Center for Biomedical Imaging

Annual Report
FY2025

(issued August 2025)

The Center for Biomedical Imaging provides resources for enabling basic and clinical scientists to discover new insights into normal and disease processes and apply this knowledge to clinically relevant research.

MUSC
MEDICAL UNIVERSITY of SOUTH CAROLINA

Introduction & Background

The Center for Biomedical Imaging (CBI) was established by the Board of Trustees in 2010 as a *University Designated Center* under the direction of the Vice President for Research. This initiative has enabled MUSC to be competitive with other leading academic institutions by developing and maintaining the infrastructure and collaborative environment needed to support advanced biomedical imaging research.

The CBI facilities are located in the 30 Bee Street Building and on the second floor of the Bioengineering Building at 68 President Street. It is administered through the Department of Neuroscience, with administrative offices located on the fourth floor of the Basic Science Building. The CBI is a resource for basic and clinical scientists to discover new information about normal and disease processes and apply this knowledge to clinically relevant research. Central to the mission objectives of the CBI are: 1) service to the MUSC imaging research community, 2) training and mentorship of graduate students and postdocs to help develop future leaders in biomedical imaging, 3) recruitment of outstanding biomedical investigators, 4) discovery of new clinical applications of imaging and their practice in the clinical arena, and 5) promotion of basic research in biomedical imaging and related fields. The CBI's website can be found here.

In fiscal year 2025, the CBI provided imaging support and resources for a total of 53 grants, 27 of which were NIH grants to MUSC (Appendix III). The CBI also supports MUSC faculty by allowing development time to qualified investigators for collaborations and the collection of pilot data. In fiscal year 2025, the CBI underwrote approximately $81K of this development time for MUSC researchers.

Mission Statement:

The mission of the CBI is to provide the leadership and infrastructure in the imaging sciences necessary for basic and clinical scientists to collaborate, to discover new ways to study normal and disease processes, to develop and apply this knowledge to clinically relevant research, and to translate these advances to the patient community while fostering a quality education and training environment.

Vision Statement:

The vision of the CBI is to serve the MUSC community as an integrated and multidisciplinary center for biomedical imaging research with mutually supportive and valued interactions among basic science and clinical departments.

Administration

Leadership:

In FY25, the leadership of the CBI consisted of:

Dr. Jens H. Jensen, Director
Dr. Maria Fatima Falangola, Associate Director of Preclinical MRI

CBI Internal Advisory Committee:

The CBI's Internal Advisory Committee (IAC) comprises the CBI Directors as well as both early stage and senior researchers from across the University. Many of these individuals are experienced in participating in large research programs as well as in the management of shared facilities. The IAC advises the Director on the administrative operation of the CBI, coordinates resources, and ensures that the goals of the CBI reflect the overall priorities of MUSC.

Members of the IAC in FY25 were:

Dr. Stephanie Aghamoosa	Dr. Lisa McTeague
Mr. Joseph Bennett	Dr. Anand Mehta
Dr. Christopher Cowan (Chair)	Dr. Timothy Stemmler
Dr. Maria Fatima Falangola	Dr. Lindsay Squeglia
Dr. Jens Jensen	Dr. Thomas Uhde
Dr. Steven Kautz	Ms. Mary Catherine Williams

CBI leadership holds regular "Advisory Committee Meetings", as well as "Town Hall Meetings" in which all users are able to express their views and opinions. These meetings were held on:

Advisory Committee	**Town Hall**
October 8, 2024	September 17, 2024
February 11, 2025	January 21, 2025
June 10, 2025	May 20, 2025

Business Management:

In FY25, business operations for the CBI were managed by Emily Clark under the supervision of Joseph Bennett and Mary Catherine Williams, who served as the administrative managers for the Department of Neuroscience.

Operations

Faculty & Staff:

The following faculty & staff were fully or partially supported by the CBI in FY25:

Bennett, Joseph	Administrative Manager
Brown, Crystal	Fiscal Analyst
Brown, Josh	Administrative Assistant
Clark, Emily	Grants Administrator
Coatsworth, James	3T MRI Program Manager
Doose, Jayce	Biomedical Engineer
Falangola, Fatima	Assistant Professor, Associate Director of Preclinical MRI
Fleury, Tom	Facilities/Information Manager
Henderson, Scott	3T MRI Program Manager
Hopkins, Sarah	Administrative Coordinator
Jensen, Jens	Professor, Director
Spampinato, Vittoria	Professor, Radiologist
Voltin, Josh	7T MRI Research Specialist
Smalls, Vonetta	Administrative Assistant
Williams, Mary Catherine	Administrative Manager

Human imaging Resources:

Human MRI studies take place in the CBI's 30 Bee St. facility, which houses a 3 Tesla (T) Prisma^{fit} MRI system, four interview rooms, two changing rooms, office space, an electronics lab, and a waiting area for subjects. In FY17, the CBI upgraded the Siemens MAGNETOM Trio 3T MRI system to a Siemens MAGNETOM Prisma^{fit} 3T MRI system. This upgrade has significantly benefited a multitude of National Institutes of Health (NIH) funded researchers, as well as researchers funded from other sources, in the fields of substance abuse, addiction, aging, Alzheimer's disease, Parkinson's disease, attention-deficit hyperactivity disorder, stroke, and basic neuroscience. The scanner operates with a 100% mandate for research and is covered by a Master Research Agreement with Siemens. It is the only research-dedicated human MRI scanner at MUSC, and one of only two research-dedicated human scanners in South Carolina.

The CBI also supports a mock scanner located at 135 Cannon St. This is a full-size replica of the 3T MRI made from plywood and other building materials designed to look and sound like a real

system. It is available for 'trial runs' with patients who are wary of undergoing the full scanning procedure and can be also booked for use as a training or demonstration tool.

Preclinical (Small Animal) Imaging Resources:

The CBI operates and maintains a Bruker BioSpec 70/30 MRI scanner for high-resolution imaging and MR spectroscopy of small animals. This magnet has a field level of 7T and is located on the second floor of the Bioengineering Building. The 7T MRI is ideal for 2D and/or 3D high-resolution anatomical imaging as well as diffusion, flow, cardiac, dynamic contrast, functional, and chemical shift imaging. Adjacent to the scanner is a surgery room that is available to support imaging studies.

The 7T system is 18 years old and no longer fully supported by the manufacturer. The cold head was upgraded in FY20, but the electronics are now past end-of-life and would be difficult to repair. A major upgrade of this system or a replacement scanner may be needed within a few years in order to continue offering animal MRI at MUSC. During the past year, eight funded studies utilized this resource, four of which are NIH grants.

MRI Safety Training:

The CBI staff conducts regular safety training classes for researchers who use CBI resources. Completion of this course is required of all personnel before they are allowed to work in the scanning areas. In FY25, these were held on 7/9/24, 8/19/24, 9/18/24, 10/22/24, 11/19/24, 12/18/24, 1/27/25, 2/26/25, 3/24/25, 4/21/25, 5/14/25, and 6/16/25.

MRI Safety Committee:

The CBI has established an MRI Safety Committee for approving and overseeing safety procedures for both scanners. In particular, ancillary equipment must be evaluated by this committee prior to being used within the scanner suites. The committee members are Jayce Doose (Chair), James Coatsworth, Scott Henderson, and Tom Fleury. In FY25, 1 new ancillary device was approved for operation with the 3T MRI system.

Scheduling:

