NYU PHYSICIAN

THE MAGAZINE OF NEW YORK UNIVERSITY SCHOOL OF MEDICINE

FALL 2010
VOLUME 62 • NO. 1

kids

SIX STORIES OF THE SPECIAL CARE THEY NEEDED— AND RECEIVED.

PLUS

THE CASE OF THE ONE-SIDED CLOCK

HIGHLIGHTS OF RECENT RESEARCH

TALKING ABOUT INFERTILITY WITH DAVID KEEFE

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NYU Langone Medical Center

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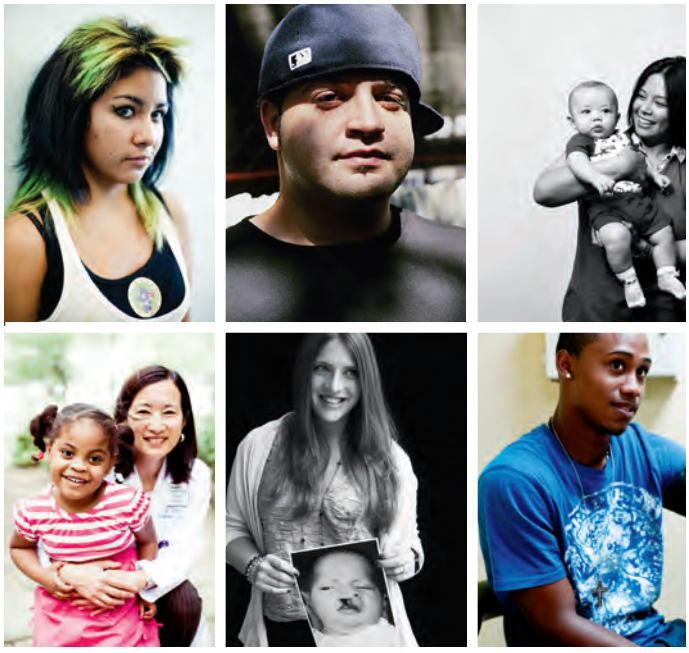


PHOTOGRAPHS TOP AND BOTTOM LEFT AND BOTTOM RIGHT: ELIZABETH WEINBERG; OTHERS: SASHA NIALLA

"OUR GREATEST TREASURE IS OUR CHILDREN."

ROBERT I. GROSSMAN, MD, DEAN AND CEO

COVER STORIES

SIX KIDS AND THE SPECIAL CARE THEY NEEDED

DEPARTMENTS

TO OUR READERS
Beginning with this issue, *NYU Physician* is available for iPad users. Download it free from the App Store.

NYU Langone Medical Center

Children's Stories

NYU LANGONE MEDICAL CENTER has enjoyed a long association with pediatrics ever since a children's clinic at Bellevue Hospital was established in 1874 by Dr. Abraham Jacobi, who served on the NYU School of Medicine faculty and is considered the father of American pediatrics. The clinic was the first of its kind in the United States. Most of this issue of *NYU Physician* is dedicated to stories about children, who hold a special place in our community. Although each story is unique, the unusual courage and determination of these children—and their parents—is a recurrent theme, serving as an inspiration to all of us.

These stories also demonstrate the dedication and compassion of our physicians, surgeons, rehabilitation therapists, nurses, and other healthcare providers to ensure that these special patients receive the best care. There is truly an outstanding range of specialty services for children at NYU Langone Medical Center, from the neonatal intensive care unit where the sickest newborns receive care, to the surgical suites where complex congenital heart defects are repaired, to the Stephen D. Hassenfeld Children's Center for Cancer and Blood Disorders where children with acute lymphoblastic leukemia and other cancers receive the most advanced treatments.

Our Hospital for Joint Diseases (see article on facing page), one of the leading specialty hospitals in the nation, provides world-class pediatric specialty care through its Center for Children. The center treats a wide range of musculoskeletal problems in children, ranging from trauma and fracture, to sports-related injuries in children and adolescents, to neuromuscular disorders and cerebral palsy.

Our greatest treasure is our children. I am proud to report that with the support of our philanthropic community, including KiDS of NYU, we are now laying the groundwork for a new state-of-the-art children's hospital and we are continuing to hire new faculty in pediatric subspecialty fields. The future of children's healthcare appears brighter than ever, and NYU Langone will certainly be part of that story. ●

DEAN & CEO ROBERT I. GROSSMAN, MD

How Many Kids Get Sick from That?

10,730
Estimated number of new cases of cancer diagnosed in 2009 in children ages 0-14 years.
SOURCE: National Cancer Institute

30,000
Number of children and adults in the U.S. with cystic fibrosis, more than half of whom are under the age of 18.
SOURCE: Cystic Fibrosis Foundation

45,000
Number of children under age of 15 in the U.S. who annually develop epilepsy.
SOURCES: Epilepsy Foundation

17%
Proportion of children between ages of 12 and 19 who are obese.
SOURCE: Centers for Disease Control and Prevention

12.8%
Percentage of infants born prematurely in U.S. each year.
SOURCE: March of Dimes

One in 125
Rate of children born with congenital heart defects each year.
SOURCE: Hoffman JIE and Kaplan S. *J Am Coll Cardiol* 29 (2002): 1890-1900.

One in 303
Rate of children born each year with cerebral palsy.
SOURCE: Centers for Disease Control and Prevention

7,805
Number of pediatric discharges under 18 years old from NYU Langone Medical Center in FY2009.
SOURCE: NYU Langone Medical Center

46,957
Number of pediatric outpatient visits at NYU Langone Medical Center in FY2009.
SOURCE: NYU Langone Medical Center ●

Q&A With Gary Cohn

New Chair of the Advisory Board for NYU Hospital for Joint Diseases

GARY COHN, who was recently named chair of the advisory board of Hospital for Joint Diseases, is president and chief operating officer of Goldman Sachs, one of the most prestigious financial institutions in the United States. He and his wife, Lisa Pevaroff Cohn, were founding advisory board members of the NYU Child Study Center and also funded the Pevaroff Cohn Professorship in Child and Adolescent Psychiatry at the NYU School of Medicine in 1999. He has also been a member of the NYU Langone Medical Center's Board of Trustees since 2000. The couple reside with their three daughters in Manhattan.

Hospital for Joint Diseases, founded in 1905, is one of five specialty hospitals in the world devoted to musculoskeletal care. Affiliated since 1994 with NYU Langone Medical Center, it was fully merged into the Medical Center in 2006.

NYU PHYSICIAN: *What drew you to the Hospital for Joint Diseases?*
GARY COHN: One of the things we pride ourselves at Goldman Sachs on is having a great culture—a culture of teamwork, communication, and camaraderie. I felt that the HJD culture was very similar.

NYU PHYSICIAN: *What do you hope to accomplish?*
GARY COHN: I want to help the hospital become the premier institution for musculoskeletal medicine as well as orthopedics. Like the financial services industry, the Hospital for Joint Diseases is trying to adapt to a new world and a new way of doing things that didn't exist years ago. I know a lot about that.

The Hospital has many goals that I hope to help it achieve. We want to successfully manage growth. Given increased demand the facility on 17th Street is moving to mainly in-patient status as well as expanding its schedule to include weekend surgery. We also want to continue to change and improve how ambulatory surgery is delivered. Rehabilitation medicine, which includes such services as physical and occupational therapy pioneered through our Rusk Institute—will also be undergoing dramatic changes. And finally, we're expanding our research effort. We have created an amazing Musculoskeletal Center of Excellence that will delve more deeply into the causes and cures of rheumatologic and musculoskeletal diseases. We're hoping that effort will further enhance our already outstanding reputation for research and education. So HJD is clearly on the cutting edge. It's an organization that has a great past but an unbelievable future.

NYU PHYSICIAN: *What makes HJD special to you?*
GARY COHN: The people. Dr. Joseph Zuckerman (surgeon-in-chief of the Hospital for Joint Diseases and the Walter A.L. Thompson Professor of Orthopaedic Surgery chair of orthopaedics), Dr. Steven Abramson (professor and director of rheumatology), and David Dibner (senior vice president for hospital operations) have an enormous passion for what they are trying to do with the hospital. This is an organization that's clearly in the Top Ten of its field, but has the desire to be number one. That inspires me.

NYU PHYSICIAN: *What are some of your plans?*
GARY COHN: I plan to create a new advisory board. I'll be looking for other people who can help us think outside the box, people who are adaptive, people who are visionary, and people who have a passion about the institute.

NYU PHYSICIAN: *Maybe this article will help you recruit some people to the group.*
GARY COHN: I certainly hope it will. ●

Tracking the Source of Early-Onset Alzheimer's

OF THE NEARLY 30 MILLION PEOPLE WORLDWIDE who suffer from Alzheimer's disease, about 5 percent are younger than 65. This early-onset form of the disease usually strikes between ages 30 and 60 and, like its later-onset counterpart, progressively destroys the affected person's mind. In the U.S. alone, some 200,000 people live with the early form of Alzheimer's, which tends to run in families.

Fifteen years ago, studies linked the early form to mutations in a gene called presenilin 1. However, until now no one had figured out how the mutations caused the disease. Many researchers had focused on the gene's role in producing the hallmark protein clumps called amyloid plaques that collect in the brains of Alzheimer's patients. But Ralph Nixon, MD, PhD, professor of psychiatry and cell biology and director of the Center for Dementia Research at the Nathan S. Kline Institute for Psychiatric Research, took a different route.

Dr. Nixon has spent most of his career tracking the impact of Alzheimer's on neurons in the brain, focusing on intracellular systems, in particular lysosomes, the "stomachs" that digest and recycle damaged proteins. He wondered if there might be a connection between the lysosome dysfunction he observed and mutations in the presenilin gene.

In a recent study, Dr. Nixon and his colleagues discovered that defects in the gene actually cause the digestion process in neurons to break down. They found that the flawed gene impairs the development of an acid pump that is critical to the lysosome's job. Like real stomachs, lysosomes require acid for digestion. When the acid pump is broken, the disposal system in nerve cells falters, and toxic proteins build up.

Their findings, published in the journal *Cell*, force researchers to think about Alzheimer's as a multifactorial disease, says neuroscientist Lorenzo Refolo, PhD, program director in the Division of Neuroscience at the National Institute on Aging. "Before, it was thought that the mutations in this gene just caused excess amyloid," he says. "This work adds another mechanism by which neurons can be compromised and eventually die."

The discovery may also hold the key to developing treatments for both the early- and late-onset forms of the disease, researchers say. Current medications only ease some of the symptoms of Alzheimer's by boosting brain cell communication, but don't slow or stop the progression of the disease. "Most efforts to develop drugs for Alzheimer's have focused on removing the plaque," says Dr. Nixon. "Now we can look at how the lysosome is malfunctioning and we can try to reverse or repair that malfunction."

George Perry, PhD, a leading neurobiologist at the University of Texas at San Antonio and editor of the *Journal of Alzheimer's Disease*, agrees. Pursuing this alternative treatment target, he says, could benefit all patients with Alzheimer's. "In terms of mechanism, genetic (early-onset) and sporadic (early- or late-onset) Alzheimer's are indistinguishable," says Dr. Perry, adding that presenilin mutations and lysosome disruption may be involved in everyone who has Alzheimer's." In fact, preliminary observations from ongoing studies by Dr. Nixon and his team at the Nathan S. Kline Institute suggest that similar disruptions in lysosomes do occur in the late-onset form of the disease

Already, expectations are being raised that the lysosomal link to one of the major neurodegenerative diseases of the brain could lead to new therapies. "We have to be aware of lysosome disruption when designing therapeutic agents," says Dr. Refolo of the National Institute on Aging. "It's something new to think about." ●

—GISELA TELIS

The buildup of junk proteins in the axons of nerve cells is caused by dysfunctional lysosomes, which normally digest unwanted proteins.

ILLUSTRATION OF NEURONS COURTESY OF CORRINNE PETERHOFF ROSA

ILLUSTRATIONS BY **PETER OUMANSKI**

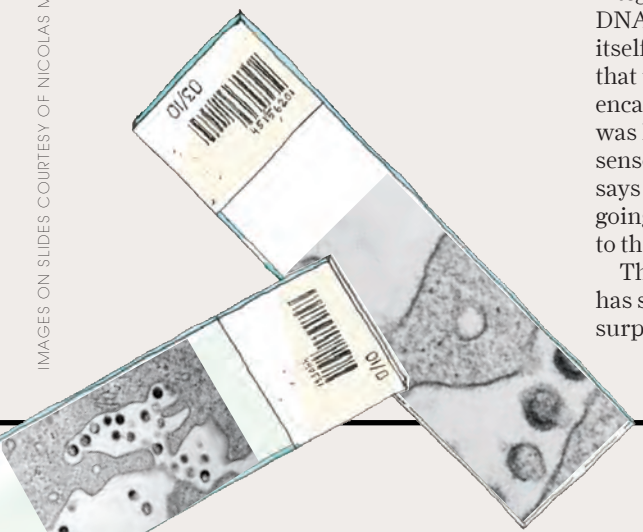
Outfoxing the Trojan Horse

Promising clues to a long elusive vaccine for HIV

EARLY OPTIMISM OVER A protective vaccine against HIV-1, the virus that causes AIDS, has long since faded. Antibodies launched against the viral surface have failed to generate meaningful immune responses, while T-cells—the body's foot soldiers—have been disappointingly inept at killing virus-infected cells.

A new study led by Dan Littman, MD, PhD, the Helen L. and Martin S. Kimmel Professor of Molecular Immunology, may open an alternate route and enable a strategy to bolster therapeutic or preventive HIV-1 vaccines. The study, published in *Nature*, found that our immune system's sentinels, called dendritic cells, contain a sensor that recognizes HIV-1 but is normally switched off. The researchers were able to activate a strong antiviral reaction, at least in the laboratory, by forcing these dendritic cells into the seemingly suicidal gambit of making themselves vulnerable to infection. That apparent weakness may be an uncommon strength, the research suggests, as HIV-infected dendritic cells switched on the virus-specific sensor and activated a potent but only partially understood defense system known as innate immunity.

