

OVERVIEW

What are the normal changes in thyroid function associated with pregnancy?

Hormone Changes. A normal pregnancy results in a number of important changes that alter thyroid function. While usually normal, the TSH may be slightly low in the first trimester due to high hCG levels (the hormone measured in the pregnancy test) and then return to normal throughout the duration of pregnancy. Increased total T4 is often seen due to an increase in serum binding proteins caused by estrogen. However, measurements of “Free” (or active) hormone remain normal. The thyroid is functioning normally if the TSH, Free T4 and Free T3 are all normal throughout pregnancy.

Size Changes. The thyroid gland can increase in size during pregnancy (enlarged thyroid = goiter), especially in iodine-deficient areas of the world. In the United States, which is relatively iodine-sufficient, the thyroid often increases only 10-15%. However, sometimes a significant goiter may develop, prompting the measurement thyroid function tests.

What is the interaction between the thyroid function of the mother and the baby?

For the first 10-12 weeks of pregnancy, the baby is completely dependent on the mother for the production of thyroid hormone. By the end of the first trimester, the baby’s thyroid begins to produce thyroid hormone on its own. The baby, however, remains dependent on the mother for ingestion of adequate amounts of iodine, which is essential to make the thyroid hormones. The normal diet in the United States contains sufficient iodine so additional iodine supplementation is rarely necessary.

HYPERTHYROIDISM

What are the most common causes of hyperthyroidism during pregnancy?

Overall, the most common cause (80-85%) of maternal hyperthyroidism during pregnancy is Graves’ disease (see [Graves’ Disease brochure](#)) and occurs in 1 in 1500 pregnant patients. The diagnosis of hyperthyroidism can be somewhat difficult, as ¹²³I thyroid scanning is contraindicated during pregnancy due to the small amount of radioactivity, which can be concentrated by the baby’s thyroid. Consequently, diagnosis is based on a careful history, physical exam and laboratory testing.

What are the risks of Graves’ Disease/hyperthyroidism to the mother?

In addition to the classic symptoms associated with hyperthyroidism, inadequately treated maternal hyperthyroidism can result in early labor and a serious complication known as pre-eclampsia. Graves’ disease often improves during the third trimester of pregnancy and may worsen during the post partum period.

What are the risks of Graves’ Disease/hyperthyroidism to the baby?

- 1) Uncontrolled maternal hyperthyroidism: Uncontrolled maternal hyperthyroidism has been associated with fetal tachycardia (fast heart rate), small for gestational age babies, prematurity, stillbirths and possibly congenital malformations. This is another reason why it is important to treat hyperthyroidism in the mother.
- 2) Extremely high levels of thyroid stimulating immunoglobulins (TSI): Graves’ disease is caused by the production of antibodies that stimulate thyroid gland referred to as thyroid stimulating immunoglobulins (TSI). These antibodies do cross the placenta and can interact with the baby’s thyroid. Although uncommon (2-5% of cases of Graves’ disease in pregnancy), high levels of maternal TSI’s, have been known to cause fetal or neonatal hyperthyroidism. Measuring TSI in the mother with Graves’ disease is often done in the third trimester.

In the mother on antithyroid drug therapy, fetal hyperthyroidism due to the mother’s TSI is rare, since the antithyroid drugs also cross the placenta. Of potentially more concern to the baby is the mother with prior treatment for Graves’ disease (for example radioactive iodine or surgery) who no longer requires

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antithyroid drugs. It is very important to tell your doctor if you have been treated for Graves' Disease in the past so proper monitoring can be done to ensure the baby remains healthy during the pregnancy.

- 3) Anti-thyroid drug therapy (ATD). Methimazole (Tapazole) or propylthiouracil (PTU) are used for the treatment of hyperthyroidism (see [Hyperthyroidism brochure](#)). Both of these drugs cross the placenta and can potentially affect the baby's thyroid function. Historically, PTU has been the drug of choice for treatment of maternal hyperthyroidism; however, recent studies suggest that both drugs are safe to use during pregnancy. The lowest possible dose of ATD should be used to control maternal hyperthyroidism to minimize the effects on the baby. Neither drug appears to increase the general risk of birth defects.

What are the treatment options for a pregnant woman with Graves' Disease/hyperthyroidism?

