



# Anesthesiology



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*American Society of Critical Care Anesthesiologists*

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- Jun Tang, Xiaoguang Chen, Paul F. White, Ronald H. Wender, Hong Ma, Alexander Sloninsky, Robert Naruse, Robert Kariger, Tom Webb, and Alan Zaentz*
- The addition of a 5-HT<sub>3</sub> antagonist, ondansetron (4 mg intravenous) or dolasetron (12.5 mg intravenous), failed to improve the antiemetic efficacy of droperidol (0.625 mg intravenous) and dexamethasone (4 mg intravenous) when administered for routine prophylaxis in the office-based surgery setting.

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- ◇ **Comparison of Predicted Induction Dose with Predetermined Physiologic Characteristics of Patients and with Pharmacokinetic Models Incorporating those Characteristics as Covariates** 299  
*Tomiei Kazama, Koji Morita, Takehiko Ikeda, Tadayoshi Kurita, and Shigehito Sato*  
 Predicting induction dose from predetermined physiologic characteristics of patients provides reasonable accuracy for young to middle-aged and elderly patients with both high and low administration rates of propofol. A previously reported pharmacokinetic model that incorporated patient characteristics provides the same accurate induction dose for a low rate.
- Effects of Isoflurane on  $\gamma$ -Aminobutyric Acid Type A Receptors Activated by Full and Partial Agonists** 306  
*Norbert Topf, Andrew Jenkins, Nicole Baron, and Neil L. Harrison*  
 By studying a mutant  $\gamma$ -aminobutyric acid type A receptor with impaired gating, the authors were able to demonstrate that isoflurane can increase the efficacy of a partial agonist as well as increase agonist potency. These data suggest that the volatile anesthetic isoflurane exerts at least some of its effects on the  $\gamma$ -aminobutyric acid type A receptor *via* alterations in gating rather than simply changing binding or unbinding of the agonist.
- Response Surface Modeling of Remifentanyl-Propofol Interaction on Cardiorespiratory Control and Bispectral Index** 312  
*Diederik J. F. Nieuwenhuijs, Erik Olofsen, Raymonda R. Romberg, Elise Sarton, Denham Ward, Frank Engbers, Jaap Vuyk, Rene Mooren, Luc J Teppema, and Albert Dahan*  
 When given separately, remifentanyl and propofol depress respiration in a dose-dependent fashion. When given in combination their effect on respiration is strikingly synergistic resulting in severe respiratory depression.
- ◇ **Effects of EDTA- and Sulfite-containing Formulations of Propofol on Respiratory System Resistance after Tracheal Intubation in Smokers** 323  
*Petra Rieschke, Bonnie J LaFleur, and Piotr K. Janicki*  
 The total respiratory system resistance in patients with smoking history is significantly elevated after induction with sulfite-containing than with EDTA-containing propofol formulation. The preservative used for propofol formulation may alter the effects of propofol on the total respiratory system resistance in smokers.

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### Intracranial Pressure and Cerebral Hemodynamic in Patients with Cerebral Tumors: A Randomized Prospective Study of Patients Subjected to Craniotomy in Propofol-Fentanyl, Isoflurane-Fentanyl, or Sevoflurane-Fentanyl Anesthesia

329

*Kurt D. Petersen, Uffe Landsfeldt, Georg Emil Cold, Carsten B. Petersen, Søren Mau, John Hauerberg, Peter Holst, and Karsten Skovgaard Olsen*

Intracranial pressure is lower and cerebral perfusion pressure is higher in patients subjected to propofol-fentanyl anesthesia compared with isoflurane-fentanyl or sevoflurane-fentanyl anesthesia.

### Antifibrinolytic Therapy and Perioperative Blood Loss in Cancer Patients Undergoing Major Orthopedic Surgery

337

*David Amar, Florence M. Grant, Hao Zhang, Patrick J. Boland, Denis H. Leung, and John A. Healey*

In a double-blind, placebo-controlled study of 69 patients undergoing major orthopedic surgery for primary or metastatic disease, the authors determined that neither aprotinin nor epsilon amino-caproic acid administered at the start of surgery reduced perioperative blood loss or transfusion requirements.

