

GAFCHROMIC® QD+ Dosimetry System for IMRT Patient Plan Verification

The 'GAFCHROMIC® QD+ Dosimetry System' is a high quality IMRT film dosimetry system with the lowest start-up and operating costs.

The 'GAFCHROMIC® QD+ Dosimetry System' package is composed of:

- 4 boxes of GAFCHROMIC® EBT self-developing radiochromic films**
- An Epson 1680 flatbed color transmission/reflection film scanner**
- One year license of FilmQA™ verification software by 3Cognition LLC *****
- One day on-site hands on training.**

***** Note: We also offer 'GAFCHROMIC® QD+ Deluxe Dosimetry System' package with one unlimited license in place of one year license.**

This positions the GAFCHROMIC® QD+ Dosimetry System as the *lowest cost start-up* alternative for IMRT dosimetry and the *lowest operating costs* for film dosimetry. Only a small fraction of costs of dosimetry systems based on silver film and systems based on diode or ion chamber arrays.

Yet the GAFCHROMIC® QD+ Dosimetry System delivers compelling technical and performance advantages over the competition.

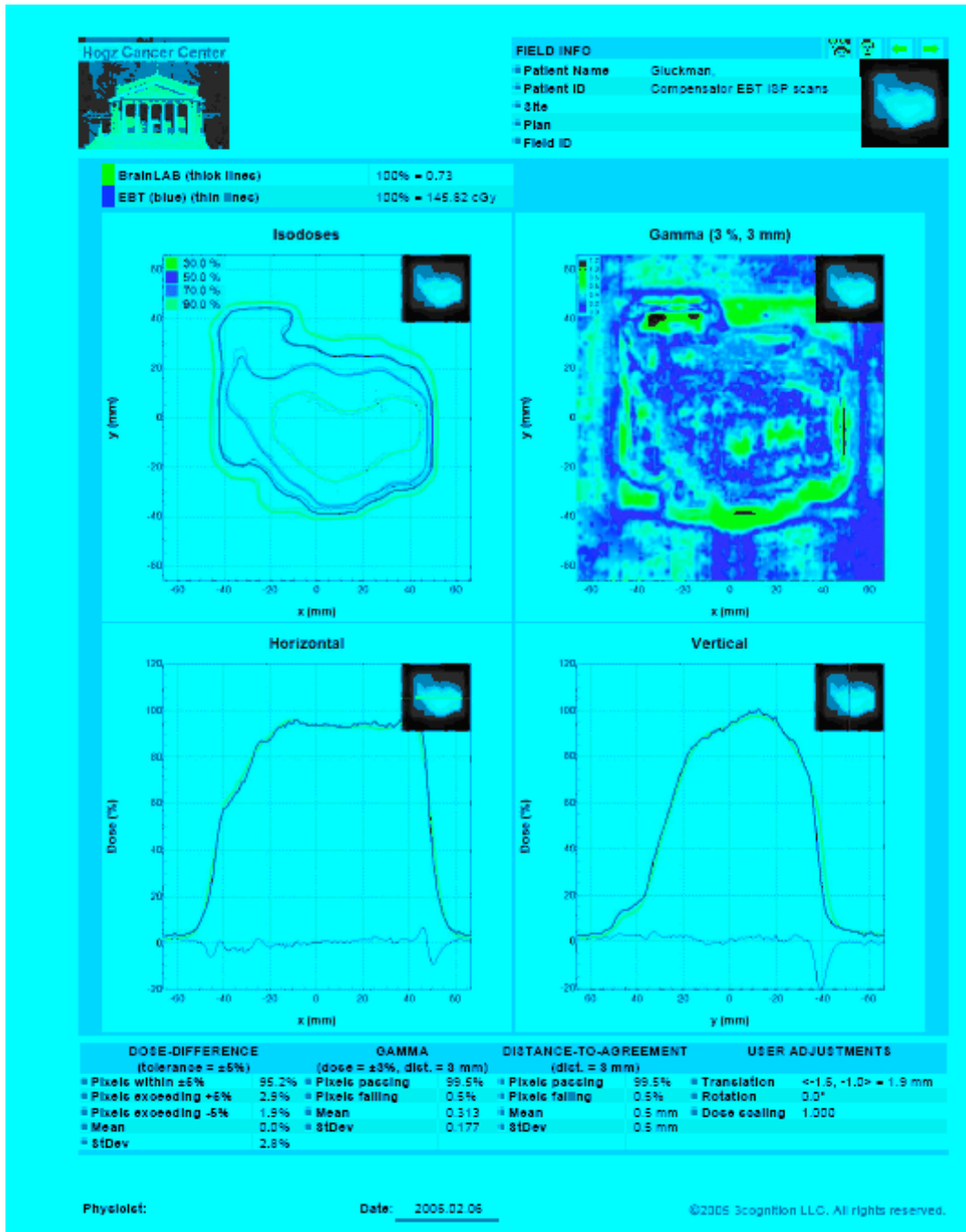
GAFCHROMIC® EBT dosimetry film is ideal for quantitative dosimetry. It has spatial resolution better than 0.1mm and its response is energy and fractionation independent. The film is self-developing and can be handled in room light. For applications where qualitative results are sufficient, GAFCHROMIC® RTQA film is more economical yet has many of the same attributes of the EBT film. Both films are durable and water-immersible.

