

AbstractID: 3327 Title: Fast Dynamic MR Imaging for Tracking Lung Tumor Motion During the Respiratory Cycle

Purpose: To compare two MR sequences, HASTE and trueFISP, to track lung tumor motion and to assess tumor conspicuity and image artifacts.

Method and Materials: A lung tumor motion phantom, three healthy volunteers and two lung tumor patients were examined using a clinical 1.5-T scanner (Sonata, Siemens, Germany) with the following parameters: trueFISP (TE/TR 1.5/204.2ms; FA/55°; FOV/300×300; matrix/128×128; slice-thickness/5mm), and HASTE (TE/TR 25/800ms; FA/160°; FOV/325×400; matrix/123×256; slice-thickness/5mm). No contrast agent or gating was used. Parenchyma signal intensity, lung regions and diaphragm displacement were measured in three healthy subjects. Tumor displacement, tumor SNR and tumor-to-parenchyma CNR were calculated in the two lung tumor patients. Tumor conspicuity and imaging artifacts were evaluated in all subjects by two radiation oncologists.

Results: HASTE visualized better in peripheral vessels, but blurred tumor and central vessels. TrueFISP visualized better in non-peripheral vessels, but demonstrated ghost artifacts in the phase-encoding direction. Relative to CT, both sequences showed high SNR and CNR in patient #1 with the metastatic adenocarcinoma (HASTE 42.26/24.48; trueFISP 37.72/17.41; CT 42.04/29.98), but reduced SNR and CNR in patient #2 with the primary squamous cell carcinoma adenocarcinoma (HASTE 24.51/4.81; trueFISP 8.54/1.73; CT 36.67/26.84).

Conclusions: HASTE and trueFISP can both monitor lung tumor motion during free breathing. Tumor conspicuity and imaging artifacts depend upon the tumor type, size and location.