# Salt Lake City RFA Clinic

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**Radiofrequency Ablation: A Leading Edge, Non-Surgical Treatment of Thyroid Nodules**

The thyroid gland is small, but it has a big job. It keeps the entire body functioning normally — from digestion, to the brain, heart and metabolism. Like a car battery, we don't usually think about it, until it stops working properly.

Although relatively common, nodules on the thyroid gland can interfere with how it performs. Even though the vast majority are benign and not life-threatening, they can still cause problems. Some benign thyroid nodules may cause cosmetic concerns, discomfort, problems with swallowing, or produce excess thyroid hormone.

Traditionally, the most common treatment options to address these problems have been: thyroid surgery, radioactive iodine therapy and/or thyroid medication. While they're all safe, they have their drawbacks.

For one thing**, thyroid surgery** is not a minor procedure. In fact, it's hard. You're **under general anesthesia,** and it requires a hospital stay. To say nothing of the pain and recovery time. Add to that the risks of bleeding, scarring, **hypothyroidism**, damage to the vocal cord nerve, and calcium deficiency. Cosmetically speaking, you trade a lump for a **visible scar.**

Similarly, **radioactive iodine therapy** has its challenges. To begin with, you stay in a special isolation room to protect others from **exposure to the radiation**, especially children. That means you can be in the hospital for a few days. If you have children, plan on arranging for childcare for seven days after you have treatment. Additionally, there are short-term side effects such as nausea, swelling and tenderness in the neck area, dry mouth and a metallic taste that can stay with you for a while, i**n addition to cancer risk.**

Moreover, thyroid hormone medication can be a balancing act. If you have hypothyroidism, you may feel sluggish and tired. You'll need to have regular blood tests, prescriptions and doctors visits as the doctor determines the proper thyroid dosage. If you have too much, you feel nervous and shaky. As a result, it may take some time before you feel your best. Managing thyroid medication is a lifelong process.

In the United States, these methods have been the only options for patients dealing with thyroid nodules — until now.

**An Easier Option**

**Radiofrequency ablation (RFA),** A common practice in other countries, is now available in the United States. Developed over 18 years ago, this non-surgical alternative shrinks the nodules without compromising thyroid function and helps avoid long recovery times of thyroid surgery.

Radiofrequency ablation of the thyroid was first performed in 2002 by Professor Baek in South Korea and has since been continuously developed. Worldwide, approximately seven thousand procedures are performed each year in just a few facilities.

**What is Radiofrequency Ablation?**

Using radio frequency waves, radiofrequency ablation cauterizes thyroid nodules and cysts. Performed under local anesthesia, radiofrequency ablation is relatively painless and does not require general anesthesia. Doctors use guided ultrasound to insert a thermal probe into the thyroid nodule. Through selective heating of the probe tip, the nodule is destroyed. The cauterized tissue is then broken down by the body.

**Advantages of Radiofrequency Ablation of Thyroid Nodules**

Compared with surgery, the primary advantages of radiofrequency ablation are:

- fewer complications
- shorter recovery time with a quick return to normal activities
- preservation of thyroid function
- Takes between fifteen minutes to one hour.
- NO general anesthesia
- NO scarring of traditional thyroid surgery
- NO (minimizes) the risk of permanent damage to the vocal cord nerve
- NO risk to the parathyroid glands.
- NO need for long term followup with lifelong thyroid medication.

Radiofrequency ablation is highly effective. Depending on the type, nodules shrink anywhere between 60-90% after one year, with approximately 80% on average.

**Preparing For Radiofrequency Ablation**

Radiofrequency ablation is done in my office under sterile precautions. In most cases, your medications will not affect the procedure. If you're on blood thinning medication, you will probably need to stop taking it for a few days prior to the procedure. Procedure is not performed if you have a pacemaker, implants, are pregnant, or on medication for blood thinning. Don't wear makeup, lipstick, or any metal jewelry on the day of the procedure.

**What to Expect During the Procedure**

You will be able to breathe, swallow and talk normally the entire time. Two grounding pads will be attached to your thighs to prevent skin burn**.** **A pre-procedure Xanax may be offered if you feel anxious about the procedure.** The doctor and staff will ask you several times during the treatment how you are doing and whether you feel discomfort. (unlike FNA when we instruct you not to talk or swallow).

You will be covered with sterile cloths, and your neck will be disinfected. Your head will be placed on a small cushion in a slightly overstretched position. The doctor will use a very thin needle to place a local anesthetic under the skin in the area surrounding the thyroid gland.

**How It Works**

A generator creates an electric circuit. Internally cooled electrodes with different active tip lengths are connected to the generator. Both are FDA approved and specifically designed for thyroid radiofrequency ablation.

During the procedure, the doctor will insert the probe into the nodules. The generator creates a high frequency wave and sends it directly to the end of the needle tip. This heats the nodule tissue a few millimeters around the probe tip and treats it point by point.

An alternating electric current creates frictional heat around the electrode. Although this heat creates immediate damage to nodule tissue, the damage is significant only in regions very close to the electrode. Nodule tissue that is more remote from the electrode is heated slowly. When temperatures reach 46°C, irreversible cellular damage on the nodule occurs. When temperatures are increased to 60-100°C, the nodule tissue immediately coagulates.

You will often hear background noise and “cracking” sounds (similar to making popcorn) throughout the procedure. This means the generator and the water pump are doing their jobs and is normal.

**How Long Does the Procedure Last?**

You should set aside around 2 hours on the day of treatment. Depending on the size of nodule to be treated, the procedure will take between fifteen minutes to one hour. Pre-procedural care and post procedural monitoring takes additional time. When the procedure is complete site may be cooled with ice packs if necessary.

**Is Radiofrequency Ablation Painful?**

The procedure is so gentle that most people have little to no discomfort. The thyroid gland itself is not sensitive to pain, and the skin and surrounding area of the thyroid gland are anesthetized for the procedure. Only two to three percent of patients experience discomfort. This is usually a temporary burning sensation, similar to that experienced during anesthetizing at the dentist. In the event of severe discomfort, the procedure will be interrupted and anesthetic will be injected again until there is no pain. Radiofrequency ablation does not cause any scarring to the neck. In most cases, one puncture of the skin is sufficient to treat the entire thyroid gland.

**What to Expect After the Procedure**

You will stay in a recovery area at least 1/2 hour after the procedure. You should be able to return to your regular daily activities immediately. However, you’ll be advised to limit certain activities for 1-2 days following the procedure. You will want to avoid the following activities during that time:

- Lifting heavy objects (over eleven pounds)
- Strenuous physical activities
- Activities that involve holding your breath such as playing a wind instrument, inflating something, etc. Singing, shouting or over stress on the voice

If you feel any abrupt change, you should notify your physician immediately.

**What Happens to the Nodules After Treatment?**

In the weeks following the procedure, the cells of the treated thyroid nodule are metabolized by the body's immune system. Most patients notice the nodule has already become smaller after just two to three weeks, with solid nodules taking longer than cystic nodules.

The targeted thyroid nodule is permanently destroyed from the high temperatures of the procedure. The effect can be compared to boiling an egg. Immune cells of the body then break down the dead tissue, which shrinks the nodules. The amount reduced depends on the original size and nature of the nodules, with around 40–60% after three months and about 60–90% after one year.

All that remains of the nodule is residual scar tissue. The surrounding healthy thyroid gland remains completely unharmed and can continue to produce hormones so that daily thyroid medication is not required following the procedure.

Any difficulty swallowing, feeling of pressure or tightness of the throat or appearance of the nodule is usually significantly decreased or no longer detectable.

**Can I Be Treated With Radiofrequency Ablation?**

The Korean Society of Thyroid Radiology (KSThR) introduced its first guidelines in 2012, with a revision in 2018. According to the 2018 guidelines, radiofrequency ablation for treating benign thyroid nodules is recommended for patients with:

- Benign thyroid nodules that produce compressive symptoms or cause cosmetic concern.
- Nodules that produce excess thyroid hormone: hot nodules, autonomous functioning thyroid nodules (AFTN).
- Thyroid cysts that produce excess thyroid hormone
- Rapidly growing benign nodules or cysts
- Visually disturbing nodules or cysts
- Patients who do not want surgery
- Patients who are at high risk for anesthesia

Radiofrequency ablation is not performed during pregnancy or on patients with implanted pacemakers or defibrillators.

Radiofrequency ablation is not recommended for patients with:

- Thyroid cancer, also called follicular neoplasm, that is diagnosed through fine needle aspiration (FNA) or core needle biopsy (CNB).
- A nodule that meets U.S. criteria of cancer, despite FNA or CNB results.

Before undergoing radiofrequency ablation, doctors will want to make sure your thyroid nodule is benign. This is confirmed through at least two ultrasound guided fine-needle aspiration (FNA) or core needle biopsies (CNB). In some cases, a single benign diagnosis may be sufficient.

Surgery is currently the standard treatment for primary thyroid cancer. However, in patients with primary thyroid cancer who refuse surgery or who are unsuitable for surgery, radiofrequency ablation can be considered as an alternative to surgery.  For those patients who refuse surgery or who are at high surgical risk, radiofrequency ablation can also be performed for recurrent thyroid cancers in the thyroid gland area or lymph nodes located in the neck.

**How Effective Is This Procedure?**
**C**linical trials measured the rate of reduction, therapeutic success, changes in symptoms and cosmetic improvement of benign thyroid nodules.

For “cold” benign nodules (those that do not produce excess thyroid hormone), clinical trials have shown a mean reduction rate of 32.7 to 58.2% at one month, and 50.7 to 84.8% at six months. In most patients, nodule

related symptoms and cosmetic problems also significantly improved or disappeared. In a long term follow-up study, radiofrequency ablation was effective over a four year period with the nodules consistently decreasing to 93.5%.

For “hot” benign thyroid nodules (those that do produce excess thyroid hormone) clinical trials have shown volume reduction rates of 52.6 to 70.7% at six months, and improved or normalized thyroid function in most patients. In a multi-center study, hyperthyroidism caused by “hot” nodules improved in all patients and was completely normalized in 81.8% of patients. This led to the conclusion that radiofrequency ablation can be considered an alternative to thyroid surgery or radioactive iodine therapy.

**How Many Treatments Are Necessary?**

For most average sized nodules, one treatment will sufficiently decrease the size of the nodules. When nodules are close to vocal cord nerves, or with very large nodules, repeated procedures may be necessary.

Untreated areas of “hot” nodules may interfere with the improvement in thyroid function. In these instances, complete ablation is required. For this reason, more than one treatment session may be necessary to successfully treat “hot” nodules.

**Are There Any Side Effects or Complications?**

In a multi-center study of 1459 patients organized by the Korean Society of Thyroid Radiology, the overall complication rate following radiofrequency ablation was 3.3%. The major complication rate was 1.4%.

While uncommon, complications can be:

- Temporary voice changes, such as hoarseness.
- Slight bleeding — usually disappears on its own within one day, or at the most, up to three months.
- Wound infections
- In rare cases, vomiting, cough, or seared skin at the puncture site may occur.
- Patients with AFTN (“hot” thyroid nodules) have the possibility of hypothyroidism after the procedure.

Although rare, a complication would require an inpatient hospital stay or follow-up treatment.

**Is There Any Follow-Up Care?**

Following radiofrequency ablation, your physician will monitor the treated nodules with ultrasound scans after three months, six months and twelve months.

**Leading Edge Option for Benign Thyroid Nodules**

In the final analysis, radiofrequency ablation (RFA) is an exciting alternative for patients who experience problems from benign thyroid nodules— with less pain, less downtime and no scarring. While there are specific types of patients who would be candidates, it is a safe and validated procedure that is now approved in the United States. With its long lasting effects, radiofrequency ablation is a breakthrough in treating the symptoms of thyroid nodules. Ultimately, your physician can help determine the most effective treatment option for you.