Since GAFCHROMIC films are blue there is an inherent advantage to using a color scanner. In addition flatbed scanners work with both transparent and reflective media and therefore perfect for EBT and RTQA films. And Epson flatbed scanners offer 48-bit response, spatial resolution to 0.02mm and have stability and noise response characteristics¹ similar to far more expensive scanners such as Uidar.

FilmQA™ validation software by 3Cognition LLC is the fastest and easiest-to-use software for image evaluation and IMRT plan validation and works with all treatment planning systems. It uniquely performs simultaneous automated image registration of multiple fields. Interactive evaluations of films and plan are done with a selection of qualitative features including dynamic isodose maps and profiles as well as sophisticated qualitative analysis tools such as dose-difference and gamma and distance-to-agreement functions. Results are output in customized, browser-readable reports.

1 “Measurement Consistency and Single Pixel Noise of Two Epson Flatbed Film Scanners and a Uidar UXR-16” available at <http://www.gafchromic.com>

System Performance Examples



Compensator case: EBT Epson 1680

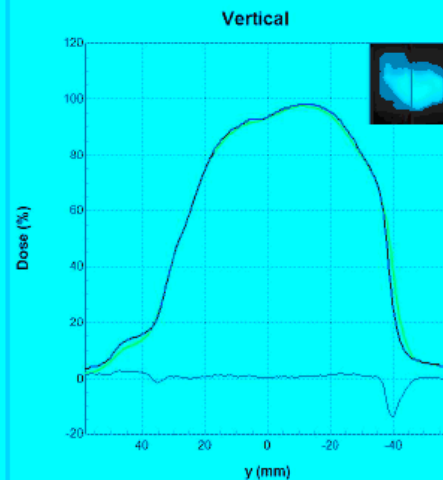
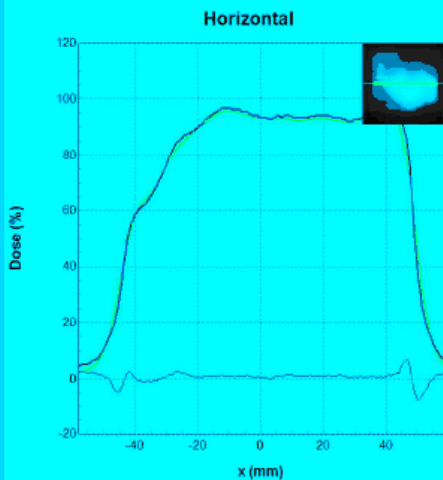
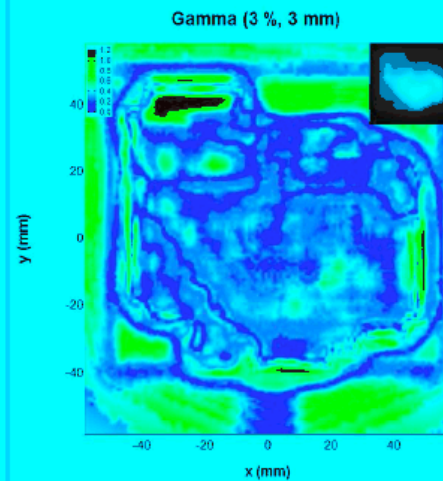
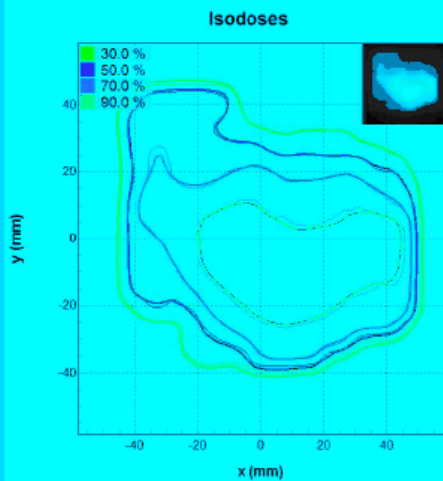


FIELD INFO

- Patient Name: Gluckman,
- Patient ID: EDR-2 Compensator
- Site:
- Plan:
- Field ID:



- BrainLAB (thick lines) 100% = 0.73
- EBT (blue) (thin lines) 100% = 145.82 cGy



DOSE-DIFFERENCE (tolerance = ±5%)		GAMMA (dose = ±3%, dist. = 3 mm)		DISTANCE-TO-AGREEMENT (dist. = 3 mm)		USER ADJUSTMENTS	
• Pixels within ±5%	95.8%	• Pixels passing	99.1%	• Pixels passing	95.6%	• Translation	<-0.2, 0.5> = 0.5 mm
• Pixels exceeding +5%	2.5%	• Pixels failing	0.9%	• Pixels failing	4.4%	• Rotation	0.0°
• Pixels exceeding -5%	1.7%	• Mean	0.361	• Mean	0.8 mm	• Dose scaling	1.000
• Mean	0.3%	• StDev	0.197	• StDev	1.6 mm		
• StDev	2.3%						

Physicist:

Date: 2006.02.06

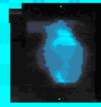
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Compensator case: EDR-2 on Uidar UXR-16

