

NEWS & VIEWS

The Newsletter of
 NYU Langone Health
DECEMBER 2018



EDUCATION

A Humbling Gift for Those Entering a Noble Profession

NYU School of Medicine becomes the first top-ranked medical school to award its MD students full-tuition scholarships.

AT THE END of this year's White Coat Ceremony, held in Farkas Auditorium on August 16, Kenneth G. Langone, chair of NYU Langone Health's Board of Trustees, explained that he had never before addressed first-year medical students and their families at this annual rite of passage, where the incoming class receives their first white coats to mark the start of their formal journey to become physicians. But this year, Langone noted, he had some important news to share, and it would transform the celebration from a milestone into a momentous occasion. Flanked by his wife, Elaine, and Robert I. Grossman, MD, the Saul J. Farber Dean and

CEO, Langone announced: "As of this very moment, NYU School of Medicine is now a tuition-free medical school for all MD students." Even before he could finish the sentence, the audience gasped and cheered, then applauded through a standing ovation.

NYU School of Medicine launched this bold initiative to reduce the staggering debt incurred by medical students due to the ever-rising cost of their education. "Many new doctors begin their careers with more debt than a typical mortgage," notes Rafael Rivera, MD, associate dean for admissions and financial aid. "Our goal is to recruit and train

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MILESTONES

ALL-PRIVATE AND FULLY DIGITAL, KIMMEL PAVILION STANDS APART

Single-bedded rooms. Interactive digital walls. Scenic views. These are just a few of the patient-centered amenities that complement NYU Langone's renowned clinical care in the new Helen L. and Martin S. Kimmel Pavilion and Hassenfeld Children's Hospital.

WALK INTO ANY of the 374 patient rooms inside the new Helen L. and Martin S. Kimmel Pavilion, and you'll see large windows with abundant light, a sleeper couch for visitors, just one bed, and a 75-inch-wide, high-definition smart screen from which patients can not only peruse a menu of entertainment options, but also review their medical records, read about their care team, order meals, and control the temperature and lighting in their room.

If these features sound somewhat unusual for an inpatient setting, that's by design. Everything about the Kimmel Pavilion and Hassenfeld Children's Hospital, which occupies three of the

11 patient floors, is intended to make a patient's stay less stressful. "The addition of the Kimmel Pavilion and Hassenfeld Children's Hospital to the main campus is the culmination of more than a decade of planning," notes Robert I. Grossman, MD, the Saul J. Farber Dean and CEO. "It's state-of-the-art in every respect."

The facility's opening last June marked a milestone not only for the institution, but also for New York City. The Kimmel Pavilion is the city's only inpatient clinical facility with exclusively private

The Kimmel Pavilion has 374 single-bed patient rooms—68 devoted to children within Hassenfeld Children's Hospital.

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Tuition-Free MDs

(Continued from page 1)

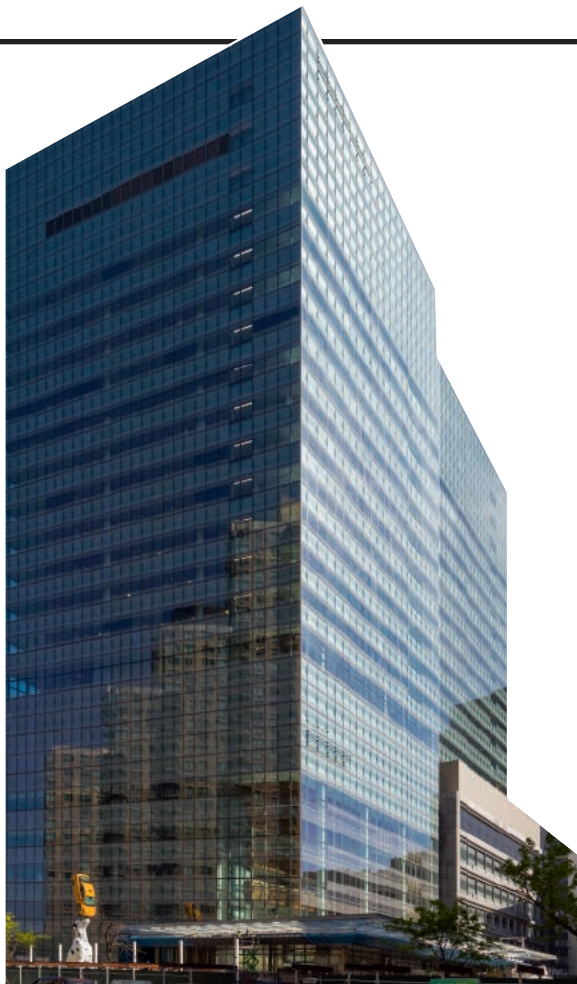
the very best students in the country, regardless of financial need. Awarding full-tuition scholarships is a key element of that strategy.”

Of the 20,000 students enrolled in American medical schools in 2017, three-quarters graduated with debt, according to the Association of American Medical Colleges. The median debt was \$180,000 for graduates of public medical schools, and \$202,000 for graduates of private institutions. Moreover, approximately one-third of medical students also have educational loans from prior academic programs. Fearing the rising costs of medical school, many promising high school and college students may not even consider a career in medicine.

“We believe we have a moral obligation to help aspiring doctors fulfill their

desire to serve humanity, unencumbered by overwhelming debt,” says Dean Grossman. “A population as diverse as ours is best served by doctors from all walks of life. People should be free to pursue a career in medicine, and free to pursue their specialty of choice, without undue focus on debt or future compensation. By giving the most talented and passionate prospects the opportunity to achieve their professional dreams, we are changing the face of medicine.”

The historic initiative was made possible by a visionary group of more than 2,500 supporters, including trustees, alumni, and other philanthropic partners. Over the last decade, NYU Langone has raised \$450 million toward the \$650 million needed to finance full-tuition scholarships for



MILESTONES IN PATIENT CARE

(Continued from page 1)

rooms. And Hassenfeld Children’s Hospital, now NYU Langone’s primary location for pediatric inpatient care, is the city’s first new children’s hospital in nearly 15 years.

