

Radioactive Iodine

- Iodine is a naturally occurring element that is required for thyroid hormone production. In the US the majority of our iodine is from fortified table salt.
 - All elements have multiple atomic isotopes, and some of these isotopes are radioactive.
- Two kinds of radioactive iodine isotopes matter to endocrinologists
 - I-123 is used for diagnostic scanning of the thyroid.
 - Half life approximately 13 hours in a normal healthy patient. It takes 4-5 half-lives to fully decay the isotope.
 - I-131 is used for treating (ablation) of the thyroid gland for both Graves' disease and thyroid cancer.
 - Half life approximately 5 ½ days in a normal healthy patient. It takes 4-5 half-lives to fully decay the isotope.
- Why does radioactive iodine work?
 - Because the only place iodine is concentrated in the body is the thyroid tissue, so it's a pretty focused treatment.
 - It even works when a thyroid cancer has metastasized to other places in the body because that tissue will also concentrate iodine.
- When do we use radioactive iodine treatments?
 - Graves' Disease: when patients can't or won't take the medications methimazole and PTU, or if these medications FAIL.
 - The dose is usually small, 20-50 mCi and is very effective because a Graves' thyroid gland is SO metabolically active.
 - Up to 15% of ablations will fail, depending on severity of disease and the dose that was administered. A second treatment is a reasonable choice.
 - If it fails again we would explore surgery or continuing medical therapy.
 - Thyroid cancers
 - Certain types of thyroid cancer as well as very small tumors and low risk stages of disease may NOT need I-131 treatment.
 - The dose is calculated based on the extent of thyroid tissue in the body. Some people require small doses (< 100 mCi) and some require quite large doses (150+ mCi)
 - People with larger tumors, metastases and certain variants of cancer that are riskier will be treated with radioactive iodine. This is standard of care.
 - Radioactive treatment requires planning and preparation, so it occurs well AFTER the patient has recovered from thyroid surgery.
- How long does I-131 take to work?
 - The destruction of thyroid tissue continues for weeks to months after you have excreted the isotope.
- How do I prepare for I-131 ablation?

- Graves' disease: there is NO special diet. You stop your methimazole or PTU 3-5 days prior to your appointment with nuclear medicine. They will do a scan and calculate the dose you need.
- Thyroid Cancer: you have to consume a low iodine diet for approximately 2 weeks before your treatment. In the majority of cases, patients continue taking their levothyroxine and during the week of treatment, will receive 2 injections of Thyrogen to block thyroid hormone and make their thyroid "hungry" for the iodine treatment.
- Do I have to be in the hospital for I-131 treatment?
 - Usually NO. It's easier and safer to take the isotope at the radiology department, and then go home. We will hospitalize certain patients who have other needs, like hemodialysis, or who require assistance with basic tasks like toileting.
- How does a home I-131 treatment work?
 - You take the radioactive isotope pill at the hospital, and return home.
 - Ideally, you have both your own room and your own bathroom that is sequestered from everyone else in the house, even pets.
 - Your meals should be eaten with disposable cutlery and paper plates.
 - People typically remain isolated for 2-5 days, depending on the dose.
- What are the side effects of I-131?
 - Some people experience nausea, but this is easily controlled.
 - Some people have discomfort in their salivary glands, and this is dose dependent. You should suck on lemon drop candies after your treatment to encourage salivation and protect the glands.
 - Every fluid your body produces will be radioactive: sweat, skin oils, urine, etc. This is why we want to keep you totally sequestered from other people and pets so you do not affect THEIR thyroids.
 - This is why we don't prefer hospital or hotel ablations because after a shower or using the toilet, that radioactive fluid will travel through the plumbing.
 - Drink as much water as possible to flush out the isotope as quickly as possible, this will reduce the time you need to be isolated.
 - When your isolation is complete, all clothing, bedding, linens, etc. must be washed SEPARATELY.
- Long term effects
 - These are dose dependent. For patients with severe, advanced thyroid cancer that require large doses of I-131 there are risks of fibrosis in the lungs, damage to bones, or induction of a second cancer in the future.
 - **Women of reproductive age should use reliable birth control for 1 year after treatment.**
- Resources
 - American Thyroid Association <https://www.thyroid.org/radioactive-iodine/>