EVALUATION OF PLAQUE MORPHOLOGY BY 64-SLICE COMPUTED TOMOGRAPHIC ANGIOGRAPHY COMPARED TO INTRAVASCULAR ULTRASOUND IN NON-OCCLUSIVE SEGMENTS OF CORONARY ARTERIES

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Authors: Manoj Kesarwani, Taeyoung Choi, Lily Honoris, David M. Shavelle, Matthew J. Budoff, Los Angeles Biomedical Research Center at Harbor-UCLA Medical Center, Torrance, CA

Background: The ability to detect the presence of plaque morphology by coronary computed tomographic angiography (CCTA) remains unclear. Although intravascular ultrasound (IVUS) has become the gold-standard for plaque characterization, the non-invasive approach associated with CCTA requires further evaluation.

Methods: Thirty patients undergoing cardiac catheterization for clinical indications underwent both IVUS and CCTA for research purposes. The presence of plaque was evaluated by both modalities in non-occlusive segments of the left anterior descending (LAD), left circumflex (LCX), or right coronary arteries (RCA). Plaque morphology was classified as: (1) soft or fibrous, (2) fibrocalcific, or (3) calcific. Results by IVUS and CCTA were compared on a segment-to-segment basis, blindly, by an experienced investigator for each modality.

Results: Among the 30 patients (mean age 56.2 ± 8.8 years, 27% female), 146 segments were analyzed. Of these segments, 43.8% involved the LAD, 28.8% involved the LCX, and 27.4% involved the RCA. Plaque morphology by IVUS identified 99 segments as fibrous, 31 as fibrocalcific, and 6 as calcific; 10 segments were normal. To evaluate segments for the presence of plaque, CCTA had a sensitivity of 99.3% (135/136) and a specificity of 70.0% (7/10). The sensitivity and specificity of CCTA to identify plaque morphology as calcified (fibrocalcific or calcific) versus non-calcified (soft or fibrous) was 86.5% (32/37) and 96.0% (97/101), respectively. On CCTA, the mean Hounsfield units (HU) for fibrous or soft (HU 102 ± 77), fibrocalcific (HU 331 ± 99), and calcific (HU 944 ± 439) plaque segments were also significantly different (p < 0.0001). Overall, the accuracy of CCTA to detect the presence of plaque was 97.3% (142/146); accuracy to detect plaque calcification was 93.5%.

Conclusion: CCTA offers excellent sensitivity and accuracy for plaque characterization in non-occlusive coronary artery segments. Therefore, this modality shows strong promise as a non-invasive method of assessing plaque.