



Anesthesiology



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■ **2005 JOURNAL SYMPOSIUM
PLASTICITY AND POSTOP PAIN**

Upregulation of Prostaglandin E₂ and Interleukins in the Central Nervous System and Peripheral Tissue during and after Surgery in Humans **403**

Asokumar Buvanendran, Jeffrey S. Kroin, Richard A. Berger, Nadim J. Hallab, Chiranjeev Saha, Corina Negrescu, Mario Moric, Marco S. Caicedo, and Kenneth J. Tuman

Upregulation of prostaglandin E₂ and interleukin 6 at central sites is an important component of the surgically induced inflammatory response in patients.

Postoperative Modulation of Central Nervous System Prostaglandin E₂ by Cyclooxygenase Inhibitors after Vascular Surgery **411**

Scott S. Reuben, Asokumar Buvanendran, Jeffrey S. Kroin, and Robert B. Steinberg

Vascular surgery produces an increase in the inflammatory mediator prostaglandin E₂ in cerebrospinal fluid, despite adequate spinal anesthesia. Postsurgical intravenous administration of the mixed cyclooxygenase 1/cyclooxygenase 2 inhibitor ketorolac, and especially the cyclooxygenase 2 selective inhibitor parecoxib, reduce cerebrospinal fluid prostaglandin E₂ concentration and postoperative pain.

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Peter H. Pan, Robert Coghill, Timothy T. Houle, Melvin H. Seid, W. Michael Lindel, R. Lamar Parker, Scott A. Washburn, Lynne Harris, and James C. Eisenach

A multifactorial predictive model with preoperative thermal pain sensitivity assessment and patient history is useful in predicting postoperative pain and analgesic requirement after cesarean section.

Developmental Differences in Spinal Cyclooxygenase 1 Expression after Surgical Incision **426**

Douglas G. Ririe, Heather D. Prout, David Barclay, Chuanyo Tong, Marina Lin, and James C. Eisenach

Developmental expression of spinal cyclooxygenase 1 after incision.

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Changes in Properties of Substantia Gelatinosa Neurons after Surgical Incision in the Rat: *In Vivo* Patch-clamp Analysis 432

Mikito Kawamata, Hidemasa Furue, Yuji Kozuka, Eichi Narimatsu, Megumu Yoshimura, and Akiyoshi Namiki

Responsiveness of multireceptive and nociceptive substantia gelatinosa neurons, but not that of subthreshold neurons, increased after an incision, and systemic administration of lidocaine suppressed the increased responsiveness of the substantia gelatinosa neurons. The results suggest that changes in properties after an incision vary depending on the classification of neurons and that systemic administration of lidocaine can reverse the increase in responsiveness of neurons after incision.

■ CLINICAL INVESTIGATIONS

◆ Obesity in Diabetic Patients Undergoing Coronary Artery Bypass Graft Surgery Is Associated with Increased Postoperative Morbidity 441

Wei Pan, Katja Hindler, Vei-Vei Lee, William K. Vaughn, and Charles D. Collard

Obesity in diabetic but not nondiabetic patients is an independent predictor of adverse postoperative outcomes after primary coronary artery bypass graft surgery.

◇ Cortical Processing of Complex Auditory Stimuli during Alterations of Consciousness with the General Anesthetic Propofol 448

Gilles Plourde, Pascal Belin, Daniel Chartrand, Pierre Fiset, Steven B. Backman, Guoming Xie, and Robert J. Zatorre

During propofol anesthesia, cortical processing of complex auditory stimuli in primary and secondary areas is reduced but not suppressed, and high-level differential processing is perturbed or abolished.

Feasibility and Safety of Delivering Xenon to Patients Undergoing Coronary Artery Bypass Graft Surgery While on Cardiopulmonary Bypass: Phase I Study 458

Geoffrey G. Lockwood, Nicholas P. Franks, Neil A. Downie, Kenneth M. Taylor, and Mervyn Maze

Xenon was administered in concentrations of up to 50% to 12 patients undergoing coronary artery bypass grafting on cardiopulmonary bypass, using a novel gas delivery system. No increase in embolic load or other adverse effect was noted.

