

Letters from the Institute

JEFFERSON MOSS REHABILITATION RESEARCH INSTITUTE

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- 1 Message from the Director
- 2 Letter From Former Postdoc Charlene Lee, PhD
- 2 Institute Welcomes New Faculty Member
- 3 Movement Science
- 4 Language and Communication
- 5 Cognition, Behavior and Emotion
- 5 Our Newest Postdoctoral Fellows
- 6 2025 Accomplishment Highlights
- 7 Celebrating 25 Years of the Research Registry



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Message from the Director



Our Institute enters 2026 with strong momentum. Last year, our faculty, trainees, clinician-researchers and collaborators published 48 peer-reviewed papers and delivered over 60 scientific presentations worldwide, advancing neurorehabilitation research from basic mechanisms to clinical trials. Our intellectual community thrives through visiting scholars, Scientists in Residence and robust postdoctoral training. We are proud that our research assistants and postdocs advance to graduate programs and faculty positions nationally and internationally.

In 2025 we welcomed faculty member Andrew Persichetti, PhD, from the NIH Intramural Research Program, whose neuroimaging expertise strengthens our work in cognition, language and communication while growing our research core infrastructure. We continue to win and renew competitive federal grants, and our funding portfolio now includes the National Science Foundation, highlighting our leadership in both translational and clinically applied research.

Innovation remains a hallmark across our Centers and Programs: new psychosocial interventions in aphasia, continued national leadership in the Traumatic Brain Injury Model System, expansion of the Klein Family Parkinson's Rehabilitation Center and 25 years of patient engagement through our Research Registry. These efforts, grounded in clinical/research integration, support Jefferson Moss-Magee Rehabilitation – Elkins Park's recognition among the nation's top rehabilitation hospitals.

Looking ahead, we are expanding research integration across Jefferson Health, including Jefferson Moss-Magee Rehabilitation – Center City and Riverfront locations, while deepening collaborations across Thomas Jefferson University and affiliated Global Centers. These partnerships, together with growing engagement with the Office of Innovation, position us to extend the real-world impact of our science. As we develop enhanced data science capabilities, we see tremendous opportunities in AI for health care and research.

I am grateful to our dedicated staff, collaborators and donors whose support makes this work possible. I look forward to the discoveries we will achieve together in the year ahead.

Sincerely,

Dylan J. Edwards, PhD

*Nancy Wachtel Shrier Director, Jefferson Moss Rehabilitation Research Institute
Professor, Rehabilitation Medicine, Thomas Jefferson University*

Letter From Former Postdoc Charlene Lee, PhD



Growing up, I became fascinated by how humans are capable of processing complex symbolic systems like language seemingly effortlessly. It was not until my senior year that I realized that what I was interested in could be studied in more scientific ways in linguistics and psychology.

I wanted to learn more about how language interconnects with other sensory-motor systems. At the time, Dr. Laurel Buxbaum had a research line that focused on embodied cognition and how different types of actions may differentially constitute meaning representations. I was very drawn to this hypothesis. I was fortunate to have the opportunity to work as a postdoctoral fellow with Dr. Buxbaum at the Institute to learn more about this topic.

Everyone in the lab was very friendly and professional. It was a very collegial lab. I still remember the help Dr. Solene Kalenine gave me when I first got to the lab, and those afternoons when people grabbed a cup of coffee and drew new ideas on the whiteboard!

Dr. Buxbaum gave us room to sharpen our skills and catch up on the literature that we may not be as familiar with, and she provided the help and resources that we needed. She is also very fun to be with, and her passions for science and music are very inspiring to me.

The research training I got from the Institute was very solid and had a great influence on me. Working there gave me many opportunities to interact with people from various disciplines and to observe how people from different disciplines communicate and collaborate. These kinds of multidisciplinary experiences are very helpful in my current position.

Now, I am an Associate Professor at National Taiwan University (NTU) and currently serve as the Head of the Graduate Institute of Linguistics. I also hold joint appointments with the Department of Psychology and the Graduate Institute of Brain and Mind Sciences, and I am a member of the NTU Neurobiology and Cognitive Neuroscience Center. My work primarily focuses on research in language processing, advising graduate students and teaching. I also serve as an Associate Editor for *Psychophysiology*.

