

AbstractID: 4523 Title: The deviation of leaf position in DIMRT

Purpose: To analysis the deviation of leaf position on fraction size and on dose rate in dynamic IMRT (DIMRT).

Methods and materials: The shape of target, which is similar to 60° wedge profile, was drawn at 11.5cm depth in phantom on the Eclipse system. The field size is set as $11.3 \times 16.0 \text{ cm}^2$ and energy used is 6 MV. The constraint of optimization of target is kept the same, using single portal, for different fraction sizes which varied from 500cGy/fx to 5cGy/fx. The treatment file is transferred to LINAC for beam-on at Varian 21EX. The MLC log file is analyzed using MLC dynalogfile viewer 6.2.0. We varied the dose rate during beam-on for the same treatment file to take the leaf deviation data.

Results: Dose rate 300MU/min is using in clinical treatment. It is the least error for dynamic leaf for the biggest fraction size with single portal. The quantity, field width multiplied dose rate then divided by MU, is used to evaluate the average speed of dynamic leaf. The evaluated average speed is 89.2 (cm/min) and 121.1 (cm/min) for 10cGy/fx and 5cGy/fx respectively and the larger speed caused the large average deviation around 0.4mm and 0.6mm respectively. The maximum deviation is 1.0mm and has 37.7% in deviation histogram for the smallest fraction size, 5cGy/fx.

For the same fraction size, 5cGy/fx, the dose rate affected the leaf deviation too. A larger dose rate has larger average leaf speed and a large deviation too. Our data showed the average speed is 242.2 (cm/min) and the average deviation is 0.9mm for dose rate 600MU/min. With this dose rate, the maximum deviation is 2.5mm and has 14.3% in deviation histogram.

Conclusion: The positions accuracy is better for lower dose rate even with a large dose fraction.