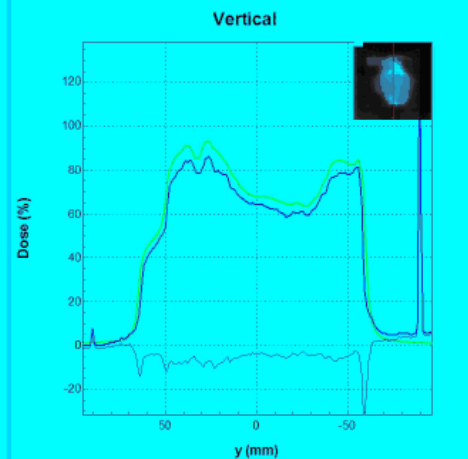
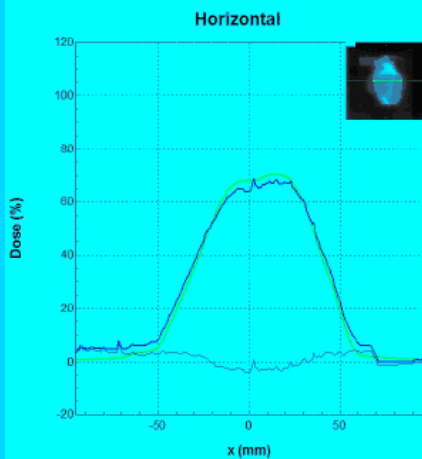
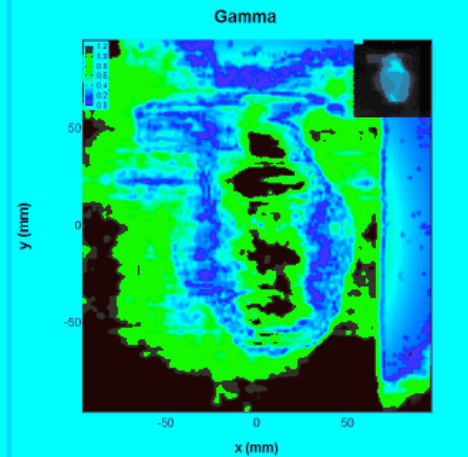
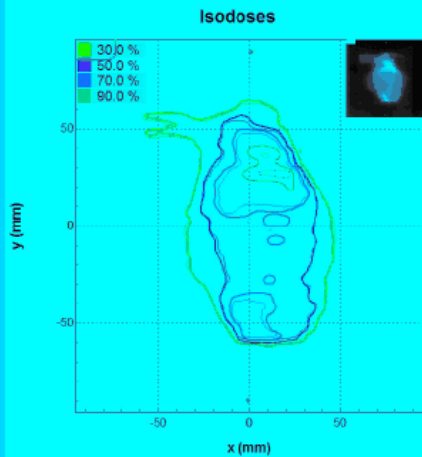


FIELD INFO

• Patient Name: cubic fit, 3% at 3mm
 • Patient ID: Vidar 34351-05
 • Site:
 • Plan:
 • Field ID: g308



BrainLAB (thick lines) 100% = 75.39 cGy
 EBT (blue) (thin lines) 100% = 150.78 cGy



DOSE-DIFFERENCE (tolerance = $\pm 3\%$)	GAMMA (dose = $\pm 3\%$, dist. = 3 mm)	DISTANCE-TO-AGREEMENT (dist. = 3 mm)	USER ADJUSTMENTS
• Pixels within $\pm 3\%$: 56.6%	• Pixels passing: 72.1%	• Pixels passing: 88.1%	• Translation: $\langle -0.3, 0.0 \rangle = 0.3$ mm
• Pixels exceeding +3%: 26.0%	• Pixels failing: 27.9%	• Pixels failing: 11.9%	• Rotation: 0.6°
• Pixels exceeding -3%: 17.3%	• Mean: 0.745	• Mean: 1.4 mm	• Dose scaling: 1.000
• Mean: 2.1%	• StDev: 0.565	• StDev: 1.7 mm	
• StDev: 14.7%			

