Preface

Seven years have passed since the last edition of *Auditory and Vestibular Research, Methods and Protocols.* During this period of time, technological advances and research findings in the field continued at a rapid pace. Thus, no single edition could encompass all the different types of experiments and protocols conducted in the auditory and vestibular fields. With this, the second edition of *Auditory and Vestibular Research*, *Methods and Protocols*, we expand the previous volume from three to seven major sections. Here, we introduce new protocols that encompass cell culture, tissue engineering, nanotechnology, high-throughput screening, and physiology. The section on physiology alone covers techniques that include optical coherence tomography, patch clamping, and photostimulation of caged neurotransmitters. While the first edition explored the nuances of DNA/RNA and protein protocols, the second edition further expounds on these techniques with new chapters and updates. The imaging section in this edition elucidates traditional areas of fluorescence microscopy, including how to build your own fluorescence microscope, but also contains newer techniques that allow the scanning of live stereocilia at nanoscale resolution and large-scale mapping of the brain using electron microscopy (EM). As in the first edition, the present overview provides a perspective of basic research with both mammalian and non-mammalian animal models. The chapters in Part I focus on RNA delivery and extraction, while those in Part II bring updates to protein protocols such as the yeast two-hybrid system and plasmon resonance, while adding new chapters on protein stoichiometry and colocalization. Part III covers various microscopy techniques, including confocal fluorescence, hopping probe ion conductance, and EM to study connectomics. Part IV describes culture protocols such as those used in organ culture, quantifying neurite behavior, and tissue engineering using umbilical cord cells. Part V focuses on nanotechnology with a general overview of nanoparticle-based delivery in hearing disorders and, more specifically, nanotechnology in membrane electromechanics. Part VI entails a description of inner ear cell sorting techniques and high-throughput chemical screens. Finally, Part VII contains seven chapters describing physiological techniques that measure responses beginning with the basilar membrane, continuing with hair cells, their stereocilia, and spiral ganglion cells, and ending with central auditory circuits. The techniques described herein will be useful to scientists in other fields, especially where tissues are scarce and where a comparative approach is useful in discovering the causes of human disorders.

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