

Laboratory Testing for Thyroid Disease

ThyroidChange (www.ThyroidChange.org) is dedicated to improving the diagnosis and treatment of thyroid disease. This page is intended for patients to print for reference as they speak with their doctors. Please see the references at the bottom of this document for published research and other related articles that support the text listed below.

Why the TSH Lab Test is Not Enough

The Thyroid Stimulating Hormone (TSH) lab test is often considered the diagnostic "gold standard" for thyroid disease. A thyroid disorder is typically diagnosed if the TSH level is above the normal range (hypothyroidism) or if the TSH level is below normal range (hyperthyroidism). However, many patients continue to suffer from ongoing symptoms despite a normal TSH.



Current research and growing number of physician reports suggest that the TSH test is not a sufficient measure of overall thyroid function and can be unreliable in many cases [1-6, 39]. This is because TSH is not an indicator of cellular hypothyroidism, but rather an indicator of how the thyroid is reacting to the pituitary gland and vice-versa. It does not tell the practitioner the amount of thyroid hormone that is available to the cells. The Free T3 and Free T4 lab tests, however, provide a much better picture of thyroid hormone cellular status [4,6]. Physicians and

researchers are now learning more about the hypothalamic-pituitary-thyroid (HPA) axis and tissue regulation of thyroid hormones [4,7-8]. As a result, many practitioners are discovering that the TSH lab test is not reliable for diagnosing thyroid dysfunction in all of their patients. For more information on the physiology and accuracy of the TSH test, please refer to [How Accurate is TSH Testing?](#) by Kent Holtorf, MD, director of the National Academy of Hypothyroidism.

Comprehensive Thyroid Tests

Based on mounting research and clinical reports of many practitioners, the following best practices have emerged. A diagnosis of thyroid disease should start with the following:

1. a detailed symptom list
2. a careful account of any family history of thyroid disease
3. a physical exam

A hands-on thyroid and neck examination will help determine if the patient shows signs of an enlarged thyroid or nodules in the gland.

Laboratory Blood Tests: All of the following labs (not just TSH) should then be drawn for any patient exhibiting symptoms related to thyroid disease, including changes in mood. While there are limitations to all testing, running a full thyroid panel will help to better evaluate tissue thyroid status and/or possible thyroid

hormone pooling in the bloodstream. Diagnosis should be made based on clinical presentation in conjunction with comparing laboratory results to optimal levels.

- **TSH:** A marker for measuring the amount of thyroid-stimulating hormone that is produced by the pituitary gland. TSH activates the thyroid gland to produce thyroid hormones [4, 7-8, 10]. Optimal levels are closer to 1.0 and anything above 2.0 is grounds for possible hypothyroidism [26-30]. Anything below 1.0 is grounds for possible hyperthyroidism.
- **Free T3:** A marker of the level of unbound T3 thyroid hormone within the cells [1-4, 6, 9-11]. Optimal levels are near the mid-top end of the range. Results at the bottom of the range are grounds for possible hypothyroidism [26, 31, 32]. Elevated levels are grounds for possible hyperthyroidism [43].
- **Free T4:** A marker of the level of unbound T4 thyroid hormone levels within the cells [3-4, 9-13]. Optimal levels are near mid-range or slightly higher. Bottom of the range results are grounds for possible hypothyroidism. [31, 32]. Elevated levels are grounds for possible hyperthyroidism [44].
- **Reverse T3:** A marker for either the inhibition of Reverse T3 uptake into the cells and/or a marker of increased T4 to Reverse T3 formation. Reverse T3 can compete at the receptor site with T3 causing cellular hypothyroidism and resulting symptoms [4, 9-10, 12-15]. Elevated Reverse T3 can be triggered by physical stress, adrenal dysfunction, chronic illness and low ferritin, among other factors. A Reverse T3 level of above 250, or a free T3/reverse T3 ratio that is lower than 1.8 (if the free T3 is in ng/dL) or lower than 0.018 (if the free T3 is in pg/mL) is grounds for possible hypothyroidism or hyperthyroidism [4, 26].
- **Thyroid Antibodies (anti-TPO, TgAb, TRAb, and TSI):** Markers to help determine if the patient has an autoimmune thyroid disease such as Graves' disease or Hashimoto's thyroiditis. Clinical reports have noted that antibodies can be elevated despite a "normal" TSH, thus warranting treatment [16-18]. Antibodies should be tested for initial diagnosis and should be tested approximately once per year to assess autoimmune status. It is also important to note that patients can have an autoimmune thyroid disease despite normal thyroid antibody tests.

