



ANESTHESIOLOGY

The Journal of the American Society of Anesthesiologists, Inc. • anesthesiology.org

Mission: Promoting scientific discovery and knowledge in perioperative, critical care, and pain medicine to advance patient care.

EDITOR-IN-CHIEF

James C. Eisenach, M.D.
Editor-in-Chief, ANESTHESIOLOGY
Department of Anesthesiology
Wake Forest University School of Medicine
Medical Center Boulevard
Winston-Salem, NC 27157
Tel: 1-800-260-5631
E-mail: editorial-office@anesthesiology.org

PAST EDITORS-IN-CHIEF, ANESTHESIOLOGY

Henry S. Ruth, M.D., 1940–1955
Ralph M. Tovell, M.D., 1956–1958
James E. Eckenhoff, M.D., 1959–1962
Leroy D. Vandam, M.D., 1963–1970
Arthur S. Keats, M.D., 1971–1973
Nicholas M. Greene, M.D., 1974–1976
C. Philip Larson, Jr., M.D., 1977–1979
John D. Michenfelder, M.D., 1980–1985
Lawrence J. Saidman, M.D., 1986–1996
Michael M. Todd, M.D., 1997–2006

COVER ART

James P. Rathmell, M.D.
Boston, Massachusetts
Annemarie B. Johnson, C.M.I.
Medical Illustrator
Winston-Salem, North Carolina

CME EDITORS

Leslie C. Jameson, M.D.
Dan J. Kopacz, M.D.

EDITORIAL OFFICE

Vicki Tedeschi, Managing Editor
E-mail: managing-editor@anesthesiology.org
Allison Akeley
Tracy Candelaria
Karen Parks
ANESTHESIOLOGY Journal
1061 American Lane
Schaumburg, IL 60173-4973
Tel: (847) 268-9296
E-mail: editorial-office@anesthesiology.org

LWW PUBLICATION STAFF

Druanne Martin, Publisher
Joseph Albrecht, Journal Production Editor
Debbie Moody, Journal Production Associate
Michelle Smith, Senior Account Manager, Advertising
Keida Spurlock, Classified Advertising Representative
Silvia Serra, Director, Rights, Licensing & Permissions

ASA OFFICERS

John P. Abenstein, M.D., President
Daniel J. Cole, M.D., President-Elect
Jane C. K. Fitch, M.D., Immediate Past President
Jeffrey Plagenhoef, M.D., First Vice-President
Beverly K. Philip, M.D., Vice-President for Scientific Affairs

All articles accepted for publication are done so with the understanding that they are contributed exclusively to this Journal and become the property of the American Society of Anesthesiologists, Inc. Statements or opinions expressed in the Journal reflect the views of the author(s) and do not represent official policy of the American Society of Anesthesiologists unless so stated.



ANESTHESIOLOGY

The Journal of the American Society of Anesthesiologists, Inc. • anesthesiology.org

Mission: Promoting scientific discovery and knowledge in perioperative, critical care, and pain medicine to advance patient care.

EDITOR-IN-CHIEF

James C. Eisenach, M.D.
Winston-Salem, North Carolina

EXECUTIVE EDITORS

Michael J. Avram, Ph.D., Chicago, Illinois
Charles D. Collard, M.D., Houston, Texas
Jerrold H. Levy, M.D., F.A.H.A., F.C.C.M.,
Durham, North Carolina
James P. Rathmell, M.D., Boston, Massachusetts
David S. Warner, M.D., Durham, North Carolina

STATISTICAL EDITOR

Timothy T. Houle, Ph.D.
Winston-Salem, North Carolina

EDITORS

J. David Clark, M.D., Ph.D., Palo Alto, California
Hugh C. Hemmings, Jr., M.D., Ph.D., New York, New York
Shiroh Isono, M.D., Chiba, Japan
Brian P. Kavanagh, M.B., B.Sc., M.R.C.P., F.C.A.R.C.S.I.,
Toronto, Canada
Jean Mantz, M.D., Ph.D., Clichy, France
Piyush M. Patel, M.D., F.R.C.P.C., San Diego, California
David M. Roth, M.D., Ph.D., San Diego, California
Daniel I. Sessler, M.D., Cleveland, Ohio

ASSOCIATE EDITORS

Julien Amour, M.D., Ph.D., Paris, France
Takashi Asai, M.D., Ph.D., Osaka, Japan
Brian Thomas Bateman, M.D., Boston, Massachusetts
George S. Bause, M.D., M.P.H., Cleveland, Ohio
Beatrice Beck-Schimmer, M.D., Zurich, Switzerland
Chad Michael Brummett, M.D., Ann Arbor, Michigan
John Butterworth, M.D., Richmond, Virginia
Jaume Canet, M.D., Ph.D., Barcelona, Spain
Carol Wiley Cassella, M.D., Seattle, Washington
Steven P. Cohen, M.D., Baltimore, Maryland
Deborah J. Culley, M.D., Boston, Massachusetts
Albert Dahan, M.D., Ph.D., Leiden, The Netherlands
Andrew J. Davidson, M.D., M.B.B.S., F.A.N.Z.C.A.,
Melbourne, Australia
Holger K. Eltzschig, M.D., Ph.D., Aurora, Colorado
Pamela Flood, M.D., San Francisco, California
Amanda A. Fox, M.D., M.P.H., Dallas, Texas
Admir Hadzic, M.D., Ph.D., New York, New York
Quinn H. Hogan, M.D., Milwaukee, Wisconsin
Ru-Rong Ji, Ph.D., Durham, North Carolina
Yandong Jiang, M.D., Ph.D., Boston, Massachusetts
Sachin Kheterpal, M.D., M.B.A., Ann Arbor, Michigan
Kate Leslie, M.B.B.S., M.D., M.Epi., F.A.N.Z.C.A.,
Parkville, Australia
Ronald S. Litman, D.O., F.A.A.P., Philadelphia, Pennsylvania
Martin J. London, M.D., San Francisco, California
Edward Mascha, Ph.D., Cleveland, Ohio
George A. Mashour, M.D., Ph.D., Ann Arbor, Michigan
Paul S. Myles, M.B., B.S., M.P.H., M.D., F.F.A.R.C.S.I.,
F.A.N.Z.C.A., Melbourne, Australia
Peter Nagele, M.D., M.Sc., St. Louis, Missouri
Mark D. Neuman, M.D., M.Sc., Philadelphia, Pennsylvania
Warren S. Sandberg, M.D., Ph.D., Nashville, Tennessee
Alan Jay Schwartz, M.D., M.S.Ed., Philadelphia, Pennsylvania
Nikolaos J. Skubas, M.D., New York, New York
Jamie W. Sleigh, M.D., Hamilton, New Zealand
Balachundhar Subramaniam, M.B.B.S., M.D., M.P.H.,
Boston, Massachusetts
Marcos F. Vidal Melo, M.D., Ph.D., Boston, Massachusetts
Hannah Wunsch, M.D., M.Sc., New York, New York

Access to articles published in ANESTHESIOLOGY is available to nonsubscribers through pay-per-view at the journal Web site, www.anesthesiology.org. Authors may order quantity print or electronic reprints of their own articles using the order form supplied with their proofs and posted to the journal Web site. For all other bulk purchases, please contact reprintsolutions@wolterskluwer.com in North America, Carlos Moreyra (Carlos.Moreyra@wkglobal.com) in Latin America, and Jean Jones (PS-Reprints@wolterskluwer.com) in Europe and elsewhere.

ANESTHESIOLOGY is abstracted or indexed in Index Medicus/MEDLINE, Science Citation Index/SciSearch, Current Contents/Clinical Medicine, Current Contents/Life Sciences, Reference Update, EMBASE/Excerpta Medica, Biological Abstracts (BIOSIS), Chemical Abstracts, Hospital Literature Index, and Comprehensive Index to Nursing and Allied Health Literature (CINAHL).

The affiliations, areas of expertise, and conflict-of-interest disclosure statements for each Editor and Associate Editor can be found on the Journal's Web site (www.anesthesiology.org).