

## Deep Learning Improves Lung Cancer Detection from X-rays



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New research led by South Korean radiologists provides further proof as to how artificial intelligence can help improve diagnosis of lung cancer using medical imaging.

Radiologists performed better in detecting malignant lung cancers on chest x-rays when they read images with deep-learning based software, according to the research published in the journal *Radiology*.

Radiologists showed greater sensitivity (70.3%) – the ability to detect an existing cancer – when aided by deep convolutional neural network (DCNN) software, up from 65.1% for radiologists reading without DCNN assistance.

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Evaluation of lung nodules on chest x-rays, the researchers point out, is often difficult due to characteristics of lung lesions including size, density and location. Notably, machine learning methods such as DCNN have helped to improve detection. Neural networks may provide an approach to reducing the number of false positive reads, add the researchers.

As shown in the current study, the "average sensitivity of radiologists was improved by 5.2% when they re-reviewed x-rays with the deep-learning software," explained Byoung Wook Choi, MD, PhD, professor at Yonsei University College of Medicine, and an author of the study. "At the same time, the number of false-positive findings per image was reduced."

For this retrospective study, radiologists randomly selected a total of 800 x-rays from four participating centres, including 200 normal chest scans and 600 with at least one malignant lung nodule confirmed by CT imaging or pathological examination (50 normal and 150 with cancer from each institution). There were 704 confirmed malignant nodules in the lung cancer x-rays (78.6% primary lung cancers and 21.4% metastases). More than half (56.1%) of the nodules were between 1cm and 2cm, while 43.9% were between 2cm and 3cm.

A second group of radiologists (ie, three from each institution) interpreted the selected chest x-rays with and without cancerous nodules. These radiologists then re-read the same x-rays with the help of DCNN software, which was trained to detect suspicious nodules.

Results reveal that, in addition to higher average sensitivity of radiologists in detecting malignant nodules, the number of false positives – incorrectly reporting that cancer is present – per chest scan declined from 0.2 for radiologists alone to 0.18 with the help of DCNN software.

"Computer-aided detection software to detect lung nodules has not been widely accepted and utilized because of high false positive rates, even though it provides relatively high sensitivity," Dr Choi noted. "DCNN may be a solution to reduce the number of false positives."

Source: Radiological Society of North America

Image: iStock

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