EVERY ASPIRING PHYSICIAN DREAMS OF THE DAY SOMEONE WILL

"Unlike a heart or a liver, whose function is basically mechanical, a face is central to a person's identity. Emotionally, it stands alone."

COVER STORIES

PHOTO: NYU LANGONE STAFF

NYU School of Medicine
E MEDICAL CENTER

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Teamwork: the Cornerstone of Outstanding Medical Care

TIME AND TIME AGAIN, we see that hospital patients do best when the people caring for them share common goals and values, communicate effectively, and solve problems as a group rather than in isolation. Members of these teams have each mastered their own roles, know they can depend on each other, and thrive in environments conducive to collaboration and coordination. A dramatic example of this is the NYU Langone team that recently performed the most extensive face transplant in history.

In case you missed the headlines, Patrick Hardison, the recipient, ` jX+ ( $ p \ X i $ X c k [ _ f \ ] i Ô m X e ] f i d \ i m f c l e k Ô \ i i \ Ô ^ _ k \ i n _ f j \ ] X Z n \ X j j \ m \ i \ c ` p j Ô ^ l i \ ` [ e k _ c ` e f \ ] [l k p (+ p \ X i X ^ f % Last August, he underwent a 26-hour marathon surgery, led by Eduardo D. Rodriguez, MD, DDS, the Helen L. Kimmel Professor of Reconstructive Plastic Surgery and chair of the Hansjörg Wyss Department of Plastic Surgery, to replace the skin and underlying tissue of his face, head, and neck. The operation was a success, thanks to Dr. Rodriguez's team of over 100 experts, drawn from a remarkably wide range of disciplines, from plastic surgery and transplant medicine to social work and psychology. Many of them trained together for over a year, rehearsing every step of the procedure over and over again until they could do it their sleep. You can read about their remarkable effort on page 10. I think you'll agree that their story is a true testament to the power of collaboration. c c z \ ^n.

PHOTOGRAPH BY
JOHN CARNETT

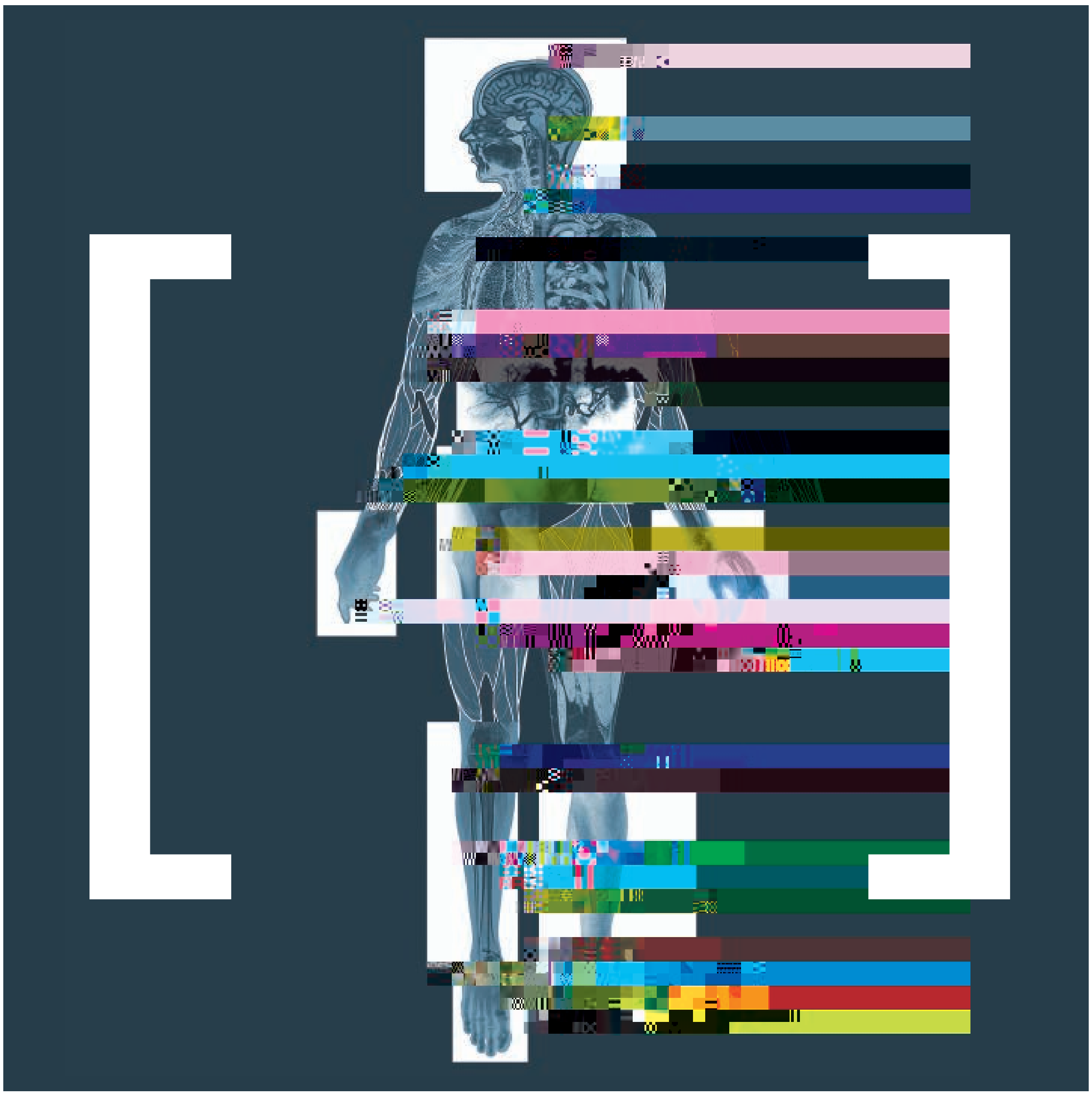

IMAGE: MEHAU KULYK, SCIENCE PHOTO LIBRARY / GETTY IMAGES

The idea is not to improve the technology of imaging but to recon gure how physicians interact with radiology services and radiologists.

REDESIGNING RADIOLOGY, PAGE 4 Æ

TEVE JOBS once said that design is “not just what it looks like and feels like. Design is how it works.” The visionary Apple CEO was talking about the iPod, the gadget that transformed the music industry, but his philosophy has struck a chord among researchers at NYU Langone.

Funded by a four-year, $4-million grant from the U.S. Agency for Healthcare Research and Quality, an innovative partnership between radiologists and population-health experts at the Medical Center aims to reimagine how radiology works in sprawling healthcare systems. The idea is not to improve the
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how physicians interact with radiology services and radiologists, and vice versa. “Our goal is to determine how radiologists and non-radiologists can work together to improve patient safety and clinical outcomes,” says Soterios Gyftopoulos, MD, assistant professor in the department of radiology, who is
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leading the project.

Radiology is not more error prone than any other aspect of medicine. The problem is that over the years, radiology has ingrained itself into virtually every medical specialty and every healthcare setting, with too little attention paid to the day-to-day practicalities of ordering tests,
Zfddle`ZXk`e^ Ôe[`e^j# fi dXeX^`e^
follow-ups.

“If you need surgery, you go to the appropriate expert: a surgeon,” explains project co-leader Leora Horwitz, MD, associate professor of population health and medicine, and director of the Center for Healthcare Innovation and Delivery Science at NYU Langone. “But if you need a radiology test, it’s ordered by your primary care doctor, your orthopaedist, your oncologist, and so on. It’s not done by the radiologist, the one who really knows which type of scan is better to answer a given question.”

A second issue concerns how results are communicated. “A radiologist might report that there’s a 1-centimeter-wide cyst in the ovary, with the classic recommendation: ‘Clinical correlation advised,’” says Dr. Horwitz. “A more standardized report, with concrete guidance and a reference to supporting evidence would be much more helpful.”

Then there’s the issue of follow-up. “Let’s say an ER patient with a bad cough gets a CT scan that reveals a small lung nodule,” says Dr. Horwitz. “That scan should probably be repeated in a year to make sure it’s not cancer. But if I’m your primary care doctor, how do I know you’ve had a scan? How do I remember a year from now to follow up? I’m not pulling up charts of all my 5,000 patients every day.”

