

AbstractID: 6979 Title: Comparison of Radiographic Film, Radiochromic Film, and CR Plates for Intensity Modulated Radiation Therapy Quality Assurance

Purpose: The primary purpose of this study was to evaluate different types of IMRT QA media and determine which provides the most accurate results and efficient process for performing IMRT quality assurance. The secondary purpose was to evaluate new correction algorithms that have been developed for use in the RIT113 dosimetry system.

Method and Materials: Ten random patients were chosen who received treatment with step-and-shoot IMRT. IMRT dose measurements were taken in both a coronal and axial plane using radiographic film (EDR), radiochromic film (EBT), and a computed radiography (CR) plate. Because scanning EBT film with a Vidar scanner will result in artifacts caused by light scattering and lead to a non-uniform response, all EBT films were carefully marked to indicate orientation and scanned prior to irradiation. After exposure, a new background correction algorithm was developed to correct for non-uniformity. CR plates also have variations in their response across the width of the plate. In order to correct for this effect, a special calibration procedure was developed. A dose-response calibration curve was generated for each pixel on the plate, which was accomplished by exposing the plate multiple times to a large uniform dose.

Results: In all cases, the application of the new background correction algorithm improved the results for EBT film. Using the correction, the percentage of pixels exceeding the gamma threshold dropped from 8.1% to 4.6%. The IMRT analysis with the CR plate was consistently worse than both the EDR and the EBT films. The CR plate results improved with the uniformity correction, but still exhibited a 10-20% angular dependence and a 2 to 8% field size dependence.

Conclusion: IMRT QA results with background corrected EBT films were comparable to EDR films in many cases, while CR plates consistently delivered inferior results.

Conflict of Interest: Research consultant for RIT.