Anesthesiology

The Journal of the American Society of Anesthesiologists, Inc.
American Society of Critical Care Anesthesiologists
Society for Obstetric Anesthesia and Perinatology

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Bruno Riou

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■ CLINICAL INVESTIGATIONS

◆ Incidence and Significance of Cardiac Troponin I Release in Severe Trauma Patients **1262**
Alain R. Edouard, Marie-Louise Felten, Jean-Louis Hebert, Claudine Cosson, Laurent Martin, and Dan Benhamou

Serial electrocardiographic recordings and troponin I assessments during the initial screening of trauma patients may detect anatomical cardiac injuries by the time course of circulating protein. In contrast with septic patients, troponin I release does not have a prognosis value in trauma patients.

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Estimation of the Plasma Effect Site Equilibration Rate Constant (k_{e0}) of Propofol in Children Using the Time to Peak Effect: Comparison with Adults **1269**

Hernán R. Muñoz, Luis I. Cortínez, Mauricio E. Ibacache, and Fernando R. Altermatt

A longer time to peak effect of propofol in children than in adults results in a different plasma effect site equilibration rate constant, depending on the pharmacokinetic model used to calculate it.

◇ Spectral Entropy and Bispectral Index as Measures of the Electroencephalographic Effects of Sevoflurane **1275**

Richard Klaus Ellerkmann, Vidal-Markus Liermann, Thorsten Michael Alves, Ingobert Wenningmann, Sascha Kreuer, Wolfram Wilhelm, Heiko Roepcke, Andreas Hoeft, and Jörgen Bruhn

Spectral entropy and Bispectral Index correlated equally well with sevoflurane effect site concentration.

Comparative Evaluation of the Datex-Ohmeda S/5 Entropy Module and the Bispectral Index® Monitor during Propofol–Remifentanil Anesthesia **1283**

Gunter N. Schmidt, Petra Bischoff, Thomas Standl, Angelika Hellstern, Olaf Teuber, and Jochen Schulte am Esch

The Datex-Ohmeda S/5 Entropy Module (Datex-Ohmeda Division, Instrumentarium Corp., Helsinki, Finland) and the Bispectral Index® monitor (Aspect Medical Systems, Newton, MA) reveal similar information on the level of sedation and allow the anesthesiologist to distinguish between different steps of anesthesia.

◇ Platelet Gene Polymorphisms and Cardiac Risk Assessment in Vascular Surgical Patients **1291**

Nauder Faraday, Elizabeth A. Martinez, Robert B. Scharpf, Laura Kasch-Semenza, Todd Dorman, Peter J. Pronovost, Bruce Perler, Gary Gerstenblith, Paul F. Bray, and Lee A. Fleisher

Polymorphisms in platelet glycoproteins IIIa (adjusted odds ratio [OR] and 95% confidence interval, 2.4 [1.2–6.2]) and Ibα (OR 3.4 [1.4–9.3]), diabetes mellitus (OR 4.0 [1.7–12.5]), abdominal aortic surgery (OR 4.1 [1.7–14.4]), and thoracoabdominal aortic surgery (OR 6.4 [2.7–23.8]) were independent predictors of ischemic outcome in vascular surgical patients. The addition of platelet gene polymorphisms to clinical factors improved a model to predict ischemic risk ($P < 0.001$ by likelihood ratio testing, receiver operator characteristic = 0.73 *vs.* 0.64; $P = 0.04$).

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Myocardial Performance Index with Sevoflurane–Pancuronium *versus* Fentanyl–Midazolam–Pancuronium in Infants with a Functional Single Ventricle **1298**

Catherine M. Ikemba, Jason T. Su, Stephen A. Stayer, Wanda C. Miller-Hance, Benjamin W. Eidem, Louis I. Bezold, Stuart R. Hall, Luke M. Havemann, and Dean B. Andropoulos

Myocardial performance index was assessed echocardiographically in infants with a functional single ventricle randomized to sevoflurane or fentanyl–midazolam anesthesia. Myocardial performance index did not change from baseline with sevoflurane or fentanyl–midazolam with two dose levels.

Proper Shoulder Position for Subclavian Venipuncture: A Prospective Randomized Clinical Trial and Anatomical Perspectives Using Multislice Computed Tomography **1306**

Norihito Kitagawa, Mayuko Oda, Tadahide Totoki, Noriaki Miyazaki, Ichiroh Nagasawa, Takahiko Nakazono, Tsutomu Tamai, and Masatoshi Morimoto

Spatial relations between the subclavian vein and surrounding structures were observed using multislice computed tomography, and optimal shoulder position for safe subclavian venipuncture was investigated. A caudally lowered shoulder position increases both overlap and proximity between the clavicle and the subclavian vein without decreasing venous diameter. This position is expected to offer safer and more reliable venipuncture compared with other shoulder positions, as indicated by the results of a limited clinical trial.

