Department of Physical Medicine & Rehabilitation

KU SCHOOL OF MEDICINE
The University of Kansas

QUARTERLY NEWSLETTER

What's Inside

Stay up to date with KU Medial Center's Department of Physical Medicine & Rehabilitation with our quarterly newsletter that features highlights from faculty, residents, research, and much more!

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- **Resident Spotlight**
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  Read about our Assistant Professor in research, David Guggenmos, Ph.D, and learn about all the recent publications our department has contributed to this year

Updates from the Departmental Chair

"The secret of change is to focus all of your energy not on the fighting the old, but on building the new."
-Socrates

Fall is a season of change. Kids go back to school, young adults leave for college, and the weather finally cools down in Kansas City. In my household, we are experiencing many changes as our oldest daughter enters high school, our middle daughter starts middle school, and we welcome new teachers and schools into our lives. Sometimes, when everything around you is changing, there is comfort in having a few things stay the same. For example, our youngest daughter is entering second grade with teachers who taught our older children and have been at our school for years. **(Read More...)**

Faculty Feature

Sarah Eickmeyer

ADVOCACY

for the disabled population was a major reason I decided to become a physician

For our Fall 2023 Faculty Feature we will be getting to know Dr. Sarah Eickmeyer, Departmental Chair and Professor at KU PM&R.

Tell us about yourself.

I grew up in the cold Minnesota and Wisconsin winters. I completed all my medical training at Northwestern University in Chicago, the windy city (which is also very cold). I joined the faculty at the University of Kansas in 2015 and really enjoy the warmer winters in Kansas City! My husband Jason and I live in Overland Park, Kansas, with our three daughters. I enjoy reading books, trying new restaurants, and tasting new wines. Most of our free time is spent chasing after our kids and their numerous activities. We're also fortunate to be part of a wonderful community of families at our church and school, since it really takes a village to raise good kids.

Tell us about the work you did prior to becoming our new chair.

I was the Medical Director of Inpatient Rehabilitation from 2015 to 2023, working with our interdisciplinary team on quality outcomes and program development. Our acute inpatient rehabilitation unit showed tremendous growth during that time period in volume, acuity and quality of care. We now have three strong service lines in Stroke, Spinal Cord Injury and Brain Injury Rehabilitation. We also provide rehabilitation for some of the University of Kansas Health System's most medically complex patient populations including solid organ transplant, ventricular assist devices, bone marrow transplant and cancer diagnoses. Our rehab unit was named #1 for the state of Kansas in Newsweek's America's Best Physical Rehabilitation Centers in 2021.

I was the Residency Program Director from 2015 to 2021. During my time as program director, I secured funding for our full complement of 12 residents, and our program rose in ranking to 24th for PM&R on the Doximity Residency Navigator. Because PM&R continues to be a specialty in which medical students lack early exposure and mentorship in physiatry, I decided over the past several years to increase my involvement in medical student education and leadership. In 2021, I transitioned to Assistant Director for the University of Kansas School of Medicine Alumni Society Learning Community Program where I facilitate small group learning and provide one-on-one coaching to medical students.

What interested you in PM&R?

I grew up with family and friends who had different types of disabilities. Advocacy for the disabled population was a major reason I decided to become a physician. I was thrilled to discover the field of Physical Medicine and Rehabilitation because I could combine my interests in neurologic diagnoses and disability advocacy. I enjoy having a strong background in medical management and rehabilitation interventions. As physiatrists, we often bridge the gap between the traditional medical model and a more holistic, practical plan for functional restoration.

What are some goals you have for the department over the next few years?

Clinical priorities include expansion of ambulatory clinics in neurorehabilitation, limb loss and prosthetic rehabilitation, cardiac and cancer rehabilitation, and spine and sports medicine rehabilitation. We also will evaluate key community partnerships to expand our footprint in the Kansas City area.

Our research faculty will continue to partner with other departments within the University of Kansas Medical Center. Under Dr. Randy Nudo's leadership as Vice Chair for Research, we have current strengths in basic science neurorehabilitation and recovery research. Future goals are to build upon collaborations with Physical Therapy, Neurology, Neurosurgery, Trauma Surgery and Orthopedic Surgery to expand clinical research.

