



# A COLLABORATIVE EFFORT

**2023 ANNUAL REPORT**

The background of the entire page is a monochromatic blue image. It features a close-up of a hand holding a human brain. The brain is covered in a surgical cap with several circular holes. The lighting is soft, highlighting the contours of the hand and the texture of the surgical cap.

*"A culture of collaboration across disciplines is one of the true strengths at the University of Kentucky. It is reflected in KNI's clinical, research, educational, and service-related programs, bringing together expertise from across the university to advance all of our shared missions."*

**DR. LARRY GOLDSTEIN**

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*"The close interactions and communication that occur between clinicians and researchers are integral to KNI. Collaborations among teams of investigators with diverse skills and viewpoints provide synergies that result in scientific breakthroughs. These can rapidly progress to new advances in neurological and neurosurgical care."*

**DR. LINDA VAN ELDIK**



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## COLLABORATE TO ELEVATE

Our mission at the UK Kentucky Neuroscience Institute (KNI) is to forge a healthier future for the people of Kentucky and extend its impact beyond the state's borders. But what sets us apart from other institutions is that we have found a novel approach to achieve this: collaborate to produce more innovative and effective treatments.

Together, our neurology and neurosurgery teams have developed a synergy that ensures our patients have access to the most progressive treatments. As trailblazers in neurological and neurosurgical care, KNI is dedicated to treating patients with complex neurological diseases and injuries. Our focus on innovation ensures that we are constantly able to pivot and evolve as new research unfolds, aligning treatment plans with the latest scientific breakthroughs.

But our impact goes beyond the walls of KNI in Lexington. Through the UK HealthCare-Norton Healthcare-Stroke Care Network, VizAI hub-and-spoke hospitals, and numerous research alliances, KNI works closely with physicians and hospitals across the state – and nation – to continue to advance neurological and neurosurgical care.

Through its steadfast commitment to research, KNI is able to discover new, innovative ways to treat neurological disease and provide state-of-the-art care for patients across the state. Through the UK Neuroscience Research Priority Area (NRPA), more than 300 investigators across nine colleges at the university are working on neuroscience research to discover tomorrow's treatments today. For calendar year 2022, 11 members of the NRPA were among the top 2% of most cited researchers in the world, as reported by the Elsevier Data Repository.

In the pages that follow, you'll learn how we continue to foster relationships and collaborations to elevate neurologic and neurosurgical care. From networks of providers in stroke care, to a unique partnership in creating a 3D printing lab, to multi-disciplinary teams conducting scientific research and educating the next generation, you'll see the faces of our clinicians and our scientists who are leading the charge.

It's all thanks to our dedicated doctors, advanced practice providers, nurses, researchers, lab technicians, pharmacists, social workers, and it's thanks to our partners in care, like you.

Together, we are propelling Kentucky toward a bright, healthy future.

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

Co-Director, UK Kentucky Neuroscience Institute  
Chair, Department of Neurology

### **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



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Left to Right: Drs. Craig van Horne,  
Linda Van Eldik, Larry Goldstein

# THE PROMISE OF DBS PLUS

Ten years ago, Craig van Horne, M.D., Ph.D., and the University of Kentucky Brain Restoration Center team began studying whether grafting Peripheral Nerve Tissue (PNT) during a Deep Brain Stimulation (DBS) procedure could help reduce symptoms in patients with Parkinson's disease.

The researchers (Greg Gerhardt, Ph.D. and George Quintero, Ph.D.) have seen promising results from this dual procedure, called DBS Plus. And the more they learn, the more the study evolves to include more participants.

By 2019, 60 patients had received nerve grafts through DBS Plus. That group is now up to 80.

DBS Plus treatment is not a cure for the degenerative nerve disease that impairs the body's movement. But early data has shown it can reduce symptoms.

*"The next part is ... a double-blind, placebo-controlled trial to really show if we can translate this into a true clinical opportunity."*

**DR. CRAIG VAN HORNE**

Now, researchers are evaluating the location and amount of PNT. When the study began, patients received single-location unilateral PNT implantations. But could it work better to implant the nerve on different parts of the brain on the same side? What about implanting on both sides of the brain?

"Using higher dosage, which covers more area, within the structures we're trying to target, tends to have a better effect overall than the smaller doses," said Dr. van Horne, the study's principal investigator.

Recently, the team has also learned more about these grafts' longevity. Thanks to the generosity of participants and their families, six previous DBS Plus patients who passed away from other causes donated



their brains for further study. This has allowed researchers to examine the condition of the nerve grafts years after implantation. (The nerves aren't treated with dye, so they don't show up on living patients' imaging.)

"In the brains that have been donated, we've identified a graft in there," said George Quintero, Ph.D., the study's co-investigator. "[The brains] appear to have cells from that graft continuing to live."

As positive results accumulate, a larger clinical trial to evaluate efficacy is on the horizon.

"The next part is ... a double-blind, placebo-controlled trial to really show if we can translate this into a true clinical opportunity," said Dr. van Horne.

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Page left: L to R: Dr. Craig van Horne, Ann Hanley, Dr. George Quintero

Above: Ann Hanley

Right: Dr. George Quintero



## EXTRA PHILANTHROPIC SUPPORT HAS ACCELERATED DBS PLUS RESEARCH

A key driver of the DBS Plus study has been the Ann Hanley Fund.

Hanley herself has Parkinson's disease and wanted to turn her diagnosis into advocacy. To offer support, she has sat with more than 300 of Dr. Craig van Horne's patients during their standard DBS procedures. She's also helped raise about \$2 million to fund this critical research.

Grant cycles are long. Researchers sometimes apply multiple times before they receive funding, which can greatly impede research timelines — and progress. But having a fund like the one Hanley started allows research to continue even as grant applications stall.

"Having a source of philanthropic money that allows you to get initial data is a huge benefit," said Dr. van Horne. "Ann's got a heart bigger than the universe."

# STROKE CARE, NO MATTER WHAT

The system for stroke care around the Commonwealth is a complex machine with many different moving parts. It involves multiple players – including emergency medical service responders, doctors, nurses, pharmacists, neuropsychologists, and a variety of therapists and other health care providers all of whom must work together at top speed to save lives and improve stroke recovery outcomes – across a large geographic area. But expertise is concentrated in regional institutions such as UK HealthCare, with many small and medium-size hospitals in rural areas lacking comparable resources.

The Kentucky Neuroscience Institute (KNI) is helping to fine-tune this (sometimes unwieldy) machine. Using partnerships, collaborations, and cutting-edge technology, KNI is implementing new ways to share medical information and expert input in real time at the earliest and most critical stages of stroke treatment; to provide specialized stroke care training for medical staffs in smaller hospitals; and to provide data and analysis to EMS teams and the hospitals they serve.

With these and other initiatives, KNI is helping make early-stage stroke treatment faster, more streamlined, and more equitable across the Commonwealth. The goal is to provide optimal stroke-related care regardless of where in Kentucky a patient may live.

## Stroke Care Network

One of the most expansive and far-reaching of these initiatives is the Stroke Care Network (SCN), a group including about 40 small and medium-sized hospitals around the state whose medical staffs receive extensive specialized training from experts at UK HealthCare and Louisville-based Norton Healthcare on how to recognize and respond to stroke cases as quickly and accurately as possible.

“There’s a huge knowledge deficit around strokes, in part because stroke presents in so many different ways,” explained Lisa Bellamy, SCN’s managing director. “There’s also a tremendous amount of community education that has to happen because stroke care is so different now. If you had a stroke prior to 1996, the response was, ‘Let’s get you into rehab to help you adjust to your new life.’ Now we have so many things we can do with drug therapy and mechanical procedures, but people don’t always know that. I find that many people don’t even know that stroke happens in the brain, which is a big problem when there is such little time to treat a stroke.”

