

AbstractID: 1181 Title: QA of MLC-based IMRT using MU-weighted distribution convolution with a standard dose kernel

We have implemented an IMRT QA process consisting of a composite film based measurement and an independent 2D dose calculation per beam. A standard effective dose kernel is convolved with the MU-corrected total MLC intensity distribution to calculate a dose distribution in a specific plane of a phantom. The standard dose kernel includes the effects of scatter, MLC leakage and extra-focal radiation. Although this approach is energy and geometry specific, it is adequate for computing dose to a single plane at fixed depth in a unit-density phantom, such as is used in routine IMRT QA. This allows the reduction of all dose component contributions to a single effective convolution kernel. The standard dose kernel may be calculated from the average of the direct deconvolution of MU-corrected MLC intensity distributions and calibrated film measurement. Our kernel was directly calculated using dose maps from 115 individual IMRT beams which were verified by direct comparison to point measurements using a micro-ionization chamber and film based distribution evaluation. Validation of the standard dose kernel was performed and calculated point doses were found to agree within 2.5% of measured values. Strengths of the method are: applicability to both step-and-shoot and dynamic systems, provision of 2-D intensity maps of each beam, time and resource efficiency, measurement of the full delivery sequence to identify any problems with the delivery system, and validation through chamber based measurement. The detailed findings of our validation measurements and a representative copy of the output from the independent calculation will be presented.