Purpose:
A 3D dose calculation program (PIDOSE) for prostate implant was developed for comparison to treatment plans from a commercial treatment planning system (Variseed V7.1, Varian Medical System, Palo Alto, CA).

Methods:
Although a simple dose verification (one source) was done when Variseed was commissioned, we believe more complicated treatment plans should also be verified. These verifications include 3D dose distributions, dose histograms, isodose lines, maximum, median and minimal doses as a second hand check. A file with needle-source information was exported from the Variseed planning system to PIDOSE. A 3D dose matrix was created using a tri-exponential fitting function for the seed model (1). All single-source doses were summed and selected isodose lines were superimposed on the ultrasound image slices together with those from Variseed. Dose-volume histograms for prostate, urethra and partial rectum were calculated and compared.

Results:
Although maximum dose, mean dose and standard deviation were slightly different, there were no large deviations from typical isodose lines (< 1 mm), minimum dose (<2%), median dose (<2%) and DVHs.

Conclusions:
The 3D dose verification as a second hand check confirms the accuracy of dose calculations provided by the Variseed Planning System. The small differences between maximum dose, mean dose and standard deviation are due to the differences in dose calculation resolution, dose volume interpolation, and radial dose fitting functions. The maximum doses from PIDOSE at some calculation points near the seeds were high due to the exponential fitting function.

Reference: