

RECOVERS

CENTER OF BIOMEDICAL RESEARCH EXCELLENCE (COBRE) IN STROKE RECOVERY

Volume 3 Issue 1

Spring 2016

NC NM4R

One of the COBRE's big achievements has been exporting the BSTIM core to the nation as the National Center of Neuromodulation for Rehabilitation (NC NM4R) a component of NIH's Rehabilitation Research Resource Network (<https://www.nichd.nih.gov/about/org/ncmrr/Pages/overview.aspx>).

Through its first round of workshops, led by COBRE investigators Mark George and Colleen Hanlon, the focus of NC NM4R is advancing knowledge in the field of neuromodulation for rehabilitation. Workshops included one-week basic Neuromodulation for Rehabilitation, three-day Advanced rTMS, and three-day Advanced Operant Conditioning.

National Attendance

Twenty-eight researchers and clinicians currently working in the field attended the workshops, gaining immediate knowledge and training in cutting edge and next generation NM4R applications. Representing 15 states in the U.S., the attendees especially enjoyed the daily hands-on experience they received in the various labs on campus.

What the Future Holds

This first series of workshops is just the start of the activities sponsored by the NC NM4R. Future goals include expanding an on-line presence through community membership, facilitating collaborative opportunities for members through the website and campus visits, live and recorded webinars, and pilot grant opportunities.

To join the NC NM4R community, please visit:

<http://academicdepartments.musc.edu/ncnm4r/>.



Pictured: (L)Mark George, (R)Michelle Mcleod

All participants were highly engaged and many eyes were opened to the multiple tools they could learn for neuromodulation that went beyond basic TMS, including operant conditioning of spinal circuits."

-Rick Segal, PT, PhD, FAPTA

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FROM THE DIRECTOR

We have now begun our third grant year, although our third calendar year of support won't begin until July. While hard to believe, we are less than a year away from beginning to write our application for a Phase 2 COBRE and years 5-10 of support. We have done much over the past year to prepare. We had a valuable strategic planning retreat in November to help set our vision for the future of the COBRE in Stroke Recovery. We then went over the results of the planning with our External Advisory Board members and received their feedback. First and foremost among our priorities, supporting the Junior Investigators as they strive for independence emerged as a key activity in year 3. Also of great importance is identifying the next generation of Junior Investigators. I will be meeting with deans and department chairs over the next few months to discuss opportunities to partner with the COBRE and invest in faculty interested in pursuing stroke recovery research. My goal is to line up several commitments to recruit new faculty members with an emphasis in stroke recovery research, as well as to identify current faculty who would be strong candidates. Our application will be off to a great start if we are able to end year 3 with several Junior Investigator graduations and several commitments to recruit new Junior Investigators.

An item identified through our planning as a potential weakness was a lack of collaborations with bioengineers. As one effort to address this concern, we will be exploring a particularly exciting opportunity for collaboration with Brown University and the Providence VA Medical Center in May. During May I visited their brain-machine interface (BMI) group and the VA Center of Excellence for Neurorestoration and Neurotechnology as a guest of Dr. Leigh Hochberg. We will be discussing possible collaborations between COBRE investigators and their groups, as well as a possible collaborative NSF EPSCoR Track 2 application next winter. With our COBRE's strengths in neuromechanics, neuromodulation and neuroimaging, collaborating with BMI experts offers great opportunities to push our work into exciting new areas on the frontiers of adaptive neurotechnologies applied to stroke recovery.

Other items that will be addressed this year include the potential development of an Animal Behavioral Core; the development of some key classes to serve as the foundation for a training program; and the development of a more robust subject recruitment pipeline through increased outpatient recruiting efforts and strengthened relationships with Roper and Health-South Rehabilitation Hospitals.

I look forward to a great third year.

Steve Kautz
Director, COBRE in Stroke Recovery



COMPREHENSIVE STROKE CERTIFICATION

The Medical University of South Carolina recently met the Joint Commission's standard for becoming a Disease-Specific Care Comprehensive Stroke Center, attaining the highest certification level. This achievement is based on MUSC's ability to treat the most complex of stroke patients and consistently provide the most advanced care available. As the first hospital in South Carolina to achieve this elite status of excellence in stroke treatment, MUSC enters the ranks of a group of approximately 100 hospitals across the country.

