AbstractID: 7607 Title: Evaluation of a Computed Radiography System for verification of Intensity Modulated Radiation Therapy

Purpose: There has been great interest recently in replacing conventional film with computed radiography (CR) systems.However, the study of its dosimetric applications has been limited. This work presents a detailed evaluation of its performance in quality assurance (QA) for intensity modulated radiation therapy (IMRT).

Method and Materials: A CR system comprised of a Kodak ACR-2000i laser scanner, an Agfa CR plate, and a PC was used for IMRT verification. Both the scanner and the CR plate were calibrated by following the Kodak-provided instructions. A dose calibration curve for the CR plate was generated in the dose range of 0.5cGy to 400cGy. In the IMRT verification experiment, the CR plate with 6cm solid water build-up was irradiated to a clinical 6-field IMRT treatment plan (Varian Eclipse) of 6MV photons. Gantry angles were set to 0° for the dose delivery. The CR plate was scanned right after irradiation. An independent EDR2 film measurement of the delivered dose was also conducted. A 3-way comparison of dose information between the Eclipse calculations, film measurements, and CR measurements was performed. Dose maps, profiles, isodose lines, and Gamma maps were utilized for analysis.

Results: The CR results show excellent agreement with both Eclipse calculations and film measurements within the 3% dose difference and 3mm distance to agreement criteria except in penumbra regions or just outside field edges. CR and film measurements agree with each other better than with Eclipse calculations in the regions outside field edges, indicating possible limitations of calculation algorithms in those regions.

Conclusion: The CR system can provide comparable accuracy in relative dose measurements to conventional film. The CR system, having the advantages of digital nature, environmental cleanliness, reusability, and high convenience, is a feasible and reliable tool for routine IMRT QA.