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Special Article

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

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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,
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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



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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 Investigators95

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*

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