

#11

IN *U.S. NEWS & WORLD REPORT*
FOR CARDIOLOGY &
HEART SURGERY

Pioneering

TECHNIQUES IN MINIMALLY
INVASIVE VALVE AND
ARRHYTHMIA TREATMENTS

Improving

RECOVERY
TIME

240+

SCIENTIFIC
PUBLICATIONS

\$25M+

NIH FUNDING



Cardiac and Vascular Institute

2015
YEAR IN REVIEW

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NYU Langone Medical Center's Cardiac and Vascular Institute is a national leader in clinical care, research, and education, and its contributions to the rapidly changing field of cardiovascular medicine are wide-reaching. We are pleased to share with you our 2015 report of achievements and milestones.

Cardiovascular medicine is in a period of exciting growth, opening up new possibilities for safely and effectively treating the most challenging conditions. We're proud to have helped to further the progress being made in the field. Over the past year, we have implemented new programs and enhanced existing ones to treat patients with hypertrophic cardiomyopathy, congenital heart disease, and other complex disorders. We have adopted an array of innovative techniques designed to minimize the use of anesthesia, the risk of complications, and the length of hospital stay and to increase use of minimally invasive approaches whenever possible, particularly for structural heart disease and vascular disease. For elderly and frail patients, who previously had few treatment options, these methods offer significantly improved opportunities for a successful outcome.

We have fostered the advancement of cardiac and vascular care through our continued investment in basic, translational, and clinical research. This year, we developed new laboratory models of heart disease, created novel stem cell systems to explore mechanisms of arrhythmia, and conducted public health research to illuminate the relationship between the environment and cardiovascular disease. In addition, we spearheaded major national clinical trials on new treatments for atrial fibrillation, aortic and mitral valve disease, and aortic aneurysms.

Propelled by a commitment to the community, we have expanded our ambulatory care network, bringing our knowledge and experience in treating heart failure to people where they live and work in New York City and beyond. And we have increased our focus on disease prevention with the launching of our Heart Balance Nutrition Program and free monthly Heart Health Lecture Series, both aimed at educating the public on adopting and maintaining a heart-healthy lifestyle.

At NYU Langone, we are honored to contribute to the goal of improved cardiovascular health and healthcare for our patients and for communities worldwide.

Cardiac and Vascular Institute

PATIENT VOLUME

300+

Transcatheter
Valve Procedures

400+

Minimally
Invasive Surgical
Valve Procedures

1,200+

Cardiac
Ablations

220+

Pediatric
Congenital Heart
Surgeries

1,400+

Fetal
Echocardiograms

4,600+

Pediatric
Echocardiograms

24,000+

Adult
Echocardiograms

5,000+

Coronary Cardiac
Catheterization
Procedures

(DIAGNOSTIC AND
INTERVENTIONAL)

FACULTY & FELLOWS

333

FACULTY
MEMBERS

53

FELLOWS

Highest

**AGGREGATE
PROGRAM SCORE**
on the annual American College
of Cardiology In-Training
Examination (ACC-ITE) of fellows
(among 200 participating
cardiology training programs)

RESEARCH

240+

SCIENTIFIC
PUBLICATIONS

\$25M+

NIH FUNDING

59

ACTIVE
CLINICAL TRIALS

ACCOLADES

#11

FOR CARDIOLOGY & HEART SURGERY

in U.S. News & World Report's
2015–16 Best Hospitals



Gold Plus

AHA ACHIEVEMENT AWARD

for Heart Failure

**First
in the country**

**THE LEON H. CHARNEY DIVISION OF CARDIOLOGY
AT NYU SCHOOL OF MEDICINE**

is among the oldest and most renowned cardiology
programs in the United States. Founded in 1911, when the
John Wyckoff Cardiology Clinic opened its doors at Bellevue
Hospital Center, it became the first ambulatory cardiac clinic
in the United States.

NYU Langone Medical Center



#1

overall patient safety
& quality for
three years in a row

AND

ambulatory care quality
& accountability

among leading academic medical centers
across the nation that were included in the
University HealthSystem Consortium 2015
Quality and Accountability Study

Top 15

in *U.S. News & World Report*



#12

**BEST HOSPITALS
HONOR ROLL**



#14

**BEST MEDICAL
SCHOOLS FOR
RESEARCH**

and nationally ranked in 12 specialties,
including top 10 rankings in
Orthopedics (#5), Geriatrics (#6),
Neurology & Neurosurgery (#9),
Rheumatology (#9),
and Rehabilitation (#10)

ADVANCING CARDIAC AND VASCULAR MEDICINE

Education in Cardiac Genetics

NYU Langone hosted the 8th Annual International SADS (Sudden Arrhythmia Death Syndrome) Foundation Conference in May 2015. Glenn I. Fishman, MD, the William Goldring Professor of Medicine and director of the Leon H. Charney Division of Cardiology, and Silvia G. Priori, MD, PhD, scientific director at Fondazione Salvatore Maugeri, in Pavia, Italy, directed the conference, in which internationally recognized experts presented the latest information and evidence-based management guidelines for long QT syndrome, Brugada syndrome, catecholaminergic polymorphic ventricular tachycardia, and arrhythmogenic right ventricular cardiomyopathy.

Giving Cardiopulmonary Resuscitation a Hand

NYU Langone partnered with the American Heart Association during National CPR & AED (Automated External Defibrillation) Awareness Week to raise awareness about Hands-Only™ CPR. At an event held in June in New York City's Times Square, hundreds of people were trained in Hands-Only CPR as they watched the world's largest continuous CPR relay, setting a new Guinness World Record for the most people to take part in a CPR relay. Lawrence Phillips, MD, assistant professor of medicine and director of the Nuclear Cardiology Laboratory, along with Cardiology fellows, developed the idea for the event, which drew some 700 participants.

Appointments and Honors

FRANK CECCHIN, MD, NAMED DIRECTOR OF PEDIATRIC CARDIOLOGY

Frank Cecchin, MD, the Andrell E. Pearson Professor of Pediatric Cardiology and professor of medicine, has been named director of the Division of Pediatric Cardiology. Dr. Cecchin, a pediatric electrophysiologist specializing in heart rhythm device therapy for children and in diagnosing complex congenital heart conditions, has published numerous journal articles on the management of arrhythmias in congenital heart disease, quality of life of young patients with heart rhythm devices, and related topics.

LARRY A. CHINITZ, MD, NAMED CLINICAL DIRECTOR OF CARDIOLOGY

Larry A. Chinitz, MD, the Alvin Benjamin and Kenneth Coyle, Sr. Family Professor of Medicine and Cardiac Electrophysiology and director of the Heart Rhythm Center, has been named clinical director of the Leon H. Charney Division of Cardiology. Dr. Chinitz is a nationally recognized heart rhythm specialist who has served as a leading investigator for multiple device and intervention trials that have shaped the field, such as trials of nonsurgical ablation catheters. In 2014, he led a team that implanted, for the first time in the United States, the world's smallest leadless cardiac pacemaker.

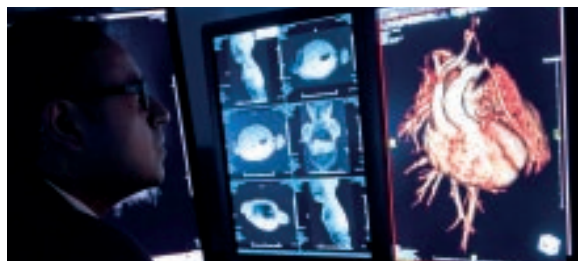
GLENN I. FISHMAN, MD, HONORED BY AMERICAN HEART ASSOCIATION

Glenn I. Fishman, MD, the William Goldring Professor of Medicine and director of the Leon H. Charney Division of Cardiology, was awarded the American Heart Association (AHA) 2015 Basic Research Prize, in recognition of his outstanding contributions to the advancement of cardiovascular science, in particular, for his discovery—through the creation of genetically engineered animal models—of the molecular defects associated with cardiovascular disease, including those responsible for heart rhythm disorders and cardiomyopathies. This award was presented to Dr. Fishman at the opening session of the AHA Scientific Sessions 2015 in Orlando, Florida.

