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

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FWHM and EI both showed statistically significantly lower values using IR instead of standard FBP (FWHM: B30/30=111.3 vs. 92.1; B50/50=167.6 vs. 115; B70/70=197.8 vs. 137.5; EI: B30/30=4.8 vs. 2.8; B50/50=11.3 vs. 5.8; B70/70=20 vs. 6.6). There was a significant lower variation between the different kernels using IR when compared to FBP. Image noise was reduced by 27% when compared to FBP.

Conclusion: Variation of quantitative emphysema chest CT parameters between different reconstruction kernels is significantly reduced with IR when compared to FBP and may increase the robustness for therapy planning.

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 (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 morbidities and a DE-CTPA negative for pulmonary embolism. Automated quantification of global and regional pulmonary PBV was performed using the syno 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=-0.54, 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). Global PBV values strongly correlated with diffusing lung capacity for carbon monoxide (DLCO, r=0.80, p<0.001, n=15). Pulmonary PBV values decreased with visual emphysema severity (r=-0.46, p<0.003, n=40). Moderate negative correlations were found between global PBV values and parenchymal hypodensity in a per-patient (r=0.63, p<0.001, n=40) and per-region analyses (r=-0.62, p<0.001, n=40).

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.

Author Disclosures:

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Densitometry on MDCT in cystic fibrosis: radiological evidence for emphysema

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Purpose: The present study was conducted to employ computational densitometry based on multi-detector computed tomography (MDCT) of the chest to characterise and quantify emphysema in cystic fibrosis (CF), identical to its routine clinical application in chronic obstructive pulmonary disease (COPD).

Results: CB symptoms and airflow limitation in CF were independent of generation and additionally associated with the emphysema index. Emphysema was inversely related to the relative change in residual volume after lung transplantation.

Conclusion: CB symptoms are associated with emphysema and could be used as a non-invasive tool to predict and follow-up disease progression.

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