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Recent Findings and the Significance of Coronary Artery Calcification

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Coronary artery calcium (CAC) is a sensitive marker of calcific coronary atherosclerosis and correlates well with the risk of future major adverse cardiac events (MACE). Although CAC score is now utilized as a useful tool for early detection of coronary artery disease, prior studies have suggested some variability in the presence and severity of coronary calcification according to race, ethnicity, and/or geographic regions.

Among Asian populations, it would appear necessary to reappraise the utility of CAC score and whether it remains superior over and above established clinical risk prediction algorithms. To this end, the KOrea Initiatives on Coronary Artery calcification (KOICA) registry has been designed to identify the effectiveness of CAC score for primary prevention of CVD in asymptomatic Korean adults. When compared the results of KOICA with a Chinese cohort, the prevalence of any, moderate, or severe CACS did not differ significantly between the two groups. We also found that the elevations in the resting heart rate, particularly above 80 beats per minute, were found to be independently associated with the presence of subclinical atherosclerosis as measured by CAC scoring. However, changes in other unmeasured factors over time are likely the culprits for the elevated prevalence of CACS in asymptomatic East Asians. In asymptomatic subjects in KOICA, CAC score improved prediction of all-cause mortality over and above that of a conventional risk tool. It was also noted that in asymptomatic subjects, while diabetes had an incremental impact on CAC progression, pre-diabetes did not. Importantly, when there were no other risk factors, the absence of CAC evoked a strong protective effect against all-cause mortality as reflected by the longer warranty period of 9 years compared to the 5 years of warranty period in patients with CAC>0.

Progression of CAC score has traditionally considered as an indicator for the increase in future MACE. Recently, there has been a debate emerged from the pro-calcific effects of statins, because statins, which markedly reduce MACE risk, increase CAC score. Because this discrepancy can be explained only by direct comparison of the changes in CAC score with changes in total coronary atherosclerotic burden – the extent of coronary atherosclerosis. Therefore, using the Progression of AtheRosclerotic PlAque DetermIned by Computed TomoGraphic Angiography Imaging (PARADIGM) study, a prospective multinational registry of consecutive patients (n=2,252) who underwent serial coronary computed tomography angiography (CCTA) at a ≥2-year interval, we explored whether CACS progression represents compositional plaque volume (PV) progression differently according to statin use. While CACS progression indicated the increase of both calcified and non-calcified PV in statin-naïve patients, it was associated only with the calcified PV progression, but not with the non-calcified PV progression in statin-taking patients. Whether this differential association between CAC score progression and compositional PV progression according to statin use will also have a different impact on clinical outcome, and whether the cut-off values for defining the clinically meaningful CACS progression should differ according to the use of statins are remains to be further invesgitaged.