

RPC Thorax Lung Phantom Reports and Data



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Radiological Physics Center

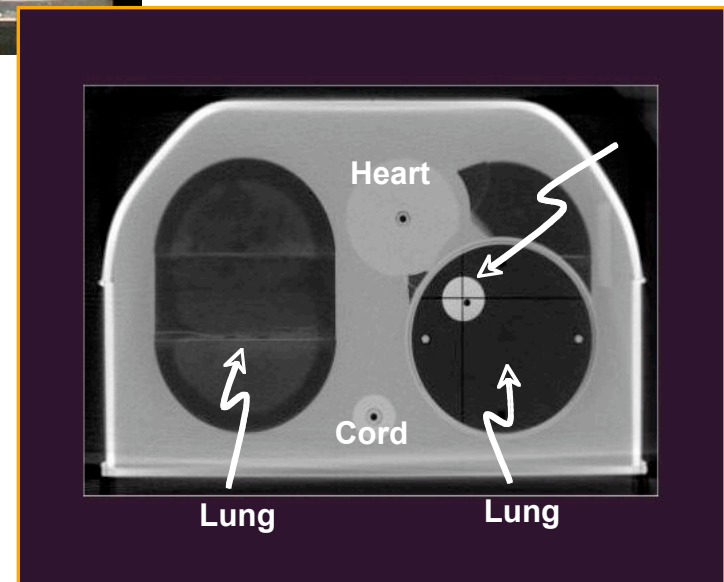
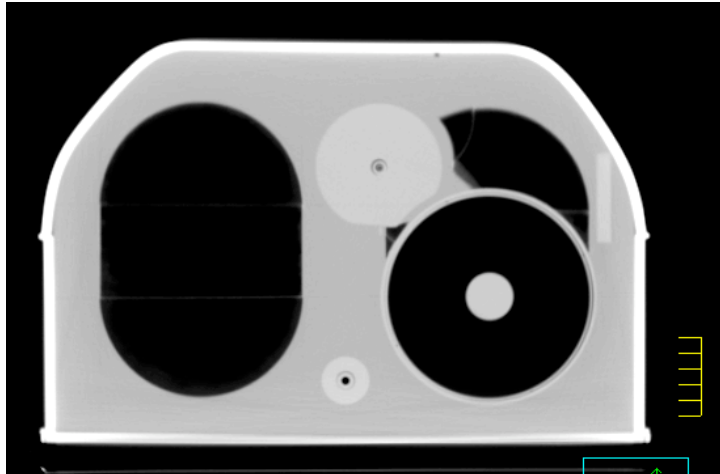
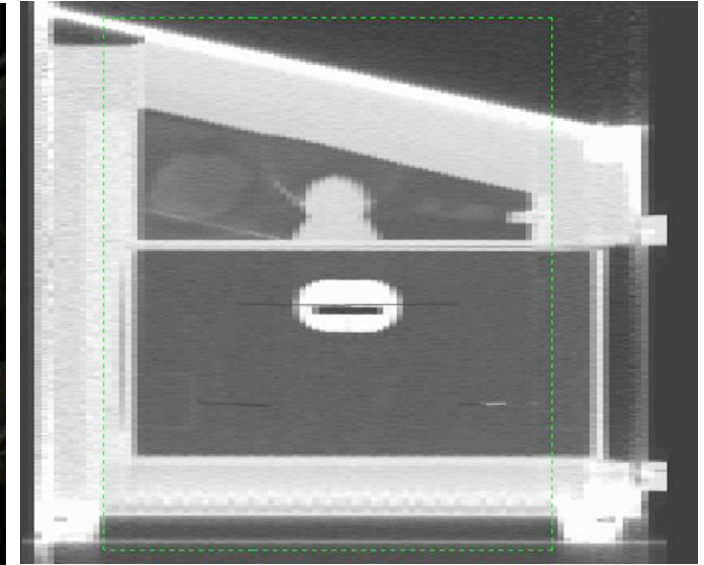
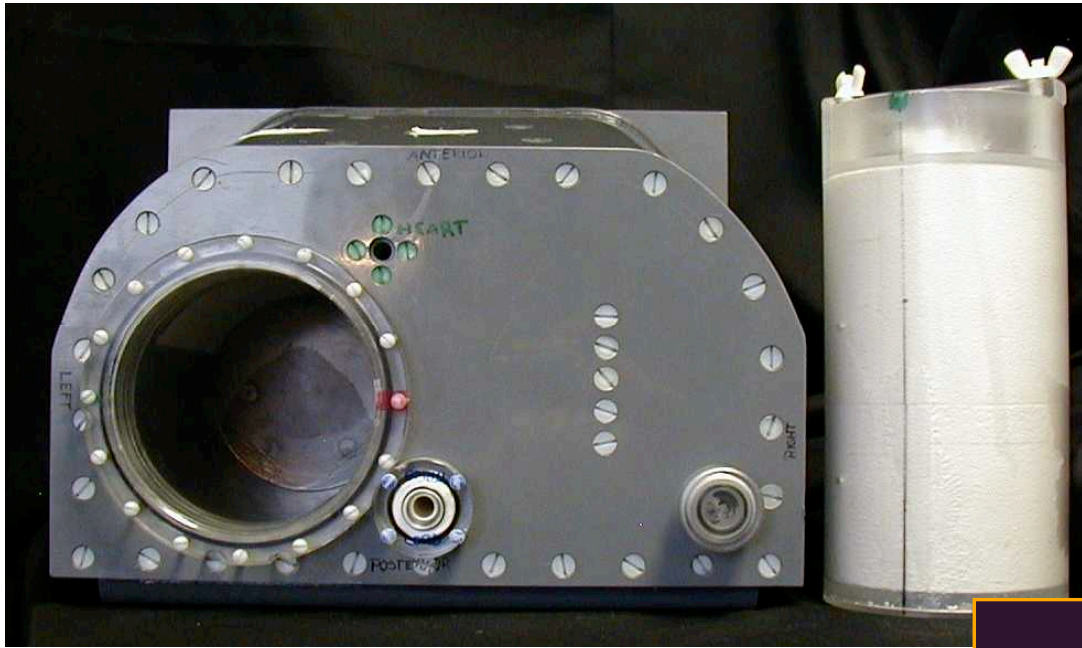
THE UNIVERSITY OF TEXAS
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Credentialing for SBRT Lung Protocols



- ★ ~ 30 irradiations of lung phantom
- ★ Evaluate dose/DTA from TLD and film data
 - ◆ 5% at center / 5 mm at all sides of target
- ★ Analysis neglects variation across target
 - ◆ Plan to include evaluation of dose across target

RPC Lung Phantom



Analysis



Ten irradiations at institutions using
Convolution/Superposition systems

Convolution - 44

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
TLD in superior PTV	32.1	30.47	0.95
TLD in inferior PTV	31.6	30.15	0.96

Location	Institution reported doses (Gy)	TLD Dose (Gy)
TLD in heart	0.82	0.45
TLD in cord	4.22	5.04

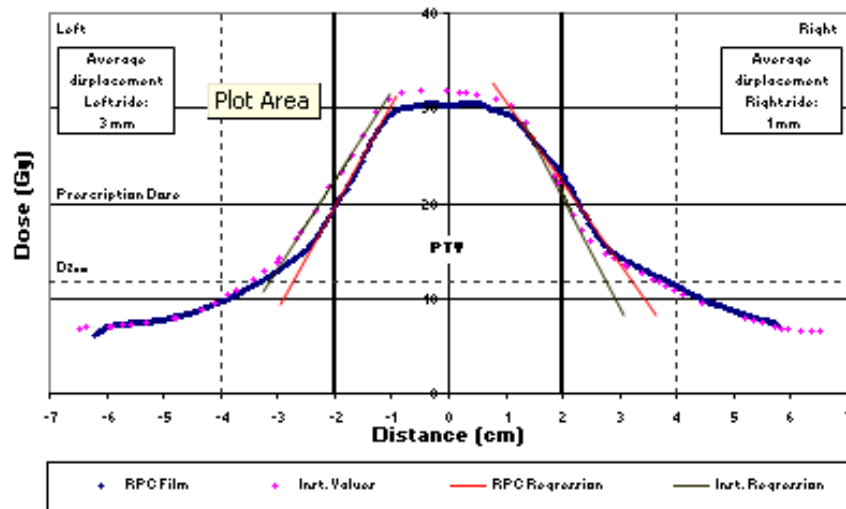
Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged.

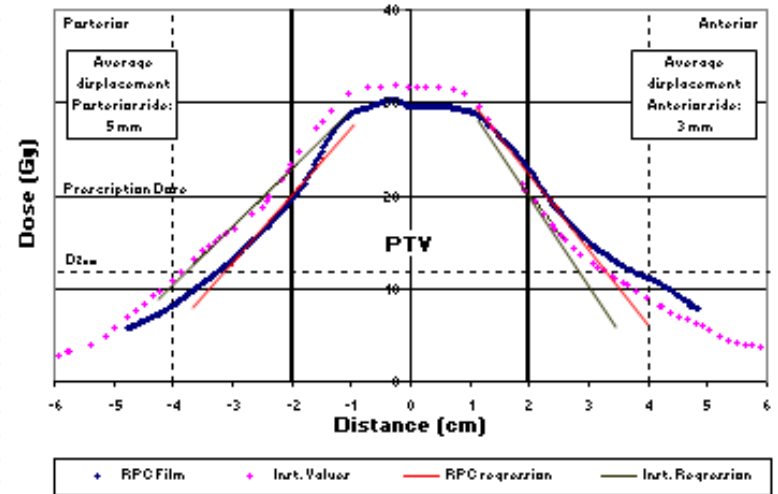
The "Prescription Dose" is 20Gy. "D_{2cm}" is the maximum dose 2cm from PTV in any direction

Profile 1

Right / Left Profile

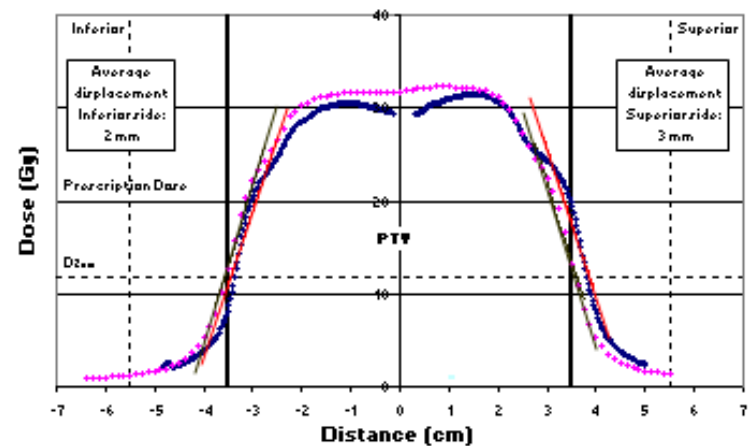


Anterior / Posterior Profile



Profile 3

Superior / Inferior Profile



Convolution - 53

J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
TLD Results:						Page 2 of 3	Profile 2						Page 3 of 3		

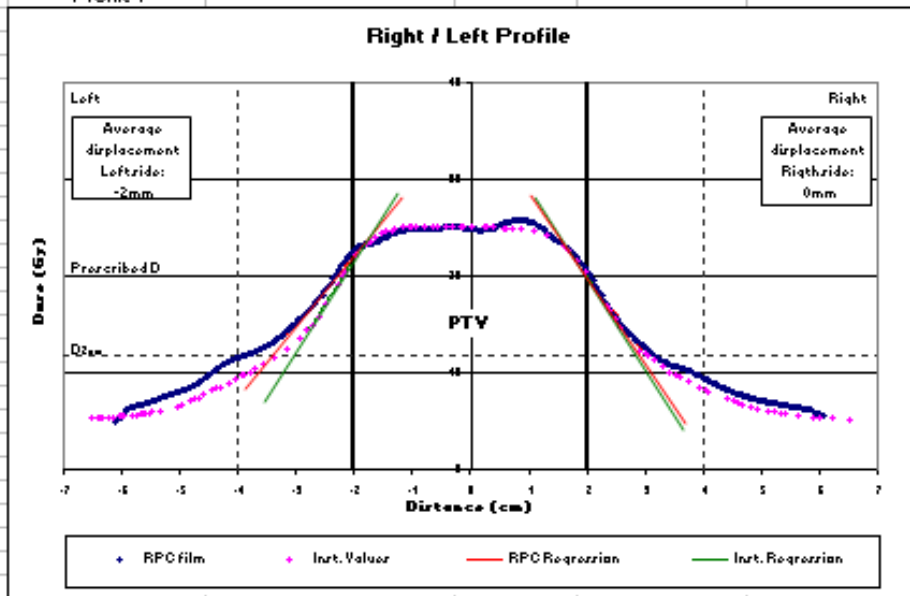
Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
TLD in superior PTV	25.2	25.02	0.99
TLD in inferior PTV	25.1	24.57	0.98

Location	Institution reported doses (Gy)	TLD Dose (Gy)
TLD in heart	5.91	6.07
TLD in cord	4.27	3.98

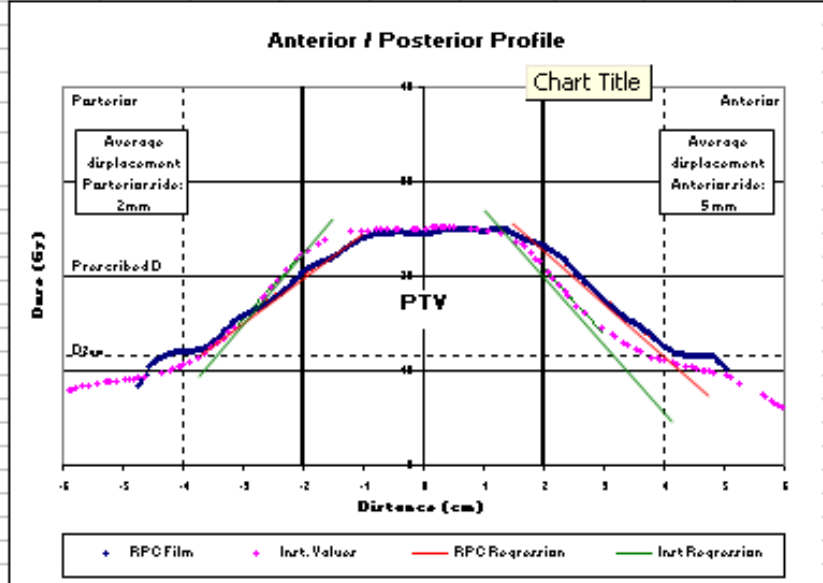
Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The "Prescription Dose" is 20Gy. "D_{2cm}" is the maximum dose 2cm from PTV in any direction.

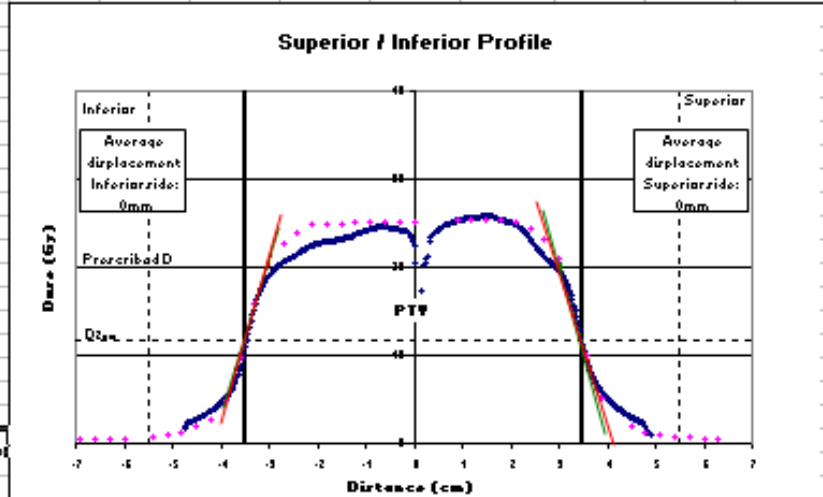
Profile 1



Profile 2



Profile 3



Convolution - 67

K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	
TLD Results:						Page 2 of 3		Profile 2						Page 3 of 3	
Location	Institution reported doses (Gy)		TLD Dose (Gy)	Measured/Institution											
PTV_TLD_sup	24.92		24.77	0.99											
PTV_TLD_inf	24.89		25.14	1.01											
Location	Institution reported doses (Gy)		TLD Dose (Gy)	Acceptability (Gy)											
HEART_TLD	0.97		0.46	0 - 2.21											
CORD_TLD	2.09		2.22	0.47 - 3.97											

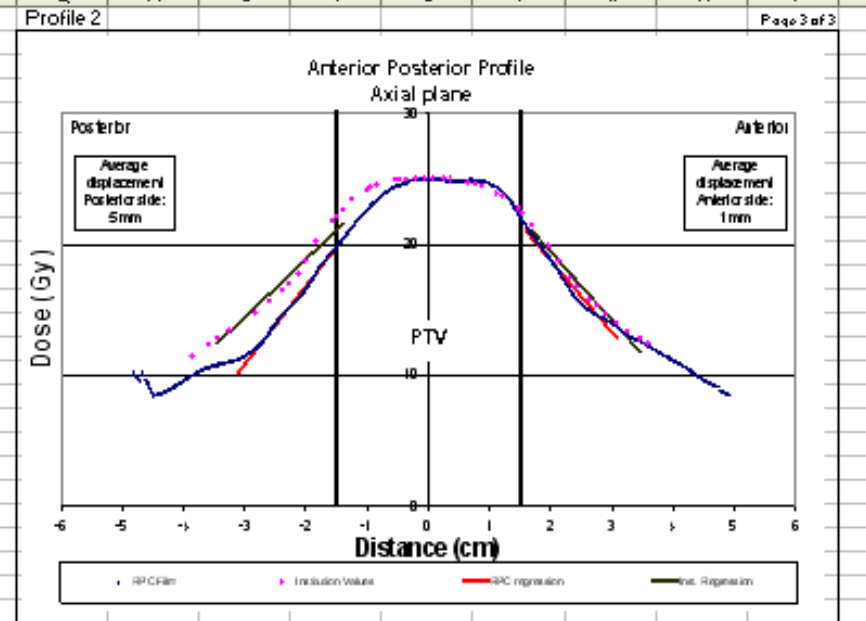
* The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison

Plan results:

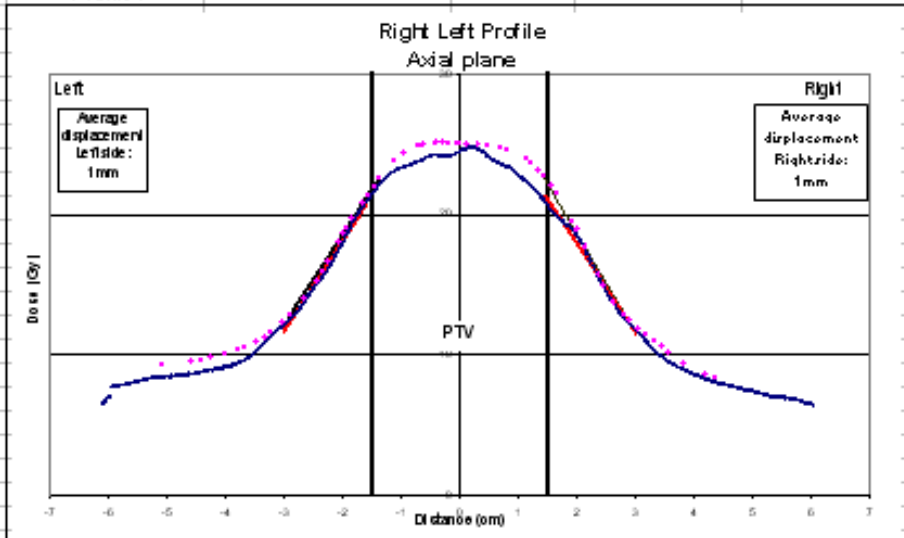
- The treatment plan that was not corrected for heterogeneities met the following criteria:
- At least 95% of the PTV received 20 Gy.
- At least 99% of the PTV received 18 Gy.
- The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy.

