AbstractID: 3839 Title: The impact of heterogeneity correction on tumor dosimetry for lung cancer stereotactic body radiation therapy

Purpose: Stereotactic body radiation therapy (SBRT) for non-small cell lung cancer has been shown to limit toxicity. Heterogeneity correction on lung cancer radiotherapy has not been recommended by RTOG. In this study, dosimetric difference between the SBRT plans with/without heterogeneity correction is analyzed.

Materials and methods: Nine lung cancer patients treated with SBRT techniques using a 6 MV Novalis system were selected. Using the path length algorithm in BrainLAB treatment planning system, all the treatment plans were applied the heterogeneity correction. With same beam parameters, we performed the plans without the heterogeneity correction, and compared the dosimetric difference to the treatment plans. The heterogeneity correction factors (Kc) at iso-center, target coverage, heterogeneity index (HI), and conformity index (CI) were used in the comparison.

Results: The average of Kc at isocenter for 14 planning target volumes (PTV) was 1.002 ± 0.02, only three Kc values (1.07, 0.985, 0.981) were relatively off to the average. Except one case, the other 13 target coverage values of the plans with the heterogeneity correction were better than those without the correction. The maximum difference of the target coverage was ~7%. All the HI values of the plans with the heterogeneity correction were better than those without the correction. The maximum difference of the HI reached 300%. The difference of the CI between the compared plans was within ~10%. The CIs of the plans without correction were better than those corrected. For one case ─ the tumor located in the lung base, the impact of heterogeneity correction was significant.

Conclusion: The impact of heterogeneity correction for tumor dosimetry on SBRT for lung cancer is case depended. For most primary lung tumors the difference between the plans with/without heterogeneity correction is clinically insignificant. For the tumors near the interface of different mass density, the heterogeneity correction is necessary.