

**Weekly Colloquium**

Tuesday, 10/24/2017, 12:30pm, Billings Building – Rosedale Conference Room

**Title of talk: “Neuroplasticity following Spinal Cord Injury”**

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**Research Abstract:**

The corticospinal tract is an important target for motor recovery in humans with spinal cord injury (SCI). Using noninvasive electrophysiological techniques we have demonstrated the presence of reorganization in corticospinal projections targeting spinal motor neurons of muscles located close and at a distance from the injury site in individuals with chronic anatomically incomplete cervical SCI. We used this physiological information to develop noninvasive protocols to enhance transmission in residual connections after the injury. For example, we have precisely timed the arrival of descending and peripheral volleys at corticospinal-motoneuronal synapses of upper and lower-limb muscles. We found that the arrival of presynaptic volleys prior to motor neuron discharge enhanced corticospinal transmission and hand and leg voluntary motor output. We have also targeted late cortical synaptic inputs to corticospinal neurons. Late inputs are largely affected after the injury and aberrantly contribute to the recruitment of spinal motoneurons. We found that repeated pairs of pulses targeting late cortical inputs enhance voluntary motor output by changing cortical and spinal transmission. Targeted modulation of residual corticospinal connections may represent a therapeutic target for enhancing voluntary motor output following SCI.

**Recent publications:**

Baker SN, Perez MA. Reticulospinal Contributions to Gross Hand Function after Human Spinal Cord Injury. *J Neuroscience*, 2017 (in press).

Long J, Federico P, Perez MA. A novel target to enhance hand motor outputs in humans with spinal cord injury. *Brain*, 2017 (in press).

Urbini MA, Ozdemir RA, Tazoe T, Perez MA. Spike-Timing-Dependent Plasticity in Lower-Limb Motoneurons after Human Spinal Cord Injury. *J Neurophysiology*, 2017 (in press).

