American Spinal Injury Association
Annual Scientific Meeting
May 20-23, 2024 · San Juan, Puerto Rico

Train TRIP: Neuromodulation and Neuroplasticity; Not All Plasticity Is Good or Bad. Reflexes, Neuromodulation and Peripheral Plasticity After Spinal Cord Injury

Course ID 39

Bing Chen; Evan Sandler, DPT, PhD Candidate; Morgan Sharp-Forston, PhD Candidate; Alan Phipps, Ph.D., Postdoctoral Fellow

Number of individuals proposed: 4 – all trainees. Type of course: Expert panel focused on cutting-edge translational research into spinal and peripheral plasticity, reflexes, spasticity and neuromodulation after spinal cord injury. Educational Objectives: 1. To describe aspects of central and peripheral plasticity, including of nociceptors, descending tracts and motor neurons, that can impact spinal reflexes, neuropathic pain, spasticity and functional recovery after spinal cord injury. 2. To illustrate how neuromodulation can influence spinal reflexes, plasticity, and function. 3. To address and discuss the concepts of adaptive and maladaptive plasticity. 4. To highlight the contributions of trainees to translational research in spinal cord injury. Summary: Bing Chen (Perez Lab) will discuss how post-activation depression (PAD) of the soleus H-reflex changes in humans with chronic incomplete spinal cord injury (SCI). We found that PAD was attenuated to a similar extent in people with SCI with and without spasticity, highlighting the need to further assess the role of PAD in spasticity following SCI. Is it good or bad plasticity? Evan Sandler (Field-Fote Lab) will describe the influence of various transcutaneous spinal stimulation parameters on electrophysiological and biomechanical correlates of spasticity in participants with SCI. Morgan Sharp-Forston (Magnuson Lab) will describe how the innervation of the gastrocnemius muscle by CGRP+ nociceptors fundamentally changes after SCI, and will discuss the functional and therapeutic implications of this dramatic anatomical plasticity. Is it adaptive or maladaptive? Alan Phipps (Thompson Lab) will discuss noxious and non-noxious cutaneous sensation processing and cutaneous reflexes in people with and without neuropathic pain due to chronic incomplete SCI. Distorted balance between nociceptive and non-nociceptive processing may play a role in neuropathic pain after SCI. Funding Sources: Perez: R35 NS122336; I01RX003715; I01RX002474 Field-Fote: NIH R01 HD101812; NIDILRR 90SIMS0002 Magnuson: DOD SCIRP SC170121 & SC210090 Thompson: R01 NS114279; DOD SCIRP SC210118 Draft Agenda: After a brief introduction, each speaker will have 12 minutes for a presentation and 2 minutes for questions. Course Chair: Linda Jones Contact: David Magnuson. Faculty: Bing Chen, Research Scientist, Perez lab, Shirley Ryan AbilityLab, Northwestern University bchen03@sralab.org Evan Sandler, DPT, PhD Candidate, Field-Fote lab, Georgia Institute of Technology, and Crawford Research Institute, Shepherd Center. evan.sandler@shepherd.org Morgan Sharp-Forston, PhD Candidate, Magnuson lab, Kentucky Spinal Cord Injury Research Center, University of Louisville. morgan.sharp.1@louisville.edu Alan Phipps, Ph.D., Postdoctoral Fellow, Thompson lab, Medical University of South Carolina. phippsal@musc.edu

Learning Objective 1 Describe aspects of central and peripheral plasticity that can impact spinal reflexes, neuropathic pain, spasticity and functional recovery after spinal cord injury.

Learning Objective 2 Illustrate how neuromodulation can influence spinal reflexes, plasticity, and function.

Learning Objective 3 Address and discuss the concepts of adaptive and maladaptive plasticity.