Because all of the Kimmel Pavilion’s patient rooms—68 devoted to children—are single bedded, they enhance patient care in many ways: greater privacy, quieter surroundings, and improved communication between patients and their care team—all contributing to better clinical outcomes and faster recovery times. “The level of privacy frames the individualized care because as soon as you enter the room, it’s clear that the patient should be the singular focus,” explains Fritz Francois, MD, NYU Langone’s chief medical officer and patient safety officer. “Since communication of the care team with the patient and the family is totally private, it’s easier for clinicians to elicit the kind of detailed medical history that is essential for diagnosis and treatment.”

At the same time, the Kimmel Pavilion is designed to ensure that privacy doesn’t mean confinement or isolation. On the seventh floor, roof gardens—one for adults and another for children—provide fresh air and greenery. “We take a holistic view of creating environments of the highest quality for our patients and families,” explains Vicki Match Suna, AIA, senior vice president and vice dean for real estate development and facilities. “Recognizing that design greatly impacts the patient experience and can have positive effects on health outcomes, these new spaces have been thoughtfully planned with welcoming environments that encourage overall health and wellbeing. We want patients and their families to feel a sense of peace and wellness.”

The sleeper couch that accommodates loved ones for overnight stays is just one small example. “When our baby was brought from the neonatal intensive care unit, my husband and I were in a fragile state emotionally,” recalls the

PHOTOS: KARSTEN MORAN (ABOVE), JEFF GOLDBERG (LEFT)



Dean and CEO Robert I. Grossman, MD, (at left) and Board Chair Kenneth G. Langone, with his wife, Elaine, (below) congratulate medical students after the White Coat Ceremony.



all its medical students. The scholarships cover each year of tuition—\$55,018 for the 2018–2019 academic year—for all 442 MD students currently enrolled at NYU School of Medicine, as well as all future attendees. The School will refund out-of-pocket tuition payments already made, and return all student loans used to cover tuition costs.

“The model of medical education needs to address changing scientific, social, and economic circumstances, as well as dramatic changes in the healthcare delivery

system,” notes Steven B. Abramson, MD, senior vice president and vice dean for education, faculty, and academic affairs, chair of the Department of Medicine, and the Frederick H. King Professor of Internal Medicine. In 2013, NYU School of Medicine expanded its earlier efforts in educational reform by launching an accelerated three-year curriculum for select students, a program designed, in part, to ease the financial burden of medical school. “As the School’s latest strategy for alleviating

student debt, our tuition-free initiative promises to pave the way for other medical schools nationwide to follow suit,” says Dr. Abramson.

In his congratulatory message to the first-year students, as well as the upper-class students who were simultaneously notified by email and text messages, Ken Langone said, “We have only one wish: that you leave here with a great education and that you do all you can to help someone live a healthier, better life.”

First-year student Emily Mills took those words to heart. “We all felt humbled by this generosity,” she says. “We’ve been given a unique opportunity, so we don’t want to let anybody down. This makes me want to give back—to help people even further.” ■

“We believe we have a moral obligation to help aspiring doctors fulfill their desire to serve humanity, unencumbered by overwhelming debt,” says Dean Grossman.

A roof terrace with greenery offers an outdoor respite for patients and their families at the Hassenfeld Children’s Hospital within the new Kimmel Pavilion.

mother of an infant patient. “By allowing us to stay with our child every night for a month, NYU Langone took care of us, too.”

Complementing the patient-friendly design is a host of technologies that enhance quality and safety—so many that the Kimmel Pavilion has earned distinction as one of the most digitally sophisticated inpatient facilities in the country. Many of these new systems and devices are seamlessly integrated into NYU Langone’s electronic medical record system, providing physicians and nurses with real-time data at the bedside. Outside each patient room, for instance, a digital medication drawer—the first of its kind at any hospital in the US—saves nurses the time they used to spend shuttling back and forth to central medication rooms. Inside, a smart bed system alerts caregivers when patients who are at risk for falling leave their bed and when it’s time to reposition them to prevent bed sores.

“Many of the technologies in Kimmel are truly first-of-their-kind and represent a step forward for the entire medical field,” says Nader Mherabi, senior vice president and vice dean and chief information officer at NYU Langone.

Of course, the new technology isn’t just for the clinical care team. One of the most popular amenities is MyWall, a communication and entertainment system developed for NYU Langone that turns rooms into a virtual home away from home, making patients feel more empowered.

For all its special features, Kimmel offers the same exceptional clinical care that patients have come to expect across the entire institution. “It’s important for patients to be cared for in an environment that’s truly healing—not only comfortable but comforting,” notes Catherine Manno, MD, the Pat and John Rosenwald Professor of Pediatrics and chair of the Department of Pediatrics. “This is a hallmark of Hassenfeld Children’s Hospital and the Kimmel Pavilion.” ■



TELEMEDICINE

THE DOCTOR IS IN—AND ONLINE

NYU Langone's new Virtual Urgent Care service provides a medical consultation from the convenience of your smartphone or tablet.

THE OLD-FASHIONED house call is back with a modern twist. Thanks to NYU Langone Health's new Virtual Urgent Care service, patients in New York, New Jersey, Connecticut and Pennsylvania can now be seen by a board-certified emergency-medicine physician through a secure video-conferencing app. Suspected case of pink eye? Mysterious rash? Flu-like symptoms? Virtual Urgent Care specialists can attend to these and other minor conditions, in many cases sparing patients a trip to the doctor's office or the Emergency Department.

Patients are often surprised by how much a virtual exam feels just like an office visit, notes Viraj Lakdawala, MD, director of telemedicine in the Ronald O. Perleman Department of Emergency Medicine. "We can tell a lot by observing how the patient is breathing, how much they are sweating, how flushed their face is, and how lethargic they seem," Dr. Lakdawala explains. "If they point the camera on their smartphone at the back of the throat, we can see whether the tonsils are inflamed." The doctor may also ask the patient to press on their sinuses, lymph nodes, or abdomen for signs of inflammation. At the end of a visit, which typically takes about 10 minutes, the doctor can prescribe medications, order tests, or make a referral as needed.

