

AbstractID: 4564 Title: Boost within a Boost in Permanent Seed Implants: Dosimetric and Clinical Impact

Purpose: Study the dosimetric and clinical impact on the target volume, boost volume (BV) and urethra of performing boosts in seed implants.

Method and Materials: 35 localized prostate cancer patients with detailed biopsy results were treated with permanent seed implants. Personalized plans in which BV corresponding to regions of positive biopsy were generated intra-operatively based on a simulated annealing inverse planning algorithm. A second plan was generated for each patient without the BV. The dose objectives are 144 Gy to the prostate with a 3-4 mm margin, 2/3 (1/3) of the prostate covered by 150% (200%) of the prescription dose (PD), urethra V150 less than 10% and D5 should be below 220 Gy. Finally, 100% of BV should receive 150% PD (or 216 Gy).

Results: Comparing plans without and with BV show no significant change in the number of seeds, needles, prostate V100 and V200 ($p > 0.37$). Prostate V150 and D90 show significant differences increasing from 65% to 70% and from 187 Gy to 191 Gy. By forcing the coverage of the BV, the 150% isodose lines (which extend outside the prostate) shift inside of the prostate. This small increase in prostate V150 leads to significant increases of the BV V150 from 79% (lowest 42%) to 94% (lowest 86%). BV do not translate to higher urethra doses (V150 and D5). BV are relatively small compared to the prostate V150 volumes (average ratio of 18%). Thus multiple seed reconfigurations inside the prostate are achievable to cover BV.

Conclusion: Specific areas within the prostate can be boosted to receive 150% of the PD with no impact on the urethra. Large volumes of these dose levels are inherent to the procedure. The plans lead essentially to a rearrangement of the seed positions. Potential radiobiological advantages could be obtained at no cost (procedure or time).