PEDIATRIC
INSIGHTS

WINTER 2022 • An Update From the Divisions of Child Neurology and Pediatric Neurosurgery

Mutations Cause Rare Genetic Disease in Children

In a paper published in *Nature Communications,* an international group of collaborators led by researchers at UPMC Children's Hospital of Pittsburgh have identified a genetic cause of a rare neurological disorder marked by developmental delay and loss of coordination, or ataxia.

The disorder, scientists found, is caused by mutations in a protein called GEMIN5 — one of the key building blocks of a protein complex that controls RNA metabolism in neurons. No mutations in GEMIN5 were previously linked to any genetic disease.

"It's just like building a house," says senior author **Udai Pandey, PhD**, associate professor of pediatrics, human genetics, and neurology at the University of Pittsburgh School of Medicine. "You take out the most important brick at the base and the whole building falls apart."

GEMIN5 is part of a protein complex that regulates a slew of important cellular processes, including development of specialized outgrowths from nerve cells called dendrites and axons. Interestingly, mutations in another key protein of the complex, named survival motor neuron protein, cause a different devastating disorder — spinal muscular atrophy.

To gather material for the study, Pittsburgh researchers contacted pediatricians, geneticists, and neurologists from all over the globe, eventually collecting data from 30 patient families in 12 different countries.

Because isolating live neurons from people isn't possible, researchers had to come up with another way of getting samples for future testing. They collected blood samples from pediatric patients who were referred to neurogenetic clinics with undiagnosed neurological symptoms. Blood samples were then processed to isolate cells that, with careful tinkering in the lab, were reprogrammed into neurons.

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Mechanistic Link Between Repetitive Traumatic Brain Injury and Neurodegenerative Disorders

In June, a research team from the University of Pittsburgh, led by senior author **Udai B. Pandey, PhD**, from the Division of Child Neurology at UPMC Children's Hospital of Pittsburgh, published a new study in the journal *eLife* that describes a mechanistic link between repetitive traumatic brain injury and neurodegenerative disorders.

The study, conducted in collaboration with researchers from the University of Arizona, Boston University School of Medicine, and the University of Colorado, uncovered that dysfunction in nucleo-cytoplasmic transport (NCT) occurs in traumatic brain injury, and this dysfunction in the movement of cellular constituents into and out of the nucleus of the cell leads to accumulation of the TAR DNA binding protein 43 (TDP-43). TDP-43, through prior research, has, among other mechanisms, been implicated in neurodegenerative disorders such as amyotrophic lateral sclerosis (ALS) and frontotemporal lobar degeneration (FTLD).

Dr. Pandey and colleagues' research, conducted in both *Drosophila* and rat models of repetitive TBI, also found that the nuclear pore complex (NPC) protein was upregulated in the setting of TBI, leading to protein irregularities and TDP-43 accumulation. Upregulation of the NPC protein was only one aspect of the nearly 400 different proteins that the team found to undergo significant changes in the setting of traumatic injury. Components of the NPC, a group of proteins called nucleoporins (NUP), were shown to exist in higher levels in the models after TBI.

The lead author **Eric N. Anderson, PhD**, a postdoctoral associate in the Pandey Laboratory, investigating human brain tissues of deceased chronic traumatic encephalopathy (CTE) patients, found both increased levels of NUP, and specifically NUP62, at increasing levels based on the severity of the disease at the time of death. In contrast, in healthy tissue comparisons, no increased levels of NUP62 were seen. Similar findings also were seen in their rat TBI models showing increasing levels of NUP62 based on disease severity.

The mechanisms that Dr. Pandey's team uncovered linking traumatic brain injury to neurodegenerative conditions through nuclear transport dysfunction may open up a potential new approach for therapeutic targets that could repair or blunt the downstream effects seen after TBI that lead to the increases in NUP62 and TDP-43.

Reference

Anderson EN, Morera AA, Kour S, Cherry JD, Ramesh N, Gleixner A, Schwartz JC, Ebmeier C, Old W, Donnelly CJ, Cheng JP, Kline AE, Kofler J, Stein TD, Pandey UB. Traumatic Injury Compromises Nucleocytoplasmic Transport and Leads to TDP-43 Pathology. *eLife.* 2021; 10: e67587.

Shunt Infection, Malfunctions, and Long-Term Outcomes in Cases of Myelomeningocele

A new study on shunt infection and malfunctions in cases of myelomeningocele with symptomatic hydrocephalus provides new findings on long-term outcomes.