Our educational training programs remain strong. We are looking at opportunities to expand our residency program, collaborate with the pediatric rehabilitation program at Children's Mercy Hospital on a combined PM&R/Pediatrics residency, and start a Brain Injury Medicine fellowship. I am also working with leadership at the University of Kansas School of Medicine to develop more disability awareness and advocacy curriculum.

How would you define good mentorship?

Mentorship is all about the relationship between mentor and mentee. Whether these relationships are formally assigned or develop organically, good mentorship exists when built upon mutual trust and respect. I have had exceptional mentors in all phases of my career to help me wrestle with important decisions, dispense wise counsel, and provide a listening ear. I've also enjoyed mentoring peers, junior faculty and trainees as they progress through their career in medicine. Mentoring roles change over time, and sometimes morph into coaching, sponsoring or counseling roles depending on the mentees' needs. Having good mentors is essential for a career in academic medicine.

How has PM&R changed since you were a resident?

The core mission of PM&R hasn't changed since I was a resident, however the secret is out about this amazing field of medicine! Matching into a PM&R residency is much more competitive than it used to be as we attract more applicants than available residency positions. We've seen growth in the number of new PM&R residency programs each year, but the supply cannot keep up with current demand for training positions. One thing that has changed is that many residents now choose to pursue pain, spine and sports medicine fellowships, and not as many residents choose to enter general or neurologic physiatry. This has created a shortage of physiatrists working in inpatient rehabilitation facilities nationally, which is a huge opportunity for our field to consider.

Tell us about your research you are currently working on.

I collaborate with researchers at the University of Kansas Medical Center to bring stroke recovery research to the rehabilitation unit and clinics. My collaborations with Dr. Sandra Billinger from the Department of Neurology and the Research in Exercise and Cardiovascular Health (REACH) laboratory have led to work on stroke outcomes and recovery, aerobic exercise intensity and type, cerebrovascular health and the effect on blood brain flow. Dr. Billinger and I are co-site primary investigators on a clinical trial investigating the efficacy of a frequency-tuned electromagnetic field treatment in facilitating the recovery of subacute ischemic stroke patients. I also collaborate with Dr. Wen Liu from the School of Health Professionals and the Department of Physical Therapy on a NIH R01 grant developing a walking exercise program for non-ambulatory stroke survivors.

Resident News

Meet Our Newest Residents

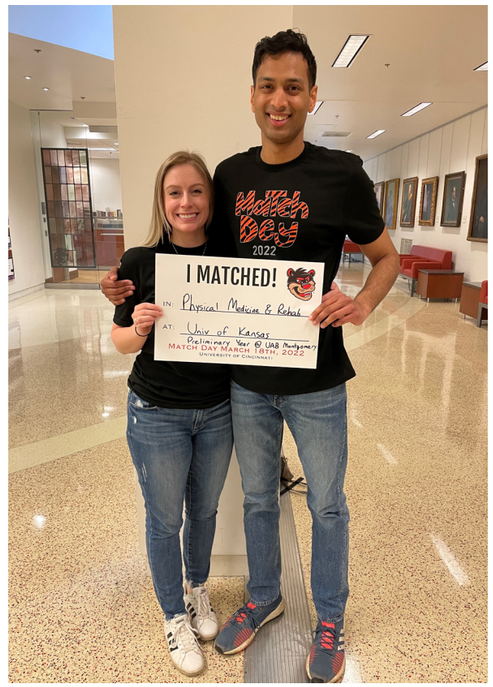
Join us as we welcome our newest PGY-2 residents: Laura Allen-Matlock, Scott Draper, Parth Patel, and Ann Wingard!

Scott Draper, D.O.

Dr. Draper was born and raised in Salt Lake City, UT. While there, he completed undergraduate training at the University of Utah in Kinesiology and Biomedical Engineering and an MBA in Healthcare Management. He then moved to the midwest to complete medical training at Kansas City University and an intern year at the University of Kansas Medical Center. In the future, he is interested in pursuing a fellowship in Interventional Spine and MSK. Outside of residency, most of his time is spent with his wife and chasing after his 4 children. He enjoys all things outdoors, including camping, rock climbing, disc golf, fishing, pickleball and all sports.

