NYU Langone MEDICAL CENTER

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NEWS & VIEWS

Where Patient Care, Scientific Research, and Medical Education Meet
NOVEMBER 2016

My First Year with My New Face

One year after his landmark surgery, Patrick Hardison reflects on his new appearance, his new life, and those who made it all possible.

PATRICK HARDISON, the 42-year-old volunteer firefighter who made medical history at NYU Langone last year when he successfully underwent the most extensive face transplant ever performed, formally introduced himself to the media—and to the world—in August. He was the guest of honor at a press conference held at NYU Langone to mark the one-year anniversary of his pioneering surgery. Hardison, a father of five, was severely burned in the line of duty in 2001 in his hometown of Senatobia, Mississippi.

Eduardo D. Rodriguez, MD, DDS, the surgeon who led a team of more than 100 medical professionals who collaborated on the procedure, reported that Hardison is thriving. He can form a full range of facial expressions, chew without pain, and articulate clearly. Not only can he fully close his eyes for the first time since the accident, but his ability to blink has been restored, keeping his eyes clean and hydrated so that he's no longer at risk of going blind. "We are amazed at Patrick's recovery, which has surpassed all of our expectations," says Dr. Rodriguez, the Helen L. Kimmel Professor of Reconstructive Plastic Surgery and chair of the Hansjörg Wyss Department of Plastic Surgery. "Most significant is the lack of a rejection episode. We believe this has much to do with the methodical approach we took in the matching process to ensure that Patrick's donor provided the most favorable match."

Hardison's extraordinary recovery—unique among the 37 face transplants previously performed—has allowed his medical team to move

Continued on page 2

Patrick Hardison, in the firehouse where he was a volunteer firefighter for seven years before his injury.

PHOTO: BEN ROLLINS

NYU Langone Ranks as a Top-10 Hospital Nationwide

"I AM AN optimist," Robert I. Grossman, MD, wrote to the NYU Langone community in July 2007, shortly after becoming the Saul J. Farber Dean and CEO. "I define optimism as the conviction that you can do what you set out to do. We have the potential for true greatness."

In August, NYU Langone proudly announced that by one important measure, it had fulfilled its promise. For the first time, the Medical Center places among the top 10 hospitals nationwide in *U.S. News & World Report*'s annual Best Hospitals Rankings. It joined this elite group at #10 on the Honor Roll, having ranked #12 last year.

The Medical Center was also nationally ranked in 12 specialties. Seven of these specialties were ranked in the top 10: geriatrics (#5), orthopaedics (#5), neurology and neurosurgery (#7), rheumatology (#8), rehabilitation (#9), cardiology and heart surgery (#10), and urology (#10). The other nationally ranked specialties are gastroenterology and GI surgery, pulmonology, diabetes and endocrinology, cancer, and ear, nose, and throat. ■

My First Year with My New Face (cont'd from page 1)

forward with the removal of his abdominal feeding tube and the breathing tube in his trachea much sooner than expected. Now that Hardison's facial swelling has largely subsided, Dr. Rodriguez has been able to perform revisions to his forehead, eyes, lips, chin, and ears. "Patrick is extremely committed to regular exercise, complying with his medication regimen, and meeting with his physicians regularly," notes Dr. Rodriguez. "This puts him way ahead of schedule in terms of achieving the optimal level of recovery and appearance."

38

The number of full and partial face transplants, including Patrick Hardison's, documented worldwide.

During a recent visit to New York, Hardison shared his reflections on the most transformative year of his life.

A Bond Like No Other

"Once I met Dr. Rodriguez, I knew he was the guy. We just had a connection. He said, 'This is what's going on. You and I are family. We're hooked for life.' And he's been straight up with me the whole time. Dr. Rodriguez and his team have been very supportive. I had a lot going on in my head, but he helped me work through it all. After the transplant, I would call Dr. Rodriguez, and he would come to my hospital room within minutes. I never had any doubts that it would go well. From the first time I met Dr. Rodriguez, he was determined that this was going to be a success. I'm so grateful to him and the entire transplant team for the new face they gave me."

Highs and Lows

"After my accident, it was very tough. Every day I was thinking, 'If I can just make it through this day without the stares and the questions.' It was like that for 14 years, but now I don't have to do that. Now I'm just a normal guy walking down the street. It's such a great feeling. I'm so much happier. My energy level is good, so I'm able to do whatever I want to do. My two sons live with me, and we spend as much time together as we can. We've taken some small trips out of town and a big trip to Disney World. I enjoy the simple stuff: sitting down to dinner with my kids, going fishing with them, having friends over, hanging out with my buddies at the firehouse.

"After the transplant surgery, I tried to stay focused on healing and maintaining a positive outlook. I remember when I thought my life was over. I used to say to myself, 'When my daughters get married, I'll just wear my cap and dark glasses.' But I prayed on it heavily for years. I prayed for change, and then this wonderful thing happened. When I look into the eyes of my kids, I see happiness—because they see how happy I am. My favorite memory of the past year is when all of my kids came to New York to visit me at NYU Langone after the transplant. I hadn't seen them in a while, and I was really missing them. It gave me a little extra boost."

A Joyful Homecoming

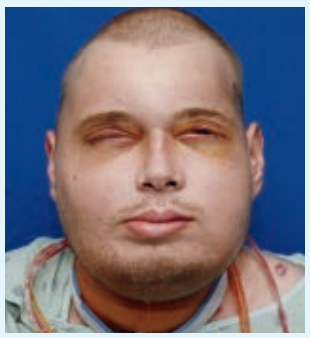
"It was great to finally go home to Senatobia after the surgery. The first thing I did was have a glass of sweet tea. It's a Southern thing—you can't get it in New York. The entire town greeted me. The streets were lined up with cars and people. Many of them came to the house and welcomed me home. It really got my spirits up.

"I've tried to get back to my routine. The biggest adjustment is just learning to live with a new face. I walk up to people and ask them, 'Do you know who I am?' They say, 'No, I guess I don't.' So I tell them, and they're just stunned. Oddly enough, when I'm in New York, some people actually recognize me. They'll come up to me and say, 'Hey, you're the guy on the news?' And I'll say, 'Yes, sir, I am.'"

A Miracle of Modern Medicine—and Faith

"Some people who hear about my story tweet me. They say things like 'I thought I had a big problem, but once I learned what a courageous person you are, I don't even acknowledge my own problems anymore.' But I don't like to be classified as a hero,

December 10, 2012



August 27, 2015

January 13, 2016

August 3, 2016

Patrick Hardison's dramatic transformation is chronicled in these portraits taken (from left to right) before his face transplant, 13 days after the operation, five months later, and at the one-year mark. As the swelling further subsides, Dr. Rodriguez explains, Hardison's appearance will continue to change.

