



Radiofrequency Ablation

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What is radiofrequency ablation?

Radiofrequency ablation is a procedure carried out to remove diseased tissue or a tumour (a lump) from the body. It is one type of what is called tumour ablation (or removal).

Tumour ablation is where a needle is placed directly into a tumour so that a chemical (usually alcohol or acetic acid) or thermal (heat or ice) treatment can be applied to destroy or reduce the tumour. Although tumour ablation has been used for a long time, only in the last 15 years has it been increasingly used to treat tumours. This is due to increasing technologies both in ablation and in imaging guidance. Imaging guidance is the use of X-rays, computerised tomography (CT), ultrasound (US) or magnetic resonance imaging (MRI) to allow accurate positioning of the ablation needle within the tumour or tumours.

Radiofrequency ablation is the most commonly carried out tumour ablation procedure. Radiofrequency uses an electric current that moves back and forth to create heat within the tumour. A needle is used to produce heat within the tumour or tumours to completely or significantly destroy the tumour or tumours. This is usually carried out under image guidance to ensure the needle is placed correctly within the tumour or tumours.

Tumours of the liver, kidney, lung or bone that are benign (non-cancerous) or malignant (cancerous) are being increasingly treated with radiofrequency ablation. Although many of these tumours can be completely treated with radiofrequency ablation, surgery remains at this time the best and most complete treatment. Radiofrequency ablation is used when surgery is thought to be too risky (patient fitness or location and number of tumours) or for palliation (improving quality of life or length of life, but not completely destroying the tumour). Occasionally, radiofrequency ablation may be the best treatment due to it being less invasive than surgery, such as in some benign tumours of the bone.

The technology of tumour ablation and radiofrequency ablation is continuing to grow and it is likely that these technologies will continue to improve over the next few decades.

How do I prepare for a radiofrequency ablation?

The need for having a procedure to destroy or reduce a tumour is usually assessed using ultrasound, CT scan or MRI, and sometimes all three. These imaging tests will be used to determine the size, location and other features of the tumour as a guide for planning the procedure. The test will also be used in future assessment of the response to treatment. Blood tests will also be carried out to ensure there are no medical reasons why radiofrequency ablation should not be used and the test results will be used to assess tumour markers (features or signs). Fasting (no food or fluid) is usually required for a few hours before the procedure.

You will generally be admitted to hospital or to a day procedure centre on the day of the procedure if you are not already in hospital. Radiofrequency ablation can be carried out under general anaesthetic, where you will be asleep and monitored by an anaesthetist (specialist doctor). Alternatively, you may be awake, but sedation medication will be given to ensure you are drowsy and relaxed.

What happens during radiofrequency ablation?

Monitored by the anaesthetist, you will be taken to the medical imaging or radiology department of the hospital where you are having the procedure.

The area where the needle electrode will be inserted is cleaned with antiseptic solution and covered with a surgical drape. Grounding pads are laid on the skin, usually on both thighs, so that the electrical current can be safely applied while the radiofrequency ablation is carried out. Then the area will be numbed with a local anaesthetic if the procedure is carried out without general anaesthetic. A very small cut is made in the skin after it is numb and then the radiofrequency ablation needle electrode is inserted into the tumour being treated using imaging guidance, usually ultrasound, sometimes CT scanning, and images or pictures are shown on a screen. Once the electrode is in place, the electrical current is applied. Heat may be felt during the procedure. At the end of the procedure, the electrode will be removed and pressure will be applied to the site where the needle was inserted, to stop any bleeding. The opening in the skin is covered with a dressing.

No stitches are required.

Are there any after effects of radiofrequency ablation?

Pain. It is common to have some pain following your procedure. This can last a few days and is usually mild. Severe pain not relieved with painkillers is uncommon and should be communicated to your doctors or medical staff.

