

## Preface

Tinnitus (ringing in the ears) has many forms, and the severity of tinnitus ranges widely from being a slight nuisance to affecting a person's daily life. How loud the tinnitus is perceived does not directly relate to how much it distresses the patient. Thus, even tinnitus very close to the hearing threshold can be a disabling symptom that amounts to a major burden, it can reduce the quality of life by generating anxiety and concentration problems impairing the ability to do intellectual work, making it difficult to sleep; causing depression and tinnitus can ultimately lead to suicide. Tinnitus can occur at young age, but its prevalence steadily increases with the degree of age-related hearing loss and can reach 12–15% for people aged 65 and over. Moreover, tinnitus incidence is increasing dramatically with increased leisure noise, more work-related noise trauma, and longer lifespan.

The different forms of tinnitus have similarities with different kinds of pain; many forms of pain and tinnitus are phantom sensations. Another important commonality is that pain and tinnitus lack detectable signs; imaging tests (structural MRI, CT, etc.) and common electrophysiological test results are the same whether or not a person has tinnitus.

For a long time, it was believed that the anatomical location of the physiological abnormalities that caused the tinnitus was the ear. However, it was later understood that most forms of tinnitus are caused by abnormalities in the central nervous system and that these abnormalities are often caused by expression of neural plasticity.

Many structures of the body, such as the ear, the auditory nervous system, the somatosensory system, other parts of the brain, and muscles of the head and the neck are directly or indirectly involved in different forms of tinnitus. To treat and understand the pathology of tinnitus, therefore, requires the involvement of many specialties of medicine, surgery, psychology, and neuroscience.

Tinnitus may occur after noise exposure and administration of pharmacological agents, but the cause of subjective tinnitus is often unknown. Severe tinnitus is often accompanied by symptoms, such as hyperacusis (lowered tolerance to sound) and distortion of sounds. Affective disorders, such as phonophobia (fear of sound) and depression, often occur in individuals with severe tinnitus. With such differences in attributes, it is not reasonable to expect that a single cause can be responsible for severe tinnitus, again a factor that makes managing the tinnitus patient a challenge for health care professionals.

Realizing the complexity of tinnitus has highlighted the importance of interdisciplinary research, and the fact that most forms of tinnitus are disorders of the nervous system has put emphasis on neuroscience, both in studies and in the treatment of tinnitus.

However, few clinicians are specifically trained in tinnitus treatment, and there is a lack of suitable books that describe how to diagnose and treat each of these many forms of tinnitus most effectively.

Each of the authors contributing to the “Textbook of Tinnitus” were, therefore chosen from many specialties of medicine, surgery, psychology, and neuroscience, and came from diverse areas of expertise, such as Neurology, Neurosurgery, Audiology, Otolaryngology, Psychiatry, Clinical- and Experimental Psychology, Pharmacology, Dentistry, and Neuroscience.

Unlike pain, which has considerable literature, including a book with the title “Textbook of Pain” now in its fifth edition, there is no comprehensive book that covers the many aspects of tinnitus. This book, therefore, fills a void by providing relevant information about tinnitus as a disease and how to treat it effectively. The “Textbook of Tinnitus” is directed toward the clinician and gives detailed information about the diagnosis of many different forms of tinnitus and their treatment. The book also provides an overview of what is known about the pathophysiology of different kinds of tinnitus.

It has become more and more evident that neural plasticity plays an important role, not only in adapting the nervous system to changes in demand and after injuries, but also as a cause of symptoms and signs of disease. Such diseases have been called “plasticity disorders.” The role of neural plasticity in creating symptoms of disease, such as many forms of tinnitus, has only been described in a few books directed to neurologists and researchers in neuroscience. This means the medical community in general is often unaware that functional changes in the nervous system can be the cause of a patient’s complaints, and that hampers the diagnosis of disorders, such as tinnitus. Therefore, the effective treatment of tinnitus also requires knowledge about neural plasticity as a cause of diseases. This is one of the aspects of tinnitus that is covered in the “Textbook of Tinnitus.”

The fact that tinnitus is not a single disease, but a group of diseases means tinnitus cannot be effectively treated by a single approach, and several disciplines of health care must be involved in managing the patient with tinnitus. Treatment of the patient with severe tinnitus requires collaborations between clinicians in many different fields of medicine, audiology, and psychology. Accordingly, tinnitus research and treatment have been performed by a variety of disciplines, viewing the problem from various perspectives, focusing on different targets, and using diverse approaches. New developments regarding the treatment have prompted the involvement of neurosurgeons, neurologists, psychiatrists, and dentists. Therefore, an important challenge for the future consists in improving cooperation between different disciplines involved in tinnitus research and treatment.

It is a challenge to translate the results from basic research into clinical practice. The “Textbook of Tinnitus” provides the basis for multidisciplinary management of the tinnitus patient using the most modern methods of treatment. The book represents a new and broad interdisciplinary approach to tinnitus by bringing together in a single book, contributions from many different areas of basic science and clinical research and health care to guide the management of the tinnitus patient. This is the first time that such broad efforts have been made regarding the treatment of tinnitus.

