

TABLE OF CONTENTS

ANESTHESIOLOGY

Volume 135

Issue 1

July 2021

◆ This Month in ANESTHESIOLOGY	A1
Science, Medicine, and the Anesthesiologist.....	A13
Infographics in Anesthesiology	A17
◆ Editorials	

Authorship and Publication Matters: Credit and Credibility

E. D. Kharasch, M. J. Avram, B. T. Bateman, J. D. Clark, D. J. Culley,
A. J. Davidson, T. T. Houle, Y. Jiang, J. H. Levy, M. J. London,
J. W. Sleight, L. Vutsits 1

Clinical Practice Guidelines in Anesthesiology: Adjusting Our Expectations

M. D. Neuman, J. L. Apfelbaum 9

Tranexamic Acid in High-risk Arthroplasty Patients: How Will We Adapt to Evolving Evidence?

D. A. Colquhoun, B. R. Hallstrom, S. Kheterpal 12

Targeting the Hypoxia-Adenosine Link for Controlling Excessive Inflammation

A. Czopik, X. Yuan, S. E. Evans, H. K. Eltzschig 15

Special Article

Anesthesiology: Resetting Our Sights on Long-term Outcomes: The 2020 John W. Severinghaus Lecture on Translational Science

B. A. Orser 18

Many patients experience new cognitive deficits after anesthesia and surgery. The author's research team has discovered that anesthetic drugs trigger persistent overactivity of memory-blocking receptors, and they have identified new strategies to preserve memory by selectively inhibiting these receptors.

Perioperative Medicine

CLINICAL SCIENCE

◆ ◆ Levels of Evidence Supporting the North American and European Perioperative Care Guidelines for Anesthesiologists between 2010 and 2020: A Systematic Review



A. Laserna, D. A. Rubinger, J. E. Barahona-Correa,
N. Wright, M. R. Williams, J. A. Wyrobek, L. Hasman,
S. J. Lustik, M. P. Eaton, L. G. Glance 31

In a systematic review of 2,280 recommendations in 60 guidelines published by major North American and European societies, half of the recommendations were supported by a low level of evidence. The proportion of recommendations supported by a high level of evidence did not increase between 2010 and 2020.

◆ ◆ Safety of Tranexamic Acid in Hip and Knee Arthroplasty in High-risk Patients



J. Poeran, J. J. Chan, N. Zubizarreta, M. Mazumdar, L. M. Galatz,
C. S. Moucha 57

National administrative data from more than 500 hospitals and 40,000 patients demonstrate that approximately half of high-risk patients receive tranexamic acid, similar to non-high-risk patients. Tranexamic acid use in high-risk patients undergoing lower-extremity arthroplasty is associated with fewer transfusions. Tranexamic acid use is not associated with venous thromboembolism, myocardial infarction, seizures, ischemic strokes, or transient ischemic attacks. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

◆ Refers to This Month in ANESTHESIOLOGY

◆ Refers to Editorial



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






This article is Open Access






ON THE COVER: Although there are thousands of published recommendations in anesthesiology clinical practice guidelines, the extent to which these are supported by high levels of evidence is not known. In this issue of ANESTHESIOLOGY, Laserna *et al.* present a systematic review of anesthesia evidence-based recommendations from the major North American and European anesthesiology societies, mapping the level of evidence supporting current recommendations. In an accompanying editorial, Neuman and Apfelbaum discuss the strengths and limitations of practice guidelines and their role in current clinical practice. Cover Illustration: A. Johnson, Vivo Visuals. Photo: J. P. Rathmell.




