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Farah Hameed, MD, evaluates injuries in young athletes with the goal of reducing the risk of re-injury.

New Pediatric & Adolescent Sports Medicine Program – Up and Running

With the opening of the new Sports Medicine Center for the Developing Athlete, the Department's sports medicine and musculoskeletal practices have been expanded to include care of pediatric and adolescent patients in a joint effort with the Columbia Department of Orthopaedic Surgery.

Farah Hameed, MD, Assistant Attending Physician and Assistant Professor of Clinical Rehabilitation and Regenerative Medicine, Columbia University College of Physicians

and Surgeons, is playing a leading role in developing this program. She will see young athletes in three convenient locations – two in Manhattan and a third in Westchester County in the department's new Tarrytown practice.

The Sports Medicine Center for the Developing Athlete focuses on treatments and programs to maximize performance while minimizing the risk of injuries. The Center specializes in the management of disorders related to throwing, knee

...continued page 2

“Our goal is to prevent injuries from happening, by reaching out to coaches, trainers, parents and the athletes themselves with a series of educational programs at schools.”

– Farah Hameed, MD

... *Pediatric & Adolescent Sports Medicine continued*

injuries, concussion evaluation and management, and the female athlete triad. Says Dr. Hameed, “Our goal is to prevent injuries from happening, by reaching out to coaches, trainers, parents and the athletes themselves with a series of educational programs at schools. When injuries do occur, we want to be able to see patients quickly in order to provide prompt and accurate diagnosis, create a personalized regimen of care for each patient, and offer guidance on the optimal time to return to play, reducing the risk of re-injury and improving the athletes performance through the season and beyond.”

Dr. Hameed is board certified in Physical Medicine and Rehabilitation and in Sports Medicine. She has special interest in patients with spine disorders, overuse injuries, sports injury prevention, women’s/adolescent

female health, female athlete triad, and concussion management. After graduating from University of Texas Medical Branch, she completed her internship in Internal Medicine at the Boston University Medical Center, and her residency at Harvard University/ Spaulding Rehabilitation Hospital.

Dr. Hameed’s fellowship in Sports Medicine was based at Northwestern University/Rehabilitation Institute of Chicago in 2012 where she also served as sporting event physician for the NCAA Division 1 Women’s Soccer and Basketball teams.

For more information about adolescent sports medicine and concussion programs, visit: <http://childrensnyp.org/mschony/sports-developing-athlete.html>.

Brain Machine Interfaces May Help the Severely Disabled

“Brain Computer Interface (BCI) technology shows great promise in the field of assistive robotics,” says Peter K. Allen, PhD, Professor of Computer Science at Columbia University. “In particular, severely impaired individuals lacking the use of their hands and arms would benefit greatly from a robotic grasping system that can be controlled by a simple and intuitive BCI.” Dr. Allen was recently awarded a 5-year National Science Foundation (NSF) grant to develop an assistive robot with brain-muscle interfaces, part of the National Robotics Initiative for Assistive Robotics for Grasping and Manipulation Using Novel Brain Computer Interfaces.

This project will develop a field-deployable assistive robotic system that will allow severely disabled patients to control a robot arm/hand system to perform complex grasping

and manipulation tasks using novel Brain Muscle Computer Interfaces (BMCI). Collaborators include Sanjay Joshi, PhD, of the Mechanical and Aerospace Engineering Department at UC Davis; and Joel Stein, MD, Simon Baruch Professor and Chair, Department of Rehabilitation and Regenerative Medicine at Columbia University College of Physicians and Surgeons. Lyssa Sorkin, MD, also of the Department of Rehabilitation and Regenerative Medicine at Columbia will be a co-investigator. Dr. Joshi developed the Brain Computer Interface and has worked with patients with spinal muscle atrophy to use the surface EMG signal to guide a cursor from the origin to a target. Dr. Allen developed the robotic grasping technology.

Initially, the study will focus on 10-12 individuals with spinal cord injury to



determine if they can be trained in effective control of the brain computer interface using EMG signals generated by a small muscle in the face called the auricularis superior. Three-D imaging presents the patient with various grasps to manipulate an object. The user can control the approach direction with facial muscle control through the

BCI interface and can also assist the grasp planning simulator system in choosing the optimum grasp. Once the grasp is planned, a robotic hand/arm can execute the grasp – resulting in a robust and stable grasp of an object in a human environment. The study will also investigate if a Bluetooth connection through a smart phone can be used to wirelessly control the robotic arm. “This novel technology holds promise to improve independence and quality of life for patients disabled not only by spinal cord injury, but also by stroke, ALS, cerebral palsy, muscular dystrophy and other diseases causing severe physical disabilities,” says Dr. Lyssa Sorkin.

