NODULAR HYPERTHYROIDISM
(I-131 as Sodium Iodide)

Overview

- In hyperthyroidism secondary to a hyperfunctioning nodule(s) there is the opportunity to cure the hyperthyroidism and return the patient to a euthyroid state. The excess thyroid hormone produced by the nodule(s) will suppress secretion of thyroid stimulating hormone (TSH) by the pituitary gland so that the normal thyroid tissue will not take up iodine. I-131 therapy for Nodular Hyperthyroidism uses I-131 orally to ablate the hyperfunctioning nodule(s). The normal thyroid tissue then resumes function and usually, but not always, produces a normal amount of thyroid hormone.

Indications

- Treatment of hyperthyroidism secondary to autonomous functioning nodule(s) (1-6).

Procedure Time

- Initially: 20 minutes for obtaining informed consent and administering the dose.
- Later (if the patient is hospitalized): 20 minutes per day for monitoring the patient's I-131 body burden until it is below 30 mCi (1,110 MBq).

Patient Preparation (2)

- The patient must discontinue iodide containing preparations, thyroid hormones, and other medications that could potentially affect the ability of thyroid tissue to accumulate iodide.

Medication	Time of withdrawal
Antithyroid medication (propylthiouracil, methimazole, carbimazole)	3 dy
Multivitamins	7 wk
Thyroid hormones	2 wk for triiodothyronine 4 wk for thyroxine
Expectorants, kelp, agar, carageen, topical iodide	3 wk
Radiographic contrast agents	3 wk
Amiodarone	3 mo

- The nuclear medicine physician explains the expected benefits and possible complications.

- The nuclear medicine physician obtains written informed consent for treatment and for treatment as an outpatient [see consent forms at end of section].

Radiopharmaceutical, Dose, & Technique of Administration

- Radiopharmaceutical: I-131 as sodium iodide.
- Dose: 15-35 mCi (555-1,073 MBq) (2,3,6).

- Technique of administration: Oral.

Protocol Summary Diagram

Post Treatment Restrictions

- There may be post-treatment restrictions related to the distance between the patient and other persons, and the patient's urine. [See form at the end of this section.]

Complications

- The following complication frequencies are best estimates from the literature for a treatment dose of 15-29 mCi.

Complication	Time of onset	Frequency (%)	Reference
Exacerbation of hyperthyroidism	< 1 wk	rare	2
Permanent vocal cord paralysis	< 1 wk	rare	7
Persistent hyperthyroidism	< 1 yr	5	6
Hypothyroidism	< 1 yr	10-40	3,6,8
All cancers including leukemia	< 15 yr	no increase	9
Subsequent birth defects, miscarriages		no increase	2

- If the patient is inadvertently treated with radioiodine while pregnant, the treatment may cause severe abnormalities in the fetal thyroid gland (10).

Optional Maneuvers

- Retreatment: If the patient does not become euthyroid in 3 months, the patient may be retreated with I-131 (2).
- Imaging suppressed thyroid tissue: May be done with Tc-99m-sestamibi (11).
- Letter documenting radioactive treatment: If the patient triggers a radiation detector in a public facility, it is useful for him/her to have a letter documenting the cause (12).

Principle Radiation Emission Data - I-131 (13)

- Physical half-life = 8.04 days.

Radiation	Mean % per disintegration	Mean energy (keV)
Beta-4	89.4	191.5
Gamma-14	81.2	364.5

Dosimetry - I-131 as Sodium Iodide (14,15)

Organ	rads/29 mCi	mGy/1,073 MBq	
Thyroid	37,700.0	377,000	
	Stomach wall	40.6	406
Total body	20.6	206	
Ovaries	4.1	41	
Testes	2.6	26	

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THERAPY FOR NODULAR HYPERTHYROIDISM
Nuclear Medicine Department
Institution_____

Your physician has ordered a treatment dose of radioactive iodine for hyperthyroidism (overactive thyroid gland) secondary to one or more functioning nodules in your thyroid gland. Other methods of therapy may be available, but this particular treatment is felt to be best in your situation at this time.

We are attempting to return you to a normal thyroid state by destroying part of your thyroid gland cells. Results are not always successful. There is an approximately 5% chance that you will still have an overactive thyroid gland following this treatment. In that case an additional treatment will be necessary.

On the other hand, there is an approximately 10-30% chance that the treatment will decrease your thyroid gland function below normal (hypothyroidism). This decrease in thyroid gland function to less than normal may occur at any time in the future.

If your thyroid function becomes less than normal, you will need to take replacement thyroid hormone. Because this may happen anytime in the future, you should see a physician periodically, e.g. once a year, for the rest of your life to be sure that the amount of thyroid hormone in your blood is normal.

There is an approximately 1% chance that the treatment may make your thyroid condition worse for 1 to 3 days. If this complication occurs, you may contact your physician for symptomatic treatment.

You should refrain from eating for 1 hour following ingestion of the radioactive iodine.

Female patients who may be pregnant or who are breast feeding should not undergo this treatment. Pregnancy should be postponed for at least 3 months following treatment.

_____ _____
Patient or legal guardian Physician

_____ _____
Witness Date

REFERRAL INFORMATION

Referring physician_____ Patient name_____

Diagnosis_____ Hormone levels: TSH_____ T-4_____

Imaging findings_____ Uptake values: 6 hr_____ 24 hr_____

Nodule size_____ Patient weight_____

Off PTU ≥ 7 days_____ No IV contrast ≥ 3 weeks_____

Pregnancy test (females of reproductive age)_____

Comments_____

Dose of I-131 to be ordered_____ Treatment date_____

Nuclear medicine physician_____ Today's date_____

INSTRUCTIONS FOR OUTPATIENT TREATMENT WITH IODINE-131

Nuclear Medicine Department

Institution _____

Patient _____ was administered _____ mCi of I-131 on _____

The radioiodine dose that you will receive will be beneficial to you, but other persons with whom you may come in contact should not be unnecessarily exposed to radiation. If you are currently nursing an infant, additional instructions will be given to you concerning the need to interrupt or discontinue breast feeding. Below are some actions to which you must agree to help keep exposures to others as low as possible. The instructions should be followed for 2 days following the treatment.

1. Maintain a distance of at least 3 feet from others for the first 2 days.

2. Sleep alone for the first 2 nights.

3. Do not travel by airplane or mass transport for the first 2 days.

4. Do not travel with others by automobile for longer than 2 hours for the first 2 days.

5. Have sole use of a bathroom for the first 2 days or follow detailed instructions for bathroom use.

6. Drink plenty of fluids for the first 2 days.

The above are minimum actions necessary to keep exposures to others as low as possible. Your physician may wish to have you follow certain other precautions to help maintain exposures to others as low as possible.

Other precautions:

_____

_____

_____

_____

Patient Agreement

I agree to abide by the above recommendations as a condition of my treatment on an outpatient basis. I have had the opportunity to ask questions regarding the limitations on my activities following release and understand each of the recommendations described above.

_____ _____

Patient signature/Date Staff signature/Date

NOTES