

**NEUROLOGY AND
NEUROSURGERY**

2014 YEAR IN REVIEW

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MESSAGE FROM THE CHAIRS

Dear Colleagues and Friends,

We are pleased to present this inaugural annual report from the Departments of Neurology and Neurosurgery at NYU Langone Medical Center.

This publication marks a time of significant growth for our departments: Patient volume has risen steadily, we have added stellar faculty members in key strategic areas, and our research and educational programs continue to expand.

Today, all of our subspecialties are staffed by physician leaders, including many nationally and internationally recognized clinicians and researchers. Our divisions include one of the largest, most sophisticated epilepsy centers in the nation; the leading brain, skull-base, and cerebrovascular surgery programs in the New York area; nationally known centers for the treatment of multiple sclerosis and Parkinson’s disease; one of the three most active radiosurgery practices in the nation; the only U.S. treatment site for familial dysautonomia; a world-class center for clinical care and research into Alzheimer’s disease (AD) and related disorders; a pioneering program for deep brain stimulation; and one of the country’s largest neuro-ophthalmology groups.

This only begins to tell the story of our outstanding clinical, research, and educational programs. We are proud to work with some of the finest physicians and surgeons, nursing teams, technicians, and support staff in medicine. Our collaborative spirit and collective expertise allow us to treat the most challenging neurologic conditions of every type—from complex brain or spinal tumors to rare neurogenetic conditions—and to do so in a consistently caring and compassionate way.

This collaboration is found across our cutting-edge clinical, translational, and basic science research programs and between our two departments. Whether a case involves our neurologists and neurointerventionalists removing a blood clot from a stroke patient’s brain, our neurosurgeons performing complex procedures under the monitoring of our clinical Neurophysiology Division, or our seizure and motor disorder specialists working with our epilepsy surgeons and neuromodulation teams on cutting-edge treatments, the close professional bonds between the Neurology and Neurosurgery Departments have enriched both immeasurably.

This excellence is also the result of the support we receive from NYU Langone as a whole, starting with the commitment and vision of our Dean and CEO, Robert I. Grossman, MD. From funding state-of-the-art facilities and technology, to facilitating grant and patent applications and information technology infrastructure, this support makes possible everything we do. The same is true of our collaboration with the Medical Center’s other departments—including the otolaryngologists our surgeons partner with to remove acoustic neuromas; the vascular specialists who work with our Center for Cognitive Neurology to evaluate cognitive disorders; the psychologists who support our AD, multiple sclerosis, and Parkinson’s patients; and the clinicians of Rusk Rehabilitation who help our patients recover their functional abilities.

Ultimately, we are driven toward excellence for our patients: their strength, perseverance, and willingness to entrust their care to us are what drive us to strive continually to be the best.



STEVEN L. GALETTA, MD

Philip K. Moskowitz, MD Professor and Chair of Neurology
 Department of Neurology
 Professor of Ophthalmology and Neurology
 NYU Langone Medical Center



JOHN G. GOLFINOS, MD

Chair, Department of Neurosurgery
 Associate Professor of Neurosurgery and Otolaryngology
 NYU Langone Medical Center

FACTS & FIGURES*

Neurology and Neurosurgery

PATIENT VOLUME

4,992

neurosurgical
procedures
performeda 20% increase from the
prior year

47,100

neurology
patient visitsa nearly 50% increase in
volume compared to the
prior year

1,000+

concussion
patientstreated since Concussion
Center was established
in 2013

#8

for Neurology
and Neurosurgeryin *U.S. News & World Report's*
2014-15 "Best Hospitals"

FACULTY

75

full time
Neurology facultyincluding 11 new faculty
members in the past year

24

full time
Neurosurgery faculty

with primary appointment

21

neurosurgeons and
neurologistsrecognized as "America's Top
Doctors" by Castle Connolly

40+

Neurology and
Neurosurgery
residents

currently in training

RESEARCH AND FUNDING

\$4,600,000+

in neurosurgery
grant funding

received in fiscal year 2013 and 2014

100



grants

to NYU Langone neurologists for current
research, totaling more than \$18m in funding

250+



presentations

delivered by neurologists and
neurosurgeons in 2014 national and
international conferences

landmark

epilepsy study

published by Comprehensive Epilepsy Center researchers in
the *American Journal of Human Genetics* (AJHG) showing
that genetic mutations related to synapse function are
linked to severe childhood epilepsies

50+



research studies

of new MS medications and
other treatments that MS
Comprehensive Care Center
is currently participating in

\$8,000,000

in donor gifts

committed to the
Neurology Department



NYU Langone Medical Center

Ranked #1 for Two Years in a Row

in overall patient safety and quality, among leading academic medical centers across the nation that participated in the University HealthSystem Consortium Quality & Accountability Study



Ranked #15 on "Best Hospitals" Honor Roll

by *U.S. News & World Report* and nationally ranked in 13 specialties, including top 10 rankings in Orthopaedics (#4), Rheumatology (#6), Geriatrics (#8), Neurology & Neurosurgery (#8), and Rehabilitation (#9)



Ranked One of the Top 20 Medical Schools

by *U.S. News & World Report*

Magnet Designation for Third Consecutive Term

for Tisch Hospital and Rusk Rehabilitation, an honor achieved by only 2% of hospitals in the country. NYU Langone's Hospital for Joint Diseases received its first Magnet recognition in 2012.



NEW & NOTEWORTHY

Transformation Through Growth, Innovation, and Collaboration

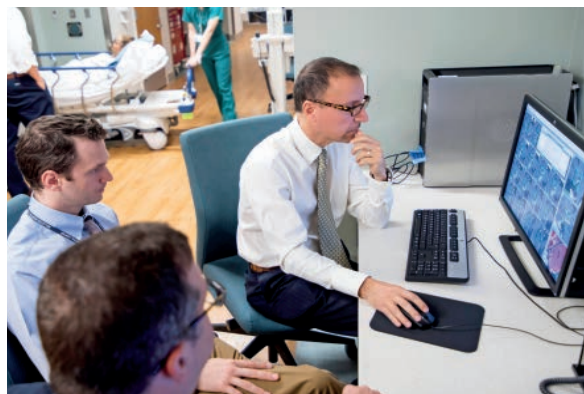
Concussion Center Reaches 1,000 Patient Mark

One of the few comprehensive, interdisciplinary centers in the United States devoted to diagnosis and treatment of concussion, NYU Langone's Concussion Center has treated over 1,000 patients since it was established in the spring of 2013. The center maintains a concussion patient registry, and is currently investigating the use of the King-Devick Test® for eye movement, and other quickly administered cognitive and balance screens for sideline concussion diagnosis. The Center's research on the King-Devick Test was profiled by the American Academy of Neurology® as one of the highlights of their annual meeting.



New Radiosurgery Suite Allows for Increased Gamma Knife® Volume

Early in 2014, the Neurosurgery Department opened its new radiosurgery suite, a completely renovated facility housing a Leksell Gamma Knife® Perfexion™. With the new space, the department also saw an impressive 15 percent increase in patient volume, to 459 procedures for the year, making NYU Langone's Gamma Knife® practice the third-largest in the United States, and the most active in the New York metropolitan area.



Model Home Care Program for Immobile Parkinson's Disease Patients

NYU Langone's Parkinson's and Movement Disorders Center (PMDC) has launched a multidisciplinary Parkinson's disease home care program—the first of its kind. Now, when patients with advanced Parkinson's can no longer travel to appointments, a physician-led team visits them at home to conduct a full evaluation and regular follow-ups. The PMDC has also joined with the Edmond J. Safra Philanthropic Foundation, the National Parkinson® Foundation, and Jewish Community Center (JCC) Manhattan to bring this groundbreaking New York City-based program to four other U.S. cities.

FDA Approvals on Drugs for Lysosomal Storage Disorders

NYU Langone neurologists helped lead clinical trials for Cerdelga™ and Vimizim®, two lysosomal storage disorder drugs that got FDA approval in 2014. Research efforts led by NYU Langone’s Dysautonomia Center also resulted in FDA approval this year of droxidopa for treating neurogenic orthostatic hypotension—the first new hypotension medication in two decades, and only the second ever developed.

Smart Pacemaker Approved for Epilepsy

Faculty at the Comprehensive Epilepsy Center, now part of NYU Langone’s Faculty Group Practice, were part of clinical trials resulting in recent FDA approval of responsive neurostimulator (RNS) devices, and performed the nation’s first post-approval RNS implantation. The device uses sensors and electrical stimulation to detect and shut down incipient seizures in the brain before they start.

Newly Identified Compounds Could Impact Cognitive Disorders

NYU Langone’s Center for Cognitive Neurology (CCN) researchers have identified and patented a compound, 2-PMAP, which reduces brain levels of toxic amyloid proteins—potential contributors to Alzheimer’s disease (AD) and other cognitive disorders—by more than 50 percent in animal studies. The center also developed a way to stimulate the body’s innate immune response using the Toll-like receptor 9 protein, an approach found in animal studies to reduce all key Alzheimer’s pathologies. CCN researchers have also developed and patented active and passive vaccination approaches that target both Aβ and tau pathology concurrently, which are highly effective in multiple animal models of AD.



Stroke Center Grows to Meet Increased Need

In 2014, NYU Langone opened its Ronald O. Perelman Center for Emergency Services, resulting in a 30 percent increase in stroke patients. NYU Langone’s Comprehensive Stroke Care Center responded accordingly, expanding to include three dedicated neurologists specializing in stroke treatment to provide advanced care.

The Center also has a full-time attending neuroradiologist, four neurointerventional radiologists, and access to a newly opened, 10-bed Neurosurgical Intensive Care Unit. Staffed by neurointensivists, neurology and neurosurgery residents, and Magnet-recognized nursing staff, the Neuro ICU cares for the most severely ill stroke, seizure, and other neurological patients. The unit offers the latest in neurological monitoring, including invasive brain monitoring, transcranial Dopplers, and 24/7 EEG monitoring.

Advancing Neurosurgery with Novel Device Design

Howard A. Riina, MD, professor and vice chair of the Department of Neurosurgery and director of endovascular surgery, designed and recently patented a bifurcation flow-diverter—a device that steers blood flow away from brain aneurysms located in branching vessels.

NEW & NOTEWORTHY

Deep Brain Stimulation for Patients with Tourette Syndrome and Obsessive-Compulsive Disorder

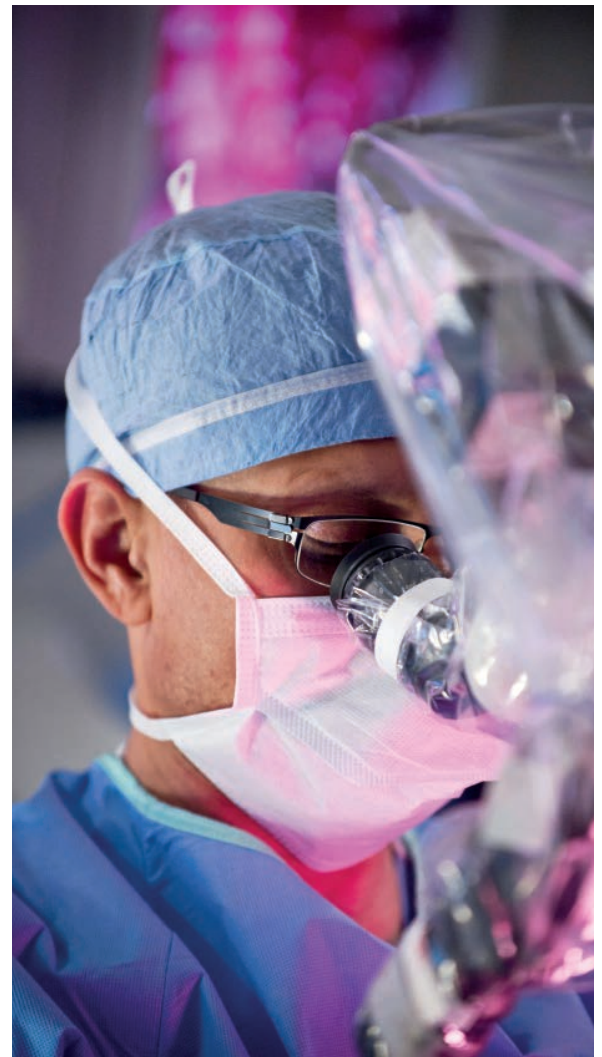
NYU Langone neurologists and neurosurgeons have pioneered the use of deep brain stimulation (DBS) as a treatment for Parkinson's disease and other motor disorders, as well as treatment-resistant depression. They are now extending its therapeutic applications to obsessive-compulsive disorder (OCD) and Tourette syndrome. Clinical trials for DBS in the treatment of both conditions began in 2014, and have yielded promising early results.

“Flight Simulator” Helps Neurosurgeons Prepare for Surgery

NYU Langone's neurosurgeons are using a novel technology that serves as a “flight simulator,” allowing them to rehearse complicated brain surgeries before making an actual incision on a patient. The new simulator, called the Surgical Rehearsal Platform (SRP), creates an individualized, three-dimensional walkthrough for neurosurgeons based on the patient's CT and MRI scans. Its unique software combines lifelike tissue reaction with accurate modeling of surgical tools and clamps, enabling surgeons to practice navigating multiple-angled models of a patient's brain and vasculature. Says John G. Golfinos, MD, chair of the Department of Neurosurgery and associate professor of neurosurgery and otolaryngology, “The SRP will also enhance the training of medical students, residents, and fellows, and help them hone their skills in new and more meaningful ways.”

New Program Takes on Headache

A new headache service under the direction of new faculty member Mia T. Minen, MD, assistant professor of neurology, will soon provide advanced treatment for the many causes of headache, using medical therapy and other emerging techniques that have demonstrated efficacy in refractory cases.





Awards and Recognition

- **Anthony K. Frempong-Boadu, MD**, was featured as a “Spine Neurosurgeon to Know” in the 2014 *Becker’s Spine Review*.
- **Jacqueline A. French, MD**, served as the president of the American Epilepsy Society.
- **Steven L. Galetta, MD**, was honored as the Master Clinician Award winner at the 2014 NYU Langone Dean’s Honors Day.
- **John G. Golfinos, MD**, was honored at NYU Langone’s 2014 Laura and Isaac Perlmutter Cancer Center Gala.
- **Horacio Kaufmann, MD**, was named editor-in-chief of the journal *Clinical Autonomic Research*.
- **Douglas S. Kondziolka, MD**, has been named as a director of the American Board of Neurological Surgery (ABNS).
- **Alon Mogilner, MD, PhD**, was named board member of the North American Neuromodulation Society and of the American Society for Stereotactic and Functional Neurosurgery.
- **Donato R. Pacione, MD**, and **Michael L. Smith, MD**, were featured as “Spine Neurosurgeons Under 40 to Know.”
- **Howard A. Riina, MD**, was honored as a recipient of the American Heart Association (AHA) Heartsaver Hero Award.
- **Janet C. Rucker, MD**, was elected to the editorial board of the *Journal of Neuro-Ophthalmology*, and was re-elected as chair of the Neuro-Ophthalmology and Neuro-Otology section of the American Academy of Neurology.
- **Stephen C. Rush, MD**, was awarded the Meritorious Service Medal by the United States Air Force.
- **Omar Tanweer, MD**, was honored with the Robert Florin Award for Socioeconomic Issues in Neurosurgery.
- **Howard L. Weiner, MD**, was elected to the editorial board of the *Journal of Neurosurgery* and to the Executive Council of the American Society of Pediatric Neurosurgeons.
- **Thomas M. Wisniewski, MD**, was elected a distinguished fellow of the Kosciuszko Foundation Collegium of Eminent Scientists and a standing member of the Neurological Sciences and Disorders C Study section for the National Institutes of Health National Institute of Neurological Disorders and Stroke.

CLINICAL CARE



Breadth and Depth of Expertise

➔ *NYU Langone's Departments of Neurology and Neurosurgery are characterized by a rarified combination of expertise, experience, and collaborative spirit that is evidenced by the exceptionally high quality of patient care.*

Managing the Most Complex Cerebrovascular Conditions with a Range of Approaches

DIVISION OF CEREBROVASCULAR SURGERY

Where repair of brain aneurysms is concerned, Howard A. Riina, MD, professor and vice chair of NYU Langone’s Department of Neurosurgery and director of endovascular surgery, is one of a handful of neurosurgeons skilled at both open microneurosurgery and the use of minimally invasive endovascular interventional neuroradiology techniques. This gives Dr. Riina a uniquely objective perspective in choosing his mode of surgery, and the capability to treat nearly any patient referred to him. “If I can get a good result with endovascular surgery, I’ll tend to use it,” he says. “But I regularly do open procedures when endovascular tools aren’t the best way to obliterate the aneurysm due to its size, shape, or location.”

2014 Highlights

- Performed over 1,000 neurointerventional/endovascular radiology procedures, with the treatment of over 250 brain aneurysm repairs (both endovascular and open) and 75 brain AVMs
- Novel minicraniotomy approaches to brain aneurysms using an eyebrow or blepharoplasty incision

With the ongoing development of enhanced techniques and technology, more and more cerebrovascular surgeries are now being done using either an endovascular approach—which typically requires just a one-night hospital stay—or through less-invasive, novel supraorbital craniotomies, involving a small incision over the eyebrow or in the crease of the eyelid. The Medical Center’s hybrid operating room is also used for these complex cerebrovascular cases that require both open and endovascular procedures.

Whatever approach is employed, says Dr. Riina, “we’re now able to successfully treat most—if not all—aneurysms, unruptured and ruptured, with a very, very high success rate and excellent outcome.” This expertise, also made possible by the division’s two other leading cerebrovascular surgeons, Jafar J. Jafar, MD, professor of neurosurgery, neurosurgeon-in-chief, and director of cerebrovascular surgery, and Paul P. Huang, MD, assistant professor of neurosurgery and head of cerebrovascular surgery at Bellevue Hospital Center, has made NYU Langone the go-to center on the East Coast for complex aneurysms, arterial malformations, and other cerebrovascular disorders, with patients routinely flying in from the West Coast and elsewhere. “We’re not seeing run-of-the-mill cases anymore; we are seeing cases requiring that added expertise, or those that have been attempted at other institutions without success,” Dr. Riina notes.

largest
referral center

for brain aneurysms
and arterial-venous
malformation (AVM) of the brain
and spinal cord

advanced
imaging

including dedicated
neuro-digital biplane
angiography equipment and
hybrid operating room

CLINICAL CARE

Dr. Riina is currently working on several new devices of his own design, including a bifurcation flow-diverter that he recently patented, which steers blood flow away from aneurysms located in branching vessels. He is also collaborating with one of the Medical Center's pediatric ENT specialists on a tracheal stent that could avoid the need for tracheotomies in conditions such as tracheomalacia or in patients whose airway has been damaged by trauma or radiation therapy.

The division utilizes advanced imaging equipment in their procedures, including digital biplane angiography, which marries three-dimensional angiography to a neuro-navigational guidance system. They are now working with a leading technology company on an even more advanced concept, in which three-dimensional translucent images of the brain's blood vessels would be superimposed over the surgeon's field of vision during surgery, giving the surgeon "X-ray vision."

"Our field is all about advanced imaging and intervention," says Dr. Riina. "We're always looking for the next technological step that will make our treatments even more effective. The definition of the neurosurgeon is evolving—now an image-based, minimally invasive interventionalist who brings the latest technology to bear on the treatment of complex neurological problems."



"HYBRID" OR COMBINES OPEN AND IMAGE-GUIDED SURGICAL FACILITIES

In NYU Langone's "hybrid" operating room, cerebrovascular neurosurgeons perform both open and minimally invasive, image-guided procedures, often within the same operation if necessary. The hybrid OR combines the features of a standard operating room with the technology of a neuroradiology interventional suite, including built-in digital X-ray fluoroscopy mounted on a robotic arm, computer guidance systems, and three-dimensional video-integrated technology that projects three-dimensional images of the surgical field onto high-definition plasma monitors. Two additional neurosurgical hybrid ORs are slated for installation in a new clinical pavilion, scheduled to open in 2017.

"The hybrid room provides the ultimate flexibility," says Dr. Riina. "When the patient is on the table, I can come in, get the additional diagnostic information I need, and do whatever intervention is necessary. Whether that involves a minimally invasive incision through a 1-cm craniotomy over an eyebrow or through the eyelid, a needlestick in the groin to deliver a flow-diverter, or a skull-base approach for an unusual vascular lesion—it can all be done right then and there."



CLINICAL CARE

Shaving Minutes, Saving Brain Cells

COMPREHENSIVE STROKE CARE CENTER

With every minute's delay in administering the clot-busting drug tPA to an ischemic stroke patient, another two million brain cells die, explains Koto Ishida, MD, assistant professor of neurology and director of NYU Langone's Comprehensive Stroke Care Center. That is why, although their average "door-to-needle" time (elapsed time from ambulance arrival to tPA injection) was under 60 minutes, the center's team spent considerable time this year planning for implementation of the Helsinki Model. This protocol shaves off additional minutes through steps that include the ambulance team pre-notifying the hospital when a stroke patient is en route; a triage process that sends the patient directly from the ambulance to a CT-scanner; and administration of tPA right in the CT-scan suite.

2014 Highlights

- 30 percent increase in patient volume since April 2014
- Chosen as one of 25 regional coordinating centers for StrokeNet, the new NIH stroke clinical research consortium

The new model, which was developed in close collaboration with NYU Langone's Ronald O. Perelman Department of Emergency Medicine, will roll out in early 2015. Offering this capability 24/7 in NYU Langone's new, state-of-the-art Perelman Center for Emergency Services is just one of the innovative approaches employed by the center's vascular neurology team.

Average
**< 60
minutes**
"door-to-needle"
time

Awarded AHA
**Stroke
Gold Plus**
status for four
consecutive years

The team also partners proactively with the stroke center's neurointerventionalists, utilizing the latest research to identify appropriate candidates for mechanical clot extraction or for delivery of tPA directly to the clot in those cases where intravenous tPA is not indicated or isn't working sufficiently. And they partner closely with the Medical Center's Neuro ICU on severely ill cases and work with Rusk Rehabilitation's world-class stroke rehabilitation team on post-acute recovery. Their engagement in community outreach regarding early recognition of stroke symptoms is also designed to help reduce the time-to-tPA by increasing awareness.

The center is also actively investigating other aspects of post-stroke care. Its recent selection as one of 25 regional coordinating centers in StrokeNet, the NIH's new centralized stroke research consortium, ensures that the center will continue to be at the forefront of clinical care and research in the years ahead.

"The ultimate outcome we strive for is recovery with minimal or no disability," notes Dr. Ishida. "We're trying to get people back to work, and back to their lives."



A State-of-the-Art Neuro ICU, Where Quality and Safety Are Paramount

NEURO-CRITICAL CARE

With three neurointensivists and a 10-bed unit supervised by an attending physician around the clock, NYU Langone’s Neuro ICU has quickly established itself as a leading facility in the region. In addition to a full array of state-of-the-art technology—including intracranial pressure monitoring, 24/7 EEG brain monitoring capability, transcranial Doppler ultrasound, and noninvasive brain-cooling techniques—the staff also employs innovative, proactive protocols to optimize patient safety and quality of care.

2014 Highlights

- Expanded to take critically ill neurology patients as well as all post-neurosurgery patients
- Implemented first-ever neuro-critical care residency rotation

“When caring for post-neurosurgery patients, for example, we’ll bypass the PACU and take a handoff straight from the neuro-anesthesiologist,” says Aaron Lord, MD, Neuro-Critical Care division chief, “so there’s a continuous stream of critical care.”

The unit’s physicians are complemented by a superb nursing team and highly skilled support personnel. “Whether a patient is dealing with hemorrhagic brain disease, stroke sequelae, traumatic brain injury, hydrocephalus, or post-neurosurgical recovery,” notes Dr. Lord, “this is what we do all day, every day. Our patients require very specific fluids, ventilation, and blood pressure goals—and you need a thorough understanding of both critical care and neurology to do that well.”



Includes access to a
10-bed
Neurosurgical Intensive Care Unit, three neurointensivists, a full-time attending neuroradiologist, and four neurointerventional radiologists

CLINICAL CARE

World-Class Technical Skills and Cutting-Edge Technology

BRAIN TUMOR CENTER

Building on an annual volume that has increased steadily over the past half-decade, NYU Langone's Brain Tumor Center recorded some impressive numbers in 2014—including several hundred procedures to remove benign and metastatic brain tumors, over 100 skull-base cranial procedures, dozens of trans-nasal endoscopic surgeries, and hundreds more brain tumor patients treated with Gamma Knife® radiosurgery. What these numbers don't show, however, is the complexity of cases handled by the center's surgeons—they are among the most complex brain tumor cases in the New York metropolitan area and beyond.

2014 Highlights

- 1,150+ cranial procedures
- Ranked number 1 in the country for quality and safety in cranial procedures by University HealthSystem Consortium (UHC®)

"With the team we've established, there's no procedure our department can't handle," says John G. Golfinos, MD, chair of neurosurgery and an internationally recognized specialist in open-skull, minimally invasive and Gamma Knife brain tumor surgery. "That includes the surgical treatment of rare brain tumors related to neurofibromatosis type 2, craniopharyngioma, and rare skull base tumors like chordoma." As Dr. Golfinos notes, by doing these rare, highly demanding procedures on a regular basis, NYU Langone's neurosurgeons also keep their skills honed for more standard brain surgeries.

Despite its focus on challenging brain procedures, with the potential complications these entail, in 2014 the center's program was ranked number one in the U.S. by the University Hospital Consortium (UHC) in quality and safety for cranial procedures, with top ratings in mortality and most other individual UHC categories. At the same time, the center continues to advance its navigational imaging capabilities, and is teaming with NYU Langone's neuropsychologists on an innovative initiative to assess patients before and after surgery, in order to better understand how procedures involving "non-eloquent" areas of the brain impact neurologic functions such as metacognition—research that will be published shortly.

Other research projects include a soon-to-be-published acoustic neuroma (vestibular schwannoma) series comparing surgical outcomes to Gamma Knife radiation, and numerous ongoing clinical trials of adjunct postsurgical therapies. Standardized protocols are also being developed for the timing of antibiotic and anticoagulant administration.

The center is also committed to providing physician education and training. In addition to its highly competitive residency training, the department also regularly hosts international surgeons, who typically come for a month or longer as visiting fellows to observe the advanced surgical techniques utilized by NYU Langone's surgeons.

internationally
recognized

specialists in open-skull,
minimally invasive and Gamma Knife®
brain tumor surgery

NEURO-IMAGING: TAKING NAVIGATION A STEP FURTHER

An early leader in the use of MRI-based navigational software, NYU Langone's neurosurgeons are now taking this approach a step further by working with neuroradiology colleagues to identify and chart the function of deep-lying nerve tracts—knowledge that will further improve surgeons' ability to avoid impacting speech and language. "We're mapping pathways we never looked at before," says Dr. Golfinos.

Another innovation involves merging the Surgical Theater, a technology that uses MRI and CT scans to create a virtual, interactive, three-dimensional model of a patient's brain, with MRI tractography to produce a three-dimensional navigational map of the brain that can be utilized in the operating room. The center is also working with the Neuroradiology Division to pioneer combined PET

and MRI scans for imaging malignant brain tumors. "We're still in the data-gathering stage with the MRI-PET approach," notes Dr. Golfinos. "Among other things, we hope it will help distinguish between treatment effects, such as necrosis caused by radiation or medication, and actual tumor growth."



Surgical treatment of
rare brain tumors

including neurofibromatosis type 2 and craniopharyngioma, and rare skull-base tumors such as chordoma

Close partnership and collaboration with experts at NYU Langone's

**Laura and Isaac
Perlmutter
Cancer Center**

CLINICAL CARE

Expanding the Benefits of Gamma Knife® Surgery

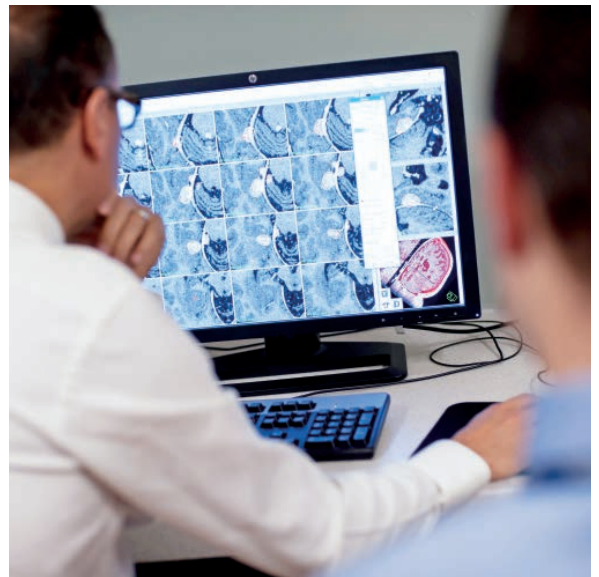
CENTER FOR ADVANCED RADIOSURGERY

In 2013, the first full year in which Douglas S. Kondziolka, MD, served as director of the NYU Langone Center for Advanced Radiosurgery, his center performed over 400 Gamma Knife® surgery procedures, immediately establishing the Medical Center as one of the busiest stereotactic radiosurgery practices in the nation. Last year, which saw the opening of the center's new, fully renovated Gamma Knife suite, was even more productive, with volume increasing to 459 procedures, making the practice the largest in the New York metropolitan area—and one of the three largest in the United States.

NYU Langone's surgeons and radiation oncologists are also among the most experienced in the world at using the Leksell Gamma Knife® Perfexion™—the most advanced radiosurgery technology available—to obliterate blood vessel malformations and inactivate a diverse range of benign and malignant brain and skull-base tumors. Under the guidance of Dr. Kondziolka, professor and vice chair of clinical research, who has published over 600 scientific articles related to radiosurgery, they are also continuing to refine Gamma Knife protocols: The center's team has published extensively on its studies of optimal radiation dosage, and is working closely with NYU Langone's medical oncologists on new, targeted combination therapies for cancer management.

2014 Highlights

- Opened a new, fully renovated radiosurgery suite with a state-of-the-art Leksell Gamma Knife® Perfexion™
- Launched first-ever prospective database for radiosurgery patients





450+
Gamma Knife®
procedures

1 of the 3
largest
practices in the country
and the largest
in the New York City area

Expanding use of
radiosurgery to treat
Parkinson's
disease,
other movement disorders,
and OCD

At the same time, the center's clinicians are pioneering novel applications for this noninvasive technology. They have treated 10 or more tumors in a patient's brain in a single Gamma Knife session numerous times, and have collaborated with NYU Langone's Center for the Study and Treatment of Pain to treat patients with sphenopalatine neuralgia, a rare facial pain syndrome. Dr. Kondziolka is currently investigating the use of radiosurgery to alleviate symptoms of Parkinson's disease and other movement disorders, as well as obsessive-compulsive disorder. With colleagues in neuroradiology, new imaging techniques to define brain anatomy and to more simply measure tumor activity are being refined.

The center is also focused on physician training—it maintains an active training program for visiting physicians, and recently hosted its first CME course—as well as quality of care. Dr. Kondziolka's group has instituted the world's first prospective radiosurgery patient database. The new initiative includes a sophisticated tracking and analysis tool that captures data from every patient visit, including patient and referral demographics, disease features, radiosurgery treatment data, and follow-up.

Says Dr. Kondziolka, "Our focus is on the evidence-based quality of care that's driving today's treatments. That's how we become better."

CLINICAL CARE

Building a Hub for Education, Research, and the Care of Concussion

CONCUSSION CENTER

In 2013, to address the lack of comprehensive treatment options in the New York area for concussions suffered by young athletes and others, NYU Langone took an important step, establishing a multidisciplinary Concussion Center. The center brings together NYU Langone's neurology expertise—including adult and pediatric neurologists, neuropsychologists, neuro-radiologists, and neuro-ophthalmologists—with neuro-rehabilitation and sports medicine specialists and other clinicians from across the Medical Center.

2014 Highlights

- Presented preliminary clinical research on the use of visual screens in the sideline diagnosis of concussion
- Hosted first annual CME course on Concussion in Sports

"It's a truly distinct program at the leading edge of concussion management and research," says Steven L. Galetta, MD, the Philip K. Moskowitz, MD Professor and Chair of the Department of Neurology.

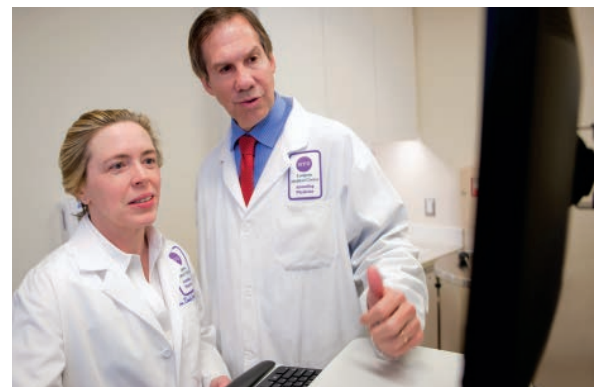
To streamline access to all specialties and provide a single entry-point, the center maintains a phone number staffed by trained nurses who carefully review each caller's symptoms and then promptly schedule an appointment with the appropriate specialist. The center also has a dedicated program manager—Mara F. Sproul, RN, MPA, CRRN, RN-BC, a highly experienced and seasoned registered nurse—who coordinates and oversees the patient journey across all specialties.

Since concussion damage frequently doesn't show up on MRI and CT scans, diagnoses are based on neuropsychological and neuro-ophthalmologic testing. In addition to avoiding high-risk activities, treatment may include cognitive remediation or occupational or vestibular rehabilitation, as well as medical management of symptoms such as post-concussion headache, sleep disorders, and psychiatric disturbances.

Another primary focus of the center involves educating the community, including coaches, athletic trainers, and health professionals, about concussion

symptoms, as well as the importance of immediately removing individuals with potential concussion from the field of play and seeking treatment for them. Recent events hosted by the center include a concussion workshop for lacrosse coaches and parents and an annual, daylong CME course for medical professionals on Concussion in Sports. The course covers current knowledge on the epidemiology and pathophysiology of concussion, advances in neuro-cognitive, neuro-imaging, and neuro-ophthalmologic diagnostics, and the latest thinking on concussion rehabilitation, management, and safe return to play.

The center has also initiated a concussion patient registry, and is conducting ongoing research aimed at refining sideline concussion diagnosis through screening tests such as the King-Devick Test® for eye movement, the Standardized Assessment of Concussion (SAC) cognition and memory scale, and the Balance Error Scoring System. "A composite (concussion) test and sequential testing are likely to be the screening paradigm of the future," notes Dr. Galetta. To track brain healing and identify which concussion victims are at highest risk for ongoing problems, NYU Langone's neurologic researchers are concurrently pursuing the development of concussion biomarkers through advanced technologies such as optical coherence tomography and brain imaging.



Exploring a Window into the Central Nervous System

NEURO-OPHTHALMOLOGY

“Vision is involved in about half of the brain’s pathways,” says Laura J. Balcer, MD, vice chair of the Department of Neurology and professor of ophthalmology and neurology, “which means that we can learn a huge amount about the brain and the nervous system by studying how our eyes move, see, and process what they’re looking at.”

2014 Highlights

- Pioneered vision testing outcome measures in multiple sclerosis
- Investigating King-Devick Test® as a sideline diagnostic tool

Neuro-ophthalmology is among the fastest-growing fields of neurology for this very reason. And with three neurologically trained faculty members—Dr. Balcer; Steven L. Galetta, MD, the Philip K. Moskowitz, MD Professor and Chair of the Department of Neurology; and Janet C. Rucker, MD, the Bernard A. and Charlotte Marden Associate Professor of Neurology, who leads the Neuro-Ophthalmology Program as well as its fellowship training program—plus a fourth faculty member, Floyd A. Warren, MD, professor of neurology and ophthalmology, who brings an ophthalmologic background to the practice, the Medical Center’s Neuro-Ophthalmology Program is one of the largest and most experienced in the nation.

A prime example of the discipline’s increasing applications is the growing use of the King-Devick Test® as a diagnostic tool for acute concussion. The test, which involves reading a series of single-digit numbers, can accurately evaluate a player’s brain status on the sidelines in just two minutes. But Dr. Balcer’s observation applies to virtually any neurological condition, from multiple sclerosis (MS)—which can be studied in part by using an optical coherence tomography (OCT) scan to measure the thickness of the retinal layers at the back of the eye—to brain tumors and epilepsy surgery, where analysis of visual pathways can help determine which nerves are being affected.



“Because we study an anatomical system, rather than a specific disease area, we do a tremendous amount of consulting with other neurologic disciplines,” notes Dr. Rucker, an expert in eye movement analysis. “Various conditions affect eye movement in different ways, almost like a fingerprint,” she explains. “There are subtle differences, for example, in the abnormal eye movements associated with Alzheimer’s disease compared to other cognitive disorders. We’re frequently called on to help diagnose uncommon conditions like atypical Parkinson’s disease or late-onset Tay-Sachs disease.”

“Various conditions affect eye movement in different ways, almost like a fingerprint.”

The program recently installed a sophisticated eye movement tracking device, and its new eye movement lab will be fully operational by early 2015. With the versatility of OCT, eye movement tracking, electroretinography, and other analytic tools, NYU Langone’s Neuro-Ophthalmology Program is also playing a central role in clinical research on a wide range of neurologic conditions. Drs. Galetta and Balcer (who have co-authored more than 350 original scientific publications between them) are principal investigators in an ongoing clinical trial of a remyelinating agent for the treatment of optic neuritis—a condition that is considered a model for MS lesions. “There was some skepticism at first about using vision as an outcome measure for this new drug, but we’re getting very solid results,” notes Dr. Balcer. “People are now realizing that visual analysis is the wave of the future in terms of testing these novel neurologic therapies.”

CLINICAL CARE

New Approaches to Calming the Brain's Trouble Spots

COMPREHENSIVE EPILEPSY CENTER

Last April, neurosurgeon Werner K. Doyle, MD, associate professor of neurosurgery, performed the first nonexperimental implantation of the responsive neurostimulator system, a newly approved “smart pacemaker” that can detect incipient seizures before they start and shut them down through direct electrical stimulation to the brain. As a clinical trial site for the device, Comprehensive Epilepsy Center (CEC) clinicians know firsthand the impact of this important new treatment option for drug-resistant epilepsies.

2014 Highlights

- Participated in trials leading to FDA approval of responsive neurostimulator (RNS) devices, and performed the nation's first post-approval RNS implantation
- *Nature* publication showing that speech processing involves bilateral brain activity
- *American Journal of Human Genetics* report showing that genetic mutations related to synapse function are linked to severe childhood epilepsies
- Forming a Rare Epilepsy Network aimed at expediting research into the rare epilepsies, in partnership with the Epilepsy Foundation and other patient advocacy groups
- Awarded a five-year CDC grant to establish a Managing Epilepsy Well Network Collaborating Center
- One of 15 institutions across the U.S. and the United Kingdom collaborating to study the causes of Sudden Unexpected Death in Epilepsy (SUDEP) as part of the NIH-funded Center for SUDEP Research

This is just one way in which the center, which includes 30 neurologists, neurosurgeons, neuropsychologists, and neuroscientists that are now part of NYU Langone's Faculty Group Practice, is pushing boundaries in epilepsy treatment and research. The CEC's neurology staff includes Jacqueline A. French, MD, professor of neurology and a leader in the development of new anti-epileptic medications, as well as the center's Director Orrin Devinsky, MD, and Co-Director Ruben Kuzniecky, MD, who are helping to spearhead the Epilepsy Phenome/Genome Project, a global consortium that is mapping the genetic mutations that have been linked to epilepsy. Last September, the consortium published its findings in the *American Journal of Human Genetics*, identifying mutations linked to synapse function as a causative factor in certain severe childhood epilepsies.

FROM RESEARCH TO TREATMENT

These genetic investigations and other pathophysiologic breakthroughs are yielding a growing array of novel therapeutic targets, many of which the center's patients have access to. The CEC's widely published research program is currently involved in numerous trials of new anti-seizure medications. These include cannabidiol—an oral agent containing the non-psychoactive ingredient of cannabis, which is being studied as a potential treatment for Dravet and Lennox-Gastaut syndromes—and everolimus, an immunosuppressant that appears to reduce seizure activity and improve cognition in tuberous sclerosis patients by inhibiting the mTOR protein, a key driver of the disease. Drs. Kuzniecky and French are also leading and coordinating the Epilepsy Phenome/Genome Project, a large multicenter consortium studying biomarkers in new-onset epilepsy with the aim of predicting seizure outcome.

The CEC's neurosurgeons, Dr. Doyle, and pediatric specialist Howard L. Weiner, MD, professor of neurosurgery and pediatrics, have a long history of advancing the field as well, with innovations that include the pioneering of multiple subpial transections and multi-stage procedures. Dr. Weiner, who serves on the Executive Council of the American Society of Pediatric Neurosurgeons, also developed the current

state-of-the-art approach to tuberous sclerosis surgery, in which the brain's epileptic regions are mapped with electrodes prior to surgical excision. Dr. Doyle is one of the nation's most experienced surgeons at brain resection in adult patients, and has also been a leader in utilizing both responsive neurostimulation and the vagus nerve stimulator—an implantable device that can reduce seizure activity by transmitting electrical signals to the brain indirectly via the vagus nerve in the neck.

COLLABORATIVE APPROACH

CEC clinicians and researchers are also using innovative neuroimaging techniques to pinpoint epileptic regions prior to surgery, including combining the results of subtraction SPECT scans, MRI and PET imaging, and magnetoencephalography, and using enhanced computer analysis of MRI images to identify areas of gray-white blurring in the brain. An interdisciplinary conference of two dozen or more medical professionals meets on a regular basis to carefully review each patient's imaging results.

"Most of our senior members have been working together for 15 or 20 years—we have a seasoned team with many strengths," says Dr. Devinsky. "Besides doing a great job on the relatively simple cases, we've been very effective at finding new treatment modalities for patients who have run through existing therapies." As treatments evolve, he adds, the center is increasingly finding that they can bring about significant improvement even when a patient's epilepsy is not completely cured.

"If we can reduce a young person's seizures by 80 percent," observes Dr. Devinsky, "that translates into a dramatically reduced seizure burden over the next 10 or 20 years."

NEUROGRID TECHNOLOGY PROVIDES ENHANCED MAPPING OF BRAIN NEURON ACTIVITY

NYU Langone recently published research showing that a thin sheet of electrode-containing material, spread over the surface of the brain, can effectively detect specific neuronal electrical activity both on and below the brain's surface. The technology, called NeuroGrid, was designed and manufactured by Dion Khodagholy, PhD, a postdoctoral fellow at NYU Langone. It uses a thin, flexible sheet of biocompatible material containing gold, platinum, and a conducting polymer called PEDOT:PSS, which conforms to the contours of the brain. Because it remains on the brain surface, the technology enables physicians to accurately measure and map action potentials across a much larger number of neurons than the traditional approach of implanting electrodes into the brain. The recent study was conducted with CEC investigators, who successfully used the NeuroGrid to assess neuronal activity in two patients undergoing epilepsy surgery.



CLINICAL CARE



The largest
Level Four

epilepsy center
in the nation

—
Treats

6,700+

patients and performs
60 to 80 surgical
procedures annually

SPECIALTY AREAS IN EPILEPSY TREATMENT

Treatment-Resistant Epilepsy

The CEC has particular expertise in caring for the most difficult-to-control cases of epilepsy, combining extraordinary resources in neurodiagnostics (from genetics to novel computer-assisted MRI techniques) and neurotherapeutics, both clinically and in cutting-edge research to advance epilepsy care. A broad expertise in antiepileptic drug therapies, new drug trials, dietary therapy, surgically implanted devices, and surgical therapy, combined with an individualized approach to patient care and access to an outstanding collaborative team, make the CEC especially effective in these challenging cases.

Dravet Syndrome

The Dravet Center, directed by pediatric neurologist Judith Bluvstein, MD, assistant professor of neurology, provides comprehensive care for children with Dravet syndrome, including inpatient monitoring if needed, as well as a ketogenic diet program. The center is also part of a collaborative network of Dravet centers whose goals include developing and optimizing a standard of care for Dravet syndrome and pursuing basic science and clinical research on the condition.

Tuberous Sclerosis (TS)

The Tuberous Sclerosis Center—whose staff includes Dr. Devinsky and Kimberly Menzer, RN, NP, senior staff nurse—provides comprehensive interdisciplinary medical and surgical care for children and adults with TS. Dr. Weiner pioneered the multi-stage invasive monitoring technique for TS and is an expert in its surgical treatment. CEC research faculty members are also studying the underlying mechanisms that cause TS.

Monitoring Neurosurgical Procedures, Evaluating Nerve Function

NEUROPHYSIOLOGY

NYU Langone’s surgeons have an essential partner in the OR with them: the Medical Center’s Neurophysiology Division, which closely monitors the neurological status of patients during any operations that carry risk of neurologic complication.

The approach is generally employed for neurosurgical spine, brain tumor, and cerebrovascular procedures, as well as selected operations done by orthopaedic surgeons, otolaryngologists, and other surgical specialties. During such procedures, PhD-level technicians continuously measure the function of descending and ascending nerve pathways, while supervising neurologists oversee the data stream in real time. If any nerve signals weaken, this is reported immediately to the attending surgeon, who then adjusts the surgical approach to avoid harming the affected nerves.

“For example, we’ll typically monitor procedures to repair congenital hip problems that involve elongating the leg,” says Aleksandar Beric, MD, director of neurophysiology at NYU Langone’s Hospital for Joint Diseases, “since this carries risk of nerve damage and possible foot drop.”

The most recent innovation involves a proposed clinical research project that will quantify the neuromuscular blockade during spine surgery, to ensure the blockade is completely reversed following the procedure. The division’s outstanding staff and cutting-edge protocols are a key factor in NYU Langone’s number 1 national ranking by University HealthSystem Consortium (UHC®) for quality and safety in craniotomy procedures.

Its other focus involves assisting fellow neurologists in the clinical diagnosis of neuropathies, back pain, and neuromuscular conditions such as myasthenia gravis and Guillain-Barre syndrome, through the use of nerve conduction testing, electromyography (EMG), and evoked potential measurements.

“We have the full spectrum of the latest diagnostic technology available 24 hours a day, including single-fiber EMGs,” says Dr. Beric. “Two hours with a patient is usually sufficient time to diagnose any condition, even in its earliest stages.”

Measuring and Treating Cognition and Mood

NEUROPSYCHOLOGY/NEUROPSYCHIATRY

Much of the diagnosis, treatment, and research that takes place across NYU Langone’s Departments of Neurology and Neurosurgery would not be possible without the Medical Center’s large team of neuropsychologists. Using the latest modalities, they can precisely evaluate a patient’s cognitive status to inform the diagnosis for many neurologic conditions, and can also provide targeted cognitive therapy where appropriate.

Neuropsychology services are integrated seamlessly as part of numerous NYU Langone programs, including:

- Testing before and after epilepsy or brain tumor surgery, to map localized function in areas around the surgical test site and to assess effects on cognitive function postsurgically
- Assessment of cognitive and behavioral disorders related to epilepsy and neurodegenerative diseases such as MS and Parkinson’s disease
- Evaluation of cognitive function as part of diagnostic workups for memory disorders such as AD and other age-related dementia, and for traumatic brain injury or concussion
- Assessment of language, learning, and attention deficits in children
- Measurement of cognitive status in response to standard or experimental treatments for cognitive-related neurological conditions
- Cognitive remediation therapy for patients whose cognitive abilities have been impacted by neurologic disease or brain trauma

In cases where either a neurologic disease or its treatment affects mood or behavior—a common occurrence in epilepsy and neurodegenerative conditions such as MS, Parkinson’s, and Alzheimer’s—the Medical Center’s Neuropsychiatry Division may also be called to make an evaluation and provide psychopharmacologic treatment where appropriate.

Accredited neurophysiology
lab staffed by

more than a dozen
electromyographers

CLINICAL CARE

Offering New Hope for a Debilitating Disease

MULTIPLE SCLEROSIS (MS) COMPREHENSIVE CARE CENTER

There are currently 12 FDA-approved drugs for reducing activity and disease progression in MS—more than double the number that existed just a decade ago—and more are in the pipeline. As a major clinical trial site for medicines in the advanced stages of testing, the MS Comprehensive Care Center is at the forefront of this progress. What sets its clinicians apart, however, is their expertise at optimizing the benefits of the drugs already available, including, in several instances, recalibrating how they're administered.

2014 Highlights

- Developed novel physician- and patient-administered MS disease severity measures
- Conducted breakthrough clinical research on the effectiveness of reduced-dose Tysabri® (natalizumab)
- Received IRB approval for the establishment of a new MS biotissue repository

Natalizumab (Tysabri®) is considered the most effective medication at stopping MS relapses, but it has traditionally been reserved for the most severe cases, due to a potentially fatal side effect—progressive multifocal leukoencephalopathy (PML)—which may affect as many as 1 in 100 Tysabri® users with multiple risk factors. By analyzing the drug's pharmacokinetics, NYU Langone researchers concluded it could be equally effective taken every two months, rather than monthly as called for by FDA guidelines.

Utilizing this new protocol, the NYU Langone team has achieved excellent therapeutic results with zero PML cases to date. MS Center clinicians spearheaded efforts to collect data on nearly 700 MS patients treated with alternative natalizumab dosing across the country and presented their results at a recent international MS conference in fall 2014. The center is also working on a global registry of patients using natalizumab at different frequencies, aiming to eliminate this side effect to a point where the drug is appropriate for a majority of patients. They've also pioneered a less frequent and safer regimen for mitoxantrone, a chemotherapy agent that slows difficult-to-treat secondary progressive MS.

Besides modified drug protocols, the center's interdisciplinary team—including four neurologists, a urologist, a psychiatrist, occupational and physical therapists, a nurse practitioner, a social worker, and specialized nursing staff—provides comprehensive symptom management and a range of support and socialization programs.

One of the largest MS centers
in the U.S., treating

2,500 patients
annually

50+ active
research
studies

including several trials of
promising new medications

**Utilizing this new protocol [for Tysabri],
the NYU Langone team has achieved
excellent therapeutic results with zero
PML cases to date.**

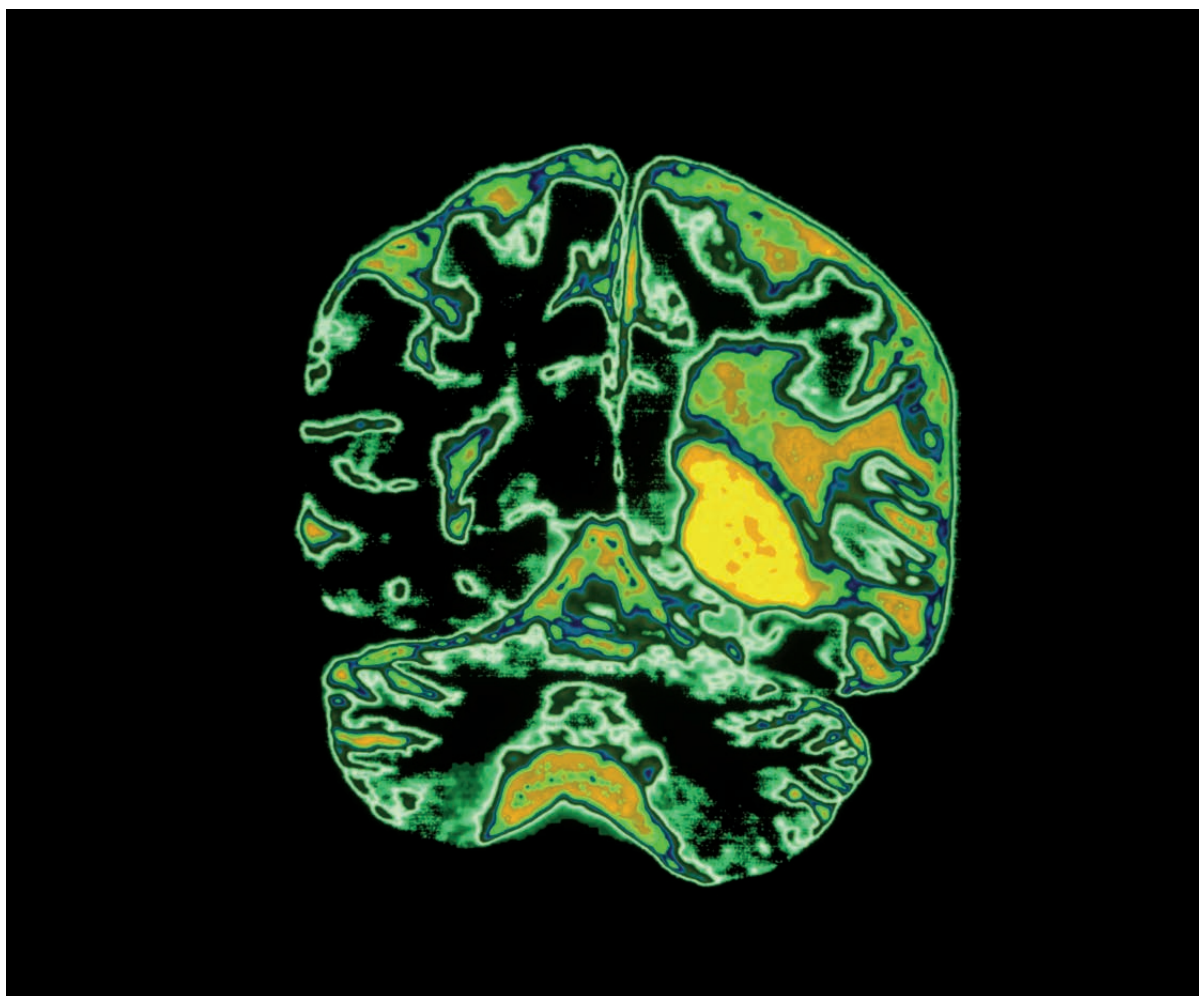
The center is crafting new assessment tools as well, in order to chart patient responses to treatment and better understand MS pathology. They recently developed two simple, highly accurate tools for tracking MS severity—one meant to be given by a physician, another self-administered by patients. Using the novel patient-reported measure, MS Center researchers reported that disease severity in the patients attending the centers is significantly lower than in the largest national registry of MS patients. The researchers are now refining a more in-depth composite measure that will be used to evaluate several neurological domains affected by MS, including upper and lower limb function, vision, and cognition.

Most recently, the MS Center has launched an initiative to collect, analyze, and store various tissue samples from every patient, with the ultimate goal of finding a biomarker for MS.

A TRIBUTE TO JOSEPH HERBERT, MD

Joseph Herbert, MD, professor of neurology and director of NYU Langone's MS Comprehensive Care Center, passed away in January 2015.

Guiding the MS Center brilliantly for the past two decades as a model for others to follow, Dr. Herbert's empathy and humanity are treasured by thousands of patients as well as his colleagues. His creative and relentless pursuit of every therapeutic option, boundless intellectual curiosity, and love of teaching are an inspiration to all who are fortunate to be a part of Dr. Herbert's legacy.



CLINICAL CARE

Pushing the Envelope in Parkinson's Disease Research and Care

PARKINSON'S AND MOVEMENT DISORDERS CENTER

With no curative treatments yet available for Parkinson's disease, the gold standard for care calls for managing the condition through an array of therapies. NYU Langone's Parkinson's and Movement Disorders Center has honed this approach, coordinating an interdisciplinary treatment strategy that includes skilled use of symptom-relieving medications; collaboration with NYU Langone's world-class Rusk Rehabilitation team to provide physical, occupational, and speech therapy as needed, and psychiatric and psychosocial interventions for depression and other mental symptoms. The center also features one of the most comprehensive social services programs in the country for patients and their families, with on-site psychotherapy, a social worker, support groups, and scheduled social events; and a unique wellness program with exercise classes tailored specifically to Parkinson's patients, which data suggest may slow disease progression.

The center also collaborates clinically with other NYU Langone divisions where appropriate, referring Parkinson's patients to the Center for Neuromodulation for deep brain stimulation and to the Medical Center's neuro-ophthalmologists for diagnosis based on visual tracking.

2014 Highlights

- Launched a program to disseminate its unique Parkinson's Wellness Program nationally
- Instituted one of the country's first home-care treatment programs for patients with advanced Parkinson's disease
- Conducting clinical trials on the use of transcranial magnetic stimulation (TMS) to improve motor and non-motor function in Parkinson's patients

A HUMAN APPROACH TO PARKINSON'S

The dedication of staff to their patients is one of the center's defining attributes. "We realize these individuals have life-altering diseases," explains Alessandro Di Rocco, MD, the Founders Professor of Neurology and the center director. "So we take a very humanistic, personalized approach, maintaining a strong connection with each patient throughout the trajectory of their illness."

In 2014, the center enhanced its patient-centered focus even further by instituting one of the nation's first interdisciplinary home-care Parkinson's programs. When patients with advanced Parkinson's can no longer travel to appointments, a physician-led team, including a social worker and nurse, now visits them at home to conduct a full evaluation and regular follow-ups. The program, funded by the Edmond J. Safra Philanthropic Foundation, "is having an incredible impact on patients' health," says Dr. Di Rocco.

In another major step forward, the center is teaming with the Edmond J. Safra Philanthropic Foundation, the National Parkinson® Foundation, and Jewish Community Center (JCC) Manhattan to launch the expansion of its noted Parkinson's Wellness Program, bringing its fitness, support, education, and socialization opportunities to four additional U.S. cities over the next year.

"The goal is to help build energetic, connected, and empowered local communities for individuals and families living with Parkinson's nationwide," said Amy C. Lemen, managing director of the Edmond J. Safra National Parkinson's Wellness Initiative, and associate director of community services at the center. "We're excited at the opportunity to expand a program that is redefining what it means to live well with Parkinson's."

National Parkinson®
Foundation

Center of
Excellence



CHARTING A NEUROLOGICAL PATH TO TREATMENT

On the clinical research front, the center’s motor physiology lab is studying transcranial magnetic stimulation (TMS), which uses an external magnetic field to stimulate targeted brain neurons as a therapy for improving motor and non-motor function, and is teaming with Rusk Rehabilitation to investigate the use of TMS in recovery of motor function following stroke. Other research projects include trials of two promising medications, istradefylline, an adenosine A2 antagonist, and droxidopa.

The center is also working with NYU Langone’s Neuroscience Institute on a translational research grant to investigate how faulty brain reorganization, or maladaptive plasticity, may contribute to Parkinson’s symptoms, and how exercise, external brain modulation, and other approaches may help the Parkinson’s-affected brain reorganize in more functional ways. “This is a radically new theoretical and practical approach,” notes Dr. Di Rocco. “We think it may lead to groundbreaking treatments for Parkinson’s.”



Exercise, external brain modulation and other approaches may help the Parkinson’s-affected brain reorganize in more functional ways.

1,500 patients

receiving ongoing care

CLINICAL CARE

Pioneering New Uses for Targeted Electrical Stimulation

NEUROMODULATION

At NYU Langone's Center for Neuromodulation, deep brain stimulation (DBS) is a therapy with unfolding potential. The center's director, neurosurgeon Alon Mogilner, MD, PhD, and co-director, neurologist Michael Pourfar, MD, have been leaders in the use of DBS to alleviate physical symptoms of Parkinson's, essential tremor, and dystonia in patients who aren't responding to medication or are suffering from medication side effects such as excessive movements. Recently, they have pioneered the use of deep brain stimulation (DBS) for conditions including depression, obsessive-compulsive disorder (OCD), Tourette syndrome, cluster headaches, and neurological disorders such as Huntington's disease.

2014 Highlights

- 245 patients treated with deep brain stimulation (DBS) or peripheral nerve stimulation (PNS)
- Concluded and submitted for publication a clinical trial of DBS for the treatment of depression
- Clinical trials under way include DBS for treatment of OCD and Tourette's, and PNS for treatment of migraine headache and back pain

The center's unique expertise resides in its finely-tuned, interdisciplinary approach, including imaging and brain mapping of the DBS implantation sites to guide electrode placement, and extensive follow-up as needed to optimize electrode settings and other parameters. It has published widely on DBS clinical outcomes, and is currently conducting clinical trials of DBS for both OCD and Tourette's that do not respond to medication (Tourette's results to date "have been remarkable," notes Dr. Mogilner). The center is also participating in a multi-institution trial of a novel DBS device that selectively stimulates targeted areas of the brain.

In addition to its expertise in DBS, the center performs a large number of peripheral nerve stimulation (PNS) procedures for headache and facial pain conditions that don't respond to other treatments, including migraines; cluster and post-traumatic headache and post-craniotomy pain; occipital, supraorbital, and infraorbital neuralgia; hemicrania continua; and trigeminal autonomic cephalalgia. The center has the most extensive experience in the nation in the use of PNS for headache associated with Chiari malformation, and has conducted clinical trials of this treatment method.

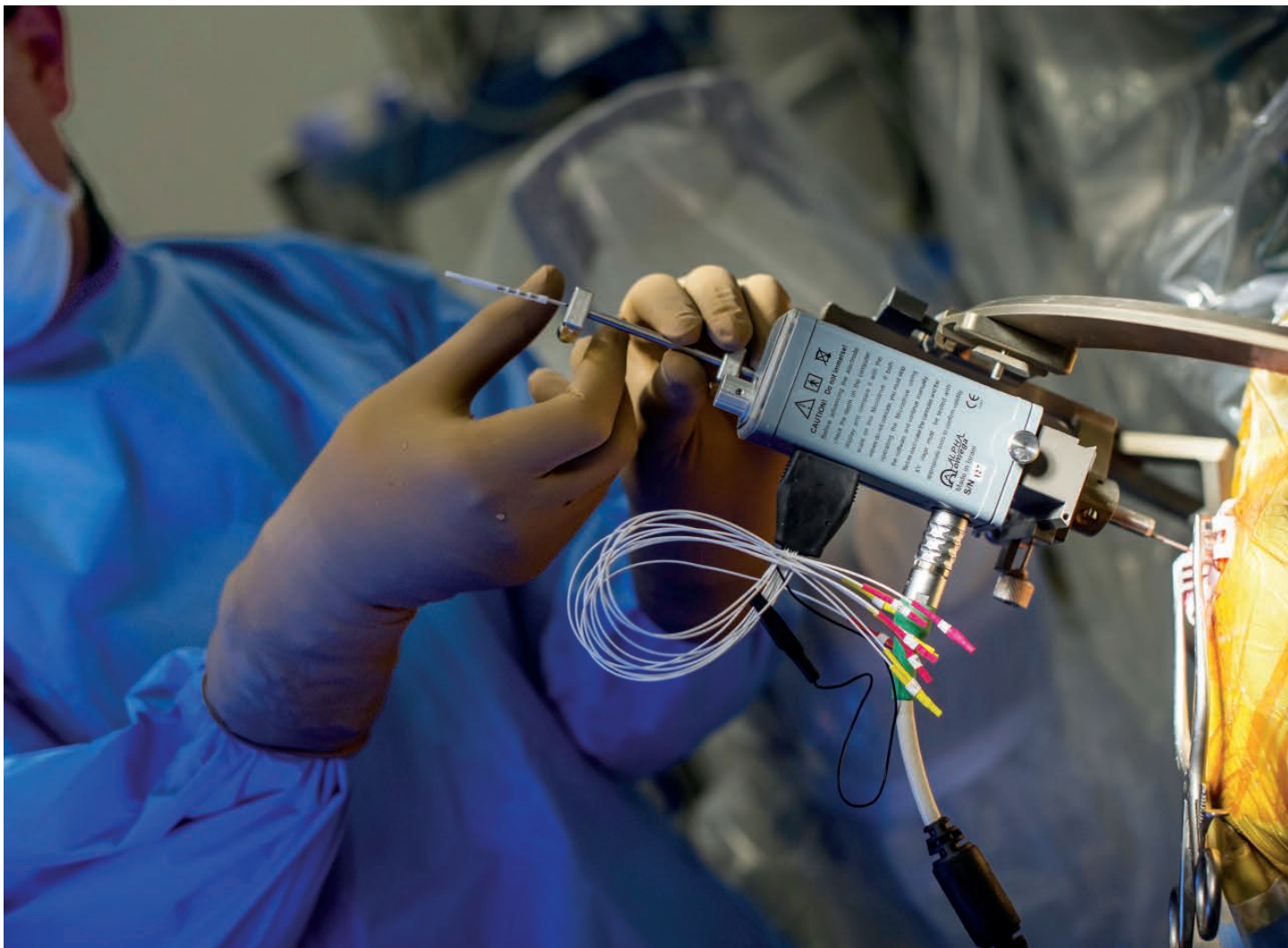
Current PNS trials include participation in a multi-site study of occipital nerve stimulation for migraine headache, and another multi-site trial of a self-regulating spine stimulating device for the treatment of intractable postsurgical back pain. The center's physicians remain focused on finding new uses for this and other therapies.

"Our goal is always to be one step ahead of the game," says Dr. Mogilner. "If a new neuromodulation application or technology becomes available, we want to be involved in the clinical trials for that new approach."

"Our goal is always to be one step ahead of the game. If a new neuromodulation application or technology becomes available, we want to be involved in the clinical trials for that new approach."

1 of 2

leading U.S. centers
in number of Tourette's patients
treated with DBS



pioneered DBS

as a treatment for PD and other motor disorders, OCD, Tourette syndrome, and depression

100+
DBS procedures
per year



CLINICAL CARE

Leading the Quest for an Alzheimer's Disease Cure

CENTER FOR COGNITIVE NEUROLOGY

2014 Highlights

- Identified and patented a novel compound, 2-PMAP, that reduces brain levels of toxic amyloid proteins by more than 50 percent in animal studies
- Developed a method to stimulate innate immunity via Toll-like receptor 9, which has been demonstrated in animal studies to reduce all the key pathologies of AD
- Multiple presentations at the 2014 Alzheimer's Association International Conference, including:
 - a novel immunization procedure used to produce monoclonal antibodies (mAbs) that recognize multiple pathological proteins, including the most toxic, oligomeric forms of amyloid beta and tau proteins
 - a new technique for imaging tau protein accumulation in the brain
 - research on the role of TRAIL death-receptors and mitochondrial dysfunction in amyloid beta-related destruction of the brain's vascular cells
 - positive results of a phase III clinical trial of memantine therapy in conjunction with a Comprehensive Individualized Person Center Management Program

Developing effective treatments for the prevention and management of Alzheimer's disease (AD) and other age-related cognitive disorders is one of today's great medical challenges, and NYU Langone's new interdisciplinary Center for Cognitive Neurology (CCN) is poised to lead the way. Featuring a cutting-edge clinical program and basic, translational, and clinical research programs, the center currently has 20 clinical trials of AD medications underway, with numerous other experimental agents about to move into human testing.

The CCN was recently formed through the consolidation of several programs, to unify NYU Langone's clinical and research efforts in this area. Programs that are now part of the CCN include the Pearl I. Barlow Center for Memory Evaluation and Treatment, which specializes in clinical diagnosis and treatment of age-related cognitive impairment; the Silberstein Alzheimer's Institute, which serves as the center's clinical research hub; and the NYU Langone Alzheimer's Disease Center, one of 29 NIH-funded AD research centers across the country, encompassing a number of affiliated labs at the Medical Center.

Combining basic, translational, and clinical research programs with

20 clinical trials

of Alzheimer's medications underway

Provides advanced clinical care for

every stage

of age-related cognitive impairment, including ready access to clinical trials

Through these linked entities, the CCN provides the most advanced clinical care for every stage of age-related cognitive impairment, including ready access to clinical trials, while its basic and translational research programs can be seamlessly incorporated into the clinic as appropriate. The increasing pace at which new medical therapies for age-related cognitive impairment are being developed is making early detection and treatment more critical than ever, notes the CCN's director and the Lulu P. and David J. Levidow Professor of Neurology, Thomas M. Wisniewski, MD.

"If someone is struggling with age-related memory issues, I urge them to come into our clinic as soon as possible," he says. "There are many things we can do now to help them—and in the relatively near future, these options will be greatly expanded."

In addition to multiple clinical trials of experimental medications, CCN investigators are refining combined MRI-PET imaging that will precisely measure amyloid and tau protein accumulation in the brain. "These scans can detect toxic brain proteins 15 to 20 years before they cause any symptoms," notes Dr. Wisniewski. "It's changing how we think about Alzheimer's. One day, everyone will get brain scans at age 50 to see what preventive steps they should be taking—just like a colonoscopy."



KEY AREAS OF RESEARCH AND DISCOVERY

- Understanding how amyloid and tau proteins contribute to AD and other cognitive disorders, including an intensive focus on amyloid precursor protein (APP) function
- Highly promising immunologic approaches, including a possible AD vaccine
- Blocking other proteins involved in amyloid deposition
- Identifying growth factors that may protect brain neurons from aging, as well as agents that may prevent free radical damage in the brain
- Using genomics to investigate how microRNAs may contribute to neurodegenerative disease
- Investigations of other brain disorders, such as prion diseases, Lewy body disease, autism, and sudden unexpected death in epilepsy

CLINICAL CARE

Comprehensive Care for the Most Complex Pediatric Neurologic Conditions

PEDIATRIC NEUROLOGY AND NEUROSURGERY

NYU Langone's Division of Pediatric Neurosurgery was the first in New York City when it was established 30 years ago. Today, it is the most active practice in the metropolitan area, known internationally for its expertise at treating pediatric brain and spinal tumors, epileptic disorders, neurofibromatosis types 1 and 2, hydrocephalus, Chiari malformations, pediatric spine disorders, and other congenital and developmental conditions.

2014 Highlights

- Performed more than 280 brain tumor, epilepsy, and spinal surgeries on children, as well as over 300 other pediatric and congenital neurosurgical procedures
- Participated in cutting-edge clinical research on the genetic basis of autism, Tourette syndrome, epilepsy, and other childhood disorders

Led by Jeffrey H. Wisoff, MD, professor of neurosurgery and pediatrics, director of pediatric neurosurgery, and the 2010 recipient of the Children's Brain Tumor Foundation Pioneer Award, NYU Langone's pediatric neurosurgeons perform more cranial brain tumor procedures annually than any other program in the New York metropolitan area, including challenging surgeries to remove complex tumors. Dr. Wisoff has pioneered techniques for the removal of deep seated brain tumors including craniopharyngiomas, suprasellar gliomas, pineal tumors, and thalamic gliomas. The pediatric neurosurgeons are also steadily expanding their use of minimally invasive endoscopic techniques for selected brain tumors, and are teaming with NYU Langone's Laura and Isaac Perlmutter Cancer Center on novel treatments for brain malignancies,

such as a recent Phase II study on the use of sorafenib following surgery for recurrent low-grade astrocytoma. Together with Dr. Jeffrey Allen, Professor of Neurology and Pediatrics and Director of the Division of Pediatric Neuro-Oncology, NYU Langone pediatric neurosurgeons and pediatric neuro-oncologists have been leaders in the national Children's Oncology Group for over three decades. "Thanks to improved treatments, our cure rate for malignant pediatric brain tumors is now 80 to 85 percent," notes Dr. Wisoff.

The division is also a major referral center for childhood epilepsy. Neurosurgeon Howard L. Weiner, MD, professor of neurosurgery and pediatrics, has pioneered surgical innovations such as the multistage procedure for tuberous sclerosis. In his epilepsy cases, Dr. Weiner collaborates with neurologists and other clinicians at NYU Langone's Comprehensive Epilepsy Center. Rounding out the division is David H. Harter, MD, assistant professor of neurosurgery, who specializes in endoscopic management of brain tumors and hydrocephalus, congenital spinal disorders, and pediatric vascular malformations, such as cavernous and arteriovenous malformations.

highest-volume

practice in the New York
metropolitan area

Houses

one of the only

dedicated pediatric neuromuscular
programs in the United States

Involved in

national research
consortiums

to identify genetic risk factors for
epilepsy, autism, Tourette syndrome,
and other childhood disorders



SPECIALIZED NEUROLOGIC PROGRAMS FOR CHILDREN

For conditions that don't require surgery, NYU Langone's Division of Pediatric Neurology provides a comprehensive array of clinical services as well as specialized programs. The neurogenetics program provides treatment for children with rare inherited conditions such as Gaucher disease and other lysosomal storage disorders; the Dysautonomia Center is the nation's only treatment site for children with familial dysautonomia; and the Elly Hammerman Center for the Treatment of Neuromuscular Disorders treats children with muscular dystrophy, cerebral palsy, myasthenia gravis, spasticity, and hypotonia.

These subspecialty services are complemented by the Medical Center's general pediatric neurology program, which treats a wide range of developmental conditions including autism, learning disorders, and complications related to premature birth. "Besides our neonatal neurology services, we're starting to develop a fetal neurology program, which will be the first of its kind in New York," adds John T. Wells, MD, chief of the Division of Pediatric Neurology. "Our pediatric neuroradiologists can now perform MRI scans on a fetus, and we also have an internationally known pediatric neuro-sonographer who does sophisticated ultrasound scans of unborn

babies." By detecting neurologic abnormalities before birth, doctors can initiate treatment at the earliest possible time.

The pediatric neurology and neurosurgery programs are part of NYU Langone's Hassenfeld Children's Hospital, allowing collaboration with numerous other disciplines, including pediatric specialists in neuro-oncology, neuropsychology, and anesthesiology; radiosurgery and skull-base surgery subspecialties; and Rusk Rehabilitation's renowned pediatric rehabilitation program.

PATIENTS FOR LIFE

With their specialized expertise in these complex conditions, NYU Langone's neurologists and neurosurgeons continue providing care to their patients even after they reach adulthood. "Because we're not just a children's hospital but a complete academic medical center, we're able to maintain ongoing relationships with the children we treat, avoiding transitions of care which have been a major impediment to young adults with pediatric and congenital diseases," says Dr. Wisoff. "They really are our patients for life."

CLINICAL CARE

Developing New Treatments for Inherited Neurodegenerative Disorders

NEUROGENETICS

When Heather A. Lau, MD, assistant professor of neurology and director of NYU Langone's Lysosomal Storage Disorders Program, got word from the FDA that Cerdelga™ (eliglustat) had been approved as a first-line oral treatment for Gaucher disease, it represented a victory both for her and for the patients she treats. Gaucher disease, a genetic condition in which a toxic lipid accumulates inside the body's cells and organs, affects just 1 in 100,000 people. Dr. Lau cares for over 120 such patients from around the globe—making hers one of the largest Gaucher practices in the world.

2014 Highlight

- Received FDA approval for Cerdelga and Vimizim, two drugs for which NYU Langone helped lead clinical trials

“There are three first-line enzyme therapies for Gaucher's, all of which my predecessors at NYU Langone helped get through the approval process, and all of which are quite good,” notes Dr. Lau. Still, they require time-consuming infusions every few weeks. Because Cerdelga™, which Dr. Lau played a central role in testing, can be taken as a pill, “it will be life-changing for the right patients.”

Gaucher's is one of more than 50 lysosomal storage disorders (LSDs) that Dr. Lau treats. Characterized by an inherited inability to manufacture certain key enzymes, these conditions lead to the buildup of toxic substances inside the brain, lungs, spleen, liver, heart, and other organs. While close to one million people worldwide are affected by some type of LSD, each individual disorder is rare and unique in its symptoms and time of onset. Notes Dr. Lau, “We get a lot of mystery diagnoses—patients who have been to a dozen other doctors before coming to us.”

LSDs are just one of the disease categories handled by Dr. Lau and her colleague, Ricardo H. Roda, MD, PhD, assistant professor of neurology, and neuroscience and physiology. Dr. Lau also treats leukodystrophies, genetic epilepsies, and inherited ataxia, while Dr. Roda specializes in mitochondrial disorders, muscular dystrophies, neuropathies, and other inherited neuromuscular diseases. Because these are lifelong conditions, Drs. Lau and Roda have ongoing relationships with their patients, collaborating with other NYU Langone specialists as needed, conducting genetic and prenatal testing, giving palliative care where appropriate, and providing adult and pediatric infusion services to replace missing enzymes.

one of the
largest

Gaucher disease practices
in the world

Member of an

NIH research
consortium

for lysosomal storage disorders



In a field where there are no cures and management options are often limited, there is a significant need for new therapeutics that may one day cross the blood brain barrier and succeed in halting progression. The NYU Langone team is currently involved in trials for numerous oral and intravenous agents and is exploring ways to permeate the blood-brain barrier to treat a variety of disorders that affect the central nervous system. Meanwhile, as a member of other multicenter research trials in LSDs, her division continues to assist in bringing new drugs to FDA

approval. In April 2014, the FDA approved the use of Vimizim®—another drug Dr. Lau’s group played a pivotal role in testing—for Morquio A syndrome.

“We are making progress,” says Dr. Lau. “With Morquio and Maroteaux-Lamy syndromes, for example, my patients have increased stamina and can attend school. They still have long-term disability issues, but their lung and heart function is better, and for patients with Maroteaux-Lamy syndrome, even their 10-year mortality has improved—so that’s compelling.”

CLINICAL CARE

Diagnosing and Treating a Wide Range of Nerve and Muscle Conditions

NEUROMUSCULAR DISEASES

The diverse and varied presentation of neuromuscular conditions can make diagnosis challenging. NYU Langone's neuromuscular physicians are among the most experienced in the field at evaluating these conditions, drawing on a full range of sophisticated testing options to assess the location, severity, and underlying physiology of neuromuscular disorders. "We have a very dedicated group of well-trained, caring physicians with expertise in a variety of neuromuscular areas," notes Howard Sander, MD, division chief.

2014 Highlights

- New faculty member Ricardo H. Roda, MD, PhD
- Launched a clinical research project on the prevalence and pathogenicity of LRP4 antibodies in myasthenia gravis

With this spectrum of expertise, the division treats a broad array of disorders involving peripheral neuropathy, myopathy, myasthenia gravis, and muscular dystrophy.

"Some of these conditions are fairly rare and they often don't have a classic presentation, so they require some digging into," adds Dr. Sander. "Making an accurate diagnosis is the key to effective treatment."

Often, the division's patients with previously undiagnosed neuropathy turn out to have autoimmune conditions that can be treated with immunosuppressant or immune-modulating medication. For example, chronic inflammatory demyelinating polyneuropathy is treatable with intravenous immunoglobulin, steroids, or plasma exchange. Many other neuropathies are now treatable with medication as well, while others can be resolved by identifying and addressing underlying medical issues such as Lyme disease, lupus, or celiac disease.



The division's expertise has been augmented by the recent addition of Ricardo H. Roda, MD, PhD, a neurogenetics specialist in inherited neuromuscular disease who was a fellow at the National Institute of Neurological Disorders and Stroke before coming to NYU Langone. In addition to treating patients, Dr. Roda currently has a three-year grant to conduct research on the nature of LRP4 antibodies in recently described forms of myasthenia gravis.

advanced diagnostic testing

capabilities include in-house electromyography lab, tissue biopsies, and genetic diagnostics

Pioneering Clinical Advances for Inherited and Acquired Autonomic Diseases

DYSAUTONOMIA CENTER

As the only center in the United States that treats familial dysautonomia (FD), NYU Langone’s Dysautonomia Center is accustomed to emergency phone calls at any hour, from all corners of the globe—which is why the line is manned by a clinician 24/7. As one of just five centers in the U.S. devoted to autonomic disorders, the center also receives a steady flow of patient visits from around the nation and the world. Ranging from toddlers to retirees, all suffer from autonomic nervous system disruptions that can inflict havoc on blood pressure, breathing, and other essential functions.

2014 Highlights

- 700 patients seen
- Center-led research efforts resulted in FDA approval of droxidopa for treating neurogenic orthostatic hypotension
- Published first study showing that carbidopa relieves FD-related nausea

The center manages these symptoms with the latest treatments—many of which it helped develop. In 2014, the center’s pioneering work led to FDA approval of the drug droxidopa for treating neurogenic orthostatic hypotension, the first new hypotension drug in 20 years. Approval of this medication was made possible by a multi-nation clinical trial, in which Horacio Kaufmann, MD, the Felicia B. Axelrod Professor of Dysautonomia Research and the center’s director, was principal investigator.

In the past year, the center published the first controlled study showing that the enzyme inhibitor carbidopa can effectively treat the severe vomiting attacks caused by FD; it is the first non-sedating therapy developed for this disabling symptom. Based on its discovery that gait ataxia in FD is caused by muscle spindle dysfunction, the center also conducted a preliminary study testing a low-tech therapy that uses athletic tape applied to the skin to provide additional spatial input to the brain. The results indicate that this approach improves FD patients’ walking ability significantly, and a controlled trial is now being planned.

Other new research from the center includes a trial showing that the nutritional supplement phosphatidylserine may be a potential gene-modifying therapy for FD, and another study linking vision loss in FD to destruction of retinal ganglion cells. The center is also spearheading an international study of patients with multiple system atrophy, a rare autonomic disorder related to Parkinson’s disease. These investigations and clinical collaboration with NYU Langone specialists, including pulmonologists, gastroenterologists, orthopaedists, cardiologists, anesthesiologists, and neurologic intensivists, positions the center at the forefront of treatment of autonomic disorders.

“Our ability to manage symptoms has progressed to a point where people with familial dysautonomia can live longer lives with a fairly good quality of life,” notes Dr. Kaufmann. “We believe we’re improving quality of life for other autonomic disorders as well. But there’s much about these complex diseases that we still need to understand.”

<p>1 of 5 centers in the U.S. dedicated to treating autonomic disorders</p> <hr/> <p>Only U.S. center that treats familial dysautonomia</p>	<p>1 of 3 accredited fellowships</p> <p>in autonomic disorders in the U.S.</p>	<p>Established</p> <p>pure autonomic failure</p> <p>as a Lewy body disorder</p>
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CLINICAL CARE

Complex Surgeries with Minimally Invasive Precision

SPINE AND PERIPHERAL NERVE

At NYU Langone's spine neurosurgery program, says Anthony K. Frempong-Boadu, MD, associate professor of neurosurgery and director of the Division of Spinal Neurosurgery, "we don't tend to see the straightforward cases." Of the 1,200+ procedures performed in 2014 by the Spine and Peripheral Nerve Center, many were challenging operations to remove spinal cord tumors such as ependymomas, astrocytomas, and schwannomas; to treat spine trauma or degenerative or congenital spinal conditions, including complex occipitocervical junction procedures; and to address peripheral nerve disorders such as carpal tunnel syndrome and nerve sheath tumors.

2014 Highlights

- 1,200+ neurosurgical spine procedures
- Presented on a new, lateral endoscopic procedure for hyperhidrosis at the International Society of Sympathetic Surgery annual conference

"We cover the whole spectrum of spinal disease," notes Dr. Frempong-Boadu, "and we cover all the bases in terms of technique as well—from the smallest endoscopic microdisc procedures to major scoliosis surgery." This ability to handle complex conditions using both open and minimally invasive procedures is a hallmark of the division. Noel I. Perin, MD, associate professor of neurosurgery and director of minimally invasive spinal surgery, has pioneered numerous endoscopic procedures, and is one of the few neurosurgeons in the world to perform endoscopic thoracic spinal surgery. The center offers a CME course on minimally invasive techniques such as endoscopic disc repair, in which a small incision is used to slip a scope between the back muscles, avoiding the need to cut through muscle tissue.



These endoscopic procedures are facilitated by advanced virtual fluoroscopy, in which a computer manipulates pre-procedural fluoroscopic images, enabling the surgeon to precisely navigate the spinal region and place screws and other instrumentation with pinpoint accuracy, while minimizing radiation exposure to the patient. To help diagnose peripheral nerve disorders, the division also has access to NYU Langone's neurophysiologists to conduct electrodiagnostic testing.

The center continues to develop new surgical approaches, recently publishing results of a novel lumbar approach to endoscopic sympathectomy for hyperhidrosis. This socially disabling condition can be cured by cutting the related sympathetic nerve—a specialty of Dr. Perin's. "Previously, endoscopic hyperhidrosis surgery involved several fairly large incisions in the abdomen," he says. "With this new approach, we make one small incision in the side, then go in with a scope to snip the nerve—and immediately, the patient's hands are dry."

pioneers

in the use of minimally invasive surgical techniques for treating the spine and spinal cord

one of the few

U.S. centers specializing in neurosurgical treatment of hyperhidrosis

Treating the Full Spectrum of Neurologic Conditions

GENERAL NEUROLOGY

NYU Langone’s General Neurology Division serves two essential roles: Its large staff of board-certified neurologists provides diagnosis and treatment each year for thousands of patients with neurologic conditions such as headaches, back and spinal pain, neuropathy, stroke, neuromuscular problems, seizure disorders, dizziness and vertigo, and neurodegenerative conditions. At the same time, they serve as an access point to the Medical Center’s neurologic subspecialties for patients whose conditions require more targeted care.

As a major regional referral center, the division has expertise in diagnosing and treating the full range of neurologic conditions. For complex diagnoses, they utilize the Medical Center’s sophisticated array of diagnostic technologies, including its neuroradiology, electromyography, electrophysiology, and neuro-ophthalmology capabilities. The division also works closely with other NYU Langone disciplines, including pain management, vascular specialists, and neurosurgeons.

In cases where more targeted neurologic care is required due to the nature or progression of the patient’s condition, the division’s neurologists will refer their patients to the appropriate subspecialty area or center, such as the MS Comprehensive Care Center and the Center for Cognitive Neurology. Patients then have the option of consulting with these centers while their care continues under one of NYU Langone’s general neurologists, or transferring their care to the center itself. In either scenario, patients have ready access to clinical trials of experimental medications and other investigational therapies.

“We’re essentially a hub that extends in all directions,” says Harold J. Weinberg, MD, PhD, professor of neurology and division chief of general neurology. “As part of an academic medical center, we have tremendous resources available in the form of neurophysiologic testing, monitoring, and advanced treatment options. At the same time, for the 10 percent of our patients whose needs go beyond the scope of general neurology, we are able to connect them directly with state-of-the-art subspecialty care.”

In the past year, the General Neurology Division has become the primary treatment center for patients referred to NYU Langone’s Concussion Center for concussions due to non-sports-related causes, such as a fall or work-related accident, and it currently treats several concussion patients per day on average. In 2014, the division also added its first faculty member dedicated purely to the treatment of headaches—an area that has seen considerable therapeutic progress in recent years and is expected to be an ongoing focus of clinical research.



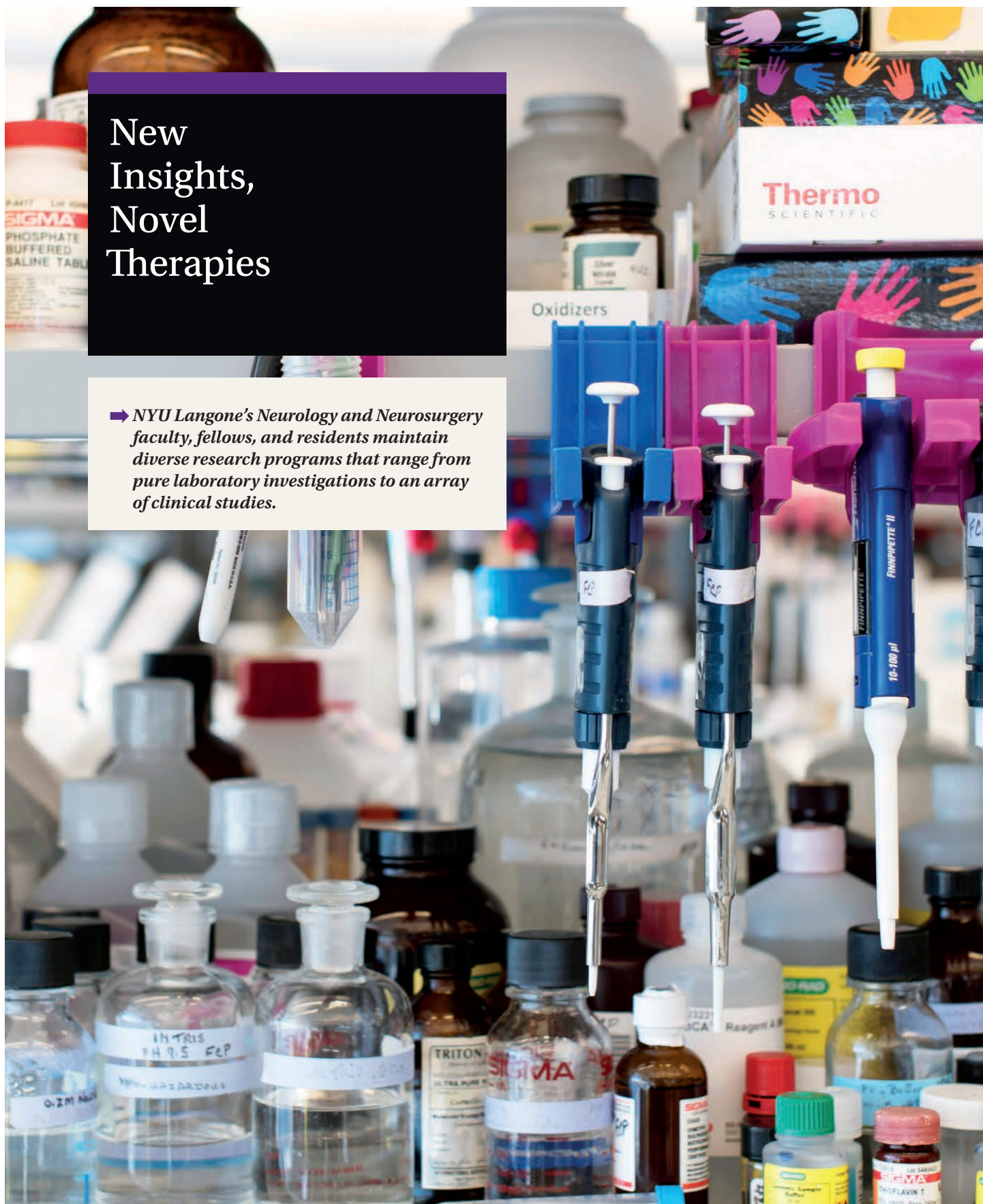
9
board-certified
neurologists

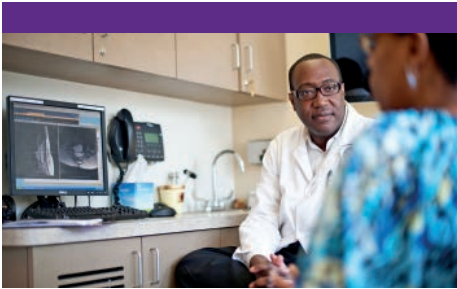
thousands
of patients
seen each year with neurologic
conditions from headaches
to neurodegeneration

RESEARCH

New Insights, Novel Therapies

➔ *NYU Langone's Neurology and Neurosurgery faculty, fellows, and residents maintain diverse research programs that range from pure laboratory investigations to an array of clinical studies.*

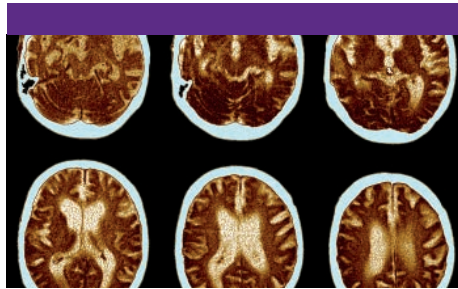




Clinical Research

The Neurology and Neurosurgery Departments participate in numerous multi-site clinical trials, are engaged in establishing patient registries and bio-tissue databases for various neurologic diseases, and belong to national research consortiums investigating genetic risk factors for these conditions. Important areas of investigation include:

- Medications for neurogenetic, movement, autonomic, and seizure disorders and neurodegenerative diseases
- Applications and techniques for deep brain stimulation
- Applications for radiosurgery
- Stroke-care protocols
- Enhanced imaging techniques for epilepsy, brain tumors, cerebrovascular conditions, and neurodegenerative diseases
- Use of neuro-ophthalmologic tools to diagnose and track neurologic disorders
- Evaluation of chemotherapy and radiation treatments in conjunction with the neurosurgical treatment of malignant brain and skull base tumors
- New surgical approaches and technologies for the treatment of cerebrovascular, spine, and peripheral nerve conditions
- Novel therapies, such as the use of transcranial magnetic stimulation for Parkinson's disease



Translational and Basic Research

The Center for Cognitive Neurology carries out extensive basic and translational research activities designed to elucidate the underlying pathophysiologic mechanisms of Alzheimer's disease and other neurodegenerative diseases, and to develop new therapeutic targets.

The Department of Neurosurgery maintains five basic science laboratories:

- Mechanisms that regulate and modulate pH in the mammalian brain, and the role of these processes in disorders such as seizure, stroke, cardiac arrest, and brain tumor growth
- The regulation of dopamine in motor and reward pathways in the brain
- The study of stem cell function in the context of gliomagenesis, neurogenesis, and neuropsychiatric disorders
- Biological approaches to decreasing edema (swelling) in the brain after a hemorrhage
- Genetic pathways involved in the development of central nervous system tumors

The departments also work closely with other NYU School of Medicine research institutions, including the Sackler Institute of Graduate Biomedical Sciences and the NYU Neuroscience Institute, an integrated network of basic scientists and physician-researchers drawn from across the Medical Center, other areas of New York University, and the Nathan Kline Institute.



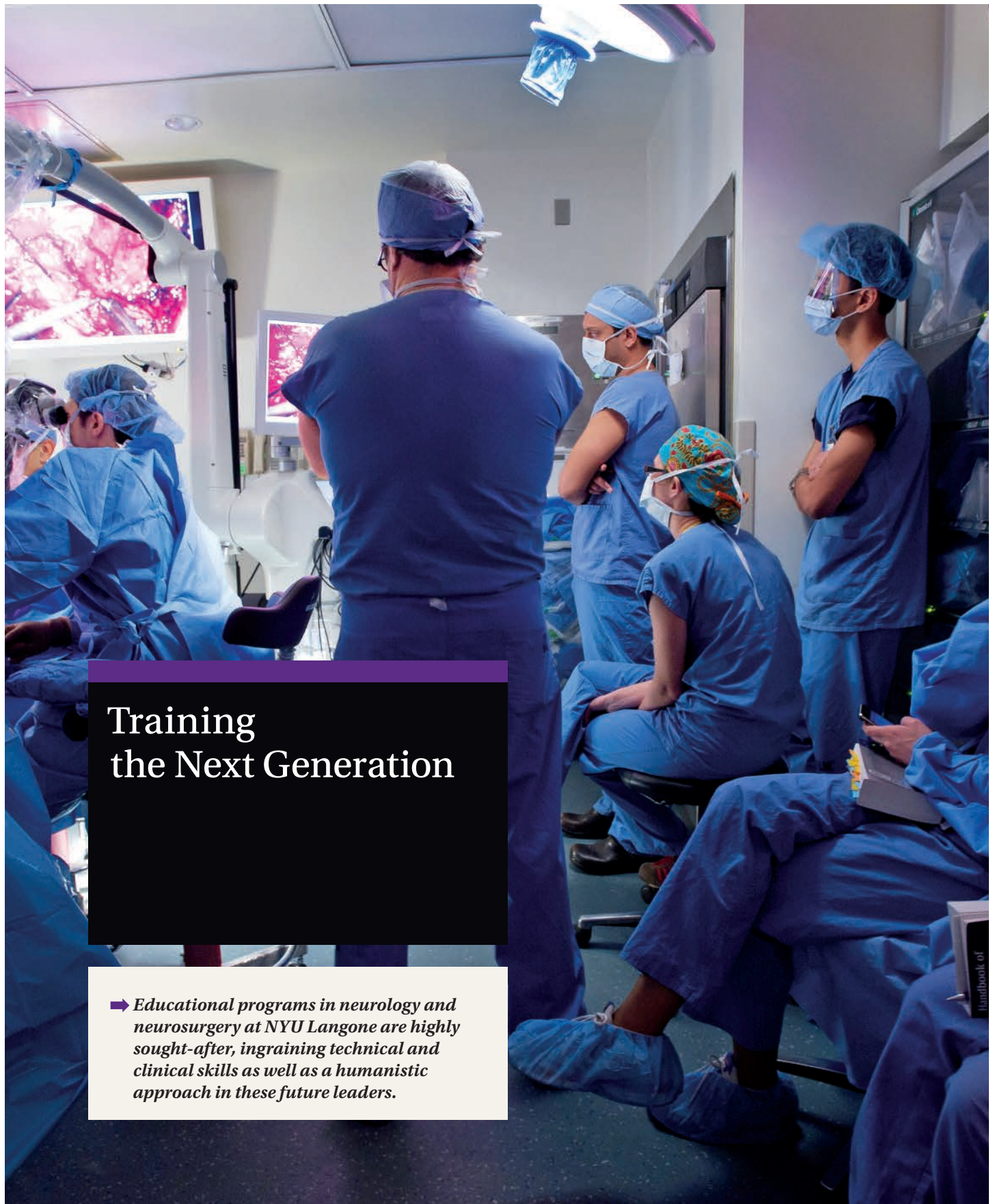
Research Mentoring

The mentoring of students, residents, and junior faculty is a high priority of our research programs. Individual mentoring is stressed, and is complemented by a program of journal clubs, seminars, and joint laboratory meetings.

“To understand disease, you have to understand the basic workings of cells. What’s unique about NYU Langone is a deep appreciation for research at every level, from developing new clinical techniques to basic research.”

Mitchell Chesler, MD, PhD
Vice Chair of Research, Neurosurgery

EDUCATION & TRAINING



Training the Next Generation

➔ *Educational programs in neurology and neurosurgery at NYU Langone are highly sought-after, ingraining technical and clinical skills as well as a humanistic approach in these future leaders.*

Neurology

2014 Highlights

- Neurology residency slots increased from seven to nine
- Neuro ICU rotation added to neurology core clerkship
- Received approval for new, accredited stroke fellowship
- Four-day CME training program in Gamma Knife® surgery
- Two-day Clinical Neurology Update CME course
- Establishment of the Neurology Global Health Division to provide residents with training opportunities in the developing world



RESIDENCY TRAINING

In 2014, the Neurology Department increased the number of residents accepted annually into its three-year residency program from seven to nine (a six-year combined neurology/psychiatry residency is also available for one to two candidates per year; a three-year pediatric neurology residency is also available for one to two candidates per year). Residents rotate through a wide range of required and elective neurologic subspecialties, including a newly established Neuro ICU rotation, and participate in a unique, patient-oriented clinical research curriculum.

Training includes inpatient responsibilities at Tisch Hospital, Bellevue Hospital Center (where residents provide the bulk of medical services), the Manhattan VA Hospital, and NYU Langone's Comprehensive Epilepsy Center, as well as regular outpatient clinic hours at Bellevue and the VA. In addition, NYU Langone maintains a pediatric outpatient neurology clinic where pediatric and adult neurology residents treat children with neurological disorders. The residency program currently has two students enrolled in NYU School of Medicine's new, three-year MD-Neurology Track, in which students are accepted into the neurology residency upon entering medical school, and begin their residency after their third year of medical school.

Residents can also conduct extended translational research with financial support at the Center for Cognitive Neurology. The department recently launched a global health initiative as well, offering residents the chance to practice clinical neurology in developing nations.

FELLOWSHIPS

Post-residency fellowship training opportunities include:

- A one- to two-year ACMGE-accredited fellowship in autonomic disorders—one of three in the U.S.
- One-year accredited fellowships in
 - Clinical neurophysiology
 - Vascular neurology (includes training in neuroradiology, neuro-sonology, and neuro-critical care)
- Two one-year fellowships in movement disorders
- One-year fellowship in Neuro-Ophthalmology
- A newly established, accredited stroke fellowship
- Two year-long fellowships at the MS Comprehensive Care Center, one in clinical care and one in clinical research
- A non-accredited one- to two-year fellowship at the Comprehensive Epilepsy Center for physicians who have completed clinical neurophysiology fellowship training

Planning is under way for a sports neurology fellowship centered on the Concussion Center, and a multidisciplinary pain medicine fellowship is available to neurologists within the Department of Anesthesiology.

The Pediatric Neurology Division offers three- and five-year residencies that are essentially fellowships, since all participants have participated in pediatric residency training. The Medical Center recently recruited Kaleb Yohay, MD, a nationally known pediatric neuro-oncologist and neurofibromatosis expert, to contribute to its pediatric neurology education program.

EDUCATION & TRAINING

Neurosurgery

RESIDENCY TRAINING

The Neurosurgery Department accepts two residents per year into its seven-year residency program, and will expand to three residents in alternating years, starting in 2015. Residents are given increasing responsibility as they rotate through all neurosurgical subspecialty services at Tisch Hospital, Bellevue Hospital Center, and the Manhattan VA Hospital. Beyond learning the world's most advanced surgical techniques in our advanced operating rooms, residents have access to the Surgical Theater, a three-dimensional surgical simulation tool. They also have the opportunity to pursue research projects in one of the division's basic science labs, with their fifth year devoted to research. The residency program, now the largest in New York State, currently includes two graduates of NYU School of Medicine's new neurosurgery track, in which students are accepted into the neurosurgery residency upon entering medical school, and begin their residency after their third year of medical school.

A high volume of patients, extensive surgical facilities, and diverse clinical settings afford neurosurgical residents a unique opportunity to gain hands-on surgical experience in all subspecialty areas, beginning at the very start of their residency.

FELLOWSHIPS

The Department of Neurosurgery offers several fellowships on an ongoing basis:

- International Visiting Fellowship through the World Federation of Neurosurgical Societies
- Pediatric Neurosurgery: Intra- and Post-residency
- Complex Spine Fellowship: Intra- and Post-residency

In addition, clinical neurosurgery fellowships may be offered in spine surgery, stereotaxis/radiosurgery, pediatric neurosurgery, endovascular surgery peripheral nerve surgery, and epilepsy surgery.

FERTILE TRAINING GROUND

Clinical training sites

Trainees rotate through three hospital systems, all located in close geographic proximity but spanning the municipal and federal sectors, offering a broad and varied clinical experience treating the diverse and unique patient populations within:

- NYU Langone Medical Center's Tisch Hospital
- Bellevue Hospital Center
- Manhattan VA Hospital
(VA NY Harbor Healthcare System)

UPCOMING CME COURSES

Second Annual 'Concussion in Sport': The Latest in Diagnosis and Management

February 27, 2015

Course Directors: Laura J. Balcer, MD, MSCE; Dennis A. Cardone, DO; Steven R. Flanagan, MD; Dina Pagnotta, MPT, MPH

Neuropsychiatric Symptoms in Parkinson's Diseases: Addressing Unmet Needs

March 1, 2015

Course Director: Rebecca Gilbert, MD, PhD

Comprehensive Training Program in Gamma Knife® Radiosurgery

April 13-16, 2015; June 15-19, 2015

Course Directors: Douglas Kondziolka, MD, MSc, FRCS(C), FACS; Joshua S. Silverman, MD, PhD; Kerry Han, PhD

FOR MORE INFORMATION,
GO TO
NYULMC.ORG/CME



Neurology
and Neurosurgery
collectively have

40+
residents in
training

houses 1 of 3
ACMGE-accredited
fellowships

in autonomic
disorders in the U.S.

90% of
neurosurgery
residents

join the faculty at
leading U.S. academic
medical institutions

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