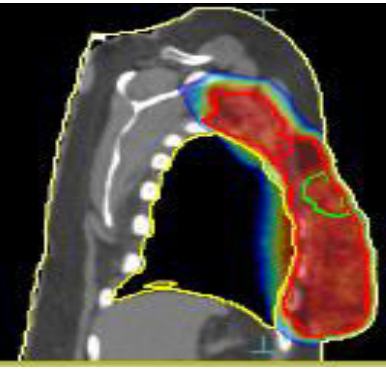
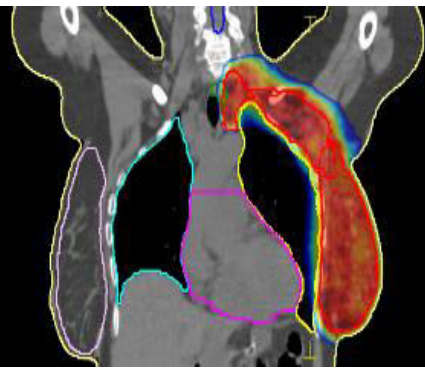
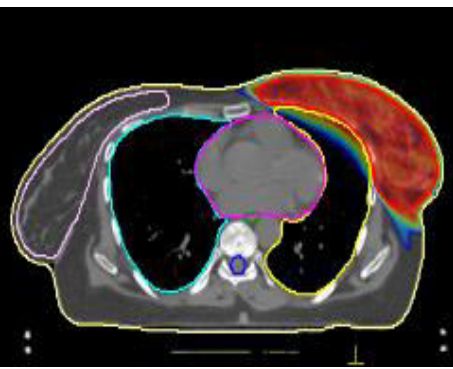


مستشفى الملك فيصل التخصصي ومركز الأبحاث  
King Faisal Specialist Hospital & Research Centre  
مؤسسة عامة - Gen. Org.



# 2016 RADIOTHERAPY PLAN COMPETITION

Be the strongest link in the radiotherapy chain



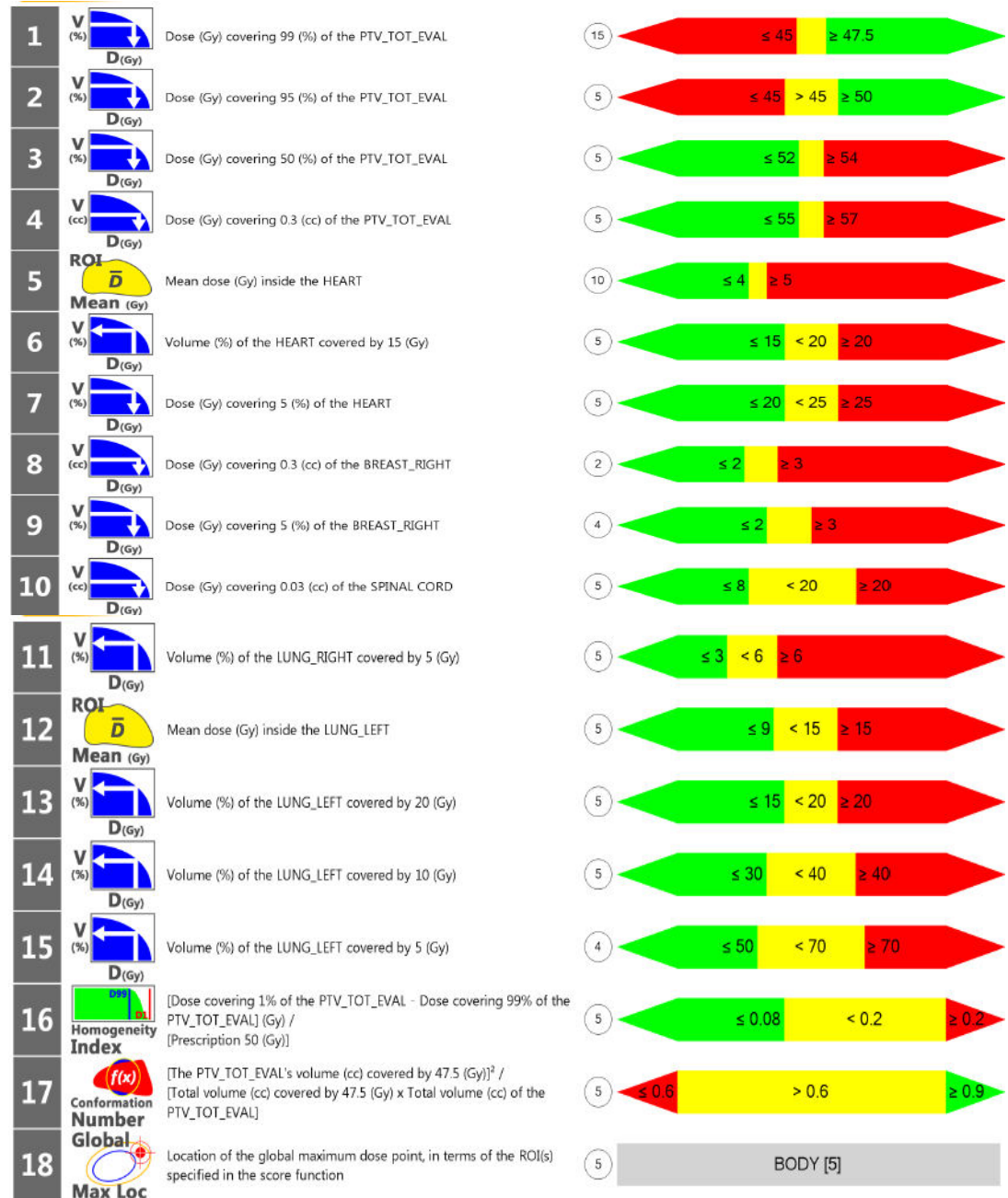
**Mamta Mahur**, M.Sc Physics, DRP  
Medical Physicist  
Delhi State Cancer Institute, Delhi, India.

# Lt Breast Case

- Close proximity to OARs
- Large Target volume
- Peripheral target closer to skin
- Inhomogeneity involved

## Criteria to achieve for

1. PTV\_TOT\_EVAL
2. Heart
3. Left Lung
4. Right Lung
5. Right Breast
6. Spinal Cord
7. Homogeneity index
8. Conformation number
9. Global maximum dose location



# Equipment and method used

- ONCOR expression Linear Accelerator (Siemens AG, Germany)
- OPTIFOCUS™ Multileaf collimator with 41 leaf pairs
- Leaf size 1cm (outer leaf pair 0.5cm)
- 6MV Photon Energy
- Step and Shoot IMRT Technique
- Monaco TPS version 5.10.02 from IMPAC Medical Systems, Elekta, USA.
- Algorithm used – Monte Carlo
- Nine coplanar beams

Monaco@Monaco3 - [LTBREAST, Plan Competition FEB-201, CT1]

Tools Workspace Fusion Contouring Plan Options Planning Output

Pan  Zoom  Volume Jump to Cursor  Point...  Reset  Magnifying Glass  3D Rotate  3D Translate X/Y  3D Translate X/Z  Window and Level  Apply to same type  Save As Preset

Affects: Window: 600 Presets: CT1 Level: 40 SoftTissue

Measure Tool  Grid  Show Interest Points  Show Markers  Contour Autosave  Interest Points and Markers  Image Statistics  Anatomical Groups

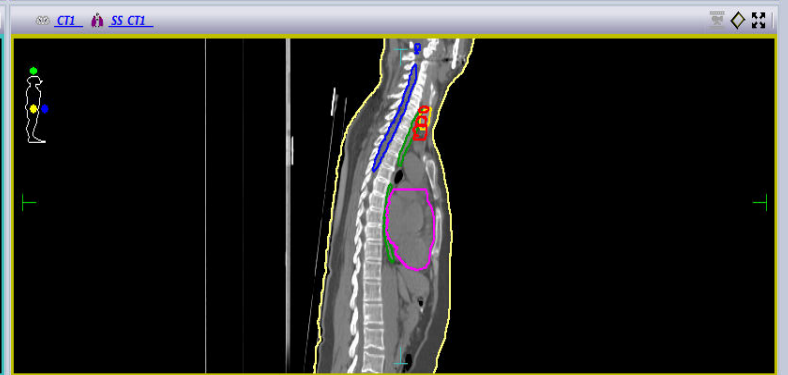
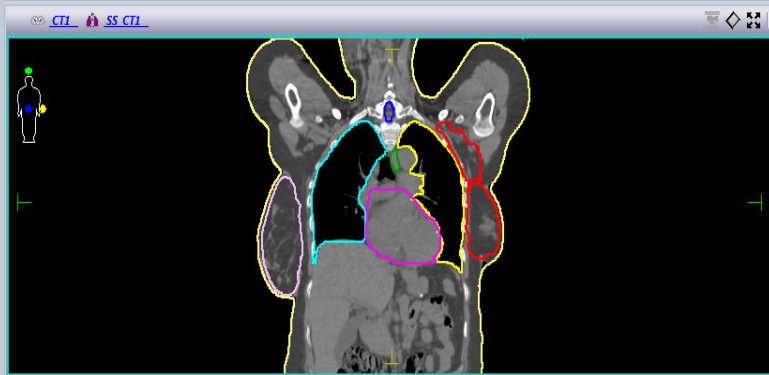
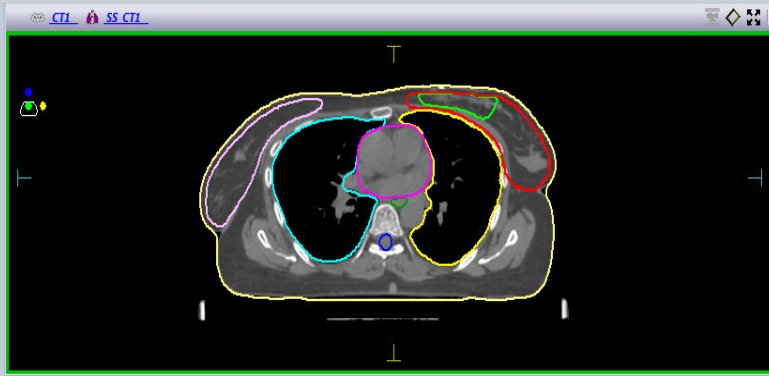
Remove Measures Grid Editing

