

The focus of the Andersen laboratory is the mechanistic and therapeutic study of Parkinson's disease (PD) and more recently, Alzheimer's disease (AD.) The lab works with PD-related neurotoxic, genetic, and proteotoxic stresses in mouse, cell, and *C. elegans* model organisms.

**Background:** One of the mechanisms considered to cause Parkinson's progression is alpha-synuclein protein aggregation. Alpha-synuclein is a synaptic protein, but its exact mechanistic roles are not entirely understood. Alpha-synuclein can form aggregates, and it is thought that these higher order proteins species spread between cells and cause progression of the disease.

**Therapeutic approach:** Exercise is currently considered to be the best medicine for Parkinson's. A previous clinical study showed that high intensity exercise can significantly mitigate the progression of PD and even reverse symptoms.

**Model organism:** Recent research has shown that swimming exercise in *C. elegans* is a good model to study mammalian exercise. In addition, the comparative simplicity (every cell and neuron has been mapped), shorter lifespan (about 30 days as compared to 3 years for mice), and close homology to mammals (about 85%) can help us to understand these complex mechanisms. In addition, several *C. elegans* Parkinson's models have been characterized, including models of alpha-synuclein aggregation.

**Project goal:** Previously, our research has shown that a short bout of swimming exercise in a *C. elegans* model of alpha-synuclein aggregation dramatically reduces aggregates and shows protection downstream. Our aim is to better understand the therapeutic effect of exercise for PD by better understanding exercise mechanisms in *C. elegans*, specifically, how they affect protein aggregation and nervous system response.

**Position:** We are looking for a student who is eager and excited to help better understand the therapeutic potential of exercise for Parkinson's. Prior experience in a laboratory setting and specifically with experience in biological experimental techniques such as Western blot, cell culture, and/or *C. elegans* maintenance are a plus.

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