Dendritic cells are constantly on the lookout for danger, and they sound the alarm when they encounter bacteria and viruses and recognize them as foreign invaders. Once the threat is assessed, dendritic cells present pieces of the insurgents to T-cells to indicate whom the army should target for elimination. An army of T-cell clones then rises up against the intruders.



IMAGES ON SLIDES COURTESY OF NICOLAS MANEL

HIV-1, however, has adopted a "devilish kind of strategy," says Dr. Littman. Like a Trojan horse, the virus fools patrolling dendritic cells into taking it up but not recognizing it as a threat or turning on their sensors. Through a mechanism that remains murky, the virus exploits the unaware dendritic cells for a free ride to its true target: T-cells. "It actually infects the same soldiers that are supposed to protect us from it," explains study co-author Derya Unutmaz, MD, associate professor of pathology, medicine, and microbiology.

But by adding a protein from related viruses that can infect dendritic cells, the researchers likewise granted HIV-1 the power to infect a dendritic cell, integrate into the cell's chromosomal DNA, and begin producing copies of itself. Unexpectedly, the team found that the production of an outer coat that encapsulates the virus, known as capsid, was key to flipping on the dendritic cell's sensor. "Now the alarm started to ring," says Dr. Unutmaz, "and the T-cells were going crazy, proliferating and responding to the dendritic cells."

The researchers believe the work has several major implications. One surprise is that for dendritic cells, HIV-1 susceptibility may be a plus. "The paradox," notes Dr. Littman, "is that individuals who have dendritic cells that are more readily infected may actually be more resistant to the virus, mount a better response, and contain that virus." That mechanism may explain why about 1 in 300 people who are HIV-positive—known as elite controllers—can maintain nearly undetectable levels of the virus for years and never progress to AIDS. One intriguing possibility is that their dendritic cells may be more sensitive to HIV-1 infection, thereby triggering a better innate immune response.

The research may also help explain why HIV-1 vaccination efforts haven't panned out. In bypassing the dendritic cell-led innate immune response, existing vaccinations may have failed to raise a T-cell army focused on the real target. If scientists can force dendritic cells to recognize the virus's capsid protein or otherwise turn on its own HIV-1 sensor, however, they may be able to create a more potent vaccine.

"By adding elements of this capsid to a vaccine," suggests co-author Nicolas Manel, PhD, who is now affiliated with the Institut Curie based in Paris, "it may be possible to improve the immune response of those who have HIV or mount a potent immune response before the individual is infected." ●

—BRYN NELSON

HIV particles, appearing as dark circles in these slides, are recognized by the immune system's sentinels through a newly discovered sensor.

An Unusual Route to Cholesterol Regulation

ON HER FIRST DAY at NYU Langone Medical Center in December 2009, Kathryn J. Moore, PhD, associate professor of medicine and cell biology, was chatting with her new neighbor, Carlos Fernandez-Hernando, PhD, assistant professor of medicine and cell biology, when she realized they were working on the same project. Both were trying to find snippets of RNA, called microRNA, involved in cholesterol regulation. "We were stunned, because we were working on identical projects," Moore says. Rather than compete with one another, Drs. Moore and Fernandez-Hernando quickly joined forces. The move was a good one—together they discovered a microRNA that helps regulate cholesterol balance and movement. The discovery, reported in the May 13, 2010, issue of *Science*, may lead to new treatments for atherosclerosis and high cholesterol.

"Our study identifies a new pathway to regulate HDL levels and suggests that antagonists to a particular microRNA could be used in conjunction with other therapies to raise HDL," says Dr. Moore. High-density lipoprotein, the so-called good cholesterol, is thought to protect against the buildup of plaque in arteries, and treatments to raise HDL are being intensively pursued.

Cells keep a careful check on cholesterol, which is essential for survival, controlling both its synthesis and its movement. When there isn't enough, the cell starts making a helper protein called SREBF-2 to increase production. At the same time, the cell limits the amount of cholesterol it loses by reducing production of transporter proteins that carry cholesterol out of the cell. But just how cells limit synthesis of the transporter proteins has remained obscure until now.

Biologists have learned that microRNAs can regulate many physiological processes, from brain function to tumor metastasis. Drs. Moore and Fernandez-Hernando looked for microRNAs affected by changing cholesterol levels and initially identified 21 fitting the description.

"We became interested in microRNA-33 because it is located in a stretch of the SREBF-2 gene which is turned on when cells need to increase cholesterol synthesis," explains Dr. Moore. She and Dr. Fernandez-Hernando, along with Katey Rayner, PhD, a postdoctoral fellow in Dr. Moore's lab, and Yajaira Suarez, PhD, assistant professor of medicine, discovered that activating the SREBF-2 gene turns on microRNA-33. Further experiments revealed this RNA blocks production of the cholesterol transporter proteins, allowing the cell to retain more already-synthesized cholesterol. However, the plunge in available transporter proteins also reduces the amount of new HDL, because the proteins are critical for its formation.

Consequently, when the researchers looked at the effects of inhibiting microRNA-33 in mice, they found that they could increase HDL levels in the blood by as much as 25 percent, without changing the levels of low-density lipoprotein, the so-called bad cholesterol. HDL levels are inversely correlated with the risk of atherosclerosis. Co-author Edward A. Fisher, MD, the Leon H. Charney Professor of Cardiovascular Medicine and professor of medicine, pediatrics, and cell biology, says: "These are potentially very important findings." Dr. Fisher is also the director of the Marc and Ruti Bell Vascular Biology and Disease Program, a component of the Leon H. Charney Division of Cardiology. The collaboration among the study's authors resulted from their participation in this program.

Although Drs. Moore and Fernandez-Hernando have independent laboratories, they are continuing to work together on this project. They now plan to test whether antagonists to microRNA-33 can reduce or reverse atherosclerosis in other animal models. ● *—RABIYA TUMA*

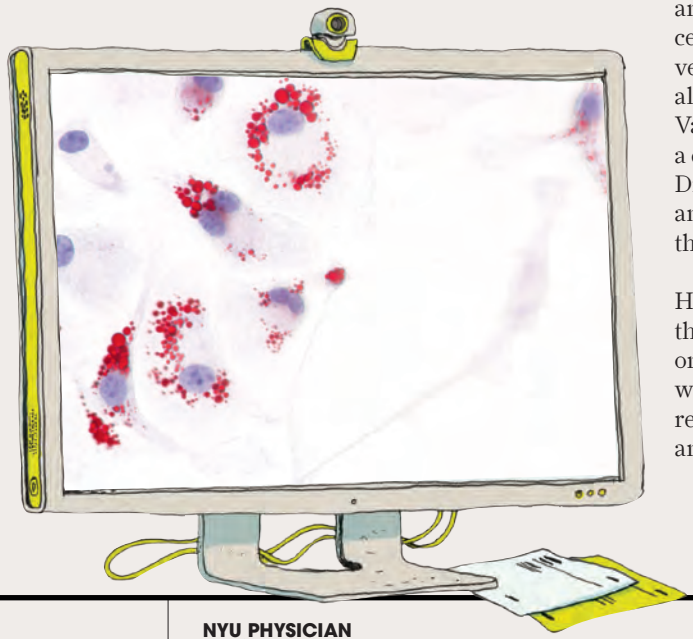


Image on monitor shows cholesterol (red) accumulating within specialized immune cells in mice.

CHOLESTEROL IMAGE COURTESY OF CARLOS FERNANDEZ-HERNANDO

ILLUSTRATIONS BY **PETER OUMANSKI**

The Danger of UVA Rays

Study links tanning salons and UVA rays to melanoma

ALTHOUGH RESEARCHERS HAVE long linked prolonged exposure to the sun and its UVB form of radiation with a high risk for skin cancer, the role of UVA radiation in carcinogenesis has been murkier. Now researchers from NYU Langone Medical Center have found evidence that strongly implicates UVA—also the main source of radiation in tanning salons—as a key contributor to melanoma, the deadliest type of skin cancer.

"Our data really provide the scientific basis to explain why sun tanning and UVA sunlight exposure will cause melanoma," says Moon-shong Tang, PhD, professor of environmental medicine, pathology, and medicine.

This year, melanoma is expected to strike more than 68,000 Americans and kill 8,700, according to the National Cancer Institute. The cancer's primary triggers, though, have remained uncertain. UVB radiation has a much higher energy level than UVA radiation and is commonly associated with burns, inflammation, and extensive DNA damage that can lead to other skin cancers. UVA radiation, meanwhile, accounts for more than 95 percent of the sunlight that reaches Earth, and is more capable of penetrating human skin.

A study recently published in the journal *Cancer Epidemiology, Biomarkers & Prevention* concluded that among predominantly fair-skinned Minnesotans, frequent indoor tanning sessions significantly increased the risk of melanoma, especially among users of high-speed, high-intensity, and high-pressure tanning beds or booths. These devices all use mostly UVA, though some have varying levels of UVB, making it difficult to figure out which type of radiation might be most responsible.

Dr. Tang's study, published in the July 6, 2010, issue of *Proceedings of the National Academy of Sciences*, may help fill in some of the gaps with its finding that UVA light causes a distinct type of DNA damage in human skin cells containing the pigment melanin, but not in other skin cells. The finding bolsters other recent studies also suggesting that UVA may be the principal culprit behind melanoma.

Melanin protects our skin from sunlight by absorbing UV radiation and converting its potentially dangerous energy into heat. Ironically, Dr. Tang, working with graduate student Hsiang-tsui Wang, and postdoctoral fellow BongKun Choi, PhD, found that the skin's melanocytes, the pigmented cells that can grow out of control, have a low capacity for repairing the DNA damage caused by UVA radiation. They also discovered that DNA damage induces many more mutations in melanocytes than in other skin cells.

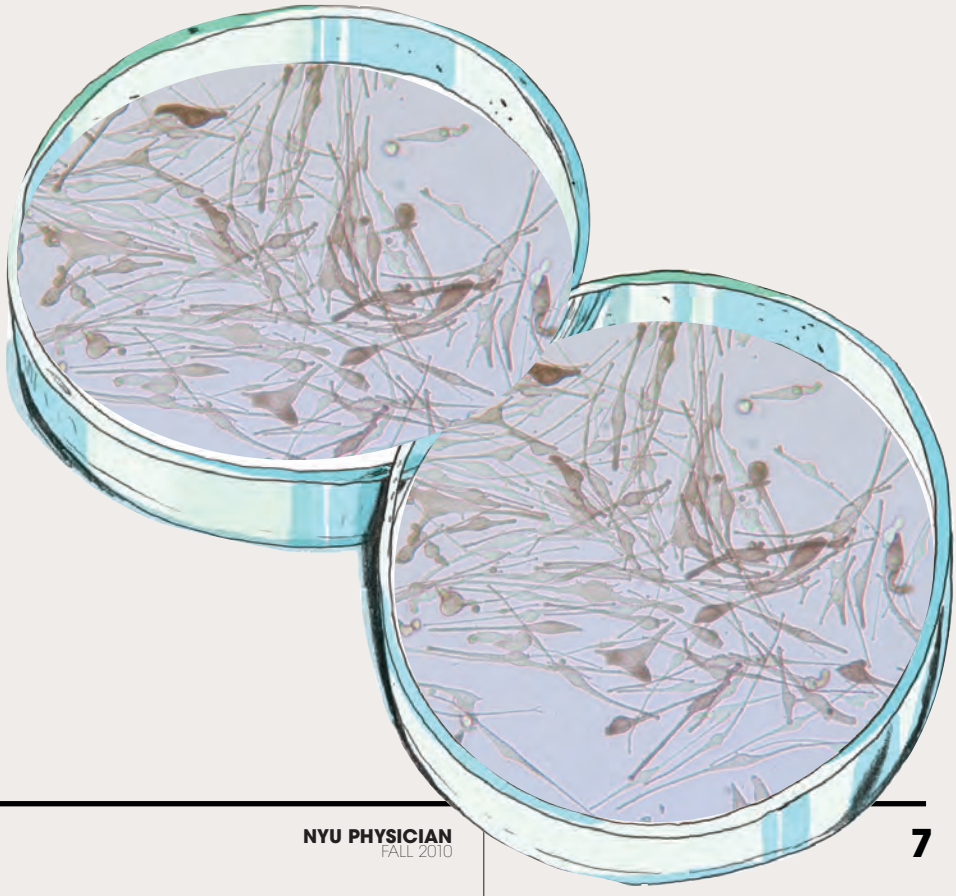
"The most important biological consequence of DNA damage is that if it is not repaired, it will cause mutations and mutations can trigger carcinogenesis, the process that leads to cancer," Dr. Tang says. The inherently low capacity of melanocytes to repair DNA, he notes, may explain why these cells in the genitalia, nasal septum, and colon, which aren't exposed to light, are still vulnerable to melanoma.

David Polsky, MD, PhD, associate professor of dermatology and pathology, says Dr. Tang's study fits well with researchers' growing suspicion that UVA is more dangerous than previously thought. "It does provide more hard evidence in a laboratory setting, and I think it supports the argument that UVA is important," says Dr. Polsky.

The jury is still out on whether UVA- and UVB-blocking sunscreens can directly prevent melanoma, but Dr. Polsky says they can clearly prevent burns, a major risk factor for skin cancer. "They're part of the solution," he says. ●

—BRYN NELSON

Human melanocytes viewed under a microscope.



MICROSCOPIC IMAGES COURTESY OF PRASHIELA MANGA

Liza Arguelles-Brady and her son, James, who was born with his aorta and pulmonary artery transposed.

SOMETIMES BABIES ARE BORN WITH ARTERIES THAT ARISE FROM THE WRONG PLACES.

