Purpose: Currently, the point source approximation is used in our institution to calculate the dose distribution of I-125 seeds. The purpose of this study was to compare the isodose distributions of both point source and line source models in prostate implant and eye plaque procedures.

Methods: Using Pinnacle Planning System (V8.0m, dose grid size 2x2x2 mm3), the point source and line source models for Iodine-125 were commissioned according to the AAPM TG43 report. Values of function g(r) and F(r, &#952;) were obtained from reference tables in TG-43. The CT images for 3 post-implant prostate cases were obtained in 3mm slices. In addition, the plans for 5 different sized eye plaques (diameters 12-20 mm) were used. The point source was positioned at the center of each seed, and the orientation of the line source was defined by both ends of the seed. Dose volume histograms for the prostate, bladder, and rectum were calculated for the prostate implants, while the dose at points 5mm and 10mm from the sclera were calculated for the eye plaque cases.

Results: Target prescription dose coverage for the prostate post-implants increased by ~4% using the line source over the point source, while mean target dose decreased by ~9.1%. D90 increased by ~7.5%. Mean dose to rectum increased by as much as 6.5% and mean dose to the bladder decreased as much as 4Gy in one patient. For the eye plaque cases, a significant difference in dose at 5mm and 10mm existed between the point and line source models. This discrepancy can be explained by large differences in g(r), between the two models, at small distances.

Conclusions: Further investigation is required to determine the extent to which the point source approximation can be implemented in clinical settings while ignoring the discrepancy between the two models.