
institutCurie
Ex-Presidente
ESTRO
European SocieTy for
RADIOTHERAPY
& ONCOLOGY
Presidente
ECCO
European CanCer Organisation


Trappist
Trappist
HAPKIN
Moinette
Palmina
Achel
Bru
Tripel
CHIMAY
Grotse
trop
Tripel
CHOUFFE
LA
CHOUFFE

3° Taller Internacional Multidisciplinario de Cáncer de Mama

&

1° Simposio de Cáncer Ginecológico

&

1° Taller de Planificación y Control de Calidad para Radiocirugía

"De la práctica a las bases teóricas"

Radioterapia post reconstrucción

I have no conflicts of interest

1. Introduction
2. RT after breast reconstruction
3. Breast reconstruction after RT
4. Sequence of reconstruction & RT
5. New developments / On-going research
6. Conclusions

Breast reconstruction & RT: *introduction*

1. Introduction: why mastectomy?
2. RT after breast reconstruction
3. Breast reconstruction after RT
4. Sequence of reconstruction & RT
5. New developments / On-going research
6. Conclusions

Breast reconstruction & RT: *introduction*

<u>Who should not undergo breast conservation?</u>

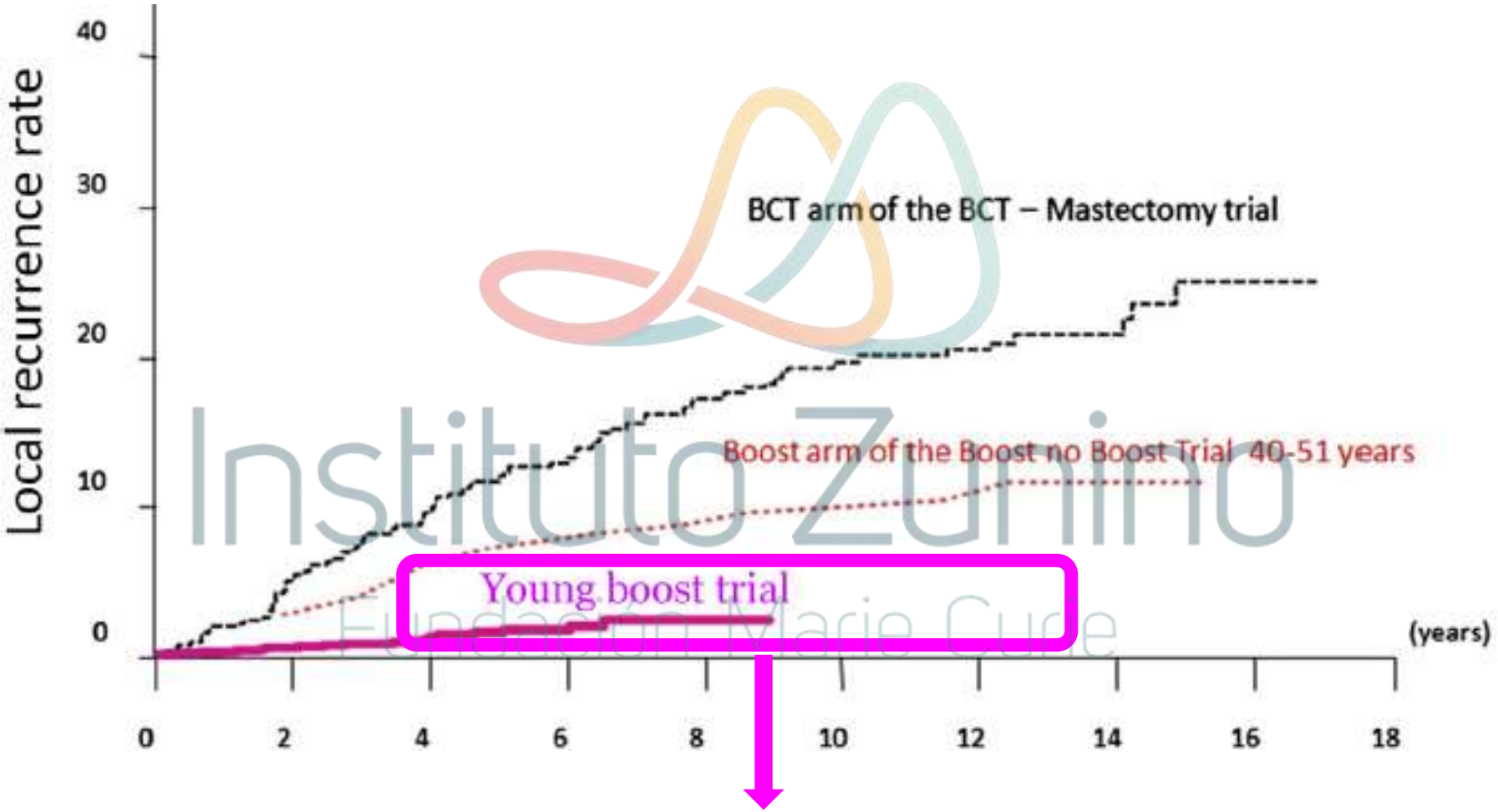
Risk factors:

- > focally incomplete margins: x2
- < 35 years: x 2 ***(yes, but: see next slide)***
- no radiotherapy: x **3-6**

In larger cancers ➔ PST to be considered.
Oncoplastic procedures to be available.

Finally: remains an individual decision

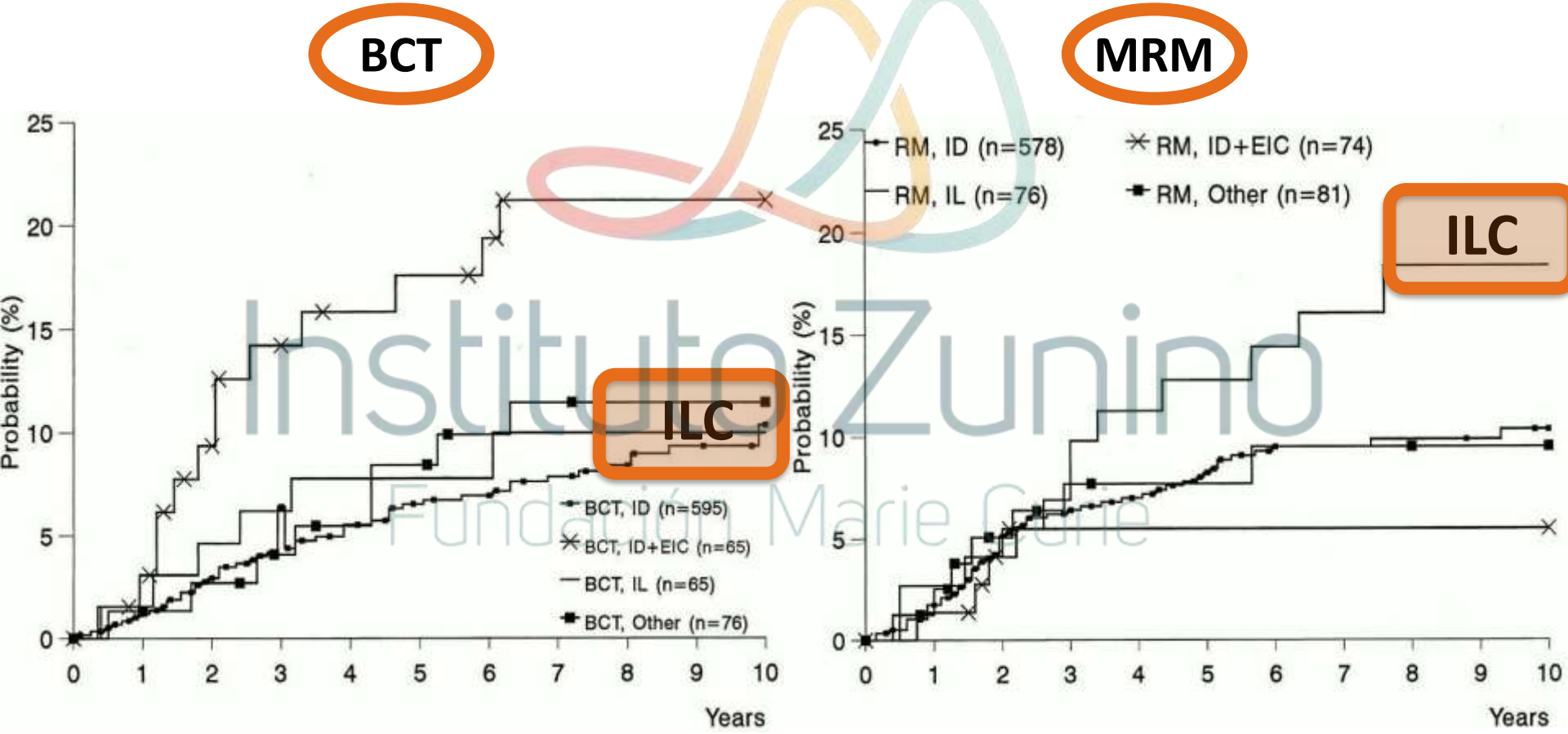
Breast reconstruction & RT: *introduction*



Breast reconstruction & RT: *introduction*

EORTC 10801 & DBCG-82TM.

Cumulative LRR according to histologic type:

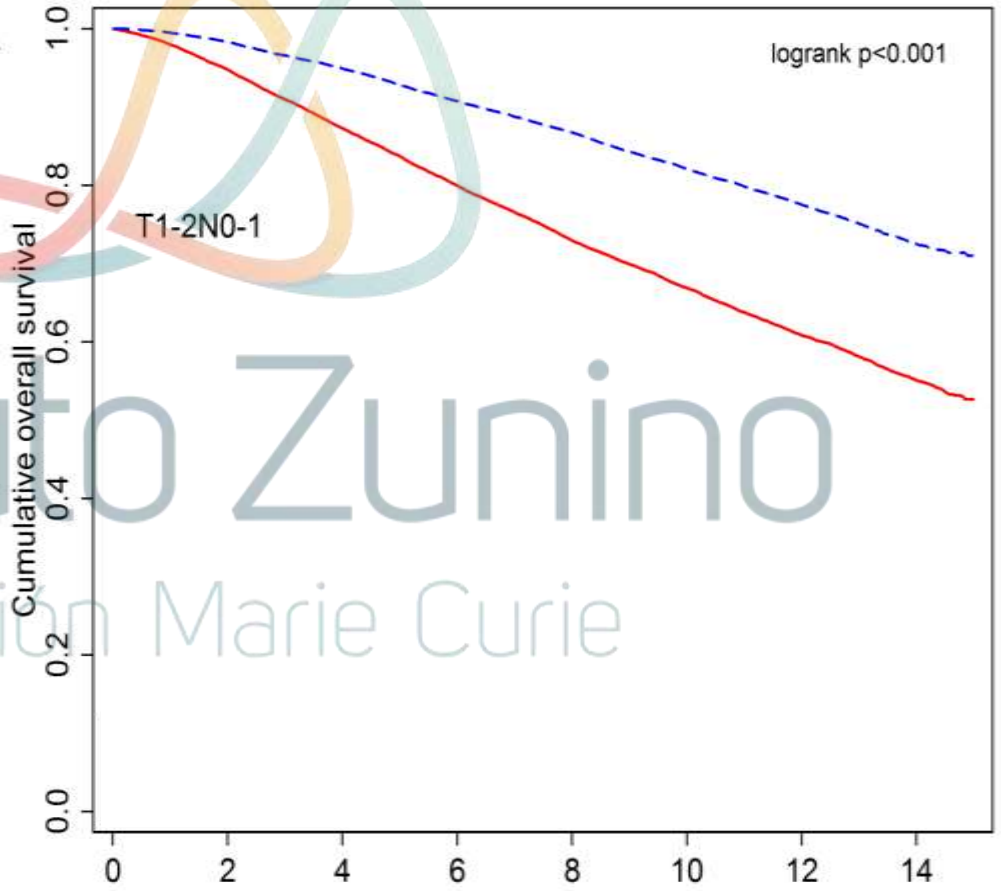


Breast reconstruction & RT: *introduction*

Dutch population based cancer registry

2000-2004 cohort: 37,207 patients

- 58.4% BCT
- 41.6% MRM

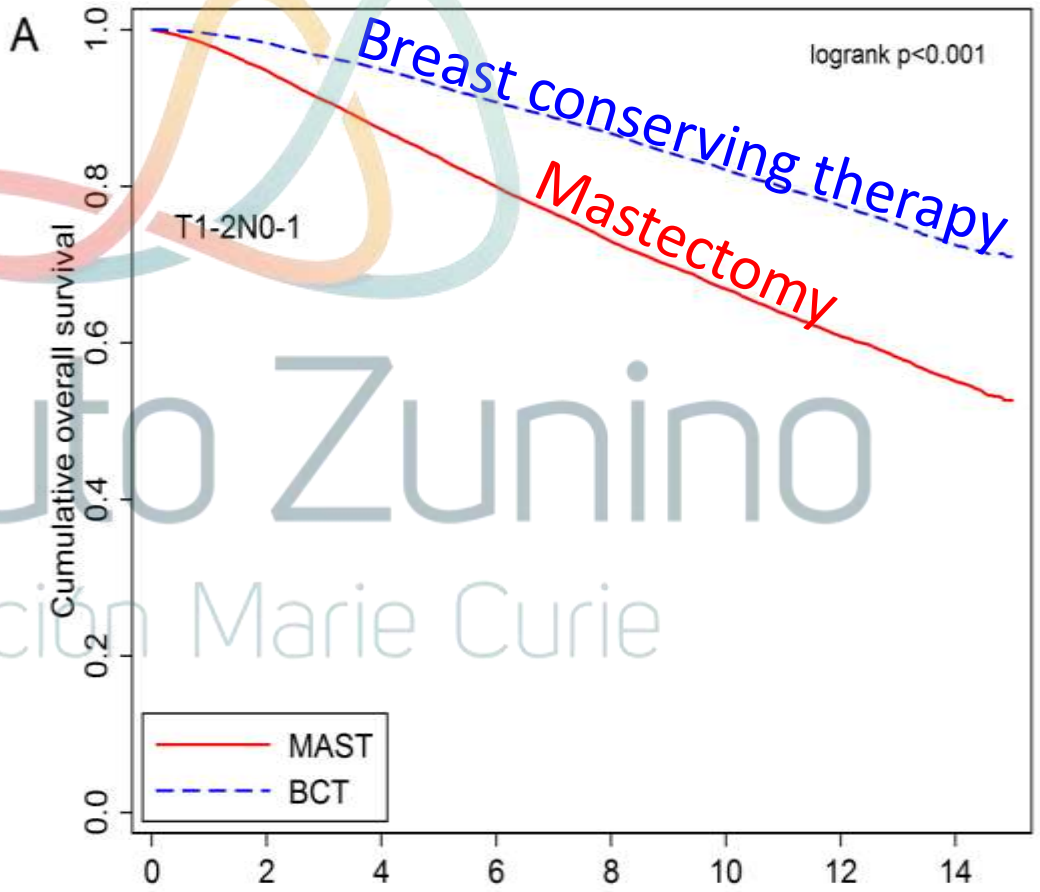


Breast reconstruction & RT: *introduction*

Dutch population based cancer registry

2000-2004 cohort: 37,207 patients

- 58.4% BCT
- 41.6% MRM



The Breast 35 (2017) 32–33

Contents lists available at ScienceDirect

The Breast

journal homepage: www.elsevier.com/brst

Viewpoints and debate

Less is more. Breast conservation might be even better than mastectomy in early breast cancer patients

