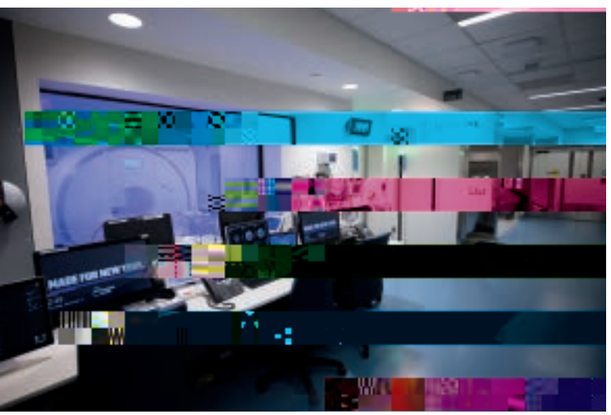
Deeper intraoperative insight is transforming the neurosurgical team's treatment of complex tumors, allowing surgeons to achieve full resection by better distinguishing margins from normal brain tissue, identifying complications such as hemorrhage with a new level of accuracy, and circumventing problems such as shifting brain tissue that typically obscures tumor margins and is missed by less precise intraoperative MRI. “ e availability of intraoperative MRI makes surgery more e cient and safer for our patients



Complex Case

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When a patient with recurrent neurological symptoms underwent imaging that revealed a cavernous malformation in the brain, the 49-year-old was referred to experts at NYU Langone Health's Center for Stroke and Neurovascular Diseases for surgical intervention. [illegible]ere, a carefully planned multidisciplinary approach guided by advanced technology enabled a successful resection and restored the patient's quality of life.

Howard A. Riina, MD (Photo credit: Keiji Drysdale)

Howard A. Riina, MD (Photo credit: Keiji Drysdale)

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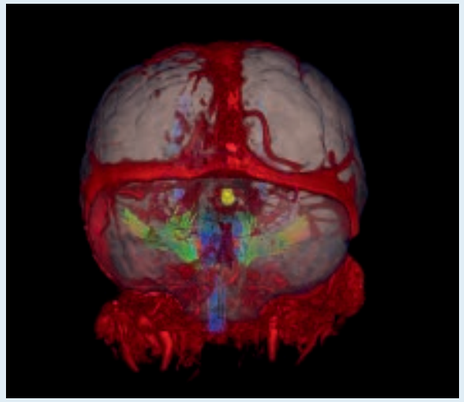
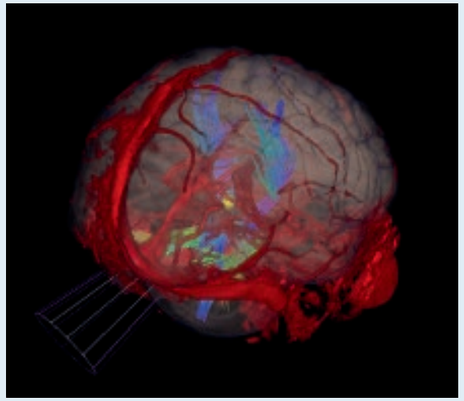
At another institution, a presentation of headaches, visual problems, and hemisensory loss precipitated the diagnosis of obstructive hydrocephalus and intracranial hemorrhage. Imaging subsequently revealed a cavernous malformation at the tectum, and active surveillance was recommended. Two years later, imaging prompted by recurring symptoms revealed a repeat hemorrhage at the posterior tectum, and studies four months later showed expansion of the cavernous malformation without resorption of the hemorrhage.

F[illegible] C[illegible]N DE[illegible]I[illegible]E, HE[illegible] [illegible]HAGE I[illegible]C[illegible]E[illegible] EA[illegible]E

The patient's increasing sensory abnormalities and headaches led Howard A. Riina, MD, professor of neurosurgery, neurology, and radiology, vice chair of the Department of Neurosurgery, and director of the Center for Stroke and Neurovascular Diseases, to consider surgical intervention, a challenging option that had been ruled out by other experienced surgeons. The patient's history also supported surgery: Although the hemorrhage rate is initially 0.25 percent to 2.3 percent, the rate climbs to 30 percent to 40 percent for patients with symptomatic recurrent hemorrhage, making resection urgent.

In light of the technical challenges and significant risks, Dr. Riina's extensive surgical experience would be critical to the successful management of this case. "A case as complex as this one requires both a precise approach and advanced imaging," says Dr. Riina. "Superimposing a fused image of the brain and vascular anatomy on the patient both guides our approach and allows us to avoid all critical vascular structures and motor pathways so we can confidently achieve full resection."





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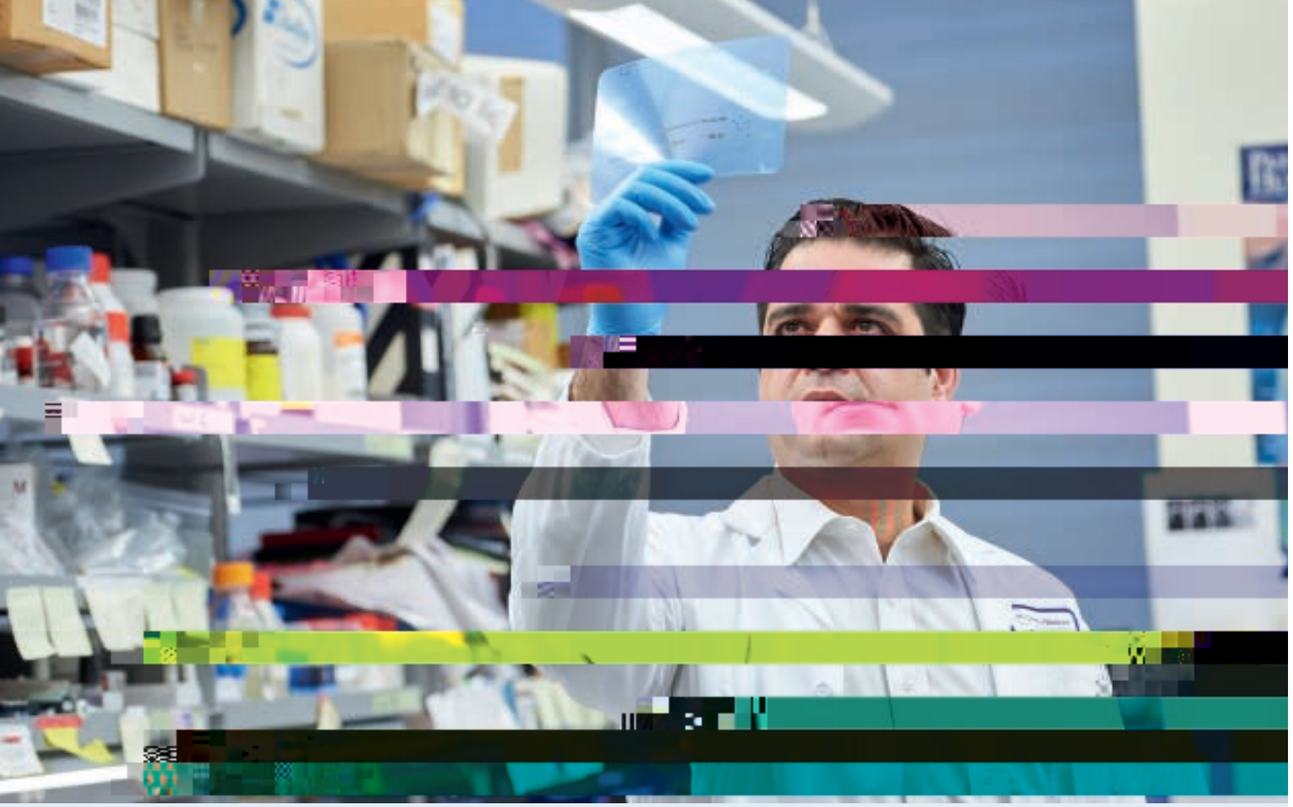
Multi-planar, multi-sequential MRI showed a malformation with a hemosiderin rim measuring 1.2 centimeters by 1.1 centimeters in the right paramedian tectum, with evidence of chronic hemorrhage. A developmental venous anomaly inferior to the lesion drained into the right ambient cistern, and a ventriculoperitoneal shunt catheter with a right 2.7 (t(i)-10.1 (e)-15.5 (n)-12.7 (t c)-7.2 (i)-6.7 (ri)1.4 (un)-0.7 (tt c)-7.-)-13. Twm12.7 (i)-11.1 (dt)12 (r)12-13.9 (m)-17.osideddrdetoRèto te merhe rigo t a0.2 (e)-dr1.1 (d)-12.8 (e)-15.ddrde rii5 ( )]TJ-16.8r4



Expanded Edge of Brain Tumor Treatment and Advanced Medical Data Science

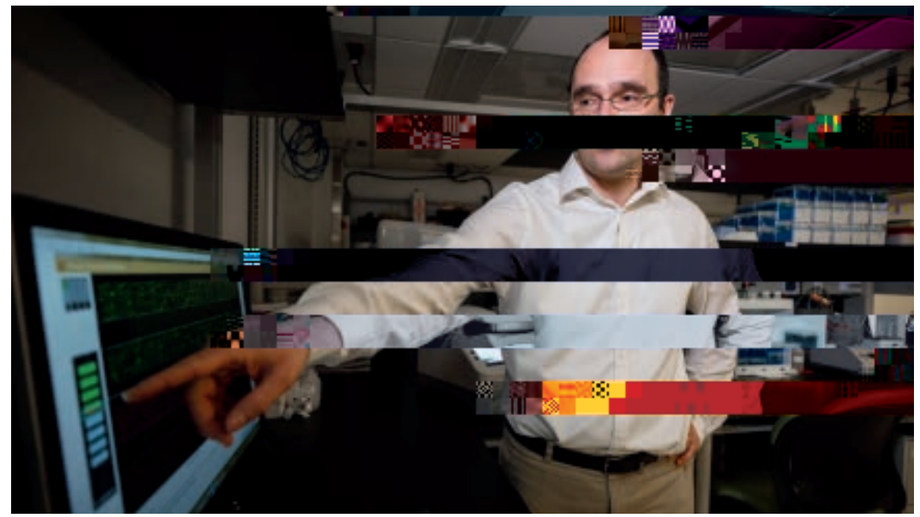
Clinicians at NYU Langone Health's Brain Tumor Center are expanding brain tumor treatment options with a new laser-based ablation approach, and a collaborative e ort to develop genetically based cancer screens is advancing the complementary elds of cancer diagnosis and cancer research.

Dimitris G. Placantonakis, MD, PhD

A E A A IDE I I I A I E AC A E

Laser interstitial thermal therapy (LITT), a tumor ablation technique in use at NYU Langone over the past year, o ers a new treatment approach to inoperable brain tumors. Stereotactic navigation guides the placement of an infrared laser probe that heats and destroys the adjacent cancerous tissue, with real-time MRI informing the precise positioning required for this treatment. " is approach gives us tremendous control over the ablation process," notes Dimitris G. Placantonakis, MD, PhD, assistant professor of neurosurgery. "It expands our reserve of treatments in cases that lack surgical options because of tumor location, or when a patient's age or overall health makes a craniotomy unfeasible."

e therapy's application in an 80-year-old patient with a



e gene panel will be used as a foundation for detailed cancer investigations, with ndings then translated into basic science studies that could lead to therapeutic targets. Eventually the panel could be used to screen all cancer patients and o ered as a service to regional medical centers that lack such diagnostic resources. “To have our own large sequencing panel that serves as a agship genomic screen for national institutions represents a new era for NYU Langone,” says Dr. Snuderl.

Two additional novel screens developed by Brain Tumor Center researchers are being reviewed for approval by

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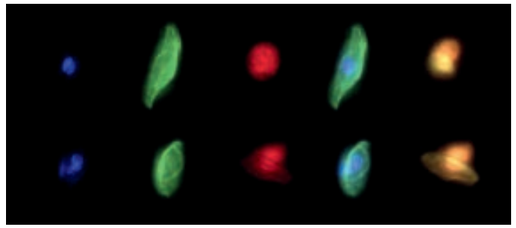

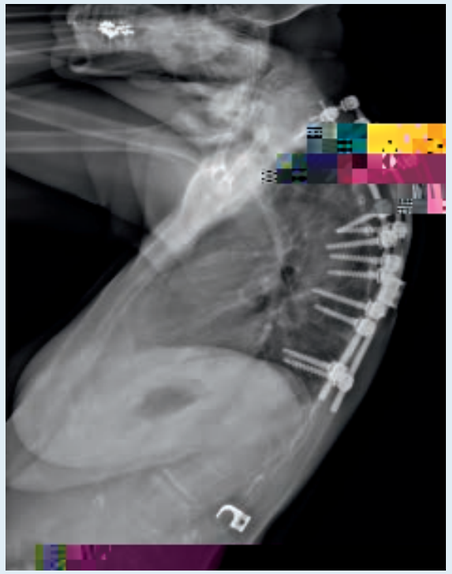

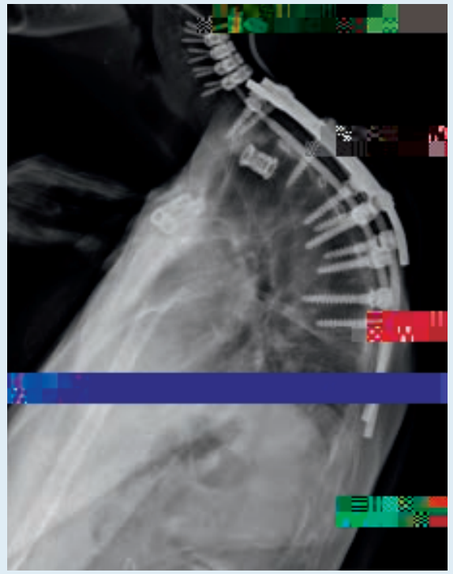

Temporary stabilizing rods were placed, and the transverse processes were removed before resection of the posterior lateral bony elements and bilateral T2 pedicles. Careful dissection around the T2 vertebral body to the ventral midline was achieved without injury to the soft tissue structures and the great vessels. The vertebrectomy was performed from inferior T1 to the superior T3 endplates, the epidural plane was opened, and the posterior longitudinal ligaments were tamped into the defect. A titanium expandable cage was placed and packed with bone graft harvested from the

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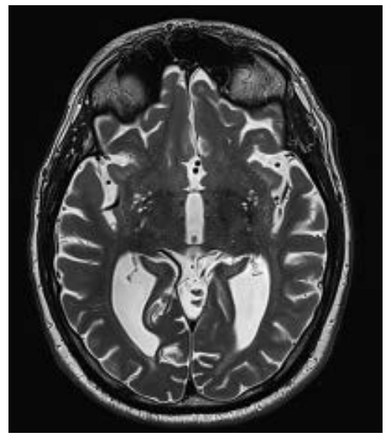

New Technologies Target the Brain to Control Movement Disorders

To con rm that symptoms can be reduced without unwanted side e ects, physicians precisely map the brain area, and then apply test doses of HIFU to produce a temporary lesion. Once the target is con rmed, the patient receives multiple 30-second treatment doses inside an MRI machine in an outpatient procedure that takes just a few hours to complete. “It’s pretty remarkable to have somebody come in with a tremor they’ve had for 20 years, then return home the same day with the tremor taken care of,” notes Dr. Mogilner.

Use of HIFU for essential tremor has been approved by Medicare, and private insurance companies are expected to follow suit within the next year. e procedure’s applications could expand considerably as clinical trials explore its use for symptoms associated with other neurological disorders, such as motor function in individuals with Parkinson’s disease.

It’s pretty remarkable to have

Select Publications

Ashayeri K, Sahasrabudhe N, Galic V, Beric A, Smith M. Retrospective analysis of EMG-evoked potentials in cortical bone trajectory pedicle screws. *Clinical Spine Surgery*. October 2018; 31(8): E391–E396.

Barger J, Siow M, Kader M, Phillips K, Fatterpekar G, Kleinberg D, Zagzag D, Sen C, Gol nos JG, Lebowitz R, Placantonakis DG. e posterior nasoseptal ap: a novel technique for closure after endoscopic transsphenoidal resection of pituitary adenomas. *Surgical Neurology International*. February 2018; 9: 32.

Bready D, Placantonakis DG. Molecular pathogenesis of low-grade glioma. *Neurosurgery Clinics of North America*. January 2019; 30(1): 17–25.

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Awards & Recognition