Sincerely,

A handwritten signature in cursive script that reads "Chia-Lin Lee".

Chia-Lin (Charlene) Lee, PhD

Institute Welcomes New Faculty Member Andrew Persichetti, PhD



Our Institute continues to grow and thrive, and last spring we were pleased to welcome Andrew Persichetti, PhD, to the Institute. He joined us as Director of the Memory and Perception (MAP) Laboratory.

Dr. Persichetti received his PhD from Emory University under the mentorship of Daniel Dilks, PhD. His PhD work focused on how people recognize places and navigate within and between them. In his dissertation, Dr. Persichetti used data from several neuroimaging and behavioral experiments to demonstrate that recognizing places and navigating through them are distinct cognitive functions supported by dissociable neural systems.

After receiving his PhD, Dr. Persichetti accepted a postdoctoral research fellowship in the Section on Cognitive Neuropsychology within the Laboratory of Brain and Cognition

at the National Institute of Mental Health. Under the supervision of Alex Martin, PhD, his work focused on how knowledge about the world is represented in the human mind and brain.

In addition to his theoretical work, Dr. Persichetti also worked on advancing fMRI methods so we can better characterize individual differences in functional brain networks and noninvasively measure brain responses in humans that are closer to the single-neuron measurements achieved in animal models. For example, Dr. Persichetti was awarded a K99/R00 grant from the National Eye Institute to support his work using high-resolution fMRI methods to probe cortical layers in the human brain.

Now, as the Director of the MAP Laboratory, Dr. Persichetti will continue his basic science research with an eye toward informing rehabilitation efforts in individuals with different types of topographical disorientation, agnosia and aphasia due to stroke or neurodegenerative disease. ▲

Movement Science

NSF Awards Funding for Novel Research on How Our Brains Estimate Body Position

To successfully navigate through the world, our brain needs to know where our body is and how our body's position changes as we move. Amanda S. Therrien, PhD, has been awarded a Standard Grant from the National Science Foundation (NSF) to conduct an innovative study that will help us better understand the processes our brains use to estimate where the body is in space and how sensory predictions and perceptions may influence movement.

Dr. Therrien directs the Sensorimotor Learning Laboratory at Jefferson Moss Rehabilitation Research Institute and is an Assistant Professor of Rehabilitation Medicine at Thomas Jefferson University. As Principal Investigator, she will lead this three-year grant, titled "The Role of Sensory Predictions in Updating Perception and Action," beginning in August of this year. This grant is the first-ever NSF grant awarded to an investigator at our Institute, and the project will contribute to answering longstanding questions in the field about how the brain combines predictions and feedback signals to estimate body position and how it changes with movement (i.e., the body state).

Feedback from our senses, particularly vision and proprioception, constantly provides the brain with information on our body state. However, these sensory systems process information relatively slowly, so the information our brain receives about our body position is always delayed in time. To compensate for the time delay, researchers have hypothesized that the brain generates predictions of the sensory consequences of movements to anticipate and correct errors before sensory feedback is available.

Dr. Therrien's research aims to shed light on how the brain combines predictions and feedback signals to estimate the body's state. This dynamic process is something we all experience every day. Our sensory predictions must constantly be updated when the physics of our bodies and our surroundings change — for example, when you put on a heavy coat or suddenly step on a slippery surface.