Preventing Heart Disease Through Collaboration and Education

The Center for the Prevention of Cardiovascular Disease is dedicated to preventing and reversing heart disease. It works with patients undergoing cardiovascular procedures to assess and lower risk factors and leads major research and public education programs.

This year, the center launched the Heart Balance Nutrition Program, which develops customized meal plans to help patients achieve their heart-health goals. The center also introduced a free monthly public lecture series on risk reduction through lifestyle changes. These programs complement the center's annual Advances in Cardiovascular Risk Reduction Symposium, which



features talks by experts from NYU Langone and other leading academic medical centers and attracts an audience of health professionals from across the country.

Bringing Heart Health to the Barbershop

As men waited for their trims and shaves at the Harlem Masters Barbershop, they were also getting free blood pressure screenings and heart health information from the Men's Health Initiative, developed by Joseph Ravenell, MD, assistant professor of population health and medicine and co-founder of the Resistant Hypertension Program, located at Bellevue Hospital Center. Dr. Ravenell's program, which focuses on an at-risk population of African Americans, has reached 69 barbershops across New York City.

With a five-year NIH grant, which concluded in 2014, Dr. Ravenell and colleagues screened more than 10,000 New Yorkers at barbershops, including more than 4,000 men aged 50 and over. They then invited the men with high blood pressure to enroll in a six-month study aimed at reducing their blood pressure, which included advice from a trained patient navigator, in person and over the phone, on nutrition, exercise, medication-taking, and smoking cessation.



More than 700 men enrolled and their blood pressure dropped by an average of 5 points. "If the entire population were to achieve that kind of drop, we'd reduce stroke risk by about 30 percent," Dr. Ravenell says. "We're talking about a potentially major public health impact."

NYU LANGONE MEDICAL CENTER NEWS

Groundbreaking Face Transplant Exemplifies Expertise and Multidisciplinary Collaboration

In August 2015, surgeons at NYU Langone Medical Center performed the most complex face transplant to date. The patient, former firefighter Patrick Hardison, had lost all of the skin around his entire face, scalp, and neck, including his eyelids, ears, lips, and nose, while trapped in a burning building. Led by Eduardo Rodriguez, MD, DDS, the Helen L. Kimmel Professor of Reconstructive Plastic Surgery and chair of the Hansjörg Wyss Department of Plastic Surgery, the successful 26-hour operation—the first to include transplantation of eyelids capable of blinking as well as functional ears, among other milestones—involved more than 100 physicians, nurses, and technical and support staff. More than a dozen departments contributed to the planning and execution of the procedure, or to postoperative care.

CLINICAL INNOVATIONS FOR TREATING COMPLEX CONDITIONS



As a nationally recognized leader in cardiovascular care, NYU Langone offers patients access to the latest diagnostic and therapeutic advances, such as next-generation stent grafts for aortic aneurysms, new lifesaving procedures for valve replacement, and experimental therapies such as renal denervation to treat atrial fibrillation.

Heart Rhythm Center: Controlling Atrial Fibrillation to Prevent Stroke

The Heart Rhythm Center at NYU Langone is one of the highest-volume centers in the nation for treating atrial fibrillation (AF), which causes 15 percent of strokes. The center helped to pioneer ablation techniques for treating heart rhythm disorders, and it is leading the development of procedures and technologies to reduce the incidence of dangerous arrhythmias.

ALTERNATIVE TO ANTICOAGULATION—WATCHMAN LEFT ATRIAL APPENDAGE CLOSURE DEVICE

Clinical investigators in NYU Langone's Heart Rhythm Center participated in the trials that led to the 2015 FDA approval of the WATCHMAN™ Left Atrial Appendage Closure Device, which offers new hope for reducing stroke incidence in AF patients who are unable to tolerate anticoagulant medications and thus remain at high risk even after standard catheter ablation.

"The left atrial appendage is the site of 90 percent of the clots that occur in patients with AF," explains Larry A. Chinitz, MD, the Alvin Benjamin and Kenneth Coyle, Sr. Family Professor of Medicine and Cardiac Electrophysiology, director of the Heart Rhythm Center, and clinical director of the Leon H. Charney Division of Cardiology. "We now have data proving that closing the left atrial appendage with the WATCHMAN device is noninferior to warfarin in preventing stroke and has a lower risk of bleeding. This gives us a very viable alternative to anticoagulation therapy in patients who are at risk of stroke."

NOVEL INSERTABLE CARDIAC MONITOR

At least once a week, a patient arrives at NYU Langone's Ronald O. Perelman Center for Emergency Services following a transient ischemic attack (TIA)—a "mini-stroke" caused by a clot temporarily blocking blood flow to the brain. "In emergency departments around the country, TIA patients are routinely treated with standard therapy," Dr. Chinitz notes. "But studies show that close to 40 percent of them actually have underlying AF, and without further treatment, they are at extremely high risk for a full-blown stroke."

The Heart Rhythm Center and the Stroke Center have launched a stroke prevention partnership with the Ronald O. Perelman Department of Emergency Medicine and the Department of Neurology to identify at-risk patients and monitor them for AF. Using a new

injectable cardiac monitor called Reveal LINQ™, the smallest implantable cardiac monitor available today, NYU Langone's electrophysiologists can track TIA patients 24 hours a day, for as long as is necessary to detect an arrhythmia. The device can remain implanted for up to three years.

CLINICAL TRIAL IN RENAL ARTERY DENERVATION

Laboratory research in the Heart Rhythm Center has demonstrated that an overactive autonomic nervous system (ANS) contributes to the development of AF. NYU Langone is a leading site in a new national trial to test whether disrupting signals from the ANS by ablating the renal artery can improve the outcomes of catheter ablation in controlling AF. Dr. Chinitz is the principal investigator for the trial, known as SYMPLICITY AF, which will compare standard catheter ablation of the pulmonary vein with standard catheter ablation plus ablation of the nerves surrounding the renal artery.

STUDY SHOWS CPAP EFFECTIVE AGAINST SLEEP APNEA-RELATED AF

Sleep apnea is associated with a high risk for cardiac arrhythmias, with up to 50 percent of individuals with apnea also having AF. In a meta-analysis published in *JACC Clinical Electrophysiology* in March 2015, Dr. Chinitz and Heart Rhythm Center colleagues demonstrated that treatment of sleep apnea with continuous positive airway pressure (CPAP) dramatically reduces AF in both patients who undergo catheter ablation and patients whose AF is managed medically.

SYMPLICITY AF trial

PRINCIPAL INVESTIGATOR

Larry A. Chinitz, MD, the Alvin Benjamin and Kenneth Coyle, Sr. Family Professor of Medicine and Cardiac Electrophysiology and director of the Heart Rhythm Center

Genetic and Congenital Heart Disease

The diagnosis and lifelong management of genetic and congenital heart disease are among the most complex challenges in medicine. This year, NYU Langone has recruited renowned specialists and achieved significant advancements in imaging and surgical techniques.

