


Breast radiotherapy: TomoDirect vs TomoHelical rationale

Advantages of TomoDirect Treatment

- Decreased dose to contra-lateral structures
- Beam-on dose sparing
- Decreased integral dose
- Decreased planning effort



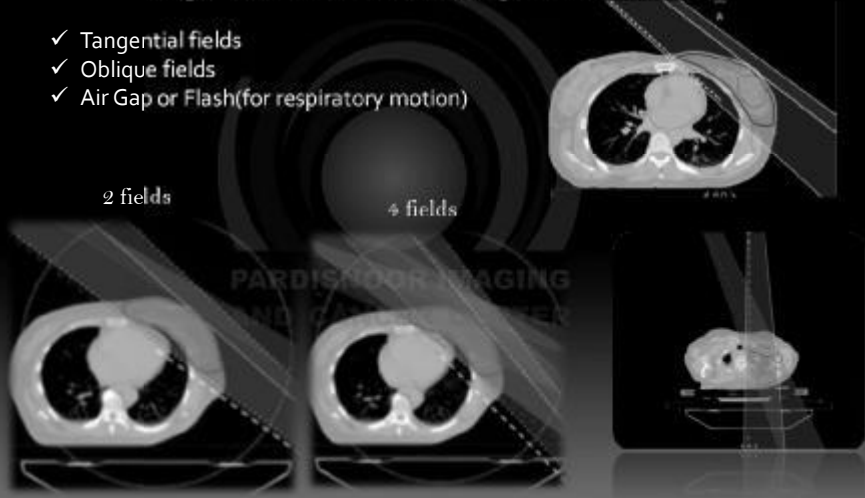
PARDISNOOR IMAGING
CANCER CENTER

55 Gy
45 Gy
35 Gy
25 Gy
15 Gy
5 Gy

TomoDirect Breast Planning

1. Choosing the best beam angles is critical

- ✓ Tangential fields
- ✓ Oblique fields
- ✓ Air Gap or Flash (for respiratory motion)

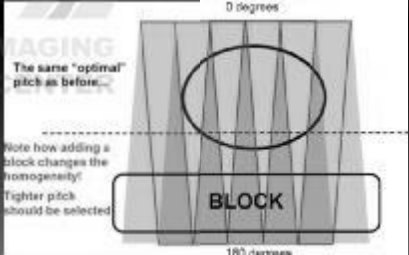
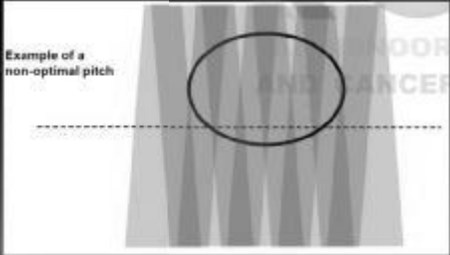
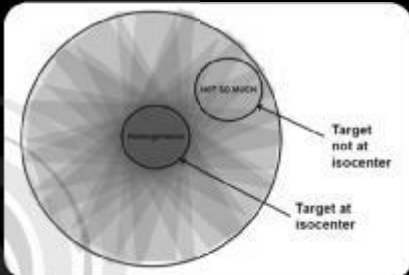


PARDISNOOR IMAGING
CANCER CENTER

TomoDirect Breast Planning

2. Pitch is per projection and not per rotation

Pitch !!!



Example of a non-optimal pitch

The same "optimal" pitch as below...

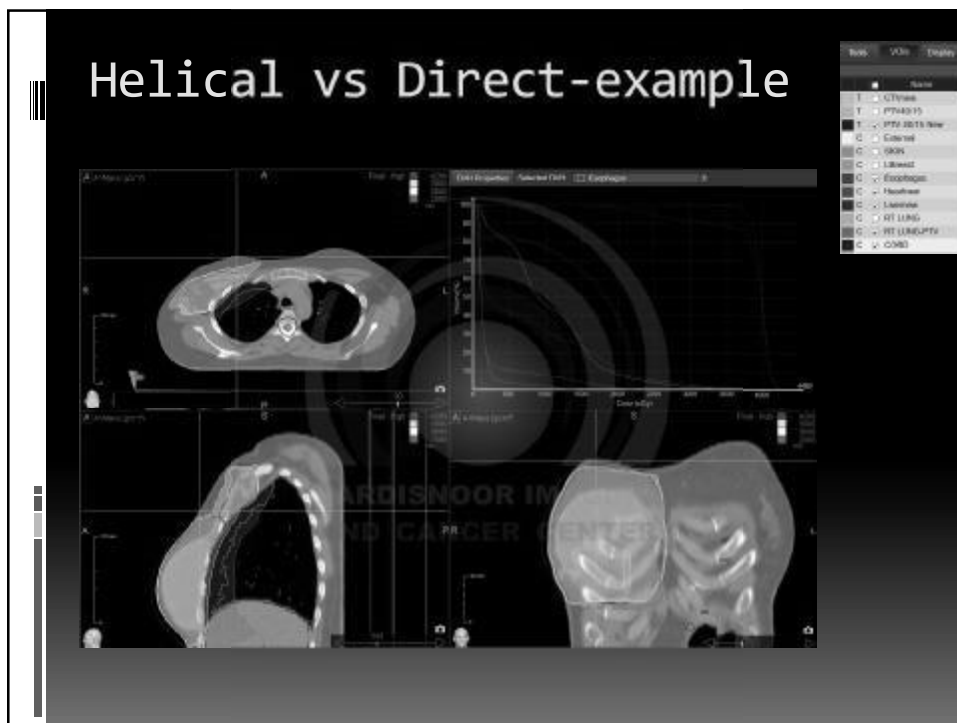
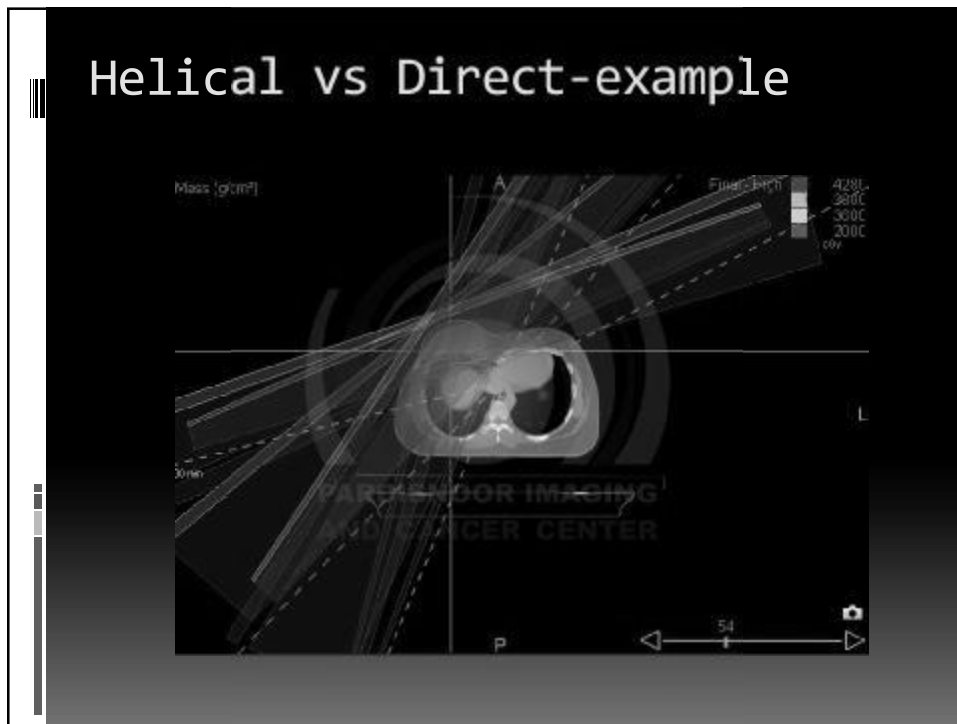
Note how adding a block changes the homogeneity!
Tighter pitch should be selected

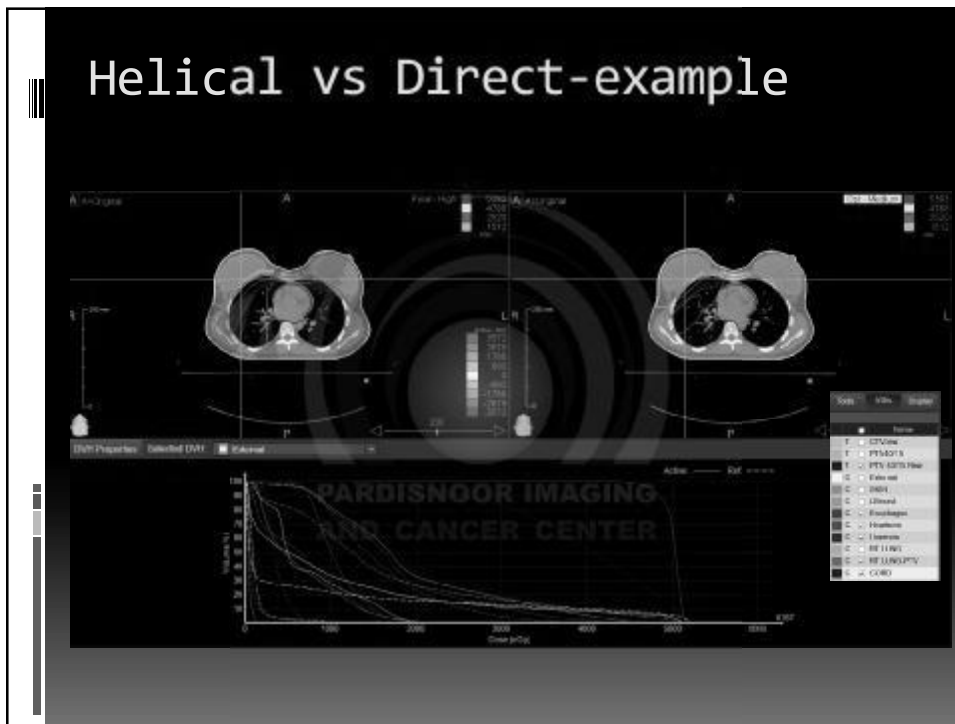
BLOCK

TomoDirect Breast Planning

3. More beams doesn't necessarily mean longer treatment time








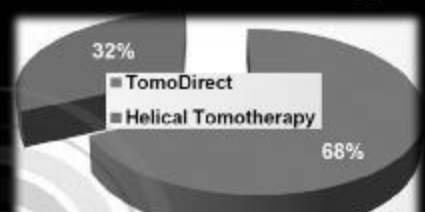
Helical vs Direct-example

Name	CRW	Min (ct)	Max (ct)	Min (ct)	Max (ct)	Min (ct)	Max (ct)	Q1	Q3	SD	ROI 1	ROI 2	ROI 3	ROI 4	Coverage (%)	Coverage (%)
PTV	No	2586	3061	4906	5681	5294	5843	1.94	1.81	3.76	2.21	1.15	1.35	35.89	78.83	
PTV-T	Yes	1800	2017	4327	4915	5282	6137	1.18	1.07	3.83	1.71	1.15	1.23	28.71	62.51	
Esoph	Yes	73	6	1373	870	8382	9117	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Heart	Yes	569	33	735	31	7900	743	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Heart	No	188	27	373	131	2592	1826	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
w/Heart	No	192	29	1304	11	2105	1271	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Lung (Total)	Yes	52	14	126	46	2754	211	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Lung (Total)	Yes	34	43	1825	151	4371	2256	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
SpinalCord (Thorax)	Yes	86	27	727	170	2189	1818	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
AVOID	No	180	182	1255	2381	3104	5436	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
SOB	73	1866			5893			6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
LT.LUNG-PTV	34	1722			4371			6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
VO	373	2884			4382			6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
PTV (w/PTV)	1800	4305			6298			1.17	1.07	3.76	1.71	1.15	1.23	43.35		


Helical IMRT Breast Planning

WHY?





32% TomoDirect
68% Helical Tomotherapy



80-90 breast RT patients/yr
30% Whole Breast
15% Mast.
15% H&N
30-35% Breast
20% Whole Breast

Concerns

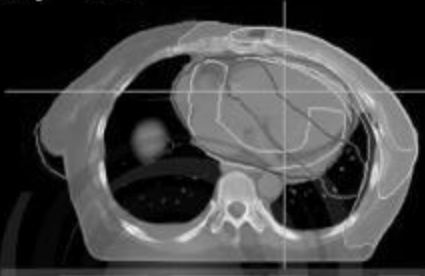
- Low Dose
- Skin Dose-respiratory issue
- Complex treatment planning

Clinica Luganese monacco

Case study #1

Tool: VOI, Display

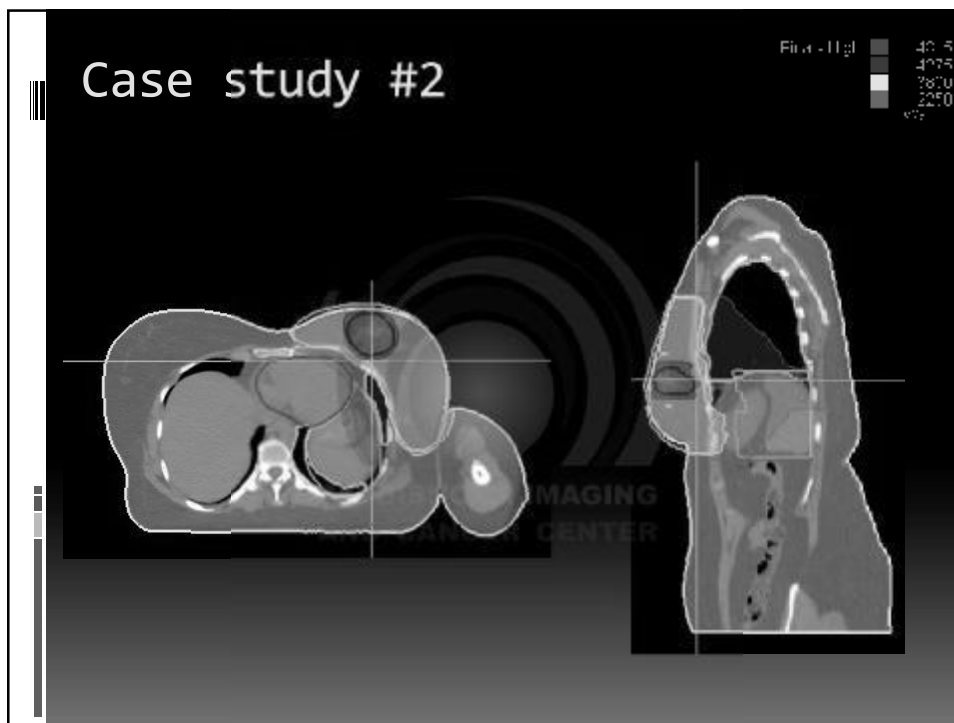
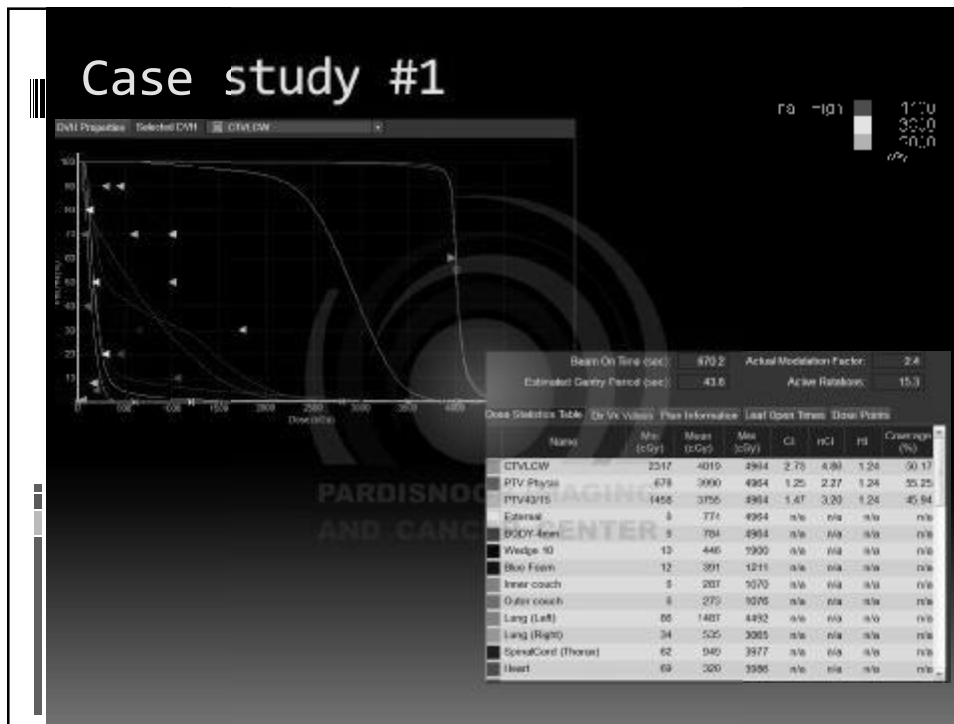
- None
- T CTV/LOM
- T PTV HxProc
- T PTV4B15
- C Gdrenal
- C BODY+4mm
- C Wedge 10
- C Slice Form
- C Inner couch
- C Outer couch
- C Lung (Left)
- C Lung (Right)
- C SpinalCord (Th...
- C Heart
- C Larynx
- C PTV4G 5
- C PTV+30mm
- C PTV+15mm
- T PTV-14
- C Skelapex
- C L-LUNG+PTV
- C L-LUNG-PTV15
- C L-LUNG-PTV30
- C L-LUNG-TRAF
- C HEART-PTV30mm
- C HEART-PTV15
- C HEART-PTV30
- C HEART-BASE
- C Skel+crates
- C Contralateral B...
- C Skel+cond brn

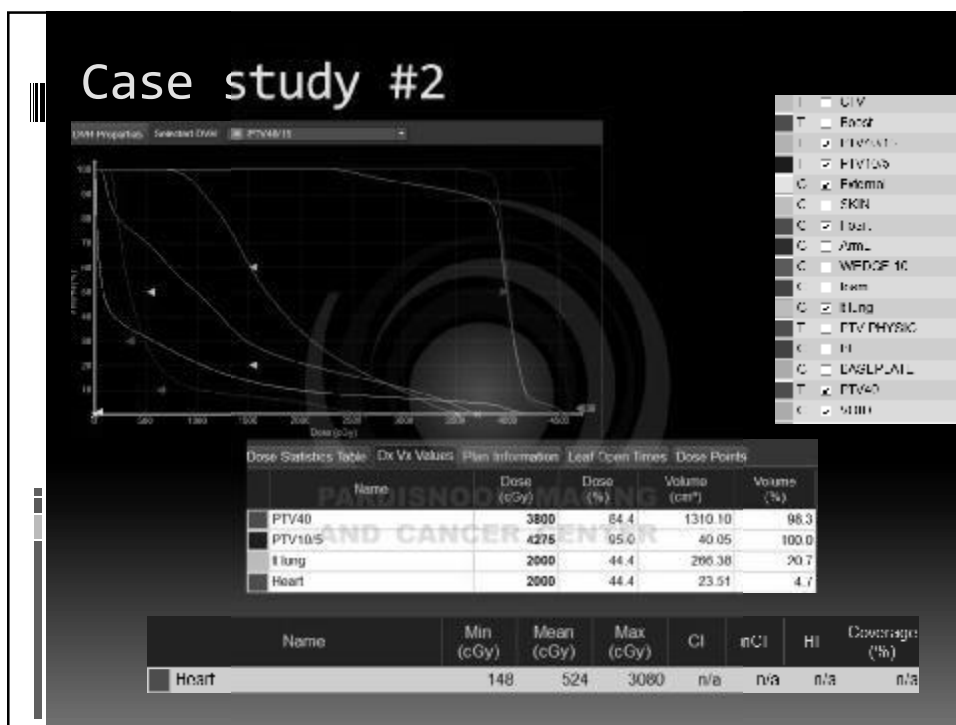
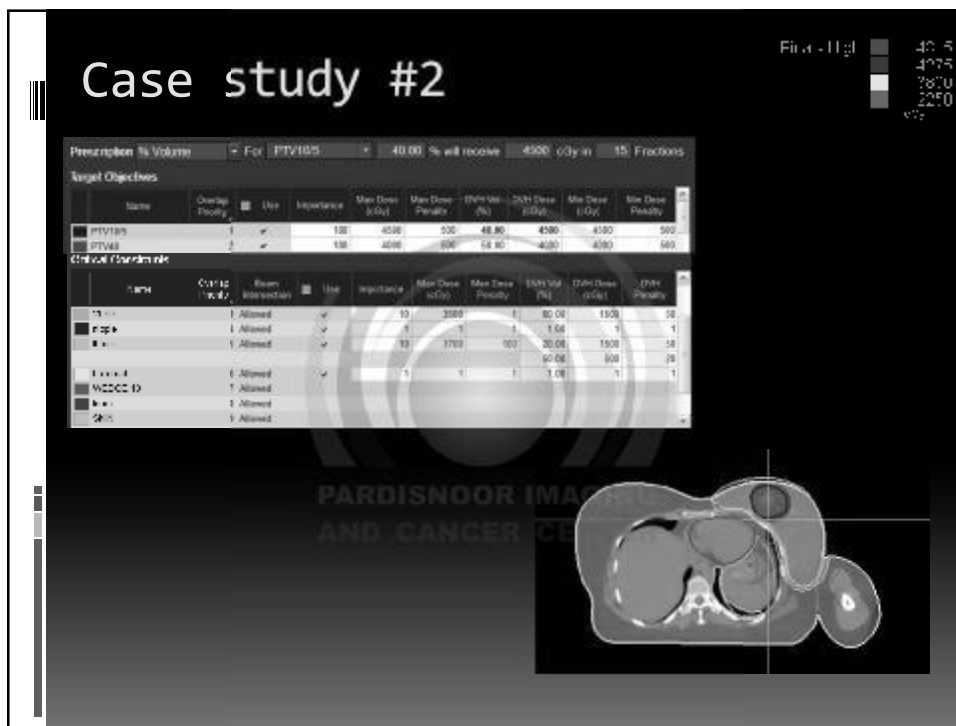


