Sociedad Española
de Senología y Patología Mamaria

Curso de Radioterapia Intraoperatoria

IPM. ¿Por qué? ¿Qué es? ¿Para qué? ¿Cómo se hace?

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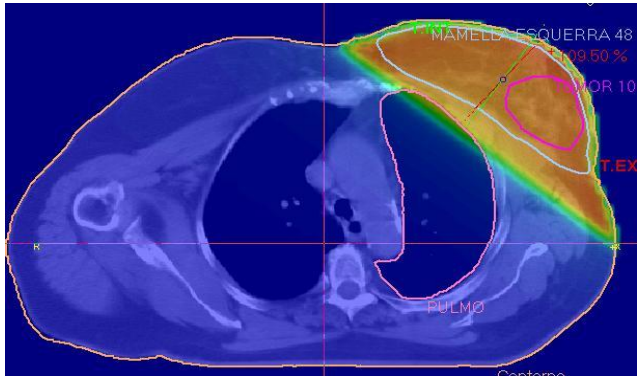
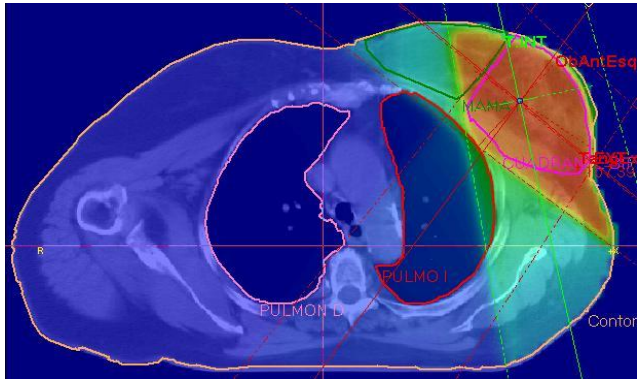
Oncología Radioterápica

- **Introducción**
- **Selección de pacientes**
- **Técnicas de irradiación parcial acelerada**

Accelerated **P**artial **B**reast **I**rradiation

Administrar un **dosis/fracción elevada** de radiación al **lecho tumoral** durante un **corto período de tiempo**, después de la cirugía conservadora sin comprometer los resultados ni los efectos secundarios.



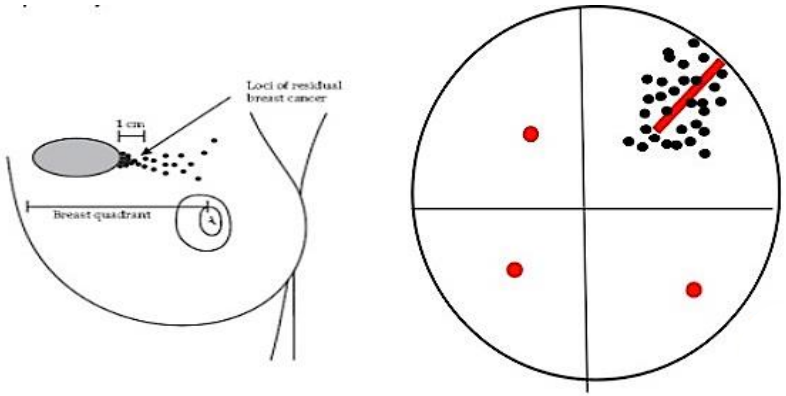


¿Irradiación completa o parcial de la mama?

- Más del 75% de las recidivas locales ocurren en la proximidad del lecho tumoral.

Fisher 2001, Veronesi 2001, Malmstrom 2003

- < 1% por año y similar a la aparición de una segunda neoplasia en la mama contralateral



Es necesario irradiar **toda** la mama en **todas** las pacientes?

¿Irradiación completa o parcial de la mama?

TOXICIDAD CARDÍACA

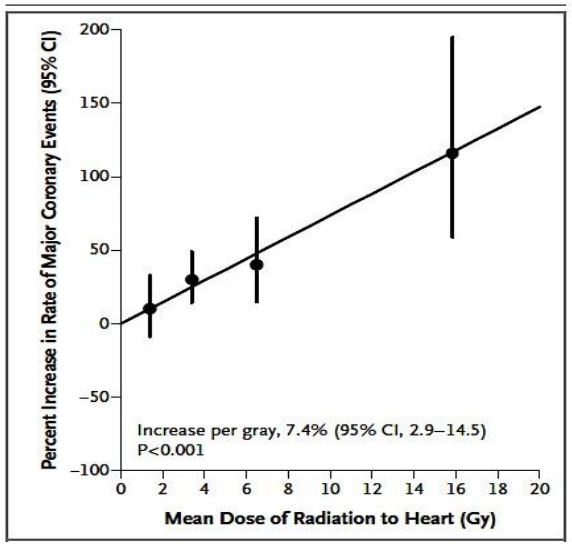
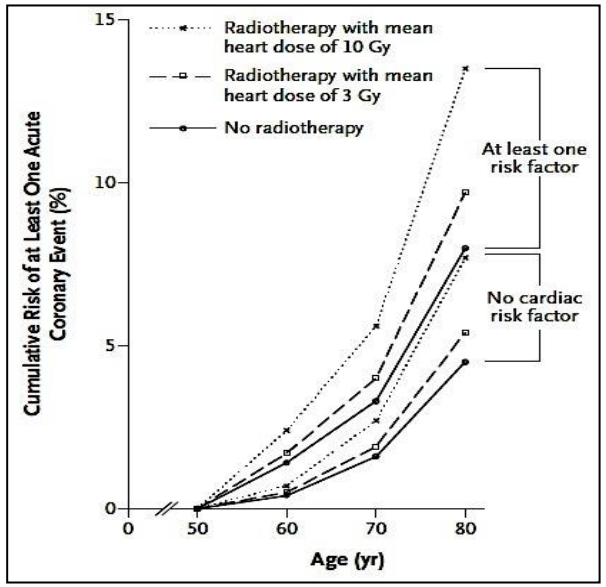


Table 3. Percentage Increase in the Rate of Major Coronary Events per Gray, According to Time since Radiotherapy.

Time since Radiotherapy*	No. of Case Patients	No. of Controls	Increase in Rate of Major Coronary Events (95% CI)†
			% increase/Gy
0 to 4 yr	206	328	16.3 (3.0 to 64.3)
5 to 9 yr	216	296	15.5 (2.5 to 63.3)
10 to 19 yr	323	388	1.2 (–2.2 to 8.5)
≥20 yr	218	193	8.2 (0.4 to 26.6)
0 to ≥20 yr	963	1205	7.4 (2.9 to 14.5)



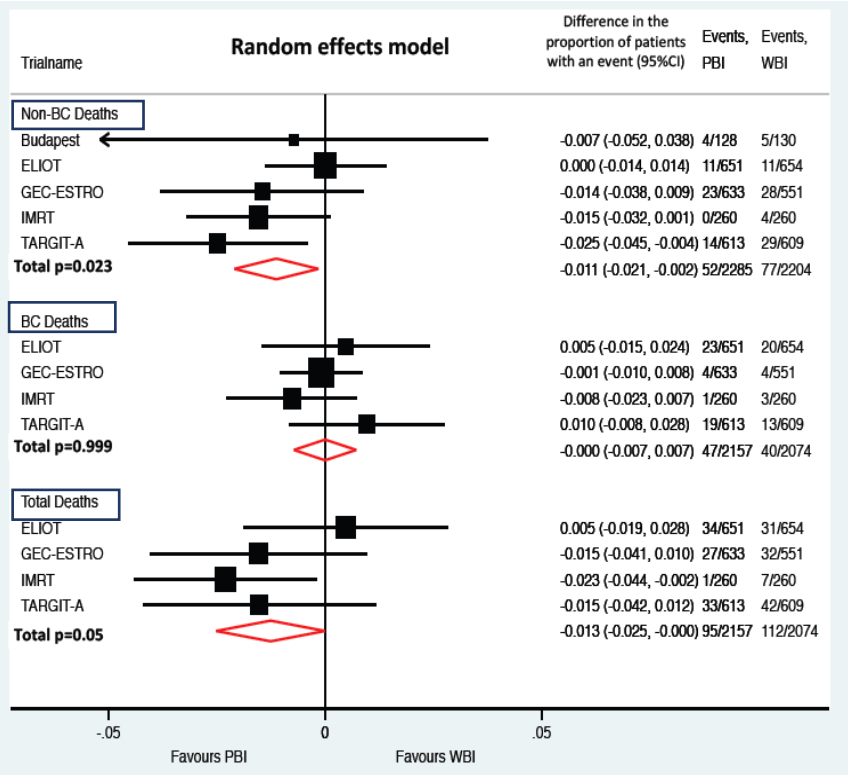
- La morbilidad cardíaca aumenta 7.4% por cada Gy extra
- No hay una dosis cardíaca umbral

Darby, NEJM 2013

¿Irradiación completa o parcial de la mama?

Reduced Mortality With Partial-Breast Irradiation for Early Breast Cancer: A Meta-Analysis of Randomized Trials

9 ensayos aleatorizados



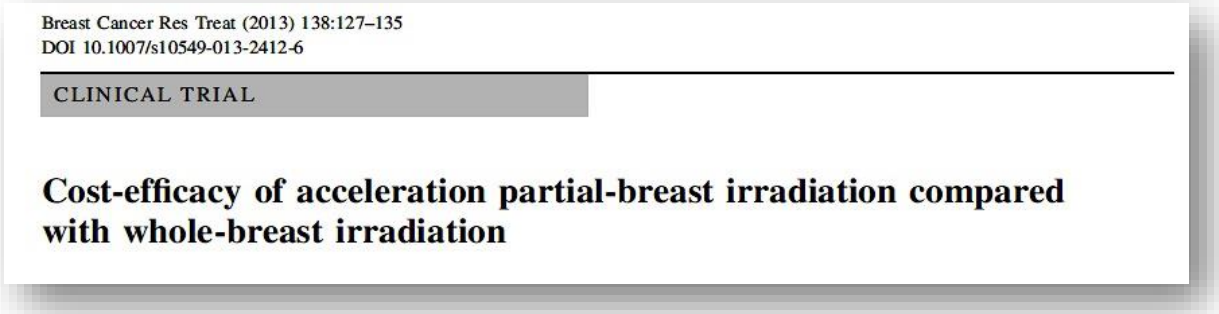
MORTALIDAD

- No diferencias en mortalidad por cáncer de mama
- APBI reduce la mortalidad no relacionada con cáncer de mama (p=0.023) y la mortalidad global (p=0.05)

Reducción del 25% del riesgo relativo de muerte

Vaidya, IJROBP 2016

¿Irradiación completa o parcial de la mama?



Breast Cancer Res Treat (2013) 138:127–135
DOI 10.1007/s10549-013-2412-6

CLINICAL TRIAL

Cost-efficacy of acceleration partial-breast irradiation compared with whole-breast irradiation

COSTE -EFICACIA

- **Cost minimization, incremental cost-effectiveness ratio (ICER), and cost per quality adjusted life year (QALY) analyses.**

- For 1000 patients treated, the cost savings would be $6.0 million (APBI 3D-CRT), $2.0 million (APBI IMRT), and $0.7 million (APBI interstitial) with the utilization of APBI compared to WBI 3D-CRT.

- The cost per QALY was $54698 and $49009 for APBI multilumen and APBI 3D-CRT, respectively, when incorporating the cost of recurrences and non-medical costs

Comparado con WBI 3D-CRT, la **APBI con RT externa es la más coste-efectiva** basándose en la reducción de costes y la **APBI con braquiterapia** es coste-efectiva basándonos en coste por QALY

¿En qué pacientes?

Institución	Fase	pT/pN	Márgen quirúrgico	Técnica	Dosis	Seguimiento (meses)	Recidiva local (%)
Hospital Christie, UK	III	≤4cm/Nx	Libre/afecto				19,5
Hospital Guy, UK	I-II				55	6	37
Hospital Royal Dev			[illegible]e/justo	Braquiterapia HDR	20-32	1,5	15,6

ADECUADA SELECCIÓN DE PACIENTES

¿En qué pacientes?

Update ASTRO guidelines *Correa, PRO 2017*

Table 1 Comparison of patient groups in original and updated consensus statements

Patient group	Risk factor	Original	Update
Suitability	Age	≥60 y	≥50 y
	Margins	Negative by at least 2 mm	No change
	T stage	T1	Tis or T1
	DCIS	Not allowed	If all of the below: • Screen-detected • Low to intermediate nuclear grade • Size ≤2.5 cm • Resected with margins negative at ≥3 mm
Cautionary	Age	50-59 y	• 40-49 y if all other criteria for "suitable" are met • ≥50 y if patient has at least 1 of the pathologic factors below and does not have any "unsuitable" factors *Pathologic factors:* • Size 2.1-3.0 cm [a] • T2 • Close margins (<2 mm) • Limited/focal LVSI • ER(-) • Clinically unifocal with total size 2.1-3.0 cm [b] • Invasive lobular histology • Pure DCIS ≤3 cm if criteria for "suitable" not fully met • EIC ≤3 cm
	Margins	Close (<2 mm)	No change
	DCIS	≤3 cm	≤3 cm and does not meet criteria for "suitable"
Unsuitable	Age	<50 years	• <40 y • 40-49 y and do not meet the criteria for cautionary
	Margins	Positive	No change
	DCIS	>3 cm	No change

¿Cómo puedo administrar APBI?

- **Braquiterapia intersticial**

- **Braquiterapia mediante balón** MammoSite
  Axxent Electronic Brachytherapy
  Contura

34 Gy en 10 sesiones,
2 sesiones /día

- **Dispositivos híbridos** SAVI (Strut Adjusted Volume Implant)
  CP (ClearPath)

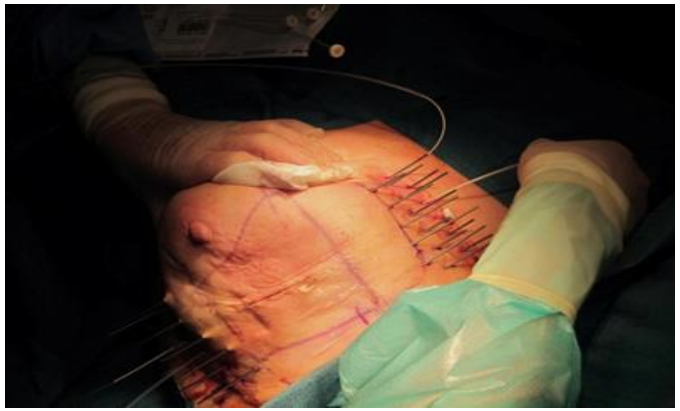
- **Intraoperatoria** rayos X: INTRABEAM
  electrones: MOBETRON, NOVAC-7

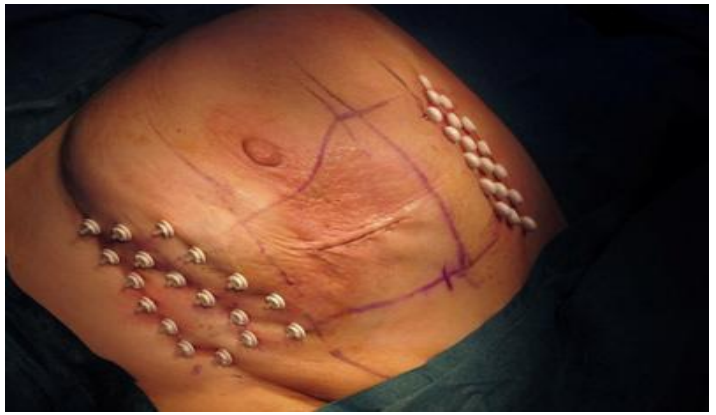
20-21 Gy en 1 sesión

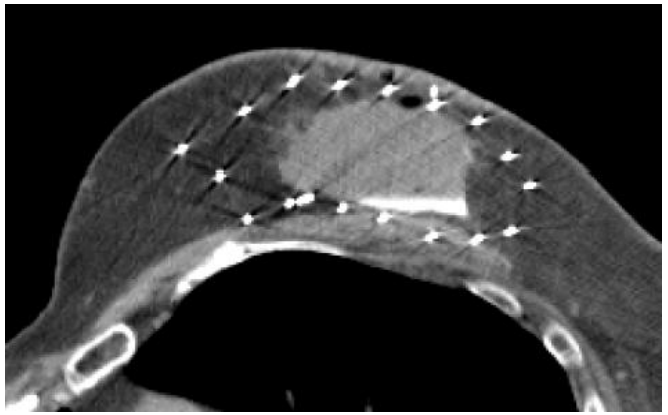
- **Radioterapia externa 3D-conformada**

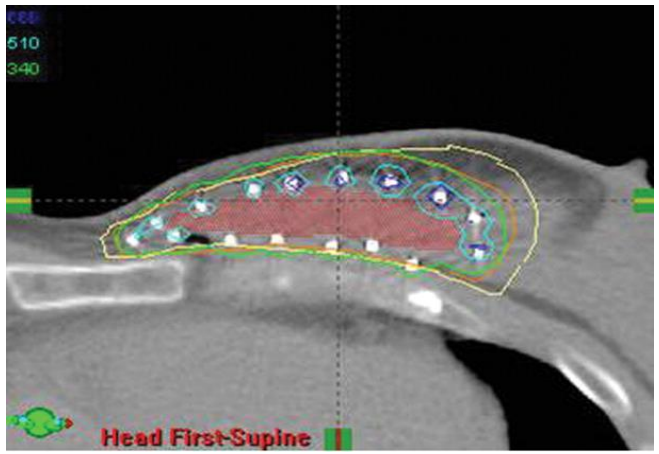
37,5-38,5 Gy en 10sesiones,
2 sesiones/día

BRAQUITERAPIA INTERSTICIAL









- En quirófano, se coloca el implante, que puede hacerse guiado por ecografía para localizar el lecho quirúrgico.

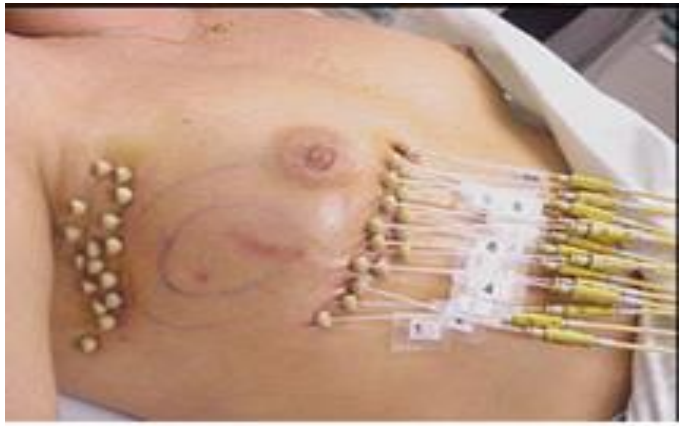
- Se decide el número de planos y los puntos de entrada y salida de los vectores metálicos, pudiendo inyectarse contraste radio-opaco en la cavidad quirúrgica, para ayudar a su diseño. Se sustituyen por tubos plásticos.

- Se realiza una TC para el cálculo de la dosis.

- **VENTAJAS:**

- Es a la técnica con mayor seguimiento,

- Permite adaptar la dosis a los cambios de tamaño y forma de la cavidad de tumorectomía



•**LIMITACIONES:**

- Necesita entrenamiento y experiencia

- Aceptación por parte de la paciente

-Tumores superficiales o mamas pequeñas (dosis en piel)

BRAQUITERAPIA INTERSTICIAL

Author	No of cases	Follow up interval (years)	Dose rate/pt no	Scheme	Total dose (Gy)	5-year LR (%)	Good/Excellent cosmesis
Strnad et al.[60]	274	5.25	PDR/HDR	PDR = 0.6 Gy/hr HDR = 4 Gy x8	PDR = 50 Gy HDR = 32 Gy	2.9%	90%
Antonucci et al. [59]	199	9.6	LDR/HDR	LDR 0.52 Gy/h × 96 hours HDR = 4 Gy x8 HDR = 3.4 Gyx10	LDR = 50 Gy HDR = 32 Gy HDR = 34 Gy	5%	99%
Johansson et al.[61]	50	7.2	PDR	50Gy/5	50	4%	56%
Arthur et al.[62]	99	7	LDR/HDR	LDR = 3.5 -5 days HDR = 3.4 × 10	45 Gy (LDR) 34 Gy (HDR	4%	n/a
Polgar et al.[63]	128	6.8	HDR	5.2 × 7	36.4 Gy	4.7%	77%
King et al [64]	51	6.25	LDR/HDR	LDR = 4 days 4 Gyx8	45 Gy (LDR) 32 Gy (HDR)	3.9%	75%
Otto et al. [65]	274	5.25	PDR/HDR	PDR 5 days, 0.6 Gy/hr HDR = 4 Gyx8	49.8 Gy (PDR) 32 Gy (HDR)	2.9%	92%
Polgar et al.[58]	45	11.1	HDR	4.33 × 7 5.2 × 7	30.3 Gy 36.4 Gy	4.4%	78%

LR = local recurrence, HDR = high dose rate, LDR = low dose rate, PDR = pulsed dose rate, n/a = data not available

N: 2309 **seguimiento: 2,5-11 años** **0-4,7% recidivas locales**

Njeh, Rad Oncol 2010

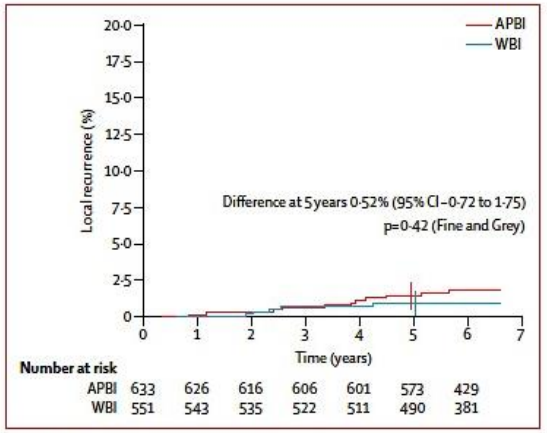
5-year results of accelerated partial breast irradiation using sole interstitial multicatheter brachytherapy versus whole-breast irradiation with boost after breast-conserving surgery for low-risk invasive and in-situ carcinoma of the female breast: a randomised, phase 3, non-inferiority trial

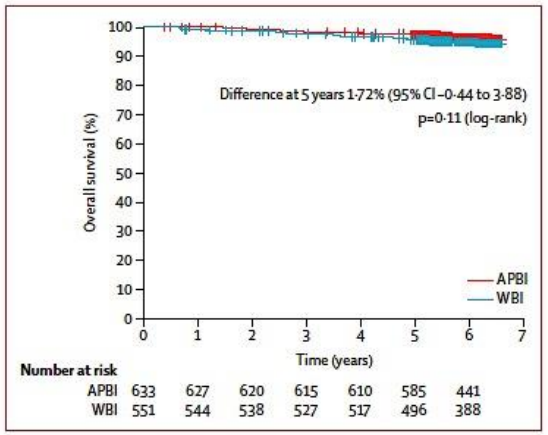
GEC-ESTRO
N: 1184

WBI
(50 Gy/25 frac)
+/- boost

BQT intersticial
32 Gy /8 frac HDR
30 Gy/7 frac HDR
50 Gy PDR

≥ 40 años
T1-2a (<3 cm)
pTis grado bajo-intermedio
N0
Márgenes libres ≥ 2mm (CLI o CIS ≥ 5mm

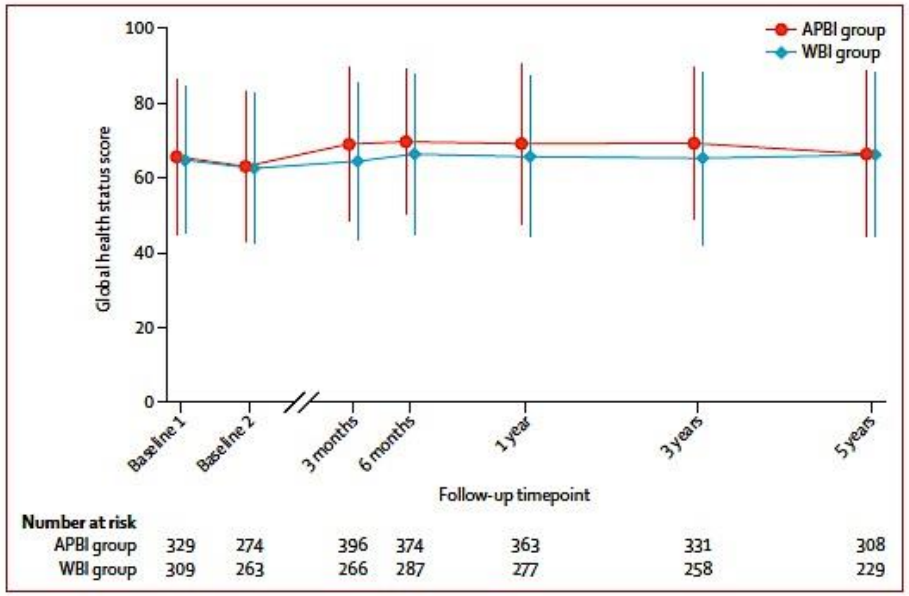


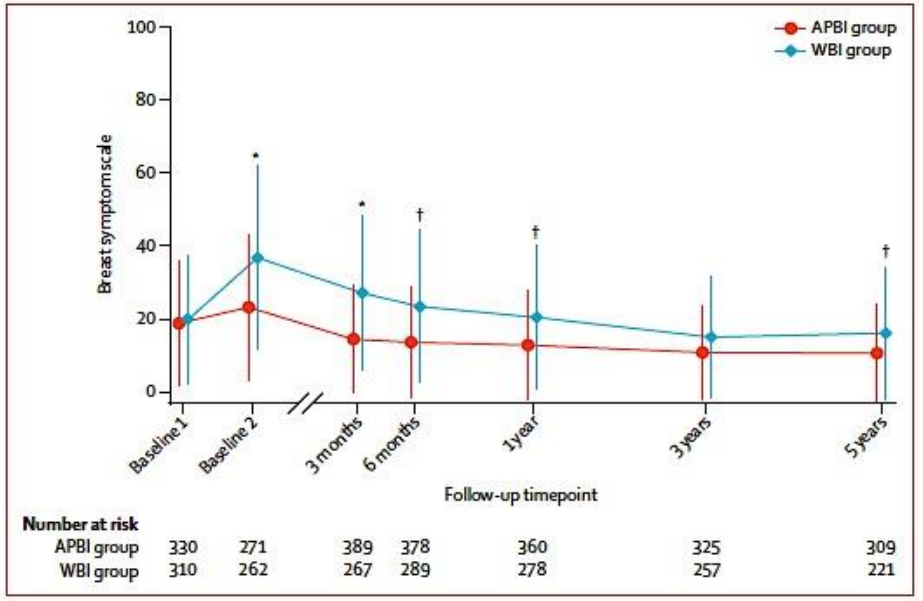


The difference between treatments was below the relevance margin of 3 percentage points. Therefore, adjuvant APBI using multicatheter brachytherapy after breast-conserving surgery in patients with early breast cancer is not inferior to adjuvant whole-breast irradiation with respect to 5-year local control, disease-free survival, and overall survival.

Strand, Lancet 2016

Quality-of-life results for accelerated partial breast irradiation with interstitial brachytherapy versus whole-breast irradiation in early breast cancer after breast-conserving surgery (GEC-ESTRO): 5-year results of a randomised, phase 3 trial





Interpretation APBI with multicatheter brachytherapy was not associated with worse quality of life compared with whole-breast irradiation. This finding supports APBI as an alternative treatment option after breast-conserving surgery for patients with early breast cancer.

Schäfer, Lancet 2018

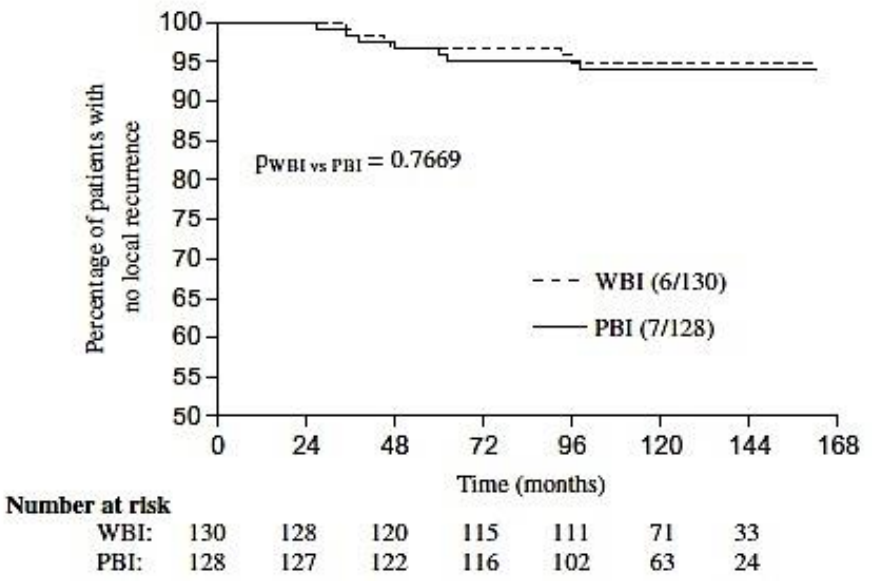
Breast-conserving therapy with partial or whole breast irradiation: Ten-year results of the Budapest randomized trial

Polgar
N: 258

> 40 años
pT1 (≤ 2 cm)
N0-1mi (micrometástasis ≤ 2 mm)
Grado 1-2
No lobulillar, No CIS extenso
Márgenes libres

WBI
(50 Gy/25 frac)
+/- boost

BQT intersticial
31,4Gy /7 frac HDR
Electrones (RT externa)



In conclusion, the ten-year results of our randomized study suggest that PBI using interstitial BT implants or electron beams to deliver radiation to the tumor bed alone for a selected group of early-stage breast cancer patients produce similar long-term results to those achieved with conventional WBI. Significantly better cosmetic outcome can be achieved with carefully designed HDR multi-catheter BT implants compared with the outcome after WBI.

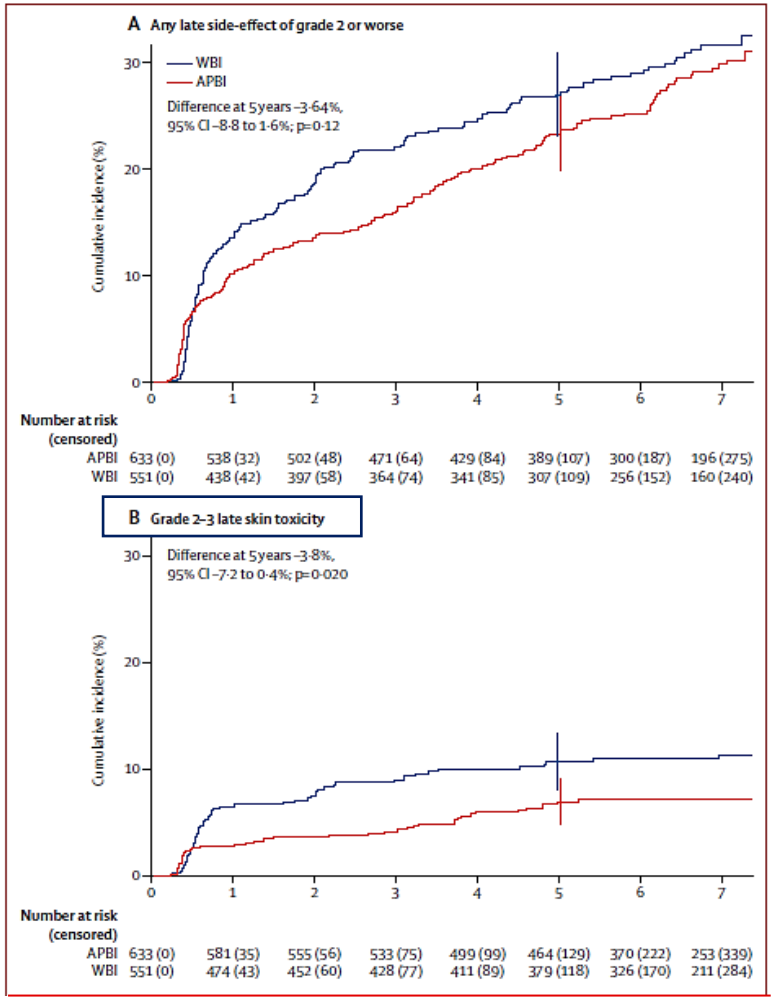
Polgar, Radiother Oncol 2013

Late side-effects and cosmetic results of accelerated partial breast irradiation with interstitial brachytherapy versus whole-breast irradiation after breast-conserving surgery for low-risk invasive and in-situ carcinoma of the female breast: 5-year results of a randomised, controlled, phase 3 trial

	Patients' view (n=1173)*			Physicians' view (n=1173)*		
	Accelerated partial breast irradiation group	Whole-breast irradiation group	p value†	Accelerated partial breast irradiation group	Whole-breast irradiation group	p value†
Baseline						
Excellent to good	580/629 (92%)	499/544 (92%)	0·84	584/630 (93%)	489/543 (90%)	0·13
Fair to poor	49/629 (8%)	45/544 (8%)		46/630 (7%)	54/543 (10%)	
1-year follow-up						
Excellent to good	552/597 (92%)	459/503 (91%)	0·53	556/598 (93%)	452/502 (90%)	0·10
Fair to poor	45/597 (8%)	44/503 (9%)		42/598 (7)	50/502 (10%)	
3-year follow-up						
Excellent to good	517/561 (92%)	421/463 (91%)	0·55	523/562 (93%)	415/463 (90%)	0·065
Fair to poor	44/561 (8%)	42/463 (9%)		39/562 (7%)	48/463 (10%)	
5-year follow-up						
Excellent to good	498/541 (92%)	413/454 (91%)	0·62	503/542 (93%)	408/454 (90%)	0·12
Fair to poor	43/541 (8%)	41/454 (9%)		39/542 (7%)	46/454 (10%)	

Data are n (%).*Data available for cosmetic results at baseline. †Calculated by doubling one-tailed exact probability of Fisher's exact test.

Table 3: Cosmetic results according to treatment

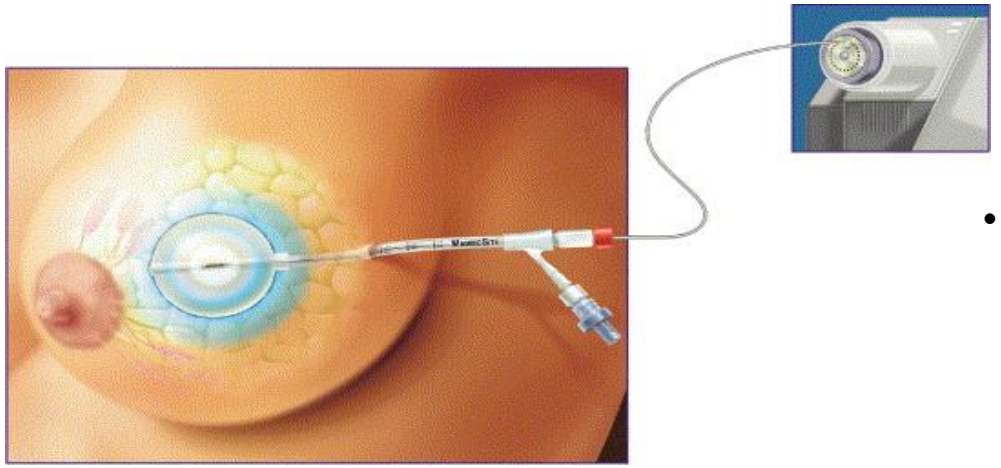


Interpretation 5-year toxicity profiles and cosmetic results were similar in patients treated with breast-conserving surgery followed by either APBI with interstitial brachytherapy or conventional whole-breast irradiation, with significantly fewer grade 2–3 late skin side-effects after APBI with interstitial brachytherapy. These findings provide further clinical evidence for the routine use of interstitial multicatheter brachytherapy-based APBI in the treatment of patients with low-risk breast cancer who opt for breast conservation.

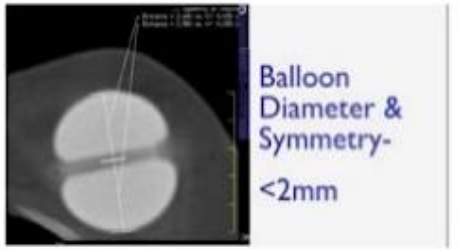
Polgar, Lancet 2017

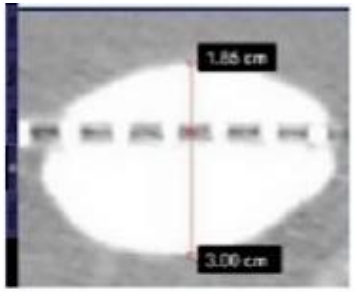
BRAQUITERAPIA mediante BALÓN

MAMMOSITE



- Consta de un **globo de silicona** que se rellena con suero salino y contraste, adoptando una forma esférica o elipsoidal en función del aplicador que se adapte a la cavidad de tumorectomía.
- Dentro del globo, centrado, se encuentra un catéter de silicona en cuyo interior se introduce la fuente radioactiva.
- El aplicador finaliza en dos tubos obturados uno con un **tapón de color rojo (el que se conecta al equipo de HDR, Ir 192) y otro de color azul (por el que se introduce el suero salino**





Asymmetrical

- **LIMITACIONES**

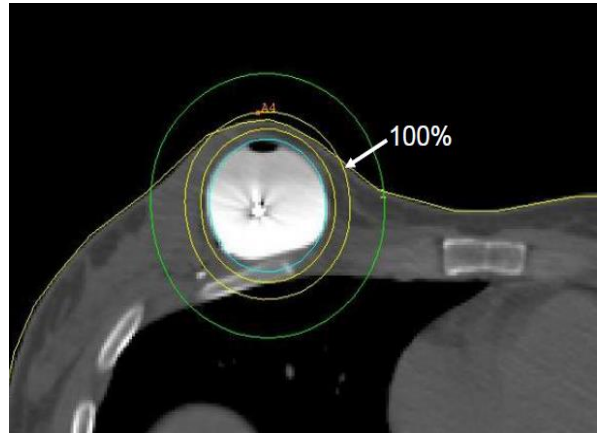
- Simetría: Debido a que contiene una única fuente central, no permite adaptar la dosis en dirección perpendicular al catéter central

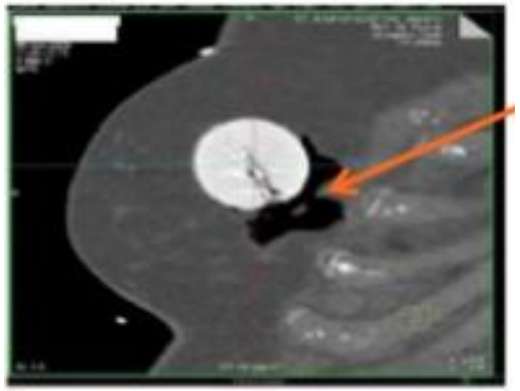
- Distancia a piel: Requiere 5-7 mm para un buen resultado estético

- Mamas pequeñas

- Tumores en QSI

- Cavidad quirúrgica irregular





- **VENTAJAS:**

Fácilmente reproducible

MAMMOSITE

Author	No of cases	Median follow up interval (months)	IBF	Good/ Excellent cosmesis
Benitez et al.[73]	43	65	0%	81.3%
Niehoff et al [69]	11	20	0%	n/a
Patel et al.[75]	26	48.5	0%	n/a
Vicini et al.[71]	1440	30	1.6%	95%
Chen et al.[76]	70	26.1	5.7%	n/a
Belkacemi et al. [77]	25	13	0%	84%
Voth et al.[78]	55	24	3.6%	n/a
Dragun et al. [70]	90	24	2.2%	90%
Vicini et al.[79]	1440	60	2.6%	90.6%
Jeruss et al. [74]	194$	54.4	3.1%	92%

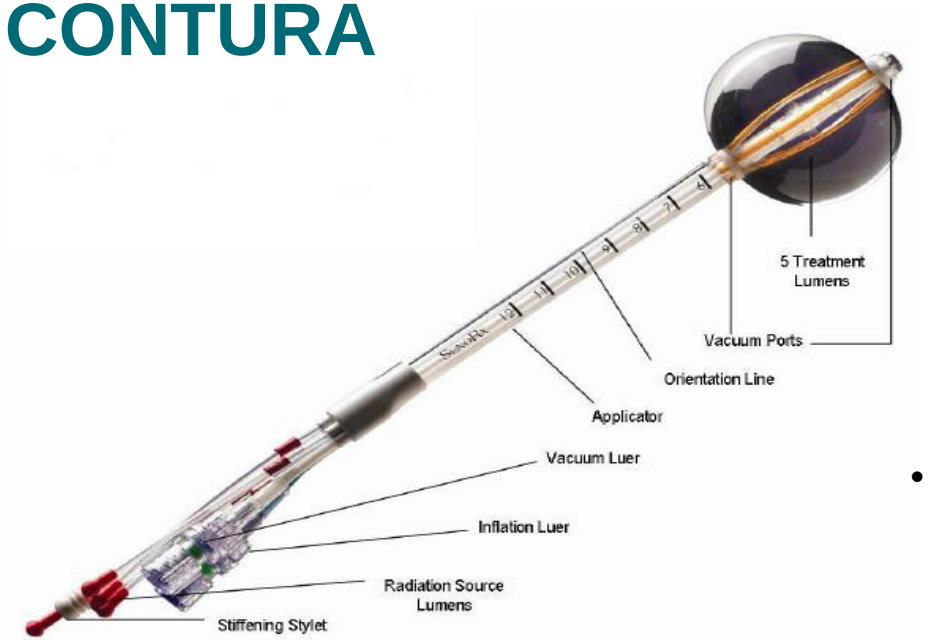
n/a data not available, IBF = ipsilateral breast failure, $ these are ductal carcinoma in situ (DCIS) patients recruited in the American Society of Breast Surgeons APBI registry trial.

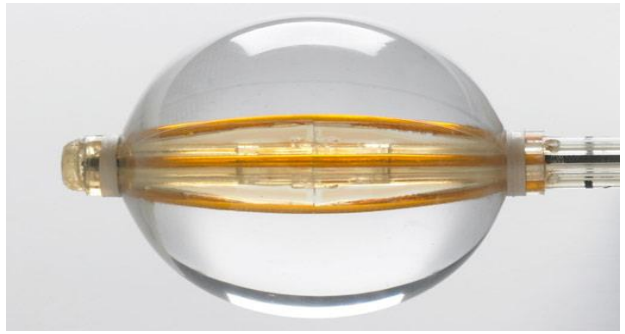
N: 3899 seguimiento: 2-66 meses 0- 5,7% recidivas locales

Njeh, Rad Oncol 2010

BRAQUITERAPIA mediante BALÓN

CONTURA





- Tiene **múltiples luces** para pasar la fuente de **Ir 192**, (1 canal central + 4 canales alrededor). Catéter para drenar seroma o aire.

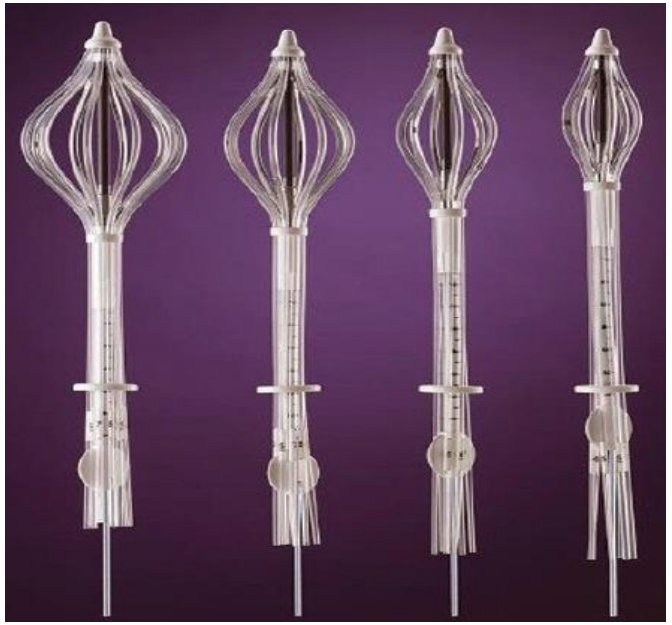
- Permite posiciones de fuentes adicionales→ mejora la distribución de dosis→ reducir la dosis en piel y en los órganos de riesgo.

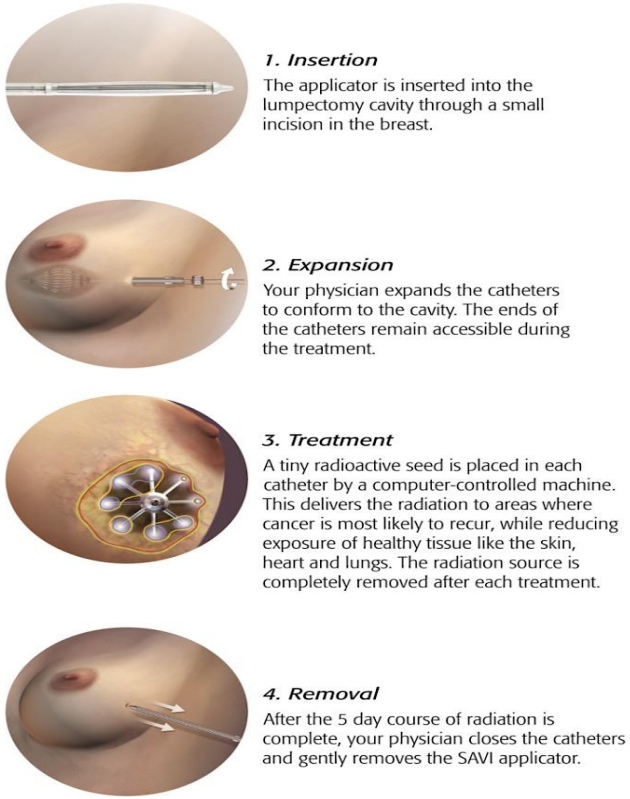
Wilder RB, Curcio LD, Khanijou RK, et al. A Contura catheter offers dosimetric advantages over a MammoSite catheter that increase the applicability of accelerated partial breast irradiation. Brachytherapy 2009, 8:373-378.

Brown S, McLaughlin M, Pope K, et al: Initial radiation experience evaluating early tolerance and toxicities in patients undergoing accelerated partial breast irradiation using the Contura Multi-Lumen Balloon breast brachytherapy catheter. Brachytherapy 2009, 8:227-233.

DISPOSITIVOS HÍBRIDOS

Strut Adjusted Volume Implant (SAVI)





1. Insertion

The applicator is inserted into the lumpectomy cavity through a small incision in the breast.

2. Expansion

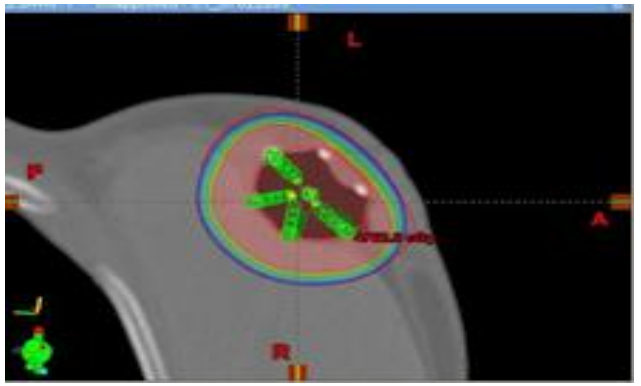
Your physician expands the catheters to conform to the cavity. The ends of the catheters remain accessible during the treatment.

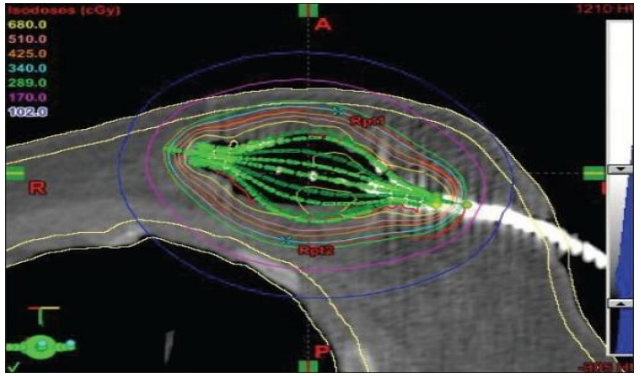
3. Treatment

A tiny radioactive seed is placed in each catheter by a computer-controlled machine. This delivers the radiation to areas where cancer is most likely to recur, while reducing exposure of healthy tissue like the skin, heart and lungs. The radiation source is completely removed after each treatment.

4. Removal

After the 5 day course of radiation is complete, your physician closes the catheters and gently removes the SAVI applicator.



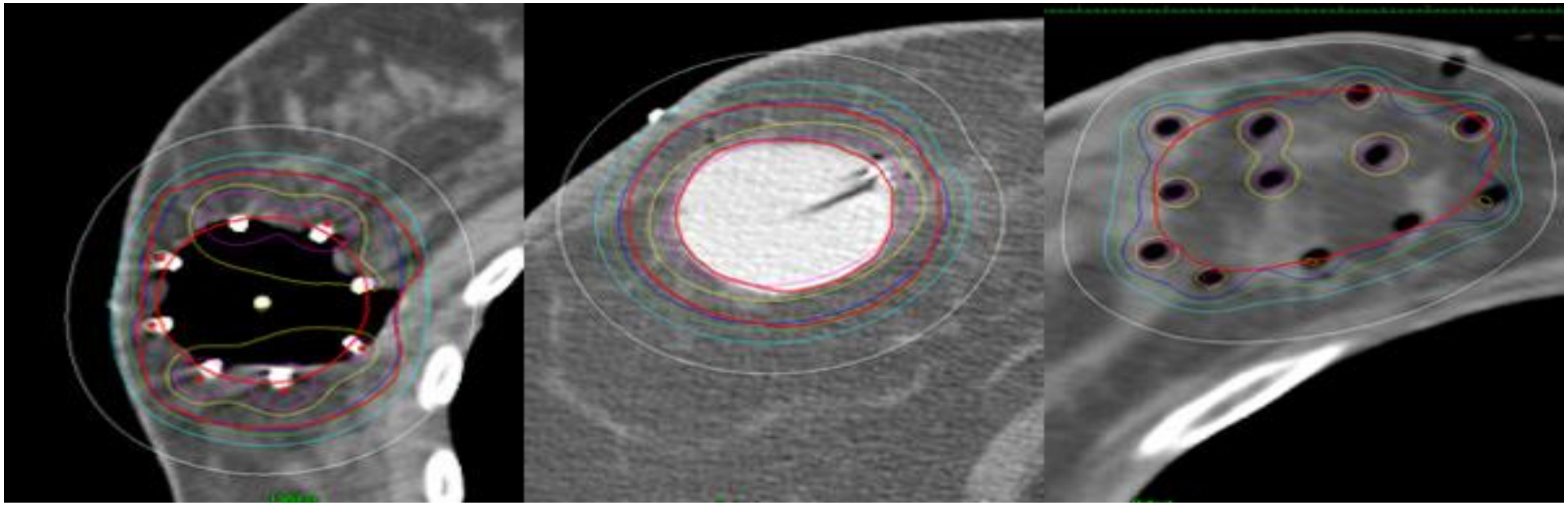


Scanderbeg DJ, Yashar C, Rice R, et al: Clinical implementation of a new HDR brachytherapy device for partial breast irradiation. Radiother Oncol 2009, 90:36-42.

DISPOSITIVOS HÍBRIDOS

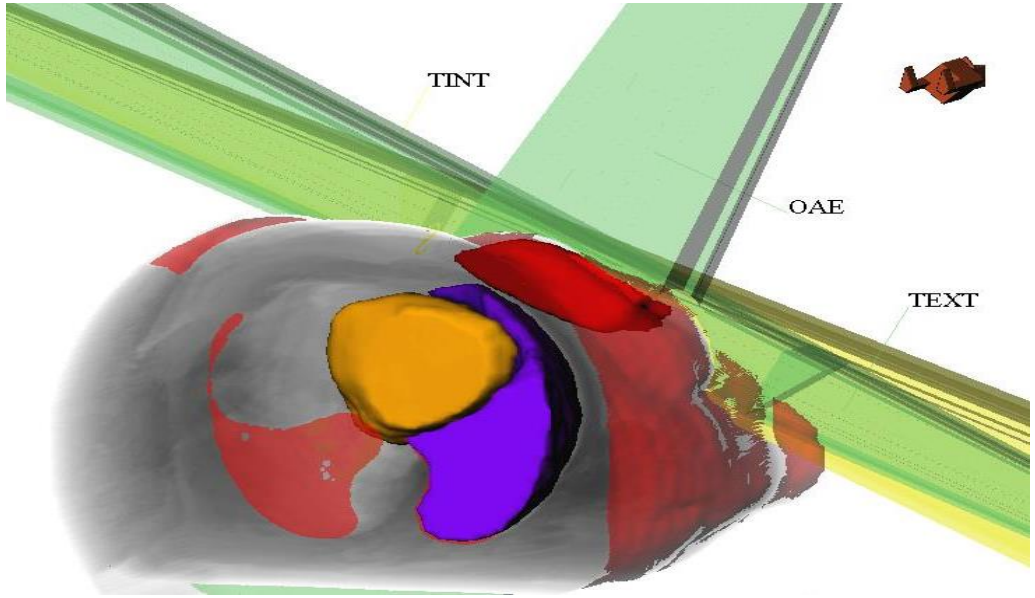
CLEARPATH

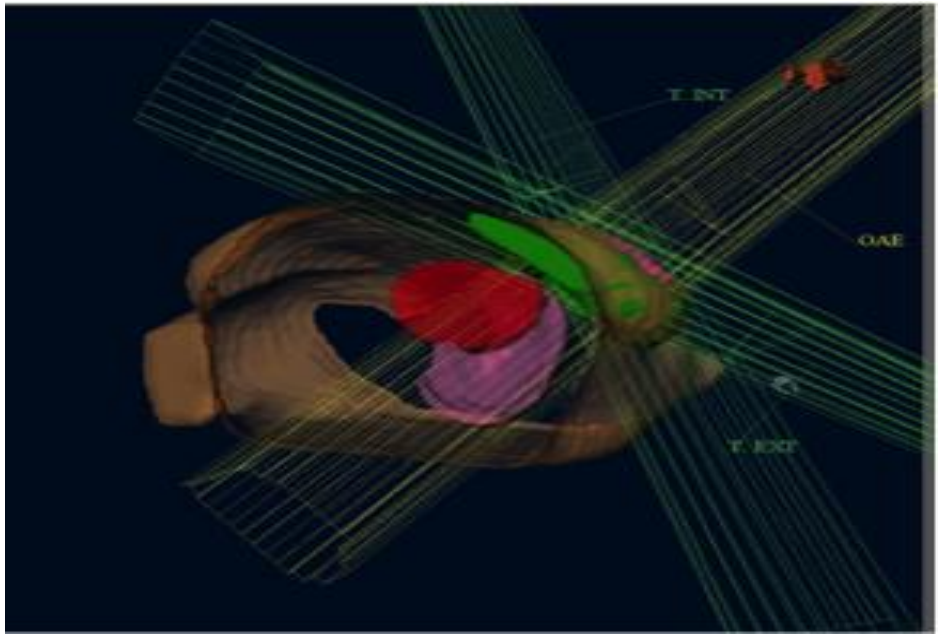
- Combina la ventaja del balón con los multicateter.
- Contiene **6 tubos plásticos auto-expandibles** (Ir-192). El radio de expansión de los tubos se ajusta en la base del dispositivo y pueden expandirse para obtener una forma similar a un balón.
- **A diferencia del SAVI la fuente de radiación no está en contacto directo con el tejido mamario.** Una vez colocado se separa la base de los catéteres y se cubren los canales, mejorando el confort de la paciente



SAVI CONTURA INTERSTICIAL

RADIOTERAPIA EXTERNA 3D- CONFORMADA





- **VENTAJAS:**

- No invasiva

- Disponible en todos los centros

- Menos requerimientos técnicos

- Resultados pueden ser más uniformes entre diferentes oncólogos radioterápicos

- Homogeneidad de la dosis elevada

RADIOTERAPIA EXTERNA 3D- CONFORMADA

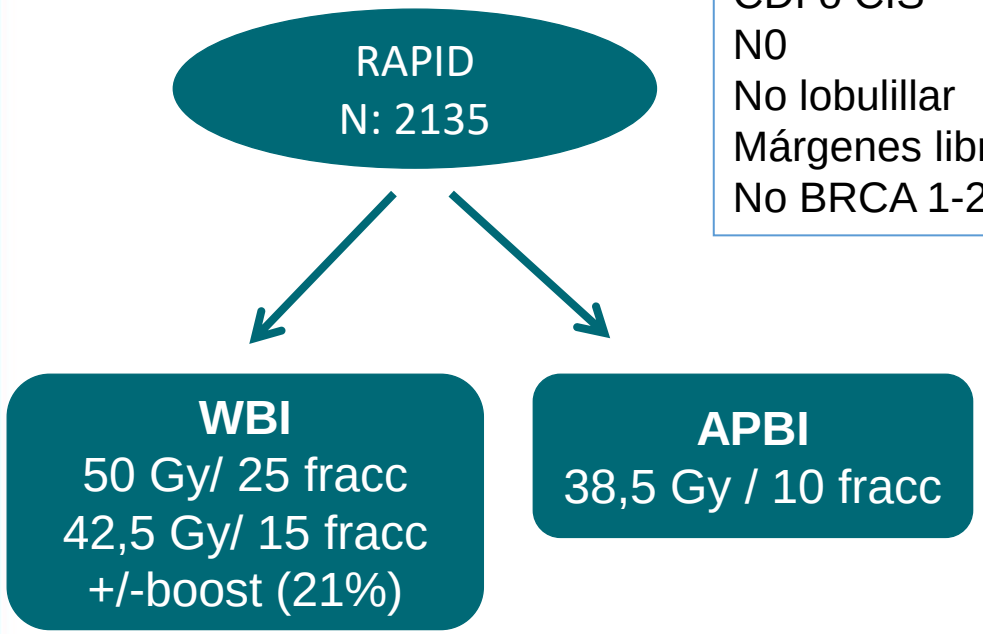
Institution/series	No. cases	Follow-up (months)	Fractionation schedule	IBF rate	Cosmetic result (good/excellent)	≥Grade 3 toxicity
RTOG 0319 (current study)	52	54 (median)	385 cGy × 10 (b.i.d.)	6%	NS	4%
William Beaumont Hospital (8,29)	94	50 (median)	340 or 385 cGy × 10 (b.i.d.)	1.1%	89%	4%
Harvard (31)	99	36	3200 cGy 4 Gy/bid	2%	97%	NS
New York University/Keck School of Medicine (32)	10	36 (minimum)	500, 550, or 600 cGy × 5 (10 days)	0%	100%	NS
Formenti (15)	47	18 (median)	600 cGy × 5 (10 days)	0%	NS	NS
Christie Hospital/ Holt Radium Institute (33)	353	96 (mean)	500–531 cGy × 8 (10 days)	25%	NS†	NS
National Institute of Oncology, Hungary (Phase III Trial)*	40	86 (median)	200 cGy × 25	2.5%	70%	NS
Rocky Mountain Cancer Center (34)	55	34	385 cGy × 10 (b.i.d.)	0%	NS	NS
NSABP B39/ RTOG 0413 Phase III Trial (28)	3200	19.4 (mean)	385 cGy × 10 (b.i.d.)	NS	NS	<1%
Hospital de la Esperanza Barcelona, Spain Phase III Trial (30)	46	18 (median)	375 cGy × 10 (b.i.d.)	0%	NS	0%
Tufts University Brown University (25)	64	15 (median)	385 cGy × 10 (b.i.d.)	NS	81.7%	8.3%
University of Michigan (26)	34	>24	385 cGy × 10 (b.i.d.)	NS	79.5%	NS

N: 2674 seguimiento: 15-96 meses 0- 6% recidivas locales

Vicini, Int J Rad Oncol Biol Phys 2010

Interim Cosmetic and Toxicity Results From RAPID: A Randomized Trial of Accelerated Partial Breast Irradiation Using Three-Dimensional Conformal External Beam Radiation Therapy

>40 años
pT1-2 (≤ 3 cm)
CDI o CIS
N0
No lobulillar
Márgenes libres
No BRCA 1-2



- **No diferencias en recidiva local entre APBI y WBI** a 5 (2.3 vs 1.7% y 8 años (3% vs 2.8%)
- **Peor resultado estético a 3, 5 y 7 años en APBI vs. WBI** valorado por enfermería, pacientes y médicos revisando fotografías
- **Menor toxicidad aguda y aumento de toxicidad tardía G1-2** en APBI. Toxicidad G3 rara
- **Posibles causas:**
  - Empleo de boost infrecuente en WBI (21%)
  - Poca conformación en el grupo APBI
  - Carencia de tiempo de reparación adecuado

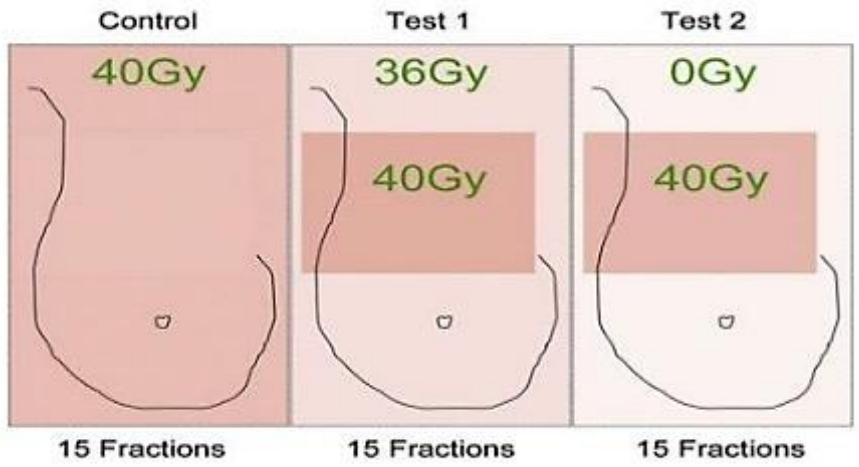
Interpretation External beam APBI was non-inferior to whole breast irradiation in preventing IBTR. Although less acute toxicity was observed, the regimen used was associated with an increase in moderate late toxicity and adverse cosmesis, which might be related to the twice per day treatment. Other approaches, such as treatment once per day, might not adversely affect cosmesis and should be studied.

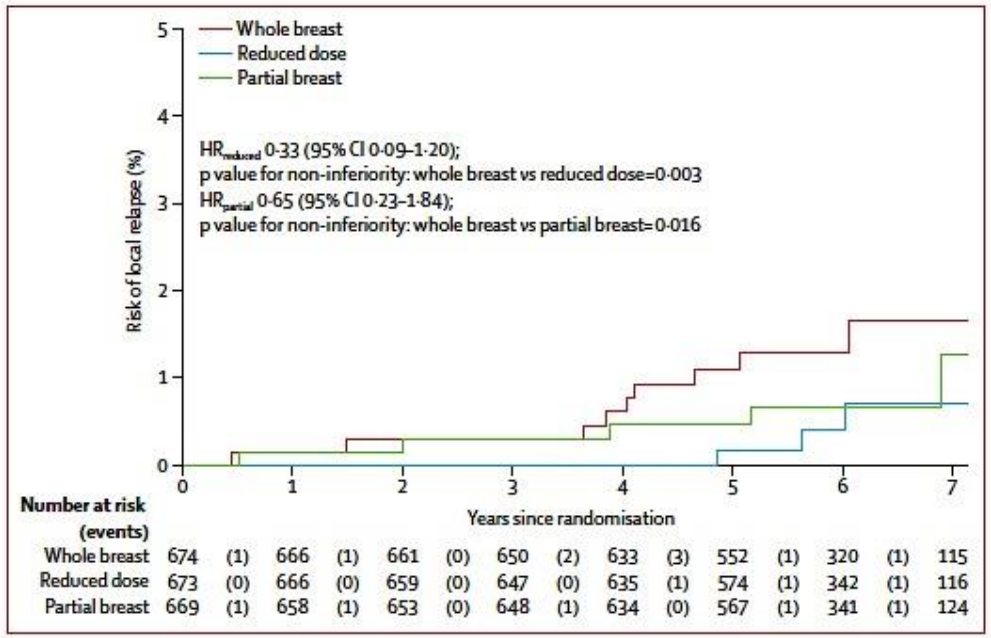
Olivotto JCO 2013, Whelan Lancet 2019

Partial-breast radiotherapy after breast conservation surgery for patients with early breast cancer (UK IMPORT LOW trial): 5-year results from a multicentre, randomised, controlled, phase 3, non-inferiority trial

IMPORT-LOW
N: 2018

≥ 50 años
pT1-2 (≤ 3 cm)
N0-1 (1+/3)
Grado 1-3
No lobulillar
Márgenes libres ≥ 2 mm





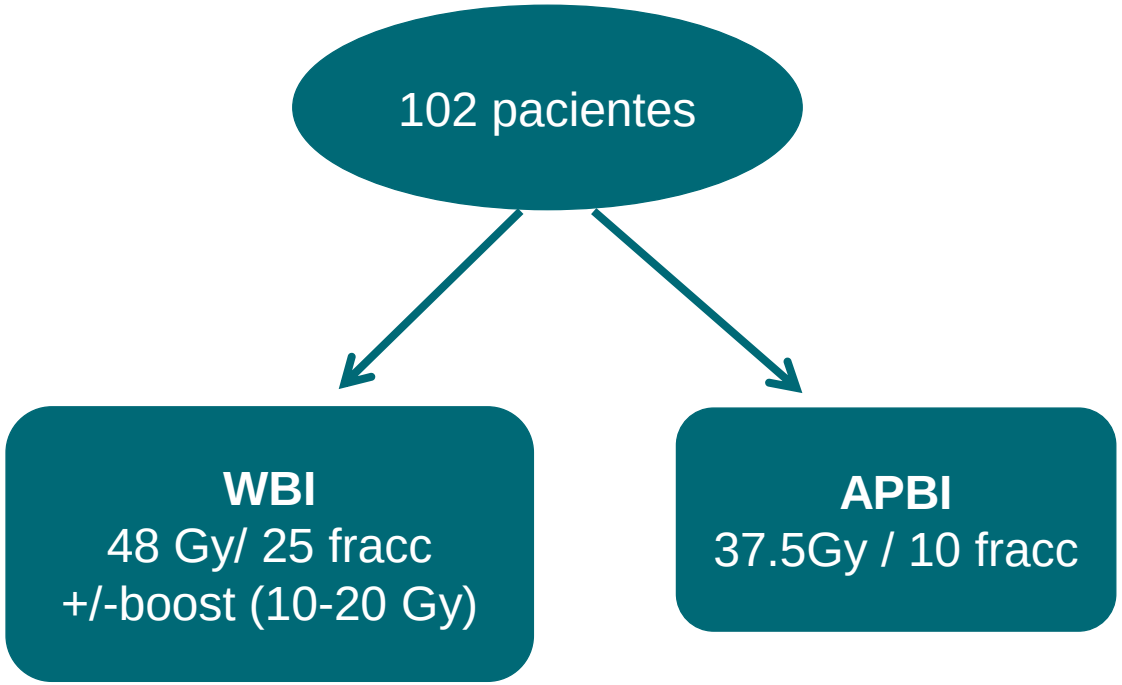
Interpretation We showed non-inferiority of partial-breast and reduced-dose radiotherapy compared with the standard whole-breast radiotherapy in terms of local relapse in a cohort of patients with early breast cancer, and equivalent or fewer late normal-tissue adverse effects were seen. This simple radiotherapy technique is implementable in radiotherapy centres worldwide.

Coles, Lancet 2017

Five-Year Outcomes, Cosmesis, and Toxicity With 3-Dimensional Conformal External Beam Radiation Therapy to Deliver Accelerated Partial Breast Irradiation

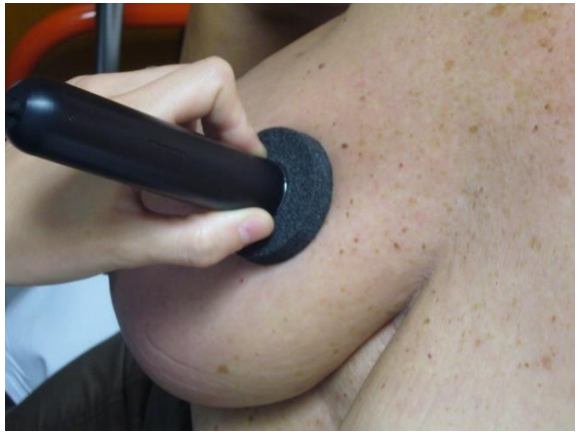
Núria Rodríguez, MD, PhD,*,† Xavier Sanz, MD,*,† Josefa Dengra, RN,* Palmira Foro, MD, PhD,*,† Ismael Membrive, MD,* Anna Reig, MD,* Jaume Quera, MD,*,† Enric Fernández-Velilla, MD,* Óscar Pera, MD,* Jackson Lio, MD,* Joan Lozano, MD,* and Manuel Algara, MD, PhD*,†

Int J Radiation Oncol Biol Phys, Vol. 87, No. 5, pp. 1051–1057, 2013

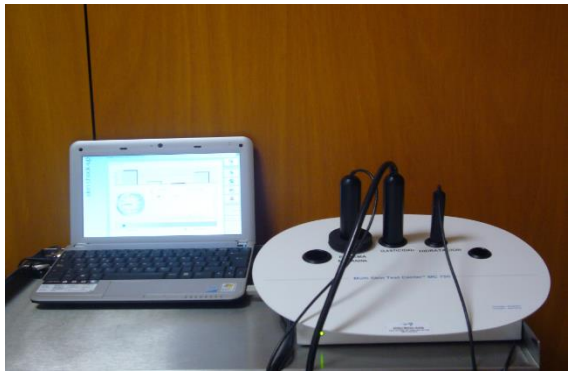


≥ 60 años
T ≤ 3 cm
CDI, Grado 1-2
pN0
No lobulillar
No CIS puro o extenso
Márgenes > 3 mm
Excluye: hematoma postquirúrgico ≥ 2 cm,
seroma que ha precisado más de un drenaje

- La **toxicidad aguda y crónica** se recogió mediante las *escalas de la RTOG* (Radiation Therapy Oncology Group), semanalmente durante el tratamiento, al mes, 3 y 6 meses y anualmente.

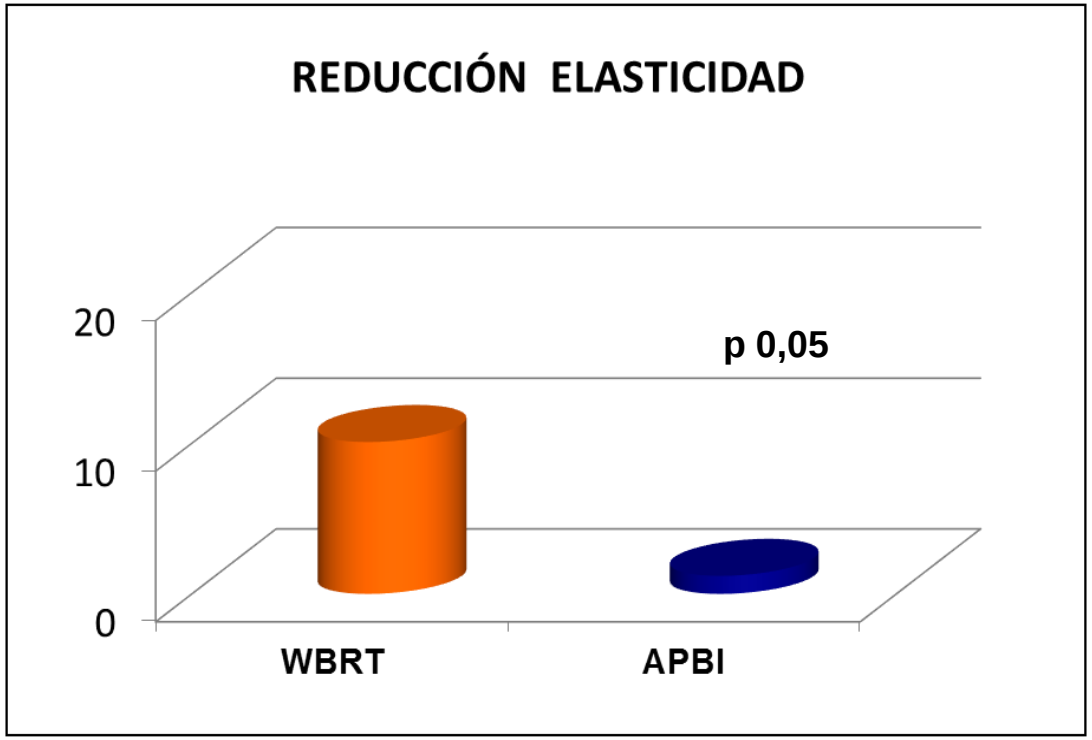


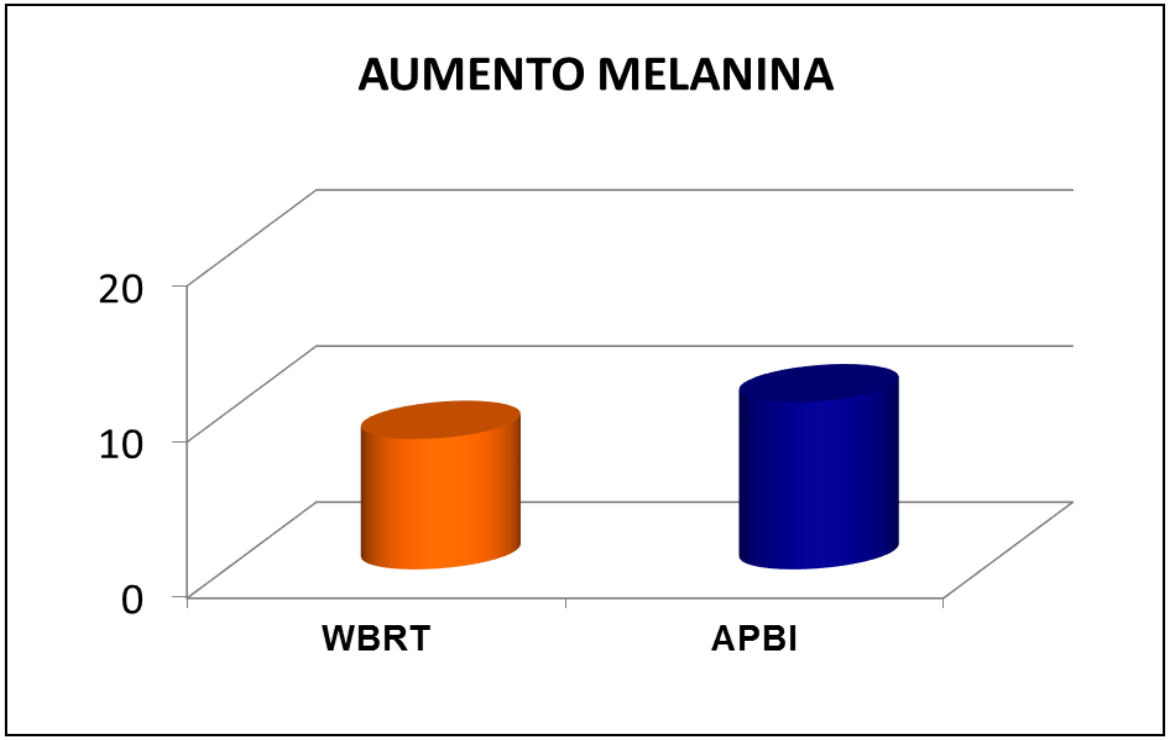
- El **resultado estético,** se evaluó :
  - valoración cuantitativa mediante el dispositivo *Multi Skin Test Center*
  - valoración médica (*Harvard/NSABP/RTOG Breast Cosmesis Grading Scale)*
  - valoración cuantitativa de la paciente



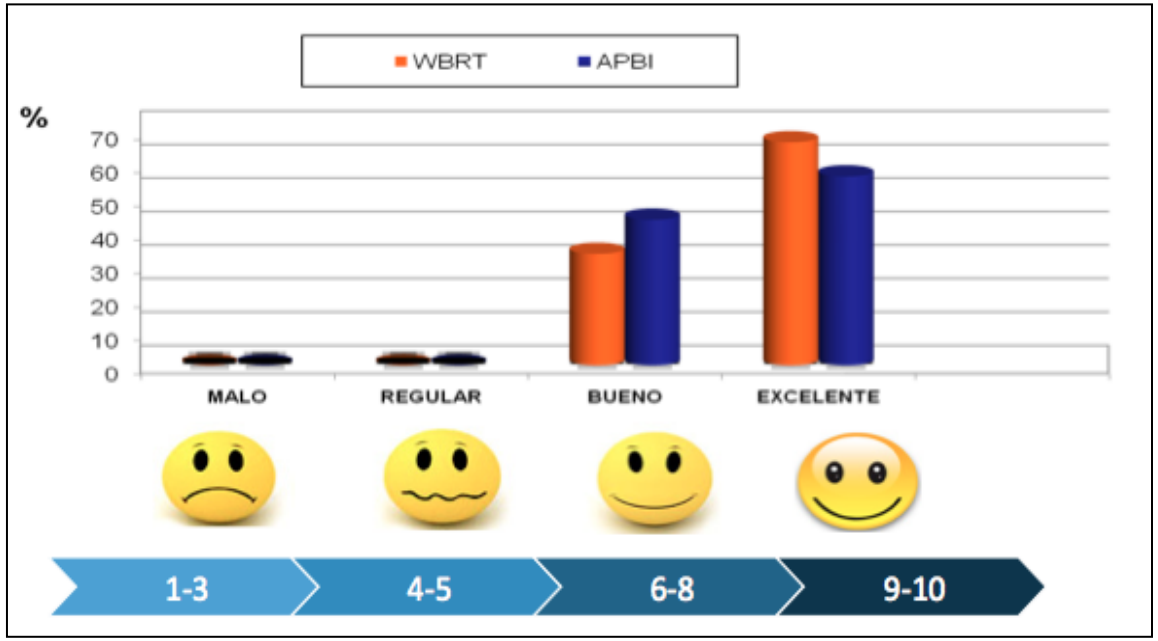
- **Seguimiento medio de 5 años**

Valoración Multi skin Test Center

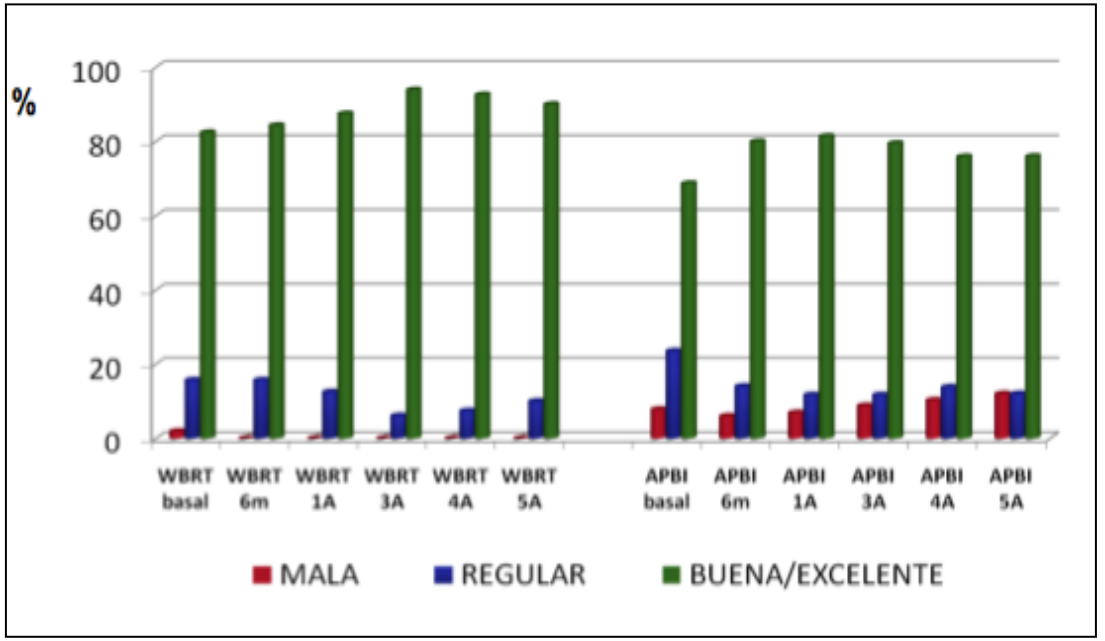




Valoración por la paciente

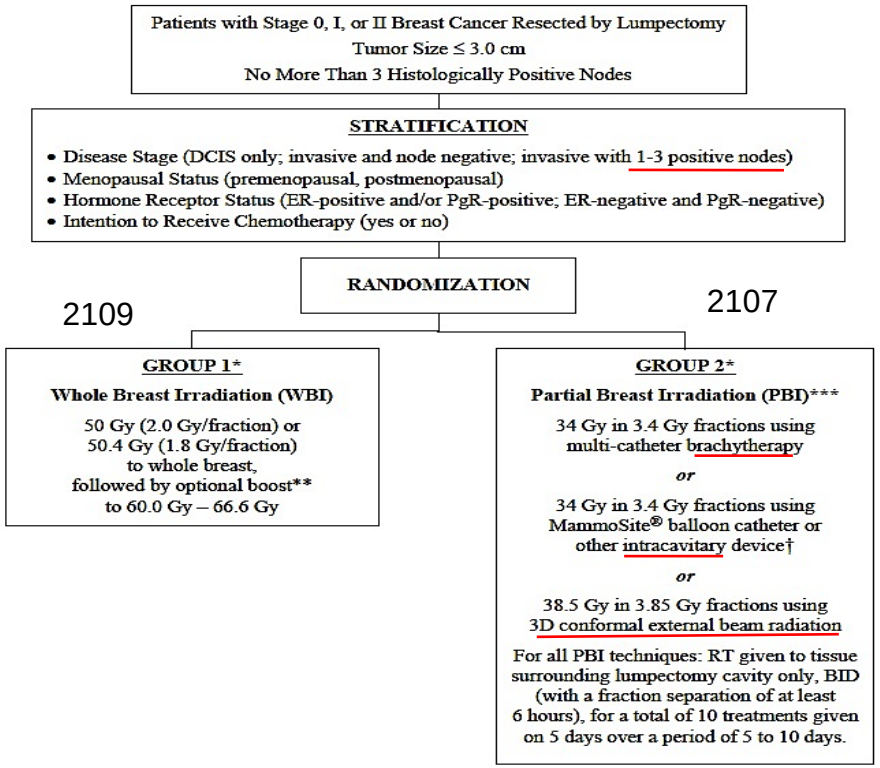


Valoración por el médico



No se objetivaron recaídas locales

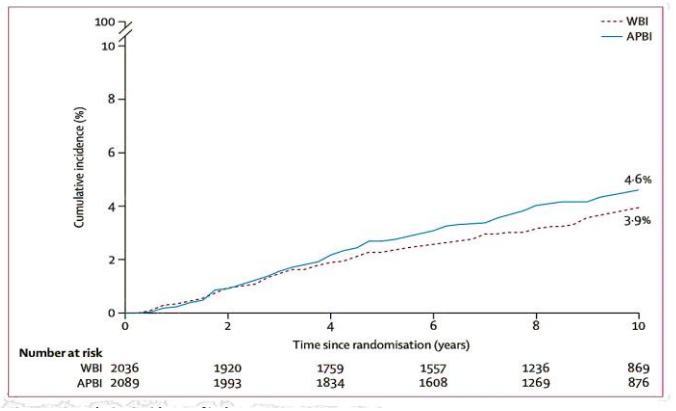
RTOG 0413 NSABP – B 39



- **APBI no es equivalente a la WBI en recidiva local**

  IBTR: 4% APBI vs 3% WBI. HR 1.22 [90%CI: 0.94-1.58]

- **La diferencia absoluta en la incidencia acumulada a 10 años de IBTR es < 1%.**



- **Supervivencia global, libre de enfermedad y tiempo hasta recaída a distancia son similares**

Interpretation APBI did not meet the criteria for equivalence to whole-breast irradiation in controlling IBTR for breast-conserving therapy. Our trial had broad eligibility criteria, leading to a large, heterogeneous pool of patients and sufficient power to detect treatment equivalence, but was not designed to test equivalence in patient subgroups or outcomes from different APBI techniques. For patients with early-stage breast cancer, our findings support whole-breast irradiation following lumpectomy; however, with an absolute difference of less than 1% in the 10-year cumulative incidence of IBTR, APBI might be an acceptable alternative for some women.

Vicini, Lancet 2019

Estudios en marcha

IRMA (33)	Open	3302	3DCRT	≥49 y, stage I–II, < 3 cm, pN-0 – N-1 (<3 LN+), (−) margins (2 mm)
SHARE (34)	Open	2796	3DCRT	≥50 y, stage 1, < 2 cm, p N0-N i+ (−) margins (2 mm)

ESTRO 2017

N:983.

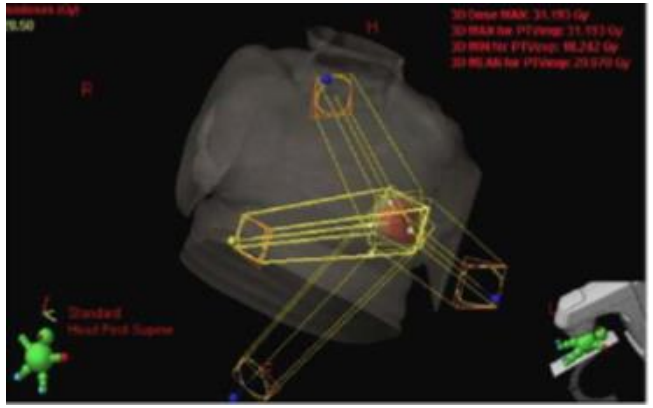
No diferencias en cosmesis

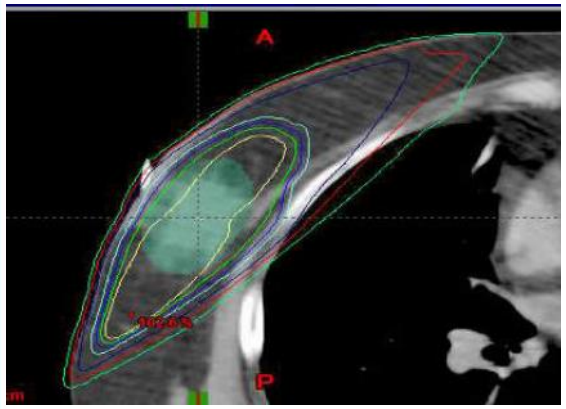
Toxicidad aguda G3 poco frecuente y similar

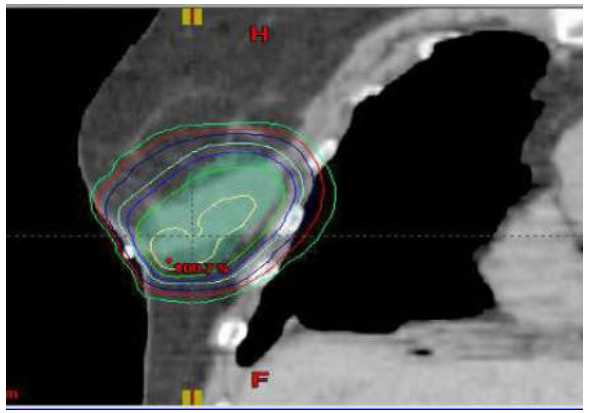
Toxicidad tardía G3-4 similar

RADIOTERAPIA EXTERNA- NUEVAS TÉCNICAS

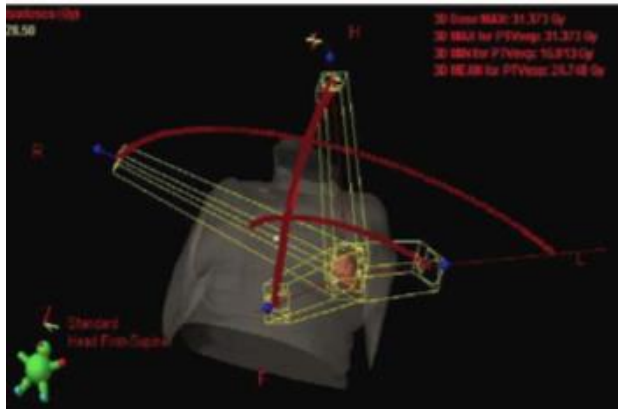
3D-CRT

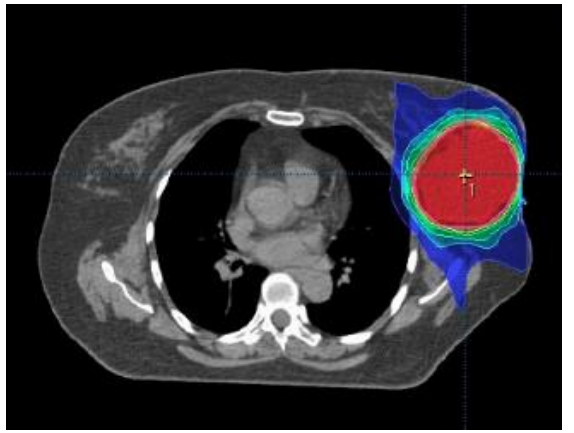


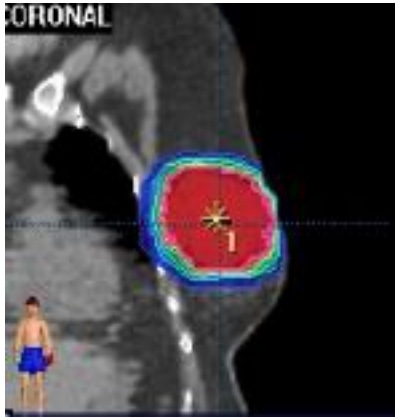




IMRT-VMAT







Accelerated partial breast irradiation using intensity-modulated radiotherapy versus whole breast irradiation: 5-year survival analysis of a phase 3 randomised controlled trial

520 pacientes
2005-2013
N:1233

>40 años
T < 2.5 cm
CDI o CIS
No excluye ILV
N0-1
No CIS extenso
Excluye si no hay clips
Márgenes ≥ 5 mm

WBI (260)
50 Gy/ 25 fracc
+/-boost (10 Gy)

APBI-IMRT (260)
30Gy / 5 fracc
(días alternos)

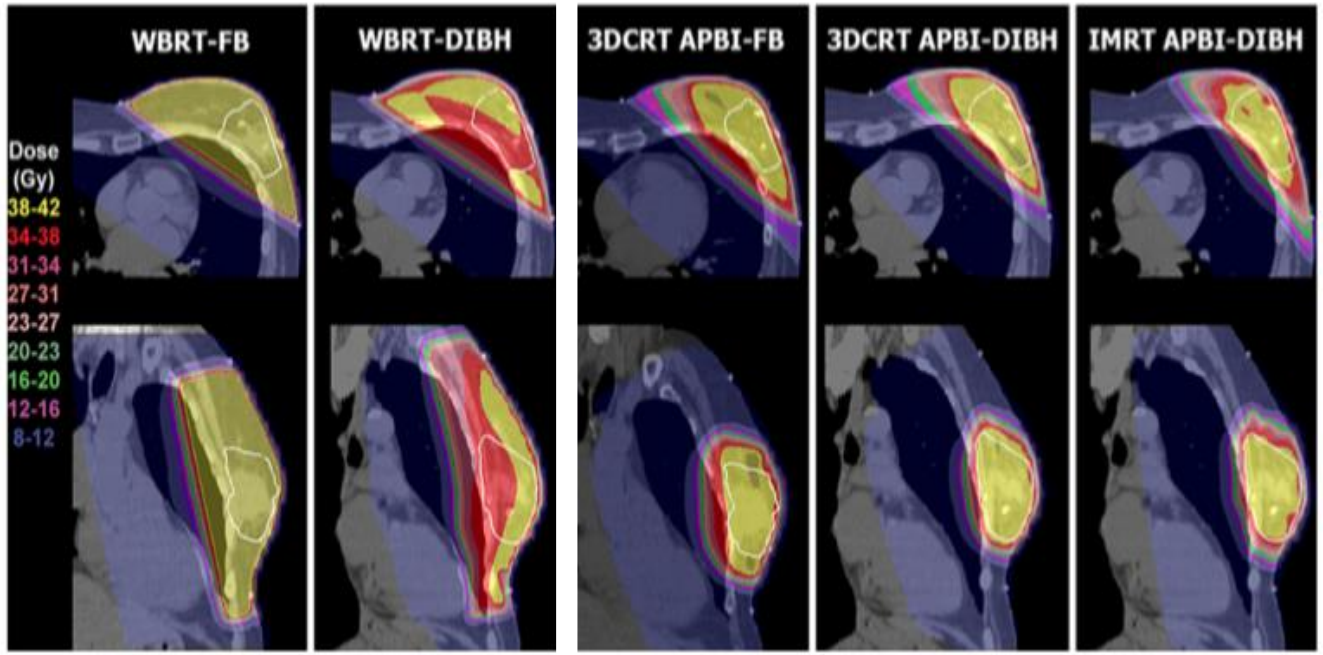
No hay diferencias en recidiva local ni supervivencia

APBI, menor toxicidad aguda (p = 0.0001), tardía (p = 0.004), y resultado estético mejor (p = 0.045).

Livi, Europ J Cancer 2015; Meattini, E J Cancer 2017

RADIOTERAPIA EXTERNA- NUEVAS TÉCNICAS

ACCELERATED PARTIAL BREAST IRRADIATION: WHAT IS DOSIMETRIC EFFECT OF ADVANCED TECHNOLOGY APPROACHES?



Buena cobertura del tumor

Reducción de dosis máxima en corazón y en arteria coronaria con APBI vs WBI.

Mayor reducción si ABPI con IMRT y control respiratorio

Moran IJROBP 2009

CONCLUSIONES

✓ La **reducción del volumen** de irradiación permite la administración de una dosis eficaz en un **número menor** de sesiones.

✓ La irradiación parcial de la mama se puede administrar con diferentes técnicas, con buenos resultados en supervivencia y toxicidad en **pacientes seleccionadas**.

✓ **Potenciales ventajas**:

- Reducción del tiempo de tratamiento: mayor comodidad para la paciente, coste-eficacia.
- Reduce las dosis en órganos sanos
- Menor mortalidad no relacionada con cáncer de mama