CAD is Valuable in Lung Cancer Screening According to Latest Research

Computer-aided detection (CAD) software can add additional benefits over double reading of low-dose chest computed tomography (CT) examinations in a lung cancer screening environment, with potential of keeping false positives low, researchers from the Netherlands have found.

"Using a combination of CAD and nodule size cutoff in lung cancer screening improves the sensitivity of pulmonary nodule detection compared to that of double reading, without missing lung cancers," commented lead author Dr. Yingru Zhao of University Medical Center Groningen.

CAD yielded 96.7% sensitivity for detecting potentially significant lung nodules and outperformed the 78.1% sensitivity produced by independent double readers.

The objective of the research that was published in the October issue of *European Radiology* was to evaluate performance of CAD beyond double reading for pulmonary nodules on low-dose CT by nodule volume.

The study included a total of 400 randomly selected cases out of the 4,280 baseline CTs from the Nederlands-Leuvens Longkanker Screenings Onderzoek (NELSON) trial. The CT scans were evaluated by two independent and experienced readers and were then processed by CAD (LungCAD VB10A, Siemens Healthcare).

At least one finding was reported on 332 of the 400 baseline CT examinations. A consensus panel of expert chest radiologists evaluated that he readers and CAD system detected an aggregate of 1,667 findings -- 311 were found by double reading and CAD, 24 were found only by double reading, and 1,332 were only found by CAD.

Of these 1,667 findings, 1,516 (90.9%) could be excluded from further evaluation; 49.2% were excluded due to their small size (< 50 mm 3), 37.6% were excluded as they were judged to be benign lesions, and 13.2% were excluded as they were determined to be nonlesions. The 151 findings that needed further evaluation were contributed by double reading and CAD in 113 (74.8%) of cases, by double reading only in five cases (3.3%), and only by CAD in 33 (21.9%) cases.

"CAD was better in detecting most types of nodules, namely peripheral and nonperipheral nodules, solid nodules, intraparenchymal nodules, and spherical and nonspherical nodules," the authors wrote.

Readers struggled to detect vessel-attached nodules, finding only 11 (37.9%) of 29. Of the nodules found by CAD but undetected by the readers, 69.7% were attached nodules; 78.3% of the attached nodules were vessel-attached. Seven out of 11 nonperipheral, vessel-attached nodules were missed by readers, but all 11 were detected by CAD.

Of the 33 nodules missed by the double readers but found by CAD at baseline, 24 were detected at three-month or one-year follow-up CT exams, according to the authors.

"Lung cancer was diagnosed in one solid intraparenchymal nodule, found to have grown at the second-year screening CT," the authors noted. "The baseline volume of this missed nodule was 160.7 mm3."

CAD also had some failures. It fell short of finding one fissure-attached and two pleural-based nodules. Of the five nodules that were not detected by CAD, two were nonsolid or part-solid nodules. A solid pleural-based nodule with a volume of 217.8 mm3 was later diagnosed as cancer after it was found to be growing on the three-month follow-up CT exam.

CAD also produced high false-positive rates. But using a nodule volume-cutoff threshold could sharply reduce that problem, the researchers found.

"Adding a nodule volume cutoff of 50 mm 3 to CAD leads to nearly half the false-positive rate (1.9 versus 3.7 false-positive/CT) with an increase in positive predictive value," the authors noted.

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