NEW LEADERSHIP IN HYPERTROPHIC CARDIOMYOPATHY

HCM, an abnormal thickening of the heart muscle, affects approximately 1 in every 500 people. Mark V. Sherrid, MD, professor of medicine, and Daniel G. Swistel, MD, associate professor of cardiothoracic surgery, came to NYU Langone as director and surgical director, respectively, of the Hypertrophic Cardiomyopathy (HCM) Program in 2015, bringing with them hundreds of patients unwilling to entrust their care to anyone else. Dr. Sherrid, a cardiologist, and Dr. Swistel, a cardiac surgeon, are renowned experts in HCM, the most common inherited heart disease. Medical partners for more than 20 years, they have treated more than 1,200 patients with the condition, and cardiologists often refer their most difficult cases to the pair.

Dr. Sherrid calls HCM “the great masquerader of cardiology,” because it can be mistaken for many other conditions, including exercise-induced asthma, rheumatic heart disease, and anxiety. “Most tragically, it can be misdiagnosed as ‘normal,’ because it often affects young people, and no one thinks a young person might have heart disease,” he says. Yet HCM is the most common cause of sudden cardiac death in adolescents and young adults.

Dr. Sherrid pioneered the use of the antiarrhythmic drug disopyramide for relieving left ventricular outflow obstruction for treating HCM symptoms, an approach

that is successful in about two-thirds of obstructed patients. Also a researcher, Dr. Sherrid has written more than 35 journal articles on the diagnosis and treatment of HCM. Dr. Swistel is one of the few surgeons in the country with extensive experience in performing myectomy for HCM, and he has published widely on novel procedures for correcting the condition.

The HCM Program has five central elements of patient care:

- Risk stratification for the occurrence of sudden death, and when risk factors occur in a patient, treatment of those at high risk with implantable defibrillators to prevent sudden death.
- Treatment of symptoms such as shortness of breath, exercise intolerance, chest pain, and blackouts with medication or (if necessary) surgery.
- Family screening and genotype analysis to identify other family members who may have HCM.
- Exercise prescription. Patients with HCM are encouraged to exercise, although they should avoid competitive sports and extremes of exertion.
- Management of cholesterol and other coronary heart disease risk factors to avoid development of concomitant coronary artery disease.

“Hypertrophic cardiomyopathy used to be considered an untreatable inherited illness, with refractory symptoms and a poor prognosis. Now, we can improve the quality of life of the vast majority of severely symptomatic patients, and with treatment, their survival approaches that of normal individuals their age,” says Dr. Sherrid.



Mark V. Sherrid, MD (left), and Daniel G. Swistel, MD

▼ Frank Cecchin, MD, with a patient



EXPANDING CARE FOR CONGENITAL HEART DISEASE— A COMPREHENSIVE ADULT CONGENITAL HEART DISEASE PROGRAM

Nearly 1 in every 100 babies is born with a congenital heart defect. NYU Langone is a national leader in providing people with congenital heart disease with fully integrated care from before birth through adulthood.

Although advances in medical treatment now allow most people with congenital heart disease (CHD) to live long, productive lives, ensuring that they do so requires specialized care throughout the life span. Yet less than half of adults with CHD are monitored by a specialist. “They’ve been through so much, and now they feel okay,” explains Dan G. Halpern, MD, assistant professor of medicine and the new medical director of the Adult Congenital Heart Disease Program. “They don’t think they need to be watched over, or they are just afraid of having to go through these procedures again.”

Key to improving compliance is ensuring that patients have access to evolving best practices in adult congenital cardiac care. Dr. Halpern’s appointment in 2015 signaled NYU Langone’s commitment to that pursuit. A subspecialized cardiologist, Dr. Halpern received his fellowship training at Boston Children’s Hospital and Brigham and Women’s Hospital, where he contributed to research being used to manage complex CHD in adults.

The Adult Congenital Heart Disease Program, which serves more than 500 patients, provides state-of-the-art, coordinated care for the long-term sequelae of all forms of CHD. The most common of these sequelae—arrhythmias and heart failure—are addressed in collaboration with the Heart Rhythm Center and the Heart Failure Advanced Care Center. The program also treats disorders such as atherosclerosis and hypertension, which may require modified approaches in patients with CHD, as well as pregnancy challenges. The team includes specialists in adult congenital cardiac surgery, electrophysiology, maternal-fetal medicine, and cardiac genetics, among others. Dr. Halpern joined adult congenital heart disease specialist Catherine R. Weinberg, MD, clinical instructor of medicine, who has a special interest in CHD and pregnancy.

500+

Adult congenital heart disease patients

50+

Adult congenital heart disease surgeries

ADVANCES IN EARLY DETECTION AND TREATMENT

Early detection of heart defects is essential to patients' surviving and thriving. NYU Langone's pediatric echocardiographers specializing in CHD perform more than 1,400 fetal echocardiograms and 4,600 pediatric echocardiograms annually. Twenty pediatric cardiologists are available to perform sophisticated diagnostic and interventional procedures. And with the clinical team's extraordinary skills, the Pediatric Cardiothoracic Surgery Program had a 98 percent survival rate over the past year.

In 2015, Frank Cecchin, MD, was named the Andrall E. Pearson Professor of Pediatric Cardiology and director of Pediatric Cardiology. One of the nation's foremost pediatric electrophysiologists, Dr. Cecchin specializes in diagnosing complex congenital heart conditions and in implantable cardioverter therapy; he is also a leading expert on quality of life issues for CHD patients. The pediatric cardiac team is co-led by Ralph S. Mosca, MD, the George E. Reed Professor of Cardiac Surgery, professor of pediatrics, and chief of the Division of Pediatric and Adult Congenital Cardiac Surgery, who has published widely on the management of complex structural heart abnormalities and interoperative myocardial mechanics.

Cardiac defects can be accurately diagnosed in fetuses as early as 18 weeks. Today, most CHD defects can be diagnosed with echocardiography and cardiac MRI, without the need for cardiac catheterization. Some infants undergo surgery immediately after birth, while other defects are best repaired at toddler age or older. "Recently, we have made great progress in miniaturized catheterization technology," says Achiau Ludomirsky, MD, professor of pediatrics and associate chair for Outreach in the Department of Pediatrics. "We can now use catheters to perform many cardiac interventional procedures that weren't available 10 or 20 years ago, avoiding open heart surgery."

When children with CHD reach adolescence, they enter the Congenital Heart Disease Transition Program, which preserves the continuity of their care and helps them adjust to the physical and psychological changes they are experiencing before they move to the Adult Congenital Heart Disease Program. "At every stage of life," says Dr. Halpern, "our patients get the care they need from specialists dedicated to treating their unique condition and their unique issues."

Dan G. Halpern, MD, and
Catherine R. Weinberg, MD

NEW FRONTIERS IN DIAGNOSTIC IMAGING

NYU Langone is a leader in adapting new imaging technology to improve the care of CHD patients. In 2015, the Congenital Heart Disease Program began using 3-D printing to create models of the heart and heart defects. "We use data that we collect from transesophageal echocardiography on adult patients with atrial septal defects to create beautifully detailed 3-D images. We image and then print a portion of the patient's heart, replicating the defect perfectly," says Muhamed Saric, MD, PhD, associate professor of medicine and director of the Echocardiography Laboratory. "Working with Puneet Bhatla, MD, assistant professor of pediatrics and radiology and director of Noninvasive Pediatric Imaging in Pediatric Cardiology, we have created about 30 of these models, which allow us to understand a patient's lesion in depth and to better plan percutaneous closures or surgical interventions for specific defects. Ultimately, these models will also permit us to develop better devices, targeted to individual conditions."