Stephanie Greene, MD, director of vascular neurosurgery, and director of perinatal neurosurgery at the Brain Care Institute at UPMC Children's Hospital of Pittsburgh, was the senior author of the study[1] published in May in the *Journal of Neurosurgery Pediatrics.* The study was selected as the Editor's Choice for this edition of the journal for its potential impact on clinical practice with shunt use in myelomeningocele. This study is the second of Dr. Greene's investigations published in the past year to have been selected as an Editor's Choice feature in the journal.

Study Overview

Hydrocephalus occurs in a high percentage of cases of myelomeningocele, necessitating correspondingly high placement rates of ventriculoperitoneal shunts. However, long-term outcome data in these cases related to shunt infection rates, malfunctions, and revision procedures has been lacking. Shunt infection rates in patients with myelomeningocele are significantly higher than in other causes of symptomatic hydrocephalus. Infections and shunt malfunctions lead to revision procedures and other patient morbidities.

This single-institution study retrospectively examined 170 cases of myelomeningocele closure performed at UPMC Children's Hospital of Pittsburgh over 22 years, from 1995 to 2017. The team's analysis examined rates of shunt insertion, revision rates, and shunt infection rates.

It is important to note that in this study, Dr. Greene and colleagues' analysis accounted for and compared outcomes in patient cohorts after 2011 when the hospital instituted the Hydrocephalus Clinical Research Network (HCRN) protocol for shunt cases as a means to avoiding or reducing rates of shunt infection. This protocol was responsible for significant changes in managing patients post-implementation.

Key Findings

One hundred seventy cases of myelomeningocele closure performed at UPMC Children's during the study period were included in the analysis. Of the 170 cases, 137 (87%) required placement of a ventriculoperitoneal shunt for symptomatic hydrocephalus. Furthermore, the shunt revision rate was found to be 21.1% per person-year, and the rate of shunt infection was 2.1% per person-year at a mean follow-up of 10.8 years. This translates to a median revision rate of 0.14 per year, and a mean number of revisions per patient of 2.28 over the entire follow-up period. These rates are comparable to other findings in the literature.

It should be emphasized that while the overall percentage of revision procedures appears high for the study (72%), the follow-up period for this study is more than 20 years, an extraordinarily long period for such a study, making comparisons with studies of much shorter duration that exhibit lower rates incomparable. It should also be noted that shunt placements, in general, decreased over time.

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More About Dr. Greene

Stephanie Greene, MD, associate professor of neurological surgery, is the director of vascular neurosurgery and director of perinatal neurosurgery in the Brain Care Institute at UPMC Children's Hospital of Pittsburgh. Dr. Greene earned her medical degree from Albany Medical College in New York, followed by residency at the Harvard Medical School/ Children's Hospital of Boston/Brigham & Women's Hospital program, and a pediatric neurological surgery fellowship at Seattle Children's Hospital through the University of Washington School of Medicine. Dr. Greene's clinical and research interests are focused on vascular neurosurgery with an emphasis on arteriovenous malformations, fetal neurosurgery, myelomeningocele, and MoyaMoya syndrome. Dr. Greene joined the Brain Care Institute at UPMC Children's in 2009.

Pediatric Neurosurgeon Awarded New R21 Grant

UPMC Children's Hospital of Pittsburgh pediatric neurosurgeon, **Taylor J. Abel, MD, FAANS**, was awarded a National Institutes of Health (NIH) National Institute on Deafness and Other Communication Disorders R21 grant in April for a study that will investigate the flexible representation of speech in the supratemporal plane. This work is being led by Dr. Abel and co-principal investigator Lori L. Holt, PhD, Professor of Psychology and Neuroscience at Carnegie Mellon University and Principal Investigator in the Holt Laboratory.

Study Objectives

Drs. Abel and Holt's study is designed to more thoroughly understand mechanisms in the brain that confer upon individuals the ability to perceive speech in the context of dynamic settings. Examples of dynamic settings include speech perception in the context of ambient sounds or noises, or when individuals converse with someone who has a foreign accent. This line of research is important clinically because it may aid in refining or developing new rehabilitation protocols for individuals who suffer from communication disorders that interfere with their ability to perceive and ultimately process speech — disorders such as autism and dyslexia.

The study will employ Dr. Abel's extensive expertise in the use of stereoelectroencephalography (sEEG), in concert with other brain-mapping techniques, such as scalp electroencephalography and electrocorticography, to obtain electrophysiological data from within brain structures to map and assess speech perception in both study subjects and healthy controls.

More About Dr. Abel

Taylor J. Abel, MD, FAANS, is an assistant professor of Neurological Surgery at the University of Pittsburgh School of Medicine, and he is the Chief of Pediatric Epilepsy Surgery and Surgical Director of the UPMC Children's Hospital of Pittsburgh Epilepsy Center. Prior to joining UPMC Children's, Dr. Abel trained at the University of Iowa, Centre Hospitalier Universitaire Grenoble Alpes in France, and The Hospital for Sick Children in Toronto, Canada.

