

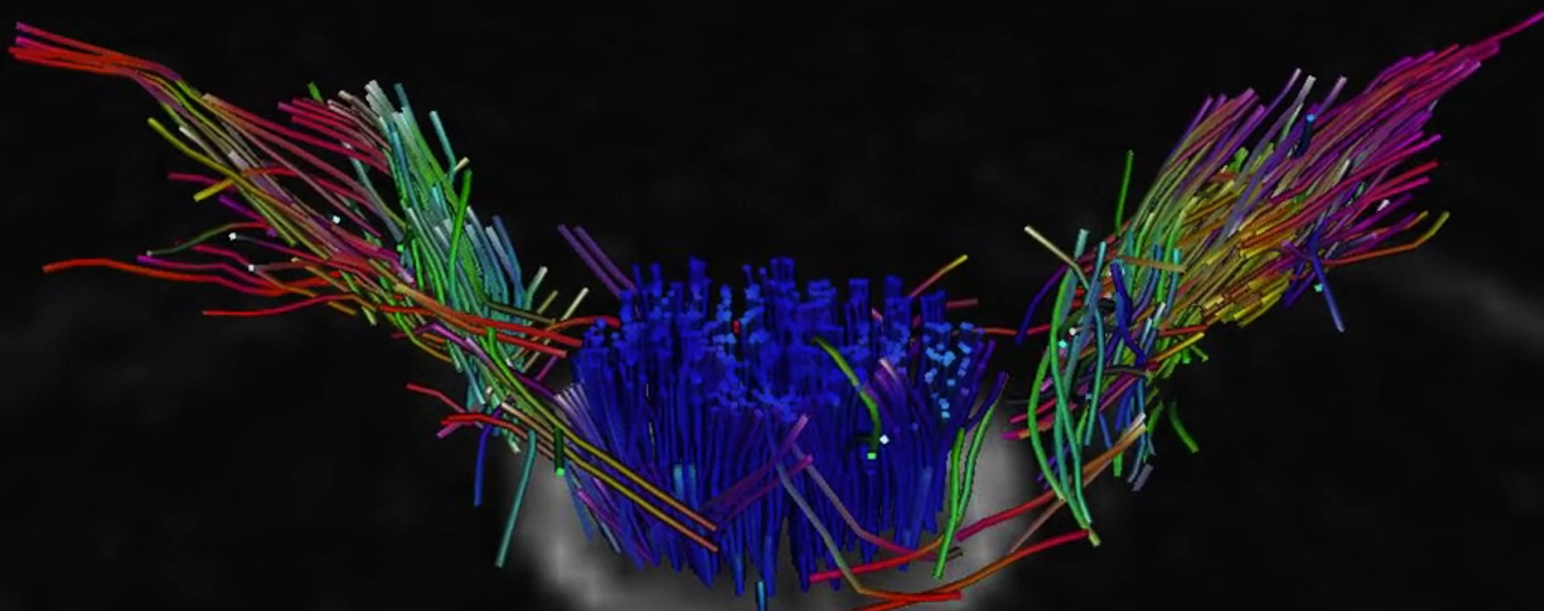
RECOVERS

Volume 3 Issue 2

Summer 2016

STROKE RECOVERY RESEARCH CENTER

A Center of Biomedical Research Excellence (COBRE) in Stroke Recovery at the Medical University of South Carolina



Swallowing
Arm & Hand Function
Improving Outcomes
Balance
Depression
Post-Stroke
Recovery
Walking
Brain Stimulation
Sensation
Visual Neglect
Rehabilitation
Quality of Life
Voice Disorders



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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> to learn more about the IDeA program.

FROM THE DIRECTOR

One of the most recent exciting news items for the COBRE in Stroke Recovery is the award of an NIH SBIR grant to Dr. Michelle Woodbury and her industry partner RecoVR (the South Carolina-based start-up company formed to produce the Duck-Duck-Punch stroke rehabilitation “game” she developed in conjunction with Clemson University collaborators). This nearly \$1 million grant allows RecoVR to work with Michelle and COBRE staff to further develop Duck-Duck-Punch and associated games as viable business products that can help people with post-stroke deficits to improve their arm function and quality of life. The COBRE is thrilled to support Michelle in these important efforts.

The successful SBIR application is just one example of our increased profile for industrial partnerships. Another SBIR application has been submitted by Dr. Na Jin Seo as a product of our pilot grant program. Additionally, we already are participating in the Halo Neurosciences trial of a transcranial direct-current stimulation (tDCS) device with Drs. Feng and Woodbury as co-Principal Investigator’s. Two pharmaceutical companies and four device companies have approached us about participating in clinical trials or SBIR applications. In each instance, COBRE leadership evaluates the project’s suitability with respect to our mission and interests, our capacity to take it and our ability to recruit subjects.

