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ANESTHESIOLOGY

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Perioperative Medicine

CLINICAL SCIENCE

◆◆◆ Perioperative Mortality of the COVID-19 Recovered Patient Compared to a Matched Control: A Multicenter Retrospective Cohort Study <i>M. F. Aziz, K. Schenning, S. Koike, A. O'Glasser, V. N. O'Reilly-Shah, V. Sera, M. Mathis, Multicenter Perioperative Outcomes Group Investigators</i>	195
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In a retrospective observational cohort study in patients presenting for elective inpatient surgery between April 2020 and April 2021, patients with a previous positive test for COVID-19 before the surgery had an elevated risk of perioperative mortality and pulmonary complications but not kidney injury. The risk was less if the positive test was more than 2 weeks before surgery.

◆◆ Target-controlled Infusion of Remimazolam in Healthy Volunteers Shows Some Acute Tolerance <i>R. Vellinga, J. V. Koomen, D. J. Eleveld, T. Stöhr, M. Pesic, M. M. R. F. Struys, P. J. Colin</i>	207
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The pharmacokinetic-pharmacodynamic relationships between remimazolam concentrations and Modified Observer's Assessment of Alertness and Sedation scores and bispectral index were assessed in 24 healthy volunteers using step-up and step-down target-controlled infusions to determine clinically appropriate target concentrations. Target concentration-dependent sedation was observed with little effect on vital signs. A difference in the sedative effects of remimazolam at identical target concentrations was observed between the step-up and step-down parts of the titration scheme that could not be explained by a bias in the predicted target concentrations. Pharmacodynamic models for Modified Observer's Assessment of Alertness and Sedation scores and bispectral index that assumed tolerance development described the observed difference in the sedative effects between the step-up and step-down parts of the titration scheme.

◆◆ Association of Patient Race and Hospital with Utilization of Regional Anesthesia for Treatment of Postoperative Pain in Total Knee Arthroplasty: A Retrospective Analysis Using Medicare Claims <i>A. A. Dixit, G. Sekeres, E. R. Mariano, S. G. Memtsoudis, E. C. Sun</i>	220
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Among 733,406 primary total knee arthroplasty surgeries between January 1, 2011, and December 31, 2016, in the Medicare database, 90.7% of patients identified as White, 4.7% as Black, and 4.6% as Other. Black patients did not have a statistically different probability of receiving a regional anesthetic compared to White patients (adjusted estimates: Black, 53.3% [95% CI, 52.5 to 54.1%]; White, 52.7% [95% CI, 52.4 to 54.1%]; $P = 0.132$). After adjustment for other patient-level confounders, 42.0% of the variation in block administration was attributable to the hospital, compared to less than 0.01% to race. Race was not associated with administration of regional anesthesia in Medicare patients undergoing primary total knee arthroplasty.

◆◆ Refers to This Month in ANESTHESIOLOGY

◆ Refers to Editorial

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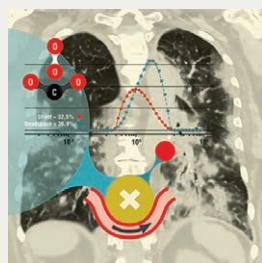
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ON THE COVER: A state-of-the-art assessment of the different causes of hypoxemia (shunt, ventilation–perfusion mismatch, and diffusion limitation) in COVID-19 acute respiratory distress syndrome (ARDS) is currently lacking. In this study, Busana *et al.* hypothesized a multifactorial genesis of hypoxemia and aimed to measure the relative contribution of each of the different mechanisms and their relationship with the distribution of tissue and blood within the lung. In an accompanying editorial, Capaccione and Vidal Melo examine the physiologic determinants of hypoxemia, relevant techniques and methods to identify and address hypoxemia, and new research on hypoxemia during COVID-19 ARDS. Cover illustration: A. Johnson, Vivo Visuals Studio.

- Busana *et al.*: Causes of Hypoxemia in COVID-19 Acute Respiratory Distress Syndrome: A Combined Multiple Inert Gas Elimination Technique and Dual-energy Computed Tomography Study, p. 251
- Capaccione and Vidal Melo: Structure–Function Relationships Determining Hypoxemia in COVID-19 Acute Respiratory Distress Syndrome, p. 186

- Effect of Extracerebral Contamination on Near-infrared Spectroscopy as Revealed during Organ Donation: A Prospective Observational Study in Brain-dead Organ Donors**
M. Soehle, J. Langer, E. Schindler, S. Manekeller, M. Coburn, M. Thudium231

Brain-dead patients (who have absent cerebral circulation) show surprisingly high cerebral oxygen saturation, which then drops when the aorta is clamped and extracerebral circulation ceases. These observations call into question the reliability of near-infrared spectroscopy in detecting isolated cerebral ischemia.