Film results:

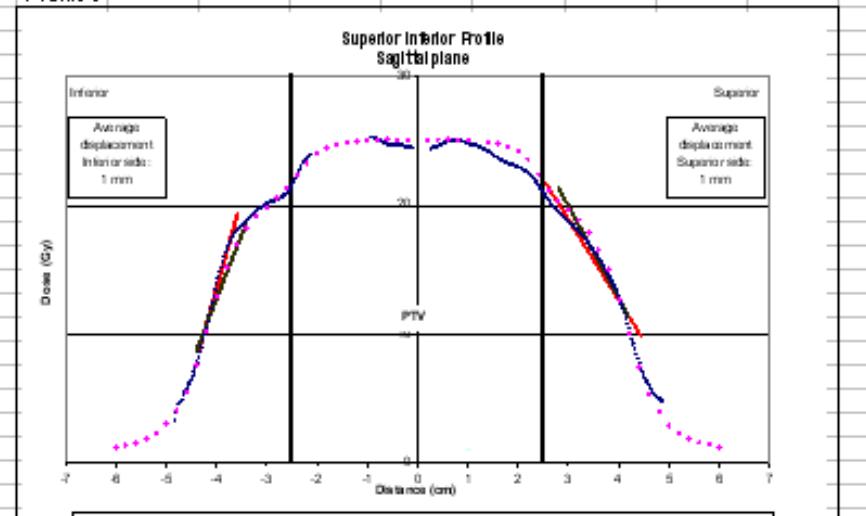
Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.



Profile 1



Profile 3



Convolution - 14

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	24.22	24.19	1.00
PTV_TLD_inf	24.09	24.20	1.00

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	4.92	5.05	3.36 - 6.74
CORD_TLD	5.92	2.48	0.79 - 4.17

* The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison

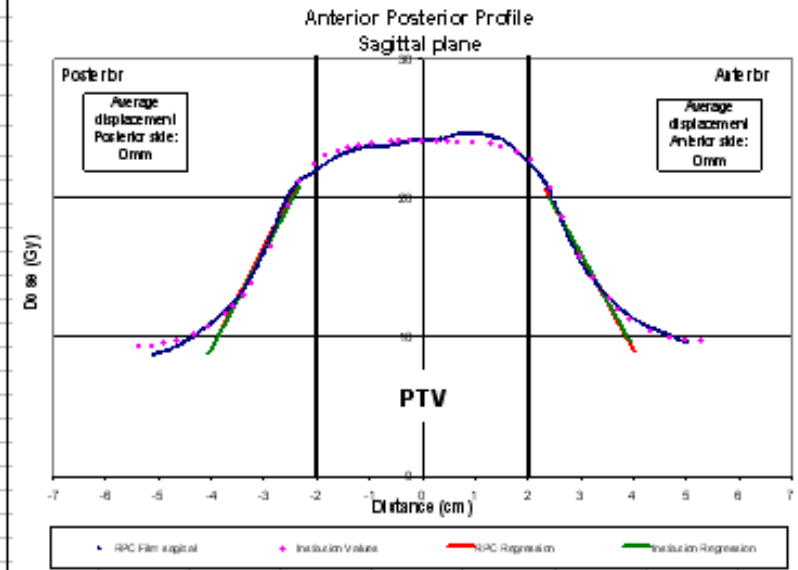
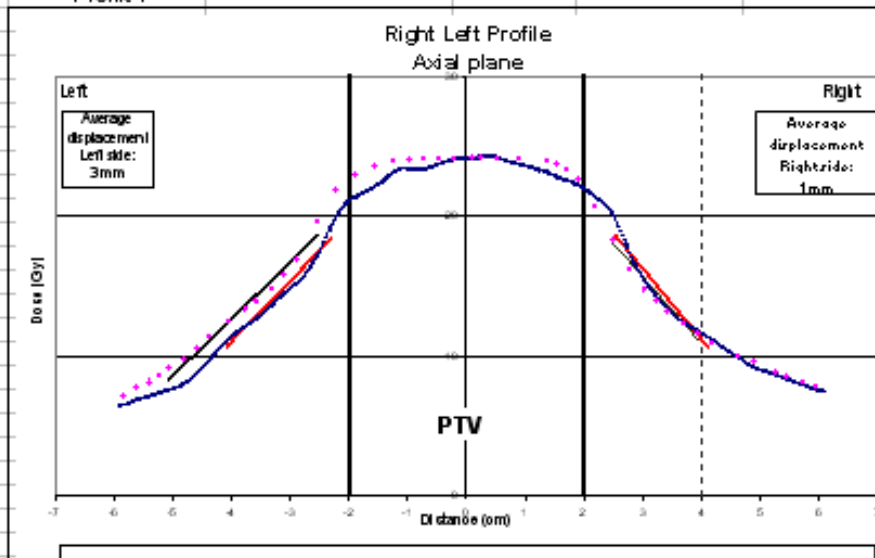
Plan results:

The treatment plan that was not corrected for heterogeneities met the following criteria:
 At least 95% of the PTV received 20 Gy.
 At least 99% of the PTV received 18 Gy.
 The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy.

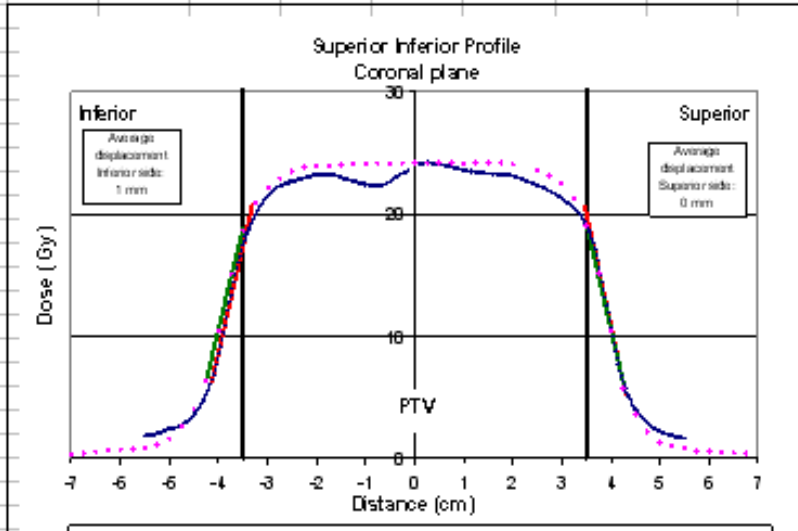
Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

Profile 1



Profile 3



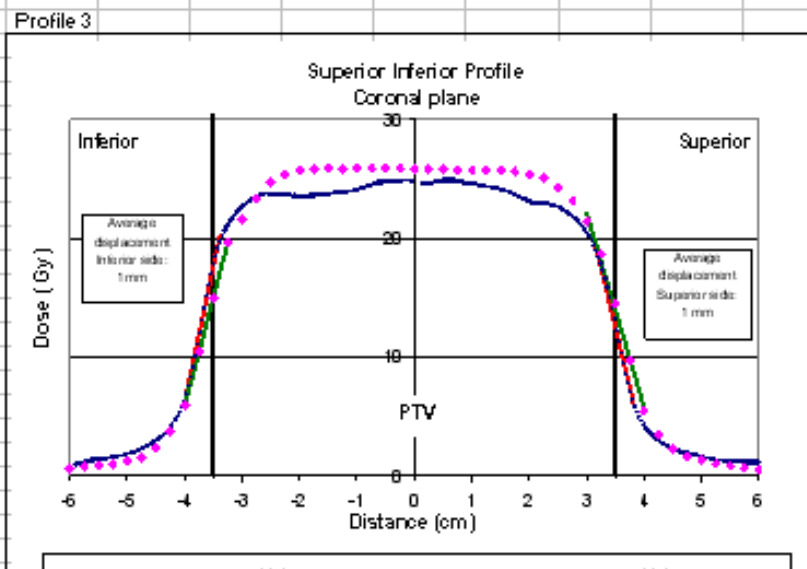
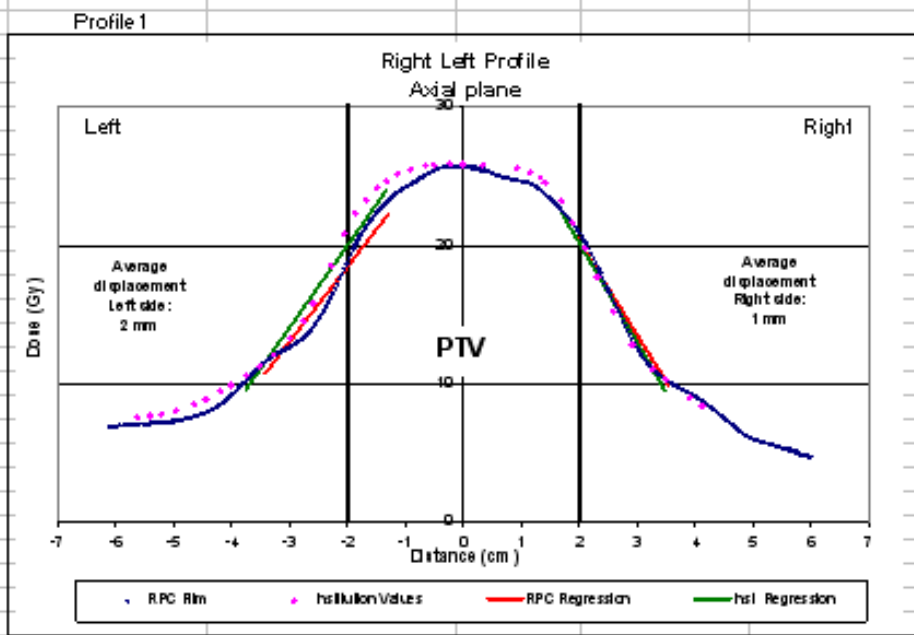
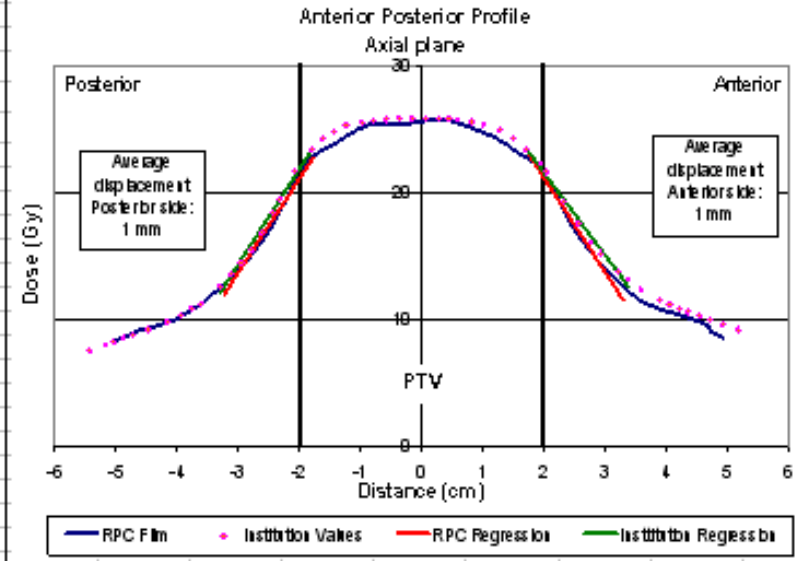
Convolution - 30

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV TLD sup	25.8	24.91	0.97
PTV TLD inf	25.7	24.70	0.96

Location	Institution reported doses (Gy)	TLD Dose (Gy)
HEART TLD	2.0	2.00
CORD TLD	1.9	2.05

Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 4 mm.



Convolution - 177

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	25.03	25.46	1.02
PTV_TLD_inf	24.98	25.33	1.01

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	3.92	3.96	2.18 - 5.74
CORD_TLD	4.32	4.42	2.64 - 6.20

* The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison

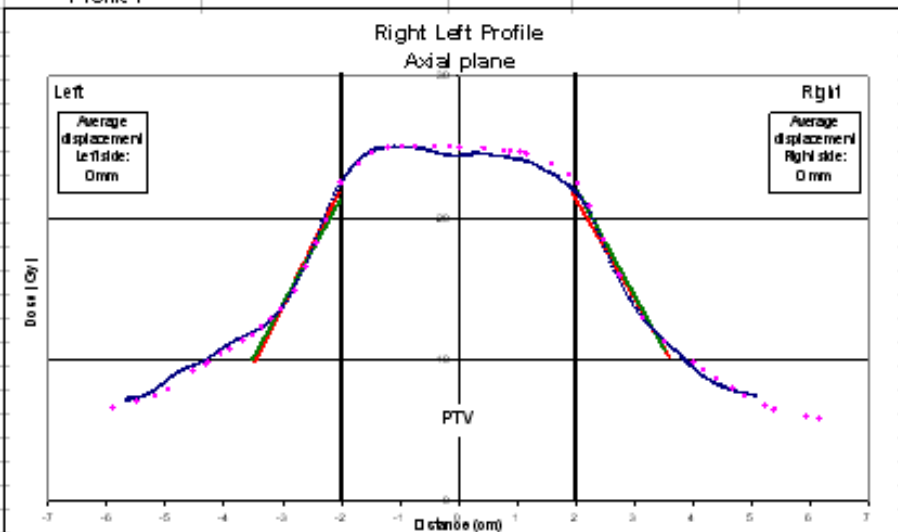
Plan results:

- The treatment plan that was not corrected for heterogeneities met the following criteria:
- At least 95% of the PTV received 20 Gy.
- At least 99% of the PTV received 18 Gy.
- The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy.