## Viz.Ai

One of the most effective stroke treatments is thrombectomy, a relatively new procedure in which cerebrovascular neurointerventionalists and their teams remove a blood clot in an artery in the brain. “It’s proved to be one of the most successful medical procedures ever,” said Justin F. Fraser, M.D., surgical director of the UK HealthCare Comprehensive Stroke Center. “We’re now treating patients who 30 years ago would have been debilitated for the rest of their lives, and some walk out of the hospital a few days later.” The problem, according to Dr. Fraser, is that the victim of an acute ischemic stroke loses up to 2 million nerve cells every minute, so time is of the essence. “If you’re close to a hospital like ours, great, but what if you live in rural parts of our state? Those areas don’t perform the procedure.”

*“I find that many people don’t even know that stroke happens in the brain, which is a big problem when we have as little as three and a half hours to treat a stroke.”*

**LISA BELLAMY**



To speed up the process of determining whether a thrombectomy is appropriate for a patient, Dr. Fraser and his KNI colleagues now use Viz.AI, one of several technologies that allow them to remotely review patients' CT angiogram results within seconds. "The scans get sent to a cloud, we get a ping on our phone, we look at the film and then text the team at the bedside in any hospital in our network with instructions to activate transfer of the patient to Lexington, if appropriate. It literally takes two or three minutes."

#### Coverdell Grant

That emphasis on lightning-quick responses to strokes – this time before the patient even arrives at any hospital – is also a focus of one of several new strategies being explored with funding by a Paul Coverdell National Acute Stroke Program Grant awarded to the University of Kentucky in 2021. Since then, UK and collaborators have been gathering data that consolidates previously uncollected data from EMS providers around the state, especially in rural counties with high stroke mortality rates, with data provided by hospitals as part of the American Heart Association's Get With the Guidelines program.

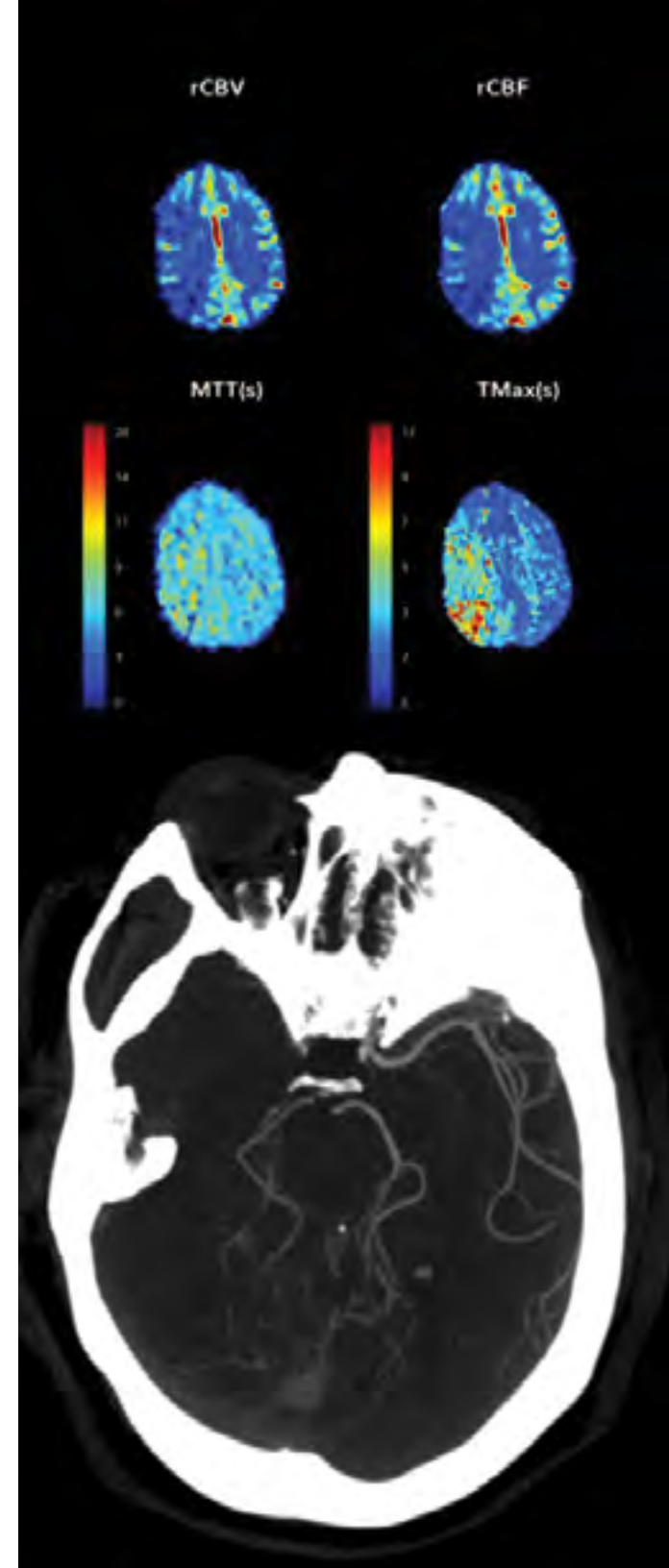
*"We're now treating patients who 30 years ago would have been debilitated for the rest of their lives, and some walk out of the hospital a few days later."*

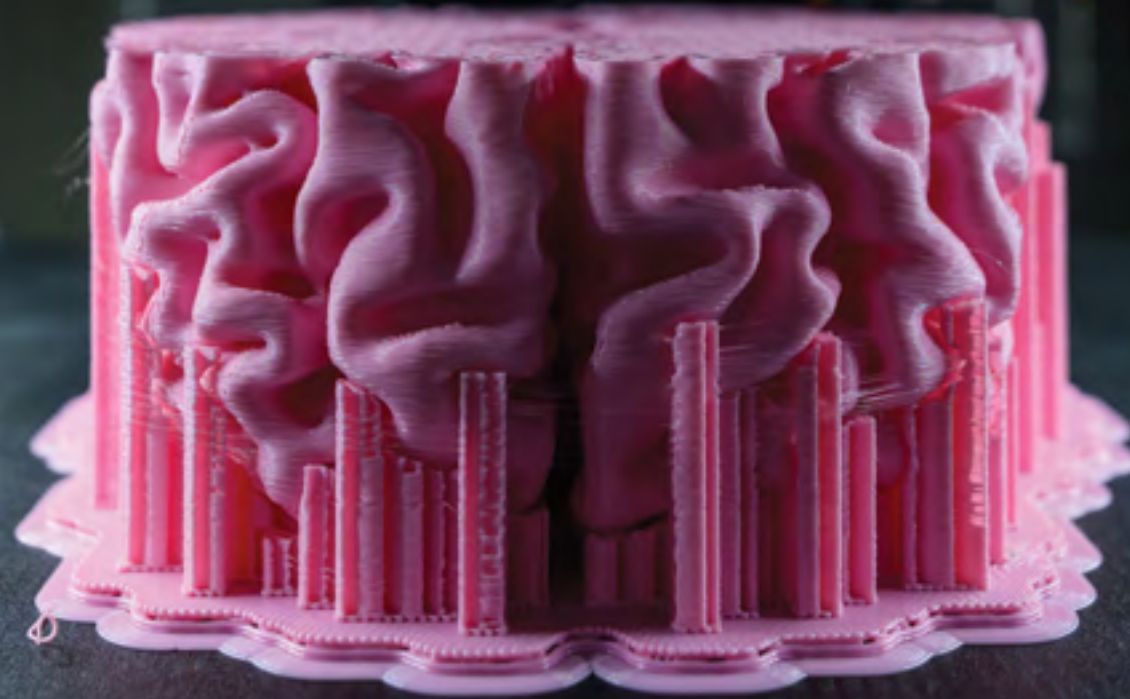
**JUSTIN FRASER, M.D.**

"It sounds like a straightforward task but it's actually very complicated," explained Larry B. Goldstein, M.D., KNI's co-director. "We're now about 80 percent matching between the pre-hospital record and the hospital record in stroke cases. Now we can see the impact of, for example, the EMS provider not calling into the hospital and telling them, 'We have a stroke patient that we're transporting to your facility.' We can now look at the downstream consequences of that, which can lead to delays in getting imaging and treatment done. And we can now produce reports to EMS providers and the hospitals so they can improve their practices."

