AbstractID: 10079 Title: A Dosimetric Comparison as a Function of Respiration and Tumor Location in Stereotactic Body Radiation Therapy Treatment Plans For Patients with Non Small Cell Lung Cancer

Purpose: To calculate and compare doses to the tumor and normal tissues at full respiratory cycle, inhalation, and exhalation as a function of the tumor site and location within the thorax.

Materials and Methods: 20 patients were scanned using 4D CT techniques. Treatment plans were created with five to seven 6 MV non-opposing coplanar beams using Varian Eclipse Treatment Planning System with tissue heterogeneity corrections for three respiratory phase combinations. A 7 mm margin was given to the internal target volume to create the planning target volume. The prescribed dose was 60 Gy in 3 fractions. Optimization goals and normal tissue constraints were the same as in the RTOG 0236 criteria. Statistical analysis used a mixed effect ANOVA model, and a 2-sided 0.05 alpha level was used for hypothesis testing.

Results: Lower peripheral tumors had three times the displacement of the upper peripheral tumors. Central tumors received lower minimum doses than the peripheral tumors. When tumors were in the peripheral region, the uninvolved lung mean dose was significantly different for all phases of respiration ($p=0.008$), specially, when the tumors were in the upper peripheral region ($p=0.04$), and the doses were higher (>26%) in the lower peripheral region compared to the upper one for all phases of respiration. The V_{15}, V_{20}, and V_{30} for uninvolved lung were below 10%. Patients with central tumors received higher maximum doses in the esophagus than patients with peripheral tumors. For the ipsilateral bronchus, patients with central tumors received higher mean and maximum doses than patients with peripheral tumors. There were no statistical differences in the mean and maximum doses to the heart or to the spinal cord.

Conclusions: Lesions in the lower part of the lung are more impacted by respiratory motion. Central lesions receive less tumor dose to preserve normal tissue dose limits.