AbstractID: 9587 Title: Simple Film Calibration Methods without Beam Modification

Radiographic film is currently a practical dosimeter for IMRT because it provides excellent spatial resolution and integration of time-varying modulated dose. Although commonly used, it has some practical limitations such as non-linearity of energy response, a relatively poor reproducibility, and labor-intensive procedures. A traditional film calibration for Kodak XV-2 film requires a large number of film measurements to obtain the nonlinear sensitometric curve. To save labor, time, and films several researches have developed simple calibration methods using beam modifiers like step-wedge and MLC. In this work, we propose two simple methods that do not require beam modifiers. One is a pivot method that requires only one calibration film at a specific monitor unit and scales a reference sensitometric curve obtained by averaging data from the traditional calibration database. The other method assumes the sensitometric curve can be approximated by a simple quadratic function and derives the fitting parameters from two calibration films and a background film. We have tested these methods to 20 cases of film calibration. Measurements were done with Kodak XV-2 film at 95 cm SSD and 5 cm depth in water-equivalent phantoms for $10\times10cm^2$ field of 6MV photon. Comparison with measured sensitometric curve shows good agreements within 1.7% and 1% in average (5% and 3% in maximum) discrepancy in the case of the pivot method and the quadratic method, respectively. However, these methods failed to reproduce the sensitometric curve with an abnormal calibration film.