

RPC Activities in Support of Advanced Technology Trials

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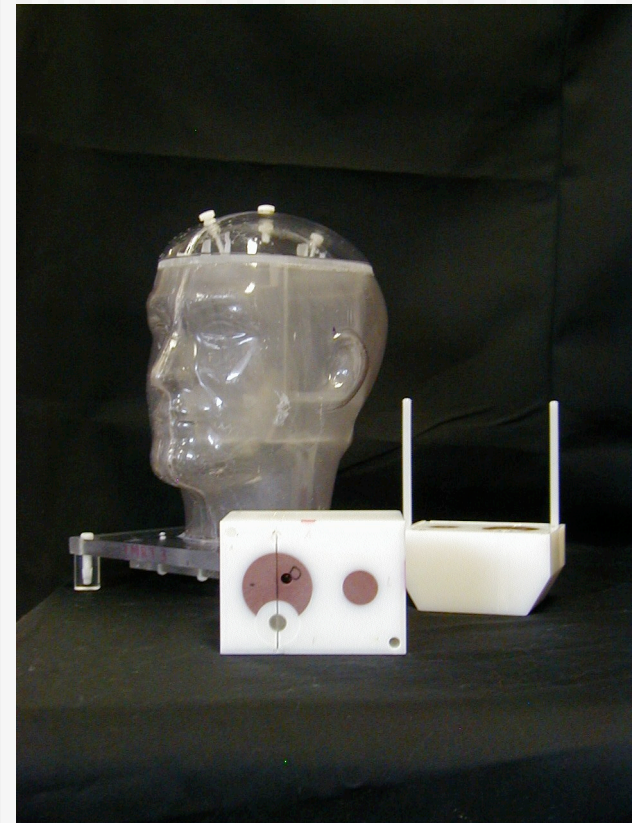
February 1, 2007

Conventional monitoring continues...

- Annual checks of machine output
 - 1,493 institutions, 12,436 beams measured with TLD
- On-site dosimetry reviews
 - 45 institutions visited
- Treatment record reviews
 - Review for GOG, NSABP, NCCTG, RTOG (brachy)
- Independent recalculation of patient dose
 - Continue to find errors

Monitoring specific to photon advanced technology trials

- Measurements specifically addressing advanced technologies: dynamic wedges, MLC-shaped fields, small fields, etc.
- Credentialing using benchmarks (compatibility with QARC maintained where relevant)
- Credentialing using phantoms
- Independent recalculation of dose distributions with Eclipse planning system and RPC “standard” data

