

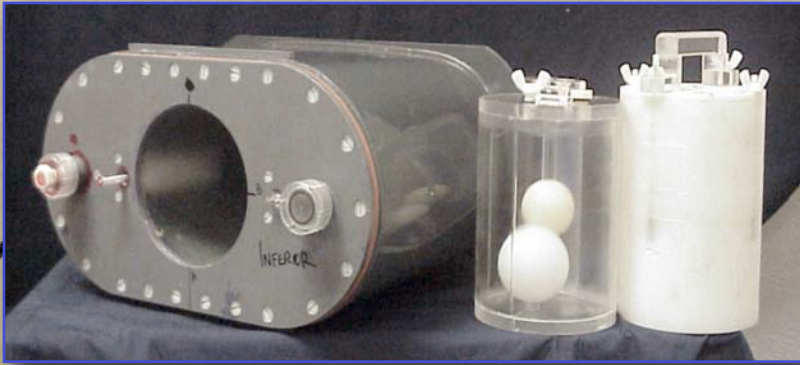
RPC Report



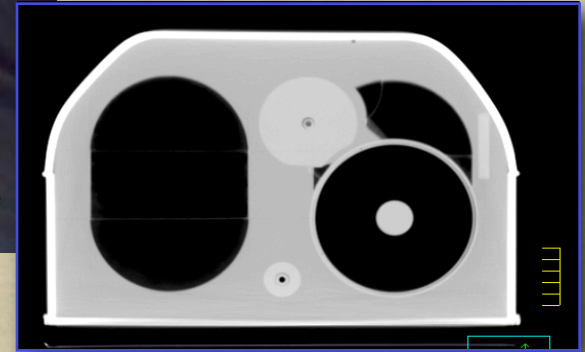
David Followill, Ph.D.,
Geoffrey S. Ibbott, Ph.D.

Supported by NCI grants
CA10953 and CA81647,
and educational grant
from Varian

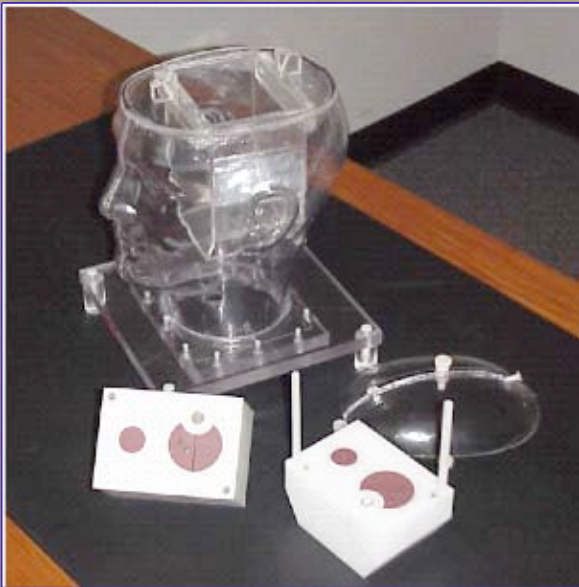
RPC Phantoms



prostate IMRT: 4 in service, 4 under construction



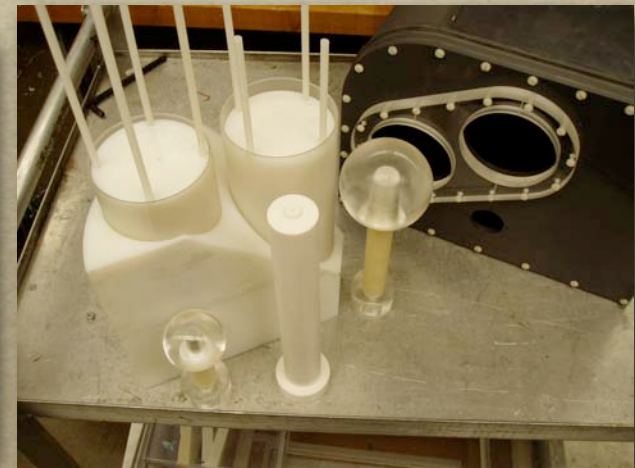
thorax SBRT: 9 phantoms



H&N IMRT: 25 in service, 6 under construction



SRS: 2 in service, others sent by RDS



liver SBRT: 3, incl. motion

Availability of Phantoms

Phantom	H&N	Lung	Prostate	Liver	SRS Head
Number	25 (+6)	9	4 (+4)	3	2
Waiting List		none		none	

Procedures for Request List

- Inst. calls or emails a request
 - RPC adds inst. to request list
- RPC contacts inst. to determine status
 - Study group member, IRB approval, ITC acct, past history
 - Priority determined by “points”
 - If not eligible, inst. referred to RDS
 - If no response, move to “hold” list, confirm by email
- RPC contacts inst. to inform ship date
 - If told inst. not ready, add to “hold” list, confirm by email
- If no response to RPC contact, move to “hold” list, confirm by email

Phantom Results

Comparison between institution's plan and delivered dose.

Criteria for agreement: 7% or 4 mm DTA

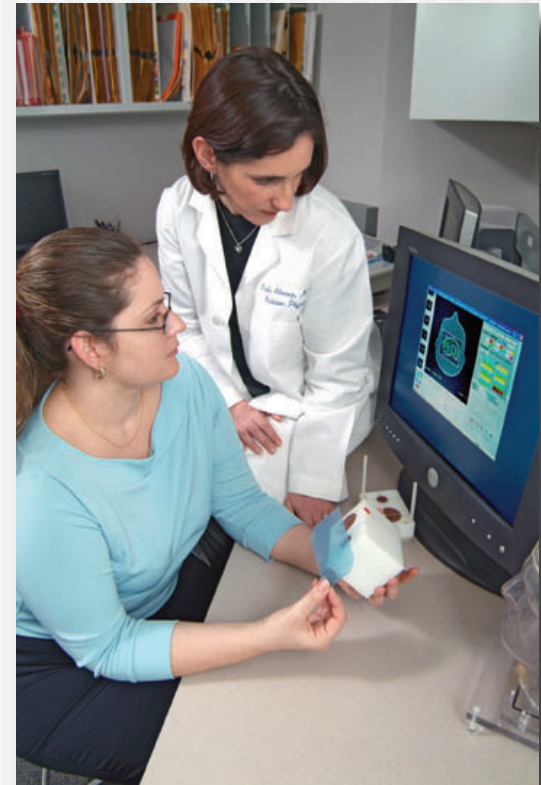
Site	Technique	Acceptable	RTOG Members	% of RTOG	Of top 10 Full	Of top 10 Affiliate
H&N	IMRT	245	198	28.3	11 (85%)	29 (60%)
Pelvis	IMRT	65	59	8.4		
Lung	SBRT	19	19	2.7		
Liver	SBRT	4	4			
Benchmark	IMRT	16	15			