Workspace@Monaco3 - [LTBREAST, Pla... X

Image Fusion Planning Plan Review

Study 1

- CT1
- SS CT1



Structures

View: Contoured | All | Layers

Name	Color	Visible	Volume (cm <sup>3</sup> )	Type	Force ED	Fill ED	Relative ED	Show 2D Outlines	2D Transparency	3D Transparency
BODY	Yellow	<input checked="" type="checkbox"/>	27395.478	External	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BREAST_RIGHT	Pink	<input checked="" type="checkbox"/>	890.020	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CTV_LUMPECTOMY	Green	<input checked="" type="checkbox"/>	40.515	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ESOPHAGUS	Dark Green	<input checked="" type="checkbox"/>	22.214	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEART	Magenta	<input checked="" type="checkbox"/>	688.000	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LARYNX	Red	<input checked="" type="checkbox"/>	14.069	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LUNG_LEFT	Cyan	<input checked="" type="checkbox"/>	1202.067	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LUNG_RIGHT	Light Blue	<input checked="" type="checkbox"/>	1371.564	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PTV_AXILL	Red	<input checked="" type="checkbox"/>	146.207	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PTV_BREAST	Red	<input checked="" type="checkbox"/>	879.309	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PTV_SC	Red	<input checked="" type="checkbox"/>	42.516	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PTV_TOT_EVAL	Red	<input checked="" type="checkbox"/>	1091.265	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPINAL CORD	Blue	<input checked="" type="checkbox"/>	51.306	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
THYROID	Yellow	<input checked="" type="checkbox"/>	3.262	Internal	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[Load](#) [Unload](#) [Unload All](#)

[click to add a new row >](#)



# Creating Plan in Monaco TPS

**New Monaco Plan**

Name: IMRT Description:

Delivery: Step & Shoot IMRT Select template to import

Anatomical Site: All

Scan Orientation (CT1): Head First Supine

Treatment Orientation

Head First

Feet First

- Template: DEFAULT (Rx Site: , Rx Dose: cGy, Total Beams: 1)
- Template: DEFAULTSNS (Rx Site: , Rx Dose: cGy, Total Beams: 7)
- StepAndShoot (Number of Beams: 7)
- Template: ESOPHY (Rx Site: , Rx Dose: 5040.0 cGy, Total Beams: 7)
- Template: ESORB (Rx Site: , Rx Dose: 5040.0 cGy, Total Beams: 7)
- Template: MADAN (Rx Site: , Rx Dose: 3240.0 cGy, Total Beams: 7)
- Template: PITUTARYRB (Rx Site: , Rx Dose: 5040.0 cGy, Total Beams: 7)
- Template: PLAN9F (Rx Site: Head & Neck, Rx Dose: 7000.0 cGy, Total Beams: 7)
- Template: RTOG1005Breast (Rx Site: , Rx Dose: 5000.0 cGy, Total Beams: 7)
- Template: pituitaryphy (Rx Site: , Rx Dose: 5040.0 cGy, Total Beams: 7)

Beam	Treatment Unit	Modality	Algorithm	Energy	Isocenter Location	X(cm)	Y(cm)	Z(cm)
1	DREXPRESION	Photon	Monte Carlo	6.0 MV	ir of PTV_TOT_EVAL	9.65	-5.40	7.00
2	ONCOREXPRES	Photon	Monte Carlo	6.0 MV	Center of PTV_TOT_	9.65	-5.40	7.00
3	ONCOREXPRES	Photon	Monte Carlo	6.0 MV	Center of PTV_TOT_	9.65	-5.40	7.00
4	ONCOREXPRES	Photon	Monte Carlo	6.0 MV	Center of PTV_TOT_	9.65	-5.40	7.00
5	ONCOREXPRES	Photon	Monte Carlo	6.0 MV	Center of PTV_TOT_	9.65	-5.40	7.00

Port Options

Import Beams Only

Retain Template Beam Shapes

Auto-conform Ports

Conform to: Margin(cm): 0.00  MLC

OK Cancel

Structures

Name	Color	Visible
BODY	Yellow	<input checked="" type="checkbox"/>
BREAST_RIGHT	Red	<input checked="" type="checkbox"/>
CTV-LUMPECTOMY	Green	<input checked="" type="checkbox"/>
ESOPHAGUS	Cyan	<input checked="" type="checkbox"/>
HEART	Magenta	<input checked="" type="checkbox"/>
LARYNX	Orange	<input checked="" type="checkbox"/>
LUNG_LEFT	Light Blue	<input checked="" type="checkbox"/>
LUNG_RIGHT	Light Blue	<input checked="" type="checkbox"/>
PTV_AXILL	Light Blue	<input checked="" type="checkbox"/>
PTV_BREAST	Red	<input checked="" type="checkbox"/>
PTV_SC	Red	<input checked="" type="checkbox"/>
PTV_TOT_EVAL	Red	<input checked="" type="checkbox"/>
SPINAL CORD	Blue	<input checked="" type="checkbox"/>
THYROID	Yellow	<input checked="" type="checkbox"/>

Workspace: CT1 SS CT1

Tools: Scan and Setup Reference, Import Positioning Device, Fluence Statistics, Show Dose Extents, Assign CT to ED Display options, Image Beam Viewer Summary, DVH Properties, DVH Statistics, Structure Combination, DVH color setup, Dose Normalization, Volume of Interest, DRR

Workspace: Image Fusion, Planning, Plan Review

Study 1: CT1, SS CT1

View: Contoured All Layers

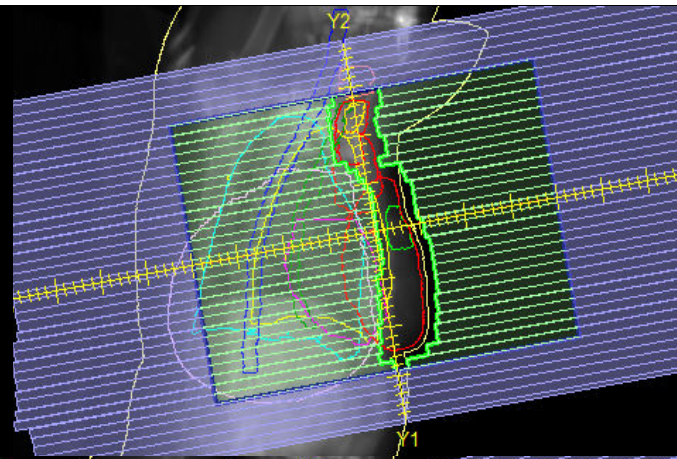
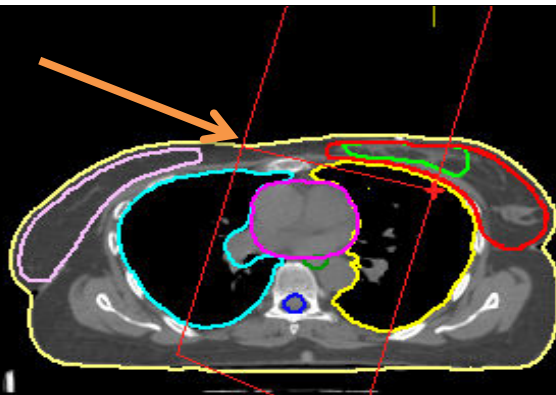
Slide Mode S (x): 9.65 T (y): -5.40 C (z): 7.92 cm Active Slice T: 120 / 233

Planning Activity

12:23 PM 6/6/2016

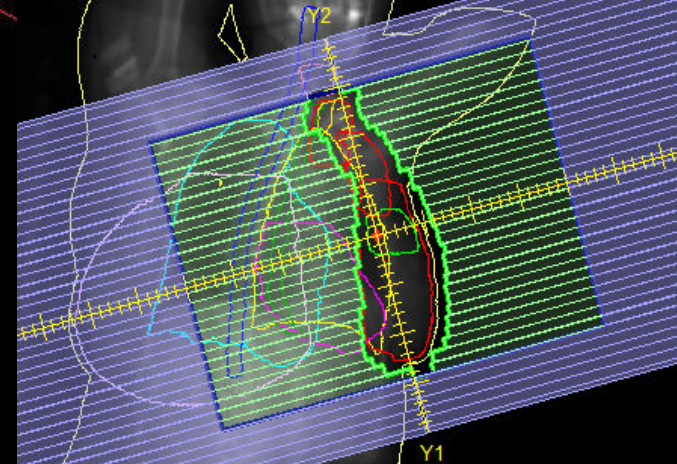
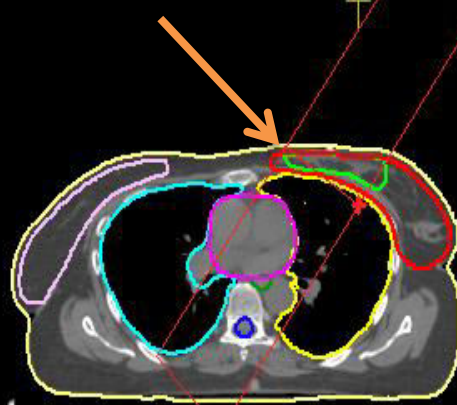
### Beam 1

Gantry angle  $285^\circ$   
Collimator angle  $10^\circ$



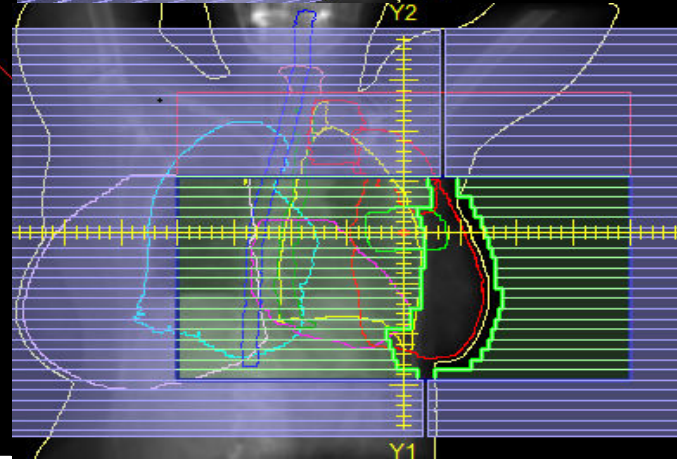
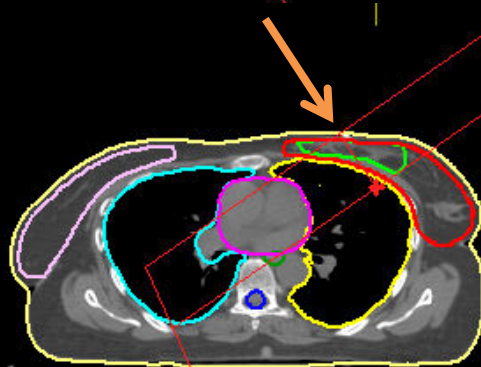
### Beam 2

Gantry angle  $305^\circ$   
Collimator angle  $15^\circ$



### Beam 3

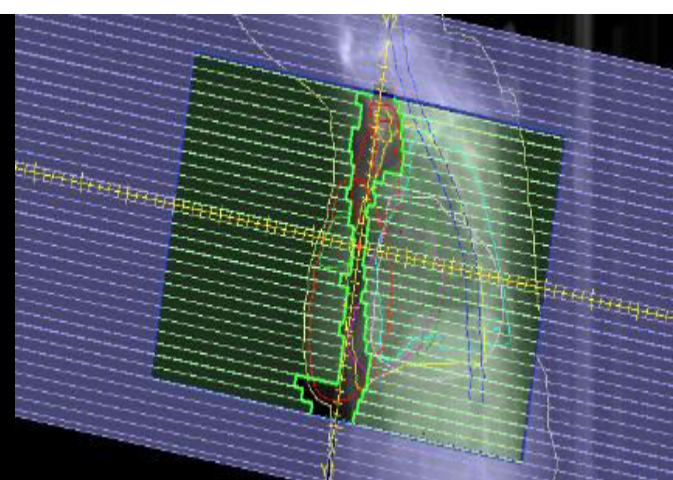
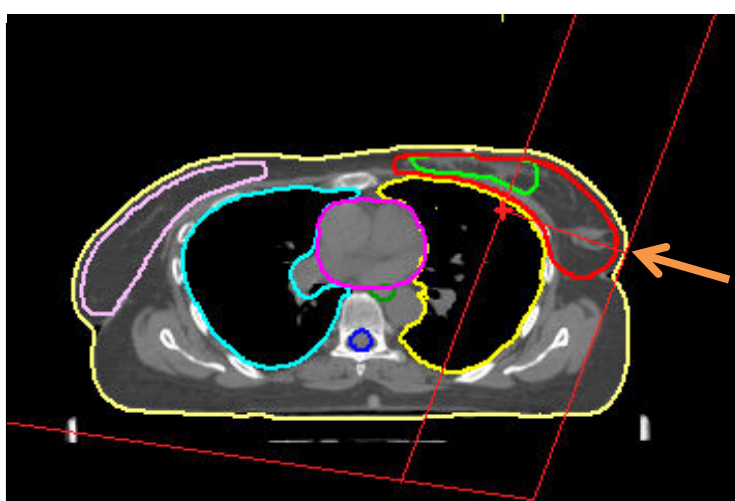
Gantry angle  $325^\circ$   
Collimator angle  $0^\circ$





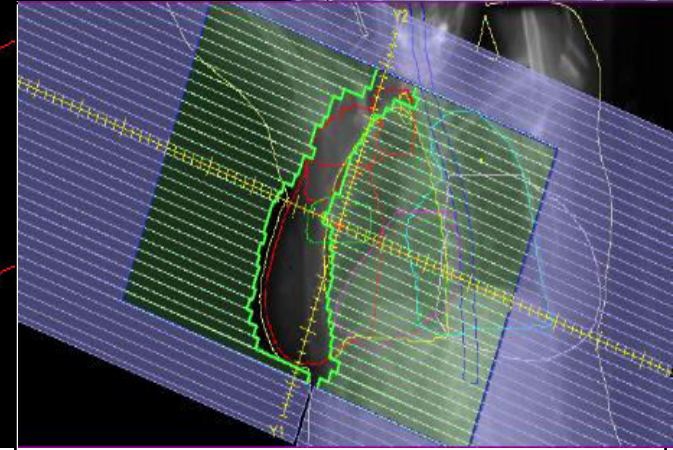
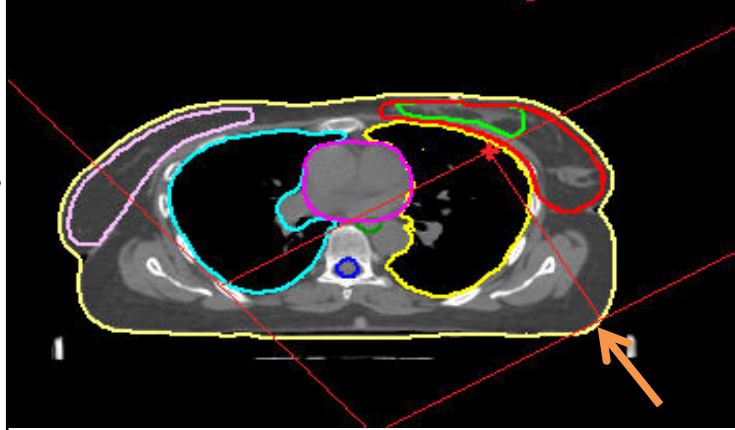
### Beam 4

Gantry angle  $110^\circ$   
Collimator angle  $350^\circ$



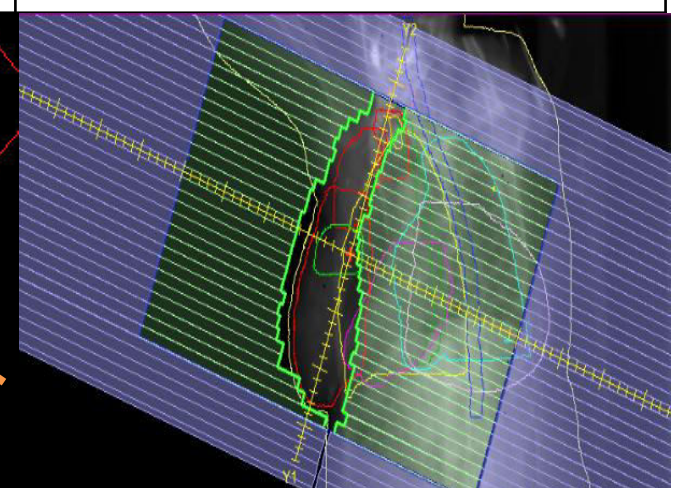
### Beam 5

Gantry angle  $150^\circ$   
Collimator angle  $340^\circ$



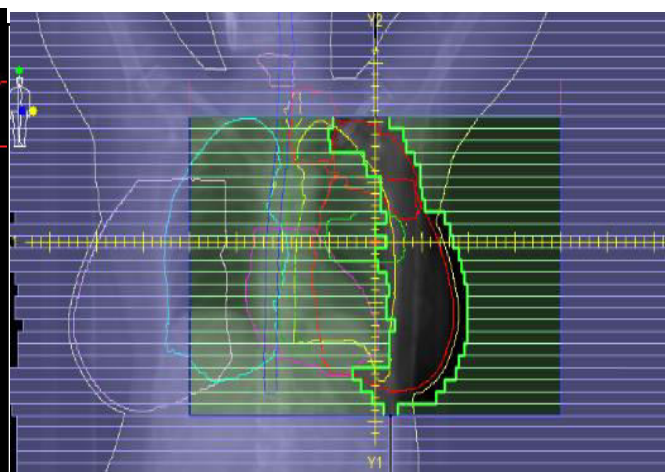
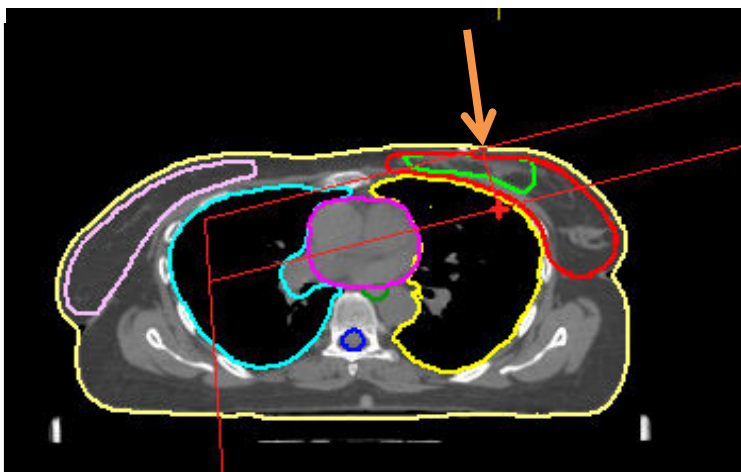
### Beam 6

Gantry angle  $130^\circ$   
Collimator angle  $340^\circ$



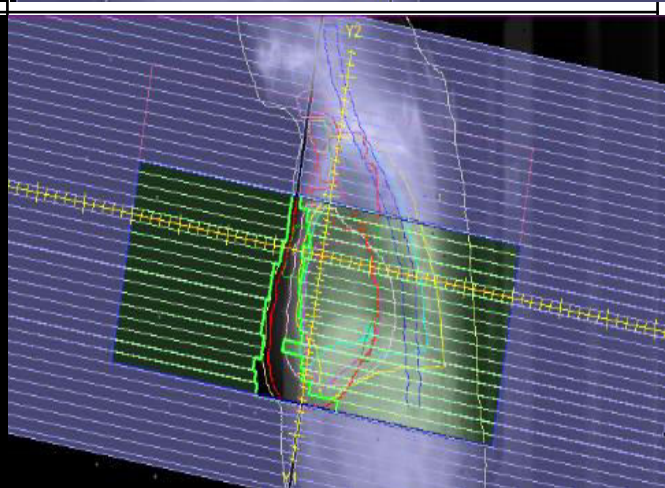
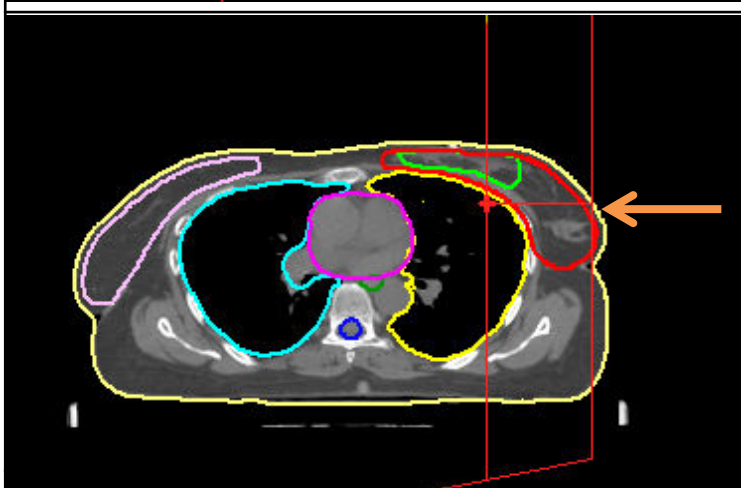
### Beam 7

Gantry angle  $345^\circ$   
Collimator angle  $0^\circ$



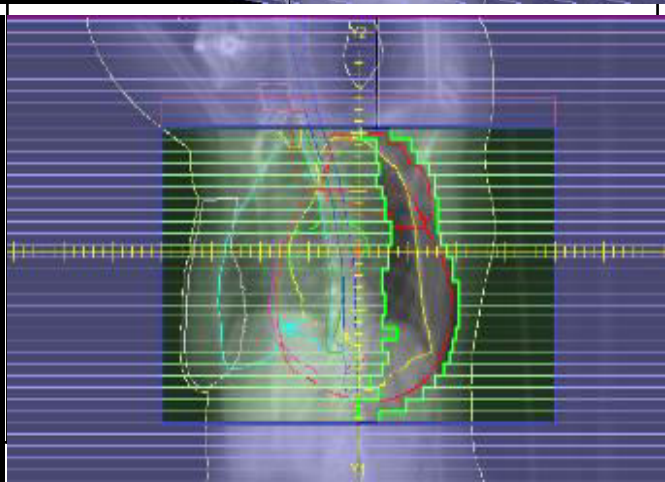
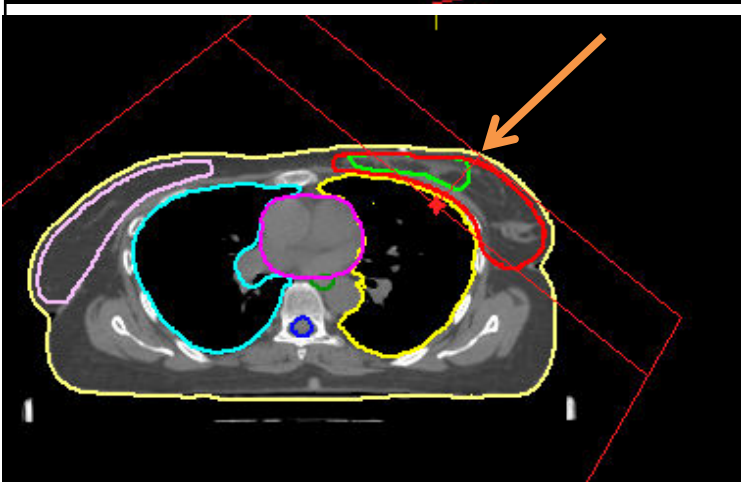
### Beam 8

Gantry angle  $90^\circ$   
Collimator angle  $350^\circ$



### Beam 9

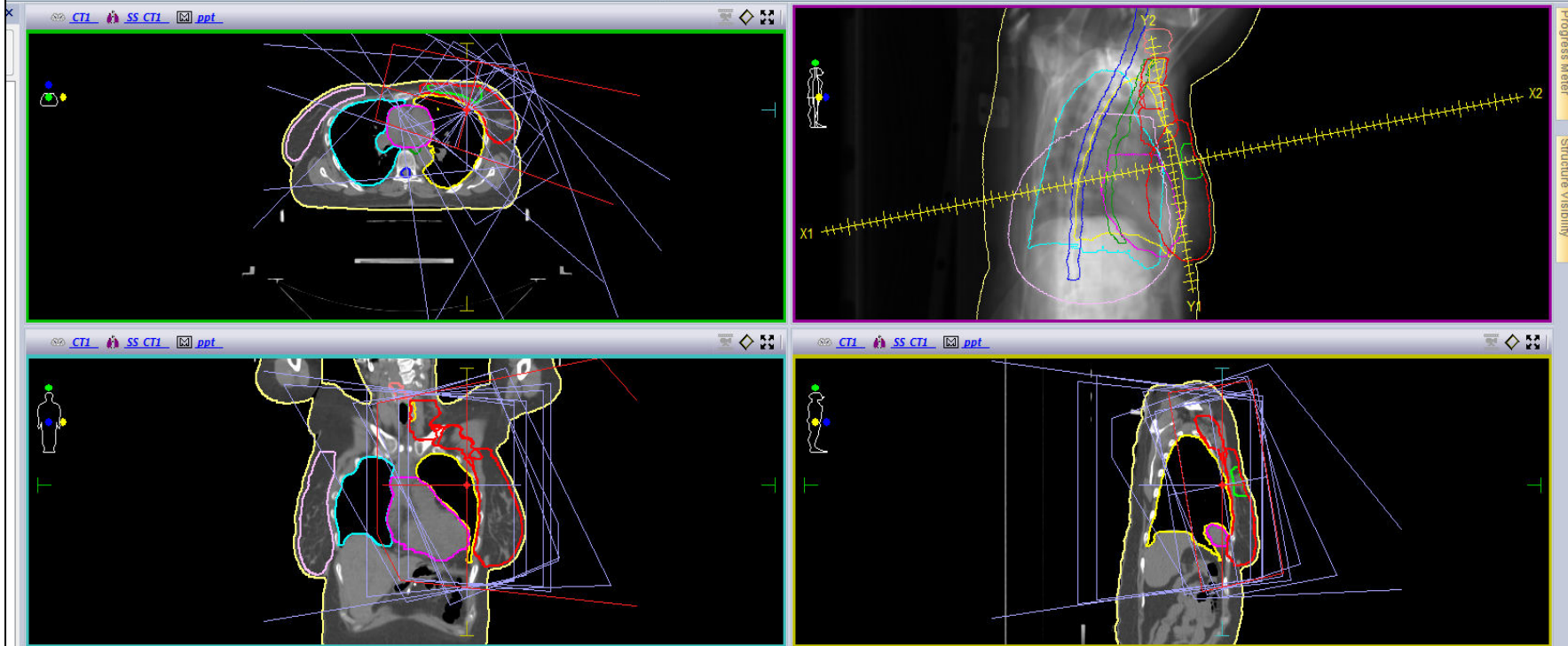
Gantry angle  $40^\circ$   
Collimator angle  $0^\circ$





Contouring Plan Options Planning Output

Structure Segment Summary DICOM Plan Segment Details DICOM Coordinates  
 Fluence Statistics IMRT Constraints Control Point Summary Auto Margin Include Base Dose  
 DVH Index Beam Summary Advanced IMRT Constraints Interest Point and Markers Print Screen Customized Reports Print Views  
 Individual Reports Reports Print Options



Beams

Delete Parent Beams

General Geometry Treatment Aids Setup Beams

Beam	Description	Field ID	Visible	Delivery	Treatment ...	Modality	Algorithm	Energy	MU / Fx	SSD (cm)	Isocenter Loca...	X (cm)	Y (cm)	Z (cm)
1	1	1	<input checked="" type="checkbox"/>	Step & Shoot IMRT	ONCOREXPRESSIC	Photon	Monte Carlo	6.0 MV	0.00	86.16	Center of PTV_TOT_El	9.65	-5.40	7.92
2	2	2	<input checked="" type="checkbox"/>	Step & Shoot IMRT	ONCOREXPRESSIC	Photon	Monte Carlo	6.0 MV	0.00	92.38	Center of PTV_TOT_El	9.65	-5.40	7.92
3	3	3	<input checked="" type="checkbox"/>	Step & Shoot IMRT	ONCOREXPRESSIC	Photon	Monte Carlo	6.0 MV	0.00	94.68	Center of PTV_TOT_El	9.65	-5.40	7.92
4	4	4	<input checked="" type="checkbox"/>	Step & Shoot IMRT	ONCOREXPRESSIC	Photon	Monte Carlo	6.0 MV	0.00	95.61	Center of PTV_TOT_El	9.65	-5.40	7.92
5	5	5	<input checked="" type="checkbox"/>	Step & Shoot IMRT	ONCOREXPRESSIC	Photon	Monte Carlo	6.0 MV	0.00	92.49	Center of PTV_TOT_El	9.65	-5.40	7.92
6	6	6	<input checked="" type="checkbox"/>	Step & Shoot IMRT	ONCOREXPRESSIC	Photon	Monte Carlo	6.0 MV	0.00	91.08	Center of PTV_TOT_El	9.65	-5.40	7.92
7	7	7	<input checked="" type="checkbox"/>	Step & Shoot IMRT	ONCOREXPRESSIC	Photon	Monte Carlo	6.0 MV	0.00	88.80	Center of PTV_TOT_El	9.65	-5.40	7.92
8	8	8	<input checked="" type="checkbox"/>	Step & Shoot IMRT	ONCOREXPRESSIC	Photon	Monte Carlo	6.0 MV	0.00	84.75	Center of PTV_TOT_El	9.65	-5.40	7.92
9	9	9	<input checked="" type="checkbox"/>	Step & Shoot IMRT	ONCOREXPRESSIC	Photon	Monte Carlo	6.0 MV	0.00	95.12	Center of PTV_TOT_El	9.65	-5.40	7.92

<click to add a new beam>

# Dose Prescription

[LTBREAST, Plan Competition FEB-201, CT1, ppt]  
 Contouring Plan Options Planning **Output** Style

Structure  
 Performance Statistics Beam Summary Advanced IMRT Constraints Interest Point and Markers  
 DICOM Plan Control Point Summary Auto Margin Print Screen Customized Reports Print Views  
 DICOM Coordinates Include Base Dose  
 Individual Reports Print Options

Prescription Segments

Add Rx Delete Rx

Rx ID	Rx Site	Prescribe To	Rx Dose (cGy)	Number of Fractions	Fractional Dose (cGy)
Physician's Intent	A Chest	Plan Isocenter X 9.65 Y -5.40 Z 7.92	5000.0	25	200.0

Actual Dose = 0.0 cGy

Rescale 5000.0 cGy to...

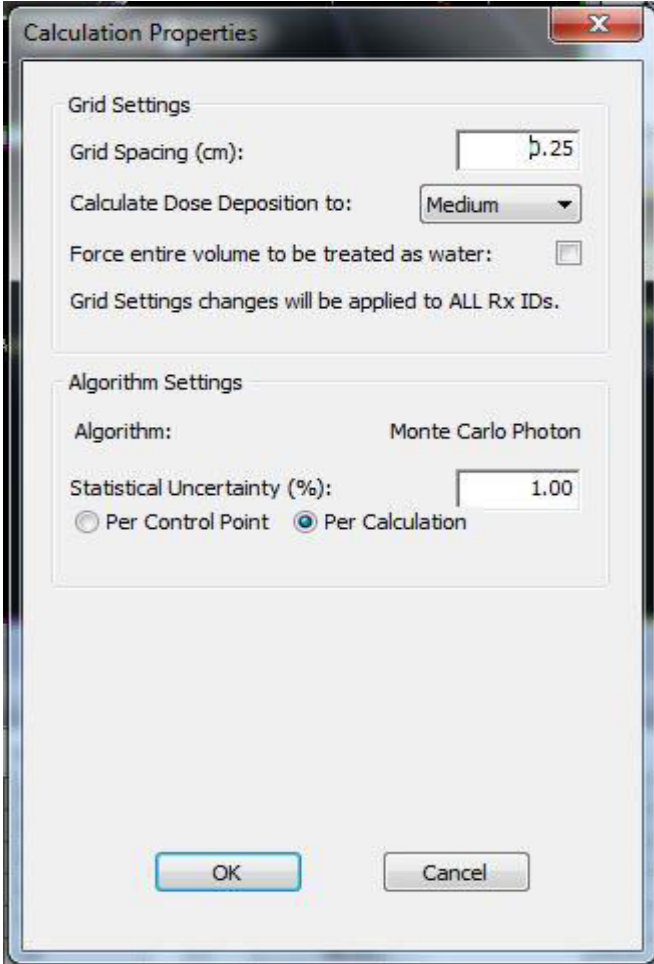
Weight beams by:  Dose  MU Equal Weights

Beam	Description	Field ID	%	Lock	MU / Fx
1	1	1		<input checked="" type="checkbox"/>	0.00
2	2	2		<input type="checkbox"/>	0.00
3	3	3		<input type="checkbox"/>	0.00

Structures Prescription Beams IMRT Constraints Dose Reference Points  
 92 cm Active Slice T 120 / 233 Press Optimize to begin stage 1 Planning Activity Max Dose: 0.0 cGy  
 11:05 AM 6/13/2016

# Plan Parameters

## Define Calculation properties



Calculation Properties

Grid Settings

Grid Spacing (cm):

Calculate Dose Deposition to:

Force entire volume to be treated as water:

Grid Settings changes will be applied to ALL Rx IDs.

Algorithm Settings

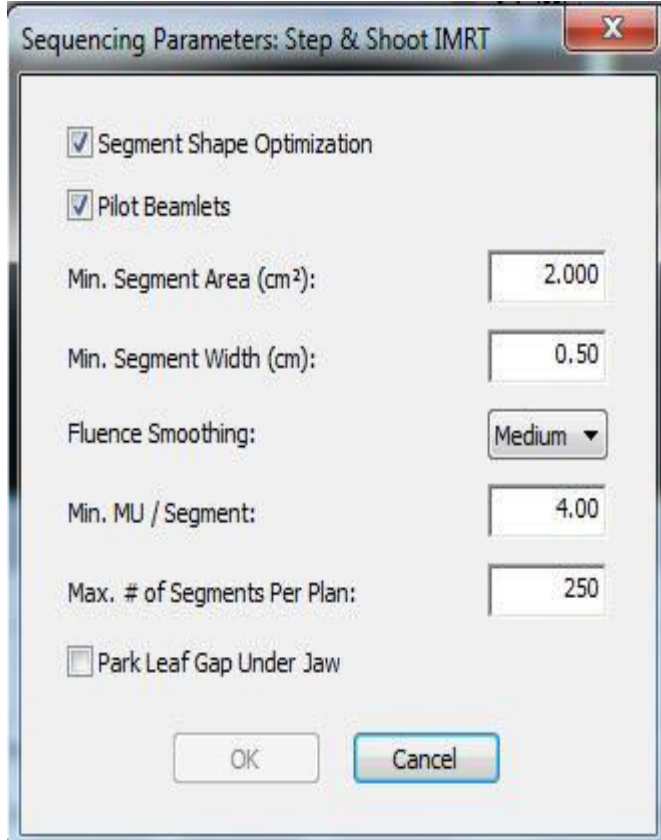
Algorithm: Monte Carlo Photon

Statistical Uncertainty (%):

Per Control Point  Per Calculation

OK Cancel

## Define sequencing parameters



Sequencing Parameters: Step & Shoot IMRT

Segment Shape Optimization

Pilot Beamlets

Min. Segment Area (cm<sup>2</sup>):

Min. Segment Width (cm):

Fluence Smoothing:

Min. MU / Segment:

Max. # of Segments Per Plan:

Park Leaf Gap Under Jaw

OK Cancel



# Optimization Process

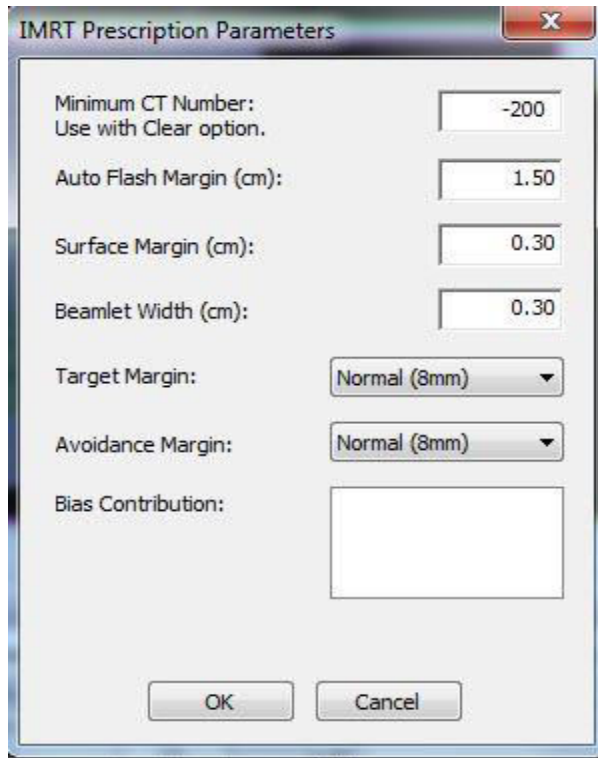
- Two stage process
  - Phase I: beamlet weights are optimized using the PB Algorithm.
  - Phase II: segment weights are optimized using MC Algorithm.
- Layering of structures/OARS (Monaco uses layering order to determine voxel ownership )
- Heart, Left Lung, Right Breast, Spinal cord, Right Lung defined all above the body but below target
- Define objectives for target and constraint for OARs
- Start optimization with PTV and Body first
- Add OARs constraint one by one in optimization
- Analyze the results of optimization using relative impact tab as well as dose statistics.

# Optimization constraints

MRT Constraints										
<span>↑</span> <span>↓</span> Pareto <b>Constrained</b> IMRT Parameters										
Structure	Cost Function	Enabled	Status	Manual	Weight	Reference Dose (cGy)	Multicriterial	Isoconstraint	Isoeffect	Relative Impact
PTV_TOT_EVAL	Target EUD	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	1.00			5000.0	0.0	
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	5200.0		100.0	0.0	
	Target Penalty	<input type="checkbox"/>	Off	<input type="checkbox"/>	1.00			5000.0	0.0	
HEART	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.08	1900.0	<input type="checkbox"/>	5.00	0.00	
	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.01	1500.0	<input type="checkbox"/>	15.00	0.00	
	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	48.61	270.0	<input type="checkbox"/>	29.00	0.00	
LUNG_LEFT	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	27.76	800.0	<input type="checkbox"/>	33.00	0.00	
	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	315.87	2000.0	<input type="checkbox"/>	14.00	0.00	
	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.02	1000.0	<input type="checkbox"/>	40.00	0.00	
BREAST_RIGHT	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.01	300.0	<input type="checkbox"/>	5.00	0.00	
	Serial	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.05		<input type="checkbox"/>	158.0	0.0	
SPINAL CORD	Serial	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.01		<input type="checkbox"/>	750.0	0.0	
LUNG_RIGHT	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.02	500.0	<input type="checkbox"/>	6.00	0.00	
BODY	Quadratic Overdose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	5000.0	<input type="checkbox"/>	30.0	0.0	
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	3333.0	<input type="checkbox"/>	30.0	0.0	
	Maximum Dose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	9.95			5550.0	0.0	
	Conformality	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	28.79		<input type="checkbox"/>	0.70	0.00	
<click to add a new structure>										

# Target Objectives

## IMRT Parameters



IMRT Prescription Parameters

Minimum CT Number:   
Use with Clear option.

Auto Flash Margin (cm):

Surface Margin (cm):

Beamlet Width (cm):

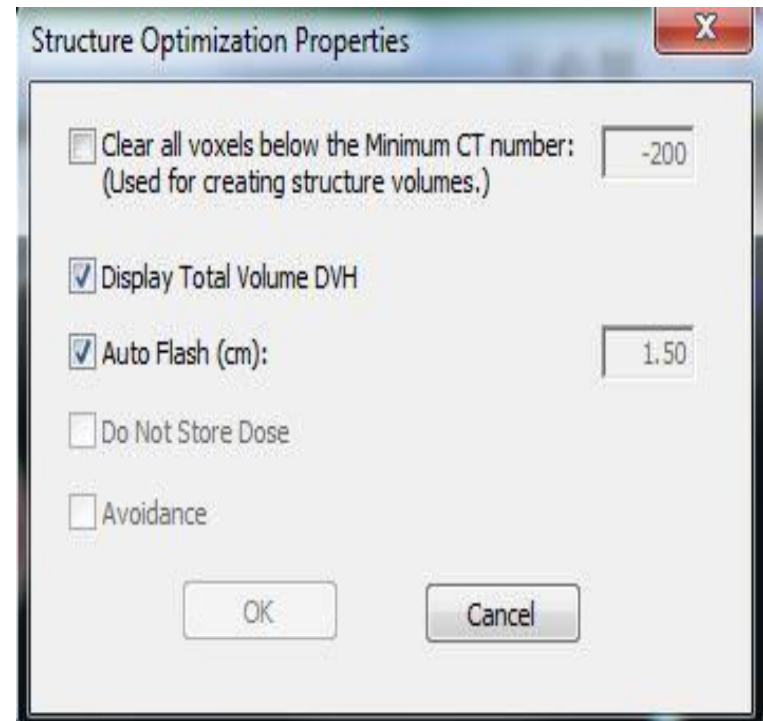
Target Margin:

Avoidance Margin:

Bias Contribution:

OK Cancel

## In PTV Structure optimization properties use Auto Flash Margin



Structure Optimization Properties

Clear all voxels below the Minimum CT number:   
(Used for creating structure volumes.)

Display Total Volume DVH

Auto Flash (cm):

Do Not Store Dose

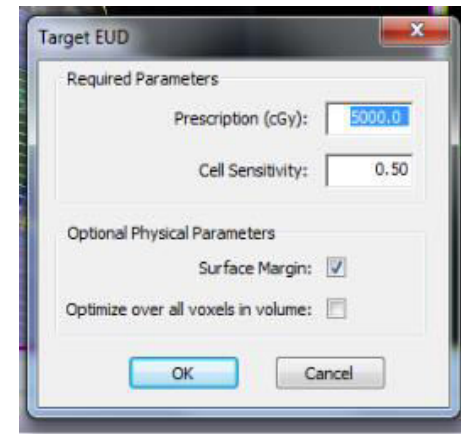
Avoidance

OK Cancel

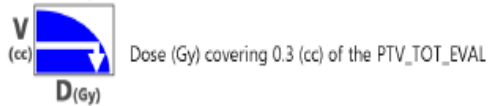
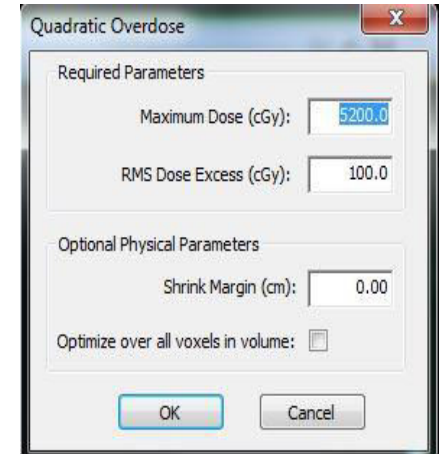


# Target Objectives

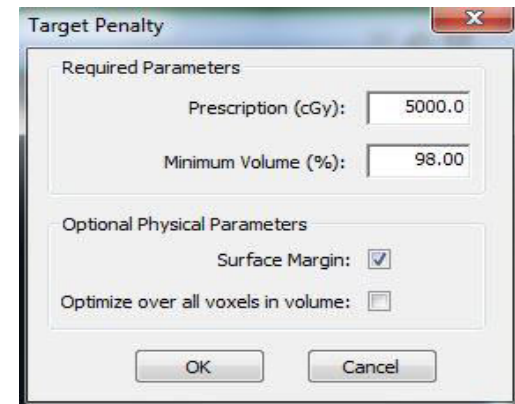
Biological cost function → Target EUD



Physical cost function → Quadratic Overdose



One more physical cost function used → Target penalty (to force the min. dose coverage)



# Define cost functions for body

- First quadratic overdose function
  - Second quadratic overdose function
  - Maximum dose cost function
  - Conformality cost function
- } To limit spillage of dose




The screenshot shows the IMRT Constraints interface. A dialog box titled 'Quadratic Overdose' is open, showing the following parameters:

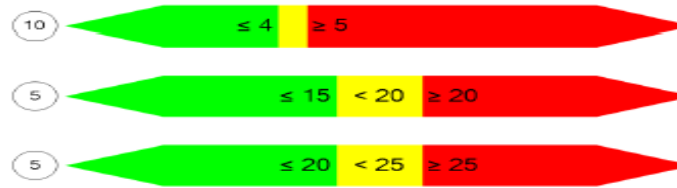
- Required Parameters:
  - Maximum Dose (cGy): 5000.0
  - RMS Dose Excess (cGy): 30.0
- Optional Physical Parameters:
  - Shrink Margin (cm): 0.00
- Optimize over all voxels in volume:
- Multicriterial:

Below the dialog box is a table of IMRT Constraints:

Structure	Cost Function	Enabled	St	Weight	Multicriterial	Isoconstraint	Isoeffect	Relative Impact
PTV_TOT_EVAL	Target EUD	<input checked="" type="checkbox"/>	On	1.00			5000.0	0.0
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	0.01		5200.0	100.0	0.0
	Target Penalty	<input type="checkbox"/>	Off	1.00			5000.0	0.0
HEART	Parallel	<input type="checkbox"/>	Off	0.08		1900.0	5.00	0.00
	Parallel	<input type="checkbox"/>	Off	0.01		1500.0	15.00	0.00
	Parallel	<input type="checkbox"/>	Off	48.61		270.0	29.00	0.00
LUNG_LEFT	Parallel	<input type="checkbox"/>	Off	27.76		800.0	33.00	0.00
	Parallel	<input type="checkbox"/>	Off	315.87		2000.0	14.00	0.00
	Parallel	<input type="checkbox"/>	Off	0.02		1000.0	40.00	0.00
BREAST_RIGHT	Parallel	<input type="checkbox"/>	Off	0.01		300.0	5.00	0.00
	Serial	<input type="checkbox"/>	Off	0.05			158.0	0.0
SPINAL_CORD	Serial	<input type="checkbox"/>	Off	0.01			750.0	0.0
	Parallel	<input type="checkbox"/>	Off	0.02		500.0	6.00	0.00
BODY	Quadratic Overdose	<input checked="" type="checkbox"/>	On	0.01		5000.0	30.0	0.0
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	0.01		3333.0	30.0	0.0
	Maximum Dose	<input checked="" type="checkbox"/>	On	9.95			5550.0	0.0
	Conformality	<input checked="" type="checkbox"/>	On	28.79				0.70

# Constraints defined for heart

- ROI**  Mean dose (Gy) inside the HEART
- Mean (Gy)**  Volume (%) of the HEART covered by 15 (Gy)
- V (%)**  Dose (Gy) covering 5 (%) of the HEART





Biological cost function used – Parallel cost function


Structure	Cost Function	Enabled	Start	End	Weight	Reference Dose (cGy)	Multicriterial	Isoconstraint	Isoeffect	Relative Impact
PTV_TOT_EVAL	Target EUD	<input checked="" type="checkbox"/>	On		0.01	5200.0		5000.0	0.0	
	Quadratic Overdose	<input checked="" type="checkbox"/>	On		1.00			100.0	0.0	
HEART	Target Penalty	<input type="checkbox"/>	Off		1.00			5000.0	0.0	
	Parallel	<input type="checkbox"/>	Off		0.08	1900.0	<input type="checkbox"/>	5.00	0.00	
LUNG_LEFT	Parallel	<input type="checkbox"/>	Off		0.01	1500.0		15.00	0.00	
	Parallel	<input type="checkbox"/>	Off		48.61	270.0		29.00	0.00	
	Parallel	<input type="checkbox"/>	Off		27.76	800.0		33.00	0.00	
BREAST_RIGHT	Parallel	<input type="checkbox"/>	Off		315.87	2000.0		14.00	0.00	
	Parallel	<input type="checkbox"/>	Off		0.02	1000.0		40.00	0.00	
	Parallel	<input type="checkbox"/>	Off		0.01	300.0		5.00	0.00	
SPINAL_CORD	Serial	<input type="checkbox"/>	Off		0.05			158.0	0.0	
	Serial	<input type="checkbox"/>	Off		0.01			750.0	0.0	
LUNG_RIGHT	Parallel	<input type="checkbox"/>	Off		0.02	500.0		6.00	0.00	
	Quadratic Overdose	<input checked="" type="checkbox"/>	On		0.01	5000.0		30.0	0.0	
BODY	Quadratic Overdose	<input checked="" type="checkbox"/>	On		0.01	3333.0		30.0	0.0	
	Maximum Dose	<input checked="" type="checkbox"/>	On		9.95			5550.0	0.0	
	Conformality	<input checked="" type="checkbox"/>	On		28.79			0.70	0.00	




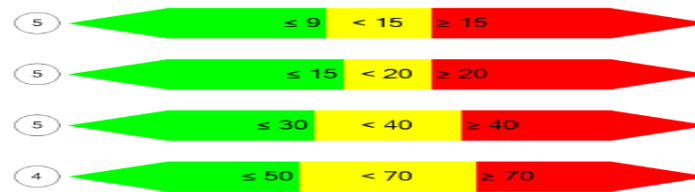
# Constraints defined for Left Lung

**ROI**  Mean dose (Gy) inside the LUNG\_LEFT

**Mean**  Volume (%) of the LUNG\_LEFT covered by 20 (Gy)

**V**  Volume (%) of the LUNG\_LEFT covered by 10 (Gy)

**V**  Volume (%) of the LUNG\_LEFT covered by 5 (Gy)



Biological cost function used – Parallel cost function

**Parallel**

Required Parameters

Reference Dose (cGy):

Mean Organ Damage (%):

Power Law Exponent:

Optional Physical Parameters

Shrink Margin (cm):

Optimize over all voxels in volume:

Multicriterial:

OK Cancel

Structure	Cost Function	Enabled	State	Weight	Value	Multicriterial	Isoconstraint	Isoeffect	Relative Impact
PTV_TOT_EVAL	Target EUD	<input checked="" type="checkbox"/>	On		5200.0			5000.0	0.0
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	0.01				100.0	0.0
	Target Penalty	<input type="checkbox"/>	Off	1.00				5000.0	0.0
HEART	Parallel	<input type="checkbox"/>	Off	0.08	1900.0	<input type="checkbox"/>		5.00	0.00
	Parallel	<input type="checkbox"/>	Off	0.01	1500.0	<input type="checkbox"/>		15.00	0.00
	Parallel	<input type="checkbox"/>	Off	48.61	270.0	<input type="checkbox"/>		29.00	0.00
	Parallel	<input type="checkbox"/>	Off	27.76	800.0	<input type="checkbox"/>		33.00	0.00
LUNG_LEFT	Parallel	<input type="checkbox"/>	Off	315.87	2000.0	<input type="checkbox"/>		14.00	0.00
	Parallel	<input type="checkbox"/>	Off	0.02	1000.0	<input type="checkbox"/>		40.00	0.00
	Parallel	<input type="checkbox"/>	Off	0.01	300.0	<input type="checkbox"/>		5.00	0.00
BREAST_RIGHT	Serial	<input type="checkbox"/>	Off	0.05		<input type="checkbox"/>		158.0	0.0
	Serial	<input type="checkbox"/>	Off	0.01		<input type="checkbox"/>		750.0	0.0
SPINAL CORD	Parallel	<input type="checkbox"/>	Off	0.02	500.0	<input type="checkbox"/>		6.00	0.00
	Parallel	<input type="checkbox"/>	Off	0.02		<input type="checkbox"/>		6.00	0.00
LUNG_RIGHT	Quadratic Overdose	<input checked="" type="checkbox"/>	On	0.01	5000.0	<input type="checkbox"/>		30.0	0.0
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	0.01	3333.0	<input type="checkbox"/>		30.0	0.0
	Maximum Dose	<input checked="" type="checkbox"/>	On	9.95		<input type="checkbox"/>		5550.0	0.0
	Conformality	<input checked="" type="checkbox"/>	On	28.79		<input type="checkbox"/>		0.70	0.00
	Conformality	<input checked="" type="checkbox"/>	On	28.79		<input type="checkbox"/>		0.70	0.00
BODY	Conformality	<input checked="" type="checkbox"/>	On	28.79		<input type="checkbox"/>		0.70	0.00

<click to add a new structure>

# Constraints defined for Right Breast



Dose (Gy) covering 0.3 (cc) of the BREAST\_RIGHT



Dose (Gy) covering 5 (%) of the BREAST\_RIGHT



Biological cost function used – Parallel and Serial cost function

**Parallel**

Required Parameters

Reference Dose (cGy): 500.0

Mean Organ Damage (%): 5.00

Power Law Exponent: 4.00

Optional Physical Parameters

Shrink Margin (cm): 0.00

Optimize over all voxels in volume:

Multicriterial:

OK Cancel

Structure	Cost Function	Enabled	St			Multicriterial	Isoconstraint	Isoeffect	Relative Impact
PTV_TOT_EVAL	Target EUD	<input checked="" type="checkbox"/>	On				5000.0	0.0	
	Quadratic Overdose	<input checked="" type="checkbox"/>	On		0.01		5200.0	100.0	0.0
HEART	Target Penalty	<input type="checkbox"/>	Off		1.00		5000.0	0.0	
	Parallel	<input type="checkbox"/>	Off		0.08		1900.0	5.00	0.00
LUNG_LEFT	Parallel	<input type="checkbox"/>	Off		0.01		1500.0	15.00	0.00
	Parallel	<input type="checkbox"/>	Off		-48.61		270.0	29.00	0.00
	Parallel	<input type="checkbox"/>	Off		27.76		800.0	33.00	0.00
BREAST_RIGHT	Parallel	<input type="checkbox"/>	Off		315.87		2000.0	14.00	0.00
	Parallel	<input type="checkbox"/>	Off		0.02		1000.0	40.00	0.00
SPINAL CORD	Serial	<input type="checkbox"/>	Off		0.01		300.0	5.00	0.00
	Serial	<input type="checkbox"/>	Off		0.05			158.0	0.0
LUNG_RIGHT	Parallel	<input type="checkbox"/>	Off		0.01			750.0	0.0
	Parallel	<input type="checkbox"/>	Off		0.02		500.0	6.00	0.00
BODY	Quadratic Overdose	<input checked="" type="checkbox"/>	On		0.01		5000.0	30.0	0.0
	Quadratic Overdose	<input checked="" type="checkbox"/>	On		0.01		3333.0	30.0	0.0
	Maximum Dose	<input checked="" type="checkbox"/>	On		9.95			5550.0	0.0
	Conformality	<input checked="" type="checkbox"/>	On		28.79			0.70	0.00

<click to add a new structure>

# Constraints defined for Spinal Cord



Dose (Gy) covering 0.03 (cc) of the SPINAL CORD



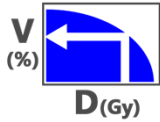
Biological cost function used – Serial cost function

Structure	Cost Function	Enabled	Serial	Parallel	Power Law Exponent	Equivalent Uniform Dose (EUD)	Multiofferal	Isoconstraint	Isoeffect	Relative Impact
PTY_TOT_EVAL	Target EUD	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	1.00		<input type="checkbox"/>	5000.0	0.0	
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	5200.0	<input type="checkbox"/>	100.0	0.0	
	Target Penalty	<input type="checkbox"/>	Off	<input type="checkbox"/>	1.00		<input type="checkbox"/>	5000.0	0.0	
HEART	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.08	1900.0	<input type="checkbox"/>	5.00	0.20	
	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.01	1500.0	<input type="checkbox"/>	15.00	0.00	
	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	48.61	270.0	<input type="checkbox"/>	29.00	0.20	
LUNG_LEFT	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	27.76	800.0	<input type="checkbox"/>	33.00	0.20	
	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	315.87	2000.0	<input type="checkbox"/>	14.00	0.20	
	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.02	1000.0	<input type="checkbox"/>	40.00	0.20	
BREAST_RIGHT	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.01	300.0	<input type="checkbox"/>	5.00	0.20	
	Serial	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.05		<input type="checkbox"/>	150.0	0.0	
SPINAL CORD	Serial	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.01		<input type="checkbox"/>	750.0	0.0	
LUNG_RIGHT	Parallel	<input type="checkbox"/>	Off	<input type="checkbox"/>	0.02	500.0	<input type="checkbox"/>	6.00	0.20	
BODY	Quadratic Overdose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	5000.0	<input type="checkbox"/>	30.0	0.0	
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	3335.0	<input type="checkbox"/>	30.0	0.0	
	Maximum Dose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	9.95		<input type="checkbox"/>	5550.0	0.0	
	Conformality	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	35.79		<input type="checkbox"/>	0.70	0.20	

<click to add a new structure>



# Constraints defined for Right LUNG



Volume (%) of the LUNG\_RIGHT covered by 5 (Gy)



Biological cost function used – Parallel cost function

Structure	Cost Function	Enabled	Stop	...	...	...	Multicriterial	Isoconstraint	Isoeffect	Relative Impact
PTV_TOT_EVAL	Target EUD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					5000.0	0.0	
	Quadratic Overdose	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0.01	5200.0			300.0	0.0	
	Target Penalty	<input type="checkbox"/>	<input type="checkbox"/>	1.00				5000.0	0.0	
HEART	Parallel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.08	2900.0	<input type="checkbox"/>		5.00	0.00	
	Parallel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.01	1500.0	<input type="checkbox"/>		15.00	0.00	
	Parallel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	48.61	270.0	<input type="checkbox"/>		29.00	0.00	
LUNG_LEFT	Parallel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	27.76	800.0	<input type="checkbox"/>		33.00	0.00	
	Parallel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	315.87	2000.0	<input type="checkbox"/>		14.00	0.00	
	Parallel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.02	3000.0	<input type="checkbox"/>		40.00	0.00	
BREAST_RIGHT	Parallel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.01	300.0	<input type="checkbox"/>		5.00	0.00	
	Serial	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.05		<input type="checkbox"/>		150.0	0.0	
SPINAL CORD	Serial	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.01		<input type="checkbox"/>		750.0	0.0	
LUNG_RIGHT	Parallel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.02	500.0	<input type="checkbox"/>		6.00	0.00	
BODY	Quadratic Overdose	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0.01	5000.0	<input type="checkbox"/>		30.0	0.0	
	Quadratic Overdose	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0.01	3333.0	<input type="checkbox"/>		30.0	0.0	
	Maximum Dose	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	9.95		<input type="checkbox"/>		5500.0	0.0	
	Conformality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	28.79		<input type="checkbox"/>		0.70	0.00	

# Dose Statistics from TPS

Monaco@Monaco3 - [LTBREAST, Plan Competition\*FEB-201, CT1, PLAN4ONCOR8c]

Fusion Contouring Plan Options Planning Output

Fluence Show Dose Assign Treatment Aid Device Statistics Extents CT to ED Display options Optional

Image Beam Viewer Summary Review

DVH Properties DVH Statistics 5000.0 cGy 100.00 % Volume of Interest DRR

Structure Combination DVH color setup

Relative mode Dose Normalization

CT1 SS CT1 PLAN4ONCOR8c

Plan Review

Total Volume DVH

DVH Statistics (Total Volume) @Monaco3 - [LTBREAST, Plan Competition\*FEB-201, CT1, PLAN4ONCOR8c]

Statistics Display

Structure	Volume (cm <sup>3</sup> )	Min. Dose (cGy)	Max. Dose (cGy)	Mean Dose (cGy)	Cold Ref. (cGy)	Volume < (cm <sup>3</sup> )	Volume < (%)	Hot Ref. (cGy)	Volume > (cm <sup>3</sup> )	Volume > (%)	% in Volume	Is in SS	Heterogeneity Index	Conformity Index
PTV_TOT_EVAL	1091.184	3546.4	5591.5	5116.4				4908.9	1036.625	95.00	100.00	yes	1.08	0.77
HEART	688.032	99.8	5313.6	399.1	200.5	361.259	52.51	1500.0	40.793	5.93	100.00	yes	14.88	
LUNG_LEFT	1189.830	103.8	5390.0	1089.9				500.0	627.775	52.76	100.00	yes	23.14	0.00
BREAST_RIGHT	889.846	6.3	259.3	66.6	12.8	34.429	3.87	223.3	0.300	0.03	100.00	yes	10.89	
SPINAL_CORD	51.244	27.7	861.9	195.9				781.6	0.031	0.06	100.00	yes	11.48	
LUNG_RIGHT	1358.594	18.0	1202.3	135.8				500.0	18.724	1.38	100.00	yes	3.38	
BODY(Unsp.Tiss.)	22088.696	0.0	5602.8	405.2				4750.0	239.128	1.08	99.72	no	446.81	0.00
CTV-LUMPECTOMY	40.652	4703.5	5424.5	5064.4							100.00	yes	1.08	

Print OK

IMRT Constraints

Pareto Constrained IMRT Parameters

Structure	Cost Function	Enabled	Status	Manual	Weight	Reference Dose (cGy)	Multicriterial	Isoconstraint	Isoeffect	Relative Impact
PTV_TOT_EVAL	Target EUD	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	1.00			5000.0	4881.0	
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	5200.0		100.0	49.2	
	Target Penalty	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	1.00			5000.0	4771.1	
HEART	Parallel	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	1900.0	<input type="checkbox"/>	4.90	4.26	
	Parallel	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	1500.0	<input type="checkbox"/>	15.00	5.75	
	Parallel	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	20.01	270.0	<input type="checkbox"/>	29.00	27.82	++++
LUNG_LEFT	Parallel	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.07	800.0	<input type="checkbox"/>	33.00	30.47	+
	Parallel	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	47.25	2000.0	<input type="checkbox"/>	14.00	13.49	++++
	Parallel	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	1000.0	<input type="checkbox"/>	40.00	25.44	
BREAST_RIGHT	Parallel	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	500.0	<input type="checkbox"/>	70.00	43.83	
	Serial	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	10.42		<input type="checkbox"/>	158.0	159.2	++++
	Serial	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	300.0	<input type="checkbox"/>	5.00	0.86	
SPINAL_CORD	Serial	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01		<input type="checkbox"/>	750.0	616.9	
	Parallel	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.02	500.0	<input type="checkbox"/>	6.00	1.80	
LUNG_RIGHT	Quadratic Overdose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	5000.0	<input type="checkbox"/>	30.0	9.6	
	Quadratic Overdose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01	3333.0	<input type="checkbox"/>	30.0	24.0	
	Maximum Dose	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	11.50		<input type="checkbox"/>	5550.0	5566.9	++++
BODY	Conformality	<input checked="" type="checkbox"/>	On	<input type="checkbox"/>	0.01		<input type="checkbox"/>	0.70	0.60	

<click to add a new structure>

Unload All Structures Prescription Beams IMRT Constraints Dose Reference Points

by: -5.40 C: 7.92 cm Active Slice T: 120 / 233 Press Optimize to begin stage 1 Planning Activity Max Dose: 5649.2 cGy

12:59 PM 6/13/2016

# Rx A : Plan Report



Hospital/Clinic: DELHI STATE CANCER INST. Doc Number: Rx A: 19220160218.111316.001 Monaco 5.10.02  
 Patient Name: Plan Competition^FEB-201 Save Plan Date/Time: Jun 13, 2016 13:40:11  
 Patient ID: LTBREAST Print Date/Time: Jun 14, 2016 11:42:46  
 Plan Name: CT1:SS\_CT1:PLAN4ONCOR8 Workstation ID: Monaco3 198.169.120.124  
 Description:  
 Comment:

StudySet Information			
Studyset ID: CT1	# of Slices: 233	Pixel Size: 0.14	Scan Orientation: Head First Supine
Plan Information			
Treatment Orientation:	Head First Supine		
Max Dose in Plan (cGy):	5649.2		
Max Dose Location (cm):	X = 4.61	Y = 1.60	Z = 8.76
Grid Information			
Grid Spacing (cm):	0.28	Assigned CTtoED File:	DICOM3.rocsboard02
Calculate Dose Deposition to:	Medium	# of Calculation Points:	3369392
Force entire volume to be treated as water:	No		

Prescription Information: [A]				
Rx Site	Prescribe To:	Rx Dose (cGy)	Fractional Dose (cGy)	Number of Fractions
Chest	Plan Isocenter	5000.0	200.0	25

Actual Dose(cGy): 3900.2  
 Rescale: No user normalization applied  
 Algorithm: Monte Carlo Photon  
 Statistical Uncertainty (%) per Calculation: 1.00  
 Delivery Mode: Step & Shoot IMRT

Beam Information												
Scan Reference Coordinates (cm): No Scan Reference Point has been selected												
Beam #	Description	Treatment Unit	Modality	Energy	Gantry (deg)	Coll. (deg)	Couch (deg)	Isocenter			# of Segs	MU/Fx
								X(cm)	Y(cm)	Z(cm)		
1	1	ONCOREXPRESS	Photon	6.0 MV	285.0	10.0	0.0	9.65	-5.40	7.92	22	163.62
2	2	ONCOREXPRESS	Photon	6.0 MV	305.0	15.0	0.0	9.65	-5.40	7.92	18	130.51
3	3	ONCOREXPRESS	Photon	6.0 MV	325.0	0.0	0.0	9.65	-5.40	7.92	22	157.85
4	4	ONCOREXPRESS	Photon	6.0 MV	345.0	0.0	0.0	9.65	-5.40	7.92	15	119.04
5	5	ONCOREXPRESS	Photon	6.0 MV	90.0	350.0	0.0	9.65	-5.40	7.92	13	82.15
6	6	ONCOREXPRESS	Photon	6.0 MV	110.0	350.0	0.0	9.65	-5.40	7.92	17	96.45
7	7	ONCOREXPRESS	Photon	6.0 MV	130.0	340.0	0.0	9.65	-5.40	7.92	17	98.20
8	8	ONCOREXPRESS	Photon	6.0 MV	150.0	340.0	0.0	9.65	-5.40	7.92	17	99.54
9	9	ONCOREXPRESS	Photon	6.0 MV	40.0	0.0	0.0	9.65	-5.40	7.92	14	114.66
<b>Total:</b>											155	1062.02

Approved by: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Plan report




# Results Summary

Plan Quality Metric Component	Objective(s)	Result	Raw Score	Max Score	Performance
[PTV_TOT_EVAL] D[99.0%] (Gy)	> 45 [≥ 47.5]	47.6849	15.00	15.00	100.0%
[PTV_TOT_EVAL] D[95.0%] (Gy)	> 45 [≥ 50]	48.9114	3.91	5.00	78.2%
[PTV_TOT_EVAL] D[50.0%] (Gy)	< 54 [≤ 52]	51.2424	5.00	5.00	100.0%
[PTV_TOT_EVAL] D[0.3cc] (Gy)	< 57 [≤ 55]	55.5935	3.52	5.00	70.3%
[HEART] Mean dose (Gy)	< 5 [≤ 4]	4.0248	9.75	10.00	97.5%
[HEART] V[15.0Gy] (%)	< 20 [≤ 15]	6.0442	5.00	5.00	100.0%
[HEART] D[5.0%] (Gy)	< 25 [≤ 20]	19.6966	5.00	5.00	100.0%
[BREAST_RIGHT] D[0.3cc] (Gy)	< 3 [≤ 2]	2.2540	1.49	2.00	74.6%
[BREAST_RIGHT] D[5.0%] (Gy)	< 3 [≤ 2]	1.4801	4.00	4.00	100.0%
[SPINAL CORD] D[0.03cc] (Gy)	< 20 [≤ 8]	7.8581	5.00	5.00	100.0%
[LUNG_RIGHT] V[5.0Gy] (%)	< 6 [≤ 3]	1.3995	5.00	5.00	100.0%
[LUNG_LEFT] Mean dose (Gy)	< 15 [≤ 9]	11.1194	3.23	5.00	64.7%
[LUNG_LEFT] V[20.0Gy] (%)	< 20 [≤ 15]	18.7632	1.24	5.00	24.7%
[LUNG_LEFT] V[10.0Gy] (%)	< 40 [≤ 30]	29.4110	5.00	5.00	100.0%
[LUNG_LEFT] V[5.0Gy] (%)	< 70 [≤ 50]	53.8121	2.86	4.00	71.4%
[PTV_TOT_EVAL] Homogeneity Index [50.0Gy]	< 0.2 [≤ 0.08]	0.1316	2.23	5.00	44.5%
[PTV_TOT_EVAL] Conformation Number [47.5Gy]	> 0.6 [≥ 0.9]	0.7891	3.67	5.00	73.5%
Global Max Location (ROI)	[BODY]	BODY	5.00	5.00	100.0%
Total [18 Metrics]			85.90	100.00	85.9%

## Monaco results vary from Sun Nuclear Score

	Sun Nuclear result	Monaco TPS result	
[PTV_TOT_EVAL] D[99.0%] (Gy)	> 45 [ $\geq$ 47.5]	47.6849	47.845
[PTV_TOT_EVAL] D[95.0%] (Gy)	> 45 [ $\geq$ 50]	48.9114	49.089
[PTV_TOT_EVAL] D[50.0%] (Gy)	< 54 [ $\leq$ 52]	51.2424	51.216
[PTV_TOT_EVAL] D[0.3cc] (Gy)	< 57 [ $\leq$ 55]	55.5935	54.935
[HEART] Mean dose (Gy)	< 5 [ $\leq$ 4]	4.0248	3.991
[HEART] V[15.0Gy] (%)	< 20 [ $\leq$ 15]	6.0442	5.93
[HEART] D[5.0%] (Gy)	< 25 [ $\leq$ 20]	19.6966	19.118
[BREAST_RIGHT] D[0.3cc] (Gy)	< 3 [ $\leq$ 2]	2.2540	2.233
[BREAST_RIGHT] D[5.0%] (Gy)	< 3 [ $\leq$ 2]	1.4801	1.49
[SPINAL_CORD] D[0.03cc] (Gy)	< 20 [ $\leq$ 8]	7.8581	7.816
[LUNG_RIGHT] V[5.0Gy] (%)	< 6 [ $\leq$ 3]	1.3995	1.38
[LUNG_LEFT] Mean dose (Gy)	< 15 [ $\leq$ 9]	11.1194	10.899
[LUNG_LEFT] V[20.0Gy] (%)	< 20 [ $\leq$ 15]	18.7632	18.35
[LUNG_LEFT] V[10.0Gy] (%)	< 40 [ $\leq$ 30]	29.4110	28.8
[LUNG_LEFT] V[5.0Gy] (%)	< 70 [ $\leq$ 50]	53.8121	52.76
[PTV_TOT_EVAL] Homogeneity Index [50.0Gy]	< 0.2 [ $\leq$ 0.08]	0.1316	
[PTV_TOT_EVAL] Conformation Number [47.5Gy]	> 0.6 [ $\geq$ 0.9]	0.7891	
Global Max Location (ROI)	[BODY]	BODY	



THANK  
YOU