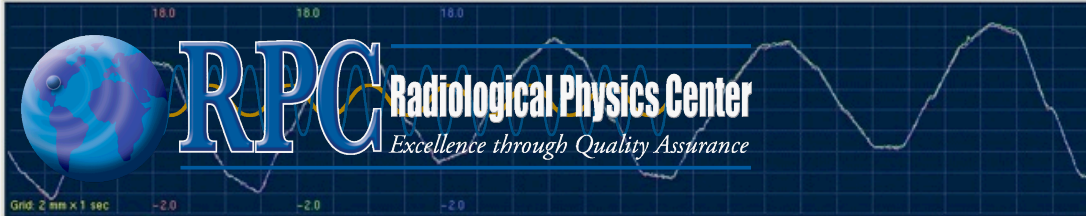


Requirements for Addressing Respiratory Motion in Cooperative Group Trials



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<http://rpc.mdanderson.org>

Supported by NCI grants
CA10953 and CA81647

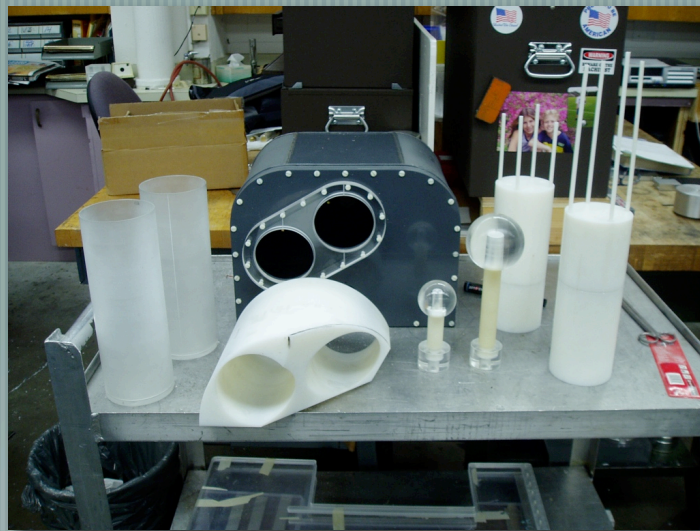
RPC Role in Evaluating Respiratory Motion

- 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

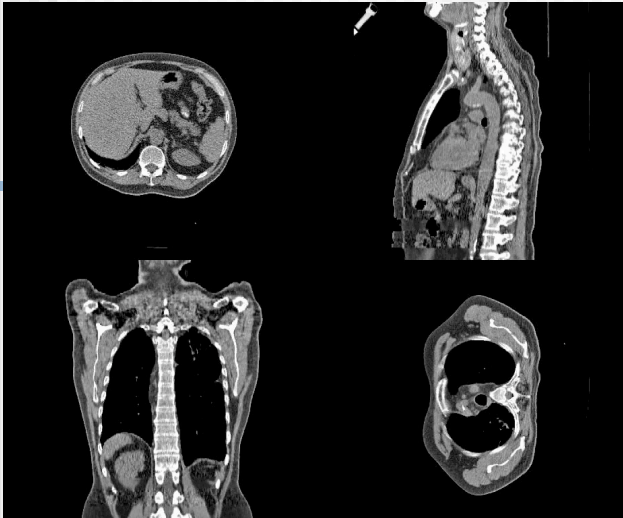


RTOG 0438

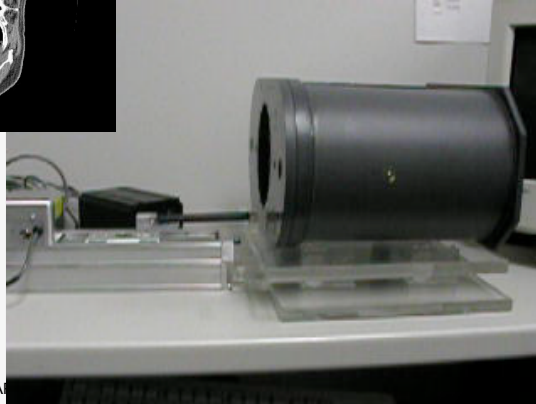
- Organ motion due to breathing must be documented
- Tumor or diaphragm motion must be recorded
- If the cranial caudal motion of the diaphragm is $< 5\text{mm}$, shallow free breathing is permitted
- Active breathing control (ABC), voluntary breath hold or gating must be used. End exhale is preferred.
- Institutional reproducibility data regarding patient setup and tumor targeting must be provided to the physics and image guidance committees.