A CHANGE OF HEART

by **GARY GOLDENBERG**

photographs by **SASHA NIALLA**

AS THE ULTRASOUND TECHNICIAN SLID THE TRANSDUCER OVER HER SWOLLEN BELLY, LIZA ARGUELLES-BRADY WAITED WITH NERVOUS EXCITEMENT TO SEE THE FIRST IMAGE OF HER UNBORN CHILD.

Instead of hearing those magic words, "Congratulations, you have a healthy baby!" she was greeted with silence. For some reason, the technician couldn't get a good image of the fetal heart. A second test, days later, yielded the same result. Liza was advised to get a more sophisticated sonogram at NYU Langone Medical Center, just to be safe. If something was amiss, no one was letting on.

This time, the images were crystal clear, and the news wasn't good. Liza's baby, a boy, had a serious heart defect called transposition of the great arteries (TGA), in which the aorta and the pulmonary artery, the major vessels carrying blood away from the heart, arise from the wrong ventricle. The vessels are transposed, so that the aorta, which normally arises from the left ventricle and carries oxygen-rich blood to the body, arises instead from the right ventricle, which is filled with oxygen-poor blood. Meanwhile, the pulmonary artery, which normally emerges from the right ventricle carrying oxygen-poor blood to the lungs where it will be loaded with oxygen, now emerges from the left ventricle. Because of this anatomical mix-up, oxygenated blood flows in a closed loop, cycling endlessly between the lungs and the left side of the heart, never reaching the body.

As Liza learned from Achiau Ludomirsky, MD, professor of pediatrics and director of the Division of Pediatric Cardiology at NYU Langone, her baby would need open-heart surgery—an arterial switch procedure—just days after birth. "I couldn't believe what I was hearing," Liza recalls. "My head was spinning. I had never heard of anything like this."

Actually, this scenario is more common than you might imagine. About one in 125 children in the U.S. is born with a congenital heart defect, says Dr. Ludomirsky. Of these, 5 to 7 percent—approximately 2,000 babies—have TGA. Until the 1970s, when the arterial switch procedure and a heart-lung bypass machine small enough for neonates were developed, TGA was lethal or severely debilitating. Today the survival rate is greater than 90 percent. However, the arterial switch remains a complex procedure, and the Brady case would turn out to be more complex than most.

After hearing the diagnosis, Liza and her husband, Peter, could do little but count down the days until the delivery date, still four months away. "The first weeks were tough," says Liza. "I did the worst thing possible, which was to search *YouTube* for videos about TGA. All you see is babies in intensive care units attached to all kinds of tubes, with music playing in the background." Peter worked hard to focus on the best possible outcome. "Although it was a setback, my mindset is you deal with what you've got," he says. "What was helpful was hearing from Dr. Ludomirsky that this procedure has a high success rate, and that our child could essentially have a normal life. Also, he promised us his team would be ready, no matter when the baby was delivered."

During those tense months, the Bradys visited with Ralph Mosca, MD, professor of cardiac surgery and director of the Division of Pediatric and Adult Congenital Cardiac Surgery at NYU Langone, who would perform the operation, and toured the neonatal and pediatric intensive care units, better known as the NICU and the PICU, which would become familiar territory. "That was tremendously helpful down the road," says Peter. "We knew what to expect."

When Liza's water broke on March 31, the Bradys headed to Tisch Hospital at NYU Langone, a short drive from their home in Jersey City. Hours later, James Brady, 7 lb., 10 oz., was delivered by C-section (a clinical decision unrelated to the baby's heart condition). He was whisked off to the NICU before Liza or Peter had even a moment to cradle him in their arms. "I was able to give James a kiss," Liza remembers.

In the beginning, James looked like a healthy newborn. Most babies with TGA develop normally in the womb, where the fetus's circulation bypasses the lungs and its blood is oxygenated by the mother, via the umbilical cord. At the moment of birth, however, circulation begins to change in various ways. Most crucially, a healthy baby's blood is immediately shunted to the lungs, allowing the baby to oxygenate its blood by breathing, a milestone announced by the first cry. For James, however, this would be one of his last gasps—unless his mismatched arteries were realigned quickly.

He wasn't taken to surgery immediately. "It's better to wait a few days," says Dr. Ludomirsky, explaining that babies with TGA sometimes have additional birth defects. "You want to bring the baby into the OR in the most stable state that you can." Waiting is possible because newborns with TGA are usually able to pump some oxygenated blood to the body through temporary remnants of the fetal circulation, namely, the ductus arteriosus (a small blood vessel that connects the aorta with the pulmonary artery) and the foramen ovale (a hole between the left and right atria). Both connections allow limited mixing of "red" (oxygenated) and "blue" (unoxygenated) blood, until they seal shut in the months after birth.

MOST BABIES WITH TGA DEVELOP NORMALLY IN THE WOMB. AT THE MOMENT OF BIRTH, HOWEVER, CIRCULATION BEGINS TO CHANGE IN VARIOUS WAYS.

LEFT: Dr. Ralph Mosca, who operated on James. CENTER: Liza with her son. RIGHT: Dr. Achiau Ludomirsky, director of the Division of Pediatric Cardiology.

By day two, however, James began to turn a sickly blue. Despite supplemental oxygen and a drug called prostaglandin, which slows shrinkage of the ductus arteriosus, his body was starved for oxygen. Dr. Ludomirsky called Michael Argilla, MD, director of the Pediatric Cardiac Catheterization Laboratory, to perform a balloon septostomy: A balloon-tipped catheter is inserted into a leg vein and snaked up into the heart, where it is passed through the foramen ovale into the left atrium. Then the balloon is inflated and withdrawn, widening the foramen ovale, which increases mixing of red and blue blood. The procedure worked, buying James precious time.

Several days later, James was wheeled into the OR for the arterial switch procedure. Dr. Mosca opened his patient's chest and examined his heart, barely the size of a walnut. As part of the repair, the coronary arteries, which supply the heart muscle with blood, need to be rerouted. (In a normal heart, the coronary arteries arise from the aorta on the left side, branching immediately off the ascending aorta just beyond the aortic valve. In an infant with TGA, the aorta emerges from the heart's right side. When the vessels are switched, the coronary arteries must be freed from the right side of the heart and moved to the left side so that they receive oxygen-rich blood.) Complicating matters, James's coronary arteries were abnormal—in size, shape, and position. With a jazz musician's flair, Dr. Mosca began to improvise, using parts of James's aorta and pericardium (the membrane that surrounds the heart) to reshape the top of his heart, making for a better fit with the coronary arteries.

"The challenge with this operation is all mechanical," says the surgeon, who performs about 10 TGA repairs a year. "You have to line up all the arteries in such a way that they are not twisted, in which case you won't get proper blood flow. If you get the plumbing right, these hearts can do very well."

Back in Liza's hospital room, the family waited for news. After four hours, the normal length of a TGA repair, Dr. Mosca sent word that there were complications. It would be a while, but when the operation was finally over, James was fine. "That was the beginning of a tough three or four days, sitting with him in the PICU. And then having to leave him at the end of the day..." says Liza, her voice trailing off.

The couple began to breathe a little easier when doctors told them James's replumbed heart was strong, but he wasn't flourishing quite yet. "At first, he didn't want to feed," Dr. Ludomirsky explains. "It's not uncommon with any patient after major surgery, and here we had a little baby who had never fed on his own." James's natural impulses eventually took hold, and he began to suckle. "The nurses encouraged us, and they showed us all the little tricks to get him to feed," says Liza. "We could see progress every day." When James left the hospital, his parents were finally able to strap him into his car seat for the drive home.

THERE IS ANOTHER CHAPTER TO JAMES'S STORY. A follow-up exam revealed that his heart had developed some scar tissue—which sometimes occurs as a consequence of cardiac surgery—at the suture line in the new aorta. In mid-September, James underwent another procedure and was sent home five days later. Soon, he was giggling and cooing like any other six-month old. His prognosis, according to Drs. Mosca and Ludomirsky, is good.

A week later, Liza brought James to watch his dad run in a race preceding the famous Fifth Avenue Mile. "Of course, James didn't know what was going on," Liza laughs. "But the weather was beautiful and James was in a good mood. All in all, it was a great day."

"We have him signed up for baby swim class, play groups, and music class," says Liza, who is looking forward to the normal joys of parenthood. "We can't wait to use the Baby Jogger with him." ●

Three-year-old Casey Lopez and the surgeons who operated on her lung, Dr. Sandra Tomita and Dr. Keith Kuenzler.

by **JANE BOSVELD**

IN PEDIATRIC SURGERY, LESS IS MORE

MINIMALLY INVASIVE SURGERY ALLOWS SURGEONS TO REPAIR CONGENITAL DEFECTS THROUGH TINY INCISIONS.

photographs by **ELIZABETH WEINBERG**

IN A PRE-OP ROOM AT TISCH HOSPITAL, CASEY LOPEZ, THREE, IS PERCHED RESTLESSLY ON A LARGE BROWN CHAIR, TUGGING ON HER PIGTAILS AND TALKING A BLUE STREAK TO HER MOTHER, GEOVANNE. Suddenly, she wound down. "I wanna go to bed," she announced, and crawled onto her mother's lap. "She's getting tired," Geovanne said softly. The sedative Casey had received a few minutes earlier had taken effect. Soon after, she was wheeled into the operating room.

Casey is one of 3 million children who have surgery in the U.S. each year to fix a birth defect. Unlike many, however, Casey was set to undergo minimally invasive surgery, the approach of choice at NYU Langone Medical Center's Division of Pediatric Surgery. Once reserved for adults, the technique has, with the design of miniaturized equipment, recently become possible for infants and children, allowing safer operations at earlier ages and with less trauma, pain, and scarring.

Even before Casey was born, doctors knew that she had a large abnormality in her left lung that might have to be removed. "My gynecologist saw it on a sonogram," says Geovanne. Further testing revealed that it was a congenital cystic adenomatoid malformation, a rare condition in which embryonic tissue fails to develop as part of the tracheobronchial tree and occupies a lobe of the lung as a nonfunctioning mass of tissue. In some people the tissue causes no symptoms and lies dormant. In others it can lead to fatigue, breathing difficulties, dangerous infections, and rarely malignancy. Either way, the mass must be removed.

Casey's development did not go smoothly. She was hospitalized with pneumonia at four months, and subsequently developed three other serious lung infections that required her to be hospitalized over the following 26 months. She also tired easily and had developed asthma by age two. Casey's pulmonologist referred her to pediatric surgeon Sandra Tomita, MD, FACS, FAAP, who evaluated her for the operation. Casey's youth was a plus. "The younger the patient, the easier it is to remove the abnormal lung tissue," explains Dr. Tomita, assistant professor of pediatric surgery. "And it frees space in the lung cavity for the normal lung to expand."

THE QUESTION FOR DR. TOMITA WAS HOW TO DO THE SURGERY. The standard technique for removing a mass of cystic lung tissue is to make a large cut through the chest cavity to get to the abnormal tissue, an approach that can cause long recovery and severe pain, as well as permanent musculoskeletal deformities and disfiguring marks. To reduce the likelihood of these effects, Dr. Tomita says, "We wanted to use minimally invasive techniques and remove the tissue through small thoracoscopic [minimally invasive surgery in the chest or thorax] incisions." But she worried that Casey's infections might have created scarring in the lungs, inhibiting this approach.

So Dr. Tomita consulted with her colleague Keith A. Kuenzler, MD, FACS, FAAP, a leading expert in pediatric minimally invasive surgery. They agreed that the best approach would be to make three small incisions of about five millimeters each. If scar tissue hindered extracting tissue, they would then resort to the standard, larger cut to open Casey's chest. "But I was fairly certain we'd be able to do it with minimally invasive techniques," recalls Dr. Kuenzler, assistant professor of pediatric surgery, who joined NYU Langone Medical Center in 2009.

"Care for children has changed in general," observes Howard B. Ginsburg, MD, director of the Division of Pediatric Surgery. "Many more kids who are born at, say, 30 weeks' gestation survive today." And with the advent of new techniques, "We're able to repair general anomalies surgically at much younger ages on much smaller babies," says Dr. Ginsburg, who founded the pediatric surgery division in 1980 and has seen the field evolve over the past three decades.

Unlike surgeons with adult patients who tend to specialize in one organ system, pediatric surgeons are truly general surgeons adept at handling a range of operations, from correcting birth defects to repairing hernias and removing appendixes and gallbladders "We're like old-fashioned doctors," Dr. Ginsburg says, "like the adult surgeons who used to do everything." The array of challenging problems is what draws physicians to the field. "If you go into any other field of general surgery, you really don't get to work in the chest anymore," notes Dr. Kuenzler. "In pediatric surgery, we operate on the esophagus, lungs, chest wall, and diaphragm, and all of these operations can be done with minimally invasive surgery."

Another attraction is the deep connection with their scared small patients and worried families. "Most pediatric surgeons like being around children," says Dr. Ginsburg. "When you make them better, you may become part of the family, and it can be a lifelong affiliation. I have been fortunate to see many of my patients grow up to be wonderful productive adults," he says. "In

5 QUESTIONS PARENTS SHOULD ASK BEFORE THEIR CHILD HAS SURGERY

1. Is the surgeon board certified in pediatric surgery?
2. Will there be a pediatric anesthesiologist administering anesthesia to my child?
3. Is there a special pediatric intensive care unit at the hospital?
4. Am I allowed to accompany my child to the operating room?
5. Can I stay with my child overnight?

LEFT: Casey with Dr. Tomita, who joined NYU Langone Medical Center after serving in the military. ABOVE: Dr. Howard Ginsburg, director of the Division of Pediatric Surgery.

fact, the emotional rewards are extraordinary."

Dr. Tomita felt the same pulls. She began her career in the military and spent seven months in Iraq in 2004. "I was in Fallujah when the insurgency started," she says. "We took care of multiply injured marines, soldiers, and Iraqis including some children, with limited equipment and often under indirect fire." When she left the military, Dr. Tomita joined NYU Langone Medical Center. She is among the growing number of women in the field. Today 19 percent of all pediatric surgeons are women, according to the American Pediatric Surgical Association. There are approximately 800 practicing pediatric surgeons in the United States.

