



Anesthesiology



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American Society of Critical Care Anesthesiologists

Society for Obstetric Anesthesia and Perinatology



CONTENTS

- ◇ **THIS MONTH IN ANESTHESIOLOGY** **5A**
- Effects of Induction Techniques on Postoperative Hoarseness and Vocal Cord Injury
- Effects of Intraoperative Hypothermia and Hypotension on Median Nerve Somatosensory-evoked Potentials
- Exploring the Myocardial Depressant Action of Bone Cement Component
- Authors Devise New Optimization Model for PCA with Morphine and Ketamine
- ◆ **EDITORIAL VIEWS**
- Evidence-based Practice and Neuromuscular Monitoring:
It's Time for Routine Quantitative Assessment **1037**
Lars I. Eriksson
- Perinatal Brain Injury: The Role of Development in Vulnerability **1039**
Rona G. Giffard and Gary Fiskum
- **CLINICAL INVESTIGATIONS**
- ◆ Residual Paralysis in the PACU after a Single Intubating Dose of Nondepolarizing Muscle Relaxant with an Intermediate Duration of Action **1042**
Bertrand Debaene, Benoît Plaud, Marie-Pierre Dilly, and François Donati
- After a single intubating dose of nondepolarizing muscle relaxant and no reversal, the incidence of a train-of-four ratio less than 0.9 on arrival in the postanesthesia care unit was 45%. Two hours after the muscle relaxant injection, 34% of the patients still had significant residual paralysis.

- ◇ Refers to This Month in Anesthesiology
- ◆ Refers to Editorial Views
- ⊗ See Web Site enhancement

CONTENTS



- ◆ Laryngeal Morbidity and Quality of Tracheal Intubation: A Randomized Controlled Trial 1049
Thomas Mencke, Mathias Echternach, Stefan Kleinschmidt, Philip Lux, Volker Barth, Peter K. Plinkert, and Thomas Fuchs-Buder
 Excellent intubating conditions are less frequently associated with laryngeal morbidity than nonexcellent conditions are. Adding atracurium to a propofol-fentanyl induction regimen improved the intubating conditions and decreased postoperative hoarseness and vocal cord sequelae.
- Potentialiation of Mivacurium Blockade by Low Dose of Pancuronium: A Pharmacokinetic Study 1057
Cyrus Motamed, Riad Menad, Robert Farinotti, Krassen Kirov, Xavier Combes, Daniel Bouleau, Pierre Feiss, and Philippe Duvaldestin
 Potentialiation of mivacurium by pancuronium is due in part to inhibition of plasma cholinesterase, inducing a decrease in mivacurium plasma clearance.
- Biphasic Shocks Compared with Monophasic Damped Sine Wave Shocks for Direct Ventricular Defibrillation during Open Heart Surgery 1063
Birgit Schwarz, T. Andrew Bowdle, G. Kimble Jett, Peter Mair, Karl H. Lindner, Gabriel S. Aldea, Robert G. Lazzara, Sharon G. O'Grady, Paul W. Schmitt, Robert G. Walker, Fred W. Chapman, and Willis A. Tacker
 This study compares intraoperative biphasic and monophasic ventricular defibrillation shock effectiveness and establishes energy dose-response curves for defibrillation. The dose-response curves show biphasic shocks to be more effective than monophasic shocks at all energies tested (2–20 J), and the biphasic curve guides selection of first-shock biphasic energy for traditional step-up protocols.
- Does the Suggested Lightwand Bent Length Fit Every Patient? The Relation between Bent Length and Patient's Thyroid Prominence-to-Mandibular Angle Distance 1070
Tsai-Hsin Chen, Shen-Kou Tsai, Chen-Jung Lin, Cheng-Wei Lu, Tsung-Po Tsai, and Wei-Zen Sun
 The difference between the bent length of a lightwand and the individual's thyroid prominence-to-mandibular angle distance has an influence on the success rate and the search time of lightwand intubation.

CONTENTS



Comparison of Point-of-Care *Versus* Central Laboratory Measurement of Electrolyte Concentrations on Calculations of the Anion Gap and the Strong Ion Difference

1077

Hiroshi Morimatsu, Jens Rocktäschel, Rinaldo Bellomo, Shigehiko Uchino, Donna Goldsmith, and Geoffrey Gutteridge

There is a significant difference and a bias in sodium and chloride measurements obtained with the central laboratory and the point-of-care technologies. These differences can markedly influence the calculated strong ion difference and anion gap and lead to significantly different acid-base diagnoses.

