

13TH INTERNATIONAL CONFERENCE ON COCHLEAR IMPLANTS AND OTHER IMPLANTABLE AUDITORY TECHNOLOGIES – A REPORT

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The 13th International Conference on Cochlear Implants and Other Implantable Auditory Technologies was held in Munich, Germany, from 19–21 June, 2014 under the Chair of Prof. Joachim Mueller. At the beginning of the conference, there was a keynote session dedicated to Prof. Graeme Clark (Melbourne, Australia), Prof. Ingeborg Hochmair (Universitaet in Vienna, Med-El), and Prof. Blake Wilson (Durham University, USA) who in 2013 jointly received the Lasker-DeBakey Clinical Medical Research Award for development of the first modern cochlear implants. During three conference days, there were a number of oral presentations. Several are discussed below, with those provided by the scientists from the Institute of Physiology and Pathology of Hearing, Warsaw, Poland, underlined.

Keynote lectures

1. *Experience with active middle ear implants:* CODACS, Vibrant Soundbridge, Carina, Esteem, Maxum, BAHA Attract; Dr P Skarżyński as the invited speaker.
2. *Binaural hearing:* neural mechanisms in single-sided deafness, speech recognition and sound localization in adverse acoustic conditions.
3. *Vestibular implants:* prototypes and perspectives.

Bernstein Sparks workshops

- 1,2. *Peripheral models and coding strategies.*
3. *Binaural electric/acoustic hearing.*
4. *Models of neural representation of speech.*

Round tables

1. *Special and new CI indications:* cholesteatoma, severe otosclerosis, acoustic neuroma removal, Meniere's disease, tinnitus, single-sided deafness; Prof H. Skarżyński as the Chairman and a panelist ("Partial Deafness Treatment cochlear implantation in children").
2. *Hearing and structure preservation:* deep vs shallow insertion of the cochlear implant electrode; Prof H. Skarżyński as a panelist.
3. *Active Middle Ear Implants:* challenging situations; Prof H. Skarżyński as a panelist.
4. *What can we learn from the experts?* Prof H. Skarżyński as a panelist.
5. *Auditory brainstem implants:* in children, cases of re-implantation.
6. *Pediatric cochlear implantation* (including electro-acoustic solutions): interventions in infants and young children.

7. *The beauty of the cochlea:* micro-imaging techniques.
8. *Bilateral cochlear implantation:* sequential vs simultaneous interventions, speech recognition and sound localization.
9. *Special bilateral sessions* dedicated to collaboration of German and Asian ENT societies.

Morning tutorials

1. Auditory tests and quality treatment standards recommended by the HEARRING group; Prof H. Skarżyński and Dr Artur Lorens as instructors. Determining standards of the diagnostic assessment and treatment from an audiological perspective, organizing medical documentation; Dr Artur Lorens as the instructor.
2. Objective measures to assess anatomical landmarks, such as the length of the cochlear duct, e.g. computed tomography, magnetic resonance imaging, neural response telemetry.
3. New surgical techniques, e.g. digital surgical microscopy, endoscopic ear surgeries, surgery techniques for the Bonebridge and the Vibrant Soundbridge systems.

Scientific Sessions (consisting of 12–24 oral presentations) organized into thematic categories:

1. *Training and rehabilitation in patients using cochlear implants*
 - special cases (autism, auditory neuropathy, Usher syndrome, CHARGE syndrome);
 - music appraisal in CI, e.g. music therapy to boost speech understanding;
 - development of children with cochlear implants; speaker: M Zgoda ("Academic achievements of experienced CI children");
 - measuring outcomes; speaker: J Ćwiklińska ("Usefulness of the auditory skills profile in evaluation of the auditory skills progress in patients with partial deafness after cochlear implantation");
 - recording technology LENA-sampling and analyzing language production in CI patients;
 - awareness, self-help rehabilitation, self-help groups to support performance, support and aftercare in assistive listening devices, growing populations; Dr P Skarżyński as Chairman;
 - quality of life, e.g. self-reporting, engagement of families;
 - bilateral hearing in pre-school CI users; speaker: A Obrycka ("Bilateral hearing in pre-school children with cochlear implants");

