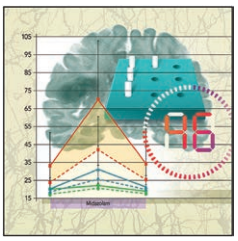
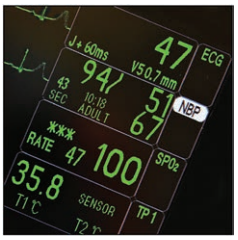
THIS MONTH IN ANESTHESIOLOGY



36 Midazolam Sedation Induces Upper Limb Coordination Deficits That Are Reversed by Flumazenil in Patients with Eloquent Area Gliomas

Midazolam sedation profoundly exacerbates or unmasks motor deficits in patients with supratentorial mass lesions. The hypotheses that mild sedation produced by midazolam can unmask or exacerbate upper limb motor incoordination in patients with eloquent area gliomas but not in non-neurosurgical patients and that the neurologic deficits induced by midazolam can be reversed by the antagonist flumazenil was tested in 15 patients with glioma and in 17 control patients. The Nine-Hole Peg Test, which requires brain sensorimotor integration, was used to evaluate upper extremity motor and sensory functions. In patients with supratentorial gliomas in eloquent areas of brain, the upper limb motor coordination that was comparable to that of normal subjects at baseline became severely worse after mild sedation with midazolam and the functional deficits could be reversed by flumazenil. Midazolam-induced motor incoordination in the ipsilateral upper limbs was also unmasked, suggesting diaschisis, or interruption of functional connectivities to remote undamaged areas. *See the accompanying Editorial View on* ***page 5.*** *(Summary: M. J. Avram. Image: A. Johnson, C.M.I., Vivo Visuals.)*



74 Automated Ambulatory Blood Pressure Measurements and Intraoperative Hypotension in Patients Having Noncardiac Surgery with General Anesthesia: A Prospective Observational Study

Intraoperative hypotension is common during noncardiac surgery with general anesthesia. The definition of physiologically relevant perioperative hypotension remains elusive, as are appropriate intraoperative blood pressure targets. This prospective observational study determined the relationship between ambulatory mean arterial pressure (MAP) and preinduction, postinduction, and intraoperative MAP in 370 American Society of Anesthesiologists Physical Status I or II patients ages 40 to 65 yr scheduled for elective noncardiac surgery with general anesthesia. Automated oscillometric noninvasive ambulatory blood pressure measurements were obtained at 30-min intervals for 1 day and the following night a median of 5 days before the day of surgery. Blood pressure was monitored while patients were in the operating room either oscillometrically or through an arterial catheter. There was only a weak correlation between the first preinduction MAP and mean daytime MAP. The lowest postinduction and intraoperative MAPs were lower than the lowest nighttime MAP In most patients. The lowest nighttime MAP exceeded 65 mmHg in more than two thirds of patients. *(Summary: M. J. Avram. Image: J. P. Rathmell.)*

58 Airway Closure during Surgical Pneumoperitoneum in Obese Patients

Airway closure causes a lack of communication between proximal airways and alveoli due to airway collapse; when airway closure is present, tidal inflation starts only after a critical airway opening pressure is overcome. When end-expiratory lung volume as well as respiratory and lung mechanics were measured before and after induction of surgical pneumoperitoneum in 50 obese patients undergoing laparoscopic surgery in the Trendelenburg position, 11 patients had respiratory system pressure-volume curve profiles compatible with airway closure after intubation in the supine position. The hypothesis that these patients could have a peculiar physiologic behavior during general anesthesia, paralysis, and mechanical ventilation was tested by comparing their respiratory mechanics with those of matched control subjects without any airway closure phenomenon enrolled in the same trial. While no patient in the control group developed airway closure after pneumoperitoneum induction, pneumoperitoneum in Trendelenburg position increased the airway opening pressure of all patients with diagnosis of airway closure after intubation in the supine position by a mean of 15 (95% CI, 11 to 18) cm H_2O. *See the accompanying Editorial View on* ***page 10.*** *(Summary: M. J. Avram. Image: J. P. Rathmell.)*

46 Oxygenation Impairment during Anesthesia: Influence of Age and Body Weight

Arterial oxygenation is impaired during anesthesia, a major cause of which may be atelectasis formation. Arterial oxygen tension is more reduced during anesthesia in both older patients and overweight patients. The hypothesis that oxygenation impairment in older and overweight patients is related to shunt, caused mainly by atelectasis, and to regions with low alveolar ventilation/perfusion ratios ($\dot{V}_A/\dot{Q}$), caused mainly by airway closure, was tested in a retrospective study of 80 nonobese patients in whom the multiple inert gas elimination technique had been used to discriminate between perfusion of nonventilated lung regions (shunt) and perfusion of poorly ventilated regions (low $\dot{V}_A/\dot{Q}$). During anesthesia, the arterial oxygen tension/inspired oxygen fraction ratio decreased with increasing age and with increasing body mass index. Shunt increased in patients up to middle age and then decreased. Low $\dot{V}_A/\dot{Q}$ increased linearly with age and became a more important cause of oxygenation impairment than shunt in older patients. Shunt also increased linearly with increasing body mass index, which had no effect on low $\dot{V}_A/\dot{Q}$. *See the accompanying Editorial View on* ***page 7.*** *(Summary: M. J. Avram. Image: J. P. Rathmell.)*

