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Influence of the cochlear implant electrode on the mechanical function of the inner ear

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Purpose: During the past years cochlea implantation (CI) has evolved to be the therapy of choice for the patient with profound hearing loss. The cochlea implant electrode stimulates directly the ending of the auditory nerve and therefore a functioning middle and inner ear is not necessary for hearing with the implant. However, it has been speculated that the auditory function of the inner ear might be important for the hearing impression in the patient with a cochlear implant. Therefore it is important to know how insertion of the electrode into the scala tympani of the inner ear influences the auditory function of the ear and especially the vibratory properties of the cochlea. In this study we assess the vibratory patterns of the round window as a measure for auditory function before and after insertion of the implant electrode.

Material and Methods: A laser beam will be aimed through a posterior tympanotomy onto the round window. A multi-sine tone will be generated and calibrated, and the scanning measurements of the round window vibration amplitude will be performed as a baseline using a scanning laser Doppler interferometer. Then the cochlea will be opened and the CI electrode will be inserted. The assessment of the round window vibrations will then be repeated. The study will include adult german speaking patients with profound bilateral hearing loss undergoing cochlear implantation. Children and patients with inner ear malformations will be excluded from this study. Prior to surgery all patients will be precisely informed and will have consented to participate in the study.

Results and Conclusion: First results are encouraging and show that the method is working and that data can be acquired during live surgery.