Feasibility of Promontory Stimulation eABR recording in cochlear implant candidates with MED-EL clinical system

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Introduction
PromStim (Promontory Stimulation) is a well-established tool to stimulate preoperatively the cochlea by a temporary trans tympanic needle placed on the middle ear (Kuo & Gibson, 2002). It was shown that eABR (Electrical Auditory Brainstem Response) recorded with PromStim is an useful objective measure in CI candidates for testing and evaluating the presence and excitability of the auditory nerve and pathway before cochlea implantation (Kileny & Zwolan, 2004). This test is especially critical for patients where it is hardly difficult or not even possible to judge the CI candidacy based on other pre-operative audiological tests. It was also demonstrated that a correct placement of the electrode tip on the RW (round window) niche, instead of the promontory, plays an important role on the efficacy of the stimulation delivery (Pau & Gibson, 2006).

For the intra-op measurement, in general anesthesia, the stimulation was provided by the CI from an apical and a basal electrode. Here pulses were set to PW = 40µs.

Nihon Kohden MEB9400 was used for eABR recording. Surface recording electrodes were applied on the contralateral mastoid (inverting), high forehead (non-inverting) and lower forehead (ground). Bandpass filter was set to 50-3000 Hz. Pre-op 1000 averaged sweeps were recorded and 1500 intra-op.

Methods
Subjects were candidates for a CI, and before CI implantation they underwent to the PromStim eABR test. For the pre-operative measurement, in local anesthesia a trans tympanic rounded-bent tip electrode was placed temporary on the RW niche and surface ground electrodes over the zygomatic bone and over the mandible angle; electrical impedance check and electrical stimulation was provided by the MED-EL Stimulator Box and was set by the clinical software Maestro. Electrode placement was confirmed by IFT, where electrode impedance was ≤ 5 kΩ. Biphasic alternating pulses with PW = 100 µs (pulse width) and 34 Hz stimulation rate were used. The stimulation amplitude was increased with 100 cu/step until response was detected.

Fig. 1. Setup for PromStim eABR (left subfigure) and for intra-op eABR (right subfigure) used with MED-EL clinical system.

Conclusions
These preliminary data show the validity of PromStim test. The later recorded intra-op eABR elicited by CI shows a good similarity with PromStim eABR and confirms the presence of those responses.

PromStim eABR with MED-EL clinical system results easy to be used and feasible on CI candidates.

References