Dr. Abel directs the Pediatric Brain Electrophysiology Laboratory, which is focused on understanding the mechanisms of auditory perception in the human brain. Dr. Abel's research group also conducts clinical trials and comparative effectiveness studies of epilepsy surgery interventions.

Reference

Flexible Representation of Speech in the Supratemporal Plane. NIH Grant Number: R21DC019217-01.

NIH Director's New Innovator Award

Assistant professor of Pediatrics, **Dwi Utami Kemaladewi, PhD**, from the Division of Genetic and Genomic Medicine was awarded a highly competitive NIH Director's New Innovator Award through the National Institutes of Health (NIH) "High-Risk, High-Reward" research program.

Dr. Kemaladewi will lead a project investigating the implications of genetic diversity in muscular dystrophy. An individual genetic makeup plays a large role in determining the clinical presentations in many monogenic diseases, including muscular dystrophy. Yet, preclinical studies to evaluate the genetic treatment of monogenic diseases generally lack the in-depth consideration of diverse genetic backgrounds with regards to safety and efficacy.

Dr. Kemaladewi and colleagues have previously developed a variety of innovative genome editing strategies for the most common form of congenital muscular dystrophy.

The NIH Director's New Innovator Award will support work by Dr. Kemaladewi's team to incorporate the element of genetic variation in the study of disease mechanisms and therapeutic development.

The ability to accurately assess and quantify genetic variant effects on gene therapy approaches is critical for the advancement of the field.

The NIH categorizes this special research program as "outside the box," allowing applicants to pursue innovative proposals that may struggle in standard peer-review processes due to inherent risk.

Learn more about the NIH Director's New Innovator Award and view Dr. Kemaladewi's project along with a list of other recently funded projects from investigators around the United States:

https://commonfund.nih.gov/newinnovator

https://commonfund.nih.gov/newinnovator/fundedresearch

Study Tests Efficacy of New EEG Electrode on Differing Hair Types

Director of Epilepsy Services at UPMC Children's Hospital of Pittsburgh, **Christina M. Patterson, MD**, is the primary investigator of a study that is testing the efficacy of a new electroencephalography system that may be more effective in registering high-quality signals from individuals with coarse and curly hair types.

The new system, called Sevo, was developed by researchers at Carnegie Mellon University (CMU) and Precision Neuroscopics in Pittsburgh. Collaborating with Dr. Patterson on the study from CMU is Associate Professor of Electrical and Computer Engineering, Pulkit Grover, PhD, and from Precision Neuroscopics, CEO Shawn K. Kelly, and Director of Accessibility, Arnelle Etienne.

Some types of hair, primarily very coarse or curly varieties, can affect the ability of EEG electrodes placed on the scalp during epilepsy screening in obtaining optimal signal quality.

The new system being tested uses a novel type of electrode with an integral clip that enables the device to realize and maintain better contact with the patient's scalp.

The study will test the new electrodes on a wide variety of hair types to compare the EEG signal quality derived from patients with coarse and curly hair against other types.

