

Restore



Akhil Chhatre, left, and Ashot Kotcharian, right, are physiatrists who are also trained in spine and musculoskeletal management.

A Comprehensive Approach to Lower Back Pain

Patients who present with lower back pain to **Akhil Chhatre** and **Ashot Kotcharian** in the Johns Hopkins Spine Program leave their appointments with a specific diagnosis and individualized treatment plan.

The physiatrists—who are also trained in spine and musculoskeletal management—perform a thorough history and physical exam to narrow down the diagnosis. Kotcharian and Chhatre check the internal rotation of the hips and the sacroiliac joints, as well as the lumbar range of motion, extension and rotation.

“If movements like forward flexion provoke pain, I know it’s likely disc-mediated pain,” Kotcharian says. “If straight back extensions or extension with rotation cause pain, then I think about facet joint syndrome.”

Kotcharian and Chhatre also evaluate motor strength and reflexes in the legs, clonus in the legs or feet, and signs of neural tension. “Maneuvers like the straight leg raise or slump-sit put tension on the nerves and provoke pain if there’s disc herniation,” says Kotcharian.

Imaging crucial to a diagnosis of spinal stenosis, facet joint syndrome or disc herniation, such as X-ray,

MRI and EMG scans, are ordered if the patient hasn’t had the tests.

When there are clear indications for surgery, like bowel-bladder incontinence due to spinal cord compression, progressive weakness or myopathy, or refractory pain, the physiatrists consult with surgical experts at The Johns Hopkins Hospital.

When the evaluation uncovers a systemic diagnosis, like rheumatoid arthritis or ankylosing spondylitis, the physiatrists will coordinate care with a Johns Hopkins rheumatologist. Further, if the evaluation finds amyotrophic lateral sclerosis or multiple sclerosis, they connect with a Johns Hopkins neurologist.

“A lot of neurological conditions can present with pains and aches, and we may be the first to diagnose these because of the nature of our training and assessment,” says Kotcharian.

Once they elicit a diagnosis, the physiatrists develop a treatment plan that includes diagnosis-specific exercises and a prescription for physical therapy. They also make referrals, including orthotics, nutrition and pain psychology—all of which are provided within The Johns Hopkins Hospital.

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10 Components to Total Treatment for the Spine:



- 1 Thorough history
- 2 Physical exam
- 3 X-ray, MRI or electromyography scan
- 4 Consideration for surgery or interventional procedures
- 5 Referrals to rheumatologist, neurologist or other specialists
- 6 Diagnosis-specific exercises
- 7 Prescription for physical therapy
- 8 Referral for orthotics
- 9 Referral for nutrition
- 10 Referral for pain psychology

Some exciting developments are taking place in the Johns Hopkins Department of Physical Medicine and Rehabilitation.

Michael Friedman, Erik Hoyer, Levan Atanelov and Dale Needham recently published a one-year longitudinal study that engaged nurses and providers to increase the number of hours that patients were active while in the general hospital. By guiding the care teams to increase the activity of patients—going for an additional walk, for example—the length of stay and incidence of immobilization diseases decreased. Specifically, patients who were expected to be in the acute hospital setting for more than a week had a decrease of 1.1 days.

In February, several Johns Hopkins psychiatrists attended the annual meeting of the Association of Academic Psychiatrists in Sacramento, California. **Marlis Gonzalez-Fernandez, Martin Brodsky and Dale Needham** participated in some successful educational sessions about rehabilitation in the intensive care unit (ICU)—efforts that will better define the important role of psychiatrists in the ICU.

Additionally, **Akhil Chhatre** presented an engaging session on the pharmacologic understanding in current pain management and considerations for specific populations. Read more about Chhatre and **Ashot Kotcharian**, both psychiatrists with expertise in spine and musculoskeletal management, on the cover page of this issue.

New and innovative activities are underway to engage Johns Hopkins undergraduates considering postgraduate education opportunities. So far, the response from students has been very promising, and the activities appear to enhance the interest of young students to become future rehabilitation leaders who will help expand the specialty.

Lastly, the department is helping patients with brain injury function better than they ever have—just like the record-setting paralympian mentioned in the article next to this column, *Pushing Neurorehabilitation to Its Limits*. The group continues to receive funding for research efforts like these to develop and test novel interventions. ■

Pushing Neurorehabilitation to Its Limits

Physiatrist **Pablo Celnik** is accustomed to getting referrals for sophisticated patients. What he is not used to is receiving referrals for patients accompanied by a film crew—until now, that is.

