

## Thyroid Health

**This paper is based simply on books, websites, and podcasts I have come across. I have zero professional or personal expertise in dealing with thyroid issues and this is merely an attempt to offer you a little more background on the gland so that you can talk to your healthcare professionals about anything that may be of concern to you. This paper should be not used to diagnose or treat your condition without input from healthcare professionals who can look at your personal issues.**

The thyroid gland sits in the front of your throat and is responsible for some key functions such as:

- ❖ metabolism
- ❖ heart function
- ❖ muscle function
- ❖ digestion
- ❖ bone maintenance
- ❖ sexual function. Roughly 60% of men and 22-46% of women who are hypothyroid experience sexual dysfunction according to some research.

There are receptors on every cell of your body for thyroid hormone which is a testament to how important it is for our health. There are two primary types of thyroid hormone called T4 and T3 (referring to the number of iodine molecules they have. There are also T1 and T2 which will not be covered here.)



The body is supposed to convert T4 into T3 which is the active form we need. But look at this graphic and see why knowing how much T4 you have in your system does not necessarily mean that it is being properly converted into T3. Low levels of zinc and/or selenium are yet more reasons why the conversion may not be happening. TSH, the standard test used to look at thyroid functioning, will not pick up this poor conversion.

Medication for hypothyroidism (Synthroid or the generic levothyroxine) is only T4. About 80% of T4 is converted into T3 in the liver, so your liver health is important to your thyroid functioning. Some claim

that T4 only medication like Synthroid does not work more often that it does work due to conversion problems.

If you have low thyroid function these processes slow down, and you may gain weight, feel sluggish and fatigued, along with being slow to heal. Other symptoms of low thyroid function include decreased mental acuity, constipation, and over longer periods of time there is a greater risk of Alzheimer's and delayed reflexes. Being hyperthyroid - having it working too fast can lead to a racing heart, feeling agitated, and losing weight unexpectedly.

The ten most common symptoms of hypothyroidism are said to be:

- ❖ fatigue after sleeping 8-10 hours at night or needing to take a nap daily
- ❖ weight gain or the inability to lose weight
- ❖ mood issues, such as mood swings, anxiety, or depression
- ❖ hormone imbalances like PMS, irregular periods, infertility, low sex drive
- ❖ muscle pain, joint pain, carpal tunnel syndrome, or tendonitis
- ❖ cold hands and feet, feeling cold when others are not, or having a body temperature consistently below 98.5°.
- ❖ dry or cracking skin, brittle nails, excessive hair loss
- ❖ constipation
- ❖ brain fog, poor concentration, or poor memory
- ❖ neck swelling, snoring, or hoarse voice

The standard test used for looking at thyroid function is called TSH (thyroid stimulating hormone). It is secreted by the pituitary. It basically is determining how much of a signal is being sent to make thyroid hormone (T3 and T4). The more signal that is sent the more there is a need for it to be made. That is, high amounts of TSH are reflective of low levels of the hormone such as might occur if a person is hypothyroid. But it could also mean that the receptors on your cells are not sensitive to the hormone. Or that your body is not converting the inactive (T4) hormone into the active type (T3). TSH also does not catch changes in thyroid activity until they have been happening for a long time. e.g. You may have a normal TSH but still have underlying problems like autoimmunity (Hashimoto's).

There is also a need to understand the concept of 'what is normal.' It was initially developed on about 200 volunteers as to establishing 'the normal range' with additional studies done since then. There is a notable lack of agreement on this 'normal' point. Some say that a TSH of 2.5 mIU/L (milli-international units per liter) is indicative of hypothyroidism. Others say it is a level of 4.5 or 5.0. The American Thyroid Association puts the cutoff for the start of hypothyroid at 4.0. Levels of 0.1-0.5 may be indicative of subclinical hyperthyroidism, and under 0.1 is symptomatic of it. But then again, there are some who say 0-0.4 is hyperthyroid. Hyperthyroidism is said to affect 2% of women and 0.2% of men. However, rates increase with age and for those over 60 the rate is 15%. (Symptoms of hyperthyroidism include heart palpitations, being short of breath, weight loss, feeling tremulous or shaky, and eyes bulging out.)

Then there are antibodies. If there are antibodies in your blood that means your immune system is attacking your thyroid gland which creates inflammation in it. And that makes it harder for it to produce T4 and T3. If such a problem occurs over a long enough time it will completely destroy

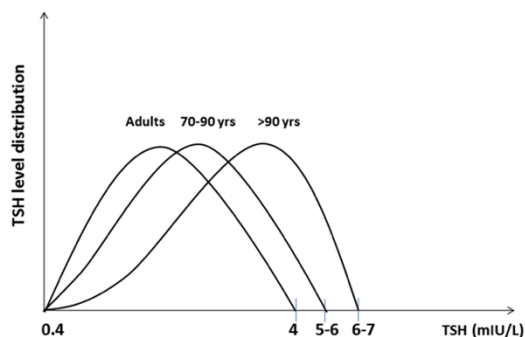
the gland, which is Hashimoto's, and you will need to always take supplemental thyroid hormone for the rest of your life. 'Normal' antibodies may be viewed as okay as high 34 IU/ml but others say that the level should be below 9 IU/ml.

Kids have higher TSH levels and they decline with age. After the newborn phase mild hypothyroidism might be defined as ranging from 4.5-10.0.

| Normal Range |              |
|--------------|--------------|
| Birth        | 3.84 - 11.75 |
| 1 month      | 1.18 - 3.57  |
| 1 year       | 1.17 - 3.55  |
| 5 years      | 1.15 - 3.47  |
| 12 years     | 1.09 - 3.31  |
| 18 years     | 1.05 - 3.16  |

Figure 1. Approximate changes of serum TSH values with aging.

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Thyroid levels can also vary with the season with TSH peaking in the winter and being lower in the summer. So symptoms during the winter - of being hypothyroid-like at least could include sensitivity to cold, constipation, weight gain, low energy, and dry skin. There is also some evidence that females generally have a higher TSH level than males. TSH levels also tend to increase with age.

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Other factors that can impact TSH levels include meds, supplements like biotin and you should stop taking biotin at least 2-3 days before a test per the American Thyroid Association's recommendation. Other factors impacting TSH include ethnicity, diet & iodine status, smoking cigarettes, and pollutants. Stress can also impact them. Caffeine can also make the thyroid drug levothyroxine move too quickly through your digestive system so you can't properly absorb it, which makes your T4 levels fall.

In pregnancy TSH levels decrease. Unusually high or low levels can affect the risk of miscarriage and cause pregnancy-related complications such as

- ❖ preeclampsia
- ❖ premature birth
- ❖ low birth weight
- ❖ congestive heart failure

There are other tests available to look at thyroid function but they are used less frequently. They include:

- ❖ T3 or free T3: this measures the amount of triiodothyronine in your blood. It is one of the two main hormones made by the thyroid. This is usually ordered if T4 is elevated. Abnormally high levels of T3 typically indicate Graves' disease (an autoimmune form of hyperthyroidism). In adults normal T3 is said to be between 80-220 ng/dl. Free T3 means how much is unattached to other molecules and available to do its work. Free T3 has a big influence on weight, cholesterol, energy, memory, menstrual cycle, skin, hair, body temperature, muscle strength and pulse rate.
- ❖ Reverse T3, which is an inactive form of T3 that attaches to thyroid receptors but can't activate them, so it prevents free T3 from doing so which can then lead to hypothyroidism symptoms. This usually happens with the body is trying to conserve energy due to severe illness or starvation, or being under stress on some other level. Excessive restriction of carbs is said to increase Reverse T3. Infections, toxins, a low-calorie diet, injuries, liver or kidney dysfunction, or certain medications can increase Reverse T3. Taking T4 only medication can cause an increase in Reverse T3 if you are unable to convert T4 into T3. Reverse T3 is a brake pedal for your metabolism. If it is high it is blocking free T3 and may be the reason why your hypothyroid free T3 and T4 look good. Under stress T4 gets converted into reverse T3. Testing for reverse T3 can be used to identify poor T4 to T3 conversion, as well as thyroid symptoms due to adrenal stress rather than thyroid malfunction or autoimmune issues. Chronic stress may cause problems in your body years before a lab test picks it up. There is also something called thyroid resistance meaning that you may have T3 in your blood but it is not being received adequately. This can be likened to driving for many hours non-stop and becoming tired so you may drift into another highway lane without realizing it until someone in that lane behind you angrily honks. With sudden alertness you now 'see' that you were drifting whereas before the honk your brain was not registering the visual information adequately. This resistance is known as 'cellular hypothyroidism.' Reverse T3 is one reason for such resistance. Another is from low zinc or vitamin A levels. Ways to determine thyroid hormone resistance include use of hair tissue mineral analysis (HTMA, where a snip of hair is analyzed for numerous minerals that impact general health including thyroid function). A DUTCH test (through a urine sample), or stool testing are other approaches to determining thyroid hormone resistance. Exercise is another way to improve thyroid receptor sensitivity.
- ❖ T4 or free T4: this measures the thyroxine in your blood, the other main hormone made by the gland. A high T4 indicates an overactive (hyperthyroid) state. Symptoms include anxiety, unplanned weight loss, tremors, and diarrhea. Most of T4 is bound to protein, and a small portion is not, which is called free T4 so that it is readily available to use. Some recommend testing free T3 and free T4 early in the morning.
- ❖ Thyroid antibodies: if some are present it might mean you have an autoimmune disorder like Graves' disease (hyperthyroidism), or Hashimoto's (hypothyroidism). Over 90% of people who are hypothyroid are said to have Hashimoto's, an autoimmune disorder. If you have thyroid antibodies present you should realize that thyroid meds cannot lower

them. Dealing with the antibodies requires a lifestyle change. They may be elevated for 5-15 years before TSH changes outside of the conventional 'normal' range. Having elevated thyroid antibodies when TSH is still 'normal' means that your thyroid gland will be destroyed eventually and then it will not be able to make enough hormone.

- Thyroid peroxidase antibodies (TPOAb) are found in 95% of Hashimoto's and 70% of those with Graves'. It can also be seen after childbirth in women with postpartum thyroiditis. It can help confirm Hashimoto's if TSH is high and T4 is low. Thyroid antibodies can be elevated for something like 10-15 years before TSH changes in Hashimoto's.
  - TRAb (thyroid stimulating hormone receptor antibodies) are found in 90% of Graves' but just 10% of Hashimoto's.
  - TG (thyroglobulin antibodies, TGAb) which is mostly a tumor marker to help guide thyroid cancer treatment such as removal of the gland itself, or use of radiation to destroy it. Looking at 'before' vs. 'after' results can indicate if cancer treatment is working and if the cancer is in remission. It can also be detected in 80% of people with Hashimoto's and 50-70% of those with Graves'. Research has suggested that only 4% of people with a TG below 1 will see cancer reoccur after 5 years.
- ❖ TPO (thyroid peroxidase antibodies) which is also known as microsomal antibodies.
  - ❖ TSI (thyroid-stimulating immunoglobulin)
  - ❖ Thyroid binding globulin (TBG) measures the protein that carries thyroid hormone in the blood.
  - ❖ T3 resin uptake (T3RU) counts the percentage of TBG in a sample of blood

# FACTORS THAT AFFECT THYROID FUNCTION

**Factors that Contribute to Proper Production of Thyroid Hormones**

**NUTRIENTS:**  
Iron, Iodine, Tyrosine, Zinc, Selenium, Vitamin E, B2, B3, B6, C, D

**Factors that Inhibit Proper Production of Thyroid Hormones**

- Stress
- Infection, Trauma, Radiation, Medications
- Flouride (Antagonist to Iodine)
- Toxins: Pesticides, Mercury, Cadmium, Lead
- AutoImmune Disease: Celiac

**Factors that Increase Conversion of T4 to RT3**

- Stress
- Trauma
- Low-calorie Diet
- Inflammation (Cytokines, etc.)
- Toxins
- Infections
- Liver/Kidney Dysfunction
- Certain Medications

**Factors that Increase Conversion of T4 to T3**

- Selenium
- Zinc

**RT3 and T3 Compete for Binding Sites**

**Factors that Improve Cellular Sensitivity to Thyroid Hormones**

- Vitamin A
- Exercise
- Zinc

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A set of ‘normal’ values vs. ‘optimal’ values has been offered by some experts and researchers in the field. These numbers are not set in concrete and can be modified over time. Numbers can also vary by age, sex, race, and ethnicity. Not everyone agrees with the numbers and two sets of ‘optimal’ as offered by different experts are shown below. But the numbers shown below may open up some opportunity to have more of a discussion with your healthcare professional about thyroid function and understanding what is going on with your body.

|                 | Normal range | Optimal ranges           |
|-----------------|--------------|--------------------------|
| <b>TSH</b>      | 0.5-3.0      | 1.5 - 2.5 or<br>1.0 - 2  |
| <b>Total T4</b> | 5-12         | 6 -10                    |
| <b>Free T4</b>  | 0.7- 2.5     | 1.45-2.5 or<br>0.9. -1.2 |
| <b>Total T3</b> | 100-180      | 150-180                  |
| <b>Free T3</b>  | 2.5-6.5      | 4.5-6.5 or               |

|                           |          |               |
|---------------------------|----------|---------------|
|                           |          | 3.4-3.9       |
| <b>Reverse T3</b>         | 9.2-24.1 | <15 or<br><12 |
| <b>Thyroid antibodies</b> |          |               |
| <b>TG</b>                 | 0-0.9    | 0             |
| <b>TPO</b>                | 0-34     | 0             |

TSH levels can vary over the day, with them in the midrange in the morning, lower at noon, and rising at night. Some advise that to keep results consistent over time to get it measured in the morning hours.

Other issues as to interpretation of lab values can include:

- ❖ normal TSH and normal T4=normal thyroid function.
- ❖ High TSH and normal T4=you may be at risk of developing an underactive thyroid
- ❖ Low TSH and high T4=overactive thyroid
- ❖ High TSH and low T4=underactive thyroid
- ❖ Low TSH and low T4=low thyroid function due to another problem such as pituitary gland dysfunction
- ❖ low T4 and high T3 which is typically seen in pregnancy, and more T4 may be of benefit for the baby's benefit.
- ❖ Low T3 and high TSH=low thyroid function
- ❖ High T3 and low TSH=overactive thyroid
- ❖ TSH close to 0 and a low free T3 usually points to being hypopituitary (a pituitary gland problem, such as from a disease)

It should also be understood that Hashimoto's might be like a 'check engine' light coming on but for your body as to indicating that something is wrong with what's 'under your hood.' In that the thyroid is the master regulator for your body, slowing it down allows the body to rest and repair. So simply saying 'Your thyroid is slow, let's speed it back to where it belongs' may be missing the underlying issue that needs to be fixed. One possible reason that may be causing your body to need rest and repair is mold inside your body. Other factors that can mess up thyroid function such as leading to Hashimoto's are 'leaky gut.' It creates the environment that allows a lot of autoimmune conditions to get started, such as MS, rheumatoid arthritis, lupus, type 1 diabetes, and other auto immune conditions including Hashimoto's.

If you have not heard of leaky gut before, think of there being a very thin barrier between your GI tract and your blood stream. Food stays on one side, blood on the other. If that barrier breaks down and leaks small particles of food can enter your blood directly where they do not belong. And then your immune system takes over, taking them to be something 'foreign' like a bad virus or bacteria and attacks them with antibodies. The problem is that such food on a molecular level looks like the thyroid tissue and creates an overactive immune system. If you have active Hashimoto's you also have a leaky gut. So to treat the root cause of Hashimoto's you have to get to the initial instigator of leaky gut. A few of them include gluten sensitivity, which is the biggest one. Gluten and thyroid cells look alike on a molecular level, and so the immune system confuses

them. Soy, hydrogenated oils, sugar, alcohol, caffeine, and dairy are other possibilities. Not having enough zinc in your system takes a toll on the GI system and allows leaks. Parasites, bacterial overgrowth and chronic fungal infections are other possible culprits that can cause leaky gut. Which is affecting you vs. someone else will vary. Sometimes cutting out the offender, especially gluten, along with dairy and sugar may allow a person to go into remission. Most people need more active approaches to heal the gut. Rebalancing the gut bacteria may be done such as through probiotics that help gut barrier integrity.

You should also understand that 'everything affects everything' in your body. e.g. Your thyroid function does not exist in isolation to the rest of your body. The thyroid gland influences various biochemicals in your body and they in turn impact the thyroid. Two of these are estrogen and progesterone and there is a two-way street between them and the thyroid. e.g. Estrogen stimulates the thyroid and a lack of that hormone can leave the thyroid with too little stimulation.

Conversely, birth control pills containing estrogen alone or with progesterone can alter the balance between free and bound thyroid hormone in the body. Estrogen increases the thyroid binding proteins available which means a woman will have less free T4 to do its job. If she is on meds for hypothyroidism and taking birth control pills more thyroid hormone supplementation may be needed. And if she goes off the estrogen, a lower dose of the supplement may be advised. Abnormal thyroid function might affect how well birth control works whether it is being used for contraception and/or hormonal regulation. There is other research that has found that using birth control pills for a longer period of time, especially over ten years, is strongly associated with hypothyroidism. ([BMJ Open](#), "Birth control pills and risk of hypothyroidism: a cross-sectional study of the NHANES survey, 2007-2012" Yuxuan Qiu et al, June 2021).

Speaking of birth, roughly 7% of women have problems with their thyroid after having a baby and this is called postpartum thyroiditis. The immune system attacks the thyroid which can cause mood swings, hair becoming thinner, and weight loss becoming more difficult. Women who have thyroid antibodies before pregnancy are much more likely to develop this postpartum thyroiditis.

Fasting or a low-calorie diet can impact the thyroid as to reducing T3 by as much as 66% in study where people were down to 400 calories/day for 8 weeks and then returned to 1200 calories/day. ([International Journal of Obesity](#), "Effects of a very low-calorie diet on weight, thyroid hormones and mood" T.A. Wadden et al, March 1990). Daily physical activity also has been found to result in lower levels of T4 along with some benefits such as reduced inflammation. ([PLOS 1](#), "Daily physical activity is negatively associated with thyroid hormone levels, inflammation and immune system markers among men and women in the NHANES dataset" Christopher Klasson et al, 7/6/22).

Another issue of the thyroid being impacted by other stuff is that numerous chemicals can take a toll. There are more than 150 industrial chemicals known as 'thyroid disruptors.' These include PCB's, dioxin, BPA, and red dye #3. BPA as an example slows the thyroid function by blocking its receptors, and there is an inverse relationship between it and total T4 and TSH. BPA can be found



in many products such as plastics, the lining of canned food, flame retardants, mattresses, and kids' pajamas.

There was research done through the NHANES study of 2007-2008 looking at 1,346 adults who were 20 years and older, and 329 adolescents ages 12-19 (Environmental Health Perspectives, "Relationship between urinary phthalate and BPA concentrations and serum thyroid measures in U.S. adults and adolescents from the NHANES 2007-2008" John Meeker et al, 711/2011). The strongest inverse relationship was between DEHP (a phthalate primarily obtained through food) and total T4, free T4, T3, and thyroglobulin, and a positive relationship with TSH. Those with urine samples in the highest 20% of exposure to DEHP were associated with as much as a 10% decrease in certain thyroid hormones compared to those with urine samples at the lowest 20% of exposure.

There are other options beyond using synthetic medication such as NDT's (natural desiccated thyroid hormone) that are derived from pig's glands. They contain the same exact biological ratio of T4 and T3 that our body does.

What to add to your diet or get more of include what are said to be the top deficiencies in Hashimoto's: selenium, vitamin B12 and ferritin (a storage of iron, such as in the liver, spleen, muscles, and bone marrow. The storage is a reservoir to be accessed when needed to prevent anemia). Selenium deficiency is a trigger for Hashimoto's. The mineral helps reduce anxiety and balances blood sugar, and can reduce thyroid antibodies over time. Selenium also converts T4 into T3 and degrades reverse T3 along with reducing thyroid antibody formation.

Iodine is of critical importance to thyroid function, and is also used by every other cell in the body. Selenium and iodine are synergists and work together. Iodine can be found in seafood including sea vegetables (e.g. nori). The best source of selenium is Brazil nuts. How much they contain varies widely depending on the soil in which they are grown. Amounts can range from something like 5-150 mcg/nut, and an average is said to be around 90 mcg. Too much selenium is dangerous so there is a need to be careful.

Potassium is important in that it sensitizes cells to thyroid hormone. People who are hyperthyroid often have too much potassium and not enough calcium.

Low stomach acid may be a problem with Hashimoto's which makes a B12 deficiency more likely, and use of a supplement can be helpful. Vegetarians and vegans are all but guaranteed to have inadequate B12 intake in that it barely exists in such food and supplementation is therefore considered mandatory.

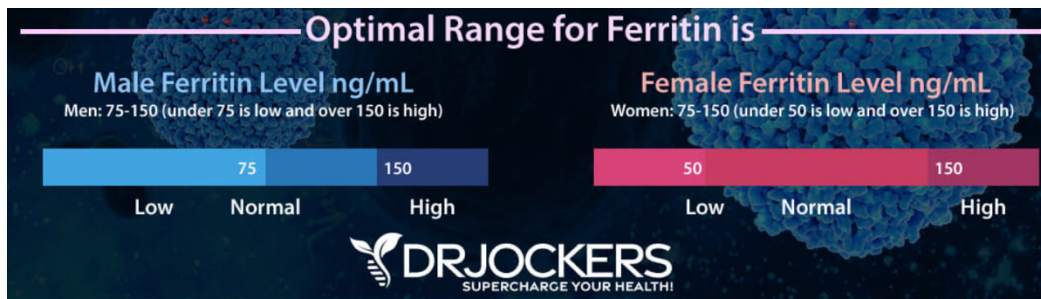
Ferritin is required to transport T3 to the nuclei of cells and then releases the hormone. Symptoms of low ferritin include:

- ❖ hypothyroid-like symptoms such as reduced energy, fatigue, hair loss, etc.

- ❖ inability to tolerate exercise and reduced overall activity (low iron decreases oxygen delivery to cells)
- ❖ decreased immune function (e.g. autoimmune diseases, or frequent illnesses)
- ❖ symptoms of GI related issues (e.g. gas, bloating, low stomach acid, nutrient deficiencies, etc.)

You can have sufficient iron according to a blood test but that does not necessarily mean that you have enough stored iron in the form of ferritin to maintain all the functions in the body that require it including thyroid functions. This is called 'latent iron depletion' which can cause a number of problems including poor thyroid function. One study found that over 70% of people who were hypothyroid were deficient in iron. Even if you are taking thyroid medicine (e.g. Synthroid) it may not be addressing your symptoms because it is being blocked by Reverse T3. One study found women taking Synthroid still had symptoms of being hypothyroid. When they got their ferritin levels over 100 ng/ml over 60% of them were able to eliminate their symptoms. Their thyroid levels also improved when given iron supplementation. So, if you take thyroid meds and are still experiencing symptoms like fatigue, hair loss, anxiety, weight gain, and other hypothyroid symptoms you need to test your ferritin levels which is a simple blood test and you may be able to order it yourself.

Once again, there can be a difference between 'normal' and 'optimal' levels of ferritin. Some experts say that hair regrowth is very difficult with ferritin levels below 70 ng/ml. However, some standards consider as little as 11 ng/ml to be normal. According to some if you are experiencing thyroid problems your optimal ferritin level may be 90-110 ng/ml. It should be understood that 'more is not always better' and having too much can cause health problems.



Here are healthy ranges offered by one expert.

<https://drjockers.com/inflammatory-lab-markers/>

What causes low ferritin and how do you fix it? Root causes of low ferritin can include

- ❖ low dietary intake of iron which is very common especially for vegetarians and vegans
- ❖ low stomach acid
- ❖ use of acid-blocking drugs (PPI's like Prilosec, Protonix, etc.)
- ❖ heavy metal toxicity (e.g. lead, mercury)
- ❖ poor absorption of nutrients which can be caused by celiac disease/gluten sensitivity, autoimmune gastritis that is commonly caused by a H. Pylori infection or other unhealthy microbes in the gut.

Iron absorption can be boosted through use of iron supplements obviously, along with vitamin C, digestive support such as Betaine HCl as recommended by some, and specific probiotics. One study found that *L. plantarum* improved iron absorption by about 50%. (British Journal of Nutrition, “Probiotic *Lactobacillus plantarum* 299v increases iron absorption from an iron-supplemented fruit drink: a double-isotope cross-over single-blind study in women of reproductive age” Michael Hoppe et al Oct. 2015).

However, you have to realize that your body wants everything ‘just right’ as to being at a Goldilocks level. Having too much ferritin is not healthy. Higher ferritin levels are associated with

- ❖ inflammatory diseases
- ❖ chronic kidney disease
- ❖ autoimmune disorders
- ❖ cancer
- ❖ type 2 diabetes
- ❖ anorexia
- ❖ atherosclerosis

to name a few. So there is a need to balance out the pros and cons of this issue, and not go overboard with ‘more is always better’ thinking. Some say that ‘normal’ levels for men are 30-400 ng/ml and for women 15-150 ng/ml. Kids 6 months – 15 years are at 7-140 ng/ml. But as one website puts it, “These values vary across laboratories, due to differences in equipment, techniques, and chemicals used.”

Symptoms of iron deficiency in hypothyroid individuals can include

- ❖ fatigue
- ❖ weakness
- ❖ pale skin (especially in the creases of the palms)
- ❖ shortness of breath
- ❖ dizziness (especially with exertion or exercise)
- ❖ craving ice (to eat or chew)
- ❖ cold hands and feet
- ❖ brittle nails and thin/dry hair
- ❖ headaches

Some of these symptoms obviously are like those found with hypothyroidism so it can make diagnosing iron deficiency more difficult. Use of the right lab tests is needed to help with such diagnosis.

Iron deficiency lowers T4 and T3 levels, and suppresses the enzyme that converts T4 into T3. Low iron can cause too much Reverse T3 to be made which can block the binding of T3 to the cells.

Reasons for anemia/iron deficiency can include

- ❖ excessive bleeding
- ❖ leaky gut
- ❖ low stomach acid
- ❖ B12 deficiency
- ❖ folate deficiency
- ❖ poor diet
- ❖ infections
- ❖ kidney disease
- ❖ liver disease
- ❖ intestinal disorders
- ❖ thyroid disease
- ❖ pregnancy
- ❖ auto immunity
- ❖ having low thyroid function which reduces the ability to absorb iron. So iron deficiency can cause thyroid problems and once it is present, it can further propagate the deficiency.

However, some sophistication is needed in understanding the relationship between iron and thyroid function. As thyroid function decreases iron tends to drop too, and so people then take in more iron. The problem that arises is that iron does not affect the gland but it does impact the hormone by binding up T4 and makes it inactive and so thyroid is not being absorbed. Consequently, one should wait 4 hours after taking thyroid medication before taking an iron supplement. Calcium is like iron as to binding up thyroid, and so it too should be taken 4 hours later.

What to avoid in your diet if you have thyroid problems includes

- ❖ sugar. Eating a lot of sugar can lead to insulin resistance and weight gain. There is a two-way connection between insulin resistance and thyroid problems.
- ❖ gluten. The vast majority of hypothyroidism is Hashimoto's which is an autoimmune disorder. Graves' disease, hyperthyroidism, is also autoimmune. On a molecular level gluten looks like thyroid cells and the immune system is not perfect and can be fooled sometimes – leading to such autoimmune disorders. Leaky gut, as previously mentioned, can arise from gluten and is a major cause of it. With such leaks occurring your immune system goes into over drive and can become so confused it starts attacking your own tissue, meaning an autoimmune problem arises.
- ❖ excess calcium in that it is antagonistic to thyroid and slow down the function and makes organs less receptive to thyroid hormone.
- ❖ dairy. Beyond many people having lactose intolerance there has been some research that found that those with Hashimoto's who avoided dairy for two months had a reduction in their TSH.

