Gene transfer technology for maintaining and regenerating auditory nerves after hearing loss

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Many types of deafness result in progressive degeneration of auditory neurons. Experimental research has proven that providing neurotrophins to the cochlea can maintain auditory neuron survival for short periods of time. We are now interested in methods of promoting longer-term nerve survival and more controlled regeneration using gene transfer technology. This project will use *in vitro* tissue culture (see picture) and *in vivo* surgical techniques to investigate gene transfer in the cochlea. The genes for brain-derived neurotrophic factor (BDNF) and neurotrophin-3 (NT3) have been placed in adeno-associated virus (AAV) and adenoviral vectors. Viral particles containing the BDNF or NT3 genes will then be added to the cultures or to the cochleae of guinea pigs in order to investigate the effect of neurotrophin gene expression on nerve survival and regeneration after sensorineural hearing loss.

Techniques that you will learn:

- General surgical skills including sterile techniques
- Micro-dissection
- Micro-surgery
- Sterile technique
- Primary tissue culture
- Molecular biology techniques eg DNA amplification.
- Immunofluorescent staining
- Fluorescent and light microscopy
- Imaging and analysis
- Statistical analysis of results