The 95 chapters in this book express the independent views of the authors, some of which may diverge and some may complement one and another. The editors have made no attempts to modify individual authors’ views, only attempts have been made to achieve a similar style of writing in the different chapters.

The book describes both the theoretical background of the different forms of tinnitus and detailed knowledge of state-of-the-art treatment of tinnitus written for clinicians by clinicians and researchers in tinnitus. It provides up-to-date information in forms that are suitable for those who diagnose and treat patients with tinnitus in their clinical praxis as otolaryngologists, neurologists, psychiatrists, neurosurgeons, clinical audiologists, dentists, and psychologists. The book can also serve as a reference for clinicians who do not treat tinnitus patients routinely because of its organization and extensive subject index.

The book has five sections, I Basics about tinnitus, II Causes of tinnitus, III Differential diagnosis of tinnitus, IV Clinical characteristics of different forms of tinnitus, and V Management of tinnitus.

The first section describes the basic aspects of tinnitus and the symptoms that often accompany the disorder, such as hyperacusis and misophonia. This section includes chapters on the epidemiology of tinnitus in children as well as adults and discusses the role of genetics in tinnitus. The anatomy and physiology of the normal auditory system and the pathologic system are the topics of other chapters; chapters on pain and similarities between tinnitus and pain are also included, as are chapters that discuss the use of special forms of neuroimaging for studies of tinnitus. Modeling of the pathologies of tinnitus is the topic of two chapters, and one chapter discusses how clinical trials are performed. The last part of the section concerns how tinnitus is perceived and approached by members of different specialties in the research and treatment of tinnitus, including a chapter about how tinnitus is viewed by the patients themselves.

Section II has chapters about different causes of tinnitus, such as the role of disorders of the ear, age, and exposure to noise and ototoxic substances. Diseases associated with tinnitus, such as vestibular schwannoma and Ménière's disease, are the topics of other chapters in this section. Yet another chapter covers the cause of somatosensory tinnitus. Other chapters concern the role of different disorders of the central nervous system. The role of disorders of the masticatory system, including that of the temporomandibular joint, is the topic of the last chapter in the section.

Section III discusses the diagnosis of tinnitus and a chapter presents a diagnostic algorithm for tinnitus, followed by chapters on how the different diagnostic methods are performed. Chapters covering otologic, audiologic, and neuro-otologic assessment and examination follow a chapter about history and questionnaires. A chapter describes the diagnosis of somatosensory tinnitus, and another the assessment of temporomandibular disorders. The last chapter in the section covers psychological and psychiatric assessments.

The chapters of Section IV cover the clinical characteristics of the different forms of tinnitus. In order to better meet the need of clinicians, the section is organized according to symptoms and syndromes as presented by the patients. The chapters describe the management of tinnitus with sudden hearing loss, hyperacusis and phonophobia, intermittent tinnitus, and pulsatile tinnitus. Tinnitus that occurs together with other symptoms, such as, Ménière's disease, headache, and psychiatric disorders (depression, anxiety, and insomnia), are also covered in separate chapters. Finally, posttraumatic tinnitus and tinnitus caused by blast injuries that occur in wars are described.

The chapters of Section V concern management of the various forms of tinnitus. The chapters provide an extensive coverage of the available treatments. The chapters review treatments, such as counseling, cognitive behavioral treatment, and auditory

training, which include various forms of sound stimulation. Specific treatment programs, such as the Tinnitus Retraining Therapy (TRT) and the Neuromonics program are described. The chapters also discuss different kinds of pharmacologic treatment. Treatment using botulinum toxin and different forms of surgical treatment are covered in separate chapters. Other chapters describe different forms of neuromodulation, and one chapter discusses complementary treatments. The two final chapters include the treatment of tinnitus and pain and strategies for TMJ disorders as their topics.

Many of the contributors to “Textbook of Tinnitus” are involved in research sponsored by the international research organization, “The Tinnitus Research Initiative” (TRI). The goal of the TRI is to improve the treatment for tinnitus through advances in the understanding of the pathophysiology of tinnitus. This organization has promoted collaborative interdisciplinary research on tinnitus during the past 5 years. It has now been converted into an international research foundation, the TRI Foundation.

TRI’s goal is to provide a basis for collaborations between researchers and clinicians from different fields to achieve an integrated approach to studies of the pathophysiology of tinnitus and develop and test treatments of different forms of tinnitus.

The Editors thank Mr. Matteo de Nora for his support to research on tinnitus through the TRI Foundation and for his support in the preparation of this book. We also acknowledge valuable support from The University of Texas at Dallas School of Behavioral and Brain Sciences. Amanda Miller provided editorial help and Paige Wahl provided general assistance in the preparation of this book.

Dallas, February 2010

Aage R. Møller  
Berthold Langguth  
Dirk De Ridder  
Tobias Kleinjung

Textbook of Tinnitus

Møller, A.R.; Langguth, B.; DeRidder, D.; Kleinjung, T.  
(Eds.)

2011, XXX, 786 p. 157 illus., 57 illus. in color.,

Hardcover

ISBN: 978-1-60761-144-8