AbstractID: 9383 Title: Interface dosimetry in heterogeneous water phantom using EBT film

Purpose:
Interface dosimetry measurements in heterogeneous phantoms are subject to additional uncertainties when using solid materials due to the presence of air gaps between the materials and the detector. The use of solid materials also limits the location of dosimeters. In this study, we investigate performing interface dosimetry using EBT film in a liquid water phantom with lung-equivalent media inside the phantom.

Materials and Methods:
A 6 MV 10x10 cm^2 static field was measured at 90 cm SSD with an ionization chamber and EBT film placed in water. Then, interface measurements were made using EBT film or an ion chamber for a 6 MV beam of a 3x3 cm^2 static field at 95 cm SSD. The heterogenous phantom consisted of a 4x4x10 cm^3 lung equivalent material suspended 5 cm below the water surface in 40x40x40 cm^3 water phantom. The phantom was CT scanned and the images were used for dose calculations. EBT film was placed perpendicular to the central axis at multiple depths and in a parallel orientation at central axis and at ±1 cm off axis. The film extended from the water surface to 12.5 cm depth. Data were averaged over multiple measurements. Film data were compared to Monte Carlo simulations and convolution/superposition calculations.
Results:
EBT film data obtained in both orientations in water agree, to within 2%, with ion chamber data. In the heterogeneous water phantom, a 3% agreement with Monte Carlo simulations is achieved. Large deviations with convolution and superposition calculations was observed.

Conclusions:

EBT film is a reliable dosimeter in water with and without the presence of heterogeneity when the film is irradiated parallel or perpendicular to central axis. The film can be used in a variety of phantoms to obtain more reliable measurements for commissioning of sophisticated dose calculations algorithms.