



ON THE COVER:

Perioperative β -adrenergic blockade appears to reduce risk of myocardial infarction, but may also increase the risk of stroke. This issue highlights retrospective data which suggest that β_1 -selective blockade may provide the benefits to the heart without the risk to the brain.

- Eisenach: Patient Safety: ANESTHESIOLOGY Contributions and Supplements to the American Society of Anesthesiologists' Annual Meeting, p. 745
- Ashes *et al.*: Selective β_1 -Antagonism with Bisoprolol Is Associated with Fewer Postoperative Strokes than Atenolol or Metoprolol: A Single-center Cohort Study of 44,092 Consecutive Patients, p. 777

THIS MONTH IN ANESTHESIOLOGY

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EDITORIAL VIEWS

Patient Safety: ANESTHESIOLOGY Contributions and Supplements to the American Society of Anesthesiologists' Annual Meeting

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James C. Eisenach

Adult Congenital Heart Disease Patients Undergoing Noncardiac Surgery and the Role of Anesthesiologists as Perioperative Physicians

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A Burning Issue: Preventing Patient Fires in the Operating Room

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◆ Refers to Editorial Views

MA Meeting Article

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CME CME Article

■ PERIOPERATIVE MEDICINE

- ◆◆ **Perioperative Outcomes of Major Noncardiac Surgery in Adults with Congenital Heart Disease** 762
Bryan G. Maxwell, Jim K. Wong, Cindy Kin, and Robert L. Lobato
 In an administrative database of over 10,000 adults with congenital heart disease undergoing major noncardiac surgery, in-hospital mortality was increased compared with a well-matched comparison cohort. Adult congenital heart disease is an independent predictor of increased perioperative mortality.
- ◆ **Flammability of Surgical Drapes and Materials in Varying Concentrations of Oxygen** 770
William C. Culp, Jr., Bradly A. Kimbrough, and Sarah Luna
 Test samples of five surgical materials were ignited in three oxygen concentrations. At 21% oxygen, all materials tested met the Standard for Flammability of Clothing Textiles established by the Consumer Product Safety Commission. When exposed to 100% oxygen, all surgical materials tested would be categorized as unacceptable for consumer wear.
 SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT
- ◆ **Selective β_1 -Antagonism with Bisoprolol Is Associated with Fewer Postoperative Strokes than Atenolol or Metoprolol: A Single-center Cohort Study of 44,092 Consecutive Patients** 777
Catherine Ashes, Saul Judelman, Duminda N. Wijeyesundera, Gordon Tait, C. David Mazer, Gregory M. T. Hare, and W. Scott Beattie
 While the β -blockers metoprolol and atenolol reduce the risk of perioperative myocardial infarction, they also increase the risk of postoperative stroke. A retrospective cohort study was undertaken to determine whether the more β_1 -selective agent bisoprolol would be associated with a lower risk of postoperative stroke in patients undergoing noncardiac, nonneurological surgery at the University Health Network in Toronto, Ontario, Canada. A matched cohort of 2,462 patients, half of whom received bisoprolol while the other half received either metoprolol or atenolol, was created using a propensity score estimating the probability of being exposed to bisoprolol. The primary outcome, a stroke within 7 days of surgery, occurred in 2 patients taking bisoprolol and 10 patients taking metoprolol or atenolol. These results, along with those of other studies, suggest the risk of stroke associated with less selective β_1 -blockers results from inhibition of β_2 -mediated cerebral vasodilation.
- Patient Injuries from Anesthesia Gas Delivery Equipment: A Closed Claims Update** 788
Sonya P. Mehta, James B. Eisenkraft, Karen L. Posner, and Karen B. Domino
 The number of claims related to gas delivery, their severity, and their fraction of the total decreased markedly. Provider error continues to contribute, as does failure to complete a full machine check.
- Surgery at the End of Life: A Pilot Study Comparing Decedents and Survivors at a Tertiary Care Center** 796
Caryn S. Barnett, Alexander F. Arriaga, David L. Hepner, Darin J. Correll, Atul A. Gawande, and Angela M. Bader
 In 747 consecutive all-payer patients seen at a preoperative assessment center, 5% were dead within 1 yr. Compared to survivors, decedents were more likely to undergo palliative or diagnostic rather than elective procedures.
- The Anesthesia in Abdominal Aortic Surgery (ABSENT) Study: A Prospective, Randomized, Controlled Trial Comparing Troponin T Release with Fentanyl–Sevoflurane and Propofol–Remifentanyl Anesthesia in Major Vascular Surgery** 802
Espen E. Lindholm, Erlend Aune, Camilla B. Norén, Ingebjørg Seljeflot, Thomas Hayes, Jan E. Otterstad, and Knut A. Kirkeboen
 No significant differences in troponin levels were observed between patients receiving volatile *versus* total intravenous anesthesia after elective abdominal aortic surgery. These prospective randomized data suggest that volatile anesthesia is no more protective than total intravenous anesthesia.
- Does Goal-directed Fluid Therapy Affect Postoperative Orthostatic Intolerance? A Randomized Trial** 813
Morten Bundgaard-Nielsen, Øivind Jans, Rasmus G. Müller, André Korshin, Birgitte Ruhnau, Peter Bie, Niels H. Secher, and Henrik Kehlet
 This prospective, double-blinded, randomized clinical trial demonstrated that patients with orthostatic intolerance had increased length of hospital stay after open prostatectomy but goal-directed therapy did not reduce the prevalence of orthostatic intolerance after surgery.

