

## **Auditory deprivation and cochlear implants: Pathological, atrophic and plastic changes in the auditory system**

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Sensorineural hearing loss is the most common form of deafness and is typically a result of the widespread loss of sensory hair cells. Loss of the sensory epithelium initiates important pathological changes in the cochlea and atrophic changes in the central auditory pathway. These changes include the gradual degeneration of spiral ganglion neurons (SGN), altered morphology of residual SGN synapses onto neurons within the cochlear nucleus, and shrinkage (but not loss) of neurons within the central auditory pathway. These deafness induced changes have implications for the initiation and propagation of neural activity evoked by cochlear implants. Techniques designed to preserve SGNs may result in improved clinical performance among cochlear implant users. I will briefly summarize the research in our laboratory using exogenous neurotrophins in combination with cochlear implants to reduce the degenerative effects of deafness on SGNs. Finally I will present data demonstrating the plastic reorganization of the auditory cortex in deafened animals that have received environmentally relevant auditory cues from the long-term use of cochlear implants.

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