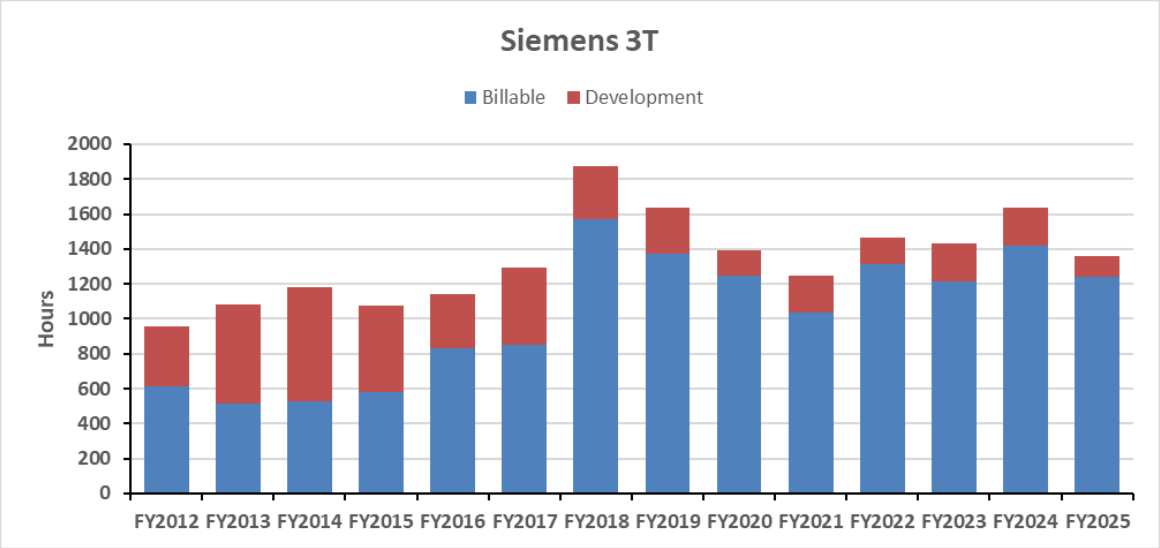
Scheduling of time on imaging systems is performed through a web-based system called Calpendo (https://musc.calpendo.com/) that allows researchers with approved protocols to reserve time for using CBI resources including scanners and interview rooms. Our standard operating hours for the 3T scanners are shown in Appendix II. The 7T animal system is available during normal business hours by appointment.

Cancellation Reduction Incentive Scheduling Program:

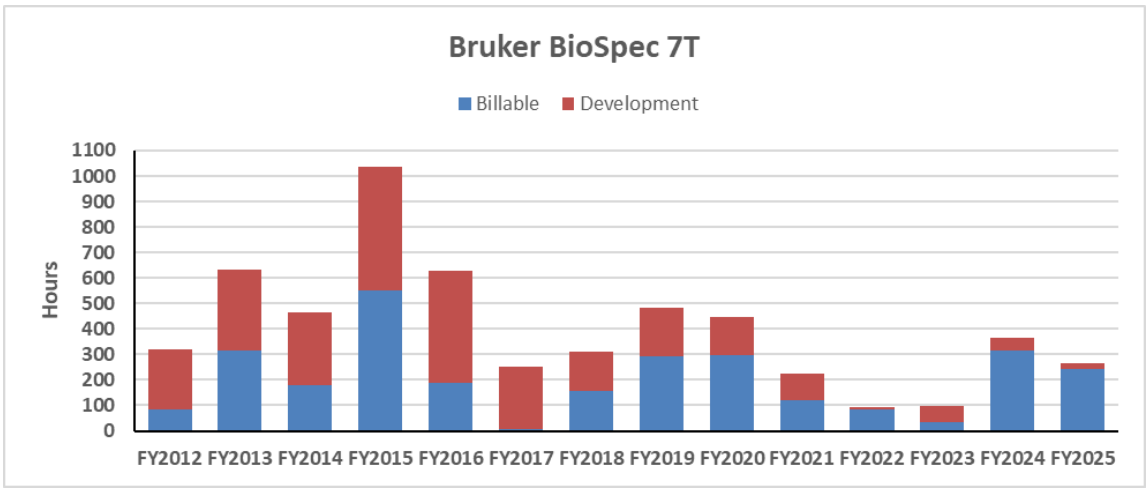
In order to encourage responsible scheduling practices for scans on the 3T MRI system, a

Cancellation Reduction Incentive Scheduling Program (CRISP) was introduced in January of 2020 and updated in January of 2024 to transition from a credit system to a voucher system in which PIs with low cancellation rates are awarded scheduling vouchers for extra slots during Prime Time hours (See Appendix II). In FY25, 57 scheduling vouchers were awarded.