Dr. Halpern and his colleagues are also active in research. Dr. Halpern is investigating the use of pediatric imaging of aortic dimensions to predict future events in patients with Marfan syndrome, a heritable connective tissue disorder associated with significant cardiovascular complications, such as aortic dissection.



On the Leading Edge in Heart Valve Disease

In 2015, the Heart Valve Center implemented new diagnostic and treatment technologies and protocols. These innovations—including advanced imaging, less invasive surgical procedures, reduced use of general anesthesia, and earlier extubation—have improved outcomes while minimizing recovery time and readmissions, reducing the risks of heart valve surgery for elderly or severely ill patients.

TRANSCATHETER AORTIC VALVE REPLACEMENT

NYU Langone became the first U.S. academic medical center to implant the newly FDA-approved CoreValve® Evolut™ R Heart Valve for severe aortic stenosis in July 2015. In a transcatheter procedure, Mathew R. Williams, MD, associate professor of cardiothoracic surgery and medicine, chief of the Division of Adult Cardiac Surgery, director of Interventional Cardiology, and director of the Heart Valve Center, implanted this next-generation heart valve, which is recapturable and repositionable and which can be implanted in patients for whom surgery is considered high risk.

“Most patients start to feel better immediately after the procedure, and many can leave the hospital in one or two days,” says Dr. Williams, who has performed nearly 2,000 transcatheter aortic valve replacements (TAVRs)—more than any other surgeon in the United States—and was the national primary investigator in the Evolut R Study.

The center is further improving TAVR outcomes by using conscious sedation. The team worked closely with Peter J. Neuburger, MD, assistant professor of anesthesiology, who led the development of the sedation protocol for TAVR patients. Now, more than 90 percent of TAVR patients at NYU Langone undergo conscious sedation rather than general anesthesia. “These patients are up and walking within four hours and have an average hospital stay of less than two days,” says Dr. Williams.

The volume of TAVR procedures performed at the Heart Valve Center increased over the past year, from 51 in 2014 to more than 200 in 2015. At the same time, the center upheld the highest safety and quality standards, with a 2015 in-hospital TAVR mortality rate of 1.3 percent, a 30-day readmission rate of 16 percent, and more than 90 percent of TAVR patients discharged home rather than to a long-term care facility, compared with national rates of 4 percent for mortality, more than 25 percent for readmissions, and about 68 percent discharged home.

IMAGING IN TAVR

State-of-the-art imaging has played an essential role in the trend toward using TAVR procedures. NYU Langone has advocated for switching from using the more invasive transesophageal echocardiography (TEE) in TAVR procedures to using the less invasive transthoracic echocardiography (TTE), which does not require general anesthesia, making it less risky for patients. “TEE in a 40-year-old is fine, but most TAVR patients are in their eighties and above, and frail, so we avoid anything invasive whenever we can,” says Muhamed Saric, MD, PhD, associate professor of medicine and director of the Echocardiography Laboratory.

In 2011–13, TEE was used in all TAVR procedures at NYU Langone. By late 2015, 94 percent of TAVR procedures were performed using TTE instead. “Although TEE generally provides a more detailed image, TTE provides sufficient diagnostic information for the procedure while minimizing both discomfort and risk,” says Dr. Saric. “And since the patient does not need to recover from general anesthesia, the recovery period is also shorter.”

Dr. Saric and his colleagues documented the evidence for using TTE in TAVR procedures in their March 2015 article in the *Journal of the American College of Cardiology*.

Real-time collaboration between cardiac surgeons, interventional cardiologists, anesthesiologists, and echocardiographers, combined with the use of high-quality CT scans, is a hallmark of the center’s Heart Valve Program, Dr. Saric says. “Traditionally, TTE has been performed by sonographers and subsequently interpreted by cardiologists. In the Heart Valve Program, cardiac imaging subspecialty physicians, including Ricardo J. Benen Stein, MD, assistant professor of medicine, and Alain F. Vainrib, MD, instructor of medicine, perform the scans and provide on-the-spot expert feedback during the procedure. This teamwork and integration of knowledge significantly enhance patient care.”

300+

transcatheter valve procedures in 2015

▼ Didier F. Loulmet, MD (at console), and Eugene A. Grossi, MD (with patient on right)



450+

robotic cardiac
surgery cases
to date

0%

mortality and
median length
of stay of 3 days

TRANSCATHETER MITRAL VALVE REPAIR AND REPLACEMENT

This year NYU Langone expanded on its minimally invasive mitral valve repair options through the increased performance of transcatheter mitral valve repairs, also known as mitral clip procedures, which provides an option for patients who are not ideal candidates for surgery. The number of transcatheter mitral valve repairs performed at NYU Langone rose from 12 in 2014 to more than 50 in 2015, making it the busiest center in the region. Most patients are able to return home within one day after the procedure. In select cases, the team has even replaced mitral valves via a transcatheter approach.

ROBOTIC SURGERY—REDUCING INTUBATION TIME

Didier F. Loulmet, MD, associate professor of cardiothoracic surgery, chief of Cardiac Surgery at Tisch Hospital, and director of Robotic Cardiac Surgery, is one of the world's leading experts in using robotic surgery to perform mitral valve repairs. Always seeking to improve quality of care and reduce complications, Dr. Loulmet has set new standards for early extubation of mitral valve surgery patients over the past year.

"Early extubation decreases ICU time and improves recovery time," says Aubrey C. Galloway, MD, the Seymour Cohn Professor of Cardiothoracic Surgery and chair of the Department of Cardiothoracic Surgery. Patients who are off respiratory equipment and intensive monitoring earlier are able to ambulate and recover more quickly.

Seventy percent of Dr. Loulmet's robotic patients are now extubated before they leave the operating room; most of the remaining 30 percent are extubated within

six hours of surgery. Dr. Galloway suggests that across all cardiac surgery, extubation within six hours sets a new benchmark for quality and that because NYU Langone has systematically prioritized early extubation, its percentages are among the best in the country.

Improving Function After TAVR

In collaboration with NYU Langone's Rusk Rehabilitation, John Dodson, MD, assistant professor of medicine and population health and director of the Geriatric Cardiology Program, is conducting a pilot study of a program designed for TAVR patients. Before the procedure, study patients will receive education on postoperative functional recovery. After the procedure, patients will have in-home rehabilitation training four times a week and will wear an accelerometer to monitor their activity levels.

"Usually, after valve surgery, in-home physical rehab is done only twice a week," says Dr. Dodson, "but we want to see if giving double the amount of rehab improves patients' post-procedure activity levels, physical function, and quality of life."

"We are hoping that the combination of pre-procedure education on the importance of physical activity and more rehab therapy in the home post-procedure will improve patients' strength and function and reduce readmissions," says Dr. Dodson.

Setting New Standards in Vascular Disease Treatment

With one of the largest vascular surgery teams in the country, NYU Langone is spearheading the development of minimally invasive stent-graft therapies, performed on an outpatient basis, for aortic aneurysms and other complex conditions.

ADVANCES IN AORTIC ANEURYSM REPAIR

NYU Langone's vascular and endovascular surgeons are participating in pivotal trials of the Zenith p-Branch® fenestrated endovascular graft for pararenal aortic aneurysms. A leading center in the ZFEN trial of the Zenith fenestrated abdominal aortic aneurysm endovascular graft, NYU Langone has also become a national training site for the use of these grafts, which, with their precisely placed fenestrations, or holes, allow aneurysm repair to be performed minimally invasively, while not cutting off blood flow to vital organs.

