



ON THE COVER:

The effects of surgery and anesthesia on the developing brain have been the source of ongoing controversy. In this issue of ANESTHESIOLOGY, Jevtovic-Todorovic reviews the evidence regarding the effects of exposing the developing brain in animals to general anesthetics, and Davidson and Sun review the human evidence. Three accompanying Editorial Views by Kharasch, Culley and Avram, and Warner *et al.* place these new reviews into perspective for the practicing anesthesiologist. Illustration by Annemarie Johnson, Vivo Visuals.

- Jevtovic-Todorovic: Exposure of Developing Brain to General Anesthesia: What Is the Animal Evidence? p. 832
- Davidson and Sun: Clinical Evidence for Any Effect of Anesthesia on the Developing Brain, p. 840
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- Competence: The Link between Education and Quality Patient Care** 707
M. D. McEvoy, A. Banerjee, and D. J. Murray

■ PERIOPERATIVE MEDICINE

CLINICAL SCIENCE

- ◇  **Cyclosporine before Coronary Artery Bypass Grafting Does Not Prevent Postoperative Decreases in Renal Function: A Randomized Clinical Trial** 710

P. Ederoth, A. Dardashti, E. Grins, B. Brondén, C. Metzsch, A. Erdling, S. Nozohoor, A. Mokhtari, M. J. Hansson, E. Elmér, L. Algotsson, S. Jovinge, and H. Bjursten

In a double-blind trial, 154 cardiac surgical patients were randomly assigned to 2.5 mg/kg cyclosporine or placebo. Plasma cystatin C, a marker of renal injury, increased more in patients given cyclosporine. Cyclosporine does not reduce the risk of acute renal injury after cardiac surgery.

- ◇  **Utility of Perioperative Lung Ultrasound in Pediatric Cardiac Surgery: A Randomized Controlled Trial** 718

I.-K. Song, E.-H. Kim, J.-H. Lee, P. Kang, H.-S. Kim, and J.-T. Kim

Using lung ultrasound to optimize lung recruitment improves clinical outcomes in children having cardiac surgery.

- ◇  **¹⁸F-florbetapir Positron Emission Tomography–determined Cerebral β -Amyloid Deposition and Neurocognitive Performance after Cardiac Surgery** 728

R Y. Klinger, O. G. James, S. Borges-Neto, T. Bisanar, Y.-J. Li, W. Qi, M. Berger, N. Terrando, M. F. Newman, P. M. Doraiswamy, J. P. Mathew; Alzheimer's Disease Neuroimaging Initiative (ADNI) Study Group; and Neurologic Outcomes Research Group (NORG)

In this prospective clinical study involving 40 patients undergoing cardiopulmonary bypass, there were no differences in global β -amyloid deposition between patients with or without cognitive impairment 6 weeks after cardiac surgery. On secondary analysis, β -amyloid deposition in the hippocampus was increased 6 weeks after cardiac surgery in patients with postoperative cognitive deficits when compared to those without cognitive deficits, although these changes were not significant after adjustment. A larger prospective study will be needed to determine whether surgery and anesthesia increase global or hippocampal β -amyloid.

- ◇ **Effect of Epidural Infusion Bolus Delivery Rate on the Duration of Labor Analgesia: A Randomized Clinical Trial** 745

E. M. S. Lange, C. A. Wong, P. C. Fitzgerald, W. F. Davila, S. Rao, R. J. McCarthy, and P. Toledo

Two hundred and twenty laboring women were randomized to intermittent boluses with high *versus* low delivery rate. Analgesia and the need for supplemental local anesthetic injections were similar in each group. Programmed high-rate epidural injections do not appear superior to low-rate epidural injections.

- Dopamine D2-receptor Antagonist Droperidol Deepens Sevoflurane Anesthesia** 754

R. Araki, K. Hayashi, and T. Sawa

Administration of droperidol decreased Bispectral Index values, augmented both α and δ - θ bicoherences, and shifted α -bicoherence to lower frequencies. These data suggest that droperidol enhances sevoflurane's effect on the electroencephalogram, partly *via* γ -aminobutyric acid–mediated subcortical reverberating networks.

