AbstractID: 2732 Title: Variability of Prostate Brachytherapy Preimplant Dosimetry: A Multi-Institutional Analysis

Purpose: To conduct a multi-institutional comparison of prostate brachytherapy preimplant dosimetry for Pd-103 and I-125.

Materials and Methods: Eight experienced brachytherapists submitted Pd-103 and I-125 monotherapeutic and boost preimplant dosimetry plans for central review. All 32 plans were calculated using the same transrectal ultrasound volumetric study. Seeds of any strength were acceptable, but were restricted to two manufacturers. The dosimetric analysis included evaluation of target volume, target to prostate ratio, target length, number of needles, seed activity, number of seeds, total activity, total activity per treatment planning volume, use of extracapsular seeds, and average treatment margins (distance between the prostate capsule and the 100% isodose). Prostate coverage was defined in terms of V100/150/ 200/300 and D100/90/50 while urethral dosimetry consisted of UV100/150/200 and UD90/50.

Results: The mean planning target volume to prostate volume ratio varied dramatically (mean 1.29, range 0.99 – 1.76) with the target length ranging from 3.5 to 4.5 cm. Although the prostate V100 was > 95% in all cases, the V150 ranged from 29.9 to 92.1% and the V200 from 6.72% to 52.5%. The urethra V100 was 100% in all cases, with 6 of the 8 brachytherapists limiting the UV150 to < 3%. However, the median urethral dose varied by up to 50%. Treatment margins also varied significantly (average 3.98 mm, range 0.32 – 7.68 mm). All brachytherapists used extracapsular seeds with five implanting > 25% of the seeds in extracapsular locations (range 6.4% - 58.2%). In addition, significant variability existed in the number of needles, the number of seeds, and seed strength.

Conclusions: This study highlights that although prostate brachytherapy prescription doses are uniform, substantial variability exists regarding target volume, seed strength, dose homogeneity, treatment margins and extracapsular seed placement. The standardization of preimplant dosimetry is essential for meaningful multi-institutional comparisons of biochemical outcomes and morbidity.