To Serve. To Teach. To Discover
SUMMER 2021

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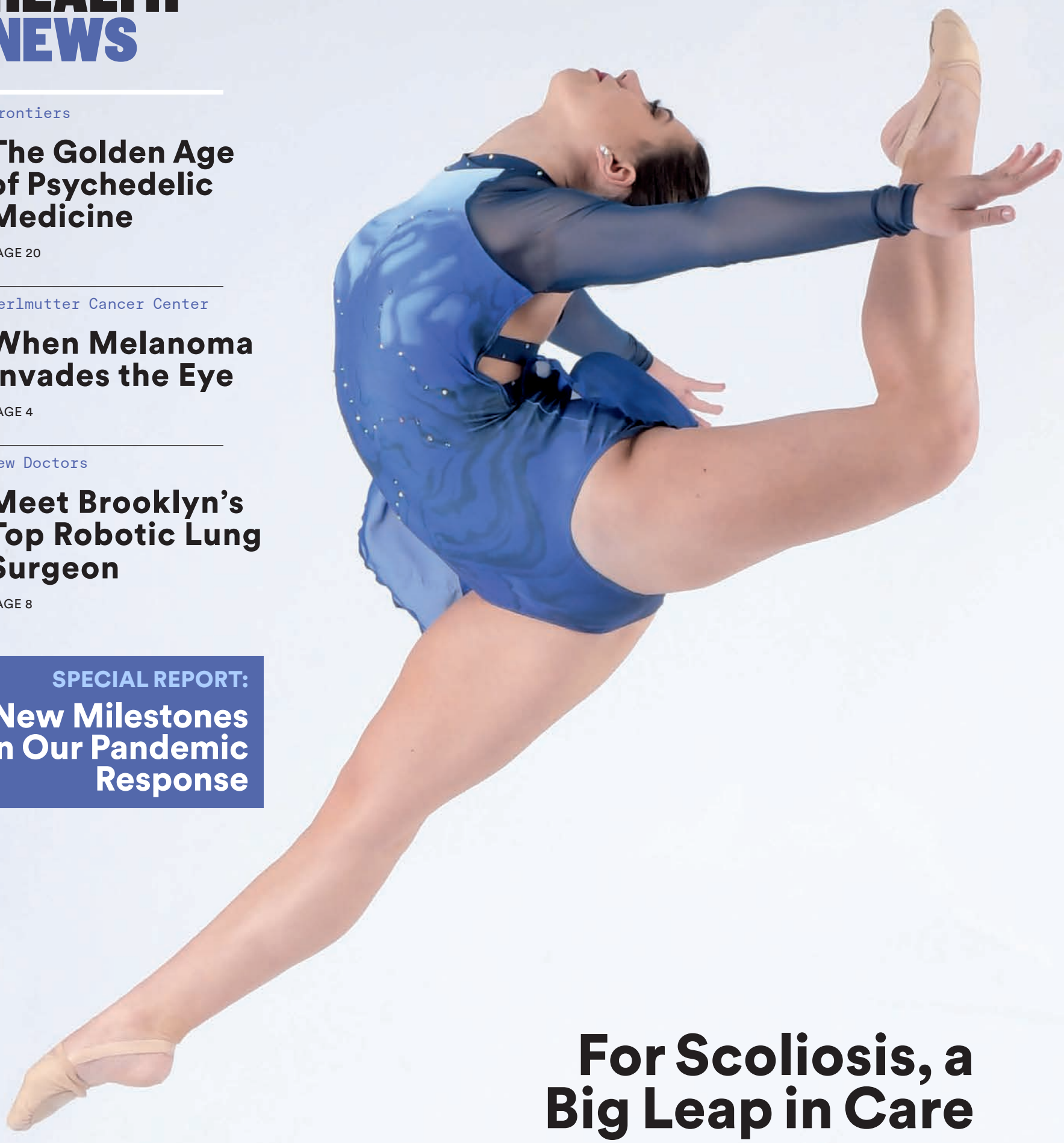

SPECIAL REPORT:

New Milestones in Our Pandemic Response

For Scoliosis, a Big Leap in Care

NYU LANGONE'S INNOVATIVE FIX FOR A CURVED SPINE IS DRAWING YOUNG ATHLETES WORLDWIDE. DANCER **JENNA MORIELLO** IS ONE OF THEM.

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Plastic Surgery

A New Face, Two New Hands, and Another Major Milestone

When NYU Langone Health performed its third successful face transplant last August, the patient, Joseph DiMeo, got a new lease on life—not only from the new face that reintroduced him to the world, but also from the new pair of hands that restored his independence. The procedure, the first successful face and double hand transplant ever performed, marked the launch of a new Hand Transplant Program at NYU Langone, and another milestone in the institution's expanding portfolio of pioneering procedures. In particular, the program now offers people with severe hand deformities an alternative to prosthetic arms, notes Eduardo D. Rodriguez, MD, DDS, the Helen L. Kimmel Professor of Reconstructive Plastic Surgery and chair of the Hansjörg Wyss Department of Plastic Surgery. "Many of these people are limited by the current technology of prostheses, which are functionally imperfect," he says.

In DiMeo's case, artificial arms were not a viable option due to the extent of the injuries he sustained during an accident. On July 14, 2018, the 22-year-old from Clark, NJ, was driving home after working the night shift as a product tester. When he fell asleep at the wheel, his car crashed, rolled over, and burst into flames. DiMeo was pulled to safety by a good Samaritan before the vehicle exploded. The accident left DiMeo with third-degree burns over 80% of his body, disfiguring his face and hands.

DiMeo endured more than 20 skin graft surgeries. His fingertips were amputated, and scarring left the remaining parts of his fingers fused together, forcing him to grasp objects as if he were wearing mittens. A plastic surgeon at a medical center in New Jersey, realizing that no additional conventional surgery would improve DiMeo's functionality, referred his patient to Dr. Rodriguez, director of NYU Langone's Face Transplant Program. When Dr. Rodriguez met DiMeo and his parents, John and Rose, he recognized both a challenge and an opportunity. While some 50 face transplants and 100 hand transplants had been performed worldwide, the two procedures had never been done simultaneously with a successful outcome. In one case, the patient subsequently died from an infection, and in the other, the transplanted hands had to be removed when they failed to thrive.

In DiMeo's case, the risks would be no less daunting. Not only would Dr. Rodriguez and his surgical team transplant the donor's full face, but they would also amputate both of DiMeo's hands, replacing them at midforearm with those of the donor. In all, they would need to connect two bones, 21 tendons, five veins, two major arteries, and three dominant nerves.

NYU Langone was well positioned to tackle the challenges of hand transplantation. For more than half a century, its surgical specialists at the Replantation Center at NYC Health + Hospitals/Bellevue, a Level I Trauma Center, have refined the microsurgical skills needed to reattach severed body parts. "These plastic and orthopedic surgeons are very experienced with these techniques," says Dr. Rodriguez, "so we capitalized on their expertise, assembling a comprehensive hand transplant team."

After DiMeo was formally accepted for the donor wait list on October 21, 2019, the surgical team began a period of rigorous rehearsals. Dr. Rodriguez and 15 other transplant surgeons practiced every step of each procedure on cadavers, first in NYU Langone's surgical skills laboratory and then in an operating room with the entire OR team of 80 clinicians and staff.

A major challenge would be attaching limbs from a donor whose anatomy is uniquely different. "This makes it very difficult to join the two sets of structures because the length and diameter of the bones and tendons are not identical," notes Sheel Sharma, MD, clinical associate professor of plastic surgery, who led the team of eight specialists who worked in concert on the limbs of both donor and recipient. "It's also challenging to weave the tendons of the donor into those of the recipient to achieve the proper tension for the pulley system that controls the

IMAGE (RIGHT): CHRISTIE RAMIAH FOR THE HANSJÖRG WYSS DEPARTMENT OF PLASTIC SURGERY

Photograph by **ELLIOT GOLDSTEIN**

During a 23-hour surgery, Joseph DiMeo made medical history as the first recipient of a successful face and double hand transplant. Praising the OR team of 15 fellow transplant surgeons and 80 clinicians and staff, Dr. Eduardo Rodriguez described the collaboration as "the most beautifully choreographed dance you could ever imagine."

movement of the hand."

To ensure that bones would be aligned perfectly, the team used 3-D computerized surgical planning and 3-D–printed customized cutting guides. A meticulous system was also needed to match the networks of nerves, blood vessels, and tendons from the donor with those of the recipient. "The inside of a limb looks like an exposed telephone cable," says Dr. Rodriguez. "We tagged all the elements to be transplanted with preprinted labels to ensure that we paired them properly."

As in all transplants, the surgeons sought to complete the operation as quickly as possible to limit the amount of time the donor's tissue is not nourished with blood. "Since Joe is right-hand dominant, the first transplant I wanted to see was his right hand," explains Dr. Rodriguez. "Once that was going well, then we went ahead with the left-hand procedure and finally progressed to the face transplant." The entire operation was completed in 23 hours, 2 hours less than NYU Langone's two previous face transplants.

DiMeo is recovering so well that his doctors consider him six months ahead of where they expected him to be. "He lifts heavier weights than I can," says Dr. Sharma. They attribute much of this progress to their patient's commitment. "Joe does everything we ask for and more," says Dr. Rodriguez, "and our hand therapists from Rusk Rehabilitation are very creative with exercises that improve his fine motor skills." Eventually, DiMeo's new hands will allow him to regain his freedom and even start driving again. "It's great that Joe has a new face, but he also loves his new hands," says Dr. Rodriguez. "Every time I see him on his smartphone, it's impressive to see his fingers typing on the tiny keypad."

Joseph DiMeo (right), five months after surgery. When Dr. Eduardo Rodriguez evaluated the prospective donor, he was happy to see that his height, weight, and skin color were a close match to DiMeo's.

FOR INFORMATION ABOUT face and hand transplantation, visit nyulangone.org/facetransplant or call 646-501-4481.

Complex Cases

When Melanoma Invades the

May 25, 2021: After a year of surgical interventions at NYU Langone Health, Colleen Regan is now free of melanoma. The vision in her affected eye is 20/30.

Eye

"Melanoma in the eye is rare and amelanotic melanoma is rarer still. The location alone makes it extraordinarily complex."
Irina Belinsky, MD

Last March, just as New York City was entering lockdown, Colleen Regan was confronting a health crisis of her own. A few days before hospitals were forced to cancel elective surgeries to free up beds for the surge of COVID patients, Regan had been diagnosed with a rare type of melanoma, a deadly skin cancer. She wondered how she would manage her illness amid a pandemic that made something as simple as leaving the house a potentially life-threatening event.

One year earlier, Regan, then 58, noticed an itchy blemish beneath her right eye, a seemingly innocuous pink spot. She consulted two dermatologists, both of whom dismissed the scaly patch as a skin infection and prescribed topical antibiotics. But when the itching persisted, Regan grew increasingly concerned. She knew she couldn't wait for the pandemic to pass to find out the cause, so she consulted a third dermatologist, Tracey Liebman, MD.

Dr. Liebman saw things differently. The pink coloring beneath Regan's eye made her suspect a rare type of skin cancer called amelanotic melanoma. "It's easy to miss because it doesn't have the pigment or other features that patients might typically associate with melanoma," explains Dr. Liebman, assistant professor of dermatology in NYU Langone Health's Ronald O. Perelman Department of Dermatology. "It can be pinkish."

On March 9, a biopsy confirmed Dr. Liebman's suspicion. About one in 50 people will develop melanoma in their lifetime. Fewer than 5% of those cases will be amelanotic, or without pigment. The rare cancer is no deadlier than conventional melanoma, but fewer people survive because it's often overlooked or misdiagnosed.

Dr. Liebman's ability to discern what others had missed reflects NYU Langone's long-standing expertise in melanoma research and care. Its dermatologists developed one of the first skin cancer treatment programs in New York City more than 30 years ago and even established the main criteria for detecting melanoma, popularized with the mnemonic ABCDE *(see page 6)*.

"Dr. Liebman was the first doctor who listened to me," recalls Regan. "She's the only one who would do a biopsy."

Within a few days, Regan was sitting across from eye surgeon Irina Belinsky, MD, an oculoplastic specialist and director of ocular oncology at NYU Langone's Department of Ophthalmology. Like Dr. Liebman, Dr. Belinsky brought specialized knowledge to the case. She is one of a few surgeons in the nation dually trained in oculoplastic surgery and ocular oncology. With her elite expertise, she was accustomed to difficult cases, but Regan's was unlike anything she had ever encountered. "Melanoma of the eye is rare," notes Dr. Belinsky, "and amelanotic melanoma is rarer still. The location alone makes it extraordinarily complex."

During multiple exploratory procedures to determine the extent of the cancer, Dr. Belinsky discovered a malignancy "rolling out like an invisible carpet." The melanoma, it turned out, had spread along the skin of her entire lower eyelid, onto the mucous membrane (conjunctiva) that lines the inside of the eyelid and white part of the eye, and even the skin of her upper eyelid. Worse still, it extended into her tear canal, the conduit for tears flowing from the eye to the sinus. "That was a big problem because if the cancer cells spread beyond the canal, the chance of surgically clearing the cancer would be slim, and Colleen's overall prognosis would be poor," says Dr. Belinsky. "It was a very sneaky melanoma that got into all of the little nooks and crannies."

There was no doubt that Regan would need more surgery. The only question was how to do it amidst the shutdown. By late March, national guidelines had recommended postponing surgeries for three months, including those for melanoma. But Dr. Belinsky knew Regan couldn't afford the delay. She successfully petitioned for an exemption and created a plan to work around the staffing limitations. "Olga Whyte, our ophthalmology nurse, came in every other day with little notice, as the positive biopsy results kept coming in, to assist me with ongoing procedures," recalls Dr. Belinsky. "I personally walked the tissue specimens down the street to the pathology lab." She would sit shoulder-to-shoulder with dermatologist Shane Meehan, MD, director of NYU Langone's dermatopathology section, peering down a microscope

Photograph by **BRAD TRENT**

at Regan's tissue samples.

After several procedures, the cancer was still encroaching. So Dr. Belinsky consulted Perlmutter Cancer Center's Tumor Board, a multidisciplinary group of physicians who convene to troubleshoot challenging cases. Dr. Belinsky remembers asking herself, "Is my patient going to lose her eye so we can clear the cancer? Is continuing with surgery the right thing, or should we think about other treatments, like radiation or topical chemotherapy?"

Dr. Belinsky's methodical approach quickly earned her patient's trust. "Dr. Belinsky had enough confidence to consult with other specialists," Regan says. "She's that intelligent. I was afraid, but being in her care made it so much easier."

Ultimately, Dr. Belinsky pressed on with a surgical approach. She treated the surface of Regan's eye with cryotherapy and removed the tear canal. Then, she teamed up with colleague John Carucci, MD, PhD, director of dermatologic surgery, to remove any remaining cancer from the surrounding skin.

Regan would go on to have a series of major reconstructive surgeries to rebuild the periocular tissue and eyelids, all at the peak of the pandemic.

"In ocular oncology, our goals are to preserve life first, save the eye, and if at all possible, save vision," says Dr. Belinsky. "For now, our team has achieved all three goals for Colleen, and we will continue to fight for her. She's an unforgettable patient. She does everything we ask of her. She's strong and never loses her positivity."

Today, Regan is back to work as a legal assistant. In her downtime, she rides her bike and enjoys taking long walks, grateful that she can still take in the scenic views. "What NYU Langone has done for me has been unbelievable," she says. "They saved my life."

TO FIND A DOCTOR who treats melanoma, visit nyulangone.org/melanoma or call 212-731-6000.

Colleen Regan with her family on Staten Island, where she lives.

THE ABCDEs OF MELANOMA DETECTION

More than 30 years ago, dermatologists at NYU Langone Health developed the criteria for detecting melanoma, popularized in the mnemonic ABCDE. NYU Langone's melanoma surgeons at Perlmutter Cancer Center specialize in removing the cancer while preserving appearance and function; our medical oncologists provide the latest targeted treatments, including genetically engineered injectable therapies; and our researchers and clinicians study all aspects of the melanoma disease process.

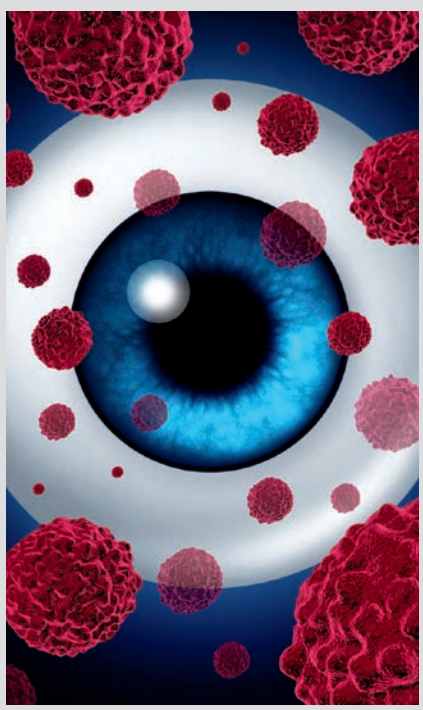
A = asymmetry, where half the mole is unlike the other.