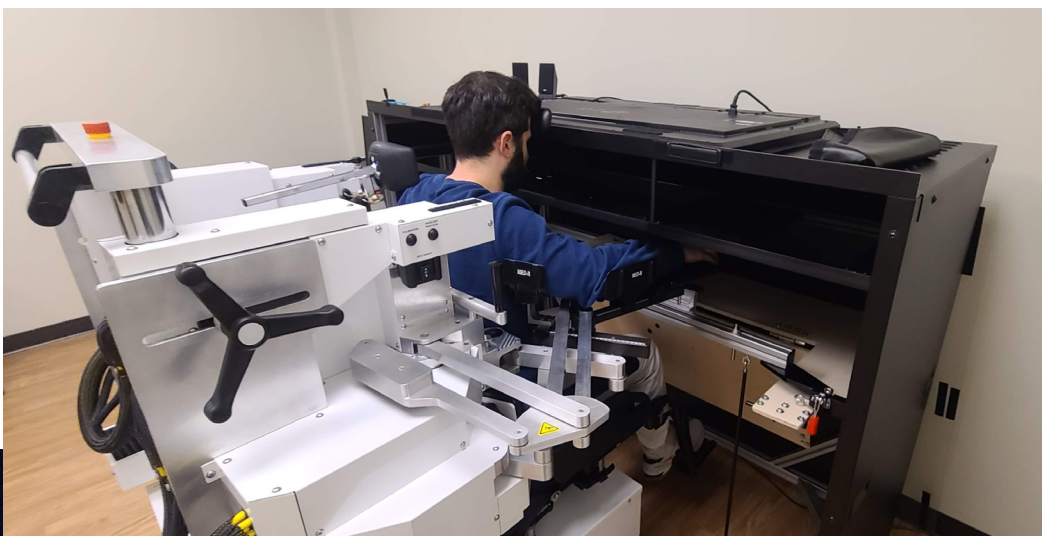
Sensory predictions are kept up to date through a learning process called motor adaptation. By updating sensory predictions, motor adaptation has the effect of altering movement. Growing evidence suggests that sensory perception also changes after motor adaptation, but it is unclear whether this perceptual update is also driven by learning new sensory predictions or another sensory updating process.

The research funded by this NSF award is designed to answer three important questions:

1. Do sensory predictions differently inform our perceptions of body position versus movement?
2. Do updated sensory perceptions show similar characteristics to updated movements following motor adaptation (e.g., context dependence)?
3. Do updated sensory perceptions following motor adaptation themselves meaningfully impact our movement?

Results from this research will provide valuable insights into the circumstances under which sensory predictions contribute to body state estimates and sensory perception, and Dr. Therrien's findings could potentially change our current theoretical models of how these signals influence movement.

This line of research is relevant for advancing our fundamental understanding of the neural control of movement, but it also has implications for rehabilitation in individuals with neurological conditions. We know that the ability to make accurate sensory predictions is impaired in individuals who have had a stroke or have cerebellar ataxia, a condition in which damage or dysfunction in the cerebellum results in poor balance, coordination and muscle control. Improving our knowledge of how information from different sources is integrated by the brain to influence movement may help identify new approaches for neurorehabilitation in the future. ▶



Language and Communication

Dr. Marja-Liisa Mailend Continues Innovative Research on Entrainment Practice for Aphasia

The Speech & Language Recovery Laboratory, led by Dr. Marja-Liisa Mailend, is concluding a clinical trial titled “Efficacy and Optimization of Speech Entrainment Practice for People with Aphasia.” This project, funded by the NIH and the Albert Einstein Society, aimed to evaluate and refine a promising treatment technique, termed Speech Entrainment Practice, for people with aphasia. Aphasia is an acquired language deficit that affects approximately 2.5 million Americans. By disrupting communication, its impact is felt in almost all human relationships and activities of daily living. Various treatments exist that promote language recovery in aphasia, but substantial communication challenges typically persist even after therapy ends. The focus of this project is a promising yet nascent approach for remediating speech production difficulties – speech entrainment.

Speech entrainment refers to the act of speaking in unison with a model speaker by imitating her speech (and accompanying mouth-movements) in real time. The study investigated the direct impact of a single intensive treatment session of speech entrainment on participants’ ability to produce speech independently. Additionally, it explored which treatment conditions might enhance the effectiveness of this treatment approach.

Findings showed that one session of speech entrainment led to improved independent speech production 24 hours after treatment. Gains were more pronounced in trained stories compared to untrained ones, strengthening the interpretation that improvements were treatment-related. The study also compared two delivery modes: audiovisual and auditory-only. Results indicated no significant advantage of one mode over the other. While individual responses varied, differences between conditions were not clinically meaningful. The study further examined training schedules to determine if massed practice (repeating one story consecutively multiple times) or distributed practice (alternating among different stories) yielded better outcomes. Again, no significant differences emerged; participants who improved did so under both conditions.

