# The Journal of Pharmacology and Experimental Therapeutics

A Publication of the American Society for Pharmacology and Experimental Therapeutics

Founded by John J. Abel - 1908

## Kenneth D. Tew *Editor* Joe Blumer, *Minireviews Editor*

### **ASSOCIATE EDITORS**

Salvatore Cuzzocrea Yuichi Hattori Roberto Levi Kent Vrana
Michael Frohman John Hayes Gerard Marek Raymond J. Winquist
James Gallo Lawrence H. Lash Gary O. Rankin Susan K. Wood

#### **EDITORIAL ADVISORY BOARD**

Geoffrey W. Abbott Mark J. Crabtree Paul Heerdt Nazareno Paolocci Thomas J. Abbruscato Ann Daly James K. Hennan Andreas Papapetropoulos François Alhenc-Gelas Annarita Di Lorenzo Edwin K. Jackson Roger D. Spealman Bradley T. Andresen Frederick J. Ehlert Mark R. Kelley David A. Taylor Thomas M. Argentieri Steven J. Feinmark Lewis B. Kinter Sandra P. Welch John Auchampach Stephen F. Flaim Giorgio Minotti Jack Yalowich Jack Bergman Hiroyuki Fukui Mahmood S. Mozaffari Andrea Cignarella Eric R. Gross S. Jamal Mustafa Bryan K. Yamamoto

#### **BOARD OF PUBLICATIONS TRUSTEES**

Mary Vore, Chair; Eric L. Barker, Jack Bergman, Lynette Daws, Beverley Greenwood-Van Meerveld, Michael F. Jarvis, J. Steven Leeder, Kathryn E. Meier, Emily E. Scott, Jeffrey C. Stevens, Kenneth D. Tew, Judith A. Siuciak, ex officio; and Joseph Jilek, ex officio Young Scientist Representative

#### ASPET EXECUTIVE OFFICER: Judith A. Siuciak

Journals Director: Richard Dodenhoff Peer Review Manager: Jacqueline Perry Senior Peer Review 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, 1801 Rockville Pike, Suite 210, Rockville, MD 20852-1633. E-mail: subscriptions@aspet.org. ASPET web site: aspet.org. Journal web site: jpet.aspetjournals.org. Subscription rates at 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:** 1801 Rockville Pike, Suite 210, Rockville, MD 20852-1633. Telephone: 301-634-7060. Fax: 301-634-7061. E-mail: info@aspet.org. ASPET web site: aspet.org. Journal web site: jpet.aspetjournals.org.

Editorial matters should be addressed to Dr. Kenneth Tew, Editor, The Journal of Pharmacology and Experimental Therapeutics, at the above address.

Instructions to Authors: See 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., 1801 Rockville Pike, Suite 210, Rockville, MD 20852-1633. Telephone: 301-634-7782. Fax: 301-634-7061. E-mail: subscriptions@aspet.org. See 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 Threapeutics, see 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 https://www.aspet.org/aspet/journals/journals-information/permissions-request. Photocopying or printing articles beyond that permitted by Sections 107 and 108 of the U.S. Copyright Law is allowed, provided that the \$35.00-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 © 2019 by the American Society for Pharmacology and Experimental Therapeutics. All rights reserved.