

AbstractID: 11204 Title: Evaluation of motion variation of liver and external marker block in repeated 4D-CT studies

Purpose: This study aims to evaluate the respiratory reproducibility in repeated sets of 4D-CT scans for gated radiotherapy. **Materials and Methods:** Five liver cancer patients underwent two sets of phase-based 4D-CT scans in a week interval. The external surrogating system composed of an infrared camera and an external marker block on the patient's chest was used to monitor patient's breathing. All the patients during imaging and treatment were breathed with an aid of audio coaching. The patient's liver and the marker block were contoured on 10 phase-based images of 4D-CT scans and their centers of mass (COM) were calculated. The same procedure was repeated for the second set of 4D-CT. The superior-inferior motion of liver and the anterior-posterior motion of the marker were evaluated in the two consecutive scans. **Results:** On average, the mean amplitude differences of two scans in the liver and marker motions were 2.3 mm and 3.6 mm, respectively. The mean position variations calculated for the COM were 2.4 mm for liver and 1.9 mm for the marker. The liver motion has a bigger variation in inhalation phases, which was different from the pattern of the marker motion. Two of five patients had liver motion variations greater than 3 mm, while none of them had motion variations of the marker greater than 3 mm. **Conclusions:** The result shows that monitoring of the external marker on the chest can surrogate the respiratory motion of liver. However, some patients might need multiple 4D-CT scans to assure the respiratory reproducibility for gated radiotherapy.