In summary, speech entrainment – whether auditory or audiovisual – proved effective in enhancing speech production in individuals with chronic aphasia. The lack of significant differences between the studied treatment conditions may suggest that entrainment practice can be individualized within these parameters according to client’s preference and logistical necessities of treatment delivery. The large amount of data that this project yielded allows us to explore many other important questions. For example, what are the characteristics of those who benefit from speech entrainment practice? Which aspects of speech and language can be expected to improve? Dr. Mailend looks forward to addressing these questions in future research studies with the ultimate goal of developing treatment protocols that can be implemented in the clinic to help people with aphasia better recover their communication skills. ▲





Cognition, Behavior and Emotion

Disability Stigma & Traumatic Brain Injury

More than 5 million Americans are living with permanent TBI-related disability related to traumatic brain injury, which can severely impact quality of life. Unfortunately, people with TBI are often socially stigmatized because of their disability. This public stigma may cause people with TBI to believe they are somehow inferior or less worthy than people without disabilities, a phenomenon known as internalized stigma. Umesh Venkatesan, PhD, a researcher at Jefferson Moss Rehabilitation Research Institute, and collaborators wanted to examine the extent to which discrimination, a type of public stigma, is internalized by people living with TBI. The study assessed the potential consequences of internalized stigma on their health and behavior.

In their recent study, Dr. Venkatesan and his colleagues administered questionnaires assessing perceived discrimination and internalized stigma to 84 adults with TBI. Their data suggest that there are different levels of stigma internalization, in that some people with TBI may be more likely than others with TBI to think and feel negatively about themselves when encountering discrimination due to their disability. Additionally, the researchers found evidence of a "why try" attitude, where people with TBI who experience high levels of internalized disability stigma may not even attempt certain tasks or engage in social activities because of a fear of failure. This process could have major health implications for people with TBI, increasingly isolating and alienating them from general society.

Although this study did not test any solutions to public or internalized disability stigma, it highlights a problem that significantly impacts the lives of people with TBI and should be addressed.

"Continued work on internalized stigma ultimately will allow us to develop interventions to help people cope with public stigma and cultivate more adaptive beliefs about themselves. Education and empowerment are critical," says Dr. Venkatesan. He also suggests that support groups and other types of peer support networks may help those with TBI to feel a sense of community belonging and safety, buffering against harmful effects of public stigma like stigma internalization. ▴

By Moriah Cunningham



Welcome to Our Newest Postdoctoral Fellows



Rachana Gangwani, PT, PhD, joined the Institute in January of 2025 and is working with Drs. Laurel Buxbaum and Dr. Shailesh Kantak on an NIH-funded project investigating the disparity between a person's ability to use their affected arm after stroke and the amount they actually use that arm (termed "non-use"). This research will facilitate identification of individuals who are at risk of non-use and inform the development of treatments that address the underlying mechanisms.



Sung-Mu Lee, PhD, started his postdoctoral position in November of 2025 with Dr. Andrew Persichetti to measure layer-specific brain activity using high-resolution 7T MRI. Understanding how information from primary sensory cortices and higher-order brain areas are organized across cortical layers in regions that are involved in perception, memory and learning processes is key for improving our understanding of cognitive function and developing treatments for psychiatric conditions. Dr. Lee will also contribute to imaging projects related to navigation and semantics.



Allie Tracey, PhD, began her postdoctoral position in July of 2025. She is working with Dr. Amanda Rabinowitz to evaluate whether ecological momentary assessment (EMA) is feasible for use in various traumatic brain injury populations. One of the primary goals of this research will be to establish a new collaboration between our Institute's Brain Injury Neuropsychology Laboratory and Nemours Children's Health.



Rachel S. Marbaker, PhD, began working with Dr. Amanda Therrien in November of 2025 on an NSF-funded project examining the processes our brains use to estimate where the body is in space and how sensory predictions and perceptions may influence human movement. She is also interested in exploring the sensory underpinnings for the brain's sense of effort in movement.



2025 Accomplishment Highlights

Dr. Sharon M. Antonucci presented findings on an NIH-funded clinical trial on animal-assisted treatment (AAT) for aphasia at the *Aphasia Access Leadership Summit* and co-facilitated a roundtable about AAT implementation in group aphasia treatment with a colleague at Boston University. Under her direction, the Aphasia Center established academic and clinical collaborations across Jefferson, including with the Sidney Kimmel Medical College, the TJU Speech-Language Pathology Masters Program and Jefferson Moss-Magee Rehabilitation – Riverfront.

