



EXPLORING **NEW** **FRONTIERS**

**ADVANCING NEUROLOGICAL
& NEUROSURGICAL CARE**

2024 KNI ANNUAL REPORT





On the Cover: Hoyt "Corky" Ball got his life back after undergoing a ground-breaking procedure for Parkinson's disease, pioneered by the team at UK HealthCare.

Inside Cover: Dr. Randaline Barnett joins the neurosurgery team, specializing in pediatric care.

CONTENTS

- 02 Message from the Directors**
- 04 Moving Science to Medicine**
- 12 The Search for a Seizure's Origin**
- 16 Altering the Course of Parkinson's Disease**
- 22 Leading the Way to Attract & Retain the Specialists Kentucky Needs**
- 26 Born in Rural Kentucky, Pediatric Neurosurgeon Stays True to Her Roots**
- 28 The Brain-Vision Connection**
- 30 Working Together for a Healthier Region**
- 34 Snapshots ▼**
 - 36 Headache**
 - 38 Epilepsy**
 - 40 Neuromuscular Disorders**
 - 42 Spine**
 - 44 Child Neurology**
 - 46 Multiple Sclerosis**
 - 48 Neuropsychology**
 - 50 Cognitive Disorders**
 - 52 Movement Disorders**
 - 54 Stroke**
- 56 New Leadership**
- 58 Living His Passion**

REMARKABLE PROGRESS TOGETHER

At the UK Kentucky Neuroscience Institute (KNI), innovation and dedication to improving neurological health are driving extraordinary advancements in neurological and neurosurgical care. As a hub for cutting-edge education, research, and clinical care, KNI continues to extend its impact far beyond direct patient services, fostering a deeper understanding of neurological disorders and empowering healthcare professionals across disciplines.

The past year has marked a period of exciting growth and transformation for KNI. Some of our notable highlights include:

Expansion of both adult and pediatric epilepsy monitoring units: The increase from six to 12 beds in the adult EMU ensures that more patients have access to advanced diagnostic and treatment options for epilepsy. Expansion of the pediatric unit reflects KNI's commitment to providing age-specific, comprehensive epilepsy care.

Growth of the Viz.ai program: This cutting-edge initiative is revolutionizing the treatment of patients with large-vessel occlusion ischemic stroke across our region, optimizing outcomes through enhanced diagnosis and intervention by working with community hospitals at the local level.

NIH funding for DBS-Plus trial: Securing funding for the STAR trial highlights KNI's role in pioneering research to advance treatment options for patients with Parkinson's disease.

Implementation of a comprehensive spine center: Recruitment of an additional complex spine surgeon rounds out a dedicated team of neurosurgeons, orthopedic surgeons, interventional pain specialists, and rehabilitation specialists, enhancing care for patients with spinal disorders, and consolidating expertise and resources to provide streamlined, patient-centered treatment.

Advancement of neuro-ophthalmology services: The expanded program will address the growing need for expert care in conditions affecting vision due to neurological causes.

Progressive research in memory disorders: The integration of anti-amyloid therapy showcases KNI's proactive approach to addressing cognitive disorders, particularly Alzheimer's disease.

Addition of pediatric subspecialists in neurosurgery and MS/neuroimmunology: This enhancement represents a significant milestone in providing specialized care for children with complex neurological conditions.

These achievements underscore KNI's unwavering dedication to not only advancing medical science but also transforming lives through education, innovation, and compassionate care. Each initiative is a testament to our mission to create a world in which brain health is a priority and in which neurological disorders are understood, prevented, and treated with the utmost precision and humanity.

As we celebrate these accomplishments, we remain committed to collaborating with the broader healthcare community, continuing to push the boundaries of neuroscience to benefit patients locally, nationally, and globally.

Larry B. Goldstein, MD, FAHA, FANA, FAAN

Co-Director, UK Kentucky Neuroscience Institute
Chair, Department of Neurology
Associate Dean for Clinical Research, College of Medicine

Linda Van Eldik, PhD

Co-Director, UK Kentucky Neuroscience Institute
Director, UK Sanders-Brown Center on Aging

Craig van Horne, MD, PhD

Chair, Department of Neurosurgery
Co-Director, UK Brain Restoration Center

Left to Right: Drs. Craig van Horne, Linda Van Eldik and Larry Goldstein lead the teams of scientists and clinicians advancing neurological and neurosurgical care for the people of Kentucky and beyond.



MOVING SCIENCE TO MEDICINE

EXPANDING OUR RESEARCH IMPACT

There's an old African proverb about teamwork that states, "If you want to go fast, go alone. If you want to go far, go together." But physician-scientists at the UK Kentucky Neuroscience Institute (KNI) seem to have put their own spin on the ancient words of wisdom. They suggest that the ability to both quickly develop advances in neuroscience and to ensure that these advances are deep and impactful comes through collaboration.

At the foundation of UK's Neuroscience Research Priority Area (NRPA) is the belief that an environment that allows for dedicated research time and fosters teamwork also enhances problem-solving, accelerates learning, promotes creativity and builds stronger relationships, said Linda Van Eldik, PhD, NRPA co-director, co-director of KNI and director of the UK Sanders-Brown Center on Aging.

The NRPA Umbrella

"The NRPA was established to offer a collaborative infrastructure and support broad-based neuroscience research across campus," Van Eldik said. And with more than 330 faculty and 480 students and trainees across nine colleges and 42 departments participating in neuroscience research endeavors in 2024, it's evident that collaboration is more than a concept.

Because the journey from neuroscience discovery in the lab to patient care at the bedside is a complex one, filled with plenty of obstacles, rigorous scientific validation and regulatory requirements, it makes alliances not only a benefit, but a necessity, she added.

The Neuroscience group was named a Research Priority Area by UK in 2019, and since then it has steadily raised the output of neuroscience research across campus, said Larry Goldstein, MD, co-director of KNI, chair of the Department of Neurology and NRPA co-director. "It's all about impacting the health of the people in Kentucky and beyond," he said.

"The NRPA is a University-wide program that takes advantage of having the health campus and Academic Medical Center located on the UK's primary campus, facilitating wide-ranging partnerships across neuroscience-related sub-disciplines. We have fairly extensive collaborations in several areas, such as with the College of Engineering, and other Colleges such as Arts and Sciences, and Pharmacy, where we have several projects," said Dr. Goldstein. "We even have ongoing work with the College of Agriculture related to brain health and other issues that affect the nervous system."

Right: University of Kentucky scientists in the neurosciences are working every day to better understand neurological diseases and help find ways to treat them.





Above: Dr. Tritia Yamasaki and team, manage the NeuroBank, a repository of human biological samples needed to drive forward scientific research.

Funds from Small to Large

Funding is essential to research, and while the premise sounds simple, it's often the most difficult, delicate and frustrating part of navigating research. It can be particularly challenging for researchers early in their careers who are getting a project off the ground, but it can also be complicated for those building upon early studies.

"It's just as important to not usurp or try not to control the existing and successful groups as it is to foster new teams," Dr. Van Eldik said. "Our new teams have great ideas, but receiving NIH funds for new ideas without feasibility data rarely occurs. To stimulate innovation, the NRPA can help with seed, pilot and equipment grants. It has been a proven way to begin gathering preliminary data that will then lead to external funding and a body of work that becomes self-sustaining."

Among the grants available through the NRPA for cutting-edge research across basic, clinical and translational neuroscience are:

- **NRPA Pilot Grants** – Awards of approximately \$25,000 each (with potential for higher funding as appropriate) for a one-year project period. For investigators at all stages of career development. Thirty-two pilot grants have been awarded to date.
- **Equipment Grants** – Grants of up to \$100,000 are available to purchase new equipment or to upgrade existing instrumentation. Priority is given to equipment that facilitates the research of multiple investigators or can be used in shared spaces. Small equipment grants are also available. "We look at things beyond one project," Dr. Van Eldik said. "How many departments or colleges will this benefit; are there training opportunities for young faculty?"
- **Mini-fellowships for Faculty** – Provides funding to assist with travel and education for faculty to go to labs in other programs around the country, as well as visiting lecture awards.
- **Neuro Research Fellows Program** – A summer program that includes a stipend for medical students, undergraduate or master's students interested in neuroscience careers.



NeuroBank's Samples Crucial to Research

Access to human biological samples is also essential for many research studies. UK's NeuroBank, which falls under the NRPA, is enabling a growing body of research, having collected blood, cerebrospinal fluid, tissue, urine, saliva and buccal swabs from a total of 1,023 subjects with a variety of neurological conditions. Total aliquots on hand are 22,145, with more samples being donated every day, said Tritia Yamasaki, MD, PhD, Neurobank Primary Investigator.

"Our patients are really amazing," she said. "I see Parkinson's patients in clinic and if they are getting a blood draw and

I ask if they will give a tube for research, they are like: 'Yes, anything for research.' Without their generosity, we wouldn't have a NeuroBank." The NeuroBank has a 93 percent consent rate.

Samples have been used by researchers studying epilepsy, movement disorders, optic neuritis, intracranial hypertension, migraine, dementia and rare autoimmune conditions, among others. In addition to supplying samples to UK researchers, the NeuroBank is willing to work with outside investigators.

Besides building a repository of biospecimens from participants with neurologic conditions, the NeuroBank actively supports several clinical research studies at UK. A few of the studies currently supported are:

- Blood-brain Barrier Function in Epilepsy: New Targets for Therapy. *Led by Bjoern Bauer, PhD, Pharmaceutical Science.*
- Characterization of Extracellular Vesicles Isolated from the Blood Plasma of Individuals with Traumatic Brain Injury. *Led by Erhard Bieberich, PhD, Physiology.*
- Spinal Cord Injury Neuroprotection with Glyburide (SCING). *Led by Francis Farhadi, MD, Neurosurgery.*
- Biochemical Analyses of Blood Samples for Tau Detection Levels. *Led by Xiuwel Yang, PhD, Pharmacology and Nutritional Sciences.*

"Our patients are really amazing... Without their generosity, we wouldn't have a NeuroBank."

TRITIA YAMASAKI, MD



Left: Dr. Keith Pennypacker leads a team of translational stroke scientists, moving medicine from bench to bedside.



Photo: Laura Muzinic, NRPA project manager, works with teams across the neurosciences facilitating a plethora of scientific endeavors.

With its recent approval to consent healthy control subjects, the NeuroBank will advance to the next level, said Laura Muzinic, MS, NRPA project manager. "This is a huge move because when we have healthy individuals with no neurological conditions, we are widening our scope. Researchers need to compare their work to a control sample and having that healthy control group enables us to support even more work."

Translational Research Bringing Science to the Bedside

To move research to the bedside can be a herculean task, and it's true that most breakthroughs aren't sudden, overnight discoveries. They actually occur over many years, with study after study building upon the last. At UK's Center for Advanced Translational Stroke Science (CATSS), translating science into treatment is central to its mission.

For example, a study led by Keith Pennypacker, PhD, has found that Appalachian patients who have an ischemic stroke treated with mechanical thrombectomy have different proteomic responses when compared with others.

"We are discovering what proteins are potentially predictors of functional and cognitive deficits so that in the future we can target some of these biomarkers for pharmaceutical intervention."

KEITH PENNYPACKER, PHD

"Appalachian patients represent 70 percent of our stroke patients," Dr. Pennypacker said. "We know that they are more apt to have comorbidities that are stroke-related than those in non-Appalachian areas. And we have discovered that their levels of proteomic expression at the time of mechanical thrombectomy are unique. The inflammatory response is different. We are discovering what proteins are potentially predictors of functional and cognitive deficits so that in the future we can target some of these biomarkers for pharmaceutical intervention."

Another area at the forefront of translational research is the Brain Neurorestoration Center, under the direction of Greg Gerhardt, PhD, Craig van Horne, MD, PhD, and Randal Voss, PhD.

BRAIN (the Brain Restoration Alliance in Neurodegeneration) unites several labs in the search of methods to heal damaged nerve cells in the brain and spinal cord.

Focused on neurodegenerative disorders such as Parkinson's disease, Huntington's disease, movement disorders, cognitive decline and other neurodegenerative conditions, the diverse group hopes to reverse the damage these diseases cause to the brain and spinal cord.



WHY UK?

Tertia Yamasaki, MD, PhD

*Associate professor
of Neurology
UK Faculty since 2015*

When one partner in a marriage receives a prime job offer, the other partner usually makes the best of it, following along. That's what happened to Tertia Yamasaki, when her physicist husband got the call from UK. "I was still training in California, and I wasn't sure what to expect in Kentucky," she said. "Once I got here, I realized that it is an extremely collaborative environment. It's a level of collaboration I really haven't experienced anywhere else. Everyone likes to talk about the science and people are open to trying new things here."



CRU at the Center of All Studies

Research doesn't occur in a bubble, nor does it stagnate, which is why the well-structured management of the KNI Clinical Research Unit (CRU, formerly known as the Clinical Research Organization) is so important, said John Slevin, MD, vice chair for research in the Department of Neurology and medical director of the KNI CRU.