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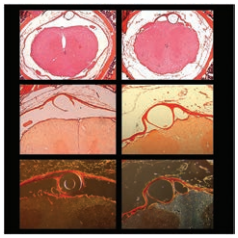
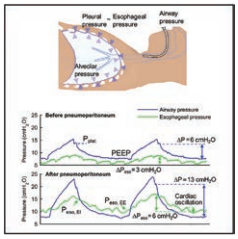
84 Days Alive and Out of Hospital: Validation of a Patient-centered Outcome for Perioperative Medicine

Patient-centric outcomes are needed to better understand the value of an intervention based on either improved patient outcomes or cost savings. Days alive and out of hospital is a composite outcome that integrates several clinically important outcomes, including death, hospital length of stay, and hospital readmission. A population-based retrospective cohort study including 540,072 adults at least 40 yr old who underwent one of 12 common high- and intermediate-risk elective noncardiac surgical procedures between 2006 and 2014 was conducted to determine the feasibility and validity of days alive and out of hospital as a patient-centered outcome for surgical patients. The primary outcome was the number of days alive and out of the hospital at 30 days after surgery, the median (interquartile range) value of which was 26 (24 to 27) days. After risk adjustment using quantile regression modeling, increased age, male sex, increased comorbidity burden, and longer duration of surgical procedures were associated with fewer days. Lower-risk procedures were associated with more days. Measured hospital-level factors were not associated with days alive and out of hospital at 30 days. *(Summary: M. J. Avram. Image: ©gettyimages.)*



132 Mast Cell Degranulation and Fibroblast Activation in the Morphine-induced Spinal Mass: Role of Mas-related G Protein-coupled Receptor Signaling

Patients receiving intrathecal opioids through chronic implantable spinal delivery systems develop neurologic signs secondary to local spinal cord compression. This has been shown in animals to result from a fibroblast-rich mass in a collagen matrix arising from the dura arachnoid. Not all opioids produce a mass, and opioid antagonists do not prevent its formation. The hypothesis that agents activating Mas-related G protein-coupled receptors will produce mast cell degranulation and intrathecal masses was tested in guinea pigs with lumbar intrathecal catheters connected to osmotic minipumps placed to deliver saline or equianalgesic concentrations of morphine sulfate, DMT-DALDA (a dermorphin-derived peptide μ-opioid agonist), or PZM21 (a biased μ-opioid ligand). Although the three opioids studied were delivered in approximately equianalgesic concentrations, only intrathecal morphine infusion produced prominent intrathecal masses, formation of which was not prevented by concomitant naltrexone administration. Morphine activated Mas-related G protein-coupled receptors and degranulated mast cells in a naloxone-insensitive manner but PZM21 did not. Whereas DMT-DALDA degranulated mast cells, the low concentrations required to produce analgesia did not produce a mass *in vivo*. *(Summary: M. J. Avram. Image: From original article.)*



155 Driving Pressure and Transpulmonary Pressure: How Do We Guide Safe Mechanical Ventilation? (Clinical Focus Review)

The concepts of driving pressure and transpulmonary pressure have been increasingly used to quantify the mechanical forces acting over the lungs during mechanical ventilation and to guide clinical care. This Clinical Focus Review discusses the physiologic concepts, pathophysiologic implications, and clinical relevance and application of driving pressure and transpulmonary pressure to prevent ventilator-induced lung injury. It begins by defining strain and stress, identifying how they apply to mechanical ventilation and ventilator-induced lung injury, and discussing their relevance for prevention of lung injury. Both driving pressure and transpulmonary pressure are then defined, how they are measured is described, and their physiologic interpretation and clinical applications are discussed. It concludes with a discussion of clinical conditions in which driving pressure and transpulmonary pressure diverge, how to interpret these circumstances, and the use of methods to estimate transpulmonary pressure, such as esophageal manometry, to guide ventilator management if there is substantial risk for ventilator-induced lung injury. *(Summary: M. J. Avram. Image: From original article.)*

186 Postresuscitation Care after Out-of-hospital Cardiac Arrest: Clinical Update and Focus on Targeted Temperature Management (Review Article)

Out-of-hospital cardiac arrest is a major cause of mortality and morbidity worldwide. The present review discusses the best practice hospital management of unconscious out-of-hospital cardiac arrest patients with a special focus on the important neuroprotective strategy of targeted temperature management with controlled sedation and mechanical ventilation. It begins with a discussion of postcardiac arrest syndrome, which affects all organs, and its immediate hospital management, which is best provided by specialized intensive care that secures the patient's airway, provides hemodynamic support with fluids and vasopressors, and performs immediate coronary angiography and percutaneous coronary intervention when indicated. Targeted temperature management and neuroprotection, which should be initiated as quickly as possible, are then discussed in detail, including their effects on organ functions and organ support. The review concludes with a discussion of a multimodal approach for the prognostication of a neurologic outcome after cardiac arrest and the logistics of postresuscitation care. *(Summary: M. J. Avram. Image: ©gettyimages.)*

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