REPORT ON THE CONFERENCE OF THE 9TH INTERNATIONAL TRI TINNITUS CONFERENCE: FROM COCHLEA TO THE BRAIN AND BACK

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The 9th International Tinnitus Conference was held from 7 to 10 June, 2015 in Ann Arbor, Michigan. Once again the conference was organized by the Tinnitus Research Initiative, which supports research aimed at understanding the causes of tinnitus and treatments to reduce or eliminate it.

Topics were addressed to audiologists, otolaryngologists, and other researchers interested in tinnitus and hearing loss. The conference brought together 140 participants, mainly from the USA and Europe, but also from Australia, Japan, and China.

The Institute of Physiology and Pathology of Hearing was represented by Dr Danuta Raj-Koziak who presented two posters. One of them, "Tinnitus in 7 and 12 year old children in Poland", reported the prevalence of tinnitus in children of different age groups, and this study is so far the largest of its type in the world. The study questions previous reported prevalences, and addresses concerns about how age groups are chosen and the methods used to classify tinnitus. Work on a similar topic by S. Nemhodt, "Prevalence of tinnitus and hyperacusis in children and adolescents: systematic review", was a compilation of all the available publications in this area.

Another presentation from IPPH, "Cortical overrepresentation of the edge frequency where the audiogram is steepest in individuals with chronic tinnitus and normal hearing" by Dr Monika Lewandowska and colleagues, was received positively, especially by people engaged with this problem. Prof. K. Pawlak-Osinska and Prof. H. Kazmierczak, from Nicolaus Kopernika University in Bydgoszcz, presented a poster on "Coexistense of tinnitus and somatosensory vertigo: clinical implications".

The focus of a large amount of research presented at the conference were explorations of the sites of tinnitus generation, looking at the brainstem and inferior colliculus of rats in which tinnitus was induced by acoustic trauma. Results point to connections between the limbic system and the inferior colliculus. In experimental tinnitus model in animals, deep brain stimulation at the level of the inferior colliculus reduced tinnitus. Practical implications of the model were presented by H. Lim in which 5 patients with type 2 neurofibromatosis were given a brainstem implant in the region of the inferior colliculus.

Findings which indicate the role of the cochlea in generating tinnitus were given by P. Brandon (Canada), who highlighted the fact that selective damage of nerve fibres, especially those carrying high frequencies, can lead to tinnitus.

Results presented by G. Kirkby-Strachan (Australia) dealt with the effect of a cochlear implant in reducing tinnitus in patients with unilateral deafness. Her hypothesis was that there is real suppresive effect or the patient aquires the ability not to focus attention on tinnitus. Tests carried out have included an assessment of tinnitus severity using the VAS scale and the THI questionnaire, an evaluation of tinnitus volume and possibilities for tinnitus suppresssion, hearing in noise, and sound localisation. On the basis of a study of eight patients it was found that an implant may prove to be a more effective method of tinnitus therapy than conventional procedures.

J. Melcher in her presentation "Multiple parallel brainstem pathways hyper-responsive in human tinnitus: a result of top-down modulation" described how ABR tests (waves I, III, and V) and DPOAE tests with contralateral stimulation could be used to evaluate hyperactivity in the brainstem of tinnitus patients. The study was performed in a group of patients who had normal hearing and no depression. The amplitude of wave I decreased and that of waves III and V increased. Reductions in DPOAE amplitudes with contralateral suppresion, and changes in ABR waves, is indirect evidence of brainstem hyperactivity.

A new type of tinnitus therapy, direct stimulation of the vagus nerve, is the subject of current research. Preliminary results were presented by R. Tyler in a presentation entitled "Vagus nerve stimulation paired with tones for treatment of tinnitus". A group of 30 patients with severe and profound hearing loss were fitted with a device that directly stimulated the left vagus nerve. Therapy is based on both acoustic and nervus vagus stimulation, and is done in sessions of 2.5 hours per day in the patient's home. After 2 months of stimulation, a reduction, or even elimination of tinnitus has been observed in approximately 60% of patients. Final results will be published after a longer observation period.

Yehoash Raphael (USA) presented the results of ongoing research in the treatment of deafness. The study focused on the use of residual hearing and the possibility of regenerating VIIIth nerve fibers. The method assumes that neurotrofin injected into the area of nerve endings causes nerve fibers to regenerate, so that cochlear implant electrodes covered in neurotrofin will cause the regeneration

of fibres near the end of the electrodes. In gene therapy, nerve cells in which viruses with neurotrofin are inserted produce their own neurotrofin, causing the nerve fibers to regenerate.

Another proposal involving gene therapy is to replace hair cells by transdifferentiation or to implant stem cells into the endolymph. "Saccular hearing" is another possible future avenue: cells located in the sacculus might start to hear if they were provided with nerve endings by using neurotrofin.

Finally, it is worth mentioning a workshop/lecture on somatosensory tinnitus and the possibilities for therapy presented by Prof. T. Sanchez from Brasil and Dr E. Biesinger from Germany.