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**13th Quarterly Progress Report**

**October 1 to December 31, 2006**

**Neural Prosthesis Program Contract N01-DC-3-1006**

***Protective and Plastic Effects of Patterned Electrical Stimulation  
on the Deafened Auditory System***

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**SUMMARY OF WORK COMPLETED DURING THE PAST QUARTER.**

- 1) A manuscript submitted to the Journal of Comparative Neurology in the previous quarter is now in press and the galley proofs were recently returned to the Journal:  
Leake PA, Hradek GT, Vollmer M, Rebscher SJ. In Press. Neurotrophic Effects of GM1 Ganglioside and Electrical Stimulation on Cochlear Spiral Ganglion Neurons in Cats Deafened as Neonates. J Comp Neurol 501.
- 2) A second manuscript was submitted to the Journal of Neurophysiology:  
Vollmer M, Snyder RL, Beitel RE, Rebscher SJ, Leake PA. (Submitted) Spatial Selectivity in the Inferior Colliculus is Degraded Following Long-Term Deafness in Cats. J. Neurophysiol.
- 3) A third paper appeared in the Audiology & Neurotology and the reprint is appended to this report:  
Sridhar D, Stakhovskaya O, Leake PA. 2006. A frequency-position function for the human cochlear spiral ganglion. Audiol. Neurotol. 11 (suppl 1): 16-20.
- 4) Work has continued on our new pilot experimental series evaluating the effects of the neurotrophin brain derived neurotrophic factor (BDNF), delivered directly to the cochea via osmotic pumps, and in some cases combined with electrical stimulation (ES) via a cochlear implant. Five additional subjects (2 neonatally deafened animals and 3 animals deafened at 30 days of age) were implanted during the last quarter with our new UCSF feline cochlear implant incorporating a drug delivery cannula. (See QPR #9, October 1 – December 30, 2005 for description of this device). Four of the animals currently are undergoing chronic stimulation. Histological studies of the spiral ganglion and cochlear nucleus were continued in the initial subjects in this series.
- 5) A cat that had been deafened at 30 days of age completed its chronic electrical stimulation period (6 months) and the terminal acute electrophysiology experiment was conducted during this past quarter. This animal is the last in an initial experimental series in which the effects of a short period of normal hearing early in life (“critical” or “sensitive” period) are being evaluated by comparing effects of deafness and chronic stimulation in neonatally deafened vs. 30-day deafened animals. Data are being collected in this series to document both SG survival and alterations in the cochlear nucleus. A preliminary report on the cochlear nucleus findings comprises the main scientific report for this Quarterly Progress Report.
- 6) Finally, during the past quarter Dr. Leake presented an invited paper at the 7<sup>th</sup> International Academic Conference on Immunobiology in Otorhinolaryngology: BIONICS AND REGENERATION OF THE EAR, on September 12-14, 2007 at Melbourne Australia.