

## THE 15<sup>TH</sup> INTERNATIONAL CONFERENCE ON COCHLEAR IMPLANTS AND OTHER IMPLANTABLE AUDITORY TECHNOLOGIES (CI2018), 27–30 JUNE 2018, ANTWERP, BELGIUM

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Each conference in the series of International Conferences on Cochlear Implants and other Implantable Auditory Technologies is of great importance for specialists in the field. This year, the 15<sup>th</sup> in the series was held in Antwerp, Belgium, on 27–30 June and attracted over 2000 participants from all over the world. The CI2018 conference theme was “Innovation built on history”, the aim of the organizers being to trigger discussion on “the next step forward in the field, relying on evidence-based experience and fueled by cutting-edge technologies and the latest scientific developments”. To help participation, plenary sessions were grouped into nine topics: 1) basic science, 2) genetics and diagnosis, 3) cochlear implants in children, 4) cochlear implants in adults, 5) bone-anchored hearing aids and active middle ear implants, 6) rehabilitation in children, and 7) in adults, 8) electro-auditory evoked potentials and objective measures, and 9) innovation, ethics, and economics.

Basic research covered studies on cochlear anatomy and physiology, hair cell regeneration, molecular therapies of the inner ear, and preservation of cochlear structures during implantation. The last several years have brought the first human trials of inner ear gene therapy and cell therapy. The research, presented by Hinrich Staecker from the University of Kansas School of Medicine, covered challenges for future therapies, including identification of the etiology of hearing loss, recognizing optimal times for delivery of medications, and managing the patient's expectations of outcomes. He also presented preliminary results of gene therapy to possibly improve low-frequency hearing or stop the progression of hearing losses in patients with partial deafness, thus improving EAS outcomes.

There was also a number of presentations concerning the role of pharmaceuticals in hearing preservation after cochlear implantation. The results of a double-blind control trial presented by Stephen O’Leary from the University of

Melbourne, Australia, showed that injection of high-dose local steroids at surgery is not effective in preventing a loss of residual hearing. At the same session, Piotr Skarzynski from the Institute of Physiology and Pathology of Hearing, Poland, revealed that a combination of intravenous and oral steroid therapy stabilizes hearing thresholds and helps preserve hearing. He also delivered the key note lecture, continuing the topic of hearing preservation with the results of an observational surgical study on the round window approach.

So far as cochlear implants (CI) in children is concerned, at lot of discussion was held over bilateral implantation. In general, the studies presented showed that achieving a high level of performance with a second CI is connected to a short time interval between the first and second implantation. A long duration of deafness before receiving a second CI predicts poor outcomes. Children implanted with a second CI after a long delay from the first need much more time and rehabilitation effort to acquire any bilateral benefit. It was shown that in a group of patients who received a second CI after a long period of time the number of patients who did not use their second implant was significantly higher compared to the group who were implanted simultaneously or over a short period of time.

A significant amount of the conference program was devoted to cochlear implantation in single-sided deafness (SSD). At first, cochlear implantation was offered to patients with SSD as a treatment for incapacitating tinnitus. The pioneering work in this area was done by the host of the meeting (Paul Van de Heyning) and the summary of this research was one topic of his keynote lecture. Other research in this area, undertaken by the Institute of Physiology and Pathology of Hearing in Poland, has been to compare the benefits of a CI in SSD patients with tinnitus to SSD patients without tinnitus. Results of the study, presented by Artur Lorens, indicates that cochlear implantation

can be a beneficial option for treating cases of SSD where tinnitus is absent. A number of speakers underlined that test batteries should include measures of sound localization ability and speech recognition as well as quality-of-life assessment. The need for a unified testing protocol was commonly mentioned. Cochlear implantation in congenital SSD children should be treated with caution, according to Antje Aschendorff from the University of Freiburg. Although the first encouraging results show similar effects as in adults, a decision on cochlear implantation should be made only after careful examination of the auditory nerve with MRI. Finally, the importance of rehabilitation of the implanted ear was broadly debated. So far there is no unified rehabilitation method for SSD patients. Auditory training after cochlear implantation in SSD patients was presented by Marika Kruszyńska from the Institute of Physiology and Pathology of Hearing in Poland, and this approach was found innovative and promising.

