



PLANEJAMENTO DE MAMA BILATERAL COM BOOST CONCOMITANTE USANDO VMAT

DOSIMETRISTA: THAFAREL MACHADO

SEM CONFLITO DE INTERESSES

INDICAÇÃO

➡ DIAGNÓSTICO

CA DE MAMA BILATERAL

CIRURGIA (QUADRANTECTOMIA)

ANATOMOPATOLÓGICO: FATORES DE RISCO, IDADE, TAMANHO DO TUMOR,
QUANTIDADE DE LINFONODOS POSITIVOS.

BOOST: ≤ 50 ANOS, GRAU, CLIPE CIRÚRGICO*.

➡ PROPOSTA DE RADIOTERAPIA

15 FRAÇÕES: 2,67 Gy/DIA = 40,05 Gy MAMA

3,20 Gy/DIA = 48 Gy BOOST



MODALIDADE



TÉCNICA RECOMENDAÇÕES

- b. Approaches for ARM 2 Hypofractionated Whole Breast Irradiation with concurrent boost include:
- vii. 3DCRT WBI with 3DCRT concurrent boost
 - viii. 3DCRT WBI with IMRT concurrent boost
 - ix. 3DCRT WBI with electron concurrent boost
 - x. IMRT WBI with 3DCRT concurrent boost
 - xi. IMRT WBI with IMRT concurrent boost
 - xii. IMRT WBI with electron concurrent boost
 - xiii. IMRT WBI with IMRT simultaneously integrated boost (SIB)

RTOG 1005; version date 07/31/2014



ALERTAS NO PLANEJAMENTO 3DCRT

- DEFINIÇÃO DO ISOCENTRO
- ENTRADA E SAÍDA DOS CAMPOS
- PESO DOS CAMPOS

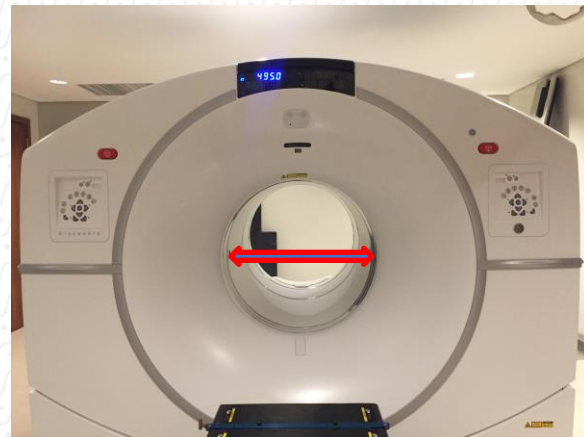
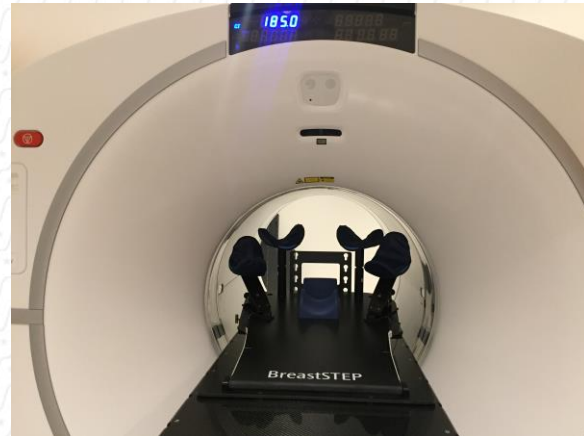


SIMULAÇÃO

➡ **ACESSÓRIOS**
RAMPA DE MAMA; VAC-FIX; SUPORTE DE JOELHO.

➡ **POSICIONAMENTO**
DECÚBITO DORSAL; BRAÇOS ELEVADOS;
CABEÇA CENTRALIZADA.

➡ **DIÂMETRO DO GANTRY DA CT**
FOV; LIMITAÇÃO DE IMAGEM.



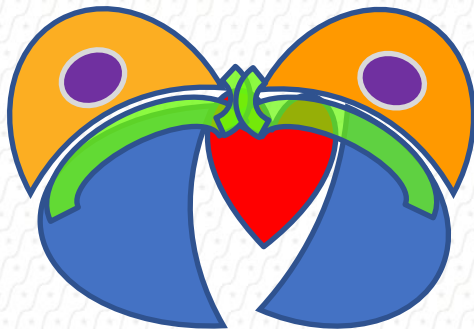
DELINEAMENTO

➔ OAR'S

PROTOCOLO RTOG 1005

➔ ESTRUTURA ACESSÓRIOS

ANEL; PTV OTM; OAR'S OTM.



