

AbstractID: 2844 Title: On the Prescription Dose in Permanent Cs-131 Seed Prostate Implants

Purpose: Recently, ^{131}Cs seeds have been introduced for prostate permanent seed implants. This type of seed has a relatively short half-life and has its most prominent emitted photon energy peaks in the 29 keV to 34 keV region. Traditionally, 145 Gy and 125 Gy have been prescribed for ^{125}I and ^{103}Pd seed prostate implants, respectively. Since both the half-life and dosimetry characteristics of ^{131}Cs seed are quite different from those of ^{125}I and ^{103}Pd , the appropriate prescription dose for ^{131}Cs seed prostate implant may well be different. This study was to determine an appropriate dose prescription scheme for permanent ^{131}Cs seed prostate implants.

Method and Materials: A linear quadratic radiobiological model was used in this study. Prostate edema of different durations and sizes was taken into consideration in the dose and tumor cell survival fraction calculations. The tumor cell survival fractions in ^{103}Pd and ^{125}I permanent seed implants were taken as reference values to derive the appropriate dose prescription value for ^{131}Cs seed implants. Calculations were also performed for tumors of different tumor doubling times.

Results: As expected, the derived prescription dose values were dependent on type of tumors and types of edema. For fast growing tumors, the derived prescription doses were different depending on the type of reference implant was used: ^{125}I or ^{103}Pd seed implant. However, for slow growing tumors such as prostate cancer, the derived prescription dose values were very similar and it was determined that 124 Gy was an appropriate prescription dose for permanent ^{131}Cs seed prostate implants.

Conclusion: An appropriate prescription dose has been derived for ^{131}Cs permanent seed prostate implants. The dose value was determined to be 124 Gy.