

MEDICAL PHYSICS
in
private clinical practice

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What does it take to become a Medical Physicist?

To be a medical physicist, you should:

- have a high level of ability and interest in physical sciences and computing
- have an interest in medicine and in the development of new methods of patient care and treatment
- be accurate, able to concentrate for long periods, and have a high level of attention to detail

What does it take to become a Medical Physicist?

- have high ethical standards and the ability to take responsibility for making decisions
- have an enquiring mind and good problem solving skills to lead a research and development team
- have excellent oral and written communication skills
- be able to reassure nervous patients.

What does a Medical Physicist do?

- apply the principles of physics to patient care
- work closely with doctors and other professionals to assess and treat ill health
- research, design and develop techniques and equipment used by medical staff to diagnose and treat patients (alongside other specialist physicists, clinical engineers and technical staff)

Departments

- Diagnostic Radiology
 - CT, MRI, mammography, rtg, echography
- Interventional Radiology
 - angiography, coronagraphy...
- Emergency center
- Nuclear Medicine
- PET center
- Radiotherapy

What does a Medical Physicist do?

The Medical Physicist's major roles are to:

- provide support for the clinical activities of radiotherapy, nuclear medicine and radiology
- manage a radiation protection service.
- research and postgraduate teaching programme

Support for the clinical activities

- commissioning
- calibration
- periodical measurements
- patient dose uncertainties

