

AbstractID: 10945 Title: Initial clinical experience with electromagnetic localization and tracking for external beam partial breast irradiation

Purpose: The Calypso® 4D Localization System™ (Calypso Medical) uses non-ionizing AC electromagnetic radiation to localize and track small wireless devices (called Beacon® transponders) implanted in or near a patient's tumor. We report on the first clinical experience with the use of the system for localizing and tracking the lumpectomy cavity during external-beam accelerated partial breast irradiation (EB APBI).

Method and Materials: The study included patients treated receiving EB APBI on an IRB approved protocol. Thirteen patients were implanted with both gold markers (GM) and beacon® transponders and two patients were implanted with beacon® transponders alone. For patients in whom MRI follow-up was anticipated, two removable interstitial breast catheters were inserted and afterloaded with gold markers and transponders. The catheters were removed post radiation therapy. Initial alignment was performed using lasers. For patients with gold markers, orthogonal images were used to obtain the necessary shift. The shift values were compared to the shift predicted under electromagnetic guidance. During treatment, Calypso was used to track the target motion.

Results: Fifteen patients have been studied, and 93 treatment fractions were analyzed. The catheters and transponders overall showed good stability with inter-transponder distance changes of less than 2 mm. Calypso based setup can be performed in less than 2 minutes. An average residual setup error of 10.29 mm was determined using gold markers. For the 63 fractions analyzed, the difference between the residual setup error determined by the GM and the Calypso system on average was 1.5 mm. Tracking showed regular motion in the range of 2-3 mm with occasional deeper breaths exceeding 4-5 mm.

Conclusion: Results show excellent agreement between gold markers and electromagnetic guidance in EB APBI with electromagnetic guidance providing a more rapid setup and real time tracking during delivery.

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