



Evaluation of Varian RapidPlan^{PT} DVH Estimates against Clinically Delivered Plans for Head and Neck Cancer Treated with Proton Radiation Therapy

Brandon Reber, PhD¹, Andrew Y. K. Foong, PhD¹, Machele D. Michels¹, Jing Qian, PhD¹, David Routman, M.D.¹, Satomi Shiraishi, PhD¹
¹Department of Radiation Oncology, Mayo Clinic Rochester

OBJECTIVES

- To evaluate the agreement between Varian RapidPlan^{PT} DVH estimates and clinically delivered plans using an independent validation set for head and neck cancer treated with proton radiation therapy.

METHODS

- 87 treatment plans used to treat bilateral oropharynx cancer with 70 Gy at Mayo Clinic Rochester from 2015-2024 were identified for model development.
- 11 additional independent plans were used to determine RapidPlan^{PT} performance.

RESULTS

- The majority of clinically delivered plan DVH metrics fell within the RapidPlan^{PT} estimates.
- Of the 88 evaluated clinical plan metrics, 59 (67%) fell within RapidPlan^{PT} estimates, 12 (14%) had values greater than upper band estimates, and 17 (19%) had values less than lower band estimates

CONCLUSION

- RapidPlan^{PT} models have the potential to not only develop high quality plans, but to improve planning efficiency as well.
- Most clinical metrics fell within estimates, suggesting strong model DVH estimation performance.

Table 1: Summary of Validation Set DVH Estimation Results

Metric	Clinical plans with metric values within band estimates	Clinical plans with metric values greater than upper band estimates	Clinical plans with metric values less than lower band estimates
Brainstem D _{max} [cGy]	7	0	4
Brainstem V _{30%} [%]	7	1	3
Esophagus D _{mean} [cGy]	7	2	2
Esophagus V _{55%} [%]	9	2	0
Larynx D _{mean} [cGy]	9	1	1
Larynx V _{50%} [%]	8	1	2
Mandible D _{max} [cGy]	7	3	1
Spinal Cord D _{max} [cGy]	5	2	4
Total	59	12	17

CONTACT

Brandon Reber
Reber.Brandon@mayo.edu

Figure 1: RapidPlan^{PT} DVH estimates for the 11 validation set plans. Blue bands correspond to the upper and lower DVH estimates from the RapidPlan^{PT} model and orange points correspond to the metrics from the clinically delivered treatment plans.

