Tinnitus Auditory Remapping with Sound Therapy preliminary report

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Introduction
Tinnitus is a challenging condition for clinicians because it has no single cause and no comprehensive treatment has been found. Although tinnitus now affects up to 40 million Americans, tinnitus patients are still routinely told that no treatment is available and they must learn to live with the condition. It is not uncommon for tinnitus sufferer to seek advice from up to 20 clinicians in attempting to find a cure. (Jastreboff 1993). A treatment that is accessible and affordable, and could easily be recommended by GPs and audiologists could make a big difference to tinnitus sufferers everywhere.

Auditory remapping
Hearing is a complex series of processes that take place in the ear and brain in order to receive and interpret sounds. Fully developed at birth, this fragile system is constantly amended by sounds and life experiences to create our ability to hear and to understand what we are hearing.

The ear is responsible for collecting auditory information from the environment and then encoding this information into a format that can be recognized by the brain. This process transforms air pressure variation from sound waves to mechanical energy and finally into an electrical signal.

The brain takes this code and determines if the information received is relevant, and if so applies the code to a predetermined pattern that corresponds to a perception of the sound.

A new tinnitus treatment
Tinnitus Auditory Remapping with Sound Therapy is a portable listening program of spectrally modified recordings of classical music, which has been filtered using a specific algorithm to stimulate the auditory pathways. Played quietly through headphones, this process of auditory remapping is thought to assist the brain to filter out the disturbing tinnitus perception. Two new understandings serve to explain the possible mechanism of Tinnitus Auditory Remapping.

1. We now know that while normally initiated by damage to the ear, persistent tinnitus is generated by the repetitive firing of auditory neural pathways in the brain. (Goldstein, 2005.)
2. Recent discoveries in the field of neural plasticity have demonstrated the potential for brain pathways to be restructured and organized through sensory stimulation. (Jenkins *et al.,* 1990, Sasaki *et al*., 1980.)

Since we know that auditory remapping can occur, the question is what kind of stimulus can promote this remapping in such a way as to interrupted and calm the tinnitus signal.

Sound therapy is believed to influence responses in the medial temporal lobe system and bring about adaptations of the central nervous system to induce appropriate integration with the limbic system, which is the seat of the brain's emotional responses (Goldstein 2005).
The use of classical music means this program integrates the proven beneficial effects of music therapy with the neural stimulus of sound therapy. (Jausovec 2003). Classical music, and in particular the compositions of Mozart, have been found to beneficially influence brain function. (Jausovec 2003)

It is believed that the rich combination of complex melody, harmony and rhythm inherent in this music is a significant factor in the efficacy of Tinnitus Auditory Remapping.

While the potential for neural plasticity and its role in alleviating tinnitus is well documented (Goldstein 2005; Hanley et al 2008) less is known about the potential for rehabilitation of the middle ear musculature and the cilia. The calming impact of high-frequency sound on tinnitus suggests that hair cell stimulus and reactivation could possibly play a role in tinnitus changes observed during sound therapy. (Jastreboff 1993; Goldstein 2005)

Sound Therapy listeners survey

A survey was sent to 600 Sound Therapy listeners over a three-year period. The purpose of the survey was to gather subjective data on tinnitus reduction and the related health and quality of life improvements experienced by listeners. The participants were instructed to play the music at just audible volume during daily activities or sleep, for several hours per day, for a minimum period of four months.

As well as providing some basic demographic historical data, subjects were asked to report if they had noticed changes resulting from Sound Therapy in any of the following conditions:
Tinnitus, Hearing Loss, Stress, Energy, Sleep, Communication, Dizziness and Speech Problems.

Results
Out of approximately 400 total respondents, 139 had tinnitus and completed the program as required, qualifying to be included in the study. Figure 1 shows the total number of participants and the comparison of those who reported a reduction in tinnitus compared to those who had no tinnitus reduction but expressed other benefits. Of the qualified respondents 86% reported benefits from the Sound Therapy program. 14% reported no benefits after four or more months of listening.

In the group that benefited, 42% reported a reduction in the noise level of their tinnitus. The other 44% reported benefits in associated symptoms including reduced stress, increased energy, better sleep, and mentioned not being as bothered by their tinnitus due to the effect of masking and stress reduction. Most respondents reported benefits in three or more areas.