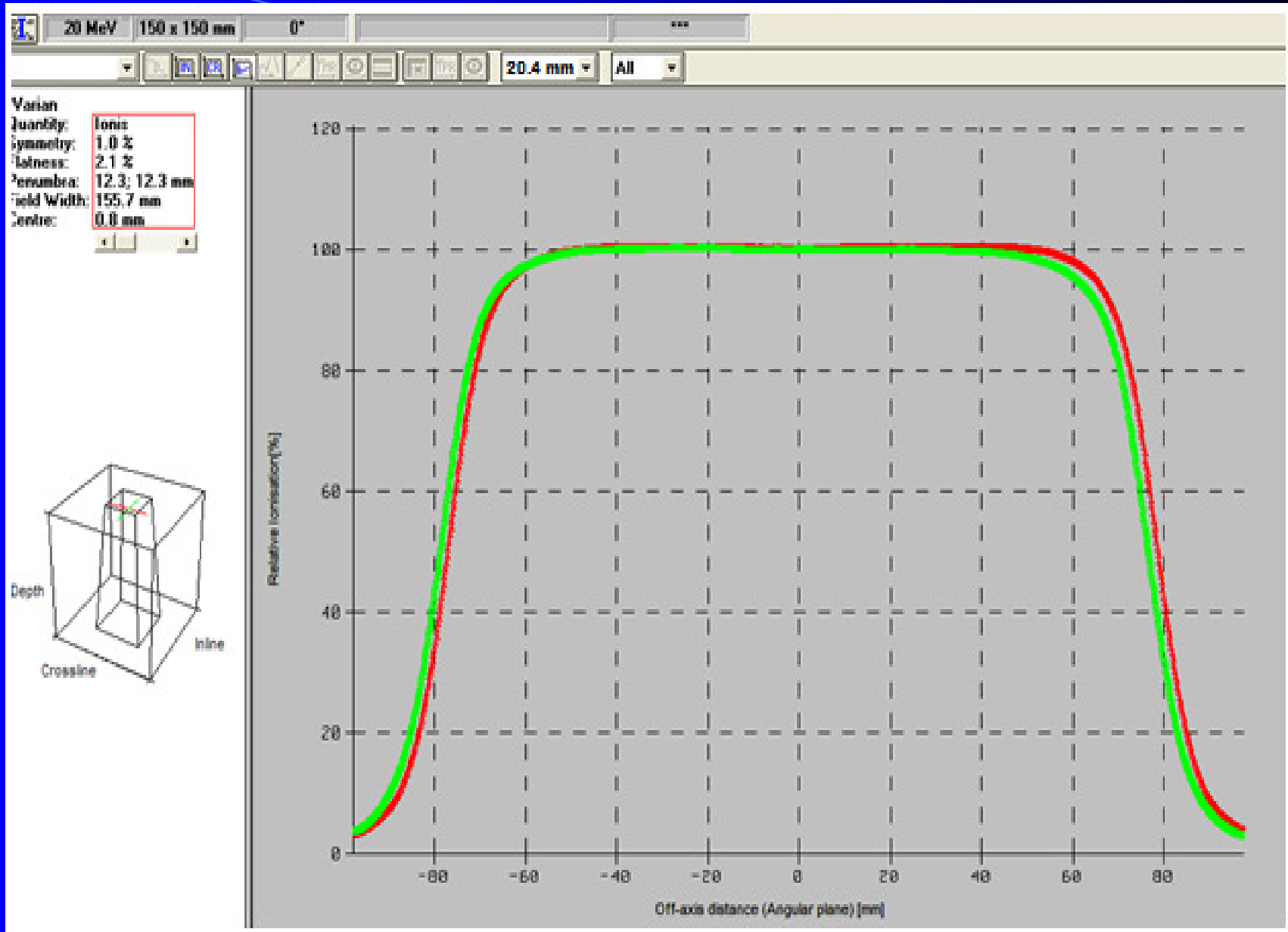
Commissioning

Prepare for clinical use:

- measure necessary parameters
- use them as reference values for calculation

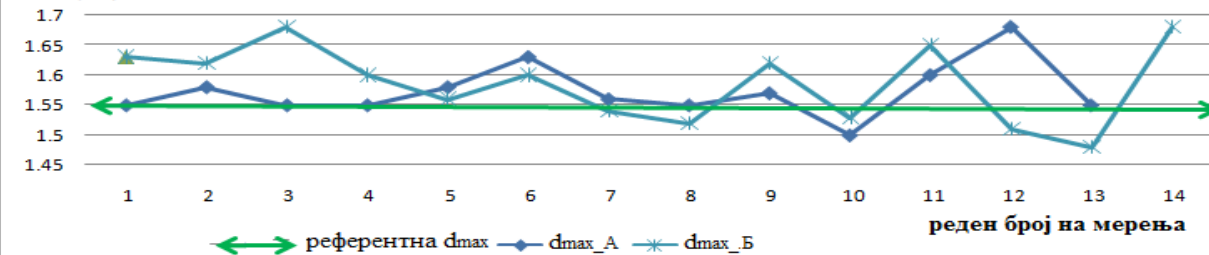
Calibration and Dosimetry checks

Periodically measurements of these parameters, comparing with the reference values and calibrate them if necessary



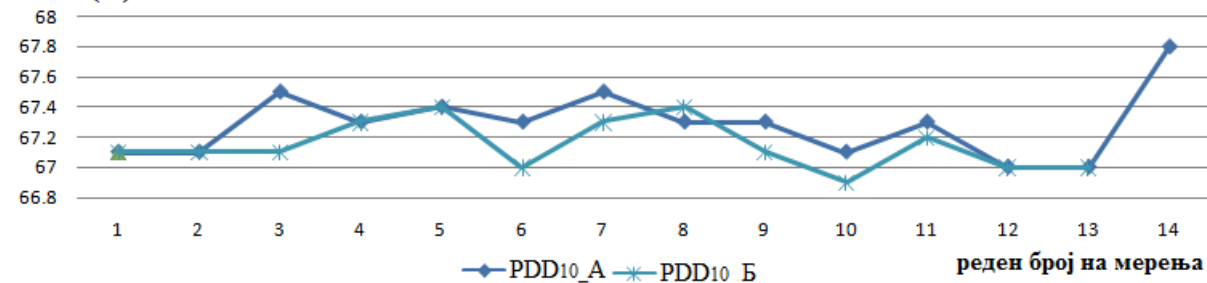
10 x 10

d_{max} (cm)



$$QI = TPR_{20,10} = 1,2661 * PDD_{20,10} - 0,0595$$

PDD₁₀ (%)



