

Interventional Oncology

**Patient Awareness**

**Interventional Radiology:**  
your minimally invasive alternative

[www.cirse.org](http://www.cirse.org)

Cardiovascular and Interventional Radiological Society of Europe

## CANCER : The Whys and Hows

**Minimally invasive treatments help cancer patients extend life and improve quality of life**

### What is Cancer?

Normally, cells grow and divide to form new cells as the body needs them. Old cells eventually die and new cells take their place. Sometimes, this orderly process goes wrong: new cells form when the body does not need them and old cells do not die when they should. These extra cells can form a mass of tissue, known as a tumour. Cancerous tumours are abnormal and divide without control or order. Metastases occur when a single tumour cell or clump of cells spread into the bloodstream or lymphatic system, travel to a new organ, multiply and then regrow their vascular structure to obtain a supply of blood for delivery of nutrients.

### Diagnosis of Cancer

Various tests can help in the diagnosis of cancer, including:

- blood tests
- physical examination
- imaging
- biopsy (a sample of tissue from the tumour or other abnormality is obtained and examined by a pathologist)

Open surgery is sometimes performed to obtain a tissue sample for biopsy. In most cases, tissue samples can be obtained without open surgery with interventional radiology techniques.

### Needle Biopsy

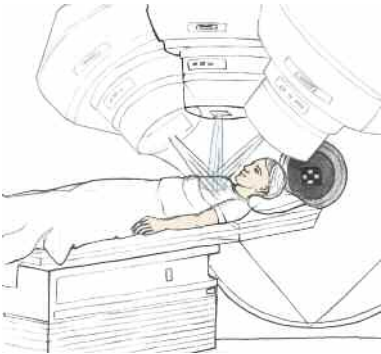
Also called image-guided biopsy, this is usually performed using a moving X-ray technique (fluoroscopy) or computed tomography (CT) to guide the procedure, allowing radiologists to see an area inside the body from various angles. This "stereotactic" equipment helps them pinpoint the exact location of the abnormal tissue, so it can be accurately sampled.

### Fine Needle Aspiration

A similar technique called fine needle aspiration can be used to withdraw cells from a suspected cancer. It also can diagnose fluids that have collected in the body.

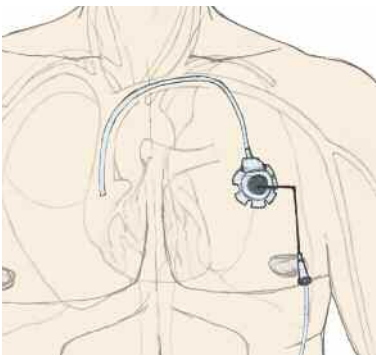
## Your Treatment Options

### Radiotherapy



High energy radiation is used to destroy the tumour. This generally requires many sessions over weeks or months.

### Chemotherapy



Anticancer medication is used to destroy the tumour. Depending on the clinical situation chemotherapy can be administered in different ways. Sometimes an implantable chamber is inserted under the skin and a small catheter drives the chemotherapy into the veins. This form of chemotherapy requires careful maintenance of the implantable port and numerous sessions are required.

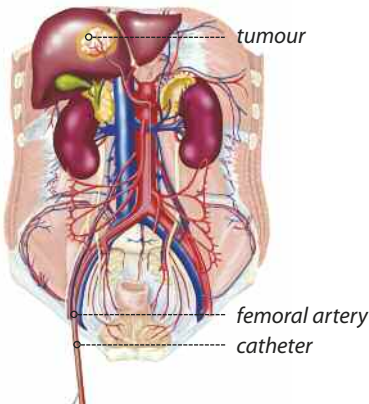
## Surgery



The surgeon opens up the body under general anaesthesia and removes the tumour. Surgical removal of tumours usually offers the best chance for cure. Unfortunately, tumours can be inoperable due to their large size or metastasis.

## Interventional Radiology Treatments

### Liver tumour chemoembolisation



Under local anaesthesia, a catheter is inserted into the femoral artery. Using careful and expert manoeuvres, the interventional radiologist advances the catheter into the hepatic artery and through it, injects the chemotherapeutic agents at a very high dose. As the injection is carried out selectively, it is possible to inject very high doses that are able to destroy the cancer without causing debilitating side effects.

### Results of Embolisation

In some patients, embolisation may shrink the tumour substantially, rendering the patient a suitable surgical candidate. In others, arterial embolisation effectively eliminates tumour-related symptoms and improves the patient's quality of life.

**Chemoembolisation** delivers a high dose of cancer-killing drug (chemotherapy) directly to the organ while depriving the tumour of its blood supply by blocking (embolising) the arteries feeding the tumour.

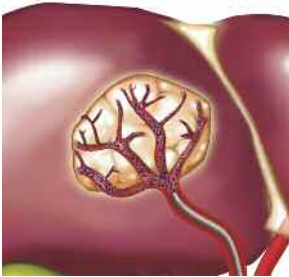
### Transcatheter Embolisation

Interventional radiologists inject tiny particles, the size of grains of sand, through a catheter and into the artery that supplies blood to the tumour. The particles cause clotting that decreases the tumour's blood supply, reducing pain.

### Yttrium-90 Radioembolisation

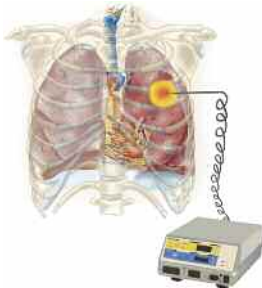
Radioembolisation is very similar to chemoembolisation but with the use of radioactive microspheres.

### Close-up of tumour embolisation in the liver



Microparticles loaded with the chemotherapy agent are injected directly into the tumour and destroy it very selectively without damaging the normal part of the liver.

## Lung Radiofrequency Ablation



**Under general anaesthesia, the interventional radiologist places a needle through the skin into the lung under CT guidance. The needle is connected to a generator that delivers the radiofrequency current solely into the tumour.**

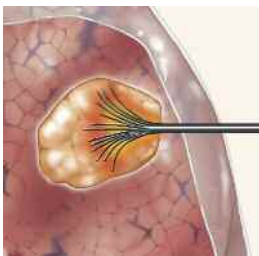
**Radiofrequency Ablation (RFA)** offers a non-surgical, localised treatment that kills the target tissue with heat, while sparing the healthy tissue.

### Other Ablation Treatments

**Cryoablation** is similar to RFA in that the energy is delivered directly into the tumour by a probe that is inserted through the skin. Rather than killing the tumour with heat, cryoablation uses an extremely cold gas to freeze it.

**Laser Therapy** causes cell death through the delivery of laser energy by a fibre-optic probe that is inserted into the tumour using imaging for guidance.

### Close-up of tumour ablation in the lung



The radiofrequency probe is deployed into the lung cancer under image guidance. A high level of energy is delivered locally and kills the tumour.

## Treatments for Cancer Complications

There are also a number of interventional radiology techniques that are used to treat the complications of cancer, including pain, bleeding, and obstruction of vital organs, blood clots and infection. Although these treatments do not cure cancer, they can make patients more comfortable, extend life and improve quality of life.

### How can interventional radiology improve the effective diagnosis and treatment of cancer?

Many procedures:

- require only an outpatient or a short hospital stay
- offer new cancer treatment options
- are less painful and debilitating for patients
- result in quicker recoveries
- have fewer side effects and complications



DNA

## NEW CANCER TREATMENTS ON THE HORIZON

**Interventional Radiology is playing a significant role in developing new techniques that may improve cancer treatment in the future.**

### "Magnetic" Chemotherapy

Interventional radiologists are currently investigating a new technique in which magnets are used to pull chemotherapy drugs into tumours. Physicians are hopeful that it will boost the effects of chemotherapy while avoiding some of the drugs' side effects, such as hair loss and nausea.

### Gene Therapy

In recent years, scientists have gained a new understanding of genes and the role they play in disease. This knowledge has set the stage for medical science to alter patients' genetic material to fight or prevent cancer.

**These techniques are still in development, but they offer new hope in the war against cancer**

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