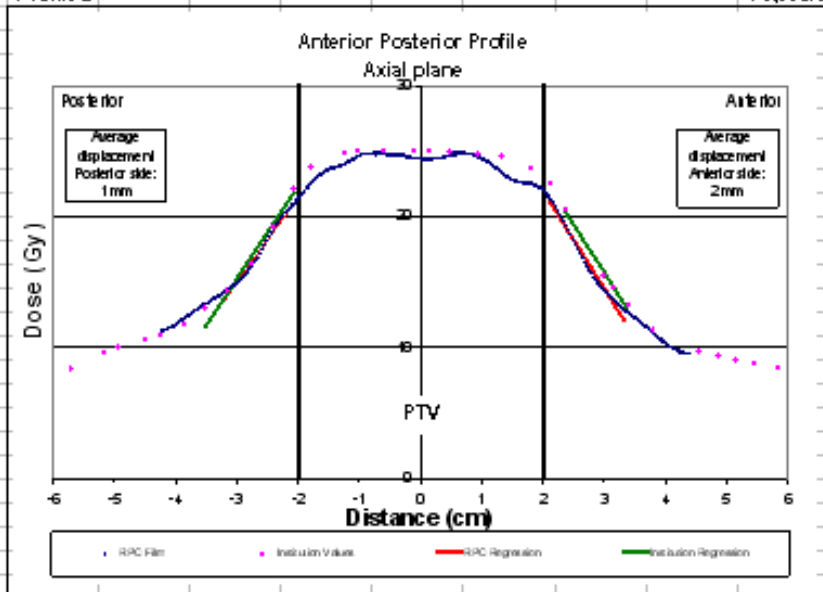
Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

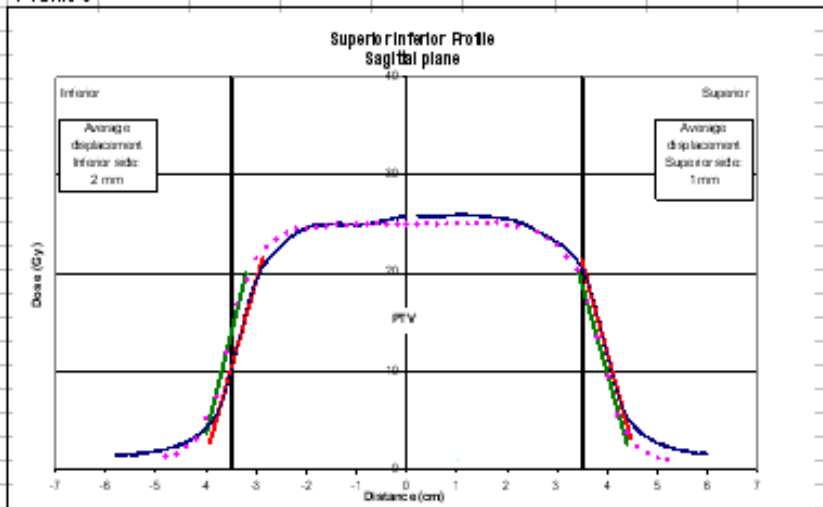
Profile 1



Profile 2



Profile 3



Convolution - 28

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	25.6	25.9	1.01
PTV_TLD_inf	25.9	26.2	1.01

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	2.16	2.12	0.30 - 3.94
CORD_TLD	2.29	2.47	0.65 - 4.29

* The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison

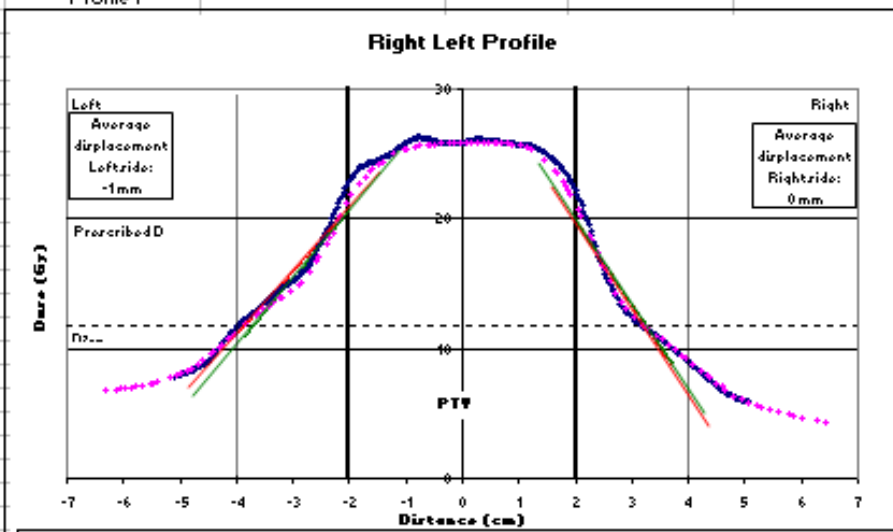
Plan results:

The treatment plan that was not corrected for heterogeneities met the following criteria:
 At least 95% of the PTV received 20 Gy.
 At least 99% of the PTV received 18 Gy.
 The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy, but result marginal on certain profiles

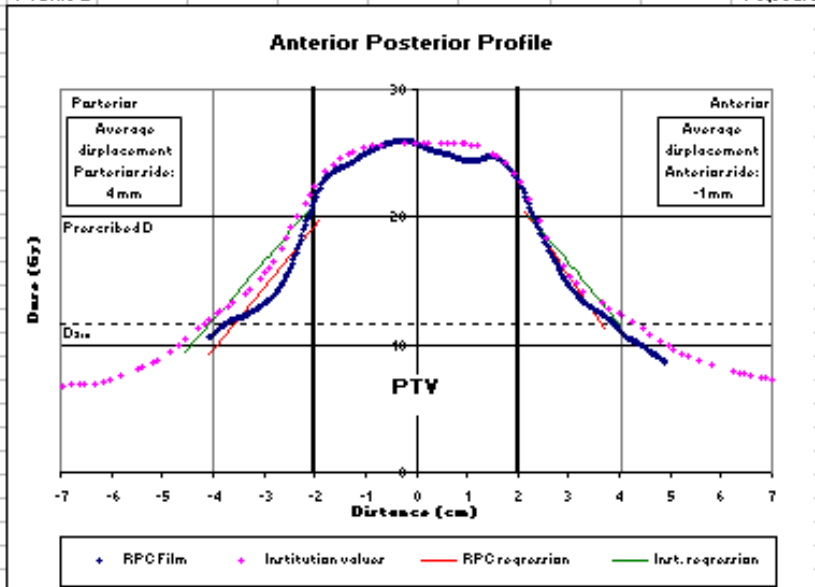
Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

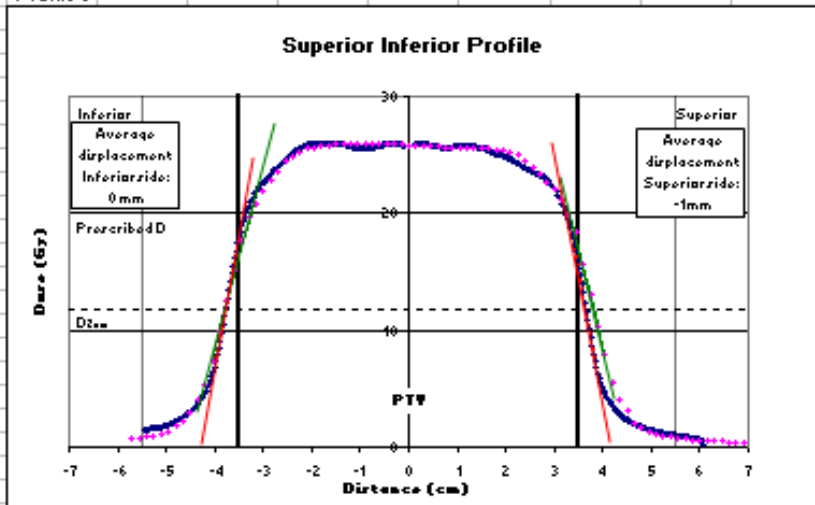
Profile 1



Profile 2



Profile 3



Convolution - 10104

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	6.87	6.84	1.00
PTV_TLD_inf	6.87	6.82	0.99

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	0.52	0.55	0.09 - 1.04
CORD_TLD	0.97	0.94	0.46 - 1.42

*The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison.

Plan results:

The instructions require that the treatment plan that was not corrected for heterogeneities meet the following criteria:

At least 95% of the PTV receives 6.0 Gy. **Your uncorrected plan shows 87.9% of the PTV received 6.0 Gy.**

At least 99% of the PTV receives 5.4 Gy. Your uncorrected plan meets this requirement.

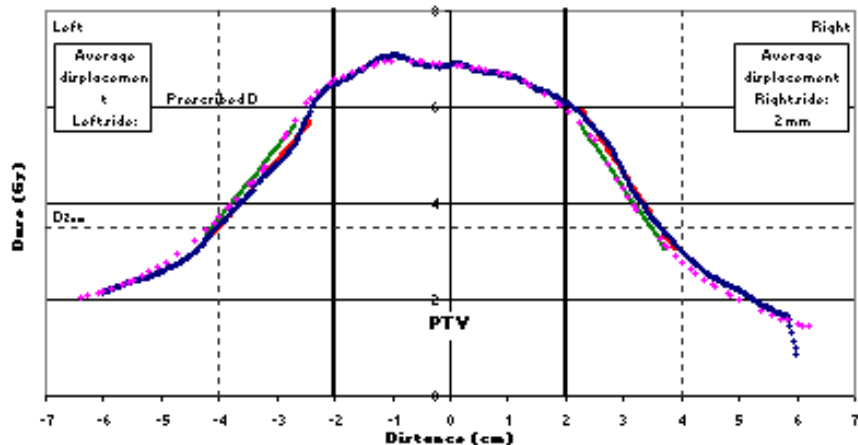
The dose at 2 cm radial distance from the PTV does not exceed 3.5 Gy. **There is a point on the Left-Right**

Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

Profile 1

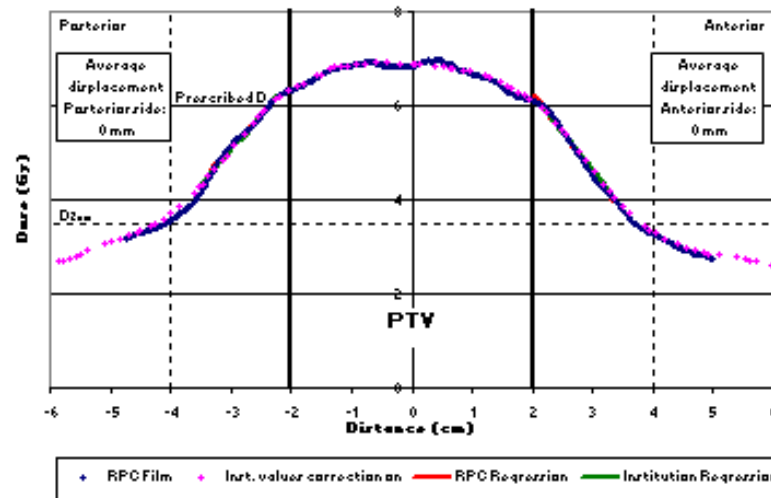
Right Left Profile



Page 2 of 3

Profile 2

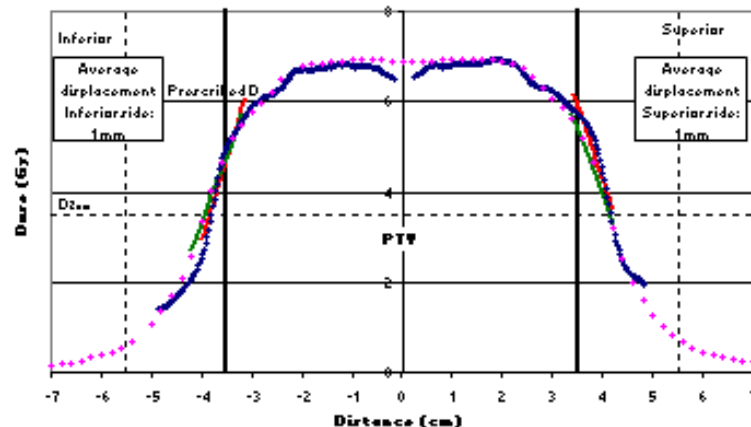
Anterior Posterior Profile



Page 3 of 3

Profile 3

Superior Inferior Profile



Convolution - 123

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	25.97	25.8	0.99
PTV_TLD_inf	25.77	25.6	0.99

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	5.18	3.80	2.00 - 5.60
CORD_TLD	3.90	4.96	3.16 - 6.76

* The RPC 7% criteria is quoted as a percentage of the prescribed dose and not as a local point comparison

Plan results:

The treatment plan that was not corrected for heterogeneities met the following criteria:

At least 95% of the PTV received 20 Gy.

At least 99% of the PTV received 18 Gy.

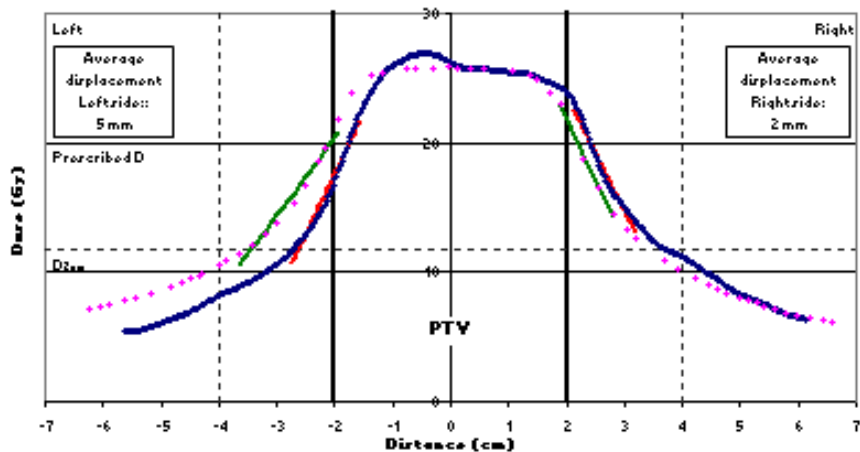
The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy.

Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

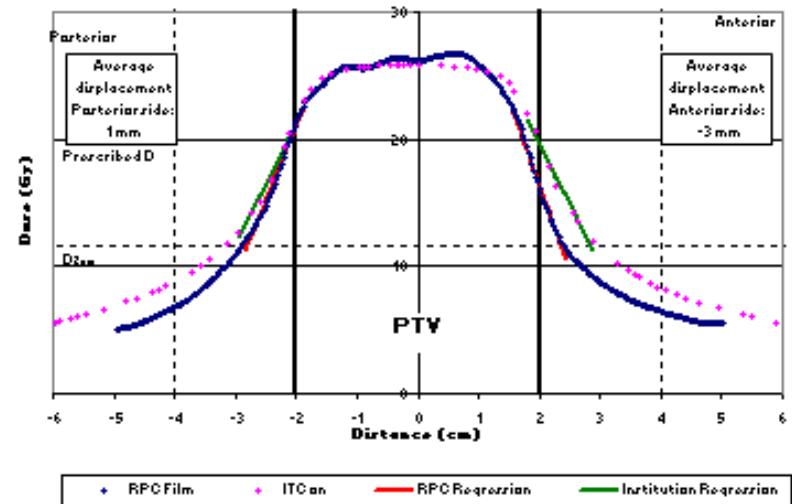
Profile 1

Right Left Profile



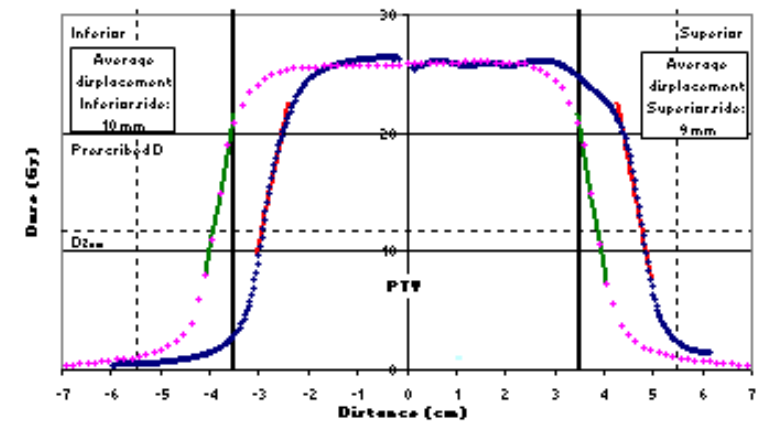
Profile 2

Anterior Posterior Profile



Profile 3

Superior Inferior Profile



Convolution - 354

TLD Results:			
Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	23.39	22.0	0.94
PTV_TLD_inf	23.28	21.9	0.94

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	3.16	3.66	0.68 - 3.75
COPD_TLD	2.24	2.22	2.13 - 5.20

* The RPC 7% criteria is quoted as a percentage of the prescribed dose and not as a local point comparison

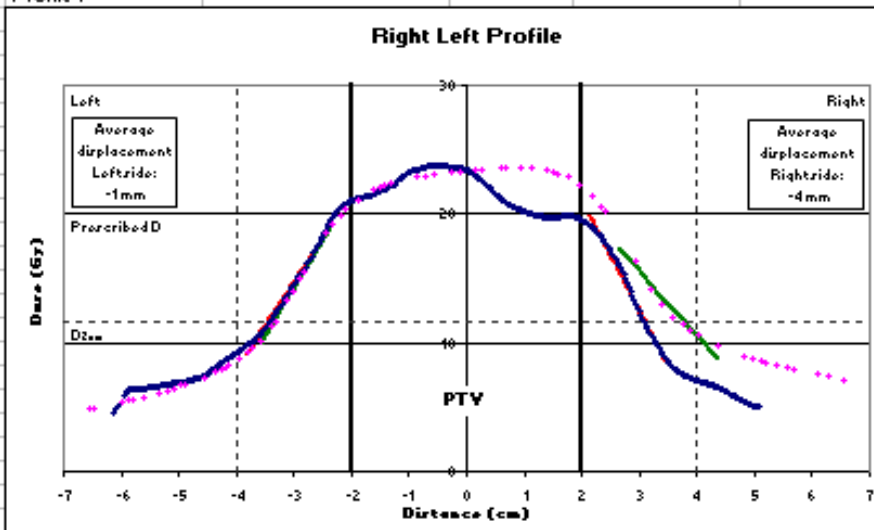
Plan results:

- The treatment plan that was not corrected for heterogeneities met the following criteria:
- At least 95% of the PTV received 20 Gy.
- At least 99% of the PTV received 18 Gy.
- The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy, except on the Pa/Ap

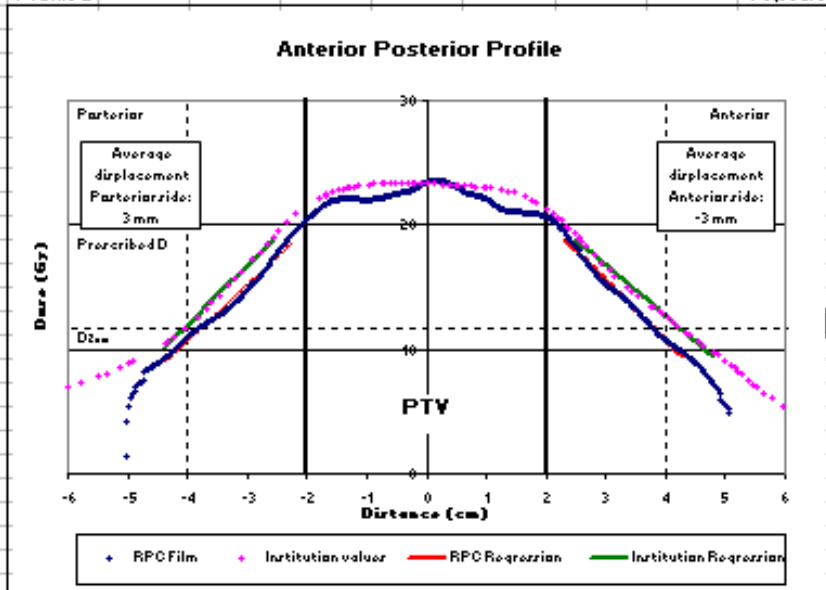
Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

