

Reference Cases

Please calculate and attach isodose distributions for the single seed and geometric implant described below. Sources should be the model ^{125}I or ^{103}Pd seeds (from the list of models complying with the AAPM prerequisites – see <http://irochouston.mdanderson.org>) that you choose to treat your patients, with source strength specified exact at the beginning of the implant. Do the calculations as you would do them clinically using the TG-43 dosimetry, detailing any assumptions necessary.

Case 1: A single seed, strength 0.5U ($\mu\text{Gy m}^2 \text{ h}^{-1}$) (use 2.5 U for ^{103}Pd): If your software allows and you use a line source approximation, calculate both in the longitudinal and mid-transverse planes of the seed. Please submit isodose lines from 0.2 to 100 Gy. (Lines 0.2, 0.5, 1, 5, 10, 50, & 100 Gy are preferred.) The lower isodose lines can be achieved by using a lower prescription dose.

Dosimetry Calculations:

Write below the equation that will be used for hand calculating the instantaneous dose-rate to an arbitrary point from a single seed in the TG-43 formalism. (If possible give notations used by your treatment planning computer). The intent is for you to be able to verify that the values of various parameters in your treatment planning system are the same as in TG-43.

Define the variables in the equation:

For each seed model used to treat patients on this protocol, submit the data used by your treatment planning computer for the following parameters:

- Dose rate constant (Λ)
- Anisotropy constant (Φ) or factors
- Radial dose function
- The units of S_K are : _____
- Do your ^{125}I dose calculations agree with TG-43 to within $\pm 5\%$ from 5-70 mm? Yes No
- Do your ^{103}Pd dose calculations agree with TG-43 to within $\pm 5\%$ from 5-50 mm? Yes No

Case 2: The diagram on the following page represents a cylindrical prostate and rectum. Assume the dimensions of the prostate and rectum in the drawing to be both the PTV and ETV.

The purpose of this reference case is principally to verify the consistency of your calculations with TG-43. Perform calculations for the implant shown in the diagram using seeds of source strength 1.5 ($\mu\text{Gy m}^2 \text{ h}^{-1}$) (use 2.5 U for ^{103}Pd).

- Submit isodose distributions in all axial planes. (0.5 cm spacing)
- Submit the following isodose lines: 290, 217, 145, 130, 73 and 36 Gy
- Submit the volumes of prostate and rectum as calculated by the treatment planning system.
- Submit integral dose-volume histogram (DVH) tables in 10 Gy increments for:
 - (i) Planning target volume (PTV).
 - (ii) Rectum in prostate region.

Note: If you wish to use more than one of the approved seed models, please submit cases 1 and 2 for each seed model.

