

WALDMAN • TERZIC

Expert **CONSULT**

Online + Print

Activate your online access today!  
Look for the activation instructions  
in the first few pages of this book.

# Pharmacology and Therapeutics

## Principles to Practice

An Expert **CONSULT** Title

Online + Print

EXHIBIT

IP2018-0403

2223

SAUNDERS  
ELSEVIER

# Pharmacology and Therapeutics

Principles to Practice



## ASSOCIATE EDITORS

**Laurence J. Egan, MD, FRCPI**

Professor, National University of Ireland, Galway; Department of Pharmacology and Therapeutics, Clinical Science Institute, University College Hospital Galway, Newcastle, Galway, Ireland

**Jean-Luc Elghozi, MD, PhD**

Professor of Pharmacology, Faculté de Médecine, Université Paris-Descartes; Head, Clinical Pharmacology Unit, Hôpital Necker, Paris, France

**Arshad Jahangir, MD**

Associate Professor of Medicine, Division of Cardiovascular Diseases, Mayo Clinic, Rochester, Minnesota

**Garvan C. Kane, MD, PhD**

Assistant Professor of Medicine, Division of Cardiovascular Diseases, Mayo Clinic, Rochester, Minnesota

**Walter K. Kraft, MD, MS**

Associate Professor of Pharmacology and Experimental Therapeutics and Medicine, Director of the Jefferson Clinical Research Unit, Thomas Jefferson University, Philadelphia, Pennsylvania

**Lionel D. Lewis, MA, MB BCh, MD, FRCP (London)**

Professor of Medicine/Pharmacology and Toxicology, Department of Medicine, Dartmouth Medical School and Dartmouth Hitchcock Medical Center, Lebanon, New Hampshire

**Jason D. Morrow, MD**

Chief, Division of Clinical Pharmacology, F. Tremaine Billings Professor of Medicine and Pharmacology, and Director of the Research Center for Pharmacology and Drug Toxicology, Vanderbilt University Medical Center, Nashville, Tennessee

**Leonid V. Zingman, MD**

Assistant Professor of Medicine, Department of Medicine, University of Iowa, Iowa City, Iowa

## EDITORIAL BOARD\*

**Darrell R. Abernethy, MD, PhD**

Professor of Medicine and Pharmacology and Molecular Science, Johns Hopkins University School of Medicine, Baltimore; Chief Science Officer, United States Pharmacopeia, Rockville, Maryland

**Arthur J. Atkinson, Jr., MD**

Adjunct Professor, Department of Molecular Pharmacology and Biochemistry, Feinberg School of Medicine, Northwestern University, Chicago, Illinois

**Neal L. Benowitz, MD**

Professor of Medicine and Biopharmaceutical Sciences, University of California, San Francisco; Chief, Division of Clinical Pharmacology and Experimental Therapeutics, San Francisco General Hospital Medical Center, San Francisco, California

**D. Craig Brater, MD**

Dean and Walter J. Daly Professor, Indiana University School of Medicine; Vice President with Responsibility for Life Sciences, Indiana University, Indianapolis, Indiana

**Jean Gray, CM, MD, FRCPC, LLD (Hon), DSc (Hon), FRCP (London)**

Professor Emeritus, Medical Education, Medicine, and Pharmacology, Dalhousie University, Halifax, Nova Scotia, Canada

**Peter K. Honig, MD, MPH**

Executive Vice President, Worldwide Regulatory Affairs and Product Safety, Merck Research Laboratories, West Point, Pennsylvania

**Gregory L. Kearns, PharmD, PhD**

Marion Merrell Dow/Missouri Chair of Pediatric Medical Research, Departments of Pediatrics and Pharmacology, University of Missouri-Kansas City; Chairman, Department of Medical Research, Associate Chairman, Department of Pediatrics, and Chief, Division of Pediatric Pharmacology and Medical Toxicology, Children's Mercy Hospitals and Clinics, Kansas City, Missouri

**Barbara A. Levey, MD**

Adjunct Professor, Medicine, and Molecular and Medical Pharmacology, David Geffen School of Medicine at UCLA; Assistant Vice Chancellor for Biomedical Affairs, UCLA, Los Angeles, California

**Stephen P. Spielberg, MD, PhD**

Dean and Professor of Pediatrics, Pharmacology and Toxicology, Dartmouth Medical School, Hanover, New Hampshire

**Richard Weinshilboum, MD**

Professor of Pharmacology and Experimental Therapeutics and Medicine, Mayo Clinic, Rochester, Minnesota

**Raymond L. Wosley, MD, PhD**

CEO, President, and Chairman of the Board of Directors, Critical Path Institute; Director, Arizona Center for Education and Research on Therapeutics, Tucson, Arizona

\*All members of the Editorial Board are former presidents of the American Society for Clinical Pharmacology and Therapeutics (ASCPT).

