

## AbstractID: 9017 Title: Daily alignment results for in-room CT-guided stereotactic body radiation therapy for lung cancer

**Purpose:** To assess daily bone alignment results and changes in soft tissue tumor position during hypofractionated, in-room computed tomography (CT)-guided stereotactic body radiation therapy (SBRT) of lung cancer.

**Method and Materials:** Daily alignment results during SBRT were analyzed for 117 tumors in 112 patients. Patients received 40-50 Gy of SBRT in 4-5 fractions to the target using an integrated CT-LINAC system. The free-breathing CT scans acquired during treatment set-up were retrospectively re-aligned to match with each of the bony references and the gross tumor volume (GTV) defined on the reference CT by rigid registration, and the daily deviations were calculated.

**Results:** The mean ( $\pm$ SD) three-dimensional (3D) shift from the initial skin marks to the final bone-aligned positions was  $9.4 \pm 5.7$  mm. The mean daily GTV deviation from the bone position was  $0.1 \pm 3.8$  mm in the anterior-posterior (AP) direction,  $-0.01 \pm 4.2$  mm in the superior-inferior (SI) direction, and  $0.2 \pm 2.5$  mm in the lateral direction. A statistically significant trend (linear fit with  $R^2 > 0.8$ ) in the change in GTV position relative to the bone was observed in 15 (13%), 11 (9%), and 21 (18%) cases along the AP, SI, and lateral directions, respectively. There were no significant associations between the trends in GTV movement and clinical factors. A margin of 10 mm around the ITV covered the inter-fractional organ motion errors in 96.4% of tumors in the AP direction, 100% of tumors in the SI direction, and 100% of tumors in the lateral direction.

**Conclusion:** 3D bone alignment using daily in-room CT-guided SBRT has good accuracy. However, a substantial number of tumors showed trends in position changes over 4 or 5 days. An isotropic margin distance of 10 mm around the ITV was necessary for adequate coverage of inter-fractional organ motion errors of all cases.