



Creating Biomedical Technologies to Improve Health

Picturing the Heart

NIH National Institute of Biomedical Imaging and Bioengineering

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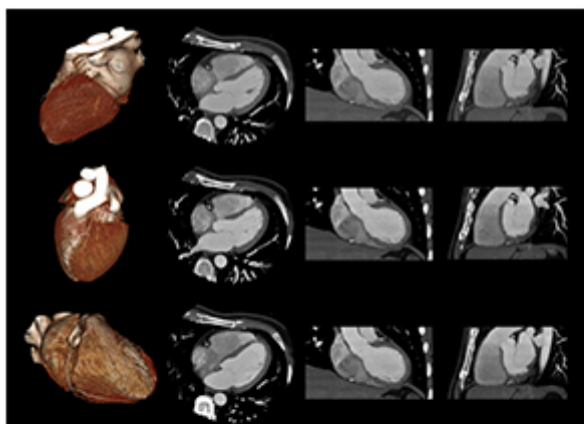
PICTURING THE HEART

Every year more than 1 million Americans have heart attacks¹. Medical heart scans are usually performed to determine heart damage and risk of further problems. But what kinds of scans are out there and what's the difference?

Source: Thinkstock

CARDIAC CT

Cardiac computed tomography, or cardiac CT, uses an x-ray machine to take pictures that are processed by the machine's computer to create cross-sectional images of the heart. A computer combines the pictures to make a three-dimensional image of the whole heart.



Source: iStock

A cardiac CT can tell doctors about:

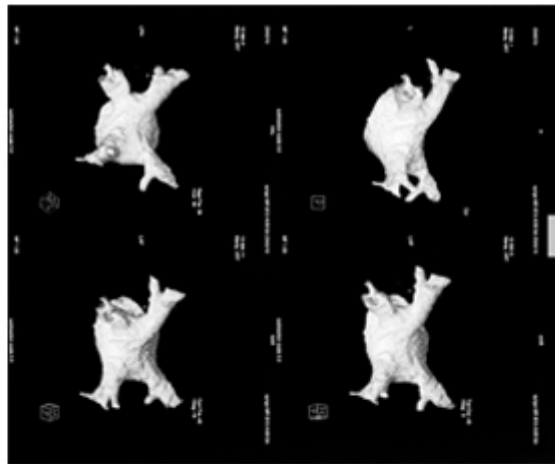
- Coronary heart disease
- Calcium buildup in the walls of the coronary arteries
- Problems with the aorta
- Cardiac aneurysm
- Cardiac dissection
- A pulmonary embolism
- Problems in the pulmonary veins
- Problems with heart function and heart valves
- Pericardial disease
- Results of coronary artery bypass grafting

CARDIAC MRI

Cardiac MRI creates both still and moving pictures of the heart and major blood vessels. Cardiac MRI is able to capture images of the beating heart and displays its structure and function.

A cardiac MRI can tell doctors about:

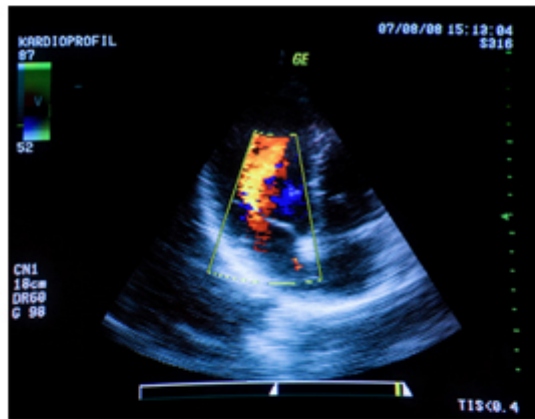
- Coronary heart disease
- Damage caused by a heart attack
- Heart failure
- Heart valve problems
- Congenital heart defects
- Pericarditis—a condition in which the membrane around the heart is inflamed
- Cardiac tumors



Source: iStock

ECHOCARDIOGRAPHY

Echocardiography, or echo, uses sound waves (like ultrasound) to create moving pictures of the heart. The pictures show the size and shape of the heart. They also show how well the heart's chambers and valves are working.



Source: Shutterstock

Echocardiography can tell doctors about:

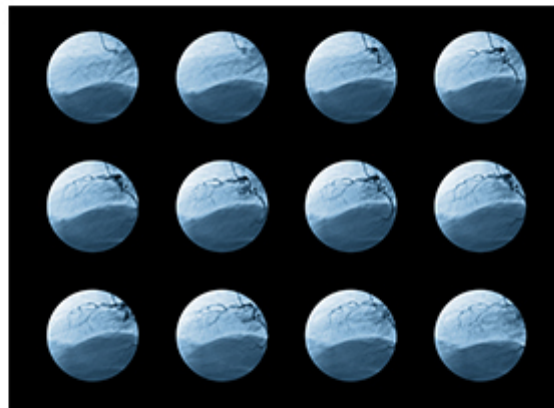
- The size of the heart
- Heart muscles that are weak and aren't pumping well
- Heart valve problems
- Structural problems
- Blood clots or tumors

CORONARY ANGIOGRAPHY

Coronary angiography uses dye that is visible on x-ray pictures. After the dye is injected, the x-ray machine takes a series of rapid images that shows the insides of coronary arteries.

