Alexis Webb, PhD Candidate, Laboratory of Dr. Linda Nie

Alexis is a second year PhD student in the Medical Physics program. She received her bachelor’s degree in Physics from the University of Delaware in 2017 and her Master’s in Medical Physics from the University of Arizona in 2019. After graduating with her Master’s, Alexis chose to continue her academic career at Purdue and has been working in Dr. Linda Nie’s lab since her arrival in the fall of 2019. The project she works on focuses on measuring the distribution and concentration of metals in the brain using synchrotron x-ray fluorescence, with particular interest in lead.

The negative health effects of lead exposure have long been studied. There has been recent interest in the connection between lead and neurological conditions, especially neurodegenerative diseases such as Alzheimer’s Disease (AD) and Parkinson’s Disease (PD). Lead exposure has been shown to affect the expression of amyloid precursor protein (APP) and subsequently the production of beta-amyloid (Aβ) in animal models and previous x-ray fluorescence studies have shown a high concentration of lead in Aβ plaques—a key indicator of AD. Despite the evidence to support this, the underlying mechanism of lead neurotoxicity is still widely unknown.

Thus far, this project has discovered a relationship between lead and selenium, a known antioxidant. The relationship is still not well understood, so further investigation of this is warranted. In her research, Alexis hopes to learn more about the deposition and accumulation of lead in the brain by looking at mouse and human samples with the overarching goal of further understanding the mechanism behind lead neurotoxicity, its relationship to AD, and the role that selenium plays in this.