

TABLE OF CONTENTS

ANESTHESIOLOGY

◇ This Month in ANESTHESIOLOGY	5A
Science, Medicine, and the Anesthesiologist.....	15A
Infographics in ANESTHESIOLOGY.....	19A

◆ Editorial Views

Wake Up, Neurons! Astrocytes Calling

M. Perouansky, M. Bruce MacIver, R. A. Pearce.....361

Acute Respiratory Distress Syndrome: Biomarkers, Mechanisms, and Water Channels

W. M. Kuebler.....364

Readers' Toolbox

The American Society of Anesthesiologists Practice Parameter Methodology

J. L. Apfelbaum, R. T. Connis.....367

The American Society of Anesthesiologists practice parameter methodology is described, including task force composition, identification of interventions and outcomes, literature review and analysis, convergence of scientific and opinion-based information, and review and adoption of the document.

Perioperative Medicine

CLINICAL SCIENCE

◇ Driving Pressure during Thoracic Surgery: A Randomized Clinical Trial



M. Park, H. J. Ahn, J. A. Kim, M. Yang, B. Y. Heo, J. W. Choi, Y. R. Kim, S. H. Lee, H. Jeong, S. J. Choi, I. S. Song.....385

In a double-blinded, randomized trial (292 patients), minimized driving pressure compared with standard protective ventilation was associated with less postoperative pneumonia or acute respiratory distress syndrome.

BASIC SCIENCE

◇ Automated Titration of Vasopressor Infusion Using a Closed-loop Controller: *In Vivo* Feasibility Study Using a Swine Model

A. Joosten, A. Delaporte, B. Alexander, F. Su, J. Creteur, J.-L. Vincent, M. Cannesson, J. Rinehart.....394

In this study of pigs with normovolemic hypotension induced by administration of sodium nitroprusside, an automated closed-loop vasopressor administration device was able to maintain mean arterial pressure within 5 mmHg of 80 mmHg for 98% of the intraoperative period. This suggests that norepinephrine can be accurately titrated using an automated infusion device in order to maintain target blood pressure.

Critical Care Medicine

CLINICAL SCIENCE

◇ Aquaporin 5 –1364A/C Promoter Polymorphism Is Associated with Pulmonary Inflammation and Survival in Acute Respiratory Distress Syndrome

T. Rahmel, K. Rump, J. Peters, M. Adamzik.....404

In acute respiratory distress syndrome attributable to bacterial pneumonia, the C-allele of the aquaporin-5 –1364A/C promoter polymorphism is associated with less pulmonary inflammation and greater survival. This may improve characterization of acute respiratory distress syndrome and ultimately facilitate individualized care. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*


◇ Delays in Cardiopulmonary Resuscitation, Defibrillation, and Epinephrine Administration All Decrease Survival in In-hospital Cardiac Arrest

N. G. Bircher, P. S. Chan, Y. Xu, for the American Heart Association's Get With The Guidelines–Resuscitation Investigators.....414

Assessment of witnessed, pulseless cardiac arrests occurring at 538 hospitals during a 9-yr period indicates that cardiopulmonary resuscitation (CPR) did not occur immediately at 0 min in 5.7% of patients despite guidelines for instantaneous initiation. Delay in initiation of CPR was associated with significantly decreased survival. Time to initiation of CPR and subsequent time to initiation of administration of defibrillation shock (for shockable arrhythmias) and epinephrine were both associated with reduced patient survival. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

◇ Refers to This Month in ANESTHESIOLOGY

◆ Refers to Editorial Views

 This article has an Audio Podcast

 See Supplemental Digital Content

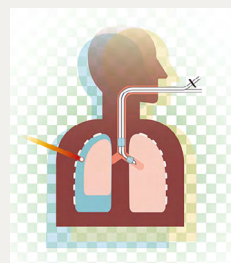
 CME Article

 This article has a Video Abstract

 Part of the Letheon writing competition

 This article has a Visual Abstract

 Readers' Toolbox



ON THE COVER: One-lung ventilation during thoracic surgery places patients at added risk of ventilator-induced lung injury. Recently studies have suggested that pulmonary complications are related to driving pressure more than any other ventilatory parameter. In this issue of ANESTHESIOLOGY, Park *et al.* compared driving pressure–guided ventilation with conventional protective ventilation in thoracic surgery in a double-blind randomized controlled study of 292 patients. Application of the driving pressure–guided ventilation during one-lung ventilation was associated with a lower incidence of postoperative pulmonary complications compared to conventional protective ventilation in thoracic surgery.

