

**THE GULF COAST CENTER
ACKNOWLEDGEMENT OF RECEIPT & UNDERSTANDING
OF HYPOTHYROIDISM TRAINING MATERIAL**

Full Legal Name: _____

Company Name: _____

I acknowledge that I have received a copy of Training Material on Hypothyroidism, and
I acknowledge that I have read and understand its contents.

Signature of Individual

Date

Signature of Supervisor

Date

Please mail completed form to this address after completion:

The Gulf Coast Center
Attention: Lina Ellis
P.O. Box 2490
Galveston, TX 77553-2490

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HYPOTHYROIDISM

Did you know?

[Hypothyroidism](#) is present in 1 out of every 5000 newborns¹.

Impairment of thyroid function affects about 2% of adult women and about 0.1% to 0.2% of adult men in North America.²

As many as 25% of patients with hypothyroidism have normal levels of T₃.² Symptoms of thyroid dysfunction can have a significant impact on behavior such as mental confusion and memory problems.³

Hypothyroidism can be associated with depression and its symptoms^{4,5}:

- decreased interest in daily activities
- concentration difficulties
- sleep disturbances
- reduced sexual interest

Hypothyroidism can be associated with certain heart problems and mild high blood pressure.⁶

Even mild thyroid failure can have harmful effects.⁷

What is Hypothyroidism?

The thyroid is a small, butterfly-shaped gland located in the front of the neck, which produces thyroid hormones, or “chemical messengers,” that signal cells throughout the body to increase oxygen use. The two key thyroid hormones are [L-triiodothyronine](#) (T₃)—the more biologically active thyroid hormone—and [thyroxine](#) (T₄).⁸

[Hypothyroidism](#) occurs when there is an inadequate secretion of thyroid hormones, resulting in a slowing down of the body’s metabolism.^{1,2} While low production of these hormones results in hypothyroidism (an underactive thyroid), high production of these hormones results in [hyperthyroidism](#) (an overactive thyroid).^{1,6}

The goals of thyroid hormone replacement therapy are to normalize thyroid hormone levels and to provide symptomatic relief. Although there are several types of thyroid hormone replacement available, not any one type is optimal therapy for everyone. As a result, treatment options may vary from person to person.⁹

Who Develops Hypothyroidism?

Select a category from the list or scroll down the page.

- [Age and Gender](#)
- [Genetic Defects](#)
- [Smoking in Women with Hypothyroidism](#)

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- [Risk Factors for Pregnant Women](#)
- [Other Risk Factors](#)

Age and Gender

Estimates suggest that 1 in 10 Americans, approximately 20 million people, have a thyroid disorder.¹ Thyroid disease strikes women more often than men.² The elderly are the most susceptible to [hypothyroidism](#).³ Underdiagnosis is a risk in the elderly because many of the symptoms of hypothyroidism—dry skin, fatigue, constipation, and memory loss—may be mistaken for signs of aging.⁴

However, hypothyroidism can affect people of all ages, and 1 out of every 5,000 infants is born without a working thyroid gland.⁴ [Hashimoto's thyroiditis](#)—an inflammation of the thyroid caused by autoimmune factors—is the leading cause of hypothyroidism, affecting about 8% of adults.²

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Genetic Defects

Heredity plays a role in both underactive and overactive thyroid; about half of those with close relatives with chronic [autoimmune disease](#) have antibodies—the immune system's agents for attacking specific proteins—to the thyroid. As many as half of those with [Turner's syndrome](#)—one of the most common genetic diseases in women—have hypothyroidism, usually resulting from [Hashimoto's thyroiditis](#).⁵

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Smoking in Women with Hypothyroidism

Smoking is generally regarded as an unhealthy habit for many reasons, and in women with [hypothyroidism](#), it should likewise be avoided. In a study reported in *The New England Journal of Medicine*, women with [subclinical hypothyroidism](#) who also smoked had higher total [LDL](#) cholesterol levels than nonsmokers. Women with hypothyroidism who smoked also had higher serum cholesterol concentrations and more muscle problems than those who did not smoke.⁶ It was concluded that smoking impairs both thyroid hormone secretion and thyroid hormone action. Therefore, your smoking status needs to be considered when hypothyroidism is suspected or being medically managed.

