

I cannot count the times I have had a patient with weight gain come into my office certain they have thyroid disease. The conversation often starts like this, “I have had tests before, and they have been normal, but I have read all about low thyroid and I am sure mine must be low...”

Sometimes it is, and sometimes it isn't. In this article, we will review what the thyroid gland is, its role in metabolism and what happens when it malfunctions.

The Role of Your Thyroid in Metabolism and Weight Control

By Jacqueline Jacques, ND

What is the thyroid gland?

Your endocrine system is a group of glands in your body (such as the pituitary, thyroid, pancreas, ovaries and testes) that secrete hormones (like growth hormone, thyroid hormone, insulin, estrogen and testosterone) that regulate functions such as metabolism, growth, development and reproduction.

The thyroid gland is the largest gland in the endocrine system. It is a butterfly-shaped organ that sits roughly in the middle of the neck, just below where the Adam's apple is in men. In your physical exam, when your doctor places a hand on the front of your neck and asks you to swallow, they are doing so to feel your thyroid gland.



What does the thyroid gland do?

The thyroid gland produces three hormones: Thyroxine (T4), Triiodothyronine (T3) and Calcitonin. T4 and T3 are what most people think of as “thyroid hormones.” These hormones play a significant role in your metabolism and in energy regulation in the body. T4 and T3 are made in the thyroid gland from using the building blocks iodine (a trace mineral) and tyrosine (an amino acid). T3 has three molecules of iodine, and T4 has four. You make about four times the amount of T4 as you do T3.

After T4 and T3 are made, they are released by the thyroid gland into circulation. This release happens in response to stimulus from a part of your brain called the pituitary that makes a substance called Thyroid Releasing Hormone (TRH). TRH tells the thyroid gland to release thyroid hormones into your blood stream.

Thyroid hormones act on almost every kind of cell in your body to increase cellular activity or metabolism. If there is too much or too little thyroid hormone, the metabolism of your entire body is impacted.

Calcitonin, which this article will not focus on, is a hormone that reduces the amount of calcium and phosphate in the blood and promotes the formation of bone by signaling the body to absorb more calcium into the bone matrix.

Diseases of the thyroid

There are numerous things that can go wrong with the thyroid gland, but mostly they fall into three categories:

1. *Overactivity or Hyperthyroidism* – when the body makes too many of the thyroid hormones
2. *Underactivity or Hypothyroidism* – when the body makes too little of the thyroid hormones
3. *Growths* – this can include benign cysts, nodules or cancers of the thyroid gland

Thyroid disease is extremely common. According to the American Association of Clinical Endocrinologists, 27 million Americans have an over or underactive thyroid gland. Thyroid disease is much more common in women – 8 in 10 thyroid patients are female and women are between five and eight times more likely than men to develop a problem with the gland. One part of this gender imbalance is the strong tie between pregnancy and thyroid disease. Approximately 18 percent of pregnant women will develop a post-partum thyroid problem. In a quarter of these, the problem will be permanent.

Thyroid disease is also strongly linked to diabetes. People with diabetes and their close relatives are approximately three to five times more likely to develop thyroid disease as compared to the general population.

Hypothyroidism, metabolism and obesity

Because the thyroid hormones T3 and T4 control cellular metabolism throughout the body, when there is not enough of them for any reason, this metabolic function slows and becomes impaired. The most common causes of hypothyroidism are autoimmune failure (Hashimoto's Thyroiditis) and surgical removal or destruction of the gland. These latter treatments are usually done for thyroid cancer to treat hyperthyroidism or goiter (an enlargement of the thyroid gland). Outside of the United States, hypothyroidism is often caused by iodine deficiency. When there is not enough iodine to make thyroid hormones, the body cannot produce them. Iodine is added to salt in the US, which has eliminated almost all iodine deficiency.

Since thyroid hormone are important to all the cells of the body, symptoms can appear very general and may often be seen as vague in mild cases.

Signs and symptoms of hypothyroidism (underactive thyroid) include:

- **Fatigue**
- **Sleepiness**
- **Mood swings**
- **Forgetfulness**
- **Weight gain**
- **Depression/irritability**
- **Muscle cramping and aching**
- **Weakness**
- **Decreased perspiration**
- **Changes in blood pressure**
- **High cholesterol**
- **Swelling in legs**
- **Blurred vision**
- **Cold intolerance**
- **Hoarse voice**
- **Heavy menses**
- **Coarse, dry hair and skin**
- **Hair loss (on head and/or body)**
- **Constipation**

How is thyroid disease linked to weight and BMI?