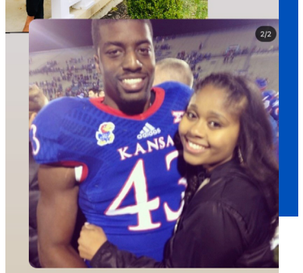
Parth Patel, M.D.

Dr. Parth Patel was born in Illinois and grew up in Union, KY, close to Cincinnati. He attended University of Kentucky where he graduated with BS in both Psychology and Biology. He then attended University of Cincinnati College of Medicine and completed his intern year at the University of Alabama at Birmingham (Montgomery Campus). He has interests in almost all fields of PM&R but would also like to develop as a researcher during residency. In his spare time, Dr. Patel enjoys movies, exercising, cleaning, and spending time with his fiancé and family.



Laura Allen-Matlock, M.D.

Dr. Allen-Matlock grew up in Akron, Ohio before moving to Lawrence, Kansas to receive her bachelor's degree in Human Biology with a concentration in Psychology at the University of Kansas. After graduating, she took three years off and worked as a preschool teacher for kids age 3 to 4, as well as doing ABA therapy for children with autism and developmental disabilities. During this time, she completed a post baccalaureate program with a Cleveland State University and Northeast Ohio Medical University (NEOMED), which is ultimately where she completed her 4 years of medical school. She is currently married to a Psychiatry Resident who is also practicing at the University of Kansas. They are both parents to a beautiful toddler daughter. Her interest in PM&R includes cancer rehabilitation, pediatric rehabilitation, sports medicine, and/or inpatient rehabilitation. Outside of medicine, she enjoys hanging out with her daughter and



Annie Wingard, D.O.

Dr. Wingard grew up in Round Rock, Texas before going to the University of Texas at Austin to receive her bachelor's degree in Human Biology. After graduating, she worked at Dell Medical School managing their Pipeline Program in the division of Diversity, Equity, and Inclusion. She was then accepted to Texas College of Osteopathic Medicine in Fort Worth, TX, where she met the love of her life. Her husband is a general surgery resident in the KUMC program. Her interest in PM&R includes cancer rehabilitation, pediatric rehabilitation, MSK and spine, and/or inpatient rehabilitation. Outside of medicine, she enjoys quality time with her husband, playing any and every game, doing yoga, and going for runs in Loose Park.

KUdos

Recognizing Departmental Wins

June

Kudos to Laura Diaz-Romero for taking care of all the visiting research students every day**. - Elizabeth Ramirez**

Kudos to our previous co-chief resident, Vinicius Francio Tieppo, for placing first in the GME Research Forum for Variables associated with nonresponders to spinal cord stimulation **- KU PM&R**

July:

Jeannine Nilges is so hard working, dedicated to the PM&R clinical research team and thoughtful to everyone around her. She goes the extra mile every day with her diligence and excellent communication. It doesn't matter whose work a task is, she dives in and helps others with their work in addition to going above and beyond with her own work. She keeps a positive attitude to get the best out of others around her and stimulates acts of kindness among team members by giving gifts of hot drinks and snacks. Our department is fortunate to have such a positive and hard-working team member!

- Dr. Neil Segal

I would like to give Kudos to my resident, Logan Leavitt. Logan went above and beyond in helping everyone on our Medical Mission trip to Antigua, Guatemala. His impressive fluency in Spanish was so beneficial to everyone who went and helped all specialties that went on the trip, PM&R, ENT, and Urology. Thank you, Logan, for all you efforts!!!

- Dr. John Alm

August

We'd like to recognize the following: David Guggenmos, PhD, research assistant professor in the Department of Rehabilitation Medicine, has received a new four-year $1.7 million total cost R01 grant from NIH entitled "The contribution of premotor cortex to recovery after stroke. **- Dr. Randy Nudo**

September:

Please join me to congratulate Malorie Heinen, BSN, RN Spinal Cord Injury Program Coordinator, for receiving this year's Expanded Role for Nursing Excellence award by SCIN Board of The Academy of Spinal Cord Injury Professionals(ASCIP). This award is presented for outstanding clinical performance, knowledge and expertise, creativity, as well as collaboration with other health care professionals for SCI/D. Well-deserved Malorie!! Also, for those who will be attending the ASCIP conference in San Diego, Malorie will be presenting at the nursing pre-con on Sunday, September 3, 2023. **- Dr. Namrata Raut**

