AI support is transforming early lung cancer diagnosis globally

Clinical studies show that radiologists supported by software created using machine-learning algorithms detect significantly more cancerous structures or nodules than human-only readings

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Lung cancer is the number one cancer globally, for men and women combined. Yet it is notoriously challenging to spot early enough for positive treatment outcomes. Usually symptoms occur in late stages of the disease when successful treatment becomes more and more difficult. Unlike various other types of cancer, such as breast cancer, which can be checked for in a number of different ways, it takes targeted medical imaging to determine what's going on inside our breathing apparatus.

That's why governments internationally are increasingly launching targeted screening campaigns – like NHS England's mobile lung health checks, where portable CT scanners are being driven out to areas of the country where rates of lung disease are higher than average. The idea is that by looking out for the earliest signs of problems among at-risk groups (smokers, those working in potentially harmful environments, and so on), health services will save more lives, and reduce the significant long-term costs of treating late-stage cancer.

Keeping pace with demand

The potential flaw in this plan is that qualified radiologists are not an abundant resource and, as more images are taken, their workloads will soar. Supported by standard, static imaging solutions, even the most experienced radiologists can take up to 10 minutes (or longer) to read a patient's lung scans in sufficient detail to be able to inform next steps.

It is fortuitous, then, that artificial intelligence is now sufficiently mature and robust to offer a solution. It's a technology we've been working with in a range of cancer detection solutions, and from 2014 we've been applying AI and machine learning to reading lung images. By showing the software all sorts of cancer-based images, even the most subtle early signs, we have trained our computer-aided detection algorithm to spot suspicious structures that could be cancer, which even the most expertly-trained eye might miss.

Developed using machine learning techniques, Veolity's algorithm aim is to recog-

nise even the subtlest potential signs of lung cancer, so that it now offers an indispensable and highly stable diagnostic support tool. Combining this technology with radiologists' own readings is leading to the best detection rates ever known - an impressive improvement compared to human-based readings alone, according to clinical studies of computer-aided detection success rates. This is crucial – one supports the other: radiologists benefit from valuable automatic features, while retaining complete control of their diagnostic process.

Accelerating diagnosis

Together, human and machine are now detecting even the most difficult to spot signs of cancer – the signals that might otherwise have been overlooked, especially where radiologists are under increased time pressure. Importantly, the software has the potential get through those workloads at high speed too, allowing experienced radiologists to comfortably and reliably assess more cases per hour.

It isn't only in the reading of baseline studies and complex follow-up comparisons that AI-based technology is leaving its mark, and lightening workloads. Veolity automatically extracts lung nodules and provides comparable volumetric measurements that help to assess findings. It also makes short work of planning further patient treatment, by matching findings and country-specific reporting guidelines including management recommendations.

For hard-pressed health services, and at-

risk populations, use of AI-based detection techniques in mass-scale lung cancer screening is a win-win.

Thanks to our implementation of Veolity directly for large OEM healthcare equipment providers, and strategic distribution partnerships including that with SynApps Solutions in the UK, MeVis Medical Solutions AG is the world's leading specialist in image-based lung cancer screening solutions, with established deployments on every continent. Veolity's extensive global market penetration illustrates the scale of the technology's potential in making more of radiologists' time, and improving outcomes for lung cancer patients.