

AbstractID: 10795 Title: Dwell position inaccuracy in the Varian GammaMed HDR ring applicator

Purpose: Varian has issued two Product Notification Letters warning of known inaccuracies in dwell position for their GammaMed HDR ring applicators. This study measures actual dwell positions for two sets of ring applicators and tests a correction methodology.

Method and Materials: Ring applicators were taped onto Kodak Ready-Pack EDR2 film. Solid water was placed under the film and on top of the applicators, primarily for stability and immobilization. An x-ray exposure was made using a conventional simulator, then an autoradiograph was made with the HDR source at different dwell positions. A total of 22 double exposures were made for each of the three ring applicators (30°, 45°, and 60°) of set 1 and 4 double exposures for each applicator in set 2. Source position measurement was performed within the BrachyVision treatment planning program, per Varian recommendations. Films were digitized and imported in BrachyVision, and the distance from the inner tip of the ring to the center of each dwell was determined using system measurement tools. Measured distance was compared to the programmed/expected distance.

Results: For all but the most distal dwell positions, which are indistinguishable due to drag of the source within the ring, the autoradiograph was distal to the expected position. Differences averaged 0.34 cm (range 0.17 cm – 0.59 cm) across all positions in all rings. To correct for this displacement, during planning the tip of the ring is extrapolated distally beyond its actual position in the patient image set and a proximal offset of the same distance is applied to the dwell positions. A global shift of 0.3 mm corrected all but the most proximal dwell to within ± 2 mm of the planned position.

Conclusion: Measured source positions were shifted distally from expected positions. A single shift value can be used to correct all rings to within ± 2 mm.