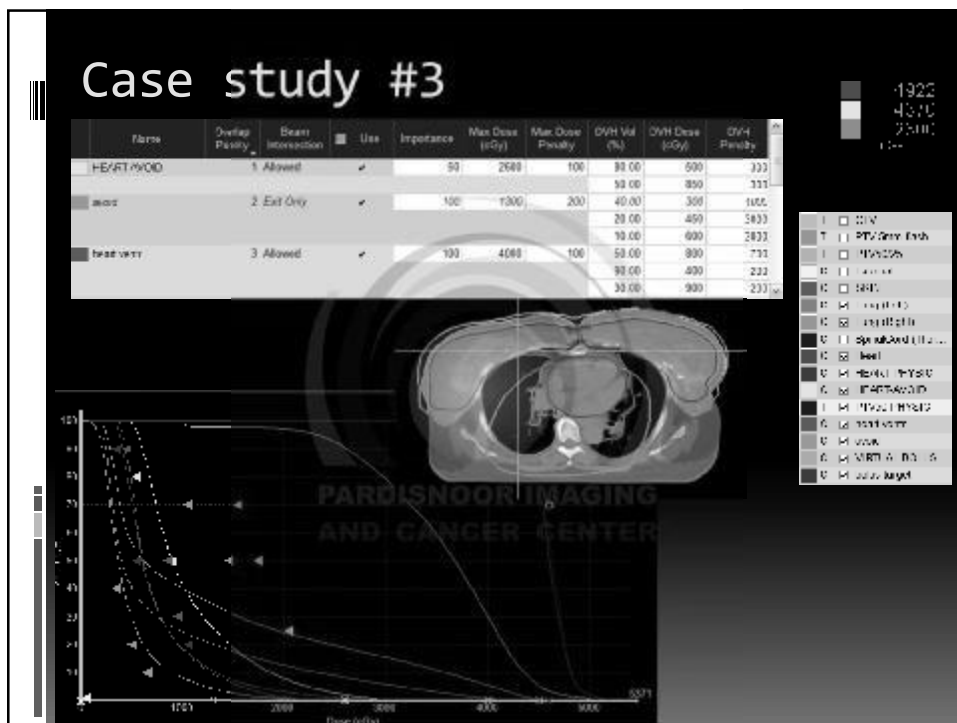
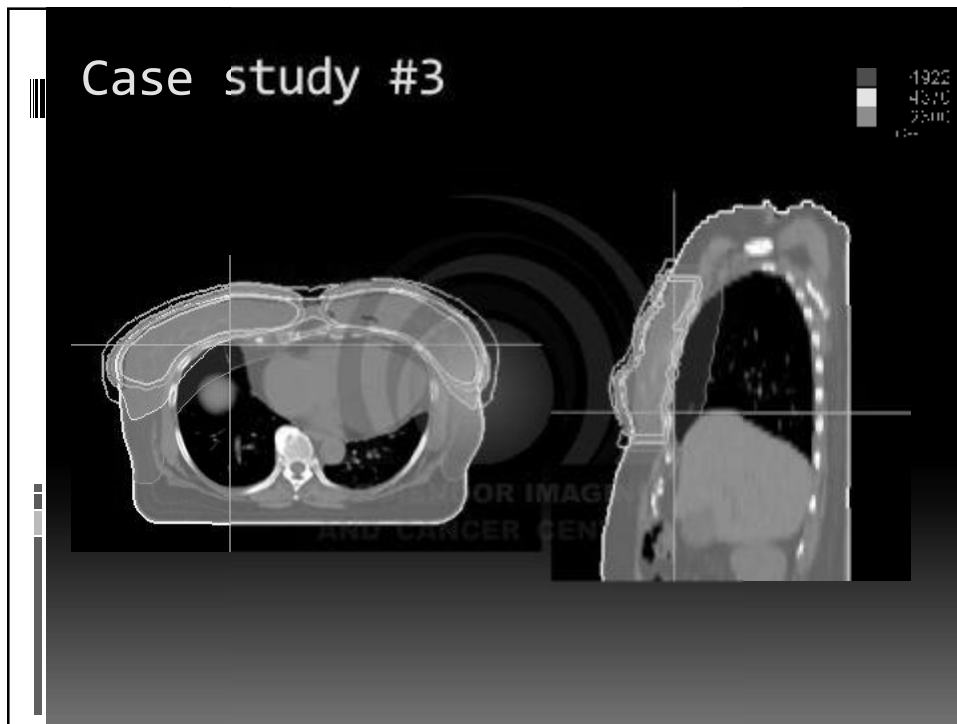
Prescription: 50.00 Gy/25Fx
50.00% full receive 4000 cGy x1 15 Fractions

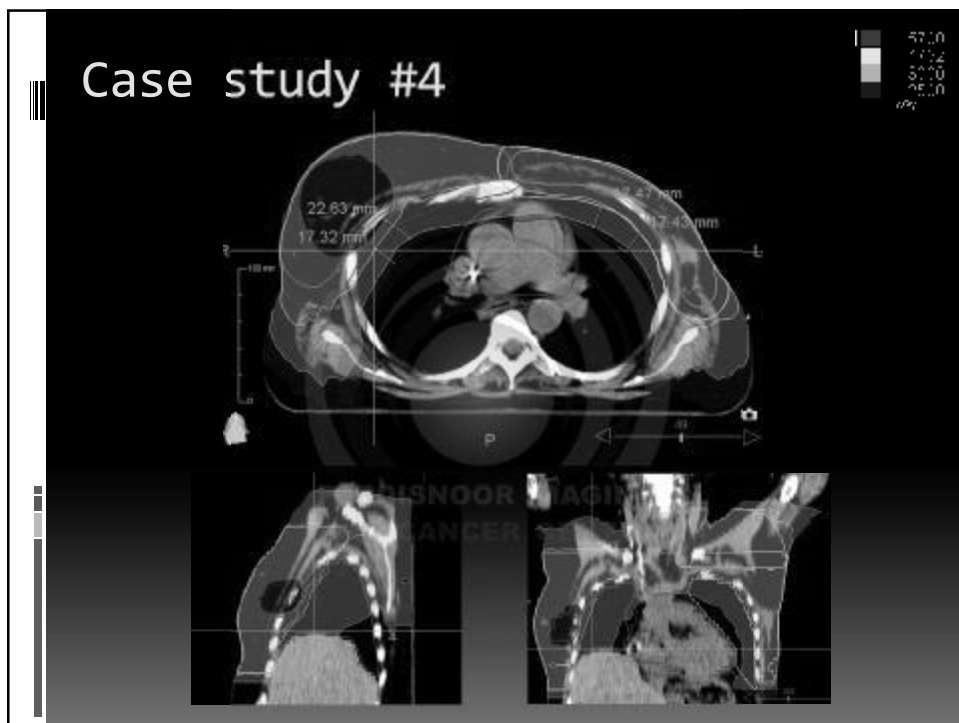
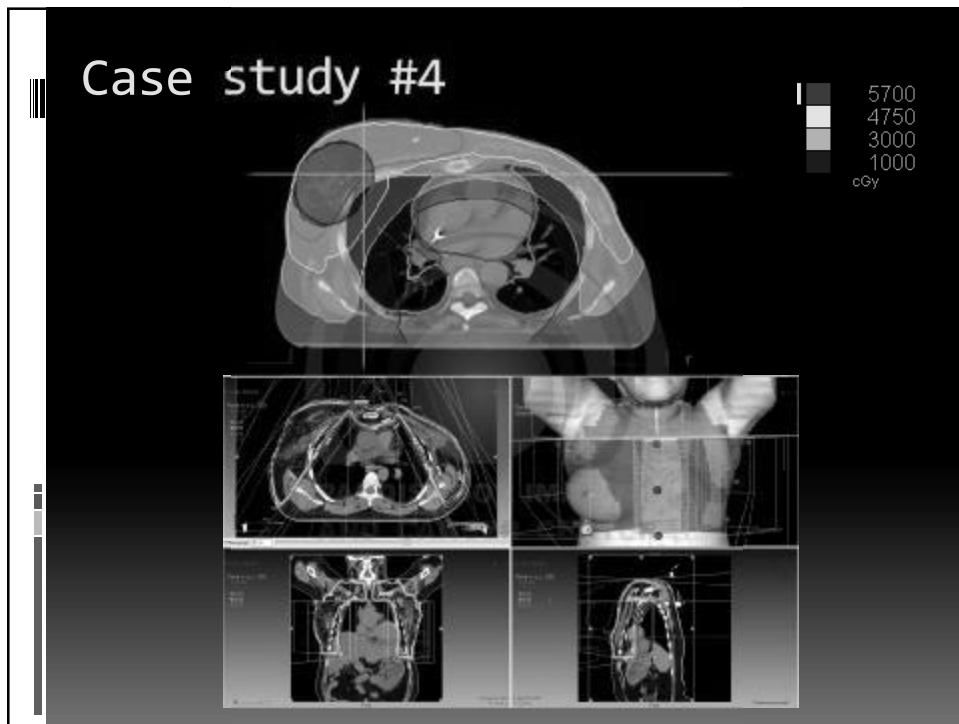
Name	Density	Max	Min	Max Dose (cGy)	Min Dose (cGy)	DVH Vol (%)	DVH Dose (cGy)	Min Dose (cGy)	Max Dose (cGy)
Heart	1	20	400	100	40.00	400	1.00	1.00	1.00
PTV+30mm	2	20	400	100	95.00	400	1.00	1.00	1.00

Name	Density	Rears Intersection	Use	Importance	Max Dose (cGy)	Max Dose Penalty	OVN UM (%)	DVH Dose (cGy)	DVH Penalty
ISO 4450cGy	1	Allowed	✓		10	4200	750	1.00	1
Heart	2	Never	✓		10	400	100	8.00	120
L-LUNG-BASE	3	Allowed	✓		5	3000	100	90.00	50
L-LUNG-DAGE	3	Allowed	✓		5	3000	100	75.00	50
L-LUNG-PTV30	4	Allowed	✓		5	3500	100	90.00	400
								75.00	950
								90.00	1700









Take Home message...

Tomo Direct

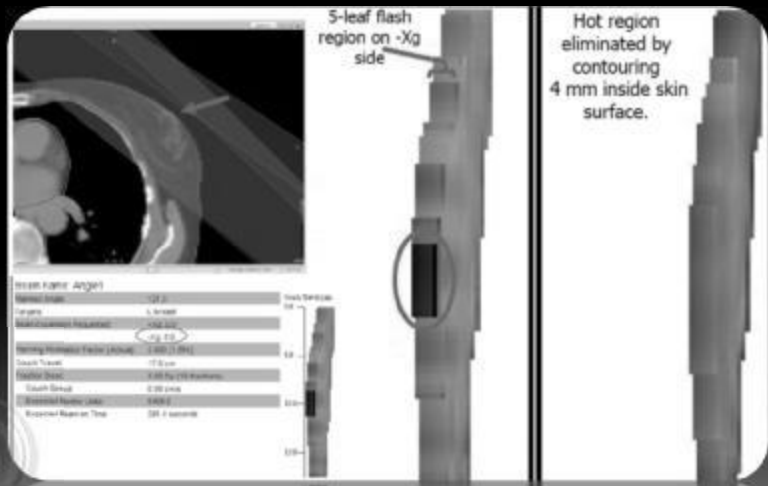
- ✓ Results similar or better than by LINAC
- ✓ Greater efficiency when planning and treating simple cases
- ✓ Direct tomotherapy or LINAC!!!



END

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For both helical and TomoDirect plans, the planner should avoid **contouring targets next to the surface of the patient**. If the optimizer is trying to fill in some dose, it needs more fluence if the beamlet is being transported mostly through air.



Parameter	Value
Beam Name	Angpt
Beam Size	1.0 cm
Beam Energy	6.0 MV
Beam Collimator	15.0 cm
Beam Filter	1.0 cm
Beam Dose	1.00 Gy
Beam Status	On
Beam Type	Photon
Beam Weight	1.00
Beam Order	1
Beam Priority	1
Beam Group	1
Beam ID	1
Beam Description	1.00 Gy