Diagnostics of the Cochlear Amplifier by Means of Distortion Product Otoacoustic Emissions

**Abstract:**

Distortion product otoacoustic emission (DPOAE) growth functions reflect the active nonlinear cochlear sound processing when using a primary-tone setting which accounts for the different compressions of the two primaries at the DPOAE generation site and hence provide a measure for objectively assessing cochlear sensitivity and compression. DPOAE thresholds can be derived from extrapolated DPOAE input/output (I/O) functions independently of the noise floor and consequently can serve as a unique measure for reading DPOAE measurements. The thus-estimated DPOAE thresholds exhibit a close correspondence to behavior audiometric thresholds and thus can be used for reconstructing an audiogram, i.e., a DPOAE audiogram. The DPOAE I/O functions' slope increases with cochlear hearing loss and thus provides a measure for assessing recruitment. Hence, DPOAE I/O functions can give more information for diagnostic purposes than those of DP grams, transiently evoked OAEs (TEOAEs), or auditory brain stem responses (ABRs). DPOAE audiograms can be applied in pediatric audiology to assess cochlear dysfunction in a couple of minutes. In newborn hearing screening, they are able to detect transitory sound-conductive hearing loss and thus can help to reduce the rate of false-positive TEOAE responses in the early postnatal period. Since DPOAE I/O functions are correlated with loudness functions, DPOAEs offer the possibility of basic hearing aid
adjustments, especially in infants and children. Extrapolated DPOAE I/O functions provide a tool for a fast automated frequency-specific and quantitative evaluation of hearing loss.

Stichworte: Distortion product otoacoustic emissions; Cochlear amplifier

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