In 2015, NYU Langone became one of the first U.S. centers to perform more than 70 percent of its endovascular aneurysm repairs (EVARs) percutaneously, rather than with the more invasive open surgical cutdown approach on the common femoral artery. Just a year ago, only 10 percent of infrarenal abdominal aortic aneurysms were repaired this way. This change has resulted in reduced postoperative complications, such as hematoma from the surgery and infection at the incision site, and a faster, more comfortable recovery for patients.

In addition, in approximately 90 percent of lower extremity revascularization procedures—balloon angioplasties, stents, and atherectomies—use of new suturing technology allows patients to be discharged on the same day that the procedure is performed. “We have striven to move procedures that traditionally involved an

open cutdown to percutaneous techniques. The vast majority of our percutaneous procedures are performed on an outpatient basis, providing improved outcomes and a better patient experience,” says Mark A. Adelman, MD, the Frank J. Veith, MD, Professor of Vascular and Endovascular Surgery and chief of the Division of Vascular and Endovascular Surgery.

VENOUS THROMBOEMBOLIC DISEASE CENTER

Venous thromboembolic disease (VTE) kills more than 100,000 Americans every year. With its Venous Thromboembolic Disease Center (VTEC), officially launched in early 2015, NYU Langone is one of the only U.S. institutions with a dedicated center for VTE treatment and research.

“We have created standardized, evidenced-based guidelines for screening, preventing, diagnosing, and managing blood clots that are used throughout NYU Langone,” says Thomas Maldonado, MD, associate professor of surgery and VTEC's medical director. “We are able to track virtually every patient found to have a blood clot while being treated here, enabling VTEC experts to quickly treat these clots.”

In addition, at NYU Langone's Tisch Hospital, when a patient develops a pulmonary embolism, VTEC's new Pulmonary Embolus Response Team (PERT) is mobilized immediately, with specialists in cardiac surgery, vascular surgery, interventional radiology, and hematology identifying and quickly implementing the best means for treating the clot.

Research at VTEC, led by Jeffrey S. Berger, MD, associate professor of medicine and surgery, in collaboration with Dr. Maldonado and other team members, includes a large clinical study aimed at developing a genetic and molecular “handprint” for blood clots. “The goal is to create a blood test that can warn us which patients may develop blood clots, such as deep vein thromboses or pulmonary embolisms, so we can provide the best preventive treatments to keep these events from occurring,” says Dr. Maldonado.

VTEC is also participating in two trials of stents for treating iliac compression syndrome, a rare condition in which compression of the left common iliac vein leads to swelling and blood clots in the leg.



▲
Aubrey C. Galloway, MD (left),
and Mark A. Adelman, MD

Heart Failure: Addressing the Needs of a Growing Population

Heart failure is the leading cause of hospital admissions in the rapidly growing over-65 population, and NYU Langone is bringing state-of-the-art care to these patients. This year, it expanded its delivery of advanced subspecialty care to a network of community practices and implemented a lifesaving Cardiogenic Shock Program.

EXPANDING LOCAL ACCESS TO QUATERNARY CARE

NYU Langone is dramatically expanding its specialized network of ambulatory cardiovascular care in New York City and onto Long Island.

At several ambulatory care centers on Manhattan's West Side and in Brooklyn, Queens, Nassau, and Suffolk counties, as well as at NYU Lutheran Medical Center (the newly merged teaching hospital and network of ambulatory care facilities, which are now part of NYU Langone's clinically integrated health network), heart failure (HF) patients have access to expert heart failure care evaluation for heart transplantation and left ventricular assist device (LVAD) therapy, as well as for other cutting-edge devices and medical therapies.

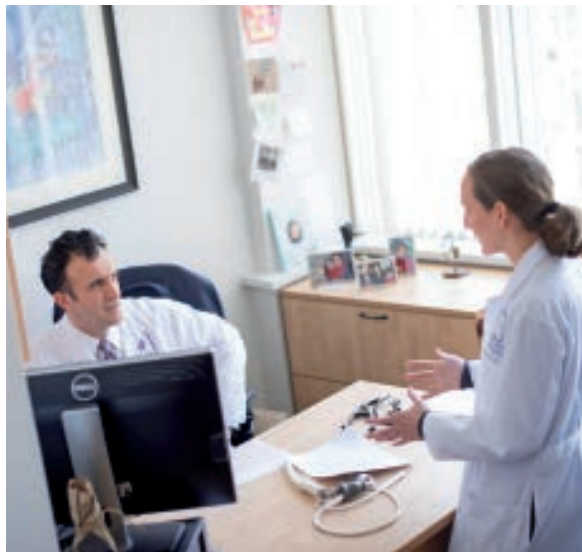
"Our goal is to bring quaternary care for heart failure directly to the community," says Alex Reyentovich, MD, assistant professor of medicine, medical director of the Left Ventricular Assist Device Program, and newly named clinical director of the Heart Failure Advanced Care Center.

NYU Langone is one of the only academic centers in the region to place advanced HF specialists directly in its affiliated community practices. For example, says Dr. Reyentovich, several novel HF medications are just becoming available. "These medications are still hard to get, and cardiologists who do not subspecialize in heart failure may not yet be comfortable using them. The ongoing presence of heart failure specialists helps local practices adopt advanced therapies more quickly."

Working with NYU Langone's Department of Medicine's Clinical Innovations team, Dr. Reyentovich is developing a cohesive, integrated HF management protocol encompassing both hospitalized patients and patients in the community. "Heart failure specialists cannot provide routine care for all patients with heart failure—there are simply too many heart failure patients and too few specialists for this to be feasible," Dr. Reyentovich says. "However, we can still significantly improve the level of care, and we are doing this by partnering with cardiologists in the community, internists, patients, and families to create a comprehensive continuum of care for heart failure at all stages."

NEW CARDIOGENIC SHOCK PROGRAM PROVIDES ECMO

For hospitalized patients whose hearts are so severely damaged that they can no longer supply enough blood to their body, leading to cardiogenic shock and acute organ failure, NYU Langone has expanded its treatment armamentarium. Led by Deane E. Smith, MD, assistant professor of cardiothoracic surgery, and Leora Balsam, MD, assistant professor of cardiothoracic surgery and surgical director of the Ventricular Assist Device Program, the Cardiogenic Shock Program provides acute circulatory support using extracorporeal membrane oxygenation (ECMO). "This expansion of our Ventricular Assist Device Program to provide ECMO has saved the lives of 50 percent of the first cohort of advanced heart failure patients treated this year," explains Aubrey C. Galloway, MD, the Seymour Cohn Professor of Cardiothoracic Surgery and chair of the Department of Cardiothoracic Surgery. "Some patients went on to receive ventricular assist devices, one received a ventricular assist device as a bridge to transplantation, and one was discharged from the hospital—amazingly—needing no further treatment."



Alex Reyentovich, MD,
and Leora Balsam, MD

TRANSFORMING THE FUTURE OF CARDIAC AND VASCULAR MEDICINE



NYU Langone is developing tomorrow's treatments for cardiac and vascular disease. The 30-plus investigators in the Cardiac and Vascular Institute are leading or participating in almost 60 clinical trials and numerous basic research studies, in a wide range of areas, including the cellular origins of heart disease, new surgical approaches and therapeutics, epidemiology, and innovative public health interventions.

Research Highlights

TURNING STEM CELLS INTO CARDIAC PURKINJE CELLS TO STUDY ARRHYTHMIAS

NYU Langone scientists achieved an important breakthrough this year in understanding Purkinje cells, the specialized cells that create the electrical circuit responsible for normal activation of the heart. When damaged, these cells transmit abnormal impulses, resulting in uncoordinated or out-of-control heart muscle contractions and abnormal heart rhythms, leading to sudden cardiac death, a condition in which the electrical activity of the heart goes so awry that the heart stops pumping.