One aspect of MUSC's excellence in stroke care is the COBRE in Stroke Recovery's mission to optimize outcomes post-stroke. The COBRE investigators are dedicated to improving quality of life for individuals following a stroke. As MUSC's COBRE in Stroke Recovery we provide a platform for researchers dedicated to optimizing stroke recovery processes.

Currently, 23 investigators, 10 post-doctoral fellows, and 11 graduate students contribute to the Center's stroke recovery research. MUSC hosts 33 active grants investigating stroke recovery, 13 of which are funded through the COBRE in Stroke Recovery. For 6 of the 23 investigators, the COBRE provided their first opportunity to investigate stroke recovery. Collectively, in the past year this body of research enrolled 373 research participants involved in 2207 sessions in the Center's Brain Stimulation, Neuroimaging, and Quantitative and Behavioral Assessment and Rehabilitation Cores.

NEW TEAM MEMBER

Philipp Summers

Biomedical Engineer



After an extensive search, the COBRE's Brain Stimulation and Neuroimaging Labs welcome a biomedical engineer, Philipp Summers, as

a joint member of both teams. Mr. Summers will oversee the technical aspects of the labs, maintain all equipment, develop new analysis routines, and participate in data collection.

Welcome to the team, Philipp!

Use FAST to remember warning signs of stroke:



FACE: Ask the person to smile. Does one side of the face droop?



ARMS: Ask the person to raise both arms. Does one arm drift downward?



SPEECH: Ask the person to repeat a simple phrase. Is their speech slurred or strange?



TIME: If you observe any of these signs, call **9-1-1 immediately**.

VISITING SCHOLARS

The COBRE in Stroke Recovery remains focused on providing opportunities for mentoring and professional development to enhance the impact of the research it supports. In recent months, a number of guest scholars were invited to visit with the COBRE team and share their work in stroke recovery research. These sessions offer the Junior Investigators valuable feedback specific to their COBRE projects and foster opportunities for interdisciplinary and international collaboration.

Trisha Kesar, PT, PhD | Monday, February 22nd



Emory University

Assistant Professor, Rehabilitative Medicine

Presentation: "Neural and Biomechanical Mechanisms Underlying Locomotor Training"

Dr. Kesar's research goal is to develop novel gait rehabilitation interventions and strategies that are based on an in-depth understanding of the neuroplasticity, biomechanical, and motor learning mechanisms underlying gait and gait training.

Ongoing projects in Dr. Kesar's lab are investigating the time course of evolution of changes in gait biomechanics, walking function, and corticospinal excitability during paradigms that mimic clinical post-stroke gait retraining. Some of the tools and techniques that Dr. Kesar employs in her research include 3-dimensional kinematic and kinetic analysis of human motion, electromyography, functional electrical stimulation, and transcranial magnetic stimulation.

Michael Borich, DPT, PhD | Tuesday, February 23rd



Emory University

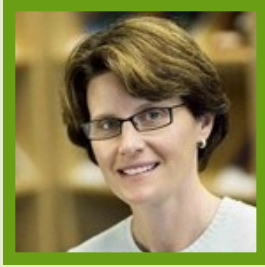
Assistant Professor, Rehabilitative Medicine

Presentation: "Characterizing Human Brain Cortical Reactivity and Connectivity Using Simultaneous TMS-EEG"

Dr. Borich is keenly interested in understanding and harnessing the plastic capacity of the human nervous system in health and disease in an effort to improve rehabilitation outcomes for individuals with neurologic injury and disease.

His research utilizes multimodal neuroimaging and neurostimulation techniques to characterize the brain structural and functional correlates of neural plasticity associated with learning and experience.

Lara Boyd, PT, PhD | Monday, April 25th



University of British Columbia

Canada Research Chair (Tier II) in Neurobiology of Motor Learning

Director, Brain Behaviour Laboratory

CIHR Delegate & Health Research Advisor to the VP Research

Presentation: “Non-invasive Brain Stimulation to Map and Promote Recovery from Stroke”

Dr. Lara Boyd, is a physical therapist and neuroscientist who is leading the effort to understand what therapies positively alter patterns of brain activity after stroke. Her group uses a combination of functional magnetic resonance imaging and transcranial magnetic stimulation to map changes in brain activity. Her studies are among the first to comprehensively examine the patterns of brain activation as they relate to motor learning and parameters of practice after stroke.

