Comparing AI-Enabled Opportunistic Detection of Lung Cancer on Coronary Artery Calcium Scans versus Chest CT: A Pooled Cohort Analysis of MESA and Framingham Heart Study

Radiology: Cardiothoracic Imaging | Original Research

Background and objective

Fewer than one in five lung cancers are diagnosed following low-dose CT screening surveillance, and many occur in people outside current screening eligibility criteria. This study evaluated whether AI could identify lung cancer opportunistically on coronary artery calcium (CAC) scans and paired chest CT, compared with a Fleischner-anchored nodule-size threshold.

Methods

The pooled analysis included participants from MESA Examination 5 and the Framingham Heart Study who had paired CAC and chest CT scans. A multi-model AI platform combined whole-chest analysis, nodule-focused assessment, and safety-net checks to classify scans as low, intermediate, or high likelihood. The endpoint was lung cancer diagnosed within two years.

Results

Among 3,816 participants, 15 lung cancers were diagnosed within two years. The high-likelihood AI category captured 10 of 15 cancers on CAC scans (sensitivity 66.7%; positive predictive value [PPV] 7.5%) and 12 of 15 on chest CT (sensitivity 80.0%; PPV 5.9%). An automated nodule threshold of 8 mm had sensitivity/PPV of 73.3%/2.8% on CAC and 93.3%/2.3% on chest CT. PPV was significantly lower for the size threshold than for high-likelihood AI on both scan types. Two-year cancer rates in the AI low-likelihood groups were 0.14% for CAC and 0.0% for chest CT.

Conclusions

In this pooled cohort, AI-enabled opportunistic assessment of CAC and chest CT scans showed higher PPV for lung cancer detection than a Fleischner-anchored nodule-size threshold. Prospective evaluation is needed to establish clinical utility and impact.

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