



Handbook of Ion Channels

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The New Benchmark for Understanding the Latest Developments of Ion Channels

Ion channels control the electrical properties of neurons and cardiac cells, mediate the detection and response to sensory stimuli, and regulate the response to physical stimuli. They can often interact with the cellular environment due to their location at the surface of cells. In nonexcitable tissues, they also help regulate basic salt balance critical for homeostasis. All of these features make ion channels important targets for pharmaceuticals.

Handbook of Ion Channels illustrates the fundamental importance of these membrane proteins to human health and disease. Renowned researchers from around the world introduce the technical aspects of ion channel research, provide a modern guide to the properties of major ion channels, and present powerful methods for modeling ion channel diseases and performing clinical trials for ion channel drugs.

Conveniently divided into five parts, the handbook first describes the basic concepts of permeation and gating mechanisms, balancing classic theories and the latest developments. The second part covers the principles and practical issues of both traditional and new ion channel techniques and their applications to channel research. The third part organizes the material to follow the superfamilies of ion channels. This part focuses on the classification, properties, gating mechanisms, function, and pharmacology of established and novel channel types. The fourth part addresses ion channel regulation as well as trafficking and distribution. The final part examines several ion channel-related

diseases, discussing genetics, mechanisms, and pharmaceutical advances.

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Editorial Review

Review

"... for several years now, researchers have discussed the need for a new, updated, and modern standard work for the field particularly given the explosion of new approaches to channel research, some of which barely existed in 2001. And now we have it. Jie Zheng and Matthew Trudeau have organized an authoritative multi-author handbook covering much of the ion channel field, encompassing the conceptual, technical, organizational, and pathophysiological aspects of ion channel function ... I enjoyed reading it and learned a lot, particularly in areas that I haven't kept up with. It will be a great reference."

?Richard W. Aldrich, *The Journal of General Physiology*, July 2015

"... an excellent source to those wanting to understand, or better understand, basic mechanisms and the diversity of ion channels with respect to cellular function."

?*The Physiologist*, July 2015

"This is the most comprehensive reference book on ion channels to date. It covers from basic concepts and mechanisms to advanced topics and applications. All chapters are written by leading experts in their fields."

?Yongchang Chang, MD, PhD, Laboratory of Ion Channel Biophysics, Division of Neurobiology, Barrow Neurological Institute

"Today we have single-channel recording, genes, hundreds of ion channel subtypes, evolutionary trees, crystal structures, 300,000 papers, many targeted drugs, and very many investigators contributing to this vigorous and mainstream field. The chapters in this volume are testimony to that beautiful success..."

?From the Foreword by Professor Bertil Hille, University of Washington

About the Author

Jie Zheng, PhD, is a professor in the Department of Physiology and Membrane Biology at the University of California Davis School of Medicine. He earned a PhD in physiology from Yale University and received his postdoctoral training at the Howard Hughes Medical Institute (HHMI) and the University of Washington. Dr. Zheng has published over ten book chapters and review articles as well as numerous original research papers. His current research focuses on the activation mechanism of the temperature-dependent thermoTRP channels.

Matthew Trudeau, PhD, is an associate professor in the Department of Physiology at the University of Maryland School of Medicine. He earned a PhD in physiology from the University of Wisconsin-Madison and was a postdoctoral fellow at the University of Washington and the Howard Hughes Medical Institute (HHMI). Dr. Trudeau's current work focuses on hERG potassium channels.

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