B = border, where the mole is irregularly shaped, scalloped, or poorly defined.

C = color, where there is variation from one area to another or different shades of tan, brown, black, and sometimes white, red, or blue.

D = diameter, where a mole is wider than a pencil eraser.

E = evolving, where a mole changes in size, shape, or color over time.



WILDPIXEL

Photograph by **BRAD TRENT**

Robotics: Part 1

Saving Time, Saving Lives

A Brooklyn Breakthrough: Robotic Diagnosis and Surgery for Lung Cancer, All in One Day

Maria Rodriguez, 62, has been a pack-a-day smoker since she was a teenager, so her primary care physician orders an annual lung cancer screening. This year, the low-dose CT scan revealed a small nodule. Normally, the finding would lead to further imaging tests or a needle biopsy. Instead, Rodriguez, who lives in the Bensonhurst section of Brooklyn, skipped these steps thanks to a novel tag-team robotic approach being pioneered by NYU Langone Health's Lung Cancer Center, part of Perlmutter Cancer Center.

In March, Rodriguez was wheeled into an OR at NYU Langone Hospital–Brooklyn and sedated. There, Jorge Mercado, MD, associate section chief of pulmonary, critical care, and sleep medicine, inserted a first-of-its-kind robotic scope called the Monarch through her mouth and airways. Using a handheld controller, Dr. Mercado maneuvered the long, flexible camera deep into her lungs. The scope's robotic features, which afford unprecedented control, allowed Dr. Mercado to safely travel further into the fragile airways, where he identified and biopsied the suspicious mass. Pathologist Deepthi Hoskoppal, MD, meanwhile, evaluated the sample in the OR rather than transporting it to the pathology lab. Within minutes, Dr. Hoskoppal identified the cancerous cells, and Dr. Mercado injected a contrast marker to aid in locating the cancer during surgery. The team then exchanged the robotic scope for a robotic surgical system. Thoracic surgeon Travis Geraci, MD, assistant professor of cardiothoracic surgery, identified the area with the cancer and removed a small segment of the lung. Rodriguez was discharged two days later, effectively cured of her stage I malignancy. "I was relieved they caught it and that I don't require further treatment," she says.

Diagnosing and treating early-stage lung cancer in one day is a first—for Brooklyn and for Perlmutter Cancer Center. The same-day approach spares patients weeks of worry between appointments. More important, it saves precious time. "Removing lung cancer as early as possible is critical to prevent it from spreading," says Dr. Mercado.

Brooklyn patients like Rodriguez who require lung cancer surgery are in expert hands. Dr. Geraci was trained by two of the most accomplished robotic surgeons in the country, Robert Cerfolio, MD, MBA, director of clinical thoracic surgery and chief of hospital operations at NYU Langone, and Michael Zervos, MD, chief of thoracic surgery at NYU Langone's Manhattan campus. Together, they have completed more than 3,500 robotic thoracic surgeries. "They've been at the forefront of robotic surgery for years and were a big reason why I came to NYU Langone," says Dr. Geraci.

The robotic surgical system Dr. Geraci uses, like those at other NYU Langone locations, offers a minimally invasive approach for removing lung cancers. With a 3-D camera providing visual guidance for the surgeon, who operates from a nearby console, tiny surgical instruments mounted on robotic arms permit precise movements. In addition to reduced scarring and a shorter recovery time compared with conventional surgery, "the robotic method has clear advantages for removing a small segment rather than an entire lobe," says Dr. Geraci.

Robotic diagnostic and surgical procedures are only half the story of Perlmutter Cancer Center's heightened emphasis on treating lung cancer in Brooklyn *(see text at right)*. "Our mission is to provide access to underserved, underrepresented communities," says Abraham Chachoua, MD, the Jay and Isabel Fine Professor of Oncology and medical director of the Lung Cancer Center.

With that in mind, the Lung Cancer Center launched a screening initiative at the Sunset Park Family Health Center last August. The program leverages Epic, NYU Langone's electronic health record system, to identify patients who should be scanned annually based on their smoking history and additional risk factors, including a family history of lung cancer and exposure to asbestos. The initiative has expanded to other NYU Langone Family Health Centers in Brooklyn and NYU Langone Levit Medical in Midwood, with plans to add additional practices in Brooklyn, as well as in Queens, Manhattan, and Long Island.

Early detection is vital for robotic surgery, generally a viable option only for stage 1 and stage 2 tumors. It boosts the effectiveness of other lung cancer treatments, as well. At Perlmutter Cancer Center, a National Cancer Institute–designated Comprehensive Cancer Center, these treatments include radiation therapy, chemotherapy, and clinical trials for patients whose mutations are likely to respond to investigational therapies. Brooklyn patients have access to all of these services through Perlmutter Cancer Center–Sunset Park, an airy, 25,000-square-foot facility that opened two blocks from NYU Langone Hospital–Brooklyn in 2019. "We are offering comprehensive lung cancer care and giving more patients access to it," says Dr. Chachoua. "No other hospital in Brooklyn has a robust screening program like the one we're building," he notes.

Maria Rodriguez is a shining example of the difference stepped-up early detection and treatment can make. Two decades ago, she lost her older sister, also a smoker, at age 42 to lung cancer, just a month after diagnosis. "She didn't get screenings, and by the time they found the cancer, she was at stage 4," recalls Rodriguez. By contrast, Rodriguez's scan revealed a suspicious lesion early on, and a team of doctors at NYU Langone was able to remove it quickly. "I'm grateful to Dr. Geraci and Dr. Mercado," says Rodriguez. "This procedure saves patients time, and it will save lives."

TO FIND A DOCTOR who treats lung cancer, visit nyulangone.org/lungcancercenter or call 212-731-5662.

LUNG CANCER: THE PROBLEM BROOKLYN CAN'T FUHGEDDABOUD

The need for lung cancer screening is compelling. Nationwide, lung cancer is projected to kill 131,880 people in 2021, twice the number of mortalities from any other cancer. In Brooklyn, lung cancer is the single largest cause of cancer death. The most populous borough has New York City's highest annual lung cancer incidence and second-highest rate (after Staten Island). Abraham Chachoua, MD, medical director of the Lung Cancer Center at Perlmutter Cancer Center, notes that a high percentage of his Brooklyn patients are diagnosed with advanced lung cancer, "and that speaks to a lack of screening." Lung cancer typically causes no symptoms in its early stages and has spread to other organs by the time it's diagnosed. Only a tiny fraction of those eligible for screening actually receive it, despite the fact that, according to a major study, annual scans reduce lung cancer deaths among this cohort by 20%. The five-year survival rate for localized non–small-cell lung cancer is 63%, but that figure drops to 7% for patients diagnosed at stage 4, according to the National Cancer Institute. New recommendations from the US Preventive Services Task Force will nearly double the number of patients advised to have yearly scans, lowering the recommended screening age from age 55 to 50 and reducing the smoking history guideline from 30 years to 20 years.

Photograph by **JONATHAN KOZOWYK**

It takes three: Robotic lung surgeon Travis Geraci, MD, pathologist Deepthi Hoskoppal, MD, and pulmonologist Jorge Mercado, MD, team up at NYU Langone Hospital–Brooklyn to diagnose and remove early-stage lung cancer.

"Removing lung cancer as early as possible is critical to prevent it from spreading."
Jorge Mercado, MD, NYU Langone Hospital-Brooklyn

Robotics: Part 2

Moving Mountains

A Month After Robotic Mitral Valve Repair, an FDNY Firefighter Feels (and Is) on Top of the World

Barton Fendelman has never been one to give up on a goal. So when the New York City firefighter, now 52 and retired, came to see Didier Loulmet, MD, NYU Langone Health's director of robotic cardiac surgery and chief of cardiac surgery, he mentioned his plan to climb Mount Kilimanjaro, the highest peak in Africa, in two months.

Dr. Loulmet was, to say the least, surprised. Fendelman, referred by NYU Langone cardiologist Manuel Morlote, MD, had been diagnosed with mitral valve regurgitation, a condition in which the valve fails to close, causing some blood to flow backward into the heart's upper chamber. In severe cases like Fendelman's, it can lead to congestive heart failure. Without surgery, Fendelman was at risk for heart failure, but he was determined and, perhaps, in denial. "I asked, 'Can this wait until after my trip?' " he recalls.

It couldn't, but Dr. Loulmet, a pioneer in robotic mitral valve repair surgery, didn't rule out his patient's summit quest. Though he has performed the repair using open and minimally invasive techniques, Dr. Loulmet favors the robotic approach because it is the most precise and least invasive, resulting in a shorter hospital stay and quicker recovery period. "The visualization system gives the surgeon 10 times greater magnification and a 3-D view," says Dr. Loulmet. The tiny instruments, inserted through five pencil-size incisions on the right side of the heart, endow the surgeon with a greater range of motion and finer dexterity.

The robotic system requires a seasoned hand at the helm, and Dr. Loulmet has experience few other surgeons can match. He assisted Alain Carpentier, MD, on the world's first robotic mitral valve repair in 1998 in Paris, and during the past 12 years, he and fellow cardiothoracic surgeon Eugene Grossi, MD, who operates together with Dr. Loulmet, have completed nearly 1,000 robotic mitral valve repairs at NYU Langone, with a success rate of nearly 100%. The Robotic Cardiac Surgery Program team has been chosen by the Society of Thoracic Surgeons to train other experienced cardiac surgeons in robotic mitral valve repair.

Firefighter Barton Fendelman takes in the view atop Mt. Kilimanjaro just one month after undergoing a robotic mitral valve repair.

"To climb Kilimanjaro so soon after conventional surgery would've been impossible. Robotic repair lets you recover quickly and move on with your life."

Didier Loulmet, MD

"Dr. Loulmet sets the standard for the elite top-tier surgeons internationally who are able to do complex valve repairs with this advanced approach," says Aubrey Galloway, MD, chair of cardiothoracic surgery at NYU Langone.

Mitral valve regurgitation is the most common form of valve disease. It often results from simple wear and tear. Although some cases can be controlled with medication, the only effective treatment for severe forms like Fendelman's is to repair or replace the errant valve. Two-thirds of surgical candidates for this condition are men, and a majority are in their 50s or 60s, though Dr. Loulmet has done surgical repairs on patients as young as 18 and as old as 89. "Health is the biggest factor, not age," says Dr. Loulmet, explaining that some patients are too sick to endure an open procedure that requires surgeons to stop the heart and use a heart-lung bypass machine. Overall, less than 5% of patients receiving robotic mitral valve repair will develop recurrent mitral valve regurgitation over a period of 20 years.

Fendelman's 3½-hour procedure was straightforward. Seated at the console and guided by the high-definition binocular display, Dr. Loulmet made an incision in the left atrium to reach the mitral valve, removed the damaged portion of the leaflet, and repaired the valve with the remaining tissue. Finally, he implanted a device around the mitral valve, known as an annuloplasty band, to correct and reinforce the valve's shape.

Fendelman was discharged two days later, feeling sore but otherwise symptom free. He progressed quickly, and at his follow-up visit, Dr. Loulmet cautiously cleared him for the climb.

One month after his surgery, Fendelman departed for Tanzania, where he met up with his tour group for the week-long expedition. The final leg to the 19,341-foot summit was a challenge but, he says, well worth it. "It was a beautiful, cloudless day," he says. "Being that high with nothing else around me was unforgettable."

The vast majority of the 150-plus patients Dr. Loulmet operates on robotically each year are simply happy to return to good health. Still, Fendelman's dramatic example points to the benefits of the technique. "To climb Kilimanjaro so soon after conventional surgery would've been impossible," says Dr. Loulmet. "Robotic repair lets you recover quickly and move on with your life."

TO FIND A DOCTOR who treats mitral valve disease, visit nyulangone.org/mitralvalveprogram or call 212-263-3940.

COURTESY OF BARTON FENDELMAN

Photograph by **JONATHAN KOZOWYK**

Experience matters: Robotic cardiothoracic surgeon Didier Loulmet, MD, assisted on the world's first robotic mitral valve repair and has completed nearly 1,000 more at NYU Langone Health with a success rate of almost 100%.

Better Dermatology

Shining a Spotlight on Skin Conditions Commonly Overlooked When They Affect People of Color

When Daniel Gutierrez, MD, began medical school, he planned to become a primary care physician. Then he learned that the field of dermatology is the least ethnically diverse specialty in all of medicine, and he reconsidered. “My mentors thought I could make a much bigger impact in dermatology, treating underserved patient populations,” recalls Dr. Gutierrez.

Dr. Gutierrez, the son of a migrant worker from Mexico, has long aspired to bring better care to those hit hardest by healthcare disparities. Now an instructor in the Ronald O. Perelman Department of Dermatology, he’s quickly making an impact in his field. Just months after completing his residency at NYU Langone Health last year, Dr. Gutierrez joined forces with NYU Langone dermatologists Nayoung Lee, MD, Prince Adotama, MD, and Anupama Parameswaran, MD, to establish a new initiative focused on diagnosing and treating dermatological conditions that disproportionately affect those with black and brown skin. The program, called Skin of Color, emphasizes medical therapies, clinical research, and educational training of residents.

“It was a great idea that was only missing the motivated clinicians who wanted to implement it,” says Seth Orlow, MD, PhD, chair of the Ronald O. Perelman Department of Dermatology.

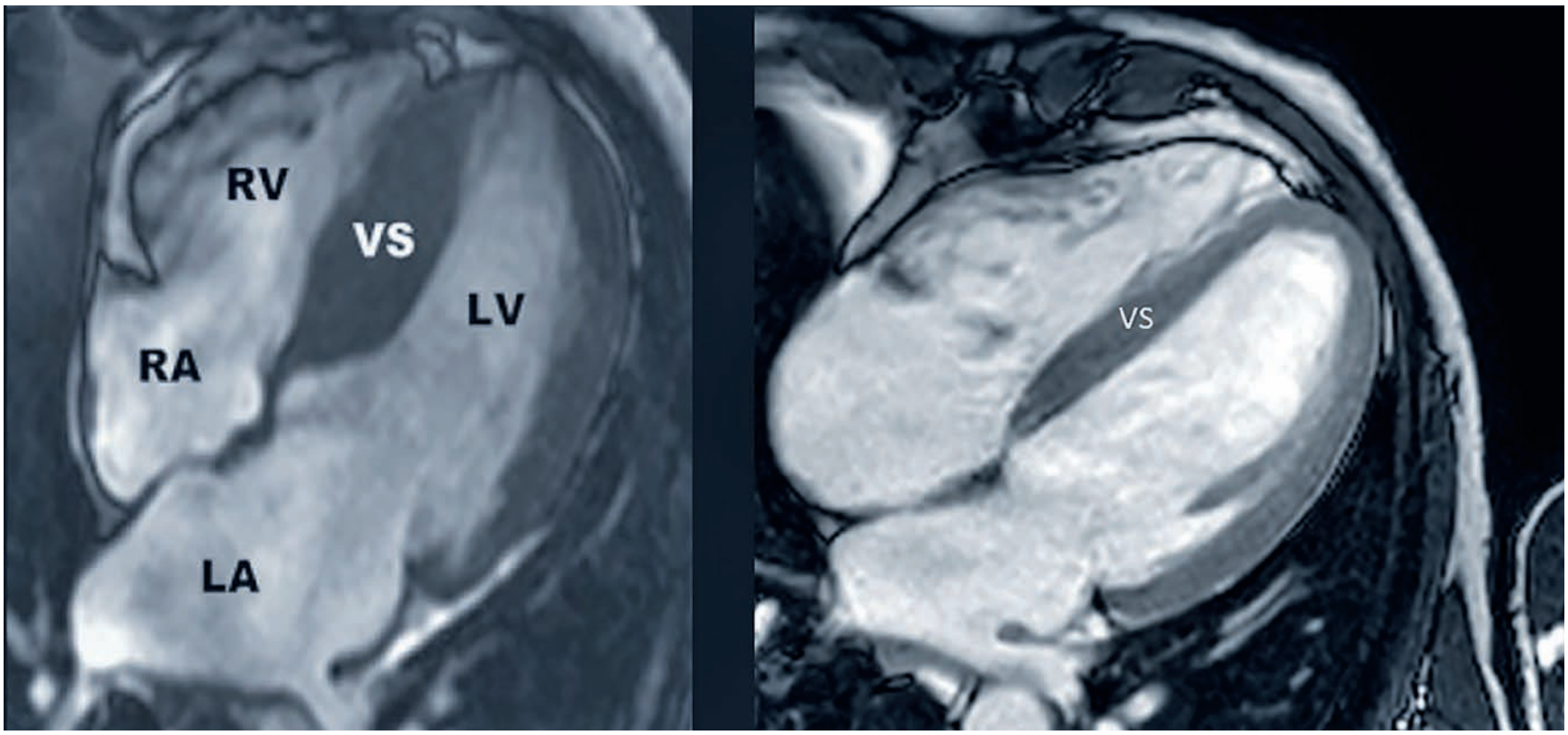
The four young doctors treat the full spectrum of skin problems, though each has a special interest in a condition impacting patients with pigmented skin. Dr. Gutierrez’s focus is vitiligo, which results in spotty white patches that can be minimized with topical medications and light treatments, known as phototherapy. Dr. Lee, a skin cancer surgeon, is the principal investigator of a study to determine whether laser-assisted drug delivery is effective at eliminating prominent raised scars, called keloids, that predominantly affect Black patients. Dr. Adotama’s research focuses on healthcare disparities and outcomes in hair disorders; he offers a variety of remedies for treatable hair-loss disorders among Black patients. Meanwhile, Dr. Parameswaran has created a clinic for an inflammatory skin disease called hidradenitis suppurativa, which causes painful boils in the armpits and genital area and is more prominent among young Black women. She is studying the effect of three investigational drugs that may prove beneficial in treating the disease, under the direction of principal investigator Kristen Lo Sicco, MD, director of NYU Langone’s Skin and Cancer Unit.

