

AbstractID: 11396 Title: Clinical Investigation of the Effects of Implant Geometry on 3D-Image-based Intracavitary Brachytherapy of Carcinoma of the Cervix

Purpose: To clinically investigate the effects of implant geometry on tumor coverage, bladder and rectal doses for CT-based intracavitary brachytherapy of carcinoma of the cervix

Method and Materials: Eighteen low-dose-rate (LDR) gynecological (GYN) implants for ten patients with cervical cancer were undertaken CT-based planning with defined gross-tumor volume (cervix + uterus), rectum (upper-rectum + medial sigmoid), whole bladder, surrounding normal tissue (5-cm around the applicator), and multiple points of interest. The effects of the implanted geometry on the image-based plans were evaluated by the target coverage by the fraction of the GTV receiving doses higher than the prescription dose (average A₁-point doses), ratios of the maximum bladder or rectum doses to the doses at the points defined in ICRU Report #38, and dose drop-off (or gradient) represented by ratios of total volume within the prescription dose to the total volume in 90% of the prescription dose.

Results: The target coverage decreased from ~50% to ~30% with the increase of the separation of the two ovoids and the depth from the top-end of the first tandem source to the mid-point of the separation due to the enlarged target volumes. The bladder doses in CT-based plans relating to the conventional bladder doses increased from factor of ~1.0 to ~1.5 as increase of the separation and the depth. The rectal doses in CT-based plans were generally higher than the conventional defined rectal doses by a factor of 1.5. The implant geometry has less effect on the dose gradient at the prescription dose. Significant variations (> 200%) of the rectal and bladder doses occurred among individual cases.

Conclusion: Implant geometries do have systematic effects on image-guided GYN implants which could be used for selection of cases that are desirable for having LDR or HDR GYN intracavitary brachytherapy.

Conflict of Interest (only if applicable):