

AbstractID: 5801 Title: Clinical Implementation of a New Elekta Dedicated-Stereotactic Linac into Radionics Treatment Planning System

Introduction: A new Elekta "Synergy S" dedicated stereotactic machine has been commissioned and clinically implemented. This linac has special features, including a kV cone beam CT (CBCT) and a multileaf collimator (MLC) system, termed as "Beam Modulator" (BM), with no back up jaws. Dosimetric parameters of the BM are compared with those of Radionics mini multileaf collimator (MMLC). The two MLC systems have different dosimetric parameters, chiefly due to different shapes, field sizes and isocentric distances. The effects of these differences on tumour dose coverage and sparing organs at risk (OAR) are evaluated.

Methods and Materials: The leaf thickness and maximum field size at the isocentre are 4mm and 16x21cm for the BM and 3.75mm and 10x12cm for MMLC. The leaf-bottom isocentric distances of the two systems are 45.2cm and 33cm, respectively. Radionics treatments planning (XKnife RT3.01) is used for planning comparison. Dose penumbras and percentage depth doses were measured using diode detector and XV2 films for different field sizes. CBCT doses were measured using an ion-chamber and MOSFET. Two different clinical cases were chosen for the treatment planning comparison.

RESULTS: MMLC dose penumbras (80-20%) at d_{max} for a 9.6x10.4cm field were 5.4mm and 5.6mm for the leaf sides and leaf ends, respectively and 5.8mm and 6.5mm for BM. As a result, Radionics MMLC has the advantage of better sparing of OARs. Also, Radionics MMLC delivered the prescribed doses using fewer segments and less number of monitor units by up to 20%. The CBCT dose to head phantom was in the range of 1.5 to 3.0 cGy per scan.

Conclusion: In this work it is shown that the above MLC systems are overall clinically comparable, with Radionics MMLC marginally better sparing normal tissues. The Elekta BM however has the advantage of larger field size and better isocentric clearance.