

AbstractID: 2942 Title: Dosimetry of a thyroid uptake detected in seed migration survey following a patient's iodine-125 prostate implant and measurements of seed leakages

Purpose: To improve the quality of prostate brachytherapy. A case of thyroid uptake following an I-125 prostate implant was previously reported. The abstract presents the methods to estimate the dose to thyroid and data of source leakages measured for different iodine-125 seeds.

Method and Materials: Seed migration survey is provided to the prostate brachytherapy patients as a quality control procedure. Different implant techniques were evaluated to minimize the seed migration. To estimate the thyroid uptake dose from a seed ruptured during implantation, I-125 source intentional leakage is measured in vitro. A seed is cut open and placed in saline solution. The concentration of I-125 in the solution is measured over a period of 2 months. A leakage curve is obtained. Using MIRD model, the dose to thyroid is calculated. The thyroid counts at different times are used to verify the thyroid uptake dose.

Results: Seven of 11 vendors distributing I-125 seeds in North America provided I-125 seeds in our seed leakage investigation. The measured data shows that the leakage half-life of a seed varies from 12 days to infinite for different manufactured seeds. Based on the leakage data and patient measurements, we conclude that one seed was leaking in our thyroid uptake case. The estimated dose to thyroid is 263 cGy.

Conclusion: The elimination of seed migration has been achieved and so the improvement of the implant quality. Since more and more prostate cancer patients will be treated by brachytherapy, increased incidences of thyroid uptake are expected. The measured seed leakage data can be used in the estimation of dose to thyroid in case a seed leak is encountered.

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