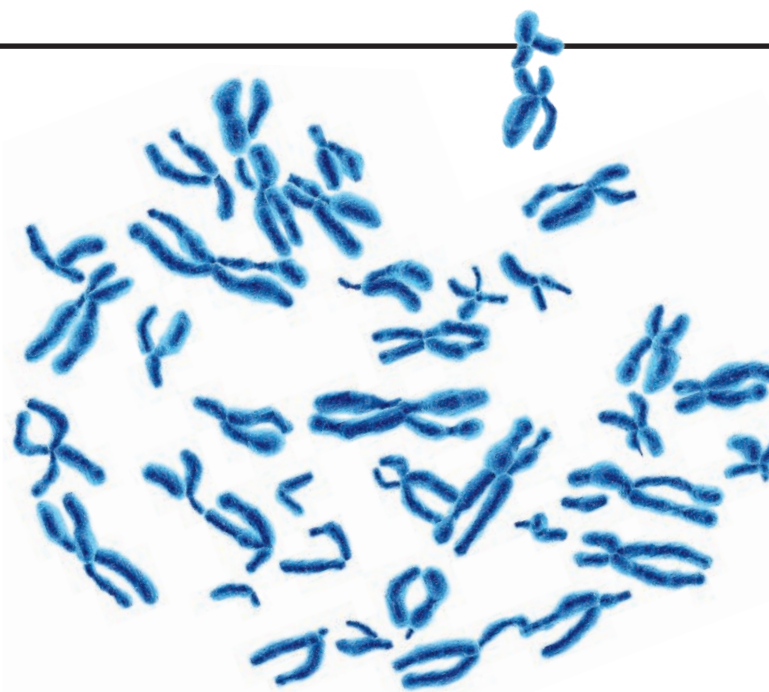
"This model of care allows NYU Langone to offer patients an extremely convenient, high quality option that they can access from anywhere," says Robert Femia, MD, chair of the Department of Emergency Medicine.

NYU Langone's Virtual Urgent Care team consists of 30 physicians from its nationally renowned Department of Emergency Medicine, all trained in telemedicine by Dr. Lakdawala. These specialists are skilled not only in diagnosing and treating a wide variety of conditions, but also in determining when symptoms warrant a visit to the Emergency Department. (Fortunately, this happens infrequently: only about 5% of the patients who use Virtual Urgent Care are diagnosed with a condition that requires an immediate in-person evaluation.) And because Virtual Urgent Care is integrated with the institution's electronic medical record system, doctors can quickly consult the medical history of existing patients and extend to new patients the benefits of NYU Langone's vast network of specialists.

The service is currently offered 7 days a week to adults and to children ages 12 and older, with plans to extend it to pediatric patients as young as 5. Same-day appointments are available, often with short waits. "This is a new way of seeking care," says Dr. Lakdawala, "but our patients feel comfortable with it because they know they can trust us." ■

Three Easy Steps to Schedule an Appointment

1. On your smartphone or tablet, go to nyulangone.org/virtualurgentcare, or navigate to the "virtual urgent care" section of the NYU Langone Health app.
2. Select a time from 7:00 a.m. to 11:00 p.m. Monday to Friday, and 8:00 a.m. to 8 p.m. Saturday and Sunday.
3. Click the registration link in your visit confirmation e-mail to begin your video visit.



BREAKTHROUGHS

NYU Langone Researchers Create New Species

Fusing chromosomes in yeast points up new strategies for repairing chromosomal defects in humans.

SCIENTISTS BELIEVE THAT humans once boasted 24 pairs of chromosomes, just like other primates, until at some point in our distant past two pairs fused into one, leaving us with 23 pairs. That transformation inspired Jef Boeke, PhD, director of the Institute for Systems Genetics at NYU Langone Health, to wonder how well other species might tolerate such big genetic changes.

In the case of brewer's yeast, the answer is . . . quite well. In a new study published in the journal *Nature*, Dr. Boeke and colleagues found that the single-celled organism used to make beer and bread thrives even after its normal set of 16 chromosomes have been fused together to form two megachromosomes.

"What we asked, broadly, is how extensively we could rewrite a genome and still have a healthy organism come out at the other end," says Dr. Boeke, a leader in the emerging field of synthetic biology. "What we found is that yeast is amazingly adaptable."

This genomic flexibility may lead to a better understanding of how human cells divide and provide instructions to their progeny, given that yeast possess a cellular organization similar to ours. Such knowledge, says Dr. Boeke, could aid researchers in determining how extra or missing chromosomes are passed on—sometimes resulting in miscarriages or genetic disorders such as Down syndrome—and may lay the groundwork for therapeutic interventions to prevent or repair such chromosomal anomalies.

Dr. Boeke and his colleagues harnessed bacteria to fuse the ends of each yeast chromosome together. The reengineered cells reproduced successfully, though they could no longer do so with their unaltered counterparts. In engineered strains, Dr. Boeke's team found that healthy progeny depended upon a certain numeric compatibility among their parents: When males and females possessed the same number of chromosomes—be it eight, four, or two—their mating was successful. If their chromosomes mismatched, say, with 16 chromosomes in a male and only 8 in a female, reproduction failed.

Beyond medicine, these findings could help control the harmful spread of genetically modified species in the wild. The process studied mimics a key step in evolution, in which isolated populations can evolve into a new species over time. In this case, the researchers found that as few as eight fusions were enough to completely isolate the two yeast populations from each other, in effect creating a separate species virtually overnight. "Our work sheds light on the wild trajectory of accidental chromosome duplications and fusions across evolution," says Dr. Boeke. "We are learning how one species becomes two." ■

PHOTOS: ALFRED PASTERA/GETTY IMAGES (ABOVE); IDEAS ON PURPOSE (LEFT)

THE EXPLAINER

Five Things You Should Know about Sports Medicine

Whether a joint injury is caused by an athletic endeavor or a daily activity, the orthopedic specialists at NYU Langone's Sports Medicine Center can set you on the path to recovery.

