



# EFOMP

***Medical Physicists***

***Improving treatments, saving lives***

The importance of physics, engineering and  
technology in healthcare



# EFOMP

***Physiciens médicaux  
Amélioration des traitements,  
sauvant des vies***

L'importance de la physique, l'ingénieur et la  
technologie pour la santé



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Medical physicists working for  
radiotherapy

Les physiciens médicaux en  
radiothérapie

*Medical physicists – improving treatments, saving lives*

Fitting an electron beam applicator to a linear accelerator



Placement de l'applicateur des électrons pour l'accélérateur linéaire

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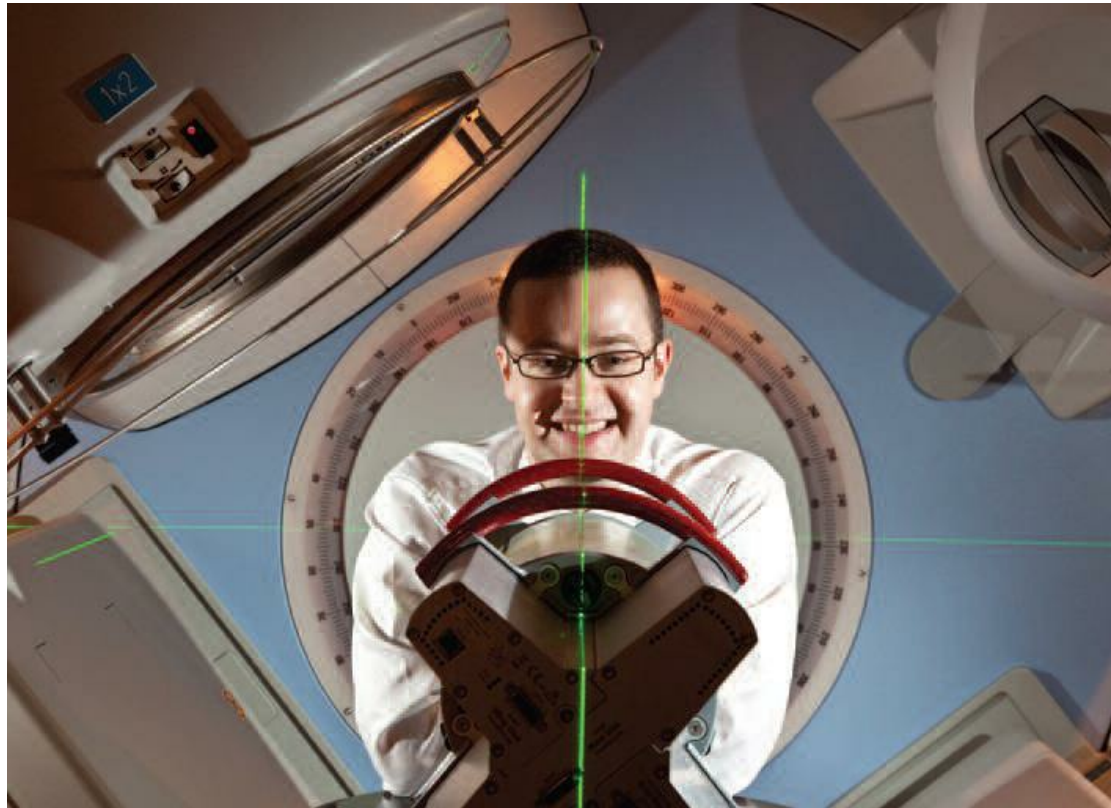
Acceptance tests on a new linear accelerator



Vérification de la mise en service d'un nouveau accélérateur linéaire

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Checking accelerator beam alignment



Vérification d'alignement du faisceau d'un accélérateur linéaire

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Reference dosimetry measurements for treatment planning



Mesures des dose de référence qui entre dans la planification des traitements

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## Precision dosimetry at the French national laboratory



Dosimétrie de précision au laboratoire national français



## *Medical physicists – improving treatments, saving lives*

Fitting an end-plate electron beam applicator to a linear accelerator for dose measurements in a water tank



Placement d'un plateau de l'applicateur des électrons pour l'accélérateur linéaire afin de mesurer les doses absorbées dans une cuve rempli d'eau

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Setting up a water tank for reference dose measurements



Mise en place d'un cuve d'eau pour les mesures de dose de référence

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Making reference dose measurements for radiotherapy



Mesurant les doses de référence pour la radiothérapie

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Setting up a plastic « phantom » with a thimble chamber for reference dose measurements



Mise en place d'un bloc en plastique qui représente le corps humain avec une chambre en de pour les mesures de référence

## Performing linear accelerator dosimetry



Faisant les mesures de doses dans le faisceau d'un accélérateur linéaire

## Image-guided radiotherapy monitoring



Vérification de la radiothérapie guidéait par les images

## Checking treatment machine alignment



Vérification d'alignement de l'accélérateur avec l'iso centre

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## Film dosimetry for treatment planning verification



Radiothérapie dosifilme pour la vérification du planification  
du traitement



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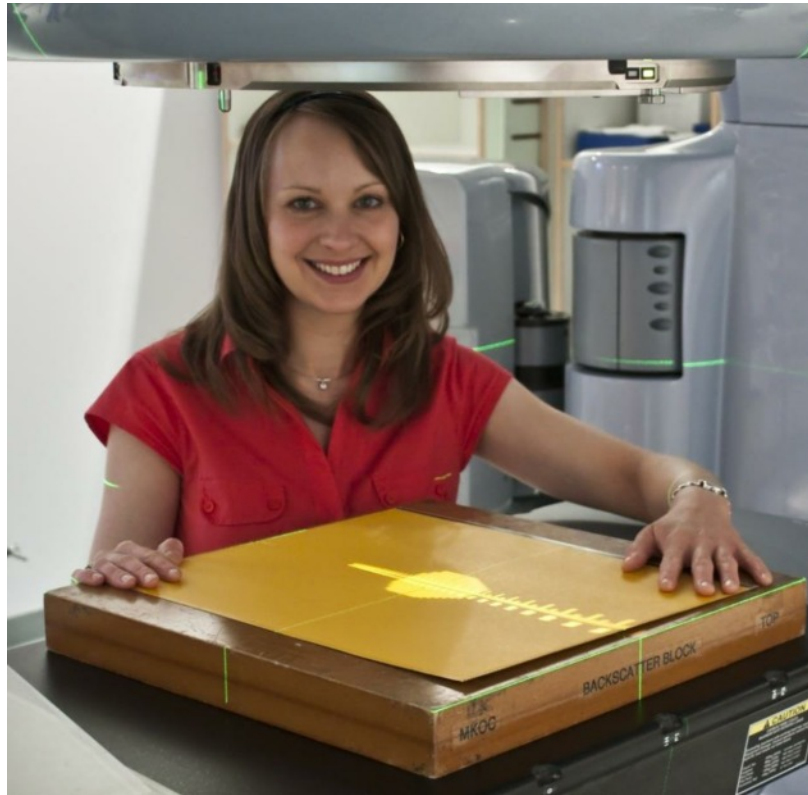
Testing respiratory-gated treatment using a patient model



Utilisation d'une maquette du patient pour tester l'efficacité du traitement quand c'est lié avec la respiration

