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## REPORT

### Thyroid Deficiency

#### Preventing a Metabolic Meltdown

By Raphael Kellman, MD

*Fatigue, weight gain, insulin resistance, depression, and dementia are all associated with the degenerative aspects of aging. Yet many of these symptoms may actually be caused by hypothyroidism, which is often overlooked and misdiagnosed. A simple thyroid stimulating hormone (TSH) blood test can reveal your thyroid status and help you avoid misdiagnosis of these symptoms.*

*An estimated 5% of Americans suffer from hypothyroidism, a deficiency of the thyroid gland, and many go undiagnosed.<sup>1</sup> Patients and their doctors often disregard common symptoms, mistaking them for “normal” signs of aging. In my integrative medical practice, I offer patients an alternative to suffering with symptoms that are eminently treatable.*



A swollen and inflamed thyroid gland. The pituitary gland secretes thyroid stimulating hormone (TSH). TSH levels are monitored in patients with thyroid disease.

#### Role of the Thyroid

The thyroid is a small, butterfly-shaped organ in the neck, located above the collarbone and below the Adam's apple. This tiny gland is vital to regulation of the body's metabolism. Made up of small sacs, the thyroid is filled with an iodine-rich protein called thyroglobulin, along with the two thyroid hormones, T4 (tetraiodothyronine, or thyroxine) and T3 (triiodothyronine). T3, the more active of the two thyroid hormones, is produced in much smaller amounts than T4, which accounts for about 93% of the hormone produced. Most of the T3 is created by conversion from T4, which occurs in the liver and kidneys.

The primary function of these two hormones is to convert food into energy and to regulate the body's other systems. A deficiency in the production (or absorption) of thyroid hormones can cause a global decline in the body's metabolic reactions and lead to a host of symptoms, most commonly fatigue, weight gain, low body temperature, dry skin, and hair loss in the eyebrows.<sup>2-4</sup> But low thyroid function—that is, hypothyroidism—can also produce more far-ranging symptoms, potentially affecting all of the body's organs and cells. That is why I make it a point to test a patient's thyroid levels whenever he or she presents with a common and often interrelated series of health problems.

#### The Testing Controversy

Diagnosing hypothyroidism has sparked an ongoing debate in the medical community over what hormone levels constitute a hormone deficiency. Generally, doctors use the TSH blood test to diagnose thyroid conditions. TSH is produced in the brain's pituitary gland. A pituitary that produces excess TSH indicates that the thyroid is functioning below par and therefore requires more stimulation than normal. The problem lies in defining the standard range for TSH levels. I have found that even at the edges of the so-called “normal” range, many patients suffer from untreated hypothyroidism, with significantly diminished health.

The reference ranges published by various laboratories are subject to change as new information becomes available. In fact, the medical profession always adjusts these ranges to reflect new discoveries in clinical practice. For example, while a total cholesterol level of 300 mg/dL was once considered normal, we now know that that number is far too high, and levels around 200 mg/dL are now recommended.

In 2002, the American Academy of Clinical Endocrinology revised the normal range for TSH levels downward to the current values of 0.2-5.5 m $\mu$ /ml.<sup>5</sup> From testing and treating patients who present with significant health problems, I and many other doctors believe that this upper value is still too high. Studies have shown that values of more than 4.0 m $\mu$ /ml increase the prevalence of heart disease after correcting for other known risk factors.<sup>6</sup> Other research reveals that people with TSH values of more than 2.0 m $\mu$ /ml have a higher risk of developing overt hypothyroid disease over the next 20 years.<sup>7</sup> Research also links hypothyroidism with high cholesterol. When the level of TSH is over 1.9 m $\mu$ /ml, with concomitant high levels of cholesterol, doctors should look for thyroid deficiency before treating the patient with cholesterol-lowering drugs.<sup>8</sup> These findings all show a notable difference between the optimal TSH range and the so-called “normal” range.

