European Respiratory Society
Annual Congress 2013

Abstract Number: 2915

Publication Number: P3430

Abstract Group: 4.1. Clinical respiratory physiology, exercise and functional imaging

Keyword 1: Imaging **Keyword 2:** Physiology **Keyword 3:** No keyword

Title: Gravity dependence of specific ventilation (SV), Hounsfield unit (ΔHU) and specific gas volume (ΔSVg) variations assessed by high resolution (HR) CT

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Body: To compare the gravity dependence of the CT-based parameters proposed as lung function descriptors, namely ΔHU, SV (Simon et al, JClinMonitComput 2000) and ΔSVg (Salito et al, Radiology 2009),we quantified their vertical gradient in six supine healthy volunteers, scanned at TLC and RV by HRCT. ΔHU (HU_{RV}-HU_{TLC}), SV and ΔSVg ($SVg,_{TLC}$-$SVg,_{RV}$) were mapped voxel-by-voxel after registering TLC onto RV (Fig.1). The gravitationally-dependent gradients of ΔHU, SV and ΔSVg were significantly different, respectively 54.6±9.8%, 53.1±11.3%, 19.7±9.7% ($p<0.001$ Fig.2). Dividing the lung vertically into thirds showed a statistically significant difference in ΔHU, SV and ΔSVg between nondependent, intermediate and dependent regions, with ΔHU of 99.2±26.0, 135.3±36.3 and 186.0±44.2 HU respectively ($p<0.001$), SV of 1.3±0.3, 1.8±0.6, 2.7±0.9 ($p<0.001$) and ΔSVg of 3.4±0.6, 3.7±0.7, 4.3±0.9 ml/g ($p<0.001$).

Results show that ΔHU and SV percent vertical gradient is more than twice ΔSVg increase. The lower gravity-dependence of ΔSVg suggests this parameter as more reliable to discriminate healthy from pathological regions.