

## Letter by Shaikh and Budoff Regarding Article, “Multimodality Intracoronary Imaging With Near-Infrared Spectroscopy and Intravascular Ultrasound in Asymptomatic Individuals With High Calcium Scores”

To the Editor:

We read with great interest the article by Madder et al<sup>1</sup> entitled “Multimodality Intracoronary Imaging With Near-Infrared Spectroscopy and Intravascular Ultrasound in Asymptomatic Individuals With High Calcium Scores”. The study assessed the frequency of lipid-rich plaque in asymptomatic patients with coronary artery calcium scores >300 Agatston units. The authors concluded that in patients mostly on statins, coronary artery calcium scores >300 Agatston units correlated with total plaque volume but not lipid-rich plaque and it is lipid-rich plaque that underlies the most of the acute events. Histological studies show that coronary calcification starts with microscopic foci in regions of inflammation, usually lipid-rich/necrotic core of plaque. These microcalcification foci as they grow in size become visible on CT imaging and are clinically indicated as spotty calcification. Furthermore, pathological studies suggest as plaque becomes more calcified, it contains less lipid-rich material.<sup>2</sup> IVUS and CTA studies have shown that spotty calcification is associated with plaque rupture,<sup>2</sup> whereas more established plaques are densely calcified and are associated with less plaque rupture. Coronary artery calcium scores remains a robust predictor of future of cardiovascular events as extent and prevalence of coronary calcification is closely associated with overall plaque burden. CAC provides independent incremental information in prediction of coronary heart disease in several published studies including MESA (Multi-Ethnic Study of Atherosclerosis).<sup>3</sup> We do agree with the point raised on an editorial<sup>4</sup> that Agatston score up-weights calcified plaque area for greater calcium density.

Agatston Score=Area x DWF (Density weighing factor)

Some reports suggest that calcium density is positively associated with age and inversely linked with traditional cardiovascular risk factors. Criqui et al<sup>5</sup> showed that CAC volume was positively and independently associated with CHD and CVD risk. At any level of CAC volume, CAC density was inversely and significantly associated with CHD and CVD risk. Because most of the patients in the current study were on statins, statins have also shown to increase CAC scores through calcification of lipid-rich plaque

and therefore increased calcium density. It would be interesting to see if using calcium area and calcium density as distinct plaque features as suggested by Criqui et al<sup>5</sup> could identify more patients with vulnerable plaque. In summary, coronary artery calcium scores using Agatston method correctly identifies high-risk and vulnerable patients and their future risk of incident CHD and all-cause mortality, whereas the incremental value of vulnerable plaque still needs further study.

## Disclosures

Dr Matthew Budoff is a consultant for General Electric. The other author report no conflicts.

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