Right now, about six million Americans are living with heart failure, in which the heart loses its ability to pump strongly enough to meet the body’s need for blood and oxygen. And about 450,000 die from it each year.

Sometimes heart failure comes on for no reason—or so it seems. Mario J. Garcia, M.D., right, aims to convince these “normal” hearts to reveal their secrets.

“Many patients have subtle abnormalities of heart function that until recently haven’t been detected,” says Dr. Garcia, the new chief of the Einstein/Montefiore division of cardiology and codirector, with Robert E. Michler, M.D., of the Montefiore-Einstein Center for Heart and Vascular Care. Dr. Garcia was recruited last year from Mount Sinai Medical Center, where he oversaw the cardiac imaging program.

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Stopping Heart Failure Before It Starts
(continued from page 1)

He can now be found where the machines are: at Montefiore Medical Center, the University Hospital and Academic Medical Center for Einstein, or at the Gruss Magnetic Resonance Research Center (MRRC).

Together, they offer a complete menu of imaging options, from state-of-the-art patient angiography, echo-cardiography (ultrasound) and MRI, to the emerging fields of CT and nuclear imaging to advanced systems for research studies.

“There are very exciting developments in echocardiography, the area where I’ve worked the longest,” says Dr. Garcia, Einstein’s Pauline A. Levitt Chair in Medicine and professor of radiology. Working with computer specialists and biomedical engineers, Dr. Garcia measures the velocity of blood flow through the chambers of a patient’s heart. Then, using hydrodynamic equations, he calculates the resulting pressures within the heart, all without invasive catheterization.

With this information, he says, it’s possible to estimate how efficiently the heart beats. Or consider an older man complaining of fatigue and shortness of breath during physical activity—a sign of heart failure. “If Dr. Garcia’s recent research, cardiac fibrosis (scarring of the heart muscle) could be involved. Cardiac fibrosis is a well-known legacy of a past heart attack but may also develop for hidden reasons, in both men and women.

“Using cardiac MRI, we’ve been able to identify and characterize how fibrosis develops,” says Dr. Garcia. Fibrosis is present in about 30 percent of all cases of hypertrophic cardiomyopathy, the heart enlargement that leads to heart failure and often sudden death—even without a heart attack. Using the new 3 Tesla Philips magnetic resonance system at the Gruss MRRC, “we can work faster and at higher resolution,” Dr. Garcia says. “Blood vessel scars as small as 1 millimeter long,” he says.

The next step: to understand how fibrosis and heart enlargement occur and develop therapies to treat these problems—and help that older man resume his workouts.

CORONARY MAGNETIC RESONANCE IMAGING (MRI)

How it works: Radio waves and the body’s magnetic field plus computers produce 3D action or still images.

What it shows: Precise dimensions of the heart, scarring after heart attack, congenital heart defects, inflammation.

Radiation? No.

Invasive? Not usually. Contrast medium is sometimes used.

ECHOCARDIOGRAPHY (ULTRASOUND)

How it works: High-frequency sound waves create action or still images of heart chambers, heart valves and blood flow; can be 3D.

What it shows: Blood-flow velocities, indirect measurements of pressures within the heart, congenital heart defects, blood clots, tumors.

Radiation? No.

Invasive? Not usually. Contrast medium is sometimes used.

CORONARY ANGIOGRAPHY

How it works: Technicians thread a thin tube (catheter) through the groin artery to the heart, then injects dye visible to X-rays, yielding action or still images of the inside of blood vessels.

What it shows: Coronary artery blockage or narrowing.

Radiation? Yes.

Invasive? Yes.

CORONARY CT ANGIOGRAPHY

How it works: CT scan uses X-rays to produce 3D action or still images.

What it shows: Artery narrowing or blockage, heart-function problems, aneurysms, blood clots, calcium buildup.

Radiation? Yes.

Invasive? No. Requires contrast medium.

Gaining a better understanding of cardiovascular disease and stroke requires a team effort. Cardiologists, cell and molecular biologists and AIDS specialists are all needed. The three scientists profiled on this page exemplify the different approaches that Einstein researchers take as they seek better treatments for cardiovascular disease.

Nikolas G. Frangogiannis, M.D.
Professor of Medicine (Cardiology)
The Edmond J. Safra/Republic National Bank of New York City Chair in Cardiovascular Medicine

A heart attack happens when a blocked artery starves the heart of oxygen. It often starts a downward spiral for heart health: The damaged heart becomes inflamed, which activates substances that break down collagen fibers needed for support. The heart then tries to replace the collagen—which can create scarring that stiffens the heart and leads to heart failure. By examining animal heart muscle tissue, Dr. Frangogiannis hopes to waylay the molecules that govern the process so hearts could heal without scarring. “the ultimate goal of cardiovascular research,” he says.

In a 2010 American Journal of Pathology study, he and his colleagues found that stimulating a cell-surface receptor called CXCRs triggers recruitment of blood cells with potent anti-inflammatory activity that protects the heart from collagen breakdown—the potential basis for an extremely useful therapy.

The College of Medicine welcomes Dr. Frangogiannis, who came from Baylor College of Medicine in Houston to Einstein last fall.
VISITING COMMITTEE TO CONVENE

Einstein is forming a Visiting Committee on Cardiovascular Research. The committee will be composed of supporters who wish to be more deeply involved in cardiovascular research at Einstein. They will meet with leading Einstein faculty several times a year and learn about the latest research in cardiovascular medicine. Each meeting will feature a question-and-answer session during which members can talk to our researchers about issues, concerns and current cardiovascular topics in the news.

If you or your family members have been affected by cardiovascular disease, this will be a wonderful way for you to learn about the newest research developments as they are taking shape.

The first meeting will take place later this year. To learn more or to get involved, please call Christie Hubbard at 718.430.4171, or e-mail her at christie.hubbard@einstein.yu.edu.

FOR MORE INFORMATION

For more information or to learn more about supporting the work of the Wilf Family Cardiovascular Research Institute at Albert Einstein College of Medicine, please contact Glenn Miller, associate dean for institutional advancement, at 718.430.2411 or glenn.miller@einstein.yu.edu.

CONGRATULATIONS, DR. KITSIS!

Dr. Richard Kitsis, the director of the Wilf Family Cardiovascular Research Institute, was among a select group of cardiology researchers in New York City honored as “Rock Stars of Research” by the American Heart Association. Rock of Ages Broadway star Constantine Maroulis bestowed the awards at the 2010 New York City Go Red for Women Luncheon. Dr. Kitsis also is the Dr. Gerald and Myra Dorros Chair in Cardiovascular Disease.

THE WILF FAMILY CARDIOVASCULAR RESEARCH INSTITUTE

OUR MISSION:
• To better understand cardiovascular disease—the world’s number-one killer
• To translate this knowledge into novel treatments to relieve suffering and improve human health

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Director
Richard N. Kitsis, M.D.