

Effects of exogenous neurotrophins in the deaf stimulated cochlea

Poster presentation

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Introduction: Neurotrophins can prevent the degeneration of spiral ganglion neurons (SGN) that occurs following cochlear hair cell loss. However, neurotrophin treated SGNs can also resprout peripheral fibres that project in a disorganised manner within the cochlea. As SGNs are the target cells for intracochlear electrical stimulation (ICES) by a cochlear implant, any disruption of the spatial organisation of the SGNs would be expected to degrade implant performance.

Methods: Two weeks after ototoxin deafening with kanamycin sulphate (420mg/kg), animals were implanted through the round window with a neurotrophin delivery cannula and stimulating array. Following a four week chronic neurotrophin and/or ICES period, the response intensity of neurons in the central nucleus of the inferior colliculus (ICC) to ICES was measured using a multi-channel electrode array. The shape of ICC spatial tuning curves indicated which SGNs were activated by ICES.

Results: Preliminary results indicate that a six week period of deafness without further treatment caused no change in ICC response thresholds or electrode tuning curve spread at 4dB above threshold compared to normal acutely deafened controls. Cochlear histology also indicated little change in the cochleotopic organisation of SGNs.

Discussion: The prevention of SGN degeneration through neurotrophin treatment following deafness may improve cochlear implant performance, and is therefore of clinical interest. However, the maintenance of cochleotopic SGN organisation is also an important determinant of implant performance. This study addresses the potential for neurotrophins to cause undesired changes in SGN morphology following neurotrophin treatment, and the possible influence of these changes on implant performance.

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