
Tinnitus Habituation Therapy: The University of Maryland Tinnitus and Hyperacusis Center Experience

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INITIAL ASSUMPTIONS

Several assumptions about tinnitus and signal perception are fundamental in the "neurophysiological" approach to tinnitus as described by Jastreboff (1990). First, for the vast majority of patients, we have been unable to modify the peripheral (or central) generators of tinnitus with medication, surgery, biofeedback or other standard psychological measures. Second, cognitive function can attend to only one task at a time (for example, try to dictate and sign a prescription at the same time). Third, the constant barrage of input from all the sense organs is continuously filtered at a subcortical level. And, fourth, the filtering of these signals results in selective perception of a few signals from the multitude that are available (for example, unless brought to our attention we ignore an air conditioner fan, or the sensation of our tongue resting against the hard palate).

Several features make a signal more likely to be given attention: the signal can be new, it can be important based on our past experience (e.g., our own name said in a crowd), the intensity of other ongoing mental activity, and the contrast of the signal to surrounding activity (example, candle in a dark room versus sunlit room).

"Habituation" is defined as the disappearance of a reaction to a stimulus. The goal of habituation therapy is to use the properties of brain function just described, to move the tinnitus into the category of "unimportant signals" despite the fact that the tinnitus signal is still active in the subcortical auditory system. Thus, the tin-

nitus sufferer will not be aware of the presence of the sound for the majority of time, but can still perceive the tinnitus if attention is focused on it.

APPROACH TO TINNITUS HABITUATION

From the previous discussion it is apparent that what is important is not the strength or magnitude of the signal, but the meaning attached to it. "Neutral" signals have little importance or emotional impact (for instance, **my** dog barking versus **your** dog barking). For the over 70% of people experiencing tinnitus it remains "neutral" and does not adversely impact their quality of life. Unfortunately, in some patients, the tinnitus develops severe negative connotations and emotional impact; the patient fears a brain tumor, deafness, mental instability, inability to sleep, etc. As the annoyance increases, the brain's perception of the importance of the signal increases, and in turn the perception of the tinnitus increases.

The first stage in our approach to the treatment of tinnitus is to remove the negative connotations of the tinnitus. This includes a thorough medical evaluation to eliminate both the possibility and the fear that the tinnitus is a harbinger of some more serious medical condition. Second, the patient's fear that this is a permanent state and "nothing can be done" must be removed. Lastly, the patient is educated in the auditory system, its physiology, and probable mechanisms of tinnitus generation. Again, the objective is to give the patient a sense of understanding and control in order to remove the negative connotations of the tinnitus.

The actual habituation of tinnitus perception is facilitated by the introduction of a sound through the use of enriched environmental sounds, enhancement of environmental sounds with amplification, and the introduction of broad band noise produced by low intensity white noise sound generators. All of these measures serve to decrease the contrast between the background neural activity and the tinnitus signal. This approach is

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distinct from tinnitus "masking" with an auditory signal used to cover or hide the tinnitus signal. Masking is counter productive because it is impossible to habituate to a signal that is not detected by the nervous system.

RESULTS

Since its founding in 1990, the University of Maryland Tinnitus and Hyperacusis Center has seen nearly 800 patients. Although some patients have responded rapidly to the intervention, most require 12 to 18 months before completion of the program. Close follow-up contact, reinforcement of the basic principles, and adjustment of time and magnitude of the sound generators or hearing aids is an integral part of the program.

One hundred fifty-two consecutive patients, enrolled in the program for at least six months, were surveyed. Eighty four percent have significant improvement in both decreased annoyance of the tinnitus and definite habituation to its perception as assessed in a questionnaire. Fourteen percent of patients were unchanged and two percent deemed themselves worse. Criteria for this assessment of significant improvement included that at

least one activity of living previously prevented by tinnitus was no longer affected by tinnitus, and a subjective improvement of at least 20% in tinnitus awareness, annoyance or impact on life. Successful patients perceive their tinnitus during a small percentage of the time, usually less than 10%. By contrast, in a smaller group of patients treated with counseling, education and medical evaluation alone, only 17% reported a substantial improvement.

Once habituation has been accomplished, patients can cease using their noise generators. Relapses, once the patient has developed successful habituation, are uncommon.

Although time consuming and labor intensive for both the patient and our medical staff, our experience with this approach to tinnitus management has been extremely gratifying in this difficult group of tinnitus sufferers.

REFERENCE

- Jastreboff PJ: Phantom auditory perception (Tinnitus): mechanism of generation and perception. *Neuroscience Research* 8:221-254, 1990.