Because Purkinje cells make up less than 1 percent of all heart cells, they are difficult to find for study purposes. However, Glenn I. Fishman, MD, the William Goldring Professor of Medicine and director of the Leon H. Charney Division of Cardiology, has developed a technique for turning stem cells into Purkinje cells.

He and his co-researchers Karen Maass, PhD, research assistant professor of

medicine, Eugene E. Kim, MD, assistant professor of medicine, and Akshay Shekhar and Camila Delgado, both graduate students, first induced mouse stem cells to become cardiac precursor cells. With collaborators at Weill Cornell, they then screened nearly 5,000 chemicals and found one—sodium nitroprusside—that induces up to 40 percent of the original stem cells ultimately to become Purkinje cells. With this discovery, reported in *Stem Cell Reports* in June 2015, unlimited numbers of these cells can be created for use in research.

The team's next goal is to make laboratory models of the disease, introduce mutations to the cells, and find out why these mutations trigger arrhythmias in different types of heart disease. Identifying the mutation that sets off the arrhythmia may point to new therapeutics. Isolating large numbers of Purkinje cells could also allow scientists to reconstruct part of the heart's conduction system, facilitating even more advanced research.

A NOVEL LABORATORY MODEL OF HEART DISEASE

The first large-animal model of an inherited arrhythmic disease, developed by investigators at NYU Langone in 2015, points the way toward development of better treatments for inherited forms of life-threatening arrhythmias, which are a significant cause of sudden cardiac death.

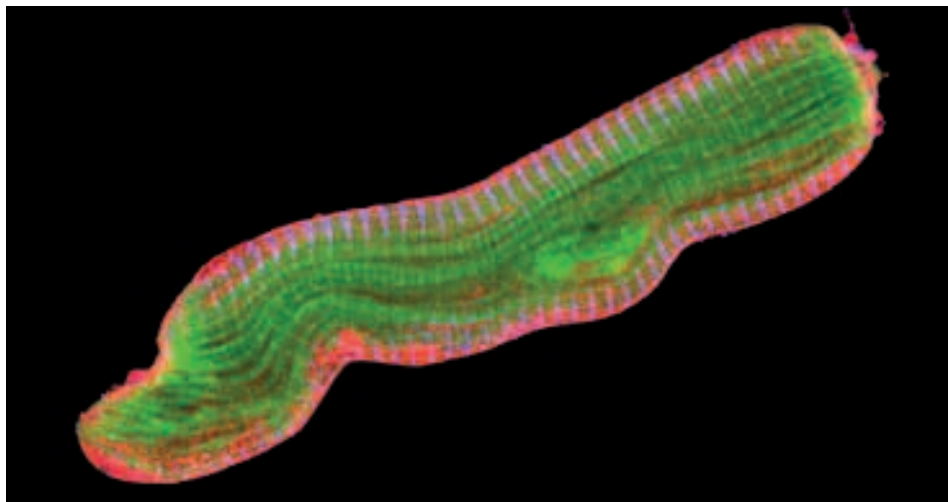
David S. Park, MD, assistant professor of medicine, Glenn I. Fishman, MD, the William Goldring Professor of Medicine and director of the Leon H. Charney Division of Cardiology, and their colleagues created a genetically engineered pig model of sodium channelopathy, which allowed them to examine the mechanisms responsible for fatal arrhythmias in a human-like heart. Previous models of cardiac channelopathies had been limited to cell culture and mouse models. These investigators reported on their work in the January 2015 issue of the *Journal of Clinical Investigation*.

ENVIRONMENTAL POLLUTION INCREASES CARDIAC RISK

Living in an area with high levels of air pollution may be a risk factor for stroke, according to new findings presented by NYU Langone's researchers in March 2015 at the American College of Cardiology's 64th Annual Scientific Sessions.

Upon analyzing data from more than 300,000 people, the investigators found that those living in zip codes with the highest annual levels of fine particulate matter air pollution were significantly more likely to develop stenosis of their internal carotid arteries than were those living in areas with the lowest pollution levels. These atherosclerotic lesions are a key predictive factor for stroke.

Jonathan D. Newman, MD, the Eugene Braunwald MD Assistant Professor of Medicine, the study's lead author, says, "As clinicians, we spend a lot of time thinking about traditional risk factors for stroke, such as high blood pressure, cholesterol, diabetes, and smoking—but our data underscore the possibility that everyday air pollution may also pose a significant stroke risk."



▲ Purkinje cells, which make up less than 1 percent of all heart cells, create the electrical circuit responsible for normal activation of the heart. Sodium channels (red) are partially responsible for this electrical activity, while actinin microfilaments (blue) provide cellular structure.

NEWER DRUG-COATED STENTS JUST AS GOOD AS BYPASS SURGERY

According to a clinical registry study involving more than 18,000 patients, the long-term death rates for newer drug-coated stents that keep arteries open are similar to the rates for traditional bypass surgery.

Earlier studies had found that patients who received previous-generation stents were at higher risk of heart attack and death than patients who underwent bypass surgery. “We aren’t using older stents anymore, so this study gives us some insight into more up-to-date clinical outcomes,” says Sripal Bangalore, MD, associate professor of medicine and the lead author of the study, whose results were published in the March 2015 issue of the *New England Journal of Medicine*.

“We aren’t using older stents anymore, so this study gives us some insight into more up-to-date clinical outcomes,” says Sripal Bangalore, MD.

He adds, “This may encourage patients and physicians to weigh the risks and benefits of stenting versus bypass surgery.”

DIABETES AND THE RISK OF DEATH FROM HEART DISEASE IN YOUNG PEOPLE

Diabetes may be a particularly strong risk factor for death from ischemic heart disease among younger adults, according to new research from Adriana Quinones-Garcia, MD, assistant professor of medicine, and Harmony Reynolds, MD, the Saul J. Farber Associate Professor of Medicine, published in *Clinical Cardiology* in February 2015.

Analyzing death records from the New York City Bureau of Vital Statistics, Dr. Quinones-Garcia and Dr. Reynolds found diabetes listed as a contributing cause for 15 percent of women and 10 percent of men aged 25 to 54 who died from ischemic heart disease—significantly higher percentages than in the general population. Indeed, these

investigators suggest that diabetes may be a particularly important risk factor for women in this age group, as its rate of appearance in ischemic heart disease death records was five times higher than in similarly aged women in the general population.

DIABETES UNDERDIAGNOSED IN PERCUTANEOUS CORONARY INTERVENTION PATIENTS

A third of patients undergoing elective percutaneous coronary intervention (PCI) have a diagnosis of diabetes, and nearly two-thirds meet the criteria for prediabetes. More surprising findings are the rates of patients with undiagnosed diabetes (8.3 percent) and patients with diabetes who are not at glucose goal (57 percent with an A1C above 7.0), according to research conducted by NYU Langone’s Eugenia Gianos, MD, assistant professor of medicine and co-clinical director of the Center for the Prevention of Cardiovascular Disease, and Revathi Balakrishnan, MD, instructor of medicine, and published in September 2015 in *Diabetes/Metabolism Research and Reviews*. Between November 2010 and March 2013, screening tests conducted among 740 patients scheduled to undergo elective coronary PCI revealed the high rates of diabetes and prediabetes in this group, nearly 55 percent of whom also have metabolic syndrome. The article notes that in view of the large proportion of patients with an abnormal glucometabolic state, routine A1C screening at the time of revascularization could identify patients who would benefit from targeting of modifiable risk factors for these conditions.