Even when tests reveal “normal” TSH levels, I sometimes suspect the presence of hypothyroidism, especially in older patients, as thyroid deficiencies often imitate age-related symptoms. In such cases, I perform a stimulation test using thyrotropin-releasing hormone (TRH) to disclose low thyroid performance even if a blood test is normal. The TRH stimulation test is conducted only under the direct supervision of a physician. The test requires the intravenous injection of the hormone TRH with additional blood sampling before and after the injection. The results of this test help to distinguish between outright hypothyroidism and “subclinical” or developing hypothyroidism. In some individuals (and depending on the physician’s interpretation of the laboratory tests), outright hypothyroidism may take as long as 20 years to develop. With the help of measures such as the TRH stimulation test, I am able to diagnose hypothyroidism when the onset of symptoms (fatigue, weight gain, etc.) precedes abnormal laboratory values. Early intervention thus may save patients from years of needless suffering.

### **Symptoms of Hypothyroidism**

I generally prefer to observe patients closely and assess their entire range of symptoms to determine whether hypothyroidism is a contributor to their condition, and then to use blood tests to confirm hypothyroidism. I first look for deficiency, low metabolism or tiredness, and weight gain, though there are many other indicators. According to the pioneering physician Broda Barnes, author of *Hypothyroidism: The Unsuspected Illness*, there are at least 47 symptoms of low thyroid function—most of them overlooked by blood tests. “The development and use of thyroid function blood tests,” Barnes wrote, “left many patients with clinical symptoms of hypothyroidism undiagnosed and untreated.” For this reason, Barnes estimates that up to 34% of the adult population has some form of thyroid deficiency.

In addition to fatigue, I have found that symptoms may include depression, dementia, decreased cognitive function (“brain fog”), a weakening of the immune system, constipation, weight gain and fluid retention, irregular menstrual cycle, infection, discoloration of the skin, hair loss, and drooping eyelids.<sup>9-17</sup> A sluggish thyroid can also be linked to a fatty liver or high cholesterol, candida, and low glucose and insulin levels. In extreme cases, untreated hypothyroidism can cause anemia, low body temperature, and heart failure.<sup>18-27</sup> Additional tests to better determine the significance of such symptoms include a liver panel, a complete blood count (CBC), a chemistry panel including a cholesterol profile, the candida antibody test, and a fasting insulin level.

Because the thyroid governs metabolic processes extending all the way down to the cellular level, every organ and system of the body can potentially be affected by its dysfunction. For example, hypothyroidism can affect the digestive tract, leading to constipation. This occurs when a sluggish metabolism affects the cells lining the gut walls, in turn slowing peristalsis, the contractions that govern bowel movements. Slowed metabolic activity in the brain can manifest as lowered mood and depression, the result of a decreased production of neurotransmitters. Nerve cells that are not firing well may produce decreased cognitive function. In fact, many elderly people with hypothyroidism have been misdiagnosed as suffering from dementia.



One of my patients, a 78-year-old woman who was progressively declining at home, had lost overall function, was tired and forgetful, and could not remember the names of those close to her. Routine tests for TSH showed her to be in the “normal” range, and her doctors had concluded that she was suffering from “beginning dementia,” an all-too-common misdiagnosis in the elderly. Suspecting hypothyroidism, I tested her and then started her on low doses of thyroid hormone, to which she immediately responded. Her memory returned and her overall function improved dramatically. “I feel like I was rescued from the dead,” she told me. Although many patients with subclinical hypothyroidism show no symptomatic improvement upon treatment according

to the medical literature, it is impossible to refute this anecdotal observation. It is tragic that so many elderly patients are considered untreatable and dismissed as “over the hill” when their symptoms, due to hypothyroidism, can be alleviated with hormone treatment.

