

La TOMOTERAPIA in Italia: Esperienze a confronto

Presidenti: Umberto Ricardi - Teodoro Meloni



Sabato
20 novembre 2010



Forte di Bard
11020 Bard (AO) - Tel. 0125.833.816

5 CREDITI ECM

L'ESPERIENZA DI MELDOLA: Ipofrazionamenti

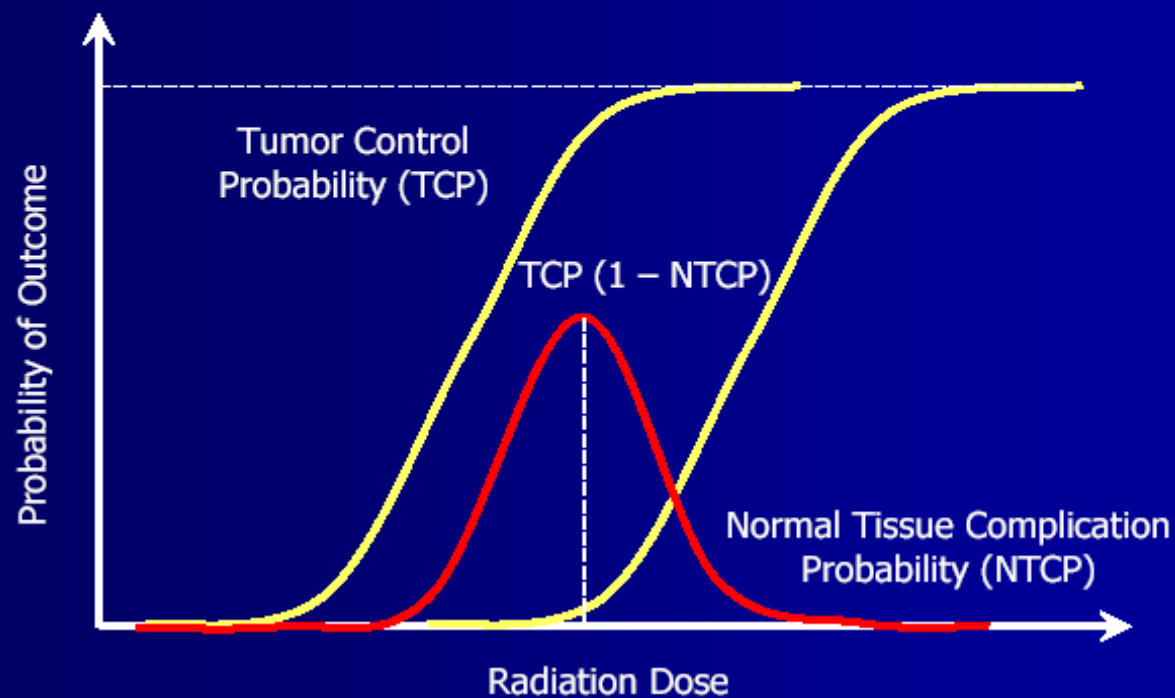
Elisabetta Parisi

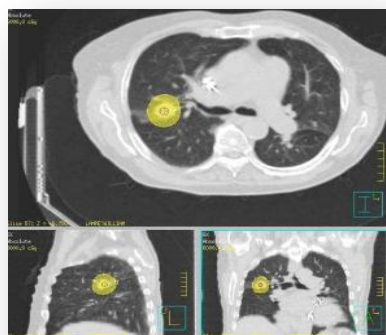
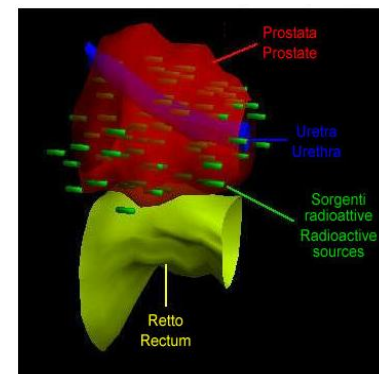
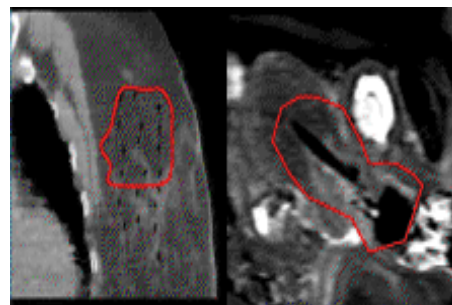
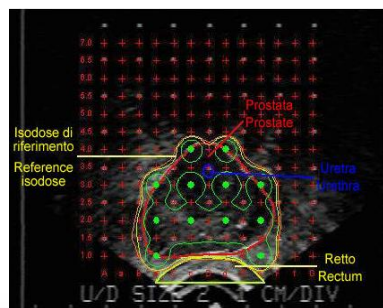
U.O. di Radioterapia "Massimo Pieratelli"
I.R.S.T. di Meldola (FC)



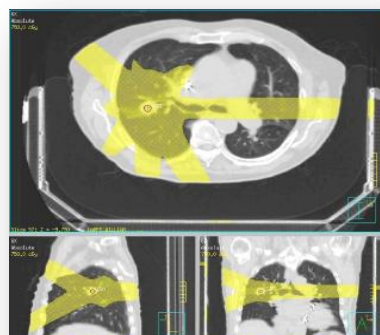
SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Unità Sanitaria Locale di Forlì

Goal of Radiation Therapy

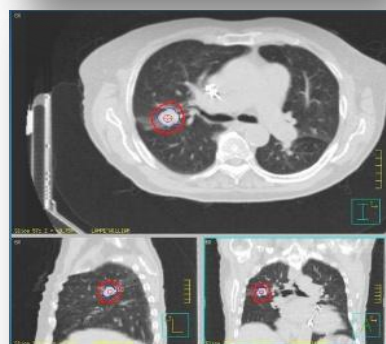




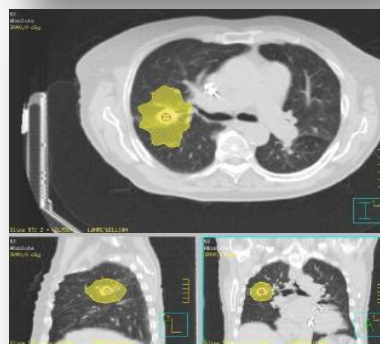
6000 cGy (script dose)



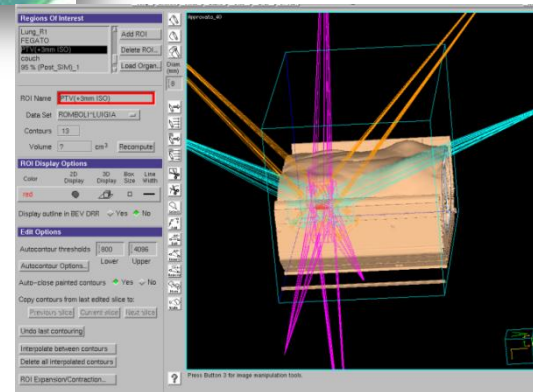
750 cGy (12.5% of script dose)

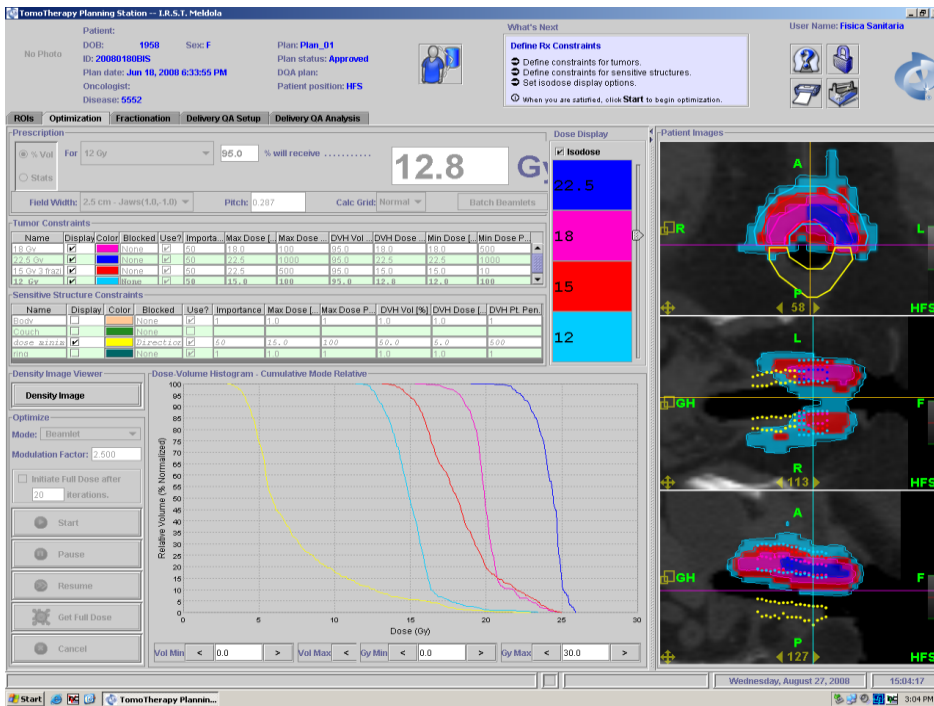


Targets (blue - GTV, red -PTV)

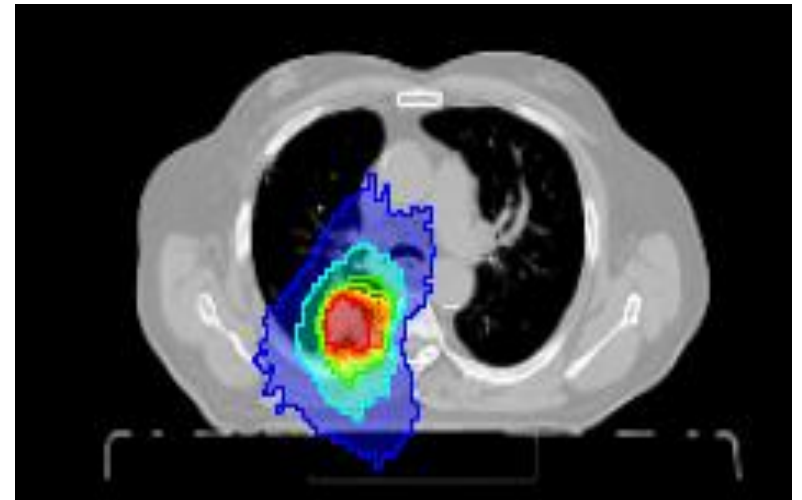
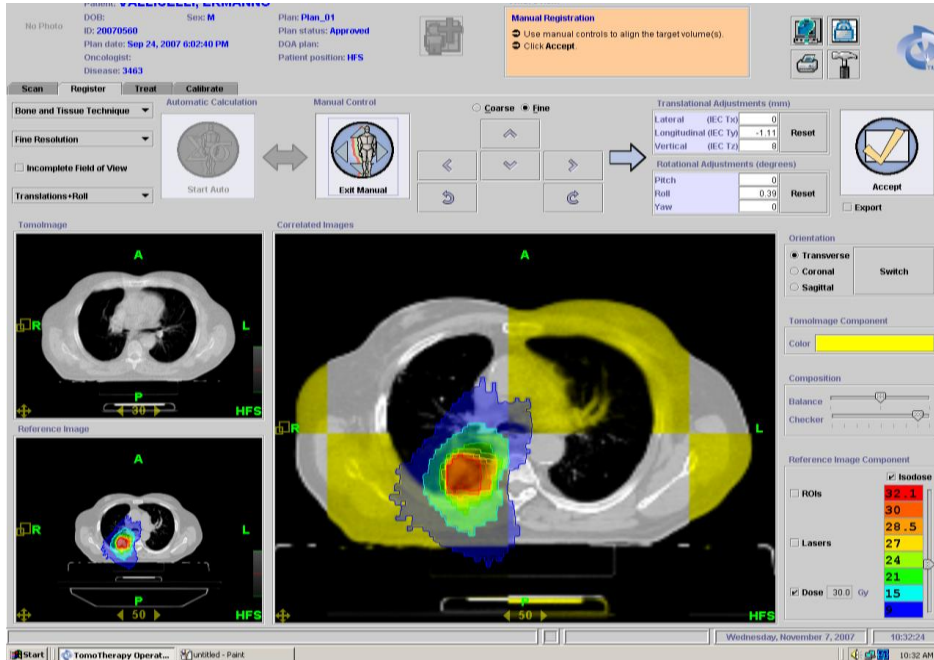
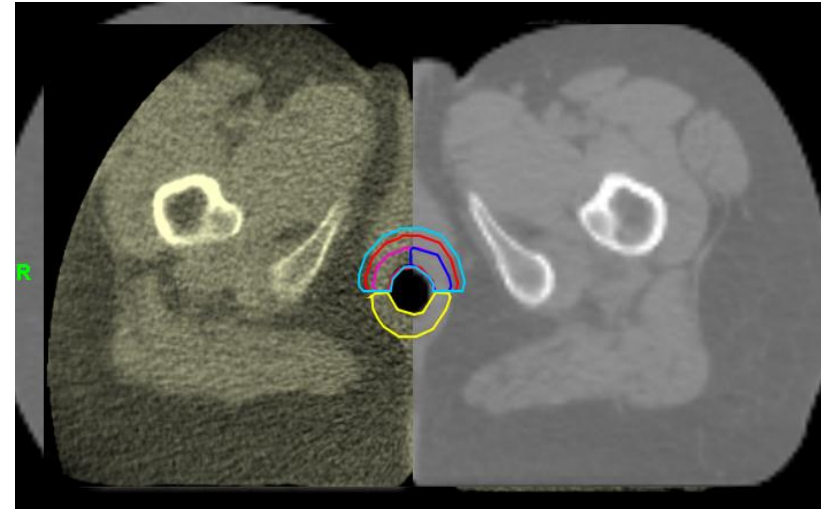


3000 cGy (50% script dose)





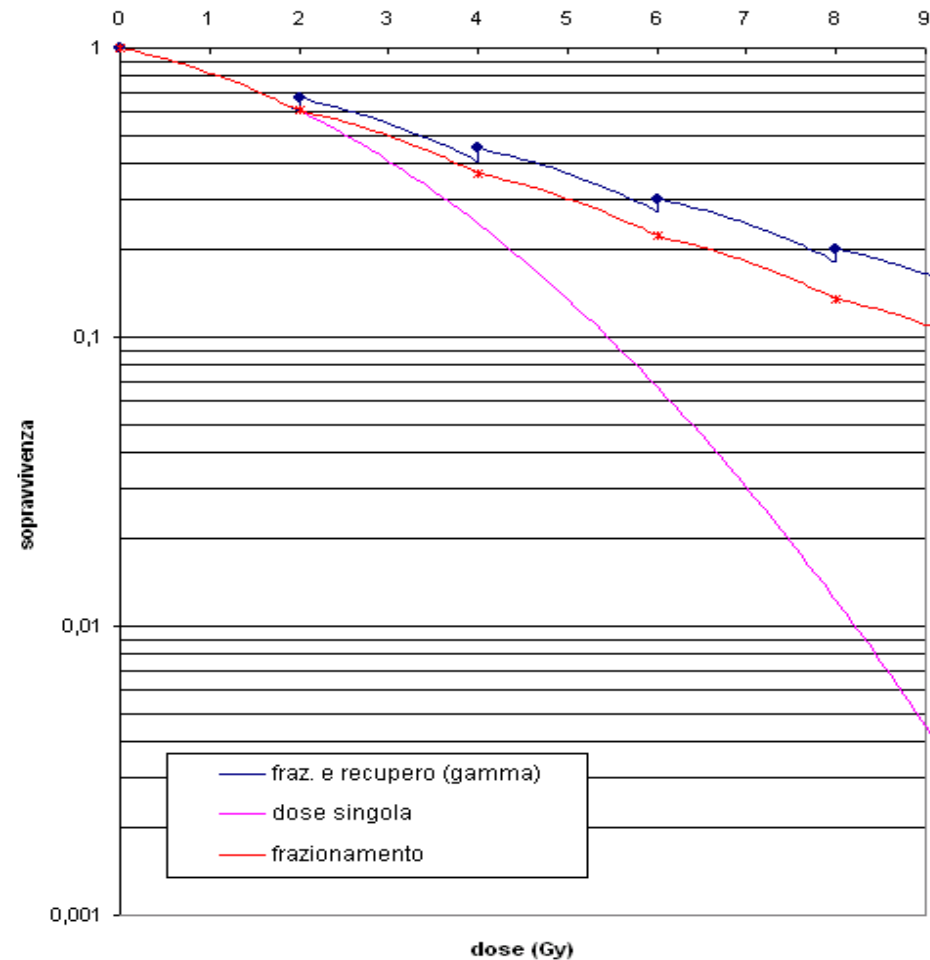
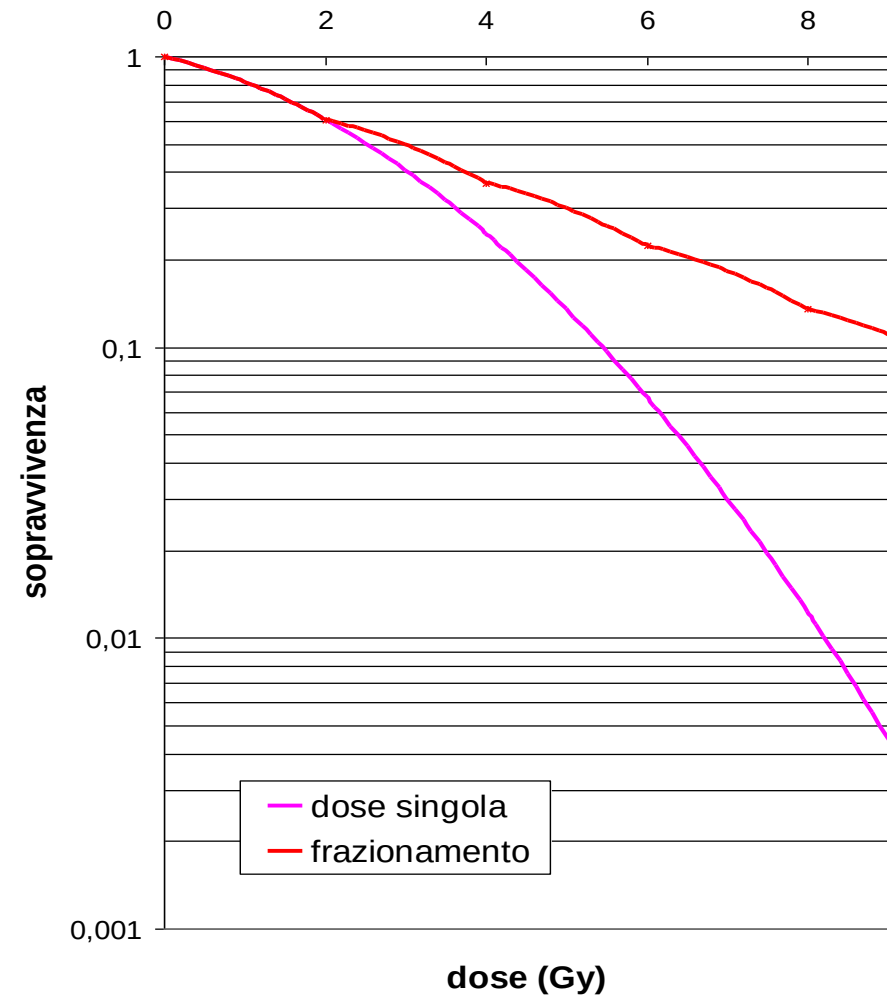
ISTITUT
SCIENTIFIC
ROMAGNOL
PER LO STUDI
DEI TUMORI E LA CURA



Modelli matematici

La sopravvivenza cellulare S di una popolazione cellulare è ben rappresentata dal modello Lineare Quadratico

Che cosa succede quando irradiamo con dosi frazionate una popolazione cellulare, considerando anche la crescita cellulare

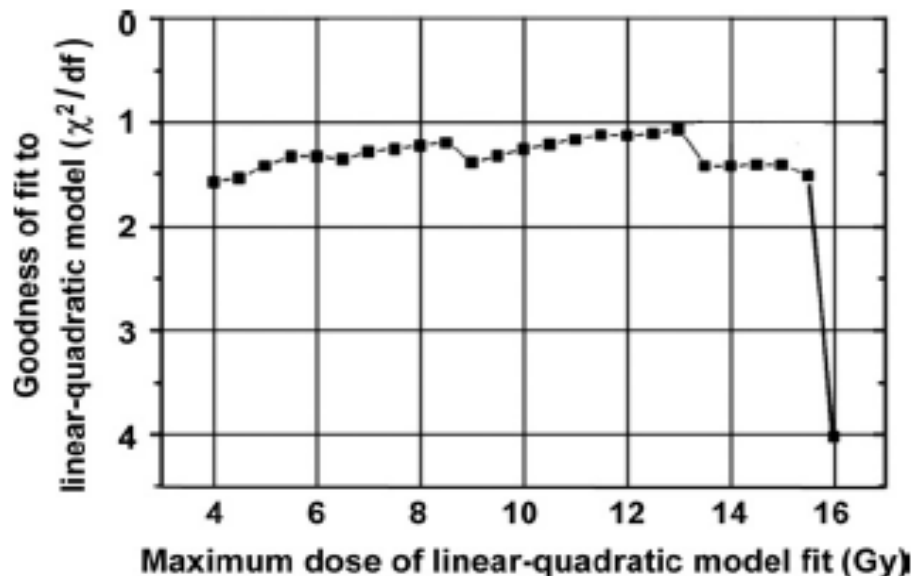


The Linear-Quadratic Model Is an Appropriate Methodology for Determining Isoeffective Doses at Large Doses Per Fraction

David J. Brenner, PhD, DSc

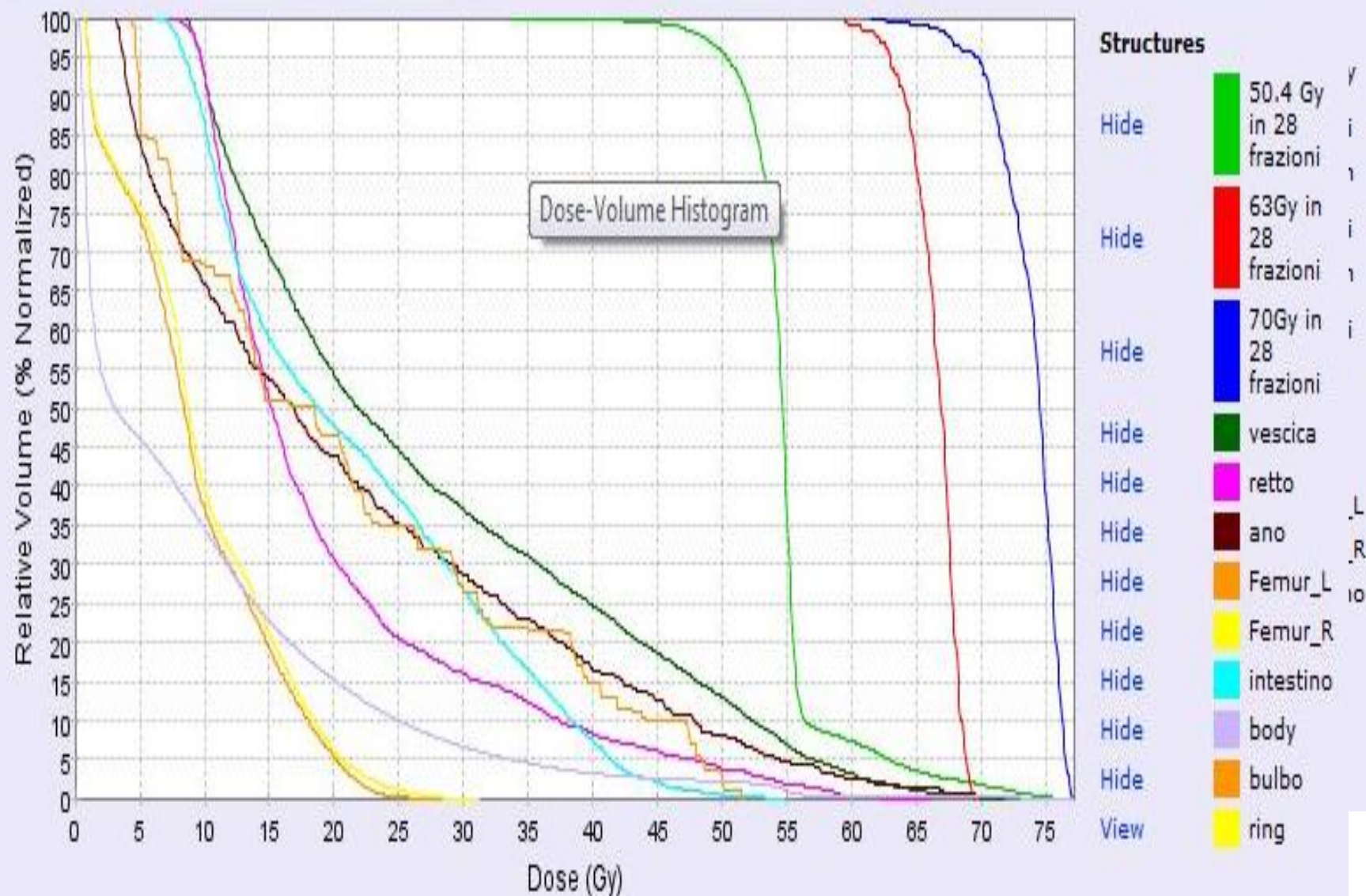
The tool most commonly used for quantitative predictions of dose/fractionation dependencies in radiotherapy is the mechanistically based linear-quadratic (LQ) model. The LQ formalism is now almost universally used for calculating radiotherapeutic isoeffect doses for different fractionation/protraction schemes. In summary, the LQ model has the following useful properties for predicting isoeffect doses: (1) it is a mechanistic, biologically based model; (2) it has sufficiently few parameters to be practical; (3) most other mechanistic models of cell killing predict the same fractionation dependencies as does the LQ model; (4) it has well-documented predictive properties for fractionation/dose-rate effects in the laboratory; and (5) it is reasonably well validated, experimentally and theoretically, up to about 10 Gy/fraction and would be reasonable for use up to about 18 Gy per fraction. To date, there is no evidence of problems when the LQ model has been applied in the clinic. Semin Radiat Oncol 18:234-239 © 2008 Elsevier Inc. All rights reserved.