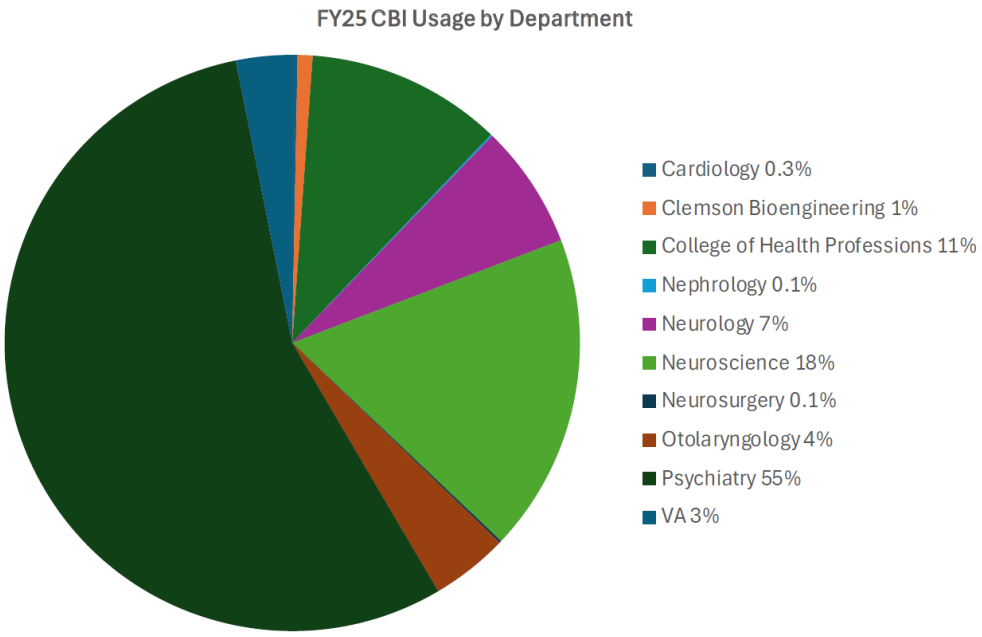
Equipment Usage:



Annual scanner hours used by researchers from FY12 through FY25 on the Siemens 3T MRI system. Development time is free of charge but only for restricted purposes.



Annual scanner hours used by researchers from FY12 through FY25 on the Bruker 7T MRI system.



Breakdown of scanner usage (combined 3T and 7T) by MUSC College of Medicine department or other affiliation. In FY25, the largest user of CBI resources was the Department of Psychiatry and Behavioral Sciences.

Early Stage Investigator Program:

MUSC researchers who qualify as early stage investigators (ESI), according to criteria established by the NIH, are eligible to receive subsidies that partially defray the cost of MRI scans for certain types of small grants. In FY25, the CBI provided a total of $64,675 in ESI subsidies to MUSC faculty and postdocs. This program allows young imaging scientists with limited financial resources to pursue studies that would otherwise be cost prohibitive. No new ESI projects are currently being approved due to financial constraints although already approved ESI projects continue to be supported.

Help Requests:

To support the CBI user community, a web-based ticket system is used to manage help requests. In FY25, the CBI staff successfully responded to approximately 100 individual tickets.

CBI Faculty

The CBI is supported by 7 primary staff and a multidisciplinary group of 22 faculty members representing various clinical and basic science departments at MUSC. Collaboration among faculty in the development of new and cross-disciplinary methodologies is strongly encouraged.

Faculty members contribute imaging-related seminar lectures, provide advice to the CBI leadership, and generally promote the overall well-being of the CBI. They are expected to take part in regularly scheduled CBI seminars, which provide a forum for researchers to have in-depth technical discussions. Faculty members are expected to give lectures on their research to the CBI community every few years if requested. The CBI faculty for FY25 are listed below:

Aghamoosa, Stephanie, PhD	Assistant Professor	Health Sci. & Research
Badran, Bashar, PhD	Associate Professor	Psychiatry
Benitez, Andreana, PhD	Associate Professor	Neurology
Borckardt, Jeffrey, PhD	Professor	Psychiatry
Kevin Caulfield, PhD	Assistant Professor	Psychiatry
Andrew Chen, PhD	Assistant Professor	Public Health Sciences
Dias, James, PhD	Assistant Professor	Otolaryngology
Falangola, Maria, MD/PhD	Assistant Professor, Assoc. Dir.	Neuroscience
George, Mark, MD	Distinguished University Prof.	Psychiatry
Harris, Kelly, PhD	Professor	Otolaryngology
Heise, Kirstin-Friederike, PhD	Assistant Professor	Health Sci. & Research
Jenkins, Dorothea, MD	Professor	Pediatrics
Jensen, Jens, PhD	Professor, Director	Neuroscience
Joseph, Jane, PhD	Professor	Neuroscience
Li, Xingbao, MD	Associate Professor	Psychiatry
McTeague, Lisa, PhD	Associate Professor	Psychiatry
Prisciandaro, James, PhD	Professor	Psychiatry
Revuelta, Gonzalo, DO	Professor	Neurology
Roberts, Donna, MD	Professor	Radiology
Rowland, Nathan, MD/PhD	Associate Professor	Neurosurgery
Spampinato, Vittoria, MD	Professor	Radiology
Squeglia, Lindsay, PhD	Professor	Psychiatry

Education

CBI Seminars:

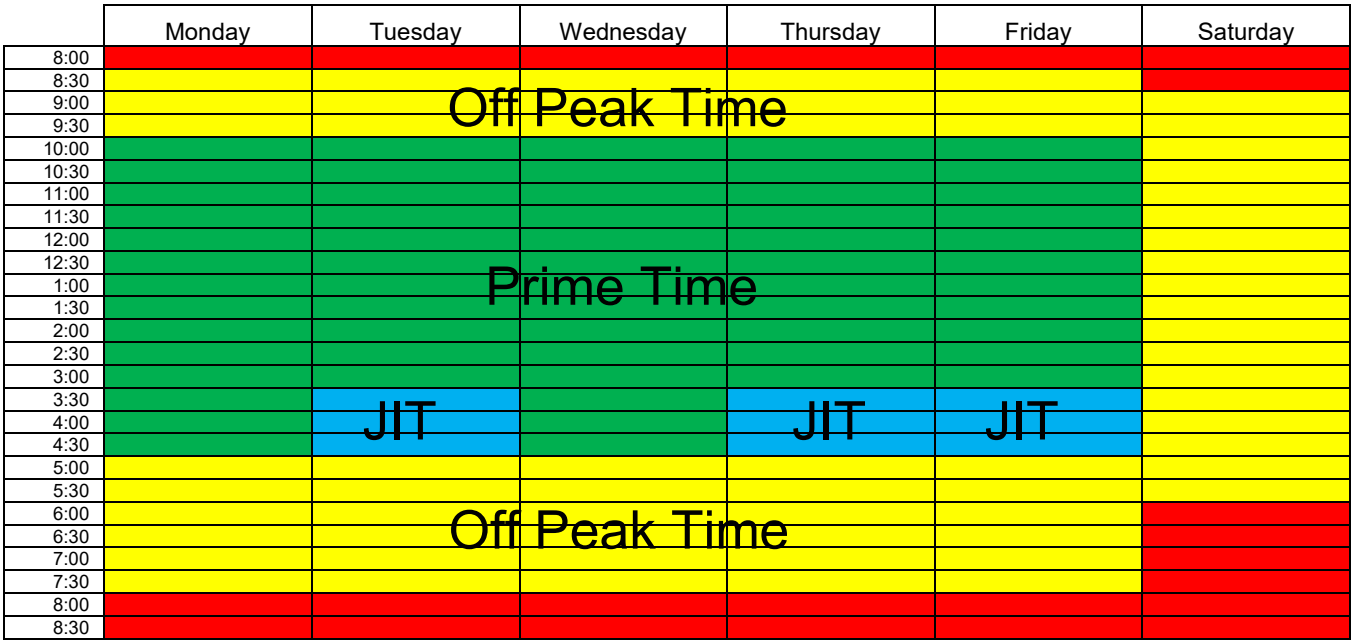
The CBI regularly hosts lectures given by both visiting speakers and MUSC investigators. For the past year, these were organized by Drs. Kelly Harris and Lisa McTeague. CBI seminars for FY25 are listed below:

