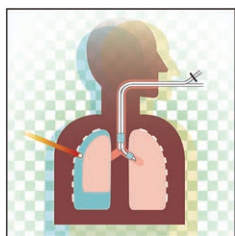


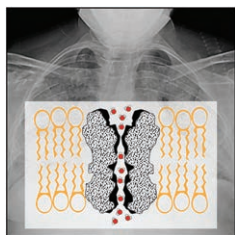
# THIS MONTH IN ANESTHESIOLOGY



## 385 Driving Pressure during Thoracic Surgery: A Randomized Clinical Trial

There is a high incidence of postoperative pulmonary complications despite the use of protective ventilation during thoracic surgery. The hypothesis that postoperative pulmonary complications, based on the Melbourne Group Scale, until postoperative day 3 will be less in patients receiving driving pressure-guided ventilation during one-lung ventilation than in patients receiving conventional protective ventilation was tested in a randomized controlled trial of 292 patients undergoing thoracic surgery. Driving pressure-guided ventilation was provided using the positive end-expiratory pressure that produced the lowest driving pressure and, as a result, the highest respiratory system compliance in a given patient. Eighteen of 147 patients (12.2%) in the protective ventilation group had four or more of the eight dichotomous factors on the Melbourne Group Scale by postoperative day 3,

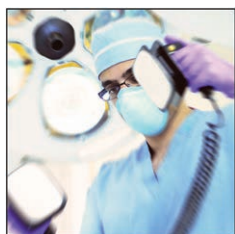
whereas only eight of the 145 patients (5.5%) in the driving pressure group had four or more factors (odds ratio 0.42; 95% CI, 0.18 to 0.99). (Summary: M. J. Avram. Image: A. Johnson, Vivo Visuals.)



## 404 Aquaporin 5 –1364A/C Promoter Polymorphism Is Associated with Pulmonary Inflammation and Survival in Acute Respiratory Distress Syndrome

Acute respiratory distress syndrome (ARDS) is characterized by an inflammatory destruction of pulmonary parenchymal integrity. The wide variability in the severity of lung inflammation and outcome in ARDS cannot be explained by patients' comorbidities. Aquaporin 5 mediates key mechanisms of inflammation that prevail in sepsis. The hypotheses that the AC and CC genotypes of the aquaporin 5 –1364A/C promoter single nucleotide polymorphism in patients with bacterial pneumonia evoking ARDS are associated with an attenuated pulmonary inflammation and higher 30-day survival was tested in 93 patients

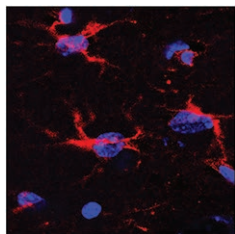
with the AA genotype, 38 with the AC genotype, and 5 with the CC genotype. The AA genotype was associated with aggravated pulmonary inflammation, as suggested by higher bronchoalveolar lavage supernatant protein and leukocyte concentrations as well as lactate dehydrogenase activity. Thirty-day survival was 62% for AA genotypes and 86% for AC and CC genotypes; homozygous AA subjects were at high risk of death within the 30-day observation period (hazard ratio 3.53; 95% CI, 1.38 to 9.07). See the accompanying Editorial View on [page 364](#). (Summary: M. J. Avram. Image: J. P. Rathmell.)



## 414 Delays in Cardiopulmonary Resuscitation, Defibrillation, and Epinephrine Administration All Decrease Survival in In-hospital Cardiac Arrest

The hypothesis that delays in initiation of cardiopulmonary resuscitation (CPR) and from the time of CPR to defibrillation or epinephrine treatment are each associated with lower in-hospital cardiac arrest survival was tested using data from a large prospective, hospital-based, multicentered clinical registry. In the overall cohort of 57,312 patients, there were 9,802 survivors (17.1%). In the multivariable logistic regression model that included both defibrillation and epinephrine treatment groups, increasing time to initiation of CPR and time from CPR to treatment were associated with decreased survival. Survival was 17.1% (9,711 of 56,694) if the time to initiation of CPR was 2 min or less but was 14.7% (91 of 618) if CPR was initiated after more than 2 min. Times

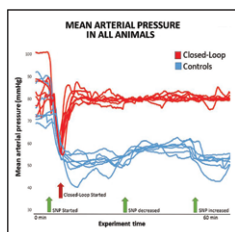
from CPR to either defibrillation or epinephrine treatment of 2 min or less were associated with an 18.0% (7,654 of 42,475) survival, but it was 15.0% (1,680 of 11,227) for 3 to 5 min, 12.8% (382 of 2,983) for 6 to 8 min, and 13.7% (86 of 627) for 9 to 11 min. (Summary: M. J. Avram. Image: J. P. Rathmell.)



## 423 Mitochondrial Function in Astrocytes Is Essential for Normal Emergence from Anesthesia in Mice

Inhibition of mitochondrial complex I function has been proposed as a possible molecular mechanism of action of volatile anesthetics. In mice, restriction of loss of the mitochondrial complex I gene *Ndufs4* to glutamatergic neurons confers a profound hypersensitivity to volatile anesthetics similar to that seen with global genetic knockout of *Ndufs4*, with an EC<sub>50</sub> one third that of wild-type mice. Glutamatergic synapses consist of three cells, a presynaptic neuron, a postsynaptic neuron, and a supporting astrocyte. The hypothesis that mice with astrocyte-specific knockout of *Ndufs4* would be more sensitive than control mice to isoflurane and halothane was tested using two different anesthetic endpoints, loss of righting reflex and response to a

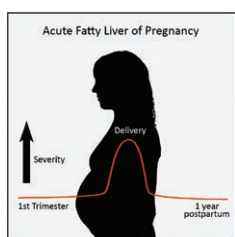
tail clamp. The acute loss of *Ndufs4* in astrocytes specifically lowered the concentrations at which the mutants emerged from anesthesia, without affecting the induction concentrations, for both responses to tail clamp and loss of righting reflex assays, indicating a hysteresis in anesthetic sensitivity produced by astrocytes alone. See the accompanying Editorial View on [page 361](#). (Summary: M. J. Avram. Image: Adapted from original article.)