Kudos to our previous co-chief resident, Vinicius Francio Tieppo, for placing first in the GME Research Forum for Variables associated with nonresponders to spinal cord stimulation **- Dr. McCasey Smith**

Kudos to Drs. Mok, Leavitt, and Hiett for volunteering their time at the JayDoc MSK Physical Exam Workshop put on for KUMC medical students. **- Dr. McCasey Smith**

Kudos to Sara Jorgensen for getting the Varghese Learning Center up and running and providing snacks for the residents! **- Dr. McCasey Smith**

> Having external funding for basic science in our department allows us to focus on relevant questions for rehabilitation and act as local subject matter experts regarding the fundamental properties underlying recovery from acquired brain injury.

Q & A With Dr. Guggenmos

Interview with Dr. David Guggenmos

Distinguished Research Faculty Feature

Tell us about yourself.

I began at KUMC in 2005 as a graduate student in Dr. Randolph Nudo's lab. During a post-doctoral fellowship at Duke University, I was recruited back to KUMC as a research faculty and have been with Rehab Medicine since 2015.

I live in Prairie Village with my wife and two kids. Outside of work, I like to get away from computers and technology as much as possible. My family and I enjoy hiking and bicycle riding around the city. We like to travel, especially to national parks, forests, and monuments. I also relax by working in my shop building furniture and other things when I get the chance.

What kind of research do you typically conduct with KU PM&R?

In general, the lab investigates how the brain changes in response to experience, injury, and interventions. We do this by assessing and analyzing changes in behavior, in structural and functional anatomy, and in the pattern of neural activity across many brain regions in different animal models.

Tell us about your current research.

I currently have several ongoing research projects. The most exciting is one where we are investigating how ischemic injury alters motor dynamics. Using microelectrode arrays that are implanted in premotor and somatosensory cortex, we record individual neural activity from ~100 neurons while an animal is performing a motor task. By recording this activity prior to and after an injury, we can see how patterns of activity within and between spared regions change and how this relates to recovery. Using this same paradigm, we are using targeted cortical stimulation to artificially shape the neural activity to improve behavioral outcomes.

How has your previous research prepared you for the current research?

For my PhD research, my main project was to develop and implement an implantable, programmable wireless device that could perform activity-dependent stimulation, which consists of brief, microampere electrical pulses that are delivered to a specific brain region when neural activity is detected in a different region, artificially linking the two areas. We used this device in a rat model of traumatic brain injury to synchronize the activity of premotor cortex with somatosensory cortex. This treatment led to a rapid recovery of motor function. During my post-doctoral fellowship, I was involved in performing large-scale neural recordings and learning engineering techniques for building and interfacing to behavioral tasks. This combination has put me at the intersection of neuroscience, bioengineering, and rehabilitation.

Tell us about the grant you received for this research.

I was awarded an NIH R01 through NINDS to investigate the role of premotor cortex on recovery of motor function after ischemic injury to primary motor cortex. Primary motor cortical neurons or their projections are often damaged during stroke, leading to motor impairment. We know that some recovery can occur after such an injury, especially when coupled with rehabilitation, but the underlying mechanisms underpinning this recovery is still unknown We believe that changes in neural activity within premotor cortex contributes to recovery of motor function due to its corticospinal projections and contribution to motor planning and execution. The purpose of our current grant is to quantify the contribution and any timing-dependencies (relative to the injury) that premotor cortex has on the recovery process with and without rehabilitative therapy.

Why is funding so important to our program?

The vast majority of funding for health-related basic or translational science comes from federal agencies, such as the National Institutes of Health (NIH). The current funding allows us to look at fundamental questions regarding brain plasticity and rehabilitation, by utilizing systematic and controlled studies that are not possible with human subjects. Our department prioritizes evidence-based medicine; it is important to recognize that basic and translational science leads to improved knowledge of biological mechanisms, which in turn can lead to new techniques and applications used in the clinic.

Recent Publications from KU PM&R

Global statements to produce and implement evidence in the post-COVID-19 era provide a path forward for rehabilitation - A joint initiative of Cochrane Rehabilitation and the leading journals in the field. Negrini S, Borg K, Cusick A, Ferriero G, Frontera WR, Gross DP, Heinemann A, Machalicek W, Moore AP, Nudo RJ, Pérennou D, Stam H, Kiekens C. Ann Phys Rehabil Med. 2022 Sep;65(5):101688.

