



## High resolution CT for lung nodule characterization: a multi-reader comparison against conventional normal resolution CT

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**Purpose:** To compare high-resolution CT (HRCT) with conventional CT for lung nodule characterization on the same patient.

**Materials and Methods:** 24 retrospective chest HRCT scans with pulmonary nodules were collected. Corresponding normal resolution (NR) reconstructions were synthesized using a validated algorithm - facilitating clinical imaging comparisons on the same patient at the prescribed dose. An experienced cardiothoracic radiologist localized each nodule and recorded the density and dimensions. HR and NR datasets for each patient were split and randomly distributed into two reading sessions (separated by a washout period) for two radiologist readers who were blinded to the reconstruction. Evaluation parameters included: lung nodule size (long and short axis), margin clarity (5-point Likert scale: 1=not visible; 2=poor visualization/delineation,3=adequate,4=good,5=excellent), lung nodule density (ground glass, part solid, solid), and density confidence (0-100%). These parameters were evaluated by the readers using a 3D visualization software built in-house with the target nodule locations indicated by a spherical VOI.

**Results:** Inter-reader agreement was excellent for long and short axis assessment (ICC=0.925 and 0.924, respectively), good for nodule density ( $k=0.772$ ), and fair for margin clarity ( $k=0.399$ ). Averaged across readers, margin clarity was rated as 3.21 and 3.00 for HR and NR, respectively. Nodule density was correctly scored for 90% and 94% of HR and NR, respectively. For cases where nodule density was correctly identified, the confidence was the same for reader 1, but for reader two the confidence was on averaged 88% and 85% for HR and NR, respectively. HR resulted in a smaller bias in short axis nodule quantification compared with NR, and the opposite was true for the long axis.

**Conclusion:** Our initial evaluation of HRCT for lung nodule characterization demonstrated an improved ability to visualize margin clarity and quantify short axis dimensions. Lung nodule size, margin clarity, and density are known features to predict likelihood of malignancy. These findings could improve clinical decision making as it relates to the follow up and diagnostic accuracy of chest HRCT.

**Clinical Relevance:** This work provides an initial evaluation for HRCT lung nodule characterization utilizing a robust framework for clinical comparisons between high-resolution and conventional CT on the same patient.