Before 2000 the tools used in minimally invasive operations were too large for children and infants; they became child-friendly-sized only in the last decade. The advance has enabled pediatric surgeons to operate on children more safely and earlier. "A lot of parents are afraid to send their children in for major surgery to remove a lung mass that hasn't caused any symptoms yet," notes Dr. Kuenzler. "They figure, 'let's wait until there's a problem.' But the trouble with that strategy is that the operations can be much more difficult and invasive when the children are older and have already suffered infections."

Dr. Kuenzler tells the story of a seven-year-old girl who had the same birth defect as Casey. The girl had had at least two bouts of pneumonia every year of her life before her parents brought her in for surgery. "We hoped we'd be able to remove the abnormal lung mass thoracoscopically," he says, "but there was so much inflammation, it wasn't safe to do it that way." He was forced to open her chest with a much larger incision to reach the tissue by hand. The operation was successful, but the girl suffered much more pain and took much longer to recover than if the operation had been performed earlier with minimally invasive techniques.

Fortunately for three-year-old Casey, Drs. Tomita and Kuenzler were able to operate using minimally invasive surgery. They made two tiny cuts, one of which was used to insert a camera and other tools, another for the incision, and a third, slightly larger cut through which to extract the tissue. Pediatric anesthesiologist Inca Chui, MD, assistant professor of anesthesiology, deflated Casey's left lung and Drs. Tomita and Kuenzler detached the airway and blood vessels to the lobe of the lung they wanted to remove. When the entire lower lobe was separated, it was cut into smaller pieces to be removed through the tiny incision.

Two days later, Casey was back home, a bit tired but with pain so minor that all she needed was acetaminophen. When she plays with her toys, she sometimes starts breathing heavily. But, her mother says, "After I set her down and we practice the really deep inhaling, she calms down and is good. She has only these three tiny incision cuts." ●

Julia Nadel, 16, with a photograph of herself as an infant.

It's About Much More than How You Look

It takes years to fully repair a cleft lip and palate, but Julia Nadel persevered and is now living an ordinary teenager's life.

FRESH OFF A FIVE-WEEK tour of Italy, Julia Nadel has started her junior year of high school with a full plate of studies, extracurricular activities, and early musings about college. She's living an ordinary teenager's life—a fact that is still sinking in. "It's a little surreal," she admits. "This is the first time since I was seven years old that I don't have a monthly orthodontist appointment."

Julia, 16, was born with a unilateral cleft lip and palate, a condition that occurs in one out of every 600 children. While not life-threatening, it affects children's appearance, speech, and social interactions, shaping the way youngsters view themselves and the world at an age when self-image is critically important. "A cleft palate is about much more than how you look," says Julia. "It goes so deeply into your emotions and psychology—I don't think people really understand the whole depth of the issue."

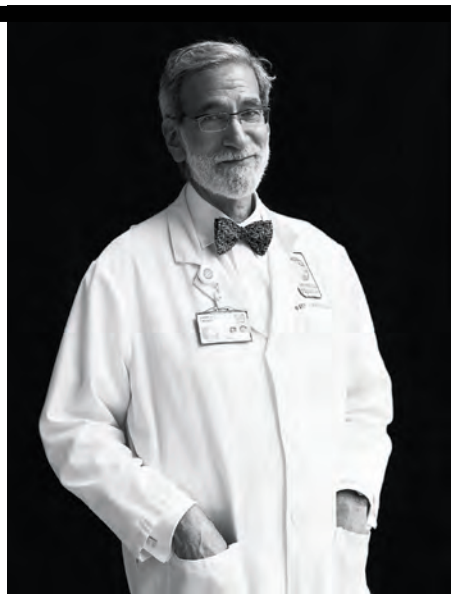
Every fetus actually begins life with clefts (openings) in both sides of the upper lip and palate, but these normally fuse together during the first trimester of pregnancy. In some children, however, the palate and/or lip fail to join properly—sometimes on just one side, a condition known as a unilateral cleft, and sometimes on both, resulting in a bilateral cleft. About half of all children with an unjoined palate also have an affected lip. (A cleft lip alone is rarer.)

Although the most severe aspects of the deformity are now surgically repaired during infancy, kids with this birth defect typically require numerous medical interventions throughout childhood: They may have a deviated nasal septum that impairs breathing and needs surgery; because they are prone to ear infections, ear tubes may be implanted; some children require a bone graft in their jaw when they are about six; ongoing orthodontic care may also be necessary to ensure that the teeth and jaw grow in correctly. For 25 percent of patients, this medical saga culminates in an operation in the teen years to bring forward the upper jaw, which often fails to keep up with the growth of the lower jaw, during adolescence. A final surgery on the nose, which is often deformed in children with clefts, may follow.

In Julia's case, she needed all of the above. "She was one of those kids where, if anything could go wrong, it did," says her mother, Wendy. Since early infancy, Julia has been treated at NYU Langone's Institute of Reconstructive Plastic Surgery, whose physicians have pioneered a number of treatments for cleft lip and palate. Fortunately, she was born at a time when several key innovations had been recently introduced by a team led by Court Cutting, MD, professor of surgery, and Barry Grayson, DDS, associate professor of surgery.

The earliest of these breakthroughs, nasoalveolar molding (NAM), is what first led the Nadels to NYU Langone shortly

PHOTOGRAPHS BY **SASHA NIALLA**



Surgeon Dr. Court Cutting (left) and orthodontist Dr. Barry Grayson.

after Julia's birth. (At that time there was still no way to detect cleft palate before birth; today NYU and other medical centers routinely screen for it during pregnancy, allowing caregivers and family to prepare ahead of time for postdelivery treatment.) "We talked to numerous specialists," says Wendy. "At NYU, their approach was radically different from everyone else's." The NYU Langone team was performing two operations during infancy—one in which they molded the gums and nasal cavity for several months immediately after birth and then joined the lips and nose, and a second procedure at the one-year mark to repair the palate.

This approach aims to improve the reconstruction of the face and reduce the chances that additional surgeries would be needed later. "With the old approach, children were undergoing a dozen or more surgeries and still didn't look quite right," says Dr. Cutting. "My goal is to put all my efforts into the first year, then not touch the child again until the mid- to late-teenage years."

Although the NAM procedure was still fairly new, the Nadels thought it was the best approach for their daughter. The original procedure had begun simply as aveolar molding, in which the orthodontist places a device in the child's mouth that pushes the gum pads into proper position prior to surgery. This method still left much work to be done on the nasal cartilage and nose, however. Then Dr. Grayson had a "eureka" moment. He knew doctors had long been reshaping congenitally deformed ears by molding the ear cartilage during the first months of life. "Since the lower half of the nose contains cartilage," he recalls, "I thought, why not take a similar approach to reshaping the nasal cartilage and soft tissue deformities of babies with clefts prior to surgery?"

In consultation with Dr. Cutting, Dr. Grayson designed a stent that went into the infant's nasal passage, where it gently reduced the cartilage deformity while stretching and expanding the nasal soft tissue. By the time Julia was born, the approach had been proven safe and effective. Still, NAM requires daily care by the parents, who must periodically remove and clean the device, check their child's mouth for irritation, then reattach the device with tapes that are applied to the cheeks. "That's why we consider the parents to be one-third of the medical team, along with the plastic surgeon and the orthodontist," explains Dr. Grayson.

Julia went through the presurgical NAM process and had her first procedure at three months, followed by an extra operation for a deviated septum at six months, then palate reconstruction at age one.

But Julia's hardest personal test lay in front of her: Navigating childhood and adolescence. Because her cleft was very wide, her nose would remain somewhat misshapen until her final operation as a teenager. In first grade, she had a bone graft to repair the cleft between the teeth in her upper jaw—a procedure that forced her onto crutches for a time, since the graft was taken from her hip.

"Psychosocially, it's very tough on these children," says Wendy. "Julia got teased all through elementary school by kids who called her things like 'big nose.' She's pretty tough and would throw it back, but the hardest times for me were when she came home in tears."

As a surgeon specializing in cleft lip and palate, Dr. Cutting feels the stress on his young patients keenly. "Adolescence is a particularly vulnerable time," he notes. "In the traditional approach to cleft palate, we'd wait until age 18, when bone growth has stopped, to do the final reconstruction of the jaw and nose. By then, a lot of damage has occurred."

Looking for a way to lessen this emotional pain, Dr. Cutting drew on the groundbreaking work of Joseph McCarthy, MD, Lawrence D. Bell Professor of Plastic Surgery and director of the Institute of Reconstructive Plastic Surgery, who had shown that lower jaw deformities could be treated by cutting and slowly stretching the bone, causing new bone tissue to form. In the mid-1990s, Dr. Cutting began applying this technique to adolescents with cleft palate, in a procedure called maxillary distraction. "What we do is fracture the bone, then, as it heals, slowly pull it forward by turning a screw device inside the mouth about a half-millimeter, twice a day, for four weeks." says Dr. Cutting. "Since the bone doesn't have time to knit fully, the jaw stretches forward, creating new bone."

By overcompensating slightly for future growth in the lower jaw, this procedure allows the jaw and nose to be restructured earlier in adolescence, hopefully resulting in a more normal teen experience, says Dr. Cutting. He usually performs this procedure when a youngster is around 16. Having known Julia since birth, however, Dr. Cutting wasn't surprised when Julia told him she wanted to push the envelope and undergo the procedure at 14, earlier than it had ever been done by his team. He agreed to go ahead. Julia also insisted on personally turning the screw inside her mouth each day. "I wouldn't let my parents touch it," she says. "I know my pain tolerance, and I wanted control."

The procedure went well. "Six months later, I fixed her nose. Now she's ready for Hollywood," says Dr. Cutting.

"I've never known what it's like not to be looking ahead to whatever treatment is coming next," says Julia. "When I was being teased at an early age, I was able to get through it because my parents taught me to be confident and know inside myself that things were going to change. Now that the treatment is finally done, it's hard to imagine not thinking about this condition all the time. I couldn't be happier."

The Institute of Reconstructive Plastic Surgery recently received a $4 million grant to expand its facilities from the National Foundation for Facial Reconstruction. ● *—ROYCE FLIPPIN*

Growing Up with HIV/AIDS

TO LOOK AT JOSÉ ROMAN—a short, muscular Puerto Rican-American with sleepy green eyes, a slow, sweet grin, pierced ears, a backward baseball cap covering black hair tied in a bun, and the nickname REX tattooed prominently along one arm—you might guess the 23-year-old has seen a bit of life. And you'd be right:

José Roman, who contracted HIV at birth, stays healthy by taking nine pills a day.

José contracted HIV at birth from his drug-addicted mother, who died of AIDS when he was three. Some years later he learned of his status from his father, who, along with an aunt and uncle, also succumbed to the disease.

Still, José says he's heard stories "a lot worse" from other young people he's met at Bellevue Hospital's special clinic for children and young adults with HIV/AIDS, where he has received medical care since childhood. Today he works as a peer educator for the clinic's summer program on healthy living. "These kids are going through a lot of pain," he says. "Some were born in places like Ghana and were sent here to stay with relatives and get treatment while their parents stayed behind dying of the disease."

Of the 105,633 New Yorkers now living with HIV or AIDS, 2,449 of them, or 2.3 percent, contracted the virus from their mother at birth, according to the most recent data from the city health department. These young people, most of them poor blacks or Hispanics—the groups hardest hit by the AIDS epidemic—represent a bubble in time, their fate sealed by the accident of having been born before the mid-1990s, when scientists discovered that powerful antiretroviral drugs—first zidovudine (AZT) and later protease inhibitors—could block viral transmission from mother to baby. On the plus side, the new drugs turned a fatal disease into a chronic illness, so that most babies infected at birth are now surviving into adulthood.

From the beginning of the epidemic

PHOTOGRAPH BY SASHA NIALLA

in 1981, Bellevue was one of only a few hospitals in the city caring for infected pregnant women and their newborns. Its clinic for children with HIV/AIDS was started two years later. "By 1983, we'd started seeing a number of infants we thought were infected, but it wasn't easy to diagnose because the antibody test didn't really come along until 1984," says William Borkowsky, MD, professor of pediatrics and director of the Saul Krugman Division of Infectious Diseases and Immunology.

By 1986, NYU physicians at Bellevue had learned that infants of infected mothers had a one-in-four chance of acquiring the infection, usually during delivery. In those years, about half of infected children who survived infancy were dead by age two. As the new antiretroviral drugs rolled out, Bellevue became one of the first centers in the country to take part in national clinical trials involving HIV-infected mothers and infants. "We tried to treat everyone we could," Dr. Borkowsky says. "After 1996 we saw a dramatic reduction in mortality. In the last five years we've had only four deaths, usually because patients weren't taking their medication."

The clinic currently has a caseload of about 100 children born with HIV, most of them now teenagers or young adults who have been seen by the same doctors and support staff every three or four months since birth. Others have grown up and moved elsewhere or graduated to the hospital's adult clinic.

Like many of these young people, José was raised by his grandmother, who kept a tight rein on him. "She sheltered me," he says. "In seventh grade, I realized I had a place to go every night, a plate of food, and clean clothes to put on the next morning. A lot of kids I grew up with didn't have that."

To stay healthy, he takes five pills in the morning and four at night, more or less the same routine he's had since childhood. He's had to change medicines a few times because of side effects, such as a risk of kidney stones brought on by indinavir, a protease inhibitor, and ingrown toenails. "I've had five surgeries on two toes," he says.

These days, José lives in his own apartment with his girlfriend and her two-year-old son, and commutes two hours each way to work at the clinic. Besides working on his GED, he coaches the neighborhood kids in basketball and writes rap songs "about life's struggles, life without a mother or a father." Unlike most of his peers, he's open about his disease. "All my friends know what I have and they still accept me. They say, 'you better not die on me!'

"The biggest lesson for me is that I can still have a normal life," he adds.

TYRA,* 20, taps her purple and pink acrylic fingernails against the table. World weary, she leans her head to one side. Sloe-eyed and full-lipped, with her dark hair slicked back against coffee-colored skin, she takes a deep breath before speaking slowly, carefully.

She never knew her father, she says, and doesn't remember her mother, who died of AIDS when she was four. A brother also died of AIDS, at 19. "I didn't understand when he was getting sick," she remembers. "I was 11. That's when they sent me to the clinic."

▸ TYRA FOUND OUT THE TRUTH ABOUT HER HIV STATUS IN A BELLEVUE CLINIC SUPPORT GROUP.

At age two, she had been taken in by her foster mom, who later told her that the medications she took were "vitamins." She found out the truth in a Bellevue clinic support group, when a social worker asked her if she knew why she was there. "I was like 'What?' I was thinking it was like cancer or diabetes."

Last fall, after taking herself off her medication, Tyra's weight dropped from 160 to 126, and she was hospitalized with pneumonia. She says that until then, she didn't have a clear understanding of her illness. "It wasn't sticking to me because I didn't want to be like that. I didn't want to think about having this illness," she says. "That woke me."

The people close to Tyra know her status. This includes her boyfriend. "He was glad I told him. He's a caring person. I was pretty comfortable telling him—but we knew each other for a few years, first.

"I used to think 'Why me?'" she says. "But if I didn't have HIV, I would have had a baby already. I've always used protection. I used sex as stress relief and didn't take anyone seriously. Now, I'm happy. I thought no one could love me, and I was going to be old and lonely. It feels so good that someone really accepts you."

ANTHONY,* 18, found out two years ago that he had been born with HIV. "I always had regular checkups where they took blood samples. I thought everybody went to the doctor every three months," he says with a shy grin. When tests showed a decline in his immune function, his doctor decided he needed medication.

"I couldn't believe it had happened to me—I was in shock," he recalls. "As I got to thinking about it, I started to get worried. I was 16! But it took me a short time to get over it, just two weeks." He also learned that the woman he'd called mom since age two was actually his father's cousin, who had adopted him. His father is still alive, but Anthony has no desire to know him.

The first few months on medication made him dizzy and drowsy, but after that, the side effects subsided. "At first, it was an obstacle," he says. "I made it my main goal to make sure the disease wasn't going to keep me back, and that forces me to take my medicine every day."

Outside of the monthly Bellevue support group he attends, he's decided to keep his status to himself, choosing not to reveal it even to his closest friends. "My mother worries," he admits. "She says I should try and get some feelings out."

With an A-minus average, Anthony plans to go to college to study computers. "I'm always fiddling with electronics, taking things apart and putting them back together." He's also crazy for basketball. At 6' 3" and 200 pounds, he is waiting to hear from his coach about a college scholarship. Learning his HIV status, he says, has made him a more careful player. Before a game, he'll study the opposing team. "If they're an aggressive team, I'm not going to drive to the basket. I'll take more jump shots," he explains. "I do play hard. I'm not playing aggressively, but I'm still playing effectively."

A serious relationship would be a "distraction" right now, adds Anthony. "I do think that [having the virus] has prevented me from getting close to a girl," he says. "But when the time comes, I'm going to tell her." ●

—AUBIN TYLER

** Names have been changed*

Back in the Game

A young girl's determination and the dedication of her team at Rusk Institute brought her back from a brain hemorrhage.

ON A SATURDAY MORNING in October 2007, Michelle DelPin and her mother, JoAnn, were getting ready to drive to a cousin's wedding on Long Island. Without warning, the 13-year-old felt as though she'd been hit on the head by a sledgehammer. When a CT scan at their local emergency room in Brooklyn showed a brain hemorrhage, she was transported to NYU Langone Medical Center. The speed with which all this happened stunned her mother. Instead of partying at a reception, she was walking into a room in the Pediatric Intensive Care Unit (PICU) at Tisch Hospital where a team led by David Harter, MD, assistant professor of pediatric neurosurgery, was waiting for her and Michelle.

For Dr. Harter, this initial meeting is the most difficult: "A parent literally has to turn her child over to you, to trust someone she just met."

Tests showed a congenital arteriovenous malformation in her brain, a tangle of abnormal blood vessels. These malformations can occur anywhere in the body. About 300,000 people in the United States have them, but many never develop symptoms. Every year NYU Langone Medical Center treats about five to 10 children who develop cerebral complications. In Michelle's case, the tangle of blood vessels had grown tighter and tighter over the years until a vessel burst. Renegade blood shot into the brain, destroying tissue and putting dangerous pressure on delicate structures.

Michelle had surgery to remove the arteriovenous malformation and subsequently to install a shunt for hydrocephalus (water on the brain). Working deep in the cerebellum, near the brainstem, Dr. Harter knew the risks: "She could have had problems with speech, with balance, eye movements, consciousness. She could have been in a coma forever."

When Michelle began to wake up, says Dr. Harter, "We could see she had been profoundly affected by the hemorrhage. She barely opened her eyes—it was very scary."

After her surgery, doctors and therapists from the Rusk Institute of Rehabilitation Medicine visited Michelle in the PICU. Rusk, the largest center in the world devoted exclusively to rehabilitation

ABOVE: Michelle DelPin works on her balance with Rusk therapist Ashley Sefecka.

PHOTOGRAPH BY ELIZABETH WEINBERG

care—and the first, founded in 1948—treats hundreds of children annually for brain injury. A team led by David Salsberg, PsyD, clinical instructor in rehabilitation medicine and pediatrics and director of pediatric psychology and neuropsychology at Rusk, assessed Michelle's cognitive state: "We always assume the child as a whole is in there," Dr. Salsberg says, "but when you meet a blank stare, it's hard to gauge what's inside."

The next step was to establish communication, a job that fell to Laura Brooks Newcomb, supervisor of speech and language pathology. She found that Michelle could speak with her eyes: closing them signaled Yes, keeping them open meant No. Laura was excited by Michelle's response: "You start by asking simple questions like: Is your name David? Are you eight years old? She nailed every one." From that moment Laura knew Michelle was in there, and she never wavered in her commitment to help the girl speak again.

Over the eight months Michelle was an inpatient at Rusk, medical professionals from many disciplines helped her: speech therapy, physical therapy, occupational therapy, swallow therapy, vision therapy, neuropsychology, recreational and music therapy, social work and nursing.

Michelle had to relearn everything most of us take for granted. At one point her therapists realized she had little sense of what it meant to be upright. They brought in a mirror so she could see what upright looked like, to help her brain recognize what upright felt like.

She had to be taught where her midline was so she could coordinate the right and left sides of her body. She also had difficulty coordinating the upper and lower halves of her body. Ashley Sefecka, senior physical therapist, used a foam-lined suit that strapped snugly around the trunk of Michelle's body to facilitate muscle activation. The purpose of the suit was to help connect her upper and lower body and retrain them to work together so that both halves could act in unison.

Occupational therapists taught her skills of everyday living: how to button a button, zip a zipper, brush teeth, brush hair, and other activities so basic most people don't think of them as activities—like holding a sandwich with two hands. When one hand has more tremors than the other, getting them to work together is no small feat. To relearn these skills, exercises must be done over and over again, requiring infinite patience on the part of the therapist, the patient, and the parent.

Every person interviewed for this story used the same word to describe Michelle: determined. Ashley Sefecka, her primary physical therapist, says, "Michelle is the most determined young lady I have ever met. Even on a rough day, she still gave 150 percent."

For five months during her rehabilitation, the degree of difficulty was heightened because Michelle could not speak and had to rely instead on devices such as an alphabet board. Her speech pathologist would point to the letters A, B, C, D until Michelle closed her eyes, which meant the therapist had reached the next letter in the word she wanted to spell—and keep in mind the letter might have been Z.

Everyone, including Michelle, agrees she would never have made so strong a recovery without the unflagging support of her mother and her sister Kristen. JoAnn moved into the hospital. Her boss lent her his laptop so she could work while Michelle was in therapy. She slept on a recliner in Michelle's room. The family's steadfast friends were always on call, ready to step in if JoAnn had to leave the hospital. Michelle was never alone.

▸ SUDDENLY DURING A THERAPY SESSION MICHELLE SAID "MOM." BY THE END OF THE DAY SHE WAS PUTTING SENTENCES TOGETHER.

During her hospitalization Michelle sorely missed her beloved terrier Marshy. In January, Dr. Harter finally gave permission for a visit. When Marshy saw Michelle, she jumped up on her hind legs and pawed the air, her claws frantically trying to get a purchase on the linoleum so that she could get to Michelle faster. When Marshy got into her lap, she burst into tears. Until that day, Michelle's therapists had never seen her cry, even when she was in pain. Samantha Muscato, senior occupational therapist, believes that finally being able to express her emotions freed Michelle. "From there she took off—moving so much more and interacting with us so much more," says Samantha. "Pet therapy is very beneficial." Still, Michelle could not talk. By March, some on her team were beginning to fear she never would.

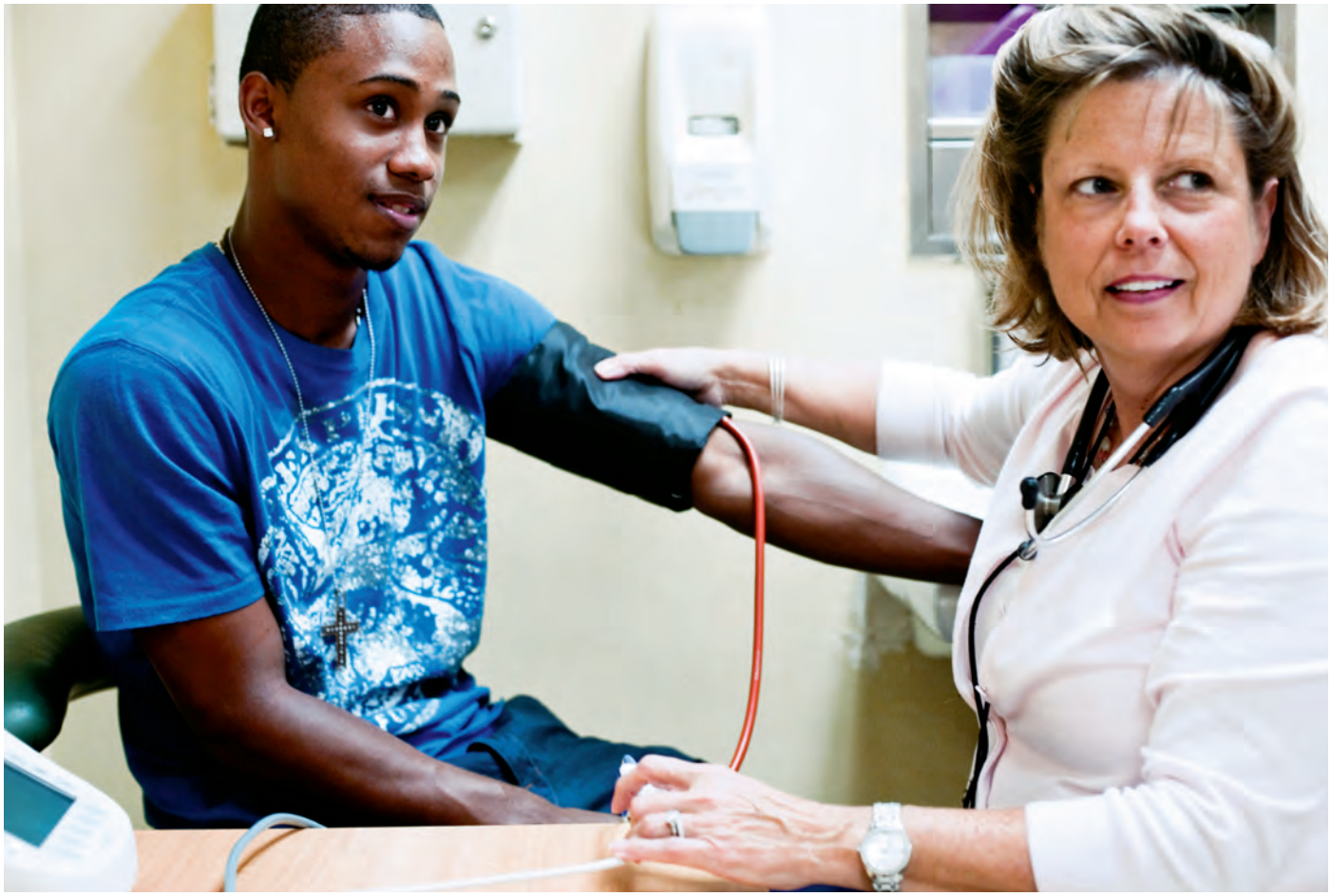
Then suddenly, during a therapy session Michelle said "Mom." Her speech therapist Laura Brooks sent for JoAnn, who arrived to hear her child saying Mom over and over again. Laura felt great relief—something in Michelle's brain had taken fire. By the end of the day she was putting sentences together. Michelle remembers saying, "'I'm cold. I need a blanket.' Everybody was so happy and yelling, and I'm thinking, Hey, did anybody hear me? Eventually, I got the blanket."

For Dr. Salsberg, the most important goal was still in the distance. "We get our young patients back to as much of themselves as we can, but if we don't reintegrate them into their lives, which means getting them into school, it's a failure." He was worried about the challenges Michelle would face after she left the hospital in May 2008. She was going to have to learn strategies to compensate for the fact that her hydrocephalic brain needed extra time to process information, to comprehend what she read, to problem-solve. Over the next two years, the staff at Rusk negotiated to make sure that she got all the special education supports she needed, including tuition at a private school, paid for by the City of New York. Michelle has lived out Dr. Salsberg's vision. This fall she is an honors student in the 11th grade.

