

ERIC MEYERS

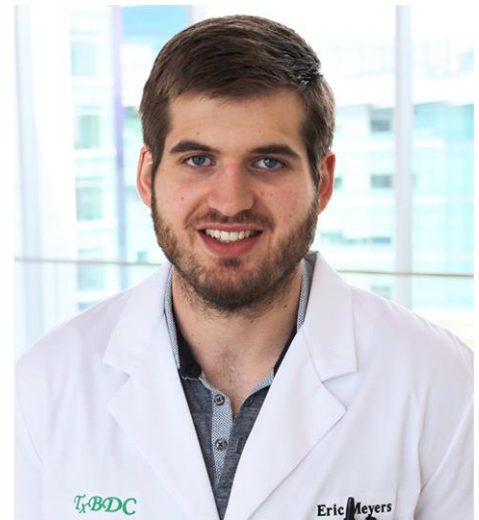
Final Dissertation Defense

ENHANCING PLASTICITY USING VAGUS NERVE STIMULATION IMPROVES RECOVERY FOLLOWING NEUROLOGICAL INJURY

Damage to the nervous system often results in permanent physical disability. The work in this dissertation investigates two mechanistically distinct neurological injuries, stroke and peripheral nerve injury. These disorders affect over one million Americans per year and often affect the upper extremities. Long-term impairment of hand function is a debilitating consequence of these injuries. There is currently an unmet clinical need for therapeutic interventions to restore function in these patients. Insufficient plasticity in central networks has been implicated in poor recovery. Here we demonstrate that vagus nerve stimulation (VNS) paired with rehabilitative training is an effective method to enhance plasticity in central networks after injury to improve motor dysfunction. We demonstrate the substantial clinical utility of VNS to treat motor dysfunction after stroke, and reveal an anatomical substrate of recovery. Next, we show that the same plasticity-enhancing technique to improve function after stroke can also be applied to injuries in the periphery. VNS paired with rehabilitative training results in enhanced motor and sensory function after peripheral nerve injury. Furthermore, we assess the role of central plasticity in recovery following peripheral nerve injury.

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