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The goal of my lab is to understand the fundamental principles controlling the differentiation, growth, and survival of neurons during development and after nerve injury. These studies hope to guide and support the development of treatment strategies designed to treat neurological disorders such trauma to the spinal cord, amyotrophic lateral sclerosis (ALS), peripheral nerve injuries, spinal muscle atrophy, and Parkinson's disease. My lab routinely uses multiple approaches (electrophysiology, molecular biology, state-of-the-art real time imaging, optogenetics, gene manipulation) and model systems (genetically modified mice, chicken embryos, tissue culture) to understand neural development and regeneration.

Currently the lab has four main research interests:

1. the directed differentiation of embryonic stem (ES) and iPS cells into functional motor neurons to repair damaged tissue
2. Restoring meaningful function to completely and permanently denervated skeletal muscles using light activation via channelrhodopsin
3. Understanding the molecular mechanisms underlying synapse stability at the neuromuscular junction in animal models of ALS.