### Cardiopulmonary Bypass Decreases G Protein-Coupled Receptor Kinase Activity and Expression in Human Peripheral Blood Mononuclear Cells

343

*Scott A. Hagen, Amy L. Kondyra, Hilary P. Grocott, Habib El-Moalem, Daniel Bainbridge, Joseph P. Mathew, Mark F. Newman, Joseph G. Reves, Debra A. Schwinn, and Madan M. Kwatra*

The G protein-coupled receptor kinase (GRK) activity and expression in peripheral blood mononuclear cells is significantly decreased immediately after cardiopulmonary bypass at a time when plasma interleukin-6 is increased. The GRKs recover on postoperative day one but the recovery between patients is quite variable.

### ◇ What Is the Minimum Training Required for Successful Cricothyroidotomy?: A Study in Mannequins

349

*David T. Wong, Atul J. Prabhu, Margarita Coloma, Ngozi Imasogie, and Frances F. Chung*

Using mannequins, at least five cricothyroidotomy procedures must be performed to achieve proficiency in performing the procedure in 40 s or less.




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### The Parker Flex-Tip Tube *versus* a Standard Tube for Fiberoptic Orotracheal Intubation: A Randomized Double-blind Study 354

*Michael S. Kristensen*

During oral fiberoptic intubation, use of the Parker Flex-Tip tube is associated with a greater incidence of initial success of passage of the tube into the trachea when compared to a standard endotracheal tube.

### Phonomyography as a Novel Method to Determine Neuromuscular Blockade at the Laryngeal Adductor Muscles: Comparison with the Cuff Pressure Method 359

*Thomas M. Hemmerling, Denis Babin, and François Donati*

Phonomyography and the cuff pressure method can be used interchangeably to determine neuromuscular blockade of the laryngeal adductor muscles. Phonomyography allows measurement of laryngeal blockade with the tracheal tube in the normal position.

## ■ LABORATORY INVESTIGATIONS

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### Effects of Isoflurane and Propofol on Glutamate and GABA Transporters in Isolated Cortical Nerve Terminals 364

*Robert I. Westphalen and Hugh C. Hemmings, Jr.*

Using three independent assays for glutamate and  $\gamma$ -aminobutyric acid transporters, isoflurane and propofol did not substantially affect uptake, synaptic membrane binding, or  $\text{Ca}^{2+}$ -independent reverse transport of L-[ $^3\text{H}$ ]glutamate or [ $^{14}\text{C}$ ] $\gamma$ -aminobutyric acid in isolated cortical nerve terminals. The presynaptic neuronal transporters of these principal excitatory and inhibitory central nervous system transmitters do not represent important anesthetic targets.

### Hepatic Ischemia Is Associated with an Increase in Liver Parenchyma Nitric Oxide That Is in Part Enzyme-Independent 373

*Franck Lhuillier, Pierre Parmantier, Joelle Goudable, Philippe Crova, Bertrand Delafosse, Guy Annat, Raymond Cespuglio, and Jean Paul Viale*

Nitric oxide is present in liver parenchyma. Its generation is dramatically affected by an ischemia-reperfusion injury. The increased nitric oxide generation during local ischemia is, at least in part, independent of nitric oxide synthases.

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### Isoflurane Alters Energy Substrate Metabolism to Preserve Mechanical Function in Isolated Rat Hearts following Prolonged No-Flow Hypothermic Storage 379

*Barry A. Finegan, Manoj Gandhi, Matthew R. Cohen, Donald Legatt, and Alexander S. Clanachan*

Isoflurane enhances mechanical functional recovery and adenosine triphosphate content, and normalizes energy substrate metabolism in hearts subject to prolonged no-flow hypothermic arrest.

### Preconditioning with Sevoflurane Reduces Changes in Nicotinamide Adenine Dinucleotide during Ischemia-Reperfusion in Isolated Hearts: Reversal by 5-Hydroxydecanoic Acid 387

*Matthias L. Riess, Enis Novalija, Amadou K. S. Camara, Janis T. Eells, Qun Chen, and David F. Stowe*

Anesthetic preconditioning protects mitochondrial function during cardiac ischemia as assessed by nicotinamide adenine dinucleotide fluorescence. These effects are reversed by 5-hydroxydecanoic acid.