A BETTER CORONARY ARTERY DISEASE TEST FOR WOMEN

Commonly used tests for obstructive coronary artery disease (CAD), such as nuclear stress tests and exercise treadmill tests, have less predictive value for women than for men.

“ASGES is the only sex-specific test available that takes into account cardiovascular differences between men and women, making it especially suitable for women who may experience symptoms differently than men,” says Joseph A. Ladapo, MD, PhD.

An NYU Langone study published in *Menopause* in November 2015 suggests that a blood test–based age/sex/gene expression score (ASGES) can better help rule out CAD among women with chest pain and other symptoms, lessening the need for further, possibly invasive, diagnostic testing.

Says Joseph A. Ladapo, MD, PhD, assistant professor of population health and medicine and the study’s lead investigator, “ASGES is the only sex-specific test available that takes into account cardiovascular differences between men and women, making it especially suitable for women who may experience symptoms differently from men.”

ACCORDING TO AN NYU LANGONE STUDY

15%
OF WOMEN AND
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aged 25 to 54 who died from ischemic heart disease had diabetes as a contributing factor, significantly higher percentages than in the general population

ISCHEMIA Trial

INTERNATIONAL STUDY OF COMPARATIVE HEALTH EFFECTIVENESS WITH MEDICAL AND INVASIVE APPROACHES

Principal Investigator:

Judith S. Hochman, MD

Harold Snyder Family Professor of Cardiology; Associate Director of Cardiology; Senior Associate Dean for Clinical Sciences; Co-Director, NYU-HCC Clinical and Translational Science Institute

\$84 MILLION GRANT FROM THE NATIONAL HEART, LUNG, AND BLOOD INSTITUTE

This clinical trial is a comparative effectiveness study to determine the best management strategy for patients with stable ischemic heart disease and at least moderate ischemia on stress testing. The study compares two standard treatments:

1. Invasive strategy

Starting treatment with cardiac procedures, such as cardiac catheterization, and then performing stent placement or bypass surgery and prescribing medications and lifestyle changes.

2. Conservative strategy

Starting treatment with medicines and lifestyle changes alone, and performing cardiac procedures only if medical therapy fails.

Stable patients with ischemia and chronic kidney disease may be eligible to participate in the ISCHEMIA-CKD trial.

NYU Langone is enlisting the collaboration of medical centers in the United States and internationally and is enrolling 8,000 patients worldwide.

For more information, visit: ischemiatrial.org

BLOOD CONSERVATION POSSIBLE IN HIGH-RISK AORTIC SURGERY

Blood conservation strategies can be applied safely in high-risk complex aortic surgery, according to a study by Aubrey C. Galloway, MD, the Seymour Cohn Professor of Cardiothoracic Surgery and chair of the Department of Cardiothoracic Surgery, and colleagues, published in the *Journal of Cardiothoracic and Vascular Anesthesia* in June 2015. In 132 consecutive high-risk patients undergoing thoracic aortic aneurysm or dissection repair, a blood conservation strategy had no significant impact on mortality or major complications, despite the blood conservation patients having a higher incidence of aortic dissection and emergent procedures. Dr. Galloway and his colleagues suggest that clinical practice guidelines for blood conservation be considered for these high-risk patients.

CHOLESTEROL TURNS AORTIC SMOOTH MUSCLE CELLS INTO DYSFUNCTIONAL MACROPHAGES

Macrophages have long been known as villains in cardiovascular disease, causing cholesterol accumulation and inflammation that lead to atherosclerosis, heart attacks, and stroke. Vascular smooth muscle cells (VSMC), conversely, were thought to exercise a protective effect by stabilizing arterial plaque. In recent years, however, research led by Edward A. Fisher, MD, PhD, the Leon H. Charney Professor of Cardiovascular Medicine, professor of cell biology and pediatrics, director of the Marc and Ruti Bell Vascular Biology and Disease Research Program, and director of the Center for the Prevention of Cardiovascular Disease, has shown the role of VSMC to be far more complex.

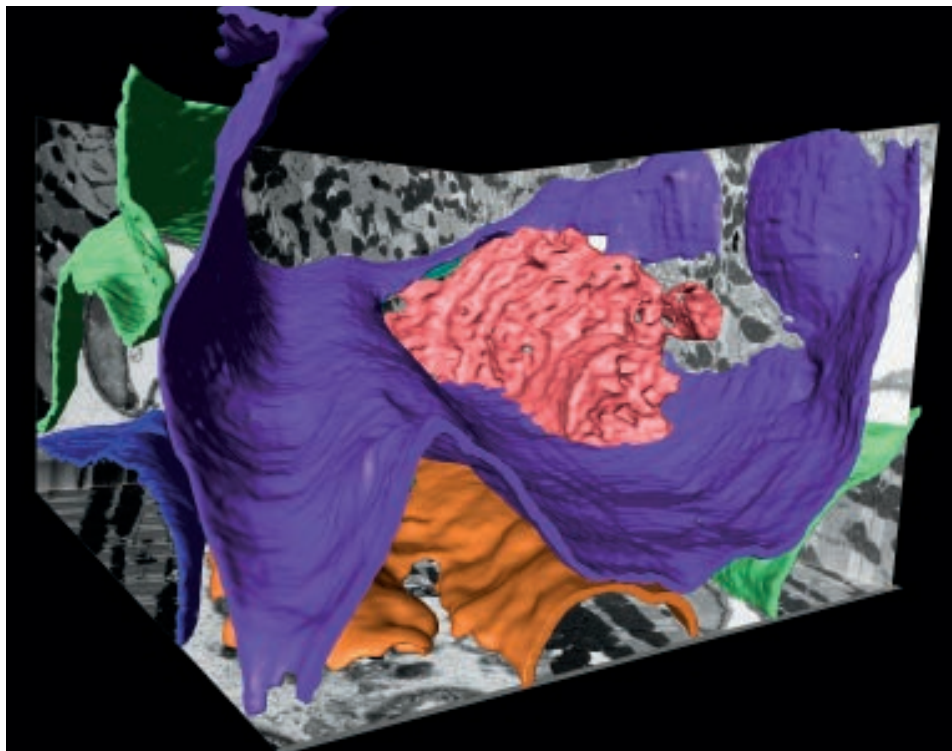
In a landmark 2003 study, Dr. Fisher and colleagues showed that smooth muscle cells can actually convert to a macrophage-like phenotype when exposed to high cholesterol. And in March 2015, in *Arteriosclerosis, Thrombosis, and Vascular Biology*, Dr. Fisher's team revealed the molecular mechanisms behind the transformation: In mouse and human VSMC, cholesterol loading reprograms the microRNA-143/145-myocardin axis. The researchers also found that VSMC-derived macrophages are less inflammatory and less efficient at phagocytosis and efferocytosis, than their classical counterparts. "Going forward," says Dr. Fisher, "we will be exploring the implications of these differences."

MICRORNA SILENCING MAY PROMOTE TISSUE REPAIR IN CARDIOVASCULAR DISEASE

Although macrophage buildup in artery walls is associated with atherosclerosis, research led by Kathryn J. Moore, PhD, the Jean and David Blechman Professor of Cardiology and professor of cell biology, suggests that monocyte-derived macrophages could also be harnessed to combat such inflammatory disorders. These foot soldiers of the immune system can adopt a spectrum of activation programs: M1 macrophages promote inflammation, while M2 macrophages have recently been shown to suppress it. However, the factors regulating macrophage polarization have been poorly understood.

