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AI-enabled Automated Cardiac Chambers Volumetry In Non-contrast ECG-gated Cardiac Scans Vs. Non-contrast Non-gated Lung Scans

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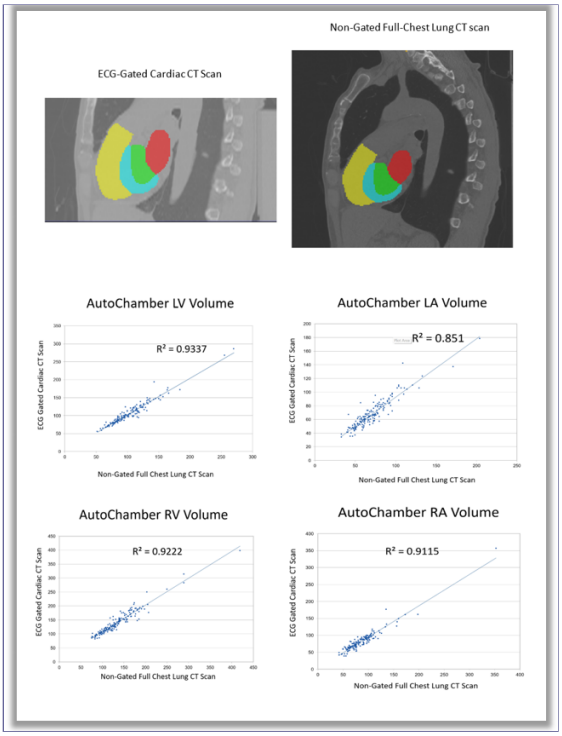
Abstract:
Introduction: We have developed an AI-enabled automated volume measurement of cardiac chambers (AutoChamber) that works on ECG-gated coronary artery calcium scans and correlates well with contrast enhanced coronary CT angiography scans. We have recently reported that increased left atrial volume measured by AutoChamber is a strong predictor of new onset atrial fibrillation (Afib) in asymptomatic individuals of Multi-Ethnic Study of Atherosclerosis (MESA). In this study, we compare the volumetry results in ECG- gated CAC scans with those of non-gated full-chest lung cancer screening scans in the same individuals.
Methods: We have studied 169 cases of paired ECG-gated cardiac CT scans and non-gated lung scans. Mean±SD for age was 62±10 with 52% female. All cases were asymptomatic and were scanned for preventive health assessment. AutoChamber was run on all cases by an independent operator who was not involved in data analysis. P value was calculated using a two-tailed test of significance with α=0.05.
Results: AutoChamber in cardiac scans vs lung scans reported volume (Mean±SD) for left atrium (LA) as 67.2 and 70.1, left ventricle (LV) 102.8 and 105.5 right atrium (RA) 81.9 and 85.7 right ventricle (RV) 140.7 and 134.2 left ventricle wall (LVW) 113.0 and 109.7 respectively ($P < 0.0001$). Correlations between cardiac and lung scans for each cardiac chamber: LA ($R^2 = 0.85$), LV ($R^2 = 0.93$), RA ($R^2 = 0.91$), RV ($R^2 = 0.92$), and left ventricular wall (LVW) $R^2 = 0.95$. ($P < 0.0001$ for all).
Conclusions: AutoChamber volumetry results are similar in ECG-gated cardiac scans vs non-gated full-chest lung scans. This AI-enabled automated tool is promising as it can provide added value to patients undergoing coronary calcium and lung cancer screening scans flagging enlarged cardiac chambers at risk of Afib and heart failure.



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