



## RESEARCH IN THE DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION

The Department is very proud to be consistently ranked top 3 in NIH funding to physical medicine and rehabilitation programs. Our investigations follow the guidelines set by the NIH Roadmap: medical research should be designed to deepen our understanding of biology, stimulate interdisciplinary research teams, and reshape clinical research to accelerate medical discovery and improve people's health. Trainees of all levels and from a wide variety of departments and specialties have received valuable instruction from our faculty in the various laboratories and shared spaces in UPMC and the University of Pittsburgh.

A number of basic laboratory investigations have led to clinical innovations including:

- Development of advanced biomimetic upper limb prosthetics
- Electrical stimulation used to enhance regenerative capabilities in aged muscle
- Neuroprosthetics and sensorimotor functions
- Brain-computer interface studies to restore hand function
- Ultrasound used to determine rotator cuff changes associated with wheelchair propulsion

The department is at the forefront of national rehabilitation trends in both basic and clinical research.

- Traumatic Brain Injury (TBI)
- Regenerative Medicine
- Neuroprosthetics
- Brain-Computer Interface (BCI)
- Assistive Technology
- Musculoskeletal Regeneration
- Cognitive Studies
- Stem Cell Research
- Spinal Cord Regeneration



Find information about interest groups, clinical electives, and internal and external research opportunities on our website: [rehabmedicine.pitt.edu](http://rehabmedicine.pitt.edu)



## RESEARCH FACULTY AND INTERESTS

### Biostatistics

Gina McKernan, PhD

Assistant Professor, Vice Chair for Data Science & Rehabilitation Analytics  
([gina.mckernan@pitt.edu](mailto:gina.mckernan@pitt.edu))

Dr. McKernan's current research interests include using ML techniques to analyze behavioral and psychosocial outcomes of people with disabilities, creating enhanced data structures by appending socio-geographic and demographic data to existing clinical data, and analysis of randomized controlled trials involving neuro-stimulation and pharmacologics for individuals with stroke, TBI, and other conditions.

Christina K Zigler, PhD, MEd

Associate Professor ([cek53@pitt.edu](mailto:cek53@pitt.edu))

Dr. Zigler is a psychometrician and statistician, and her current research uses rigorous, patient-centered methods to develop and evaluate clinical outcome assessments. She specializes in the design of tools for individuals with chronic conditions and rare diseases so that their voices and the voices of their families can be prioritized in research. Her current research interests include using mixed methods to explore meaningful changes in patient-reported outcome scores, small sample size statistical methods, and anchoring vignettes.

### Brain Injury Research

Corina Bondi, PhD

Associate Professor ([bondico@upmc.edu](mailto:bondico@upmc.edu))

Dr. Bondi's current research focuses on therapeutic strategies, such as pharmacotherapies and environmental enrichment, to improve complex cognitive processing deficits and distinct neurobehavioral and neurochemical alterations relevant to psychiatric disorders after TBI.

Anthony E. Kline, PhD

Professor ([klinae@upmc.edu](mailto:klinae@upmc.edu))

Dr. Kline investigates various therapeutic strategies, such as pharmacotherapies and environmental enrichment, in an attempt to restore function and/or reduce TBI-induced deficits in rodents who have sustained motor and cognitive injury mimicking those seen in people with TBI.

Elvira Pirondini, PhD

Assistant Professor ([elvirap@pitt.edu](mailto:elvirap@pitt.edu))

Dr. Pirondini's research interests include the study of upper limb motor control strategies in humans and animal models, and neuroimaging tools for the design of innovative clinical approaches for rehabilitation in neural disorders.



Amy Wagner, MD

Professor ([wagnerak@upmc.edu](mailto:wagnerak@upmc.edu))

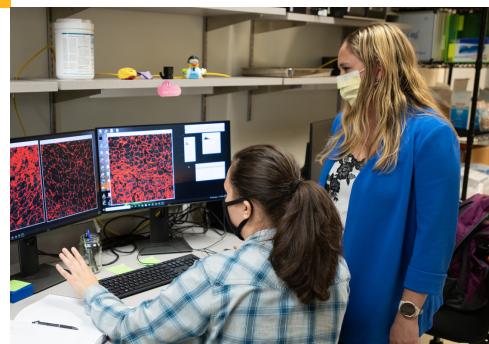
Dr. Wagner investigates the impact of an individual's genetics and biomarkers on treatment and outcome after TBI with the intention of laying solid groundwork for a "personalized medicine" approach to treatment and rehabilitation. She has coined the term "rehabilomics" to define this new field of study that involves the rehabilitation-relevant properties of biomarkers and biologics as related to function, prognosis, treatment, and recovery.

## Musculoskeletal Research

Allison Bean, MD, PhD

Assistant Professor ([beanac2@upmc.edu](mailto:beanac2@upmc.edu))

Dr. Bean's research focuses on understanding the molecular mechanisms of musculoskeletal tissue injury and repair, using this knowledge to guide the development of novel regenerative rehabilitation therapies to improve physical function.



Brendan L. McNeish, MD

Assistant Professor ([mcneishbl@upmc.edu](mailto:mcneishbl@upmc.edu))

Dr. McNeish's research interests are in the underlying causes of mobility disability in cancer survivors. Specifically, he is interested in investigating how neuromuscular and cognitive capacities change with cancer and treatment as well as how they are associated with changes in balance, gait, falls, and quality of life.



