AbstractID: 9419 Title: Source motion in permanent implant prostate brachytherapy due to ultrasound probe deformation

Purpose: To determine the amount of seed motion in the prostate due to ultrasound probe deformation during permanent implant prostate brachytherapy. **Method and Materials:** A C-arm was used to take variable angle images of clinical implants immediately after the last needle was delivered with the patient and ultrasound remaining in the treatment position, after the ultrasound probe was lowered, and after it had been removed with the patient remaining in the treatment position. Three dimensional seed coordinates were calculated and corresponding seed coordinates were compared to determine the motion induced by the ultrasound probe. A rigid body registration was performed and deformational effects were evaluated using the residual seed motion. **Results:** Seed positions over all patients moved, on average, 6.6 mm posterior, 1.6 mm caudal, 1.5 mm patient right and the mean total motion was 7.1 mm (range 2.1 mm – 12.3 mm). The mean for a single patient ranged from 5.3 mm (2.4 mm – 8.3 mm) to 9.7 mm (8.1 mm – 12.3 mm). The rigid body registrations showed rotation about an axis perpendicular to a sagittal plane in each patient (mean 4.2°, range 2.9° – 5.9°). The mean residual seed motion was 1.1 mm (0.2 mm – 4.4 mm) and showed non-random deformational patterns. **Conclusion:** Final seed positions are significantly different from those delivered due to the ultrasound probe. Non-random residual motion within the implant can be associated with deformation and may have dosimetric consequences.