

Series Preface



The following preface is the one that we published in Volume 1 of the Springer Handbook of Auditory Research back in 1992. As anyone reading the original preface, or the many users of the series, will note, we have far exceeded our original expectation of eight volumes. Indeed, with books published to date, and those in the pipeline, we are now set for more than 50 volumes in SHAR, and we are still open to new and exciting ideas for additional books.

We are very proud that there seems to be consensus, at least among our friends and colleagues, that SHAR has become an important and influential part of the auditory literature. While we have worked hard to develop and maintain the quality and value of SHAR, the real value of the books is very much because of the numerous authors who have given their time to write outstanding chapters and to our many coeditors who have provided the intellectual leadership to the individual volumes. We have worked with a remarkable and wonderful group of people, many of whom have become great personal friends of both of us. We also continue to work with a spectacular group of editors at Springer. Indeed, several of our past editors have moved on in the publishing world to become senior executives. To our delight, this includes the current president of Springer US, Dr. William Curtis.

But the truth is that the series would and could not be possible without the support of our families, and we want to take this opportunity to dedicate all of the SHAR books, past and future, to them. Our wives, Catherine Fay and Helen Popper, and our children, Michelle Popper Levit, Melissa Popper Levinsohn, Christian Fay, and Amanda Fay Sierra, have been immensely patient as we developed and worked on this series. We thank them, and state, without doubt, that this series could not have happened without them. We also dedicate the future of SHAR to our next generation of (potential) auditory researchers—our grandchildren—Ethan and Sophie Levinsohn; Emma Levit; and Nathaniel, Evan, and Stella Fay.

Preface 1992

The Springer Handbook of Auditory Research presents a series of comprehensive and synthetic reviews of the fundamental topics in modern auditory research. The volumes are aimed at all individuals with interests in hearing research including advanced graduate students, postdoctoral researchers, and clinical investigators. The volumes are intended to introduce new investigators to important aspects of hearing science and to help established investigators to better understand the fundamental theories and data in fields of hearing that they may not normally follow closely.

Each volume presents a particular topic comprehensively, and each serves as a synthetic overview and guide to the literature. As such, the chapters present neither exhaustive data reviews nor original research that has not yet appeared in peer-reviewed journals. The volumes focus on topics that have developed a solid data and conceptual foundation rather than on those for which a literature is only beginning to develop. New research areas will be covered on a timely basis in the series as they begin to mature.

Each volume in the series consists of a few substantial chapters on a particular topic. In some cases, the topics will be ones of traditional interest for which there is a substantial body of data and theory, such as auditory neuroanatomy (Vol. 1) and neurophysiology (Vol. 2). Other volumes in the series deal with topics that have begun to mature more recently, such as development, plasticity, and computational models of neural processing. In many cases, the series editors are joined by a coeditor having special expertise in the topic of the volume.

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Volume Preface

Each volume in the Springer Handbook of Auditory Research (SHAR) series provides comprehensive and up-to-date conceptual reviews on specific topics closely related to the sense of hearing. Whereas previous SHAR volumes have focused primarily on either basic science or applied science, this volume provides both an overview and examples of the translational research process, which is defined as the specific activities that allow basic scientific data to be “translated” first into clinical investigation and then into healthcare application. Thus, the authors of each chapter were charged with describing the challenges and joys of translational research and the process whereby one moves from basic scientific inquiry all the way to clinical delivery. The topics in this book were selected with the goal of emphasizing the critical importance of these translational activities to new advances in hearing healthcare based on evidence-based practice (EBP), a principle defined by clinical practices that reflect approaches derived from compelling scientific evidence of efficacy.

Chapter 1 by Le Prell and Lobarinas provides an overview of the volume and puts the contents into the broad perspective of translational science. This is followed in Chap. 2 by Le Prell, who discusses the entire scientific continuum from basic science to clinical trials to the epidemiological assessment of public health with careful attention to potential obstacles in the translational process that may be encountered at each of these stages. Next, in Chap. 3, Kraus and Anderson discuss the challenges of treatment and diagnosis of central auditory processing disorder (CAPD), a clinical disorder for which there are no widely accepted diagnostic criteria or treatment options.