### Isoflurane Decreases ATP Sensitivity of Guinea Pig Cardiac Sarcolemmal $K_{ATP}$ Channel at Reduced Intracellular pH 396

*Anna Stadnicka and Zeljko J. Bosnjak*

Intracellular pH appears to modulate direct interaction of isoflurane with cardiac  $K_{ATP}$  channel. At reduced pHi, isoflurane enhances channel opening by increasing Po and decreases channel sensitivity to inhibition by intracellular ATP.

### Interaction of Isoflurane with the Dopamine Transporter 404

*John Votaw, Michael Byas-Smith, Jian Hua, Ronald Voll, Laurent Martarello, Allan I. Levey, F. DuBois Bowman, and Mark Goodman*

Experiments in monkeys, rats, and cells show that isoflurane causes dopamine transporters to be trafficked from the plasma membrane into the cytoplasm.

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### Despite *In Vitro* Increase in Cyclic Guanosine Monophosphate Concentrations, Intracarotid Nitroprusside Fails to Augment Cerebral Blood Flow of Healthy Baboons

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*Shailendra Joshi, Roger Hartl, Lena S. Sun, Adam D. Libow, Mei Wang, John Pile-Spellman, William L. Young, E. Sander Connolly, and Carol A. Hirshman*

Intracarotid infusion sodium nitroprusside, in doses that on recirculation significantly decrease systemic arterial pressure, does not increase cerebral blood flow of anesthetized healthy baboons. However, *in vitro* proximal cerebral arterial segments obtained from the same animal species demonstrate dose-dependent increase cyclic guanosine monophosphate content. Collectively, these observations suggest that sodium nitroprusside could affect the tone of large cerebral arteries, but *in vivo* intraarterial sodium nitroprusside does not affect the tone of resistance arterioles.

### Respiratory Depression by Tramadol in the Cat: Involvement of Opioid Receptors

420

*Luc J. Teppema, Diederik Nieuwenhuijs, Cees N. Olievier, and Albert Dahan*

The opioid receptor antagonist naloxone completely reversed the inhibiting effects of the analgesic tramadol on ventilatory control and prevented more than 50% of the respiratory depression after a single dose of tramadol in an anesthetized experimental cat model. This indicates that tramadol causes respiratory depression mainly *via* its action on opioid receptors.

### The $\alpha_2$ -Adrenoceptor Agonist Dexmedetomidine Converges on an Endogenous Sleep-promoting Pathway to Exert Its Sedative Effects

428

*Laura E. Nelson, Jun Lu, Tianzhi Guo, Clifford B. Saper, Nicholas P. Franks, and Mervyn Maze*

Evidence from immunohistochemistry, behavioral pharmacology, and discrete neuronal lesioning studies in rats indicates that the  $\alpha_2$ -adrenoceptor agonist dexmedetomidine activates endogenous NREM sleep-promoting pathways to exert its sedative action.

### Thermogenesis Inhibition in Brown Adipocytes Is a Specific Property of Volatile Anesthetics

437

*Kerstin B. E. Ohlson, Sten G. E. Lindahl, Barbara Cannon, and Jan Nedergaard*

Inhibition of thermogenesis in brown adipocytes is a specific property of volatile anesthetics, as compared with both nonvolatile anesthetics and volatile nonanesthetics. This property is of significance for thermoregulatory studies and for body temperature control during anesthesia, and it implies that brown adipocytes possess cellular properties, making them potential model systems for elucidation of the molecular mechanism of anesthetics.




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### Ketamine and Midazolam Differentially Inhibit Nonadrenergic Noncholinergic Lower Esophageal Sphincter Relaxation in Rabbits: Role of Superoxide Anion and Nitric Oxide Synthase 449

*Atsushi Kohjitani, Takuya Miyawaki, Makoto Funahashi, Hitoshi Higuchi,  
Ryuji Matsuo, and Masahiko Shimada*

Ketamine inhibits nitric oxide-mediated nonadrenergic noncholinergic lower esophageal sphincter relaxation *via* extracellular production of superoxide anion, whereas midazolam inhibits it *via* inhibiting nitric oxide synthase activity.

