


XXXII CONGRESSO NAZIONALE AIRO  
XXXIII CONGRESSO NAZIONALE AIRB  
XII CONGRESSO NAZIONALE AIRO GIOVANI

# AIRO2022

Radioterapia di precisione per un'oncologia innovativa e sostenibile

BOLOGNA, 25-27 NOVEMBRE  
PALAZZO DEI CONGRESSI

 Associazione Italiana  
Radioterapia e Oncologia clinica

 Società Italiana di Radiobiologia

 Associazione  
Italiana  
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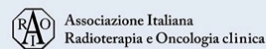
## Plan quality comparison at five years in two cohorts of breast cancer patients treated with Helical Tomotherapy

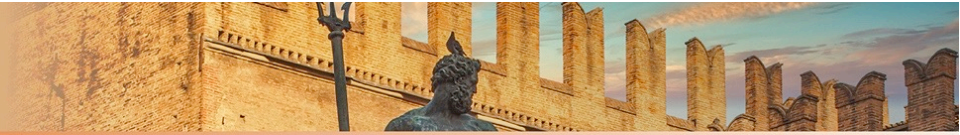
S. Dicuonzo, M. Zaffaroni, K. Amin, G. Ronci, M. D'Arcangelo, M.G. Vincini, R. Cambria, R. Luraschi, D.P. Rojas, M.A. Zerella, M. Pepa, F. Cattani, R. Orecchia, M.C. Leonardi, B.A. Jereczek-Fossa

European Institute of Oncology- IRCCS- Milan



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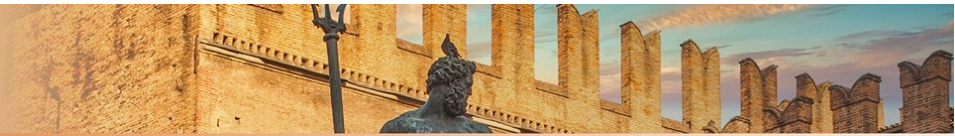


## DICHIARAZIONE

### Relatore: Dott.ssa Maria Alessia Zerella

Come da nuova regolamentazione della Commissione Nazionale per la Formazione Continua del Ministero della Salute, è richiesta la trasparenza delle fonti di finanziamento e dei rapporti con soggetti portatori di interessi commerciali in campo sanitario.

- Posizione di dipendente in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Consulenza ad aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Fondi per la ricerca da aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazione ad Advisory Board **(NIENTE DA DICHIARARE)**
- Titolarità di brevetti in compartecipazione ad aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
  
- Partecipazioni azionarie in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Altro



# Background

**European Society for Radiotherapy and Oncology Advisory Committee in Radiation Oncology Practice consensus recommendations on patient selection and dose and fractionation for external beam radiotherapy in early breast cancer**

*Icro Meattini, Carlotta Becherini, Liesbeth Boersma, Orit Kaidar-Person, Gustavo Nader Marta, Angel Montero, Birgitte Vrou Offeren, Marianne C Aznar, Claus Belka, Adrian Murray Brunt, Samantha Dicuonzo, Pierfrancesco Franco, Mechthild Krause, Mairead MacKenzie, Tanja Marinko, Livia Marrazzo, Ivica Ratoso, Astrid Scholten, Elżbieta Senkus, Hilary Stobart, Philip Poortmans\*, Charlotte E Coles\**

**The Italian Association for Radiotherapy and Clinical Oncology (AIRO) position statements for postoperative breast cancer radiation therapy volume, dose, and fractionation**

Icro Meattini<sup>1,2</sup> · Isabella Palumbo<sup>3</sup> · Carlotta Becherini<sup>2</sup> · Simona Borghesi<sup>4</sup> · Francesca Cucciarelli<sup>5</sup> · Samantha Dicuonzo<sup>6</sup> · Alba Fiorentino<sup>7</sup> · Ruggero Spoto<sup>8</sup> · Philip Poortmans<sup>9,10</sup> · Cynthia Aristei<sup>3</sup> · Lorenzo Livi<sup>1,2</sup>

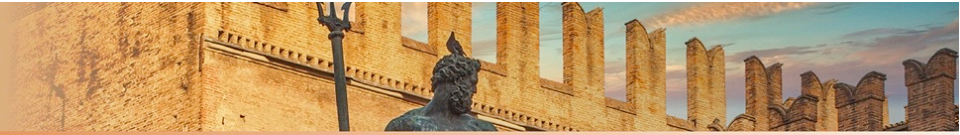
Hypofractionation in the setting of PMRT is still not used worldwide

Apprehension regarding the inferiority of hypofractionation with respect to toxicities



When the standard treatment changes, increasing experience in treatment planning is necessary

Modern planning techniques, i.e. IMRT, and increasing experience in treatment planning could minimize the incidence of radiation-related late toxicities



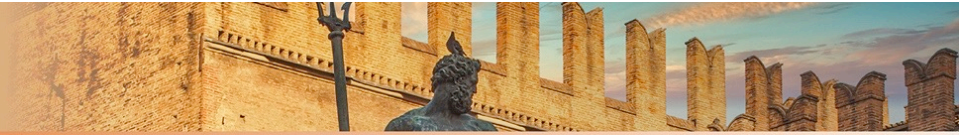
# Aim

The aim of this analysis was to retrospectively evaluate treatment plans of two groups of BC patients treated at two different time points with hypofractionated IMRT with Helical TomoTherapy®.



Quality of planned dose distribution

The physicist learning curve



## Methods

**Patients:** women with implant-based immediate breast reconstruction (IBR) receiving PMRT at EIO to the CW and to SVC nodal region with moderate hypofractionation (15-fraction-2.67 Gy/fraction-Total dose 40.05 Gy).

**Period:** 120 consecutive patients treated between 2012 and **2015** vs 120 consecutive patients treated between 2019 and **2020**; planned by 5 expert Physicists

**Technique:** Helical TomoTherapy Hi-Art System (TomoTherapy® System, Accuray Incorporated, Sunnyvale, CA)

### Analysis:

Dosimetric parameters extracted from DVHs

Quantitative scoring tool, adapted from the one used by Motwani et al., to compare the quality of the planned dose distribution between the sub-cohorts in terms of both target coverage and sparing of OARs. (6 points: optimal plans; 5.5 points: acceptable plans, less than 5 points: compromised plans)

Median value was recorded and Two-sided Wilcoxon rank was performed

**Toxicity:** Capsular contracture according to Baker definition (Data censored at the last follow up available or removal of the definitive implant)

Written informed consent- dedicated data bank (RTP R039-000-TomoTherapy-breast)



## Results (1)

Distribution of total scores resulting from the summation of points and the distribution of planning objectives for PTV coverage and for OAR sparing

	Total score (points)	n plans 2012-2015 (%) N = 120	n plans 2019-2020 (%) N = 120	$\Delta$
Optimal	6	85 (70.8)	95 (79.2)	+ 9.2%
Acceptable	5.5	22 (18.4)	18 (15)	-3.4%
Compromised	$\leq 5$	13 (10.8)	7 (5.8)	-5.0%





## Results (2)

Planning objective/constraint	Median value (IQR)_2012-2015	Median value (IQR)_2019-2020	p-value	Plans satisfying planning objectives/constraints 2012-2015 (%)	Plans satisfying planning objectives/constraints 2019-2020 (%)
<b>PTVs Chest wall</b>					
V95% ≥ 90%	94.9 (92-97)	96.3 (92.6-98.0)	<b>.03486</b>	85.8	90
V90% ≥ 95%	99 (97-99.8)	99.4 (98.4-100.0)	<b>.01928</b>	92.5	95
Dmean ≥ 99%	99.8 (99.5-100)	99.6 (99.4-99.8)	<b>.00038</b>	90.8	92.5
D0.03 cm <sup>3</sup> ≤ 110%	107.7 (106-108.9)	106.6 (105.8-107.1)	<b>&lt; .00001</b>	90.8	97.5
V107% ≤ 30%	0.04 (0-0.3)	0 (0-0.01)	<b>.00288</b>	100	100
<b>PTV svc</b>					
V95% ≥ 85%	93 (87.2-96.1)	97.8 (96.3-98.8)	<b>&lt; .00001</b>	81.7	100
V90% ≥ 90%	97.7 (95.0-99.2)	99.4 (98.6-100)	<b>&lt; .00001</b>	91.7	100
Dmean ≥ 95%	98.8 (96.9-99.9)	99.1 (98.6-99.7)	<b>.0139</b>	91.7	100
D0.03 cm <sup>3</sup> ≤ 110%	107.0 (105.0-108.2)	107.0 (105.6-108.2)	.3843	90	95
V107% ≤ 30%	0 (0-0.2)	0 (0-0.15)	.78716	100	97.5

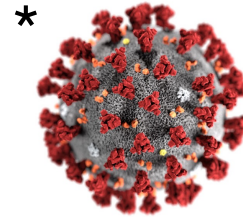
**For OARs:** Dmax Brachial plexus and Ipsilateral lung (D20% ≤ and D35% ≤ 17.6 Gy ) gave the major contribution in plans satisfying planning constraints





## Results (3)

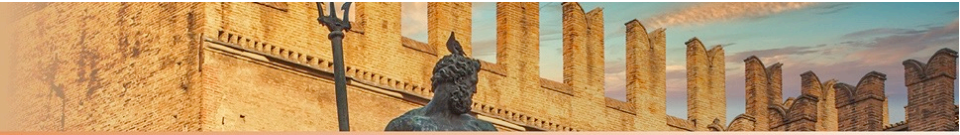
### Baker capsular contracture



Expander → n 70 (2012-2015); 85 (2019-2020)

Definitive → n 50 (2012-2015); 35 (2019-2020)

Baker	1	2	3	4	na	Median follow up
Recent n, %	8/65 (12,3) ↑	30/65 (46) ↑	22/65 (33,8) =	5/65 (7,6)	55*/120 (40%) ↓	22
Old n, %	1/110 (0,9) ↑	25/110 (22,7) ↑	34/110 (30,9)	14/110 (12,7) ↓	10/120 (8,3%) ↓	24



## Discussion

### Limitation:

- Different rate of capsular contracture probably derived from different n of pts at follow up → update of follow-up under evaluation
- Follow up with plastic surgeons or radiation oncologists not available for all the patients
- 5 different Physicists → but the same group in the 2 subcohorty, all with more than 5 years of experience in breast cancer treatment planning

### Strenght:

- Helical Tomotherapy provides a large proportion of optimal plans in a challenging population of postmastectomy patients with IBR treated with hypofractionation since 2012
- 5 years-learning curve shows increasing of optimal plans
- At our knowledge, no other similar studies
- Useful platform to compare dose constraints between similar studies and to further refine them to optimize helical PMRT
- Relation between cosmetic outcome and planning improvement need to be validated

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# Thank you



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