Overseeing more than 60 active clinical neurology studies, as well as neuro-surgical studies, the CRU is in place to assist investigators — in many ways, Dr. Slevin said. "It's everything from making sure an investigator has a balanced portfolio so that they don't have multiple studies recruiting from the same pool or sub-pool of patients, thereby competing against themselves, to helping them get the ball rolling with the IRB, to establishing a budget," he said.

Put simply, Dr. Slevin said, the CRU breaks down the barriers that can often stop a researcher in their tracks before a project is off the ground. "We help with the groundwork, and we are also there to give guidance so that everything is done correctly along the way and it is as good a trial as possible."

Left: Student researchers are an integral part of UK's neurosciences research initiatives, as one of the goals of the NRPA is increased access to the neurosciences to a broad field of future scientists.

A few of the active clinical trials at UK are:

- DBS-Plus, combining Deep Brain Stimulation with an experimental nerve-grafting procedure to help halt the progression of Parkinson's disease. *Led by Craig van Horne, MD, PhD.*
- STAR (Sleep, Timing, and Rhythms Collaborative), looking at the interactions among sleep, circadian rhythms and health, and homing in on sleep fragmentation and Alzheimer's disease. *Led by Sridhar Sunderam, PhD, and Marilyn Duncan, PhD.*
- Diagnosing Optic Neuritis With or Without Diagnosis of MS or NMOSD. *Led by Jay Avasarala, MD.*
- The ALS (Lou Gehrig's Disease) clinical trial studying familial ALS to better determine the causes of ALS and who might be a carrier. *Led by Edward Kasarskis, MD, PhD.*

"It's really an exciting time to be involved in neuroscience research," Dr. Van Eldik said. "Our researchers, whether they are undergraduates, medical students, residents, young faculty or those with a lifetime of experience, are using innovative methods to make advances that improve the lives of those in Kentucky. I'm proud of them and optimistic about our continued growth. There is a lot of great work going on here." ■

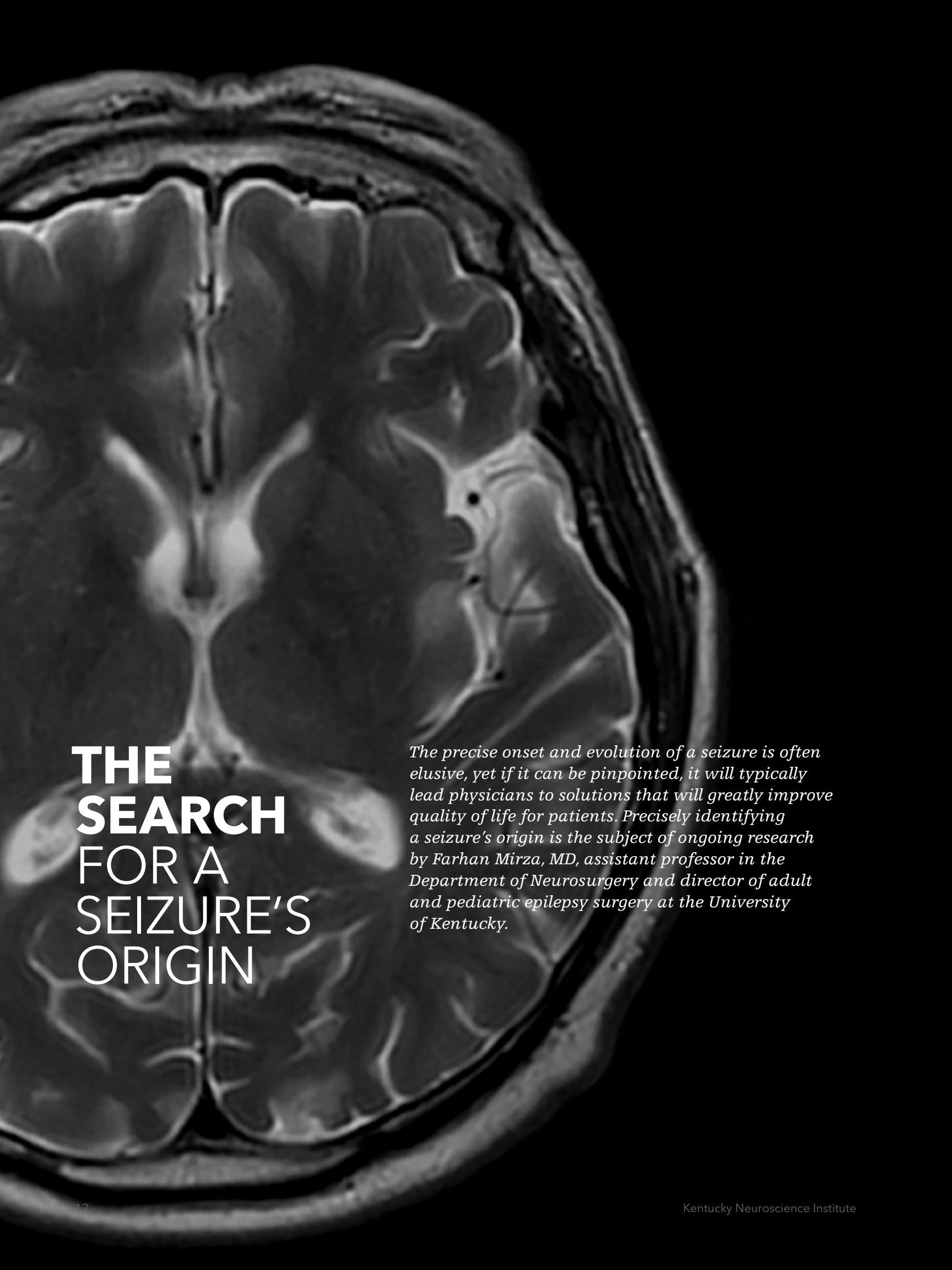


WHY UK?

Laura Muzinic

*Research Project Manager,
Neuroscience Research
Priority Area
UK Employee since 2005
UK MSc alum*

"I came to UK because it had the largest collection of Mexican axoloti salamanders in the world and I was getting my master's degree in aquaculture. After 17 great years with the Ambystoma Genetic Stock Center, I was looking for growth and a new challenge and I got that when I came to the Neuroscience Research Priority Area. The opportunity has opened up my world at UK."



THE SEARCH FOR A SEIZURE'S ORIGIN

The precise onset and evolution of a seizure is often elusive, yet if it can be pinpointed, it will typically lead physicians to solutions that will greatly improve quality of life for patients. Precisely identifying a seizure's origin is the subject of ongoing research by Farhan Mirza, MD, assistant professor in the Department of Neurosurgery and director of adult and pediatric epilepsy surgery at the University of Kentucky.

Left: The FINDERS research relies on high-quality brain imaging read by dedicated epilepsy radiologist.

One of the most common neurological conditions, epilepsy can cause severe disability. Additionally, up to 40 percent of epilepsy patients become refractory to medical therapy over time.

“Combination therapy with medications, dietary changes and consideration of surgical measures such as resection, disconnection, ablation or neuromodulation is key to achieving seizure control and improved quality of life,” Dr. Mirza said.

“Unfortunately, several factors have led to continued underutilization of proven surgical methods for the treatment of refractory epilepsy, largely tethered to misinformation, inadequate referral patterns and imprecise diagnostic measures,” he added.

Dr. Mirza works with a team that includes Flavius Raislau, MD, Jordan Clay, MD, Jihye Bae, PhD, and Rachel Ward-Mitchell, RN, along with clinicians such as radiologists, neurologists (epileptologists), neuropsychologists, neuroimaging researchers and physicists, and biomedical and electrical engineers through the FINDERS (Functional Imaging and Neuro-Diagnostics for Epilepsy and Resective Surgery) Alliance at UK.

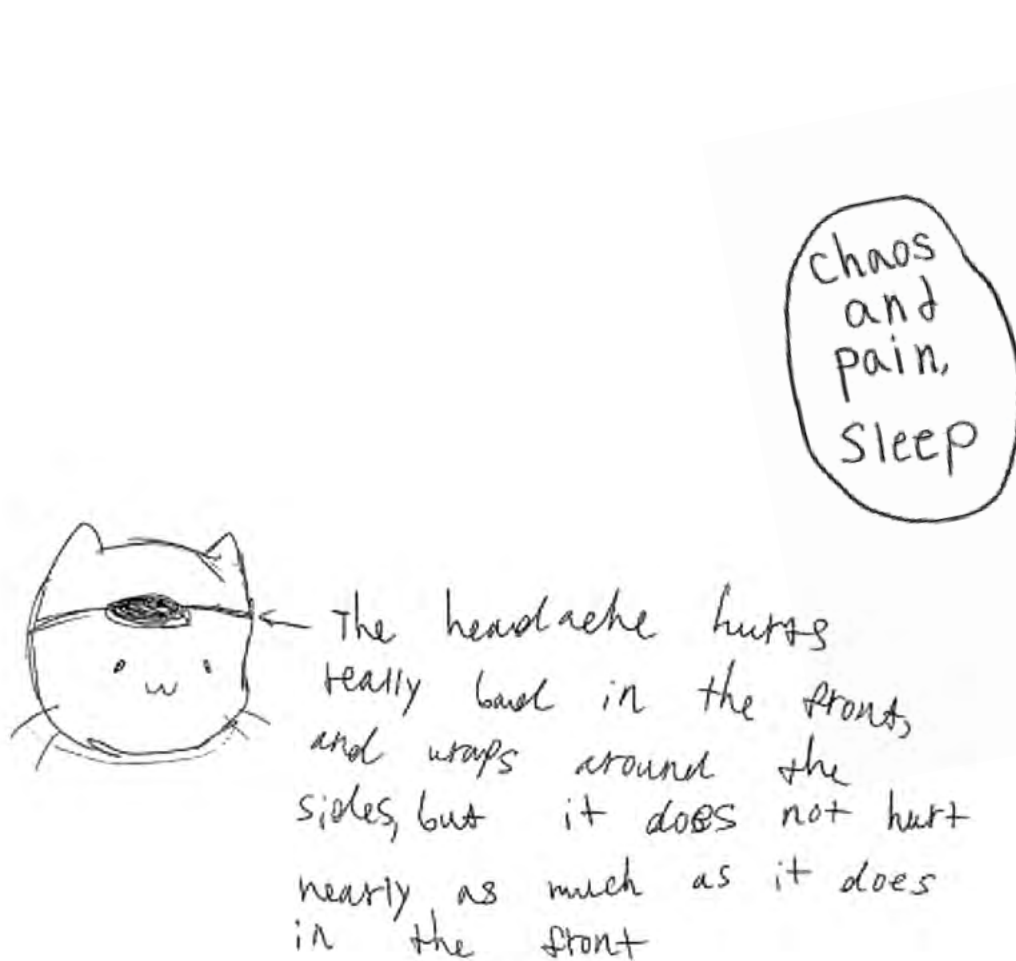
“Findings are then discussed in the setting of a refractory epilepsy conference, where all pieces of the puzzle are put into context. As the complexity increases tremendously in this process, successful assessments require a whole team of experts and a dedicated epilepsy research team.”

FARHAN MIRZA, MD

“Identifying a lesion completely changes the outlook for that patient,” Dr. Mirza said. The group is advocating for patients to receive high-quality 3-Tesla brain MRIs with special epilepsy sequences that are read by dedicated epilepsy radiologists and nuclear imaging studies conducted and read by dedicated epilepsy nuclear radiologists.

“Findings are then discussed in the setting of a refractory epilepsy conference, where all pieces of the puzzle are put into context,” he explained. “As the complexity increases tremendously in this process, successful assessments require a whole team of experts and a dedicated epilepsy research team.” UK’s robust and growing epilepsy program has become known for its innovative approach to successful patient assessments.

It is the goal of the epilepsy team, the UK Kentucky Neuroscience Institute and the UK Epilepsy Program to bridge the treatment gap. And the work the teams are doing to improve seizure localization through the development of novel neuroimaging and signal analysis techniques is beginning to do just that, he said.



Left: Dr. Sharoon Qaiser has his pediatric headache patients draw what they feel, helping create an understanding of what his young patients may have difficulty verbalizing.

"The average delay in diagnosis in children with migraines is five years. For children in rural areas who may not have access to a specialist, that delay can be even longer. We must make care more accessible."

SHAROON QAISER, MD



Children and Headaches: Research Helping to Ease Pain

Child neurologist Sharoon Qaiser, MD, goes beyond the typical history and physical exam for his young patients. The director of UK HealthCare's Children and Young Adult Headache & Research Program asks patients to draw pictures that reflect their headaches and pain.

What may seem like an unorthodox approach is beginning to help speed referrals and, ultimately diagnosis and care, for pediatric migraine sufferers.

"Migraines are the second most common cause for missed school days," Dr. Qaiser said. "The average delay in diagnosis in children with migraines is five years. For children in rural areas who may not have access to a specialist, that delay can be even longer. We must make care more accessible."

Dr. Qaiser is working with biomedical engineers at UK on his promising drawing initiative that uses artificial intelligence bolstered by machine learning along with an app he has developed to help identify which patients should be referred for further diagnosis and treatment.

