Epilogue

Key Findings From Tinnitus Research and Clinical Implications

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The articles in this special issue of the *American Journal of Audiology* represent just a portion of the content from the 8th biennial Veterans Administration (VA) Rehabilitation Research and Development Service, National Center for Rehabilitative Auditory Research (NCRAR) conference. Therefore, we think it insightful to share a summary of the whole conference before attempting to bring together learnings from the articles in this special issue. The objective of the conference was to enhance knowledge about theoretical models of, psychological responses to, and clinical manifestations of tinnitus, and to discuss how this knowledge can be translated into clinical practice, so that individuals with tinnitus can receive the most effective treatment. To achieve these goals, the conference addressed four broad topics associated with tinnitus: (a) its etiology, (b) evaluation and measurement, (c) clinical presentation, and (d) effectiveness of management options.

Presenters described neurophysiological models at the subcortical and cortical levels that attempt to explain the underlying mechanisms that generate tinnitus. It is logical to expect that intervention effectiveness will vary depending on where tinnitus originates from. Together, the presented talks on this topic provide an overview of the biological basis of tinnitus, but it is important to remember that limitations

exist in translating animal research to humans—a major barrier in the development of a successful pharmacological agent for tinnitus.

When describing approaches to evaluating the tinnitus patient, presenters focused on the difficulties and nuances associated with measuring tinnitus, a subjective percept that is further complicated by the fact that an individual's emotional state contributes to his/her experience of tinnitus. The inability to objectively measure tinnitus means we are limited in confirming its diagnosis and assessing outcome(s) of an intervention. This always has been, and remains, a major problem for both research and clinical settings. Other presenters focused on additional obstacles associated with diagnosis and management of tinnitus, such as (a) the need to differentiate hearing-related problems from tinnitus-related problems and consequent selection of an appropriate intervention; and (b) the observation that many tinnitus patients have auditory comorbidities (e.g., hearing loss, hyperacusis) and nonauditory comorbid conditions involving their mental health, in particular posttraumatic stress disorder among Veterans, such that management and follow-up must be adjusted accordingly. Presenters described and discussed a variety of approaches to tinnitus management including cognitive behavioral therapy, sound-based therapies (including amplification when appropriate), head and neck manipulations when somatosensory tinnitus is suspected, neuromodulation, and novel interventions for which there is often little or no scientific evidence as to their efficacy. When available, the theoretical rationale for the intervention/management approaches were explained, and data on effectiveness and efficacy were presented.

It should be clear from this summary, combined with the articles in this issue, that clinical management of tinnitus is complex and limited by knowledge gaps surrounding the biological and physiological basis of the condition, the heterogeneous nature of potential sources, and the need to factor

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auditory and nonauditory comorbidities into the treatment plan.

Conclusion

In conclusion, the key take-home messages from the conference can perhaps be best summarized in the following four points:

- The underlying mechanisms by which tinnitus is generated are not fully understood; thus, it is challenging to develop a pharmacological cure and clearly define the relationship with comorbid conditions.
- The tinnitus percept, and the psychological reaction it evokes, is complex and can involve both auditory and nonauditory systems; therefore, when patients present with complex symptomology and nonauditory comorbid conditions, it is recommended to take a multidisciplinary approach to best meet the needs of your patients. Additionally, it is helpful to create a handout you can provide patients that includes community resources to find a mental health or other appropriate health care provider (e.g., websites of national organizations, associations, etc.) and to let other providers know you are interested in working together.
- Currently, tinnitus cannot be objectively measured. To evaluate treatment efficacy and effectiveness, it is only possible to indirectly assess the perceptual attributes of tinnitus and reported impacts on quality of life. With that said, using these tools helps evaluate the patients' needs and engages patients to take an active role in the decision-making process and in setting realistic goals. Additionally, using these same tools to

monitor change informs the clinician about the effectiveness, or otherwise, of the treatment/management and allows patients to self-assess their progress and revisit/set new goals.

- Individual differences greatly impact how each patient perceives his/her tinnitus and what s/he finds bothersome about it; thus, it is necessary to adapt the choice of intervention to the specific needs of each patient. Once again, this emphasizes the need for tinnitus management to be multifaceted and individualized—considering the patient's preferences, goals and expectations, mental health status, and auditory and nonauditory comorbid conditions—to achieve the best possible outcome.

We hope you have enjoyed the content of the seven articles in this special issue and that it has provided you with insights about tinnitus research and clinical practice that you can integrate into your clinical decision making so your patients receive the best assessment and most effective tinnitus management strategies available to date.

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