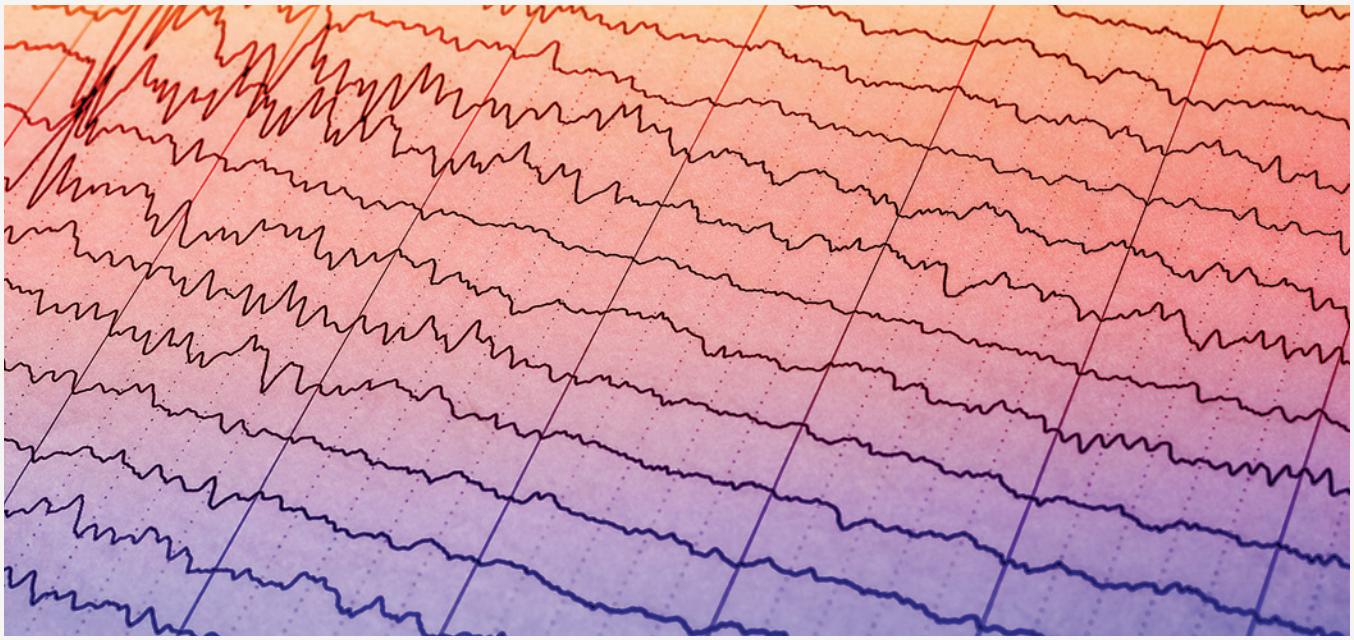
More About Dr. Patterson

Christina Patterson, MD, is the director of Epilepsy Services at UPMC Children's Hospital of Pittsburgh. An associate professor of Pediatrics in the Division of Pediatric Neurology at the University of Pittsburgh School of Medicine, Dr. Patterson also directs the Epilepsy Monitoring Unit (EMU) at UPMC Children's and serves as the medical director of the Pediatric Epilepsy Surgery Program. Her research interests are focused on pediatric epilepsy and epilepsy surgery, clinical neurophysiology, and electroencephalography.

"Our goal is to enroll 200 subjects in the trial, and we are actively recruiting children and young adults from the ages of 2 to 26 years who are visiting the Epilepsy Center for screening at UPMC Children's," says Dr. Patterson. "If we can achieve optimal EEG signal quality across a spectrum of patients with varying hair types, this study and the device will be a step toward reducing the diagnostic disparities in epilepsy for patients because of their hair type."

For Referring Physicians

To refer a patient to the study, or for more information about the study protocol, email Dr. Patterson at **CHPNeurology@chp.edu** and reference the Sevo Electrode Study.



R01 to Explore Mechanistic Processes of the Frequency-Following Response

A multidisciplinary research team at UPMC and the University of Pittsburgh have begun new studies that will elucidate the properties of the frequency-following response (FFR) in auditory speech processing with the ultimate goal to help develop translational biomarkers that can aid in the diagnosis of numerous speech-processing related disorders and conditions.

Leading the study is principal investigator **Bharath Chandrasekaran, PhD**, professor and vice-chair in the Department of Communication Science and Disorders at the University of Pittsburgh. Collaborating with Dr. Chandrasekaran are co-PIs **Tobias Teichert, PhD**, assistant professor of psychiatry and bioengineering at the University of Pittsburgh; **Srivatsun Sadagopan, PhD**, assistant professor in the Department of Neurobiology at the University of Pittsburgh; and **Taylor J. Abel, MD, FAANS**, assistant professor in the Division of Pediatric Neurological Surgery at the University of Pittsburgh School of Medicine and surgical director of the Pediatric Epilepsy Surgery Program at UPMC Children's Hospital of Pittsburgh.

The new grant, titled "Cortical Contributions to Frequency-following Response Generation and Modulation," builds upon previous NIH-funded work by Dr. Chandrasekaran and colleagues that explored how auditory brainstem responses to speech are influenced by experience-dependent plasticity.

The FFR is a well-known speech biomarker in the brain used as a metric for assessing how the brain encodes speech signals in both healthy individuals and individuals with speech processing disorders.

However, a certain amount of controversy exists in the field related to the cortical contributions of the FFR at the level of the cerebral cortex. The study team will investigate these cortical mechanisms of the FFR across different species, including humans, a non-human primate, and guinea pigs, and across scales — scalp EEG, intracranial recordings, and animal electrophysiology.

"As an epilepsy surgeon who uses stereoelectroencephalography (sEEG) during epilepsy surgery, we have the unique ability to collect intracranial or direct brain recordings of electrical signaling and activity of cortical processing during epilepsy surgical procedures, which is essentially impossible to do in humans in any other situation because of the invasiveness of the procedure. sEEG is not something you can or would consider using in healthy subjects to obtain intracranial data," says Dr. Abel.