BASIC SCIENCE

- Increasing Levels of Positive End-expiratory Pressure Cause Stepwise Biventricular Stroke Work Reduction in a Porcine Model**
G. Wood, T. L. Madsen, W. Y. Kim, M. D. Lyhne240

This study of six healthy, anesthetized female pigs found that stepwise increases in positive end-expiratory pressure (PEEP) were associated with biventricular decreased stroke work as assessed using biventricular pressure-volume loop recordings. Higher PEEP had divergent effects on right *versus* left ventricle for key hemodynamic variables including arterial elastance, ejection fraction, ventriculo-arterial coupling, and end-systolic pressures. The impact of PEEP was more notable and potentially detrimental for the right ventricle compared to the left ventricle.

Critical Care Medicine

CLINICAL SCIENCE

- Causes of Hypoxemia in COVID-19 Acute Respiratory Distress Syndrome: A Combined Multiple Inert Gas Elimination Technique and Dual-energy Computed Tomography Study**
M. Busana, A. Rau, S. Lazzari, S. Gattarello, M. Cressoni, L. Biggemann, L.-O. Harnisch, L. Giosa, A. Vogt, L. Saager, J. Lotz, B. Meller, K. Meissner, L. Gattinoni, O. Moerer251

The authors found shunt, ventilation-perfusion mismatch, and potentially diffusion limitation or postpulmonary shunting in COVID-19 acute respiratory distress syndrome (ARDS). The authors also found an excess of blood volume compared to the tissue in well-aerated regions but not with atelectasis. The findings support the concept of a multifactorial genesis of hypoxemia, in which alveolar factors, typical of ARDS, are combined with vascular factors, more typical of pulmonary embolism, all of which contribute to the overall severity of the disease.

- Monitoring of Argatroban in Critically Ill Patients: A Prospective Study Comparing Activated Partial Thromboplastin Time, Point-of-Care Viscoelastic Testing with Ecarin Clotting Time and Diluted Thrombin Time to Mass Spectrometry**
L. Heubner, R. Oertel, O. Tiebel, N. Mehlig-Warnecke, J. Beyer-Westendorf, M. Mirus, M. Roessler, B. Renner, P. M. Spieth261

Although activated partial thromboplastin time monitoring of argatroban is the most commonly used test, diluted thrombin time and point-of-care viscoelastic ecarin clotting times provide improved guidance for optimal dosing and identifying overdosing.

Pain Medicine

BASIC SCIENCE

- Opposing Effects on Descending Control of Nociception by μ and κ Opioid Receptors in the Anterior Cingulate Cortex**
E. Navratilova, C. Qu, G. Ji, V. Neugebauer, M. Guerrero, H. Rosen, E. Roberts, F. Porreca272

Microinjection of κ opioid receptor antagonists into the anterior cingulate cortex of nerve injured rats restored descending control of nociception, an endogenous pain control circuit. Microinjection of selective κ opioid receptor agonists reduced descending control of nociception in sham injured rats confirming the importance of the κ opioid receptor in regulating endogenous pain control.

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- Perioperative Management for Complex Spine Fusion Surgery**
L. M. Carabini, T. R. Koski, J. F. Bebawy293

Complex spine surgeries performed worldwide continue to increase in number, as do the age and comorbidity of patients undergoing these operations. Perioperative care protocols related to blood management, postoperative pain control, and intraoperative measures to mitigate morbidity may improve clinical workflows and patient outcomes.

Meaning and Management of Perioperative Oliguria

R. T. Tallarico, I. E. McCoy, F. Dépret, M. Legrand.....304

Perioperative oliguria is an alarm signal. The initial assessment includes closer patient monitoring, evaluation of volemic status, risk–benefit analysis of fluid challenge or furosemide stress test, and investigation of possible perioperative complications.

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Consciousness and General Anesthesia: Challenges for Measuring the Depth of Anesthesia

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The authors discuss the concept of consciousness, how it is altered by anesthetics, the challenges for assessing consciousness, currently used technologies for assessing anesthesia levels, and future research directions.

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