

AbstractID:9453Title:The dosimetric advantages of Varian HD 120MLC over Millennium120 MLC for photon external beam treatment

Purpose: To compare the dosimetric properties of the Varian HD120 high definition MLC and Millennium120 MLC and their performances in IMRT treatment planning. **Method and Materials:** Dosimetric properties of the Varian HD120 high definition MLC (minimum leaf width 2.5mm) is studied using a TrilogyTx. The penumbra of the MLC formed 10 cm x 10 cm in length at different depths was determined from the reconstructed 3D dose distribution from gel dosimetry. Results are compared with those from EDR2 film measurement at Dmax and 10 cm depth. Leakage radiation is measured using an arm ion chamber. This procedure was repeated for a Millennium 120 MLC (minimum leaf width 5mm) on a 21EX. To compare the dose distributions from the HD120 and the Millennium120 for the same beam arrangement and optimal fluences, ahead-neck IMRT plan was generated using the Eclipse -Helios optimization engine. The optimal fluences obtained were applied to both the Trilogy with HD120 and the 21EX with Millennium120. The resultant dose distributions and the dose-volume histograms from the two plans were compared. 3D dose distributions from the two plans were also verified using gel dosimetry.

Results: Smaller penumbra regions were identified for the HD120 using gel and film measurements. The leakage radiation from HD120 is smaller. For the two IMRT plans using the same optimal fluences, the dose distribution with HD120 is more uniform over the PTV. The dose distribution is softer than the one with Millennium 120 in the high dose gradient region, as a result of smaller leaf width and penumbra. The doses received at the critical organs scatter radiation with HD120 are also smaller.

Conclusion: HD 120 provides better dose conformalities around treatment targets and spares critical organs and normal tissue better than Millennium 120 MLC.

Conflict of Interest (only if applicable):