# Pharmacology and Therapeutics

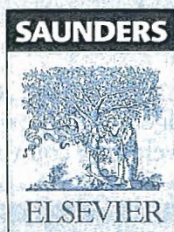
## Principles to Practice

### **Scott A. Waldman, MD, PhD, FCP**

Past President, American Society for Clinical Pharmacology and Therapeutics  
Samuel M.V. Hamilton Professor of Medicine  
Professor of Pharmacology and Experimental Therapeutics and Medicine  
Chair, Department of Pharmacology and Experimental Therapeutics  
Director, Division of Clinical Pharmacology, Department of Medicine  
Director, Gastrointestinal Malignancies Program, Kimmel Cancer Center  
Director, NIH Training Program in "Clinical Pharmacology"  
Thomas Jefferson University  
Philadelphia, Pennsylvania

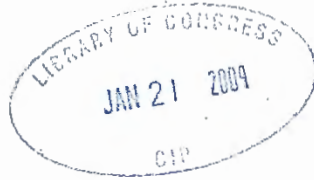
### **Andre Terzic, MD, PhD**

Past President, American Society for Clinical Pharmacology and Therapeutics  
Marriott Family Professor of Cardiovascular Research  
Professor of Medicine and Pharmacology, Medical Genetics  
Director, Marriott Heart Disease Research Program  
Director, NIH Training Program in "Cardiovascular"  
Mayo Clinic Associate Director for Research  
Co-Director, Mayo Clinic Center for Individualized Medicine  
Mayo Clinic  
Rochester, Minnesota



**SAUNDERS**  
ELSEVIER

1600 John F. Kennedy Blvd.  
Ste 1800  
Philadelphia, PA 19103-2899



PHARMACOLOGY AND THERAPEUTICS: PRINCIPLES TO PRACTICE ISBN: 978-1-4160-3291-5  
Copyright © 2009 by Saunders, an imprint of Elsevier Inc. Expert Consult: 978-1-4160-3291-5  
Expert Consult Premium: 978-1-4160-6098-7

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system, without permission in writing from the publisher. Permissions may be sought directly from Elsevier's Rights Department: phone: (+1) 215 239 3804 (US) or (+44) 1865 843830 (UK); fax: (+44) 1865 853333; e-mail: [healthpermissions@elsevier.com](mailto:healthpermissions@elsevier.com). You may also complete your request on-line via the Elsevier website at <http://www.elsevier.com/permissions>.

Notice

Knowledge and best practice in this field are constantly changing. As new research and experience broaden our knowledge, changes in practice, treatment and drug therapy may become necessary or appropriate. Readers are advised to check the most current information provided (i) on procedures featured or (ii) by the manufacturer of each product to be administered, to verify the recommended dose or formula, the method and duration of administration, and contraindications. It is the responsibility of the practitioner, relying on their own experience and knowledge of the patient, to make diagnoses, to determine dosages and the best treatment for each individual patient, and to take all appropriate safety precautions. To the fullest extent of the law, neither the Publisher nor the Editors assumes any liability for any injury and/or damage to persons or property arising out of or related to any use of the material contained in this book.

The Publisher

Library of Congress Cataloging-in-Publication Data

Pharmacology and therapeutics : principles to practice / [edited by] Scott A. Waldman, Andre Terzic.—1st ed.  
p. ; cm.

ISBN 978-1-4160-3291-5

1. Pharmacology. 2. Chemotherapy. I. Waldman, Scott A. II. Terzic, Andre.

[DNLM: 1. Pharmacology, Clinical—methods. 2. Drug Therapy. QV 38 P53603 2008]

RM300.P5193 2008

615'.1—dc22

2007044208

Acquisitions Editor: Druanne Martin  
Developmental Editor: Adrienne Brigido  
Project Manager: Mary B. Stermel  
Design Direction: Steven Stave  
Text Designer: Ellen Zanolle  
Editorial Assistant: John Ingram  
Marketing Manager: Courtney Ingram

Printed in United States of America

Last digit is the print number: 9 8 7 6 5 4 3 2 1

Working together to grow  
libraries in developing countries

[www.elsevier.com](http://www.elsevier.com) | [www.bookaid.org](http://www.bookaid.org) | [www.sabre.org](http://www.sabre.org)

ELSEVIER BOOK AID International Sabre Foundation

**DOCKET**  
**ALARM**

Find authenticated court documents without watermarks at [docketalarm.com](http://docketalarm.com).

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.