AbstractID: 9469 Title: Dosimetric Impact of Daily Shifts on Prostate IMRT Dose Distributions

It is becoming common clinical practice to shift prostate patients daily based on transabdominal ultrasound or imaging of implanted fiducial markers. These shifts account for daily differences in the position of the prostate relative to the bony anatomy, due to factors that include variations in bladder and rectal filling. This study looks at the effects of such daily shifts on dose distributions in the target, rectal wall and bladder wall for IMRT. The shifts in this study were based on daily ultrasound imaging using the Sonarray™ system, but the results are applicable to shifts made using other methods. To investigate how these shifts affect dose distributions and predicted outcomes, ADAC Pinnacle™ treatment plans were generated for 3 cases: 1) the initial preplan, which represents the ideal case in which no shifts are necessary; 2) a postplan incorporating each day's actual shifts; and 3) a postplan in which no shifts were made but the internal organs move by the amounts indicated by daily US imaging. Analyses for ten patients are presented.

Results show that when daily shifts are made, doses to the target, rectal wall and bladder wall are virtually identical to those in the preplan. When no shifts were made, however, the dose distributions were degraded. For a typical patient, target EUD's were 67.7 for the preplan, 67.5 for the postplan with shifts and 62.8 for the postplan without shifts. This illustrates that delivery of IMRT without adequate target localization can induce cold spots that could potentially compromise local control.