CLINICAL STUDY: HEAD & NECK CARCINOMA

An independent analysis to illustrate the differences between Compensator-Based and MLC-Based IMRT

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XIO / SIEMENS

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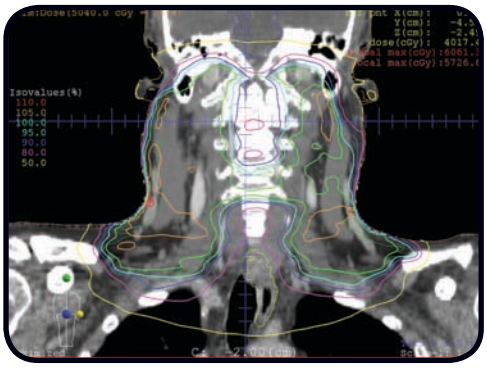
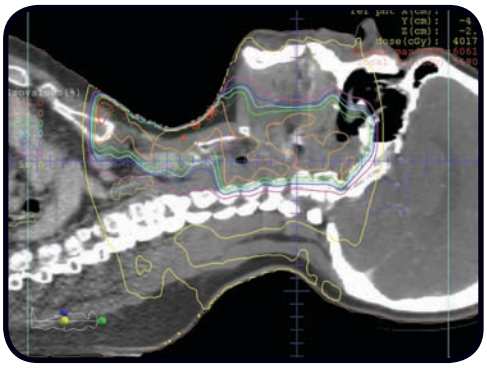
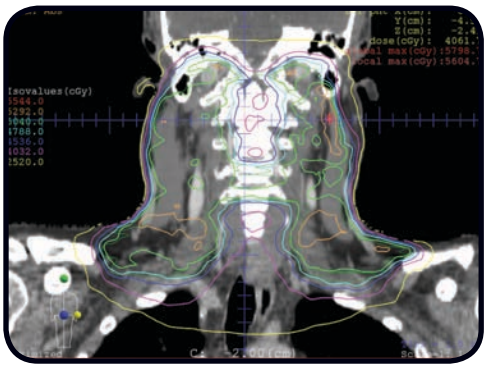
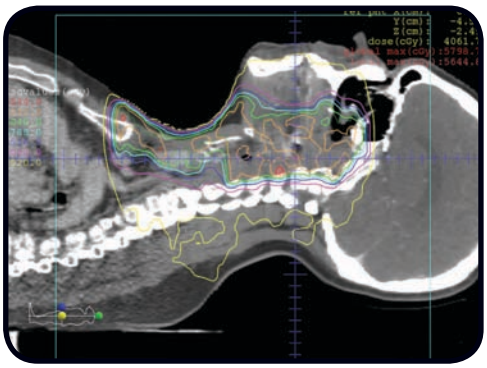




MLC





PARAMETERS

Protocol
- *9 Field IMRT*

Prescription:
- *Target=50.4 Gy @ 1.8 Gy x 28*

Equipment:
- *CMS XiO*
- *Siemens Primus, 52 Leaf MLC*

The goal of this clinical study is to illustrate the differences between Compensator-Based IMRT and MLC IMRT. This is an independent analysis of both treatment modalities for educational purposes.

The goal of the treatment plan is to deliver 50.4 Gy to the tumor volume, while subjecting the surrounding tissue to as little radiation as possible.

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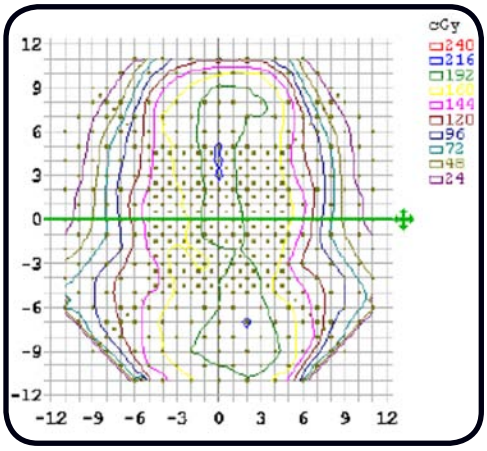
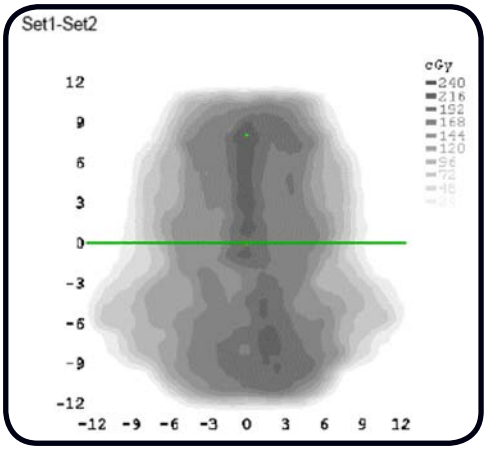




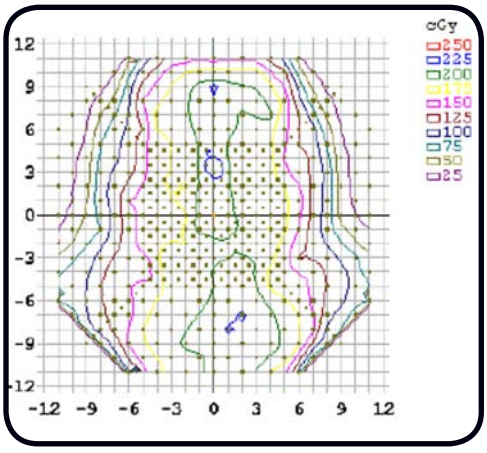
SUMMARY (DTA ANALYSIS)

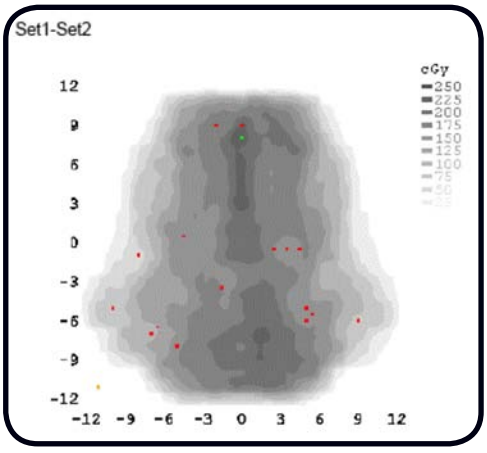
3mm/3%

Total Points: 373
Passed: 372
Failed: 1
% Passed: 99.7

Note the significant increase in accuracy with Compensator-Based IMRT.

MLC

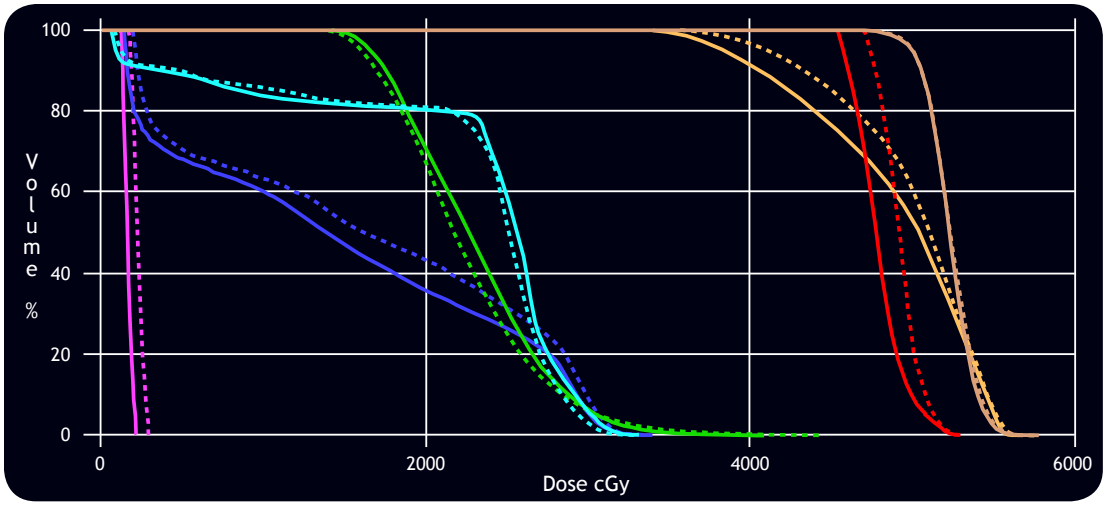




SUMMARY (DTA ANALYSIS)

3mm/3%

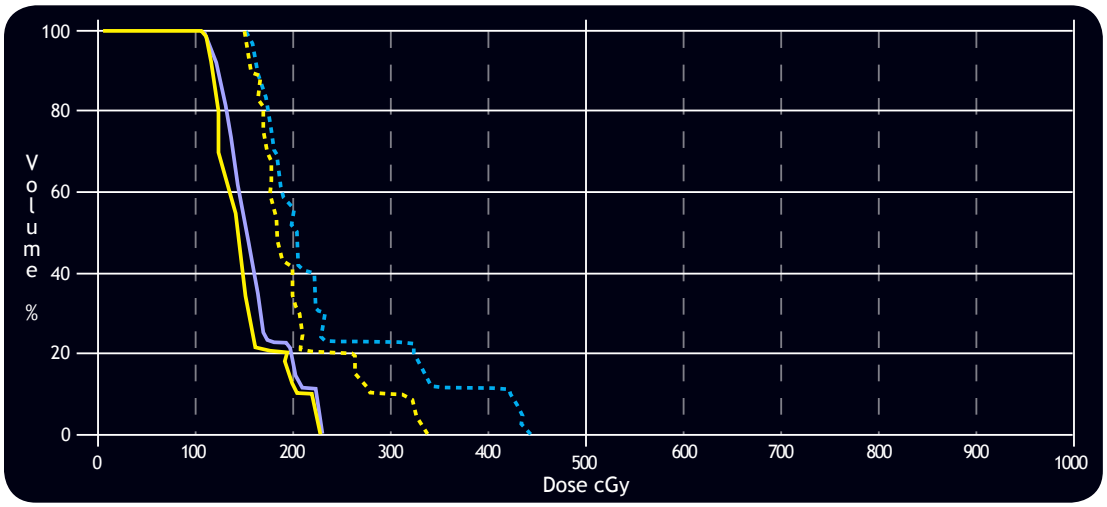
Total Points: 382
Passed: 366
Failed: 16
% Passed: 95.8



Solid IMRT —— *MLC* - - -

Rt Optic Nerve
Brain Stem
Cord
Lt Parotid
Rt Parotid
Vocal Cords
PTV#1 New

The DVH graph for the entire Head and Neck case. Note the Brain Stem, Optic Nerve, Lt Parotid, and Rt Parotid doses were significantly less for Compensator-Based IMRT.



Solid IMRT —— *MLC* - - -

Right Lens
Left Lens

The DVH graph for the Right and Left Eye dose. Note the Lens doses were significantly less for Compensator-Based IMRT.

	Compensators with MLC	MLC-only
Treatment Time	*11 minutes, 1 second*	*36 minutes, 11 seconds*
Total Fields	*9*	*9*
Total MUs	*523*	*927*

The above chart illustrates the differences between the **MLC-only** plan and the **Compensators with MLC shaping** plan. The MLC plan Treatment Time was 3.3 times longer than the Compensator plan Treatment Time, and the Total MUs from the Compensator plan were 43.6% lower than the Total MUs from the MLC plan. Although dosimetry time was not included in this study, Compensator planning time is typically significantly less than MLC delivery time.

ADDITIONAL BENEFITS

SKIN DOSE - As noticed by several clinicians, while delivering equal fluence doses, initial measurements indicate that the skin dose from the compensators are much less than MLC based IMRT, up to 40%. This difference has been seen in various disease sites such as breast and large field anal canal lesions.

MOVING TARGETS - For lungs, Compensator-Based IMRT delivers beam fluence that is steady with time, not subject to temporal (time) fluctuations of smaller sub-fields associated with MLCs, and less likely to under-dose the target.
"On the dose to a moving target while employing different IMRT delivery mechanisms" *Ehler, Nelms, and Tomé, Radiotherapy and Oncology 83 (2007)*

LARGE FIELDS - The maximum width and length that can be treated by a single IMRT field can fluctuate depending on the linac model, often resulting in increased planning time and a compromised plan quality. Compensators on the other hand are a static broad beam delivery and are very efficient at treating large fields up to 40x40.

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