NRG ONCOLOGY

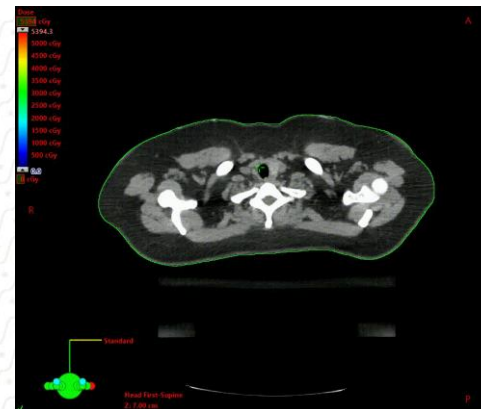
RTOG 1005

**A PHASE III TRIAL OF ACCELERATED WHOLE BREAST IRRADIATION
WITH HYPOFRACTIONATION PLUS CONCURRENT BOOST
VERSUS STANDARD WHOLE BREAST IRRADIATION
PLUS SEQUENTIAL BOOST FOR EARLY-STAGE BREAST CANCER**

Hipofracionamento (15x267cGy)

	ESTRUTURA	CRITÉRIOS	STATUS
☐	CTV MAMA	D95% ≥ 38 (≥ 36)Gy; D50% $\leq 43,2$ ($\leq 44,8$)Gy;	
☐	CTV BOOST	D95% $\geq 9,5$ (9,0)Gy; V11Gy ≤ 5 (10)%;	
☐	CORAÇÃO	V16(20)Gy ≤ 5 %; V8Gy ≤ 30 (35)%; Dmédia $\leq 3,2$ (4)Gy;	
☐	PULMÃO	V16Gy ≤ 15 (20)%; V8Gy ≤ 35 (40)%; V4Gy ≤ 50 (55)%;	
☐	PULMÃO contralateral - IMRT	V4Gy ≤ 10 (15)%;	
☐	MAMA contralat.	D _{0,03cc} ≤ 240 (384)cGy; D5% ≤ 144 (240)cGy;	

Gradiente Máximo de D_{0,03cc} (12%): _____

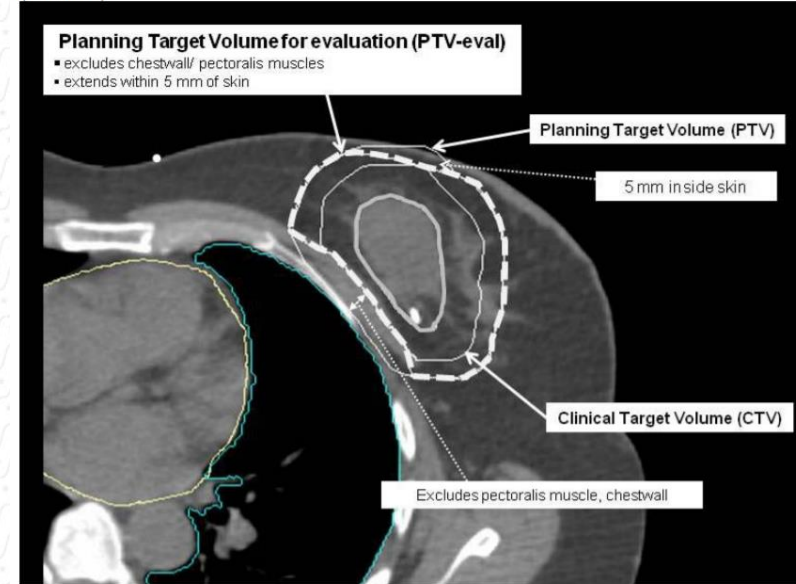


DELINEAMENTO

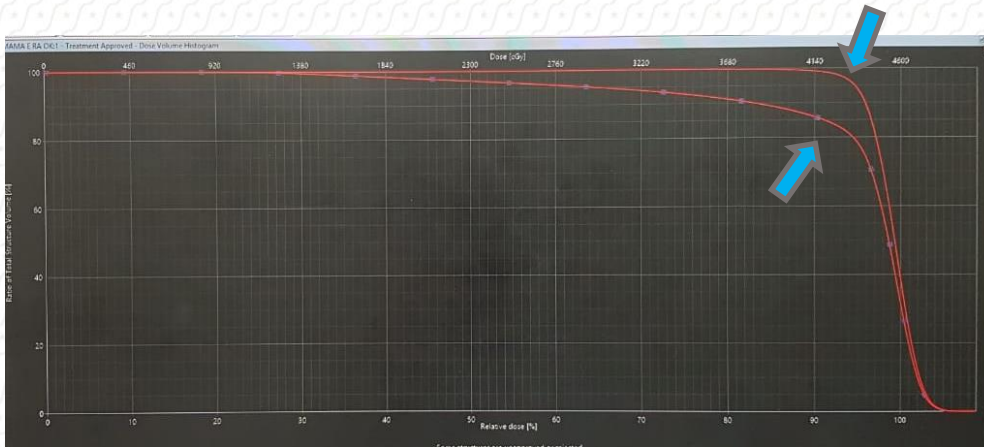
➡ **PTV EVAL
MARGEM**

➡ **BUILD UP**
REMOVER PTV FORA DO CORPO PARA ANÁLISE DO DVH;
TEM INFLUÊNCIA NA NORMALIZAÇÃO DA DOSE;

Figure 3. Lumpectomy Planning Target Volume for Evaluation (PTVeval)



RTOG 1005; version date 07/31/2014



PLANEJAMENTO

- ➡ UNIQUE
- ➡ MILLENNIUM 120
 - ↳ PERIFÉRICAS: 1,0 cm ; CENTRAIS: 0,5 cm
- ➡ 6 MV
- ➡ ECLIPSE 13,7
- ➡ AAA (*ANISOTROPIC ANALYTICAL ALGORITHM*) 13,7
- ➡ PO (*PHOTON OPTMIZATION*) 13,7



DEFINIÇÃO DOS ARCOS

RT Prescription Properties

RT Prescription | Constraints | Approval | Debug

Name

MAMA D : R3

Status

Approved

Prescription Properties

Fraction Dose [cGy]	Fractions	Total Dose [cGy]	Target
267.0	15	4005.0	CTV MAMA D
320.0		4800.0	CTV BOOST

Treatment Site: 02. Mama

Treatment Type: Arc Therapy

Energy Mode: Photon

Energies: 6X

Bolus:

Primary/Boost: Primary

Note:

RT Prescription Properties

RT Prescription | Constraints | Approval | Debug

Name

MAMA E : R1

Status

Approved

Prescription Properties

Fraction Dose [cGy]	Fractions	Total Dose [cGy]	Target
267.0	15	4005.0	CTV MAMA E
320.0		4800.0	CTV BOOST

Treatment Site: 02. Mama

Treatment Type: Arc Therapy

Energy Mode: Photon

Energies: 6X

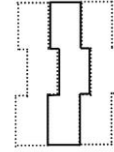
Bolus:

Primary/Boost: Primary

Note:

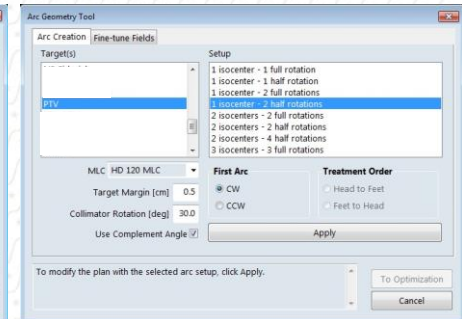
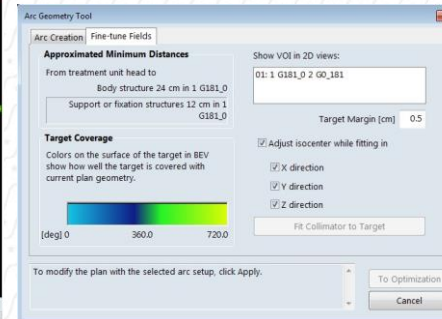
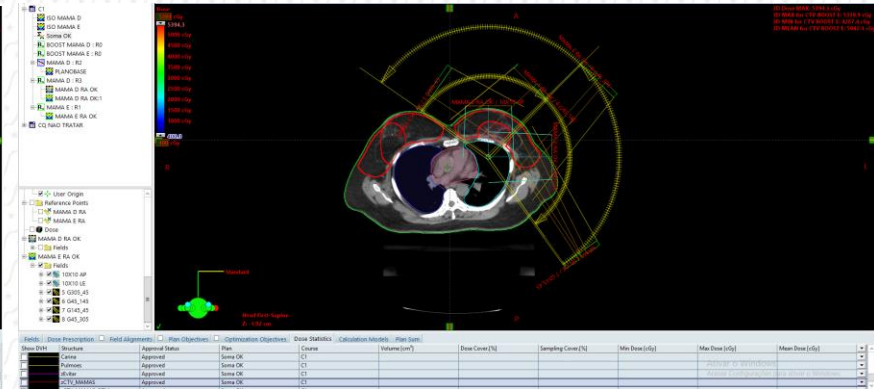
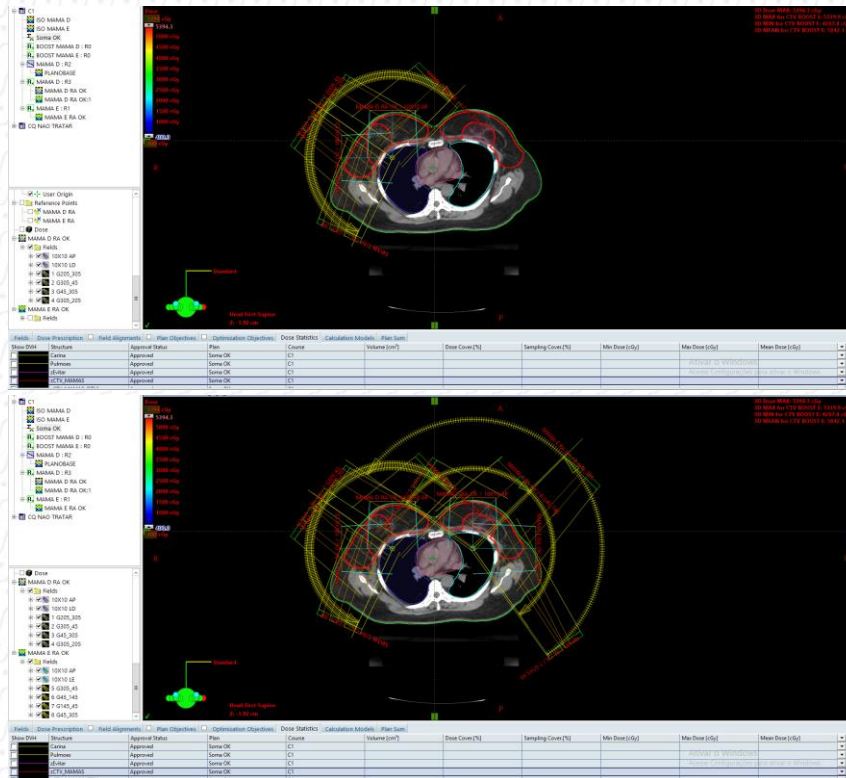


PLANEJAMENTO



Varian

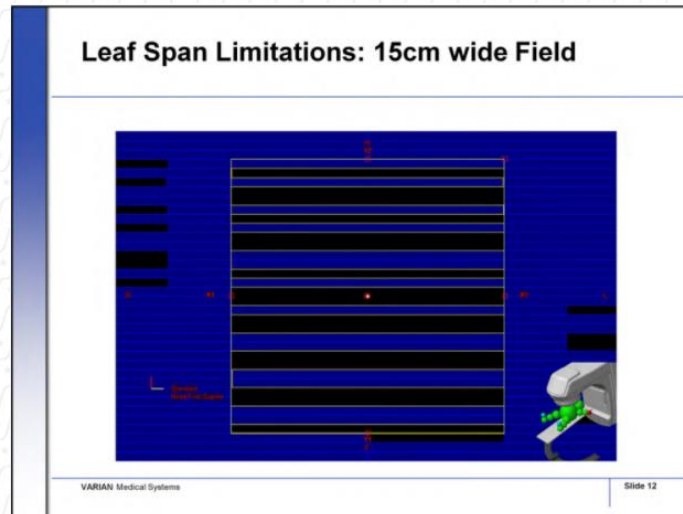
GTY > 180°; COBERTURA DO ALVO; EFEITO TONGUE AND GROOVE.





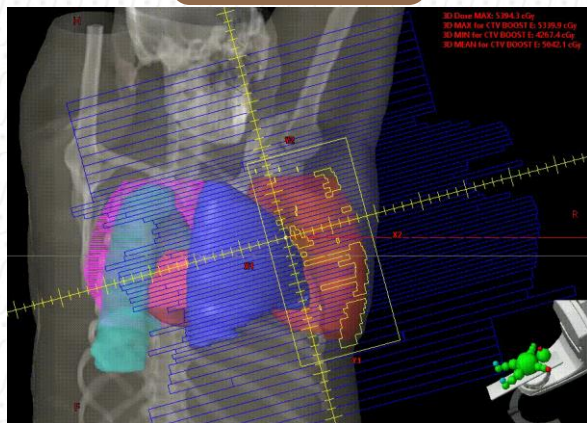
PLANEJAMENTO

- ➡ **LIMITAÇÃO DO TAMANHO DO CAMPO**
- ➡ SEM GRUPO DE SPLIT;
- ➡ SEM LIMITAÇÃO TÉCNICA DO TAMANHO DO CAMPO;
- ➡ CAPACIDADE DE MODULAÇÃO DA LÂMINA EM ATÉ 15cm;
- ⌞ TAMANHO DE CAMPO GRANDE PODE IMPACTAR A CAPACIDADE DE MODULAÇÃO;
- ⌞ APLICAR AJUSTE DO TAMANHO DE CAMPO;
- ⌞ TAMANHO DO CAMPO NA DIREÇÃO “X” MAIOR QUE 18cm, O PLANEJAMENTO COMEÇA A DEGRADAR.



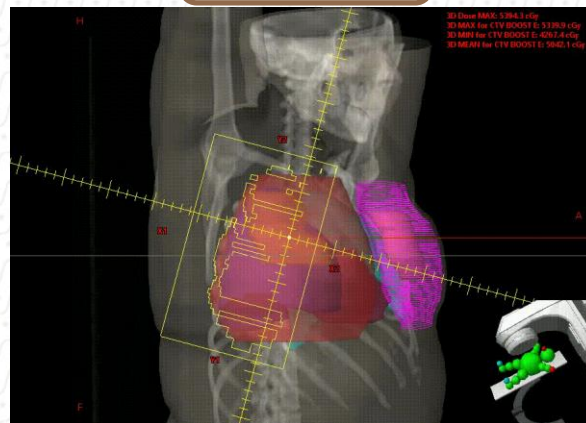


1G: **205° – 305°**
COL **15°**

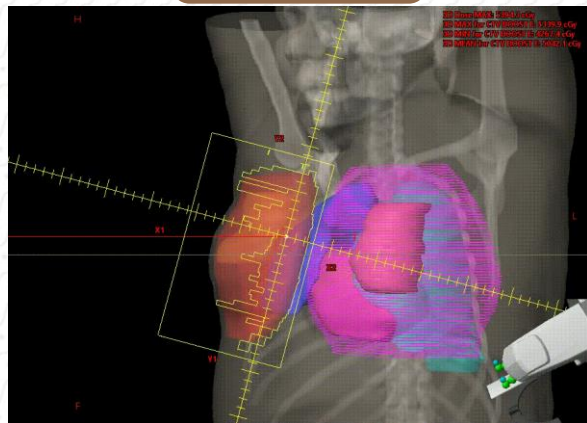


PLANEJAMENTO

2G: **305° – 45°**
COL **345°**



3G: **45° – 305°**
COL **345°**



4G: **305° – 205°**
COL **15°**

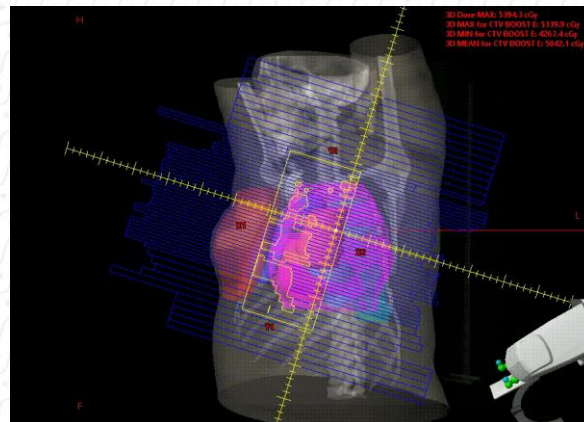




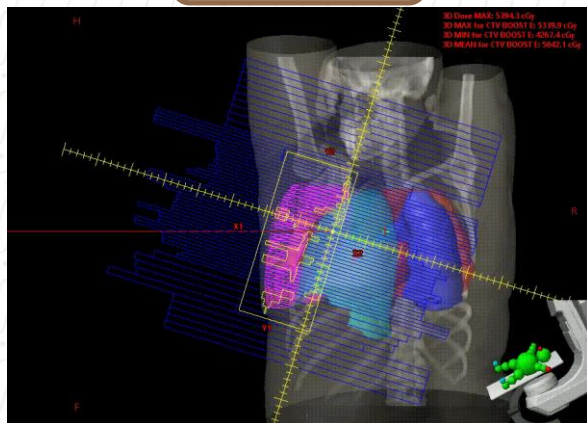
1G: $305^{\circ} - 45^{\circ}$
COL 17°



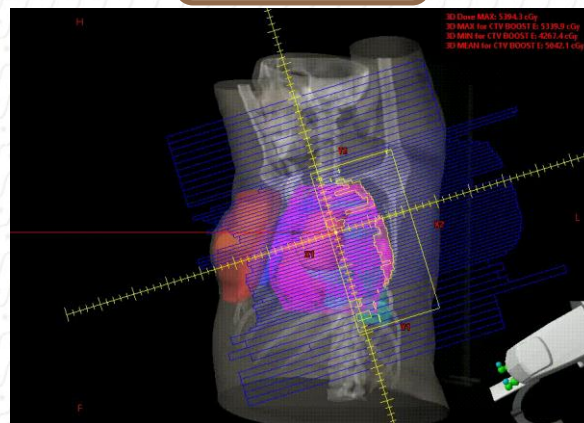
2G: $45^{\circ} - 145^{\circ}$
COL 343°



3G: $145^{\circ} - 45^{\circ}$
COL 343°



4G: $45^{\circ} - 305^{\circ}$
COL 17°



PLANEJAMENTO

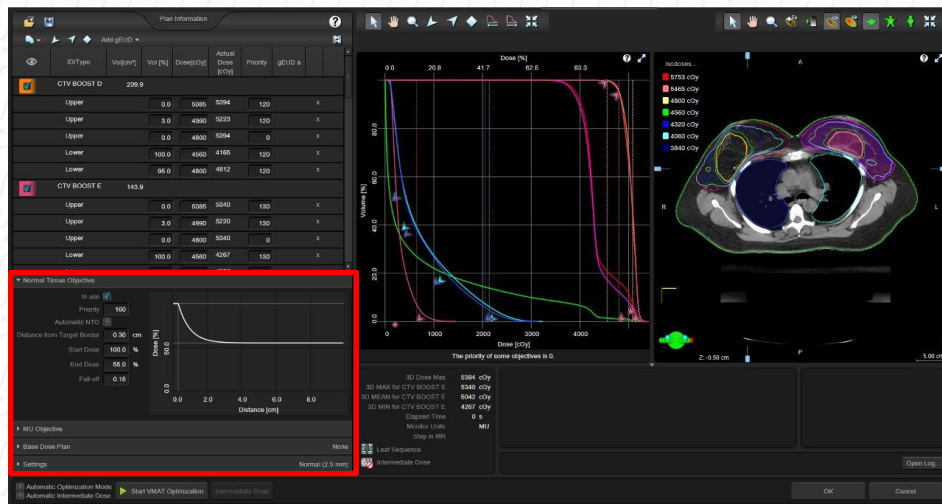
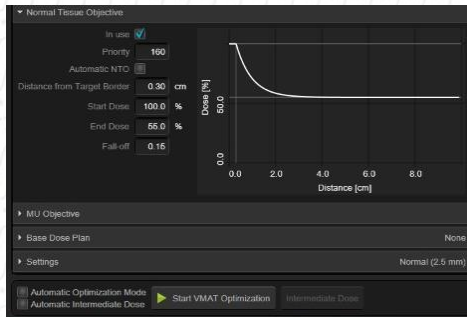
OBJETIVO DO PLANEJAMENTO

ALGORITMO PO

DOSE INTERMEDIÁRIA

PAUSA NO NÍVEL MR

CONTROL POINTS



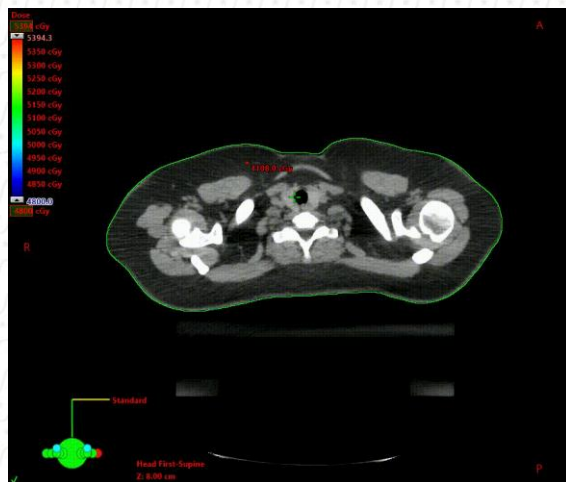
General				Control Points		Leaf Positions		Debug	
				Index	Meterset Weight				Dose Rate [MU/mm]
				23	0.0861				402.766
				24	0.0933				402.766
				25	0.1005				402.766
				26	0.1086				452.924
				27	0.1177				511.689
				28	0.1282				386.876
				29	0.1406				600.000
				30	0.1552				600.000
				31	0.1703				600.000
				32	0.1853				600.000
				33	0.2003				600.000
				34	0.2141				600.000
				35	0.2300				600.000
				36	0.2465				600.000
				37	0.2631				600.000
				38	0.2802				600.000
				39	0.2974				600.000
				40	0.3146				600.000
				41	0.3314				600.000
				42	0.3476				600.000
				43	0.3630				600.000
				44	0.3784				600.000
				45	0.3938				600.000
				46	0.4092				600.000
				47	0.4246				600.000
				48	0.4401				600.000
				49	0.4544				600.000
				50	0.4667				600.000
				51	0.4792				600.000
				52	0.4918				600.000
				53	0.5043				600.000
				54	0.5163				600.000
				55	0.5270				596.678
				56	0.5363				520.716
				57	0.5440				434.065
				58	0.5533				520.716

Objectives				Optimization Objectives		Dose Statistics		Calculation Models		Plan Sum		Status		Calculation Options	
				Calculation Type	Calculation Model	Calculation Model	Algorithm								
				Infinite Surface Compensator	PQC_13176	PQC_13176	Dose Volume Optimizer (Version 13.1.16)	OK						Edit	
				Compensator	PQC_13023	PQC_13023	Plan Beam Convolution (Version 10.0.2)	No configured beam data (SPRQUE H12143 60)				Edit			
				Portal Dose	PDP_PDP	PDP_PDP	Portal Dose Image Prediction (Version 13.6.23)	There is a new version of this algorithm available (13.7.16)				Edit			
				Beam Angle Optimization	PQC_13176	PQC_13176	Plan Geometry Optimizer (Version 13.7.16)	OK				Edit			
				IMRT Optimization	PQC_13176	PQC_13176	Photon Optimizer (Version 13.7.16)	OK				Edit			
				Stereotactic Dose								Edit			

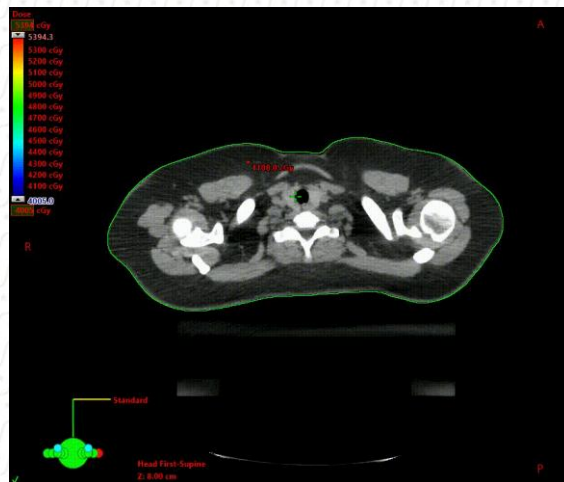
PLANEJAMENTO

➔ AVALIAÇÃO

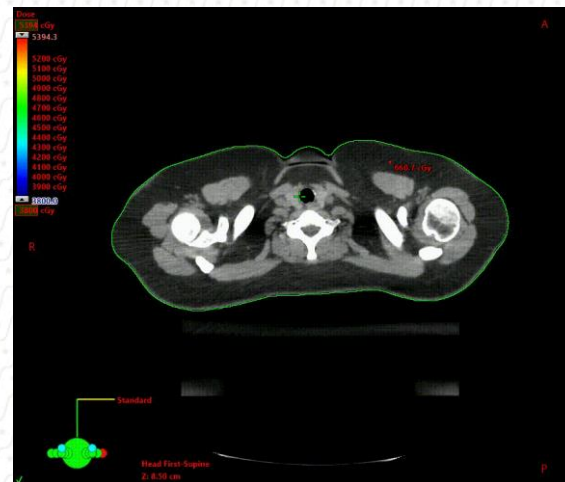
DOSE 48Gy



DOSE 40Gy



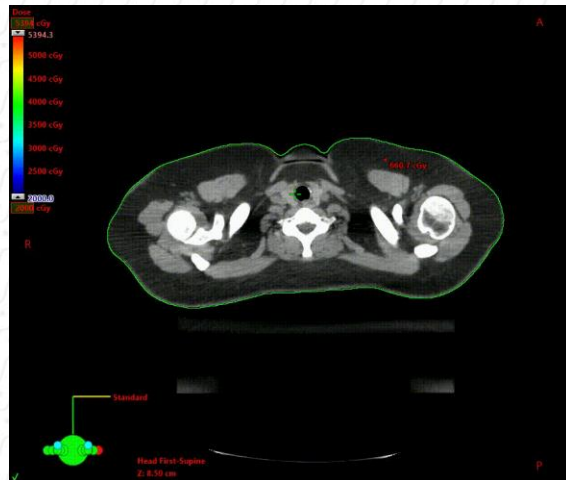
DOSE 38Gy



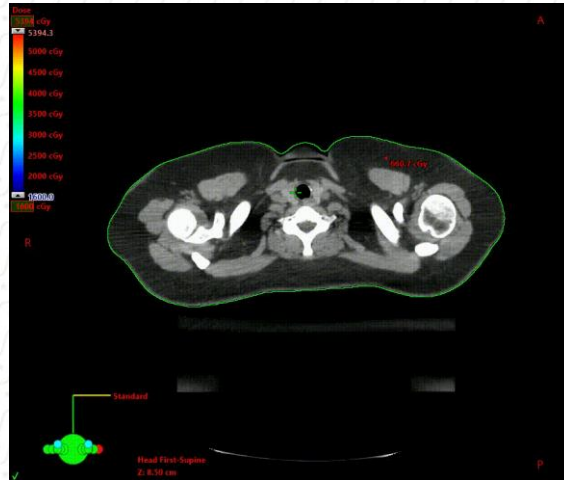
PLANEJAMENTO

➔ AVALIAÇÃO

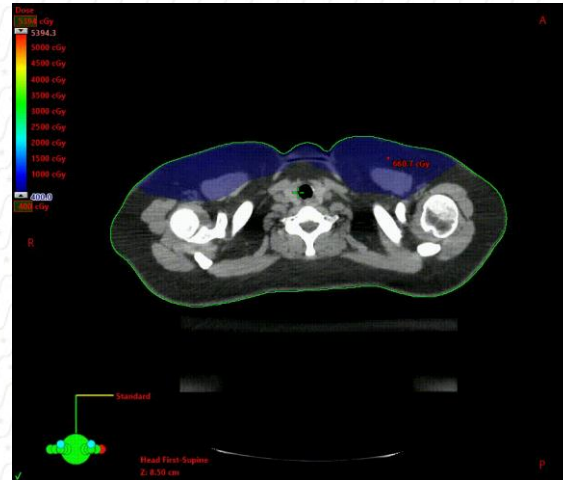
DOSE 20Gy



DOSE 16Gy



DOSE 4Gy

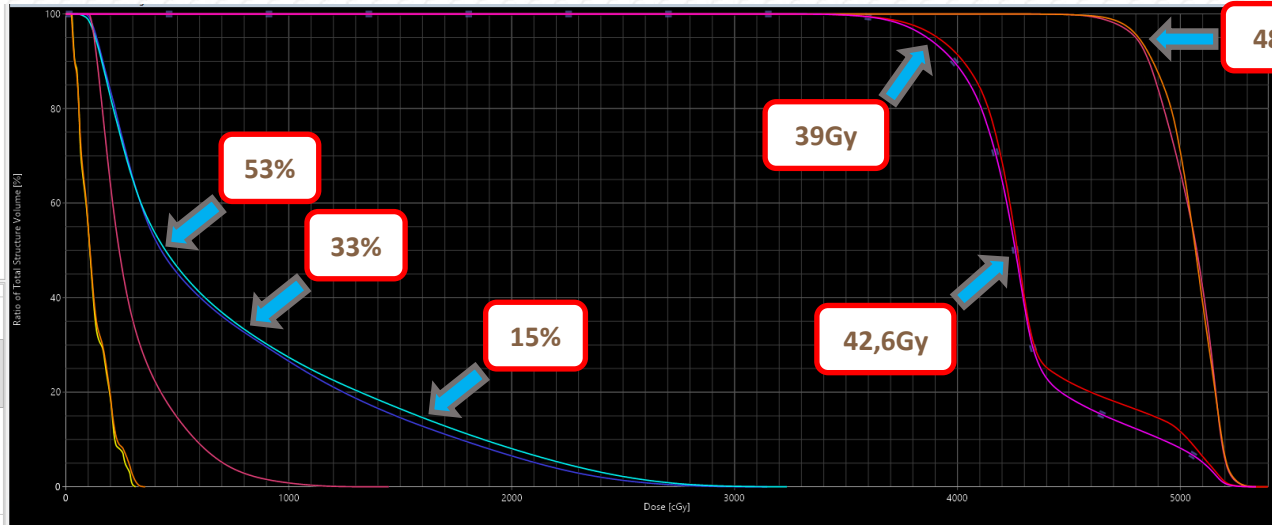


PLANEJAMENTO

AVALIAÇÃO

Hipofracionamento (15x267cGy)

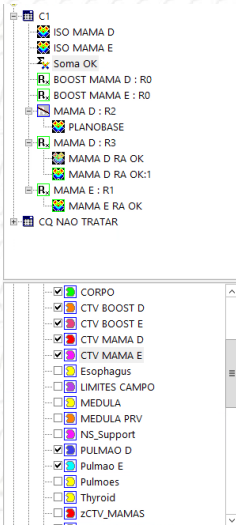
ESTRUTURA	CRITÉRIOS	
☐ CTV MAMA	<u>D95% ≥ 38 (≥ 36)Gy:</u>	<u>D50% ≤ 43,2 (≤ 44,8)Gy:</u>
☐ CTV BOOST	<u>D95% ≥ 9,5 (9,0)Gy:</u>	<u>V11Gy ≤ 5 (10)%:</u>
☐ CORAÇÃO	<u>V16 (20)Gy ≤ 5%:</u>	<u>V8Gy ≤ 30 (35)%:</u> <u>Dmáx ≤ 3,2 (4)Gy:</u>
☐ PULMÃO	<u>V16Gy ≤ 15 (20)%:</u>	<u>V8Gy ≤ 35 (40)%:</u> <u>V4Gy ≤ 50 (55)%:</u>
☐ PULMÃO contralateral - IMRT	<u>V4Gy ≤ 10 (15)%:</u>	
☐ MAMA contralat.	<u>D0,03cc ≤ 240 (384)cGy:</u>	<u>D5% ≤ 144 (240)cGy:</u>



NORMALIZAÇÃO
D95% = 100% NO
VOLUME CTV
BOOST.

DOSE 3Gy

DMÁX 112%



Fields		☐ Dose Prescription	☐ Field Alignments	☐ Plan Objectives	☐ Optimization Objectives	Dose Statistics	Calculation Models	Plan Sum				
Show DVH	Structure	Approval Status	Plan	Course	Volume [cm³]	Dose Cover [%]	Sampling Cover [%]	Min Dose [cGy]	Max Dose [cGy]	Mean Dose [cGy]		
☒	AREA CARDIACA	Approved	Soma OK	C1	638.3	100.0	100.0	101.9	1449.7	305.4		
☒	Clique D	Approved	Soma OK	C1	209.9	100.0	100.0	4164.8	5394.3	5048.8		
☒	CTV BOOST D	Approved	Soma OK	C1	1272.7	100.0	100.0	3124.8	5394.3	4361.5		
☒	CTV MAMA D	Approved	Soma OK	C1								
☒	LIMITES CAMPO	Approved	Soma OK	C1								
☒	MEDULA	Approved	Soma OK	C1	19.7	100.0	100.1	25.1	317.7	122.7		
☒	MEDULA PRV	Approved	Soma OK	C1	74.0	100.0	100.1	22.4	359.0	125.7		
☒	Pulmao E	Approved	Soma OK	C1	870.2	100.0	100.0	50.5	3237.1	748.7		



CONTROLE DE QUALIDADE



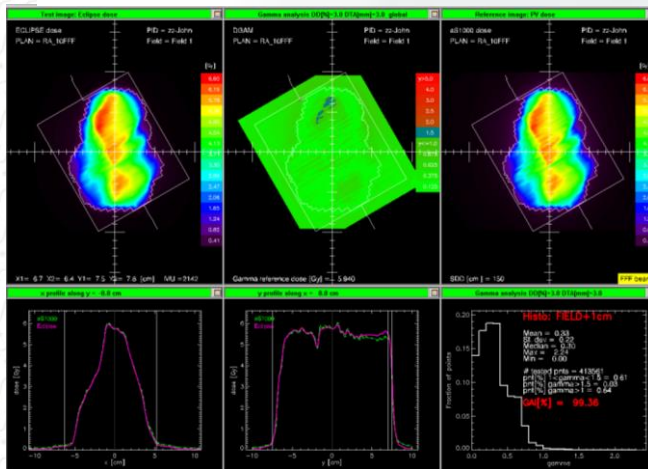
QA

ANÁLISE GAMMA;

DOSE RATE 100 – 600 UM/min;

DETECTOR DIODO DE SILÍCIO;

PDIP_PDPC;





OBRIGADO!

