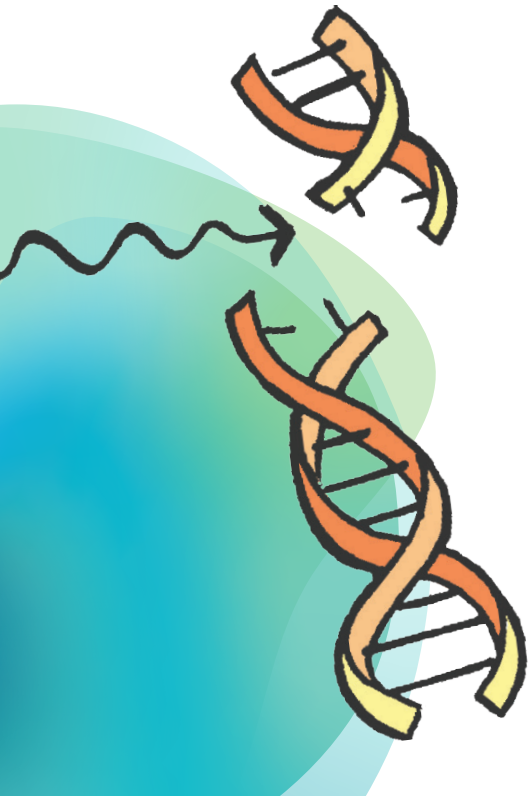
The Scientists

Medical physicists help plan complex treatments, ensure the machines deliver the right dose and advise on new equipment. They also take part in research to develop new techniques and treatments.

Radiotherapy technologists have a wide range of roles. Dosimetrists produce most treatment plans. Other technologists produce radiation shields or immobilisation for patients, prepare and apply brachytherapy sources, maintain the equipment or manage IT and quality assurance issues.

Radiation protection experts make sure that radiation safety measures are adequate and being followed and also provide radiation safety advice for staff and the public.

Clinical computing staff help to specify, set up and maintain the specialised computing systems needed for radiotherapy. They may also write and maintain software.



This series of leaflets highlights the science and the scientists behind some widely used medical techniques.

They are produced by the Institute of Physics and Engineering in Medicine. To find out more about Medical Physics or Clinical or Biomedical Engineering, or to request free leaflets or posters in this series, contact us:

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The techniques described in this leaflet are only available in certain cases and some are not yet widely available. If you need radiotherapy, your doctor will advise on the best treatment for you.

This leaflet was produced with the help of IPEM's Radiotherapy Special Interest Group.

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IPEM
Institute of Physics and Engineering in Medicine

The Science & The Scientists

Treating cancer with radiation

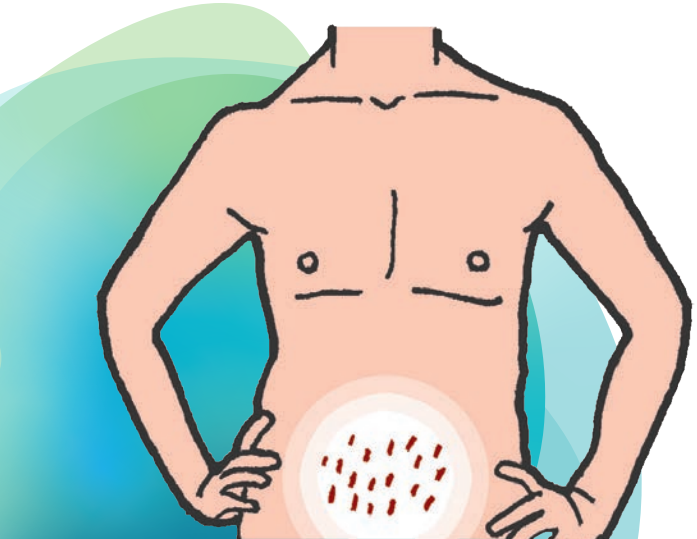
One of the best ways to treat cancer is to expose it to high-energy radiation (radiotherapy). This damages the cancer cells and stops the cancer growing. Radiotherapy can cure cancer or reduce the patient's symptoms.

The Science

Medical physicists, doctors, radiographers and technologists work on the radiotherapy treatment together. They use medical scans to look inside the body and accurately locate the tumour. They must then decide on the best treatment method and the distribution and dose of radiation needed.

The radiotherapy team may choose to use **brachytherapy**, placing one or more radioactive capsules on or in the body, near the tumour or inside it.

Radiation emitted from the capsule treats the cancer.



If they choose to use external beam radiotherapy, they will apply beams of high-energy radiation to the patient, usually in the form of x-rays. A linear accelerator (linac) makes the x-rays. It does this by smashing sub-atomic particles into a tungsten plate at almost the speed of light. It can also produce electron beams to treat superficial cancers.

Linacs use metal shutters that move in and out of the radiation beam. This shapes the radiotherapy beam to match the shape of the tumour, which limits damage to surrounding tissues.

When radiation hits the cancer, it damages the DNA of the cancer cells, which stops them from replicating. Radiation can damage healthy cells too, although they are less vulnerable than cancer cells.

Instead of using x-rays, beams of particles such as protons can be used. **Proton radiotherapy** is particularly useful for some childhood and spinal cancers and is becoming more widely available.