PHOTOS: MARY SPANO (LEFT), JAY BRADY (TOP), JOHN ABBOT (FACING PAGE); ILLUSTRATIONS: MUTI (FACING PAGE)

At a press conference held in August to mark the one-year anniversary of his face transplant, Patrick Hardison was joined by his children, and his surgeon, Dr. Eduardo D. Rodriguez. "The road to recovery has been long and hard," Hardison told the audience. "But if I had the opportunity to do it again, I would in a heartbeat."

and I don't see myself that way. I'm the same person I've always been. I still have the same friends. I still do the same things. I'm just Pat—and I'll always be Pat. I had an accident doing what I loved, and this was the outcome. You've got to take the good with the bad. If I could go back, I would still go into that burning house. I was angry for years, but now I see this for what it is—a miracle. God has kept me on this earth this long to get this transplant, so that I can inspire others, so that I can give them hope."

Facing the Future

"Now that I can blink again, I sleep better than I have in years—usually six or seven hours. It's just like it was before the accident. My eyes are never dry, so I can tell they're doing a good job. This means I can drive again, and that's a big deal for me. For so long, I had to depend on others to get around.

"Dr. Rodriguez says that in another six months, when more of the swelling goes down, I'll look totally different. Hopefully, I'll get to a place one day where I can do some motivational speaking. I'd like to share my story with wounded warriors or injured firefighters and police officers. I want to encourage others who need a face transplant. The rewards are way bigger than the risks.

"I recently met the donor's mother. I wanted her to know that her son is still living in me and in those who received his other organs. It was great to meet her and thank her. She gave me a new life." ■

DR. ROBERT A. MONTGOMERY EXPANDS TRANSPLANT PROGRAM

Under his leadership, the new Transplant Institute at NYU Langone unveils ambitious plans, promising to save the lives of more patients on waiting lists.

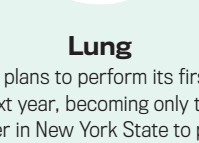
NEARLY 120,000 AMERICANS are currently waiting for a lifesaving organ transplant, but up to 40% of these patients will never get one, either because they will become too sick to undergo the operation or will die waiting for a suitable donor. More than 8,400 people in need of a transplant live in the New York metropolitan area. Now, in a bid to help, NYU Langone has recruited esteemed transplant surgeon **Robert A. Montgomery, MD, DPhil** (at right), from The Johns Hopkins Hospital, where he long served as chief of transplant surgery. Dr. Montgomery's charge as founder and director of NYU Langone's new Transplant Institute is to broaden the Medical Center's expertise in solid organ transplantation, advance surgical techniques, and address the needs of a growing and increasingly diverse patient population. "NYU Langone wants to be the place to go in New York City for the treatment and care of end-stage organ disease," says Dr. Montgomery.

Here's a look at what's in the pipeline.

Liver

By the end of this year, NYU Langone expects to perform more than 30 liver transplants, with about 80 projected annually in five years. The number of liver transplants from live donors will also increase to make more organs available. Some 14,600 Americans are awaiting a liver transplant.

Recent recruits—including **Nabil Dagher, MD,** chief of abdominal transplant surgery, who specializes in living-donor liver transplants—will help make it happen.



Lung

NYU Langone plans to perform its first lung transplant next year, becoming only the second medical center in New York State to provide this treatment. About 35 lung transplants are projected annually in five years. An estimated 1,400 Americans are awaiting a lung transplant.

Recent recruits, including pulmonologist **Luis Angel, MD,** will play pivotal roles.

Kidney

By 2017, NYU Langone expects to perform nearly 80 kidney transplants, with about 200 projected annually in five years. Key to the expansion is a newly adopted protocol—developed by Dr. Montgomery and his colleagues at Johns Hopkins—that enables the recipient of a kidney to accept an organ from a previously incompatible donor. Nearly 100,000 Americans are awaiting a kidney transplant.

Recent recruits include surgeon **Bonnie Lonze, MD, PhD,** who specializes in incompatible kidney transplants, and nephrologist **Nicole Ali, MD.**

Bone Marrow

Some 70% of patients who need a bone marrow transplant do not have a fully matched donor in their family. NYU Langone currently performs mostly autologous transplants, in which stem cells from the patient's own blood or marrow are harvested, frozen, and returned to the patient after treatment. Next year, a new collaboration with Johns Hopkins will also enable NYU Langone to perform allogeneic transplants, in which the patient receives a donor's stem cells to reconstitute their injured marrow and fight off any remaining cancer cells.

FOR INFORMATION about organ transplants, call 212-263-8134 or visit nyulangone.org/organtransplant.

Does Fat Play a Role in Breast Cancer?

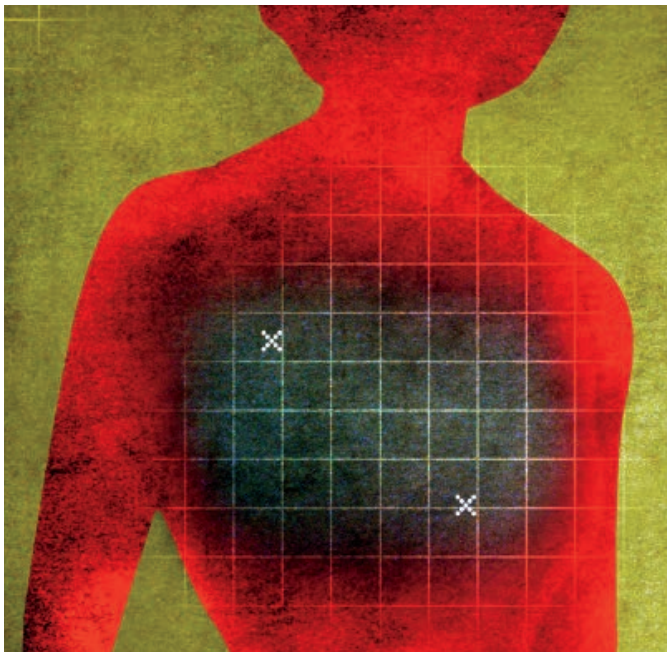
An innovative imaging technique developed by NYU Langone radiologists links fatty acids to breast cancer in postmenopausal women.

WHEN A SUSPICIOUS lump is detected in the breast, women typically submit to a painful biopsy and a stressful wait for the results. Sungheon Gene Kim, PhD, a researcher in NYU Langone's Department of Radiology, has developed a novel approach to imaging that he hopes will not only speed up the diagnostic process, but also improve its accuracy. Using a method called gradient-echo spectroscopic imaging, a kind of MRI that assesses the chemical content of body tissues, Dr. Kim showed for the first time that saturated fatty acids in breast adipose tissue can indicate the presence of cancer.

Dr. Kim had long wondered whether women with breast cancer might have a different composition of fat tissue. "There had not been any study to see whether differences can be detected within diagnostic breast MRI exams," he says, even though obese women or those with a higher body mass index tend to have higher rates of breast cancer. Dr. Kim and his team recruited 89 women at high risk, one-third of whom were postmenopausal. All of them were scanned with an MRI.

During the last five minutes of the routine clinical MRI exam, gradient-echo spectroscopic imaging was used to assess breast fat composition. Various types of fatty acids, including saturated fatty acids, were identifiable by their distinct patterns of chemical shift, revealed by the newly developed imaging method. The results, published in the journal *Radiology,* showed that the breast adipose tissue of postmenopausal women with invasive cancer had a higher concentration of saturated fatty acids than that of cancer-free women.