While weight gain or difficulty losing weight is strongly associated with hypothyroidism, the connection with body mass index (BMI) and obesity is still not well understood. Several new studies have examined this and we are beginning to gain more knowledge.

A study published in the *International Journal of Obesity* in 2006 compared BMI and TSH levels in 6,164 adults from 1995 to 2001¹. In this study, higher BMI was associated with higher TSH (TSH is higher in hypothyroidism), and increases in BMI throughout the six-year period was positively correlated with increases in TSH. In a 2004 study of obese patients referred for evaluation at a sleep disorder clinic found previously undiagnosed subclinical hypothyroidism in 11.5 percent of patients². They also found a strong correlation with BMI and neck circumference.

In a group of 72 patients preparing for gastric bypass surgery, 25 percent were found to have undiagnosed subclinical hypothyroidismⁱⁱⁱ. They concluded that overall, morbid obesity was associated with elevated TSH and that weight-loss after surgery generally resulted in decreasing TSH. It is important to note that this study, however, did not find a direct association between TSH and BMI.

Several studies have found changes in TSH in obesity with normal levels of T4 and T3^{iv,v}. This has led some researchers to believe that there is another cause of the elevation of TSH that is not related to low levels of circulating thyroid hormones. Currently, a popular theory is that insulin resistance leads to changes in the thyroid that can result in changes in the gland and possibly in TSH levels of thyroid hormone levels^{vi}. Other things being examined are associations with leptin and adiponectin.

How do I get my thyroid checked?

There is enough evidence for undiagnosed thyroid disease in obesity, that if you are overweight or obese, it is probably a good idea to have your thyroid checked with your annual labs. This is even truer if you are female or know that you have insulin resistance or diabetes, because of the increased risk. The most common tests used to evaluate the thyroid are:

1. *TSH*: TSH is the most common screening test for thyroid disease. Levels of TSH rise when levels of thyroid hormone decrease. What constitutes “normal TSH” has been much debated in the past decade.

While the most recent consensus statement issued by a joint committee of the American Association of Clinical Endocrinologists (AACE), the American Thyroid Association (ATA) and the Endocrine Society (TES) stated that the upper limit of TSH should be 4.5 mIU/L, the AACE issued their own follow-up statement saying that “AACE uses an upper limit of normal for TSH of 3.0mIU/L established in a population of patients carefully screened for thyroid disease by the National Academy of Biochemistry in 2002.” Thus, if you have a TSH that is between 3 and 4.5, you may want to ask your doctor about repeat testing or further tests to explore for thyroid disease.

2. *T3 and T4 levels*: T3 and T4 are your circulating thyroid hormones. These may be checked on an initial screen or only if TSH is found to be abnormal. These tests should be done using a method called radioimmunoassay (RIA).



3. *Thyroid antibodies*: As Autoimmune destruction of the thyroid gland is the most common cause of hypothyroidism, sometimes your doctor will look at antibody levels. These include thyroid peroxidase antibody (TPO), thyroglobulin antibody (TgAb) and thyroid stimulating hormone receptor antibody (TRAb).
4. *Other tests*: Other tests that your doctor may use to look at your thyroid function include: TRH (thyroid releasing hormone), thyroid ultrasound and thyroid scan (radioactive iodine uptake test).

To learn more about thyroid disease, you can talk to your doctor or visit the following Web sites for more information:

- The American Thyroid Association: www.thyroid.org
- The American Association of Clinical Endocrinologists: www.aace.com
- The Endocrine Society: www.endo-society.org
- The Thyroid Disease Center at About.com: www.thyroid.about.com

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To view the references for this article, please visit the OAC Web site.



ABOUT THE OBESITY ACTION COALITION (OAC)

The Obesity Action Coalition (OAC) is a National non-profit organization dedicated to giving a voice to individuals affected by obesity and helping them along their journey toward better health. Our core focuses are to elevate the conversation of weight and its impact on health, improve access to obesity care, provide science-based education on obesity and its treatments, and fight to eliminate weight bias and discrimination.



VIBRANT COMMUNITY



NATIONAL AWARENESS CAMPAIGNS



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LEARN, CONNECT, ENGAGE

The OAC knows that the journey with weight can be challenging but we also know that great things happen when we learn, connect and engage. That is why the OAC Community exists. Our Community is designed to provide quality education, ongoing support programs, an opportunity to connect, and a place to take action on important issues.

Through the OAC Community, you can get access to:

- Weight & Health Education • Community Blogs
 - Community Discussion Forum
 - Ongoing Support • Meaningful Connections
- AND MUCH MORE**



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