REPORT ON THE 39TH ANNUAL MIDWINTER MEETING OF THE ASSOCIATION FOR RESEARCH IN OTOLARYNGOLOGY, 20–24 FEBRUARY, 2016, SAN DIEGO, CA, USA

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The 39th annual midwinter conference of the Association for Research in Otolaryngology took place in San Diego, California, USA from February 20–24, 2016. This year 27 podium sessions, 4 poster sessions (with 945 poster presentations), 14 symposia, 5 workshops, and 8 mentoring sessions were organized.

The conference began with the Presidential Symposium entitled "Cochlear gene therapy" and the first lecture, given by Dr Jean Bennett, one of the world's top researchers in the field of gene therapy, focused on her gene therapy trials in children and adults with congenital blindness due to *RPE65* gene mutation. The results from Phase 3 studies have demonstrated the safety of the therapy, with robust and stable recovery of visual function. This makes it a frontrunner for the first approved gene therapy drug in the USA. Dr Bennett strongly encouraged scientists working in the field of otolaryngology to conduct similar gene therapies studies for other sensorineural disorders, such as hearing loss and vestibulopathy.

The current status of genetic testing for hearing disorders was summarized by Dr Richard Smith from the University of Iowa, USA. At his laboratory, targeted genomic enrichment and next generation sequencing (OtoSCOPE) is used to analyze all exons of all genes implicated in non-syndromic hearing loss. Currently the seventh version of the OtoSCOPE panel includes probes for 134 genes known to cause non-syndromic hearing loss, Usher syndrome, Pendred syndrome, and other hearing loss-related phenotypes. Dr Smith strongly underlined the importance of testing not only single nucleotide variants but also copy number variations, as they are a common cause of non-syndromic hearing loss. He also pointed to the difficulty of identifying genetic factors involved in tinnitus and hyperacusis because of the problem of exactly defining the patient's phenotype.

Dr Smith also presented the results of mouse model studies of human autosomal-dominant non-syndromic hearing loss at the DFNA36 locus which showed that single intracochlear injection of artificial micro-RNA can rescue the progressive hearing loss phenotype in animals. This suggests that selective suppression of mutant alleles using RNA interference may be broadly applicable to prevent autosomal-dominant non-syndromic hearing loss because this type of deafness is caused in 85% of cases by missense variants.

Current applications of gene therapy for hearing disorders in animals was also the focus of work by Dr Saaid Safieddine who discussed inner ear gene therapy to prevent noise-induced hearing loss and restore balance in vestibulopathy using a mouse model for Usher syndrome type 1G. The data presented by Dr Jeffrey Holt also suggested that gene therapy is a promising approach for restoring the hearing of deaf patients.

Lastly, Dr Hinrich Staecker summarized the development and initial Phase I trial of the first gene therapy study for hearing loss in humans. The goal is to evaluate the safety, tolerance, and ability of CGF166, delivered by intralabyrinthine infusion, to improve the hearing and vestibular function of patients with bilateral severe-to-profound hearing loss. CGF166 contains cDNA encoding the human Atonal transcription factor (ATOH1) inserted in the DNA sequence of the adenovirus 5 (Ad5).

Topics of this year's symposia also included:

- Stress signaling pathways in sensorineural hearing loss: trends and challenges in translational research,
- The blood-labyrinth barrier in inner ear function,
- Active role of glia in auditory physiology,
- Hearing loss and human genetics: science, policy, and beyond,
- The role of proton magnetic resonance spectroscopy in noise- and blast-induced neurotrauma,
- Zebrafish as a model for hearing and balance,
- Active auditory processing: basic mechanisms, individual differences, and clinical applications,
- Optogenic approaches for auditory research and development of prostheses,

- Auditory nociception and pain hyperacusis,
- Mechanisms of fast auditory signaling,
- WNT signaling in development and disease,
- Neural underpinnings of auditory perception: insights from development.

Many oral presentations focused on the use of animal models, particularly mouse and zebrafish, to study the mechanisms of disease and novel therapeutic approaches. Intriguingly, data from the International Mouse Phenotyping Consortium suggest that a further 600 genes will be found to be essential for hearing, adding greatly to the 300 genes that are already known from mouse and human studies to be involved in deafness. Thus, there are possibly as many as 1000 genes in the mammalian genome that are important for auditory function.

There were three participants from Poland: Krzysztof Kochanek, Monika Oldak, and W. Wiktor Jedrzejczak, all from the World Hearing Center of the Institute of Physiology and Pathology of Hearing, Kajetany/Warsaw. The work they presented ranged from electrophysiology to genetics. Pertinent to our own work, we have analyzed published data on the effects of gene mutations in *in vitro* cell cultures, research which is of practical importance for experiments currently being performed in the Department of Genetics, Institute of Physiology and Pathology of Hearing.

A frequently featured topic was 'hidden' hearing loss. Results were presented for both animals and humans in subjects with different ages, subjects exposed to intense music, and subjects with auditory processing disorder. Different measures for detecting hidden hearing loss were investigated. In the field of otoacoustic emissions (OAEs), the most common topics were spontaneous OAEs, the effect of the medial olivocochlear reflex on OAEs, and new techniques and ways of measuring OAEs.

This year's recipient for the Award of Merit was Geoffrey A. Manley (Oldenburg University, Germany) for his pioneering research in cochlear physiology across vertebrate species. He gave a lecture on "Comparative auditory neuroscience: understanding the evolution and function of ears". One of the things he underlined was that recent studies of spontaneous and evoked otoacoustic emissions in lizards, birds, and mammals have brought to light many similarities between these animals in terms of auditory processing, especially at the most basic level of the hair cell.

One evening was a special program involving the San Diego Symphony. The evening began with a special lecture by Dr Charles Limb and Dr Nina Kraus about the relationship between music and hearing. It also delved into the impact of hearing loss on the perception of music. The lecture was followed by performances by Steven Schick, the Gilbert Castellanos Jazz Trio, and the San Diego Symphony String Quartet.