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Using Viz.AI technology, the stroke team at UK can remotely review patients' CT angiogram results within seconds, allowing them to help direct treatment statewide in real time.





# THE FUTURE IS NOW

**DR. CRAIG VAN HORNE READIES 3D PRINTING FOR  
THE COMMONWEALTH**

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3D models, like this one of a section of the human brain, help doctors better prepare for procedures by interacting with a tangible object that's in scale.

In a dimly lit room in the middle of Albert B. Chandler Hospital in Lexington, several people are gathered around a fascinating machine as it emits a metronomic buzz while doing its job – a process that began nearly 24 hours prior.

A black box races back and forth across steel rails, with each pass adding substance to the object below – a spongy form that resembles half a human brain.

This is not the makeshift set of a science fiction film. It's the 3D Printing Lab at Kentucky Neuroscience Institute.

Once that 3D model of a brain is complete, it will be used to help University of Kentucky medical students study their craft or assist doctors in explaining to UK HealthCare patients what various procedures might entail – or even guide surgeons in the operating room.

### **A Gateway to Understanding**

Led and championed by Department of Neurosurgery Chair Craig van Horne, M.D. and Neurosurgery Chief Resident Amy Sheldrake, M.D., the 3D Printing Program is yet another example of the commitment by the University of Kentucky and UK HealthCare to spearhead leading-edge medical science advancements.

“For us, 3D printing is more than a technological marvel. It's a gateway to understanding and learning,” said Dr. van Horne.

“The beauty behind 3D printing is that you can get a solid object, to scale, that you can hold in your hand, you can manipulate it with your hands. And studies have shown that the ability to interact with that information as a model, with that tactile feel, leads to better learning than through other 3D models; on a computer screen, for instance.”

If someone walked into Dr. van Horne's office with no knowledge of the work being done at UK in the 3D printing realm, they'd likely be in for a temporary shock. Tables and windowsills are laden with models of brains, skulls and spinal columns. No mere decorations, these models are tools Dr. van Horne and other surgeons use to help plan procedures and ensure optimal outcomes.

“In terms of 3D printing, one of the main concepts is it relates back to what we do surgically,” said Dr. van Horne. “So much of what we do in the operating room has to do with developing a three-dimensional model of what you're operating on in your own mind.”

Thanks to these 3D models, surgeons don't necessarily have to rely on a mental image or a graphic on a computer screen to inform their work in the operating room. For instance, a brain or back surgeon could create an exact replica of an individual patient's skull or spine and use that to help plan procedures and guide their hands during surgery.

*“With these physical 3D models, I can look to see what my approach is going to be, I can get a much better sense of how to approach the operation. There's a lot of advantages to that for physician education.”*

**CRAIG VAN HORNE, M.D.**

“In the old days we just had (models) on film, and we had a view box where you displayed the X-ray or CT scan or MRI scans. We had to create that 3D model from just that series of images,” explained Dr. van Horne.

“With these physical 3D models, I can look to see what my approach is going to be, I can get a much better sense of how to approach the operation. There's a lot of advantages to that for physician education. And, we can bring this to the patient and show them exactly what's going on with them.”

Among the game-changing developments ushered in by the rapidly expanding capabilities of 3D printing technology in the medical field is the way it's helping providers communicate with patients about their diagnoses and treatment options on a deeper level.

“Rather than having them look at an image, they can actually hold a representation of what’s going on in their own body,” Dr. van Horne said. “I can explain to them what we’re going to do in the operation. I can point that out to them in this model. And they can hold it in their hands as well. We can talk about the risks, we can talk about the benefits of the procedure. It’s a great educational tool for them.”

Residents and fellows in training are also reaping the benefits of 3D printing at Kentucky Neuroscience Institute. “We can use it with our learners, with our resident trainees. We can print out as many models as we want, so we can give one to the patient, give one to the resident, I can keep one in my office. We can then go over the surgery beforehand on that model,” said Dr. van Horne.

“I can explain to the resident what I’m thinking, what the approach is going to be, have it as an interactive. They can take it home. They can look at it that night before the surgery. There’s a lot of benefit on the educational side of things, and that’s really where it started.”

### Opening Opportunities

While 3D printing has proven a valuable educational tool in the present, Dr. van Horne envisions a future in which it could be used to create actual material implanted in a patient’s body.

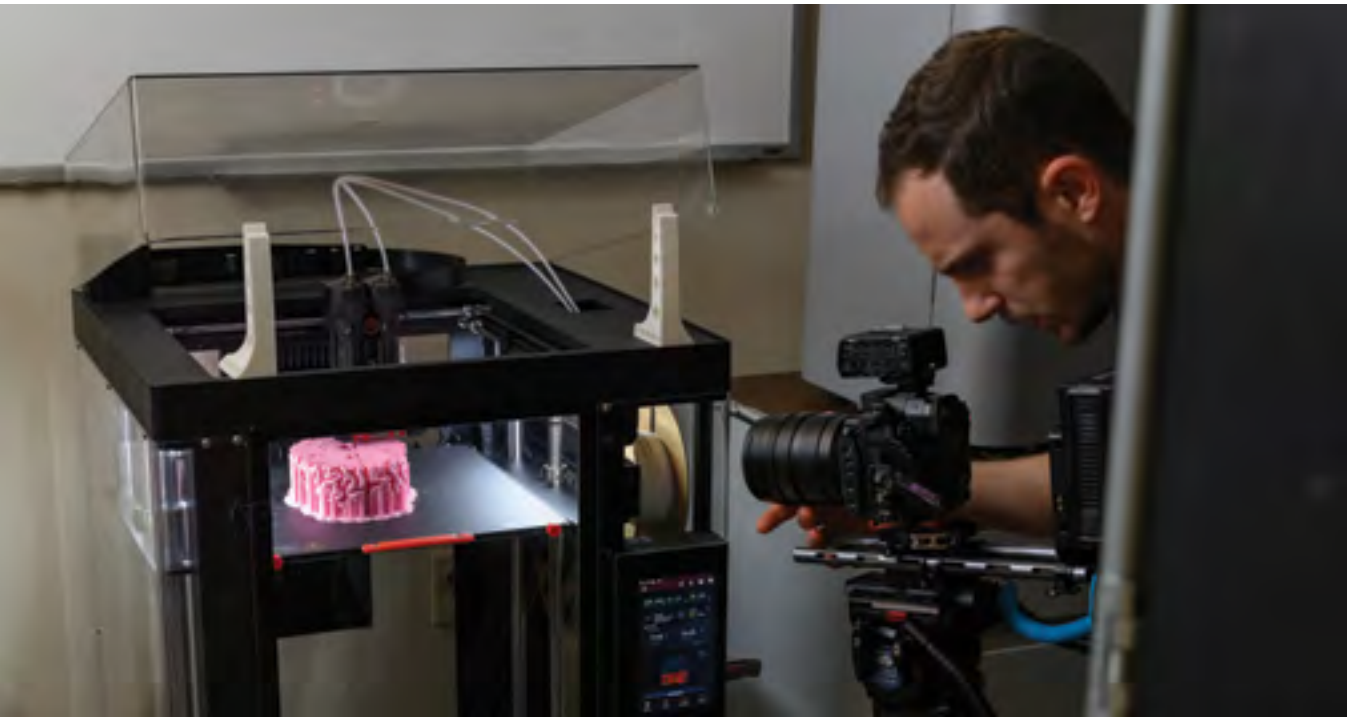
“It opens up a lot of opportunities and doors,” said Dr. van Horne. “In the future, you can imagine implanting materials that are structural; being able to print parts of the body, three-dimensionally, with living cells. So,

you could develop scaffolding, and then you can embed living cells.”