Chapter 4 by Montgomery, Bauer, and Lobarinas then describes sudden hearing loss (SHL), a clinical disorder for which there *are* well-accepted diagnostic criteria and treatment options. Within the translational research spectrum, this chapter highlights the discrepancy among existing practice guidelines, evidence for these guidelines, and public health needs for SHL, a significant clinical problem with limited treatment options. Specifically, there are now multiple systematic reviews and meta-analyses that draw into question the extent and reliability of steroid

treatment, the most widely accepted and used therapeutic intervention. This chapter provides an overview of the challenges associated with establishing etiology, formal assessment, and treatment of SHL. In Chap. 5, Lynch, Kil, and Le Prell describe the myriad of issues related to preclinical development of a drug, with the primary emphasis of the chapter being the issues that emerge with the transition to clinical testing. Chapter 6 by Campbell and Fox continues the theme of new drug development, discussing the challenges of translation of otoprotective drugs from testing in animal models to assessment in humans.

Chapter 7 by Allman, Schormans, Typlt, and Lobarinas transitions from prevention of hearing loss to treatment of tinnitus, a condition often comorbid with hearing loss. Next, in Chap. 8, Staecker, Klickstein, and Brough describe the development of molecular therapeutics for treating profound hearing loss via regeneration of sensory cells in the cochlea. In Chap. 9, Tan, Xia, and Richter discuss the potential for alternative cochlear implant designs that take advantage of new stimulation technologies. The authors specifically review and consider three novel strategies for neural stimulation, including optogenetics, optoacoustics, and infrared neural stimulation.

Although this volume focuses on translational auditory neuroscience, much of the basic and applied science in the previous volumes provides background to these chapters. As a complement to the previous SHAR volumes on the human auditory cortex and cochlear implants, the first case study in the current volume delves into central auditory processing (Chap. 3) and builds on the themes raised in *Neural Correlates of Auditory Cognition* (Vol. 45, 2012, edited by Cohen, Popper, and Fay). The second case study in this volume focuses on sudden hearing loss (Chap. 4) and updates previous discussion of autoimmune inner ear disease as provided in *Auditory Trauma, Protection, and Repair* (Vol. 31, 2008, edited by Schacht, Popper, and Fay).

Similarly, the problem of noise-induced hearing loss was discussed in detail in *Noise-Induced Hearing Loss* (Vol. 40, 2012, edited by Le Prell, Henderson, Fay, and Popper). In the current volume, the process by which a therapeutic intervention would transition from the laboratory, through the regulatory bodies, to clinical trials and ultimately into routine clinical care is presented as a third in-depth case study (Chap. 5). The next case study in this volume (Chap. 6) focuses on ototoxicity, a topic considered in *Auditory Trauma, Protection, and Repair* (Vol. 31, 2008, edited by Schacht, Popper, and Fay). In this new volume, the current state of available therapies to alleviate tinnitus is discussed in the context of translating these interventions into clinical practice in the fifth case study (Chap. 7). The earlier edition, *Tinnitus* (Vol. 44, 2012, edited by Eggermont, Zeng, Popper, and Fay), provided a thorough overview of the proposed underlying mechanisms of tinnitus.

In the next case study (Chap. 8), readers are given a glimpse into the future with specific examples of promising molecular therapies for hearing loss, an update to the information reviewed in *Development of the Inner Ear* (Vol. 26, 2005, edited by Kelley, Wu, Popper, and Fay) and the more recent *Hair Cell Regeneration, Repair, and Protection* (Vol. 33, 2008, edited by Salvi, Popper, and Fay). Finally, novel and emerging cochlear implant technologies progressing through the translation process

are discussed (Chap. 9). This final case study builds on the discussion of current technology in *Cochlear Implants: Auditory Prostheses and Electric Hearing* (Vol. 20, 2004, edited by Zeng, Popper, and Fay) as well as in *Auditory Prostheses* (Vol. 39, 2011, edited by Zeng, Popper, and Fay).

Fundamental to the issue of translational research is selection of the most appropriate animal models. Multiple chapters draw on the important preceding work across mammals as described in *Comparative Hearing: Mammals* (Vol. 4, 1994, edited by Fay and Popper). Another critical element in translational research is the selection of the most appropriate human functional metrics. This new volume builds on the work discussed in both *Clinical Aspects of Hearing* (Vol. 7, 1996, edited by Van De Water, Popper, and Fay) and *Human Psychophysics* (Vol. 3, 1993, edited by Yost, Popper, and Fay).

Collectively, the chapters in this volume build on and frame previous important topics in hearing science in the context of the scrutiny and high bar of the translational process and the critical steps involved in moving from the bench to the bedside.

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