Despite its name, sports medicine isn't solely for jocks or weekend warriors. "A traumatic injury can happen anywhere, not just on a sports field," explains Laith Jazrawi, MD, chief of the Division of Sports Medicine in NYU Langone's Health's Department of Orthopedic Surgery. The Sports Medicine Center focuses on acute and chronic injuries to the major joints—the shoulder, elbow, hip, knee, and ankle—and their surrounding soft tissue. Its clinicians come from many different specialties, but they share a common goal: helping sidelined patients get back in the game. Here, Dr. Jazrawi and his colleague Dennis Cardone, DO, chief of the Primary Care Sports Medicine Program, shed light on their field, the center, and recent advances in treatment.

Early intervention is critical.

About half the center's 35,000 annual patient visits involve acute injuries, such as sprains, fractures, torn ligaments, or ruptured tendons that require immediate attention or, in some cases, surgery. The rest entail chronic conditions—among them, tendonitis, bursitis, and osteoarthritis—resulting from repetitive strain, improper form, or degenerative disease. "Anyone who has persistent pain or discomfort during or after exercise should seek an evaluation," says Dr. Cardone. Typically, the earlier a repetitive-motion injury is diagnosed, the easier it is to treat. Rotator cuff tendonitis, for example, often resolves after a few days of rest and targeted strengthening. On the other hand, "frozen shoulder," an extremely painful and potentially debilitating condition, requires more intensive physical therapy and a possible therapeutic injection. By consulting a sports medicine specialist who can differentiate one condition from the other, the patient can speed up their recovery.

New treatments can accelerate healing.

More than 90% of the center's patients can be treated

without surgery. A ruptured Achilles tendon, for instance, is now often left to heal on its own by using immobilization techniques and early rehabilitation. Professional athletes, however, may require surgery to enable them to return to the field faster and more predictably. For conditions such as osteoarthritis, doctors can inject therapeutics directly into the joint to relieve pain, improve function, and allow the supporting muscles to be strengthened.

Joint surgery has become gentler.

For patients who require surgery, most will benefit from arthroscopy, a minimally invasive approach in which pencil-thin instruments and a tiny camera are inserted through small incisions. "There's been great progress in arthroscopic surgery, enabling us to accomplish complex procedures that once would have required open surgery," notes Dr. Jazrawi. One example is a superior capsular reconstruction, in which tissue from an organ donor is used to help repair a torn rotator cuff. With an arthroscopic approach, patients typically return to work within a week—twice as



fast as with open surgery—and to sports within four to six months. Virtually all arthroscopic surgeries allow the patient to return home the same day. Other advantages: They require less anesthesia, reduce postoperative pain, involve fewer complications, and have a lower risk of infection than open surgery.

"Weak in the knees" is not just an expression.

The most common sports-related injuries involve the largest and most complex joint. Though the knee is designed to support seven times the body's weight, it's highly vulnerable to injury. The rotational forces involved in pivoting subject the surrounding ligaments to stress that can make them fail, and in contact sports, the knees often take a direct hit. Compared to most medical centers nationwide, which perform about 600 knee surgeries per year, NYU

Langone performs more than 5,000 annually, reports Joseph Bosco, MD, vice chair for clinical affairs in the Department of Orthopedic Surgery. One of the most cutting-edge approaches is a cartilage-repair technique known as autologous chondrocyte implantation, in which healthy cells are harvested from elsewhere in the knee, multiplied in a lab, and then transplanted into the damaged area. Another technique involves transplanting fresh cartilage grafts from young donor patients. Both techniques can forestall or even eliminate the need for joint replacement, which can be severely limiting for athletes.

Sometimes a major repair is still the best option.

When a patient has torn one of the ligaments or layers of cartilage that support and stabilize the knee, or the

cartilage starts to break down due to aging, joint replacement may be necessary to restore full function. The same is true for people with severe osteoarthritis who are dealing with unbearable knee pain due to the loss of shock-absorbing cartilage pads. While most medical centers across the country perform about 300 knee replacements per year, notes Dr. Bosco, NYU Langone performs some 2,500 of these procedures annually. Recent advances, such as muscle-sparing surgical techniques and medications injected into the site during surgery, speed up recovery. The majority of these patients leave the hospital within two days, and some head home the same day. ■

TO FIND A SPORTS MEDICINE SPECIALIST, call 646-501-7223, or visit nyulangone.org/sports-medicine.



Interventional cardiologist Cezar Staniloae, MD, and Mathew R. Williams, MD, director of NYU Langone's Heart Valve Center, outside Kimmel Pavilion's hybrid operating rooms.

PIONEERING PROCEDURES

Out of Options? Not Here.

At 76, Sarah Rosenfeld was told nothing could be done to treat a condition that left her too fatigued to leave home. Then she discovered NYU Langone's Heart Valve Center.

WHEN SARAH ROSENFELD says that NYU Langone's doctors are "all heart," she's speaking from the bottom of her own. More than 30 years ago, one of the institution's renowned cardiac surgeons saved her son's life with an innovative procedure performed on children born with one functioning heart ventricle. Last January, another pioneering surgeon saved Rosenfeld's own life with a tiny clip designed to repair a leaky heart valve. Mathew R. Williams, MD, director of NYU Langone's Heart Valve Center, inserted the clip into Rosenfeld's heart during a nonsurgical procedure that took about 25 minutes and required not a single stitch.

For Rosenfeld, a 78-year-old Brooklyn native with a long, complex history of heart problems, the procedure not only saved her life, but also restored much of her quality of life. A human resources executive who retired

only last year, she had long commuted to Manhattan by subway. Its gauntlet of staircases and the sudden sprints to beat closing doors can be tiring for even the fittest New Yorkers, but for Rosenfeld, it began to feel dangerous. "I'd walk five blocks to the station and then climb 50 steps to reach the elevated platform," she recalls. "Sometimes, it left me in so much pain and so winded that I felt on the verge of fainting."

By the time Rosenfeld reached her early 70s, she could no longer push through the discomfort. She consulted Adam H. Skolnick, MD, in NYU Langone's Leon H. Charney Division of Cardiology, who ran a battery of tests that revealed intermittent atrial fibrillation, a type of arrhythmia. The abnormality, Dr. Skolnick determined, was due to a condition known as mitral valve regurgitation, the most common form of heart valve

"With our vast experience, we felt we had the best team to tackle this challenge."