The possibilities are boundless and fascinating, and Dr. van Horne and his colleagues at Kentucky Neuroscience Institute are working hard to help turn what sounds like science fiction into reality.

*“Rather than having them look at an image, they can actually hold a representation of what’s going on in their own body.”*

**CRAIG VAN HORNE, M.D.**



Left: KNI is able to print 3D models in its own facility for residents and fellows to use during their training.

Right: Neurosurgery Chair Craig van Horne, M.D., examines a 3D model with Neurosurgery Chief Resident Amy Sheldrake, M.D., which gives them the opportunity to plan their approach before a procedure.





# OUT OF THE STROKE ZONE

**SCOTT EVELY IS SAFE  
AFTER UK NEUROLOGISTS  
PIECED TOGETHER THE CLUES**

*In his off hours, Scott Evely, an officer with the Lexington Police Department, plays in his church's softball league. In June 2023, he was sprinting to catch the ball during a game in Wilmore, Ky., when he hit the chain link fence surrounding the field at full speed.*

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Left: Scott Evely takes his first steps back onto a baseball field last November after his near-fatal stroke during a game.

It was something that had happened to him countless times, but that night was different. His ears were ringing. He couldn't hear. He couldn't talk. Then he collapsed. Scott was rushed from Wilmore to UK HealthCare in Lexington in an ambulance.

What had happened to this otherwise healthy 32-year-old?

#### **The Search for Answers**

As a police officer, Scott was no stranger to UK HealthCare. He was accustomed to being in the Emergency Room with victims of shootings and other violent crimes. But now, he was the patient.

Emergency Department staff members were initially uncertain of what was wrong with Scott, especially given his young age. They took him to get a CT scan, during which he stopped breathing. "That's the last thing I remember," Scott said.

He had to be intubated, and afterwards, he began shaking.

Thinking it seemed like a seizure, the staff quickly gave him antiepileptic medication.

"No one was quite sure what was happening," said Scott's wife, Martha. "There was a lack of clarity until our heroine, Dr. Rani Vasireddy, came and cut through the chaos."

#### **Putting the Pieces Together**

Because Martha was home with their 9-month-old daughter when the accident occurred, Rani Vasireddy, M.D., a neurology resident, spoke to someone at the game who witnessed what happened. He told her that he saw Scott hit the fence but didn't strike his head. He also said that Scott couldn't speak and appeared frustrated initially but then he completely stopped responding.

"That's the story they gave me, which didn't make any sense to me, because none of the head traumas would present like that," said Dr. Vasireddy, who was called to see Scott for seizures. "The clue in that was that he was trying to say something, and he couldn't."

Armed with this information, Dr. Vasireddy then looked over Scott's scans. That's when she saw the massive clot blocking blood flow into his brain. She confirmed this with Suhas Gangadhara, M.D., (the stroke attending on call) and Shivani Pahwa, M.D., director of Spine Neurointerventional Services in the Department of Radiology.

Her conclusion: the high-velocity trauma while trying to catch the ball caused a vertebral dissection, leading to a stroke.

"What happens when your neck is hyperextended is that your vertebral artery dissects and it throws a clot, which goes into one of the main arteries that supplies blood to your brain from the posterior part," explained Dr. Vasireddy. "The story makes complete sense for a dissection, rather than head injury."

Now it was time to jump into action before it was too late.

### Acting Fast

Time is critical in the case of a stroke.

To be most effective, Tissue Plasminogen Activator (tPA) needs to be administered within four-and-a-half hours after the stroke symptoms start. This treatment helps restore blood flow to the brain and potentially reverses some of the effects of the stroke.

Dr. Vasireddy identified that Scott had suffered a stroke at the 3.5 hour mark – just within the time recommendation.

Scott needed to have the blood clot removed quickly. Without removing the clot, he could die or become quadriplegic.

“They can’t move their hands or legs or the body, but they completely understand you. It’s called locked-in syndrome,” said Dr. Vasireddy. “You don’t want anything like that for anyone in the world.”

Martha consented to the surgery on her husband’s behalf.

“It was just crazy that I get a call that my healthy, young husband who’s out playing sports is suddenly within minutes of potentially dying from a stroke,” she said. “It was just difficult to get my head around.”

Dr. Pahwa performed a thrombectomy [the removal of the blood clot] successfully that Thursday night. She

was able to get the clot out but it took five passes due to the difficulty of the case.

*“It was just crazy that I get a call that my healthy, young husband who’s out playing sports is suddenly within minutes of potentially dying from a stroke.”*

**MARTHA EVELY**

“They had warned me that if he survived surgery, he would probably never be the same – cognitively, physically,” said Martha. “But the next morning, he was able to squeeze my hand.”

Over the course of that Friday, Scott was able to communicate more and more.

By Saturday morning, he was walking down the hallway – albeit on crutches due to an ankle sprain.

And by Saturday night, Martha was allowed to take Scott home to Jessamine County.

“With that big of a stroke, he walked out of here, which was miraculous,” said Dr. Vasireddy. “It was one of the most fulfilling things that I’ve seen in my four years of residency.”



Left to Right: Shivani Pahwa, M.D., and Rani Vasireddy, M.D.





### A Year Later

It's been over a year since the stroke shook Scott's world, and a lot has happened in the meantime. He received a promotion at work, and he and his wife welcomed another daughter to their family.

Scott has returned for multiple follow-up visits and scans, which show his artery is almost fully healed. Doctors did not identify any underlying causes for the stroke other than the arterial dissection.

On the first anniversary of Scott's stroke – his "stroke-aversary," as he calls it – he and Martha reached out to his doctors with a note of thanks and appreciation.

"We don't want to be the kind of people who forget how close he came," said Martha. "I think of it every time I see him with our kids. One of our kids wouldn't exist, and the other one wouldn't have a dad. And I would be doing all this alone."

The couple plans to commemorate each "stroke-aversary" as a reminder to never take this life – or each other – for granted.

*"With that big of a stroke, he walked out of here, which was miraculous. It was one of the most fulfilling things that I've seen in my four years of residency."*

**RANI VASIREDDY, M.D.**



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Left: A team effort and quick diagnosis from Dr. Rani Vasireddy allowed Dr. Shivani Pahwa to remove Scott's clot as quickly as possible, limiting the after-effects of a very serious stroke.

Right: Scott and Martha Evely are grateful to live a normal life and do not take each other – nor their health – for granted.



# LEADING THE WAY IN VITAL, INNOVATIVE RESEARCH

## GRANTS, PARTNERSHIPS BRING STATE-OF-THE-ART CARE TO KENTUCKIANS

At KNI, research is an essential part of the mission to offer patients the most comprehensive care and innovative treatment in Kentucky – both now and in the future. In 2023, researchers and clinicians worked together to make truly important contributions across the field of neuroscience, working on both notable grants and global clinical trials to bring cutting-edge treatments that improve the lives of patients across the Commonwealth and beyond.

