Beitrag wird präsentiert am 10.03.2012 um 10:15 Uhr im Rahmen der FV13

Cochlea Implantate: Grundlagen.

Application of triphasic pulses with adjustable phase amplituderatio (PAR) for cochlear ECAP recording: Recovery functions.

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Triphasic electrical stimulation pulses with an adjustable phase amplitude ratio (PAR) can reduce stimulus artifacts in electrically evoked compound actions potential recording (ECAPs) in the cochlea (see companion paper Bahmer and Baumann, 2011). The present study describes the application of triphasic pulses in forward masking paradigms for recording recovery functions. Masking was found to be most effective using equal masker-probe PAR settings. Results were compared with data applying artifact can cellation strategy for biphasic pulses according to Miller (Miller et al., 2000). Measurements were accomplished in five subjects (S1-S5) with an equal masker-probe PAR setting, whereby more detailed test series were carried out in one subject (S1). All subjects were users of MED-EL SONATAti100 or PULSARci100 cochlear implants (Innsbruck, Austria). Parameters like asymptote level, absolute refractory period and time constant were determined by fitting exponential functions to the recovery functions. Detailed measurements collected on 11 electrode locations in subject S1 showed similar parameter profiles on basal electrode contacts for both triphasic and Miller artifact cancellation methods, whereas apical/middle electrode contacts differed in part largely. Compared to Miller's artifact cancellation method estimated asymptote levels were lower with triphasic stimulation the estimated absolute refractory period and time constants were estimated higher on apical electrodes. Results obtained in subjects S2-S5 showed considerable variances and a proper parametrization of the recovery function was possible only very selectively for triphasic pulse stimulation. In these cases, congruencies in estimated asymptote levels and time constants were found when triphasic stimulation and biphasic stimulation according to Miller were compared.

Literatur:A. Bahmer U. Baumann, 2011, Application of triphasic pulses with adjustable phase amplitude ratio (PAR) for cochlear ECAP recording: I. Amplitude growth functions. JNM, acceptedA. Bahmer U. Baumann, 2011, Application of triphasic pulses with adjustable phase amplitude ratio (PAR) for cochlear ECAP recording: II. Recovery functions. JNM, accepted