Capitol Graduate Research Summit

Wheat Protein-Based Bio-Scaffold for Neural Regeneration

Ryan Brice and Li Yao

Department of Biological Sciences, Wichita State University

Spinal and peripheral nerve injuries are common in both civil and military environments and are primarily the result of transection injuries or burns. In the majority of nerve injuries, the nerve ends cannot be directly sutured. Biomaterial conduits can act as a bridge to connect two damaged nerve ends together, providing channels to guide nerve growth. In the proposed project, we fabricated a novel multichannel neural conduit with a hybrid composition of collagen and wheat glutenin (WG) for nerve repair and regeneration. Collagen is a common biomaterial that mimics a microenvironment suitable for neural growth. However, collagen materials have weak mechanical properties. The WG component in the proposed neural conduit can increase its mechanical strength. In this project, a WG-collagen neural conduit has been fabricated and a number of studies are performed to characterize the mechanical, molecular, chemical, and biocompatible properties of the neural conduits. Because gliadin is toxic to animal tissue, the glutenin will be extracted from the wheat gluten and the gliadin component will be removed. Our preliminary study by western blotting showed that gliadin has been effectively removed from WG. Adult human astrocytes (HA) were cultured on top of WG-collagen and shown to support cell growth. The outcome of our study indicates that the neural conduit is suitable to be grafted into the injured rat nerve to investigate nerve regeneration and functional recovery.