Date	Presenter	Title	Institution
9/13/24	Dr. Gonzalo Revuelta	Imaging Biomarkers of Freezing of Gate Response to Deep Brain Stimulation	MUSC
10/9/24	Dr. Louise Mewton	Using Population Science to Inform Neuroscience	University of Sydney, Australia
11/13/24	Dr. Dale Mugler	The Many Clinical Applications of Magnetic Resonance Spectroscopy	MUSC
12/11/24	Dr. Nicholas Balderston	Using Precision Neuromodulation and Threat to Understand the Mechanisms of Anxiety Expression and Regulation	University of Pennsylvania
1/8/25	Dr. Ingrid Johnsrude	Using fMRI to Study Engagement and Disengagement with Speech in Noise	Western University, Canada
2/12/25	Dr. Lucina Uddin	Brain Dynamics and Flexible Behaviors	University of California Los Angeles
3/12/25	Dr. Leonard Tozzi	Brain-Circuit Biomarkers for Precision Psychiatry of Depression and Anxiety	Stanford University
5/14/25	Dr. Dani Bassett	Control Strategies in Human Brain Networks	University of Pennsylvania

Appendix I: End-of-Year Budget FY25

FY25 EOY Budget				
Budget Category	**Admin**	**3T**	**7T**	**TOTAL**
Revenue				
Operating Revenue	0	831,025	56,650	887,675
42010:Sales and Services		831,025	56,650	
44010:Other Operating Revenues		0	0	
Non-Operating Revenue	-77.87	-3750.3	0	-3,828
45090:Internal Transfers	-77.87	-3750.3	0	
Other Revenue	0	0	0	0
Total Revenue	-78	827,275	56,650	883,847
Expenses				
Salaries and Fringe Benefits	0	560,694	99,152	659,846
60010:Payroll - Earnings		387,771	68,613	
60020:Payroll - Benefits		172,923	30,539	
Materials, Supplies and Services	0	248,302	37,799	286,101
61010:Services		219,119	37,227	
61020:Medical/Pharmaceutical Supplies		-18.10		
61050:Other		7,928.38		
61090:Meals & Travel		284.95		
62020:Supplies - Medical		13,452.13	182.07	
62030:Supplies - Non-Medical		7,535.60	389	
Facility Related Expenses	0	1,647	0	1,647
61040:Insurance				
61060:Leases				
61080:Utilities		1,647.29		
Total Expenses	0	810,643	136,951	947,594
% of Total Expenses	*22%*	*67%*	*11%*	
Net Income	**($78)**	**$16,632**	**($80,301)**	**($63,747)**

Appendix II: Operating Hours for Prisma 3T



PRIME TIME	JUST-IN-TIME (JIT)	OFF-PEAK TIME
Mon & Wed, 10:00am - 5:00pm; Tue, Thur & Fri, 10:00am - 3:30pm	Tue, Thur, & Fri, 3:30 – 5:00pm	Mon - Fri, 8:30 - 10:00 am Mon - Fri, 5:00 - 8:00 pm Sat, 9:00 am – 6:00 pm
Maximum of two bookings per week per study.[1]	Maximum of two (Prime Time + Just-In-Time) bookings per week per approved study.[1]	No limits on scheduling billable scans.
Can only be used for billable scans.[1]	Can only be used for billable scans.[2]	Max of 2 hours of Dev Time per week per PI.[4,5]
	Requires preapproval to utilize.[3]	

1) ***Any scan that begins or ends during Prime Time and JIT hours will count toward the two bookings/week limit. If not booked within one week of table time, Prime Time slots will be made available to any study. If JIT slots are not booked within 72 hours of table time, these will be made available to any billable study. The use of scan time under these conditions will not count toward weekly booking limits for billable studies.***
2) ***Just-In-Time may also be used for Development Time, but only if scheduled on the same day as the scan.***
3) ***Approval may be requested by emailing cbi@musc.edu. Your request must explain why your protocol needs Just-In-Time scheduling based upon the specific requirements of your protocol and not just a desire to use this mechanism for the sake of convenience.***
4) ***PI must be approved by CBI. More information may be obtained by emailing cbi@musc.edu.***
5) ***Two-hour weekly limit on Development Time also includes time scheduled under notes 1) and 2) above.***

