

# Pregnancy and Thyroid Disease

*National Endocrine and Metabolic Diseases Information Service*



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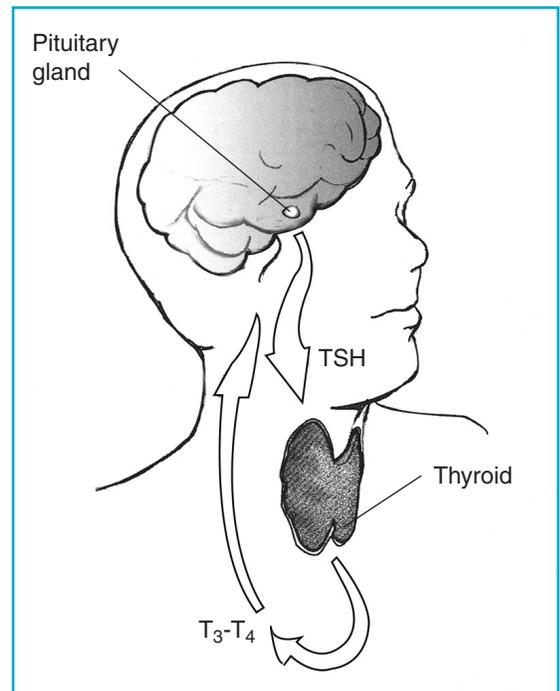
## What is thyroid disease?

Thyroid disease is a disorder that affects the thyroid gland. Sometimes the body produces too much or too little thyroid hormone.

Thyroid hormones regulate metabolism—the way the body uses energy—and affect nearly every organ in the body. Too much thyroid hormone is called hyperthyroidism and can cause many of the body's functions to speed up. Too little thyroid hormone is called hypothyroidism and can cause many of the body's functions to slow down.

Thyroid hormone plays a critical role during pregnancy both in the development of a healthy baby and in maintaining the health of the mother.

Women with thyroid problems can have a healthy pregnancy and protect their fetuses' health by learning about pregnancy's effect on the thyroid, keeping current on their thyroid function testing, and taking the required medications.



The thyroid's production of thyroid hormones—T<sub>3</sub> and T<sub>4</sub>—is regulated by TSH, which is made by the pituitary gland.

## What is the thyroid?

The thyroid is a 2-inch-long, butterfly-shaped gland weighing less than 1 ounce. Located in the front of the neck below the larynx, or voice box, it has two lobes, one on either side of the windpipe. The thyroid is one of the glands that make up the endocrine system. The glands of the endocrine system produce, store, and release hormones into the bloodstream. The hormones then travel through the body and direct the activity of the body's cells.

The thyroid gland makes two thyroid hormones, triiodothyronine ( $T_3$ ) and thyroxine ( $T_4$ ).  $T_3$  is the active hormone and is made from  $T_4$ . Thyroid hormones affect metabolism, brain development, breathing, heart and nervous system functions, body temperature, muscle strength, skin dryness, menstrual cycles, weight, and cholesterol levels.

Thyroid hormone production is regulated by thyroid-stimulating hormone (TSH), which is made by the pituitary gland in the brain. When thyroid hormone levels in the blood are low, the pituitary releases more TSH. When thyroid hormone levels are high, the pituitary responds by decreasing TSH production.

## How does pregnancy normally affect thyroid function?

Two pregnancy-related hormones—human chorionic gonadotropin (hCG) and estrogen—cause increased thyroid hormone levels in the blood. Made by the placenta, hCG is similar to TSH and mildly stimulates the thyroid to produce more thyroid hormone. Increased estrogen produces higher levels of thyroid-binding globulin, also known as thyroxine-binding globulin, a protein that transports thyroid hormone in the blood.

These normal hormonal changes can sometimes make thyroid function tests during pregnancy difficult to interpret.

Thyroid hormone is critical to normal development of the baby's brain and nervous system. During the first trimester, the fetus depends on the mother's supply of thyroid hormone, which comes through the placenta. At around 12 weeks, the baby's thyroid begins to function on its own.

The thyroid enlarges slightly in healthy women during pregnancy, but not enough to be detected by a physical exam. A noticeably enlarged thyroid can be a sign of thyroid disease and should be evaluated. Thyroid problems can be difficult to diagnose in pregnancy due to higher levels of thyroid hormone in the blood, increased thyroid size, fatigue, and other symptoms common to both pregnancy and thyroid disorders.

## Hyperthyroidism

### What causes hyperthyroidism in pregnancy?

Hyperthyroidism in pregnancy is usually caused by Graves' disease and occurs in about one of every 500 pregnancies.<sup>1</sup> Graves' disease is an autoimmune disorder. Normally, the immune system protects people from infection by identifying and destroying bacteria, viruses, and other potentially harmful foreign substances. But in autoimmune diseases, the immune system attacks the body's own cells and organs.

With Graves' disease, the immune system makes an antibody called thyroid-stimulating immunoglobulin (TSI), sometimes called TSH receptor antibody, which mimics TSH and causes the thyroid to make too much thyroid hormone. In some people with Graves' disease, this antibody is also associated with eye problems such as irritation, bulging, and puffiness.

Although Graves' disease may first appear during pregnancy, a woman with pre-existing Graves' disease could actually see an improvement in her symptoms in her second and third trimesters. Remission—a

disappearance of signs and symptoms—of Graves' disease in later pregnancy may result from the general suppression of the immune system that occurs during pregnancy. The disease usually worsens again in the first few months after delivery. Pregnant women with Graves' disease should be monitored monthly.<sup>2</sup>

More information about Graves' disease is provided by the National Endocrine and Metabolic Diseases Information Service (NEMDIS) in the fact sheet, *Graves' Disease*, available at [www.endocrine.niddk.nih.gov](http://www.endocrine.niddk.nih.gov).

Rarely, hyperthyroidism in pregnancy is caused by hyperemesis gravidarum—severe nausea and vomiting that can lead to weight loss and dehydration. This extreme nausea and vomiting is believed to be triggered by high levels of hCG, which can also lead to temporary hyperthyroidism that goes away during the second half of pregnancy.

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<sup>1</sup>Komal PS, Mestman JH. Graves hyperthyroidism and pregnancy: a clinical update. *Endocrine Practice*. 2010;16(1):118–129.

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<sup>2</sup>Ogunyemi DA. Autoimmune thyroid disease and pregnancy. eMedicine website. [www.emedicine.com/article/261913-overview](http://www.emedicine.com/article/261913-overview). Updated April 23, 2010. Accessed August 11, 2011.

## How does hyperthyroidism affect the mother and baby?

Uncontrolled hyperthyroidism during pregnancy can lead to

- congestive heart failure
- preeclampsia—a dangerous rise in blood pressure in late pregnancy
- thyroid storm—a sudden, severe worsening of symptoms
- miscarriage
- premature birth
- low birth weight

If a woman has Graves' disease or was treated for Graves' disease in the past with surgery or radioactive iodine, the TSI antibodies can still be present in the blood, even when thyroid levels are normal. The TSI antibodies she produces may travel across the placenta to the baby's bloodstream and stimulate the fetal thyroid. If the mother is being treated with antithyroid medications, hyperthyroidism in the baby is less likely because these medications also cross the placenta.

Women who have had surgery or radioactive iodine treatment for Graves' disease should inform their health care provider, so the baby can be monitored for thyroid-related problems later in the pregnancy.

Hyperthyroidism in a newborn can result in rapid heart rate, which can lead to heart failure; early closure of the soft spot in the skull; poor weight gain; irritability; and sometimes an enlarged thyroid that can press against the windpipe and interfere with breathing. Women with Graves' disease and their newborns should be closely monitored by their health care team.

