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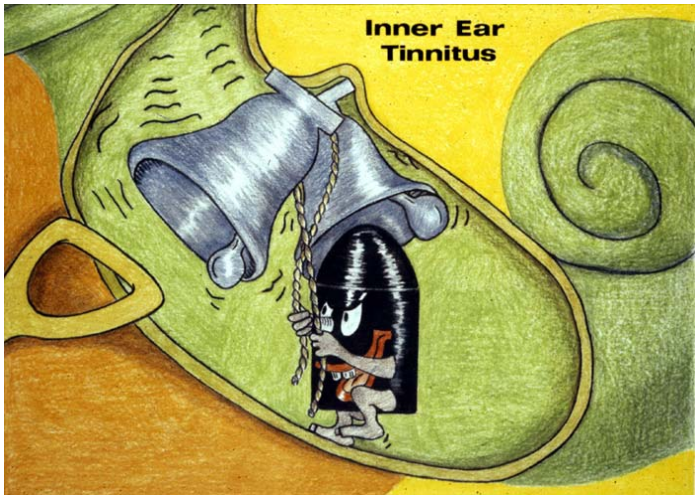
Just the Facts... *Tinnitus and Noise-Induced Hearing Loss*

Communications limitations and social isolation are only part of the tragedy of a noise-induced hearing loss and perhaps not the worst part. Many individuals have an accompanying condition called "tinnitus" that can be more debilitating than the hearing loss. They will tell you that as hard as it is to live with the hearing loss, ***the constant ringing in their ears is the worst part.***

Definition. For some, tinnitus is a buzzing, roaring or rushing sound in their ears. For those with a noise-induced hearing loss, tinnitus is usually a chronic high-pitched ringing or hissing sensation. In this discussion tinnitus is defined as: "The perception of a sound that results exclusively from the activity within the nervous system without any corresponding mechanical, vibrating activity with the cochlea."[1]

Prevalence. Tinnitus is a symptom that can be associated with almost every known hearing problem. Most of us have experienced a transient ringing in our ears. For an estimated 40 million Americans, however, it is a permanent condition and a debilitating condition for 10 million of these people.[2] Tinnitus is the most prevalent disability among new cases added to Veterans' Affairs rolls.

Impact. Individuals will exhibit a range of reactions to their tinnitus. Until it is explained otherwise, some may believe they have a brain tumor. Although tinnitus does not cause hearing loss, it can interfere with one's concentration and attention span. Depression and insomnia have been linked to tinnitus severity and loudness.[3,4] Tinnitus has even been a contributing factor to suicide.[5]



Hearing Protectors. A hearing conservation consideration for those with tinnitus is the increased awareness of tinnitus when hearing protectors are fitted in quiet surroundings like a clinic. The complaint is that we just made their ringing worse. This is one consequence of the occlusion effect. When external sound is blocked or significantly attenuated, sounds inside the head appear louder. An existing sensation of tinnitus will sound louder when air-conducted sound is blocked. Our counseling strategy would be to re-assure the individual that the hearing protectors merely enable them to hear their tinnitus better in a quiet setting. Hearing protectors do not make tinnitus worse. Once back in the workplace, background noise will mask their tinnitus. Although there are no guarantees that their tinnitus will eventually go away, counsel them on the possibility that it could get worse if hearing protectors are not used.

Audiometric Monitoring. Tinnitus must also be factored into the medical surveillance element of the Hearing Conservation Program. Audiometers in the Defense Occupational and Environmental Health Readiness System - Hearing Conservation (DOEHRS-HC) application are defaulted to the pulsed tone mode.

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Pulsed tones accommodate those in our program who already have some degree of tinnitus. The pulsed tone makes it easier to separate tinnitus from the audiometer test frequencies for a more reliable and accurate hearing evaluation.

Health Education. The exact mechanism that produces tinnitus in cases of noise-induced hearing loss is speculative. It is known that tinnitus is associated with cochlear damage in the inner ear. The take home message is that anytime someone experiences tinnitus after noise exposure, they are probably incurring damage to their inner ear, most likely to the outer nerve hair cells. These outer nerve hair cells "have an active role in reducing the damping of the basilar membrane to allow detection of low sound energy close to the threshold of human hearing."[6] Although it is well established that those outer hair cells are capable of modulating the activity of the cochlea, "precisely how, and what effect this may have on tinnitus…is still a matter of conjecture."[7]

Treatment. Excision of the cochlea or section of the auditory nerve are radical treatments that provide only short term relief of tinnitus.[8] The tinnitus eventually returns sometimes worse than before along with other complications such as loss of balance and complete loss of hearing in that ear. If the tinnitus persists despite such radical interventions, then what is the recommended course of treatment? The short answer is that chronic, noise-induced tinnitus is not treatable, but there are management strategies that attempt to control reactions to the tinnitus. For further information on support, self-help groups and management strategies consult websites at the American Tinnitus Association and the Oregon Health & Science University at www.ata.org and http://www.ohsu.edu/ohrc/tinnitusclinic.

References

[1]Jastreboff, P.J., Chapter 8, "Tinnitus as a Phantom Perception, Theories and Clinical Implications," in Mechanisms of Tinnitus edited by Veron J.A. and Moller, A.R., Allyn and Baron, Boston, 1995, page 74.

[2]Seidman, M.D., Jacobson M.P., "Update on Tinnitus." Otolaryngology Clinics of North America. 1996 Jun; vol 29 number (3) pages 455-465.

[3]Folmer, R.C., Griest S.E., Meikle M.B. and Martin W.H., "Tinnitus Severity, Loudness and Depression," Journal of Otolaryngology Head Neck Surgery, 1999, Jul, vol 121 (1) pages 48-51.

[4]Folmer, R.L. and Griest S.E., "Tinnitus and Insomnia," American Journal of Otolaryngology. 2000, Sep vol 21 number 5 pages 287-293.

[5]Personal Communication with Dr. Dan Johnson.

[6]Hazell, J.W.P., Chapter 7, "Models of Tinnitus", in Mechanisms of Tinnitus, page 62.

[7]Ibid.

[8]Feldmann, H., Chapter 5, "Mechanisms of Tinnitus", in Mechanisms of Tinnitus, page 43.