

AbstractID: 11745 Title: Commissioning the Ring & Tandem Combination Applicator Set - CT & MR Compatible, for clinical use with the VariSource™ HDR unit

Purpose: Ring applicators always present a challenge for source wire positioning in HDR brachytherapy. X-ray and autoradiograph imaging of applicators may indicate that without commissioning, a delivered dwell position may be different than planned. The reason for these differences may be attributed to the fact that the inner diameter of the ring has to be larger than the wire diameter to accommodate it within the applicator. This work reports on a method to develop correction offsets in the treatment plan to deliver the intended dwell positions.

Method & Materials: Imaging of HDR applicators is commonly used for the commissioning process. In addition to taking x-ray images with a static marker wire inserted, we describe imaging of dwell positions using the dummy and/or active wire to show the physical location of the HDR source for a given dwell position with respect to the ring applicator. Coupled with autoradiography, it is possible to determine the delivered dwell position by viewing the active source footprints on film. Delivered dwell positions can be compared to the planned dwell positions for comparison. Depending on the magnitude and location of the variations, one correction method is to apply a positional offset table for a given ring, where the offset depends on the planned dwell position. Additional imaging is used to verify that the dwell position modifications are appropriate.

Results: We found differences between planned position and treatment position of up to 5 millimeters. Such a difference may be of clinical significance. Using the described dwell position offset method; we applied correction offsets for improved source position accuracy.

Conclusion: Using standard radiation therapy equipment, we have shown a straightforward method to determine potential differences between planned and delivered treatment source positions in an HDR ring applicator, and illustrated a straightforward method to correct for positional variation.