Thyroid Foundation of Canada
La Fondation canadienne de la Thyroïde
Bus. No. 11926 4422 RR0001

Thyroid Information Package

Thank you for your request for information on Thyroid Disease. We are pleased to provide you with the enclosed information. It is hoped you will find it of benefit to you as well as giving you an idea of who we are and our activities.

Since thyroid disease is believed to be a genetic condition, it is very possible that someone with thyroid disease has family members who have been or will be diagnosed with the condition in the future - children, grandchildren, siblings and parents.

The Thyroid Foundation of Canada provides patients and the general public with valuable information on various thyroid conditions. It is very evident that thyroid disease is of high prevalence right across Canada – as well as throughout the whole world.

The Foundation has raised funds to support thyroid research and awards have been granted for a variety of projects. Grants from government and corporate sources have been received for the production of educational material in English and French.

This information package contains ***Information on Thyroid Disease***:

- Thyroid Disease: Know the Facts
- Thyroid Disease… Overview of Thyroid Function
- To Confirm the Clinical Diagnosis

About the Thyroid Foundation of Canada

WHO ARE WE?

The Thyroid Foundation of Canada was founded in Kingston by Diana Meltzer Abramsky in 1980. It grew from the concerns and feelings of isolation of thyroid patients and their families. These feelings were largely due to the lack of adequate information available on thyroid disease and lack of support groups for discussion of mutual problems and frustrations.

WHAT ARE OUR AIMS?

- To awaken public interest in, and awareness of, thyroid disease;
- To lend moral support to thyroid patients and their families;
- To assist in fund raising for thyroid disease research.

Our commitment to thyroid disease is to provide **Education, Support and Research**. In order to provide those services, we rely on the generosity of people like you. We hope you will become a Member of TFC – a Membership Form is included in this package which you can complete and return or you can join or donate at thyroid.ca

WHAT DO WE PROVIDE?

- THYROBULLETIN – TFC's semi-annual publication. It presents up-to-date information on thyroid disease, patient stories, our activities, and more.
- EDUCATIONAL MATERIAL – available free
- OUR WEBSITE thyroid.ca – with a ***Just for Members*** section

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Thyroid Disease: Know the Facts

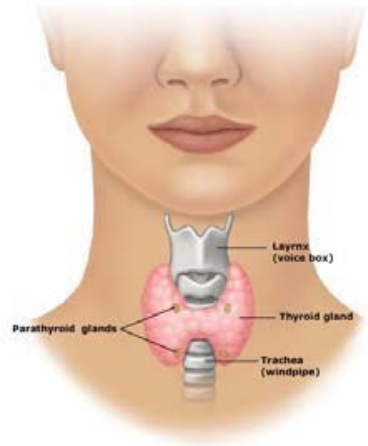
THYROID DISEASE IS A WORLD-WIDE REALITY

About 200 million people in the world have some form of thyroid disease. Yet before the founding of the Thyroid Foundation of Canada in 1980, no lay organization existed in North America to promote public education about thyroid disease and to promote public support of thyroid research.

Thyroid disorders for the most part are treatable; however, untreated thyroid disease can produce serious results in other parts of the body. Improved public awareness and understanding of thyroid disorders will enable patients and their families to cope more effectively with the sometimes disturbing course of thyroid illness. In this way individuals will also be better equipped to play a role in alerting their physicians to a suspected thyroid condition that may otherwise be difficult to diagnose in the sometimes slowly developing initial phases.

THE THYROID GLAND

The thyroid gland is a small butterfly-shaped gland at the base of the neck. It weighs only about 20 grams. However, the hormones it secretes are essential to all growth and metabolism. The gland is a regulator of all body functions. Thyroid disorders are found in 0.8-5% of the population and are 4 to 7 times more common in women.



TYPES OF THYROID DISEASE

There are many types of thyroid disease. However, the main conditions present in most thyroid illnesses are hypothyroidism (thyroid under activity) and hyperthyroidism (thyroid over activity).

SYMPTOMS OF THYROID DISEASE

Signs and symptoms of hypothyroid and hyperthyroid conditions include:

HYPOTHYROIDISM	HYPERTHYROIDISM
• weak slow heart beat • muscular weakness and constant fatigue • sensitivity to cold • thick puffy skin and/or dry skin • slowed mental processes and poor memory • constipation • goitre (increased size of the thyroid) • *more on **Hypothyroidism***	• rapid forceful heartbeat • tremor • muscular weakness • weight loss in spite of increased appetite • restlessness, anxiety and sleeplessness • profuse sweating and heat intolerance • diarrhea • eye changes • goitre (increased size of the thyroid) • *more on **Hyperthyroidism***

Each person's experience of thyroid illness differs depending on a number of factors; a patient will not necessarily have all the above symptoms and some patients have the symptoms in the absence of thyroid disease. A physician should be consulted if thyroid illness is suspected.

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THYROID NODULES AND THYROID CANCER

Thyroid nodules are common and treatable but should always be investigated since a small proportion of them are cancerous. The majority of thyroid cancers have a favourable prognostic and requires a multidisciplinary approach (endocrinologist, surgeon, nuclear medicine specialist and sometimes oncologist). In the past years there has been a rise in the number of thyroid cancers being identified. There has been no change however, in the mortality rate.

THE EMOTIONAL ASPECTS OF THYROID ILLNESS

There may be emotional reactions to thyroid illness. Hyperthyroid patients often feel unusually nervous or irritable. Hypothyroid patients can feel unusual fatigue or depression. It is important for thyroid patients and their families to understand that these reactions are common and likely to resolve with treatment. It is also important to realize that some thyroid disorders develop very gradually and it can take a while before they disappear after treatment has been initiated. Since symptoms may not be easily recognized at first, subtle reactions in emotions or behaviour may be the only visible signs of thyroid disorder.

THE NEED FOR MONITORING

Thyroid patients require life-long monitoring. Patients who believe they have been completely cured of their thyroid illness should discuss the need for follow-up with their family physicians or thyroid specialists.

THE PURPOSE OF NEWBORN SCREENING

Canada is a world leader in developing screening methods for the detection of the serious disorder of congenital hypothyroidism. As a result, most North American hospitals now screen for this disease. One baby in 4000-5000 is being identified in Canada by screening tests. Thus the serious mental retardation and growth defects that can result from congenital hypothyroidism are being prevented. However, early identification and treatment are absolutely essential.

THE NEED FOR FURTHER RESEARCH

Further thyroid research is necessary to continue the progress that has been made in diagnosis and treatment. Although there are effective treatments for most thyroid disorders, the underlying causes require further investigation. The continued study of the thyroid may yield important knowledge in other areas of medical science. The role of new treatments for thyroid cancer has to be defined and improved. To achieve these goals, public support of thyroid research is vital.

Updated in August 2018 by Deric Morrison, MD FRCPC, Div. of Endocrinology, Dept. of Medicine, University of Western Ontario. Original text written by Irving B. Rosen, MD and Paul G. Walfish CM, MD, FRCP(C), FACP, FRSM.

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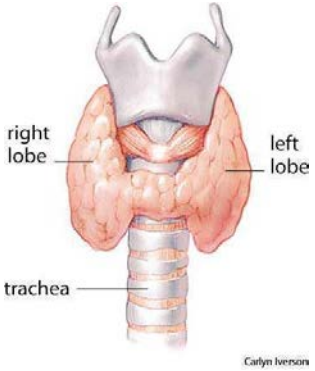
Thyroid Disease… Overview of thyroid function

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 can aggravate hyperthyroid disease.

GOITRE

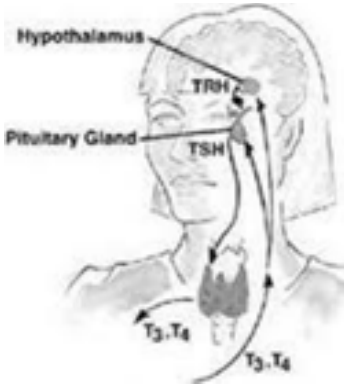
Enlargement of the thyroid gland is called goitre. Goitre does not always indicate a disease, since thyroid enlargement can also be caused by physiological conditions such as puberty and pregnancy.

HYPOTHALAMIC – PITUITARY – THYROID AXIS

1. The thyroid gland is influenced by hormones produced by two other organs:
2. The pituitary gland, located at the base of the brain, produces thyroid stimulating hormone (TSH)
3. 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 those geographic areas of the world which have a deficiency of iodine is a good example of how the 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 1-5% of the 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 the most common cause of thyroid dysfunction. 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 diseases of this type. Graves' disease affects about 1 in 100 of the population, whereas Hashimoto's thyroiditis is even more common (its prevalence increases with age).

GRAVES' DISEASE

Graves' disease (thyrotoxicosis) is due to a unique antibody called "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). In the beginning, thyroid hormone production decreases. In response to lower thyroid hormones levels, TSH increases and goitre can develop. In the later stages, the goitre can disappear because of the progressive destruction of the thyroid.

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 and this is called "multinodular goitre". Genetic modifications of the proteins usually involved in thyroid growth and function can contribute to this phenomenon.

THYROID DISEASE AND THE ELDERLY

Since it may mimic the symptoms and signs of aging, the clinical recognition of thyroid dysfunction in the elderly requires a high index of suspicion. Although the standard tests used to monitor thyroid function may be slightly altered by aging, the "normal ranges" used for younger adults can be applied for diagnosing thyroid dysfunction in the elderly when factors of concurrent acute or chronic illness, changes in nutritional and mental status as well as the possible recent administration of x-ray dyes and drugs have been excluded.

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To Confirm the Clinical Diagnosis

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). Some patients will also have an associated goitre (swelling of the thyroid gland). 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 one and present with hyperthyroidism (overactive thyroid).

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 (T4 and T3). 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 THYROXINE (T4) OR TRIIODOTHYRONINE (T3)

In some cases of abnormal TSH values, measurement of T4 or 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, is encountered in 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, their assessment and management 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. In these individuals the total T4 and T3 are higher because the body will compensate by increasing the production of T4 and T3 so that the free level remains normal. In these individuals, even though there are higher total T4 and T3 the free level remains normal and TSH does not change. Current laboratory procedures usually measure free T4 and/or free T3 . 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 20-25% 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 after a 24h period. The test is safe since the radiation dose is very small, although it is usually not carried out in pregnant women. The test distinguishes between permanent causes of hyperthyroidism such as Graves' disease and temporary causes such as thyroiditis; in Graves' disease the iodine uptake is elevated while in thyroiditis it is low. 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 is usually used together with the uptake to give a complete idea of the shape and size of the thyroid gland as well as its function. These tests can also be used to determine whether a thyroid nodule is functioning and can lead to excess amount of hormones.

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 can also give information about the presence of nodules but are not the first choice. Certain characteristics of a nodule on thyroid ultrasound can provide additional information about its risk of being cancerous.

THYROID ANTIBODIES

The majority of diseases causing thyroid dysfunction are caused by autoimmune diseases. 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, the major cause of hypothyroidism, 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.

THYROID BIOPSY

Thyroid biopsy is presently in common use and is considered to be the first line of investigation for patients with thyroid nodules. 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 or placed in a special liquid and the pathologist can 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. Some patients 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 after thyroid biopsy. Local anaesthetic is usually not necessary even with children.

Thyroid biopsy can be carried out with or without ultrasound guidance. It is very sensitive for detecting certain types of thyroid cancer and is a procedure to be considered for most nodules that are larger than 1 cm. Approximately 10% of biopsies can be non-informative because the number of cells obtained for pathology examination is insufficient. Among the factors determining the success of the thyroid biopsy is the experience of the individual performing the biopsy and the pathologist reading the smears.

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*Become a member of TFC or make a donation at **thyroid.ca** - or complete the form below and mail to: Thyroid Foundation of Canada, P.O. Box 298, Bath ON K0H 1G0*

More information on Thyroid Disease

More topics on thyroid disease can be seen under Resource Material on our website thyroid.ca

Hypothyroidism
Thyroid Nodules
Thyroiditis
Hyperthyroidism (Thyrotoxicosis)
Graves' Eye Disease (Ophthalmopathy)
Thyroid Disease, Pregnancy & Fertility
Thyroid Disease in Childhood
Surgical Treatment of Thyroid Disease
Thyroid Cancer

Membership and Donation Form

Name:			☐ Ms ☐ Mrs ☐ Mr
Address:			
Telephone:			
Email:			
MEMBERSHIP LEVEL			
One Year	☐ Regular $35	☐ Senior $30	☐ Family $45
Two Year	☐ Regular $60	☐ Senior $50	☐ Family $65

TOTAL		
$	Membership	*Members receive **Thyrobulletin**, official newsletter of the Thyroid Foundation of Canada*
$	Donation	*All donations support the work of the Thyroid Foundation of Canada*
$	**TOTAL**	☐ Sign me up for ***Just for Members*** *(your username and password will be emailed to you)*

PAYMENT		
☐ Visa	☐ MasterCard	☐ Cheque (payable to: Thyroid Foundation of Canada)

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***You can also join and make donations on TFC's website**: www.thyroid.ca*

Thank you for your support!