It has been shown that patients can be trained to use muscle surface EMG signals to control an object in two-dimensions on a screen. This 5-year study will expand on that evidence to see if

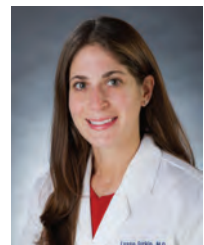
patients can use these electrical signals to manipulate and grasp an object in a more functionally relevant setting. Joel Stein, MD, explains that grasp planning for robotic hands in natural environments using electrophysiological signals is a difficult problem because of the huge number of possible hand configurations. “A fully developed end-to-end, real-time grasping system has not yet been demonstrated,” says Dr. Stein. “We are optimistic that this study will validate robotic grasping as a viable, non-invasive rehabilitation protocol.”

The clinical part of the study takes place at the Department’s Easy Street Occupational Therapy Gymnasium, where patients interact in real-life situations and activities of daily living such as shopping. Validation trials with disabled patients begin shortly.

Sanjay Joshi, PhD
Dr. Joshi is Associate Professor of Mechanical and Aerospace Engineering at the University of California, Davis, where he directs the Robotics, Autonomous Systems, and Controls Laboratory. After joining UC Davis in 2001, Dr. Joshi began applying autonomous robotics and controls to the study of behavior, cognition, and human-computer interfaces. In 2010-2011, he was Visiting Associate Professor at Columbia University Medical School, New York City, in the Department of Neurology.

Peter K. Allen, PhD
In recognition of his work, Professor Allen has been named a Presidential Young Investigator by the National Science Foundation.

Lyssa Sorkin, MD
Dr. Sorkin is a physiatrist in the Department of Rehabilitation and Regenerative Medicine at Columbia University College of Physicians and Surgeons.



Dr. Lyssa Sorkin demonstrates the capabilities of the Easy Street Occupational Therapy Gymnasium with Dr. Alex Martinez, a PGY-4 resident in the PM&R program.

The clinical part of the study takes place at the Department’s Easy Street Occupational Therapy Gymnasium, where patients interact in real-life situations and activities of daily living such as shopping.

MESSAGE FROM THE CHAIR

Joel Stein, MD



Simon Baruch Professor and Chair
Department of Rehabilitation and Regenerative Medicine
Columbia University College of Physicians and Surgeons

Professor and Chief
Division of Rehabilitation Medicine
Weill Cornell Medical College

Physiatrist-in-Chief
NewYork-Presbyterian Hospital

As we begin a new year, I'd like to bring you up-to-date on the growth and increased geographic scope of the Department's clinical programs. This fall, a new Columbia practice site opened in Tarrytown, New York. And this winter, our Weill Cornell faculty will expand clinical services to our newly affiliated New York Downtown Hospital with an outpatient spine and musculoskeletal practice.

We're also expanding our educational opportunities. Our Columbia Department has established a new one-year fellowship in Sports Medicine, under the direction of Christopher Visco, MD. Fellows will be trained in the management of the full range of sports-related injuries. A significant portion of the program will focus on care of injuries in high school, college and professional athletes.

In the last few months, the Department's sports medicine and musculoskeletal practice has expanded to include the care of pediatric and adolescent patients through the new Sports Medicine Center for the Developing Athlete. Dr. Farah Hameed recently joined our faculty, and will see these young patients in multiple locations.

Columbia Stem Cell Initiative's recruitment of two talented young laboratory researchers solidifies our stem cell initiative and gives us a critical mass of researchers in this area. I am delighted to welcome Professors Masayuki Yazawa, PhD, and Lei Ding, PhD, to our stem cell laboratories.

Lastly, our department was well represented in Atlanta this past November at the annual American Academy of Physical Medicine & Rehabilitation meeting. Our clinicians and scientists presented more than 18 lectures, papers and posters highlighting our latest research and clinical expertise. I'm proud of all we have achieved over the past year and look forward to continuing this momentum in 2013.

For more information about the department, please visit nyp.org/rehabmed

OT "Rock Star"

Dr. Glen Gillen Honored by AOTA



It has been reported that Dr. Glen Gillen, EdD, OTR, FAOTA, is known in Columbia graduate student circles as the OT profession's "rock star."