Physicist: Elekta Watts

Date: 2005.10.17

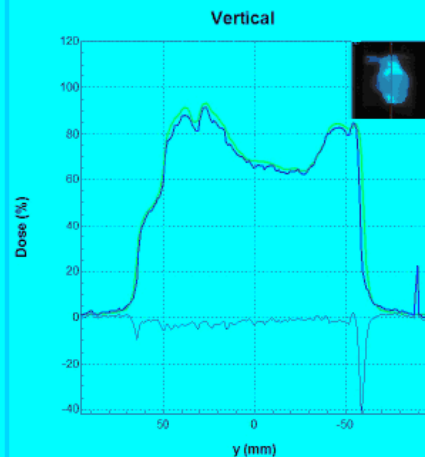
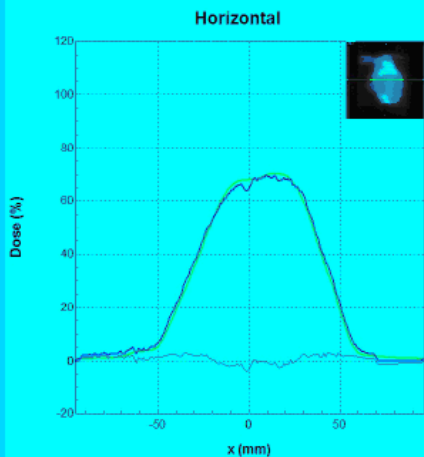
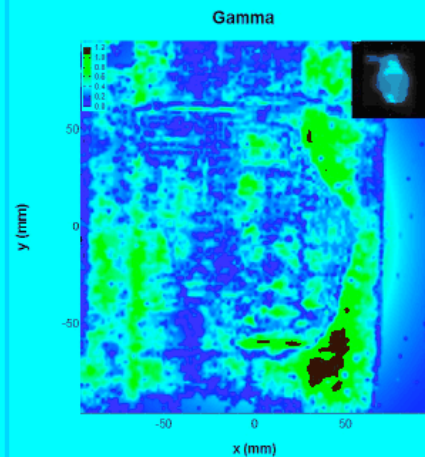
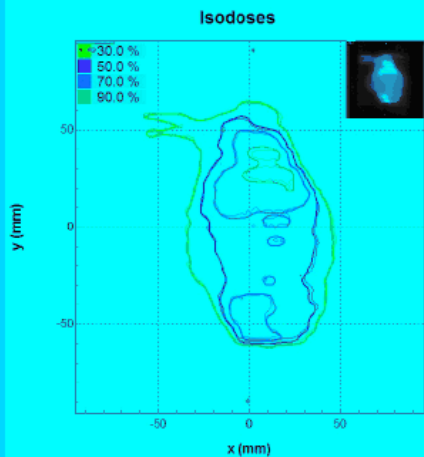
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Brainlab case with MLC : EBT on Vidar UXR-16 without background correction



FIELD INFO	
• Patient Name	cubic fit, 3% at 3mm
• Patient ID	Vidar 34351-05
• Site	
• Plan	
• Field ID	g308

BrainLAB (thick lines) 100% = 75.39 cGy
 EBT (blue) (thin lines) 100% = 150.78 cGy



DOSE-DIFFERENCE (tolerance = $\pm 3\%$)	GAMMA (dose = $\pm 3\%$, dist = 3 mm)	DISTANCE-TO-AGREEMENT (dist. = 3 mm)	USER ADJUSTMENTS		
• Pixels within $\pm 3\%$	91.5%	• Pixels passing	98.2%	• Translation	$\langle -0.3, -0.6 \rangle = 0.7$ mm
• Pixels exceeding +3%	5.1%	• Pixels failing	1.8%	• Rotation	0.9°
• Pixels exceeding -3%	3.4%	• Mean	0.343	• Dose scaling	1.000
• Mean	0.6%	• StDev	0.200		
• StDev	3.8%	• StDev	2.0 mm		

Physicist: Elekta Watts

Date: 2005.10.17

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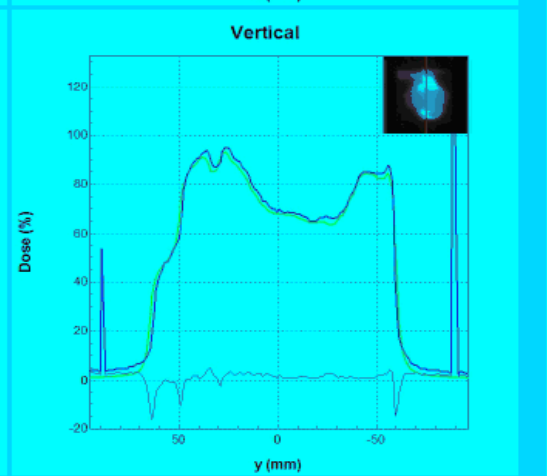
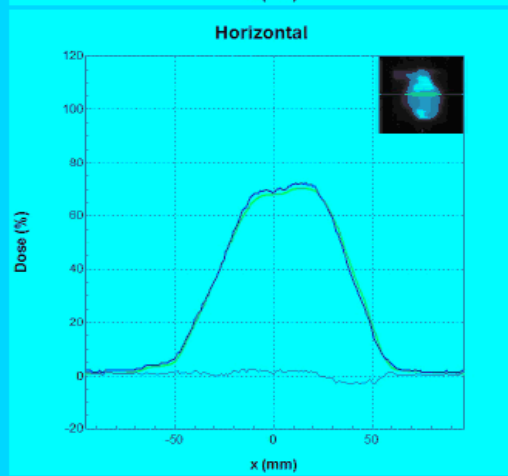
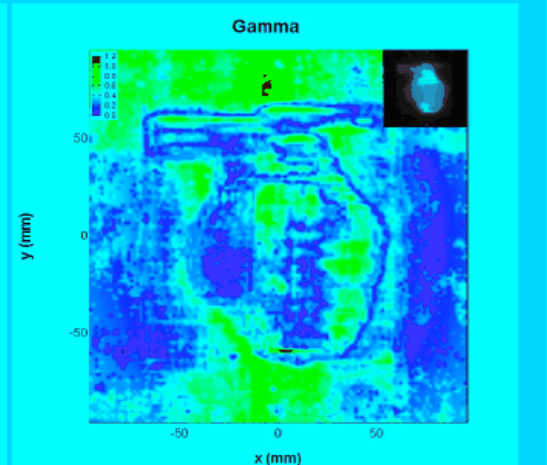
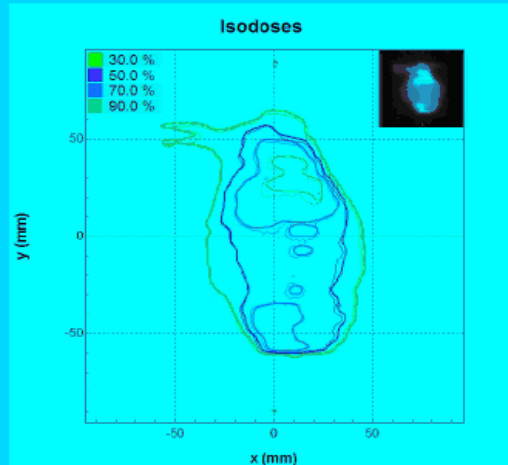
Brainlab case with MLC : EBT on Vidar UXR-16 with background correction



FIELD INFO

- Patient Name: 4th order fit, read 9-13
- Patient ID: 34194-03 Epson 4990-T
- Site:
- Plan:
- Field ID: g308

BrainLAB (thick lines) 100% = 75.39 cGy
 EBT (blue) (thin lines) 100% = 150.78 cGy



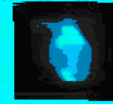
DOSE-DIFFERENCE (tolerance = ±3%)	GAMMA (dose = ±3%, dist. = 3 mm)	DISTANCE-TO-AGREEMENT (dist. = 3 mm)	USER ADJUSTMENTS
• Pixels within ±3%	90.7%	• Pixels passing	99.6%
• Pixels exceeding +3%	5.6%	• Pixels failing	0.4%
• Pixels exceeding -3%	3.7%	• Mean	0.375
• Mean	0.8%	• StDev	0.190
• StDev	2.5%	• StDev	0.5 mm
		• Translation	<-0.2, 0.1> = 0.2 mm
		• Rotation	0.0°
		• Dose scaling	1.000

Physicist: Elekta Watts Date: 2005.09.14 ©2005 3cognition LLC. All rights reserved.

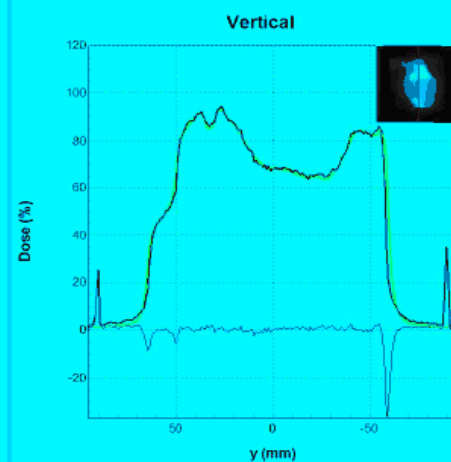
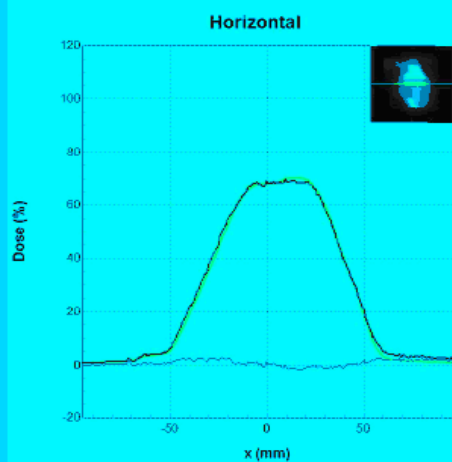
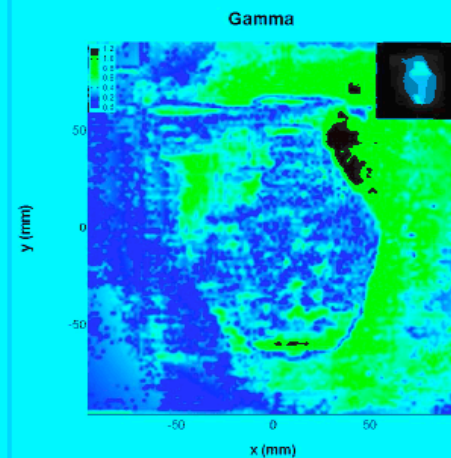
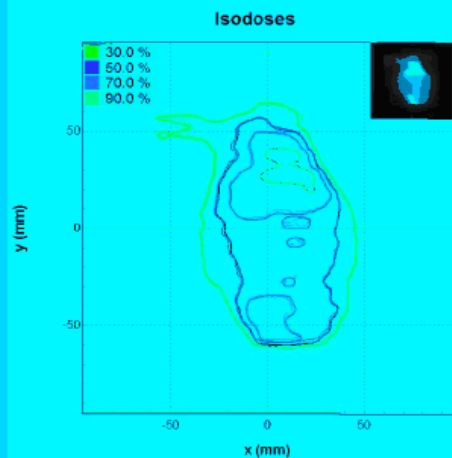
Brainlab case with MLC: EBT on Epson 4990 with background correction



• Patient Name 3rd order, Epson 10000XL
 • Patient ID 34351-05 2% 2mm
 • Site
 • Plan
 • Field ID g308



BrainLAB (thick lines) 100% = 75.39 cGy
 EBT (red) (thin lines) 100% = 150.76 cGy



