AbstractID: 2610 Title: IMRT for Prostate Cancer

While arguably the most mature site for IMRT use, prostate treatments still require 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 this results in additional dose to surrounding normal structures. We attempt to reduce the uncertainty by employing active localization using BAT ultrasound and currently use a 8mm PTV in all directions except posteriorly where a 5mm margin is typical. Patients being irradiated in the post-prostatectomy setting undergo localization via an in-room CT scanner. These methods allow for minimal expansion of the PTV by moving the prostate or prostate bed into the appropriate dose region on a daily basis. All patients are simulated and treated supine without a thermoplastic immobilizer to facilitate the use of ultrasound and to minimize respiratory related prostatic motion. Patients undergo CT followed immediately by MR simulations with the rectum empty. These data are fused and all soft tissue structures contoured based on the MR scan. 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. 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 delivery of modern 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 volumes of rectum receiving 65Gy and 40Gy are less than 17% and 35%, respectively. Additionally, the volumes of bladder receiving 65Gy and 40Gy are less than 25% and 50%, respectively. The volume of either femoral head receiving 50Gy should be less than 10%. 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. PTV coverage should result in at least 95% of the volume receiving the prescription dose. 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 resulting in the safe use of the numerical values presented for plan acceptance