

The Radiological Physics Center's Experience with IMRT



ACMP

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THE UNIVERSITY OF TEXAS
MD ANDERSON
CANCER CENTER
Making Cancer History®

Purposes of Credentialing for IMRT Clinical Trials

- Education
- Evaluate ability to deliver dose
- Improve understanding of protocol
- **Reduce deviation rate**

General Credentialing Process

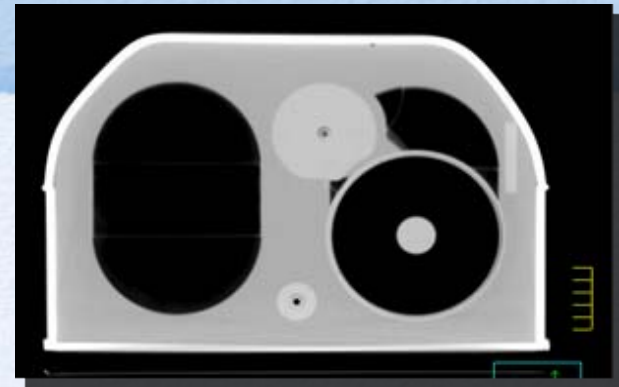
- Previous patients treated with technique
- Facility Questionnaire
- Knowledge Assessment Questionnaire
- Benchmark case or phantom
- Electronic data submission
- RPC QA & dosimetry review
- Clinical review by radiation oncologist

Feedback to Institution

RPC Phantoms



prostate IMRT: 4, incl. prosthesis



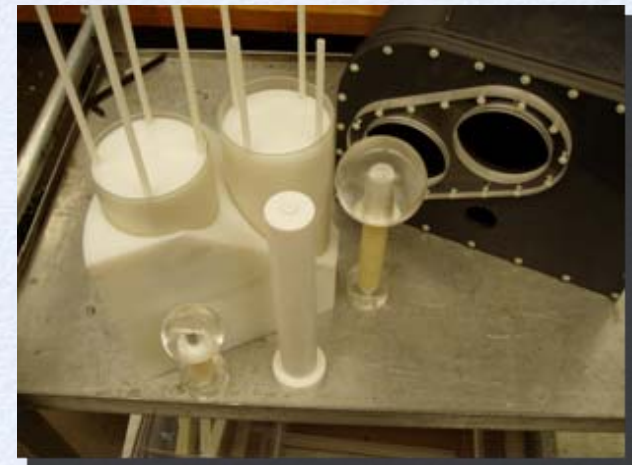
**thorax IMRT/SBRT: 3
phantoms, 6 constr., motion**



**H&N IMRT: 20 in
service, 5 under
constr.**



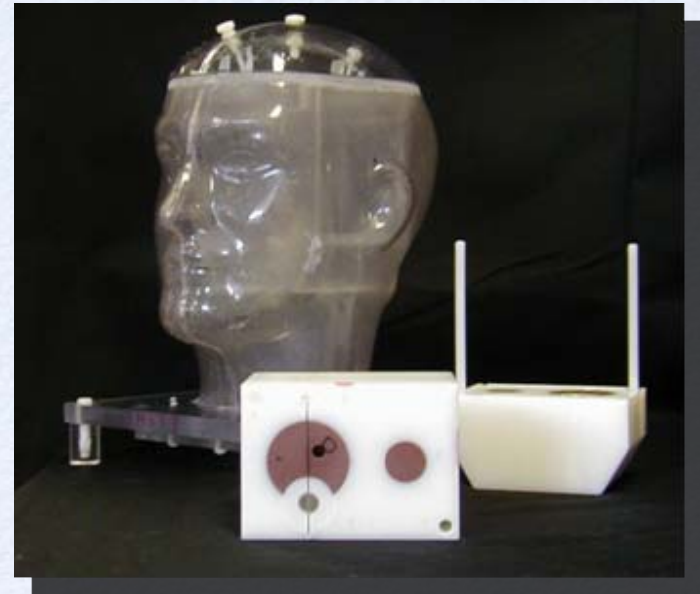
**SRS: 2 in service, others
sent by RDS**



