

AbstractID: 8191 Title: Tissue Heterogeneity Corrections for Thoracic Malignancies: A Dosimetric Evaluation

Purpose: To evaluate and compare dose to tumor and normal tissues in patients with thoracic malignancies calculated using heterogeneity corrections.

Materials and Methods: Fifteen lung patients were evaluated. Multiple non-opposing coplanar beams of up to seven fields with step and shoot IMRT techniques were used. Treatment planning was performed with the Eclipse system and the prescribed dose was 70.2 Gy with 1.8 Gy per fraction. For clinical use, plans were generated with Modified Batho Power Law correction that uses only the descending part of the TMR/TPR curve for tissue heterogeneity. Additional plans were generated with same beam arrangements and monitor units using a) no correction, b) generalized Batho correction, and c) equivalent tissue air correction.

Results: The uncorrected homogeneous plans resulted in lower average PTV mean, minimum and maximum doses by at least 6.4%, 9.4% and 5.0%, respectively ($p < 0.001$). In addition, the percentage of PTV receiving doses below the prescribed dose was higher for the homogeneous plans ($p < 0.001$). There were no significant differences in the average PTV mean, minimum and maximum doses among the three plans with heterogeneity corrections (1.6%, 2.8% and 1.2%, respectively). Moreover, heterogeneity corrections did not significantly impact on the percentage of uninvolved lung volume receiving doses of 30 Gy or higher ($p = 0.833$). The maximum spinal cord doses were less than 25.2 Gy, and comparable for all plans ($p = 0.952$).

Conclusions: Heterogeneity corrections impact on tumor but not on normal tissue doses. With the emergence of clinical evidence in support of dose escalation in lung cancer, accounting for heterogeneity corrections is of particular importance to ensure adequate tumor dosing in this setting.