Phantom Turn-Around Time

Phantom	Average (days)	Max (days)
H&N	28	137
Pelvis	24	79
Lung	30	164
Liver	42	90
SRS Head	41	279

Phantom Turn-Around Time

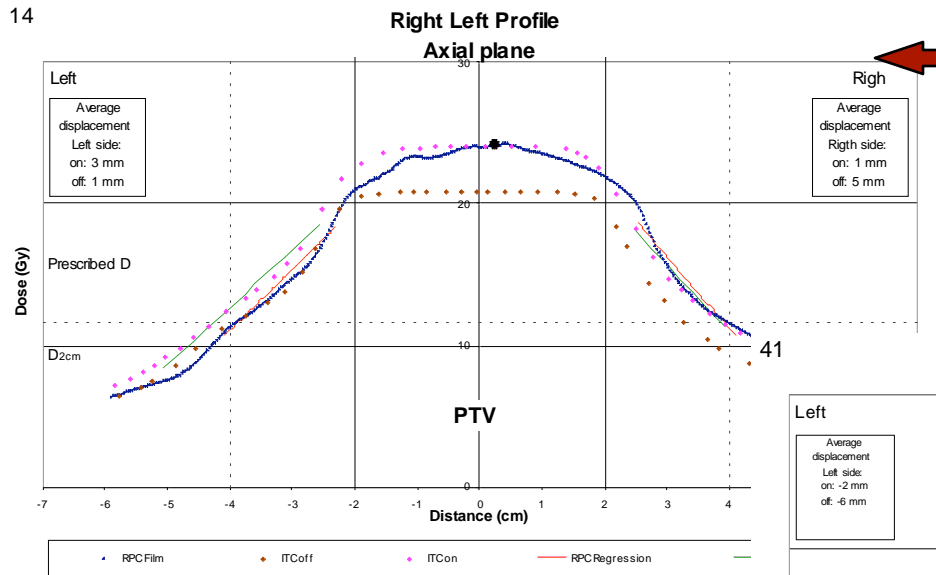
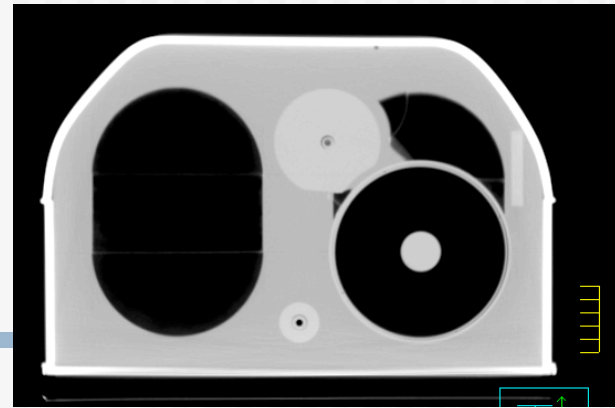
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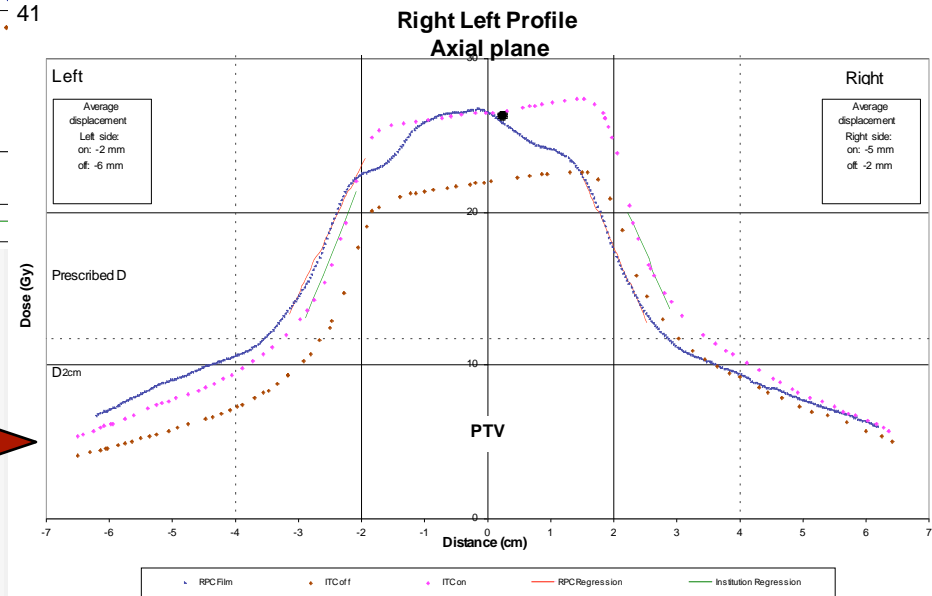
Preparation for upcoming lung protocols

- Commissioned new phantoms (9 total)
- Contacting institutions that used Eclipse pencil-beam
 - Requesting they repeat with AAA
- Developing facility questionnaire
 - To determine calculation algorithm, other capabilities

Evaluation of Heterogeneity Corrections with RPC Thorax Phantom



Convolution/superposition algorithm showing good agreement with measurements



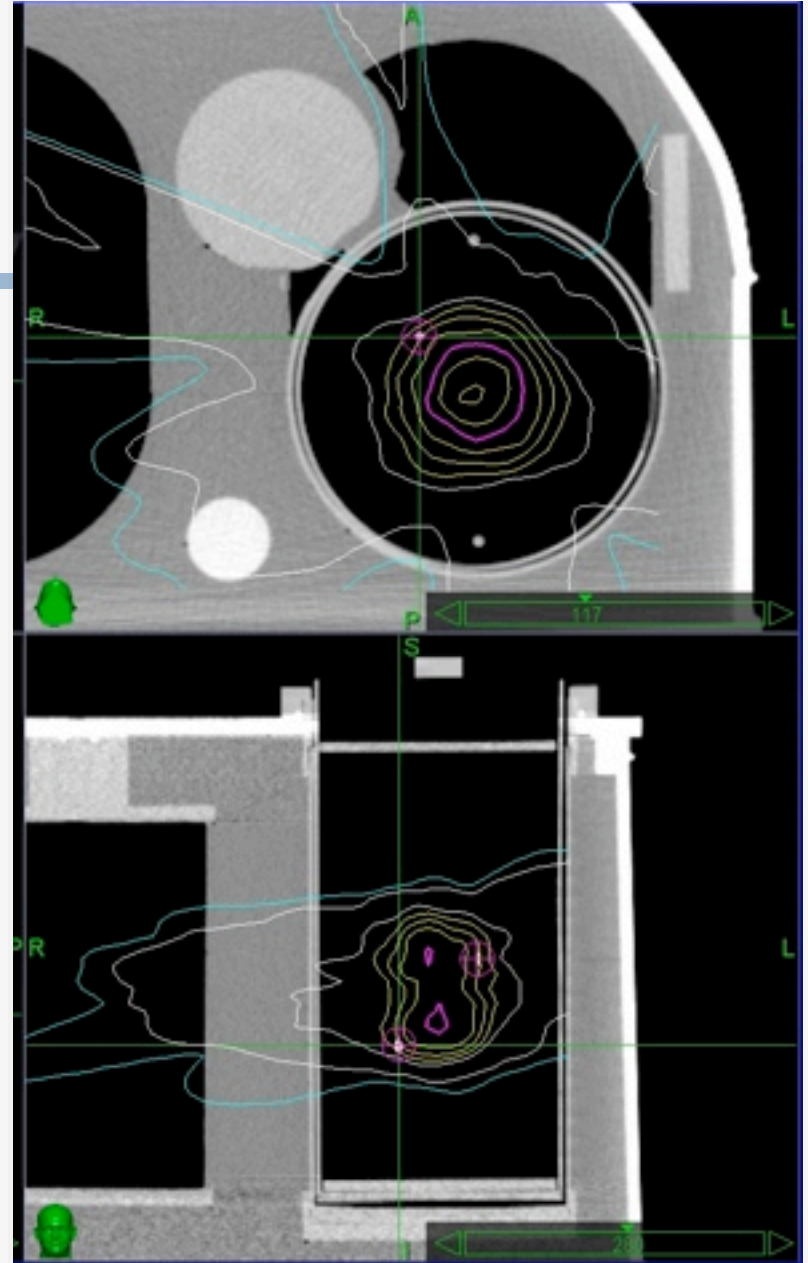
Pencil-beam algorithm showing poor agreement with measurements

RPC Role in Evaluating Respiratory Motion

- NCI protocols required to address respiratory motion when IMRT used
 - For intra-thoracic tumors and other locations
- RTOG 0438
 - Liver primary and metastases (no IMRT)
- RTOG 0618
 - SBRT lung (IMRT permitted with approval)
- Institutions required to demonstrate capability
 - RTOG has written requirements

Modifications to Phantoms for IGRT

- Two phantoms modified to add fiducials, investigating methods to add anatomical structures for image guidance



Define Parameters

Number of Fraction:

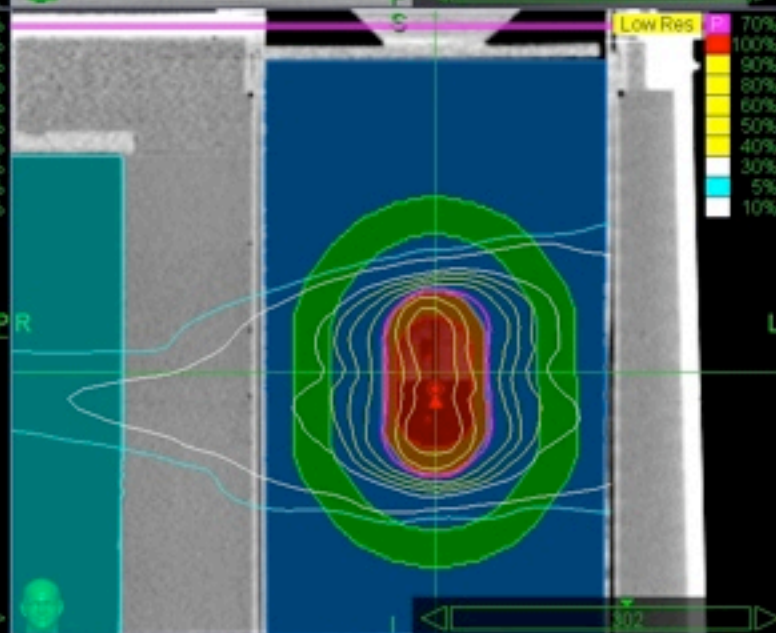
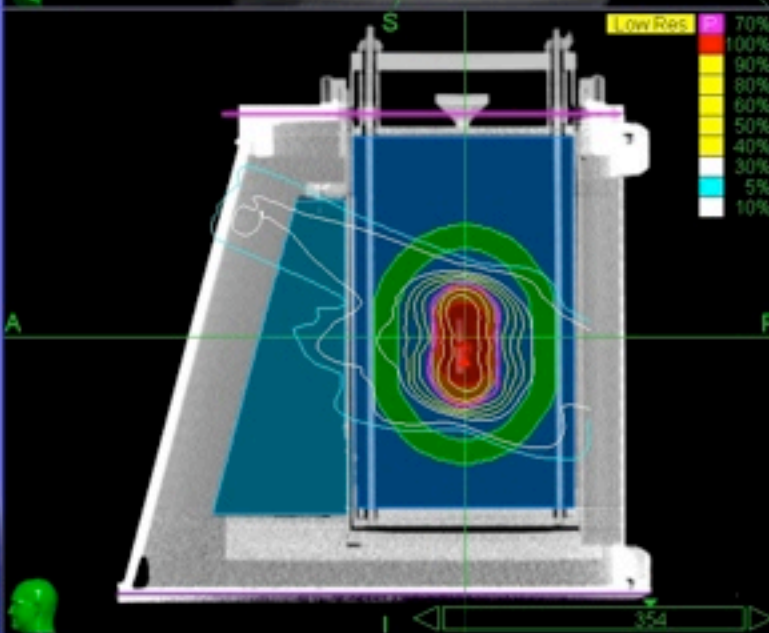
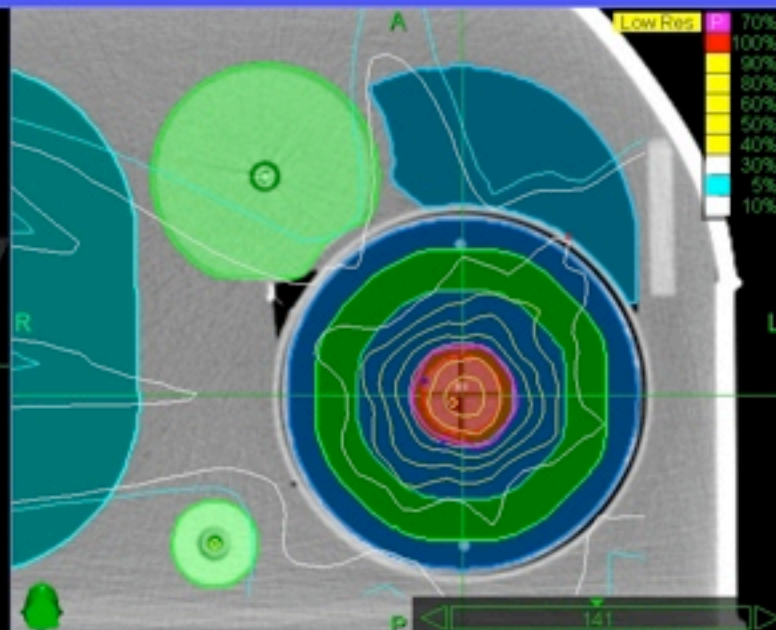
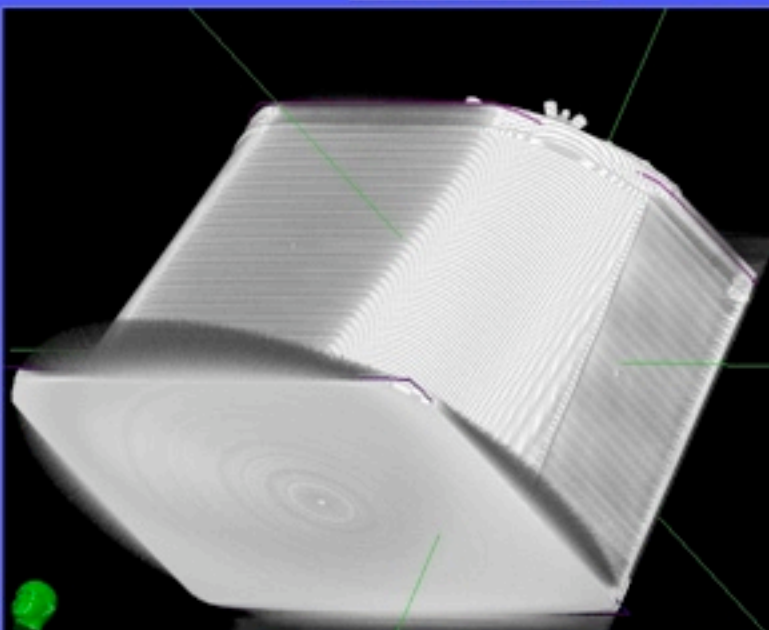
Treatment Anatomy:

Template Path Set:

Tracking Method:

Treatment Mode:

Max. Beam On Time (sec):



Patient

rpc RPC_LUNG
RPC_LUNG

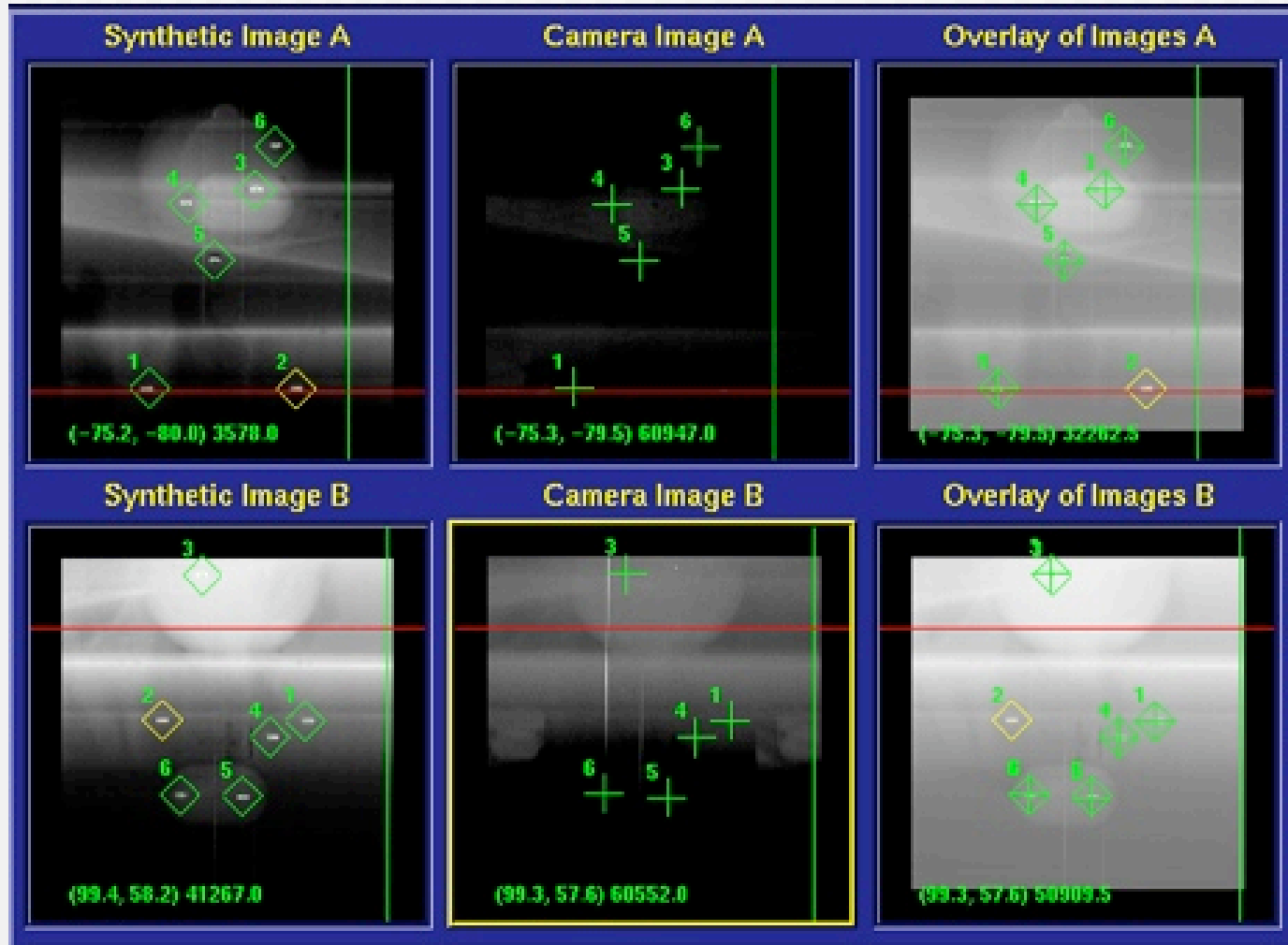
Plan

RPC_thorax_jongPlan
2007-03-22 10:45:27

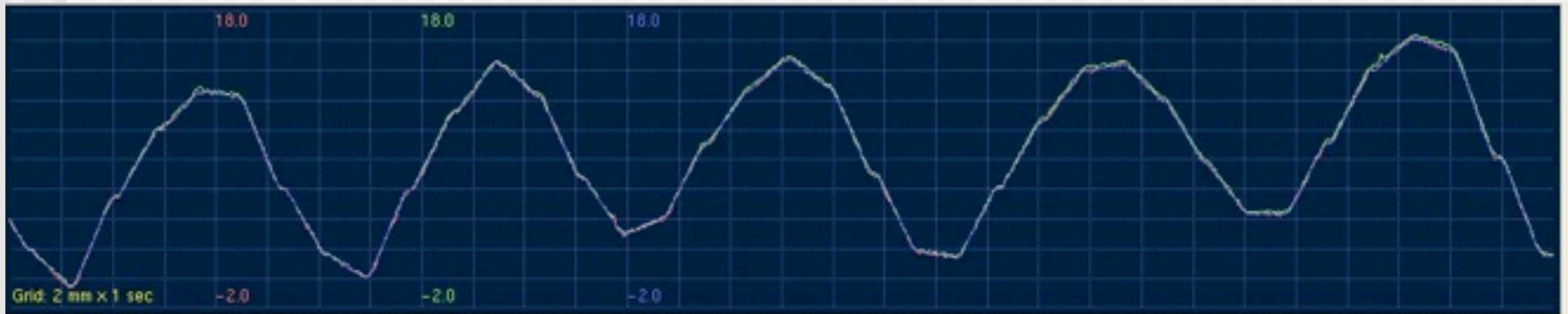
Rx

70%, 600.00 cGy

Phantom Alignment

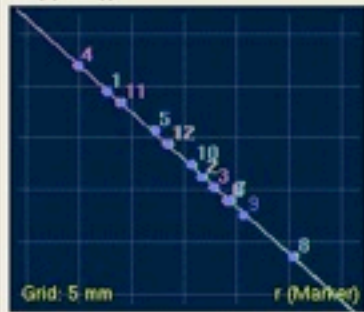


Model of Respiratory Motion

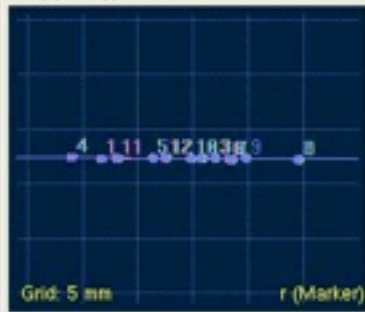


Correlation Graphs

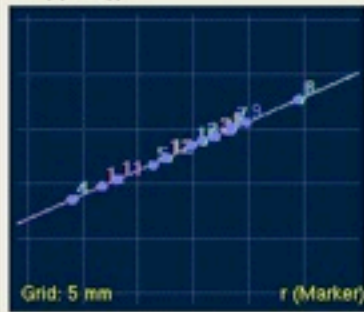
INF(+)/SUP(-)



LFT(+)/RGT(-)



ANT(+)/POS(-)



Summary Info

Average	INF/SUP	LFT/RGT	ANT/POST
Model Type :
Standard Error [mm] :	0.16	0.05	0.10
Correlation Error [mm] :	0.09	0.07	-0.06
Coverage :			100%

Evaluation of Synchrony

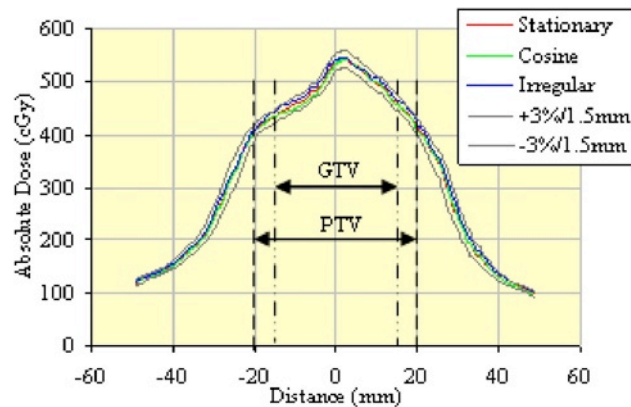


Figure 3. Anterior-Posterior Dose Profiles

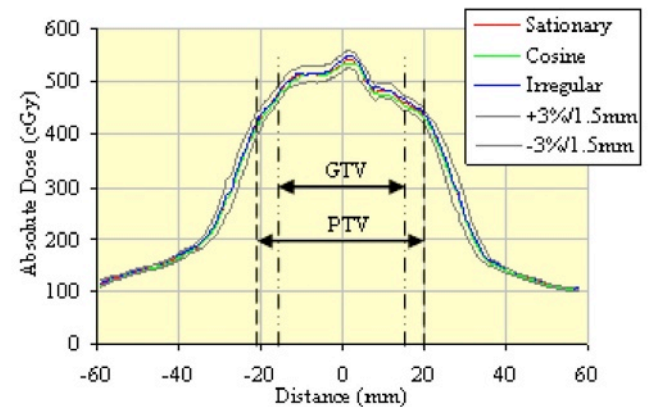


Figure 4. Medial-Left Lateral Dose Profiles

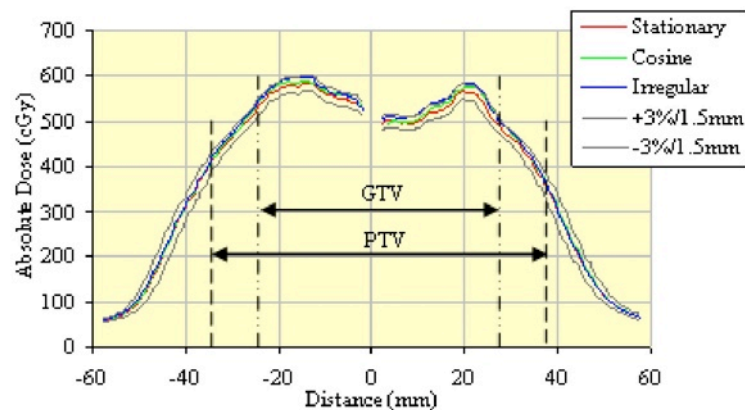


Figure 5. Superior-Inferior Dose Profiles

Evaluation of Synchrony

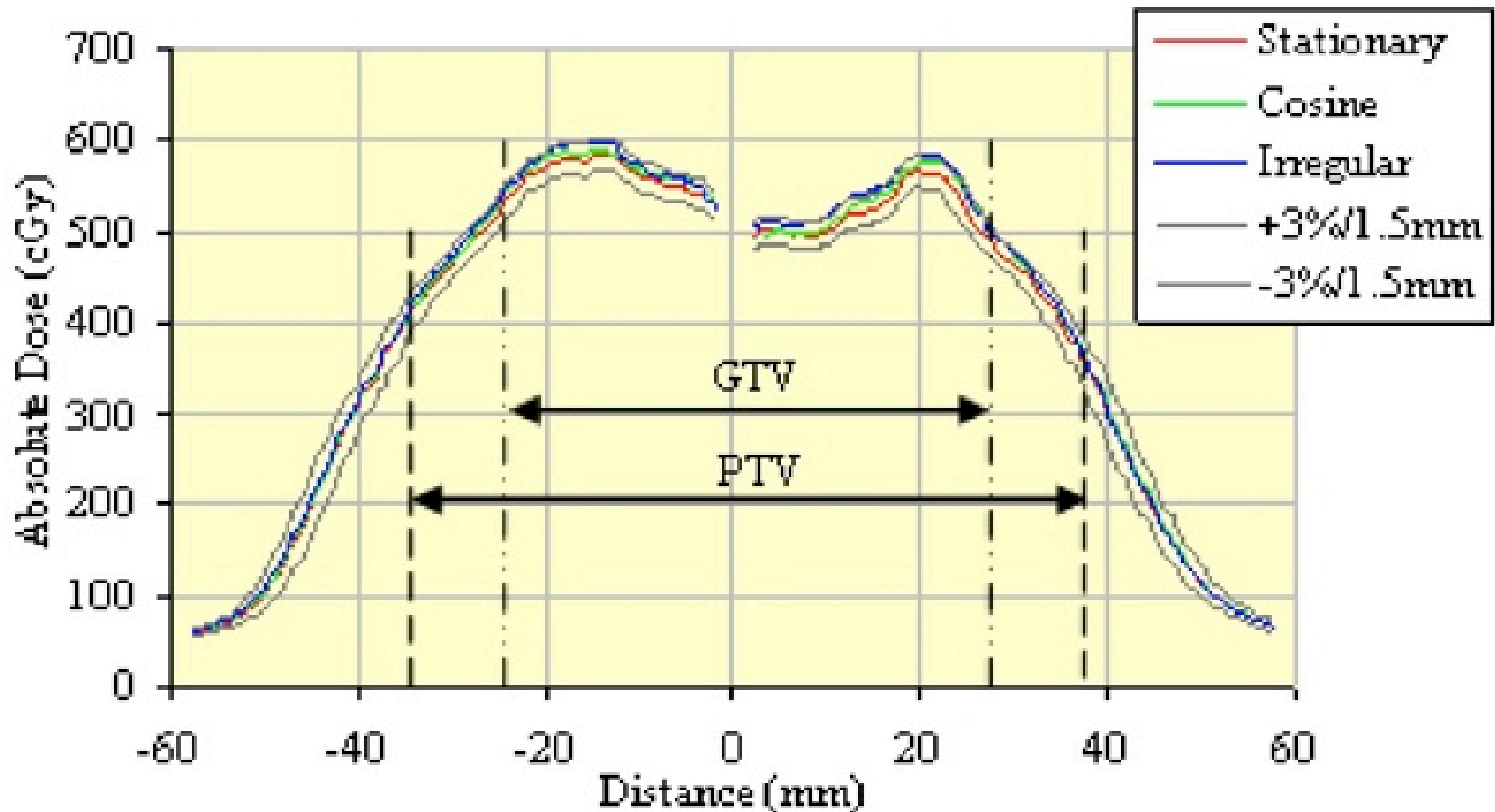
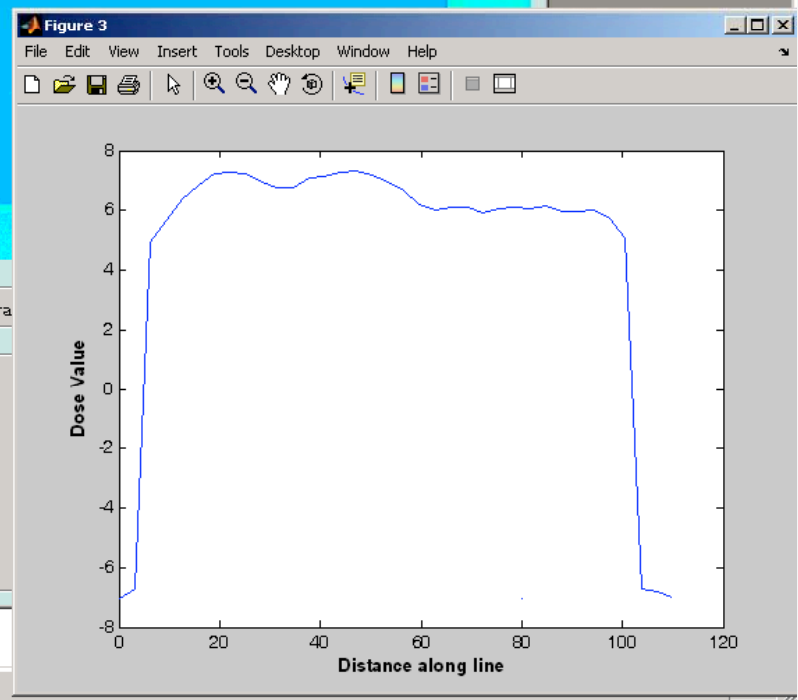
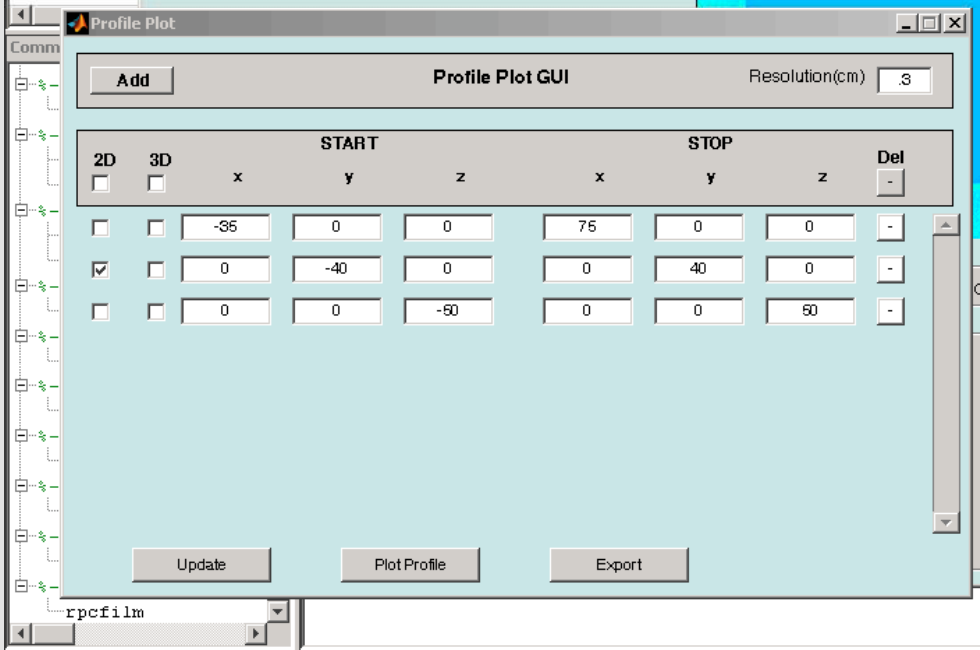
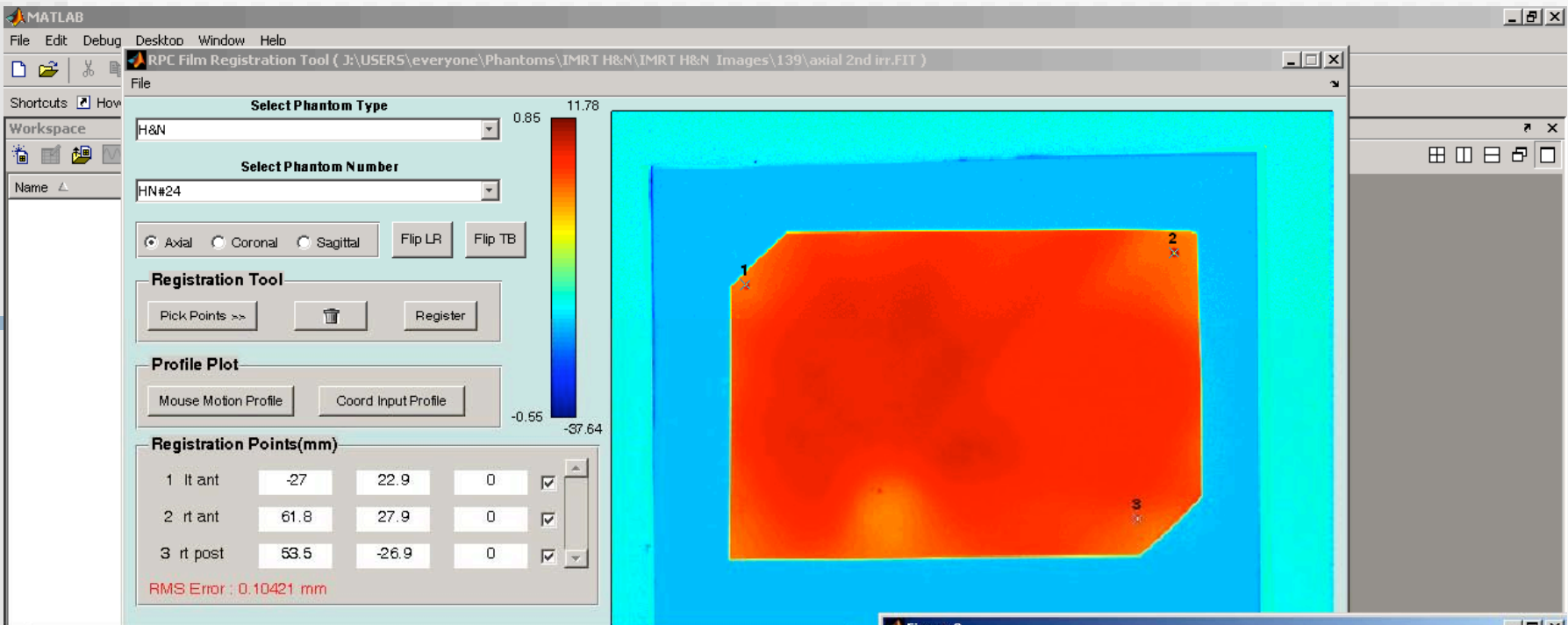


Figure 5. Superior-Inferior Dose Profiles

Subcontract with CERR

- Contract formalized, effective Jan 1
- Significant progress
 - Registration of films
 - Display of film and institution data
- Next: comparison of data



MATLAB

File Edit Debug Desktop Window Help

Current Directory: C:\Program Files\MATLAB704\work

Shortcuts How to Add What's New

Workspace

Name	Value
ans	132

Figures

Navigation Montage for Scan: 1

Structures Bookmarks Switch Scan

CERR: C:\Program Files\MATLAB704\work\p055.mat.bz2

File View Dose Metrics Scan Structures Help

Not for clinical use

CT window: --Manua...
Center: 0 Width: 300

7.01 7.01

0 0

Command: help

fx1hetero Exchange Plan Loaded p055.mat.bz2. Ready.

Legend

- 68_Sant
- 68_Spost
- COORD
- PTV
- PTV_S4
- PTV_68
- SS4_TLD
- SKIN
- margin

Command Window

```

rpc
  |-- 4.
  |-- CERR
  |-- rpc
  |-- 4.
  |-- rpc
  |-- 4.
  |-- rpc
  |-- 4.
  |-- rpc
  |-- 5.
  |-- rpc
  |-- 5.
  |-- rpc
  |-- 5.
  |-- rpc
  |-- 6.
  |-- rpc
  |-- 6/19/07 2:45 PM
  |-- rpcfilm
  |-- CERR
  >>

```

Start

Start MATLAB RPC Film Registratio... Microsoft PowerPoin... CERR: C:\Program... Navigation Montage ...

