

Presenter: Carlo Nicola De Cecco, MD

Title of Abstract: **Dual-Energy First-Pass CT for the Assessment of the Myocardial Blood Supply: Do We Need Rest, Stress, and Delayed Acquisition? A Comparison with SPECT**

Institution: Medical University of South Carolina

Authors: Carlo Nicola De Cecco, Felix G. Meinel, Justin R. Silverman, John W. Nance Jr, Philip Costello, Joseph Schoepf

Modality: CT

Organ System: CV

Intro: To date, no study has systematically compared the relative values of rest, stress, and delayed acquisitions for the assessment of myocardial perfusion on DECT.

Purpose: To compare the relative contributions of rest, stress, and delayed acquisitions to the accuracy of contrast-enhanced dual-energy CT (DECT) for the assessment of the myocardial blood supply.

Methods Used: We prospectively enrolled 55 consecutive patients (10 females, 62±10 years) males, who were clinically referred for cardiac SPECT for known or suspected coronary artery disease (CAD). DECT studies were acquired on a second-generation dual-source CT system during peak adenosine stress, at rest, and after 6 minutes. The DECT iodine distribution maps of rest, stress, and delayed acquisitions were visually assessed for the presence of blood pool deficits or late iodine enhancement using the AHA 17-segment model. DECT iodine maps were compared with rest-stress SPECT for identification of hypoperfused myocardial segments. Per-segment agreement between modalities was investigated with kappa statistics. Test characteristics for the detection of SPECT perfusion deficits were calculated for combinations of rest, stress, and delayed acquisition.

Results of Abstract: On SPECT, 714 segments were considered normal, 192 showed fixed perfusion defects, and 29 showed reversible perfusion deficits. Rest-only DECT correctly identified 203/221 myocardial segments with perfusion abnormalities as abnormal and 701/714 segments as normal. Sensitivity was 92% at 98% specificity. Stress only, rest/stress, stress and delayed, and the combination of all three correctly identified 218/221 myocardial segments as having perfusion abnormalities and 696/714 segments as normal. Sensitivity was 99% at 97% specificity. Of 29 segments with reversible perfusion deficit on SPECT, 13 (45%) were misclassified by rest/stress DECT as fixed perfusion deficits (regardless of whether or not delayed acquisition was considered). Stress DECT plus delayed misclassified 13/192 (7%) segments with fixed perfusion deficit on SPECT as reversible and 1/29 segments with reversible perfusion deficit as a fixed perfusion deficit.

Discussion: Rest/stress acquisition should be regarded as the protocol of choice for DECT assessment of the myocardial blood supply. The accuracy of DECT is not increased by the addition of a delayed DECT acquisition, which may therefore be omitted to reduce radiation exposure.

Scientific and/or Clinical Significance? Delayed acquisition can be omitted from DECT myocardial perfusion protocol without affect the accuracy.

Relationship to existing work Delayed acquisition can be omitted from DECT myocardial perfusion protocol reducing the total radiation dose.