Bring Out the Hook and Start Playing the Music

I’m sure many of us have had a similar experience. You’re sitting on the couch on a Sunday night trying to stay up to see who won the Academy Award for Best Picture. The program is running overtime because of yet another thank-you speech mentioning a large number of names. Thankfully, the music starts and sequined ushers swoop in to escort the speaker from the stage.

In this issue of Rehab Progress, it’s we who’ve been caught in the spotlight. Our UPMC Department of Physical Medicine and Rehabilitation’s (PM&R) Brain-Computer Interface research was honored with a Breakthrough Award by Popular Mechanics. Meanwhile, the PM&R chairman, who’s more comfortable on the couch than in the spotlight, was elected to the Institute of Medicine, something I’ll endeavor to live up to.

The fact is, these honors are shared by an amazing team of researchers, clinicians, mentors, students, and support staff who work tirelessly for our patients. I would like to call out the names and give a shout out to all of you at the UPMC Rehabilitation Institute and the University of Pittsburgh, as well as colleagues at other institutions, who contribute so selflessly to the field of physical medicine and rehabilitation.

Our work is a coordinated effort and it’s an honor to work with all of you. But here comes the music, the sequined ushers, and the hook to whisk me offstage before I get started naming you all individually. So, sincere thanks to our entire team of exceptional people.

Sincerely,

Michael Boninger, MD
Director, UPMC Rehabilitation Institute
Professor and Chairman, Department of Physical Medicine and Rehabilitation
University of Pittsburgh School of Medicine
Breakthrough Awards from Popular Mechanics

*Popular* Mechanics magazine has been recognizing leaders and innovators in the fields of science, technology, and product innovation with its annual Breakthrough Awards since 2004. The UPMC Department of Physical Medicine and Rehabilitation’s Brain-Computer Interface research, which enables a person’s thoughts to control a robotic arm, has been honored for 2012 with this accolade. We introduced our readers to this groundbreaking research in the article “Thought Translated to Movement,” in the summer 2012 issue of *Rehab Progress*, accessible at [http://pmr.medicine.pitt.edu/content/pdfs/RehabProgress_Summer2012.pdf](http://pmr.medicine.pitt.edu/content/pdfs/RehabProgress_Summer2012.pdf).

Winners were featured at the Breakthrough Conference gallery followed by an awards presentation on October 3, 2012 at New York City’s Hearst Tower. Award recipients were Michael Boninger, MD, Jennifer Collinger, PhD, Wei Wang, MD, PhD, and Alan Degenhart from the UPMC Department of PM&R; Andrew Schwartz, PhD, from the Department of Neurobiology; Elizabeth Tyler-Kabara, MD, PhD, from the Department of Neurological Surgery; and research volunteer Timothy Hemmes.

Boninger Elected to the Institute of Medicine

*M*ichael Boninger, MD, professor and chairman, Department of PM&R, has been elected to the highly prestigious Institute of Medicine (IOM). Each year, the full membership elects up to 70 new members to the IOM who are selected for their excellence and professional achievement in a field relevant to the IOM’s mission. These individuals represent not only the health care professions, but also the natural, social, and behavioral sciences, as well as law, administration, engineering, and the humanities.

For those at the top of their field, membership in the IOM reflects the height of professional achievement and commitment to service. Dr. Harvey Fineberg, IOM president stated, “The Institute of Medicine is greatly enriched by the addition of our newly elected colleagues, each of whom has significantly advanced health and medicine. Through their research, teaching, clinical work, and other contributions, these distinguished individuals have inspired and served as role models to others. We look forward to drawing on their knowledge and skills to improve health through the work of the IOM.” (From the IOM announcement at [www.iom.edu](http://www.iom.edu).)

2012 Gold Award for Improving Outcomes

The UPMC Rehabilitation Institute at Montefiore and the UPMC Transplant Service Line received the Fine Foundation’s gold award for their initiative “Preventing Readmissions through Good Discharge Planning.” The initiative lowered the hospital readmission rate for post-organ transplant patients to less than one-in-10, compared to more than four-in-10. Fewer re-hospitalizations within 30 days of discharge resulted in savings of more than $500,000 annually.

Sponsored by the Fine Foundation and the Jewish Healthcare Foundation (JHF), the Fine Awards were established to reinforce the critical role teamwork plays in health care. The theme of this year’s awards was “Transitions of Care Partnerships,” focusing on improving outcomes for patients who are transitioning in and out of, or between, different types of care settings and providers.

“This is such a fabulous accomplishment for the team,” says Deb Maurer, program administrator, Thomas E. Starzl Transplantation Institute. “The rehab team took on one of the most complex patient populations and was able to show unbelievable results.”

Staff at the UPMC Rehabilitation Institute at Montefiore noticed there were significant readmission rates among transplant patients who had been in rehabilitation. The team identified causes behind this trend, and discovered that many readmissions were due to poor understanding about medications. The collaborative group then worked to educate patients and their families about discharge medications, organized pill boxes for patients prior to discharge, and scheduled all follow-up appointments prior to rehab discharge. These steps resulted in cutting readmission rates by more than 50 percent for this population after they left the inpatient rehabilitation unit (see graph below).
Exercise Interventions in Individuals with Parkinson’s Disease

Deborah Josbeno, PhD, PT, NCS, CSCS
Assistant Professor

Deborah Josbeno, PhD, PT, is a faculty member in the Department of Physical Therapy at the University of Pittsburgh and is one of the coordinators for a multi-site clinical trial looking at the effects of exercise in patients with newly diagnosed Parkinson’s disease (PD). This clinical research trial is led by a group of researchers from the University of Pittsburgh Physical Therapy Department and will examine the impact of a structured aerobic exercise program for people with PD.

In addition to Dr. Josbeno, the team includes Anthony Delitto, PhD, PT, FAPTA, professor and chairman, Department of Physical Therapy. A total of 126 individuals with PD between the ages of 40 and 80 will be tracked over a six-month period. This multi-site trial, funded by the National Institute of Neurological Disorders and Stroke (NINDS), will recruit patients at the University of Colorado Denver, the University of Illinois at Chicago, and the University of Pittsburgh.

The main aim of the project is to examine the feasibility of implementing an exercise program consisting of different intensity levels (moderate or vigorous intensities) in patients with PD. Specifically, the objective is to test whether individuals with de novo Parkinson’s disease (naive to dopaminergic drug treatment) can achieve the randomly assigned levels of mean exercise intensity (60% to 65% average HRmax or 80% to 85% average HRmax) and adhere to the exercise protocol.

The intervention regimen consists of endurance exercise performed at either moderate (60% to 65% HRmax) or high (80% to 85% HRmax) intensity. The exercise will be delivered via treadmill training, four times per week for 26 weeks. Subjects then will be offered to continue exercising for an additional 26 weeks at the prescribed training level. Subjects randomized to usual care will not exercise for the first 26 weeks, but will be offered the exercise intervention for the second 26 weeks.

Dr. Josbeno hopes that this study — focusing on patients who have been newly diagnosed with the disease and are not yet on any PD medications — will provide further evidence for the protective benefits of exercise for people with early-stage Parkinson’s. The longer-term goal is to find out if exercise at a high intensity level has added benefits compared to moderate intensity or no exercise at all.

Department of Physical Medicine and Rehabilitation and UPMC Rehabilitation Institute Earn NIDRR Designation

The U.S. Department of Education’s National Institute on Disability and Rehabilitation Research (NIDRR), has designated the University of Pittsburgh Department of Physical Medicine and Rehabilitation (PM&R) and the UPMC Rehabilitation Institute as a Traumatic Brain Injury (TBI) Model System, and part of a five-year, $2,150,490 grant that connects the department to a network of 15 TBI Model System sites across the nation.

Amy Wagner, MD, associate professor and vice chairman of Research is the TBI Model System Project director. Other contributing PM&R faculty include Joseph Ricker, PhD, associate professor and vice chairman of Neuropsychology and Rehabilitation Psychology, and Patricia Arenth, PhD, assistant professor.

Model System Project sites must promote scientific research to improve the outcomes and lives of individuals with disabilities. Dr. Wagner has gained an international reputation for her TBI-focused genetic and biomarker research, called Rehabilomics®. Her biomarker expertise aims toward a future goal of “personalized medicine” through examining biological and genetic profiles of a patient’s injury, as well as the patient’s existing social, functional, and cognitive factors, to determine how these distinct characteristics might impact recovery from TBI.

“Rehabilitation after traumatic brain injury requires a person-centered and individualized approach to care,” Dr. Wagner says. “We are very excited to participate as a Model System site and have the opportunity to showcase the incredible wealth of local scientific and medical talent. We have so many scientists who understand the genetic and biological impact of injury at the cellular level, experts in acute and long-term medical care and therapy, and scientists studying TBI via neuroimaging, cognitive, and psychological methods. In addition, we have community partnerships that will allow us to share what we learn directly with individuals and families impacted by TBI.”

The department joins an elite group of just seven other university research centers nationwide with the distinction as Model System sites for both traumatic brain injury (TBI) and spinal cord injury (SCI).
UPMC Rehabilitation Institute SCI Research Appreciation Picnic

More than 100 patients, family, friends, and volunteers gathered at the Thelma Lovette YMCA in the Hill District in July for the UPMC Rehabilitation Institute SCI Research Appreciation Picnic. The event was organized as a “thank you” to patients and their families who have participated in spinal cord injury research at the University of Pittsburgh. The event included wheelchair basketball and rugby demonstrations, a wheelchair obstacle course competition, current research demonstrations by Department of Physical Medicine and Rehabilitation faculty and staff, and tours of the new YMCA’s accessible fitness equipment and pool. Tim Hemmes, who was the keynote speaker, spoke to the group about his experiences as the first participant in the Brain Computer Interface research project.

Second Annual Wheelchair Wash and Tune-Up

UPMC Mercy Rehabilitation Institute and UPMC Mercy SCI Support Group staff and volunteers washed and shined 18 manual and power wheelchairs belonging to patients and community members at the Second Annual Wheelchair Wash and Tune-Up in June. In addition, local vendors were on-site performing minor repairs, troubleshooting, and evaluating potential problems with the wheelchairs. Recent research at the University of Pittsburgh found that 52% of people with a spinal cord injury (SCI) required wheelchair repairs in the preceding six months and many experienced adverse consequences when repairs weren’t made.

By promoting and supporting this annual event, the UPMC Rehabilitation Institute and UPMC Mercy SCI Support Group strive to teach and motivate patients about the importance of maintaining optimal wheelchair function both for safety and to prolong wheelchair life.
Mohamed Al-Rabti: The Rebel Rower

On August 28, 2011, Mohamed Al-Rabti, a member of Libya’s national rowing team, was injured when his rebel squad was attacked by pro-Gadhafi forces near his home in Zwara, Libya. The injuries resulted in an above elbow amputation of his left arm. Emergency surgery saved Mr. Al-Rabti’s life, but left him with chronic pain and dashed hopes of a future as a competitive rower.

The Department of the Injured, formed by the new Libyan government to address the medical needs of the rebel fighters, first sent Mr. Al-Rabti to Tunisia, then to Germany for treatment. Doctor after doctor told him that the chronic pain was a consequence of amputation, with no cure or treatment beyond medication.

Salem Bensasi, Mr. Al-Rabti’s cousin and a data manager at UPMC, worked with the Libyan government and the U.S. State Department to secure a visa for Mr. Al-Rabti to come to Pittsburgh for treatment. Michael Munin, MD, professor and vice chairman of Clinical Development in the University of Pittsburgh, Department of Physical Medicine and Rehabilitation, and well-known for his expertise in electromyography and prosthetic rehabilitation, was their first stop. Dr. Munin was impressed by Mr. Al-Rabti’s determination to return to the sport he loved and his unwavering belief that a life of chronic pain and dependence on medication was not his future. “Surgically, the site looked fine to the naked eye, but he was very sensitive to light touch.” Dr. Munin went on to explain, “We were suspicious he might have neuroma, especially since his amputation occurred on the battlefield and they may not have had time to properly resect the residual nerves.” Ivan Tarkin, MD, assistant professor and chief, Division of Orthopaedic Traumatology in the Department of Orthopaedic Surgery, resected the neuromas from the residual musculo-cutaneous, median, and ulnar nerves (see picture at right). Dr. Munin says of the outcome, “He is virtually pain free after the operation. He no longer has the hypersensitivity he once did.”