мере

мерења

6MV фотони /		апарат А	
d _{max} (cm)	PDD ₁₀ (%)	PDD _{20,10} (%)	QI (%)
1,54	67,0	0,58	0,670
1,55	67,1	0,58	0,675
1,58	67,1	0,57	0,662
1,55	67,1	0,58	0,675
1,55	67,3	0,58	0,675
1,58	67,4	0,58	0,675
1,63	67,0	0,58	0,675
1,56	67,3	0,58	0,675
1,55	67,4	0,58	0,675
1,57	67,1	0,58	0,675
1,50	66,9	0,58	0,675
1,60	67,2	0,58	0,675
1,68	67,0	0,57	0,662
1,55	67,0	0,57	0,662
d _{max} (cm)	PDD ₁₀ (%)	PDD _{20,10} (%)	QI (%)
1,55	67,0	0,58	0,670
1,63	67,1	0,58	0,675
1,62	67,1	0,57	0,662
1,68	67,5	0,58	0,675
1,60	67,3	0,58	0,675
1,56	67,4	0,58	0,675
1,60	67,3	0,58	0,675
1,54	67,5	0,58	0,675
1,52	67,3	0,58	0,675
1,62	67,3	0,58	0,675
1,53	67,1	0,58	0,675
1,65	67,3	0,58	0,675
1,51	67,0	0,58	0,675
1,48	67,0	0,57	0,662
1,68	67,8	0,58	0,675



Calibration in Radiology

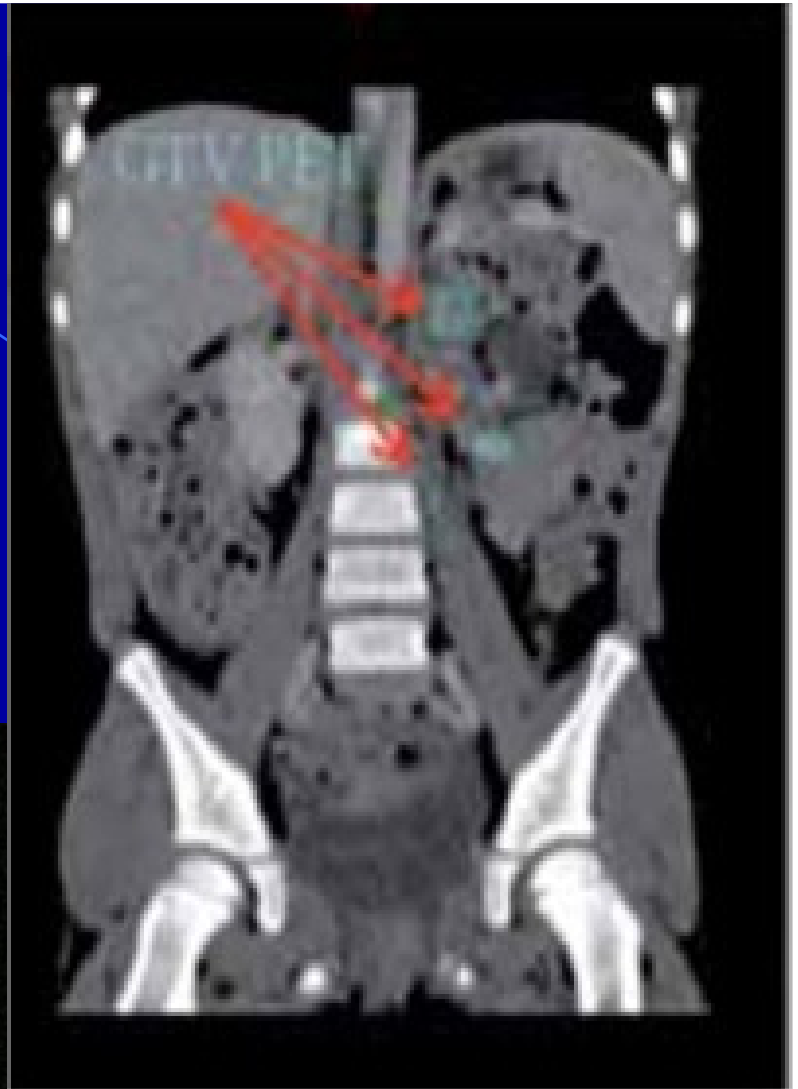
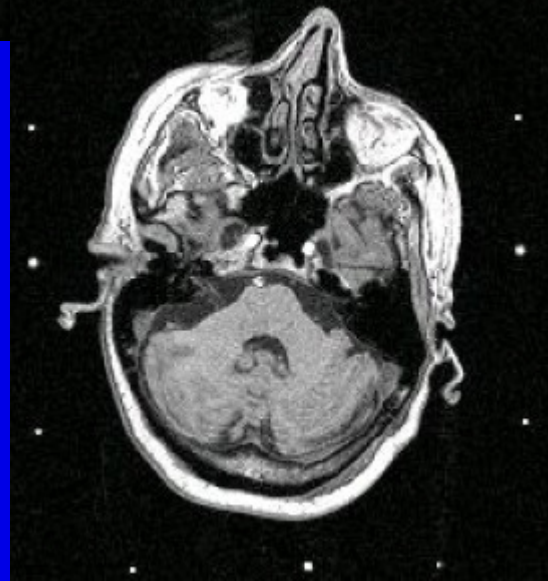
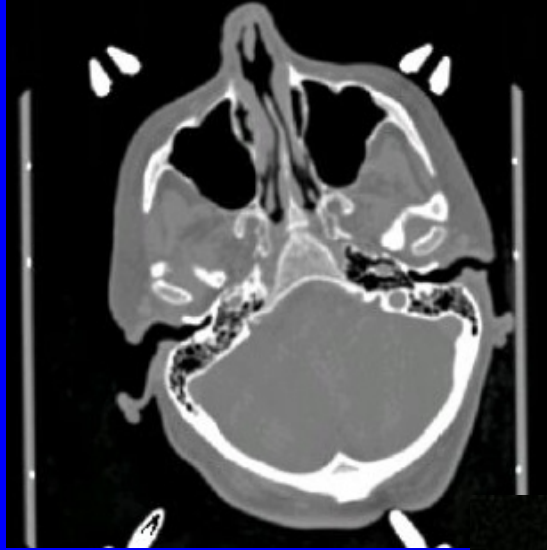
Calibrate the unit on the way to have:

