

AbstractID: 5601 Title: Radiochromic film dosimetry for a new type of I-125 seed: Determination of TG43 parameters

Purpose

A new prototype of I-125 seed was studied using radiochromic EBT film in solid water for the dose distributions from 0.06cm out to 5cm. The high activity seed was designed for intravascular brachytherapy of lesions in peripheral arteries. The active source core was produced with Xenon ion implantation into a solid quartz core (without silver marker) and then encapsulated in titanium to form a sealed source.

Materials and methods

A multiple film technique was employed. Each film (EBT lot #35076) was in contact geometry with the seed at the center of a solid water phantom, 30x30x20 cm. Totally 46 films were separately exposed to 12 seeds, with the product of activity and exposure time between 8 and 4910 mCi-hr. The seed activity ranged from 12.5 to 2.4 mCi during the experimental runs. 30 calibration films were exposed to one seed at 0.5 cm above or below the seed. All experimental, calibration and background films were scanned (pixel resolution 0.2mm) using a PeC CCD100 densitometer, with red and green light sources at least one day after exposures. Conversion from optical densities to doses was achieved based on the calibration curve established for each light source used in scanning. The 2-d dose values in cylindrical coordinates were converted to polar coordinates, and the TG43 parameters were generated.

Results

The radial dose function and anisotropy function were plotted. Compared with the Implant Sciences model 3500 seed, the anisotropy function values are similar, while the radial dose function values (at distances > 1cm) are higher, possibly due to the absence of silver fluorescent x-rays. An interim value of dose rate constant was determined.

Conclusion

TG43 parameters for a new type of high activity I-125 seed have been obtained using radiochromic EBT film for distances from 0.06 to 5 cm in solid water phantom.