Abstract Number: EBCC-1073 (European Breast Cancer Conference)

Topic	**Local Regional Treatment - Radiotherapy**
Presentation preference	**Poster Presentation**
Abstract title	**Dosimetric impact of an AI-based delineation software satisfying international guidelines in breast cancer radiotherapy**
	M. Ung[1], S. Rivera[1], A. Rouyar[1], E. Limkin[1], C. Petit[1], T. Sarrade[2], A. Carre[1], G. Auzac[1], A. Lombard[3], E. Ullmann[3], N. Bonnet[4], A. Lamrani-Ghaouti[4], N. Paragios[3], C. Martineau-Huynh[3], E. Deutsch[1], C. Robert[1]. [1]Institut Gustave Roussy, Radiothérapie, Villejuif, France. [2]Institut Curie, Radiothérapie, Paris, France. [3]Therapanacea, Therapanacea, Paris, France. [4]Unicancer, Recherche, Paris, France.
Cooperative Study Groups	

Background: Delineation is time consuming in radiation oncologist's daily life and prone to inter-expert variability. Automatic delineation (AD) allows time saving, practice harmonization and may result in qualitative improvement. The objective of this study was to evaluate, based on a retrospective monocentric cohort of breast cancer patients treated before 2015, the clinical impact of the use of an Artificial Intelligence (AI)-based solution for organs-at-risk (OAR) and target volume delineation, respecting international guidelines.

Material and methods: A CE-marked solution for AD harnessing a unique combination of anatomically preserving and deep learning delineation concept was developed. Using transfer learning, the model was tuned to respect the 2015 ESTRO guidelines, through the integration of 256 cases randomly selected from the HYPOG-01 trial. Forty-four patient cases were retrieved for which 3D-conformal radiotherapy (3D CRT) was prescribed. For each case, AD was generated and minor corrections were applied when necessary. Dosimetric maps used in clinic were then transferred without plan re-optimization on the AD to evaluate the dosimetric relevance of the delivered plans. Dosimetric values were compared using a Wilcoxon test. Qualitative evaluation consisted in scoring each plan as A (Dosimetry accepted), B (Minor correction required) or C (Dosimetry rejected) based on the HYPOG-01 dosimetric constraints.

Results: Dosimetric objectives were met with AD and manual delineations (MD) for all OARs as shown in Table 1 for 50 Gy prescription. The majority (91%) of thoracic wall treatments included axillary and internal mammary nodes (IMN). All of them were scored as "B" or "C" in AD configuration as 3D CRT was responsible for field junction undercoverage. 3/26 cases of 50+16 Gy prescription were scored as "C" in AD. These cases included axillary nodes treatment without MD, showing that this region was underdosed in clinical practice.

Conclusions: Even if dose plans were performed before ESTRO recommendations, dose constraints were respected for all OARs. Axillary nodes delineation should improve coverage of target volumes and AD could contribute to this coverage improvement.

Table 1. Dosimetric comparison between MD and AD for 50 Gy prescription (mean dose; standard deviation) (n=11) - ND: Not Done

	Manual Delineation	Auto Delineation	p-value(Wilcoxon test)
CTV Breast			
D95 (Gy)	**38.01 (9.44)**	**37.62 (12.48)**	**0.58**
D2 (Gy)	**54.45 (0.96)**	**54.70 (1.17)**	**0.06**
Dmean (Gy)	**49.16 (2.00)**	**49.23 (2.22)**	**0.41**
Volume (cm3)	**399.49 (195.09)**	**386.49 (204.51)**	**0.21**
CTV Level 3 (D95, Gy)	**ND**	**41.98 (3.64)**	
CTV Level 4 (D95, Gy)	**ND**	**44.02 (2.82)**	
CTV IMN (D95, Gy)	**ND**	**18.10 (9.09)**	
Ipsilateral lung			
V20 (%)	**21.75 (5.18)**	**17.40 (3.34)**	**0.10**
Dmean (Gy)	**11.31 (2.04)**	**11.67 (2.08)**	**0.10**
Heart			
V20 (%)	**2.98 (2.23)**	**2.78 (1.96)**	**0.41**
V40 (%)	**1.27 (1.70)**	**1.74 (2.23)**	**1.00**

Spinal cord			
Dmax (Gy)	**5.96 (6.03)**	**5.18 (4.23)**	**0.67**

COI: **I/we (in case of co-authors) have no potential conflict of interest to disclose**