



# Anesthesiology



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*Society for Obstetric Anesthesia and Perinatology*



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- Overestimation of Bispectral Index in Sedated Intensive Care Unit Patients Revealed by Administration of Muscle Relaxant** **9**

*Benoît Vivien, Sophie Di Maria, Alexandre Ouattara, Olivier Langeron, Pierre Coriat, and Bruno Riou*

Bispectral Index monitoring in sedated intensive care unit patients may be considerably overestimated because of high muscular activity. The magnitude of the Bispectral Index decrease following neuromuscular blockade was significantly correlated to both Bispectral Index and electromyographic values before muscle relaxation.

- Effect of Prophylactic Bronchodilator Treatment with Intravenous Colforsin Daropate, a Water-soluble Forskolin Derivative, on Airway Resistance after Tracheal Intubation** **18**

*Zen'ichiro Wajima, Toshiya Shiga, Tatsusuke Yoshikawa, Akira Ogura, Kazuyuki Imanaga, Tetsuo Inoue, and Ryo Ogawa*

Prophylactic treatment with colforsin daropate produced lower airway resistance and higher dynamic lung compliance after anesthesia induction and endotracheal intubation when compared with placebo medication. The authors' results suggest that such pretreatment before induction and intubation is particularly beneficial and advantageous for middle-aged smokers without chronic obstructive pulmonary disease.

- ◇ **Mechanisms of Sevoflurane-induced Myocardial Preconditioning in Isolated Human Right Atria *In Vitro*** **27**

*Alexandra Yvon, Jean-Luc Hanouz, Benoît Haelewyn, Xavier Terrien, Massimo Massetti, Gérard Babatasi, André Khayat, Pierre Ducouret, Henri Bricard, and Jean-Louis Gérard*

Sevoflurane preconditions isolated human myocardium through opening of  $K_{ATP}$  channels and stimulation of adenosine  $A_1$  receptors.

- Narcotrend Monitoring Allows Faster Emergence and a Reduction of Drug Consumption in Propofol-Remifentanil Anesthesia** **34**

*Sascha Kreuer, Andreas Biedler, Reinhard Larsen, Simone Altmann, and Wolfram Wilhelm*

The Narcotrend, a new electroencephalographic monitor designed to measure the depth of anesthesia, was investigated during propofol-remifentanil anesthesia. Narcotrend and Bispectral Index<sup>®</sup> monitoring were equally effective in reducing recovery times and propofol consumption when compared to a standard practice protocol.

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**Large-dose Hydroxyethyl Starch 130/0.4 Does Not Increase Blood Loss and Transfusion Requirements in Coronary Artery Bypass Surgery Compared with Hydroxyethyl Starch 200/0.5 at Recommended Doses** **42**

*Stefan-Mario Kasper, Philipp Meinert, Sandra Kampe, Christoph Görg, Christof Geisen, Uwe Mehlhorn, and Christoph Diefenbach*

Hydroxyethyl starch 130/0.4 at a median dose of 49 ml/kg (approximately 1.5 times the manufacturer's recommended maximum dose) did not increase blood loss and transfusion requirements in coronary artery bypass surgery compared with hydroxyethyl starch 200/0.5 at a median dose of 33 ml/kg.

**Relationship between Aortic-to-radial Arterial Pressure Gradient after Cardiopulmonary Bypass and Changes in Arterial Elasticity** **48**

*Masahiro Kanazawa, Haruo Fukuyama, Yoshio Kinefuchi, Mamoru Takiguchi, and Toshiyasu Suzuki*

The authors demonstrated the relationship between the aortic-to-radial arterial pressure gradient after cardiopulmonary bypass and changes in the arterial elasticity.

**Evaluation of a New Point-of-care Celite-activated Clotting Time Analyzer in Different Clinical Settings: The i-STAT Celite-activated Clotting Time Test** **54**

*Rita Paniccia, Sandra Fedi, Fiorella Carbonetto, Daniela Noferi, Paolo Conti, Brunella Bandinelli, Betti Giusti, Lucia Evangelisti, Paola Pretelli, Mara F.G. Palmarini, Rosanna Abbate, and Domenico Prisco*

During hemodialysis and cardiac surgery, celite-activated clotting time measurements performed with a new point-of-care device were compared with activated clotting time values obtained with the traditional system. This test showed quite similar results and relationships with heparin plasma levels.

