

AbstractID: 11282 Title: Evaluation of the Dose Perturbation Caused by Tungsten Shields within a Fletcher-Suit Delclos Applicator in Ir-192 HDR Brachytherapy

Purpose: To evaluate the dose perturbation in bladder and rectal regions caused by tungsten shielding within the ovoids of a Fletcher-Suit Delclos gynecological applicator in Ir-192 HDR brachytherapy procedures. **Method and Materials:** A Fletcher-Suit Delclos (FSD) gynecological applicator, assembled with Tungsten shielded ovoids, was rigidly suspended within a water tank. 28 sheets of gafchromic film were then secured in 6.20 mm increments in regions representative of a patient's bladder and rectum. A treatment plan was created (PLATO) to deliver 650 cGy to a user defined pseudo point A. Each film was scanned and analyzed to ascertain its dosimetric distribution. The data was arranged into two three-dimensional matrices based on the physical dimensions of the films and their locations with respect to a pseudo origin (intersection of the central tandem with the ovoids). Dosimetric data was also extracted from the planning system at points corresponding to specific locations on the gafchromic films. The entire process was then repeated for an FSD applicator without shielding in the ovoids. **Results:** The measured shielded data was compared to the planning system data (computed) that accounted for the tungsten shielding within the ovoids. It was evident that the measured doses in both the bladder and rectal regions were significantly lower than the computed data predicted. The largest reduction was roughly 24% in the bladder region, and 23% in the rectal region. Similar values were noticed in the unshielded comparison, where the unshielded FSD measurements were compared to computed data not accounting for ovoid shielding. This verifies a consistent discrepancy between the computed predictions and the measured doses. **Conclusion:** With the current dose tolerances for critical organs being estimated using shielded applicators, an accurate assessment of dose is imperative. This study provides a quantitative estimate for adjusting these accepted standards of bladder and rectal dose.