The Effects of Isoflurane and Desflurane on Intracranial Pressure, Cerebral Perfusion Pressure, and Cerebral Arteriovenous Oxygen Content Difference in Normocapnic Patients with Supratentorial Brain Tumors

1085

Marcial Fraga, Pablo Rama-Maceiras, Sara Rodiño, Humberto Aymerich, Pilar Pose, and Javier Belda

Desflurane and isoflurane do not increase intracranial pressure in normocapnic patients undergoing craniotomy for supratentorial brain tumors without mass effect.

Echocardiographic Doppler Assessment of Pulmonary Capillary Wedge Pressure in Surgical Patients with Postoperative Circulatory Shock and Acute Lung Injury

1091

Bélaïd Bouhemad, Armelle Nicolas-Robin, Alain Benois, Sacha Lemaire, Jean-Pierre Goarin, and Jean-Jacques Rouby

In critically ill surgical patients with postoperative shock and acute lung injury, pulmonary capillary wedge pressure can be noninvasively estimated from transesophageal echocardiography using a combination of parameters derived from conventional Doppler and Doppler tissue imaging.

Neural Mechanism of Propofol Anesthesia in Severe Depression: A Positron Emission Tomographic Study

1101

Kenichi Ogawa, Takeshi Uema, Nobutaka Motohashi, Masami Nishikawa, Harumasa Takano, Masahiko Hiroki, Etsuko Imabayashi, Takashi Ohnishi, Tomio Inoue, Yutaka Takayama, Masatoshi Takeda, Hiroshi Matsuda, Tomio Andoh, and Yoshitsugu Yamada

To analyze the changes effected by propofol in the regional cerebral blood flow in severe depression, the authors utilized positron emission tomography and statistical parametric mapping in patients with severe depression. Propofol causes a pronounced decrease in regional cerebral blood flow in the brain stem reticular formation, the thalamus, and the parietal association cortex.



CONTENTS

- ◆ Hypothermia Does Not Alter Somatosensory Evoked Potential Amplitude and Global Cerebral Oxygen Extraction during Marked Sodium Nitroprusside-induced Arterial Hypotension 1112

Eva Kottenberg-Assenmacher, Wolf Armbruster, Norbert Bornfeld, and Jürgen Peters

Arterial hypotension with a mean arterial pressure of 40 mmHg evoked by sodium nitroprusside does not depress median nerve somatosensory evoked potential amplitude or alter cerebral oxygen extraction with or without hypothermia of 32° C during intraocular tumor resection.

■ LABORATORY INVESTIGATIONS

- ◆ Apoptotic Neuronal Death following Deep Hypothermic Circulatory Arrest in Piglets 1119

Dara Ditsworth, Margaret A. Priestley, Andreas W. Loepke, Chandra Ramamoorthy, John McCann, Lauren Staple, and C. Dean Kurth

After DHCA, induction of apoptosis in the neocortex occurs within a few hours of reperfusion and continues for several days. Increased Fas, cytochrome *c*, and caspase concentrations, coupled with normal brain ATP concentrations and apoptotic histologic appearance, are consistent with the occurrence of apoptotic cell death.

- Peri-MAC Depression of a Nociceptive Withdrawal Reflex Is Accompanied by Reduced Dorsal Horn Activity with Halothane but not Isoflurane 1128

Steven L. Jinks, John T. Martin, Earl Carstens, Sung-Won Jung, and Joseph F. Antognini

At concentrations that bracket MAC, halothane, but not isoflurane, depresses lumbar dorsal horn neuronal responses to noxious thermal stimulation, suggesting that isoflurane suppresses movement at more ventral sites as compared to halothane.

- Local Anesthetics Modulate Neuronal Calcium Signaling through Multiple Sites of Action 1139

Fang Xu, Zayra Garavito-Aguilar, Esperanza Recio-Pinto, Jin Zhang, and Thomas J. J. Blanck

Local anesthetics modulate the evoked $[Ca^{2+}]_i$ transients in neuronal cells at multiple sites. In addition to the Ca^{2+} homeostatic mechanisms, K^+ channels are also involved in generation of such $[Ca^{2+}]_i$ transients and in the local anesthetic effects on them.

CONTENTS



Midazolam Stimulates Vascular Endothelial Growth Factor Release in Aortic Smooth Muscle Cells: Role of the Mitogen-activated Protein Kinase Superfamily

1147

*Kumiko Tanabe, Shuji Dohi, Hiroyuki Matsuno,
Kouseki Hirade, and Osamu Kozawa*

Midazolam increases vascular endothelial growth factor concentration in rat plasma. In cultured aortic smooth muscle cells, activation of p44/p42 mitogen-activated protein kinase and stress-activated protein kinase/c-Jun N-terminal kinase plays a part in the vascular endothelial growth factor release. Propofol and ketamine have no effect on vascular endothelial growth factor release.

