

diseases of this type. Graves' disease affects about 1 in 100 of the population, whereas Hashimoto's thyroiditis is even more common.

Other less common causes of thyroid disease include thyroid cancer, subacute thyroiditis and primary hypothyroidism. Nodules, mostly benign, are very common.

Graves Disease

Graves' disease (thyrotoxicosis) is due to a unique "thyroid stimulating antibody" which stimulates the thyroid cells to grow larger and to produce excessive amounts of thyroid hormones. In this disease, the goitre is due not to TSH but to this unique antibody.

Hashimoto's Thyroiditis

In Hashimoto's thyroiditis, the goitre is caused by an accumulation of white blood cells and fluid (inflammation) in the thyroid gland. This leads to destruction of the thyroid cells and, eventually, thyroid failure (hypothyroidism). As the gland is destroyed, thyroid hormone production decreases; as a result, TSH increases, making the goitre even larger.

Thyroid Nodules

Sometimes, thyroid enlargement is restricted to one part of the gland; the rest of the gland being normal. The most common cause of this is a cyst or nodule, which may be benign or malignant. Occasionally there are many nodules. This so called "multinodular goitre" is probably caused by mutations of follicular cells.

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The Thyroid Gland A General Introduction

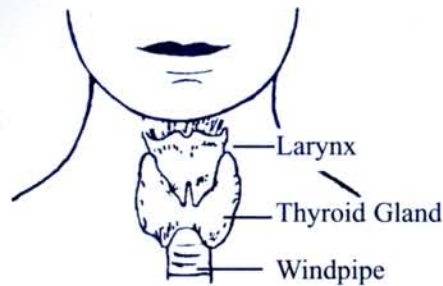
**HEALTH GUIDES ON
THYROID DISEASE**



**Thyroid Foundation of Canada
La Fondation canadienne de la Thyroïde**

The Thyroid Gland: A General Introduction

The thyroid gland is located in the front of the neck attached to the lower part of the voicebox (or larynx) and to the upper part of the windpipe (or trachea). It has two sides or lobes. These lobes are connected by a narrow neck (or isthmus). Each lobe is about 4 cm long and 1 to 2 cm wide. The name "thyroid" comes from the Greek word which means "shield".



Thyroid Hormones

The thyroid gland produces thyroid hormones. These are peptides containing iodine. The two most important hormones are tetraiodothyronine (thyroxine or T₄) and triiodothyronine (T₃). These hormones are essential for life and have many effects on body metabolism, growth, and development.

Iodine

Iodine plays an important role in the function of the thyroid gland. It is the chief component of thyroid hormones, and is essential for their production. Iodine is obtained from the water we drink and the food we eat. In areas of the world where there is an iodine deficiency, iodine must be added to the salt or bread. The Great Lakes area of Canada and the U.S., the Swiss Alps and Tasmania are such areas. In Canada and the U.S., most of the salt is iodized, thus the iodine intake is more than adequate. Taking excess amounts of iodine in foods such as kelp will aggravate autoimmune thyroid disease.

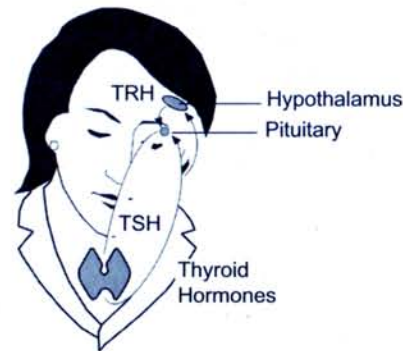
Goitre

Enlargement of the thyroid gland is called goitre. Goitre does not always indicate a disease, since thyroid enlargement can also be caused by physiological conditions such as puberty and pregnancy.

Hypothalamic - Pituitary - Thyroid Axis

The thyroid gland is influenced by hormones produced by two other organs:

1. The pituitary gland, located at the base of the brain, produces thyroid stimulating hormone (TSH).
2. The hypothalamus, a small part of the brain above the pituitary, produces thyrotropin releasing hormone (TRH).



Low levels of thyroid hormones in the blood are detected by the hypothalamus and the pituitary. TRH is released, stimulating the pituitary to release TSH. Increased levels of TSH, in turn, stimulate the thyroid to produce more thyroid hormone, thereby returning the level of thyroid hormone in the blood back to normal.

The three glands and the hormones they produce make up the "Hypothalamic-Pituitary-Thyroid axis".

The way a goitre forms in areas of the world which have a deficiency of iodine is a good example of how this axis functions. Normally, TSH increases the uptake of iodine by the thyroid gland and increases production of thyroid hormone. If there is little iodine available in our diet, insufficient thyroid hormone is produced by the thyroid; hypothalamic

TRH causes TSH to be released from the pituitary in large amounts. The pituitary also responds directly to the lack of thyroid hormone in the blood, and TSH is increased. This enables the thyroid to capture most of the iodine presented to it from food and water. But, TSH has a second action - it causes growth of thyroid cells.

The gland grows and becomes very large under the influence of this high level of TSH secretion. Therefore, most people who live in iodine deficient areas have goitre, thus allowing them to produce enough thyroid hormone for normal body function. Once thyroid hormone levels are restored, TSH secretion stabilizes at a high level.

In healthy individuals and in those with goitre, the hypothalamic - pituitary - thyroid axis maintains thyroid hormone production at a finely controlled level and enables the thyroid to respond to situations requiring more or less thyroid hormone production.

Thyroid Disorders

The main causes of thyroid disease are:

1. too much thyroid hormone production or HYPERTHYROIDISM.
2. too little thyroid hormone production or HYPOTHYROIDISM.

The state of normal thyroid function is called EUTHYROIDISM.

Abnormalities of the thyroid gland are common and affect about one in twenty (1 in 20) of the Canadian population. All thyroid disorders are much more common in women than in men. Because of the widespread use of iodized salt and bread, lack of iodine is no longer a cause of thyroid disease in Canada as it was some 50 years ago.

"Autoimmune disorders" of the thyroid gland are common. These autoimmune disorders are caused by abnormal proteins, (called antibodies), and the white blood cells which act together to stimulate or damage the thyroid gland. Graves' disease (hyperthyroidism) and Hashimoto's thyroiditis are