The cross-disciplinary research team is uniquely positioned to perform these studies because of the varied expertise of the investigators. Dr. Chandrasekaran's research is focused on understanding neurobiological computations that underlie human communication and learning, including

studying the FFR using scalp EEG recordings; Dr. Teichert's research involves studies of the neural mechanisms of auditory function and decision-making in nonhuman primates to better understand the nature of auditory deficits in individuals with schizophrenia; Dr. Sadagopan's expertise lies in the study of how the auditory system transforms the neural representation of sounds from one that is based on the sensing of individual frequencies to a representation that can support complex behaviors such as speech and perception; and Dr. Abel specializes in studying how the brain processes auditory signals using a combination of electrophysiology, neuroimaging, and lesion mapping techniques in the human brain in epilepsy surgery patients, where both scalp EEG and sEEG can be combined to build a bridge between the two data sets.

By combining their varied scientific expertise, the study team is positioned to study FFR in humans and compare the responses to what is seen in animal models where more mechanistic-focused experiments and data can be obtained.

Study Aims Details

The first aim of the study is to perform experiments that will measure FFRs from scalp EEG recordings and intracranial recordings in all three biological systems — humans, monkeys, and guinea pigs. This data will allow the research team to "characterize cortical phase-locking limits, laminar and frequency dependence, and hemispheric asymmetry across the models."

The second aim of the study will focus on obtaining intracranial and scalp EEG recordings of FFRs while subjects experience both human speech sounds and non-human vocalizations while measuring and analyzing the differences in FFR patterns within and across species.

The third aim of the research involves the design of a computational model that "consists of a core feedforward module that is modulated by a feedback cortico-collicular module. Predictions from this model will be systematically validated in human patients with Heschl's gyrus lesions, and using chemogenetic experiments to reversibly suppress cortico-collicular feedback in animal models."

Toward FFRs as a Clinical Biomarker for Speech Processing Disorders

FFR now is essentially a way of measuring the integrity of speech signals in the brain. FFR can become impaired in certain speech processing disorders. Having a more fully detailed understanding of FFR and its mechanistic constituents may allow it to be used as a robust biomarker to aid in the diagnosis of various speech processing disorders. FFR also may be a way of monitoring either the progression of the disorder or perhaps even the recovery or normalization of FFR as part of a rehabilitative process or protocol for the underlying condition or clinical presentation.

Data Will Help Better Understand Speech Processing Patterns After Epilepsy Surgery

In a separate component of the grant, Dr. Abel, with this sEEG intracranial study data, will assess and better understand speech processing differences that epilepsy surgical patients have after they have had surgery and had a portion or part of their auditory cortex removed. While the data will not necessarily help inform or shape how epilepsy surgery may be performed on individual patients, the data collected will be useful in helping epilepsy surgeons better understand patient speech processing patterns after surgery.

Reference

Cortical Contributions to Frequency-Following Response Generation and Modulation. Project Number: 2R01DC013315. Co-Principal Investigators: Bharath Chandrasekaran; Taylor Abel; Srivatsun Sadagopan; Tobias Teichert.

From left to right: **Bharath Chandrasekaran, PhD**; **Tobias Teichert, PhD**; **Srivatsun Sadagopan, PhD**; and **Taylor J. Abel, MD, FAANS**.

Shunt Infection *Continued from Page 3*

Concerning infection rates, Dr. Greene's study found that patients with shunts experienced an infection rate of 2.1% per person-year across the study. Of the 137 cases of shunt placement analyzed in the study, 15.3% of patients had at least 1 infection, but this was over a mean follow-up period of 10.8 years. More than half (52%) of the infections occurred during the first year of life, and patients experienced a mean of 3.4 surgeries (both initial shunt insertion or revisions) before having their initial infection.

Of note, the rate of subsequent shunt infections was found to be higher in cases where shunt externalization, in which the distal shunt is removed from the peritoneum and attached to a drainage collection bag, leaving the remainder of the shunt in place, was used during an active infection compared to cases where there was immediate removal of the shunt and temporary transition to a new external drainage catheter before replacement of the entire shunt after a course of antibiotics had been completed.

Dr. Greene's team found no statistically significant difference between the study cohorts in the rate of shunt infections, the number of revisions required, or in several other metrics.

"As the HCRN protocol was implemented in order to standardize shunt surgery across institutions in the United States, theoretically reducing complications associated with the procedure, it was a surprising finding that our research uncovered no statistically significant differences in outcomes after we began using the HCRN measures," says Dr. Greene.

Clinical Implications

The most important finding from the new study is that neurosurgeons should be cognizant of the high rates of shunt malfunction and infections in patients with myelomeningocele.