### Using Virtual Reality Game Research as Therapy

Amanda Glueck, Ph.D., assistant professor of Neurology, and Dan Han, PsyD, professor of Neurology and director of the Division of Neuropsychology, are responsible for managing timely grants from the Office of Naval Research, Department of Defense as well as Lockheed Martin and the Association of the U.S. Army Research Funds, with a unique focus: the use of virtual reality video games for cognitive rehabilitation for neurotrauma.

These grants under Drs. Glueck and Han are focused on testing potential recovery and rehabilitation improvements in neurologic disorders through the use of video games. Spearheaded by Dr. Glueck's lab, they are testing whether or not video game training, especially immersive virtual reality platforms, can

improve recovery and reaction times in brain injuries or other neurologic disorders where cognition is impaired, such as stroke, Alzheimer's disease, Parkinson's disease, and more.

"The media often portrays video game play in a negative light, however there are numerous benefits to gaming. For instance, individuals who play video game have faster reaction times, better visual processing, spatial reasoning, and attention compared to non-gamers," said Dr. Glueck. "And these are often areas of cognition or thinking that are disrupted following injury."

Drs. Glueck and Han's study, *Improvement Potentials in Balance and Visual-Motor Reaction Time After Mixed Reality Gameplay* – published in *Virtual Reality*, found positive results: "Our study demonstrated that game training with mixed reality improved reaction times and balance. This was especially exciting because of the balance improvements. We believe that because mixed reality incorporates a three-dimensional gaming area, as opposed to two-dimensional screen in traditional gaming, that mixed reality has the potential for greater application in patient populations." said Dr. Glueck.

Drs. Glueck and Han saw similar improvements in short-term memory, simple and complex attention, and cognitive processing speed in a recent study exploring the benefits of game training with head-mounted immersive virtual reality. Essentially, video games can make you smarter – depending on how and what you play. "We want to see what the effect sizes are for these improvement potentials and see how these current developments can be used to enrich clinical translation more comprehensively," said Dr. Han.

### Moving Global Research to Local Care in the Fight Against Alzheimer's

Greg Jicha, M.D., Ph.D., division director of the Memory Disorders Clinic, has played a vital role in bringing the newest Alzheimer's therapies to Kentucky for both research and clinical treatment. In addition to serving as principal investigator for UK's network site of the Alzheimer's Clinical Trial Consortium, Dr. Jicha also serves on the executive and steering committees. The Consortium is a national thinktank for new Alzheimer's research that brings new medicines forward for treatment – among the most important clinical trial consortiums in the nation.

According to Dr. Jicha, the biggest news to highlight this year was lecanemab's approval by the FDA on July 6, 2023. Lecanemab is a key antibody therapy in the fight against Alzheimer's, with enormous potential to extend the quality of life for patients who are developing and in the early stages of Alzheimer's disease.

"Lecanemab can actually remove the Alzheimer plaques from the brain of an Alzheimer's patient, and it is now clinically available to anyone," said Dr. Jicha. While it is not a cure, this is the first medicine that can actually change the disease in the brain – and UK has been part of global clinical trials that led to FDA approval for over 10 years.

"We're the only center in Kentucky who participated in these global studies, and we have a wealth of experience working with it," said Dr. Jicha. "We have treated hundreds of people with this medicine over more than the last decade and are able to provide the most state-of-the-art treatment and safety monitoring."

Lecanemab is a promising breakthrough for patients in the early stages of Alzheimer's disease, made possible in part by UK's presence as an important research center.

"We are a driving force in bringing new medicines forward," said Dr. Jicha. "Right now, we're evaluating around two dozen experimental medicines, and UK has a huge pipeline of other medicines to treat a variety of different diseases that you can't find in very many places worldwide – and certainly no other places in Kentucky."



Right: Drs. Amanda Glueck and Dan Han use immersive virtual reality to help patients with brain injuries and neurological disease that have caused decreased cognition, memory and reaction times.

# RURAL ENGAGEMENT

## THE NEXT GENERATION OF PROVIDERS STAY CLOSE TO HOME

As rural Kentucky grapples with physician shortages, especially in specialties like neurology, UK HealthCare is working to narrow that gap.

This doesn't just mean recruiting from bigger cities or other states. It starts closer to home — with preparing the next generation of doctors to stay in local communities.

Beyond Lexington, the UK College of Medicine has campuses in Bowling Green and Northern Kentucky, plus the Rural Physician Leadership Program in Morehead.

For second-year medical student Justin Ma, attending the Bowling Green campus was a chance to stay near his hometown of Mayfield. Growing up there, he saw firsthand the challenges of rural healthcare accessibility when his father had a stroke.

To be a part of the solution, Ma wants to finish his neuroscience education and serve communities like his own.

"[UK is] trying to expand their reach into rural areas, which is what I liked about the program," he said. "They're actively trying to help this problem."

That neuro physician shortage is a challenge that also inspired Daniel Lee, M.D., former medical director of the Kentucky Neuroscience Institute outpatient clinic. Through a professional services agreement, Dr. Lee is now embedded full-time at St. Claire Hospital in Morehead, Ky, while continuing as faculty member of the UK Department of Neurology.

"We have a dire need in Eastern Kentucky for neurologic care," said Dr. Lee. "The gap is widening, and we have to do something about it."

Now, Dr. Lee's focus is twofold: provide on-the-ground rural healthcare and educate the next generation of Kentucky physicians.

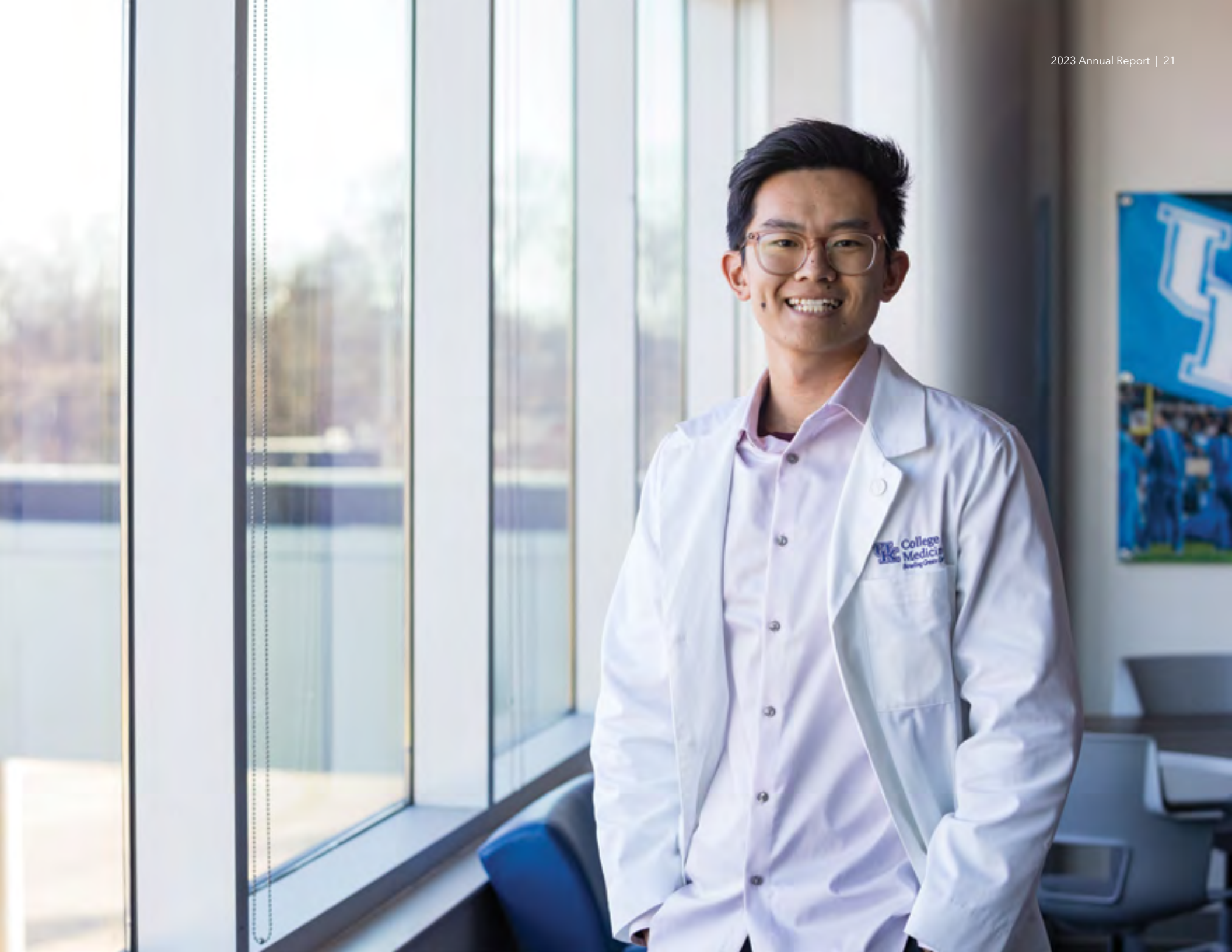
As part of the program faculty, Dr. Lee helped launch the UK Neurology Physician Assistant (PA) Academic Residency. Since it takes so long to train a neurologist, the physician shortage only continues to expand during that period. Opening a direct pipeline for neuro-trained PAs can ease the strain.

Dr. Lee also invites as many students and residents as possible to experience rural medical settings firsthand. As a healthcare provider in a rural area, doctors become an intricate part of the community, often treated as "part of the family." Showing students the power of those relationships and the impact they can have is often the motivation they need to stay closer to home after their education.

"I want every single one of [the students] to continue asking an important question: 'How can we provide better care in the rural community?'" said Dr. Lee. "I want to give them the clinical and research tools. Then truly we're preparing the next generation."

---

Right: Medical student Justin Ma wants to finish his neuroscience education to provide care to underserved rural communities like the one where he grew up.



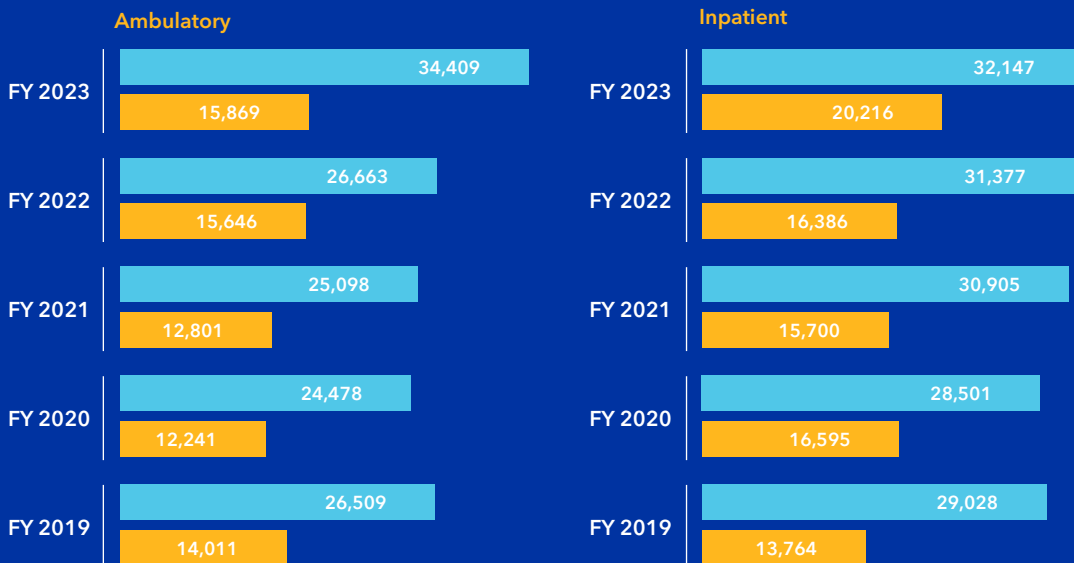
# SNAPSHOTS

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 not only celebrates but drives the spirit behind the providers, clinicians and additional staff of KNI.

The following pages recount the milestones for 2023, 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



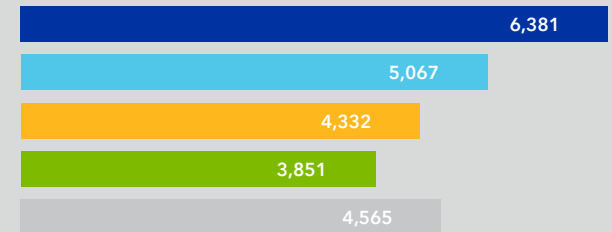
## Data

# 6,381

Outpatient Visits in FY 2023

## Headache Outpatient Visits by Fiscal Year

● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020 ● FY 2019





# MIGRAINES BE GONE

## SERVING KENTUCKIANS WITH RECURRING HEADACHES

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 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 Adult Headache Specialist

---

1 Board-certified Pediatric Headache Specialist

---

2 Neuro-Ophthalmologists

---

1 Interventional Neuroradiologist with special training in CSF leaks and Vascular Imaging

---

4 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:

- ▶ Chronic migraine headaches
- ▶ Cluster headaches
- ▶ Refractory Headaches

### Treatments

---

Dependent upon the condition, KNI offers pharmacological intervention including infusions, nerve blocks, Botox injections; consideration of devices and minimally invasive treatments; and in rare cases, neurosurgical intervention.

Unique to KNI, collaborative partners include:

- ▶ Interventional Pain
- ▶ Interventional Neuroradiology
- ▶ Orofacial Pain
- ▶ Neuro-Ophthalmology
- ▶ ENT

- ▶ Plastic Surgery
- ▶ Neurosurgery
- ▶ Cardiology

### 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.

---

As the only active fellowship training program in the region, KNI trains the next generation of clinicians to meet the challenge of delivering complex care.

### Research

---

Clinical research on innovative drugs and devices

---

One of very few sites evaluating a PFO closure device in the treatment of migraine with aura

---

Participation in patient outcomes research to evaluate different therapies for children and adolescents with headaches

# EPILEPSY PROGRAM RECOGNIZED NATIONALLY

## ADVANCING EPILEPSY CARE AT HOME AND ACROSS THE NATION

Kentucky Neuroscience Institute's 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 refractory epilepsy, 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, epilepsy neuropsychologist, and an epilepsy neurosurgeon. This combined expertise and focused approach is utilized for every patient suffering from drug-resistant epilepsy or uncontrolled seizures.