Michelle says that, before her hemorrhage, she was a quieter person. Her values and beliefs were strongly held, but she didn't always express them, fearing, as many eighth-graders would, that others might think her foolish. Today frankness is her trademark. But she is also gentler. Her medical calamity changed her. "I'm more charitable," she says, "I appreciate how precious life is."

Michelle's therapies will continue indefinitely. When she comes for outpatient visits, her therapists love to see her because she is delightful—and because her progress inspires them. Their work made her recovery possible. As Miriam Sabbagh, supervisor of pediatric occupational therapy, says, "People come to Rusk for a chance to work with other professionals who have dedicated their lives to children. Their compassion is contagious." ●

—GAY DALY



Taking Charge of Their Own Health

A school-based health clinic shows students how.

AS SOON AS HE made the catch, Alex Triunfel knew something wasn't right. A junior at Norman Thomas High School in New York City at the time, Alex was playing right field for the baseball team and dove after a sinking line drive, the ball landing softly in his glove. When he came up, he couldn't lift his arm. His shoulder was dislocated. Surgery and months of physical therapy lay ahead of him.

If Alex had attended any number of other public high schools in New York, he might have been forced to negotiate the complexities of the healthcare system and search out proper medical care on his own. But at Norman Thomas he had Debbie Arnold, MSN, MPH, on his side. Arnold is the nurse practitioner at Norman Thomas's school-based health center. Before taking on her current job four years ago, she worked for 13 years as a nurse practitioner at Bellevue Hospital, which sponsors the center.

The clinic's doors are open Monday through Friday during school hours, and the six plastic chairs in its small waiting area are almost always occupied. Last year, Arnold and her staff processed approximately 6,600 visits, including several by Alex Triunfel, who graduated last spring and did his rehab under Arnold's guidance.

"Debbie's always been there for me," Triunfel says. "She was always making appointments for me and checking up on me. Even though I'm going on to college now, I'm still going to come back to see her."

ABOVE: Debbie Arnold, nurse practitioner, with recent Norman Thomas High graduate Alex Triunfel.

As of November 2009, there were more than 1,900 school-based health centers across the country. Fifty-seven percent are located in urban communities, including more than 130 in New York City. Many of these are based at schools like Norman Thomas, on 33rd Street and Park Avenue in Manhattan, a school with more than 2,000 students, nearly three-quarters of whom are eligible for free or reduced-fee lunches, and where the four-year graduation rate is 37 percent. Two out of every three centers are affiliated with a local hospital, health center, or health department.

PHOTOGRAPHS BY **ELIZABETH WEINBERG**

Bellevue's proximity led to its sponsorship of the Norman Thomas clinic, which began a decade ago. (The hospital also sponsors a clinic at nearby P.S. 51 in Manhattan.)

The philosophy behind the centers is simple: Young people who might not otherwise seek medical care will do so when it's available right down the hall and can be visited at their convenience. Appointments are encouraged, of course, but walk-ins are the norm. Even during summer-school sessions in mid-July, a regular stream of students parades through the door of the 10th-floor office in search of treatment and advice. This easy relationship is an outgrowth of the clinic's on-campus setting, says Arthur H. Fierman, MD, associate professor of pediatrics at NYU Langone Medical Center and director of Bellevue Pediatric Ambulatory Care, who helps oversee the center. "In the school, it's their turf," he notes. "It's like they're in their own home, without their parent."

The familiarity of Arnold and her colleague Rhonda James-Rodney, a pediatric nurse practitioner, with the physicians at Bellevue is an added advantage. In a case like Alex's, they can place a call to an orthopaedic surgeon to schedule an appointment. When a student was diagnosed with lupus, they immediately set her up with a rheumatologist. One student was 20 years old and had lived his entire life with six fingers on each hand; they were able to refer him to a specialist. They sent another teenager with appendicitis straight to Bellevue's emergency room, alerting the attending physician.

If students don't have health insurance (30 percent of the visitors to New York State's school-based health centers in 2008-2009 lacked insurance), Arnold and her staff can set them up with it. If a student is more comfortable speaking Spanish or the student's parents speak only Spanish translation services are available. Arnold's patient care associate, Inez Carriel, helps students and families navigate. There are two examination rooms. Social workers treat students with mental-health issues from a classroom-sized office next door and also run several well-attended support groups.

The Norman Thomas administration is supportive, says Arnold. The consent form for the clinic is part of the school's enrollment package, and every student who takes an English class is shown a video on reproductive choices called "My Life, My Decision." Afterward, a staff member makes a pitch for the clinic.

A cluster of laminated signs on the wall of the waiting room emphasizes what is perhaps the most crucial aspect of the clinic's success: WE RESPECT YOUR PRIVACY, one sign reads. Given that approximately half of the visits to the clinic involve reproductive health issues, trust is crucial. In compliance with state law, Arnold and her staff can see patients and distribute birth control and emergency contraception; and while they preach abstinence first, their main emphasis is on responsible decision-making. They also screen for sexually transmitted infections, which are most common among adolescents and young adults.

Sometimes Norman Thomas students even bring in friends from other city high schools. "We don't see a lot of the crassness and disrespect you might see schoolwide," Arnold says. "The students are always very polite. They treat us the way we treat them." "We don't talk down to them," adds Sherri Panikoff, one of the clinic's social workers.

Because of this, the clinic has become a refuge for students dealing with delicate issues, and not just those centered around reproductive health. In New York, nearly 40 percent of public school students are overweight or obese, putting them at risk for type II diabetes. When Antonio Convit, MD, professor of psychiatry and medicine, developed the Banishing Obesity and Diabetes in Youth (BODY) project, to screen, diagnose, and intervene with students at Norman Thomas and another school-based health clinic in the city, Arnold's staff arranged space and access for his team. The center continues to play a key follow-up role with at-risk students, helping them to stick to their dietary and exercise programs and referring them to specialists when necessary.

"We try not to make it about the kids' size," Dr. Convit says. "We say, 'This isn't about getting you into a size-6 dress, or 32-inch-waist pants. This is about getting you healthy.'" Last year three students enrolled in his study were diagnosed with type II diabetes, while 32 percent of the obese students had marked insulin resistance—a prediabetic condition that Dr. Convit's research has shown can lead to cognitive problems.

The BODY project is funded by WellPoint Foundation, Assurant Health Foundation, and the Dr. Robert C. and Veronica Atkins Foundation.

Despite their numerous successes, Arnold and her staff have also experienced their share of frustrations. Until recently the clinic had a full-time dental hygienist, but funding for the position was pulled. Even with their steady flow of patients, Dr. Fierman says, school-based clinics like the one at Norman Thomas don't generate much revenue. Due to the sheer volume of appointments, the staff often find themselves staying late to code electronic records, and they sometimes have to clean their own office.

Still, there's nowhere Arnold would rather be. "This is an environment where you can make a difference," she says. "We really empower kids to take responsibility for their own health care." ●

—MICHAEL WEINREB

LEFT TO RIGHT: Norman Thomas student Shanice Rivera, social worker Sherri Panikoff, student Lisbeth Infante, pediatric nurse practitioner Rhonda James-Rodney, and Alex Triunfel.

Dr. David Keefe in the nursery at Tisch Hospital.

FAMILY MAN

A CONVERSATION WITH DAVID L. KEEFE, MD, A DEVOTED SCIENTIST AND PHYSICIAN WHO DIAGNOSES AND TREATS WOMEN WITH INFERTILITY.

DAVID L. KEEFE, MD, who was appointed chair of the Department of Obstetrics and Gynecology last year, is a psychiatrist and specialist in reproductive endocrinology, a unique blend of skills. An award-winning teacher and researcher, Dr. Keefe has devoted his laboratory work to stem cell and embryo biology. This father of seven is also a clinician, who brings a special sense of understanding and respect to his work diagnosing and treating women with infertility.

How did you arrive at a career in reproductive medicine? After completing a residency in psychiatry at Harvard, I went to Northwestern on an NIH-funded fellowship where I studied how hormones affect the brain and discovered a newly emerging subspecialty of OB/GYN called reproductive endocrinology. It was an exciting time. The first in vitro fertilization (IVF) baby had been born just a few years before, and the field was exploding. I realized that the science I was using in my own research was being applied to human health in a very direct way that I found appealing.

My wife, Candy, who was an on-air TV personality at the time, was willing and able to support us while I completed a second residency in OB/GYN and a second fellowship in reproductive endocrinology at Yale, a pioneer in the field of reproductive medicine. Candy had started out as an elementary-school teacher and, having switched careers herself, knew the importance of finding something that you feel passionate about and do well.

We had our first child in 1983, fortunately without any fertility problems. Still, my daughter's birth was a source of absolute joy and made me realize how transformative the experience of building a family could be. I recognized that the two specialties in which I had trained, OB/GYN and psychiatry, really were one. Combining them in a career in reproductive endocrinology allowed me to work with the complete patient. Never for a moment have I regretted that decision.

How has psychiatry enhanced your approach as a fertility doctor working with patients? OB/GYN is very technical and surgical in its approach, which of course is important. And while much of my work in IVF and reproductive surgery depends on those skills, they are not sufficient. Psychiatry taught me that words can be as powerful as a scalpel and that they must be wielded skillfully for the good of the patient. Some of my colleagues say I never left psychiatry because I use it every day in what I do.

Unlike many areas of surgery, in reproductive medicine the cures are rarely definitive, and treatments never 100 percent effective. Invariably, there's disappointment. Part of the treatment is to alleviate suffering, to work through painful emotions so that patients can continue in treatment until it works or until they decide to pursue other approaches to build their families. Applying the language and mindset of psychiatry to infertility has been tremendously valuable.

Also, the dynamics of working with couples can be challenging for those of us whose training focused on the one-on-one doctor–patient relationship. During infertility treatment typically three of us sit in the consult room: the wife, the husband or partner, and the doctor. Psychiatric training helps me to understand group dynamics and to avert some of the conflicts that arise, so we can move forward together as a team.

Why is the treatment of infertility so stressful? The diagnosis of infertility cuts to the core of who we are and where we are going as human beings. Our evolutionary hard wiring to reproduce is on a direct collision course with the changing role of women in modern society. Couples often come to us feeling dehumanized and embarrassed by the insensitive comments of family and friends. The treatment of infertility can be painful, exhausting, expensive, and time-consuming. Yet many patients are remarkably resilient, becoming so knowledgeable about infertility that they could pass medical boards on the subject!

What is the focus of your own research? I am interested in how aging affects eggs and how eggs can be used to make stem cells. The best predictor of IVF outcome across the world is the woman's age. Yet women of the same age have variable success rates, suggesting that biological age is more important than chronological age. We study the biology of egg aging.

Our working theory is that with age, the telomeres [the caps at the ends of chromosomes] in eggs shorten, which lowers their fertility and diminishes their longevity. We have done some clinical studies which show that telomere length can help predict a woman's outcome following IVF. This assay could help women decide when to pursue treatment using their own eggs versus undergo egg donation or adoption, which otherwise is a very tough decision.

Why do you study stem cells? Our thinking is that if a woman could freeze her eggs when she is young, she could not only store them for future reproduction but also to make stem cells for regenerative medicine. We've already created stem cells from mice eggs which can differentiate to almost any cell type, including heart, brain, or cartilage cells. Making stem cells from eggs rather than embryos avoids the religious/ethical controversy over embryonic stem cells because nobody could make an embryo out of these eggs without a sperm. But they create beautiful stem cells that are immunologically compatible with the woman and offer the potential for "spare parts" as she ages, becomes ill from a degenerative disease, or suffers traumatic injury.

What is it like being the father of seven children? I guess you can say I practice what I preach. Both my wife and I are from large families. Our seven children range in age from 14 to 27 and there are challenges and tradeoffs. We have no lives outside of our kids and our work, but they are what we live for. We try to set examples, by striving every day to do something bigger than ourselves, through service and through dedication to each other. My wife is the real CEO. She used to anchor a news desk and now she anchors our home front. No doubt her current job is even more demanding than her prior one. ● —*IRENE S. LEVINE, PhD*

PHOTOGRAPH BY **SASHA NIALLA**

The Case of the One-Sided Clock

SITTING AT HER DESK AT THE *NEW YORK POST* one day in March last year, fledgling reporter Susannah Cahalan started crying hysterically. Minutes later, she was laughing giddily and skipping down the hall. Cahalan, 24, had had several troubling and inexplicable moments in recent days. Walking through Times Square, she'd suddenly found the sky so bright a blue and the billboards so violently colored that her eyes hurt. She'd also begun feeling a weird tingling in her left arm and leg. Panicked after her work outburst, she contacted a neurologist, who ordered an MRI and other tests. They came back negative.

Days later, while watching TV with her boyfriend, Cahalan had a seizure. She remembers nothing of the next month but has pieced together what happened through interviews with family and friends and reading notes kept by her father. She awoke in a hospital. A CT scan showed no brain abnormality, and she was released. But her behavior turned bizarre. She couldn't sleep and stopped eating. She began hallucinating, imagining that her father had killed his wife, and she became paranoid, ranting that her physicians were out to get her. She had a second seizure. Doctors trotted out various diagnoses—a viral infection; alcohol withdrawal (though she was a light drinker); epilepsy; bipolar disease; an unspecified mental illness—but none fit.

Admitted to NYU Langone Medical Center after a third seizure, Cahalan's mad behavior and delusions mounted. She ripped off electrodes monitoring her brain activity, ran down the halls searching for an escape, accused the woman in the next bed of taping her conversations, and punched a nurse taking her blood pressure. Medications dampened her paranoia, but despite visits by a panoply of specialists, including internists, infectious disease experts, immunologists, psychiatrists, and psychopharmacologists, and a battery of tests, including MRIs, sonograms, X-rays, and PET/CT scans, no definitive diagnosis emerged.

