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# RPC REPORT

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# AAPM Proposal for an Imaging Physics Center

- \* Per John Boone:
- \* No concrete efforts to form an IPC
- \* Boone has written a grant through AAPM to focus on quantitative imaging physics.
  - \* Subcontractors: 5 universities including MDACC
- \* A “virtual” center, not envisioning on-going NCI funding



# ACRIN QA Committee

- \* Function is similar to RTOG QC Committee
- \* Committee reviews quality of data, timeliness of submissions
- \* Also reviews individual member institutions
- \* Discusses monitoring and auditing, and adverse events
- \* RPC participates in these discussions

# ATC Supported Protocols

## \* NCCTG N0577

- \* N0577: Phase III Intergroup Study of Radiotherapy versus Temozolomide Alone versus Radiotherapy with Concomitant and Adjuvant Temozolomide for Patients with Newly Diagnosed Anaplastic Oligodendroglioma or Anaplastic Mixed Glioma with Chromosomal Co-deletions of 1p and 19q

## \* GOG 0238

- \* A RANDOMIZED TRIAL OF PELVIC IRRADIATION WITH OR WITHOUT CONCURRENT WEEKLY CISPLATIN IN PATIENTS WITH PELVIC-ONLY RECURRENCE OF CARCINOMA OF THE UTERINE CORPUS

## \* GOG 0249

- \* A PHASE III TRIAL OF PELVIC RADIATION THERAPY VERSUS VAGINAL CUFF BRACHYTHERAPY FOLLOWED BY PACLITAXEL/CARBOPLATIN CHEMOTHERAPY IN PATIENTS WITH HIGH RISK, EARLY STAGE ENDOMETRIAL CARCINOMA

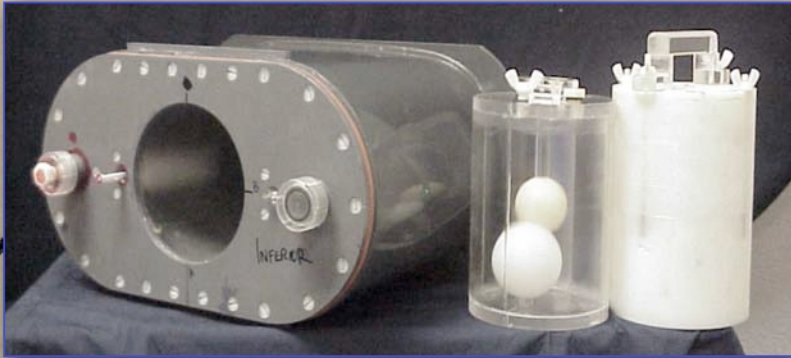


# EORTC Collaboration

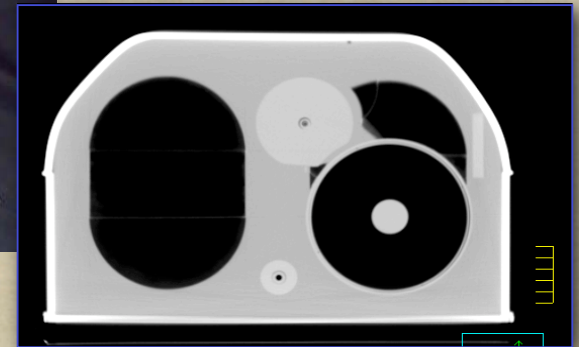
- \* 24 EORTC Institutions participating in RTOG 0525
- \* 21 EORTC institutions currently being monitored by RPC through agreement with EORTC
- \* RPC monitors ~ 26 institutions of 45 we're aware of outside North America
- \* ~ 100 EORTC institutions (combining all available lists)



