An NSF Integrative Graduate Education and Research Traineeship in

**Integrating Nanotechnology with Cell Biology and Neuroscience**

**INCBN IGERT Seminar**
*(in conjunction with Biophysics Seminar)*

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**Location:**
Room 1131
Physics & Astronomy
Main Campus

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**Thursday, 19 Nov. 2009, 3:30 pm**

**Speaker: Massoud Akhtari**

*Assistant Professor of Psychiatry and Biobehavioral Sciences, Semel Institutes of Neuropsychiatry, UCLA*

**Conjugated Magnetonanoparticles in Diagnosis and Treatment of Disease**

The purpose of this work is to develop nonradioactive and targeted magnetonanoparticles (MNP) capable of crossing the blood–brain barrier (BBB) and of concentrating in the epileptogenic tissues of acute and chronic animal models of temporal lobe epilepsy to render these tissues visible on magnetic resonance imaging (MRI).

Nonradioactive alpha methyl tryptophan (AMT) was covalently attached to MNP composed of iron oxide and dextran. A rodent model of temporal lobe epilepsy was prepared by injecting kainic acid into the right hippocampus. MRIs were obtained before and after AMT-MNP injection in all animals. Intracranial EEGs were obtained in all chronic animals after completion of MRI studies.

AMT-MNP conjugates could cross the BBB and their intraparenchymal uptake was visible on MRI. In the acute condition, AMT-MNPs appeared to localize to both hippocampi, whereas plain MNPs only identified unilateral, presumably inflammatory, changes. In the chronic condition, AMT-MNP uptake correlated with the occurrence of spontaneous seizures, and the location of uptake appeared to agree with bilateral or unilateral epileptogenicity confirmed by subsequent intracranial EEG.

The MNP-MRI approach is potentially applicable to the use of any bioactive molecules as ligands for imaging normal and abnormal localized cerebral functions, accurately, safely, and inexpensively.

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