

AbstractID: 1650 Title: The Accuracy of Beacon™ Transponder Coordinate Capture from CT Images

New implantable wireless markers called Beacon™ transponders were designed for use with the Calypso™ 4D localization system using AC magnetic fields for continuous, objective and accurate localization and positioning of radiation treatment targets. Prior to treatments utilizing the system, the location of the transponders relative to isocenter will be measured on CT, similar to the method used for radio-opaque markers. The current study examined the accuracy to be expected in the CT-based transponder localization.

In the study, three investigators from different institutions acquired multiple CT scans, with different slice thicknesses, of phantoms containing three Beacon transponders. Beacon™transponder locations were measured via image analysis tools available at each institution. The Beacon™ transponder locations identified on CT were compared to the locations known to high precision from the construction of the phantoms.

The accuracy of measurements of Beacon™transponder relative distance was found to be dependent on CT slice thickness. The mean distance error was near zero for the 1 mm and 1.5 mm slice thicknesses and about 0.2 mm for the 3 mm slice thickness. The standard deviations for repeated trials by individual observers ranged from 0.1 to 0.7 for 1mm slice thickness, 0.1 to 0.6 for 1.5 mm slice thickness, and 0.1 to 2.7 for 3 mm slice thickness.

The error in locating Beacon™ transponders reveals dependence on the CT slice thickness. The study also revealed, to a lesser degree, that errors are dependent on observer variability.

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