

Hypothyroidism

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The Thyroid Gland: Some Basic Facts

About the fourth week of gestation, the thyroid gland appears at the base of the tongue. During fetal development, it migrates downward to take its position at the base of the neck in front of the windpipe. Nearby this butterfly-shaped structure, weighing normally 20-25 grams, are important arteries and nerves as well as the four small parathyroid glands which control the blood calcium level. Because of their proximity to the thyroid gland, there is a risk to these during thyroid surgery. The main role of the thyroid is to manufacture the two hormones, thyroxine or T₄, and triiodothyronine or T₃ (so-called because their molecules have four and three atoms of iodine respectively). These hormones circulate to virtually all the organs in the body and regulate their metabolism.

How It Is Regulated

The thyroid gland does not work independently. The signal to release the thyroid hormones is given by the pituitary, a small gland in the centre of the head behind the eyes, which secretes thyroid-stimulating hormone or TSH. The pituitary is, in turn, governed by the TSH-releasing hormone or TRH, which is produced higher in the brain by the hypothalamus. When the normal blood levels of T₄ and T₃ are reached, the message goes back to the pituitary to shut off its output of TSH. Damage to any part of this "loop" system will decrease the amount of thyroid hormones in circulation. In only a small percentage of cases (perhaps 5% or less), however, does hypothyroidism result from hypothalamic or pituitary disease (i.e., tertiary or secondary hypothyroidism). The vast majority of cases result from disease of the thyroid (i.e., primary hypothyroidism).

Causes of Primary Hypothyroidism

Primary hypothyroidism is a clinical condition known for centuries as cretinism. Yet, only about 100 years ago, Sir William Ord first demonstrated in Great Britain that the

condition is due to a thyroid malfunction. He called it myxedema because of the dough-like consistency of the skin in many of the patients. Hypothyroidism is very common. Its incidence increases as age brackets rise, and, for reasons not clear, occurs more often in women than in men. In order of frequency, the causes are:

- 1) Post-Ablative - following thyroid surgery or radioactive iodine treatment for hyperthyroidism;
- 2) Autoimmune - occurring in Hashimoto's thyroiditis, a condition (first described in 1911 by the Japanese physician, Hashimoto) in which the immune system, for reasons unknown, turns against the thyroid gland and destroys it;
- 3) Congenital - present at birth;
- 4) Drug-induced - e.g., by drugs such as propylthiouracil used to treat hyperthyroidism or lithium used in some forms of mental illness;
- 5) Food-induced - e.g., by foods such as turnip and cabbage containing "goitrogens" or substances which, in huge quantities, may impair the function of the thyroid (these foods, it should be noted, are not a large enough component of the North American diet to be a danger here);
- 6) Infiltrative - i.e., by diseases such as hemochromatosis that invade the body organs, which may include the thyroid, and interfere with their function;
- 7) Subacute thyroiditis - an inflammatory condition with a hyperthyroid and a hypothyroid phase;
- 8) Iodine deficiency - no longer seen in North America where iodized salt is used and where, even on a salt-free diet, plenty of iodine is obtained from bread and other foods.

Clinical Symptoms of Hypothyroidism

Patients may present the following symptoms: apathetic facial features, pale complexion, bags around the eyes, enlarged tongue, lustreless and coarse hair, slow pulse, sometimes a slight rise in blood pressure,

brittle nails, sometimes hoarseness, often a goiter, fatigue, constipation, marked intolerance of cold, muscle cramps, memory problems. In very rare cases, when hypothyroidism has gone untreated, myxedema coma occurs with swelling in body cavities, abdomen, lining around the heart, and perhaps the lungs. This can be fatal.

Confirming the Diagnosis

Blood tests done to confirm the clinical diagnosis measure the levels of T₄, T₃ and TSH in the blood. The TSH test is very important, because low thyroid hormone levels and an elevated TSH level point to primary hypothyroidism, whereas low levels of both thyroid hormone and TSH point to pituitary or hypothalamic disease.

In congenital hypothyroidism, prompt diagnosis is extremely important. Brain tissue is very sensitive to thyroid hormone levels, especially in the fetal period and early infancy. If treatment is not begun by three months of age, permanent intellectual retardation results - a tragedy leading to institutionalization. Cretinous children often have a narrow forehead, puffy face, thickened tongue, pug nose, distended abdomen, protruding belly button, short legs. But some look quite normal, and it is for this reason that there must be screening of all infants. The screening program in Toronto is detecting one in 4000 children with congenital hypothyroidism. These will need thyroid hormone replacement for life.

Treatment

The early treatment for hypothyroidism was with desiccated thyroid tablets made from animal thyroid. But these were not of reliable potency, and today, practically all patients take pure synthetic thyroid hormone (thyroxine) preparations of standardized quality. This replacement medication is sometimes referred to as levothyroxine or L thyroxine. In Canada, it is available under the brand names Eltroxin and Synthroid. Patients are usually started with a small daily dosage and gradually build up to the dosage that will bring for them a good therapeutic response (probably 0.1-0.15 mg). Time is needed for adjustment; if full dosages are given too quickly, symptoms of hyperthyroidism may appear. Young children require more thyroid replacement medication in proportion to their weight than adults. In hypothyroidism, as in all other thyroid disorders,

regular checkups are essential to make sure that the thyroid hormone levels remain normal.

Question Period

- Q. How frequently should checkups take place?
- A. Blood tests should be done every few weeks with newly diagnosed patients who will need their dosages adjusted up or down until the desirable plateau is reached. Then, once or twice a year after the patient is euthyroid (i.e., normal) and feels well.
- Q. In families with a history of thyroid problems, when should apparently healthy relatives be tested?
- A. Whenever any of the common signs appear, and at time of greatest risk such as puberty, pregnancy, lactation, and periods of extra stress. Hypothyroidism, especially the autoimmune variety, definitely runs in families.
- Q. What is the best time of day to take the medication?
- A. Preferably in the morning, one-half to one hour before eating. All medications are absorbed best on an empty stomach, but some may cause irritation and therefore need to be taken with food.
- Q. Does the dosage, once determined for the individual, ever have to be changed?
- A. Yes, as children grow and sometimes as adults age. Also, some other medications and concomitant illnesses may affect the dosage needed. If the blood tests are normal, the dosage is likely correct.
- Q. Is it serious to forget to take one's thyroxine?
- A. Thyroxine has a fairly long life in the blood, and nothing happens if the dose is omitted for a day or even two to three days. But do not double the dosage in the effort to make up.
- Q. Are there interactions between thyroxine and other drugs?
- A. All drugs interact to some extent, but generally patients who are euthyroid do not have to worry. Check with your doctor, however, if you are taking medication such as questran which affect absorption.