

AbstractID: 7600 Title: Feasibility of Use of Anatomical Geometry and Volume for Prostate IMRT Planning

Purpose: To study the feasibility of using simple geometrical information such as volumes of prostate, bladder, and rectum, and volumes of bladder wall and rectal wall to streamline the optimization process in intensity modulation radiotherapy (IMRT) of prostate.

Method and Materials: Class solutions (standard dose constraints and standard beam arrangements) for prostate IMRT planning have been developed in many treatment centers. While it is possible to achieve similar solutions and desired dose constraints among most patients, there are some cases in which it is difficult, even after using different beam arrangements. Prostatic size and geometrical shape relative to normal tissue (rectum and bladder) and their overlapped regions attribute to sub-optimal solutions. In this study, we analyze the volumetric information of prostate, bladder, bladder wall, rectum, and rectal wall to understand if some definitive conclusions can be drawn. We planned ten prostate patients with CT scans using IMRT. Each plan consists of five coplanar beams using 15 MV photon beams and similar dose constraints. Each plan was optimized to according to our protocols. Total dose for each plan is 79.2 Gy for 44 fractions.

Results: We calculate dose volume histogram (DVH) for each organ for each optimized plan. We compare the V40, and V60 of rectum, rectal wall, bladder and bladder wall between each patient's plans using the ratio of the volumes of above organs to that of prostate.

Conclusions: There is a complex relationship between the ratio of normal tissue organs and prostate. However, an overall trends exist that could be used to reduce the treatment planning time based on what is achievable relative to standardized dose constraints. Among the more significant finding is the reduction of V60 for rectum and bladder as function of the volumetric ratios.