Individually Optimized Hemodynamic Therapy Reduces Complications and Length of Stay in the Intensive Care Unit: A Prospective, Randomized Controlled Trial 824

Matthias S. Goepfert, Hans Peter Richter, Christine zu Eulenburg, Janna Gruetzmacher, Erik Rafflenbeul, Katharina Roeher, Alexandra von Sandersleben, Stefan Diedrichs, Hermann Reichenspurner, Alwin E. Goetz, and Daniel A. Reuter

Early goal-directed therapy using stroke volume variation, cardiac index, and optimized global end-diastolic volume index reduces intensive care unit stay after cardiac surgery.

Perioperative Auto-titrated Continuous Positive Airway Pressure Treatment in Surgical Patients with Obstructive Sleep Apnea: A Randomized Controlled Trial 837

Pu Liao, Quanwei Luo, Hisham Elsaid, Weimin Kang, Colin M. Shapiro, and Frances Chung

In this randomized open-labeled clinical trial enrolling 177 patients with obstructive sleep apnea, auto-titrated continuous positive airway pressure (CPAP) successfully reduced the apnea hypopnea index whereas it remained abnormally high without the treatment. Despite the effectiveness, only 26–48% of the patients used the CPAP for more than 4 h per night during the perioperative nights.

Real-time Closed-loop Control in a Rodent Model of Medically Induced Coma Using Burst Suppression 848

ShiNung Ching, Max Y. Liberman, Jessica J. Chemali, M. Brandon Westover, Jonathan D. Kenny, Ken Solt, Patrick L. Purdon, and Emery N. Brown

A closed-loop anesthesia delivery system using a computer-controlled infusion of propofol can achieve a reliable and accurate real-time control of burst suppression in rats.

Isoflurane in Contrast to Propofol Promotes Fluid Extravasation during Cardiopulmonary Bypass in Pigs 861

Hege Kristin Brekke, Stig Morten Hammersborg, Steinar Lundemoen, Arve Mongstad, Venny Lise Kvalheim, Oddbjørn Haugen, and Paul Husby

Isoflurane, in contrast to propofol, during cardiopulmonary bypass is associated with a greater increase in fluid extravasation from the intravascular to the interstitial space, resulting in dilution of interstitial fluid and a decrease in interstitial colloid osmotic pressure.

