

Purpose:

In this work, we report on our initial testing, commissioning, and clinical implementation of the Elekta's VMAT planning solution in the Monaco treatment planning system. Monaco VMAT was released clinically in February 2010.

Method and Materials:

Monaco is an IMRT-only treatment planning system that was recently updated to include an inverse planning module for VMAT. VMAT plans are produced using a two-step process. First, optimized fluence maps are determined from each beam direction. Next, the optimized maps are translated into a deliverable VMAT sequence. VMAT plans are delivered using a sweeping window technique where the leaves move unidirectionally across the field in alternating directions over the course of each arc. We have tested the Monaco VMAT system for a variety of treatment sites including intracranial, prostate, and head-and-neck. Initially five cases have been planned and verified. For each case, comparisons were made with both fixed field IMRT and VMAT plans produced using the Philips SmartArc planning module. Plan verifications were performed using phantom irradiations with the IBA MatriXX 2D ion chamber array embedded in a MULTicube phantom.

Results:

On average, single arc Monaco VMAT plans delivered in 4 minutes 24 seconds. Plans verified with an average of 99.6% of the points passing a gamma analysis using a 3%/3mm distance to agreement criteria. For complex head and neck cases, Monaco produced VMAT plans delivered using a hybrid technique combining rotational and fixed field delivery. The hybrid delivery technique provided greater flexibility in shaping the dose distributions but significantly lengthened the deliver times.

Conclusion:

Elekta's Monaco VMAT planning tools provides a full inverse planning solution for VMAT. All of our plans have delivered accurately and the commissioning process has been completed. We anticipate commencing Monaco VMAT treatments in March 2010.

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