

AbstractID: 6926 Title: Determination of TG43 parameters for Cs-131 model CS-1R2 seed using radiochromic EBT film dosimetry

Purpose

To measure the 2D dose distributions for Cs-131 seed model CS-1R2 for distances from 0.06cm to 4cm using radiochromic EBT film dosimetry. TG43 dosimetric parameters were generated.

Method and Materials:

Each radiochromic film (GAFCHROMIC[®] EBT lot #35076) was in contact with a model CS-1R2 seed (IsoRay Medical) at the center of a solid water phantom, 30x30x20cm. A multiple film technique was employed. More than 50 films were separately exposed to 10 seeds, with the product of air kerma strength and exposure time between 14 and 800 Uhr. The seed strength ranged from 10 to 4U (NIST traceable) during the experimental runs. For calibration, 15 films (of the same lot) were exposed to 50kV x-ray (M50) in air at 100cm SSD with doses ranging from 0.2 to 20Gy. Since the EBT film response is almost identical for M50 and M40 x-rays, the energy response can be considered to be flat in this region and thus also the same for the Cs-131 energy. All experimental, calibration and background films were scanned (pixel resolution 0.2mm) using a CCD camera-based densitometer, with red and green light sources. Conversion from net optical density readings to doses were achieved based on the calibration curve established for each light source used in scanning. The 2D dose values in cylindrical coordinates were converted to polar coordinates, and the TG43 parameters were generated.

Results

The dose rate constant, radial dose function and 2D anisotropy function were determined, and compared with those reported by other authors. General agreement was found.

Conclusion

It is feasible to determine TG43 parameters for Cs-131 model CS-1R2 seed in solid water phantom using radiochromic EBT film. This method is superior to TLD dosimetry (1) in providing data with high spatial resolution for distances down to 0.06 cm and (2) within reasonably achievable time frame.