

Purpose: In order to use MV EPID and/or integrated kV imaging system to obtain 3D positions of implanted fiducial markers for the purpose of patient setup and / or image-guided radiation therapy in real-time, it is essential to investigate the accuracy of this method. **Method and Materials:** A Calypso QA phantom with three Beacons was imaged by both MV and kV beams at a series of gantry angles on a Trilogy (Varian Medical Systems, Palo Alto, California, USA) while Beacon positions were simultaneously tracked using a Calypso 4D localization system (Calypso Medical Technologies, Inc., Seattle, WA, USA). Beacons were automatically detected on kV and MV projection images using in-house software, their 3D positions were calculated from MV-MV, kV-kV, or MV-kV pairs with a 60° or larger gantry angle separation between each pair, and compared with Calypso results. A special QA procedure was developed to assess geometric accuracy of MV and kV imaging systems on the Trilogy, and geometric parameter deviations, particularly detector center offsets, were applied to correct the 3D position calculations. **Results:** A phantom was placed at known positions based on the detected Calypso Beacon centroids. Both MV and kV images were acquired at 12 gantry angles with an increment of 30°. 2D and 3D positions were calculated. The different calculation modalities resulted in noticeable discrepancies from the Calypso 3D positions. The application of a geometric correction is capable of reducing these deviations, with the measured net shifts matching Calypso results within 0.1 mm. **Conclusion:** Geometric correction after QA of imaging geometry helps improve detection accuracy. Implanted fiducial markers can be detected by multiple projections of either MV or kV x-ray beams with an accuracy of approximately 1 mm.