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**Title:** Regional measures of 3D lung mechanics using magnetic resonance imaging

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**Body:** Lung disease, such as emphysema and fibrosis, can result in changes in pulmonary mechanical properties that are not easily identified on a regional level using current methods. A recently reported method, using 2D structural proton MRI in conjunction with post-processing and image registration, to provide measures of local lung motion and relative regional tissue compliance demonstrated differences between healthy and diseased lungs[1]. This technique has been extended to 3D, to overcome the limitations of the 2D method. Multi-slice structural lung MR images were acquired in 2 healthy volunteers during breath-hold at end-expiration and end-inspiration. 3D lung volumes were segmented, and an automatic mesh-based image registration used to identify correspondence points in the lung between the two respiratory extremes. Vector field maps of local lung motion show an increasing magnitude of motion from apex to diaphragm, as expected in healthy lungs, with motion in the anterior-posterior as well as in the foot-head direction (Figure 1). These methods provide potentially useful information on local lung mechanics in diagnosis of disease, and may be used to calculate regional lung compliance.

Fig.1: Vector field maps showing regional lung motion in expiration in a sagittal view. 3D motion is illustrated as vectors collapsed onto xy-plane. Vector length indicates magnitude of motion. x=anterior-posterior, y=foot-head. [1]Morgan A.R. et al. ERJ 38:S55:p323s.