How Quality Assurance Programmes can Maximize the Safety and Accuracy of Radiation Treatments

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Prevention, Diagnosis, Treatment

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IMAGING AND RADIATION ONCOLOGY CORE
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Quality in Radiation Oncology

- Radiation Oncology is a **technology** driven versatile and complicated treatment modality that is important to many patients

- Intuitively, quality is very important
  - deliver the correct dose to the correct place
  - Too much dose is **bad** and too little dose is **bad**

- Achieving optimal quality can be challenging as complexity increases especially when factoring in human error

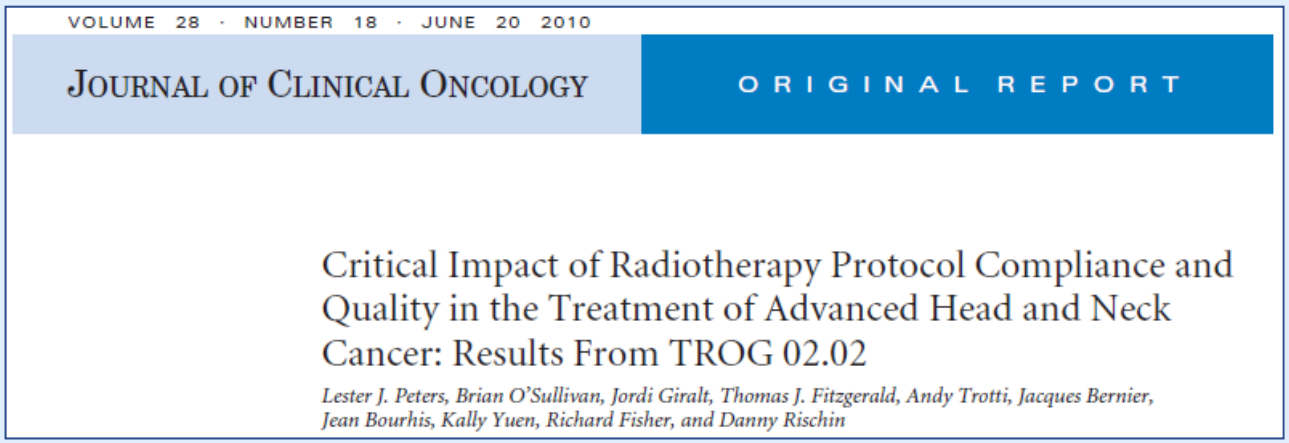
- Yet in Radiation Oncology we have **Quality Programmes** in place that can quantify the radiation delivery and its quality

Crucial Elements for Successful Implementation of QA Programmes

- Appropriate education and training
- Required hardware/software and dosimetry equipment
- Hospital’s commitment for staffing and sustainability
- A commitment to support ongoing Quality Assurance Programmes
- Good communication between RT staff and hospital administration
- Input from all involved staff prior to purchase

