

European Respiratory Society Annual Congress 2012

Abstract Number: 777

Publication Number: P2259

Abstract Group: 5.2. Monitoring Airway Disease

Keyword 1: COPD - diagnosis **Keyword 2:** Biomarkers **Keyword 3:** Imaging

Title: The prediction of airway wall thickening by computer aided lung sound analysis

Ms. Surussawadi 6424 Mackawan sm9e08@soton.ac.uk¹, Dr. Anne 6425 Bruton ab7@soton.ac.uk¹, Dr. Anna 6426 Barney ab3@soton.ac.uk², Dr. Michael 6427 Bennett michael.bennett@soton.ac.uk³ and Dr. Tom 6428 Havelock T.Havelock@soton.ac.uk MD³. ¹ Faculty of Health Sciences, University of Southampton, Hampshire, United Kingdom, SO17 1BJ ; ² Institute of Sound and Vibration Research, University of Southampton, Hampshire, United Kingdom, SO17 1BJ and ³ Southampton Centre for Biomedical Research, University Hospital Southampton NHS Foundation Trust, Southampton, Hampshire, United Kingdom, SO16 6YD .

Body: Computer Aided Lung Sound Analysis (CALSA) has been used to detect and analyse added lung sounds to aid diagnosis of many respiratory diseases. The wall area of the main bronchi, expressed as a percentage of the cross-sectional area of each branch, is a biomarker of chronic airway inflammation which is raised in COPD. The objective of this study was to explore the possible relationship between characteristics of crackles measured by CALSA and percentage of wall area of the main bronchi measured by High Resolution Computed Tomography (HRCT), and hence the possibility of using crackles as a biomarker of COPD. 26 participants (9 healthy non-smokers, 9 healthy smokers and 8 COPD) were recruited. Lung sound data were recorded using a digital stethoscope. HRCT scans were conducted using a Siemens Sensation 64 CT scanner and the resulting data were analysed using the Pulmonary Workstation 2 (Vida Diagnostics, Iowa, US) software to give measurements of airway geometry. The results showed that the percentage of wall area at the right upper bronchus correlated with the two cycle duration of crackles ($r=-0.39$, $p=0.025$) recorded at the right upper lobe (RUL), the number of crackles per breathing cycle (NCpB) at RUL ($r=-0.49$, $p=0.005$) and NCpB at right lower lobe ($r=-0.49$, $p=0.006$). Additionally, the NCpB at RUL was found to significantly predict the percentage of wall area at the right upper bronchus (adjusted $R^2=0.20$, $R^2=0.24$, $p=0.010$). These initial results suggest NCpB might be useable to predict changes in percentage of wall area caused by the chronic inflammation of the main bronchi, though a larger sample is needed to confirm it. This suggests that crackles could possibly be used as a biomarker of COPD.