

AbstractID: 10708 Title: Practical use of Gafchromic® EBT films with electron beams – application to TPS Quality Assurance tests

Purpose:

To validate dosimetry using Gafchromic® EBT films parallel to electron beams in order to facilitate electron TPS Quality Assurance tests.

Method and Materials:

2D dose distributions were performed using EBT films with 6, 9 and 12 MeV electron beams and 10x10, 5x10, 4x10 and 3x10 cm² fields. The films were exposed parallel to the incident beam in a polystyrene phantom. An experimental setup was suggested to perform irradiation with EBT films parallel to the incident beam (Fig.1, 2).

The CARPET® phantom was used to perform a QA test with the presence of a shaped bolus applied on the surface. An EBT film was positioned parallel to the beam in the centre of the phantom and another one under the bolus in order to measure the skin dose. This setup combines 5 different quality assurance tests: oblique incidence, complex surface shape, extended SSD, skin dose test and presence of a shaped bolus (Fig.3).

Results:

Comparison with IC15 ionisation chamber measurements showed that differences in absolute dose for the standard fields ranged from 0.5 to 1%, and mean difference for small fields was 2.4%. The mean offset in the PDD curves was 0.8 mm and the maximal difference in the profiles widths was 1.4 mm (TableI).

The isodoses matching between calculated (Eclipse TPS) and measured data for the CARPET® phantom test showed very good agreement. The γ index map showed that almost 99% of the points satisfy the $\gamma < 1$ criteria with a 3% - 3 mm tolerance in dose and distance respectively (Fig.4).

Conclusion:

This study validates Gafchromic® EBT film dosimetry for standard and small electron fields. Parallel film dosimetry in electron beams greatly facilitates TPS QA tests which is very important in a clinical busy environment.