

# Study demonstrates need to change scoring system for heart disease

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A study led by researchers at the University of California, San Diego School of Medicine shows that one of the most widely used systems for predicting risk of adverse heart events should be re-evaluated. A surprise finding was that coronary artery calcium (CAC) density may be protective against cardiovascular events. The study of CAC will be published in the January 15 issue of the *Journal of the American Medical Association (JAMA)*.

Great CAC density of calcified plaque in the coronary arteries was inversely and significantly associated with risk of coronary [heart](#) disease and cardiovascular disease (CVD) events, said lead author Michael H. Criqui, MD, MPH, of the Department of Family and Preventive Medicine at UC San Diego.

"Current scoring systems assume that denser heart plaque (CAC) is more hazardous, but we found the opposite," said Criqui. "It's not good to have CAC but it is less hazardous if it's more dense."

The standard CAC score is called the Agatston. According to the National Heart, Blood and Lung Institute, the score is based on the amount of calcium found in a patient's coronary arteries. Traditionally, the test is negative if no calcium deposits, or calcifications, are found in the arteries, and interpreted to mean that the chance of the patient having a heart attack in the next 2 to 5 years is low.

The test is positive if calcifications are found in the arteries.

Calcifications are a sign of atherosclerosis, a condition in which the arteries harden and narrow due to plaque buildup. The higher the Agatston scores are, the more severe the atherosclerosis.

"However, our study shows that in addition to CAC volume, the role of CAC density should also be considered when developing a risk score," Criqui said. "A greater volume of CAC does indicate a higher risk, but at any given volume of CAC, a higher density is associated with lower risk. This may be because densely calcified plaques are more stable."

He added that since the dense plaques pose less risk, researchers need to look at what factors are related to denser plaques, adding that statin drugs appear to increase CAC density. The next phase of Criqui's research will include evaluation of the effect of diet, exercise and medical management of CVD on plaque density. Another focus will be developing an improved CAC score to incorporate density and other variables.

The study looked at 3,398 participants at six U.S. sites from four ethnic groups: non-Hispanic white, African American, Hispanic and Chinese, aged 45 to 84 years who were free of known CVD at baseline, and had CAC greater than zero on their baseline CT. The study participants were followed up through October 2010.

During a median of 7.6 years of follow up, there were 175 [coronary heart disease](#) (CHD) events, such as myocardial infarction, resuscitated cardiac arrest or death, and an additional 90 other CVD events, such as stroke.

According to the researchers, measurement of CAC has consistently proven to be the best sub-clinical CVD measure in terms of improving CHD risk prediction. However, their study data suggest that the Agatston area or volume scores alone are not optimal measures to use in CVC risk

prediction, since the demonstrated inverse association with [density](#) also needs consideration.

Criqui added that the data are consistent with numerous prior observations, including a modest correlation between CAC and coronary stenosis, or narrowing of the arteries due to fat or cholesterol. Previous studies have shown that patients with stable angina – chest pain caused by insufficient blood flow to the heart – were more likely to have calcified plaque than patients with unstable angina, which is more likely to lead to a heart attack.

CAC is present in more than half of middle-aged U.S. residents; by age 70, its probability exceeds 90 percent.

Provided by University of California - San Diego

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