

Radiochromic Dosimetry in Intravascular Brachytherapy for Treating Restenosis

This investigation was undertaken to study the radiochromic dosimetry with a new method and apply it to intravascular brachytherapy. Eleven Gafchromic films were exposed first with a Sr-90 eye applicator with doses ranging from 3.47 to 140.52 Gy. The films were then scanned with a Nikon LS-2000 scanner with a RGB LED array light source and a reading resolution up to 2700 optical dpi. Digital images with 150x150 matrices were acquired with a resolution of 0.1 mm per pixel. Red, green and blue channels from the 24 bit image data were extracted and calibrated separately to obtain three polynomial dose versus optical density curves with the backgrounds corrected. Radiochromic films exposed to Re188/186 wire in jig and water were then scanned with the same resolution to get the dose distributions. Optical densities ranging from 0.0563 to 1.087, 0.0189 to 0.3656 and 0.0121 to 0.1644 were obtained with the red, green and blue channels respectively from the calibration films. As expected, the red channel provided the widest optical density range. The doses on film from the Re188/186 wire using the red channel calibration agreed with the TLD measurements from the collaborative institution to about 13%. Compared with the laser scanner with the specific red light source, the RGB LED scanner with a separated red channel calibration can be an alternate method to obtain reliable dose distributions within 0.1 mm intervals for intravascular brachytherapy.