FROM OUR CHAIR

As we enter a new year, I’m filled with a sense of accomplishment. It’s been another year of impressive achievements and growth for the Department of Neurology. This annual report includes some of the highlights of 2017, including the facilities where we treated more than 42,000 patients, the nearly 150 publications by our faculty appearing in peer-reviewed journals, and the expansion of our training programs for residents, fellows, and advanced practice providers (APPs).

As a Department, we are committed to excellence through integrity, teamwork, and diversity. These core values inform all of our actions and decisions, from making sure that every patient gets compassionate and state-of-the-art care, to creating an inclusive, objective recruitment process for trainees and new faculty, to maintaining an environment that is welcoming and open to everyone.

In my nearly four years at Duke, I’ve become ever more aware of how much work this success has entailed. Our faculty, staff, and trainees continue to work tirelessly to advance neurological research, provide patient care, and train the next generation of neurologists. We also owe a debt of gratitude to all those outside of the Department who have kept us moving forward, including family members, alumni, philanthropic partners, DUHS and SOM leadership, and our academic collaborators, with special acknowledgements to Steve Lisberger, PhD, the Chair of Neurobiology, and John Sampson, MD, PhD, Chair of Neurosurgery.

The new year is also an opportunity to look to the future. This year will see a new Duke Neurology practice open in South Durham’s Crooked Creek, as well as major renovations to our Morreene Road Clinic. Our research faculty welcome the addition of the new Center for Neurodegeneration and Neurotherapeutics, which is investigating the origins of neurodegenerative conditions like Huntington’s disease, ALS, and Alzheimer’s disease, and may offer the first disease-modifying therapies for these conditions. 2018 will also see the largest class of residents, fellows, and APP residents in the history of the Department.

While we continuously look forward, we also remember our past. Last year, we lost one of the true greats of American neurology and the person who most influenced our Department, Allen Roses, MD. In his memory we’ve commissioned a wonderful portrait to hang in his beloved Bryan Research Building, and will hold a symposium honoring his achievements this spring.

RICHARD O’BRIEN, MD, PHD.
CHAIR, DUKE DEPARTMENT OF NEUROLOGY
The Duke Department of Neurology offers exceptional patient care for patients with conditions affecting the brain and nervous system. We also conduct cutting-edge basic, translational, and clinical research, and train the next generation of leaders in neuroscience.

Total faculty: 74
Total number of staff: 175
Residents & Fellows: 38
Grants and awards awarded (FY17): $14.8M
Total clinic visits: 43,730
Total donations (FY17): $1.7M

DIVISIONS

- Critical Care and Vascular Neurology
- Epilepsy and Sleep
- Headache and Pain
- General and Community Neurology
- Memory Disorders
- Multiple Sclerosis and Neuroimmunology
- Neuromuscular Disease
- Parkinson's Disease and Movement Disorders
- Stroke
WHAT IS DUKE NEUROLOGY

1. The Joseph and Kathleen Bryan Research Building houses the Neurology Department’s research faculty and laboratories, from the Brain Injury Translational Research Center, which is developing therapies to prevent and repair brain damage after injury occurs, to the laboratory of Nicole Calakos, MD, PhD, whose research is mapping how habits change the brain at the neuronal level. This facility also includes the Bryan Brain bank, an archive of more than 1,000 samples of brain tissue of individuals with Alzheimer’s disease or other neurodegenerative diseases.

2. The Duke Neuroscience Intensive Care Unit (or Neuro ICU), a critical care and surgery expansion of Duke University Hospital provides essential, lifesaving care to some of the most critical cases in the hospital. The state-of-the-art, eight-floor pavilion includes 160 critical care rooms, 16 operating rooms, and imaging equipment, as well as an adjacent step-down unit. Family zones, floor to ceiling windows, larger patient rooms, and waiting areas provide patients and their loved ones with a top-of-the-line healthcare experience.

3. The Duke Neurological Disorders Clinic, 1L, provides additional neurological care in Duke Clinic, offering treatments for general neurological conditions, epilepsy, multiple sclerosis, cerebrovascular conditions, neuromuscular disease, and other conditions.

4. The Duke Stroke Center integrates the care of stroke patients from when they arrive at the emergency department through inpatient care and assessments for rehabilitative services. The Center is recognized as a Comprehensive Stroke Center by the Stroke Commission.
The Neurological Disorders Clinic on Morreene Road offers treatments for headache and facial pain, movement and memory disorders such as Alzheimer’s, Parkinson’s, ALS, and Huntington’s disease. The clinic also includes physical and occupational therapists specialized in neurological and pain disorders, as well as specialty psychiatrists and psychologists offering neuropsychological testing and treatment.

The Duke ALS Clinic is one of the largest, most comprehensive ALS care centers in the world. Our Parkinson’s disease facilities and Huntington’s disease clinics are recognized as national Centers of Excellence by the Parkinson’s Foundation and Huntington’s Disease Society of America.

Duke Neurology at North Duke Street offers general and subspecialty neurology services in a personable and comfortable environment, providing treatments for general neurology, neuromuscular evaluations, electromyogram (EMG)-guided chemodenervation and nerve conduction studies, sleep disorder evaluations, and more.

The Bryan Alzheimer’s Disease Research Center is a research science center dedicated to patients and families affected by Alzheimer’s disease and other memory disorders, discovering the mechanisms underlying the disease, and developing effective treatments and preventive strategies. The center also offers support services, community outreach, and education programs.

Duke Neurology of Raleigh offers neurological services to patients living in Raleigh and greater Wake County, including treatment for stroke, multiple sclerosis, movement disorders, headache, epilepsy, sleep disorders, and EMG/nerve conduction studies.

Duke Neurology at North Duke Street offers general and subspecialty neurology services in a personable and comfortable environment, providing treatments for general neurology, neuromuscular evaluations, electromyogram (EMG)-guided chemodenervation and nerve conduction studies, sleep disorder evaluations, and more.

Headed by Professor Al La Spada, MD, PhD, the new Center for Neurodegeneration and Neurotherapeutics is a concentrated effort to translate progress made in our understanding of neuroscience over the past 25 years into new therapies. Research in this Center holds the potential to slow or halt the progress of conditions like Huntington’s disease, Alzheimer’s disease, and ALS rather than simply providing symptom relief.
The Pilot Club of Charlotte visits the Bryan Research Building and Alzheimer’s Disease Research Center, touring the Bryan Brain bank and giving $75,000 to fund Alzheimer’s research.

After being diagnosed with ALS, architect Phil Freelon partners with the Duke ALS clinic for the “Design a World without ALS” campaign, working to raise $250,000 to create an endowed professorship, improve patient care, and fund future clinical trials for ALS.
The textbook *Continuous EEG Monitoring: Principles and Practice*, edited by Aatif Husain, MD, and Saurabh Sinha, MD, PhD, and featuring several chapters by members of the Duke Neurology Department, is published, providing a practical, comprehensive guide to this rapidly growing, clinically important field.

**FEBRUARY**

Resident Jordan Mayberry, MD, receives Duke’s Strength, Hope, and Caring Award for going above and beyond the call of duty by providing a swift medical response to a passed-out woman on his way home after completing a night shift.
Duke Neurology residents and physician assistants lead discussions at seven middle schools throughout Durham as part of Brain Awareness week. Students learn about epilepsy and seizures, from what happens during a seizure, to how to spot a seizure and how to help.

MARCH

A study co-authored by Michael Lutz, PhD, Kathleen Welsh-Bohmer, PhD, and Allen Roses, MD, finds that “jumping genes” that interfere with the development of mitochondria, the energy-producing parts of the cell, in the brain, may help cause Alzheimer’s and other conditions.

MARCH

Duke President Richard Brodhead presents Kathy Ervin with a Meritorious Presidential Award, honoring her achievements within the Duke Neurology Department and four decades at Duke.

APRIL
More than 20 faculty, residents, and fellows teach courses, present posters, or lead discussions at American Academy of Neurology’s annual meeting in Boston. Current and former residents and faculty members also gather to honor Joel Morgenlander’s 30 year anniversary at Duke.

Dean Nancy Andrews, MD, PhD, presents Joel Morgenlander, MD, with the Leonard Palumbo, Jr. Faculty Achievement Award to honor his dedication to compassionate patient care, and excellence in the teaching and mentoring of young physicians.

Members of the Duke Neurosciences unit and colleagues receive a “3D It Takes a Team” award for their efforts to prevent catheter-associated urinary tract infections, a major cause of death, disability, and increased hospital costs.

Duke Neurology faculty, residents, and fellows gather to celebrate the achievements of this year’s graduating class and wish them well as they enter a new phase in their careers.
From the moment ambulances rushed Ryley Hopper, a rising college sophomore, into Duke’s Neuro ICU until the day he left almost a month later, Hopper didn’t just have a doctor. He had a team of more than a dozen specialists. An accident in a swimming pool had shattered one of the vertebrae in Hopper’s neck, leaving him in a coma and unable to breathe on his own.

Duke Neurologists Christa Swisher, MD, and Christian Hernandez, MD, monitored his brain health and managed his care for his four-week stay. A neurosurgery team drilled a hole in Hopper’s skull to monitor his brain oxygen and reconstructed the shattered vertebrae. A respiratory team restored his ability to breathe, and infectious disease specialists pinpointed a rare allergy his body had to the anesthetic he was given.
When Hopper awoke without the ability to speak, speech therapists helped him communicate by attaching a laser pointer near his temple and providing him an alphabet board, allowing him to spell words through small head movements. And the nursing team in the Neuro ICU met his emotional as well as his physical needs, bringing him outside to enjoy a sunny day and building a relationship with his family who set up camp just outside the Neuro ICU.

After leaving the Neuro ICU and months of rehabilitation, Hopper has regained the use of his arms, pushes himself around in a hand-powered wheelchair, and has relearned activities like brushing his teeth. In the fall of 2017, he resumed classes at UNC-Wilmington. “[The Neuro ICU] was a dream team,” Hopper says. “I was in good hands.”

### Evaluating the Neurological Impact of Sports Injuries

Evaluating the effects of head injuries sustained during athletic events is a complex challenge. Sophisticated neurocognitive evaluations are required to determine deficits in balance, cognition, or other areas, as well as how to manage symptoms and recovery, and determine when and if an athlete should return to play. Joel Morgenlander, MD, provides that kind of analysis at the Duke Sports Concussion Clinic. This multidisciplinary clinic provides care and management of concussions sustained by Duke football and basketball players, as well as athletes from local high schools, club teams, and even professional teams. The group includes specialists in sports medicine, physical therapy, neuropsychology, and other fields. Recently, Morgenlander and other faculty in the division of General and Community Neurology have also begun working with Duke neuropsychologists to evaluate retired football players from the National Football League to see if they are eligible for settlement for compensation for head trauma. They provide a comprehensive neurocognitive evaluation to about eight NFL players a month.

### Improving Stroke Care Throughout North Carolina

Prompt, effective care can literally mean the difference between life or death for stroke, the fifth-leading cause of death in the United States. However, the quality of care patients receive often varies from location to location for reasons that are not fully understood. The Neurology Department’s Brad Kolls, MD, PhD, (right), and Carmelo Graffagnino, MD, are leading an effort to improve this care not just at Duke, but throughout the southeast.

Kolls and Graffagnino are the principal investigators for IMPROVE Stroke Care, a program that will develop a regional integrated stroke system that will quickly and effectively identify, classify, and treat stroke patients. Developed in collaboration with the Duke Clinical Research Institute (DCRI), IMPROVE Stroke Care will begin collecting data from more than 10,000 patients spread across 10 stroke centers and hospitals in Tennessee and the Carolinas in 2018. This information will help stroke patients throughout the region, identify best practices for stroke care, and reduce health care costs from extended hospital stays, nursing home visits, and stroke-associated disabilities.
RESEARCH

Our research reaches across the spectrum of neurology, from laboratory research examining the subcellular origins of neurodegenerative diseases, to the clinical level, where our clinician scientists are developing and refining potential therapies for stroke, traumatic brain injury, and other conditions. Our translational research bridges these two poles, applying lessons learned from the lab into clinical practice to find potential new avenues for future treatments.

By the Numbers

Peer Reviewed Publications, per year

- ‘14: 99
- ‘15: 103
- ‘16: 139
- ‘17: 136

Federal and non-Federal Research Awards (in millions)

- ‘14: $3.4
- ‘15: $7.4
- ‘16: $10
- ‘17: $14.8

Laboratory Research Highlights

» **SIMON GREGORY, PHD**, was a senior author of a *Cell* study identifying gene variants that increase the risk for multiple sclerosis (MS). This study could lead to tests that diagnose MS earlier and more accurately.

» A study by **NICOLE CALAKOS, MD, PHD**, and colleagues pinpointed a neuron deep within the brain that serves as a “master controller” of habits. The team found that habit formation boosts the activity of this influential cell, and that shutting it down was enough to break habits in mice.

» **LAURIE SANDERS, PHD**, (center right), was the senior author of a study that found the activity of the enzyme (LRRK2), may be responsible for damaging the DNA of mitochondria (mtDNA) in Parkinson’s disease (PD). Inhibiting this enzyme appears to reverse mtDNA damage and may be the key for future PD therapies.

2017 | A YEAR IN REVIEW

Twenty-five middle school students from the Building Opportunities and Overtures in Science and Technology (BOOST) XXL science program tour the Bryan Brain Bank and receive an interactive lesson in stroke from neurocritical care fellow Yasmin O’Keefe, MD.
ROAR: Offering a Faster, Patient-Centric Approach for ALS Research

By design, clinical trials are slow and methodical. This helps ensure safety for medications and provides reliable evidence that they are better than existing conditions. But for ALS, which is devastating, lacks disease-modifying therapies, and is relatively rare, Rick Bedlack, MD, PhD, has adopted a different approach. Replication of ALS Reversals (ROAR) uses a widely inclusive, patient-centric approach to test alternative therapies for ALS associated with ALS reversals—instances where ALS progression halts or even reverses for an extended time. The goal of ROAR is to make it easier for ALS patients to participate in trials and quickly hone in on alternative therapies that offer high-impact benefits. The program’s first trial, which examined the soy peptide lunasin, completed enrollment in record time, with high rates of adherence and compliance. Bedlack is already adopting the study design for future ROAR program trials.

Translating Knowledge into New Therapies for Neurodegenerative Disease

Despite revolutionary progress in other fields of medicine, little progress has been made in the treatment of neurodegenerative disease over the past 30 years. For conditions like Huntington’s disease, ALS, and Alzheimer’s disease, no known therapy can change the course of disease. Al La Spada, MD, PhD, head of the new Duke Center for Neurodegeneration and Neurotherapeutics, hopes to change that. The Center’s ongoing research has already uncovered two existing medications, bexarotene, and KD3010, that may help people with Huntington’s disease. The pathways these and similar medications use may also lead to new pathways to treat other neurodegenerative diseases, and potentially the aging process itself.

A new book by Jodi Dodds, MD, examines carotid and vertebral artery dissections, a major cause of strokes and vascular injuries among young adults. Co-written by a survivor of a severe dissection, the book alternates between medical information and real patient stories.
EDUCATION

Our Department takes a leadership role in training the next generation of neurologists in all areas of patient care as well as basic, translational, and clinical research.

Residency Program

Our residency program provides excellent training in all areas of general and subspecialty neurology. Residents spend their first year in general internal medicine, and then spend three years working with Department faculty, treating patients in the inpatient and outpatient setting, and conducting their own research with gradually increasing responsibility.

When I reflect upon my residency experience, I think about the wonderful people I’ve gotten to know. My fellow residents, especially, are some of my favorite people, and they make it enjoyable to show up for work in the morning. I also very much enjoy the congenial relationship between residents and attendings — it makes for a much a fun, fruitful learning environment.

YVONNE BAKER, MD
DUKE NEUROMUSCULAR FELLOW AND 2017 GRADUATE

Duke University Hospital is a tertiary care center where interesting cases arise from around the state and country. The hospital also serves as a community hospital for Durham and the surrounding region. The volume and diversity of the patients that come through our inpatient wards and outpatient clinics insure that every resident has ample opportunity to gain expertise in all aspects of neurology.

The faculty at Duke are incredible. I’m always amazed at how brilliant yet approachable everyone is. I always feel bad calling attendings at home, especially at night, but everyone has been incredibly helpful, even at 2 in the morning. The other neurology residents are fantastic people and have become some of my closest friends.

CASEY FARIN, MD,
4TH YEAR RESIDENT

Department Chair Rich O’Brien, MD, PhD, visits the Durham Center for Senior Life to discuss Alzheimer’s disease and dementia with about 30 senior residents and visitors.
Fellowship Programs

The Neurology Department’s fellowship programs allow established neurologists to become clinical and research experts in their field of choice. Our Department currently offers seven ACGME-approved fellowship programs, with an eighth opening in 2018—more than any other Department in the Duke School of Medicine. Our fellows work with Duke Neurology faculty, many of whom have completed multiple fellowships themselves, as well as national experts in anesthesiology, neurosurgery, cardiology, and other fields.

We offer fellowships in the following fields:
» Clinical Neurophysiology
» Neurocritical Care
» Neuromuscular Medicine/EMG*  
  *Advanced, second year of training available on request
» Multiple Sclerosis and Neuroimmunology
» Parkinson’s Disease and Movement Disorders
» Sleep Medicine
» Vascular Neurology
» Headache  
  (Coming in 2018)

The faculty at Duke treat the residents like colleagues. They are fun, approachable, knowledgeable, and teach us the necessary skills that we need to become excellent clinical neurologists.

AARON LOOCHTAN, DO  
STROKE FELLOW

Advanced Practice Providers (APP) Residency Program

In addition to training physicians, the Duke Department of Neurology has pioneered a residency program for advanced practice providers. This one-year program provides specialty neurology training to licensed nurse practitioners and physician assistants. APP residents work alongside faculty and residents in the inpatient and outpatient setting. Residents are trained in clinical neurological principles and become capable of working in a general or subspecialty neurology practice upon completion. This successful program, which trains two residents a year, is already being emulated by academic centers across the country.

I was thrilled when I heard about the APP residency program at Duke. I knew that a program such as this would provide me with diverse clinical training in neurology that would enable me to practice at the forefront of medical technology and treatment.

ALLISON WALCZYK, AGNP-BC  
APP RESIDENT

A new study by Simon Davis, PhD, finds that brain hemispheres increase communication during the aging process to compensate for the negative effects of aging.
OUR ALUMNI

For seven decades, our residents and fellows have gone on to success in all areas of neurology, including hospital systems, private practice, and the academic setting. Graduates of our residency and fellowship programs are leading neurology units in hospitals from Dallas, Texas, to Queensland, Australia, helping patients in their own practices across the country, and holding faculty positions in leading academic institutions, including at Duke.

We are proud of the work that every one of our graduates are doing to help people affected by neurological conditions, advance research, and train their future colleagues.

I completed the Department’s fellowships in both neurocritical care and neurophysiology. These fellowships provided excellent training and have allowed me to feel confident as an attending on these services. Additionally, the mentorship I received from the Neuro ICU and Neurophysiology faculty has been tremendous.

CHRISTA SWISHER, MD
CURRENT DUKE FACULTY

Duke Neurology definitely prepares you for the demands of practice. The residency taught me a great deal about providing excellent care in an logical, efficient, and cost-effective way. These are lessons that I pass along to my residents as much as I can. The best part of my neurology residency was my fellow residents. I could not have asked to work with a better group.

AMBICA TUMKUR, MD
PRIVATE PRACTICE, LOUISVILLE KENTUCKY
2014 GRADUATE

I am extremely proud of my time at Duke and believe it has continued to serve me well in my current work. Duke has a culture of personal accountability and responsibility that was quite influential in developing my approach to medicine. Additionally, the rigor and quality of training was such that I feel that I was able to take away skills in particular specialties from my training despite not having formal fellowship instruction in these areas.

CHAD MILLER, MD,
OHIOHEALTH RIVERSIDE METHODIST HOSPITAL
2000 GRADUATE
A YEAR IN REVIEW

SEPTEMBER
Carmelo Graffagnino, MD, and Stroke Coordinator Heather Forrest both receive a pie to the face as part of a fundraiser for the American Stroke Association/American Heart Association, helping to raise nearly $1,000.

OCTOBER
In downtown Durham, Nicole Calakos, MD, PhD, discusses how habits change the brain before a live audience at a Periodic Tables event, a recurring series where speakers discuss new developments in science with the general public.

OCTOBER
The MS Mosaic iPhone app, designed by F. Lee Hartsell, MD, and Katherine Heller, PhD, debuts. By allowing patients with multiple sclerosis to easily and precisely record symptoms, this app will help patients receive better treatment and guide future research.

NOVEMBER
At a panel event, Leonard White, PhD, reflects on his four years teaching a free online course in medical neuroscience and looks to the future of online education. His course, named as one of the “best free online courses of all time” by Class Central, has already reached more than 200,000 people worldwide.
Carmelo Graffagnino, MD, and members of the Duke Neuro Intensive Care Unit travel to Uganda to help patients recover from the aftermath of neurosurgery as part of an ongoing effort with the Duke Global Neurosurgery and Neuroscience program.

A new study by new faculty members Al La Spada, MD, PhD, and Audrey Dickey, PhD, finds that a pair of drugs already in use to treat some cancers and type 2 diabetes may have potential to treat Huntington’s disease. Their research also opens a potential new avenue to treating neurodegenerative diseases.
GIVING

Our work cannot be done alone. Now more than ever our Department depends on financial support from individuals and philanthropic organizations.

YOUR GIFTS CAN HELP:

- Develop innovative and diagnostic treatment options for people with neurological conditions
- Endow professorships to attract and keep the brightest minds and provide them dedicated time for research
- Train the next generation of leaders in neurology, including trainee research projects.

There are many ways to support our work. To discuss your options for giving, or suggest a contribution area, contact Holli Gall, executive director of development, at holli.gall@duke.edu or 919-385-2406.

LAST YEAR, 867 INDIVIDUALS DONATED TO THE DUKE NEUROLOGY DEPARTMENT. THIS YEAR WE’D LIKE TO MAKE IT MORE THAN 1,000.

In Duke Today, neurologist and veteran Marvin Rozear, MD, reflects on his experience as a young doctor in Vietnam in 1970, where he treated U.S. and Vietnamese soldiers, civilians, and prisoners of war in the Army’s 95th Evacuation Hospital.