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Oral Sessions

Disruption of gap junction-mediated intercellular communication in the spiral ligament causes outer hair cell loss in the cochlea.

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It is well-known that cochlear outer hair cell (OHC) loss concomitant with permanent hearing loss induced by intense noise. Our earlier studies demonstrated the production of hydroxynonenal and peroxynitrite, as well as the disruption of gap junction-mediated intercellular communication (GJIC), in the cochlear spiral ligament prior to noise-induced hearing loss. The purpose of this study was to evaluate the mechanism underlying cochlear OHC loss induced by intense noise exposure. In organ of Corti explant cultures from mice, no significant OHC loss was observed after exposure to 4-hydroxynonenal (4-HNE, a product of lipid peroxidation), SIN-1 (peroxynitrite generator), and carbenoxolone (a GJ inhibitor). *In vivo* intracochlear carbenoxolone injection through the posterior semicircular canal caused marked OHC and hearing loss, as well as the disruption of GJIC in the cochlear spiral ligament. However, no significant OHC loss was observed *in vivo* in mice treated with 4-HNE and SIN-1. In conclusion, our data suggest that disruption of GJIC in the cochlear spiral ligament is an important cause of cochlear OHC loss in models of noise-induced hearing loss.