

AbstractID: 10259 Title: Plan Comparison on Magnetic Resonance Image between Inverse Planning Simulated Annealing and Point A Normalization for High Dose Rate Brachytherapy on a Cervical Cancer Patient.

**Purpose:**

The availabilities of CT/MRI compatible tandem and ovoid (TNO) applicators in recent years have improved the visibility of the tumor and organs at risk (OAR) in the treatment of cervical cancer using HDR brachytherapy. The purpose of this study was to observe the dose differences between different optimization methods shown on MRI.

**Method and Materials:**

A stage IIIB cervical cancer patient was treated with HDR brachytherapy using CT/MRI compatible TNO applicator. CT and MRI images were taken for the first fraction. The patient was carefully transferred between the two image modalities to prevent applicator movements. Catheter reconstructions on the MRI were performed based on CT/MRI registration focusing mainly on the applicator and the soft tissue surrounding the applicator. Two plans using different optimization methods were generated on MRI images, inverse planning simulated annealing (IPSA) and point A normalization. Dose distribution on each image slices were reviewed and DVHs for two plan protocols were compared.

**Results:**

The IPSA method showed better dose coverage to the target area(s) when compared with point A method. For the organs at risk (OAR), lower bladder dose (-16.5% for  $D2cm^3$ ) and higher rectal dose (10.9% for  $D2cm^3$ ) were found in IPSA plan. The rectal dose was increased due to better conformity at the ovoid level. Both plans have similar dose homogeneity index.

**Conclusion:**

Better target coverage was achieved with an IPSA plan compared to point A prescription plan. In this study, MRI provided superior soft tissue resolution and CT offered better image quality for catheter and source dwell position definition. It is advantageous to use both CT and MRI for HDR TNO brachytherapy planning.

**Conflict of Interest (only if applicable):** None