Anesthetic Preconditioning Improves Adenosine Triphosphate Synthesis and Reduces Reactive Oxygen Species Formation in Mitochondria after Ischemia by a Redox Dependent Mechanism

1155

*Enis Novalija, Leo G. Kevin, Janis T. Eells,
Michele M. Henry, and David F. Stowe*

Mitochondrial function after global ischemia is largely protected by APC, in both isolated mitochondria and intact hearts. Results indicate that ROS are central both in triggering and mediating APC, and that the mitochondrion is the target for these changes.

Role of Endothelium-derived Hyperpolarizing Factor in Phenylephrine-induced Oscillatory Vasomotion in Rat Small Mesenteric Artery

1164

*Kayoko Okazaki, Sumihiko Seki, Noriaki Kanaya, Jun-ichi Hattori,
Noritsugu Tohse, and Akiyoshi Namiki*

Phenylephrine produces endothelium-dependent oscillatory vasomotion in rat small mesenteric artery, which is partly mediated by endothelium-delivered hyperpolarizing factor. Endothelium-delivered hyperpolarizing factor may contribute to the α_1 -adrenergic regulation of vascular tone.

Potentialiation of Proopiomelanocortin Gene Expression in Cultured Pituitary Cells by Benzodiazepines

1172

*Kazuhiko Fukuda, Nobuo Uetsuki, Hisatoshi Uga, Mitsuko Hashiguchi,
Masami Sato, Taizo Hisano, Hajime Segawa, and Yasumasa Iwasaki*

Diazepam and midazolam potentiate the corticotropin-releasing hormone- or forskolin-stimulated proopiomelanocortin gene expression in cultured pituitary cells. This potentiating effect might be mediated by phosphodiesterase inhibition by benzodiazepines.

Continued on page 21A

CONTENTS



Propofol Suppresses Macrophage Functions and Modulates Mitochondrial Membrane Potential and Cellular Adenosine Triphosphate Synthesis

1178

Ruei-Ming Chen, Chih-Hsiung Wu, Huai-Chia Chang, Gong-Jhe Wu, Yi-Ling Lin, Joen-Rong Sheu, and Ta-Liang Chen

A therapeutic concentration of propofol reduced macrophage functions. In parallel with macrophage dysfunction, propofol decreased mitochondrial membrane potential and adenosine triphosphate synthesis but did not affect cell viability. Thus, we suggest that propofol can suppress macrophage functions, possibly through inhibiting mitochondrial membrane potential and cellular adenosine triphosphate production.

◇ Direct Myocardial Depressant Effect of Methylmethacrylate Monomer: Mechanical and Electrophysiologic Actions *in vitro*

1186

Ki Jun Kim, Da Guang Chen, Namsik Chung, Carl Lynch III, and Wyun Kon Park

Methylmethacrylate monomer directly depressed myocardial contractility in guinea pig myocardium *in vitro*, which seems to be partly caused by reduction of Ca^{2+} influx through cardiac membrane.

■ PAIN AND REGIONAL ANESTHESIA

◇ Combinations of Morphine with Ketamine for Patient-controlled Analgesia: A New Optimization Method

1195

Gorazd Svetcic, Andrea Gentilini, Urs Eichenberger, Martin Luginbühl, and Michele Curatolo

For patient-controlled analgesia, a new stepwise optimization model was applied to the combination of morphine with ketamine, with a lockout interval as an additional variable. After analyzing 12 combinations, the optimization procedure converged to a morphine-to-ketamine ratio of 1:1 and a lockout interval of 8 min.

Femoral-Sciatic Nerve Blocks for Complex Outpatient Knee Surgery Are Associated with Less Postoperative Pain Before Same-day Discharge: A Review of 1,200 Consecutive Cases from the Period 1996-1999

1206

Brian A. Williams, Michael L. Kentor, Molly T. Vogt, John P. Williams, Jacques E. Chelly, Stacey Valalik, Christopher D. Harner, and Freddie H. Fu

Retrospective analysis of two categories of outpatient knee surgery showed that femoral-sciatic nerve block analgesia for complex knee surgery was associated with pain-free recovery in the hospital and successful same-day discharge for more than 95% of patients.