While every NYU Langone dermatologist is more than capable of treating these conditions, Dr. Gutierrez points to two broader benefits of the burgeoning program. First, the team will attune residents and fellows to the nuances of how common skin conditions manifest in patients of color, since images in medical textbooks tend to show how they look only on white skin. For instance, psoriasis, an overgrowth of skin cells that causes itching and scaly flareups, usually appears red or pink on fair-skinned people but is more likely to be violet or dark brown on those with black skin.

Beyond this, the team plans to bring more patients of color to their NYU Langone practices through outreach efforts, as well as word of mouth. All four physicians have skin of color—Dr. Gutierrez is Hispanic, Dr. Adotama is Black, Dr. Lee was born in South Korea, and Dr. Parameswaran is of Indian descent—and believe that their backgrounds will help attract those who may be hesitant to seek out a dermatologist. “When you have cultural concordance, patients have more confidence in your care, and that improves outcomes,” says Dr. Gutierrez.

TO FIND A DOCTOR who treats skin conditions in people of color, visit nyulangone.org/dermassociates or call 212-263-5015.

DRB IMAGES



Center of Attention

NEW YORK'S LARGEST CLINIC FOR HYPERTROPHIC CARDIOMYOPATHY

The Need Every week, cardiologist Mark Sherrid, MD, sees new patients whose chronic symptoms—shortness of breath, chest tightness, and periodic blackouts—had previously been misdiagnosed. They had been told they were suffering from conditions like exercise-induced asthma, panic attacks, depression, coronary artery disease, or mitral valve prolapse, yet the treatments, predictably, weren't working. Finally, an observant cardiologist helps these patients learn the truth: they have a genetic heart disease affecting one in 500 people that causes the wall between the heart's chambers to thicken, restricting the flow of blood. The condition, called hypertrophic cardiomyopathy, or HCM, can be disabling and potentially fatal. "HCM is the great masquerader of cardiology, because it looks like a lot of other conditions," says Dr. Sherrid, director of NYU Langone Health's Hypertrophic Cardiomyopathy Program, "and it can end a patient's life at a tragically young age."

The Draw Cardiologists generally refer patients with HCM to a center that specializes in the disease. Many in the tristate area wind up in the office of Dr. Sherrid, who has contributed to its improved prognosis during the past two decades. "HCM used to have a high mortality rate, but in recent years, it's become remarkably treatable, in most cases with a normal life expectancy," says Dr. Sherrid. Since their arrival at NYU Langone in 2015, he and surgical director Daniel Swistel, MD, have built the largest program in New York State, accredited as a Center of Excellence by the Hypertrophic Cardiomyopathy Association. Dr. Sherrid, in parallel with cardiologist Daniele Massera, MD, assistant professor of medicine at NYU Grossman School of Medicine, sees 350 new patients each year and follows 3,000 men and women ranging from 18 to their early 90s. "People routinely tell us that our care has transformed their quality of life," Dr. Sherrid says.

The Approach Since obstruction in the heart is often latent, and the characteristic murmur may be absent at rest, Dr. Sherrid often asks new patients to trigger it by eating a meal and then walking briskly on a treadmill right before undergoing an ultrasound of the heart. This diagnostic strategy helps point to medications that, in a majority of cases, reduce symptoms significantly. Magnetic resonance imaging can help identify patients at lifelong risk for sudden death. Patients whose HCM triggers an irregular heart rhythm are candidates for an implantable device, called a defibrillator, which emits an electric shock when needed to restore a normal heartbeat. Those with severe obstruction may require surgery to thin out the wall between the heart's chambers, called the septum, to increase blood flow to the body's central artery, the aorta. Dr. Swistel has performed more than 600 of these complex repairs, among the most of any surgeon nationally, with about 95% of patients showing improvement. Regardless of the treatment, Dr. Sherrid emphasizes the importance of moderate exercise and weight management, as early results from an NYU Langone study show that losing weight improves symptoms and may reduce heart wall thickness.

The News NYU Langone has been at the forefront of surgical innovations for HCM. Dr. Swistel pioneered the technique of removing a portion of the mitral valve, which tends to become elongated in patients with the disease, further hindering the flow of blood. He and fellow HCM surgeon Deane Smith, MD, assistant professor of cardiothoracic surgery, are testing an investigational ultrasound probe to assess heart wall thickness in real time during septal reduction surgery and ensure that the optimal amount of tissue is removed. The program is enrolling patients in a phase 3 study of a novel medication to relieve obstruction, and Dr. Sherrid is leading a phase 1 clinical trial for another drug that has shown early promise. "It's a very exciting time in our field, with advances that are helping patients with HCM live longer, healthier lives," says Dr. Sherrid.

The MRI of a patient with hypertrophic cardiomyopathy (above left) shows a thickened wall between the heart's chambers, called the ventricular septum (VS), that obstructs blood flow from the left ventricle (LV) to the aorta. Above right, a healthy ventricular septum.

TO FIND A DOCTOR who treats hypertrophic cardiomyopathy, visit nyulangone.org/hcm or call 646-501-0568.

Treating Young Athletes

Standing Tall: A New Surgical Alternative for Scoliosis

Jenna Moriello tried her best to draw attention away from the dramatic curve in her spine, but the malformation was hard to hide in a dancer's skintight bodysuit. By her freshman year at the Union County Academy for Performing Arts high school in Linden, New Jersey, her condition, called scoliosis, was worsening, causing far more than emotional distress; the chronic back pain forced her to continually compensate for her misalignment. An X-ray in November 2019 revealed a curvature of nearly 70 degrees; anything over 50 degrees is considered severe. "My spine was shaped like an S," says Jenna, now 16. "I started to look for it in photographs and videos of me dancing. It didn't help that I was in a leotard in front of a mirror every day. That made me insecure."

The corrective brace Jenna wore at night, a remedy that prevents the condition from progressing in many of the 6 to 9 million Americans with the condition, primarily girls and women, wasn't working. With Jenna hiding her body in oversized clothes, and with the risk that her curvature could ultimately impede her lung function, her mother, Danielle, knew that surgery couldn't wait much longer. However, she was afraid of the standard procedure, fusing two or more vertebrae together to straighten the spine, because it limits a patient's flexibility. "I worried about the impact of such a surgery on a 14-year-old, especially a dancer," Danielle says.

While she weighed the pros and cons, Danielle heard through a Facebook group about a surgical alternative recently approved by the FDA, called vertebral body tethering, or VBT. The novel approach restrains one side of the spine with a flexible polymer cord threaded through screws attached to the side of affected vertebrae, allowing the opposing side to straighten naturally as a child grows. Unlike a fusion rod, the tether doesn't reduce mobility. Finding no local providers who offered it, Danielle reached out to a leading practitioner of the technique, Juan Carlos Rodriguez-Olaverri, MD, PhD, at the Centro Médico Teknon in Barcelona, Spain. As chance had it, Dr. Rodriguez-Olaverri, renowned for treating adolescent athletes with spinal deformities, had just accepted a position at NYU Langone Health as director of Early Onset Scoliosis.

"Fusion surgery would have stopped Jenna's dancing career. If I can give her four more years of doing what she loves, that's wonderful."
Juan Carlos Rodriguez-Olaverri, MD, PhD

The pandemic delayed Dr. Rodriguez-Olaverri's arrival, but he met the Moriellos in the spring of 2020, reviewed Jenna's case, and recommended the procedure. "Fusion surgery would have stopped Jenna's dancing career," says Dr. Rodriguez-Olaverri. "If I can give her four more years of doing what she loves, that's wonderful."

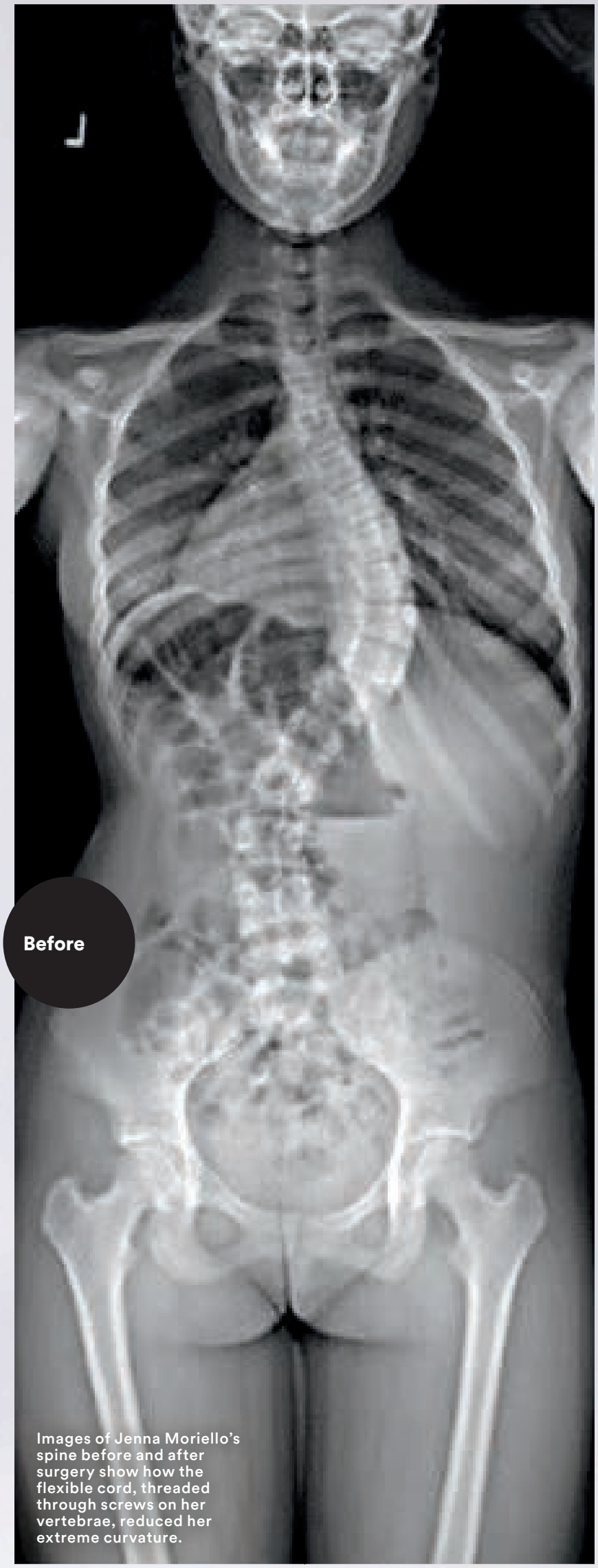
A pioneer in his field, Dr. Rodriguez-Olaverri tested many versions of VBT. Despite design improvements, there remains a one-in-five chance that the cord, pulled taut, will tear within two years. To reduce that risk, he uses two sets, side-by-side, reducing the breakage rate to less than 5%. He is one of only two surgeons globally to use computerized tomography imaging to facilitate placement of the titanium screws during the six-hour procedure.

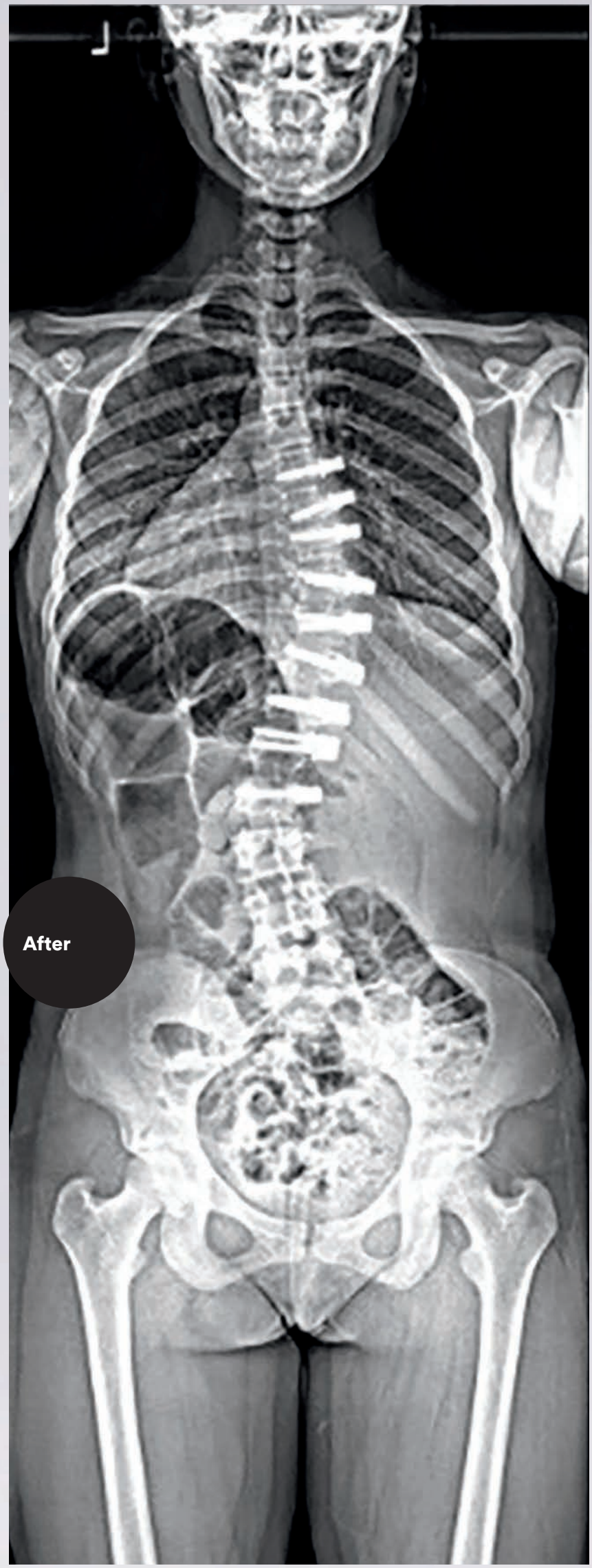
When Jenna left Hassenfeld Children's Hospital at NYU Langone in June 2020, five days after surgery, her curvature measured a negligible 20 degrees. She spent the summer adjusting to her new alignment. In September, she returned to dancing without restrictions. "I felt surprisingly normal," she says.

By this spring, Jenna had grown an inch—helping to straighten her spine further—and Dr. Rodriguez-Olaverri had completed 50 VBT surgeries at NYU Langone, a great majority on children and teenagers who traveled from other states or nations to see him. He delights in the post-procedure videos they share: figure skaters able to resume jumps, gymnasts doing flips, and baseball players back on the field in as little as four to six weeks. "We're helping these patients continue to be competitive athletes," he says. "You can always do fusion later on."

TO FIND A DOCTOR who treats scoliosis in children, visit nyulangone.org/scoliosisinchildren or call 646-929-7970.

PHOTOGRAPHS (THIS PAGE AND COVER) COURTESY OF DSM PRODUCTIONS





Images of Jenna Moriello's spine before and after surgery show how the flexible cord, threaded through screws on her vertebrae, reduced her extreme curvature.

Telemedicine

12+22=2

A Dozen Doctors, 22 Days, and Two Lives Saved

"Twenty years ago, people used to say that emergency departments were a safety net for patients. But COVID-19 has made telemedicine another safety net for people who are afraid to come into hospitals or doctor offices."
Leslie Miller, MD

Like many people, Tammy Fried was skeptical about the value of a virtual visit with a doctor. When she awakened one morning in May 2020 with a nosebleed and bloody cough, she was concerned about her symptoms but wondered what a doctor could possibly do for her over the phone. Still, Fried, then seven months pregnant, was reluctant to make a trip to the Emergency Department amid the pandemic. So instead, she made an appointment with NYU Langone Health's Virtual Urgent Care service, as thousands of patients had done throughout the spring surge.