The bulk of Dr. Qaiser's other research includes numerous sponsored trials on new headache medications, particularly calcitonin gene-related peptide (CGRP) pathway inhibitors and ditans, which have been used in adult patients with great success. While occasionally used for specific pediatric patients, the data proving safety and efficacy in children is still being collected.

At UK, Dr. Qaiser also developed the region's first pediatric headache database, which will provide valuable information that may impact the future of care for young headache sufferers.

"We have a very dedicated research program with a culture of support and collegiality," he said. "We are making a difference for the children in Kentucky."

"Kentucky is in the stroke belt, where there is a much higher rate of stroke than the rest of the country. Many of these patients have vascular changes in the white matter of the brain, but we aren't really getting the early picture of white matter disease. Our end goal here is to find a telling signature."

JORDAN HARP, PhD

Stroke Recovery and Dementia: Looking for the Link

Up to one-third of stroke survivors go on to develop dementia and cognitive impairment. And in rural Appalachia, the numbers are even higher. But is it possible to predict, at the time of a stroke, who will have the best cognitive recovery?

That's a question that University of Kentucky neuropsychologist Jordan Harp, PhD, associate professor of neurology, hopes to answer as principal investigator of a study that is looking at biomarkers and neurocognitive test data for clues.

"Kentucky is in the stroke belt, where there is a much higher rate of stroke than the rest of the country," Dr. Harp said. "Many of these patients have vascular changes in the white matter of the brain, but we aren't really getting the early picture of white matter disease. Our end goal here is to find a telling signature."

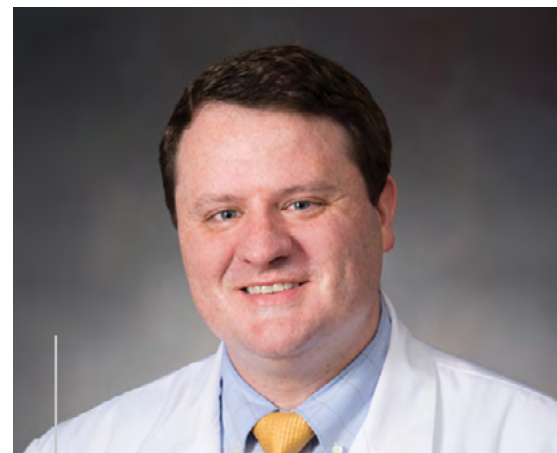
If researchers are better able to predict outcomes, early and aggressive treatment may help mitigate or prevent the damage, he added.

In ischemic strokes where a clot is blocking a large vessel, KNI neuro-interventionalists perform an emergency procedure called a mechanical thrombectomy, which physically captures the clot inside the vessel, removes it and restores blood flow to the affected brain areas.

The INDICATE study — Investigating Neuromarkers of Decline in Cognition After Thrombectomy for ELVO (Emergent Large Vessel Occlusion) — involves drawing arterial blood during the mechanical thrombectomy and performing follow-up venous blood draws and cognitive testing at three months, six months, one year and two years post-procedure.

It builds upon work done in the parent BACTRAC study — Blood And Clot Thrombectomy Registry And Collaboration, under the direction of key faculty that included Harp, pharmacologist Keith Pennypacker, PhD, neurosurgeon and PI of BACTRAC Justin Fraser, MD, and biostatistician Chris McLouth, PhD. The work is being done through the Center for Advanced Translational Stroke Science.

Making INDICATE even more important for Kentucky is that it will enroll rural and Appalachian patients, who face unique health disparities and environmental concerns. Dr. Harp's other research includes numerous studies on aging, Alzheimer's and cognitive degeneration, as well as dementia in the Down syndrome population. ■



WHY UK?

Jordan Harp, PhD

*Neuropsychologist
UK Faculty since 2020
UK Master's, PhD
and neuropsychology
fellowship alum*

"I've been here over 17 years. We are raising our kids here and love the schools and the area. I really enjoy the people I work with, and the research community has just gotten better and better over time. Having the guidance and research support, and a mentor like Fred Schmitt, has been fantastic."



ALTERING THE COURSE OF PARKINSON'S DISEASE

With the support of the National Institutes of Health, a groundbreaking new study led by Dr. Craig van Horne aims to not only halt Parkinson's disease in its tracks but also reverse its effects.

Photo: Hoyt "Corky" Ball was able to return to his career as a school bus driver after undergoing a breakthrough treatment for Parkinson's disease at the UK Kentucky Neuroscience Institute.

This Kentuckian's experience with an innovative clinical trial is a beacon of hope for many battling Parkinson's disease.

It all began when Hoyt "Corky" Ball's right hand began to tremble uncontrollably. The 69-year-old knew something was wrong. The tremors impacted his work in construction and as a school bus driver.

His primary care doctor initially ruled out Parkinson's, but the prescribed medication failed to alleviate his symptoms. That's when his sister urged him to see Zain Guduru, MD, a neurologist with the UK Kentucky Neuroscience Institute and associate professor in the University of Kentucky College of Medicine. Within 10 minutes of meeting Dr. Guduru, Ball received a definitive diagnosis: It was, in fact, Parkinson's. Ball didn't know much about the movement disorder at first.

"My first question was: How long do I have?"

Guduru reassured him that Parkinson's is treatable and suggested a method called deep brain stimulation (DBS). DBS is described as a "pacemaker for the brain." By placing electrodes within malfunctioning brain pathways, DBS disrupts abnormal signals that cause tremors and other symptoms.

A Revolutionary Clinical Study

As Ball began researching his diagnosis and treatment options, he came across UK HealthCare neurosurgeon Craig van Horne, MD, PhD, and his work on a procedure known as DBS-Plus. Van Horne is co-director of the UK HealthCare Neurorestoration Center (NRC) and a team of physician-scientists and researchers leading a first-of-its-kind clinical study aimed at stopping or reversing the degenerative effects of Parkinson's disease.

The study combines DBS with an experimental nerve-grafting procedure. The nerve cells are transplanted during DBS surgery, meaning patients do not have to undergo additional procedures.

In this combined approach, known as DBS-Plus, the surgeon transplants peripheral nerve tissue into an area of the brain where neurons are dying. The grafted cells are being tested for their ability to release chemicals believed to rejuvenate the brain's weary dopamine-producing neurons. Van Horne and his team take a small piece of nerve tissue from the patient's ankle and implant it in their brain. Because the tissue is from the patient's own body, there are no concerns about rejection.

The grafting procedure has been proven relatively safe with only minimal additional risk through the work that van Horne and team have conducted.





"You can give medications, you can even do deep brain stimulation, and you can treat some of the symptoms, but you don't stop the progression. That's what we are trying to fix"

CRAIG VAN HORNE, MD, PHD

Focusing on Disease Progression

Scientists have long known that peripheral nerves, which exist outside the brain and spinal cord, possess regenerative qualities that central nervous system nerves do not. The UK team hopes to leverage those regenerative effects within the brain, potentially halting or reversing nerve damage caused by Parkinson's.

"While the peripheral nervous system can repair itself, the central nervous system does not do a very good job of it," said van Horne, the study's principal investigator. "The question is: Can we tap into the ability of the peripheral nervous system's response for repair? Can we bring this biologic intelligence to the central nervous system?"

To test the effect of the graft, researchers can turn off the DBS pulse generator and evaluate patient's symptoms at a baseline level.

The team's vision is to alter the course of Parkinson's.

"Our concept for DBS-Plus, the 'plus' part being the nerve grafting, is disease modification," van Horne said. "Previously, all of the other transplant models were looking at symptoms and not disease progression. From that standpoint, that's where we can say the DBS-Plus has its big advantage."

Parkinson's disease is a progressive disease. Once it starts, there are currently no treatments that will prevent it from worsening.

"You can give medications, you can even do deep brain stimulation, and you can treat some of the symptoms, but you don't stop the progression. That's what we are trying to fix," van Horne said. "What we really want to determine is this: What is it going to take to get patients to a better place? It is not going to be one-size-fits-all."

The Incredible Impact of DBS-Plus

Intrigued by the potential of DBS-Plus to not only help him but also advance medical understanding, Ball decided to participate in the clinical trial.

"I really didn't want to have DBS without doing DBS-Plus. It might not help me, but it may help somebody later," he said.

Ball's journey with DBS-Plus began in February 2023, and he has since experienced remarkable improvements. Before DBS-Plus, his tremor made daily tasks nearly impossible.

"Talking to somebody, my hand just went crazy. I couldn't do anything with my right hand," he said.

It was a tough reality for someone who was often on ladders and rooftops working in construction. But today, Ball reports being 90% better. He goes in for appointments every two to three months to see if any adjustments need to be made.

Left: Following his procedure, Corky was able to return to playing the music that had been such a part of his life before Parkinson's disease.



"I don't think I will ever be 100%, but my life has improved greatly. My overall health is better. You can't tell I ever had Parkinson's. It's been a life-changer for me."

HOYT "CORKY" BALL

Photo: Corky Ball is looking forward to a bright future ahead of him.

"I don't think I will ever be 100%, but my life has improved greatly. My overall health is better. You can't tell I ever had Parkinson's," he said with a smile.

Ball said his medication has reduced from 12 pills a day to just three. He's able to continue his work as a school bus driver in Nelson County, which he has done for eight years. Plus, he can play guitar again, one of his favorite hobbies.

"It's been a life-changer for me."

Momentous Support from NIH

Van Horne hopes the nerve-graft will eventually become the new "standard of care" for advanced Parkinson's. The study is one step closer to that goal after receiving financial support from the National Institutes of Health (NIH) in the summer of 2024.

"This has really legitimized to some degree what we have been working to do," van Horne said. "To get NIH funding, it has to go through many committees of researchers and clinicians who review the work, they compare it to other people's work and if you're successful and they think it's worthwhile, then they'll say that it's worth funding."

The study is known as the STAR trial. Greg Gerhardt, PhD, John Slevin, MD, and George Quintero, PhD, are leading the work along with van Horne. It spans the departments of neurosurgery, neuroscience and neurology within the UK College of Medicine.

This NIH grant will provide the opportunity to carry out the first double-blinded study of this approach, which is especially important in developing a possible future efficacy trial to fully assess the use of peripheral nerve repair cells.

Until now, researchers have primarily focused on altering the progression of the motor symptoms of Parkinson's disease. With this grant, they can now begin to evaluate a strategy to alter the progression of nonmotor symptoms of Parkinson's, in particular cognitive disorders that may overlap with neurodegenerative diseases.

Up until this point, the work has been sustained by philanthropy and community support, which van Horne and the rest of the team are immensely grateful for. It's an approach that doesn't generate money, since doctors are using the patient's own nerve cells.

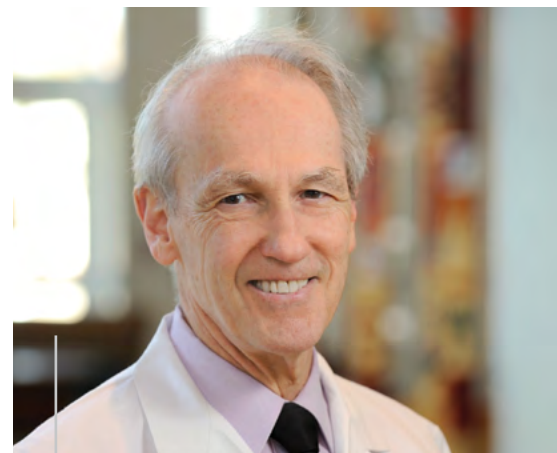
"For us to get something like this is remarkable," van Horne said. "We don't have corporate support. We don't have company support. We don't have a good business model. We just want to be able to translate this into better outcomes for patients."

Ball's journey underscores the importance of innovative treatments like DBS-Plus.

"My quality of life is better than I could have ever hoped," Ball said. "I'm doing things I love and celebrating the big milestone of my 50th wedding anniversary this year."

Now as van Horne and the rest of the team continue their groundbreaking work with the support from NIH, stories like Ball's emphasize the immense potential to change lives.

"There's a lot of hope, and now is the chance for us to be able to prove that," van Horne said. ■



WHY UK?

John Slevin, MD

*Vice Chair for Research,
Neurology
UK Faculty since 1981*

"The bottom line was that I was given support and allowed time to develop my research program. I never thought that anyone was trying to impede me, and I was able to divide my time among clinical research and administrative service. And one of the things I love to do now is to talk with medical students and/or residents who are interested in pursuing research to help them get their foot in the door."



**LEADING THE WAY
TO ATTRACT &
RETAIN THE
SPECIALISTS
KENTUCKY NEEDS**

Education, opportunities and environment are key players in solving the state's shortage of neurological specialists.

There were so few neurologists and neurosurgeons in the state in 1976, that the specialties weren't even mentioned in the following year's 88-page Physician Manpower in Kentucky's report from the state's Legislative Research Commission.

Shockingly, nearly 50 years later, some counties in the Commonwealth still lack a single physician — let alone a specialist. While the physician shortage is a complex national problem, the impact on Kentucky is disproportionate, particularly when coupled with the state's ranking as one of the unhealthiest in the country.

