

# Dosimetric advantages of hybrid treatment planning using the Ring Delivery System (RDS) for patients with positive nodes and left-sided breast cancer

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## PURPOSE/OBJECTIVES

To evaluate the dosimetry of hybrid planning for patients with left-sided breast cancer and regional nodes using Halcyon.

## MATERIALS and METHODS

Five treatment plans (Rx = 50Gy total, 6MV) were created utilizing the hybrid plan technique which consists of field-in-field 3D-Conformal radiotherapy for breast tangents (3DCRT) and volumetric modulated arc therapy for both regional nodes and breast (VMAT) (2-3 arcs per plan). The hybrid plans were compared with static IMRT plans (sIMRT)..

The patients were simulated in the Supine position on Breast Board with both arms up and Free Breathing.

MDs contoured the planning target volumes for the breast (PTVp) and nodes (PTVn) by expanding CTVp and CTVn (p = primary, n = nodes).

The dose to the Organ at Risks (OARs) such as Heart and Ipsilateral Lung were compared and analyzed using RTOG 1304 guidelines.

The objectives for PTV coverage were as follows: Lt Breast:  $D_{95} \geq 95\%$  and SCLAV:  $D_{90-95} \geq 95\%$ , Heart mean < 5Gy and Lung L V20 < 40%. The maximum PTV dose was kept below 120% in all plans. Same isocenter was kept for both 3DCRT and VMAT treatment plans.

