

Should Family Physicians Use Coronary Artery Calcium Scores to Screen for Coronary Artery Disease?

No: Screening is Unproven, Expensive, and Potentially Harmful

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Screening for disease is challenging because we must minimize the possibility of taking someone who is perfectly healthy and making them worse off. Even relatively innocuous blood tests can lead to overdiagnosis and overtreatment, and imaging studies have the added danger of radiation exposure. Although it may be tempting to have more information about our patients, we should seek it only when there is evidence that the benefits of obtaining that information outweigh the harms and come at a reasonable cost.

Coronary artery calcium (CAC) scores have been recommended as a way to screen for coronary artery disease (CAD). Before we get too enthusiastic about this expensive new test, remember that a good screening test must perform significantly better than existing or less invasive tests, that the cost and risk should be low, and that using the test should improve patient-oriented outcomes.¹ Unfortunately, CAC scoring does not meet any of these criteria.

The area under the receiver operating characteristic (ROC) curve is a measure of the ability of a test to discriminate healthy patients from those who are ill: an area under the ROC curve of 0.5 indicates a worthless test, whereas 1.0 indicates a perfect test. The Framingham risk score, a free and simple way to assess cardiovascular risk, has an area under the ROC curve of 0.76. In one study, adding CAC scoring to the area under the ROC curve increased its predictive accuracy only modestly, to 0.81.² This difference is of questionable clinical importance, and comes at considerable cost



This is one in a series of pro/con editorials discussing controversial issues in family medicine.

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and radiation exposure. Another study of 1,096 patients found no difference between a standard clinical risk assessment and an assessment that added the CAC score.³

Can CAC scores alter our classification of a patient's risk status? In a large study, 20 percent of patients who had coronary arteries with significant stenosis (greater than 50 percent) had a CAC score of zero, so the "reassurance factor" is not very reassuring.² Additionally, it was rare for the score to reclassify someone from low risk to high risk (only six out of 3,746 participants) or from high risk to low risk (32 out of 285). Most reclassifications were from moderate risk to low risk.² Is it likely that a physician who has prescribed a statin for a moderate-risk patient with high cholesterol will (or even should) stop the medicine because of a low CAC score? What matters is the impact on physician and patient behavior, and on that count, we have no evidence of benefit.

The CAC test exposes patients to approximately 1 mSv of radiation, and many of these patients will undergo a follow-up nuclear stress test that exposes them to another 10 mSv.⁴ If we screened a cohort of 100,000 55-year-old adults one time, we would cause an estimated eight cancers in men and 20 in women.⁵ Of course, many participants would undergo repeated screening, so the number of tumors would likely be even higher over time.

CAC testing is not only potentially harmful, it is also expensive. Consider a group of 100,000 patients being screened every five years from 50 to 75 years of age. If this

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population is scanned five times during that period, the total cost at \$200 per scan would be \$100 million. This does not include the cost of thallium stress tests for healthy persons who otherwise would not undergo them because of false-positive CAC scores. Entrepreneurs have promoted CAC tests as a way to increase the number of subsequent exercise tests and angiographies to subspecialists and hospitals that invest in them.⁶ A final harm is that normal CAC scores may lead to unintended consequences, such as decreased motivation to adopt healthy lifestyle habits.

The U.S. Preventive Services Task Force recommends against screening low-risk persons, and concludes that the evidence is insufficient for high-risk persons.⁷ CAC scoring is unproven, expensive, and potentially harmful. We have great alternatives that are safe, free, and available online. A risk assessment tool from the National Heart, Lung, and Blood Institute is available at <http://hp2010.nhlbihin.net/atp/iii/calculator.asp>. Several more tools are available through the Android and iTunes App Stores using the search term "Framingham."

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Author disclosure: No relevant financial affiliations to disclose.

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