Photo: KNI works hard to both train and retain the next generation of neurological and neurosurgical care providers, amidst growing shortages in the medical profession.

“Residents of Kentucky should not have to leave the Commonwealth for complex neurological issues, and that means having the specialists right here to care for them”

LARRY GOLDSTEIN, MD

“Residents of Kentucky should not have to leave the Commonwealth for complex neurological issues, and that means having the specialists right here to care for them,” said Larry Goldstein, MD, co-director of the UK Kentucky Neuroscience Institute and chair of the UK Department of Neurology. “A lack of neurologists and neurosurgeons at a time when the rate of stroke and other neurological conditions are on the rise is disconcerting.”

At the center of the issue are education, recruitment and retention. KNI and UK continue to tackle the problem together, employing strategies such as expanding residency and fellowship programs; giving faculty the opportunity to focus on their interests that can combine clinical care, research, education and community involvement or service; and offering structured professional development programs.



WHY UK?

Keith Pennypacker, PhD

Came to UK in 2016, Director of Center for Advanced Translational Stroke Science UK Faculty since 2016

When Keith Pennypacker, PhD, tried repeatedly to get colleagues at his previous institution engaged in his science, he would be praised for his efforts but had little support moving forward. “There was no internal funding like that which comes from the NRPA to help you get going until you can get NIH funding. I wanted to do something that was impactful for stroke patients,” he said. “I realized that I needed to find a place where I could partner with clinicians. One of the main attractions for coming to UK was to work with neurosurgeon Justin Fraser. Everyone here is interested and involved. This is what I was hoping to do.”

"It's really about providing a welcoming and collaborative environment where trainees and faculty are valued, their contributions are noticed and where high-quality clinical programs are grown."

LARRY GOLDSTEIN, MD

"It's really about providing a welcoming and collaborative environment where trainees and faculty are valued, their contributions are noticed and where high-quality clinical programs are grown," Dr. Goldstein said.

In 2024, Dr. Goldstein was named co-chair of the Kentucky Heart Disease and Stroke Prevention Task Force to advance stroke prevention and stroke care throughout the state. With his experience in clinical care and research, he has his finger directly on the pulse of the state's needs and is in a unique position to address the shortage of neurologists and neurosurgeons.

"We'd love our medical students, residents, and fellows to stay here or to come back if they decide to get a different perspective elsewhere, which is perfectly fine," he said. "And while our faculty retention is extraordinarily good, we must continue to evolve as needs such as work/life balance and learning styles change. This begins with listening and communicating."



Left: Dr. Keith Pennypacker considers education and training an integral part of his clinical translational science work.

Right: Dr. Lauren Bojarski completed a neurology residency at University of Kentucky and is currently pursuing a geriatric neurology fellowship at UK.



A few of the projects that are helping to address the shortage are:

- The growth of the residency programs in both adult and child neurology, expanding the adult program from seven to eight residents and moving from two to three residents in child neurology beginning this July.
- Growth of UK's Pipeline program for premedical UK and Kentucky high school students and summer fellowships for undergraduate students.
- Further development of the already close and integrated relationship between the Neurology and Neurosurgery Departments. "Many of our programs are joined at the hip," Dr. Goldstein said. "Being seamlessly integrated provides a strong infrastructure for clinical care, research and education."

- The PA neurology residency program, which now has two positions a year for physician assistants who receive a yearlong experience in neurology subspecialties.
- A structured and clear program to help faculty track their progress up the academic ladder to promotion. "We review the statements of evidence, a guide for accomplishments supporting academic promotion, every five years and modify them accordingly," Dr. Goldstein said. "While others may have something similar, our program, which includes faculty mentoring, is very structured."

"UK is a place where there is a sense of belonging and collegiality, where we work to provide opportunities for our faculty to pursue their interests and where we support each other across departments," said Dr. Goldstein, who came to Kentucky in 2015 after a 30-year career at Duke University. "UK is a sweet spot for me, and I hope it will become one for many others." ■

FELLOWSHIPS AT A GLANCE

Recognition that UK's fellowship programs in neurology and neurosurgery are vital and of high-quality has driven the expansion of the programs.

Current neurology fellowships include clinical neuropsychology, epilepsy, geriatric neurology, headache medicine, epilepsy, movement disorders, vascular neurology and clinical neurophysiology with plans to add programs in neuromuscular medicine and multiple sclerosis/neuroimmunology.

Neurosurgery fellowships are available in endovascular and neurointervention (also open to neurologists and interventional radiologists), spine deformity and stereotactic and functional neurosurgery.

BORN IN RURAL KENTUCKY, PEDIATRIC NEUROSURGEON STAYS **TRUE TO HER ROOTS**

Growing up in rural Kentucky — with a father who is still working as a coal miner and friends who lacked running water and electricity — Randaline “Randi” Barnett, MD, recognized early the hardships faced by many in the Commonwealth.

“There are a lot of good, hardworking people who are really struggling. I grew up seeing many of the disparities that exist,” Dr. Barnett recalled. By the age of five, she already knew she wanted to be a doctor, and she envisioned a future where she could be part of the solution.

Today she is fulfilling that dream as a pediatric neurosurgeon with the University of Kentucky, where she is also one of a growing group of physicians who decide to stay or return to Kentucky after training.

Their stories are of great significance to Larry Goldstein, MD, who as co-director of the UK Kentucky Neuroscience Institute and chair of the Department of Neurology has devoted considerable energy to growing educational opportunities and building a welcoming environment. “We love when our own medical students consider staying,” he said. “But we also love when they come to us for medical school and go elsewhere for their training or post-training years and opt to come back. We call that voting with their feet.”

Dr. Barnett received her bachelor’s and medical degrees at the University of Kentucky before heading to the University of North Carolina-Chapel Hill for a neurosurgical residency. Prior to beginning her pediatric neurosurgery fellowship at Le Bonheur Children’s Hospital and St. Jude’s Children’s Research Hospital in Memphis, she had signed her contract with Kentucky.

Considering her family roots, the decision to return was not difficult. “I have a huge family back in Eastern Kentucky and some of my best memories are the cookouts and fun we had together,” she said. “My parents still live right where I grew up, in Breathitt County, and my husband and I wanted our daughter to be close to family and have that same experience.”

But her choice was influenced by deeper factors, as well. “People always say never forget where you came from,” she said. “Taking care of the kids in Kentucky is what I have wanted to do. It was a huge driving force.” ■



Photo: Following several advanced training programs, Dr. Randaline Barnett knew she wanted to return home to Kentucky to provide the best care for kids in Appalachia.

THE BRAIN-VISION CONNECTION

NEURO-OPHTHALMOLOGISTS WORK TO SAVE AND IMPROVE EYESIGHT OF PATIENTS WITH NEUROLOGICAL CONDITIONS

Nearly every neurological condition, including stroke, epilepsy, migraine, multiple sclerosis and intracranial hypertension, has the potential to cause a vision disturbance — sometimes even blindness or a permanent vision impairment that is severely debilitating. And when you consider that more than 3 billion people around the world are living with a neurological problem, according to a study released by The Lancet Neurology, you can begin to appreciate the high demand for neuro-ophthalmologists.

Enter the team of Padmaja Sudhakar, MD, and Mangayarkarasi Thandampallayam Ajjeaya Gowder, MD, neuro-ophthalmologists and neurology faculty at the UK Kentucky Neuroscience Institute (KNI). They treat visual problems related to the nervous system, which includes conditions that affect the optic nerve, the movement of the eyes and areas of the brain where vision is processed.

Drs. Sudhakar and Thandampallayam typically see patients whose vision problems are a result of conditions such as optic nerve disease like optic neuritis and papilledema, brain tumor or stroke, nystagmus and double vision. They also treat patients who have traumatic brain injuries and those with inflammatory diseases like giant cell arteritis, infections and autoimmune disorders such as myasthenia gravis. “Often, a vision problem is the first sign something is wrong neurologically. We are the starting point for many patients,” Dr. Sudhakar said.

A Rare and Crucial Service

While having one neuro-ophthalmologist on staff is uncommon even for large institutions, two is quite rare, the doctors agree. “Many of our patients travel two to three hours to see us,” Dr. Thandampallayam said. “My heart goes out to them. There is such a huge need in Kentucky.”

Kentucky’s high rates of obesity and smoking are contributing factors to a rise in neurological conditions, the doctors said. Coupled with environmental factors and poor access to care for many in rural areas, it’s a problem that continues to worsen.

In the year since Dr. Thandampallayam joined KNI, the wait time for their services has decreased substantially, but it is still longer than the doctors would like, they acknowledge.

“There is the perception that patients have to wait six months to be seen,” Dr. Sudhakar said. “But that isn’t always the case. We have developed a triage system so that we can see the most serious cases first, and we also work closely with the ERs. We are always



Above: Drs. Padmaja Sudhakar, MD, and Mangayarkarasi Thandampallayam Ajjea Gowder bring a unique perspective to treating patients with neurological disease.

available to discuss a patient with any doctor who has concerns, to provide clinical advice and to talk them through preliminary workup steps."

The fellowship-trained neuro-ophthalmologists are also frequently called in by physicians treating patients with medications that may affect vision.

Making a Lasting Impact

Active in the research arena, Drs. Sudhakar and Thandampallayam are involved in clinical trials related to myasthenia gravis and epilepsy, looking at the link between sleep apnea and vision, and searching for biomarkers that can predict dementia. Much of their work is performed with other neuroscience colleagues. It's a multidisciplinary team whose collaboration is vital in research and in patient care, they said.

Their love of teaching is also evident as they lead discussions with neurology residents on neuro-ophthalmology and begin work on developing a fellowship program. "You can objectively show

"It's not fast-paced. It's a field that requires you to think things through."

PADMAJA SUDHAKAR, MD

the science as you teach," Dr. Sudhakar said. "It's not fast-paced. It's a field that requires you to think things through. Most medical students and residents have not had much exposure to ophthalmology and neuro-ophthalmology."

As the neuro-ophthalmology program at KNI continues to grow, the doctors focus on providing the highest quality care for patients. "When you save someone's vision, it is lifechanging for them," Dr. Thandampallayam said. "It is very satisfying to have such an impact on a patient's life." ■

WORKING TOGETHER FOR A HEALTHIER REGION

The Stroke Care Network spans 40 affiliate hospitals across three states to ensure that stroke patients receive the best care possible in a timely manner.

The Stroke Care Network – a collaboration between UK HealthCare and Norton Healthcare – is proof that we are stronger together.

As the first community-based stroke program in the region, the Stroke Care Network is designed to provide the highest quality clinical care and educational programs to physicians, hospital staff and community members. Founded in 2008, the network now has 40 affiliate hospitals in Kentucky, western West Virginia and southern Indiana.

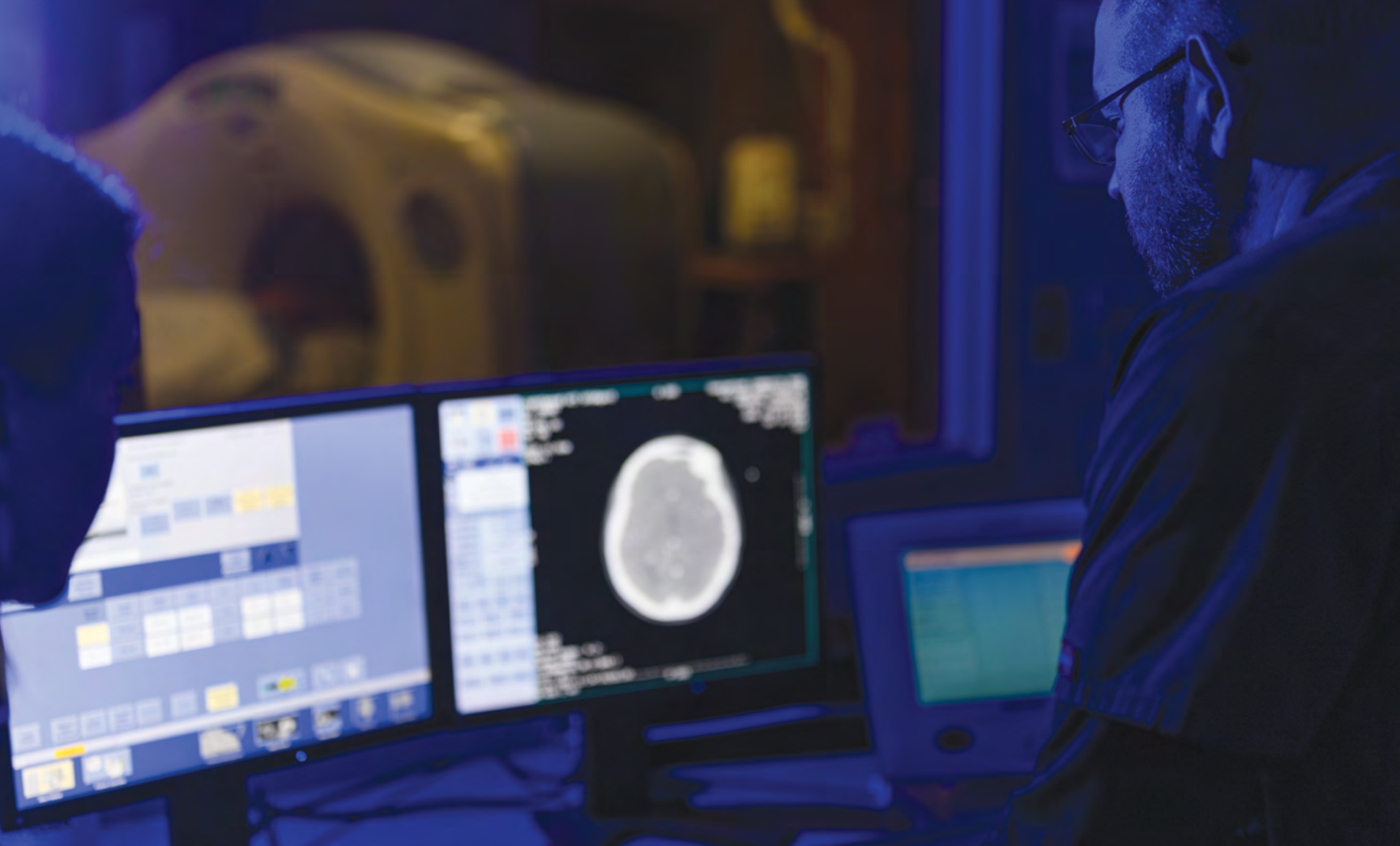
“The Stroke Care Network is here to support hospitals across the Commonwealth (and beyond) in optimizing stroke care within their communities. Our goal is to make sure that everyone receives top-notch services, no matter where they live,” said Dr. Larry Goldstein, interim director of the Stroke Care Network. “Each hospital has made a strong commitment to providing current and clinically effective stroke care for the community.”

