Instructor Profile

Dr. Sabrina D. Robertson

Research Areas:

- Neuroscience
- Neurodegeneration
- Pain
- Norepinephrine
- Neuroscience & Biotechnology Education

Techniques:
Recombinase-based intersectional genetic approach, Tissue sectioning, Western blotting, Immunofluorescence, PCR, Confocal microscopy, Laboratory animal care and husbandry

A fundamental challenge of modern neuroscience is to map the connections and functions of all neurons in the brain. Map building may seem mundane, but the intrigue and challenge of building a map of the nervous system lies in the shear numbers. The human brain is composed of billions of neurons that communicate through trillions of synaptic connections that define who we are and how we interact with the world. My research focuses on a tiny sliver of this complexity, a group of neurons that are defined by their synthesis of the neurotransmitter norepinephrine (NE). Despite the small number of neurons in this group, release of NE from synaptic connections across the brain and body modulate a wide variety of behaviors and processes, including: attention, stress, learning, memory and the perception of pain. In disease states where these behaviors are disrupted, such as Alzheimer's disease, specific subsets of NE neurons are often compromised. My research goal is to construct a functional map of the diverse subsets of NE neurons in the brain. Projects in my lab use cutting edge genetic techniques (i.e. recombinase-based intersectional strategies) to study the effects of manipulating NE neuron activity *in vivo*. One group in the Robertson lab explores how long-term dysfunction of a single subset of NE neurons impacts brain aging and neurodegeneration. For this study, mice have been genetically engineered to express tetanus toxin light chain in a subset of NE neurons to prevent the release of neurotransmitter from these neurons throughout the lifetime of the animal. A second project, using a similar approach, focuses on the role NE neurons play in the perception of pain. With the power to manipulate genetically defined subsets of NE neurons in living mice, we hope to uncover how NE signaling contributes to various behaviors and disease states.

Students working on these studies will lay the foundation for exciting new projects in the Robertson lab. They will perform experiments using new and fundamental techniques associated with both modern neuroscience and molecular biology research. Students will also have the opportunity to work in collaboration with leading researchers at N.C. State and other institutions.