AbstractID: 9265 Title: Target Delineation, Reposition, and Dose Delivering Accuracies in CBCT-Guided Stereotactic Radiotherapy of Small Lung Tumors

Purpose: To use daily cone-beam computed tomography (CBCT) for assessment of image-guided stereotactic radiotherapy (IGSR) of early-stage non-small cell lung cancer (NSCLC). **Method and Materials:** Patients were CT simulated in a body-frame with or without an abdominal compression device. PET-CT scans, if available, were fused with the simulation CT for target delineation. Daily pre-treatment CBCTs were acquired with the Elekta XVI system, and the lung tumors were manually aligned with the simulation CT images at the treatment machine. The shifts required to align lung tumors were recorded. Later, the CBCTs were imported into our treatment planning system and the treatment isocenter was registered with the planning CT isocenter, accounting for the daily pretreatment table shifts. GTVs and PTVs for every treatment session were redefined on the daily CBCT image sets. Individual and cumulative DVHs for the daily treatments were calculated and compared to the original planning DVHs. **Results:** Using CBCT-guidance, daily setup errors ranging from 1 to 3 cm had been corrected, that would have altered the mean dose to GTV by >30%. We found that even with daily CBCT-guided table shifts to correct setup error, the dose to GTV could vary by 20% due to daily changes in shape of the lung tumor, when no margin was added from GTV to PTV. This daily dose variability was reduced to < 3% if PTV included a 5 mm margin around GTV. **Conclusion:** The interfractional setup errors caused the greatest amount of potential geographic miss of GTV, which was almost entirely eliminated by daily CBCT guidance. The underdosing of GTV due to deformation of the lung tumor could be overcome by expanding GTV by 5mm in all directions to define the PTV.