An Example of QA Making a Difference

- TROG 02.02
- Cisplatin (CIS) vs Cisplatin + tirapazamine (TPZ)
- All patients: 70 Gy in 35 fx using a shrinking field technique
- Hypothesis: 10% improvement in 2 year overall survival
- 861 patients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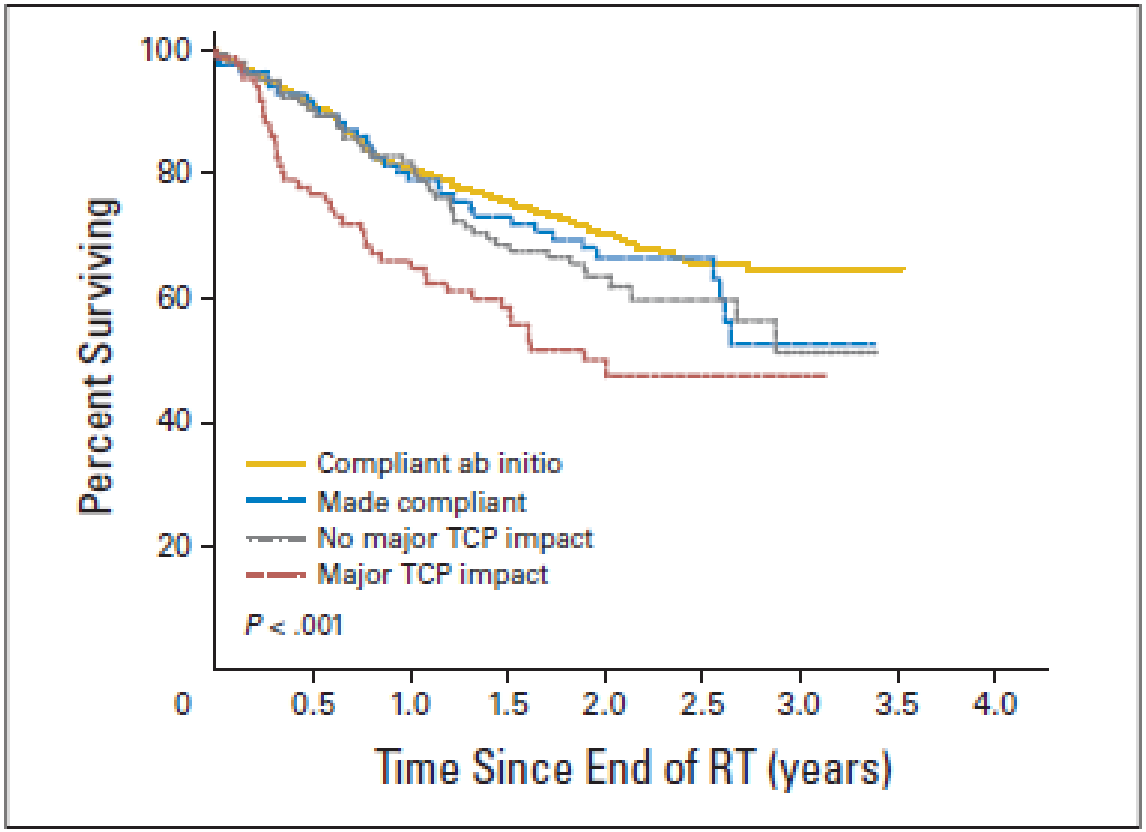
ORIGINAL REPORT

Critical Impact of Radiotherapy Protocol Compliance and Quality in the Treatment of Advanced Head and Neck Cancer: Results From TROG 02.02

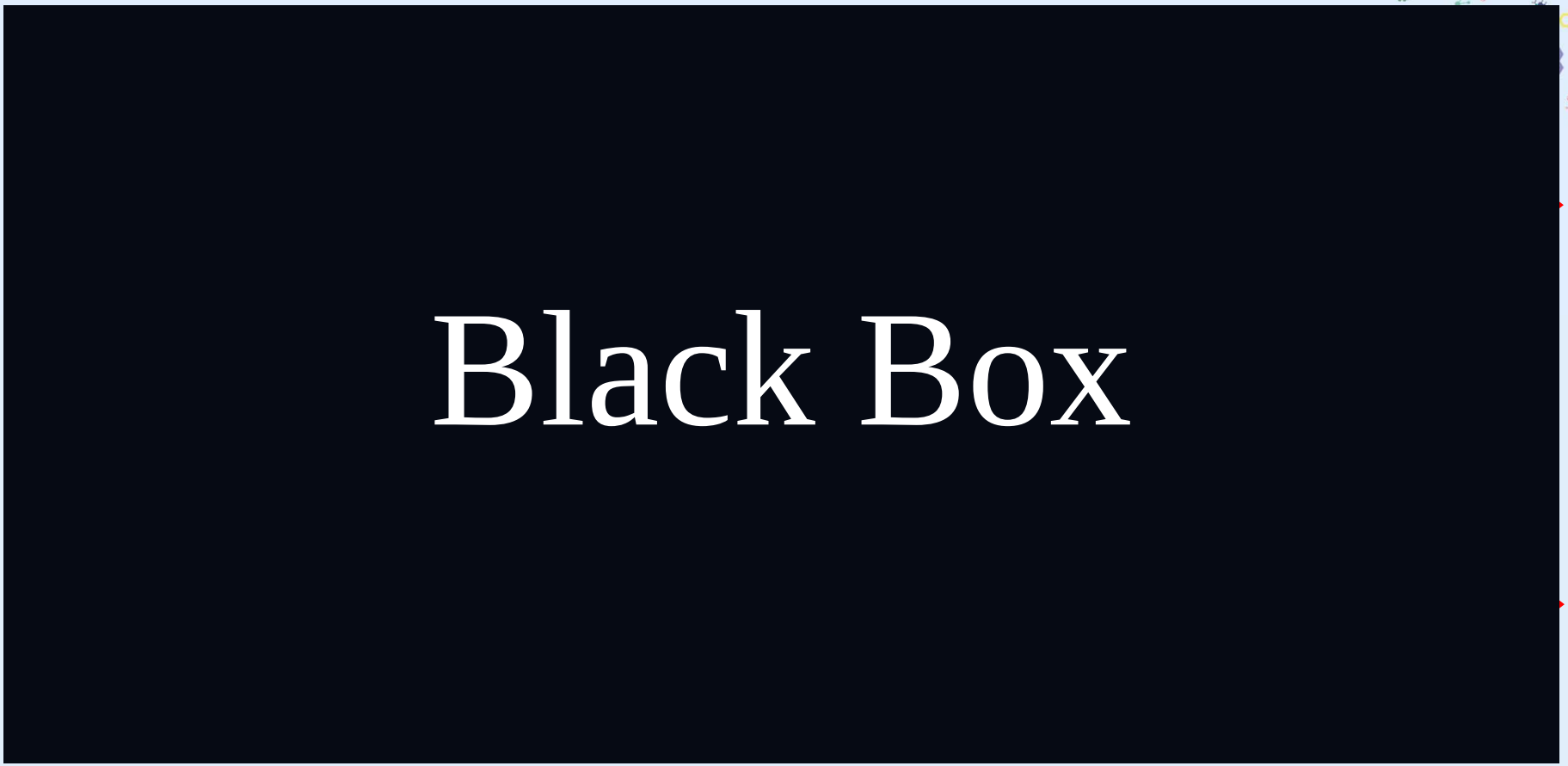
Lester J. Peters, Brian O'Sullivan, Jordi Giralt, Thomas J. Fitzgerald, Andy Trotti, Jacques Bernier, Jean Bourhis, Kally Yuen, Richard Fisher, and Danny Rischin



