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Frequency-specific assessment of hearing loss in newborns and infants by means of extrapolated DPOAE I/O-functions

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DPOAEs provide frequency-specific and quantitative information about hearing disorders. When using extrapolated DPOAE I/O-functions cochlear hearing thresholds can be estimated (Boege and Janssen 2002) and presented in the form of an audiogram (Janssen et al. 2006). The purpose of the present study was to investigate the test-performance and the efficacy of the novel method in newborn hearing-screening and pediatric audiometry. DPOAE I/O-functions ($L_2 = 15$ to 65 dB SPL) were measured between 1.5 and 6 kHz. DPOAE-audiograms (derived from the extrapolated DPOAE I/O-functions) were obtained in 100 newborns (195 ears) within the early post-natal period (mean age 2.5 days) and in 148 children (296 ears) aged between 0.5 to 15 years. Measurements were done using a hand-held system (Cochlea-Scan, Fischer-Zoth). In the newborns, the estimated hearing threshold was 12.7 dB for the right ear and 14.6 dB for the left ear on average across test-frequencies. Mean thresholds lowered with increasing age (1 day: 15.4 dB; 2 days: 14.4 dB; 3 days: 14.3 dB; > 3 days: 9.4 dB); this may be due to residual amniotic fluid and vernix. In some newborns a discrepancy between ATEOAE findings and DPOAE-audiograms was observed. In the pediatric group the difference between estimated and behavioural thresholds decreased with increasing age from 40 to 3 dB on average. Measuring time for establishing an DPOAE-audiogram took up from two to ten minutes depending on the hearing loss. The findings suggest the novel method to be a suitable tool in "refer" babies and high-risk newborns in hearing-screening programs, as well for assessing cochlear hearing loss in pediatric audiometry. The method is able to assess hearing loss more precisely than behavioural audiometry or TEOAEs and ABRs. Within a short time and without sedative a maximum of information about the hearing loss can be achieved.

Literatur:

Boege P, Janssen T (2002) Pure-tone threshold estimation from extrapolated distortion product otoacoustic emission I/O-functions in normal and cochlear hearing loss ears. *J Acoust Soc Am* 111(4):1810-1818
Janssen T, Niedermeyer HP, Arnold W (2006) Diagnostics of the Cochlear Amplifier by Means of Distortion Product Otoacoustic Emissions. *Otorhinolaryngol* 68:334-339