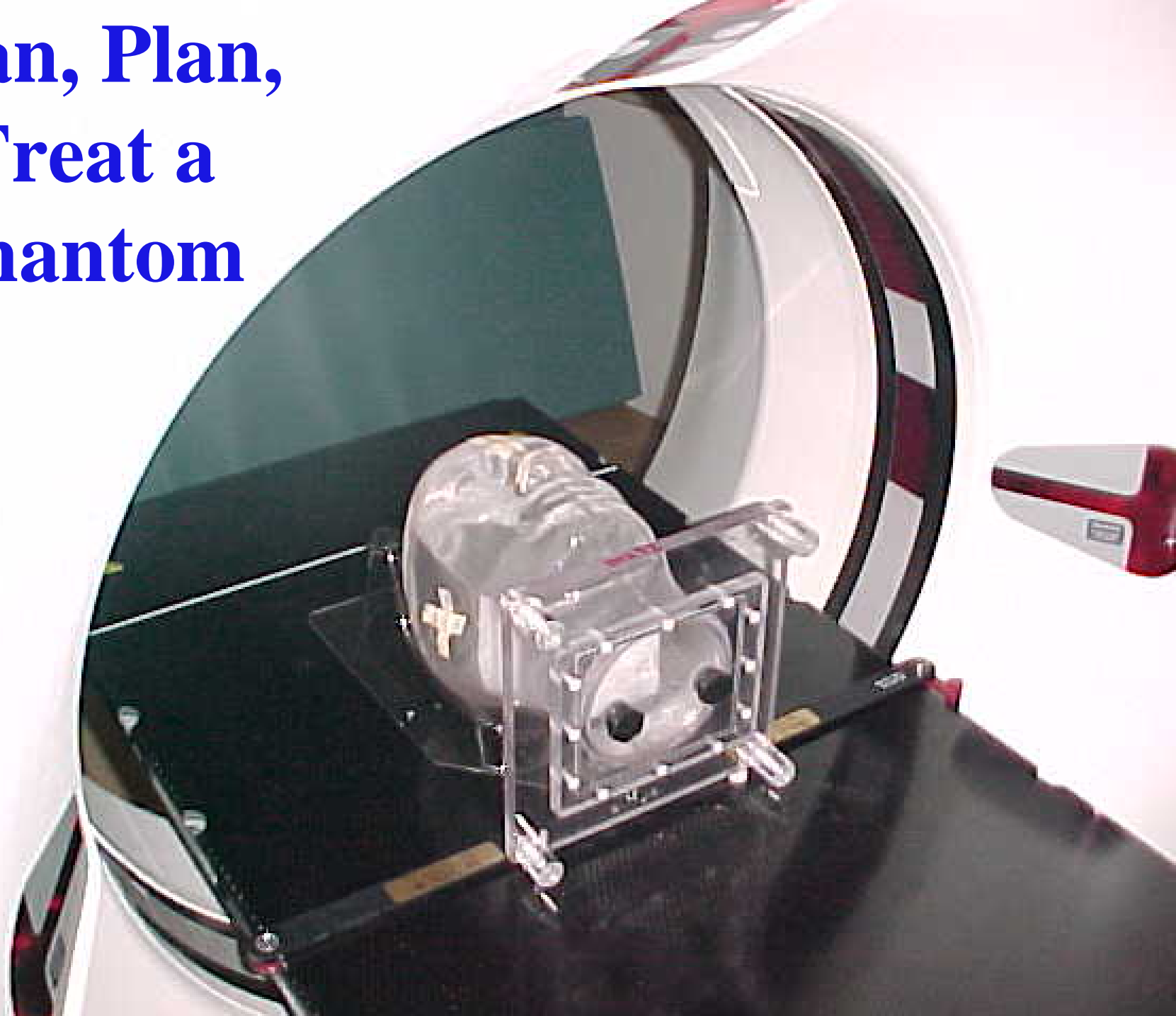
**liver SBRT: 3,
incl. motion**

IMRT Credentialing

