

# The Journal of Pharmacology and Experimental Therapeutics

A Publication of the American Society for Pharmacology and Experimental Therapeutics

Founded by John J. Abel - 1908

**Michael F. Jarvis, Editor**

**Keith Glaser, Assistant Editor**

## ASSOCIATE EDITORS

Darrell R. Abernethy  
Ian Adcock  
Arthur Christopoulos  
Salvatore Cuzzocrea  
Giora Z. Feuerstein  
Mitchell P. Fink

David A. Gewirtz  
Alan R. Gintzler  
Yuichi Hattori  
Ronald N. Hines  
Raouf A. Khalil  
Rohini Kuner

Lawrence H. Lash  
Roberto Levi  
Philip R. Mayeux  
David S. Miller  
Richard A. Morrisett

James M. O'Donnell  
Bryan L. Roth  
Robert A. Roth  
Roland Seifert  
Domenico Spina

Kenneth D. Tew  
David Weinschenker  
Michael Williams  
Raymond J. Winquist  
Benjamin Yerxa

## EDITORIAL ADVISORY BOARD

Geoffrey W. Abbott  
Thomas J. Abbruscato  
Peter Abel  
Edson X. Albuquerque  
Bradley Andresen  
Thomas M. Argentieri  
Reto Asmis  
John Auchampach  
Bork Balkan  
Amy Banes-Berceli  
William A. Banks  
Bjoern Bauer  
Reina Bendayan  
Jack Bergman  
Daniel C. Bertrand  
Italo Biaggioni  
Mark A. Birrell  
Floyd E. Bloom  
Jean-Marie Boeynaems  
Franco Borsini  
Robert Brock  
Marco Brotto  
Nancy Brown  
Qin Chen  
Jon Corton  
Lucio G. Costa

Brian M. Cox  
Bryan F. Cox  
Brian Cummings  
Ann Daly  
M. Imad Damaj  
William C. deGroat  
Russell Delude  
Patrick Dougherty  
Grant Drummond  
Andrea Eckhart  
Frederick J. Ehler  
John L. Evenden  
Alessandro Fatatis  
Steven J. Feinmark  
Stephen F. Flaim  
Anthony W. Fox  
Gert Fricker  
Ryan Fryer  
Hiroyuki Fukui  
James J. Galligan  
Vadivel Ganapathy  
Patricia E. Ganey  
Kathy Gauthier  
Gary Gintant  
John R. Glowa  
Steven M. Grassl

Garrett J. Gross  
Perry V. Halushka  
Gyorgy Hasko  
Derek Hausenloy  
Paul Heerdt  
Susanna Hourani  
Leonard L. Howell  
Dale G. Hoyt  
John Imig  
Edwin K. Jackson  
Douglas Johns  
Kenneth M. Johnson  
William J. Jusko  
Peter W. Kalivas  
Mark R. Kelley  
Lewis B. Kinter  
Thomas Kocarek  
Wouter Koek  
George F. Koob  
Suk-Hee Lee  
Richard Lock  
Benedict R. Lucchesi  
Joseph J. Lynch  
Lee Ann MacMillan-Crow  
Gerard Marek  
Rosalinde Masereeuw

Mark J. Millan  
Virginia Miller  
Giorgio Minotti  
Hitoshi Morikawa  
Hasan Mukhtar  
S. Jamal Mustafa  
Michael Nader  
S. Stevens Negus III  
Kim A. Neve  
Yasuyuki Nomura  
James S. Norris  
Grazyna Nowak  
Patricio O'Donnell  
Nazareno Paolucci  
Achilles J. Pappano  
B. Kevin Park  
Sandra Pfister  
Russell O. Pieper  
Russell A. Prough  
Raymond M. Quock  
Fabio Recchia  
J. Larry Renfro  
Richard Rothman  
Jonathan G. Scammell  
Michal Laniado  
Schwartzman

Federico Sesti  
Patrick Sexton  
Shivendra D. Shukla  
David R. Sibley  
Theodore A. Slotkin  
Philip C. Smith  
Nikolai M. Soldatov  
Patricia K. Sonsalla  
Michael D. Southall  
Roger D. Spealman  
Francis G. Spinale  
Douglas Sweet  
Milt Teitler  
Alvin V. Terry  
Myron L. Toews  
George J. Trachte  
Hiroshi Ueda  
Ellen Walker  
Sandra P. Welch  
Daniel Wierda  
Jeffrey M. Witkin  
Bryan K. Yamamoto

## BOARD OF PUBLICATIONS TRUSTEES

James E. Barrett, *Chair*; Randy A. Hall, Michael F. Jarvis, Kathryn E. Meier, Edward T. Morgan, Kim A. Neve, David R. Sibley, Stephen F. Traynelis, Jeffrey M. Witkin, and Christine K. Carrico, *ex officio*

