Experimental study concerning the effect of positive Gz – acceleration on human hearing.

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Background: Decreased blood flow and stagnant hypoxia are discussed to be main reasons for inner ear dysfunction, especially for a few types of sudden hearing loss (SHL) and noise induced hearing loss (NHL). Several types of hypoxia cause impairment of inner ear function [1,3]. Changes of DPOAE* – signals are observed, but only after centrifuge runs [2]. This pilot study was aimed to find out, if acceleration and stagnant hypoxia affect human hearing. *DPOAE = Distortion Products of Otoacoustic Emissions

Methods: Using the high performance human centrifuge of the German Air Force Institute of Aviation Medicine, Distortion Products of Otoacoustic Emissions (DPOAE) from 1 kHz to 4 kHz (Ω) and eardrum impedance of 8 male volunteers were recorded during centrifuge runs with increasing acceleration up to + 5 G (z-axis, head to foot).

Results: During increased positive acceleration starting at +3 Gz about 5 - 10 dB decreased DPOAE were observed at all frequencies of all volunteers (N = 8). DPOAE amplitudes were more reduced in the lower (1-2 kHz) than in the high frequency range (3-4 kHz). Additionally eardrum impedance also increased with increasing positive Gz - acceleration.

Conclusions: Inner and middle ear function are affected by positive acceleration (z-axis, head to foot). To distinguish between perfusion and mechanical caused impairment of hearing further research is necessary. The effect of decreased cerebral perfusion might be compensated by anti-G-suits.

Literature:


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