ESTRO 2026 AMEND CONTINUE

Submission ID

1608

Author approval (read-only)

I confirm that this abstract has been approved by all authors.

Accuracy of the abstract (read-only)

I accept responsibility for the accuracy of the abstract. I understand that no changes to the abstract text are possible after the submission deadline of 12 November 2025 (23h59 CET).

Author list (read-only)

I confirm that all authors contributing to the abstract are properly included in the author list. I understand that no changes to the author list are possible after the 1 February 2026.

Abstract presentation (read-only)

I certify that, if the abstract is selected, the information reported is for the exclusive presentation in the scientific programme and will not be presented at any commercially-sponsored satellite symposia during the congress.

register to attend and present at the congress.

Embargo of abstracts (read-only)

I understand that abstracts are embargoed until 1 month prior to the congress at which point abstracts are published in the abstract book and online searchable programme. Should you wish for an abstract to be embargoed until the congress, please email abstracts@estro.org by 28 February 2026.

Abstract verification (read-only)

I accept to check the abstract overview provided in the submission confirmation email and ensure all abstract details are correct.

Contact person (read-only)

I accept to be the contact person for all correspondence related to the abstract and to share relevant information with the co-authors.

Topic (read-only)

Physics: Dose prediction/calculation, optimisation and applications for photon and electron planning

Keywords (read-only)

auto-planning, breast cancer

Abstract title (read-only)

Automated VMAT Planning for breast cancer radiotherapy

Authors and affiliations (required)

Pauline Maury (Presenting) pauline.maury@gustaveroussy.fr
Radiation Oncology Department, nstitute Gustave Roussy, Villejuif, France

Ana-Maria Gardareanu oprea.nicoleta93@yahoo.com
Radiation Oncology Department, nstitute Coltea Clinical Hospital, Bucharest, Romania

Gorkem Gungor gorkem.gungor@acibadem.com
Radiation Oncology Department, Acibadem MAA University School of Medicine, Istanbul, Turkey

Madalina-Liana Costea m.costea@therapanacea.com
Clinical Affairs, TheraPanacea, Paris, France

Baris Ungun b.ungun@therapanacea.eu
Physics, TheraPanacea, Paris, France

Remi Vauclin r.vauclin@therapanacea.com
Physics, TheraPanacea, Paris, France

Elie Mengin e.mengin@therapanacea.com
Physics, TheraPanacea, Paris, France

Nikos Paragios n.paragios@therapanacea.com
CEO, TheraPanacea, Paris, France

Waissi Waisse waisse.waissi@lyon.unicancer.fr
Radiation Oncology Department, Centre Leon Berard, Lyon, France

Purpose/Objective (read-only)

Automated radiotherapy planning can improve efficiency, plan quality, and reduce inter-observer variability. Two-step workflows combining dose prediction and dose mimicking have shown promising results [1,2]. The purpose of this study was to develop and evaluate end-to-end fully automated VMAT planning strategies for breast cancer radiotherapy.

Material/Methods (read-only)

Two automated planning (AP) approaches were developed. AP-Method1 used a machine learning–based dose prediction trained on 48 VMAT plans from a European center using a moderate hypofractionation regimen (40.05 Gy/15 fractions) [3]. AP-Method2 used an analytical formula for generating a dose prediction [4]. Both methods shared the same dose-mimicking step to generate DICOM RT plans.

External validation was performed on 10 patients. For each case, two automated VMAT plans were generated for a VersaHD linac, imported into RayStation for final dose calculation, and quantitatively compared with corresponding manual clinical plans using established evaluation criteria [3,5]. One physicist and two radiation oncologists reviewed the automated plans, adjusted normalization as needed, assessed clinical acceptability, and indicated their preferred method. Five cases underwent patient-specific QA to assess deliverability.

Results (read-only)

Automated plan generation averaged 8 minutes per case. Both AP methods produced plans that were clinically comparable or superior to manual ones, with improved CTV/PTV coverage and enhanced cardiac sparing (Table1). After minor normalization adjustments (mean 0.8%, range 0.4–1.4%), clinical acceptability was achieved in 90% and 93.3% of plans for AP-Method1 and

acceptability between expert pairs (1–2, 2–3, and 1–3) was 80% for AP-Method1 and 87% for AP-Method2, whereas plan preference agreement was limited to 33%.

Patient QA results demonstrated excellent deliverability, with 3%/2 mm gamma pass rates of 97% (AP-Method1) and 93% (AP-Method2).

Structure	DVH metric	Manual Plans (Gy)	AP-Method 1 (Gy)	AP- Method 2 (Gy)
CTV_{Breast}	D95%>38.0475 Gy	39.04 ± 0.13	39.4 ± 0.08	39.33 ± 0.09
CTV_{Breast}	D2%<42.0525 Gy	40.88 ± 0.29	41.02 ± 0.09	41.15 ± 0.13
CTV_{Breast}	D2cc<42.8535 Gy	41.17 ± 0.3	41.5 ± 0.31	41.68 ± 0.37
CTV_{Breast}	Dmax<44.055 Gy	42.09 ± 0.38	42.75 ± 0.46	42.91 ± 0.52
PTV_{Breast}	D95%>38.0475 Gy	38.06 ± 0.01	38.77 ± 0.31	38.98 ± 0.18
PTV_{Breast}	Dmax<44.055 Gy	42.31 ± 0.41	42.9 ± 0.33	43.15 ± 0.43
Heart	D10%<17 Gy	4.07 ± 0.52	2.94 ± 0.58	3.19 ± 0.61
Heart	D5%<16 Gy	4.96 ± 0.6	3.51 ± 0.74	3.75 ± 0.78
Heart	Dmean<2.4 Gy	2.36 ± 0.34	1.74 ± 0.34	1.99 ± 0.37
LAD Coronary	Dmax<17 Gy	5.77 ± 1.01	5.46 ± 1.88	5.2 ± 1.93
Breast_Right	Dmean<3 Gy	2.21 ± 0.27	1.88 ± 0.23	2.24 ± 0.24
Lung_Left	D15%<16 Gy	15.84 ± 1.17	13.31 ± 1.56	12.5 ± 1.04

Table 1. Quantitative evaluation of manual and automated plan solutions

	Clinical acceptability		Plan preference		
Expert	AP-Method 1	AP-Method 2	AP-Method 1	AP-Method 2	BOTH
Medical Physicist	90.0%	90.0%	40.0%	50.0%	10.0%
Radiation Oncologist 1	80.0%	90.0%	10.0%	90.0%	0.0%
Radiation Oncologist 2	100.0%	100.0%	80.0%	20.0%	0.0%
Mean among experts	90.0%	93.3%	43.3%	53.3%	3.3%

Table 2. Qualitative evaluation results

Conclusion (read-only)

Both AP methods successfully generated high-quality, clinically acceptable plans for breast cancer radiotherapy with minimal human intervention. These findings demonstrate that automated end-to-end VMAT planning is feasible, can improve plan consistency, efficiency, and quality, supporting integration into routine clinical workflows.

[1] M. Hussein *et al.*, “Automation in IMRT planning – recent innovations,” *Br. J. Radiol.*, vol. 91, p. 20180270, 2018.

[2] P. Meyer *et al.*, “Automation in RT planning: clinical use and trends,” *Cancer/Radiother.*, vol. 25, pp. 617–622, 2021.

[3] M. S. Thomsen *et al.*, “Dose constraints for whole breast RT in DBCG HYPO trial,” *Clin. Transl. Radiat. Oncol.*, vol. 28, pp. 118–123, 2021.

[4] A. Munshi *et al.*, “Dose fall-off with VMAT and 3D-CRT,” *Cancer Radiother.*, vol. 23, pp. 138–146, 2019.

[5] L. L. Puckett *et al.*, “Consensus quality measures and dose constraints for breast cancer,” *Pract. Radiat. Oncol.*, vol. 13, pp. 217–230, 2023.

Conflict of Interest Disclosure (read-only)

- (●) I do not have a Conflict of Interest to disclose.
- ( ) I do have a Conflict of Interest to disclose.

Permission to publish (required)

In submitting this abstract, you give ESTRO permission to publish it in the congress abstract book, a supplement to the Green Journal and online in various forms (searchable programme, media library, congress platform and others).