AbstractID: 1966 Title: Improved Film Dosimetry of IMRT Fields in the Surface Buildup Region

Film dosimetry provides fast, convenient 2-D dose distributions, but is challenged by the dependence of film response on scatter conditions (i.e. energy dependence). Verification of delivered dose in the surface buildup region is important for IMRT where volumes of interest involve the buildup regions (e.g. head/neck, breast). The current work demonstrates that film dosimetry can accurately predict the dose in the buildup region, since 1) film dosimetry can be performed with sufficient accuracy for small fields and 2) IMRT is delivered by "small" segments (SMLC) or dynamic gaps (DMLC). This work evaluates the accuracy of XV and EDR film for measurements from 2 mm to 10 cm depths for small fields and clinical IMRT beams. Film measurements have been compared to single point measurements made with a stereotactic diode (STD) and parallel plate ionization chamber (P11) at various depths for square (STD, P11) and IMRT (STD) fields. Preliminary results show that in the surface region (2mm depth) for a sample of measured beamlets, there are 5%-20% and 10% -22% differences for EDR and XV film measurements, respectively, compared to STD measurements. These differences between film and STD measurements are correlated with dose. This has allowed the development of a correction function. When applied to the film calibration curve for measurements in the buildup region, the function can improve the accuracy sufficiently for IMRT calculation verification (i.e. ~5% uncertainty). These results will allow the quantitative analysis of buildup region doses from clinical IMRT treatments.

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