Dr. Munin also consulted with Robert Dobson of Union Orthotics/Prosthetics. Mr. Dobson, with Mr. Al-Rabti’s input on the mechanics of rowing, began designing a prosthetic limb specifically for the sport. The prosthetic arm includes a universal joint at the elbow and a friction ball joint at the wrist that mimics the rotation of this joint when rowing. In addition to the sport prosthetic limb, he is being fitted with a neuroprosthetic arm that allows him exquisite control for daily activities.

On October 11, 2012, after nearly two years away from the sport he loves, Mr. Al-Rabti was on the Allegheny River sculling with three other rowers from the Three Rivers Rowing Association.

Mr. Al-Rabti began rowing at 16 years of age, winning his first medal at his first competition. At 18 he was a member of Libya’s national rowing team, winning medals every year at competitions in Algeria, Tunisia, Greece, Italy, and other countries.

Mr. Al-Rabti intends to return to Libya and continue rowing for the national team, filling the spot his teammates are holding open for him. He will begin training for the 2013 Arab Games and for the 2016 Summer Olympics in Rio de Janeiro, Brazil.

A video of Mohamed Al-Rabti rowing, and interviews with Dr. Munin and Dr. Tarkin, Bob Dobson, Mr. Al-Rabti, and his cousin Salem Bensasi, is available on YouTube at http://www.youtube.com/watch?v=j62ocainSn0.
Highlights in Recent Top Publications from the UPMC Department of PM&R

Elimination of dysphagia using ultrasound guidance for botulinum toxin injections in cervical dystonia.
Hong JS, Sather GG, Niyonkuru C, Munin MC

One of the consequences of inaccurate botulinum toxin injections for cervical dystonia is dysphagia. Hong et al found that the addition of real-time ultrasound imaging to EMG guidance eliminated dysphagia in five patients who had previously experienced this complication with unguided injections. They conclude that ultrasound guidance will improve the safety of botulinum toxin injections, particularly in patients who have had dysphagia in the past. (Muscle & Nerve. 2012 Oct; 46(4): 535-9)

Virtual electric power wheelchair driving performance of individuals with spastic cerebral palsy.
Dicianno BE, Mahajan H, Guirand AS, Cooper RA

Upper limb spasticity may impair the use of control interfaces, such as joysticks, for many individuals with disabilities, such as cerebral palsy (CP). The aims of this study were to compare the driving performance of those with CP to that of control participants, to identify the impact of lead time on performance, and to compare two joystick designs — a standard movement sensing joystick and a novel isometric joystick. (Phys. Med. & Rehab. 2012 Oct; 91 (10):823-30)

Sparse Optimal Motor Estimation (SOME) for extracting commands for prosthetic limbs.
Li Y, Smith L, Hargrove L, Weber D, Loeb G

The paper by Li et al describes a novel approach for translating motor nerve recordings into robust control signals having the dynamic range and update rate that is necessary to achieve dexterous control of a prosthetic arm/hand. This work is an important component of a larger DARPA-funded project to develop a spinal nerve interface for controlling and sensing prosthetic limbs. The PMR Rehab Neural Engineering Lab led by Weber is the first group to target the spinal nerves as a site for creating a high performance neural interface for prosthetic limbs. (Neural Systems and Rehab. Engin. 2012 Sep 27. [Epub ahead of print])

Novel ex-vivo mechanobiological intervertebral disc culture system.
Hartman RA, Bell KM, Debski RE, Kang JD, Sowa GA

Intervertebral disc degeneration, a leading cause of low back pain, poses a significant socioeconomic burden with a broad array of costly treatment options. Mechanical loading is important in disease progression and treatment. Connecting mechanics and biology is critical for determining how loading parameters affect cellular response and matrix homeostasis. A novel ex-vivo experimental platform was developed to facilitate in-situ loading of rabbit functional spinal units (FSUs) with relevant biological outcome measures. (Journal of Biomech. 2012 Jan10;45(2):382-5)