

Javier Mata Peñuela 

M.D. Hospital La Mancha Centro

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**Mata Peñuela, J. (Ed.) 2022. *Manual de audiología laboral [Handbook of occupational audiology]*. Getxo, Biscay: Lettera Publicaciones, S.L. 525 pp. ISBN: 978-84-121623-5-6**

Noise-induced hearing loss is a multidisciplinary subject that involves a range of medical specialties with contrasting yet complementary approaches. Despite the wealth of resources published in English, we lack a Spanish publication addressing the multidisciplinary nature of this type of hearing loss, covering the perspective of both Spain and Latin America. This handbook is the work of an editor and group of authors – 36 specialists in occupational medicine, ENT and audiology – and provides a complementary clinical and research-focused account of occupational noise-induced hearing loss. The volume comprises 21 chapters divided into 4 sections that explore the different fields involved in this type of hearing loss.

The first section covers general aspects, starting with chapter 1 on the physics of noise, authored by specialist physicists but written in an accessible way so that non-physicists can understand aspects related to noise types, evaluation, sources, propagation and control. Chapter 2 discusses noise exposure epidemiology, including an introduction to the emerging area of individual susceptibility to noise.

Chapter 3 gives an overview of auditory anatomy and physiology, laying the groundwork for chapter 4 on the effects of noise exposure, its clinical presentation, and cochlear, vestibular and neural involvement. The section continues with a sizeable chapter 5, focusing on audiological examinations, in particular pure-tone audiometry – the technique and fundamental aspects of the

procedure that must be taken into account for correct performance –, auditory evoked potentials and otoacoustic emissions, their role in diagnosing noise-related hearing loss, early detection potential, and limitations of these tests. The section ends with chapter 6, on legislation. European and Spanish regulations are covered, although in most cases the latter is simply a transposition of the former.

Section two addresses occupational medicine and hearing, opening with chapter 7 on hearing assessments in occupational medicine, its characteristics and criteria for assessing hearing loss, from the well-known Klockhoff scale to the currently used significant threshold drop classification. Chapter 8, another lengthy chapter, maps out action criteria, i.e. the criteria in place for assessing and communicating conclusions, plus a highly relevant part on evaluating fitness for work. It also elaborates on hearing impairment and disability, as well as setting out the guideline criteria for assessing disability due to hearing loss and balance disorders. The chapter then discusses assessing incapacity for work and identifying hearing loss as a work illness, occurrence or accident, and also includes an interesting part on legal disputes in cases of occupational hearing loss.

Chapter 9 delves into specific work cohorts, such as musicians and law enforcement personnel, as well as workers with more sensitive needs, such as pregnant women. The tenth, also comprehensive, chapter focuses on preventing noise-induced hearing loss: risk assessment procedures, noise measuring instruments, workplace design, methods to reduce noise exposure, and signage. Chapter 10 continues with a part on collective and individual protection,

covering different types of protective methods, and ends with a discussion about health surveillance of workers exposed to noise in Spain, comparing it with existing protocols in the USA, Italy, England, Germany and France. The second section ends with another similarly comprehensive chapter, number 11, which addresses the role of companies in occupational risk prevention, including noise, and also covers personal protective equipment.

The third section approaches noise-induced hearing loss from the audiologist's and ENT specialist's perspective, opening with chapter 12 on monitoring and assessing hearing loss. While a previous chapter discussed the techniques, advantages and limitations of the mentioned audiological examinations in general, this chapter maps out investigations in order, starting with the otological examination, followed by the various speech and tonal audiometric tests, then impedance testing, and concluding with otoacoustic emissions and auditory evoked potentials. The chapter incorporates an interesting part on the clinical diagnosis of cochlear synaptopathy. Chapter 13 focuses on the impact of occupational noise and hearing loss, and implications on that impact on communication, safety, work performance and quality of life. The challenges and recommendations when attending people with noise-induced hearing loss are covered in chapter 14, with special reference to preventive measures and personalised medicine.

Chapter 15 elaborates on emerging treatments and strategies, starting with non-pharmacological approaches such as training and hearing protection, and continuing with drug therapies, with notable insights in the use of corticosteroids to reduce the effects of noise exposure, antioxidants to reduce oxidative stress, and neurotrophins as the treatment of choice for synaptic restoration. The chapter closes by explaining the various options available at present for hair cell regeneration using viral vectors or drugs, including, of course, indications for cochlear implantation in these cases.

Chapter 16 provides an interesting and comprehensive account of tinnitus in general and noise-induced tinnitus in particular, which

is a common symptom and sometimes an early sign of hearing loss. A detailed discussion follows on tinnitus epidemiology, pathophysiology, and diagnosis by clinical examination, audiological tests and tinnitus-specific tests. The chapter ends with current tinnitus treatments, including sound, habituation and cognitive-behavioural therapies, and the use of drugs.

The fourth and final section of the handbook is devoted specifically to research, leading with chapter 17 on systematic reviews, and clinical practice and research guidelines. To introduce research methodology, the chapter gives a detailed and up-to-date account of systematic reviews, covering critical reading and evaluation, the research question and specific method, while also outlining sources, checklists, results and conclusions. Moving on to clinical practice guidelines, the chapter details the specifics of methodology and of drawing up the recommendations and questions, evaluating the criteria and reaching conclusions.

The novel topic of hidden hearing loss is addressed in chapter 18, opening with cochlear synaptopathy in non-human models, especially in noise-exposed animal models, and continuing with humans. The chapter explores the relationship between noise-induced cochlear synaptopathy and a sensitive biomarker, such as a speech-perception measure, physiological and speech-perception tests and tinnitus. Finally, the chapter reflects on future perspectives and diagnostic techniques.

Chapter 19 focuses on basic research in noise-induced hearing loss and what can be learnt from animal models, discussing the different animal models for hearing loss and which methodology should be followed for hearing assessment and noise exposure. The genetic foundations and molecular mechanisms of noise-induced hearing loss confirmed in animal models is then discussed, and the chapter ends with preclinical trials in animal models. Chapter 20 reviews auditory system disorders caused by noise and solvent exposure. Organic solvents used in industry today are listed, followed by a review of animal and human studies on this subject, with an analysis of the effects of solvents on audiometric thresholds and the central nervous system.

The handbook closes with chapter 21 – originally written in French, and translated into Spanish by the editor – about the interesting and novel topic of the role of the middle ear in the symptomatology associated with acoustic trauma and other causes. This final chapter presents five distinctive cases of acoustic trauma and the different signs observed during functional middle ear examination. It concludes with a description of the pathophysiological mechanisms of tonic tensor tympani syndrome and its role in acoustic trauma.

All in all, readers interested in occupational audiology are sure to note the “practical handbook” feel conferred by the multidisciplinary approach to this book, making it the leading resource in Spanish on this subject to date, giving readers an understanding of how other specialties approach noise-induced hearing loss, and furnishing them with a unique, comprehensive and up-to-date perspective. New related topics will doubtlessly emerge in this field and may be addressed in subsequent editions of this handbook.

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