- ❖ alcohol. Alcohol blunts the thyroid by inhibiting the release of pituitary and hypothalamic hormones. It can also lead to obesity by way of insulin resistance along with liver damage, and this can impact the thyroid functions too. Some advise that alcohol should be avoided entirely if you have thyroid disease. (Indian Journal of Endocrinology & Metabolism, “Impact of alcohol use on thyroid function” Yatan Pal Singh Bahara et al, July-Aug 2013).
- ❖ trans fat. Some studies have linked high fat diets to thyroid dysfunction.

Another approach to improving Hashimoto’s is improving gut health such as through use of probiotic foods like fermented ones such as sauerkraut. Something else to look at relative to gut health is infections such as SIBO (small intestinal bacterial overgrowth), parasites, and H. Pylori. One study found 54% of hypothyroid patients had SIBO. There is research linking H. pylori to Hashimoto’s and thyroid antibodies. Sometimes treating the H. pylori will cause a person to go into remission.

One way of getting a thyroid panel done if your doctor will not order it is through an online site. <https://www.drkateld.com/thyroid-test-info-page> is being offered only on an informational basis, and no endorsement is being offered here.

Then there is something that looks like hypothyroidism but is not. It is called hypothalamic obesity disorder. And thyroid treatment may make the condition worse. The condition is unrelated to the thyroid and instead obviously involves the hypothalamus, the master gland in the brain. People with this disorder have hypothyroid symptoms but normal labs. They are unresponsive to thyroid treatment and can gain weight in the process. This disorder involves the gland becoming dysregulated as to sensing if the body has extra fat and what happens is it wrongly assumes the body is in a state of starvation. So the hypothalamus slows down the metabolism, increases appetite, lowers body temperature, reduces heat and energy production, and cause the body to store fat. This obviously leads to weight gain. The disorder can arise from severe trauma to the brain but other factors can cause it too, including

- ❖ repeated yo-yo dieting and calorie restricted dieting.
- ❖ untreated hypothyroidism
- ❖ binge eating or eating disorders
- ❖ leptin resistance
- ❖ chronic stress
- ❖ constant and persistent lack of sleep

The most common symptoms of hypothalamic obesity disorder include (in decreasing frequency according to at least one study. Medpage Today, “Thyroid’ issues may really be hypothalamic” Kristina Fiore, 5/15/2014).

- ❖ weight gain
- ❖ mood disorders
- ❖ fatigue

- ❖ dizziness, lightheadedness, inability to exercise
- ❖ pain
- ❖ changes in sleep
- ❖ temperature dysregulation
- ❖ libido issues

The disorder can be diagnosed with four or more of the above symptoms, and three is suggestive, according to some. There are meds that are said to help with this disorder; talk to your doctor. A Mediterranean style diet may also be beneficial. Daily exercise to tolerance meaning doing it to your limit.

One other issue to mention is that blood tests are not necessarily the ultimate way to evaluate for various issues for several reasons. One is that they are giving you a snapshot of what is occurring inside your body today. If you ate a meal that threw off assorted nutrients, or you did or did not take some nutritional supplements prior to the blood being drawn, may affect results. The time of day you draw blood can make a difference. TSH levels vary over the course of a day such as being lower in the afternoon than morning in many people according to some research. It has been suggested in one study that a diagnosis could be missed in 3 out of every 10 patients with subclinical hypothyroidism if the blood draw is done later in the day. Another approach is through HTMA.

Calcium and potassium have important roles in thyroid function. Calcium slows the thyroid down, while potassium speeds it up. Finding the ratio between these two minerals can show whether the thyroid is operating too slow, too fast, or at a Goldilocks 'just right' level. HTMA can also look at other issues that may be affecting a person's energy level such as the adrenals which involves the ratio of sodium to magnesium. Sodium speeds it up, magnesium slows it down. There are other minerals and heavy metals like mercury that can impact one's energy level too. (Environmental Health Perspectives, "Thyroid hormones in relation to lead, mercury and cadmium exposure in the NHANES survey 2007-2008" Aimin Chen et al, Feb. 2013).

There are two labs in the U.S. that are recognized as being the best. One is Trace Elements out of Texas. The other is Analytical Research Labs out of Phoenix. (Each of them requires that you go through an authorized representative to use their services. I am such a rep for Trace Elements, and charge nothing to go through me. You just pay Trace for their analysis.)

Blood tests may show normal thyroid function while HTMA shows something is off. Moreover, the blood test only tells you 'TSH is high or low' and does not tell you why. HTMA's can show you why the 'check engine' light is on. e.g. Calcium may be low because lead is high. Simply giving more thyroid hormone is not addressing the underlying issue that a person is being poisoned by a very toxic heavy metal and could potentially die from it. HTMA can look at thyroid hormone production (e.g. manganese and iodine are among nutrients needed), its release (e.g. this may be affected by exhausted adrenals), absorption into cells (calcium and magnesium levels affect cell membrane permeability), and utilization by mitochondria in the cell (e.g. potassium plays a role in sensitizing mitochondria to thyroid hormone utilization. Fluoride and chloride such as in

drinking water and bleached flour can hinder thyroid utilization. Fluoride can reduce T3 and T4 and increase TSH. Fluoride can displace iodine.)

Then there are common nutrient deficiencies that thyroid patients often have. These include

- ❖ The B-complex can be helpful with thyroid disease. B6 is involved with thyroid hormone production and can help reverse symptoms of hypothyroidism. Deficiency in B12 and B2 (riboflavin) are found in those with thyroid disease. B12 needs certain conditions in the gut in order to be absorbed. And once it is absorbed problems can still arise (e.g. the MTHFR gene mutation that many people have where certain types of vitamins like the common form of B12 – cyanocobalamin – is not transformed into the needed version, and so methyl cobalamin has to be taken instead). There is also a difference between what some labs may say are ‘normal’ levels (250-350 pg/ml) vs. what are ‘optimal’ (500-550 mg/ml). And the difference can be sizeable as to the improvement in health that results with an optimal level reached.