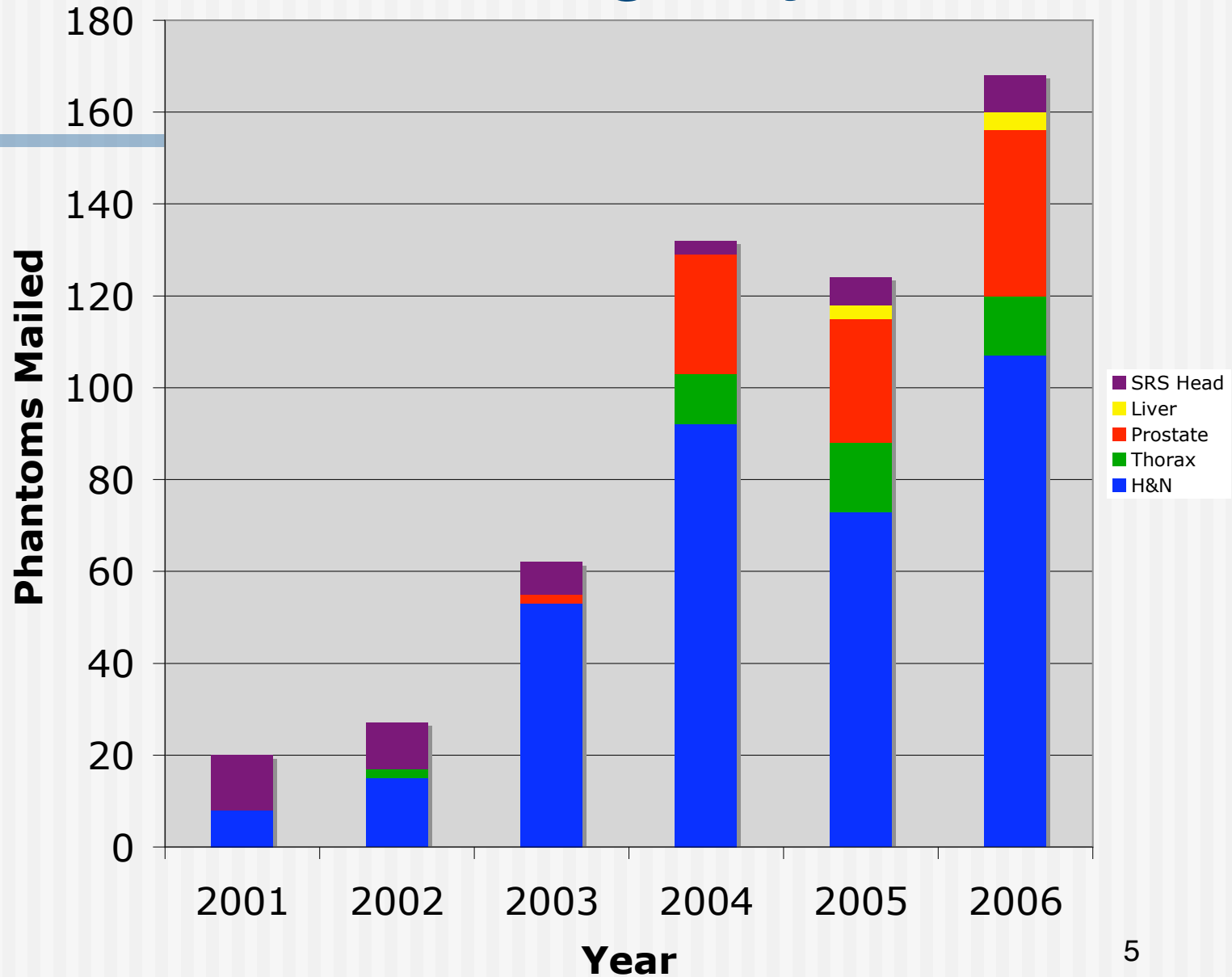


RTOG 0413/ NSABP B-39

Modality	Rad Oncs Credentialed	Rad Oncs in Progress	Institutions Credentialed	Institutions in Progress
3D	852	170	382	98
Mammosite	557	117	266	71
Multicatheter	125	60	45	30

RPC does rapid reviews for brachytherapy (322 to date). Total number of institutions credentialed: 553 (from 416 in July 06) ⁴

Phantom Mailings by Year



Phantom Results

Comparison between institution's plan and delivered dose.

Criteria for agreement: 7% or 4 mm DTA

Phantom	H&N	Prostate	Thorax	Liver
Irradiations	254	73	30	6
Pass	179*	55	17	3
Fail	71	9	7	1
Under analysis or at institution	30	6	6	1
Year introduced	2001	Spring 2004	Spring 2004	Spring 2005

*** 30% of institutions failed H&N phantom on the first attempt**

Explanations for Failures

Explanation	Minimum # of occurrences
incorrect output factors in TPS	1
incorrect PDD in TPS	1
Software error	1
inadequacies in beam modeling at leaf ends (Cadman, et al; PMB 2002)	14
not adjusting MU to account for dose differences measured with ion chamber	3
errors in couch indexing with Peacock system	3
2 mm tolerance on MLC leaf position	1
setup errors	7
target malfunction	1

Issues with Credentialing

- Need to streamline process
- Status of institution submission
- RPC needs beam & source data
 - will ITC provide?
- Benchmarks: CT data not readable by all treatment planning systems
- Contract with Dr. Deasy to develop:
 - Monte Carlo calculations
 - Software for comparison of plan with film/TLD data₈



Grandfathering

- New procedure this year (Section 5.1)
- Institution completes on-line questionnaire
 - Demographic information
 - Protocols previously participated in
 - Credentialing procedures completed
- RPC determines remaining procedures to be completed, if any



Credentialing Status Inquiry

CREDENTIALING FOR ADVANCED TECHNOLOGY PROTOCOLS

This questionnaire is will help determine if your institution is credentialed to participate on a protocol. If there are any questions please contact the RPC at (713) 745-8989 or rpc@mdanderson.org

Facility Name:

Provide the Facility's member number: RTOG #: RTF#¹:

Name of person completing this form:

Email address:

Are you a: Radiation Oncologist Physicist Dosimetrist Clinical Coordinator

Which protocol are you interested in being credentialed for?

