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# ANESTHESIOLOGY

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## 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 Group* .....408

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 FiO<sub>2</sub> versus 0.30 FiO<sub>2</sub>, 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 FiO<sub>2</sub> 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**

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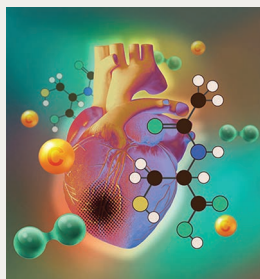
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**ON THE COVER:** Hyperoxia and oxidative stress may be associated with increased risk of myocardial injury. In this issue of ANESTHESIOLOGY, Holse and members of the VIXIE (VitamIn and oXygen Interventions and cardiovascular Events) Trial Group report 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 (ETCO<sub>2</sub>) postinduction in hypotensive patients due to anaphylaxis compared to other causes, a low ETCO<sub>2</sub> contributed to the diagnosis of anaphylaxis. The results therefore suggest that in mechanically ventilated patients with severe postinduction hypotension, ETCO<sub>2</sub> should be considered as one of the means of distinguishing between anaphylaxis and other potential causes. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

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-  **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.

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