

AbstractID: 14174 Title: Gated RapidArc Treatment Delivery Using The New Varian Trilogy MX Linear Accelerator

Purpose: The new Trilogy MX linear accelerator has been designed by Varian Medical Systems to offer new treatment delivery capabilities such as the ability to perform respiratory gated RapidArc treatments. A preliminary evaluation of gated RapidArc treatment deliveries on the Trilogy MX has been performed. **Method and Materials:** A dosimetric comparison between the gated and non-gated RapidArc field deliveries was performed using film and an ion chamber. Film was placed within a water equivalent plastic phantom at three planes; isocenter and +/- 3 cm from isocenter, and all were irradiated simultaneously. The absolute dose was also measured at the isocenter using an ion chamber. For all of the gated RapidArc measurements the gating threshold was arbitrarily set to 50% of the waveform amplitude. Three treatment delivery conditions were tested; standard delivery, Jaw Tracking mode, and Flattening Filter Free (FFF) mode. **Results:** The mean percent difference between the gated and non-gated absolute dose measurements at the isocenter was 0.5% and 1.5% for the ion chamber and film, respectively. A best agreement analysis shows an average discrepancy of 3%/1.0mm between the gated and non-gated dose distributions (10% dose threshold, 95%+ pass rate). Gated and non-gated dose distribution profiles agreed well. Compared to calculated dose distributions, the accuracy of the gated and non-gated dose distributions deliveries was similar, approximately 4%/2.0mm for all three treatment delivery conditions. **Conclusion:** Overall some discrepancies between the gated and non-gated field deliveries are detectable but not clinically significant. The Trilogy MX offers a useful tool for radiotherapy treatment in the thoracic region given that RapidArc provides lower peripheral lung dose and gating combined with the high dose rate FFF beam minimizes the effects of target movement. **Conflict of Interest:** Research sponsored by Varian.