■ CRITICAL CARE MEDICINE

Relationship between Volume and Survival in Closed Intensive Care Units Is Weak and Apparent Only in Mechanically Ventilated Patients 871

Rafael Fernández, Susana Altaba, Lluís Cabre, Victoria Lacueva, Antonio Santos, Jose-Felipe Solsona, Jose-Manuel Añon, Rosa-Maria Catalan, Maria-Jose Gutierrez, Ramon Fernandez-Cid, Vicente Gomez-Tello, Emilio Curiel, Enrique Fernandez-Mondejar, and Joan-Carles Oliva, on behalf of the Sabadell Score Group

There was no association between unit size and standardized mortality. Factors other than size, such as having full-time intensivists, appear to be the major determinants of mortality. *SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT*

Accuracy of Plateau Pressure and Stress Index to Identify Injurious Ventilation in Patients with Acute Respiratory Distress Syndrome 880

Pier Paolo Terragni, Claudia Filippini, Arthur S. Slutsky, Alberto Birocco, Tommaso Tenaglia, Salvatore Grasso, Tania Stripoli, Daniela Pasero, Rosario Urbino, Vito Fanelli, Chiara Faggiano, Luciana Mascia, and V. Marco Ranieri

Using computed tomography references for morphologic indexes in both a training and a validation group of patients, a $P_{PLAT} > 25$ cm H₂O and a $STRESS\ INDEX > 1.05$ were found to be the best thresholds for identifying injurious ventilation.

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- ◆  **Pulmonary Blood Flow Increases in Damaged Regions Directly after Acid Aspiration in Rats** 890
Torsten Richter, Ralf Bergmann, Lilla Knels, Frank Hofheinz, Michael Kasper, Martin Delle, Jens Pietzsch, Maximilian Ragaller, and Thea Koch

In the early stage of inflammation after acid-induced acute lung injury, the pulmonary blood flow is distributed heterogeneously. Areas of aspiration damage are congruent with regions of higher blood flow 10 min after injury.
 SUPPLEMENTAL DIGITAL CONTENT IS AVAILABLE IN THE TEXT

- ◆ **Volatile Anesthetics Improve Survival after Cecal Ligation and Puncture** 901
Inge K. Herrmann, Maricela Castellon, David E. Schwartz, Melanie Hasler, Martin Urner, Guochang Hu, Richard D. Minshall, and Beatrice Beck-Schimmer

Exposing septic mice to volatile anesthetics, particularly sevoflurane, significantly improved survival.

■ PAIN MEDICINE

- Epidural Injections for Spinal Pain: A Systematic Review and Meta-analysis Evaluating the “Control” Injections in Randomized Controlled Trials** 907
Mark C. Bicket, Anita Gupta, Charlie H. Brown IV, and Steven P. Cohen

This systematic review of the literature found that the few available trials directly comparing epidural nonsteroid to nonepidural injections showed no benefit. Indirect comparisons of the techniques from a larger number of trials suggested epidural nonsteroid injections may confer some benefit.

- Effect of Perioperative Intravenous Lidocaine Administration on Pain, Opioid Consumption, and Quality of Life after Complex Spine Surgery** 932
Ehab Farag, Michael Ghobrial, Daniel I. Sessler, Jarrod E. Dalton, Jinbo Liu, Jae H. Lee, Sherif Zaky, Edward Benzel, William Bingaman, and Andrea Kurz

Lidocaine administration to patients undergoing complex spine operations reduced pain but not opioid requirements early in the postoperative period.

- Cyclosporine-inhibitable Blood–Brain Barrier Drug Transport Influences Clinical Morphine Pharmacodynamics** 941
Konrad Meissner, Michael J. Avram, Viktor Yermolenka, Amber M. Francis, Jane Blood, and Evan D. Kharasch

In 14 healthy volunteers, cyclosporine, an inhibitor of blood–brain barrier transporters, had minimal effects on circulating morphine concentrations, but increased the centrally mediated effect of morphine (miosis). These results suggest that transporter-mediated removal of morphine from the brain plays a role in morphine’s pharmacodynamics after systemic administration.

■ EDUCATION

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- Tegaderm™ Trauma in the Operating Room** 955
Karim Fikry and Edward A. Bittner

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REVIEW ARTICLE

- Risk Stratification Tools for Predicting Morbidity and Mortality in Adult Patients Undergoing Major Surgery: Qualitative Systematic Review** 959
Suneetha Ramani Moonesinghe, Michael G. Mythen, Priya Das, Kathryn M. Rowan,

This article is a qualitative systematic review of risk stratification systems used in major noncardiac, nonneurological surgery, and which have been validated in heterogeneous surgical cohorts.

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