

# How Does RFA Work?

When surgery is not an option, RFA can eliminate tumors without the side effects of other techniques. Here's how it works.

## Seek

RFA is a very precise procedure. Using an imaging guidance system such as ultrasound, computed tomography (CT), or magnetic resonance (MR), the physician places a slender probe directly into the tumor. This ensures that treatment will focus on the diseased area. Once the probe is in position, a bouquet of very thin, flexible electrodes are extended from the end of the probe into the tissue to encompass the tumor.

## Heat

Using a radiofrequency generator, the doctor then allows a carefully-controlled amount of energy to flow through the electrodes into the tissue. This causes the tissue to heat up. Heating is sustained for a predetermined length of time, usually just a few minutes. Temperature is constantly measured by tiny thermometers at the tips of the electrodes.

## Destroy

This heat kills and destroys the tumor and the destroyed tissue is absorbed into normal body wastes.

## About Radiofrequency Energy

Radiofrequency is a type of electrical energy that has been used in medical procedures for decades. At the most basic level, this electrical energy is used to create heat. The heat is created in a specific location, at a specific temperature, for a specific period of time, and ultimately results in the death of unwanted tissue.

## How Heat Destroys Tumors

During a radiofrequency procedure, an ablation probe is placed directly into the target tissue. An array of several small, curved electrodes are deployed from the end of the probe into the tissue. The generator is turned on and target temperatures are input. The radiofrequency energy flows through the electrodes, causing ionic agitation, and therefore friction, in the nearby tissue. This friction creates heat, and once sufficient temperatures have been reached, the heat kills the target tissue within a few minutes. Thermocouples (tiny thermometers) incorporated into the tips of the electrodes allow continuous monitoring of tissue temperatures, and power is automatically adjusted so that the target temperatures remain constant. Ultrasound is typically used to monitor the treatment process.

Heat is a very effective means of killing tissue. As tissue temperature rises above 113° F (50° C), protein is permanently damaged and cell membranes fuse. The process is rapid, typically requiring less than 10-15 minutes exposure time for a 3cm ablation.

Depending on the power applied and the resistance of the tissues, heat decreases rapidly at a specific distance from the electrode tip, limiting the ablation size. The size of the ablated area is determined largely by the size of the probe, the temperature of the tissue, and the duration of time the energy is applied. There is a sharp boundary between dead tissue and unaffected surrounding tissue. Thus unwanted tissue can be ablated within a defined surgical margin.

# Understanding Your Options

## What is an RF Procedure Like?

Your physician can tell you what to expect before and after the procedure. There are several different ways that a RF procedure may be performed, and each has different benefits, limitations, and applicability. You and your physician can determine which is most suitable for you.

## The Percutaneous Approach

One option is a percutaneous approach, in which the electrode is inserted through the skin to the desired location. The physician usually uses ultrasound to guide the needle to the right location. This is the least invasive way that RF is performed. General anesthesia is usually not necessary, but typically the patient is sedated. Often the patient is able to go home the same day. If general anesthesia is not used, some discomfort or pain may be felt while the area is being ablated.

## The Laparoscopic Approach

Another option is a laparoscopic approach. With this approach, the surgeon makes a few small incisions in the abdomen, through which the necessary instruments are passed in order to treat the target tissue. This is also a minimally invasive approach, although general anesthesia is necessary. Patients typically go home the next day. One advantage of this approach is that intraoperative ultrasound can be used, which may result in more accurate location and visualization of the target tissue.

## The Open Approach

The Open approach is what most people probably think of when they think of an operation. An incision is made in the area to be treated, and the surgeon can directly visualize the procedure. General anesthesia is necessary, and the recovery period is a bit longer. Patients may experience a slight fever for two or three days after the procedure. Physicians often allow the fever to resolve without intervention.

Sometimes the RITA System is combined with other treatments, such as drug therapy. The choice of therapy may depend upon the type of tissue the physician intends to treat, the number, size, and location of these areas, the general health of the patient, the severity of the disease, and other factors. Your physician can recommend the best approach for you.

## Minimal Complications

RF ablation procedures have a relatively low rate of complications. Most of the complications are considered minor. The following are the complications associated with this procedure: infection (abscess), bleeding, collapse of the lung, abnormal heart rhythms, and skin burn.

## More Options for You

Radiofrequency Ablation (RFA) offers a valuable, groundbreaking treatment option for people with tumors. RFA is a medical technology that destroys tumors in a much less invasive way. It can destroy a tumor when surgical removal is not an option -- without the side effects of more invasive techniques.

## Benefits

- Reduces the size or eliminates tumors
- Less invasive than traditional treatments - usually performed in an outpatient setting

- Highly effective - can be used on tumors up to 7 cm in size
- Can be used repeatedly or on new tumors
- Has few side effects or complications

Complications after RFA are low with most of the complications being considered minor. The following complications (in alphabetical order) have been associated with electro-surgical ablation procedures in liver and bone metastases: abscess, bleeding/local hematoma, bone fracture, cardiac arrhythmia, fever, fistula, injury to adjacent structures, liver dysfunction and death, pneumothorax (without symptoms), procedural discomfort, and skin burn.

## Is RFA Right For You?

Used alone, or as a supplement to other treatments, AngioDynamics' RFA procedure is an effective option for unresectable (inoperable) tumors. Alternatives to the RFA procedure would include, but may not be limited to:

**Biological Therapy** - These natural or manufactured substances strengthen the body's own immune system to fight cancer or lessen the side effects associated with some cancer treatments.

**Chemotherapy** - The use of drugs to treat cancer.

**Cryotherapy/Cryosurgery** – The use of extreme cold to freeze and destroy cancer cells.

**Embolization** - a type of treatment that reduces the blood supply to the cancer by the injection of materials to plug up the artery that supplies blood to the tumor.

**Hormone Therapy** – The use of hormones (sometimes combined with other types of therapy) to treat hormone dependent tumors.

**Radiation Therapy** – The use of gamma rays or high energy x-rays to damage or destroy cancer cells. Radiation therapy can be internal or external.

**Surgery** - The treatment of disease by removal of tissue. An operation.