Oreste D. Gentilini [a, *], Maria-Joao Cardoso [b], Philip Poortmans [c]

[a] San Raffaele University and Research Hospital, Milano, Italy
[b] Breast Unit, Champalimaud Foundation, Lisbon, Portugal
[c] Department of Radiation Oncology, Institut Curie, Paris, France

"Sometimes patients demand a mastectomy, driven by fear and the desire of getting rid of the disease while ignoring all this new information. It is important to inform them properly that, in most cases, breast cancer can be cured maybe even better without the need to be separated from of their breasts."

Breast reconstruction & RT: *introduction*

1. Introduction: why PMRT?
2. RT after breast reconstruction
3. Breast reconstruction after RT
4. Sequence of reconstruction & RT
5. New developments / On-going research
6. Conclusions

Breast reconstruction & RT: *introduction*

oa OPEN ACCESS

Effect of radiotherapy after mastectomy and axillary surgery on 10-year recurrence and 20-year breast cancer mortality: meta-analysis of individual patient data for 8135 women in 22 randomised trials

EBCTCG (Early Breast Cancer Trialists' Collaborative Group)*

Lancet 2014; 383: 2127–35

Breast reconstruction & RT: *introduction*

1. Introduction: use of reconstruction?
2. RT after breast reconstruction
3. Breast reconstruction after RT
4. Sequence of reconstruction & RT
5. New developments / On-going research
6. Conclusions

Breast reconstruction & RT: *introduction*

SEER database 2000 - 2010

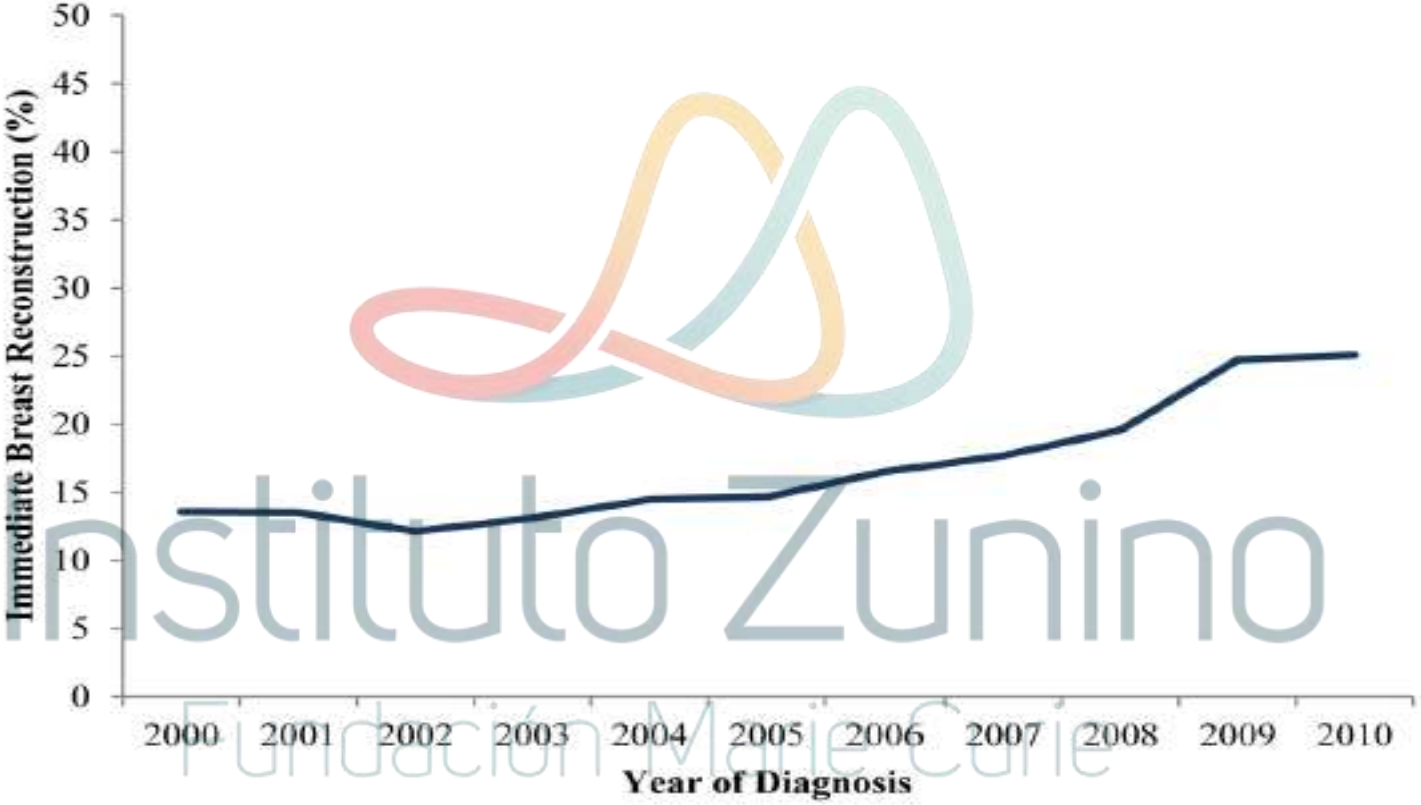


Figure 1.
Immediate Breast Reconstruction Rate from 2000–2010 in Patients Requiring Radiation. (6,875 reconstructions/40,568 women with BC)

Breast reconstruction & RT: *introduction*

SEER database 2000 - 2010

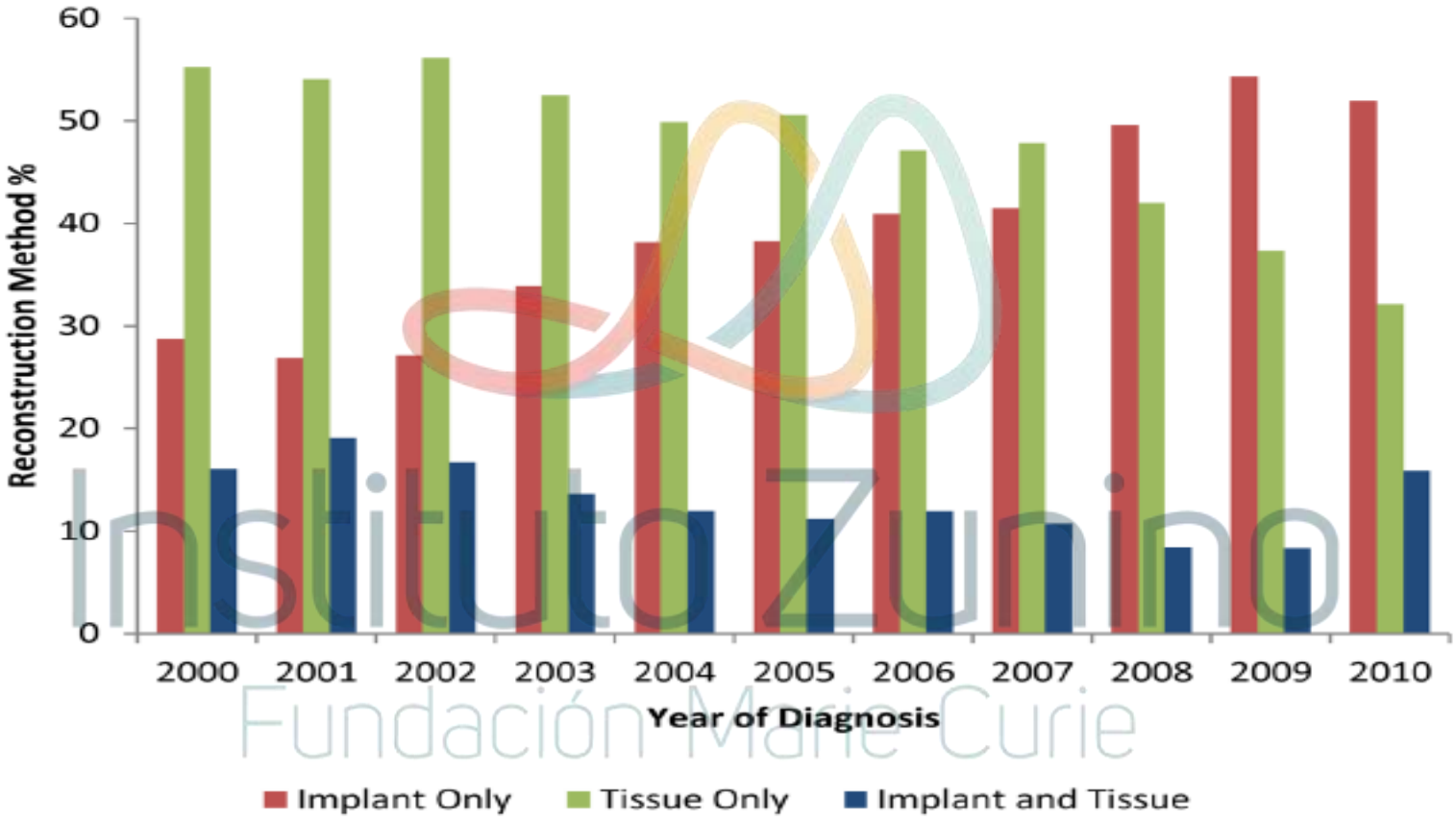


Figure 2.
Reconstruction Rates by Method in Radiated Patients from 2000–2010 out of all specified reconstructions

Breast reconstruction & RT: *introduction*

USA-Low risk/BCS eligible

- Breast reconstruction increased from 11.6% to 36.4%
- Bilateral mastectomy for unilateral disease increased from 1.9% to 11.2%

(not correlating with the rates of BRCA/PALB2)

Breast reconstruction & RT: *introduction*

USA-Low risk/BCS eligible

- Breast reconst… 6% to 36.4%
- Bilateral ma… increased from 1.9% to 11…

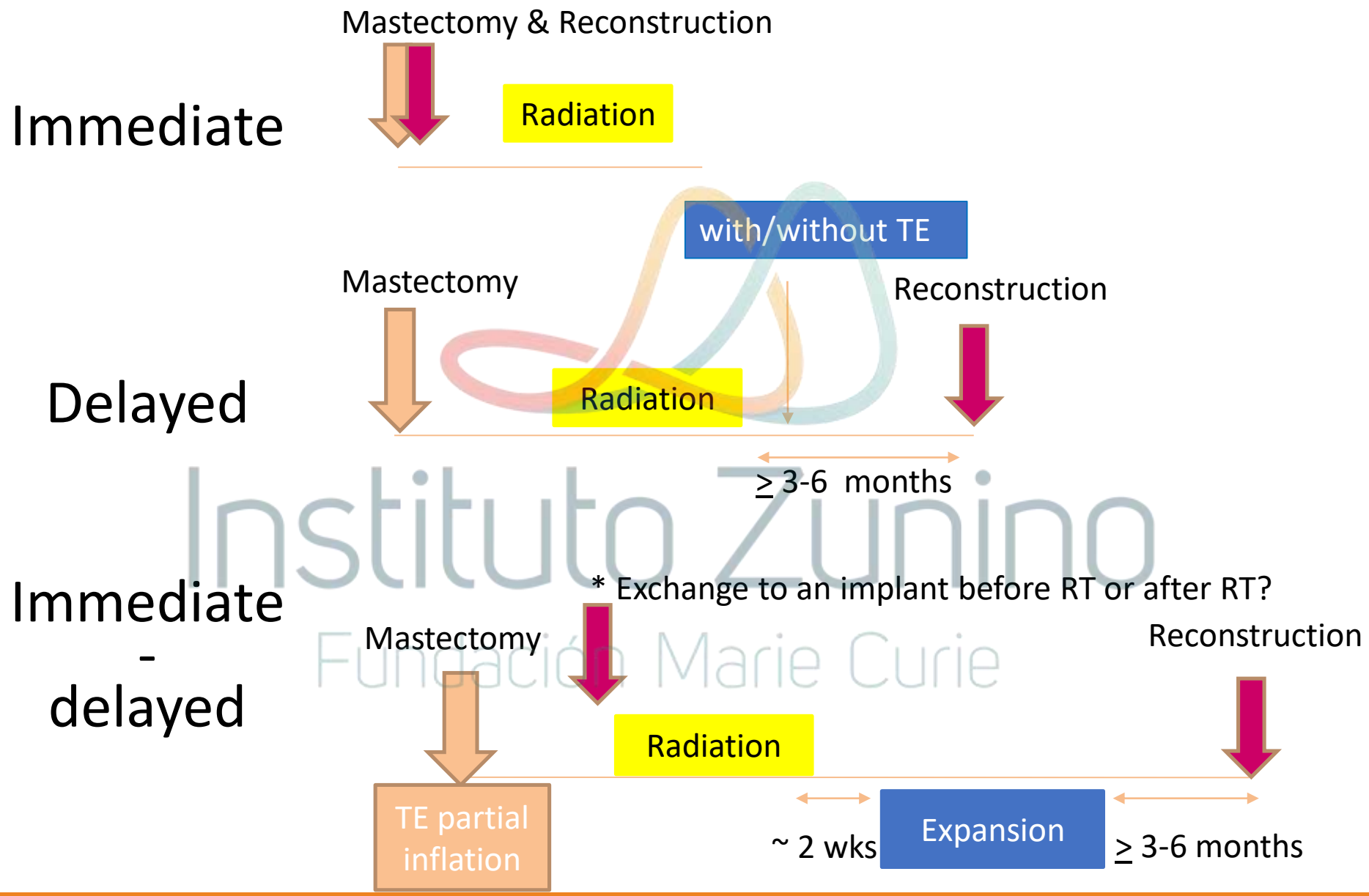
…BRCA/PALB2)

Patients desire symmetry and cosmesis

Breast reconstruction & RT: past or present challenge?

1. Introduction
2. RT after breast reconstruction
3. Breast reconstruction after RT
4. Sequence of reconstruction & RT
5. New developments / On-going research
6. Conclusions

Breast reconstruction & RT: *RT after reconstruction*



Breast reconstruction & RT: *RT after reconstruction*

Questions:

1. Is it safe (tumour control/survival)?
2. Is it safe (complications/cosmesis)?
3. Is it feasible (RT issues)?

Breast reconstruction & RT: *RT after reconstruction*

Question 1:

- Is it safe (tumour control/survival)?

Answer:

- Interval between surgery/chemotherapy & RT ~ acceptable
- Compromised DFS/OS??? More studies needed!
- Safe & well tolerated in LABC *(Crisera Plast Reconstr Surg 2011;128:32-41)*

Breast reconstruction & RT: *RT after reconstruction*

Question 2:

- Is it safe (complications/cosmesis)?

Breast reconstruction & RT: *RT after reconstruction*

Capsular contracture following IBR with implant.

	IBR (n)	IBR + RT (n)	CC %		Re-operation	Med FU
			no RT	RT	%	(mths)
Marseilles 2003	69	47	0	17	11	25
New York 2004	143	68	40	68	1.2	34
Stockholm 2006	107	24	15	42	15	60
London 2006	136	44	14	39	9	48
Bristol 2008	53	18	11	39	22.2	33
Cambridge 2009	120	42	0	19	19.5	50

Breast reconstruction & RT: *RT after reconstruction*

Capsular contracture following IBR with implant.

	IBR (n)	IBR + RT (n)	CC %		Re-operation	Med FU
			no RT	RT	%	(mths)
Marseilles 2003						
New York 2004						
Stockholm 2006						
London 2006						
Bristol 2008						
Cambridge 2009						

Weighted means capsular contraction:

IBR 16% (range 0-40%)

IBR + RT 40% (range 18-68%)

➔ Risk ~ x 2.5

Breast reconstruction & RT: *RT after reconstruction*

Autologous tissue reconstruction vs implant.

	Implant	Autolog	Complic	Reoperation	Med FU
	No	No	%	%	mths
Philadelphia 2004	44	26	TRAM:0 Implant:5	2 (implants)	28
Boston 2002	18	30	TRAM:12 Implant:53	TRAM:8 Implant:42	32
Long Island 2008	69	23	ATR:9 Implant:55	ATR:0 Implant:19	38

Breast reconstruction & RT: *RT after reconstruction*

Autologous tissue reconstruction vs implant.

	Implant	Autolog	Complic	Reoperation	Med FU
	No	No	%	%	mths
Philadelphia 2004	***wm***		Complications		Re-operations
Boston 2002	Auto		6% (0-9%)		1% (0-8%)
Long Island 2008	Impl		38% (5-55%)		22% (2-42%)

Breast reconstruction & RT: *RT after reconstruction*

Question 2:

- Is it safe (complications/cosmesis)?

Answer:

- Increased capsular contraction (16% ➔ 40%)
- Lower risk for complications after autologous IBR

Breast reconstruction & RT: *RT after reconstruction*

Question 3:

- Is it technically feasible (RT issues)?

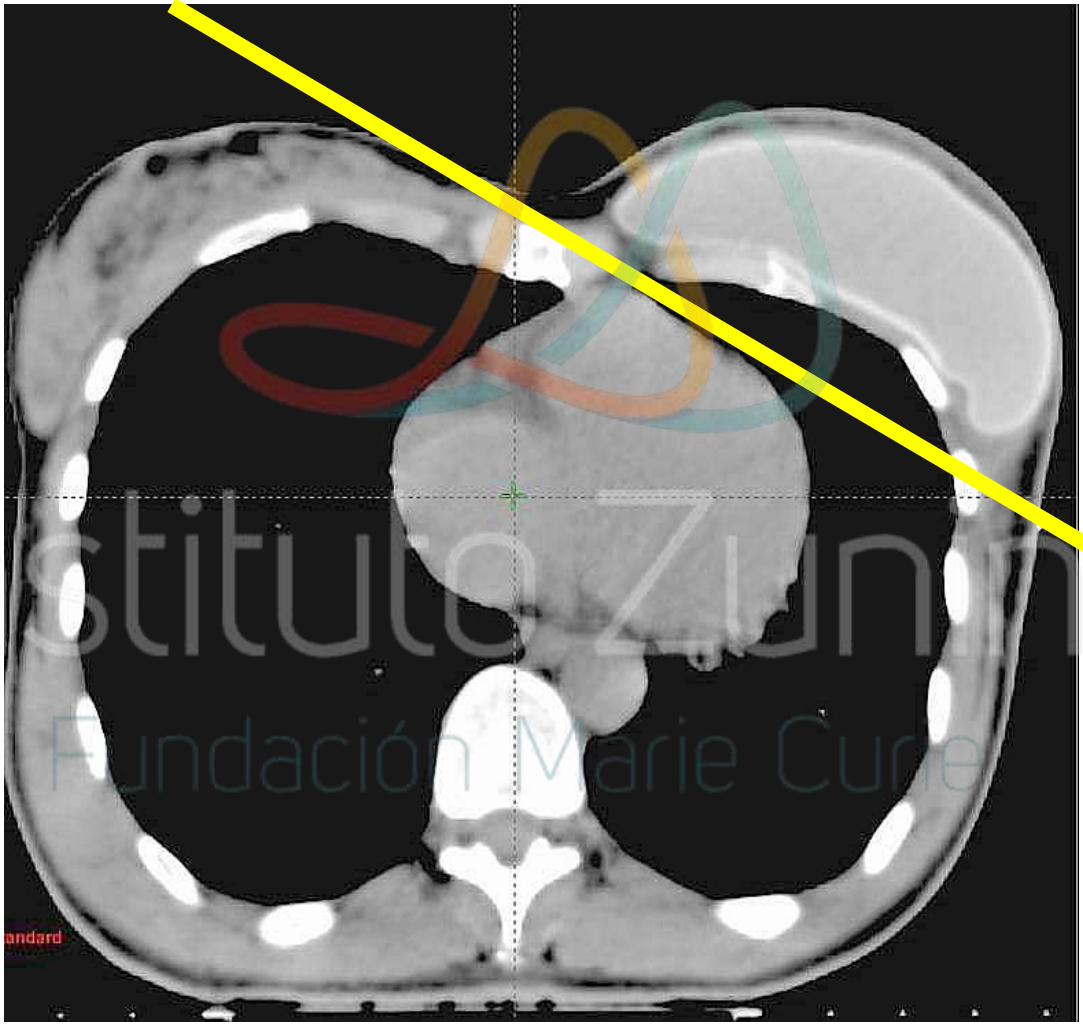
Breast reconstruction & RT: *RT after reconstruction*

Technical challenges:

- Chest wall shape
- Coverage of target volume
- Tissue heterogeneities
- Combination with regional nodes irradiation
- Avoidance of OAR (lung and heart)
- Delay in initiation of radiotherapy

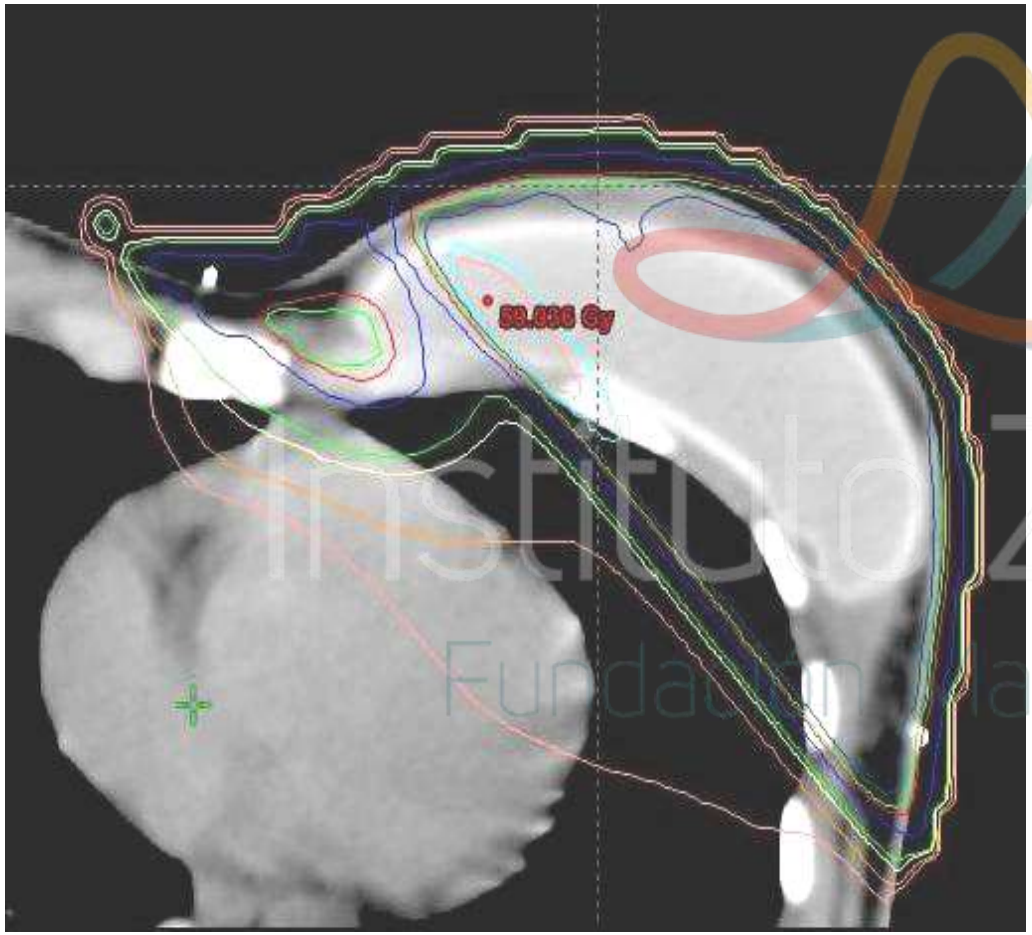
Breast reconstruction & RT: *RT after reconstruction*

Chest wall shape.



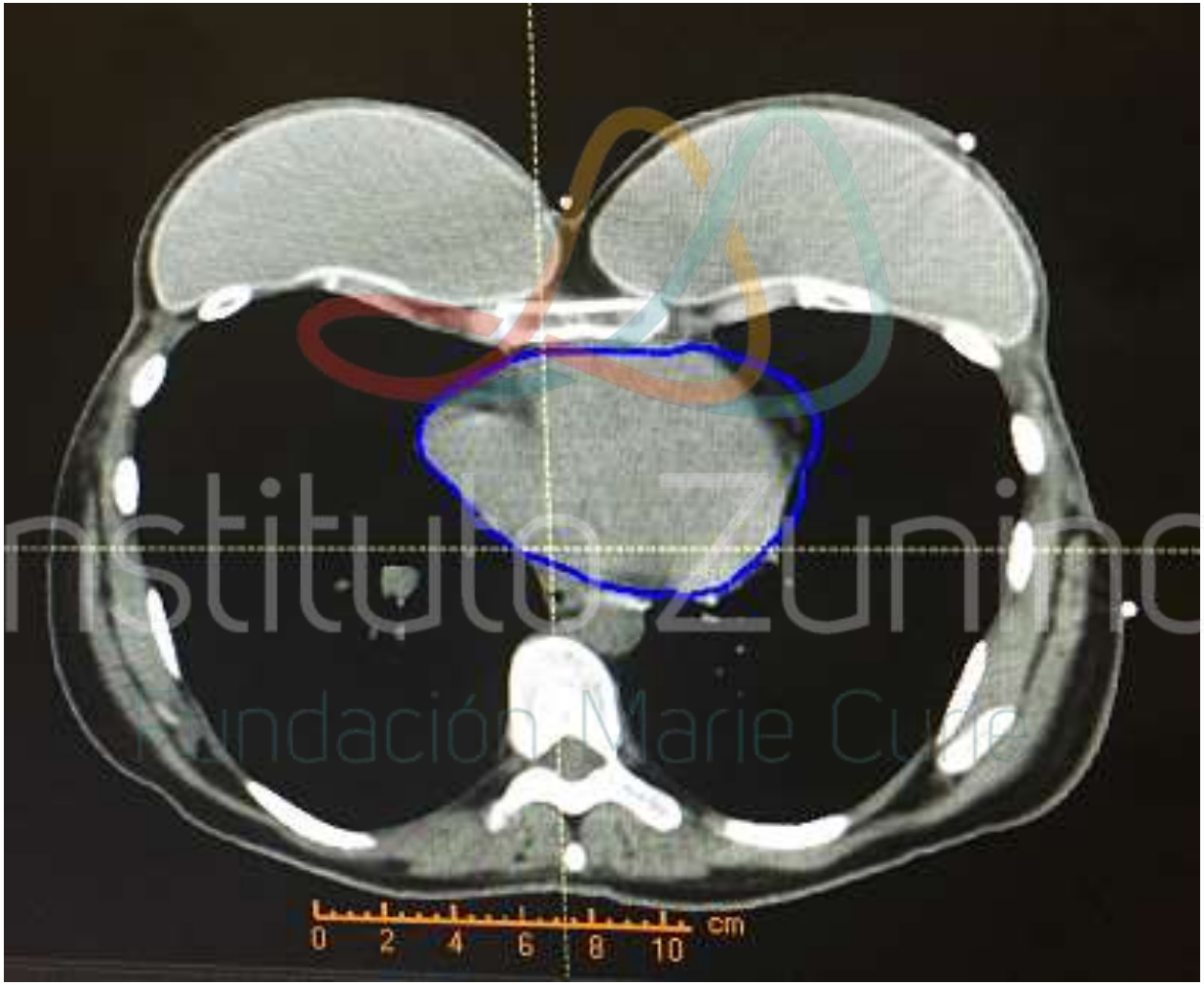
Breast reconstruction & RT: *RT after reconstruction*

Coverage of target volume; regional RT.



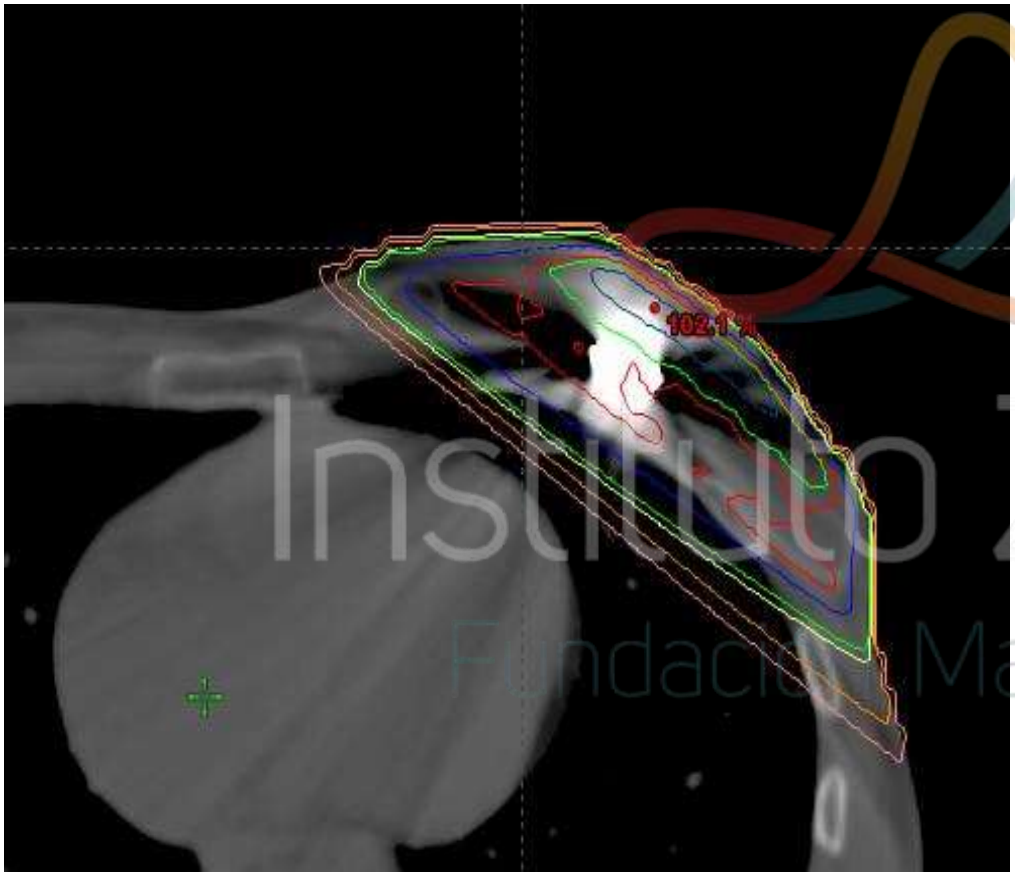
Breast reconstruction & RT: *RT after reconstruction*

Bilateral reconstruction.



Breast reconstruction & RT: *RT after reconstruction*

Tissue heterogeneities.



Breast reconstruction & RT: *RT after reconstruction*

Coverage/regional/OAR.

<u>Impact of IBR (auto) on dosimetry (MDACC)</u>

- N = 112
- Modified radical mastectomy ➔ IBR (auto) (96% TRAM)

versus

- N = 106
- Modified radical mastectomy without IBR

➔ ***Dosimetric comparisons***

Breast reconstruction & RT: *RT after reconstruction*

Coverage/regional/OAR.

	% optimal dosimetry		
	without reconstruction	with reconstruction	
	n=112	n=106	*p*
Chest wall coverage	100	78	*< 0.0001*
Treatment of IMC	93	45	*< 0.0001*
Lung irradiation	97	83	*< 0.0015*
Heart protection	92	85	*0.14*
Overall:	93%	48%	
Moderate/major deviations		33%/19%	
Left-sided		more deviations	

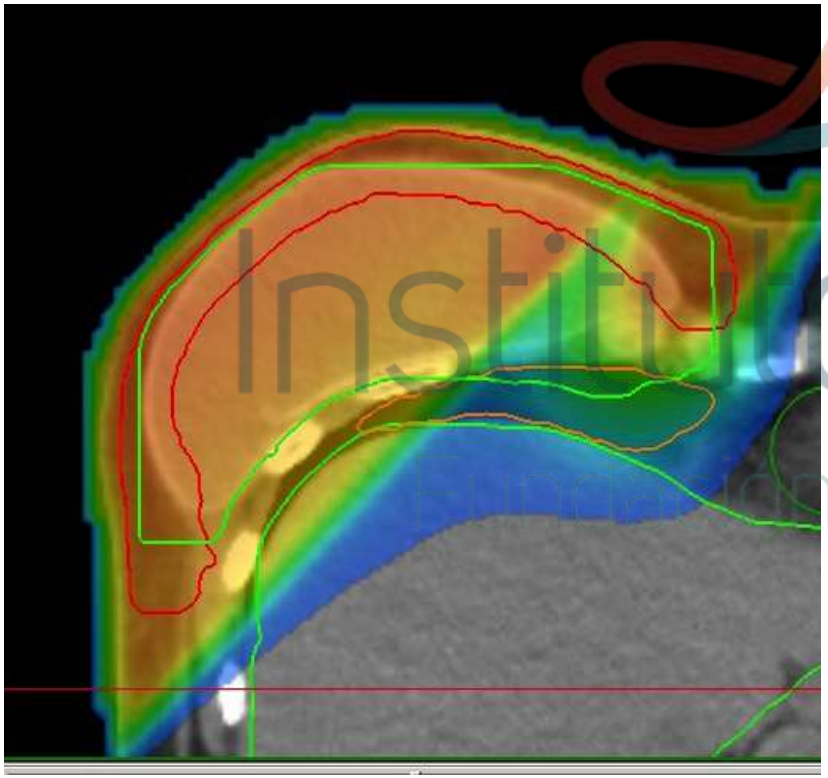
Breast reconstruction & RT: *RT after reconstruction*

New RT techniques.

3D-CRT:

-More experience

-No “low dose bath”



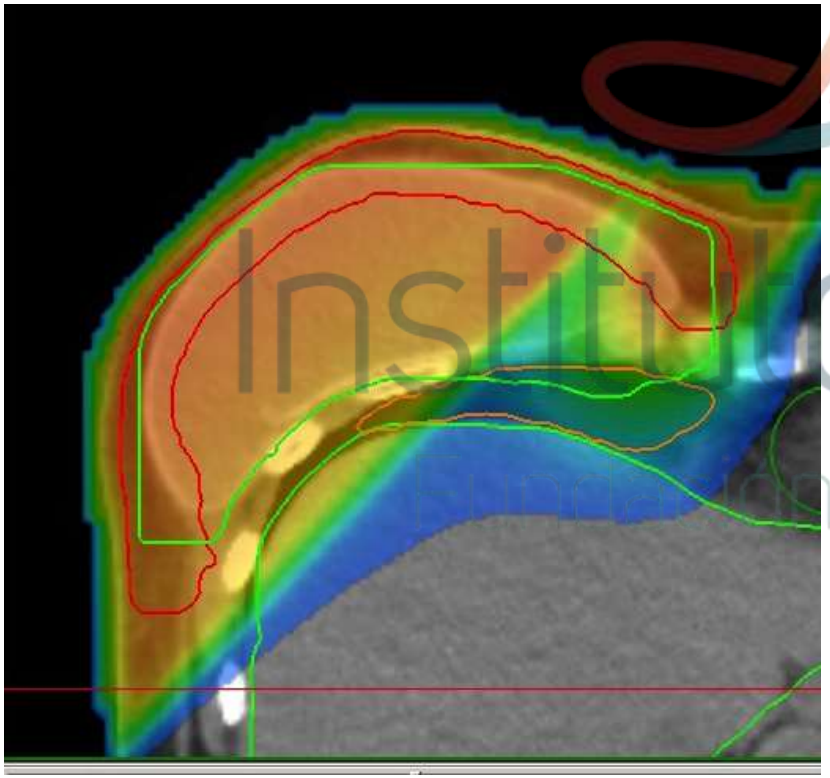
Breast reconstruction & RT: *RT after reconstruction*

New RT techniques.

3D-CRT:

-More experience

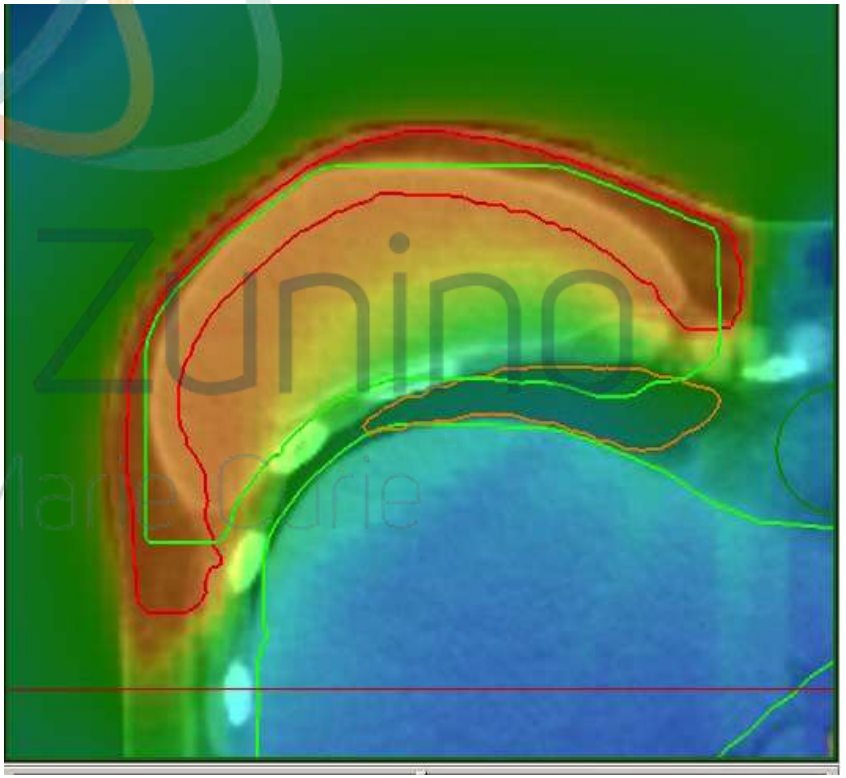
-No “low dose bath”



Volumetric IMRT:

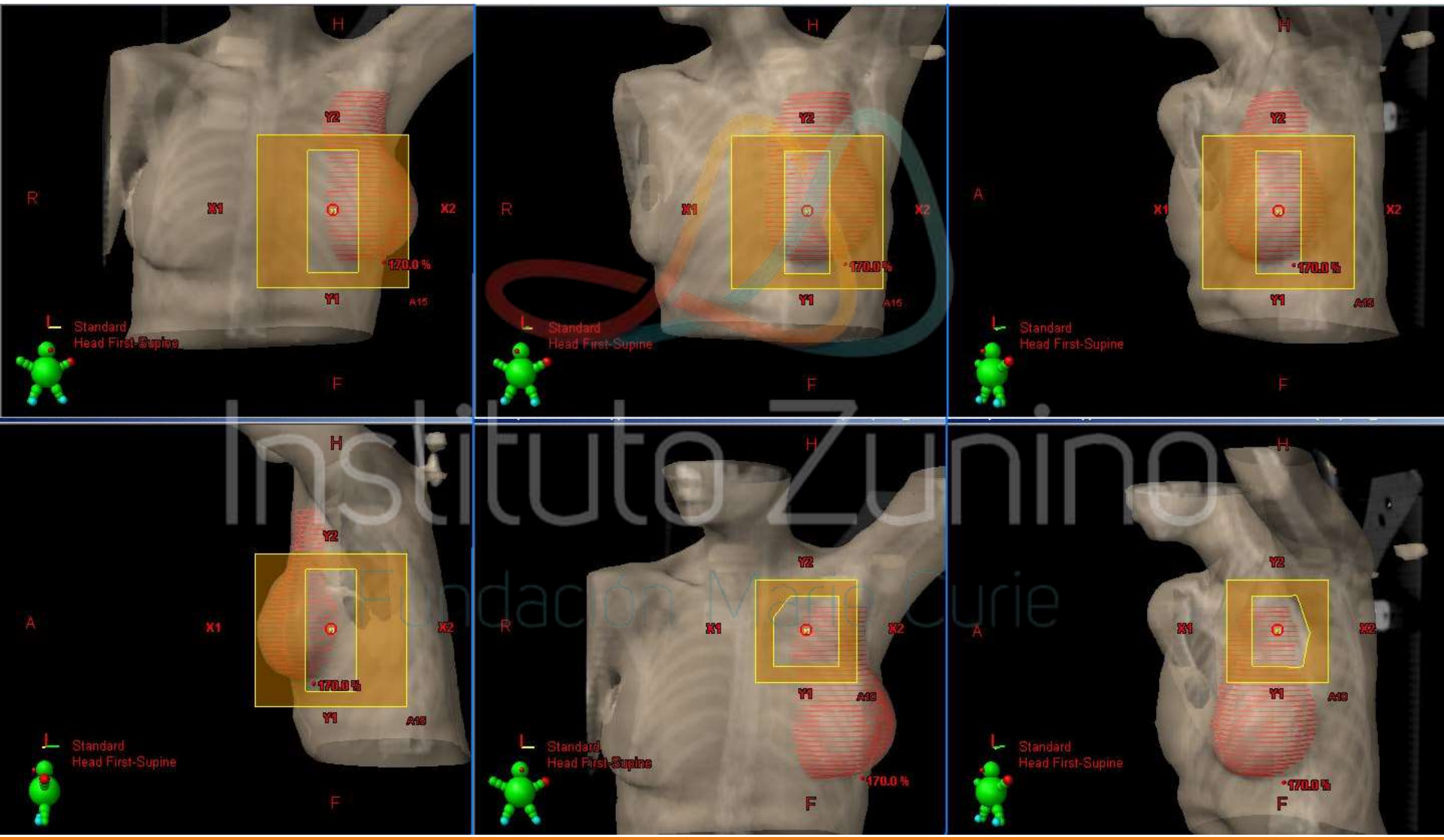
-Better TV coverage

-Improved dose homogeneity

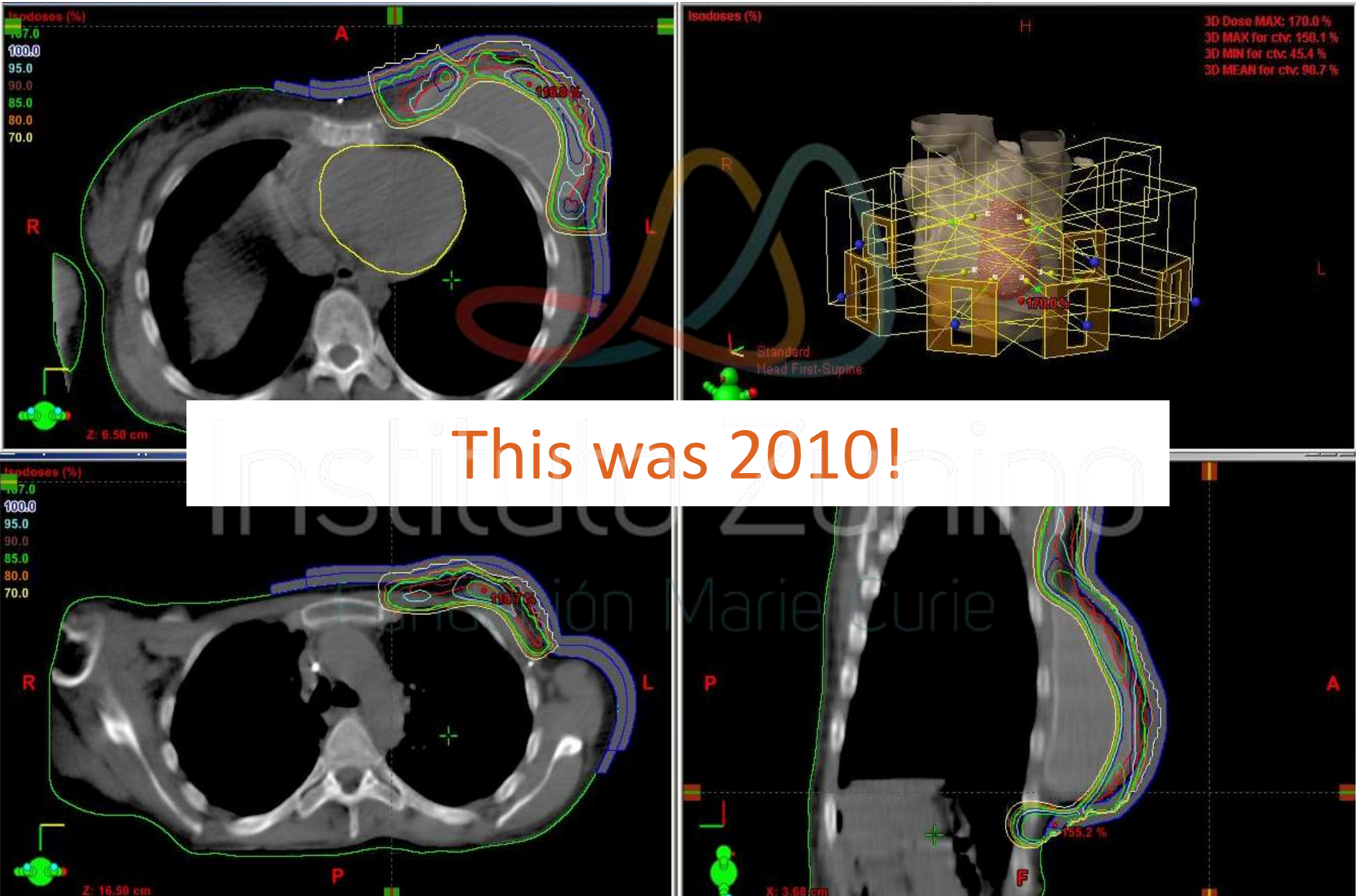


Breast reconstruction & RT: *RT after reconstruction*

New RT techniques.



Breast reconstruction & RT: *RT after reconstruction*



This was 2010!

Breast reconstruction & RT: *RT after reconstruction*

Breast reconstruction & RT: *RT after reconstruction*

Question 3:

- Is it technically feasible (RT issues)?

Answer:

- Quite a challenge to meet all constraints
- More time and resource consuming
- Target volume delineation (!!!)

Breast reconstruction & RT: past or present challenge?

1. Introduction
2. RT after breast reconstruction
3. Breast reconstruction after RT
4. Sequence of reconstruction & RT
5. New developments / On-going research
6. Conclusions

Breast reconstruction & RT: *Reconstruction after RT*

Question:

- Is it safe (complications/cosmesis)?

Answers:

- Autologous in general preferred
- Individualise

Breast reconstruction & RT: past or present challenge?

1. Introduction
2. RT after breast reconstruction
3. Breast reconstruction after RT
4. Sequence of reconstruction & RT
5. New developments / On-going research
6. Conclusions

Breast reconstruction & RT: *Reconstruction & RT sequence*

A Systematic Review of Complications of Implant-Based Breast Reconstruction with Pre-Reconstruction and Post-Reconstruction Radiation Therapy

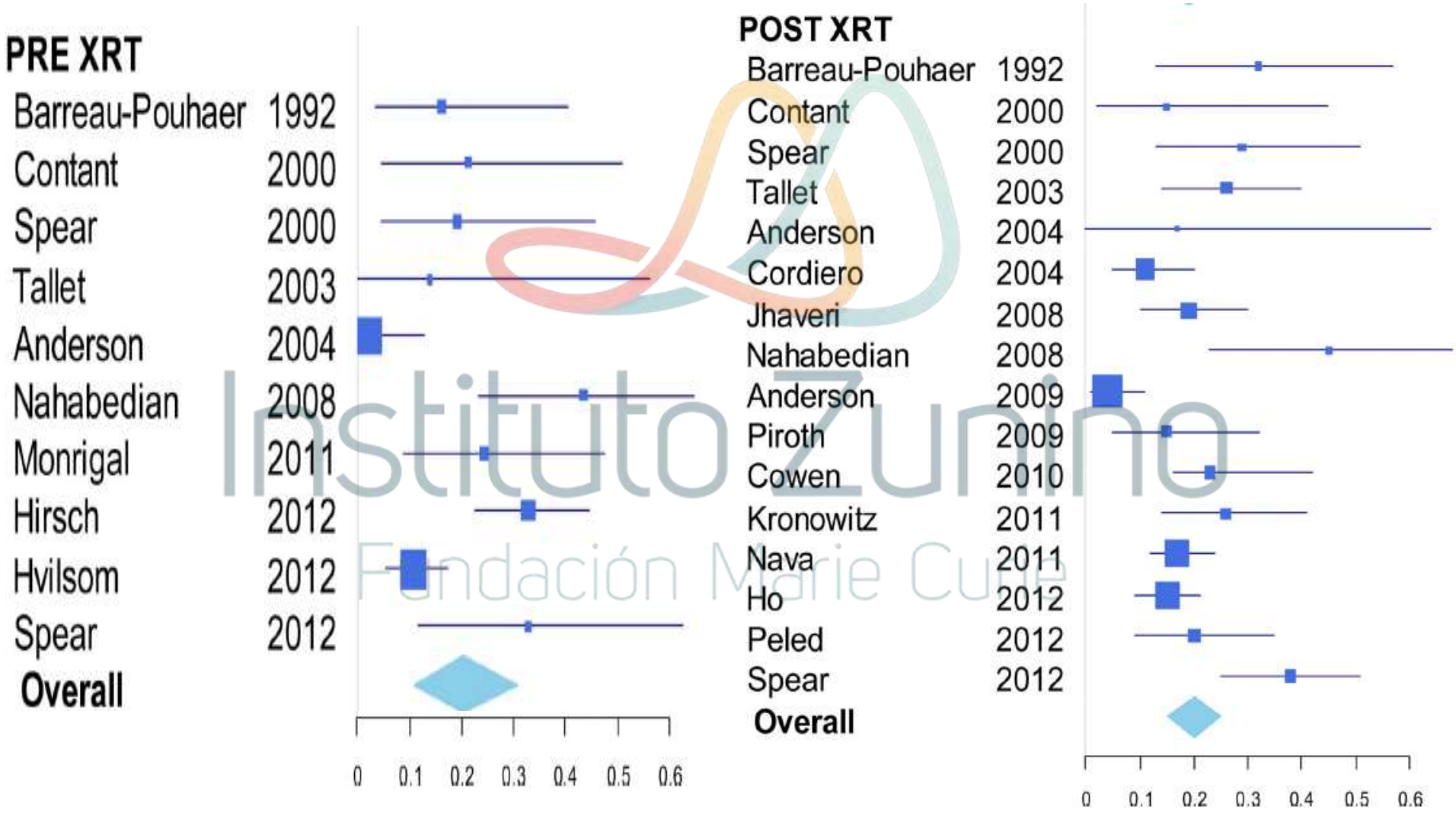
Adeyiza O. Momoh, MD[1], Raouf Ahmed, BSc Hons[2], Brian P. Kelley, MD[3], Oluseyi Aliu, MD[3], Kelley M. Kidwell, PhD[4], Jeffrey H. Kozlow, MD[5], and Kevin C. Chung, MD MS[6]

1006 ➔ 26 articles *1684 patients/breasts*

- 14 on pre-reconstruction RT
- 23 on post-reconstruction RT

Breast reconstruction & RT: *Reconstruction & RT sequence*

Reconstruction failures



Breast reconstruction & RT: *Reconstruction & RT sequence*

A Systematic Review of Morbidity Associated with Autologous Breast Reconstruction Before and After Exposure to Radiation Therapy- Are Current Practices Ideal?

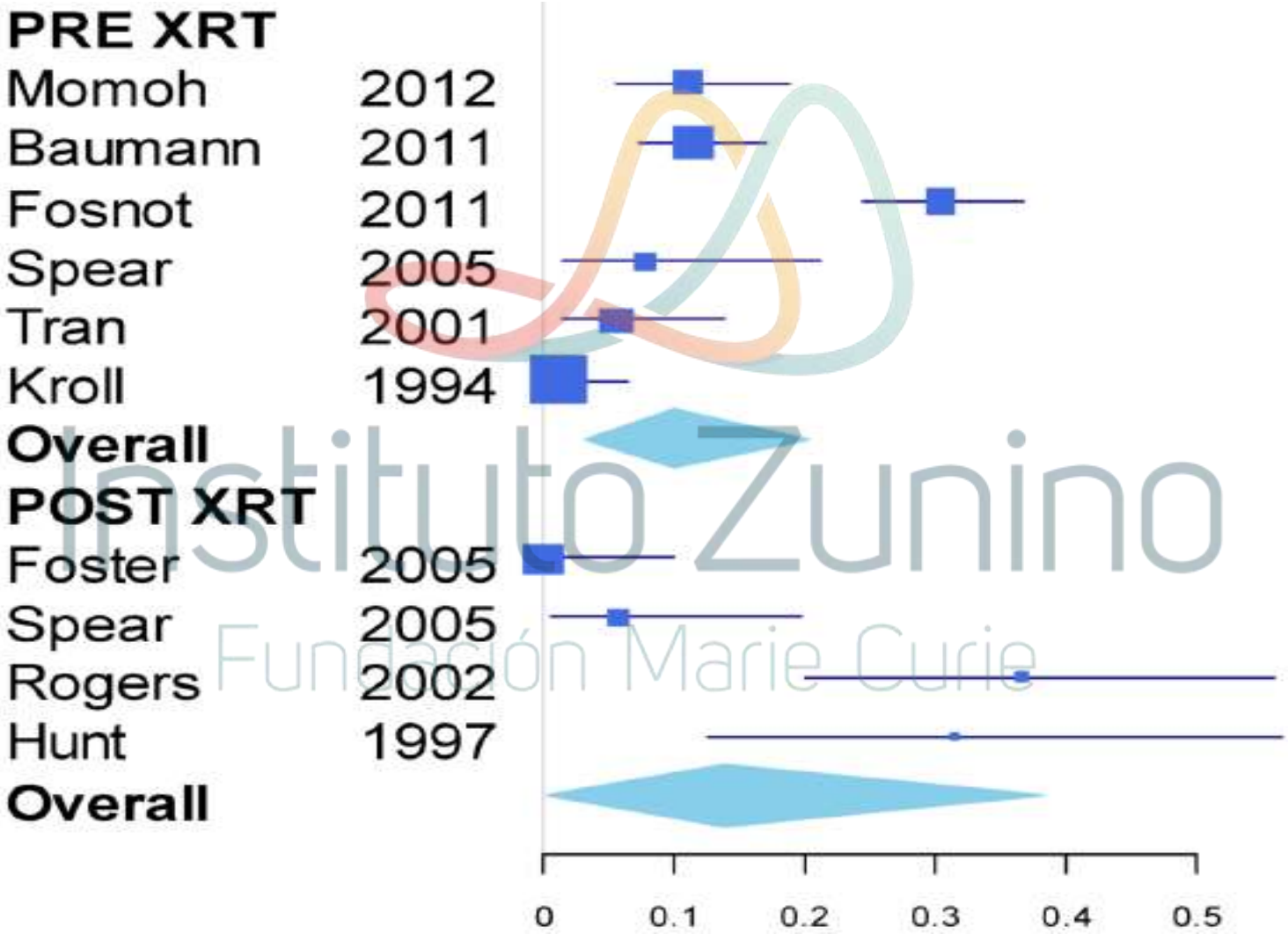
Brian P. Kelley, MD[1], Raouf Ahmed, BSc Hons[2], Kelley M. Kidwell, PhD[3], Jeffrey H. Kozlow, MD MS[4], Kevin C. Chung, MD MS[5], and Adeyiza O. Momoh, MD[6]

897 ➔ 20 articles *1580 patients/breasts*

- 6 on pre-reconstruction RT
- 9 on post-reconstruction RT
- 5 both

Breast reconstruction & RT: *Reconstruction & RT sequence*

Wound healing complications



Breast reconstruction & RT: *Reconstruction & RT sequence*

<u>= very similar:</u>

- But more complications than without PMRT
- Homologous better
- Carefully evaluate “quality” of (sub)cutaneous tissue

Breast reconstruction & RT: past or present challenge?

1. Introduction
2. RT after breast reconstruction
3. Breast reconstruction after RT
4. Sequence of reconstruction & RT

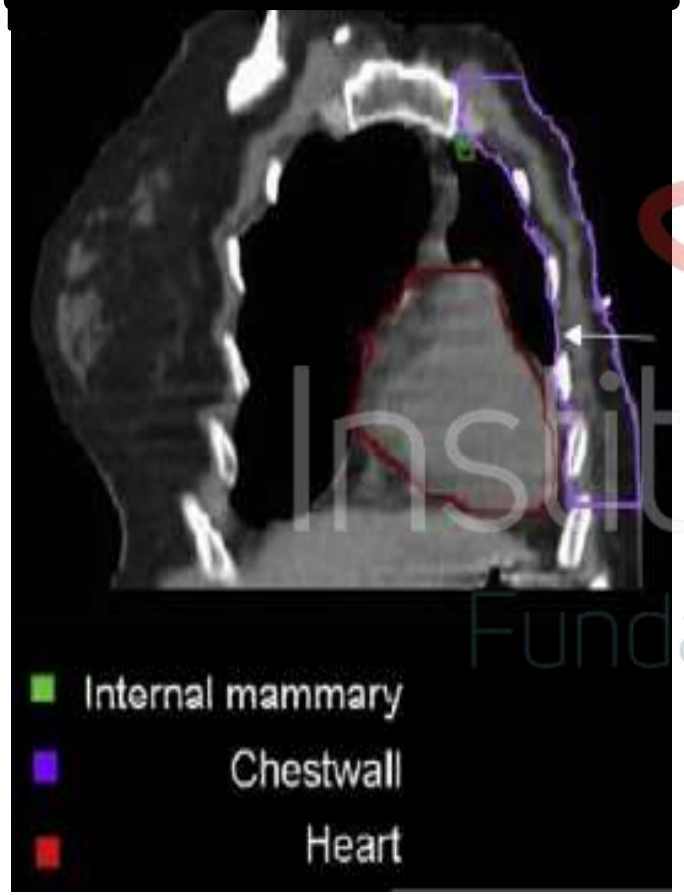
5. New developments / on-going research

6. Conclusions

Breast reconstruction & RT: *Developments*

Guidelines for PMRT- CTV_chest wall

RTOG guidelines



ESTRO guidelines

Skin: CTVp_thoracic wall extended up to the level of the skin.

CW: Unless invasion (T4a and T4c), there is *no* reason for routinely including the major pectoral muscle and the ribs.

Breast reconstruction & RT: *Developments*

Guidelines for PMRT- CTV_chest wall after IBR

ESTRO ACROP consensus guideline for target volume delineation in the setting of postmastectomy radiation therapy after implant-based immediate reconstruction for early stage breast cancer

Orit Kaidar-Person*, Birgitte Vrou Offersen*, Sandra Hol, Meritxell Arenas, Cynthia Aristei, Celine Bourgier, Maria Joao Cardoso, Boon Chua, Charlotte Coles, Tine Engberg Damsgaard, Dorota Gabrys, Reshma Jagsi, Rachel Jimenez, Anna M. Kirby, Carine Kirkove, Youlia Kirova, Vassilis Kouloulias, Tanja Marinko, Icro Meattini, Ingvil Mjaaland, Gustavo Nader Marta, Petra Witt Nystroem, Elzbieta Senkus, Tanja Skyttä, Tove F Tvedskov, Karolien Verhoeven, Philip Poortmans.

Breast reconstruction & RT: *Developments*

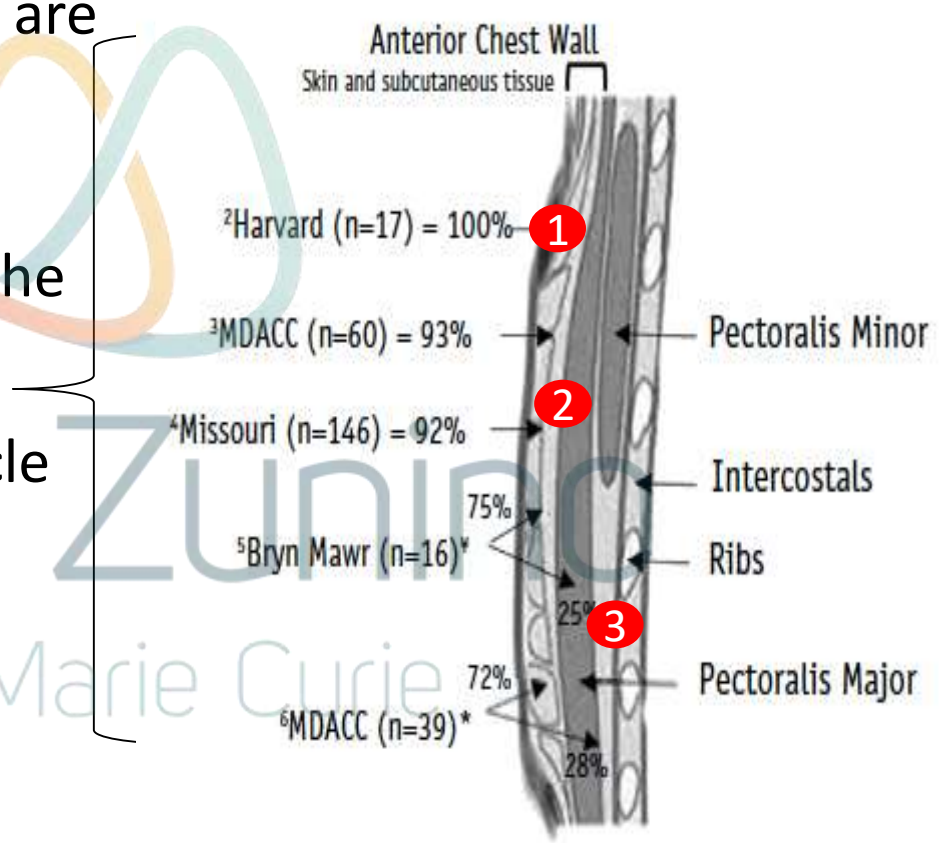
Guidelines for PMRT- CTV_chest wall after IBR

- Target volume should be decided according to risk & site of recurrence.
- Understanding the surgical procedure and pathology report is essential!

Breast reconstruction & RT: *Developments*

Sites of recurrence

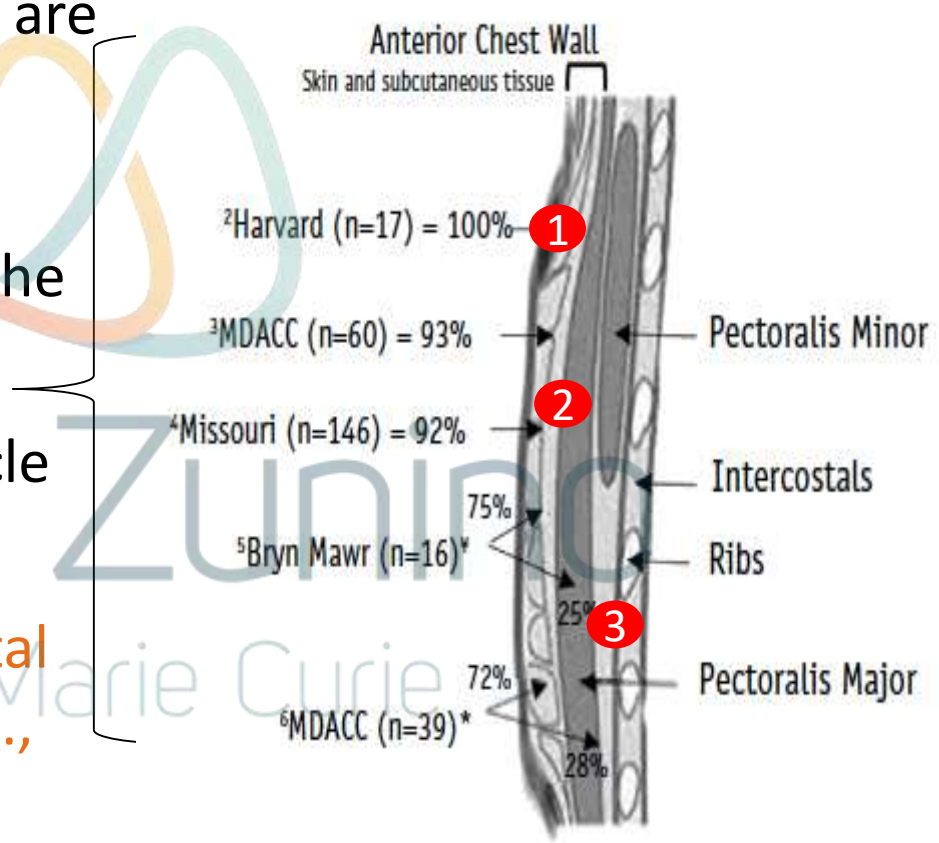
- ✓ 72-100% “chest wall” recurrences are within the skin and subcutaneous tissue anterior to the pectoralis
- ✓ #2nd most common site is within the pectoralis
- ✓ No reports of isolated rib/IC muscle recurrences intercostal muscles...



Breast reconstruction & RT: *Developments*

Sites of recurrence

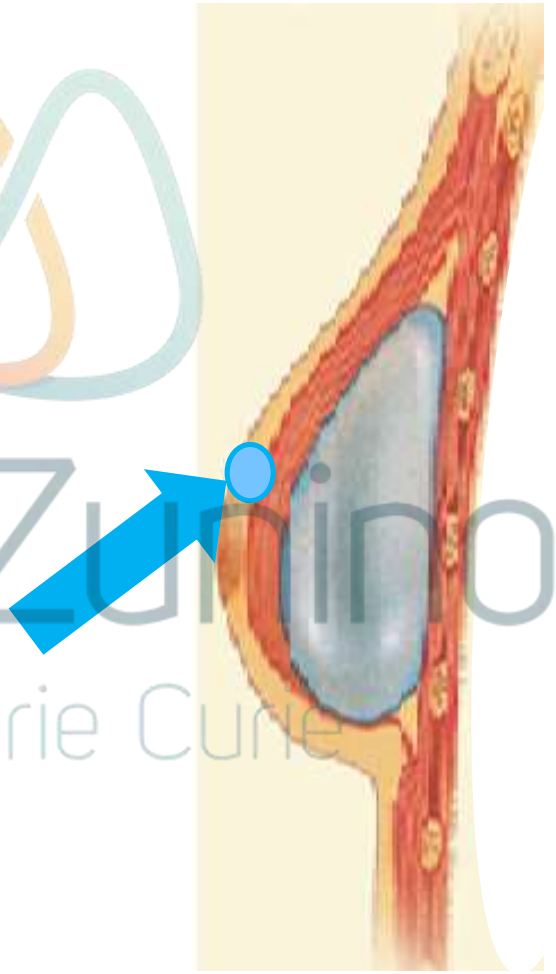
- ✓ 72-100% “chest wall” recurrences are within the skin and subcutaneous tissue anterior to the pectoralis
- ✓ #2nd most common site is within the pectoralis
- ✓ No reports of isolated rib/IC muscle recurrences intercostal muscles...
- ✓ ... a few isolated rib and intercostal muscles are reported (Chang et al., Rad & Onc 2017)



Breast reconstruction & RT: *Developments*

Sites of recurrence – implant-based reconstruction

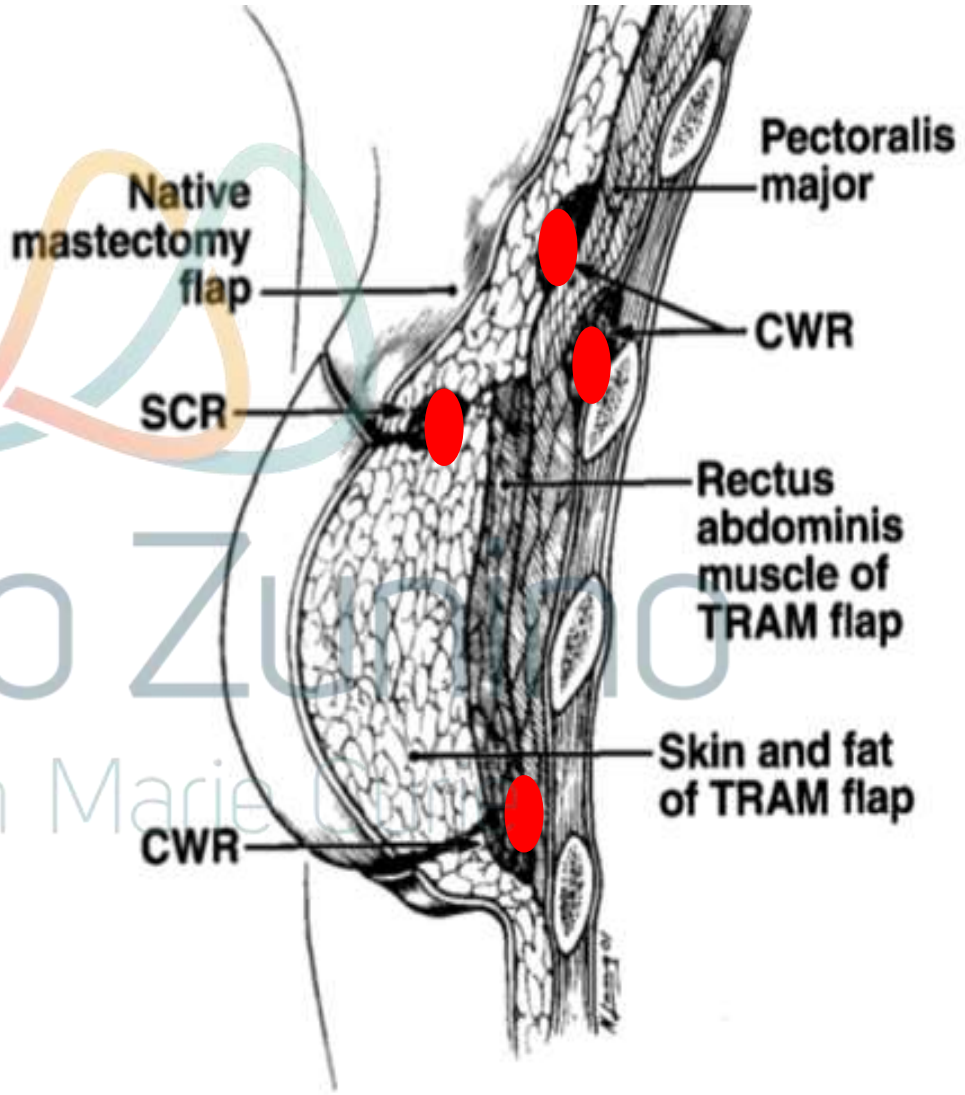
Post-pectoral implant



Breast reconstruction & RT: *Developments*

Sites of recurrence – autologous reconstruction

According to literature the sites of recurrence remain the same regardless of the autologous procedure.



Breast reconstruction & RT: *Developments*

Sites of recurrence ➔ target volumes

What are the target volumes in the immediate-reconstruction setting?

Like without reconstruction but:

- *Without the reconstructed (prosthesis, autologous (muscle, fat, skin), ...) material/tissue*
- *Some tissue might be displaced (pectoral muscles) or stretched (skin)*

Breast reconstruction & RT: *Developments*

Sites of recurrence ➔ target volumes

Yes, taking into account:

- *Tissue that might be displaced (pectoral muscles)*
- *Tissue that can be stretched (skin)*

Are the target volumes similar in case of implant-based reconstruction versus autologous flap?

Breast reconstruction & RT: *Developments*

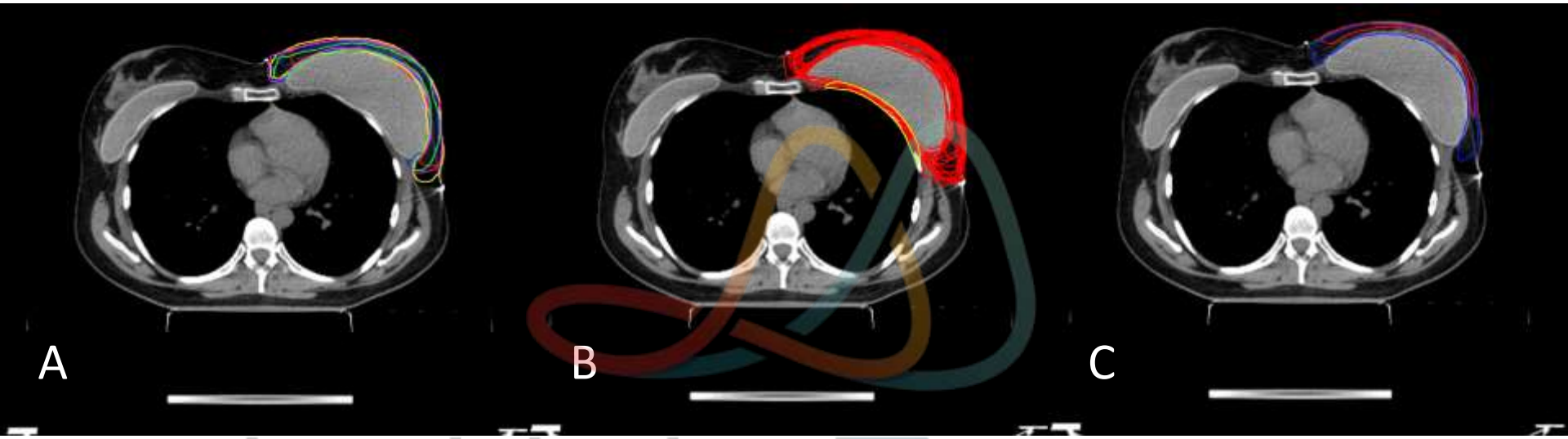


Figure 1: CTV contouring of case with immediate breast reconstruction left using an implant. A: by writers of guideline of DBCG RT Recon Trial (n=5); B: by other radiation oncologists (n=18); C: by breast cancer surgeons (n=2).

Kaidar-Person O, et al. Radiother Oncol 2019, accepted.

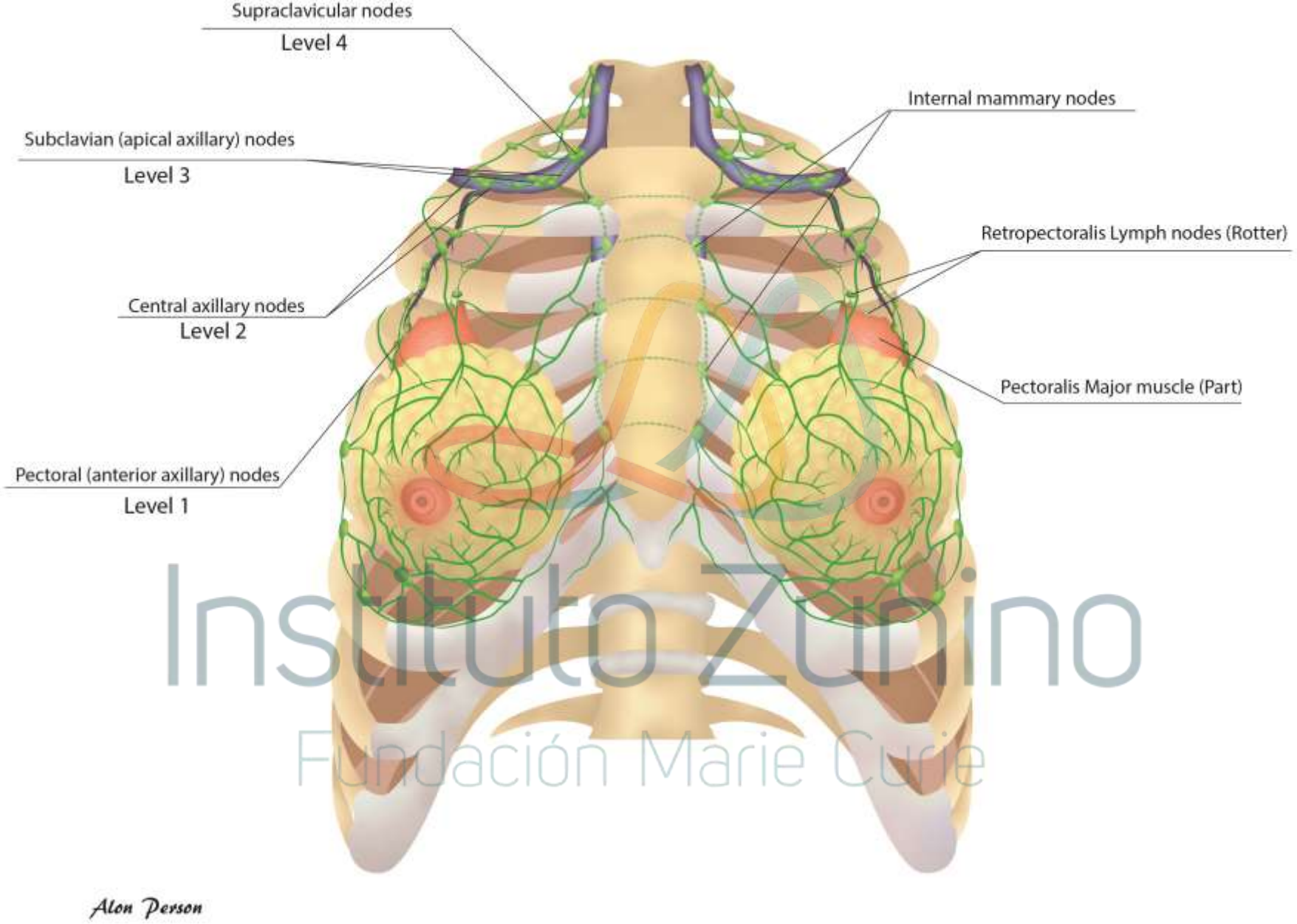


Figure 2: Lymphatic draining pattern from the mammary region via the dermal plexus located within the subcutaneous tissues.

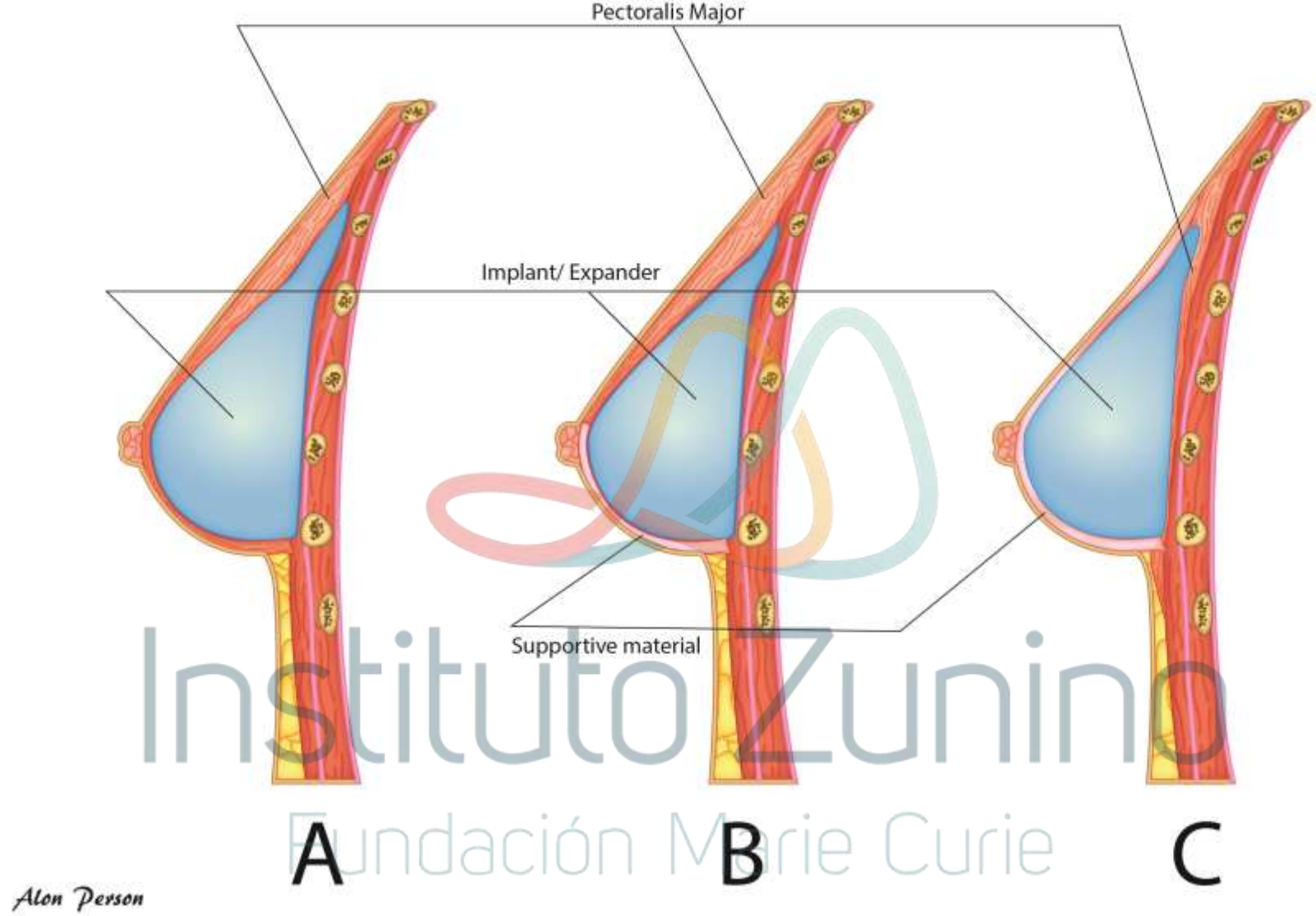


Figure 3: Implant positioning. A: retropectoral with full coverage by the pectoral muscle; B: retropectoral with partial coverage by the pectoral muscle and supportive material in the lower part; C: prepectoral with full coverage by supportive material.

Breast reconstruction & RT: *Developments*

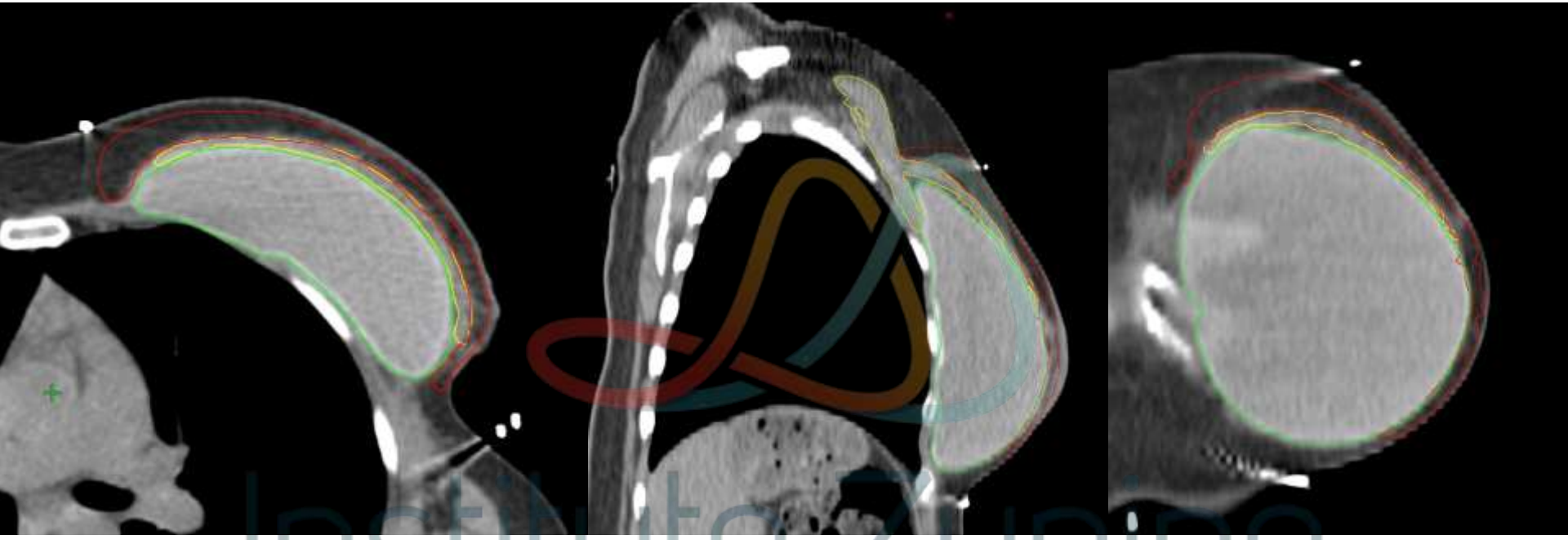


Figure 4A: CTVp_chestwall with only a ventral part (red) in cases for whom only the subcutaneous lymphatic plexus should be irradiated. Pectoral muscles (yellow) and implant (green).

Kaidar-Person O, et al. Radiother Oncol 2019, accepted.

Breast reconstruction & RT: *Developments*

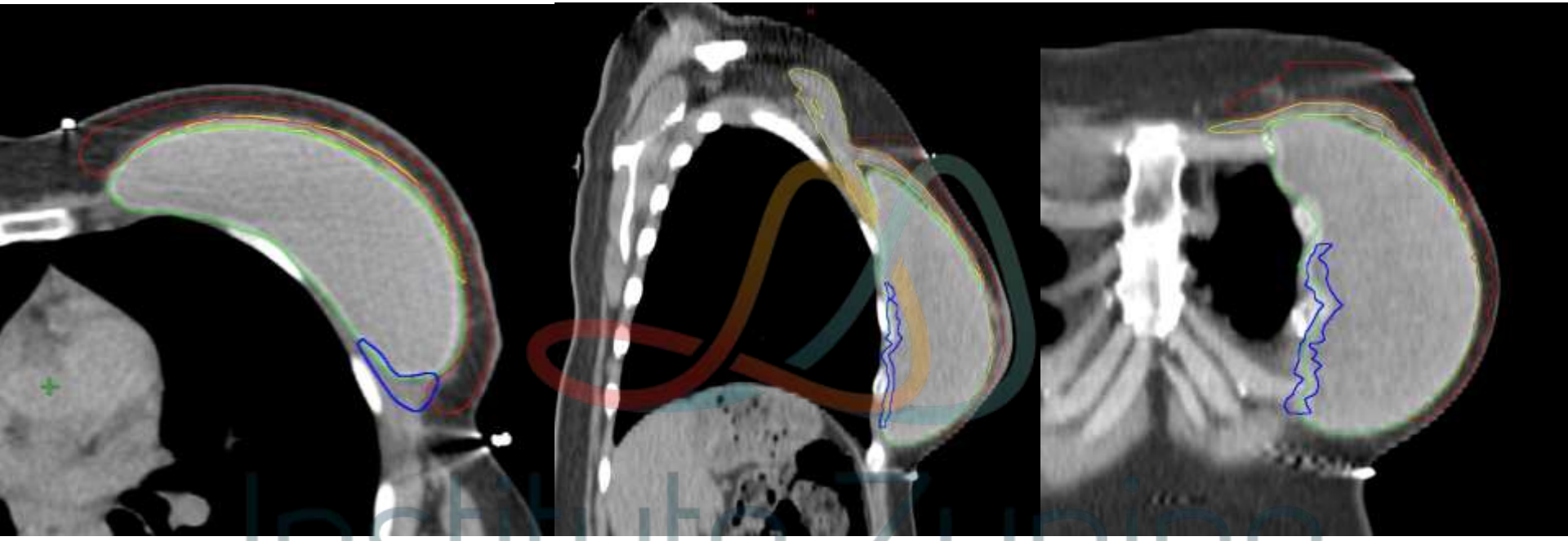


Figure 4B: CTVp_chestwall with a ventral (red) and dorsal (blue) part in cases for whom the subcutaneous lymphatic plexus should be irradiated as well as the part of the chest wall that was initially not covered by the pectoral muscles (yellow). Retropectoral implant (green).

Kaidar-Person O, et al. Radiother Oncol 2019, accepted.

Breast reconstruction & RT: *Developments*

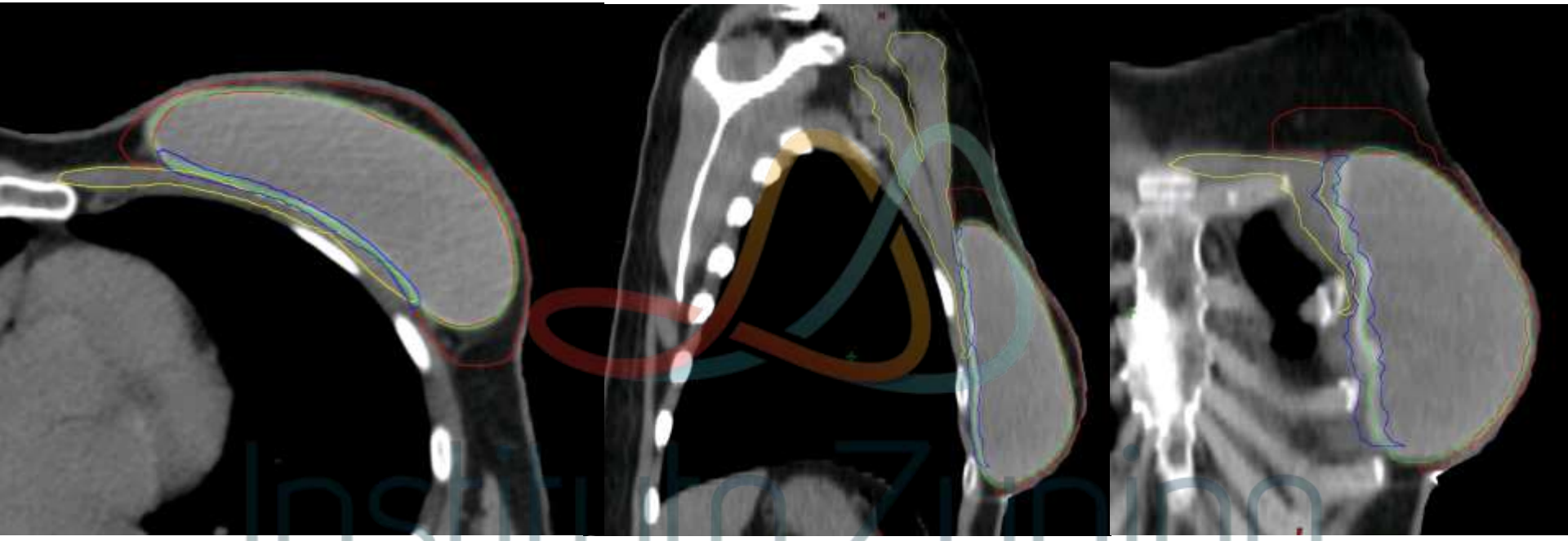


Figure 4C: CTVp_chestwall with a ventral (red) and dorsal (blue) part in cases with a prepectoral implant (green). Pectoral muscles (yellow).

Kaidar-Person O, et al. Radiother Oncol 2019, accepted.

Breast reconstruction & RT: *Developments*

The DBCG RT Recon Trial:

Immediate versus delayed breast reconstruction in early breast cancer patients treated with mastectomy and adjuvant loco-regional radiation therapy.

A multicenter randomized clinical trial

Future research

1. Target volume definition
2. In fact, this entire clinical question…
3. SSM/NSM +/- deflated tissue expander
4. (Free) fat grafting
5. BRAVA & HBOT
6. RT before mastectomy

Breast reconstruction & RT: past or present challenge?

1. Introduction
2. RT after breast reconstruction
3. Breast reconstruction after RT
4. Sequence of reconstruction & RT
5. New developments / on-going research

6. Conclusions

Breast reconstruction & RT: *Conclusions*

1. Advise BCT, unless…
2. Determine the odds for PMRT prior to surgery
3. No clear impact on prognosis
4. Impact on complications and cosmesis
5. Less complications with autologous
6. Individualise based on: RT effects; BMI; HT; age; smoking; stage; surgeon
7. Joint multidisciplinary process & shared decision making

Breast reconstruction & RT: *Conclusions*

1. Advice BCT, unless…
2. Determine the odds for PMRT prior to surgery
3. No clear impact on prognosis
4. Impact on complications and cosmesis
5. Less complications with autologous
6. Individualise based on: RT effects; BMI; HT; age; smoking; stage; surgeon
7. Joint multidisciplinary process & shared decision making

Breast reconstruction & RT: *Conclusions*

1. Advice BCT, unless…
2. Determine the odds for PMRT prior to surgery
3. No clear impact on prognosis
4. Impact on complications and cosmesis
5. Less complications with autologous
6. Individualise based on: RT effects; BMI; HT; age; smoking; stage; surgeon
7. Joint multidisciplinary process & shared decision making

Breast reconstruction & RT: *Conclusions*

1. Advice BCT, unless…
2. Determine the odds for PMRT prior to surgery
3. No clear impact on prognosis
4. Impact on complications and cosmesis
5. Less complications with autologous
6. Individualise based on: RT effects; BMI; HT; age; smoking; stage; surgeon
7. Joint multidisciplinary process & shared decision making

Breast reconstruction & RT: *Conclusions*

1. Advice BCT, unless…
2. Determine the odds for PMRT prior to surgery
3. No clear impact on prognosis
4. Impact on complications and cosmesis
5. Less complications with autologous
6. Individualise based on: RT effects; BMI; HT; age; smoking; stage; surgeon
7. Joint multidisciplinary process & shared decision making

Breast reconstruction & RT: *Conclusions*

1. Advice BCT, unless…
2. Determine the odds for PMRT prior to surgery
3. No clear impact on prognosis
4. Impact on complications and cosmesis
5. Less complications with autologous
6. Individualise based on: RT effects; BMI; HT; age; smoking; stage; surgeon
7. Joint multidisciplinary process & shared decision making

Breast reconstruction & RT: *Conclusions*

1. Advice BCT, unless…
2. Determine the odds for PMRT prior to surgery
3. No clear impact on prognosis
4. Impact on complications and cosmesis
5. Less complications with autologous
6. Individualise based on: RT effects; BMI; HT; age; smoking; stage; surgeon
7. Joint multidisciplinary process & shared decision making

Breast reconstruction & RT: *Acknowledgements*

- Orit Kaidar-Person
- Birgitte Offersen
- Charlotte Coles
- Ingvil Mjaaland
- Liesbeth Boersma
- Sandra Hol
- Miika Palmu
- Celine Bourgier
- Icro Meattini
- Meritxell Arenas
- Anna Kirby
- Sofia Rivera
- Carine Kirkove
- Elzbieta Senkus-Konefka
- Youlia Kirova
- Cynthia Aristei
- Vassilis Kouloulias
- Gustavo Nader Marta
- Dorota Gabrys
- Karolien Verhoeven
- Rachel Jimenez
- Reshma Jagsi
- Boon Chua
- Yvonne Zissiadis
- Tanja Skyttä
- Tanja Marinko
- Petra Witt Nystroem
- Tine Engberg Damsgaard
- Fiona MacNeill
- Maria Joao Cardoso
- Tove Tvedskov
- Giorgio De Santis
- And many others!


TRAPPIST
WESTVLETEREN
BELGIANSHOP.COM©


institutCurie