

## Concussion Assessment Research Laboratory



The *Concussion Assessment Research Laboratory*, located in the College of Health Sciences' Department of Rehabilitation Science, currently has a MagStim200<sup>2</sup> transcranial magnetic stimulation device, a BioPac MP150 data acquisition system, and a GRASS Technologies stimulation and signal amplification system. We have a close relationship with the Musculoskeletal Laboratory in the Department of Rehabilitation Sciences which includes a NeuroCom SMART Balance System with advanced capabilities for vestibular assessment. Possibilities also exist for research collaboration with the Spinal Cord and Brain Injury Research Center (SCoBIRC), the Magnetic Resonance Imaging & Spectroscopy Center (MRISC), and the Department of Physical Medicine and Rehabilitation at Cardinal Hill Rehabilitation Hospital.

### **Current Research**

We are investigating electrophysiological changes in the brain following concussion using a technique known as transcranial magnetic stimulation (or TMS). Concussion is a form of mild traumatic brain injury (TBI) and occurs in many contact sports. Very little is currently known about how the brain responds to this type of injury, how long the recovery period is, and when it is safe to return-to-play. Currently there are no neuroanatomic or neurophysiologic assessment techniques available to identify a concussion, determine the severity of injury, or monitor recovery. Using TMS we are able to stimulate the human motor cortex and assess the physiologic integrity of the descending motor pathways. TMS is used to elicit motor evoked potentials (MEPs) which reveal changes associated with concussion within the first 1 to 10 days following injury.

Current research in the Concussion Assessment Research Lab involves the acute assessment of concussions among middle school, high school, and collegiate athletes. Our aim is to quantify the electrophysiological changes associated with mild TBI and determine the clinical utility of MEPs following sports-related concussion. Investigation of MEPs in an athletic population will increase our understanding of the pathophysiology of concussive injuries and, ultimately, will assist in the management and safe return to play of the athlete with mild TBI.

### **Future Research**

Future research in the CARL will include balance and postural stability assessments post-concussion and correlating these results with MEP changes. We plan to evaluate the motor and vestibular contributions to postural stability/balance among athletes post-concussion. Deficits in balance and stability after concussion have been well-documented in the medical literature, but it remains unknown to what extent motor and/or vestibular dysfunction may play a role. Results from this type of study will improve our ability to identify athletes who have sustained a concussion, and should also provide valuable information that can be used in designing effective rehabilitation programs.

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