In January 2016, Celnik was contacted by a University of Tokyo neuroscience researcher, Daichi Nozaki, who was involved with producing a health and science documentary film. Nozaki wanted to learn how a Baltimore-based Paralympian, who was being featured in the film, could become a competitive swimmer despite left hemiparesis.

The Paralympian, 24-year-old Cortney Jordan, has

a history of spastic cerebral palsy due to a stroke that occurred at birth. Despite her medical challenges, she is a two-time U.S. Paralympian with eight medals and numerous world records.

Nozaki asked Celnik if he would evaluate Jordan to see if the left hemisphere controls her left arm in the same way it controls her right arm. Celnik, a well-known neurological rehabilitation scientist with clinical expertise in stroke and traumatic brain injury, agreed to assess Jordan and try to uncover how her motor cortex functions.

In February, the film crew visited Baltimore and filmed Jordan swimming and exercising while Celnik monitored her behavior. They then went to the Johns Hopkins Human Brain Physiology and Stimulation Laboratory.

To understand how Jordan's brain controlled her body, Celnik performed a thorough assessment of her brain function capacity using transcranial magnetic stimulation, behavioral tasks and functional MRI.

At the end of the evaluation, Celnik found Jordan has a traditional left spastic hemiparesis that presents with limited function in the ability to move the left side of her body, while her right side functions normally. "Even though there is a large lesion on the right side of her brain, the left side of her body is still controlled by the right," says Celnik. "Areas of the brain around the lesion carry out this coordination."

For Nozaki, the finding explained how Jordan can perform freestyle and backstroke but is unable to do other strokes. For Celnik, Jordan is a testament to the idea that understanding how the brain controls behavior is critical to finding the appropriate target to deliver novel, scientifically based neurorehabilitation interventions.

"Most people recover proportionally to the original damage caused by a stroke," says Celnik. "Traditional rehabilitation allows patients to

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Pablo Celnik applies transcranial magnetic stimulation to a research participant in the Human Brain Physiology and Stimulation Laboratory.



Learn more about the Human Brain Physiology and Stimulation Laboratory at bit.ly/celnik.

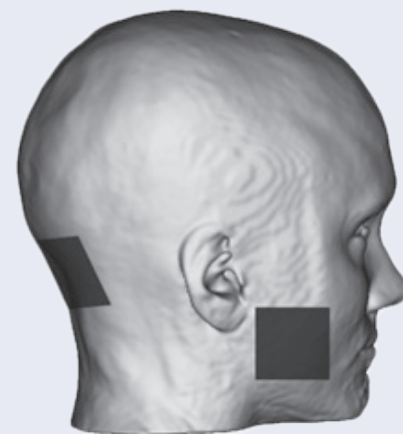
Research to Enhance Motor Function

As a clinician-scientist in the Department of Physical Medicine and Rehabilitation, **Pablo Celnik's** most pressing question is, "How can you enhance motor function in patients with and without neurological damage?"

Inside the Johns Hopkins Human Brain Physiology and Stimulation Laboratory, Celnik uses noninvasive brain stimulation, motion analysis and other behavioral techniques to understand the mechanisms behind motor learning and motor recovery following a brain lesion.

Most recently, Celnik gathered several colleagues investigating cerebellar non-invasive brain stimulation to summarize how cerebellar transcranial direct current stimulation (ctDCS) can become a viable intervention for patients with neurological conditions. They found evidence suggesting that ctDCS could influence motor, cognitive and emotional behavior. If so, the intervention could provide an option for cerebellar ataxias, which currently lacks effective alternative treatments.

"This work is bringing us closer to new treatments that could promote recovery of motor function following an injury," says Celnik. ■



In cerebellar transcranial direct current stimulation, one electrode is centered over the right cerebellar cortex and the other is placed on the right buccinator muscle.

Expert Outpatient Care, Many Locations

Patients with general or specific rehabilitation needs who want to be treated at The Johns Hopkins Hospital have numerous options. The world-class treatment available from its Department of Physical Medicine and Rehabilitation is also available at Johns Hopkins Bayview Medical Center, Howard County General Hospital, and the Johns Hopkins Health Care and Surgery Center at Green Spring Station, White Marsh and Odenton.

“At The Johns Hopkins Hospital, there is a diverse clinical team available to address any type of condition that could come their way,” says **Ken Johnson**, therapy director of outpatient rehabilitation at Green Spring Station. “Our clinical teams in the community are offering the same level of care.”

Over the last 20 years, the department has provided customized treatment to restore patients to their highest level of function possible. The team of doctors, therapists, nurses and rehabilitation psychologists develops and pursues individual treatment plans tailored to each patient’s needs.

