Engineering Neuroscience & Health Seminar Series Presents:	Monday	Locations: Seminar is simultaneously presented
Dr. Robert Gregor Rgregor@usc.edu	September 15, 2008 4:00 p.m. Refreshments will be served 3– 4 p.m.	**HSC: 147 – LIVE** **Center for the Health Professional** HSC Campus Map/Directions: http://www.usc.edu/about/visit/hsc/ **UPC: HNB 100 – Video Conference** **Hedco Neurosciences Building** UPC Campus Map/Directions: http://www.usc.edu/about/visit/upc/

Sensorimotor Control of Locomotion: Loss of Length-Dependent Input

There is general agreement that muscles are utilized by the motor system in a manner that satisfies the mechanical demands of movement, i.e. task dependency. There is also general consensus that muscles are selected by the central nervous system by integrating information from centrally generated commands, e.g. CPGs, and various forms of sensory feedback, e.g. length-dependent feedback. The structure and function of the CPG and the extent to which various forms of feedback are integrated to yield a task specific response, however, remains open to debate. Our general hypothesis is that proprioceptive input is important to movement control with its significance dictated by the specific demands of the motor task and by the muscles responsible for controling that task.

To address this general hypothesis we use a self-reinnervated muscle model because this procedure results in permanent loss of the length-dependent sensory input. In our previous work we found, after surgical self-reinnervation of the medial gastrocnemius (MG) and soleus (S) muscles in the adult cat, clear signs of short-term compensation for the functional loss of these self-reinnervated muscles. Generally normal emg patterns emerged early in recovery in a variety of tasks (3-4 weeks) but normal joint kinematic and joint moment patterns did not, even after an extended recovery period. In light of these findings at the global level of analysis our attention now focuses on local mechanics of the muscle tendon unit, i.e. strain distribution between the muscle fibers and the tendon, and its performance in an intact animal and during the early recovery period (4-6 weeks) and an extended recovery period (12 months) from self-reinnervation. Understanding changes in the local mechanics in an intact system and then applying that knowledge to the period of recovery from peripheral nerve injury is important because passive structures, including tendon, play a larger role in controlling movement when active muscle output is compromised.

Our methods of analysis include the chronic implantation of sonomicrometry crystals to measure muscle-tendon unit and muscle fascicle lengths in the intact and self-reinnervated muscles and motion capture and force plate data to calculate global kinematic and kinetic outcome measures. Overground walking on different slopes is used to alter environmental demands.

This particular presentation will focus on the response of the intact animal to slope perturbations during overground locomotion, the differential response of individual whole muscle-tendon units and individual muscle fascicles to the different slope conditions, i.e. the muscle physiology, and finally the redevelopment of motor output patterns during the recovery period after surgical self-reinnervation.

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