PRESS RELEASE

Hearing is Believing:

Precision Implantation of Cutting-Edge Hybrid Hearing Devices Stabilises Residual Hearing and Improves Speech Recognition

Study by Karl Landsteiner University of Health Sciences in Krems demonstrates long-term effectiveness of electric-acoustic stimulation as a treatment for hearing impairment

Krems, Austria, 13. August 2020 – Precision surgical implantation of electrodes for the electric-acoustic stimulation of the inner ear can stabilise the long-term residual hearing of severely hearing-impaired people and significantly improve their speech recognition. These are the findings of a study carried out by Karl Landsteiner University of Health Sciences in Krems (KL Krems). The research, which has been published in an international journal, involved carrying out 18 complex operations on patients, who received cochlear implants using a procedure that leaves the anatomy of the inner ear virtually unaltered. The cutting-edge treatment enabled some of the patients to retain their residual hearing, allowing for supplementary acoustic stimulation in addition to electrical stimulation.

Cochlear implants (CI) are wonders of modern technology that work by converting sound impulses into nerve signals. They allow even children and adults who have total hearing loss to perceive sound – enabling them to follow conversations and enjoy music. But not everyone who could benefit from a CI has total hearing loss. Implant candidates include people with partial hearing loss who have some low-frequency residual hearing, but severe loss in the high-frequency ranges. These frequencies are particularly important for understanding speech and successful communication. People with high-frequency hearing loss are not able to understand speech adequately with a hearing aid alone. But technological advances and surgical procedures are now enabling people with this type of hearing loss to benefit from a technology called electric-acoustic stimulation (EAS), which boosts low frequencies purely by acoustic means, while relying on the more complex electrical stimulation of the hearing nerve for mid and high frequencies. A medical team at Karl Landsteiner University of Health Sciences in Krems has demonstrated that the technology is effective and can stabilise long-term residual hearing.

Better Speech Recognition

“We are encouraged by the results of the study,” commented Prof. Georg Mathias Sprinzl, head of St. Pölten University Hospital’s Ear, Nose and Throat Department, KL Krems. “They show that it is possible to position cochlea implants in such a way that existing residual hearing can be preserved for years. This improves long-term hearing and significantly enhances speech recognition.”

The study reported that the residual hearing of half of all the patients was still just as good two years after the operation. And for a further 30-40% residual hearing was partially preserved, where the deterioration was most likely due to age-related hearing loss. In one case, the patient maintained

their residual hearing, at least partially, for almost five years. “We think that in most cases patients’ low-frequency hearing will be preserved for even longer periods,” said Prof. Sprinzl. “However, the longest period we looked at was five years.” Prof. Sprinzl’s team also measured significantly improved levels of speech recognition as a result of the hearing preservation in the low-frequency ranges. This was especially noticeable in comparison with CI patients with no residual hearing, who had therefore received an implant which relied purely on electrical stimulation.

Outstanding Treatment

In addition to the technical component – the EAS implant – the surgical procedure and the skills of the operating surgeon when placing the special electrodes were also key to the success of the treatment. Inserting the implant without damaging the patient’s residual hearing requires excellent surgical abilities as well as experience. “We also administered antibiotics and cortisone preparations to prevent infections and carefully removed blood and bone residue from the cochlea,” explained Prof. Sprinzl.

The study, published in the journal *Otology & Neurotology*, illustrates the synergy between internationally respected research and outstanding patient care requiring very high levels of technical expertise at KL Krems. Without the operations taking place at the university hospital, the research topic and statistical analysis would never have come about. Medical engineering research is an important focus area at KL Krems, and this work takes its lead directly from routine medical care, to the benefit of patients’ wellbeing and quality of life.

Original publication: Long-term Hearing Preservation in Electric Acoustic Cochlear Implant Candidates. G. M. Sprinzl, P. Schoerg, S. H. Edlinger & A. Magele. Otol Neurotol. 2020 Jul;41(6):750-757. DOI: 10.1097/MAO.0000000000002627

About Karl Landsteiner University of Health Sciences

Karl Landsteiner University of Health Sciences (KL) is a pioneer for innovation in medical and health sciences education and research, and a catalyst for groundbreaking work which will benefit society at large. Research at KL focuses on niche fields in bridge disciplines such as molecular oncology and hematology, biomedical engineering, psychology and psychodynamics, as well as topics including water quality and related health issues. Study programmes include health sciences, human medicine, psychology, psychotherapy and counselling and have full European recognition. A network of university hospitals in St. Pölten, Krems, and Tulln provides students with quality-assured, research-led education; it. It enables them to do internationally- recognized top-class clinical and translational research that is recognised worldwide. Karl Landsteiner University received accreditation by the Agency for Quality Assurance and Accreditation Austria (AQ Austria) in 2013.

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