

Seminar Hosted by
Center for Adaptive Neural Systems
(James Abbas and Ranu Jung)

WEDNESDAY, JUNE 21, 2006
BIODESIGN INSTITUTE Room 350, BLDG A
9:30AM - 10:30AM

**“NEURONAL RESPONSES IN CAT PRIMARY AUDITORY CORTEX TO
ACOUSTIC AND DIRECT INTRANEURAL AUDITORY NERVE STIMULATION”**

Presenter: Seung-Jae Kim, PhD
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Abstract:

Cochlear implants (CIs) have been successfully used by many individuals with profound hearing impairment. However, problems remaining in the CIs include poor spatial resolution, and cross-talk between electrodes. In order to overcome these problems, direct intraneural stimulation of the auditory nerve (AN) via penetrating electrode arrays was proposed. Such an approach should provide focal stimulation and a greater selective activation of the AN fibers, resulting in narrow-band frequency percepts and minimal cross-talk between electrodes. In this study, I extended the feasibility issue in direct intraneural AN stimulation to functional feasibility; the degree of stimulus selectivity that can be achieved with penetrating microelectrodes. Since the primary auditory cortex (AI) manifests highly selective tonotopic organization, I investigated the cortical activity in the AI evoked by stimulating AN electrodes.

As a prelude to quantifying stimulus selectivity, I employed simultaneous multielectrode recording techniques using multimicroelectrode arrays to study the functional architecture of feline AI. The results responses recorded from about 90% of recording electrodes suggest that the implantation of high density microelectrode arrays allows for reliable recordings from the cortex. Using these recordings, I have constructed a functional model of AI that best specifies the distribution of characteristic frequencies (CF's) along the rostral-caudal direction and obtained the average CF gradient (0.53 ± 0.08 octave per millimeter).