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Comparison of peripheral compression estimates using auditory steady-state responses (ASSR) and distortion product otoacoustic emissions (DPOAE)

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ABSTRACT
The healthy auditory system shows a compressive input/output (I/O) function (f = 2 kHz). Distortion-product otoacoustic emission input/output (DPOAE I/O) functions were measured in normal hearing (NH) and hearing impaired (HI) subjects. ASSR I/O functions were determined from stimulus level (dB SL) vs. ASSR magnitude (dB re 1 µV) measurements. ASSR I/O functions in HI subjects reflect the loss of sensitivity at lower stimulus levels.

RESULTS

- NH subjects consistently show compressive functions with slopes between 0.1 and 0.5 dB/dB.
- ASSR saturates or even decreases at higher stimulus levels.
- Repeated points (●) recorded in different sessions show small variability in the response.

- HI subjects show higher variability in the results.
- Significant responses at input levels of 30 dB SL and above have been obtained for HI subjects.
- ASSR I/O functions in HI subjects reflect the loss of sensitivity at lower stimulus levels.

DPOAE in NH:

- Multiple and single frequency stimulation elicit similar responses.
- No interaction among the different SAM tones seems to be present in the ASSR recordings from the used multi-frequency stimulus.
- Results from single frequency stimulation recordings show slightly higher variability than results from multi-frequency stimulation.

DPOAE recordings show growing I/O function with constant slopes using mid-range stimulus levels.

Compression estimate from DPOAE I/O functions was obtained using the method proposed by Neely et al. (2003).

CONCLUSIONS

- ASSR compression estimates for levels above 30 dB HL are consistent with psychoacoustic data.
- ASSR I/O functions recorded in HI subjects reflect the loss of sensitivity at lower input levels.
- Correlation analysis between ASSR and DPOAE recordings showed more compressive functions in ASSR than in DPOAE.
- Reduced compression at levels close to threshold (≤ 20 dB HL) could not be estimated using ASSR. Longer recording times are required to estimate compression with ASSR near threshold.

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REFERENCES


