Abstract ID: 8487 Title : Dosimetric verification of the CCCS algorithm for spatially fractionated radiation therapy

Purpose: The comparison between measurements and the collapsed cone convolution superposition (CCCS) using a multileaf collimator (MLC) for grid therapy is demonstrated in this study.

Materials and methods: Grids with the projected field openings of 8mm x 8 mm to 20mm x 20 mm were created using multiple MLC-shaped fields for 6MV and 18M Vp hoton beams. The separation between the grid openings and the open-to-blocked area ratio varied from 16mm to 36mm (from center to center) and 0.25 to 0.50 respectively. The deposited doses (profiles) with films at different depths and also the percent depth doses (PDD) were measured in a solid water phantom and compared against calculations using the CCCS algorithm in Pinnacle.

Results: The PDDs were in good agreement with the calculated ones. The highest discrepancy was observed at the depth past 10cm and it was in the order of 2% for the smallest grid size. For the larger grid sizes the agreement was within 1%. On the other hand, there was a high discrepancy between the measured and calculated profiles. While there was a good agreement at the peaks, there was a difference at the location of the valleys. The difference in the lateral direction was in the order of about 2mm for all grid sizes and at the lowest point of each valley the CCCS algorithm over-predicted the dose by about 50%.

Conclusion: In summary we have demonstrated that the CCCS algorithm can correctly predicted the dose at the openings of the grid fields. The agreement is very good for all grid field sizes and independent of the open-to-blocked area ratio. However, the film measurement of the profiles showed that the CCCS algorithm over-predicts the dose under the blocked area independent of the grid opening and the open-to-blocked area ratio.