The UK Comprehensive Stroke Center and Norton Healthcare support these efforts by providing clinical guidance and oversight, making sure that stroke patients receive the right treatment at the right time.

These three pillars guide the network’s goals: quality improvement, clinical and provider education, and community outreach and prevention.

Right: Training in emergency protocol and procedure in hospitals across the state, has improved access to the best stroke care available for those living in Kentucky.





Quality Improvement

In 2025, Kelley Elkins, BSN, RN, accepted the role of managing director of the Stroke Care Network. She had previously held roles as education and quality coordinator, and quality and research associate in the UK HealthCare Comprehensive Stroke Center, and her focus on quality improvement takes a starring role within the Stroke Care Network.

Efforts to improve quality enable the network to refine protocols, streamline processes and enhance interdisciplinary collaboration. These improvements ultimately lead to better patient outcomes and satisfaction.

Above: Early detection and intervention is critical to stroke outcomes.

In 2024, the Stroke Care Network established two new goals for the affiliate hospitals:

1. **Ensure Door-to-needle time is 60 minutes or less.** Door-to-needle measures the time from a patient's arrival in the Emergency Department to the administration of IV Thrombolytic.
2. **Ensure Door In Door Out time is 120 minutes or less.** Door In Door Out (DIDO) measures the time from a patient's arrival in the Emergency Department to the transfer to another hospital.

"Building and maintaining stroke programs that adhere to evidence-based standards of care and prioritize continuous quality improvement is crucial. Our goal in collaborating with the affiliates is to assist them in effectively managing appropriate patients close to home while ensuring the swift transfer of high-acuity cases when necessary," Elkins said. To further that effort, the team tracks and analyzes data allowing the team to monitor key performance metrics, monitor trends over time, and make informed decisions that drive enhancement of network stroke programs' effectiveness and efficiency.

"Building and maintaining stroke programs that adhere to evidence-based standards of care and prioritize continuous quality improvement is crucial."

KELLEY ELKINS, BSN, RN

Clinical and Provider Education

The Stroke Care Network strives to provide a strong base in clinical education to all healthcare providers who may impact stroke care: physicians, advanced practice providers, pharmacists, nurses, EMS, speech-language pathologists, and physical, occupational and respiratory therapists.

Some of the major educational opportunities offered include:

- **The Comprehensive Approach to Stroke (CATS)** program, an accredited educational seminar series for healthcare professionals. Sessions are virtual. Topics covered include inpatient care, emergency department protocol, case study review and more.
- **Seven enduring CME web-based learning modules** to provide an alternative to in-person training. Each module is fully accredited and can be done online at a time convenient for any participant.
- **Apex Hemispheres 3.0 Stroke Competency Series**, an accredited online educational course comprised of nine modules focused on stroke-related topics.
- **Education on the Go**, a new stroke educational pilot program. The network provides stroke educational posters targeted for EMS, RNs, and physicians. The affiliate hospital then prints the posters and places them in a visible area. Upon reviewing the educational material, participants can simply scan a QR code and answer a few questions. Once the questions have been successfully answered, an email with further instructions will be sent to complete accreditation.

Community Outreach and Prevention

Another core value of the Stroke Care Network is educating people in communities across the region about the things they can do each day to live healthier lives and reduce their stroke risk.

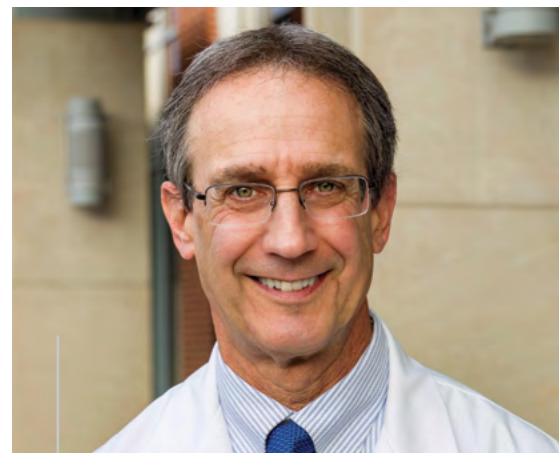
The Stroke Community Outreach, Prevention and Education (SCOPE) program plays a pivotal role in raising awareness and promoting proactive health practices.

The network and affiliates provide this education for children and adults through interactive health screenings, informational sessions and targeted outreach efforts.

To date, the SCOPE Program has educated over 58,000 individuals through more than 1,300 events.

Looking Forward

Dr. Goldstein's goal is constant improvement and expansion of the network. "As we look ahead, we remain committed to pushing the boundaries of stroke care excellence, guided by our mission to provide compassionate, state-of-the-art and accessible care to all those affected by stroke. Together, we will continue to build a future in which every stroke patient receives the highest level of care and support." ■



WHY UK?

Larry Goldstein, MD

*Co-director, UK Kentucky Neuroscience Institute
Chair, Dept. of Neurology
Co-Director, UK Neuroscience Research Priority Area
Medical Director, Stroke Care Network
Associate Dean for Clinical Research, College of Medicine
UK Faculty since 2015*

"One of the things that really attracted me is being able to support young people, encourage their development and promote their careers. Our programs make a difference as does our welcoming environment for all cultures and people. I also love that the academic medical center is located on the university campus. It provides the opportunity for very wide collaborations."

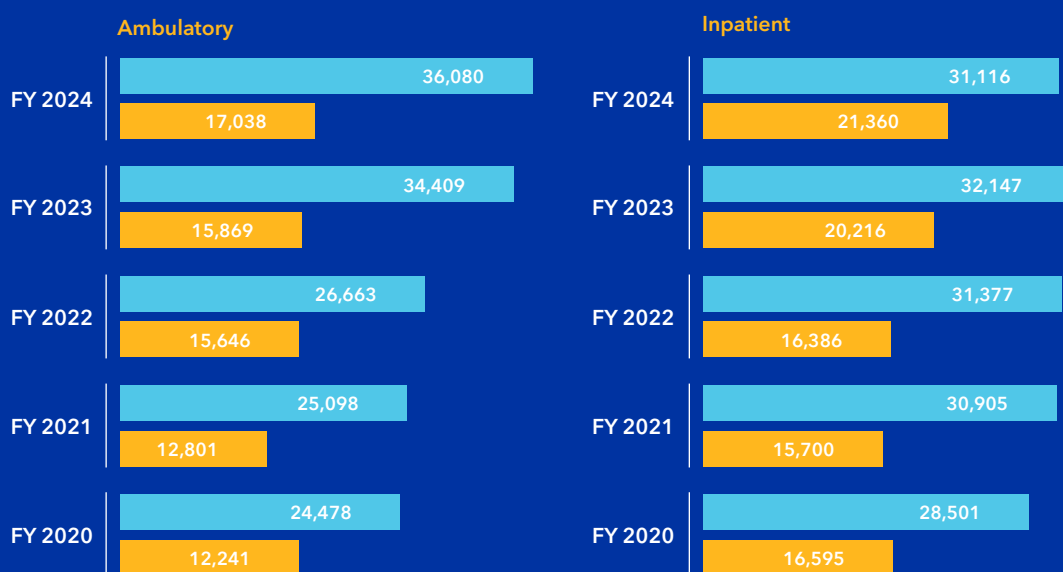
SNAPSHOTS

With the goal of creating a healthier Kentucky, the UK Kentucky Neuroscience Institute (KNI) is the preeminent destination for neurological and neurosurgical care in the Commonwealth. KNI is committed to providing superior care, based on leading-edge research that addresses a multitude of neurological needs. This annual report celebrates the spirit behind the providers, clinicians and the entire team at KNI.

The following pages recount the milestones for 2024, which include “snapshots” that provide insight at a glance into how KNI is improving care across the state and conducting research that has the potential to impact the nation.

Total Neuroscience Institute Patient Visits

● Neurology ● Neurosurgery



ENDING THE CYCLE OF PAIN

A PERSONALIZED APPROACH TO HEADACHE RELIEF IN KENTUCKY

Headaches affect millions of men, women and children each year, but only 4% of those experiencing severe, recurring headaches – known as migraines – seek medical care from headache specialists, according to the Migraine Research Foundation.

But chronic and frequent headaches do not have to be left untreated. The UK Kentucky Neuroscience Institute's (KNI) Headache Program offers specialized care and highly trained physicians who focus on evaluation and headache management.

Specialists

1 board-eligible adult headache specialist

1 board certified pediatric headache specialist

2 neuro-ophthalmologists

1 interventional neuroradiologist

5 APPs

1 adult and 1 pediatric nurse who specialize in taking care of complex headache populations

Conditions

The neurologists specializing in headaches at KNI use a multidisciplinary approach to diagnose and treat headaches while providing education, preventing the onset of headaches and offering symptom relief. KNI offers treatment for:

- ▶ Migraine/chronic migraine
- ▶ Trigeminal autonomic cephalgias (for example, cluster headache), occipital neuralgia
- ▶ Refractory headaches

Treatments

Dependent upon the condition, KNI offers pharmacological intervention including infusions, injections (such as nerve blocks, trigger point, and onabotulinum toxin), and in rare cases, neuro-surgical intervention.

Unique to KNI, collaborative partners include:

- ▶ Interventional pain medicine
- ▶ Interventional neuroradiology
- ▶ Orofacial pain
- ▶ Neuro-Ophthalmology
- ▶ ENT
- ▶ Plastic surgery
- ▶ Neurosurgery

The UK Difference

UK faculty oversee and manage the Lexington VA Headache Center of Excellence, providing care to our veteran population.

KNI offers access to UK Specialty Pharmacy and its pharmacists who specialize in modern therapeutics.

Through the UK College of Medicine, KNI offers a headache medicine fellowship program to help train the next generation of clinicians to meet the challenge of delivering complex care.

Research

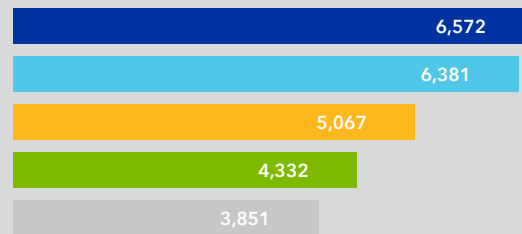
Participation in patient outcomes research to evaluate different therapies for children and adolescents with headaches (see page 14 for detail on Dr. Sharoon Qaiser's pediatric research.)

Data

6,572 Outpatient Visits
in FY 2024

Headache Outpatient Visits by Fiscal Year

● FY 2024 ● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020



EPILEPSY PROGRAM RECOGNIZED NATIONALLY

ADVANCING EPILEPSY CARE AT HOME AND ACROSS THE NATION

The UK Kentucky Neuroscience Institute's (KNI) Epilepsy Program provides specialized care to infants, children, adolescents and adults living with epilepsy. Every patient's epilepsy is unique, requiring a personalized treatment plan. The KNI epilepsy team endeavors to provide this through a multimodal multidisciplinary approach.

