Internal radiotherapy is when you have radioactive material placed inside your body to treat cancer. This material can be radioactive implants like metal wires, seeds, or tubes. Or it can be radioactive liquids like a drink, capsule or injection.

With some types of internal radiotherapy, you do not become radioactive, and it is safe to spend time with friends and family afterwards. Or you might need to spend some time in isolation or take extra care. Your treatment team will tell you what to do. Ask questions and make notes if this is helpful for you. Radiotherapy is a very personalised treatment depending on the cancer and the patient, so the advice you get will be specific to you.

Below you can read a short summary of different types of internal radiotherapy and how they work. You will also see links to further information.

Brachytherapy

Brachytherapy is a form of radiotherapy where radioactive implants are placed, inside, on or near a tumour. These implants produce radiation called gamma-rays. Gamma-rays have the same effect on cancer cells as the rays used in external beam radiotherapy. They damage the DNA inside the cancer cells which stops the cancer cells growing, repairing and multiplying.

Brachytherapy can be used for certain prostate, breast, cervical, endometrial and skin cancers.

There are two main types of brachytherapy: low dose rate (LDR) and high dose rate (HDR).

a) Low Dose Rate brachytherapy (LDR)

Small radioactive ‘seeds’ are permanently implanted near or in the tumour. These stay in place, releasing small amounts of radiation over several weeks or months. Most commonly this is used for treating localised prostate cancers. This is when the cancer has not spread outside of the prostate gland or to any other parts of the body. People can often get back to their usual activities a day or two after the ‘seeds’ are put inside them.

In some cases, you might need to stay in hospital to have brachytherapy. For cervical cancers, an applicator is used to help deliver the source of radiation. You need to be still, and lying down, so a stay in hospital helps with this.

Permanent implants become less radioactive each day. The radiation doesn’t usually go much farther than the area of the implant. Your medical team may instruct you to take some safety precautions directly after the procedure. They will tell you what to do.

b) High Dose Rate brachytherapy (HDR)

High dose rate brachytherapy is based on similar principles to low dose rate brachytherapy, but the delivery is slightly different. Firstly, the radioactive implants are taken out at the end of each treatment session.

Secondly, the radiation delivered is more intense but short-lived. Patients usually attend between one and three treatment sessions. HDR brachytherapy is often given alongside External Beam Radiation Therapy (EBRT).

Further information about brachytherapy

[About Brachytherapy](https://aboutbrachytherapy.com/)

https://aboutbrachytherapy.com/

[Varian Patient Portal](https://patient.varian.com/en/treatments/brachytherapy)

https://patient.varian.com/en/treatments/brachytherapy

Radioisotope or Radionuclide therapy

Radioisotopes and radionuclides are elements that radiate energy that can be used to treat diseases. This therapy uses a radioactive substance to targets tumour cells specifically, even if they are spread throughout your body, and then delivers radiation to cure or control the cancer. It can be placed in your body in different ways, either taken as a pill, drink, injected into the place of the tumour (like the liver), or injected into the blood stream, where it travels throughout the body.

As the radioactivity is attached to a carrier that binds cancer cells, that is where it will go. The radioactivity will then damage the DNA of cancer cells to a level that cannot be repaired and the cancer cells then die. This is different to chemotherapy, as radioactive therapy will only target cancer cells. This can reduce the potential side effects caused by radiation damage to healthy cells and allow high doses of radiation only at the cancer sites.

For this type of treatment, you may need to stay in hospital for a few days. This is to make sure that enough of the radioactivity has disappeared from your body. People who receive radionuclide therapy may need to take special precautions for the first few days after treatment. Your treatment team will discuss these precautions with you.

SIRT (also known as radio-embolisation)

SIRT is ‘Selective Internal Radiotherapy,’ also called ‘Radio-Embolisation’ (RE). It is a method of treating liver tumours.

It delivers high doses of radiation over long periods of time and is different from external beam radiation.

Millions of tiny ‘beads’ are injected into the arteries inside the liver. These microspheres are too small to see with the naked eye. Each microsphere is much smaller than the width of a human hair.

These microspheres contain a radioactive isotope substance. The microspheres are injected into the liver. They get lodged in the blood vessels that supply the tumour and deliver radiation that kills the tumour cells. This radiation only affects a small area. The liver tumour is directly targeted, doing little damage to the surrounding healthy liver.

The microspheres also help to cut off the blood supply to the tumours. This stops oxygen and essential nutrients getting to cancer cells. The radiation effect on the tumour lasts for about two weeks. After two weeks only 3% of the initial radiation remains and after one month it has all gone. The effects of the radiotherapy and damage caused to the cancer last much longer though.

Intra-operative Radiotherapy (IORT)

Intra-operative radiotherapy (IORT) is when radiation is delivered to an area during surgery. It can be the cancer itself or the area the tumour is removed from. The radiation used can be low energy x-rays or electrons. It is most commonly used in the treatment of breast cancer. However, it can be used for other tumours, like cancer of the cervix.

In the case of breast cancer a single dose of IORT is delivered at the time of breast conserving surgery (also known as a lumpectomy). In some cases, using IORT means the patient does not need External Beam Radiotherapy (EBRT).

The IORT machine delivers low-energy, high-dose radiation directly to the area where the tumour has been removed. This happens in the operating room under anaesthetic.  Part of the IORT machine is placed directly into the surgical site. Here it delivers a small dose of radiation. The types of radiation used are electron beams, X-rays or high-dose-rate brachytherapy. Afterwards, the surgery site is closed.