[Brain Behavior Laboratory website](#)

Troy Herter, PhD | Monday, May 2nd



University of South Carolina, Arnold School of Public Health

Assistant Professor, Exercise Science

Graduate Director & Head of the Rehabilitation Sciences Division

Presentation: “Linking Impairments of Visual Search with Abnormal Motor Skill Performance Following Stroke”

Dr. Herter’s interests involve visual-motor integration and other complex tasks in patients with stroke.

Winston Byblow, PhD | Monday, May 9th



University of Auckland

Professor, Exercise Sciences

Director, Movement Neuroscience Laboratory

Presentation: “Noninvasive Brain Stimulation after Stroke: Lessons from Spontaneous Biological Recovery”

Dr. Byblow is an internationally acclaimed leader in movement neuroscience who conducts pioneering work in stroke rehabilitation and the brain mechanisms underlying movement control. <http://www.ses.auckland.ac.nz/people/w-byblow>

COBRE Funded Grants

Investigator	Title
Awgulewitsch, Alexander	Exploring Potential Roles of Hox Genes in Stroke Recovery
Bonilha, Heather	Role of Insular Cortex in Swallowing Impairment & Recovery after Stroke
Bowden, Mark	Excitatory and Inhibitory rTMS as Mechanistic Contributors to Walking Recovery
Dean, Jesse	Application of Ultrasound Technology to Enhance the Quantitative Measurement of Post-stroke Behavior and Function
Feng, Wayne	Optimizing Transcranial Direct Current Stimulation Current and Electrode Montage for Stroke Patients
Gregory, Chris	Treating Depression and Enhancing Locomotor Recovery Post-stroke
Hanlon, Colleen	Investigating the Neurobiologic Basis for Loss of Cortical Laterality in Chronic Stroke Patients
Li, Xingbao	Paired Associative Stimulation Modulates Motor Excitability and Plasticity in Chronic Stroke Patients
Martin-Harris, Bonnie	Novel Training Approach for Treatment of Swallowing Impairment in Patients with Refractory Dysphagia after Stroke
Roberts, Donna	fMRI BOLD Signal as a Biomarker for Optimal Dosing of rTMS of Rehabilitation in Chronic Stroke Patients
Seo, Na Jin	Sensory Stimulation to Enhance Hand Function Post-stroke
Shih, Andy	Microvascular Function and Neuroplasticity after Stroke
Thompson, Aiko	Operant Down-conditioning of the Soleus H-Reflex Hemiparesis after Stroke
Tomlinson, Stephen	Complement-dependent Inflammation and Experience-dependent Neural Plasticity after Stroke

The Medical University of South Carolina was awarded a major grant from the National Institutes of Health (NIH) to support the development of a Center for Biomedical Research Excellence (COBRE). This award (P20GM109040) is part of the Institutional Development Award (IDeA) program administered by the National Institute of General Medical Sciences (NIGMS).

