Sociedad Española
de Senología y Patología Mamaria

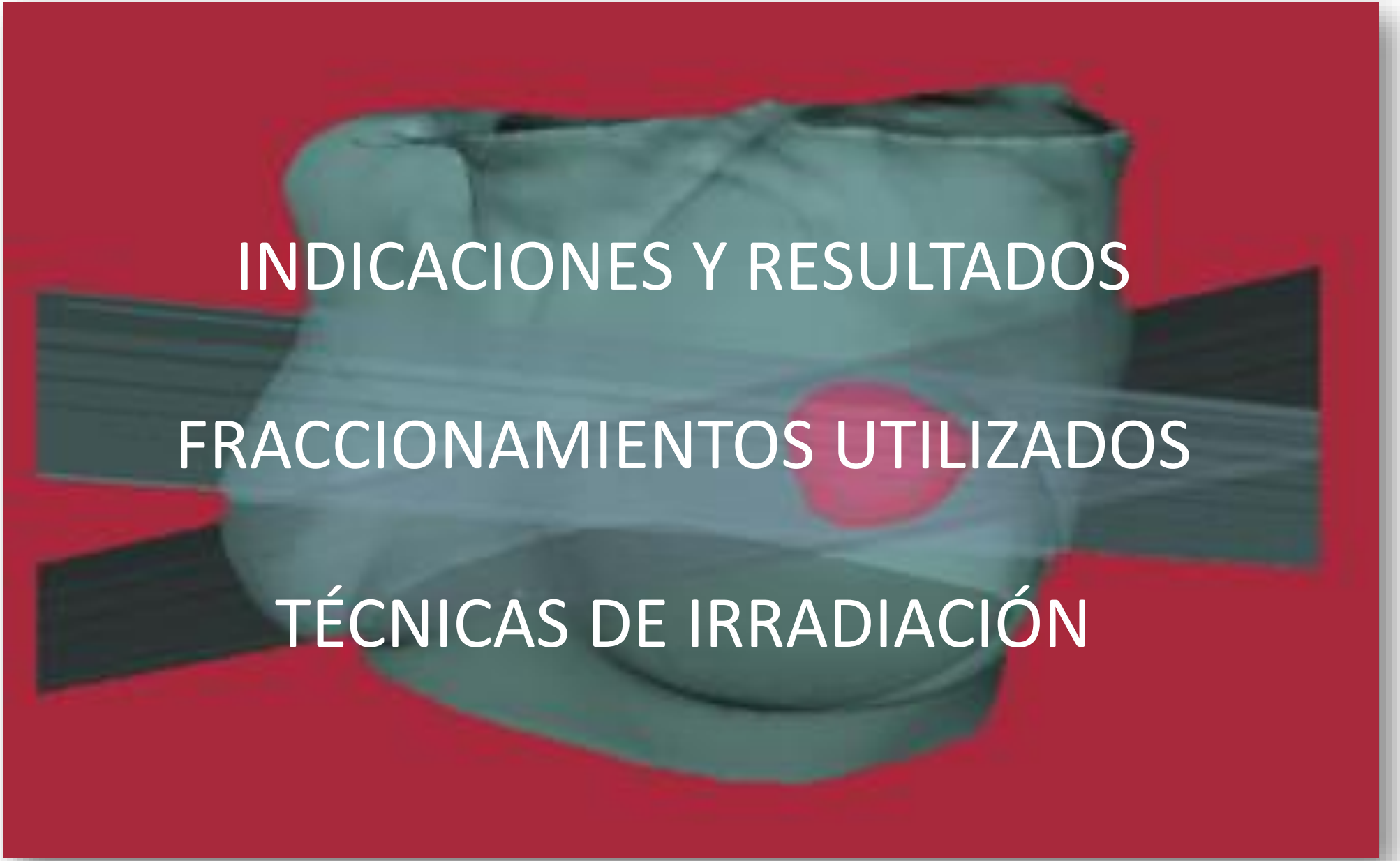
# Curso de Radioterapia Intraoperatoria

## Irradiación de la mama

JAVIER SANZ LATIESAS

*Hospital del Mar*

*Oncología Radioterápica*



# INDICACIONES Y RESULTADOS

# FRACCIONAMIENTOS UTILIZADOS

# TÉCNICAS DE IRRADIACIÓN

# INDICACIONES Y RESULTADOS

Clin Transl Oncol (2008) 10:47-51
DOI 10.1007/s12094-008-0152-6

RESEARCH ARTICLES

## Use of radiation treatment units in breast cancer. Changes in the last 15 years

Manuel Algara López · Xavier Sanz Latiesas · Palmira Foro Arnalot · Martí Lacruz Bassols · Anna Reig Castillejo · Joan Lozano Galán · Ismael Membrive Conejo · Jaume Quera Jordana · Nuria Rodríguez de Dios

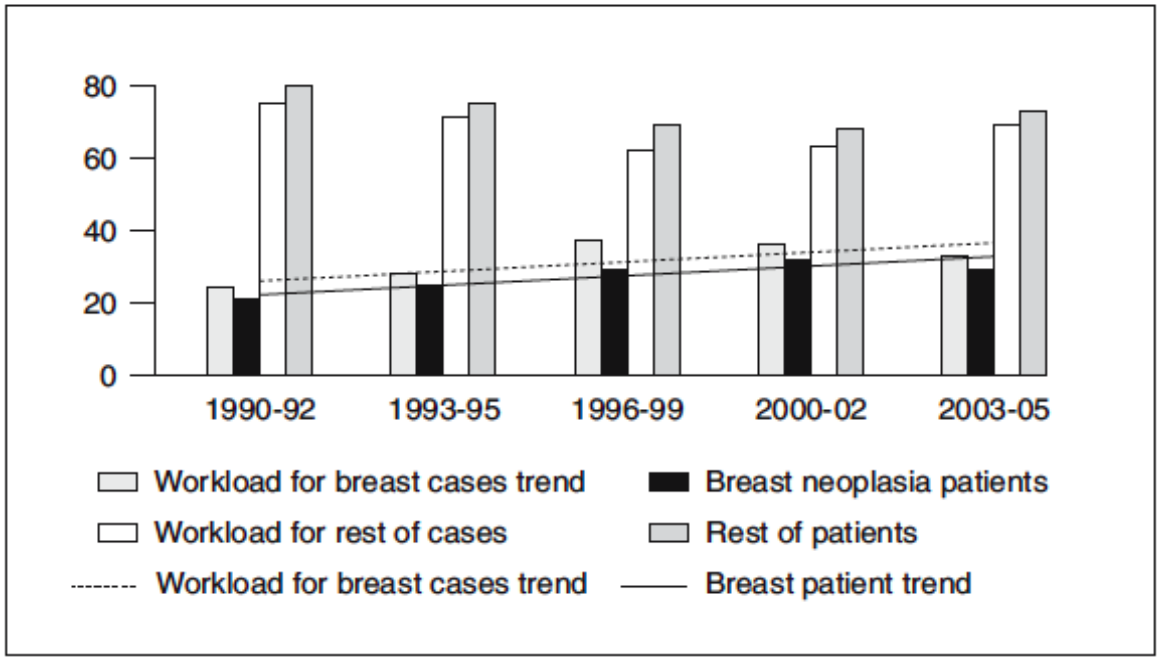
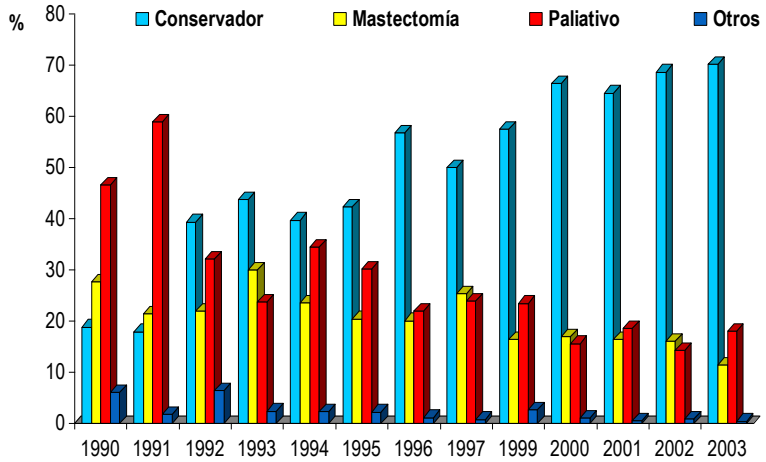



Fig. 1 Percentage of treatments, workload and trends in teletherapy units for breast cancer




Sociedad Española de Senología y Patología Mamaria

Artic

## Effects of chemotherapy and hormonal therapy for early breast cancer on recurrence and 15-year survival: an overview of the randomised trials

*Early Breast Cancer Trialists' Collaborative Group (EBCTCG)**

Lancet 2005; 3

See Comment

*Collaborators
at end of report

Correspondence
EBCTCG secreta
CTSU, Raddiffe
Oxford OX2 6H
bc.overview@

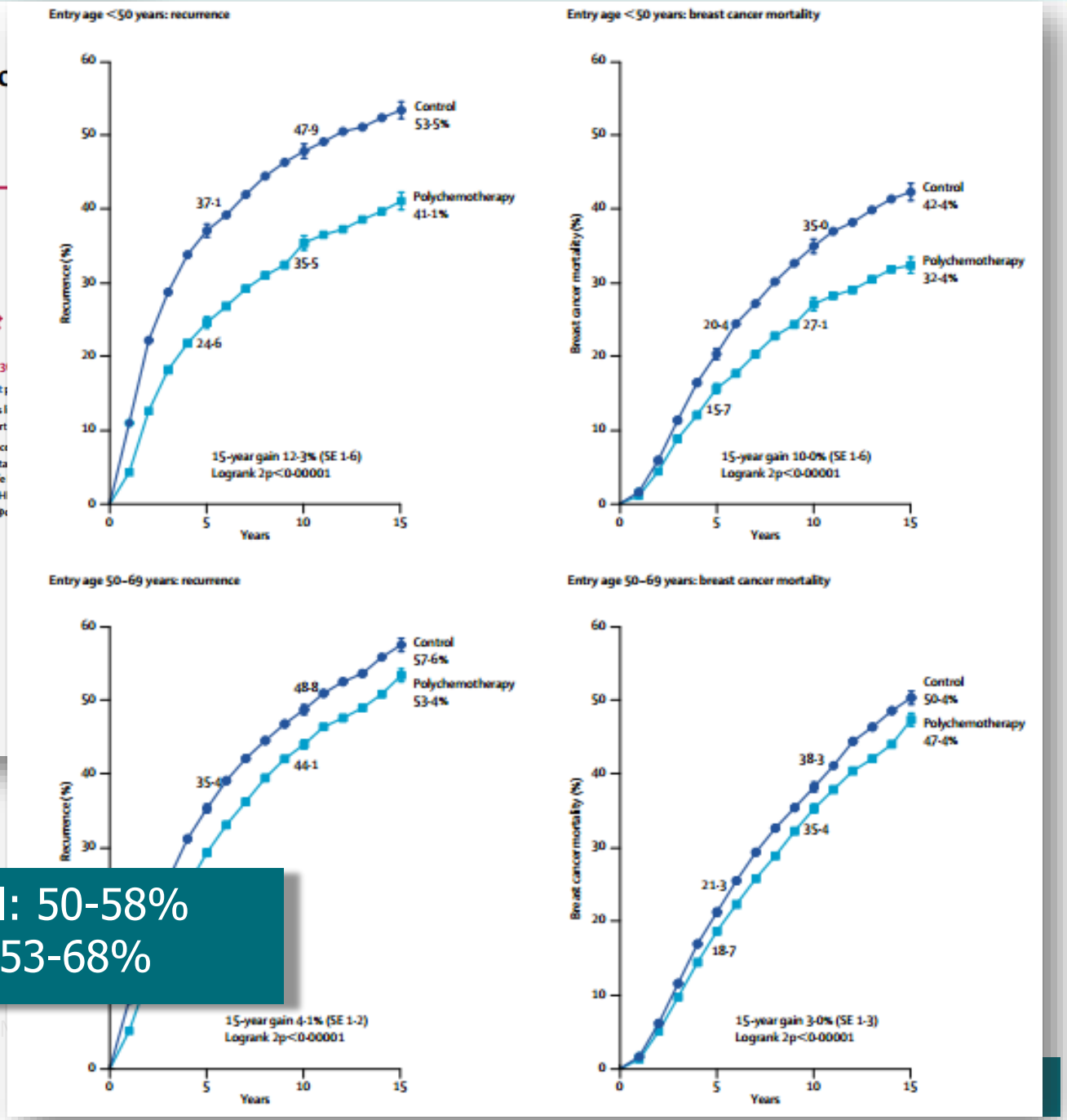
**Summary**

**Background** Quinquennial overviews (1985–2000) of the randomised trials in early breast cancer have assessed the 5-year and 10-year effects of various systemic adjuvant therapies on breast cancer recurrence and survival. Here, we report the 10-year and 15-year effects.

**Methods** Collaborative meta-analyses were undertaken of 194 unconfounded randomised trials of adjuvant chemotherapy or hormonal therapy that began by 1995. Many trials involved CMF (cyclophosphamide, methotrexate, fluorouracil), anthracycline-based combinations such as FAC (fluorouracil, doxorubicin, cyclophosphamide) or FEC (fluorouracil, epirubicin, cyclophosphamide), tamoxifen, or ovarian suppression: none involved taxanes, trastuzumab, raloxifene, or modern aromatase inhibitors.

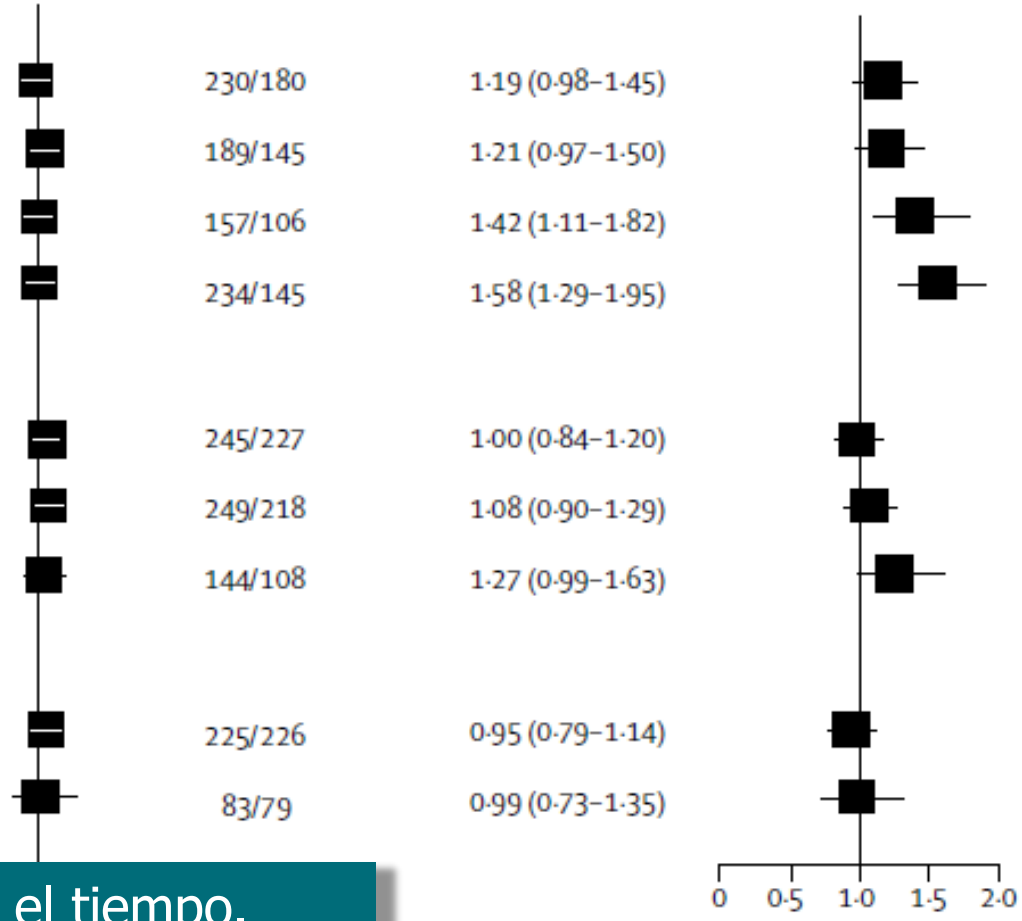
**Findings** All
annual brea
about 20% (
oestrogen r
(2p=0·0001
women of a

El tratamiento locoregional aumenta la supervivencia




Supervivencia con tratamiento locoregional: 50-58%
Supervivencia añadiendo quimioterapia: 53-68%

| Years from breast cancer diagnosis to cardiac death | No radiotherapy | | Radiotherapy | |
|---|---|---|---|---|
| | Cardiac deaths left/right | Cardiac mortality ratio, left-sided *vs* right-sided (95% CI) | Cardiac deaths left/right | Cardiac mortality ratio, left-sided *vs* right-sided (95% CI) |
| **Diagnosed 1973–82** | | | | |
| <5 years | 717/679 | 0·98 (0·89–1·09) | 230/180 | 1·19 (0·98–1·45) |
| 5–9 | 673/614 | 1·04 (0·93–1·15) | 189/145 | 1·21 (0·97–1·50) |
| 10–14 | 469/441 | 1·00 (0·87–1·13) | 157/106 | 1·42 (1·11–1·82) |
| ⩾15 | 515/480 | 1·01 (0·89–1·15) | 234/145 | 1·58 (1·29–1·95) |
| **Diagnosed 1983–92** | | | | |
| <5 years | 880/785 | 1·06 (0·96–1·16) | 245/227 | 1·00 (0·84–1·20) |
| 5–9 | 815/729 | 1·07 (0·97–1·18) | 249/218 | 1·08 (0·90–1·29) |
| ⩾10 | 390/361 | 1·04 (0·90–1·20) | 144/108 | 1·27 (0·99–1·63) |
| **Diagnosed 1993–2001** | | | | |
| <5 years | 567/508 | 1·05 (0·93–1·18) | 225/226 | 0·95 (0·79–1·14) |
| 5–9 | 144/136 | 1·02 (0·81–1·29) | 83/79 | 0·99 (0·73–1·35) |




y status, period of diagnosis, and years from breast

La mortalidad "tóxica" ha disminuido con el tiempo.

Las mejoras tecnológicas impactan en la supervivencia

Clinical Medicine & Research
Volume 13, Number 2: 65-73

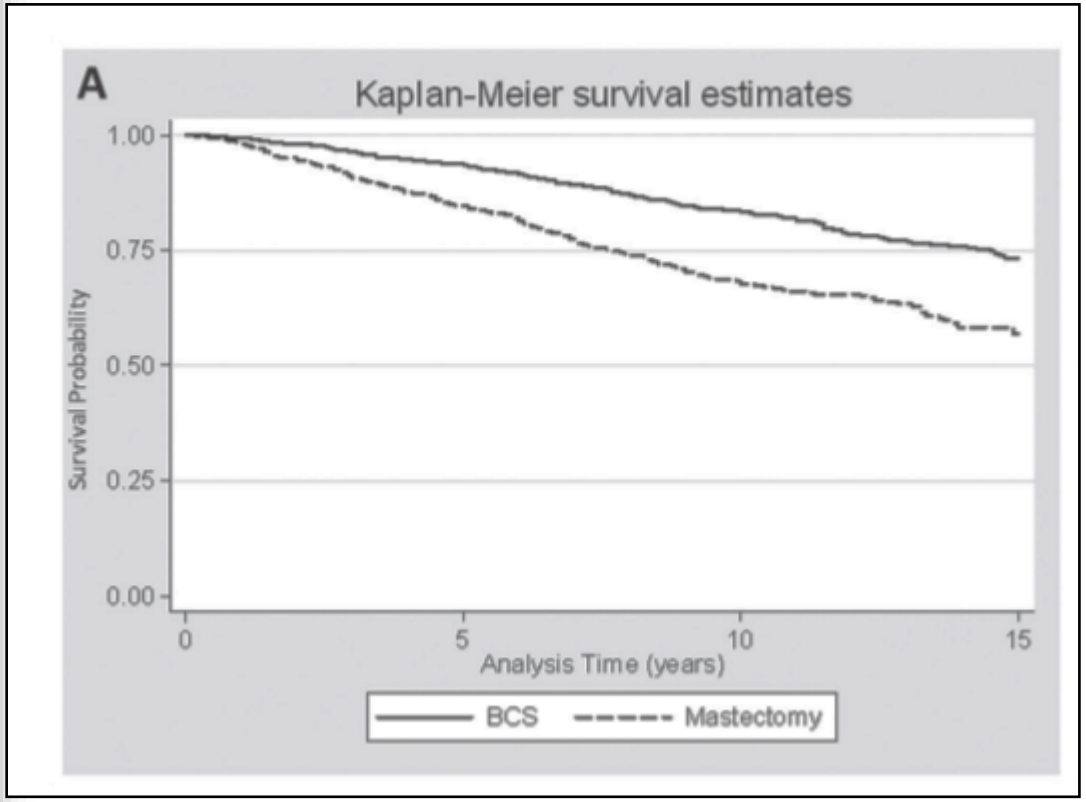
clinmedres.org

Original Research

# Survival Comparisons for Breast Conserving Surgery and Mastectomy Revisited: Community Experience and the Role of Radiation Therapy

Adedayo A. Onitilo, MD, PhD, MSCR, FACP; Jessica M. Engel, DNP, RN; Rachel V. Stankowski, PhD; and Suhail A.R. Doi, MBBS, FRCP, PhD

***Objectives:*** Evidence suggests superiority of breast conserving surgery (BCS) plus radiation over mastectomy alone for treatment of early stage breast cancer. Whether the superiority of BCS plus radiation is related to the surgical approach itself or to the addition of adjuvant radiation therapy following BCS remains unclear.



# Indicaciones de irradiación tras mastectomía

- **T4, incluido carcinoma inflamatorio**
- **4 o más ganglios afectos**
- **T3 con ganglios positivos**
- **T3 N0**

**tener en cuenta factores de riesgo**

- **T1-2 N1**

ASCO GUIDELINES™

**Postmastectomy Radiotherapy: An American Society of Clinical Oncology, American Society for Radiation Oncology, Society of Surgical Oncology Focused Guideline Update**

www.asco.org/pmrt-guideline 

- The American Society of Clinical Oncology (ASCO) guideline for the use of postmastectomy radiotherapy (PMRT) was published in 2001.
- This update of that guideline, completed in collaboration with the American Society for Radiation Oncology (ASTRO) and the Society of Surgical Oncology (SSO), focuses on key areas of ongoing controversy including:
  - Use of PMRT for patients with 1-3 positive lymph nodes
  - Use of PMRT for patients undergoing neoadjuvant systemic therapy (NAST)
  - Selected technical aspects of PMRT, particularly the extent of regional nodal irradiation (RNI)

## Clinical Questions

1. Is PMRT indicated in patients with T1-2 tumors with one to three positive axillary lymph nodes who have axillary lymph node dissection?

2. Is PMRT indicated in patients with T1-2 tumors and a positive sentinel node biopsy who do not undergo completion axillary lymph node dissection?

3. Is PMRT indicated in patients presenting with clinical Stage I or II cancers who have received neoadjuvant systemic therapy?

4. Should regional nodal irradiation include the internal mammary and/or supraclavicular-axillary apical nodes when PMRT is used in patients with T1-2 tumors with one to three positive axillary nodes?

# MRC SUPREMO TRIAL
## (BIG 2-04)

(**S**elective **U**se of **P**ostoperative **R**adiotherapy Aft**E**r **M**astect**O**my)

**ISRCTN61145589 MREC Ref:05/S0501/106**

under the auspices of:

UK Medical Research Council
Scottish Cancer Trials Breast Group

**1.1** Stage II histologically confirmed unilateral breast cancer following mastectomy including the following pTNM stages:

- **pT1N1M0**
- **pT2N1M0**
- **pT2N0M0 if grade III histology and/or lymphovascular invasion**
- **pT3N0M0.**

If the tumour area comprises multiple small adjacent foci of invasive carcinoma then overall maximum dimension is taken to determine the size for T staging (see section 7.2.2 for a more detailed explanation). Multifocal or multicentric tumours can be included (pT1m; pT2m; pT3m). The size of the largest tumour focus determines the T stage classification. See section 7.2.1).

**1.2** Stage II histologically confirmed unilateral breast cancer following **neoadjuvant systemic therapy** and mastectomy, if the original clinical stage was cT1-2cN0-1M0 or cT1-2pN1(sn)M0 and with the following (**yp**TNM) stages after neoadjuvant systemic therapy:

- **ypT1pN1M0**
- **ypT2pN1M0**
- **ypT2pN0M0 if grade III histology and/or lymphovascular invasion.**
- **ypT0pN0 or ypT1pN0 or ypT0pN1** (pathological complete remission, or near complete remission).
- **ypT2N0** independent of grade or lymphovascular invasion, if the original clinical stage was cT3N0.

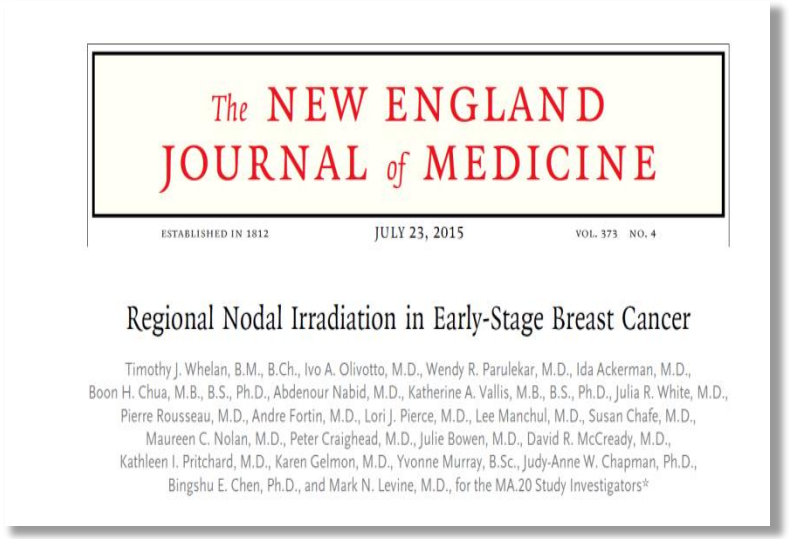
Also:

- **ypT3N0M0,** if original clinical staging was cT1-3cN0 M0 or cT1-3pN0 (sn) M0.

# 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)*

Beneficio de irradiar cuando hay 1-3 ganglios afectos incluso cuando se añade quimioterapia

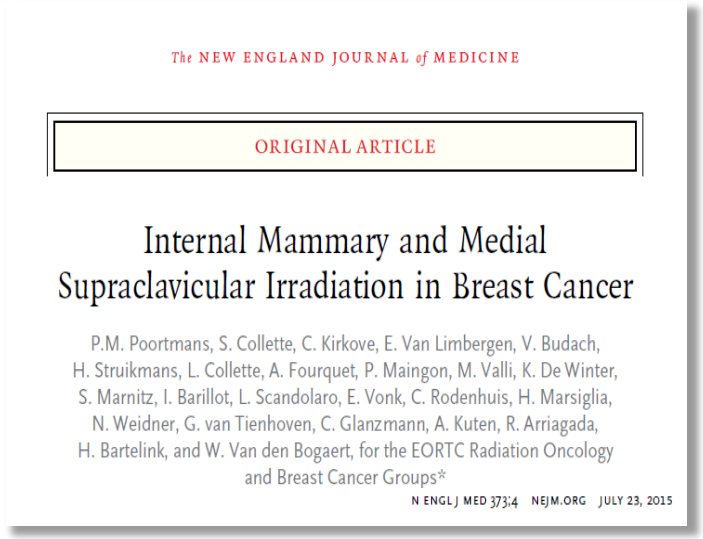


The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JULY 23, 2015 VOL. 373 NO. 4

## Regional Nodal Irradiation in Early-Stage Breast Cancer

Timothy J. Whelan, B.M., B.Ch., Ivo A. Olivotto, M.D., Wendy R. Parulekar, M.D., Ida Ackerman, M.D., Boon H. Chua, M.B., B.S., Ph.D., Abdenour Nabid, M.D., Katherine A. Vallis, M.B., B.S., Ph.D., Julia R. White, M.D., Pierre Rousseau, M.D., Andre Fortin, M.D., Lori J. Pierce, M.D., Lee Manchul, M.D., Susan Chafe, M.D., Maureen C. Nolan, M.D., Peter Craighead, M.D., Julie Bowen, M.D., David R. McCready, M.D., Kathleen I. Pritchard, M.D., Karen Gelmon, M.D., Yvonne Murray, B.Sc., Judy-Anne W. Chapman, Ph.D., Bingshu E. Chen, Ph.D., and Mark N. Levine, M.D., for the MA.20 Study Investigators*



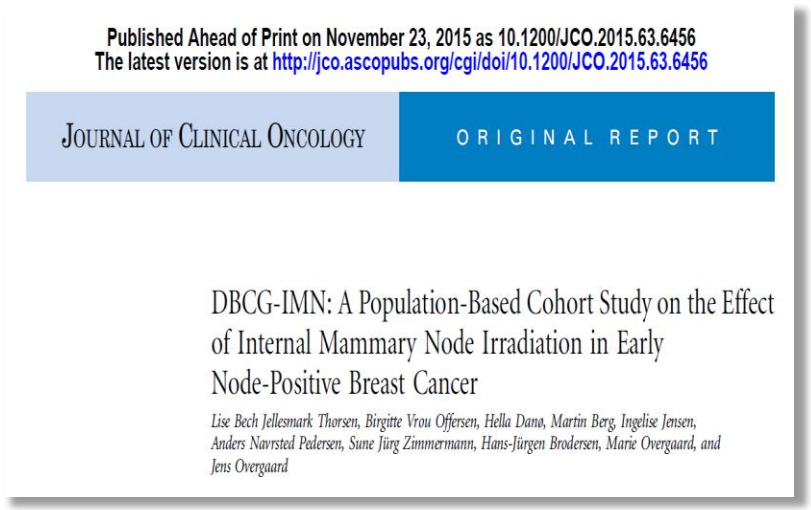
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

## Internal Mammary and Medial Supraclavicular Irradiation in Breast Cancer

P.M. Poortmans, S. Collette, C. Kirkove, E. Van Limbergen, V. Budach, H. Struikmans, L. Collette, A. Fourquet, P. Maingon, M. Valli, K. De Winter, S. Marnitz, I. Barillot, L. Scandolaro, E. Vonk, C. Rodenhuis, H. Marsiglia, N. Weidner, G. van Tienhoven, C. Glanzmann, A. Kuten, R. Arriagada, H. Bartelink, and W. Van den Bogaert, for the EORTC Radiation Oncology and Breast Cancer Groups*





Published Ahead of Print on November 23, 2015 as 10.1200/JCO.2015.63.6456
The latest version is at http://jco.ascopubs.org/cgi/doi/10.1200/JCO.2015.63.6456

JOURNAL OF CLINICAL ONCOLOGY ORIGINAL REPORT

## DBCG-IMN: A Population-Based Cohort Study on the Effect of Internal Mammary Node Irradiation in Early Node-Positive Breast Cancer

*Lise Bech Jellesmark Thorsen, Birgitte Vrou Offersen, Hella Danø, Martin Berg, Ingelise Jensen, Anders Navrsted Pedersen, Sune Jürg Zimmermann, Hans-Jürgen Brodersen, Marie Overgaard, and Jens Overgaard*

Impacto de la irradiación de la cadena mamaria interna

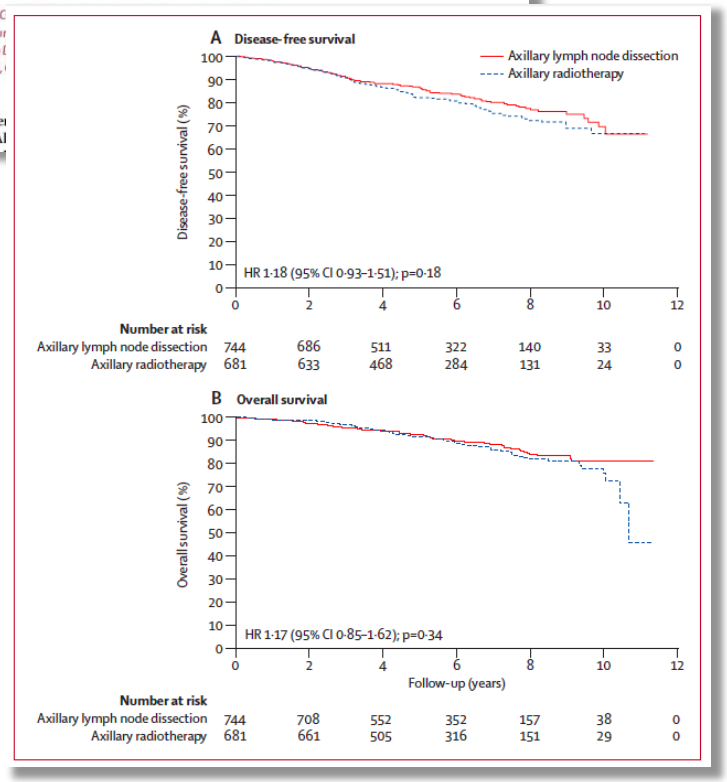
Articles

# Radiotherapy or surgery of the axilla after a positive sentinel node in breast cancer (EORTC 10981-22023 AMAROS): a randomised, multicentre, open-label, phase 3 non-inferiority trial

Mila Donker, Geertjan van Tienhoven, Marieke E Straver, Philip Meijnen, C
A Helen Westenberg, Jean H G Klinkenbijl, Lorenzo Orzalesi, Willem H Bour
Sanne C Veltkamp, Leen Slaets, Nicole J Duez, Peter W de Graaf, Thijs van L
Jos W S Merkus, Yazid Belkacemi, Patrick Petignat, Dominic A X Schinagl,

**Summary**

**Background** If treatment of the axilla is indicated in patie
axillary lymph node dissection is the present standard. Al



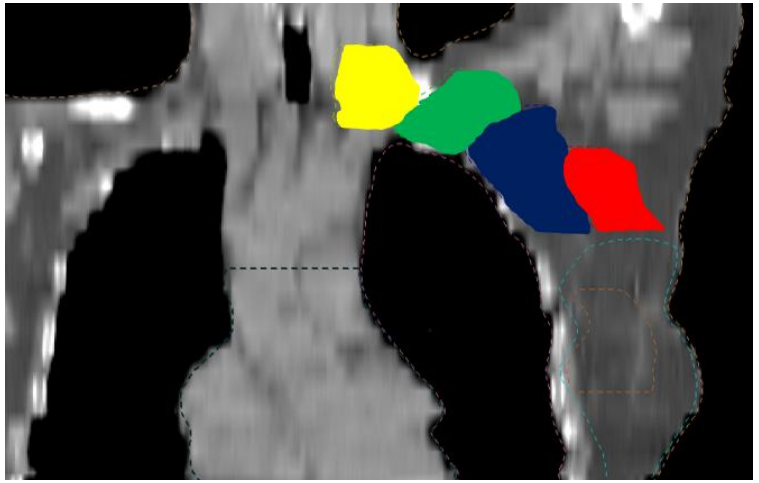

# Axillary Dissection vs No Axillary Dissection in Women With Invasive Breast Cancer and Sentinel Node Metastasis

## A Randomized Clinical Trial

Armando E. Giuliano, MD
Kelly K. Hunt, MD
Karla V. Ballman, PhD
Peter D. Beitsch, MD
Pat W. Whitworth, MD

**Context** Sentinel lymph node dissection (SLND) accurately identifies nodal metastasis of early breast cancer, but it is not clear whether further nodal dissection affects survival.

**Objective** To determine the effects of complete axillary lymph node dissection (ALND) on survival of patients with sentinel lymph node (SLN) metastasis of breast cancer.



**Menor toxicidad con radioterapia**

# OPTIMAL

cN0 → SLNB Conservative surgery of the breast (No cALND) → OSNA +/++ TTL 250-15.000

Intentional

- Whole Breast RXT+ Axilla I+II+III+ Supraclavicular
- Whole Breast RXT, not aimed to Axilla

Incidental

# OPTIMAL II

N+ → PST → SLNB and Tumorectomy or Mastectomy → OSNA -

- RXT Breast or chest wall + Axilla I+II+III+ Supraclavicular
- RXT Breast or chest wall + Axilla I+II

Gicor
Grupo de Investigación Clínica en Oncología Radioterápica

## PRINCIPLES OF RADIATION THERAPY

**Optimizing Delivery of Individual Therapy:**
It is important to individualize radiation therapy planning and delivery. CT-based treatment planning is encouraged to delineate target volumes and adjacent organs at risk. Greater target dose homogeneity and sparing of normal tissues can be accomplished using compensators such as wedges, forward planning using segments, and intensity-modulated radiation therapy (IMRT).
Respiratory control techniques including deep inspiration breath-hold and prone positioning may be used to try to further reduce dose to adjacent normal tissues, in particular heart and lung. Boost treatment in the setting of breast conservation can be delivered using enface electrons, photons, or brachytherapy. Chest wall scar boost when indicated is typically treated with electrons or photons.
Verification of daily setup consistency is done with weekly imaging. In certain circumstances, more frequent imaging may be appropriate. Routine use of daily imaging is not recommended.

**Whole Breast Radiation:**
Target definition is the breast tissue in entirety. The whole breast should receive a dose of 46–50 Gy in 23–25 fractions or 40–42.5 Gy in 15–16 fractions (hypofractionation is preferred). All dose 5 days per week. A boost to the tumor bed is reco at higher risk for recurrence. Typical boost doses fractions.

**Chest Wall Radiation (including breast reconstruc**
The target includes the ipsilateral chest wall, mas sites when indicated. Depending on whether the p reconstruction or not, several techniques using p are appropriate. CT-based treatment planning is e identify lung and heart volumes and minimize exp Dose is 46–50 Gy in 23–25 fractions to the chest wall +/- scar boost at 2 Gy per fraction to a total dose of approximately 60 Gy. All dose schedules are given 5 days per week. Special consideration should be given to the use of bolus material to ensure that the skin dose is adequate.

**Regional Nodal Radiation:**
Target delineation is best achieved by the use of CT-based treatment planning. For the paraclavicular and axillary nodes, prescription depth varies based on the patient anatomy. For internal mammary node identification, the internal mammary artery and vein can be used as a surrogate for the nodal location (as the nodes themselves are not usually visible on planning imaging). Based on the post-mastectomy radiation randomized studies and recent trials, radiation therapy of the internal mammary lymph nodes should be strongly considered when delivering regional nodal irradiation. CT treatment planning should be utilized when treating the internal mammary lymph nodal volume to evaluate dose to normal tissues, especially the heart and lung, and dose constraints respected. Dose is 46–50 Gy in 23–25 fractions to the regional nodal fields. All dose schedules are given 5 days per week.

**Accelerated Partial Breast Irradiation (APBI):**
Preliminary studies of APBI suggest that rates of local control in selected patients with early-stage breast cancer may be comparable to those treated with standard whole breast RT. However, compared to standard whole

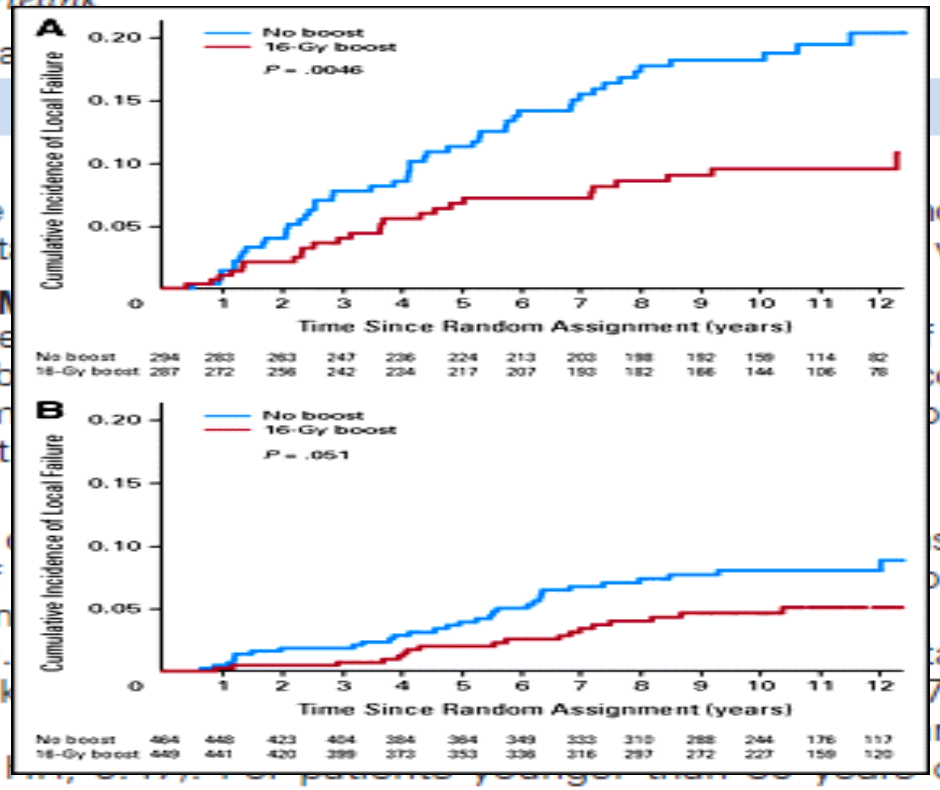
prescribed to the tumor bed. Other fractionation schemes are currently under investigation.

**Preoperative Systemic Therapy:**
In patients treated with preoperative systemic therapy, indications for radiation therapy and treatment fields should be based on the maximum stage from the pre-therapy clinical stage, pathologic stage, and tumor characteristics.

**Preoperative Systemic Therapy:**
In patients treated with preoperative systemic therapy, indications for radiation therapy and treatment fields should be based on the maximum stage from the pre-therapy clinical stage, pathologic stage, and tumor characteristics.

# Impact of Pathological Characteristics on Local Relapse After Breast-Conserving Therapy: A Subgroup Analysis of the EORTC Boost Versus No Boost Trial

*Heather A. Jones, Ninja Antonini, Augustinus A.M. Hart, Johannes L. Peterse,† Jean-Claude Horiot, Françoise Collin, Philip M. Poortmans, S. Bing Oei, Laurence Collette, Henk Struikmans, Walter F. Van den Bogaert, Alain Fourquet, Jos J. Jager, Dominic A.X. Schinagl, Carla C. Wárlám-Rodenhuis, and Harry Bartelink*

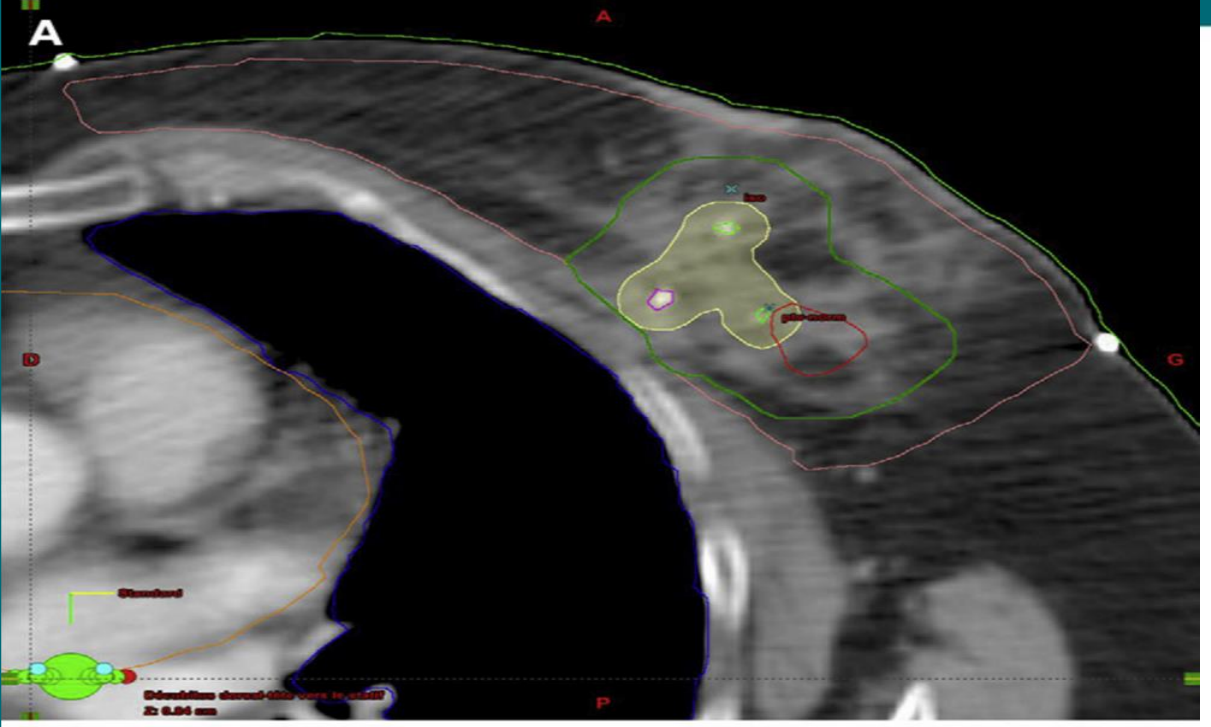


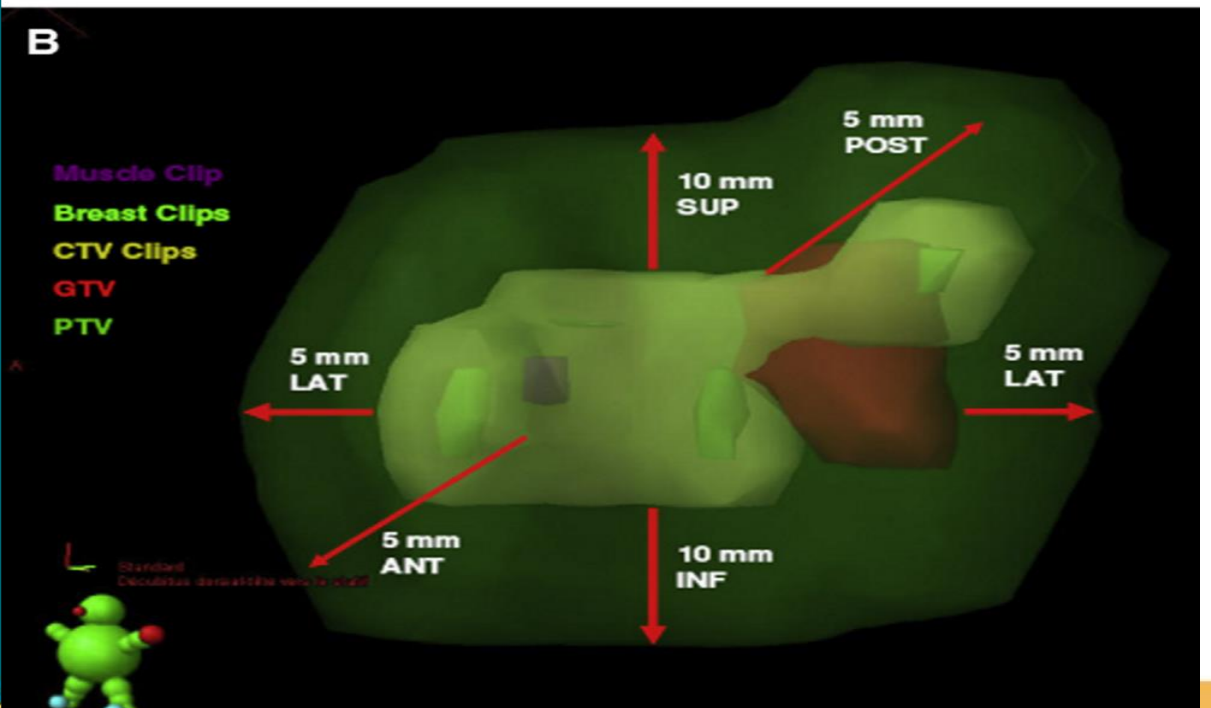

**Purpose**
To investigate … d an extra boost dose of 16 Gy on local relapse, for st… with b…

**Patients and M…**
In the Europe… Canc… after whole b… comple… were random… ose of… patients cent…

**Results**
The 10-year … s a first event was not significantly influenced if … ositive for invasive tumor or ductal carcinoma in… (log-rank $P = .45$ and $P = .57$, respectively)… al carcinoma was associated with an increased risk… 7), as was age younger than 50 years ($P < .0001$; … ntly reduced the local relapse rate ($P = .0006$; … old and in patients with high grade invasive ductal carcinoma, the boost dose reduced the local relapse from 19.4% to 11.4% ($P = .0046$; HR, 0.51) and from 18.9% to 8.6% ($P = .01$; HR, 0.42), respectively.

## Estudio EORTC 22881




# IMPROVING THE DEFINITION OF TUMOR BED BOOST WITH THE USE OF SURGICAL CLIPS AND IMAGE REGISTRATION IN BREAST CANCER PATIENTS

Youlia M. Kirova, M.D.,* Pablo Castro Pena, M.D.,* Tarek Hijal, M.D.,* Nathalie Fournier-Bidoz, Ph.D.,* Fatima Laki, M.D.,[y] Brigitte Sigal-Zafrani, M.D.,[z] Re´mi Dendale, M.D.,* Marc A. Bollet, M.D.,* Francois Campana, M.D.,* and Alain Fourquet, M.D.*

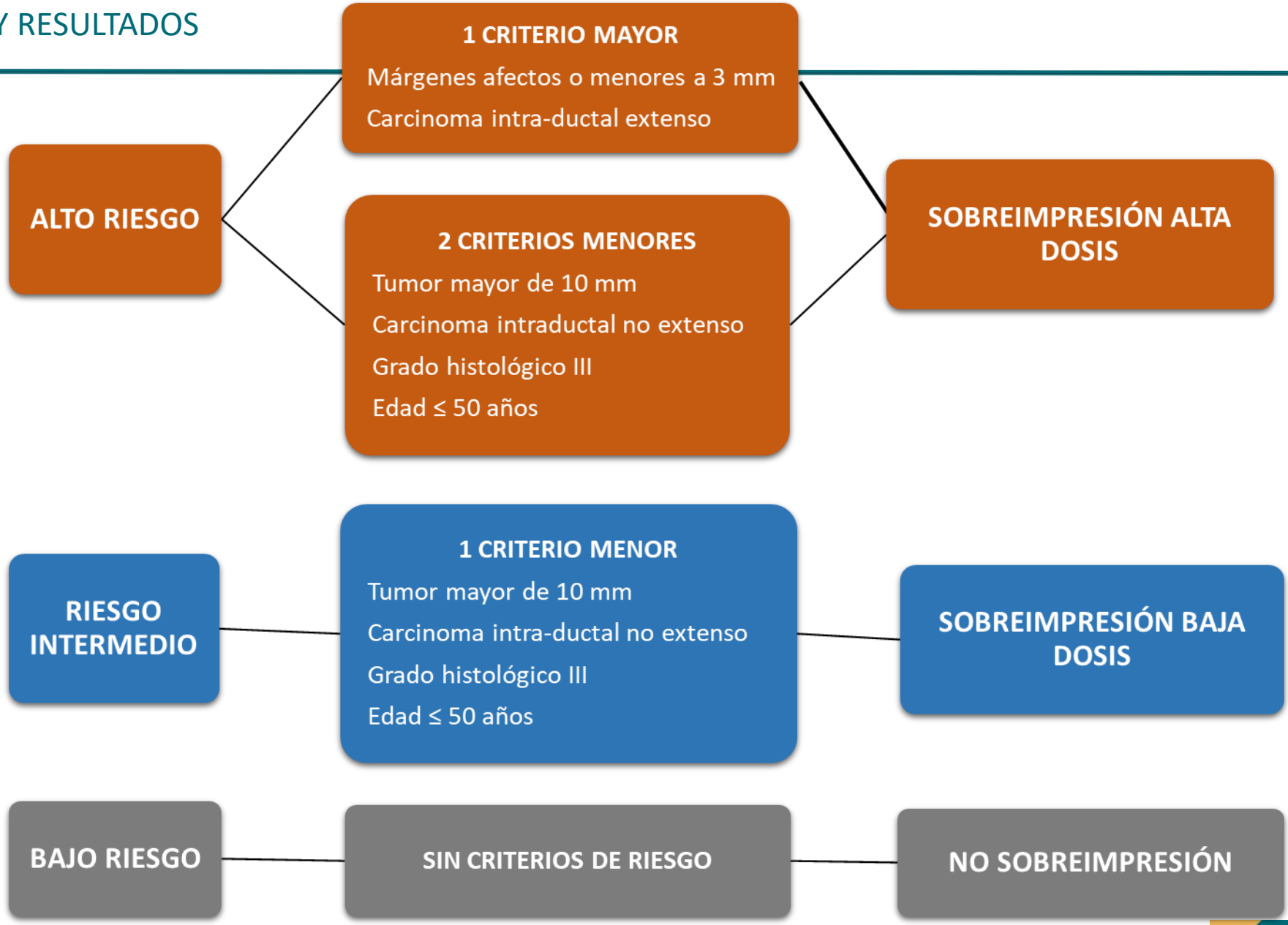
Departments of *Radiation Oncology, [y]Surgery, and [z]Pathology, Institut Curie, Paris, France

Purpose: To evaluate the accuracy of a boost technique.

Methods and Materials: Twenty-two patients underwent tumorectomy with placement of two or more clips in the surgical cavity before breast remodeling. Preoperative and postoperative computed tomography scans, with match-point registration, were performed on all patients. The relationship between the location of the gross tumor volume (GTV), defined on the preoperative scan, and clip clinical target volume (CTV) (clips with a 5-mm margin on the postoperative scan) was then studied, by use of commercial volume analysis software.

Results: Of the patients, 4 had two clips, 2 had three clips, 8 had four clips, and 8 had five clips. The median GTV

# INDICACIONES Y RESULTADOS



# Ligero aumento de la fracción diaria
# 2,67 Gy hasta 2,85 Gy
# 13-16 sesiones

| Autor | Esquema de irradiación | Mediana de seguimiento | Resultados |
|---|---|---|---|
| Whelan | 50 Gy (25x2Gy) (n=612)<br>42.5 Gy (16x2.5Gy) (n=622) | 12 años | Sin diferencias en la toxicidad aguda, crónica o en la estética |
| Yarnold | 50 Gy (25x2Gy) (n=470)<br>42.9 Gy (13x.3Gy) (n=466)<br>39 Gy (13x3Gy) (n=474) | 9.7 años | Mejor resultado estético con 39 Gy vs. 50 Gy (p=0,01) |
| START A | 50 Gy (25x2Gy) (n=750 )<br>41,6 Gy (13x3.2G y) (n=749 )<br>39 Gy (13x3Gy) (n=737) | 5.1 años | Sin diferencias en la toxicidad aguda o crónica<br>Mejor resultado estético con 39 Gy vs. 50 Gy (p=0,002) |
| START B | 50 Gy (25x2Gy) (n=1.105 )<br>40 Gy (15x2.67Gy) (n=1.110 ) | 6 años | Sin diferencias en la toxicidad aguda o crónica<br>Mejor resultado estético con 40 Gy vs. 50 Gy (p=0,03) |
| Taher | 50 Gy (25x2Gy) (n=25)<br>42.5 Gy (16x2.5Gy) ( n=25) | 1.8 años | Sin diferencias en la toxicidad aguda, crónica o en la estética |
| Karasawa | 50 Gy (25x2Gy)+ sobreimpresión (8x2Gy)(n=381)<br>43.2 Gy (16x2.7Gy) + sobreimpresión (3x2.7Gy)( n=717) | 2.1 años | Dermitis grado 2 inferior con 43.2 Gy vs. 50 Gy (p<0,001) |

# FRACCIONAMIENTOS UTILIZADOS

Radiotherapy and Oncology xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

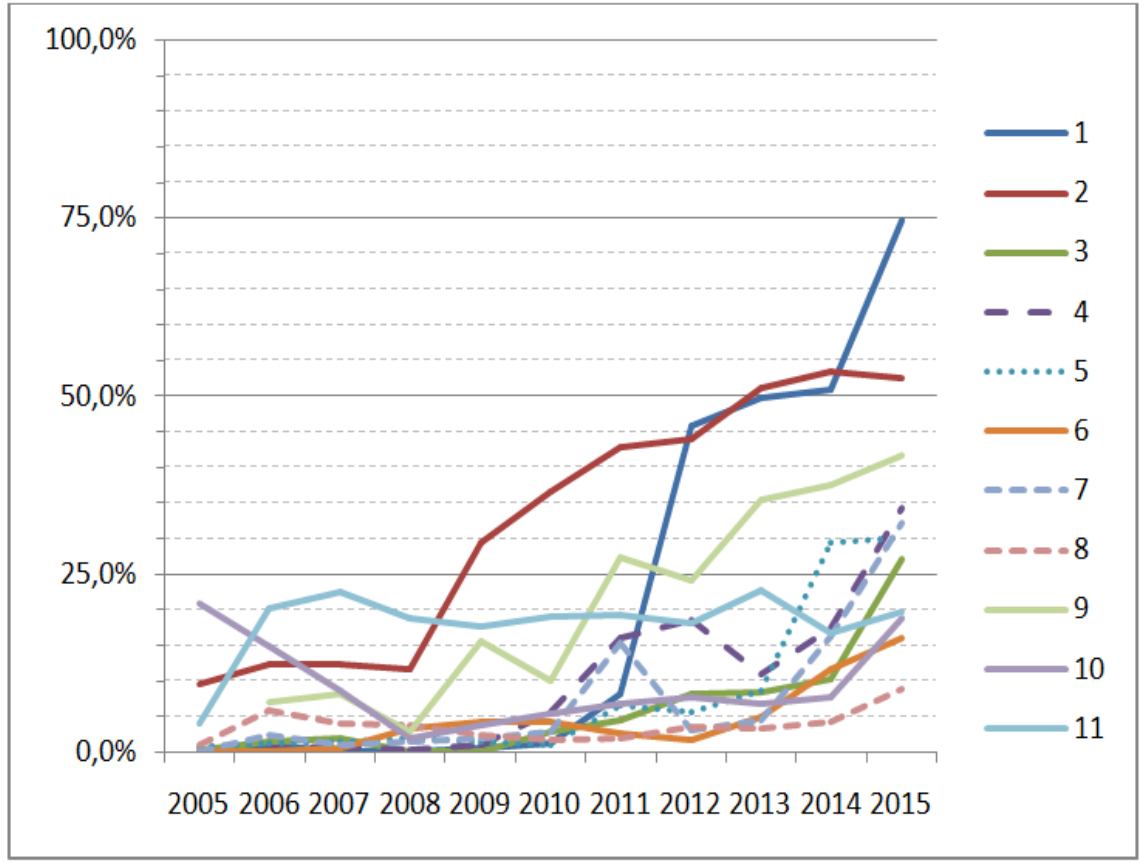
Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Original article

## Understanding variations in the use of hypofractionated radiotherapy and its specific indications for breast cancer: A mixed-methods study

Joan Prades [a], Manel Algara [c], Josep A. Espinàs [a], Blanca Farrús [d], Meritxell Arenas [e,f], Victoria Reyes [g], Virginia García-Reglero [h], Maria Josep Cambra [i], Esther Rubio [j], Lluis Anglada [k], Arantxa Eraso [b,l], Agustí Pedro [m], Maria J. Fuentes-Raspall [n], Victòria Tuset [o], Judit Solà [a], Josep M. Borras [a,b,*]



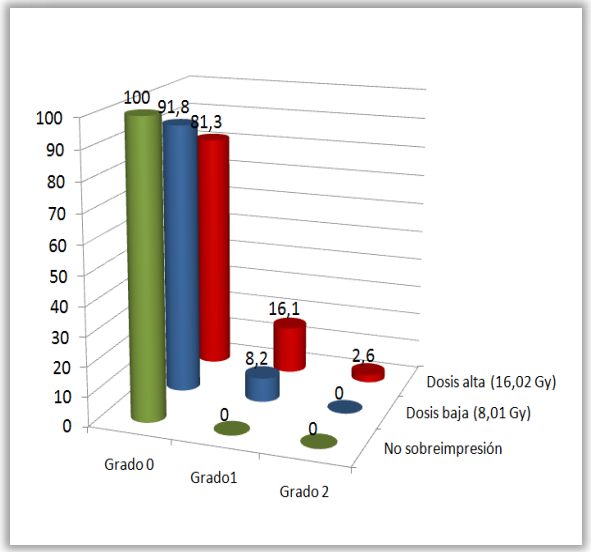
# INDICACIONES Y RESULTADOS

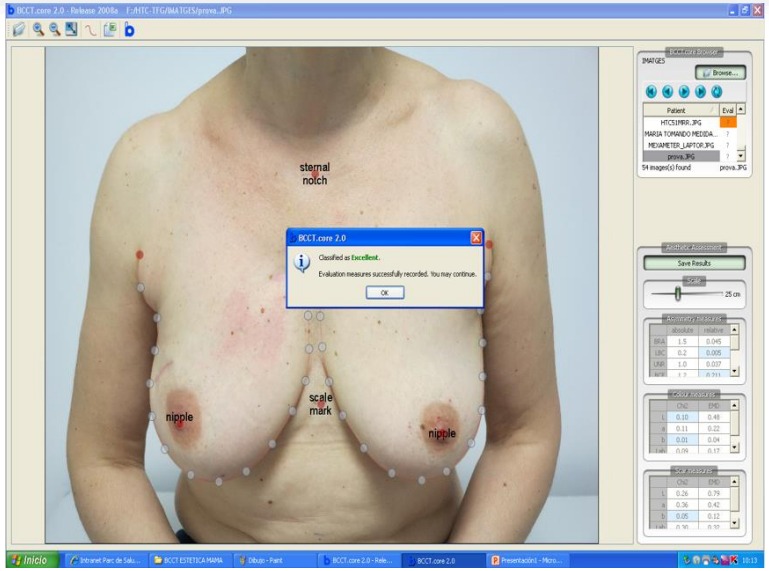
Clin Transl Oncol
DOI 10.1007/s12094-016-1548-3

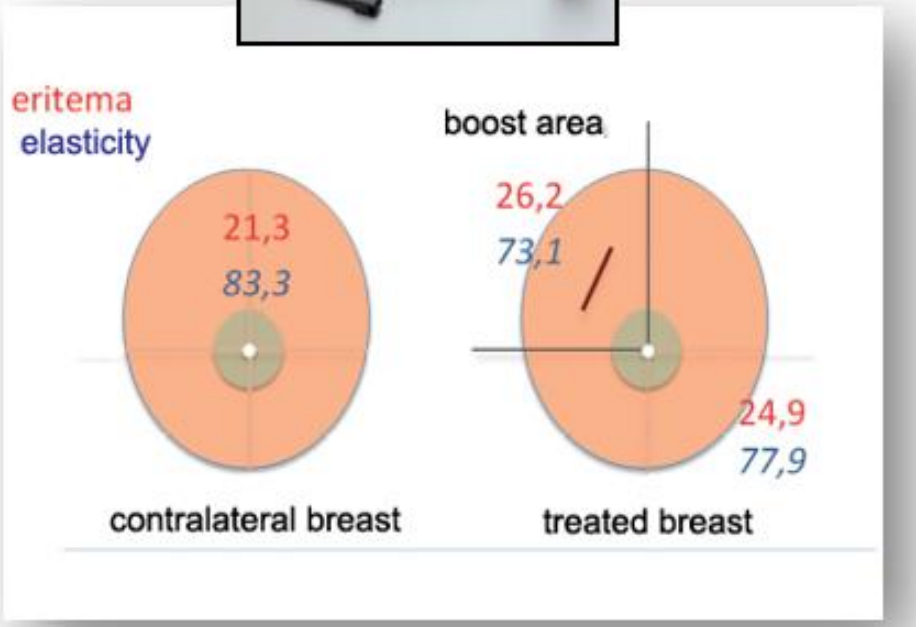
RESEARCH ARTICLE

## Hypofractionated boost after whole breast irradiation in breast carcinoma: chronic toxicity results and cosmesis

J. Sanz[1,2,3] · N. Rodríguez[1,2,3] · P. Foro[1,2,3] · J. Dengra[1,2] · A. Reig[1,2] · P. Pérez[1,2] · I. Membrive[1,2] · A. Ortiz[1] · M. Codinach[3] · M. Algara[1,2,3]

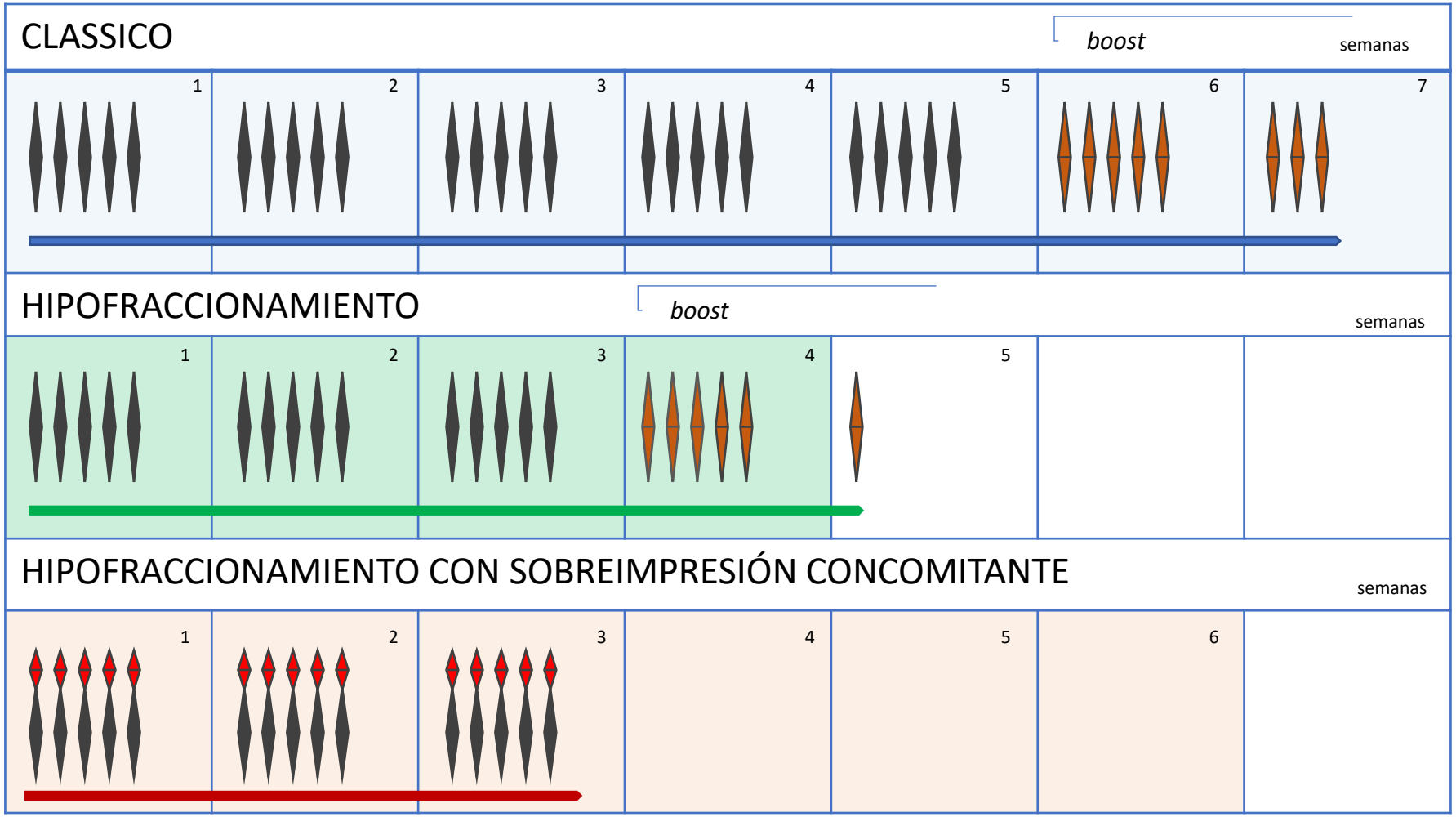



Sociedad Española de Senología y Patología Mamaria

# FRACCIONAMIENTOS UTILIZADOS



Hindawi
BioMed Research International
Volume 2018, Article ID 8321871, 9 pages
https://doi.org/10.1155/2018/8321871

Hindawi

*Clinical Study*

# Once-Weekly Hypofractionated Radiotherapy for Breast Cancer in Elderly Patients: Efficacy and Tolerance in 486 Patients

**Javier Sanz**,[1,2] **Min Zhao**,[3] **Nuria Rodríguez**,[1,2] **Raquel Granado**,[1] **Palmira Foro**,[1,2] **Ana Reig**,[1] **Ismael Membrive**,[1] **and Manuel Algara**[1,2]

[1]*Radiation Oncology Department, Hospital del Mar, Parc de Salut Mar, Barcelona, Spain*
[2]*Pompeu Fabra University, Barcelona, Spain*
[3]*Autonomous University of Barcelona, Barcelona, Spain*

Correspondence should be addressed to Javier Sanz; jsanz@parcdesalutmar.cat

Received 25 August 2017; Revised 20 November 2017; Accepted 31 December 2017; Published 15 March 2018

| | | | |
|---|---|---|---|
| Ortholan et al., 2005 [22] | 150 | 6.5 Gy × 5 s; supra 5.5 Gy × 5 s; boost 6.5 Gy × 1 or 2 s | 108 p lumpectomy, 43 p mastectomy |
| Courdi et al., 2006 [24] | 115 | 6.5 × 5 s | Median age 83 years, biopsy only |
| Sanz et al., 2008 [7] | 262 | 6.25 Gy × 6 s (+6.25 Gy × 2 s if positive margin in conservative surgery) | 22 p biopsy, 174 p lumpectomy, 66 p mastectomy |
| Dragun et al., 2011 [26] | 42 | 6 Gy × 5 s | 69% lumpectomy 31% chemotherapy |
| Yarnold, 2011 [25] | 915 | 50 Gy (2 Gy × 25 s) versus 28.5 Gy (5.7 × 5 s) or 30 Gy (6 Gy × 5 s) | |
| Rovea et al., 2015 [27] | 298 | 30 Gy (6 Gy × 5 s) or 32.5 Gy (6.5 Gy × 5 s) | |
| Brunt et al., 2016 [35] | 352 | 40 Gy in 15 s in 3 weeks versus 27 Gy in 5 s in 1 week or 26 Gy in 5 s in 1 week | Patients that require lymph node irradiation are excluded |

# FAST-Forward

Randomised clinical trial testing a 1 week course of curat
in terms of local cancer control and late adverse effects i

**Disease site:** Breast cancer

**Treatment modality:** Radiotherapy

**Status:** Open to recruitment

## Trial details

FAST-Forward is a phase III, multicentre, randomised co
curative radiotherapy that is at least as effective and safe
surgery for early breast cancer.

4,100 patients were recruited from UK sites over a 2.5 ye
whole breast or post mastectomy chest wall/reconstructe
one of the following groups:

- Control group: 40.05 Gy in 15 Fr of 2.67 Gy
- Test group 1: 27.0 Gy in 5 Fr of 5.4 Gy
- Test group 2: 26.0 Gy in 5 Fr of 5.2 Gy

Phase III randomised trial

## Acute skin toxicity associated with a 1-week schedule of whole breast radiotherapy compared with a standard 3-week regimen delivered in the UK FAST-Forward Trial

A. Murray Brunt[a,*], Duncan Wheatley[b], John Yarnold[c], Navita Somaiah[d], Stephen Kelly[e], Adrian Harnett[f], Charlotte Coles[g], Andrew Goodman[h], Amit Bahl[i], Mark Churn[j], Rada Zotova[k], Mark Sydenham[l], Clare L Griffin[l], James P Morden[l], Judith M Bliss[l], on behalf of the FAST-Forward Trial Management Group

[a] *University Hospitals of North Midlands & Keele University, Stoke-on-Trent;* [b] *Royal Cornwall Hospital;* [c] *The Institute of Cancer Research, London;* [d] *The Institute of Cancer Research and The Royal Marsden, London;* [e] *Derriford Hospital, Plymouth;* [f] *Norfolk and Norwich University Hospitals NHS Foundation Trust;* [g] *Cambridge University Hospital NHS Foundation Trust;* [h] *Torbay District General Hospital;* [i] *University Hospitals Bristol NHS Foundation Trust;* [j] *Worcestershire Acute Hospitals NHS Trust;* [k] *Mount Vernon Hospital; and* [l] *ICR-CTSU, The Institute of Cancer Research, London, UK*

ARTICLE INFO

*Article history:*
Received 1 December 2015
Received in revised form 4 February 2016
Accepted 22 February 2016
Available online 1 April 2016

*Keywords:*
Breast cancer
Radiotherapy
Hypofractionation

ABSTRACT

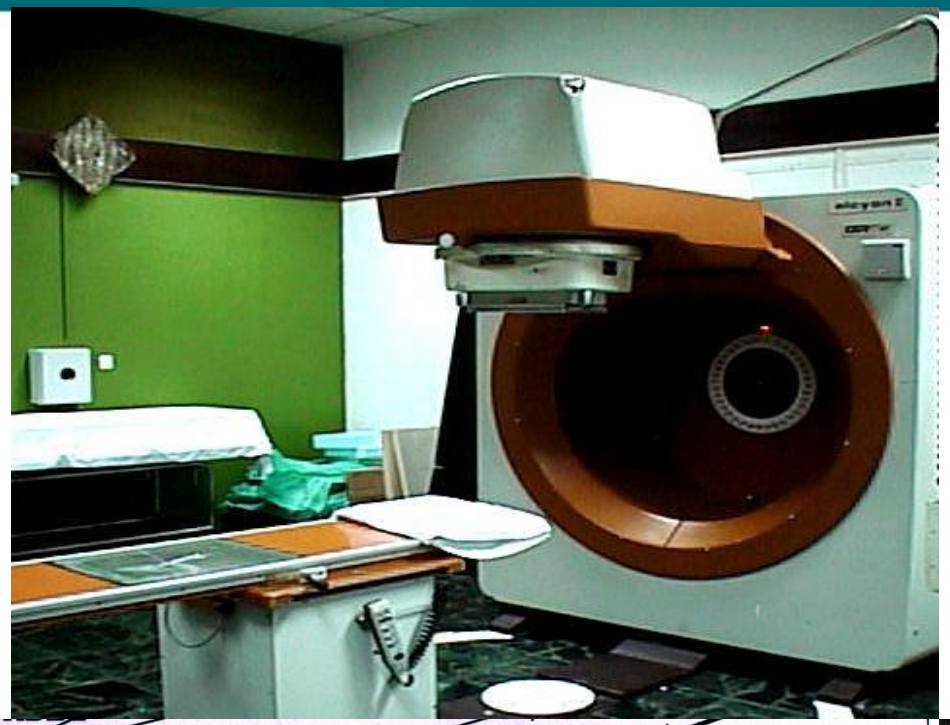
*Background and purpose:* FAST-Forward is a phase 3 clinical trial testing a 1-week course of whole breast radiotherapy against the UK standard 3-week regimen after primary surgery for early breast cancer. Two acute skin toxicity substudies were undertaken to test the safety of the test schedules with respect to early skin reactions.

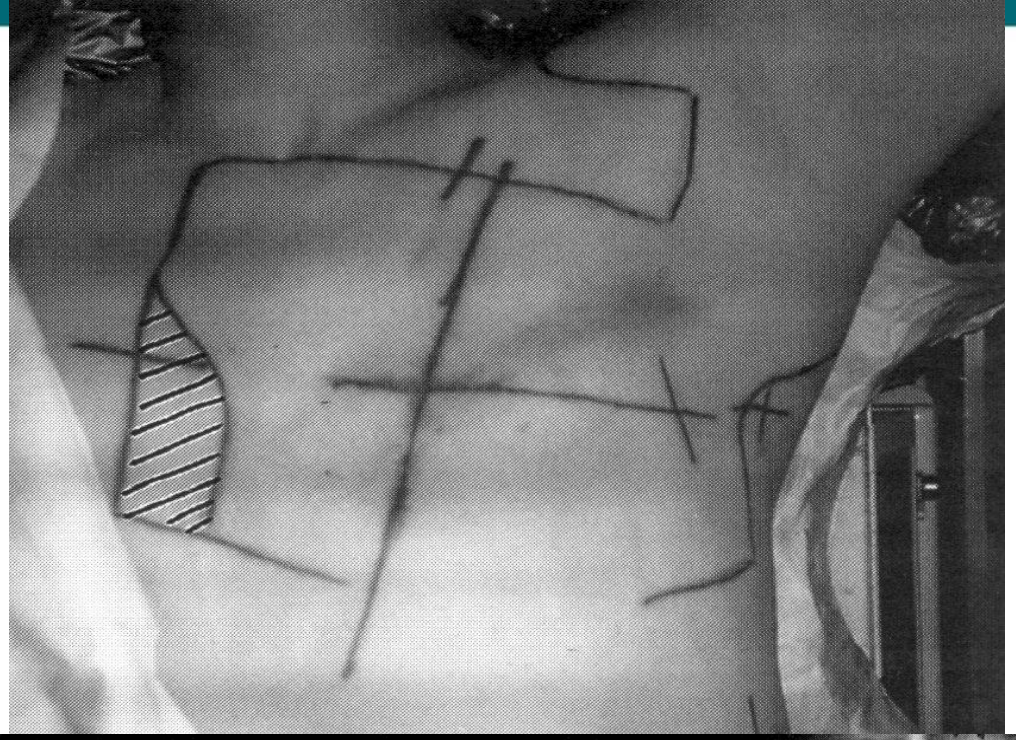
*Material and methods:* Patients were randomly allocated to 40 Gy/15 fractions (F)/3-weeks, 27 Gy/5F/1-week or 26 Gy/5F/1-week. Acute breast skin reactions were graded using RTOG (first substudy) and CTCAE criteria v4.03 (second substudy) weekly during treatment and for 4 weeks after treatment ended. Primary endpoint was the proportion of patients within each treatment group with grade ⩾3 toxicity (RTOG and CTCAE, respectively) at any time from the start of radiotherapy to 4 weeks after completion.

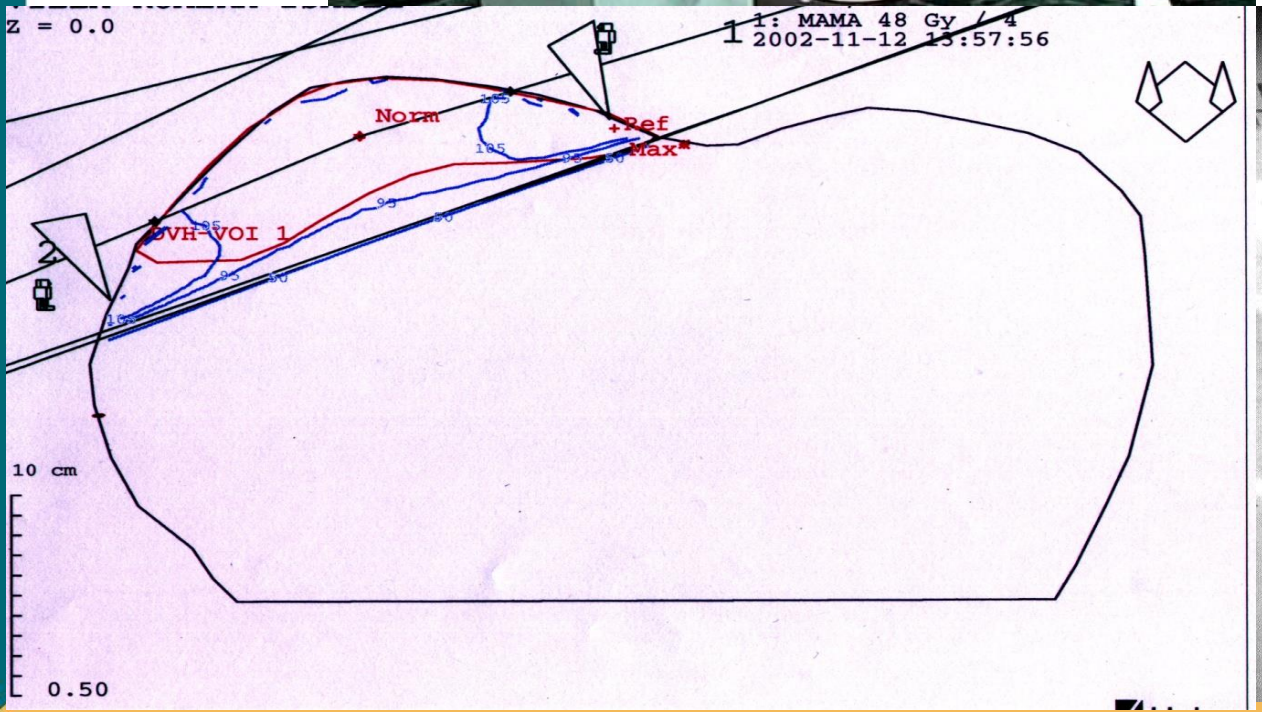
*Results:* 190 and 162 patients were recruited. In the first substudy, evaluable patients with grade 3 RTOG toxicity were: 40 Gy/15F 6/44 (13.6%); 27 Gy/5F 5/51 (9.8%); 26 Gy/5F 3/52 (5.8%). In the second substudy, evaluable patients with grade 3 CTCAE toxicity were: 40 Gy/15F 0/43; 27 Gy/5F 1/41 (2.4%); 26 Gy/5F 0/53.

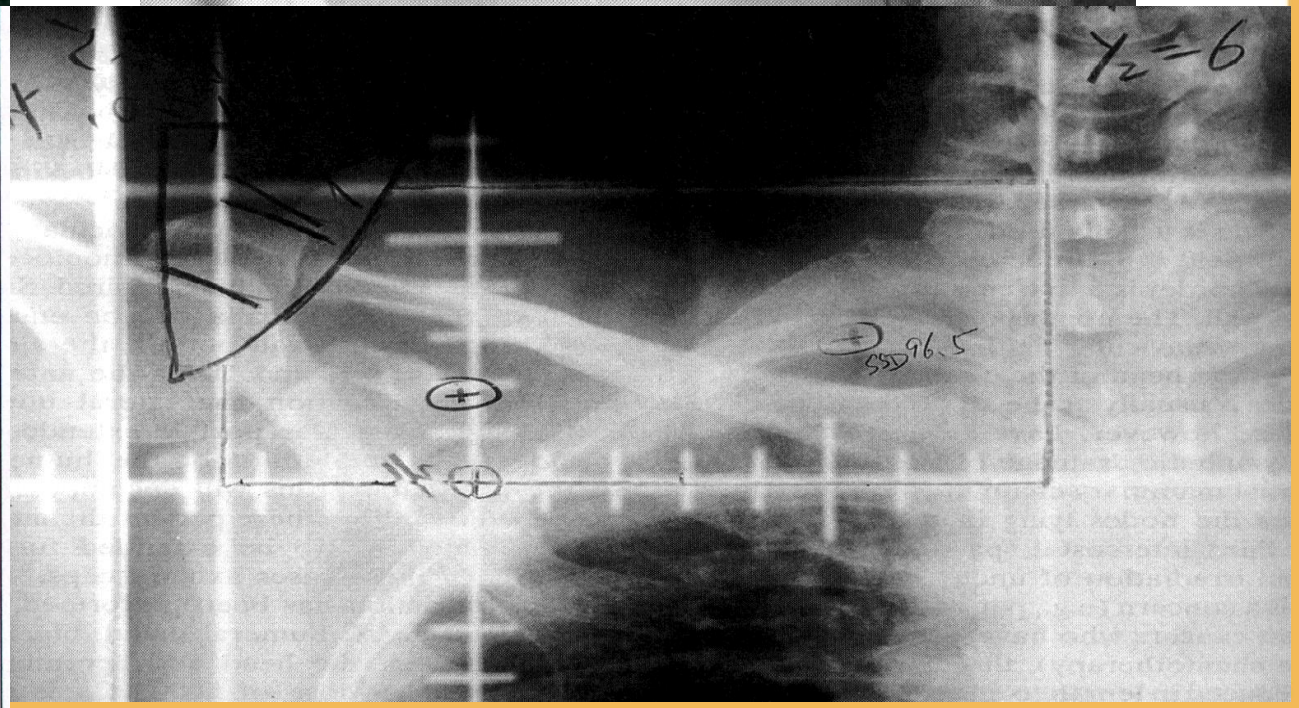
*Conclusions:* Acute breast skin reactions with two 1-week schedules of whole breast radiotherapy under test in FAST-Forward were mild.

 Radiotherapy and Oncology 120 (2016) 114–118

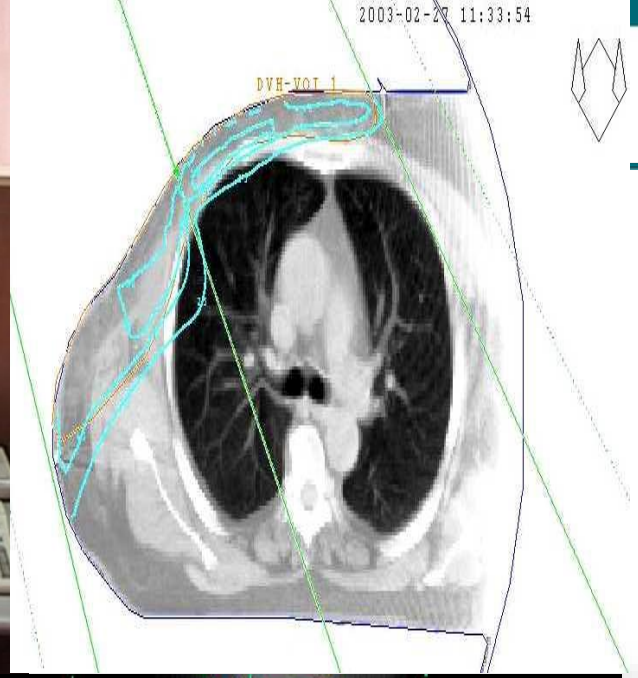


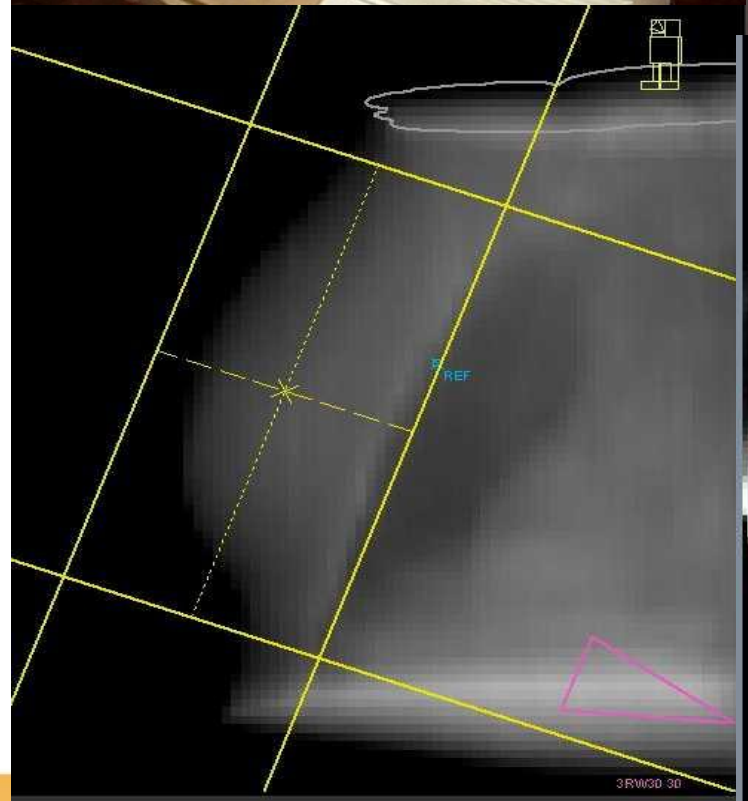


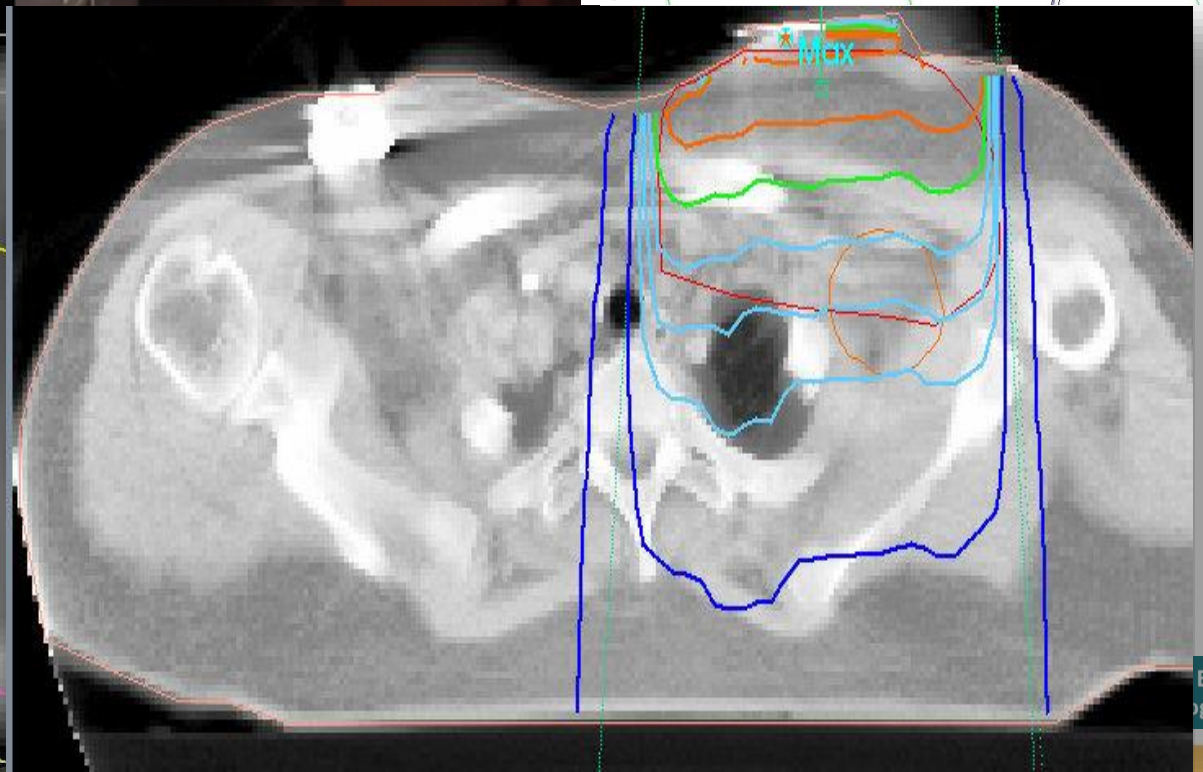

Z = 0.0
1: MAMA 48 Gy / 4
2002-11-12 13:57:56
Norm
+Ref
Max*
OVH-VOI 1
10 cm
0.50


SSD 96.5

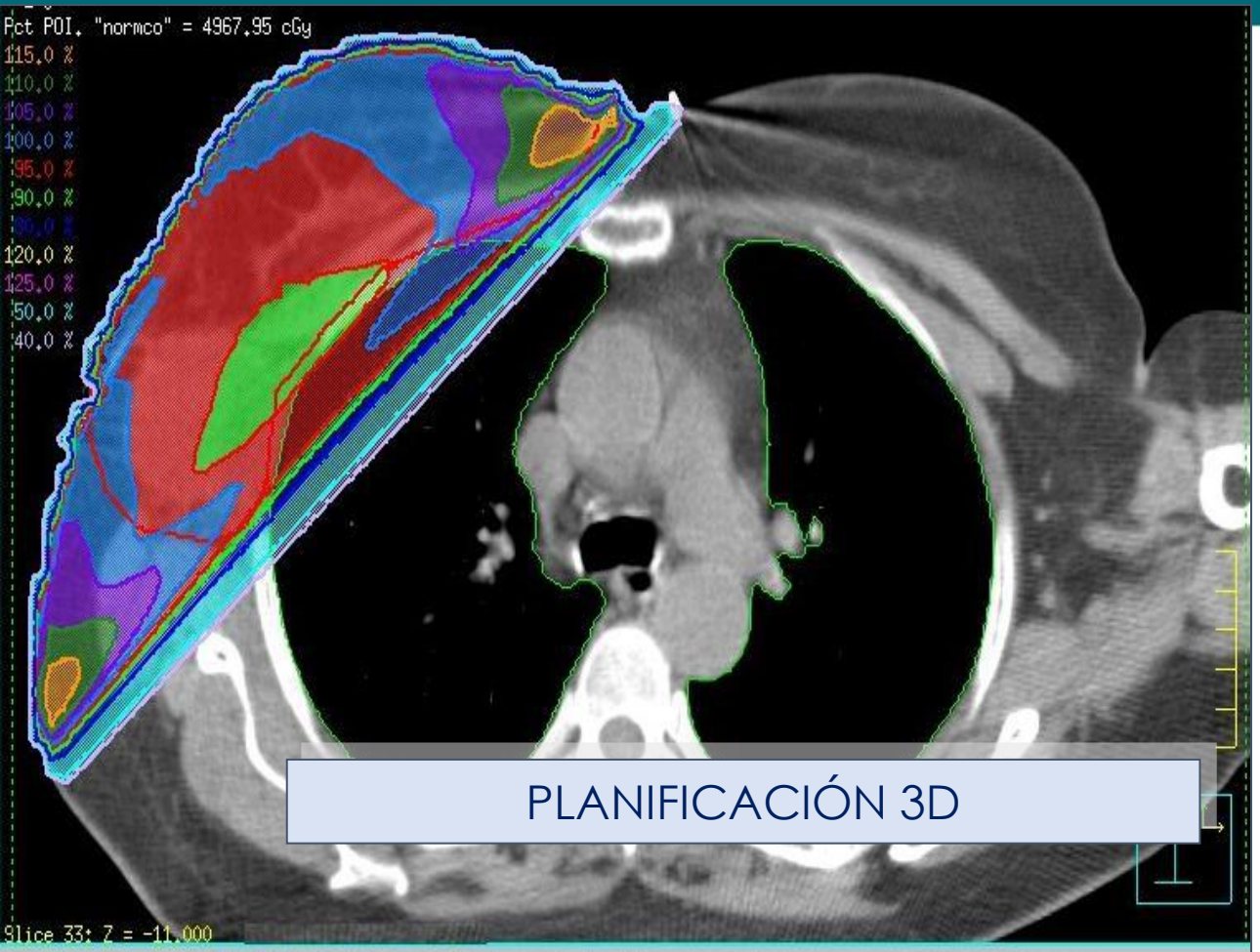
TÉCNICAS DE



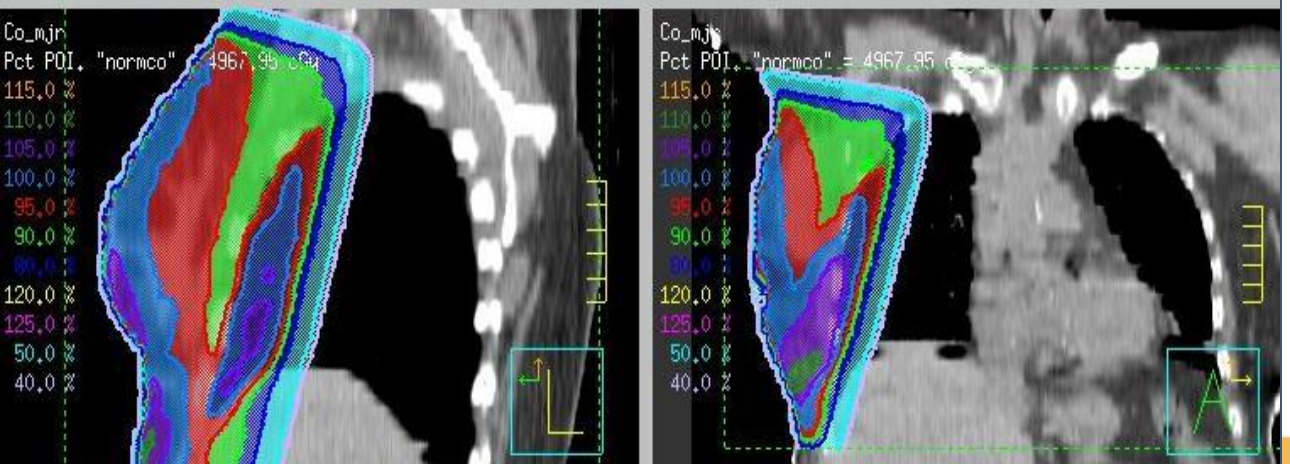



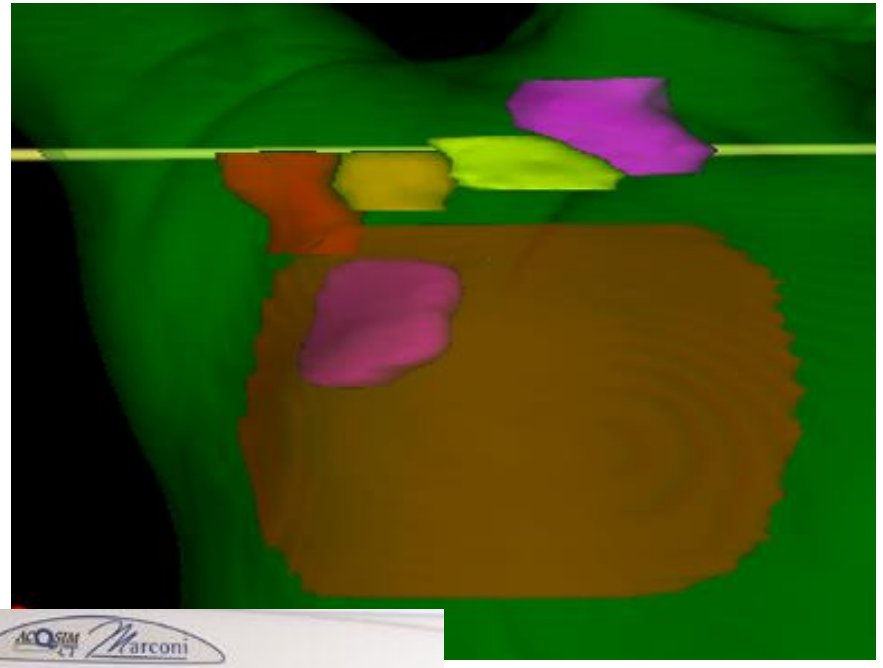



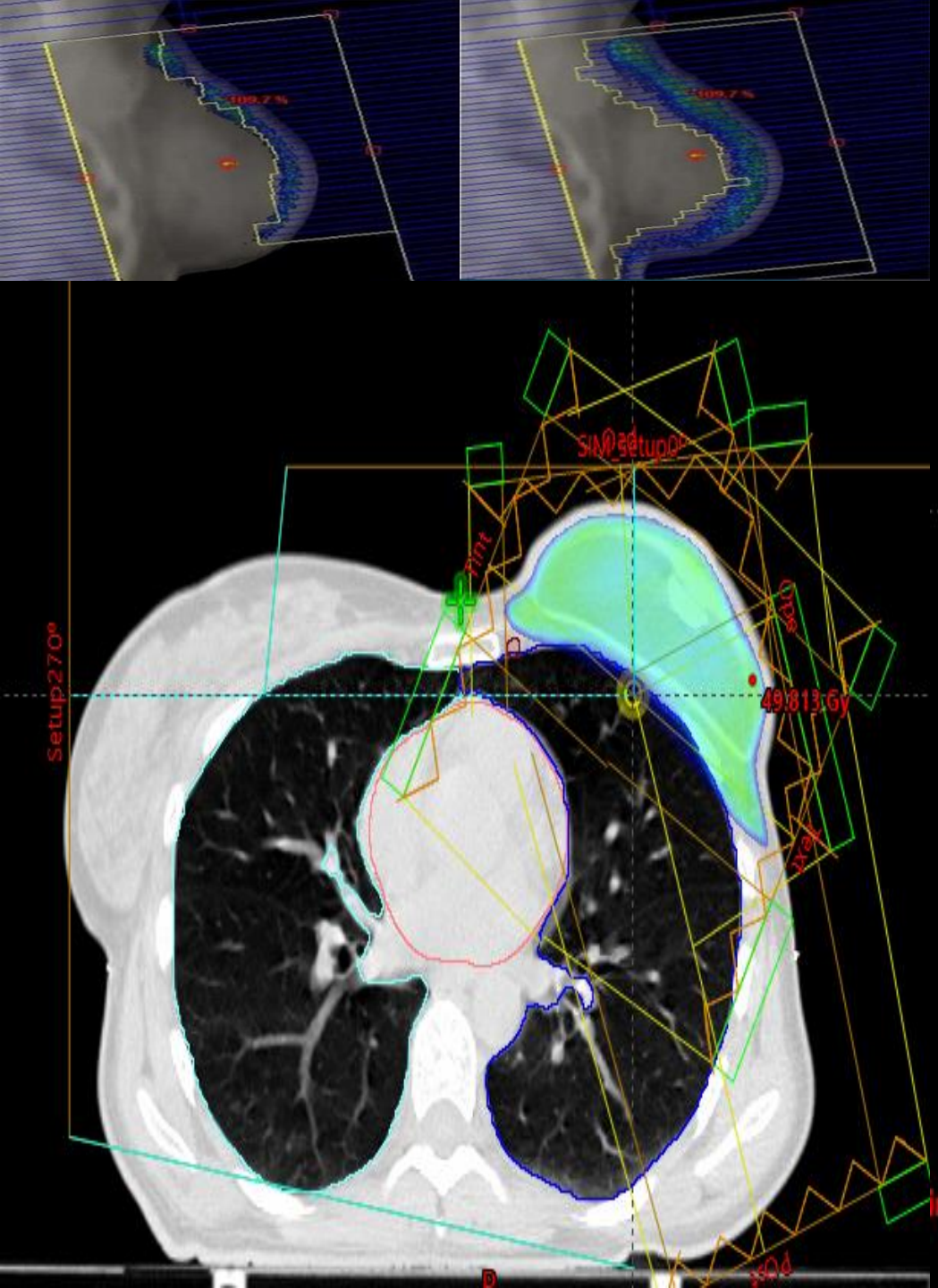

Española
ogía y Patología Mamaria

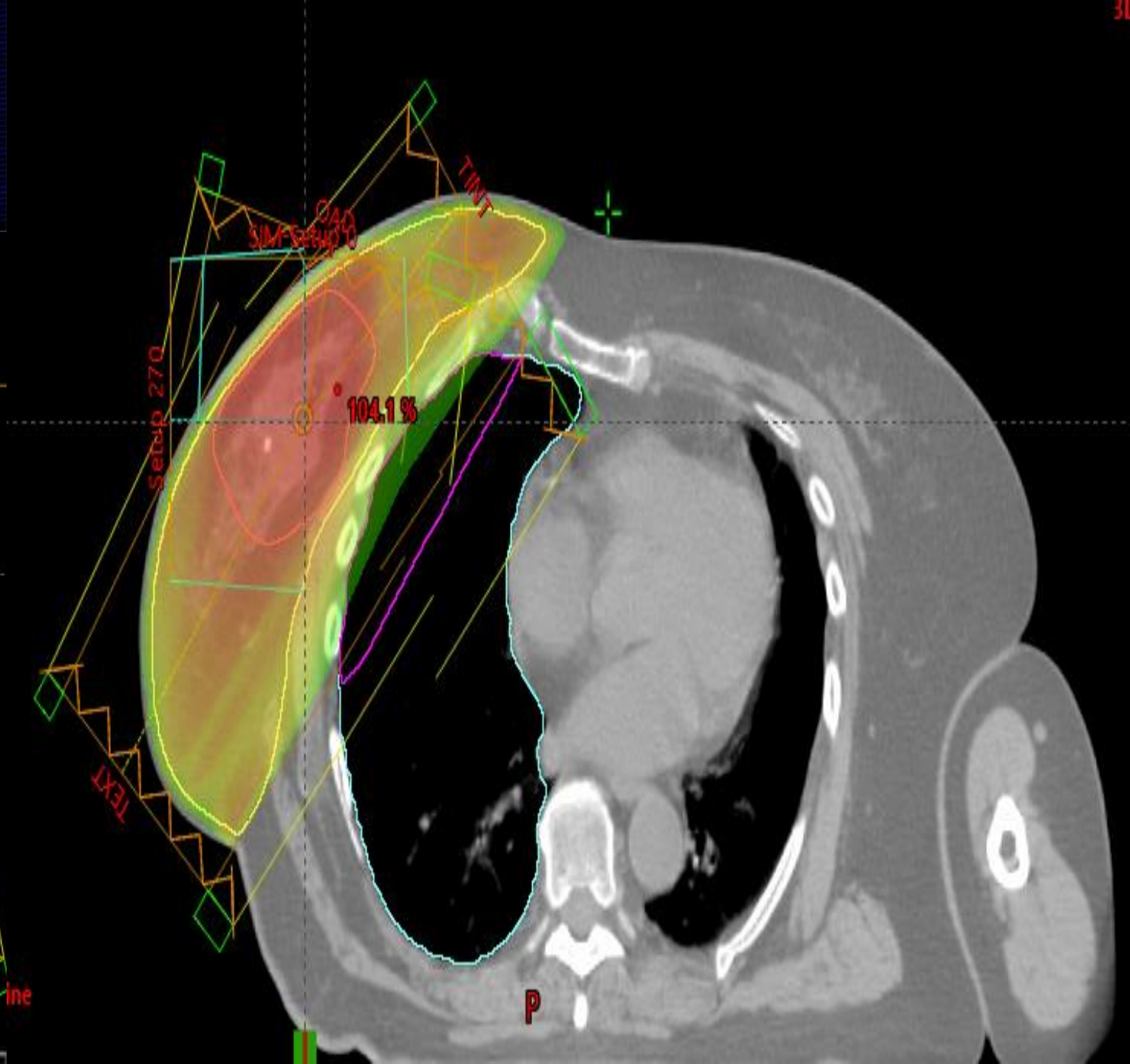


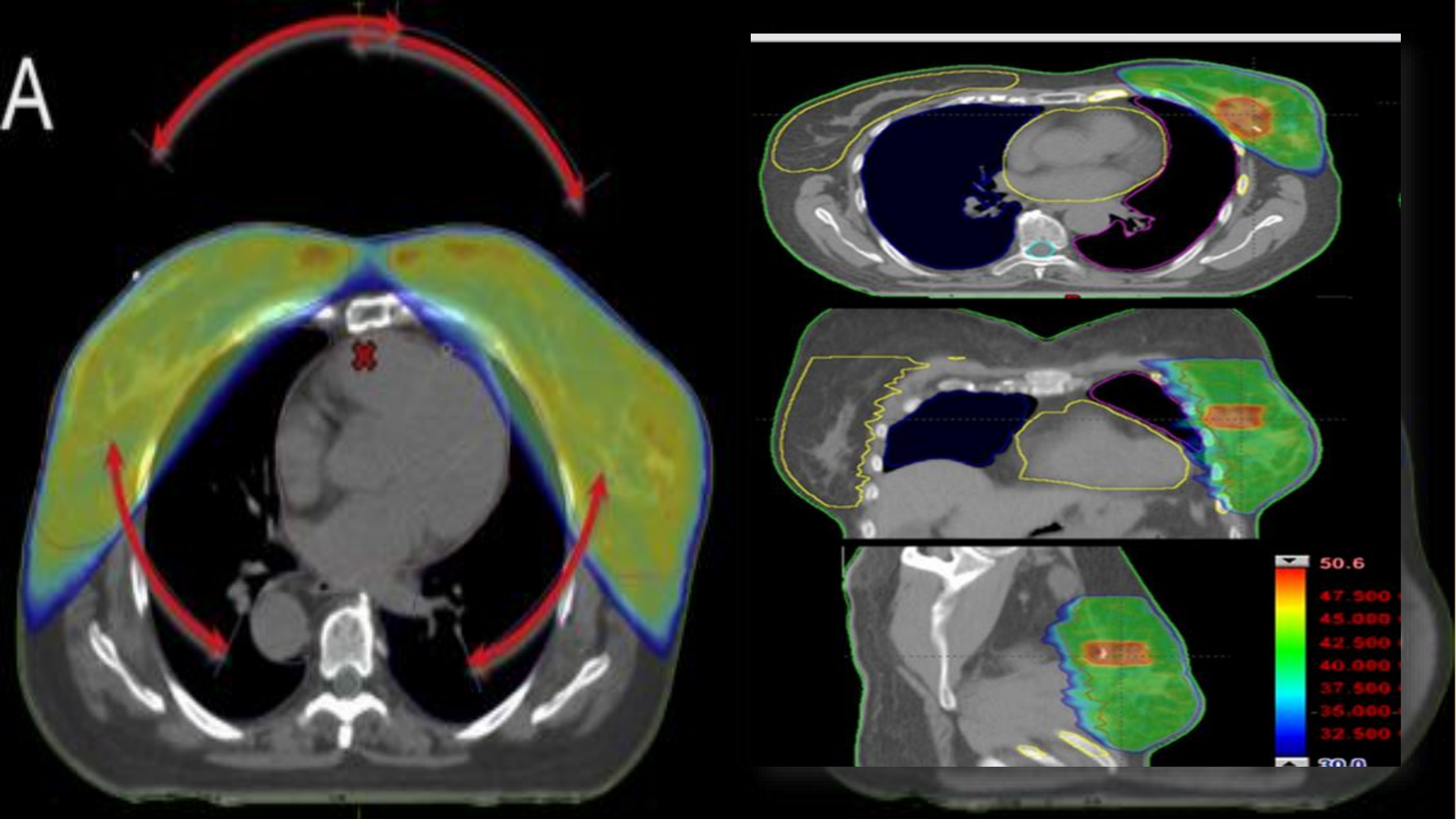

# PLANIFICACIÓN 3D

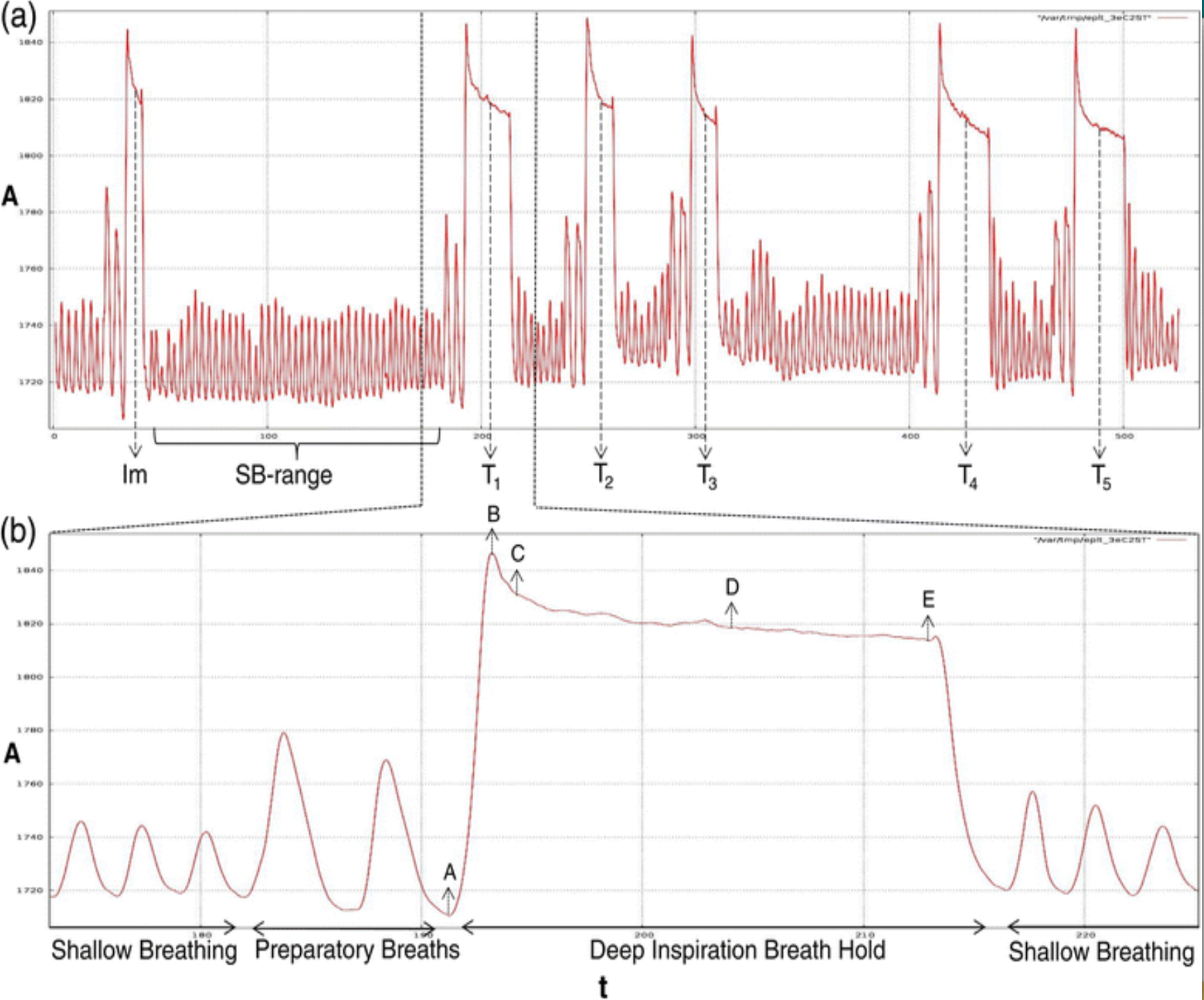



109.2%
109.2%
SIM setup 0°
PTV
CTV
TEXT
49.813 Gy
Setup 270°
P


SIM Setup 0°
PTV
Setup 270°
104.1 %
TEXT
P


A
50.6
47.500
45.000
42.500
40.000
37.500
35.000
32.500
30.0


(a)
A
Im
SB-range
T1
T2
T3
T4
T5
(b)
A
B
C
D
E
Shallow Breathing
Preparatory Breaths
Deep Inspiration Breath Hold
Shallow Breathing
t

## Fraccionamento clàsico

- 2 Gy
- Boost 10-20 Gy

## Irradiación parcial acelerada

- 3,85 Gy BID
- 1 semana

## Radioterapia intraoperatoria

- Dosi única vs
- Boost anticipado

## Dosis única SBRT?

**1980**

**2000**

**2015**

**2020**

## Hipofraccionamento semanal

- 6,25 Gy x semana
- 6 sesiones

## Hipofraccionamento diario

- 2.7 Gy
- 15-21 sesiones

## IMRT, VMAT, BREATH HOLD, BOOST CONCOMITANTE

## Ultrahipofracciona-miento diario

**5,2 Gy – 5,8 Gy**
**5 sesiones**


VARIAN