Considering that 400 million radiological tests are performed in the U.S. each year, the conseqpful.”l my4000e to support (v

GEORGE MILLER, MD

HIJACKING THE IMMUNE SYSTEM

A rogue immune receptor conspires with gut microbes to fuel pancreatic cancer.

colleagues recently found that at least one TLR protein can be co-opted by an aggressive pancreatic cancer. In susceptible mice, the researchers discovered that a TLR protein known as TLR9 can actually promote the equivalent of human pancreatic ductal adenocarcinoma. Deleting the receptor's gene or blocking its function, conversely, protected the mice against tumor gif^i\jj`feÇXe le\og\Zk\[ Ôe[`e^ k_Xk points to a potential therapeutic target for a devastating disease.

More than 95 percent of patients jlZZldY n`k_`e Ôm\ p\Xij f] [`X^efj`j diagnosed with pancreatic ductal adenocarcinoma, making it the fourth deadliest kind of cancer in the United JkXk\j% :_ife`Z `eÕXddXk`fe f] k_\ pancreas can increase the risk of this cancer by 15-fold, and multiple studies _Xm\ c`eb\[`eÕXddXk`fe kf

progression. The mechanism behind the initial tumor formation, however, has remained unclear.

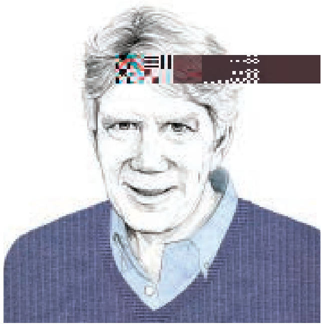
The new study's key experiments used mice with a pancreatic cancer–linked genetic mutation. When the researchers activated TLR9 by adding the right mix of molecular bait for the protein to recognize and latch onto, tumor formation ensued, and the cancer accelerated. In these mice, additional experiments showed that the receptor gets turned on in a subset of pancreatic cells that mature and then pump out chemicals that promote tumor cell proliferation and keep the immune system suppressed within the tumor.

By genetically blocking or deleting the gene for TLR9, the researchers were able to protect the mice from tumor formation and improve their odds of survival. "The clinical implication is to potentially use this strategy in patients who are at high risk for pancreas cancer, to block TLR9," Dr. Miller says. Several research groups are already investigating small molecules that may block the receptor and work as anticancer agents.

@eki`^l`e^cp# k_\ i\j\XiZ_ Ôe[`e^j Xcjf implicate the microbiome, or the entire collection of microbes that naturally inhabit the gut, in pancreatic cancer. The study suggests that certain gut-dwelling bacteria can move into the pancreas. Once there, bacterial DNA sequences bind to TLR9, which then signals pancreatic cells to begin releasing the tumor-aiding chemicals.

This pancreatic cancer–boosting mechanism, it seems, may be hijacking a microbial sythe9rea vRe59 (RE>1n (ug)10us)10.1 (g sm5C>Tj /45 753 c u1]rea)1n(theTd [)15 (tune J -1

deploy and protect the intestinal wall from potential invaders. The new



N MULTIPLE sclerosis, the malfunctioning immune system targets an insulation-like cover called myelin that

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professor of cell biology, and neurology and neuroscience. “But we found a way to coax them and make them much better at it.”

K_Ô e[`eZ\ek\fiej fe`Z\[^_f^# a well-studied gene whose encoded protein directs early brain development by sending signals that turn on other genes. Some scientists had suggested that boosting this protein's signaling activity might aid myelin repair.

Instead, Dr. Salzer and colleagues have found just the opposite. “The big surprise from our study was that one of key endpoints in the hedgehog pathway actually turns out to be a brake on myelin repair,” says Dr. Salzer, whose k\Xd i\Z\ekcp glYc`j_\[ `kj Ôe[`e^j `e the journal Nature.

In one set of experiments, the researchers effectively released that brake by genetically depleting the brain's stem cells of GLI1, one of the genes normally turned on by sonic hedgehog. This disruption in hedgehog-directed signaling, they found, allowed the stem cells to be converted into a bigger crew of myelin-manufacturing specialists.

A second set of experiments yielded j`d`cXi i\jlckj% K_\ jZ`\ek`jkj Ôijk inoculated mice with a protein that provoked the immune system to attack the neurons' myelin covering, and then an experimental drug called GANT61, which has been previously shown to target GLI1. After a month on the drug, previously paralyzed mice regained most of their mobility, while their untreated counterparts remained severely disabled. At the cellular level, the treated mice retained 50 percent more myelin, on average, and lost far fewer of the motor neurons that control movement in the lower extremities. By inhibiting the GLI1 protein, the GANT61 drug may free up the brain's stem cells to orchestrate the necessary myelin repairs.

KiXejcXk`e^ k_\j\ Ôe[`e^j `ekf Xe effective therapy will require a better understanding of how GLI1 proteins behave in humans, and Dr. Salzer believes a more potent drug will be needed. Even so, he says, the discovery of an “exciting target that hadn't been explored” and his experimental results have earned his group a grant from the National Multiple Sclerosis Society and provided new momentum toward a badly needed clinical intervention.

● —BRYN NELSON

NEW FACE, NEW BEGINNING

Inside the 26-hour marathon surgery that ^Xm\ Ôi\Ô^_k\i GXki`Zb ?Xi[`jfe X e\n]XZ\ÇXe[set a new standard for transplantation medicine

BY KENNETH MILLER

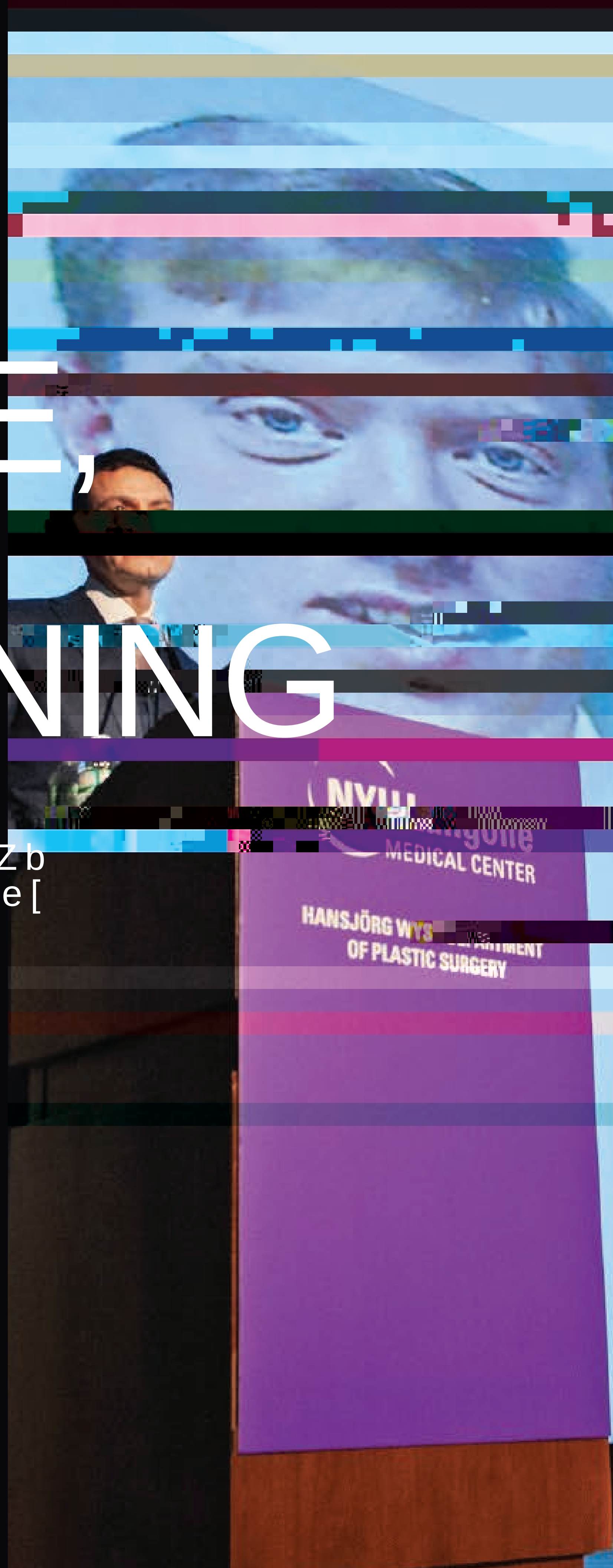

PHOTO: BRYAN THOMAS / GETTY IMAGES

Eduardo D. Rodriguez, MD, announces the completion of the most extensive face transplant to date during a press conference held at NYU Langone Medical Center last November.

