

Investigating Common Thyroid Problems



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The prevalence of thyroid problems varies according to sex and age. According to the National Health and Nutrition Examination Survey III, approximately 13% of the female population and only 9% of males have positive markers of thyroid autoimmunity (the presence of anti-thyroperoxidase [TPO] antibodies). Thyroid-stimulating hormone (TSH) elevation is found in 4.6% of the population, where 0.3% consists of frank hypothyroidism and 4.3% of mild hypothyroidism.¹

Hyperthyroidism, on the other hand, affects 1.3% of the general population (0.5% clinical and 0.8% sub-clinical hyperthyroidism [suppressed TSH with normal levels of thyroid hormones]); women are affected twice as much as men. However, the prevalence of thyroid disease increases with age—up to 20% of women older than age 74 demonstrates an elevated TSH level,² and almost 4% of the population older than age 55 suffers from sub-clinical hyperthyroidism.¹

How should patients be screened?

Even though there is no Canadian recommendation for the screening of thyroid diseases in healthy adults, some people are recognized to be at risk for thyroid problems (Table 1). When some of these characteristics are present, a TSH measurement should be done, since it is the best screening procedure for the detection of thyroid disease.

The majority of healthy people have a TSH between 0.4 mIU/L to 2.5 mIU/L, which is the new normal level recommended by the National Academy of Clinical Biochemistry.³ However, many laboratories consider an upper limit of a normal TSH as 4 mIU/L.¹

Louisa and Rachel

- Louisa, 25, consults you regarding her fatigue.
- Over the last six months, she noticed a 4-kg weight gain, constipation and irregular menses.
- She does not take any medication and reports her mother is being treated for hypothyroidism.
- On physical examination, Louisa looks tired and her thyroid gland is increased in size and finely irregular.
- Louisa's 30-year-old sister, Rachel, comes with her for the evaluation of a lump in her neck. Rachel noticed this lump one month ago and believes it is growing.
- Rachel does not have any compressive symptoms and her voice has not changed.
- She has no history of neck irradiation and no other symptoms.
- On physical examination, you notice a firm and fixed, 2-cm nodule in her left thyroid lobe.



What investigation would you suggest for Louisa?
What would you do for her sister, Rachel?

For the answers to these questions, read on...



What are the best ways to detect hypothyroidism and hyperthyroidism?

TSH is the best initial test to detect thyroid dysfunction. If TSH is elevated, the T4 level should be measured, but there is no need for T3 measurement. However, if the TSH is suppressed, both T4 and T3 could be measured. Frank or sub-clinical hypothyroidism (TSH elevation in the presence of a normal level of free thyroxine) can be caused by autoimmune thyroiditis (Hashimoto), other forms of thyroiditis, post-radiation or thyroidectomy, excess iodine, other medications (amiodarone, lithium, interferon gamma, IL2) and rarer causes in North America, such as iodine deficiency.

A dosage of anti-TPO antibodies may be requested in order to confirm the autoimmune nature of the hypothyroidism.⁴ If a suppressed TSH is found, radionuclide scanning should be ordered to differentiate between autonomous thyroid hormone production (high iodine uptake) and thyroiditis (low iodine uptake).

Pregnancy is an absolute contraindication to radionuclide scanning. Therefore, in this particular setting, obtaining a thyroid stimulating antibody (TSA) test could be helpful, since a positive TSA is suggestive of Graves' disease and should alert the clinician for slightly increased risk of neonatal hyperthyroidism.

What should be done with thyroid nodules?

About 4% to 7% of the adult population has a palpable thyroid nodule. When including nodules discovered by ultrasound, the prevalence rises to > 50% in people older than age 60.

Again, thyroid nodules are more common in women with advancing age. The overall risk of malignancy

Table 1

Clinical characteristics of thyroid disease in high-risk patients

- Personal history of thyroid disease
- Goiter
- Female older than age 50
- Postpartum period (one year)
- Strong family history of thyroid disease
- Personal history of neck irradiation or thyroid surgery
- Medications (lithium, amiodarone, iodine, anticonvulsants)
- Ophthalmopathy
- Atrial flutter or atrial fibrillation

Table 2

Characteristics suggesting the diagnosis of a malignant thyroid nodule

High suspicion

- Family history of thyroid carcinoma or multiple endocrine neoplasia
- Rapid tumour growth
- Very firm or hard nodule
- Fixation of the nodule to adjacent structures
- Vocal cord paralysis
- Regional lymphadenopathy
- Distant metastases

Moderate suspicion

- Age either younger than age 20 or older than age 70
- Male
- History of neck irradiation
- Partially cystic or larger nodules (> 4 cm)
- Symptoms of compression (cough, dyspnea, dysphagia, dysphonia, hoarseness)

Table 3

Ultrasonographic characteristics of thyroid nodules

Benign characteristics	Malignant characteristics
Hyperechogenicity	Hypoechogenicity
Peripheral calcifications (eggshell)	Microcalcifications
Smooth border	Irregular or microlobulated borders
Halo	Absent or irregular halo
Peripheral vascularity	Increased intranodular vascularity

nancy is about 5% to 15% and seems to be similar in smaller nodules (< 1 cm) and larger ones. However, some clinical characteristics should be considered highly suspicious of cancer (Table 2).

The evaluation of a patient with a thyroid nodule requires a careful history and physical examination and a TSH measurement. In fact, a suppressed TSH would suggest a benign functioning nodule and a fine-needle aspiration of the nodule would not be indicated, since the risk of malignancy in those nodules is < 1%.

Radionuclide scanning should only be performed in these patients with a thyroid nodule and a low TSH, or in the context of a follicular lesion on fine-needle aspiration (FNA).⁵ If the TSH is normal or elevated, an FNA of the nodule should be obtained at an early stage in the investigation. The cytopathologic diagnosis could be either:

- malignant,
- follicular in nature,
- clearly benign or
- inconclusive.

FNA should be repeated in the case of inconclusive results.

A thyroid ultrasound is helpful in assessing the size and morphology of the nodule and should, therefore, be considered in the initial evaluation and in the followup of thyroid nodules. Furthermore, some ultrasonographic characteristics correlate with an increased risk of malignancy (Table 3).⁶

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In conclusion...

Thyroid dysfunction is frequent. The best screening procedure for people at a high risk of hypo- and hyperthyroidism is a serum TSH measurement. The investigation of a patient with a thyroid nodule should start with a careful history and physical examination to identify patients with a higher risk of malignancy. A serum TSH should be included in the evaluation, as well as an FNA of the nodule. Thyroid ultrasound should be considered in order to identify nodules with high-risk characteristics and to help with the followup. Radionuclide scanning is seldom helpful in the investigation of thyroid nodules.

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Take-home message



- Serum TSH is the best screening tool for detecting thyroid dysfunction.
- Careful history and physical examination and a serum TSH should be done in every patient with a thyroid nodule.
- An FNA should be performed in every patient with a thyroid nodule, except if the serum TSH is suppressed.
- Thyroid ultrasonography is a helpful tool for assessing the morphology and followup of thyroid nodules.
- Radionuclide scanning should only be reserved for patients with a low TSH or for patients with a thyroid nodule of follicular origin.