Stimulation-Evoked Effective Connectivity (SEEC): An in-vivo approach for defining mesoscale corticocortical connectivity. Bundy DT, Barbay S, Hudson HM, Frost SB, Nudo RJ, Guggenmos DJ. J Neurosci Methods. 2023 Jan 15;384:109767.

Broad Therapeutic Time Window for Driving Motor Recovery After TBI Using Activity-Dependent Stimulation. Hudson HM, Guggenmos DJ, Azin M, Vitale N, McKenzie KA, Mahnken JD, Mohseni P, Nudo RJ. Neurorehabil Neural Repair. 2023 Jun;37(6):384-393.

Chronic Stimulation Improves Motor Performance in an Ambulatory Rat Model of Spinal Cord Injury. Borrell JA, Gattozzi D, Krizsan-Agbas D, Jaeschke MW, Nudo RJ, Frost SB. J Integr Neurosci. 2023 May 15;22(3):71.

Spared Premotor Areas Undergo Rapid Nonlinear Changes in Functional Organization Following a Focal Ischemic Infarct in Primary Motor Cortex of Squirrel Monkeys. Plautz EJ, Barbay S, Frost SB, Stowe AM, Dancause N, Zoubina EV, Eisner-Janowicz I, Guggenmos DJ, Nudo RJ. J Neurosci. 2023 Mar 15;43(11):2021-2032.

Neuromorphic-Based Neuroprostheses for Brain Rewiring: State-of-the-Art and Perspectives in Neuroengineering. Chiappalone M, Cota VR, Carè M, Di Florio M, Beaubois R, Buccelli S, Barban F, Brofiga M, Averna A, Bonacini F, Guggenmos DJ, Bornat Y, Massobrio P, Bonifazi P, Levi T. Brain Sci. 2022 Nov 19;12(11):1578.

Post-ischemic reorganization of sensory responses in cerebral cortex. Hayley P, Tuchek C, Dalla S, Borrell J, Murphy MD, Nudo RJ, Guggenmos DJ. Front Neurosci. 2023 Jun 2;17:1151309.

Reorganization of Ventral Premotor Cortex After Ischemic Brain Injury: Effects of Forced Use. Frost SB, Chen D, Barbay S, Friel KM, Plautz EJ, Nudo RJ. Neurorehabil Neural Repair. 2022 Aug;36(8):514-524.

Activity-dependent stimulation increases synaptic efficacy in spared pathways in an anesthetized rat model of spinal cord contusion injury. Borrell JA, Krizsan-Agbas D, Nudo RJ, Frost SB. Restorative Neurology and Neuroscience, 2022 Feb 22.

The impact of closed-loop intracortical stimulation on neural activity in brain-injured, anesthetized animals. Carè M, Averna A, Barban F, Semprini M, De Michieli L, Nudo RJ, Guggenmos DJ, Chiappalone M. Bioelectric Medicine, 2022 Feb 28;8(1):4.

LFP analysis of brain injured anesthetized animals undergoing closed-loop intracortical stimulation. Averna A, Barban F, Care M, Murphy MD, Iandolo R, De Michieli L, Nudo RJ, Guggenmos DJ, Chiappalone M. IEEE Trans Neural Syst Rehabil Eng. 2022 May 23;PP.

Monitoring electrically-evoked hemodynamic responses in the squirrel monkey brain using photoacoustic computed tomography and photoacoustic microscopy. Kai-Wei Chang, Yunhao Zhu, Heather Hudson, Scott Barbay, David Guggenmos, Randolph J. Nudo, Xinmai Yang, and Xueding Wang Proc. SPIE PC11960, Photons Plus Ultrasound: Imaging and Sensing 2022, PC119600B (7 March 2022).

Photoacoustic imaging of squirrel monkey cortical and subcortical brain regions during peripheral electrical stimulation. Chang, Kai-Wei, Yunhao Zhu, Heather M. Hudson, Scott Barbay, David J. Guggenmos, Randolph J. Nudo, Xinmai Yang, and Xueding Wang. Photoacoustics 25 (2022): 100326.

