MedicalXpress

X-ray dark-field radiography provides detailed imaging of lung diseases

May 27 2014

Scientists at the Helmholtz Zentrum München (HMGU) working in cooperation with the Ludwig-Maximilians-Universität Hospital (KUM) and the Technischen Universität München (TUM) tested for the first time X-ray dark-field radiography on a living organism for the diagnosis of lung disease. This enables highly detailed images of the lung to be produced. As the team reports in the Investigative Radiology journal, this method shows promise in detecting diseases such as pulmonary emphysema at an earlier stage, than it is currently available.

Conventional radiographic procedures generate images based on the absorption of X-rays as they pass through the tissue. The newly developed technique of X-ray dark-field radiography uses new technology to monitor wave changes during tissue transmission to create higher resolution images.

Detailed images

With the aid of this new technique, the team from the HMGU, KUM and TUM around Dr. Ali Önder Yildirim and Prof. Oliver Eickelberg of the Comprehensive Pneumology Center (CPC), which is one of the centers of the German Center for Lung Research (DZL), achieved detailed images of soft tissue.

The study was conducted in cooperation with the Cluster of Excellence Munich-Centre for Advanced Photonics (MAP). The scientists used a

small-animal scanner developed by Prof. Franz Pfeifer at the TUM to test X-ray dark-field radiography on a living organism. For their investigations, they evaluated and compared images of the lung. "With X-ray dark-field radiography, structural changes in the lung tissue are visible at an early stage", Dr. Yildirim from the CPC/HMGU says.

Early detection of lung disease

"Early detection of changes in the lung tissue will improve the diagnosis of lung diseases", explains Dr. Felix Meinel from the Institute of Clinical Radiology at the KUM. The clinical application, in particular the diagnosis of lung diseases such as pulmonary emphysema or pulmonary fibrosis, will now be tested in further studies.

Lung diseases are among the leading causes of death worldwide. Genetics, lifestyle and environmental factors all play a role in their development. The work of the Helmholtz Zentrum München, the German Research Center for Environmental Health, focuses on the major common diseases with the aim of developing new approaches to their diagnosis, treatment and prevention.

More information: Meinel, F. et al. (2014): "Improved Diagnosis of Pulmonary Emphysema using in vivo Dark-Field Radiography," *Investigative Radiology*. DOI: 10.1097/RLI.0000000000000067

Related: Bech, M. et al. (2013): In-vivo dark-field and phase-contrast x-ray imaging, Nature *Scientific Reports*, DOI: 10.1038/srep03209

Provided by Helmholtz Association of German Research Centres