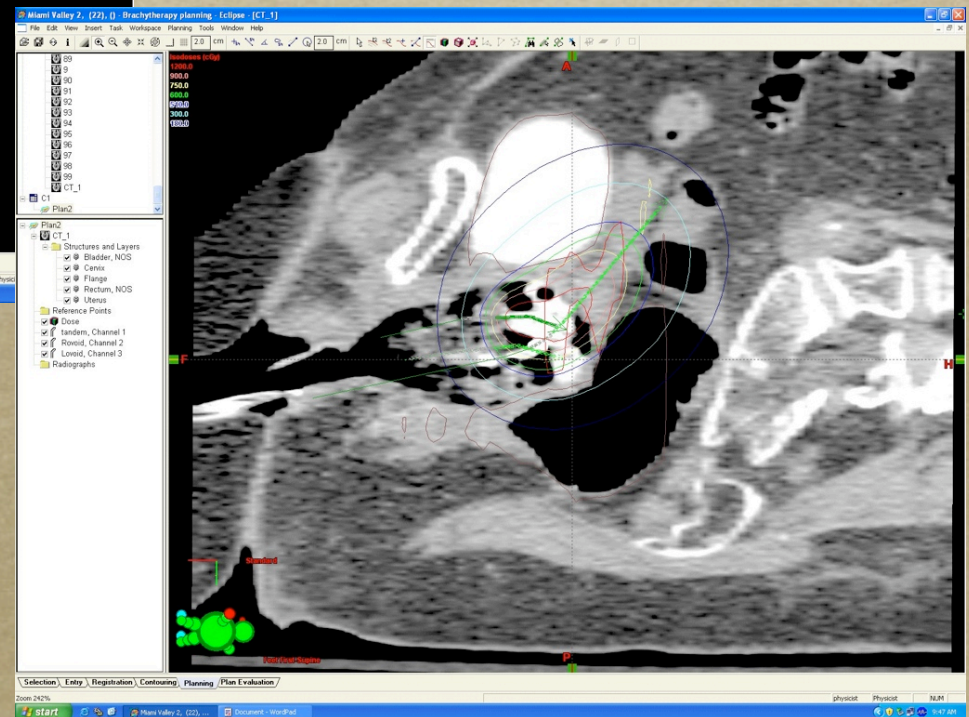
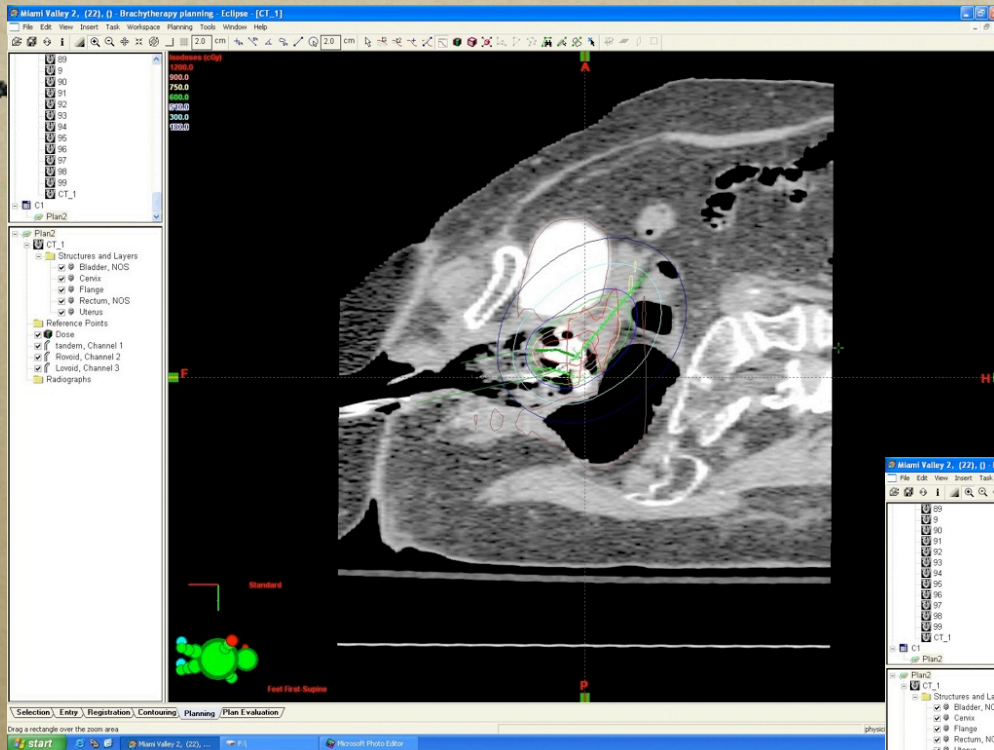
Has your institution successfully irradiated an RPC phantom? Yes No

If yes, which phantom?

IMRT Head & Neck IMRT Pelvis Stereotactic Lung Stereotactic Liver

New Eclipse TPS at RPC

Commissioning has been completed



Now have ability to receive plans and films electronically

Monitoring of Proton Facilities

- Present status:
 - US facilities evenly divided between two calibration protocols, with known differences
 - No program of regular independent checks
 - No program of regular comparisons
 - Differences in protocols for QA

Status of RPC Preparations for Monitoring Proton Facilities

- RPC able to visit PTC-H during construction to learn about facility design and operation
- Visits to PTC-H and to UF/Jacksonville to measure and verify beam output, depth dose characteristics
- Irradiated TLD at 3 facilities under more than 30 combinations of energy, field size, depth and residual range
- Evaluated radiochromic film (2 types) for use in proton beams
- Presently testing BANG® gel & Presage™ dosimeters
- Pursuing agreement with Landauer to evaluate OSL dosimeters in various beams, including protons