Figure 1

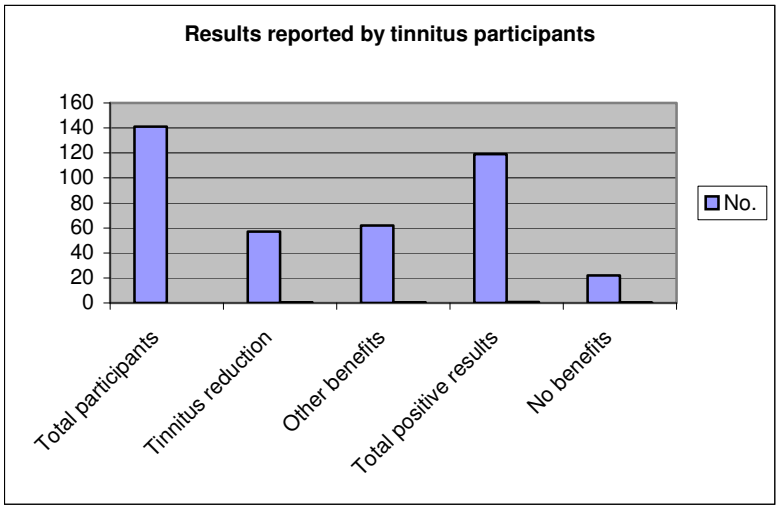

Figure 2 shows a snapshot in time at 3, 6 and 12 months indicating the ratio of how many subjects reported tinnitus improvement relative to other benefits.

Figure 2

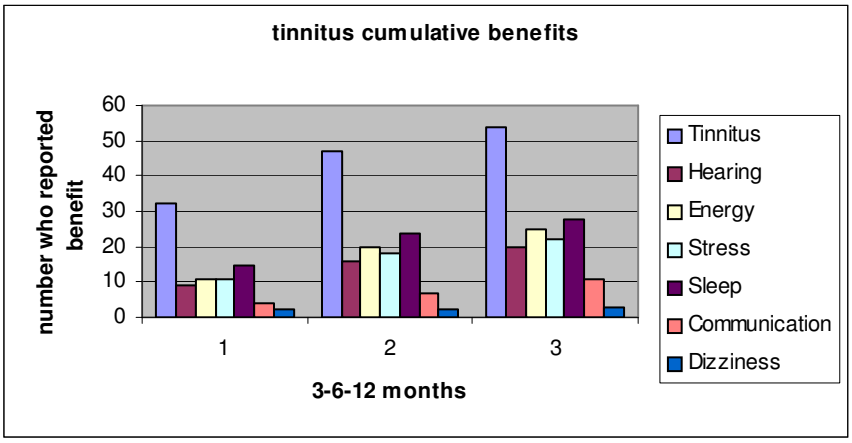

Figure 3

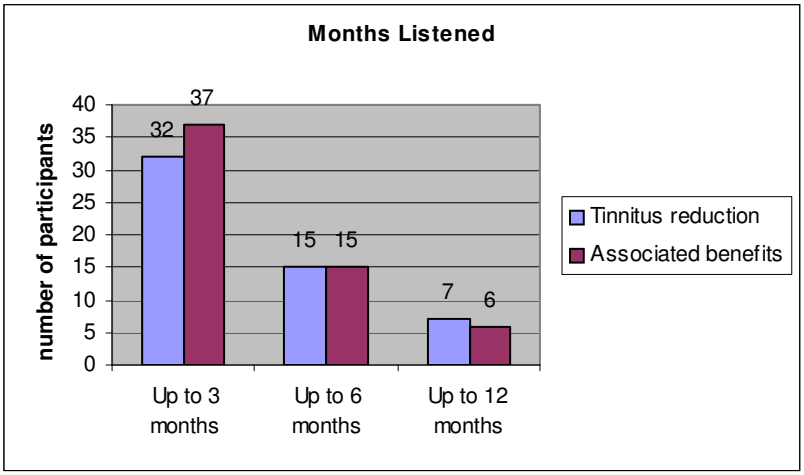

Figure 3 shows the ratio of persons with tinnitus reduction to those with only associated benefits at intervals of 3, 6 and 12 months. This ratio changes in favor of tinnitus resolution as time progresses, indicating that for some patients, listening for upward of 6 to 12 months may be required.

Conclusion

Tinnitus Auditory Remapping is a program that has been under development for 20 years and is soon to be made available through audiologists. This longitudinal survey delivered clinically significant reduction in tinnitus disturbance in more than 86% of respondents.
These statistics show a promising role for Tinnitus Auditory Remapping in the treatment of tinnitus, and the relatively low cost of this method, at under $1,000.00, would make it accessible to a large proportion of tinnitus sufferers.
Because the respondents differed in their mix of associated symptoms and level of symptom severity, the survey effectively demonstrated that Tinnitus Auditory Remapping with Sound Therapy leads to significant improvements for a broad cross-section of tinnitus sufferers.

This study found that the Tinnitus Auditory Remapping provides significant and timely improvements to the severity of tinnitus symptoms and their effect on the subject's quality of life. This was a consistent effect, tested over 12 months, and was achieved through a method that subjects reported as being pleasant to use.

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