Experimental Verification of TPS Software and Tabulated Data for Blocked Fields

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Back Ground

- In radiation therapy, monitor units (MU) to deliver treatment is calculated by treatment planning systems (TPS).
- The essential part of quality assurance is to verify the TPS-calculated MU with an independent calculation

Objective

- To establish and verify a formalism to calculate Monitor Units for small fields in 3D-Conformal radiotherapy.

Materials and Method

- For various collimator settings, square and rectangular blocked fields of various sizes were generated with MLC or poured blocks.
- For a pre-determined number of monitor units, the dose at a point of interest was calculated using the head scatter and phantom scatter data and compared with experimental measurements.
- Comparison of measured doses was made with that predicted by the Varian Eclipse treatment planning software.
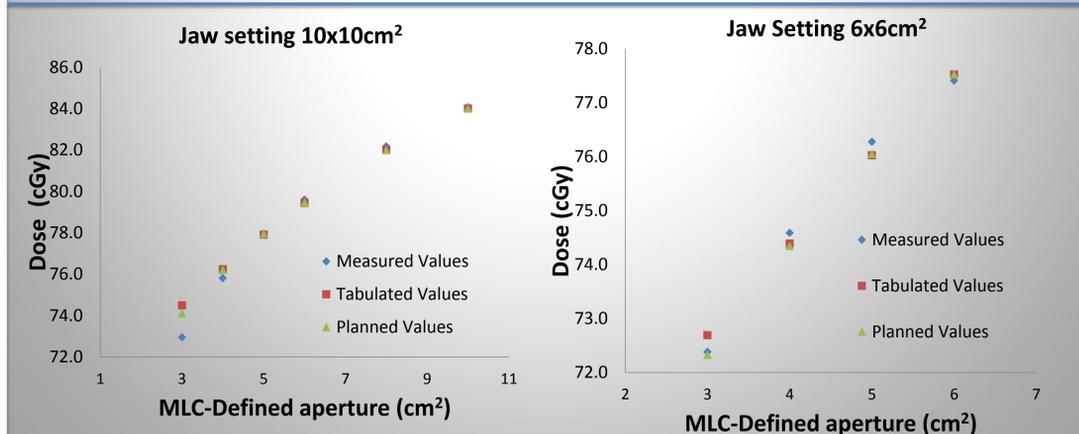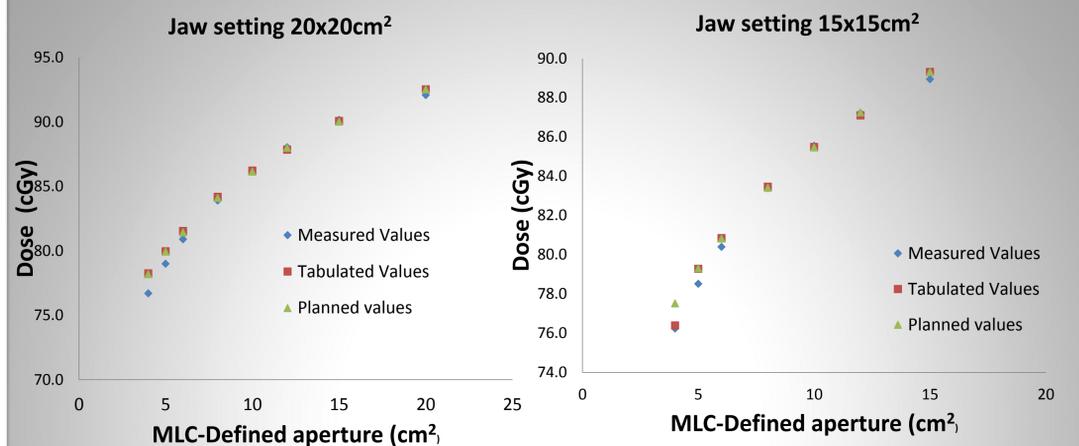
Results

- The measured data was found to be in agreement with the predicted doses for fields for which the blocked aperture size was smaller but comparable with the collimator defined field size.
- For strongly blocked fields, a discrepancy of up to 2% was noted.

Conclusion

- The monitor unit calculation for strongly blocked fields requires a correction factor to account for the change in head scatter due to blocking.
- Such strongly blocked fields become clinically significant in the so-called "field-in-field" technique in which small "patch" fields are used to obtain dose uniformity within the planning target volume.

Charts below show sample of MLC-defined aperture within a different jaw settings for 6 MV.

Charts below show sample of MLC-defined aperture within a different jaw settings for 18 MV.