

AbstractID: 3636 Title: Use of Radiochromic Films for I-125 Seed Dosimetry In Solid Water

Purpose:

To evaluate the use of two new models of high sensitivity radiochromic film, GAFCHROMIC[®] EBT and XRT, for I-125 seed dosimetry from 0.1 cm out to 5 cm.

Method and Materials:

Experimental films were positioned in contact with or at a distance of 0.5 or 1 cm from the ¹²⁵I seed (Implant Sciences model 3500) in solid water phantom. A multiple film technique was employed, with the product of the air kerma strength and exposure time ranging from 5 U_h to 5500 U_h, using four seeds with NIST traceable air kerma strengths of 7 U. A series of 25 calibration films of each model were exposed to one ¹²⁵I seed at 0.5 cm distance, one at a time. A CCD camera based microdensitometer, with interchangeable green (520nm) and red (665nm) light boxes, was used to scan all the films with 0.2 mm pixel resolution. The dose to each calibration film center was calculated using the air kerma strength of the seed (incorporating decay), exposure time and TG43U1 recommended dosimetric parameters. Based on the established calibration curve, dose conversion from net optical density was achieved for each film model and light combination.

Results:

2-d isodose rate (in cGy/U_h) curves were plotted and compared among the film model and scanning light combinations. Radial dose function and anisotropy function were also determined. The results obtained from two film models corroborate each other. We found general agreement with the TG43U1 recommend values of dosimetric parameters.

Conclusion:

Radiochromic film dosimetry using GAFCHROMIC[®] EBT or XRT models is feasible and accurate in determining 2-d dose distributions around low dose rate ¹²⁵I seed. It is a viable alternative to TLD dosimetry for ¹²⁵I seed dose characterization.

Conflict of Interest

Prototype GAFCHROMIC[®] EBT and XRT films from ISP.
Free I-125 seeds from Implant Sciences.