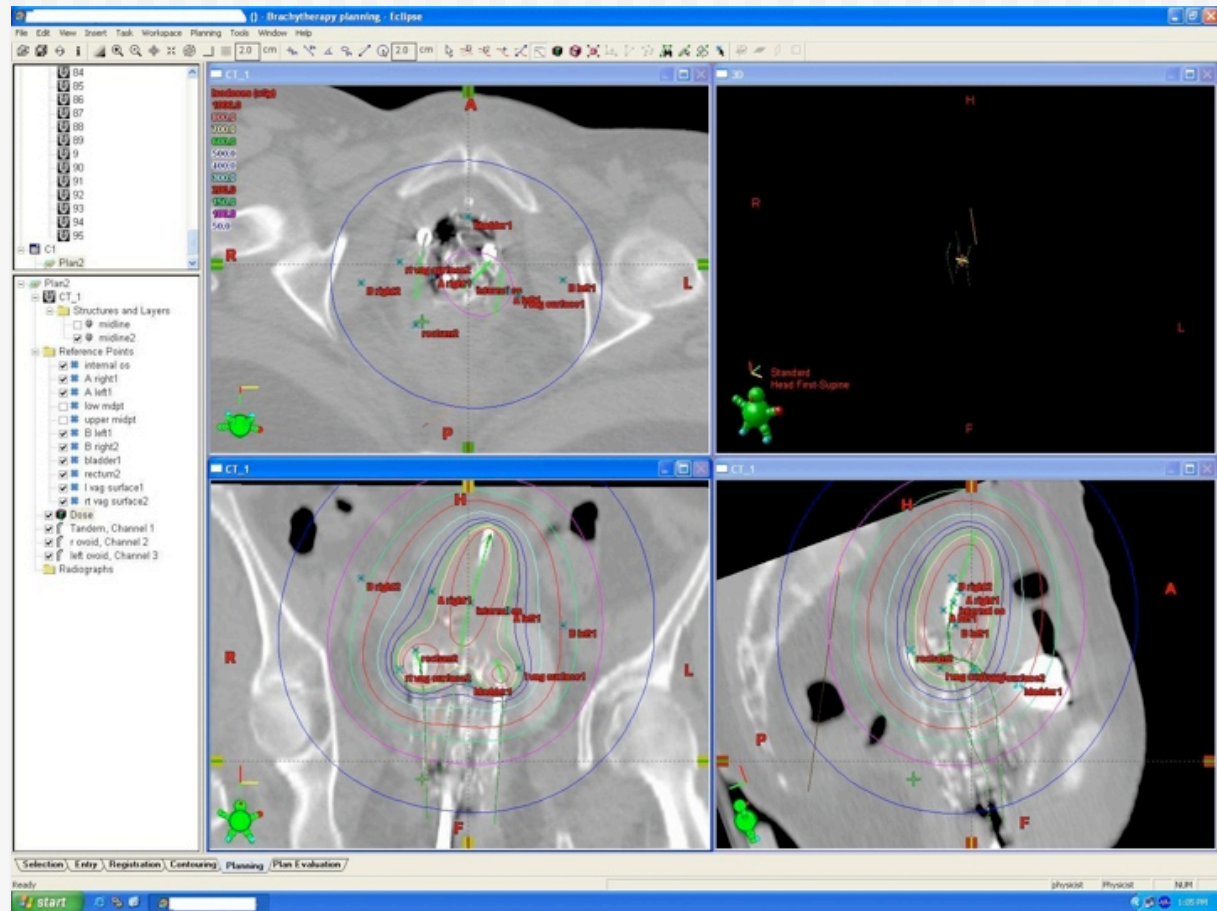
2:56 PM

CERR Project: Monte Carlo

- Developing generic solution to enable RPC to verify IMRT and lung heterogeneity calculations
- Several visits to St. Louis
- Progress: preliminary calculations
 - Benchmarked Varian 6 MV IMRT in lung

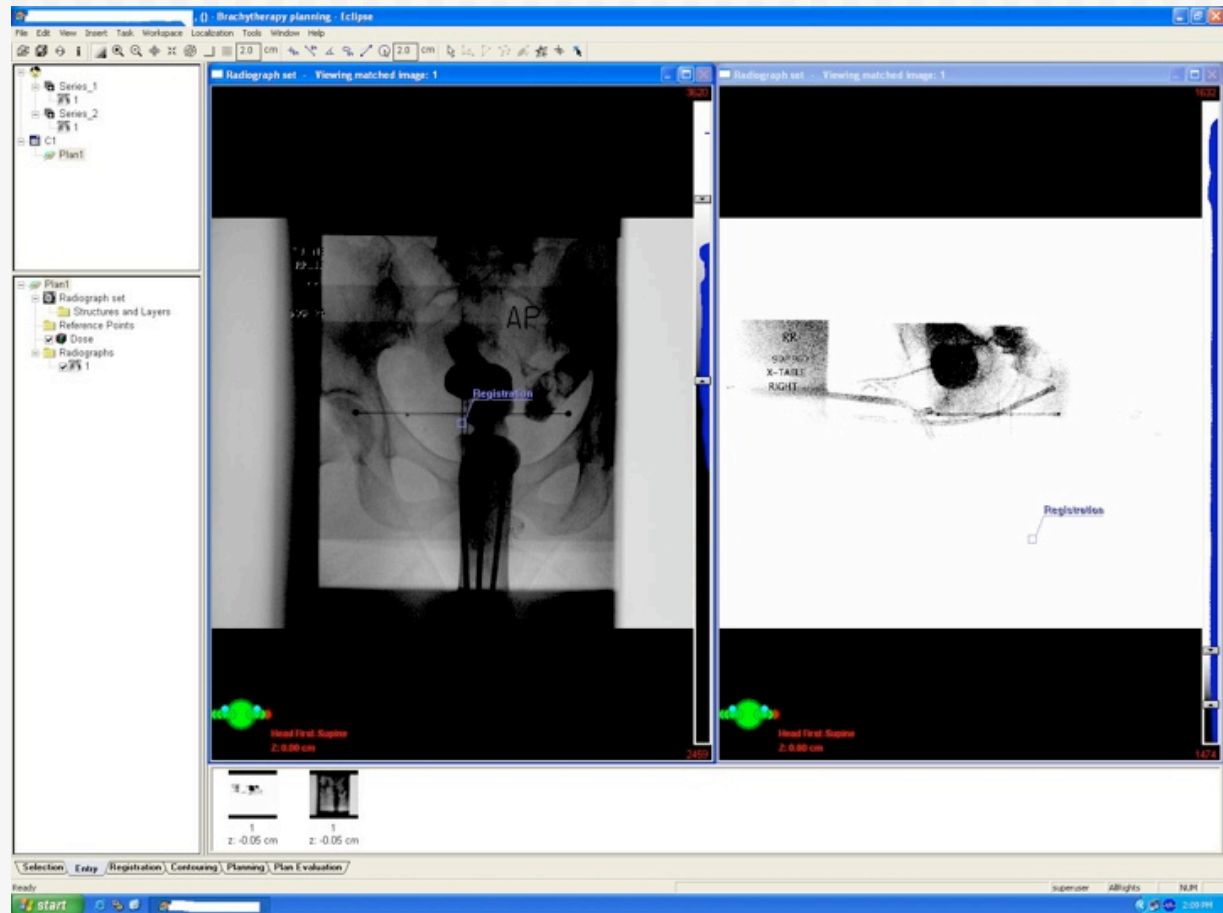
Brachytherapy Review

Eclipse
workstation to
review GOG/
RTOG brachy
charts received
electronically



Brachytherapy Review

Eclipse
workstation to
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RTOG brachy
charts received
electronically



EORTC•ROG

- Responded to RFP for TLD monitoring (with NCI approval)
 - RPC selected
- EORTC to recommend RPC for biennial monitoring
- TLD sent to first group of institutions