Fried, a tax attorney who lives on Manhattan's Upper West Side, soon found out just how valuable NYU Langone's telemedicine service could be. Her outreach marked the first step of a long, complex medical journey in which a team of NYU Langone specialists drew upon their wide-ranging expertise and keen decision-making to save her life.

It all began with Leslie Miller, MD, an emergency medicine physician with 30 years of experience, who fielded Fried's Virtual Urgent Care visit last May. "With pregnancy, one of the things you have to be very concerned about is spontaneous bleeding," explains Dr. Miller, an emergency medicine physician. It's not unusual for people to cough up blood due to pneumonia, bronchitis, or other respiratory conditions, she notes. But Dr. Miller could hear Fried's cough sounding progressively wetter, suggesting an increasing amount of blood in her lungs. Sensing that her condition was deteriorating, Dr. Miller explained the need for a CT scan to help diagnose a potential vascular abnormality. "You need to go to the Emergency Department," she told Fried. "The sooner, the better."

Soon after Fried arrived at the Ronald O. Perelman Center for Emergency Services at Tisch Hospital, she was coughing up an alarming amount of blood. Concerned that an underlying disorder was causing Fried to hemorrhage, doctors ordered a CT scan, expedited by emergency medicine physician Tina Wu, MD. The scan didn't show evidence of a life-threatening blood clot known as a pulmonary embolism, nor did it identify the cause of the bleeding. The same was true for an endoscopy of Fried's airway, which ruled out a severe nosebleed as the culprit. With Fried stabilized in the Emergency Department, Dr. Wu transferred her to the intensive care unit. There, she was sedated and intubated, and a bronchoscopy was performed to remove blood from her lungs and identify the location of the bleeding.

"By isolating the source of the bleeding, the bronchoscopy helped us correlate what we would see on an angiogram," explains Akhilesh Sista, MD, chief of the Division of Vascular Interventional Radiology. Using the angiogram's series of X-rays to view the integrity of the blood vessels, interventional radiologist Beatriz Escobar, MD, was able to identify the precise source of the bleeding. A fistula, or abnormal connection between two blood vessels that are normally excluded from one another, had formed between the bronchial and pulmonary arteries. Upon bursting, it had caused blood to leak into Fried's lungs—slowly at first, and then with greater force. Through a pinhole incision in the groin, Dr. Escobar threaded a catheter to the bronchial artery, but she was unable to block it off because one of the microwires damaged blood vessels, which sometimes occurs during the procedure. "This is a very unusual place for a fistula to form," notes Dr. Sista, "and it can be very challenging to gently guide a wire through a tortuous vessel."

Fried continued to cough up small amounts of blood over the next few days, which were suctioned out by the intensive care team. When the vessels healed several days later, Dr. Sista, the interventional radiologist on duty, was able to successfully block off the artery by plugging it with metallic coils, which prevented blood from spilling into Fried's lungs. Dr. Sista describes this embolization technique as one of the most advanced procedures performed by interventional radiologists, placing NYU Langone at the forefront of the field. "Anytime there's internal bleeding," he says, "we can employ high-end mechanical and imaging technology to stop it, avoiding major surgery."

Her bleeding issue resolved, Fried and her baby faced a new threat. She had developed a severe form of preeclampsia, a life-threatening condition that affects multiple organ systems, including the mother's liver and kidneys. When it became clear that Fried's organ damage was worsening, maternal fetal medicine specialist Sara Brubaker, MD, recommended delivery, which reverses the complications of the illness. Though Fried was frail from 10 days of hospitalization, 8 spent on a ventilator, her baby was strong at just 30 weeks of gestation. On May 26, five days after being weaned off sedation, Fried gave birth via cesarean delivery to a 3-pound 15-ounce boy. "To hear the baby cry," she says, "was like hearing the angels sing. It felt like everything was going to be okay." After 10 weeks in the neonatal intensive care unit, "Miracle Max," as his parents referred to him, went home to meet his three-year-old brother, Jack.

"Twenty years ago, people used to say that emergency departments were a safety net for patients," notes Dr. Miller. "But COVID-19 has made telemedicine another safety net for people who are afraid to come into hospitals or doctor offices." When Fried made a full recovery, she sent Dr. Miller a note to thank her for the expert care she provided during their video visit. "You saved my life," she wrote.

TO SCHEDULE A VIRTUAL URGENT CARE VISIT, go to nyulangone.org/virtualurgentcare. Or navigate to the "virtual urgent care" section of the NYU Langone Health app.

Photograph by **TONY LUONG**

Meeting in person for the first time, Dr. Leslie Miller offers a warm embrace for the two lives she helped save: Tammy Fried and her son, Max.

1,000%

The rise in Virtual Urgent Care video visits since the start of the pandemic in January 2020

Tammy Fried's reluctance to visit an emergency department during the spring surge is one that has been shared by many New Yorkers throughout the pandemic. Since January 2020, some 88,000 patients have taken advantage of NYU Langone's Virtual Urgent Care service, compared to about 9,000 during the previous two years combined. The soaring increase reflects the value of telemedicine during a public health crisis, and it suggests that in many cases, virtual healthcare is here to stay. Of those patients who consult one of NYU Langone's 200 specialists in emergency medicine—the average wait time for an appointment is only two to three minutes—about 7% are referred to one of NYU Langone's Emergency Departments because they require in-person care. But Tammy Fried belongs to a much smaller elite group. "In a typical year," notes Viraj Lakdawala, MD, clinical associate professor of emergency medicine and medical director of Virtual Urgent Care, "only one or two patients we refer to the Emergency Department require a lifesaving intervention."

Milestones

All Heart, No Question

1. Our Transplant Team Saved a Patient's Life by Implanting an Artificial Heart—and Then a Real One

"When we decide to do something, we make things happen quickly. We have a remarkable team, one of the best in the world."
Nader Moazami, MD

It's been over five decades since the first artificial heart was implanted in a human. That device, handmade from plastic and connected to a 400-pound air compressor, kept a 47-year-old patient alive for three days until it was replaced by a donor heart.

The technology has evolved significantly, but the artificial heart is still seen as a bridge to transplantation and reserved for patients who are too sick to receive a real heart. Because the four- to six-hour open surgery required to implant the device is more complex than a heart transplant, with poorer overall outcomes, not many centers are willing to take on the challenge. In fact, only about 100 artificial hearts are implanted worldwide in a typical year.

At NYU Langone Health, however, the thinking is different. The Transplant Institute finds donor hearts faster than any other center in the Northeast, due in part to its innovative protocol for accepting and later treating otherwise healthy organs infected with hepatitis C. Moreover, with the highest one-year survival rate among heart transplant patients in the Northeast and the best outcomes among multiorgan transplants in the US, it has been named the top heart transplant program twice in a row based on data published by the Scientific Registry of Transplant Recipients. So taking on patients whose only hope of survival is an artificial heart is a natural extension of its mission.

"When everybody else says no, patients can always rely on NYU Langone to look at the most complex cases," says Nader Moazami, MD, chief of heart and lung transplantation and mechanical circulatory support. "We're not afraid to say yes."

The Transplant Institute's inaugural artificial-heart implantation, on March 31, was, in Dr. Moazami's words, "as complex as it gets." The patient, Floyd Gaskins, 55, a pastor from Vauxhall, New Jersey, has amyloidosis, a rare disease caused by the buildup of a protein that damages the body's major organs. By the time Gaskins was transferred to NYU Langone from a referring hospital in New Jersey, he was in cardiogenic shock, a life-threatening condition in which the heart can no longer pump enough blood to meet the body's needs. He had been on chronic dialysis, his liver function was declining quickly, and he had early-stage bone marrow cancer.

NYU Langone acted quickly, securing a SynCardia 70cc Total Artificial Heart (TAH) within a week and training a team of 143 clinical specialists on the device in just two days. "NYU Langone isn't an ocean liner you can't turn," says Dr. Moazami. "When we decide to do something, we make things happen quickly. We have a remarkable team, one of the best in the world."

Having worked with the manufacturer on investigational studies for the TAH while at another institution, Dr. Moazami was comfortable leading the procedure. With the patient on a heart-lung machine, Dr. Moazami and Deane Smith, MD, associate director of heart transplantation and mechanical circulatory support, removed both lower heart chambers and the four valves, positioned the device, sutured it into place, and connected tubes to the chambers of the original heart and the aorta. The artificial heart attaches to a tube that extends through the chest wall to an external pneumatic driver that does the pumping and monitoring.

Though designed as a temporary solution, the device has supported some patients unable to get a transplant for more than four years. One month after surgery, Gaskins was well enough to walk the halls at the Kimmel Pavilion, and on June 9, he underwent a heart-kidney transplant at NYU Langone. Gaskins will likely require chemotherapy to combat his amyloidosis—the next step on his path to recovery.

"This represents a critical, life-saving option for patients who need a heart transplant but might not otherwise be candidates in other centers," says Aubrey Galloway, MD, the Henry H. Arnhold Chair and Professor of Cardiothoracic Surgery.

The surgery sets up the Transplant Institute to participate in trials for other artificial heart devices currently in development and further bolsters its reputation. "He would not have received this care and treatment at any place other than NYU Langone," says Robert Montgomery, MD, chair of surgery and director of the NYU Langone Transplant Institute. "This cements us as a top center that can do anything and everything for patients in heart failure."

The Total Artificial Heart is designed to increase blood flow and speed the recovery of vital organs to make the patient a stronger transplant candidate. The only device of its kind approved by the FDA, about 1,500 have been implanted worldwide since 2004.

FOR MORE INFORMATION about NYU Langone's Heart Transplant Program, visit nyulangone.org/hearttransplant or call 833-344-3278. For doctors who treat pediatric cardiac conditions, visit nyulangone.org/pediatricheart or call 212-263-5989.

IMAGE COURTESY OF SYNCARDIA

2. And Our Pediatric Cardiac Surgeons Saved This Baby—and Hundreds More Each Year—Thanks to Outcomes That Exceed the National Average

99%

NYU Langone's overall risk-adjusted survival rate for pediatric cardiac surgery, compared with a national rate of 97.2%

Soon after a routine 20-week ultrasound, Jessie Taormina, 34, then a nurse at NYU Langone Hospital–Brooklyn, learned with her husband, Nicolo, that their baby had a rare congenital condition known as hypoplastic left heart syndrome (HLHS). Dubbed "half a heart syndrome," it leaves the left side of the heart so underdeveloped that it struggles to pump blood to the rest of the body. Thirty years ago, the survival rate of the approximately 960 babies born in the US annually with HLHS was less than 5%. Today, thanks to a series of three reconstructive surgeries, the five-year survival rate has increased to 70%, with 90% long-term survival of children who reach their first birthday.

Jessie was deeply relieved to learn that NYU Langone Health has one of the most successful programs in the country for this condition, led by one of the top pediatric cardiac surgeons. Ralph S. Mosca, MD, chief of the Division of Pediatric and Adult Congenital Cardiac Surgery, helped define the modern-day surgical standard of care in the 1990s. The cardiac surgery program he heads at Hassenfeld Children's Hospital, which treats the most complex forms of congenital heart disease and performs nearly 250 operations annually, has the highest risk-adjusted survival rate of any hospital in New York State for pediatric patients. That impressive outcome report was recently issued by the state's Department of Health, which takes into account the complexity of care at the time of surgery, as well as the number of children treated for the condition at the institution.

In addition, Hassenfeld Children's Hospital outperforms the national average for clinical outcomes, complication rates, and length of hospital stay, according to the Society of Thoracic Surgeons (STS). The latest data from STS shows that NYU Langone's survival rates for pediatric cardiac surgery exceed the national average in several categories. The institution's overall survival rate is 99%, compared with a national rate of 97.2%. For neonates, the survival rate is 96.2%, compared with a national average of 92%. For infants up to age 1, the survival rate is 99.5%, compared with a national average of 97.4%.

In September 2018, Sammie Taormina became one of those success stories. Seventeen days after he was born at Tisch Hospital, Sammie had his first operation. It went smoothly, as did the second surgery in March 2019 and the third last September. Once Sammie fully recovered, he was cleared to do all the climbing, running, and jumping he wished. Today, the Taorminas look like any other relaxed young family, with a chubby-cheeked toddler who, along with his new baby brother, Russell, charm everyone they meet.

At a follow-up visit in 2019, Sammie Taormina shared a smile with his doctors, cardiologist Dr. Achi Ludomirsky and cardiac surgeon Dr. Ralph Mosca.

Photograph by **TONY LUONG**

The Explainer

5 THINGS YOU SHOULD KNOW ABOUT

Psychedelic Medicine

IN EARLY 2021, NYU Langone Health launched the Center for Psychedelic Medicine to investigate the use of hallucinogens, drugs that can produce radical changes in consciousness, for the treatment of psychiatric conditions such as substance-use disorders, the leading preventable cause of death and disability in the US. The Center, the first of its kind in New York City and one of only a handful nationwide, builds on years of trailblazing research on addiction, depression, post-traumatic stress disorder, and cancer-related distress.

This body of work has made NYU Langone a major force behind the emerging renaissance in psychedelic-medicine research. In a controlled setting and amid ongoing psychotherapy, most clinical-trial participants are administered pharmaceutical-grade drugs like psilocybin, the psychoactive ingredient in "magic mushrooms," or MDMA, a psychoactive drug known more colloquially as Ecstasy.

Here, psychiatrist Michael Bogenschutz, MD, who leads the Center, offers insights into this renewed field.

TO FIND A DOCTOR who treats addiction, visit nyulangone.org/addiction or call 646-929-7950. For doctors who treat post-traumatic stress disorder, visit nyulangone.org/ptsd or call 646-929-7950.

1 It isn't new.

In the 1950s, scientists began exploring the therapeutic potential of psychedelic drugs to treat people with addictions, as well as terminally ill patients. There was big interest in their clinical potential, but the widespread abuse of LSD during the 1960s led to the criminalization of psychedelics. Research on psychedelics in the US resumed in the early 1990s, and the initial studies from this second wave have gained attention due to impressive clinical outcomes and safety within controlled trials. Based on these early results, the Food and Drug Administration has fast-tracked studies on psilocybin for major depressive disorder and MDMA for PTSD. Recently, the need for effective therapies has gained even greater urgency due to the opioid epidemic and the psychosocial impact of the pandemic. "It's taken a while for a second wave of research to gain credibility," notes Dr. Bogenschutz. "But even skeptical scientists are beginning to give these drugs a fresh look."

2 The benefits can be enduring.

Psychedelic treatment typically includes one to three sessions in which medication is administered, combined with a number of non-drug therapy sessions. Volunteers are carefully screened and prepared for the treatment sessions. Two therapists (one a psychiatrist) conduct the therapy and support the patient through any episodes of fear or anxiety. After a dose of psilocybin is administered orally, the patient spends several hours reclined on a couch, wearing eye shades and listening to music on headphones to help maintain an inward focus. During MDMA medication sessions, there is typically more interaction between the participant and the therapists. Dr. Bogenschutz says he's most surprised by how transformative and durable the effects of the therapy can be. "If a single treatment can leave a patient problem-free for six months, that's highly predictive of continued success."

3 Science is underway to explain why.

"How a single experience can produce lasting changes is something we're still trying to unpack," says Dr. Bogenschutz." Based partly on brain imaging studies, he believes that psilocybin enhances the brain's ability to adapt and reorganize its structure and activity. By disrupting ingrained negative patterns, psychedelics may allow new patterns of brain activity and behavior to emerge. Studies show that psilocybin can produce intense, meaningful experiences marked by a sense of oneness and transcendence. Dr. Bogenschutz thinks of these episodes as having an effect that is the opposite of the effect of traumatic experiences causing PTSD. In that disorder, a single traumatic event seared into memory can cause dramatic, persistent changes in brain function and behavior. "Maybe what we're seeing with psilocybin," he says, "is an experience so powerfully positive that it can have an enduring positive effect on one's brain and psyche."

4 NYU Langone researchers are leading the way.

Excessive alcohol use is the fourth leading cause of preventable death in the US. "Alcohol abuse was a main focus of the first wave of psychedelic science, so it was a logical place for me to start my research," says Dr. Bogenschutz. One of the clinical trials he's leading assesses the effectiveness of psilocybin, coupled with psychotherapy, in reducing the amount of alcohol participants consume. With 95 randomized participants, it's the largest clinical trial ever conducted with psilocybin, and one of the largest ever with a psychedelic drug. "Behaviorial patterns become deeply ingrained in a person's reaction to stress," Dr. Bogenschutz says. "We hope to learn who responds best to these treatments, and how they can make lasting changes. A larger, multi-site trial is now being planned with the ultimate goal of FDA approval for psilocybin as a treatment for alcohol use disorder.

