



Review article

Computed tomography coronary calcium score test: A new, state-of-the-art imaging technique and novel innovation in imaging technology.

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ABSTRACT

Cardiovascular disease is recognized as the foremost cause of death worldwide. However, numerous individuals suffering from coronary artery disease remain asymptomatic and are unaware of their health status. The identification of coronary artery calcium (CAC) indicates the existence of coronary artery disease in a patient, providing essential prognostic insights that surpass those offered by traditional cardiovascular risk factors. An elevated coronary artery calcium score increases the probability of experiencing adverse cardiovascular events in the future, even among asymptomatic individuals. Furthermore, CAC can also be assessed through thoracic computed tomography (CT) conducted for purposes unrelated to cardiac issues. CAC is frequently discovered during non-gated thoracic CT scans, and this observation significantly impacts prognosis.

KEYWORDS: Computed Tomography, Imaging Technology.

INTRODUCTION:

Coronary calcium scans are advanced cardiac computed tomography (CT) scans. They examine the heart's arteries for calcium deposits. Narrowing of the arteries due to calcium buildup can lead to decreased blood flow to the heart. A coronary calcium scan may detect coronary artery disease before any symptoms arise. (1)

PEOPLE GET IT DONE FOR WHAT REASON:

The calcium present in the cardiac arteries is evaluated through a CAC test. Utilizing this calcium score, your healthcare team can assess your likelihood of experiencing a future heart attack, the extent of plaque in your heart arteries, congenital heart conditions, heart valve problems, artery obstructions, heart tumors or masses, and the

efficiency of the heart's pumping function. CAC testing is beneficial when considering treatment options, such as initiating statin therapy or low-dose aspirin. (2)

Some demographics for which it can be beneficial include:

Individuals who are uncertain about statin therapy and wish to understand the potential risks and benefits.

Individuals who are apprehensive about resuming statin therapy after discontinuing treatment due to side effects; men or women aged 55 to 80 with minimal risk factors who are curious if statin therapy would be advantageous; and those aged 40 to 55 with a 5% to 7.5% ten-year risk of developing heart disease and risk factors that elevate their risk.

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For individuals without symptoms of heart disease and at low risk of a heart attack, calcium scoring is not recommended unless there is a significant family history of early coronary heart disease.

If you have previously undergone a calcium score, it will not yield any additional information. Heart attack, bypass surgery for the heart, and a coronary stent. (3)

RISKS:

A coronary calcium scan employs an X-ray. X-rays are based on radiation. Radiation levels are generally considered safe. Coronary calcium scans, which are endorsed by certain medical facilities, can easily evaluate heart attack risk.

In many instances, a referral is not required for these scans. Unfortunately, insurance may not cover these procedures.

Blood pressure assessments and more affordable blood tests can assist your medical team in determining your heart attack risk. (4,5)

PREPARATION:

There is no requirement for preparation prior to a heart CT scan.

You should continue taking your prescribed medications as usual, but you must refrain from smoking for four hours before the test.

For your examination, please wear comfortable, loose-fitting clothing. You may be required to change into a gown for the procedure.

Metal items, including hairpins, dentures, jewelry, and glasses, can interfere with CT scans.

It is advisable to remove these items before your test or leave them at home.

For specific CT scans, you may be requested to remove your dental appliances and hearing aids.

Women who wear bras with metal underwire will need to remove them.

If possible, it is recommended to remove any piercings.

If a woman believes she may be pregnant, it is essential to inform both the CT technician and her physician. (6)

WHAT YOU CAN EXPECT:

During the procedure

- Before undergoing a coronary calcium scan, adhesive patches equipped with sensors are placed on your chest, and sometimes on your arms or legs as well.
- These patches are connected to a device that monitors your heartbeat via wires. An automated CT scanner is utilized to conduct the scan.
- You will lie on your back on a movable table.
- A large tube-shaped machine accommodates the table. Generally, your head remains outside the scanner throughout the procedure. The examination room is likely to be cool.
- You may be prescribed medication to reduce your heart rate, which results in clearer images. If you feel anxious or tense, medication may also be provided to help you relax.
- It is essential to remain still while the images are being captured.
- You might be instructed to hold your breath for a few seconds.
- During the examination, the medical professional will be able to see and communicate with you.
- The entire test typically takes between ten to fifteen minutes to complete. (7)