Furthermore, the data from Dr. Greene's analysis show that in cases of shunt infections, shunt externalization is likely not the optimal approach to adopt to clear the infection.

Neurosurgeons should first consider removing the shunt and transitioning to temporary external drainage while the infection is treated and cleared before replacing the ventriculoperitoneal shunt.

Reference

White MD, McDowell MM, Agarwal N, Greene S. Shunt Infection and Malfunction in Patients With Myelomeningocele. *J Neurosurg Pediatr.* 2021; 27: 518-524.

Mutations Cause Rare Genetic Disease *Continued from Page 1*

After comparing genetic material of reprogrammed neurons from sick children with that of unaffected relatives, scientists linked neurologic manifestations of the disease to 26 mutations in the GEMIN5 gene that cause damage to the structure of the protein.

"Children came into the clinic with non-specific symptoms, such as developmental delay and abnormal gait. Their doctors ran all the possible tests, including assessing a child's metabolic function, to no avail — their conditions had no easy explanation," says **Deepa Rajan, MD**, assistant professor of pediatrics in the Division of Child Neurology at UPMC Children's, and a co-first author of the study. "It was not until we did an extensive genome analysis that we found that these patients had mutations in the GEMIN5 gene."

"Many genetic disorders seem individually rare, but collectively they are relatively common," added Dr. Rajan, who also is director of the Neurogenetics Clinic at UPMC Children's Hospital.

"We now are able to harness next-generation technology to help diagnose previously undiagnosed children, and each new gene discovery is the start of the journey to understanding each of these diseases better."

Additional experiments linked damage to GEMIN5 protein to disease manifestations more definitively. Scientists found that depleting an analog of human neuronal GEMIN5 protein in fruit flies was deadly if it happened in early stages of the fly's life cycle, or drastically delayed its development if such disruption happened later.

"The most exciting part of being a researcher is working on a project that directly helps families," said Pandey. "We are hopeful that because of our study, neurologists will now consider testing for GEMIN5 mutations and that labs will include GEMIN5 in their testing for ataxic disorders. Genetic diseases are challenging to identify and treat, but if we find a cure, it will make a massive difference in someone's life."

Other authors on the manuscript include Sukhleen Kour, PhD, Tyler Fortuna, PhD, Eric Anderson, PhD, Dhivyaa Rajasundaram, PhD, and Caroline Ward, all of Pitt, among 70 total authors.

This work was supported by a University of Pittsburgh Children's Neuroscience Institute research grant.

Fridays With Friedlander: Engaging Conversations on Current Topics in Neurosurgery

Fridays with Friedlander is a live webcast hosted by University of Pittsburgh School of Medicine Department of Neurological Surgery chairman **Robert M. Friedlander, MD**. The webcasts feature department faculty, residents, alumni, and prominent figures in medicine presenting updates on topical neurological surgery issues — followed by an interactive Q&A session.

Current topics in the series featuring Division of Pediatric Neurosurgery faculty include:

Selective Dorsal Rhizotomy featuring **Robert G. Kellogg, MD**, assistant professor of Neurological Surgery.

The Future of Pediatric Epilepsy Surgery featuring **Taylor J. Abel, MD, FAANS**, assistant professor of Neurological Surgery and Bioengineering, and surgical director of the Pediatric Epilepsy Surgery Program at UPMC Children's.

The Evolving Role of Surgery and Molecular Profiling for Childhood Brain Tumors featuring **Ian F. Pollack, MD**, chief of Pediatric Neurosurgery at UPMC Children's Hospital of Pittsburgh, A. Leland Albright Professor of Neurosurgery at the University of Pittsburgh School of Medicine, and co-director of the Neurosurgical Oncology Program at UPMC Hillman Cancer Center.

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Faculty Members News & Notes

Division of Child Neurology Welcomes Elissa Ortolani, MD

Elissa K. Ortolani, MD, joined the Brain Care Institute at UPMC Children's Hospital of Pittsburgh in August. Dr. Ortolani is a stroke and pediatric stroke specialist who will have dual practices in the Division of Child Neurology at UPMC Children's while also seeing adult patients in the Department of Neurology at the University of Pittsburgh School of Medicine.

Dr. Ortolani earned her medical degree from the State University of New York at Buffalo School of Medicine and Biomedical Science. She then traveled to the University of Pittsburgh School of Medicine for her residency in pediatrics and child neurology while practicing at UPMC Children's. Dr. Ortolani served as one of the chief neurology residents during her fifth year. Dr. Ortolani next completed a combined pediatric and adult fellowship in vascular neurology at UPMC. She returns to Pittsburgh after holding appointments as an assistant professor of pediatrics and neurology at Emory University School of Medicine in Atlanta, Georgia.