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A population model for propofol pharmacokinetics and pharmacodynamics and depth of sedation is proposed for nonventilated infants after craniofacial surgery.

◆ Evaluation of Patient Simulator Performance as an Adjunct to the Oral Examination for Senior Anesthesia Residents **475**

Georges L. Savoldelli, Viren N. Naik, Hwan S. Joo, Patricia L. Houston, Marianne Graham, Bevan Yee, and Stanley J. Hamstra

Simulator performances of senior anesthesia residents were compared with their oral performances while managing resuscitation and trauma scenarios. The two assessment modalities correlated moderately. Simulator performance seems to measure different but important dimensions of clinical competence.

■ LABORATORY INVESTIGATIONS

Comparison of Minimum Alveolar Concentration between Intravenous Isoflurane Lipid Emulsion and Inhaled Isoflurane in Dogs **482**

Xiao-Lin Yang, Han-Xiang Ma, Zong-Bin Yang, Ai-Jie Liu, Nan-Fu Luo, Wen-Sheng Zhang, Li Wang, Xue-Hua Jiang, Jie Li, and Jin Liu

The minimum alveolar concentration (MAC) of isoflurane lipid emulsion by intravenous injection is less than the MAC of isoflurane by inhaled approach.

⊗ Time Delay of Index Calculation: Analysis of Cerebral State, Bispectral, and Narcotrend Indices **488**

Stefanie Pilge, Robert Zanner, Gerhard Schneider, Jasmin Blum, Matthias Kreuzer, and Eberhard F. Kochs

The time delay of index calculation was measured for the Cerebral State, Bispectral, and Narcotrend indices, using artificially generated signals. Delay time ranged from 14 to 155 s and was different for decreasing and increasing values depending on both starting and target index value.

Isoflurane Produces Sustained Cardiac Protection after Ischemia-Reperfusion Injury in Mice **495**

Yasuo M. Tsutsumi, Hemal H. Patel, N. Chin Lai, Toshiyuki Takahashi, Brian P. Head, and David M. Roth

Cardiac protection produced by isoflurane is associated with an acute memory period that is sustained and functionally relevant for at least 2 weeks after ischemia-reperfusion injury in mice *in vivo*.

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Impact of *In Vivo* Preconditioning by Isoflurane on Adenosine Triphosphate-sensitive Potassium Channels in the Rat Heart: Lasting Modulation of Nucleotide Sensitivity during Early Memory Period **503**

Anna Stadnicka, Jasna Marinovic, Martin Bienengraeber, and Zeljko J. Bosnjak

In vivo preconditioning by isoflurane induces a long-lasting decrease in sensitivity of the rat cardiac sarcolemmal adenosine triphosphate-sensitive potassium channel to intracellular adenosine 5'-triphosphate and adenosine 5'-diphosphate, raising the possibility that modulation of channel nucleotide sensitivity is a factor contributing to the mechanism of early memory of anesthetic preconditioning.

◇ **Protective Effects of Isoflurane Pretreatment in Endotoxin-induced Lung Injury** **511**

Jörg Reutershan, Daniel Chang, John K. Hayes, and Klaus Ley

In endotoxin-induced lung injury, isoflurane pretreatment attenuates neutrophil recruitment and migration, protects from capillary leakage, and inhibits chemokine release into the alveolar air space.

■ **PAIN AND REGIONAL ANESTHESIA**

◇ **Safety and Efficacy of the Cyclooxygenase-2 Inhibitors Parecoxib and Valdecoxib after Noncardiac Surgery** **518**

Nancy A. Nussmeier, Andrew A. Whelton, Mark T. Brown, Girish P. Joshi, Richard M. Langford, Neil K. Singla, Mark E. Boye, and Kenneth M. Verburg

Patients (n = 1,062) recovering from various noncardiac surgical procedures were randomly assigned to receive either (1) intravenous parecoxib followed by oral valdecoxib or (2) placebo medications for 10 postoperative days. The two groups had similar rates of adverse events, but patients receiving placebo required more morphine and reported more pain and opioid-related adverse effects than did patients receiving parecoxib and valdecoxib.

