

## AbstractID: 1980 Title: Post-Implant Prostate Dosimetry without Seed Localization

An important part of prostate cancer treatment regimens for permanent interstitial seed implants is the post-implant analysis, which evaluates how well the dose distribution from the actual seed placement conforms to the desired dose to the prostate. The results of the post-implant evaluation are used to determine the actual dose distribution, ascertain treatment outcome, and determine any necessary follow-up. Current methods of post-implant dosimetry require the intermediate step of seed localization in which the location and orientation of each seed are determined. Despite recent significant advances, this remains an error-prone procedure: Individual seed locations can be determined with an accuracy of only 3 to 5 mm, and current imaging procedures cannot always account for all seeds. We propose a new method for direct seed dosimetry that does not require explicit information on seed positions and orientations. Trace quantities of a positron emitter may be placed in the seed capsule which in turn is imaged by PET/CT fusion. The measured positron annihilation event distribution may be correlated with the therapeutic dose distribution by an appropriate computational algorithm, and dose volume histograms may be directly obtained from this correlation. This way, there is no requirement to determine the precise positions and orientations of seeds on anatomical images before dose calculations can be performed. In this approach the DVH is much less sensitive to errors in seed localization and concomitant dose computation, and real-time dosimetry for improved seed placement may also become feasible if the method is fully developed.