AbstractID: 7202 Title: Treatment Verification for lung cancer patients undergoing fractionated stereotactic body radiation therapy (SBRT) utilizing cone beam CT (CBCT)

Purpose: Recent increase in hypofractionated radiation therapy for early stage lung cancer necessitates accurate patient setup. The acquisition of CBCT prior to treatment provides a three dimensional setup and verification tool. We assessed the utility of CBCT for SBRT through examination of dosimetric parameters.

Methods and Materials: Four patients with early stage non small cell lung cancer were used for the analysis. Each patient underwent a 4DCT simulation for internal target volume (ITV) determination. A five to seven field IMRT plan was generated for PTV = ITV + 3mm. Four fractions were delivered (12 Gy/fraction) and CBCT was acquired prior to each fraction. Online image registration between CBCT and simulation CT (simCT) was performed and the resulting shifts were applied to move the couch prior to treatment. In the offline evaluation, the GTV was contoured on each CBCT and compared to the ITV. To assess the ITV coverage, we overlaid the ITV onto CBCT (CBCT-ITV) based on the shift data and performed dose calculations using the respective simCT plan. Dosimetric parameters including volumes receiving 95% (V95), 90% (V90), and minimum (min) dose were used for analysis.

Results: The average set up shifts in the AP, SI, and LR directions were -0.16±0.33, -0.29±0.44, and 0.33±0.34 cm, respectively. CBCT volumes varied when compared to the respective ITV with a range of 0-50% decrease in volume. Due to this variability ITVs were used for the dosimetric analysis. The average PTV/CBCT-ITV coverages for V95, V90, and min were: 94%/94.9%, 99.3%/96.7%, 85.4%/88.3%, respectively.

Conclusion: The CBCT volumes were not representative of the ITV as seen by the volume discrepancy. Our dosimetric analysis showed good correlation between PTV and CBCT-ITV coverage, supporting our current PTV margin (3mm). Our data affirms that CBCT provides further assurance in regards to target localization for hypofractionated SBRT of lung cancer.