

AbstractID: 13089 Title: Influence of Body Compression on Localization Accuracy of Thoracic Tumors Using Fractionated Stereotactic Body Radiotherapy

Purpose: To investigate the use of body compression device combined with Elekta Stereotactic Body Frame (ESBF) in fractionated lung stereotactic body radiation therapy (SBRT) to reduce tumor motion and improve daily setup uncertainties.

Method and Materials: Thirty-one patients with diagnosis of stage IA and IB of non-small cell lung carcinoma treated with 3-5 fractions of SBRT were retrospectively analyzed. For sixteen selected patients, ESBF with body compression was used in both CT simulation and daily treatment setup. Cone-beam CT images were acquired daily before radiation treatment and co-registered with planning CT images. The translational co-registration shifts were applied to the couch before each fraction of treatment, whereas the rotational displacements were ignored due to current unavailability of couch rotations. A total of 129 recorded daily target isocenter shifts were analyzed to assess the interfractional tumor motions and daily treatment setup uncertainties, among which 63 isocenter shifts were from patients with body compression in ESBF, and 69 isocenter shifts from patients without body compression.

Results: We found that the mean setup errors and standard deviations for patients with body compression in ESBF were 0.4 ± 7.4 mm, -1.0 ± 7.1 mm, and -0.8 ± 11.2 mm for the superior/inferior (S/I), lateral (L/R), and anterior/posterior (AP) shifts, respectively. In comparison, for patients treated without body compression, the mean setup errors and standard deviations were -3.4 ± 11.7 mm, -0.6 ± 7.4 mm, and -2.3 ± 13.6 mm for shifts in the S/I, L/R, and A/P directions, respectively.

Conclusion: Body compression in ESBF reduces tumor motion significantly in the patient longitudinal direction, and slightly improves the setup accuracy in the anterior-posterior direction. No improvement was observed for the lateral setup accuracy with the use of body compression in ESBF.

Conflict of Interest (only if applicable):