

**2º Taller Internacional
Multidisciplinario de
Cáncer de Mama**

"De la práctica a las bases teóricas"

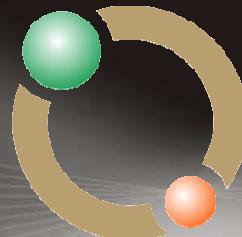
18, 19 y 20 de Junio de 2017

Córdoba - Argentina

Hipofraccionamiento en Cáncer de Mama *Avanzado*

Pablo CASTRO PENA
Radioterapia Oncológica

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Radioterapia Adyuvante - OBJETIVOS

-  control local
-  metástasis a distancia
-  mortalidad específica
-  *Efectos Secundarios por RT*
-  *Calidad de Vida durante RT !!!*

Hipofraccionamiento en Cáncer de Mama

Hipofraccionamiento Reg. Ganglionares

Requisitos para puesta en marcha

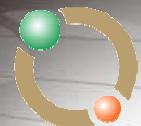
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Hipofraccionamiento en Cáncer de Mama

Evidencia +++



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Yarnold, 1986

- 1.410 pac randomizadas a 3 esquemas
- **50 Gy en 25 Fr / 2 Gy x Fr**
- **42.9 Gy en 13 Fr / 3.3 Gy x Fr**
- **39 Gy en 13 Fr / 3 Gy x Fr**

- Seg ½ — 8 años
- α/β para fibrosis 3,1 Gy (95%CI, 1,8-4,4 Gy)
- α/β para recurrencia 4 Gy (95% CI 1.0- 7,8 Gy)
- resultados sugieren que α/β para cáncer de mama es baja y similar a tejido mamario normal.

Radiother Oncolo 75: 9-17, 2005

Long-Term Results of Hypofractionated Radiation Therapy for Breast Cancer

Timothy J. Whelan, B.M., B.Ch., Jean-Philippe Pignol, M.D., Mark N. Levine, M.D.,
Jim A. Julian, Ph.D., Robert MacKenzie, M.D., Sameer Parpia, M.Sc.,
Wendy Shelley, M.D., Laval Grimard, M.D., Julie Bowen, M.D., Himu Lukka, M.D.,
Francisco Perera, M.D., Anthony Fyles, M.D., Ken Schneider, M.D.,
Sunil Gulavita, M.D., and Carolyn Freeman, M.D.

N ENGL J MED 362;6 NEJM.ORG FEBRUARY 11, 2010

50 Gy/25 fr/35 días

Vs

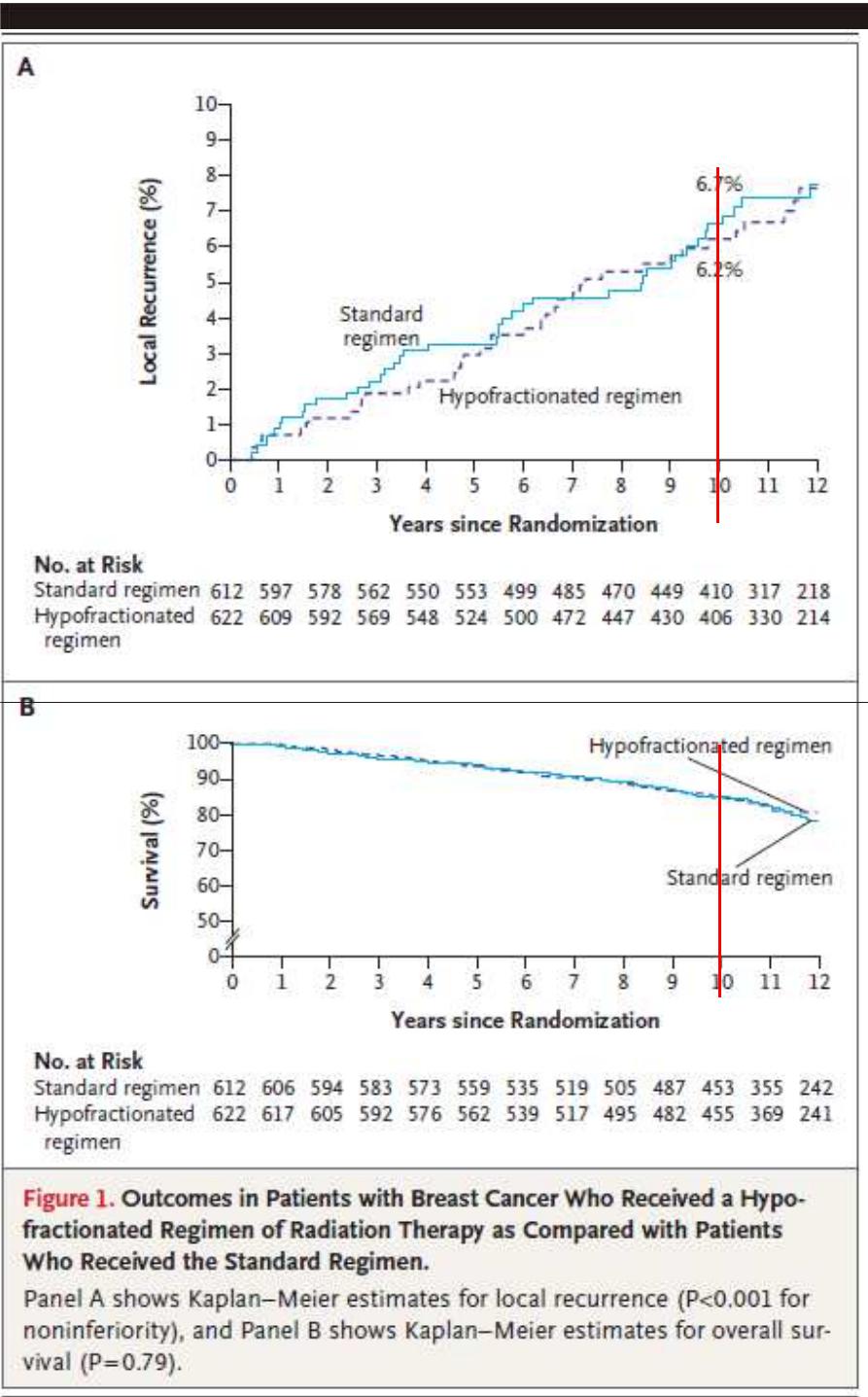
42.5 Gy / 16 fr/ 22 días

FUp 10y

612 pac. (6.2% Hipofracc.)



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Long-Term Results of Hypofractionated Radiation Therapy for Breast Cancer

Timothy J. Whelan, B.M., B.Ch., Jean-Philippe Pignol, M.D., Mark N. Levine, M.D., Jim A. Julian, Ph.D., Robert MacKenzie, M.D., Sameer Parpia, M.Sc., Wendy Shelley, M.D., Laval Grinard, M.D., Julie Bowen, M.D., Himu Lukka, M.D., Francisco Perera, M.D., Anthony Fyles, M.D., Ken Schneider, M.D., Sunil Gulavita, M.D., and Carolyn Freeman, M.D.

N ENGL J MED 362;6 NEJM.ORG FEBRUARY 11, 2010

Recidiva local

Kaplan-Meier

3 vs 5 semanas

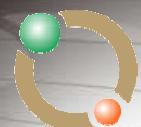
p=NS

Sobrevida Global

Kaplan- Meier

3 vs 5 semanas

p=NS



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Table 1. Late Toxic Effects of Radiation, Assessed According to the RTOG-EORTC Late Radiation Morbidity Scoring Scheme.*

Site and Grade	5 Yr		10 Yr	
	Standard Regimen (N=424)	Hypofractionated Regimen (N=449)	Standard Regimen (N=220)	Hypofractionated Regimen (N=235)
<i>percent of patients</i>				
Skin				
0†	82.3	86.1	70.5	66.8
1	14.4	10.7	21.8	24.3
2	2.6	2.5	5.0	6.4
3	0.7	0.7	2.7	2.5
Subcutaneous tissue				
0‡	61.4	66.8	45.3	48.1
1	32.5	29.5	44.3	40.0
2	5.2	3.8	6.8	9.4
3	0.9	0.9	3.6	2.5

* Effects of radiation effects and grade 0–3. Data from the Radiation Therapy Oncology Group.

† The absolute difference at 5 years is 2.8 percentage points.

‡ The absolute difference at 10 years is 2.8 percentage points.

Toxicidad tardía

p=NS

50 Gy / 25 fr

42,5 Gy en 16 Fr

Rating no toxic
in Therapy

and at 10

difference was



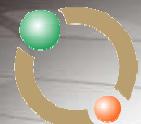
UK Standardization of breast radiotherapy

2- START -A 2.236 pacientes

Lancet Oncology 9: 331-341, 2008

3- START- B 2.215 pacientes

Lancet 371: 1098-1107, 2008

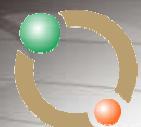


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The UK Standardisation of Breast Radiotherapy (START) trials of radiotherapy hypofractionation for treatment of early breast cancer: 10-year follow-up results of two randomised controlled trials

Joanne S Haviland, J Roger Owen, John A Dewar, Rajiv K Agrawal, Jane Barrett, Peter J Barrett-Lee, H Jane Dobbs, Penelope Hopwood, Pat A Lawton, Brian J Magee, Judith Mills, Sandra Simmons, Mark A Sydenham, Karen Venables, Judith M Bliss*, John R Yarnold*, on behalf of the START Trialists' Group†

www.thelancet.com/oncology Published online September 19, 2013 [http://dx.doi.org/10.1016/S1470-2045\(13\)70386-3](http://dx.doi.org/10.1016/S1470-2045(13)70386-3)



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Estudio Randomizado 1999 a 2002

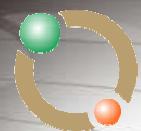
Ca. Invasor / pT1-3a, pN0-1

Cirugía conservadora o mastectomía

-**START A** 2.236 mujeres / Seg ½ - 9,3 años
50 Gy / 25 Fr / 5 sem vs **41,6 Gy ó 39 Gy en 13 Fr / 5 sem**

-**START B** 2.215 mujeres / Seg ½ - 9,9 años
50 Gy / 25 Fr / 5 sem vs **40 Gy / 15 Fr / 3 sem**

Edad > 18 años / Edad media 57 años



SIN DIFERENCIA SIGNIFICATIVA

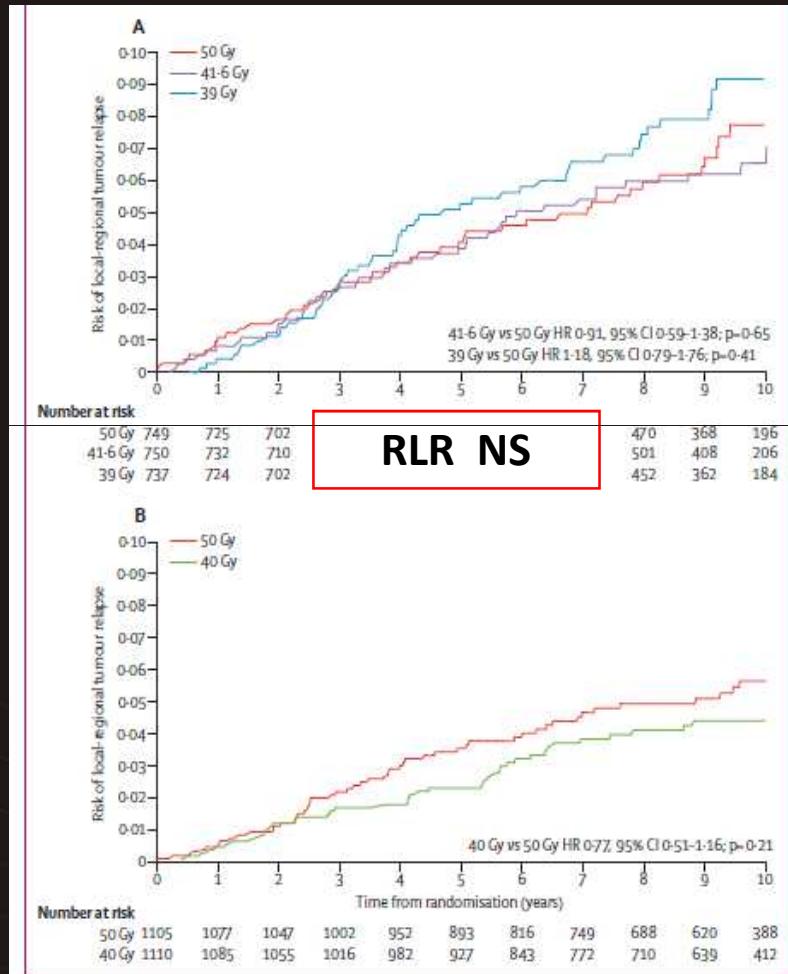


Figure 1: Cumulative risk of local-regional tumour relapse
In START-A (A) and START-B (B).

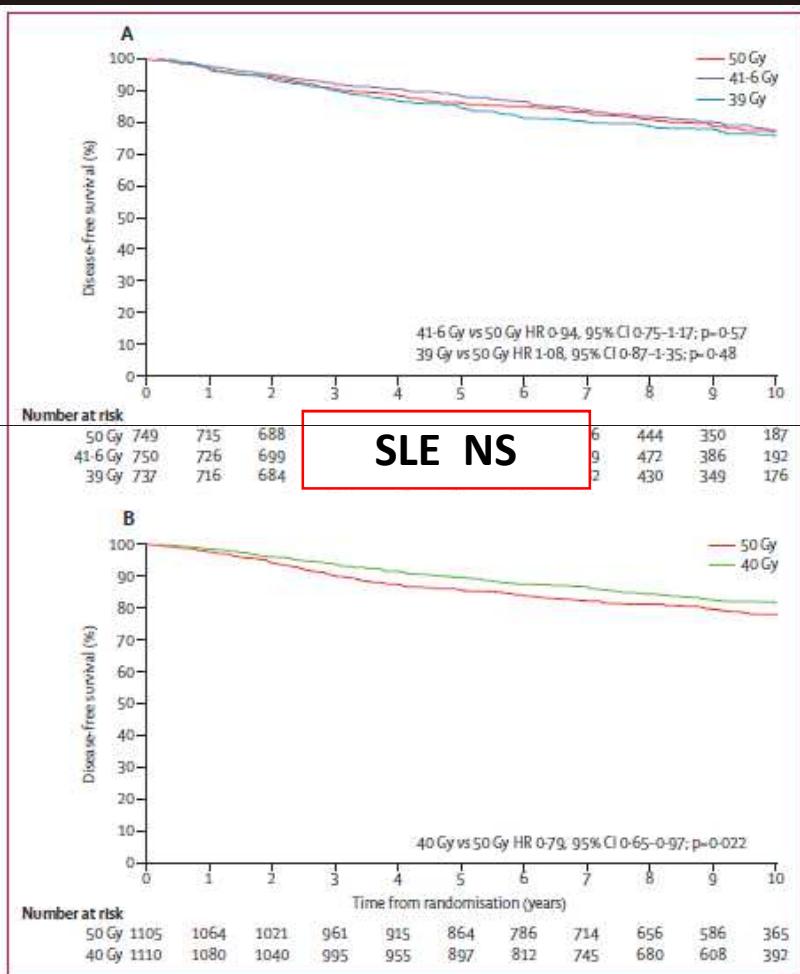
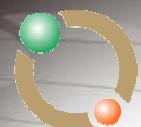


Figure 2: Kaplan-Meier analysis of disease-free survival
In START-A (A) and START-B (B).



Efecto Tardío del Tejido Normal

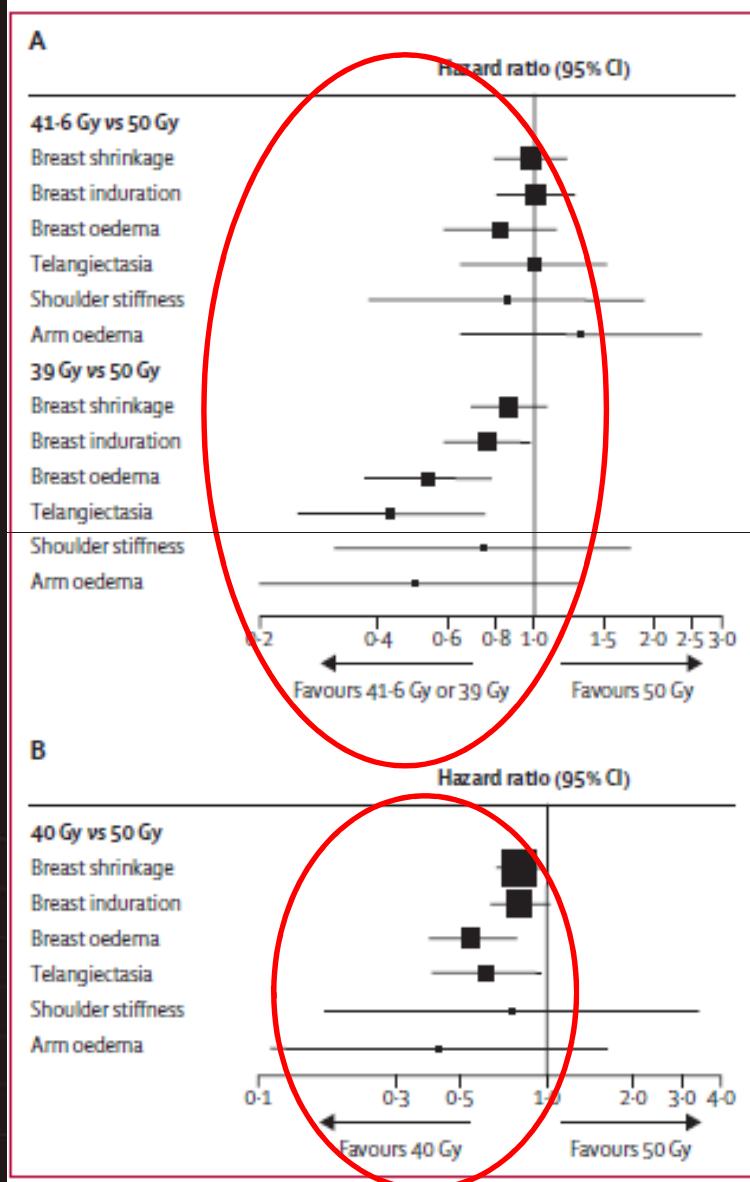


Figure 3: Late normal tissue effects
In START-A (A) and START-B (B). Assessed as moderate or marked by

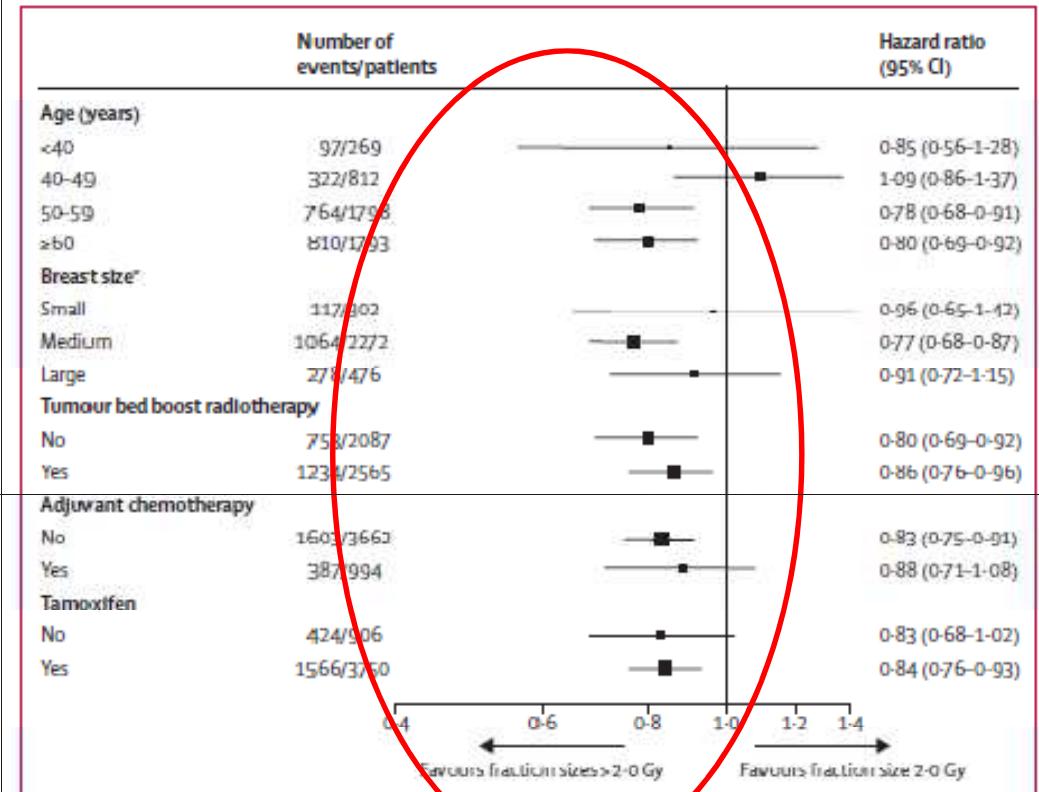


Figure 5: Meta-analysis of any moderate or marked physician-assessed normal tissue effects in the breast comparing hypofractionated regimens versus 50 Gy in 25 fractions
Includes 4672 patients from START pilot trial, START-A, and START-B. *Assessed from baseline photographs.



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Eur J Surg Oncol. 2015 Oct;41(10):1411-6. doi: 10.1016/j.ejso.2015.07.011. Epub 2015 Jul 31.

The influence of simultaneous integrated boost, hypofractionation and oncoplastic surgery on cosmetic outcome and PROMs after breast conserving therapy.

Lansu JT¹, Essers M², Voogd AC³, Luiten EJ⁴, Buijs C², Groenendaal N², Poortmans PM⁵.

CONCLUSION:

Our study indicates that the current RT techniques seem to be **safe for cosmetic outcome and quality of life**.

Further investigation is needed to verify the possible *negative influence of oncoplastic surgery* on the cosmetic outcome and the quality of life as this technique is especially indicated for patients with an unfavourable tumour/breast volume ratio.



Hipofraccionamiento en Cáncer de Mama

OK

Hipofraccionamiento Reg. Ganglionares

Requisitos para puesta en marcha

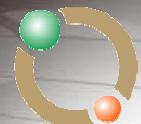
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Hipofraccionamiento en Ganglios Regionales

...podemos?



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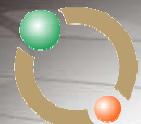
EFFECT OF NODAL IRRADIATION AND FRACTION SIZE ON CARDIAC AND CEREBROVASCULAR MORTALITY IN WOMEN WITH BREAST CANCER TREATED WITH LOCAL AND LOCOREGIONAL RADIOTHERAPY

ERIKA L. STOKES, M.D., *† SCOTT TYLDESLEY, M.D., *† RYAN WOODS, M.Sc., ‡ ELAINE WAI, M.D., *§
ANDIVO A. OLIVOTTO, M.D.*§

*Division of Radiation Oncology and Developmental Radiotherapeutics, University of British Columbia, Vancouver, BC, Canada;

†Radiation Therapy Program, and ‡Population Oncology, British Columbia Cancer Agency, Vancouver, BC, Canada; §Radiation Therapy Program, British Columbia Cancer Agency, Victoria, BC, Canada

Int. J. Radiation Oncology Biol. Phys., Vol. 80, No. 2, pp. 403–409, 2011



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Objetivo:

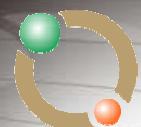
Efecto de RT adyuvante local ó locorregional y tamaño de la fracción ($> 2 \text{ Gy}$ vs $\leq 2 \text{ Gy}$) en riesgo de muerte cardíaca o ACV
1990-1996 / 4929 p / Seg $\frac{1}{2}$ 11,7 años

Resultados:

RT locorregional  riesgo de muerte cardiovascular vs RT local
($p=0.004$)

Analisis Multivariado:

Tamaño de la fracción NO aumenta riesgo de muerte

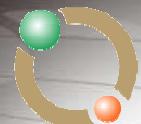


Diferencias entre irradiar Volumen Mamario +/- Ganglios

Cancer/Radiothérapie 19 (2015) 241–247

Irradiación de ganglios aumenta exposición de dosis en pulmón, corazón, vasos y nervios....

...pero es el ***tamaño de la fracción*** lo que incrementa el *riesgo de toxicidad?*
...o el volumen irradiado y técnica?



Role of hypofractionated radiotherapy in breast locoregional radiation

Place de la radiothérapie hypofractionnée dans l'irradiation locorégionale du sein

J.-M. Caudrelier^{a,*}, P.T. Truong^b

UK trials – RT locoregional 7-21% de pacientes incluidas en START A-B



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Interim Analysis of 455 Breast Cancer Patients Randomly Treated With Hypofractionated or Conventional Fractionated Radiation Therapy After Mastectomy

S. Wang, Y. Song, X. Liu, J. Jin, W. Wang, Z. Yu, Y. Liu, H. Ren, H. Fang, and Y. Li; Cancer Hospital, CAMS, Beijing, China

Int J Radiat Oncol Biol Phys, 2013; 25; S7tim

455 p. / 48 a. (24-74) / 2008-2012 / (T3 - N+4)

RT post mastectomía / Randomizado

50 Gy / 5 sem (n=233) vs HFRT 43,5 Gy / 3 sem (n=232)

Todas recibieron QT ± HT / Seg ½ 33 meses (*min 6 meses*)

No diferencia a 3 años: LRR (p= 0.5); DM (p=0.6); DFS (p=0.5)
y OS (p=0.7)

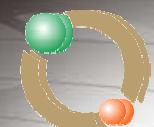
Incidencia G2 y G3 dermatitis significativ  **HFRT vs 50 Gy / 5 s.**
(10.8% vs 19.7% y 4.3% vs 11.7% , p< 0.0001)

No diferencia en neumonitis, edema de brazo..



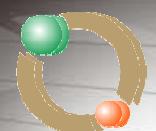
Hypofractionated irradiation of infra-supraclavicular lymph nodes after axillary dissection in patients with breast cancer post-conservative surgery: impact on late toxicity

Marina Guenzi¹, Gladys Blandino^{1*}, Maria Giuseppina Vidili³, Deborah Aloï¹, Elena Configliacco¹, Elisa Verzanini¹, Elena Tornari¹, Francesca Cavagnetto² and Renzo Corvò¹



Conclusions

Mild hypofractionated WBI delivered in 20 fractions represents a safe and effective treatment for the infrasupraclavicular node areas. ASTRO board reported that shorter treatment schedules can significantly benefit patients in terms of convenience, acceptance of therapy, and cost. They suggest to do not initiate whole-breast radiation therapy as a part of breast conservation therapy in women age ≥ 50 with early-stage invasive breast cancer without considering shorter treatment schedule [9]. The limited experience available on hypofractionated scheme extended to lymph nodes do not seem to show an increased toxicity. In our department the adoption of this mild hypofractionated loco-regional radiation schedule in the context of a policy of gradual reduction of the numbers of the fractions has shown to be safe when delivered on locoregional nodal areas. This preliminary evidence should be further investigated and confirmed by large-scale prospective studies.



RESEARCH

Open Access



CrossMark

Hypofractionated irradiation of infra-supraclavicular lymph nodes after axillary dissection in patients with breast cancer post-conservative surgery: impact on late toxicity

Marina Guenzi¹, Gladys Blandino^{1*}, Maria Giuseppina Vidili³, Deborah Aloi¹, Elena Configliacco¹, Elisa Verzanini¹, Elena Tornari¹, Francesca Cavagnetto² and Renzo Corvò¹

- Análisis de impacto clínico de Hipo-fraccionamiento medio en LN Supra & Infra-clavicular.
- 2007-12; 100 pac. Ca. Mama (pT1-4,pN1-3,pMx)
- Edad $\frac{1}{2}= 60^{\text{a}}$ [34-83].
- Luminal A (59%); Luminal B (24%); Basal-Like (10%); Her-2 (7%)
- ***FU $\frac{1}{2}= 50 \text{ m}$ [19-82]***

Tratamiento

-HT (82%); QT Neo (9%); QT Ady (81%)

-Hypofracc (100%)

Mama & Infra-Supraclav = 46 Gy/ 2.3 Gy/ 20 fr.

Boost = 52 Gy/ 2.6 Gy/ 20 fr.

Control enfermedad:

-Recurrencia local = 2%

-MTTS distancia = 3%

Toxicidad tardía

-Sin diferencia

Guenzi et al. RadiationOncology (2015)10:177



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Hipofraccionamiento en Cáncer de Mama
OK

Hipofraccionamiento Reg. Ganglionares
OK

Requisitos para puesta en marcha

Experiencia Institucional



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...y postmastectomia ?



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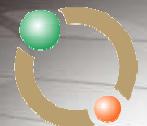
Med Oncol (2012) 29:2570–2576
DOI 10.1007/s12032-012-0192-1

ORIGINAL PAPER

Hypofractionation in post-mastectomy breast cancer patients: seven-year follow-up

Hany Eldeeb · Iman Awad · Osman Elhanafy

Received: 12 December 2011 / Accepted: 9 February 2012 / Published online: 22 February 2012



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RT post MASTECTOMIA

2001-2004

50 Gy/ 25 fr. Vs. 45 Gy/ 17 fr. Vs. 40 Gy/ 15 fr.

FU½= 23m

SIN diferencia SIGNIFICATIVA en

- Control Local
- Dolor
- Telangiectasia
- Fibrosis
- Edema brazo
- Pigmentación cutánea

Toxicidad AGUDA

- Mayor en esquema hipo-fraccionado (**sin** repercusión en toxicidad tardía)

Review & MetaAnalisis

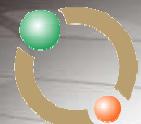
Hipo vs Normofraccionamiento

Zhi-Rui Zhou et al. Surgical Oncology 24 (2015) 200-211

-Evaluar eficacia y seguridad del
Hipofraccionamiento en Ca. de Mama

-23 estudios analizados

-Comparación entre:
Normo-fraccionamiento 1.8-2 Gy/ día
Hipo-fracc 2.5-3 Gy/ día
Hipo-fracc +++ >4 Gy/ día



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-Toxicidad cutánea aguda Gr2/3: Menor en Hipo o Hipo ++
[RR=0.80,95%CI(0.70-0.91),p=0.0001]

-Tox. Tardía (cambios fotográficos): Hipo < Normo < Hipo++
[RR=1.21,95%CI(1.06-1.38),p=0.004]

-Rec. Local & Metástasis Distancia & SG & SLE & NeumoRad & Cardiolsque & FracturaCostal
(p= NO significativa entre fraccionamientos)

-Evidencia demuestra que Hipofraccionamiento en 2.5-3 Gy/ día es la mejor elección



Changing practice patterns for breast cancer radiation therapy with clinical pathways: An analysis of hypofractionation in a large, integrated cancer center network

Malolan S. Rajagopalan MD, John C. Flickinger MD,
Dwight E. Heron MD, Sushil Beriwal MD*

Department of Radiation Oncology, University of Pittsburgh Cancer Institute, Pittsburgh, Pennsylvania

-Sub-utilización en servicios de radio-oncología.

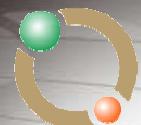
-Luego de conocimiento de ensayos publicados y práctica clínica, incremento del uso ≈ 20 veces.



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...entonces el análisis debería ser focalizado en las dosis a los OAR y no el “**TAMAÑO**” de las dosis por fracción o fraccionamiento...

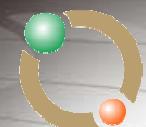
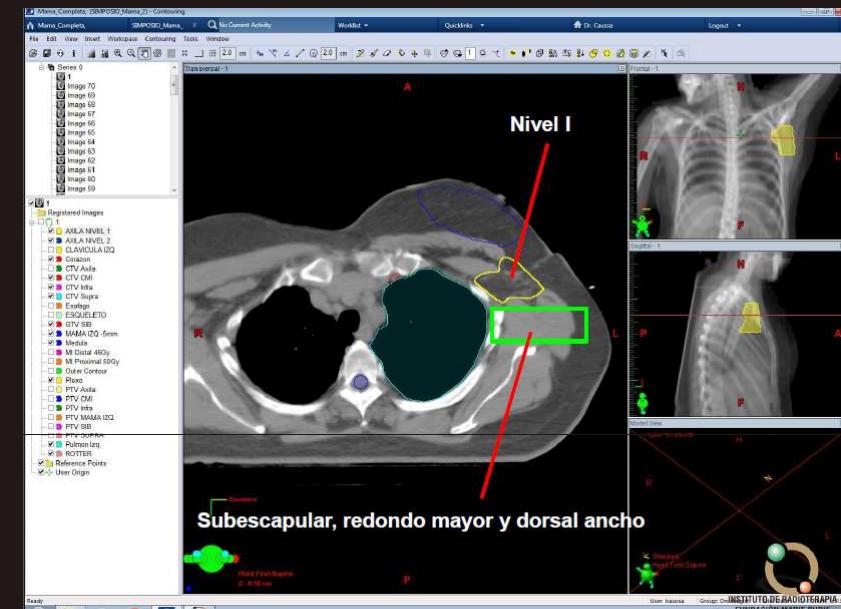
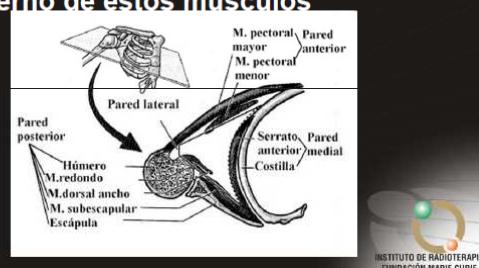
...veamos los puntos importantes...



Guías DELIMITACION Volúmenes !!!

Axila Nivel I / Límites

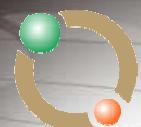
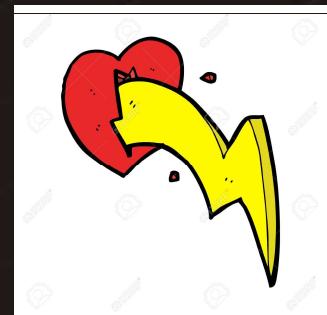
- ✓ Superior - 1 cm debajo de cabeza humeral (RDR coronal)
- ✓ Inferior - borde inferior de carina ó 4ta. Costilla
- ✓ Anterior - borde externo y posterior de pectorales mayor y menor
- ✓ Posterior- borde anterior de músculos subescapular, redondo mayor y dorsal ancho
- ✓ Externo - borde externo de estos músculos
- ✓ Interno - costillas



Risk of Ischemic Heart Disease in Women after Radiotherapy for Breast Cancer

N Engl J Med 2013;368:987-98.

Sarah C. Darby, Ph.D., Marianne Ewertz, D.M.Sc., Paul McGale, Ph.D., Anna M. Bennet, Ph.D., Ulla Blom-Goldman, M.D., Dorthe Brønnum, R.N., Candace Correa, M.D., David Cutter, F.R.C.R., Giovanna Gagliardi, Ph.D., Bruna Gigante, Ph.D., Maj-Britt Jensen, M.Sc., Andrew Nisbet, Ph.D., Richard Peto, F.R.S., Kazem Rahimi, D.M., Carolyn Taylor, D.Phil., and Per Hall, Ph.D.



Risk of Ischemic

...

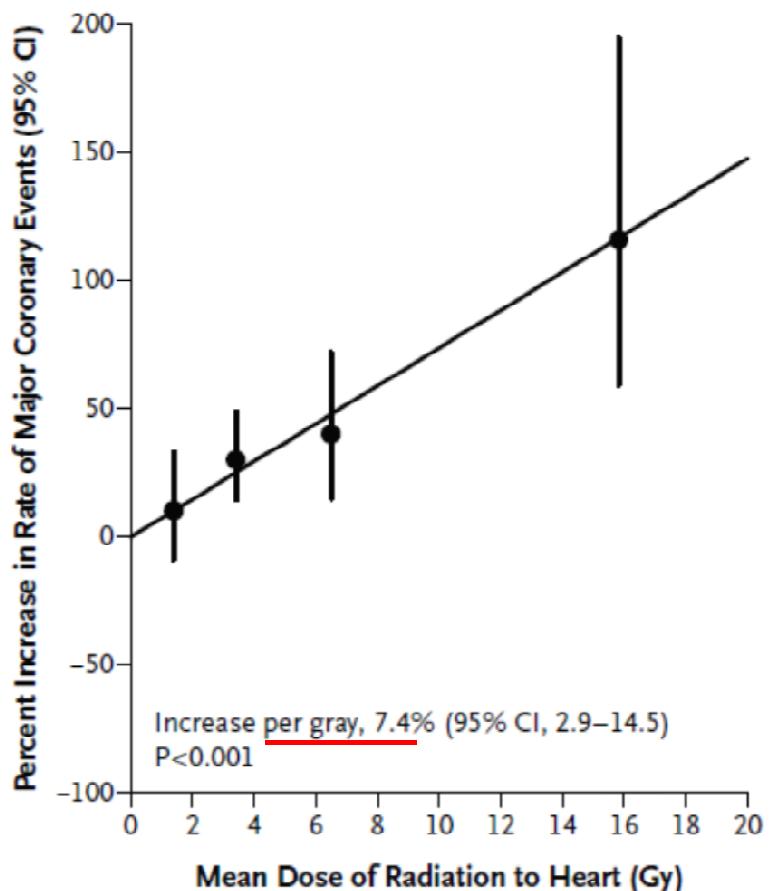


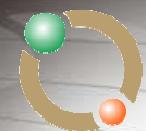
Figure 1. Rate of Major Coronary Events According to Mean Radiation Dose to the Heart, as Compared with the Estimated Rate with No Radiation Exposure to the Heart.

N Engl J Med 2013;368:987-98.

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)

* The values shown are the numbers of years since the breast-cancer diagnosis. The median time from the breast-cancer diagnosis to the start of radiotherapy was 42 days.



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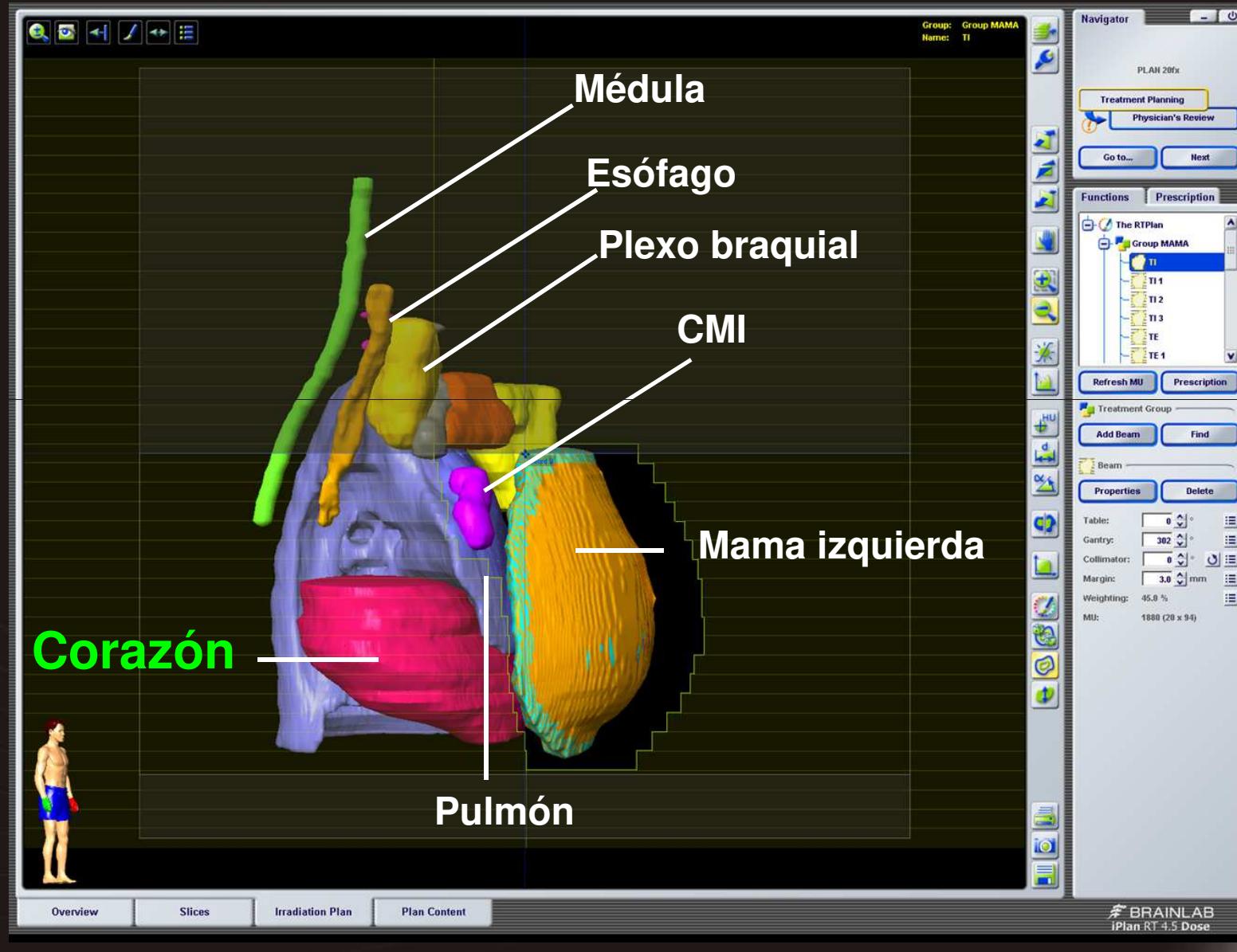
Control respiratorio & Inspiración Forzada (Gating)

> Protección corazón

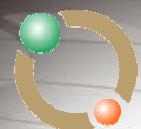
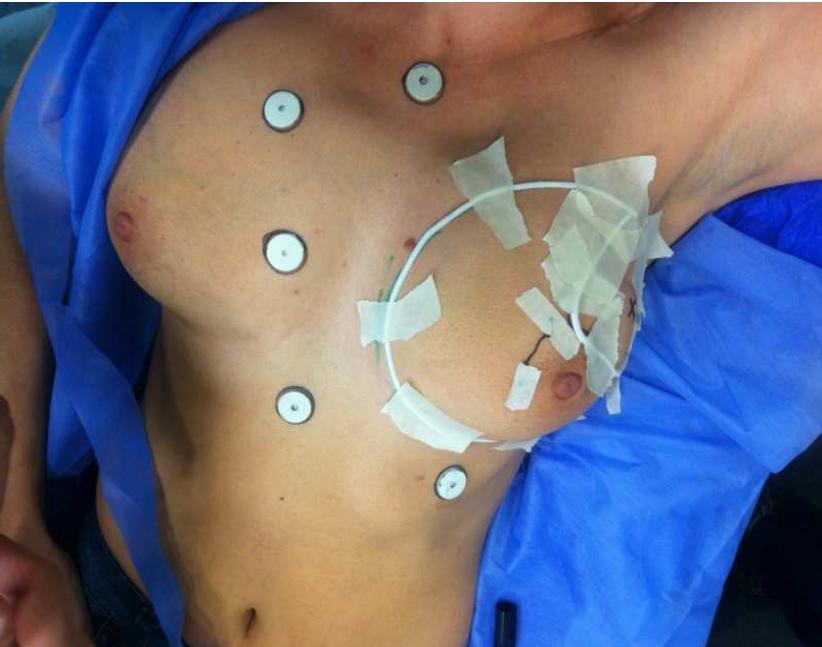


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Limitar toxicidad OAR's

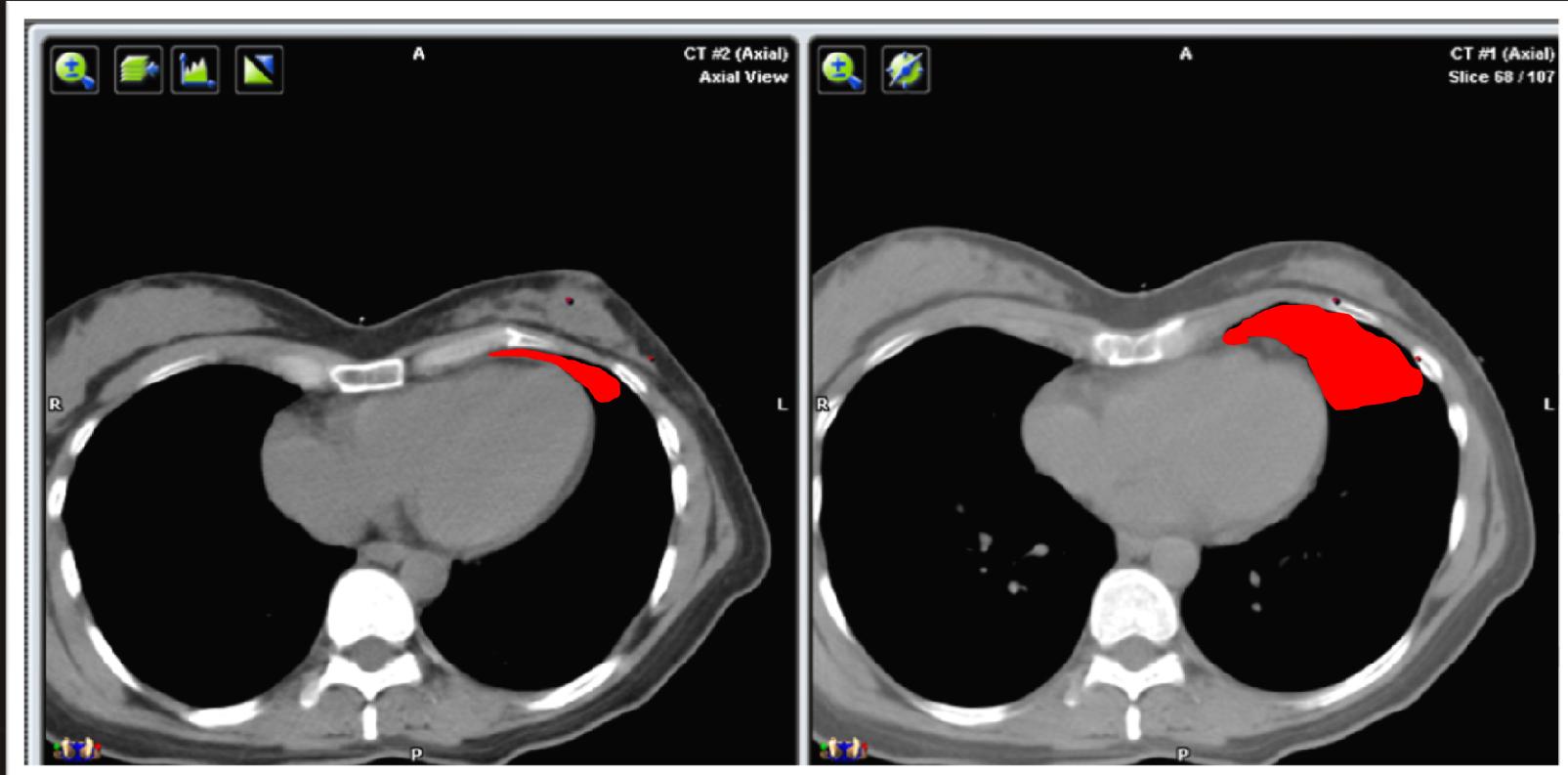


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Inspiración Forzada



- **Aumento** de la distancia entre la pared y corazón
- **Disminución** de la dosis al corazón



sIMRT en Mama Izquierda con gaiting respiratorio



sIMRT en Mama Izquierda respiración libre



Tenemos suficiente material
publicado para poder diseñar
protocolos de dosis/volumen en
esquemas **HIPOFRACCIONADOS**



RADIATION DOSE–VOLUME EFFECTS IN THE LUNG

2010

Despite these caveats, it is prudent to limit V₂₀ to $\leq 30\text{--}35\%$ and MLD to $\leq 20\text{--}23\text{ Gy}$ (with conventional fractionation) if one wants to limit the risk of RP to $\leq 20\%$ in definitively treated patients with non–small-cell lung cancer. Similar

Role of hypofractionated radiotherapy in breast locoregional radiation

Place de la radiothérapie hypofractionnée dans l'irradiation locorégionale du sein

Lung effects Cancer/Radiothérapie 19 (2015) 241–247

Table 1

Estimate of biologically effective dose late effects in lungs for four fractionation regimen.

	V _{20eq} ^a	d ^b (Gy)	BED3 (Gy)	BED4 (Gy)	V _{30eq} ^a	d ^b (Gy)	BED3 (Gy)	BED4 (Gy)
50 Gy/25 fractions	20	0.80	25.3	24	30	1.2	42	39
45 Gy/25 fractions	18	0.72	22.3	21.2	27	1.08	36.7	34.3
42.6 Gy/16 fractions	17	1.06	23.1	21.6	25.5	1.59	39.1	35.8
40 Gy/15 fractions	16	1.07	21.7	20.3	24	1.60	36.8	33.6

BED: biologically effective dose.

Each BED is calculated with the formula:

$$\text{BED}_{\alpha/\beta} = \text{Total dose (or V}_{x\text{eq}}) \times \left(1 + \frac{d}{\alpha/\beta}\right)$$

with $\alpha/\beta = 3$ or 4 Gy .

^a The V_{20eq} and the V_{30eq} are a simple calculation to estimate the equivalent dose if initial planning 50/25 fractions is renormalized corresponding to other fractionation schedules.

^b Daily dose received by the isodose of interest (e.g. for the V₂₀, 50/25 fractions, is 20 Gy/25 fractions and then 0.8 Gy per fraction).

Efecto cardiovascular ($\alpha/\beta = 1,5$ Gy)

Depende de volumen irradiado

NO de dosis x Fr ó tiempo total

START A y B – tasa de isquemia a 5 años **NS**
entre HFRT y CFRT

En series con  de infarto de miocardio y ACV

... **Dosis x Fr no es factor independiente**



Role of hypofractionated radiotherapy in breast locoregional radiation

Place de la radiothérapie hypofractionnée dans l'irradiation locorégionale du sein

Plexo Braquial

Cancer/Radiothérapie 19 (2015) 241–247

Si α/β para nervio: 2 Gy, 1,5 Gy y 1 Gy

Esquema 42,6 Gy / 16 Fr

Dosis total equivalente a 50 Gy / 25 Fr

Debería ser 49,7 Gy, 50,6 Gy y 52 Gy

Injuria Braquial  relacionada a DOSIS OAR
NO a fraccionamiento

Actualmente debería ser nula
(Gracias a alta tecnología)

Role of hypofractionated radiotherapy in breast locoregional radiation

Place de la radiothérapie hypofractionnée dans l'irradiation locorégionale du sein

Cancer/Radiothérapie 19 (2015) 241–247

Sistema Linfático

Linfedema relacionado a fibrosis (α/β 3 - 4 Gy)

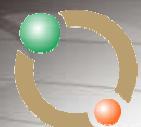
No depende de dosis/fracción



con suma terapéutica - ***Cirugía Ax + RT***

EORTC AMAROS trial (10981/22023)

Linfedema - a 5 años: 28% Dax, 14% RTax (p<0.0001)



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Hipofraccionamiento en Cáncer de Mama
OK

Hipofraccionamiento Reg. Ganglionares
OK

Requisitos para puesta en marcha
OK

Experiencia Institucional



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Hipofraccionamiento

Protocolos Institucionales
FMC



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Protocolos Institucionales - FMC

MAMA HDV

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Name	Date modified	Type	Size
APBI (IMRT + IGRT) x 10 FRACCIONES DT40Gy	9/2/2016 11:25	Microsoft Excel 97-2...	17 KB
IMRT mama sola 80 años o mayores	7/3/2017 20:34	Microsoft Excel 97-2...	22 KB
INFLAMATORIO PARED TORACICA +RG final	9/2/2016 11:25	OpenDocument Spre...	20 KB
INFLAMATORIO sin tumor palpable final	9/2/2016 11:26	OpenDocument Spre...	20 KB
INFLAMATORIOcon tumor palpable final	9/2/2016 11:26	OpenDocument Spre...	20 KB
MAMA con o sin prótesis riesgo bajo e intermedio & SIB sIMRT x 20 Fracciones	6/10/2016 14:51	Microsoft Excel 97-2...	23 KB
MAMA con o sin prótesis y Reg. Ganglionares sIMRT x 16 Fracciones	10/1/2017 17:06	Microsoft Excel 97-2...	37 KB
MAMA con o sin prótesis y Reg. Ganglionares sIMRT x 20 Fracciones	18/6/2017 17:20	Microsoft Excel 97-2...	43 KB
MAMA conservador con margenes comprometidos x 20 Fracciones	14/10/2016 21:21	Microsoft Excel 97-2...	29 KB
MAMA sIMRT 16 Fx_3 subvolumenes_con_ganglios_Whelan 2	7/10/2016 18:36	Microsoft Excel 97-2...	21 KB
MAMA sIMRT 16 Fx_3 subvolumenes_Whelan 2	1/6/2016 16:29	Microsoft Excel 97-2...	21 KB
PARED CON EXPANSOR sIMRT x 25 Fracciones	9/2/2016 11:26	Microsoft Excel 97-2...	18 KB
PARED-CON-EXPANSOR-& REG. GANGLIONARES sIMRT x 25 Fracciones	9/2/2016 11:26	Microsoft Excel 97-2...	16 KB
PARED TORACICA & REG. GANGLIONARES sIMRT x 20 Fracciones	7/10/2016 19:12	Microsoft Excel 97-2...	34 KB
PARED TORACICA MAS REGIONES GANGLIONARES sIMRT 16 Fx AlfaBeta 3	2/6/2017 20:43	Microsoft Excel 97-2...	17 KB
PARED TORACICA SOLA sIMRT 16 Fx	2/6/2017 20:51	Microsoft Excel 97-2...	13 KB

16 items

Windows Search File Explorer Internet Explorer WhatsApp Microsoft Word

09:19 20/6/2017



MAMA con o sin prótesis y Reg. Ganglionares siMRT x 16 Fracciones	Deq2Gy [Gy]	BED [Gy]	Alfa/beta [Gy]
1 PTV_SIB (Dd = 3.25 Gy DTot = 52 Gy)	65	108,3	3
2 PTV_proximal (Dd = 2.7 Gy DTot = 43.2 Gy)	49,2	82,1	3
3 PTV_distal (Dd = 2.5 Gy DTot = 40 Gy)	44	73,3	3
PTV Axila (Dd = 2.56 Gy DTot = 41 Gy)	46,8	93,5	2
PTV Supraclavicular (Dd = 2.56 Gy DTot = 41 Gy)	46,8	93,5	2
PTV Subclavicular (Dd = 2.56 Gy DTot = 41 Gy)	46,8	93,5	2
PTV CMI (Dd = 2.56 Gy DTot = 41 Gy)	46,8	93,5	2
Organos a Riesgo			
	16fx		Ref 25fx
Plexo braquial (Alfa/beta = 2)			
Dmax	<39 Gy		<45.4Gy
Médula espinal (Alfa/beta = 2)			
Dmax	<9 Gy		<10Gy
Pulmón homolateral (Alfa/beta = 3)			
V19Gy	<35%		V20 <35 %
V38Gy	≤25%		V40 ≤ 25 %
Corazón (MI) (Alfa/beta = 2)			
V9Gy	≤10%		≤10%
Dmedia	≤5Gy		≤5Gy



MAMA con o sin prótesis y Reg. Ganglionares siMRT x 20 Fracciones	Deq2Gy [Gy]	BED [Gy]	Alfa/beta
PTV SIB (dd 0.55Gy/DT11Gy) – (dosis total por fraccion 2.82Gy / DT 56,4 Gy)	65,6	109,4	3
PTV - proximal (dd 2.27Gy / DT 45.4 Gy)	47,9	79,8	3
PTV Distal (dd 2.15Gy / DT 43Gy)	44,3	73,8	3
PTV Axila (dd 2.3Gy / DT 46 Gy)	49,4	98,9	2
PTV Supraclavicular (dd 2.3Gy / DT 46 Gy)	49,4	98,9	2
PTV Subclavicular (dd 2.3Gy / DT 46 Gy)	49,4	98,9	2
PTV CMI (dd 2.3Gy / DT 46 Gy)	49,4	98,9	2
Organos a Riesgo			
	20fx		Ref 25fx
Plexo braquial (Alfa/beta = 2)			
Dmax	<42 Gy		<45.4Gy
Médula espinal (Alfa/beta = 2)			
Dmax	<10 Gy		<10Gy
Pulmón homolateral (Alfa/beta = 3)			
V19Gy	<35%		V20 <35 %
V38Gy	≤25%		V40 <= 25 %
Corazón (MI) (Alfa/beta = 2)			
V10Gy	≤10%		≤10%
Dmedia	≤5Gy		≤5Gy



PARED TORACICA & REG. GANGLIONARES siMRT x 20 Fracciones Gy

PTV - Pared torácica (dd 2.35Gy / DT 47 Gy) EQD2Gy = 50.3 Gy

PTV Axila (dd 2.3Gy / DT 46 Gy) EQD2Gy = 48.5 Gy

PTV Supraclavicular (dd 2.3Gy / DT 46 Gy) EQD2Gy = 48.5 Gy

PTV Subclavicular (dd 2.3Gy / DT 46 Gy) EQD2Gy = 48.5 Gy

PTV CMI (dd 2.3Gy / DT 46 Gy) EQD2Gy = 48.5 Gy

Organos a Riesgo	HDV Objetivos	HDV Logrado	%
Plexo braquial			
Dmax	<45.4Gy		
Médula espinal			
Dmax	<10Gy		
Pulmón homolateral			
V20Gy	<35%		%
V40Gy	≤25%		%
Pulmón contralateral			
V4Gy	≤10%		%
Corazón (MI)			
V16Gy	<5%		%
Mama contralateral			
D2%	≤2.4 Gy		Gy
D5%	≤1.4 Gy		Gy



Hipofraccionamiento Locoregional

Experiencia Institucional

Toxicidad aguda y tardía
Resultados preliminares

ZUNINO & col.



20 Fracciones

207 pacientes -07-07-2014 y 30-03-2016-

T1-2, N0- 1

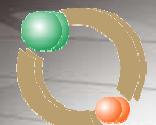
Edad: 58,8 años (27,6 - 84,8)

Seguimiento medio - 17,5 meses (5.8 - 30.5)

Conservador - 167 p. (80.7%)

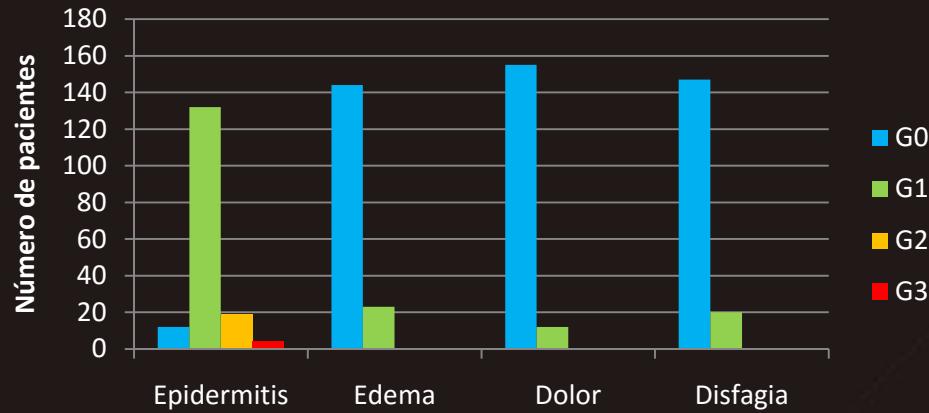
Mastectomía - 40 p. (19.3%)

Objetivo evaluar toxicidad aguda y tardía

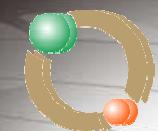
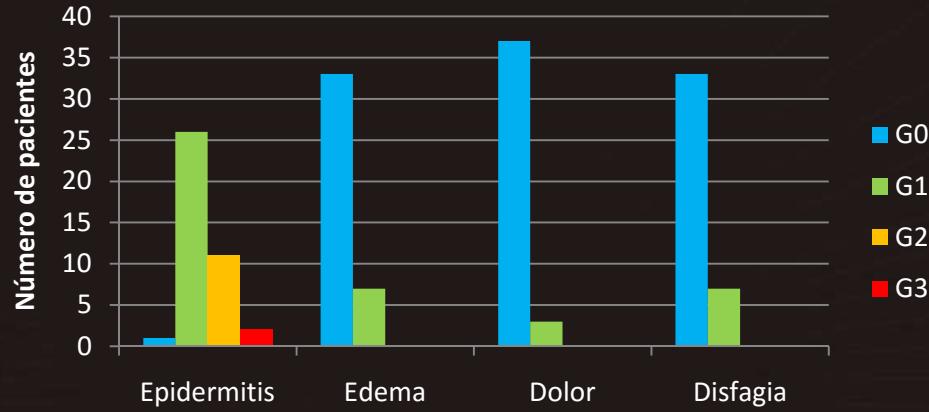


Toxicidad aguda (<3m)

Conservador, n=167

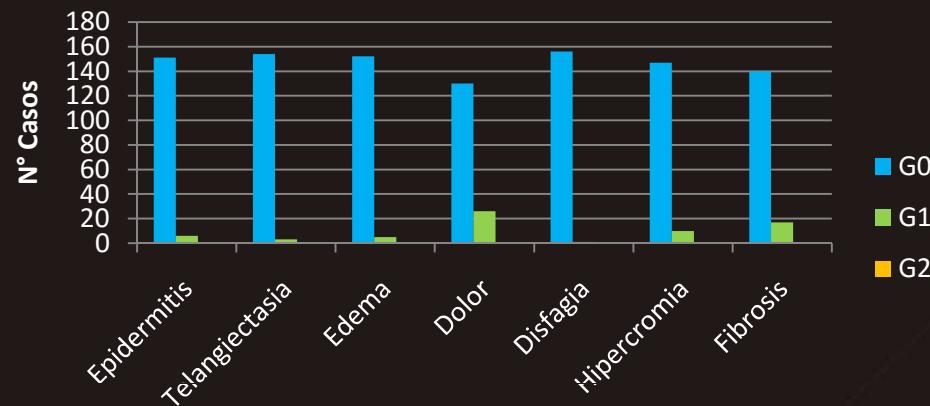


Mastectomía, n=40

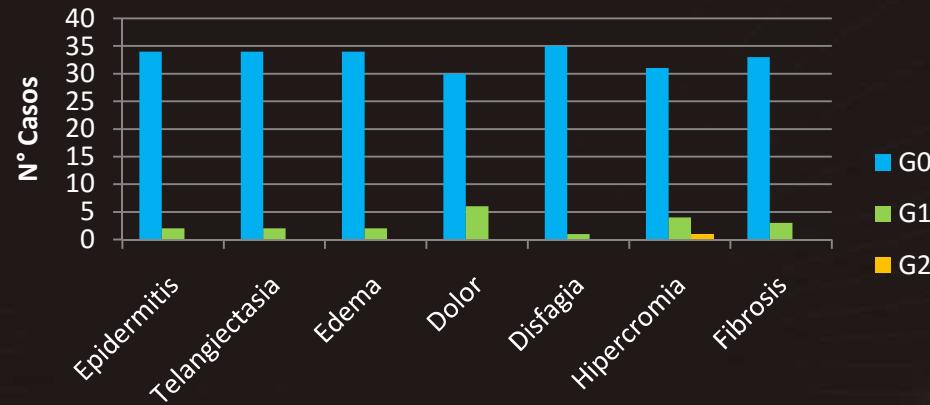


Toxicidad tardía (>3m)

Conservador, n=157



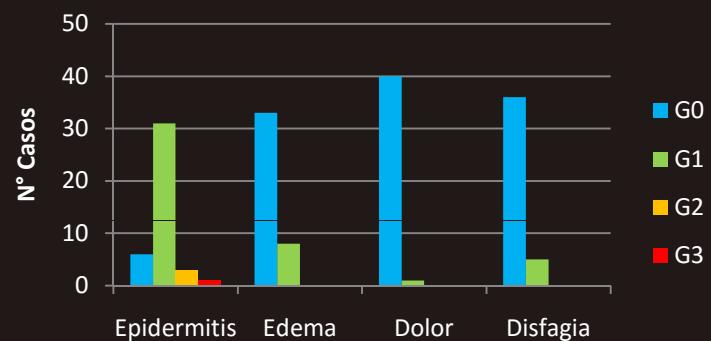
Mastectomía, n=36



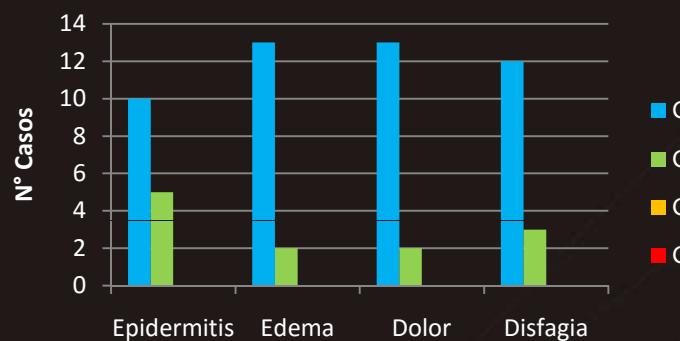
Toxicidad aguda ($\leq 3m$) & edad

≤ 50 años

Conservador, n=41

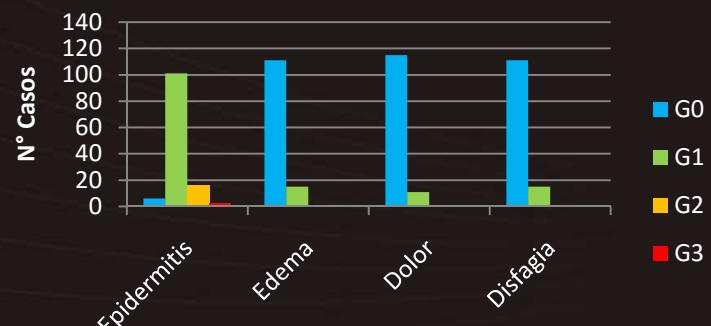


Mastectomía, n=15

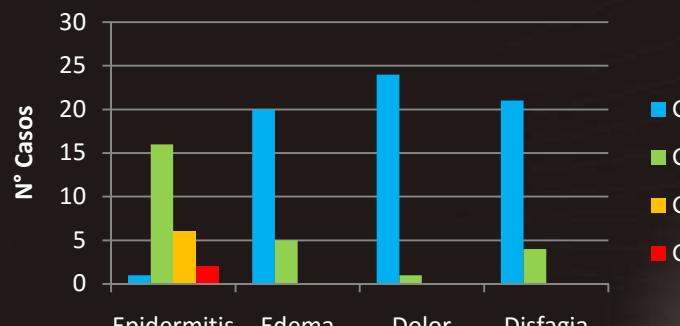


>50 años

Conservador, n=126



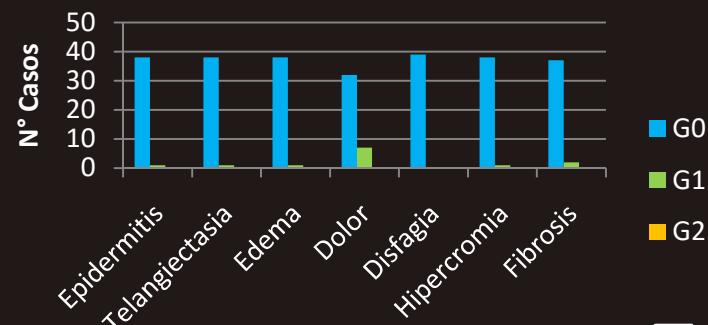
Mastectomía, n=25



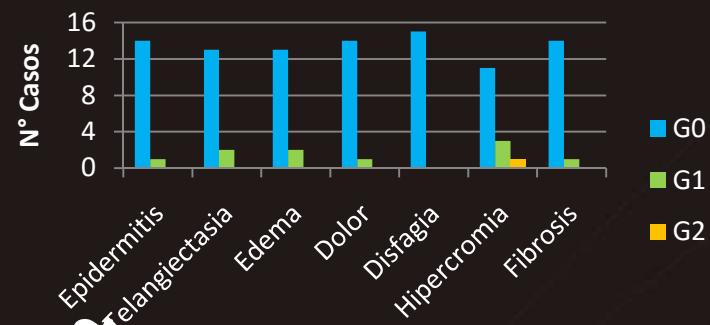
Toxicidad tardía (>3m) & edad

≤ 50 años

Conservador, n=39

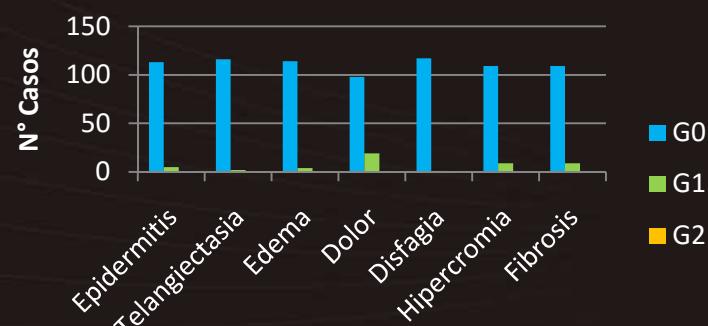


Mastectomía, n=15

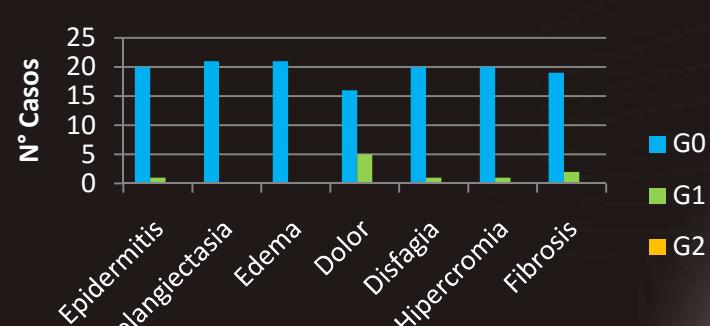


>50 años

Conservador, n=118

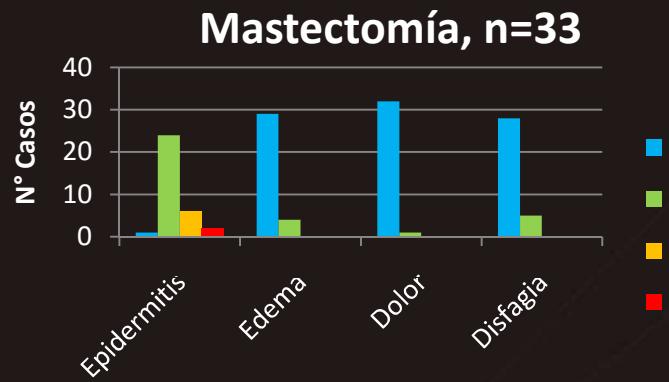
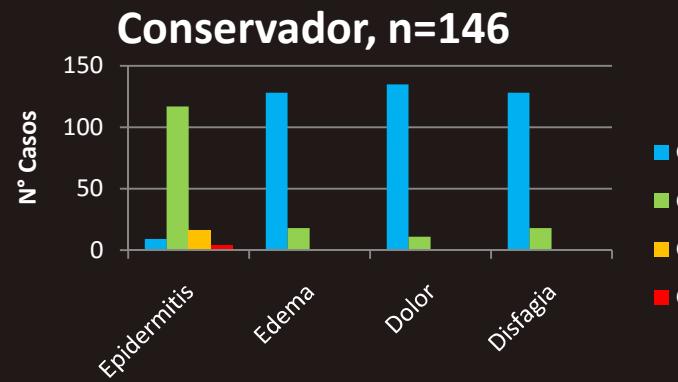


Mastectomía, n=21

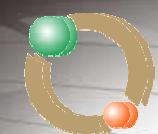
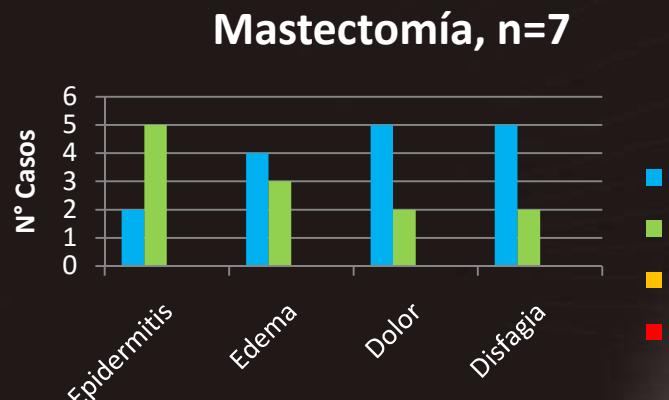
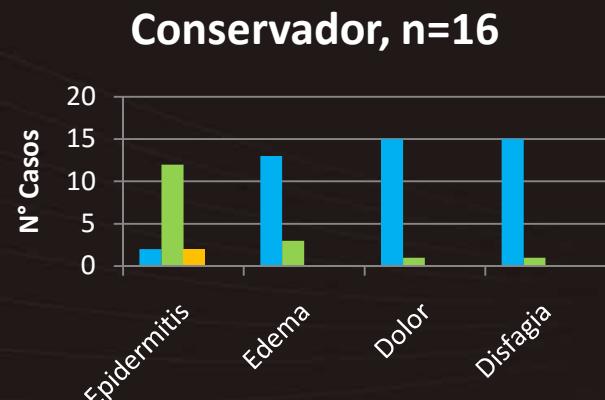


Toxicidad aguda ($\leq 3m$) & RH

RH+



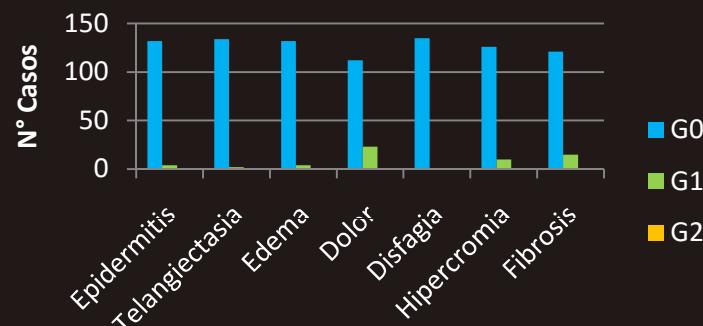
RH-



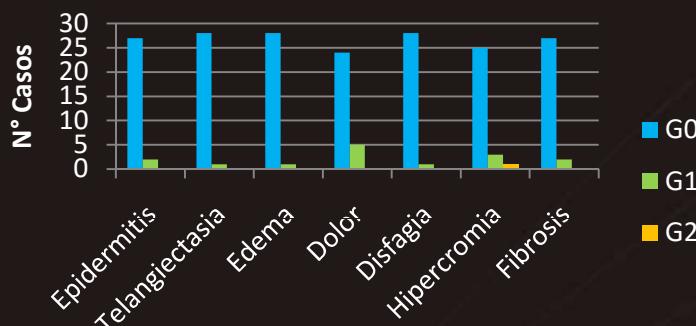
Toxicidad tardía (>3m) & RH

RH+

Conservador, n=136

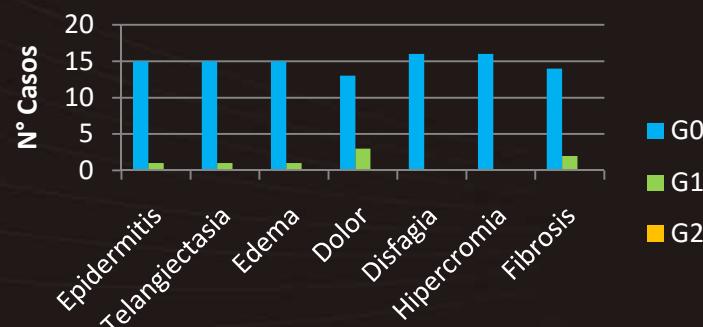


Mastectomía, n=29

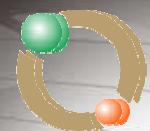
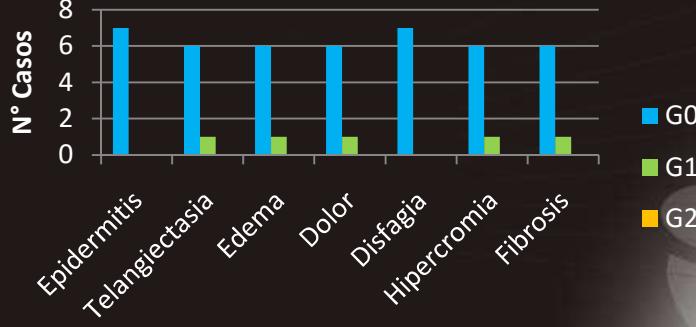


RH-

Conservador, n=18



Mastectomía, n=5



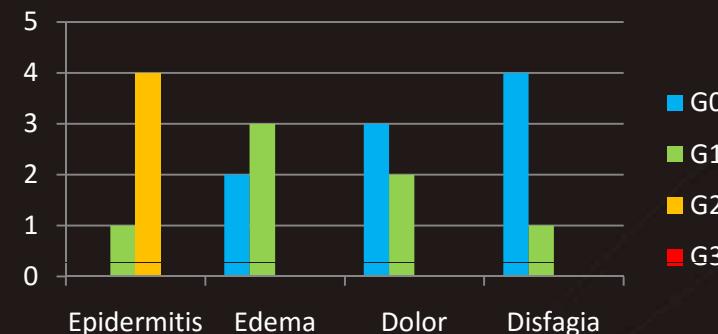
Toxicidad & Triple negativo

Toxicidad aguda (≤ 3 meses)

Conservador, n=146

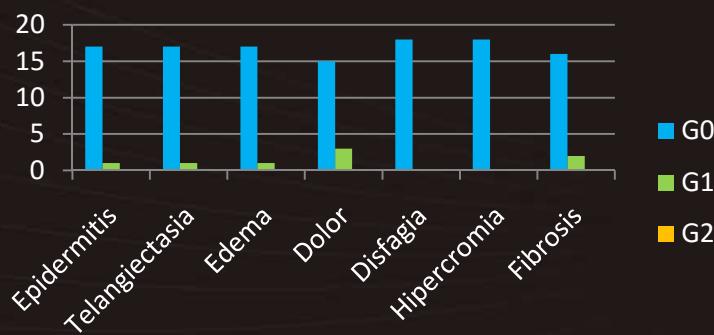


Mastectomía, n=33

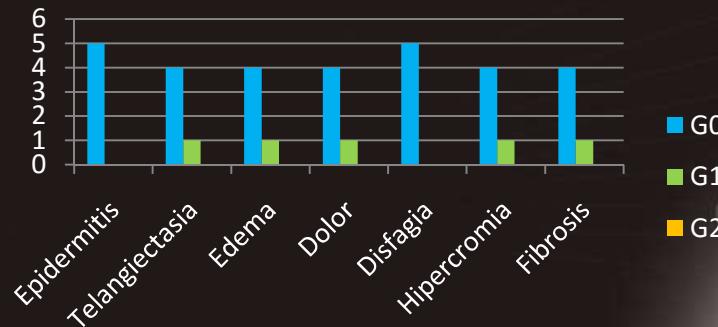


Toxicidad tardía (>3 meses)

Conservador, n=18



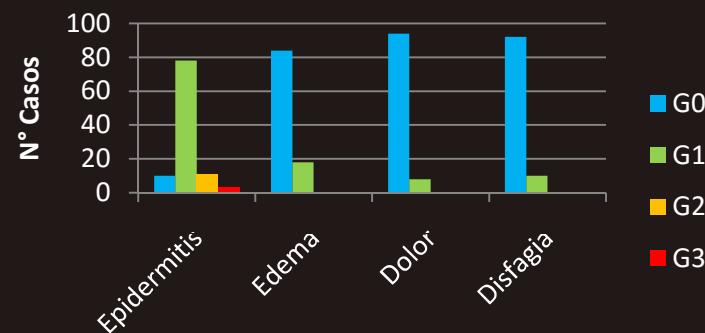
Mastectomía, n=5



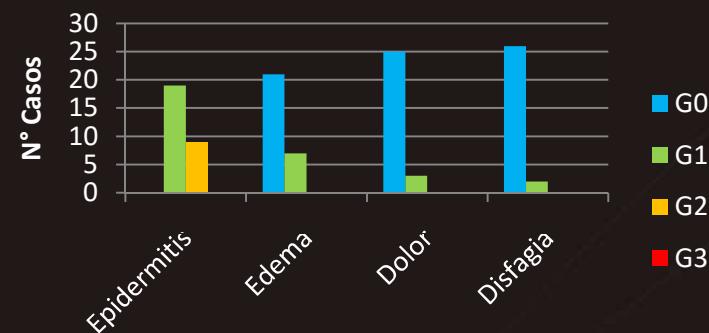
Toxicidad aguda ($\leq 3m$) & Ubicación

Cuadrantes externos

Conservador, n=102

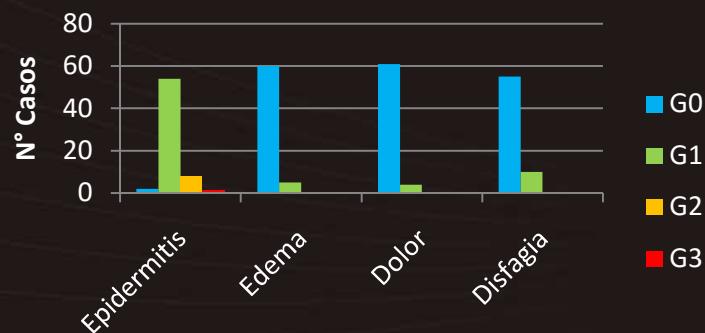


Mastectomía, n=28

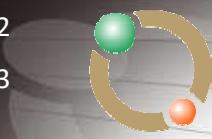
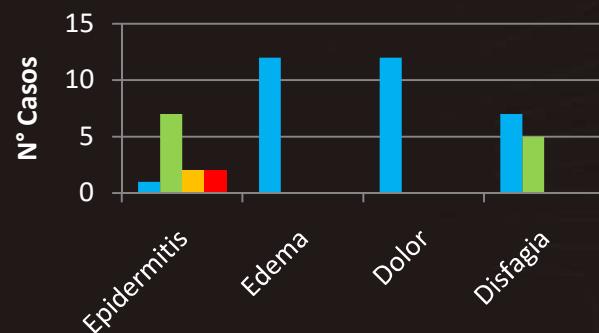


Cuadrantes internos y centrales

Conservador, n=65



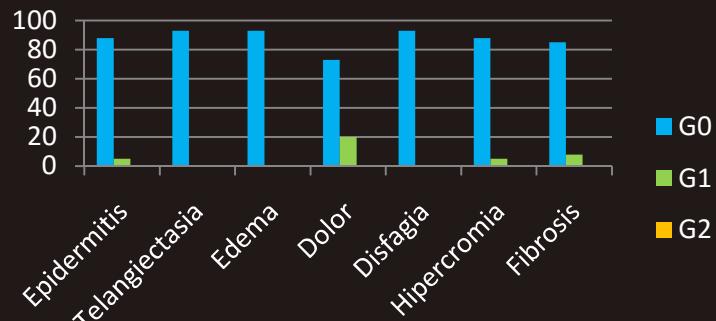
Mastectomía, n=12



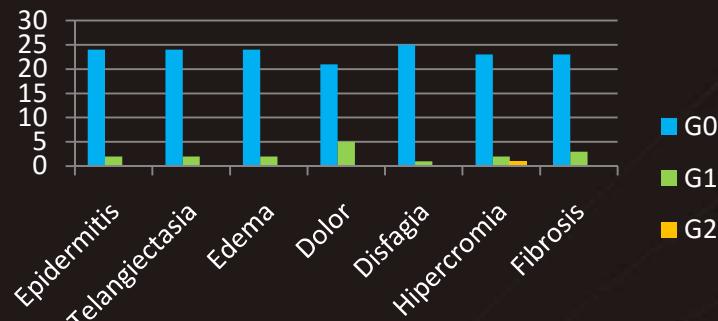
Toxicidad tardía (>3m) & Ubicación

Cuadrantes externos

Conservador, n=93

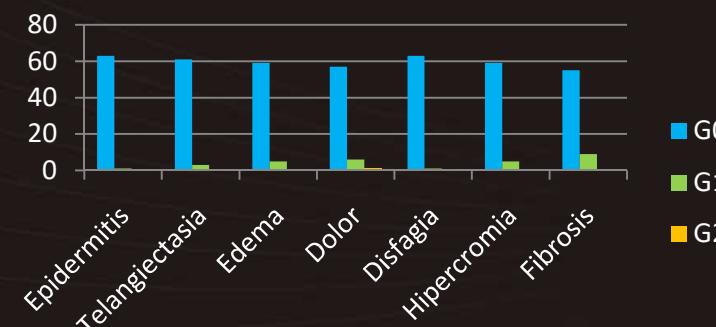


Mastectomía, n=26



Cuadrantes internos y centrales

Conservador, n=64



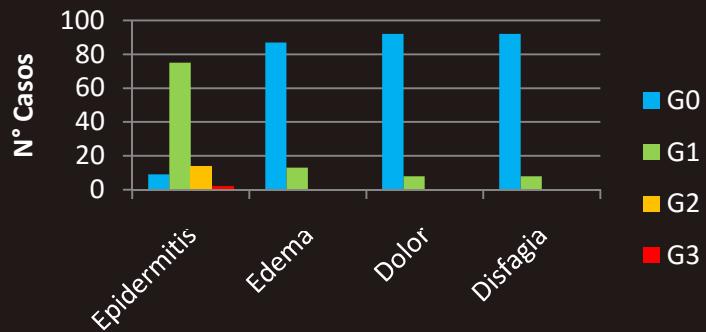
Mastectomía, n=10



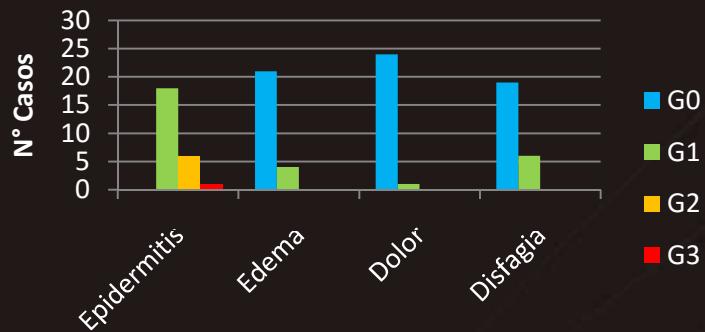
Toxicidad aguda ($\leq 3m$) & Duración del tratamiento

24 a 28 días

Conservador, n=100

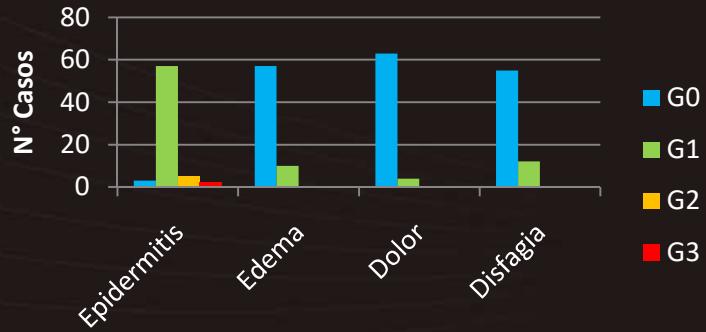


Mastectomía, n=25

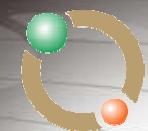
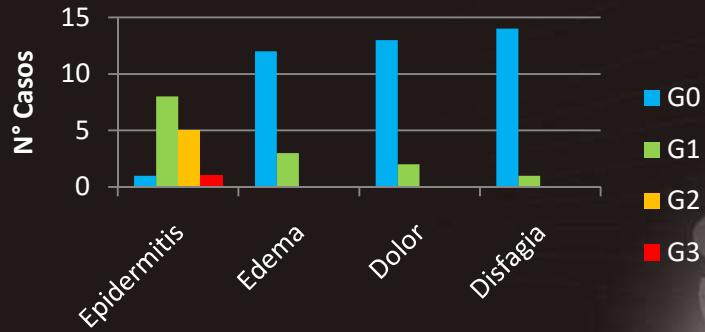


29 a 32 días

Conservador, n=67



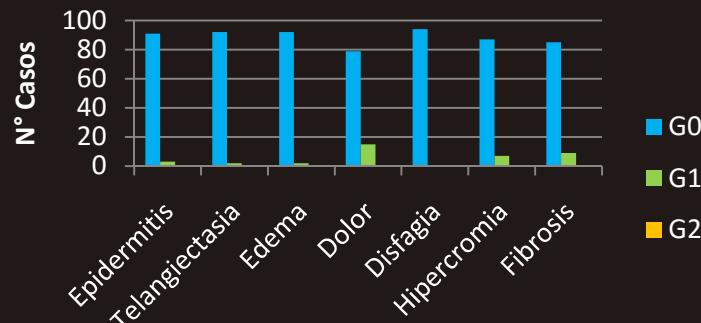
Mastectomía, n=15



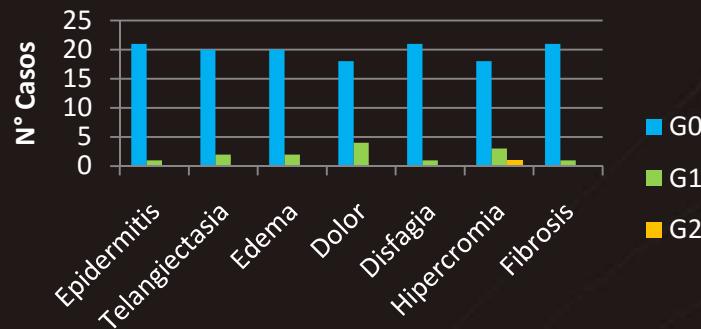
Toxicidad tardía (>3m) & Duración del tratamiento

24 a 28 días

Conservador, n=94

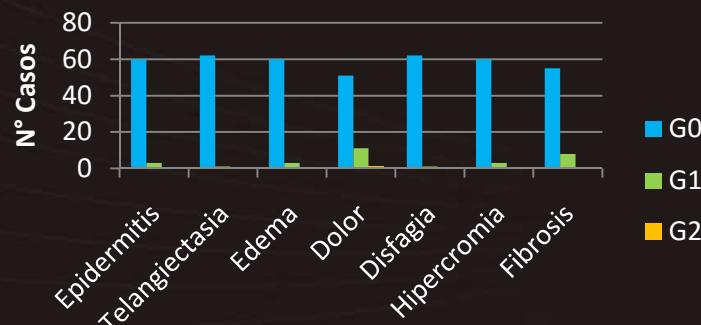


Mastectomía, n=22

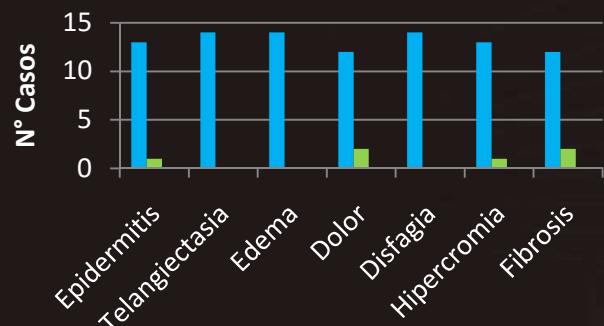


29 a 32 días

Conservador, n=63



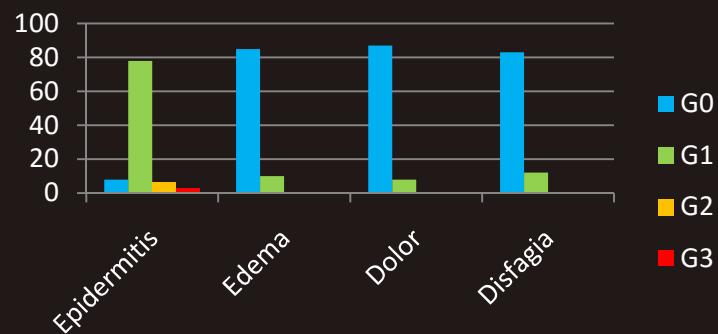
Mastectomía, n=14



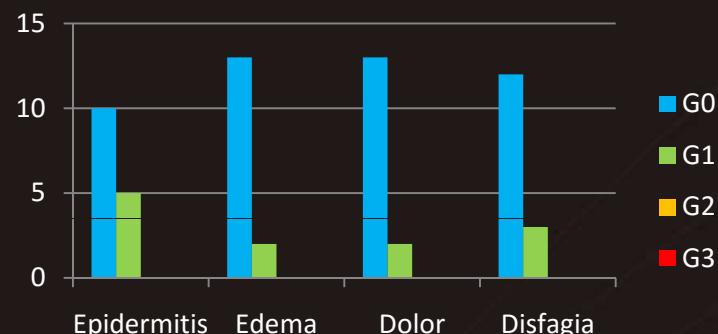
Toxicidad aguda ($\leq 3m$) & QT

QT+

Conservador, n=95



Mastectomía, n=15

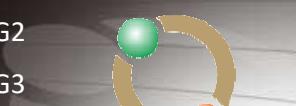
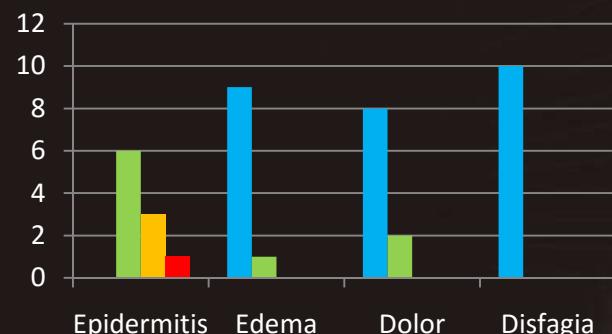


QT-

Conservador, n=71



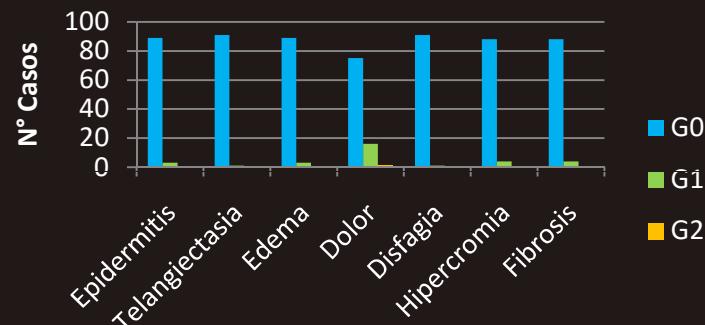
Mastectomía, n=10



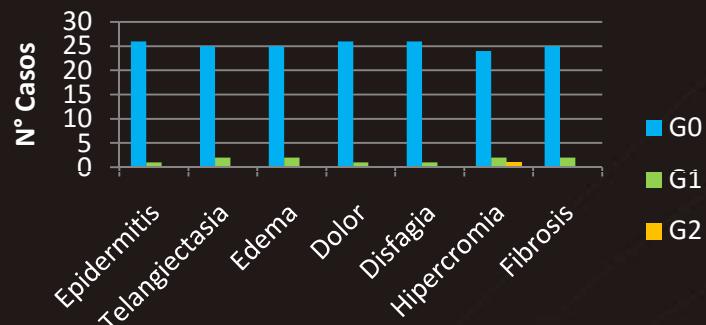
Toxicidad tardía (>3m) & QT

QT+

Conservador, n=92

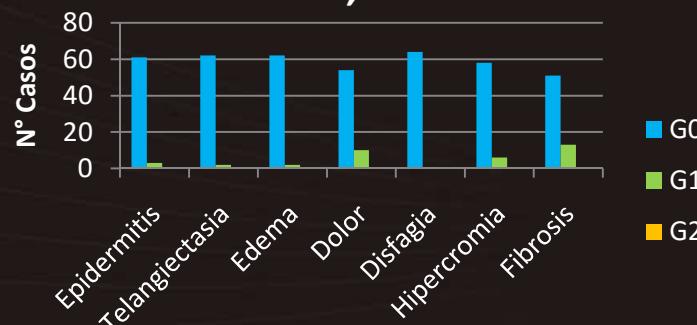


Mastectomía, n=27

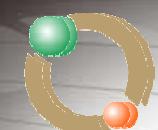
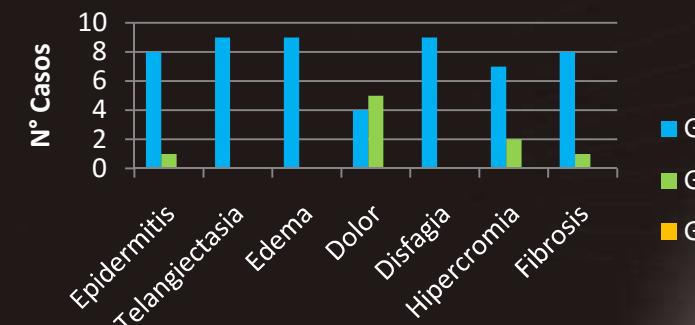


QT-

Conservador, n=64



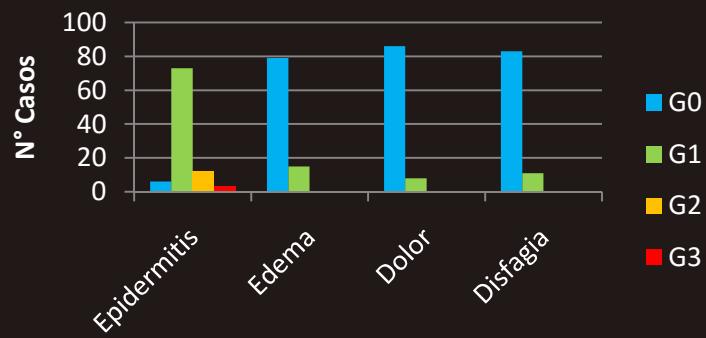
Mastectomía, n=9



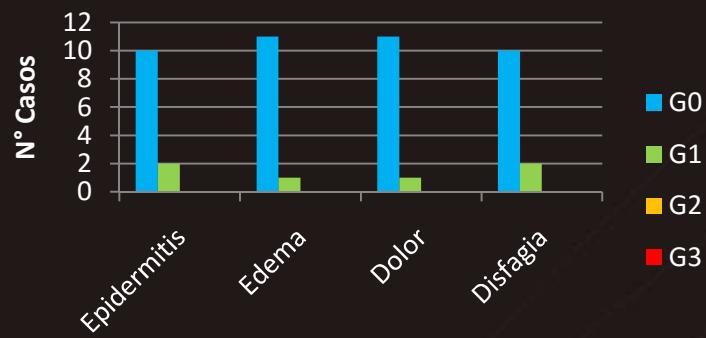
Toxicidad aguda ($\leq 3m$) & T

T1

Conservador, n=94

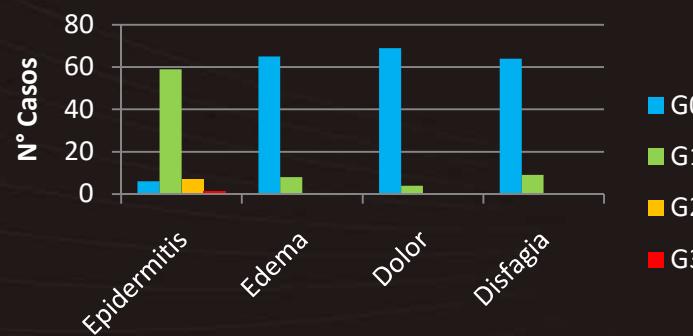


Mastectomía, n=12

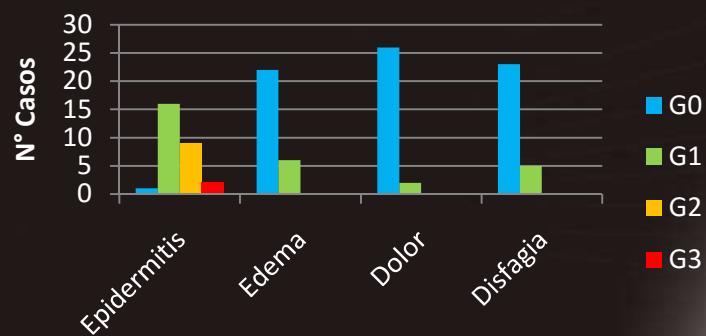


T2

Conservador, n=73



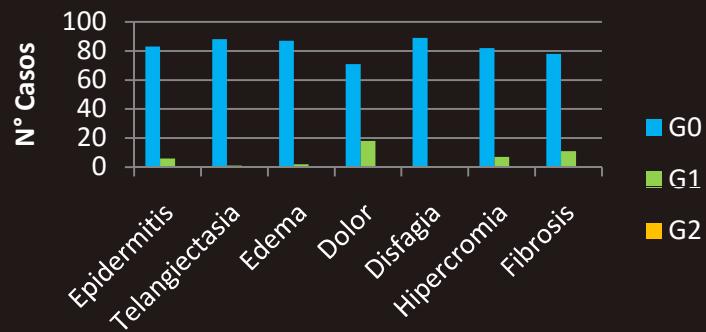
Mastectomía, n=28



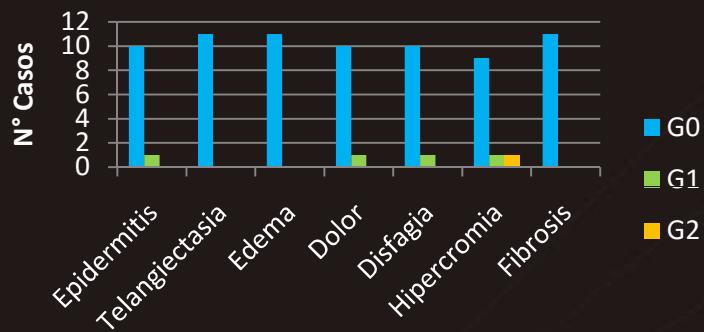
Toxicidad tardía (>3m) & T

T1 T1

Conservador, n=89

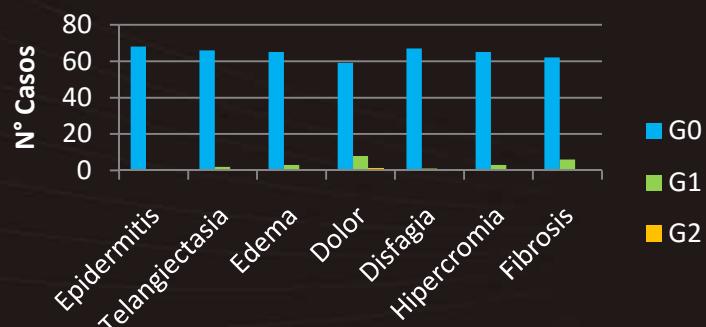


Mastectomía, n=11

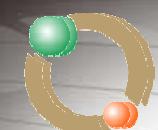
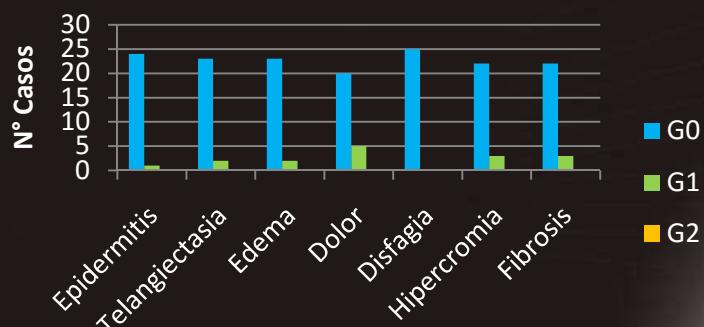


T2

Conservador, n=68



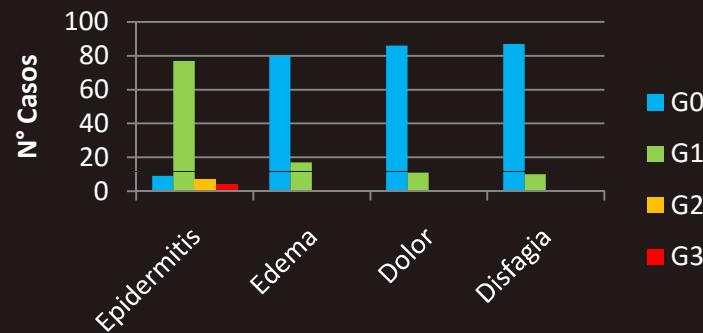
Mastectomía, n=25



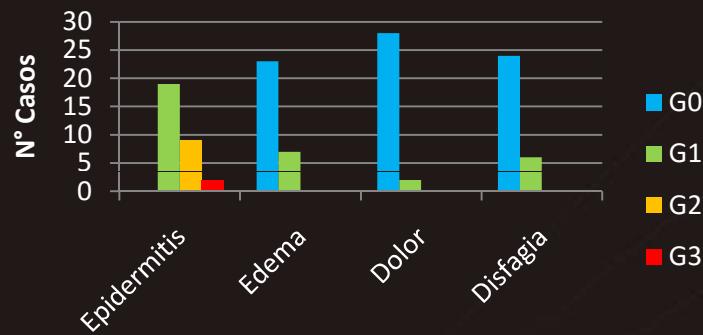
Toxicidad aguda ($\leq 3m$) & N

N1

Conservador, n=97

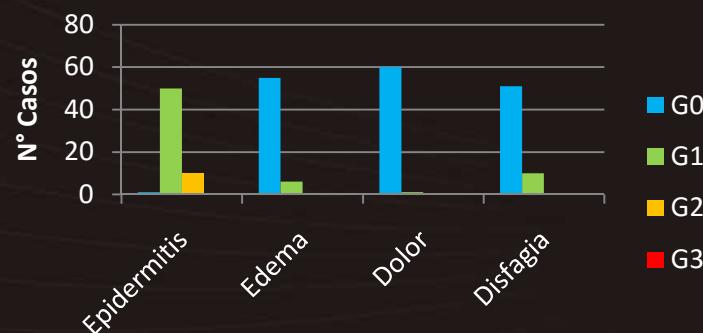


Mastectomía, n=30

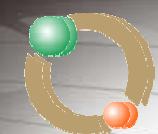
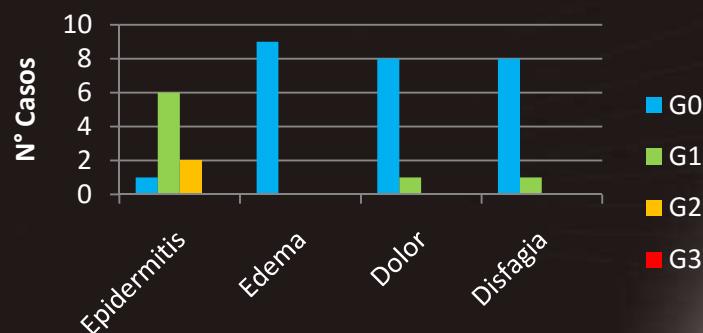


N0

Conservador, n=61

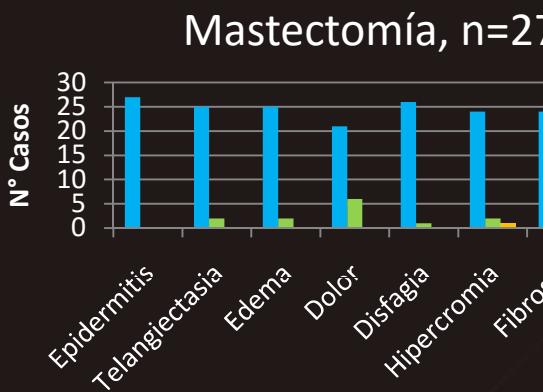
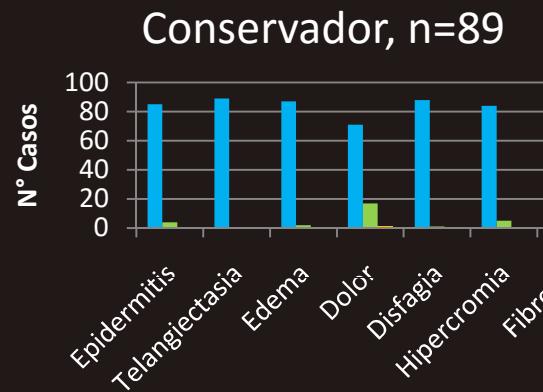


Mastectomía, n=9

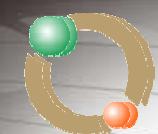
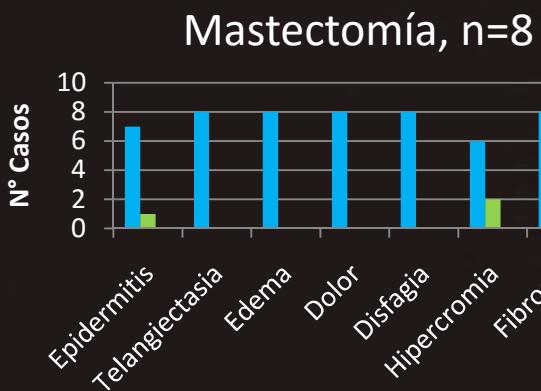
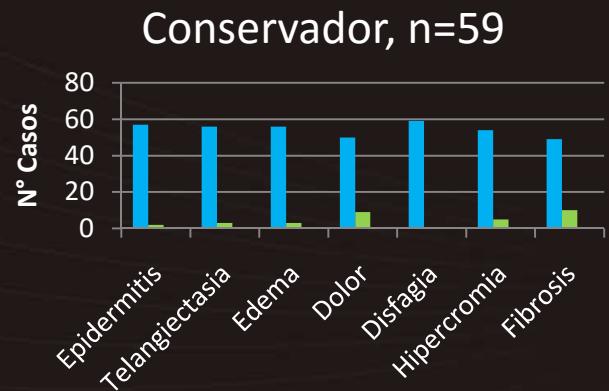


Toxicidad tardía (>3m) & N

N1



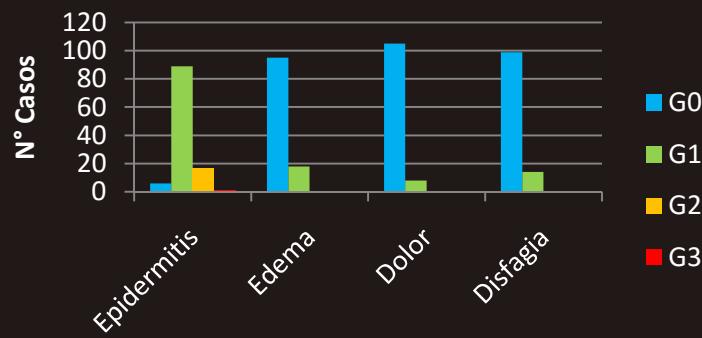
N0



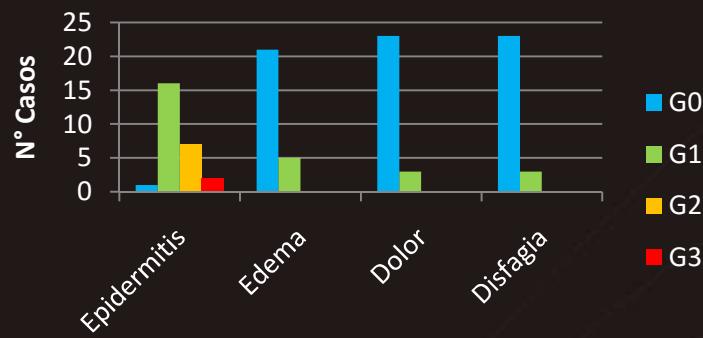
Toxicidad aguda ($\leq 3m$) & GN

GN 1 y 2

Conservador, n=113

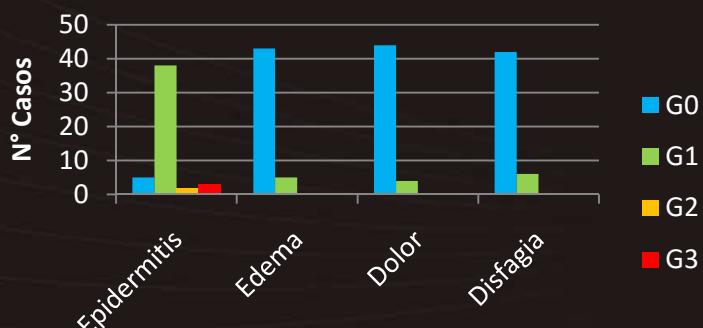


Mastectomía, n=26

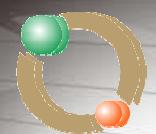
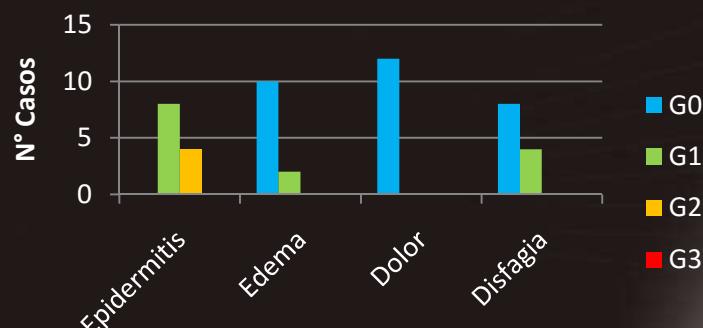


GN 3

Conservador, n=48



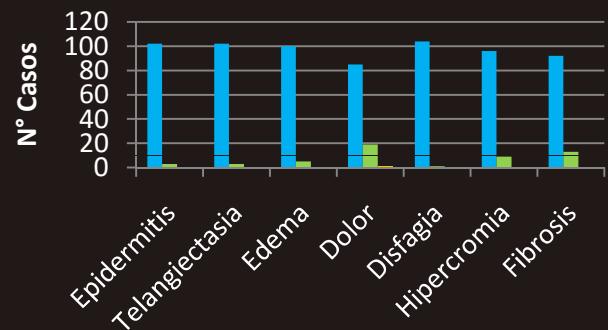
Mastectomía, n=12



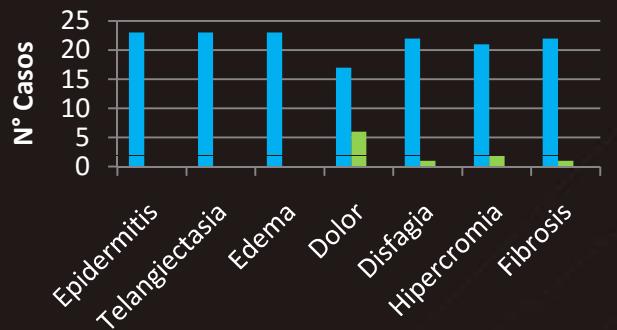
Toxicidad tardía (>3m) & GN

GN 1 y 2

Conservador, n=105

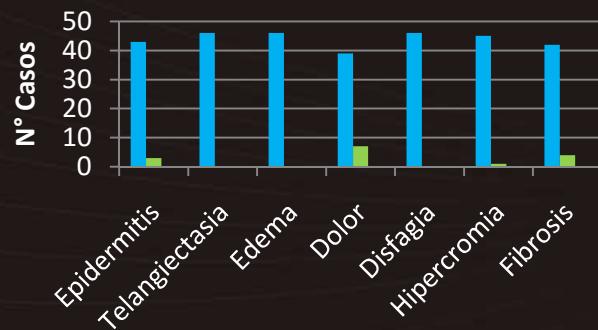


Mastectomía, n=23

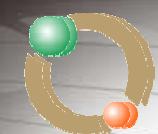
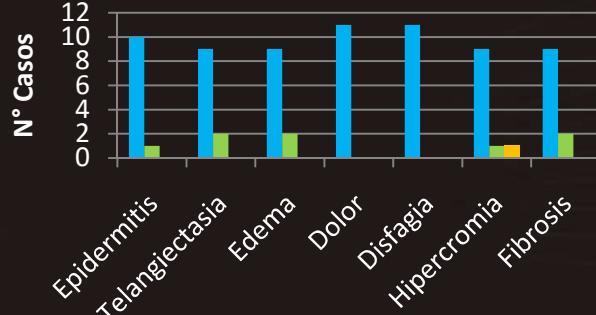


GN 3

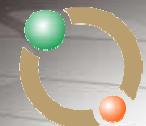
Conservador, n=46



Mastectomía, n=11



**SIN DIFERENCIA EN
TOXICIDAD AGUDA
ni TARDIA**



INSTITUTO DE RADIOTERAPIA
FUNDACIÓN MARIE CURIE

Hipofraccionamiento en Cáncer de Mama
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**2º Taller Internacional
Multidisciplinario de
Cáncer de Mama**

"De la práctica a las bases teóricas"

18, 19 y 20 de Junio de 2017

Córdoba - Argentina

GRACIAS

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