### 394 Automated Titration of Vasopressor Infusion Using a Closed-loop Controller: *In Vivo* Feasibility Study Using a Swine Model

Perioperative hypotension has been identified as a risk factor for increased occurrence of stroke, acute kidney injury, myocardial injury, and overall mortality. Vasopressor administration for correcting vasodilatory hypotension requires continuous modification of the infusion rate. The performance of an automated closed-loop vasopressor device developed to treat hypotension was assessed in 14 healthy anesthetized pigs using norepinephrine to treat normovolemic vasodilation induced by sodium nitroprusside. The pigs were randomly assigned to a closed-loop controller group or a control group and underwent a 2-h study protocol in which the sodium nitroprusside infusion rate was adjusted every 30 min, alternating between 130  $\mu\text{g}/\text{min}$ , the infusion rate expected to cause a reduction in mean arterial pressure to around 50 mmHg, and 65  $\mu\text{g}/\text{min}$ .

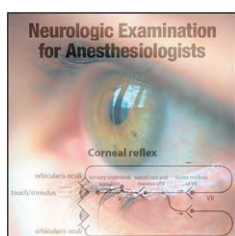
The closed-loop controller maintained mean arterial pressure in the target range of  $80 \pm 5$  mmHg for  $98 \pm 1\%$  (mean  $\pm$  SD) of the study protocol, whereas in the control group the mean arterial pressure was  $80 \pm 5$  mmHg for  $14 \pm 3\%$  of the time. (Summary: M. J. Avram. Image: Adapted from original article.)



### 446 Acute Fatty Liver of Pregnancy: Pathophysiology, Anesthetic Implications, and Obstetrical Management (Clinical Focus Review)

Acute fatty liver of pregnancy is a potentially morbid obstetric complication characterized by acute hepatic failure secondary to fatty infiltration of the liver. The resultant effects include coagulopathy, electrolyte abnormalities, and multisystem organ dysfunction. Acute fatty liver of pregnancy patients have the potential to develop severe complications and may require intensive care management during the peripartum period. The definitive management for acute fatty liver of pregnancy is delivery of the fetus, but consideration should be given to each individual case as to the timing and method of delivery. Anesthetic management for delivery must be tailored to the condition of the patient, which requires an anesthesiologist's understanding of both its pathophysiology and

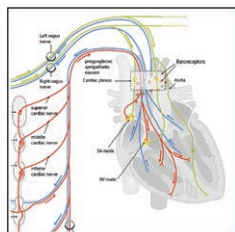
obstetric impact for appropriate recognition and management. This review discusses the pathophysiology of the illness, diagnosis, initial management, delivery implications, and anesthetic goals of care as well as potential critical care concerns to consider when treating these patients. (Summary: M. J. Avram. Image: J. P. Rathmell.)



### 462 A Neurologic Examination for Anesthesiologists: Assessing Arousal Level during Induction, Maintenance, and Emergence (Review Article)

General anesthesia is a reversible pharmacologically induced coma. The parts of the neurologic examination that are commonly used by neurologists to assess level of arousal and integrity of brainstem and corticothalamic function in patients in coma, vegetative states, and minimally conscious states can be used to evaluate arousal levels in patients who receive general anesthesia or sedation. The neuroanatomy and neurophysiology of selected components of the neurologic examination are reviewed as are how the elements of the neurologic examination that focus on the brainstem can be used to assess loss of consciousness, level of unconsciousness, and recovery of consciousness in patients receiving general anesthesia and sedation. When used with other

parts of the physical examination, vital signs, and electroencephalogram assessments, the neurologic examination can provide the anesthesiologist with a more informed picture of a patient's state of arousal during general anesthesia and sedation. (Summary: M. J. Avram. Image: J. P. Rathmell.)



### 472 Effects of Thoracic Epidural Anesthesia on Neuronal Cardiac Regulation and Cardiac Function (Review Article)

Thoracic epidural anesthesia is widely applied in thoracic and abdominal surgical procedures because it provides excellent analgesia and decreases postoperative pulmonary complications. Epidural anesthesia with local anesthetics not only produces sensory and motor blockade but also affects the autonomic nervous system. While the effects of thoracic epidural anesthesia have generally been considered beneficial to the cardiovascular system and protective against surgical stress, recent systematic reviews have not been able to confirm improved cardiac outcome in surgical patients treated with thoracic epidural anesthesia, and some evidence was found for increased cardiovascular problems in high-risk patients receiving neuraxial block. The present

comprehensive update on the cardiovascular effects of high thoracic epidural anesthesia and cardiac sympathectomy in healthy and diseased patients found that the conviction that thoracic epidural anesthesia has beneficial hemodynamic effects may not apply to all patients. Although protective in particular pathophysiologic conditions, such as ischemic heart disease, cardiac sympathectomy may also attenuate the capacity of the heart to respond to hemodynamic challenges in particular subgroups. (Summary: M. J. Avram. Image: Adapted from original article.)