

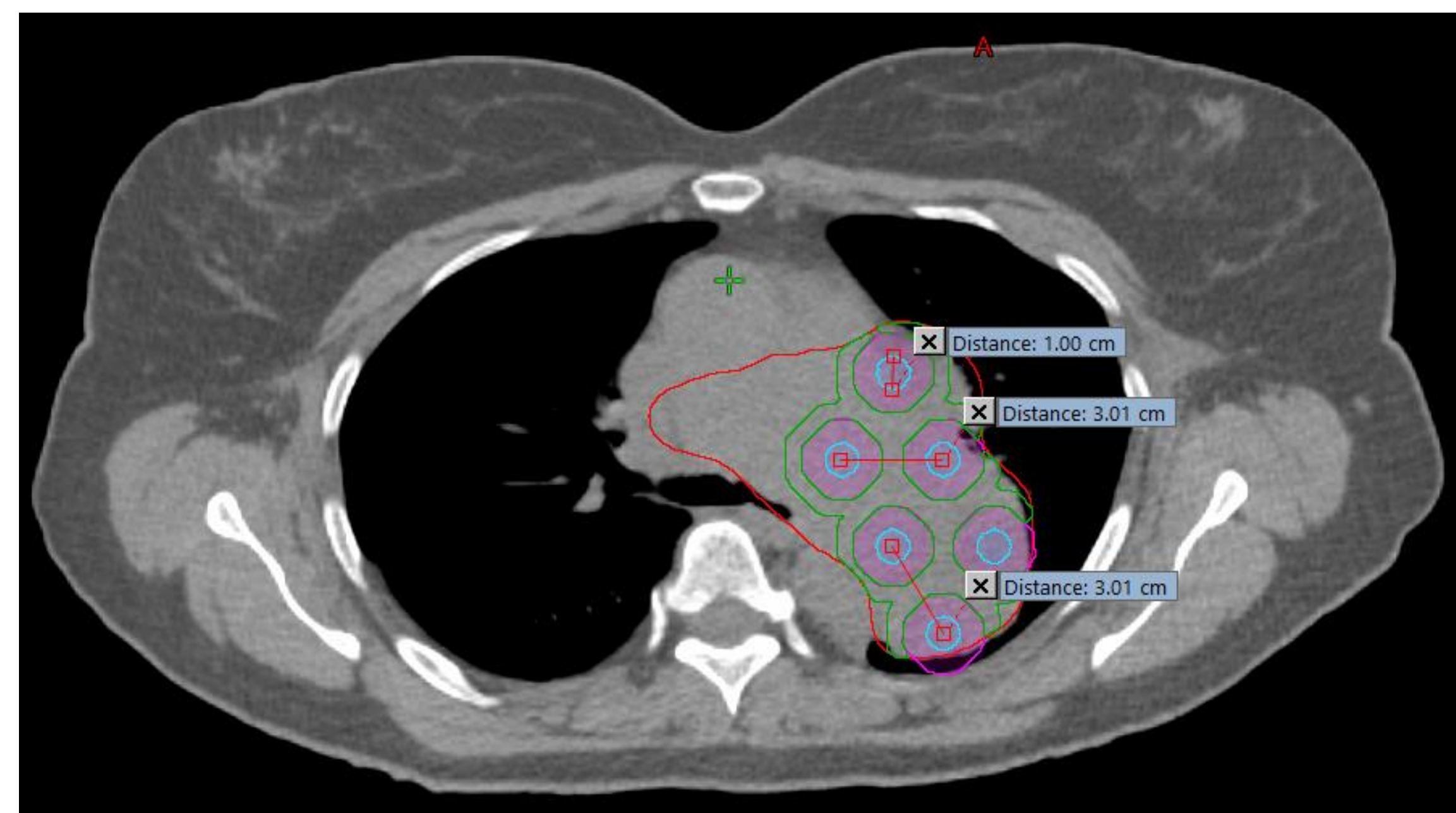
Introduction

Lattice radiotherapy (LRT) is a spatially fractionated radiotherapy technique that delivers high-dose vertices within large tumors while preserving lower-dose valley regions. The ability to accurately create and deliver lattice dose distributions on different treatment platforms is essential for clinical implementation.

Purpose: To evaluate the feasibility of planning and delivering lattice radiotherapy using Varian Ethos and Elekta VersaHD platforms within a common Eclipse treatment planning environment.

Lattice Geometry

- 1 cm spheres
- 3 cm center-to-center spacing
- 3D hexagonal pattern contained entirely within the GTV



Spherical boost vertices (1 cm diameter) arranged in a 3D hexagonal lattice with 3 cm center-to-center spacing.

Methods

Patient Selection & Planning

- Four patients previously treated with VMAT were retrospectively selected
- Three lattice plans were generated for each patient in Eclipse (TPS)
- Beam models evaluated
 - Varion Ethos 6 MV FFF
 - Elekta VersaHD 6 MV FFF
 - Elekta VersaHD 6 MV
- Prescription: 15 Gy in a single fraction

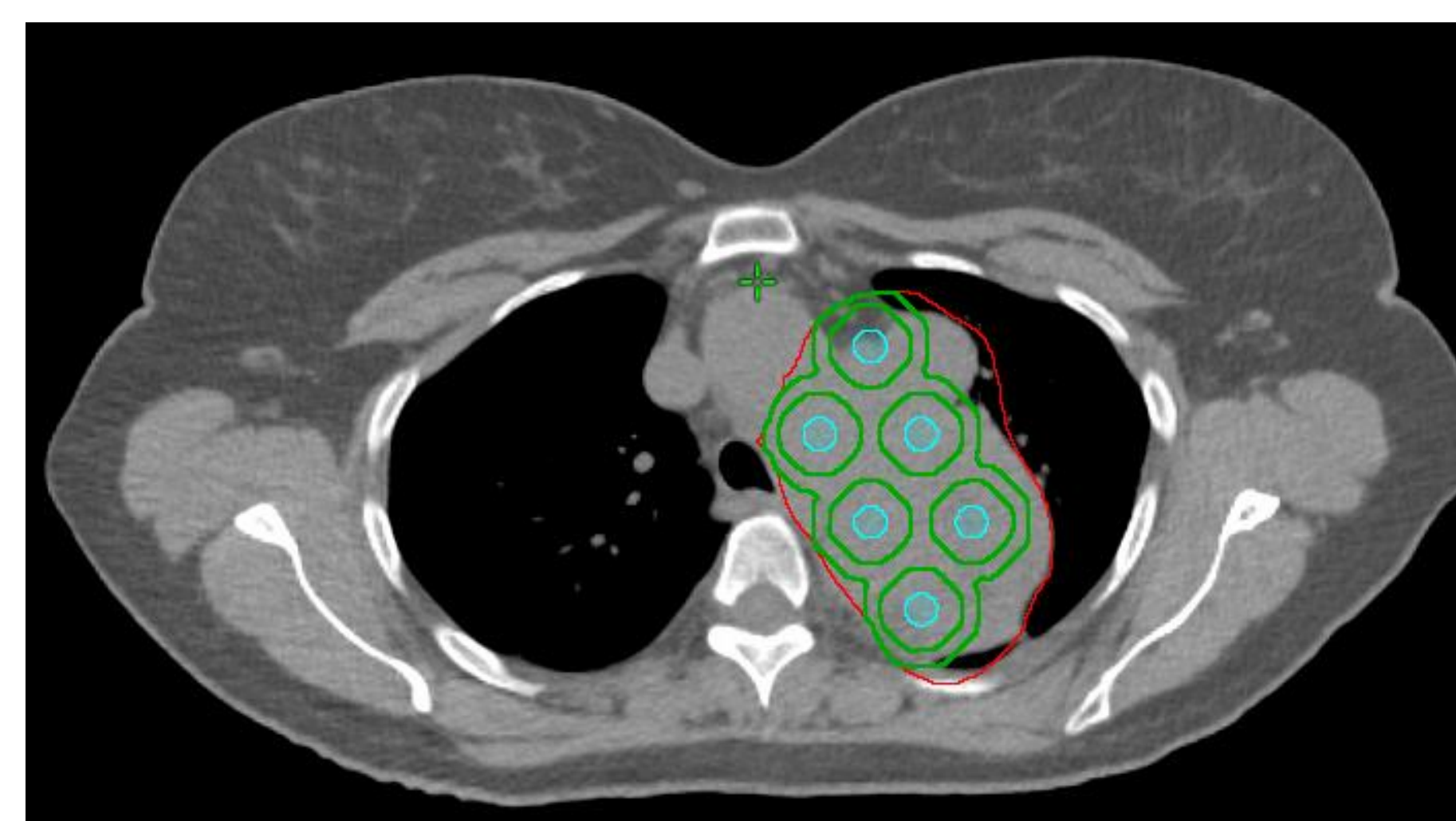
Treatment Planning

- All plans generated in Varian's Eclipse TPS
- 1 cm spheres with 3cm center-to-center spacing in a 3D hexagonal pattern contained entirely within the GTV
- Four VMAT arcs

