

TABLE OF CONTENTS

ANESTHESIOLOGY

Volume 136

Issue 3

March 2022

This Month in ANESTHESIOLOGYA1
Science, Medicine, and the Anesthesiologist.....A13
Infographics in AnesthesiologyA17
Editorial

The Importance of Definitive Trials: The VIXIE Trial
P. Nagele403

Propofol Anesthesia: A Leap into the Void?
G. A. Mashour, R. D. Sanders, U. Lee.....405

Perioperative Medicine

CLINICAL SCIENCE

🌐📢👁️ **Hyperoxia and Antioxidants for Myocardial Injury in Noncardiac Surgery: A 2 × 2 Factorial, Blinded, Randomized Clinical Trial**
C. Holse, E. K. Aasvang, M. Vester-Andersen, L. S. Rasmussen, J. Wetterslev, R. Christensen, L. N. Jorgensen, S. S. Pedersen, F. C. Loft, H. Troensegaard, M.-L. Mørkenborg, Z. R. Stisen, K. Rünitz, J. P. Eiberg, A. K. Hansted, C. S. Meyhoff, for the VIXIE Trial Group408

This is a 2 × 2 factorial, randomized, clinical trial (VIXIE [VitamIn and oXygen Interventions and cardiovascular Events] trial) designed to determine whether perioperative administration of 0.80 FiO₂ *versus* 0.30 FiO₂, as well as perioperative administration of antioxidants (vitamin C and N-acetylcysteine) *versus* placebo, significantly impacted degree of myocardial injury after noncardiac surgery. Myocardial injury was assessed by measurement of high-sensitivity troponins. The VIXIE trial found no association between increased perioperative FiO₂ or administration of antioxidants and degree of myocardial injury after noncardiac surgery. **SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT**

🌐📢👁️ **Propofol-induced Unresponsiveness Is Associated with a Brain Network Phase Transition**
R. M. Pullon, C. E. Warnaby, J. W. Sleigh.....420

OPEN

Temporospatial electroencephalographic analysis of brain network dynamics over a wide range of frequencies and time scales in 16 volunteers receiving slowly increasing concentrations of propofol revealed that transition to unresponsiveness was associated with a sudden rise in alpha frequency network phase synchrony anteriorly, but also a transient surge and then loss of network coupling over long (tens of seconds) time scales. Deep anesthesia was characterized by alpha waveform hypersynchrony and slow-wave power envelope dissynchrony across the whole cortex. These observations suggest that propofol anesthesia is associated with a constellation of changes in network connectivity across frequencies and time scales that are signatures of sharp and sudden transitions in the behavior of networks. **SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT**

🌐📢👁️ **Interscalene Brachial Plexus Block with Liposomal Bupivacaine *versus* Standard Bupivacaine with Perineural Dexamethasone: A Noninferiority Trial**
D. H. Kim, J. Liu, J. C. Beathe, Y. Lin, D. S. Wetmore, S. J. Kim, S. C. Haskins, S. Garvin, J. A. Oxendine, M. C. Ho, A. A. Allen, M. Popovic, E. Gbaje, C. L. Wu, S. G. Memtsoudis.....434

Interscalene nerve blocks using bupivacaine plus dexamethasone were compared with blocks using liposomal bupivacaine for shoulder surgery. These alternative blocks provided very similar levels and durations of analgesia, and no differences in opioid consumption were identified. The interscalene injection of bupivacaine plus dexamethasone and liposomal bupivacaine provide similar clinical benefits for shoulder surgery. **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

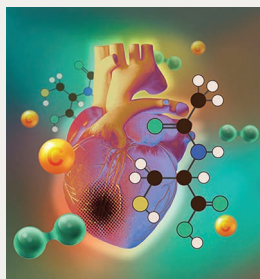
🎬 CME Article

🎬 This article has a Video Abstract

🔧 Readers' Toolbox



👁️ This article has a Visual Abstract

OPEN This article is Open Access





ON THE COVER: Hyperoxia and oxidative stress may be associated with increased risk of myocardial injury. In this issue of ANESTHESIOLOGY, Holse and members of the VIXIE (VitamIn and oXygen Interventions and cardiovascular Events) Trial Group report the results of a randomized clinical trial examining the impact of hyperoxia and the antioxidants vitamin C and N-acetylcysteine on the degree of myocardial injury after noncardiac surgery. In an accompanying editorial, Nagele discusses the need for more well-designed trials like VIXIE to definitively answer important clinical questions. Cover Illustration: A. Johnson, Vivo Visuals Studio.