Appendix III: Grants Supported by CBI for FY25

†7T study

PI	Funding Source	Grant Title
Andreana Benitez	**NIA**	Transcranial Magnetic Stimulation for MCI: A Phase II Dose-Response Study
Andreana Benitez	**NIA**	Quantitative Neuroimaging Assessment of White Matter Integrity in the Context of Aging and AD
Bashar Badran/Jeffrey Borckardt	**MUSC Blue Sky Award**	Ehlers-Danlos Syndrome - tAN
Bashar Badran/Jeffrey Borckardt	**NINDS**	Determining the independent and synergistic effects of transcutaneous auricular neurostimulation (tAN) on direct brain activation in healthy individuals
Bashar Badran/Jeffrey Borckardt	**NINDS**	Evaluating the specific role of endogenous opioids as the mechanism underlying tAN-based analgesia in healthy individuals
Olga Brawman-Mintzer	**VA**	Alzheimer's Disease Neuroimaging Initiative 4
Kevin Caulfield	**NINDS**	Ultrasound to the hippocampus
James Dias	**Hearing Health Foundation**	Neural Determinants of Age-Related Change in Auditory-Visual Speech Processing
Jens Jensen/Fatima Falangola	**NIA**	†Diffusion and Functional MRI Monitoring of Therapy Response in AD Mouse Model
Hongkuan Fan	**NIA**	†The Role of Pericytes in Brain Hypoperfusion in Alzheimer's Disease Development
Mark George	**The George Institute**	The Randomized Controlled Trial of Frontal and Temporal Electroconvulsive Therapy (ECT) for Severe Depression (The RAFT ECT Study)
Mark George	**Other**	Clinical Feasibility of Low Intensity Focused Ultrasound Pulsation for the Treatment of Generalized Anxiety Disorder
Chris Gregory	**VA**	Enhancing Mobility and Psychosocial function in Obese Veterans via Weight loss and Exercise (EMPOWER)
Chris Gregory	**NICHD**	Combining rTMS & aerobic exercise to treat depression and improve post-stroke walking

Parneet Grewal	**National Center for Neuromodulation for Rehabilitation**	Accelerated rTMS for Post-Stroke Apathy: Targeting Amotivation Toward Improving Whole Health and Rehabilitation Engagement
Kelly Harris	**MUSC Translational Team Science**	Neural Determinants of cochlear implant success
Amber Jarnecke	**SCTR**	Examining the Neural Processes Underlying Social Reward for Individuals with PTSD and Trauma-resilient Individuals
Amber Jarnecke	**NIAAA**	Identifying the Neurobehavioral Signature of Individuals with AUD and Comorbid PTSD
John Kindred	**VA**	Neuromodulation for Rehabilitation of Post-stroke Fatigue: An rTMS Pilot Study
Anna Kirkland	**NIAAA**	The effects of adolescent alcohol use on oral microbiota and the brain
Daniel Lench	**NINDS**	A Neural Basis for Cognitive Decline Following Deep Brain Stimulation
Allison Lewis	**NICHD**	Operant conditioning of the wrist extensor motor evoked potential to target corticospinal plasticity and upper limb motor recovery after cervical spinal cord injury
Xingbao Li	**NIDA**	RTMS targets to neural circuity for smoking cessation
Andrew Manett	**Psychiatry Chairman's Research Development Fund**	Tracking Brain Biomarkers and Renormalization Associated with Antidepressant Transcranial Magnetic Stimulation Therapy
Carolyn McClaskey	**Hearing Health Foundation**	Age and Hearing-Loss Effects on Subcortical Envelope Encoding
Lisa McTeague	**NIAA**	MPFC Theta Burst Stimulation as a Treatment Tool for Alcohol Use Disorder: Effects on Drinking and Incentive Salience
Lisa McTeague	**NIAAA**	ARC: Targeting the Shared Substrates of Alcohol Misuse and Cognitive Impairment: Accelerated rTMS for Older Adults with Alcohol Use Disorder
Lisa McTeague	**DOD**	RECOVERS – Realigning Emotion and Cognition Via precision Regulation networks
William Mellick	**NIAAA**	Effects of a Novel mGluR5 Negative Allosteric Modulator on Alcohol Drinking, Neurochemistry, and Brain Reactivity to Alcohol Cues in Alcohol Use Disorder