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Measurements for the UK National IMRT Audit



Des mesures faites pour l'audit national (GB) dans le domaine de la radiothérapie par modulation d'intensité

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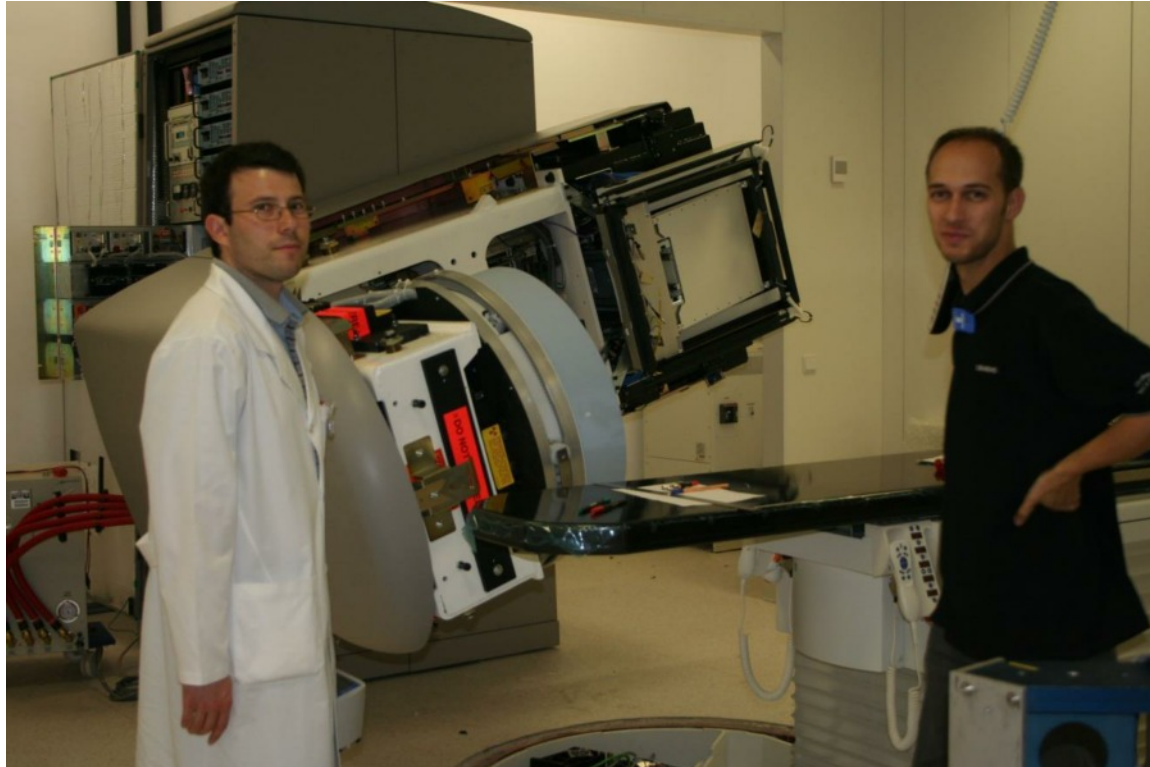
Checking results and signing off linear accelerator QA in compliance with national QART requirements



Vérification des résultats d'assurance qualité pour l'accélérateur linéaire et signature en accord avec la procédure requise dans les audit nationaux QART

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Linear accelerator acceptance testing



Mesures afin de vérifier la mise en service d'un accélérateur linéaire

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Treatment planning audit; comparison of calculated and measured doses



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Measurement of I-125 seeds for prostate  
brachytherapy



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## Precision measurements for brachytherapy dosimetry



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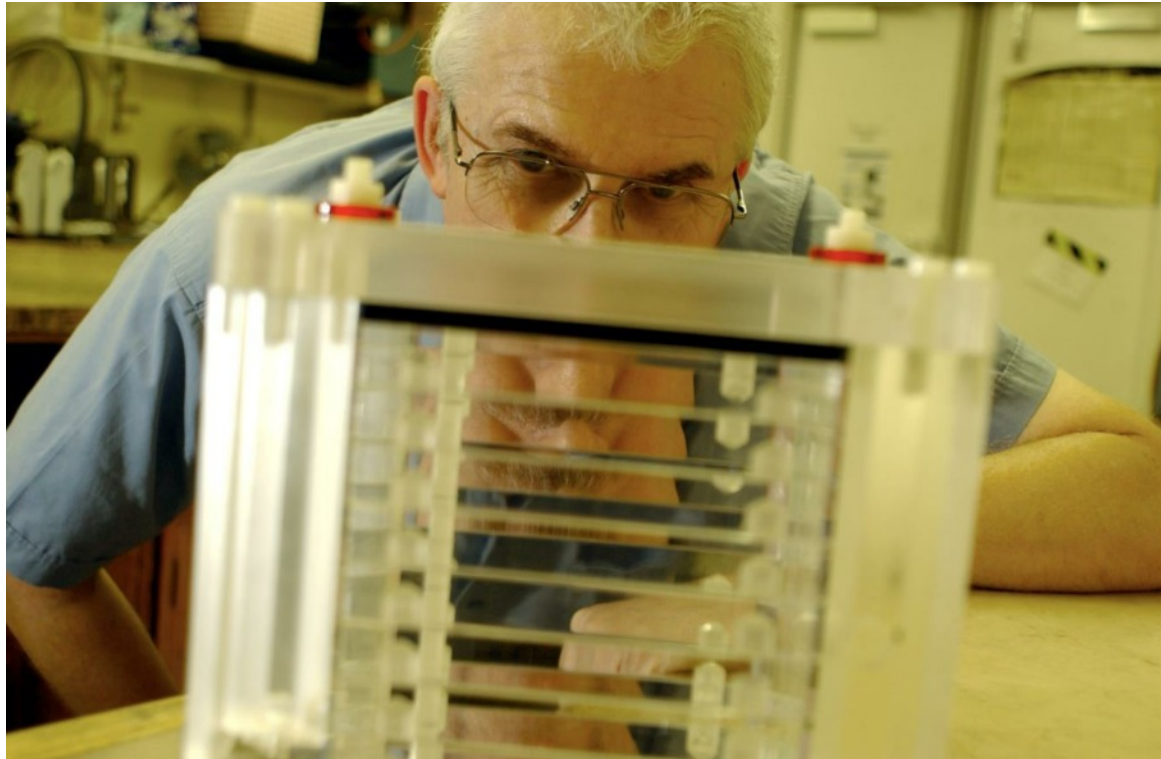
## Innovative radiosurgery





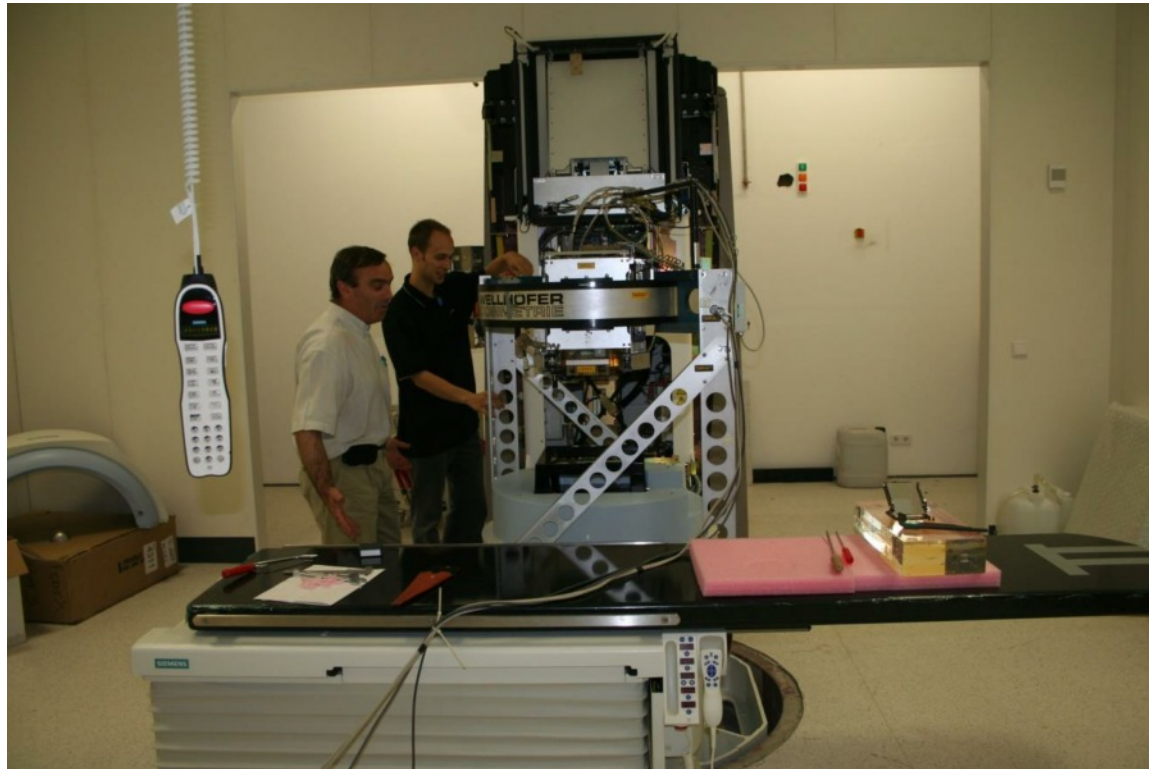
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Final checks on the fabrication of a stereotactic radiosurgery beam alignment phantom



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Linear accelerator first-line maintenance

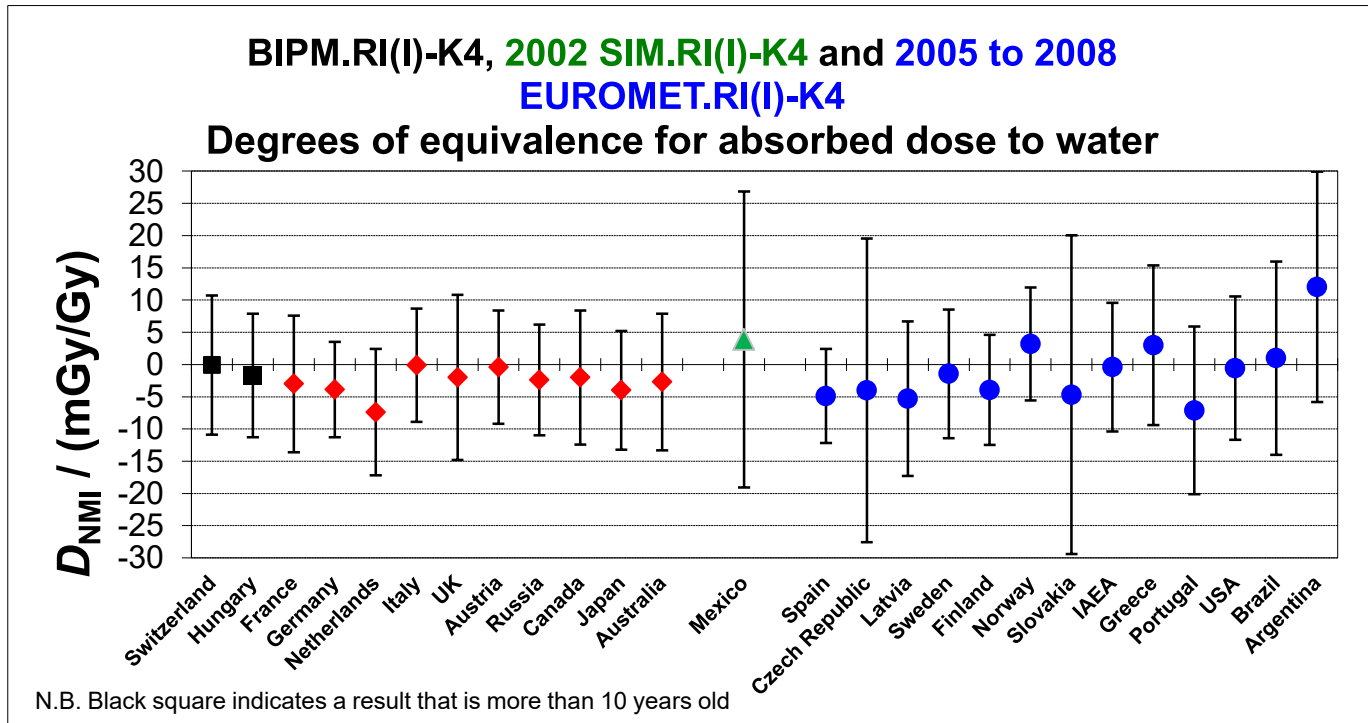


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Acceptance testing of a new linear accelerator



## International traceability for radiotherapy dosimetry





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diagnostic radiology

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Optimization of an automatic x-ray exposure device



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Image quality verification for an x-ray image intensifier



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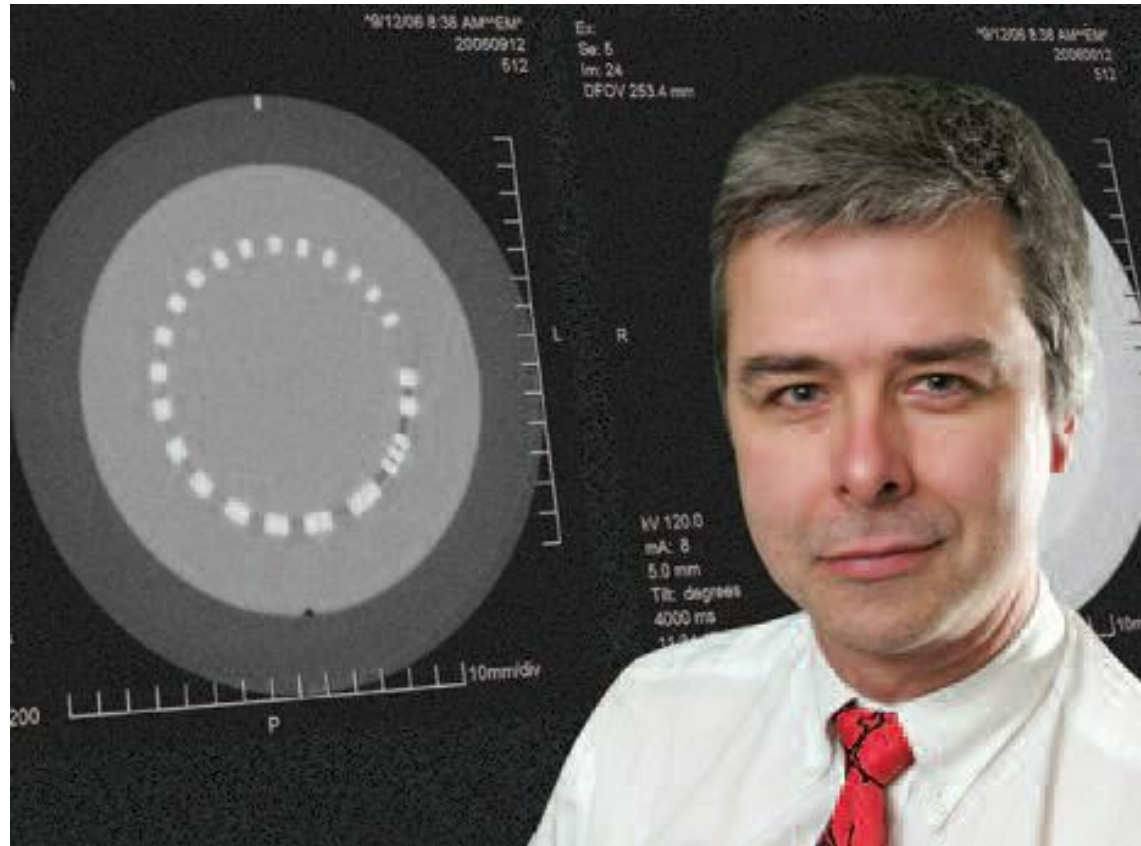
## International traceability for mammography beam calibrations





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Verifying x-ray image quality



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Performing QA on dental radiology equipment



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Quality assurance checks for diagnostic x-ray unit



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Performing QA checks on an x-ray unit



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Image quality checks for CT using a patient-phantom



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Performing CT QA with a special patient phantom





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interventional radiology

## Quality control for interventional radiology





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Image quality assessment of a C-arm x-ray image intensifier



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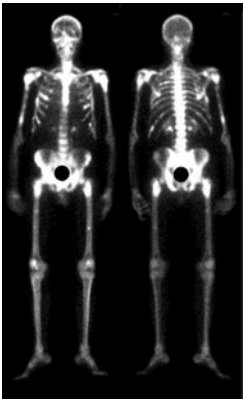
Calibrating primary reporting monitors to DICOM greyscale standard





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Medical physicists working for  
nuclear medicine imaging



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Measurements of gamma camera resolution



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Patient in a dual-headed SPECT scanner



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A combined PET-CT scanner



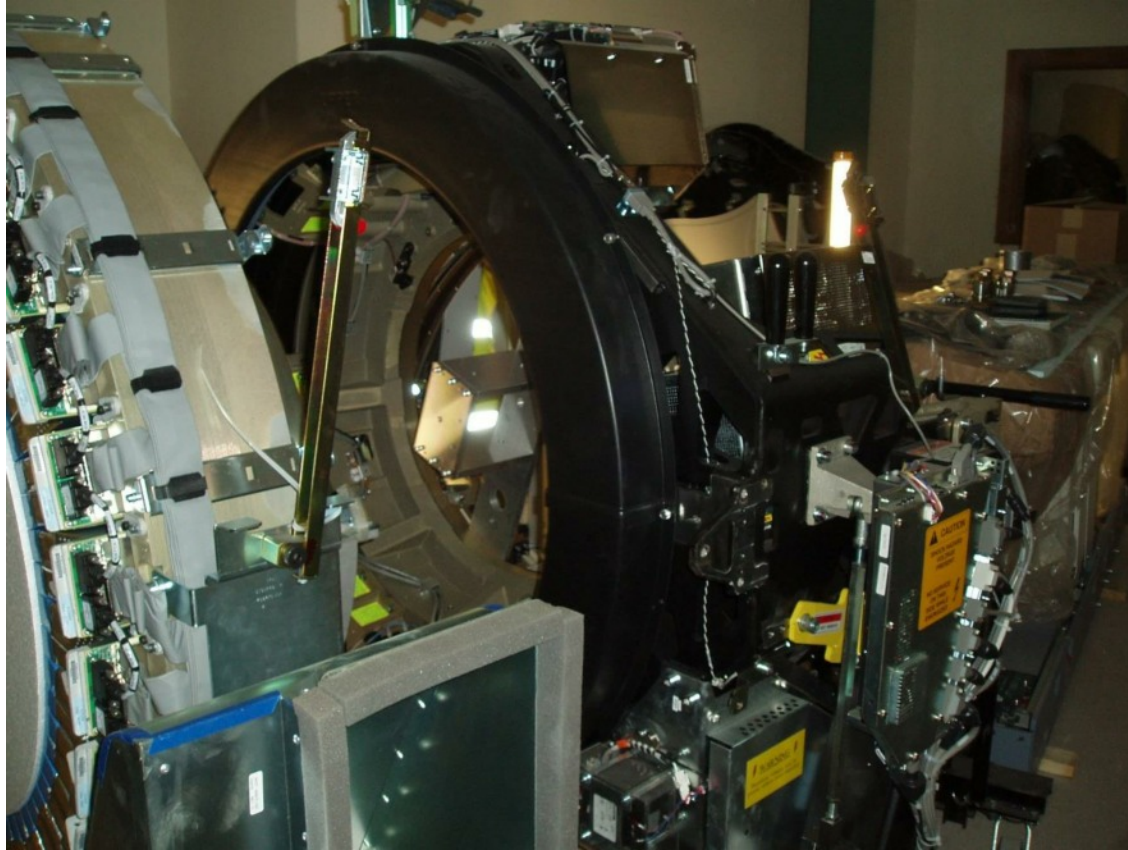
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## The clinical team



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Covers off the PET-CT scanner





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## Cyclotron for producing PET radionuclides



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Inside the cyclotron that produces the short-lived PET radionuclides



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Preparing a radiopharmaceutical patient injection for nuclear medicine imaging



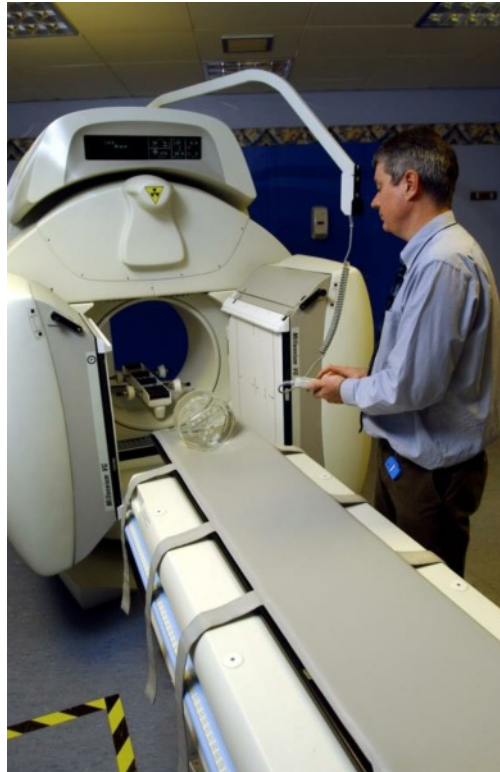
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Setting up a patient for the gamma camera



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Performing image quality tests on a gamma camera with  
CT attenuation correction



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## Radiochemical preparation for imaging radiopharmaceuticals



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Analysing the PET and CT images



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Quality assurance on a SPECT-CT scanner





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Monitoring image quality on a SPECT-CT scanner



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Quality assurance on a SPECT-CT scanner





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Medical physicists working for  
nuclear medicine therapy  
(molecular therapy)

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Checking for residual iodine activity prior to discharge



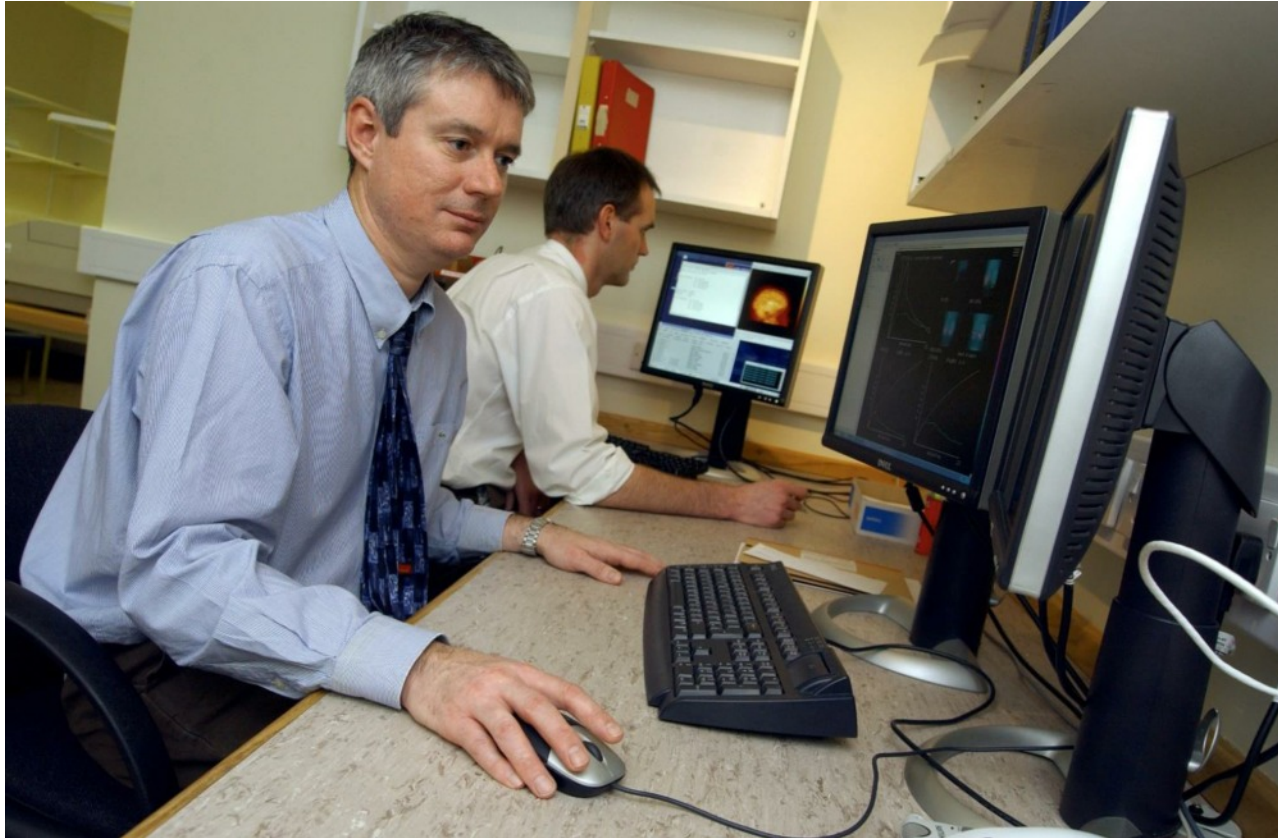
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### Analysing quantitative nuclear medicine images



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Analysing quantitative nuclear medicine images





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Medical physicists working for  
magnetic resonance imaging (MRI)

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Innovation – first magnetic resonance imaging system



Image courtesy of the University of Aberdeen



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Innovation – first MR image, through the liver showing multiple metastatic deposits in purple

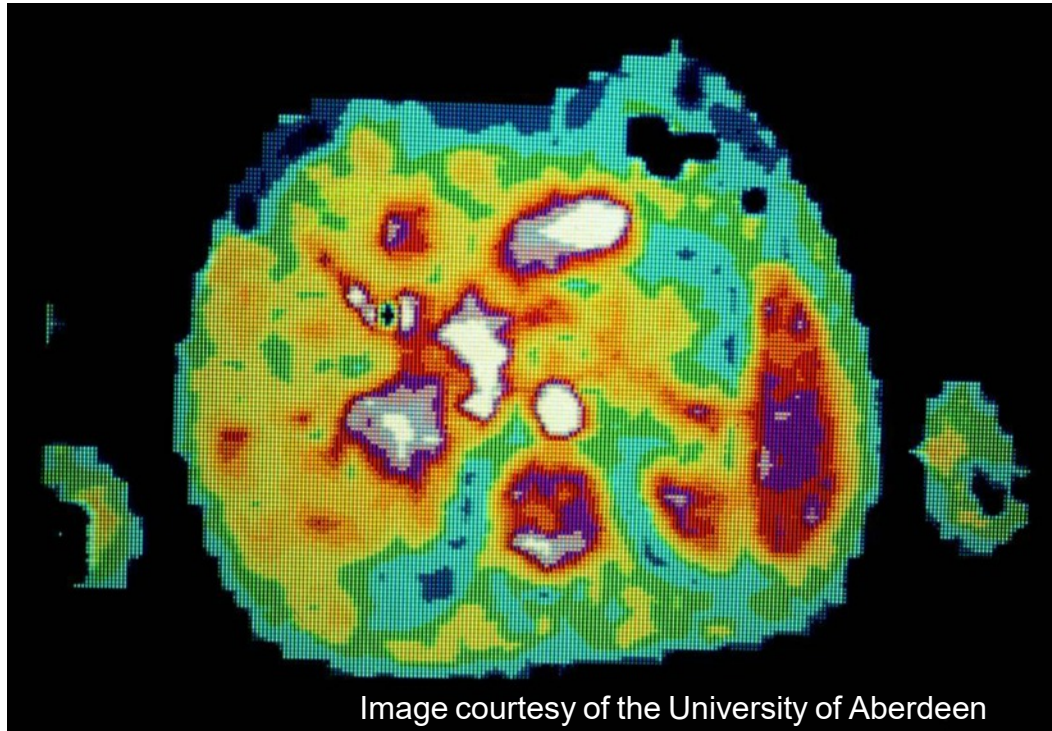


Image courtesy of the University of Aberdeen

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Setting up a volunteer with a new RF-coil for an MRI scan



