

AbstractID: 4970 Title: Seed-based Translation Alignment Accuracy of an Electromagnetic tracking System and On-Board Kilovoltage Imaging Localization System

Purpose: On-board kilovoltage imaging is being used for accurate fiducial-based alignment of tumors. However, these systems deliver additional dose to the patient and do not allow interactive repositioning with the therapist in the room. The purpose of this study is to measure and compare static localization accuracy of a commercial on-board kilovoltage imaging system and a novel AC electromagnetic tracking system.

Materials and Methods :

A kilovoltage imaging system (Trilogy™ System, Varian, Palo Alto, CA) and an electromagnetic tracking system (Calypso® 4D Localization System, Calypso Medical, Seattle, WA) which provides a continuous measurement of the implanted transponder positions, were compared for localization accuracy. A phantom containing three radiofrequency transponders was moved, using an in-house developed 4D phantom (with a 0.4 mm position accuracy), in steps from 0.4 cm to 5 cm in the lateral, longitudinal, and vertical directions. The transponder positions were measured using the commercial matching software using antero-posterior and lateral images and comparing against DRRs. These results were compared against the Calypso System measurements.

Results: The localization accuracy, defined as the average difference of the measured positions (by the localization systems) to the actual positions (as determined by 4D- phantom positioning system) was found to be 0.0 ± 0.00 cm, 0.1 ± 0.1 cm and 0.1 ± 0.0 cm in three directions for KV system and 0.0 ± 0.0 cm for the Calypso system. Results showed that both systems provided excellent positioning accuracy.