AbstractID: 9567 Title: Analysis of Variation in H&D Curve Creation for EDR2 film Dosimetry

The purpose of this study was to evaluate the precision with which one can use a single film calibration method for absolute and relative dosimetry using Kodak EDR2 film. The magnitude of the variation caused by the film digitizer, film processor, and energy/scatter variations due to the different depths of measurement for IMRT applications was investigated. H&D curves were created using a single film irradiation technique where 8 dose levels are delivered to the film. H&D curves measured at depths of 3, 7.5, 10, and 20 cm were independent of depth (standard deviation of 1.4%). Digitization of a single film 10 times produced reproducible H&D curves, with the mean standard deviation of the optical density values $OD\sigma = 0.3\%$. 10 films studied over the course of 1 day, 15 over 1 month, and 15 over 1 year produced H&D curves with the $OD\sigma = 1.4\%$, 2.4%, and 4.7%. Next, a single characteristic H&D curve was computed and used for all films. Absolute dosimetric differences were within 3%, 6%, and 12% over the course of 1 day, 1 month, and 1 year. For relative dosimetry, all differences were within 5%, with over 95% within 2% for films exposed during 1 month and 95% within 3.5% for 1 year. In conclusion, daily H&D curves created with EDR2 film are necessary for absolute dosimetry. However, a daily H&D curve is unnecessary for relative dosimetry, rather a characteristic H&D curve created from a series can be used for relative film dosimetry within 5% with 95% confidence.