- as usefulness as possible image
- as less as possible dose received to the patient

Adjust the parameters (e.g. kV, mA) on the way to

- perform the medical procedure in one step
- not to repeat the procedure

Calibration in Radiology



Calibration in Radiotherapy

Calibrate the unit on the way to have:

- minimal geometrical uncertainties
- dose received to the tumor as it was prescribed
- dose delivered into tumor and health tissue being as predicted

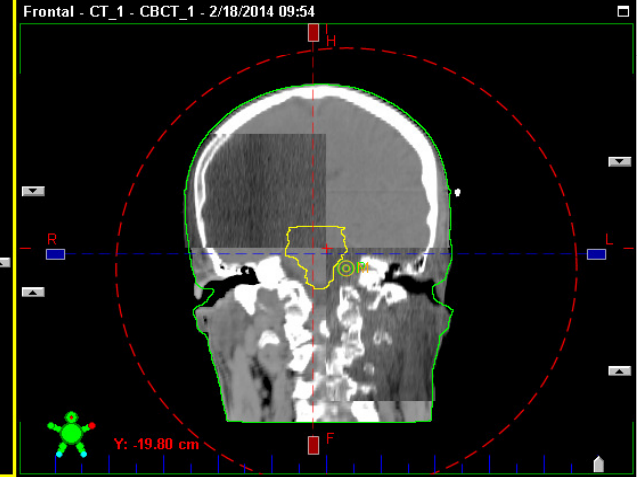
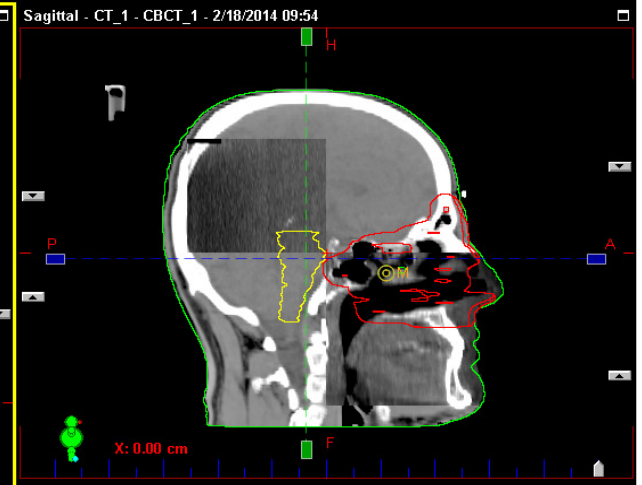
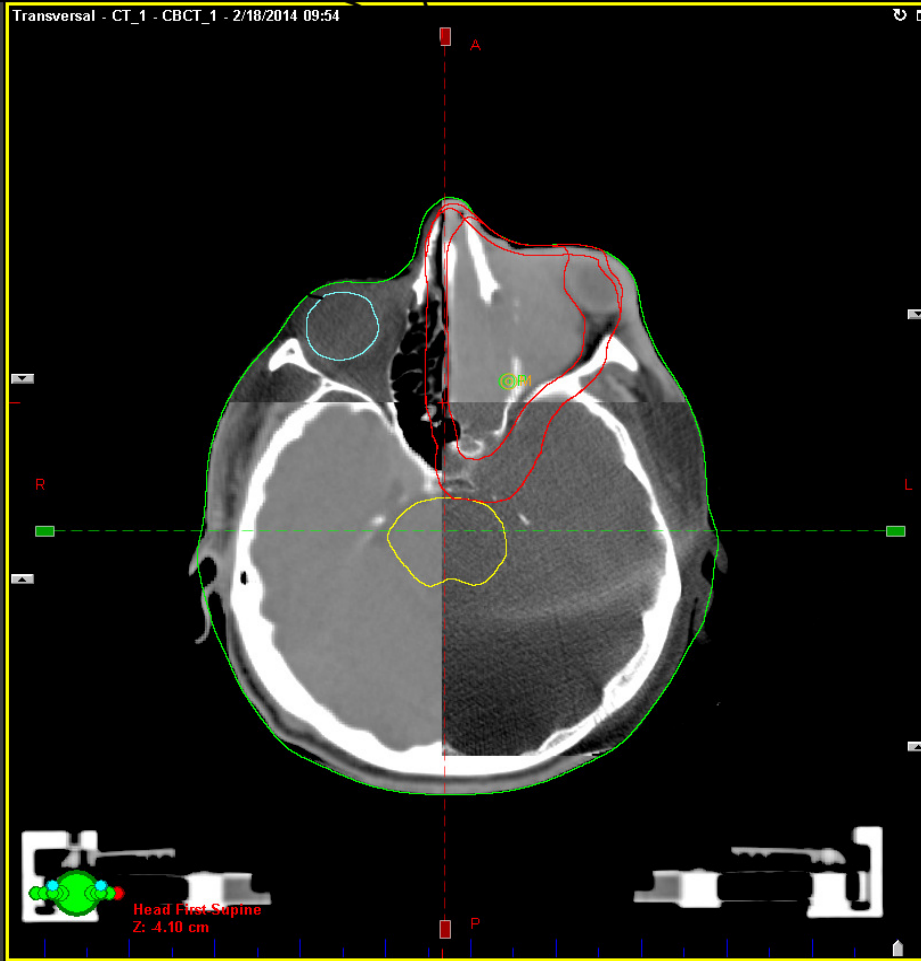
treatment verification

ID: 005_14

3D/3D Match

Plan Tree Image Gallery
Reference:
AP1-DR...

