Speuro: A Novel Approach to Treating Axon Degeneration and Nerve Cell Death in Motor Neuron Disease and Spinal Contusions Utilizing Kudzu-Based Supramolecular Polymers

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Amyotrophic Lateral Sclerosis (ALS) is a fatal neurodegenerative disease that leads to the degeneration of motor neurons in the spinal cord and brain. Despite research into various causes—such as TDP-43 aggregation, axon degeneration, and SARM1 activation—no current treatments address all aspects of the disease. Similarly, spinal contusions from injuries, especially in the youth due to motor vehicle accidents, also result in severe motor impairments and progressive muscular atrophy, further diminishing quality of life. While existing therapies like Riluzole and SARM1 blockers show some promise for ALS, they fail to offer comprehensive solutions. Additionally, spinal injury treatments remain primarily rehabilitative, with limited options for long-term recovery. My project aims to bridge this gap by developing a novel, affordable, and environmentally conscious treatment platform for motor neuron diseases and spinal contusions. A key innovation in my approach involves the creation of biodegradable polymers derived from kudzu, a fast-growing invasive plant. These polymers can be engineered to support nerve regeneration through supramolecular interactions, offering a sustainable solution for both motor neuron disease and spinal injuries. By integrating computational chemistry with real-world testing, I am developing a targeted treatment that not only addresses the underlying causes of these conditions—such as axon degeneration and motor neuron death—but also promotes the regeneration of damaged tissues. This approach holds the potential to not only advance treatments for ALS and spinal injuries but also provide a platform for addressing other neuromuscular diseases in the future.

Awards Won: