AbstractID: 6441 Title: Temporal variation of characteristic curves of EDR2 film used for IMRT quality assurance

Routine IMRT QA is often performed using radiographic film in combination with a film analysis software package. In addition to differences in film batches, various factors could affect the film developing process such as temperature, transport rate, or replenishment rate.

The conversion of the degree of blackening of the film, as measured by optical density, to dose is achieved by applying a sensitometric, or characteristic curve, to the film; thus converting it to a dose map. These curves need to be constructed at the beginning of the start of film IMRT QA.

In order to account for processing variations, and film batch differences, our practice is to expose a single reference film to a known dose at the time of each IMRT QA and adjust the "baseline" film sensitometric curve accordingly; in effect assuming that the shape of the curve remains unchanged and it is only shifted by a fixed amount to a higher or lower dose. The validity of this assumption and the degree to which film processing can affect it are investigated here.

We have analyzed the sensitometric curves and reference films used for adjusting the curves at two institutions over a three-year period. Our data show that sensitometrically-derived doses from the reference films vary from the delivered doses by up to 17% in one institution and 12% in another. Analysis of curves generated for different film batches, or over time, shows that this method of scaling the dose to shift the sensitometric curve results in an acceptable match when curves for the same film type are compared, validating our simple QA technique. Other factors, such as a good processor QA, may affect the results.

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