As a result of our increasingly visible profile, I expect that in future years the COBRE will need to plan how best to manage interest from industry as well as interest from other institutions that wish to collaborate with us in multi-site research projects and trials. Deciding which research projects to pursue is a nice “problem” to have. All of this is made possible by the hard work of everybody on the COBRE team. I look forward to the COBRE’s continuing to expand our ability to help industry improve the quality of life for stroke patients and the business community in South Carolina. Doing so is one of the goals of the NIH IDeA program that funds the COBRE, and it is a real pleasure to be able to report good news to them.

Steve Kautz
Director, COBRE in Stroke Recovery



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, two guest scholars visited with the COBRE team to 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 collaboration.

John Buford, PT, PhD | Thursday, August 11, 2016



Ohio State University

Director and Associate Professor of Physical Therapy

Presentation: **“Corticospinal and Reticulospinal Substrates for Control of Reaching and Recovery from Stroke.”**

Stemming from Dr. Buford’s research interest in neural control of movement, his current project investigates the function of the reticulospinal system.

Specifically, Dr. Buford is working to better advance understanding of the function and potential adaptiveness of this motor system. Dr. Buford’s

additional areas of research include the study of mechanisms for the prevention and treatment of carpal tunnel syndrome. [Learn more about Dr. Buford.](#)

Sook-Lei Liew, OTR/L, PhD | Friday, September 23, 2016



University of Southern California

Director of the Neural Plasticity and Neurorehabilitation Lab

Presentation: **“Big Data Neuroimaging and Neuromodulation to Promote Motor Recovery after Stroke.”**

The goals of the Neural Plasticity and Neurorehabilitation Laboratory, under the direction of Dr. Sook-Lei Liew, are to 1.) characterize and predict neural plasticity changes in healthy and post-stroke individuals throughout the process of learning or recovery; 2.) enhance neural plasticity or neural recovery in individuals using noninvasive brain stimulation, brain-computer interfaces and novel learning paradigms; and 3.) personalize the use of plasticity-inducing paradigms in order to capitalize on each individual's unique potential for learning or recovery. The overall mission of the laboratory is to enhance neural plasticity in a wide population of individuals in order to improve their quality of life and engagement in meaningful activities. [Learn more about Dr. Liew.](#)

NEW TEAM MEMBERS

Tarkeshwar Singh, PhD Postdoctoral Fellow



Tarkeshwar Singh is a postdoctoral scholar in the Quantitative Behavioral Assessment and Rehabilitation (QBAR) Core. Prior to joining the Medical University of South Carolina (MUSC), Dr. Singh was a postdoctoral fellow at the University of South Carolina where his research focused on stroke-induced visuomotor deficits. He earned his Ph.D. in motor control and biomechanics at the Pennsylvania State University. His other research interests are in computational modeling and integrating technologies to address novel clinical questions in stroke-related movement disorders. At MUSC, he will develop electrophysiological techniques to address questions on corticomuscular integration.

Welcome to the team, Tarkesh!

Eric Monsch, PT, DPT, C/NDT Research Physical Therapist



Eric Monsch is the newest member of the Locomotor Rehabilitation Research faculty, in the QBAR Core. He is a Doctor of Physical Therapy with primary appointment to the

Department of Health Sciences and Research, and a secondary appointment to the Department of Health Professions, Physical Therapy Division, within the College of Health Professions. Within the Department of Health Sciences and Research, Eric will work primarily as a research physical therapist on projects within the Locomotor Rehabilitation Research team. Daily responsibilities will include screening and assessing subjects, supervising daily protocol sessions, and assisting in program management. Eric's responsibilities outside the research department include teaching in the Doctor of Physical Therapy program and an administrative role in the Physical Therapy Neurologic Residency program.

Welcome to the team, Eric!



John Buford, PT, PhD, presents his research related to neural control of movement to COBRE investigators.



Sook-Lei Liew, OTR/L, PhD, and Colleen Hanlon, PhD, record a discussion for the National Center of Neuro-modulation for Rehabilitation.

PUBLICATON HIGHLIGHT

Microvascular basis for growth of small infarcts following occlusion of single penetrating arterioles in mouse cortex.

Taylor ZJ, Hui ES, Watson AN, Nie X, Deardorff RL, Jensen JH, Helpern JA, Shih AY

Abstract

Small cerebral infarcts, i.e. microinfarcts, are common in the aging brain and linked to vascular cognitive impairment. However, little is known about the acute growth of these minute lesions and their effect on blood flow in surrounding tissues. We modeled microinfarcts in the mouse cortex by inducing photothrombotic clots in single penetrating arterioles. The resultant hemodynamic changes in tissues surrounding the occluded vessel were then studied using *in vivo* two-photon microscopy. We were able to generate a spectrum of infarct volumes by occluding arterioles that carried a range of blood fluxes. Those resulting from occlusion of high-flux penetrating arterioles (flux of 2 nL/s or higher) exhibited a radial outgrowth that encompassed unusually large tissue volumes. The gradual expansion of these infarcts was propagated by an evolving insufficiency in capillary flow that encroached on territories of neighboring penetrating arterioles, leading to the stagnation and recruitment of their perfusion domains into the final infarct volume. Our results suggest that local collapse of microvascular function contributes to tissue damage incurred by single penetrating arteriole occlusions in mice, and that a similar mechanism may add to pathophysiology induced by microinfarcts of the human brain.

