

# Rehabilitation Updates

Collaborative care, innovative approaches, and research-driven therapies to help patients get back to their lives.



Kennedy Krieger Institute  
UNLOCKING POTENTIAL

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## A Word from the Director

Frank S. Pidcock, MD, Vice President of Rehabilitation at Kennedy Krieger Institute, Director of the Pediatric Rehabilitation Division in the Department of Physical Medicine & Rehabilitation, Johns Hopkins Hospital.



In this first issue of *Rehabilitation Updates*, we are pleased to introduce the wide array of exciting and innovative rehabilitation programs available at Kennedy Krieger Institute. Our mission is to provide excellence in patient care in a clinical learning environment that brings research from bench to bedside.

Kennedy Krieger's Rehabilitation Continuum of Care has been accredited by CARF (the Commission on Accreditation of Rehabilitation Facilities), and it includes an inpatient pediatric rehabilitation unit, a rehabilitation day hospital program for providing coordinated interdisciplinary therapies, a community-based rehabilitation program for providing

service in the home, and outpatient clinics that provide ongoing rehabilitation care. Using this multilevel continuum, we provide coordinated, individualized care for children with a wide variety of neurologic and musculoskeletal disorders.

In this inaugural issue, find out how our state-of-the-art aquatic therapy center harnessed the power of water as a healing and therapeutic modality for a teenager recovering from a brain tumor. Future issues of *Rehabilitation Updates* will highlight other innovative interventions, such as movement-assisted robotic devices, therapeutic video games, virtual reality systems, and computerized exercise cycles that help patients achieve their optimal therapy goals more quickly and effectively.

Our team includes four board-certified pediatric rehabilitation medicine physicians who are also members of the Johns Hopkins Department of Physical Medicine and Rehabilitation. We have an active practice committed to improving the welfare of patients through clinical care, inquisitive research, and ongoing learning.

It is a real honor and privilege to work with the many caring, smart, and dedicated team members from the wide variety of disciplines that make up the Rehabilitation team at Kennedy Krieger. We strive to make the lives of the patients and families we serve better, one day at a time.

Watch for future issues of *Rehabilitation Updates*, in which we will continue to highlight the latest research and treatment options in neurorehabilitation. If you have any questions or would like to learn more about any of our services, please call our **Physician Referral Line** at 443-923-9403.

### Rehabilitation Specialty Programs at Kennedy Krieger Institute

Kennedy Krieger Institute has a wide variety of rehabilitation programs to meet the needs of patients at all levels. For a complete listing, please visit [kennedykrieger.org](http://kennedykrieger.org).

#### Pediatric Inpatient Rehabilitation Program

- Brain injury
- Medical rehabilitation
- Pain rehabilitation
- Post-orthopedic surgery
- Spinal cord injury

#### Outpatient Rehabilitation Programs

- Brachial Plexus Clinic
- Brain Injury Programs:
  - Brain Injury Early Assessment
  - Brain Injury Responsiveness Program
  - Interdisciplinary Brain Injury Clinic
  - Neurorehabilitation Concussion Clinic
- Community Rehabilitation Program
- Constraint-Induced and Bimanual Therapy Program
- Cranial Cervical Clinic
- Focused Interdisciplinary Therapy Program
- International Center for Spinal Cord Injury
- Limb Differences Clinic
- Orthopedics Clinic
- Pediatric Pain Rehabilitation Clinic
- Philip A. Keilty Center for Spina Bifida and Related Condition
- Physical Medicine and Neurorehabilitation Clinic
- Specialized Transition Program Day Hospital

#### Related Services and Clinics

- Aquatic Therapy Program
- Assistive Technology Clinic
- Audiology Clinic
- Behavioral Psychology Program
- Movement Disorder Clinics
- Neuropsychology Outpatient Clinics
- Nutrition and Weight Management Clinic
- Occupational Therapy Clinic
- Pediatric Psychology Clinic
- Physical Therapy Clinic
- Seating Clinic
- Speech and Language Clinic

# Escaping Gravity: State-of-the-Art Aquatic Therapy Treadmill Helps Patient Learn to Walk Again



Fifteen-year-old Kokayi Thomas had always been healthy and athletic, until last November when he started complaining of weakness in his right arm and leg. After a visit to the pediatrician, a battery of tests, and an MRI, Kokayi and his parents were shocked to hear the diagnosis: Kokayi had a brain tumor. Although considered low-grade, the tumor—pilocytic astrocytoma—was located on his brain stem. “Our world turned upside down,” recalls Kokayi’s mother.

