
Coronary artery calcium screening: where do we go from here?

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Introduction

For decades, physicians have used risk assessment to determine prognosis and institute preventive therapy for their patients. Much of this has been based on risk assessment systems like the Framingham risk score (FRS), a multivariable statistical model which employs age, sex, smoking history, blood pressure, cholesterol, high-density lipoprotein cholesterol, blood glucose level, and history of diabetes to estimate coronary event risk in individuals without prior coronary heart disease¹.

Prediction models based on coronary heart disease risk factors, such as the FRS, have acknowledged limitations in their ability to determine which individuals will or will not experience coronary heart disease^{1,2}. One suggested approach to improving risk prediction over the FRS is the quantification of coronary artery calcium score (CACS) using computed tomography³⁻⁹.

Coronary artery calcium score and coronary heart disease

In our recent article¹⁰, we reported a significant association between CACS and subsequent coronary heart disease events in non-diabetic adults with intermediate coronary heart disease risk. We further reported that the addition of CACS to FRS significantly increased the power and discrimination of FRS for predicting subsequent coronary heart disease events. Figure 1 shows the relationship between predicted event rates and CACS as well as Framingham risk.

Our results provide data based support for the most recent guidelines from the

American College of Cardiology and the American Heart Association (ACC/AHA)³ regarding the use of coronary calcium scanning. The results of our study validate the use of coronary calcium scanning in persons at intermediate risk of having coronary heart disease events. A physician treating an asymptomatic patient with no known coronary disease but with a lipoprotein level that puts him in the intermediate risk range can now refer that person for calcium scanning with the expectation that the result will help guide subsequent preventive treatment.

Screening by coronary artery calcium score

Does this mean that coronary calcium scanning can prolong the lives of people who are at intermediate risk of developing coronary heart disease? Unfortunately, we do not yet have the answer to this question. There has been no clinical trial of coronary computed tomographic scanning for calcification. Thus our studies, and those of others which have shown similar results, do not give coronary calcium screening the same validity as the screening mammogram for breast cancer¹¹, for which there have been several clinical trials. As the ACC/AHA guidelines stated, calcium screening may be helpful in risk stratification only if used by a physician knowledgeable in this field and who understands a specific patient's clinical and life situation. In the United States for example, there has been a tendency to promiscuously market imaging tests directly to consumers, either as a separate screening for atherosclerosis or in combination with more standard risk assessment. Using CACS as if it were

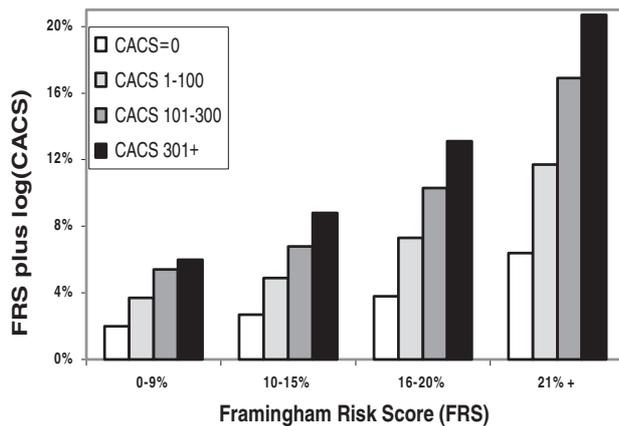


Figure 1. Predicted event rates for coronary death or non-fatal myocardial infarction, stratified by four levels of Framingham risk score and four levels of the coronary artery calcium score (CACS). Pairwise analyses compared the highest CACS level (CACS > 300) with each of the lower levels of CACS within each Framingham risk score group.

the “mammogram of the heart”¹² is unfounded and may do more harm than good.

Conclusion

Our findings, coupled with those of other investigators, provide preliminary data germane for the planning of a large-scale clinical trial of coronary calcium screening alone or in combination with other screening tests for subclinical atherosclerosis. Such a trial is sorely needed to determine if disease screening for coronary calcium or other measures of subclinical atherosclerosis are effective in preventing death and morbidity from heart disease. The initial investment in such a trial, though significant, pales in comparison to the potential benefit if coronary calcium proves to have merit as a preventive tool. A country such as Italy where com-

mercial use of calcium screening is not yet widespread would be ideal for such a trial.

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