

AbstractID: 3698 Title: A Newly designed LDR Brachytherapy Applicator for Treatment of Cervical Cancer with Extension into the Lower Vagina

Purpose: The new applicator was designed at the University of Kentucky for treatment of cervical cancer with the extension into the vaginal. The design incorporates properties of both the Fletcher-Suit applicator and vaginal cylinder. A dosimetric evaluation of this applicator was performed using TLD measurements and the results were compared to the presently available Fletcher-suit applicator and a commercially available treatment planning system.

Method and Materials: Presently, patients with cervical cancer extending to the lower vaginal are being treated with the standard Fletcher suit applicator followed by treatment with a vaginal cylinder. To eliminate the possibility of overdose to critical organs such as of bladder and rectum, arising from two separate treatments, and also reduce the patient inconvenience a new applicator was designed to combine these treatments. To evaluate the dosimetric characteristics of this applicator, a solid water phantom was constructed to accommodate both the applicator and LiF TLD chips. The positions of the TLD chips were selected to represent the most commonly calculated points including vaginal mucosa and point A, as defined in ICRU report 38. The applicator was then loaded with Cs-137 sources, using the standard loading scheme. The 1 cm³ TLD chips were placed in the phantom along with the applicator. The experimental results were compared with the calculated values using a treatment planning system.

Results: The data compared dose rates at different points in the phantom which represent points along vaginal mucosa with analogous points from the same digitized set-up in the treatment planning system. The agreement was within or close to 10% for most points. Also, dose rates from the new applicator compared well with the Fletcher-Suit applicator.

Conclusion: This dosimetric evaluation provides solid evidence that this applicator is a safe and effective LDR device to treat cervical cancer with extension into the lower vagina.