5 Don't skip the therapy sessions.

The Center for Psychedelic Medicine is squarely focused on developing safe, effective therapies for hard-to-treat psychiatric disorders. Michael Bogenschutz, MD, the Center's director, is leading clinical trials on psilocybin for mitigating dependence on alcohol and opioids, and MDMA for PTSD. Stephen Ross, MD, the Center's associate director, is leading trials on psilocybin for major depressive disorder, LSD for advanced cancer pain treated with opioids, and cannabidiol for chronic nerve root pain. Sarah Mennenga, PhD, is leading preclinical studies on the effects of LSD and BOL-148, a nonpsychoactive drug similar to LSD, on alcohol use behavior in mice. Findings on the safety of these drugs in a controlled clinical setting have been very reassuring. But professional supervision is the key, says Dr. Bogenschutz. "I'm hopeful that the evidence will be so compelling that one day these treatments will become widely available through trained therapists," he adds.

ILLUSTRATION BY ROBINOLIMB

Education

Big Discoveries Boost NYU Grossman School of Medicine's National Rank for Research to the #2 Spot

ILLUSTRATION BY KAITLIN SOBIESIAK FOR NYU LANGONE HEALTH

Some important scientific advances emerge from an urgent quest, such as those made by dozens of NYU Langone Health clinician-researchers and basic scientists who have spent more than a year refocusing their work on SARS-CoV-2, the virus that causes COVID-19 (*see page 13 of Special Report*). Others come about through sheer serendipity, such as the 2018 discovery by Neil D. Theise, MD, professor of pathology, that widespread layers of the human body, long thought to be solid connective tissues, actually contain fluid-filled spaces that Dr. Theise has dubbed the interstitium (*see illustration*). If accepted by scientific consensus, this previously unknown network would be designated the body's 80th organ.

"I had been looking at the interstitium for 30 years and never really noticed it before," says Dr. Theise. "But now that we're viewing living tissue at the microscopic level, this has enabled us to stumble onto this, and I don't think there's anything that doesn't get changed by it." Earlier this year, Dr. Theise and colleagues published research suggesting that this interconnected series of compartments—a kind of anatomical "highway"—may potentially play a role in the spread of cancer cells.

Whether such breakthroughs arise from intense multidisciplinary collaboration or chance that favors the prepared mind, they explain why NYU Grossman School of Medicine was recently ranked number 2 in the nation for research in *U.S. News & World Report*'s 2022 Best Graduate Schools rankings, a jump from number 4 on last year's list. The listing for medical schools is based on faculty resources, the academic success of entering students, and qualitative assessments by participating schools and their residency directors. The research rankings include two measures of productivity: total federal research activity and average federal research activity per faculty member.

"While we are pleased to receive this accolade, the importance of our work far exceeds any ranking from any single organization," notes Robert I. Grossman, MD, Dean and CEO of NYU Grossman School of Medicine. "We recognize this survey for what it is: a source of feedback to help us identify areas of strength and opportunity."

New research suggests that an interconnected series of fluid-filled compartments throughout the body form a kind of superhighway distinct from blood and lymphatic vessels that may play a role in the spread of cancer.

"Patients with advanced heart failure have a life expectancy of less than one year. On average, an LVAD pump adds five years of life and, just as important, provides a higher quality of life."

Sunil Abrol, MD, cardiothoracic surgeon, NYU Langone Hospital-Long Island

Photograph by **JONATHAN KOZOWYK**

Milestones

In Cardiac Surgery, a Life-Saving First at NYU Langone Hospital-Long Island

The math is simple yet painful: Some 600,000 people in the US have end-stage heart failure, the most severe form of the disease, but each year less than 1% receive a life-saving heart transplant. While the nationwide shortage of donor organs helps explain the sad statistic, so does the fact that many patients with the life-threatening condition are too sick and at too high a risk to undergo a transplant. But for some, like Sal Cangialosi, 75, a retired construction worker from Franklin Square, New York, there is another option: a left ventricular assist device, or LVAD, a battery-operated mechanical pump that helps the heart deliver oxygen-rich blood to the rest of the body.

On March 23, Cangialosi, who was suffering from severe shortness of breath, even at rest, became the first patient to be implanted with an LVAD device at NYU Langone Hospital–Long Island. The four-hour procedure was performed by cardiothoracic surgeon Sunil Abrol, MD, the hospital's director of the Mechanical Circulatory Assist and LVAD Program, and Nader Moazami, MD, professor of cardiothoracic surgery and chief of Heart and Lung Transplantation and Mechanical Circulatory Support at NYU Langone Health. After placing the patient on a heart-lung machine, the surgeons, using real-time imaging for guidance, implanted the device just below the heart and attached tubes to the left ventricle and the body's main artery, the aorta. Then they connected a cable to the external controller and power source, worn by the patient on a belt. Once activated, the LVAD began suctioning blood from the left ventricle and delivering it to the aorta, thus lightening the load on the overburdened heart.

Cangialosi was discharged nine days later, spent a week at NYU Langone's Rusk Rehabilitation, and then returned home. By early May he was back to gardening and taking walks with his wife, Mary. Another patient received an LVAD in April, and many more implants are planned at the hospital. "Patients with advanced heart failure have a life expectancy of less than one year," says Dr. Abrol. "On average, this device adds five years of life and, just as important, provides a higher quality of life."

To Shaline Rao, MD, director of the Heart Failure Advanced Care Center at NYU Langone Hospital–Long Island, the milestone represents the natural expansion of a program ranked 11 nationally in cardiology and heart surgery by *U.S. News & World Report*. Long Island patients with heart failure now have access to the life-extending device at a convenient location. Those patients for whom an LVAD serves as a temporary bridge to transplantation can now get the bulk of their before-and-after care in Mineola while receiving a new heart once a match is confirmed at NYU Langone's Transplant Institute, named the nation's top heart transplant program based on data from the Scientific Registry of Transplant Recipients. "A lot of these patients are frail, and traveling to the city is burdensome for them and their family," says Dr. Rao. "The launch of the LVAD Program on Long Island gives them access to complex heart failure care close to home."

Since his LVAD implantation, Sal Cangialosi, 75, (opposite) feels well enough to garden and take walks with his wife, Mary.

TO FIND A DOCTOR who treats heart failure, visit nyulangone.org/heartfailurecenter or call 646-501-0119.

ON THE EAST END OF LONG ISLAND, CLOSE-TO-HOME OUTPATIENT CARE IS NOW EVEN CLOSER

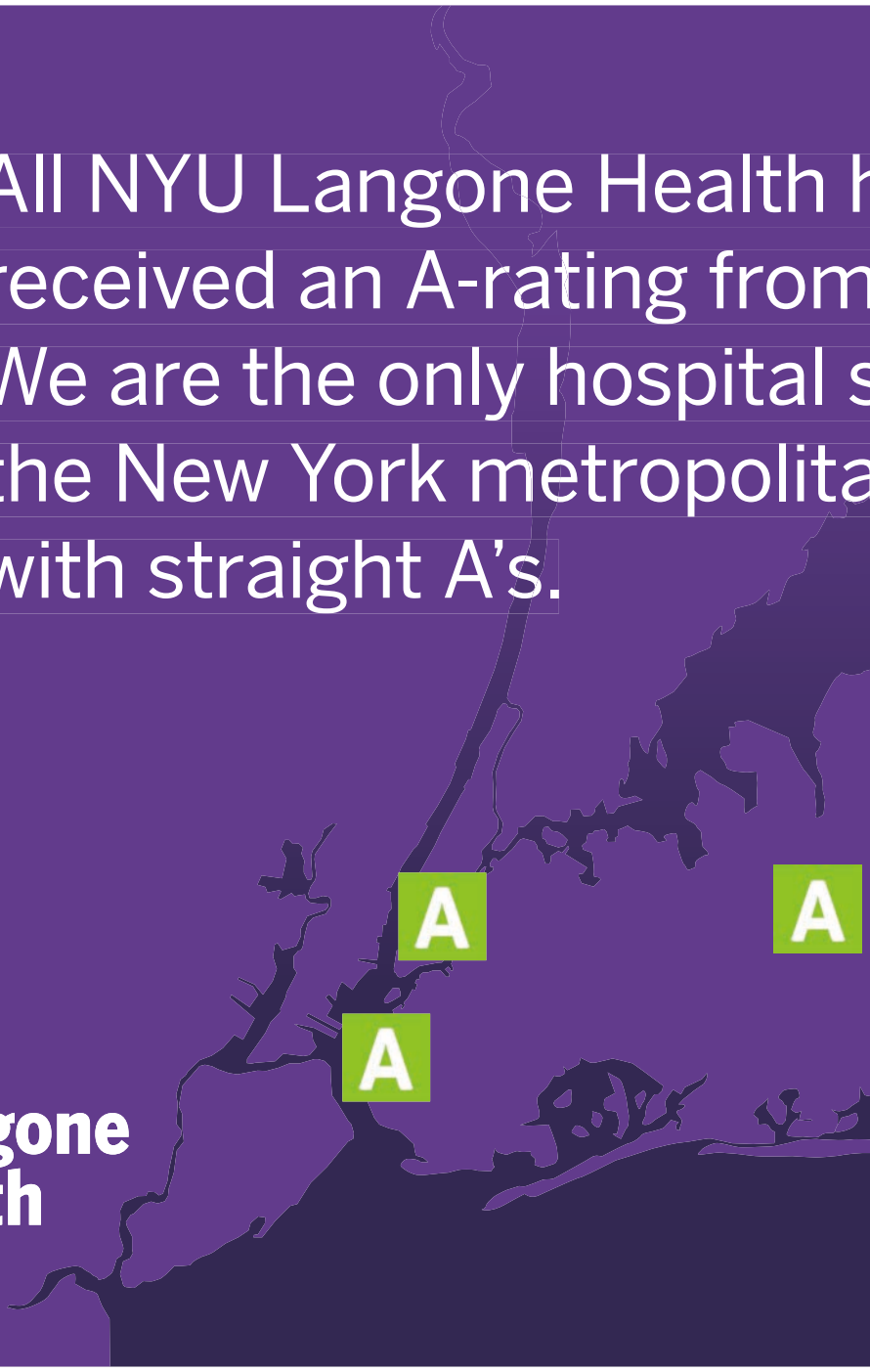
In late summer 2020, as NYU Langone Health's ambulatory care practices were starting to fully reopen after the pandemic had paused their operations, patient volume in several outpatient sites on the East End of Long Island rose by more than 10% over the previous year. The reason? The region, long a popular summer destination for many New Yorkers, has become a more permanent residential option for those who have shifted to working from home during the pandemic. NYU Langone has responded to the area's changing demographic by launching two new multispecialty practices, which join three existing practices in this part of Suffolk County. NYU Langone Medical Associates–Riverhead ① offers care in internal medicine, endocrinology, urology, pulmonology, and podiatry. (Additionally, on-site oncology services are available at Perlmutter Cancer Center at NYU Langone Arena Oncology–Riverhead.) The second new practice, NYU Langone Medical Associates–Bridgehampton ②, has specialists in internal medicine, pediatrics, and cardiology. "These new sites have been in the works for years, but we're expanding our footprint and commitment on Long Island to serve a growing population of patients seeking high-quality healthcare services close to home," says Andrew Rubin, senior vice president for clinical affairs and ambulatory care.

To find a doctor on the East End of Long Island, visit nyulangone.org/eastend.

NYU Langone Health

550 First Avenue
New York, NY 10016

All NYU Langone Health hospitals received an A-rating from Leapfrog. We are the only hospital system in the New York metropolitan area with straight A's.



NYU Langone Health

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STILL SAVING LIVES:

A SPECIAL REPORT

“Our researchers have a profound sense of what it means to do something for the community and for the world.”

LUDOVIC DESVIGNES, PHD,
DIRECTOR OF NYU LANGONE’S HIGH-CONTAINMENT LABORATORY

PAGE 6

Leadership

"I Was One of the First People in the World to Get the Pfizer Vaccine. Here's What I've Learned."

A CONVERSATION WITH AISHA LANGFORD, PHD, MPH

When Aisha Langford, PhD, MPH, wrote her doctoral dissertation on improving minority participation in clinical trials some years ago at the University of Michigan, she had little inkling that one day she would not only enroll in a trial herself, but it would also be a study of historic importance. When a friend contracted COVID-19 during New York City's spring 2020 surge, she was compelled to put her research into practice. "I wanted to help people avoid COVID-19," she says. An assistant professor of population health, Dr. Langford researches how enhancing health communication can improve individual decision-making and reduce health disparities. Her efforts aim to boost recruitment and retention for clinical trials. She also advises NYU Langone's Vaccine Center on strategies for improving community outreach and diversity. In June 2020, Dr. Langford enrolled in Pfizer's Phase 1 Vaccine Clinical Trial at NYU Langone Health. She received her first shot on July 1, 2020, becoming one of the first people to receive the experimental vaccine. Here, she shares her insights.

WAS THERE A PARTICULAR MOMENT WHEN YOU DECIDED TO ENROLL IN NYU LANGONE'S CLINICAL TRIAL FOR AN EXPERIMENTAL COVID-19 VACCINE?

In early May of 2020, my pastor from back in Michigan saw on the news that NYU Langone was launching a vaccine trial for COVID-19 and texted me to see if I knew about the trial. I was not aware of the trial but learned more about it on NYU Langone's Clinical Research Studies web page (clinicaltrials.med.nyu.edu). Before that, a good friend got very sick from COVID-19. He lives alone and had to call an ambulance because he was struggling to breathe. He was hospitalized for four days and still has some health challenges. I can't imagine being by yourself when you're that sick. I felt very blessed that I hadn't gotten COVID-19, but I started thinking, "If there's going to be a vaccine, I want to be one of the first to get it."

DID YOU HAVE ANY FEAR OR RESERVATIONS ABOUT TAKING AN EXPERIMENTAL VACCINE?

I was one of 48 participants at NYU Langone's site for the Pfizer Phase 1 Vaccine Clinical Trial, and we were literally among the first humans to get this vaccine. The consent form was 20 pages long. So, yes, I was a little bit concerned, but I'm familiar with science and believe in getting vaccines as a way to protect health. So I was more focused on the potential benefits. I was also curious about the clinical trial process and what the participant experience would entail. I thought, "Why not have some potential personal benefit while also contributing to the global effort to find a vaccine for this devastating disease?" It was a privilege to participate.

DID YOUR FAMILY AND FRIENDS EXPRESS CONCERN?

I got different reactions after I officially enrolled in the trial. My mom said, "That makes sense. You've been talking about clinical trial participation for years." My brother said, "Why are you doing this? Are you crazy?" My significant other said, "Gosh, we should have talked about this. What if you get hurt?" My dad said, "That's really brave. We're proud of you." I understand all of their views. They care about me, so volunteering for a clinical trial for something totally new sounded scary to some of them.

HOW DID YOU FEEL AFTER BEING VACCINATED?

After my second vaccine shot on July 22, 2020, I had a low fever and was tired for a couple of days. Partly because of that reaction, I sensed that I had received the active vaccine rather than a placebo. Those mild side effects actually made me feel excited because my immune system was responding. When NYU Langone began offering its employees the vaccines that were FDA-approved for emergency use authorization, I inquired with the clinical trial study team

Photograph by **TONY LUONG;** Cover photograph by **JONATHAN KOZOWYK**

With a master's degree in epidemiology and behavioral science and a doctorate in health education and health behavior, Dr. Aisha Langford has long championed public health. "We need to think more about social determinants of health," she says.

about whether I had received the active vaccine, and learned that I had. Of the three groups in the trial, my group received a slightly smaller dose than the one later approved by the FDA for emergency use authorization. So I chose to get an optional booster shot through the clinical trial, which I received on March 17, 2021. I'm being followed for two years to monitor the efficacy and durability of the vaccine. My participation will end in July 2022.

YOU'VE SAID THAT IT'S ONLY NATURAL FOR PEOPLE TO BE "ON THE FENCE" ABOUT THE COVID-19 VACCINE? WHY IS THAT?

It's understandable for people to be cautious. Although the vaccines were based on good science and collaboration, I don't think health professionals communicated that very clearly early on. Historically, medical innovation has been slow. So people didn't understand how we got the vaccines so fast when we still don't have cures or vaccines for other conditions. But hesitation can be a good thing. It means people need more information and want to have their questions answered. From there, they can make informed decisions about getting vaccinated.

WHAT'S THE BEST WAY TO APPROACH SOMEONE WHO IS VACCINE HESITANT?