In a study published in the *Journal of Clinical Investigation* in October 2015, Dr. Moore and colleagues (including Dr. Fisher, on whose VSMC paper she was also a coauthor) reported that the microRNA miR-33 promotes an M1-like macrophage phenotype in mouse models; inhibiting miR-33 reprograms macrophages to reduce inflammation and promote tissue repair. "Given the protective effect of anti-miR-33 in atherosclerosis, silencing miR-33 may be an effective therapeutic approach to the treatment of other chronic inflammatory diseases in which certain macrophages predominate," Dr. Moore observes.

▼ 3-D images of the discs that are key to heartbeat and rhythm coordination



MAPPING CONNECTING DISC STRUCTURES THAT ARE KEY TO CARDIAC RHYTHM

NYU Langone investigators have reconstructed the first 3-D images of intercalated discs—protein structures in the mammalian heart cell that are key to coordinating heart beats and rhythms—inside mouse heart muscle cells. These images show that the discs are closely bound with packs (clusters) of electrically conductive sodium-ion channels needed to maintain the heartbeat.

Using a combination of nanoscale imaging methods that can target single molecules and visualize individual protein groupings as well as other previously unseen aspects of intercalated discs, the team found that these discs connect as many as five heart muscle cells and can occupy as much as 10 percent of a heart muscle cell's surface area. More important, they demonstrated that molecules that hold the cells together,

and those that make the cells beat, converge into individual nodes. This is similar to what happens in neurons, but it had never before been observed in the heart because the nodes are much smaller.

“Our multidimensional modeling of mouse cardiomyocytes offers the first detailed mapping—and the first opportunity for scientific analysis—of the intercalated discs’ complex molecular features,” says lead investigator Mario Delmar, MD, PhD, the Patricia M. and Robert H. Martinsen Professor of Cardiology and professor of cell biology. These findings could one day be used to more accurately identify people at risk of developing potentially life-threatening heart rhythm disturbances through structural assessments of abnormalities in the intercalated disc structure.

The study appeared online in *Nature Communications* in January 2016.

TEVAR SHOWS PROMISE IN ACUTE UNCOMPLICATED TYPE B AORTIC DISSECTION

Although medical management remains the standard treatment modality for acute uncomplicated type B aortic dissection (TBAD), some studies suggest that thoracic endovascular aortic repair (TEVAR) may improve long-term outcomes. To clarify whether TEVAR’s potential benefits outweigh its short-term risks, NYU Langone researchers analyzed the Nationwide Inpatient Sample from 2009 and 2010, comparing outcomes for the 4,202 uncomplicated TBAD patients who received only medical management and the 504 who also received TEVAR.

The study, published in 2014 in *Vascular and Endovascular Surgery*, found similar mortality for both groups. And although stroke and length of stay (LOS) were higher in the TEVAR cohort up to age 70, all outcomes except LOS were similar when stratified by age. “These data support more widespread use of TEVAR among these patients,” says Glenn R. Jacobowitz, MD, professor of surgery and vice chief of the Division of Vascular and Endovascular Surgery. “This research will help shape how cardiac surgeons and vascular surgeons treat thoracic dissections in the future.”

Continuing Medical Education Courses

Invasive Cardiology Update for Practicing Healthcare Professionals

April 2016

Dietary Strategies for Cardiovascular Risk Reduction

May 2016

For more information or the course brochure, visit: nyulmc.org/cme

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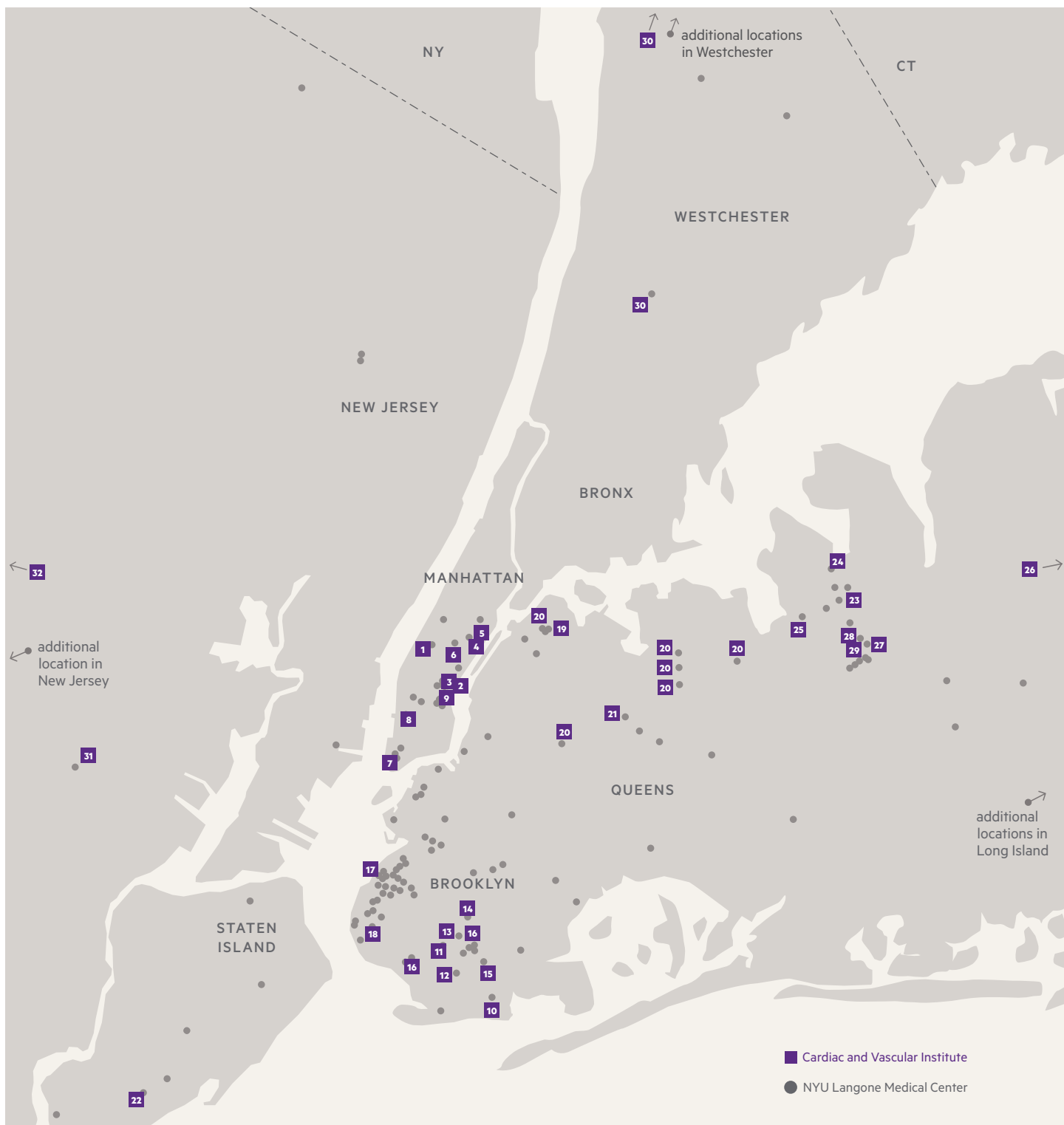
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38,554 Patient Discharges	2,627 Voluntary Faculty	272 PhD Candidates	\$178,000,000 NIH Funding
1,216,428 Hospital-Based Outpatient Visits	128 Endowed Professorships	400 Postdoctoral Fellows	\$295,000,000 Total Grant Funding
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2,900,000 Faculty Group Practice Office Visits	3,465 Registered and Advanced Practice Nurses		
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*Numbers represent FY15 (Sept 2014–Aug 2015)