Stereotactic Liver Phantom



MDACC: M. Fitzpatrick, T. Guerrero



Credentialing Procedure

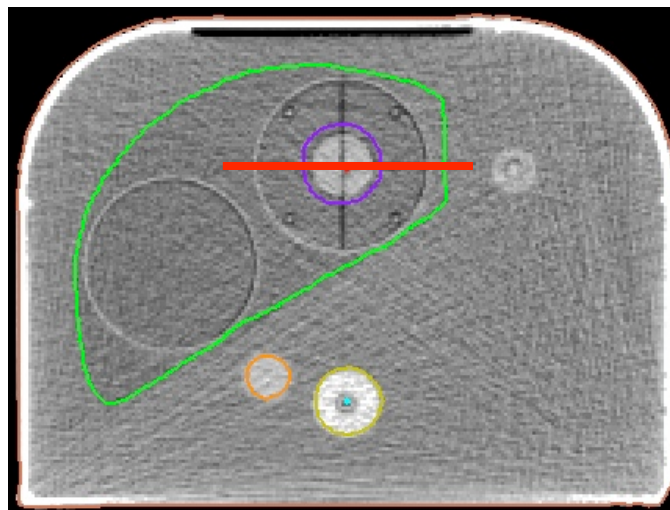
- Institution requests phantom
 - ❖ Priority based on several factors
- RPC ships phantom/moving platform
 - ❖ Institution fills with water
 - ❖ Performs imaging
 - ❖ Prepares treatment plan
 - ❖ Delivers plan
 - ❖ Drains water
 - ❖ Returns phantom
- Institution sends data electronically to ITC
- RPC compares measurements with plan



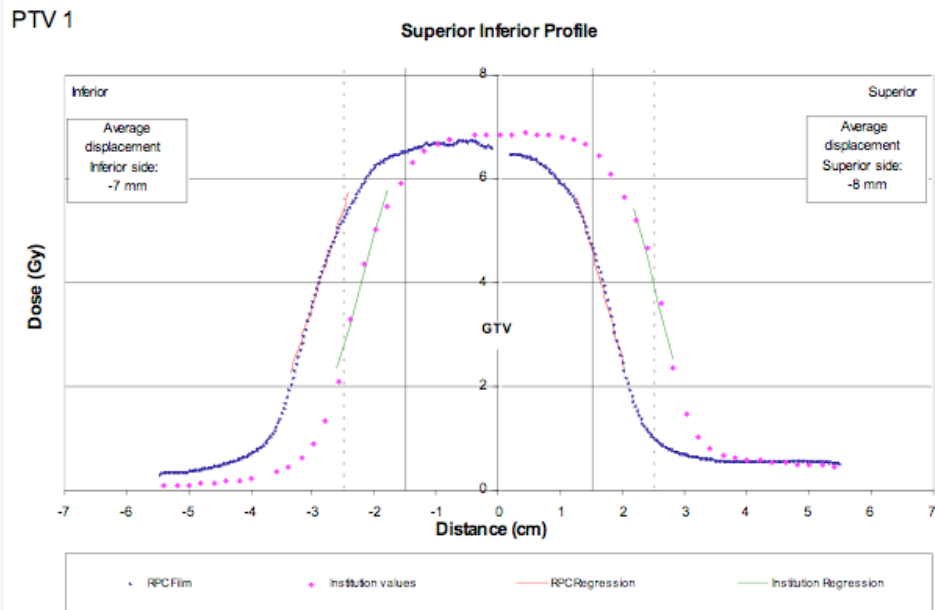
Dynamic Liver Phantom Irradiations (for RTOG 0438)

- 6 institutions requested for credentialing
 - ❖ 2 received phantom twice
- 4 have passed
- 2 failed due to sup/inf shifts
 - ❖ Both using free-breathing limited to 5 mm

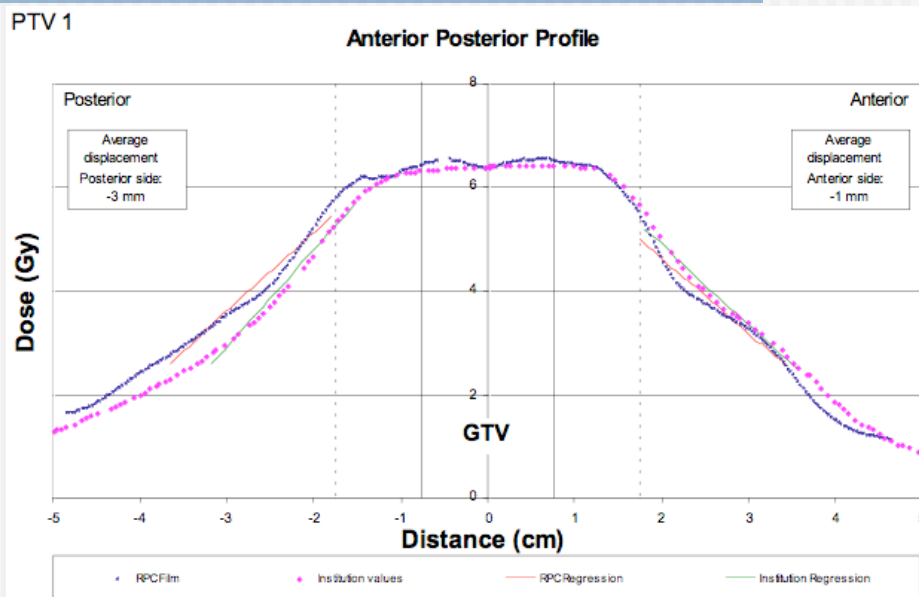
Liver Phantom Delivery Using Free Breathing (5 mm) L-R



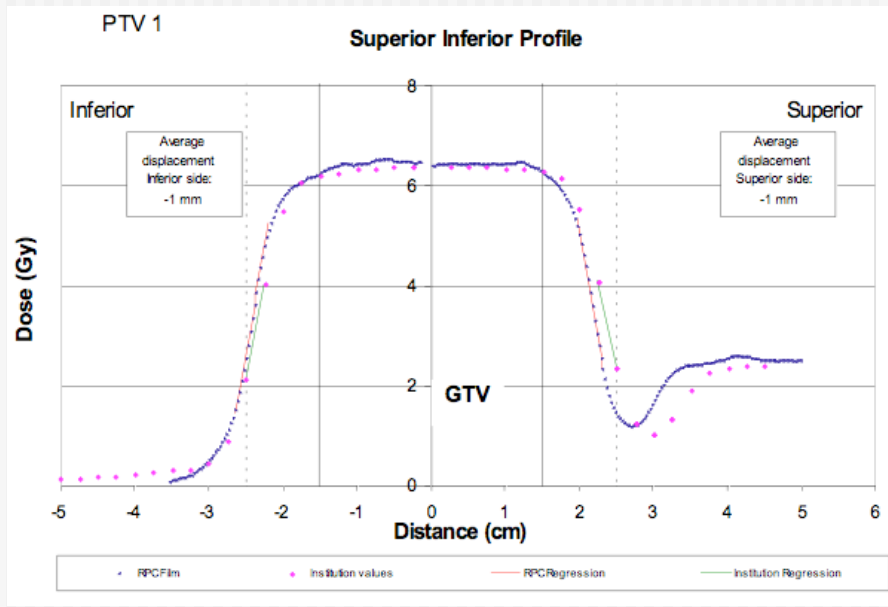
Liver Phantom Delivery Using Free Breathing (5 mm) S/I



Liver Phantom Delivery Using Gating: A-P



Liver Phantom Delivery Using Gating: S/I

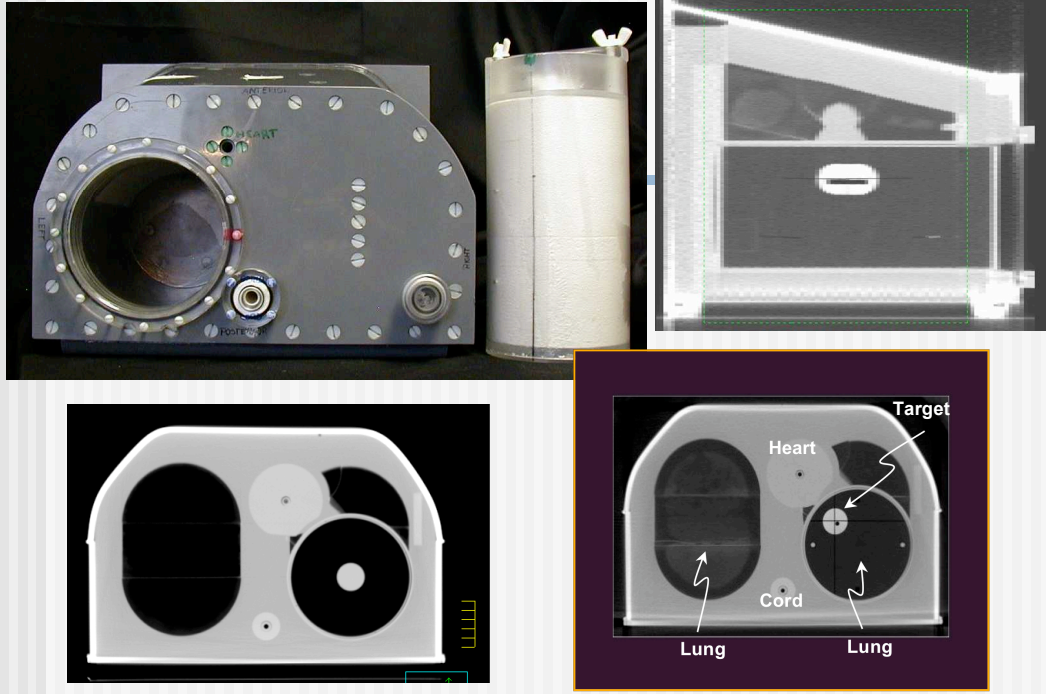


Irradiations with CyberKnife



P. NITSCH, TH-D-AUD-5: 2:18 PM

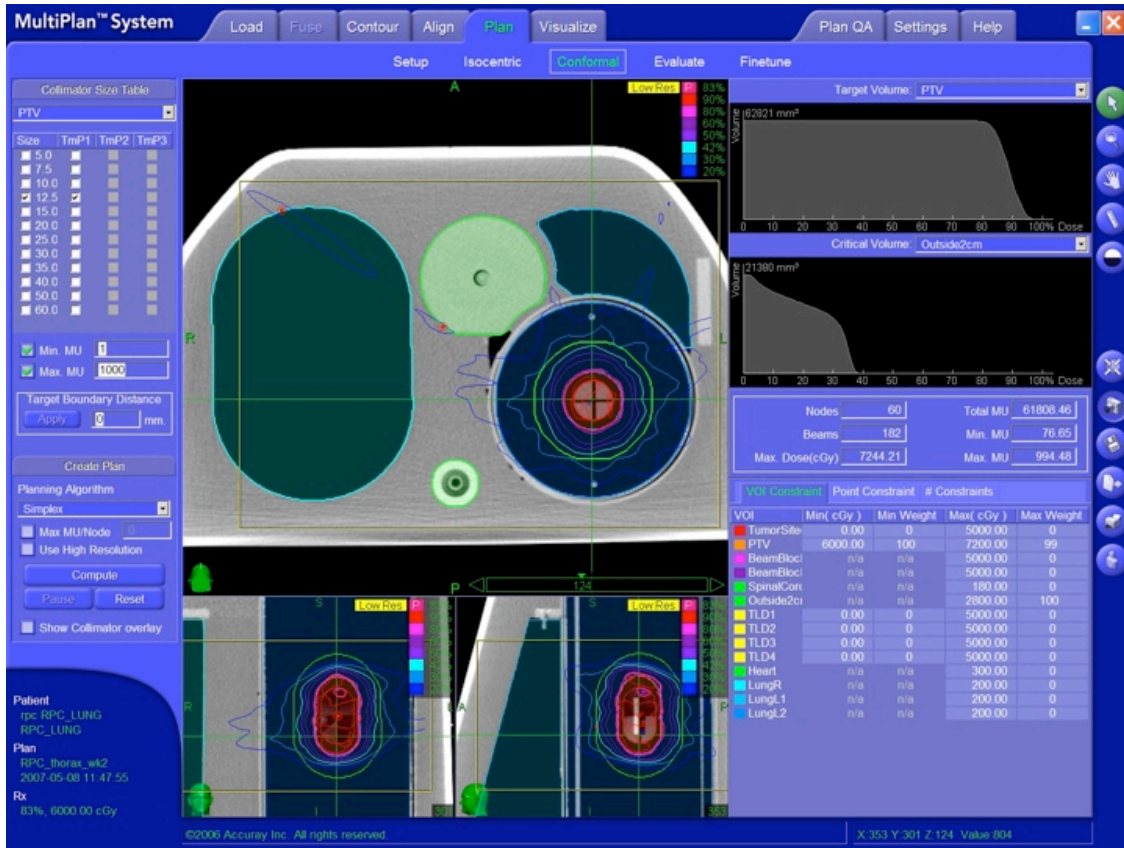
RPC Lung Phantom



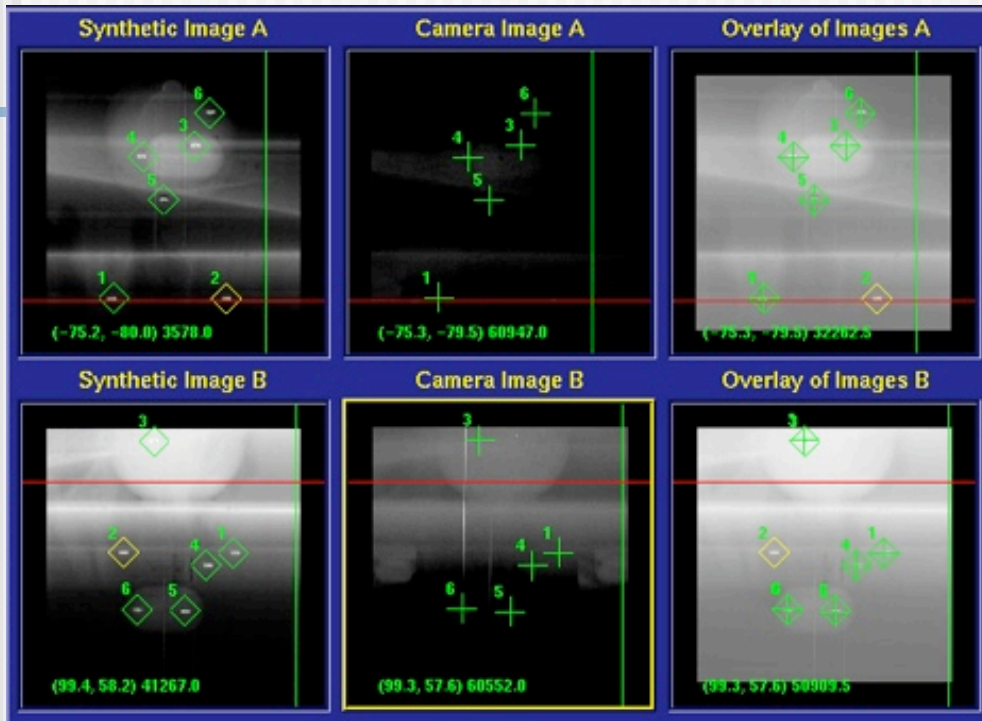
Modifications to Phantoms for IGRT