Ask questions to find out why they're hesitant. Some people have an underlying medical condition and want to know if the vaccines were tested in people with that same condition. Others don't get recommended vaccines like the flu shot because they don't think getting the illness is a big deal. Other people think

Photograph by **TONY LUONG**

they're going to get a big bill, especially if they don't have health insurance. It's important to provide the information and support people's need to feel more confident about getting vaccinated. For health professionals, it's critical to listen and acknowledge concerns.

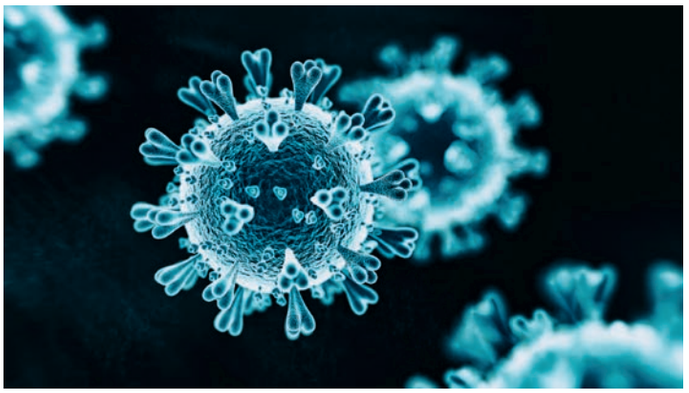
VACCINE HESITANCY HAS HISTORICALLY BEEN HIGHER IN THE BLACK COMMUNITY COMPARED WITH OTHER GROUPS. HAVE RECENT ADVOCACY EFFORTS MADE AN IMPACT?

The media have focused on Blacks and Hispanics, but vaccine confidence and willingness to get vaccinated is actually improving in every group. Black adults account for the biggest increase in those willing to get the COVID-19 vaccines. This success is due in part to intense efforts by many Black churches, community-based organizations, and medical professionals to build vaccine confidence. We need to keep providing opportunities for people to ask questions, find trusted sources of information, and access high-quality health care. To come out on the other side of this pandemic, it will be important for everyone to consider getting vaccinated. Vaccines are one of the greatest tools we have to minimize the burden of preventable diseases.

TO MAKE AN APPOINTMENT for a COVID-19 vaccination, visit nyulangone.org/covid19vaccine.

Know Your Pandemic Lingo

Adenoviral Vectors



Want to beat a virus? Enlist another virus.

That's the thinking behind most of the COVID-19 vaccines distributed globally today. AstraZeneca, Johnson & Johnson, CanSino in China, and Russian scientists have all developed vaccines that rely on adenoviruses, a family of pathogens more commonly blamed for cold-like symptoms and conjunctivitis (pinkeye). By stripping out adenovirus genes that allow the virus to reproduce, scientists can transform it into a delivery vehicle, or "vector," and equip it with instructions for making a small, but critical, part of the SARS-CoV-2 virus called the spike protein. Once these genetic blueprints are ferried inside human cells, the spike protein is mass produced to trigger an immune response. In effect, it tricks the body into fighting off a COVID-19 infection it doesn't really have. "Adenoviruses have evolved to infect human cells very well and to deliver their cargo," says Daniel Sterman, MD, director of the Division of Pulmonary, Critical Care, and Sleep Medicine at NYU Langone Health. "That cargo could be an anti-cancer therapeutic or a protein the body will develop an immune response to, like the spike protein in the COVID-19 vaccine."

First developed in the 1980s, adenovirus vectors have been used in clinical trials to test gene therapy and vaccines against HIV, malaria, tuberculosis, and other diseases. With the exception of successful Ebola and rabies vaccines, all of these efforts have sputtered. Nonetheless, researchers are optimistic about the new wave of COVID-19 vaccines. Unlike the mRNA vaccines made by Pfizer and Moderna, the adenovirus-based vaccines can be stored at room temperature. And in many cases, they require just one shot instead of two. One of the potential drawbacks is that some people may have preexisting immunity to the adenoviral vector itself and therefore generate a weaker, less protective immune response. Scientists are also studying whether an overly robust immune response might be associated with a very rare but serious side effect: blood clotting.

Vaccines aside, adenoviruses also play a starring role in an exciting new therapy for lung cancer. As part of a Phase II clinical trial testing a new therapeutic approach against advanced non-small cell lung cancer, Dr. Sterman and colleagues are using an adenoviral vector to deliver a "suicide" gene encoded with an enzyme directly into tumors. When activated, it can effectively kill off the cancer cells. The researchers believe an inflammatory response triggered by the adenoviral vector may enhance the immune reaction to the introduced gene and boost the therapy's effectiveness. With the COVID-19 vaccines taking center stage, Dr. Sterman says he will be watching closely for new insights that can help him refine his own anti-cancer strategy.

ILLUSTRATION BY KOTO-FEJA

Photograph by **JONATHAN KOZOWYK**

Research

Inside a High-Containment Lab:

The Gear, the Safety, the Science

Dr. Ludovic Desvignes leads NYU Langone's high-containment facility, where scientists work in "space suits" to protect them from infection.

Ever since COVID-19 made its mysterious and deadly debut in New York City last spring, researchers at NYU Grossman School of Medicine have been at the forefront of scientific investigations to demystify the pathogen and help give doctors the upper hand in treating it.

But how exactly do you safely study a highly contagious virus that has killed more than 3.8 million people worldwide? The answer lies within a special type of research facility known as a high-containment lab, or an ABSL-3, short for Animal Biosafety Level 3.

Since 2016, when NYU Langone Health opened its newest and largest ABSL-3 facility, its researchers have been securely studying tuberculosis, chikungunya, hantavirus, and other contagious pathogens that require extra layers of precautions and regulations. So, when COVID-19 emerged, NYU Langone researchers were fast off the blocks. By February, the Vaccine Center had already secured the SARS-CoV-2 strain circulating in Washington state from the Centers for Disease Control and Prevention and begun studying how the virus infects humans and might be thwarted by vaccines or drugs. "Without our existing ABSL-3 facility, NYU Langone simply wouldn't have been able to join in the global research effort on SARS-CoV-2," says Ludovic Desvignes, PhD, director of NYU Langone's High-Containment Laboratory.

The facility has so far yielded a wellspring of scientific insights. In one recently published study, Kenneth Stapleford, PhD, assistant professor of microbiology, and colleagues collected blood serum from a group of 101 healthcare workers at NYU Langone who had recovered from COVID-19 and volunteered for a study to determine whether their infections might afford some protection against reinfection. Within the protective confines of the ABSL-3 facility, the team mixed dilutions of antibodies from the volunteers' blood with dilutions of the virus, allowed them to incubate, and then added the mix to cultured monkey cells to see whether the antibodies could block the virus.

The researchers found that a robust and diverse antibody response best protected the monkey cells from being infected in the lab. "One take-home message is that you need lots of different types of antibodies in order to get the best blockage of the virus after infection," Dr. Stapleford explains. He notes that the post-infection mecha-

Continued on page 11

THE HIGHER THE RISK, THE HARDIER THE LAB: FOUR LEVELS OF BIOSAFETY FACILITIES

Laboratories where biological agents are studied are classified by the level of containment they require for safety. There are four levels of biosafety labs, ranging from those that house low-risk pathogens, biosafety level 1 (BSL-1), to the highest risk microbes, biosafety level 4 (BSL-4).

Biosafety Level 1 (BSL-1)

For research with agents that usually don't cause disease in healthy adults, and pose minimal potential hazard to laboratory personnel and the community. Examples include a nonpathogenic strain of *E. coli*.

Biosafety Level 2 (BSL-2)

For research with agents that can cause mild disease in healthy humans or are difficult to contract through inhalation, and present moderate potential risk to laboratory personnel and the community. Examples include herpes simplex virus, rhinoviruses, RSV, *Staphylococcus aureus*, and *Salmonella*. Access is restricted and appropriate personal protective equipment is required.

Biosafety Level 3 (BSL-3)

For research with agents that can cause serious or potentially lethal disease through inhalation, and pose a significant potential risk to laboratory personnel and the community. Examples include *Mycobacterium tuberculosis*, SARS-CoV-2, *Bacillus anthracis* (anthrax), and West Nile virus. Access to a BSL-3 laboratory is restricted, and the lab is equipped with self-closing, interlocking doors, sealed windows, devices to decontaminate infectious waste, a HEPA-filtered ventilation system, and directional air flow that draws air into the laboratory from clean areas. Work is performed in biosafety cabinets, and extensive personal protective equipment is required, including disposable gloves, a powered air purifying respirator (PAPR), and a full body suit.

Biosafety Level 4 (BSL-4)

For research with agents that can cause life-threatening disease to humans, with no vaccines or treatments available. Such agents pose a high risk of infection through inhalation and constitute a high risk to laboratory personnel and the community. Examples include Ebola virus and smallpox virus. In addition to the design specifications and safety precautions required by a BSL-3 lab, a BSL-4 lab is located in a separate building or in an isolated and restricted zone, with dedicated supply and exhaust ventilation. Work is performed in a Class III biosafety cabinet ("glovebox") and wearing a full body, tear-resistant, air-supplied positive pressure protective suit. Upon entry, a complete change of clothing is required; upon exit, showering and decontamination of all materials are required.

Microbiologist Kenneth Stapleford, PhD, (left), used NYU Langone's BSL-3 laboratory to analyze blood samples from recovered healthcare workers to assess their level of protection against COVID-19 reinfection. In the lab of microbiologist Meike Dittmann, PhD, Maren De Vries, PhD (right), performs an assay to quantify infectious viral particles and isolate viral clones.

DR. LUDOVIC DESVIGNES; OPPOSITE PAGE: KARSTEN MORAN

HOW TO ENTER AND EXIT A HIGH-CONTAINMENT LAB

STEP 1: Enter the anteroom through self-closing double doors. A directional airflow system draws in air and sweeps it into the facility to protect the surroundings from any accidental spill.

STEP 2: Zip yourself into a full-body, waterproof Tyvek suit, complete with booties.

STEP 3: Don two pairs of latex gloves and a protective sleeve over each arm.

STEP 4: Place a powered air-purifying respirator over your head. It fits like an astronaut's helmet and connects to your suit via a protective shroud. This contraption allows you to breathe filtered air within your suit.

STEP 5: Once inside the lab, work with the virus inside a biosafety cabinet, a large hood with controlled air circulation. All of the facility's air vents out of the building several times per hour through an extensive HEPA-filtration system on the roof. A fully integrated alarm system, which can send warnings through sirens, flashing lights, emails, and text messages, monitors the air supply, pressure, and exhaust fans. For decontamination, use a powerful disinfectant to quickly inactivate the virus after experiments and sterilize all waste with a large pass-through autoclave (the decontaminated and autoclaved waste is then collected as regulated medical waste and incinerated off-site).

STEP 6: Every time you finish your experiments for the day, follow the same cadence to make sure your work remains in the ABSL-3 facility. Off comes the outer pair of gloves, discarded along with the sleeves in a biohazard waste container. Then discard the Tyvek suit, and remaining gloves as well; the special respirator can be reused after it's been thoroughly disinfected.

Photographs by **JONATHAN KOZOWYK**

Before entering an ABSL-3 lab, Ludovic Desvignes, PhD, (opposite page), dons a full-body Tyvek suit, one of several pieces of gear that protect against airborne pathogens. "There's always someone who knows who is in the lab at any given time and when they leave," he says. At right: To help prevent accidents, warning signs and reminders are posted and an eye sink is nearby for potential splashes.

Continued from page 7

nism, though, seems to be quite different than the post-vaccination mechanism, which largely relies on only one type of antibody production to block the virus.

In another major study that could only have been conducted in an ABSL-3 facility, researchers found that an experimental compound called PF-00835231, provided by Pfizer as part of a collaboration, may offer a new therapeutic against SARS-CoV-2 by targeting an essential viral enzyme called 3CLpro. "Shutting down the enzyme means shutting down the progression to viral replication," says Meike Dittmann, PhD, assistant professor of microbiology.

In tests on genetically engineered stand-ins for human lung cells, Dr. Dittmann and colleagues found that the drug inhibits the virus at least as well as remdesivir, the only FDA-approved antiviral currently available to treat COVID-19 patients. The researchers confirmed the drug's efficacy with another type of cell culture that recreates the 3-D structure of the lung tissue in a dish. Moreover, the enzyme targeted by the drug is well conserved among known SARS-CoV-2 variants, suggesting that the drug could work on all of them. Based on these positive results, Pfizer is following up with clinical trials of the drug.

"Any time you're looking at an immune response or something a virus triggers, you really have to use the live virus," says Dr. Stapleford. "So the ABSL-3 has been instrumental in enabling us to see what this virus actually does to cells."


AIRLOCK
OVERRIDE
PUSH
LIFT HERE

NINE MAJOR COVID-19 STUDIES, COURTESY OF OUR HIGH-CONTAINMENT LAB

DECEMBER 22

Can a Free-Floating ACE2 Inhibitor Block the Growth of SARS-CoV-2?

The first step in a coronavirus infection occurs when the virus latches onto a protein called ACE2 that lines the surface of cells in the lungs. With this in mind, virologist Nathaniel Landau, PhD, professor of microbiology, engineered a free-floating version of the ACE2 protein to serve as a decoy that binds to the virus before it reaches lung cells. Dr. Landau and team found that their ACE2 imitator was highly effective at inhibiting viral entry into cells and blocking the replication of SARS-CoV-2 both in vitro and in a mouse model. The study's findings, published in *Cell Reports*, may point to future therapeutics to treat and protect against COVID-19.

FEBRUARY 5

How Does the Spike Protein Fool the Immune System?

To better understand how human antibodies naturally fight coronavirus, Shohei Koide, PhD, professor of biochemistry and molecular pharmacology, designed variants of the virus's famous spike protein, which binds to human cells, subjected them to blood samples from 94 COVID-recovered patients, and generated synthetic versions of human antibodies targeting the variants in test tubes. In a study published in *Journal of Molecular Biology*, the researchers showed that only a small fraction of both natural and synthetic antibodies targeted a vulnerable region of the spike protein important for neutralizing the virus. Their findings hold important implications for future vaccine design.

FEBRUARY 23

Is a New Antiviral An Effective Alternative to Remdesivir?

With a dire need for effective antiviral treatments for patients with acute COVID-19 symptoms, principal investigator Meike Dittmann, PhD, assistant professor of microbiology, tested a potential new therapy that targets an enzyme essential for SARS-CoV-2 infection and multiplication. Publishing the results in *Journal of Virology*, Dr. Dittmann and team found that their experimental drug, called PF-00835231, is at least as effective as remdesivir, the only antiviral approved to treat patients infected with COVID-19, when tested in a model of the human airway epithelium.

FEBRUARY 26

How Does Viral Load in the Lower Airways Reflect Patient Outcomes?

Few studies have been completed on the lower airways in patients with COVID due to the risk of viral transmission to healthcare providers. Leopoldo Segal, MD, associate professor of medicine, and clinicians and researchers at NYU Langone obtained bacterial and fungal culture data from 589 critically ill patients requiring mechanical ventilation; they also performed bronchoscopies on some of these patients to quantify the viral load and immune response within their lower airways. The team found that those patients whose samples revealed a high SARS-CoV-2 viral burden and a poor antibody response had the highest mortality rate.

MARCH 9

Do Recovered COVID-19 Patients Need a Booster Shot?

People previously infected with SARS-CoV-2 still require the protection provided by a COVID-19 vaccine, but they may not need two. An exploratory study led by Mark Mulligan, MD, director of NYU Langone's Vaccine Center, found that recovered patients who receive their first dose of the Pfizer-BioNTech vaccine produce antibodies equal to or greater than uninfected people who receive both doses. Moreover, the scientists found that a booster shot among recovered patients did not improve their antibody levels further. The findings, if confirmed by additional and larger studies, could alter vaccine guidelines and make additional doses available to other patients.

MARCH 10

Are Recovered Patients Immune to Reinfection?

Patients who have recovered from COVID-19 often test positive for viral antibodies, but are they protected from reinfection? To find the answer, the teams of principal investigators Kenneth Stapleford, PhD, assistant professor of microbiology, and Shohei Koide, PhD, analyzed blood samples from 101 recovered healthcare workers for three types of antibodies: IgG, IgM, and IgA. The results, published in *Scientific Reports*, suggest that patients who produce a broader spectrum of antibodies can more effectively neutralize the SARS-CoV-2 virus than those who produce individual isotopes.

APRIL 21

Do Vaccinations Evoke the Same Immune Response As COVID?

A SARS-CoV-2 infection and the Pfizer-BioNTech vaccine can both stimulate robust immune responses that shield against subsequent infection. In a recent study, Sergei Koralov, PhD, associate professor of pathology, analyzed 120,000 immune cells from volunteers to compare the two. His team's findings revealed that while both infection and vaccination lead to the production of many different types of immune cells to fight COVID, the blood of vaccinated people had three times as many memory CD8T cells, which can attack the virus directly, suggesting their protection could last longer. Beyond this, vaccinated patients had far fewer immune cells tied to body-wide inflammation in COVID patients. By contrast, those infected with the virus had high levels of inflammatory immune proteins, which exacerbate symptoms and might be tied to "long haul" symptoms that linger for many months after infection.