• Park *et al.*: Driving Pressure during Thoracic Surgery: A Randomized Clinical Trial, p. 385

Pain Medicine

BASIC SCIENCE

- ◆◆ Mitochondrial Function in Astrocytes Is Essential for Normal Emergence from Anesthesia in Mice
 R. Ramadasan-Nair, J. Hui, L. S. Itsara, P. G. Morgan, M. M. Sedensky423

In a tamoxifen-activated astrocyte-specific *Ndufs4(KO)* mouse, the induction EC50s for tail clamp in both isoflurane and halothane were similar between the control and astrocyte-specific *Ndufs4(KO)* mice at 3 weeks after 4-hydroxy tamoxifen injection. However, the emergent concentrations in both anesthetics for the astrocyte-specific *Ndufs4(KO)* mice were half that of the controls. Similarly, the induction EC50s for loss of righting reflex were similar between the control and astrocyte-specific *Ndufs4(KO)* mice; concentrations for regain of righting reflex in both anesthetics for the astrocyte-specific *Ndufs4(KO)* mice were much less than the control. Thus, mitochondrial complex I function within astrocytes is essential for normal emergence from anesthesia. **SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT**

Education

CLASSIC PAPERS REVISITED

- Nitric Oxide Story
W. M. Zapol435

IMAGES IN ANESTHESIOLOGY

- Esophageal Pressure Monitoring in the Critically Ill Obese Subject
M. Lemyze, A. Guiot, M. Granier441

- 🌐 Endovascular Retrieval of Broken Arterial Cannulas
M. Béland, C. Lalonde, G. Garneau, M. Méthot442

SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

- 🌐 B-lines Visualization and Lung Aeration Assessment: Mind the Ultrasound Machine Setting
S. Mongodi, Andrea Stella, A. Orlando, F. Mojoli444

SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

- Propofol-associated Green Hair Discoloration
B. P. Pulos, H. P. Sviggum, E. E. Sharpe445

CLINICAL FOCUS REVIEW

- ◆ Acute Fatty Liver of Pregnancy: Pathophysiology, Anesthetic Implications, and Obstetrical Management
E. E. Naoum, L. R. Leffert, H. V. Chitilian, K. J. Gray, B. T. Bateman446

A narrative review of the pathophysiology, diagnosis, management, delivery implications, obstetric anesthesia care, and potential critical care needs in patients presenting with acute fatty liver of pregnancy.

REVIEW ARTICLE

- ◆ A Neurologic Examination for Anesthesiologists: Assessing Arousal Level during Induction, Maintenance, and Emergence
E. R. Reshef, N. D. Schiff, E. N. Brown462

This article reviews the principal components of the neurologic examination that are most relevant to anesthesiologists for inferring a patient's level of brainstem function and arousal during induction, maintenance, and emergence from general anesthesia. The neurologic examination provides information about a patient's arousal level that is complementary to that provided by vital signs and electroencephalogram measures.

- ◆ Effects of Thoracic Epidural Anesthesia on Neuronal Cardiac Regulation and Cardiac Function
J. Wink, B. T. Veering, L. P. H. J. Aarts, P. F. Wouters472

This review provides a comprehensive update on the cardiovascular effects of high-thoracic epidural anesthesia and cardiac sympathectomy in healthy and diseased patients. **SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT**

- 📺 Operating Room Fires
T. S. Jones, I. H. Black, T. N. Robinson, E. L. Jones492

Operating room fires are rare but devastating events; their prevention and management require our understanding of the three ingredients of a fire (oxidizer, fuel, ignition source), an accurate preoperative assessment of risk, and teamwork to extinguish.

MIND TO MIND

- 🖋 Morning in the Surgical Waiting Area
D. Doyle502

- The Pager Goes Off
D. A. Gutman503

- Down: Death through the Eyes of an Intern
A. Zak505

Correspondence

- Other Factors Affect the Occurrence of Perioperative Respiratory Adverse Events
L. Wang, L. Wei, X. Deng507

- Improving External Validity May Jeopardize Internal Validity
M. Daoud508

Is a Single Dose of Propofol Good Enough to Prevent Respiratory Complications beyond the Induction Phase?

A. Subedi, K. Pokharel509

Does Intravenous *versus* Inhalational Induction of Anesthesia Only Decrease Perioperative Respiratory Events during the Induction Period?

T. T. Nguyen, H. V. Lam, T. M. Austin510

In Reply

A. Davidson511

In Reply

*A. Ramgolam, G. L. Hall, G. Zhang, H. Mary,
B. S. von Ungern-Sternberg*511

Opiates and IV Acetaminophen

J. Steadman513

When Large Administrative Databases Provide Less Relevant Information than Randomized Studies

F. Aubrun, Y. Le Manach, B. Riou514

In Reply

J. Poeran, S. G. Memtsoudis, M. Mazumdar, A. B. Leibowitz515

Experimental Controls in Lipid Resuscitation Therapy

M. R. Fettiplace, G. Weinberg516

Metabolite Palmitoylcarnitine Mediates Intralipid Cardioprotection Rather Than Membrane Receptors

M. Zaugg, A. S. Clanachan, P.-H. Lou, E. Lucchinetti518

In Reply

S. Umar, M. Eghbali519

Reviews of Educational Material 522

Anesthesiology Reflections from the Wood Library-Museum

Never Mind Its Past Cocaine and Celery: Celerina's Alcohol "Treated" Alcoholism

George S. Bause 363

Etherist Crawford Long on a Cinderella Stamp

George S. Bause 366

Joining the Angels: Laughing-gas Advertising Divined by Dr. G. W. Chamberlain

George S. Bause 403

The On-call Anesthesiologist: A Physiological Fireman?