◇ **Cricoid Pressure Displaces the Esophagus: An Observational Study Using Magnetic Resonance Imaging** **60**

*Kevin J. Smith, Julian Dobranowski, Gordon Yip, Alexandre Dauphin, and Peter T-L. Choi*

Magnetic resonance imaging was used to determine the anatomic changes in the airway and the esophagus with and without the application of cricoid pressure.




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### Systemically Administered $\alpha_2$ -Agonist-induced Peripheral Vasoconstriction in Humans 65

*Pekka Talke, Errol Lobo, and Ronald Brown*

Increasing plasma target concentrations of an  $\alpha_2$ -agonist were administered to healthy young volunteers in whom the sympatholytic effects of the drug were attenuated in one of two ways: general anesthesia or axillary brachial plexus block. By denervating the vascular bed of interest or by decreasing sympathetic nervous system activity, the authors could observe vasoconstriction induced by a systemically administered  $\alpha_2$ -agonist with minimal interference from the sympatholytic effects of the drug.

#### ■ LABORATORY INVESTIGATIONS

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### ◆ Morphometric Effects of the Recruitment Maneuver on Saline-lavaged Canine Lungs: A Computed Tomographic Analysis 71

*Chae-Man Lim, Sung Soon Lee, Jin Seoung Lee, Younsuck Koh, Tae Sun Shim, Sang Do Lee, Woo Sung Kim, Dong-Soon Kim, and Won Dong Kim*

In lung-lavaged dogs, the recruitment maneuver was compared with a positive end-expiratory pressure titration to the lower inflection point (a conventional method of recruitment) with regard to volumetric and topographic changes in lung aeration. Compared with the positive end-expiratory pressure titration, the recruitment maneuver resulted in a greater functioning lung volume, better aeration of the most dependent lung, and less regional heterogeneity of lung aeration. However, the recruitment maneuver tended to induce a greater increase in hyperaerated lung volume than did the positive end-expiratory pressure titration.

### Protection with Antibody to Tumor Necrosis Factor Differs with Similarly Lethal *Escherichia coli* versus *Staphylococcus aureus* Pneumonia in Rats 81

*Waheedullah Karzai, Xizhong Cui, Bjoern Mehlhorn, Eberhard Straube, Thomas Hartung, Eric Gerstenberger, Steven M. Banks, Charles Natanson, Konrad Reinhart, and Peter Q. Eichacker*

The efficacy of antibodies to tumor necrosis factor in sepsis may be altered by bacteria type.




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### Effects of Inhalational Anesthetics on L-type $\text{Ca}^{2+}$ Currents in Human Atrial Cardiomyocytes during $\beta$ -Adrenergic Stimulation 90

*Jens Fassl, Christian R. Halaszovich, Rocco Hüneke, Eberhard Jüngling, Rolf Rossaint, and Andreas Lückhoff*

In cardiomyocytes isolated from human atria, halothane and sevoflurane but not xenon depressed L-type  $\text{Ca}^{2+}$  currents stimulated with the  $\beta$ -adrenergic agonist isoproterenol. Halothane evoked an additional long-lasting enhancing effect that became apparent after washout of the anesthetic.

### Tolerance to Acute Isovolemic Hemodilution: Effect of Anesthetic Depth 97

*Philippe Van der Linden, Stefan De Hert, Nathalie Mathieu, Françoise Degroote, Denis Schartz, Haibo Zhang, and Jean-Louis Vincent*

Tolerance to acute isovolemic anemia, reflected by the critical hemoglobin concentration, is significantly reduced during halothane and ketamine anesthesia in dogs.

