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## Quantification of Coronary Artery Calcium Using Dual Energy Subtraction Digital Radiography

J N Mafi, BS; **B Fei, PhD**; RC Gilkeson, MD; S Roble, MD; A Dota, MD ; P Katrapati, MD ; H Bezerra, MD

* E-mail: bfei@emory.edu ; Website: www.feilab.org

### PURPOSE

The computed tomography (CT) calcium score predicts risk of cardiovascular events. However, relatively high cost ($250-1000) and radiation dose (1-3 mSv) limit its universal utility as a screening tool. Dual Energy Subtraction Digital Radiography is an inexpensive (<$60) and low radiation technique (0.07 mSv) that enables improved detection of calcified structures when compared to conventional chest radiographs. In this pilot study, we evaluated the feasibility of a coronary artery calcium (CAC) score system based on dual energy subtraction digital radiography (DEDR).

### METHOD AND MATERIALS

We identified 39 patients with documented CAC for DEDR scoring who underwent non-contrast CT and DEDR chest imaging performed within 12 months. A semi-automated calcium score system was developed based on pixel intensity multiplied by the area of the region of interest. DEDR scores were plotted against CT scores and a receiver operating characteristic (ROC) curve was performed to determine a DEDR score threshold that predicted a CT score ≥400. A relatively high DEDR score threshold would be chosen in order to maximize positive predictive value (PPV).

### RESULTS

The DEDR score yielded a correlation coefficient of 0.87 ($p<0.0001$) when compared to the CT score. Of all 39 patients in the cohort, 14 had a DEDR score of ≥270, and 26 had a CT score ≥400. This DEDR threshold demonstrated a PPV of 100% and a negative predictive value of 52% in predicting a CT score ≥400.

### CONCLUSION

This pilot study supports the hypothesis that DEDR can quantify CAC and correlates with the CT score. DEDR also demonstrates excellent PPV for CT scores ≥400. Further refinement of DEDR as a safe and inexpensive supplemental tool to assess CAC appears warranted.

### CLINICAL RELEVANCE/APPLICATION

Although the CT score independently predicts cardiovascular risk, its high cost and radiation dose (1-3 mSv) limit its universal use. DEDR (0.07 mSv) can quantify CAC and correlates with the CT score.