Epilepsy is one of the most common neurological disorders. Many patients suffer from seizures despite being on multiple medications, which has a severe impact on mental, physical and social well-being. As a Level 4 National Association of Epilepsy Centers (NAEC) accredited center, KNI offers the most advanced monitoring, testing and treatment for complex types of epilepsy. The UK epilepsy team is comprised of epileptologists, epilepsy neuroradiologists, an epilepsy neuropsychologist, an epilepsy neurosurgeon, and a full complement of specially trained and experienced EEG, nursing, and support staff. This combined expertise and focused approach is utilized for every patient suffering from drug-resistant epilepsy or uncontrolled seizures.

Specialists

9 adult, 4 remote adult, and 3 pediatric epileptologists

1 dedicated epilepsy neurosurgeon

1 neuropsychologist

2 dedicated neuroradiologists

Dedicated registered EEG technologists

Specialty trained EMU nursing and support staff

1 ambulatory pharmacist dedicated to the epilepsy clinic

Faculty and staff holding appointments on national boards, foundations and other entities directing advancement in epilepsy care in Kentucky and nationwide

Research

Interdepartmental alliance (FINDERS team) is working to develop advanced neuroimaging methods to improve localization of seizures, leading to better identification (see page 12) and treatment of diseased brain tissue causing refractory epilepsy

Active multidisciplinary team funded by National Institutes of Health (NIH) to find therapeutic strategies that resolve neurovascular inflammation and repair blood-brain barrier dysfunction in epilepsy

Active work through the Clinical Research Unit to participate in clinical research trials and studies, ensuring patients have access to the most advanced treatment options

Active participation in national clinical trials investigating the use of novel medications

The UK Difference

Recent expansion of the adult epilepsy monitoring unit (EMU) from six beds to 12, making it the largest EMU in Kentucky

Dedicated three-bed pediatric EMU in the Kentucky Children's Hospital to provide monitoring and care in a child-friendly environment

Long-term video-EEG monitoring in the EMU and ICU, outpatient and inpatient EEGs, and ambulatory (at home) EEG services

Special diagnostics such as PET, Ictal SPECT, Wada test, advanced neuropsychological testing, functional MRI for language and motor mapping, intraoperative monitoring

24/7 EEG coverage for adult and pediatric patients

Referral epilepsy care network partners with King's Daughters, Frankfort Regional Medical Center, Rockcastle Regional Hospital, and Owensboro Health

Recognized epilepsy and clinical neurophysiology fellowship programs for advanced training

Weekly refractory epilepsy conference in a multidisciplinary setting to discuss complex patients who are suffering from uncontrolled or medication-resistant seizures. The findings and consensus from this conference guide individualized treatment for each patient.

Robust surgical program with personalized care for each patient with medication-resistant epilepsy:

- ▶ Intracranial EEG using robotic stereoelectroencephalography (SEEG) for improved seizure diagnosis
- ▶ Surgical resection or disconnection of diseased brain tissue causing seizures
- ▶ Neuromodulation with the latest devices including Vagus Nerve Stimulation (VNS), Responsive Neurostimulation (RNS), and Deep Brain Stimulation (DBS)

Awards and Accreditations

NAEC Level 4 Epilepsy Center

ABRET LTM/EMU accreditation

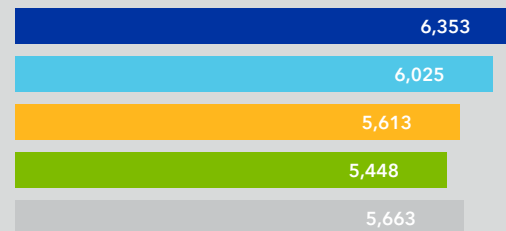
ABRET Electroencephalography Lab accreditation

Data

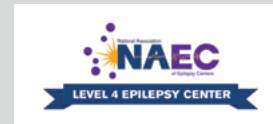
6,353 Outpatient Visits in FY 2024

Epilepsy & Neuromuscular Outpatient Visits by Fiscal Year

● FY 2024 ● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020



*Epilepsy & Neuromuscular Outpatient reflect combined statistics



RESTORING ABILITY TO PATIENTS WITH NEUROMUSCULAR DISEASE

When nerves and muscles fail to function well, a person’s control over their entire body can be affected, causing a variety of symptoms ranging from weakness, to loss of sensation, to difficulty walking, swallowing or breathing. Neuromuscular disorders, which are diseases of the peripheral nervous system, are challenging to diagnose and treat, and often leave patients feeling helpless in their search for healing.

The UK Kentucky Neuroscience Institute’s (KNI) Neuromuscular Disorders Program specializes in addressing these diseases. Specifically, they diagnose and treat conditions affecting the peripheral nerves, the muscles, the autonomic nervous system and the nerve-muscle junction.

Specialists

- 3 neuromuscular fellowship-trained MDs
- 2 neurophysiology fellowship-trained MDs
- 1 MD, PhD and 1 MD caring for patients with ALS
- 6 board-certified electromyographers
- 2 dedicated EMG technicians
- Nurses; physical, occupational and speech therapists; social workers and support staff trained to care for those living with neuromuscular disorders and ALS

Conditions

- Amyotrophic lateral sclerosis (ALS) or motor neuron diseases (MNDs)
- Chronic inflammatory demyelinating polyradiculoneuropathy (CIDP)
- Myasthenia gravis (MG)
- Muscle disorders including myopathy and muscular dystrophy
- Guillain-Barré syndrome (GBS or AIDP)
- Peripheral neuropathy and nerve injuries/compressions
- Rare diseases like Charcot-Marie-Tooth disease (CMT), periodic paralysis, stiff-person syndrome (SPS), myotonia

The UK Difference

Comprehensive and advanced diagnostics including electro-myography (EMG including single-fiber EMG), neuromuscular ultrasound, and nerve/muscle biopsies to determine etiologies of neuromuscular disorders

The only ALS Association Certified Treatment Center of Excellence in Kentucky

American Board of Psychiatry and Neurology (ABPN) neuromuscular subspecialty-certified providers

Faculty located in outreach clinics to increase accessibility to quality care for patients in rural areas of Kentucky.

Research

Over 10 currently active clinical trials, allowing patients access to the latest medical therapies before they are widely available

Investigator-initiated original research studies on the pathophysiology and impact of various neuromuscular disorders

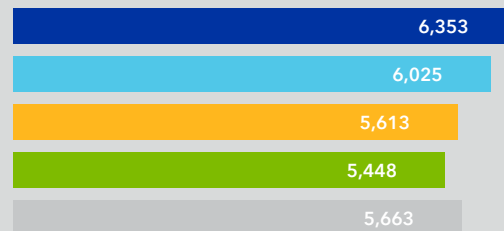
Dedicated ALS research team, working to understand familial ALS, disease causation and progression, and striving to improve longevity and quality of life in ALS patients

Data

6,353 Outpatient Visits
in FY 2024

Neuromuscular & Epilepsy Outpatient Visits by Fiscal Year*

● FY 2024 ● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020



RELIEF & RECOVERY

SPINE PATIENTS BENEFIT FROM COLLABORATIVE APPROACH

Neck and back pain isn't just uncomfortable—it's life-altering. For residents of Central Kentucky dealing with the daily struggle of acute or chronic spine issues, we offer a beacon of hope.

In 2024, UK HealthCare spine care experts across the health system came together to create the UK HealthCare Comprehensive Spine Center, a single, multidisciplinary team comprised of some of the nation's finest spine neurosurgeons, orthopedic specialists, interventional pain experts, and rehabilitation therapists. Working collaboratively across specialties, our experts are dedicated to crafting personalized treatment plans tailored to each patient's unique needs.

Specialists

8 spine surgeons (neuro and ortho)
9 APPs
2 ortho RNs
1 certified athletic trainer
Nurse navigator serving as a bridge between clinic and inpatient
Physical medicine care & rehabilitation and interventional pain experts

Conditions

Surgeons with the program are trained to treat a variety of spinal disorders:

- ▶ Cranio-cervical or other spinal instability
- ▶ Failed back surgical syndrome
- ▶ Herniated disc (cervical, thoracic, lumbar)
- ▶ Myelopathy
- ▶ Radiculopathy
- ▶ Scoliosis
- ▶ Spinal deformities
- ▶ Spinal fractures and other spine injuries
- ▶ Spinal stenosis
- ▶ Spinal synovial or ganglion cysts
- ▶ Spinal tumors (Schwannomas, neurofibromas)

Procedures

KNI surgeons are all trained in minimally invasive approaches to treat the full range of spinal conditions, ranging from simple to the most complex, allowing access to the latest treatments for whatever spinal condition they may have. Common procedures performed are as follows:

- ▶ Vertebral augmentation with balloon kyphoplasty
- ▶ Tumor ablation
- ▶ Minimally invasive spine decompression +/- fusion
- ▶ Cervical total disc replacement
- ▶ Cervical laminoplasty
- ▶ Complex reconstructive surgery

The UK Difference

Integrated program of spine neurosurgeons, orthopedic surgeons, interventional pain specialists and rehabilitation experts, allowing access to the full spectrum of care in one program

Minimally invasive surgical techniques (including spine endoscopy) that cause less harm to surrounding bones and tissue, leading to less pain and faster recovery times for patients

Team approach among neurosurgeons, orthopedic surgeons, vascular surgeons and ICU physicians to make even the most complicated surgeries as safe as possible

Spinal neuromonitoring and navigation equipment used to make surgery safer and more precise, often minimizing the amount of surgery necessary to treat a problem

Research

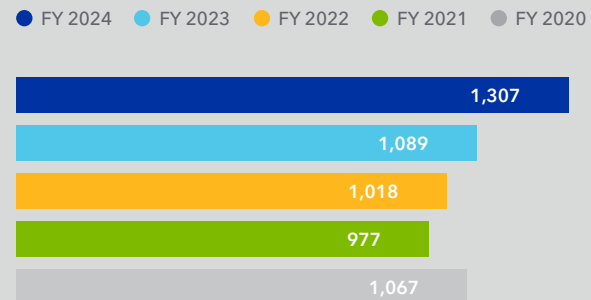
KNI neurosurgeons benefit from a close partnership with the researchers and clinicians of the UK Spinal Cord and Brain Injury Research Center, focusing on advances in the following areas:

- ▶ Identifying baseline parameters that can help better predict outcomes after management of a variety of spinal conditions
- ▶ Developing treatments to minimize damage and promote repair mechanisms following spinal cord or nerve injury
- ▶ Developing strategies to promote neuronal regeneration, including gene therapy
- ▶ Identifying mechanisms involved in axon guidance and myelination
- ▶ Implementation of advanced control systems for functional neuromuscular stimulation

Data

1,307 Outpatient Visits in FY 2024

Spine Outpatient Visits by Fiscal Year



SOLVING THE BIGGEST NEUROLOGICAL PROBLEMS FOR THE LITTLEST PATIENTS

A child’s neurological system is complex. And problems that arise in the brain or nervous system during childhood can cause serious complications and developmental delays. Age does not impact significance of care, so a child’s neurological system also requires advanced, high-quality levels of care and treatment. That’s where the child neurology team at the UK Kentucky Neuroscience Institute (KNI) can make a difference.

Under new leadership since 2023, the team has expanded, both in quantity and in breadth of experience. Boasting 12 dedicated child neurologists, the team at UK HealthCare is equipped to treat the broadest array of neurological conditions.

KNI’s providers—board certified in pediatrics, neurology and child neurology—have access to leading-edge care for the diagnosis, evaluation, management and treatment of pediatric neurologic conditions.