**ASPET EXECUTIVE OFFICER:** Christine K. Carrico

*Journals Director:* Richard Dodenhoff

*Managing Editor:* Jill Filler

*Editorial Coordinator:* Cassie Wood

**The Journal of Pharmacology and Experimental Therapeutics** (ISSN 1521-0103) is published monthly online only by the American Society for Pharmacology and Experimental Therapeutics, 9650 Rockville Pike, Bethesda, MD 20814-3995. E-mail: [subscriptions@aspet.org](mailto:subscriptions@aspet.org). ASPET web site: [aspet.org](http://aspet.org). Journal web site: [jpet.aspetjournals.org](http://jpet.aspetjournals.org). Subscription rates at [aspetjournals.org/site/subscriptions/index.xhtml](http://aspetjournals.org/site/subscriptions/index.xhtml). GST Tax Number for Canadian subscribers: BN:13489 2330 RT.

**Indexed or abstracted by:** *Biochemistry & Biophysics Citation Index*®, *Biological Abstracts*, *BIOSIS Previews Database*, *Bio-Sciences Information Services*, *Current Awareness in Biological Sciences*, *Current Contents*®/*Life Sciences*, *EMBASE/Excerpta Medica*, *Index Medicus*, *Medical Documentation Service*®, *PsycINFO*, *Reference Update*®, *Research Alerts*®, *Science Citation Index*®, *SciSearch*®, and *SIIC Data Bases*.

**Journal and ASPET office:** 9650 Rockville Pike, Bethesda, MD 20814-3995. Telephone: 301-634-7060. Fax: 301-634-7061. E-mail: [info@aspet.org](mailto:info@aspet.org). ASPET web site: [aspet.org](http://aspet.org). Journal web site: [jpet.aspetjournals.org](http://jpet.aspetjournals.org).

**Editorial matters** should be addressed to Dr. Michael F. Jarvis, Editor, *The Journal of Pharmacology and Experimental Therapeutics*, at the above address.

**Instructions to Authors:** See [jpet.aspetjournals.org](http://jpet.aspetjournals.org) for the Instructions to Authors and the ASPET Authorship Responsibility, Financial Disclosure, and Chemical Structure Statement forms.

**Subscriptions:** Contact the ASPET Subscriptions Dept., 9650 Rockville Pike, Bethesda, MD 20814-3995. Telephone: 301-634-7782. Fax: 301-634-7061. E-mail: [subscriptions@aspet.org](mailto:subscriptions@aspet.org). See [aspetjournals.org/site/subscriptions/index.xhtml](http://aspetjournals.org/site/subscriptions/index.xhtml) for rates.

**Change of IP addresses:** ASPET will help institutional subscription administrators update IP address ranges as requested. Subscription administrators can make these changes at the journal site using their account user name and password.

**Reprints of individual articles** are available from the journal web site using the pay-per-view option for nonsubscribers.

**Reprints in large quantities** for commercial or academic use may be purchased from ASPET. For information and prices, call 301-634-7063.

**Copyright information:** *The Journal of Pharmacology and Experimental Therapeutics* is copyrighted by the American Society for Pharmacology and Experimental Therapeutics. For permission to photocopy entire articles from *The Journal of Pharmacology and Experimental Therapeutics*, see [www.copyright.com](http://www.copyright.com) or contact the Copyright Clearance Center (CCC), Inc., 222 Rosewood Dr., Danvers, MA 01923. Telephone: 978-750-8400. For permission to reprint portions of articles such as figures and tables or to reprint entire articles in a thesis or dissertation, see [www.aspet.org/webforms.aspx?ekfrm=84](http://www.aspet.org/webforms.aspx?ekfrm=84). Photocopying or printing articles beyond that permitted by Sections 107 and 108 of the U.S. Copyright Law is allowed, provided that the \$25.00-per-copy fee is paid through the CCC. Classroom photocopying is permitted at no fee, provided that students are not charged more than the cost of duplication. This consent does not extend to other kinds of copying. Reproduction of any portion of an article for subsequent republication requires permission of ASPET.

**Disclaimer:** The statements and opinions contained in the articles of *The Journal of Pharmacology and Experimental Therapeutics* are solely those of the individual authors and contributors and not of the American Society for Pharmacology and Experimental Therapeutics. The appearance of advertisements in the journal is not a warranty, endorsement, or approval of the products or their safety. The American Society for Pharmacology and Experimental Therapeutics disclaims responsibility for any injury to persons or property resulting from any ideas or products referred to in any article or advertisement.

**Copyright** © 2012 by the American Society for Pharmacology and Experimental Therapeutics. All rights reserved.