To confirm the link between saturated fatty acids and invasive breast cancer, and to understand the diagnostic role of saturated fatty acids, Dr. Kim plans to repeat his study with a larger group that includes both low-risk and high-risk patients. He also wants to study the link between breast adipose tissue composition and established risk factors for breast cancer, hoping to understand how saturated fatty acids may contribute to breast cancer development and growth. ■



WIDE AWAKE DURING HAND SURGERY

A new approach to many outpatient procedures for hand and wrist conditions offers greater convenience and better outcomes.

IN MOST HOSPITALS, surgery on the hand and wrist is usually performed using regional anesthesia and intravenous sedation, or general anesthesia. Patients must undergo preoperative tests, fast starting the night before, and spend an hour or more in a recovery room. In September, NYU Langone became one of the first medical centers in the US to change those protocols. At the Outpatient Surgery Center on East 38th Street, a new operating room is dedicated to "wide-awake" hand surgery, which allows many of these surgical procedures to be performed "as quickly and easily as a trip to the dentist," explains orthopaedic surgeon S. Steven Yang, MD, who helped spearhead the new program. "When patients are done, they can go home without needing an escort."

With outpatient surgery becoming increasingly common, why is that so unusual? Traditionally, hand and wrist surgeons have used an arm tourniquet to limit bleeding, but the pressure it causes is often so uncomfortable that medication is required to make it tolerable. Alternative approaches that don't use a tourniquet have long been limited because physicians were reluctant to use epinephrine—a drug that constricts blood vessels and prolongs the effect of local anesthetics—on the hands and wrists.

But all that has changed, thanks to a flood of studies showing that epinephrine is safe, and a technique in which epinephrine blended with a local anesthetic eliminates the need for a tourniquet. Surgery on the hand or fingers can now be performed without an IV, sedatives, or preoperative testing.

With 17 board-certified hand surgeons, NYU Langone's Division of Hand Surgery is the largest program of its kind in the country, performing more than 5,000 procedures annually. Wide-awake surgery is used for a range of operations, from the excision of a ganglion cyst or a carpal-tunnel release to more complex procedures. The new technique can also improve outcomes. A fully conscious patient can move their hand and fingers, enabling the surgeon to assess the results in real time. The surgeon can also communicate with the patient, soothing any nervousness. The only pain is the sting of the initial shot. ■

TO FIND A PHYSICIAN who performs hand surgery, call 855-698-4263 or visit nyulangone.org/handcenter.

ILLUSTRATION: BRIAN STAUFFER/THEISPOT; PHOTO: (LEFT) WAVEBREAKMEDIA/SHUTTERSTOCK; (FACING PAGE) ANDREW NEARY/ADAM WATT

Five Things You Need to Know about Childhood Diabetes

Dr. Mary Pat Gallagher, a leading expert tapped to head the new Robert I. Grossman, MD, and Elisabeth J. Cohen, MD, Pediatric Diabetes Center, discusses a growing epidemic.

In May, NYU Langone launched the Robert I. Grossman, MD, and Elisabeth J. Cohen, MD, Pediatric Diabetes Center, funded by a $10 million gift from an anonymous donor. "Our goal is to provide comprehensive, fully integrated services to families faced with this condition," explains Mary Pat Gallagher, MD, a distinguished pediatric endocrinologist, who was recruited earlier this year as the center's inaugural director. "Patients and their loved ones will be able to see a doctor, a certified diabetes educator, a dietitian, a psychologist, and a social worker—all in one visit, under one roof." The new center is part of the Hassenfeld Children's Hospital of New York at NYU Langone.

DIABETES IS A growing epidemic among children and adolescents, affecting an estimated 208,000 youngsters in the US. Characterized by high levels of glucose in the blood, diabetes results from the body's inability to produce or respond to insulin, a hormone that controls blood sugar. If not properly controlled, the condition can lead to severe complications—from cardiovascular problems to blindness to kidney failure. Dr. Gallagher shares her insights on preventing, diagnosing, and treating this complex disease.

1. Adult-onset diabetes isn't just for grownups.

Not long ago, the two most common forms of diabetes were primarily defined by their age of onset. Type 1 diabetes was known as juvenile diabetes because it typically emerged in childhood. Type 2 diabetes was called adult-onset diabetes because it rarely affected people under 20. In fact, type 1 diabetes can be diagnosed at any age, and type 2 is increasingly seen in very young adolescents. Type 1 occurs when the immune system mistakenly attacks insulin-producing cells in the pancreas, which can occur as early as infancy. Type 2 develops when the body is resistant to insulin, and the insulin-producing cells are unable to compensate. (Most people with insulin resistance will not go on to develop type 2 diabetes.) The prevalence of type 2 in children soared by 30% from 2001 to 2009, the latest year for which figures are available—a trend thought to be associated with rising rates of childhood obesity. But there is some good news: more recent data suggests that the surge is leveling off.

Dr. Mary Pat Gallagher, director of NYU Langone's new Robert I. Grossman, MD, and Elisabeth J. Cohen, MD, Pediatric Diabetes Center.

2. Obesity isn't the whole story.

Rates of type 1 diabetes in children have also risen over the past two decades, though the reasons remain unknown. "There may be some environmental factor that triggers the immune system," Dr. Gallagher suggests. "It could be exposure to certain chemicals, foods, or viruses—or a *lack* of exposure to different infections. Researchers are investigating all of those possibilities." What's clear, however, is that genes play a key role in all forms of diabetes. Studies show that when one twin has type 1, the other twin develops it about half the time. About 80% of children diagnosed with type 2 have at least one parent with the disease. Although there are rare forms of diabetes that are caused by mutations in single genes, called monogenic diabetes, scientists are still learning which combinations of genes are involved in types 1 and 2 diabetes.

Dr. Gallagher and her colleagues try to increase parents'—and children's—sense of confidence and control. "This is a marathon, not a sprint," she reminds them. "It's hard work, but they can make it."

3. Diagnosing which type of diabetes a child has can be tricky.

Type 1 diabetes is often diagnosed after a patient develops ketoacidosis, a dangerous condition caused by a severe insulin deficiency. Symptoms include extreme thirst, frequent urination, vomiting, and fruity-smelling breath. In addition to high glucose and low insulin levels, most often a blood test will show evidence of an autoimmune reaction to confirm the cause. By contrast, type 2 may go unnoticed until a child has a routine checkup, and a hemoglobin A1C test detects persistently high levels of blood sugar. But the truth can be elusive. While type 2 is commonly associated with obesity, an overweight patient may prove to have type 1. Just as surprisingly, a patient with an autoimmune marker may turn out to have type 2.

4. Treating type 2 diabetes in young people can be challenging.

Although type 1 represents only 5% of diabetes cases in the US, it's by far the most common form in youngsters. Fortunately, it can usually be controlled by administering insulin. "These children are healthy," Dr. Gallagher explains. "They can play sports and eat ice cream just like their peers." Treating young people with type 2, however, is a different story. Although insulin and medication can help control blood sugar levels, neither will work without lifestyle changes. "Getting teenagers to cut carbs and exercise regularly isn't easy," notes Dr. Gallagher, "so we try to work with the whole family to help them make healthy changes."

