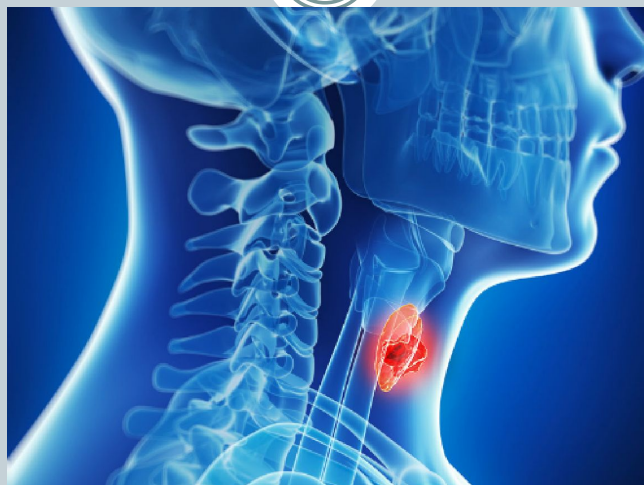


# Radioterapia en ORL, enfoque multidisciplinario.

4 ta. Jornada Académica de Integración en Radio-Oncología



**DR. FEDERICO LORENZO.  
ASIST. ONCOLOGÍA RT.**

10/11/18



● Declaro no tener  
conflicto de interés.

# En esta charla



- Historia.
- Carcinoma ORL diferencias con otras patologías
- Equipo Multidisciplinario
- Técnicas 3D conformadas HyN “avanzadas”
- IMRT

# Historia 1901



## THE ROENTGEN RAYS IN MEDICINE AND SURGERY

AS AN AID IN DIAGNOSIS AND AS  
A THERAPEUTIC AGENT

Designed for the Use of Practitioners and Students

BY

FRANCIS H. WILLIAMS, M.D. (HARV.)

GRADUATE OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY; VISITING PHYSICIAN  
AT THE BOSTON CITY HOSPITAL; FELLOW OF THE MASSACHUSETTS MEDICAL  
SOCIETY; MEMBER OF THE ASSOCIATION OF AMERICAN PHYSICIANS;  
MEMBER OF THE AMERICAN CLIMATOLOGICAL ASSOCIATION;  
FELLOW OF THE AMERICAN ASSOCIATION FOR THE  
ADVANCEMENT OF SCIENCE, ETC.

WITH THREE HUNDRED AND NINETY-ONE ILLUSTRATIONS

400 THE ROENTGEN RAYS IN MEDICINE AND SURGERY

**Mask.** — For the face I use a mask, made of gauze and pressed into the shape of a face, such as may be purchased at theatrical supply stores. This mask of course does not obstruct the rays. I cover it with tinfoil except over the diseased area, and cut one or several small holes in the portion of the mask lying over the part to be treated, in order to recognize the size of the area. It is better not to make this



FIG. 211 shows the method of treating areas of lupus, or cancer of the face, with the patient seated in front of the tube. The box containing the vacuum tube is seen on the left. On the front of the box is a diaphragm of sheet lead, and outside of it is a thin sheet of aluminum in which there is no opening, and which projects above the front of the box and is grounded; outside of these two sheets is a circular diaphragm of glass. The opening in the glass diaphragm shown in the cut is rather too large for this patient. The patient has on a mask which is covered in its lower portion with tinfoil, and in the center of the lower part is cut an opening somewhat larger than the area to be treated. An opening

# Década 30



# Década 50

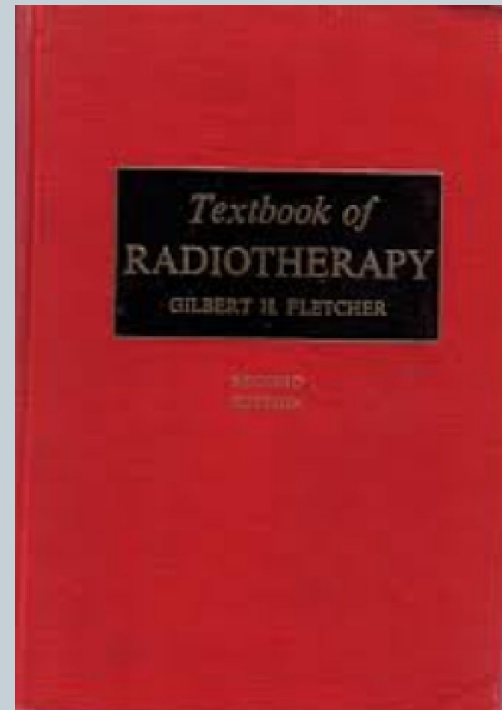


- 1 equipo de Telecobaltoterapia
- Canadá 1951



# Década del 70

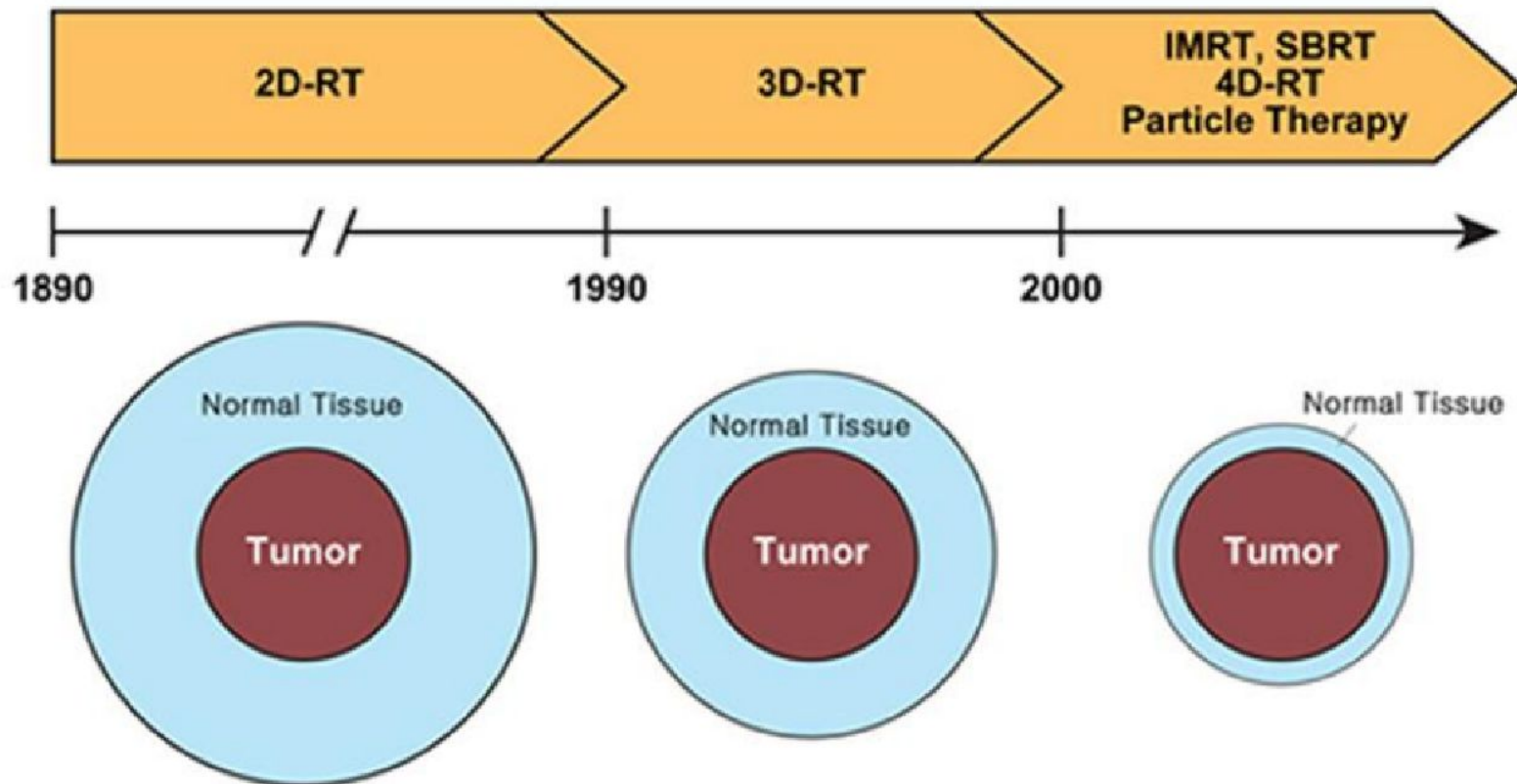
## Gilbert Fletcher MD.



# Evolución de la radioterapia



## EVOLUTION OF MODERN RADIOOTHERAPY



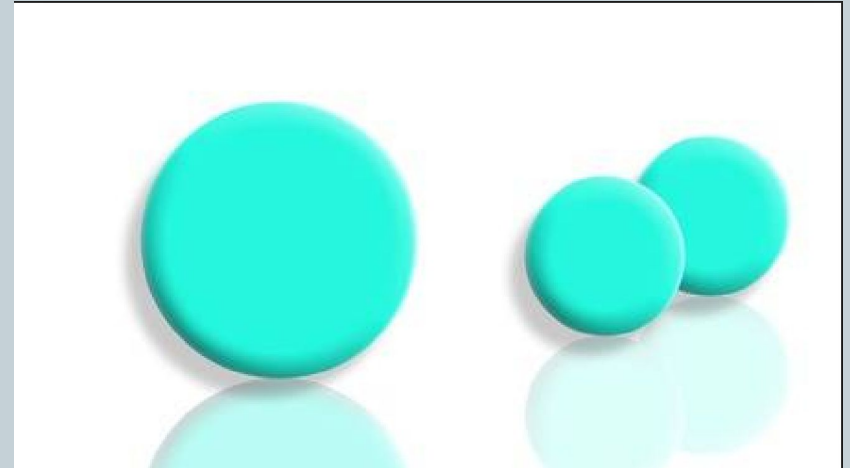


# TNM estadios (“1-7”)



- I → 95 %
- IB
- II
- III
- IVA
- IVB
- IVC

# TNM laringe



# Equipo multidisciplinario



# Equipo Multidisciplinario



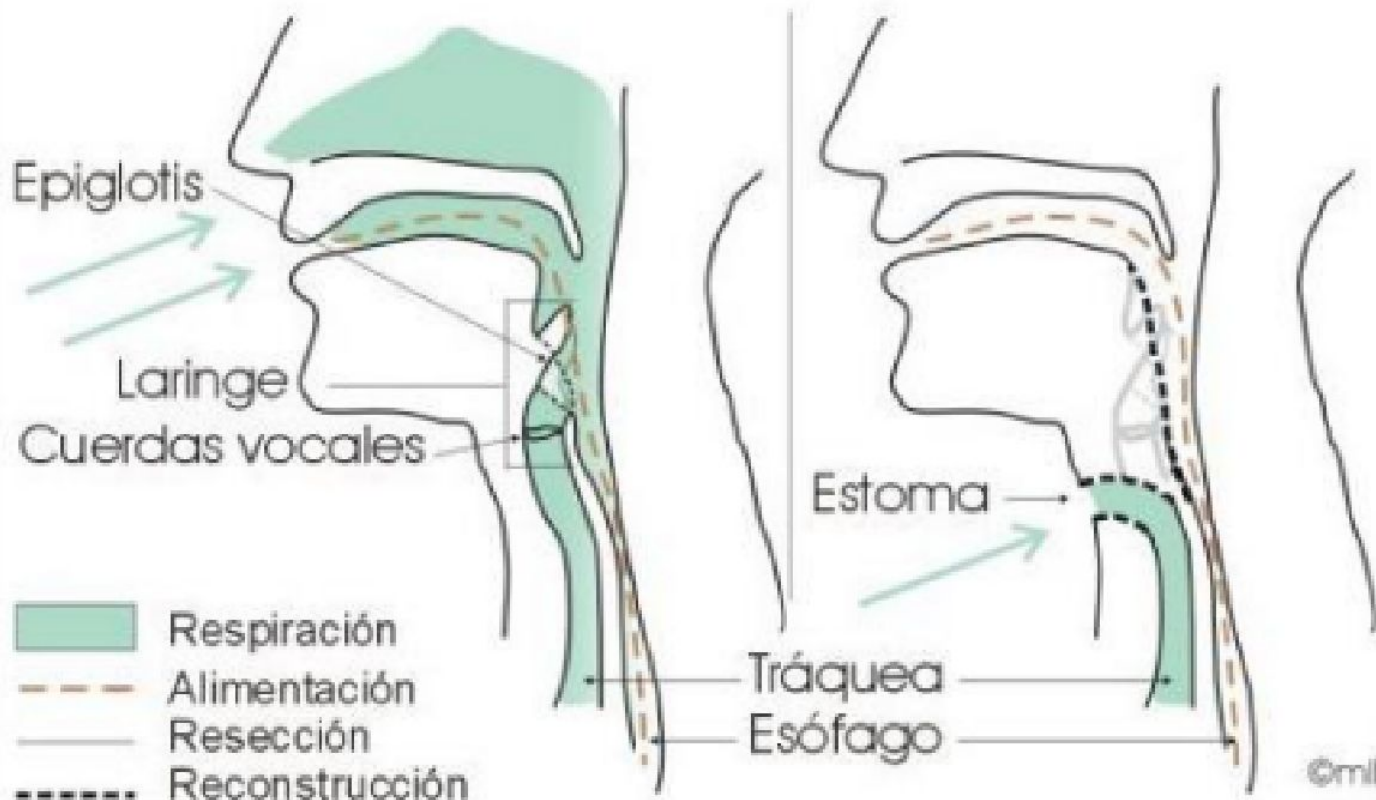
- Ante la posibilidad de diferentes terapéuticas, ofrece información al paciente
- El abordaje multidisciplinario va a tener valor si se plantea una estrategia terapéutica común.

# Laringectomía



## LARINGECTOMIA TOTAL

Antes y después de la intervención



# Vaciamiento funcional



- Consiste en resecaar el tejido celuloganglionar y las aponeurosis cervical superficial y media

# Vaciamiento Radical



- Consiste en reseca el tejido celuloganglionar; aponeurosis cervical superficial y media; músculos esternocleidomastoideo, omohioideo y vientre posterior del digástrico; venas yugulares anterior, externa e interna; nervio espinal y ramas superficiales del plexo cervical; glándula submaxilar y extremidad inferior de la glándula parótida

# Cuanto aporta el agregado de QT en control local al tto RT en ORL?



Contents lists available at [ScienceDirect](#)

## Radiotherapy and Oncology

journal homepage: [www.thegreenjournal.com](http://www.thegreenjournal.com)



### Meta analysis

## Meta-analysis of chemotherapy in head and neck cancer (MACH-NC): An update on 93 randomised trials and 17,346 patients

Jean-Pierre Pignon<sup>a,\*</sup>, Aurélie le Maître<sup>a</sup>, Emilie Maillard<sup>a</sup>, Jean Bourhis<sup>b</sup>, on behalf of the MACH-NC Collaborative Group<sup>1</sup>

<sup>a</sup> Department of Biostatistics and Epidemiology, Institut Gustave-Roussy, Villejuif, France

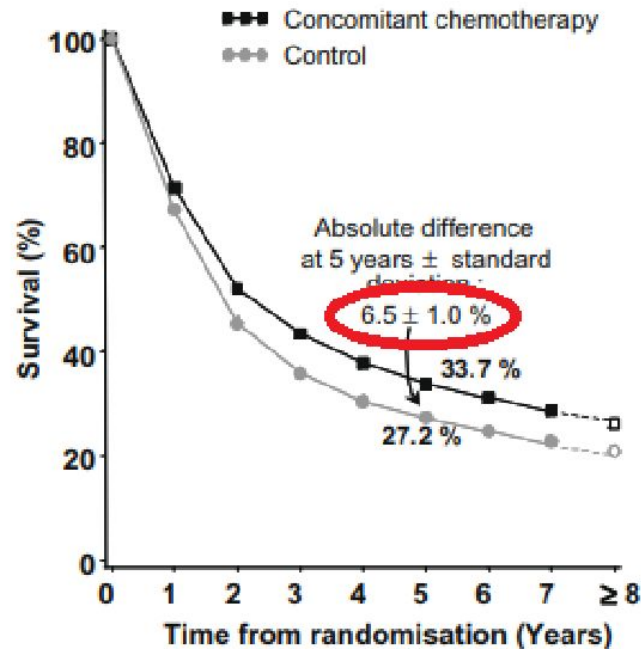
<sup>b</sup> Department of Radiotherapy, Institut Gustave-Roussy, Villejuif, France



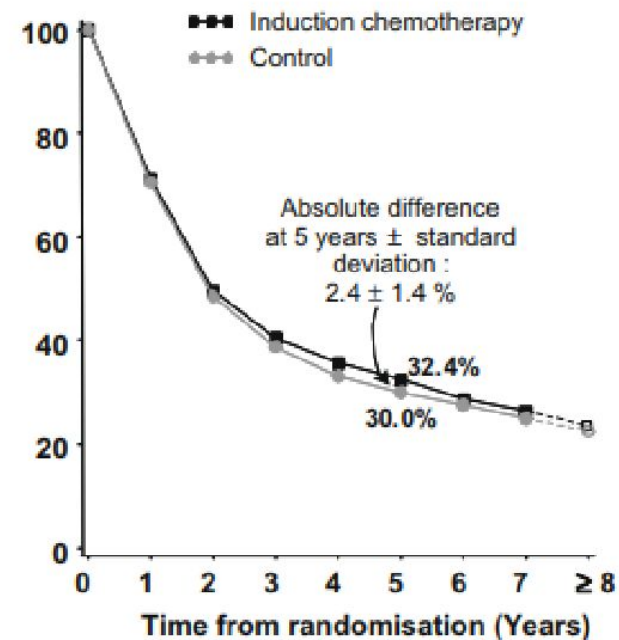
# Equipo multidisciplinario OM



(a) Concomitant chemotherapy.



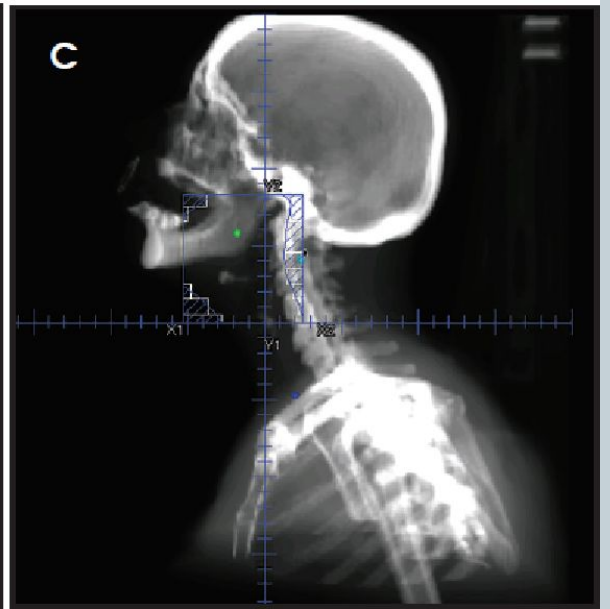
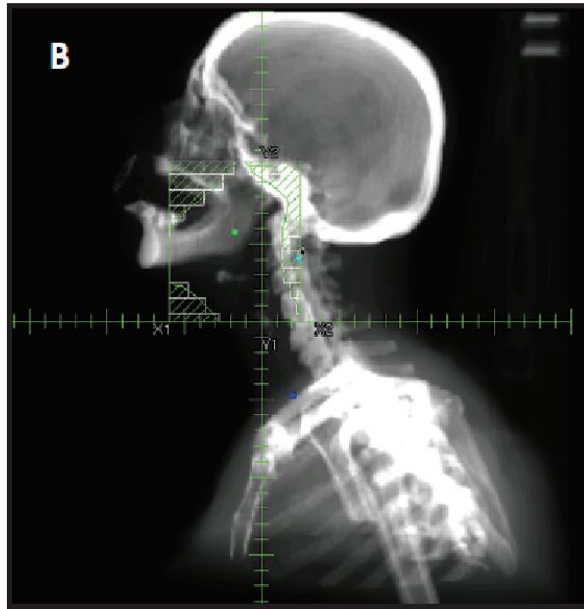
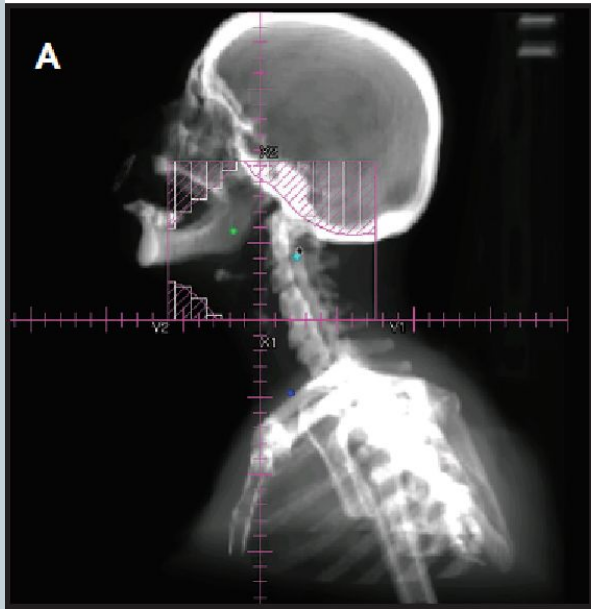
(b) Induction chemotherapy

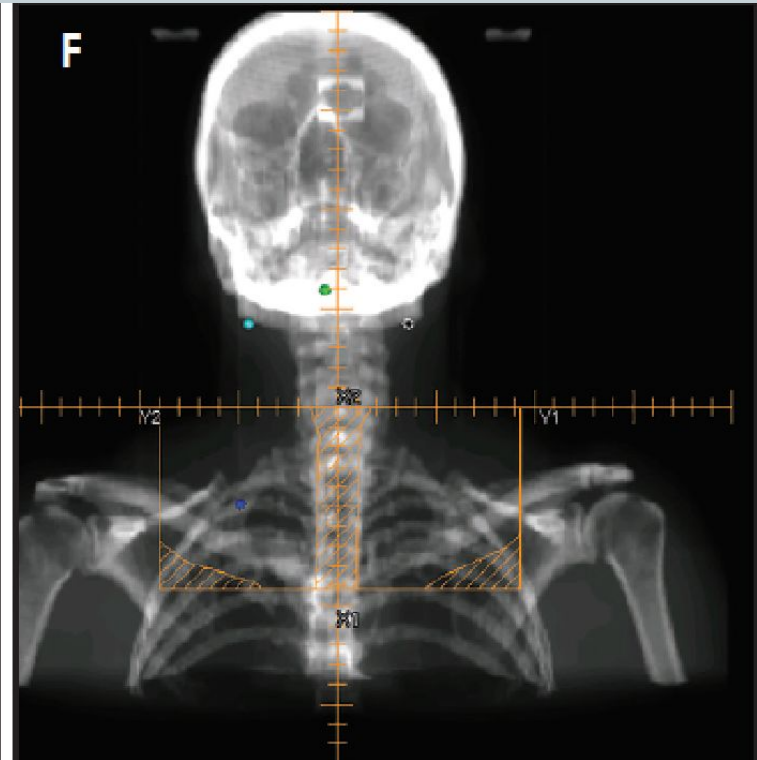
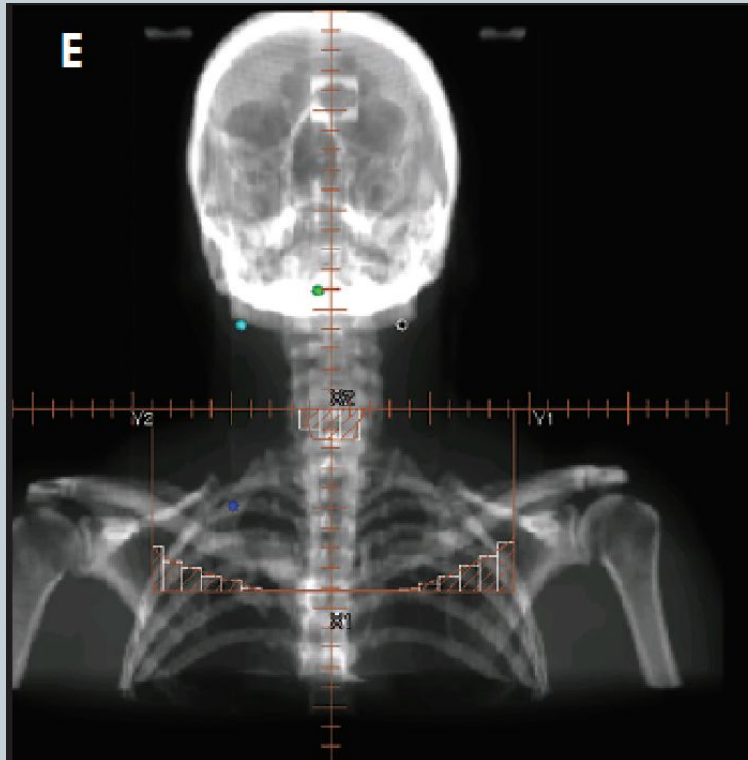


# Radioterapia 2D

## Década 80







# Década 90 Bellinzona



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Int. J. Radiation Oncology Biol. Phys., Vol. 45, No. 5, pp. 1331–1338, 1999  
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0360-3016/99/\$—see front matter

PII S0360-3016(99)00319-3

## **PHYSICS CONTRIBUTION**

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### **CRITICAL APPRAISAL OF A CONFORMAL HEAD AND NECK CANCER IRRADIATION AVOIDING ELECTRON BEAMS AND FIELD MATCHING**

ANTONELLA FOGLIATA, DIPL. PHYS., LUCA COZZI, PH.D., SABINE BIERI, M.D., AND  
JACQUES BERNIER, M.D., PH.D.

Ospedale S. Giovanni, Radio-Oncology Department, **Bellinzona**, Switzerland

# Antonella Fogliata



# Por que Bellinzona?



# OAR Bellinzona



- Medula espinal (75 % dosis, equivalente 40.5 Gy)
- Vértice pulmón
- Bulbo
- Glándulas parótidas



# Bellinzona



Table 1. Patient selection and target volumes

Patient ID	Anatomical site*	TNM staging-histological grade	PTV upper edge	PTV lower edge	PTV (cm <sup>3</sup> )
1	Larynx	pT4 pN2b M0 GII	Parapharyngeal space	Supraclavicular Th2/Th3 <sup>†</sup>	690
2	Mobile tongue	T2 N1 M0 GII	Hard palate	Supraclavicular Th3/Th4	780
3	Vallecula	pT4 pN0 M0 GIII	Parapharyngeal space	Supraclavicular Th3/Th4	850
4	Mobile tongue	T4 N0 M0 GII	Parapharyngeal space	Supraclavicular Th4/Th5	1080
5	Hypopharynx	T4 N1 M0 GIII	Parapharyngeal space	Supraclavicular Th4/Th5	980

\* All tumours were squamous cell carcinomas.

<sup>†</sup> Level of thoracic vertebra.

# Bellinzona

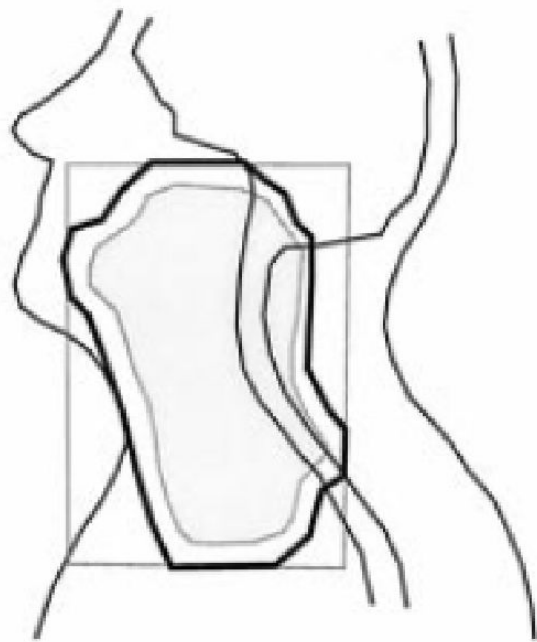


- Se comparo la nueva técnica de 5 campos con la técnica clásica de 2 campos laterales, con refuerzo de electrones en las cadenas espinales.
- PTV 5 mm
- La dosis 54 Gy ( se considero esta dosis por ser la de la esterilización microscópica)
- Se admitía una inhomogenidad de la dosis del 10%

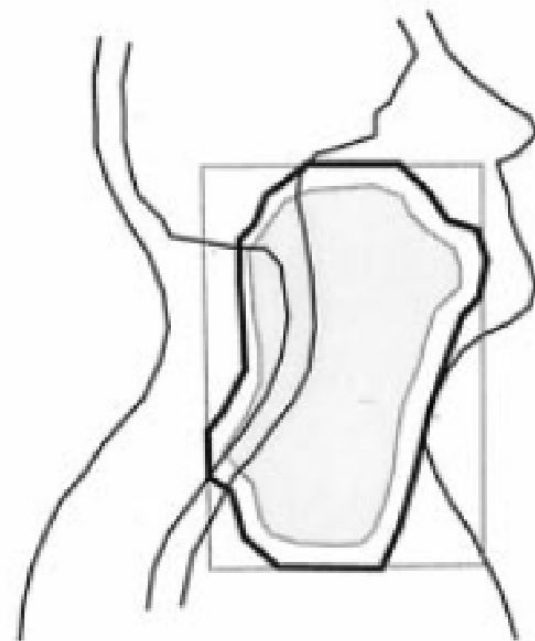
# Grados campos



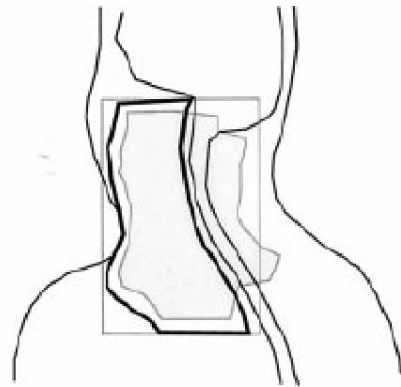
- 90 y 270
- 140-150 y 210-220
- 180



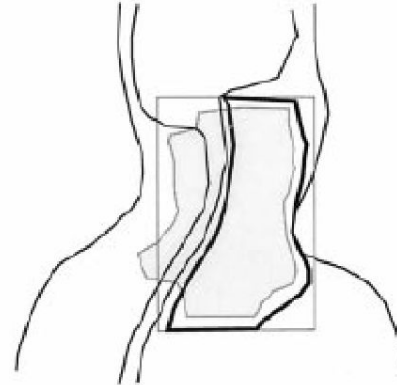
**Lateral left**



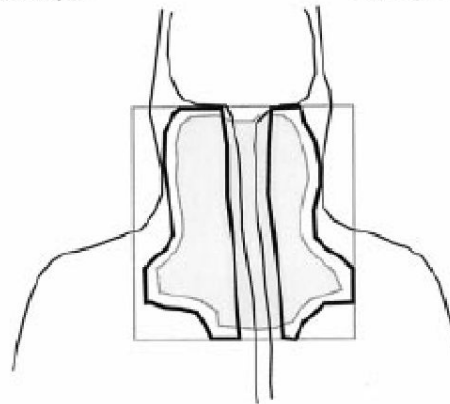
**Lateral right**



Left posterior oblique

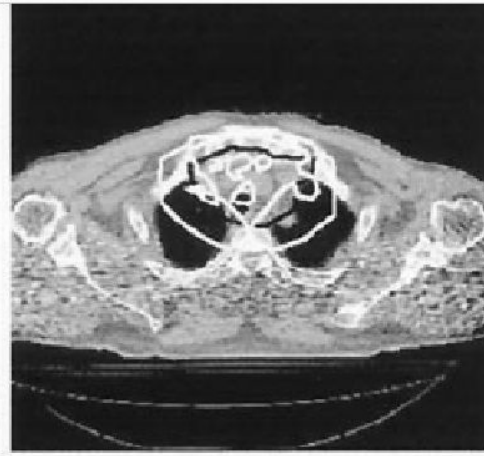
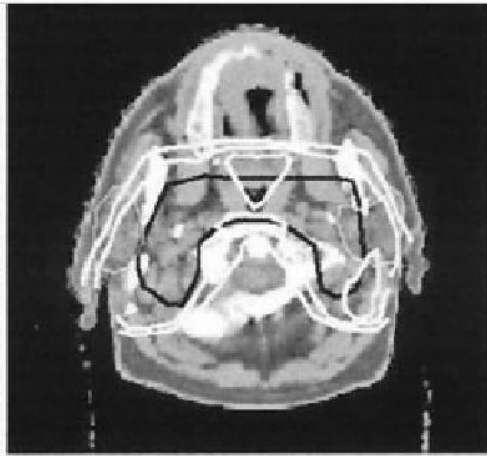
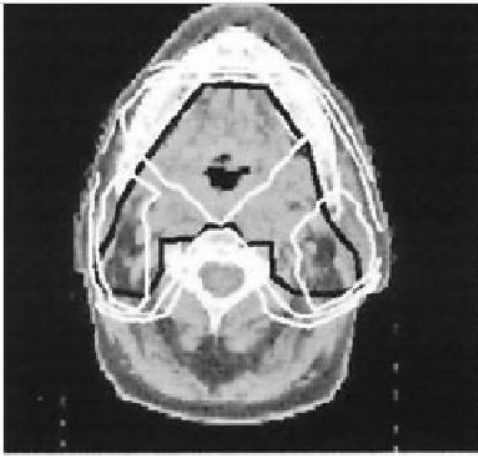


Right posterior oblique

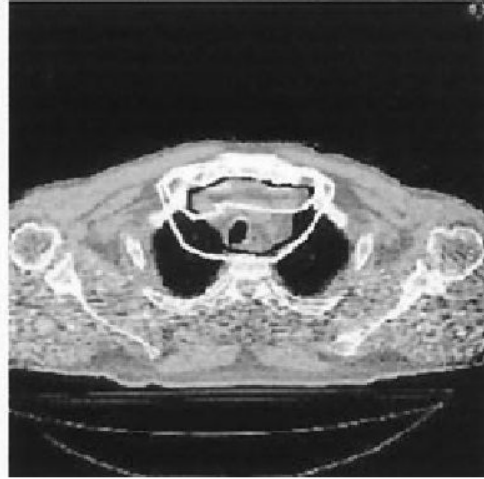
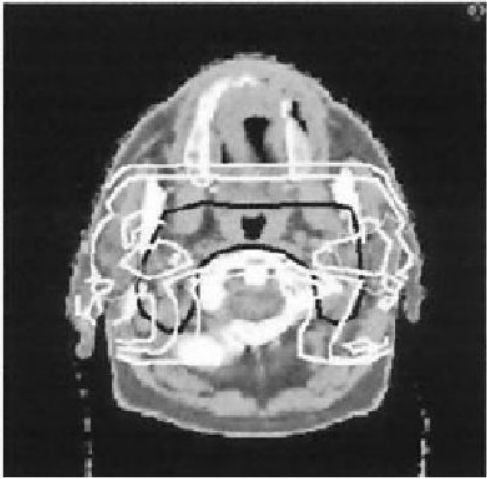
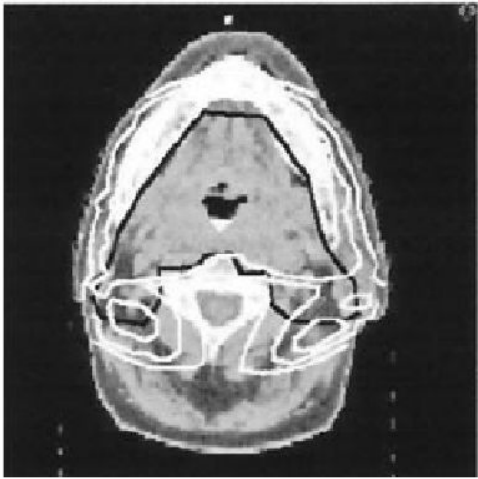




FIVE-POSITION FIELD  
TECHNIQUE



'CONVENTIONAL'  
TECHNIQUE



# Análisis estadístico



	PTV					Spinal Cord	Parotid Gland	Lung Apexes	Oral Cavity
	Max dose (%)	Min dose (%)	Median dose (%)	Mean dose (%)	Std Dev.	Max dose (%)	Median dose (%)	Median dose (%)	Median dose (%)
<b>Patient 1</b>									
Conventional	109.5	73.0	100.0	99.4	4.9	77.5	99.5	22.2	93.4
Five-field	112.8	85.1	100.3	100.1	4.6	76.2	97.7	14.8	98.1
<b>Patient 2</b>									
Conventional	112.0	77.2	101.3	101.3	4.5	78.9	92.9	12.1	98.7
Five-field	114.4	85.3	101.5	101.8	4.2	76.4	84.9	7.7	102.3
<b>Patient 3</b>									
Conventional	114.6	73.6	100.6	100.4	5.4	75.0	97.0	31.7	88.1
Five-field	113.5	84.7	102.4	102.0	4.7	75.3	101.5	26.6	76.8
<b>Patient 4</b>									
Conventional	112.2	75.6	98.7	98.9	5.6	76.4	94.7	36.0	96.1
Five-field	109.6	82.7	100.1	99.7	4.2	75.3	99.6	42.9	101.4
<b>Patient 5</b>									
Conventional	111.2	67.0	100.9	99.6	5.3	76.0	101.1	32.4	93.6
Five-field	113.9	83.4	99.8	99.7	5.2	72.1	99.6	25.3	94.4
<b>Mean values:</b>									
Conventional	111.9 ± 1.8	73.3 ± 3.9	100.3 ± 1.0	99.9 ± 0.8	5.1 ± 0.4	76.8 ± 1.5	97.0 ± 3.4	26.9 ± 9.7	94.1 ± 3.9
Five-field	112.8 ± 1.9	84.2 ± 1.1	100.8 ± 1.1	100.7 ± 1.0	4.6 ± 0.4	75.1 ± 1.7	96.7 ± 6.7	22.8 ± 14.0	94.6 ± 10.4

# Conclusiones



- Es una técnica factible de realizar con un solo isocentro y evitando la incertidumbre de la uniones de campo (fotones-fotones, fotones-electrones).



# ConPas: a 3-D Conformal Parotid Gland-Sparing



Strahlentherapie  
und Onkologie

Original Article

## ConPas: a 3-D Conformal Parotid Gland-Sparing Irradiation Technique for Bilateral Neck Treatment as an Alternative to IMRT

Ruud Wiggendaad<sup>1</sup>, Mirjam Mast<sup>1</sup>, Jan van Santvoort<sup>2</sup>, Marc Hoogendoorn<sup>3</sup>, Henk Struikmans<sup>1</sup>

**Background and Purpose:** Intensity-modulated radiotherapy (IMRT) is used in most reported techniques for bilateral neck irradiation that aim at parotid gland sparing. A relatively simple *conformal parotid-sparing* technique (ConPas) was developed that uses no beam-intensity modulation. The purpose of this paper is to demonstrate, in patients with larynx or hypopharynx carcinoma, that ConPas enables adequate coverage of the primary tumor and the bilateral neck nodes, while keeping the mean parotid dose (MPD) < 26 Gy.



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## dr. R.G.J. Wiggeraad

Radiotherapeut





- Trabajo se publico en el 2005
- Objetivo: Describir una nueva técnica como alternativa a IMRT para entregar 46 Gy al CTV g 70 Gy GTV, con una Dosis media a parótida menor a 26 Gy.

# Selección paciente



Patient	Tumor location	Stage
1	Larynx	T2 N0 M0
2	Hypopharynx	T4 N0 M0
3	Larynx	T1 N0 M0
4	Larynx	T2 N0 M0
5	Larynx	T4 N0 M0
6	Hypopharynx	T3 N1 M0
7	Larynx	T2 N0 M0
8	Larynx	T3 N0 M0
9	Larynx	T3 N1 M0
10	Larynx	T4 N0 M0



- No había ninguno N<sub>2</sub>-N<sub>3</sub>

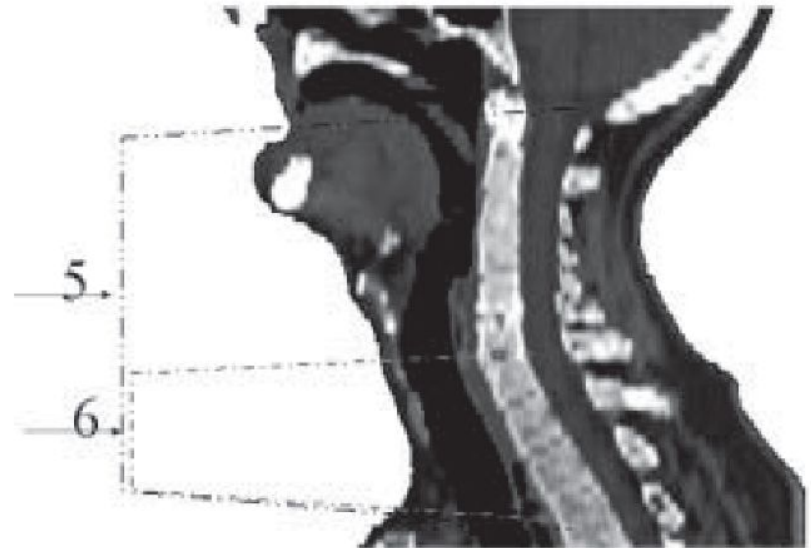
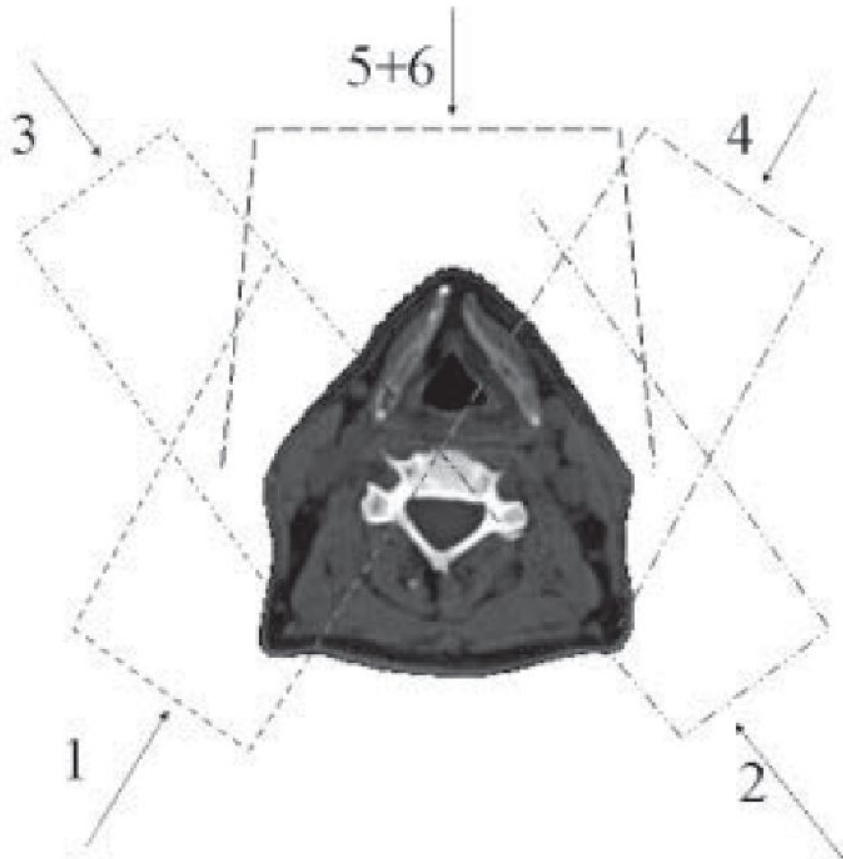


# Determinación del CTV



- II-III-IV
- II-III-IV-V (N<sub>1</sub>)
- No se irradiaron los G retrofaringeos

# Campos



# Campos



- Utilizaron entre 6-7 campos mas un campo SCV

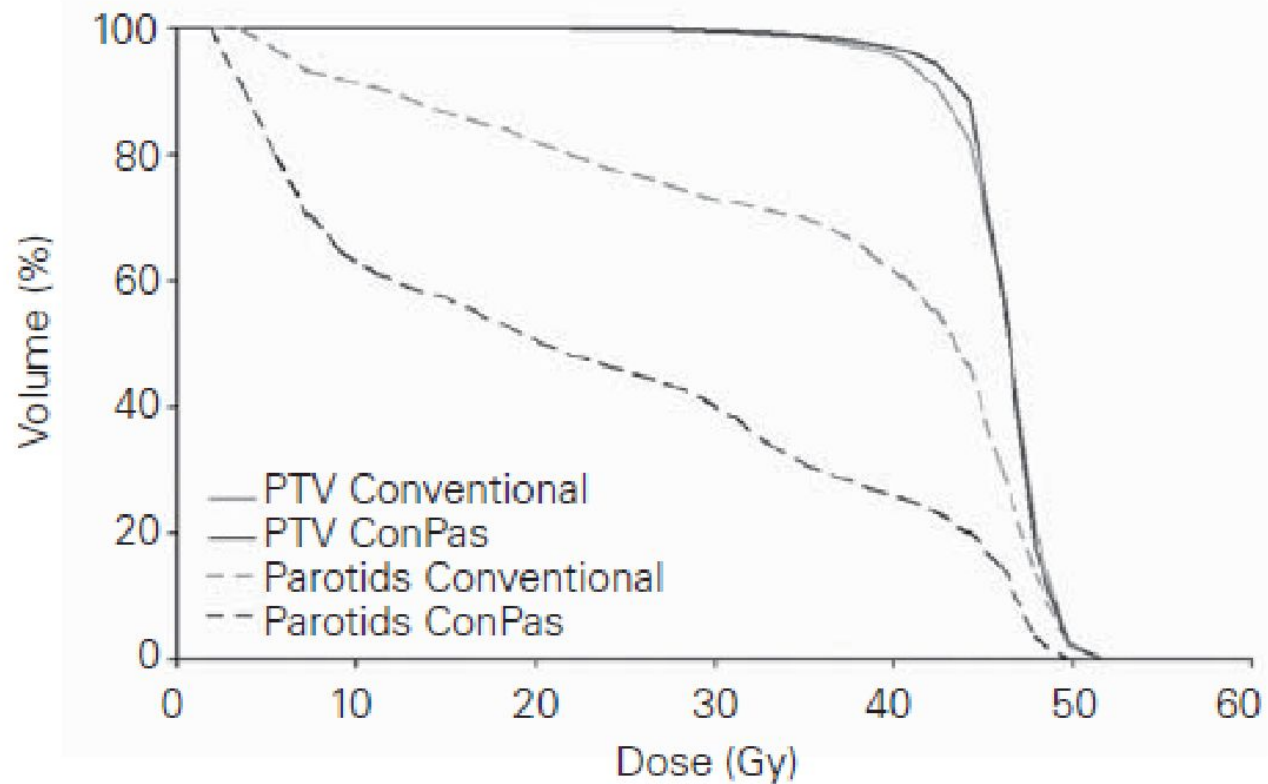
Beam	Angle (°)	Weight	Parotid <sup>a</sup>	Spinal cord <sup>c</sup>
Right oblique anterior	320	50	Inside	Inside
Left oblique anterior	40	50	Inside	Inside
Right oblique posterior	220	100	Blocked <sup>b</sup>	Outside
Left oblique posterior	140	100	Blocked <sup>b</sup>	Outside
Anteroposterior	0	40	Blocked <sup>b</sup>	Inside
Supraclavicular segment	0	40	Outside	Inside
Left lateral	90	40	Inside	Inside
Right lateral	270	40	Inside	Inside





Patient		Elective dose: 46 Gy					Boost: 24 Gy		Total: 70 Gy		
		V <sub>95</sub>	V <sub>107</sub>	MPD right	MPD left	M OCD	M SC D	MPD right	MPD left	MPD right	MPD left
1	Conventional	83.9	0.5	30.9	31.5	10	47.8	1	1	31.9	32.5
	ConPas	88.0	1.3	22.1	22.8	34.9	41.8	1	1	23.1	23.8
2	Conventional	81.2	1.7	37.2	41.2	7.3	46.9	1.3	1.6	38.5	42.8
	ConPas	83.9	1.3	20.4	24.3	26.7	39.1	1.3	1.6	21.7	25.9
3	Conventional	87.8	7.2	35.1	33	4.2	49.2	4.6	3.5	39.7	36.5
	ConPas	97.6	7.6	24.5	23.2	31.4	39.6	4.6	3.5	29.1	26.7
4	Conventional	92.0	0	45.6	42.9	15.7	45.1	1.9	1.6	47.5	44.5
	ConPas	92.2	4.7	25.5	23.9	38.5	41.4	1.9	1.6	27.4	25.5
5	Conventional	98.0	14.1	35.9	35.7	23.8	46.5	0.9	1.1	36.8	36.8
	ConPas	98.6	6.1	24.0	23.8	25.9	40.9	0.9	1.1	24.9	24.9
6	Conventional	72.2	1.5	43.4	39.5	14.7	48.3	5.4	1.4	48.8	40.9
	ConPas	90.0	1.9	29.6	26.4	42.9	43.2	5.4	1.4	35	27.8
7	Conventional	91.1	7.2	26.1	39.7	6.2	49.2	0.8	1.1	26.9	40.8
	ConPas	96.5	7.2	16.4	24.8	32.8	39.6	0.8	1.1	17.2	25.9
8	Conventional	89.4	2.1	29.0	30.6	4.8	48.8	4.4	4.1	33.4	34.7
	ConPas	93.4	2.2	15.0	14.8	28.6	39.6	4.4	4.1	19.4	18.9
9	Conventional	77.7	3.5	41	40.9	7.7	48.3	0.7	0.8	41.7	41.7
	ConPas	88.5	0.7	28.6	26.4	40.9	40	0.7	0.8	29.3	27.2
10	Conventional	79.1	3.0	37	37.2	6.9	48.3	1.2	1.3	38.2	38.5
	ConPas	83.3	4.1	26.1	26.4	28.3	39.6	1.2	1.3	27.3	27.7

# DVH



# Conclusión ConPAS



- Esta técnica conformada 3-D (ConPas) permite lograr una dosis adecuada al CTV y GTV comparable con otros planes y mantener el OAR parótida dentro de los límites de tolerancia, siendo relativamente fácil de implementar en los departamentos que aún no han comenzado un programa IMRT.

# FPMS



- Otras técnicas 3D que remedan tratamientos de IMRT.
- FPMS
- Arcos



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Int. J. Radiation Oncology Biol. Phys., Vol. 59, No. 2, pp. 584–594, 2004

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doi:10.1016/j.ijrobp.2004.02.005

## **PHYSICS CONTRIBUTION**

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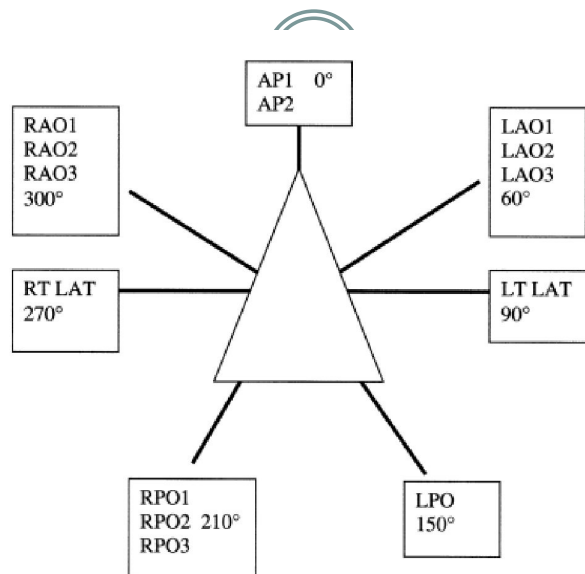
### **A FORWARD-PLANNED TREATMENT TECHNIQUE USING MULTISEGMENTS IN THE TREATMENT OF HEAD-AND-NECK CANCER**

NANCY LEE, M.D., CLAYTON AKAZAWA, C.M.D., PAM AKAZAWA, C.M.D., JEANNE M. QUIVEY, M.D.,  
CHRIS TANG, LYNN J. VERHEY, PH.D., AND PING XIA, PH.D.

Department of Radiation Oncology, University of California-San Francisco Medical Center, San Francisco, CA

**Purpose:** To describe in detail a forward-planned multisegment technique (FPMS) as an alternative treatment method for patients who are not suitable for inverse-planned intensity-modulated radiation therapy (IP-IMRT), or for situations where IP-IMRT is not available in a medical clinic.

**Methods and Materials:** Between April 1995 and February 2002, 38 primary head-and-neck patients were treated using the FPMS technique, which has evolved over the past 7 years at our medical center. In the most recent version of the FPMS technique, which includes 5 patients examined in this analysis, the primary tumor and the upper neck nodes were treated with 7 gantry angles, including an anterior, 2 lateral, 2 anterior oblique, and 2 posterior oblique beams with a total of 13 beam shapes formed by multileaf collimators (MLC), called MLC segments. The shape of each MLC segment was carefully designed, and the associated weights were optimized through manual iterations. The lower neck nodes and the supraclavicular nodes were treated with a



Field	1	2	3	4	5	6	7	8	9	10	11*	12*	13*
Name	RPO1	Rt LAT	RAO1	RAO2	AP1	AP2	LAO1	LAO2	Lt LAT	LPO	RPO2	RPO3	LAO3
Gantry angle	210°	270°	300°	300°	0°	0°	60°	60°	90°	150°	210°	210°	60°
Wedge	60°	45°	45°	–	–	45°	45°	–	–	60°	–	–	–
Weight	6%	5%	7%	11%	7%	20%	7%	11%	5%	6%	5%	5%	5%
Cord block	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Brainstem block	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Beam energy	18 Mv	18 Mv	6 Mv	18 Mv	18 Mv	6 Mv	6 Mv	18 Mv	18 Mv	18 Mv	18 Mv	6 Mv	18 Mv

# Que es IMRT?



- El termino IMRT se refiere a una técnica RT, en la cual la fluencia no es uniforme y es dada por mutiles posiciones de campos para optimizar la distribución de la dosis.



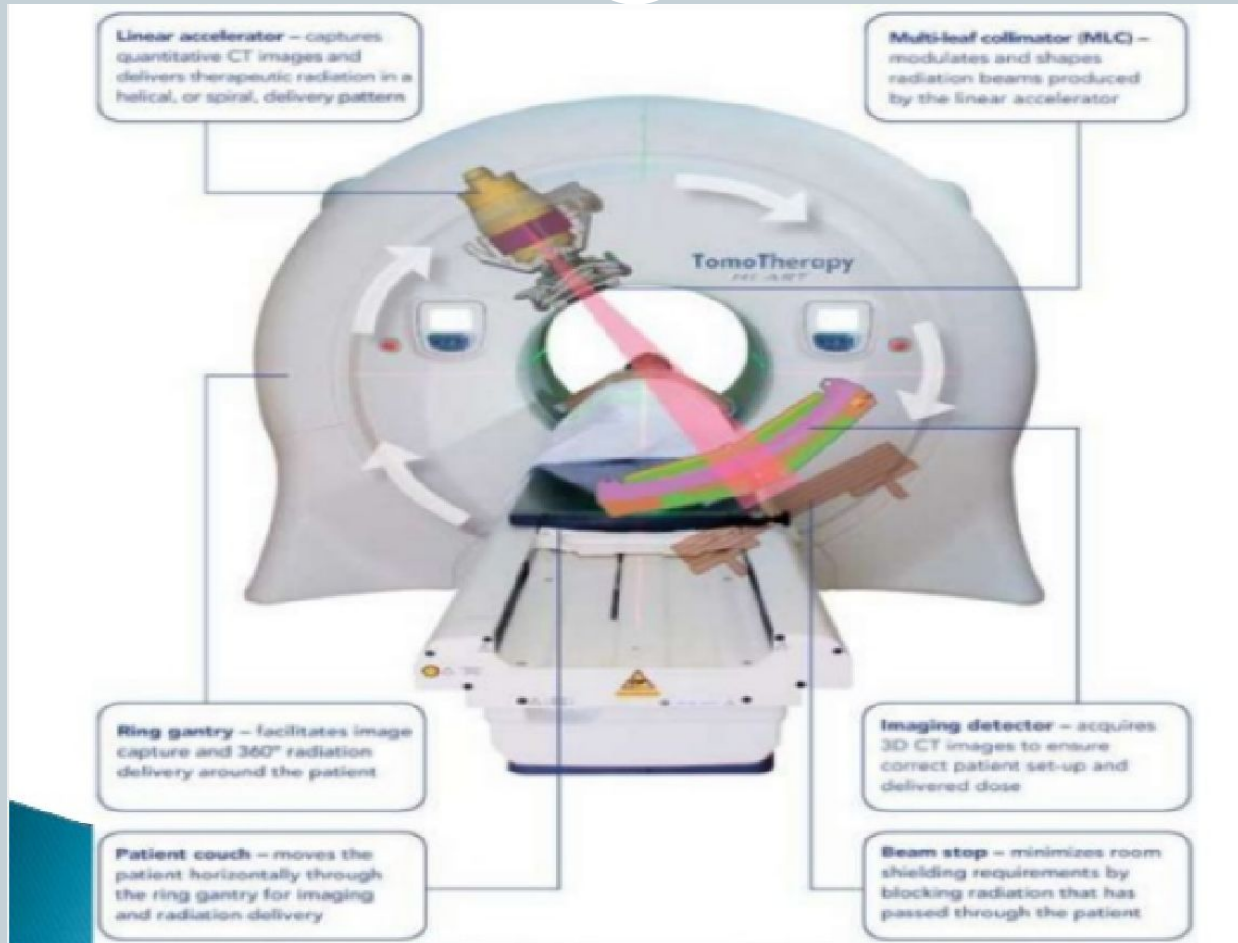
# IMRT con ángulo gantry fijo



- Segmental MLC ( step and shoot)
- Dinámico MLC



# Tomotherapy



# IMRT con rotación gantry

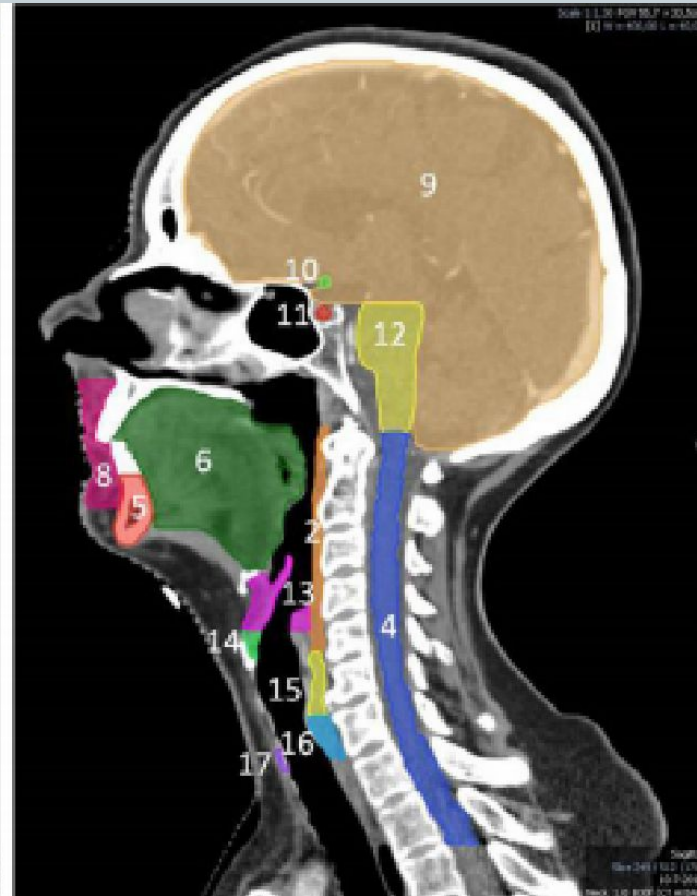
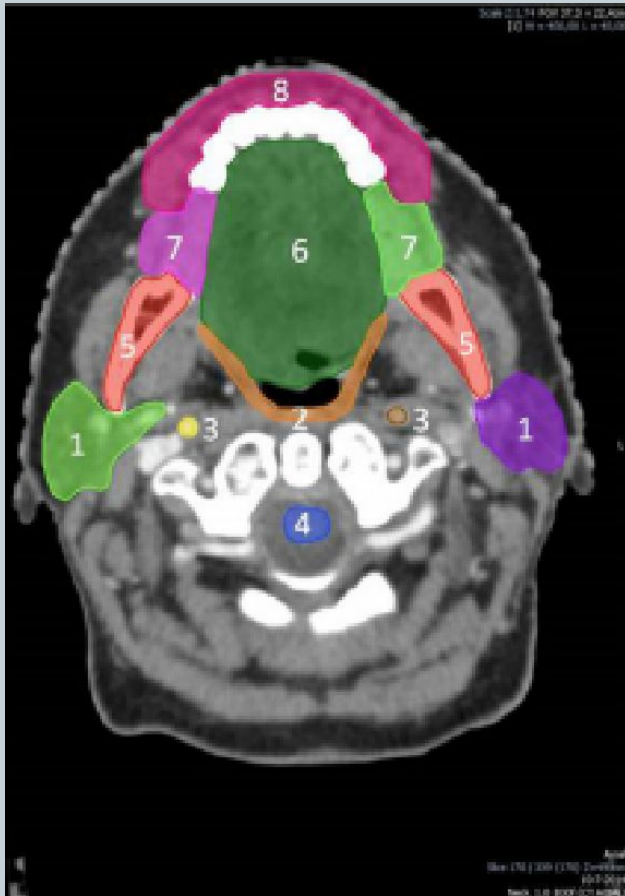


## ● VMAT (Volumetric modulated Arc Therapy)

- MLC
- Gantry
- Tasa de dosis



# Más trabajo de contorneo



# Cual es la ganancia en OS, DFS 3D conf vs IMRT?

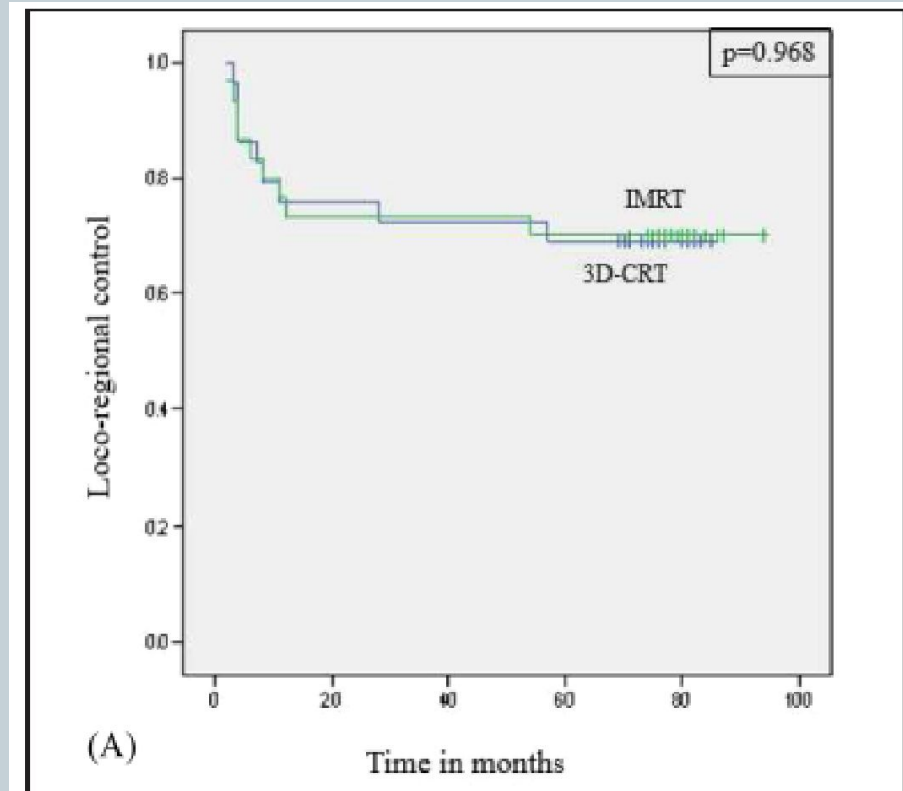


- -1 %
- 0 %
- 12 -20%
- 40 %
- 99%

# Cual es la ganancia en OS, DFS 3D conf vs IMRT



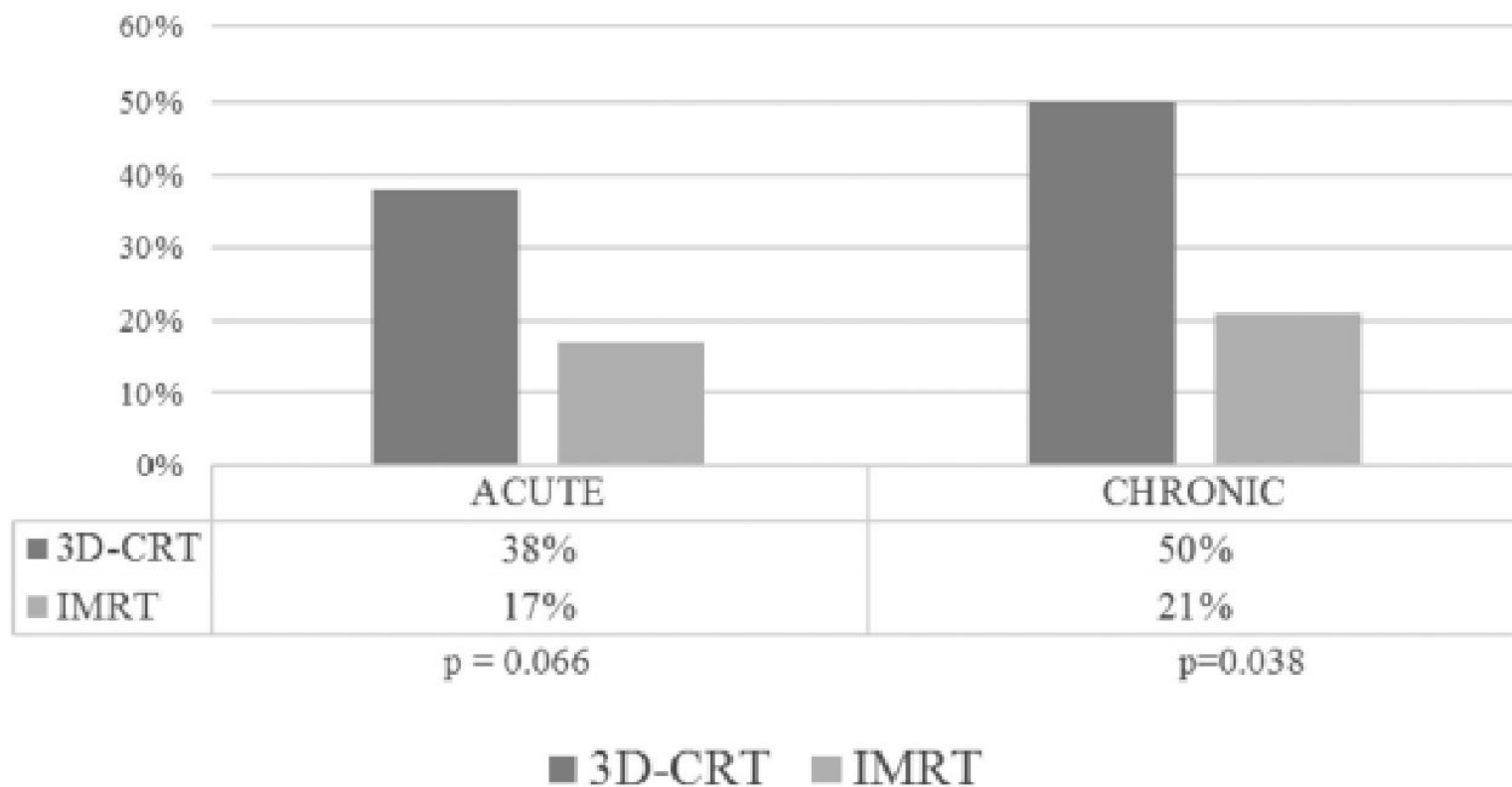
0%



# Por q IMRT entonces en HyN?



Substantial weight loss (>10% of pre-treatment weight)



# Por q IMRT entonces en HyN?

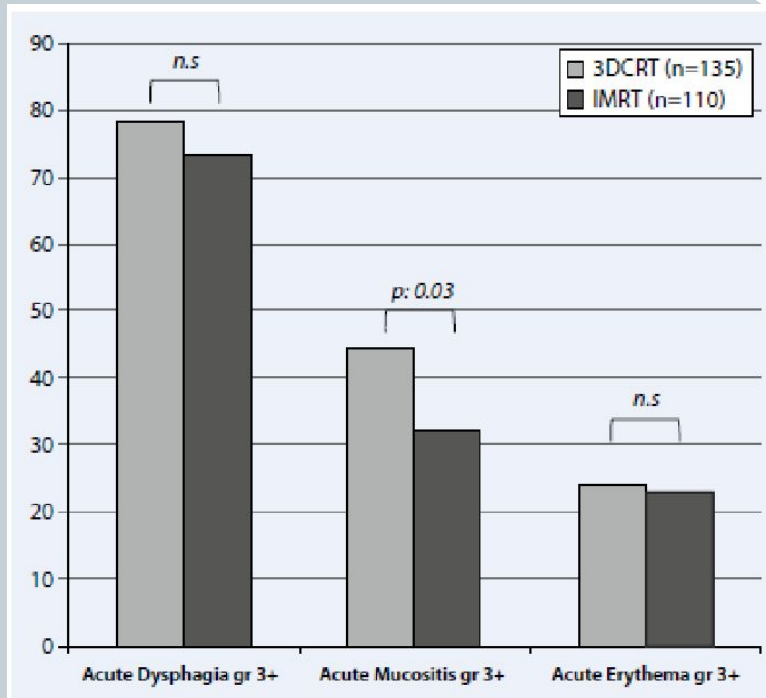


Fig. 2 ▲ Acute toxicity during radiotherapy scored according to common toxicity criteria of adverse events vs 3.0

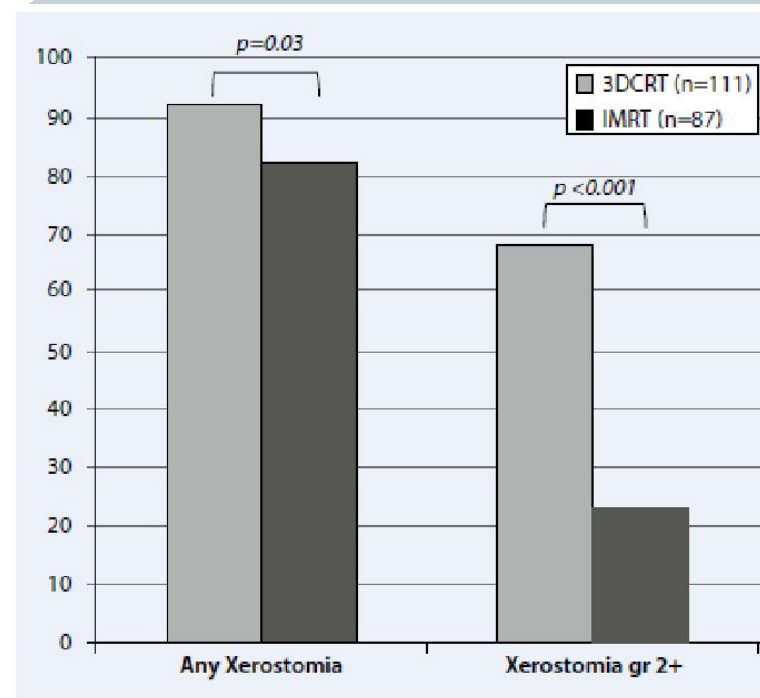


Fig. 3 ▲ Xerostomia after treatment for both groups

# Conclusión IMRT



- Es una técnica de RT mayor complejidad, costos y controles dosimétricos, que logra una mejor calidad de vida en los pacientes.



Gracias



**REITERAMOS**

*crónica*

16:21  
26:5

**GRACIAS A TODOS POR SU  
ATENCION APLAUDA FUERTE Y  
NO HAGA PREGUNTAS.**