

AbstractID: 5315 Title: Time-Delay Measurement of a Varian Real-Time Position Management System

Purpose: Respiratory gating systems have been developed to reduce treatment uncertainty caused by organ motions related to respiration. The time-delay between when the gating signal is triggered and when the beam is turned on may affect the actual radiation dose delivered. In this study, we investigated the time delay for a Varian real-time position management (RPM) respiratory gating system.

Method and Materials: A motion phantom with infrared markers was used to simulate a respiration signal. A small metal target ball was also attached to the phantom. An infrared camera was used to observe the motion of the phantom and to plot out a true motion curve. A narrow 2% phase gating window was set at various phases of 0%, 10%, 20%... and 90%. Electronic Portal Vision images were taken with a Varian Linear Accelerator at various phases of the simulated breathing cycle, and the location of the target ball was then plotted versus time to give a measured motion curve. The shift in time between the RPM gating signal and motion curve from portal imager was then measured to determine the time delay in the gating system.

Results: The time-delay in Varian's gating system was found to be 0.0173 seconds.

Conclusion: This work shows that there was a short time delay between the gating signal and the time when the radiation beam is turned on. The effect of time-delay on patient dosimetry needs to be further investigated.

Partially supported by Varian research grant.