George S. Bause 440

Careers & Events 23A

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 Alan Jay Schwartz, M.D., M.S.Ed., Director of Education, Department of Anesthesiology and Critical Care Medicine, The

Children's Hospital of Philadelphia, 34th Street and Civic Center Blvd., Room 9327, Philadelphia, Pennsylvania 19104-4399. Article-specific permission requests are managed with Copyright Clearance Center's Rightslink service. Information can be accessed directly from articles on the journal Web site. More information is available at <http://anesthesiology.pubs.asahq.org/public/rightsandpermissions.aspx>. For questions about the Rightslink service, e-mail customer-care@copyright.com or call 877-622-5543 (U.S. only) or 978-777-9929. Advertising and related correspondence should be addressed to Advertising Manager, ANESTHESIOLOGY, Wolters Kluwer Health, Inc., Two Commerce Square, 2001 Market Street, Philadelphia, Pennsylvania 19103 (Web site: <http://www.wkcenter.com/>). Publication of an advertisement in ANESTHESIOLOGY does not constitute endorsement by the Society or Wolters Kluwer Health, Inc. of the product or service described therein or of any representations made by the advertiser with respect to the product or service.

ANESTHESIOLOGY (ISSN 0003-3022) is published monthly by Wolters Kluwer Health, Inc., 14700 Citicorp Drive, Bldg 3, Hagerstown, MD 21742. Business office: Two Commerce Square, 2001 Market Street, Philadelphia, PA 19103. Periodicals postage paid at Hagerstown, MD, and at additional mailing offices. Copyright © 2019, the American Society of Anesthesiologists, Inc.

Annual Subscription Rates: *United States*—\$977 Individual, \$2249 Institution, \$393 In-training. *Rest of World*—\$1030 Individual, \$2497 Institution, \$393 In-training. Single copy rate \$230. Subscriptions outside of North America must add \$56 for airfreight delivery. Add state sales tax, where applicable. The GST tax of 7% must be added to all orders shipped to Canada (Wolters Kluwer Health, Inc.'s GST Identification #895524239, Publications Mail Agreement #1119672). Indicate in-training status and name of institution. Institution rates apply to libraries, hospitals, corporations, and partnerships of three or more individuals. Subscription prices outside the United States must be prepaid. Prices subject to change without notice. Subscriptions will begin with currently available issue unless otherwise requested. Visit us online at www.lww.com.

Individual and in-training subscription rates include print and access to the online version. Online-only subscriptions for individuals (\$323) and persons in training (\$323) are available to nonmembers and may be ordered by downloading a copy of the Online Subscription FAXback Form from the Web site, completing the information requested, and faxing the completed form to 301-223-2400. Institutional rates are for print only; online subscriptions are available via Ovid. Institutions can choose to purchase a print and online subscription together for a discounted rate. Institutions that wish to purchase a print subscription, please contact Wolters Kluwer Health, Inc., 14700 Citicorp Drive, Bldg 3, Hagerstown, MD 21742; phone: 800-638-3030; fax: 301-223-2400. Institutions

that wish to purchase an online subscription or online with print, please contact the Ovid Regional Sales Office near you or visit www.ovid.com/site/index.jsp and select Contact and Locations.

Address for non-member subscription information, orders, or change of address (except Japan): Wolters Kluwer Health, Inc., 14700 Citicorp Drive, Bldg 3, Hagerstown, MD 21742; phone: 800-638-3030; fax: 301-223-2400. In Japan, contact Wolters Kluwer Health Japan Co., Ltd., Forecast Mita Building 5th floor, 1-3-31 Mita Minato-ku, Tokyo, Japan 108-0073; phone: +81 3 5427 1969; e-mail: journal@wkjapan.co.jp.

Address for member subscription information, orders, or change of address: Members of the American Society of Anesthesiologists receive the print and online journal with their membership. To become a member or provide a change of address, please contact the American Society of Anesthesiologists, 1061 American Lane, Schaumburg, Illinois 60173-4973; phone: 847-825-5586; fax: 847-825-1692; e-mail: membership@ASAhq.org. For all other membership inquiries, contact Wolters Kluwer Health, Inc., Customer Service Department, P.O. Box 1610, Hagerstown, MD 21740; phone: 800-638-3030; fax: 301-223-2400.

Postmaster: Send address changes to ANESTHESIOLOGY, P.O. BOX 1610, Hagerstown, MD 21740.

Advertising: Please contact Hilary Druker, Advertising Field Sales Representative, Health Learning, Research & Practice, Medical Journals, Wolters Kluwer Health, Inc.; phone: 609-304-9187; e-mail: Hilary.Druker@wolterskluwer.com. For classified advertising: Dave Wiegand, Recruitment Advertising Representative, Wolters Kluwer Health, Inc., Two Commerce Square, 2001 Market Street, Philadelphia, PA 19103; phone: 847-361-6128; e-mail: Dave.Wiegand@wolterskluwer.com.