Hypothyroidism
Clinical Tool

This document has been written for clinicians. The content was developed by the Integrative Medicine Program, Department of Family Medicine, University of Wisconsin-Madison School of Medicine and Public Health in cooperation with Pacific Institute for Research and Evaluation, under contract to the Office of Patient Centered Care and Cultural Transformation, Veterans Health Administration.

Information is organized according to the diagram above, the Components of Proactive Health and Well-Being. While conventional treatments may be covered to some degree, the focus is on other areas of Whole Health that are less likely to be covered elsewhere and may be less familiar to most readers. There is no intention to dismiss what conventional care has to offer. Rather, you are encouraged to learn more about other approaches and how they may be used to complement conventional care. The ultimate decision to use a given approach should be based on many factors, including patient preferences, clinician comfort level, efficacy data, safety, and accessibility. No one approach is right for everyone; personalizing care is of fundamental importance.
Overview

The thyroid is a vitally important hormonal gland that plays an essential role in metabolism, growth and maturation of the human body. The thyroid produces and releases into the circulation at least two potent hormones, thyroxine (T4) and triiodothyronine (T3), which influence basal metabolic processes and enhance oxygen consumption in nearly all body tissues. Thyroid hormones also influence growth, temperature regulation, lipid and carbohydrate metabolism, cardiac myocyte activity, reproduction, cognitive functioning, and bone development.

Hypothyroidism is the insufficient production of thyroid hormone. Overt hypothyroidism is present in 0.1-2% of all adults, with 15% of older women meeting the criteria for subclinical hypothyroidism. Worldwide, iodine deficiency is the most common cause of hypothyroidism. In the United States, where salt is fortified with iodine, autoimmune thyroiditis or Hashimoto’s thyroiditis is the most common type of hypothyroidism. In autoimmune thyroiditis there is cell-mediated antibody destruction of the thyroid gland. The second leading cause of hypothyroidism is iatrogenic—including situations when surgery, medications or radiation have affected the functioning of the gland.

Because the thyroid affects so many different physiologic processes in the body, the clinical signs of hypothyroidism are variable from one individual to another. Some patients present with mild symptoms in spite of having low levels of circulating thyroid hormones, while some patients have more significant symptoms despite only mildly abnormal lab testing.

Common Symptoms of Hypothyroidism

<table>
<thead>
<tr>
<th>Fatigue</th>
<th>Concentration or memory problems</th>
<th>Menorrhagia, irregular menses or infertility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry skin and nails</td>
<td>Constipation</td>
<td>Depression</td>
</tr>
<tr>
<td>Cold intolerance</td>
<td>Weight gain</td>
<td>Bradycardia and Hypothermia</td>
</tr>
<tr>
<td>Hair loss</td>
<td>Carpal tunnel symptoms</td>
<td></td>
</tr>
</tbody>
</table>

Diagnosis

The diagnosis of hypothyroidism is based on the combination of clinical context and laboratory tests including TSH and Free T4. In primary hypothyroidism, serum TSH is elevated (typically >4.5mIU/L) and serum free T4 is decreased.

There is a continuum between the euthyroid state and hypothyroidism and it is suggested that the range be further contracted to an upper limit of normal of 2.5 mIU/L to more
appropriately diagnose people with hypothyroidism. Approximately 80% of adults have a TSH below 2.5 mIU/L suggesting that the “normal” cut-off should be lower to better capture all cases of hypothyroidism. However, natural history data shows us that up to half of older people (50-70) with upper limit TSH 3.0-5.0 and thyroid antibodies will go on to develop hypothyroidism. As few as 10% of people of younger age (20-40) without antibodies will go on to develop hypothyroidism. Many endocrinologists argue that the TSH limit should not be adjusted as the normalization of TSH is common and there are no health consequences for those with a mildly elevated TSH but normal thyroxine levels.3,4