Differential Effect of Ketamine and Lidocaine on Spontaneous and Mechanical Evoked Pain in Patients with Nerve Injury Pain **527**

Hanne Gottrup, Flemming W. Bach, Gitte Juhl, and Troels S. Jensen

Differential effect of lidocaine and ketamine suggests pain and hyperalgesia is dependent on several separate molecular mechanisms.

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Heart Rate Variability Predicts Severe Hypotension after Spinal Anesthesia 537

Robert Hanss, Berthold Bein, Hendrik Weseloh, Martin Bauer, Erol Cavus, Markus Steinfath, Jens Scholz, and Peter H. Tonner

The predictive value of heart rate variability for hypotension after spinal anesthesia was evaluated. A retrospective model was confirmed prospectively. An overall sensitivity and specificity of 0.85 was demonstrated to predict a decrease of systolic blood pressure of more than 20% of baseline.

Opioid-induced Hyperalgesia in a Murine Model of Postoperative Pain: Role of Nitric Oxide Generated from the Inducible Nitric Oxide Synthase 546

Evelyne Célérier, Juan R. González, Rafael Maldonado, David Cabañero, and Margarita M. Puig

Opioids and surgical incision, individually and combined, induce long-lasting hyperalgesia and allodynia in a murine model of postoperative pain. These effects are reduced by the deletion of the gene expressing inducible nitric oxide synthase.

■ REVIEW ARTICLES

■ **Levosimendan, a New Inotropic and Vasodilator Agent 556**

Wolfgang G. Toller and Christian Stranz

Levosimendan, a myofilament Ca^{2+} sensitizer, is both safe and effective in the positive inotropic management of acute and chronic heart failure. This review describes the different mechanisms of action of positive inotropic drugs and summarizes experimental and clinical trials with levosimendan.

Opioid-induced Hyperalgesia: A Qualitative Systematic Review 570

Martin S. Angst and J. David Clark

Evidence is accumulating that opioid therapy aiming at relieving pain may somewhat paradoxically increase the sensitivity to pain. This phenomenon is referred to as opioid-induced hyperalgesia. This review provides a comprehensive overview of basic and clinical research regarding opioid-induced hyperalgesia, discusses potential clinical implications, and proposes future research directions.

■ SPECIAL ARTICLE

◆ **General Anesthetic-induced Seizures Can Be Explained by a Mean-field Model of Cortical Dynamics 588**

Marcus T. Wilson, James W. Sleight, D. Alistair Steyn-Ross, and Moira L. Steyn-Ross

Using a mean-field model to investigate how enflurane and isoflurane may alter the dynamics of cortical neuronal interactions, the authors demonstrated that when the cortex is in an inhibited (anesthetized) state, its stability is critically dependent on the shape of the inhibitory postsynaptic potentials.

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Allan Gottschalk, Steven P. Cohen, Stephen Yang, and E. Andrew Ochroch

The pain from thoracic surgery is intense and prolonged, with an established impact on pulmonary function. Here, evidence-based strategies for preventing and treating the pain that accompanies thoracic surgery are described.

Postoperative Hyperalgesia: Its Clinical Importance and Relevance 601

Oliver H. G. Wilder-Smith and Lars Arendt-Nielsen

Postoperative hyperalgesia, the result of surgical nociception or anesthetic drugs, is increasingly linked to poor acute and chronic postoperative pain outcomes after surgery. Such hyperalgesia can be diagnosed and quantified using quantitative sensory testing and may provide a basis for preventive and therapeutic strategies improving acute and chronic postoperative pain outcomes.

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