Kokayi underwent a suboccipital craniotomy to remove the tumor. The surgery was successful, but because the cerebellum was affected, Kokayi experienced ataxia and a lack of muscle coordination, increased weakness on his right side, and tremors. Kokayi began intensive occupational, physical, and speech therapy for these impairments in Kennedy Krieger’s rehabilitation program, first as an inpatient and then in the Institute’s day hospital—the Specialized Transition Program (STP).

**Kennedy Krieger’s combination of motivational therapists and rehabilitation technology is “sheer art plus science.”**

—Dwight Thomas, father of Kokayi

*Kokayi and his physical therapist Katlyn Recchia in the state-of-the-art aquatic therapy pool.*



When physical therapist Katlyn Recchia first began working with Kokayi, he couldn’t walk without assistance or navigate his wheelchair. But since then, he’s made great progress with the help of intense therapy in the Institute’s state-of-the-art aquatic therapy pools, equipped with underwater treadmills, video systems, temperature controls, and hydraulic lifts that allow the floors to be raised and lowered for easy access by patients in wheelchairs.

Perhaps what’s best about aquatic therapy is the independence and freedom that comes from escaping the limitations of gravity, allowing patients to do more in the pool than is possible on land and achieve their therapeutic goals more quickly.

“With the underwater treadmill, Kokayi gets thirty minutes of cardiovascular activity using the natural resistance and buoyancy of water,” says Recchia. The pool’s multiple jets can increase this resistance, helping build muscle strength and coordination. And a video screen shows patients a view of their leg and foot placement from the underwater cameras as they walk, helping retrain a proper gait pattern while maintaining good posture alignment. “When you combine all that, it’s a very efficient therapy session,” explains Recchia.

These days, Kokayi is able to walk short distances and climb stairs, and is much more independent with his wheelchair. His parents attribute his success to Kennedy Krieger’s ability to bring together the science of rehabilitation technology with therapists who know how to motivate patients. As Kokayi’s father explains, “It’s sheer art plus science.”



*An underwater camera shows Kokayi a view of his leg and foot placement, helping him retrain a proper gait pattern.*

Kennedy Krieger offers an expansive array of innovative technologies and equipment to improve function and strength, reduce muscle atrophy, and stimulate nerves, including rehabilitation equipment designed especially for children. Some of the latest technologies include:

- Armeo® Boom and Armeo® Spring
- FES elliptical bikes
- TheraStride® Body Weight Support System
- LiteGait®
- Medi Touch Hand Tutor™ and Leg Tutor™
- Nintendo Wii and iPads

To see a more complete listing of rehabilitation technologies, visit [rehabilitation.kennedykrieger.org](http://rehabilitation.kennedykrieger.org).

# From Bench to Bedside

*Kennedy Krieger's clinicians and researchers are leaders in the worldwide effort to prevent and treat disorders of the brain, spinal cord, and musculoskeletal system. Our investigators continue to break new ground with innovative imaging technology, investigate critical areas, and develop new treatment models and therapies. Recent research related to topics in this issue:*

## Osteoporosis and Aquatic Therapy:

Use of the aquatic environment to balance safety with intensive therapies.

Obst K, White L, Sachs C, Recio A. (2013). "Osteoporosis and Aquatic Therapy". *Advance for Physical Therapy and Rehab Medicine*, 23(3), 22.

## Treatment of Cerebellar Cognitive Affective Syndrome with Aripiprazole:

Therapeutic benefit of aripiprazole for treatment of mental status changes associated with resection of a posterior fossa tumor.

Yap J, Wachtel L, Ahn E, Sanz J, Slomine B, Pidcock F. (2012). "Treatment of cerebellar cognitive affective syndrome with aripiprazole". *Journal of Pediatric Rehabilitation Medicine*, 5(3):233-8. PMID: 23023255

## Treatment-related Changes in Vermal Volumes and Neuropsychologic Performance in Children Receiving Brain Radiation of the Cerebellum:

Smaller size of the vermis (part of the cerebellum) was found in children receiving treatment for brain tumor or leukemia and was associated with worse performance on cognitive and motor tasks.

Horská A, Laclair A, Mohamed M, Wells CT, McNutt T, Cohen KJ, Wharam M, Mahone EM, Kates W. (2010). "Low cerebellar vermis volumes and impaired neuropsychologic performance in children treated for brain tumors and leukemia". *American Journal of Neuroradiology*, 31(8):1430-7. PMID: 20448013

## Neuroimaging and Neuropsychological Follow-up in Brain Tumors:

Description of multi-modal brain imaging findings and functional changes noted in a patient with brain tumor examined three times over 27 months.