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Thyroid dysfunction can also contribute to insulin resistance, especially among overweight people, and in such cases is often a precursor to diabetes.<sup>28,29</sup> Insulin, produced by the pancreas, results in the storage of excessive calories. But in insulin resistance, the cells become less responsive to the action of insulin. The body therefore produces more and more insulin as a result, trying to maintain normal blood sugar levels, a condition known as hyperinsulinemia. High insulin levels also stimulate appetite: when glucose levels drop, the insulin sends a signal to the brain to keep the food coming. Thus, you begin to eat when you least need to, with intractable weight gain being the result. A high insulin output over many years because of poor diet can cause the pancreas to “burn out” and insulin output to drop, resulting in diabetes. A number of studies suggest that hypothyroidism is associated with diabetes mellitus.<sup>30</sup>

The connection between the thyroid and the hypothalamus-pituitary axis results in three different types of hypothyroidism. Primary hypothyroidism arises from a deficiency in the thyroid itself, while secondary and tertiary hypothyroidism involve the pituitary and hypothalamus, respectively. In tertiary hypothyroidism, the hypothalamus shuts down protectively in response to stress, producing low levels of thyroid hormone.<sup>31</sup> Often linked to chronic fatigue syndrome and fibromyalgia, this condition can cause low body temperatures, a tendency toward infections, and the other metabolic consequences of low thyroid.<sup>32</sup> It has been suggested that problems with the mitochondria, the cellular structures that furnish us with energy, may cause this suppression of the hypothalamus. Since dysfunction of the mitochondria is also a result of hypothyroidism, here again we have an example of how processes behave reciprocally in the body.

Weight gain is an effect of hypothyroidism that can similarly become a cause. In response to the metabolic slowdown and corresponding weight gain, patients may lower their caloric intake, which in turn can lower production of T3, initiating a vicious cycle in which the basal metabolic rate slows and leads to even more weight gain. I use the little-known Achilles Tendon Reflex Recovery Test and the Barnes Basal Temperature as measures of deficient conversion of T4 to T3 to ascertain whether hypothyroidism is implicated in cases of obesity. In addition to those previously mentioned, several other blood tests also gauge T3 and T4 levels, including the reverse T3, T3 uptake, T4, and complete thyroid panel tests.

#### Thyroid and Hormonal Imbalances

Thyroid function is intimately tied to adrenal function, which reciprocally acts to stimulate the pituitary, where TSH is produced. If the adrenals are not working well, the thyroid and pituitary often will be affected. Adrenal imbalances can be measured via cortisol levels. Stress tends to raise cortisol levels, increasing insulin and thereby leading, in some cases, to insulin resistance and overproduction of cortisol, as measured by the saliva test, thus signaling trouble for the thyroid.<sup>33,34</sup> Excess cortisol causes a decrease in thyroid expression by leading to diminished conversion of T4 into T3, the active hormone.



A progesterone-estrogen imbalance can similarly interfere with thyroid function as well as result from diminished thyroid function. Estrogen and thyroid hormone have opposite effects: estrogen causes calories to be turned into fat, and thyroid hormone causes fat calories to be turned into energy. So when progesterone is low and estrogen is dominant (even when TSH blood levels are normal), if symptoms of hypothyroidism are present, high estrogen levels could be the cause.<sup>35,36</sup> Weight gain can also upset the progesterone-estrogen balance. To counteract this effect of estrogen, I generally recommend the use of topical progesterone creams. Higher levels of progesterone activate estrogen receptor sites in the body and cause the estrogen to be used before it can do harm. The progesterone-estrogen balance can be determined by a monthly saliva test or by progesterone and estrogen blood tests.



## Autoimmune Thyroid Disease

Low progesterone in women between the ages of 30 and 50 may lead to autoimmune hypothyroiditis, or Hashimoto's disease, as a consequence of immune stimulation by the dominant estrogen. In this condition, the body's immune system develops antibodies to thyroid cell components, resulting in self-destruction of the thyroid gland; specifically, antibodies to thyroid peroxidase and thyroglobulin are generated pathologically. Twenty-five percent of such cases may also result from a genetic predisposition. This attack by the immune system on the thyroid results in damage to the cellular mitochondria, the energy producers in the cytoplasm, and the progressive destruction of the thyroid itself. Stress can also provoke this mitochondrial response, which in turn can result in other types of inflammation and allergies. To improve mitochondrial function, we use N-

acetylcysteine (a precursor to glutathione), coenzyme Q10, and alpha lipoic acid, an antioxidant for liver and nerve health that also works to regenerate coenzyme Q10.<sup>37</sup> This treatment also improves cholesterol and fat levels in the liver, and helps the gall bladder.

