Following spinal cord injury (SCI), voluntary motor output is generally reduced below the lesion, whereas the spinal effects of sensory feedback become pathologically increased, contributing to hyperreflexia and neuropathic pain. We have recently developed a novel pre-clinical therapy for motor rehabilitation after SCI that uses electrical intraspinal microstimulation (ISMS) to facilitate and guide Hebbian-like strengthening of spared motor pathways (McPherson et al., PNAS 2015). It is possible that ISMS for motor rehabilitation can also be designed to reduce transmission in pain pathways below the lesion. If so, it would address two critical unmet needs of the SCI population: non-opioid therapies for SCI-related neuropathic pain and multimodal rehabilitation. ISMS-based therapies would also overcome a key limitation of clinically available spinal stimulators, which are parameterized for treatment of motor or sensory impairments alone. This talk will describe our laboratory’s current efforts to characterize the "unintended" effects of motor rehabilitation-focused ISMS on transmission in spinal pain pathways as well as possible mechanisms underlying these effects that point to new avenues for therapeutic intervention.