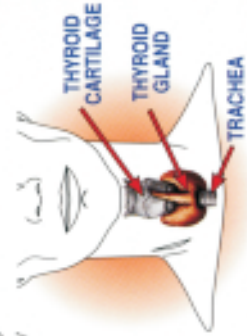


Symptoms of hypothyroidism may include:

- Slowed metabolism and slowed heart rate
- Cold and heat intolerance – cold hands and feet
- Fluid retention - face, legs, eyelids and abdomen
- Fatigue
- Dry skin, eyes and/or hair
- Yellowed skin
- Loss of eyebrows
- Constipation
- Infertility
- Low sexual desire
- Headaches, migraines
- Depression, apathy and anxiety
- Irritability - low self esteem
- Memory and concentration impairment
- Enlarged tongue, deep voice and swollen neck
- PMS, Irregular menstrual periods
- Lack of exercise tolerance
- Weight gain (especially in the stomach)
- Hypoglycemia (low blood sugar)

Thyroid Hormone (TH) is produced by the thyroid, a butterfly-shaped gland behind the larynx, in response to the release of thyroid stimulating hormone (TSH) from the pituitary gland.

TH helps the body convert food into energy and heat, regulates body temperature, and impacts many other hormonal systems in the body.



Approximately 200 million people worldwide have thyroid disorders, and the risk increases with age. More than half of all Americans affected by thyroid disease are unaware of their condition. Thyroid disease affects many more women than men (possibly because women need higher levels of TH) but it has no age, gender, or ethnic barriers. Patients may have some or all of the above symptoms, but may not be diagnosed for years.

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Hypothyroidism is the second leading cause of high cholesterol, after diet. When TH levels drop, the liver no longer functions properly and produces excess cholesterol, fatty acids, and triglycerides, which increase the risk of heart disease. High cholesterol may also increase the risk of Alzheimer's disease, and severe hypothyroidism can cause symptoms similar to those of Alzheimer's disease.

TH imbalance has a profound effect on cardiovascular fitness because TH helps control heart rate and blood pressure. Under hypothyroid conditions, the heart rate can slow substantially and arrhythmias may develop. Blood pressure may fall significantly. Hypothyroidism also weakens muscles, including the diaphragm. As a result, breathing can become less efficient. Snoring may start or become worse. Fatigue is extremely common, and muscles and joints often ache. With impaired respiration and reduced availability of oxygen, muscles do not strengthen in response to exercise and stamina does not improve.

TH exists in two major forms:

- **Thyroxine (T₄)**, with four iodine atoms per molecule, is an inactive form that is produced exclusively by the thyroid gland.
- **Triiodothyronine (T₃)**, with three iodine atoms per molecule, is the active form of thyroid hormone. About 20 percent of T₃ is produced by the thyroid gland, with the remainder produced through conversion of T₄ in various tissues of the body when more T₃ is needed. Some people may transform T₄ into a non-usable form called Reverse T₃.

An increased need for T₄ during estrogen therapy has recently been recognized. It is caused by the estrogen-induced increase in serum T₄ binding globulin (TBG), which occurs with any orally administered estrogen but not with transdermal estrogen therapy.

The goal of any form of hormone replacement therapy should be to provide an adequate supply of the deficient hormone in a form that is as close as possible to that which the body originally produced, therefore resulting in normal physiologic effects. Researchers have attempted to provide appropriate thyroid hormone replacement for the treatment of hypothyroidism since 1892, when the Armour meat company began to provide desiccated thyroid extract from the thyroid glands of animals (Armour Thyroid®). Desiccated thyroid

extract contained both T₄ and T₃ and was the only available treatment for hypothyroidism for almost 50 years, but various preparations differed considerably in bioavailability and potency. Ingestion of a few grains of desiccated thyroid could cause a steep increase in serum T₃ concentrations, often reaching peak levels that were higher than normal within two hours, and producing undesirable side effects including palpitations.

Beginning in the 1970s, the use of desiccated thyroid for the treatment of primary hypothyroidism was gradually replaced by a synthetic form of T₄ known as levothyroxine sodium, with the aim of relieving symptoms and normalizing the serum TSH (thyroid-stimulating hormone) concentration. Although both T₄ and T₃ are secreted by the normal thyroid gland, most patients are now treated only with levothyroxine (synthetic T₄). Physicians note that despite apparently adequate replacement therapy with levothyroxine, some hypothyroid patients remain symptomatic. Studies suggest that replacement therapy for hypothyroidism with levothyroxine alone does not ensure normal thyroid hormone levels in all tissues, and that a combination of levothyroxine and T₃ may be required for optimal thyroid replacement therapy. However, the only commercially available form of T₃ for replacement therapy is synthetic liothyronine sodium, an immediate release formulation which is rapidly absorbed, may result in higher than normal T₃ concentrations throughout the body, and may cause serious side effects, including heart palpitations. Because immediate release T₃ is also quickly broken down in the body, replacement of T₃ with synthetic liothyronine requires multiple daily doses. Therefore, due to dosing problems and the significant potential for side effects, liothyronine is only used in exceptional circumstances. Research indicates there is a need for sustained-release T₃ preparations in order to avoid adverse cardiac effects due to high serum T₃ levels which can result if the hormone is absorbed too rapidly.

Evaluation of T₃ levels is often omitted from the standard thyroid assessment. Recent work by Belgian endocrinologist Dr. Thierry Hertoghe has confirmed that the addition of T₃ measurement provides a more accurate reflection of thyroid status. If results of blood tests are normal, yet signs of hypothyroidism persist, physicians may wish to consider therapy with low-dose sustained-release T₃.

A study published in the New England Journal of Medicine reported that treatment with T₄ plus T₃ improved the quality of life for most hypothyroid patients. The researchers also recommended that the ideal thyroid hormone replacement

program for someone without a thyroid gland, or whose thyroid gland is nearly non-functioning, should include daily T₃ in sustained-release form, along with enough T₄ to ensure normal levels of thyroid hormone.

Bunivicius and colleagues compared the effects of thyroid hormone replacement with T₄ alone versus the use of T₄ plus T₃ in patients with hypothyroidism either caused by autoimmune thyroid disease or removal of the thyroid gland due to thyroid cancer. In a randomized, double-blind, crossover study design, each patient was studied for two five-week periods. During one period, the patient received his or her usual dose of T₄ (average dose was 175 micrograms). During the other, the patient received a regimen in which 50 micrograms of the usual dose of T₄ was replaced by 2.5 micrograms of T₃. Performance on tests of incidental learning was significantly better after T₄ plus T₃ treatment, indicating improved mental flexibility and attention. Patients scored their mood and physical symptoms as significantly better after T₄ plus T₃ treatment, and tended to be less depressed than after treatment with T₄ alone. When asked at the end of the study, two-thirds of patients preferred T₄ plus T₃, saying they were more energetic, better able to concentrate, and simply felt better. This study concluded that partial substitution with T₃ improved cognitive performance, mood, physical status, and neuropsychological function in hypothyroid patients.

Patients and their physicians may wish to consider the inclusion of sustained-release T₃ in the treatment of hypothyroidism, particularly when the response to levothyroxine (T₄) has not been complete. For more information about sustained-release T₃ formulations, please contact our compounding pharmacist.

Our compounding professionals can prepare medications in the specific strength and dosage form that is most appropriate to meet each patient's specific needs and solve medication problems.

REFERENCES

- N Engl J Med 1999 Feb 11;340(6):424-9
- J Endocrinol Invest 2002 Feb;25(2):106-9
- Med J Aust 2001 Feb 5;174(3):141-3
- Horm Res 2001;56 Suppl 1:74-81
- N Engl J Med 1999 Feb 11;340(6):468-70
- Endocrinology 1996 Jun;137(6):2490-502
- J Clin Invest 1995 Dec;96(6):2828-38