

European Respiratory Society Annual Congress 2012

Abstract Number: 3953

Publication Number: P1701

Abstract Group: 1.3. Imaging

Keyword 1: Imaging **Keyword 2:** COPD - diagnosis **Keyword 3:** No keyword

Title: Simultaneous imaging of lung structure and function with triple nuclear MRI

Prof. Jim 24481 Wild j.m.wild@sheffield.ac.uk¹, Dr. Helen 24491 Marshall h.marshall@sheffield.ac.uk¹, Ms. Xiaxun 24492 Xu x.xu@sheffield.ac.uk¹, Mr. Graham 24493 Norquay g.norquay@sheffield.ac.uk¹ and Dr. Juan 24494 Parra-Robles j.psrra-robles@sheffield.ac.uk¹. ¹ Academic Radiology, University of Sheffield, United Kingdom, S10 2JF .

Body: Hybrid medical imaging scanners (eg PET-CT) allow imaging with different detection modalities at the same time, providing complementary anatomical and functional information within the same physiological time course. Here, we re-engineer a standard clinical MRI scanner for the simultaneous acquisition of lung MR images from three different nuclei (1H, 3He and 129Xe) in a single breath-hold. The temporal and spatial registration of these images is impossible to achieve in separate breath-hold scans. This new system opens up the possibility of simultaneous capture of regional lung function from the 3He and 129Xe gases and lung structure from the 1H MRI without reliance on ionising radiation.

Figure shows images of 3He, 1H and 129Xe acquired from a healthy volunteer in the same breath; the anatomical 1H images show excellent spatial registration with the 3He and 129Xe ventilation images. The method has multiple potential applications, allowing side-by-side quantitative analysis of early signs of impaired lung function from the 3He and 129Xe images and anatomical signs of disease from 1H MRI. For a variety of lung diseases, registration of ventilation MRI to anatomical 1H MRI would allow subsequent image registration to the radiological gold standard for anatomy, CT, which serves as the clinical gold standard in diseases such as emphysema.