Dr. Rodriguez (left) jettisoned a career in dentistry when a mentor recognized his talent with a scalpel.

◀

AT 7:00 P.M.

on August 14, 2015, surgeons lifted the skin from Patrick Hardison's head as if pulling off a ski mask, exposing the underlying bone, muscles, ligaments, and blood vessels. With an electric saw, Eduardo D. Rodriguez, MD, DDS, removed the patient's nasal and chin bones. The only features that remained recognizable were Hardison's bright blue irises, staring out from naked eyeballs."That's when it became clear that there was no turning back," recalls Leslie Bernstein, administrative director of NYU Langone Medical Center's Hansjörg Wyss Department of Plastic Surgery and administrator of the Face Transplant Program. Watching from across the operating room, she remembered her long talks with Hardison, at the hospital and on a visit to his hometown, Senatobia, Mississippi.

The moment came approxi[illegible] hours af[illegible] k_\ j[illegible]Xik f[illegible]k_\ j[illegible]\ipÇ most ex[illegible]nsive f[illegible]ce transp[illegible]an[illegible] \m\i [illegible]\i]fid\[ÇXe[illegible] (+[illegible] p[illegible] after the[illegible]catastrophe[illegible]hat upended Hardison's life. The mfclek\\i Ôi\dXe iXe `ekf X burning house in September 2001, searching for a woman mistakenly believed to be trapped inside. When the ceiling collapsed, he managed to escape through a window, but his head and upper body n\i\ Xci\X[p fe Ôi\% ?\ was still in a medically induced coma when the 9/11 attacks occurred the following week. He lost his eyelids, ears, lips, and most of his nose, and was left with a mass of scar tissue from his scalp to his chest. Despite 71 reconstructive procedures, he remained unable to form normal facial expressions, to eat or laugh without pain, or to go out in public without attracting stares. He couldn't blink or close his eyes. Although surgeons had jlkli\[kf^\k_\i ÕXgj f] jb`e kf protect his vision, he was at risk of slowly going blind.

Now, the 41-year-old father of Ô[illegible]\ cXp Xe\jk_\k`q\[ Xe[ lkk\ [illegible]able, awaiting a new face f[illegible] a young man who'd been [illegible]X[illegible] injured two days earlier. If all[illegible]went[illegible]well, Hardison would regain much of what had been taken from him. If things went badly, the likely scenarios were \`k_\i [\Xk_ fi X [`jÔ^li\d\ek more severe than before.

Dr. Rodriguez, the Helen L. Kimmel Professor of Reconstructive Plastic Surgery, chair of the Hansjörg Wyss Department of Plastic Surgery, and one of the leading surgeons `e _`j Ô\c[# _X[jg\ek dfi\ than a year preparing the Zc`e`Z`Xej `e k_`j iffd ÇXcfe^ n`k_ [fq\ej f] fk_\ijÇ]fi k_\ groundbreaking operation. Yet even he had put the odds of success at just 50-50.

Few other surgical procedures are as medically daunting

PHOTOS: JOHN ABBOTT; COURTESY OF DR. EDUARDO D. RODRIGUEZ (FACING PAGE) as a face transplant, and few raise as many complex ethical, philosophical, and psychological issues. “It’s at the far end of what we call the vascularized composite allografts,” observes Arthur Caplan, PhD, the Drs. William F. and Virginia Connolly Mitty Professor of Bioethics. “You’re transplanting skin, nerves, muscles, blood vessels, and other tissues all at once. The new face has to feel, taste, smell, communicate verbally and visually, and fit cultural aesthetic criteria. And unlike a heart or liver, whose function is basically mechanical, a face is central to a person’s identity. Emotionally, it stands alone.”

Wanting a new face is generally not a matter of life and death. It can, however, profoundly improve a patient’s quality of life, complicating the risk-benefit calculation that must be made before any major surgery—especially a transplant, which requires the patient to take immunosuppressant medications indefinitely to prevent rejection.

The expense is another factor. A procedure that can cost nearly $1 million, including pre- and postoperative care, cannot be undertaken lightly, but the potential gains for other patients must also be considered. Although face transplantation is still in its infancy, it has already spawned technical innovations that may prove useful elsewhere in plastic surgery, transplant medicine, regenerative medicine, and beyond. The possible payoffs have attracted growing interest from some of the world’s leading academic medical centers, as well as the U.S. Department of Defense. The logistical challenges, meanwhile, have kept the pace of research slow.

The first face transplant was performed in 2005, on a French woman who’d been mauled by a dog; surgeons in Paris successfully replaced her nose, cheeks, lips, and chin. Since then, there have been 37 such procedures, but only a dozen have encompassed an entire face. Hardison’s would be the first to involve the scalp, as well, and to include functional eyelids. (In other cases, the recipients were blind, with no need to blink, or skin was simply grafted to existing eyelid muscles.) “No one had ever replaced this quantity of tissue before,” says Dr. Rodriguez. “There was no medical experience to show it was possible.”

Dr. Rodriguez was determined to prove it could be done. The son of Cuban immigrants, he’d initially set out to become a dentist (he even graduated from NYU College of Dentistry) but found his vocation after a mentor recognized his talent with a scalpel. A prolific researcher as well as a sought-after surgeon, he has published extensively in peer-reviewed scientific journals. In 2012, while at the University of Maryland, he performed what was then the most ambitious face transplant ever, on a man who’d lost his lips, nose, and jaws in a shotgun accident; tissue from the hairline to the neck was replaced, including both jawbones and part of the tongue.

That surgery led to the recruitment of Dr. Rodriguez the following year by NYU Langone, which sought to build a face transplant program of its own and expand its existing transplant program. “There’s a tremendous amount to learn from face transplants,” says Robert I. Grossman, MD, the Saul J. Farber Dean and CEO of NYU Langone. “How do we advance our microsurgical techniques? How do we the emotional stresses surrounding the procedure, of understanding the potential pitfalls, and of following the regimen necessary for a successful long-term flkZfd\Çefk fecp kXb`e^ an array of medications, but avoiding activities that could compromise the health of the graft, such as cigarette smoking or excessive sun exposure.

Hardison, who had approached Dr. Rodriguez before the surgeon's move to New York, was already in the running, but before he could be selected, he had to undergo a battery of physical, psychological, and other evaluations.

Dr. Rodriguez traveled to Senatobia (pop. 8,165) with

work removing his mask of scar tissue. Around 11:00 a.m., 3-D–printed cutting guides based on CT scans of Rodebaugh's head arrived from Colorado (see "Making the Cut"). In the donor room, Dr. Rodriguez began sawing portions of bone from Rodebaugh's facial skeleton (the chin, nasal structure, and a sliver of the cheekbones), leaving them attached to the inner skin. This technique, which had never been used before, would help ensure that the face was properly secured kf Ôk `kj e\n fne\i%

Shortly before 7:00 p.m., the surgeon went next door kf Ôe`j_ k_\ kX`cfi`e^ fd Hardison's facial skeleton.

Then, he returned to the donor room and completed the operation on Rodebaugh. Dr. Rodriguez placed the donor's face in a basin of preservative solution and wheeled it to the recipient room on a rolling stand. He [iXg\[k_\ _ff[f] Õ\j_ fm\i Hardison's head, snapped the bones into place, and secured them with plates and screws. Peering through a microscope, he stitched the major sensory e\im\j kf^\k_\iÇfk_\ij n\i\ expected to grow back over k`d\ÇXe[ Y\^Xe¬® kQP so swollen that his mouth wouldn't close. He gazed j`c\ekcp Xk k_\ i\Õ\Zk`fe# expression impossible to read.

