AbstractID: 7106 Title: Clinical implementation and initial experience with Calypso 4D tracking system for prostate cancer treatment

Purpose: The Calypso 4D tracking system can detect real-time intra-fractional tumor motion based on RF signals from the implanted beacons. The initial clinical experience on tracking prostate motion during the treatment is reported. We performed a series of tests to evaluate the calibration accuracy and stability of the system.

Material and Methods: The first FDA approved clinical Calypso 4D tracking system was installed and used for this work. With three beacons implemented in the prostate, the system reports the target location in a real time fashion. Seven patients with prostate cancer were localized/tracked using this system. The vender provided a monthly calibration phantom and an in-house developed stereotactic cone based alignment tool that were used to test the calibration accuracy of the Calypso 4D tracking system. The system stability was also studied using the monthly calibration phantom.

Results: For the seven patients treated so far, the average initial setup shifts from the external tattoos were 1.1, 2.2 and 4.0 mm along lateral, longitudinal and vertical directions, respectively. For one patient, the observed maximum shifts along the above three axes were 4.6, 10.9 and 29.2 mm. The range of target motion during treatment was found to be 3.4 (Right-Left), 9.9 (Superior-Inferior) and 12.3 (Anterior-Posterior) mm. The average patient setup time was less then 5 minutes. The daily QA of the system takes around 5 minutes on average.

The vender provided system calibration procedure is based on room lasers with 2 mm error tolerance, which may potentially decrease the overall system accuracy. Our stereotactic cone based alignment tool can achieve sub-millimeter accuracy. Repeated monthly calibration procedures showed that the system stability is within 1 mm.

Conclusion: Calypso system provides efficient and accurate patient setup for prostate treatment. The current calibration procedure can be improved to achieve better accuracy.