Conditions

KNI treats a comprehensive set of conditions affecting children, including but not limited to:

- Brain injury
- Brain tumor
- Cerebral palsy
- Concussion
- Developmental disorders
- Headaches
- Hypoxic brain injuries
- Muscle weakness (myopathy)

- Neurofibromatosis
- Neurological problems of neonates in conjunction with UK Neonatology
- Neuromuscular disorders
- Seizures
- Stroke
- Tics
- Tourette’s disorder
- Tuberous sclerosis

Research

Ongoing work with Clinical Research Unit on new drugs and devices

Participation in patient outcomes research to help determine best therapies and treatments in all areas of child neurology

Particular areas of focus include:

- ▶ New therapies for childhood migraine
- ▶ New therapies for epilepsy in childhood
- ▶ Outcomes for persons with Down syndrome
- ▶ Molecular characterization of pediatric brain tumors
- ▶ Organization of services for children with autism and related disorders

Specialists

12 child neurologists

4 APPs

1 dedicated pharmacist

Dedicated support staff including nurses, patient coordinators, medical assistants, a social worker, a dietitian, and a genetic counselor to care for children and their families

The UK Difference

Dedicated child-neurology-trained epileptologists and epilepsy-monitoring rooms housed in Kentucky Children's Hospital so young patients can be monitored, diagnosed and treated in a child-friendly environment

Advanced treatment, such as new genetic treatments currently available for some children with spinal muscular atrophy, Duchenne muscular dystrophy and other rare childhood neurological diseases

Recruitment of a new pediatric neurosurgeon with a background in pediatric oncology to collaborate closely with DanceBlue Kentucky Children's Hospital Hematology/Oncology Clinic, a multidisciplinary clinic that includes neurosurgery and pediatric hematology-oncology, treating primary and secondary brain tumors in children

The only multidisciplinary headache clinic in the region focused on children, teenagers and young adults ages 25 and younger

Access to and treatment by UK HealthCare's Comprehensive Stroke Center, ensuring young stroke patients have access to the top level of stroke care

Neurodevelopmental clinic comprised of a child neurologist, speech-language pathologists, occupational and physical therapists, psychologists and more - reducing a typically months-long process of diagnosing developmental disorders into a single-day visit

Close collaboration with the Office for Children with Special Health Care Needs to make advanced neurological care accessible and affordable to families in eastern Kentucky

Child neurology inpatient unit embedded in the Kentucky Children's Hospital (KCH) and a dedicated child-neurology outpatient clinic space, allowing kids and families to seek care in a warm, welcoming, child-friendly environment

Close work with KCH child life specialists, helping children master the challenging situations associated with illness and positively cope with anxiety from treatments

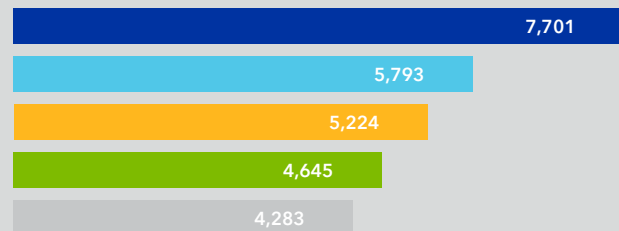
Data

7,701

Outpatient Visits
in FY 2024

Child Neurology Outpatient Visits by Fiscal Year

● FY 2024 ● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020



EXPERT MULTIPLE SCLEROSIS CARE AT UK HEALTHCARE

A TEAM OF SPECIALISTS COVERS THE CONDITION FROM ALL ANGLES

One of the most common neurological conditions in the United States, multiple sclerosis (MS) affects more than 5,000 people in Kentucky and southeast Indiana, according to the National MS Society. Because MS impacts the brain, optic nerves and spinal cord, having a team of specialists on hand to address the unique challenges of MS is critical when it comes to patient care.

And the Multiple Sclerosis and Neuroimmunology program at the Kentucky Neuroscience Institute at UK HealthCare is equipped with the experts necessary to manage the complete spectrum of MS-related complications.

Specialists

2 MS fellowship-trained MDs

2 neuro-ophthalmologists

1 neuropsychologist

Pharmacists trained to manage and educate patients on medication and infusion

Physical and occupational therapists

Conditions

Clinicians with the program are trained to manage a variety of neuroimmunologic disorders in addition to MS:

- ▶ All MS subtypes, including progressive, relapsing-remitting and secondary progressive
- ▶ Acute disseminated encephalomyelitis (ADEM)
- ▶ Neuromyelitis optica spectrum disorder
- ▶ Pediatric MS and related disorders
- ▶ Sarcoidosis
- ▶ Transverse myelitis
- ▶ Other autoimmune diseases of the central nervous system

The UK Difference

Designation as a Center for Comprehensive Care by the National MS Society, recognizing that KNI upholds the highest standards for care

Facilities equipped with sophisticated radiological and physiological testing technology to diagnose and monitor disease progression

Experts in cognitive neurology and ophthalmology, pharmacy and neuropsychology, all trained to manage the unique needs of MS patients

On-site infusion center delivering the most effective infusion therapies to our patients

Occupational and physical therapists who have special training in MS and are dedicated to improving mobility and quality of life

Research

Active participation in numerous clinical trials through the Clinical Research Unit

Participation in MS International Federation-sponsored evaluation of MS drugs for use in research-poor settings. The suggested list of drugs was approved by the World Health Organization

Evaluation of point-of-care ultrasound for diagnosis of ocular emergencies, such as large vessel vasculitis

Evaluation of vascular patterns in the retina of MS patients for diagnostic markers

Introduction of CAR T therapeutic clinical trials in Kentucky. One of the few site locations across the country for CAR T clinical trials for refractory MS patients.

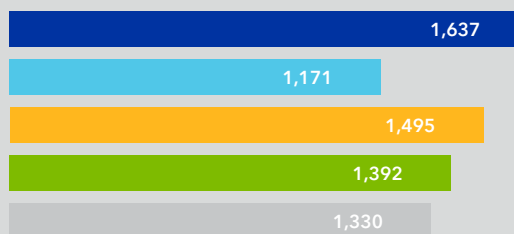
Collaboration with Molecular Genetics, Immunology and Microbiology at UK to conduct an exploratory study of B cell receptor density for CAR T dosing

Data

1,637 Outpatient Visits in FY 2024

Multiple Sclerosis Outpatient Visits by Fiscal Year

● FY 2024 ● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020



NEUROCOGNITIVE DIAGNOSTICS

NEUROPSYCHOLOGY TEAM PROVIDES EXPERT INSIGHT INTO BRAIN BEHAVIOR DEFICITS

Conditions you cannot see, such as those impacting the way you think and/or the way you absorb and process information, can be the most difficult to understand and diagnose. The experts with the neuropsychology program at the UK Kentucky Neuroscience Institute (KNI) can help.

When treating physicians and allied health providers need complex differential diagnostic questions answered, they can count on KNI’s team of neuropsychologists. UK HealthCare’s neuropsychology division includes world-renowned academic clinicians with research appointments in the Sanders-Brown Center on Aging, the Spinal Cord and Brain Injury Research Center, and the Markey Cancer Center.

Neurocognitive testing, also known as neuropsychological testing, is a comprehensive evaluation of the patient’s cognitive function by specific neurologic domains, (i.e., memory, attention, problem solving, language, visuospatial, processing speed, motor, and emotion.) The neurocognitive diagnostic service team is trained to perform these evaluations to help diagnose cognitive deficits that may have resulted from several causes, including neurodegenerative disorders such as dementia, stroke, Parkinson’s disease, cancer, epilepsy and traumatic brain injury. Once a proper diagnosis has been determined, the neuropsychologists can provide higher levels of patient care with an individualized treatment plan.

Specialists

5 doctoral faculty providers, specializing in neuropsychology
1 doctoral research faculty
1 doctoral staff psychologist
4 neuropsychology fellows
3 dedicated psychometrists

The UK Difference

Comprehensive neurodiagnostic testing, including cognitive and behavioral evaluation, memory assessment for dementia, cognitive testing pre- and post-brain surgery, evaluation of cognition after stroke, and assessment after injury
Consultative integration within 24 UK HealthCare service lines and clinical programs
Consultation service for 62 external regional hospitals and specialty practices across Kentucky, Ohio, West Virginia, and Tennessee
Faculty holding positions on regional, national and international boards and organizations, ensuring that UK is at the forefront of neuro-diagnostic service, breakthrough science, and process and protocol creation

Conditions

The program has broad experience with conditions and treatments such as (but not limited to):

Adult and pediatric oncology	LVAD implantation
Adult and pediatric neurotrauma	Meningitis
ALS	Movement disorders
Brain injury	Multiple sclerosis
Dementia syndromes	Plastic surgery (craniofacial trauma)
Epilepsy & seizures	Rheumatology
Encephalitis	Solid organ transplant
General neurology	Stroke
General neurosurgery	Toxin exposure
Hydrocephalus	

Research

Glueck Lab: neurobehavioral research lab focused on exploring novel interventions to aid in recovery for individuals with mild cognitive impairment due to traumatic brain injury

Sponsorship by multiple agencies of the National Institutes of Health, Department of Defense, Department of Education, clinical trials and foundation grants

Individual faculty research interest in neurodegenerative disease, Alzheimer's disease and related dementias, acquired brain injury, stroke, movement disorders, global health and sustainability, neurobehavioral performances, neurogastronomy and chemosensory disorders, neuromodulation technology, and neurotoxicology

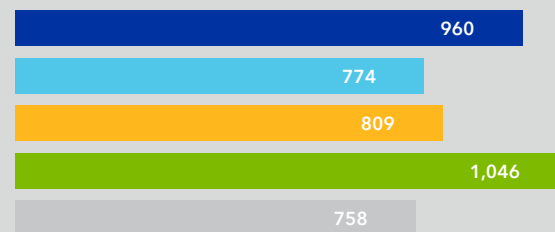
Data

960

Outpatient Labs
in FY 2024

Neuropsychology Outpatient Labs by Fiscal Year

● FY 2024 ● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020



COLLABORATIVE CARE PRODUCES GREATER RESULTS

The UK Memory Disorders Program and the Sanders-Brown Center on Aging join forces to provide the latest in dementia care.

Started by Dr. William Markesbery in 1969, the UK Memory Disorders Program has been a foundational clinic leading national and international efforts for early diagnosis and treatment for 55 years. The clinic has been fully integrated with the internationally renowned Sanders-Brown Center on Aging (SBCoA), since its inception in 1979 as a center for excellence in research, care and treatment for Alzheimer's and related dementias. This collaboration between research and clinical care gives patients access to the most advanced treatments and therapies, often before they're widely available on the market.

In 1985, SBCoA was recognized and funded as one of the first of 10 Alzheimer's Disease Centers by the National Institute on Aging. The program continues to offer state-of-the-art biomarker diagnostic capabilities, including: sophisticated 3 Tesla MRI with a focus on cerebrovascular disease, molecular PET imaging, spinal fluid testing and a wealth of experience in the new blood testing platforms for Alzheimer's disease and related dementias that are coming into clinical practice today.

Specialists

2 MD, PhDs and 4 APPs trained in and dedicated to memory disorders

Shared team of neuropsychologists, geriatricians, pharmacists, social workers, occupational and physical therapists who can augment care recommendations and develop comprehensive treatment plans

Over 30 research engagement specialists, medical team staff, psychometrists, and coordinators

National Recognition and Leadership

Founding member of the International Working Group on the diagnosis of Alzheimer's disease

Founding member of the Society for Frontotemporal Dementia

Engagement on the Executive, Steering, and Ethics Committees for the NIH/NIA National Alzheimer Clinical Trials Consortium

Active leadership on the National Institute on Aging Alzheimer's Disease Research Centers Program including the Clinical Steering Committee and the Clinical Task Force

Faculty presented Presidential Award for Lifetime Achievement, greater Cincinnati and Northern Kentucky Alzheimer's Association chapter, Cincinnati, OH

Steering committee membership for the National Alzheimer's Disease Neuroimaging Initiative (ADNI)

Conditions

The Memory Disorders Program at UK is not just for Alzheimer's disease, but for all conditions throughout the lifespan that are associated with cognitive and behavioral changes

SBCoA evaluates and treats over 30 conditions relating to various dementias, encephalopathies, encephalitis, and many rare cognitive disorders

Services are appropriate for those at risk for future cognitive or behavioral decline on the basis of family history, genetics, and/or prior brain injury

Experimental Treatment Options

Over 16 years' experience with new disease-modifying therapies that are just entering the clinical space now

The KNI Memory Disorders and SBCoA is a leading site moving forward over 130 new therapies approved by FDA for experimental use:

- ▶ Vaccines and treatments to prevent Alzheimer's disease
- ▶ Infusions to remove Alzheimer's proteins from the brain
- ▶ Anti-inflammatory medicines to slow or stop brain injury from cognitive disease
- ▶ Medicines that target dementia with Lewy bodies and Parkinson's disease dementia
- ▶ New medicines to treat "hardening of the arteries," now classified as vascular cognitive impairment and dementia
- ▶ Treatments to help with the behavioral and psychiatric symptoms of dementia that are a major problem as disease progresses
- ▶ Medicines that are designed to improve synaptic transmission, helping nerve cells talk to one another so the brain can function in a better way
- ▶ Treatments designed to change the abnormal shape of dementia proteins and modify the genetic risks that lead to dementia

Coverage Area

While the KNI Memory Disorders Clinic serves as the leading memory and aging care center in the Commonwealth, the clinic population and referrals come from other healthcare facilities across the nation.

The nearest centers of excellence can be found in Chicago; St. Louis; Indianapolis IN; Atlanta; Raleigh, NC. This creates an environment where the KNI clinic serves a central role in providing memory care in the southeast and central United States.

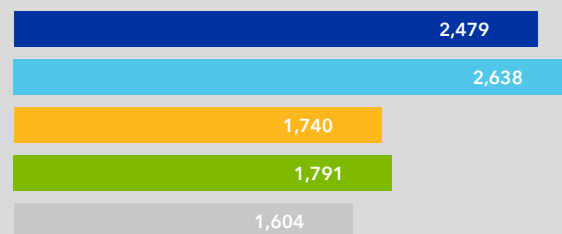
Referrals from California to Oregon to South Dakota to Pennsylvania to Massachusetts to New York to South Carolina to Florida are routine in the clinic.

Data

2,479 Outpatient Visits in FY 2024

Cognitive Disorders Outpatient Visits by Fiscal Year

● FY 2024 ● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020



Rural Telemedicine Clinic

The Rural Telemedicine Clinic in operation since 2005.

Designed to care for those with memory or other thinking problems in their own communities across the Commonwealth.

Over 3,000 Kentuckians have taken advantage of this clinic, receiving state-of-the-art care in their own local communities.

