Abstract EFAS/DGA 2007

Clinical application of the Cochlea Scan for Hearing Threshold Estimation in Children

Knief, A., Schmidt, C.-M., Deuster, D., am Zehnhoff-Dinnesen, A.

Department of Phoniatrics and Pediatric Audiology, University Hospital of Münster, Westfälische Wilhelms-University Münster

Background:
The growth function of distortion product otoacoustic emissions offers the possibility to estimate ear and frequency specific hearing thresholds in children. With the Cochlea Scan (Fischer-Zoth/Natus) a portable device for clinical measurements is commercially available. Its application was tested on a group of newborns, infants and children.

Methods:
95 children in the age from 7 days to 11.7 years (63 male, 32 female), mean age 5 y ± 4 m were examined. We performed Cochlea Scan measurements in the frequencies 1.5, 2, 3, 4, and 6 kHz and, dependent on age and individual development, sound-field or air conduction audiometry. Thresholds of Cochlea Scan and pure tone audiometry were compared with the Wilcoxon signed rank test. By using the analysis of variance (ANOVA) it was tested if frequency was an influencing factor of thresholds.

Results:
Compared to sound-field audiometry, Cochlea Scan estimated significantly better thresholds at 2, 3, 4, and 6 kHz (Wilcoxon, $p<0.02$). Air conduction audiometry provided significantly better thresholds than Cochlea Scan at 1.5, 2, and 3 kHz and significantly worse thresholds at 6 kHz. Only Cochlea Scan thresholds showed frequency-dependency (ANOVA, $F=42.86$, $p<0.001$): The significantly highest mean Cochlea Scan threshold of 22 dB was found at 2 kHz, the significantly lowest mean threshold of 6 dB was found at 6 kHz.

Conclusion:
Despite the unexpected variation of thresholds with frequency (lowest threshold at highest frequency), Cochlea Scan provides a valuable tool to measure peripheral hearing thresholds in newborns, infants and young children. Using Cochlea Scan to measure the cochlear function age independently, side-specifically and frequency-specifically is superior to sound-field audiometry. Nevertheless we have to keep in mind that middle ear pathologies can influence the results, hearing loss can only be estimated up to 50dB, and supracochlear damage cannot be ruled out by otoacoustic emission measurements.