—Mathew R. Williams, MD, Director of NYU Langone's Heart Valve Center

disease, affecting an estimated 4 million Americans. It occurs when the leaflets of the mitral valve—one of the heart's four gatekeepers—fail to close completely, allowing blood to backflow into the heart and lungs.

Although mild cases can often be controlled with medication, the only effective treatment for severe forms such as Rosenfeld's may be to repair or replace the errant valve. However, some older people are too frail to survive the rigors of open heart surgery, while others may be unable or unwilling to endure months of painful recovery. Of the 1.7 million patients who become eligible for mitral valve surgery each year, however, only 30,000 undergo it. Without treatment, the condition can eventually lead to congestive heart failure.

By 2016, Rosenfeld was mostly homebound, struggling just to walk from one room of her apartment to

1.7

million

The number of patients who become eligible for mitral-valve surgery each year. However, only 30,000 undergo it. Without treatment, the condition can eventually lead to congestive heart failure.

another. “Everything had become so hard,” she says. Rosenfeld had consulted experts at several leading medical centers nationwide, but they all deemed her case too high-risk for the clip procedure. “I had been to so many places,” she says, “but no one could offer solutions. One doctor advised me to exercise more. Another told me to stay home and drink tea.”

Dr. Skolnick referred Rosenfeld to the Heart Valve Center. Dr. Williams knew that because of Rosenfeld’s age, cardiac condition, and a chronic lung disease, open heart surgery was not an option. He also knew that her case would be challenging because calcium deposits had hardened the valve, offering little viable space to attach the clip. But he resolved to help, finding one small spot on her mitral valve where he thought he might be able to attach the clip successfully.

“Technically, we could do it,” he explains, “but if you fail to grasp the right amount of tissue, you can turn a leaky valve into a narrow one, making the problem worse.” Rosenfeld had become so debilitated, however, that Dr. Williams decided to move ahead. “With our vast experience,” he says, “we felt we had the best team to tackle this challenge.”

Even for less complex cases, the clip procedure demands rarified skills and a wide range of specialists. Dr. Williams—the first physician in the US trained in both interventional cardiology and cardiac surgery—is a pioneer of catheter-based valve repairs, and his team is one of the most experienced in the country. Cezar Staniloae, MD, an interventional cardiologist, accesses the femoral vein through a tiny puncture in the groin, threading a catheter up into the heart. Muhamed Saric, MD, PhD, director of echocardiography and clinical director of noninvasive cardiology, uses live imaging to provide millimeter-scale visual accuracy that guides Dr. Williams as he implants the device,

Sarah Rosenfeld, standing on the terrace of her Brooklyn apartment, says the clip procedure has improved her quality of life markedly.



which grips the leaflets of the valve and clips them together securely.

With the right team, Rosenfeld’s procedure went flawlessly. “Dr. Williams attached the clip on his first try,” says Rosenfeld. Like most who undergo this repair, she was home the next day. Her condition has improved markedly, and she’s grateful for the easy recovery. “I feel the best I’ve felt in years,” Rosenfeld

adds. “I have a rewarding, productive life, and I’ve regained my independence,” she says. “And that means a lot.” ■

 **TO SCHEDULE AN APPOINTMENT AT THE HEART VALVE CENTER** call 646-501-0264 or visit nyulangone.org/heartvalvecenter.

ABOUT THE HEART VALVE CENTER

NYU LANGONE’S HEART VALVE CENTER is among the most innovative programs in the country for the treatment of heart valve disease. Its surgeons have pioneered many of today’s most effective treatment options, including minimally invasive robotic-assisted surgery and catheter-based techniques that offer a nonsurgical alternative to open heart surgery.



PHOTOS: BRAD TRENT (TOP); JONATHAN KOSZOWYK (RIGHT)

PERSPECTIVES

Is 45 the New 50 for Colon Cancer Screening?

Colorectal cancer is on the rise among younger adults. Gastroenterologists are searching for answers—and lifesaving solutions.

Last May, the American Cancer Society (ACS) became the first national organization to recommend that adults of average risk for colorectal cancer begin routine screening at age 45 instead of 50. The revised guidelines come on the heels of an alarming rise in rates of colorectal cancer among younger adults, coupled with new data showing the lifesaving benefits of early screening. We recently sat down with Mark Pochapin, MD, the Shotz/Leeds Professor of Gastroenterology and director of the Division of Gastroenterology and Hepatology, to chat about this surprising uptick in colorectal cancer among younger adults, and new strategies to prevent the second leading cause of cancer-related deaths in the US.

What do you think accounts for the increase in colorectal cancer among patients in their 30s and 40s?

That's the million-dollar question, and we're still looking for answers. Gastroenterologists and researchers hypothesize that the rise among this age group could be linked to dietary changes, like consuming more sugar and less fiber, and routine use of antibiotics. Both factors can alter the community of microbes that inhabit the intestines and aid general health and metabolism. There could also be a connection to decreased physical activity. We just don't know, but it's become a priority to find out.

Do most organizations in your field agree with the new guidelines?

There's no consensus yet, in part because many professional organizations are still assessing the data. For example, the US Preventive Services Task Force, an independent panel that evaluates the scientific validity of medical screenings, determined in 2016 that the benefits of earlier screening were not well established. But the latest ACS guidelines take into account new modeling data that show a lifesaving benefit in screening patients at age 45 instead of

50. As more data emerges, I personally believe 45 will ultimately become the new standard.

Should some groups be especially vigilant about screening?

Yes. If you have a family history of the disease, it's

essential to get checked early, before the onset of symptoms. If a parent or a sibling was diagnosed with colorectal cancer at, say, 47, the guideline is to begin screening 10 years before you reach that age. Another high-risk group is African Americans, who have a 20% higher incidence

of colorectal cancer and a 45% higher mortality rate. Everyone should be alert to the warning signs of colorectal cancer: blood in the stool, unexplained weight loss, a change in bowel habits, and abdominal pain. If you notice any of these symptoms, see a doctor right away.

How do you persuade younger patients of average risk to get screened?