Michael Munin, MD

Professor and Vice Chair of Clinical Program Development  
([muninmc@upmc.edu](mailto:muninmc@upmc.edu))

Dr. Munin is involved in industry-funded clinical research. Research that has included testing ultrasound-guided delivery of chemodenervation agents used to reduce the effects of spasticity.

Amrita Sahu, PhD

Assistant Professor ([ams519@pitt.edu](mailto:ams519@pitt.edu))

Dr. Sahu's research interest lies in applying bioengineering approaches to solve age-related declines in skeletal muscle and cognitive capacity. Her research focuses on developing regenerative medicine based therapeutics for enhancing skeletal muscle and cognitive health using rehabilitation approaches.



Gwendolyn Sowa, MD, PhD

Professor and Chair ([sowaga@upmc.edu](mailto:sowaga@upmc.edu))

Dr. Sowa currently performs molecular laboratory-based, translational, and clinical research, investigating the effect of motion on inflammatory pathways and the beneficial effects of exercise on managing low back pain. She has won national and international recognition for her research of IDD and the development of biological and biomechanical therapies.

## Pediatric Research

Amy Houtrow, MD, MPH, PhD

Professor and Vice Chair of Pediatric Medicine ([houtrow@upmc.edu](mailto:houtrow@upmc.edu))

Dr. Houtrow recognizes the impact raising children with disabilities has on families and her research focuses on developing channels to improve delivery of medical services.



Jessica Jarvis, PhD

Assistant Professor ([jarvisjm@upmc.edu](mailto:jarvisjm@upmc.edu))

Dr. Jarvis works within multidisciplinary teams and uses quantitative and qualitative approaches in her program of research to address two main lines of inquiry: (1) determining trajectories of functional recovery post-pediatric critical illness for children and their families; and (2) developing mechanistic, nonpharmacologic interventions to improve PICU and post-PICU functioning.

Sarah Laughlin, PhD

Assistant Professor ([sarah.laughlin@chp.edu](mailto:sarah.laughlin@chp.edu))

Dr. Laughlin is a pediatric neuropsychologist who uses evaluation results to make recommendations to families and the child's broader care team that consider the child's unique profile of neurocognitive, behavioral and social-emotional strengths and challenges.

Amery Treble-Barna, PhD

Assistant Professor ([amery.treble@chp.edu](mailto:amery.treble@chp.edu))

Dr. Treble-Barna's research aims to account for unexplained heterogeneity in outcomes following pediatric traumatic brain injury with the long-term goal of moving the field towards precision medicine to improve individual prognostication, predict response to rehabilitation, and identify novel targets for treatment development. Her research program tackles this unexplained heterogeneity problem from several angles by investigating environmental (e.g. psychosocial adversity), genetic, epigenetic, and rehabilitation factors influencing neurobehavioral recovery.

## Rehabilitation Psychology

Melody Mickens, PhD

Assistant Professor ([mickensmn@upmc.edu](mailto:mickensmn@upmc.edu))

As a clinician-scientist, Dr. Mickens is a funded investigator who has published on facilitators of community reintegration and resilience after spinal cord injury as well as determinants of caregiver emotional wellness during progressive neurological illness and in response to COVID 19.

## Spinal Cord and Technology Research

Michael L. Boninger, MD  
Professor ([boninger@upmc.edu](mailto:boninger@upmc.edu))

Dr. Boninger is the director of the University of Pittsburgh Model Center on Spinal Cord Injury, a National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) Center of Excellence. He is world renowned for his research in SCI, assistive technology and neuroprosthetics, and related brain-computer interface technology.

Jennifer Collinger, PhD  
Associate Professor ([collinger@pitt.edu](mailto:collinger@pitt.edu))

Dr. Collinger's research is related to neurorehabilitation and BCI technology for individuals with motor impairments due to spinal cord injury and disease. Her groundbreaking work using BCI technology to translate thought to action has garnered international attention.



Brad Dicianno, MD  
Professor, Assistant Dean for Medical Student Research, and Vice Chair for Research  
([dicianno@pitt.edu](mailto:dicianno@pitt.edu))

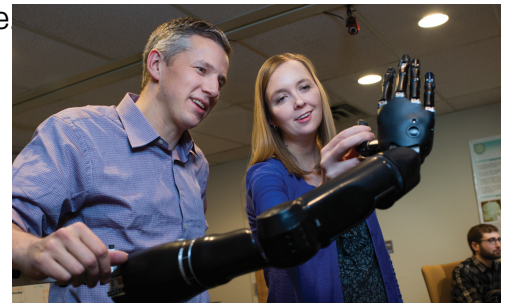
Dr. Dicianno's research interests lie at the intersection of disability, assistive technology, and value-based care. Specifically, he is interested in studying how technologies can improve outcomes for people with disability and also improve the delivery of healthcare and community-based services.

Lee Fisher, PhD  
Associate Professor ([lef44@pitt.edu](mailto:lef44@pitt.edu))

Dr. Fisher's current research interests involve the development of neuroprostheses for sensory and motor function to restore deficits after neural damage or disease.

Robert Gaunt, PhD  
Associate Professor ([rag53@pitt.edu](mailto:rag53@pitt.edu))

Dr. Gaunt is presenting investigating the integration of advanced technology with movement and sensory functions in upper limb neuroprostheses. The goal of this research is to produce an upper limb prosthetic that mimics the sensory and functional actions of a natural arm.



Lynn Worobey, PhD, DPT  
Assistant Professor ([law93@pitt.edu](mailto:law93@pitt.edu))

Dr. Worobey's research focuses on maximizing function for individuals who utilize assistive technology in both a research and clinical setting.