Treatment of subclinical hypothyroidism (TSH 5.0-10.0 mIU/liter) is also not recommended by conventional medicine as there is no compelling evidence that treatment with levothyroxine improves symptoms compared with placebo in individuals with TSH in the 5.0–10 mIU/liter range. Treatment of subclinical hypothyroidism when serum TSH is between 5 and 10 mIU/liter generally does not have a beneficial effect on serum lipid profiles and does not affect cardiac risk. The only documented adverse health outcome for individuals with TSH levels between 3.0 and 5.0 mIU/liter is progression to overt hypothyroidism.5 In general, treatment can be considered in the following situations:

- Patients who have TSH levels higher than 10 mIU/L on repeated measurements
- Patients who have symptoms or signs (eg, goiter) associated with thyroid failure
- Patients who have convincing family history of thyroid disease
- Pregnant patients
- Patients who have severe hyperlipidemia.2

Some practitioners feel conventional methods of diagnosis of hypothyroidism are too narrow and miss many cases of hypothyroidism in patients who are clinically symptomatic. An alternative practice is to look at the absolute levels of T3 and T4, not just TSH. If T3 and T4 are low, regardless of TSH, a patient may be diagnosed by these practitioners with hypothyroidism.

**Nutrition**

**Goitrogens**
Goitrogens are food substances that block thyroid hormone synthesis. Thiocyanate and isothiocyanate are compounds found in cruciferous/brassica vegetables (cabbage, broccoli, cauliflower, and brussel sprouts) and they have been found to block the iodinyation of thyroglobulin if they are consumed in high amounts. This is especially true if a person is iodine deficient.6 Studies also show suppression of thyroid peroxidase activity, TSH elevation and increase in thyroid symptoms in people eating high quantities of soy isoflavones.7 When eating a reasonable amount of soy and Brassica vegetables (less than 30 grams daily), steaming or cooking these foods briefly may help reduce their goitrogenic effect while preserving their nutrient content.8

**Gluten and thyroid**
The link between celiac and other autoimmune diseases, including autoimmune thyroiditis is well-established. Treatment of celiac disease with the avoidance of gluten can improve
WHOLE HEALTH: CHANGE THE CONVERSATION
Clinical Tool: Hypothyroidism

absorption of levothyroxine and enhance subsequent treatment effects. While current evidence does not suggest that a gluten-free diet mediates thyroid symptoms in patients with celiac disease or gluten intolerance, many patients do find this to be helpful.

The anti-inflammatory diet
A number of medical conditions are linked to too much inflammation, including autoimmune thyroiditis. Any long-term, healthy eating plan should try and incorporate the principles of the anti-inflammatory diet. The pertinent aspects of this diet include: avoiding trans-fats, limiting fats that are high in omega-6-fatty acids including many saturated fats, increasing monounsaturated fats and omega-3 in the diet, aiming for 8-10 servings of fruits and vegetables, and eating at least 30 grams of fiber daily, choosing whole grains whenever possible. See The Anti-Inflammatory Diet clinical tool.

Vitamins and Minerals

Iodine
Iodine is an essential element for humans and is required for the synthesis of thyroid hormones (see Table 1). Iodine deficiency is common in many land-locked developing areas of the world, but not in the United States and other industrialized countries, where table salt is fortified with iodine. Ironically, ingestion of too much iodine can lead to iodine-induced hyperthyroidism (the Jod-Basedow phenomenon) or iodine induced hypothyroidism (the Wolff-Chaikoff effect) in patients who are iodine deficient. In patients without iodine deficiency, chronic exposure to high levels of iodine reduces binding over time and can also cause hypothyroidism.

Sea vegetables and seaweed including kelp, nori and dulse are natural sources of iodine. The quantity of iodine in each serving will vary based on where they were grown, species, part of plant, climate the grew in and how they were prepared.

