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Changes in DPOAE and hearing threshold fine structure after noise-exposure

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Noise-overexposure is known to affect outer hair cell (OHC) function. The purpose of our study was to find out to what extent noise induced temporary hearing threshold shift (TTS) is reflected in distortion product otoacoustic emissions (DPOAEs).
15 normally hearing volunteers who were exposed to noise in a discotheque and 52 factory-workers exposed to industrial noise for one workday participated in the study. 17 office-workers served as control-group. High-resolution behavioural thresholds and DPOAE-grams (∆f =47 Hz) were measured between 3.5 and 4.5 kHz before and after noise exposure. Primary-tone level L2 was set to 30 and 20 dB SPL.
The discotheque group exhibited a high inter-individual variability in both absolute DPOAE-level and TTS. TTS ranged from -10 to 30 dB. Mean TTS across subjects and frequency was 14.2 dB, mean change in DPOAE-level was 12.9 dB. There was neither a significant correlation between TTS and change in DPOAE-level nor between TTS and absolute DPOAE-level. Roughness of the fine structures of both measures decreased with increasing TTS. In the factory-workers, both hearing threshold and DPOAE level slightly decreased after one workday by -1.1 dB and -0.9 dB, respectively. Whereas, in the office-workers, both measures increased by 1.6 and 0.3 dB. Significant difference ($p<0.05$) between both groups was found for pure-tone hearing thresholds and for DPOAEs.
Variability of susceptibility to noise-induced TTS known from psychoacoustic tests was reflected in the DPOAEs. DPOAEs and audiograms revealed reduced hearing capability in the factory workers even after just one workday. However, there was no indication for predicting cochlear vulnerability by means of the absolute DPOAE level. Since DPOAEs are an objective measure and its measuring time is far shorter than that needed to obtain behavioural thresholds, DPOAEs are suggested to be an alternative method to detect marginal changes in OHC function in occupational medicine.