
Preface

Research on ion channels has exploded in the last few decades and it is now clear that ion channels play essential roles in cell biology and physiology, with their dysfunction being the root cause of many human diseases. Understanding human biology in the post-genome sequencing era requires that the function of the protein products encoded by these recently sequenced genes be quantified. Using contemporary tools and new experimental approaches, scientists interested in ion channels are in the unique position of being able to directly, and often in real-time, measure ion channel activity, subunit stoichiometry, structure-function relationships, as well as many other biophysical/biochemical parameters regarding a channel of interest. Development and application of these experimental tools has led to a boom in investigation of ion channels; however, as in many fields of research, wide implementation of the newest technological advances lags well behind the discovery of these advances. We believe that recently developed technologies useful for studying ion channels have matured enough to where they should now be readily available to any interested scientist. *Ion Channels* provides a comprehensive and detailed description of recent technological breakthroughs and experimental designs used to successfully study ion channels.

We write *Ion Channels* with the hopes that it will provide insight into rational experimental design and the practical application of methodologies for research on ion channels. The book is designed as a guide to facilitate emerging scientists and young investigators beginning to establish their independent laboratories. In addition, the established investigator whose research has recently directed them towards the study of ion channels will find the book useful. This edition also details several recent methodological breakthroughs with respect to study of ion channels that the established ion channel investigator will find useful. Finally, this edition will serve as a general and hopefully handy resource with respect to practical application of diverse experimental approaches for studying ion channels. It is our goal that this edition will provide scientists the wherewithal to implement new research strategies and methods into their research programs.

Ion Channels is mainly about practical implementation of the study of ion channels and should be used as a field guide by the investigator when designing and performing research on channels. Each chapter provides detail about a

particular aspect of investigating ion channels. This detail includes description of the actual successfully employed experimental procedures and pitfalls for each application. The applications covered here are broad-ranging, from the study of allosteric regulation of ion channel activity using a classic mutagenesis approach to the study of channel subunit stoichiometry using a novel biophysical approach based on fluorescence resonance energy transfer. We feel that our book is both comprehensive and practical providing important information that every scientist interested in ion channels should know.

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