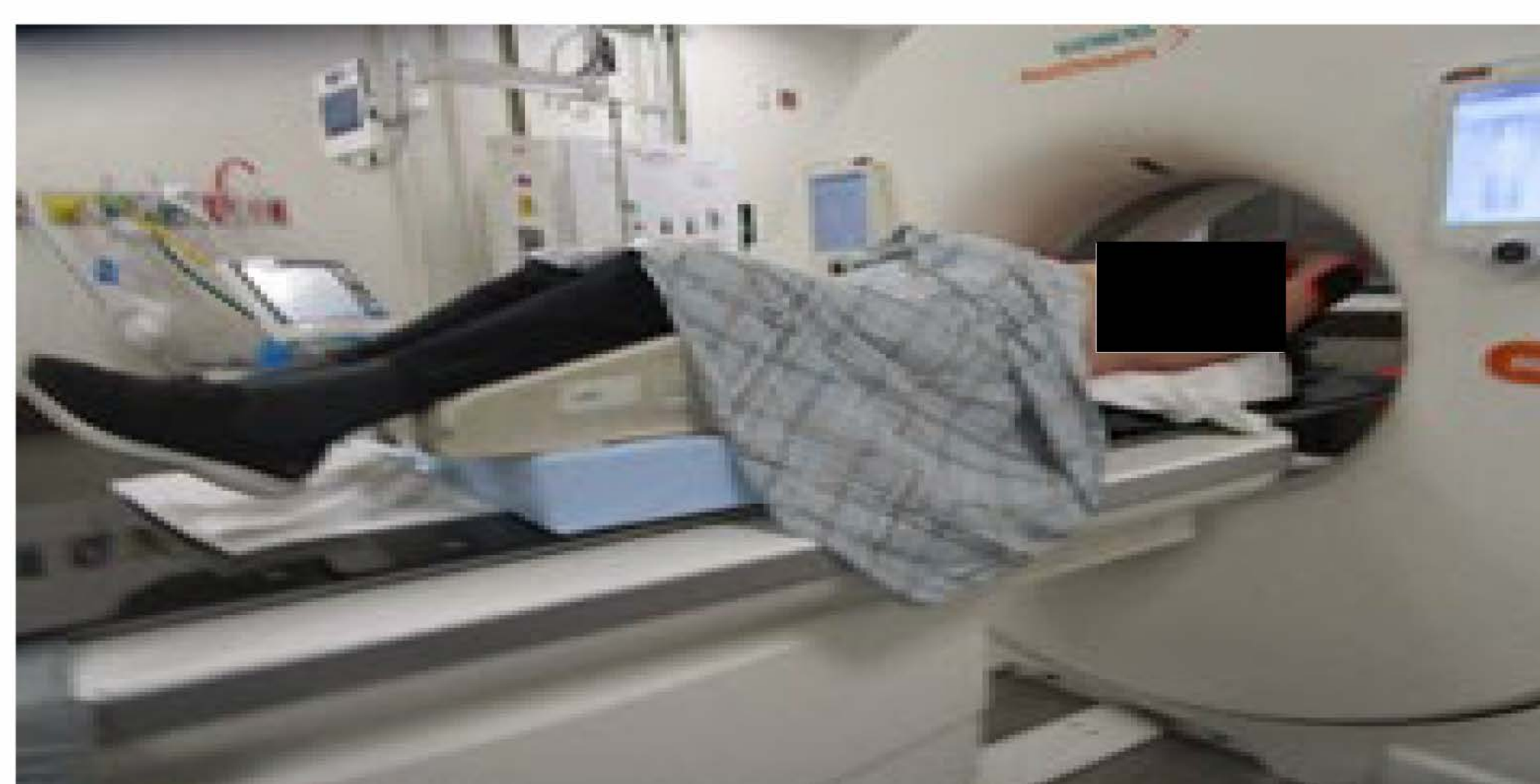
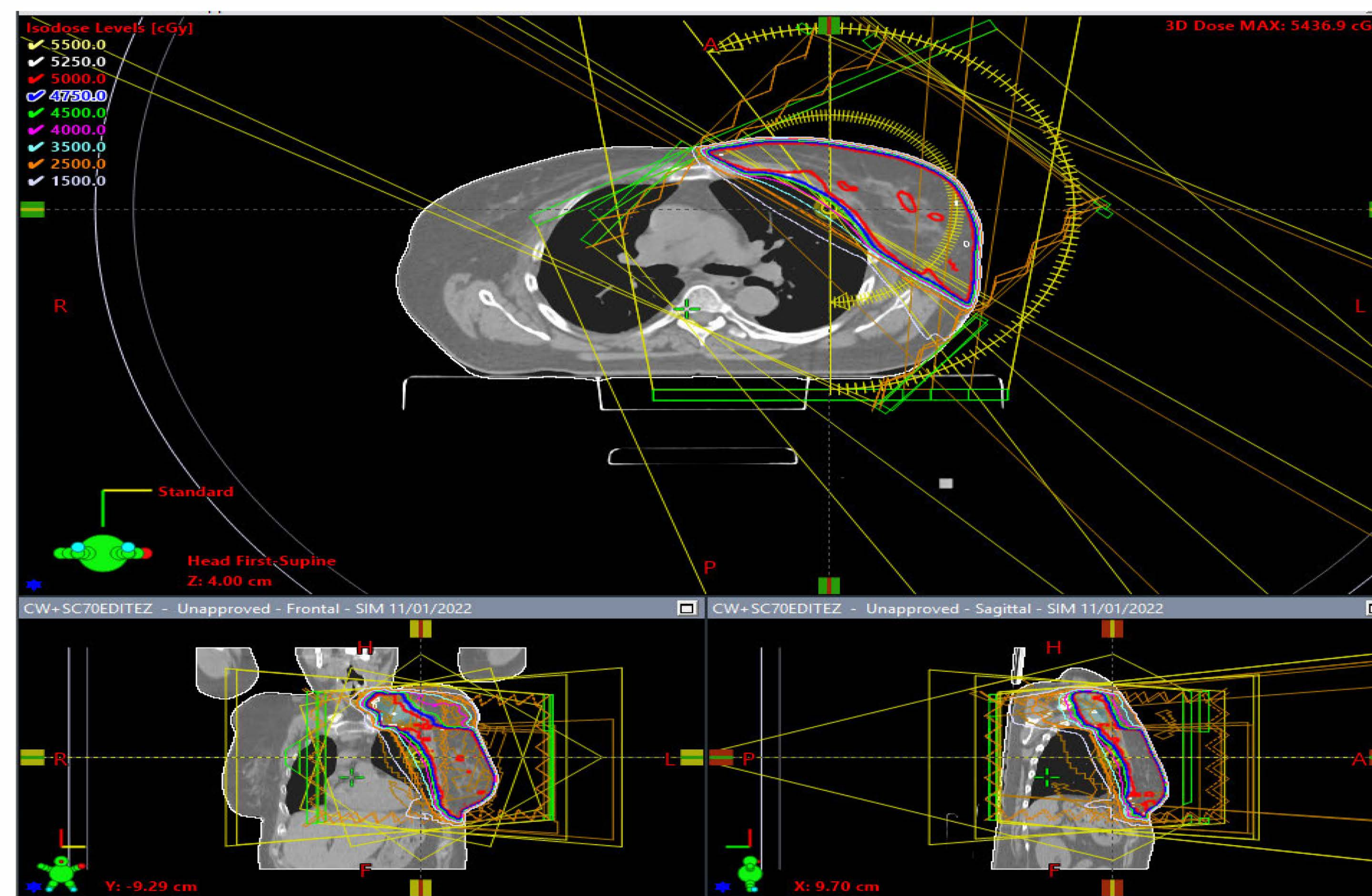


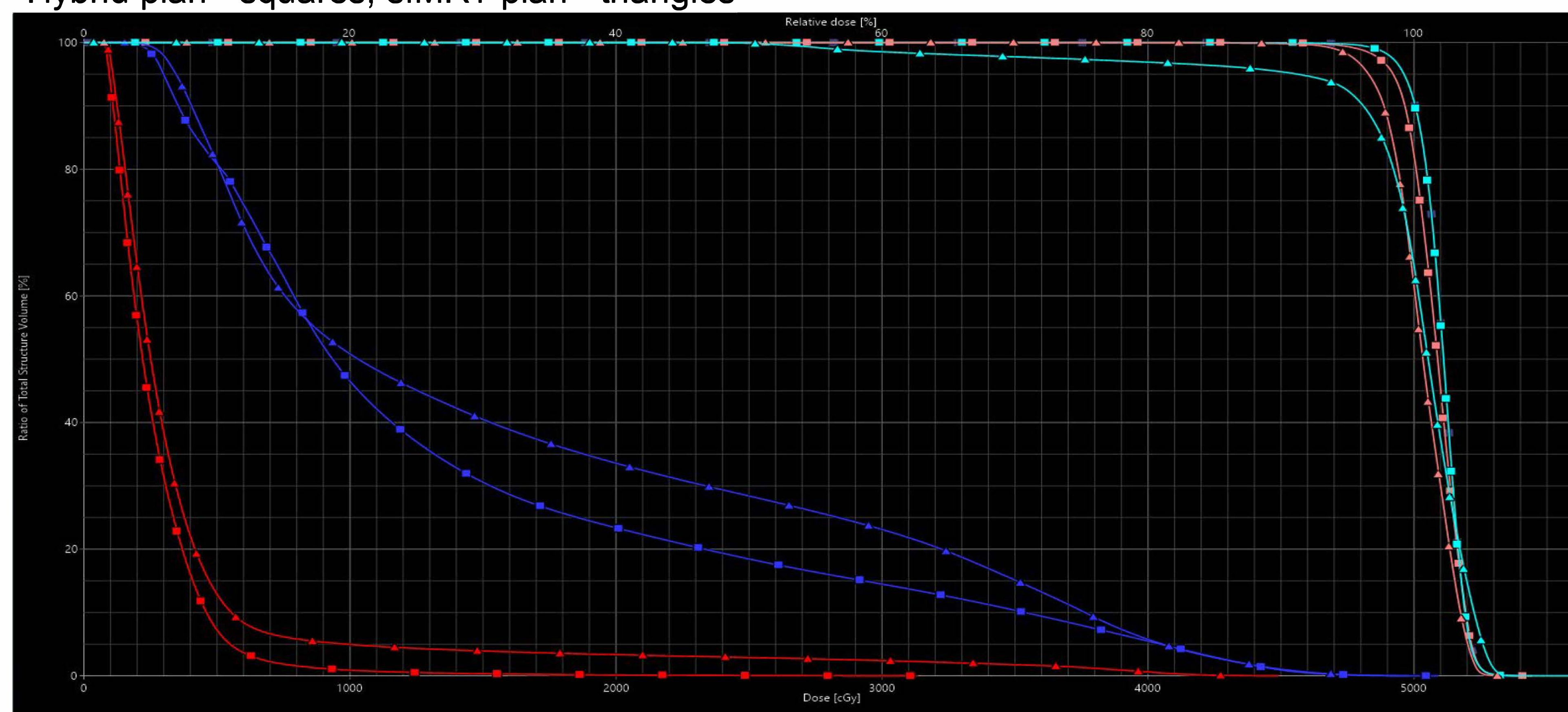
Figure 1 Patient setup



Figure 2 TrueBeam ([www.varian.com](http://www.varian.com))



Hybrid plan= squares, sIMRT plan= triangles



DVH: Cyan=PTVp; Pink=PTVn; Red=Heart; Blue=L Lung

Average Data						
OARs/PTVs	Lung Left	Heart	PTVpn	PTVP	PTVn	
Constraints	V20 (%)	Mean (Gy)	Max Dose	D90-95 (%)	D90-95 (%)	MUs
<b>Hybrid</b>	20.42	3.2	110.9	98.2	99	909.6
<b>sIMRT</b>	30.34	3.76	109.4	97.36	96.46	1879.2

## RESULTS

All treatment plans met PTV coverage requirements ( $D_{95} \geq 95 \pm 2\%$ ). Hybrid technique provided a lower lung dose (V20: range 16-23%), lower dose to the heart (mean: range 2.6-3.4Gy), and lower MUs (average 909, range 681-1076) compared to sIMRT (lung V20: range 28-33%), heart mean: range 3.1-4.1Gy), and MUs (average 1871, range 1571-2454).

