THE 13TH EUROPEAN SYMPOSIUM ON PEDIATRIC COCHLEAR IMPLANTS (ESPCI), MAY 2017, LISBON, PORTUGAL

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The 13th European Symposium on Pediatric Cochlear Implants (ESPCI) was held in Lisbon, Portugal on 25–28 May 2017. This year's symposium gathered more than 1500 participants from over 70 countries. ESPCI began 25 years ago and the significant anniversary triggered discussion on the achievements of cochlear implants programs across Europe. Milestones were discussed, and delegates consistently rated implantation of very young children and hearing preservation as breakthroughs.

For optimum outcomes from cochlear implantation, hearing preservation was considered crucial. The round window approach, proposed over 15 years ago by Professor Henryk Skarzynski, was agreed to be the best method for maximizing the hearing preservation rate. In addition, better hearing preservation can be achieved by the use of atraumatic electrodes and slow insertion. The depth of electrode insertion should be one that is the best compromise between optimal cochlear coverage (maximum benefit for speech understanding) and the risk of hearing loss. Hearing preservation was recognized as vital not only for patients with residual low frequency hearing but also to save the ear for future technologies. To promote hearing preservation the advantages of robotic surgery were discussed and preliminary studies on the safety and feasibility of robotic surgeries were highlighted. Also noted were imaging methods to help in the optimal placement of electrodes, using X-rays or endoscopy. Prototypes of new atraumatic electrodes that work with a drug delivery system to prevent inflammatory processes in the cochlea were also discussed.

Current developments in technology are not confined just to surgery. The role of biomedical engineering in rehabilitation after cochlear implantation was emphasized. In order for a cochlear implant to effectively compensate for lost auditory function, it is necessary to individually optimize the electrical stimulation parameters for each patient. In performing such fitting, modern and noninvasive technological solutions can now accurately assess the functional abilities of an electrically stimulated auditory system. Rehabilitation engineers have developed technological solutions such as impedance telemetry, recording of electrically evoked compound action potentials, measurement of electrically evoked stapedius muscle reflexes, and electrically evoked auditory potentials.

Attention was given to the issue of objective measures. It has been shown that it is possible to record acoustically evoked potentials directly from the cochlea using a cochlear implant system's multichannel electrodes. In the near future this method might be used to improve the fitting of the acoustic part of the speech processor following partial deafness treatment (PDT). Moreover, during electrode insertion, intraoperative measurement of acoustically evoked potentials might become a useful tool for monitoring hearing preservation. As a complementary objective measure, cortical auditory evoked potentials can also be used to assess auditory function. It was proposed that cortical evoked potentials could be used as biomarkers of auditory maturational status, as a tool for improving cochlear implant programming, for confirming the appropriateness of speech processor fitting, and to monitor the auditory system's ability to differentiate speech sounds.

Discussion took place on candidacy criteria for cochlear implantation, especially in single-sided deafness. Preliminary data show that this special group can benefit from a cochlear implant in terms of improvement of sound localization and speech understanding in noisy environments. The best rehabilitation strategy for this group was debated. To expand candidacy criteria for partial deafness treatment, the next step was considered to be using a cochlear implant to complement normal hearing at low and mid frequencies with electric stimulation at higher frequencies. This arrangement has been described as electro-natural stimulation (ENS) of the inner ear. Preliminary results of hearing preservation and its speech benefit in patients after PTD with ENS were presented.

There was considerable discussion of cochlear implantation at an early age. One view was that early cochlear implantation is just as important for children with congenital partial deafness as it is for children with congenital severe to profound hearing loss. Current studies confirm that children implanted before the age of 12 months develop age-appropriate auditory ability within 12 months of CI use. Thus, within two years of life, the delay in auditory development of children with profound hearing loss can be compensated for. Although early cochlear implantation can effectively compensate for deficits in primary auditory cortex caused by congenital deafness, as demonstrated functionally, it still remains unclear whether there is a

morphological correlate. During this year's ESPCI meeting, results were presented of an animal model which showed that the effects of deafness are layer-specific and involve both primary and higher-order areas.

Poland was represented in ESPCI 2017 by delegates from the Institute of Physiology and Pathology of Hearing; Children's Hospital in Bydgoszcz; Poznan University of Medical Sciences; Clinic of Otolaryngology, Oncologic Laryngology, and Neurology in Szczecin; and Independent Public Teaching Hospital no. 4 in Lublin. The delegates from the Institute of Physiology and Pathology of Hearing presented 16 studies including partial deafness treatment in children, hearing preservation classification, expanding candidacy criteria for partial deafness treatment, current technology development, genetics, auditory development of children implanted an early age, optimization of parameters for electric stimulation in children with the use of objective measurements, auditory potentials evoked directly from the cochlea using the multichannel electrode of a cochlear implant system, rehabilitation in children with single-sided deafness using cochlear implants, indications for different auditory implants (bone conduction and middle ear implants) and their outcomes, and long term results of binaural auditory brainstem implants. The delegates from the Institute of Physiology and Pathology of Hearing also took part in three round-table discussions on electrode design, special cases, and complications and failures in cochlear implant surgery.