The conference program included several sessions devoted to topics related to middle ear implants and implantable bone conduction devices. This is a dynamically developing field in which marked technological progress has been made in recent years. There is now a need for international consensus on the procedures used and ways of reporting the results of how well implantable devices perform in overcoming conducted and mixed hearing loss. During the session on “Presentation and discussion of consensus statements for conducted and mixed hearing loss with implantable devices”, the audiological aspects were discussed, with particular emphasis on the definitions of the measurements used, the detailed classification of devices, and the role and tasks of the manufacturers. Because the Institute of Physiology and Pathology of Hearing is one of the first in Europe to implement programs for the use of the newest middle ear implants and bone conduction implants, representatives of the Institute (Henryk Skarżyński, Piotr Skarżyński, and Anna Ratuszniak) were invited to work on a consensus statement.

The most important aspects of rehabilitation after a CI, discussed during the conference, included: the school achievements of deaf students; using cochlear implants; social competencies of children with a CI; types of rehabilitation recommended for maximising outcomes; and music perception. There were two reports on school attainments of a CI children, one presented by Malgorzata Zgoda from the Institute of Physiology and Pathology of Hearing and another by Stefanie Krijger from Ghent University, Belgium. They both showed that the school results of CI children fell within the normal range of NH peers.

There were two plenary sessions devoted to music perception in CI users and the role of music in CI rehabilitation. It was highlighted that complementing the standard rehabilitation program of pediatric CI users with a musical component had a significant impact on the auditory, communication, spoken language, and general development of the child. Barbara Kaczyńska from the Institute of Physiology and Pathology of Hearing gave two presentations on this topic.

A number of presentations focused on electrocochleography (ECochG). Intracochlear ECochG using the CI

electrode itself as recording electrode was considered a promising method to monitor electrophysiological status, and hence cochlear trauma, during or after cochlear implantation. Dayse Távora-Vieira from the University of Western Australia and Flurin Pfiffner from University Hospital Zurich, Switzerland, presented robust correlations of intracochlear ECochG thresholds with postoperative audiometric thresholds. They concluded that ECochG could be used to measure and monitor residual hearing in pediatric CI recipients and to reliably fit the acoustic component of EAS systems. At this stage further work needs to be done to optimize recording parameters of intracochlear ECochG. An example of such an optimization attempt was presented by Adam Walkowiak from the Institute of Physiology and Pathology of Hearing, Poland, concerning both stimulus parameters as well as the optimal recording site on the CI electrode array.

Much discussion was held over outcome measures used to evaluate the effectiveness of implantable auditory technologies in various groups of patients. As well as common measures such as hearing threshold or speech perception, there is great interest in using various questionnaires to assess many other aspects of treatment success – pain, satisfaction with anesthesia, hospital anxiety and depression, tinnitus severity, dizziness severity, satisfaction with the device used, working life satisfaction, patient well-being, music perception, role of music in the family, neuropsychological status, cognitive function, subjective benefit from the device, sound quality, spatial hearing, auditory development in very young children, and so on. To gauge the quality of questionnaires used to assess such properties, authors used standardized and validated tools.

An increased focus has been placed on the assessment of health-related quality of life (HRQoL). A number of studies gauged the quality of life of patients given auditory implants as assessed with different instruments. The work presented by Anita Obrycka from the Institute of Physiology and Pathology of Hearing highlighted the advantages of the AQoL-8D questionnaire over other instruments. The study showed that AQoL-8D is a sensitive tool to capture hearing-related changes in the HRQoL of CI patients derived from physical factors as well as from psychosocial aspects.

Poland was represented in CI2018 by delegates from the Institute of Physiology and Pathology of Hearing, the Poznan University of Medical Sciences, Pomerania University of Medicine Szczecin, Medical University of Lodz, Medical University of Silesia, and Medical University of Warsaw. Delegates from the Institute of Physiology and Pathology of Hearing presented 30 studies ranging over partial deafness treatment, hearing preservation, auditory development of children with partial deafness implanted an early age, optimization of parameters for electric stimulation in children using objective measurements, auditory potentials evoked directly from the cochlea using a multichannel electrode of the cochlear implant system, rehabilitation in patients with single-sided deafness using cochlear implants, indications for different auditory implants (bone conduction and middle ear implants), the outcomes of patients with different auditory implants, and long-term results of binocular auditory brainstem implants.