Dr. Gillen, Associate Director, Programs in Occupational Therapy and Associate Professor Clinical Rehabilitation and Regenerative Medicine at Columbia

University, was recently awarded the Eleanor Clarke Slagle Lectureship for 2013 by the American Occupational Therapy Association (AOTA). The highest academic honor given to an occupational therapist, this annual lectureship is awarded to an individual who has made significant contributions to the occupational therapy body of knowledge through research, education and/or clinical practice. Dr. Gillen's leadership and scholarship in the field

of neurologic rehabilitation following stroke has made him deserving of this recognition.

Janet Falk-Kessler, EdD, OTR, FAOTA, Director, Programs in Occupational Therapy at Columbia University, said of Dr. Gillen, "He rises to the top of scholars in our field who have the capacity to lead and inspire. The contributions he has made in over two decades as an occupational therapist are matched

by few, and his dedication to the field of occupational therapy can neither be challenged nor overstated. I know of no individual more deserving of the Eleanor Clarke Slagle Lectureship than Dr. Gillen.”

Dr. Gillen’s current research focuses on the assessment of mental practice as an intervention to enhance functional performance in activities of daily living after stroke. He is also investigating how coping behaviors during rehabilitation affect functional outcomes. Dr. Gillen is the author of many journal articles and books. His evidence-based text, *Stroke Rehabilitation: A Function-Based Approach*, is the gold standard of textbooks for this practice area, and is now going into its fourth edition.

The Slagle Lectureship was established in 1955 in honor of Eleanor Clark Slagle, whose vision set the course for the



Dr. Glen Gillen with Columbia University OT students

Dr. Gillen’s leadership and scholarship in the field of neurologic rehabilitation following stroke has made him deserving of the Eleanor Clarke Slagle Lectureship for 2013.

occupational therapy profession. Dr. Gillen is the fiftieth occupational therapist to receive this prestigious honor. He will deliver the Slagle Lecture at AOTA’s 93rd Annual Conference in San Diego, April 25-27. His lecture will explore contemporary evidence-based

practice in relation to historical roots and growth as a profession. It will trace the profession’s voyage away from and return to authentic occupation-based therapy.

Weill Cornell Spine & Musculoskeletal Practice Expands Services to New York Downtown Hospital

Jaspal Ricky Singh, MD, is leading the expansion of the Weill Cornell spine and musculoskeletal practice to New York Downtown Hospital (NYDH), a community hospital serving the residents and working professionals of Lower Manhattan. NYDH is part of the NewYork-Presbyterian Healthcare System. The musculoskeletal practice will complement existing Orthopaedic services at the hospital, making it easier for patients to get a full range of rehabilitation services all under one roof.

Dr. Singh explains, “Our goal is to broaden the clinical specialties that are already in place at NYDH. My clinical work focuses on musculoskeletal conditions, including sports and occupational injuries, as well as spine and pain related issues. I implement a multi-disciplinary approach to treat patients’ pain with the ultimate goal of



optimizing their function and mobility.”

Dr. Singh is Assistant Professor of Clinical Rehabilitation Medicine at Weill Cornell Medical College and Assistant Attending Physiatrist at NewYork-

Presbyterian Weill Cornell Medical Center. Most recently, he was an Interventional Pain Medicine Fellow at the University of Colorado, Denver. Dr. Singh is triple-board certified in Physical Medicine and Rehabilitation, Sports Medicine and Pain Medicine.

The spine and musculoskeletal practice is located at 156 Williams Street in Manhattan.

J. Ricky Singh, MD, received his BA from George Washington University and his MD from the George Washington University Medical School. He completed his internship in General Surgery at Boston Medical Center, Boston University School of Medicine, and residency in Physical Medicine and Rehabilitation at the Hospital of the University of Pennsylvania.



Talented Stem Cell Scientists Join the Department

Two talented faculty have joined the department through the Columbia Stem Cell Initiative (CSCI), strengthening the core stem cell expertise of CSCI.

Masayuki Yazawa, PhD, is a young Japanese scientist with a top-level mechanistic stem cell biology background linked with a strong interest in the therapeutic consequences of his work. He most recently worked in the Dolmetsch laboratory at Stanford University.