E' validato, sperimentalmente e teoricamente, al di sopra dei 10 Gy per frazione e applicabile fino ai 18 Gy per frazione



$$BED = D[1 + d/(a/\beta)]$$

Tumor Structures		
Name	Display	Color
50.4 Gy in 28 frazioni	☒	
63Gy in 28 frazioni	☒	
70Gy in 28 frazioni	☒	



Constraints degli OAR

(riferimenti di letteratura elaborato dal Gruppo Regionale AIRO Emilia Romagna e Marche)

OAR vie ottiche:

- dose inferiore a 54Gy (60Gy con rischio del 10% tossicità)

OAR ponte-midollo allungato:

- dose massima 54 Gy (1 cc sopra 56Gy)
- TD 5/5 10 Gy fc TD 50/5 18 Gy fc

OAR Parotide:

- dose media < 26 Gy (in almeno una ghiandola)
- 50% del volume ghiandolare < 30 Gy (in almeno una ghiandola)

OAR orecchio interno (danno neurologico)

- TD 5/5 50 Gy fc TD 50/5 65 Gy fc

OAR Mandibola

- dose < 70 Gy

OAR laringe:

- 5/5 68 Gy in frazionamento convenzionale
- TD 50/5 79 Gy in frazionamento convenzionale

OAR Midollo spinale

- 6Gy frazione per 3 frazioni nei trattamenti stereotassici
- 1% a 45 Gy
- 0% a 50 Gy

OAR intestino

Volume di intestino (cc)

- V15Gv 120-150
- V20Gv 112-145
- V25Gv 105-140
- V40Gv 71-125

OAR fegato

VOLUME 100%: 20-30 Gy
con limite massimo di 33-35 Gy
VOLUME 30% >40 Gy

OAR polmone

- V13<45%
- V20 <30% (accettabile 35%)
- V25<25% (accettabile 30%)
- V30<15%
- MLD < 20 Gy

OAR retto

- V70 <25 %
- V50 <=50%,
- V60 <=40%,
- V70 <= 20%,
- V75 <=5%.
- V70 <=15%
- V30 <= 75%

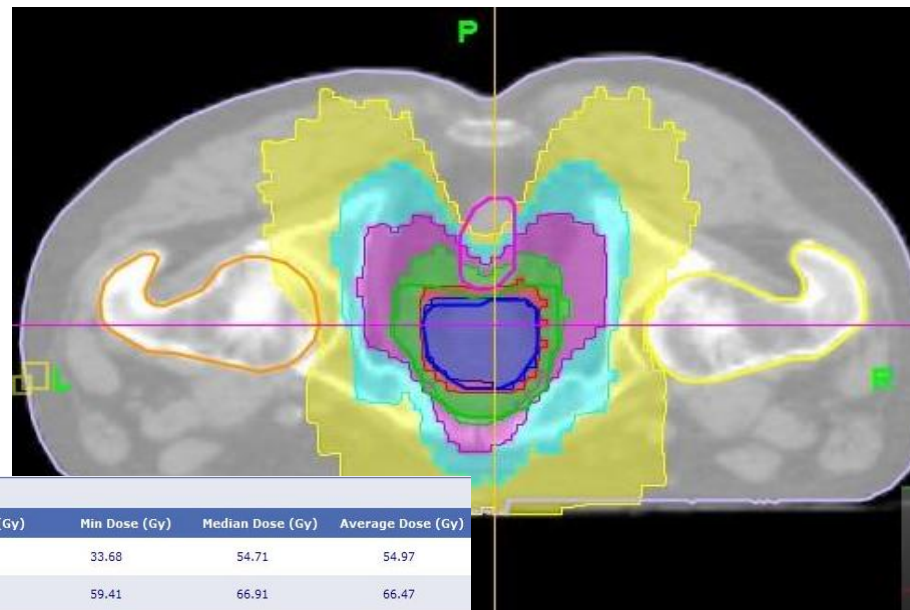
OAR rene

- TD 5/5 23 Gy
- TD 50/5 28 Gy
- V38 12 Gy
- D Med 10 Gy

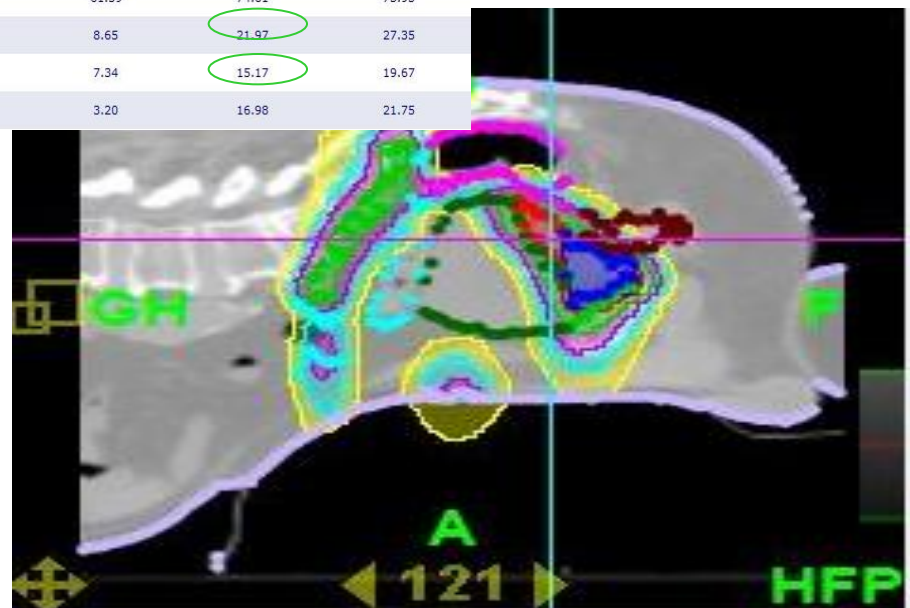
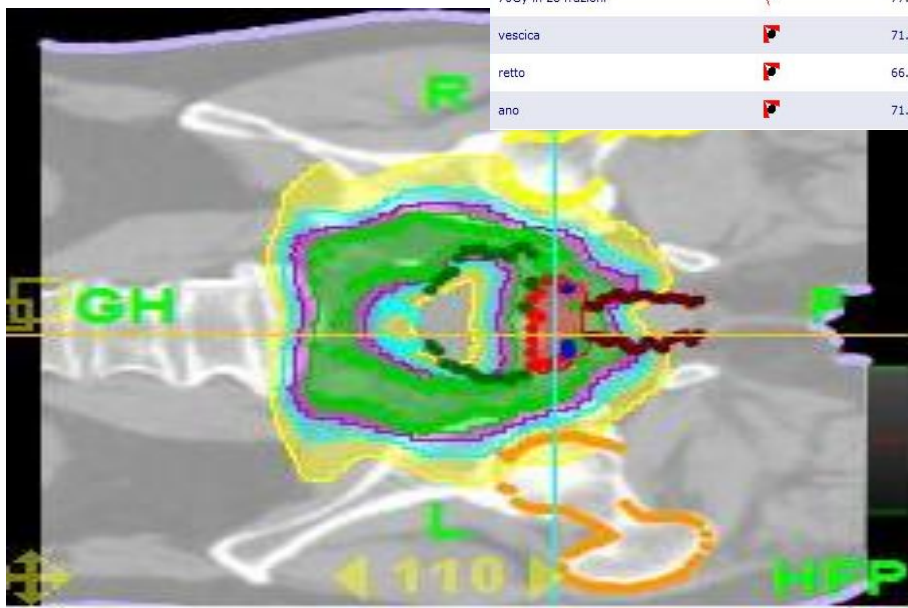
OAR esofago

- >50 Gy a < 30% del volume
Se ct concomitante
- 45 Gy a < 40% del volume

Neoplasia prostatica



STRUCTURE DOSE STATISTICS:					
Name	Type	Max Dose (Gy)	Min Dose (Gy)	Median Dose (Gy)	Average Dose (Gy)
50.4 Gy in 28 frazioni		77.03	33.68	54.71	54.97
63Gy in 28 frazioni		69.38	59.41	66.91	66.47
70Gy in 28 frazioni		77.03	61.59	74.61	73.95
vescica		71.65	8.65	21.97	27.35
retto		66.04	7.34	15.17	19.67
ano		71.36	3.20	16.98	21.75



An Overview of Hypofractionation and Introduction to This Issue of *Seminars in Radiation Oncology*

The main objective of therapeutic radiation is to disrupt clonogenicity.

....common curable disease like breast and prostate cancer have been treated by non-ablative hypofractionation.

Serial Tissue	Volume (mL)	Volume Max (Gy)	Max Point Dose (Gy)	Endpoint (≥Grade 3)
THREE-FRACTION TREATMENT				
Optic pathway	<0.2	15 (5 Gy/fx)	19.5 (6.5 Gy/fx)	Neuritis
Cochlea			20 (6.67 Gy/fx)	Hearing loss
Brainstem	<1	18 (6 Gy/fx)	23 (7.67 Gy/fx)	Cranial neuropathy
Spinal cord	<0.25	18 (6 Gy/fx)	22 (7.33 Gy/fx)	Myelitis
	<1.2	11.1 (3.7 Gy/fx)		
Cauda equina	<5	21.9 (7.3 Gy/fx)	24 (8 Gy/fx)	Neuritis
Sacral plexus	<3	22.5 (7.5 Gy/fx)	24 (8 Gy/fx)	Neuropathy
Esophagus*	<5	21 (7 Gy/fx)	27 (9 Gy/fx)	Stenosis/fistula
Ipsilateral brachial plexus	<3	22.5 (7.5 Gy/fx)	24 (8 Gy/fx)	Neuropathy
Heart/pericardium	<15	24 (8 Gy/fx)	30 (10 Gy/fx)	Pericarditis
Great vessels	<10	39 (13 Gy/fx)	45 (15 Gy/fx)	Aneurysm
Trachea and ipsilateral bronchus*	<4	15 (5 Gy/fx)	30 (10 Gy/fx)	Stenosis/fistula
Skin	<10	22.5 (7.5 Gy/fx)	24 (8 Gy/fx)	Ulceration
Stomach	<10	21 (7 Gy/fx)	24 (8 Gy/fx)	Ulceration/fistula
Duodenum*	<5	15 (5 Gy/fx)	24 (8 Gy/fx)	Ulceration
Jejunum/ileum*	<5	16.2 (5.4 Gy/fx)	27 (9 Gy/fx)	Enteritis/obstruction
Colon*	<20	20.4 (6.8 Gy/fx)	30 (10 Gy/fx)	Colitis/fistula
Rectum*	<20	20.4 (6.8 Gy/fx)	30 (10 Gy/fx)	Proctitis/fistula
Bladder wall	<15	15 (5 Gy/fx)	30 (10 Gy/fx)	Cystitis/fistula
Penile bulb	<3	21.9 (7.3 Gy/fx)	42 (14 Gy/fx)	Impotence
Femoral heads (right and left)	<10	21.9 (7.3 Gy/fx)		Necrosis
Renal hilum/vascular trunk	<2/3 volume	18.6 (6.2 Gy/fx)		Malignant hypertension
Parallel Tissue				
	Critical Volume (mL)	Critical Volume Dose Max (Gy)		Endpoint (≥Grade 3)
Lung (right and left)	1,500	10.5 (3.5 Gy/fx)		Basic lung function
Lung (right and left)	1,000	11.4 (3.8 Gy/fx)		Pneumonitis
Liver	700	17.1 (5.7 Gy/fx)		Basic liver function
Renal cortex (right and left)	200	14.4 (4.8 Gy/fx)		Basic renal function

Serial Tissue	Volume (mL)	Volume Max (Gy)	Max Point Dose (Gy)	Endpoint (≥Grade 3)
FIVE-FRACTION TREATMENT				
Optic pathway	<0.2	20 (4 Gy/fx)	25 (5 Gy/fx)	Neuritis
Cochlea			27.5 (5.5 Gy/fx)	Hearing loss
Brainstem	<1	26 (5.2 Gy/fx)	31 (6.2 Gy/fx)	Cranial neuropathy
Spinal cord	<0.25	22.5 (4.5 Gy/fx)	30 (6 Gy/fx)	Myelitis
	<1.2	13.5 (2.7 Gy/fx)		
Cauda equina	<5	30 (6 Gy/fx)	34 (6.4 Gy/fx)	Neuritis
Sacral plexus	<3	30 (6 Gy/fx)	32 (6.4 Gy/fx)	Neuropathy
Esophagus*	<5	27.5 (5.5 Gy/fx)	35 (7 Gy/fx)	Stenosis/fistula
Ipsilateral brachial plexus	<3	30 (6 Gy/fx)	32 (6.4 Gy/fx)	Neuropathy
Heart/pericardium	<15	32 (6.4 Gy/fx)	38 (7.6 Gy/fx)	Pericarditis
Great vessels	<10	47 (9.4 Gy/fx)	53 (10.6 Gy/fx)	Aneurysm
Trachea and ipsilateral bronchus*	<4	18 (3.6 Gy/fx)	38 (7.6 Gy/fx)	Stenosis/fistula
Skin	<10	30 (6 Gy/fx)	32 (6.4 Gy/fx)	Ulceration
Stomach	<10	28 (5.6 Gy/fx)	32 (6.4 Gy/fx)	Ulceration/fistula
Duodenum*	<5	18 (3.6 Gy/fx)	32 (6.4 Gy/fx)	Ulceration
Jejunum/ileum*	<5	19.5 (3.9 Gy/fx)	35 (7 Gy/fx)	enteritis/obstruction
Colon*	<20	25 (5 Gy/fx)	38 (7.6 Gy/fx)	colitis/fistula
Rectum*	<20	25 (5 Gy/fx)	38 (7.6 Gy/fx)	proctitis/fistula
Bladder wall	<15	18.3 (3.65 Gy/fx)	38 (7.6 Gy/fx)	cystitis/fistula
Penile bulb	<3	30 (6 Gy/fx)	50 (10 Gy/fx)	Impotence
Femoral heads (right and left)	<10	30 (6 Gy/fx)		Necrosis
Renal hilum/vascular trunk	<2/3 volume	23 (4.6 Gy/fx)		Malignant hypertension
Parallel Tissue				
	Critical Volume (mL)	Critical Volume Dose Max (Gy)		Endpoint (≥Grade 3)
Lung (right and left)	1,500	12.5 (2.5 Gy/fx)		Basic lung function
Lung (right and left)	1000	13.5 (2.7 Gy/fx)		Pneumonitis
Liver	700	21 (4.2 Gy/fx)		Basic liver function
Renal cortex (right and left)	200	17.5 (3.5 Gy/fx)		Basic renal function



Exploring the Possibility of Unique Molecular, Biological, and Tissue Effects With Hypofractionated Radiotherapy

Michael Story, PhD, Reinhard Kodym, MD, and Debabrata Saha, PhD

High-dose hypofractionated radiotherapy is feasible because of technological advances that allow for the precise delivery of radiation to a target volume that contains a limited amount of normal tissue. No longer constrained by the normal tissue response of large fields, very large doses of radiation can be delivered. However, with the application of high doses of radiation to very precise treatment volumes, we find ourselves wondering if the fundamental principles that govern conventional radiotherapy apply. The conventions of tumor hypoxia, reoxygenation, tumor repopulation, and intrinsic radiosensitivity are all likely to be unique or play new roles in tumor or normal tissue response. With that in mind, we highlight several facets of tumor or normal tissue response in which a better understanding of tumor biology and radiation biology could be beneficial to the application of high dose per fraction treatment modalities or in which caution should be exercised.

Semin Radiat Oncol 18:244-248 © 2008 Elsevier Inc. All rights reserved.



The size of the Target Volume:
margins are usually in the low millimeter range for SBRT, and in an earlier study, it was suggested that the optimal range was 0 mm.

"Bystander effect" which induces a radiation response in unirradiated cells and it is able to mediate cell death over a distance in the range of 5 mm to 7.5 mm

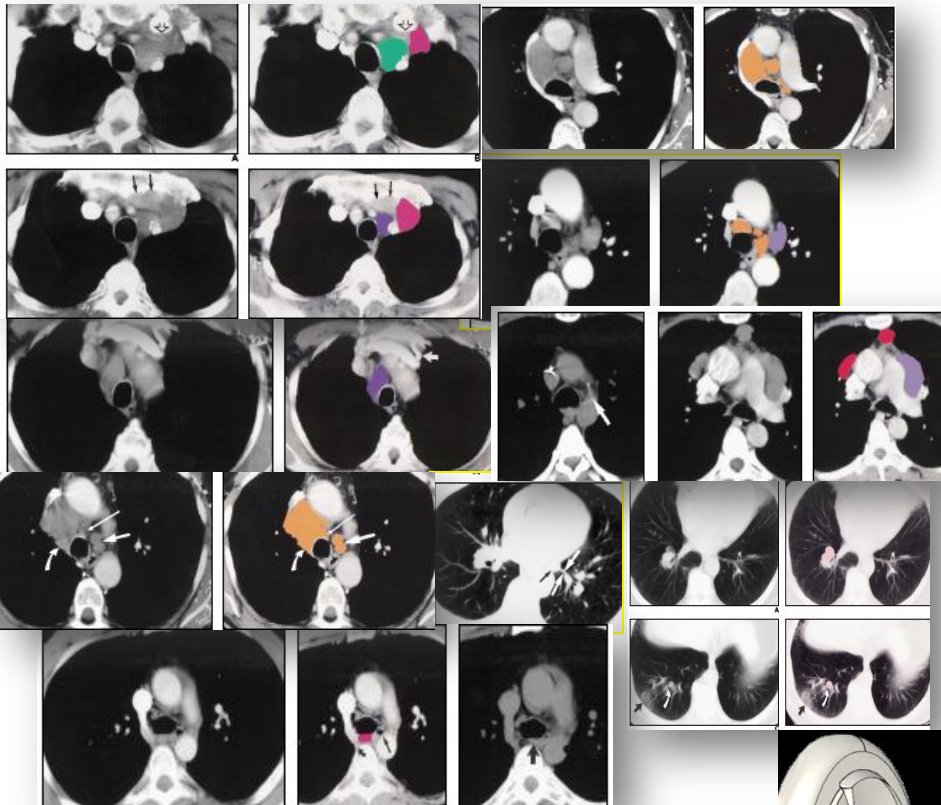
Mothersill C, Seymour CB: Cell-cell contact during gamma irradiation is not required to induce a bystander effect in normal human keratinocytes: Evidence for release during irradiation of a signal controlling survival into the medium. Radiat Res 149:256-262, 1998

Cardinale RM, Wu Q, Benedict SH, et al: Determining the optimal block margin on the planning target volume for extracranial stereotactic radiotherapy. Int J Radiat Oncol Biol Phys 45:515-520, 1999

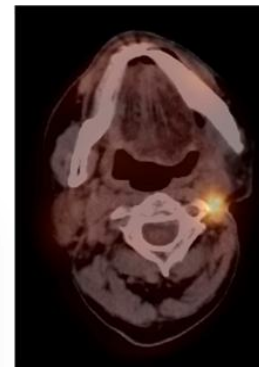


IMAGING di centramento

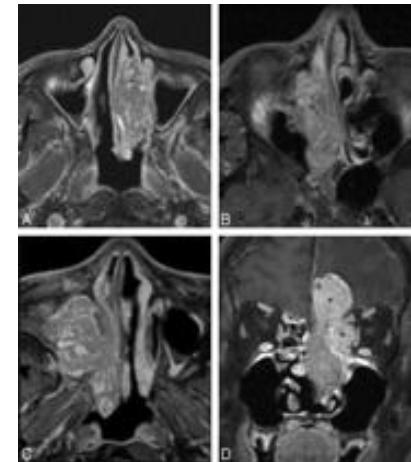
TC di centramento multifasica



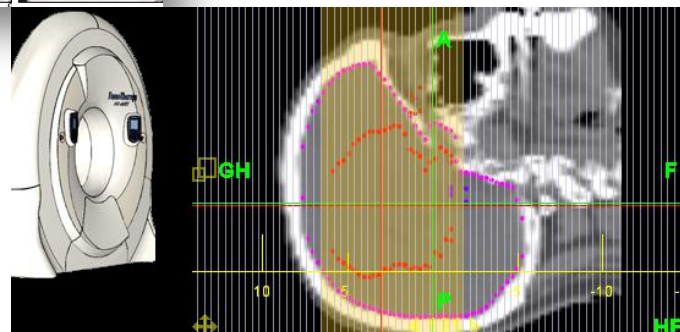
PET/TC



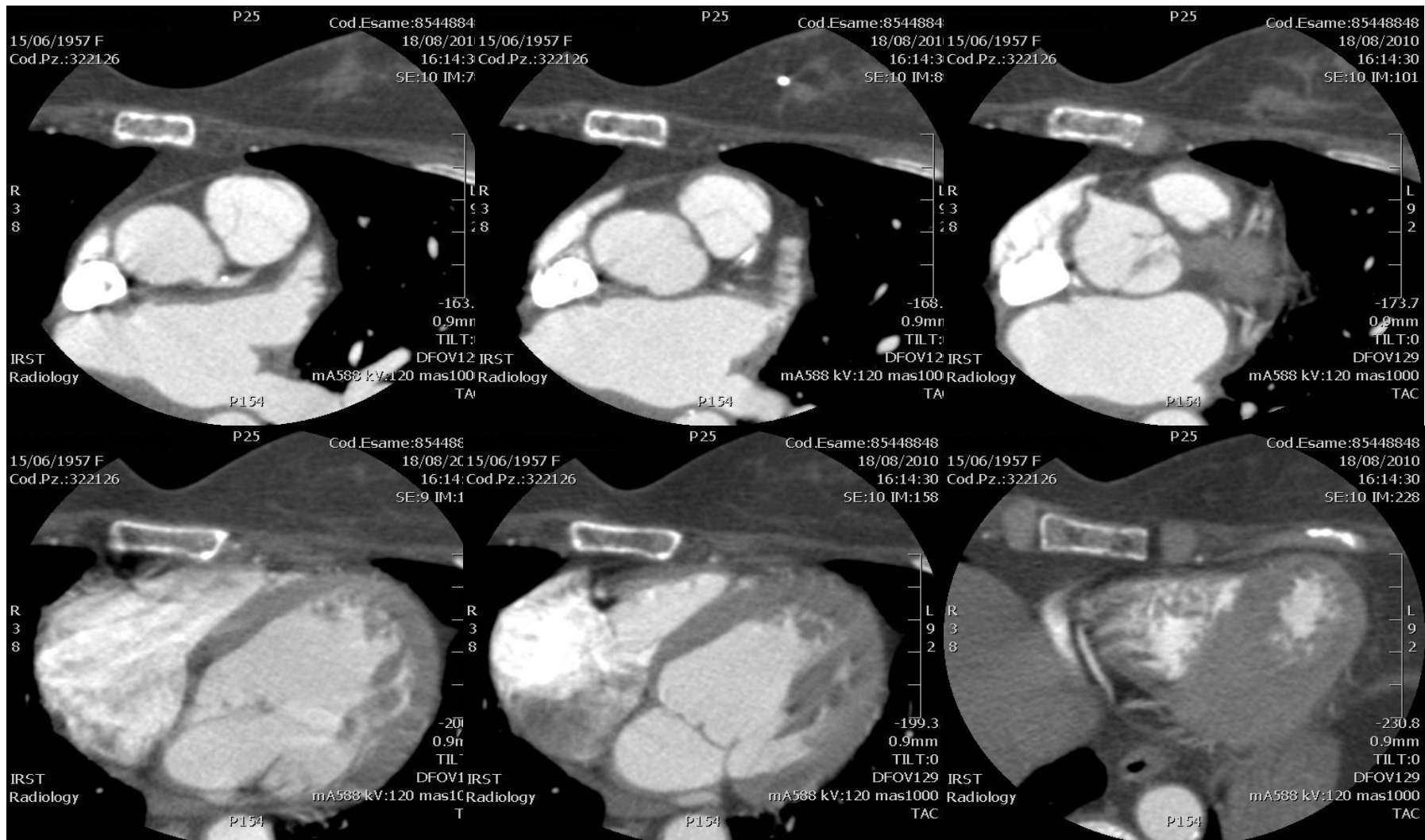
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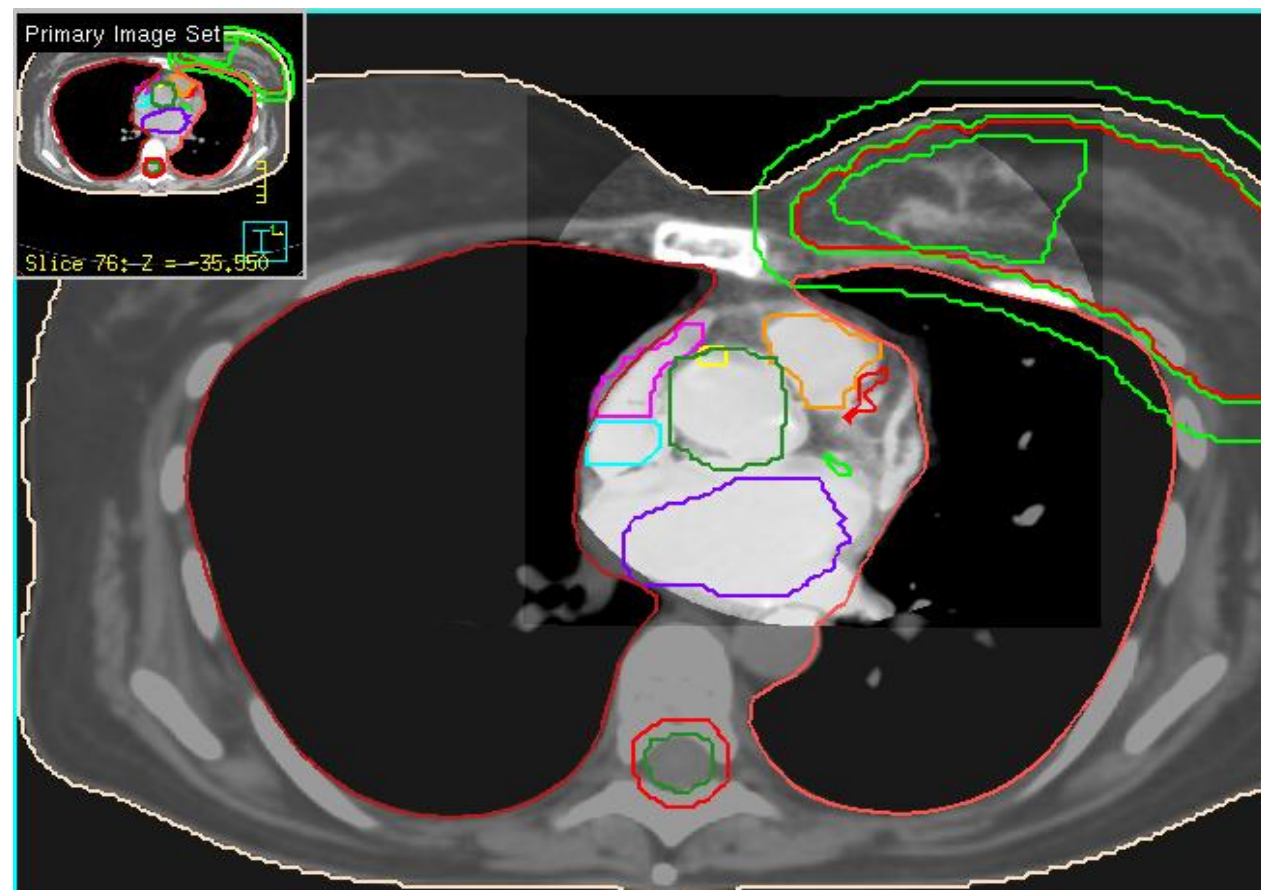
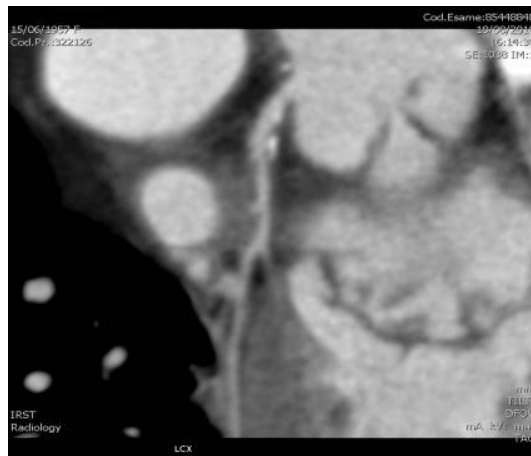
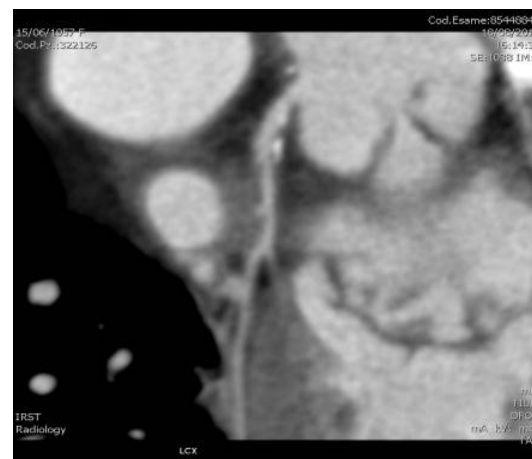
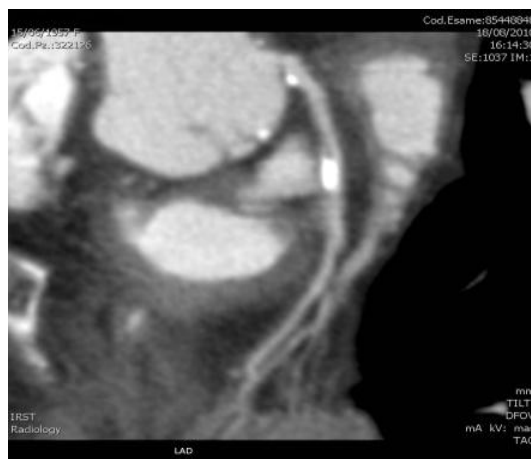


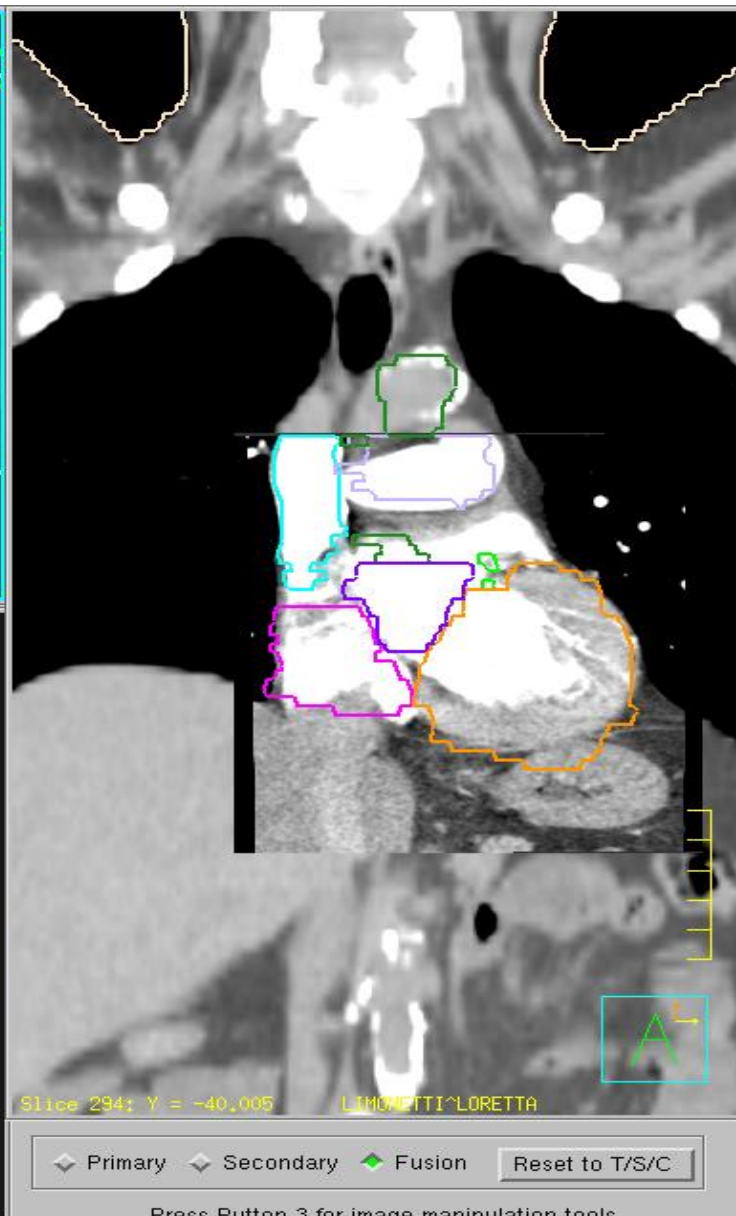
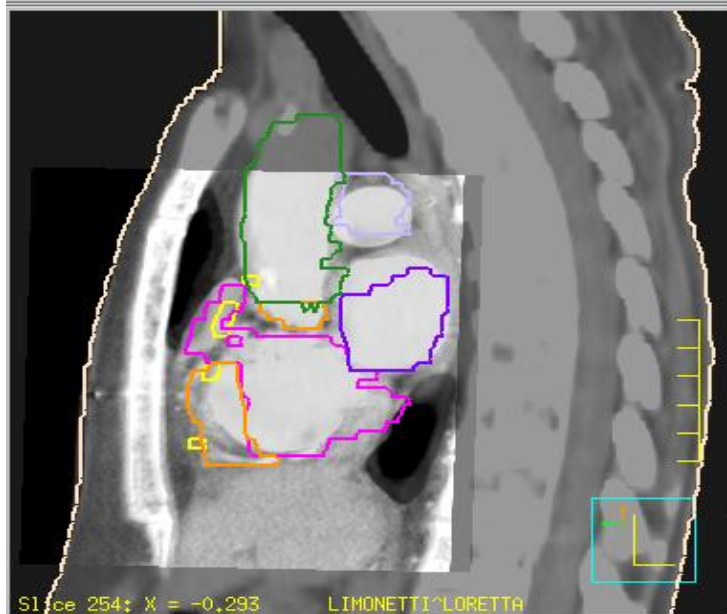
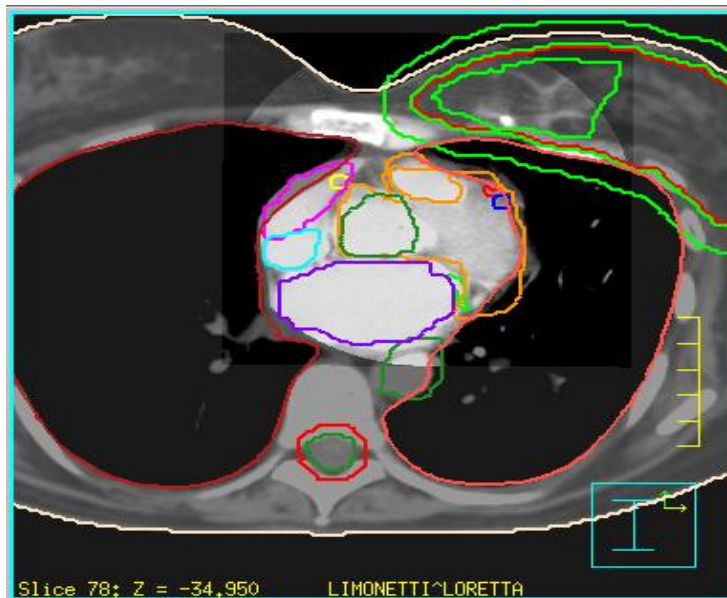
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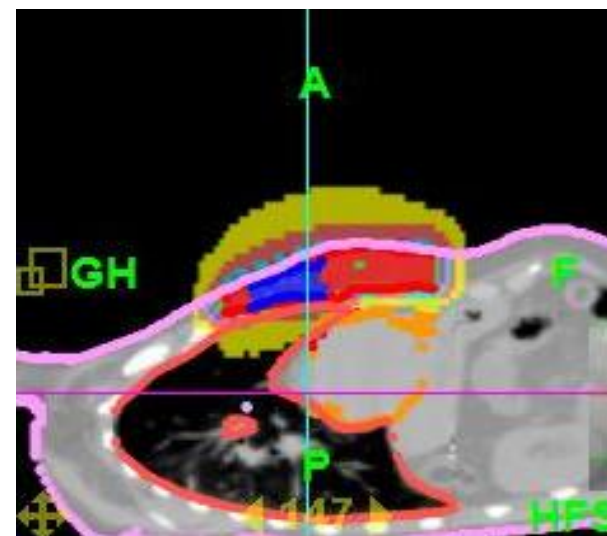
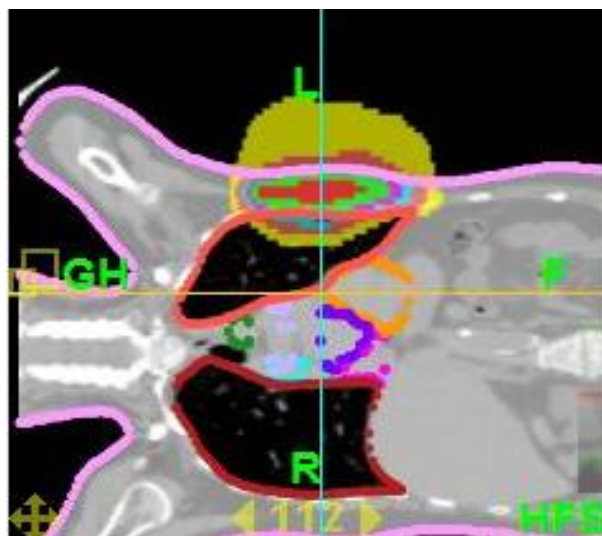
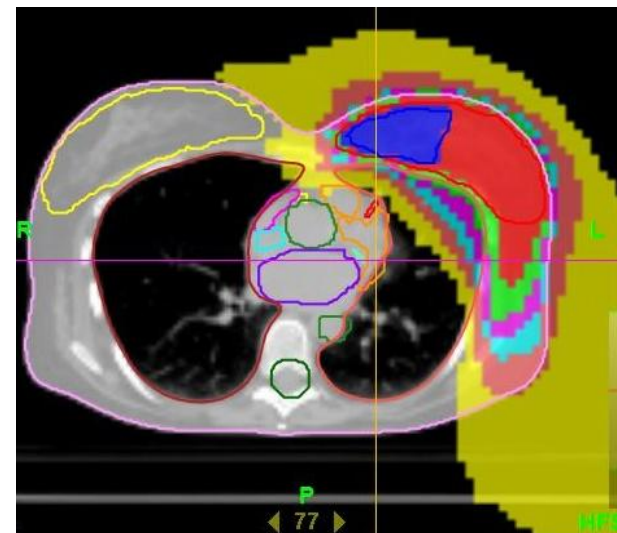
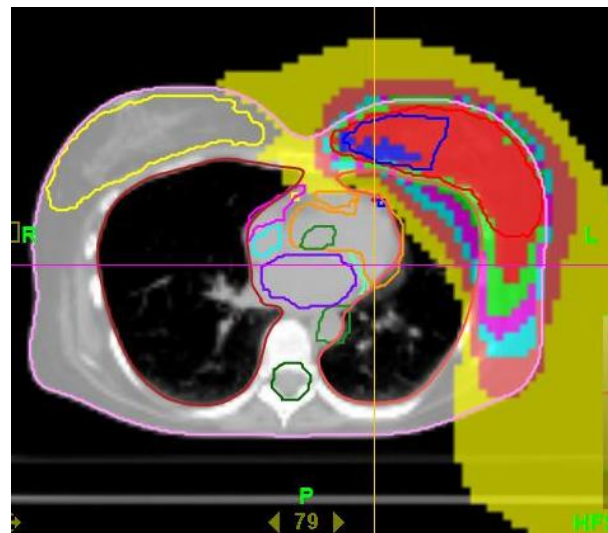
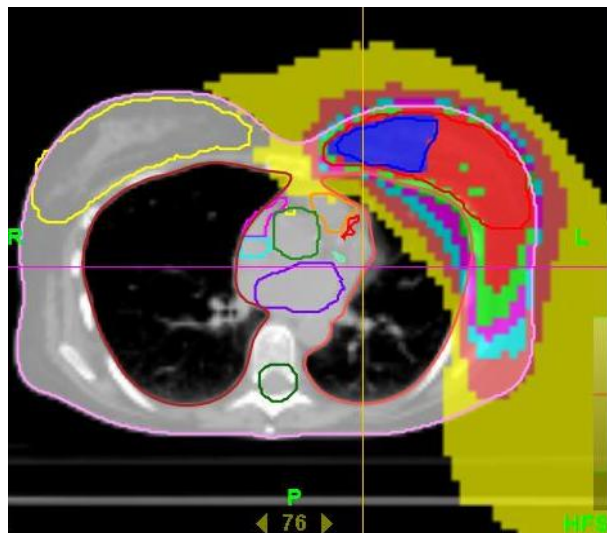


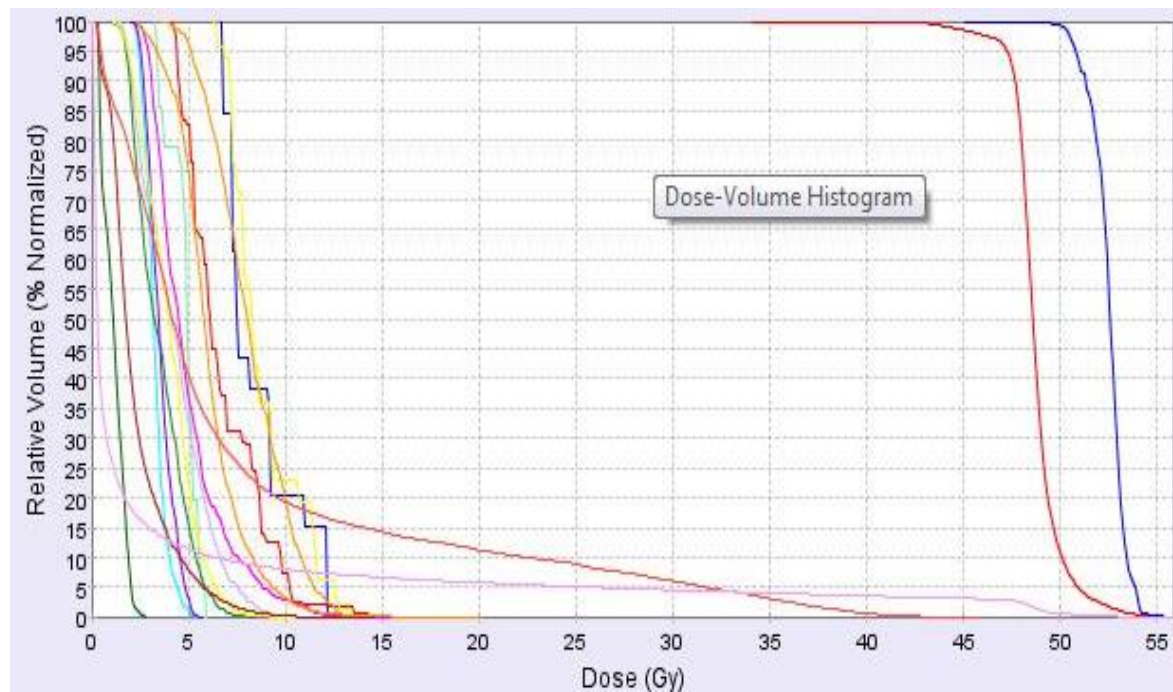
TC Cuore multistrato



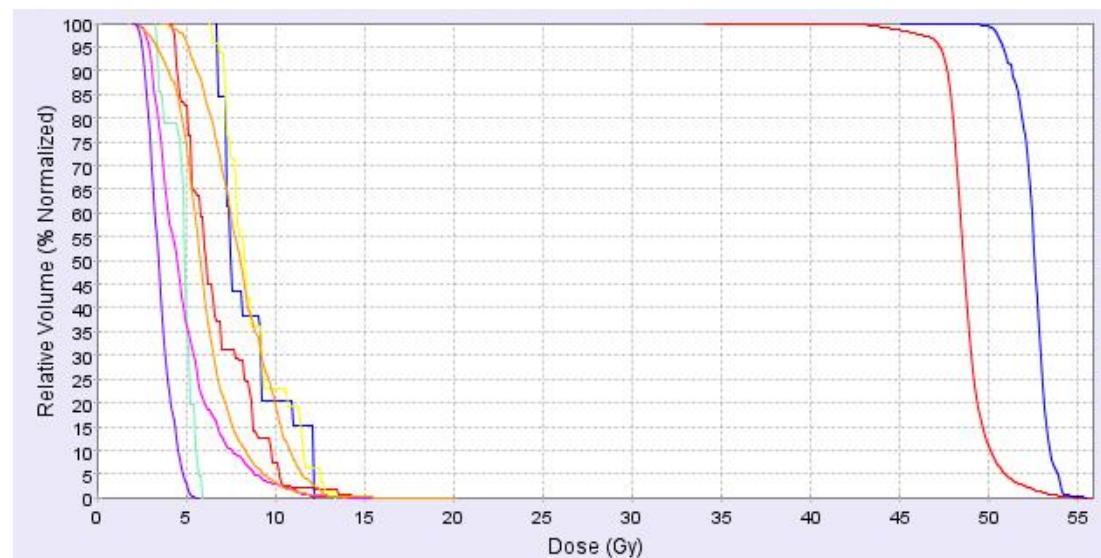








Name	Used	Blocked	Overlap Priority	Importance	Max Dose (Gy)
mid exp	✓		1	800	5.00
LAD	✓		2	800	5.00
DX	✓		3	800	5.00
CRX	✓		4	800	5.00
AORTA	✓		5	800	5.00
D	✓		6	800	5.00
CAVA SUP	✓		7	800	5.00
A DX	✓		8	800	5.00
V DX	✓		9	800	5.00



Neoplasia mammaria bilaterale

TomoTherapy Planning Station -- I.R.S.T. Meldola

Patient:
 No Photo
 DOB:
 ID: 20070760
 Plan date: Dec 13, 2007 4:21:11 PM
 Oncologist:
 Disease: 3979

Sex: F
 Plan: Plan_01
 Plan status: Approved
 DQA plan:
 Patient position: HFS

What's Next
Define Rx Constraints
 Define constraints for tumors.
 Define constraints for sensitive structures.
 Set isodose display options.
 When you are satisfied, click **Start** to begin optimization.

User: Fisica Sanitaria

ROIs Optimization Fractionation Delivery QA Setup Delivery QA Analysis

Prescription
☒ Vol For 47.25 Gy 21 frazioni dx 85.0 % will receive **47.25 Gy**
☐ Stats
 Field Width: 5.02 cm - Jaws(2.1,2.1) Pitch: 0.300 Dose Calc Grid: Normal Batch beamlets ☐

Tumor Constraints

Name	Display	Color	Blocked	Use?	Importance	Max Dose [G]	Max Dose P	DVH Vol [%]	DVH Dose [G]	Min Dose [G]	Min Dose Pt
47.25 Gy 21	☒	Red	None	☒	400	47.25	800	85.0	47.25	47.25	50
47.25 Gy 21	☒	Orange	None	☒	500	47.25	1500	95.0	47.25	47.25	400
contenimento	☒	Blue	None	☒	200	25.0	300	95.0	12.0	8.0	20

Sensitive Structure Constraints

Name	Display	Color	Blocked	Use?	Importance	Max Dose [Gy]	Max Dose Per	DVH Vol [%]	DVH Dose [Gy]	DVH Pt. Pen.
L.L	☐	Red	None	☐	1	1.0	1	1.0	1.0	1
R.L	☒	Red	Complete	☒	1	1.0	1	1.0	1.0	1
Heart	☒	Teal	Complete	☒	1	1.0	1	1.0	1.0	1
couch	☐	Green	None	☐	1	1.0	1	1.0	1.0	1

Dose Display
☒ Isodose
 50
 47.25
 30
 20

Patient Images
 A
 L
 HFS
 49
 GH
 F
 HFS
 GH
 F
 HFS
 85

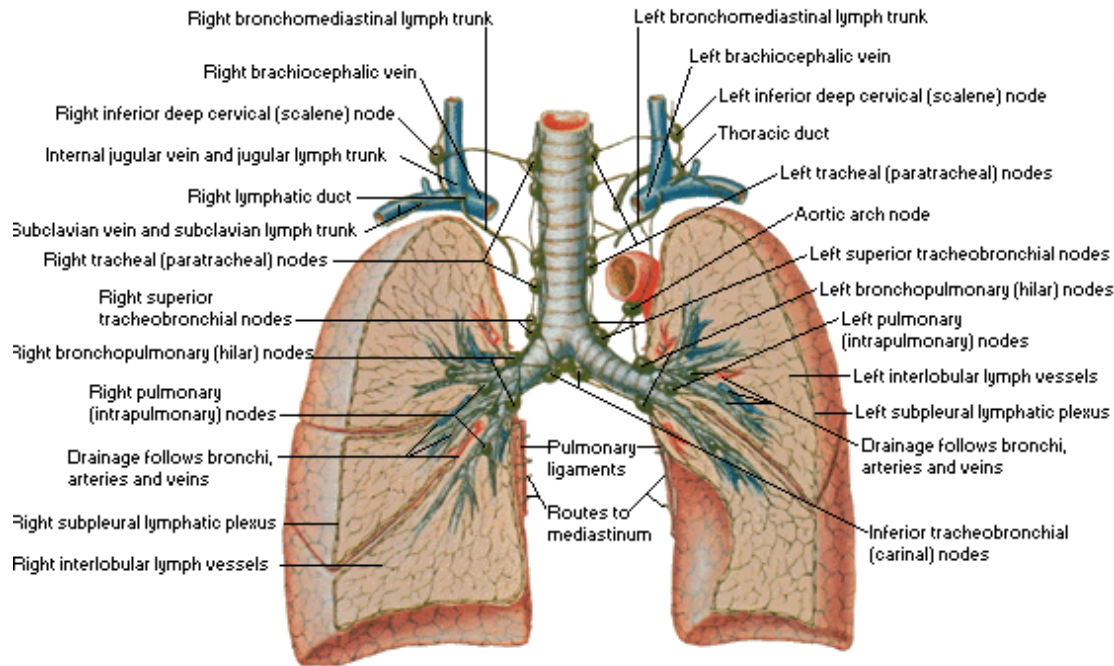
Density Image Viewer
 Density Image
 Optimize
 Mode: Beamlet
 Modulation Factor: 2.000
☐ Initiate Full Dose after 20 iterations.
 Start
 Pause
 Resume
 Get Full Dose
 Cancel

Dose-Volume Histogram - Cumulative Mode Relative

Relative Volume (% Normalized)
 Dose (Gy)
 Vol Min < 0.0 > Vol Max < 100.0 Gy Min < 0.0 > Gy Max < 60.0 >

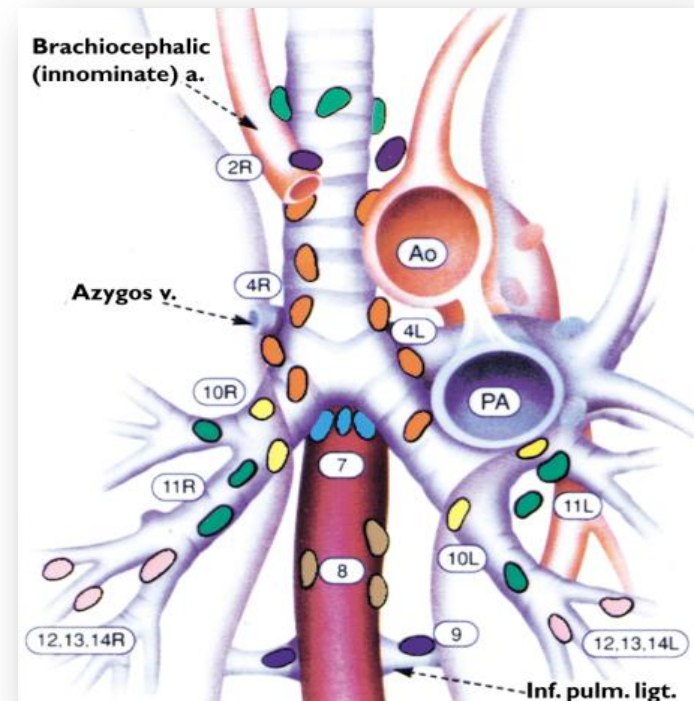
Monday, January 7, 2008 10:12:38
 10:12 AM

Neoplasie del polmone (NSCL)



Right lung: All lobes drain to intrapulmonary and bronchopulmonary (hilar) nodes, then to inferior tracheobronchial (carinal) nodes, right superior tracheobronchial nodes and to right tracheal nodes on way to brachiocephalic vein via bronchomediastinal lymph trunk and/or scalene node.

Left lung: Upper lobe drains to pulmonary and hilar nodes, carinal nodes, left superior tracheobronchial nodes, left tracheal nodes and/or aortic arch node, then to brachiocephalic vein via left bronchomediastinal trunk and thoracic duct. Left lower lobe drains also to pulmonary and hilar nodes and to carinal nodes, but then mostly to right superior tracheobronchial nodes, where it follows same route as lymph from right lung.



Neoplasia polmonare

DOB: Jun 20, 1931 **Sex: M** **Plan: Plan_02**

ID: 20090125 **Plan status: Approved**

Plan date: Mar 9, 2009 1:36:51 PM **DQA plan:**

Oncologist: **Patient position: HFS**

Disease: 7909

Define Rx Constraints

- Define constraints for tumors.
- Define constraints for sensitive structures.
- Set isodose display options.

When you are satisfied, click **Start** to begin optimization.

Prescription

☒ Vol For 25 Gy 5 fr mediast 95.0 % will receive **25.0 Gy**

☐ Stats

Field Width: 2.5 cm - Jaws(1.0,-1.0) Pitch: 0.216 Calc Grid: Normal Batch Beamlets

Tumor Constraints

Name	Display	Color	Blocked	Use?	Importa...	Max Dose [...]	Max Dose ...	DVH Vol ...	DVH Dose ...	Min Dose [...]	Min Dose P...
30 Gy 5 fr lun	☒		None	☒	80	40.0	1500	95.0	30.0	30.0	500
40 Gy lung	☒		None	☒	80	40.0	1500	95.0	40.0	40.0	500
25 Gy 5 fr	☒		None	☒	80	30.0	500	95.0	25.0	25.0	500
30 Gy medi	☒		None	☒	80	30.0	500	95.0	30.0	30.0	500

Sensitive Structure Constraints

Name	Display	Color	Blocked	Use?	Importance	Max Dose [...]	Max Dose ...	DVH Vol [%]	DVH Dose [...]	DVH Pt. Pen.
esofago	☒		None	☒	10	25.0	100	20.0	5.0	100
RING 1cm	☐		None	☒	10	30.0	100	25.0	15.0	100
RING 1cm	☐		None	☒	10	25.0	100	25.0	25.0	100
polm dx	☒		None	☒	10	30.0	100	30.0	5.0	100

Dose Display

☒ Isodose

40
30
25
20
12.5

Patient Images

Density Image Viewer

Density Image

Optimize

Mode: Beamlet

Modulation Factor: 3.000

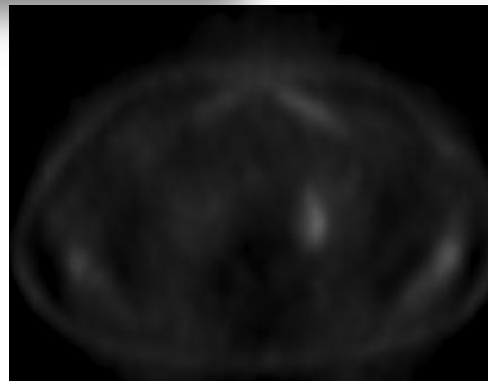
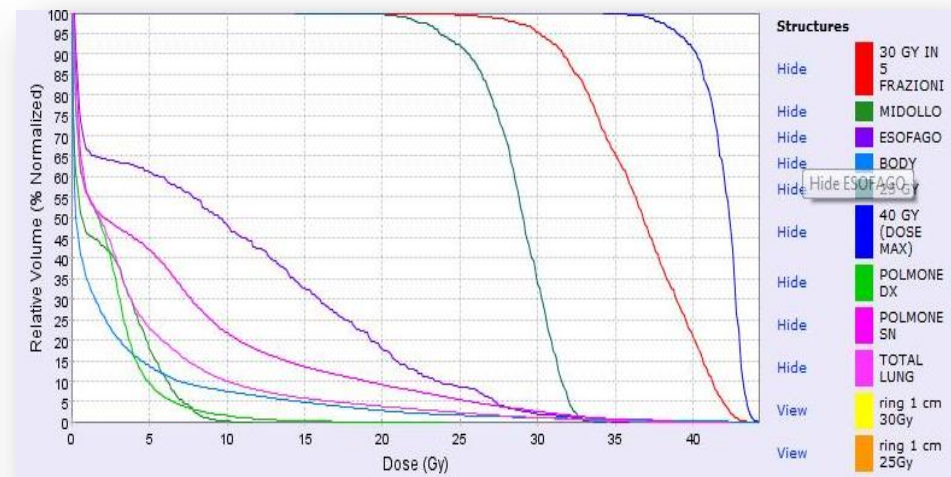
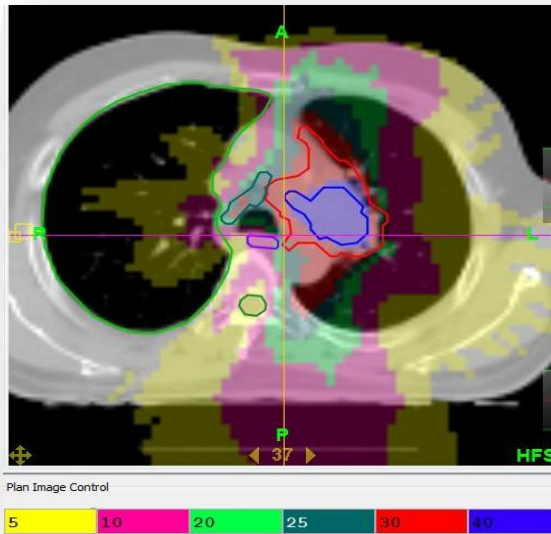
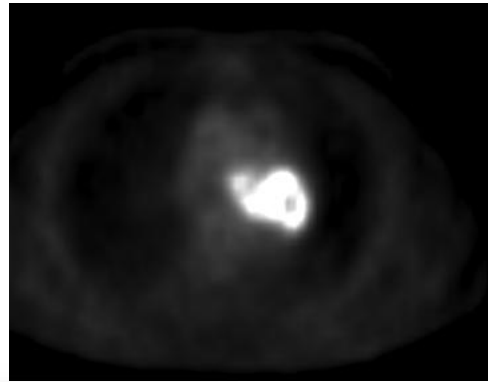
☐ Initiate Full Dose after 20 iterations.

Start **Pause** **Resume** **Get Full Dose** **Cancel**

Dose-Volume Histogram - Cumulative Mode Relative

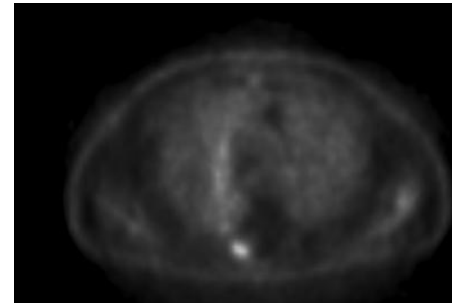
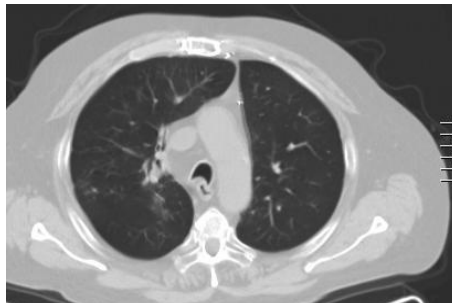
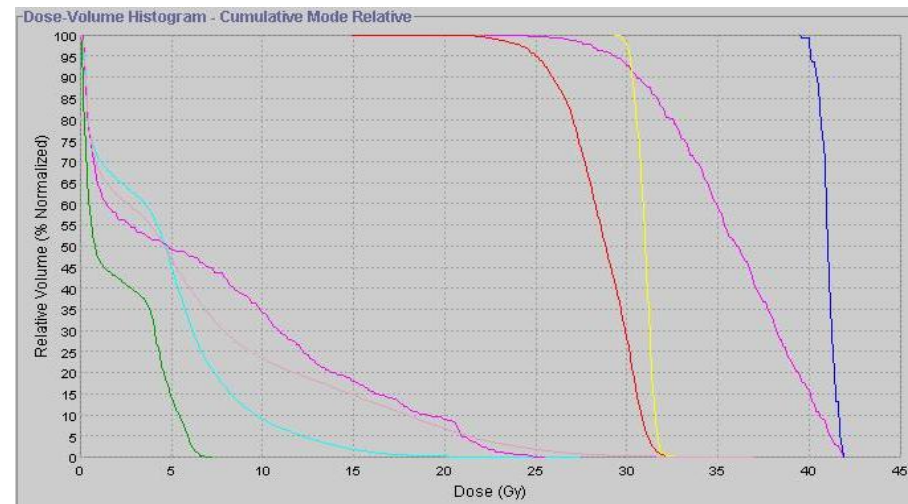
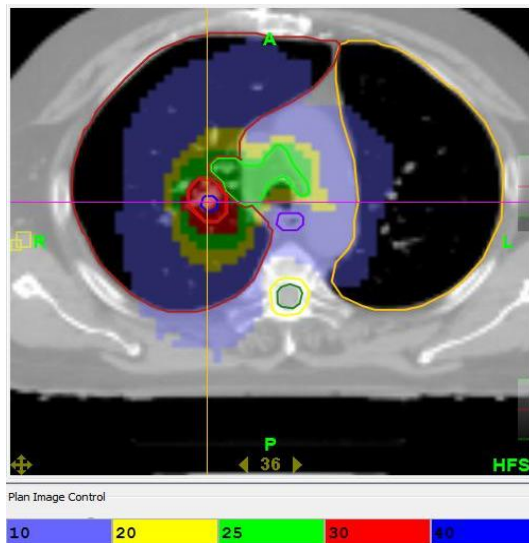
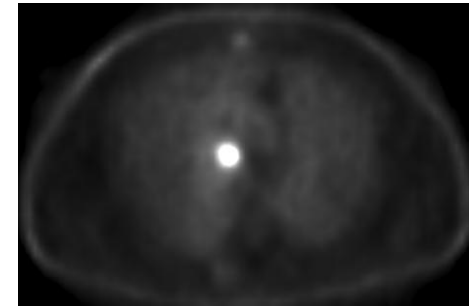
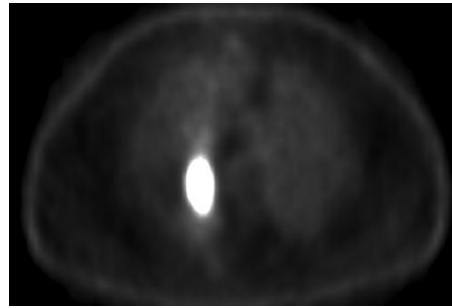
Vol Min < 0.0 > Vol Max < Gy Min < 0.0 > Gy Max < 45.0 >

Protocollo polmone IRST



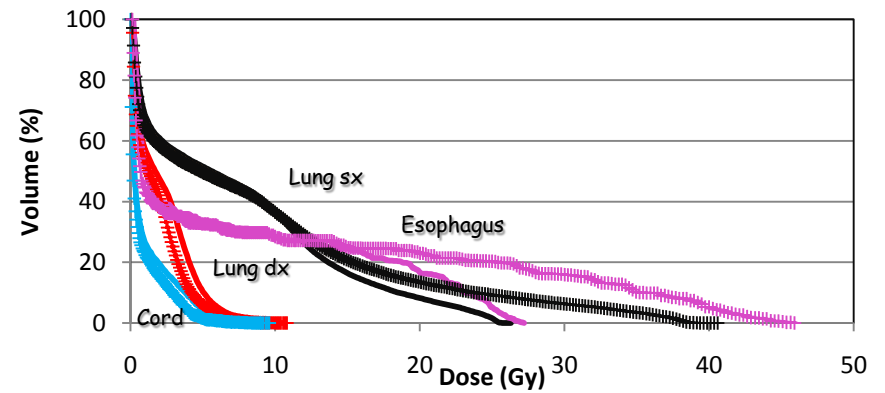
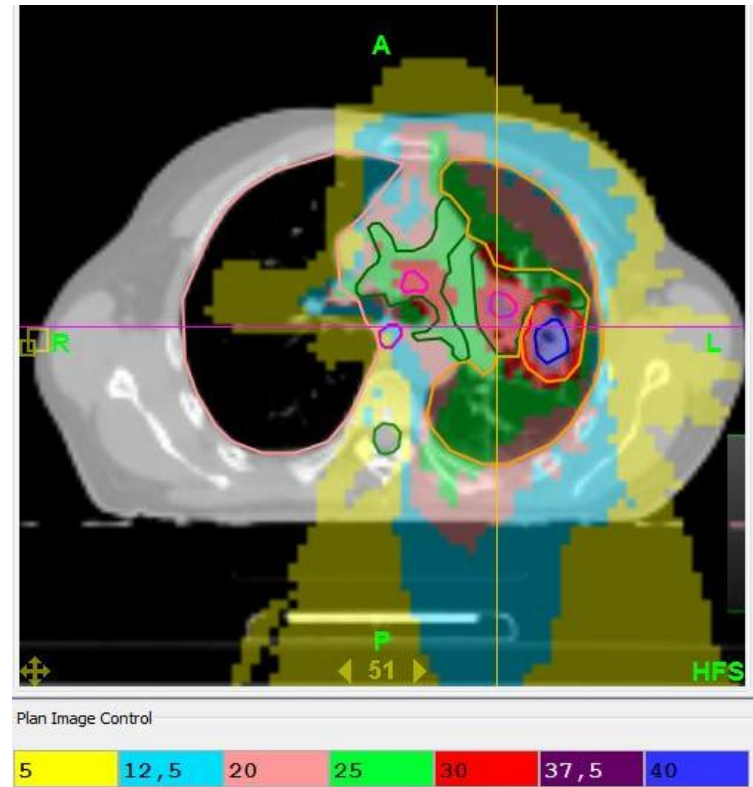
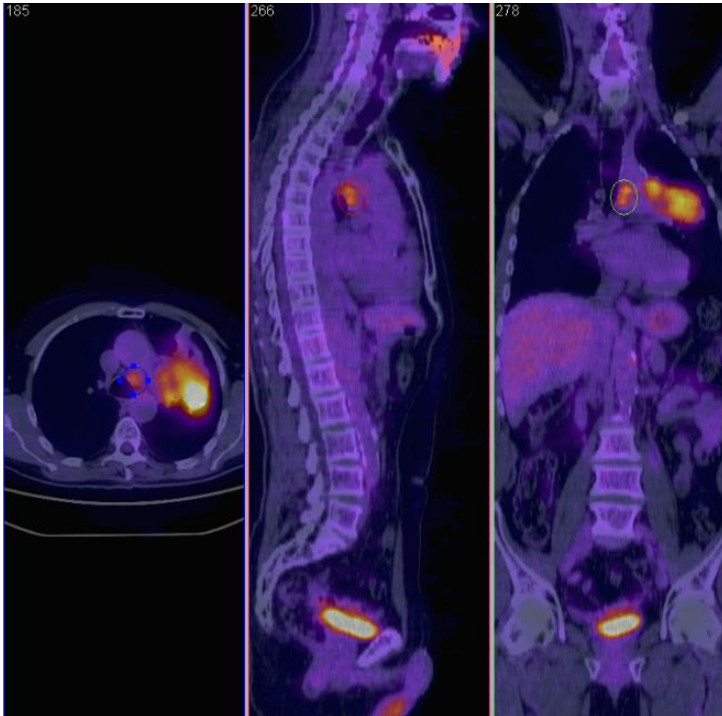
Protocollo polmone IRST

ISTITUT
SCIENTIFIC
ROMAGNOL
PER LO STUDI
DEI TUM
E LA CURA
RI



Protocollo polmone IRST

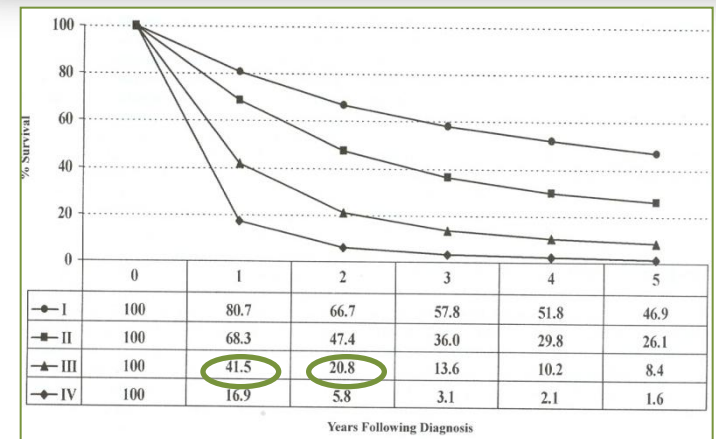
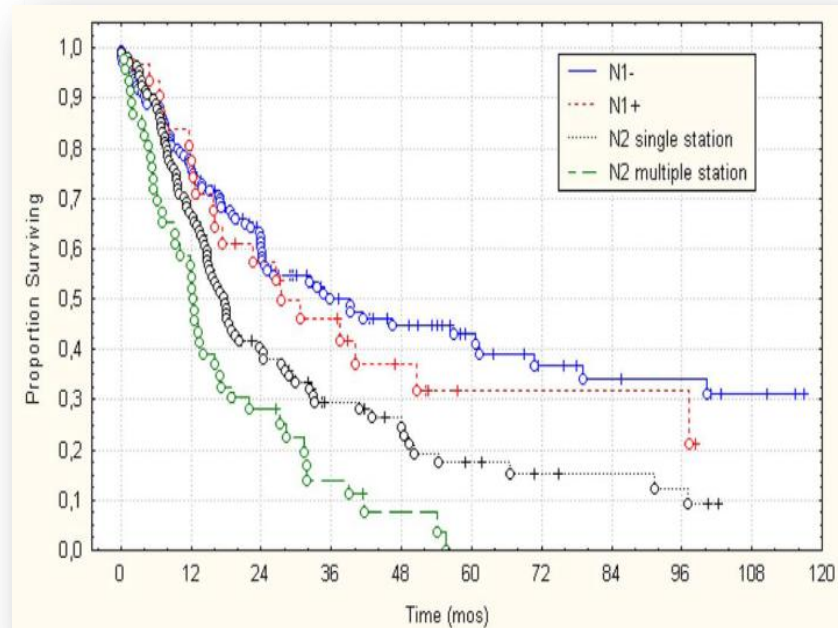
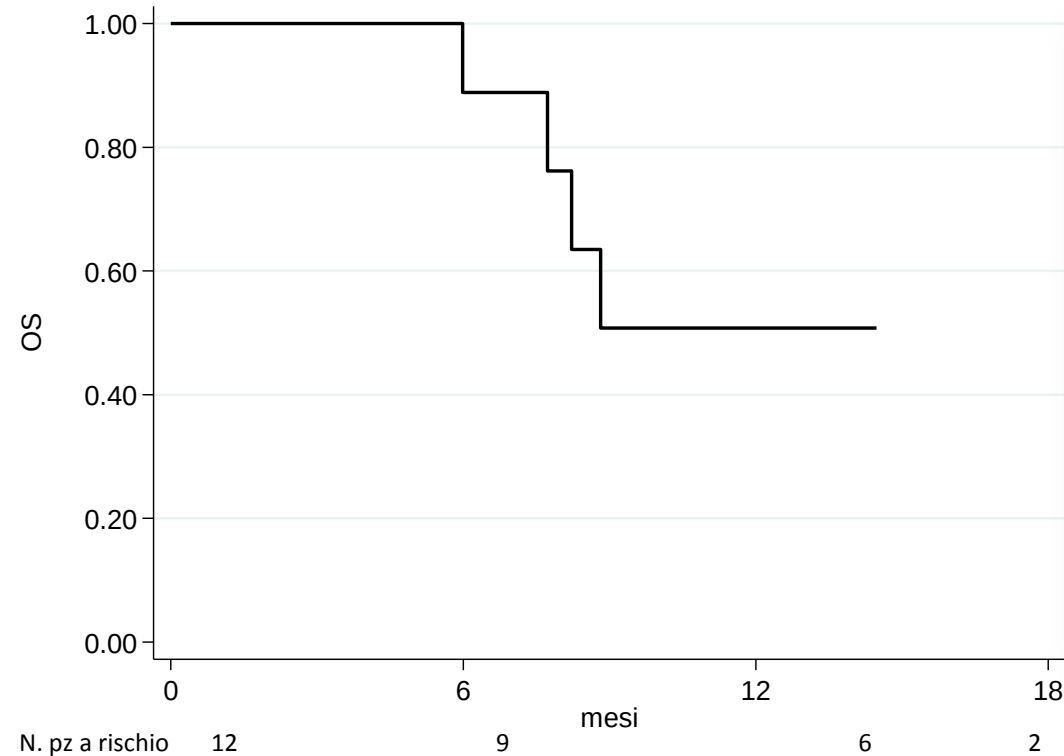
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PER LO STUDI
DEI TUM
E LA CURA
RI



Protocollo polmone IRST

Overall Survival

(follow-up mediano: 17 mesi, range 1-20)



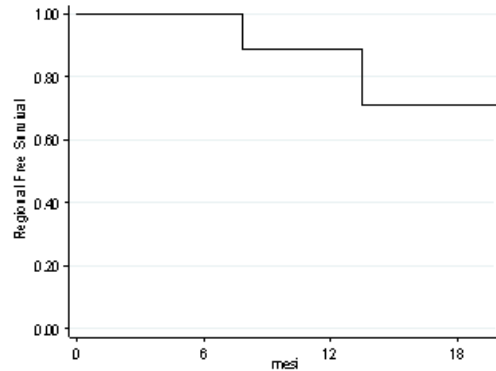
Prognostic significance of main bronchial lymphnodes involvement in non-small cell lungcarcinoma: N1 or N2?

Federico Rea*, Giuseppe Marulli, Donatella Callegaro, Andrea Zuin, Tobia Gobbi, Monica Loy, Francesco Sartori Lung Cancer (2004) 45, 215–220

National Cancer Data Base (Commission on Cancer American College of Surgeons and American Cancer Society)

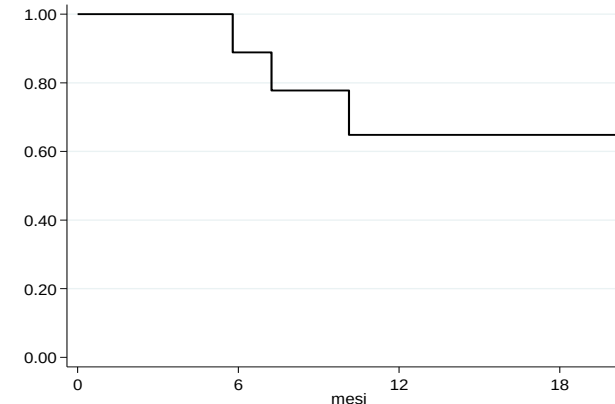
Protocollo polmone IRST

Regional Free Survival



N. pz a rischio 12 9 6
2

Metastasis Free Survival



N. pz a rischio 12 8 5
2

casi	d fincur	d.uv	status	gg.surv	T.es	T.fin	Dw.st	N.es	N.fin	dw.st	st.es	dw.st	evol
1	30/05/2009	03/09/2009	1	235	4	0	si	3	0	si	IIIB	no	pr M
2	26/06/2009	25/04/2010	0	440	4	x(4)	no	2	0	si	IIIB	no	
3	07/08/2009	25/04/2010	0	395	2	0	si	2	0	si	IIIA	si	ycT0N0M0
4	29/07/2009	25/04/2010	0	370	4	0	si	3	0	si	IIIB	si	ypT0N0M0
5	04/08/2009	25/04/2010	0	376	4	x(2)	si	3	0	si	IIIB	si	ycT2N0M0
6	13/10/2009	25/12/2009	1	250	4	4	no	2	2	no	IIIB	no	pr T
7	16/10/2009	nv	0	#VALORE!									
8	20/11/2009	25/04/2010	0	268	4	x(4)	no	2	0	si	IIIB	no	
9	no	nv	0	#VALORE!									
10	16/03/2010	25/04/2010	0	206	4	x(4)	no	2	0	si	IIIB	no	
11	19/03/2010	25/04/2010	0	182	4	x(4)	no	2	2	no	IIIB	no	pr M

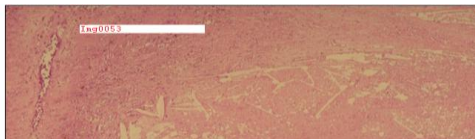
Resezioni polmonari dopo radioterapia ad alte dosi (RT P.A.M.)

VITTORE PAGAN, ROLANDO POLICO*, ROBERTO MORETTI, ALESSANDRO BUSETTO, GIANBEPPI PIZZIZ*, LANFRANCO STEA"

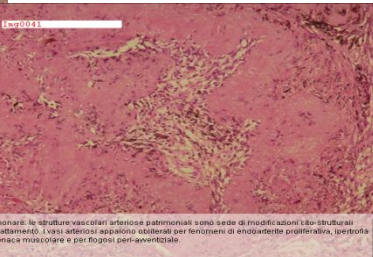
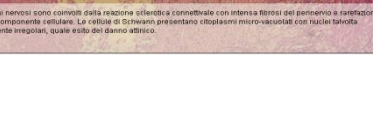
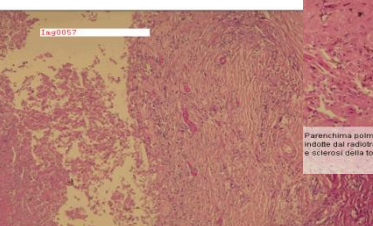
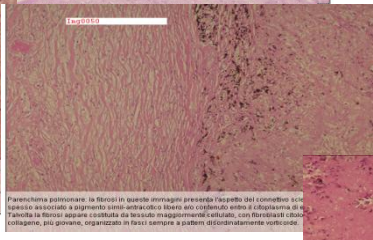
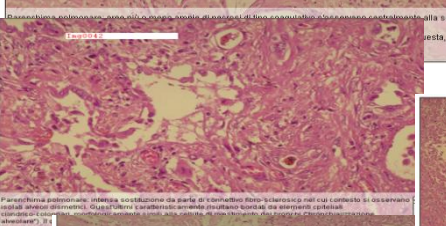
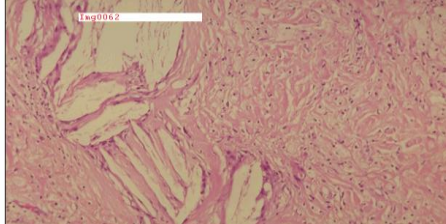
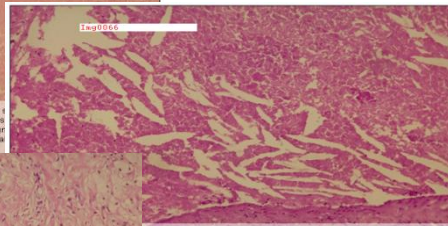
*Ospedale di Venew-Mestre U.O. Chirurgici Toracica * U.O. Radioterapia Oncologica 0 il.O. Fisica Sanitaria*
ARCHIVIO DI CHIRURGIA TORACICA E CARDIOVASCOLARE Voi. XX - N. 6 - Novembre-Dicembre 1998

La PAM risulta maggiormente efficace sulle neoplasie a differenziazione squamosa, mentre le forme adenocarcinomatose mostrano una maggiore resistenza alla terapia anche nella zona a massima dose.

Gli effetti della necrosi attinica sono limitati, con intensità diversa, al perimetro di applicazione della terapia radiante con scarsi e trascurabili danni al parenchima polmonare attiguo e sulla pleura, a differenza di quanto si osserva nella radioterapia convenzionale ove i danni attinici sono così diffusi da determinare esiti fibro-adesivi.



Parenchima polmonare: area più o meno ampia di necrosi di tipo coagulativo e dell'irradiazione. La necrosi appare marginata da un tessuto sclerotico e fibroso pseudo-capsula a perfetto andamento concentrico, spesso "spruzzata" da pigri talvolta, comprime il pericardio bronchiale, erodendo ed assottigliando l'iride.



Neoplasia della pleura

No Photo

DOB: Jan 26, 1977 Sex: M

ID: 20090150

Plan date: Apr 9, 2009 9:37:12 AM

Oncologist:

Disease: 7979

Plan: Plan_02

Plan status: Approved

DQA plan:

Patient position: HFS

Adjust Fractionization Schedule

- ➔ Modify the fraction count or adjust details for each fraction as necessary.
- ➔ Run Final Dose.
- ⓘ When you are satisfied with the plan, click Final Accept.

ROIs Optimization Fractionation Delivery QA Setup Delivery QA Analysis

Fraction Count: 5

The plan has 5 fractions defined for a planned delivery of 25.0 Gy.
90.0% of the 25 Gy 5 fractions volume receives at least 25.0 Gy for the current plan.
Modulation factor for this tomotherapy IMRT plan is 1.354

Fraction	Locked	Fraction Date
1	☐	April 09, 2009
2	☐	April 10, 2009
3	☐	April 11, 2009
4	☐	April 12, 2009
5	☐	April 13, 2009

Fraction 2
Gantry Period: -- sec
Duration: 2080.94 sec

Unlock All Fractions

Dose Display

☒ Isodose

25
20
15
10
5

Patient Images

Finalize

Final Dose

Final Accept

Plan Report

Dose-Volume Histogram - Cumulative Mode Relative

Vol Min < 0.0 > Vol Max Gy Min < 0.0 > Gy Max < 35.0 >

Tumor Settings

Name	Display	Color
25 Gy 5 fr	☒	Red
total lung	☒	Green

Sensitive Structure Settings

Name	Display	Color
polmone sn	☒	Red
Lung_R1	☒	Green
Cord3	☒	Blue
esofago	☒	Purple
body	☐	Yellow
cuore	☐	Orange
dose minim	☒	Dark Blue
tiroide	☐	Light Blue

Neoplasia della pleura

No Photo

DOB: 1946 Sex: F Plan: Plan_01

ID: 200800112 Plan status: **Approved**

Plan date: May 21, 2008 1:25:31 PM DQA plan:

Oncologist: Patient position: HFS

Disease: 4581

Adjust Fractionization Schedule

- Modify the fraction count or adjust details for each fraction as necessary.
- Run **Final Dose**.
- When you are satisfied with the plan, click Final Accept.

ROIs Optimization Fractionation Delivery QA Setup Delivery QA Analysis

Fraction Count: 10

The plan has 10 fractions defined for a planned delivery of 25.0 Gy.
% of the 25 Gy 5 fraction volume receives at least 25.0 Gy for the current
Modulation factor for this tomotherapy IMRT plan is 2.786

Unlock All Fractions

Fraction	Locked	Fraction Date	Fraction	Locked	Fraction Date
1	☐	May 26, 2008			
2	☐	May 27, 2008			
3	☐	May 28, 2008			
4	☐	May 29, 2008			
5	☐	May 30, 2008			
6	☐	June 02, 2008			
7	☐	June 03, 2008			
8	☐	June 04, 2008			
9	☐	June 05, 2008			
10	☐	June 06, 2008			

Dose Display

☒ Isodose

25

22.5

20

10

Patient Images

Finalize

Final Dose

Final Accept

Plan Report

Tumor Settings

Name	Display	Color
25 Gy 5 fr	☒	Red
CONTENIME	☒	Blue
Total Lung	☒	Cyan

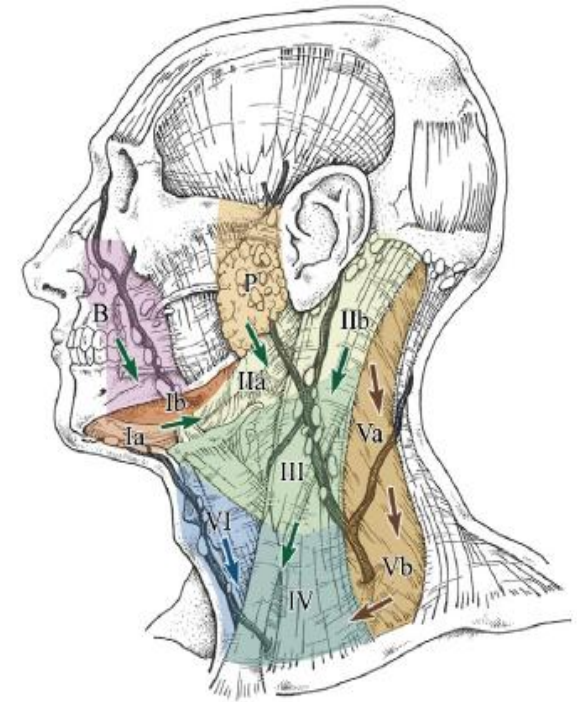
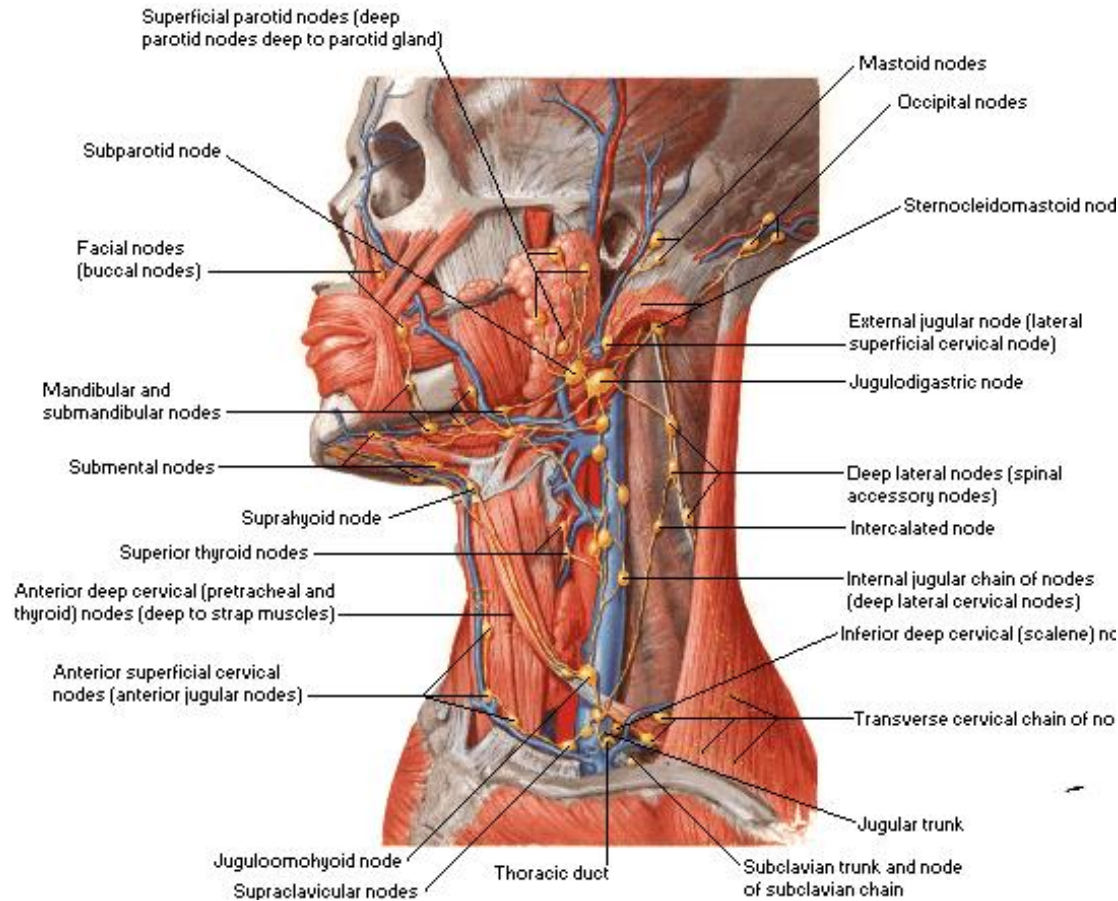
Sensitive Structure Settings

Name	Display	Color
POLMONE S	☒	Red
BODY	☐	Green
MIDOLLO	☒	Green
ESOFAGO	☒	Purple
POLMONE D	☒	Orange
COUCH	☐	Blue
CUORE	☒	Yellow
FEGATO	☒	Magenta

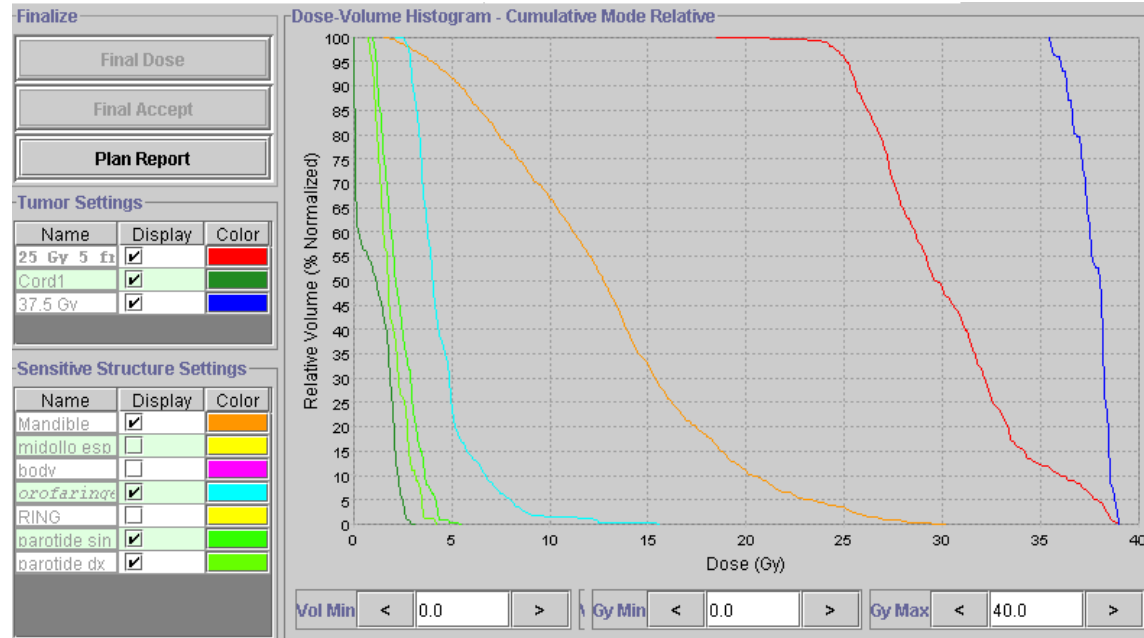
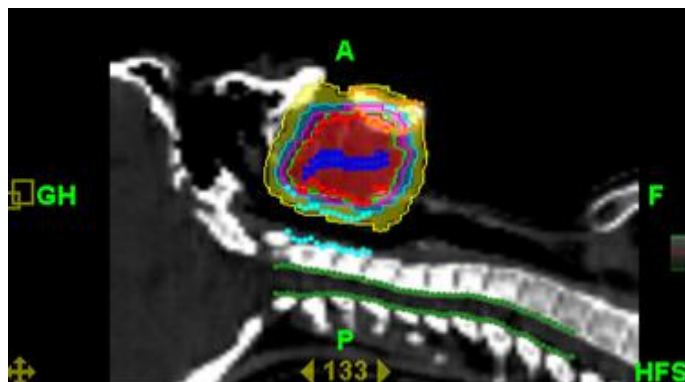
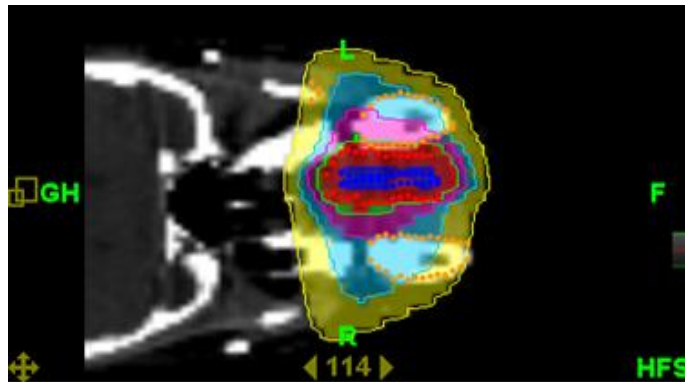
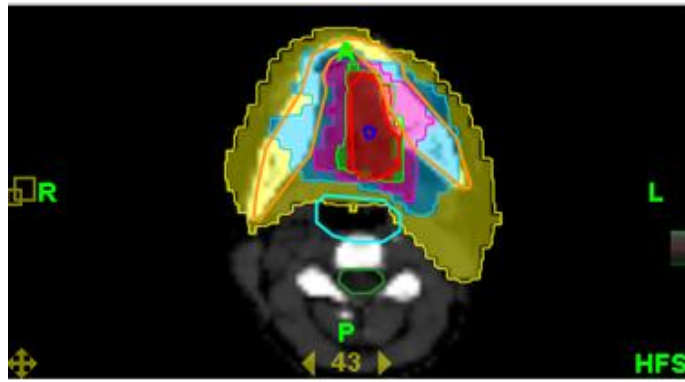
Dose-Volume Histogram - Cumulative Mode Relative

Vol Min < 0.0 Gy Min < 0.0 Gy Max < 30.0

Neoplasie del distretto testa-collo



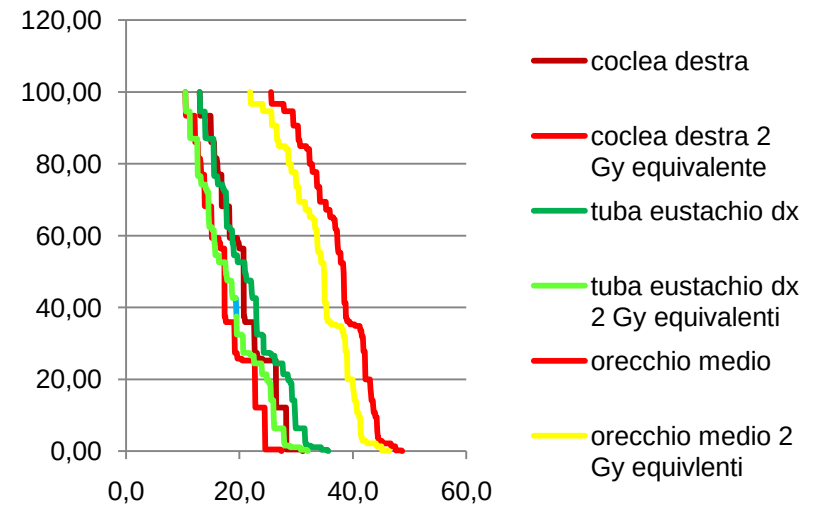
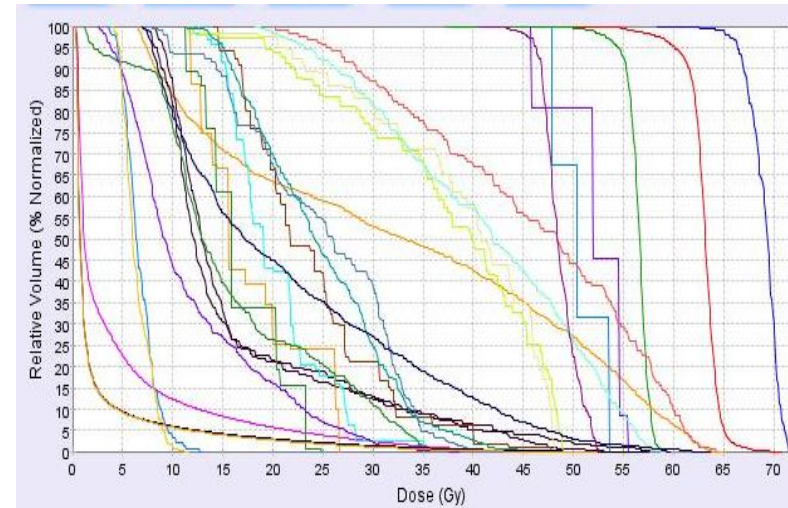
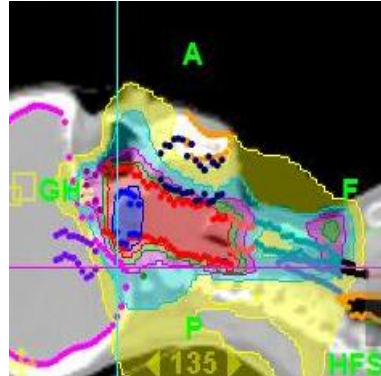
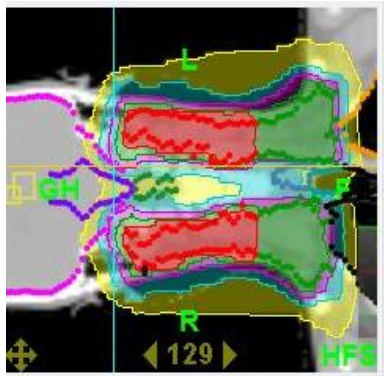
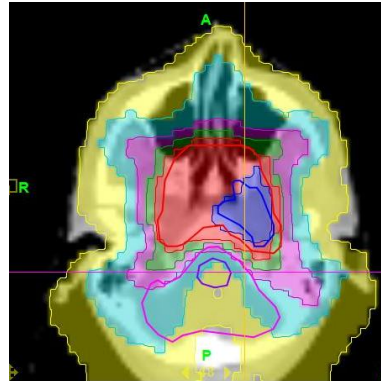
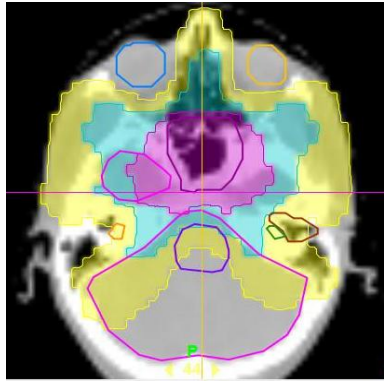
Neoplasia della lingua



Sensitive Structure Constraints

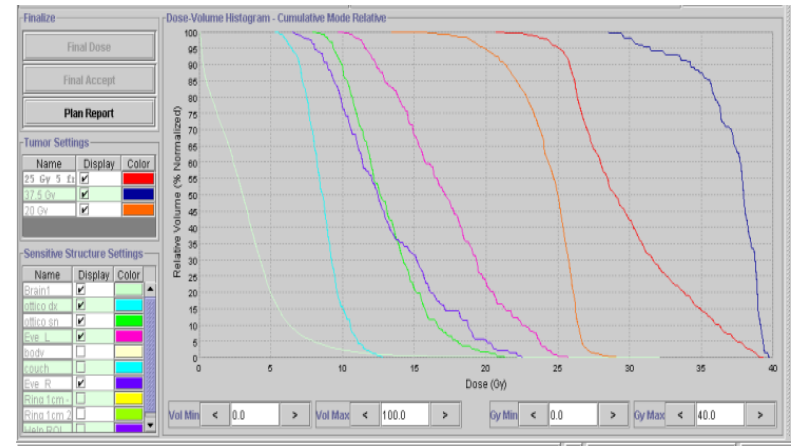
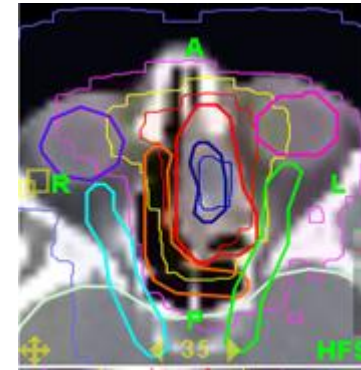
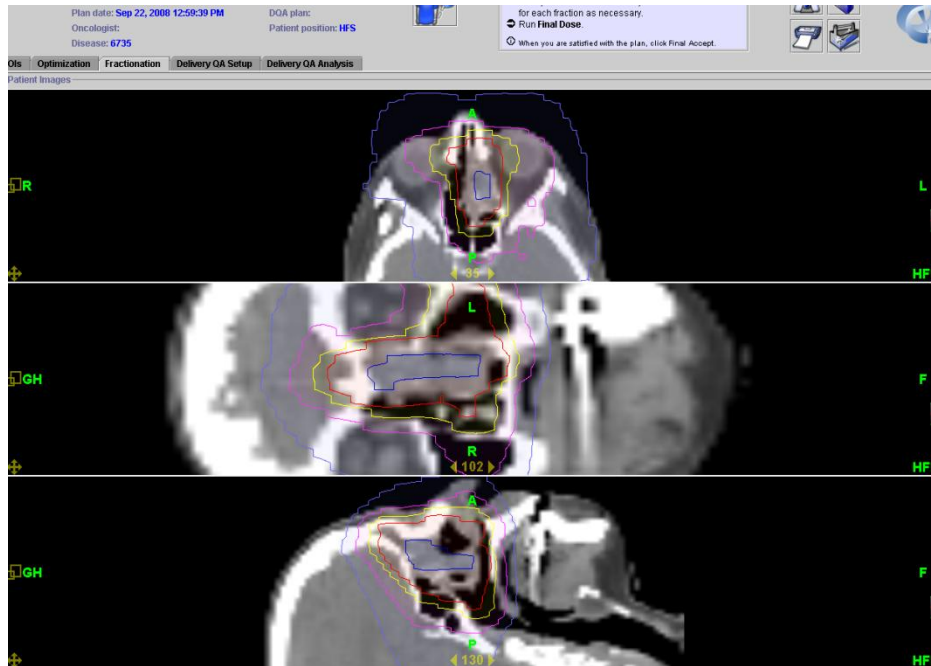
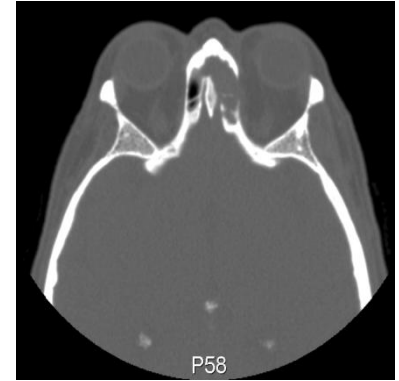
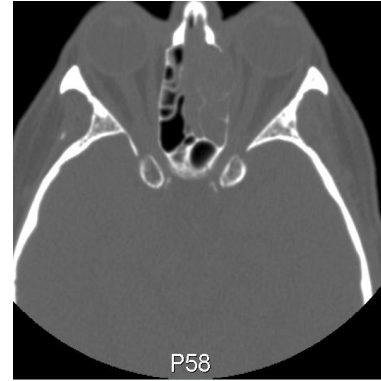
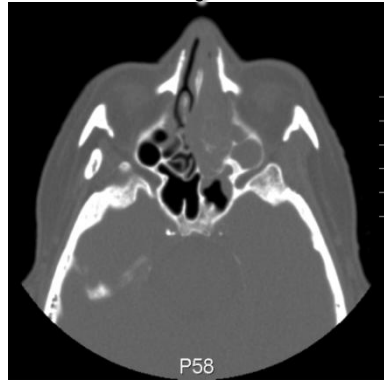
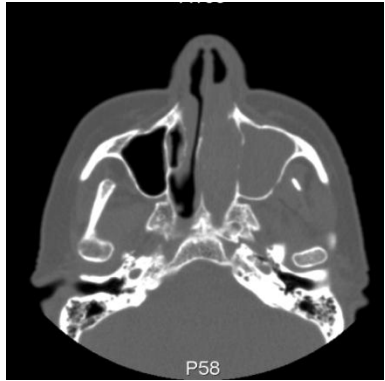
Name	Blocked	Use?	Importance	Overlap Priority	Max Dose Constr. [Gy]	Max Dose Pen.	DVH Vol [%]	DVH Dose [Gy]	DVH Rt. Pen.	Max Dose [Gy]	Min Dose [Gy]	Median Dose [Gy]	Avg Dose [Gy]	StdDev Dose [Gy]	Physical Vol [cc]
Mandible	None	yes	1	2	100	1	100	100	1	30.16	1.64	12.82	12.82	5.71	73.79
orofaringe	DIRECTIO...	yes	1500	3	15.00	500	20.00	5.00	1500	15.53	2.26	4.12	4.59	1.69	23.40
parotide sin	None	yes	100	4	4.00	500	10.00	3.00	500	5.40	1.04	2.20	2.38	0.93	3.30
parotide dx	None	yes	100	5	4.00	500	10.00	3.00	500	4.18	0.82	1.79	1.97	0.80	2.93

Neoplasia del rinofaringe

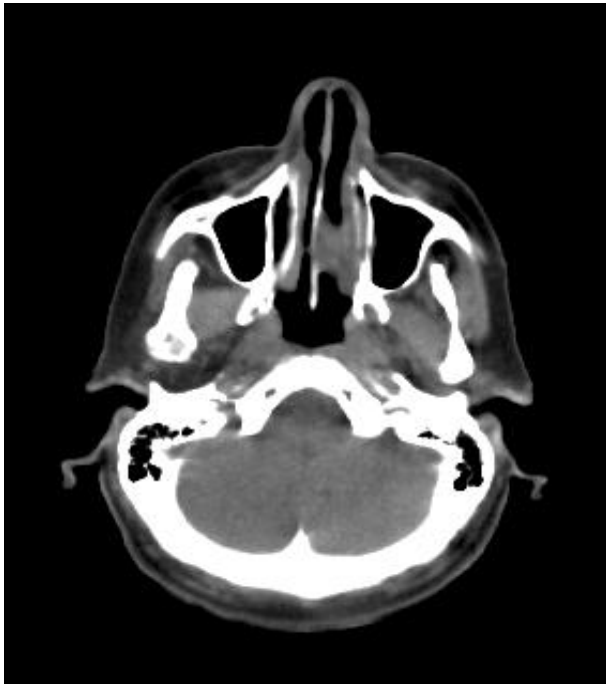


Neoplasie delle fosse nasali e dei seni paranasali

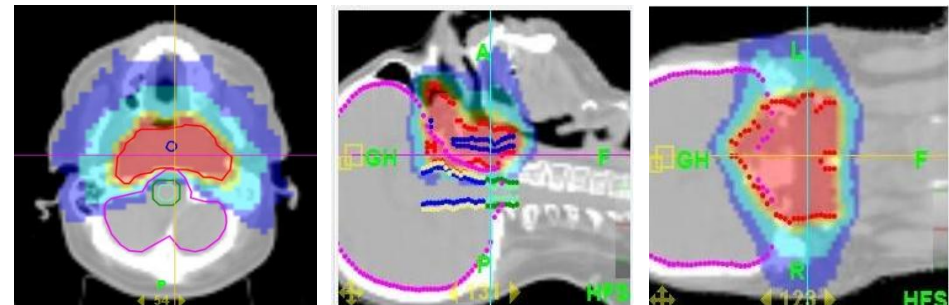
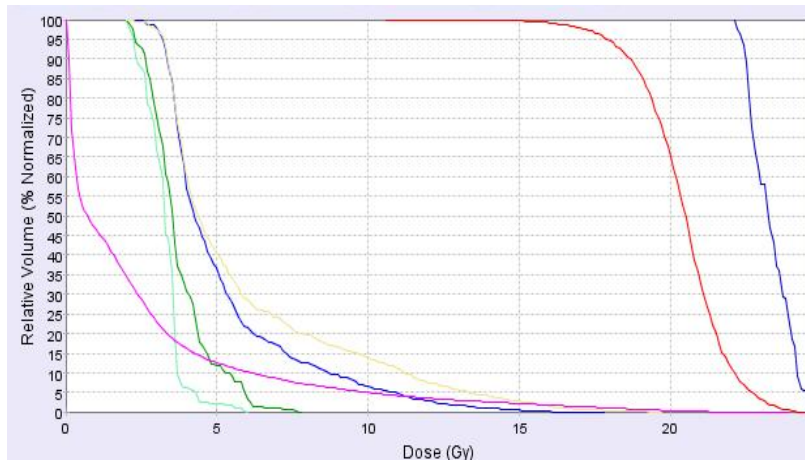
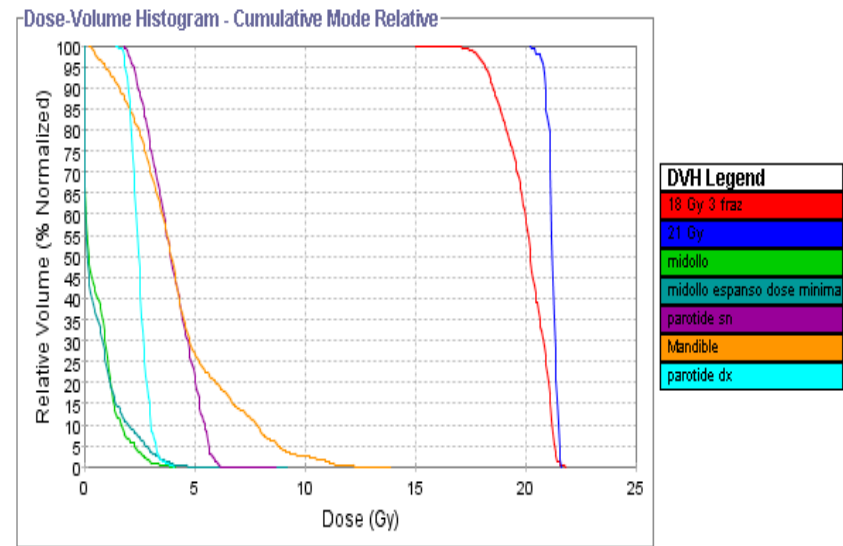
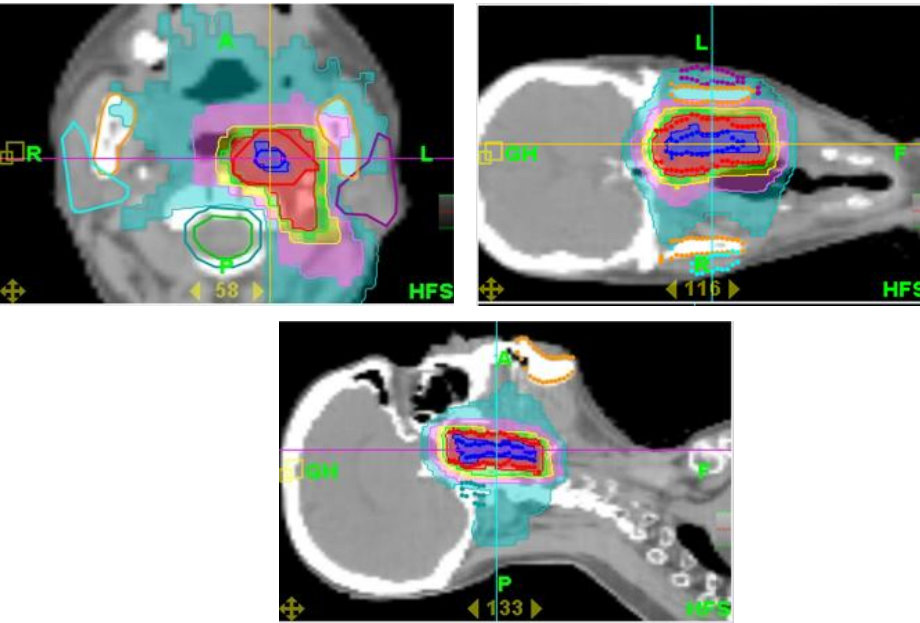
ISTITUT
SCIENTIFIC
ROMAGNOL
PER LO STUDI
DEI TUMORI E LA CURA



Rivalutazione post RT a 6 mesi

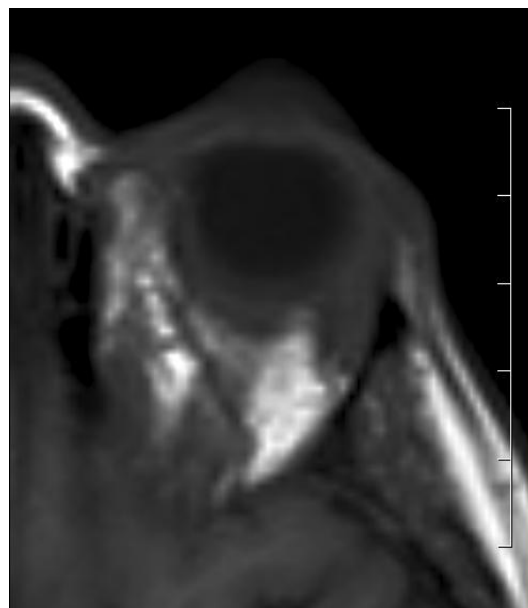
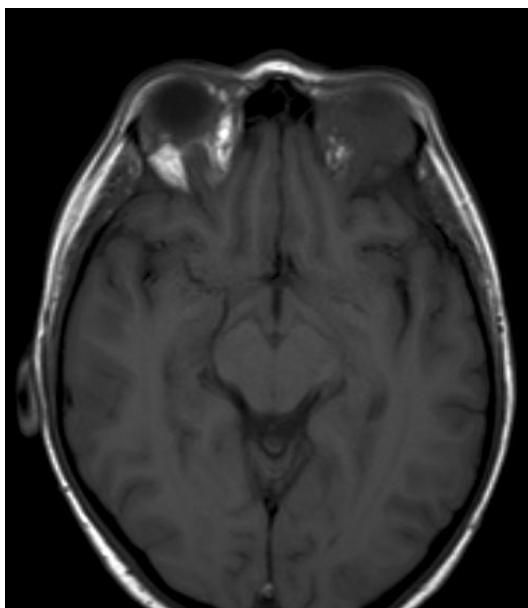
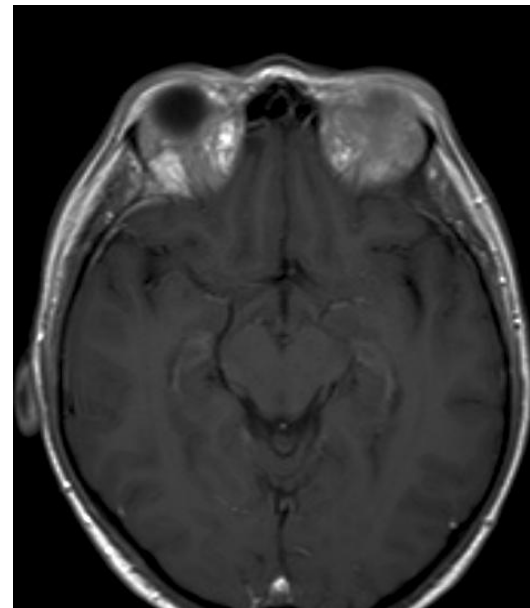
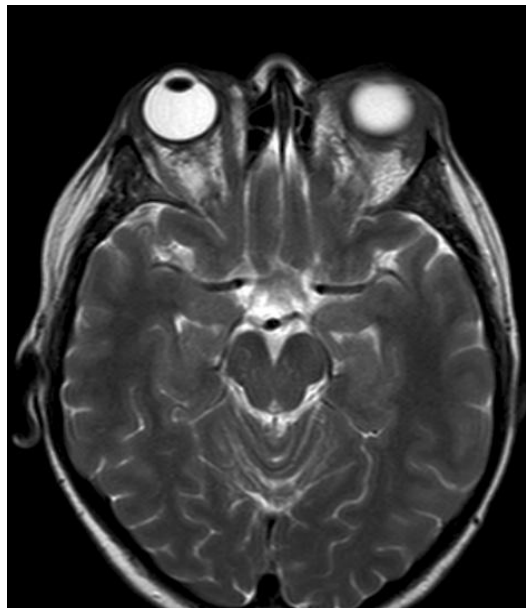


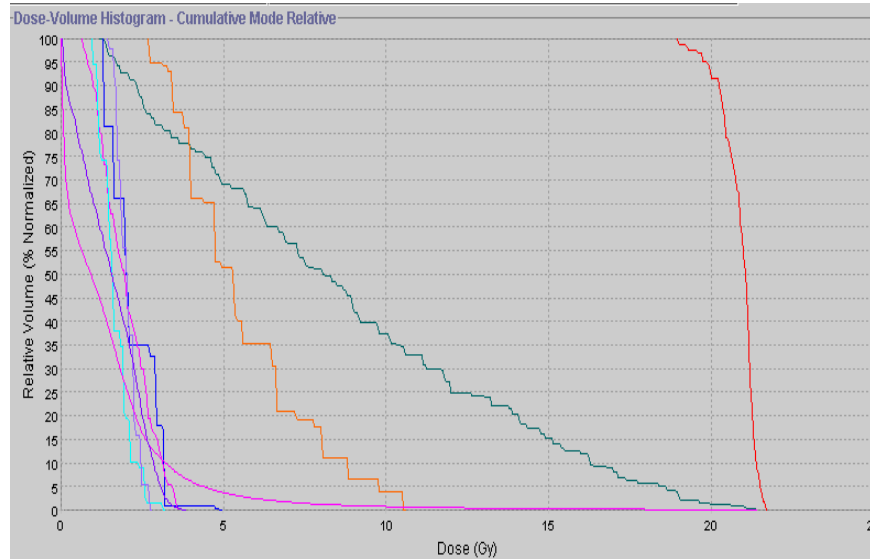
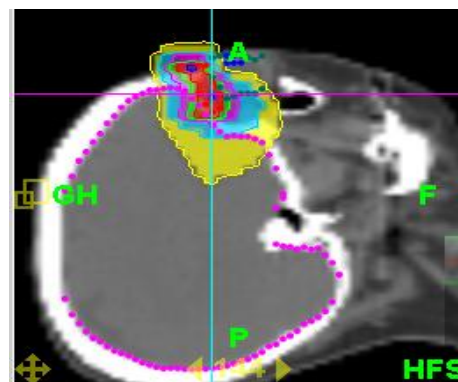
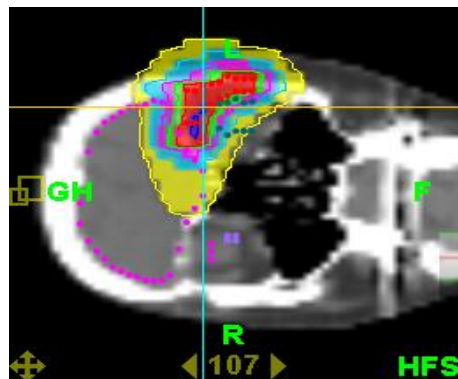
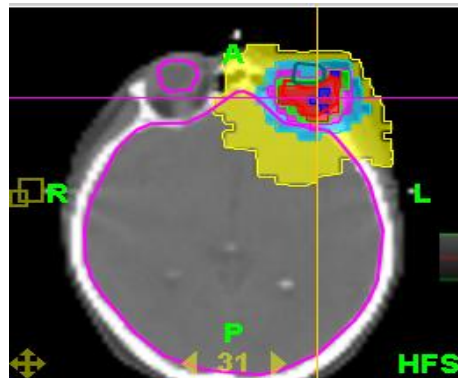
Re-irradiazione



Name	Color
18 Gy 3 frazioni	
midollo spinale	
brainstem	
24 Gy	

Metastasi retrorbitaria





DVH Legend	
20 Gy in 4 frazioni	
occhio sin	
cristallino sin	
n o sin	
occhio dx	
cristallino dx	
n o dx	
Brain2	
Brainstem	

Plan Report: I.R.S.T. Meldola

Patient Name:

Patient ID: 20100385

Plan Name: Plan_01



Tumor Constraints

Name	Blocked	Use?	Importance	Overlap Priority	Max Dose Constr. [Gy]	Max Dose Pen.	DVH Vol [%]	DVH Dose [Gy]	Min. Dose Constr. [Gy]	Min. Dose Pen.	Max Dose [Gy]	Min. Dose [Gy]	Median Dose [Gy]	Avg Dose [Gy]	StdDev Dose [Gy]	Physical Vol [cc]
20 Gy in 4 frazioni	None	yes	140	1	20.00	50,000	95.00	20.00	20.00	9,000	21.69	18.97	21.07	20.90	0.53	4.00

Sensitive Structure Constraints

Name	Blocked	Use?	Importance	Overlap Priority	Max Dose Constr. [Gy]	Max Dose Pen.	DVH Vol [%]	DVH Dose [Gy]	DVH H Pen.	Max Dose [Gy]	Min. Dose [Gy]	Median Dose [Gy]	Avg Dose [Gy]	StdDev Dose [Gy]	Physical Vol [cc]
occhio sin	None	yes	150	3	20.00	150	60.00	6.00	2,500	21.37	1.22	8.13	8.72	5.21	6.43
cristallino sin	None	yes	200	1	4.00	5,000	25.00	3.00	2,500	4.93	1.34	2.04	2.24	0.74	0.29
n o sin	None	yes	150	5	10.00	500	35.00	5.00	500	10.58	2.74	5.45	5.60	2.05	0.61
occhio dx	None	yes	100	4	4.00	500	40.00	3.00	500	3.75	0.66	1.97	2.00	0.79	6.20
cristallino dx	None	yes	100	2	3.00	1,000	40.00	2.00	1,000	3.19	0.99	1.63	1.71	0.48	0.30
n o dx	None	yes	100	6	3.00	1,000	40.00	2.00	1,000	2.77	1.49	2.05	2.07	0.31	0.37
Brain2	None	yes	1	8	1.00	1	1.00	1.00	1	21.38	0.05	0.97	1.45	1.83	1,306.84
Brainstem	None	yes	1	7	1.00	1	1.00	1.00	1	3.83	0.10	1.62	1.60	0.98	27.67
body	None	yes	1	10	1.00	1	1.00	1.00	1	21.69	0.02	0.08	0.63	1.81	2,139.93
Ring 1 cm	None	yes	30	9	20.00	150	25.00	16.00	150	22.09	3.06	15.54	14.94	4.57	18.61

Pitch:

0.173

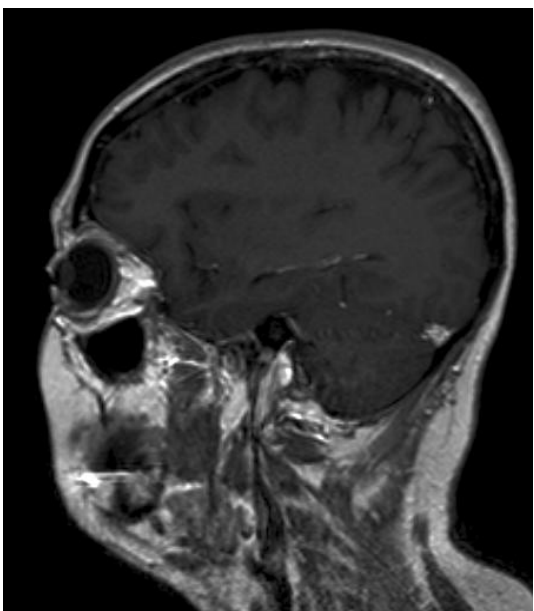
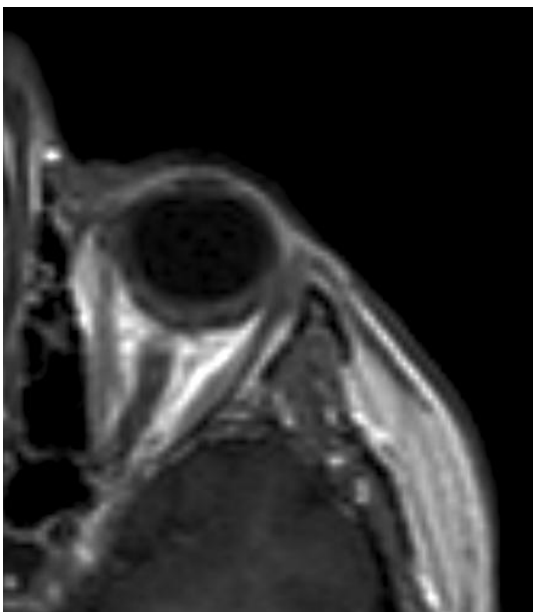
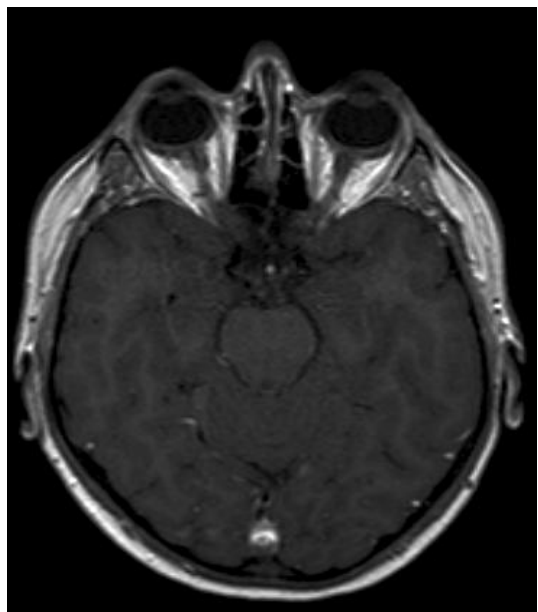
Planning Modulation Factor (Actual):

3.500 (2.120)

Gennaio 2010

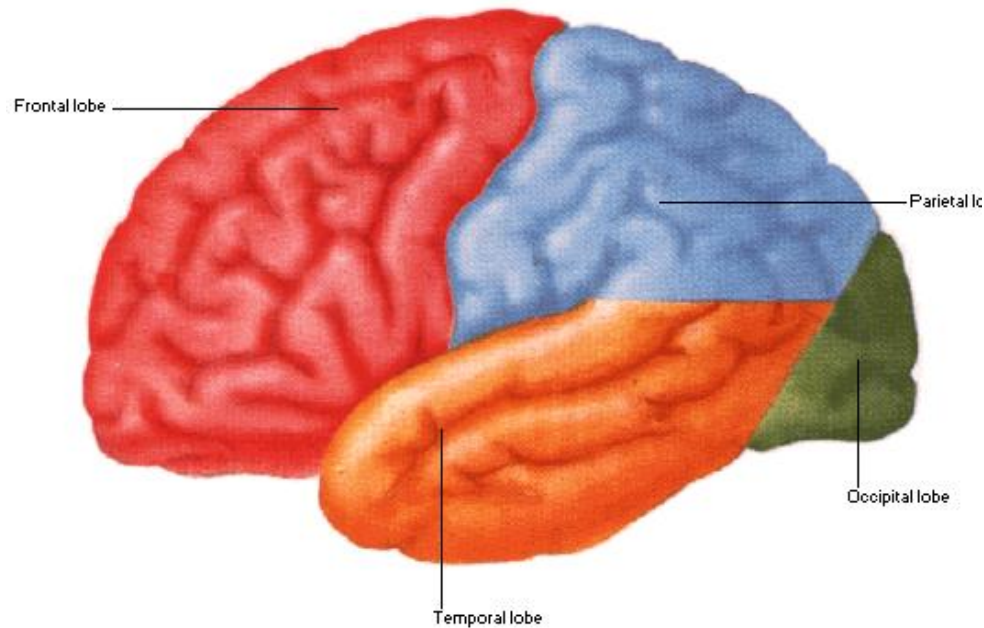


Rivalutazione a 10 mesi dalla RT

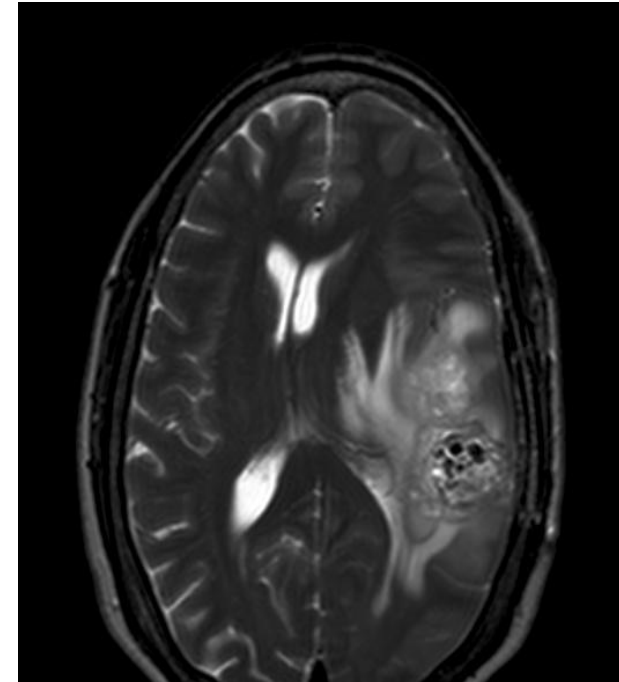
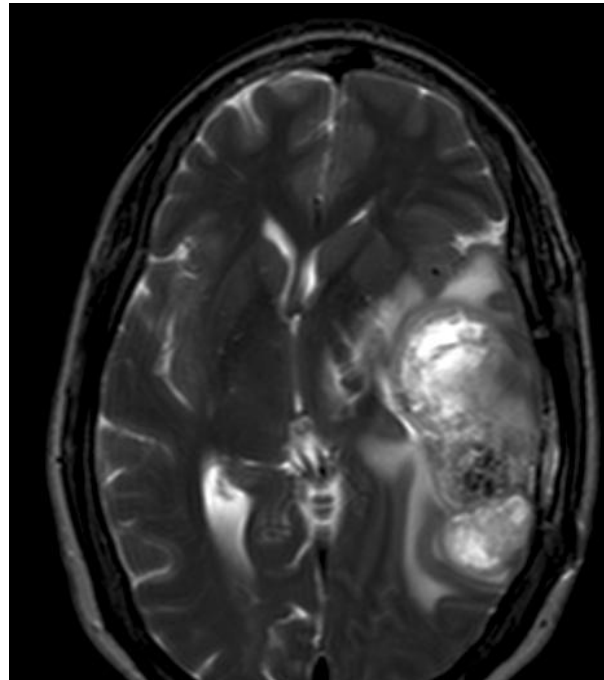
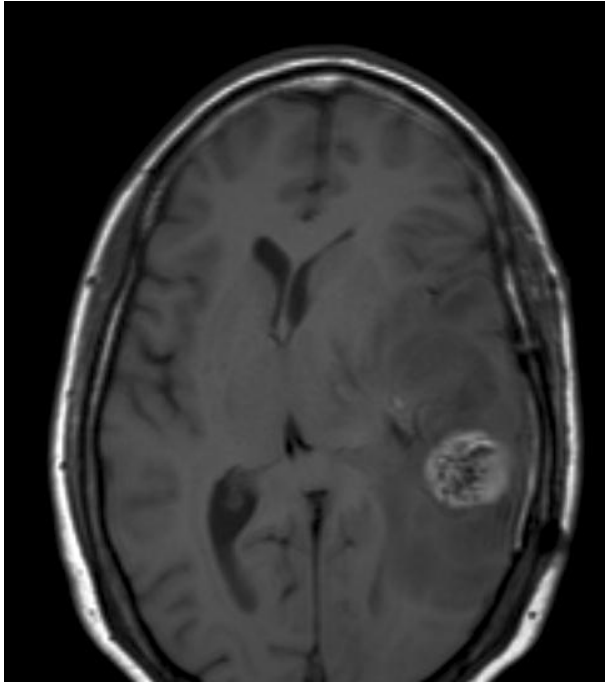


Neoplasie del SNC

Lateral View

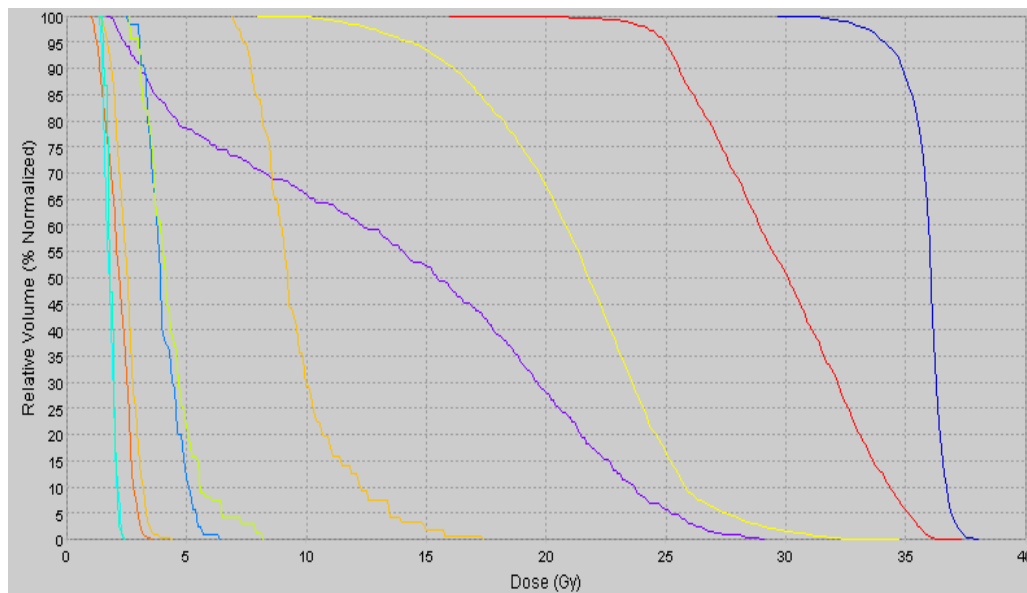
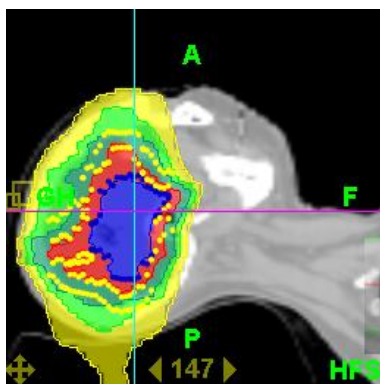
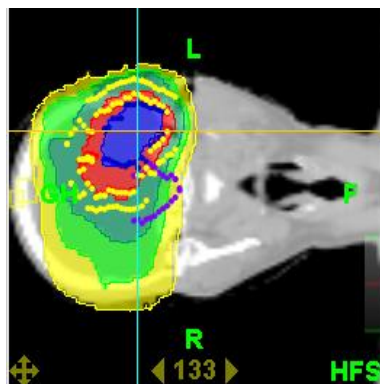
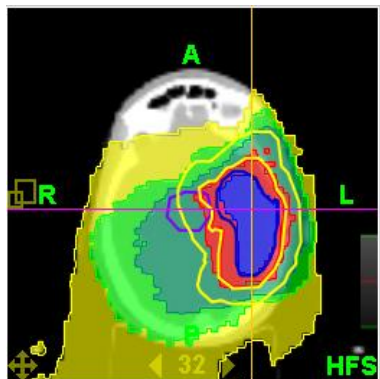


Glioblastoma multiforme



Giugno 2008

Glioblastoma multiforme



25 Gy 5 fraz
Eye_L
Eye_R
cristallino destro
cristallino sinistro
35 Gy
Brainstem
nervo ottico di destra
nervo ottico di sinistra
chiasma ottico
RING

Plan Report: I.R.S.T. Meldola
Patient Name:
Patient ID: 20080309BIS
Plan Name: Plan_01



Tumor Constraints

Name	Blocked	Use?	Importance	Overlap Priority	Max Dose Constr. [Gy]	Max Dose Pen.	DVH Vol [%]	DVH Dose [Gy]	Min Dose Constr. [Gy]	Min Dose Pen.	Max Dose [Gy]	Min Dose [Gy]	Median Dose [Gy]	Avg Dose [Gy]	StdDev Dose [Gy]	Physical Vol [cc]
25 Gy in 5 fr	None	yes	300	2	37.50	500	96.00	25.00	25.00	600	40.16	10.97	29.22	30.07	3.98	62.67
20 Gy in 5 fr	None	yes	300	3	20.00	300	97.00	20.00	20.00	300	31.54	6.97	21.44	22.00	1.92	101.11
37.5 Gy	None	yes	400	1	37.50	800	96.00	37.50	37.50	500	40.96	32.71	38.89	38.46	1.60	4.14

Sensitive Structure Constraints

Name	Blocked	Use?	Importance	Overlap Priority	Max Dose Constr. [Gy]	Max Dose Pen.	DVH Vol [%]	DVH Dose [Gy]	DVH R. Ref.	Max Dose [Gy]	Min Dose [Gy]	Median Dose [Gy]	Avg Dose [Gy]	StdDev Dose [Gy]	Physic Vol [cc]
Brain1	None	yes	1	3	1.00	1	1.00	1.00	1	40.96	0.80	10.18	12.53	7.72	1.08883
Eye_L	None	yes	500	6	3.00	500	1.00	1.00	1	3.71	0.49	1.36	1.54	0.83	5.15
Eye_R	None	yes	500	7	3.00	500	1.00	1.00	1	3.34	0.78	1.80	1.88	0.65	4.52
Lens_L	None	yes	500	4	2.00	500	1.00	1.00	1	1.69	0.93	1.45	1.28	0.24	0.14
Lens_R	None	yes	500	5	2.00	500	1.00	1.00	1	1.39	0.71	0.90	0.97	0.15	0.17
ottico dx	None	yes	500	8	5.00	500	1.00	1.00	1	5.42	2.06	3.53	3.66	0.78	1.26
ottico sn	None	yes	500	9	10.00	500	1.00	1.00	1	10.72	4.02	7.80	7.70	1.76	0.37
body	None	yes	1	11	1.00	1	1.00	1.00	1	25.01	0.13	0.78	2.72	3.51	2.32132
dose minima possible	DIRECT...	yes	1,500	1	8.00	1,500	1.00	1.00	1	10.14	0.76	4.21	4.22	1.38	16.52
RING	None	yes	80	10	25.00	100	25.00	16.00	100	25.04	8.36	16.36	16.46	2.39	64.24
chiasma	None	yes	500	2	10.00	500	1.00	1.00	1	10.83	5.81	8.49	8.21	1.11	0.51

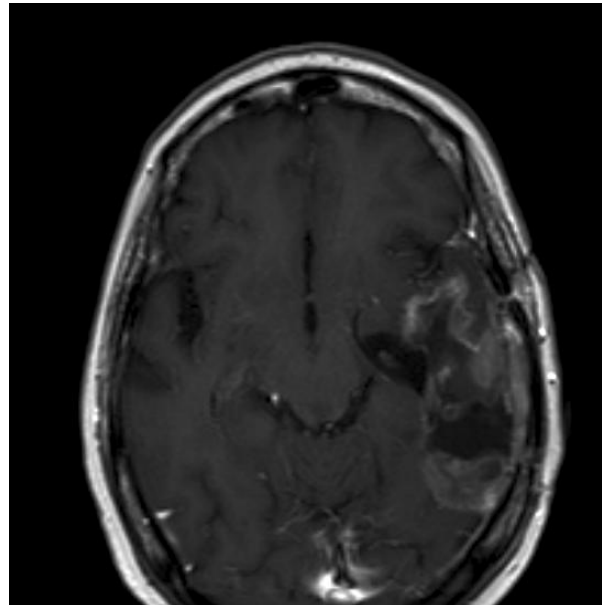
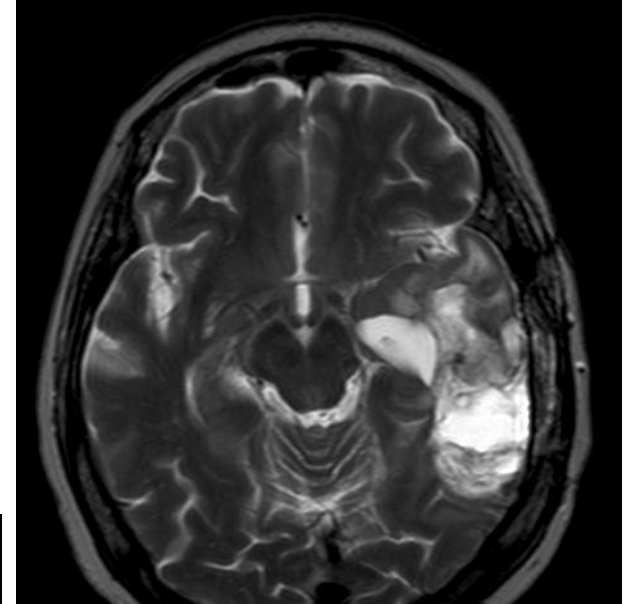
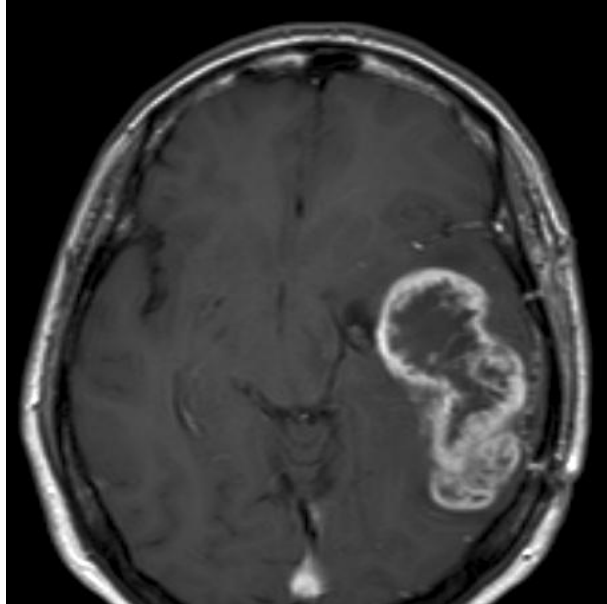
Pitch: 0.216

Planning Modulation Factor (Actual): 2.500 (1.476)

Luglio 2008

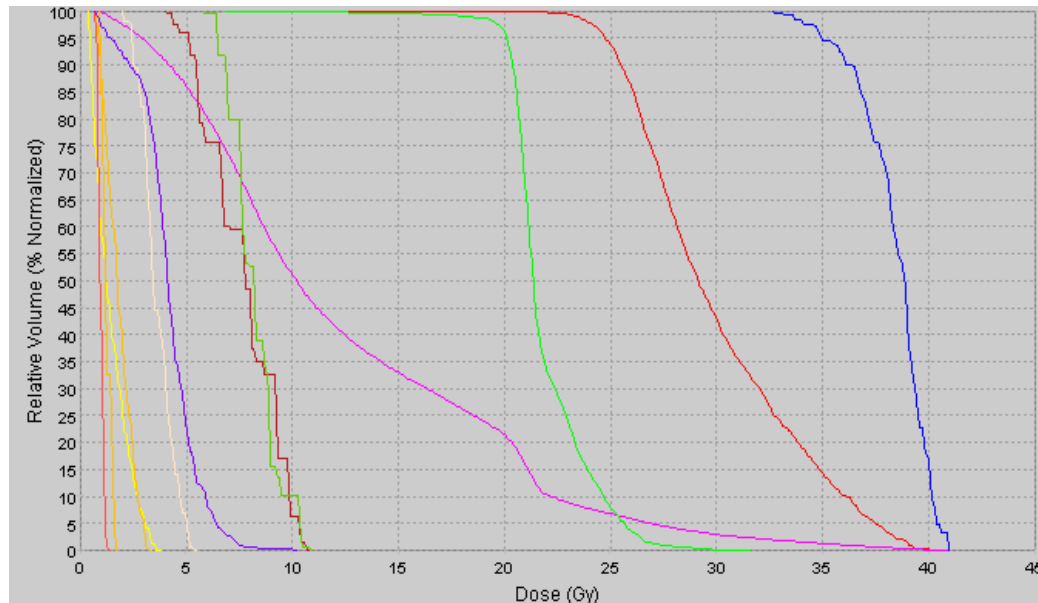
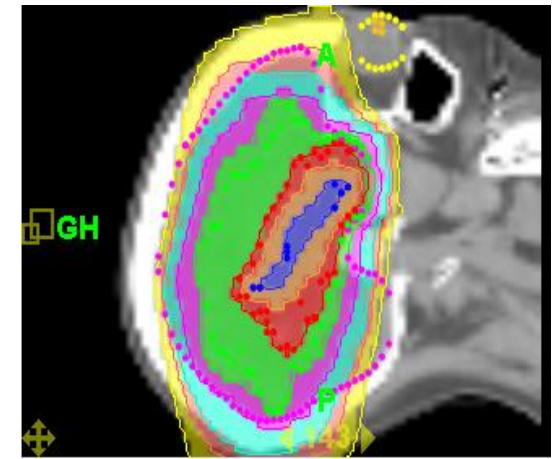
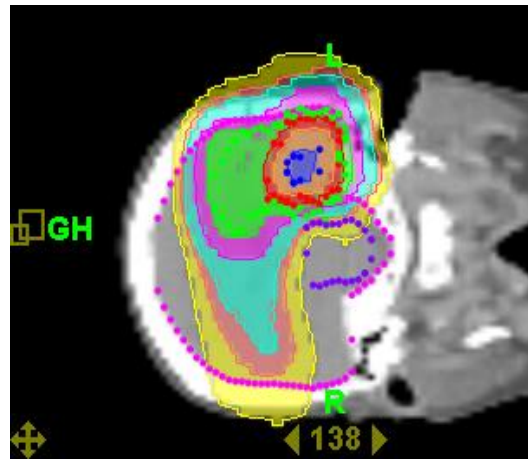
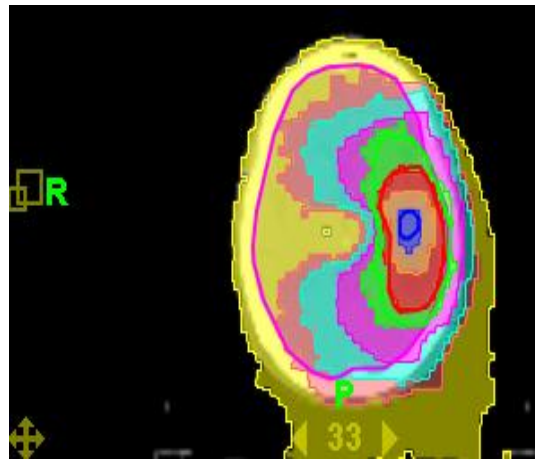


Glioblastoma multiforme: rivalutazione



Dicembre 2009

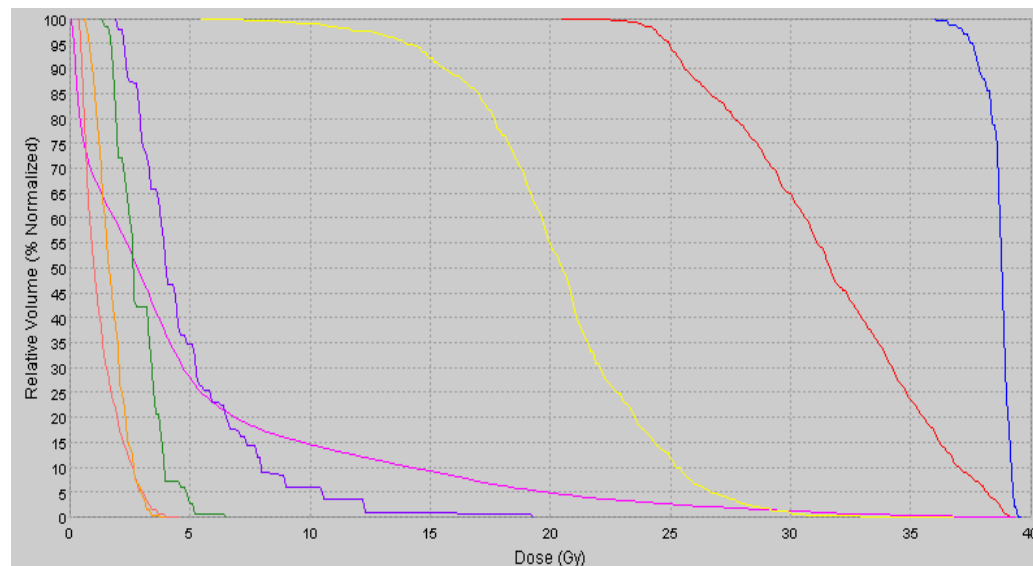
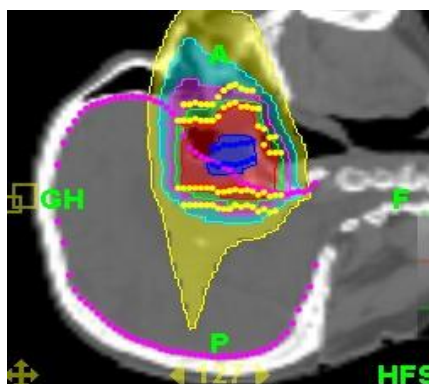
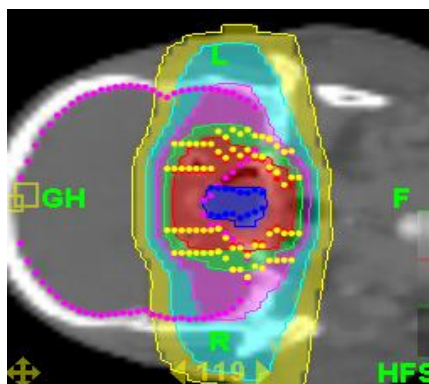
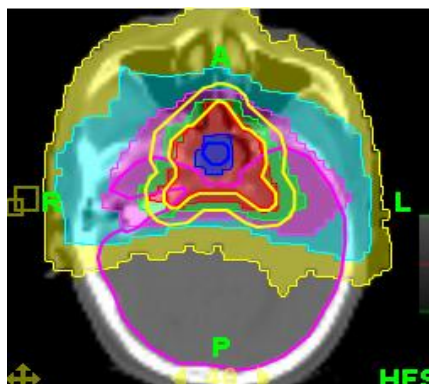
Ritrattamento glioblastoma



Brain1	
Eve L	
Eve R	
Lens L	
Lens R	
ottico dx	
ottico sn	
body	
dose mini	

Gennaio 2010

Cordoma del clivus



25 Gy 5 frazioni
Brain1
occhio dx
occhio sn
nervo ottico dx
nervo ottico sn
37.5 Gy
RING 25Gy

Plan Report: I.R.S.T. Meldola

Patient Name:

Patient ID: 20090356

Plan Name: Plan_01



Tumor Constraints

Name	Etichetta	Use?	Importance	Overlap Priority	Max Dose Constr. [Gy]	Max Dose Pen.	DVH Vol [%]	DVH Dose [Gy]	Min Dose Constr. [Gy]	Min Dose Pen.	Max Dose [Gy]	Min Dose [Gy]	Median Dose [Gy]	Avg Dose [Gy]	StdDev Dose [Gy]	Physical Vol [cc]
25 Gy 5 frazioni	None	yes	100	2	37.50	8,000	95.00	25.00	25.00	750	39.24	20.52	31.68	31.63	4.08	54.10
37.5 Gy	None	yes	80	1	37.50	10,000	95.00	37.50	37.50	2,500	39.52	36.07	38.88	38.74	0.54	2.96

Sensitive Structure Constraints

Name	Etichetta	Use?	Importance	Overlap Priority	Max Dose Constr. [Gy]	Max Dose Pen.	DVH Vol [%]	DVH Dose [Gy]	DVH H. Pen.	Max Dose [Gy]	Min Dose [Gy]	Median Dose [Gy]	Avg Dose [Gy]	StdDev Dose [Gy]	Physical Vol [cc]
Brain1	None	yes	35	5	37.50	100	25.00	5.00	500	39.28	0.19	2.91	5.02	6.51	1,338.78
body	None	yes	1	7	1.00	1	1.00	1.00	1	39.52	0.08	0.48	2.90	5.03	3,232.28
occhio dx	None	yes	50	1	3.50	2,000	15.00	2.00	750	4.45	0.43	1.06	1.32	0.82	9.02
occhio sn	None	yes	50	2	3.50	2,000	15.00	2.00	750	3.92	0.61	1.62	1.75	0.65	8.31
nervo ottico dx	None	yes	75	3	4.50	3,500	35.00	3.00	1,000	6.48	1.33	2.71	2.90	0.96	1.47
nervo ottico sn	None	yes	75	4	15.00	750	25.00	5.00	1,000	19.23	1.91	4.03	4.87	2.63	2.48
RING 25Gy	None	yes	25	6	25.00	200	25.00	20.00	200	36.72	5.53	20.52	20.47	3.86	43.38

Planning Modulation Factor (Actual):

2.500 (1.371)

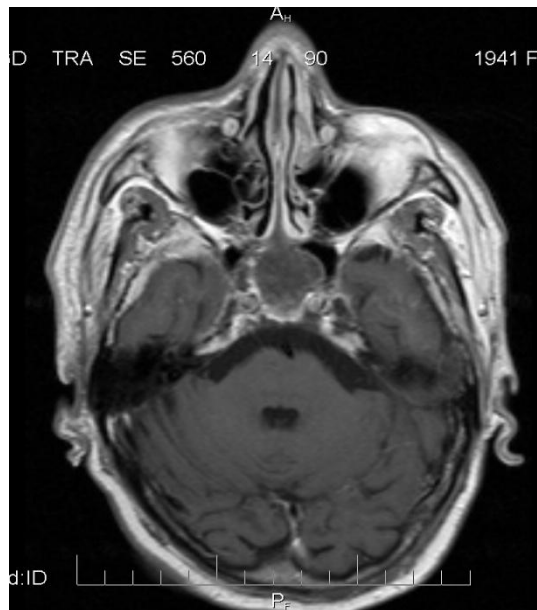
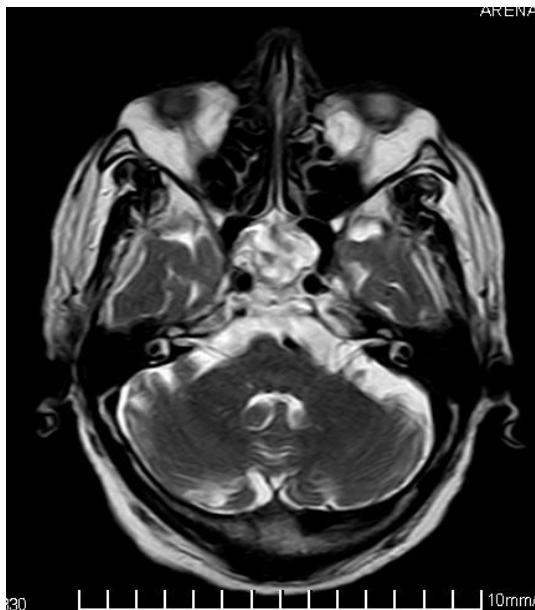
Pitch:

0.173

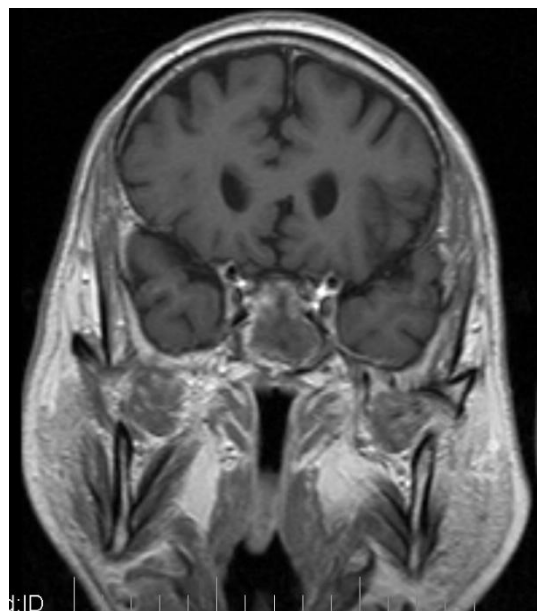
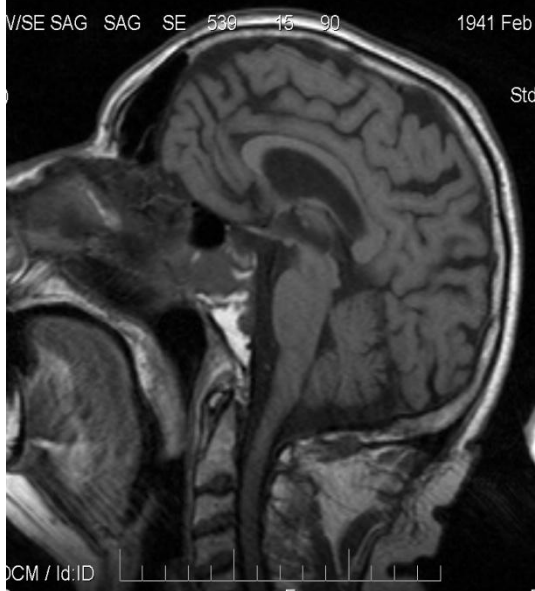
Luglio 2009



Rivalutazione a 14 mesi post-Rt



"Tessuto isointenso in T1 ed iperintenso in T2 in corrispondenza del seno sfenoidale, verosimilmente in relazione al pregresso intervento chirurgico."



"Non si evidenziano aree di assunzione di mdc aventi significato patologico"

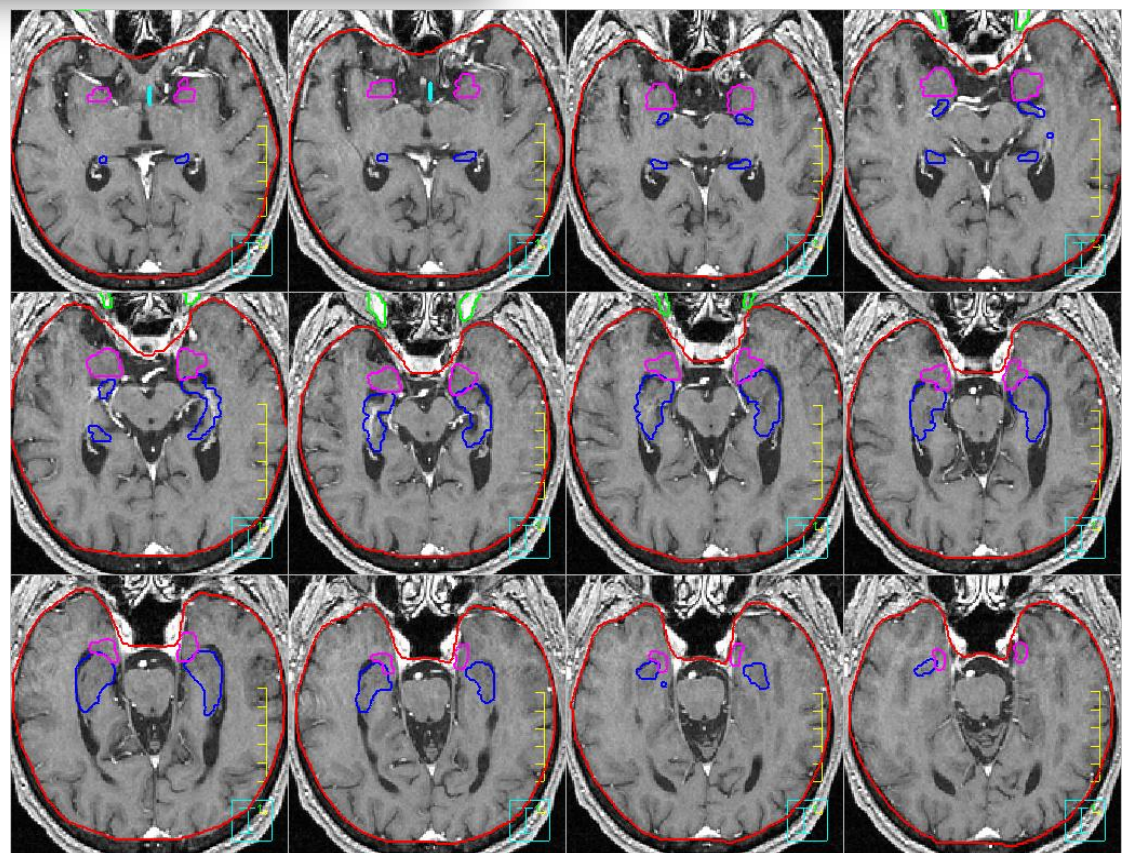
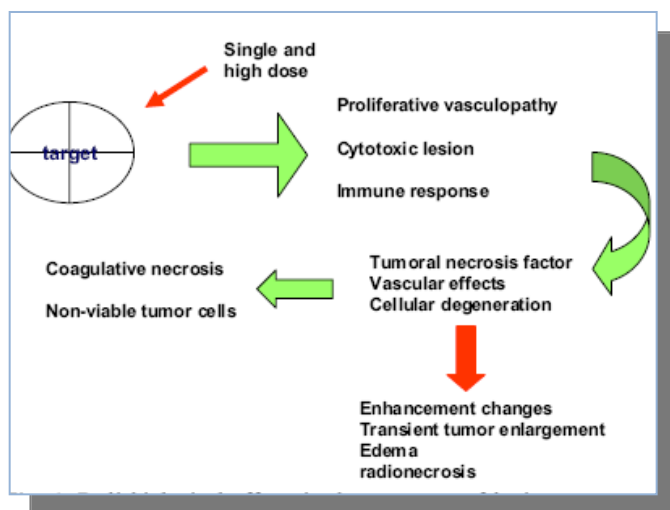
PHYSICS CONTRIBUTION

WHOLE BRAIN RADIOTHERAPY WITH HIPPOCAMPAL AVOIDANCE AND SIMULTANEOUSLY INTEGRATED BRAIN METASTASES BOOST: A PLANNING STUDY

ALONSO N. GUTIÉRREZ, PH.D.,* DAVID C. WESTERLY, M.Sc.,* WOLFGANG A. TOMÉ, PH.D.,*[†]
 HAZIM A. JARADAT, PH.D.,[†] THOMAS R. MACKIE, PH.D.,*^{†‡} SØREN M. BENTZEN, PH.D., D.Sc.,[†]
 DEEPAK KHUNTIA, M.D.,[†] AND MINESH P. MEHTA, M.D.[†]

Departments of *Medical Physics and [†]Human Oncology, University of Wisconsin School of Medicine
 and Public Health, Madison, WI; and [‡]TomoTherapy, Inc., Madison, WI

Radiobiological effects in the treatment of brain metastases with SRS



Metastasi cerebrali

TomoTherapy Planning Station -- I.R.S.T. Meldola

Patient: No Photo
 DOB: 1984 Sex: F
 ID: 20080370
 Plan date: Jun 17, 2008 1:22:42 PM
 Oncologist: Disease: 5683

Plan: Plan_02
 Plan status: Approved
 DOA plan:
 Patient position: HFS

What's Next
Adjust Fractionization Schedule
 Modify the fraction count or adjust details for each fraction as necessary.
 Run Final Dose.
 When you are satisfied with the plan, click Final Accept.

User Name: Fisica Sanitaria

ROIs Optimization Fractionation Delivery QA Setup Delivery QA Analysis

Fraction Count
 15
 The plan has 15 fractions defined for a planned delivery of 63.0 Gy.
 % of the LESIONE1 63 Gy volume receives at least 63.0 Gy for the current
 Modulation factor for this tomotherapy IMRT plan is 3.166

Unlock All Fractions

Fraction	Locked	Fraction Date	Fraction	Locked	Fraction Date
1	☐	June 23, 2008			
2	☐	June 24, 2008			
3	☐	June 25, 2008			
4	☐	June 26, 2008			
5	☐	June 27, 2008			
6	☐	June 30, 2008			
7	☐	July 01, 2008			
8	☐	July 02, 2008			
9	☐	July 03, 2008			
10	☐	July 04, 2008			
11	☐	July 07, 2008			
12	☐	July 08, 2008			
13	☐	July 09, 2008			
14	☐	July 10, 2008			
15	☐	July 11, 2008			

Dose Display
☒ Isodose
 70
 63
 50
 40
 32.25
 30
 10
 6

Patient Images

Ctrl(cm): x = 0.10 y = 19.85 z = -7.54
 HFS

GH
 Ctrl(cm): x = 0.09 y = 18.78 z = -7.54
 HFS

GH
 Ctrl(cm): x = -1.82 y = 18.55 z = -6.40
 HFS

Finalize
 Final Dose
 Final Accept
 Plan Report

Tumor Settings

Name	Display	Color
IPPOCAMP	☒	Red
ENCEFALO	☒	Green
LESIONE1	☒	Blue
LESIONE2	☒	Yellow

Sensitive Structure Settings

Name	Display	Color
BODY	☐	White
COUCH	☒	Green
exp +5mm	☐	Yellow

Dose-Volume Histogram - Cumulative Mode Relative

Relative Volume (% Normalized)

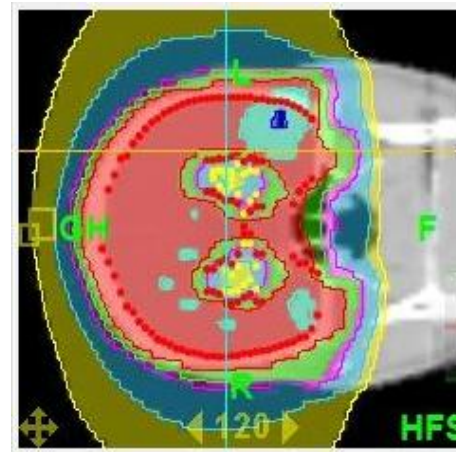
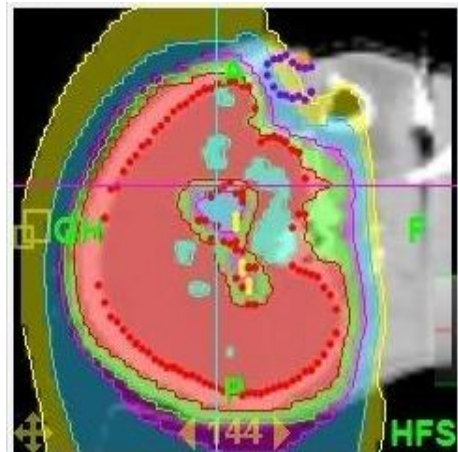
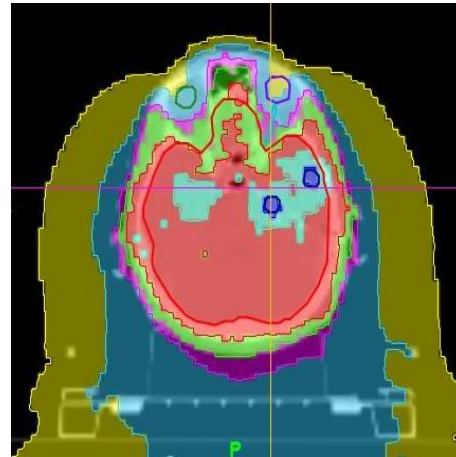
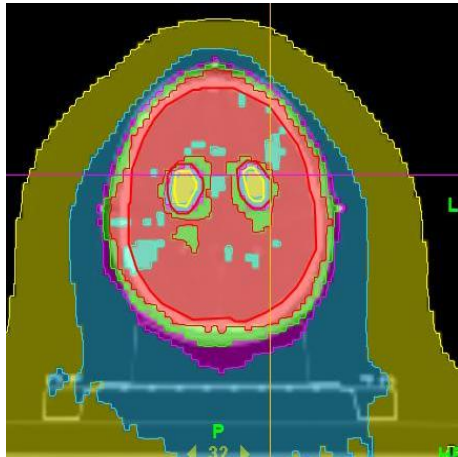
Dose (Gy)

Vol Min < 0.0 Gy Min < 0.0 Gy Max < 75.0

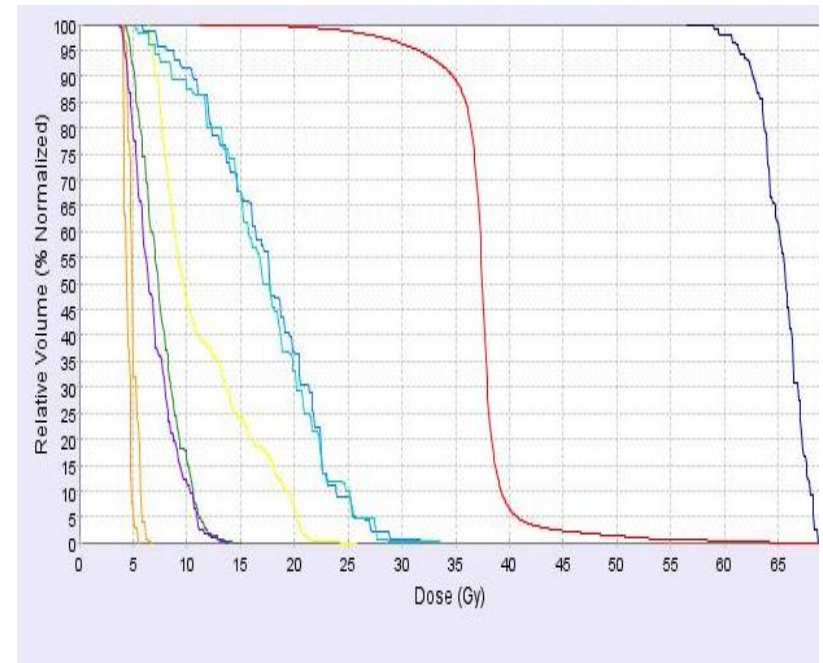
Thursday, April 2, 2009 19:40:27

Start TomoTherapy Plannin... CRS Admin Console (tom... Search Results 7:40 PM

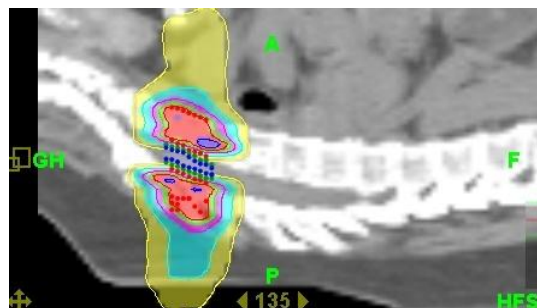
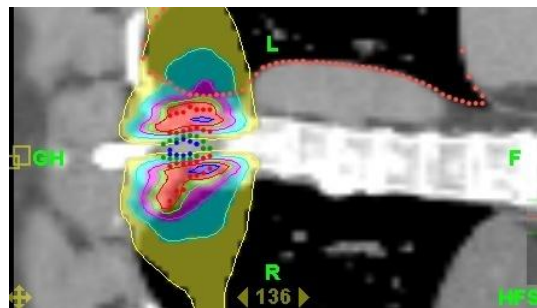
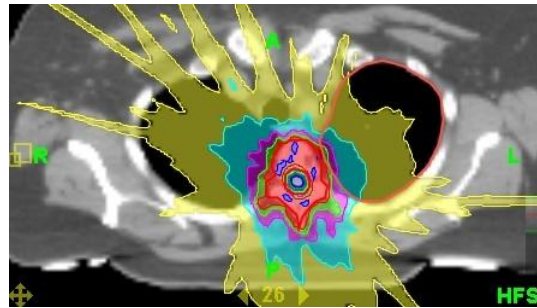
Metastasi cerebrali



6 10 20 25 32, 25 40



Metastasi vertebrale



Finalize

Final Dose

Final Accept

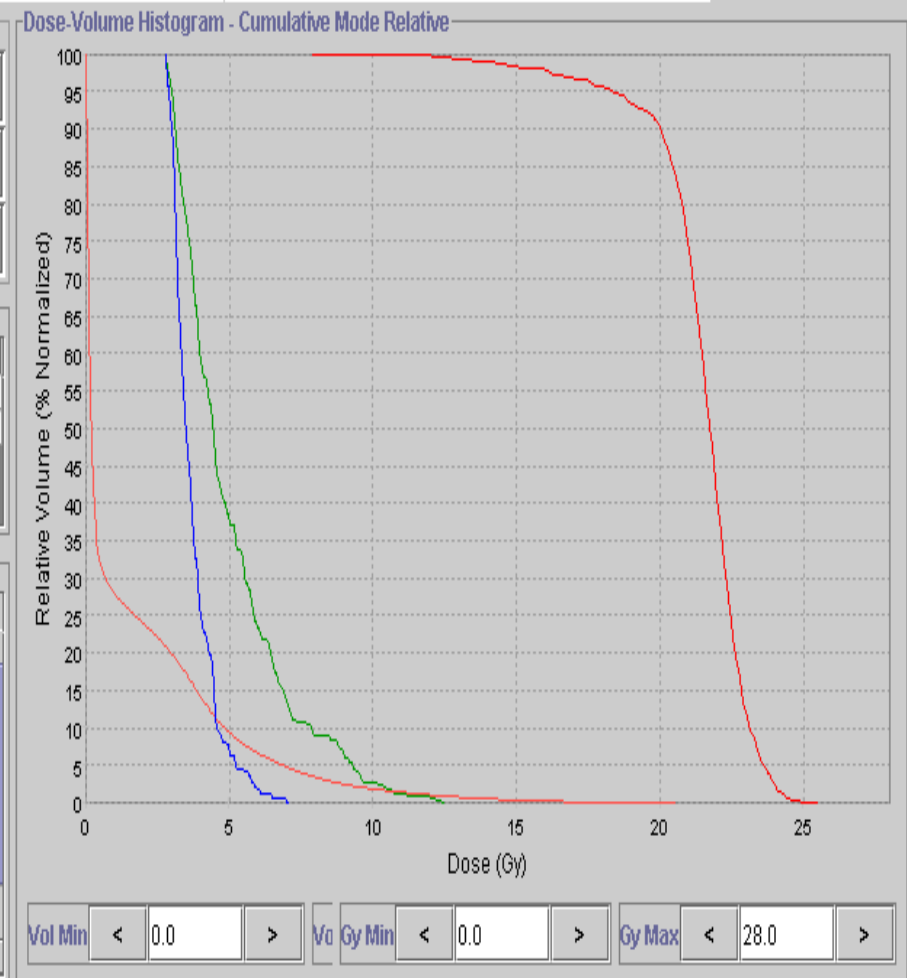
Plan Report

Tumor Settings

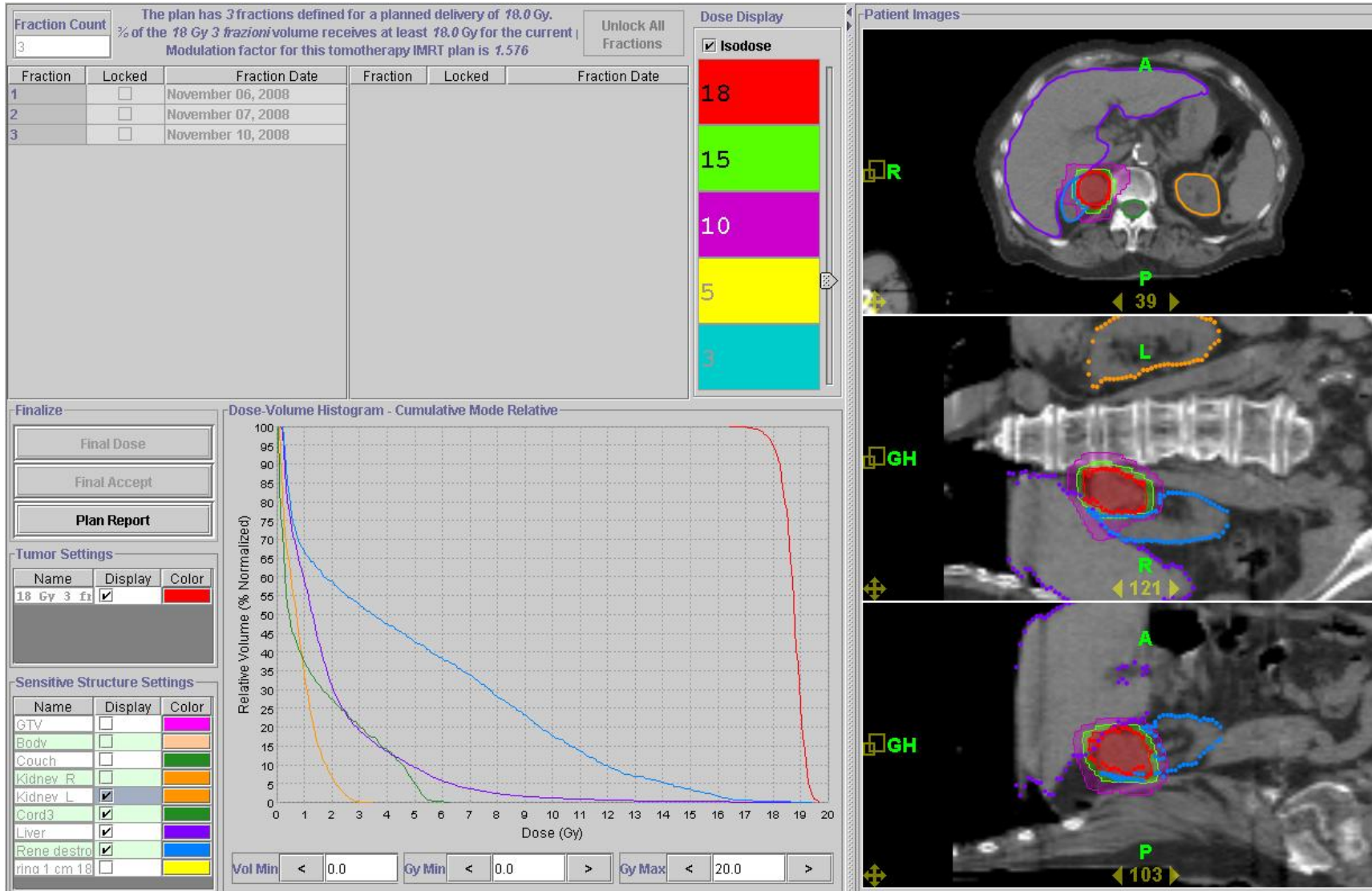
Name	Display	Color
20 Gy 5 fr	☒	Red
midollo1	☒	Green

Sensitive Structure Settings

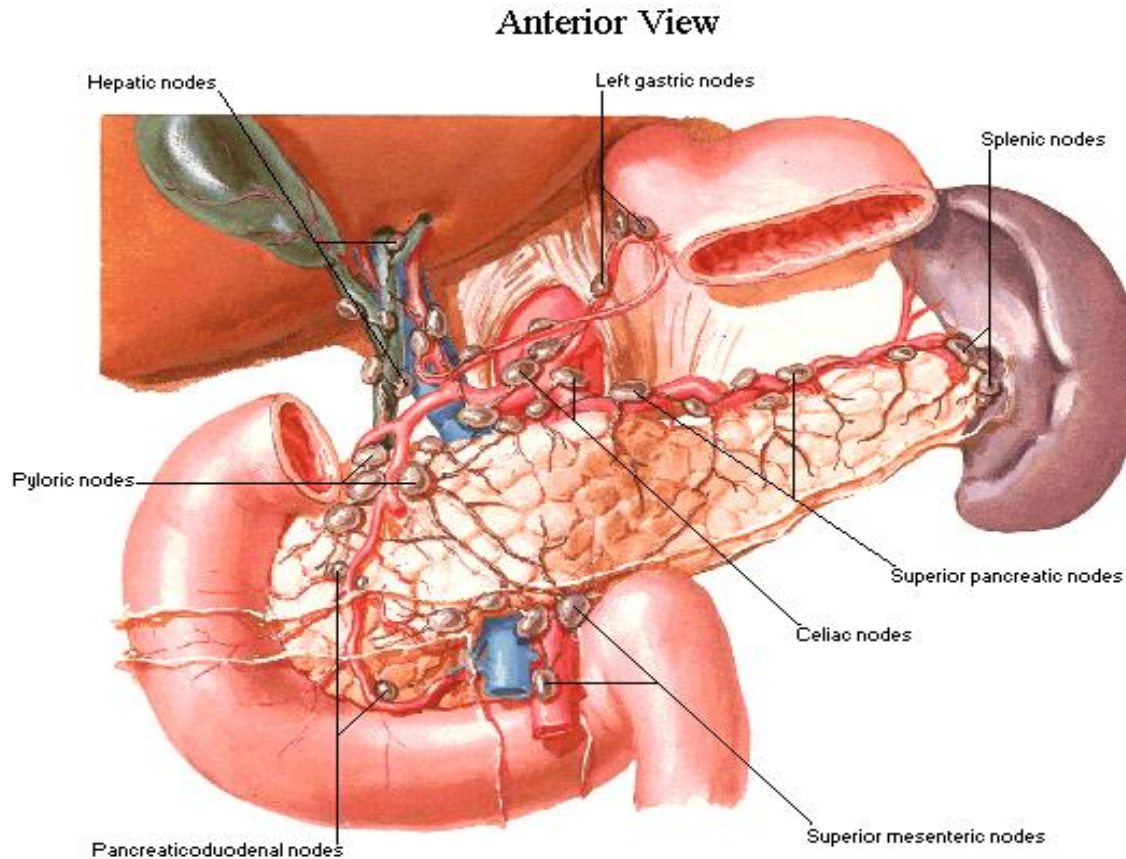
Name	Display	Color
canale mid	☐	Yellow
canale mid	☐	Yellow
20 Gy 5 fr D	☐	Red
midollo2	☐	Orange
25 Gy 5 fraz	☐	Orange
35 Gy	☐	Green
Luna L1	☒	Red
body	☐	Orange
Rina 20Gv	☐	Orange
Rina 20Gv	☐	Green



Neoplasia renale

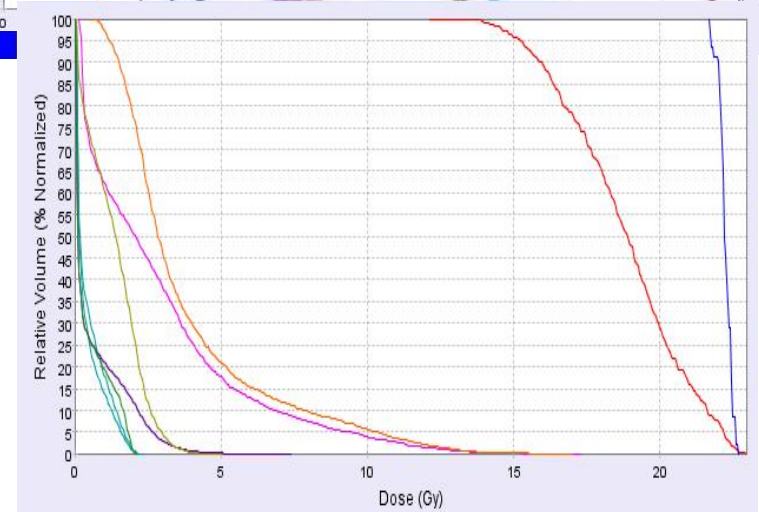
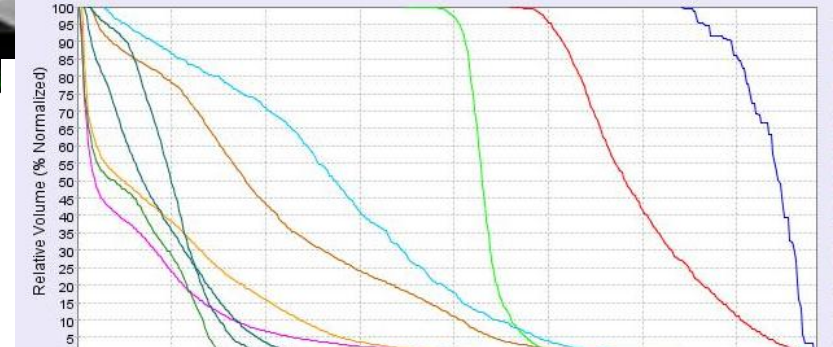
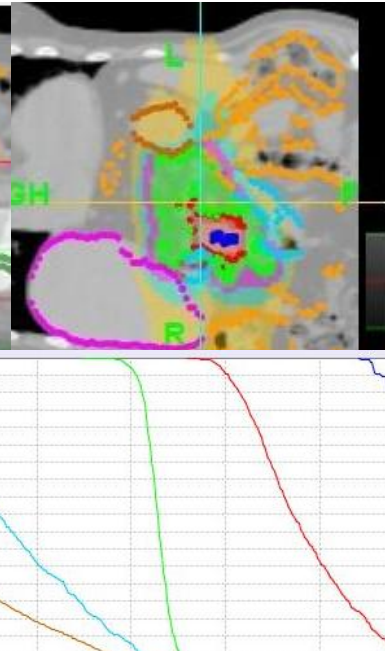
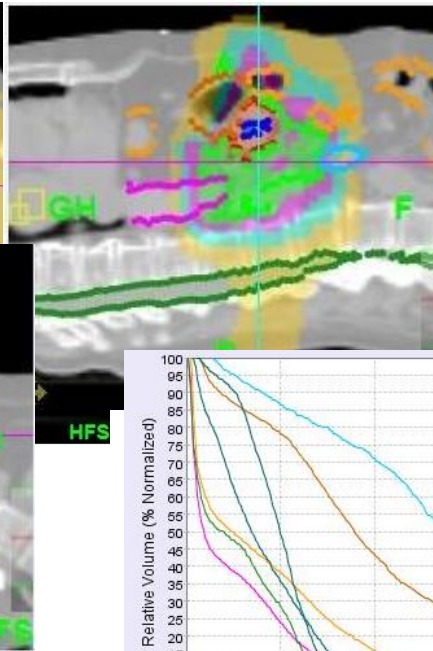
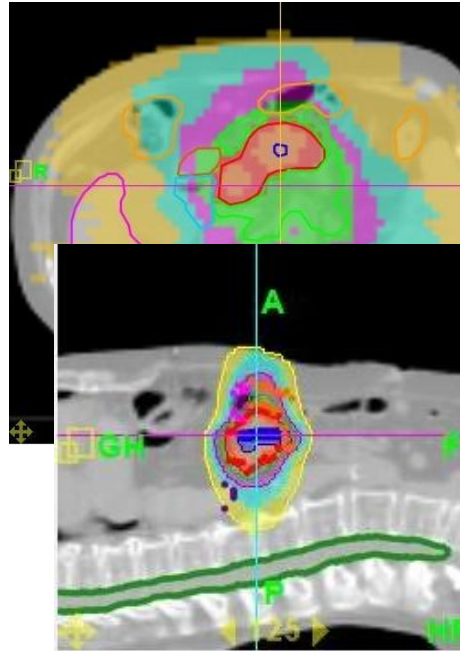


Neoplasie del pancreas

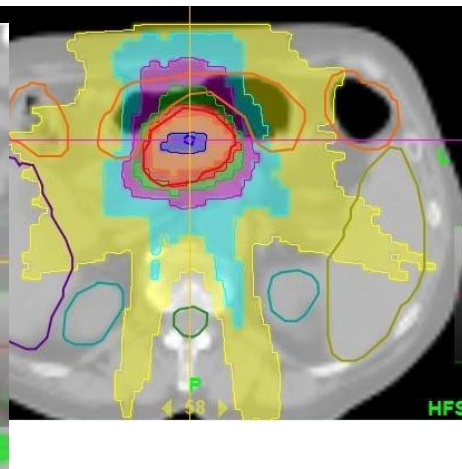
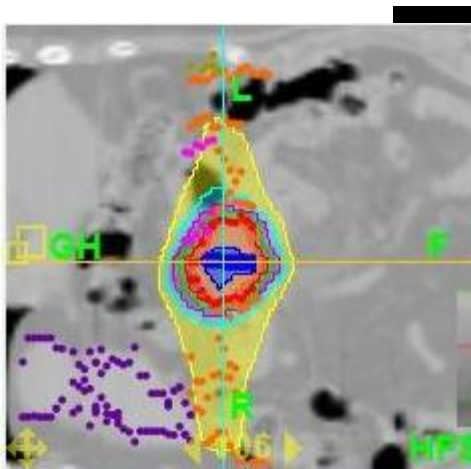


Neoplasia pancreas I ciclo

ISTITUTO
SCIENTIFICO
ROMAGNOLI
PER LO STUDIO
E LA CURA
DEI TUMORI



II ciclo



Sarcoma di Kaposi



TomoTherapy Planning Station -- I.R.S.T. Meldola

Patient:
 DOB: 1969 Sex: M
 ID: 20080494
 Plan date: Oct 2, 2008 4:17:16 PM
 Oncologist:
 Disease: 6739

Plan: Plan_01
 Plan status: Approved
 DQA plan:
 Patient position: FFS

What's Next
 Adjust Fractionization Schedule
 Modify the fraction count or adjust details for each fraction as necessary.
 Run Final Dose.
 When you are satisfied with the plan, click Final Accept.

User Name: Fisica Sanitaria

ROIs Optimization Fractionation Delivery QA Setup Delivery QA Analysis

Fraction Count: 8
 The plan has 8 fractions defined for a planned delivery of 32.0 Gy.
 32 Gy in 8 frazioni settimanali volume receives at least 32.0 Gy for the c
 Modulation factor for this tomotherapy IMRT plan is 1.272

Unlock All Fractions

Fraction	Locked	Fraction Date	Fraction	Locked	Fraction Date
1	☐	October 13, 2008			
2	☐	October 14, 2008			
3	☐	October 15, 2008			
4	☐	October 16, 2008			
5	☐	October 17, 2008			
6	☐	October 20, 2008			
7	☐	October 21, 2008			
8	☐	October 22, 2008			

Dose Display
☒ Isodose
 34.24
 32
 20
 15
 10

-Patient Images
 A
 R
 P
 FFS
 R
 L
 H
 FFS
 A
 P
 FFS

Finalize
 Final Dose
 Final Accept
 Plan Report

Tumor Settings

Name	Display	Color
32 Gy in 8	☒	Red

Sensitive Structure Settings

Name	Display	Color
Body	☐	Orange
Couch	☐	Green
Head	☐	Yellow
Head internal	☐	Purple

Dose-Volume Histogram - Cumulative Mode Relative
 Relative Volume (% Normalized)
 100
 95
 90
 85
 80
 75
 70
 65
 60
 55
 50
 45
 40
 35
 30
 25
 20
 15
 10
 5
 0

Dose (Gy)
 5 10 15 20 25 30 35 40

Vol Min < 0.0 Gy Min < 0.5 Gy Max < 40.0

Thursday, April 2, 2009 20:18:38

Start TomoTherapy Plann... CRS Admin Console (tom... Search Results C:\Documents and Sett... babini.bmp - Paint 8:18 PM

I carichi di lavoro

Nell' U.O. di Radioterapia IRST da ottobre 2007 ad oggi sono stati eseguiti **1562** trattamenti con **tomotherapy**:

Ottobre 2007:	76
2008:	437
2009:	518
2010:	531

90 % Ipofrazionamenti accelerati
10 % Frazionamenti convenzionali

I carichi di lavoro attuali (giornalieri)

Uso clinico
della
tomoterapia:

Ore 8-21

28 pazienti/die,
tutti con
tomoimage
quotidiana

RTADMIN

Select Patient

Close

Add

Change

Delete

Refresh

All 1 / 30

Patient 1 / 30

Time	Patient	Activity	Status	Dept	Location	Comment
8:00	8.00BARDI EMANNO	TOMO tomoterapia	RO		TOMOTHERAPY	
8:30	8.30COMPAGNON GIO	TOMO tomoterapia	RO		TOMOTHERAPY	
9:00	9.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	solo per domani ore 13.30
9:30	9.30MARI GIANFRAN	TOMO tomoterapia	RO		TOMOTHERAPY	AVVISATO
10:00	10.00COPPINI MARCEL	TOMO tomoterapia	RO		TOMOTHERAPY	AVVISATO
10:30	10.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	recuperato nel AVVISATO
11:00	11.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
11:30	11.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
12:00	12.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
12:30	12.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
13:00	13.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
13:30	13.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
14:00	14.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
14:30	14.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
15:00	15.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
15:30	15.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
16:00	16.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
16:30	16.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
17:00	17.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
17:30	17.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
18:00	18.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
18:30	18.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
19:00	19.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
19:30	19.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
20:00	20.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
20:30	20.30MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	
21:00	21.00MONTI ALBERTO	TOMO tomoterapia	RO		TOMOTHERAPY	

Rolando Polico,
medico
Roberto Bellia,
medico
Annelisa d'Angelo,
fisico
Giulia Ghigi, medico
Massimo Giannini,
medico
Enrico Menghi,
fisico
Simona Micheletti,
medico
Elisa Neri, medico
Elisabetta Parisi,
medico
Antonino Romeo,
medico
Anna Sarnelli,
fisico