But Hardison was able to Yc`eb ]fi k_\ Ôijk k`d\ j`eZ\ 2001, and his progress in other areas proved rapid. By early October, he was holding conversations and eating solid food. When his kids came for k_\`i Ôijk m`j`k# k\Xij but then the whole gang went out for barbecue. Two weeks later, Hardison was discharged to outpatient status; he moved to an apartment across the street from the hospital, returning daily for ongoing rehabilitation. He took a shopping trip to Macy's and was overjoyed when no one stared.

In November, he returned to Senatobia, where a parade was held in his honor. Hardison rode in an open limousine and was serenaded Yp _feb`e^ Ôi\ kilZbj% ?\ enjoyed a Thanksgiving feast with his family. He appeared on Nightline, where he spoke passionately of his gratitude to Rodebaugh and his loved ones. ?\ j_fn\[ k_\ Ôijk `ebc`e^ f] a smile.

That didn't mean he was out of the woods. Although no face transplant patient has died during surgery, three _Xm\ g\i`j_\[ n`k_`e k_\ Ôijk year, either from infections or complications related to rejection. Indeed, almost every patient has had an episode of acute rejection within the Ôijk 0' [Xpj% 9lk Yp =\Yil\Xip# when this article went to press, Hardison had not. Bruce Gelb, MD, assistant professor of surgery, and director of renal transplantation at NYU Langone, who designed his immunosuppressant regimen, credits a postoperative dose of rituximab, a monoclonal antibody used to treat blood cancers and autoimmune disorders that has also shown \]ÔZXZp `e gi\m\ek`e^ i\a\Zk`fe in kidney transplants. Hardison `j k_\ Ôijk]XZ\$kiXejgcXek patient to receive rituximab (in addition to the standard combination of thymoglobulin, tacrolimus, and low-dose prednisone, and his continued health may encourage the use of this medication for those who follow.

Dr. Rodriguez was recently awarded $2.5 million by the Defense Department to aid in continued face-transplant research. He's already looking for his next patient. But Hardison will remain in his care for years to come, returning for regular checkups as well as occasional surgeries to adjust his new features, and consulting as needed with the rest of the team. "This is not an operation for everyone," Dr. Rodriguez says. "It's for very courageous people. We're in awe of Patrick, and we'll be here for him as long as he needs us."

Members of NYU Langone's extensive medical team spent over a year preparing for Patrick Hardison's face transplant. Below, Dr. Rodriguez and Patrick about three months after the surgery.

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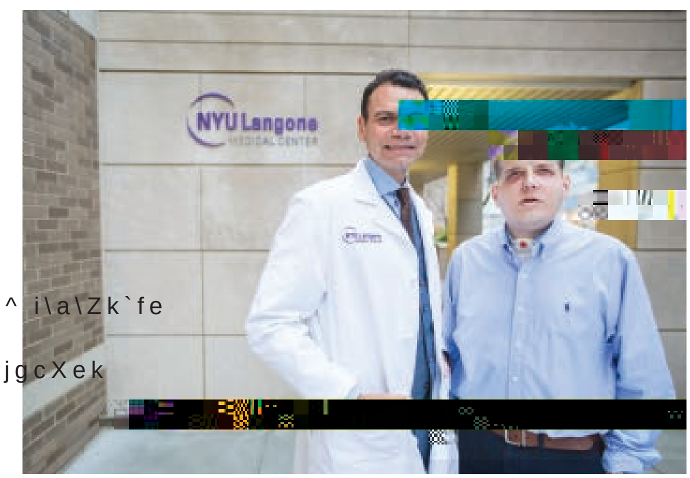
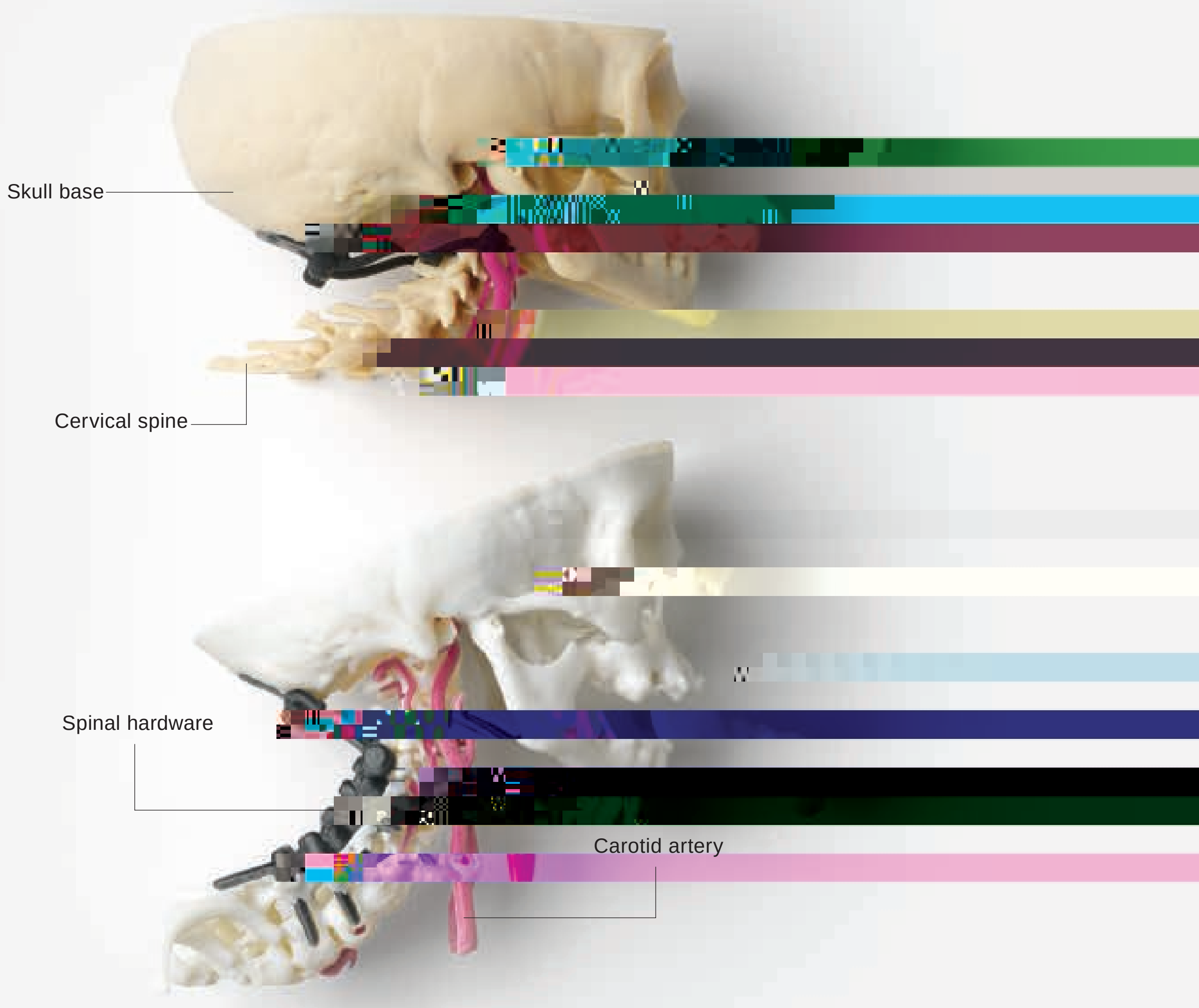


F A PICTURE is worth a thousand words, a 3D model tells the whole story, and that advantage can make all the difference in the operating room.