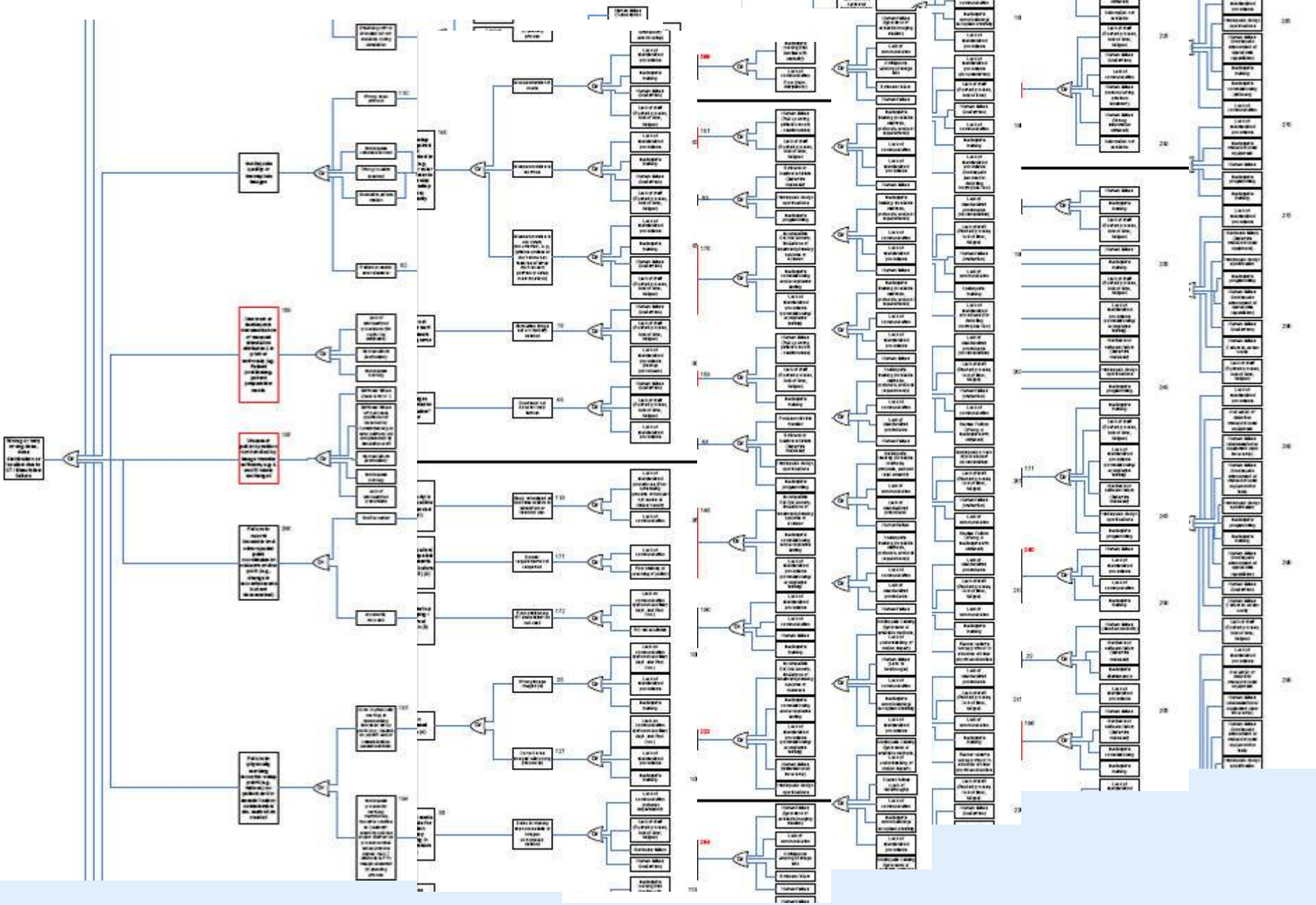
2 year overall survival:
70% (good RT) vs 50% (poor RT)