Biotin (B7) is often taken by people who have hair loss problems that can arise with hypothyroidism. Biotin impacts thyroid labs but not the glands functioning and blood levels. It makes the lab results inaccurate by making it look like you have more thyroid hormone in your body, and so your doctor will cut the dose down and cause worsening of problems. You should avoid taking biotin for 2-3 days before a lab is done.

- ❖ vitamin D3. Low levels of it decrease thyroid function, and increase the risk of developing Hashimoto’s and thyroid cancer.
- ❖ zinc and selenium. They have an impact on the T4 to T3 conversion. Zinc is needed for thyroid hormone synthesis. It is also involved with converting T4 to T3. Supplementing with zinc has been shown to raise free T3, lower Reverse T3, and lower TSH. Zinc is also important for immune health, which has implications for Hashimoto’s. In some studies with older adults taking care of a zinc deficiency with a supplement actually fixes the thyroid. Such studies have not been done with younger people but similar results would be expected. There are some who estimate that zinc deficiency occurs in perhaps 30% of thyroid patients. However, one should not start gulping down zinc because there is an inverse relationship between it and copper. And copper is important for proper thyroid function. Some of the most common reasons to be deficient in zinc include
  - digestive disorders (e.g. leaky gut)
  - meds (e.g. NSAID’s, acid blockers, antibiotics)
  - poor diet
  - blood sugar imbalance
  - chronic stress
  - high toxin exposure

Selenium is also needed for glutathione (an important antioxidant) production which protects the thyroid gland from inflammation. You may be deficient in zinc and/or selenium.

- ❖ Iodine. Iodine deficiency can arise for a variety of reasons including not using iodized salt, not eating seafood and sea vegetables, high levels of chlorine, fluorine or bromine that can arise from food as well as water (e.g. chlorinated and/or fluoridated water, along with fluoride in toothpaste, mouthwash and various foods. Bromine is in flour products like bread, and is also part of different cleaning compounds.) There is a need to be careful with iodine and not take too much of it because that can cause problems too. Having too much iodine can be dangerous and may harm the thyroid gland if too high a dose is used. And if you have a low selenium level plus a high dose (maybe 25-50 mg/day according to at least one expert) of iodine it can trigger thyroid inflammation which can then lead to thyroid autoimmunity as to Hashimoto's or Grave's disease (hyperthyroidism). You need to work with an appropriate healthcare professional on such a matter.
- ❖ magnesium. Hypothyroid patients tend to have low levels of magnesium. Blood serum levels of magnesium are inaccurate in that less than 1% of the mineral is there. Getting intracellular levels of magnesium is considered more accurate.
- ❖ iron. Your thyroid needs iron to function properly. But low thyroid function affects the ability to absorb iron, and a downward spiral can result.
- ❖ vitamin A. Even a small deficiency of it can cause reversible hypothyroidism. Deficiency of it is said to be not that common in the U.S., but you might have sub-optimal levels that could impact your thyroid function.
- ❖ Tyrosine (an amino acid) along with iodine is involved in producing T4 and T3. Low levels of tyrosine are linked to reduced levels of thyroid hormone along with neurotransmitters like dopamine.
- ❖ Vitamin C supports the adrenal gland which is where it is most concentrated. If C is lacking the adrenals cannot adequately respond to stress which then taxes the thyroid. One study looking at hypothyroid patients had them take vitamin C for six months and they ended up with improved T<sub>r</sub>, T<sub>3</sub>, and TSH.
- ❖ Omega-3 fatty acids are also involved with the thyroid. Low levels of it reduces thyroid hormone secretions and impairs cognitive brain functions including memory.
- ❖ A thyroid glandular is something to be careful with. It is the thyroid gland of an animal, drying it, and sticking it in a capsule for you to take. They have the potential of being good but can be harmful if they contain thyroid hormone which is not regulated. If it contains the hormone it can be a random amount of it and you might end up with too much between medication taken and the glandular used.

#### What you can do to increase Free T3 naturally

One issue to understand is that when your body has T4 it comes to a fork in the road which consists of converting it into either T3 or Reverse T3. One way to encourage your body to take the fork that converts it into T3 is take the nutrients the body needs for that to occur. Zinc and



selenium are among them, as previously noted. A second approach is to have more antioxidants in your body. This is because the more inflammation in your body the more likely T4 will be converted into Reverse T3. Third, focus on improving your gut health. Thyroid patients are at increased risk of developing GI problems because of the impact that thyroid hormone has on the gut. Roughly 20% of the T4 to T3 conversion occurs in the gut. So if there are gut problems present it can interfere with the conversion process. Ways you might be able to recognize gut problems include

- ❖ abdominal pain
- ❖ constipation, diarrhea or other stool problems
- ❖ gas, bloating
- ❖ food intolerances
- ❖ H. Pylori infection
- ❖ SIBO (small intestinal bacterial overgrowth)
- ❖ acid reflux

with the last three being among the most common symptoms indicating gut issues (according to some doctors at least).

