AbstractID: 7913 Title: IMRT Site Specific - I: Prostate, GYN, Pelvis

Treatment of prostate cancer with IMRT requires great care in order to achieve the intended results. The prostate is a mobile structure compared to the surrounding bony anatomy. Daily setup, immobilization and localization uncertainties can be addressed by increasing the PTV but results in additional dose to surrounding normal structures. At FCCC we attempt to reduce the uncertainty by employing daily localization using BAT ultrasound or implanted fiducials and currently use an 8mm growth in all directions except posteriorly where 5mm is typical. Patients with fiducials and those being irradiated in the post-prostatectomy setting undergo localization via an in-room CT scanner. These methods allow for minimal PTV expansion by moving the prostate or prostate bed into the intended dose region.

All patients are simulated and treated supine without a thermoplastic immobilizer to minimize respiratory related prostatic motion and to facilitate the use of ultrasound. Patients undergo CT followed immediately by MR simulations with the rectum empty. These data are fused and all soft tissue structures contoured based on MR. We believe the apex of the prostate is more accurately visualized with MR without the potential prostate distortion associated with a retrograde urethrogram. Dose limiting structures primarily include the rectum, bladder, and femoral heads, but may also include bowel and erectile tissues. The delivery of high doses (70-80+Gy) using 3D CRT invariably includes rectal shielding to some degree in order to avoid unwanted complications. Rectal shielding also creates a dose gradient across the posterior prostate. Our initial comparisons at 78Gy between 3D CRT and IMRT resulted in an increase in 95% PTV coverage from approximately 76Gy to 78Gy, respectively and a reduction of approximately 6Gy to the “hottest” 20% of the rectum. We have developed “plan acceptance criteria” based on published data with respect to rectal complications. DVH analysis is used to ensure that the rectal volumes receiving 65Gy and 40Gy are less than 17% and 35%, respectively. Additionally, the bladder volumes receiving 65Gy and 40Gy are less than 25% and 50%, respectively. The volume of either femoral head receiving 50Gy should be less than 10%. PTV coverage should result in at least 95% of the volume receiving the prescription dose. It should be noted that the 3D dose distribution itself plays an important role in IMRT delivery and DVH analysis alone may not be sufficient. The isodose distribution should be such that the 50% and 90% lines do not traverse the full or half width of the rectum on any CT slice, respectively. Additionally, emphasis is given to treatment time not only for throughput but also for patient comfort. Quality assurance includes verification of absolute dose as well as the resultant spatial distribution and our plan acceptance is based on ±3% and 3mm DTA, respectively. We have been able to meet the absolute dose criteria in approximately 94% of cases.

Educational Objectives:

1. To understand the practical steps associated with IMRT of the prostate
2. To understand the planning methods utilized to achieve the numerical values presented for plan acceptance