



RADIOIODINE OR RADIOACTIVE IODINE THERAPY

What is radioiodine therapy?

If you have an overactive thyroid gland or have been diagnosed with thyroid cancer, your endocrinologist may prescribe radioactive iodine (RAI) or radioiodine as part of your overall treatment. This treatment is safe, well tolerated and has successfully treated many cases of hyperthyroidism and thyroid cancer even after the tumor has spread.

Radioiodine has been used for more than 70 years for the treatment of thyroid diseases, with few side-effects. However, problems may occur when very large doses are given, including decrease in taste sensation and irritation of the salivary glands or the gastrointestinal tract. No significant increase has been seen in the number of birth defects in children born later to women who have received this type of treatment. A very small number of patients may develop a second cancer years after treatment with a high dose of radioiodine.

The thyroid gland works to produce hormones that regulate the body's metabolism. In order to produce these hormones, the thyroid gland requires large amounts of iodine, found in seafood, table salt, bread and various other foods. Iodine is an essential ingredient in the creation of thyroid hormone. Each molecule of thyroid hormone contains either three (T3) or four (T4) molecules of iodine. Most overactive thyroid glands are hungry for iodine. This led to the discovery in the 1940s that an overactive thyroid gland could be "tricked" into destroying itself by simply feeding it radioactive iodine.

Hyperthyroidism (overactive thyroid)

Before the development of current treatment options, the death rate from severe hyperthyroidism was as high as 50 percent. Now several effective treatments – antithyroid drugs, surgery and radioiodine – are available and death from hyperthyroidism is rare. Deciding which treatment is best for you depends on what caused the hyperthyroidism, its severity and other conditions you may have. Hyperthyroid conditions are best managed by an endocrinologist.

Thousands of patients have received radioiodine treatment, including former U.S. President George H. W. Bush and his wife, Barbara. The treatment is safe, simple and effective. Most endocrinologists consider radioiodine to be the treatment of choice for hyperthyroidism cases caused by overproduction of thyroid hormones.

Radioactive iodine is given by mouth, usually in capsule form, and is quickly absorbed from the bowel. It then enters the thyroid cells from the bloodstream and gradually destroys them. Although the radioactivity from this treatment remains in the thyroid for some time, it is largely eliminated from the rest of the body within a few days. Its effect on the thyroid gland usually takes between one and three months to develop, and maximal benefit is usually noted within three to six months. However, it is not possible to eliminate "just the right amount" of the diseased thyroid gland, since radioiodine eventually damages all thyroid cells. Therefore, most endocrinologists give enough radioactive iodine to make the thyroid underactive (hypothyroidism). Hypothyroidism is easily, predictably and inexpensively corrected by lifelong daily use of oral thyroid hormone replacement therapy.

Although every effort is made to calculate the correct dose of radioiodine for each patient, not every treatment will successfully correct hyperthyroidism, particularly if the thyroid is quite large, in which case a second dose of radioactive iodine is needed.

Thyroid cancer

The two most common types of thyroid cancer (papillary and follicular) usually can be treated with radioiodine because the cells are able to take up some iodine.

Radioiodine is usually administered either:

- **After removal of the thyroid**

An experienced thyroid surgeon can remove most of the thyroid with very low risk of complications. In many cases, surgery followed by thyroid hormone therapy is sufficient to treat thyroid cancer. However, some cases may require radioiodine therapy to destroy any remaining thyroid gland and to prevent a recurrence of thyroid cancer.

Until recently, patients had to temporarily stop thyroid hormone therapy to receive RAI treatment or undergo monitoring tests for possible cancer recurrence. This was to allow the patient's thyroid-stimulating hormone (TSH) level to rise and stimulate cancer cells to absorb iodine. Thanks to the development of a synthetic product called recombinant human TSH, many thyroid cancer patients can undergo RAI treatment and monitoring using recombinant human TSH without temporarily discontinuing their thyroid hormone therapy.

- **During follow-up**

Patients with residual thyroid cancer or cancer that has spread to regions outside of the neck, can undergo a scan with a test amount of radioiodine, which helps to determine the extent of "persistent" or "recurrent" thyroid cancer, whether it may respond to radioactive iodine, and how much radioactive iodine is needed for treatment. If any iodine is concentrated in the areas of the thyroid cancer, larger doses of radioiodine can be given to try to destroy the tumor.

Patients with thyroid cancer should have regular follow-up examinations by an endocrinologist.

- **What happens after radioiodine treatment?**

Since surgery removes the vast majority of thyroid tissue, much of the radioiodine usually leaves the body through urine. Small amounts will also be excreted in saliva, sweat, tears, vaginal secretions and feces. Nearly all the radioactive iodine will leave the body during the first two days after the dose has been given.

- **What about pregnancy?**

Whenever pregnancy is possible, pregnancy testing is mandatory prior to administering diagnostic or therapeutic radioiodine

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treatment. If radioiodine is inadvertently administered to a woman who is pregnant, the advisability of terminating the pregnancy should be discussed with her obstetrician and endocrinologist.

- **What about breastfeeding?**

Small amounts of radioactive iodine are excreted in breast milk. Since radioiodine could permanently damage the infant's thyroid, breast feeding is not allowed.

- **Are future pregnancies possible?**

As a precaution, it is advised that males avoid fathering a child for several months after radioactive iodine administration. Women are advised to postpone pregnancy for six months or more in order to stabilize their thyroid status for conception. Even though the amount of radioactivity retained may be small and there is no medical proof of an actual risk from radioiodine treatment, there is a theoretical risk to a developing fetus. Such precautions essentially eliminate direct fetal exposure to radioactivity and markedly reduce the possibility of conception with sperm that might theoretically have been damaged by exposure to radioiodine. You may need to contact your physician for guidance about methods of contraception.

Regulations regarding the use of radioiodine therapy are made by the U.S. Nuclear Regulatory Commission (NRC). Physicians and hospitals that administer this therapy must have a license to administer radioiodine and must adhere to stringent regulations regarding its use. If you have any questions before or after receiving your treatment, contact your physician or your hospital radiation safety officer for clarification.

Is hospitalization necessary for treatment with radioiodine?

Treatment for hyperthyroidism is almost always done on an outpatient basis because the dose required is relatively small in comparison with the doses typically used for treatment of thyroid cancer. If you have to take a larger dose of radioiodine for treatment of thyroid cancer, you may need to be admitted to the hospital for several days depending on the amount of radioiodine administered, your living environment, residence or local practice patterns.

If you require hospitalization, your hospital room will have frequently handled items such as the TV control, table, phone, faucet handles, etc., covered with protective material and the floor will be partially covered as well. These precautions are designed to prevent the radioactive iodine from contaminating those items that will be reused by other patients after your discharge from the hospital. To limit the contamination of your personal items, you should bring a minimal amount of belongings for your stay. All items will be monitored at your discharge. During your hospital stay, you should wear only hospital gowns. You may want to bring disposable items, such as magazines or newspapers. Important, valuable or durable items like hardcover books, laptops, glasses and jewelry should be left at home. Clothing should be limited to what you wear when you are admitted. Check with your endocrinologist if you have any questions.

After treatment, should contact with other people be limited?

Recommendations for reduction of exposure to others for several days after treatment:

- Use private toilet facilities, if possible; flush twice after each use.
- Bathe daily and wash hands frequently.
- Drink normal amount of fluids.
- Use disposable eating utensils or wash your utensils separately from others.
- Sleep alone and avoid prolonged intimate contact.
- Launder your linens, towels and clothes daily at home, separately from others. No special cleaning of the washing machine is required between loads. This is because the radioiodine administered is water soluble.
- Do not prepare food for others that requires prolonged handling with bare hands (such as mixing a meat loaf or kneading bread).

Brief periods of close contact, such as handshaking and hugging, are permitted.

Your endocrinologist or radiation safety officer may recommend continued precautions for up to several weeks after treatment, depending on the amount of radioactivity administered. Patients receiving radioactive iodine should also carry information about their treatment with them in order to fully inform authorities who are in charge of screening for radioactive materials in public areas such as airports and subways.

The amount of radioactive exposure to other persons during your daily activities will depend on the duration of contact and the distance you are from them. As an example: a person two-feet away receives only one-fourth the exposure of someone one-foot away. Therefore, the general principle is to avoid prolonged, close contact with other people for several days.

If your work or daily activities involve prolonged contact with small children or pregnant women, you have to wait for several days after your treatment to resume these activities. Those patients with infants at home should arrange for care to be provided by another person for the first several days after treatment. It will not be necessary for you personally to stay elsewhere after your treatment, although you will need to sleep alone for several days.