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Thyroid Function Tests - A Primer

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Introduction

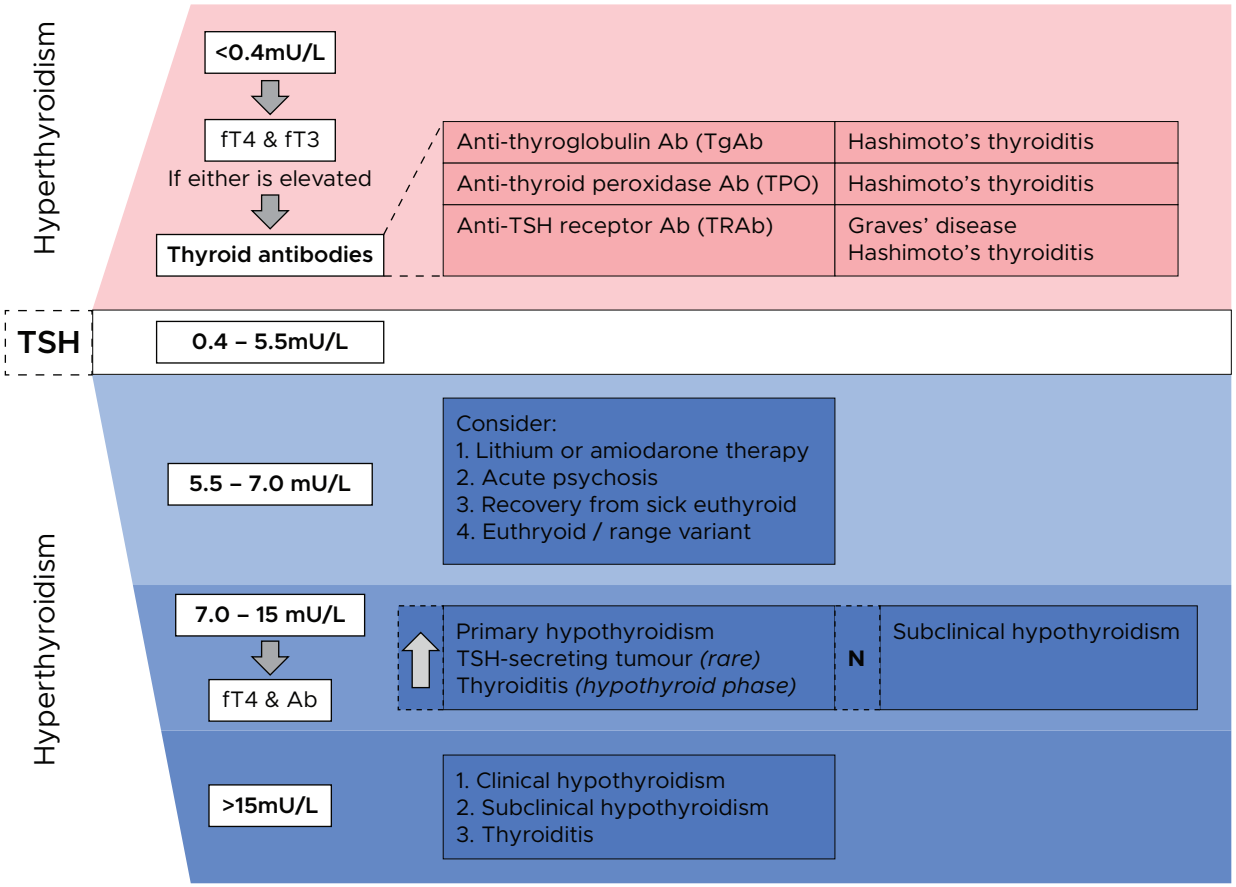
Following diabetes mellitus, thyroid gland disturbances are the most common endocrine disorders, affecting approximately 200 million people worldwide[1].

Although in the majority of cases, test results are straightforward, at times, interpretation of results prove to be more complicated and even at odds with what is clinically expected[2].

Screening strategies

Primary screening for thyroid disease should preferentially be performed in the absence of acute, severe disease with a TSH level. This strategy will identify the majority of thyroid pathology.

Figure 1. Screening algorithm [4,5]



*Testing algorithm assumes clinical correlation with physical and radiological examination where necessary.

Table 2. Screening indications published by SEMDSA.

Screening Indications
• Symptomatic patients or abnormal thyroid examination • Autoimmune disease and first-degree relative with autoimmune thyroid disease • History of neck radiation, radioactive iodine therapy or surgery for malignancies or thyroid dysfunction • Psychiatric disorders • Amiodarone or lithium therapy • Infertility and repeated miscarriages • Growth retardation and delayed puberty • Pregnancy with risk factors • Genetic syndromes • Dyslipidaemia • Heart failure *American Thyroid Association recommends screening from 35 years every 5 years.

Table 1. Overview of TFT interpretation[2,3]

		TSH		
		Low	**Normal**	**High**
fT4 / fT3	**Low**	NTI§ Central hypothyroidism Isolated TSH deficiency	NTI§	Autoimmune thyroiditis (*Hashimoto's, atrophic*) Post-radioiodine therapy / thyroidectomy Hypothyroid phase of thyroiditis Neck irradiation Riedel's thyroiditis Thyroid infiltration (*tumour, amyloid*) Congenital hypothyroidism Drugs (*amiodarone, lithium, TKI**)
	Normal	Subclinical hyperthyroidism Recent treatment for hyperthyroidism NTI§ Drugs (*steroids, dopamine*)	Normal	Subclinical hypothyroidism Poor compliance thyroxine Malabsorption of thyroxine NTI§ recovery phase TSH resistance Drugs (*amiodarone*)
	High	Graves' disease Toxic multinodular goitre Toxic adenoma Thyroiditis (*post-viral, post-partum*) Excess thyroxine ingestion Pregnancy related (*hyperemesis gravidarum, hydatidiform mole*) Congenital hyperthyroidism Drugs (*amiodarone, iodine*)	Thyroxine replacement therapy NTI§ Neonatal period TSH-secreting pituitary adenoma Resistance to thyroid hormone Disorders of thyroid hormone transport or metabolism Drugs (*amiodarone, heparin*)	

* Tyrosine kinase inhibitors § Non-thyroidal illness

Interpretation of thyroid function tests

A host of physiological, pathological and pharmacological factors impact on the interpretation of thyroid function tests. As a primer, tests can be interpreted based on the initial assessment of TSH and fT4 levels, with or without fT3 levels (Table 1)[2].

Monitoring Therapy

Biochemical response to levothyroxine therapy is variable, and testing should best be implemented in no less than 4 weekly intervals. Continued biochemical abnormalities may occur in the following settings (Table 3)[2]:

Table 3. Abnormalities in patients on replacement therapy[2]

TSH	fT4	Cause	Clinical Implications
Normal	↑	Normal physiological variant (*fT3 normal*)	Monitor using fT3
↑, N or ↓	↓	Maladministration Malabsorption U TH metabolism U TH binding capacity	Exclude concomitant factors in control
Persistent ↑	↑, N or ↓	Difference in half-lives	Ensure compliance Use fT4 as measure of response

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