AbstractID: 13485 Title: Practical Considerations for the Novel Multiple Adaptive Planning Strategy for Patients Concurrently Treated with the Prostate and Pelvic Lymph Nodes

Purpose: Our previous work presented the feasibility of a novel adaptive strategy, multiple adaptive planning (MAP), for the concurrent treatment of the prostate and lymph nodes. The question raised for this technique is how many plans can adequately account for multi-directional movements of the prostate. In this study, we provide a guideline for the minimum number of plans required for clinically implementing the MAP technique.

Methods and Materials: Data from five patients with high-risk prostate cancer, who have undergone IMRT, were selected for this study. Without including lateral prostate shifts, combinations of anterior/posterior and superior/inferior shifts of 0 cm and 0.5 cm were considered. Correspondingly, a total of 9 IMRT plans were prepared for the following treatment. Double Image registrations between daily MVCBCT and the planning CT were conducted to identify independent prostate shifts. Based on this information, a most suitable plan was retrospectively selected and recalculated using the daily CBCT images. For comparison, the corresponding iso-center shifting plans were also created.

Results: For 20 fractions from 5 patients, prostate shifts in the range between 0.4 cm and 0.8 cm, were observed in 13 fractions. Of these fractions, conventional iso-tracking method would result in adequate dose coverage of the lymph nodes in only 37% days compared to 100% days in MAP strategy. Both strategies achieved 95% of the prostate receiving a daily dose > 97% of the prescription dose in 11, 12 fractions, respectively. Furthermore, the average D50 of the rectum and bladder in the iso-tracking plans, 29.9 Gy and 31.5 Gy, were higher than those, 28.9 Gy and 28.9 Gy, in the MAP plans.

Conclusion: Using of the MAP technique with 9 pre-created plans, which accommodate for independent prostate shifts, can achieve our treatment goals for the treatment of high-risk prostate cancer.

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