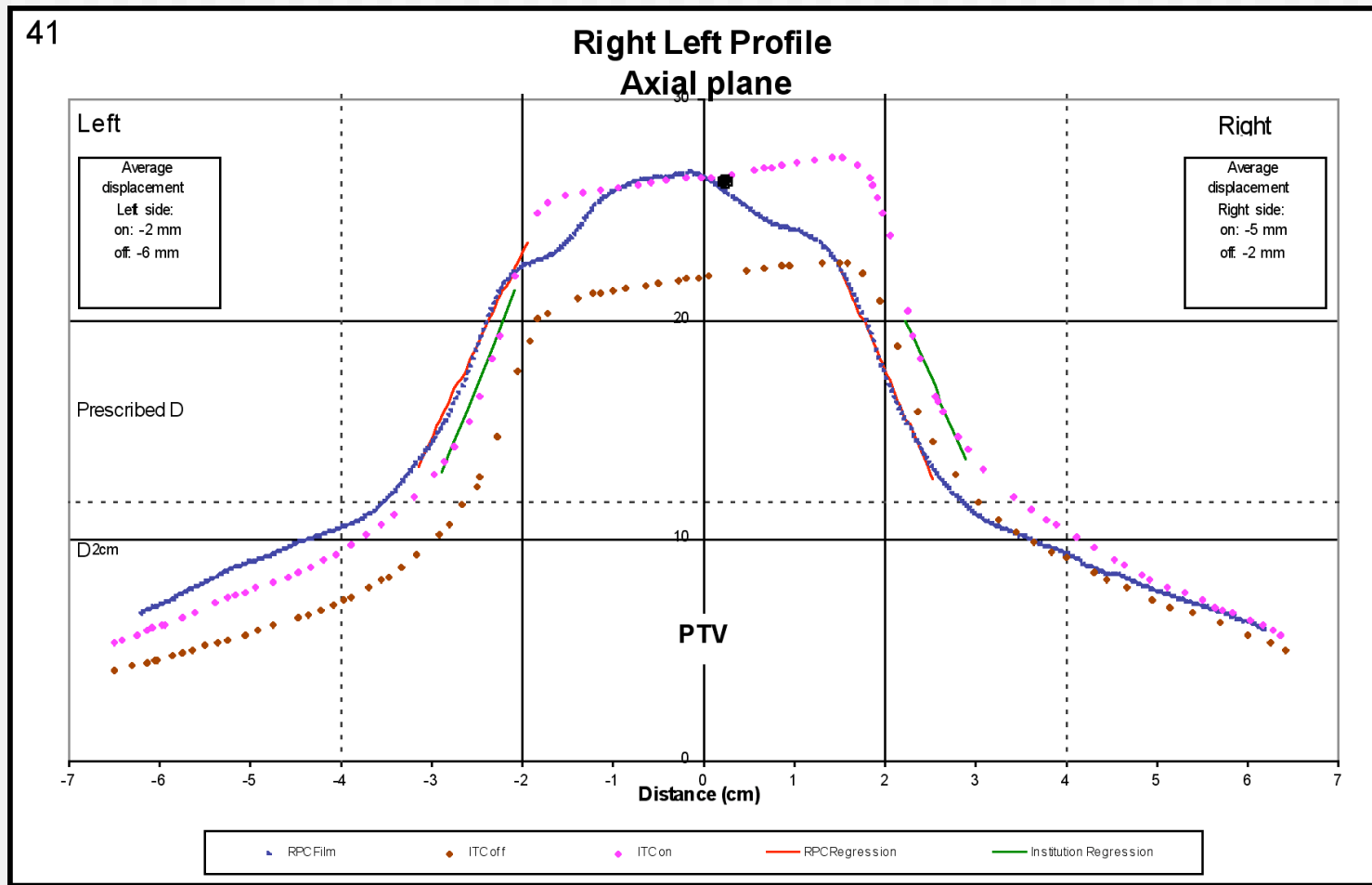
RPC's Vision for Support of Proton Clinical Trials

- Encourage uniform adoption of calibration protocol with traceability to NIST
 - Participate on AAPM Work Group on Particle Beams
- Design and implement devices for monitoring beam calibration
 - Proton-specific blocks for TLD or OSL
- Pursue evaluation of gel/Presage™ dosimeters
- Design, evaluate and implement modified anthropomorphic phantoms for evaluating proton beam delivery
- Implement proton planning on RPC's Eclipse workstation for independent review

