

AbstractID: 2957 Title: Optimal matching of 3D film dosimetry with calculated dose for IMRT quality assurance

Purpose: To develop an optimal matching of the three dimensional film dosimetry with calculated dose for Intensity Modulated Radiation Therapy (IMRT) quality assurance

Method and Materials: We have fabricated the 3D IMRT phantom which consists of the base frame (30x30x5 cm³) and 12 acrylic plates (30x30x1cm³). The EDR2 films were embedded in each plate for 3D film dosimetry. Both absolute point dosimetry and 3D film dosimetry were performed throughout the IMRT using Clinac 21EX's millennium MLC. With custom-written software modules, the measured and calculated dose distributions for axial, coronal and sagittal planes were superimposed by coincidence of their origins, followed by comparison of the point doses at all matched positions. Then, with the optimization algorithm the setup errors were recovered.

Results: We developed custom-written software modules for managing dose-distribution files, optimizing the position, calculating dose differences, and printing out the report. The dose verifications for axial, coronal and sagittal planes were obtained and graphically shown. Differences between the calculated and measured doses over the 3% criterion could be reduced by 15% after applying the optimization algorithm.

Conclusion: We have presented a 3D dose-verification scheme with an optimization algorithm for IMRT that determines the setup errors in the measuring device by minimizing the average dose difference between the calculated and measured doses. Optimization dramatically reduced the difference between measured and calculated dose distributions in all cases investigated.

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