AbstractID: 1800 Title: Radiochromic Film Dosimetry for a New Electronic Brachytherapy Source

Radiochromic film measurements have been made of the dose distribution around a new miniature x-ray source designed for electronic brachytherapy. GAFCHROMIC model XR-T films, lot #30189-2, were exposed to x-rays emitted from a new flexible x-ray probe with 40 kVp and 100μA setting in a RMI457 solid water phantom. The experimental films were positioned parallel to the tube axis at a distance of 9mm. To establish the calibration curve, a series of calibration films (also at 9mm distance) individually received 1 to 60 Gy at the film center with a dose rate of 5 Gy/min based on miniature ion chamber measurements. All films were scanned using red (665nm) and green (520nm) lights in a CCD100 microdensitometer with spatial resolution of 0.2mm. The average optical density (OD) over 1mmx1mm area at the center of each calibration film was obtained. After subtracting the background film reading, separate calibration curves (Net OD vs. dose) were plotted for red and green lights. A simple geometric transform was used to convert the measured OD values to dose in the plane containing the probe axis. Incorporating the exposure time, 2-d dose rate distributions were obtained for distances up to 4 cm, and depth-dose curves were plotted. Dose anisotropy in polar angles and dose variation with radial distances were extracted and evaluated. Measurements agreed favorably with Monte Carlo calculations of x-ray probe output. GAFCHROMIC XR-T film is a useful tool for measuring 2-d dose distributions of new electronic brachytherapy sources.

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