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The value of otoacoustic emissions in the evaluation of noise-induced hearing damage

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The cochlea is the site of the most extensive noise-induced changes within the auditory system and, therefore, otoacoustic emissions (OAEs), as a by-product of the cochlear (outer hair cells - OHC) activity, can provide valuable information on noise-induced damage. OAE recording techniques are simple, non-invasive, they provide objective information and they are available in routine clinical practice.

The following application of OAEs in the evaluation of noise-induced effects will be discussed:

- The detection of early noise-induced change, even before any notable change in audiometric thresholds, as OHCs seem to be particularly vulnerable to noise.
- Intra-individual monitoring of subtle changes in the cochlear integrity following noise exposure. Although there is a high inter-individual variability, OAEs display a remarkable intra-individual stability, which makes them very valuable for this application.
- OAEs may also provide a glimpse into functional status of the OHCs, with a possible application in the assessment of noise-induced tinnitus and hyperacusis.
- The application of OAEs in the evaluation of the medial olivocochlear (MOC) system, which may be implicated in the physiological protection mechanism against noise and, therefore, the efficacy of the MOC could be considered a potential factor of inter-individual susceptibility to the damaging effect of noise. The MOC system may also be of relevance in developing tinnitus and hyperacusis.