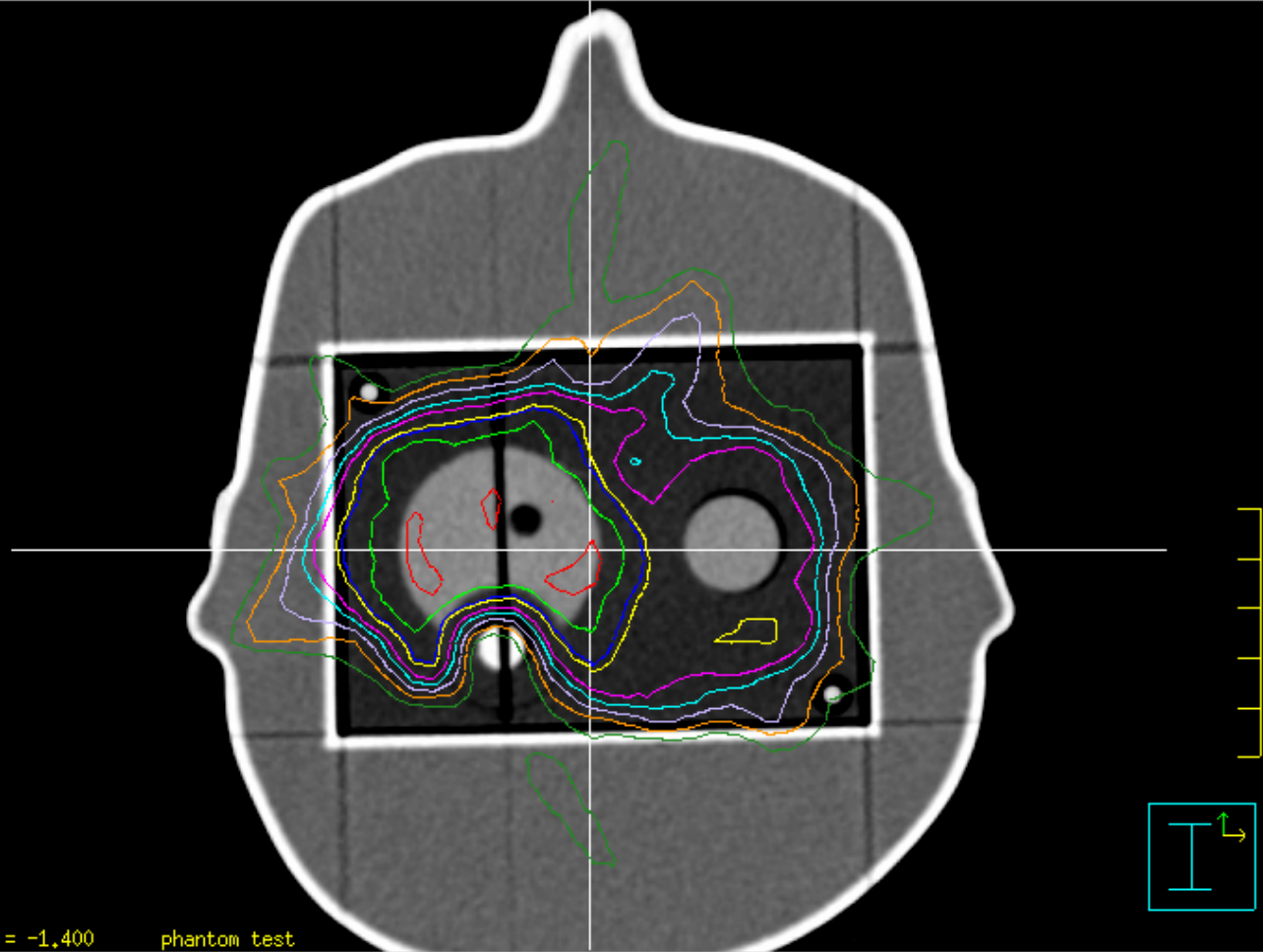
.250+ institutions have
successfully irradiated an
RPC IMRT phantom



Scan, Plan, Treat a phantom

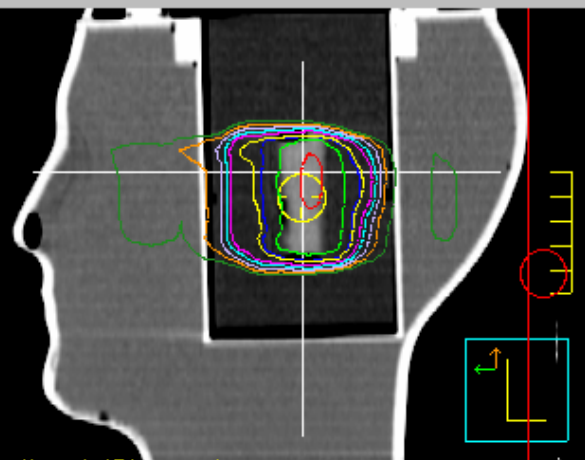


Absolute
700,0 cGy
660,0 cGy
614,0 cGy
600,0 cGy
540,0 cGy
502,0 cGy
450,0 cGy
400,0 cGy
350,0 cGy

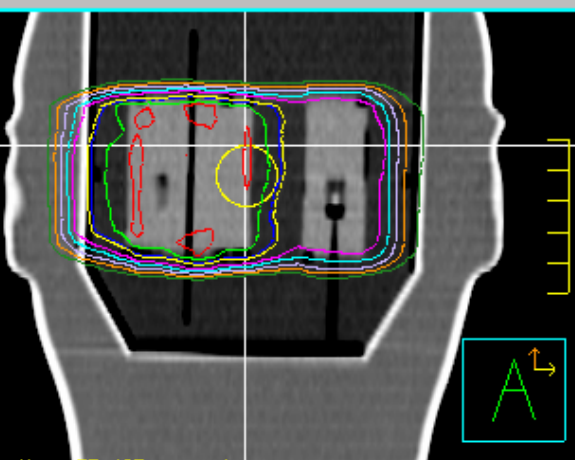


Slice 83: Z = -1,400 phantom test

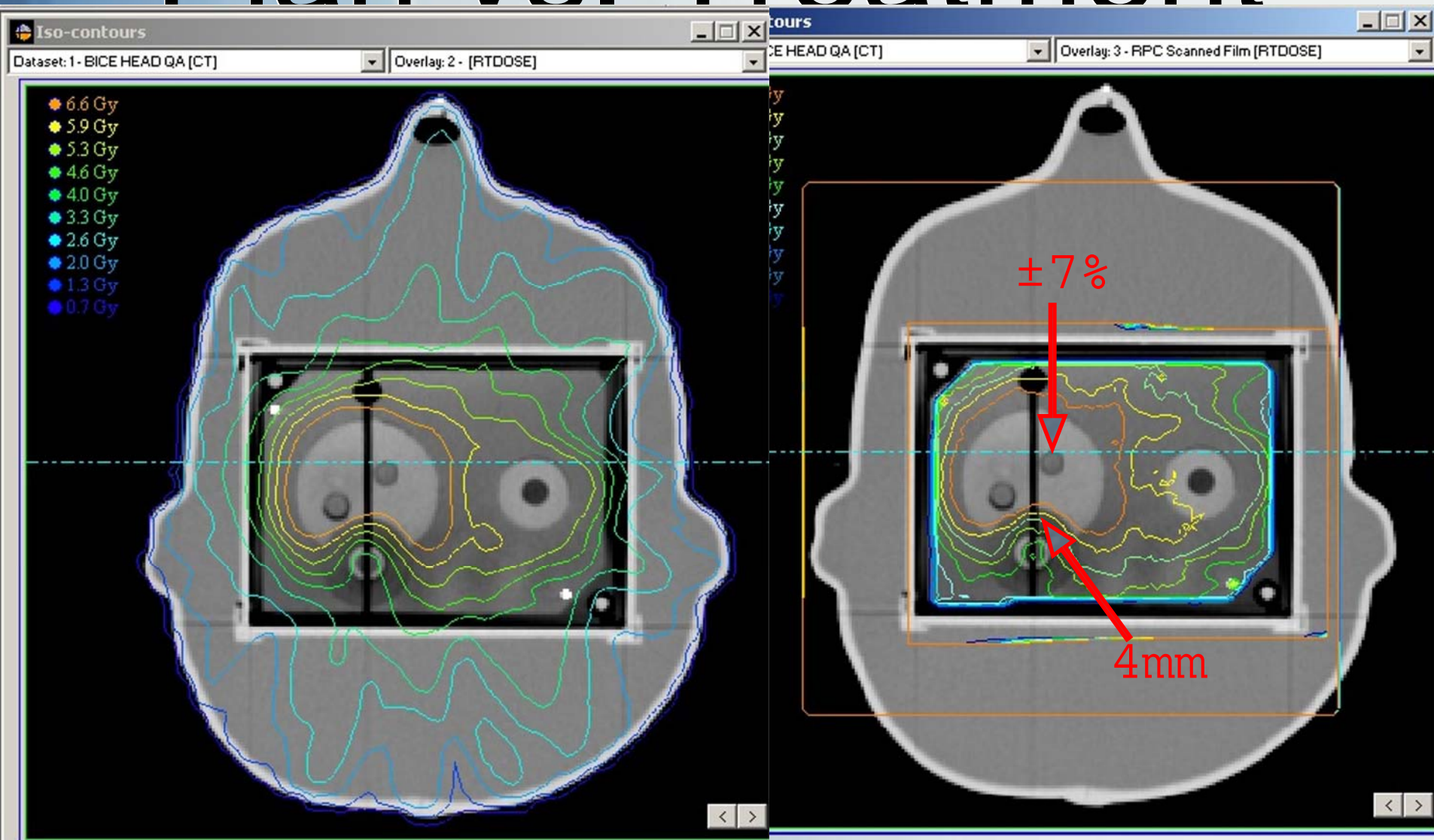
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350,0 cGy