“We provide therapy for all different populations—from pediatrics to professional athletes,” says Johnson.

Outpatient services include physical medicine, physical therapy, occupational therapy and speech-language pathology. Alongside these general services, there is highly specialized care for patients with amputations, muscle spasticity, stroke, brain injury, spine pain and other conditions.

Physiatrists work seamlessly with colleagues in other departments, such as Orthopaedic Surgery and Neurology, as The Johns Hopkins Hospital’s tradition of collaboration continues in the community facilities.

“Our comprehensive approach applies to all patients—whether they have general needs, from a sprain or strain, or more complex needs,” says **Marlis**

Gonzalez-Fernandez, medical director of outpatient rehabilitation for The Johns Hopkins Hospital. “The process for a patient’s improvement is an iterative one that happens more quickly when everyone works together and adjustments are made along the way.”

Johns Hopkins therapists incorporate the latest tools and technology to enhance recovery. These include instrumented treadmills, anti-gravity treadmills, computerized neurocognitive testing and training, balance testing, and functional electrical stimulation.

“Research from faculty is being translated into the types of therapy we provide, and it influences some of the technology we choose for treatment,” says Johnson. “In this way, Johns Hopkins research benefits all patients—whether they are in a research trial or not.” ■



Outpatient Physical Medicine and Rehabilitation
410-614-4030
 The only number you need to refer any patient to any Johns Hopkins physical medicine and rehabilitation service

INNOVATIONS FOR CARE



System Aids Quick Decisions for Clinicians, Provides More Time with Patients

A new clinical decision support tool at Johns Hopkins Bayview Medical Center prioritizes inpatients needing physical and occupational therapy in real time. Each therapist using the system saves 20 minutes a day, while therapy coordinators save 150 minutes a day—valuable time that now goes toward high-priority patients.

The photo to the left shows the team from the Department of Physical Medicine and Rehabilitation that developed the system. From left, occupational therapist **Virginia Carman**, physical therapist **Ruben Pagkatipunan**, physical therapist **Albert Mears**, occupational therapist **Barbara Ruzicka**, occupational therapist **Luke Seidman**, physical therapist **Karyn Farrar** and physiatrist **Krishnaj Gourab**.



TIME SAVINGS:

- 20 MIN/DAY FOR THERAPISTS
- 150 MIN/DAY FOR THERAPY COORDINATORS

A Comprehensive Approach to Lower Back Pain

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Kotcharian says nutrition is important to the diets of patients with pain. “Some patients have highly inflammatory diets; others have diets that interact with medications. Still others may need to lose weight,” he says.

If medication or other interventional procedures are necessary, the physiatrist can schedule fluoroscopic-guided injections or radiofrequency ablation, all of which are available within their practice.

“This comprehensive approach addresses not just symptom relief but also functional restoration and improvement,” says Kotcharian. “In many cases, we can fix the problem with conservative management and leave surgery as a last resort.” ■



Watch Ashot Kotcharian present patient case studies, diagnosis and treatment options for sacroiliac joint dysfunction and pain at bit.ly/hspine.

Pushing Neurorehabilitation to Its Limits

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return to functioning individuals in society—regaining the ability to speak, dress themselves, drive a car and go to work. At Johns Hopkins, we are working very hard to augment the process of neurological recovery.”

With a keen interest in understanding and improving motor function in patients with brain lesions, Celnik, neuroscientist **Amy Bastian** and neurologist **John Krakauer** are developing a state-of-the-art outpatient neurorehabilitation clinic. The joint venture between the departments of Neurology, Neuroscience, and Physical Medicine and Rehabilitation will pair brain stimulation techniques with interventions involving robots, immersive games and special treadmill exercises.

“We want to provide interventions that will help patients with more than just functional recovery,” says Celnik.

“We want to enhance the return of ‘normal’ neurological function while we maximize the function of the individuals. Potentially, patients could become high-achiever athletes, just like Cortney.” ■

To learn more about Johns Hopkins Physical Medicine and Rehabilitation, visit hopkinsmedicine.org/pmr.

For referrals and consultations:

Hopkins Access Line (HAL)

1-800-765-5447 or

410-955-9444

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A newsletter from Johns Hopkins Physical Medicine and Rehabilitation

Johns Hopkins Medicine

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This newsletter is one of the many ways we seek to enhance our partnership with our referring physicians. Comments, questions and thoughts on topics you would like to see covered in upcoming issues are always welcome.

Physical Medicine and Rehabilitation

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