AbstractID: 11754 Title: Helical Tomotherapy Treatment Plan Optimization for Superficial Chest Wall Irradiation Incorporating Intrafractional Motion

Purpose: To evaluate different planning strategies for adequate coverage of misaligned chest wall PTVs. **Methods and Materials**: Nine treatment plans were evaluated for adequate coverage of a superficial chest wall target anteriorly shifted due to respiration and/or set-up error. One was optimized to deliver a uniform dose to the original PTV; four plans were optimized to deliver uniform doses to both the original PTV and a secondary PTV created by extending the original PTV outside the body by 0.5, 1, 1.5 and 2 cm, respectively. Those four plans were repeated as virtual bolus plans, by applying a unit density override of each secondary PTV volume. Plans were computed on the original patient dataset, which was shifted up to 2 cm in the anterior direction to simulate misalignment. Dose volume histograms and isodoses were used to analyze the results. **Results**: For the original plan, anterior shifts resulted in underdosed regions, with a reduction in D_{min} proportional to the magnitude of the shift (57% for 2 cm). Shifts also increased PTV D_{max} by 20%, independent of the magnitude of the shift. Optimizing to secondary PTV volumes in air resulted in a smaller reduction in D_{min} with patient shift (94% for 2 cm), although the increase in D_{max} was more significant for these plans (58%). The least variation in PTV dose homogeneity was obtained with the virtual bolus plans (D_{min}=91%, D_{max}=117% for 2 cm). Reductions in PTV dose homogeneity were still observed if the shifts were greater than the virtual bolus thickness. **Conclusions**: For helical tomotherapy treatment planning, virtual bolus of thickness equivalent to the maximum expected anterior shift can account for small respiratory motion of the CW during treatment. **Conflict of Interest**: This work was supported in part by a research agreement with TomoTherapy, Inc.