

SUMMER 2022 – SC EPSCOR / INBRE RET PROJECT DESCRIPTION FORM

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Research Subject Area	Medical rehabilitation/ recovery after peripheral nerve injury

A. Briefly describe overall research program at your laboratory.

We are interested in the developing new therapeutics to treat patients with traumatic peripheral nerve injuries. Each year approximately 100,000 Americans suffer from traumatic nerve injuries that lead to long-term functional deficits. These deficits are due to various factors including the slow regeneration of injured axons that once connected to muscle or sensory targets as well as the reorganization of the connections between neurons in the spinal cord. Exercise in the form of treadmill training has been shown to be an effective therapy in promoting motor neuron axon regeneration, reducing reorganization of synaptic connections, and improving functional recovery. Interestingly, the pattern of treadmill training required for enhancing regeneration is dependent on the sex of the participant. Our lab is interested in better understanding this sex-difference in the requirement for exercise and determining the mechanisms by which exercise produces its positive effects. We hope to use our findings to develop a pharmacological treatment that can be used to treat patients suffering from traumatic nerve injuries during the periods in which they are unable to engage in exercise.

B. Briefly describe specific project(s) for your teacher:

Currently we are examining whether estrogen receptor signaling may be one of the mechanisms by which exercise exerts its effects on the stabilization of synaptic inputs onto injured motoneurons. We will be conducting small animal surgery to model nerve injuries (optional depending on comfort with working with animals), treadmill training the animals, collecting spinal cord tissue for analysis, and conducting immunohistochemistry and epifluorescence microscopy to identify synaptic connections and proteins. The scope of the project is negotiable depending on the interests of the teacher. This project could be adapted to be completed in person or remotely.

C. Will any other people (post docs, grad students, undergraduate students, colleagues, etc.) be involved directly with your teacher?

The teacher will work directly with me. We will have at least one undergraduate working in the lab over the summer that will be a member of our research team working on the same or similar projects.

D. Will you require any advanced reading/preparation for the teacher? If yes, please briefly describe.

No specialized prior knowledge or training is required. I will provide some selected background reading to help the teacher gain basic knowledge of our field. I can train the teacher in all required techniques, and we will continue learning together about the field throughout the project period. Safety and responsible conduct for research training will be required for any in-person work.