MAY 9

How Does COVID Cause a Cytokine Storm?

A coronavirus infection can unleash a rush of immune-stimulating proteins called cytokines, causing fluid buildup in the lungs that severely impairs breathing. Jun Wang, PhD, assistant professor of pathology, discovered that this damaging response is not caused by the spike protein's entry into lung cells, as previously thought, but rather by the way it interacts with surface proteins in immune cells. Based on the findings, published in the journal *Immunity*, he and team members generated an experimental therapeutic derived from antibodies that blocks the virus from attaching to proteins in both lung and immune cells. The research team plans to test the potential treatment in patients with severe cases of COVID-19.

MAY 12

Is a New Monoclonal Antibody Effective at Reducing COVID Symptoms?

Monoclonal antibodies, laboratory-produced molecules that either enhance or mimic the immune system's response to invading cells, have shown promise as a way to combat inflammatory diseases, including the coronavirus. Meike Dittmann, PhD, and researchers from NYU Langone's Vaccine Center tested an experimental monoclonal antibody designed to neutralize COVID's signature spike protein. The results, published in *Science Translational Medicine*, showed significant protection from infection and demonstrated the potential for reduced viral transmission, results that support the use of the drug for the prevention and treatment of the virus.

Photograph by **JONATHAN KOZOWYK**

A True Sense of Security

"Empathy is probably the most important aspect of our job. Our officers may be the first and last people visitors meet."

John Grosse, assistant director of security at NYU Langone Hospital–Long Island

"We normally fly under the radar, doing our jobs quietly, out of the spotlight," says Robert Zick, senior director of security at NYU Langone Health's main campus in Manhattan. But throughout the COVID-19 pandemic, the Security teams at all four campuses have played a critical and prominent role. Joining others on the front lines, they have been called upon to protect patients, staff, and visitors in ways they never would have imagined—from creating hundreds of urgently needed ID badges for temporary staff to informing family members that they were unable to visit their loved ones for safety reasons. "Empathy is probably the most important aspect of our job," explains John Grosse, assistant director of security at NYU Langone Hospital–Long Island. "Our officers may be the first and the last people visitors meet. We have to be understanding."

Here, several members of NYU Langone's Security team share their perspectives on how the pandemic touched them personally and professionally.

Photographs by **JONATHAN KOZOWYK**


NYU LANGONE HEALTH
SECURITY
SECURITY
135

"When someone comes to the hospital, I want them to feel that they're coming to a warm place where everyone is concerned about their well-being."

Mark Berry

Security Team Members at NYU Langone's Manhattan Campus: **198**
Years of Service: **22**

Last spring, when the virus hit, I got a call from my father's friend, who is like an uncle to me. I hadn't seen him in many years, but he knew I worked at NYU Langone. He was an inpatient with COVID-19, and he was calling to ask if someone could bring him a phone charger. So I got a charger to him, but I couldn't visit him. It reminded me how real COVID-19 is—that it can happen to anybody.

The pandemic has made me realize how important everyone's job actually is. Everyone's responsibilities are important. The person who mops the floors is keeping patients safe, too, because he's preventing germs from spreading. We protect people and property, of course, but our responsibilities are now on a totally different level.

I see my role in more personal terms now. When someone comes to the hospital, I want them to feel that they're coming to a warm place where everyone is concerned about their well-being. Even though I'm not providing medical care, I'm a reflection of the hospital where they get treated."

"In a situation like this, you realize how tight-knit you really are. We're just links in the chain, but every link has held strong."

Javier Crespo

Security Team Members at NYU Langone Orthopedic Hospital: **21**
Years of Service: **15**

"An elderly gentleman came by several times with breakfast for his wife, asking if we could bring it up to her. We had to explain that the hospital's policy prohibited us from accepting food for patients. I'm sure it was difficult for him to get here, so to have to turn him away was tough. I put myself in his shoes.

Because some patients at NYU Langone Orthopedic Hospital are in the recovery phase of COVID-19, many family members assume that they can finally see their loved ones, but the visitation policy is the same. They would say to us, "Can you give them this letter?" or "Can you tell them I love them?" Now, I realize that just being here is a big part of our service to patients, visitors, and the entire community.

I've learned not to take anything for granted, and to share my feelings toward loved ones and even coworkers, because they're part of my extended family. We leave here every day and come back the next. But in a situation like this, you realize how tight-knit you really are. We're just links in the chain, but every link has held strong.

"Being a frontline worker makes you proud to work at a hospital during these difficult times."

Ines Vieira

Security Team Members at NYU Langone Hospital–Long Island: **59**
Years of Service: **4**

People would come by just to say thank you, because while everybody was being told to stay home, we came out to do our job. One time, I heard a knock at the window. It was a neighborhood resident holding up a poster that read: "Thank you, hospital employees, for everything you are doing." When I looked up, she pointed to me and gave a thumbs-up. That brought a smile to my face.

I used to think of us as security officers, but now I feel that we're so much more. Being a frontline worker makes you proud to work at a hospital during these difficult times. I live in Mineola, so NYU Langone Hospital–Long Island is my go-to hospital. I've wanted to be here as much as possible, even offering to work extra shifts. In everything we do, we try to make a difference, to go above and beyond the call of duty.

I've always been grateful for having a job, but being able to work through the pandemic and help people has made me that much more thankful for everything. It's made me more humble."

"Paychecks come and go, but a life is only once. You just hope that at the end of your shift, you've made a difference."

Carlos Gonzales

Security Team Members at NYU Langone Hospital–Brooklyn: **61**
Years of Service: **4**

"I spotted my best friend from high school in the Emergency Department one day. Even with our masks on, we recognized each other. I could tell something was wrong. "My mother is here, and she's COVID-19 positive," he said. He just broke down, and a part of me broke down, too. We said a prayer. I felt like we were meant to be together at that time.

During the surge, we were in the hospital more than we were in our homes. We all came together—even stronger. Paychecks come and go, but a life is only once. I would make phone calls for people trying to contact their family members. You just hope that at the end of your shift, you've made a difference.

As a security officer, you have to listen to people, even if they repeat themselves. They're confused. They're emotional. They're lost. More than anything, they just need to be heard.

Burning Questions

WHAT CAUSES "LONG COVID"?

The COVID pandemic may be on the wane in the United States, but the impact of the disease, which has killed some 600,000 Americans, isn't going away anytime soon. Studies show that up to one-third of nonhospitalized patients who were infected with the novel coronavirus still had a range of symptoms three months later, including fatigue, shortness of breath, "brain fog," sleep disorders, fevers, gastrointestinal issues, anxiety, and depression.

To boost the understanding and treatment of these debilitating aftereffects, known as "long COVID," the National Institutes of Health (NIH) is investing $1.15 billion in research initiatives that were funded by Congress last December. NYU Langone Health will play a critical role in the project, known as Post-Acute Sequelae of SARS-CoV-2 Infection, or PASC. The institution has been awarded up to $52 million and was named the project's Clinical Science Core, charged with leading and integrating the research activities of clinical sites around the country.

NYU Langone researchers, who have advanced the knowledge and treatment of COVID during the past 15-plus months, will lead studies on the chronic effects of the infection in diverse patient groups, known as the SARS-CoV-2 Recovery Cohort. PASC will leverage the databases of electronic health records to examine how many people are affected in the long term, what treatments contribute to recovery, and why some patients are vulnerable to these symptoms while others aren't. Biological specimens will be examined to learn how the brain, heart, and other organs are impacted by the still-mysterious virus.

"We are grateful to the NIH for their support of this important mission, which is to better understand the long-term effects of COVID-19 infection and to find new ways to avert a potentially profound public health crisis," says Stuart Katz, MD, the Helen L. and Martin S. Kimmel Professor of Advanced Cardiac Therapeutics, director of NYU Langone Health's Heart Failure Program, and principal investigator for the PASC Clinical Science Core.

The PASC Clinical Science Core will be led by Dr. Katz; Leora Horwitz, MD, director of the Center for Healthcare Innovation and Delivery Science; and Andrea Troxel, ScD, director of the Division of Biostatistics. "These leaders were the first to acknowledge the expertise and technical skills made by countless NYU Langone collaborators in support of an initiative of this magnitude and importance to the health of our patients," says Dafna Bar-Sagi, PhD, the Saul J. Farber Professor of Biochemistry and Molecular Pharmacology, and chief scientific officer at NYU Langone.

■ **For more information on "long COVID," visit recovercovid.org**

PHOTOGRAPHY BY JONATHAN KOZOWYK

Pandemic Armor

A Standby Respirator Does a Stand-up Job

At the height of the spring surge in March 2020, the worldwide demand for disposable N95 respirators, which afford a high level of protection against airborne pathogens, had created such a frenzy among healthcare institutions that Michael Phillips, MD, NYU Langone Health's chief hospital epidemiologist, resigned himself to a painful reality. "I don't expect that N95s are going to be readily available anytime soon," he acknowledged.

With its own reserves dwindling, NYU Langone's Supply Chain Management team reached out to 3M, its primary supplier of N95s. The company offered an alternative respirator that provides equivalent protection: its 6000 Series Half Facepiece Elastomeric Respirator. A reusable device made of silicone, it's known in healthcare as a P100. The mask is named for its particulate filter, which has the highest level of efficiency: 100%. The filter needs to be changed only once a year, unless the cartridge that houses it gets contaminated, damaged, or clogged.

The respirator of choice in construction and industry, the P100 was found in only a handful of hospitals across the country until March of last year, when the FDA authorized the use of elastomeric respirators in healthcare. Competition for the device became so fierce that 3M was forced to limit its allocations, but Supply Chain purchased a supply early on, building a robust inventory. The P100 was piloted at NYU Langone Hospital–Long Island, where the device served as a primary respirator for several months. "Clinicians really took to it," recalls Richard Kraft, director of logistics, inventory, and distribution. "It's much more comfortable than an N95, provides a tighter seal, and comes with a nylon storage bag that makes people feel that they have their own personal respiratory protection at all times."

On July 17, 2020, at all four of its hospitals, NYU Langone started fit-testing the P100 for clinicians who provide patient care. More than 7,000 employees have been fitted so far. "We started by focusing on high-volume users of N95s," explains Marta Figueroa, PhD, senior director of environmental health and safety, who partnered with Occupational Health and Safety and other departments, "and now they are an option for anyone who has been fit-tested for an N95." The P100 is considered an equivalent alternative to the N95, so clinicians can use it if the type of N95 for which they've been fitted is unavailable. Staff is trained to disinfect the respirator with germicidal wipes. Because the device has an exhalation valve, it's not suitable for sterile procedures.

Thanks to its reusable service, a single P100 can do the work of hundreds of N95s. "This respirator gives us not only peace of mind, but a true readiness to address a shortage of N95s," says Dr. Figueroa. "No matter what happens, we're able to take care of our patients and ensure the protection of our staff."

Photograph by **DEVON JARVIS**


3M

Innovative Education

Video Consults with Medical Students Help COVID Patients Safely Go Home—and Stay There

During the peak of the first wave of the pandemic last spring, Victoria Terentiev, MD, a fourth-year resident specializing in emergency medicine at NYU Langone Hospital–Brooklyn, noticed a curious pattern: Many of the patients diagnosed with COVID-19 in the Emergency Department (ED) whose symptoms were mild enough to recover at home were bouncing back to the ED within a few days. In most instances, they were no sicker upon their return. Rather, they had grown increasingly anxious about their infection and how to shield the family members who live with them. The sheer volume of patients—up to 300 people had visited the hospital's ED daily, about one-third more than before the surge—required clinicians to review their discharge instructions with them in a few minutes and move on.

"Patients with COVID-19 have lots of questions and require a longer duration of counseling," says Dr. Terentiev. Her solution? Tap students at NYU Grossman School of Medicine for assistance. Nancy Conroy, MD, associate chief of service for NYU Langone Hospital–Brooklyn's Emergency Department, was intrigued by the idea of having medical students counseling patients in the ED before their discharge, but there was a logistical challenge: the students were prohibited from all clinical units during the spring surge. Audrey Tse, MD, clinical assistant professor of emergency medicine, came up with a workaround, suggesting that students instead consult with patients virtually, using iPads the hospital had been given to facilitate communication between physicians and the fami-

Photograph by **TONY LUONG**

"Patients with COVID-19 have a lot of questions and require a longer duration of counseling."
Dr. Victoria Terentiev

During a recent simulation, Victoria Terentiev, MD, introduces a mock patient to Christopher Kuhner, one of 20 students at NYU Grossman School of Medicine tapped to remotely counsel COVID-19 patients on how to recover at home.

lies of hospitalized patients.

Christopher Caspers, MD, vice chair of clinical operations for the Ronald O. Perelman Department of Emergency Medicine, championed the project, and Ian Wittman, MD, chief of service for the ED at NYU Langone Hospital–Brooklyn, signed off. "It was an innovative idea with minimal risks that met everyone's needs—patients, clinicians, and med students," says Dr. Caspers. Linda Tewksbury, MD, associate dean for student affairs, meanwhile, helped recruit 20 third- and fourth-year students. Dr. Terentiev and Dr. Conroy, for their part, created a 10-page script highlighting what discharged patients need to know, from the expected symptoms and recommended fever reducers, to proper hygiene practices and symptoms that might necessitate a return visit. "We used simple language patients could understand," says Dr. Terentiev. She tutored medical students Christopher Kuhner and Joshua Ross in how to conduct video chats, access clinicians' notes, and for the 43% of patients at NYU Langone Hospital–Brooklyn with COVID-19 whose primary language is one other than English, connect with a translator. In turn, Kuhner and Ross trained other students at NYU Grossman School of Medicine, now ranked as the #2 medical school in the nation by *U.S. News & World Report*'s 2022 Best Medical Schools: Research.

Since its launch last May, virtual discharge counseling has been an unqualified success. Prior to discharge, patients spend an average of 20 minutes speaking remotely with medical students, freeing up emergency medicine doctors and nurses to attend to other sick patients. "We knew there was a lot of uncertainty among patients, and these calm one-on-one sessions made sure they truly understood what they were being told," says Dr. Conroy.

With all their COVID-19 questions addressed, the rate of patients returning to the ED has dropped by more than half, from 8.1% to 3.7%.

The program has since expanded to the ED at NYU Langone Health–Cobble Hill and to the Ronald O. Perelman Center for Emergency Services at Tisch Hospital. What's more, as COVID-19 cases eased over the summer, 12 other common diagnoses were added to the discharge counseling roster, including back pain, headaches, urinary tract infections, and diabetes, each with an accompanying script to guide the students.

"We think this approach improves care, and we're excited about building on it," Dr. Wittman says.

Operation Vaccination

How We Delivered Over 156,000 Doses in Five Months ...

... Across 21 Locations

December 14, 2020, is a date etched in the memory of Samuel Levine, NYU Langone Health's director of operations and resourcing. Nine months to the day after COVID-19 was declared a pandemic, the institution began administering the Pfizer vaccine to employees under the FDA's emergency use authorization. For Levine, it was more than a milestone. "Some staff had tears of joy and relief," he recalls. "There was a sense that we've all been through so much, and getting vaccinated is the beginning of the end."

Indeed, vaccination has been the true turning point in the pandemic, with the Pfizer and Moderna vaccines proving at least 94% effective at preventing hospitalization among fully vaccinated adults. However, the 52 shots given that day to staff working on COVID units—as well as the 156,000 first doses given to patients and employees by early May at 21 NYU Langone locations in Manhattan, Brooklyn, Queens, Long Island, and West Palm Beach, Florida—would not have been so seamless without the tireless efforts of the vaccination team, including physicians, nurses, and the departments of Medical Center Information Technology, Ambulatory Operations, Emergency Management, and Communications and Marketing. "People worked 24/7 to make sure we were set to go," says Andrew Rubin, senior vice president for clinical affairs and ambulatory care. Rubin points to four strategies that ensured NYU Langone's success.

