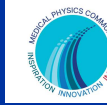


# Evaluation of RapidPlan knowledge-based planning models for VMAT Chestwall and regional lymph node irradiation

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## Introduction

VMAT post-mastectomy and regional lymph node irradiation is a highly complex technique that requires multiple planning iterations to achieve adequate coverage while minimizing OAR doses leading to decreased planning efficiency.

RapidPlan, a Varian knowledge-based modeling program, has improved planning efficiency for many sites. Current models are focused on whole or partial breast irradiation with few published models evaluating post-mastectomy and nodal irradiation and little evaluation on the impact of fractionation.

The goal is to develop a comprehensive RapidPlan model for VMAT chestwall and nodal irradiation that encompasses varying laterality and fractionation schemes aiming to improve planning efficiency.

## Methods

### Aim 1

RapidPlan models for fractionation dependencies

5000 cGy  
25 fx (n=22)

4256 cGy  
16 fx (n=21)

Left-sided  
(n=20)

Right-sided  
(n=24)

### Aim 2

RapidPlan models for laterality dependencies

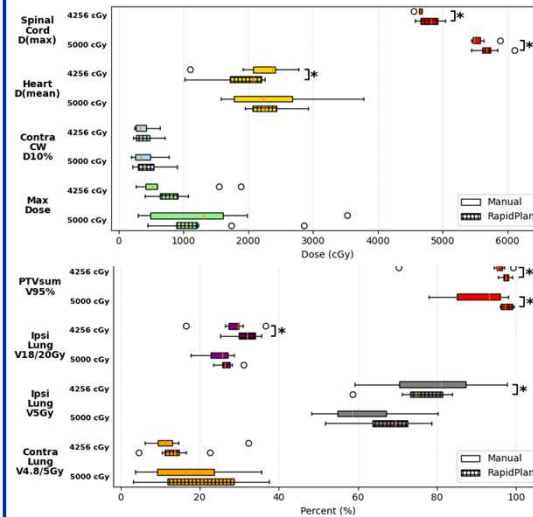
### Aim 3

Comprehensive RapidPlan model for clinical use  
(n = 51)

One iteration was run with RapidPlan model. In-house clinical goals used for all comparisons between manual plans and RapidPlan-created plans (n=9-12 patients). Wilcoxon Ranked Sum test was used for statistical comparison.

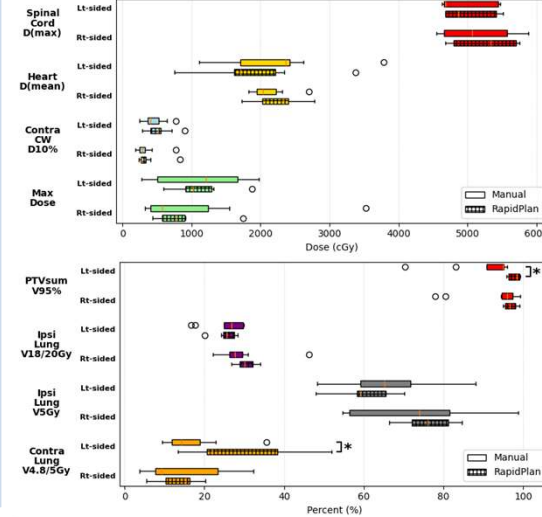
## Results

### Aim 1: Evaluate fractionation-dependencies for RapidPlan models with CW+Nodal cases.



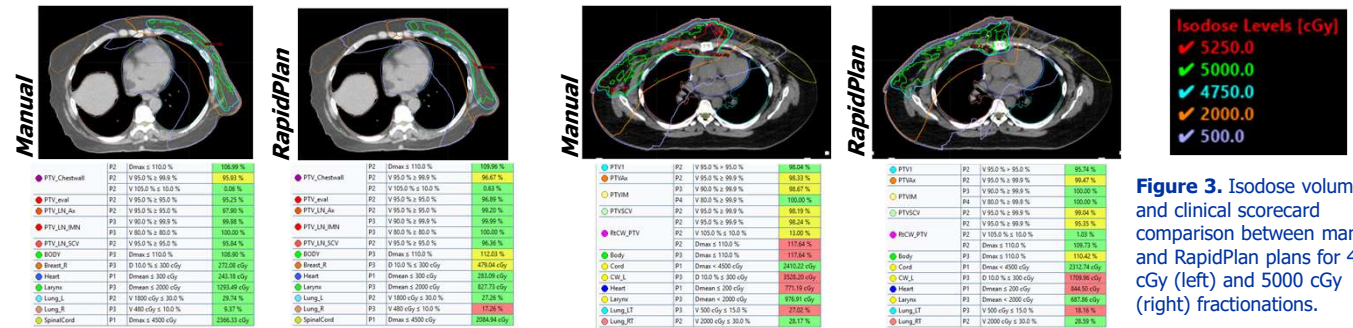
**Figure 1.** Dosimetric comparisons between manual and RapidPlan-based plans for 4256 cGy and 5000 cGy fractionations. Wilcoxon Ranked Sum test (n=10, \*, W < 78) used to determine significance (CI=95%). RapidPlan model ran for one iteration with an average time of 346.1 s.

### Aim 2: Evaluate laterality-dependencies for RapidPlan models with CW+Nodal cases.



**Figure 2.** Dosimetric comparisons between manual and RapidPlan-based plans for left-sided vs. right-sided disease. Wilcoxon Ranked Sum test (Lt: n=9, \*, W < 62; Rt: n=10, \*, W < 78) used to determine significance (CI=95%). RapidPlan model ran for one iteration with an average time of 367.4 s.

### Aim 3: Develop a comprehensive RapidPlan model for CW+Nodal cases and implement clinically.



**Figure 3.** Isodose volume and clinical scorecard comparison between manual and RapidPlan plans for 4256 cGy (left) and 5000 cGy (right) fractionations.

## Conclusions

VMAT post-mastectomy+CNi planning can be effectively supported using a RapidPlan model, improving planning efficiency and aiding in eliminating inter-planner variability while maintaining clinically acceptable plan quality. Our findings demonstrate that model performance is independent of fractionation and laterality, enabling the development of a single comprehensive model for clinical implementation. Since, the model has reduced planning time for a single case to approximately 20-30 minutes, streamlining the treatment planning workflow and improving clinical efficiency.

## References

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