CONTENTS

Quantitative Sensory Testing and Human Surgery: Effects of Analgesic Management on Postoperative Neuroplasticity 1214

Oliver H. G. Wilder-Smith, Edömer Tassonyi, Ben J. P. Crul, and Lars Arendt-Nielsen

The differing effects on postoperative pain outcomes of supplementing general anaesthesia with fentanyl or ketorolac *versus* placebo are made visible by measures of central neuroplasticity (quantitative sensory testing) but not by measures of pain experience (pain scores, analgesia use). Compared to clinical pain measures, perioperative quantitative sensory testing provides new and different information that may provide the basis for more mechanism-based approaches to perioperative pain management in the future.

GABAergic Interneurons at Supraspinal and Spinal Levels Differentially Modulate the Antinociceptive Effect of Nitrous Oxide in Fischer Rats 1223

Ryo Orij, Yoko Ohashi, Sunil Halder, Mariangela Giombini, Mervyn Maze, and Masahiko Fujinaga

GABAergic neurons modulate the antinociceptive effect of N₂O differentially at supraspinal and spinal levels. Midazolam attenuates the antinociceptive effect of N₂O at the supraspinal level.

Supraspinal Contribution to Development of Both Tonic Nociception and Referred Mirror Hyperalgesia: A Comparative Study between Formalin Test and Bee Venom Test in the Rat 1231

Hui-Sheng Chen, Meng-Meng Li, Juan Shi, and Jun Chen

Subcutaneous injection of bee venom into one hind paw of rats could produce a persistent spontaneous nociception, primary heat and mechanical hyperalgesia and contralateral heat hyperalgesia. Bilateral lesions of rostral medial medulla prevented the development of spontaneous nociception and contralateral heat hyperalgesia, but had no effect on the primary heat and mechanical hyperalgesia, suggesting that tonic activation of descending facilitatory pathway contributes to bee venom-induced spontaneous nociception and referred hyperalgesia, but not primary hyperalgesia.

Spinal Adrenergic and Cholinergic Receptor Interactions Activated by Clonidine in Postincisional Pain 1237

Frédéric Duflo, Dawn Conklin, Xinhui Li, and James C. Eisenach

Intrathecal clonidine reduces hypersensitivity to a mechanical punctuate stimulus in rats following plantar incision of the paw by actions on both α_2 A and α_2 non-A adrenoceptors, and on interactions with spinal cholinergic receptors.

Continued on page 25A

CONTENTS



■ ECONOMICS

- Operating Room Utilization Alone Is Not an Accurate Metric for the Allocation of Operating Room Block Time to Individual Surgeons with Low Caseloads** **1243**

Franklin Dexter, Alex Macario, Rodney D. Traub, and David A. Lubarsky

Using computer simulation, we found that neither 3 months nor 1 yr of historical data are enough to be able to identify individual surgeons who have persistently low average OR utilizations. Historical utilization alone is not an accurate or objective metric for the allocation of operating room block time to individual surgeons.

■ REVIEW ARTICLE

- Clinical Relevance of the Bezold-Jarisch Reflex** **1250**

Jason A. Campagna and Christopher Carter

The Bezold-Jarisch Reflex is a cardiac reflex with limited, but clear importance in human physiology. There is, however, little evidence in the literature to support its role in the etiology of cardiac arrest seen during regional anesthetic techniques.

■ SPECIAL ARTICLES

- The American Society of Anesthesiologist's Efforts in Developing Guidelines for Sedation and Analgesia for Nonanesthesiologists: The 40th Rovenstine Lecture** **1261**

Burton S. Epstein

The current shortage of anesthesiologists exceeds their capacity to administer all sedation in hospitals, ambulatory care facilities, and offices. The American Society of Anesthesiologists must take the lead in developing evidence-based research to quantify the risks of anesthesia administration by nonanesthesiologists.

- 🌐 **Practice Guidelines for Management of the Difficult Airway: An Updated Report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway** **1269**

The American Society of Anesthesiologists Task Force on Management of the Difficult Airway presents a systematically developed set of recommendations based on analysis of the current literature and a synthesis of expert opinion.

■ CLASSIC PAPERS REVISITED

- 🌐 **Criteria of Adequate Clinical Recovery from Neuromuscular Block** **1278**

Hassan H. Ali

This article is a revisiting of original material published as: Ali HH, Saverese JJ, Lebowitz PW, Ramsey FM: Twitch, Tetanus and Train-of-Four as Indices of Recovery from Nondepolarizing Neuromuscular Blockade. *ANESTHESIOLOGY* 1981; 54:294-7.



