

The Heart of the Matter

Many of the techniques used to diagnose and treat cardiac problems are developed and perfected at New Jersey hospitals.

By Karen DeMasters

The methods used to diagnose and treat heart ailments, many of which can be fatal, are constantly evolving fields and some of the newest techniques are being developed and used in New Jersey hospitals.

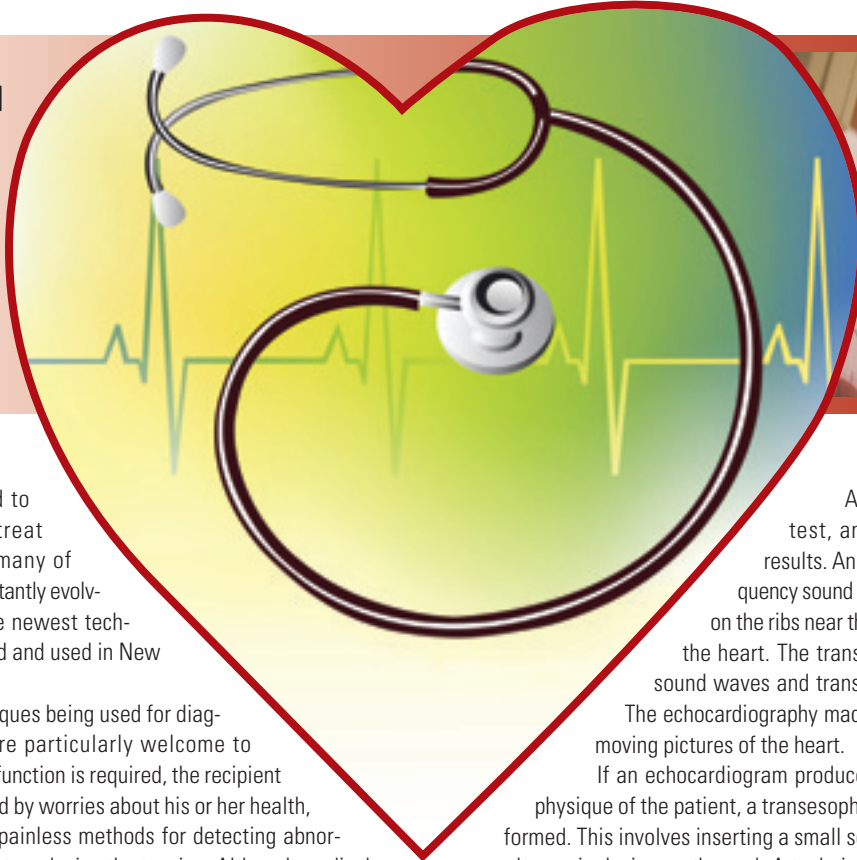
The noninvasive techniques being used for diagnosing heart problems are particularly welcome to patients. If a test for heart function is required, the recipient probably is already stressed by worries about his or her health, so the quickest and most painless methods for detecting abnormalities can go a long way to reducing the tension. Although medical personnel often consider tests to be routine, there is little that is "routine" about it for the person on the receiving end of the tests.

Diagnostic tools for heart specialists such as a 3D echocardiography are now in use in the Garden State and provide clearer pictures of the heart function. The heart, one of the human body's most vital organs, is really just a large muscle, but it is complex and can be hard to view from all angles, according to the physicians trying to get the best view possible.

Hackensack University Medical Center is one of the leaders in the field – a field that started with something as simple as a blood pressure checkup and has graduated to a number of others kinds of real time measurements of the heart's efficiency.

"One-dimensional cardiograms were eventually converted to two-dimensional [images], which was extremely useful," says Dr. Louis Evan Teichholz, director of cardiology at Hackensack University Medical Center. "Then real-time, three-dimensional viewing was made possible," Teichholz explained. "This gave us immense potential for improving diagnosis. It also helps us detect congenital heart disease in children, which is a complex diagnosis. We can see the spatial relationship and the vessels."

Three-dimensional testing and other procedures can now be done through the methods of noninvasive diagnosis, with no incisions or exploratory surgeries. An echocardiogram uses sound waves to create a moving picture of the heart. The picture is much more detailed than an X-ray image and involves no radiation exposure.



A trained sonographer performs the test, and a heart doctor interprets the results. An instrument that transmits high-frequency sound waves called a transducer is placed on the ribs near the breast bone and directed toward the heart. The transducer picks up the echoes of the sound waves and transmits them as electrical impulses.

The echocardiography machine converts these impulses into moving pictures of the heart.

If an echocardiogram produces unclear results because of the physique of the patient, a transesophageal echocardiogram can be performed. This involves inserting a small scope in the back of the throat with an ultrasonic device on the end. A technician guides the scope down to the lower part of the esophagus, where it is used to obtain a clearer, two-dimensional echocardiogram of the heart.

Two and three dimensional viewing of the heart are only two of the noninvasive methods now used to fight coronary artery disease, the leading cause of death in the United States. Every 60 seconds, someone in this country suffers a fatal heart attack. In half of those cases, there is no warning sign or previous symptoms, according to officials at the Princeton Longevity Center.

