

Purpose: Accuracy of delivered dose compared to BrachyVision™ generated treatment plans was tested using both a calibrated miniature air ionization chamber to measure dose at the prescription point, and radiochromic film to map isodose contour lines. Quantitative and qualitative comparisons of the total dose and contour shapes were made.

Method and Materials: Xofter applicator balloons were held in a water phantom with a Solid Water™ fixture. A PTW model 34013 ionization chamber connected to a PTW UniDos electrometer, and read into a computer, were used to measure the dose at the prescription point. Films were held in the fixture in the plane of the source, offset by 5 mm. The Xofter Axxent controller performed sample treatments including stepping of the source for four combinations of balloon size and operating voltage. Film samples were digitized and converted to dose values through a specially developed calibration curve. Comparison of isodose contours with the film-measured dose was accomplished with specially written image analysis algorithms, which compared the measured values with predicted along the isodose contours.

Results: Dosimeter based dose measurements agreed with prescription to within 11% worst case, with an RMS error of 8%. Film analyses quantified deviation from isodose contours as a function of polar angle, with relative RMS deviations well under 10%. However limitations in the accuracy of film calibration limited absolute accuracy to just over 20%, with systematic behavior attributable to limitations of the fitting function.

Conclusions: Validation of treatment plans were performed using direct dosimetry and film based measurements. Novel image analysis tools were developed to allow numerical evaluation of film dose to isodose contours.

Conflict of Interest: Research was supported by Xofter, Inc.