Dr. Laurel Buxbaum's lab continues to be funded by two NIH awards. She and a postdoctoral fellow completed research funded by the Klein Family Parkinson's Rehabilitation Center exploring conceptual processing in Parkinson's Disease. Dr. Buxbaum published articles on concept, object and action processing in people with stroke and dementia in *Psychonomic Bulletin & Review*, *Cortex* and *Journal of Neuroscience*. She also contributed an invited chapter on action to the *Encyclopedia of Cognitive Science* and gave invited talks at international meetings.

Dr. Dylan J. Edwards began recruitment for a phase III multisite randomized clinical trial of home-based telerehabilitation for motor recovery after stroke. He is co-leading the trial with Dr. Steven Cramer at UCLA. His Chernowitz Medical Research Foundation funding was renewed to support phase II of a project developing precision targeting for transcranial magnetic stimulation treatment after stroke. Dr. Edwards was also invited to present at multiple international meetings.

Dr. Marja-Liisa Mailend continued her research on an NIH-funded project that investigates the efficacy of speech entrainment practice for people with aphasia and, in collaboration with Dr. Erica Middleton, continued with an Albert Einstein Society (AES)-funded project, which focuses on the generalization of single-word training to connected speech.

Dr. Mailend and collaborators published several research papers in *Cortex* and the *American Journal of Speech-Language Pathology* and gave several presentations at international meetings.

Dr. Erica Middleton and collaborators published several research articles in journals including *Brain Communications*, *Cortex* and *Archives of Physical Medicine and Rehabilitation*. Her work was presented at several national and international meetings. Dr. Middleton continued her NIH- and AES-funded research on the application of fundamental principles of human learning to enhance treatment efficacy and efficiency in aphasia, a disorder in language processing after stroke.

Dr. Andrew Persichetti joined the Institute as Director of the Memory and Perception Lab in the Spring of 2025 and has since welcomed two members to the team. He received an R00 award from the National Eye Institute to fund his lab's work using high-resolution functional MRI to study the human brain. Dr. Persichetti and collaborators also published several papers in peer-reviewed journals over the past year.

Dr. Amanda Rabinowitz was honored with the Mitchell Rosenthal Mid-Career Award from the American Congress of Rehabilitation Medicine in recognition of her contributions to rehabilitation research. Over the past year, her lab also received NIH funding to develop an SMS-based chatbot delivering behavioral activation therapy for individuals with traumatic brain injury, and published a positive randomized clinical trial demonstrating the effectiveness of mobile technology-augmented behavioral activation for treating depression and anxiety after TBI.

Dr. Amanda S. Therrien received a research grant from the National Science Foundation for a project studying the mechanisms underlying sensory plasticity that occurs during adaptive motor learning and welcomed a new postdoctoral fellow

to her lab, who will assist in conducting this work. Dr. Therrien was also invited to present work on the sensory and motor impairments that occur following damage to the cerebellum at the Pennsylvania State University and Johns Hopkins University.

Dr. Umesh Venkatesan was invited to share his work on psychosocial pathways of risk and resilience after TBI at multiple fora, including a lecture for the Brain Injury Association of Pennsylvania's Clinical Forum and a grand rounds presentation for the University of British Columbia Neuropsychiatry Program. Additionally, he was invited to participate in a symposium on aging with neurological disability at the annual meeting of the International Neuropsychological Society.

Dr. John Whyte published several new TBI-related papers focusing on early assessment of mild brain injury and long-term quality of life in those recovering from severe brain injury. He continues multiple collaborations related to the Rehabilitation Treatment Specification System (RTSS), which led to the publication of an RTSS-based reporting guideline and an invited plenary at the Annual Meeting of the American Congress of Rehabilitation Medicine, focused on the impact and future potential of the RTSS.

Dr. Aaron Wong was promoted to Associate Professor in recognition of his research, teaching and service. His lab is wrapping up several NIH-supported studies investigating the impact of left hemisphere stroke on the ability to use tools. Dr. Wong was awarded five more years of NIH funding to continue this work, focusing on impaired recognition of tool-use errors. He also presented research examining how people with Parkinson's disease trade off movement effort for reward (frequently thought to underlie slowed movements) at the Society for the Neural Control of Movement meeting. ▲

Celebrating 25 Years of the Research Registry

Founded in 2000, our Research Registry allows Jefferson Moss-Magee Rehabilitation patients and members of the community to learn about research opportunities that may ultimately benefit them or others. It is a unique and valuable resource for Institute researchers and collaborators. Last year, we celebrated the 25th anniversary of our Research Registry and reflected on the impacts it has had on our research and the people who have made it possible.