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

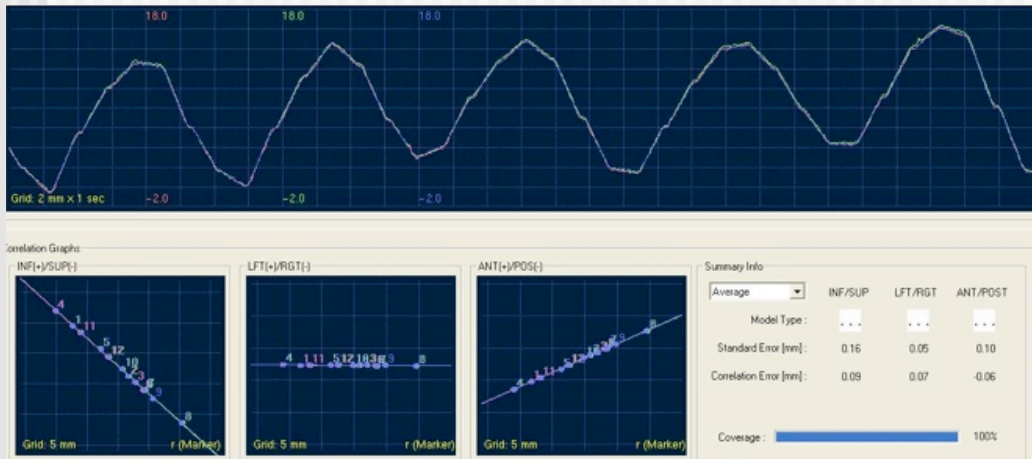




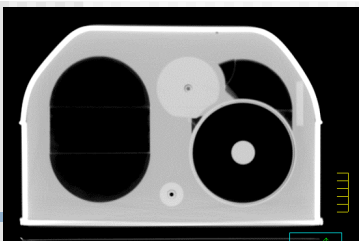
Phantom Alignment



Model of Respiratory Motion



17



Evaluation of Synchrony

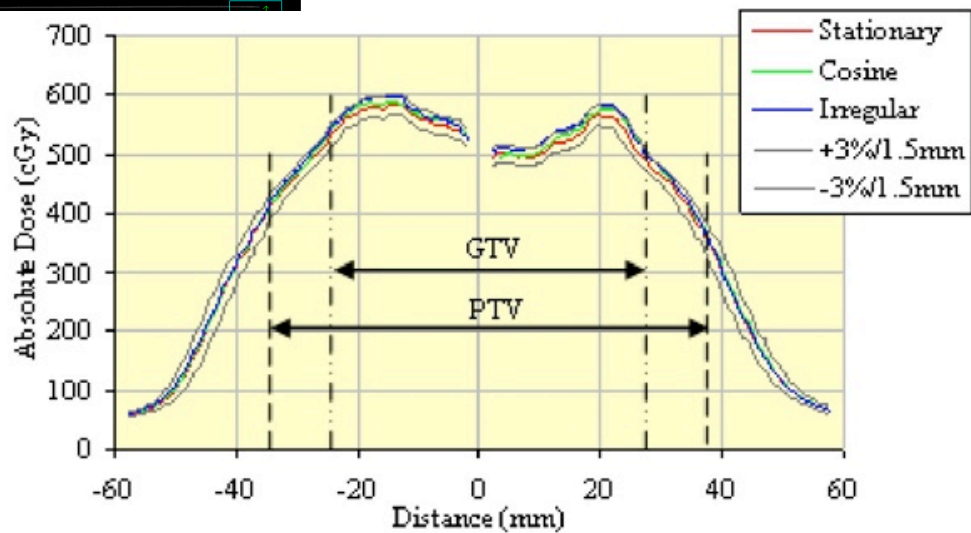






Figure 5. Superior-Inferior Dose Profiles

1. Under what circumstances does the NCI require that respiratory motion be addressed?

- 0%  Whenever there is a possibility of motion
- 0%  When IMRT is used for thoracic lesions
- 0%  Whenever IMRT is used
- 0%  Whenever radiation therapy is delivered on a clinical trial
- 0%

19







Under what circumstances does the NCI require that respiratory motion be addressed?

