Sound Exposure of Symphony Orchestra Musicians

Background: Assessment of sound exposure by noise dosimetry can be challenging especially when measuring the exposure of classical orchestra musicians where sound originate from many different instruments. A new measurement method of bilateral sound exposure of classical musicians was developed and used to characterize sound exposure of the left and right ear simultaneously in two different symphony orchestras. Objectives: To measure binaural sound exposure of professional classical musicians and to identify possible exposure risk factors of specific musicians. Methods: Sound exposure was measured with microphones mounted on the musician’s ears and recorded digitally. The recorded sound was analysed and the specific sound exposure of the left and the right ear was determined for the musicians. A total of 114 measurements covering 106 h were recorded in two symphony orchestras. Results: Sound exposure depends significantly on the specific instrument and the repertoire played by the exposed musician. Concerts, group rehearsals and individual practice were all significant contributors to the sound exposure. The highest LAeq of 86 –98 dB was found among the brass players. High string players were exposed from 82 to 98 dBA and their left ear was exposed 4.6 dB more than the right ear. Percussionists were exposed to high sound peaks >115 dBC but less continuous sound exposure was observed in this group. Musicians were exposed up to LAeq8h of 92 dB and a majority of musicians were exposed to sound levels exceeding LAeq8h of 85 dB. Conclusions: Binaural recording of the individual sound exposure showed that orchestra musicians could be exposed differently to the left and right ear and that they were primarily exposed from their own instruments. Specific repertoires as well as the specific instrument determine the level of exposure.