HEAD

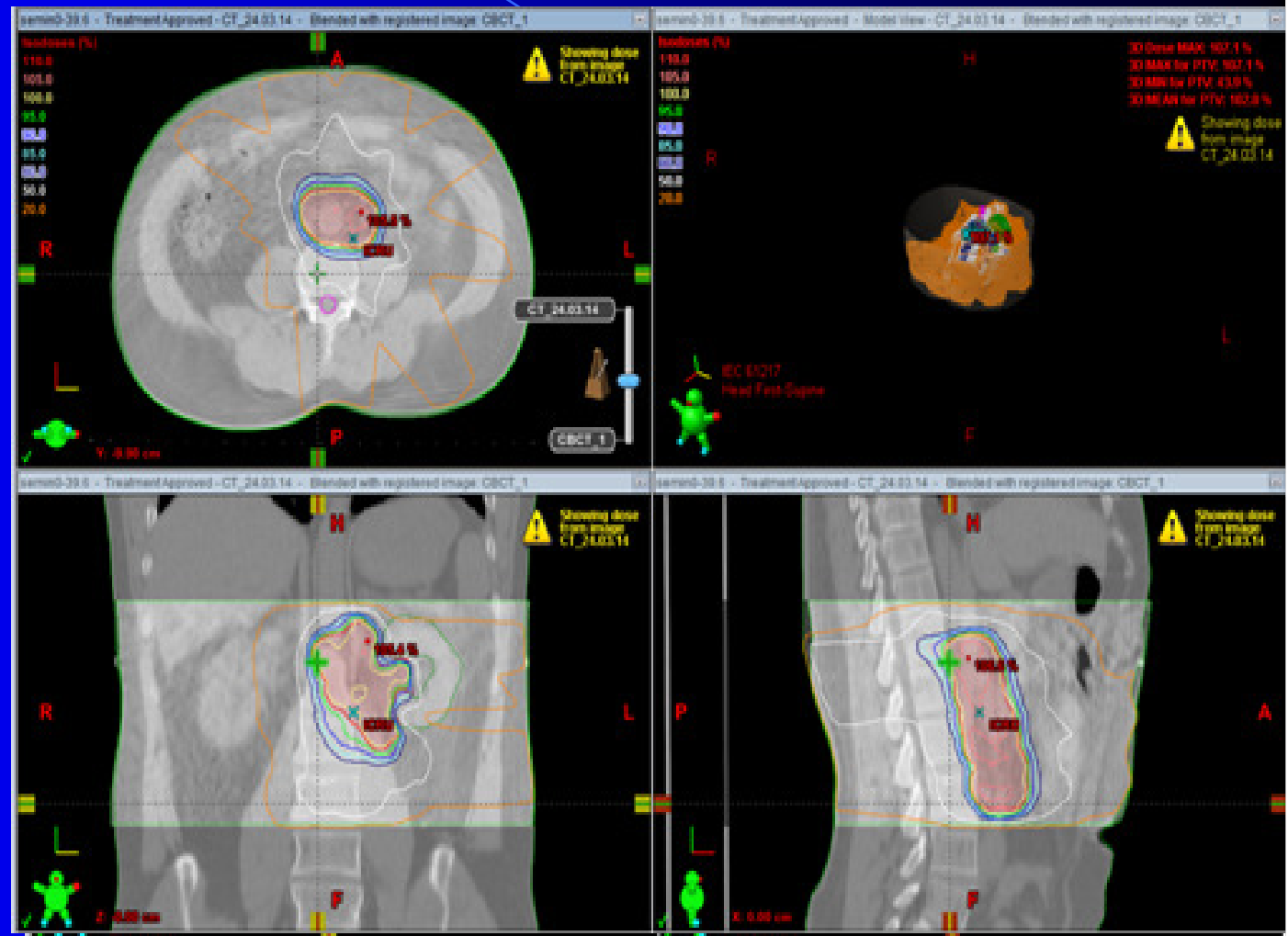


Couch Position (IEC 61217 Scale) and Shift

	TARGET	ACTUAL	SHIFT		TARGET	ACTUAL	SHIFT	
Couch Vrt	-17.4	-17.4	0.0	<input checked="" type="checkbox"/> Include	Couch Lat	-2.1	-2.2	+0.1 <input checked="" type="checkbox"/> Include
Couch Lng	117.1	117.1	0.0	<input checked="" type="checkbox"/> Include	Couch Rtn	0.0	0.0	0.0 <input checked="" type="checkbox"/> Include

