TESTING & DIAGNOSIS

Your First Appointment

Reports from practitioners and the latest research describe the following best practices for a comprehensive evaluation regarding a possible thyroid disorder. A thorough intake and exam for thyroid disease should begin with the following:

✓ Detailed symptom list
✓ Careful account of any family history of thyroid disease
✓ Physical exam for an enlarged thyroid or nodules
✓ Full thyroid panel and other essential lab testing (see below)
✓ Ultrasound ordered (if suspicious swelling, pain, or nodules are detected)

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Why is the TSH test not enough?

The Thyroid Stimulating Hormone (TSH) test is often considered the diagnostic “gold standard” of thyroid hormone imbalance. A TSH level above or below the "normal" range is required by some medical professionals before initiating a treatment plan with the goal of keeping the TSH level within this range. **However, the TSH test does not reveal cellular hormone status**, rather, it measures pituitary gland function. Research continues to demonstrate that the TSH test is not a sufficient measure of overall thyroid function and can be unreliable [1-6, 23]. Therefore, patients with a thyroid hormone imbalance, clear symptoms, and an "in-range" TSH level may not be properly diagnosed or treated if a medical professional relies on the TSH lab test exclusively.

The **Free T3, Free T4, Reverse T3, and various thyroid antibody** lab tests provide a much better picture of thyroid hormone cellular status and possible immune system dysfunction [4,6]. Through these tests, medical professionals are discovering more about the hypothalamic-pituitary-thyroid (HPA) axis and tissue regulation of thyroid hormones [4,7-8]. See the thyroid panel descriptions below and learn about how your body utilizes thyroid hormone, and how these tests reveal a window into your overall health.

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**Essential Thyroid Labs**

The following labs are the basics for monitoring thyroid hormone status, or for any patient exhibiting symptoms. A normal, in-reference-range result can still leave many patients symptomatic. Therefore, we have researched the optimal ranges from integrative practitioners who specialize in hormone imbalance and are listed below. These are ranges where most patients find symptom resolution.

As you are determining your correct dose, labs should be tested **every 4-6 weeks**. Once optimal, testing **every 6 months** is recommended. For the most consistent and accurate results, testing should always be done in the morning prior to taking food and your thyroid medication [32, 47].

<table>
<thead>
<tr>
<th>Lab Test</th>
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<th>Reference Range*</th>
<th>Optimal Range**</th>
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<tbody>
<tr>
<td><strong>TSH</strong></td>
<td>Measures the amount of thyroid stimulating hormone that is produced by the pituitary gland to activate the thyroid gland to produce thyroid hormones. Does not measure thyroid hormone available to the cells.</td>
<td>.40 - 4.50 mIU/L</td>
<td>2.0 or lower K. Holtorf, MD</td>
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<td></td>
<td></td>
<td>1.0 - 2.0 A. Myers, MD</td>
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<td></td>
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<td>.5 - 1.5 D. Borenstein, MD</td>
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<td>NOTE: T3-containing medications may suppress TSH below the lab range [24].</td>
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| **Free T3** | Measures the amount of unbound (or “active”) T3 thyroid hormone within the cells. Below optimal range is grounds for possible hypothyroidism. Elevated levels are grounds for hyperthyroidism [24]. | 2.3 - 4.2 pg/mL | 3.2 or higher K. Holtorf, MD  
3.2 or higher A. Myers, MD  
3.2 - 4.2 D. Borenstein, MD | NOTE: Many patients even need a result of 3.7 or higher to feel optimal [30-31]. |
| **Free T4** | Measures the amount of unbound (or “storage”) T4 thyroid hormone levels within the cells. Below optimal range is grounds for possible hypothyroidism. Elevated levels are grounds for hyperthyroidism [25]. | .8 - 1.8 ng/dL | 1.3 or higher K. Holtorf, MD  
1.1 or higher A. Myers, MD  
1.3 - 2.8 D. Borenstein, MD | NOTE: Free T4 levels may be dramatically lowered by pure T3-containing medication [28]. |
| **Reverse T3** | A marker for the inhibition of 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, resulting in symptoms [4, 9-10, 11-14]. | 8 - 25 ng/dL | <24 ng/dL K. Holtorf, MD  
<15 ng/dL W. Childs, DO  
<10:1 (RT3:FT3) A. Myers, MD | Find your RT3/FT3 ratio [here](#).  
NOTE: If >15, or the ratio is low, consider thyroid resistance at the cellular level [29]. |
| **TPOAb TgAb** | Markers to help determine if the patient has an autoimmune thyroid disease such as Hashimoto’s thyroiditis. Clinical reports have noted that antibodies can be elevated despite a ‘normal’ TSH, thus warranting treatment [15-17]. | <9 IU/mL  
<1 IU/mL | Ideally, negative or below reference range. Track every 6 months to monitor autoimmune status.  
K. Holtorf, MD, A. Myers, MD, Westin Childs, DO |
### Lab Test

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<tr>
<td>TPOAb</td>
<td>Markers to help determine if the patient has an autoimmune thyroid disease such as Graves’ disease. Clinical reports have noted that antibodies can be abnormal despite a 'normal' TSH, thus warranting treatment [15-17].</td>
<td>&lt;16% Inhibition</td>
<td>Ideally, negative or below reference range. Track every 6 months to monitor autoimmune status.</td>
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<tr>
<td>TRAb</td>
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<td>&lt;140% Baseline</td>
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<tr>
<td>TSI</td>
<td></td>
<td>&lt;16% Inhibition</td>
<td>K. Holtorf, MD, A. Myers, MD, Westin Childs, DO</td>
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<tr>
<td>TBII</td>
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* Reference ranges may vary depending on the lab.
** Optimal ranges based on physician articles and resources. See citations on this page.

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### Other Essential Labs

Thyroid disease is often concurrent with certain vitamin and mineral deficiencies as well as imbalances with cortisol and sex hormones. Infections such as Candida and Epstein-Barr Virus can also be present and affecting thyroid function. It is common to have any one of these manifestations which may impact your body’s immune response as well as utilization and cellular status of thyroid hormone.

The following tests are highly recommended with the full thyroid panel listed above. Always consult with a health care practitioner before supplementing.

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<tr>
<td>CMP</td>
<td>Comprehensive Metabolic Panel (CMP) measures glucose levels, electrolyte and fluid balance, kidney and liver function which are important for assessing general chemical balance and metabolism.</td>
<td>Various</td>
<td>Optimal ranges will vary. Anything that is borderline on the high or low end of the reference range should be discussed with your doctor.</td>
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<td>CBC</td>
<td>The Complete Blood Count (CBC) 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, infections, among others.</td>
<td>Various</td>
<td>Optimal ranges will vary. Anything that is borderline on the high or low end of the reference range should be discussed with your doctor.</td>
</tr>
<tr>
<td>Vitamin D3</td>
<td>Vitamin D3, or 25-hydroxyvitamin D, plays a critical role in immunity. Patients who are deficient in Vitamin D are more likely to have elevated thyroid antibody tests. [18-19].</td>
<td>30-100 ng/mL</td>
<td>60-70 K. Holtorf, MD</td>
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<td>60-80 I. Wentz, PharmD</td>
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<td>50-80 A. Romm, MD</td>
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<tr>
<td>Vitamin B12</td>
<td>There is a link between thyroid disease and B12 deficiency with as many as 40 percent of hypothyroid patients who are deficient [21-22]. Hypothyroidism can compromise the ability to absorb vitamin B12.</td>
<td>200 - 1100 pg/mL</td>
<td>700-900 K. Holtorf, MD</td>
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<td>700-900 I. Wentz, PharmD</td>
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<td>NOTE: To measure the amount of B12 stored in tissues, especially those with MTHFR, use the Organic Acids Test [33].</td>
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<td>Iron Panel</td>
<td>Total Serum Iron</td>
<td>40-190 mcg/dL</td>
<td>mid-range W. Childs, DO</td>
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<td>% Saturation</td>
<td>11-50%</td>
<td>35-38% W. Childs, DO</td>
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<td>Total Iron Binding Capacity (TIBC)</td>
<td>250 - 450 mcg/dL</td>
<td>mid-range W. Childs, DO</td>
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<td></td>
<td>Ferritin (iron storage)</td>
<td>10 - 232 ng/mL</td>
<td>70-80 W. Childs, DO</td>
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<td>Iron is one of the most common deficiencies seen in thyroid patients and is important for thyroid hormone conversion and the utilization of iodine [33].</td>
<td></td>
<td>&gt;60 J. Teitelbaum, MD</td>
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<td>80-100 D. Borenstein, MD</td>
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| **Cortisol** | Adrenal dysfunction often accompanies thyroid problems. Cortisol can decrease TSH, lowering thyroid hormone production. It can also inhibit the conversion of T4 to active T3, and can increase the conversion of T4 to Reverse T3 [26-27, 35]. | Saliva Test Coming soon! | Saliva and Serum Tests: Optimal Ranges  
S. Gottfried, MD  
DUTCH Test: Optimal Ranges  
W. Childs, MD |
| **Leptin** | High leptin values demonstrate resistance to this hormone and could lower the amount of TSH secreted, inhibit T4 to T3 conversion, increase RT3 levels, increase hunger, increase insulin resistance and decrease the ability to breakdown fats (lipids) [36]. | 4.1 - 25 ng/dl | <10 ng/dl  
K. Holtorf, MD  
<10-12 ng/dl  
W. Childs, DO |
| **Magnesium** | Optimal levels of magnesium are required for conversion of T4 to T3 and helps the thyroid gland make more T4. A deficiency is related to a goiter or swollen thyroid gland [39]. | Magnesium, RBC: 4.0-6.4 mg/dL | 6.0-6.5 mg/dL  
C. Dean, MD |
| **Zinc** | Zinc is required for the synthesis of thyroid hormones. A deficiency can result in hypothyroidism. Thyroid hormones are also essential for the absorption of zinc, and hence hypothyroidism can result in zinc deficiency [40]. | Zinc, Serum: 60-130 mcg/dL  
Zinc, RBC: 9.0-14.7 mg/L | We are currently investigating optimal ranges.  
NOTE: Zinc competes with copper, so supplementation above 40 milligrams a day may cause a copper deficiency [66]. |

