Lewis University
STEM Undergraduate Research Experience (S.U.R.E.) 2019
Faculty Mentor – Project Application

Faculty Name: Daniel S. Kissel

Department: Chemistry

Research Project Title: Investigating Cell Toxicity of Amyloid Beta 42 In the Presence of Different Concentrations of Metals and Metal Chelate Complexes Relevant to Alzheimer's Disease

Alzheimer's Disease (AD) is a neurodegenerative disorder that is currently the sixth leading cause of death in the United States, however, there are no treatment options that effectively cure or prevent progression of the disease. This investigation will focus on study the *in vivo* interactions of the amyloid beta peptide under different conditions in an effort to advance drug development in AD. The amyloid beta peptide (Aβ) has been discovered in high concentrations in AD patients as aggregated beta sheets or oligomers, and previous investigations suggest this aggregation is promoted by oxidative stress through complex redox reactions involving free metal ions such as Cu(II). Previous work done in my lab has correlated metal ion concentration to hydroxyl radical production (•OH) and Aβ peptide aggregation utilizing *in vitro* studies. This project focuses on investigating similar conditions to study $A\beta_{42}$ aggregation and cell toxicity *in vivo* using *Saccharomyces cerevisiae* and *Caenorhabditis elegans. C. elegans* is a small nematode that can be handled using *in vitro* techniques to provide a full picture of neurotoxicity inside an animal. *Saccharomyces cerevisiae* (yeast cells) will also be used to investigate $A\beta_{42}$ aggregation in a single cell system. Both *C. elegans* and *S. cerevisiae* have been shown to feature characteristic cell death pathways synonymous with mammals, and are excellent vessels for *in vivo* investigations of neurodegenerative disorders. The cell toxicity of $A\beta_{42}$ will be determined using fluorescence techniques and toxicity assays. The results of this study will be used to better understand the role copper and copper chelates in Aβ aggregation that leads to cell death.