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pMRI



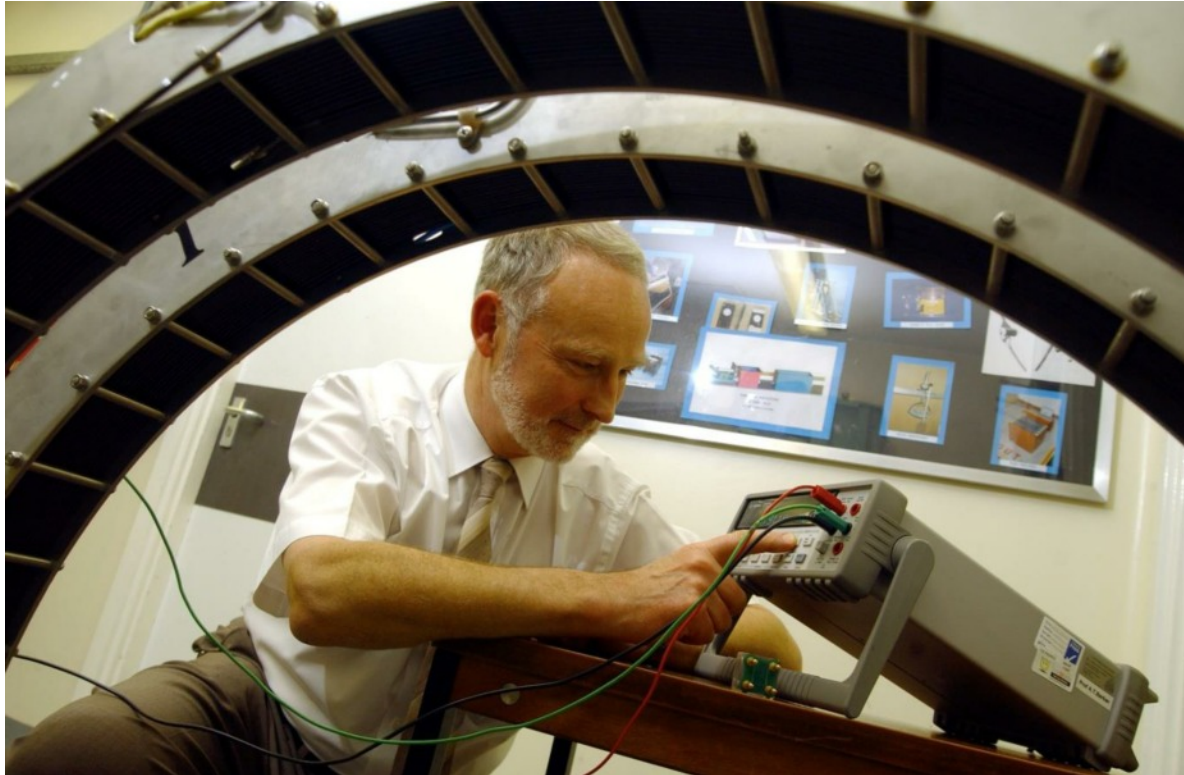
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Checking that a fabricated MR phantom fits the coil



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## Testing specialist MR Coils





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Medical physicists working for  
ultrasound diagnostic imaging and  
therapy

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Setting up for MR guided high-intensity ultrasound with temperature measurement control





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Medical physicists working for  
ultraviolet therapy



## Dosimetry of a phototherapy UV cabin



Image courtesy of Dr Freeman (GSTT)



## Assessment of a UV unit spectrum

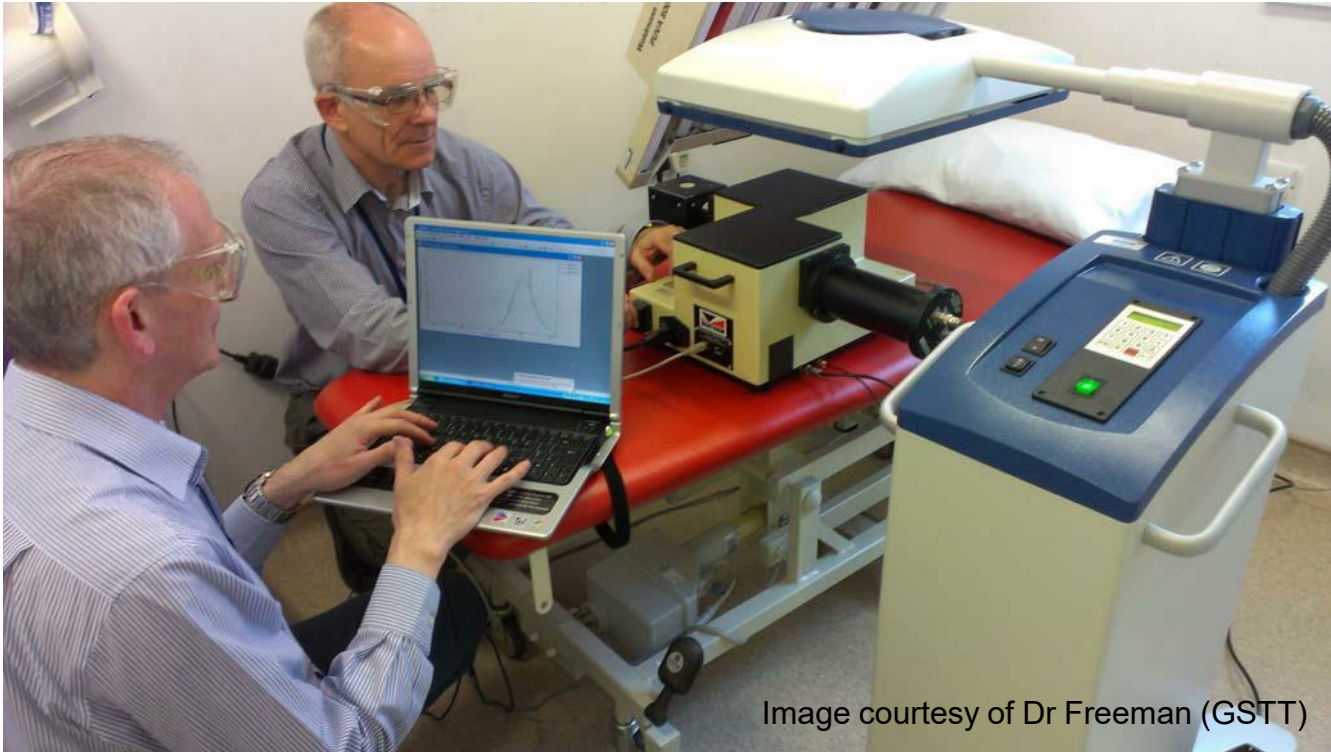


Image courtesy of Dr Freeman (GSTT)

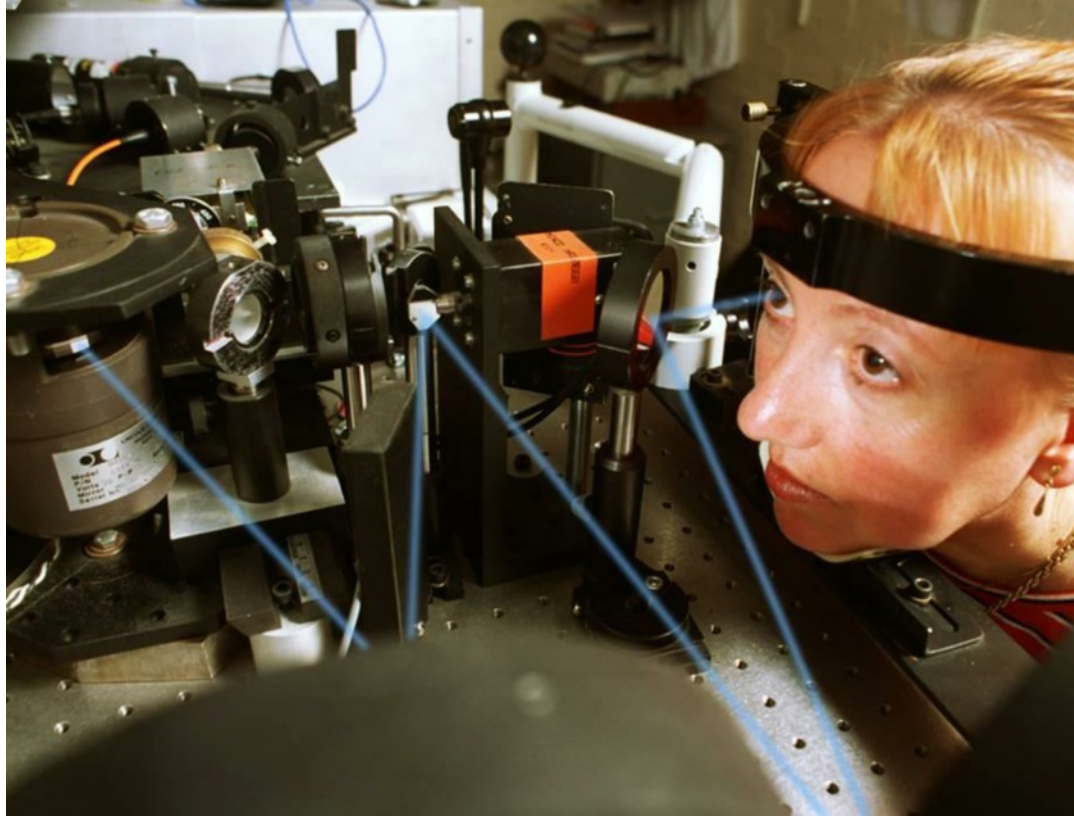


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laser applications

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## Innovative retinal imaging using a laser



## Laser ophthalmoscope retinal image





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clinical engineering

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Innovative haemodialyser for treating very small babies



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**Innovation – mobility for a paraplegic child**





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Innovation – realistic prostheses that really work



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Light source output testing



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Repairing an incubator and monitor



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Demonstrating the Gait Laboratory analysis software



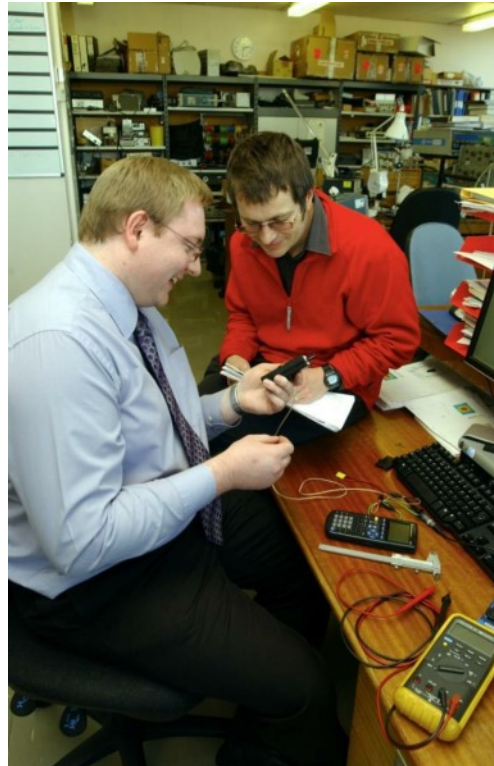
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Apnoea monitor repair



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Electronic engineers discussing a medical device design



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Precision machining for a medical device





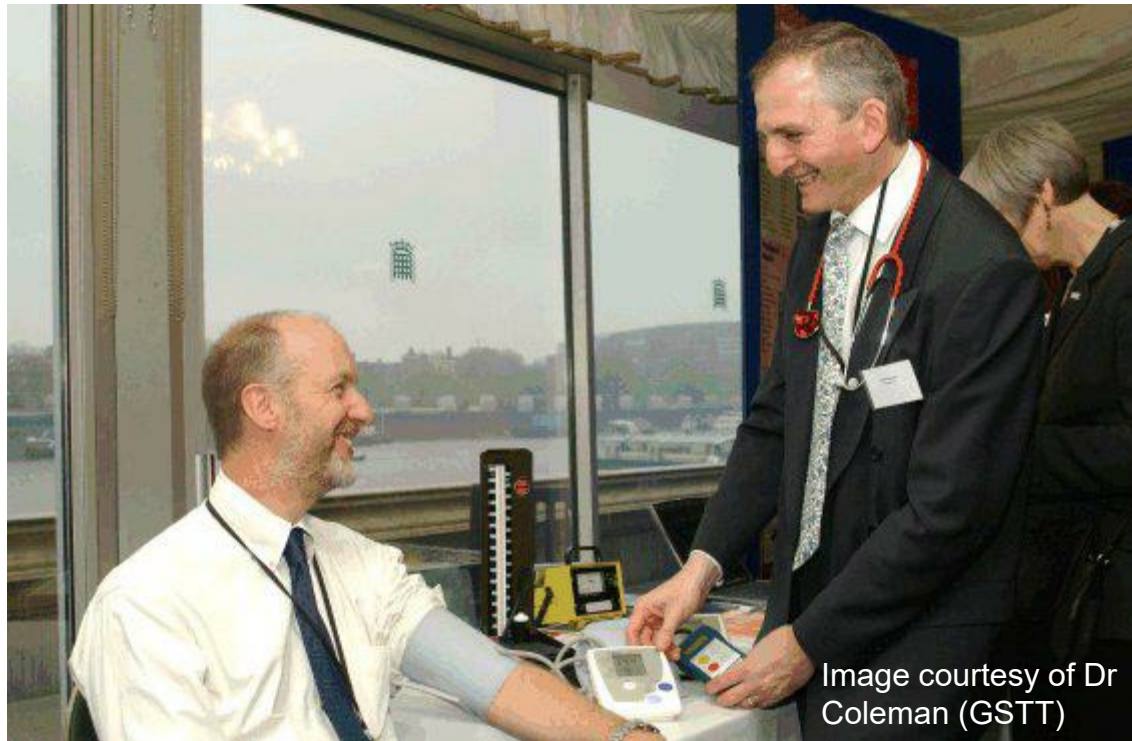
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Medical physicists working for  
physiological measurements