Chronic Stimulation Improves Motor Performance in an Ambulatory Rat Model of Spinal Cord Injury. Borrell JA, Gattozzi D, Krizsan-Agbas D, Jaeschke MW, Nudo RJ, Frost SB. J Integr Neurosci. 2023 May 15;22(3):71.

Latest advancements in imaging techniques in OA. Hayashi D, Roemer FW, Link T, Li X, Kogan F, Segal NA, Omoumi P, Guermazi A. Ther Adv Musculoskelet Dis. 2022 Dec 26;14:1759720X221146621.

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A rare complication of percutaneous ultrasonic tenotomy in a 66-year-old man with calcific Achilles tendinopathy. Hiett A, Li S, Segal NA. PMR. 2023 May 25.

Relation of gait measures with mild unilateral knee pain during walking using machine learning. Bacon KL, Felson DT, Jafarzadeh SR, Kolachalama VB, Hausdorff JM, Gazit E, Segal NA, Lewis CE, Nevitt MC, Kumar D; Multicenter Osteoarthritis Study Investigators. Sci Rep. 2022 Dec 23;12(1):22200.

Effect of Neuromuscular Electrical Stimulation During Walking on Pain Sensitivity in Women With Obesity With Knee Pain: A Randomized Controlled Trial. Matsuse H, Segal NA, Rabe KG, Shiba N. Arch Phys Med Rehabil. 2022 Sep;103(9):1707-1714

Gait, physical activity and tibiofemoral cartilage damage: a longitudinal machine learning analysis in the Multicenter Osteoarthritis Study. Costello KE, Felson DT, Jafarzadeh SR, Guermazi A, Roemer FW, Segal NA, Lewis CE, Nevitt MC, Lewis CL, Kolachalama VB, Kumar D. Br J Sports Med. 2023 Aug;57(16):1018-1024..

Departmental News

Join us in celebrating our current faculty, residents, and newest additions to the team!

Sarah Eickmeyer, MD
Promoted to *Professor and Departmental Chair*

McCasey Smith, MD, MS
Promoted to *Residency Program Director and Co-Director for MSK Fellowship*

Michael Carroll, MD
Promoted to *Co-Director for MSK Fellowship*

Alexandra N. Arickx, MD
Promoted to *Medical Director for Inpatient Rehabilitation*

Namrata Raut, MD
Promoted to *Director of Undergraduate Medical Education*

Alejandra Camacho-Soto
Assistant Professor
Joined KUMC Faculty in July 2023

Welcome Baby Mian!

Introducing the newest member of the KU Medical Center's Physical Medicine & Rehabilitation Department: David Grant Mian! Congratulations to the new parents PGY3 resident Kerry Mian and Jessica Mian!

Fellowship Matches

Congratulations to current residents PGY4s Victor Yoon, MD, and Adam Rupp, MD, on their recently announced matches to fellowship programs. Victor Yoon will be staying with KU PM&R for his MSK Fellowship year while Dr. Rupp will relocate to Detroit, MI for the Pain Medicine Fellowship Program at DMC Wayne State.

Congrats to you both!

Departmental Chair Updates Continued

I felt reassured seeing the second-grade teachers on back-to-school night and realizing that the curriculum, schedule and expectations are essentially the same as they always have been. In the midst of so many new and changing things, having a strong foundation is essential to build the next phase.

The Department of Physical Medicine and Rehabilitation is also undergoing several new and exciting changes. This summer, I was appointed as Chair and tasked with building a new vision for the department. Luckily, we have a strong foundation on which to build and grow, laid by previous leaders and visionaries. With our faculty and staff, we will embark on a strategic plan to further the department's missions in clinical care, research and education.

We are recruiting several new faculty positions to grow our clinical practice. As you will see in this newsletter, our research faculty have exciting new projects and grants to expand the research enterprise. Our educational leadership has also changed for the fellowship, residency and medical student programs. However, our mission to restore function and decrease pain in patients with musculoskeletal and neurologic disorders has not changed. I look forward to focusing on building a new direction with the department and welcome your ideas and feedback!

About the Department

We are a vibrant, energetic and growing academic department at the University of Kansas School of Medicine. Our primary mission is to restore function and decrease pain in patients afflicted with the entire spectrum of musculoskeletal and neurologic disorders. Our aim is to integrate our clinical mission with cutting-edge research and educational programs.

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DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION