Programs and Research for Medical Students

Gwendolyn Sowa, MD, PhD
Professor and Chair

rehabmedicine.pitt.edu
Research with the Department of Physical Medicine & Rehabilitation

The department is very proud to be ranked 1st in NIH funding to physical medicine and rehabilitation programs by well over $1M annually (2020, The Blue Ridge Mountain Institute). 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.

Students 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 students have presented at national conferences, and received awards and scholarships as a result of their work with our faculty.

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

A number of basic laboratory investigations have led to clinical investigations 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

Medical Student Education Leaders

Professor and Chair of the Department of Physical Medicine & Rehabilitation, Gwen Sowa, MD, PhD, is an alumnus of the University of Wisconsin and the Rehabilitation Institute of Chicago. Dr. Sowa is internationally recognized for her research in degenerative disc disease, back pain, and the mechanisms of exercise-based treatments.

Professor, Assistant Dean for Medical Student Research, and Co-Director of Medical Student Education, Brad Dicianno, MD, is an alumnus of the University of Pittsburgh, its School of Medicine, and this department’s residency program. Dr. Dicianno is committed to matching interested medical students with the right PM&R research investigations. As an SOM alum he is well informed of the requirements of the medical school research requirement. Dr. Dicianno is also the Vice Chair for Research in PM&R.

Betty Liu, MD, is an Associate Professor and Co-Director for Medical Student Education. Dr. Liu also leads the Disability Medicine Area of Concentration. She is an alumnus of New York Medical School and the Rusk Institute at NYU. It is her belief that knowledge and motivation are the primary factors influencing positive outcomes for recovery and improvement of health.
Research Faculty and Research Interests

Fabrisia Ambrosio, PhD, MPT
Associate Professor (ambrosiof@upmc.edu)
- Regenerative Medicine
- Duchenne’s Muscular Dystrophy
- Stem Cell Research
Dr. Ambrosio has gained international recognition for her work in regenerative rehabilitation. Her research uses molecular, cellular, and functional analyses to investigate the development of approaches to harness the body’s natural health capacity.

Allison Bean, MD, PhD
Assistant Professor (beanac2@upmc.edu)
- Regenerative Rehabilitation
- Sex Differences and Aging in Musculoskeletal Disorders
- Tissue Engineering
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.

Corina Bondi, PhD
Assistant Professor (bondico@upmc.edu)
- Traumatic Brain Injury
- Neuropsychopathology
- Neurotransmitters
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.

Michael L. Boninger, MD
Professor (boninger@upmc.edu)
- Adaptive Sports
- Assistive Technology
- Spinal Cord Injury (SCI)
- Medical Research Careers
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)
- Brain-Computer Interface
- Neurorehabilitation
- Assistive Technology
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 in PM&R (dicianno@pitt.edu)
- Adaptive Sports
- Assistive Technology
- Spina Bifida
- Spinal Cord Injury
- Telemedicine
His 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
Assistant professor (lef44@pitt.edu)
- Neuroprosthetics
- Bioengineering
- Somatosensory System
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)
- Neuroprosthetics
- Functional Electrical Stimulation
- Sensory Motor Control
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.
Amy Houtrow, MD, MPH, PhD  
Professor and Vice Chair of Pediatric Medicine  
(houtrow@upmc.edu)  
- Sociological Impact of Disabilities  
- Children with Disabilities  
- Pediatric Rehabilitation Medicine  
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)  
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.

Anthony E. Kline, PhD  
Professor (klinae@upmc.edu)  
- Traumatic Brain Injury  
- Antipsychotics and TBI  
- Cognitive Recovery  
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 human TBI patients.

Sarah Laughlin, PhD  
Assistant Professor (sarah.laughlin@chp.edu)  
- Pediatric Neuropsychology  
Dr. Laughlin 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.
Applying machine-learning algorithms to healthcare problems

Dr. McKernan’s current research interest and funded work includes: 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 who have experienced stroke, TBI, and other conditions.

Brendan L. McNeish, MD
Assistant Professor
- Cancer Rehabilitation
- Neuromuscular Medicine
- Gait, Balance, Fall Risk
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)
- Chemodenervation
- Prosthetic Rehabilitation
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.

Kentaro Onishi, DO
Assistant Professor (onishik2@upmc.edu)
- Diagnostic Ultrasound
- Orthobiologics
Dr. Onishi is active in translational researches in the domain of musculoskeletal regenerative medicine and tendon injuries.
Elvira Pirondini, PhD
Research Assistant Professor (elvirap@pitt.edu)
- Stroke and Motor Control
- Proprioception
- fMRI
- EEG
- Biomarkers
Dr. Pirondini primary 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.

Amrita Sahu, PhD
Assistant Professor (ams519@pitt.edu)
- Regenerative Rehabilitation
- Skeletal muscle aging
- Cognition
- Mathematical modeling and simulations
- Tissue engineering
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)
- Intervertebral Disc Degeneration (IDD)
- Molecular Biomarkers of Pain
- Low Back Pain
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.
Amery Treble-Barna, PhD  
Assistant Professor (amery.treble@chp.edu)  
- Influences of social determinants of health on neurobehavioral recovery  
- Health inequity/disparities in neurobehavioral recovery and rehabilitation utilization  
- Development and validation of a caregiver-report measure of rehabilitation utilization  
- Biomarkers of neurobehavioral recovery, including genetic, epigenetic, and protein biomarkers  

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.

Yetsa Tuakli-Wosornu, MD, MPH  
Associate Professor (tuakliwosornuya@upmc.edu)  
- MSK and Sports Medicine  
- Regenerative Medicine  
- Equity in Sports  

Dr. Tuakli-Wosornu is the founding director of the Sports Equity Lab, a research group delivering athlete-centered content that tackles inequities in sport such as discrimination, social exclusion, disability stigma, harassment, abuse, and neglect, using translational bio-psychosocial science.

Amy Wagner, MD  
Professor and Director of Translational Research (wagnerak@upmc.edu)  
- Traumatic Brain Injury  
- Rehabilomics and Genetics  
- Gender and Recovery after TBI  
- Hormone Physiology and Inflammation  
- Neuroendocrine Dysfunction, Epilepsy, Mental Health, Cognition, and Behavior  

Dr. Wagner is investigating the impact of an individual’s genetics and biomarkers on deficit progression and the development of secondary injury after TBI. Her research is laying the groundwork for a “personalized medicine” approach to treatment and improving patient outcomes.

Lynn Worobey, PhD, DPT  
Assistant Professor (law93@pitt.edu)  
- Assistive Technology  
- Spinal Cord Injury  
- Biomechanics  

Dr. Worobey’s research focuses on maximizing function for individuals who utilize assistive technology in both a research and clinical setting.
Disabilities Medicine Area of Concentration
Disabilities Medicine prepares interested medical students for healthcare careers serving children and adults with disabilities. Disabilities Medicine encompasses the body of knowledge about disabilities at multiple levels of analysis: the biological basis of disability; recommended clinical practices; functional impacts of disability and its treatment; environmental, social, and community determinant of outcomes; and public health. This area of concentration (AOC) promotes the development of skills in person- and family-centered practice, collaborative decision-making, functional assessments, cultural competence, and chronic care delivery. Participants learn about community resources and policies that interact with healthcare to improve clinical and functional outcomes for people with disabilities. Students who participates in the AOC in Disabilities Medicine support the inclusion of individuals with disabilities in all aspects of community life. Dr. Betty Liu, MD, is the Director of the AOC.

PM&R Interest Group
This group allows students interested in the field of physiatry to learn more about the field, network with faculty and residents, and attend workshops and social events. The faculty director of this group is Dr. Brad Dicianno.

Medical Student Research
Med Student Scholarly Projects are intended to expose students to the mechanics of scientific investigation, teach them how to develop a hypothesis, and how to collect, analyze, and interpret data to support it.

The Dean’s Summer Research Program (DSRP) is the major source of student (MS-1, MS-2) stipend support for summer research activity. The program is funded primarily by the dean and various NIH training grants. The program is directed by Drs. Don DeFranco and Peter Veldkamp. Dr. Brad Dicianno is one of the Assistant Deans for Medical Student Research.

Rehabilitation Research Experience for Medical Students (RREMS) is sponsored by the Association of Academic Physiatrists (AAP) and the Foundation for PM&R. This eight-week summer externship offers first-year medical students experience in scholarly research within the specialty of PM&R. The RREMS was developed for medical students with strong research interests. The program provides a structure research experience while exposing students to some of the most successful and respected faculty mentors in the field. In addition to working with experts in the field, the elected student receive a $4,000 stipend and paid travel to attend and present at the annual assembly.
https://www.physiatry.org/page/RREMS

Clinical Experience
Medical Student Summer Clinical Externship (MSSCE) and Virtual Intro to PM&R Program is also offered by the AAP. This eight-week externship focuses on inpatient and outpatient practice. The elected student(s) receive a $4,000 stipend and paid travel to attend and present at the annual assembly.
https://www.physiatry.org/page/mssce