

Can high-tech heart scans help prevent heart attacks?

Cardiac CT angiography is gaining ground as a fast, effective way to diagnose coronary artery disease.

If you experience a short-lived squeezing sensation or discomfort in your chest when you exercise or feel stressed, one possible cause is inadequate blood flow to the heart. Known as stable angina, this condition suggests you have heart disease and may be at risk for a heart attack.

Doctors can use a number of different tests to diagnose (or rule out) inadequate blood flow to the heart muscle. The first step is frequently a type of stress test, which checks the heart's electrical activity, muscle function, or blood flow patterns while the heart is under stress from exercise or medication. Stress tests can identify areas of reduced blood flow, which suggest a narrowing in the artery that supplies that part of the heart.

Plaque problems

"However, it turns out that most heart attacks don't originate from the tightly narrowed arteries that are picked up by stress tests," says Dr. Ron Blankstein, a cardiovascular imaging specialist at Harvard-affiliated Brigham and Women's Hospital. Instead, most heart attacks likely develop from what's called non-obstructive plaque—fatty debris that blocks less than half the inner diameter of an artery, he explains. These non-obstructive plaques are prone to rupturing and spewing out chemicals that trigger formation of a blood clot.

Stress tests can't detect non-obstructive plaque. But CCTA, which stands for cardiac computed tomography angiography, can (see "What is cardiac computed tomography angiography?"). While this noninvasive test has been around for about 15 years, CCTA is not widely used in the United States. But that may change, thanks to recent findings suggesting that CCTA may improve

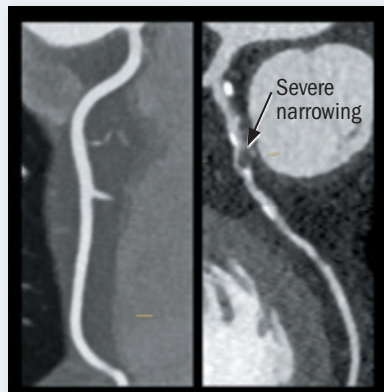
our ability to find and treat coronary artery disease, says Dr. Blankstein.

The case for CCTA

In 2015, one large study found that CCTA was just as effective as stress testing for preventing heart attacks and deaths from heart disease. Then, in 2018, a study called SCOT-HEART compared

What is cardiac computed tomography angiography?

Cardiac computed tomography angiography uses high-speed x-rays to create three-dimensional views of the blood vessels and other heart structures. Before the scan, you receive an injection of contrast dye into your arm or hand that "lights up" the blood vessels. You may also be given medications to slow your heart rate and widen your blood vessels. During the scan, you lie on a table that moves through a donut-shaped opening in the scanner. Over a period of a few seconds, the scanner takes multiple pictures, which are then merged together to create a detailed view of the heart's arteries.



The left image shows a healthy artery, while the right one shows a severely narrowed artery with extensive plaque.

standard care (which typically included stress testing plus recommended medications) to standard care plus CCTA. After nearly five years, people who'd received a CCTA scan were about 40% less likely to have died from coronary artery disease or had a nonfatal heart attack compared with those who'd had only standard care.

One advantage to CCTA is that if your arteries show no signs of plaque, that's very strong reassurance that you don't have coronary artery disease and you're at extremely low risk of a future heart attack. That's not necessarily true with a stress test. "People often recall hearing of someone who had a 'normal' stress test that suggested no blockages, but who then had a heart attack just a few months later," says Dr. Blankstein.

On the other hand, if a CCTA scan shows that you do have plaque, then you may benefit from preventive therapies, such as cholesterol-lowering statins and blood pressure drugs (as well as improved diet and exercise habits, of course). The enhanced detection of plaque and the subsequent recommendation of more aggressive preventive therapies likely explain the improved survival seen in the SCOT-HEART study, Dr. Blankstein says.

However, CCTA is not appropriate in all situations, he adds. For example, in people who already know they have coronary artery disease—such as those who've received artery-opening stents or had bypass surgery—stress testing is usually preferred.

CCTA is faster, easier, and less risky for patients than traditional coronary angiography, which involves threading a thin tube from an artery in the leg or arm up to the heart and injecting dye directly into the coronary arteries. If the test reveals an artery that's more than 70% blocked, a cardiologist can insert a stent to open that artery during the same procedure. However, mounting evidence suggests that for people with stable angina, medication may prevent heart attacks just as well as a stent. ♥

Image courtesy of Ronald Blankstein, M.D.