

AbstractID: 8988 Title: Initial Experience with the Delivery of Volumetric Modulated Arc Therapy

**Purpose:**

Recently, there has been a renewed interest in the delivery of arc-based IMRT using conventional linear accelerators. Elekta and Varian have developed linear accelerator control systems that are capable of delivering rotational IMRT by combining gantry rotation, dynamic MLC leaf motion, and a variable dose rate. Elekta's new Precise Beam Infinity™ control system has been installed in our clinic and acceptance testing and plan verifications have been performed. In this study, we will report on our initial experiences with volumetric modulated arc therapy (VMAT) delivered using an Elekta Precise linear accelerator.

**Method and Materials:**

VMAT is a radiotherapy delivery technique that combines the dosimetric advantages of rotational delivery with the dose painting capabilities of IMRT. We have developed an arc sequencing algorithm that translates optimized fluence maps into deliverable VMAT treatment plans. In this investigation, one head-and-neck and five prostate plans have been delivered in an effort to quantify the efficiency and accuracy of the VMAT delivery system.

**Results:**

A complex head-and-neck plan involving two targets and a simultaneous boost was delivered in 5 minutes 29 seconds. For this three-arc head-and-neck plan, the point dose agreed within 1.9%. Additional measurements for 5 prostate cases demonstrated an average delivery time of 3 minutes 28 seconds with all ion chamber measurements agreeing within 3%. Film measurements demonstrated close agreement between the predicted and measured isodose curves. Measurements have also been performed to quantify efficiency of single-arc versus multi-arc VMAT deliveries.

**Conclusion:**

Elekta's Precise Beam Infinity control system can safely and efficiently delivery highly complex VMAT treatment plans. In our initial investigation, all plans delivered in less than 5.5 minutes. Numerous additional plan verifications will be performed as we move towards an anticipated clinical implementation of VMAT in May 2008.

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