■ LABORATORY INVESTIGATIONS

◇ Differential Protective Effects of Volatile Anesthetics against Renal Ischemia–Reperfusion Injury *In Vivo* **1313**

H. Thomas Lee, Ayuko Ota-Setlik, Yulei Fu, Samih H. Nasr, and Charles W. Emala

Volatile anesthetics confer significant but differential protection against renal ischemia and reperfusion injury compared with pentobarbital or ketamine anesthesia by attenuating inflammation. The mechanism of protection is independent of adenosine triphosphate–dependent potassium channel activation.

The Inhibitory Effects of Isoflurane on Protein Tyrosine Phosphorylation–modulated Contraction of Rat Aortic Smooth Muscle **1325**

Jingui Yu, Koji Ogawa, Yasuyuki Tokinaga, Kazuhiro Mizumoto, Tetsuya Kakutani, and Yoshio Hatano

The findings of the current study, that isoflurane dose-dependently inhibits both the sodium orthovanadate–stimulated contraction and tyrosine phosphorylation of a set of proteins, including phospholipase Cγ-1 and p42 mitogen-activated protein kinase, in rat aortic smooth muscle, suggest that isoflurane depresses protein tyrosine phosphorylation–modulated contraction of vascular smooth muscle, especially that mediated by the tyrosine-phosphorylated phospholipase Cγ-1 and mitogen-activated protein kinase signaling pathways.

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Maternal Insufflation during the Second Trimester Equivalent Produces Hypercapnia, Acidosis, and Prolonged Hypoxia in Fetal Sheep 1332

Kenichiro Uemura, Rebecca J. McClaine, Sebastian G. de la Fuente, Roberto J. Manson, Kurt A. Campbell, Deborah J. McClaine, William D. White, Jonathan S. Stamler, W. Steve Eubanks, and James D. Reynolds

Carbon dioxide insufflation of the preterm ewe for 60 min produces significant fetal hypercapnia and acidosis along with prolonged fetal hypoxia and cardiovascular depression.

Mg^{2+} Dependence of Halothane-induced Ca^{2+} Release from the Sarcoplasmic Reticulum in Skeletal Muscle from Humans Susceptible to Malignant Hyperthermia 1339

Adrian M. Duke, Philip M. Hopkins, Jane P. Halsal, and Derek S. Steele

The effects of Mg^{2+} on sarcoplasmic reticulum Ca^{2+} release were studied in skinned fibers from normal and malignant hyperthermia–susceptible human skeletal muscle. When Mg^{2+} inhibition of the ryanodine receptor was reduced, the halothane sensitivity of normal fibers and the characteristics of the Ca^{2+} release process approached that of the malignant hyperthermia–susceptible phenotype.

Interaction of Ropivacaine with Cloned Cardiac Kv4.3/KChIP2.2 Complexes 1347

Patrick Friederich and Anna Solth

Ropivacaine has been developed as a safer alternative to bupivacaine. Bupivacaine exhibits cardiotoxic effects in part by inhibiting the cardiac K current I_{to}. In contrast to bupivacaine, the effects of ropivacaine on I_{to} have not been investigated. This study demonstrates effects of ropivacaine on human I_{to} (Kv4.3/KChIP2.2 channels).

Isoflurane and Desflurane Impair Right Ventricular–Pulmonary Arterial Coupling in Dogs 1357

François Kerbaul, Benoît Rondelet, Sophie Motte, Pierre Fesler, Ives Hubloue, Patricia Ewalenko, Robert Naeije, and Serge Brimioulle

Isoflurane and desflurane impair right ventricular–pulmonary arterial coupling in a dose-dependent manner by decreasing contractility and increasing afterload.

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Rosaria Acquaviva, Agata Campisi, Paolo Murabito, Giuseppina Raciti, Roberto Avola, Salvatore Mangiameli, Ilenia Musumeci, Maria Luisa Barcellona, Angelo Vanella, and Giovanni Li Volti

Propofol protects astrocytes against peroxynitrite damage by induction of heme oxygenase-1 expression.

Desflurane Preconditioning Induces Time-dependent Activation of Protein Kinase C Epsilon and Extracellular Signal-regulated Kinase 1 and 2 in the Rat Heart *In Vivo* **1372**

Octavian Toma, Nina C. Weber, Jessica I. Wolter, Detlef Obal, Benedikt Preckel, and Wolfgang Schlack

Both protein kinase C-ϵ and extracellular signal-regulated kinase 1 and 2 are mediators of desflurane-induced cardiac preconditioning. Protein kinase C-ϵ and extracellular signal-regulated kinase 1 and 2 are activated in a time-dependent manner during desflurane preconditioning, but extracellular signal-regulated kinase 1 and 2 activation is not protein kinase C dependent. Moreover, extracellular signal-regulated kinase 1/2 blockade abolished protein kinase C-ϵ activation, suggesting extracellular signal-regulated dependent activation of protein kinase C-ϵ during desflurane preconditioning.

PAIN AND REGIONAL ANESTHESIA

Combinations of Bupivacaine, Fentanyl, and Clonidine for Lumbar Epidural Postoperative Analgesia: A Novel Optimization Procedure **1381**

Gorazd Sveticic, Andrea Gentilini, Urs Eichenberger, Eleonora Zanderigo, Valentina Sartori, Martin Luginbühl, and Michele Curatolo

For postoperative lumbar epidural analgesia, a stepwise optimization model was applied to combinations of bupivacaine, fentanyl, and clonidine. After analyzing 12 combinations, the optimization procedure showed best results with the following combinations of bupivacaine, fentanyl, and clonidine concentrations, respectively, in the anesthetic solution: 1.0 mg/ml–1.4 μg/ml–0.5 μg/ml, 0.9 mg/ml–3.0 μg/ml–0.3 μg/ml, 1.0 mg/ml–2.4 μg/ml–1.0 μg/ml, and 0.6 mg/ml–2.5 μg/ml–0.8 μg/ml.

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Probenecid Interacts with the Pharmacokinetics of Morphine-6-glucuronide in Humans **1394**

Carsten Skarke, Michael Langer, Marwan Jarrar, Helmut Schmidt, Gerd Geisslinger, and Jörn Lötsch

Probenecid decreased the plasma clearance of morphine-6-glucuronide in healthy volunteers by 20%, resulting in increased plasma concentrations that were followed by increased miotic effects. In contrast, coadministration of quinidine had no effect on morphine-6-glucuronide pharmacokinetics.

Chronic Oral Gabapentin Reduces Elements of Central Sensitization in Human Experimental Hyperalgesia **1400**

Hanne Gottrup, Gitte Juhl, Anders D. Kristensen, Robert Lai, Boris A. Chizh, John Brown, Flemming W. Bach, and Troels S. Jensen

Chronic gabapentin reduces central sensitization.

Effect of Pain and Audiovisual Stimulation on the Depression of Acute Hypoxic Ventilatory Response by Low-dose Halothane in Humans **1409**

Jaideep J. Pandit, Ben Moreau, Simon Donoghue, and Peter A. Robbins

This study assesses the influence of audiovisual stimulation and acute pain on the ability of halothane to depress the acute hypoxic ventilatory response.

◇ Intranasal Nicotine for Postoperative Pain Treatment **1417**

Pamela Flood and Danette Daniel

A single dose of nasal nicotine under general anesthesia reduced postoperative pain for 24 hours.

Efficacy of a Prophylactic Epidural Blood Patch in Preventing Post Dural Puncture Headache in Parturients after Inadvertent Dural Puncture **1422**

Barbara M. Scavone, Cynthia A. Wong, John T. Sullivan, Edward Yaghmour, Saadia S. Sherwani, and Robert J. McCarthy

A prophylactic epidural blood patch administered through an indwelling epidural catheter after delivery did not decrease the incidence of postdural puncture headache but reduced the duration of pain symptoms. Vaginal delivery and short time interval from dural puncture to prophylactic blood patch were associated with increased headache rate.

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Epinephrine Prevents Muscle Blood Flow Increases after Perineural Injection of Tetrodotoxin **1428**

Takako Masuda, Brian E. Cairns, Senthilkumar Sadhasivam, Patricia S. Dunning, and Charles B. Berde

Previous work showed that epinephrine plus tetrodotoxin markedly prolonged rat sciatic blockade (13-fold) compared with tetrodotoxin alone. Tetrodotoxin was shown to increase local blood flow in perisciatic muscles but not in the sciatic nerve itself. Coinjection of epinephrine prevents tetrodotoxin-induced increases in perisciatic muscle blood flow. Vasoconstriction of the perisciatic muscles by epinephrine may contribute to the prolongation of tetrodotoxin-induced nerve blocks and the reduction of systemic toxicity.

ECONOMICS

Effect of Different Cost Drivers on Cost per Anesthesia Minute in Different Anesthesia Subspecialties **1435**

Martin Schuster, Thomas Standl, Joachim A. Wagner, Jürgen Berger, Hajo Reißmann, and Jochen Schulte am Esch

The effect of different cost drivers on the cost of anesthesia care for 10 major surgical subspecialties in a university hospital setting was analyzed. Subspecialties with longer case duration caused significantly lower cost per anesthesia minute. Compared with the profound effect of case duration, other cost drivers, such as high percentage of emergency cases, high percentage of young children, or more invasive monitoring needed, had small effects on the subspecialty-specific cost per anesthesia minute.

REVIEW ARTICLES

Making Management Decisions on the Day of Surgery Based on Operating Room Efficiency and Patient Waiting Times **1444**

Franklin Dexter, Richard H. Epstein, Rodney D. Traub, and Yan Xiao

Operating room management decisions on the day of surgery can be made based on four ordered priorities. The mean (expected) duration alone is a suitable number for decisions to reduce hours worked late, but additional data regarding uncertainty in case duration are required to reduce patient waiting times.

Is Low-dose Haloperidol a Useful Antiemetic?: A Meta-analysis of Published and Unpublished Randomized Trials **1454**

Michael Büttner, Bernhard Walder, Erik von Elm, and Martin R. Tramèr

At doses that are considerably lower than those used to treat psychosis or agitation, haloperidol is antiemetic, with minimal toxicity.

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