# *RPC Phantoms*



***prostate IMRT: 8 in service***



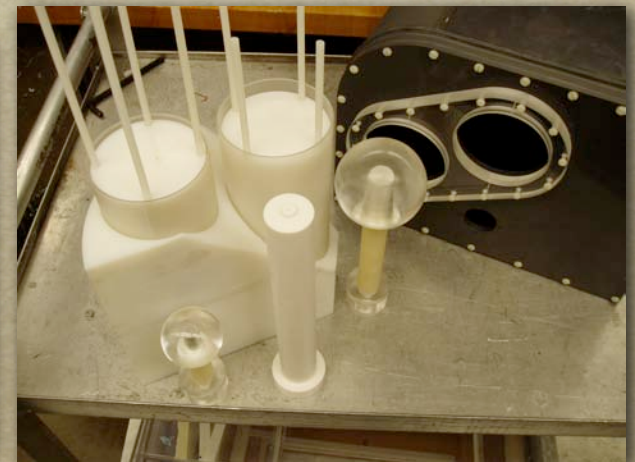
***thorax SBRT: 9 phantoms***



***H&N IMRT: 31 in service***

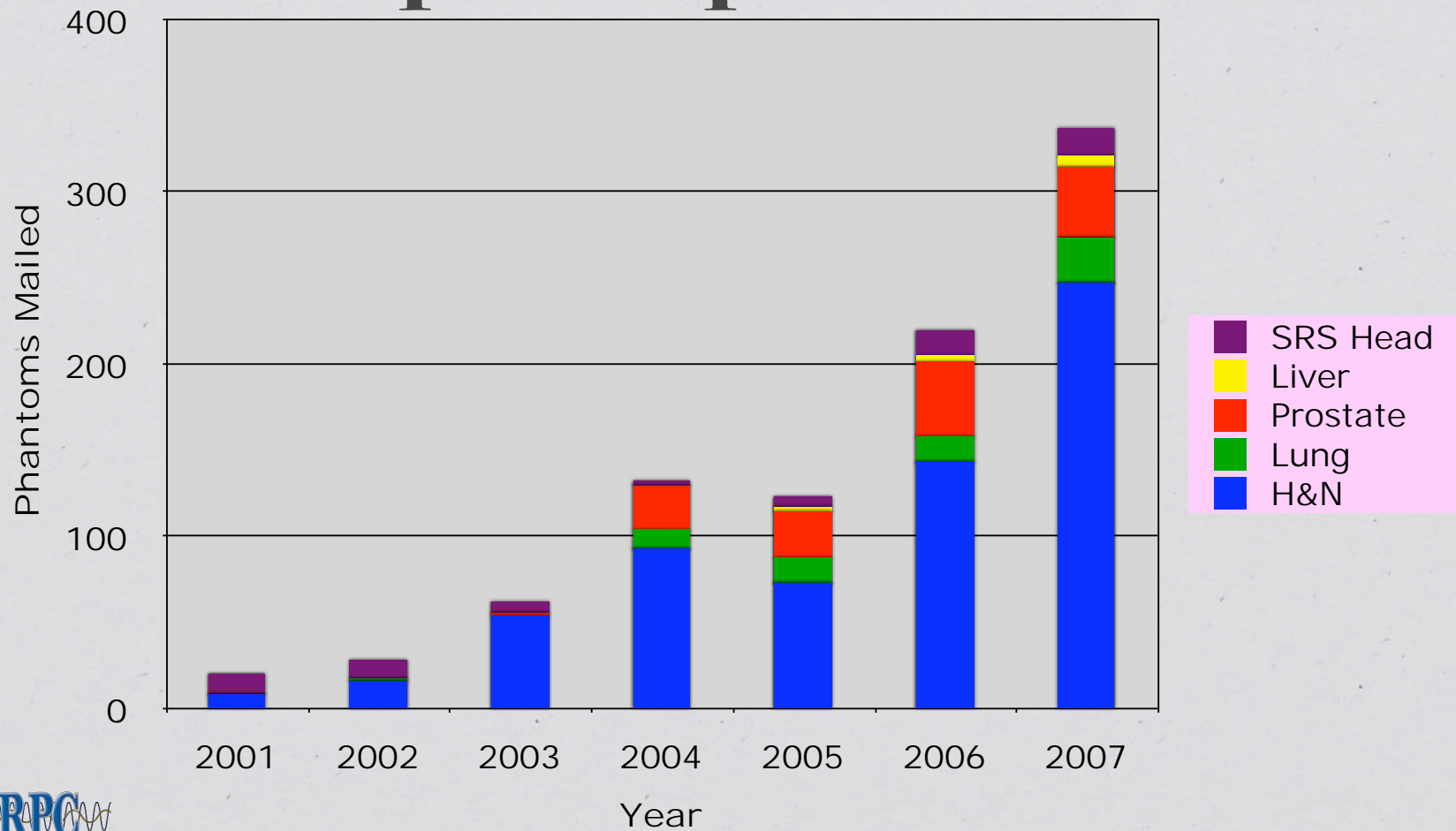


***SRS: 2 in service,  
others sent by RDS***



***liver SBRT: 3,  
incl. motion***

# Credentialing with Anthropomorphic Phantoms



# Phantom Results

Comparison between institution's plan and delivered dose. Criteria for agreement: 7% or 4 mm DTA

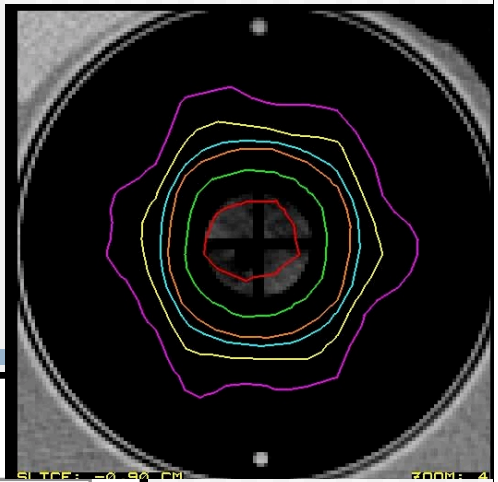
Site	Technique	Irradiations	Acceptable irradiations	Institutions acceptable
H&N	IMRT	558	425	377
Pelvis	IMRT	109	89	74
Lung	SBRT/ IMRT	55	42	35
Liver	SBRT	13	6	6
Benchmark	IMRT	89 (19)	55 (18)	



# Evaluation of Lung Phantoms

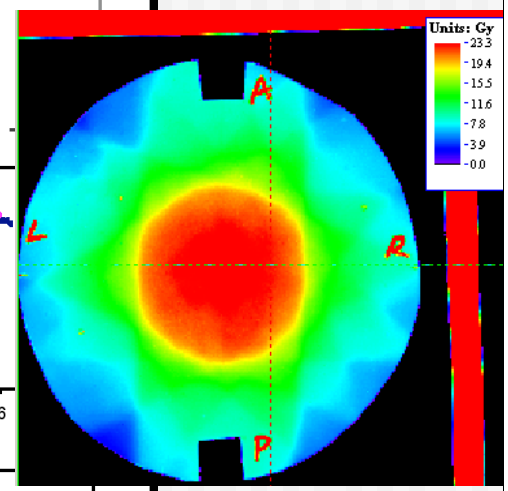
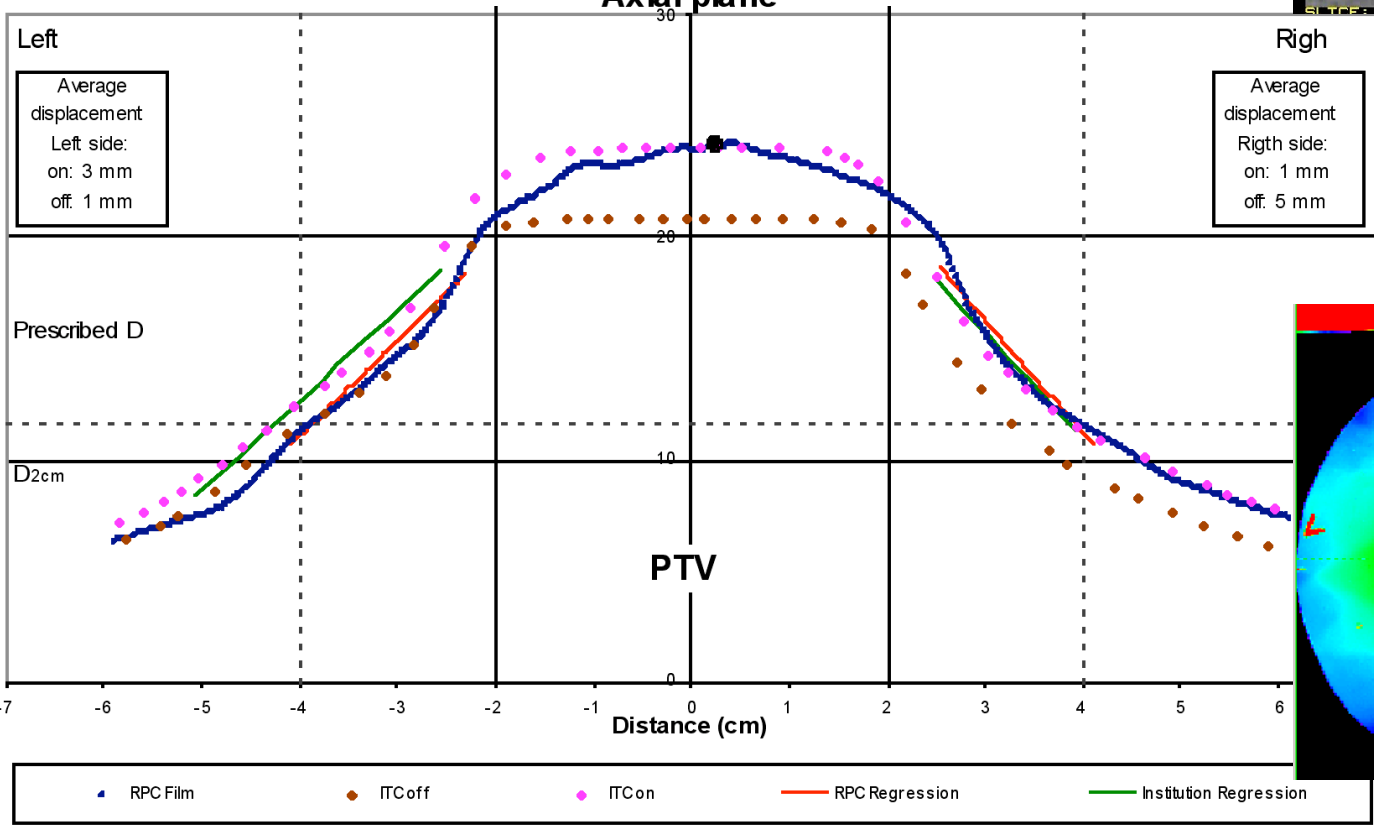
- \* Asked to re-evaluate data at July RTOG meeting
- \* Promised to complete by 30 Sept.
- \* Functioning software delivered late December
- \* Analysis is under way

# Convolution R-L Profile

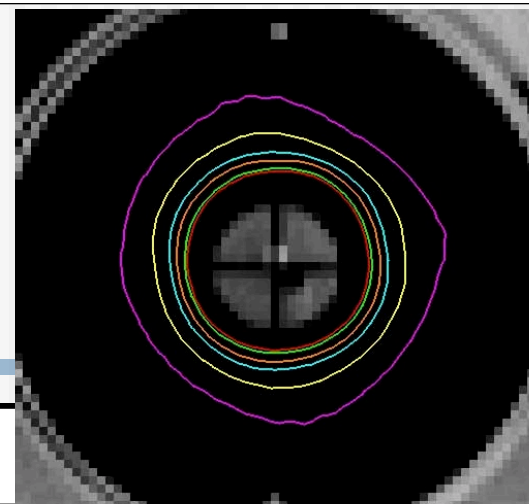


14

Right Left Profile  
Axial plane

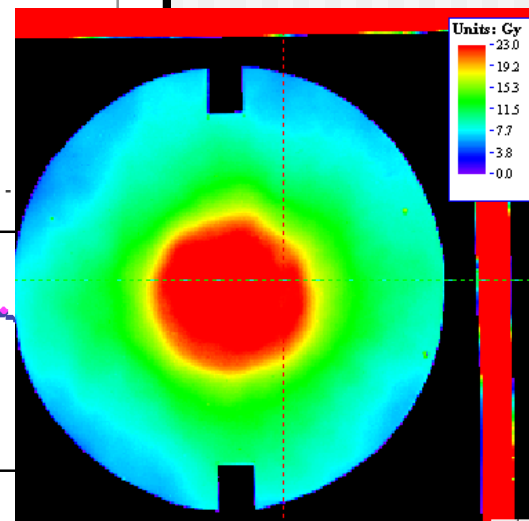
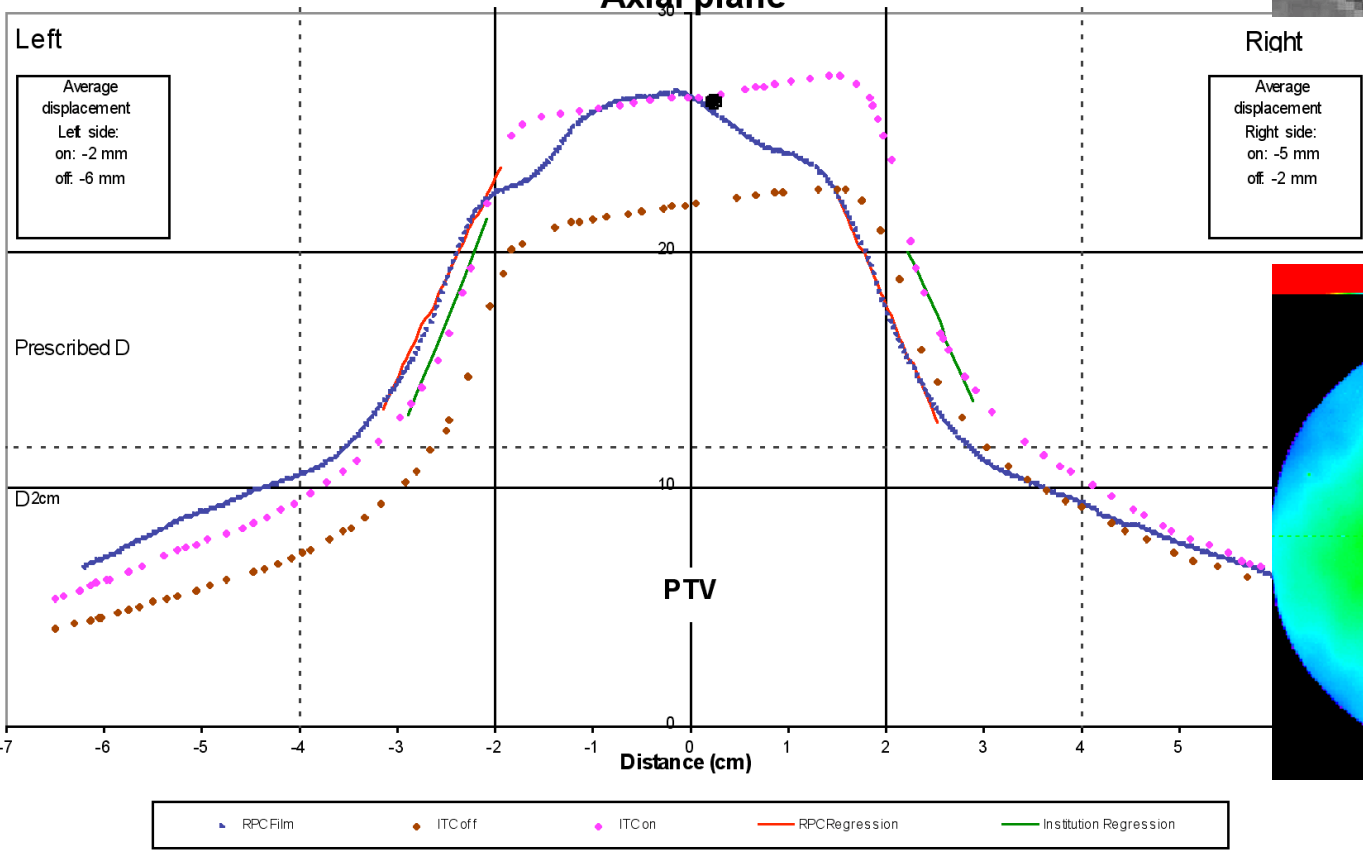