- ◇  **Prolonged Catheter Use and Infection in Regional Anesthesia: A Retrospective Registry Analysis** 764

H. Bomberg, I. Bayer, S. Wagenpfeil, P. Kessler, H. Wulf, T. Standl, A. Gottschalk, J. Döffert, W. Hering, J. Birnbaum, C. Spies, B. Kutter, J. Winckelmann, S. Liebl-Biereige, W. Meissner, O. Vicent, T. Koch, D. I. Sessler, T. Volk, and A. Raddatz

Ninety-nine percent of peripheral catheters and ninety-nine percent of epidural catheters were infection-free after four days. Infected catheters should be removed as soon as is practical.

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Effect of Maternal Body Mass Index on Postpartum Hemorrhage 774

A. J. Butwick, A. Abreo, B. T. Bateman, H. C. Lee, Y. Y. El-Sayed, O. Stephansson, and P. Flood

Obesity was not found to be a strong risk factor for postpartum hemorrhage.

■ CRITICAL CARE MEDICINE

BASIC SCIENCE

Dexmedetomidine Impairs Diaphragm Function and Increases Oxidative Stress but Does Not Aggravate Diaphragmatic Atrophy in Mechanically Ventilated Rats 784

T. Breuer, C. Bleilevens, R. Rossaint, G. Marx, J. Gehrenkemper, H. Dierksen, A. Delpierre, J. Weis, G. Gayan-Ramirez, and C. S. Bruells

After 24 h sedation in rats, dexmedetomidine (*vs.* pentobarbital) increased protein oxidation and impaired glucose transport and contractile force in the diaphragm, but did not cause atrophy. The impact on ventilator-induced diaphragmatic dysfunction and weaning requires study.

■ PAIN MEDICINE

BASIC SCIENCE

Pro- versus Antinociceptive Nongenomic Effects of Neuronal Mineralocorticoid versus Glucocorticoid Receptors during Rat Hind Paw Inflammation 796

X. Li, M. Shaqura, D. Mohamed, A. Beyer, S. Yamada, S. A. Mousa, and M. Schäfer

Steroid receptor expression, colocalization, and membrane binding in spinal cord and peripheral sensory neurons but much less in glia cells are upregulated after peripheral inflammation. Glucocorticoid receptor activation and mineralocorticoid receptor inhibition lead to attenuation of mechanical hypersensitivity, suggesting opposing nongenomic effects.

■ EDUCATION

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Y. Liu, X. Ke, X. Wu, and W. Mei

ORIGINAL INVESTIGATION IN EDUCATION

Effect of the BASIC Examination on Knowledge Acquisition during Anesthesiology Residency 813

Y. Zhou, H. Sun, C. A. Lien, M. T. Keegan, T. Wang, A. E. Harman, and D. O. Warner

This investigation tested the hypothesis that introduction of the BASIC Examination was associated with accelerated knowledge acquisition during residency training, as measured by increments in annual resident scores on the In-Training Examination. Compared with previous cohorts in the traditional examination system, the first resident cohort in the staged examination system had a 2-point (on a scale of 1 to 50) greater improvement in In-Training Examination scores between the first and the second years of clinical anesthesiology training.

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- ◆ **Simulation-based Assessment to Reliably Identify Key Resident Performance Attributes** 821
R. H. Blum, S. L. Muret-Wagstaff, J. R. Boulet, J. B. Cooper, E. R. Petrusa, and for the Harvard Assessment of Anesthesia Resident Performance Research Group

This investigation administered the seven-scenario assessment to a larger sample of first-year and third-year residents from three training programs in three different simulation centers. The assessment had good reliability and interrater agreement, further validating the technique. Third-year residents significantly outscored first-year residents for five of seven scenarios, and the vast majority of residents found the simulations more educational than an average day in the operating room.

REVIEW ARTICLE

- ◆ ◆ **Exposure of Developing Brain to General Anesthesia: What Is the Animal Evidence?** 832
V. Jevtovic-Todorovic

Newest studies with monkeys confirm the large body of evidence presented by rodent studies and brings us a step closer to understanding the implications of early exposure to general anesthesia.

- ◆ ◆ **Clinical Evidence for Any Effect of Anesthesia on the Developing Brain** 840
A. J. Davidson and L. S. Sun

There is weak human evidence for an association between anesthesia exposure in early childhood and increased risk of poor neurodevelopmental outcomes; however, there is increasing evidence that the risk is minimal with brief exposure.

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