AbstractID: 11710 Title: Non-template dosimetry for prostate seed implant

ABSTRACT:

Purpose: Template guidance has been used in modern prostate brachytherapy with 3D image-based planning. In robotically assisted prostate seed implants, template is only a virtual concept for the planning procedure, because the robot can insert needles at any desired location. A non-template dosimetry concept was presented and compared with traditional template dosimetry plan.

Materials and Methods: Variseed (V7.1) planning software was used to create the non-template plans. Based on 12 pretreated patients' contours, both template and non-template plans were created for comparison. Two different template plans were used: one used modified periphery needle pattern and the other used the same number of needles as non-template. Novel planning rules were designed to create more periphery-conformable non-template needle patterns. For all methods, inverse planning was used to optimize the seed spacing along the needles after needle pattern was determined. Dosimetry parameters (prostate V100, V150, urethra D1 and rectum V100) and number of needles and seeds were compared. The correlation of dosimetry outcome between two methods was analyzed. Isodose distributions were compared.

Results & Discussion: Compared to the template plan using modified periphery needle pattern, the non-template plans decreases number of needles by 20% and increases average V100 by 1%. Compared to the limited number of needle template plans, the non-template plans resulted in 2% increase in V100 and 4% decrease in maximum urethra dose, but the rectum V100 increased by 0.02 cc (mean). The correlation between urethra dose decrease and rectum dose increase has p-value 0.00032. That was because the needles inserted below the urethra and above the rectum play an important role to affect both doses. Non-template plan generally has greater conformal dose coverage than the template plan.

Comment [YY1]: This sounds confusing. Which plan would insert needle thru these?

Conclusions: Non-template plan dosimetry has observable advantage over template one with similar number of needles.