

AbstractID: 3301 Title: Comparison of Intra-operative Computer Optimized and Nomogram-Based Total Implant Activities in Prostate I-125 Seed Implants

Purpose: Nomograms correlating total I-125 seed activity, prostatic volume and prescription dose have been published in the literature. In this study, we have retrospectively compared our institutional patient I-125 seed implant activity data with nomogram-based calculations. Our objectives were: (a) to identify if our computer optimized implanted activity data followed any particular nomogram, and (b) to evaluate if implanting adequate activity guaranteed good post-implant dosimetric results.

Materials and Methods: The charts of 255 patients with clinically localized prostate cancer who underwent TRUS guided I-125 seed implantation of the prostate were reviewed. The median pre-implant US prostate volume was 35 cc (range 14 - 82 cc) and the median total activity was 30.9 mCi (range 14.76 – 64.17 mCi). In 95% of the cases, intra-operative computerized dosimetric planning was performed to optimize the needles, seeds and seed positions. For each patient, a CT-study obtained 1-month after the procedure was used for post-implant dosimetry.

Results: Our patient implanted activity data was within the range predicted by various nomograms, except in cases where intra-operative computer planning was not used (Fig 1). Implanted activities were dispersed and did not follow activity curve of any specific nomogram. Implanting adequate activity did not always result in good post-implant dosimetry (median D90 value 108.8 Gy, range 31.64 - 256.6 Gy, $p < 0.0001$) (Fig 2). CT/US volume ratio > 1.5 was associated with decreased D90 (median CT/US ratio 1.51, range 1 – 3.3) ($p < 0.0001$) (Fig 3).

Conclusion: Nomogram calculated and computer optimized activities complement each other, however, intra-operative computerized activity optimization should continue to be the gold standard in prostate seed brachytherapy. Even in properly implanted prostates, discrepancies caused by contouring prostate on US and CT- based images, plus any real volume changes due to edema, significantly influence post-implant dosimetric quality. CT/US-fusion featured on newer planning systems should lessen these contouring uncertainties.