A doctor may recommend coronary angiography if a patient has:

- Angina—unexplained pain or pressure in the chest.
- Survived a sudden cardiac arrest. This is a condition in which the heart suddenly and unexpectedly stops beating.
- Abnormal results from tests such as an EKG (electrocardiogram), exercise stress test, or other test.



Source: iStock

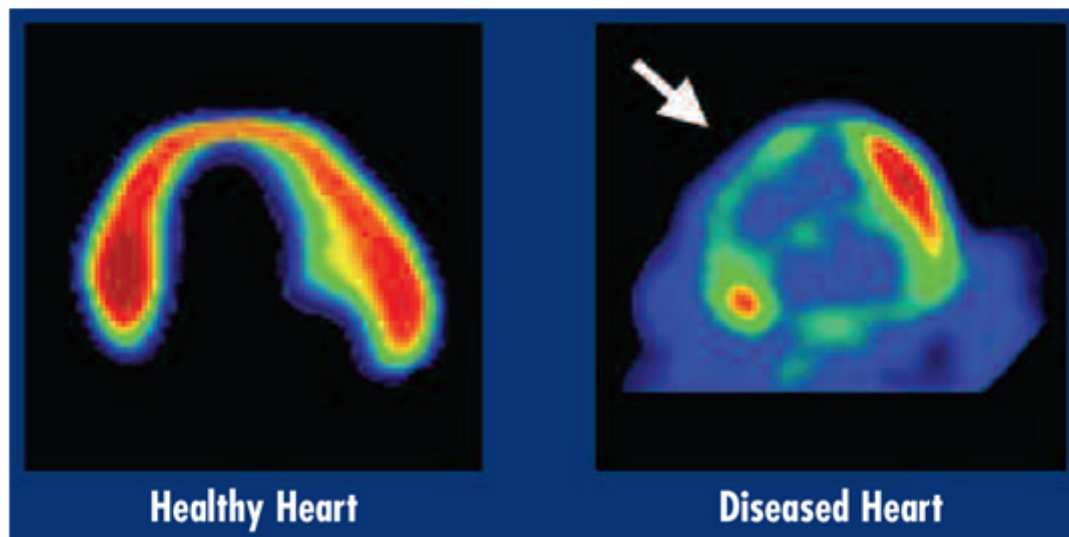
A coronary angiography also might be done on an emergency basis, such as during a heart attack. If angiography shows blockages in the coronary arteries, a doctor may do an angioplasty, a procedure to open blocked heart arteries and prevent further heart damage.

NUCLEAR HEART SCAN

Usually, two sets of pictures are taken during a nuclear heart scan. The first set is taken right after a stress test, while the heart is beating quickly. The second set is taken later, while the heart is at rest and beating at a normal rate.

A doctor may use a nuclear heart scan:

- To check how blood is flowing to the heart muscle. If part of the heart muscle isn't getting blood, it may be a sign of coronary heart disease.
- To look for damaged heart muscle.
- To see how well the heart is pumping blood to the body.
- To determine the risk for a heart attack.
- To decide whether procedures that increase blood flow to the coronary arteries will help a patient.
- To monitor procedures or surgeries that have been done, such as bypass or a heart transplant.



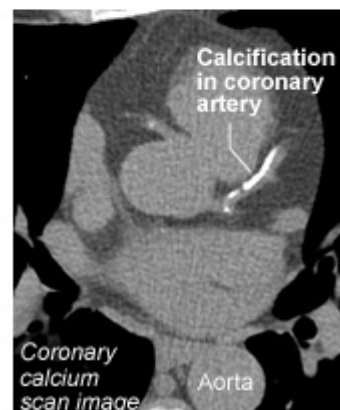
Source: National Institute of Drug Abuse

CORONARY CALCIUM SCAN

A coronary calcium scan looks for specks of calcium in the walls of the coronary arteries. Two imaging methods are able to reveal calcium in the coronary arteries—electron beam computed tomography (EBCT) and multidetector computed tomography (MDCT). Both use x-rays to create detailed pictures of the heart.

A doctor recommends a coronary calcium scan to see if plaque has built up in the arteries of the heart.

After a coronary calcium scan, an Agatston score is assigned. The score is based on the amount of calcium found in the coronary arteries. If there are no calcifications found, the test is negative. A higher score may indicate a higher risk of a heart attack and the doctor may order additional tests or treatment.



Source: National Heart, Lung, and Blood Institute

FOR MORE INFORMATION:

On Imaging and Devices:

The National Institute of Biomedical Imaging and Bioengineering
www.nibib.nih.gov

On Heart Disease:
The National Heart, Lung, and Blood Institute
www.nhlbi.nih.gov

¹National Heart, Lung, and Blood Institute

