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The impact of aging and age related hearing loss on otoacoustic emissions

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OBJECTIVE:

The amplitude of transitory evoked and distortion product otoacoustic emissions (TEOAE and DPOAE) is known to depend on age. Up to now it is not clear whether the amplitude reduction is a direct effect of aging or rather mediated by the age dependence of hearing loss. In order to clear this issue, data from a large population are needed to examine a subgroup of normal hearing persons covering at least seven decades of age.

METHOD:

TEOAE and DPOAE were recorded in 10284 ears of 5142 patients from 0.4 to 89.8 years of age during 12 years of clinical routine audiometry. From this data pool, all cases with reliable pure tone audiogram and without conductive hearing loss, sudden deafness or retrocochlear disorders were selected. The remaining 5571 ears were arranged in groups according to age and hearing capability and underwent a regression analysis.

RESULTS:

In all age groups, the OAE amplitude decreases with increasing hearing loss and in all hearing loss groups, the OAE amplitude decreases with increasing age. In the subgroup of audiometrically normal subjects, the amplitude of TEOAE and DPOAE decays with a slope of 0.6 to 1.1 dB per decade. This amplitude loss occurs much faster (0.8 to 2.2 dB per decade) if ears with age accordant instead of normal hearing are analyzed.

CONCLUSIONS:

The amplitude of TEOAE and DPOAE is not exclusively determined by the functionality of those inner ear structures whose performance is mirrored in pure tone threshold. If the OAE amplitude is used as a measure for hearing assessment, its dependence on age has to be taken into account. Normal hearing and age accordant threshold must be strictly differentiated.