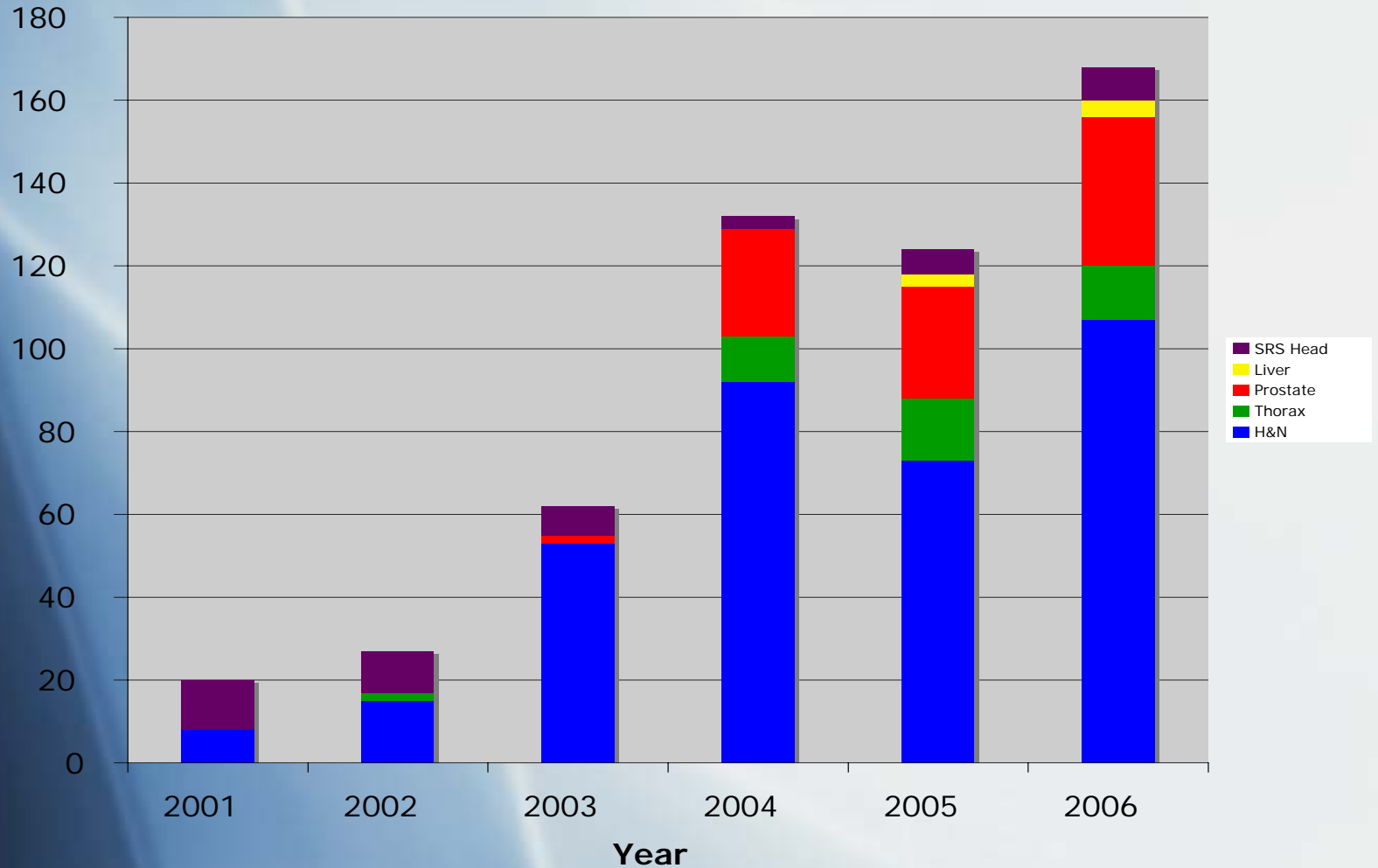
Absolute
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600,0 cGy
540,0 cGy
502,0 cGy
450,0 cGy
400,0 cGy
350,0 cGy



Plan vs. Treatment



Number of Phantom Mailings



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	2004	2004	2005

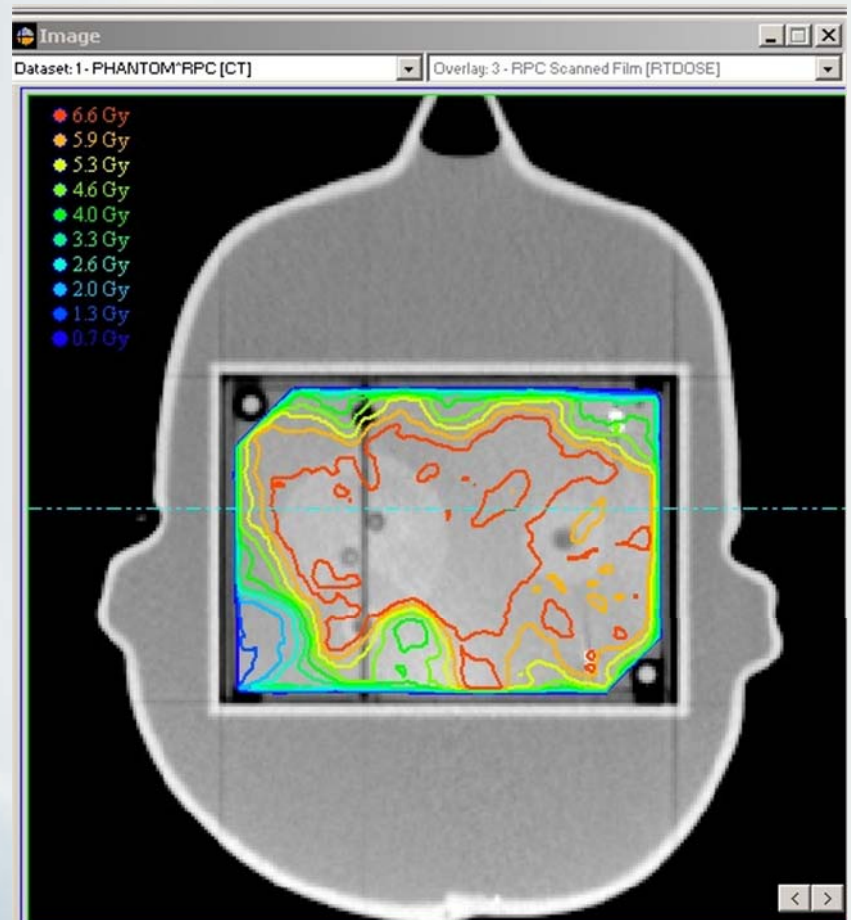
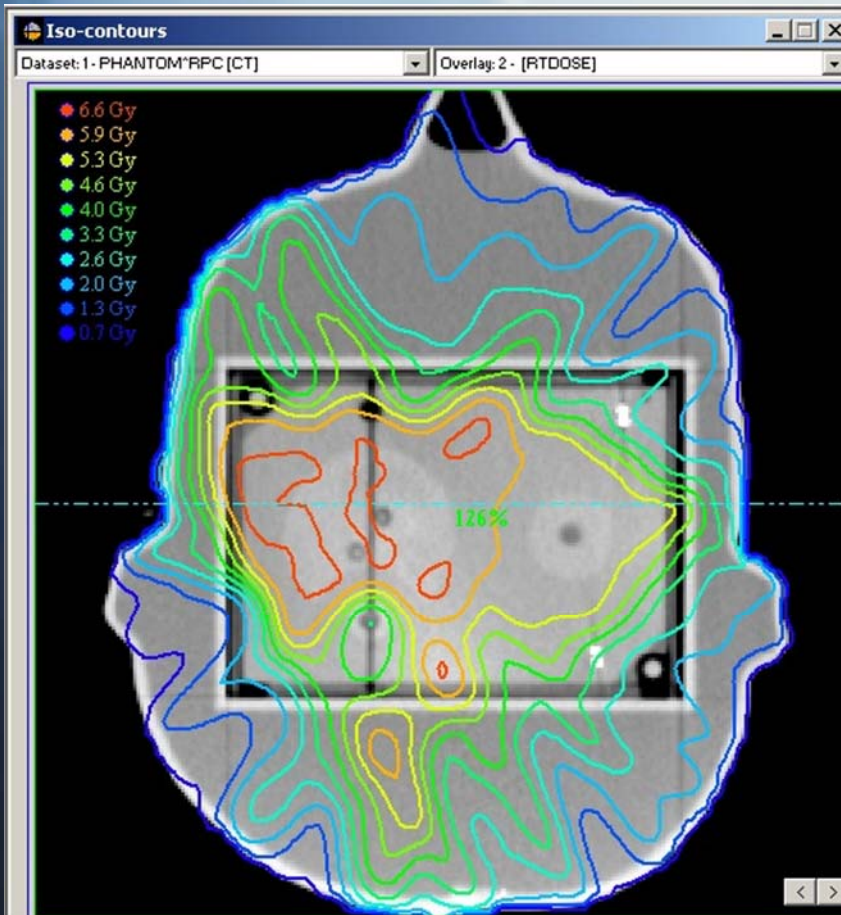
*** 30% of institutions failed H&N phantom
on the first attempt**



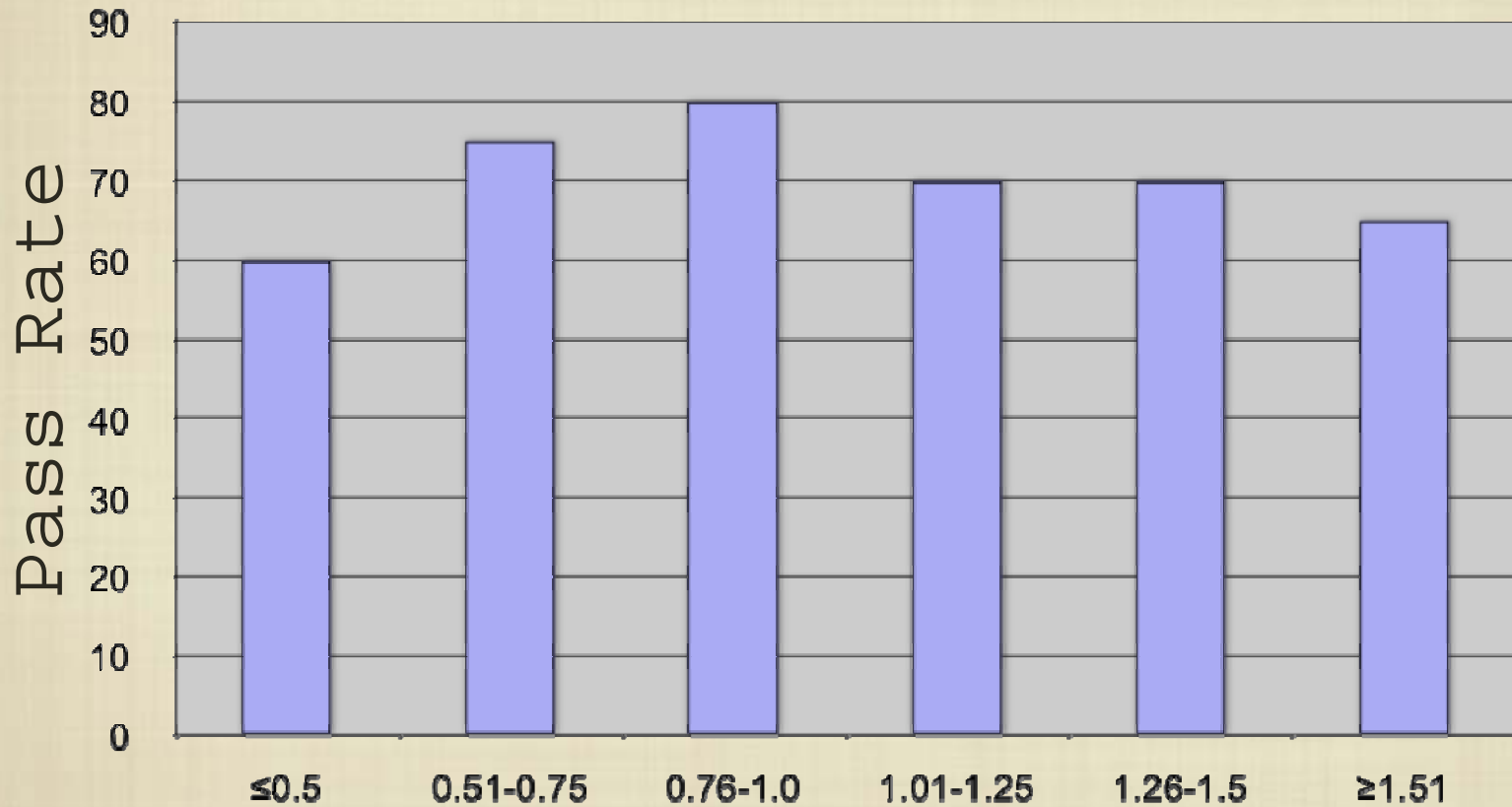
Explanations for Failures

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
Incomplete delivery	1

Examples of Failures

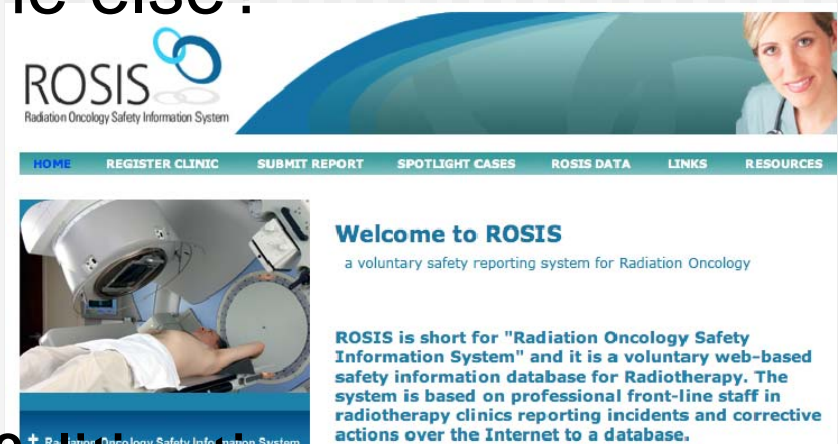


Physicists per machine



Learning from Errors

- Analysis
 - IAEA update, someone else?
- Reporting
 - ROSIS database
 - NRC
- Barriers
 - Risk of identification & litigation
 - Limitations on discussion





Thank you!



RPC

