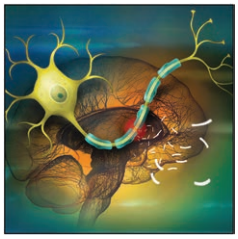
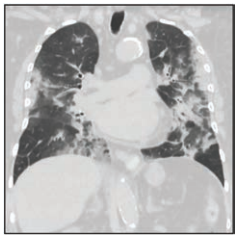
THIS MONTH IN
ANESTHESIOLOGY®



303 Perioperative Neurofilament Light Plasma Concentrations and Cognition before and after Cardiac Surgery: A Prospective Nested Cohort Study

Plasma and cerebrospinal fluid concentrations of neurofilament light, an intermediate filament protein that supports myelinated axons, increase in proportion to neuronal injury. Both baseline neurofilament light concentration and changes in neurofilament light concentration from baseline have been associated with postoperative delirium in non-cardiac surgery patients. The hypothesis that plasma neurofilament light concentration (both baseline and change from baseline to postoperative day 1) would be associated with cognition at baseline, 1 month, and 1 yr after cardiac surgery was tested in an observational study nested in a randomized controlled trial. This study included 167 patients, 134 (80%) of whom had neuropsychological data available 1 month after surgery and 99 (59%) of whom had such data available 1 yr after surgery. Higher baseline plasma neurofilament light concentration was associated with worse cognition at baseline but improvement in cognition at 1 yr. A postoperative increase in concentration was associated with decline in cognition at 1 yr. Neurofilament light concentrations were not associated with change in cognition at 1 month. *(Summary: M. J. Avram. Image: A. Johnson, Vivo Visuals Studio.)*



327 Early Physiologic Effects of Prone Positioning in COVID-19 Acute Respiratory Distress Syndrome

Prone positioning of intubated and mechanically ventilated patients with COVID-19 acute respiratory distress syndrome (ARDS) has been reported to improve oxygenation in most patients. The hypothesis that arterial oxygenation increases with prone positioning of patients with COVID-19 ARDS due to improved ventilation–perfusion matching was tested in a prospective observational study that evaluated the early response to the first cycle of prone positioning of 30 consecutive intubated and mechanically ventilated COVID-19 ARDS patients. Ventilation–perfusion matching was assessed by electrical impedance tomography before and 90 min after the first cycle of prone positioning. Patients were considered to be prone responders if their ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (Pao_2/Fio_2) increased more than 20% after 1 h in the prone position. Twenty-one patients (70%) were prone responders. Overall, prone positioning improved median [interquartile range] ventilation–perfusion matching from 58% [43 to 69%] to 68% [56 to 75%], with a median (95% CI) difference of 8.0% (0.1 to 16.0%), and Pao_2/Fio_2 improved from 141 [104 to 182] mmHg to 235 [164 to 267] mmHg. *(Summary: M. J. Avram. Image: J. P. Rathmell.)*

315 Volatile *versus* Propofol General Anesthesia and Long-term Survival after Breast Cancer Surgery: A National Registry Retrospective Cohort Study

Biomarker studies suggest that in patients undergoing cancer surgery, an inhaled volatile general anesthetic may increase the risk of a local cancer recurrence or metastasis, while propofol-based general anesthesia may have a neutral or even protective effect. The hypothesis that propofol-based anesthesia is associated with five percentage points higher absolute survival rate compared with inhaled volatile anesthetic-based anesthesia was tested in a retrospective cohort study of patients undergoing breast cancer surgery under general anesthesia between 2013 and 2019 using Swedish national registry data. After propensity score matching for demographic and clinical characteristics, there was no difference in overall survival between the patients receiving propofol-based anesthesia (4,284 of 4,658; 92.0%) and those receiving inhaled volatile anesthetic-based anesthesia (4,288 of 4,658; 92.1%), with a hazard ratio (95% CI) of 0.98 (0.85 to 1.13). Three-year survival in the propensity score–matched propofol anesthesia cohort was 92.3% (1,884 of 2,041) and it was 91.3% (1,967 of 2,154) in the volatile anesthetic cohort. *(Summary: M. J. Avram. Image: J. P. Rathmell.)*

