

# Iodine Deficiency

## WHAT IS THE THYROID GLAND?

The thyroid gland is a butterfly-shaped endocrine gland that is normally located in the lower front of the neck. The thyroid's job is to make thyroid hormones, which are secreted into the blood and then carried to every tissue in the body. Thyroid hormone helps the body use energy, stay warm and keep the brain, heart, muscles, and other organs working as they should.

## WHAT IS IODINE DEFICIENCY?

Iodine is an element that is needed for the production of thyroid hormone. The body does not make iodine, so it is an essential part of your diet. Iodine is found in various foods (see *Table 1*). If you do not have enough iodine in your body, you cannot make enough thyroid hormone. Thus, iodine deficiency can lead to enlargement of the thyroid (goiter – see *Goiter brochure*), hypothyroidism (see *Hypothyroidism brochure*) and to intellectual disabilities in infants and children whose mothers were iodine deficient during pregnancy.

Before the 1920s, iodine deficiency was common in the Great Lakes, Appalachian, and Northwestern U.S. regions and in most of Canada. Prevention of iodine deficiency by the introduction of iodized salt has virtually eliminated iodine deficiency and the so-called “goiter belt” in these areas. However, many other parts of the world do not have enough iodine available through their diet and iodine deficiency continues to be an important public health problem globally. Approximately 30% of the world's population remains at risk for iodine deficiency.

## HOW DO YOU DIAGNOSE IODINE DEFICIENCY?

Iodine deficiency is diagnosed across populations and not specifically in individuals. Since iodine is released from the body through the urine, the best way to determine iodine deficiency across a large population is to measure the amounts of iodine in urine samples. Iodine deficiency is defined as a median urinary iodine concentration less than 100µg/L in a nonpregnant population, or <150 µg/L in a population of pregnant women.

In the United States, iodine status has remained generally adequate in since the 1940s although studies have shown that urinary iodine levels dropped by about half between the early 1970s and the early 1990s, and most recently mild iodine deficiency has re-emerged in pregnant women.

Iodine deficiency remains a major issue in other parts of the world, including parts of Europe, Africa and Asia.

## WHAT ARE THE SOURCES OF IODINE?

Iodine is present naturally in soil and seawater. The availability of iodine in foods differs in various regions of the world. Individuals in the United States can maintain adequate iodine in their diet by using iodized table salt, by eating foods high in iodine, particularly dairy products, seafood, meat, some breads, and eggs, and by taking a multivitamin containing iodine (see *below*). However, the amount of iodine in foods is not listed on food packaging in the U.S., and it can be difficult to identify sources of iodine in foods.

## WHAT ARE THE SYMPTOMS OF IODINE DEFICIENCY?

All of the symptoms of iodine deficiency are related to its effect on the thyroid:

**GOITER** – Without adequate iodine, the thyroid progressively enlarges (develops a goiter) as it tries to keep up with demand for thyroid hormone production. Worldwide, iodine deficiency is the most common cause

of thyroid enlargement and goiter (see *goiter brochure*). Within a goiter, nodules can develop. Patients with a large goiter may experience symptoms of choking, especially when lying down, and difficulty swallowing and breathing.

**HYPOTHYROIDISM** – As the body's iodine levels fall, hypothyroidism may develop, since iodine is essential for making thyroid hormone. While this is uncommon in the United States, iodine deficiency is the most common cause of hypothyroidism worldwide (see *Hypothyroidism brochure*).

**TABLE 1:  
COMMON SOURCES OF  
DIETARY IODINE**

Cheese
Cows milk
Eggs
Frozen Yogurt
Ice Cream
Iodine-containing multivitamins
Iodized table salt
Saltwater fish
Seaweed (including kelp, dulce, nori)
Shellfish
Soy milk
Soy sauce
Yogurt

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**PREGNANCY-RELATED PROBLEMS** – Iodine deficiency is especially important in women who are pregnant or nursing their infants. Severe iodine deficiency in the mother has been associated with miscarriages, stillbirth, preterm delivery, and congenital abnormalities in their babies. Children of mothers with severe iodine deficiency during pregnancy can have intellectual disabilities and problems with growth, hearing, and speech. In the most severe form, an underactive thyroid can result in cretinism (a syndrome characterized by permanent brain damage, deaf mutism, spasticity, and short stature), although this has become rare worldwide. Iodine deficiency is the most common preventable cause of intellectual disabilities in the world. Even mild iodine deficiency during pregnancy, which may be present in some women in the United States, may be associated with low intelligence in children.

## HOW IS IODINE DEFICIENCY TREATED?

Iodine levels can be measured in the blood or the urine. However, these tests are not good at accurately determining how much iodine is in your body and so cannot be used to diagnose iodine deficiency. When iodine deficiency is seen in an entire population, it is best managed by ensuring that common foods that people eat contain sufficient levels of iodine. Since even mild deficiency during pregnancy can have effects on a pregnancy and the developing baby, all U.S. women who are planning pregnancy, pregnant, or breastfeeding should take a multivitamin containing 150 µg iodine per day.

## HOW IS IODINE DEFICIENCY PREVENTED?

As with many diseases, it is better to prevent the problem rather than have to treat it. Over the last 80 years, worldwide efforts have been made to eliminate iodine deficiency. Elimination of iodine deficiency has been a major goal of the Iodine Global Network, UNICEF, and the World Health Organization. Iodized salt has been the mainstay of the prevention of iodine deficiency worldwide. In regions where iodized salt is not widely available, or where pregnant women are known to have inadequate iodine intakes, use of a daily iodine-containing supplement may be recommended for pregnant and breastfeeding women. Injections of iodized oil are occasionally used in severely iodine deficient regions of the world where widespread iodized salt use is not possible.

**UNITED STATES RECOMMENDATIONS** – The Institute of Medicine has set the Recommended Dietary Allowance (RDA) for iodine in adult men and women at 150 µg per day. Individuals who add salt to their food regularly during cooking or at the table should use iodized salt. In the US and Canada, one teaspoon of iodized salt contains approximately 250 µg iodine. Most U.S. iodine-containing multivitamins marketed for non-pregnant adults have at least 150 µg iodine, but only about 60% of the types of prenatal multivitamins in the U.S. contain iodine.

**RECOMMENDATIONS FOR IODINE INTAKE DURING PREGNANCY AND BREAST FEEDING** – Recommended iodine intakes are higher for women who are pregnant or breastfeeding than for other adults. The RDA is 220 µg iodine per day for pregnant women and 290 µg iodine per day for breastfeeding women. Because the effects of iodine deficiency are most severe in pregnant women and their babies, the American Thyroid Association® has recommended that all U.S. women who are planning pregnancy, pregnant, or breastfeeding take a prenatal multivitamin containing 150 µg iodine per day.

## ARE THERE PROBLEMS WITH TAKING TOO MUCH IODINE?

Taking too much iodine can also cause problems. This is especially true in individuals that already have thyroid problems, such as nodules, hyperthyroidism and autoimmune thyroid disease. Administration of large amounts of iodine through medications (i.e.: Amiodarone), radiology procedures (iodinated intravenous dye) and dietary excess (Dulce, kelp) can cause or worsen hyperthyroidism and hypothyroidism.

In addition, individuals who move from an iodine-deficient region (for example, parts of Europe) to a region with adequate iodine intake (for example, the United States) may also develop thyroid problems since their thyroids have become very good at taking up and using small amounts of iodine. In particular, these patients may develop iodine-induced hyperthyroidism (see [Hyperthyroidism brochure](#)).



## FURTHER INFORMATION

Further details on this and other thyroid-related topics are available in the patient thyroid information section on the American Thyroid Association® website at [www.thyroid.org](http://www.thyroid.org).

For information on thyroid patient support organizations, please visit the [Patient Support Links](#) section on the ATA website at [www.thyroid.org](http://www.thyroid.org)