NATIONAL REHABILITATION AWARENESS

The mission of the National Rehabilitation Awareness Foundation (NRAF) is to educate people about the benefits and impact of rehabilitation, develop programs that aim to increase opportunities for the nearly fifty million Americans with disabilities, and help those who are disabled live up to their fullest potential.

Visit <http://rehabweek.com/rehab/about.cfm> to learn more.



Recent Meetings

Tuesday, September 27 | COBRE Internal Advisory Committee Meeting

Thursday, September 29 | COBRE External Advisory Board Meeting

Upcoming Meetings

Thursday, October 13 | COBRE Executive Committee/Junior Investigator Meeting

Thursday, November 10 | COBRE Executive Committee/Junior Investigator Meeting

Thursday, December 8 | COBRE Executive Committee/Junior Investigator Meeting

Please contact Mara Steedley for additional information for COBRE meetings.

Conferences/Workshops

Monday – Friday, October 24-28 | NM4R Level I Workshop

[For more information](#)

Tuesday—Wednesday, November 1-2 | NIH/NINDS Workshop, “Translational Stroke Research: Vision and Opportunities”

Thursday-Friday, November 10-11 | American Society of Neurorehabilitation Annual Meeting, Marriott Mission Valley—San Diego, CA

[For more information](#)

Opportunities

Wednesday, January 18, 2017 | COBRE in Stroke Recovery: Poster Presentation

PROFESSIONAL MILESTONES

Mark Bowden, PT, PhD, was named Director of the Division of Physical Therapy in the Department of Health Professions within the College of Health Professions effective January 1, 2017.

Heather Bonilha, PhD, CCC-SLP, was named the new Medical Director for the Evelyn Trammell Institute for Voice and Swallowing which is associated with the Department of Speech Language Pathology at MUSC.

COBRE Funded Grants

Principal 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
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

COBRE Affiliated – Active Grants

Principal Investigator	Title	Funding Agency	Project Dates	Total Funding
Adams, Robert	Strategically Focused Disparities in Cardiovascular Disease Research Network	AHA	06/01/15-05/31/19	\$3,709,200
Bonilha, Leo	Brain Connectivity Supporting Language Recovery in Aphasia	NIH/ NIDCD	06/10/14-05/31/19	\$1,672,440
Bowden, Mark	Augmentation of Locomotor Adaptation Post-stroke	VA/RRD	07/01/13-06/30/18	\$923,700
Dean, Jesse	Influence of Lateral Stabilization on Walking Ability Post-stroke	NIH R21	04/01/16-03/31/18	\$164,603
Dean, Jesse	Post-stroke Contributors to Increased Energetic Cost and Decreased Gait Stability	VA/RRD	10/2012-09/2016	\$639,100
Feng, Wayne	ASPIRE: Adult Spasticity International Registry on BOTOX Treatment	Allergan, Inc.	09/03/14-03/31/19	\$99,090
Feng, Wayne	Prediction and Imaging Biomarker for Post-stroke Motor Recovery	AHA	01/01/14-12/31/17	\$308,000
Feng, Wayne/ Woodbury, Michelle	The Halo-MUSC Motor Stroke Rehabilitation Clinical Trial	Halo Neuro-sciences	02/01/15-01/30/17	\$286,769
George, Mark/ Bonilha, Leo	Transcranial Direct Current Stimulation to Treat Aphasia: Phase II-Trial	NIH/ NIDCD	04/17/12-04/01/17	\$2,021,848
Grattan, Emily	Unilateral Spatial Neglect and Function: A Collaborative Project to Link Stroke Research, Education and Clinical Practice	CHP Seed Grant	07/01/16-06/30/17	\$8,550
Grattan, Emily	Examining the Effects of Transcranial Direct Current Stimulation and Task-specific Practice on Cortical Modulation among Individuals with Unilateral Spatial Neglect Post-stroke	NC NM4R	07/01/16-06/30/17	\$36,095
Gregory, Chris	Rural Veterans Telerehabilitation Initiative: RVTRI Stroke	VAMC Rural Health	10/01/15-09/30/16	\$648,050
Gregory, Chris	Skeletal Muscle Plasticity as an Indicator of Functional Performance Post-stroke	VA/RRD	10/01/13-09/30/17	\$1,099,900
Kautz, Steve	Research Career Scientist	VA/RRD	10/2014-09/2019	\$570,000
Kautz, Steve	National Center of Neuromodulation for Rehabilitation (NC NM4R)	NIH/ NICHD	10/01/15-06/30/20	\$5,245,792
Seo, Na Jin	Altering Activation Patterns in the Distal Upper Extremity after Stroke (Subaward)	RIC/NIH	05/01/14-06/30/19	\$293,822
Seo, Na Jin	Delays in Muscle Relaxation: A Novel Approach to Neuromechanism-based Stroke Rehabilitation (Transfer)	AHA	05/01/15-06/30/16	\$138,022

