

Prostate

Evaluation of a commercial automatic treatment planning system for prostate cancers

Nawa, et al. Med Dosim. 2017 Autumn;42(3):203-209
<https://www.ncbi.nlm.nih.gov/pubmed/28549556/>

Conclusion:

- Planning target volume (PTV) dose and dose to rectum were comparable between Pinnacle Auto-Planning and manual planning.
- Auto-Planning significantly reduced the dose to the bladder and femurs.
- For prostate cancer, the Auto-Planning module provided plans that are better than or comparable with those of manual planning.

Evaluating treatment plan quality between manual planning and Auto-Planning in patients with prostate and seminal vesicle irradiation

Marston, et al. 2016 AAMD Poster Submission
<http://atlanta2016.medicaldosimetry.org/2016AnnualConference/assets/File/Marston.pdf>

Conclusion:

- All structures except the penile bulb, had a statistically significant reduction in Dmean.
- The bladder and femoral heads showed an improvement in D2cc.
- The rectum, bladder, sigmoid, and small bowel all showed improvement in the V40%.
- Auto-Planning appears to facilitate the treatment optimization process all the while making the overall planning process less laborious and time consuming

Investigating the dosimetric differences between clinical planning using volumetric modulated arc therapy and Auto-Planning in Patients with cancer of the prostate and pelvic lymph nodes

Lirani,, et al, AAMD 2016 Poster submission
<http://atlanta2016.medicaldosimetry.org/2016AnnualConference/assets/File/Aziz.pdf>

Conclusion:

- Pinnacle Auto-Planning can help the planner meet certain dose constraints that might be more difficult to achieve with regular VMAT plans.
- In examining the OARs, nearly all structures had less overall mean dose.
- Reducing dose to structures is critical when it comes to sparing OAR function and limiting the side effects of radiotherapy on patients.
- Auto-Planning can make treatment planning less laborious and time consuming, while providing comparable or significantly improved outcomes than VMAT plans done manually.



Pinnacle Auto-Planning peer-reviewed clinical proof statements

Highlights

- Physicians prefer plans created with Auto-Planning
- No compromise in plan quality with similar target conformity and homogeneity
- Significant reductions in dose for many OARs
- Significant reductions in planning time enable clinicians to commit more resources to complex cases

Brain

Evaluating treatment plan quality and dosimetric differences between Pinnacle Auto-Planning and manual treatment planning in brain cancer patients

Zehren, et al. 2016 AAMD poster submission
<http://atlanta2016.medicaldosimetry.org/2016AnnualConference/assets/File/Zehren.pdf>

Conclusion:

- Treatment planning employing Auto-Planning produces similar, if not better plan quality as compared to previously delivered clinical plans for VMAT.
- The use of Auto-Planning makes the planning process less time consuming and less planner dependent.

Improved plan quality with automated radiotherapy planning for whole brain with hippocampus sparing: a comparison to the RTOG 0933 trial

Krayenbuehl, et al. Radiation Oncology (2017) 12:161
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5625717/>

Conclusion:

- Automated treatment planning for HS WBRT was able to fulfil all the recommendations from the RTOG 0933 study

- Achieved significantly improved dose homogeneity and decreased unnecessary hot spot in the normal brain.
- Achieved standardization of plan quality and minimized the effective time required for plan optimization.
- The effective working time for plan optimization for automated planning of HS WBRT was in the order of five minutes

Automatic planning on hippocampal avoidance whole-brain radiotherapy

Wang, et al. Med Dosim. 2017 Spring;42(1):63-68
<https://www.ncbi.nlm.nih.gov/pubmed/28237294>

Conclusion:

- Auto-Planning resulted in treatment plans that complied with the dosimetric criteria by RTOG0933.
- 85% of cases were generated by Auto-Planning with a generic Auto-Planning Technique without planners' intervention, whereas the other cases only necessitate slight modification.
- The QA results also revealed that all plans created with Auto-Planning were acceptable for patient care

Head and neck

Automatic treatment planning improves the clinical quality of head and neck cancer treatment plans

Hansen et al. Clinical and Translational Radiation

Oncology 1 (2016) 2–8

<https://www.sciencedirect.com/science/article/pii/S2405630816300040>

Conclusion:

- Pinnacle Auto-Planning achieved superior target homogeneity and target coverage compared with manual planning.
- Organs at risk (OARs) sparing was significantly improved by Auto-Planning for organs.
- Average operator time was halved by Auto-Planning.
- Physicians selected Auto-Planning for clinical treatment in 29/30 patients.

Automated IMRT planning in Pinnacle: A study in head-and-neck cancer

Kusters JMAM, et al. Strahlenther Onkol. 2017

<https://www.ncbi.nlm.nih.gov/pubmed/28770294>

Conclusion:

- Auto-Planning with IMRT offers similar coverage of the planning target volume as the original manually planned clinical plans (n=20).
- The mean dose of the contralateral parotid gland and contralateral submandibular gland could be reduced by 2.5Gy and 1.7Gy on average.
- The number of monitor units was reduced with an average of 143.9 (18%).
- Hands-on planning time was reduced from 1.5-3h to less than 1h.

