Discoveries in Basic and Translational Pathobiology

Editor-in-Chief
Martha B. Furie, Stony Brook University

Senior Associate Editors
William B. Coleman, University of North Carolina Chapel Hill
Richard N. Mitchell, Brigham and Women’s Hospital and Harvard Medical School

Associate Editors
Chris Albanese, Georgetown University Medical Center
Steven L. Carroll, Medical University of South Carolina
Zoran Culig, Medical University of Innsbruck
Patricia A. D’Amore, Schepens Eye Research Institute — Massachusetts Eye and Ear
Lora Hedrick Ellenson, Cornell University
Philippe G. Frank, The University of Tours

Philip Furmanski, Rutgers University
Nisha Jain Garg, University of Texas Medical Branch
Michael S. Goligorsky, New York Medical College
Meera Hameed, Memorial Sloan-Kettering Cancer Center
Yoshifumi Ish, University of Oxford
Christopher G. Kevil, Louisiana State University Health Sciences Center
Satarshan (Paul) Singh Monga, University of Pittsburgh School of Medicine
David J. Nikolic-Paterson, Monash University
Charles A. Parkos, University of Michigan
William C. Parks, Cedars-Sinai Medical Center
Drucilla Roberts, Massachusetts General Hospital
Shin’ichi Takeda, National Center of Neurology and Psychiatry
Jouni Uitto, Thomas Jefferson University
Xiao-Ming Yin, Indiana University School of Medicine
Dani S. Zander, University of Cincinnati College of Medicine

Managing Editor
Emily H. Essex

Assistant Managing Editor
Henry L. Carter, Jr.

Scientific Editor
Chhavi Chauhan, PhD, ELS

Senior Editorial Assistant
Michael Dustin

The official journal of the American Society for Investigative Pathology, published by Elsevier, Inc., seeks high-quality original research reports, reviews, and commentaries related to the molecular and cellular basis of disease. The editors will consider basic, translational, and clinical investigations that directly address mechanisms of pathogenesis or provide a foundation for future mechanistic inquiries. Examples of such foundational investigations include data mining, identification of biomarkers, molecular pathology, and discovery research. High priority is given to studies of human disease and relevant experimental models using molecular, cellular, and organismal approaches.

http://ajp.amjpathol.org

Editorial Board

Roslyn Adam Keven L. Hantzsch
Malcolm Alison Jeffrey C. Heslow
Charles E. Alpern Renata V. Isano
Gianfranco Alpini Andrei Ivanov
Ulfrey Arep Harriet Jacobson
Gloria Bonaccorsi Elaine S. Jaffe
Amed R. Brody Motoki Kanagawa
Kyle Brown Alapogam Kammarci
John Calvert C. Dela Kusume
Christian Charantet-Don Dentsch Koyakachi
Matanjiytsa Karen E. Kunishen
Sean Colgan Stefan Koch
Nicholas Dorsukov Oliver Koeber
George S. Dough, Jr. Laura T. Kung
Gabriel E. Dibattista Hans Lasmann
Wen-Xing Dong Andrew Lesok
Motomi Enomoto-Iwamoto Ricardo V. Lloyd
Melanie B. Eancy Robin G. Lorenze
Agnes Fogo Nicholas W. Lukaco
Matthew P. French Jay M. McDonald
Allan Gas George F. Murphy
Kevin L. Garbett Ansa Nusrat
Gudruny Se Geziu Shui Ogino
Andrew Gerwitz Yasutomi Ohkuma
Jeffrey A. Golden A. Wayne Orr
Steven Gunes Toreni Oyewo
Arun J. Giriath Rachid P. Patel
Anna Groza Marco A. Perez-Perez
Domen Hinsel Yuri Paraskevich

Sam H. Phan Chantabun Pothisilawatch
Raja C. Bady Daniel Ramak
Kevan A. Roth Maggie Saint-Gene
David S. Solomon
Darryl Shih

PUBLICATIONS COMMITTEE
Patricia A. D’Amore (Chair), Steven Carroll, Prathana Dalal, Yava Jones-Hall, Satarshan (Paul) Singh Monga, Morgan Pressos, Daniel G. Remick, Magali Saint-Gene, Mark E. Sobel, William G. Stetler-Stevenson, Cecelia Yates.