Mild hyperthyroidism often is monitored closely without therapy as long as both the mother and the baby are doing well. When therapy is necessary, anti-thyroid medications are the treatment of choice (see above). The goal of therapy is to keep the mother's free T4 and free T3 levels in the high-normal range on the lowest dose of antithyroid medication. Therapy should be closely monitored during pregnancy by following thyroid function tests monthly.

Surgery is an acceptable alternative in patients who cannot be adequately treated with anti-thyroid medications (i.e. those who develop an allergic reaction to the drugs).

Radioiodine is contraindicated to treat hyperthyroidism during pregnancy since it readily crosses the placenta and is taken up by the baby's thyroid gland. This can cause destruction of the gland and result in permanent hypothyroidism.

Beta-blockers can be used during pregnancy to help treat significant palpitations and tremor due to hyperthyroidism. Typically, these drugs are only required until the hyperthyroidism is controlled with anti-thyroid medications.

What is the natural history of Graves' Disease after delivery?

Graves' disease typically worsens in the postpartum period, usually in the first 3 months after delivery. Higher doses of anti-thyroid medications are frequently required during this time. As usual, close monitoring of thyroid function tests is necessary.

Can the mother with Graves' disease, who is being treated with anti-thyroid drugs, breastfeed her infant?

Yes. PTU is the drug of choice because it is highly protein bound. Consequently, lower amounts of PTU cross into breast milk compared to Tapazole. It is important to note that the baby will require periodic assessment of his/her thyroid function to ensure maintenance of normal thyroid status.

HYPOTHYROIDISM

What are the most common causes of hypothyroidism during pregnancy?

Overall, the most common cause of hypothyroidism is the autoimmune disorder known as Hashimoto's thyroiditis (see [Hypothyroidism brochure](#)). Approximately, 2.5% of women will have a slightly elevated TSH of greater than 6 and 0.4% will have a TSH greater than 10 during pregnancy.

What are the risks of hypothyroidism to the mother?

Untreated, or inadequately treated, severe hypothyroidism has been associated with pre-eclampsia, placental abnormalities, low birth weight infants, and postpartum hemorrhage (bleeding). Most women with mild hypothyroidism may have no symptoms or attribute symptoms they may have as due to the pregnancy.

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What are the risks of maternal hypothyroidism to the baby?

Thyroid hormone is critical for brain development in the baby. Children born with congenital hypothyroidism can have severe brain abnormalities if the condition is not recognized and treated promptly. Consequently, *all* newborn babies in the United States are tested for congenital hypothyroidism so they can be treated with as soon as possible.

The effect of maternal hypothyroidism on the baby's brain development is not as clear. Untreated severe hypothyroidism in the mother can lead to impaired brain development in the baby. However, recent studies have suggested that subtle brain abnormalities may be present in children born to women who had mild untreated hypothyroidism during pregnancy. While there is no general consensus of opinion regarding screening all women for hypothyroidism during pregnancy, many physician groups suggest obtaining a TSH in women at high risk for thyroid disease, such as those with prior treatment for hyperthyroidism, a positive family history of thyroid disease and those with a goiter. Clearly, woman with established hypothyroidism should have a TSH test once pregnancy is confirmed (see below). Once hypothyroidism has been detected, the woman should be treated with levothyroxine to normalize her TSH and Free T4 values (see [Hypothyroidism brochure](#)).

How should a woman with hypothyroidism be treated during pregnancy?

The treatment of hypothyroidism in a pregnant woman is adequate replacement of thyroid hormone in the form of synthetic levothyroxine (see [Hypothyroidism brochure](#)). Ideally, hypothyroid women should have their levothyroxine dose optimized prior to becoming pregnant and should have their thyroid function tested as soon as pregnancy is detected. Levothyroxine requirements frequently increase during pregnancy, often times by 25 to 50 percent, so the dose should be adjusted by their physician as needed to maintain a TSH in the normal range. It is also important to recognize that prenatal vitamins contain iron that can impair the absorption of levothyroxine from the gastrointestinal tract. Consequently, levothyroxine and prenatal vitamins should not be taken at the same time and should be separated by at least 2-3 h. Thyroid function tests should be checked approximately every 6-8 weeks during pregnancy to ensure that the woman has normal thyroid function throughout pregnancy.

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