Evaluation of an automated knowledge-based treatment planning system for head and neck

Krayenbuehl et al. Radiation Oncology (2015) 10:226

<https://ro-journal.biomedcentral.com/articles/10.1186/s13014-015-0533-2>

Conclusion:

- The evaluated Auto-Planning algorithm achieved highly consistent and significantly improved treatment plans

- Potentially clinically relevant OAR sparing by >20 % in 64 % of the cases was observed.
- The effective working time was substantially reduced with Auto-Planning.

Automatic planning of head and neck treatment plans

Hazell, et al. J Appl Clin Med Phys, 17: 272–282

<http://onlinelibrary.wiley.com/doi/10.1120/jacmp.v17i1.5901/full>

Conclusion:

- Comparison of Auto-Planning and previously delivered clinical plans showed only small dosimetric differences in target coverage,
- Yet, Auto-Planning showed significant reduction in dose to OAR
- The blinded clinical evaluation of the plans showed that, for 94% of the evaluations, Auto-Planning was similar to or better than the clinical plans.

Automatic treatment planning facilitates fast generation of high-quality treatment plans for esophageal cancer

Hansen et al. Acta Oncol. 2017 Nov; 56(11):1495–1500

<https://www.tandfonline.com/doi/full/10.1080/0284186X.2017.1349928>

Conclusion:

- Pinnacle Auto-Planning was preferred for 31/32 patients in a blinded clinical evaluation.
- Similar target coverage was obtained between Auto-Planning and manual planning methods.
- Median optimization time for Auto-Planning plans was 117 mins

Initial evaluation of automated treatment planning software

Gintz, et al. J Appl Clin Med Phys 17 (3), 331–346.

2016 May 08

<https://www.ncbi.nlm.nih.gov/labs/articles/27167292/>

Conclusion:

- Auto-Planning excelled at limiting the OAR doses, while still conforming to the relevant RTOG dose homogeneity requirements.
- Auto-Planning appears to be a robust clinical tool

Thorax and abdomen

Dosimetric benefits of automation in the treatment of lower thoracic esophageal cancer: Is manual planning still an alternative option?

Li et al. Med Dosim. 2017 Winter;42(4):289-29
<https://www.ncbi.nlm.nih.gov/pubmed/28754289>

Conclusion:

- Pinnacle Auto-Planning achieved superior target conformity, homogeneity, and similar target coverage compared with historical manual planning.
- Most of organs at risk (OARs) sparing was significantly improved by Auto-Planning except for the V5 of the lung

Evaluation of a commercial automatic treatment planning system for liver stereotactic body radiation therapy treatments

Gallio, et al. Physica Medica, Volume 46, February 2018, Pages 153-159
<https://www.sciencedirect.com/science/article/pii/S1120179718300188>

Conclusion:

- Plans created with Pinnacle Auto-Planning were comparable to the manually generated plans.
- Statistically significant differences were observed for spinal cord doses, plan average beam irregularity, number of segments, monitor units and human planning time
- The time saved in planning enables the planner to commit more resources to more complex cases.

Automated inverse optimization facilitates lower doses to normal tissue in pancreatic stereotactic body radiotherapy

Mihaylov, et al. PLoS ONE 13(1): e0191036
<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0191036>

The prescription dose to 95% of the planning target volume (PTV) is the same for the treatment and the auto-optimized plans. The average difference for maximum doses to duodenum, bowel, stomach, and

spinal cord are -4.6 Gy, -1.8 Gy, -1.6 Gy, and -2.4 Gy respectively. The negative sign indicates lower doses with the auto-optimization. The average differences in the mean doses to liver and kidneys are -0.6 Gy, and -1.1 Gy to -1.5 Gy respectively.

Conclusion:

- Automated inverse optimization holds great potential for personalization and tailoring of radiotherapy to particular patient anatomies.
- It can be utilized for normal tissue sparing or for an isotoxic dose escalation.

Dosimetric comparison between Pinnacle Auto-Planning and manual planning for lung SBRT treatments

Bishop, et al. 2016 AAMD Poster Submission
<http://atlanta2016.medicaldosimetry.org/2016AnnualConference/assets/File/Bishop.pdf>

Conclusion:

- Auto-Planning appears to generate SBRT treatment plans of similar treatment plan quality to manually optimized, clinical plans.
- No statistically significant differences were noted for the dose fall-off parameters.
- Since it provides comparable plans, it can be used as a starting point to standardize plan quality.

Improving plan quality and efficiency by automated rectum VMAT treatment planning

Wortel, et al. 2017 ESTRO Poster Submission

Conclusion:

- The average Auto-Planning OAR Dmean was 2.5 Gy lower when compared to the manual plans.
- Pinnacle Auto-Planning was unanimously preferred by radiation oncologists and planning dosimetrists.