Title of Program: Motor Neuron Cell Biology Research

Dept/Center/Lab: Department of Neurology, ALS Translational Neuroscience Laboratory, Carolinas Neuromuscular/ALS-MDA Center

Principal Mentor: Richelle A. Hemendinger, PhD

Summary Description:

The ALS Translational Neuroscience Laboratory of the Carolinas Neuromuscular/ALS Research Laboratories studies the basis of cell death in neuromuscular diseases, in particular, amyotrophic lateral sclerosis (ALS). Dr. Hemendinger leads this research and is a cellular neurobiologist with expertise in cell death mechanisms of motor neurons in vitro. Progressive loss of motor neurons in the brain and spine is the underlying pathology in patients with ALS, but the exact mechanism by which this loss occurs is not known. Riluzole is the only approved drug for treating ALS. Based on analysis of human tissue from patients with sporadic ALS and transgenic rodent models for familial ALS, glutamate excitotoxicity, alterations in calcium homeostasis, generation of reactive oxygen species/mitochondrial dysfunction, protein misfolding and alterations in axonal transport have all been proposed as contributing factors. Dr. Hemendinger’s laboratory has developed cell culture model systems of sporadic ALS using a panel of neurotoxic agents, mimicking pathways of cell death observed in patients with ALS. Dr. Hemendinger has characterized the effect, in motor neuron injury, of homocysteine, a novel neurotoxin newly identified to be elevated during the active clinical stage of ALS in humans and animal models. She is leading the preclinical studies into an emerging class of drugs, cobalamins, which may offer a new avenue to ALS treatment.

Research opportunities are available in the following project areas:

1. Use of vitamin B12 derivatives to modulate cell death
2. Role of riluzole in modulating different mechanisms of cell death
3. Identify potential therapeutic drugs and biologically active agents for treating ALS

Please feel free to contact Dr. Hemendinger (phone: 704-355-9786; email Dr. Hemendinger), if you are interested in hearing more about these opportunities.