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Development of a method to evaluate the influence of designed hearing protectors for classical orchestral musicians on perception and/or differentiation of sounds

Günter, J., Emmerich, E., Richter, F.

Institute of Neurophysiology, Klinikum of the Friedrich Schiller University Jena

In the last years it has been shown that performing of classical orchestral music holds the risk of hearing damage to the musicians since sound intensities of more than 100 dB SPL were produced and exposure exceeded the noise doses allowed in industry by more than 150 %. However, only a minority of professional musicians always uses designed hearing protectors. The majority dislikes them because they would disturb the perception of the sound while playing the instruments. Therefore we want to test, whether designed hearing protectors for musicians influence the localization of the sound, the perception of right versus out-of-tune tones. If such influences exist, we want to objectify them by AEPs and/or MMN.

The experiments are performed in 16 normal hearing musicians (aged 25-41 years, among them are 7 women). They play different instruments. The EEG is recorded from 32 electrodes (Brain Products GmbH, Germany). Stimuli are pure C-major piano chords, C³ chords, and respective out of tune chords in a classical oddball paradigm with 4 trains per 200 single stimuli each. The out of tune chords are generated by a synthesizer. Adapted to previous studies (Emmerich et al., 2006), each participant listens to two trains of C-major chords and to two trains of C³ chords. Parent and deviant stimuli are presented randomly in a 4:1 order and at randomized interstimulus intervals lasting from 2 to 6 sec. The stimulus intensity is set at 65 dB SPL and presentation is made in the free field mode.

Our results are relevant for discussing the acceptance of designed hearing protectors in professional classical orchestral musicians.

