Comparison of Lung Ventilation Volume Measurements made with Single and Separate Breath-hold Hyperpolarized 3-Helium and Proton MRI

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Introduction

• Hyperpolarized gas (3He) MRI can be combined with spatially registered proton (1H) images of the lung to calculate percentage lung ventilation volumes (%vV)
• %vV is a quantitative measure of lung ventilation which has been shown to be sensitive to early obstructive changes [1]
• However, any lung inflation difference between separate 1H and 3He breath-holds results in errors

Objective

• To increase vV% accuracy using a recently-developed co-registered single breath-hold 3He and 1H acquisition technique [2]

Methods

• 12 asthma patients with moderate-to-severe asthma (GINA 2-5) were scanned with 1.5T MRI system (GE HDx, WI)
• 3.23%. See figure 2 for example images.

Results

Healthy volunteer 1H images

• Mean difference in lung volume calculated from images acquired with sequences (2) and (3) for all 6 volunteers was 3.23%. See figure 2 for example images.
• Lower resolution 1H images with shorter acquisition time are appropriate to use for lung volume calculation

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