

## Dark-field X-ray Detects Emphysema Earlier with Less Radiation



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German researchers recently published a study in *Lancet Digital Health* showing that clinicians can use dark-field x-ray to diagnose emphysema in chronic obstructive pulmonary disease (COPD) patients.

Routine chest X-ray imaging as a lung disease diagnostic tool lacks the sensitivity needed to detect emphysema. Until now, detailed diagnostic information for emphysema was only available from computed tomography (CT) imaging; the radiation exposure coming from CT is too high to be used as a screening tool. Dark-field chest X-rays hold advantages over CT in cost and speed and, most importantly, only require 1/50th of the radiation needed for CT scanning.

In contrast to conventional X-ray imaging, which measures the attenuation of X-rays going through tissues, dark-field imaging detects ultras-small-angle scattering of X-rays at the water-to-air transitions in the lung alveoli. Thus lungs' alveolar microstructure appears bright in a dark background; the space around the lungs has no matter to scatter X-rays. The team's lead researcher explains: 'The X-ray dark-field signal is particularly strong for interfaces between air and tissue... This makes it possible for a dark-field X-ray image of the lung to clearly distinguish between intact alveoli, i.e. those filled with air, and regions in which less intact alveoli exist.'

The study enrolled 77 patients who underwent a medically indicated chest CT between October 2018 and December 2019 at Klinikum Rechts der Isar, Technical University of Munich. Five readers assessed dark-field X-rays and CT. Each patient also received spirometry and body plethysmography to evaluate lung function. In 42 patients, lung diffusion capacity was measured by carbon monoxide uptake.

Although examined previously in preclinical nonhuman studies, this is the first study to assess this technique in humans.

**Sources:** [Lancet Digital Health](#), [Press Release](#)

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