

AbstractID: 2750 Title: The Application of Varian's MarkerMatch Software in a Retrospective Study of Inter-fractional Prostate Motion

Purpose: MarkerMatch is an automated marker match software feature developed by Varian in on-board imaging. It may calculate inter-fractional prostate motion with internal fiducial markers identified on CT scans. Before each treatment, a pair of portal images was taken and fiducial markers are identified. Based on the portal image pair, MarkerMatch calculates the optimized couch displacement in 3D to maximally restore the marker positions to their reference positions. To evaluate MarkerMatch's clinical performance, we did a phantom test and a retrospective study on patients implanted with radio-opaque fiducial markers.

Method and Materials: We used a phantom implanted with 4 cylindrical-shaped markers of 1mm in diameter and 3mm in length. MarkerMatch localizes the markers based on CT images. In order to test MarkerMatch's ability to handle CT images of different quality, we scanned the phantom with four CT spacing. The portal image pair taken before treatment is normally at AP/Lateral gantry angles, but sometimes it is difficult to identify markers from the lateral image. To test MarkerMatch's ability to handle non-orthogonal portal image pair, we took portal images at 7 different gantry angles. As a preliminary test for the use of MarkerMatch in clinic, we retrospectively analyzed five patients implanted with 2-3 gold markers based on 43 pairs of weekly setup portal images.

Results: In our phantom test, MarkerMatch is able to measure overall marker displacements within 1mm in each direction, regardless of the spacing used in the CT scans. Using different gantry separation angles, the measured overall marker displacements agree with each other within 1mm. Retrospective analysis of five patients is also presented.

Conclusion: Initial studies indicate that MarkerMatch is robust in detecting and analyzing patient motion in 3D and can provide valuable information of inter-fractional prostate motion in clinic.

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