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<td><strong>Iodine</strong></td>
<td>Iodine is a critical and required nutrient for proper thyroid function since it is one of the building blocks of thyroid hormone. Without enough, the thyroid can't produce adequate T1, T2, T3, and T4 [42].</td>
<td>Iodine, Serum: 52-109 ng/mL Click here for other iodine testing methods, such as the urine loading test.</td>
<td>We are currently investigating optimal ranges.</td>
</tr>
<tr>
<td><strong>C-Reactive Protein</strong></td>
<td>C-Reactive Protein (CRP) is created by the liver and is a marker for inflammation. CRP is considered a non-specific marker for disease and decreases cellular T3 production [44].</td>
<td>&lt;8.0 mg/L</td>
<td>&lt; 1                                                                 K. Holtorf, MD</td>
</tr>
<tr>
<td><strong>SHBG</strong></td>
<td>Sex Hormone Binding Globulin (SHGB) regulates and transports sex hormones, estrogen and testosterone. Its production also responds to thyroid and estrogen hormones which is why it's another marker for identifying possible thyroid tissue levels [37-38].</td>
<td>Female 12 - 158 nmol/L depending on age Male 10-166 depending on age</td>
<td>Female 60 - 80 W. Childs, DO &gt;70 K. Holtorf, MD Male &gt;25 K. Holtorf, MD</td>
</tr>
<tr>
<td><strong>DHEA</strong></td>
<td>DHEA is a hormone secreted mainly by the adrenal glands. There is also a sulfated form called DHEA-S. DHEA is a precursor to sex hormones and low levels are often seen in thyroid patients. DHEA affects the immune system, inflammation levels, as well as insulin sensitivity, blood flow, and cognitive function [48].</td>
<td>Female 65-380 mcg/dL, Serum Male 280-640 mcg/dL, Serum</td>
<td>Female Top 1/2 of normal range, approximately 200-380 S. Gottfried, MD Male We are currently investigating optimal ranges.</td>
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<td><strong>Sex Hormone Panel</strong></td>
<td>The hormones of the body are an interrelated orchestra. If one hormone level is not optimal, this could affect other hormone levels, including thyroid hormone. A sex hormone panel should include: Estradiol Estragen, Total Pregnenolone Progesterone Testosterone (Free and Total) Luteinizing Hormone Follicle Stimulating Hormone SHBG DHEA-S</td>
<td>Lab ranges will vary. Some practitioners prefer saliva testing, while others prefer serum testing. Work with a good functional medical doctor for your specific needs.</td>
<td>Saliva and Serum Testing: Optimal Ranges S. Gottfried, MD</td>
</tr>
<tr>
<td><strong>Infection Labs</strong></td>
<td>Chronic infections cause irregularities of the immune system which makes it less able to fight foreign invaders, but more likely to attack the body. Chronic infections are often seen in autoimmune thyroid patients and should be tested to screen for infectious root causes [45]. Candida Epstein-Barr Lyme disease H. pylori Herpes Yersinia enterocolitica Hepatitis C</td>
<td>Lab ranges will vary. Work with a good functional doctor for your needs.</td>
<td>Optimal ranges will vary. Anything that is borderline on the high or low end of the reference range should be discussed with your doctor.</td>
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References


29. Dr. Westin Childs. 7 Reasons Your Thyroid Lab Tests Are Anything But Normal. Retrieved May 9, 2018 from https://www.restartmed.com/thyroid-lab-tests/.


32. Dr. Izabella Wentz, PharmD. Top 10 Thyroid Tests and How to Interpret Them. Retrieved May 9, 2018. https://thyroidpharmacist.com/articles/top-6-thyroid-tests/


https://www.restartmed.com/iodine-deficiency/

47. Dr. Izabella Wentz, PharmD. How To Get Accurate Lab Tests When Taking Thyroid Medications. Retrieved May 24, 2018. 
https://thyroidpharmacist.com/articles/how-to-get-accurate-lab-tests-when-taking-thyroid-medications/

http://www.naturalendocrinesolutions.com/articles/dhea-thyroid-health/

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