Schmidt AT, Martin RB, Ozturk A, Kates WR, Whara MD, Mahone EM, Horska A. (2010). "Neuroimaging and neuropsychological follow-up study in a pediatric brain tumor patient treated with surgery and radiation". *Neurocase*, 16(1):74-90. PMID: 20391187

## Saturation-power dependence of amide protontransfer-(APT) weighted and nuclear Overhauser enhancement-weighted image contrasts in a rat glioma model at 4.7 T:

Investigation of optimized parameters for use of this advanced brain tumor imaging technique.

Zhou J, Hong X, Zhao X, Gao JH, Yuan J. (2013). "APT-weighted and NOE-weighted image contrasts in glioma with different RF saturation powers based on magnetization transfer ratio asymmetry analyses". *Magnetic Resonance in Medicine*. 70(2):320-7. PMID: 23661598

## Cyr61 Effect on HGF/c-Met Pathway Activation:

Description of a novel pathway of activation in brain tumor cells.

Goodwin CR, Lal B, Zhou X, Ho S, Xia S, Taeger A, Murray J, Laterra J. (2010). "Cyr61 mediates hepatocyte growth factor-dependent tumor cell growth, migration, and Akt activation". *Cancer Research*, 70(7):2932-41. PMID: 20233866

## Time to Follow Commands is Most Useful for Predicting Outcome After TBI:

Investigation of the utility of various injury severity variables for predicting outcome from pediatric TBI.

Austin CA, Slomine BS, Dematt EJ, Salorio CF, Suskauer SJ. (2013). "Time to follow commands remains the most useful injury severity variable for predicting WeeFIM® scores 1 year after pediatric TBI" *Brain Injury*, 27(9):1056-62. PMID: 23781827

## Physical Abilities and Mobility Scale:

Demonstration of benefit of a novel scale for evaluating changes in caregiver burden and child's function.

Trovato MK, Bradley E, Slomine BS, Salorio CF, Christensen JR, Suskauer SJ. (2013). "Physical Abilities and Mobility Scale: reliability and validity in children receiving inpatient rehabilitation for acquired brain injury" *Archives of Physical Medicine and Rehabilitation*, 94(7):1335-41. PMID: 23254275

## Rationale, Timeline, Study Design, and Protocol Overview of the Therapeutic Hypothermia After Pediatric Cardiac Arrest Trials:

A multicenter study examining neurobehavioral outcome following the use of cooling of children following cardiac arrest in over 40 sites in the United States and Canada. Drs. Slomine and Christensen of Kennedy Krieger developed and oversee the neurobehavioral outcomes for the study.

Moler FW, Silverstein FS, Meert KL, Clark AE, Holubkov R, Browning B, Slomine BS, Christensen JR, Dean JM. (2013). "Rationale, timeline, study design, and protocol overview of the therapeutic hypothermia after pediatric cardiac arrest trials." *Pediatric Critical Care Medicine*, 14 (7):e304-315. PMID: 23842585

For a list of additional recent rehabilitation research at Kennedy Krieger Institute, please visit [rehabilitation.kennedykrieger.org](http://rehabilitation.kennedykrieger.org).

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123 Baltimore Ave  
Baltimore Md 21205



## Columbia Clinic Opening

The Neurorehabilitation Concussion Clinic is pleased to announce that we are now open and seeing patients in Howard County at the Kennedy Krieger Institute location in Columbia, Maryland.

The clinic treats children and adolescents aged 3 to 18 years who have a mild traumatic brain injury (concussion).

Treatment and services include checking for overlooked injuries or ongoing problems, assessing patients' best path to optimal recovery, and helping them to return to academic, athletic, and community life. We also provide education and support for families with questions about their child's return to typical activities.

The clinic also continues to see patients in the Broadway Outpatient Clinic on Mondays, Tuesdays, and Fridays. For more information on the Neurorehabilitation Concussion Clinic, call our Care Management team at **443-923-9400**.

## New Physician Joins Kennedy Krieger

Kennedy Krieger Institute is pleased to announce the addition of Ranjit Varghese, MD, to its medical staff. Dr. Varghese specializes in orthopedics and cerebral palsy.

Dr. Varghese comes to Kennedy Krieger from Gillette Children's Specialty Hospital in St. Paul, Minnesota, where he was a fellow in pediatric orthopedics. He was also a pediatric oncology fellow at Boston Children's and Massachusetts General Hospital.

Dr. Varghese will see children with complex orthopedic concerns as a result of congenital disorders and traumatic injuries. Dr. Varghese uses the latest technology and techniques, including a gait lab if needed, to diagnose and treat patients with a wide variety of conditions, and create individualized treatment plans for patients.

To make an appointment or to learn more, call **443-923-9403** or email [findaspecialist@kennedykrieger.org](mailto:findaspecialist@kennedykrieger.org).



### Kennedy Krieger Inpatient Rehabilitation Unit Typical Patient Mix