5. Childhood diabetes can be just as hard on parents.

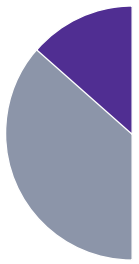
Constantly monitoring a child's glucose levels and medications can feel overwhelming, and anxiety over possible complications may add to the burden. "I emphasize to parents that they shouldn't feel guilty because they didn't cause their child's condition," Dr. Gallagher says. Instead, she and her colleagues try to increase parents'—and children's—sense of confidence and control. "This is a marathon, not a sprint," she reminds them. "It's hard work, but they can make it." ■

TO FIND A PHYSICIAN who treats pediatric diabetes, call 212-263-9910 or visit nyulangone.org/pediatricdiabetescenter.

The Alarming Rise of Diabetes

30%

Increase in prevalence of type 2 diabetes in children from 2001 to 2009.



A Heart Valve Replacement That Barely Leaves a Trace

In a technological first, a team of specialists at NYU Langone uses a pioneering nonsurgical procedure to replace a diseased mitral valve with an artificial device.

AT 73, NANCY Clayton was fitter than most women half her age, despite a congenital defect in her aortic valve that had twice required major surgery. Her daily exercise regimen involved an hour of practice with her competitive rowing team or an hour of CrossFit training—sometimes both. But last January, the marketing specialist began feeling short of breath. Doctors in Southern California diagnosed a new cardiac problem: a severely weakened mitral valve, which was allowing blood to flow in the wrong direction. Without intervention, she would go into heart failure. In light of her clinical history, however, they were uncertain what to do.

In July at NYU Langone, Clayton made medical history, becoming one of the first people in the world to have a diseased mitral valve replaced with a transcatheter approach. In this technique, the faulty valve is accessed through a vein in the leg, leaving the patient with only a nick in the skin.

Clayton had already undergone two open-heart surgeries. "A third operation, even a minimally invasive one, would have been very dangerous," says Mathew Williams, MD, director of the Heart Valve Center.

A former New Yorker, Clayton has lived on the West Coast for a decade. But after her diagnosis, she consulted Aubrey Galloway, MD, the Seymour Cohn Professor of Cardiothoracic Surgery and chair of the Department of Cardiothoracic Surgery, who had replaced her aortic valve and implanted a pacemaker when she was 58. "We may have something for you," Dr. Galloway told her. He recommended a transcatheter mitral valve replacement, or TMVR, and referred her to Dr. Williams, one of just a handful of doctors worldwide selected to test the new approach. The first physician in the country to receive training in both cardiac surgery and interventional cardiology, Dr. Williams is a veteran of over 2,200

Heart Surgery without the Surgery

Here's how a team at NYU Langone implanted one of the first artificial mitral valves without leaving a single stitch.

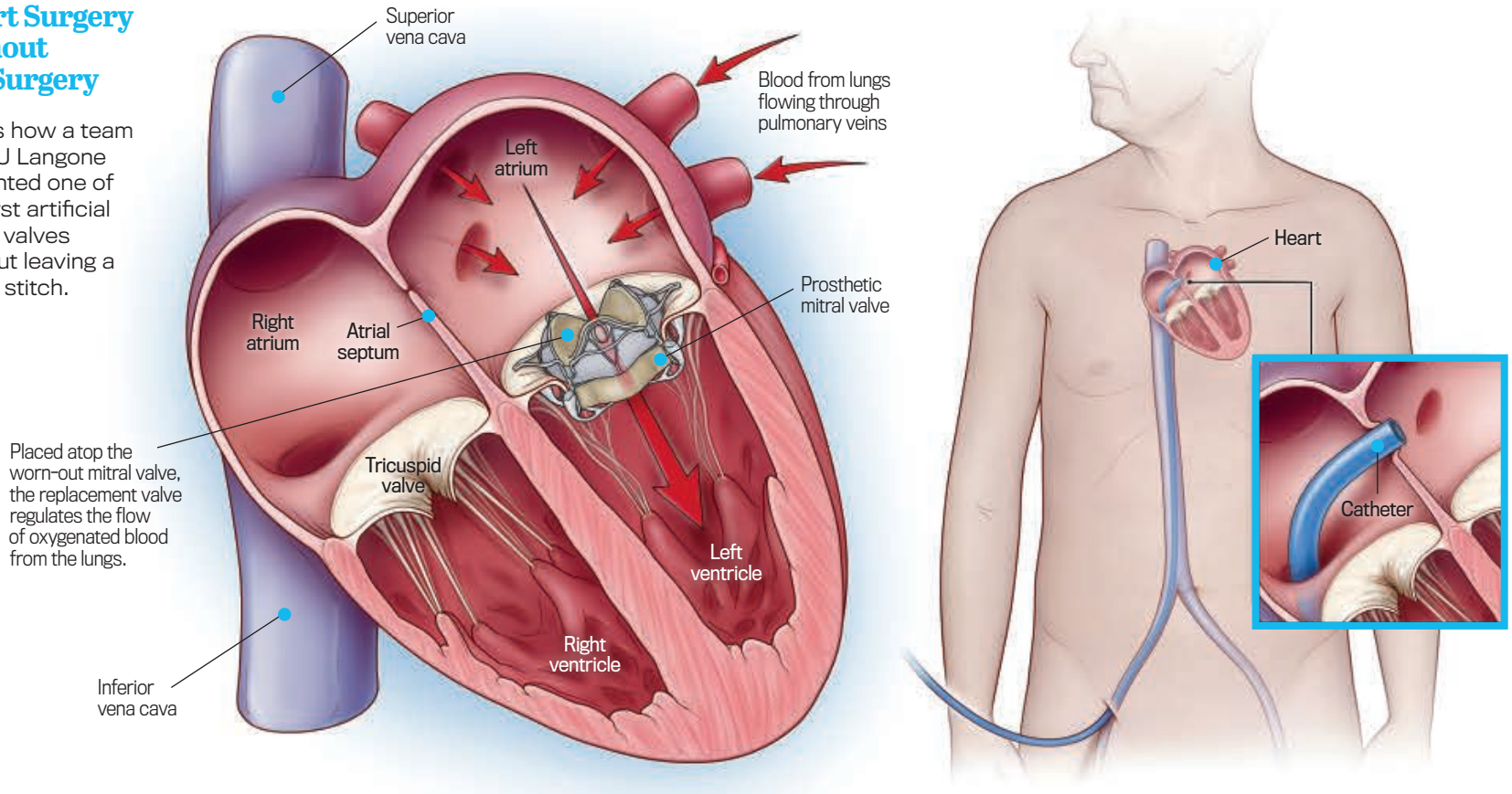


PHOTO: MICHAEL GRECCO PRODUCTIONS, INC.; ILLUSTRATION: SCOTT LEIGHTON

Several months after having her mitral valve replaced with an artificial device at NYU Langone, Nancy Clayton is back to her daily rowing and CrossFit regimen.

transcatheter aortic valve replacements (TAVRs), more than any other cardiac surgeon in the country. TAVRs were developed first because the aortic valve is a simpler structure and easier to access. TMVRs are more difficult; to reach the mitral valve, the catheter must be pushed through a wall of the heart, creating a host of technical challenges for device designers and operators. At the moment, TMVR is offered primarily to patients deemed too elderly or frail to sustain the rigors of open heart surgery. "TMVR is still experimental and thus not without risks," explains Dr. Williams.