Ultrasound: An ultrasound of the thyroid should be ordered when a physical examination or laboratory finding suggests that the thyroid is enlarged or if there is distinct pain in the area. If laboratory tests show an overactive thyroid, a radioactive iodine uptake test may be ordered at the same time [48]. An ultrasound can detect nodules that are not easily felt and can determine if a nodule is solid or cystic. An ultrasound cannot determine whether a nodule is benign or cancerous. However, if there is a suspicious nodule, a physician may order radionuclide scanning or a fine needle aspiration to screen for thyroid cancer [49].

Additional Testing

Physicians are finding that thyroid disease is often concurrent with vitamin and mineral deficiencies such as low levels of Vitamin B12, Vitamin D, iron and/or ferritin. It is common to have any one of these deficiencies in thyroid patients, and a deficiency may impact the body's utilization of thyroid hormone. Many practitioners have also discovered that adrenal dysfunction adversely affects the necessary conversion of T4 to T3. Testing cortisol levels throughout the day should be incorporated with thyroid testing procedures. Additionally, a sex hormone panel should be included as all hormones of the body are interrelated. Low thyroid hormone, for instance, can result in sex hormone abnormalities.

- **CMP (Comprehensive Metabolic Profile):** Measures glucose levels, electrolyte and fluid balance, kidney function and liver function, which are important for assessing general chemical balance and metabolism.
- **CBC (Complete Blood Count):** Assesses the type and number of cells in the blood, especially red blood cells, white blood cells and platelets. A CBC may help to diagnose conditions such as anemia, infection and many other disorders.
- **Vitamin D3 (25-hydroxyvitamin D):** Vitamin D plays a critical role in a functioning immune system. This is particularly important for thyroid patients since autoimmune thyroid disease is the most common cause of an under- or overactive thyroid. Researchers have found that patients who are deficient in Vitamin D are more likely to have elevated thyroid antibody tests [19-21]. Optimal levels should be between 50-80 ng/mL [21].
- **Vitamin B12:** There is a common association between autoimmune thyroid disease and B12 deficiency with as many as 40 percent of hypothyroid patients who are deficient [22-23]. Additionally, many symptoms of Vitamin B12 deficiency also overlap with thyroid disease, making it difficult to distinguish the symptoms. While “normal values” are typically 200 - 900 pg/mL, growing evidence suggests that optimal B12 levels should be near the top of the lab test range or over 600 pg/mL [24-25].
- **Iron (% Saturation, TIBC, and Serum Iron):** Iron plays an important role in thyroid hormone synthesis. Additionally, autoimmune thyroid patients have a high incidence of iron deficiency. Total Iron-Binding Capacity (TIBC) measures the amount of protein available for transporting iron. Normal ranges are typically between 240-450 mcg/dL. Iron Saturation measures the iron saturation of the proteins that are responsible for transporting iron. Normal ranges are typically between 20-50%. Serum Iron measures the iron level in your blood. Normal ranges are typically between 60-170 [37].
- **Ferritin:** Ferritin is the major iron storage protein of the body. Iron supplementation should be considered for patients with unexplained fatigue who have ferritin levels below 50 micrograms per milliliter [33, 38]. Optimally, ferritin levels for women should be closer to 70-90, while levels for men should be near 100-110 [34].
- **Cortisol:** Adrenal dysfunction often accompanies thyroid problems. When cortisol levels are not optimal, thyroid hormone may not be utilized properly [46-47]. Many physicians find that the sensitive 24-hour saliva cortisol/DHEA test to evaluate adrenal function is an excellent tool to detect suboptimal cortisol levels, particularly because it provides a more complete picture than a single cortisol blood test [35-36].
- **Sex Hormone Panel:** The hormones of the body are interrelated and act as a team. If one hormone level is not optimal, then this could affect other hormone levels as well. Like cortisol testing, many practitioners prefer saliva testing, but testing via bloodwork is also common. Untreated thyroid disease can often lead to excess testosterone, low testosterone, low progesterone/estrogen dominance and symptoms/conditions such as PCOS, low libido, infertility, endometriosis, etc. [40-42].

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