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EDUCATION and TRAINING

Ohio University, Bachelor of Science in Physical Therapy (*summa cum laude*)
June 1988

University of North Carolina at Chapel Hill, Master of Science in Human Movement Science
May 1994

University of Virginia, Doctor of Philosophy in Kinesiology
January 2007

Certification by the National Athletic Trainers' Association Board of Certification as an Athletic Trainer, February 2001.

Board Certified Specialist in Sports Physical Therapy by the American Board of Physical therapy Specialities, May 2006.

TEACHING

University of Kentucky (Doctor of Physical Therapy and Doctor of Philosophy in Rehabilitation Sciences Programs), 2009 to present:

- PT834 Introduction to Physical Therapy and Bioethics (instructor)
- PT654 Motor Control (course director beginning Spring 2010)
- PT831 Neurophysiology (instructor, planned for Fall 2010)
- PT676 Electrophysiologic Testing and Therapeutics (instructor, planned for Fall 2010)
- PT686 Specialty Elective (planned for Spring 2011)

The George Washington University (DPT Program)

- PT404 Kinesiology in Rehabilitation Medicine (course director)
- PT405 Functional Neuroanatomy and Electrodiagnostics (instructor)
- PT411 Foundations of Physical Therapy Examination (course director)
- PT413 Physical Agents and Electrotherapy Modalities (course director)
- PT404 Kinesiology in Rehabilitation Medicine (course director)
- PT415 Management of Musculoskeletal dysfunction I (instructor)

PT416 Management of Musculoskeletal Dysfunction II (course director)

The George Washington University (Undergraduate Athletic Training Education Program)

EXSC158 Prevention and Care of Athletic Injuries (instructor)

University of Virginia (BS Kinesiology/Sports Medicine Program)

EDHS353 Human Anatomy (instructor)
EDHS758 Anatomical Basis of Sports Medicine (Course Coordinator, instructor)
EDHS589 Current Issues in Sports Medicine (instructor)
EDHS451 Emergency Medical Care (instructor)
EDHS557 Art & Science of Sports Medicine (instructor)
EDHS841 Orthopaedic Basis of Athletic Training (instructor)
EDHS741 Pathology and Rehabilitation of Athletic Injuries (Course director, instructor)
EDHS859 Seminar in Athletic Training (Course director)

Gannon University (MPT Program)

GT507 Foundations in Human Movement (Course Coordinator and Lab Director)
GX503 Physical Therapy Practice I (Course Coordinator and Lab Director)
GX 505 Physical Therapy Practice II (Course Coordinator and Lab Director)

Gannon University (BS Sport & Exercise Science Program)

SPRT160 Aerobic Training (Course director)
SPRT161 Weight Training (Course director)
SPRT162 General Fitness and Weight Control (SPRT162)
SPRT200 Introduction to Sport and Exercise Science (SPRT200)
SPRT210 First Aid/Cardiopulmonary Resuscitation (SPRT210)
SPRT300 Sports First Aid/Sports Safety Training (SPRT300)
SPRT312 Exercise Physiology Lab (SPRT312)
SPRT412 Kinesiology Lab (SPRT412)
SPRT490 Special Topics in Sport and Exercise Science (SPRT490)
SPRT440 Independent Study in Sport and Exercise Science (Course coordinator)

PUBLICATIONS

Papers in Refereed Journals

Livingston SC, Ingersoll CD. Intra-rater reliability of a transcranial magnetic simulation technique to obtain motor evoked potentials. *Int J Neurosci* 2008;118:239-256.

Papers in Non-Refereed Journals

Livingston SC. Reflex sympathetic dystrophy: a review of pathogenesis, diagnosis and treatment. *Sports Medicine Update*, volume 9, number 2, summer 1994.

Abstracts

Livingston SC, Hertel JN, Saliba EN, Barth JT, Goodkin HP, Ingersoll CD. Motor evoked potential amplitudes are correlated with prior number of concussions in the acutely concussed collegiate athlete [abstract] *J Head Trauma Rehabil*. 24(5): 400-401.