Visit: <http://www.nigms.nih.gov/Research/CRCB/IDeA/Pages/default.aspx>

COBRE Affiliated – Active Grants

Faculty/ PI Name	Title	Funding Agency	Project Dates	Total Funding
Adams, Robert	Strategically Focused Disparities in Cardiovascular Disease Research Network	AHA	6/1/15-5/31/19	\$839,656
Bonilha, Leo	Brain Connectivity Supporting Language Recovery in Aphasia	NIH/NIDCD	6/10/14-5/31/19	\$1,672,440
Bowden, Mark	Augmentation of Locomotor Adaptation Post-stroke	VA/RRD	7/1/13-6/30/18	\$923,700
Dean, Jesse	Post-stroke Contributors to Increased Energetic Cost and Decreased Gait Stability	VA/RRD	10/2012-9/2016	\$639,100
Feng, Wayne	ASPIRE: Adult Spasticity International Registry on BOTOX Treatment	Allergan, Inc.	9/3/14-3/31/19	\$99,090
Feng, Wayne	Prediction and Imaging Biomarker for Post-stroke Motor Recovery	AHA	1/1/14-12/31/17	\$308,000
Feng, Wayne/ Woodbury, Michelle	The Halo-MUSC Motor Stroke Rehabilitation Clinical Trial	Halo Neurosciences	2/1/15-1/30/17	\$286,769
George, Mark/ Bonilha, Leo	Transcranial Direct Current Stimulation to Treat Aphasia: Phase II Trial	NIH/NIDCD	4/17/12-4/1/17	\$2,021,848
Gregory, Chris	Skeletal Muscle Plasticity as an Indicator of Functional Performance Post-stroke	VA/RRD	10/1/13-9/30/17	\$1,099,900
Kautz, Steve	Research Career Scientist	VA/RRD	10/2014-9/2019	\$570,000
Kautz, Steve	National Center of Neuromodulation for Rehabilitation (NC NM4R)	NIH/NICHHD	10/1/15-6/30/20	\$5,245,792
Seo, Na Jin	Altering Activation Patterns in the Distal Upper Extremity after Stroke (Subaward; Yr 1)	Rehabilitation Institute of Chicago/NIH	5/1/14-6/30/19	\$293,822
Seo, Na Jin	Delays in Muscle Relaxation: A Novel Approach to Neuromechanism-based Stroke Rehabilitation (Transfer)	AHA	5/1/15-6/30/16	\$138,022
Seo, Na Jin	Development of a Low-Cost Computerized Clinical Assessment Tool for Movement Quality (Subaward)	NIH	6/1/15-5/31/16	\$25,414

COBRE Affiliated – Active Grants Cont'd

Faculty/ PI Name	Title	Funding Agency	Project Dates	Total Funding
Shih, Andy	Pericytes as Inducers of Blood-brain Barrier Injury during Stroke	NIH	2/1/16-1/31/18	\$411,125
Spampinato, Maria	Diffusional Kurtosis Imaging of the Corticospinal Tract and Motor Outcome Prediction in Acute	SCTR	7/27/15-7/26/16	\$60,000
Tomlinson, Stephen	Novel Therapies to Improve Functional Recovery after Stroke	VAMC	4/1/14-3/31/18	\$261,600
Woodbury, Michelle	Patient-targeted Upper Extremity Rehabilitation after Stroke	VA/RRD	4/1/13-3/31/17	\$1,098,100
Woodbury, Michelle	Telerehabilitation in the Home Versus Therapy In Clinic for Patients with Stroke	NIH	9/8/15-2/7/17	\$71,426

COBRE Affiliated—New Grant Applications

Faculty/ PI Name	Title	Funding Agency	Funding Requested
Aaron, Stacey	Lower-limb Muscle POWER Training on Depression and Locomotor Function Post-stroke	AHA	\$51,900
Feng, Wayne	Feasibility, Tolerability, and Safety of tDCS in Patients with Acute Intracerebral Hemorrhage	Beth Israel Deaconess Medical Center	\$208,582
Seo, Na Jin	TheraBracelet: The First and Only Wearable to Instantly Improve Stroke Hand Function (STTR)	TheraBracelet, Inc.	\$67,500
Srivastava, Shraddha	Mechanisms Underlying Recovery Response to Gait Perturbation Post-stroke	AHA	\$98,950
Woodbury, Michelle	Establishing the Functional Viability and Dose-response of Duck Duck Punch: A Stroke Rehabilitation Computer Game	RecoVR, Inc./NIH/NINDS	\$467,290

COBRE Affiliated—New Awards

Faculty/PI Name	Title	Funding Agency
Dean, Jesse	Influence of Lateral Stabilization on Walking Ability Post-stroke	NIH R21
Kautz, Steve	The Effects of Impaired Post-stroke Coordination and Motor Pathway Integrity on Mobility Performance	VA/RRD

UPCOMING EVENTS

Meetings

Thursday, June 9th | COBRE Executive Committee/Junior Investigator Meeting

Thursday, July 14th | COBRE Executive Committee/Junior Investigator Meeting

Conferences

6th Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE)

