

Purpose:

Comparison of 2D electronic array systems with film for IMRT QA.

Method and Materials:

Two electronic array systems, MapCHECK (SunNuclear) and MatriXX (Scanditronix), were evaluated and compared with EDR2, XV, and Gafchromic EBT film. Patient evaluations included two H&N, two prostate, and two "problem" patients. Planning was done with Eclipse/Helios 7.3.10 treatment planning software (Varian) (TPS). All measurements were taken at a depth of 10 cm on a Varian 21EX linear accelerator (6MV). All measurements were compared with the TPS and film. Gamma analysis, isodose distributions, and profiles were analyzed for each comparison.

Results:

Film was found to have absolute dose values 20 – 30% higher than MapCHECK and MatriXX. EDR2 film measurements demonstrated smaller penumbra than either the plan or the 2D systems. Both 2D (electronic) systems demonstrated lower resolution and sensitivity issues than film demonstrated. Selection of the region of interest, detector position, and normalization methods also affected final outcome.

Conclusion:

The EDR2 and EBT film dose ranges do not appear optimal for individual field analysis. Film vs MatriXX agree (point to point) better with each other than with plan. MapCHECK's high density option requiring on extra acquisition (3.5mm offset) was found to be slightly useful and confirmed higher resolution advantages. Recommendations for IMRT QA is to have two methods at each facility; a standard method (such as 2D array) and a more detailed backup method (such as film). 2D arrays can provide a complete QA package with resolution limitations. Film analysis for MapCHECK is awkward at best with GafChromic analysis for both MapCHECK and MatriXX being better but demonstrated difficulties in user friendliness and final values. The MatriXX film analysis was preferred.