## CONCLUSION

The initial 3D plan was run with half of the prescription dose for breast tangents and 2nd plan was run with VMAT technique covering breast plus nodes with full prescription. Base dose of breast tangents was used for the VMAT plan during optimization. Thus, the combined plan achieved lower dose to heart and lung.

The hybrid treatment planning offers better dosimetry for Breast and regional Nodes and has advantage of almost 50% less MUs, and low dose to heart and lung than sIMRT.

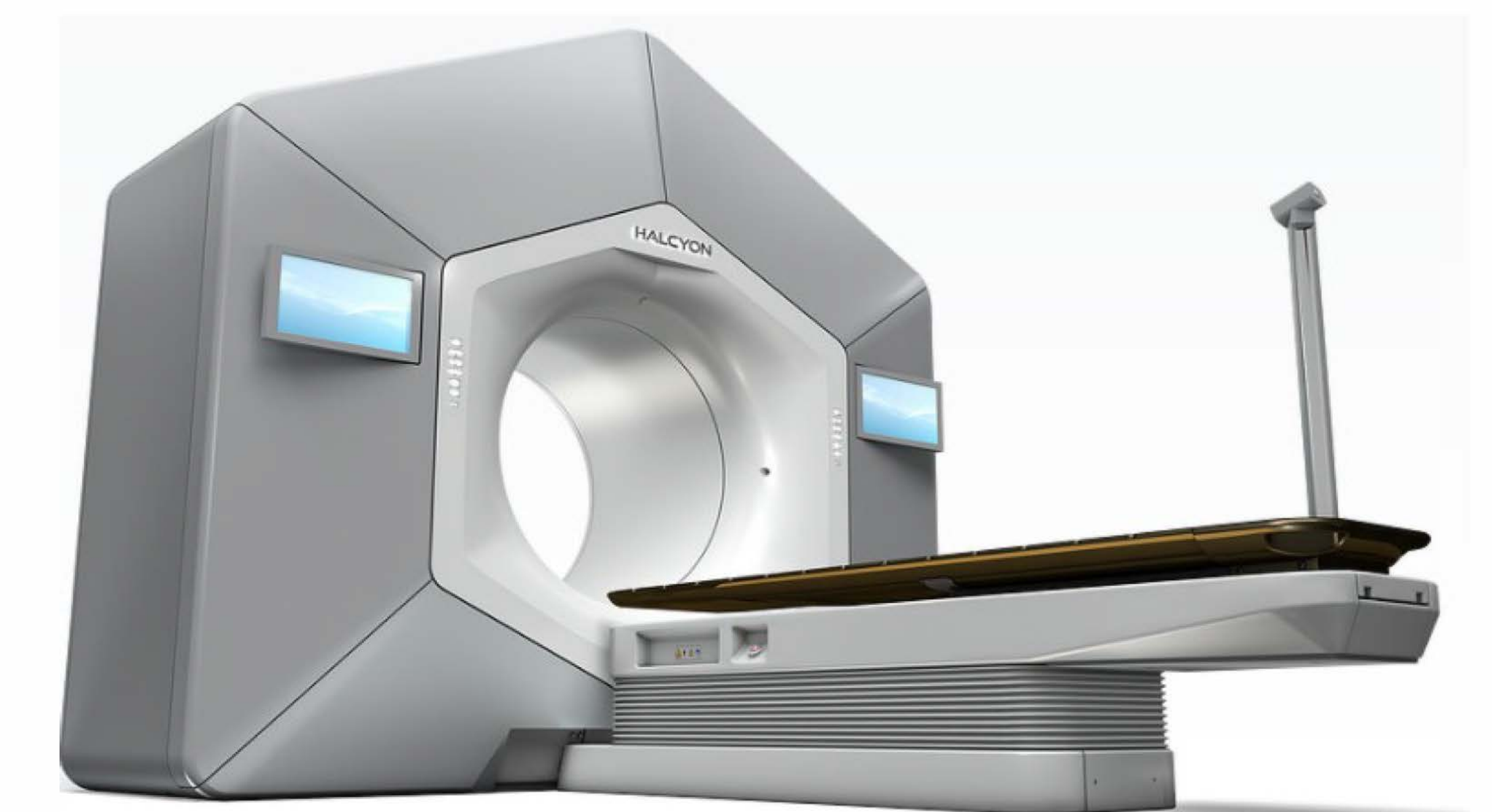


Figure 3 Halcyon ([www.varian.com](http://www.varian.com))

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