William Mellick	**NIAAA**	An Investigation of Reward Brain Circuitry Structure and Function in Individuals with Co-Occurring Alcohol Use Disorder and Bipolar Disorder and Their Unaffected Offspring
Brandon Miller	**NICHD**	†IGF-1 and Innate Immunity in Neonatal Brain Injury
Jacobo Mintzer	**Eisai Inc.**	A Placebo-Controlled, Double-Blind, Parallel-Treatment Arm, 216 Week Study to Evaluate Efficacy and Safety of Treatment with BAN2401 in Subjects with Preclinical Alzheimer's Disease and Elevated Amyloid (A45 Trial) and in Subjects with Early Preclinical Alzheimer's Disease and Intermediate Amyloid (A3 Trial)
Jacobo Mintzer	**VA**	Long-Term Nicotine Treatment of Mild Cognitive Impairment
Bashar Badran/Xiaolong Peng	**Spark Biomedical**	Mastoid tAVNS-fMRI
Xiaolong Peng	**Bob Sammons Clinical TMS Grant**	Tracking Brain Imaging Changes in Depression over Clinical Accelerated TMS Therapy at the Individual Level
Xiaolong Peng	**COBRE CNDD Pilot**	Developing Brain Imaging Biomarkers to Quantify the Effects of At-home taVNS Treatment in ASD
James Prisciandaro	**NIDA**	Gabapentin for Restoring GABA/Gultamate Homeostasis in Co-occurring Bipolar and Cannabis Use Disorders: A Randomized, Double-blind, Placebo-controlled, Parallel-Group, Clinical MRI Study
Gonzalo Revuelta	**NINDS**	Imaging Biomarkers of Freezing of Gait Response to Deep Brain Stimulation
Gonzalo Revuelta	**Ono Pharmaceutical**	A Phase 2, Double-Blind, Placebo-Controlled, Parallel-Group Study to Assess the Safety, Tolerability, Pharmacokinetics, Pharmacodynamics, and Potential Efficacy of Multiple Doses of ONO-2808 in Patients with Multiple System Atrophy (MSA)
Gonzalo Revuelta	**Murray Center for Research on Parkinson's Disease**	Accelerated TMS for FOG
Federico Rodriguez-Porcel	**Amylyx Pharmaceutical**	AMX0035 and Progressive Supranuclear Palsy

Rodney Schlosser	**NIDCD**	Olfactory Dysfunction in Aging Adults
Chris Sege	**NIMH**	Modeling and Modulating Mechanisms of Escape, Avoidance, and Approach in the Anxiety Disorder Spectrum
Chris Sege	**Brain & Behavior Research Foundation**	Modulating Escape in the Anxiety Disorder Spectrum: Targeting the Direct Neural Mediator Using Transcranial Focused Ultrasound
Na Jin Seo	**NICHD**	Concomitant Sensory Stimulation During Therapy to Enhance Hand Functional Recovery Post Stroke
Lindsay Squeglia	**NIAA**	Mentoring Clinical Investigators in Patient-Oriented Adolescent Alcohol Research
Lindsay Squeglia	**NIDA**	The Adolescent Brain Cognitive Development (ABCD) Study
Aiko Thompson	**The Doscher Neurorehabilitation Research Program**	Operant Conditioning of Motor Evoked Potential to Transcranial Magnetic Stimulation to Improve Motor Function Recovery after Spinal Cord Injury
Stephen Tomlinson	**VA**	†Role of Complement in TBI
Shangping Wang	**Clemson University Funding**	Ice-free Cryopreservation with Nanowarming for Banking of Viable Meniscal Transplants
Janina Wilmskoetter	**NIDCD**	To Assess Comparable Efficacy of Aphasia Therapy Administered via Telerehab (Aphasia Remote Therapy; Art) to Aphasia Therapy Administered in Clinic (In-Clinic Therapy; I-CT).
Yongren Wu	**NIGMS**	†Estrogen Effect on Beak Ligament Structure-Function Relationship in Thumb Basal Joint

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