CONTENTS

■ CASE REPORTS

- Total Spinal Anesthetic after Continuous Posterior Lumbar Plexus Block 1281

Robert M. Pousman, Zia Mansoor, and Didier Sciard

- A Complication of Left Heart Bypass: A Transesophageal Echocardiographic Finding 1283

Ken C. Lin and Feroze-Ud-Din Mahmood

- Complete Vasomotor Collapse: An Unusual Manifestation of the Carotid Sinus Reflex 1285

James R. Boyce and Glenn E. Peters

■ LABORATORY REPORT

- Gabapentin Blocks and Reverses Antinociceptive Morphine Tolerance in the Rat Paw-pressure and Tail-flick Tests 1288

Ian Gilron, Jessica Biederman, Khem Jhamandas, and Murray Hong

■ CORRESPONDENCE

- Use of the Cook Airway Exchange Catheter[®] to Facilitate Fiberoptic Intubation: Are We Trying to Solve a Problem That We Created? 1293

Mohammad I. El-Orbany, Katarzyna Klimas-Osolkowski, and M. Ramez Salem

- In Reply Chakib M. Ayoub, Antoine M. Lteif, Marwan S. Rizk, Naji M. Abu Jalad, Ussama Hadi, and Anis S. Baraka 1293

- Nerve Root "Irritation" or Inflammation Diagnosed by Magnetic Resonance Imaging 1294

J. Antonio Aldrete

- In Reply Alexander Avidan, Elyad Davidson, and Moshe Gomori 1294

- Postoperative Cognitive Dysfunction: Overinterpretation of Data? 1294

Frank Rosemeier, Michael Avidan, Andrea Kurz, Menelaos Kranikolas, and Alex Evers

- In Reply Tim Johnson, Terri Monk, Lars S. Rasmussen, Kari Korttila, Volkert D. Siersma, and Jaume Canet 1295

Continued on page 29A

CONTENTS



| | |
|--|----------|
| Neurally-mediated Cardiotoxicity of Local Anesthetics: Direct Effect of Seizures or of Local Anesthetics? | 1295 |
| <i>Jean E. de La Coussaye, A.Guy M. Aya, and Jean-Jacques Eledjam</i> | |
| In Reply <i>Leigh A. Ladd, Susan E. Copeland, and Laurence E. Mather</i> | 1296 |
| Efficacy of Acute Normovolemic Hemodilution in Cardiac Surgery | 1297 |
| <i>Philippe J. Van der Linden and Stefan G. De Hert</i> | |
| In Reply <i>Valter Casati</i> | 1297 |
| Comparison of External Heat Exchange Systems | 1298 |
| <i>Michael J. English</i> | |
| In Reply <i>Abdallah Kabbara, Charles E. Smith, and Alfred C. Pinchak</i> | 1298 |
| Why Not Use Amsorb Alone as the CO ₂ Absorbent and Avoid Any Risk of CO Production? | 1299 |
| <i>Mitchel B. Sosis</i> | |
| In Reply <i>Erich Knolle and Hermann Gilly</i> | 1299 |
| The Influence of the Duration of Anesthesia on Neuromuscular Potency | 1300 |
| <i>Aaron F. Kopman</i> | |
| In Reply <i>Benoit Plaud and Francois Donati</i> | 1300 |
| Central Block or Not Central Block under Ticlopidine Therapy? | 1301 |
| <i>Maurizio Fattorutto</i> | |
| In Reply <i>Christoph Maier, Thomas Weiss, and Michael Zenz</i> | 1301 |
| Overdose, Coronary Artery Disease, or Both | 1302 |
| <i>Enrique Via-Reque</i> | |
| In Reply <i>Rashmi N. Mueller and Mark H. Zornow</i> | 1302 |
| Lidocaine Administration, Seizures, and Causality | 1302 |
| <i>Paul Martin Kempen</i> | |

Continued on page 30A



CONTENTS

| | |
|---|-------------|
| Airway Fire during Tracheostomy: Should We Extubate? <i>Ju-Mei Ng and Philip M. Hartigan</i> | 1303 |
| Failure of Paging Shortcuts to Facilitate Stat Paging in Medical Emergencies <i>Harvey J. Woehlck</i> | 1303 |
| Alternative Methods of Orbitotracheal Intubation <i>Harvey J. Woehlck and Lois A. Connolly</i> | 1304 |
| Egg Allergy and Blood Products: You Say Albumen, I Say Albumin. . . <i>Samuel J. Smith, Dwight Geha, and Theodore A. Alston</i> | 1304 |
| ■ REVIEWS OF EDUCATIONAL MATERIAL | 1306 |
| ■ ANNOUNCEMENTS | 1307 |

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The Instructions for Authors are published in the January and July issues and are available at www.anesthesiology.org. Please refer to the Instructions for the preparation of any material for submission to ANESTHESIOLOGY.

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