- Laserna *et al.*: Levels of Evidence Supporting the North American and European Perioperative Care Guidelines for Anesthesiologists between 2010 and 2020: A Systematic Review, p. 31
- Neuman and Apfelbaum: Clinical Practice Guidelines in Anesthesiology: Adjusting Our Expectations, p. 9

-   **Midazolam and Ketamine Produce Distinct Neural Changes in Memory, Pain, and Fear Networks during Pain**
 *K. M. Vogt, J. W. Ibinson, C. T. Smith, A. T. Citro, C. M. Norton, H. T. Karim, V. Popov, A. Mahajan, H. J. Aizenstein, L. M. Reder, J. A. Fiez.....*69




In this randomized within-subject crossover study of healthy volunteers using an experimental memory paradigm using periodic pain under light sedation, recollection memory was reduced by midazolam compared with saline and ketamine. The paradigm-related brain activity differed between the two drugs: Whereas midazolam mostly increased, ketamine predominantly decreased functional connectivity from brain regions involved in memory encoding, pain processing, and threat response. These observations highlight how pharmacologically distinct general anesthetics may engage distinct neural dynamics to modulate cognitive experience under threat of pain. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

-   **Automated Nerve Monitoring in Shoulder Arthroplasty: A Prospective Randomized Controlled Study**
 *J. Chui, M. B. Y. Chohan, J. M. Murkin, M. Rachinsky, S. Dhir, G. S. Athwal, K. J. Faber, D. Drosdowech.....*83

Using a prospective study design, automated nerve monitoring with feedback *versus* blinded monitoring during shoulder arthroplasty was not associated with a reduced duration of nerve alerts. Secondary outcomes such as neurologic deficits and quality of life indices did not differ between the groups, although these outcomes improved in both groups over the course of the study. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*




-   **Percutaneous Peripheral Nerve Stimulation (Neuromodulation) for Postoperative Pain: A Randomized, Sham-controlled Pilot Study**
 *B. M. Ilfeld, A. Plunkett, A. M. Vijjeswarapu, R. Hackworth, S. Dhanjal, A. Turan, S. P. Cohen, J. C. Eisenach, S. Griffith, S. Hanling, D. I. Sessler, E. J. Mascha, D. Yang, J. W. Boggs, A. Wongsampigoon, H. Gelfand, on behalf of the PAINIRE Investigators*95

The use of active *versus* sham percutaneous peripheral nerve stimulation was associated with a reduction in pain scores and opioid consumption in the first 7 days after upper and lower extremity surgery. Peripheral nerve stimulation may also reduce pain's interference with physical and emotional functioning with few side effects. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

-   **Patient Involvement in Anesthesia Decision-making: A Qualitative Study of Knee Arthroplasty**
 *V. Graff, J. T. Clapp, S. J. Heins, J. J. Chung, M. Muralidharan, L. A. Fleisher, N. M. Elkassabany.....*111

In a qualitative study of 36 anesthesia consultations before knee arthroplasty, it was found that the anesthesia consultation is complex with multiple functions and involvement in shared decision-making may not be the most important function of the visit. Shared decision-making may be limited by external factors and the risk of increasing preoperative anxiety. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

BASIC SCIENCE

-   **Isoflurane Suppresses Hippocampal High-frequency Ripples by Differentially Modulating Pyramidal Neurons and Interneurons in Mice**
 *W. Zhao, S. Zhao, T. Zhu, M. Ou, D. Zhang, H. Sun, J. Liu, X. Chen, H. C. Hemmings Jr., C. Zhou.....*122

In mice, isoflurane at 0.5% impaired hippocampus-dependent memory processing and ripple oscillations without inducing loss of righting reflex. At the cellular level, these effects were associated with decreased fast-spiking interneuron activity and a concomitantly enhanced activity of excitatory neurons. These observations suggest that the suppression of hippocampal ripples by isoflurane *via* the differential modulation of principal neurons and interneurons contributes to the amnesic action of this drug. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

Critical Care Medicine

BASIC SCIENCE

-   **Sevoflurane Exerts Protective Effects in Murine Peritonitis-induced Sepsis via Hypoxia-inducible Factor 1 α /Adenosine A2B Receptor Signaling**
 *K.-C. Ngamsri, F. Fabian, A. Fuhr, J. Gamper-Tsigaras, A. Straub, D. Fecher, M. Steinke, H. Walles, J. Reutershan, F. M. Konrad.....*136

In two murine peritonitis-induced sepsis models, sevoflurane reduced peritoneal lavage neutrophil counts by lower adhesion molecule expression, reduced cytokines, and protein extravasation. The mechanism of these reported protective effects was due to the expression of hypoxia-inducible factor 1 α and adenosine A2B receptor in the intestine, liver, and lung. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