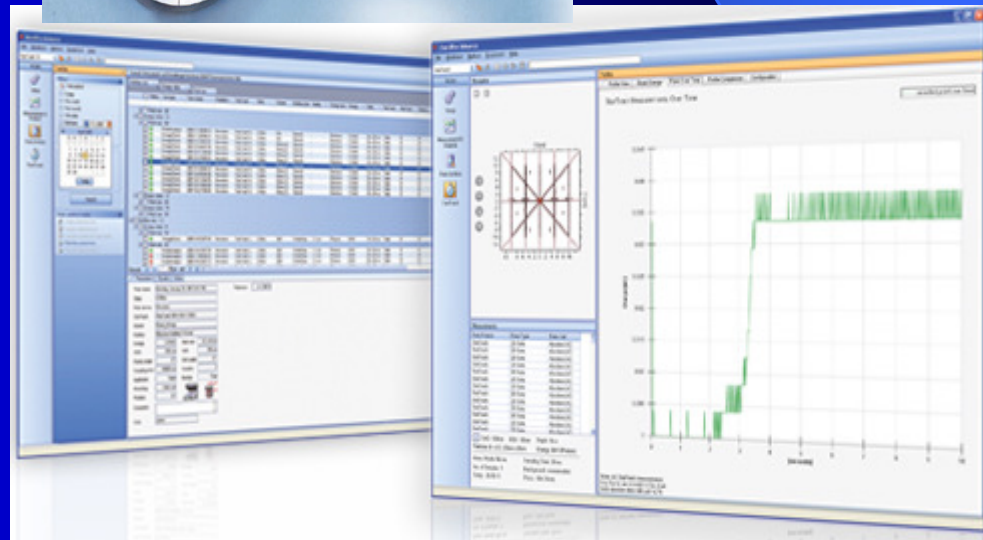
Reset Shift
Save Match
Apply Shift

treatment evaluation



Calibration in Radiotherapy

water phantom, ionizing chambers, electrometers, software for data collecting and analyzing... should also be calibrated