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Risk Factors for Pregnant Women

Women who have [hypothyroidism](#) are also at greater risk for autoimmune conditions.^{1,4} Thyroid dysfunction can have harmful effects on the fetus and the mother during pregnancy.⁷⁻¹¹ The NIH (National Institutes of Health) has also established that untreated hypothyroidism during pregnancy can adversely affect the IQ of children.¹²

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Other Risk Factors

[Hypothyroidism](#) occasionally occurs with [Addison's disease](#), [pernicious anemia](#), insulin-dependent diabetes, Sjogren's syndrome, and [rheumatoid arthritis](#).⁵ It is also associated with [myasthenia gravis](#), ovarian failure, sleep apnea, and premature gray hair.¹ Physicians should check for hypothyroidism in older people with any of these conditions.

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People with anorexia or bulimia are also at risk for [hypothyroidism](#); in these cases, however, reduced thyroid function may be an adaptation to malnutrition, and, therefore, some experts think only the eating disorder should be treated, not hypothyroidism.

Since many drugs affect the thyroid, anyone being treated for a chronic disease, anyone who is taking thyroid medication and requires other drugs, or anyone who is at risk for thyroid disorder and needs to take medications should discuss with their physician the impact of the particular drug on their thyroid.

If you believe you may have symptoms of [hypothyroidism](#), see a physician; only a physician should diagnose hypothyroidism.

What Are the Signs and Symptoms of Hypothyroidism?

Select from the list of symptoms and phase of hypothyroidism or scroll down the page.

- [Summary List of Symptoms¹](#)
- [Early Symptoms](#)
- [Later Symptoms](#)
- [Secondary Hypothyroidism](#)
- [Symptoms in Infants and Children](#)
- [Subclinical Hypothyroidism](#)

Summary List of Symptoms¹

In general, the symptoms of [hypothyroidism](#) (underactive thyroid) are: Weight gain Puffy face Loss or thinning of eyebrows Cold intolerance Low sex drive Depression Abdominal bloating Cold hands or feet Dry or thinning hair Joint or muscle pain Thickening of the skin Thin, brittle fingernails **Early Symptoms**

Many people attribute the early symptoms of [hypothyroidism](#) to stress or aging. They begin to feel chronically tired and overly sensitive to cold; muscle and joint aches often develop; modest weight gain is common even though appetite diminishes; constipation is often a problem.² Premenopausal women may experience heavy periods.²

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Depression can develop, and some experts believe that even mild thyroid failure can lead to major depression.^{3,4}

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Secondary Hypothyroidism

[Secondary hypothyroidism](#) is not common. It is caused by an abnormality of the pituitary gland and deficient TRH secretion.²

Symptoms in Infants and Children

All newborns are now screened for [hypothyroidism](#) in order to help prevent retardation, which can occur if the disorder is not detected early. Some early symptoms that develop in children who are not treated include feeding problems, constipation, hoarseness, and

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sleepiness. Later, babies may have protruding abdomens, rough, dry skin, and delayed teething. If they do not receive proper treatment in time, they may be extremely short for their age, have a puffy, bloated appearance, or have below-normal intelligence. Therefore, a child who appears to be growing abnormally slowly should be examined for hypothyroidism.⁵

Subclinical Hypothyroidism

[Subclinical hypothyroidism](#), or subclinical thyroid dysfunction, is characterized by a mildly elevated [TSH](#) level with normal serum T₄ and T₃. It is called subclinical because this condition is recognized before symptoms are detected.⁶ Symptoms in adults, particularly those over age 50, usually develop so slowly that [hypothyroidism](#) is often first diagnosed in blood tests.

If you believe you may have symptoms of hypothyroidism, see a physician; only a physician should diagnose you with hypothyroidism.

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DIAGNOSIS

How Does a Doctor Determine You Need Thyroid Hormones?

After you have discussed your symptoms with your doctor and [hypothyroidism](#) is suspected, a [TSH](#) (thyroid stimulating hormone) test, and possibly others, may be ordered. When a physician receives a laboratory report, the report slip will state normal ranges for TSH and possibly for other specific hormones. The TSH measurement is of fundamental importance since it reflects the sufficiency of the brain's supply of thyroid hormone. A normal range TSH indicates that the [hypothalamus](#) senses a normal amount of thyroid hormone and is stimulating the thyroid to continue making and releasing thyroid hormone at the same rate. An elevated TSH level signals the central nervous system's insufficiency of thyroid hormone, while a reduced TSH level indicates that the central nervous system senses increased amounts of thyroid hormone.

Blood Tests¹

If you take thyroid supplement medication on the day of your blood test, you should wait until after the blood has been drawn so as to avoid any test interference. Once the blood has been drawn, you may take that day's dose and return to your regular dosing schedule.

There are many blood tests used to diagnose and monitor patients with thyroid conditions. No single lab test is considered 100% accurate in determining thyroid disease, but a combination of two or more tests may help to determine if there is a problem with the thyroid gland or the pituitary gland. The Thyroid Stimulating Hormone ([TSH](#)) and Free [Thyroxine](#) Index (FT₄I) are the two blood tests most commonly used to diagnose patients with [hypothyroidism](#) and to monitor their progress while using a thyroid medication.¹

However, in many situations, it is necessary to perform other tests as well. Several hormones, their relationship to one another, and the respective tests used to measure the hormone levels are described below:

Thyroid Stimulating Hormone ([TSH](#))¹: TSH, also referred to as thyrotropin, is released by the pituitary gland in response to TRH stimulation. Just as the name implies, TSH stimulates the thyroid gland to produce more thyroid hormone for the body. In summary, a low level of circulating thyroid hormone results in a release of TRH, which stimulates TSH production, and finally an increased production of thyroid hormones by the thyroid gland. TSH measurement may help the physician to determine if the problem is primary (thyroid gland) or [secondary \(pituitary gland\) hypothyroidism](#). TSH measurement may also be used, in conjunction with other tests, to determine whether the dose of thyroid supplementation medication needs to be adjusted. For example, if the TSH level is high, an increase in thyroid supplement dose may be needed.

Total T₄ Immunoassay (Total T₄, T₄ RIA, [thyroxine](#), or T₄)¹: This test is used to determine the total amount of T₄ in the blood, representing both the bound (to proteins) and unbound portions of T₄. The majority of T₄ in the blood is bound to protein and therefore has no activity. The amount of free versus bound T₄ can be measured with a separate test.

Free [Thyroxine](#) Index (FT₄I)¹: This test is used to determine the amount of free (unbound) T₄ in the blood. It is important to look at the amount of free T₄ since this is the portion of thyroid hormone available to become active in the body.

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Total T₃ Immunoassay (Total T₃, T₃RIA, [L-triiodothyronine](#), or T₃)¹: This test is used to determine the total amount (both bound and unbound portions) of T₃—the more potent and active form of the two thyroid hormones—in the blood. Like T₄, if the hormone is bound to protein, it is considered inactive. This test is most often used in the diagnosis of different types of [hyperthyroidism](#), such as Graves' disease. In [hypothyroidism](#), these levels may often remain within the normal range.

Free T₃: It is believed that the minute amount of free hormone (the amount not bound by proteins in the circulation) may be the amount that is responsible for the biological activity of thyroid hormones at the cellular level (0.02% for Free T₄ versus 0.2% for Free T₃).² Measuring the Free T₃ value involves either two-test index methods, physical separation methods that isolate free from protein-bound hormone, or immunoassay methods. Your physician may have a preference for which Free T₃ test to use.

The normal values for the thyroid blood tests may vary with different laboratories. It is always important to compare your results with the normal values provided by your laboratory. It is also important to pay particular attention to the units of measure (ie, µg/dL versus mmol/L) to be sure you are comparing similar entities. The following are average normal values¹:

Name	Normal Value	Results in Hypothyroidism	Results in Hyperthyroidism
Thyroid Stimulating Hormone (TSH)	0.3 – 5.0µU/mL or 0.3 – 5.0 mU/L	High	Low
Total T ₄ Immunoassay	5 – 11µg/dL or 64 – 142 nmol/L	Low	High
Free T ₄ Index	6.5 – 12.5	Low	High
Total T ₃ Immunoassay	95 – 190 ng/dL or 1.5 – 2.9 nmol/L	Normal or Low	High
Free T ₃ Index	20 – 63	Normal or Low	High

Wide Range of Variation

Within the range of normal for thyroid hormone concentration, there is a rather wide degree of variation from individual to individual.³

When a patient has symptoms suggestive of [hypothyroidism](#) but is shown to have lower normal values of thyroid hormone, a physician may start a trial of thyroid hormone therapy, hoping to increase these lower normal thyroid hormone values to upper normal values. If there is a sustained favorable response without any evidence of clinical [hyperthyroidism](#), long-term replacement therapy may be justified.

