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

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We retrospectively analysed 40 consecutive patients with chronic CF, which should be considered for new therapeutic approaches. Densi-
Results: Global pulmonary PVB showed a moderate but highly significant nega-
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 quanti-
Conclusions: CT parameters provide a quick and non-invasive method to determine emphysematic lung changes. They can be used for clinical decision-making in CF patients.

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

B-0161 14:09
Assessing pulmonary perfusion in emphysema: automated quantification of perfused blood volume in dual-energy CTPA
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Purpose: To determine whether automated quantification of lung perfused blood volume (PVB) 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 selected from the Danish Lung Cancer Screening Trial 978 subjects without COPD who were scanned annually for 5 years with low-dose multi-slice CT. Using in-house developed software, the lungs and airways were automatically segmented and corresponding airway branches were found in all scans of the same subject using image registration. Mixed effect models were used to predict the relative change in lumen diameter (LD) and wall thickness (WT) in airways of generation 0 (trachea) based on random changes in the segmented total lung volume (TLV).

Results: On average, 1.0, 2.0, 3.9, 7.6, 15.0, 25.0 and 27.3 airways per subject were included from generations 0, 1, 2, 3, 4, 5 and 6. Relative changes in LD were positively related to changes in TLV and coefficients increased with generation: -0.20 (±0.02), 0.19 (±0.02), 0.21 (±0.01), 0.25 (±0.01), 0.29 (±0.01), 0.34 (±0.01), 0.37 (±0.01). Relative changes in WT were inversely related to changes in TLV and generation: -0.01 (±0.02), 0.01 (±0.01), -0.02 (±0.01), -0.03 (±0.01), -0.05 (±0.01), -0.09 (±0.00), -0.08 (±0.00).

Conclusion: Subjects who inspire deeper prior to scanning tend to have larger LD and smaller WT. This effect is more pronounced in higher generation airways. Thus, adjustment for inspiration level is needed to accurately assess airway dimensions.

Author Disclosures: M. de Bruijne: Grant Recipient; AstraZeneca.

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 caused by smoking and characterised by chronic inflammation and remodelling of the airway wall, commonly in large airways. The study purpose is to determine whether changes 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 0.944; collimation 1.25 mm, reconstruction increment 1 mm, standard reconstruction kernel). 26/184 examinations were performed in patients with-/