- Holse *et al.*: Hyperoxia and Antioxidants for Myocardial Injury in Noncardiac Surgery: A 2 × 2 Factorial, Blinded, Randomized Clinical Trial, p. 408
- Nagele: The Importance of Definitive Trials: The VIXIE Trial, p. 403

-   **Expression Profiles of Immune Cells after Propofol or Sevoflurane Anesthesia for Colorectal Cancer Surgery: A Prospective Double-blind Randomized Trial**
C.-S. Oh, H.-J. Park, L. Piao, K.-M. Sohn, S.-E. Koh, D.-Y. Hwang, S.-H. Kim.....448

In this randomized controlled trial, the fraction of circulating natural killer cells and T lymphocytes were comparable between propofol- and sevoflurane-based anesthesia in patients undergoing colorectal cancer surgery. These observations suggest that the type of general anesthetics used may minimally affect perioperative immune status. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

-   **Epidural Analgesia and Recurrence after Colorectal Cancer Surgery: A Danish Retrospective Registry-based Cohort Study**
R. P. Hasselager, J. Hallas, I. Gögenur.....459


In a retrospective cohort analysis of 11,618 patients in Danish national colorectal cancer surgery and anesthesia registries, 30% had an epidural catheter inserted for analgesia. The comparison of 2,980 patients receiving general anesthesia with epidural analgesia matched to 2,980 patients with general anesthesia alone demonstrated that the rates of cancer recurrence were not significantly different: 19.0% versus 20.5%. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

-   **End-tidal Carbon Dioxide for Diagnosing Anaphylaxis in Patients with Severe Postinduction Hypotension**
C. Erlich, A. Lamer, M. D. Moussa, J. Martin, S. Rogeau, B. Tavernier.....472


From a retrospective single-center case-control study comparing low end-tidal carbon dioxide (ETCO₂) postinduction in hypotensive patients due to anaphylaxis compared to other causes, a low ETCO₂ contributed to the diagnosis of anaphylaxis. The results therefore suggest that in mechanically ventilated patients with severe postinduction hypotension, ETCO₂ should be considered as one of the means of distinguishing between anaphylaxis and other potential causes. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

Education

REVIEW ARTICLE

-  **Postoperative Management of Lung Transplant Recipients in the Intensive Care Unit**
M. Di Nardo, J. Tikkanen, S. Husain, L. G. Singer, M. Cypel, N. D. Ferguson, S. Keshavjee, L. Del Sorbo.....482

The outcome of lung transplant recipients is critically affected by a complex interplay of particular pathophysiologic conditions and risk factors, knowledge of which is fundamental for the appropriate postoperative management of these patients in the intensive care unit.

-  **Anesthesia and Developing Brains: Unanswered Questions and Proposed Paths Forward**
C. Ing, D. O. Warner, L. S. Sun, R. P. Flick, A. J. Davidson, L. Vutskits, M. E. McCann, J. O'Leary, D. C. Bellinger, V. Rauh, B. A. Orser, S. Suresh, D. B. Andropoulos.....500

This report summarizes preclinical and clinical studies of anesthetic neurotoxicity in children, identifies consensus and disagreement among experts, and suggests paths forward to further ensure the safety of children undergoing procedures requiring anesthetic agents.

MIND TO MIND

- The Haunting Revenant**
K. E. McGoldrick.....513
- Dantrolene Available in China for Malignant Hyperthermia Treatment**
Z. Li, K. Liu, X. Guo.....515

Correspondence

- Cervical Injury after Videolaryngoscopy in Patient with Ankylosing Spondylitis: Comment**
M. A. Cometa.....517
- Cervical Injury after Videolaryngoscopy in Patient with Ankylosing Spondylitis: Comment**
B. J. Hindman, F. Dexter.....517
- Cervical Injury after Videolaryngoscopy in Patient with Ankylosing Spondylitis: Reply**
S. Clariot, A. Epaud, E. Levesque.....519

Anesthesiology Reflections from the Wood Library-Museum

- Dr. Paul Janssen: Making Piperidine Dreams Come True**
J. S. Moon.....419
- A Legacy with Longevity: Commemorating Crawford W. Long, M.D.**
M. L. Coleman.....458

- Reviews of Educational Material** 521
- 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/aln>). 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 customercare@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., 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 © 2022, the American Society of Anesthesiologists. All Rights Reserved.

Annual Subscription Rates: *United States*—\$1125 Individual, \$2904 Institution, \$442 In-training. *Rest of World*—\$1186 Individual, \$3224 Institution, \$442 In-training. Single copy rate \$288. 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 (\$372) and persons in training (\$372) 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.