AbstractID: 5242 Title: On using two parallel opposed fields for grid therapy

Purpose: To study the feasibility of creating well-aligned opposed grid fields and to show their dosimetric advantages for grid therapy.

Method and Materials: A Varian MLC (multileaf collimator) is used to create two opposed grid fields. The key in getting the two opposed beams aligned collinearly is to restrict the grid size to the region near the beam axis. A larger grid can then be assembled from a series of smaller ones, each with its own isocenter. To give a more quantitative assessment as to what the maximum size of these grid subunits can be, we choose the criterion of no crossings between neighboring rays. The dosimetry was studied by sandwiching radiographic films between phantom blocks.

Results: The mathematical analysis shows that the size of each of the subunit grids is governed by the series {1/3, 1/5, 1/7,…} of the SAD (source-axis distance), corresponding to the number of added columns; that is, two columns would reduce the "valid" grid coverage distance from the isocentric plane to 1/3 of the SAD, three columns to 1/5, and so forth. The percentage depth dose of a 1cm x 1cm opening along the beam axis is found to be 70% and 90% for the respective 6 and 18 MV photons traversing a water-equivalent material of 30 cm thick.

Conclusions: Well-aligned opposed grid fields shaped by a MLC have been successfully demonstrated in this study. The method gives a much more dose uniformity in the areas of the grid openings as compared to a single grid field approach. This feature is important in treating a large size tumor, as such is the nature of grid application today.