The quality of RT is critical to patient survival and safety

Imaging, Planning and Delivery QA required at each step



Fault Tree for Intensity-modulated Radiation Therapy



Quality Assurance Programme

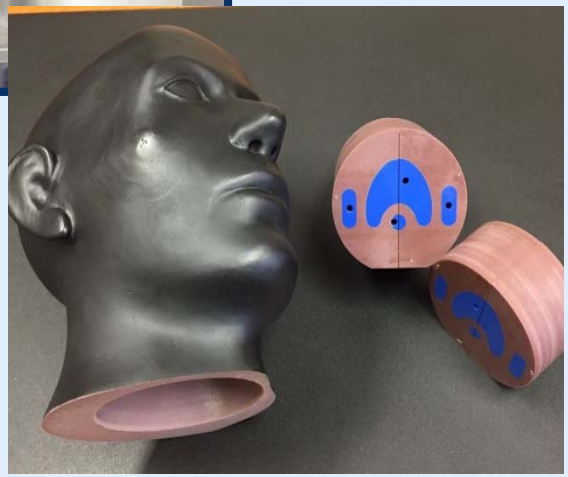
- Thus, RT requires a comprehensive QA Programme that includes internal and external independent quality reviews

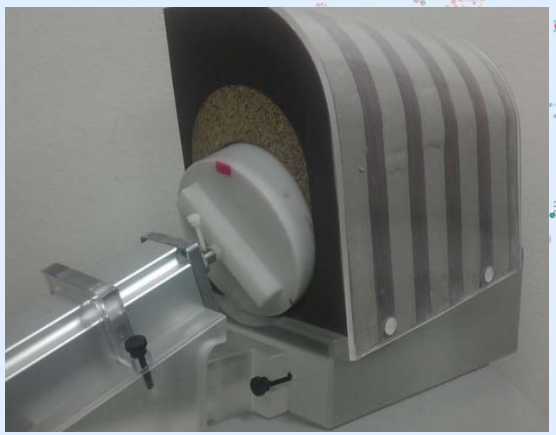
- An independent end-to-end QA audit tool is crucial
  - prior to treating a patient with new technology
  - verify the intended treatment goal (amount and location)