During her child neurology residency, she developed a strong clinical and research interest in pediatric vascular disease and stroke. These conditions are regularly seen at UPMC Children's and can have a devastating impact on lifelong disability, yet their causes, pathophysiology, and treatment are poorly understood. Dr. Ortolani's goal is to practice a combination of both adult and pediatric vascular neurology, with the intention of translating knowledge from the more developed adult experience to pediatric practice.

During her fellowship training, Dr. Ortolani was instrumental in developing protocols and clinical effectiveness guidelines for pediatric stroke in the UPMC Children's Emergency Department and the UPMC Children's Ventricular Assist Device program. She continued that line of work during her time at the Children's Hospital of Atlanta in the Departments of Neurology and Hematology.

Dr. Ortolani is a member of Alpha Omega Alpha, the American Academy of Neurology, the American Heart Association, and the Child Neurology Society. Her research interests include the care and outcomes of pediatric patients with in-hospital acute ischemic stroke.

Division of Child Neurology Welcomes Katherine Cobb-Pitstick, MD

The Division of Child Neurology at UPMC Children's Hospital of Pittsburgh is pleased to welcome new faculty member **Katherine M. Cobb-Pitstick, MD**.

Dr. Cobb-Pitstick began her tenure with the Division as faculty in September after completing a combined pediatric and adult fellowship in headache medicine at UPMC. Dr. Cobb-Pitstick also conducted her pediatric residency (chief child neurology resident during PGY5) and child neurology residency at UPMC Children's Hospital after completing her medical degree at the University of Cincinnati College of Medicine.

Dr. Cobb-Pitstick will split her clinical work between treating pediatric patients in the Division of Child Neurology at UPMC Children's and attending to adult patients in the Headache Center in the Department of Neurology at UPMC. Her dual role treating both pediatric and adult patients is designed to encourage partnerships in clinical care, education, and research between the two disciplines.

Dr. Cobb-Pitstick has a special interest in medical education, having taught extensively with medical school students and pediatric and neurology residents. Prior work has included developing a curriculum for Child Neurology shelf review for medical students.

Her research interests are focused mainly on headache and accompanying behavioral comorbidities. She has presented numerous posters and abstracts on subjects in headache medicine. She has been the lead author on three studies involving various aspects of migraine (see page 11 for references.)

Upon joining the Division of Child Neurology, Dr. Cobb-Pitstick assumed the role of associate director for medical student education.

Selected Publications

Cobb-Pitstick K, Cummings DD, Zuccoli G. Prolonged Hyperperfusion in a Child With ATP1A2 Defect-Related Hemiplegic Migraine. *Can J Neurol Sci.* 2020; 00:1-2. doi:10.1017/cjn.2020.83

Cobb-Pitstick KM, Munjal N, Safier R, et al. Time Course of Cerebral Perfusion Changes in Children with Migraine with Aura Mimicking Stroke. *Am J Neuroradiol.* 2018; 39(9) 1751-1755.

Cobb-Pitstick KM, Hershey AD, O'Brien HL, et al. Factors Influencing Migraine Recurrence After Infusion and Inpatient Migraine Treatment in Children and Adolescents. *Headache.* 2015; 55(10): 1397-403.

Division of Child Neurology Welcomes Bassam Albashiti, MD

Bassam Albashiti, MD, joined the Division of Child Neurology at UPMC Children's Hospital of Pittsburgh on October 1. Dr. Albishiti will primarily treat pediatric neurology patients at UPMC Hamot in Erie, Pennsylvania, while also covering pediatric neurology services at UPMC Children's.

Dr. Albashiti earned his medical degree from Al-Quds University in Jerusalem, Palestine. He then completed pediatric residencies at Alahli Hospital in Hebron, and at Beaumont Children's Hospital in Royal Oak, Michigan. Dr. Albashiti's fellowship in child neurology was conducted at UPMC Children's from 2018 until he joined the Division as a faculty member in October. During the last year of fellowship, Dr Albashiti served as Didactic Chief Resident in the Division of Child Neurology.

Dr. Albashiti practiced general pediatrics for four years at Alahli Hospital in Hebron and at Southeast Missouri Hospital in Cape Giradeau before transitioning to training in child neurology.

His research project during fellowship training involved a retrospective review of Acute Flaccid Myelitis (AFM) cases presenting at UPMC Children's. His research was presented as a poster at the National Meeting of the Child Neurology Society in October 2019. Dr. Albashiti also was a coauthor on a 2019 study published with colleagues from the Division in the *Journal of Clinical Neuroscience* titled "Extensive Meningeal Enhancement in Acute Central Nervous System Lyme: Case Series and Review Of Literature."

