

## AbstractID: 11176 Title: Assessment of the accuracy of Gafchromic EBT film Dosimetry in Inhomogeneous Media

**Purpose:** To accurately verify the dose distributions for IMRT in an anthropomorphic environment, we investigated the accuracies of Gafchromic@EBT film measurements in heterogeneous media by comparing with Monte Carlo calculations. **Method and Materials:** Measurements were performed in a home-made multilayer  $20 \times 20 \times 20 \text{ cm}^3$  polystyrene phantom with a cubic hole at the center for the inclusion of heterogeneities such as an air cavity or Teflon cube. 6 MV X-rays (Primus, Siemens, USA) with two beams ( $3 \times 3 \text{ cm}^2$  and  $9 \times 9 \text{ cm}^2$ ) were irradiated to the homogeneous and heterogeneous phantoms: (1) homogeneous polystyrene phantom, (2) polystyrene with a cubic air cavity, (3) polystyrene with a cubic Teflon block. Cube sizes of  $1 \times 1 \times 1 \text{ cm}^3$ ,  $2 \times 2 \times 2 \text{ cm}^3$ , and  $3 \times 3 \times 3 \text{ cm}^3$  were used. The EBT film was sandwiched between the phantom slabs parallel to the beam axis through the inhomogeneity. The percentage depth dose and lateral distributions on the film were obtained by Epson 1680 flatbed scanner. Computations were performed with the BEAMnrc and PMCEPT Monte Carlo codes with a cell size of  $0.1 \times 0.1 \times 0.1 \text{ cm}^3$  in the phantom. **Results:** The errors of percent depth dose (PDD) and lateral profiles were about 2% in homogeneous phantom. With an air cavity, the PDDs were agreed with each other within 2%, but big fluctuations were observed in the air cavity due to the poor convergence of MC (error of ~48%). The measured depth doses in the Teflon cube were higher than those of MC. The behavior of PDDs on the boundaries of the Teflon cube was very different to each other. **Conclusion:** EBT film predicted accurately the dose distributions with the inclusion of an air cavity, but over estimated them in the high density/atomic number medium such as Teflon. Correction methods are under investigation and will be presented