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INTRATHECAL NEUROTROPHIN DELIVERY PROMOTES LOCOMOTOR RECOVERY IN A LARGE ANIMAL MODEL OF SPINAL CORD INJURY

Thoracic spinal cord injury leads to paralysis of the hindlimbs which can recover stepping after undergoing intensive treadmill training. Delivery of neurotrophins such as Brain Derived Neurotrophic Factor (BDNF) or Neurotrophin-3 (NT-3) to the injury site via cellular transplants or to the lumbar cisterna via implantable mini-pumps promote recovery of locomotor behavior in the absence of locomotor training in feline and rodent models of spinal cord injury. Modeling studies of simple neuromechanical models of locomotion suggest that recovery may stem from an increase in interneuronal synaptic connectivity. Using multiunit recordings of lumbar interneurons, we found some signs of increased activity and coordination between lumbar interneurons in BDNF treated animals, but also remarkable similarities in their firing patterns when compared with interneurons recorded in animals treated with saline. While our results suggest that neurotrophins may be used to augment the effects of body-weight supported treadmill training in spinal cord injured individuals, their potential involvement in the development of chronic pain requires careful evaluation of the changes in neural pathways' sensitivities following neurotrophin delivery.

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Michel Lemay trained in Functional Neuromuscular Stimulation at Case Western Reserve University (Cleveland, OH) where he received his MS and PhD in Biomedical Engineering, following his BS in Electrical Engineering from Université de Sherbrooke, Canada. After a post-doctoral fellowship at MIT in the departments of Mechanical Engineering and Brain & Cognitive Sciences, he worked with Dr. Warren Grill as a Research Associate back at Case before obtaining his first faculty position in the department of Neurobiology and Anatomy at Drexel University. Dr. Lemay moved to the newly formed department of Bioengineering at Temple University in 2014 where he is Professor of Bioengineering. His research group focuses on understanding the functioning and contribution of the spinal circuitry to the control of locomotion, and how this circuitry can be re-engaged for rehabilitation purposes following injury.

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In-person:

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