TEST

Heart CT scan

A heart CT scan uses X-rays to create detailed images of the heart and coronary arteries.

WHAT IT MEASURES
Heart anatomy, coronary calcium, or artery narrowing

SAMPLE
None; CT imaging, sometimes with intravenous contrast

FASTING NEEDED?
Sometimes, usually before contrast coronary angiography

HOW LONG IT TAKES
Usually 30 to 60 minutes

RESULTS IN
Often several days; timing varies by radiology service

USED FOR
Cardiovascular risk assessment and diagnosis

MAIN LIMITATION
Motion and heavy calcium can mimic or hide artery narrowing

Overview

A heart CT scan uses X-rays and a computer to make detailed pictures of your heart. CT stands for computed tomography. Electrodes on your chest usually record your heartbeat so the scanner can take images at the right moment.

"Heart CT" can mean several different tests. The two most common are a coronary artery calcium scan and coronary CT angiography.

A coronary artery calcium scan does not usually need an injected dye. It measures calcium in the walls of the coronary arteries, which supply blood to the heart muscle. Calcium is a sign of coronary artery plaque, but the scan does not directly show how much an artery is narrowed.

Coronary CT angiography , often shortened to CCTA, uses an iodine-based contrast dye injected into a vein. It shows the inside and walls of the coronary arteries. It can identify plaque and areas that may be narrowed.

Other heart CT scans can examine the heart chambers, valves, aorta, veins around the heart, congenital heart differences, or the sac surrounding the heart. The preparation and meaning of the results depend on which scan you are having.

Why the test is ordered

A heart CT may be ordered to:

A calcium scan is mainly a risk-assessment test. CCTA is more often used to investigate possible coronary artery disease. Neither test answers every question about chest symptoms or heart function.

- investigate chest discomfort or other symptoms that could come from coronary artery disease
- help estimate cardiovascular risk when the best preventive plan is uncertain
- look for plaque or narrowing in the coronary arteries
- assess the aorta, heart chambers, valves, or nearby blood vessels
- plan certain heart procedures or check previous surgery
- clarify findings from an ECG, stress test, ultrasound, or other scan

Who should have the test

Heart CT is used when its likely benefit is greater than the risks from radiation, contrast, or medication. The choice depends on your symptoms, age, medical history, previous results, and the specific question that needs answering.

A calcium scan may be considered for some people without symptoms when their future cardiovascular risk is uncertain and the result could change a prevention decision. It is not a routine screening test for everyone.

CCTA may be suitable for some people with stable or recent chest symptoms. In emergency care, it is one of several possible tests selected after an initial assessment. Other people may need a stress test, heart ultrasound, invasive coronary angiogram, or no imaging.

Tell the imaging team if you are or might be pregnant. Also tell them about kidney disease, previous reactions to contrast, asthma, heart rhythm problems, and all medicines you take. These details do not always prevent a scan, but they can change how it is performed.

How to prepare

Follow the instructions from your imaging center because preparation differs by scan. A calcium scan often needs little preparation. For CCTA, you may be asked not to eat for several

hours. Water may still be allowed.

Caffeine, nicotine, and recent strenuous exercise can increase your heart rate. Some centers ask you to avoid them before CCTA because a slower, steady heartbeat usually produces clearer pictures.

Take your usual medicines unless the imaging team gives different instructions. Do not stop heart, blood pressure, diabetes, or blood-thinning medicine on your own. The team may need recent kidney blood test results before giving contrast.

Wear comfortable clothing and leave necklaces or other metal objects at home when possible. Tell staff if enclosed spaces make you anxious, although a CT scanner is open at both ends.

What happens during the test

You lie on a table that moves through a large, ring-shaped scanner. Sticky electrodes are placed on your chest to track your heartbeat. You will need to lie still and hold your breath for short periods.

A calcium scan usually does not require an intravenous line or contrast. The actual scanning takes only a few minutes.

For CCTA, a small intravenous line is placed in your hand or arm. Contrast is injected while the images are taken. It may cause a brief warm feeling, a metallic taste, or the sensation that you need to urinate.

You may receive medicine to slow your heart rate. You may also receive nitroglycerin to widen the coronary arteries. These medicines can improve image quality but may briefly cause dizziness or a headache.

Most appointments take 30 to 60 minutes, although the scan itself is much shorter. You can usually go home soon afterward.

Understanding your results

A radiologist or heart-imaging specialist reviews the pictures and sends a report to the clinician who requested the test.

A calcium scan produces a calcium score. A score of zero means no calcified coronary plaque was seen. It does not completely exclude early or non-calcified plaque. Higher scores mean more calcified plaque was detected, but they do not show exactly how narrowed an artery is.

A CCTA report describes plaque, artery narrowing, image quality, and other findings. Plaque

may be calcified, non-calcified, or mixed. A reported narrowing does not always mean that blood flow to the heart muscle is reduced.

The scan may also show findings outside the heart, such as a lung nodule or a change in the aorta. Many incidental findings are harmless, but some need comparison with older scans or follow-up imaging.

There is no single normal range for every heart CT. Reporting and interpretation vary by imaging center or laboratory method, age, sex, pregnancy status, medicines, symptoms, previous treatment, and overall clinical context.

