NEUROMETHODS

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Animal Models for Retinal Diseases

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Humana Press

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Preface to the Series

Under the guidance of its founders Alan Boulton and Glen Baker, the Neuromethods series by Humana Press has been very successful, since the first volume appeared in 1985. In about 17 years, 37 volumes have been published. In 2006, Springer Science + Business Media made a renewed commitment to this series. The new program will focus on methods that are either unique to the nervous system and excitable cells or which need special consideration to be applied to the neurosciences. The program will strike a balance between recent and exciting developments like those concerning new animal models of disease, imaging, in vivo methods, and more established techniques. These include immunocytochemistry and electrophysiological technologies. New trainees in neurosciences still need a sound footing in these older methods in order to apply a critical approach to their results. The careful application of methods is probably the most important step in the process of scientific inquiry. In the past, new methodologies led the way in developing new disciplines in the biological and medical sciences. For example, Physiology emerged out of Anatomy in the nineteenth century by harnessing new methods based on the newly discovered phenomenon of electricity. Nowadays, the relationships between disciplines and methods are more complex. Methods are now widely shared between disciplines and research areas. New developments in electronic publishing also make it possible for scientists to download chapters or protocols selectively within a very short time of encountering them. This new approach has been taken into account in the design of individual volumes and chapters in this series.

Wolfgang Walz

Preface

Retinal diseases are leading causes of irreversible visual impairment and blindness, affecting over 100 million individuals worldwide. Age-related macular degeneration and glaucoma are the leading causes of blindness in the elderly, while diabetic retinopathy is the leading cause of visual impairment in middle-aged individuals. The prevalence of all three of these retinal diseases will continue to increase as our world's populations continue to age and diabetes becomes endemic. There are a wide variety of additional important retinal diseases, including various acquired retinal degenerations (e.g., retinitis pigmentosa), maculopathies, retinal vascular disorders (e.g., ischemic retinopathies such as central retinal vein occlusion, sickle cell retinopathy, retinopathy of prematurity), and inflammatory retinopathy, each of which has devastating consequences on our most important sense perception.

Appropriate study models, especially animal models, are essential to the understanding of the etiology, pathology, and progression of these diseases. They are also critical to the evaluation, development, and improvement of therapeutic strategies for these diseases. The overall objective of this book is to provide a survey of valuable techniques as well as animal models for the prominent retinal diseases. The book starts with an overview of the morphology of the retina, visual behavior, and genetics and genomics approaches for retinal research, followed by animal models for the research of specific human retinal diseases, e.g., retinal degeneration, age-related macular degeneration, retinopathy of prematurity, diabetic retinopathy, glaucoma, retinal ischemia, and retinal inflammation. Each chapter was written by recognized experts in their respective fields. We hope that this book is valuable to ocular investigators and ophthalmologists currently working in the area of retinal diseases and ophthalmology. Its detailed and practical descriptions of the models should also appeal to those interested in entering this fascinating and important field of research.

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