

Purpose:

By verifying the consistency between the planning dose and the delivered dose for each segment, we try to figure out the cause of the high dose regions outside the treatment field which only shown in measured dose, but not in the treatment plan.

Method and Materials:

Our treatment planning system is ADAC Pinnacle version 8.0m. The IMRT plan is transferred to IMPAC oncology management system version 8.3 to drive the LINACs. Instead of taking an overall two dimensional dose distribution, we took the fluence maps for each beam by using Kodak XV films on two ELEKTA Precise LINACs and one ELEKTA Synergy.

Results:

High dose regions are obviously in only one Precise LINAC and always perpendicular to MLC leakages. By comparing the fluence maps between treatment plan and verification film segment by segment, we find it occurs on the MLC 0.8 cm gap which is designed to prevent one side MLCs to collide with the opposite MLCs. The gap should be blocked by the primary jaw and MLC directional backup jaw. However, because of the machine limitation, the primary jaws are not allowed to cross the central line, the gap is simply blocked by the MLC directional backup jaw only (3cm tungsten) occasionally and slight transmission doses are generated (about 15%). If the backup jaw goes to the wrong position and does not block the MLC gap, a high dose region occurs during dose delivery, but not shown in plan.

Conclusion:

When the backup jaw position is not compatible with treatment plan, the unanticipated high dose region emerges not only outside of the field but also inside the field. Even if one checks the jaw position by any open field, this situation sometimes occurs. The best way is to recalibrate the jaw mechanical parameters and recheck the incorrect segment.