- Correct answer:
- 2. When IMRT is used for thoracic lesions

20

2. Clinical trials that involve respiratory motion typically require that institutions:


- 0%  Measure and document organ motion due to breathing
- 0%  Use gating for all treatments
- 0%  Allow free breathing as long as the motion is < 2 cm
- 0%  Obtain 4D CT for all patients on the trial

21

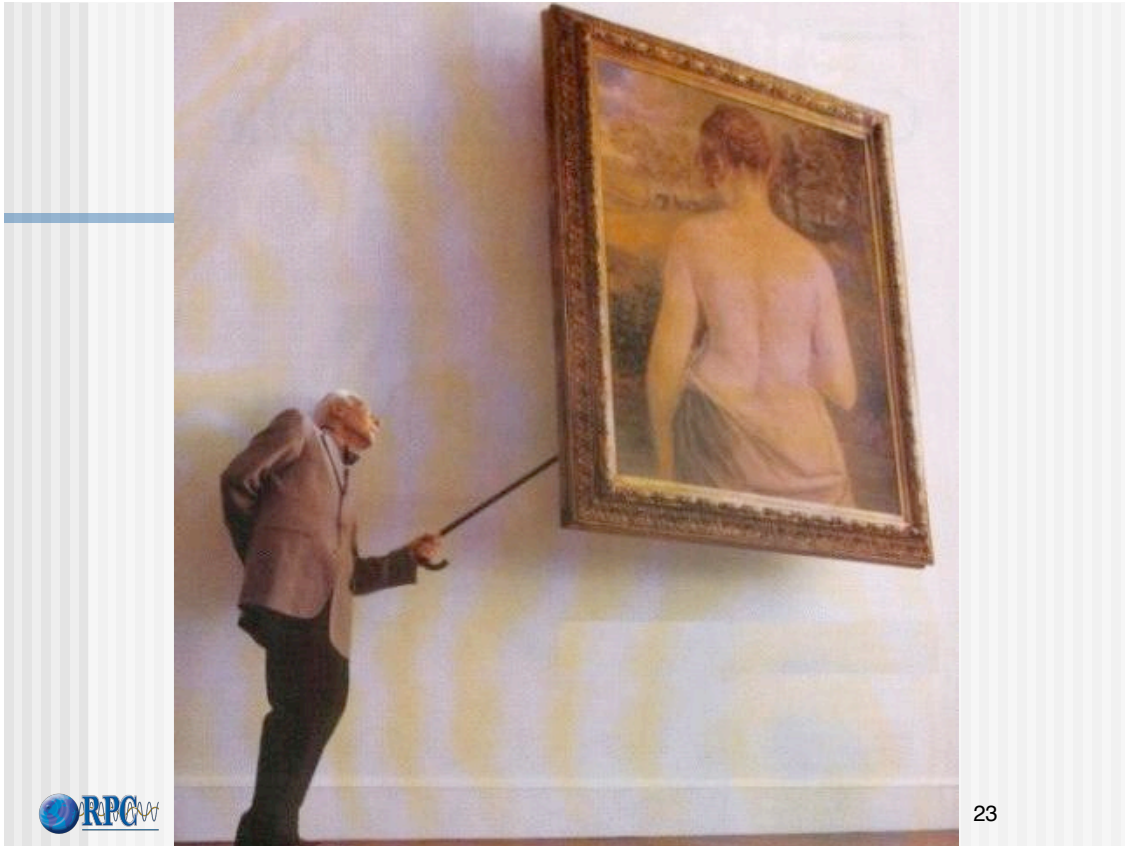


Clinical trials that involve respiratory motion typically require that institutions:

■ Correct answer:

-  Measure and document organ motion due to breathing

22



References

- Question 1 - NCI Guidelines on the use of IMRT in Clinical Trials
- Question 2 - RTOG protocols, such as RTOG 0438.