### Specialists

---

7 Adult and 2 Pediatric Epileptologists

---

1 Dedicated Epilepsy Neurosurgeon (Adult & Pediatric Epilepsy)

---

1 Neuropsychologist

---

2 Dedicated Neuroradiologists

---

Dedicated registered EEG technologists

---

Epilepsy-trained EMU staff

---

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 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 Organization 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 6 beds to 12, making it the largest EMU in Kentucky

Dedicated 3-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

Weekly Refractory Epilepsy Conference (REC) 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

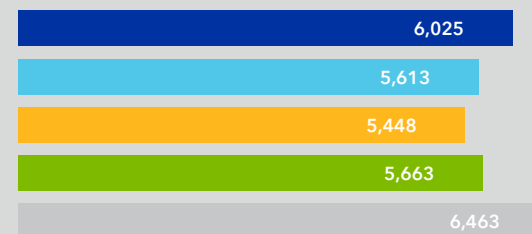
### Data

# 6,025

Outpatient Visits in FY 2023\*

### Epilepsy & Neuromuscular Outpatient Visits by Fiscal Year\*

● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020 ● FY 2019



\*Epilepsy & Neuromuscular Outpatient Visits 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 HealthCare Neuromuscular Disorders team 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 electromyography (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

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

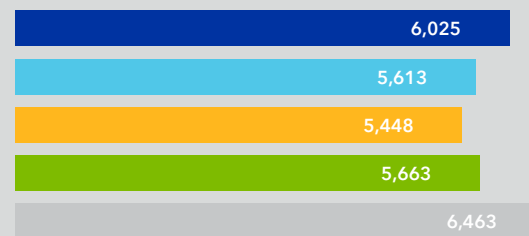
### Data

# 6,025

Outpatient Visits in FY 2023\*

#### Neuromuscular & Epilepsy Outpatient Visits by Fiscal Year\*

● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020 ● FY 2019



\*Neuromuscular & Epilepsy Outpatient Visits reflect combined statistics



# THE SPINE **SPECIALISTS**

## **PATIENTS BENEFIT FROM COLLABORATIVE APPROACH**

The complexities of spinal surgery demand advanced technology and a medical team with diverse expertise. The neurosurgeons at Kentucky Neuroscience Institute (KNI) offer patients an advanced multidisciplinary approach to spine care. From spinal aging, tumors and injuries to less-common ailments such as scoliosis, KNI's experienced physicians work hard to ensure that all patients receive high-quality, highly personalized care.

### **Specialists**

---

6 Spine Neurosurgeons

---

7 APPs

---

2 Registered Nurses

---

Physical and Occupational Therapists dedicated to supporting spine patients

---

Integration with cross-functional departments (orthopedics, neurology, PM&R, interventional pain management) with whom patients can undergo any other further required testing or management, often on a same-day basis.

### **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

Close collaboration with experts from UK Orthopaedic Surgery & Sports Medicine and PM&R, allowing access to nonsurgical treatment options for patients who may benefit from a more conservative approach

Minimally invasive surgical techniques 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

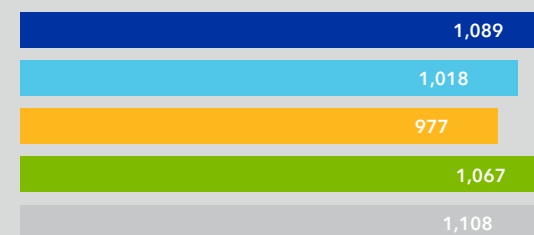
## Data

# 1,089

Outpatient Visits in FY 2023

### Spine Outpatient Visits by Fiscal Year

● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020 ● FY 2019



# 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 UK HealthCare's Kentucky Neuroscience Institute (KNI) can make a difference.

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.

### Specialists

---

10 Child Neurologists

---

3 APPs

---

1 Dedicated Pharmacist

---

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

### Conditions

---

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

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Brain injury

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Brain tumor

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Cerebral palsy

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Concussion

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Developmental disorders

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Headaches

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Hypoxic brain injuries

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Muscle weakness (myopathy)

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Neurofibromatosis

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Neurological problems of neonates in conjunction with UK Neonatology

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Neuromuscular disorders

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Seizures

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Stroke

---

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Tics

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---

Tourette's disorder

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Tuberous sclerosis



### The UK Difference

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

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

Close collaboration 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

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

### Research

Ongoing work with Clinical Research Organization 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

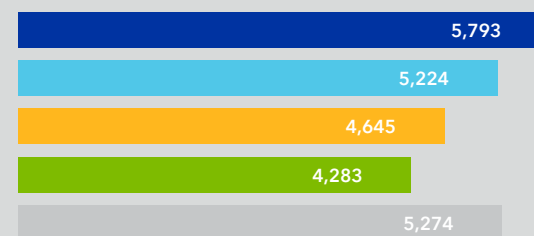
### Data

# 5,793

Outpatient Visits in FY 2023

#### Child Neurology Outpatient Visits by Fiscal Year

● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020 ● FY 2019



# EXPERT MS 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

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1 Neuro-ophthalmologist

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1 Neuropsychologist

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Pharmacists trained to manage and educate patients on medication and infusion

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Physical and Occupational therapists

### Conditions

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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 Organization

Ongoing translational research in the following arenas:

- ▶ Estimation of prevalence of autoimmune diseases using EHR data (collaborative study with Autoimmune Registry, NIH, Harvard and USC researchers)
- ▶ Accelerated diagnostic paradigms in MS and neuromyelitis optica spectrum disorders.
- ▶ Diagnostic approaches to autoimmune disorders and vision impairment
- ▶ Quantifying anterior visual pathway disorders
- ▶ Diagnostic considerations in optic neuritis, a 10-year analytical study
- ▶ Diagnosis and treatment of MS in minorities (collaborative study with VCU and UVA)

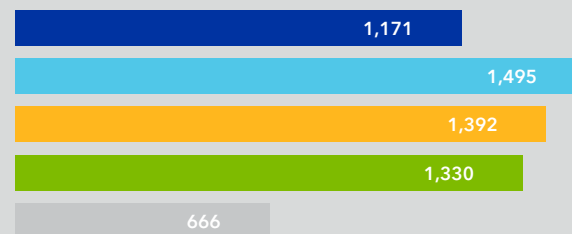
### Data

# 1,171

Outpatient Visits in FY 2023

#### Multiple Sclerosis Outpatient Visits by Fiscal Year

● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020 ● FY 2019



# COGNITIVE CARE

## 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 Kentucky Neuroscience Institute 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, one of the world's leading centers on the science of aging.

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 PhD faculty members, specializing in Neuropsychology
- 2 Neuropsychology fellows
- 4 Dedicated Psychometrists
- 1 PhD research faculty
- 1 PhD staff Psychologist

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

### 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

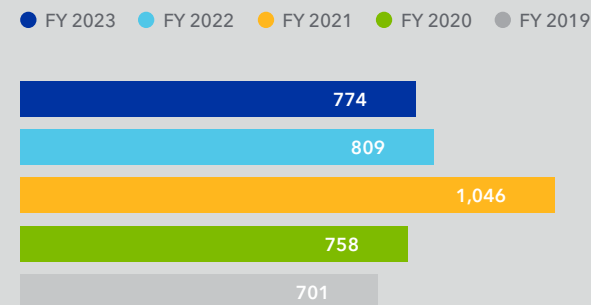
Individual faculty research interest in neurodegenerative disease, Alzheimer’s disease and related dementias, acquired brain injury, stroke, movement disorders, global health and sustainability, neurobehavioral performances, neurogastronomy and chemosensory disorders, neuromodulation technology, and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

### Data

# 774

Outpatient Labs in FY 2023

### Neuropsychology Outpatient Labs by Fiscal Year



# 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 53 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.

### 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.

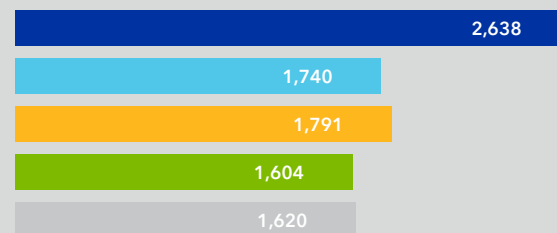
A Rural Caregiver Education Program accompanies this clinic, providing caregiver support and education. The team of clinicians and experienced social workers can help those in rural KY navigate the major issues they face as their loved ones develop memory problems and eventually progress to dementia.