To help plan the procedure, Dr. Williams used a 3-D model of Clayton's heart. An exact anatomical replica created from CT scans not only enabled Dr. Williams to puncture the septum at just the right angle to deliver the catheter into the left atrium, but it also made it possible for the team to do a dry run the day before. He began the procedure by putting a catheter into place, establishing a clear route to the mitral valve. Then, guided by Muhamed Saric, MD, PhD, director of echocardiography and clinical director of noninvasive cardiology, Dr. Williams used live X-ray and echocardiographic images to position an anchoring ring inside the diseased valve. This piece of engineering wizardry, which would secure the replacement valve, consists of a metal scaffold and natural tissue that can collapse to the width of a pencil and spring open when properly positioned. Once the new valve was in place, the leakage from Clayton's mitral valve stopped completely.

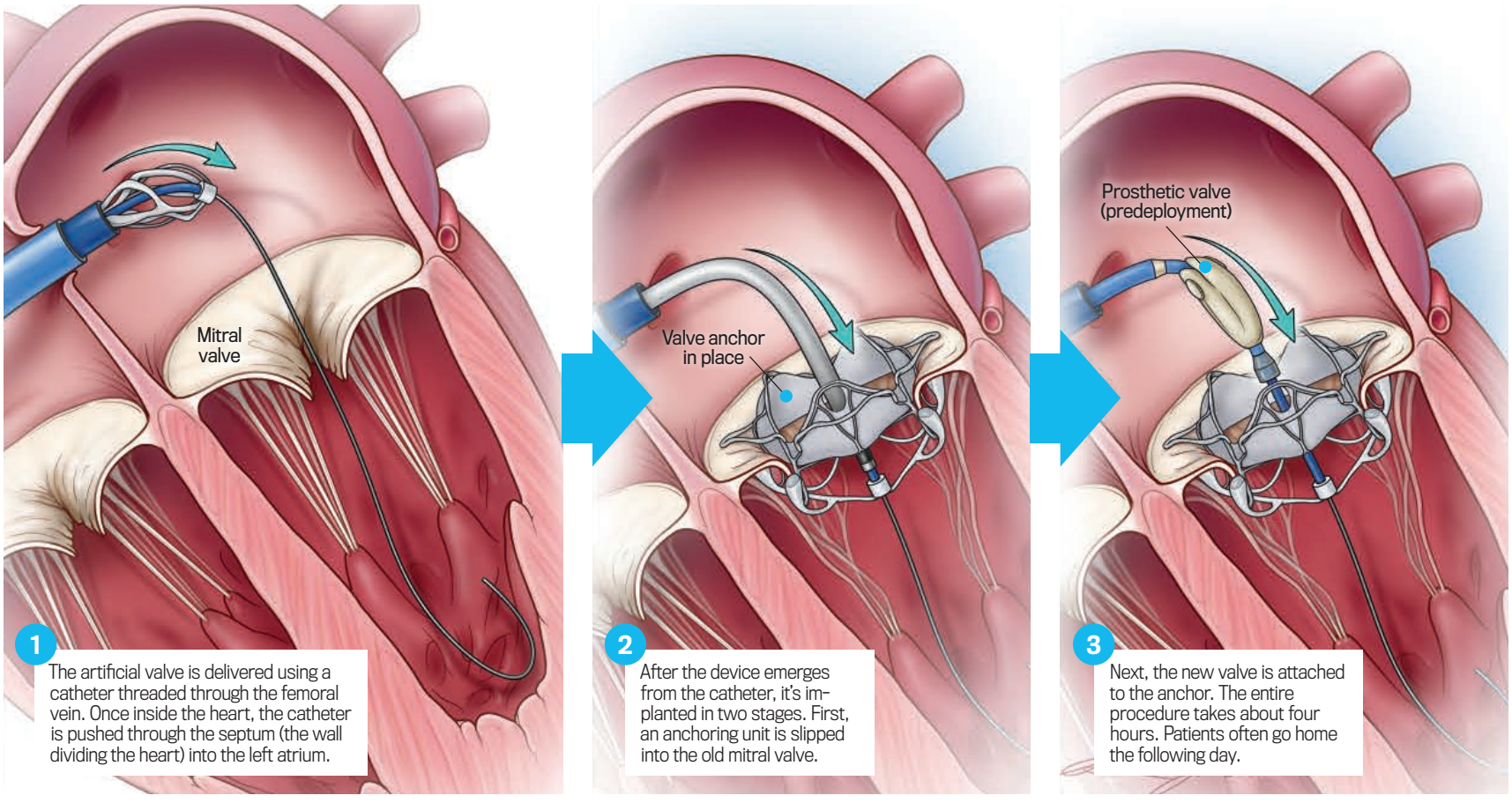
"One nice thing about this device is that we can withdraw it if it's not working correctly," explains Dr. Williams. "As it turned out, we got a perfect result."

Since the procedure had minimal impact on Clayton's body, she was awake within minutes and out of bed within hours. The day after being discharged, she was on a treadmill, and within two weeks, she was logging two miles a day. Three months later, she's back to rowing and CrossFit, functioning at what she gauges to be 80% of her former capacity. Clayton, however, is not typical of patients who would be candidates for TMVR, most of whom are too weak or frail for open-heart surgery to be an option. Yet she may well represent the future of this approach, which will become available to younger and healthier patients in need of a mitral valve replacement as advances are made in both the device and the procedure.

"I'm getting stronger every week," says Clayton, "and I absolutely expect to get back to where I was before. That's the whole point. I don't want to give up all the things I do." ■

TO FIND A PHYSICIAN who treats heart valve disease, call 646-501-0264 or visit nyulangone.org/heartvalvecenter.

Nancy Clayton made medical history, becoming one of the first people in the world to have a diseased mitral valve replaced with a transcatheter approach. The entire procedure is performed through a vein in the leg, leaving the patient with only a nick in the skin.



YOUR BRAIN ON EXERCISE

Strenuous physical activity boosts beneficial brain chemicals, according to new NYU Langone research.

EXERCISE ISN'T JUST a healthy workout for your body. Researchers at NYU Langone have found how it also spurs brain changes that could ward off dementia. Cell biologist Moses Chao, PhD, has discovered a mechanism in the mammalian brain that is responsible for exercise's ability to boost memory and promote nerve cell growth. This discovery, reported in the journal *E-Life,* may shape new ways to combat neurological disease.

To assess the effects of exercise on the cellular level, Dr. Chao studied the brains of two groups of mice. One group had access to exercise wheels in their cages for a month, while the other did not. The mice that exercised regularly had higher levels of brain-derived neurotrophic factor (BDNF), a protein scientists have dubbed the brain's "Miracle-Gro." "BDNF nourishes the brain and keeps neurons alive," Dr. Chao explains. "It can increase communication between neurons to strengthen synapses."

