AbstractID: 11427 Title: Perhipheral Dose of Tungsten Powder Compensator (WPC) Based IMRT

Purpose: To characterize the peripheral dose (PD) of the newly developed compensator system based on tungsten powder (WPC) and to compare with MLC-based IMRT.

Method and Materials:. WPCs molded with different thicknesses of tungsten powder for comparison with MLC-based plans were loaded into Elekta-SLi block-tray. Absorbed doses along the CAX and 2cm outside the field edge were measured for thickness of 1-7 cm at 1cm-increments, at depths of d_{max}, 5cm and 10cm for photon energies of 6 and 15MV. Equivalent-MLC thicknesses were calculated by constraining the total CAX dose and total MU for each compensator thickness. Absorbed doses along the CAX and 2cm outside the field edge were measured for the MLC-equivalent thickness using Farmer chamber. In addition, PD for a WPC-based clinical IMRT plan was compared to the equivalent MLC plan.

Results: PD with tungsten thickness of 4cm, normalized to 10Gy along the CAX, was found to increase from 35 to 142cGy with increasing field size($5x5cm^2$ to $20x20cm^2$ at d_{max}) and from 74 to 85cGy with depth(d_{max} to 10cm with $10x10cm^2$ field). PD at d_{max} increased 204% by varying tungsten thickness from 1cm to 7cm. PD increased linearly with field size and was energy-dependant only for the deeper depths where the PD became greater for 6MV than for 15MV. With increasing depth and decreasing field size, WPC-based PD values became nearer to those of MLC-based PD in trend. However, at the smallest field ($5x5cm^2$), WPC showed lower PD than MLC. WPC-based PD of a clinical plan measured 2cm outside the field edge, were ~60% higher than that of MLC-based plan.

Conclusion:
Mean WPC-based PD was 60% higher than MLC-based PD, however it was equivalent to 1.5% of the prescription dose of 2Gy/fraction.

Conflict of Interest: Research sponsored by Axellis Ltd.