Education

IMAGES IN ANESTHESIOLOGY


- Point-of-Care Cardiac Ultrasound on a Very Small Infant**
*K. R. Boretsky, P. Devavaram.....*151

- Securing and Mobilizing an Esophageal Mass before and after Endotracheal Intubation**
*W. Tang, P. Wei, J. Huang, J. Li.....*152

-  **Echo in Atrial Flutter**
*O. Al-Qudsi, R. Kopanczyk.....*154

SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

CLINICAL FOCUS REVIEW

-  **On the Challenges of Anesthesia and Surgery during Interplanetary Spaceflight**
*M. Komorowski, S. Thierry, C. Stark, M. Sykes, J. Hinkelbein.....*155

This focused review summarizes the medical, logistical, and environmental challenges that would be associated with dealing with a traumatic surgical case during an interplanetary space mission in the near future.

REVIEW ARTICLE

- ◆ **Obstetric Anesthesia and Heart Disease: Practical Clinical Considerations**
M.-L. Meng, K. W. Arendt 164

The safe management of pregnancy in women with heart disease requires appropriate anesthetic, cardiac, and obstetric care. This clinical review discusses current trends in obstetric anesthesia management.
 SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

MIND TO MIND

- As If**
M. DiMiceli-Zsigmond 184
- Objectifying**
N. J. Brown 186

Correspondence

- Anesthesiologist Age and Sex Influence Patients: Comment**
F. Wang, Y. Zhu, Y. Hu, Y. Wang, T. Zhu 188
- Anesthesiologist Age and Sex Influence Patients: Reply**
K. T. Forkin, G. R. Lyons, J. Z. Ma, E. C. Nemergut 188
-
- Perioperative Temperature Monitoring: Comment**
T. Nelson 189

- Perioperative Temperature Monitoring: Reply**
D. I. Sessler, R. J. Nault 190

- General Anesthesia Type and Cancer Prognosis: Comment**
M. Iwasaki, D. Ma 191

- Placental Veins Catheterization: A Realistic Simulation Model for Medical Students**
E. Guasch, N. Brogly, F. Gilsanz 191

Reviews of Educational Material 193

Erratum 195

Anesthesiology Reflections from the Wood Library-Museum

- Foregger's Autogenor: Revitalized Air for Athletes and Anesthesia**
Jane S. Moon and Melissa L. Coleman 110
- Hanaoka Style: A Blend of East and West That's Off the Hook**
Melissa L. Coleman and Jane S. Moon 150
- George Harley's Triple Threat: The A.C.E. of Anesthetic Mixtures**
Jane S. Moon and Melissa L. Coleman 163

Careers & Events A19

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 via Editorial Manager (<https://www.editorialmanager.com/ain>). Detailed directions for submission and the most recent version of the Instructions for Authors can be found on the Journal's Web site (<http://www.anesthesiology.org>). Books and educational materials for review 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.wkadcen.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., 1800 Dual Highway, Suite 201, Hagerstown, MD 21740-6636. Business office: Two Commerce Square, 2001 Market Street, Philadelphia, PA 19103. Periodicals postage paid at Hagerstown, MD, and at additional mailing offices. Copyright © 2021, the American Society of Anesthesiologists. All Rights Reserved.

Annual Subscription Rates: *United States*—\$1077 Individual, \$2671 Institution, \$434 In-training. *Rest of World*—\$1136 Individual, \$2965 Institution, \$434 In-training. Single copy rate \$266. Subscriptions outside of North America must add \$58 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 (\$356) and persons in training (\$356) 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., 1800 Dual Highway, Suite 201, Hagerstown, MD 21740-6636; 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: Wolters Kluwer Health, Inc., 1800 Dual Highway, Suite 201, Hagerstown, MD 21740-6636; phone: 800-638-3030; fax: 301-223-2400.

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, National Account Manager, 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.; phone: 847-361-6128; e-mail: Dave.Wiegand@wolterskluwer.com.