After the procedure

- Unless otherwise directed by your healthcare provider, you are usually able to drive yourself home and resume your normal activities after the test. (8)

HOW DO I OBTAIN THE RESULTS, AND WHO INTERPRETS THEM:

- A radiologist, a medical expert with specialized training in managing and interpreting radiological examinations, will analyze the images. The physician who ordered the test will receive an official report from the radiologist.
- A negative calcium scoring from the cardiac CT scan indicates that there is no calcification in the coronary arteries.

- This suggests that coronary artery disease (CAD) is either absent or so minimal that it cannot be detected using this method.
- Under these circumstances, the likelihood of experiencing a heart attack within the next two to five years is extremely low.
- A positive test result indicates the presence of CAD, regardless of whether the patient is showing any symptoms.
- The calcium score, which quantifies the level of calcification, can be utilized to estimate the risk of a myocardial infarction (heart attack) in the future. (9)

The extent of CAD is graded according to your calcium score:

Calcium Score	Presence of CAD
0	No evidence of CAD
1-10	Minimal evidence of CAD
11-100	Mild evidence of CAD
101-400	Moderate evidence of CAD
Over 400	Extensive evidence of CAD

- You may need a follow-up examination.
- If this is the case, your doctor will provide an explanation.
- Sometimes, a follow-up examination may involve additional views or a specialized imaging technique to more accurately evaluate a potential issue.
- It may also assess whether a problem has evolved over time. Follow-up exams are often the most effective means of determining the efficacy of a treatment or whether a condition necessitates further attention. (10)

BENEFITS:

- Cardiac CT for calcium scoring is a quick, painless, and noninvasive way to assess if you might be at an increased risk for a heart attack, and it does not require an injection of contrast material.

- An EBCT scan, which lasts less than 20 minutes, allows you to immediately return to your normal activities.
- After undergoing a CT scan, a patient does not retain any radiation, and the X-rays used during the scan should not cause any immediate adverse effects. (11)

RISKS:

- There is always a slight risk of developing cancer due to excessive radiation exposure. However, the benefit of obtaining an accurate diagnosis far outweighs the risks associated with CT scanning.
- This procedure involves varying levels of radiation exposure. For more information, please refer to the Radiation Dose page. Women should always inform their doctor and the X-ray or CT technologist of any potential pregnancy.

- Due to potential risks to the fetus, doctors generally recommend against CT screening for pregnant women unless it is deemed absolutely necessary by a physician.
- In response to a high calcium score, other diagnostic tests for cardiac disease may sometimes be conducted; these tests may or may not provide clinically significant results and could have negative effects. (12,13)

WHAT ARE THE LIMITATIONS OF CARDIAC CT IN CALCIUM SCORING:

- A large individual may not fit through the opening of a standard CT scanner.
- Alternatively, they may exceed the weight limit of the moving table, which is usually set at 450 pounds.
- Non-calcified plaque, or CAD, can be present without calcium and may remain undetected by the scan. (14)

RESULTS:

- The outcomes of a coronary calcium scan are typically presented as a numerical value. This figure is referred to as the Agatston score. The score is determined by the calcium density and the total area of the deposits. A score of zero indicates the absence of calcium in the heart, suggesting a low probability of experiencing a heart attack in the future. Conversely, a higher score correlates with an increased risk of heart disease when calcium is detected.
- A score ranging from 100 to 300 signifies moderate plaque deposits. This range is associated with a relatively heightened risk of heart attack or other cardiac issues over the subsequent three to five years.
- Scores exceeding 300 denote a greater risk of heart attack and more extensive disease. This number reflects the quantity of calcium present in the arteries compared to others of the same age and gender. Calcium scores around 75% have been linked to a significantly elevated risk of heart attacks. The results of your coronary calcium scan will be provided to you by your medical team. (15)

CONCLUSION:

Since the CAC score is linked to a lower risk of myocardial infarction, it needs to be taken into account as a screening method for these patients. Early detection of CAD leads to earlier or more extensive therapy, which lowers the chance of a sub.

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