IROC-H Phantoms for Protons

prostate phantom

H&N phantom

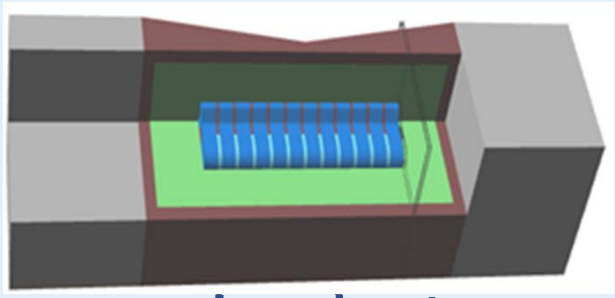




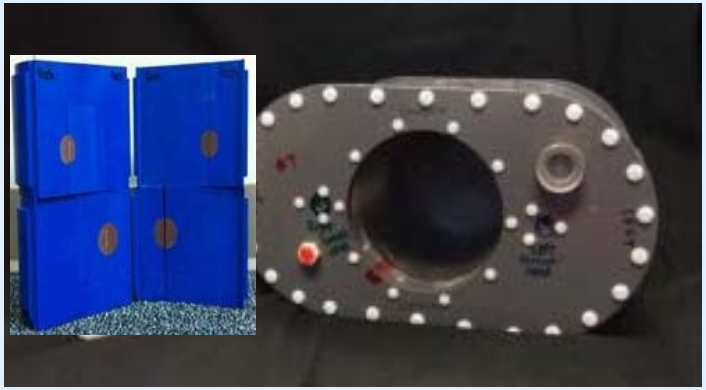
lung phantom

head phantom

Liver phantom



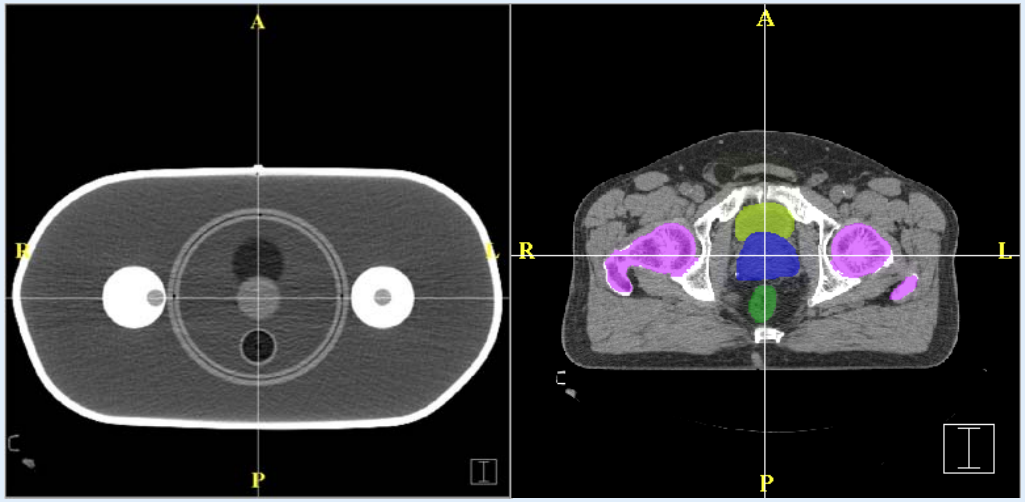
spine phantom



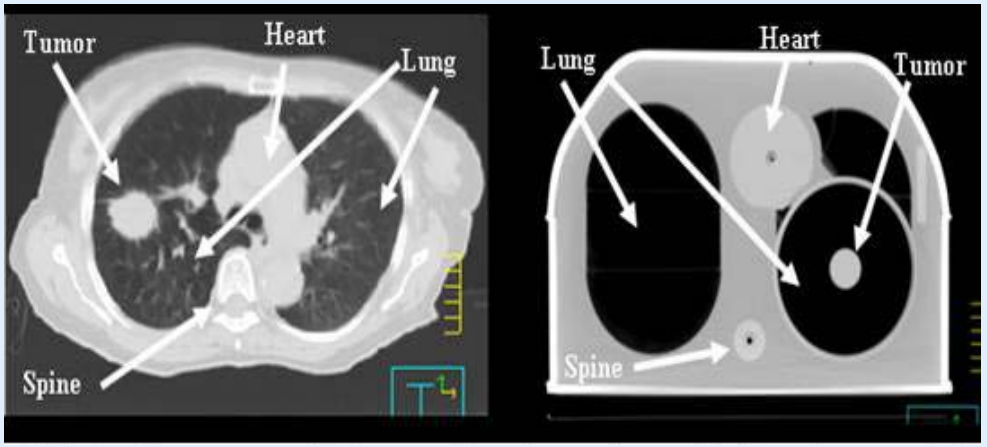
IROC-H Phantom Design

- Anthropomorphic shape
- Plastic inserts (targets and organs at risk)
- Point (TLD) and planar (radiochromic film) dosimeters
- Purpose is to evaluate the complete treatment process