Through chemical and genetic analysis of the mice's tissues, Dr. Chao and his team figured out how the active mice generated more BDNF. As the body uses up its fat stores during

Second Opinion

When to Treat Prostate Cancer

Dr. Herbert Lepor describes NYU Langone's novel approach to a more accurate diagnosis.

MEN DIAGNOSED WITH prostate cancer face a bewildering amount of information and agonizing choices about which treatment plan to pursue. Although many of these tumors grow so slowly that they never cause symptoms or become life threatening, others can be more aggressive. Prostate cancer is the second leading cause of cancer deaths for American men. A biopsy can provide clues to a tumor's lethal potential, but it's impossible to know for sure.

"Standard biopsies that detect low-risk cancers fail to detect coexisting aggressive cancers about half the time," notes NYU Langone urologist Herbert Lepor, MD, a leading expert on the disease. "This uncertainty means that some men don't get treatment when it could be most effective, while others undergo procedures that may be unnecessary."

The 10-year survival rate for men with early-stage disease who choose active surveillance is extremely high, assuming that they comply with the recommended regimen.

Dr. Lepor, the Martin Spatz Chair of the Department of Urology, explains that because surgery or radiation can cause erectile dysfunction, incontinence, and other problems, the best option for a low-risk form of prostate cancer may be to not treat it at all. But that increasingly popular approach, he adds, can have drawbacks as well.

Five years ago, 85 to 90% of patients with early-stage prostate tumors (the type found in most of the 181,000 cases diagnosed annually in the US) chose surgical removal or radiation therapy. Today, according to national surveys, 40 to 50% opt for active surveillance, in which the tumor is left untreated but carefully monitored through prostate-specific antigen (PSA) blood tests and biopsies. "There's been a paradigm shift," notes Dr. Lepor.

In part, this trend reflects his own research, showing that cancers rated 6 or less on the Gleason scale—a standard measure of aggressiveness—

Dr. Herbert Lepor, chair of the Department of Urology, is one of the country's foremost experts on the disease.

ILLUSTRATION: MIKE REDDY; PHOTOS: SASHA NIALLA (LEFT), VDL/GETTY IMAGES (FACING PAGE)

exercise, the liver produces ketones, chemicals that circulate throughout the body, including one called D-beta-hydroxybutyrate (DBHB). Testing revealed that when DBHB is present in brain tissue, it acts to turn off a genetic "switch" that limits BDNF gene expression, freeing the gene to produce larger amounts of BDNF protein.

In the past, researchers have tried giving BDNF to patients with neurological disease to enhance their brain function. But BDNF is a large, unwieldy molecule, so when it's administered as a drug, it has difficulty passing through the blood-brain barrier into the brain. The new pathway Dr. Chao has found could circumvent that problem. If DBHB (or a similar compound) is given to patients, it might spur higher levels of natural BDNF production and, therefore, boost brain health. "We think there are other ways of triggering the benefits of BDNF without having to use BDNF," notes Dr. Chao. "We're very excited about this possibility." If this strategy works in humans, new treatments for dementia might be on the horizon. ■

rarely metastasize. Other studies suggest that the 10-year survival rate for men with early-stage disease who choose active surveillance is extremely high, assuming that they comply with the recommended regimen. The problem is that most men don't comply, largely due to the discomfort and inconvenience of frequent biopsies. Moreover, conventional biopsies, in which samples are taken from random spots throughout the gland, can miss small but aggressive tumors.

Dr. Lepor and his colleagues at NYU Langone are determined to improve detection of aggressive tumors, while avoiding unnecessary treatment for those that are unlikely to ever cause trouble. They have been at the forefront of developing a prostate health index (PHI) blood test, which provides more specific information than the conventional PSA test, as well as multiparametric MRI, a type of magnetic resonance scanning that yields more detailed images than those generated by commonly used techniques. These tests, they believe, afford a clearer picture of a patient's risk level and can eliminate the need for biopsies in many cases.

When microscopic examination of the tumor is indicated, it's performed with the aid of another new imaging technique, MRI fusion target biopsy—also developed at NYU Langone—that zeroes in on the suspicious site with unparalleled precision. "The best way to manage low-risk prostate cancer is simply to avoid its detection by not performing random prostate biopsies in men who do not harbor significant disease," says Dr. Lepor. "We're trying to screen smarter and biopsy smarter so that we can treat smarter." ■

TO FIND A PROSTATE cancer specialist at the Perlmutter Cancer Center, call 646-825-6307 or visit nyulangone.org/prostatecancercenter.

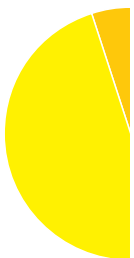
INFECTED MOTHERS, PROTECTED BABIES

Research by NYU Langone shows that by treating pregnant women for hepatitis B, the number of infected babies worldwide may be greatly reduced.

THE HEPATITIS B virus is feared around the world, and for good reason: it kills over 600,000 people annually. While the virus can sometimes be managed with medication, in many cases it causes liver cancer and liver failure. NYU Langone gastroenterologist Calvin Pan, MD, has found a way to reduce the likelihood that pregnant women will pass hepatitis B to their babies before birth, the most common way children get infected. In Dr. Pan's trial, babies born to mothers with hepatitis B who received tenofovir, an antiviral drug used to treat the disease, were less than one-third as likely to acquire the virus as babies born to untreated mothers. The research, funded by tenofovir manufacturer Gilead Sciences, was published in *The New England Journal of Medicine*.

80 to 90%

The percentage of infants infected with hepatitis B who develop long-term disease.

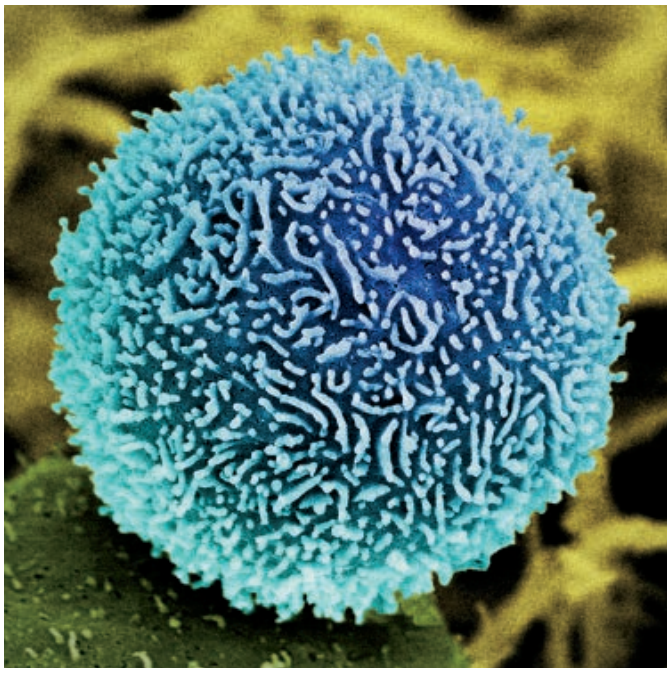


While hepatitis B turns into a chronic infection in only 2 to 6% of adults, according to the Centers for Disease Control and Prevention, about 80 to 90% of infected infants develop long-term disease. Most babies are vaccinated at birth, but when mothers have high levels of the virus, the vaccine may be less effective. Dr. Pan's team wanted to see if tenofovir could reduce the viral loads of pregnant women enough to keep them from transmitting the virus. The trial was conducted at five sites in China, where hepatitis B is endemic. Dr. Pan's team enrolled 200 women with a high viral load, half of whom received tenofovir daily, starting at 30 to 32 weeks of pregnancy. The viral loads of the tenofovir-treated women dropped dramatically, and only 5% of the infants born to these mothers developed hepatitis B, compared to 18% of those born to untreated mothers.