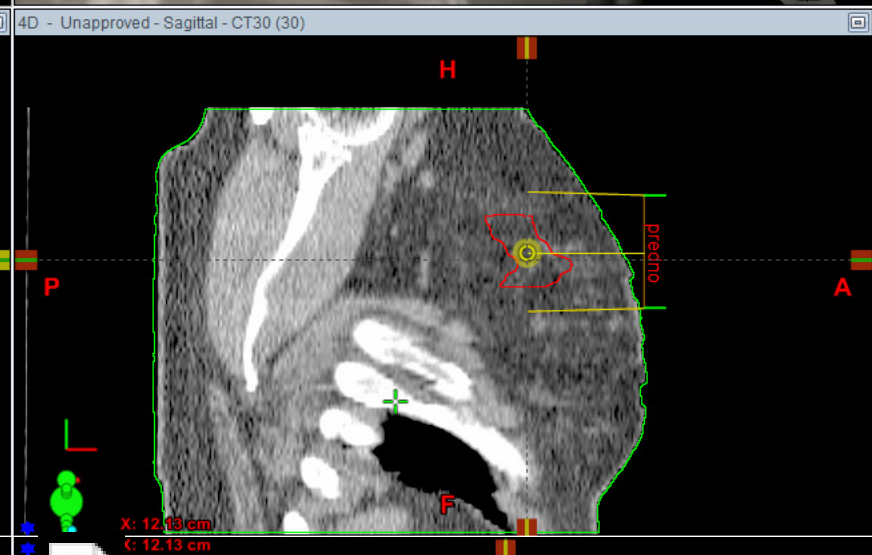
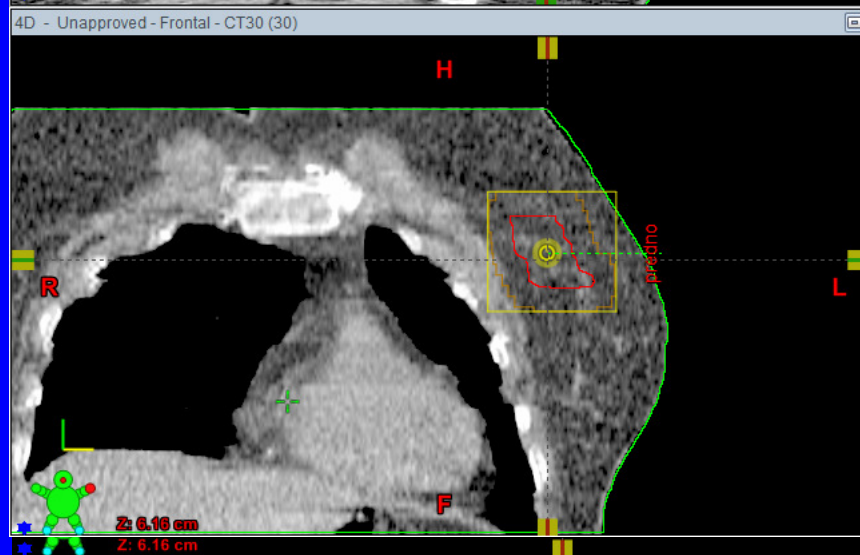
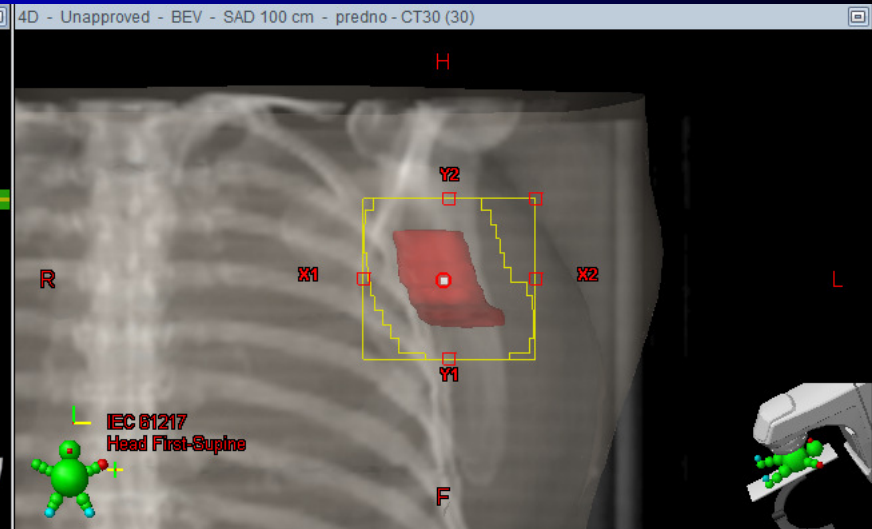
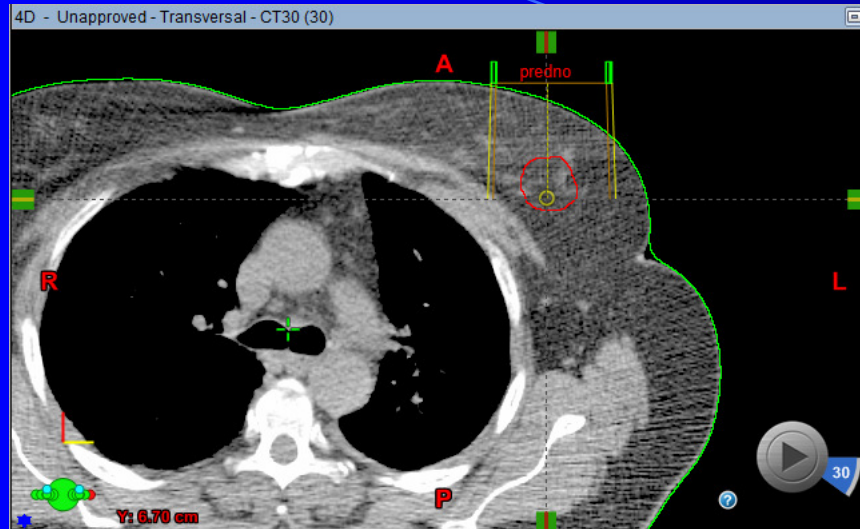


Radiation Protection

- Radiation safety service:
 - providing scientific and technical consultancy on the design of radiation facilities and the safe handling, storage and disposal of radioactive materials
 - specification, procurement and acceptance testing of complex and expensive medical equipment (radiotherapy linear accelerators and imaging equipment such as X-ray CT scanners and MRI scanners)
- Staff education

Research

- there is always a need for applied research and development work within hospitals because of the rapid technical developments in equipment used in medical imaging and therapy
- Finding the optimum way to use new equipment and designing practical and robust methods for implementing technology in a busy clinical workplace are challenges that face most medical physicists at some stage.



● patient breathing



VIDEO0099.3gp



