AbstractID: 7286 Title: Evaluation of the Beam Segmentation Algorithm in the KonRad IMRT Treatment Planning System

Purpose: Reducing the treatment time for IMRT patients is highly desirable. For step-and-shoot IMRT plans, the delivery time of a treatment fraction is determined by the number of beam segments, and to a lesser extent by the total number of monitor units (MUs). The objective of this work was to study the segmentation efficiency of the new clinical Siemens KonRad inverse treatment planning system (TPS) and compare it to the CMS XiO TPS.

Method and Materials: For head and neck, liver and prostate cancer patients, step-and-shoot IMRT plans were designed using both CMS XiO and Siemens KonRad. Number, direction and energy of beams were the same in both systems. The plans were optimized to achieve the same clinical objectives concerning dose to the target volume and to the relevant organs-at-risk. The number of intensity levels were minimized until the clinical objectives could not be achieved anymore. DVHs, EUD, mean- and maximum-doses were compared, as well as the number of beam segments and MUs. Finally the beams of each plan were delivered individually on a MapCheck device to verify the agreement between calculations and measurements to be less than 3%-3 mm distance-to-agreement.

Results: Plans optimized with KonRad resulted in fewer segments and lower number of MUs and therefore reduced delivery time, while achieving similar dose distributions. CMS XiO plans exhibited a slightly steeper dose fall-off outside the target volumes, however the difference was not clinically significant. DVHs to organs-at-risk were comparable. All calculated dose distributions passed the 3%-3 mm dose verification check.

Conclusion: Both commercial systems produce clinical similar plans. The sequencer of the KonRad system is more efficient, reducing the number of beam segments and therefore delivery time on average by more than 20%.