AbstractID: 8709 Title: Neither Dosimetric Nor Radiobiological Parameters Predict For Biochemical Control in a Large Permanent Prostate Brachytherapy Population

Purpose: To determine radiobiological predictors of biochemical control after re-evaluation of prostate implant dosimetry based on updated AAPM Task Group 43 parameters.

Materials & Methods: Among 1473 consecutive patients implanted with ^{125}I or ^{103}Pd sources prior to March 2006, there have been 55 biochemical failures. Recent consensus revisions to seed parameters indicate that corrections of up to 10% must be made to past dosimetry. The dosimetric quality parameter, D_{90} (the minimum dose covering 90% of the target volume), was updated according to the radionuclide and dosimetric era of the implant. Biologically equivalent dose (BED) and tumor control probability (TCP) was derived from the updated implant D_{90} plus any external beam dose given the patient.

Results: There was no significant difference in BED between biochemical failures and non-failures, 148 ± 27 Gy and 145 ± 24 Gy, respectively ($p = 0.352$). TCP was 0.90 ± 0.26 for biochemical failures and 0.93 ± 0.21 for non-failures ($p = 0.414$). Receiver-operating characteristic curves were analyzed and the population stratified by risk groups to determine any significant BED cut points. No significant cut point was found for intermediate-risk patients, but for low- and high-risk patients, a BED of 116 Gy for the former and 165 Gy for the latter stratified the actuarial biochemical control curves. However, Cox regression analysis found that neither BED nor TCP predicted for biochemical control either for the entire population or within each radionuclide-dependent dosimetric era. The only overall predictors of biochemical control were dosimetric era, Gleason score, and percent positive biopsies.

Conclusion: In a large prostate implant population, dosimetric and derived radiobiological parameters did not predict for failure. This may be due to low variability in implant quality or that the relatively few biochemical failures presented with occult micro-metastatic disease that was not amenable to local radiobiological control.