

Surgical Advances in Breast Cancer- Puerto Rico

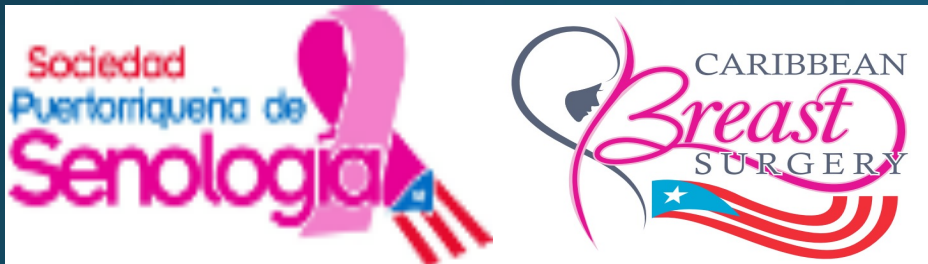
13th Winter Cancer Symposium, Rio Grande, Puerto Rico

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Director Caribbean Breast Surgery



Surgical Advances in Breast Cancer- Puerto Rico

- ONCOPLASTIC SURGERY

- INTRA OPERATIVE RADIO
THERAPY- IORT

Surgical Advances in Breast Cancer- Puerto Rico

- ONCOPLASTIC SURGERY

- Combines the principles of oncologic resection with the advantages of plastic reconstruction to obtain the best possible cosmetic results without compromising the oncologic resection.

- INTRA OPERATIVE RADIO
THERAPY- IORT

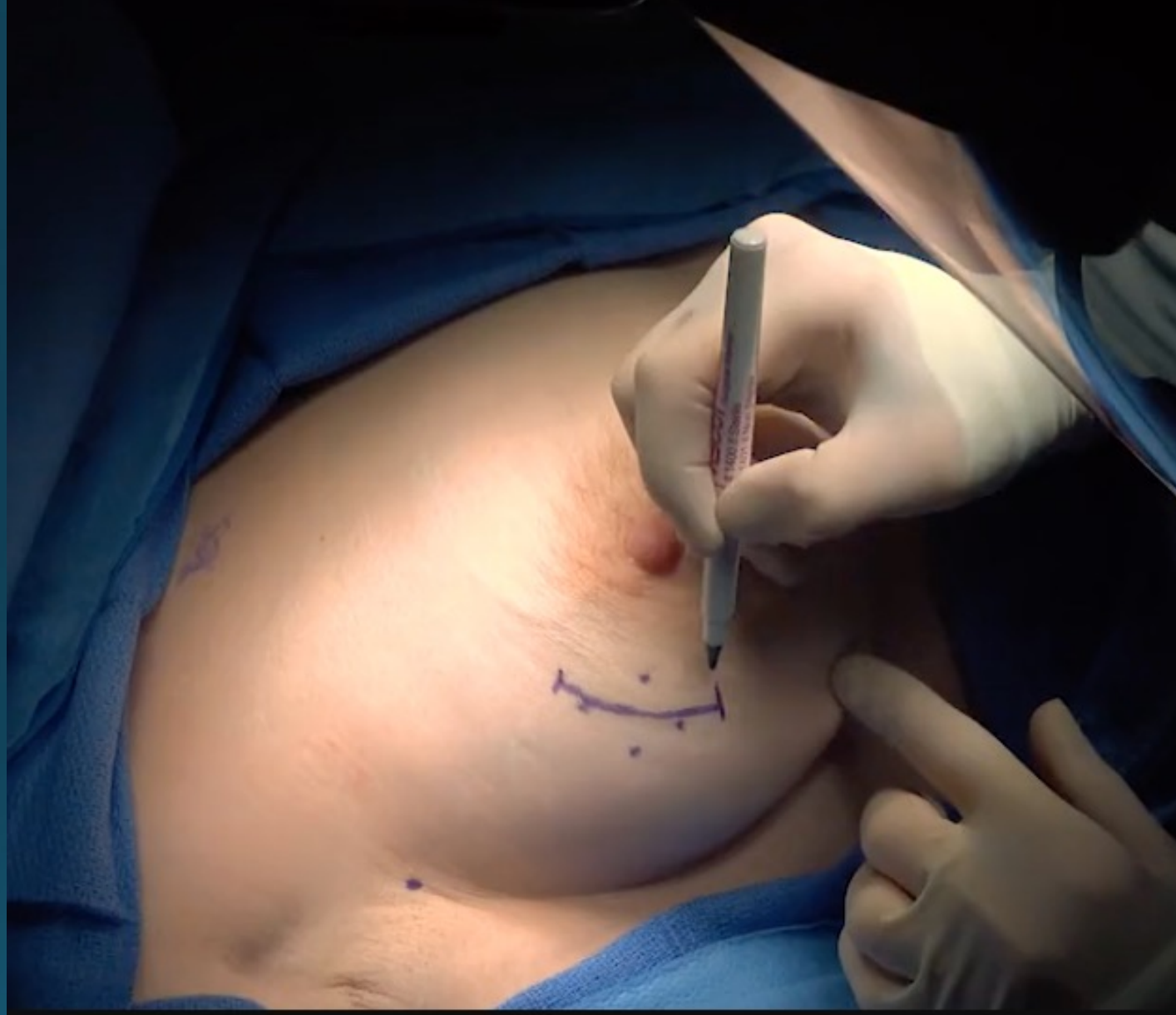
Surgical Advances in Breast Cancer- Puerto Rico

- ONCOPLASTIC SURGERY

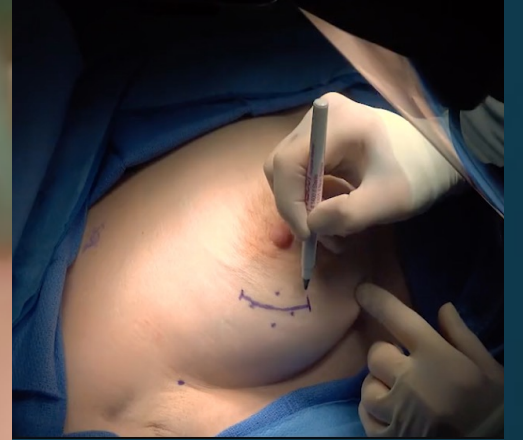
- INTRA OPERATIVE RADIO
THERAPY- IORT

- Direct delivery of the planned radiation dose into the tumor cavity at the time of surgery.
- May be used as a single treatment or as a tumor bed boost followed by subsequent WBRT

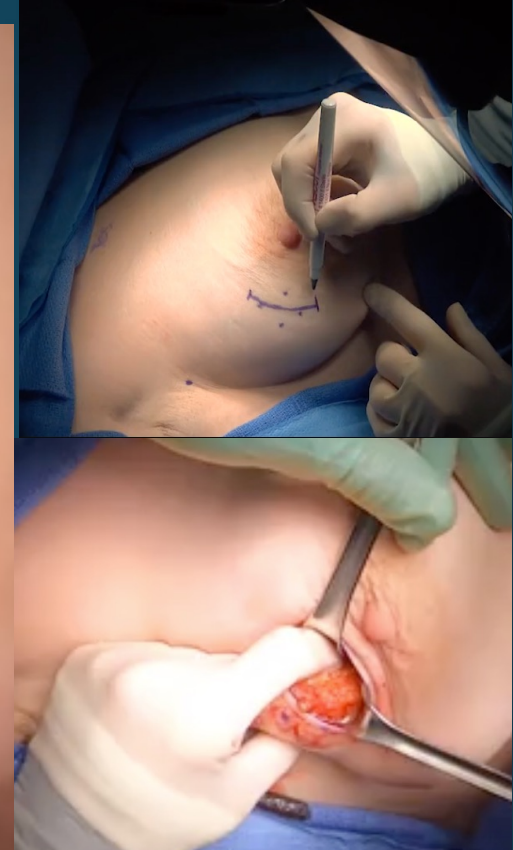
Traditional lumpectomy + SLNBx



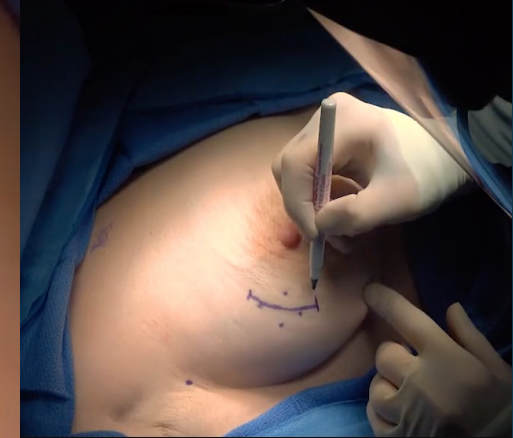
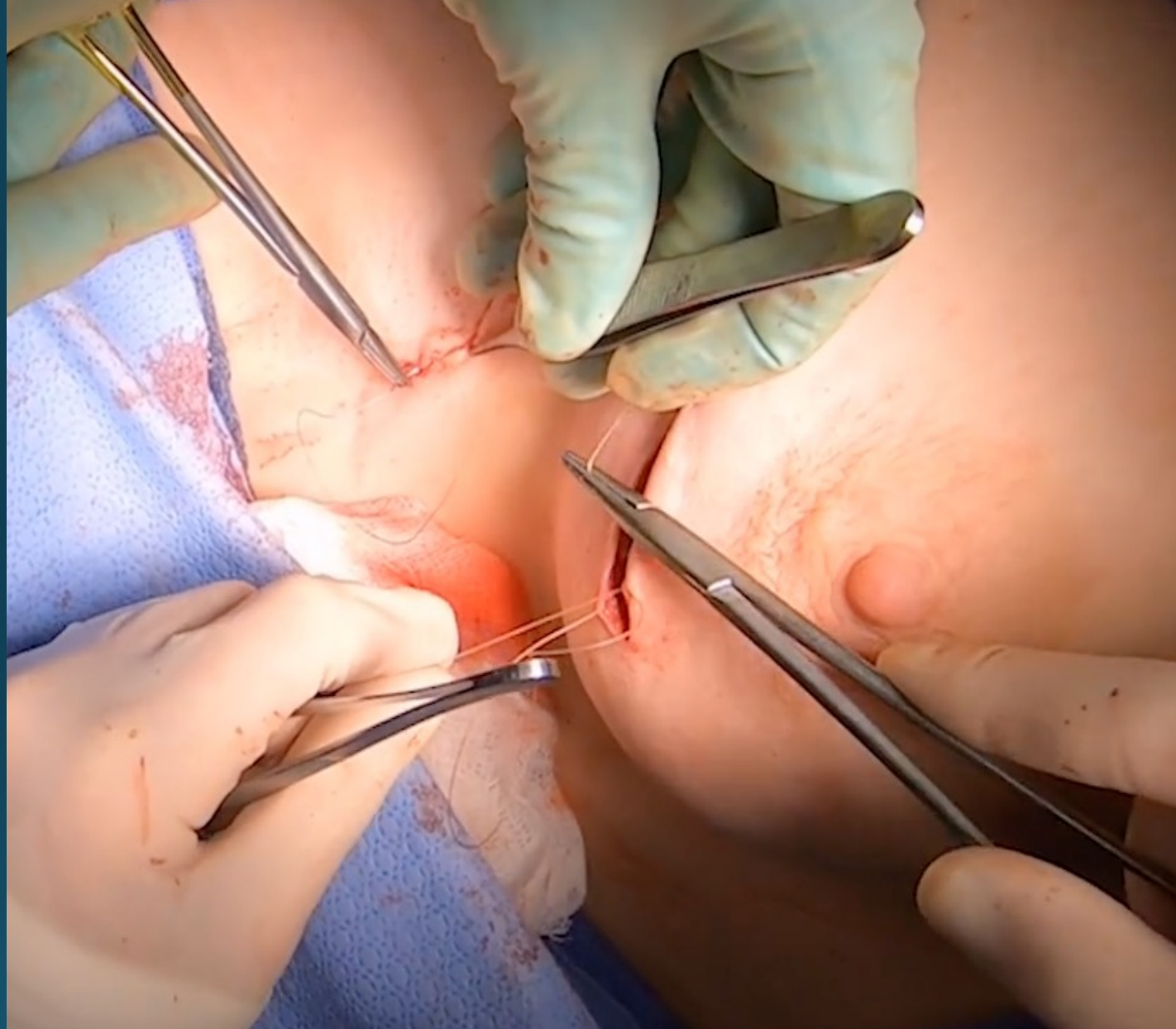
Traditional lumpectomy + SLNBx



Traditional lumpectomy + SLNBx



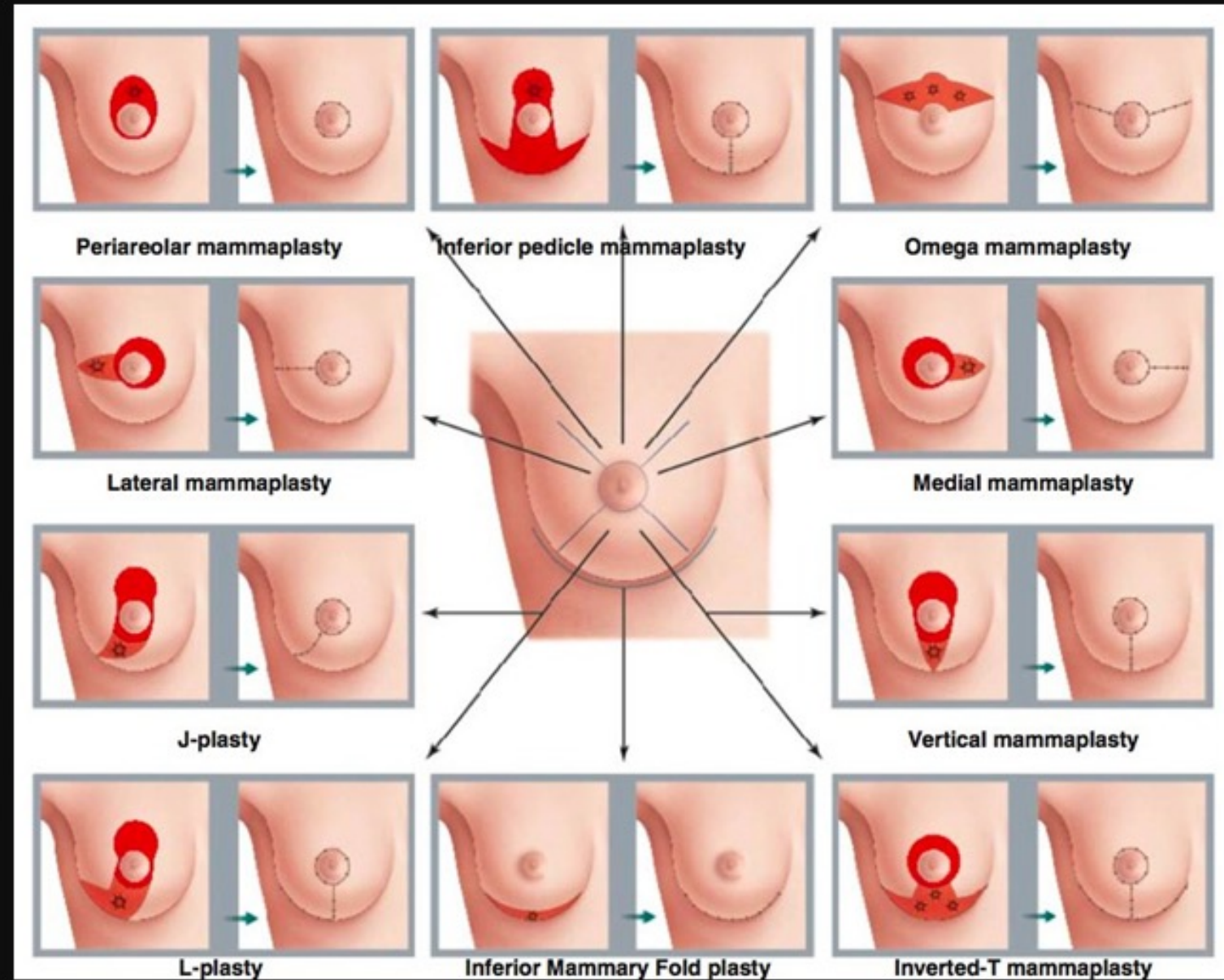
Traditional lumpectomy + SLNBx



Traditional lumpectomy + SLNBx



**Oncoplastic
resection
options
depending on
tumor
localization**



ONCOPLASTIC BREAST SURGERY CLASSIFICATION

Technique	Classification/ Definition	Examples
Volume displacement	Level 1: <20% breast tissue removed	Local tissue rearrangement Crescent mastopexy
	Level 2: 20–50% of breast tissue removed	Reduction mammoplasty
Volume replacement	> 50% of breast tissue removed	Implant-based reconstruction
		Local/regional flap reconstruction
		Thoracodorsal artery perforator, etc

Quick basics of radiotherapy

- **Photons**- completely pass through tissues
 - when used, they must be angled to traverse the target tissue only so as to avoid critical normal tissue
- **Electrons**- traverse only to a specific depth
 - Can be targeted to tailor the tissues of interest

Quick basics of radiotherapy

- Whole breast radiotherapy - **WBRT**
- Accelerated partial breast irradiation- **APBI**
- External beam radiotherapy- **EBRT**
- Brachytherapy
- Intraoperative Radiation Therapy- **IORT**

Intra Operative Radiation Therapy- IORT

- GOAL
 - Provide a non-inferior option to patients with early stage breast cancer
- BENEFITS
 - Shorter duration of tx
 - Decreased RT effect to the rest of the breast
 - Improved cosmesis
 - Reduced cost
 - IMPROVED NON-BREAST RELATED MORTALITY??
- DISADVANTAGES
 - Controversial long term results
 - Not for everyone
 - Limited availability

PRACTICE GUIDELINE | [ARTICLES IN PRESS](#)

Partial Breast Irradiation for Patients With Early-Stage Invasive Breast Cancer or Ductal Carcinoma In Situ: An ASTRO Clinical Practice Guideline

[Simona F. Shaitelman, MD, EdM](#)   • [Bethany M. Anderson, MD](#) • [Douglas W. Arthur, MD](#) • ...
[Shaveta Vinayak, MD](#) • [Timothy Whelan, BM BCh](#) • [Janice A. Lyons, MD](#) • [Show all authors](#)

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Major guidelines for APBI

Criteria	American Society of Breast Surgeons	ASTRO/ NCCN	ESTRO
Age	> 45	≥ 50	≥ 50
Histology	All and DCIS >50 No LVSI	IDC, DCIS (under conditions)	IDC, DCIS
Receptor Status	ER/PR +/-	ER+	
Tumor Size	≤ 3cm	≤ 2cm <u>Inv</u> 2,5 TIS	≤ 3cm
Node Status	N0	N0	N0
Margins	Negative	Negative	Negative
	2018	2023	2020

Intra Operative Radiation Therapy- IORT

- **ELIOT TRIAL** (miniaturized electron beam accelerator)
 - *Arch Surg.* 2003 Nov;138(11):1253-6.
 - *Lancet Oncol.* 2013;14:1269–1277
 - *Lancet Oncol* 2021 Apr 09
- **TARGIT-A TRIAL** (miniaturized low energy X-ray applicator)
 - *Lancet Oncol.* 2004;5(3):165
 - *Lancet.* 2010;376:91–102
 - *BMJ* 2020;370:m2836

ELIOT and TARGIT-A Study Comparison

Subject	ELIOT	TARGIT-A
Whole number in	1305	3451
Number of centers	Single in Milan	33 centers in 11 countries
Time	2000 - 2007	2000 - 2012
Number of IORT group	651	1721
Number of EBRT group	654	1730
EBRT after IORT	Exclude	15.2%
Radiation type	Electron	X-ray
Applicator	4 - 8 cm diameter (cylindrical)	1.5 - 5 cm diameter (spherical)
Energy	4 - 12 MeV	50 kV
Time	3 - 5 minutes	20 - 45 minutes
Dose	21 Gy	20 Gy at surface

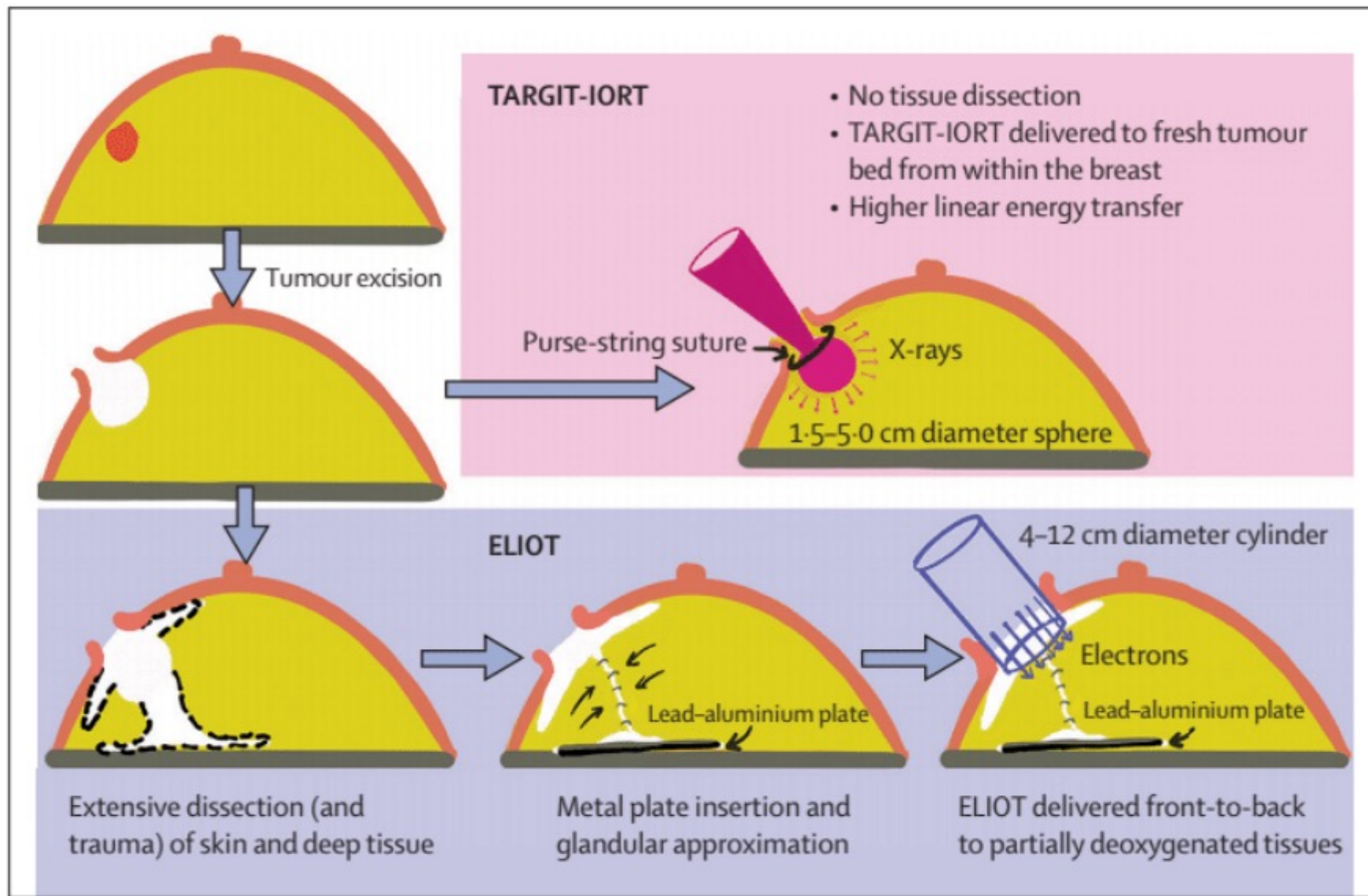


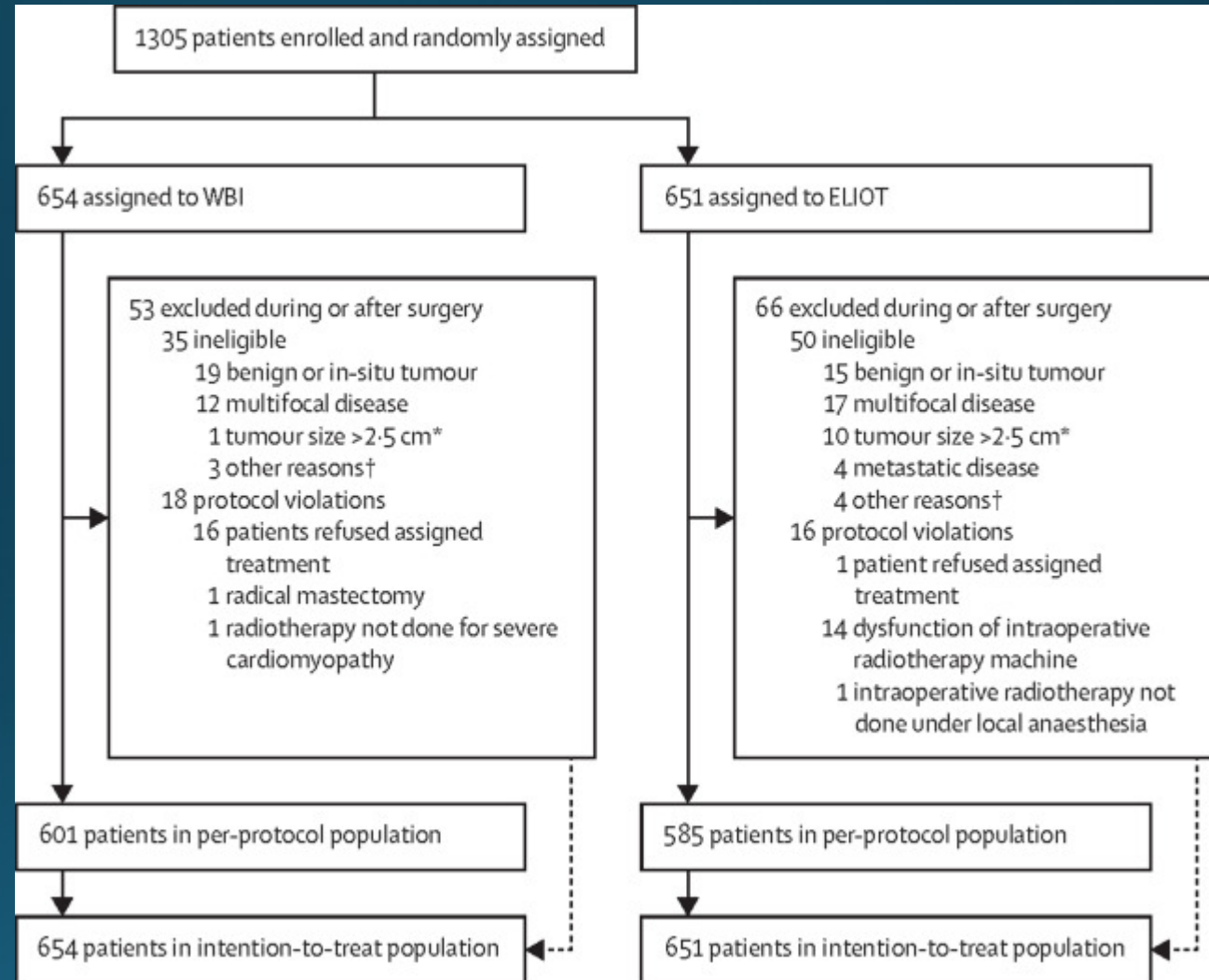
Figure: Contrasting techniques of TARGIT-IORT (during lumpectomy for breast cancer) versus ELIOT
 ELIOT=electron intraoperative radiotherapy. TARGIT-IORT=targeted intraoperative radiotherapy.

ELIOT TRIAL

- **Single-centre**, randomised, phase 3 equivalence trial was done at the European Institute of Oncology (Milan, Italy). Eligible women, **aged 48-75** years with a clinical diagnosis of a **unicentric breast carcinoma** with an ultrasound diameter **not exceeding 25 mm**, clinically negative axillary lymph nodes, and who were suitable for breast-conserving surgery
- **Randomly assigned** to receive **post-operative WBI** with conventional fractionation (50 Gy given as 25 fractions of 2 Gy, plus a 10 Gy boost), or 21 Gy **intraoperative radiotherapy with electrons** (ELIOT) in a single dose to the tumour bed during surgery
- **The primary endpoint** was the **occurrence of IBTR**.
- **Overall survival** was the **secondary endpoint**.
- The cumulative incidence of IBTR events and overall survival were **assessed at 5, 10, and 15 years** of follow-up

ELIOT TRIAL

Randomization schema



Lancet Oncol 2021 Apr 09

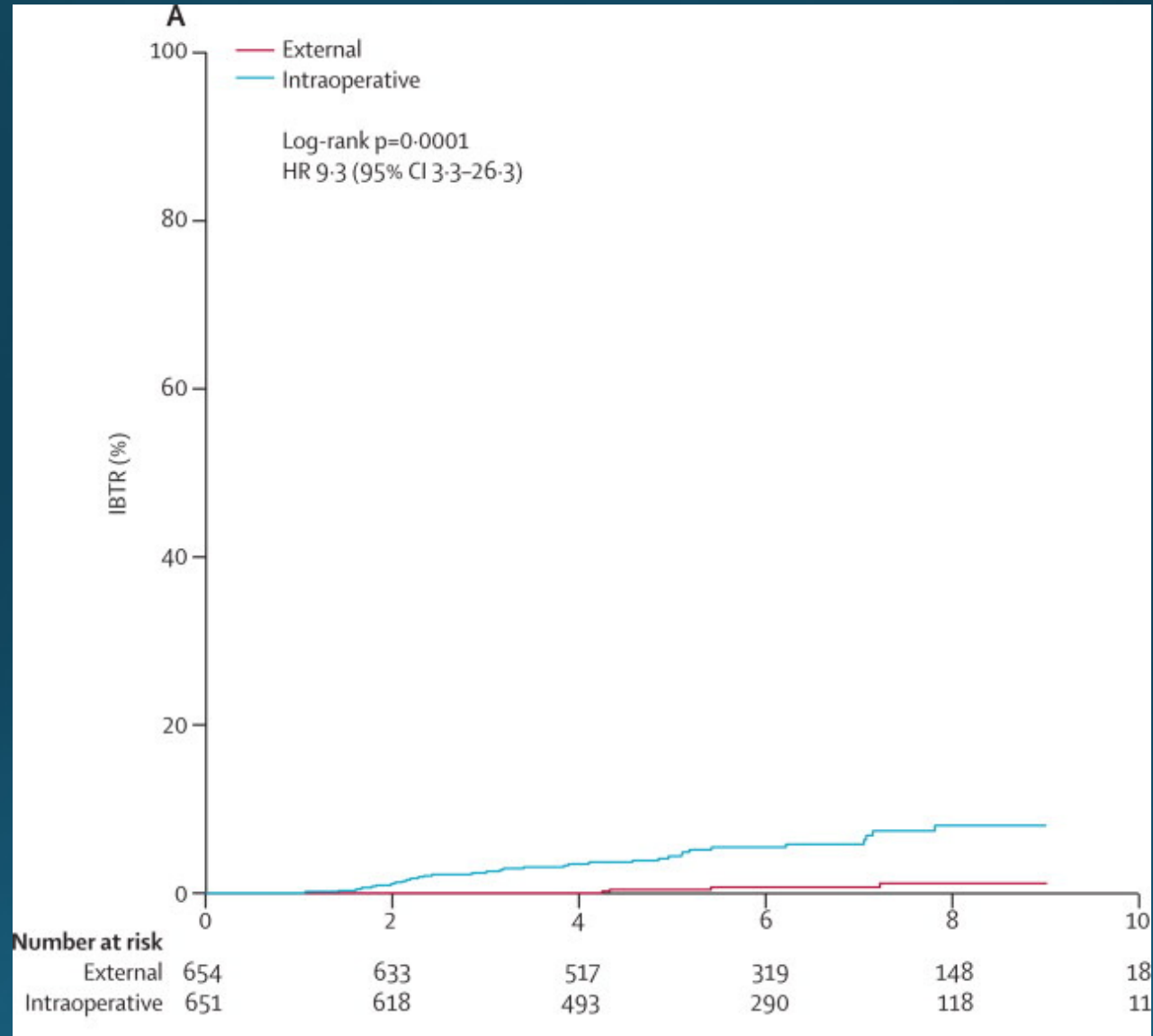
ELIOT TRIAL-

Ipsilateral breast
tumor recurrence

ELIOT- 11%

WBRT- 2%

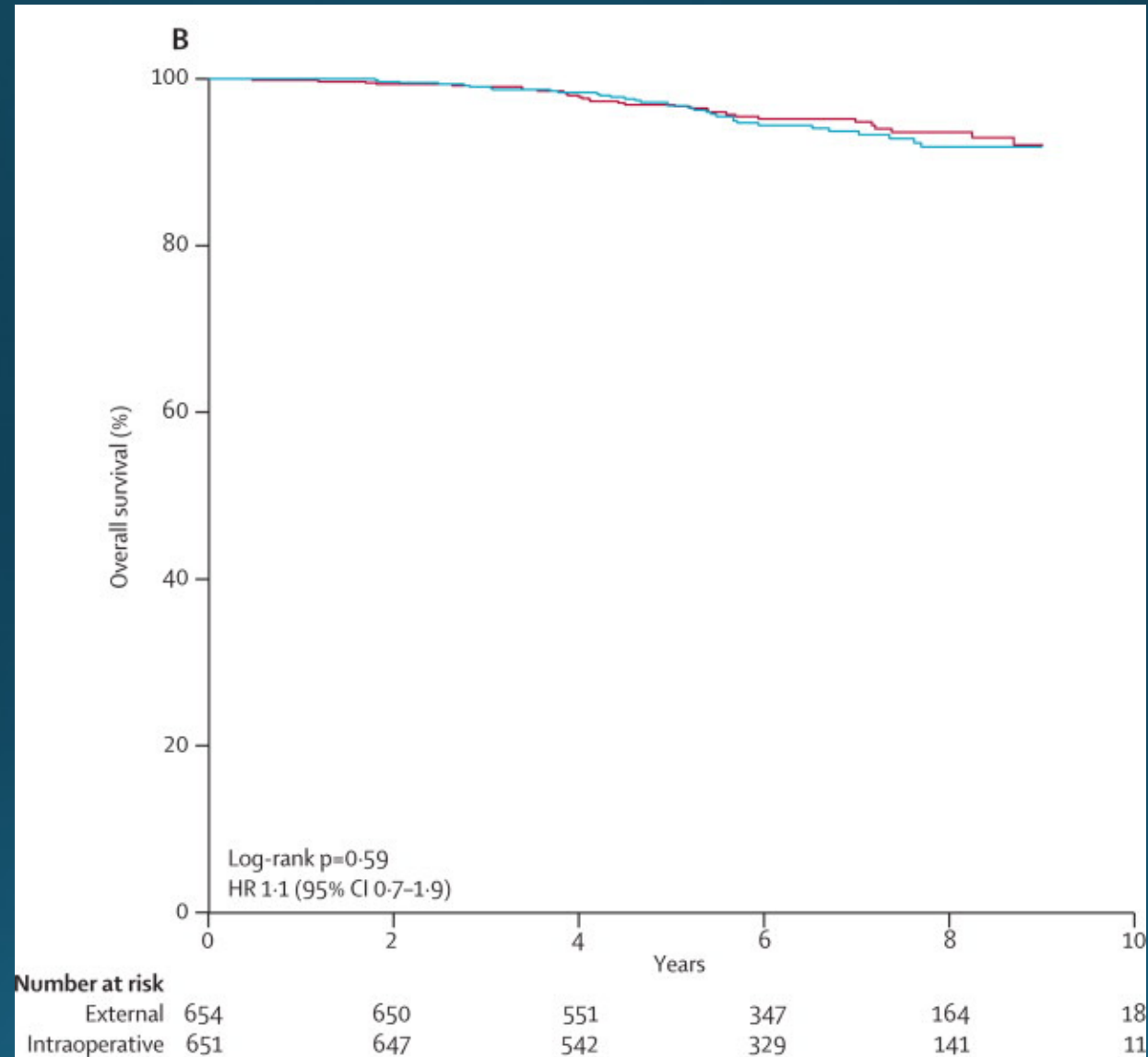
$p = 0.0001$



Lancet Oncol 2021 Apr 09

ELIOT TRIAL-

Overall survival
ELIOT- 90.7%
WBRT- 92.7%
p= 0.59



Lancet Oncol 2021 Apr 09

ELIOT TRIAL-
shielding disc being
placed beneath the
target parenchyma
and above the
muscle



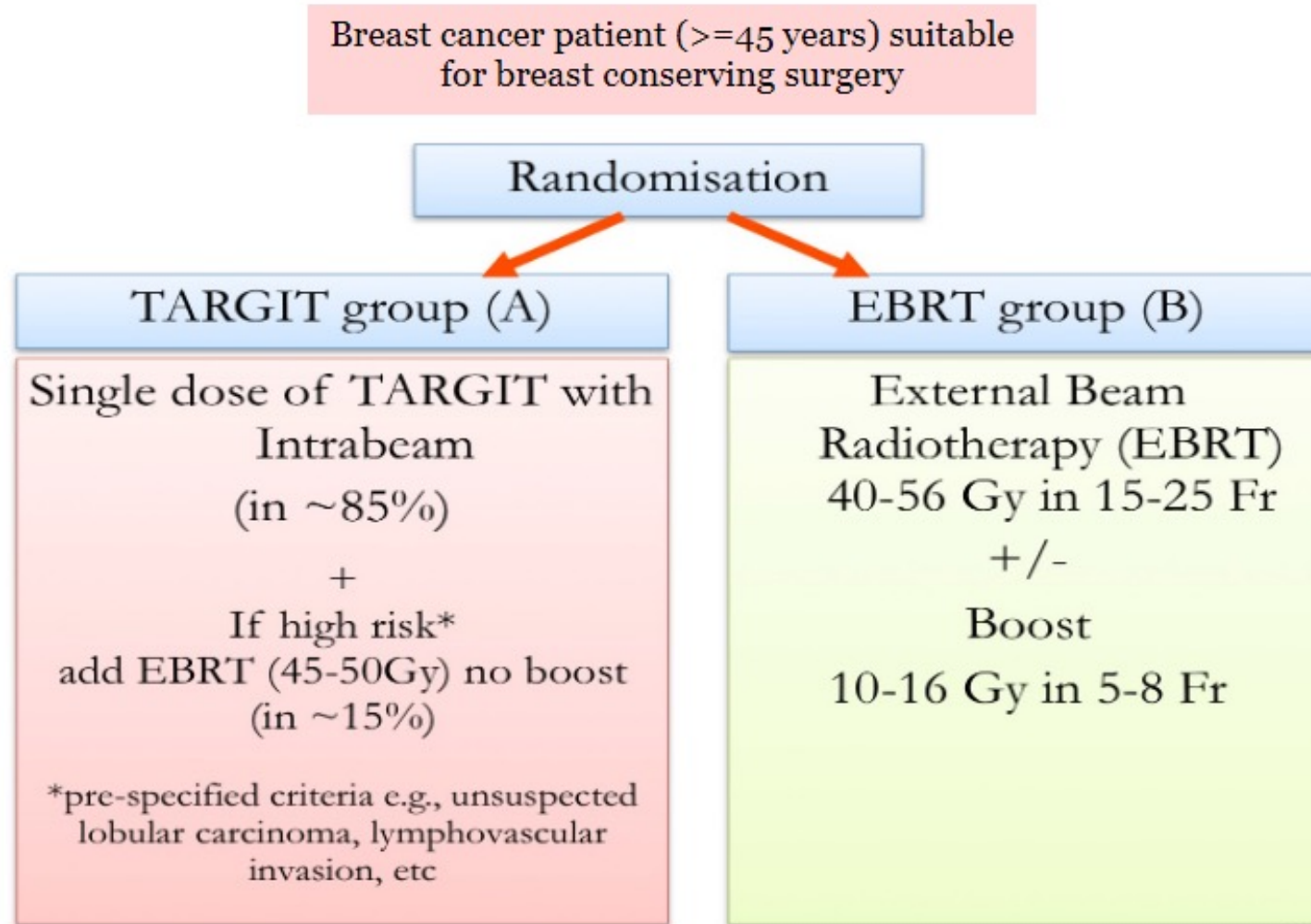
TARGIT-A TRIAL

- **Objective-** To determine whether risk adapted **intraoperative radiotherapy**, delivered as a single dose **during lumpectomy** is **non-inferior to** postoperative **whole breast** external beam radiotherapy for early breast cancer.
- **Design-** **Prospective, open label, randomized** controlled clinical trial.
- **Setting-** **32 centers** in 10 countries in the United Kingdom, Europe, Australia, the United States, and Canada.
- **Participants-** **2298 women >44 years** with **invasive ductal carcinoma up to 3.5 cm** in size, **cNo-N1**, eligible for breast conservation and **randomized** before lumpectomy.

BMJ 2020;370:m2836

The TARGIT - A trial

In the randomised TARGIT-A trial, two policies of local radiation treatment after breast cancer surgery are compared:

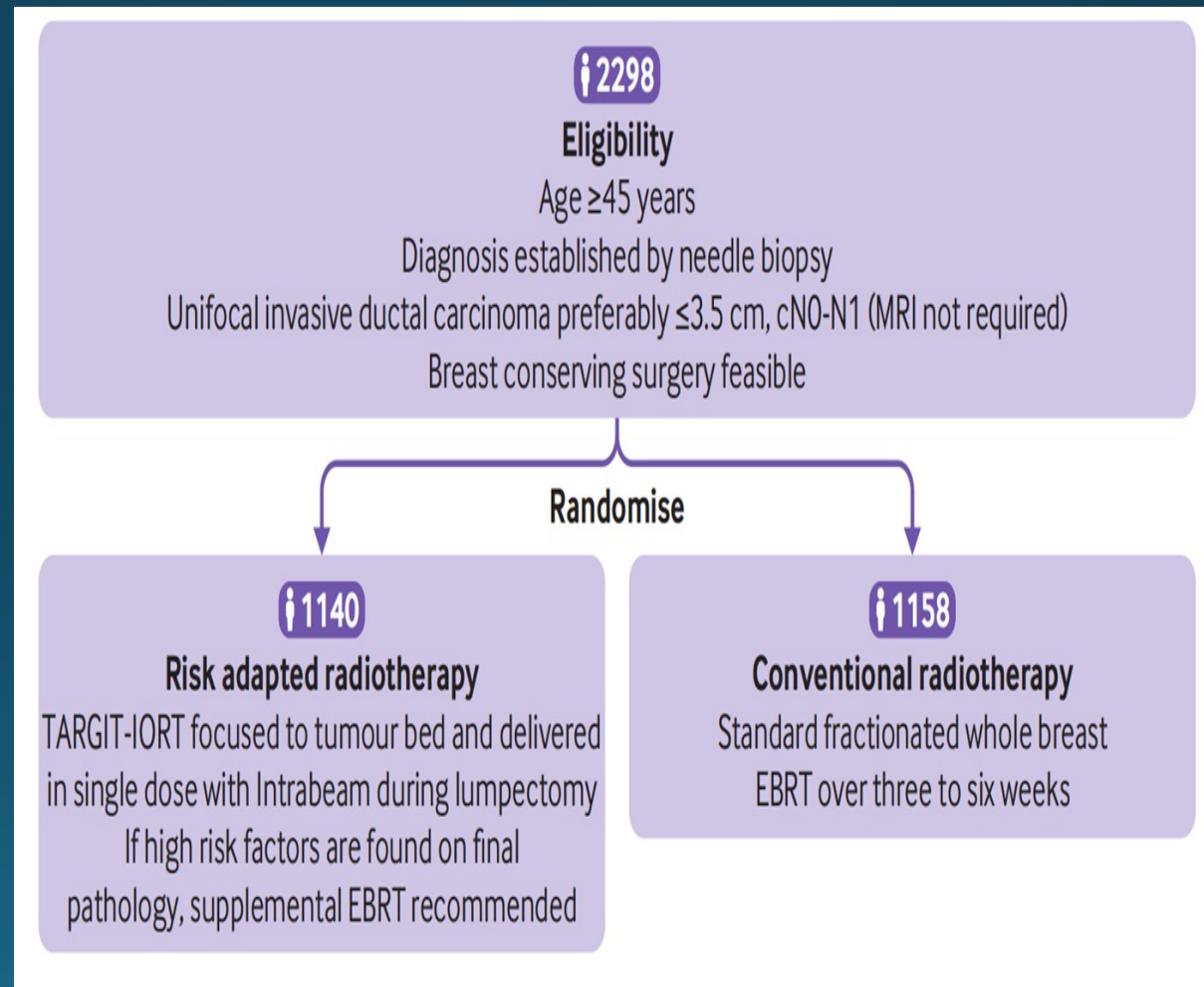


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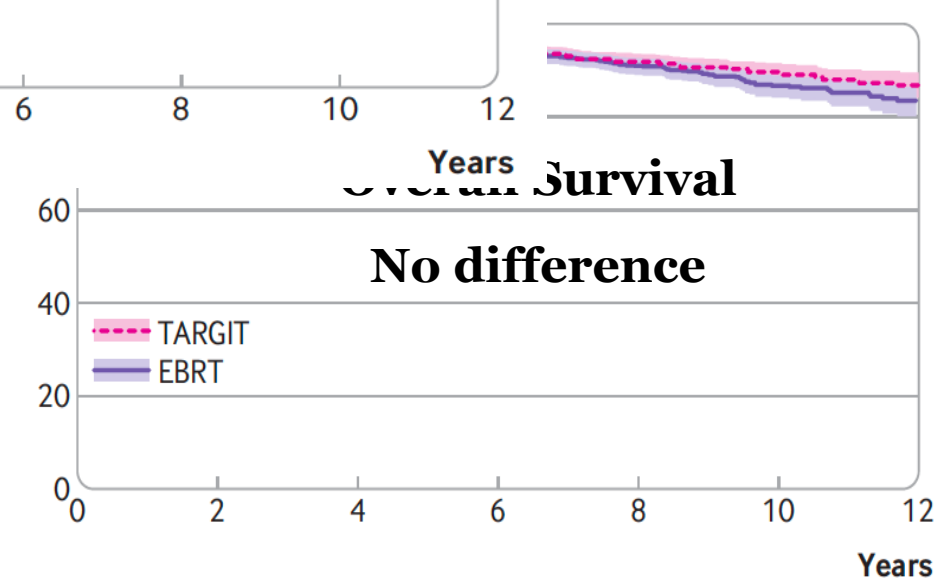
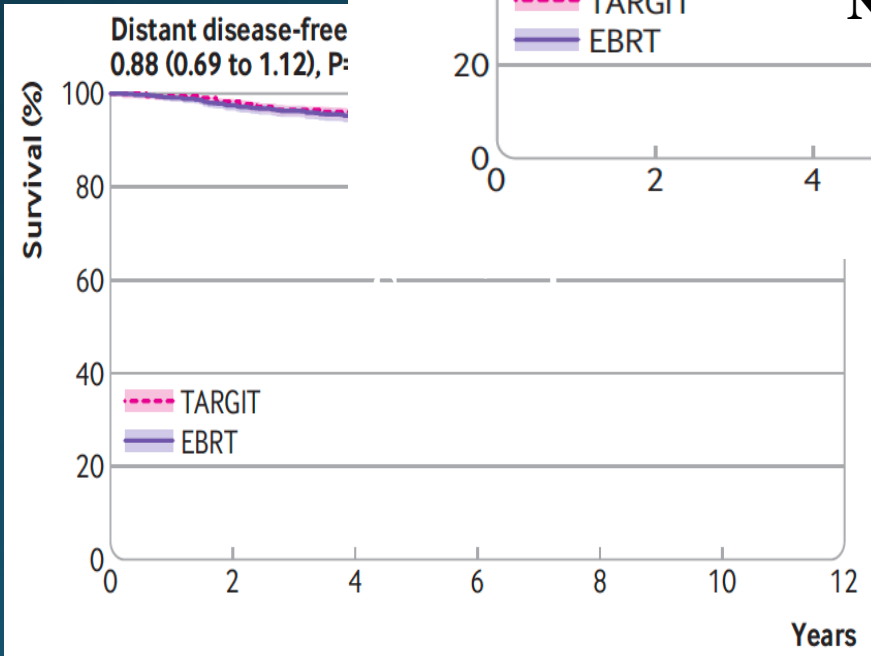
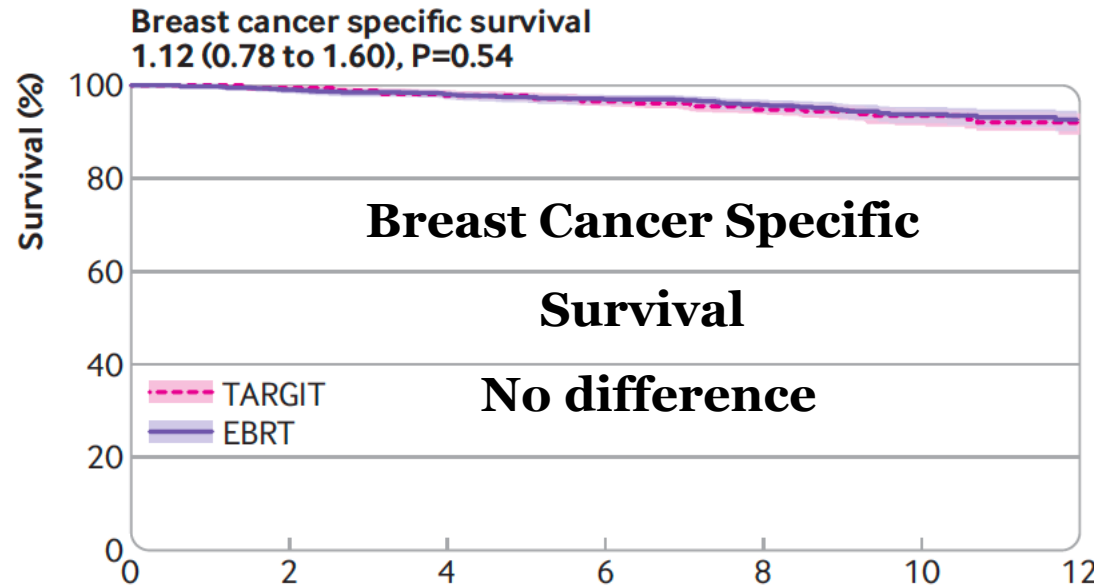
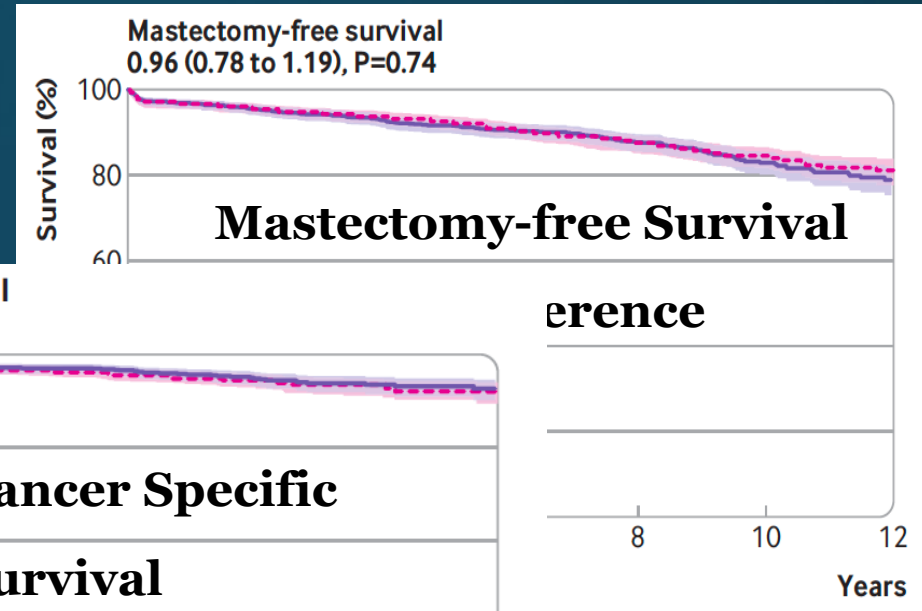
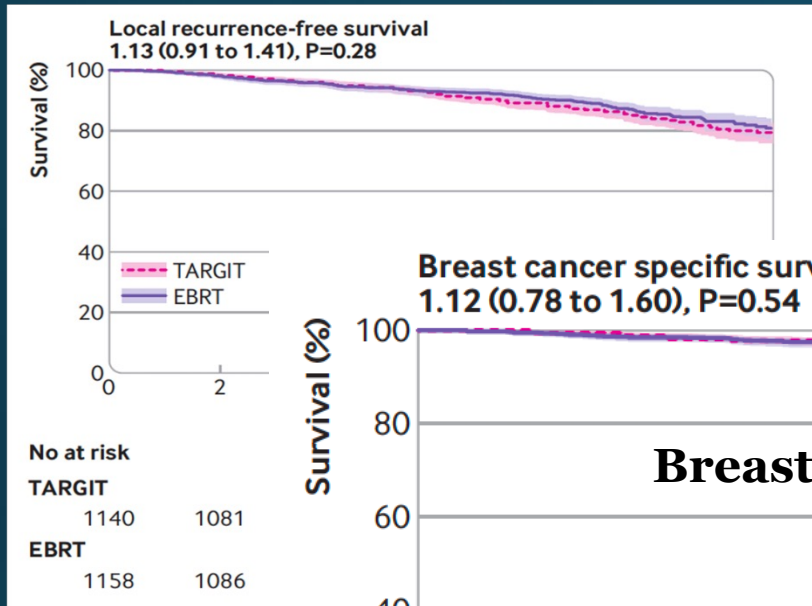
Pre-Pathology Recruitment

TARGET-A trial

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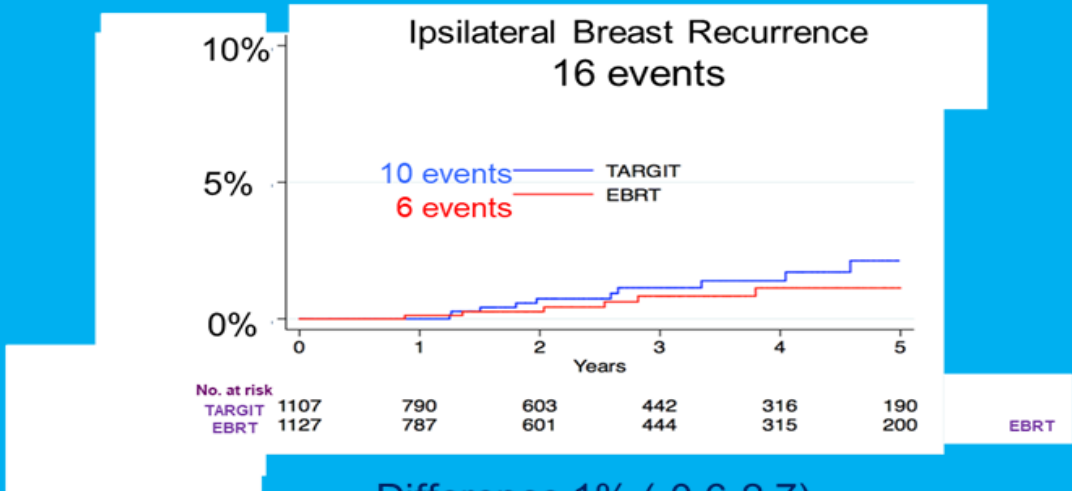
Local Recurrence Free Survival 12yrs



TARGIT-A trial

Primary endpoint LRR

Pre-pathology (Immediate)
n=2298



Difference 1% (-0.6-2.7)
p=0.31

Non-inferiority Statistical Design, $\leq 2.5\%$

BMJ 2020;370:m2836

Puerto Rico Data

- IORT available at Hospital Oncológico Isaac González Martínez since December 2022
- 18 patients treated
- Staging: pT₁ and T_{2a}, all No
- One patient required completion WBRT

Thanks to Dr. Julio Diaz who provided these facts

Doubts and other considerations

- Positive margins
- Younger patients
- DCIS
- Recurrence rates
- Omit radiotherapy altogether?
 - 10-year outcomes of the PRIME II omission of radiotherapy was associated with an increased incidence of local recurrence but had no detrimental effect on distant recurrence as the first event or overall survival (OS)
- **Ready for prime time?**

Doubts and other considerations

- Positive margins
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- Recurrence rates
- Omit radiotherapy altogether?
 - 10-year outcomes of the PRIME II omission of radiotherapy was associated with an increased incidence of local recurrence but had no detrimental effect on distant recurrence as the first event or overall survival (OS)
- Ready for prime time? **BUT NOT YET!**



TAKE HOME MESSAGE

- IORT is **not yet standard therapy** for radiotherapy at the time of BCS **but** if selected, it **can be used** in conjunction **with oncoplastic resection**.
- Review of the two main randomized trials (**TARGIT-A and ELIOT**) demonstrates **conflicting evidence** as to breast cancer patients treated with IORT having a higher risk of **local recurrence (LR)**.
- However, patients with **low-risk features** and IORT performed at the time of surgery had **similar rates of LR at 5 years**, with longer follow-up needed.
- **IORT as a boost is promising**, and studies are ongoing
- **IORT is now available in Puerto Rico** at the Hospital Oncologico Isaac Gonzalez Martinez (further information available through Dr. Edna Mora MD FACS)

**!Gracias por su
atención!**