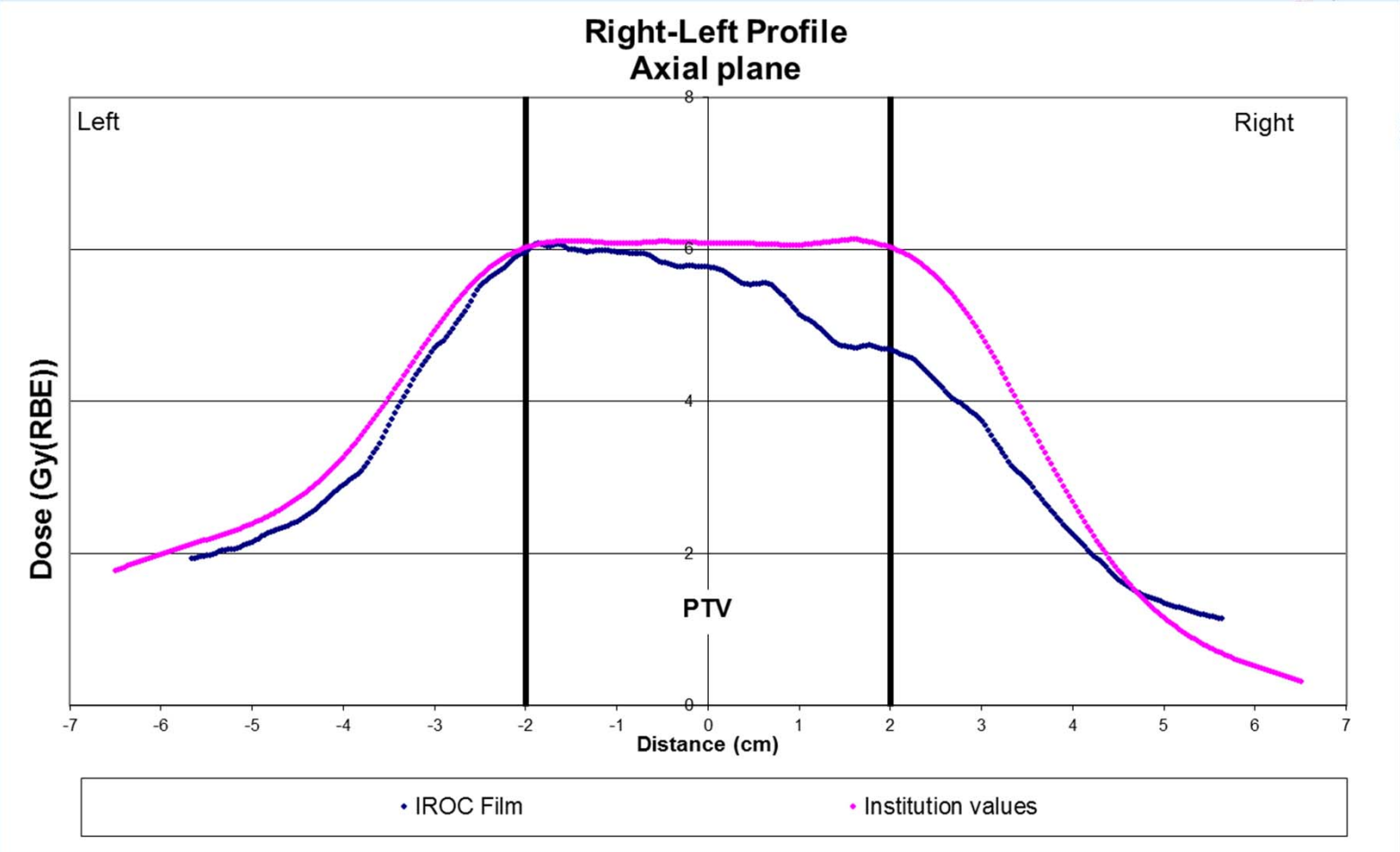
Phantom **Patient**



Patient **Phantom**



Lung Phantom Results



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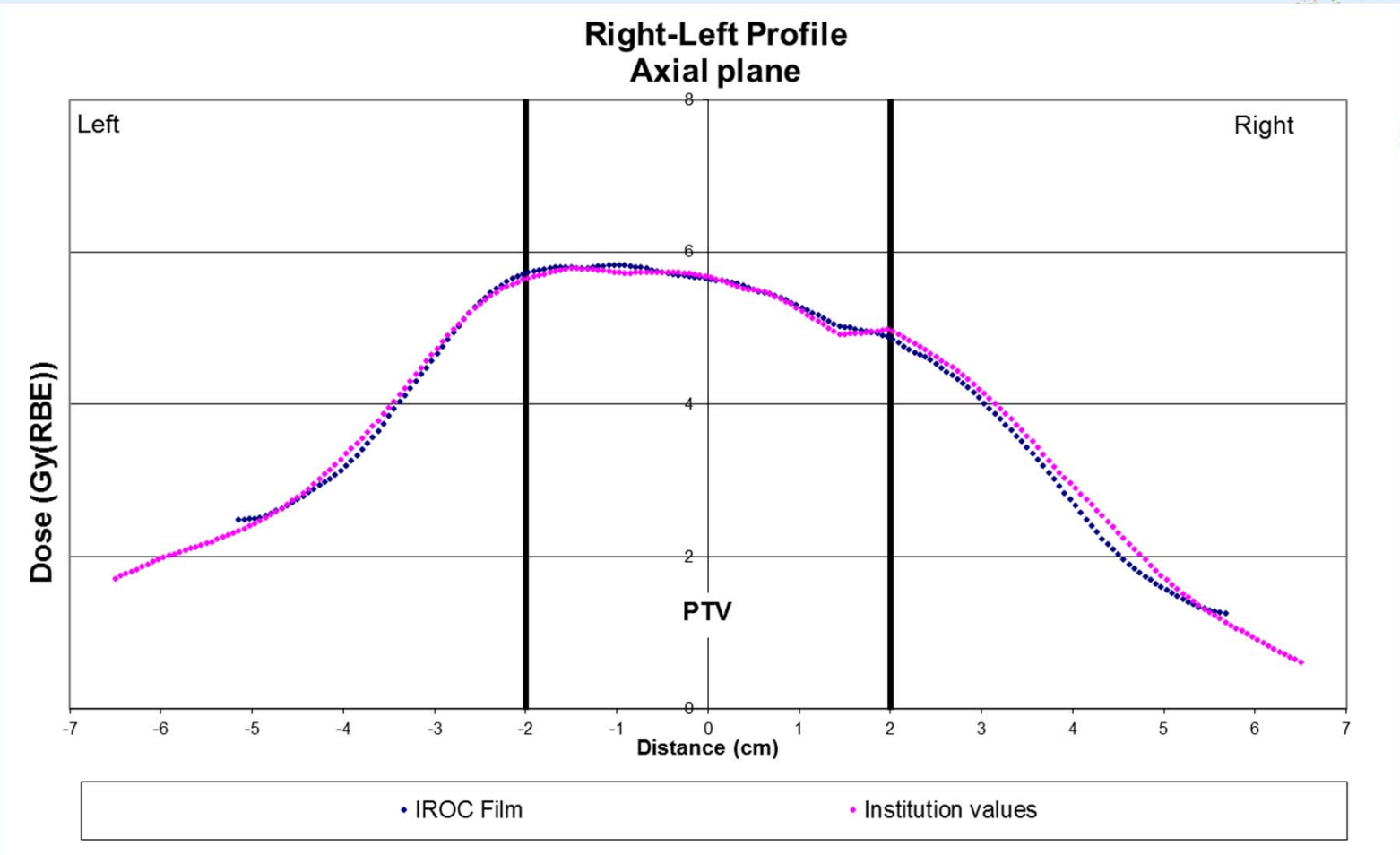

Summary

- Radiotherapy is a continually evolving complex and highly technical treatment modality that, unlike other therapies, deliver doses to the tumor that can be quantified precisely.
- Human intervention as treatments continue to evolve and become more complex may tend to introduce errors
- Through the implementation of QA Programmes
  - the delivery of radiotherapy treatments have improved,
  - errors have been detected and corrected and
  - patients are being treated more **accurately and safely.**

Thank you. Question?