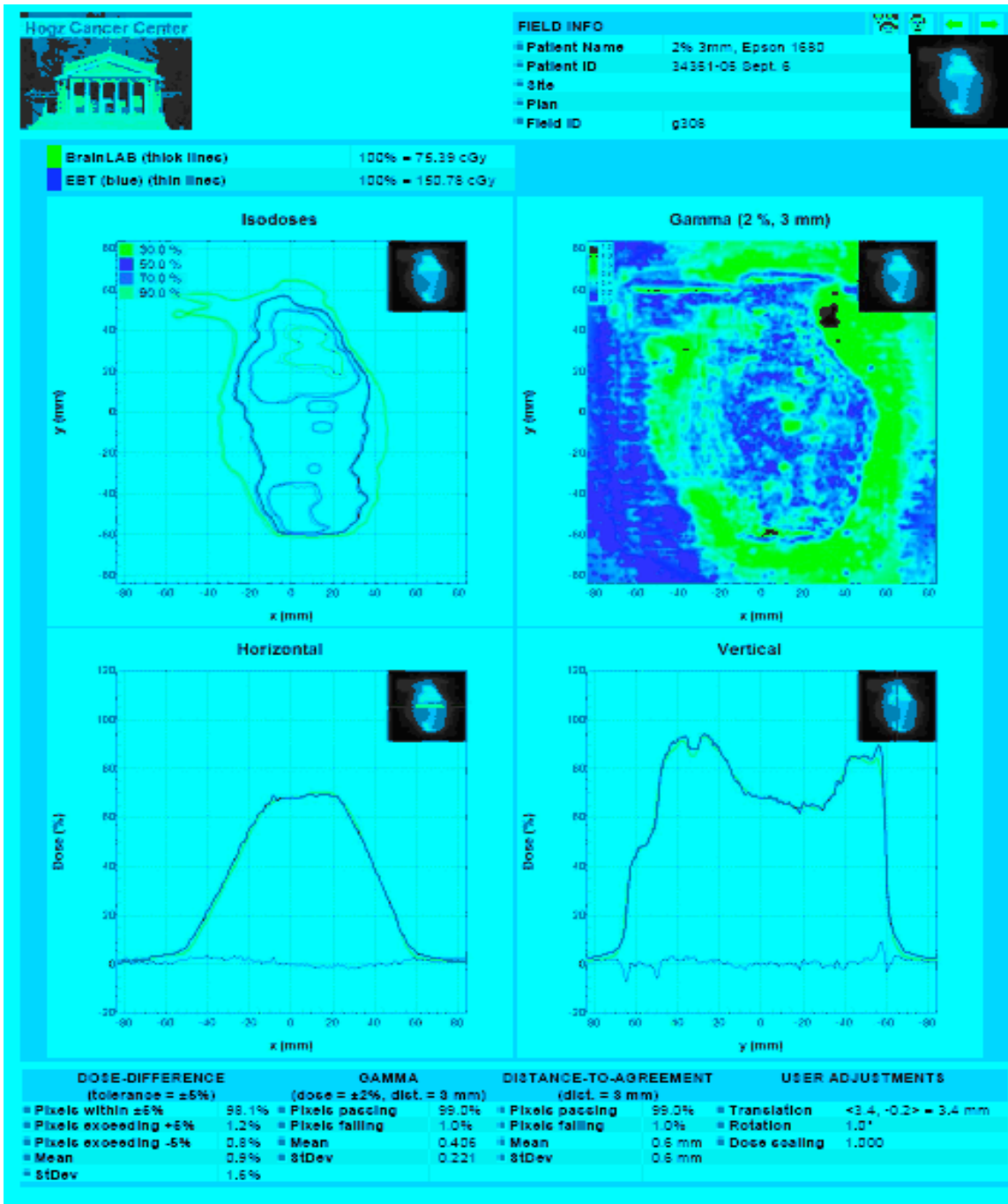
DOSE-DIFFERENCE (tolerance = $\pm 2\%$)	GAMMA (dose = $\pm 2\%$, dist. = 2 mm)	DISTANCE-TO-AGREEMENT (dist. = 2 mm)	USER ADJUSTMENTS
• Pixels within $\pm 2\%$ 88.6%	• Pixels passing 98.0%	• Pixels passing 98.8%	• Translation $\langle -0.1, -0.3 \rangle = 0.3$ mm
• Pixels exceeding +2% 6.9%	• Pixels failing 2.0%	• Pixels failing 1.2%	• Rotation 0.3°
• Pixels exceeding -2% 4.6%	• Mean 0.407	• Mean 0.5 mm	• Dose scaling 1.000
• Mean 0.9%	• StDev 0.242	• StDev 0.7 mm	
• StDev 6.0%			

Physicist: Elekta Watts

Date: 2005.11.16

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Brainlab case with MLC : EBT on Epson 10000XL with background correction



Brainlab case with MLC : EBT on Epson 1680 with background correction