Radiochromic Film Dosimetry of a High Dose Rate Beta Source for Intravascular Brachytherapy

Good clinical physics practice requires that dose rates of brachytherapy sources be checked by the institution using them, as recommended AAPM Task Group 56 and the A.C.R. For intravascular brachytherapy with catheter-based systems, AAPM Task Group 60 recommends that the dose rate be measured at a reference point at a radial distance of 2 mm from the center of the catheter axis. That task group also recommends that: The dose rate along the catheter axis at a radial distance of 2 mm should be uniform to within $\pm 10\%$ in the center two-thirds of the treated length. The relative dose rate in the plane perpendicular to the catheter axis through the center of the source should be measured at distances from 0.5 mm to R₉₀ at intervals of 0.5 mm. Radiochromic film dosimetry has been used to measure the dose distribution in a plane parallel to and at a radial distance of 2 mm from the axis of a novel, catheter-based, beta source for intravascular brachytherapy. The minimum, maximum and average dose rates on a line parallel to the catheter axis in that plane, in the centered 24.5 mm of the treated length, were calculated. Four each of four different devices: The average agreed with the dose rate measured with a well ionization chamber by the replacement method, using source trains calibrated with an extrapolation chamber at NIST. The maximum and minimum were within $\pm 10\%$ of the average.