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THYROID DISEASES

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Abstract:
This article discusses thyroid diseases and their causes.

Keywords: diseases, thyroid gland, prevention, causes.

Introduction

Thyroid disease is a medical condition that affects the function of the thyroid gland. The thyroid gland is located at the front of the neck and produces thyroid hormones[1] that travel through the blood to help regulate many other organs, meaning that it is an endocrine organ. These hormones normally act in the body to regulate energy use, infant development, and childhood development.[2]

There are five general types of thyroid disease, each with their own symptoms. A person may have one or several different types at the same time. The five groups are:

1. Hypothyroidism (low function) caused by not having enough free thyroid hormones
2. Hyperthyroidism (high function) caused by having too many free thyroid hormones
3. Structural abnormalities, most commonly a goiter (enlargement of the thyroid gland)
4. Tumors which can be benign (not cancerous) or cancerous
5. Abnormal thyroid function tests without any clinical symptoms (subclinical hypothyroidism or subclinical hyperthyroidism).

In the US, hypothyroidism and hyperthyroidism were respectively found in 4.6 and 1.3% of the >12y old population (2002).

In some types, such as subacute thyroiditis or postpartum thyroiditis, symptoms may go away after a few months and laboratory tests may return to normal. However most types of thyroid disease do not resolve on their own. Common hypothyroid symptoms include fatigue, low energy, weight gain, inability to tolerate the cold, slow heart rate, dry skin and constipation. Common hyperthyroid symptoms include irritability, anxiety, weight loss, fast heartbeat, inability to tolerate the heat, diarrhea, and enlargement of the thyroid. Structural abnormalities may not produce symptoms,

however some people may have hyperthyroid or hypothyroid symptoms related to the structural abnormality or notice swelling of the neck. Rarely goiters can cause compression of the airway, compression of the vessels in the neck, or difficulty swallowing. Tumors, often called thyroid nodules, can also have many different symptoms ranging from hyperthyroidism to hypothyroidism to swelling in the neck and compression of the structures in the neck.

Diagnosis starts with a history and physical examination. Screening for thyroid disease in patients without symptoms is a debated topic although commonly practiced in the United States. If dysfunction of the thyroid is suspected, laboratory tests can help support or rule out thyroid disease. Initial blood tests often include thyroid-stimulating hormone (TSH) and free thyroxine (T4). Total and free triiodothyronine (T3) levels are less commonly used. If autoimmune disease of the thyroid is suspected, blood tests looking for Anti-thyroid autoantibodies can also be obtained. Procedures such as ultrasound, biopsy and a radioiodine scanning and uptake study may also be used to help with the diagnosis, particularly if a nodule is suspected.

Thyroid diseases are highly prevalent worldwide, and treatment varies based on the disorder. Levothyroxine is the mainstay of treatment for people with hypothyroidism, while people with hyperthyroidism caused by Graves' disease can be managed with iodine therapy, antithyroid medication, or surgical removal of the thyroid gland. Thyroid surgery may also be performed to remove a thyroid nodule or to reduce the size of a goiter if it obstructs nearby structures or for cosmetic reasons. Most thyroid disease in the United States stems from a condition where the body's immune system attacks itself. In other instances, thyroid disease comes from the body trying to adapt to environmental conditions like iodine deficiency or to new physiologic conditions like pregnancy.

Autoimmune Thyroid Disease

Autoimmune thyroid disease is a general category of disease that occurs due to the immune system targeting its own body. It is not fully understood why this occurs, but it is thought to be partially genetic as these diseases tend to run in families. In one of the most common types, Graves' Disease, the body produces antibodies against the TSH receptor on thyroid cells. This causes the receptor to activate even without TSH being present and causes the thyroid to produce and release excess thyroid hormone (hyperthyroidism). Another common form of autoimmune thyroid disease is Hashimoto's thyroiditis where the body produces antibodies against different normal components of the thyroid gland, most commonly thyroglobulin, thyroid peroxidase,

and the TSH receptor. These antibodies cause the immune system to attack the thyroid cells and cause inflammation (lymphocytic infiltration) and destruction (fibrosis) of the gland.

Goiter

Goiter is the general enlargement of the thyroid that can be associated with many thyroid diseases. The main reason this happens is because of increased signaling to the thyroid by way of TSH receptors to try to make it produce more thyroid hormone. This causes increased vascularity and increase in size (hypertrophy) of the gland. In hypothyroid states or iodine deficiency, the body recognizes that it is not producing enough thyroid hormone and starts to produce more TSH to help stimulate the thyroid to produce more thyroid hormone. This stimulation causes the gland to increase in size to increase production of thyroid hormone. In hyperthyroidism caused by Graves' Disease or toxic multinodular goiter, there is excess stimulation of the TSH receptor even when thyroid hormone levels are normal. In Graves' Disease this is because of an autoantibodies (Thyroid Stimulating Immunoglobulins) which bind to and activate the TSH receptors in place of TSH while in toxic multinodular goiter this is often because of a mutation in the TSH receptor that causes it to activate without receiving a signal from TSH. In more rare cases, the thyroid may become enlarged because it becomes filled with thyroid hormone or thyroid hormone precursors that it is unable to release or because of congential abnormalities or because of increased intake of iodine from supplementation or medication.

Pregnancy

There are many changes to the body during pregnancy. One of the major changes to help with the development of the fetus is the production of human chorionic gonadotropin (hCG). This hormone, produced by the placenta, has similar structure to TSH and can bind to the maternal TSH receptor to produce thyroid hormone. During pregnancy, there is also an increase in estrogen which causes the mother to produce more thyroxine binding globulin, which is what carries most of the thyroid hormone in the blood. These normal hormonal changes often make pregnancy look like a hyperthyroid state but may be within the normal range for pregnancy, so it necessary to use trimester specific ranges for TSH and free T4. True hyperthyroidism in pregnancy is most often caused by an autoimmune mechanism from Graves' Disease. New diagnosis of hypothyroidism in pregnancy is rare because hypothyroidism often makes it difficult to become pregnant in the first place. When hypothyroidism is seen in pregnancy, it is often because an individual already has hypothyroidism and needs to increase their levothyroxine dose to account for the increased thyroxine binding globulin present in pregnancy.

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