### Data

**2,638**  
Outpatient Visits in FY 2023

### Cognitive Disorders Outpatient Visits by Fiscal Year

● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020 ● FY 2019



# 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

---

Two UK HealthCare movement disorders specialists staff the Lexington VA Medical Center's Parkinson's Disease Consortium Clinic that also includes speech therapists and a Clinical Research Coordinator. This clinic provides both care for Veterans, including access to DBS and Duopa, and training for Neurology residents.

### Conditions

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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

### Treatment

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EMG-guided botulinum toxin injections for movement disorders

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Deep Brain Stimulation (DBS) evaluation, surgery and programming

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Duopa enteral suspension (closely integrated with a single gastroenterologist placing all PEG/J's)



## 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 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.

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

## 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 syndromes

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

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

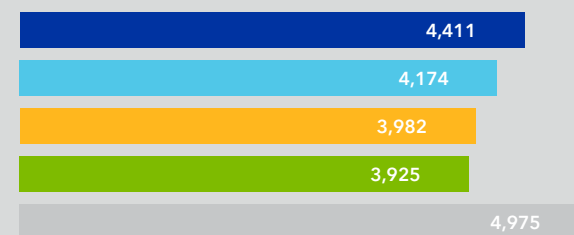
Multiple neuroscientists engage in basic research of Parkinson's disease, Huntington's disease and other neurodegenerative diseases, and closely integrate with the Movement Disorder physicians in translational research

## Data

**4,411**  
Outpatient Visits in FY 2023

### Movement Disorders Outpatient Visits by Fiscal Year

● FY 2023 ● FY 2022 ● FY 2021 ● FY 2020 ● FY 2019



# 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 UK HealthCare's 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

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7 Stroke Neurologists and 1 Stroke Fellow

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4 Neurointerventionalists (2 Neurosurgeons, 1 Radiologist, 1 Neurologist)

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3 Open Cerebrovascular Neurosurgeons

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4 Neuropsychologists

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1 Stroke Neurology Fellow and 2 Endovascular Fellows who take stroke calls

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24/7 in-house neurocritical care

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24/7 in-house stroke neurology team

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Neuroscience-dedicated physical, occupational and speech therapy

### The UK Difference

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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

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

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Neurointerventional radiology and cerebrovascular neurosurgery available 24/7

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Multiple program oversight and quality improvement teams

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Only ACGME-accredited vascular neurology fellowship in Kentucky

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Acts as hub hospital for 25 Via.Ai sites throughout Kentucky, streamlining care coordination between hospitals and ensuring patients get the appropriate care

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237 patients monitored and transferred through Viz.Ai in FY 2023

## 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

## 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.

## Data

**1,740**  
Outpatient Visits in FY 2023

## Awards

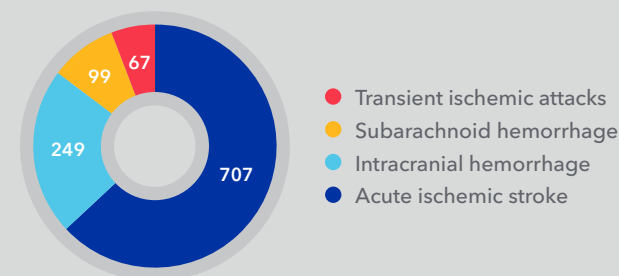
Joint Commission Comprehensive Stroke Center

Rated as High Performing in Stroke by US News & World Report for 2023/2024

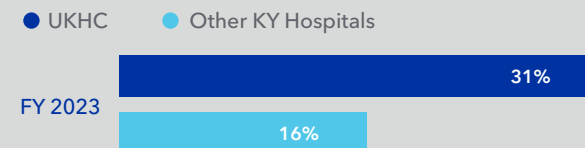


\*This Get With The Guidelines® Aggregate Data report was generated using the Quintiles PMT® system. Copy or distribution of the Get With The Guidelines® Aggregate Data is prohibited without the prior written consent of the American Heart Association and Quintiles.

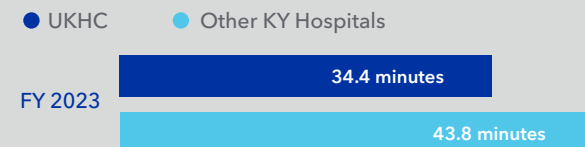
## Stroke Patients by Type of Stroke FY 2023\*



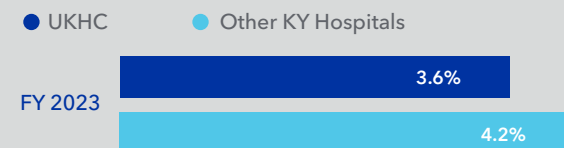
## Percent of Patients with Acute Intervention FY 2023\*



## Mean Door-to-needle Time FY 2023 (lower is better):\*



## Hemorrhagic Transformation Percentage FY 2023 (lower is better):\*



# A HALF CENTURY OF NEUROSURGICAL EXCELLENCE

## DR. PHILLIP TIBBS LEAVES A LASTING IMPACT UPON RETIREMENT

On June 21, 2023, Phillip A. Tibbs, M.D., finished his stellar career at the University of Kentucky with one final neurosurgery procedure. One final turn in the operating room ... after a career high of nearly 20,000 surgeries during his 50 years as part of the University of Kentucky College of Medicine's Department of Neurosurgery.

For someone with such an impressive record, it wasn't entirely clear from the beginning what career path Dr. Tibbs would take. He was the first person in his immediate family to have a chance to go to college and graduate. A native of Kenton County, Dr. Tibbs graduated high school at the age of 16 and receiving a scholarship to nearby Thomas More College (now known as Thomas More University).

His career path came down to English literature or pre-med; with encouragement from his Uncle Frank, he opted to become a doctor and never looked back. He graduated from University of Kentucky College of Medicine in 1973 and continued on at UK to complete his residency in neurosurgery. He completed his residency training in 1979 and joined the neurosurgery faculty at UK.

From there, Dr. Tibbs's tenure at UK included roles as assistant professor, associate professor, professor, and eventually neurosurgery chairman in 2008. He was also a key player in the development and director of the UK Spine Center and had the honor of performing the first surgery in the new operating rooms at the first expansion for UK's Albert B. Chandler Hospital in 2011.

"I just hope that I have represented the mission of UK honorably. I have loved being a doctor. To take care of people who have the profound confidence and trust to come in and lay on our table totally unconscious and let us into their body, their brains, is something I don't take lightly," said Dr. Tibbs.

The impact he has left in the field of neurosurgery, not just at UK but worldwide, is incomparable. In 1990, Dr. Tibbs and his colleague, Roy Patchell, M.D., published an article in the New England Journal of Medicine that would almost instantly change the standard of care for metastatic brain tumors. Even today, this publication is still the most cited medical literature about metastatic brain tumors.

The two continued their research with a National Institute of Health-funded prospective randomized trial of "surgery plus radiation versus radiation therapy alone" for treatment of metastatic epidural spinal cord compression. This was published to international acclaim in The Lancet in 2005. It is the No. 1 cited article by far for the treatment of metastatic tumors in the spine.

More than a half century later, Dr. Tibbs never realized UK would be where he started and ended his career. "What can I say? I'm from Kentucky, and I just really love the people here," said Dr. Tibbs.

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Right: After 50 years and 20,000 surgeries, Dr. Phillip Tibbs performed his final neurosurgery at UK in June 2023.





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