Evaluation

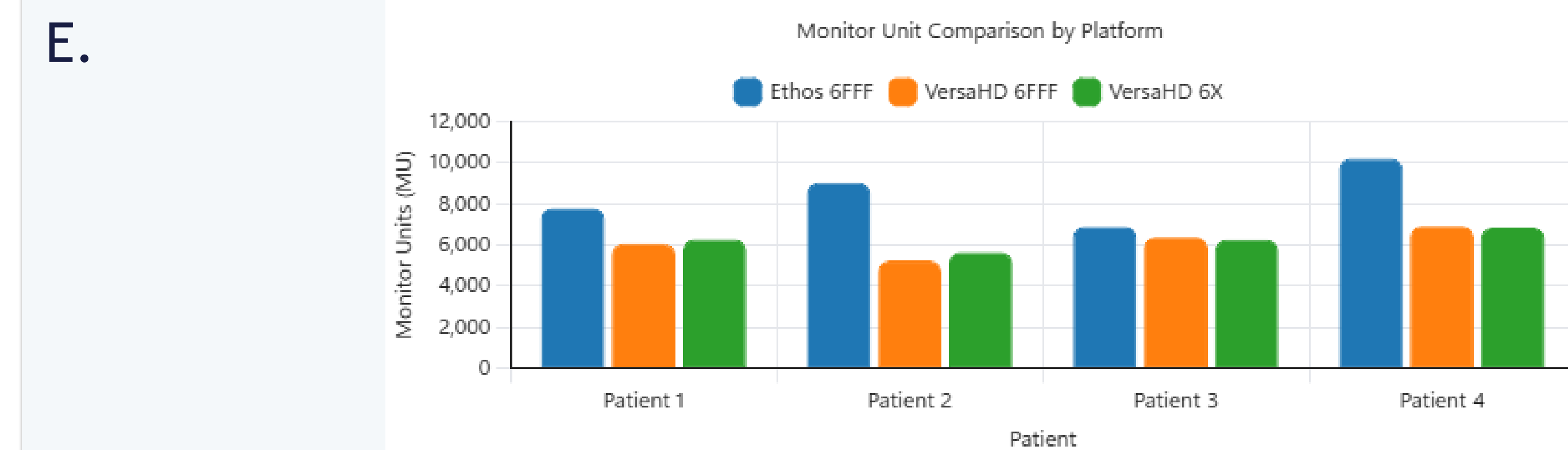
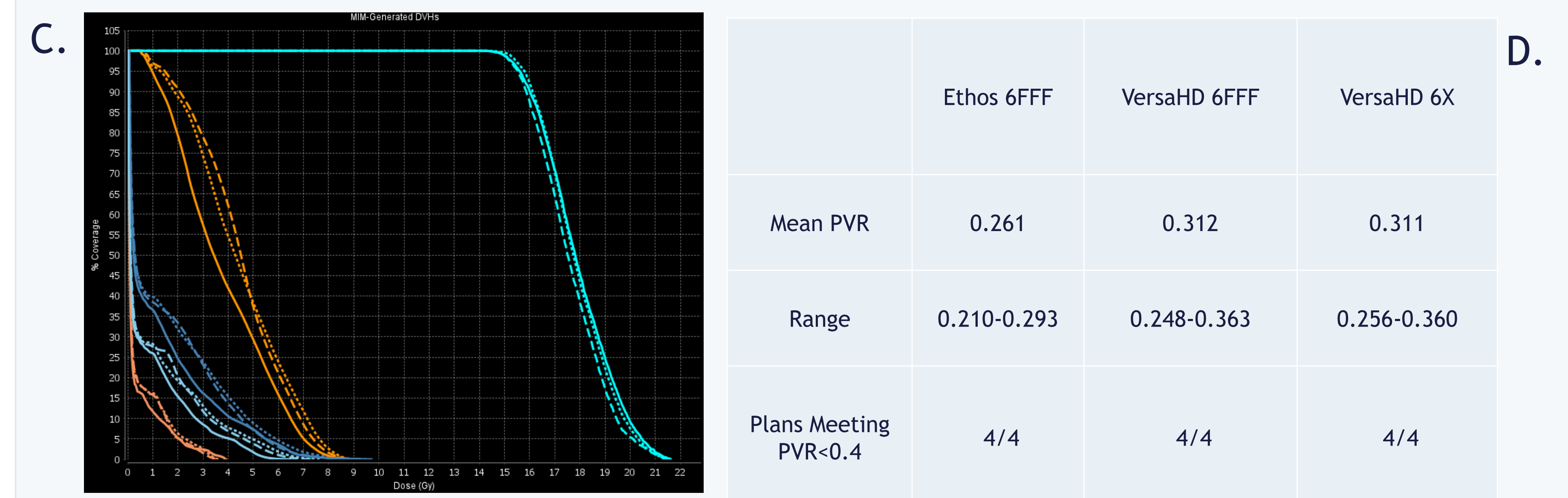
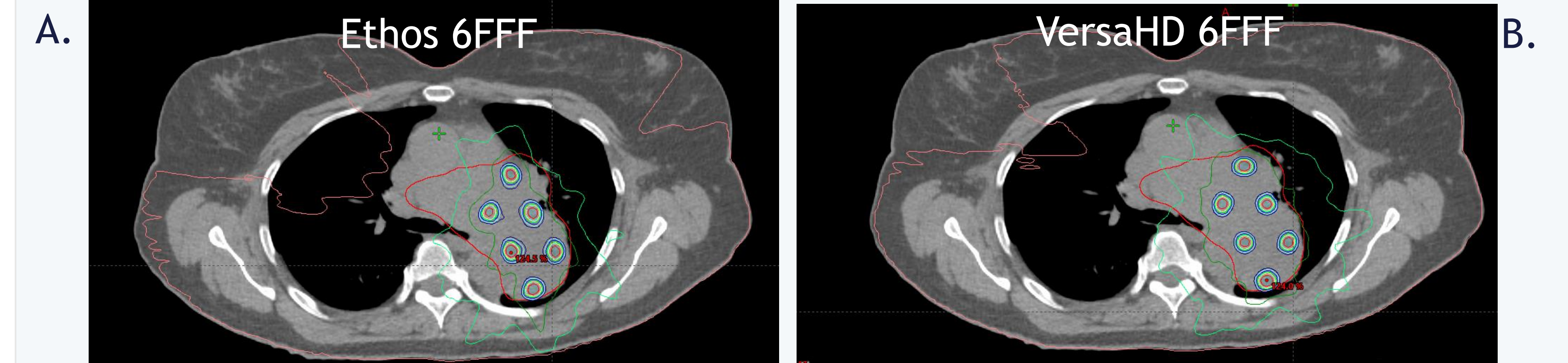
- Valley-to-Peak Ratio (VPR) used to evaluated plan quality
- Peak = mean dose of spheres
- Valley = mean dose of 5mm band centered between the spheres

$$VPR = \frac{Valley}{Peak}$$



Expansion (green) from the vertices (blue) used to represent the valley region cropped to be contained within the GTV (red).

Results



(A) Representative Ethos 6FFF lattice plan.

(B) Representative VersaHD 6FFF lattice plan.

(C) Dose-volume histograms demonstrating comparable target and lattice dose distributions.

(D) Valley-to-Peak Ratio summary showing all plans achieved the planning objective (VPR < 0.4).

(E) Monitor Units comparison across treatment platforms.

Conclusion

Lattice radiotherapy can be planned in Eclipse for both Ethos and VersaHD platforms. Standard VMAT techniques provide a clinically feasible approach for lattice radiotherapy delivery.

Key Findings

- All plans met lattice planning objectives (PVR 0.21-0.36)
- Comparable dose distributions observed between Ethos and VersaHD
- VersaHD plans required 23-24% fewer monitor units on average than Ethos 6FFF plans