



## Editorial Board

An international journal of physiology produced jointly by the International Union of Physiological Sciences and the American Physiological Society

**Editor-in-Chief** Walter Boron, Cleveland, OH  
**Associate Editors** Michael Caplan, New Haven, CT  
Ulrich Pohl, Munich, Germany  
**Special Advisor** Gerhard Giebisch, New Haven, CT

### Consulting Editors

Richard Aldrich, Austin, TX  
Hsiao Chang Chan, Hong Kong, China  
David Clapham, Boston, MA  
Graham Dockray, Liverpool, UK  
Sten Grillner, Stockholm, Sweden  
Susan Hamilton, Houston, TX  
Donald Hilgemann, Dallas, TX  
Reinhard Jahn, Göttingen, Germany  
Baruch Kanner, Jerusalem, Israel  
Julie Kauer, Providence, RI  
Amira Klip, Toronto, Canada  
Litsa Kranias, Cincinnati, OH  
Richard Lewis, Stanford, CA  
Jennifer Lippincott-Schwartz, Bethesda, MD  
José Lopez-Barneo, Seville, Spain  
Heini Murer, Zurich, Switzerland  
Tullio Pozzan, Padua, Italy  
Michael Welsh, Iowa City, IA

### Editorial Coordinator

Charleen M. Bertolini

### APS Publications Office

M. Reich, Director of Publications  
S. Boyer, Journal Copy Editor

### Art Direction, Penumbra Design, Inc.

Kelly Paralís Keenan, Art Development/Editing and Illustration

### IUPS/APS Joint Managing Board

K. E. Barrett, Chair  
Akimichi Kaneko  
Ewa Szczepanska-Sadowska  
Malcolm Gordon, IUPS Treasurer

*Physiology* (ISSN 1548-9213; ESN 1548-9221) is published bimonthly (one volume per year) by the International Union of Physiological Sciences and the American Physiological Society. Subscription Price (U.S. dollars): Institutional print only, \$270 U.S., \$285 Canada and Mexico, \$285 elsewhere; institutional print and online, \$290 U.S., \$305 Canada and Mexico, \$305 elsewhere; institutional online only, \$230; nonmember individual print only, \$185 U.S., \$200 Canada and Mexico, \$200 elsewhere; nonmember individual print and online, \$205 U.S., \$220 Canada and Mexico, \$220 elsewhere; nonmember individual online only, \$150; members of IUPS-affiliated societies print and online, \$80.00, postpaid. Subscriptions are accepted on a calendar year basis only. Single Copies, Back Issues: when available \$25 each subscriber, \$50 each nonsubscriber, postpaid. Copyright © 2008 by the International Union of Physiological Sciences and the American Physiological Society. Printed in the United States of America. The code at the bottom of the first page of an article indicates copyright owner's consent that copies may be made beyond that permitted by sections 107 and 108 of the U.S. Copyright Law—unless the copies are for general distribution, advertising, creating new works, or resale—provided the per-copy fee is paid through the Copyright Clearance Center, Inc., 222 Rosewood Dr., Danvers, MA 01923. 1548-9213/08 \$8.00. Change of Address: The journal must be advised of a change of address at least 6 weeks before date of issue, with both the subscriber's new and old addresses given. Undelivered copies resulting from an address change will not be replaced. Editorial Inquiries: Walter F. Boron, Editor-in-Chief, *Physiology*, c/o Charleen Bertolini, Editorial Coordinator, *Physiology*, Case Western Reserve University, Physiology & Biophysics, 130 Mill Pond Way, Hendersonville, NC 28791. Subscription and Advertising Inquiries: *Physiology*, The American Physiological Society, 9650 Rockville Pike, Bethesda, MD 20814-3991.

# PHYSIOLOGY

Volume 23, April 2008

**Editorial** 60

What You Don't Know Can't Hurt You....

**Highlights From the Literature** 61

## REVIEWS

**Aging of the Immune System as a Prognostic Factor for Human Longevity** 64

Anis Larbi, Claudio Franceschi, Dawn Mazzatti, Rafael Solana, Anders Wikby, and Graham Pawelec

The mechanisms and consequences of age-associated immune alterations, designated immunosenescence, are briefly reviewed here.

**Neural Systems Controlling the Drive to Eat: Mind Versus Metabolism** 75

Huiyuan Zheng and Hans-Rudi Berthoud

Review of recent studies that suggest that the cross talk between brain areas involved in cognitive, emotional, and metabolic-regulatory functions may explain why energy homeostasis breaks down for many obesity-predisposed individuals in our modern environment.

**Mitochondria: The Hub of Cellular Ca<sup>2+</sup> Signaling** 84

György Szabadkai and Michael R. Duchen

The review describes the principles of mitochondrial Ca<sup>2+</sup> handling and how the organelle directs the cellular Ca<sup>2+</sup> signaling machinery and cell fate according to its metabolic state.

**Apical Transporters for Neutral Amino Acids: Physiology and Pathophysiology** 95

Stefan Bröer

The molecular identification of apical neutral amino acid transporters has shed a light on the molecular basis of Hartnup disorder and iminoglycinuria.

**The Solute Carrier 26 Family of Proteins in Epithelial Ion Transport** 104

Michael R. Dorwart, Nikolay Shcheynikov, Dongki Yang, and Shmuel Muallem

This review highlights structural features, the functional diversity, and several regulatory aspects of the SLC26 transporters.

**Ion Transport and Energetics During Cell Death and Protection** 115

Elizabeth Murphy and Charles Steenbergen

This review discusses mechanisms involved in alterations in ions and high-energy phosphate metabolites in perfused or intact heart during ischemia and reperfusion.

**On the cover:** Changes in early T-cell receptor signaling as a cause for age-associated hyporesponsiveness. See Larbi, Franceschi, Mazzatti, Solana, Wikby, and Pawelec, p. 64.