COBRE Affiliated – Active Grants Cont'd

Principal Investigator	Title	Funding Agency	Project Dates	Total Funding
Seo, Na Jin	Development of a Low-cost Computerized Clinical Assessment Tool for Movement Quality (Subaward)	NIH	06/01/15-05/31/16	\$25,414
Shih, Andy	Pericytes as Inducers of Blood-Brain Barrier Injury during Stroke	NIH	02/01/16-01/31/18	\$411,125
Spampinato, Maria	Diffusional Kurtosis Imaging of the Corticospinal Tract and Motor Outcome Prediction in Acute Ischemic Stroke	SCTR	07/27/15-07/26/16	\$60,000
Tomlinson, Stephen	Targeting Complement and Chronic Inflammation after Traumatic Brain Injury	VA/RRD	01/01/17-12/31/18	\$200,000
Tomlinson, Stephen	Novel Therapies to Improve Functional Recovery after Stroke	VAMC	04/01/14-03/31/18	\$1,100,000
Woodbury, Michelle	Patient-targeted Upper Extremity Rehabilitation after Stroke	VA/RRD	04/01/13-03/31/17	\$1,098,100
Woodbury, Michelle	Telerehabilitation in the Home versus Therapy In Clinic for Patients with Stroke	NIH	09/08/15-02/07/17	\$71,426

COBRE Affiliated—New Awards

Principal Investigator	Title	Funding Agency	Total Funding
Adkins, DeAnna	Enhanced Mitochondrial Function to Increase Effectiveness of Post-stroke Rehabilitation	VA/RRD	\$1,000,000
Bowden, Mark	S.C.O.P.E.: Systematic Collection of Objective and Progressive Exercise	HealthSouth	\$8,728
Dean, Jesse	Development of a Novel Rehabilitation Device for the Improvement of Gait Stability	NSF	\$304,896
Dean, Jesse	A Novel Mechanics-Based Intervention to Improve Post-Stroke Gait Stability	VA/RRD	\$941,400
Kautz, Steve	The Effects of Impaired Post-stroke Coordination and Motor Pathway Integrity on Mobility Performance	VA/RRD	\$769,760
Woodbury, Michelle	Establishing the Functional Viability and Dose-response of Duck Duck Punch: A Stroke Rehabilitation Computer Game	RecoVR, Inc./ NIH/NINDS SBIR	\$943,881

COBRE Affiliated—New Grant Applications

Principal Investigator	Title	Funding Agency	Funding Requested
Dean, Jesse	Mechanism-based Strategies to Restore Post-stroke Gait Stability through Targeted Motor Adaptation (R21; Resubmission)	NIH/NICHHD	\$406,581
Grattan, Emily	Improving Measurement and Treatment of Post-stroke Neglect	VA CDA2	\$916,400
Gregory, Chris	Muscle Power Training to Improve Post-stroke Depression	VA Merit	\$1,069,600
Gregory, Chris	Aerobic Exercise to Enhance Cognitive Function in Young Veterans Following stroke	VA Merit	\$1,093,400
Li, Xingbao	Developing a New Non-invasive Tool for Measuring Brain Plasticity in Stroke Patients - Simultaneous Paired Associative PAS/fMRI	NINDS	\$275,000
Seo, Na Jin	TheraBracelet: The First and Only Wearable to Instantly Improve Hand Function	TheraBracelet, Inc./ NIH/NICHHD SBIR	\$101,595
Woodbury, Michelle	Functional Assistance Provided by Myoelectric Elbow-Wrist-Hand Orthosis (FAME)	Myomo, Inc.	\$75,280
Woodbury, Michelle	Punching Ducks to Improve Hemiplegic Arm Movement	VA Merit	\$1,098,500



How Can a Physical Therapist Help?

Physical therapists are part of the stroke rehabilitation team. Rehabilitation begins very soon after a stroke; your physical therapist's main goal is to help you return to your activities at home, at work, and in your community.

After examining you and evaluating your condition, your physical therapist will develop an individualized plan to help you achieve the best possible quality of life. The plan will focus on your ability to move, any pain you might have, and ways to prevent problems that may occur after a stroke.

Visit <http://www.apta.org/> to learn more.