- Partial Deafness Treatment; speaker: M Zgoda (“Electrical complementation and electric acoustic stimulation in younger children after partial deafness treatment”).
- 2. *Intraoperative measures during cochlear implantation*
 - Intraoperative/objective measurements; Dr Artur Lorens as Chairman and as speaker: “Recordings of acoustic evoked potentials directly from the different places of cochlea via intracochlear electrodes in cochlear implantees with partial deafness”;
 - evoked compound action potentials;
 - electrical stapedial reflex;
 - otoacoustic emissions; speaker: Dr Wieslaw Jedrzejczak (“Otoacoustic emissions in various degrees of partial deafness”);
 - ABR and AEP correlations with speech performance.
- 3. *Surgical techniques*, e.g. electroacoustic systems; transcranial minimal invasive technique; cochlear implantation in cochlear dysplasia and post-meningitis ossification; revision CI and reimplantation; robotic cochlear implantation; image guidance; laser cochleostomy.
- 4. *New implant technologies*, e.g. optical implants; surface modifications of middle ear prostheses; new electrode designs (e.g. shape memory electrode); the NANOCI program aiming to develop completely implantable CIs that can provide neurotrophin to nerve fibers (www.nanoci.org).
- 5. *Electro-acoustic systems (EAS)*, e.g. apical stimulation in partial deafness; speaker: Dr Artur Lorens (“Apical electrical stimulation after deep electrode insertion in patients with partial deafness”); spread of excitation and speech; speaker: Dr Adam Walkowiak (“Relationship between speech discrimination and spread of excitation profile width in simulated CI speech processor: comparison of electric only and PDT EC hearing”); the effects of the electrode insertion angle; sound localization and understanding speech in EAS users.
- 6. *Speech and language in CI recipients*, e.g. voice quality in patients, speaker: E Włodarczyk (“Acoustic structure of voice in children with partial deafness”); figurative language; the effects of bilingualism.
- 7. *CI in adults*: prelingual deafness; geriatric population; mental health; speaker: J Kobosko (“Mental health and cochlear implantation in postlingually deafened adults”); selective attention; CI in the elderly; cognitive function and CI.
- 8. *Drug delivery*, e.g. prototypes of neurotrophic CIs, the role of antioxidants, passive dexamethasone CI delivery.
- 9. *Sound processing and speech coding*, e.g. sequential vs simultaneous bilateral cochlear implantation; multi-microphone noise reduction; using interaural time difference; fine structure and frequency resolution; speaker: Dr A Majchrzak (“Application of a test measuring frequency modulation difference limen as a tool to assess processing of temporal fine structure information in cochlear implant patients”).
- 10. *Hearing preservation*, e.g. classification of hearing preservation extent; speaker: Dr Artur Lorens (“Hearing preservation classification”); Med-El Flex electrode series; speaker: Dr M Matusiak (“Deep insertion round window approach for hearing preservation surgery by using soft electrodes: Flex EAS, Flex soft, Flex M” and “Hearing preservation after partial deafness cochlear implantation with cochlear Nucleus CI 422 electrode in children and adults with substantial residual hearing”); hearing preservation with full-length insertion; immediate vs post-CI hearing deterioration.
- 11. *Systems for bone-conduction*, e.g. the BAHA solutions; speaker: Dr M Mrówka (“Long term observation in patients with bone anchored hearing aids”; Bonebridge in single-sided deafness; a new BC811 tooth implant.
- 12. *Radiology*, e.g. cone-beam CT to assess the cochlear duct size; 7T MR imaging of the ear; MRI in Vibrant/Bonebridge patients; tonotopic organization of the primary auditory cortex; speaker: K Ciesla (“Partial deafness: mapping tonotopy in the primary auditory cortex” and “Mapping tonotopy in the primary auditory cortex”); near-infrared spectroscopy in cochlear implant patients; diffusion-tensor imaging to assess the integrity of white matter in the prelingually deaf; optical coherence tomography.
- 13. *Active middle ear implants*, e.g. using BoneBridge in children; various coupling methods of the Vibrant-Soundbridge system; speaker: Dr P Skarzynski (“Surgical experience with BAHA Attract”).
- 14. *CI Fitting*, e.g. Cochlear Nucleus fitting software; speaker: Dr P Skarzynski (“Protocol for investigation of Nucleus fitting software and remote assistant fitting in postoperative care over implanted patients; telefitting networks; speaker: Dr A Wasowski (“Expert telefitting mode for cochlear implant recipients”); undesired facial nerve stimulation; channel independence; reducing the risk of overstimulation; speaker: Dr A Walkowiak (“Reduction of a risk of overstimulation in children after cochlear implantation”).
- 15. *Single-sided deafness*, e.g. music perception; the effect of loudness; source localization and lateralization.
- 16. *Treatment in young children*, e.g. critical periods for CI; screening programs; bilateral cochlear implantation tele-therapy; parent coaching; early development after cochlear implantation; speaker: A Obrzycka (“Factors influencing the auditory development in early cochlear implanted children”); phonetics/lexicon/syntax/timing.
- 17. *Health-economics*, e.g. lean methodology in ENT; income increase of patients following treatment; access to treatment; cost-utility of bilateral cochlear implants.
- 18. *Vestibular function*: Benign paroxysmal positional vertigo (BPPV); speaker: Dr K Pietrasik (“Management of benign paroxysmal positional vertigo in patients after cochlear implantation surgery”); electrooculography; posturography pre vs post cochlear implantation.
- 19. *Screening programs*: hearing-screening in school-children (speaker: Dr A Piotrowska “Detection of Partial Deafness during hearing screening in school age children”).
- 20. *Maturation and plasticity*: PET findings as prognostic factors of CI outcomes; event-related responses when listening to music pre and post CI (longitudinal changes); molecular-guided neuroplasticity; speaker: Dr M Matusiak (“Molecularly regulated neuroplasticity in childhood deafness treated with cochlear implantation: results of a first study”).
- 21. *Genetics*: neurotrophine gene therapy; speakers: Dr A Polak and Dr U Lechowicz “Audiological profile of patients with the mutation m.A1555G” and “Post-lingual late-onset hearing loss as a m.3243A>G mutation phenotype” and “Study of genetic background of hearing loss among Polish CI patients” and “Genetically determined hearing loss: perspectives and

diagnostic capabilities of next-generation sequencing” and “Whole exome sequencing and linkage analysis to identify a novel N714H mutation in WFS1 gene associated with autosomal dominant hearing loss”); cell regeneration in mammals.

Other

In addition, there were around 300 posters and 10 live surgery videos presented at special e-poster and video sessions. The Institute of Physiology and Pathology prepared 30 scientific posters and 6 videos showing Vibrant-Soundbridge, BoneBridge, BAHA, CODACS, and PDTCI surgeries. Hands-on workshops provided less experienced

surgeons with the chance to explore the anatomy of post-mortem human temporal bone under the supervision of internationally recognized ENT specialists. Furthermore, the whole Saturday afternoon was set aside for patients who wanted to consult with the German specialists present at the CI 2014 conference.

Conclusions

The conference remains one of the most important in the field and gathers all the prominent names of the ENT/audiology world. This year CI 2014 was an outstanding event, full of lively debates and an open atmosphere for international knowledge-exchange.