## How is hyperthyroidism in pregnancy diagnosed?

Health care providers diagnose hyperthyroidism in pregnant women by reviewing symptoms and doing blood tests to measure TSH, T<sub>3</sub>, and T<sub>4</sub> levels.

Some symptoms of hyperthyroidism are common features in normal pregnancies, including increased heart rate, heat intolerance, and fatigue.

Other symptoms are more closely associated with hyperthyroidism: rapid and irregular heartbeat, a slight tremor, unexplained weight loss or failure to have normal pregnancy weight gain, and the severe nausea and vomiting associated with hyperemesis gravidarum.

A blood test involves drawing blood at a health care provider's office or commercial facility and sending the sample to a lab for analysis. Diagnostic blood tests may include

- **TSH test.** If a pregnant woman's symptoms suggest hyperthyroidism, her doctor will probably first perform the ultrasensitive TSH test. This test detects even tiny amounts of TSH in the blood and is the most accurate measure of thyroid activity available.

Generally, below-normal levels of TSH indicate hyperthyroidism. However, low TSH levels may also occur in a normal pregnancy, especially in the first trimester, due to the small increase in thyroid hormones from HCG.

- **T<sub>3</sub> and T<sub>4</sub> test.** If TSH levels are low, another blood test is performed to measure T<sub>3</sub> and T<sub>4</sub>. Elevated levels of free T<sub>4</sub>—the portion of thyroid hormone not attached to thyroid-binding protein—confirm the diagnosis.

Rarely, in a woman with hyperthyroidism, free T<sub>4</sub> levels can be normal but T<sub>3</sub> levels are high. Because of normal pregnancy-related changes in thyroid function, test results must be interpreted with caution.

- **TSI test.** If a woman has Graves' disease or has had surgery or radioactive iodine treatment for the disease, her doctor may also test her blood for the presence of TSI antibodies.

More information about testing for thyroid problems is provided by the NEMDIS in the fact sheet, *Thyroid Function Tests*, available at [www.endocrine.niddk.nih.gov](http://www.endocrine.niddk.nih.gov).

## How is hyperthyroidism treated during pregnancy?

During pregnancy, mild hyperthyroidism, in which TSH is low but free T<sub>4</sub> is normal, does not require treatment. More severe hyperthyroidism is treated with antithyroid medications, which act by interfering with thyroid hormone production.

Radioactive iodine treatment is not an option for pregnant women because it can damage the fetal thyroid gland. Rarely, surgery to remove all or part of the thyroid gland is considered for women who cannot tolerate antithyroid medications.

Antithyroid medications cross the placenta in small amounts and can decrease fetal thyroid hormone production, so the lowest possible dose should be used to avoid hypothyroidism in the baby.

Antithyroid medications can cause side effects in some people, including

- allergic reactions such as rashes and itching
- a decrease in the number of white blood cells in the body, which can lower a person's resistance to infection
- liver failure, in rare cases

Stop your antithyroid medication and call your health care provider right away if you develop any of the following signs and symptoms while taking antithyroid medications:

- fatigue
- weakness
- vague abdominal pain
- loss of appetite
- a skin rash or itching
- easy bruising
- yellowing of the skin or whites of the eyes, called jaundice
- persistent sore throat
- fever

In the United States, health care providers prescribe the antithyroid medication methimazole (Tapazole, Northyx) for most types of hyperthyroidism.

Experts agree that women in their first trimester of pregnancy should probably not take methimazole due to the rare occurrence of damage to the fetus. Another antithyroid medication, propylthiouracil (PTU), is

available for women in this stage of pregnancy or for women who are allergic to or intolerant of methimazole and have no other treatment options.

Health care providers may prescribe PTU for the first trimester of pregnancy and switch to methimazole for the second and third trimesters.

Some women are able to stop antithyroid medication therapy in the last 4 to 8 weeks of pregnancy due to the remission of hyperthyroidism that occurs during pregnancy. However, these women should continue to be monitored for recurrence of thyroid problems following delivery.

Studies have shown that mothers taking antithyroid medications may safely breastfeed. However, they should take only moderate doses, less than 10–20 milligrams daily, of the antithyroid medication methimazole. Doses should be divided and taken after feedings, and the infants should be monitored for side effects.<sup>2</sup>

Women requiring higher doses of the antithyroid medication to control hyperthyroidism should not breastfeed.

## Hypothyroidism

### What causes hypothyroidism in pregnancy?

Hypothyroidism in pregnancy is usually caused by Hashimoto's disease and occurs in three to five out of every 1,000 pregnancies.<sup>2</sup> Hashimoto's disease is a form of chronic inflammation of the thyroid gland.

Like Graves' disease, Hashimoto's disease is an autoimmune disorder. In Hashimoto's disease, the immune system attacks the thyroid, causing inflammation and interfering with its ability to produce thyroid hormones.

Hypothyroidism in pregnancy can also result from existing hypothyroidism that is inadequately treated or from prior destruction or removal of the thyroid as a treatment for hyperthyroidism.

### How does hypothyroidism affect the mother and baby?

Some of the same problems caused by hyperthyroidism can occur with hypothyroidism. Uncontrolled hypothyroidism during pregnancy can lead to

- preeclampsia
- anemia—too few red blood cells in the body, which prevents the body from getting enough oxygen
- miscarriage
- low birth weight
- stillbirth
- congestive heart failure, rarely

Because thyroid hormones are crucial to fetal brain and nervous system development, uncontrolled hypothyroidism—especially during the first trimester—can affect the baby's growth and brain development.

### How is hypothyroidism in pregnancy diagnosed?

Like hyperthyroidism, hypothyroidism is diagnosed through a careful review of symptoms and measurement of TSH and T<sub>4</sub> levels.

Symptoms of hypothyroidism in pregnancy include extreme fatigue, cold intolerance, muscle cramps, constipation, and problems with memory or concentration. High levels of TSH and low levels of free T<sub>4</sub> generally indicate hypothyroidism. Because of normal pregnancy-related changes in thyroid function, test results must be interpreted with caution.

The TSH test can also identify subclinical hypothyroidism—a mild form of hypothyroidism that has no apparent symptoms. Subclinical hypothyroidism occurs in 2 to 3 percent of pregnancies.<sup>2</sup> Test results will show high levels of TSH and normal free T<sub>4</sub>.

Experts differ in their opinions as to whether asymptomatic pregnant women should be routinely screened for hypothyroidism. But if subclinical hypothyroidism is discovered during pregnancy, treatment is recommended to help ensure a healthy pregnancy.

## How is hypothyroidism treated during pregnancy?

Hypothyroidism is treated with synthetic thyroid hormone called thyroxine—a medication which is identical to the T<sub>4</sub> made by the thyroid. Women with preexisting hypothyroidism will need to increase their prepregnancy dose of thyroxine to maintain normal thyroid function. Thyroid function should be checked every 6 to 8 weeks during pregnancy. Synthetic thyroxine is safe and necessary for the well-being of the fetus if the mother has hypothyroidism.

## Eating, Diet, and Nutrition

During pregnancy, the body requires higher amounts of some nutrients to support the health of the mother and growing baby. Experts recommend pregnant women maintain a balanced diet and take a prenatal multivitamin and mineral supplement containing iodine to receive most nutrients necessary for thyroid health. More information about diet and nutrition during pregnancy is provided by the National Agricultural Library available at [www.choosemyplate.gov/mypyramidmoms/index.html](http://www.choosemyplate.gov/mypyramidmoms/index.html).

## Dietary Supplements

Because the thyroid uses iodine to make thyroid hormone, iodine is an important mineral for a mother during pregnancy. During pregnancy, the baby gets iodine from the mother's diet. Women need more iodine when they are pregnant—about 250 micrograms a day. In the United States, about 7 percent of pregnant women may not get enough iodine in their diet or through prenatal vitamins.<sup>3</sup> Choosing iodized salt—salt supplemented with iodine—over plain salt and prenatal vitamins containing iodine will ensure this need is met.

However, people with autoimmune thyroid disease may be sensitive to harmful side effects from iodine. Taking iodine drops or eating foods containing large amounts of iodine—such as seaweed, dulse, or kelp—may cause or worsen hyperthyroidism and hypothyroidism. More information about iodine is provided by the National Library of Medicine in the fact sheet, *Iodine in diet*, available at [www.nlm.nih.gov/medlineplus](http://www.nlm.nih.gov/medlineplus).

To help ensure coordinated and safe care, people should discuss their use of dietary supplements with their health care provider. Tips for talking with health care providers are available at the National Center for Complementary and Alternative Medicine's Time to Talk campaign at [www.nccam.nih.gov](http://www.nccam.nih.gov).

<sup>3</sup>Zimmerman MB. Iodine deficiency in pregnancy and the effects of maternal iodine supplementation on the offspring: a review. *American Journal of Clinical Nutrition*. 2009;89(2):668S–672S.

## Postpartum Thyroiditis

### What is postpartum thyroiditis?

Postpartum thyroiditis is an inflammation of the thyroid that affects about 4 to 10 percent of women during the first year after giving birth.<sup>2</sup> Thyroiditis causes stored thyroid hormone to leak out of the inflamed thyroid gland and raise hormone levels in the blood.

Postpartum thyroiditis is believed to be an autoimmune condition and causes mild hyperthyroidism that usually lasts 1 to 2 months. Many women then develop hypothyroidism lasting 6 to 12 months before the thyroid regains normal function. In some women, the thyroid is too damaged to regain normal function and their hypothyroidism is permanent, requiring lifelong treatment with synthetic thyroid hormone. Postpartum thyroiditis is likely to recur with future pregnancies.

Postpartum thyroiditis often goes undiagnosed because the symptoms are mistaken for postpartum blues—the exhaustion and moodiness that sometimes follow delivery. If symptoms of fatigue and lethargy do not go away within a few months or a woman develops postpartum depression, she should talk with her health care provider. If the hypothyroid symptoms are bothersome, thyroid medication can be given.

### Points to Remember

- Thyroid disease is a disorder that results when the thyroid gland produces more or less thyroid hormone than the body needs.
- Pregnancy causes normal changes in thyroid function but can also lead to thyroid disease.
- Uncontrolled hyperthyroidism during pregnancy can lead to serious health problems in the mother and the unborn baby.
- During pregnancy, mild hyperthyroidism does not require treatment. More severe hyperthyroidism is treated with antithyroid medications, which act by interfering with thyroid hormone production.
- Uncontrolled hypothyroidism during pregnancy can lead to serious health problems in the mother and can affect the unborn baby's growth and brain development.
- Hypothyroidism during pregnancy is treated with synthetic thyroid hormone, thyroxine (T<sub>4</sub>).
- Postpartum thyroiditis— inflammation of the thyroid gland—causes a brief period of hyperthyroidism, often followed by hypothyroidism that usually goes away within a year. Sometimes the hypothyroidism is permanent.

## Hope through Research

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) conducts and supports research into many kinds of disorders, including thyroid disease. Researchers are investigating the development, signs and symptoms, and genetics of thyroid function disorders to further understand thyroid diseases. Scientists continue to study treatment options for pregnant women with thyroid disorders, as well as long-term outcomes for mothers and their children.

Participants in clinical trials can play a more active role in their own health care, gain access to new research treatments before they are widely available, and help others by contributing to medical research. For information about current studies, visit [www.ClinicalTrials.gov](http://www.ClinicalTrials.gov).

## For More Information

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