A method for routine quality assurance for dynamic multi-leaf collimators

Purpose: To develop a user friendly method for routine quality assurance for Intensity Modulated Radiation Therapy (IMRT) using dynamic multi-leaf collimators (DMLC).

Methods and Materials: A "stop and shoot" algorithm is used to generate a matrix of 1.0 X 1.0 cm beamlets covering the maximum IMRT field of 14 X 40 cm. These beamlets have alternating intensities of 0.0 and 0.0 cGy. A Kodak RP/V2 film, located at depths of 1.5 cm in a solid water phantom for 6 MV and at 4.0 cm for 18 MV X-rays, is exposed. This procedure takes 1.5 minutes. This film is scanned with an automatic film densitometer and data are collected for analysis.

Results: This test method yields a matrix of beamlet intensities which are sensitive to 0.5 mm variation of intended leaf positions and 3% of dose variations. This method is easily implemented for routine quality assurance. Output from the film densitometer is fed into a spread sheet program for analysis.

This quality assurance method has been implemented in our Department since August, 1998. The quality assurance results show that our IMRT program and the DMLC hardware perform well within specifications.

Conclusion: A method has been developed for routine quality assurance of the IMRT program and the DMLC hardware. This method produces a hard copy film for record

keeping and a matrix of data points for analysis. This method has adequate sensitivity to detect “out of specification” variations of IMRT and DMLC.