I remind them that colorectal cancer is one of the most preventable and curable of cancers if detected early, and while a colonoscopy is still the gold standard for screening, there are less invasive options available if the inconvenience and unpleasant preparation for the procedure are

barriers. For example, a fecal immunochemical test, which detects blood in the stool, is an acceptable first-line option for patients at average risk. The test can be performed at home, and it detects cancer with 70% to 75% sensitivity. The drawback is that the results are never definitive. The test can detect tumors and large precancerous polyps only if they are bleeding, and only a colonoscopy can confirm a positive result.

Are there any promising screening methods on the horizon?

Within five years, we may be able to offer a simple blood or breath test to detect precancerous polyps and tumors. Colonoscopy will always be needed to confirm positive test results and remove polyps or cancerous tissue, but I'm optimistic that this new wave of noninvasive technologies will help us dramatically improve screening rates for colorectal cancer. It will be a game changer.

Aside from screening, how can people protect themselves?

Stop smoking. Limit your alcohol consumption. Get moving every day, whether it's going to the gym or taking regular walks, since numerous studies have linked a sedentary lifestyle to an increased risk. Eat more colorful fruits and vegetables, and reduce your consumption of red and processed meats, which are suspected to play a role in colorectal cancer. ■

Mark Pochapin, MD, the Shotz/Leeds Professor of Gastroenterology, was recently named president-elect of the American College of Gastroenterology.



TO FIND A DOCTOR who performs colon cancer screening, call 212-263-3095, or visit nyulangone.org/coloncancerscreening.



CLINICAL RESEARCH

Weight Loss Has a Joint Benefit

An NYU Langone study shows lap-band surgery may help delay or prevent knee replacement.

AFTER KAREN MILETSKY had lap-band surgery in 2014, she dropped from 187 to 132 pounds, achieving a healthy weight for her 5'2" frame. Her energy went up, her fatty liver disease markedly improved, and she finally felt good about shopping for clothes. But there was another benefit she wasn't quite expecting: the debilitating arthritic knee pain she had dealt with since her mid-30s began to ease up. "Before the surgery, I wouldn't even think of walking an extra few blocks," says Miletsky, 66, who lives in Old Bridge, New Jersey. Now, she strolls regularly and can handle stairs without worrying that her knees might buckle.

Miletsky is one of 120 patients from the NYU Langone Weight Management Program who participated in a study comparing knee pain before and after laparoscopic adjustable gastric banding, or lap-band, surgery performed between 2002 and 2015. Considered the least invasive type of bariatric surgery, the 30-minute procedure involves the placement of an inflatable band around the upper stomach to limit food intake and reduce hunger. The study results, recently published in *Seminars in Arthritis and Rheumatism*, showed that patients who lost the most weight following the procedure experienced the greatest relief. That makes sense when you consider gravity's multiplying effect: one extra pound of body weight exerts about four pounds of extra pressure on the knee joint. The study also showed that younger patients experienced greater pain relief and more knee mobility than older ones, suggesting that having the procedure done earlier in life might slow down or prevent future damage to the knees.

Christine Ren-Fielding, MD, division chief of bariatric surgery and one of the study's authors, says up to

20% of NYU Langone's bariatric patients are referred by orthopedic surgeons hoping to fend off knee replacement. "Often people come to us due to diabetes or poor quality of life or sleep apnea, and then they'll say, 'Oh, and my knees hurt, which is why I can't exercise,'" Dr. Ren-Fielding says.

Surprisingly, the postsurgical relief isn't just a matter of lightening the load. Rheumatologist Jonathan Samuels, MD, the study's senior investigator, notes that metabolic changes resulting from weight-loss surgery may also contribute to knee-pain relief. "We and other investigators have seen the levels of certain inflammatory markers, some of which have been shown to affect knee arthritis progression in other studies, drop after weight-loss surgery," says Dr. Samuels.

Whatever factors are responsible for the improvement, this latest study lends credence to the idea that bariatric surgery can be an effective way for overweight and obese patients to avoid knee replacement. "Having a lap-band procedure is less invasive, requires less recovery time, and risks fewer potential complications," says Dr. Ren-Fielding. Plus, a knee replacement only lasts for 10 years. "So even delaying it as long as possible may prevent the need for a second knee surgery," she says.

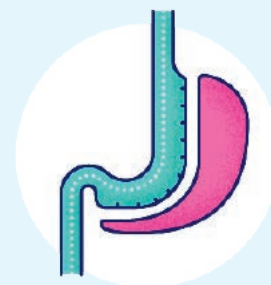
For Miletsky, it's one more powerful reason to keep the weight off. "My knee is feeling much better, and my legs feel more stable," she says. "I'm hopeful I won't need a knee replacement now." ■

TO FIND A DOCTOR who treats obesity, call 212-263-3166, or visit nyulangone.org/obesityinadults.

THE 3 MOST COMMON OPTIONS FOR BARIATRIC SURGERY

NYU Langone Health performs 1,000 weight-loss surgeries each year, more than any other medical center in the US. The techniques below are widely accepted as the safest and most effective, notes Christine Ren-Fielding, MD, division chief of bariatric surgery.

Sleeve Gastrectomy



The most commonly performed bariatric procedure, this method facilitates rapid weight loss; a typical patient will lose 80 to 100 pounds within the first six months. About 80% of the stomach is removed, making patients feel full sooner. Compared with other methods, it allows for the most normal digestive process and nutrient intake.

Gastric Bypass



Morbidly obese patients are prime candidates for this procedure. The digestive tract is rerouted around the stomach and part of the small intestine, limiting food absorption. Gastric bypass often reverses type 2 diabetes, possibly by changing gut hormones, although the reasons are still unclear.

Laparoscopic Adjustable Gastric Banding



Lap-band is ideal for patients who prefer a reversible procedure and need to lose fewer than 50 pounds. An inflatable, adjustable silicone band is placed around the top part of the stomach, limiting food intake.

INVENTIONS

Say Hello to the Future of MRI Imaging

A prototype opens the door to movie-like scans and enhanced diagnosis.

STARTING WITH A simple cloth glove, researchers at NYU Langone Health have assembled something remarkable. Their prototype of a flexible magnetic resonance imaging (MRI) detector provides an unprecedented view of how the bones, tendons, and ligaments of the hand move in concert and how they might be impinging upon one another.