Compressed Spine

THE CASE: An 11-year-old child required follow-up surgery after an operation conducted six years earlier to correct a congenital defect that compressed his spine into the base of his brain. When the best surgical approach could not be discerned from MRI and CT scans, the surgical team ordered a 3D–printed model of the patient's skull base, cervical spine, carotid arteries, and preexisting spinal hardware (top photo). With the ability to examine the model from all angles, the key surgical maneuvers became clear. "We saw that if we changed the position of the spine, we'd be in a much better situation," says Dr. Pacione, who performed the surgery with David Harter, MD. "It turned out to be very effective, and it was the model that guided our thinking." The two surgeons, both assistant professors of neurosurgery at NYU Langone, ordered a postoperative d f [\ c Y f k k f d g _ f k f k f Z f e Ô i d k _ \ g X k ` \ e k Ë j ` d g spinal alignment.

THE D PRINTER: Replicated bone, metal, and blood vessel tissues were fashioned from three different materials on Stratasys 3D printers in Israel and New York.

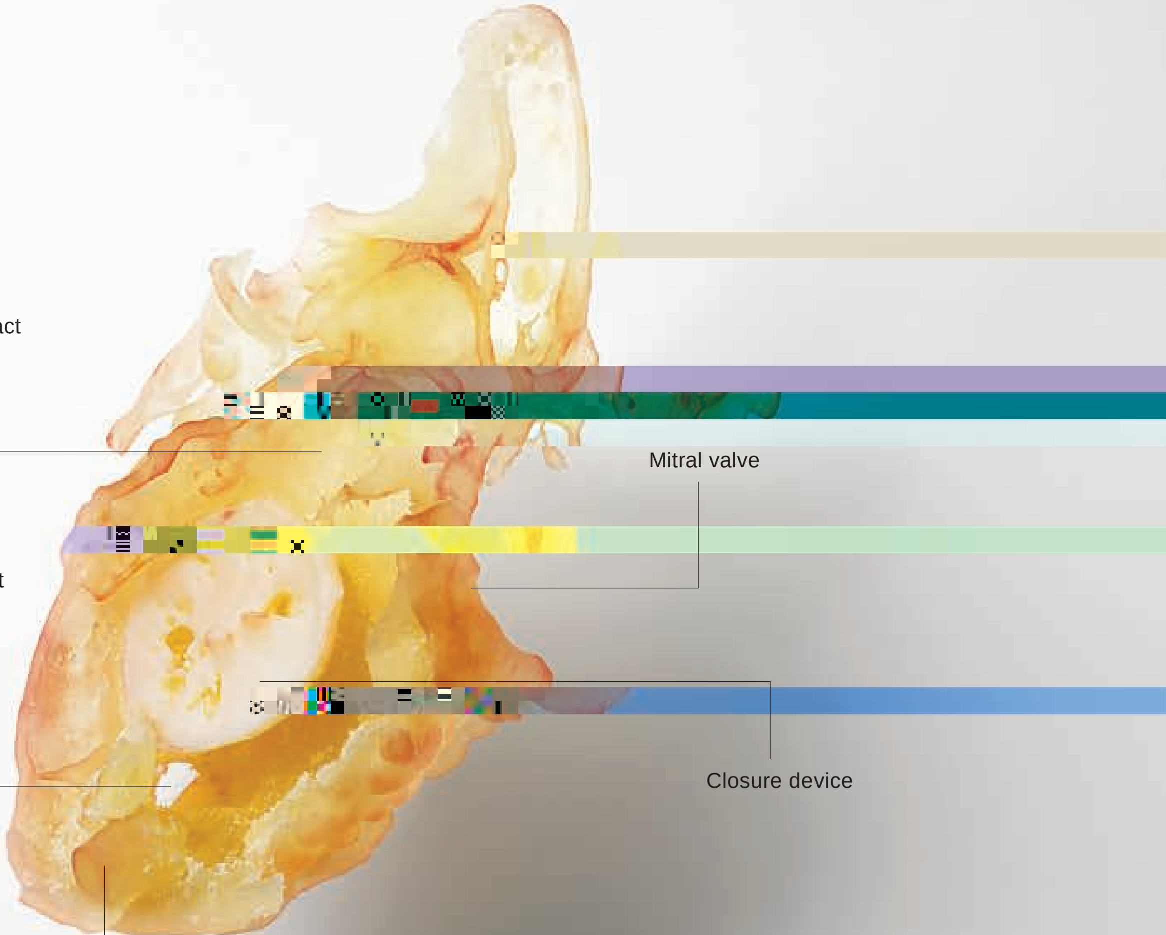


FIG. 02

Heart with Holes

THE CASE:

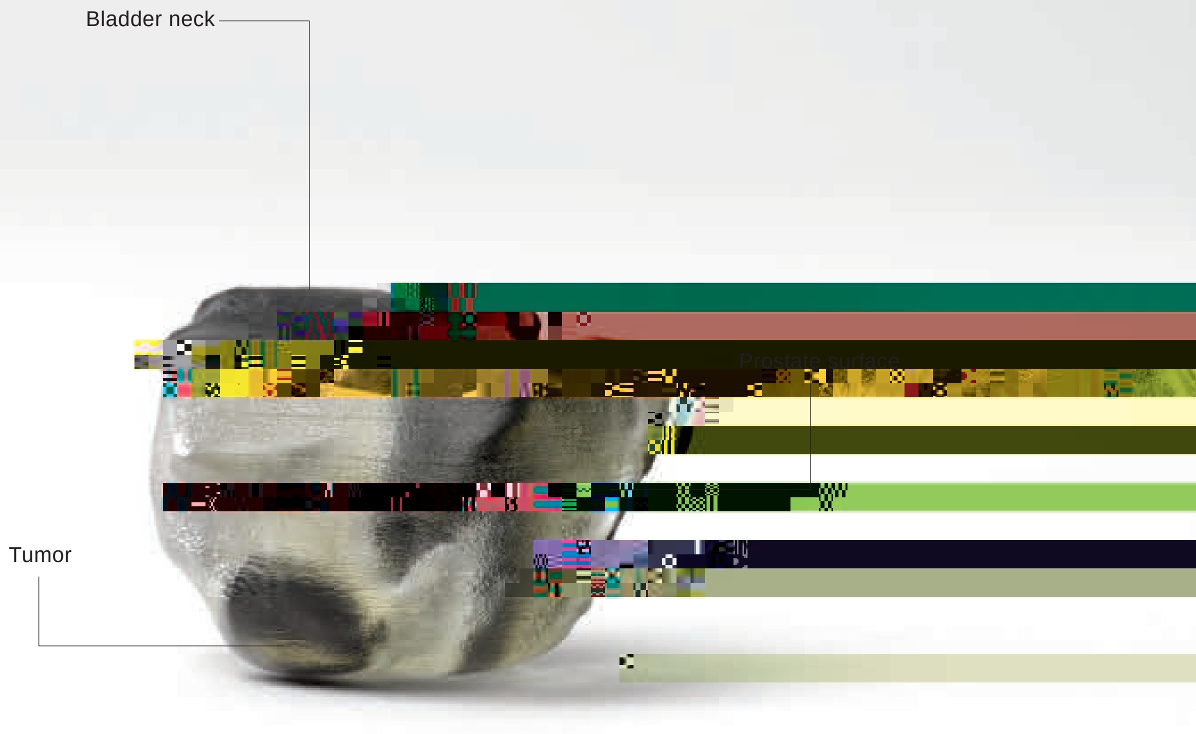


FIG. 03

Prostate with Tumor

THE CASE: A 66-year-old patient required surgery to

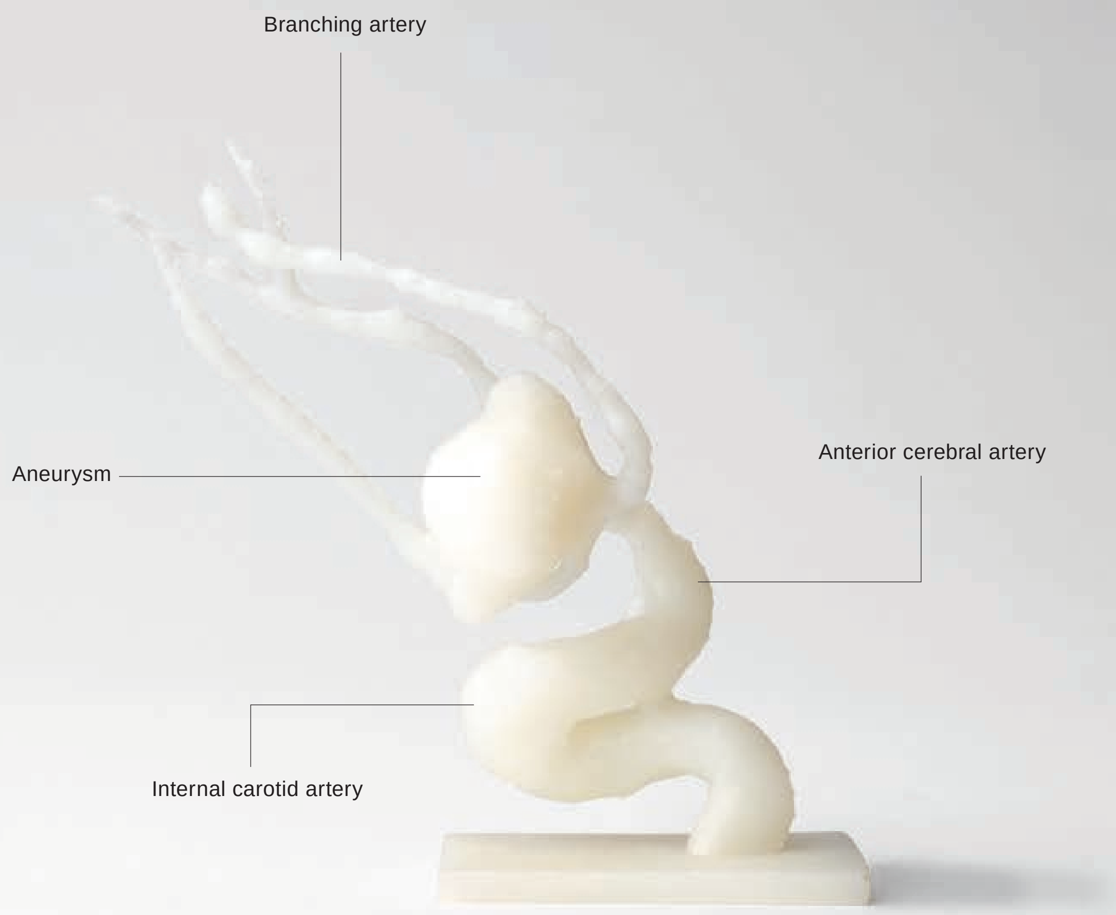


FIG. 04

Brain Aneurysm

THE CASE: A 55-year-old woman was diagnosed with a complex brain aneurysm. This model of the ballooning artery in her brain was created on a relatively inexpensive 3D desktop printer, using just a few dollars' worth of resin. Purchased with an educational grant by the Resident Education Fund, the printer is located on the Medical Center's campus and is available for use by neurosurgery residents. Models like this are increasingly used to test
k_\ Ôk f] X mXi`\kp f] jli^`ZXc Zc`gj k_Xk YcfZb Ycff[Õfn kf
Xe Xe\lipjdÇk_lj d`e`d`q`e^ k_\ e\\[kf \og\i`d\ek
with different clips during an operation, which can increase the risk of a rupture. The model was also used as a guide during the procedure itself. "The orientation of the aneurysm model perfectly matched the actual aneurysm," says neurosurgery resident Omar Tanweer, MD, who taught himself the software needed to design the model,

