AbstractID: 13356 Title: Parameterization of Dose Volume Histograms (DVHs) of Planning Target Volume (PTV) among Patients Undergoing Radiation Therapy for Prostate Cancer

Purpose: To propose and validate a method to parameterize Dose Volume Histograms (DVHs) of the Planning Target Volume (PTV) for prostate cancer patients undergoing radiation therapy.

Methods and Materials: There are generally two different formats of DVH: differential DVH (dDVH) and cumulative DVH (cDVH). Although cDVHs are more commonly used for radiotherapy treatment plan evaluation, dDVHs were used in our study to test the parameterization, as mathematically, the deferential format preserves more details than the cumulative/integral format.

Prostate adenocarcinoma patients previously irradiated at our institution were selected for the study. For these patients, the total dose was 7400 cGy prescribed to cover 95%-98% of the PTV. The treatments were planned using a 7-9 field IMRT technique. It was found that the PTV dDVHs could be characterized by a normal function. Fifteen patients were selected and their PTV DVHs were fitted with a normal function. Parameters regularly used for the treatment plan evaluations, e.g. D_{95}, mean dose and generalized mean dose (GMD), from the original DVHs were compared with those from fitted DVHs.

Results: The fittings of the rectal DVHs yielded high goodness of fit with adjusted R-square greater than 0.97. The mode of the peak was 7575.4 ± 57.1 cGy. The standard deviation was 43.3 ± 10.5 cGy. For D_{95}, mean dose and GMD, the relative differences between original and fitted DVHs were within 3%.

Conclusions: DVHs could be represented by several parameters. The PTV DVH of patients undergoing irradiation to the prostate gland could successfully be parameterized using a normal function.