

AbstractID: 6593 Title: Comparison of radiographic film with lead filter and GAFchromic EBT film for IMRT dose verification

Purpose: Film dosimetry plays an important role in IMRT dose verification and many methods have been introduced to improve its accuracy. We evaluated the newly developed film dosimetry techniques via quantitative comparisons. **Method and Materials:** X-omat (Kodak USA), EDR2 (Kodak, USA), and Gafchromic EBT (ISP, USA) films are employed for this study. Lead filters are used to X-omat and EDR2 film in order to enhance the accuracy by filtering out scattered low energy photons in a phantom. A unique cylinder phantom (\varnothing 30 cm) was designed that can be equipped with lead filters for this purpose. One anterior open field ($15 \times 15 \text{ cm}^2$), one anterior inverse pyramid-shaped field, and a 7- beam IMRT plan were delivered to each film sandwiched between the axial plans of the phantom with 6 MV X-rays. The optical density was digitized using a VXR-16 dosimetry pro (Vidar, Henden, USA) scanner and dose distribution was analyzed by RIT113 (RIT, USA) to be compared with calculated ones (Pinnacle3, ADAC, USA). The quantitative comparisons such as overlaid isodoses and distance to agreement (DTA) were made to test the consistency between calculations and measurements. **Results:** In X-omat and EDR film data without lead filters, consistency between the measured and the calculated dose was observed in high dose region ($>70\%$ of the maximum dose), whereas inconsistency was detected in low dose regions ($<50\%$). However, with lead filters, both X-omat and EDR data showed good agreement within the 3 mm DTA guideline in entire regions. EBT film data failed to meet the 5 mm DTA criterion in some regions for open and inverse-pyramid fields and showed limited spatial uniformity, though it passed the 3 mm DTA criterion for IMRT case. **Conclusion:** EDR2 film with lead filter showed its superiority in dose measurement and the developed cylindrical phantom was useful for accurate dosimetry.