent Crawford Long Postage Stamp 1037
George S. Bause

***The Rider Tavern* by Vandam** 1080
George S. Bause

Hall’s Engraving of Morton Etherizing Frost 1108
George S. Bause

■ **REVIEWS OF EDUCATIONAL MATERIAL** 1252

■ **CLASSIFIED ADS** 27A

INSTRUCTIONS FOR AUTHORS

The most recently updated version of the Instructions for Authors is available at www.anesthesiology.org. Please refer to the Instructions for the preparation of any material for submission to ANESTHESIOLOGY.

Manuscripts submitted for consideration for publication must be submitted in electronic format. The preferred method is via the Journal’s Web site (<http://www.anesthesiology.org>). Detailed directions for submissions and the most recent version of the Instructions for Authors can be found on the Web site (<http://www.anesthesiology.org>). Books and educational materials should be sent to Michael J. Avram, Ph.D., Department of Anesthesiology, Northwestern University Feinberg School of Medicine, Ward Memorial Building, Room 13-199, 303 East Chicago Avenue, Chicago, IL 60611-3008. Requests for permission to duplicate materials published in ANESTHESIOLOGY should be submitted in electronic format, to the Permissions Department (journalpermissions@lww.com). All articles accepted for publication are done so with the understanding that they are contributed exclusively to this Journal and become the property of the American Society of Anesthesiologists, Inc. Statements or opinions expressed in the Journal reflect the views of the author(s) and do not represent official policy of the American Society of Anesthesiologists unless so stated. Advertising and related correspondence should be addressed to Advertising Manager, ANESTHESIOLOGY, Lippincott Williams & Wilkins, Two Commerce Square, 2001 Market Street, Philadelphia, Pennsylvania 19103 (Web site: <http://www.lww.com/advertisingratecards/>). Publication of an advertisement in ANESTHESIOLOGY does not constitute endorsement by the Society or Lippincott Williams & Wilkins, Inc. of the product or service described therein or of any representations made by the advertiser with respect to the product or service.