The clinic operates weekly in a dedicated time slot to make sure access is always available.

A Rural Caregiver Education Program accompanies this clinic, providing caregiver support and education. The team of clinicians and experienced social workers can help those in rural KY navigate the major issues they face as their loved ones develop memory problems and eventually progress to dementia.

FORWARD MOVEMENT

MOVEMENT DISORDERS CLINIC PROVIDES PATIENTS WITH SPECIALIZED CARE

Nestled within the forefront of healthcare excellence, the UK Movement Disorders Program represents a transformative approach to the diagnosis, treatment, and ongoing management of movement disorders. With a multidisciplinary team of renowned neurologists, neurosurgeons, rehabilitation specialists, and support staff, the program redefines the standards of care for patients dealing with conditions such as Parkinson's disease, essential tremor, dystonia, and other movement-related challenges.

With a truly collaborative team from both neurology and neurosurgery, patients receive the latest medical and surgical therapies thanks to the program's focus on research aimed at disease modification rather than only treating symptoms.

Specialists

4 fellowship-trained MDs

1 functional neurosurgeon

3 dedicated APPs

1 neuropsychologist

Dedicated clinical research staff

VAMC Affiliate

A UK HealthCare movement disorders specialist staffs the Lexington VA Medical Center's Parkinson's Disease Consortium Clinic that also includes speech and physical therapists and a clinical research coordinator. This clinic provides both care for veterans, including access to DBS and Duopa, and training for neurology residents.

The UK Difference

World-class multidisciplinary team comprised of MD fellowship-trained physicians, neurosurgeon, APPs, dedicated MD clinical research staff, rehab specialists and pharmacists, ensuring access to the complete spectrum of care

Movement disorders specialists staffing the Lexington VA Medical Center's Parkinson's Disease Consortium Clinic that also includes speech and physical therapists and a clinical research coordinator. This clinic provides both care for veterans, including access to DBS and Duopa, and training for neurology residents.

Endowed Braden-Clark Movement Disorders Fellowship to provide advanced training to those with interest in movement disorders. The Braden-Clark Fellowship participates with >50 similar programs in the Movement Disorder Fellowship (MODIF) Match Network, a national matching program. The fellowship has consistently matched a fellow over the last several years.

Integrated bench-to-bedside research approach, making scientific advances available to UK patients at the earliest opportunities

Treatment

EMG-guided botulinum toxin injections for movement disorders

Deep Brain Stimulation (DBS) evaluation, surgery and programming

Duopa enteral suspension (closely integrated with a single gastroenterologist placing all PEG/Js)

Research

At any given time, the program has a portfolio of 10-15 multi-center industry-, government- and foundation-sponsored clinical trials.

The Yamasaki wet lab studies alpha synuclein seeding in PD and Parkinsonian syndrome. Dr. Yamasaki has a VA Career Development Award, and her lab receives funding through an NIH Centers of Biomedical Research Excellence award.

In close collaboration with the UK Brain Restoration Center, KNI studies the effect of autologous sural nerve graft implantations into *Substantia nigra* concurrent with DBS placement, as a means to slow the course of PD. Researchers have recently received a 5-year National Institute on Aging award to study whether nucleus basalis implants may slow development of PD dementia.

In collaboration with the UK College of Health Sciences, studies utilizing gait sensors are evaluating the effects of medication and patient perception of gait stability in PD and Parkinson syndromes.

Multiple neuroscientists engage in basic research of Parkinson's disease, Huntington's disease and other neurodegenerative diseases, and closely integrate with the movement disorder physicians in translational research.

NIH-funded trial to explore the efficacy of DBS-Plus, an innovative procedure to treat Parkinson's disease (see page 16).

Conditions

We provide treatment for:

Hypokinetic movement disorders

Parkinson's disease

Parkinsonism-plus syndromes

Stiff-person syndrome

Huntington's disease and other forms of chorea

Essential or familial tremor

Physiological tremor

Drug-induced tremors, and tremors of metabolic and medical illnesses

Rubral tremor

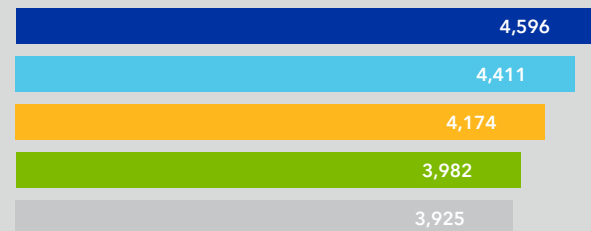
Tremors seen in cerebellar disorders

Data

4,596 Outpatient Visits in FY 2024

Movement Disorders Outpatient Visits by Fiscal Year

● FY 2024 ● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020



TAKING STROKE HEAD ON

KENTUCKY’S MOST COMPREHENSIVE CENTER FOR STROKE CARE

Over 2,300 Kentuckians died of stroke in 2020 (the most recent year for which CDC data is available). Not only is it a leading cause of death in the Commonwealth, those who survive often face a lifetime of disability.

At the UK Kentucky Neuroscience Institute (KNI), the team is on a mission to provide the highest level of stroke care possible while turning those statistics around.

Specialists

9 stroke neurologists
4 neurointerventionalists
3 open cerebrovascular neurosurgeons
4 neuropsychologists
1 stroke neurology fellow and 3 endovascular fellows who take stroke calls
9 stroke APPs covering inpatient and ambulatory service
24/7 in-house neurocritical care
24/7 in-house stroke neurology team
Neuroscience-dedicated physical, occupational and speech therapy

The UK Difference

To retain Comprehensive Stroke Center designation, KNI has to meet stringent protocols for the treatment of strokes and show that they are capable of treating the most complicated strokes 24/7

Provides all advanced neuroimaging technologies (all MRI sequences including spectroscopy and tractography, CT, CT perfusion, angiography, ultrasound, transcranial Doppler, TTE, TEE, cardiac MRI)

Neurointerventional radiology and cerebrovascular neurosurgery available 24/7

Multiple program oversight and quality improvement teams

Only ACGME-accredited vascular neurology fellowship in Kentucky

Acts as hub hospital for 29 Viz.ai sites throughout Kentucky, streamlining care coordination between hospitals and ensuring patients get the appropriate care

284 patients monitored and transferred through Viz.ai in FY 2024

Results and Outcomes

Based on Vizient data for calendar year 2023, UK HealthCare has a substantially higher case mix index, indicating more complicated patients with more comorbidities, and yet KNI retains a lower mortality index as compared to other similar hospitals.

Research

Engaged in more than 25 clinical research trials in stroke and cerebrovascular disease, including multicenter randomized trials

Awarded the prestigious Coverdell Grant, aimed at optimizing stroke prevention among those at high risk and improving care and outcomes for stroke patients throughout Kentucky

Translational projects with the Center for Advanced Translational Stroke Science

Includes first tissue bank collecting brain blood and clots in acute stroke patients

One of the only institutions in the world currently augmenting thrombectomy with investigational neuroprotective drug therapy

Awards

Joint Commission Comprehensive Stroke Center

Rated as High Performing in Stroke by US News & World Report for 2024/2025

American Heart Association Get With the Guidelines Gold Plus, Target Stroke Honor Roll Elite Plus

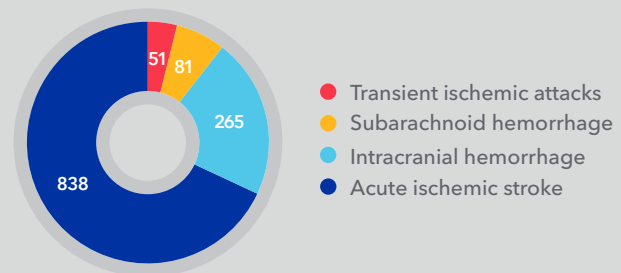


*This Get With The Guidelines® Aggregate Data report was generated using the Quintiles PMT® system. Copy or distribution of the Get With The Guidelines® Aggregate Data is prohibited without the prior written consent of the American Heart Association and Quintiles.

Data

1,235 Outpatient Visits in FY 2024

Stroke Patients by Type of Stroke FY 2024*



Percent of Patients with Acute Intervention FY 2024*

● UKHC ● Other KY Hospitals



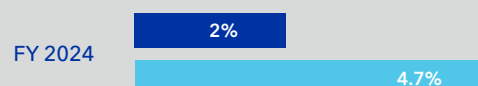
Mean Door-to-needle Time FY 2024 (lower is better):*

● UKHC ● Other KY Hospitals



Hemorrhagic Transformation Percentage FY 2024 (lower is better):*

● UKHC ● Other KY Hospitals



KENTUCKY NEUROSCIENCE INSTITUTE **LEADERSHIP**

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*Assistant Director, Neurosurgery
Residency Program*



LIVING HIS PASSION & HELPING OTHERS LIVE THEIRS

Dr. Tarif Bakdash is driving UK's Child Neurology Program to reach new heights. At the same time, he's helping his team and their young patients excel by fostering a culture of caring, curiosity and collaboration.

Left: Dr. Tarif Bakdash brings fresh energy, light and excitement to the child neurology program at UK HealthCare.

“Really, it all goes together. Philosophers tend to be deep questioners. There’s so much we don’t know and understand in neurology. And kids’ brains are changing and evolving continuously. I love the challenge of trying to understand the most complex organ in the world.”

TARIF BAKDASH, MD

Pass by the office of Tarif Bakdash, MD, and you’re apt to see a provocative question or saying on his door. “What life is worth living?” “When do you feel most alive?” “In the darkest of nights, the stars shine the brightest.” Each week’s posting, usually outside the field of medicine, is intended to inspire self-reflection and conversation.

Dr. Bakdash’s door reflects a lot about the pediatric neurologist, chief of the division of Child Neurology for the UK Kentucky Neuroscience Institute. With a master’s degree in the philosophy of medical ethics from the University of Toronto, a Master of Education in the health professions from Johns Hopkins University and special training in leadership and creativity from the University of Oxford and University of Cambridge, he is, at heart, a curious and lifelong learner.

“Really, it all goes together,” he said. “Philosophers tend to be deep questioners. There’s so much we don’t know and understand in neurology. And kids’ brains are changing and evolving continuously. I love the challenge of trying to understand the most complex organ in the world.”

During his medical training, Dr. Bakdash debated his career options. His uncle, a neurosurgeon, brought him into the OR, but Dr. Bakdash discovered it wasn’t the right fit. When he won a competition among pediatric residents for fastest newborn nursery diaper changing at Henry Ford Hospital in Detroit, he found his calling.

Fellowships at Harvard Medical School, Cleveland Clinic Foundation, Rush University and Baylor College of Medicine — in pediatric sleep medicine, epilepsy and clinical neurophysiology, movement disorders and child neurology, among others — followed.

Dr. Bakdash came to Lexington in September 2023, ready for a new endeavor and a different work environment. “When you’re young, you want to work in big places, but as you get older, you start realizing there is much more in life,” he said.



"I am working with nice, collegial, humble people. It feels like a family here and you don't find that in many medical centers anymore."

TARIF BAKDASH, MD

The number of children in need in Kentucky, as well as the University of Kentucky's supportive and collaborative atmosphere, were important to him and come up as he recruits today. "Most who go into medicine do so to help others. What better place for that if not UK? And then I ask candidates if they want to work with people they truly like," he said. "I am working with nice, collegial, humble people. It feels like a family here and you don't find that in many medical centers anymore."

The university's and department's goal of growing its child neurology department into a top-ranked leader in the region is built on the strong foundation established by many longtime and outstanding KNI physicians, Dr. Bakdash said.

"We already have amazing services in headaches, epilepsy, neuro-oncology, neonatal neurology, neuroimmunology, neurogenetics, and movement disorders," he said. His short-term agenda includes building centers of excellence led by exceptional team members (in neuro-muscular disorders, as an example).

Left: Dr. Tarif Bakdash

Knowing that a healthy and happy team leads to the best care for patients, Dr. Bakdash encourages everyone to live their passion and to seek life-work balance. As for himself, Dr. Bakdash walks to and from his office each day and helps care for his aging mother who lives with him.

When he's in clinic, kids love his trademark Lego and Disney ties, which reflect his playful nature. "The Lego tie is 3D and kids are always trying to grab it," he said, recalling his own love of Legos as a child.

As he embarks on year two of the job, Dr. Bakdash wants everyone to know his door is always open. If you stop by, be prepared for a friendly visit and possibly a chat about the question of the week. ■



WHY UK?

Tarif Bakdash, MD

*Chief, Child Neurology
UK Faculty since 2023*

Before joining UK, Dr. Bakdash was asked how much he knew about Kentucky. He replied honestly, "The Derby?" Interested in the state's history, he began reading. "I was fascinated and quickly learned about the state's underserved populations. When I visited, I found Lexington to have the feel of a small European city with little shops and excellent food. And it's the people here. I am working with nice, collegial, humble people. It feels like a family here and you don't find that in many medical centers anymore."



2024 KNI Annual Report is a publication of UK HealthCare Brand Strategy.

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