### Effect of Halothane on the Guanosine 5' Triphosphate Binding Activity of G-Protein $\alpha_i$ Subunits 105

*John Streiff, Kristofer Jones, William J. Perkins, David O. Warner, and Keith A. Jones*

Halothane did not inhibit the ability of isolated, recombinant  $\text{G}\alpha_{i1}$  subunits or endogenous  $\text{G}\alpha_i$  subunits derived from airway smooth muscle homogenates to bind a guanosine 5'-triphosphate analog. These results suggest that halothane, which inhibits receptor-activated  $\text{G}\alpha_i$ -coupled pathways in airway smooth muscle, must functionally target a different component of these pathways.

### ◇ Improved Resuscitation after Cardiac Arrest in Rats Expressing the Baculovirus Caspase Inhibitor Protein p35 in Central Neurons 112

*Peter Vogel, Herman v.d. Putten, Erik Popp, Jakub J. Krumnikl, Peter Teschendorf, Roland Galmbacher, Malgorzata Kisielow, Christoph Wiessner, Albert Schmitz, Kevin J. Tomaselli, Bernd Schmitz, Eike Martin, and Bernd W. Böttiger*

Endogenous caspase inhibitors can improve survival after cardiac arrest in rats but do not improve neurologic function in animals that survive. The mode and site of action of the baculovirus inhibitor protein p35 remain to be elucidated.

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*In Vitro*: Measurement and Application of a Diffusion  
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*Michael A. Chesney, Misha Perouansky, and Robert A. Pearce*

Physiologic effects and diffusion rates of halothane and the nonimmobilizer F6 were measured in brain slices. A diffusion model was applied to derive tissue concentration profiles during experiments *in vitro*. Slow diffusion of F6 limited tissue uptake and reduced the concentration achieved at sites of action during the time course of physiologic experiments.

**Role of Protein Kinase C, Ca<sup>2+</sup>/Calmodulin-dependent  
Protein Kinase II, and Mitogen-activated Protein Kinases in  
Volatile Anesthetic-induced Relaxation in Newborn Rabbit  
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*Judy Y. Su and Anhkiet C. Vo*

In Ca<sup>2+</sup>-clamped skinned pulmonary arterial strips from newborn rabbits, isoflurane and halothane induced a dose-dependent relaxation. The protein kinase C inhibitors Ca<sup>2+</sup>/calmodulin-dependent protein kinase II (CaMKII), mitogen-activated extracellular signal-regulated kinase kinase (MEK/ERK1/2), and p38 completely prevented the relaxation induced by isoflurane and partially prevented that of halothane. The effective inhibitor concentrations of protein kinase C were parallel to those of MEK/ERK1/2 with respect to the anesthetic concentrations, and those of CaMKII and p38 were a direct function of the anesthetic concentrations.

**Translocation of Protein Kinase C Isoforms to Subcellular  
Targets in Ischemic and Anesthetic Preconditioning** **138**

*Marina Uecker, Rafaela da Silva, Thomas Grampp, Thomas Pasch,  
Marcus C. Schaub, and Michael Zaugg*

The present study in isolated perfused rat hearts indicates that protein kinase C  $\delta$  is translocated to mitochondria in anesthetic and ischemic preconditioning. Determination of the phosphorylation status of protein kinase C  $\delta$  in response to isoflurane preconditioning further suggests that phosphorylation of protein kinase C  $\delta$  on serine643 may be of particular relevance in transferring the preconditioning stimulus to the mitochondrial adenosine triphosphate-dependent potassium channels, the predominant end effectors of ischemic and anesthetic preconditioning in this rat heart model.

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#### Effect of Combining Naloxone and Morphine for Intravenous Patient-controlled Analgesia 148

*James B. Sartain, John J. Barry, Christopher A. Richardson, and Helen C. Branagan*

The effect on opioid-related side effects of combining naloxone and morphine for intravenous patient-controlled analgesia was studied. There were no differences in outcome between the control and treatment groups.

