**Supplementary material**

**Subjects**

32 smokers (16 ex-smokers and 16 current smokers) were scanned for preoperative assessment of resectable thoracic neoplasms (n = 22, non-COPD smokers) or for the assessment of abnormal airway movements in COPD (n = 10). The diagnosis of COPD was based on the criteria of the American Thoracic Society and European Respiratory Society. No patients had large thoracic tumors with invasion of the chest wall or proximal airways.

**CT scanning**

Using the wide volume mode (non-helical mode), dynamic scanning was performed at a fixed point without bed movement, resulting in fluoroscopic images of 160 mm in length. Scanning field of view (FOV) was selected from two settings based on patient body habitus: 320 (medium, n = 14) or 400 mm (large, n = 18). Other scanning and reconstruction parameters for the dynamic-ventilation CT were fixed as follows: tube currents = 40 mA; tube voltage = 120 kVp; rotation time = 0.35 sec; total scanning time = 4.0 - 6.5 sec; imaging FOV: 320 mm; collimation = 0.5 mm; slice thickness = 1 mm (without image interval or overlapping); reconstruction kernel = FC15 (for mediastinum); reconstruction interval = 0.5 sec/frame (total 8 - 13 frames); reconstruction method = half reconstruction. Scan data were converted to CT images using an iterative reconstruction method (Adaptive Iterative Dose Reduction using Three Dimensional Processing [AIDR3D], mild setting). Before the dynamic-ventilatory scanning, patients were coached to repeat deep-breathing. Radiologic technologists monitored patients’ respiratory movements and confirmed that expiratory movement from the peak inspiratory phase to the peak expiratory phase was included during the scanning.

A conventional static chest CT was also performed using helical scanning to image the whole thorax. The parameters for the conventional chest CT were as follows: tube currents = automatic exposure control (AEC); tube voltage = 120 kVp; scanning method = helical scanning; rotation time = 0.35 sec; beam pitch = 0.828; imaging FOV: 320 mm; collimation = 0.5 mm × 80; slice thickness = 1 mm; reconstruction kernel = FC17 (for mediastinum); iterative reconstruction = AIDR3D (mild setting).

**Radiation dose assessment for dynamic-ventilation CT**

For a single gantry rotation of 160 mm (0.35 sec), the CT dose index volume (CTDI vol) was 1.28 mGy for the medium scanning FOV or 1.41 mGy for the large FOV. The dose-length product (DLP) value for a single rotation was 20.4 mGy⋅cm (medium FOV) or 22.5 mGy⋅cm (large FOV). The total estimated radiation exposure for the dynamic-ventilation CT for 4.0 – 6.5 seconds varied from 3.7 to 6.1 mSv (mean 5.4 mSv).