Dr. Albashiti also was a coauthor on a 2019 study published with colleagues from the Division in the *Journal of Clinical Neuroscience* titled "Extensive Meningeal Enhancement in Acute Central Nervous System Lyme: Case Series and Review of Literature."

Division of Child Neurology Welcomes Ilan Hyoung Won Choi, MD

Ilan Hyoung Won Choi, MD, joined the Division of Child Neurology at UPMC Children's Hospital of Pittsburgh on May 1 and will practice primarily at UPMC Pinnacle Health and the UPMC Pinnacle Harrisburg Hospital, in addition to UPMC Children's in Pittsburgh.

Dr. Choi earned her undergraduate degree from Seoul National University in South Korea and her medical degree from Korea University, South Korea. She completed her pediatrics residency at the John H. Stroger, Jr. Hospital of Cook County and a child neurology residency at the University of Kentucky Hospital. Dr. Choi completed her fellowship in neuromuscular medicine at the McGraw Medical Center at Northwestern University in Chicago and was subsequently a faculty member at the University of Minnesota and George Washington University.

Dr. Choi has an interest in clinical research in neuromuscular disorders, with a special emphasis on spinal muscular atrophy, and she has authored several publications on the subject to date.

Selected Publications

Wiens K, Berry SA, Choi H, et al. A Report on State-wide Implementation of Newborn Screening for X-linked Adrenoleukodystrophy. *Am J Med Genet A.* 2019 Jul; 179(7): 1205–1213.

Choi HW, Raymond GR, Miller W. Rare Spontaneous Attenuation of Childhood Inflammatory Cerebral Adreno-leukodystrophy. *J Pediatr Neurol.* 2020 Apr; 18(2): 106–109.

Choi, HW, Kuntz NL. Peripheral Nerve Disorders in the Neonate. *NeoReviews.* 2016 Dec; 17(12): e719-e728.

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Fridays With Friedlander *Continued from Page 9*

What's New in Brain Tumors: Current Updates and New Treatments Beyond the Horizon featuring **Sameer Agnihotri, PhD**, assistant professor of Neurological Surgery, and director of the University of Pittsburgh Brain Tumor Biology and Therapy Laboratory.

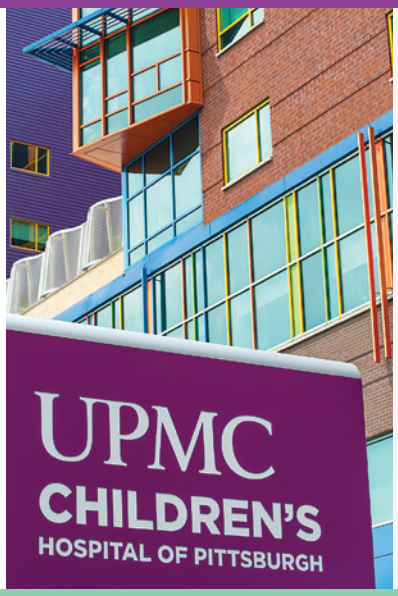
Fetal Neurosurgery for Spina Bifida featuring **Stephanie Greene, MD**, associate professor of Neurological Surgery, director of perinatal neurosurgery, and director of vascular neurosurgery at UPMC Children's.

Innovative Approaches for Adult and Pediatric Brain Tumor Immunotherapy featuring **Gary Kohanbash, PhD**, assistant professor of Neurological Surgery and Immunology and director of the Neuro-surgery ImmunoOncology Laboratory.

Learn more by visiting **Neurosurgery.Pitt.edu**.

View any of the previous episodes on the Department's YouTube channel at **YouTube.com/User/neuroPitt**.

Affiliated with the University of Pittsburgh School of Medicine and ranked among the nation's best children's hospitals by *U.S. News & World Report.*



About UPMC Children's Hospital of Pittsburgh

Regionally, nationally, and globally, UPMC Children's Hospital of Pittsburgh is a leader in the treatment of childhood conditions and diseases, a pioneer in the development of new and improved therapies, and a top educator of the next generation of pediatricians and pediatric subspecialists. With generous community support, UPMC Children's Hospital has fulfilled this mission since its founding in 1890. UPMC Children's is recognized consistently for its clinical, research, educational, and advocacy-related accomplishments, including ranking 15th among children's hospitals and schools of medicine in funding for pediatric research provided by the National Institutes of Health (FY2019) and ranking on *U.S. News & World Report's* Honor Roll of Best Children's Hospitals (2021–22).