### Supraspinal Antinociceptive Effects of $\mu$ and $\delta$ Agonists Involve Modulation of Adenosine Uptake 459

*Thao Pham, Louis Carrega, Nicole Sauze, Odile Fund-Saunier,  
Christiane Devaux, Jean-Claude Peragut, Alain Saadjian, and Régis Guieu*

This article discusses the effects of opioid agonist subtypes on adenosine uptake and the relation with analgesic effects.

### Neuroprotective Effect of Urinary Trypsin Inhibitor against Focal Cerebral Ischemia-Reperfusion Injury in Rats 465

*Toshiyuki Yano, Sakiko Anraku, Ryosuke Nakayama, and Kazuo Ushijima*

Pretreatment with urinary trypsin inhibitor attenuates focal cerebral ischemia-reperfusion injury when assessed by infarct size, neutrophil infiltration, and nitrotyrosine immunoreactivity in the ischemic hemisphere.

## ■ PAIN AND REGIONAL ANESTHESIA

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*Louis P. Vera-Portocarrero, Ying Lu, and Karin N. Westlund*

Administration of dibutyltin dichloride produces inflammation of the pancreas and nociceptive-related behaviors that are attenuated by morphine.

### Prospective Study on Incidence and Functional Impact of Transient Neurologic Symptoms Associated with 1% *versus* 5% Hyperbaric Lidocaine in Short Urologic Procedures 485

*Doris Tong, Jean Wong, Frances Chung, Mark Friedlander,  
Joseph Bremang, Gabor Mezei, and David Streiner*

There was no difference in the incidence of TNS (21% *vs.* 18%) between 1% *versus* 5% lidocaine. During the first 48 hours postop, a small proportion of patients who had TNS experienced clinically significant functional impairment of some of the activities of daily living.



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*Raquel A. Almeida, Gabriela R. Lauretti, and Anita L. Mattos*

Low-dose intrathecal neostigmine enhanced the analgesic effect of intrathecal morphine following gynecologic surgery.

### High Spinal Anesthesia for Cardiac Surgery: Effects on $\beta$ -Adrenergic Receptor Function, Stress Response, and Hemodynamics 499

*Trevor W. R. Lee, Hilary P. Grocott, Debra Schwinn, and Eric Jacobsohn, for the Winnipeg High-Spinal Anesthesia Group*

High-dose intrathecal bupivacaine combined with general anesthesia attenuates atrial  $\beta$ -receptor dysfunction and down-regulation during routine coronary artery bypass graft surgery. Additionally, it results in decreased serum epinephrine, norepinephrine, and cortisol concentrations.

### Spinal Anesthesia: Functional Balance Is Impaired after Clinical Recovery 511

*Charles O. Imaengiyaye, Dajun Song, Atul J. Prabhu, and Frances Chung*

The authors compared clinical markers of gross motor recovery with objective data of functional balance after spinal anesthesia. The ability to walk without assistance after spinal anesthesia requires a longer recovery period than predicted by restoration of gross motor function.

### Indocyanine Green: Evidence of Neurotoxicity in Spinal Root Axons 516

*Friederike B. Dietz and Richard A. Jaffe*

Indocyanine green at clinically relevant concentrations produces nerve conduction block and spontaneous bursting activity in dorsal root axons.

### ◇ Activation of Peripheral Excitatory Amino Acid Receptors Decreases the Duration of Local Anesthesia 521

*Brian E. Cairns, Giulio Gambarota, Patricia S. Dunning, Robert V. Mulkern, and Charles B. Berde*

The duration of lidocaine afferent fiber blockade is shortened by activation of peripheral excitatory amino acid receptors, which are associated with afferent sensitization as well as increased tissue extracellular fluid volume and blood flow. These findings suggest that further attention should be directed toward the clinical utility of combinations of peripheral excitatory amino acid receptor antagonists and local anesthetics.



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*Allan Gottschalk and Paul Haney*

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### WEB SITE ANNOUNCEMENT

Full-text articles are now available on-line at [www.anesthesiology.org](http://www.anesthesiology.org)

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