The American Society for Investigative Pathology

EXECUTIVE OFFICER: Mark E. Sobel
PRESIDENT: Daniel G. Remick. Past President: George K. Michalopoulos. President-elect: Asma Nusrat; Vice President: Dani S. Zander; Secretary-Treasurer: Satarshan (Paul) Singh Monga. Program Chair: Richard Mitchell; Education Committee Chair: Diane Bielenberg; Committee for Career Development and Diversity Chair: Cecelia Yates. Research and Science Policy Chair: William A. Muller; Councilors: Monte S. Willis, Robin G. Lorenze.
The American Journal of Pathology (ISSN 0002-9440) is published monthly by Elsevier, 230 Park Avenue, Suite 800, New York, NY 10169-0901, USA. Periodicals Postage Paid at New York, NY and at additional mailing offices (not valid for journal supplements).


Postmaster: Send address changes to The American Journal of Pathology, Elsevier, Journal Returns, 1799 Highway 50 East, Linn, MO 65051, USA.

Customer Service (orders, claims, online, change of address): Please visit our Support Hub page https://service.elsevier.com for assistance. Address changes must be submitted four weeks in advance.

Yearly Subscription Rates: Further information on this journal is available from the Publisher or from this journal’s website (http://ajp.amjpathol.org). Information on other Elsevier products is available through Elsevier’s website (http://www.elsevier.com).

Advertising Information: Advertising and classified advertising orders and inquiries can be sent to: Bill Hipple, Elsevier Inc., 230 Park Avenue, Suite 800, New York, NY 10169-0901, USA; e-mail: b.hipple@elsevier.com; phone: 212-592-4467. Classified Advertising: Michael Kelley; phone: 212-633-3198; e-mail: m.kelley@elsevier.com.

Author Inquiries: For inquiries relating to the submission of articles, contact the Editorial Office at 301-634-7959. You can track your accepted article at http://www.elsevier.com/trackarticle. You are also welcome to contact Customer Support via http://support.elsevier.com. Please see Information for Authors for individual journal. Contact details for questions arising after acceptance of an article, especially those relating to proofs, are provided after registration of an article for publication.

Instructions for Authors can be found online at: http://ajp.amjpathol.org/authorinfo.

Journal Scientific Integrity Policy can be found online at: http://ajp.amjpathol.org/content/integrity.

The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

Electronic Storage or Usage: Permission of the Publisher is required for resale or distribution outside the institution. Permission of the Publisher is required for all other derivative works, including compilations and translations.

Photocopying: Single photocopies of single articles may be made for personal use as allowed by national copyright laws. Permission of the Publisher and payment of a fee is required for all other photocopying, including multiple or systematic copying, copying for advertising or promotional purposes, resale, and all forms of document delivery. Special rates are available for educational institutions that wish to make photocopies for non-profit educational classroom use.

Permissions may be sought directly from Elsevier’s Rights Department in Oxford, UK; phone +1 800 523 4069 x3808, fax +44 (0) 1865 853333. Requests may also be completed online via the Elsevier site (http://www.elsevier.com/authors/obtaining-permissions-to-re-use-elsevier-material).

In the USA, users may clear permissions and make payments through the Copyright Clearance Center, Inc., 22 Rosewood Drive, Danvers, MA 01923, USA; phone: (978) 750-8400, fax: (978) 750-4744, and in the UK through the Copyright Licensing Agency Rapid Clearance Service (CLARCS), 90 Tottenham Court Road, London W1P 0LP, UK; phone: (+44) 20 7631 5555; fax: (+44) 20 7631 5500. Other countries may have a local reprographic rights agency for payments.

Derivative Works: Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution.

Address permissions requests to: Elsevier Rights Department, at the fax and e-mail addresses noted above.

Notice: Practitioners and researchers must always rely on their own experience and knowledge in evaluating and using any information, methods, compounds or experiments described herein. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug dosages should be made. To the fullest extent of the law, no responsibility is assumed by the publisher or the American Society for Investigative Pathology for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein.

Although all advertising material is expected to conform to ethical (medical) standards, inclusion in this publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer.