AbstractID: 5539 Title: A Quantitative Dose Attenuation Analysis around Fletcher-Suite Device Due to Stainless Steel tube for HDR Brachytherapy: Monte Carlo Calculations and MOSFET Measurements

ABSTRACT: Current intracavitary therapy planning system for brachytherapy treatment of cervical and endometrial cancers using Fletcher-Suite Device (FSD) typically implements Manchster point system for dose delivery. Also, all available treatment planning systems neglect the attenuation effect from stainless steel (SS) tube, leading to potential inaccuracies in dose distributions. Previous publications only reported the dose reduction from the cylinder SS tube. To the best of our knowledge, the attenuation effect of SS tube from Fletcher-Suite Device has not yet been reported. This investigation uses Monte Carlo simulations (MCNP) to construct a typical geometry of FSD and compare the doses delivered to Point A in Manchester System with and without SS tube. This will delineate quantitatively the inaccuracies in dose distributions in three-dimensional space. The source geometry was that of the VariSource wire model VS2000. The Fletcher-Suite Device was that of the Varian medical system. In this case, the bending angles of tandem and colpostats are 15^{o} and 120^{o} respectively. We assign 10 dwell positions to the tandem and 4 dwell positions to right and left colpostats each. Measurements using MOSFET were performed in water, using a water equivalent jig for precision positioning of FSD and other instruments. Typical dose delivered to point A were determined according to Manchester System. Based on our preliminary computations, the dose reduction to point A was shown to be at least 3%. So this effect of FSD on patient dose is of concern. Good agreement was observed between simulations and measurements to within the acceptable error for MOSFET dosimetry (0.9%~2.8%). Techniques used to develop the FSD design in MCNP in 3D space and dosimetry results obtained for FSD system and vaginal cylindrical tube will be presented.