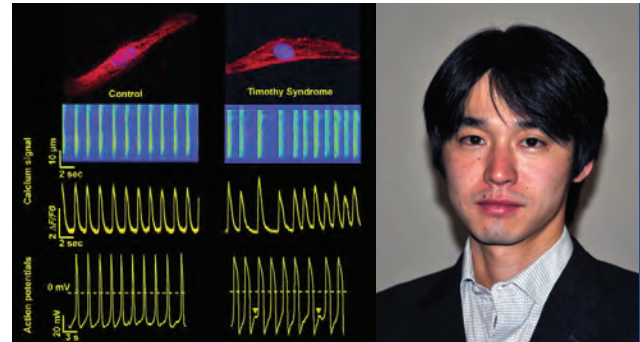
Dr. Yazawa uses stem cell technology to understand cardiac development and disease. During his postdoctoral training, he made several significant contributions. “He introduced to the lab the derivation and culture of patient-derived induced pluripotent stem cells (hiPSCs) and differentiated them into cardiomyocytes. He first used them to study heart cells from patients with Timothy syndrome, who have long QT intervals leading to life-threatening arrhythmias,” said Christopher Henderson, PhD, Director of the Columbia Stem Cell Initiative (CSCI), Vice Chairman of the Department, and Chief, Division of Regenerative Medicine. In a 2011 *Nature* paper, Dr. Yazawa showed that the abnormal calcium signaling in patient cardiomyocytes can be corrected by roscovitine, demonstrating the usefulness of such human systems for drug testing. “At Columbia,” said Dr. Henderson, “he will extend this approach to other cardiomyopathies, and will perform more extensive

mechanistic studies and drug testing.”

Dr. Yazawa also developed an exciting new technological approach through which interactions between two proteins in a cell can be triggered by a flash of blue light. He will use this and other optogenetic approaches to control the localization of specific proteins during cardiac differentiation and thereby better understand their functional role. These findings open immediate and exciting possibilities for collaboration with leading Columbia scientists.

Lei Ding, PhD, will join the Department in February as Assistant Professor and a member of the Columbia Stem Cell Initiative (CSCI). Most recently, he was a postdoctoral fellow in the Morrison lab, UT Southwestern.

Dr. Ding is an emerging leader in the field of hematopoietic stem cells (HSCs), which are responsible for the daily renewal of blood and immune cells in circulation. They are central to the success of bone marrow transplantation. Although HSCs are in many ways the best understood adult stem cells, some key questions remain unanswered. In particular, the precise composition of the protective environment – or “niche”



Dr. Yazawa uses stem cell technology to understand cardiac development and disease.

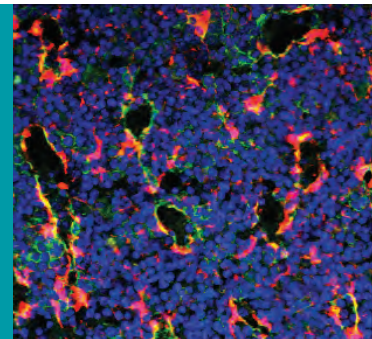
– in the bone marrow that allows their maintenance and self-renewal has been controversial.

Explains Dr. Henderson, “Dr. Ding’s work has identified both the niche and some of the factors involved, and he will extend these studies to the fetal liver, where HSCs are first generated.” Dr. Ding’s expertise will allow him to interact with many scientists in the Department of Microbiology and Immunology and the Herbert Irving Comprehensive Cancer Center, where he will hold joint appointments.

Below: A perivascular source of an HSC niche factor, CXCL12, in the bone marrow. Cxcl12-expressing cells (red) are overlapping/ immediately adjacent to endothelial cells (green) in the bone marrow of Cxcl12-DsRed knockin mice.



Dr. Ding is an emerging leader in the field of hematopoietic stem cells (HSCs), which are responsible for the daily renewal of blood and immune cells in circulation.



Resident Research: Acute Inpatient Rehabilitation for Patients with LVADs

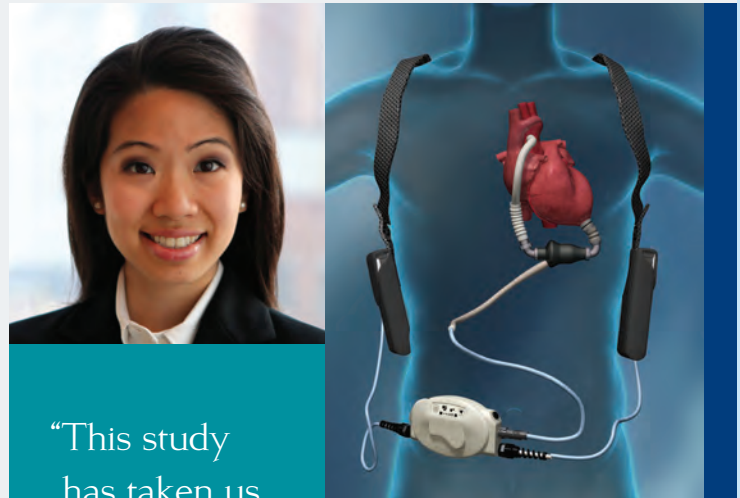
Many PM&R residency programs aspire to involve all residents in research during their residency, with variable results. The Columbia/Cornell/NewYork-Presbyterian Hospital PM&R residency program has recently established a more formal program to partner residents with faculty mentors to support resident research more effectively.