### Looking for the Cause

In addition to treating both symptoms and organic dysfunction, it is important to identify and eliminate all other possible causative factors. These may include:

**Iodine deficiencies.** Iodine is an important component of T4 and T3. Although dietary iodine deficiencies are now almost nonexistent in the US, some people need to supplement their iodine intake with kelp, seaweed, or iodine tablets. Iodine is also found in dietary supplements such as Thyroid & L-Tyrosine Complex™ capsules, which contain other trace minerals needed for optimal endocrine function—such as iodine, magnesium, zinc, copper, and manganese—as well as tyrosine, the precursor to thyroid hormone.<sup>38</sup>



**Toxicity/heavy metals.** Metal toxicity, determined by hair analysis, can be addressed with chelation, both intravenous and oral. Selenium supplementation can also help remove heavy metals by working in conjunction with glutathione peroxidase, a compound found in asparagus, garlic, and mushrooms.<sup>39,40</sup> A blood test can determine if selenium supplementation is needed; if so, there are several options, including Se-methylselenocysteine caps.

**Candida.** Candida is detected using stool testing for overgrowth of yeast and yeast antibodies. Eliminating yeast, sugar, and wheat from the diet helps to starve out candida. People suffering from this disorder should eliminate even honey and fruit sugars from their diet at first, and then slowly reintroduce them into the diet later. Twinlab Yeast Fighters include biotin, fiber, acidophilus, and herbs to support a healthy intestinal environment.

**Environmental radiation.** Radiation can cause free-radical damage to the thyroid, as has happened in Ukraine as a result of the Chernobyl nuclear reactor disaster. The cell mitochondria are also prone to free radical damage. I recommend turning off cell phones and unplugging bedside electronic and electrical devices (including the telephone) at night, even though these devices produce relatively low levels of radiation. Because electromagnetic radiation in food can also be problematic, eating organic food whenever possible is also recommended.



### Treating Hypothyroidism

Conventional treatment calls for patients to take an oral, synthetic form of T4. Synthroid®, the most popular such medication, is used by about 8 million Americans. Especially in older people for whom the side effects can be more problematic, it is important to advance the dosage slowly until TSH blood levels return to normal. This medication usually must be taken for life.

I have discovered that many people respond better to Armour® Thyroid, which is desiccated porcine thyroid. A recent article in the *New England Journal of Medicine* claimed greater improvements in mood and brain function with Armour® Thyroid than with Synthroid®.<sup>41</sup> I recommend starting treatment with a dose of 60-120 mg of Armour® desiccated thyroid, and then

retesting in a month.

One of my patients, a woman in her early forties, complained of fatigue along with dry scalp and hair loss. She had gained 10 pounds and had irregular periods of depression. Because her blood test results were in the “normal” range, she went from doctor to doctor, until one physician prescribed birth control pills and Prozac®. When she consulted me, I noticed that her TSH level was 3 mμ/ml; this score, though considered to be within the normal range, may indicate low thyroid. I treated her empirically with Armour® Thyroid. I also tested her adrenals and found that they were hypofunctioning, and thus prescribed ashwagandha and Panax ginseng.<sup>42,43</sup> Two weeks after treatment, the woman regained her energy and told me, “I have my life back!” The weight also disappeared—she dropped 10 pounds in eight weeks, her skin returned to normal, and her mood lifted.



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#### Vitamin Supplements

Natural supplements for thyroid problems include vitamins A, B complex, B12, C, and E; coenzyme Q10; and especially the minerals magnesium, manganese, selenium, and zinc. Deficiencies of any of these minerals can prevent the conversion of T4 to T3 and should be corrected. Sufficient protein iodine and especially the amino acid tyrosine are necessary to make T4 in the thyroid gland.

#### Conclusion

The causes and effects of hypothyroidism are interrelated. Healthy thyroid function depends on the action of other glands, and many key processes in turn depend on healthy thyroid function. Using integrative medicine to treat these interrelated functional areas can offer patients tremendous benefits.

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