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TREATMENTS

Hypothyroidism is traditionally treated with thyroid hormone replacement therapy (either synthetic or natural). Thyroid replacement therapy could include taking levothyroxine (T₄), liothyronine (T₃), or a combination product that contains both T₄ and T₃. All of these treatments work in the body like thyroxine, the human hormone that is normally produced by the thyroid gland, and subsequently converted to T₃, the active hormone.

Forest Pharmaceuticals, Inc. offers two combination (T₄/T₃) products, and one levothyroxine product to help treat hypothyroidism: Armour™ Thyroid (Thyroid Tablets, USP), Thyrolar® (liotrix tablets, USP), and Levothroid® (levothyroxine sodium tablets, USP).

Armour Thyroid is the leading combination therapy (T₄/T₃) product available for the treatment of hypothyroidism. It is a natural preparation derived from porcine thyroid glands.

Levothroid is a synthetic treatment containing the hormone levothyroxine (T₄). It is both gluten-free and lactose-free. It treats hypothyroidism by replacing or supplementing the T₄ that is normally produced by the thyroid.

Thyrolar is the only synthetic product combining L-triiodothyronine (T₃) and levothyroxine sodium (T₄) indicated for the treatment of hypothyroidism. This product is for patients who seek combination therapy in a synthetic form.

GLOSSARY

Addison's disease-a disease of the adrenal glands characterized by low blood pressure, weight loss, anorexia, and weakness; without replacement hormonal therapy, it is usually fatal

Autoimmune disease-condition in which the body's immune system reacts against one's own tissues or organs

Carpal tunnel syndrome-a condition in the wrist due to biomechanical factors, causing pain and burning or tingling in the fingers and hands

Hashimoto's thyroiditis-chronic inflammation of the thyroid caused by the immune system reacting against its own tissues

Hyperthyroidism-excess production of thyroid hormone due to abnormal thyroid gland function, nodules, or excessive thyroid function

Hypothalamus-lying below the thalamus, it is the part of the brain that regulates autonomic activities such as body temperature and certain metabolic processes

Hypothyroidism-deficiency of thyroid activity

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LDL-(low density lipoprotein)-"bad cholesterol"; the higher the LDL levels in the blood, the higher the risk for coronary artery disease

L-triiodothyronine (T₃)-a key thyroid hormone that is the more biologically active hormone

Myasthenia gravis-a disease usually affecting the muscles of the eyes, face, lips, tongue, throat, or neck, causing a muscle weakness, disability, and fatigue

Myxedema-a condition characterized by swelling of the skin and other tissues, particularly around the eyes and cheeks, caused by extreme deficiency of thyroid hormone

Obstructive sleep apnea-a sudden stopping of the normal breathing while sleeping

Pernicious anemia-reduction in red blood cells generally occurring in later adult life due to the inability to absorb B₁₂ from the gastrointestinal tract

Rheumatoid arthritis-a chronic disease characterized by stiffness and inflammation of the joints, loss of mobility, weakness, and deformity

Secondary hypothyroidism-a deficiency of pituitary TSH secretion resulting from insufficient thyroid releasing hormone secretion

Subclinical hypothyroidism-a mildly elevated TSH level with normal T₃ and T₄ levels and either no symptoms or very minor symptoms of hypothyroidism

Thyrotoxicosis-a toxic condition resulting from excessive amounts of thyroid hormones in the body, as that occurring in hyperthyroidism

Thyroxine (T₄)-an iodine-containing hormone produced by the thyroid gland to regulate metabolism; also made synthetically for treatment of thyroid disorders

TSH (thyroid stimulating hormone)-thyrotropin; a pituitary hormone that promotes the growth of the thyroid gland and stimulates hormonal secretion of the thyroid gland

Turner's syndrome-complete or partial absence of one of the two X chromosomes in the female, usually causing sterility and other signs