# Predoctoral Research and Training Fellowship
## 2009 Award Recipients

**Name:** Stacey Dutton
**Institution:** Emory University
**Project:** The Effect of Cell Specific Deletion of Nav1.1 on Seizure Generation
**Preceptor:** Andrew Escayg, Ph.D.
**Lay Summary:** Two epilepsy syndromes, Generalized Epilepsy with Febrile Seizures Plus (GEFS+) and Severe Myoclonic Epilepsy of Infancy (SMEI), are caused by mutations in the gene that encodes the sodium channel α subunit, SCN1A. Electrophysiological studies of mouse models of both disorders suggest that a reduction in inhibition may contribute to these epilepsy syndromes. To better understand the disease-causing mutation, this project will examine how both excitatory and inhibitory neurons contribute to seizure generation in these disorders. The researchers can achieve this by selectively deleting Scn1a from these cell types in mice, then testing their susceptibility to seizures and spontaneous seizure generation.

**Name:** Sunshine Epps
**Institution:** Emory University
**Project:** Epileptogenesis in a Rodent Model of Epilepsy and Depression Co-morbidity
**Preceptor:** David Weinshenker, Ph.D.
**Lay Summary:** Patients with epilepsy are more likely to develop depression, and patients with depression have an increased risk of epilepsy. The researchers developed a rat model to study the interaction between these diseases by showing that rats selectively bred for depression-like behaviors also have increased susceptibility to experimentally induced acute seizures. The investigator will extend these studies by investigating the development of chronic seizures in our rat model. These studies will enhance the use of our model for experiments aimed at understanding the molecular basis of the co-morbidity and for screening new medications to treat epilepsy and depression.

**Name:** Patrick Forcelli
**Institution:** Georgetown University
**Project:** Striatal Sequelae of Perinatal Antiepileptic Drug Treatment
**Preceptor:** Karen Gale, Ph.D.
**Lay Summary:** Antiepileptic drugs (AEDs) are used to manange seizures during pregnancy and in infancy. This is of particular interest and

concern, as the consequences of exposure to these drugs may change the way the brain develops. Findings have shown that some AEDs (such as phenobarbital) cause changes in brain development and cell death, while others (such as lamotrigine or levetiracetam) may not. The purpose of this fellowship is to identify which drugs may be free of unintended consequences.

Name: Shanti Frausto
Institution: Northwestern University - Chicago Campus
**Project**: Identifying the role of kainate receptors in epileptogenesis
Preceptor: Geoffrey T. Swanson, Ph.D.
Lay Summary: Kainate receptors contribute to excitatory synaptic transmission in the brain and have been implicated in several brain disorders including migraine, pain, and epilepsy. At present, there are several antiepileptic drugs (AEDs) used in the treatment of epilepsy, but none are selective for kainate receptors. This study aims to identify the specific contribution of kainate receptors in epilepsy by using novel pharmacological compounds, with kainate receptor specificity, as a potential anticonvulsant therapeutic target for epilepsy.

**Name:** Sloka Iyengar
**Institution:** University of South Carolina Research Foundation
**Project:** Neuregulin modulation of synaptic plasticity in epilepsy
**Preceptor:** David D. Mott, Ph.D.
**Lay Summary:** People with epilepsy often suffer from difficulties in learning and memory. Few treatment options exist to improve these cognitive deficits. Development of novel therapies requires a deeper understanding of mechanisms by which epileptic seizures impair learning and memory. To define novel therapeutic targets, the researchers have focused their attention on neuregulin, a neurochemical important in regulating the cellular process of learning. It has been found that seizures cause the neuregulin system to malfunction. The aim of this project is to define how changes in the neuregulin system in epilepsy can affect processes underlying learning and memory.

**Name:** Soo Yeun Lee
**Institution:** The Regents of the University of California (Irvine)
**Project:** Altered gating of perisomatic inhibition by CCK after head trauma
**Preceptor:** Ivan Soltesz, Ph.D.
**Lay Summary:** The excitability of principal cells in the hippocampus is governed by specialized neurons called the basket cells. After head trauma, the hippocampus becomes persistently hyperexcitable. Recently it has been shown that cholecystokinin (CCK), a highly abundant peptide in the brain, provides exquisite control over these basket

cells in the hippocampus. Thus, the aim of this proposal is to test the hypothesis that head injury results alterations in the control of these basket cells by CCK, that can mechanistically contribute to persistent hyperexcitability and epileptogenesis.

**Name:** Sharon Swanger
**Institution:** Emory University
**Project:** Role of CPEB1-mediated dendritic mRNA translation in a mouse epilepsy model
**Preceptor:** Gary J. Bassell, Ph.D.
**Lay Summary:** Many mechanisms that mediate neuronal plasticity, learning and memory are dysregulated by seizure activity. Recent work suggests that locally synthesized proteins might be one of these mechanisms. The proposed work aims to identify molecules involved in local protein synthesis that are aberrantly regulated by seizure activity. This research will contribute to the understanding of important synaptic mechanisms altered during seizures, and thus, facilitate the development of epilepsy therapies targeted at restoring normal neuronal function.

**Name:** Andrew Zayachkivsky
**Institution:** The University of Utah Graduate School
**Project:** Excitatory GABA and acute hyperexcitability in perinatal hypoxia-ischemia
**Preceptor:** F. Edward Dudek, Ph.D.
**Lay Summary:** Hypoxic-ischemic brain injury is the most common cause of acute seizures in children during the neonatal period. Due to properties of the neonatal brain, common anti-seizure therapies are often not effective. In this proposal, the aim is to investigate the possible mechanism that makes these treatments ineffective. Understanding them will enable the investigators to develop new strategies for treatment of neonatal seizures.