

Dosimetric characterization of interstitial brachytherapy sources is required for clinical use as detailed in TG-43. Traditional methods (film, TLD) generally require the use of water substitutes and may be impractical at distances < 1 cm. Polymer gel dosimetry was used to avoid these problems in a preliminary study. MAGIC gels contain methacrylic acid that polymerizes when exposed to radiation, increasing the optical density of the gel. Sources were placed in the gel via a catheter ~ 1 mm in diameter. After irradiation the gels were evaluated with an optical scanner to obtain a 3D matrix of optical densities. This method yielded the dose distribution and TG-43 parameters in close proximity to the source (< 1 cm). The dynamic range of optical CT is limited; low-dose regions suffer from high noise, and increasing the dose causes imaging artifacts from optically dense regions. To eliminate this problem the gel was poured around a larger catheter (~ 7 mm). Immediately after the gel set and prior to irradiation, the catheter was removed and replaced with the 1 mm catheter. The void was filled with insensitive MAGIC gel having the same index of refraction as the sensitive gel allowing the gel to be scanned with optical CT without artifact. This new method has allowed for measurements at larger distances from the source and was demonstrated using a gel irradiated with a ^{192}Ir source. The measured radial dose function agrees within $\pm 5\%$ of published data.

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