

Clinical Investigation

Real-Time 3D Image Guidance Using a Standard LINAC: Measured Motion, Accuracy, and Precision of the First Prospective Clinical Trial of Kilovoltage Intrafraction Monitoring—Guided Gating for Prostate Cancer Radiation Therapy



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Summary

Kilovoltage intrafraction monitoring (KIM) is a new real-time 3-dimensional image guidance method. Unlike previous real-time image guidance methods, KIM uses a standard linear accelerator without any additional expensive equipment. The first clinical trial of KIM is underway for

Purpose: Kilovoltage intrafraction monitoring (KIM) is a new real-time 3-dimensional image guidance method. Unlike previous real-time image guidance methods, KIM uses a standard linear accelerator without any additional equipment needed. The first prospective clinical trial of KIM is underway for prostate cancer radiation therapy. In this paper we report on the measured motion accuracy and precision using real-time KIM-guided gating.

Methods and Materials: Imaging and motion information from the first 200 fractions from 6 patient prostate cancer radiation therapy volumetric modulated arc therapy treatments were analyzed. A 3-mm/5-second action threshold was used to trigger a gating event where the beam is paused and the couch position adjusted to realign the prostate to the treatment isocenter. To quantify the in vivo accuracy and precision, KIM was compared with simultaneously acquired kV/MV triangulation for 187 fractions.

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Conflict of interest: P.J. Keall and P.R. Poulsen hold US patents on kilovoltage intrafraction monitoring technology, licensed by Stanford

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