To answer important questions about the nervous system and how to advance neurorehabilitation treatments, our researchers recruit volunteers to participate in a wide variety of research studies. The Research Registry allows us to identify individuals who are interested in volunteering for ongoing or future research studies. Individuals who join the Research Registry may have an opportunity to participate in one or more studies that assess speech and language, attention, memory movement and/or emotional well-being. These studies include advanced techniques in neuroimaging, neurophysiology, neurostimulation and robotics, as well as the evaluation of novel treatments and the development of new technology.

Initially, the Research Registry was created by our Institute's co-founders Myrna Schwartz, PhD, and John Whyte, MD, PhD, as a core facility within a large NIH-funded research center led by Dr. Whyte, called The Cognitive Rehabilitation Research Network. The purpose of the Cognitive Rehabilitation Research Network was to advance research related to the cognitive impacts of stroke, traumatic brain injury and other disorders.

As Dr. Whyte explained, "The Network was designed to conduct research in these areas and to support other investigators around the country methodologically. As part of the Network, Dr. Schwartz led the Patient Registry, which sought to facilitate enrollment of interested and well-characterized patients into research studies." Dr. Schwartz reflected that her "most vivid memories of the Research Registry are the hours of discussion" leading up to the establishment of this innovative project. Over the years, the Research Registry has been critical for enrolling participants in studies at our Institute, and it has served as a model for other facilities seeking to accelerate research.

Adelyn Brecher, MS, CCC-SLP, was also involved in the development and organization of the Research Registry, and she succeeded Drs. Schwartz and Whyte as its next Director. Ms. Brecher recalled that she was "most struck by how readily people wanted to participate." It was exciting to work with people who were familiar with the potential benefits of participating in research, including access to treatment from leading clinical researchers, novel therapeutic interventions and continued therapy after insurance coverage for services ended. "Many participants expressed a sense of purpose knowing they were potentially helping improve treatments that might be given to future patients," she said.

Interest in enrolling in the Research Registry has been high, and often the demand from potential participants has exceeded the scope of the studies that are recruiting participants. Jefferson Moss-Magee Rehabilitation clinicians have been instrumental in driving enrollment, and working with clinical colleagues has been very rewarding.

From 2015–2019, the Research Registry was directed by Erica Middleton, PhD. During this time, it continued to grow in terms of size and sophistication. In 2019, the team designed and deployed a new multi-user database for the Research Registry to track and manage interactions with participants for recruitment into our studies. This was a key milestone in the history of the Research Registry. "The database provides information to match participants into appropriate studies, and it features mechanisms for keeping participant characterization and contact methods current," noted Dr. Middleton. Currently, the database is being redesigned and updated to enhance its usability and functionality.

Since 2019, the Research Registry has been directed by Sharon M. Antonucci, PhD, CCC-SLP, and it has undergone further growth and development. "The Research Registry is in a dynamic period of expansion," Dr. Antonucci stated. "Made possible by a dedicated and person-centered staff and the willingness of those who join, the Registry continues to grow to support neurorehabilitation research for new clinical populations as well as to partner with collaborators across the Jefferson Network."

There are now 2,277 members enrolled, including adults aged 20–89 years old with stroke, traumatic brain injury and Parkinson's Disease or Parkinson-like symptoms, as well as individuals without a neurological condition. As we continue to expand and establish new laboratories, the Research Registry may begin recruiting populations with other neurological diagnoses as well. Participation in each research opportunity is completely voluntary, and Research Registry members have contributed to over 200 studies.

The time, effort and dedication of research participants has been critical in our success in advancing knowledge in the fields of neuroscience and neurorehabilitation. For more information about the Institute's Research Registry and how to get involved, please visit the Research Registry webpage Jefferson.edu/RehabResearchOpportunities. ▲



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Jefferson Moss Rehabilitation Research Institute is the research arm of Jefferson Moss-Magee Rehabilitation and provides oversight of rehabilitation research operations, bridging Thomas Jefferson University and Jefferson Health.