

# New Method of Quantifying Arterial Calcium Improves Atherosclerosis Prediction

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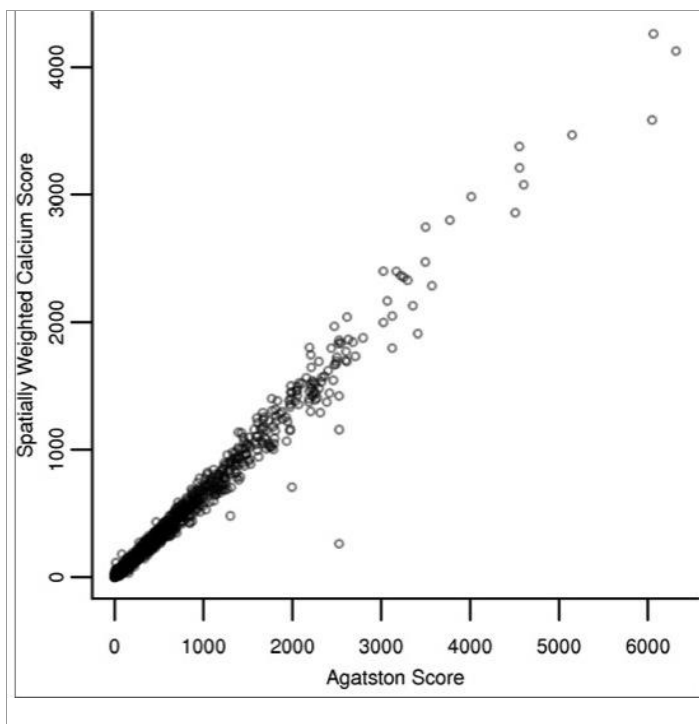
Coronary artery calcium (CAC) is a known marker of subclinical atherosclerosis, and detection by CT scan has been used to predict the risk of heart disease. Traditionally, CAC measurements have been quantified by thresholded scoring methods including the Agatston score (AS), but a continuous method of scoring CAC would be useful to study the extent of atherosclerosis, including information that exists below the current detection threshold. The current scoring technique assigns a patient a zero AS if the level of CAC present does not meet the specified minimum for disease burden, but these patients might still be at risk for clinical events, in spite of being below the detection threshold. Additionally, increased sensitivity in detecting lower levels of CAC may provide further information about genetic and environmental risk factors of coronary artery events.

To improve upon existing detection methods, Vaccine and Infectious Disease Division's Dr. Elizabeth Brown and colleagues developed a semi-automated threshold-free scoring method, the spatially weighted calcium score (SWCS). This score uses spatial information in the CT image, with 3D-weighted volume imaging calibrated to controls of known densities, to provide a more complete measure of the scan information and a continuous measure of CAC. CT scans were obtained from 6,814 participants in the Multi-Ethnic Study of Atherosclerosis (MESA), a prospective study where participants were free of cardiovascular disease at baseline.

The SWCS and AS both showed strongly significant associations with coronary heart disease events and risk factors, validating the effectiveness of the SWCS at quantifying CAC. Among participants with AS=0, indicating no detection above the threshold, the SWCS was still significantly associated with established coronary heart disease risk factors (slope, 0.181; 95% CI, 0.138 to 0.224). Importantly, Brown and colleagues demonstrated that the new SWCS did not lose any information that the existing AS provides in regard to risk of coronary heart disease events. Moreover, the authors' new metric adds additional data relevant to subclinical disease, which may predict future coronary events. The SWCS was found to forecast coronary heart disease events in participants with AS=0, whereas this predicative information could not be detected using the previous scoring method. In sum, the SWCS has been validated to provide a continuous measure of

CAC to better quantify levels of atherosclerosis, and can be useful for future studies in the evaluation of genetic and environmental risk factors.

[Liang CJ, Budoff MJ, Kaufman JD, Kronmal RA, Brown ER](#). 2012. An alternative method for quantifying coronary artery calcification: the multi-ethnic study of atherosclerosis (MESA). *BMC Medical Imaging*, Epub ahead of print, doi: 10.1186/1471-2342-12-14.



*Image courtesy of authors*

Plot of SWCS against AS for participants with AS>0 (n=3269).