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COCHLEAR FUNCTIONAL STATUS TESTING USING DIFFERENT CLASSES OF OTOACOUSTIC EMISSION AS A PROMISING METHOD FOR INTRACRANIAL PRESSURE MONITORING DURING SPACEFLIGHT

Abstract

Abstract The aim of this work was to estimate the different features of transient-evoked otoacoustic emission (TEOAE) and distortion product otoacoustic emission (DPOAE) of cochlear under conditions of simulated microgravity (21-day "dry" immersion). The study included 10 healthy male volunteers, aged 23 to 34 years (median age, 30.5 years). The signal-to-noise ratio (SNR), dB were evaluated in the stimulation frequency band of 1 kHz - 4 kHz (for the TEOAE) and in the range from 556 Hz to 4444 Hz (frequencies 556 Hz; 684 Hz; 988 Hz; 1481 Hz; 2222 Hz; 2963 Hz and 4444 Hz). TEOAEs and DPOAEs were measured before the 21-day dry immersion (in the background), on 3, 7, 14, 21 days of exposure and in the recovery period. The OAEs date was estimated for each frequency band of stimulation separately for the right and left ears. The TEOAEs date (n=10) presented a significant (p0.05) decrease (to negative values) for a stimulation frequency of 1 kHz during measurements on the 3rd, 7th, 14th and 21st day. In the recovery period TEOAEs values of the 1 kHz frequency returned to positive values for all volunteers. The SNR of TEOAEs for stimulation frequencies in the range of 2-4 Hz during the experiment and in the recovery period were multidirectional, but stayed within positive values. The DPOAEs date (n = 6), presented a pronounced decrease (up to negative) of values for stimulation frequencies of 556 Hz; 684 Hz; 988 Hz. At a stimulation frequency of 1481 Hz, a decreasind tendency in DPOAEs date within the range of positive values was noted, with relatively stable values remaining throughout the entire exposure period. For stimulation frequencies 2222 Hz; 2963 Hz; 4444 Hz, there were no significant changes in the date of DPOAEs. Thus, a 21-day "dry immersion" experiment produced data that showed a significant changes in cochlear function status, demonstrating the reduction in TEOAEs and DPOAEs parameters at 1 kHz frequency. The results prove that cochlear function status testing using various OAE classes is a promising noninvasive method for analyzing the microgravity-induced increase in ICP in astronauts during spaceflight.