341 Inappropriate Citation of Retracted Articles in Anesthesiology and Intensive Care Medicine Publications

Research articles may be retracted for reasons ranging from honest errors to intentional misconduct. Retracted articles are occasionally cited in articles published subsequent to the retraction, although they should not be. The Retraction Watch database was used to identify 478 retracted anesthesiology and critical care medicine articles, 220 (46%) of which were cited at least once after retraction. A survey was sent to 417 of the corresponding authors of the articles citing retracted articles (30% of 1,402 such articles) who could be contacted and agreed to participate in a survey designed to determine reasons for citation of retracted articles. Most of the corresponding authors (n = 372, 89%) were unaware that they had cited a retracted article largely because of missed identification of the retraction status in the journals or search database (n = 229, 62%) and use of a stored copy of the article (n = 42, 11%). *See the accompanying Editorial on* ***page 280****. (Summary: M. J. Avram. Image: J. P. Rathmell.)*

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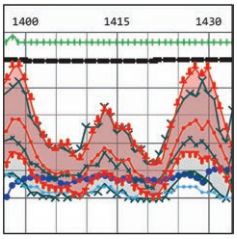
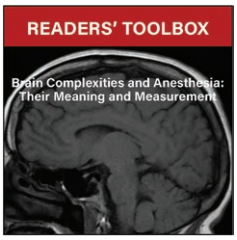


283 Performance of the Hypotension Prediction Index May Be Overestimated Due to Selection Bias (Special Article)

The Hypotension Prediction Index uses logistic regression with proprietary predictor variables derived from the arterial blood pressure waveform to predict the occurrence of hypotension 5, 10, or 15 min later. The receiver operating characteristic curve in the publication reporting development and validation of the index shows that a specific (albeit unspecified) threshold is associated with an incredible specificity of nearly 100% and sensitivity of more than 60%. The hypothesis that the seminal publication may contain a systemic statistical bias influencing its reported predictive abilities was tested using simulated data to visualize the effect of biased data selection on the model and demonstrate how biased data selection can result in overestimation of the predictive performance of the model. Based on this analysis, it is suggested that data from validation studies be reanalyzed considering the potential for selection bias, and that the predictive performance of the Hypotension Prediction Index be compared with that of the simultaneous mean arterial pressure value. *See the accompanying Editorial on* ***page 275****. (Summary: M. J. Avram. Image: J. P. Rathmell.)*

351 Aortic Biomechanics and Clinical Applications (Clinical Focus Review)

Refinement of arterial system models, increased awareness of ventricular–aortic–arterial interactions, and improvements in less invasive measures of cardiovascular physiology have led to growth in the field of aortic biomechanics. This Clinical Focus Review begins with an overview of aortic biomechanics, including aortic wall microstructure and material properties, how they contribute to mechanical behavior, and modeling that helps describe the physiologic role of the aorta. In all models, the aorta is more than a conduit between the heart and the arteries but contributes to the dynamics of blood propagation and wave reflection, which affects cardiac function and delivery of blood. Methods for quantifying aortic biomechanics are reviewed and early clinical applications are introduced. The authors conclude that although investigations into applications of aortic biomechanics are now focused on the pathophysiologic exploration and risk stratification of aortic aneurysms, they could branch into other areas. These include the perioperative arena, where preexisting disease processes, surgical interventions, or medications can affect aortic biomechanics with short- and long-term clinical implications. *(Summary: M. J. Avram. Image: From original article.)*



290 Brain Complexities and Anesthesia: Their Meaning and Measurement (Readers' Toolbox)

A complex system is marked by disorderly interacting elements that produce emergent phenomena that arise only when the components are interacting and cannot be observed or inferred by studying the isolated components. Many complexity indices have been proposed, based on a particular aspect of the complex system. The brain is a complex adaptive system that gives rise to many emergent phenomena, including consciousness and memory. If consciousness can emerge only when the brain is able to access and coordinate a suitably large repertoire of states, then measures of complexity might reliably track anesthetic impairment of consciousness. This Readers' Toolbox provides examples of approaches to the calculation of complexity indices as they pertain to anesthesia and the brain, using the analogy of an orchestra to help make the arcane methodology more tangible. It concludes that although there are many ways to extract temporal and/or spatial information into complexity metrics and most show good separation between conscious and anesthetized states, none has yet emerged as definitive. *(Summary: M. J. Avram. Image: J. P. Rathmell.)*