#### Differential Modulation of Remifentanyl-induced Analgesia and Postinfusion Hyperalgesia by S-Ketamine and Clonidine in Humans 152

*Wolfgang Koppert, Reinhard Sittl, Karin Scheuber, Monika Alsheimer, Martin Schmelz, and Jürgen Schüttler*

Cessation of a short-lasting infusion of remifentanyl caused a significant antianalgesic and hyperalgesic effect, possibly reflecting opioid withdrawal. The  $\alpha_2$ -receptor agonist clonidine significantly alleviated opioid-induced postinfusion antianalgesia. Different mechanisms were suggested for opioid-induced antianalgesia and secondary hyperalgesia, because only the latter was prevented by the *N*-methyl-D-aspartate-receptor antagonist *S*-ketamine.

#### ◇ Postoperative Morphine Consumption in the Elderly Patient 160

*Frédéric Aubrun, Dorothea Bunge, Olivier Langeron, Gérard Saillant, Pierre Coriat, and Bruno Riou*

The dose of intravenous morphine during postoperative titration was not significantly modified by age in elderly patients ( $-8\%$ ,  $P = \text{NS}$ ), in contrast to the dose of morphine administered subcutaneously over the first 24 postoperative hours ( $-36\%$ ,  $P < 0.001$ ).

#### Cephalad Movement of Morphine and Fentanyl in Humans after Intrathecal Injection 166

*James C. Eisenach, David D. Hood, Regina Curry, and Steven L. Shafer*

Using a sampling site cephalad to that of lumbar spinal injection in human volunteers, the authors observed a similar time course of rise in concentrations of fentanyl and morphine, a gradual increase in the ratio of morphine to fentanyl concentration over time, and a lack of correlation between drug concentration and cerebrospinal fluid volume.

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*Tony L. Yaksh, Kjersti A. Horais, Nicolle A. Tozier, Jeffrey W. Allen, Michael Rathbun, Steven S. Rossi, Claudia Sommer, Carol Meschter, Philip J. Richter, and Keith R. Hildebrand*
- Chronic intrathecal delivery of high concentrations of morphine, but not clonidine, over a 28-day period results in development of aseptic granulomatous masses.
- ◆ **Safety of Chronic Intrathecal Morphine Infusion in a Sheep Model** **188**  
*Tamara Lee Gradert, Wallace B. Baze, William C. Satterfield, Keith R. Hildebrand, Mary J. Johansen, and Samuel J. Hassenbusch*
- In response to a growing number of case reports describing inflammatory masses at the catheter tips of implanted opioid infusion systems, the authors determined that continuous intrathecal infusion of morphine sulfate in a sheep model at 3 mg/day produced no clinical signs and spinal histopathologic changes that were equivalent to those observed in the saline-treated animals, whereas doses of 12 mg/day or greater were associated with catheter-tip inflammatory masses.
- Plasticity in Action of Intrathecal Clonidine to Mechanical but Not Thermal Nociception after Peripheral Nerve Injury** **199**  
*Xavier Paqueron, Dawn Conklin, and James C. Eisenach*
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*Chuanyao Tong, Weiya Ma, Sang-Wook Shin, Robert L. James, and James C. Eisenach*
- Uterine cervical distension induces spinal cFos expression and intrathecal ketorolac inhibits uterine cervical distension-evoked cFos activation in a dose-dependent manner.



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**REVIEW ARTICLE**


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- ◆ **Influence of Genotype on Perioperative Risk and Outcome** **212**  
*Stephan Ziegeler, Byron E. Tsusaki, and Charles D. Collard*

Molecular biology has revolutionized medicine by increasing our understanding of the mechanisms of disease and our ability to assess genetic risk. Recent data suggest an association between specific genotypes and the risk of adverse perioperative clinical outcomes. Identification of such genotypes may not only provide insight as to why the response to surgery varies among individuals, but it also may potentially decrease surgical morbidity and mortality through preoperative risk assessment and administration of prophylactic therapy.

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*Claude A. Vachon, David O. Warner, and Douglas R. Bacon*

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*Tony L. Yaksh*

This article is a revisiting of original material published as: Yaksh TL, Rudy TA: Analgesia mediated by a direct spinal actions of narcotics. *Science* 1976; 192:1357-8.

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