What affects the results

Heart CT images can be unclear or misleading even when the scanner is working correctly.

A fast or irregular heartbeat can create blurred or mismatched images. Caffeine, nicotine, anxiety, pain, or recent exercise may raise your heart rate. Heart-rate-lowering medicine can improve the images when it is safe to use.

Movement or difficulty holding your breath can also blur the coronary arteries. Larger body size may increase image noise, although modern scanners can often adjust for this.

Heavy coronary calcium can appear larger on CT than it is. This can make an artery look more narrowed than it truly is. Metal from some stents, surgical clips, or implanted devices can create similar streaks or shadows.

Contrast timing matters in CCTA. Poor flow of contrast through the arteries can limit the scan. Kidney function affects whether contrast can be given safely, while heart function and circulation can affect how quickly contrast reaches the arteries.

Previous bypass surgery or coronary stents change the anatomy being examined. Small stents can be difficult to assess clearly. Pregnancy changes the balance between the potential benefit of the scan and radiation exposure rather than making the scanner inaccurate.

Accuracy and limitations

When image quality is good, CCTA is particularly useful for showing that major coronary artery narrowing is not present. However, it can miss disease in very small vessels or when motion, metal, or poor contrast filling hides part of an artery.

CCTA can also report narrowing that turns out to be less severe on another test. Heavy calcium is a common reason for this false-positive result. An invasive coronary angiogram may

provide a clearer answer when CCTA is uncertain or when treatment during the same procedure may be needed.

A calcium score can identify calcified plaque, but it misses plaque that has not become calcified. A zero score therefore does not rule out every cause of chest symptoms, especially in younger people or those with concerning symptoms.

Neither scan directly proves whether a narrowing is limiting blood flow. A stress test, CT-based blood-flow assessment, or invasive pressure measurement may be better for that question. Heart CT also does not replace an ECG or blood tests when a heart attack is suspected.

Risks and complications

Heart CT uses ionizing radiation. The amount differs by scan type, scanner, body size, and imaging technique. The team aims to use the lowest amount needed for useful pictures.

A calcium scan usually has no injection-related risks. For CCTA, the intravenous line may cause brief discomfort, bruising, or bleeding. Some people feel faint during needle placement.

Iodinated contrast can cause an allergic-type reaction. Serious reactions can occur but are uncommon. Contrast may also affect kidney function, with greater concern in people who already have severe kidney disease or an acute kidney problem.

Contrast can occasionally leak into tissue around the vein, causing pain and swelling. Medicines used to slow the heart or widen the arteries may temporarily lower blood pressure or cause dizziness, headache, or a slow heartbeat.

Radiation is an important consideration during pregnancy. Tell the imaging team before the scan if pregnancy is possible so they can review whether another test would be more suitable.

What happens next

For routine follow-up, the clinician who ordered the scan will discuss the report with you. The next step may be no further testing, changes to risk-reduction treatment, comparison with older images, or another test to examine blood flow.

A result showing possible severe narrowing may lead to prompt specialist review. An unclear scan may need a different test rather than simply repeating the CT.

Do not wait for a scheduled result if you develop new or severe chest pressure, marked shortness of breath, fainting, or symptoms suggesting a heart attack. Call local emergency services. After contrast, difficulty breathing or swelling of the face or throat also requires

emergency help. A mild delayed rash should be reported promptly to the imaging service or your healthcare professional.

Common questions

Can I drink coffee before a heart CT scan?

You may be asked to avoid coffee and other caffeine before CCTA because they can raise your heart rate. A calcium scan may have different instructions. Follow the directions from your imaging center.

Can I eat before the scan?

Sometimes. CCTA appointments often require several hours without food, especially if medicines or contrast will be used. Water may be allowed. Calcium scans often do not require fasting.

Does the time of day matter?

Usually not. Image quality depends more on a steady heart rate, correct preparation, and your ability to remain still. Choose a time when you can follow any fasting or caffeine restrictions.

Can I exercise beforehand?

Avoid strenuous exercise if your center has asked you to keep your heart rate low before CCTA. Gentle daily activity is usually less likely to interfere, but follow your specific instructions.

Can I drive home afterward?

Most people can drive after a routine heart CT. You may need someone else to drive if you received a sedative, feel dizzy from medication, or were given different instructions.

Is a heart CT the same as a coronary angiogram?

No. CCTA uses a vein injection and CT images. Invasive coronary angiography passes a thin tube through an artery to the heart and can allow treatment during the same procedure.

Sources

- American College of Radiology and Radiological Society of North America. Coronary CT Angiography . RadiologyInfo.org
- American College of Radiology and Radiological Society of North America. Cardiac CT for Calcium Scoring . RadiologyInfo.org



- American College of Radiology. ACR Manual on Contrast Media .
- Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC Guideline for the Evaluation and Diagnosis of Chest Pain . Circulation. 2021;144:e368-e454.
- Narula J, Chandrashekhar Y, Ahmadi A, et al. SCCT 2021 Expert Consensus Document on Coronary Computed Tomographic Angiography . Journal of Cardiovascular Computed Tomography. 2021;15:192-217.
- Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease . Circulation. 2019;140:e596-e646.