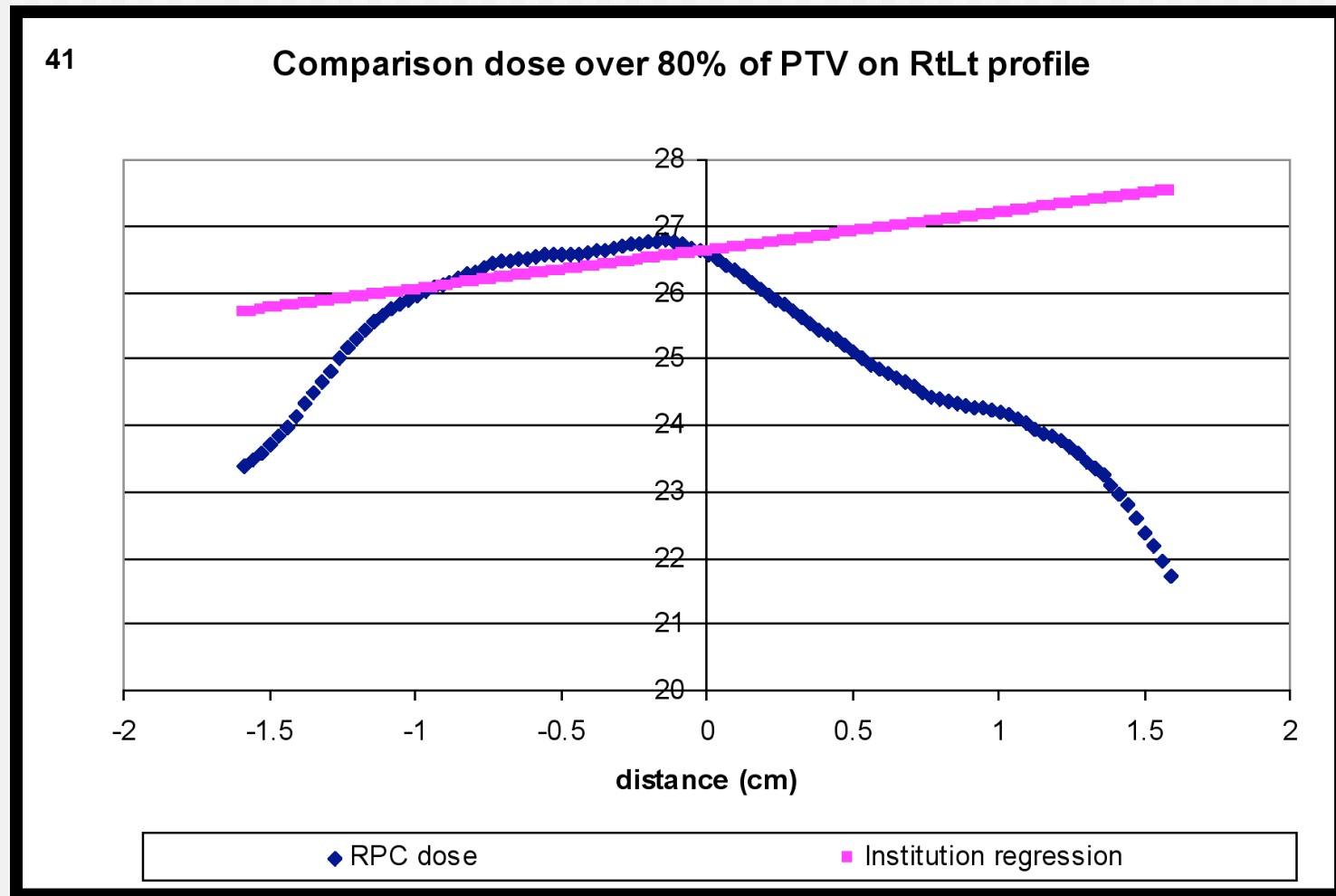
Credentialing for Lung Protocols

- RPC evaluates dose to TLDs
 - Criteria: 0.97 ± 0.05
- Evaluate DTA from film data
 - ± 5 mm at all sides of target
- Analysis neglects variation across target
- Proposal:
 - Consider variation across central 80% of target
 - Percent of points on profile within 5 %, 7 %, or 10 %?