Dr. Pan thinks the success of his trial can be replicated worldwide. Children in Asia, Africa, and South America are especially at high risk, since the virus is common in those regions. "At least 100,000 babies get infected every year," notes Dr. Pan. "With antiviral treatment, we are hoping we can reduce that to a very small number." Dr. Pan envisions a universal screening program for pregnant women in their third trimester. Those who test positive would receive antiviral therapy. ■

Starving Pancreatic Cancer

Study by NYU Langone researcher identifies an alternate food supply for this most resourceful and lethal of scavengers, offering promise of more effective therapies.



▲ A microscopic view of a pancreatic cancer cell

IN RECENT YEARS, researchers have hoped to combat pancreatic cancer by developing drugs that interfere with tumor cells' source of fuel. But a study led by researchers at NYU Langone and other institutions has found that when their glucose fuel supply runs low, pancreatic cancer cells signal to nearby support cells for help supplying them with nourishment. The study, published in the journal *Nature*, was based on research conducted in collaboration with teams from the Dana-Farber Cancer Institute at Harvard University and the University of Michigan Medical School.

Intrigued by the fact that pancreatic cancer cells keep growing even when they have very little oxygen and blood sugar, or glucose, normally supplied by the bloodstream, Alec Kimmelman, MD, PhD, wanted to find out how that happened. Dr. Kimmelman, chair of the Department of Radiation Oncology, led a team of investigators that discovered that pancreatic tumor cells communicate with nearby stellate cells—healthy cells that secrete substances providing structural support. By emitting an unknown chemical, hungry tumor cells signal the stellate cells to break down their own components into various building blocks, including the amino acid alanine. In the presence of alanine, the tumor cells' mitochondria, or cellular motors, revved up by 20 to 40%, indicating that the alanine was being used as fuel source in place of glucose.

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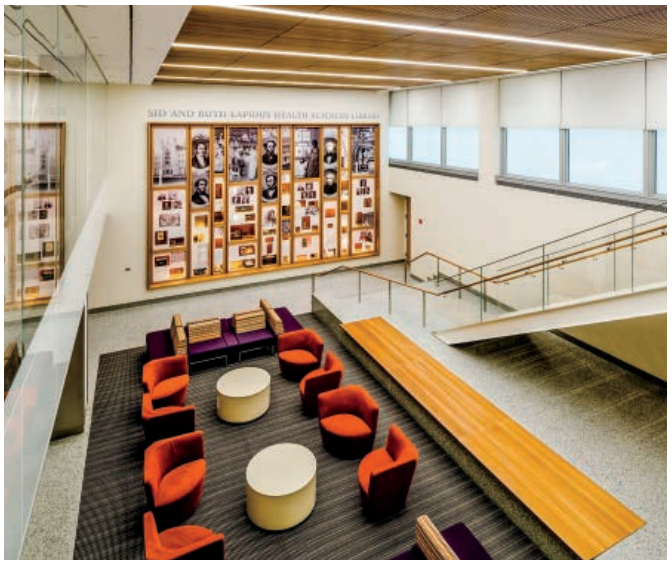
When their glucose supply is limited, cancer cells can scrounge for enough nourishment to take steps that enable them to multiply, like building new strands of DNA and RNA. "In nutrient-poor conditions, alanine is providing metabolic efficiency," explains Dr. Kimmelman. "These tumor cells have an unbelievable capacity to scavenge and adapt." When they tested this theory in mice, deactivating a gene that allows the breakdown in stellate cells, tumor growth slowed significantly compared to those grown with normal stellate cells, since they no longer had access to the secreted alanine.

Pancreatic cancer is one of the most lethal forms of cancer, with an overall five-year survival rate of just 7%. While current therapies have shown some efficacy, there is a lot of room for improvement. Dr. Kimmelman and his colleagues think it may be possible to strike back at tumor cells by limiting their scavenging abilities. "We are continuing to explore how pancreatic cancers alter their metabolism to provide essential building blocks they need," he says. His team hopes that decoding tumor cells' survival strategies will pave the way for future drugs that starve out pancreatic tumors. ■

TO FIND A PANCREATIC cancer specialist at the Perlmutter Cancer Center, call 212-731-6000 or visit nyulangone.org/pancreaticcancer.



▲ In the lounge of the new library, a two-story-high display wall showcases rotating exhibits of artifacts relating to the School's 175-year history and the medical profession.

A LIBRARY WITHOUT BOOKS

IT MAY SOUND like an oxymoron, but that's how NYU Langone is describing the new Sid and Ruth Lapidus Health Sciences Library, which opened on June 8. Except for some 550 popular titles in the medical humanities and bioethics, no printed tomes are housed within the new facility, the first all-digital library of a long-established American medical school. Yet more volumes—in the form of nearly 50,000 e-books—are available than ever before, as are 15,000 e-journals and 250 databases, as well as access to the vast holdings of New York University's libraries.

Located on the ground floor of the Medical Science Building, the new library occupies roughly the same space as the one destroyed by Hurricane Sandy in 2012. "Sandy gave us the opportunity to design and build a completely new library fit for the digital age," notes Vicki Match Suna, AIA, senior vice president and vice dean for real estate development and facilities. Named for its benefactors, an NYU Langone trustee and his wife, the new library was designed to emphasize openness and accessibility to the entire Medical Center community. In response to feedback from patrons—about 800 visit the library on an average day—there are six small group study rooms, a quiet reading room, a common lounge, a large classroom, and a technology innovation room equipped with a data visualization station, a 3-D printer, and a large interactive display. Some 30 computer workstations take the place of the card catalog of days gone by.

One of the library's most striking features is a two-story-high display wall that showcases rotating exhibits of rare books, archival documents and photographs, antique medical instruments, and other artifacts relating to the School's 175-year history and the medical profession. "The displays provide a perfect juxtaposition to the technology innovation room," says library director Neil Rambo, "because students can get a sense of the history of the institution and the medical profession, as well as the future." ■

PHOTOS: STEVE GSCHMEISSNER/SCIENCE SOURCE (TOP), RENE PEREZ (LEFT), JEFF WEINER (FACING PAGE, BOTTOM)

MILESTONES & NEWSMAKERS

Dr. Bret J. Rudy and Dr. Joseph Weisstuch appointed to top leadership posts at NYU Lutheran; three researchers earn prestigious grants; white coat ceremony welcomes class of 2020.

