

AbstractID: 1477 Title: Monte Carlo and experimental evaluation of a Palladium activated Rhodium coil

The dosimetric properties of the new palladium activated rhodium coil were investigated for permanent implants to be used in interstitial brachytherapy. The dosimetric characteristics such as the dose rate constant, radial dose function and anisotropy function were computed using the ITS version 3.0 Monte Carlo (MC) code following the TG 43 recommendations. The validity of the MC code was checked by modeling 0.5 cm source and bench marked with the commercially available I-125 Model 6711 and Pd -103 model 200 sources. The coils are available in 1 cm increments from 1.0 – 6.0cm in length. Experimental and theoretical evaluations of the dosimetric parameters were performed on a 1.0 cm coil using a solid water phantom and thermo luminescent dosimeters (TLD).

The radial dose function $g(r)$ was measured at 0.5 to 7cm and calculated for the same. The anisotropy function $F(r, \theta)$ was measured at 2, 4 and 5cm and calculated for distances from 1 to 5cm. The dose rate constant measured at 1.0 cm was found to be 0.622 cGy/U/hr and calculated was found to be 0.6728 cGy/U/hr. The measured data was then compared to the Monte Carlo calculated data. Dosimetric properties for other lengths were computed using the ITS MC code. The Monte Carlo data for 1.0 cm data was entered into the ADAC Treatment planning system. Dose distribution for the 2 to 6 cm lengths were generated and compared with Monte Carlo data, which resulted in minimal deviation. One billion histories were run to keep the statistical error less than 1%.