The effect of inspiration on airway dimensions measured in CT images from the Danish Lung Cancer Screening Trial

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Purpose: To determine whether automated quantification of lung perfused blood volume (PBV) in dual-energy computed tomography pulmonary angiography (DE-CTPA) can be used to assess the severity and regional distribution of pulmonary hypoperfusion in emphysema.

Methods and Materials: We retrospectively analysed 40 consecutive patients (mean age 67 ± 13 years) with pulmonary emphysema, no cardiopulmonary comorbidities and a DE-CTPA negative for pulmonary embolism. Automated quantification of global and regional pulmonary PBV was performed using the syngo dual-energy application (Siemens Healthcare). We further quantified the global and regional percentage of voxels with a CT density <-900 HU. Emphysema severity was rated visually and pulmonary function tests were obtained by chart review.

Results: Global pulmonary PBV showed a moderate but highly significant negative correlation with residual volume (RV) in % of predicted RV (r=0.62, p=0.002, n=23) and a positive correlation with forced expiratory volume in 1 second (FEV1) in % of predicted FEV1 (r=0.67, p<0.001, n=23). Global PBV values strongly correlated with diffusing lung capacity for carbon monoxide (DLCO, r=0.80, p<0.001, n=23) and a positive correlation with forced expiratory volume in 1 second (FEV1) in % of predicted FEV1 (r=0.67, p<0.001, n=23).

Conclusion: DE-CTPA allows simultaneous assessment of lung morphology, parenchymal density and pulmonary PBV. In patients with pulmonary emphysema, automated quantification of pulmonary PBV in DE-CTPA can be used for a quick, reader-independent estimation of global and regional pulmonary perfusion, which correlates with pulmonary function tests.

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B-0164 14:36 Chronic bronchitis in large airway: airway wall measurements on thin-slice low-dose CT
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Purpose: Chronic bronchitis (CB) is usually caused by smoking and characterised by chronic inflammation and remodelling of the airway wall, commonly in large airways. The study purpose is to determine differences in airway wall thickness (AWT) and wall area percentage (WA%) between subjects with and without CB symptoms.

Methods and Materials: 50 heavy smokers with CB symptoms (cough, mucus, dyspnoea and wheezing) and 50 heavy smokers without CB symptoms were randomly selected from 1,413 participants in a lung cancer screening trial. Airway walls were measured on images in thin-slice low-dose CT with a dedicated software tool, for airways with a luminal diameter ≥5 mm in 5 selected bronchi (RB1, RB4, RB10, LB1+2 and LB10). Differences in measurements between the groups were assessed by t-test. The association between CB symptoms and AWT and WA% was analysed using multiple linear regression adjusted for age, body mass index, smoking habit, amount of emphysema, and lung function.

Results: Mean AWT measured at 5 bronchi was 1.55±0.44 mm and 1.42±0.40 mm in subjects with and without CB symptoms, respectively (P<0.001). WA% was 47±12% and 43±11%, respectively (P<0.001). With adjustment for confounders, a significant positive association between both airway wall measurements (AWT and WA%) and CB symptoms was found for airways with a luminal diameter from 5 to 10 mm (P<0.01). In airways with a luminal diameter ≥10 mm, no significant association was found (P>0.05).

Conclusion: Patients with chronic bronchitis symptoms have thicker airway walls of airways between 5 and 10 mm diameter, not in larger diameter.

B-0165 14:45 Value of inspiratory and expiratory lung volume und lung density for detection of bronchiolitis obliterans syndrome (BOS): a feasibility study
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Purpose: To evaluate whether quantitative assessment of lung volume and density in computed tomography (CT) show differences in patients with and without BOS after lung transplantation.

Methods and Materials: 210 CT examinations were carried out in lung transplant patients in full inspiration/expiration using a 64 row MDCT (120 kVp, rotation time 0.8 s, pitch 0.984, collimation 1.25 mm, reconstruction increment 1 mm, standard reconstruction kernel). 26/184 examinations were performed in patients with/without...