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# Inhalation of hydrogen gas attenuates cisplatin-induced ototoxicity via reducing oxidative stress

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## Abstract

**Objective:** Cisplatin, an anticancer drug used extensively to treat a broad range of tumors, has strong ototoxic side effects induced by reactive oxygen species (ROS). Recently, it has been reported that hydrogen gas (H(2)) is a new antioxidant by selectively reducing hydroxyl radical, the most cytotoxic ROS. The present study was designed to investigate whether H(2) treatment is beneficial to cisplatin-induced ototoxicity via reducing oxidative stress.

**Methods:** The animals were intraperitoneally given a 30 min infusion of 16 mg/kg cisplatin or the same volume of saline. H(2) treatment was given twice with 2% H(2) inhalation for 60 min starting at 1h and 6h after cisplatin or saline injection, respectively. The hearing status of all animals was evaluated by auditory brainstem responses (ABR). The hair cell damage was observed by phalloidin staining. In addition, the levels of oxidative products in serum and cochlear tissue were measured.

**Results:** We found that H(2) treatment significantly attenuated cisplatin-induced hearing loss evaluated by click-evoked and tone burst ABR threshold. Furthermore, histological analysis revealed that 2% H(2) treatment significantly alleviated cisplatin-induced hair cell damage in the organ of corti. In addition, cisplatin significantly increased the levels of malondialdehyde (MDA) and 8-iso-prostaglandin F2α (8-iso-PGF2α) in serum and cochlear tissue, which was attenuated by H(2) treatment.

**Conclusion:** These results demonstrate that H(2) is beneficial to cisplatin-induced ototoxicity via reducing oxidative stress. Therefore, H(2) has potential for improving the quality of life of patients during chemotherapy by efficiently mitigating the cisplatin ototoxicity.



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