Something else to consider is reducing your Reverse T3 levels (but still keeping it within normal limits) which is to say that more T4 will then go into making T3. Ways to reduce the conversion into Reverse T3 include

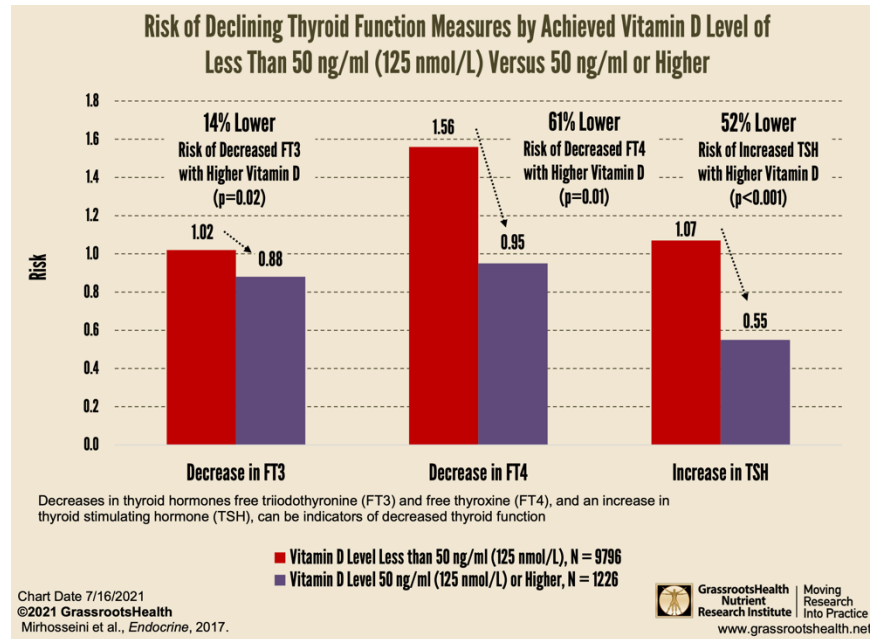
- ❖ avoiding a calorie-restricted diet. Many thyroid patients have problems with weight gain. But restricting calories is said to encourage more production of Reverse T3 which will just slow your metabolism that much more.
- ❖ eating healthier and more whole foods, and staying away from prepackaged, heavily processed items as to better nourishing of your body.
- ❖ engaging in high intensity interval training (HIIT) can help reduce Reverse T3.
- ❖ check your ferritin level (which can be done through a blood lab). Iron is needed for the production of thyroid hormone so if your iron levels are low you won't be able to produce enough thyroid hormone.
- ❖ focus on liver health. The majority of T4 to T3 conversion (somewhere around 60% reportedly) occurs inside the liver. One of the major issues with liver function in the U.S. is insulin resistance (which can be considered a precursor, or early warning, of diabetes that may show up years later). Two ways that may show insulin resistance are liver lab tests for AST and ALT. Ways to improve liver health include
  - eating vegetables that contain sulfur (e.g. cruciferous ones like broccoli, etc.)
  - avoiding alcohol
  - reduce if not eliminate sugar especially if you have insulin resistance or even slightly elevated AST and ALT.

- supplements that might help include MSM
- ❖ managing your stress. When a lot of cortisol is released due to stress it can inhibit the conversion of T4 into T3 and increase Reverse T3.
- ❖ look at your iodine level.
- ❖ beneficial too. Go for a jog, or go to the gym, do light gardening, etc. HOWEVER, over-exercising can worsen Reverse T3, so you need to figure out what the Goldilocks level is for you.

Ways to reduce antibodies beyond avoiding foods like gluten include possibly drinking aloe juice. There has been a little research on this (e.g. Journal of Clinical & Translational Endocrinology, “Marked improvement of thyroid function and autoimmunity by Aloe barbadensis miller juice in patients with subclinical hypothyroidism” Daniela Metro et al, Feb. 2018) that found that drinking 100 ml of aloe juice helped reduce thyroid antibodies and improve TSH. Aloe pills may help too. Selenium can also help reduce antibodies.

Again, gut health makes a difference for antibodies. Candida, parasites, or leaky gut can increase antibodies.

Red light therapy (sometimes referred to as photobiomodulation, PBM) used on the thyroid area may help. One study used infrared light at 850 nm with dietary supplements (vitamin D, iron, and selenium) while the other group just received the supplements. The first group showed a substantial improvement in T3 as well as the T3/T4 ratio, and a decrease in thyroid peroxidase antibodies, along with needing less hormone replacement. (Photobiomodulation, photomedicine & laser surgery, “Impact of photobiomodulation on T3/T4 ratio and quality of life in Hashimoto Thyroiditis” Candan Ercetin, et al, July 2020). A second study using infrared light at 820 nm with supplements, or just the supplements alone also found benefit with TSH, antibodies, along with weight loss, BMI reduction, waist circumference and waist/hip ratio. (Journal of Personalized Medicine, “Efficacy of combined photobiomodulation therapy with supplements vs. supplements alone in restoring thyroid gland homeostasis in Hashimoto Thyroiditis: a clinical feasibility parallel trial with 6 months follow-up” Venera Berisha-Muharremi et al, Aug. 2023).



There is also research that vitamin D by itself can have an impact on thyroid function. One study looked at over 11,000 people on vitamin D and thyroid function including TSH, free T3 and free T4, and antibodies. Vitamin D supplementation was given averaging 6,000 IU/day with a goal of achieving at least 40 ng/ml. Those who were hypothyroid were three times more likely to be deficient in vitamin D (<20 ng/ml). And those

with subclinical hypothyroidism were twice as likely to be deficient in vitamin D. TSH levels at baseline were higher and free T4 lower in the winter than in the summer among those who did not supplement with vitamin D. Vitamin D levels below 50 ng/ml were related to a lower thyroid function, and a 107% increased risk of elevated TSH. For those with a level  $\geq 50$  ng/ml there was a 32% reduced risk of elevated antibodies. (*Endocrine*, "Physiological serum 25-hydroxyvitamin D concentrations are associated with improved thyroid function – observations from a community based program" Naghmeh Mirhosseini et al, Oct. 2017).

Managing stress once again can make a difference, with higher levels causing an increase in antibodies. Another issue are toxins and chemicals that can include cleaning and beauty products that need to be filtered through the liver, can take a toll too and increase antibodies too. Metals, such as copper toxicity, are said to be common with thyroid disease and can raise antibodies. The thyroid is sensitive to copper and zinc and they need to be kept in balance. If they are out of balance hypothyroidism can result.