As the days passed, Cahalan became withdrawn and listless and barely coherent. Doctors feared that she was slipping away. Finally, they asked Souhel Najjar, MD, clinical associate professor of neurology, who is known to have success with difficult cases and baffling symptoms, to see her. "Souhel Najjar has a remarkable intuition magnified by an encyclopedic knowledge of many fields," says colleague Orrin Devinsky, MD, professor of neurology, neurosurgery, and psychiatry. The Syrian-born Dr. Najjar also possesses an unusually comprehensive background as a neurologist, neuropathologist, and epileptologist. Says Dr. Devinsky: "Dr. Najjar's training gives him sort of X-ray vision. He sometimes links a patient or an MRI to a slide he saw a decade ago. And magically he sees the diagnosis the rest of the world missed."

"When I saw Susannah," says Dr. Najjar of his first meeting with her, "I knew I could help her. I held her hand and told her, 'You have to trust me. I'm going to pull you out of this.' She looked at me with tears in her eyes. It was the only time she made eye contact."

Given Cahalan's constellation of symptoms—seizures, catatonia, high blood pressure, and high white blood cell count—Dr. Najjar suspected that she was suffering from a rare and often misdiagnosed illness: autoimmune encephalitis. "That is, her body was attacking her brain. The problem was to prove it because the brain scans were coming back negative. We had to biopsy the brain, but where to take the tissue from?"

Dr. Najjar handed Cahalan a pencil and piece of paper and asked her to draw a clock. "She filled in numbers on the right side but none on the left. That neglect indicated that the right side of her brain was inflamed, and that's where we biopsied." Dr. Najjar sent the tissue, along with samples of Cahalan's blood and spinal fluid, to Josep Dalmau, MD, PhD, a neuro-oncologist at the University of Pennsylvania.

Two weeks

Susannah Cahalan with her neurologist, Dr. Souhel Najjar.

later, the results came back confirming Dr. Najjar's diagnosis and identifying the type of autoimmune encephalitis. Cahalan was creating antibodies to the N-methyl-D-aspartic acid receptor (NMDAR). The receptors are widely distributed within the brain, especially the frontal lobes that control cognitive reasoning and the brain's emotional center. Dr. Dalmau had discovered these antibodies in 2003. Cahalan is the first person at NYU Langone Medical Center to be diagnosed with anti-NMDAR encephalitis. "Susannah's brain cells were being excited to death by these antibodies leading to brain injury and inflammation, that are supposed to protect the body from foreign infections," observes Dr. Najjar.

Anti-NMDAR strikes patients of any age group, but mostly women, often in their child-bearing years. "In about 50% of cases in Susannah's age group, the disease is caused by tumors of the ovary, but in the rest, as with Susannah, we don't know the cause. We speculate that there might be some inherited DNA glitch that gets triggered by an environmental factor, perhaps a virus."

Dr. Najjar estimates that until recently, nearly 90% of people with autoimmune encephalitis of all types went undiagnosed. "People have been locked away in nursing homes and mental hospitals, just wasting away," he says. "Awareness is slowly evolving. Doctors are identifying more and more cases each year as they become more alert to the illness. We now diagnose around 200 cases a year in the U.S. Next year, my guess is we'll identify double that. But the word needs to get out still more—70% of these patients are first seen by psychiatrists. These patients need to receive thorough neurological examinations by someone familiar with autoimmune encephalitis."

To combat her illness, Cahalan received immunoglobulin and steroids to reduce the brain inflammation. Then she was hooked up to a plasmapheresis machine to flush the harmful antibodies from her blood. A year later, Cahalan is back to normal and back to work.

"Susannah is a wonderful lady, highly intelligent and absolutely lively," says Dr. Najjar.

She returns the compliment. "Dr. Najjar is a very special person, not only a great doctor. He's so successful because he cares so much." ●

—ANASTASIA TOUFEXIS

PHOTOGRAPH BY
SASHA NIALLA

A Country Doctor

Steven Smith, MD, works overtime to care for a small community in rural Florida.

AT 10 O'CLOCK IN THE EVENING, when most other people are getting ready for bed, Steven Smith, MD ('74) finally closes up shop for the day at his family medical practice, where he may see 50 patients a day. He tends to do his grocery shopping late at night for that reason, and because he knows just about everyone in town, he is less likely to be waylaid by someone seeking a diagnosis in the cereal aisle.

Raised in the Westchester suburbs of New York City and trained in the Big Apple, Dr. Smith has spent the past 31 years treating patients in and around Marathon, a community of just over 10,000 midway down the Florida Keys, about 100 miles from Miami in one direction and 50 miles from Key West in the other.

How does he feel about being the go-to person for small and large medical issues at any time of the day or night? "It's part of the job, I guess," says Dr. Smith. "It's nice to be relied on and respected."

A long swath of the southernmost area of the continental United States relies on Dr. Smith. Not only is he a general practitioner with a robust primary care practice, but he is also a board-certified surgeon and the only general surgeon now in town after his lone colleague relocated last year. Mornings usually find him at Fishermen's Hospital in Marathon, performing a wide variety of scheduled procedures and operations. Dr. Smith ticks off the most common: "surgical endoscopies, colonoscopies, hernia repairs, breast surgery, gallbladder surgery, colon surgery, gastric surgery, bowel surgery, some vascular surgery." Beyond that, he's on call 24/7 at Fishermen's emergency room, where he deals with anything from shark attacks to car accidents to bullet wounds.

Dr. Smith's humanitarian commitment—his typical work week averages about 100 hours—and the diversity of skills he brings to his vocation are why Staff Care, a company that provides temporary staffing services for healthcare facilities around the country, recently named him 2009 Country Doctor of the Year. It was the first time the organization has given the award to a dual-purpose physician who also performs surgery, rather than someone who is strictly a family-care practitioner.

Dr. Steven Smith

PHOTOGRAPH BY **SAM KENNEDY**

The award was created in 1992 to highlight the extraordinary dedication of rural doctors who practice in communities with populations of 20,000 or less. "Younger doctors usually train in large urban hospitals where they are used to having a lot of specialists around and all the latest technology," notes Phil Miller, director of communications at Staff Care. "To go from that to a remote area where there may not be anyone to consult with as you're making life or death decisions isn't easy." In Miller's view, professional isolation has contributed to the shortage of physicians in rural areas. (See sidebar.)

To Dr. Smith, the spectrum of tasks that rural doctors perform makes his work both satisfying and very challenging. "That's my favorite part of the job. You never know what you are going to be doing," he says. At the same time, he acknowledges that it can be lonely in a way that comes from bearing great responsibilities. Dr. Smith recalls one patient who almost lost a leg because an infection wasn't responding to treatment and no hospital in the metropolitan areas of Dade and Broward counties would accept him because he didn't have insurance. "Fortunately, I made a good guess that his problem might be fungal," he says, "and all of a sudden it turned around and we were able to save his leg. But it could just as easily have gone the other way."

Dr. Smith found his way to Marathon by way of a five-year residency at the Tulane University division of Charity Hospital in New Orleans. "I really enjoyed my time at NYU, but I didn't enjoy New York City," he says. "The living conditions were too packed, and I felt claustrophobic." At that time he was a trumpeter who moonlighted in show and dance bands, so he headed for the Crescent City, where the demands of his clinical rotations soon squeezed out any kind of performance schedule.

"As part of my residency, I was sent out to some very rural hospitals where I was the most senior physician," he recalls. "I found myself taking care of a whole range of surgical emergencies." When it came time to move on, he harkened to a passion for the water, instilled in him as a child through hours spent on Long Island Sound with his father, Louis, who was also a physician and NYU School of Medicine graduate ('42), as is Dr. Smith's brother, Neil ('78). He sought out a job on the Keys, figuring that if his recreational time was going to be limited, he wanted to be close to activities that he loved, like diving and fishing. He convinced his wife, who helps maintain his office, to try it out for a year. That was in 1979.

▸ "THAT'S THE FAVORITE PART OF MY JOB. YOU NEVER KNOW WHAT YOU ARE GOING TO BE DOING."

His workday typically starts in the operating room at 7:30 a.m. After seeing dozens of patients in the afternoon and evening, the wee hours might still find him in the emergency room, tending to extreme cases. Although it is a grueling schedule, the proximity of the Atlantic and being tightly woven into the fabric of the Keys bring great satisfaction. As Dr. Smith says, with characteristic understatement, "It's nice to be part of a community." ● *—ERIC GOLDSCHEIDER*

A Vanishing Breed

ARE COUNTRY DOCTORS A VANISHING BREED? As longtime rural practitioners like Dr. Steven Smith approach retirement age, researchers and policymakers are increasingly concerned that there aren't enough young physicians to replace them. "The number of doctors practicing in rural areas is not keeping up with the number of people living in these areas," says Dr. Frederick Chen, a family doctor who is also a researcher with the federally funded Rural Health Research Center at the University of Washington School of Medicine in Seattle.

Dr. Chen was lead author of a study that tracked the 175,649 clinically active physicians in the U.S. who graduated from medical school from 1988 through 1997 to find out where they are heading geographically. The study, published in 2008, shows that by 2005, when most were well into their residencies or beyond, barely 20,000 of them, or 11 percent, had chosen to settle in a rural community.

One reason for this disparity, according to the study, is that most young doctors now gravitate to specialties, leaving far fewer generalists capable of discharging the wide range of duties required of a country doctor. According to the American Academy of Family Physicians, the percentage of medical school graduates opting for primary care residencies dropped by 53.7 percent from 1997 through 2009.

This declining interest in primary care is causing alarm among those already concerned about the shortage of doctors in rural America. "The majority of physicians who take care of rural communities are primary care doctors," says Dr. Chen. "We are really worried about the implications of this trend for rural areas."

Dr. Chen's report was done for the Health Resources and Services Administration (HRSA), a division of the U.S. Department of Health and Human Services. Joan Van Nostrand, PhD, director of research for HRSA's Office of Rural Health Policy, says that one of the solutions being actively pursued is to get more young people from sparsely populated areas interested in medical careers through outreach efforts starting as early as the fourth grade.

Doctors who grew up in rural areas "understand the problems in terms of health status, health behaviors, and infrastructure," notes Van Nostrand. Just as important, she adds, "They tend to go back to rural areas after they've been educated and gone through their residencies." The future answer to the shortage, in other words, could very likely come from the same children that America's country doctors are working overtime to care for today.

Dr. Saxe Named Chair of Child and Adolescent Psychiatry

GLENN SAXE, MD, has been appointed chair of the Department of Child and Adolescent Psychiatry and director of the Child Study Center. Previously, he was associate professor of psychiatry at Harvard Medical School and an attending psychiatrist at Children's Hospital Boston. Dr. Saxe's primary research interest is in childhood traumatic stress, specifically using innovative methods to elucidate the biobehavioral processes that lead to mental health issues in traumatized children. Over the last 15 years, he has conducted a series of studies to identify how psychosocial, behavioral, and biological processes interact in the formation of traumatic stress in children. The research, largely funded by the National Institute of Mental Health, uses longitudinal research methods to understand risk and resilience in acutely traumatized children.

Prior to joining Harvard, Dr. Saxe was chair of the Department of Child and Adolescent Psychiatry at Boston University School of Medicine and an attending psychiatrist at Boston Medical Center. He earned his undergraduate degree from McGill University and his MD from McMaster University in Canada. He completed residency training in psychiatry at Massachusetts Mental Health Center, a fellowship in traumatic stress disorders at Massachusetts General Hospital, and a fellowship in child and adolescent psychiatry at Cambridge Hospital in Boston. ●

DR. BLASER RECEIVES INNOVATIVE PROJECT AWARD

MARTIN J. BLASER, MD, the Frederick H. King Professor of Internal Medicine and chair of the Department of Medicine, received a five-year award from the National Institutes of Health aimed at encouraging exploration of exceptionally innovative and original research ideas. Dr. Blaser was among 20 investigators nationwide who received the NIH Director's Transformation Research Projects (T-RO1) award, which allows investigators to pursue high-risk, original research projects that have the potential to overturn fundamental paradigms, according to the NIH.

Dr. Blaser and his colleagues will evaluate whether the use of antibiotics in children has led to the gradual disappearance of key bacteria in the human gastrointestinal tract, including *Helicobacter pylori*, and contributed to rising rates of obesity in children today. This research is part of the study of the human microbiome, the trillions of bacteria that inhabit our skin, teeth, stomach and other internal organs, which seeks to understand how changes in the composition of the microbiome influence human health and disease. The NIH award of some $6.6 million will be used to fund microbiome studies in many departments at NYU Langone Medical Center, including the Departments of Medicine, Pathology, Radiology, Obstetrics and Gynecology, Environmental Medicine, and Microbiology.

"Right now, antibiotics are used in children early in life to treat ear infections and other ailments, and the thought process is that it may not help, but it certainly doesn't hurt," says Dr. Blaser. "But what if antibiotic use actually hurts? What if there are unintended consequences of the use or overuse of antibiotics? This is the question we hope to answer." ●

DR. CHAO TO LEAD SOCIETY FOR NEUROSCIENCE

MOSES V. CHAO, PhD, professor of cell biology, physiology and neuroscience, and psychiatry and a member of the Molecular Neurobiology Program at the Skirball Institute of Biomolecular Medicine, is the president-elect of the Society for Neuroscience, an organization of more than 40,000 physicians and scientists devoted to the study of the brain and nervous system. As president, Dr. Chao plans to focus on increasing public awareness of neuroscience research, the need to recruit more women to academic and leadership positions in the field, and the need for more basic research.

Dr. Chao received his doctorate at UCLA and finished a postdoctoral fellowship at Columbia University. He joined NYU School of Medicine in 1998 after spending 14 years at Weill Cornell Medical College. A molecular neurobiologist, Dr. Chao is noted for his work on proteins called neurotrophins. These molecules are important for the growth and survival of neurons, among many other functions, and Dr. Chao cloned the first neurotrophin receptor.

In addition to his many research publications, Dr. Chao has served on the editorial boards of the *Journal of Neuroscience, Molecular and Cellular Neuroscience* and the *Journal of Biological Chemistry*. He has been an advisory board member for many institutions including the Christopher & Dana Reeve Foundation, the Simons Foundation, the Vollum Institute and St. Jude's Cancer Center; and his work has been recognized by a Zenith Award from the Alzheimer's Association, a Javits Neuroscience Investigator Award, and a Guggenheim Fellowship. ●

PHOTOGRAPH OF DR. SAXE BY MARK OSTOW

Urology Team Wins $8.2 Million to Study the Bladder

A MULTIDISCIPLINARY TEAM of NYU Langone Medical Center researchers led by Tung-Tien Sun, PhD, the Rudolph L. Baer Professor of Dermatology and professor of cell biology, pharmacology, and urology, received an $8.2 million grant to continue their groundbreaking research on the bladder.

The five-year grant is from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The team includes Xiangpeng Kong, PhD, associate professor of biochemistry; Gert Kreibich, PhD, professor of cell biology; Angel Pellicer, MD, PhD, professor of pathology; and Xue-Ru Wu, MD, professor of urology and pathology and vice chairman for urological research. The researchers are currently studying how the urothelium, the main cell type that covers the surface of the bladder, forms a highly effective barrier and how bacteria cause urinary tract infection (UTI). They hope to understand how the disease-causing bacteria interact with and invade host urothelial cells, a process common in recurrent UTI.

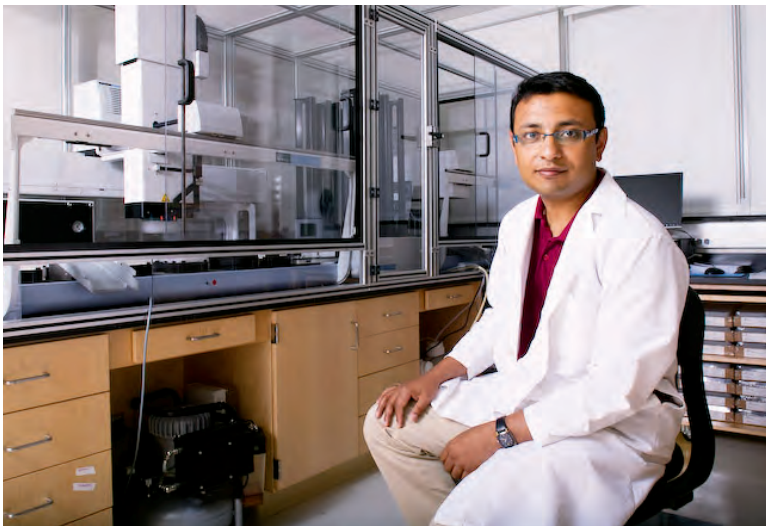
The most common cause of bloodstream infections by E. coli, UTIs cause 40,000 deaths from sepsis each year in the United States. Abnormalities in bladder urothelial cells are involved in several other urologic diseases including overactive bladder, painful bladder syndrome, which mainly affects women, and bladder cancer, the fourth most-common cancer in men.

"Dr. Sun and his multidisciplinary team are uniquely poised to address key questions regarding the structure and function of the bladder urothelium," said Chris Mullins, PhD, director of Basic Cell Biology Programs, Division of Kidney, Urologic and Hematologic Diseases, NIDDK. "Their work is expected to yield significant insights into the role these cells play in urinary tract infections." NIDDK is part of the National Institutes of Health (NIH) and the U.S. Department of Health and Human Services. ●

RNAi FACILITY TO EXPAND WITH NEW YORK STEM CELL GRANT

NYU LANGONE MEDICAL CENTER received a grant of $5.4 million from New York State to support a shared facility that will offer stem cell researchers cutting-edge technologies. The award to the Medical Center and Mount Sinai School of Medicine is from Empire State Cell Board's New York State Cell Science (NYSTEM) program and is part of an effort to maximize the expertise, efficiency, and quality of stem cell research in the state. The multi-institutional grant, one of seven awarded by NYSTEM last June, aims to foster collaborations between laboratories working with stem cells or conducting stem cell-related research.

NYU Langone will use the grant to expand its RNAi Core Facility and develop shared access with a similar kind of facility at Mount Sinai. RNAi, or RNA interference, are snippets of RNA that control gene expression, providing a powerful tool to investigate gene function and identify potentially novel therapies. The NYU facility is led by Ramanuj DasGupta, PhD, assistant professor of pharmacology. Dr. DasGupta is working with co-principal investigator Ihor Lemischka, PhD, professor of gene and cell medicine and developmental and regenerative biology at Mount Sinai School of Medicine.



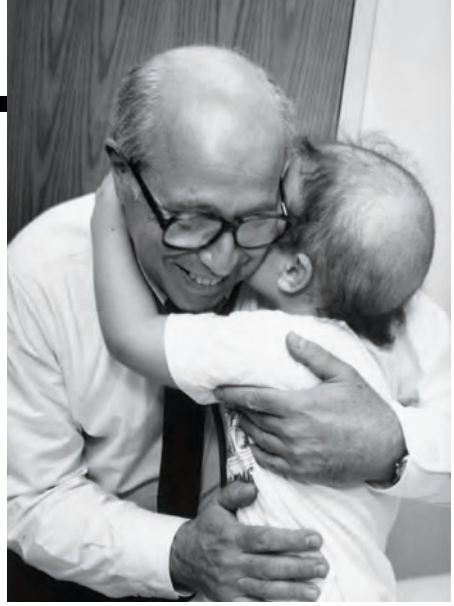
Dr. DasGupta in RNAi lab.

"This multi-institutional grant will serve the entire academic community in New York State, providing comprehensive technologies for stem cell research," said Ruth Lehmann, PhD, director of the Helen L. and Martin S. Kimmel Center for Stem Cell Biology at the Skirball Institute of Biomolecular Medicine, the Laura and Isaac Perlmutter Professor of Cell Biology, and a Howard Hughes Medical Institute Investigator. "The funding will prove invaluable for identifying new therapeutic targets," said Dr. Lehmann.

The NYU RNAi Core Facility was established in June 2008 with generous support from the Helen L. and Martin S. Kimmel Center for Stem Cell Biology and the NYU Cancer Institute. ●

PHOTOGRAPH OF DR. DASGUPTA BY BEN FERRARI

AARON RAUSEN, MD



AARON RAUSEN, MD, professor of pediatrics, founding director of the Stephen D. Hassenfeld Children's Center for Cancer and Blood Disorders, and former chief of pediatric oncology at NYU Langone Medical Center, died on July 7 at age 80 following a long battle with pancreatic cancer. During a 55-year career dedicated to treating leukemia and other blood disorders in children, Dr. Rausen helped transform his field from one in which, as he told *The New York Times* in 1991, "you...basically prepared families to grieve," to one where the majority of patients now survive and go on to lead full lives.

Along the way, he established a legacy as a brilliant and warm-hearted clinician who cared deeply about his young patients, including the many he treated pro bono. Wearing a doctor's jacket with "What's Up Doc?" emblazoned above the images of Bugs Bunny and Daffy Duck, Dr. Rausen pioneered techniques that made children active participants in their own therapy. "He was able to be on their level," recalled his daughter, Susan Drewes, because he kept "a child in his heart."

"Dr. Rausen saved my life and so much more," noted one of his former patients, Deborah Friedman. "I became a doctor because of him. He taught me that every day is a gift."

The son of Lithuanian immigrants, Dr. Rausen grew up in New York City and attended Dartmouth College and the State University of New York College of Medicine. After receiving his medical degree in 1954, he did his pediatric residency at Bellevue Hospital, followed by service in the U.S. Army Medical Corps. He went on to hold numerous posts, including director of pediatrics at Beth Israel Medical Center, before becoming NYU's chief of pediatric oncology in 1981. Named the first medical director of the Stephen D. Hassenfeld Children's Center in 1990, he guided its development into one of the nation's leading outpatient facilities for the treatment of childhood cancers and blood diseases. In 2008, his leadership was honored with a symposium titled "A Generation of Hope: Progress in Pediatric Hematology/Oncology."

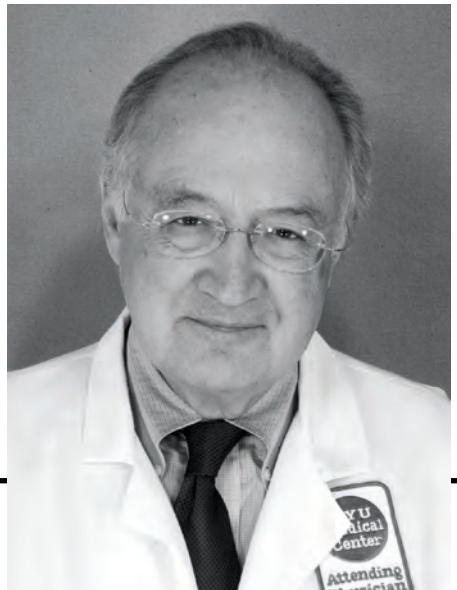
He was a board member of the American Cancer Society, the National Childhood Cancer Foundation, the Ovarian Cancer Research Fund, and the Ronald McDonald House, among other organizations. Dr. Rausen is survived by his wife, the former Emalou Watkins, his daughters Susan Drewes and Elisabeth Campo, and his son, David, and three grandchildren, Katherine, Alfred, and Annabelle. ●

JEAN-CLAUDE BYSTRYN, MD

JEAN-CLAUDE BYSTRYN, MD, professor of dermatology and a pioneering researcher in the fields of dermatology and immunology, passed away in August at the age of 72. A leading clinician-researcher and author of more than 270 peer-reviewed articles, Dr. Bystryn devoted his career to studying areas where the skin and immune system intersect—including groundbreaking efforts to develop a vaccine that boosts immunity against metastatic melanoma and investigations into autoimmune skin disorders such as pemphigus vulgaris.

"Dr. Bystryn was dedicated to doing whatever it took to help his patients," says Seth Orlow, MD, PhD, professor and chair of the Ronald O. Perelman Department of Dermatology. "But where he really stood apart was his willingness to go through the arduous process of subjecting new therapies to rigorous scientific investigation," says Dr. Orlow. "He was performing translational research long before the phrase came into existence, bringing samples from patients into the laboratory and taking insights from these studies back to the clinic to develop new therapies."

Born in Paris in 1938 to Jewish parents, Dr. Bystryn was sheltered by various individuals during the Nazi occupation before being reunited with his parents and his older sister, Denise, at the end of World War II. The family moved to New York City, and Dr. Bystryn studied biochemistry at the University of Chicago and then attended NYU School of Medicine, graduating in 1962. After completing his dermatology residency here in 1969 he joined NYU's faculty, where he focused on harnessing patients' own antibodies to fight melanoma by injecting them with proteins culled from laboratory-grown melanoma cells plus adjuvant chemicals to strengthen the immune response.



During his 40-plus years with NYU, Dr. Bystryn was the director of the Melanoma Immunotherapy Clinic, director of the Melanoma Program, director of the International Observership Program in Dermatology, and attending physician in the Bullous Disease Unit at the Charles C. Harris Skin and Cancer Clinic; he also was an NIH-funded researcher.

Known for his scientific and personal curiosity—his most recent journey was to the steppes of Kazakhstan in 2009 with his son, Alex, who was serving there in the Peace Corps—Dr. Bystryn is survived by his wife, Marcia, his son, and his daughter, Anne. ●

IN THE PAST TWO YEARS, these men and women advanced a tradition of selflessness at NYU Langone Medical Center by leaving legacies to benefit many:

Joan Antonucci
Frances Bailen-Rose, MD '38
Mitchell M. Benedict, MD '26
Paul Brieloff
Sylvia Brustor
Marion B. Carstairs
Joan Cherry
Antonina Chiaramonte
Alan Clahr
Harold S. Cole, MD '42
Max Cytryn, MD '38
Leroy G. Dalheim, MD '53
Dorothy Irene De Bear
Margaret A. Dow
Isabel Fine
Ralph S. French, MD '46
Kenneth M. Gang, MD '43
Helena L. Glover
Kermit H. Gruberg, MD '42
Helen G. Grunebaum
Walter A. Guensch, MD '43
Theodore Haber
Marshall J. Hanley, MD '45
Rose Heller
Benjamin H. Homan, Jr.
Camille Infranco
Stanley Allan Isenberg, MD '43
Mary E. Jones
Julius M. Joseph, MD '34
Jill Kaplan
Simon Karpatkin
Wallace Katz
Mary B. Ketcham
Stanley S. Kogut
Paul L. Kohnstamm
Lillian Keller Kuhn
Evan F. Lilly
Leah W. Linn
Helen Galland Loewus
Frederick Luederes
Irwin D. Mandel
Caryn Margolies
Morton Marks
Eli Mason
Claudia McClintock, MD '76
Eva U. Milenz
William J. Miller
Gene A. Morin
Stephen C. Moss
Suzanne C. Murphy
Anna May Nielsen
Abraham M. Oshlag, MD, '41
David Robinson
James L. Saphier
Joseph Schlackman
Peggy Sholtz
Barbara Skydel
Harold Snyder
Martin Spatz, MD '40
Bernard Stern
Marilyn Tomack
Zary Armand Toula
Lewis P. Waldhauer
Sandra Weber
Jules Whitehill, MD '35
Barbara Wilson, MD '49

During their lifetimes, they generously planted seeds of growth and change by naming NYU Langone as a beneficiary of their estates. Their support helps our talented physicians, scientists and educators continue to provide model patient care, groundbreaking research and transformative medical education, ensuring a brighter future in health care at our Medical Center and beyond. Today, we remember these dedicated leaders with special admiration.

plant a seed

For more information:
Marilyn Van Houten, Senior Director of Planned Giving,
at 212.404.3653 or marilyn.vanhouten@nyumc.org

NYU Langone Medical Center

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Office of Communications and Public Affairs
550 First Avenue, New York, NY 10016

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