

Summary of the research project

"Objective auditory nerve function test as a predictor for treatment success (speech understanding, tinnitus burden, HRQoL and psychological comorbidities) in patients with profound hearing impairment and cochlear implant fitting".

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Cochlear implantation is a well-established treatment method that enables deaf born patients to acquire and deafened or profoundly hearing impaired patients to regain the ability to hear. We could show that cochlear implantation is a very successful method of hearing rehabilitation, where the success of the treatment is not only measured by the postoperative speech understanding in quiet and noise, but also by increased quality of life, increased cognitive functioning, improved social interaction, reduced tinnitus burden and the reduction of psychological comorbidities. Predictive factors for success in care would be of great interest.

A significant prerequisite for successful fitting is the functional capacity of the auditory nerves and the processing central structures.

Subjective as well as objective test procedures are available to investigate the integrity of the auditory pathway. The purpose of this study was to investigate the significance of these tests in terms of predicting the outcome of the fitting.

51 postlingually severely hearing impaired patients who received a cochlear implant at the Charité underwent preoperatively the promontory test in a special design with stimulation from the external auditory canal and the electrically evoked amplitude modulation following responses (EAMFR). Auditory Response Telemetry (ART) was performed intra- and postoperatively. The success of the treatment was evaluated by comparing the pre- and postoperative speech comprehension and the pre- and postoperative perceived quality of life and tinnitus burden as well as the limitation due to comorbidities.

By comparing electrophysiologic parameters of auditory nerve integrity with fitting success, the predictive competence of auditory nerve testing procedures was assessed.

In our study, a trend could be detected suggesting that a high slope of the amplitude rise function of both EAMFR and ART gives an indication of an effective benefit, which, however, could not be statistically validated as significant. The results of the objective auditory nerve testing procedures are obviously related to the functional capacity of the auditory nerve fibers, which is why auditory nerve testing procedures are also an elementary part of the preliminary examinations before CI fitting according to the guideline of the German Society of Otolaryngology. Due to the extreme heterogeneity of patients and the abundance of factors contributing to the success of cochlear implant fitting (e.g. cognitive competence, duration of deafness, to some extent age, expectations, ability and willingness of the patient for rehabilitation, social environment, etc.), the meaningfulness of a single factor for the success of fitting is obviously limited. Thus, patients with a not too favorable prognosis from the point of view of auditory nerve testing (low slope of the amplitude rise function) can still benefit considerably from CI fitting if the constellation of other factors is favorable.

Perspectively, the complex consideration of as many relevant factors as possible will be of importance for the estimation of the chances of success.