Pencil-Beam profile



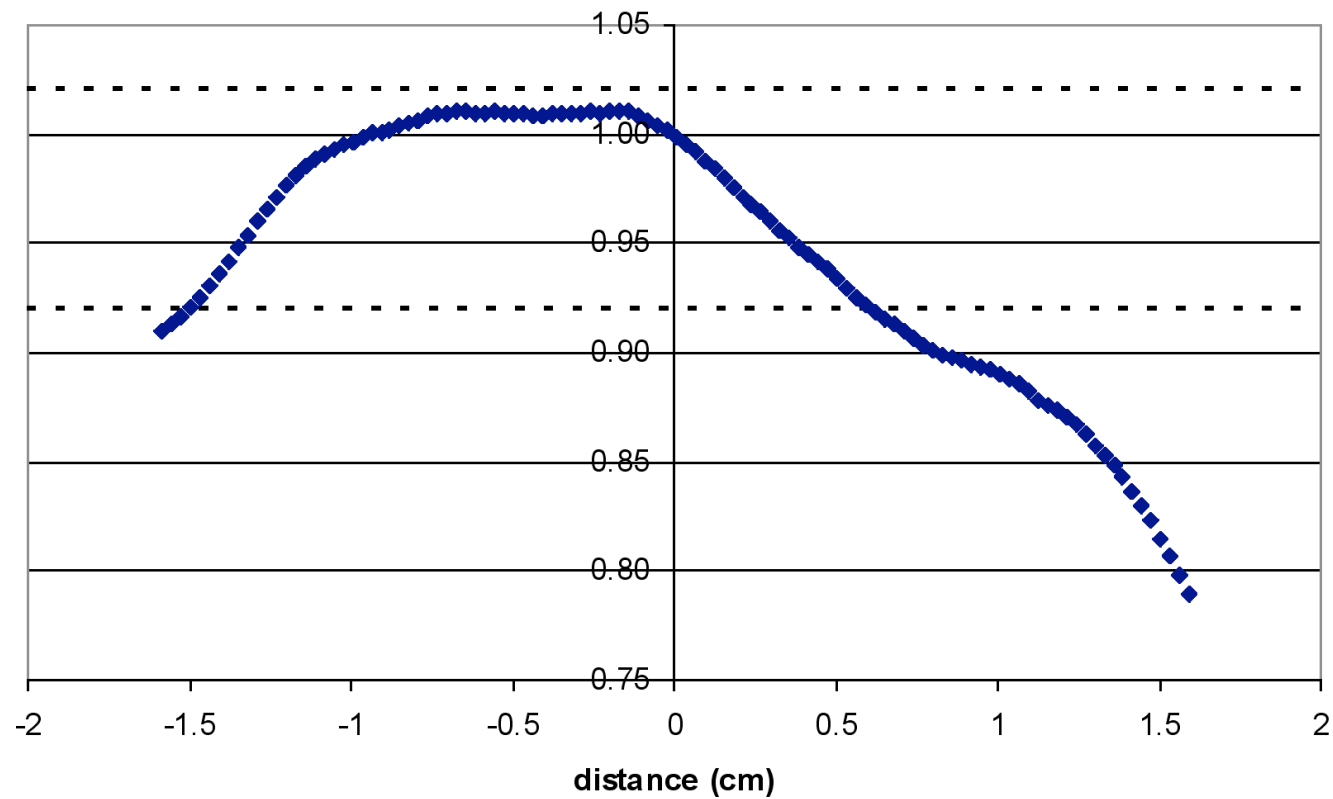
Pencil Beam - Central 80%



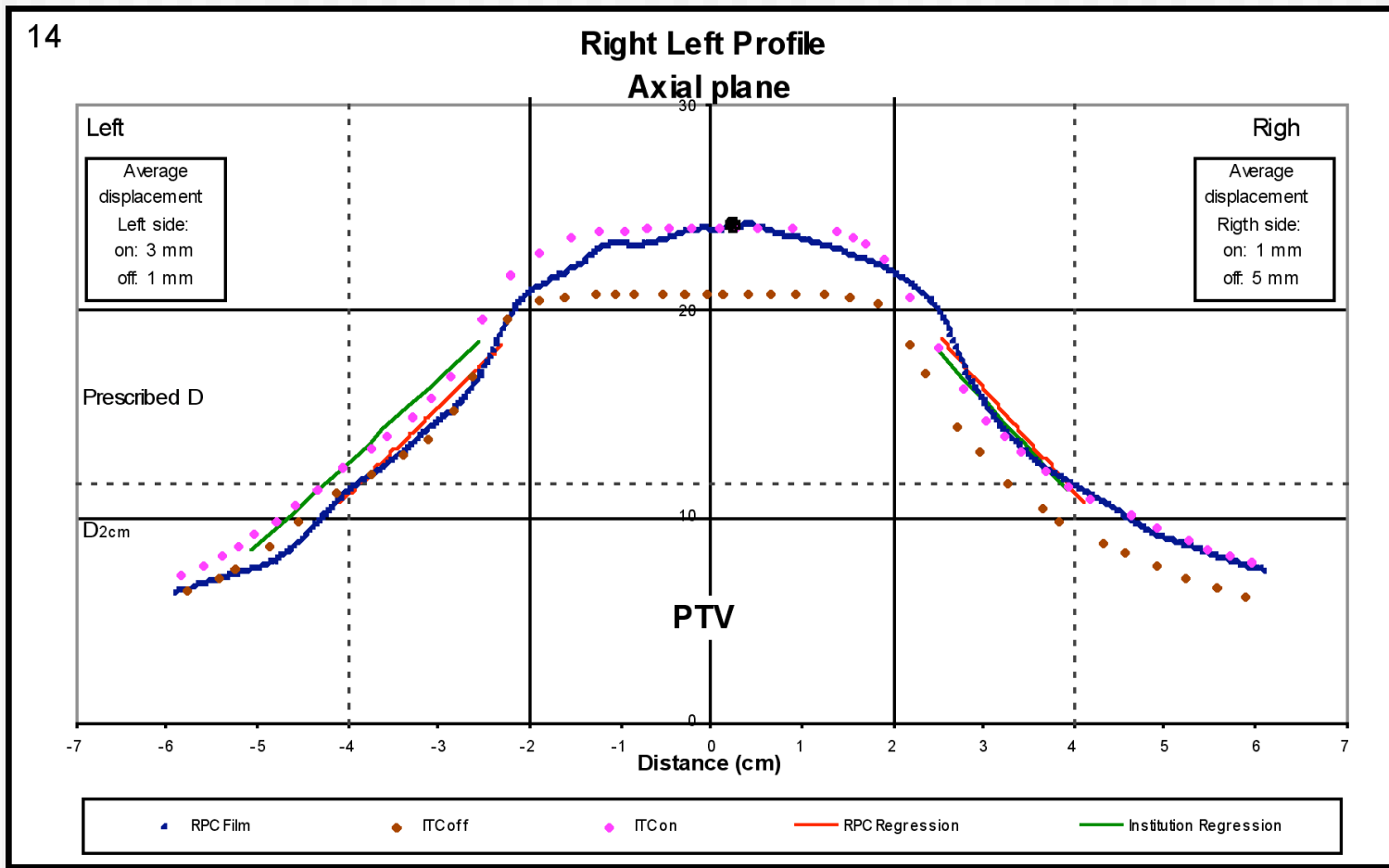
Pencil Beam RPC/Inst

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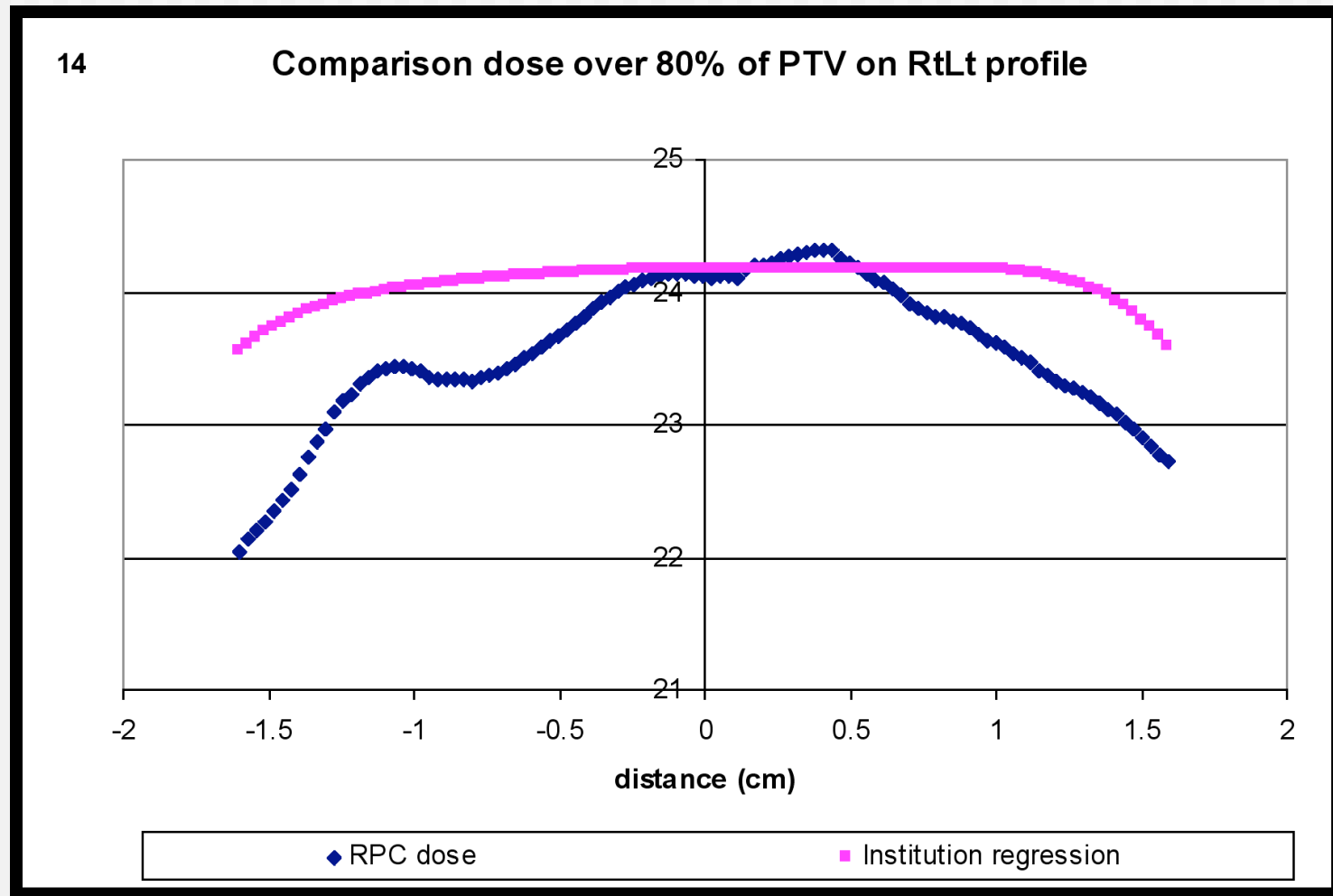
RPC/Inst over 80% of PTV on Rt Lt profile



Convolution R-L Profile



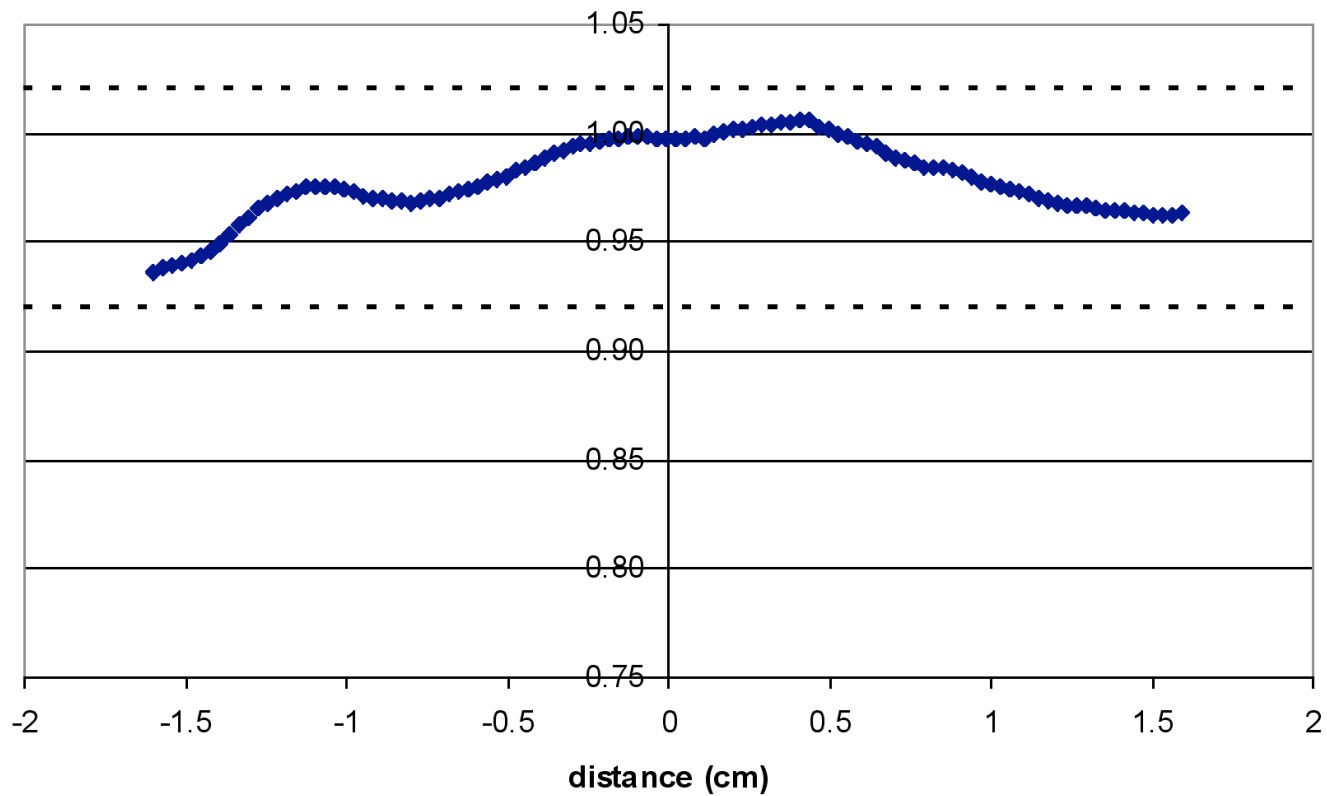
Convolution Central 80 %



Convolution RPC/Inst.

14

RPC/Inst over 80% of PTV on Rt Lt profile



Summary of Data

System/Algorithm	Percent of Points Within:		
	5 %	7 %	10 %
Precise/BrainLab/ Eclipse/Pencil Beam-Clarkson	69	82	91
Pinnacle/Conv.- Superpos.	88	96	98