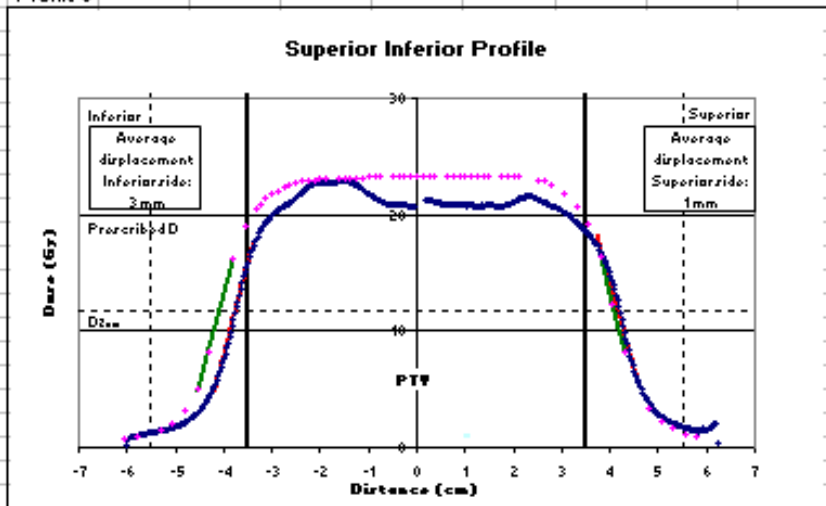
Profile 1



Profile 2



Profile 3



Pencil-Beam Systems



Ten systems using variations of effective path-length corrections

PB - 123

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	24.51	22.0	0.90
PTV_TLD_inf	24.39	21.9	0.90

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	2.53	3.66	0.68 - 3.75
CORD_TLD	1.89	2.22	2.13 - 5.20

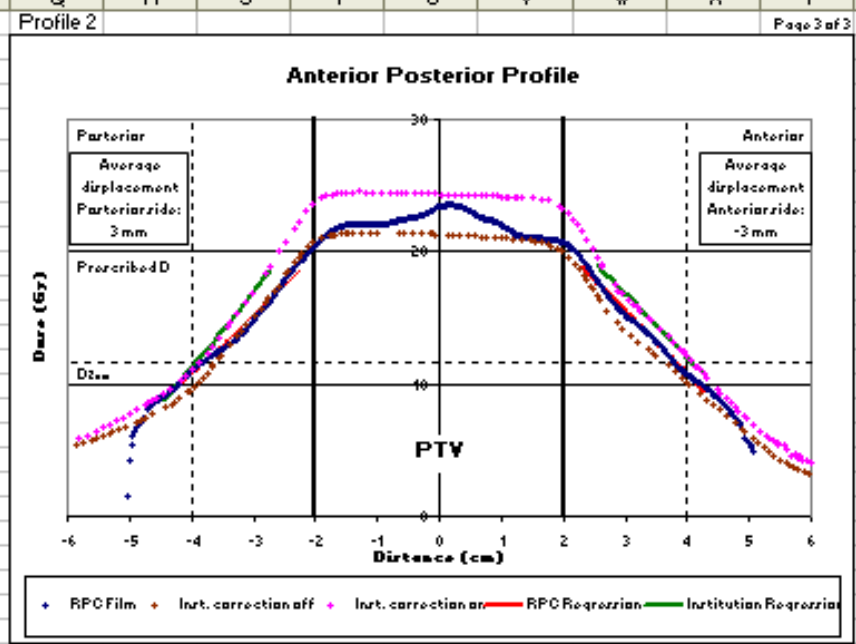
* The RPC 7% criteria is quoted as a percentage of the prescribed dose and not as a local point comparison

Plan results:

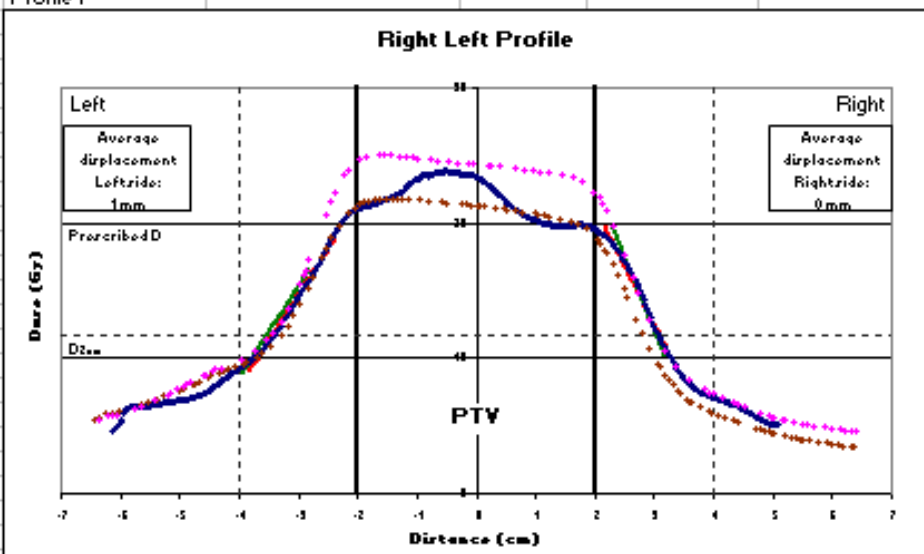
- The treatment plan that was not corrected for heterogeneities met the following criteria:
- At least 95% of the PTV received 20 Gy.
- At least 99% of the PTV received 18 Gy.
- The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy.

Film results:

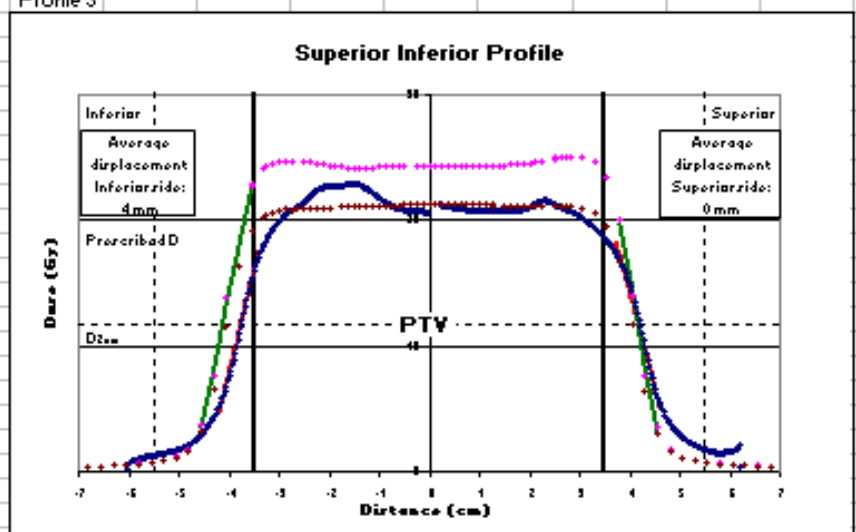
Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.



Profile 1



Profile 3



PB - 41

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	26.7	26.2	0.98
PTV_TLD_inf	26.6	26.3	0.99

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	3.30	3.28	1.44 - 5.12
CORD_TLD	1.82	1.58	0 - 3.42

* The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison

Plan results:

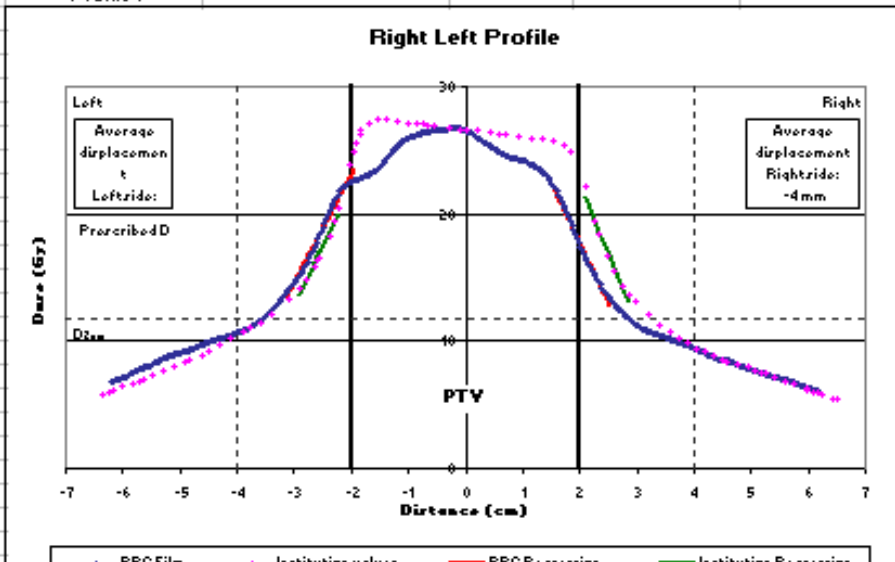
The treatment plan that was not corrected for heterogeneities met the following criteria:

- At least 95% of the PTV received 20 Gy.
- At least 99% of the PTV received 18 Gy.
- The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy.

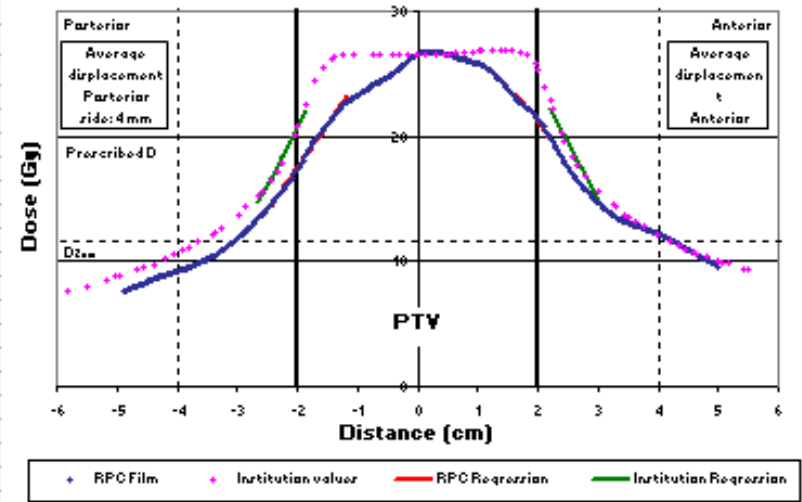
Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

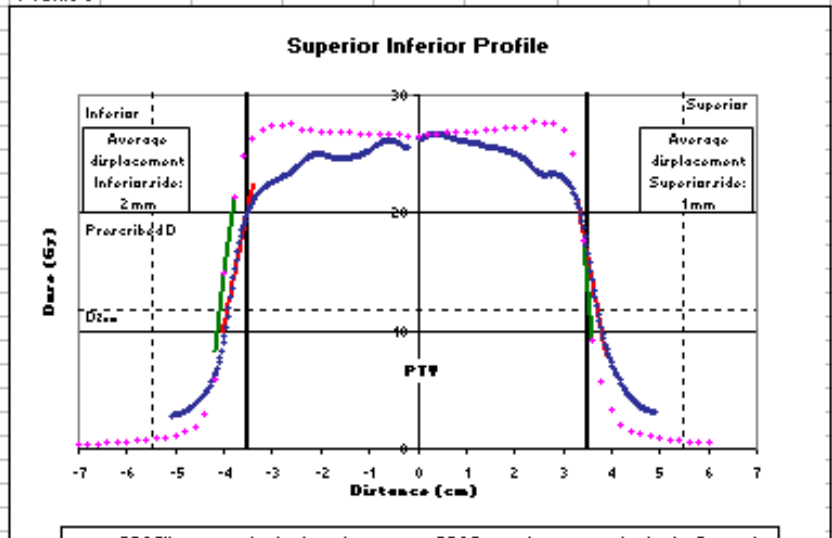
Profile 1



Anterior Posterior Profile



Profile 3



PB - 34

TLD Results:

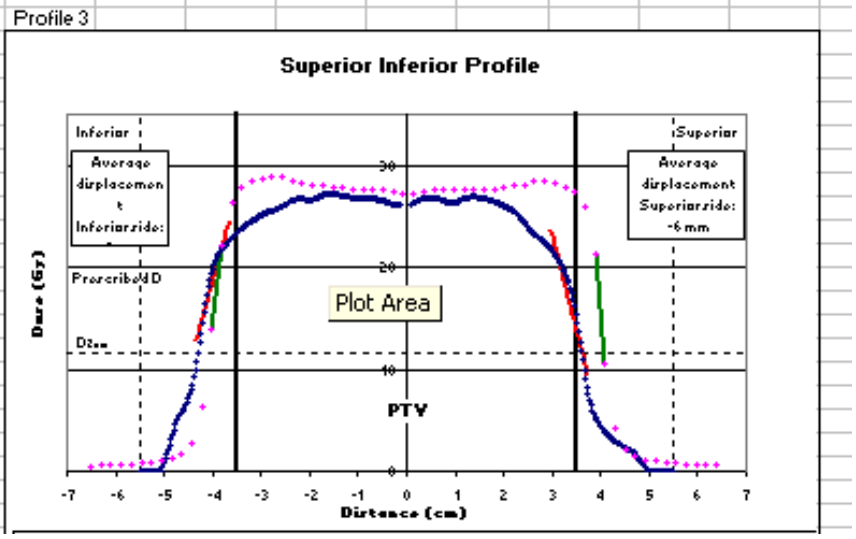
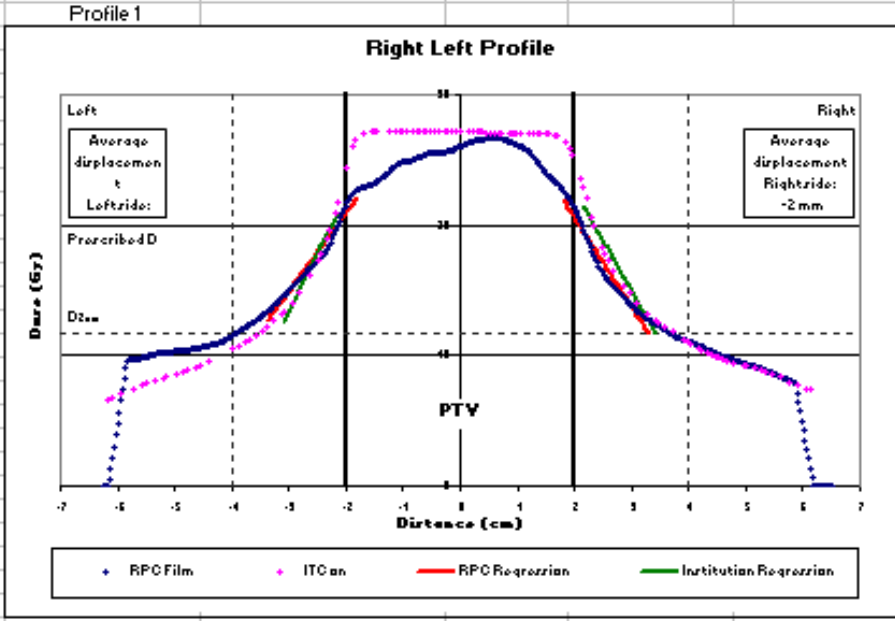
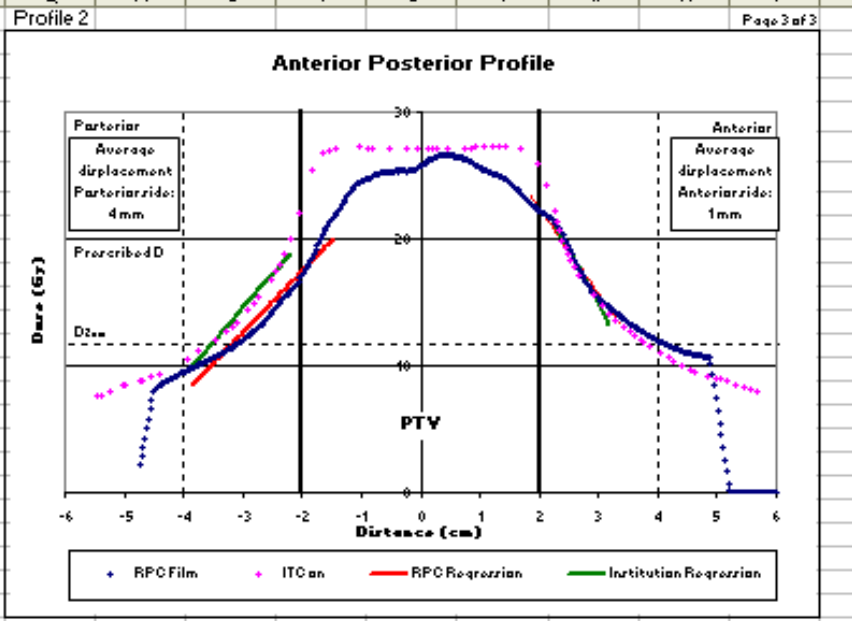
Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
TLD in superior PTV	27.3	26.65	0.98
TLD in inferior PTV	27.2	26.49	0.97

Location	Institution reported doses (Gy)	TLD Dose (Gy)
TLD in heart	3.30	3.54
TLD in cord	3.60	2.74

Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged.

The "Prescription Dose" is 20Gy. "D_{2cm}" is the maximum dose 2cm from PTV in any direction



PB - 10877

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	27.6	26.7	0.97
PTV_TLD_inf	27.6	26.6	0.97

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	0.55	0.57	0 - 2.44
CORD_TLD	2.24	2.17	0.30 - 4.04

* The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison

Plan results:

The treatment plan that was not corrected for heterogeneities met the following criteria:

At least 95% of the PTV received 20 Gy.

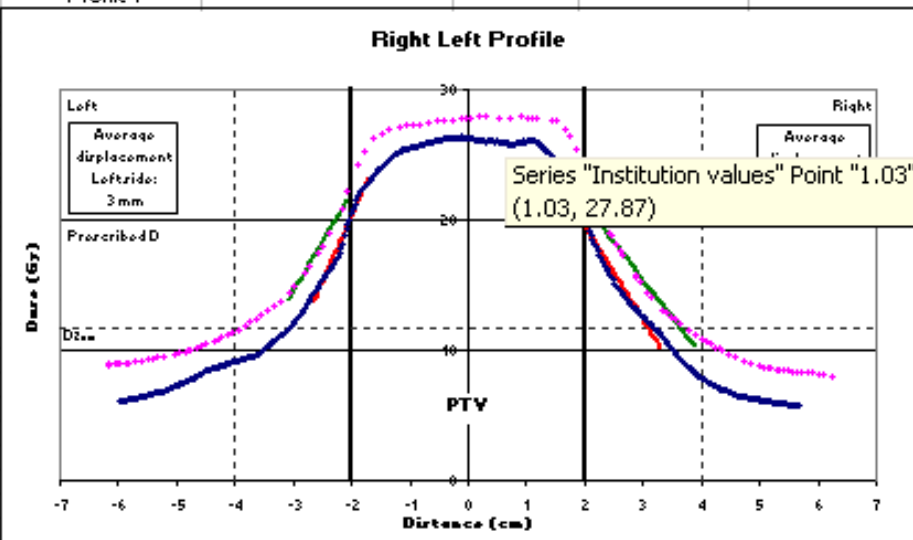
At least 99% of the PTV received 18 Gy.

The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy.

Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

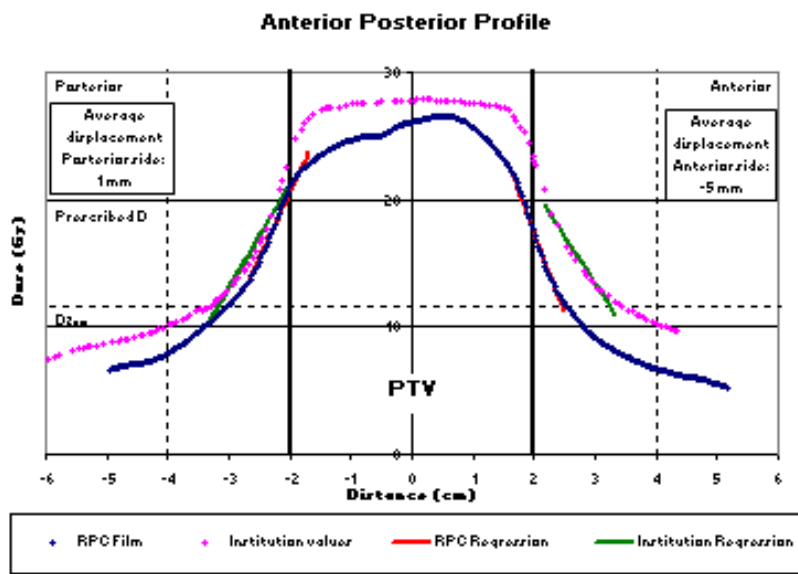
Profile 1



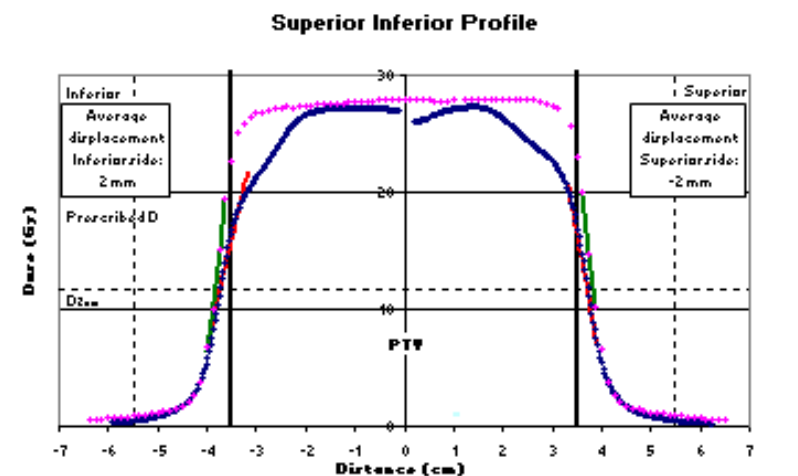
Page 2 of 3

Profile 2

Page 3 of 3



Profile 3



PB - 120

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	7.88	7.36	0.93
PTV_TLD_inf	7.87	7.39	0.94

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	1.675	1.74	1.22 - 2.25
CORD_TLD	0.769	0.65	0.13 - 1.16

* The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison

Plan results:

The treatment plan that was not corrected for heterogeneities met the following criteria:

At least 95% of the PTV received 6.0 Gy.

At least 99% of the PTV received 5.4 Gy.

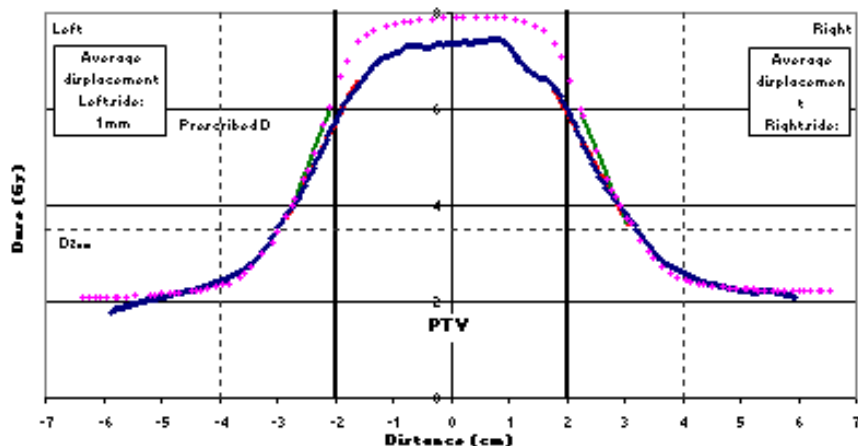
The dose at 2 cm radial distance from the PTV did not exceed 3.5 Gy.

Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

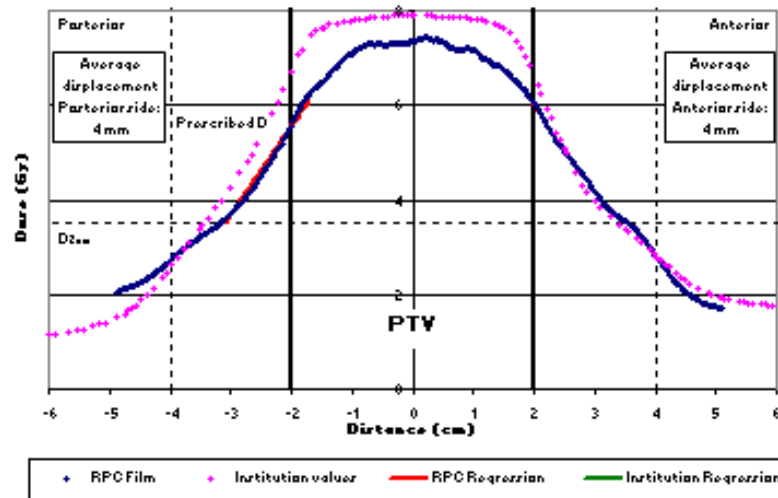
Profile 1

Right Left Profile



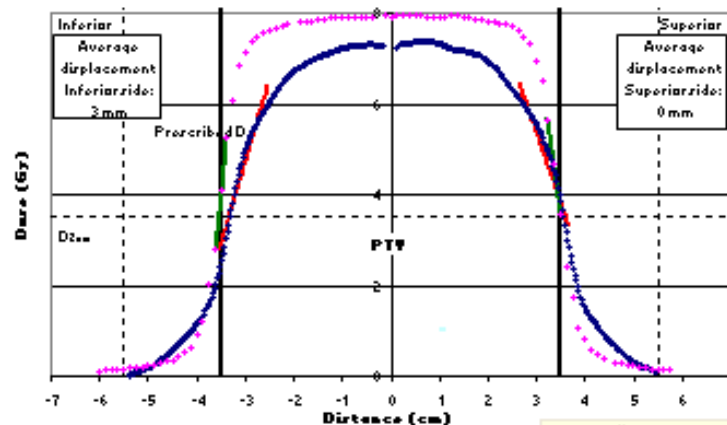
Profile 2

Anterior Posterior Profile



Profile 3

Superior Inferior Profile



Series "Primary PTV" Point 1

PB - 25 I

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	7.86	7.49	0.95
PTV_TLD_inf	7.90	7.41	0.94

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	1.65	1.53	1.01 - 2.05
CORD_TLD	1.04	0.93	0.41 - 1.45

* The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison

Plan results:

The treatment plan that was not corrected for heterogeneities met the following criteria:

At least 95% of the PTV received 6.0 Gy.

At least 99% of the PTV received 5.4 Gy.

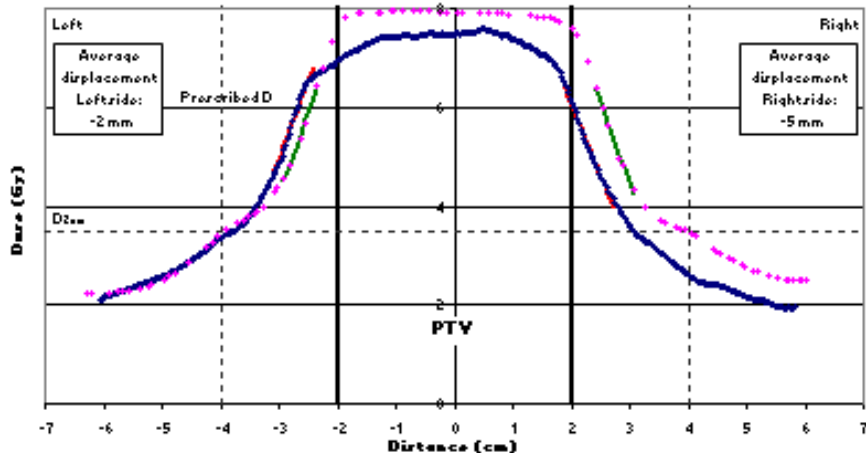
The dose at 2 cm radial distance from the PTV did not exceed 3.5 Gy.

Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

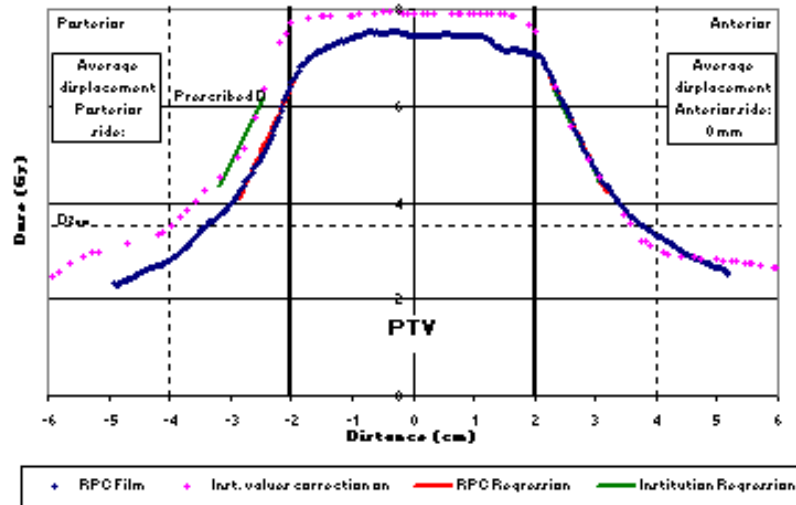
Profile 1

Right Left Profile



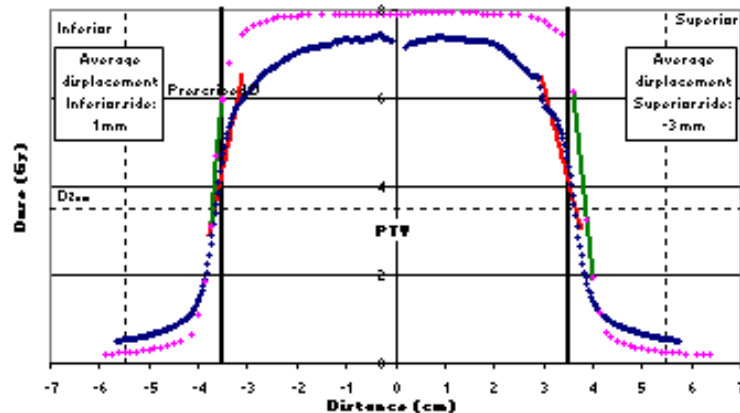
Profile 2

Anterior Posterior Profile



Profile 3

Superior Inferior Profile



PB - 89

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	25.83	24.8	0.96
PTV_TLD_inf	25.72	24.5	0.95

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART_TLD	2.62	3.02	1.29 - 4.74
CORD_TLD	1.83	1.85	0.12 - 3.58

* The RPC 7% criterion is quoted as a percentage of the prescribed dose and not as a local point comparison

Plan results:

The treatment plan that was not corrected for heterogeneities met the following criteria:

At least 95% of the PTV received 20 Gy.

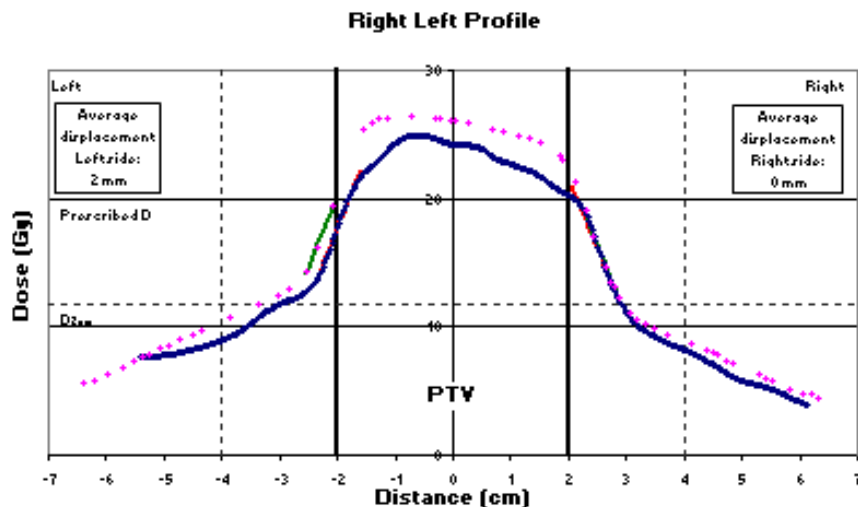
At least 99% of the PTV received 18 Gy.

The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy.

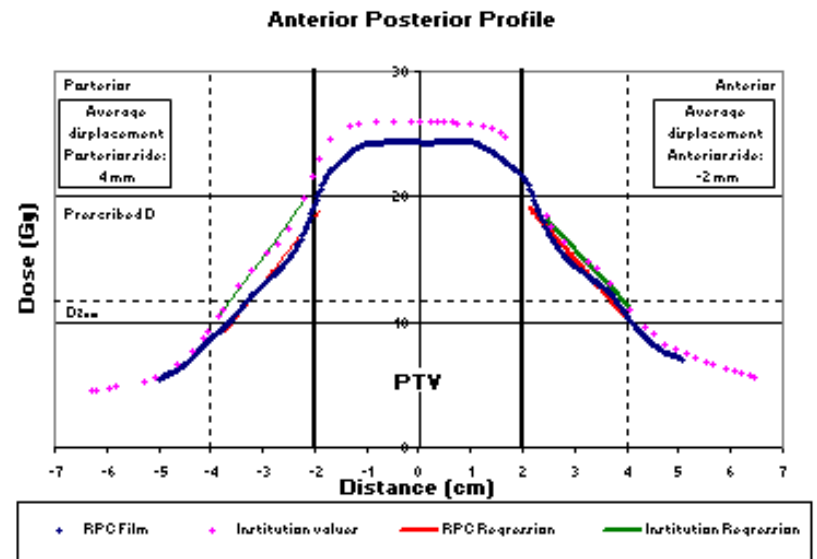
Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

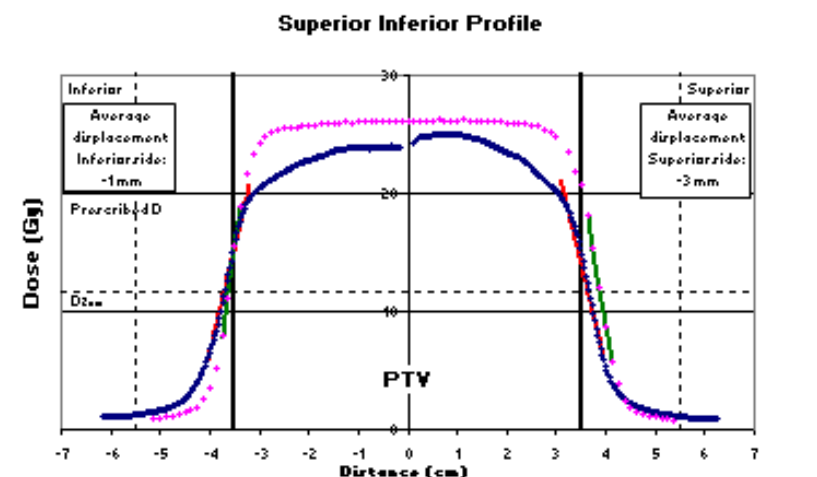
Profile 1



Profile 2



Profile 3



PB - 104

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
PTV_TLD_sup	27.8	27.0	0.97
PTV_TLD_inf	27.9	27.0	0.97

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Acceptability (Gy)
HEART TLD	3.92	3.59	1.70 - 5.48
CORD TLD	2.53	1.73	0 - 3.63

* The RPC 7% criteria is quoted as a percentage of the prescribed dose and not as a local point comparison

Plan results:

The treatment plan that was not corrected for heterogeneities met the following criteria:

At least 95% of the PTV received 20 Gy.

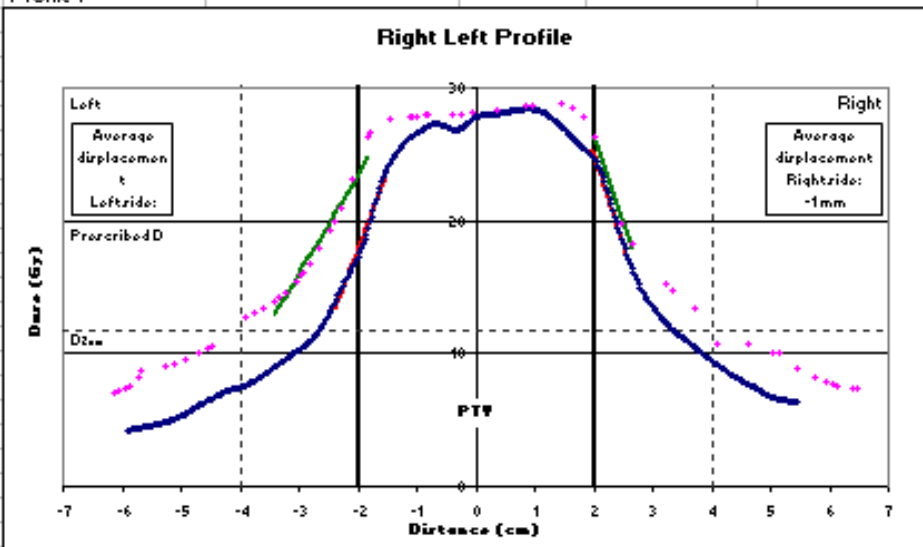
At least 99% of the PTV received 18 Gy.

The dose at 2 cm radial distance from the PTV did not exceed 11.7 Gy.

Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged. The upper bound for acceptable agreement is 5 mm.

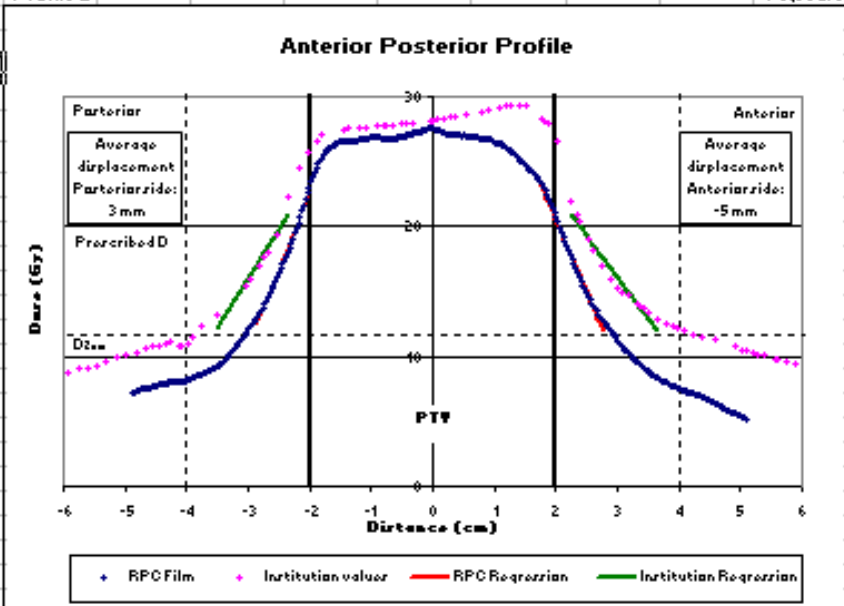
Profile 1



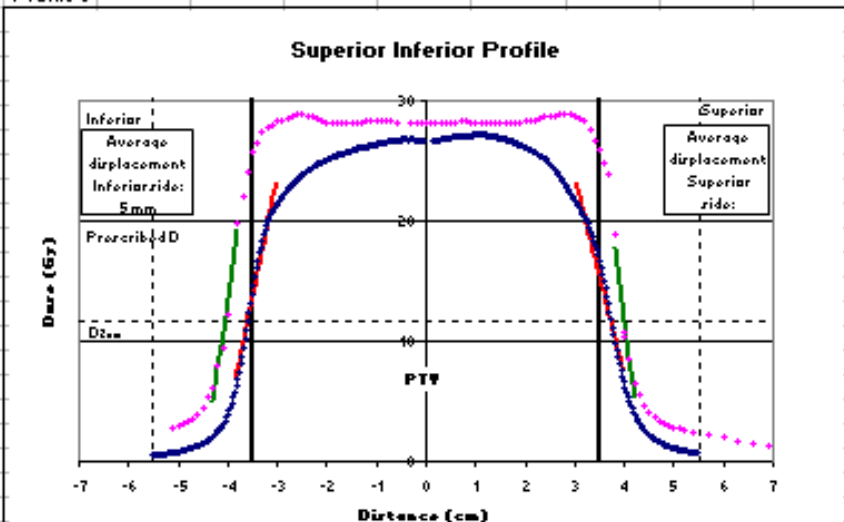
Page 2 of 3

Profile 2

Page 3 of 3



Profile 3



Clarkson – 103/295

TLD Results:			
Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
TLD in superior PTV	26.85	26.1	0.97
TLD in inferior PTV	26.93	25.9	0.96

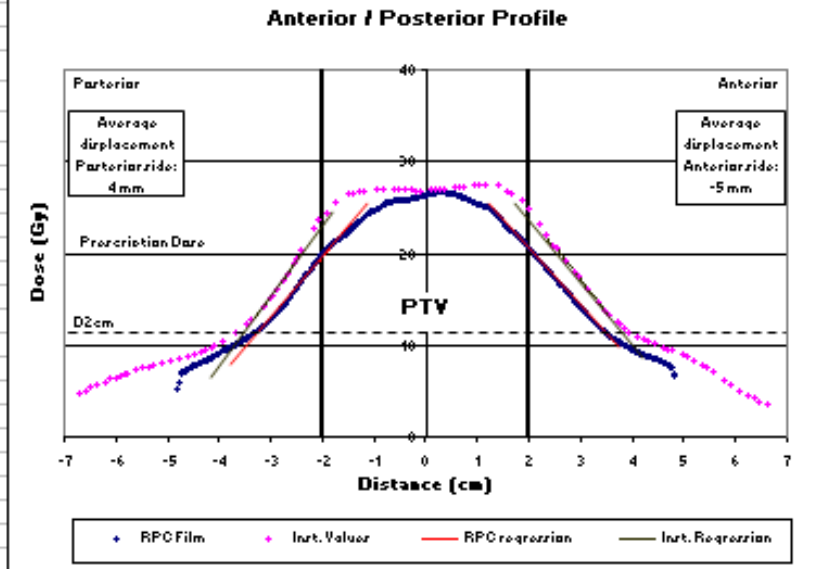
Location	Institution reported doses (Gy)	TLD Dose (Gy)
TLD in heart	2.09	2.12
TLD in cord	1.49	1.82

Film results:

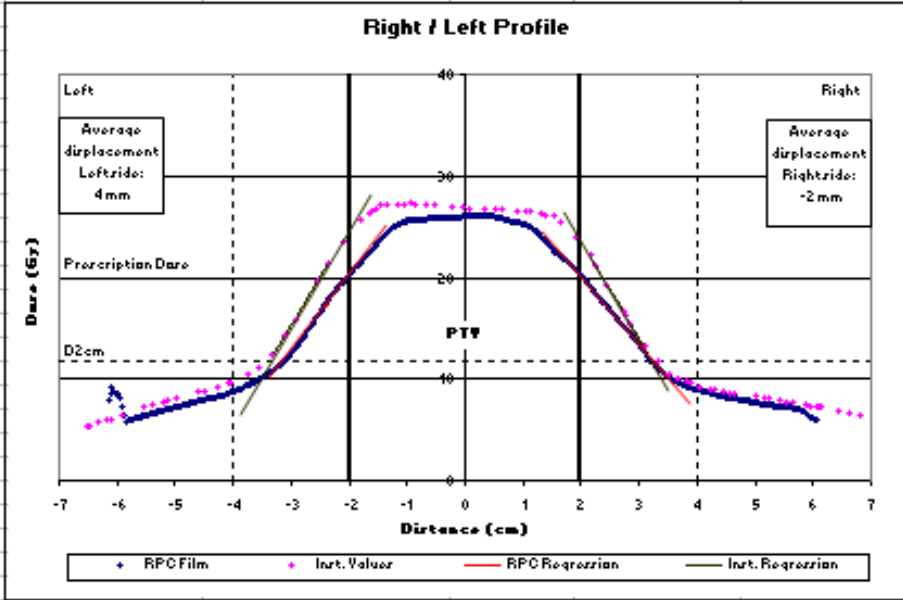
Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged.

The "Prescription Dose" is 20Gy. "D2cm" is the maximum dose 2cm from PTV in any direction

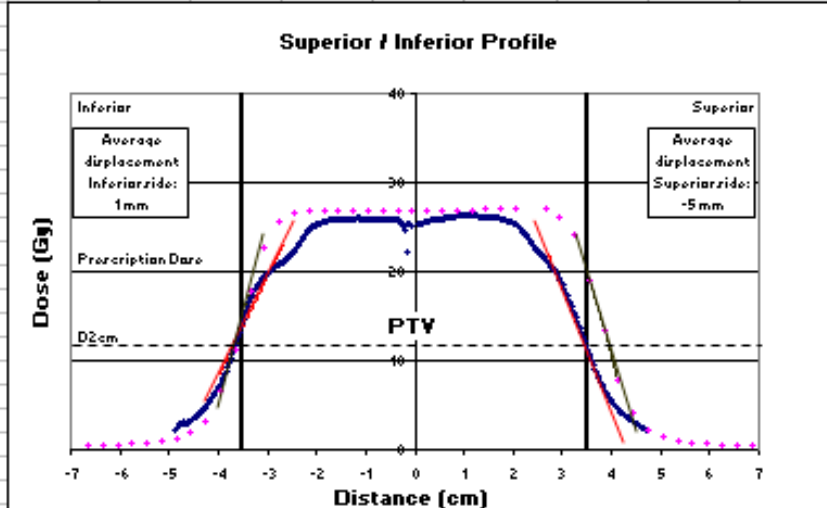
Profile 2



Profile 1



Profile 3



Clarkson – 3 (exception)

TLD Results:

Location	Institution reported doses (Gy)	TLD Dose (Gy)	Measured/Institution
TLD in superior PTV	28.8	29.12	1.01
TLD in inferior PTV	28.8	29.08	1.01

Location	Institution reported doses (Gy)	TLD Dose (Gy)
TLD in heart	3.64	4.02
TLD in cord	4.77	5.26

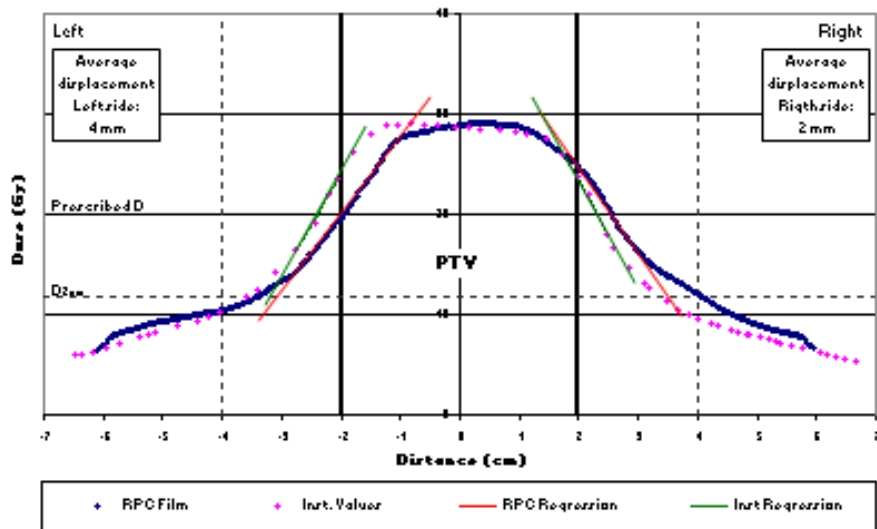
Film results:

Film profiles through the center of the target were scaled to TLD dose values. The results are plotted with dose information taken from the computer-generated isodose distribution provided by the institution. The displacement between the measured dose gradient and the institution's calculated dose gradient has been determined on each side of the target, for each plane. The displacement was measured at three levels and averaged.

The "Prescription Dose" is 20Gy. "D_{2cm}" is the maximum dose 2cm from PTV in any direction

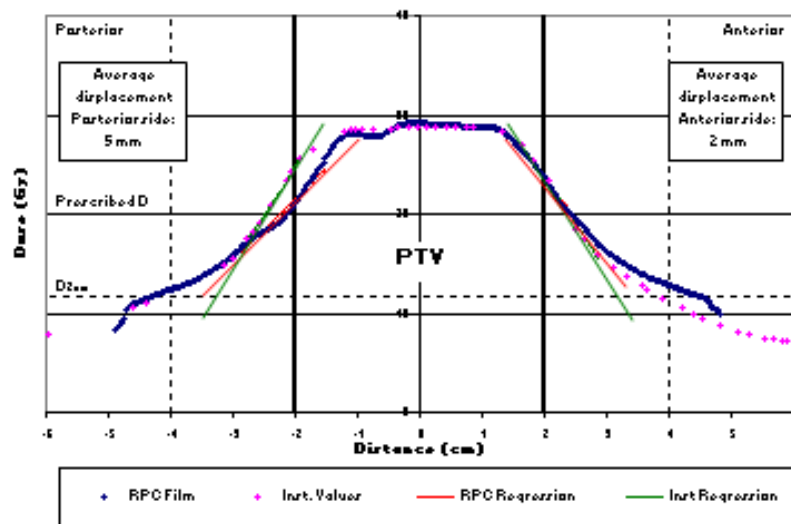
Profile 1

Right / Left Profile



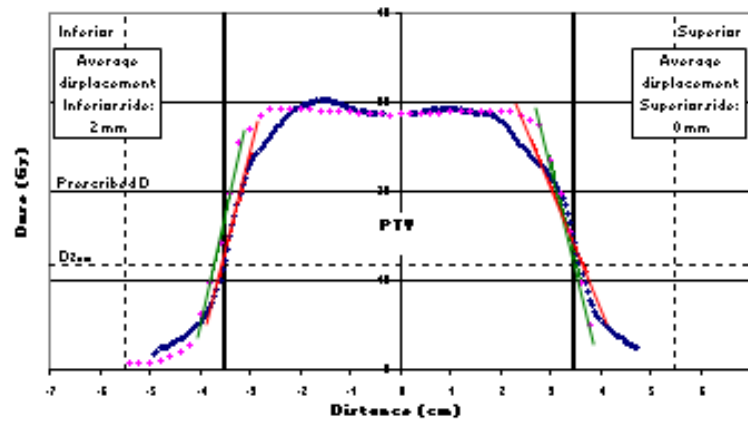
Profile 2

Anterior / Posterior Profile



Profile 3

Superior / Inferior Profile



Lung Phantom Irradiations

Calculations at Target Center

TPS	Dose Calc. Algor correction on	Number of irradiations	$D_{\text{hetero}}/D_{\text{homo}}$
Precise v 2.01	Scatter Integ. Clarkson Type	2	$1.19 \pm 2.6\%$
BrainLab	Clarkson & Pencil Beam	5	$1.20 \pm 2.2\%$
Eclipse	Pencil Beam	5	$1.18 \pm 4.3\%$
Ergo	3D Convolution Pencil Beam	2	$1.19 \pm 0.1\%$
Pinnacle v 6.2, 6.4, 7.0g, 7.4f	Adaptative Convolve	10	$1.13 \pm 2.1\%$
XiO	Superposition/ Convolution	5	$1.11 \pm 2.3\%$
Render plan	Change in primary attenuation	1	1.20
Total		30	

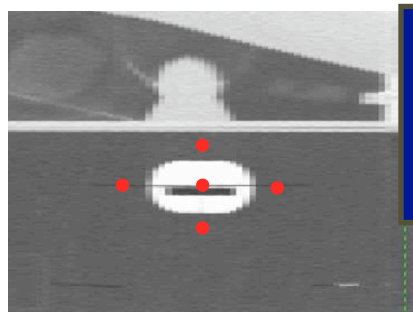
TLD Dose vs. Hetero Corrected Plan at Target Center

TPS	Dose Calc. Algor correction on	Number of irradiations	D_{TLD}/D_{hetero}
Precise v 2.01	Scatter Integ. Clarkson Type	2	$0.99 \pm 3.1\%$
BrainLab	Clarkson & Pencil Beam	5	$0.96 \pm 2.4\%$
Eclipse	Pencil Beam	5	$0.96 \pm 1.8\%$
Ergo	3D Convolution Pencil Beam	2	$0.98 \pm 3.2\%$
Pinnacle v 6.2, 6.4, 7.0g, 7.4f	Adaptative Convolve	10	$0.99 \pm 2.1\%$
XiO	Superposition/ Convolution	5	$0.96 \pm 2\%$
Render plan	Change in primary attenuation	1	0.92
Total		30	0.97

Phantom Results (PTV Periphery) Calculations

TPS	Dose Calc. Algorithm	# irradiation	TPS D_{hetero}/D_{homo}	Average Values
Precise	Scatter Int. Clarkson	2	1.21 ± 3.7%	1.20 ± 4%
BrainLab	Clarkson & Pencil beam	2	1.26 ± 3.0%	
Eclipse	Pencil Beam	5	1.18 ± 4.2%	
Ergo	3D Convul. Pencil Beam	2	1.19 ± 1.8%	1.05 ± 6%
Pinnacle	Adaptive convolve	10	1.04 ± 6.1%	
XiO	Superposition/Convul.	3	1.08 ± 6.7%	

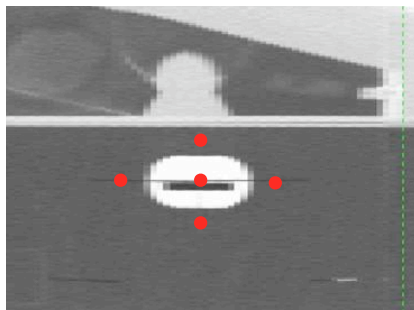
Two separate groupings again



Phantom Results (PTV Periphery) Measurements

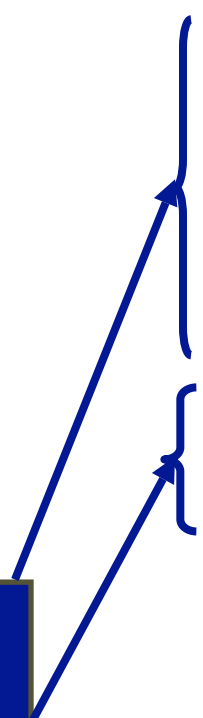
TPS	Dose Calc. Algorithm	# irradiation	PTV Periphery measured $D_{TLD/film}/D_{hetero}$	Average Values
Precise	Scatter Int. Clarkson	2	0.88	0.86 ± 18%
BrainLab	Clarkson & Pencil beam	2	0.84	
Eclipse	Pencil Beam	5	0.87	
Ergo	3D Convul. Pencil Beam	2	0.84	0.97 ± 16%
Pinnacle	Adaptive convolve	10	0.97	
XiO	Superposition/Convul.	3	0.95	

Two separate groupings again

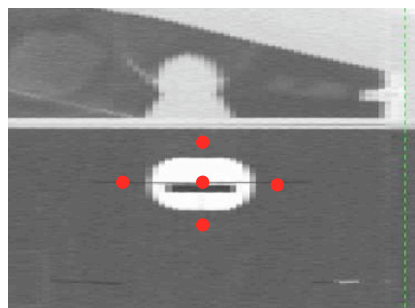


Phantom Results (PTV Periphery) Measurements

TPS	Dose Calc. Algorithm	# irradiation	PTV Periphery measured $D_{TLD/film}/D_{homo}$	Average Values (homog.)
Precise	Scatter Int. Clarkson	2	1.06	1.03±18%
BrainLab	Clarkson & Pencil beam	2	1.06	
Eclipse	Pencil Beam	5	1.03	
Ergo	3D Convul. Pencil Beam	2	1.00	1.00±16%
Pinnacle	Adaptive convolve	10	1.01	
XiO	Superposition/Convul.	3	0.97	



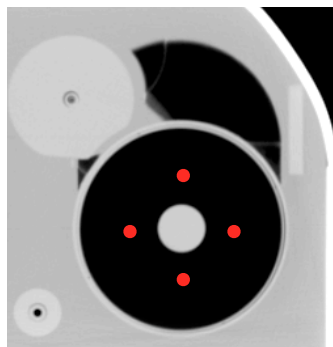
**Same groupings
again**



Phantom Results (Normal Lung) Calculations

TPS	Dose Calc. Algorithm	# irradiation	TPS $D_{\text{hetero}}/D_{\text{homo}}$ Axial plane	Average Values
Precise	Scatter Int. Clarkson	2	1.19 ± 4.2%	1.20±6%
BrainLab	Clarkson & Pencil beam	2	1.22 ± 5.5%	
Eclipse	Pencil Beam	5	1.19 ± 8.3%	
Ergo	3D Convul. Pencil Beam	2	1.20 ± 5.3%	1.12±6%
Pinnacle	Adaptive convolve	10	1.12 ± 5.8%	
XiO	Superposition/Convul.	3	1.12 ± 6.4%	

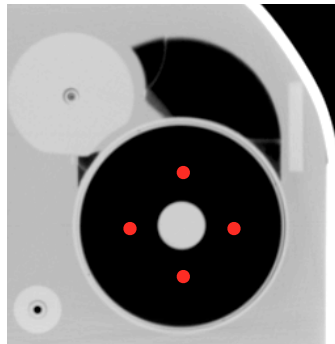
Two separate groupings again



Phantom Results (Normal Lung)

Measurements

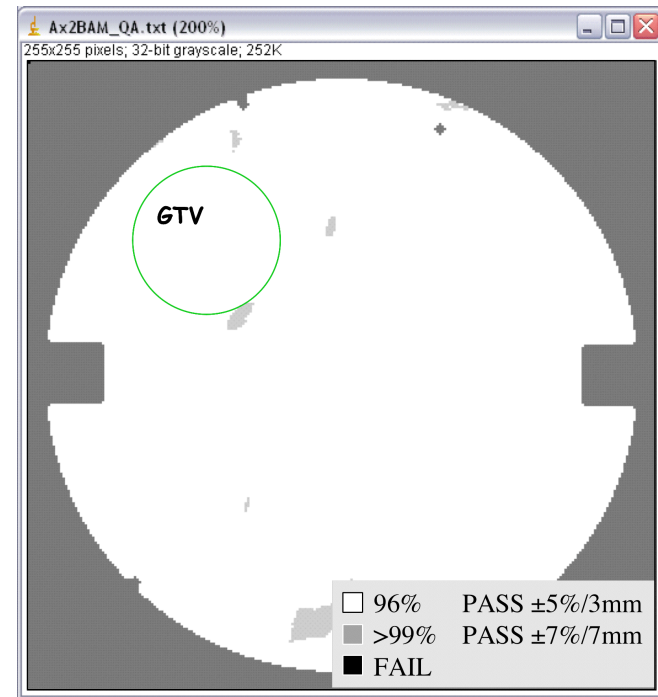
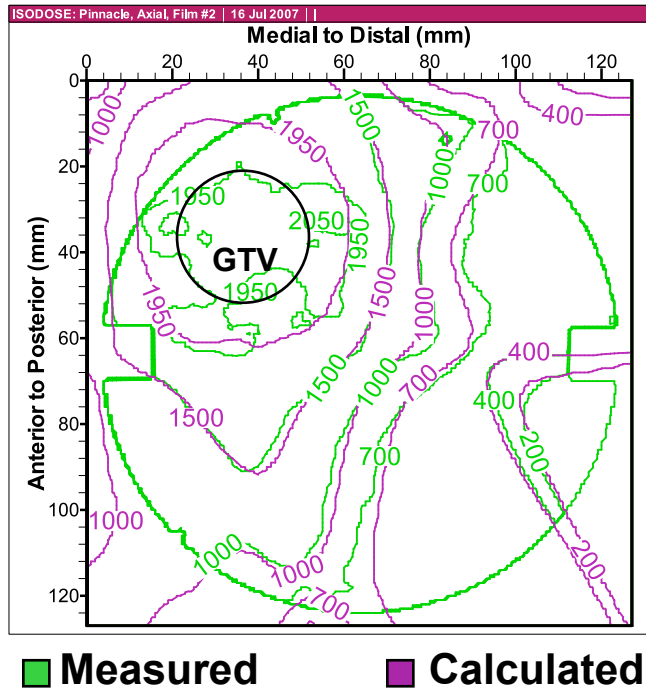
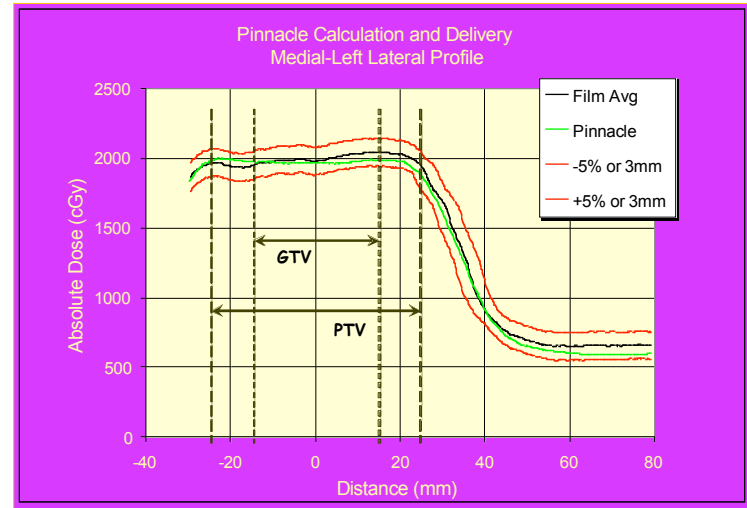
TPS	Dose Calc. Algorithm	# irradiation	Normal Lung measured $D_{TLD/film}/D_{hetero}$	Average Values
Precise	Scatter Int. Clarkson	2	1.00	0.98±15%
BrainLab	Clarkson & Pencil beam	2	1.00	
Eclipse	Pencil Beam	5	0.92	
Ergo	3D Convul. Pencil Beam	2	1.09	0.98±14%
Pinnacle	Adaptive convolve	10	0.99	
XiO	Superposition/Convul.	3	0.95	



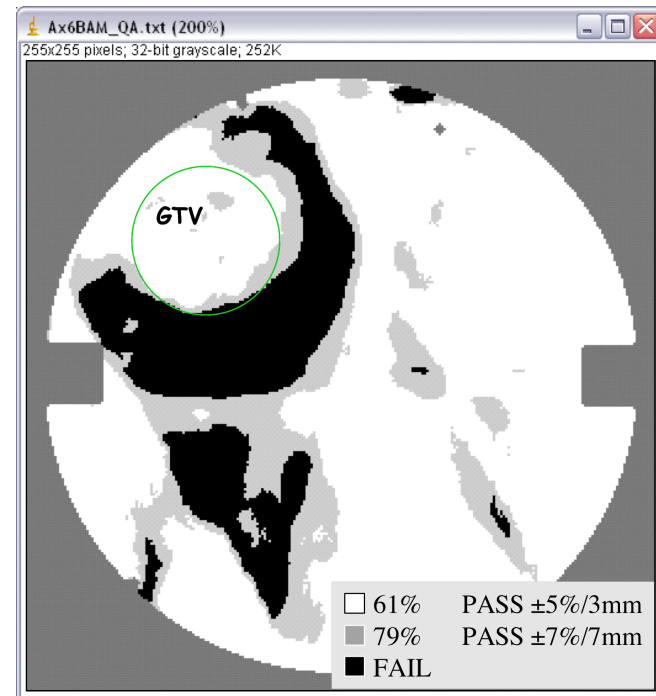
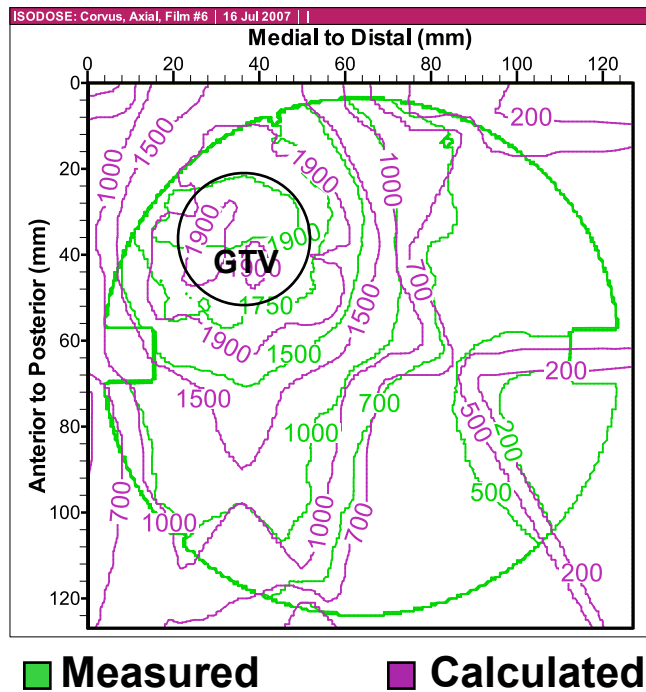
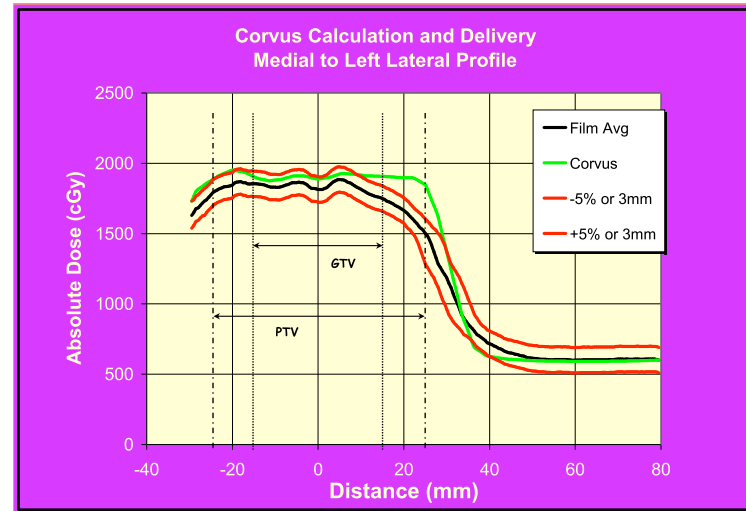
Two separate groupings again

Recent Analysis by RPC of Several Planning Systems

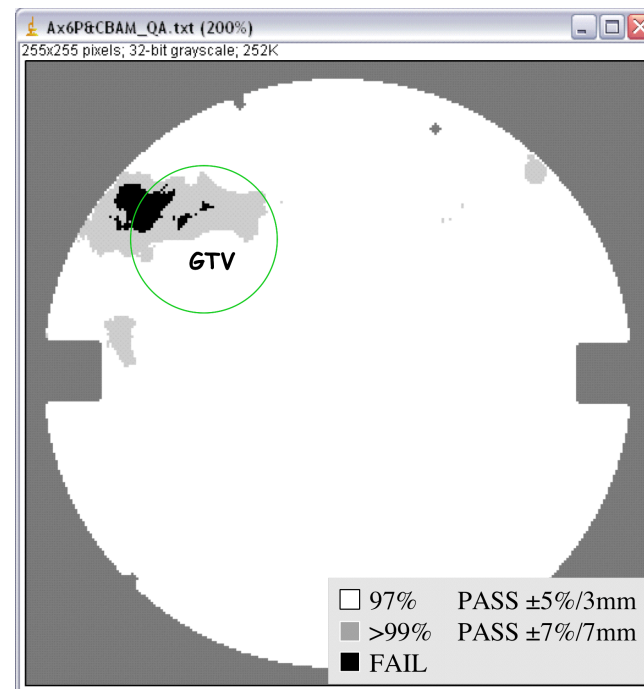
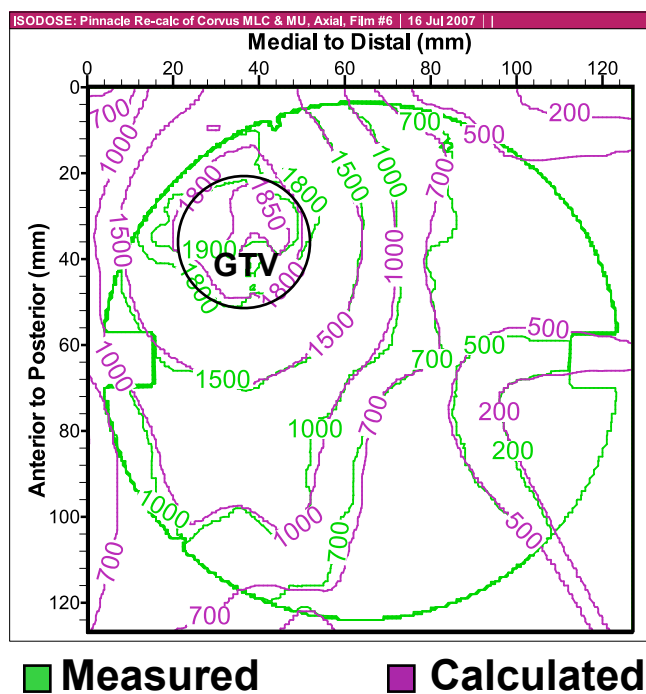
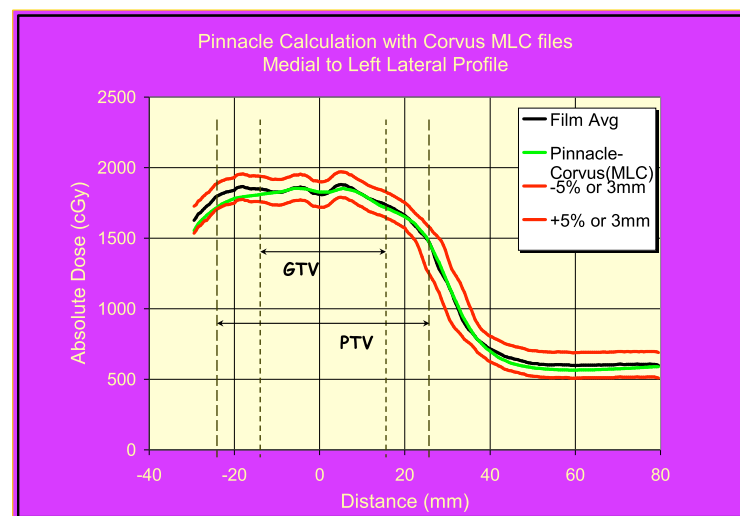
Pinnacle



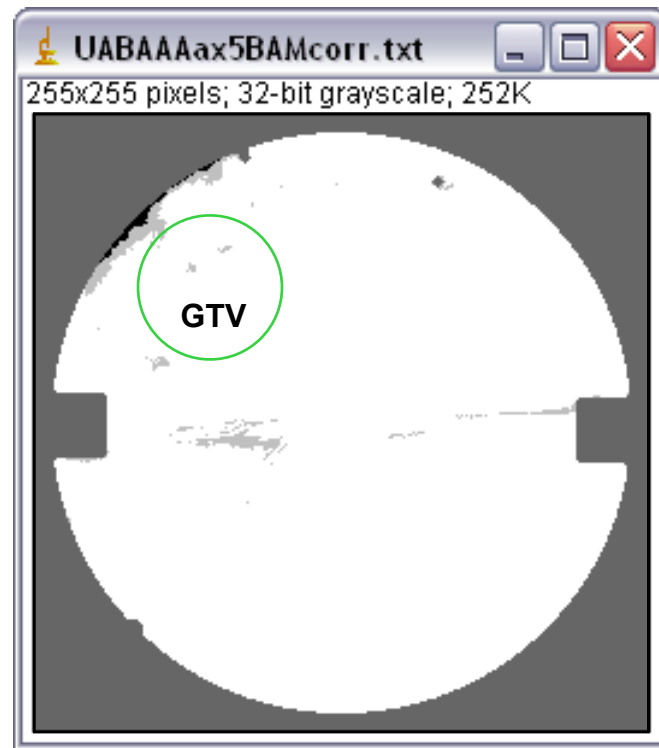
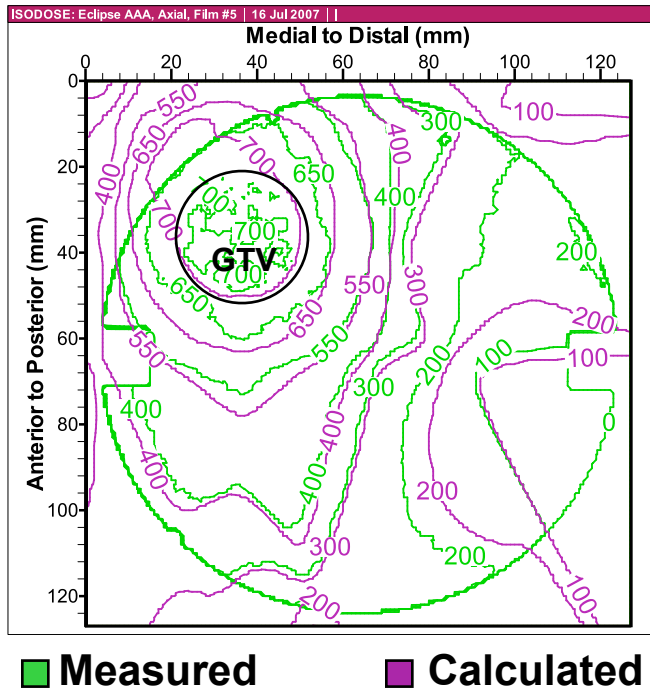
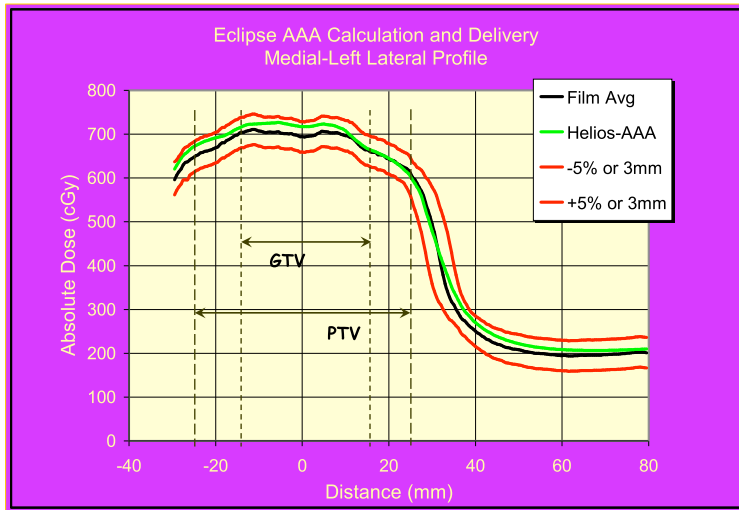
Corvus



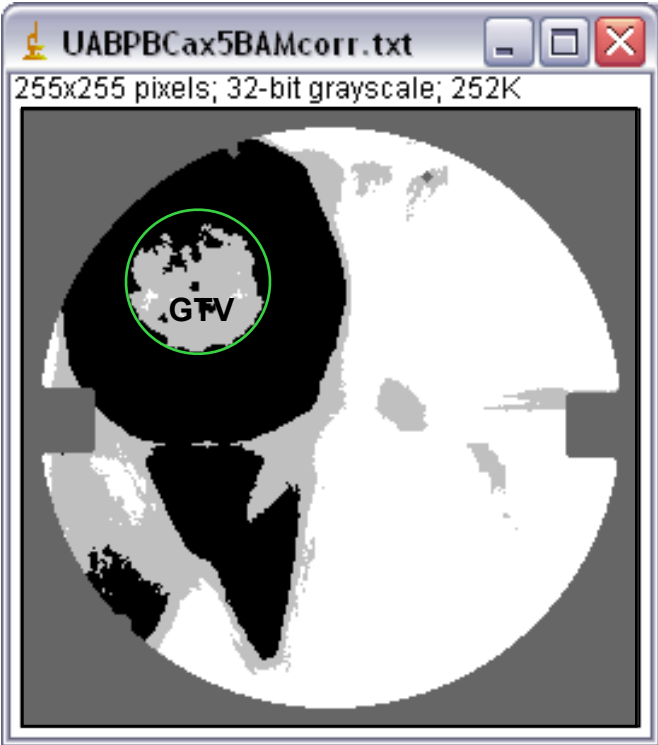
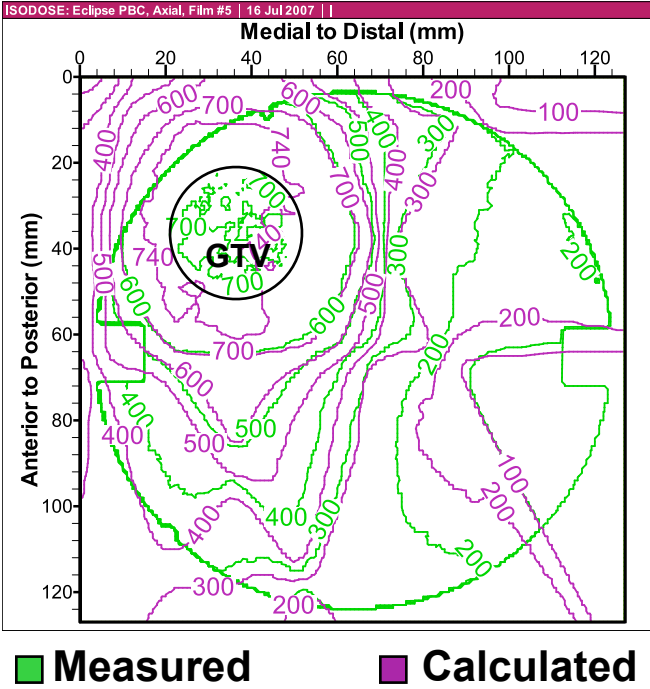
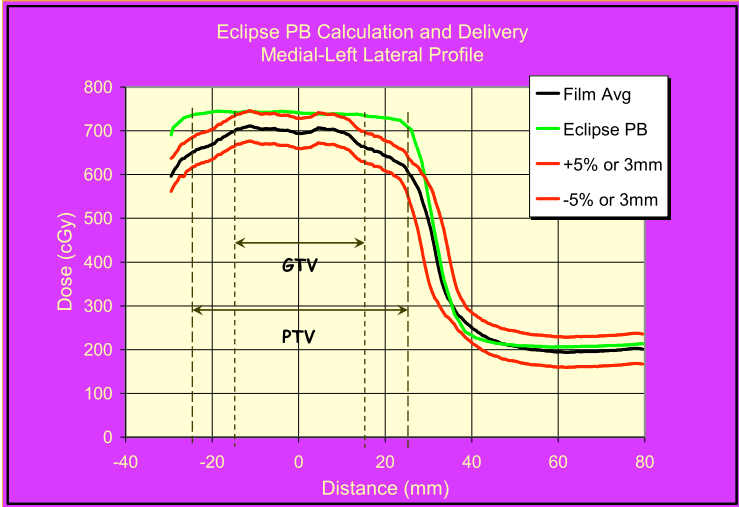
Pinnacle Recalc Corvus MLC & MU



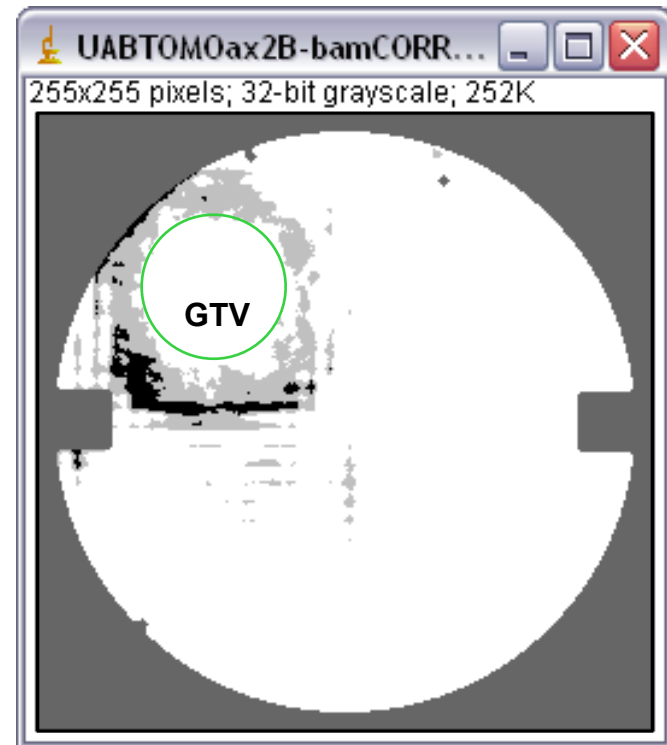
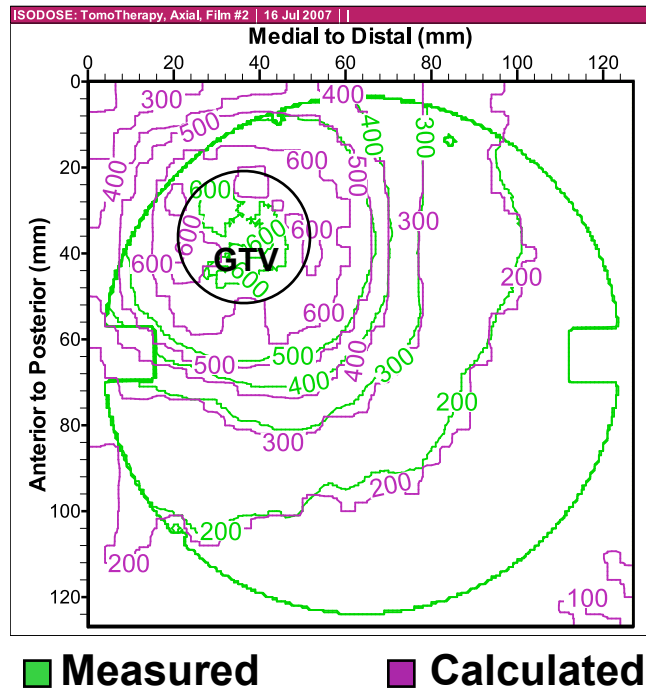
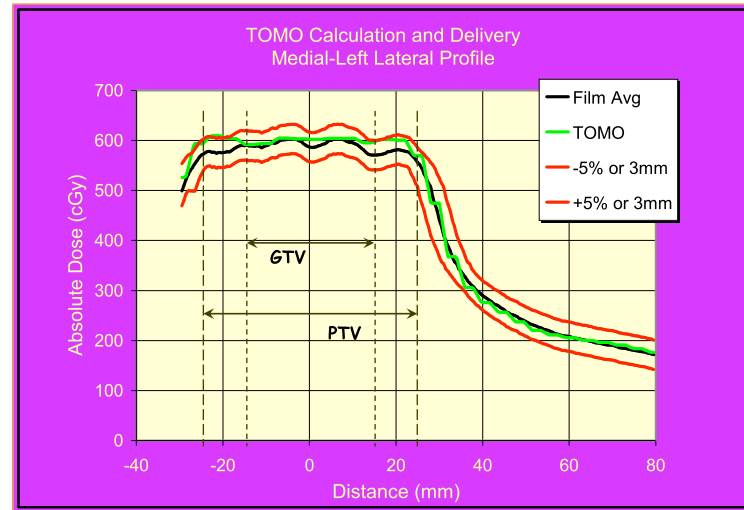
Eclipse AAA



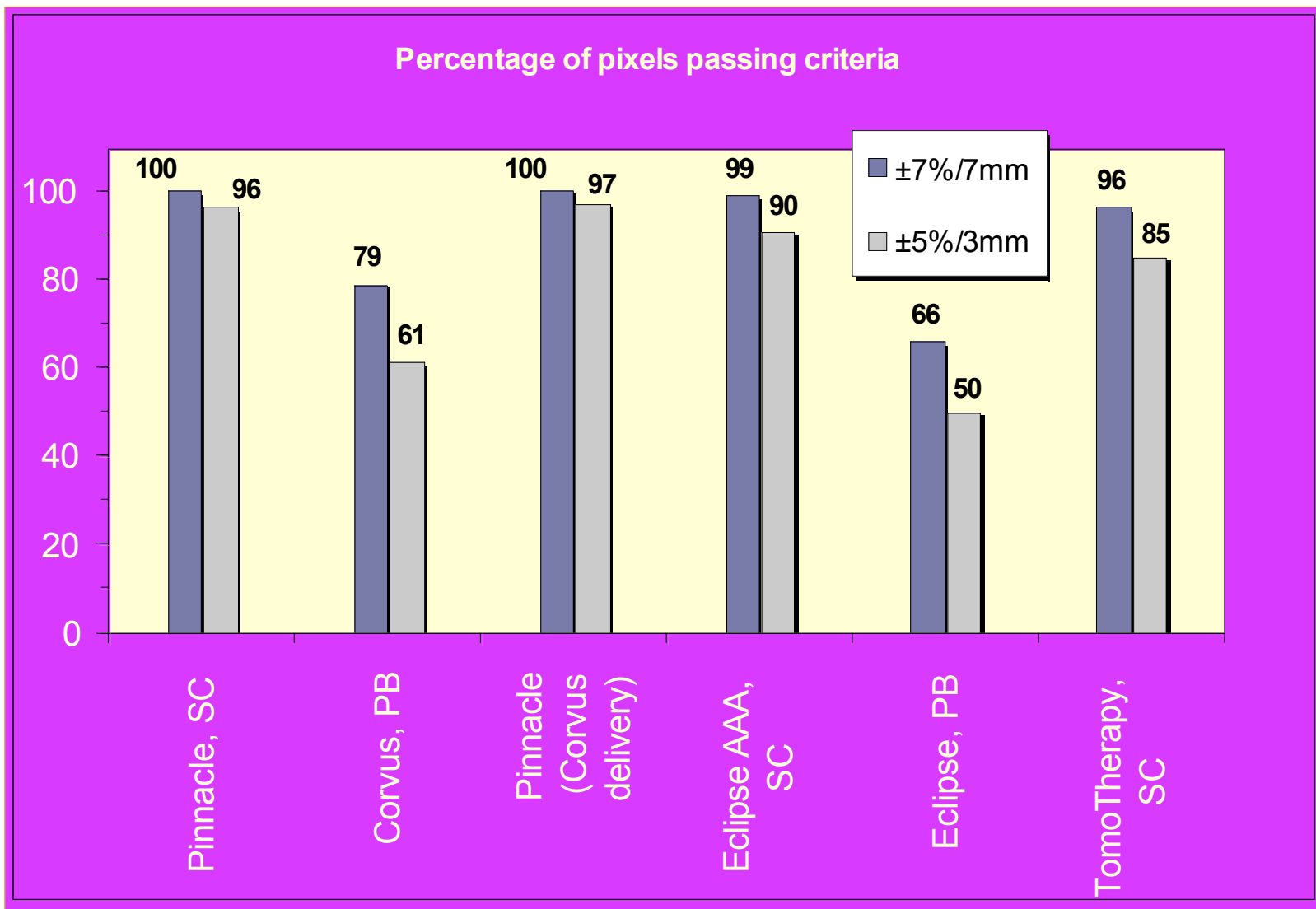
Eclipse PB



TomoTherapy



Binary Agreement Maps



Conclusions



Convolution is sufficiently accurate for clinical trials.



Pencil beam/clarkson type algorithms are not accurate enough for clinical trials.

	Max Dose(cGy)	723.21					
Total MU							3173.32
Min. MU							12.26
Max. MU							177.57
Table							
			nCI	HI	Coverage		
All Target Regs	8.71	723.21	1.00	1.36	1.43	73.55%	
TumorSplexC	8.34	723.21	1.77	1.77	1.43	100.00%	
PT	723.21	723.21	1.00	1.36	1.43	73.83%	
Bev	12.10	n/a	n/a	n/a	n/a	n/a	
Bev	10.44	n/a	n/a	n/a	n/a	n/a	
SpinalCord	1.48	132.97	n/a	n/a	n/a	n/a	
Tune 2	0.10	723.21	n/a	n/a	n/a	n/a	
Outside2cm	16.67	316.83	n/a	n/a	n/a	n/a	
TLD1	22.30	27.95	0.00	0.00	1.43	0.00%	
TLD2	8.71	10.99	0.00	0.00	1.43	0.00%	
TLD3	680.98	706.37	473.70	473.70	1.43	100.00%	
TLD4	686.24	707.04	413.41	413.41	1.43	100.00%	
Heart	3.81	244.85	n/a	n/a	n/a	n/a	
LungR	0.76	353.25	n/a	n/a	n/a	n/a	