AbstractID: 10120 Title: Correlation Between Radiation Post-Survey and Planning Parameters in Permanent Prostate Brachytherapy

Purpose: To establish correlation between radiation post-survey and planning dosimetric parameters in permanent prostate brachytherapy. Combined with patient separation, it is possible to calculate the dose rate at patient surface and exposure rate 1 meter away from the patient.

Materials /Methods: The transrectal ultrasonography (TRUS) images are obtained using the B&K unit (Analogic Corporation) in 5 mm steps. Planning goals are: for prostate V_{100} 95%, D_{90} 100%, and for prostatic urethra D_{10} 150%. Dose calculations are performed using VariSeed (Varian Medical System) planning system. The dose rate is obtained by dividing the absolute dose by $1.44T_{1/2}$, where $T_{1/2}$ is the half -life of implanted isotope. The center of the prostate is determined by locating a point on the D column in the ultrasound template at the midline and the mid-section of the prostate. The distance from the center of the prostate to patient surface is about half of the patient separation. The dose rate is also calculated using AAPM TG-43 point source model, $D(r) = S_k \Lambda \Phi_{an} g(r)/r^2$, using the same dosimetric parameters for planning. Comparisons are made between point source and VariSeed (discrete multiple sources) results.

Results: For distances larger than 8.0 cm from the center of the prostate, the dose rate by discrete multiple sources can be accurately approximated by AAPM TG-43 point source model calculation within 5.0% for I-125 and Pd-103, for Cs-131 within 10.0%. In addition, depending on patient separation, dose rate for Cs-131 can be more than 30 times higher than that for Pd-103, 10 times higher than that for I-125.

Conclusion: Planning dosimetric parameters along with patient separation can be used to calculate the post-survey results at the patient surface using AAPM TG-43 point source model. The exposure rate 1 meter away from the patient can be obtained by applying the inverse square factor.