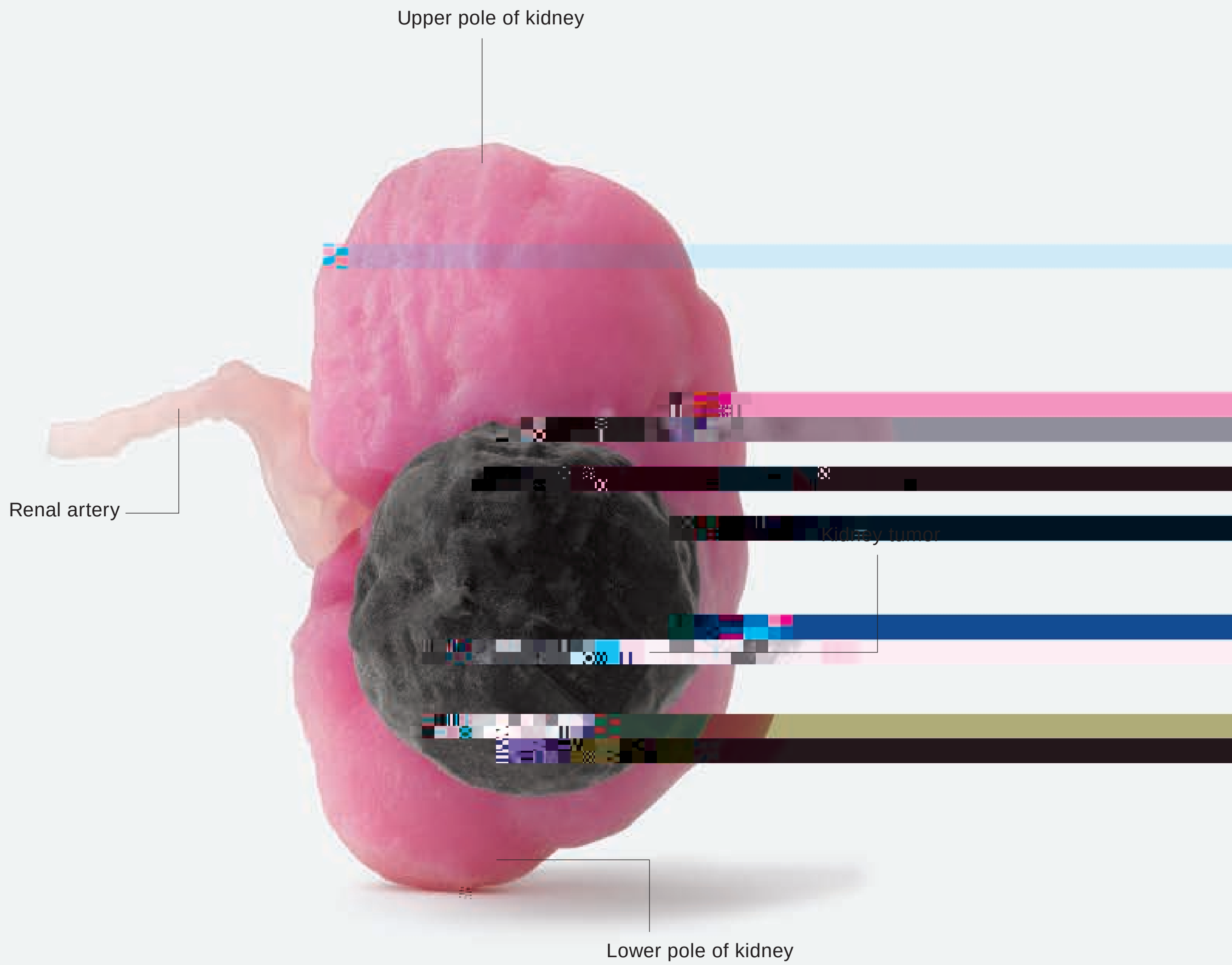


FIG. 05

Kidney with Tumor

THE CASE: A 59-year-old patient required surgery to remove

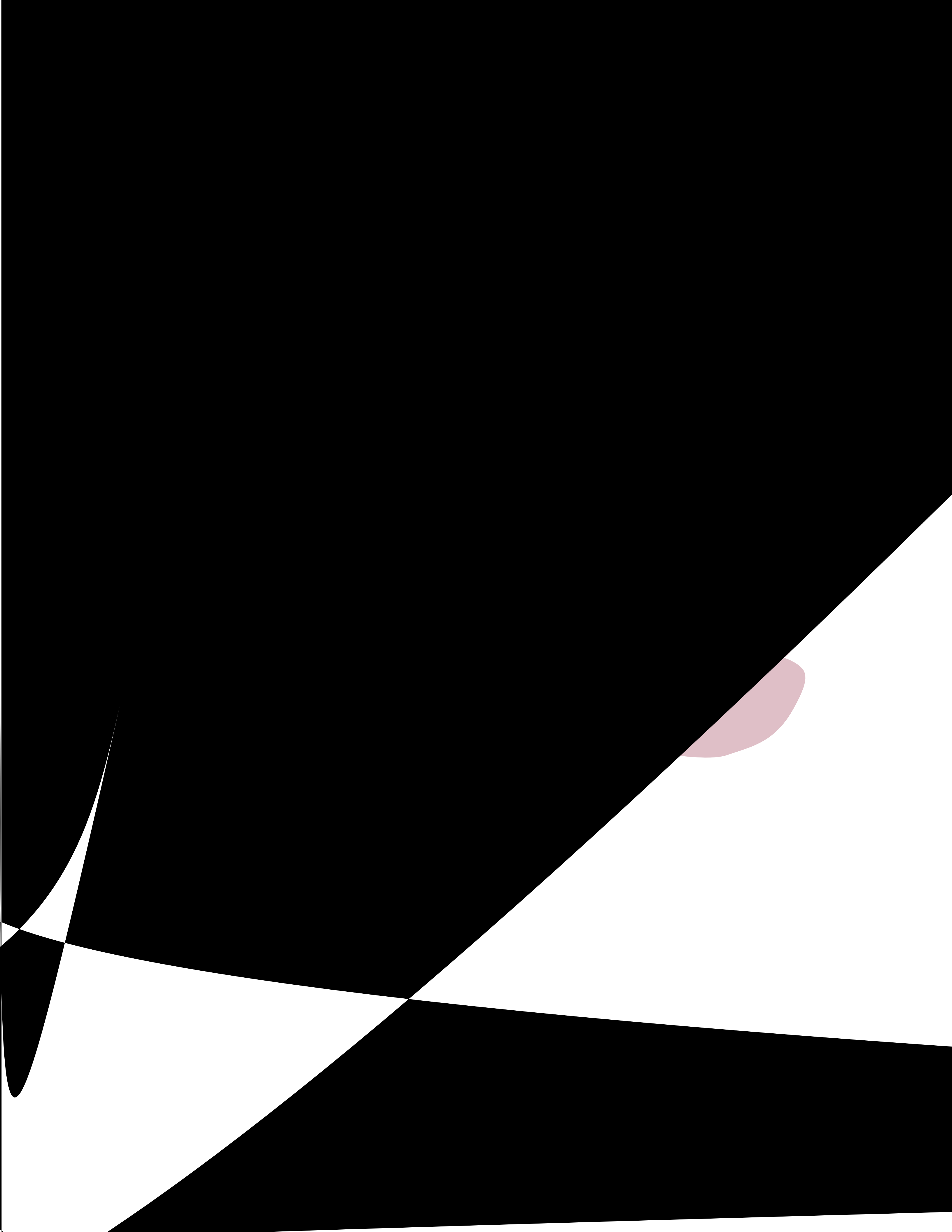
NOIS

Inspired by the mystery of consciousness,
MICHAEL HALASSA

BY ADAM PIORE

PHOTO: JOHN ABBOTT; BACKGROUND IMAGE: CHRISTIAN MUELLER/SHUTTERSTOCK

Since Dr. Michael Halassa joined NYU Langone in 2014, his experiments have revealed—in unprecedented detail—the neural circuits that filter incoming sensory stimuli and focus attention.



Knowing When to Push

How defying surgical dogma and heeding a mother's wishes saved a young boy's life

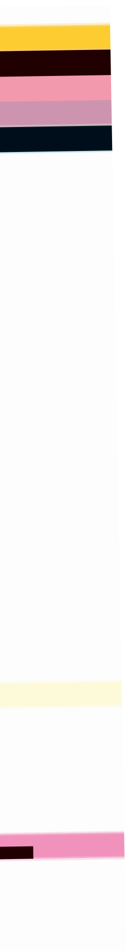
IN 1997, n_\e I`ZZXi[f DX]Ô` nXj only two weeks old, his mother, Alessandra Smeraldi, noticed that his right foot moved oddl[redacted] three months of age, the [redacted] experiencing several seizures a day. Doctors at a local hospital in Florence, Italy, diagnosed Riccardo with tuberous sclerosis, a genetic disorder that causes benign growths (called tubers for their potato-like appearance) inside various organs. A leading cause of epilepsy and autism, the disease X]Õ`Zkj ( d`cc`fe g\fgc\ nfic[n`[\ Xe[IjIXccp jki`b\j [li`e^ k_\ Ôijk p\Xi of life, just when the brain is trying to reach important milestones. In Riccardo's case, multiple tubers the size of an egg had sprouted within his brain. Medications did nothing to quell the seizures, and surgery would Y\ [`]ÔZlck# `] efk `dgfjj`Yc\# [fZkfij insisted, owing to the large number of tubers.

When Riccardo was four months old, Smeraldi found her way to Orrin Devinsky, MD, professor of neurology, neurosurgery, and psychiatry, and director of NYU Langone Medical Center's Comprehensive Epilepsy Center. By monitoring Riccardo's brain activity, Dr. Devinsky and his team were able to pinpoint the sources of Riccardo's seizures. "There were two foci, one in each hemisphere of the brain," notes Dr. Devinsky. He told Smeraldi that he agreed with the doctors in Italy: surgery was not an option. If any tissue were `eX[m\ik\ekcp [XdX^\[Ç X iX gfk\ek`Xc Zfej\hl\eZ\ f] YiX`e jli^\ipÇ corresponding structures in the opposite hemisphere might not be able to take over any lost functions.

Smeraldi and her son returned home with a new regimen of medications, but Riccardo's seizures worsened in

"He started to smile again," says Alessandra Smeraldi, of her son, Riccardo, shown here at age three, one year after surgeons at NYU Langone removed tumorous growths from his brain.

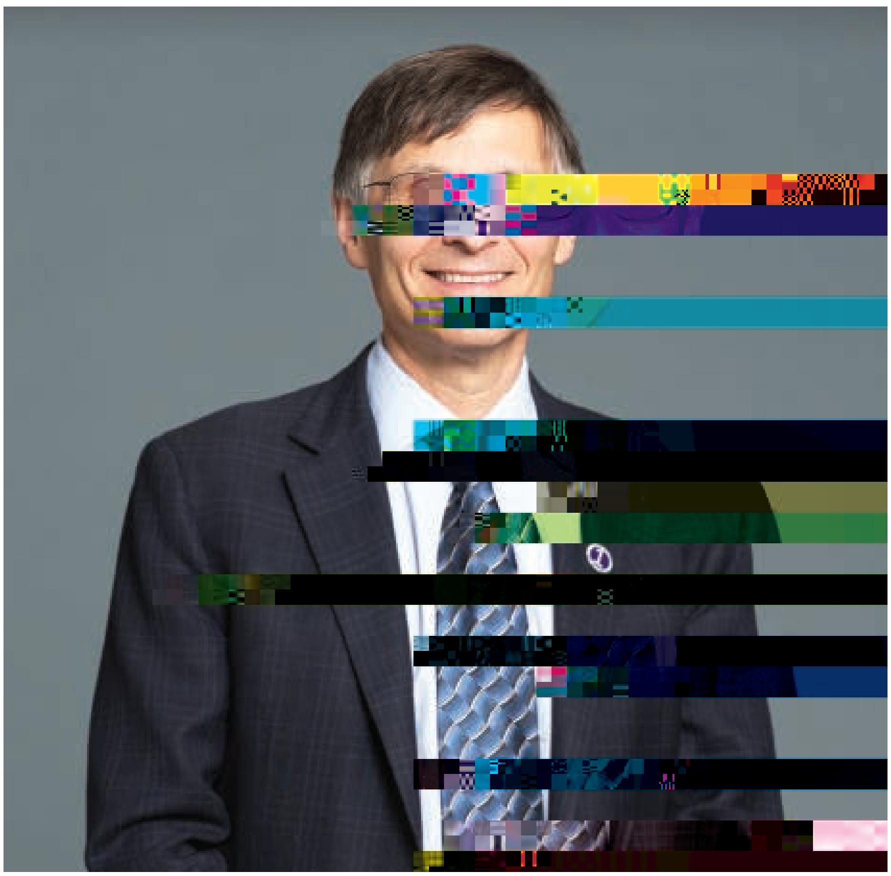
PHOTO: ALESSANDRA SMERALDI



Progress and Promise in Cancer

Benjamin G. Neel, MD, PhD, director of the Laura and Isaac G\icdlkk Xie Z\ie k\i#Õ \Zfkejk _X_ Xcc\e]Y\lj`c[`e^ a leading cancer center.

