

Enhancement in 3D dosimetry measurement using polymer gel and MRI.

ABSTRACT

The effects of varying the concentrations of cross-linker N, N'-methylene-bis-acrylamide (BIS) from 2% to 4%, and 2-hydroxyethylacrylate (HEA) monomer from 2% to 4% at 5% gelatin on the dose response of BIS-HEA-gelatin (BHEAG) aqueous polymer gel dosimeters have been studied using magnetic resonance imaging (MRI) for relaxation rate (R_2/R_2) of water proton. The dosimeters were irradiated with ^{60}Co teletherapy γ -ray source at a constant dose rate, receiving doses up to 30 Gy. The radiation polymerization occurs and increases with increasing initial dose. R_2/R_2 is found to decrease mono-exponentially with depth inside the polymer gel and depend strongly upon the initial concentrations of co-monomers (HEA and BIS). Dose-depth map for BHEAG gel was determined for different concentrations of co-monomer (HEA and BIS). The percentage dose depth was also evaluated which leads to a good agreement with the ionization chamber measurements.

Keyword: Polymer gel; Radiation; Relaxation rate; Depth-dose; Cross-linker.