Hearing threshold estimation using concurrent measurement of distortion product otoacoustic emissions and auditory steady-state responses.

Abstract:

Both distortion product otoacoustic emissions (DPOAEs) and auditory steady-state responses (ASSRs) provide frequency-specific assessment of hearing. However, each method suffers from some restrictions. Hearing losses above 50 dB HL are not quantifiable using DPOAEs and their performance at frequencies below 1 kHz is limited, but their recording time is short. In contrast, ASSRs are a time-consuming method but have the ability to determine hearing thresholds in a wider range of frequencies and hearing losses. Thus, recording DPOAEs and ASSRs simultaneously at their adequate frequencies and levels could decrease the overall test time considerably. The goal of the present study was to develop a parameter-setting and test-protocol to measure DPOAEs and ASSRs binaurally and simultaneously at multiple frequencies. Ten normal-hearing and 23 hearing-impaired subjects participated in the study. The interaction of both responses when stimulated simultaneously at frequencies between 0.25 and 6 kHz was examined. Two limiting factors need to be kept. Frequency distance between ASSR carrier frequency f(c) and DPOAE primary tone f(2) needs to be at least 1.5 octaves, and DPOAEs may not be measured if the ASSR stimulus level is 70 dB SPL or above. There was a significant correlation between pure-tone and
DPOAE/ASSR-thresholds in sensorineural hearing loss ears.

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