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Sound path(s) to the ear protected by double hearing protection

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Studies have shown that the attenuation performance of double hearing protection is limited by bone or tissue conduction. We present the first results of a program to determine the different paths of the sound to the ear when a person is protected by double hearing protection. In order to determine the contribution of the noise signal passing by secondary sound paths (bone or tissue conduction) into the volume of the ear canal behind the earplug, identical tests have been performed on humans and artificial heads. Time delay and attenuation through the hearing protection (NR) were measured on the ipsi- and contra-lateral side of the head. The measurements show differences in time delay and attenuation between artificial heads and humans which indicate that the main transmission mechanism is different. They also give a strong indication that the path of the acoustic signal depends on the angle of arrival when using double HP. This may partly explain the poor sound localization performance when using double HP that was reported by Brungart (2002). The single HP, and the double HP were then used in a sound localization experiment. The localization performance of these conditions will be presented along with the related parameters.