BY GARY GOLDENBERG



BENJAMIN NEEL, a renowned physician, researcher, and administrator, joined the NYU Langone Medical Center community in early 2015 to lead its National Cancer Institute–designated cancer center. Before returning to New York, where he earned his MD and PhD degrees, he most recently served as director of the Ontario Cancer Institute at Princess Margaret Cancer Center, Canada's largest cancer research center and part of University Health Network in Toronto, Ontario. Dr. Neel's research focuses on cell signaling in cancer and developmental disease, functional genomics of breast cancer, and tumor-initiating cells in ovarian cancer.

We're almost 45 years into the "war on cancer." Why we haven't we seen more progress?

In President Nixon's famous "war on cancer" speech, he used the analogy that if we could put a man on the moon in 10 years, we ought to be able to end cancer in our lifetime. That was a false analogy. The science behind putting a man on the moon was pretty much settled during Newton's time, and the basic principles of rocketry were elucidated by Robert Goddard in the early 20th century. Going to the moon was ÈaljkÉ Xe \e^`e\\i`e^]\XkÇXe XdXc \e^`e\\i`e^]\XkÇYlk `k [`[eËk i\hl`i much new science.

It was a completely different situation for cancer back in 1971. We didn't have a fundamental understanding of gene regulation. Since cancer is a disease of our genes, there was no rational way to XggifXZ_ ZXeZ\i% Efn# n\ _Xm\ `[\e between 500 and 1,000 genes that, in various combinations, can cause different cancers, and we have a whole new set of weapons to turn against cancer cells. I understand the public's frustration. It seems like everybody knows somebody who has cancer and that we're not making any progress. But, actually, we've made a lot of progress.

But much less so compared to heart disease. Is that a fair comparison? And isn't the incidence of cancer actually increasing?

It's true that we are seeing an increase in absolute cancer incidence, but that's Y\ZXlj\ g\fgc\ Xi\ c`m`e^ cfe^\iÇk_ largely to the success in treating heart disease. There's actually been no increase in the age-adjusted incidence of cancer. Now, why are we so successful against heart disease? I don't want to denigrate my cardiologist friends, but heart disease is not really as sophisticated a biological problem as cancer. Much of the fundamental biology was established in the mid to late ’70s. Decades later, we’re seeing the clinical applications of those insights. I think we’ll have the same lag between new discoveries in cancer and starting to see dramatic improvements in cancer therapy. That’s why were are now seeing the impact of major advances over the last 10 to 15 years, and these will accelerate over the next 10 to 20 years.

Prevention has had a major impact on heart disease. Does prevention play a similar role in cancer?
The same measures that help prevent heart disease could also have a huge impact on cancer. People shouldn’t smoke, they should exercise, and most important of all, they should maintain an appropriate weight. Obesity is now passing smoking as the number one risk factor for cancer. We could prevent probably up to 60 percent of all cancers today if people just applied what we already know about prevention.

As a cancer researcher, are you more or less fearful of cancer than the average person?
I’m neurotic, so maybe more! But I
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Michele Pagano, MD

NEW CHAIR OF THE DEPARTMENT OF BIOCHEMISTRY AND MOLECULAR PHARMACOLOGY

MICHELE PAGANO, MD, the May Ellen and Gerald Jay Ritter Professor of Oncology and professor of pathology, was appointed chair of the Department of Biochemistry and Molecular Pharmacology last October. Dr. Pagano is a leading authority on the cellular recycling of proteins, known as the lY`hl`k`e jpjk\d% ?`j `[\ek`ÔZXk`fe f] F-box proteins, which label waste within cells for recycling, opens a window onto cellular growth, proliferation, and DNA repair, and helps explain how defects in the cell's waste-removal processes lead to disease. One F-box protein, for example, may provide a key to treating certain aggressive cancers.

Dr. Pagano joined NYU Langone Medical Center in 1996 and has served as director of the Growth Control Program at the Laura and Isaac Perlmutter Cancer Center since 2000. Dr. Pagano earned his undergraduate, medical, and research degrees in molecular endocrinology from the Federico II University in his hometown of Naples, Italy. He then completed a postdoctoral fellowship at the European Molecular Biology Laboratory in Heidelberg, Germany, and later cofounded the biotechnology company Mitotix, in Cambridge, Massachusetts.

He has received many prestigious grants, including a MERIT Award from the National Cancer Institute in recognition of his outstanding achievements in cancer biology. In 2008, he was appointed a Howard Hughes Medical Institute investigator. ●

Joel Schuman, MD

NEW CHAIR OF THE DEPARTMENT OF OPHTHALMOLOGY

CLINICIAN-SCIENTIST JOEL S. SCHUMAN, MD, has been appointed chair of NYU Langone Medical Center's Department of Ophthalmology. Dr. Schuman's pioneering work has led to j`^e`ÔZXek X[mXeZ\j `e k_\ [`X^efj`j Xe[treatment of glaucoma, a disease that damages the eye's optic nerve and can result in irreversible vision loss.

Dr. Schuman joins NYU Langone following a distinguished career at the University of Pittsburgh School of Medicine, where he was professor of ophthalmology, chair of the Department of Opthalmology, and director of the University of Pittsburgh Medical Center Eye Center. Dr. Schuman also held appointments at the university's McGowan Institute for Regenerative Medicine, the Center for the Neural Basis of Cognition, and as professor of bioengineering at the Swanson School of Engineering.

A National Institutes of Health–funded researcher, Dr. Schuman and his colleagues n\i\ k_\ Ôijk kf [`jZfm\i X dfc\ZlcXi marker for glaucoma. The discovery has paved the way for advances in the detection and treatment of the disease, which often causes no symptoms in its beginning stages.

To aid in its early detection, Dr. Schuman and his colleagues developed a groundbreaking medical imaging procedure that creates a 3-D map of the eye, called optical coherence tomography (OCT). This quick and noninvasive procedure allows ophthalmologists to measure the thickness of the retina and better diagnose retinal diseases. Dr. Schuman will continue to advance OCT technology at NYU Langone.

Dr. Schuman received his medical degree from Mount Sinai School of Medicine. He completed his residency in ophthalmology at the Medical College of Virginia, and clinical and research fellowships in glaucoma at the Howe Laboratory of Ophthalmology, part of Harvard Medical School's Massachusetts <p\ Xe[<Xi @eÔidXip%

Dr. Schuman is the recipient of numerous honors and awards. In 2002, he received the New York Academy of Medicine's prestigious Lewis Rudin Glaucoma Prize for the most outstanding scholarly article on glaucoma published in a peer-reviewed journal. In 2013, he received the American Academy of Ophthalmology Life Achievement Honor Award, and he was named a Gold Fellow of the Association for Research in Vision and Ophthalmology Fellows Class of 2014. He has published more than 300 peer-reviewed articles, and authored or edited eight books.●

PHOTOS: NYU LANGONE STAFF; KARSTEN MORAN (FACING PAGE)

Bernard A. Birnbaum, MD

IN 2007, not long after Bernard A. Birnbaum, MD, was appointed senior vice president, vice dean, and chief of hospital operations, he was informed that NYU Langone Medical Center's performance on several quality and safety measures had much room for improvement. An evaluation showed that only 60 percent of patients at NYU Langone were receiving optimal care. "When I told Bernie that I didn't think our performance was good enough, he said, 'You're absolutely right.

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