

Digital Mammography: Screening for Coronary Artery Disease?

Laurie Margolies, MD

Mary Salvatore, MD

Harvey S. Hecht, MD, FACC, FSCCT

Sean Kotkin, MD

Rowena Yip MPH

Usman Baber, MD

Vivian Bishay, MD

Jagat Narula, PhD, MD, FACC

David Yankelevitz, MD

Claudia Henschke, PhD, MD

Departments of Radiology and Cardiology
Icahn School of Medicine at Mount Sinai

Background

Digital mammography screening for breast cancer is a common screening exam.

However, there is no routine screening for coronary artery disease (CAD), which kills 10x more women than breast cancer.

Breast arterial calcification (BAC) is easily evaluable on every mammogram at no additional cost and radiation, but is not reported. BAC score included number of vessels, length of involvement and density of calcification.

BAC has been associated with CAD, but not in a quantitative manner.

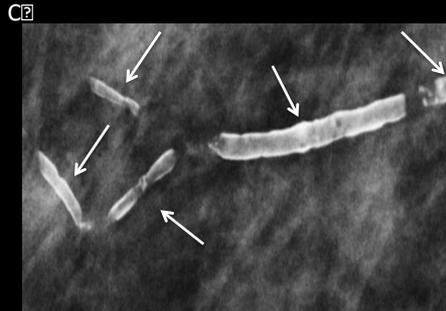
Coronary artery calcium (CAC) scanning is the most powerful predictor of CAD in the asymptomatic population and is included in the 2010 ACC/AHA Guidelines and in the 2013 AHA/ACC Risk Assessment and Cholesterol Guidelines.

CAC and BAC scored on 0-12 scale based on severity and distribution of calcium.

Mammogram

CAC CT scan

54 year old female



BAC= 9



CAC= 7 in LAD and LCx

This study compared BAC to CAC in 325 asymptomatic women including 33 with known CAD, undergoing mammography and CT scan within 1 year, and compared BAC to risk factors, the Framingham Risk Score (FRS) and the 2013 Cholesterol Guidelines Pooled Cohort Equations (PQE).

Results

BAC was found in 42.5% of the women and was related to age, hypertension and kidney disease. CAC was found in 47.6% of the women.

Results

The sensitivity, specificity, positive and negative predictive values, and accuracy of BAC >0 for CAC >0 were 63%, 76%, 70%, 69%, and 70%, respectively.

The multivariable odds ratio for CAC >0 was 3.2 for BAC 4 to 12, 2.0 for age, and 2.2 for hypertension; i.e., BAC was more powerful than standard risk factors.

The agreements of FRS risk categories with CAC and BAC risk categories were 57% for CAC and 55% for BAC; the agreement was 47% for PCE risk categories for CAC and 54% by BAC.

BAC >0 had area under the curve of 0.73 for identification of women with CAC >0, equivalent to both FRS (0.72) and PCE (0.71).

BAC >0 increased the area under the curves for FRS (0.72 to 0.77; $p = 0.15$) and PCE (0.71 to 0.76; $p = 0.11$) for the identification of high-risk (4 to 12) CAC.

With the inclusion of 33 women with established CAD, BAC >0 was significantly additive to both FRS ($p = 0.02$) and PCE ($p = 0.04$) for high-risk CAC.

Conclusions

There is a strong quantitative association of BAC with CAC.

BAC is superior to standard cardiovascular risk factors for predicting the presence of CAC.

BAC is equivalent to both the FRS and 2013 Guideline PCE for the identification of high-risk women and is additive when women with established CAD are included.

The predictive power of BAC should be evaluated in a large prospective outcomes-based trial.

Recommendations

It is reasonable to report quantitative BAC on all digital mammograms since it provides the opportunity to significantly improve the identification of high-risk women by further simple analysis of a broadly utilized screening tool.

BAC+ women should undergo further risk assessment, preferably with a gated CAC scan, with subsequent adjustment or institution of statins as indicated by the CAC score.