Thyroid Biopsy

Thyroid biopsy is presently in common use and is considered to be the first line of investigation for patients with solitary thyroid nodules by many physicians. In this procedure, a small needle on the end of a syringe is inserted into the abnormal part of the thyroid gland. The plunger of the syringe is drawn out and a small number of thyroid cells are drawn up into the base of the needle. These cells are then smeared onto glass slides. The pathologist can then examine the smears for evidence of thyroid disease. This procedure is simple, quick, and painless and is equivalent to having blood taken. In patients with a thyroid nodule due to a thyroid cyst, the fluid can be evacuated using the biopsy technique. The patient may experience mild pain at the site and, rarely swelling and bruising. It is almost unheard of that the needle would damage structures outside the thyroid gland. There have been no reports of spread of thyroid cancer. Local anaesthetic is not usually necessary, even with children.

Thyroid biopsy is not carried out if there is no thyroid swelling or nodule to feel. However, for patients with thyroid nodules, multinodular goitre or possible thyroiditis, the procedure can be extremely useful. Although only surgery can absolutely guarantee the nature of the thyroid nodule, the thyroid biopsy is 85-90% effective in diagnosing the nature of the nodule and distinguishing between benign tumors and thyroid cancer.

However, the main factor determining the success of the thyroid biopsy is the experience of the individual performing the biopsy and the pathologist reading the smears.

Health Guides on Thyroid Disease:

1 The Thyroid Gland: A General Introduction
2 To Confirm the Clinical Diagnosis
3 Hypothyroidism
4 Thyroid Nodules
5 Thyroiditis
6 Graves' Hyperthyroidism (Thyrotoxicosis)
7 Graves' Eye Disease (Ophthalmopathy)
8 Thyroid Disease, Pregnancy and Fertility
9 Thyroid Disease in Childhood
10 Thyroid Disease in Late Life
11 Surgical Treatment of Thyroid Disease
12 Thyroid Cancer
13 Common Concerns of Thyroid Patients

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Important Notice – The information contained within is for general information only and consequently cannot be considered as medical advice to any person. For individual treatment or diagnosis consult your health care professional.

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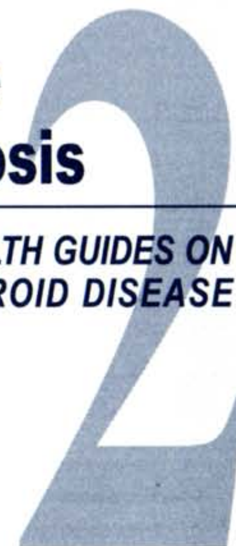
To Confirm the Clinical Diagnosis



HEALTH GUIDES ON THYROID DISEASE

Thyroid Foundation of Canada

La Fondation canadienne de la Thyroïde

Laboratory Investigation of Thyroid Disease

For many patients with thyroid disease, the gland produces excessive amounts of thyroid hormone (hyperthyroidism) or insufficient amounts of thyroid hormone (hypothyroidism). Such patients will usually have an associated goitre (swelling of the thyroid gland). However, many patients with a goitre will have normal thyroid function. Most patients who develop a lump or nodule in the thyroid will have a normal thyroid function as well. A minority of patients with thyroid nodules will have a hyperfunctioning nodule that will make the patient hyperthyroid.

The most important uses of laboratory tests are:

1. to confirm the clinical diagnosis of thyroid disease;
2. to monitor patients with thyroid disease who have been treated;
3. to select, for removal by the surgeon, those single nodules which may be malignant.

Measurement of TSH

The pituitary hormone TSH stimulates the thyroid gland to make and release the thyroid hormones. When thyroid hormone levels decrease, the TSH rises and vice versa. Measurement of TSH using a sensitive assay is presently the recommended initial screening test when thyroid disease is suspected. The TSH assay is able to separate hypothyroid and hyperthyroid patients from normal individuals. Basically, a normal TSH excludes primary thyroid disease. When the TSH is elevated, this suggests hypothyroidism and when suppressed suggests hyperthyroidism. Rarely the TSH level may be suppressed by drugs (such as corticosteroids) or by severe psychiatric or non-thyroidal illness. However, such circumstances are extremely rare in the out-patient setting.

Measurement of Blood T3 and T4

When the TSH is abnormal, measurement of thyroxine (T4) or triiodothyronine (T3) is performed to determine the extent of the thyroid abnormality. An elevated T4 or T3, in association with a low or suppressed TSH, establishes hyperthyroidism. An elevated TSH, in conjunction with a low T4, establishes hypothyroidism. Since using the TSH assay as a primary test, doctors have identified patients who have an isolated low or high TSH in association with normal T4 and T3 levels. Although some of these patients will eventually develop overt thyroid disease, it is presently difficult to predict who they will be. The assessment and management of such patients needs to be individualized.

Thyroid Hormone Binding Proteins

Thyroid hormones circulate in association with proteins which bind thyroid hormones. It is only the free or unbound portion which we believe to be active at the tissue level. However, free levels represent less than 1% of the total thyroid hormone levels. In certain circumstances, such as pregnancy or the birth control pill, the elevated estrogen or female sex hormone associated with these conditions, raises the level of thyroid hormone binding protein. The body will compensate by increasing the production of T4 and T3 so that the free level remains normal. However, such individuals will have a higher total T4 and T3. Because the free level remains normal, their TSH does not change. In many circumstances, measurement of the free T4 and free T3 is available and indeed, many laboratories will perform only free T4 and/or free T3 tests. Alternatively, the T3 resin uptake test can be performed and provides an indirect measurement of the level of thyroid binding protein. The FT4 index is the total T4 multiplied by the T3 resin uptake and should be proportional to the true free T4 level. In pregnancy, the total T4 is elevated, the T3 resin decreased and the free T4 index is normal. The availability of the TSH screening has largely eliminated any confusion caused by changes in thyroid binding proteins as the TSH will remain normal in these circumstances.

Radioactive Iodine Uptake and Thyroid Scan

The thyroid gland takes up iodine and uses this to make thyroid hormone. Radioactive iodine is taken up and metabolized by the thyroid in exactly the same way. Approximately 20% of a dose of radioactive iodine, given orally, is taken up by the thyroid gland within 24 hours after the dose is given. This is measured by counting the radioactivity over the thyroid gland. The test is safe since the radiation dose is very small, although it is usually not carried out in children or pregnant women. The test distinguishes between permanent causes of hyperthyroidism such as Graves' disease and temporary causes such as thyroiditis; in Graves' disease the test is elevated but in thyroiditis the test is suppressed. Alternatively, the gland can be photographed or "imaged" and the distribution within the gland of a radio labelled tracer (usually technetium) recorded. This is called a thyroid scan. The scan can be used as an alternative to the radioactive iodine uptake as described. In addition, the scan gives an idea of the shape and size of the thyroid gland and can be used for patients with thyroid nodules to determine whether the nodule is functioning.

Thyroid Imaging

This can be performed by ultrasound, which is very sensitive, and provides precise information about the size and shape of the thyroid gland and nodules. CAT scans and MRIs also give information about the presence of nodules.

Thyroid Antibodies

Patients with Hashimoto's thyroiditis have an autoimmune disease. Thyroid antibodies are blood proteins which react against certain of the patient's own proteins (called antigens) within the thyroid gland. In patients with Hashimoto's thyroiditis, high levels of antibodies are usually found and are therefore markers of the autoimmune process. Low levels of antibodies are sometimes found in older normal women and do not necessarily indicate clinical disease. Patients with Graves' hyperthyroidism have circulating thyroid stimulating antibodies which act like TSH and cause the thyroid cells to over-function.