Livingston SC, Ingersoll CD, Goodkin HP, Saliba EN, Hertel JN, Barth JT. Relationship between neurocognitive test performance and transcranial magnetically-evoked motor potentials following concussion among collegiate athletes [abstract] *Arch Clin Neuropsych* 22(7):837, September 2007.

Livingston SC, Goodkin HP, Barth JT, Saliba EN, Hertel JT, Ingersoll CD. Acutely concussed collegiate athletes demonstrate differences in motor evoked potentials compared to non-concussed athletes [abstract] *J Athl Training* 42(2): S32, June 2007.

Livingston SC, Saliba EN, Hertel JN, Goodkin HP, Barth JT, Ingersoll CD. Transcranial motor-evoked potentials are not correlated with self-reported symptoms following acute concussion among collegiate athletes [abstract] *Medicine & Science in Sports & Exercise*, May 2007. 39(5):S330.

Livingston SC, Kennedy CH, Freeman J, Broshek DK, Barth JT. Toward objective sideline neurophysiological detection of mild TBI: Reliability of pupilometry [abstract] *Archives of Clinical Neuropsychology* September 2006. 21(6): 542.

Livingston SC, Ingersoll CD. Motor Evoked Potentials Obtained Through Transcranial Magnetic Stimulation Demonstrate High Intra-rater Reliability [abstract]. *J Clin Monitoring Computing.2006;20(1):57-65.*

Livingston SC, Ingersoll CD. A preliminary investigation of collegiate athletes' knowledge of concussions [abstract]. *J Athl Training* 39(2): S-17, 2004.

Livingston SC. Motor and sensory conduction of the tibial nerve through the tarsal tunnel [abstract]. American Physical Therapy Association's Section on Clinical Electrophysiology Newsletter. 1999;1:6.

Other Publications

Livingston SC. "Relationship between transcranially-induced motor-evoked potentials, self-reported symptoms, and neurocognitive test performance following acute concussion among collegiate athletes" [dissertation] UMI Dissertation Publishing/ProQest Information and Learning, © 2007.

Livingston SC. *Relationship between transcranially-induced motor-evoked potentials, self-reported symptoms, and neurocognitive test performance following acute concussion among collegiate athletes* [monograph] VDM Verlag Publishers, 2008.

RESEARCH in PROGESS

2009 Publications in Preparation:

Livingston SC, Saliba EN, Goodkin HP, Hertel JN, Ingersoll CD. "Motor Evoked Potential Abnormalities Following Sport-Related Concussion: A Preliminary Investigation" *Brain Injury* (under review, September 2009).

"Persistence of Motor-evoked Potential Abnormalities Following Acute Concussion Despite Symptom Decline and Neurocognitive Improvement." In progress, *Journal of Head Trauma Rehabilitation*

"Correlation between transcranial motor-evoked potentials and self-reported symptoms following acute concussion among collegiate athletes." In progress, *Clinical Journal of Sports Medicine*

"Relationship between transcranial magnetic stimulation motor-evoked potentials and neuropsychological test performance following concussion in collegiate athletes." In progress, *Journal of Clinical Neuropsychology*

IRB Protocols:
"Assessing the Brain and Spinal Pathways Using Transcranial Magnetic Stimulation(TMS)," #09-0670-FIV, submitted August 2009 (under review)

"Optimizing the Diagnosis of Mild Traumatic Brain Injury and Associated Vestibular Deficits," in progress

PRESENTATIONS

Regional Presentations

"Electrophysiologic Evidence for the Acute Affects of Concussion: A Transcranial Magnetic Stimulation (TMS) Study of Collegiate Athletes" (oral presentation) at the 34th Annual Art & Science of Sports Medicine Symposium, *University of Virginia* (Charlottesville, VA), June 2006.

"Quantitative Assessment of the Pupillary Light Reflex Under Various Ambient Light Conditions" (poster presentation) at the *Mid-Atlantic Athletic Trainers' Association* Annual Meeting, May 2006.

"Understanding Concussion Symptomatology: Insight into the Pathophysiology of Concussion in Sports" (oral presentation) at the *Virginia Athletic Trainers' Association* Annual Meeting and Symposium, January 2006.

