

AbstractID: 9001 Title: Dosimetric Comparison of Permanent Prostate Brachytherapy Plans Utilizing Cs-131, I-125 and Pd-103 Seeds

Purpose: To compare the dosimetric differences of permanent prostate brachytherapy utilizing Cs-131, I-125 and Pd-103 seeds.

Method and Materials: We randomly selected twenty patients with organ confined prostate cancer previously treated in our institution, and re-planned with Cs-131 (1.8u), I-125 (0.5u) and Pd-103 (1.8u) seeds to prescribed doses of 115 Gy, 145 Gy and 125 Gy respectively using Prowess Brachytherapy 3.0 treatment planning system. The prostate, urethra and rectum were contoured on trans-rectal ultrasound images with no margin applied for PTV. For each case, three optimized plans were generated by automatic loading and minor adjusting, with the goals of V100 (the percentage volume of the prostate receiving 100% of the prescribed doses) ~95%, D90 (the percentage dose received by 90% of the prostate volume) $\geq 100\%$, and prostatic urethra UD10 $\leq 150\%$. For the plan comparison, we also computed V150, rectum RV100 (the volume of contoured rectum receiving 100% of the prescribed doses), and number of seeds and needles. **Results:** The median prostate volume was 26.0cc (range 13.0cc to 66.1cc). As compared to Pd-103 and I-125, Cs-131 improved the dose homogeneity and sparing of urethra and rectum. The average V150 decreased from 45.3% (Pd-103) and 39.6% (I-125) to 35.1% (Cs-131). The average UD10 decreased from 137.6% and 123.9% to 122.5%. The average rectum RV100 decreased from 0.56cc and 0.33cc to 0.27cc. In addition, the number of seeds decreased 12.5% and 3.8%, that of needles 7.6% and 2.1%, while maintaining an average D90 of 107%, and V100 of 95.0% or so for three isotopes. **Conclusion:** Permanent prostate brachytherapy utilizing Cs-131 seeds allows for better dose homogeneity and sparing of urethra and rectum while providing comparable prostate coverage compared to I-125 or Pd-103 seeds with comparable or less seeds and needles. Further biological and clinical studies associated with Cs-131 are warranted.