If detected early, the chances are good that the progression of the coronary artery disease can be halted or even reversed and heart attacks or strokes can be prevented. Studies have shown that the usual risk factor of high cholesterol levels is not necessarily good predictor of who will have a heart attack since 70% of all heart attacks occur in people with normal cholesterol levels.

Equally worrisome for diagnosis, stress tests do not show any abnormalities until an artery is at least 60% narrowed. Many heart attacks occur in arteries that are less than 50% narrowed and are therefore not detectable by any form of stress testing.

MRIs can help by enabling doctors to look at heart structure and can be an alternative to the three dimensional echocardiogram.

Sometimes, doctors determine a coronary artery scan is needed to see if calcium is building up in a person's arteries, which is a predictor for heart disease. The coronary artery scan is the most sensitive noninvasive test for calcium buildup that can be done, but involves radiation and the patient's insertion in

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Raffaele Corbisiero, M.D.,
Director of the
Electromechanical
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Deborah Heart and Lung
Center with the newly-
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equipment.

a tunnel scanning machine.

The newest scans are known as 64-slice high-definition heart scans and can show the amount of plaque forming in the arteries.

"Plaque buildup is a silent killer," Teichholz says. "It is good to measure risk factors for heart disease — age, sex, cholesterol, blood pressure, and smoking — but the risk factors do not tell you what is going on in a particular patient. But we can measure the degree of calcium and the amount of calcium correlates to what will happen to a particular person."

The 64-slice high-definition heart scan can detect the presence of blockages in the coronary arteries that may not be severe enough to show up on other tests.

If needed, dyes can be injected into the patient to improve the contrast of the images. But each injection of dye or increase in radiation to provide a better picture can include risks for the patient and so evoke controversy among doctors.

Other techniques being developed involve a minimally invasive procedure to plant a monitor under the skin to record a patient's heartbeat for days or even weeks. An ambulatory blood pressure monitor using a special blood pressure cuff can also record blood pressure for 24 hours to give doctors a better idea of what is going on with a patient's heart function.

Each type of noninvasive test can have advantages for diagnosis or be better for a particular patient.

"The new techniques help those who might not be able to undergo some of the more traditional tests," explains Dr. Marc Colmer, director of noninvasive cardiology and cardiac imaging at

Jersey Shore University Medical Center in Neptune.

"Someone with asthma might not be able to walk on a treadmill or someone who is claustrophobic might not be able to do a CAT scan," he said.

Or for example someone who can be put in a tunnel, but not want the risk of dye, the new 64-slice CAT scan can detect anomalies without the injection of dyes.

On the other hand, "a coronary angiogram that does not use catheters but injects a small amount of dye in the arms is a good tool to detect blockages in some patients," Colmer said, explaining the difference between the many available tests. "The new tools can test more quickly and often let the patient leave with immediate results.

"We are dedicated to making our tests as user friendly as possible," Colmer adds. "Also a lot of what we do here at Jersey Shore University Medical Center is teach the post doctoral cardiac fellows so they can continue the work."

Another condition that lends itself to less invasive techniques is arterial fibrillation, or an irregular heartbeat, which is one of the most common heart problems in the United States. In addition to being dangerous, it makes a person feel strange because of the irregular beat.

"This disorder causes electrical chaos in the top

part of the heart and can result in a stroke," says Dr. Raffaele Corbisiero, director of the Electromechanical Therapy Institute at Deborah Heart and Lung Center in Browns Mills.

Deborah recently added the Stereotaxis GentleTouch Magnetic system to its electrophysiology suite to test for arterial fibrillation and a host of other heart rhythm problems. The \$3 million machine, the first in use in southern New Jersey and the second in the state, makes it easier and more accurate for doctors to look at the heart.

Using the device, doctors can view the inside of the heart both anatomically and electrically. A tiny wire is inserted through a vein with no surgery and then guided through the arteries to picture the heart.

"This technology combines the benefits of computer-aided magnetic guidance with gentle catheter contact, which allows us to navigate and treat the heart without the risks associated with manual and mechanical devices," Corbisiero says.

The system uses computer-controlled magnets positioned outside the body to steer catheters and guide wires throughout the delicate cardiovascular system and reduces any risk that would be associated with a doctor pushing the wire through the arteries.

It can be used for heart irregularities such as arrhythmias, heart failure and coronary artery disease

and reduces the likelihood of needing highly invasive, open heart surgical procedures.

"This technology offers an innovation in healing by giving Deborah's doctors gentle access to remote areas of the heart that have been difficult, if not impossible, to reach before," Corbisiero said. Deborah is in the forefront of developing new technology for examining the heart with tiny wires and catheters or 'leads.'

Corbisiero recently was one of two heart specialists from the United States to be invited to attend an international panel sponsored by St. Jude Medical in Venice, Italy. The Multisite Pacing Advisory Board brought together the top doctors in the field of heart rhythm disorders and implantable medical devices to discuss the future of cardiac resynchronization therapy and future technologies to improve treatment for patients with heart failure. The panel will meet again this spring in Brussels, Belgium.



**Kane Chang, M.D., Director of
Vascular Surgery, with a
patient at Deborah Heart and
Lung Center.**