# Pencil-Beam profile

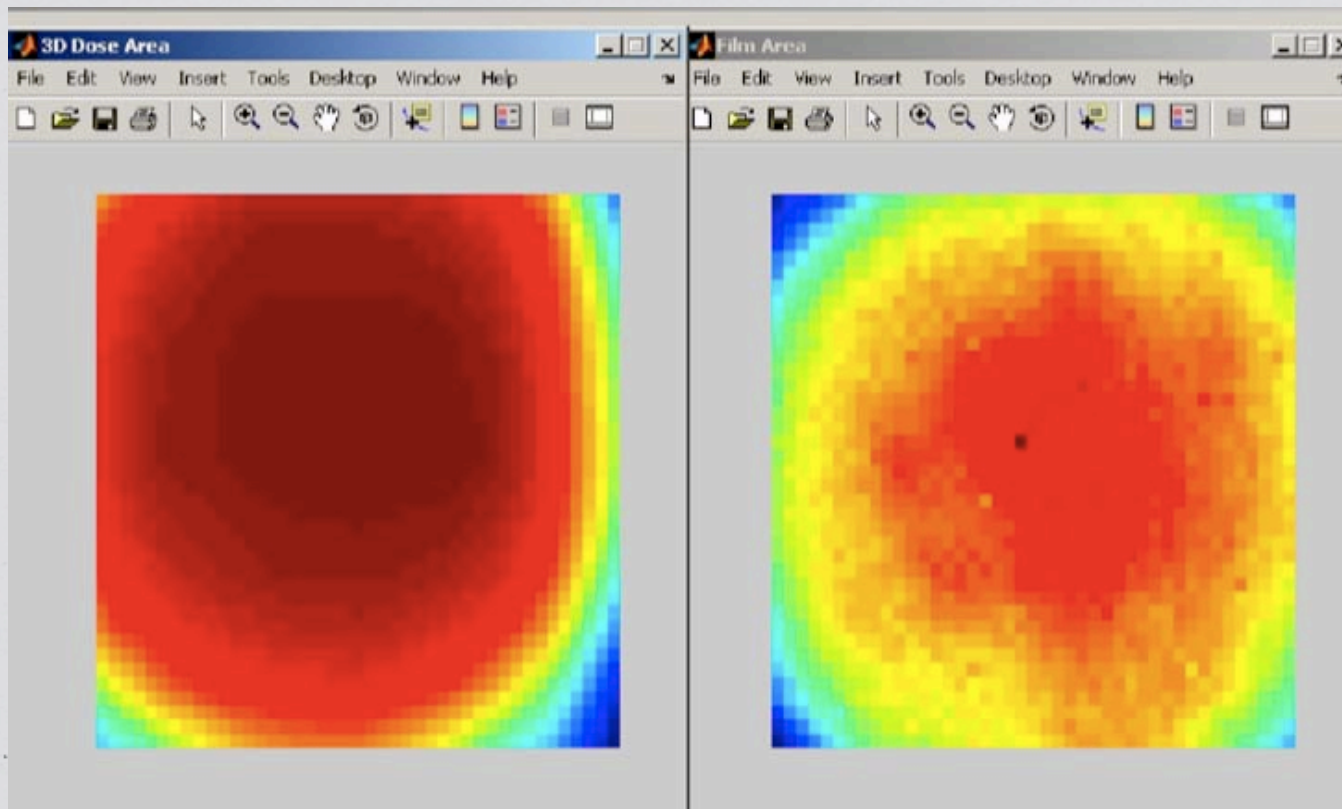


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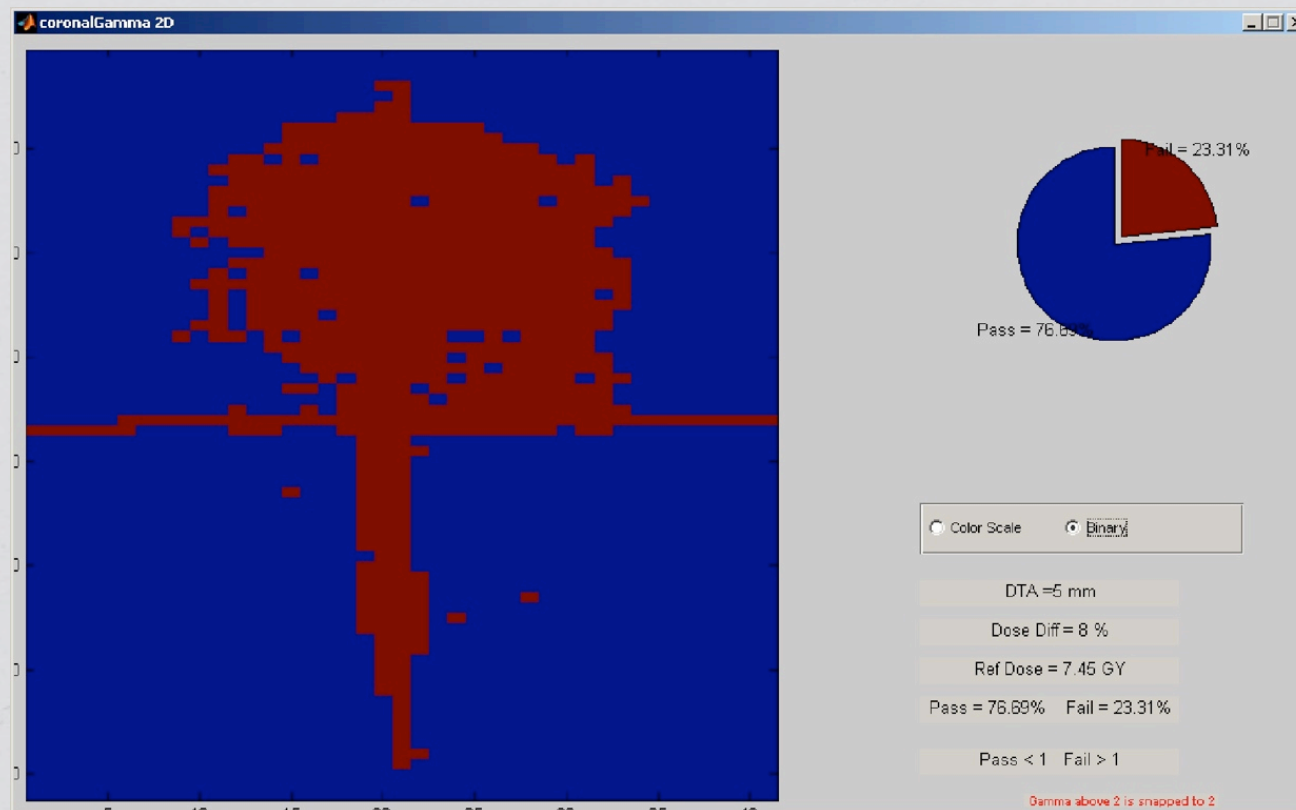
Right Left Profile  
Axial plane



# 2D Gamma Index Evaluation “Good” Irradiation



# 2D Gamma Index Evaluation Failing Irradiation



# Evaluation

- \* Criteria: 5% / 5 mm over PTV
- \* Percent of pixels passing: 92% - Axial  
78% - Coronal  
78% - Sagittal

# Results

- \* Systems with “good” algorithms, passing original criteria:
  - \* 25/29 irradiations passed 2D Gamma Index
- \* Systems with “poor” algorithms, passing original criteria:
  - \* 3/18 irradiations passed 2D Gamma Index

# 0413 / B-39 Reviews

Review Type	Number
PBI	1566
WBI	1572
<b>Patients with completed reviews</b>	<b>1085</b>
Rapid Reviews	337
Timely Reviews	565
Open Reviews	145
Random Reviews	38
DVA Scores	
Per Protocol	924
Minor corrections	157
Major corrections	3
Repeat Timely Reviews	1



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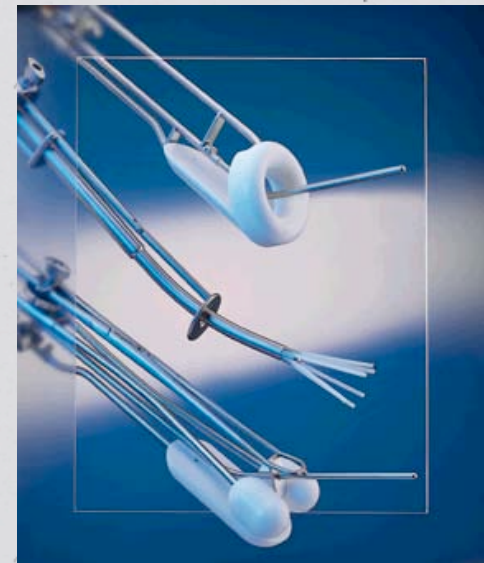
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# RTOG 0417

## Cervix Brachytherapy

- \* 37 rad oncs submitted KAs. 16 pts registered.
  - \* 10 cases reviewed by RPC and study chair:
    - \* 7 – per protocol
    - \* 1 – deviation unacceptable
    - \* 2 – chair can't evaluate, needs special viewer
  - \* 4 cases – inst has not submitted all data.
  - \* 2 cases – just started.



# RTOG 0418

## Endometrial or Cervix IMRT

- \* RPC does rapid review for 1st patient from inst, 98 patients registered. Endometrial arm closed.
- \* 39 – rapid reviews conducted
- \* 7 – had to submit twice
- \* 2 – had to submit three times

# RTOG 0529

## Anal Ca IMRT

- \* RPC does rapid review for each patient. 63 cases submitted:
  - \* 9 – passed review on first submission
  - \* 29 – passed on second submission
  - \* 25 – required more than two submissions to pass

# AAPM Posters/Presentations

- \* The RPC's Evaluation of Advanced Technology Radiation Therapy
- \* A Comparison of Heterogeneity Correction Algorithms
- \* Identification of a 3D Dosimeter Best-Suited for Use by the RPC
- \* Requirements for Addressing Respiratory Motion in Cooperative Group Clinical Trials
- \* Comparisons of a Monte Carlo IMRT Plan Recalculation Results with the Pinnacle Treatment Planning System
- \* Has IMRT Delivery Improved in the Last 5 Years?
- \* Quality Audits of the Calibration for TG-51 Non-Compliant Beams by the Radiological Physics Center
- \* Deformable Lung Phantom for Verification of 4D Dose Calculations
- \* Verification of a Monte Carlo-Based Source Model for a Varian 10 MV Photon Beam



# Development of Monte Carlo Calculations

- \* Collaboration with Joe Deasy to develop MC code
  - \* General source model
- \* Evaluated Varian 6X
  - \* IMRT with H&N phantom
  - \* IMRT with lung phantom
- \* Varian 10X under evaluation
- \* Used ATC carryover funds to purchase server
- \* RPC intends to use to evaluate IMRT and hetero calculations



# Monte Carlo



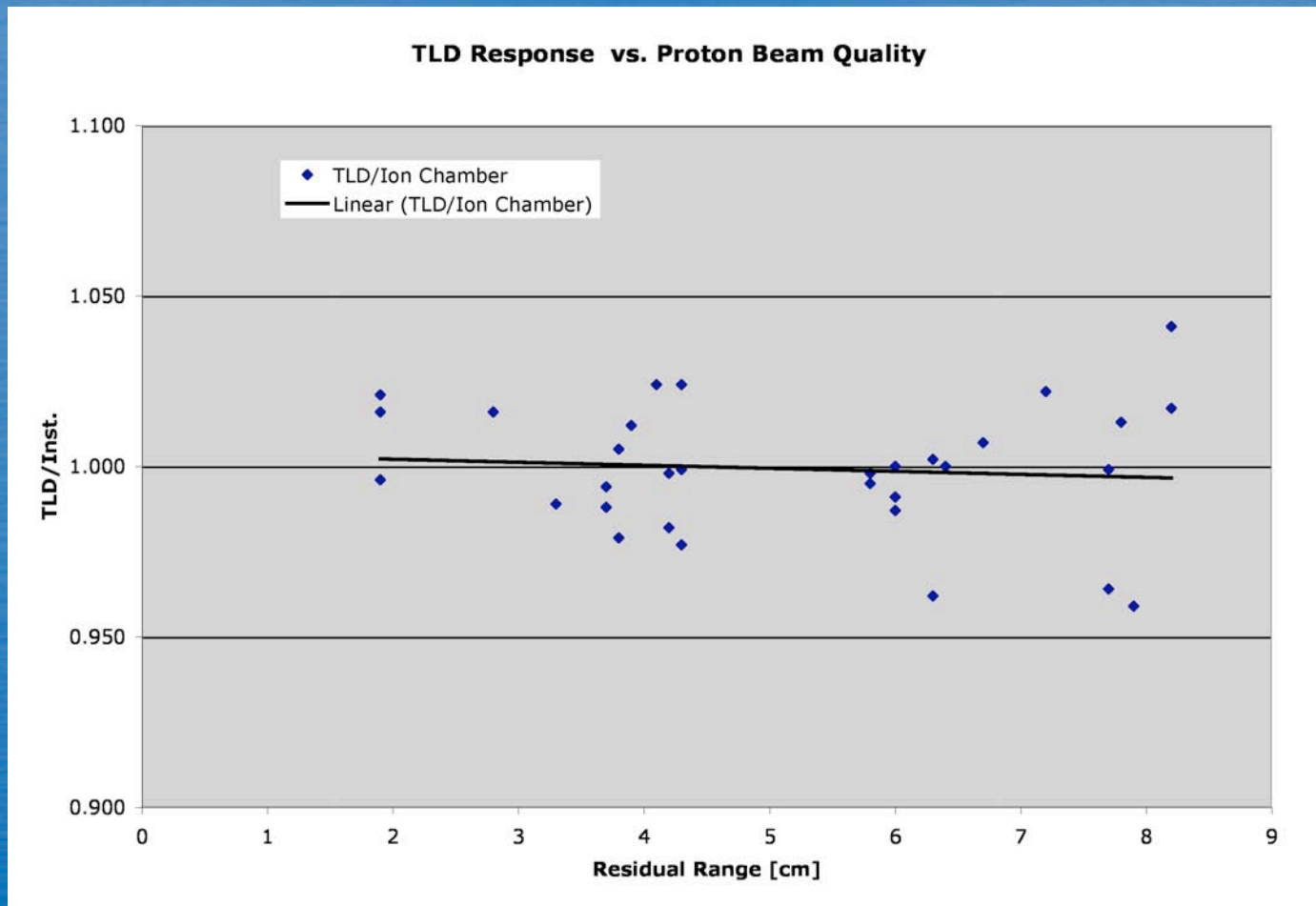


# RPC Monitoring of Proton Therapy

- Questionnaire developed jointly with QARC
- TLD audits of basic calibration
- Dosimetry review visits
- Dose delivery evaluation with anthropomorphic phantoms

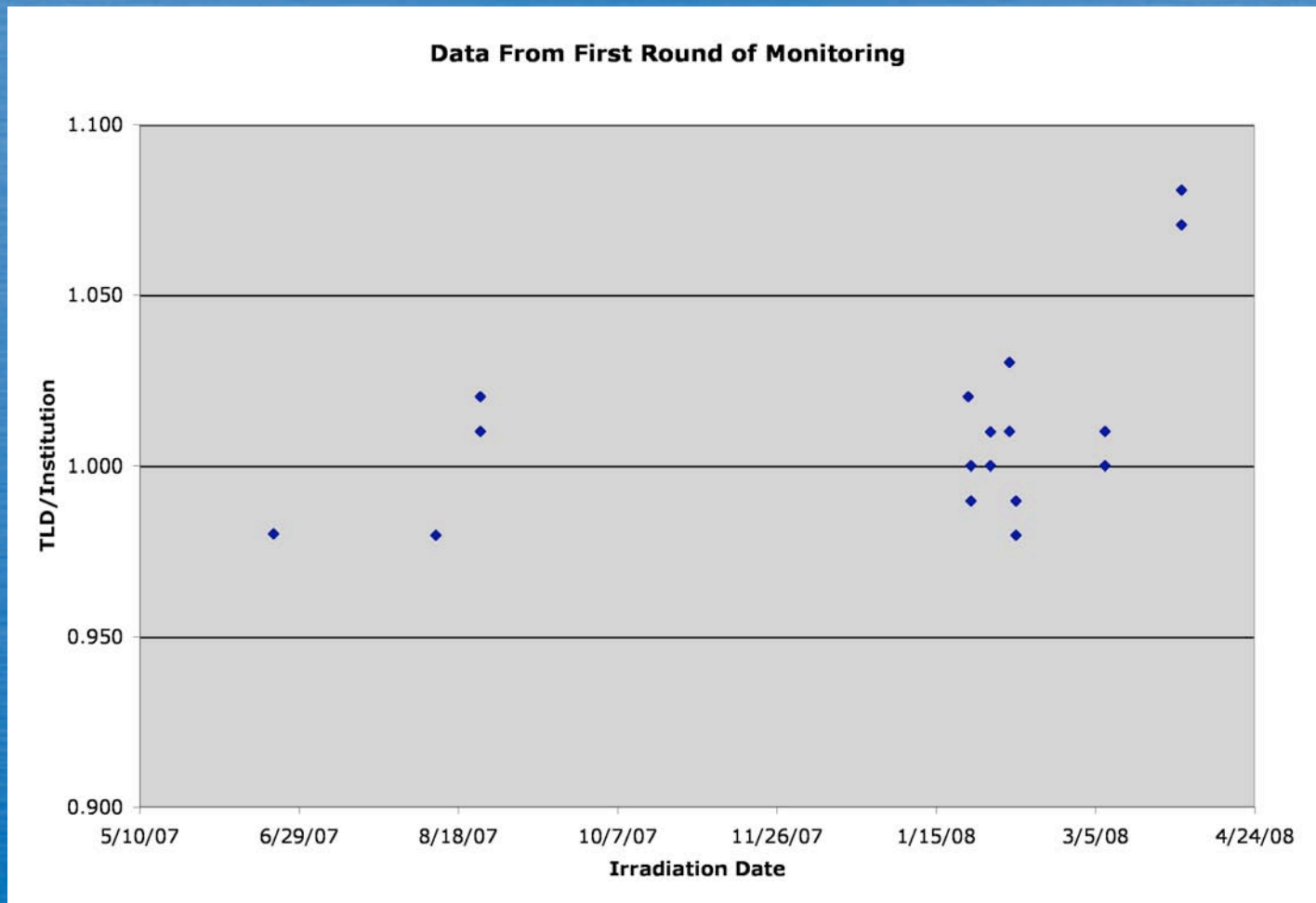


# TLD Response vs Residual Range

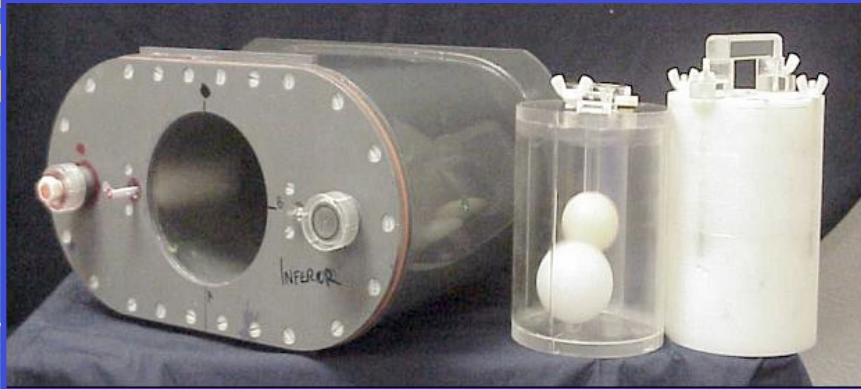




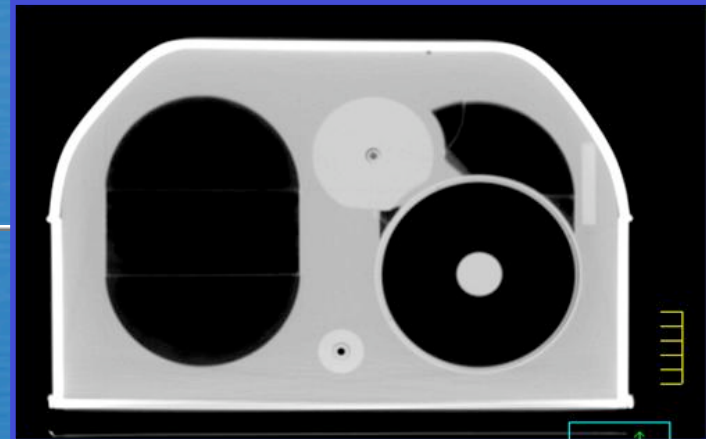
# First Round of Monitoring



# RPC Phantoms



**Pelvis (8)**



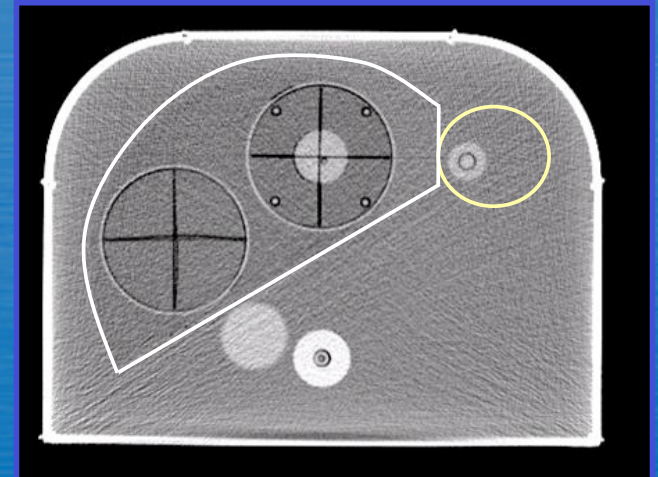
**Thorax (9)**



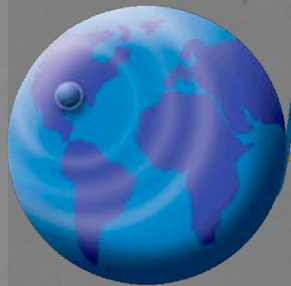
**H&N IMRT (30)**



**SRS Head (4)**



**Liver (2)**



**RPC**

**Radiological Physics Center**

*Excellence through Quality Assurance*