BRET J. RUDY, MD, previously chief medical officer of NYU Lutheran Medical Center, has been appointed its executive hospital director and senior vice president. In his new role, he is responsible for improving operational efficiencies and enhancing the scope and quality of care and services at NYU Lutheran, an acute care teaching hospital in southwest Brooklyn's Sunset Park neighborhood. A longtime faculty member and board-certified adolescent medicine physician at NYU Langone, Dr. Rudy previously served as vice chair of the Medical Center's Department of Pediatrics. Prior to his leadership posts at NYU Lutheran, he helped lay the groundwork for establishing pediatric subspecialty services there, including pediatric gastroenterology, pulmonology, cardiology and a pediatric hospitalist program. Dr. Rudy has since been instrumental in the overall transformation of NYU Lutheran's quality initiatives and clinical programs.

JOSEPH WEISSTUCH, MD, previously assistant chief medical officer of NYU Lutheran Medical Center, has been appointed its chief medical officer. In his new role, he oversees the institution's quality and safety measures, ensuring that NYU Langone's culture, as well as its rigorous standards, are integrated at NYU Lutheran. Dr. Weisstuch, a board-certified nephrologist, leads a team focused on patient outcomes, community health, and the use of proven best practices for clinical care. A member of the NYU Langone community for 35 years, he earned his MD at NYU School of Medicine and completed his residency training at Tisch Hospital and Bellevue Hospital Center. ■

A Cloak of Compassion

THE WHITE COAT Ceremony, an annual rite of passage at NYU School of Medicine, was held on August 11 for the class of 2020, signifying the start of their medical education and symbolically confirming their commitment to the medical profession. This year, 132 students were brought to the stage of Farkas Auditorium and, in the presence of their families and friends, were "cloaked" in their first white coats by several members of the faculty. The class of 2020—60 women and 72 men—hails from 25 states and the District of Columbia.

David Oshinsky, PhD, a Pulitzer Prize–winning historian and director of NYU Langone's Division of Medical Humanities, delivered the keynote speech, highlighting the rich history of NYU School of Medicine, which is celebrating its 175th anniversary this year.

Classmates Vita Jaspan, Joshua Novack, Yonathan Ararso, and Isaac Shaman at the reception following the White Coat Ceremony.

Robert I. Grossman, MD, the Saul J. Farber Dean and CEO, welcomed the new students with a speech inspired by the hit musical *Hamilton*. Noting that he could neither sing nor rap, Dean Grossman enlisted the talents of Broadway actor Andrew Manning, who recited lyrics from the show, which Dean Grossman related to the medical school experience.

Alexander Hamilton, Dean Grossman noted, didn't come from a prominent family, but with few resources save for his own prodigious talent and energy, he helped forge our nation. "All of us have different starting points," Dean Grossman reminded the students. "It's not where you begin . . . It's what you do along the way and where you finally land." ■

Grants Support Promising Research on Inflammatory Bowel Disease

Two researchers at NYU Langone's Skirball Institute of Biomolecular Medicine—microbiologist **KEN CADWELL, PHD** (at left, top), and immunologist **DAN LITTMAN, MD, PHD** (at left, bottom)—have been awarded grants from the Kenneth Rainin Foundation to study inflammatory bowel disease (IBD). They are among 27 investigators worldwide, both early-career and seasoned scientists, whose work is being recognized for its potential breakthroughs in IBD research. Dr. Cadwell is receiving the foundation's Innovator Award, which provides a $100,000 grant for one-year projects so groundbreaking that they may not qualify for funding from more traditional sources. Dr. Cadwell's grant will support his study of how bacteria in the gut compete with one another. Dr. Littman is the recipient of the foundation's Breakthrough Award, which provides continued funding to Innovator Award grantees who have demonstrated significant progress in their research goals. Dr. Littman's $90,000 grant will support his research on how the cells that line the intestines react to bacteria in the gut. Basic research such as this complements NYU Langone's Inflammatory Bowel Disease Center, led by Feza Remzi, MD, a renowned surgeon.

NIH Awards $8.9 Million Grant to Study Hazards to Children

As part of a seven-year initiative called Environmental Influences on Child Health Outcomes, which investigates how a range of environmental factors in early development affect the health of children and adolescents, the National Institutes of Health has awarded an $8.9 million, two-year grant to **LEONARDO TRASANDE, MD,** a pediatrician, epidemiologist, and expert in environmental medicine at NYU Langone. The grant will significantly expand his research, combining data from two studies to determine how early-life exposure to contaminants impacts early growth and development through age two. Experiences during sensitive developmental windows—around the time of conception, later in pregnancy, and during infancy and early childhood—can have long-lasting effects on health. "This new research will augment our understanding of the mechanisms by which chemical contaminants, including phthalates, bisphenols, and pesticides, contribute to disease and disability," says Dr. Trasande. ■

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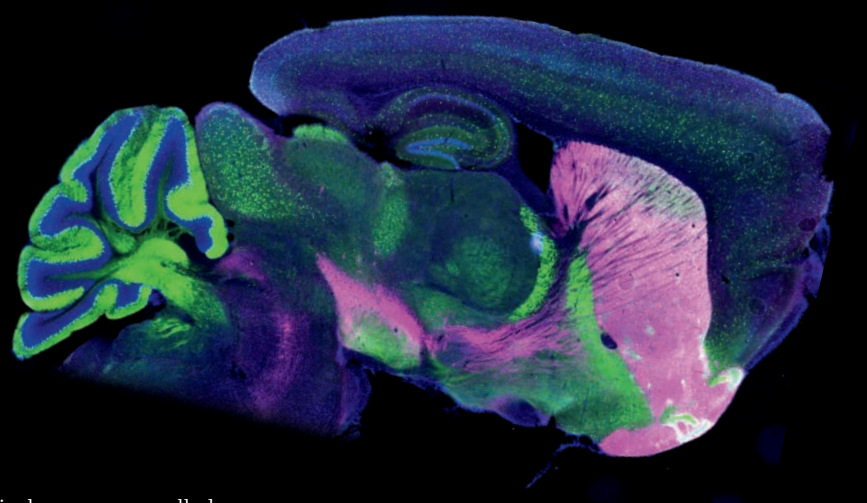
NYU Langone MEDICAL CENTER

550 First Avenue
New York, NY 10016

The Big Picture

A BEAUTIFUL MIND



ART AND SCIENCE collide in this dazzling microscope image from the laboratory of Nicolas Tritsch, PhD, assistant professor of neuroscience and physiology at NYU Langone. The bright swirl of colors, more than just eye candy, illuminates cells in the mouse brain thought to control movement and coordination. "We've known since the 1960s that a dwindling supply of brain cells that make dopamine can lead to movement disorders," says Dr. Tritsch. "What is less clear is how these cells communicate with other brain regions."

The magenta stain, clustered in the brain's striatum at right, indicates cells that receive dopamine signals. The green stain, especially concentrated in the brain's cerebellum at left, highlights cells that produce a different chemical messenger, called GABA. Dr. Tritsch believes GABA and dopamine may work together to facilitate voluntary movement. By understanding which brain cells make and release GABA, and how it interacts with dopamine, Dr. Tritsch hopes to inspire novel treatments for Parkinson's, a progressive neurological disease that leads to debilitating tremors and difficulty walking. ■

IMAGE COURTESY OF THE TRITSCH LAB