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Hydrogen-saturated saline protects intensive narrow band noise-induced hearing loss in guinea pigs through an antioxidant effect

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Free PMC article

Abstract

The purpose of the current study was to evaluate hydrogen-saturated saline protecting intensive narrow band noise-induced hearing loss. Guinea pigs were divided into three groups: hydrogen-saturated saline; normal saline; and control. For saline administration, the guinea pigs were given daily abdominal injections (1 ml/100 g) 3 days before and 1 h before narrow band noise exposure (2.5-3.5 kHz 130 dB SPL, 1 h). The guinea pigs in the control group received no treatment. The hearing function was assessed by the auditory brainstem response (ABR) and distortion product otoacoustic emission (DPOAE) recording. The changes of free radicals in the cochlea before noise exposure, and immediately and 7 days after noise exposure were also examined. By Scanning electron microscopy and succinate dehydrogenase staining, we found that pre-treatment with hydrogen-saturated saline significantly reduced noise-induced hair cell damage and hearing loss. We also found that the malondialdehyde, lipid peroxidation, and hydroxyl levels were significantly lower in the hydrogen-saturated saline group after noise trauma, indicating that hydrogen-saturated saline can decrease the amount of harmful free radicals caused by noise trauma. Our findings suggest that hydrogen-saturated saline is effective in preventing intensive narrow band noise-induced hearing loss through the antioxidant effect.

Figures

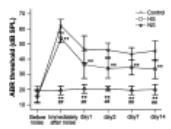

Figure 1. Noise-induced ABR threshold shifts. Immediately...

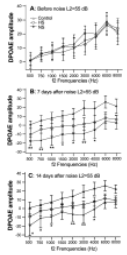

Figure 2. DPOAE amplitudes were detected before...

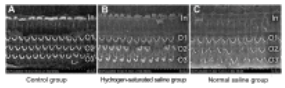

Figure 3. SEM findings after noise exposure.

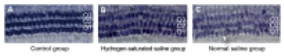

Figure 4. Surface preparation of the organ...

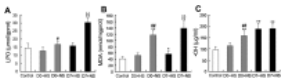

Figure 5. Free radicals in the cochleae...

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