

Diagnostic Imaging Pathways - Hyperthyroidism

Population Covered By The Guidance

This pathway provides guidance on the investigation of adult patients with hyperthyroidism.

Date reviewed: February 2018

Date of next review: February 2021

Published: June 2018

Quick User Guide

Move the mouse cursor over the **PINK** text boxes inside the flow chart to bring up a pop up box with salient points.

Clicking on the **PINK** text box will bring up the full text.

The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

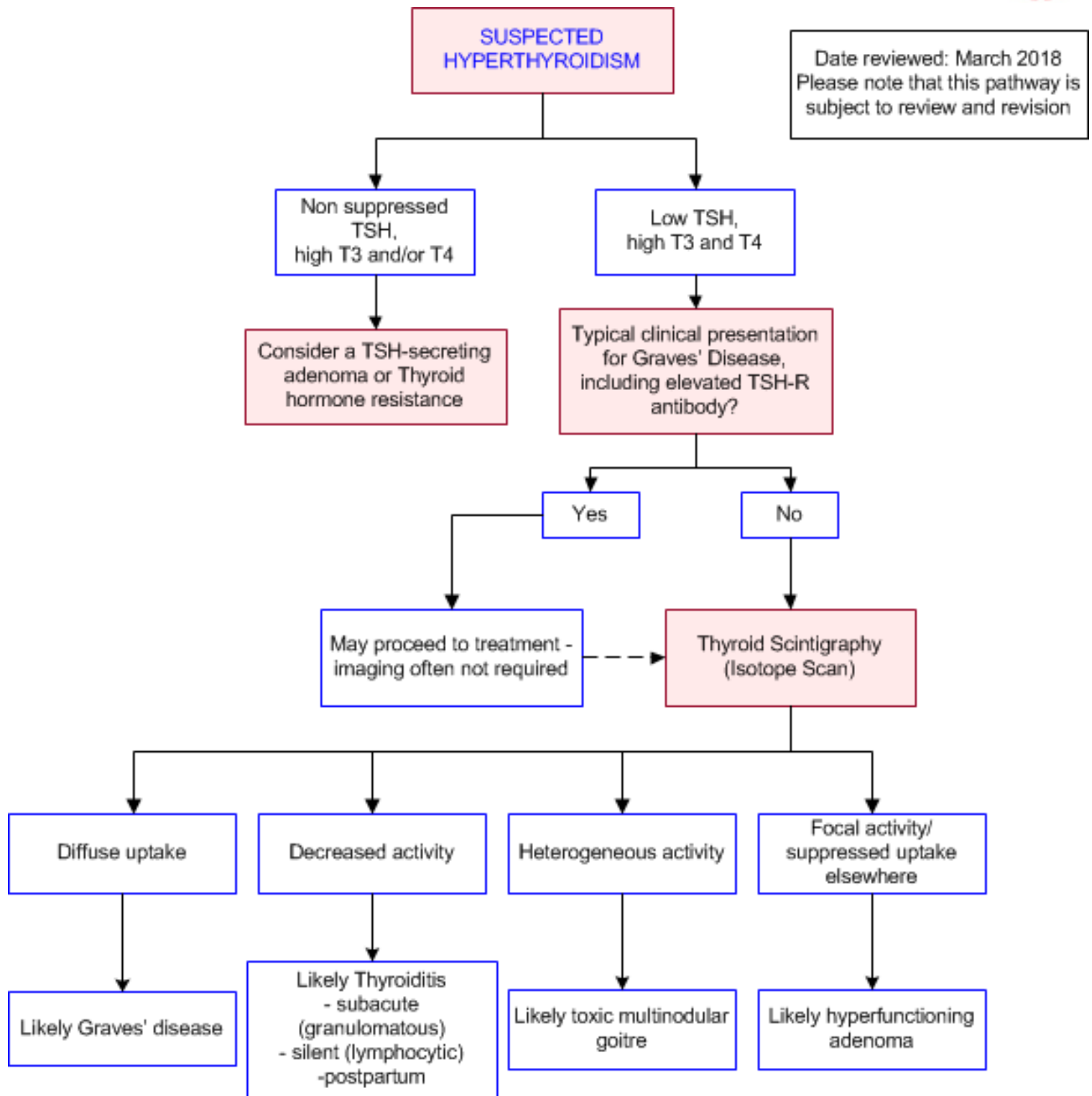


Image Gallery

Note: These images open in a new page



Image 1a and 1b (Thyroid Scintigraphy - Tc99m Pertechnetate): The thyroid gland has taken up 6.3% of the administered dose (normal between 0.6-2.7%). This is evenly distributed throughout both lobes of the thyroid gland. No focal abnormalities are demonstrated. The appearances are typical of Graves' Disease.

1b



2

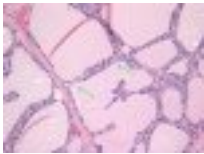
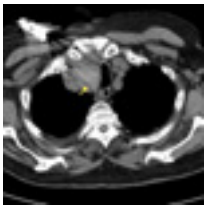


Image 2 (H&E, x10): Histological section of Graves' disease showing hyperplastic follicles with infolding of the follicular epithelium to form papillary projections (blue arrow). The colloid is pale with scalloped margins (green arrows).

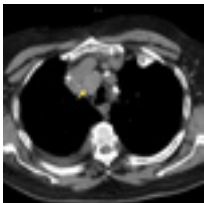
3a



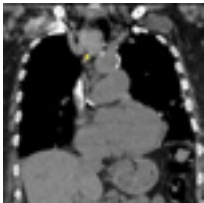
Retrosternal Goitre

Image 3a, 3b, 3c and 3d (Computed Tomography): The right lobe of the thyroid is considerably enlarged with retrosternal extension and deviation of the trachea to the left (arrows). There are a few mediastinal nodes which measure around 1cm in short axis diameter.

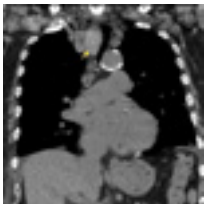
3b



3c



3d



4a



Multinodular (Colloid) Goitre

Image 4a: Total thyroidectomy showing a multinodular goitre with marked asymmetrical enlargement of the right lobe due to a massive dominant nodule.

4b



Image 4b (H&E, x2.5): Histological section of a multinodular (colloid) goitre showing the usual features of variously sized, colloid-containing follicles lined by uniform epithelial cells, patchy areas of haemorrhage and fibrosis.

Teaching Points

- Graves' disease can often be diagnosed clinically and appropriate medication commenced
- If the aetiology of hyperthyroidism is uncertain, isotope scan may aid in the diagnosis based on the pattern and location of radionuclide uptake

Hyperthyroidism

- Hyperthyroidism is diagnosed when there is elevation of serum free T4 and/or T3 accompanied by typical symptoms and signs. Biochemical evidence without clinical manifestations is referred to as subclinical hyperthyroidism. Antibody interference in thyroid assays should be considered when interpreting results [1](#)
- Common causes of hyperthyroidism include Graves' disease and toxic multinodular goitre; also consider functioning thyroid adenoma and thyroiditis [1, 2](#)
- The role of imaging in hyperthyroidism is to help establish the cause and this is usually done with a thyroid isotope scan
- Elevated T3 and T4 are usually accompanied by low levels of TSH. However, rarely hyperthyroidism is driven by high TSH levels in which case a TSH-secreting pituitary adenoma or thyroid hormone resistance should be excluded
- Typical cases of Graves' disease such as those with a diffuse goitre, ophthalmopathy and serological evidence may be treated without any prior imaging although scintigraphy may help confirm the diagnosis and exclude other causes

Thyroid Isotope Scan (Thyroid Scintigraphy)

- Usually performed with technetium-99m pertechnetate or radioiodine [3-6](#)
- Advantages of technetium-99m pertechnetate [3, 4, 6](#)
 - Lower radiation dose
 - Better image quality
 - Less waiting time after administration
 - Wider availability
 - Lower cost
 - Images can be obtained while the patient is taking anti-thyroid medications
- Advantages of radioiodine [6-8](#)
 - Has lower levels of vascular background activity which is useful when assessing retrosternal masses
 - Has some advantages in the evaluation of thyroid nodules, although these are rarely of clinical significance
 - Oral administration
- Scintigraphy is particularly useful for distinguishing Graves' disease from conditions such as subacute, silent and postpartum thyroiditis and factitious hyperthyroidism [9, 10](#)
- It is also useful for demonstrating toxic adenomas [7](#)

References

Date of literature search: September 2017

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. [Download the document](#)



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