Iodine testing is typically not necessary, though it can be considered in patients with dietary restrictions, medication use or heavy metal toxicity. The unprovoked 24 hour urine iodine test is currently the best method to evaluate iodine levels. A provoked 24 hour urine iodine test with a 50 microgram iodine load can be done, but is rarely necessary.
Selenium
Adequate selenium is also required for proper thyroid function. Specifically, selenium facilitates conversion of T4 to the active T3 through selenium dependent deiodinases. Selenium supplementation may improve thyroid dysfunction in patients who are deficient. It is unclear to what extent selenium benefits patients with hypothyroidism in the absence of a selenium deficiency.

Other nutrients: vitamin A, iron and zinc
Many other vitamins and nutrients influence thyroid function, most notably vitamin A, iron and zinc. Consider supplementing with them in hypothyroidism, especially if deficiency states are suspected.

L-Tyrosine
L-Tyrosine is an amino acid and is important for thyroid function. Thyroxine (T4) is produced through the iodination of tyrosine (Figure 1). Tyrosine is absorbed through diet and also created by the conversion of phenylalanine. Tyrosine supplementation may be helpful in patients for hypothyroid symptoms in patients who are deficient. The recommended dose of L-Tyrosine is 500 milligrams three times daily.

Recommended daily doses based on the Recommended Daily Allowances (RDAs) and Tolerable Upper Intake (TUI) levels for adults are listed in Table 1.

<table>
<thead>
<tr>
<th>Vitamin/Mineral</th>
<th>RDA</th>
<th>TUI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iodine</td>
<td>150mcg/day</td>
<td>1100mcg/day</td>
</tr>
<tr>
<td>Selenium</td>
<td>55mcg/day</td>
<td>400mcg/day</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>800mg/day elemental</td>
<td>3000mg/day elemental</td>
</tr>
<tr>
<td>Iron</td>
<td>12mg/day elemental</td>
<td>45mg/day elemental</td>
</tr>
<tr>
<td>Zinc</td>
<td>10mg/day</td>
<td>40mg/day</td>
</tr>
</tbody>
</table>

Thyroid Hormone Supplementation

Synthetic T4 (levothyroxine, Synthroid)
L-Thyroxine is a synthetic thyroid hormone and chemically similar to thyroxine (T4), which is secreted by the follicular cells of the thyroid. Synthetic T4 is the conventional treatment of choice in most cases of hypothyroidism.

Synthetic T3 (liothyronine, Cytomel)
Chemically, liothyronine is nearly identical to triiodothyronine (T3) which is also an active thyroid hormone in the body. In euthyroid patients, most of the thyroid action in the body results from the action of T3 which is converted from T4 by the deiodinases in the body. About 80% of the active T3 form is produced by this peripheral conversion, with the remaining 20% of T3 being produced by the thyroid gland. The presence of individual and organ tissue variance of deiodinase enzyme activity raises concerns that for some patients...
with hypothyroidism, supplemental T4 alone may not be adequate. It is important to recognize that T3 should always be prescribed two to three times daily due to its shorter half-life.

Numerous clinical trials and one meta-analysis have evaluated the potential advantages of combined T3 and T4 replacement over T4 alone, with mixed results.15-18 One meta-analysis involving 1,216 patients concluded that there was no advantage to combined T4 and T3 over T4 alone in terms of several patient and clinician oriented measures.18 However, there was considerable heterogeneity in the populations included in this meta-analysis. A subsequent double-blind randomized cross over study did show a benefit to combined therapy versus T4 therapy alone in terms of numerous patient-oriented quality of life and well-being measures.17

Given the possibility of benefits to sub-groups of hypothyroidism patients, an empirical trial of combined T3 and T4 could be considered in cases refractory to T4 alone, especially those with persistent low or low normal T3 levels.

**Porcine hormone**

Ground pig thyroid (Armour Thyroid, NP Thyroid and Nature-Thyroid) is an older form of supplemental thyroid hormone that is still requested or preferred by many patients. Like endogenous human thyroid secretions, porcine thyroid preparations contain a combination of about 80% T4 and 20% T3, in addition to other possibly active iodinated compounds. Many patients consider this to be more natural and experience better results with this form. Monitoring response to treatment may be done just as with standard synthetic levothyroxine, based on symptoms and TSH levels after six to eight weeks of therapy. One grain (60 milligrams) of porcine thyroid = 100 micrograms of levothyroxine. The starting dose is 0.5 grains in young healthy adults.