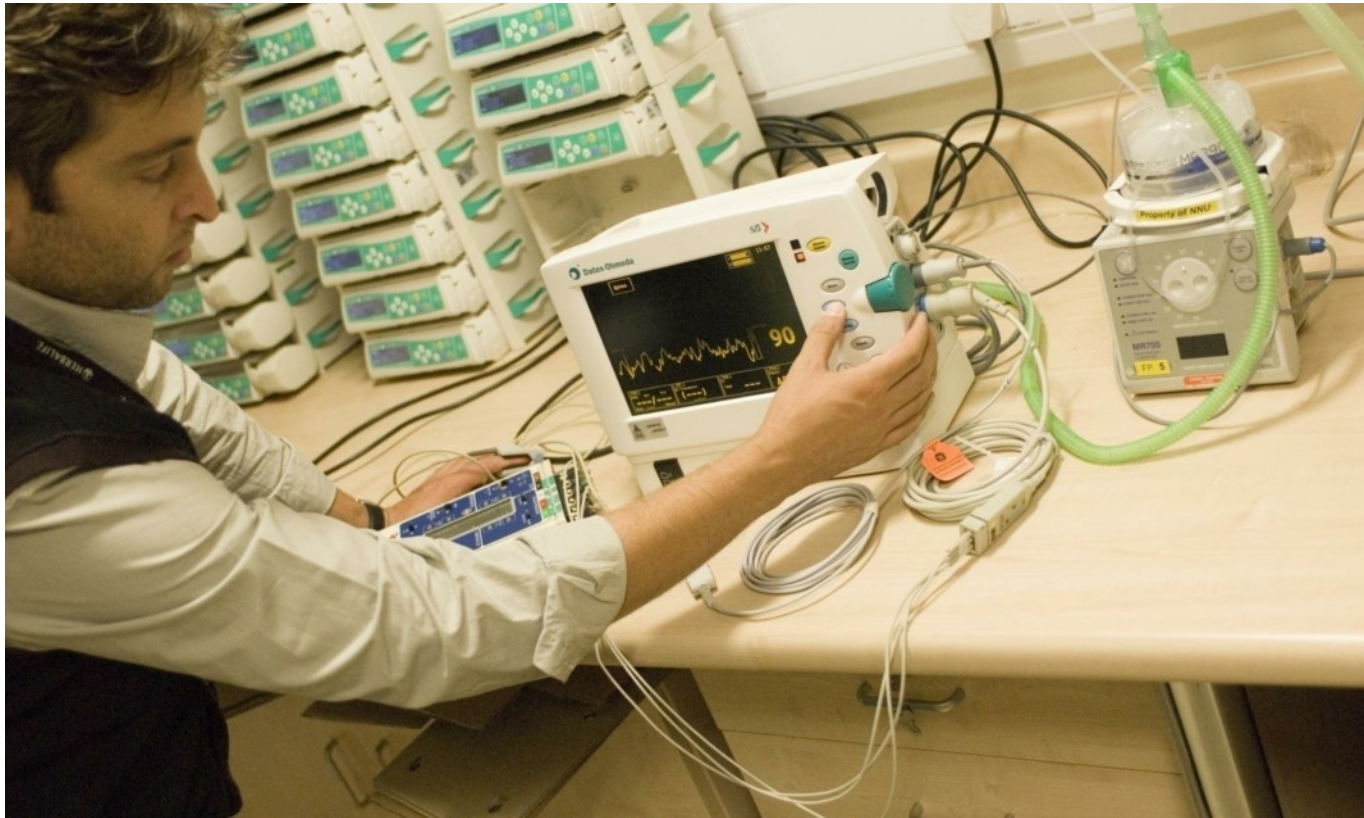
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Validation and calibration of digital pressure monitors



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Electrical testing of monitoring equipment



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Urgent repair needed for an ECG monitoring head



## Vestibular function test



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Assessing visual function



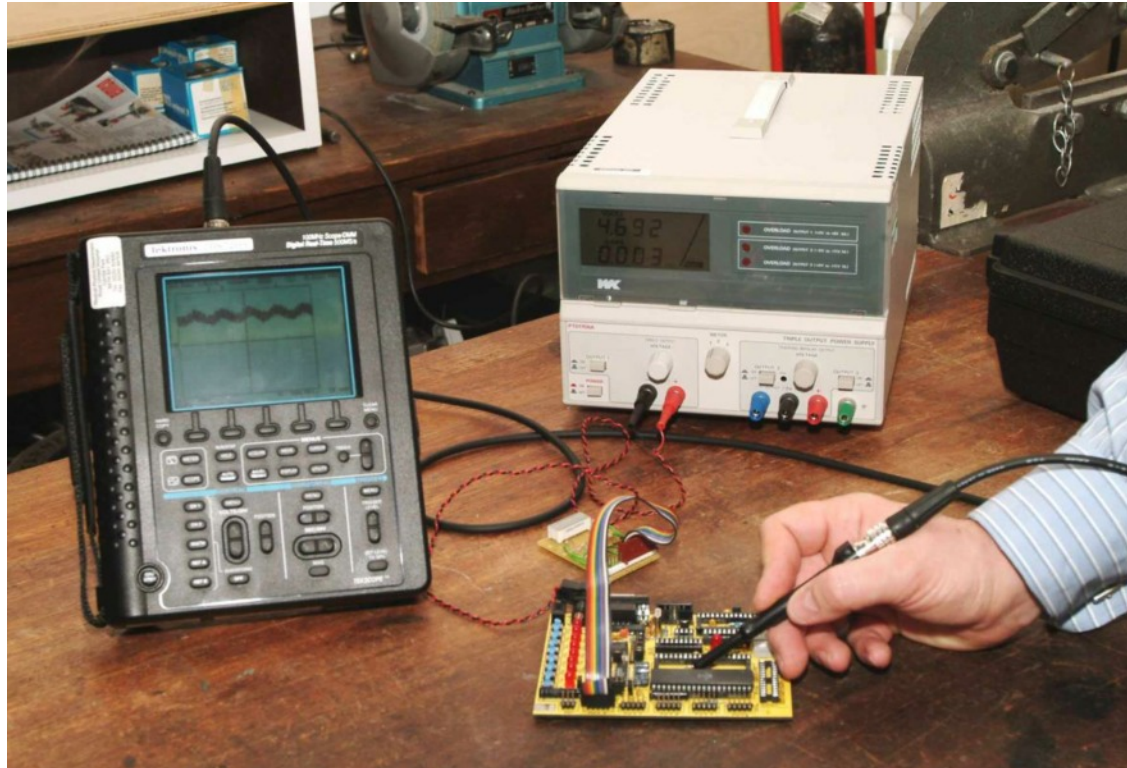
## *Medical physicists – improving treatments, saving lives*

- Mobile phone antenna monitoring for staff safety



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Electromagnetic compatibility testing at component level





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Medical physicists working for the  
safety of staff and patients



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## Assessment of a surgical light against the *Control of Artificial Optical Radiation at Work* 2010 regulations



Image courtesy of Dr Fedele(GSTT)

Vérification de la lumière chirurgicale émise contre la réglementation anglaise *Control of Artificial Optical Radiation at Work* 2010

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Checking radiation leakage from a radiotherapy vault



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### Radiation monitoring around a radiotherapy installation



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Calibrating a radiation contamination monitor



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Checking for radiation leakage from an accelerator head using x-ray films to identify where to make measurements



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Searching for a lost radioactive source in compacted waste



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Testing and calibrating a contamination monitor



## Acknowledgements

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