"Transcranial Magnetic Stimulation in the Assessment of Sports-Related Concussions" (oral presentation) at the 33rd Annual Art & Science of Sports Medicine Symposium, *University of Virginia*, June 2005.

"Use of Pupillometry in Concussion Assessment" (oral presentation) at the 32nd Annual Art & Science of Sports Medicine Symposium, *University of Virginia*, June 2004.

"Clinical Assessment of Sports-Related Concussion" (oral presentation) at the *Mid-Atlantic Athletic Trainers' Association* Annual Conference, May 2004.

"An Update on Concussion Assessment and Management" (oral presentation) at the 31st Annual Art & Science of Sports Medicine Symposium, *University of Virginia*, June 2003.

National Presentations

"Motor Evoked Potential Amplitudes are Correlated with Prior Number of Concussions in the Acutely-Concussed Collegiate Athlete" (oral/platform presentation) at the *North American Brain Injury Society (NABIS) 7th Annual Conference on Brain Injury*, October 2009.

"Sports-Related Mild Traumatic Brain Injury" (educational session) at the *American Physical Therapy Association Annual Conference & Exposition*, June 2009.

"Teaching Therapeutic Modalities: What Drives the Decision-Making Process?" (educational workshop) *APTA Combined Sections Meeting*; February 2009.

"Electrophysiological Evidence for the Acute Effects of Concussion in the Collegiate Athlete: A Transcranial Magnetic Stimulation Study" (poster) *National Academy of Neuropsychology* Sports Concussion Summit, October 2008

"Motor Evoked Potential Abnormalities in Acutely Concussed Collegiate Athletes" (poster) *APTA Combined Sections Meeting*; February 2008.

"Relationship Between Neurocognitive Test Performance and Transcranial Magnetically-Evoked Motor Potentials Following Concussion Among Collegiate Athletes" (poster) *National Academy of Neuropsychology*, November 2007.

"Motor Evoked Potential Differences Between Concussed and Non-concussed Athletes as determined by Transcranial Magnetic Stimulation" (platform presentation) *National Athletic Trainers' Association* Annual Meeting and Symposium, June 2007.

"Transcranial Motor-Evoked Potentials are Not Correlated with Self-Reported Symptoms Following Acute Concussion Among Collegiate Athletes" (poster presentation) *American College of Sports Medicine* Annual Meeting, May 2007.

"Relationship Between Transcranial Magnetically-Evoked Potentials and Subjects' Gender, Hand Dominance, Arm Length and Height" (platform presentation) *American Society of Electroneurodiagnostic Tehnologists*, July 2006.

"Toward Objective Sideline Neurophysiological Detection of Mild TBI: Reliability of Pupilometry" (poster presentation) *National Academy Neuropsychology*, October 2006.

"Motor Evoked Potentials Obtained Through Transcranial Magnetic Stimulation Demonstrate High Intra-rater Reliability" (platform presentation) *American Society of Neurophysiological Monitoring* Annual Conference, May 2005.

"An Investigation of Collegiate Athletes' Knowledge of Concussions" (platform presentation) *National Athletic Trainers' Association* Annual Conference & Symposium, June 2004.

"Motor and Sensory Conduction of the Tibial Nerve Through the Tarsal Tunnel" (platform presentation)*American Physical Therapy Association* Annual Combined Sections Meeting, February 1999.

International Presentations

"Persistence of Motor Evoked Potential Abnormalities Following Acute Concussion" [poster] at the *Society for Neuroscience*, November 2008 (Washington, DC).

"Motor Evoked Potential Amplitudes are correlated with Prior Number of Concussions in eth Acutely-Concussed Collegiate Athlete," *American Medical Society for Sports Medicine*; accepted January 2008, not presented.

"MEP Amplitudes Induced by Transcranial Magnetic Stimulation are Reduced in the Acutely Concussed Collegiate Athlete" (platform presentation) at the *Society for Neuroscience*, October 2006 (Atlanta, GA).

CURRENT RESEARCH DIRECTIONS

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 motor-evoked potentials (MEPs) following sports-related concussion. We are investigating electrophysiological changes in the brain following concussion using a technique known as transcranial magnetic stimulation (or TMS). 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 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.