Flu-like symptoms. Approximately one in four patients may develop flu-like symptoms, but this is not due to actually having the flu, which is the result of infection with influenza virus. The flu-like symptoms, such as a slight fever and loss of energy, usually last for less than 5 days and can be treated with paracetamol.

Infection. As a small cut is made in the skin during the procedure, there is a small risk of infection. The chance of infection requiring antibiotic treatment is less than one in 1000 people who have this treatment.

Bleeding. Bleeding is the most common major complication from radiofrequency ablation. The risk of bleeding is low at less than 2% of people having the treatment. This will depend exactly on where your tumour is and will be discussed with you prior to the procedure being carried out.

Burns. Burns in the skin covered by the grounding pads may occur, but this happens in less than two in 1000 people who have the treatment.

Damage to adjacent organs. These include damaging the bowel, bile duct and lung tissue in radiofrequency ablation of cancer in the liver, but the risk is small, less than two in 1000 people having the treatment. During radiofrequency ablation of the kidney, the ureter (the tube connecting the kidney to bladder) may be injured in less than two in 100 people who have the procedure. When radiofrequency ablation of the lung is carried out, pneumothorax or air inside the chest cavity causing collapse of the lung occurs in one in every two cases, but only one in five cases needs treatment. The treatment involves putting a tube into your chest to drain the air and you would need to stay in hospital for at least a couple of days before the tube could be removed. Fluid may also collect between the lung and the chest wall in less than one in five cases, but this usually does not require any treatment and, generally, you would not notice it if the amount of fluid is small (which is usually the case). With radiofrequency ablation of bone cancer or a non-cancerous bone mass, cases of fracture or injury to the surrounding nerve, skin and muscles have rarely been reported.

How long does radiofrequency ablation take?

Each radiofrequency ablation session takes approximately 15–30 minutes. For larger cancers, it may be necessary to carry out multiple ablations by repositioning the needle electrode into different parts of the tumour to ensure no cancer tissue is left behind. The entire procedure is usually completed within 1–3 hours.

What are the risks of radiofrequency ablation?

Some of the cancer cells may persist or the cancer can return after radiofrequency ablation, but the procedure can be repeated.

Radiofrequency ablation may involve exposure to X-rays if CT scanning is used to position the needle during the procedure. While there is a slight increase in the risk of cancer from any kind of radiation exposure, it is considered that the benefits outweigh this very small risk in treatment with radiofrequency ablation.

What are the benefits of radiofrequency ablation?

Radiofrequency ablation is less invasive than surgery.

As no surgical incision is required, it takes less time to recover and discomfort is minimal.

Because a larger amount of normal tissue is spared using radiofrequency ablation, the function of the involved organ, such as liver, kidney and lung, is better preserved.

Usually, radiofrequency ablation is effective and treatment related side-effects are infrequent.

Who does radiofrequency ablation?

A radiologist (specialist doctor) will use ultrasound or CT images to guide the insertion of the needle electrode through the skin and into the tumour or tumours being treated. A radiologist is a doctor who has specialised in medical imaging and image-guided treatments. Rarely, the procedure will be carried out during an operation by a surgeon.

Where is radiofrequency ablation done?

Radiofrequency ablation is usually carried out within a hospital by a radiologist. You may go home on the same day or stay for one night.

When can I expect the results of my radiofrequency ablation?

The cells in the tumour will die immediately after the radiofrequency ablation. The exact extent of cells killed during the procedure may be obscured by inflammation, a natural body reaction to the procedure. The inflammation will gradually decrease in 1 or 2 weeks. A CT scan, or rarely an MRI scan, will be taken within 1 month after your treatment to assess the results of the procedure.

It is important to realise that a period of follow up is required after radiofrequency ablation. It often takes a year (sometimes longer) to be certain that the tumour is treated. This requires both imaging and visits to your specialist doctor.

Useful websites about radiofrequency ablation:

Cardiovascular and Interventional Radiological Society of Europe:
<http://www.cirse.org/index.php?pid=96>

**The author has no conflict of interest with this topic.*

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