Elizabeth Nguyen, MD, a PGY-4 resident in the program, recently completed a retrospective study of patients with left ventricular assist devices (LVADs) receiving inpatient rehabilitation under the mentorship of Joel Stein, MD, Department Chair. The study was designed to determine whether these patients could safely tolerate inpatient rehabilitation and make functional gains necessary to return home. While many LVAD patients do not require inpatient rehabilitation, according to Nguyen approximately 29% of patients with LVADs at our institution receive inpatient rehabilitation.

LVAD surgery as an ongoing therapy for patients with end stage heart failure (known as “destination” therapy), rather than as a bridge to transplant, is becoming increasingly common, primarily because transplant lists are growing and the demand far exceeds the supply of organs. LVADs also have been shown to improve survival and enhance quality of life for these patients. However, formal studies evaluating rehabilitation outcomes in this population are lacking.

Says Dr. Nguyen, “Patients with LVADs can become severely deconditioned after prolonged hospital admissions as a consequence of post-operative medical complications. These patients require aggressive rehabilitation to improve their functional mobility and their independence in performing activities of daily living.”

“Exercise was well tolerated by the patients in our group, without any complications related to the aggressive therapy,” says Dr. Stein. “All of them were able to tolerate three hours of physical and occupational therapy six days a week, for a period of 10 to 14 days. They achieved functional gains that compared favorably to regional and national benchmarks for patients with a range of cardiac diagnoses who undergo inpatient rehabilitation. Improved functional ability enabled all of them to be discharged home.” He notes that after completing their inpatient rehabilitation, two of the original eleven



*HeartMate II External LVAD Equipment
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“This study has taken us a step closer to providing evidence that patients with LVADs can tolerate and benefit from an aggressive inpatient rehabilitation program.”

– Elizabeth Nguyen , MD

patients have subsequently passed away – one from cerebral hemorrhage and the other from cardiac arrest.

“This study has taken us a step closer to providing evidence that patients with LVADs can tolerate and benefit from an aggressive inpatient rehabilitation program. They can achieve both significant functional gains and a strong likelihood of home discharge,” Dr. Nguyen said. Findings from the study have been submitted for publication and are currently under review. Dr. Stein adds, “This project is a perfect example of a successful resident research project, with benefits for both the resident and faculty member involved, while advancing our knowledge in an important area.”

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Spotlight on Affiliates: Hospital for Special Surgery

Sports & Spine Fellowship Provides Diverse Academic Program



The Hospital for Special Surgery (HSS) Sports and Spine Fellowship provides fellows in-depth training in a broad and diverse spectrum of disorders, and includes education in interventional spine procedures, ultrasound guided techniques, sports medicine, electrodiagnostic medicine, and participation in research. The combination of the breadth of topics and in-depth experience creates a truly world-class fellowship experience, and prepares fellows for practice in either academic or private practice settings.

Peter J. Moley, MD, Assistant Attending Physiatrist, Hospital for Special Surgery and Assistant Professor of Clinical Rehabilitation Medicine, Weill Cornell Medical College is Director of this comprehensive program.

Dr. James Wyss, Assistant Attending Physiatrist, the Associate Fellowship Director, and a recent graduate of the HSS Fellowship program, brings an additional level of academic enrichment to the program in his role as mentor. Dr. Wyss has clinical interests in spine rehabilitation, interventional spine procedures, the use of ultrasound in musculoskeletal medicine, and sports injury prevention. Through his bedside

teaching and fellow lectures, Dr. Wyss is a dedicated and effective teacher and leader.

Joseph Feinberg, MD, HSS Physiatrist-in-Chief oversees the group of 13 physiatrists at HSS, and notes that the Hospital for Special Surgery “trains people not only to be good doctors, but also to become leaders in the field of PM&R.”

For additional information about the Sports & Spine Fellowship Program, please contact:
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nyp.org/rehabmed