

## Visibility of structures of relevance for patients with cystic fibrosis in chest tomosynthesis – influence of anatomical location and observer experience

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**Purpose:** To assess visibility of pulmonary structures of relevance for patients with cystic fibrosis on digital tomosynthesis (DTS) images in comparison to computed tomography (CT) images and to investigate if visibility is affected by anatomical location and observer experience.

**Methods:** Twenty-one patients with cystic fibrosis were examined by DTS and helical CT within 90 minutes. Tube voltage of both modalities was 120kV. Nominal slice thickness of the coronal section images of DTS was 5 mm and slice thickness of the transverse CT images was 1-1.25 mm. In each patient 30 pulmonary structures, primarily bronchiectasis, mucus plugging and vessels, were identified in predefined regions at four different anatomical levels of the CT examination, resulting in a total of 630 structures for head to head comparison between the modalities.

Three observers, with varying experience both regarding DTS and patients with cystic fibrosis, independently evaluated visibility of the structures in DTS on a scale from 0 to 5 using the transverse CT images as reference and coronal CT images (thickness 4mm / increment 3mm) for anatomical guidance. The observers' responses were analyzed using visual grading characteristics (VGC) analysis.

**Results:** Visibility in DTS in comparison to CT was reported as equal in 34%, inferior in 52% and superior in 14 % of the structures. The visibility of structures in the central and peripheral lateral regions of the lungs received higher scores compared to the peripheral regions anteriorly, posteriorly and around the diaphragm ( $p \leq 0.001$ ). There were no significant differences between the central regions of the different anatomical levels. The most experienced observer reported higher visibility scores than the two less experienced observers ( $p \leq 0.01$ ).

**Conclusion:** The results indicate that the perceived visibility of specific anatomical structures in DTS is generally inferior to CT and dependent on both anatomical location and observer experience.