AbstractID: 6868 Title: The Role of Seminal Vesicle Motion in Target Margin Assessment for Online Image Guided Prostate Cancer Radiotherapy

Purpose:. For intermediate and high risk prostate cancer, both prostate gland and seminal vesicle (SV) should be included in CTV. However, motion patterns of prostate and SV could be different resulting in different margin requirement. Our purposes are to investigate motion of SV and its role at the proper margins requirement on two online image guided correction methods.

Method and Materials: Twenty-five patients with at least 16 daily CTs per-patient were included in this study. Contour to contour based image auto-registrations were performed to obtain organ daily motions.

Two online image guided correction methods were simulated by using conventional 4-field treatment plan. Margins were designed to ensure that the minimal CTV cumulative dose after correction was within 2% dose reduction for at least 95% of patients. The first guidance used prostate daily translational displacement for patient online correction. In this case, two margin designs were analyzed. Margin-A was designed as uniform margin for whole CTV. Margin-B was designed for SV only meanwhile a fixing 3 mm uniform margin for prostate. The second guidance used the whole CTV translational displacement to determine the online correction. In this case, a uniform margin-C was designed for whole CTV. The cumulative dose was constructed based on deformable organ registration.

Results: The motion of SV was (0.1±1.7, 0.0±6.6, 0.1±3.7) mm, which was significantly larger than the prostate motion of (-0.2±1.0, -1.2±4.4, -0.1±3.1) mm. The margin-A, margin-B and margin-C produced similar PTVs which were PTV=CTV+4mm, (Prostate+3mm)+(SV+4mm) and CTV+3mm. The corresponding PTV volumes were 129±30, 121±28 and 116±28cc accordingly.

Conclusion: SV can move significantly larger than prostate, additional margins are needed but less essential in online correction with conformal dose delivery of prostate cancer treatment mainly due to the shallower dose gradient in the SV region.

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