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Analysis of DPOAE fine structure of 12 symphony orchestra musicians

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When distortion product otoacoustic emissions (DPOAE) are measured with a high frequency resolution, the DPOAE fine structure is revealed. It is characterized by consistent maxima and minima with notches of up to 20 dB depth (e.g. Heitmann et al., 1996). A similar fine structure is also known from the absolute hearing thresholds. It has been suggested by Mauermann et al., 1999 that it is the prevalence and character of the fine structure that best correlate with the state of the hearing.

![Figure 1](image)

Figure 1. Examples of DPOAE fine structure for the left ear of three musicians before (solid line) and after (thin line) rehearsal. The grey line represents the measurement system’s estimation of the noise floor.

In this study the DPOAE fine structure was measured for 12 symphony orchestra musicians before and after their rehearsal (preliminarily reported in Reuter & Hammershøi, 2005a). The purpose was to collect data of a group of subjects that is homogeneously exposed to relatively high levels of sound. The measurements were taken both before and after rehearsal in order to observe whether the exposure during the rehearsal causes temporary changes in the auditory system, e.g. a temporary threshold shift (TTS) or changes in the DPOAE fine structure. The DPOAE fine structure was systematically analyzed and characterized by the parameters ripple width, ripple height and ripple prevalence. Details about the automatic analysis procedure are described in Reuter & Hammershøi, 2005.

The longterm aim of this study is to investigate whether DPOAE is a more sensitive measure to detect early hearing loss than the absolute hearing threshold. In a previous study the DPOAE fine structure of 50 young, normal-hearing subjects was analyzed according to the same analysis procedure (preliminarily reported in Reuter & Hammershøi, 2004). This gives the possibility to compare the fine structure characteristics of two different groups of subjects.

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