<table>
<thead>
<tr>
<th>To Increase absorption of thyroid supplements:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Take on an empty stomach</td>
</tr>
<tr>
<td>• Do not take with iron, calcium antacids, anti-seizure medications, PPIs</td>
</tr>
<tr>
<td>• Eat a consistent amount of fiber in your diet</td>
</tr>
</tbody>
</table>

**Other Supplements**

*Note: Please see the module on Dietary Supplements for more information about how to determine whether or not a specific supplement is appropriate for a given individual. Supplements are not regulated with the same degree of oversight as medications, and it is important that clinicians keep this in mind. Products vary greatly in terms of accuracy of labeling, presence of adulterants, and the legitimacy of claims made by the manufacturer.*
**Bladderwrack**
Bladderwrack is seaweed found along the North Sea, the Baltic Sea, and the Atlantic and Pacific Oceans. Bladderwrack is used by many people to treat hypothyroidism. Iodine is most likely the active ingredient. Safety and effectiveness have not been fully evaluated.\(^{11}\)

**Guggul**
Guggul is a tree resin commonly used in Ayurvedic medicine. Due to its high fiber content, it has been found to be useful for cholesterol lowering. Animal studies suggest Guggul may stimulate thyroid function. Guggul appears to be safe, though effectiveness has not been proven.\(^{11}\)

**Other Complementary Approaches**

**Yoga**
There is a particular yoga asana or posture that is purported to stimulate the thyroid gland—Sharvangasana, or the shoulder stand. This claim has apparently not been investigated scientifically, but doing the pose is generally safe under the guidance of a qualified teacher.

**Energy medicine: reiki treatment of the fifth chakra**
According to the reiki tradition, the throat chakra is the fifth of seven chakras, or energy centers. It is located in the center of the neck in the area of the thyroid gland. It is believed that this chakra is responsible for aiding supporting thyroid function. When the throat chakra is blocked, patients may suffer from hypothyroidism, among other physical ailments. The throat chakra is associated with self-expression, creativity, writing, listening to words and music, and the senses of smell and taste. When this chakra is balanced, one is more effective at speaking and listening to people and what they have to say. In fact, a person may be encouraged to “speak your truth” in order to improve the health of the fifth chakra. Reiki for thyroid care has not been investigated scientifically, though it is generally safe from a certified practitioner.

See the [Energy Medicine (Biofield Therapies)](https://www.vha.gov) clinical tool for more information.

**Hydrotherapy**
Contrast hydrotherapy (application of hot and cold) to the neck and throat may stimulate thyroid function. It is done by alternating three minutes heat exposure with one minute cold. This is repeated three times for one set, and two to three sets are done per day.

**Traditional Chinese medicine (TCM)/acupuncture**
Although not well studied for addressing hypothyroidism, TCM can have positive effects on imbalances in the immune system, and it is useful in treating other autoimmune conditions. In TCM, hypothyroidism is generally considered to be a deficiency of spleen or kidney “yang” deficiency, especially if the disorder is characterized by cold sensation, lack of appetite, fatigue, and weight gain. Acupuncture and herbal treatments aim to strengthen qi
and yang deficiency. See the Acupuncture and Traditional Chinese Medicine clinical tool for more information.

**Environment**

The incidence of thyroid disease, including cancer and hypothyroidism is increasing in the United States. There is a growing body of evidence which supports the idea that environmental toxins may be contributing. Thyroid disrupters, including PCBs, PBDEs, and phthalates have all been shown to interfere with the production, transport and metabolism of thyroid hormone. Patients who want to maximize their thyroid function should attempt to avoid these chemicals by choosing organic foods, avoiding food/drink stored in plastic bottles and packaging and by purchasing flame-retardant free products when possible.\(^{19}\)

---

**References**