Sunday-Tuesday, June 26-28th

<http://www.etches.com/nisbre>

IV Workshop of Synaptic Plasticity, Lucca | **September 12-14, 2016**

<http://www.synapticplasticity.it/>

Opportunities

2016 Postdoctoral Preparation Institute: Career Transitions

Advancing Biomedical Research Workforce Diversity

June 2-3, 2016 | Bethesda North Marriott Hotel & Conference Center, Bethesda, MD

[travel award applications](#)

Developing Your Clinical Trial Toolbox

2016 Summer Institute Workshop

[registration form & flyer](#)

Funding

2016-2017 ACCEL Community-Engaged “ACE” Research Awards

Proposals due June 20th

<https://www.de-ctr.org/community/ace-award>

PROFESSIONAL MILESTONES

Dr. Mark Bowden was promoted to Associate Professor, Division of Physical Therapy, Department of Health Sciences and Research, College of Health Professions.

Dr. Na Jin Seo was promoted to Associate Professor, Division of Occupational Therapy, College of Health Professions.

Dr. Wayne Feng is the winner of the 3rd Franz Gerstenbrand Award by the World Federation for NeuroRehabilitation. He was presented this prize in Philadelphia during the WFNR General assembly.

APHASIA AWARENESS MONTH

Stroke is the No. 5 cause of death and the leading cause of disability in the U.S. A stroke can have various communication effects, one of which is **aphasia**. Stroke is the most common cause of aphasia, which is a language disorder that affects the ability to communicate.

June is **National Aphasia Awareness Month**, which is a national campaign to increase public education around the language disorder and to

recognize the numerous people who are living with or caring for people with aphasia. The American Heart Association/American Stroke Association is

increasing aphasia awareness by sharing communication tips, the effects of having aphasia, assistive devices for those with aphasia and more. They are making progress but still have a ways to go and need your help!

Visit www.strokeassociation.org to learn how you can help.



#COMEBACKSTRONG

Join the movement to raise stroke awareness and support the millions of stroke survivors across the U.S. Find out more & hear the inspiring stories of stroke survivors who have **Come Back Strong**.



STROKE AWARENESS

May is National Stroke Awareness Month

For more information about ways to reduce your risk of stroke visit:

www.stroke.org

PUBLICATON HIGHLIGHT

Transcranial Direct Current Stimulation Post-Stroke Upper Extremity Motor Recovery Studies Exhibit a Dose-Response Relationship.

Chhatbar PY, Ramakrishnan V, Kautz S, George MS, Adams RJ, Feng W.

Abstract

BACKGROUND AND PURPOSE:

Transcranial direct current stimulation (tDCS) has shown mixed results in post-stroke motor recovery, possibly because of tDCS dose differences. The purpose of this meta-analysis was to explore whether the outcome has a dose-response relationship with various dose-related parameters.

METHODS:

The literature was searched for double-blind, randomized, sham-controlled clinical trials investigating the role of tDCS (≥ 5 sessions) in post-stroke motor recovery as measured by the Fugl-Meyer Upper Extremity (FM-UE) scale. Improvements in FM-UE scores were compared between active and sham groups by calculating standardized mean differences (Hedge's g) to derive a summary effect size. Inverse-variance-weighted linear meta-regression across individual studies was performed between various tDCS parameters and Hedge's g to test for dose-response relationships.

RESULTS:

Eight studies with total of 213 stroke subjects were included. Summary Hedge's g was statistically significant in favor of the active group (Hedge's $g = 0.61$, $p = 0.02$) suggesting moderate effect. Specifically, studies that used bihemispheric tDCS montage (Hedge's $g = 1.30$, $p = 0.08$) or that recruited chronic stroke patients (Hedge's $g = 1.23$, $p = 0.02$) showed large improvements in the active group. A positive dose-response relationship was found with current density ($p = 0.017$) and charge density ($p = 0.004$), but not with current amplitude. Moreover, a negative dose-response relationship was found with electrode size ($p < 0.001$, smaller electrodes were more effective).

CONCLUSIONS:

Our meta-analysis and meta-regression results suggest superior motor recovery in the active group when compared to the sham group and dose-response relationships relating to electrode size, charge density and current density. These results need to be confirmed in future dedicated studies.



**Pictured: The Stroke Recovery Research Center,
on the corner of President and Bee Street.**

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The Sci-Fi Brain

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Puzzle by the Dana Alliance for Brain Initiatives