The MRI glove, described in the journal *Nature Biomedical Engineering*, yields clear images and videos of hands pretending to play a piano and making various gestures. “Some people experience hand and wrist discomfort only when doing very specific actions,” says senior author Martijn Cloos, PhD, assistant professor of radiology. “This allows us to see what is happening when patients perform those motions.” As well as helping doctors diagnose repetitive-stress injuries, the more precise view of movements in real time can help guide surgeons and might lead to enhanced prosthetics.

The glove addresses a limitation of MRI machines, which

form images by sending radio waves into the body and listening for returning waves. To avoid interference between neighboring detector coils, manufacturers must space out the coils and make them immobile relative to each other, which impedes the ability to capture complex, moving joints.

The NYU Langone team solved this problem by making the coils less sensitive to competing radio signals, thereby preventing interference. As a result, the glove’s detecting elements can be freely stitched around each finger on the glove. “This allows us to follow a moving object with a moving detector,” says study coauthor Daniel Sodickson, MD, PhD, director of the Bernard and Irene Schwartz Center for Biomedical Imaging.

Lead author Bei Zhang, PhD, research scientist at the Center for Advanced Imaging Innovation and Research, says the next goal is to produce versions of the glove that fit a range of adult and pediatric patients. “We’re excited to take the next step,” she says. ■

High-Impedance Coil

Each of these detector elements impedes the electric current from flowing easily through the coil, thus reducing signal interference.

Preamplifier

MRI signals are amplified here so that they can be transmitted to the computer system that records them.

Glove Coil

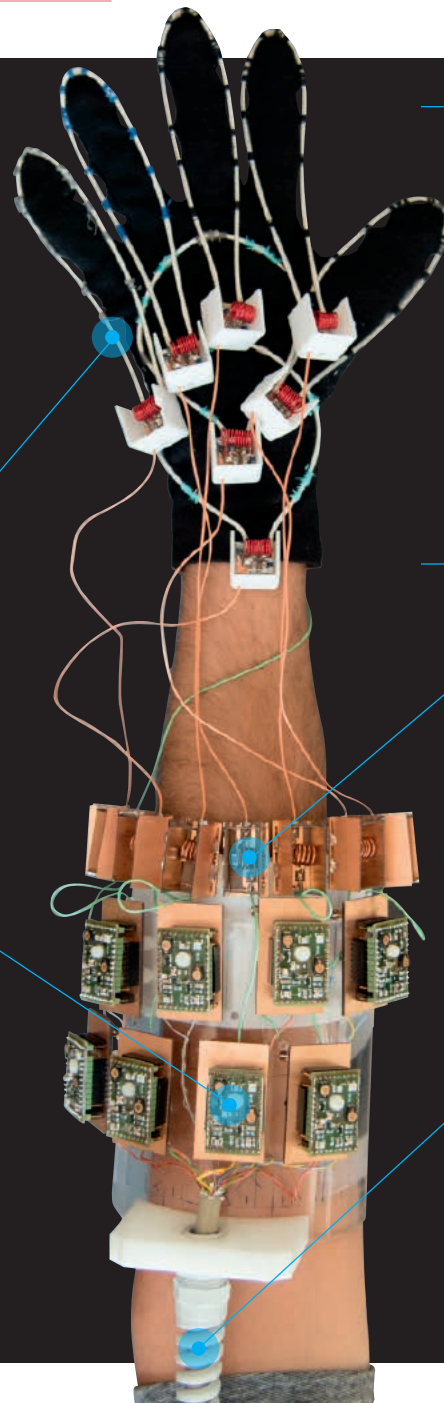
Eight individual high-impedance coils (including one on the underside) are stitched onto a cloth glove worn by the patient.

Cable Trap

This dampens interference from the cables connecting each high-impedance coil to the preamplifier.

Connection to MRI System

This attaches the device to a standard MRI scanner that surrounds the patient.



EMERGING MEDICINE

Artificial Intelligence to Bring Unrivaled Speed and Precision to Cancer Detection

A new study shows AI can help identify lung tumors and mutations for faster treatment.

ARTIFICIAL INTELLIGENCE (AI), a technology more typically associated with computers that drive cars or play chess, may soon help pathologists gain the upper hand on lung cancer, which kills 154,000 people annually, more than any other form of cancer.

Aristotelis Tsirigos, PhD, a computational scientist and director of NYU Langone’s Applied Bioinformatics Laboratories, led an AI study in which computers were trained to classify magnified images of lung tissue as either normal or cancerous. He likens the technology to a decision tree: for each biopsy, the program automatically identifies visual features—such as texture, color, density, and distance between cells—and determines whether they are characteristic of normal tissue or of distinct cancer types. “You tell the system which is which, and the more examples you give it, the higher the probability that it will perform well,” says Dr. Tsirigos.

This AI approach can match the speed and accuracy of pathologists in diagnosing certain lung cancers. It can also do what

High Marks for the Machines

97%

The accuracy of artificial intelligence, comparable to that of pathologists, in diagnosing two common types of lung cancer.



humans can’t: instantly predict which genetic mutation is responsible for the anomalies. By contrast, it takes days or even weeks to collect, purify, and sequence the DNA of a tissue biopsy to identify a cancer-linked mutation.

Since lung cancer is usually detected at an advanced stage, pinpointing mutations quickly can be critical in determining the best course of treatment. “If you knew right away what the mutation is,” Dr. Tsirigos explains, “you could start eligible patients on targeted therapy without delay,” thereby improving the odds of success.

The study, published in the journal *Nature Medicine* and coauthored by image analysis specialist Nicolas Coudray, PhD; pathology resident Paolo Santiago Ocampo, MD, PhD; and deep learning expert Narges Razavian, PhD, suggests that AI can already predict six mutations linked to the most common form of lung cancer, adenocarcinoma, with up to 86% accuracy. The technology is even more effective at differentiating among normal cells, adenocarcinoma, and another common cancer: AI can detect these two tumor types with 97% accuracy—comparable to that of pathologists—within seconds.

With further refinements, Dr. Tsirigos says, the technology could help pathologists improve both their speed and accuracy in diagnosing lung cancer. This, in turn, could help these patients receive more timely—and potentially lifesaving—care. ■

PHOTO: BEI ZHANG, PHD

Changing the Conversation around Organ Donation

New York State has the lowest rate of organ donation in the nation. NYU Langone's Transplant Institute is executing a bold strategy to change that.

WHEN IT COMES to registered organ donors, New York State's motto, *Excelsior*, meaning "ever higher," is poignantly apt. With just 30% of its eligible residents listed as donors—compared to the national average of 55%—New York has the lowest rate of organ donation nationwide, leaving much room for improvement. "We want to change the status quo," says Luis Angel, MD, medical director of NYU Langone Health's new Lung Transplant Program.

Last January, Dr. Angel assumed an additional role as the director of the Preservation of Organ Donation Project, a pilot study designed to increase the

organ-donor rate among NYU Langone patients. The three-year study—the first of its kind in the nation—is being conducted by a team of experts at NYU Langone's Transplant Institute, which has performed more than 240 transplants for kidneys, livers, hearts, and lungs this year alone. The study pairs a team of specially trained intensivists, nurses, and social workers with the medical team treating a gravely ill patient admitted to the Emergency Department or critical care unit. When the care team determines that brain death is imminent, the organ preservation team, acting as "designated requestors," initiates a conversation with the patient's family about potential organ donation.

Until now, only representatives from LiveOnNY, an organ procurement organization that recovers organs within its geographical territory and allocates them based on guidelines from the United Network for Organ Sharing, were allowed to discuss organ donation with a patient's family. However, a representative was not always available on short notice. This often resulted in precious time—and lives—being lost, because as soon as blood flow ceases, organs start

to deteriorate, making them less viable for transplantation. "By partnering with LiveOnNY to train our medical teams," notes Dr. Angel, "we can begin this delicate conversation early on and in a way that's more natural and intimate because the patient's family is already comfortable with the care team."

Candidates for heart and lung transplants are already three times as likely to receive a donor organ at NYU Langone than at other institutions in the New York metropolitan area and twice as likely compared to the national average. By 2020, Dr. Angel anticipates that NYU Langone's pilot study will result in 20 to 30 additional donors. "These critical care specialists understand the complex issues surrounding end-of-life care and organ donation, and they do it better," says Dr. Angel. "If we can show that this model is feasible, we will share it with other institutions and potentially save a lot of lives." ■

FOR INFORMATION about NYU Langone's transplant programs, call 212-263-8134, or visit nyulangone.org/transplantinstitute.

Why Organ Donation Lags in New York

NEW YORK STATE'S low percentage of organ donors has been attributed to a combination of factors unique to this locality. Nearly half the state's residents—8.5 million out of 19.8 million—live in New York City, whose large multicultural population includes some ethnic and religious groups that have historically discouraged organ donation. Until last year, only residents age 18 or older could register as donors, and before last year, New York was one of only four states that did not permit online registration. Moreover, many New York City residents have never applied for a driver's license, a common venue for donor registration.

Because patients get priority access to organs donated within their region, New York State's organ deficit results in a wait that's typically twice as long as the average in other states. Each year, more than 10,000 Americans—500 of them New Yorkers—die while awaiting a transplant. If New York State residents donated organs at a rate similar to the best-performing states, such as Montana and Alaska, there would be 100 to 200 more donors per year. A single donor can provide organs to as many as eight transplant recipients. ■

500

The number of New York State residents who die every year waiting for an organ transplant

FOR THOSE AWAITING LUNG TRANSPLANTS, FRESH HOPE

THE SHORTAGE OF donor organs is particularly acute for those in need of a lung transplant. About 1,500 Americans are currently on the waiting list for such a transplant—most because their lungs have been damaged by pulmonary fibrosis, chronic obstructive pulmonary disease, cystic fibrosis, and other chronic diseases—but less than 20% of the lungs evaluated among registered donors are viable for transplantation. "Lungs are particularly vulnerable because they are directly exposed to the environment, and because they are often injured at the time of death due to pneumonia, lung collapse, and other conditions," explains pulmonologist Dr. Luis Angel. Across the New York metropolitan area, Dr. Angel and the Donor Management Center at NYU Langone have partnered with LiveOnNY to optimize the medical management of potential donors, showing an early increase in the number of donor lungs viable for transplantation. NYU Langone has performed 17 of these lifesaving procedures since the launch of its Lung Transplant Program in February. Its surgical director, cardiothoracic surgeon Zachary Kon, MD, has research experience with a technique known as *ex vivo* lung perfusion that also promises to increase the number of viable donor lungs available. The technique reconditions damaged organs that would otherwise be unsuitable for transplant by treating them for several hours with a solution of nutrients and oxygen. "In the near future," says Dr. Kon, "we intend to use *ex vivo* lung perfusion so that we can consider an entirely new set of potential organ donors." ■



▲ Several weeks after Wanda Cepeda became NYU Langone's first lung transplant patient last February, she followed up with her surgeon, Dr. Zachary Kon (left), and her pulmonologist, Dr. Luis Angel.

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550 First Avenue
New York, NY 10016

CARDIAC SURGERY

THREE OF HEARTS

AS CHIEF OF pediatric and adult congenital cardiac surgery at NYU Langone Health, Ralph Mosca, MD, oversees 250 complex cases annually and has performed more than 6,000 open-heart surgeries. "As a surgeon, two of my best rewards are the relief I see on parents' faces and the family photos they send me after recovery," he says. Dr. Mosca operated on identical twins Daniel (left) and Joshua Shapiro in 2012 and 2013, respectively. Both were born with a rare heart defect in which a section of the aorta is so narrow that it could eventually lead to heart failure. During a follow-up visit in 2015, Dr. Mosca posed with the boys for a keepsake photo. Today, the 14-year-olds are thriving, without any limitations. David and Teresa Shapiro, the boys' parents, say they are grateful to the entire medical team, including cardiologist Alan Langsner, MD, and interventional cardiologist Michael Argilla, MD. "Their caring skills are inseparable from their healing skills," says Teresa. "Any doctor who can hold my children's hearts in his hands and make me feel good about it is truly extraordinary." ■



PHOTO: KARSTEN MORAN