AbstractID: 1374 Title: Feasibility study for clinical implementation of dose hypofractionation with IMRT for prostate cancer

As the α/β value for prostate is suggested to be less than that for late-responding rectal damage, hypofractionation regimens may be beneficial with equivalent or less late complications while yielding improved tumor control. Important considerations in the design of a hypofractionation planning technique include the dose-fractionation schedule, interfraction and intrafraction target motion, appropriate rectal and bladder dose-volume constraints, treatment-planning optimization parameters, treatment margins for the planning target volume that can be used for hypofractionated treatment. In this work, we have investigated these issues to ensure the feasibility of clinical implementation of dose hypofractionation. Several hypofractionation regimens were designed to ensure the same degree of late damage in rectal tissue as 39 fractions of 2 Gy using our standard margins and normal tissue constraints. New rectal and bladder dose-volume constraints for different hypofractionated schedules were determined based on the biologic-effective-dose equivalents of the current dose constraints. We also studied the relationship between treatment margin and rectal toxicity. Our preliminary results for five patients using 4, 6, and 8mm margins for 5 fractions of 7.5 Gy showed that all treatment plans satisfied our clinical acceptance criteria and had very good dose fall-off for the planning-target volume. As the margin was increased rectal toxicity risk also increased; however, all treatment plans satisfied the rectal dose criteria even for 8 mm margin planned on the XKnifeRT2 (Radionics) using a micro-multileaf collimator for intensity modulation delivery. Our studies confirm the feasibility of clinically implementing dose hypofractionation with IMRT for prostate cancer.