Strategies for Inner Ear Protection and Repair

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ABSTRACT

Sensorineural hearing loss (SNHL) is an irreversible hearing impairment caused by a variety of environmental and genetic factors that lead to damage of auditory hair cells and neurons. There is evidence that the cochlea in lower vertebrates, such as birds, possess the potential for hair cell regeneration and self-repair on damage; however, mammals, including humans, have never demonstrated the ability to regenerate lost hair cells. Therefore, hair cell protection and replacement of these lost cells has been a critical issue in restoration of hearing loss. Inner ear hair cell death commonly occurs following acoustic trauma or exposure to ototoxins, such as the aminoglycoside antibiotics and the antineoplastic agent cisplatin. To help improve therapeutic strategies, a better understanding of the molecular mechanisms underlying hair cell degeneration is required. In recent years, stem cell-based medicine has emerged as a therapeutic strategy for treating devastating degenerative diseases. Cell replacement therapies for diseases of the cochlea have also attracted considerable attention. Our laboratory is interested in molecular mechanisms of inner ear hair cell death and protection. We focus in particular on noise-induced inner ear degeneration, and how the pharmacologic intervention and stem cell therapy can be applied as therapeutic strategies for SNHL. Current progress of our approach and potential therapeutic targets are discussed in this presentation.

Key words: inner ear; cochlea; stem cell; hair cell; hearing loss; pharmacotherapy

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