

AbstractID: 8181 Title: Evaluation of Electromagnetic Beacon Localization Correlation with kV-kV Matching for Prostate Treatments

Purpose: To evaluate the correlation between an electromagnetic treatment positioning system and an orthogonal kV image localization system for the alignment of prostate patients for radiotherapy.

Method and Materials: Two systems, taking advantage of the same three implanted fiducial markers, have been used to localize the target volume for radiotherapy of the prostate. These markers are radio-opaque, unique frequency transponders placed in the patient's prostate designed and built by Calypso Medical Systems. The Calypso 4D Localization System employs an electromagnetic array that excites the transponders triangulates their position from their received signal. The second system, the Varian On Board Imager (OBI), acquires orthogonal kV radiographs visualizing the fiducials and performs a match with isocentric digital reconstructed radiographs. For each treatment session, external skin marks and room lasers were used to orient the patient on the treatment couch with the linac isocenter. The Calypso system was then set to localize and track, although no patient alignment motion was performed. OBI localization was carried out. Lateral, longitudinal and vertical offsets to align the transponders were recorded for the following: Calypso prior to OBI shift, OBI, and Calypso after OBI shift.

Results: Analysis of the lateral, longitudinal, vertical axes and vector of patient positioning through 141 sessions showed that on average Calypso and OBI differed by a magnitude of 0.65, 1.1 and 1.5mm respectively with an average vector magnitude of 2.1mm.

Conclusion: Our evaluation shows that the Calypso system can provide at least the same level of confidence in localization for prostate patients without the need for daily orthogonal x-ray imaging. While the kV imaging system provides a subjective localization prior to treatment, the electromagnetic system presents an objective alignment prior, during and after treatment.