I. Data at the Ready

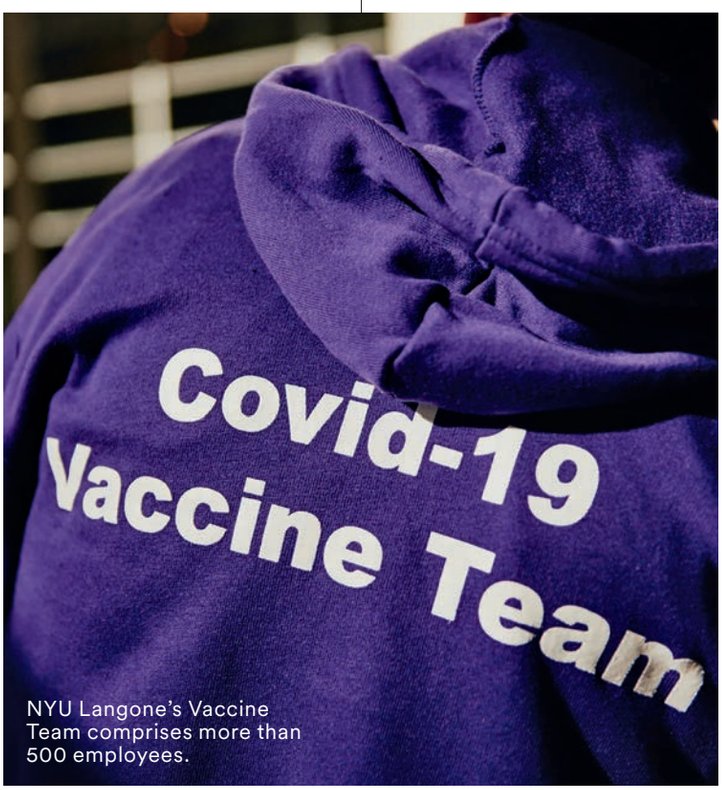
For more than a decade, NYU Langone has mined Epic, its electronic health record system, for data that can inform quality and safety measures. In the case of vaccines, digital patient records simplified the process of prioritizing employees and patients. "We sliced and diced the data multiple ways and grouped patients more specifically than New York State guidelines did," says Rubin. That was a big benefit during the early days of the rollout, when the vaccine supply was limited and the most vulnerable patients, including the elderly and cancer patients, were given priority.

II. Clear Communication

NYU Langone notified its 1.5 million patients when they would be eligible, sending out more than 5 million emails, texts, and updates via MyChart, NYU Langone's patient portal. "We provided clear instructions on how to make an appointment," says Levine. Regular communication enhanced the institution's relationships with the New York State and New York City Departments of Health, as well. Danielle Dropkin, associate director of strategy, planning, and business development, made sure government officials knew how NYU Langone planned to administer every dose, leading to Tisch Hospital becoming the first hospital in New York City to receive its vaccine shipments.

III. Scheduling Made Easy

With the number of available vaccines shifting from week to week, some area hospitals guessed how many slots would open for patients—and ended up canceling hundreds of appointments. NYU Langone never had to call off even one. The state's notification for a Monday delivery could come as late as the night before, so Rubin; the operations team; Nicole Dittmar, assistant vice president, ambulatory operations and optimization; Suzanne Howard, vice president for MCIT clinical systems and integration; and Maureen Hickey, director for EpicCare Ambulatory, spent many weekends ensuring that eligible patients could book spots on time. The user-friendly MyChart platform simplified patients' selection of a time and location on a smartphone or computer. "Our vaccine process was uniquely reliable, coherent, and well organized," says Rubin.



NYU Langone's Vaccine Team comprises more than 500 employees.

TONY LUONG

IV. Sweat Equity

A hospital system is only as good as the people who run it, and here NYU Langone rose to the challenge. Administrators helped older patients navigate tablet check-ins at vaccination locations and assisted teachers, police officers, and firefighters in creating MyChart accounts. Nurses administered up to 15 vaccinations per hour. Whenever an extra dose was discovered—NYU Langone was among the first sites to draw an extra dose from vials of the Pfizer vaccine—practices called patients in search of a last-minute taker, fulfilling the mission of not wasting a single dose. "I would go through the hospital lobby looking for candidates," says Levine. "If they met the criteria, I'd bring them for registration. We always found people."

Infographic by **CATALOGTREE**

102,392
NYU LANGONE TISCH HOSPITAL
1

20,917
NYU LANGONE MEDICAL ASSOCIATES – EAST MEADOW
4

18,951
NYU LANGONE LAKE SUCCESS MEDICAL
5

14,592
PRESTON ROBERT TISCH CENTER FOR MEN'S HEALTH
6

13,884
NYU LANGONE ASTORIA MEDICAL ASSOCIATES
7

12,427
NYU LANGONE AMBULATORY CARE REGO PARK
8

9,111
NYU LANGONE AMBULATORY CARE WEST SIDE
11

8,848
NYU LANGONE AMBULATORY CARE BAY RIDGE
12

43,842
NYU LANGONE HOSPITAL – BROOKLYN
2

22,059
NYU LANGONE HOSPITAL–LONG ISLAND
3

12,238
NYU LANGONE HUNTINGTON MEDICAL GROUP
9

10,932
NYU LANGONE AT TRINITY
10

7,766
JOAN H. TISCH CENTER FOR WOMEN'S HEALTH
13

15

16

6,151
NYU LANGONE LEVIT MEDICAL
14

17

18

19

20

21

3,949
(15) NYU LANGONE AMBULATORY CARE BROOKLYN HEIGHTS

2,065
(16) SUNSET TERRACE FAMILY HEALTH CENTER AT NYU LANGONE

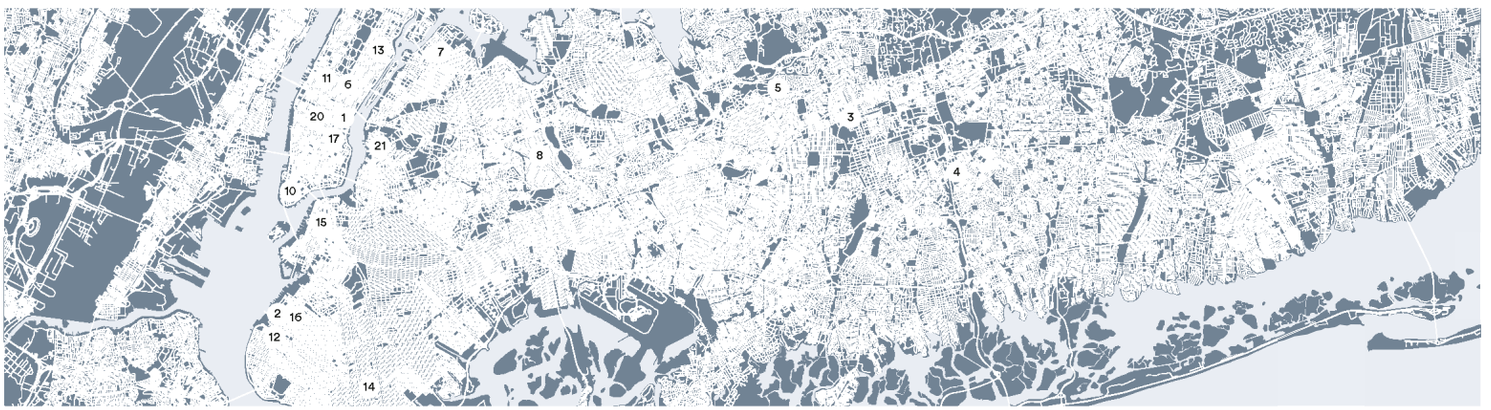
1,712
(17) NYU LANGONE ORTHOPEDIC HOSPITAL

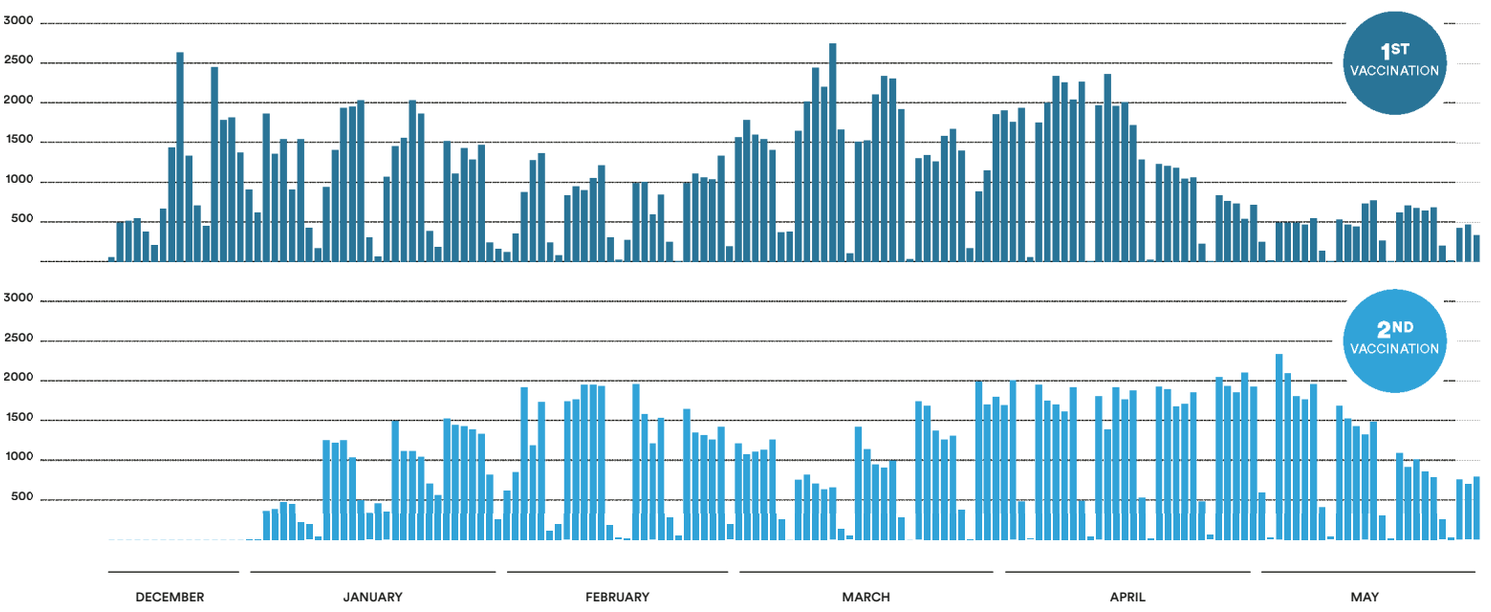
1,094
(18) NYU LANGONE MEDICAL ASSOCIATES – WEST PALM BEACH

650
(19) NYU LANGONE MEDICAL ASSOCIATES – RIVERHEAD

584
(20) NYU LANGONE MEDICAL ASSOCIATES – CHELSEA

485
(21) NYU LANGONE GREENPOINT





Transplantation

This Is What COVID Does to the Lungs.

Any Questions?

"There's no normal part of this lung.
The virus has completely destroyed it."
Dr. Navneet Narula

Stroke, weakened blood vessels, heart damage, neurological deficits—COVID-19 is linked to a long list of complications. Yet perhaps nowhere in the body is the virus's potentially devastating impact more dramatically illustrated than in the lungs. This dissected sample of a once-healthy lung ravaged beyond repair by the virus is vivid proof. It was taken on March 11, 2021, following a double-lung transplant performed at NYU Langone Health—the third lung transplant on a COVID-19 patient at the Transplant Institute since December 10, when NYU Langone became the first medical center in New York City to complete a transplant of this type.

A series of whitish spots in the upper and lower lobes indicate widespread scarring around the air sacs, which impedes the transfer of oxygen to the bloodstream. The lung's outer surface is rough and inflamed, limiting the organ's ability to expand upon inhalation. Although not visible in this image, the removed lungs were dotted with air-filled cysts, or pneumatoceles, that commonly occur in patients who suffer acute respiratory distress and are often a marker of dead tissue. "There's no normal part of this lung," says Navneet Narula, MD, professor of pathology at NYU Grossman School of Medicine. "The virus has completely destroyed it."

The patient, Robert Fernandez Guevara, a 47-year-old man from the Bronx, was infected during the peak of the first wave last spring and admitted to NYU Langone on April 2, 2020, with shortness of breath, a cough, fever, and fatigue. His condition was severe enough to require not only a ventilator, but also a form of life support called extracorporeal membrane oxygenation, or ECMO. It serves as a mechanical gas exchanger that pumps oxygen into the blood while filtering out excess CO_2, a function his lungs were no longer able to perform. The interventions saved Guevara, who was in the hospital for nearly seven months, but his only hope of long-term survival was a new pair of lungs. He was placed on the wait list for an organ donor in January and, just two weeks after the surgery, was discharged, feeling healthy and grateful. "He is doing fantastic," says Luis Angel, MD, professor of medicine and medical director of NYU Langone's Lung Transplant Program, who marveled as his patient confidently strolled the halls of the Rusk Rehabilitation unit at Tisch Hospital.

A virus-ravaged lung removed from a 47-year-old patient shows severely scarred air sacs (white).

A double-lung transplant for COVID-19 is daunting but ultimately curative. The operation can take up to 10 hours—roughly twice as long as a typical lung transplant—because the damaged lungs must be painstakingly separated from the chest wall, the diaphragm, and surrounding tissue, explains Stephanie Chang, MD, surgical director of the Lung Transplant Program.

"The rate of lung transplantation for COVID-19 is going to increase," Dr. Chang predicts, "because of the traumatic lung changes among patients with severe cases of the virus, whether it's short-term or five years from now."

NYU Langone is well equipped for the trend. It has completed more than 100 lung transplants since early 2018, a national record for the first three years of a program. Most of those cases were for pulmonary fibrosis, a progressive disease that causes lung scarring; emphysema, which occurs when the air sacs are systemically damaged; and cystic fibrosis, an inherited disease that causes thick mucus to form in the lungs, blocking and scarring the airways. The program has the shortest wait time for a donor organ and the highest one-year survival rate in the Northeast, according to data from the Scientific Registry of Transplant Patients.

"We work diligently to get our patients evaluated and listed promptly," says Dr. Angel. "Our excellent survival rate results from our selection process, our donor management, and the efforts of our multidisciplinary team to monitor patients, some of whom are extremely sick, very closely."

FOR INFORMATION about lung transplantation, visit nyulangone.org/lungtransplant or call 866-838-5864.

PATHOLOGY IMAGE COURTESY NAVNEET NARULA, MD

Photograph by **ADAM WATT**

Pulmonologist Dr. Luis Angel and surgeon Dr. Stephanie Chang visit their patient, Robert Fernandez Guevara (center), in late March following his successful double lung transplant.

“I have a purpose and a passion, and that keeps me going.”

DEBORAH PRIESTER, THE 750TH PATIENT WITH COVID-19 DISCHARGED FROM NYU LANGONE HOSPITAL–LONG ISLAND

Photograph by **JONATHAN KOZOWYK**

... And Stronger Than Ever.

(CONTINUED FROM FRONT PAGE)

up to $52 million to lead and integrate clinical sites around the country studying cohorts that represent all sectors of our society.

One of our many patients who have experienced "long COVID" is Deborah Priester, who, on April 21, 2020, was honored as the 750th patient with COVID-19 to be discharged from NYU Langone Hospital–Long Island. During the past year-plus, she has experienced anxiety that sometimes impacts her sleep. She has also suffered from a loss of taste and a reduced appetite that has resulted in unwanted weight loss. Still, Priester, who responded well to treatment and returned home after six days in the hospital, has navigated the challenges of recovery with aplomb. After receiving her final COVID-19 vaccine on April 6, she attends church again (and says her faith has only grown), works out regularly, and has even returned part-time as a special education teacher for preschoolers. "I have a purpose and a passion, and that keeps me going," she says.

I know just how you feel, Deborah. So do we.

I've often noted that because the pandemic has challenged us like nothing else we've ever encountered, we would need to summon all of our resolve and inner strength to prevail. What I never anticipated, however, was that it would summon so much more from everyone in our community. The scope and scale of the ingenuity, resourcefulness, and compassion I've witnessed makes me prouder than ever to serve at the helm of this extraordinary institution.

Robert I. Grossman, MD, Dean and CEO

We're Here ...

Sir William Osler, MD, the father of modern medicine, was fond of saying that "medicine is a science of uncertainty and an art of probability." From the earliest days of this improbable pandemic, uncertainty, unpredictability, and a vast number of unknowns have defined its very nature. Yet throughout this long, intense ordeal, the one thing I've been unshakably certain of is that NYU Langone Health would not only weather this crisis, but emerge even stronger for having done so.

I vowed from the start that we would do whatever it took to save lives and defeat COVID-19, and we've fulfilled that promise on many fronts. Our four hospitals have cared for thousands of patients with COVID-19. Our clinicians have devised novel treatment protocols that have produced some of the best clinical outcomes for this disease in New York City. Our researchers have collaborated on dozens of studies that have illuminated our understanding of COVID-19. Our institution has played a critical role in landmark clinical trials for two vaccines. All of this has been possible because we have shown ourselves to be extremely agile, innovative, and communal in our efforts—virtues that will serve us well as we face future challenges.

As one key measure of the stature we've earned and of how much stronger we have indeed become, in May the National Institutes of Health selected NYU Langone Health as the home of the Clinical Science Core for a $1.15 billion investment in understanding and treating chronic aftereffects of acute COVID-19 *(see page 20)*. As the nerve center of this nationwide initiative, NYU Langone will receive (CONTINUED ON BACK PAGE)