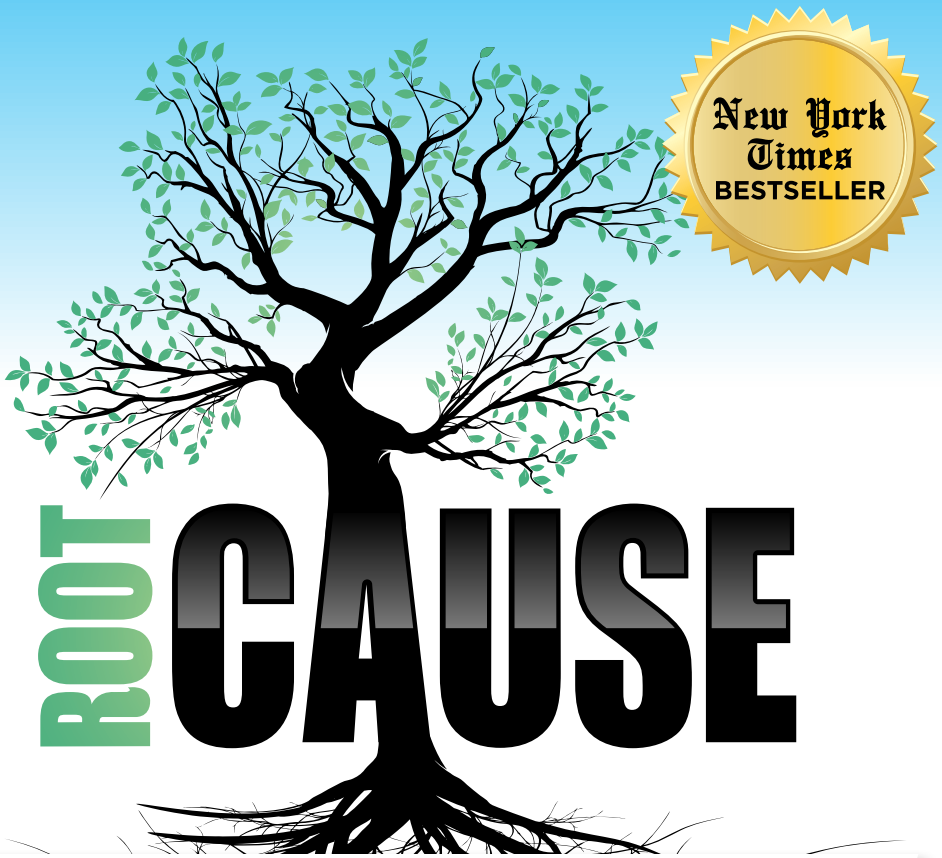
Hashimoto's Thyroiditis

Lifestyle Interventions for Finding and Treating the



Chapter 6: Digestion & Depletions

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"Bad digestion is the root of all evil."
—Hippocrates

6: DIGESTION & DEPLETIONS

We have learned that in the case of Hashimoto's—as with all cases of autoimmune conditions, —the problem lies with the immune system and not the thyroid.

In most Hashimoto's cases, the thyroid is actually working overtime to keep up thyroid hormone production, despite being attacked by the immune system.

Autoimmunity may be in part triggered by nutrient depletions, while nutrient depletions may also result from the increased thyroid cell turnover.

As a word of caution, most "thyroid support" formulas promoted by alternative medicine practitioners that promise to restore a "sluggish thyroid" do not correct an autoimmune thyroid condition and—depending on the active ingredients—may actually worsen the condition.

Some nutrients are essential to thyroid function, while others are required for proper immune system, liver, gut, and adrenal function, so a depletion may be compromising thyroid function directly or indirectly.

In contrast, an excess of other nutrients may be perpetuating an autoimmune thyroid.

Smart nutrient supplementation can be helpful in not only improving symptoms but also in reducing TPO antibodies and improving thyroid function.

The following lifestyle intervention topics will be discussed in further detail in this chapter: Causes of depletions, Impact of thyroid hormones on digestion, Addressing depletions, Selenium, N-acetyl cysteine (glutathione precursor).

CAUSES OF DEPLETIONS

Why Do We Have Nutrient Depletions?

Many substances in our comfort-craving, health-compromising Western lifestyle can have a profound impact on our nutrient levels.

Conventional Versus Organic Farming

Conventional commercial farming practices reduce our nutrient content since vegetables and fruit absorb nutrients from the soil in which they are grown.

Conventional crops are grown with synthetic fertilizers and pesticides, and the same fields are repeatedly used, causing soils to become depleted. (If you live in the Midwest, you've likely driven past cornfields that have been in the same place for decades.)

To survive transport across the country, fruits and vegetables are picked before they are ripe. This halts the natural process of ripening, and the produce no longer acquires nutrients (albeit from an already-depleted soil).

In contrast, organic farmers rotate their crops, fertilize their soils with natural fertilizers such as compost, and rely on nature's pesticides such as encouraging insect predators to make the farms their home. Organic farmers also pick vegetables when they are ripe. These vegetables have been found to be much richer in nutrients. One study discovered that some organic vegetables had almost 90 percent more nutrients as compared with their conventionally grown counterparts.

Food Processing

The way our food is processed also strips away many of the nutrients normally present. Let's take wheat, for example. Wheat starts off as a wheat kernel made up of starch, nutrient-filled bran, and germ. The bran and germ are removed, leaving behind the starch (a.k.a. "flour"). This flour is then bleached to make it more aesthetically pleasing. A couple of synthetic B vitamins, iron, and folic acid are added in.

Found in bread, cereal, waffles, wraps, sandwiches, pasta, crackers, and most processed foods, processed wheat products are the foundation of the Standard American Diet (SAD) and yet are devoid of nutrients.

Consuming these products actually causes the body to lose nutrients instead of gain them!

If that wasn't bad enough, wheat products also contain gluten, a protein toxic to many individuals. Gluten has been connected to numerous autoimmune conditions, especially Hashimoto's.

The Folly of Convenience

Devoid of nutrients and full of empty calories, the conventional foods found in the Standard American Diet can cause us to become nutrient-deficient.

Additionally, high-carbohydrate diets, oral contraceptives, antibiotics, and acid-suppressing medications also shift the type of bacteria we have in our intestinal tracts.

The probiotic (good) bacteria in our intestinal tract are responsible for extracting vitamins from our foods as well as keeping peace within our guts. (Read more about this in the Immune Imbalance and Gut chapters.)

Do You Like Tomatoes?

Commercial growers pick tomatoes when they are green and spray them with ethylene gas (a hormone that accelerates ripening) before shipping them to the various stores where they will be sold. This leads to the tomatoes looking pretty and red, but tasting like—let's face it—rubbery slush.

Growing up in Poland—where organic farming was prevalent—I only ate organic tomatoes from my grandmother's garden. Continuing the tradition when we came to the United States, my mom began growing organic tomatoes in our small backyard outside Chicago.

I remember how surprised my American friends were when they saw me eating tomatoes like an apple. "How can you eat tomatoes like that?" They were shocked—the tomatoes they were eating had no taste to them! But, as soon as they tried one of my mother's homegrown heirloom tomatoes, they understood. If you think you don't like tomatoes, try an heirloom tomato from your local farmers market.

MEDICATIONS AND DEPLETIONS

Acid-Suppressing Medications[3,4]

Drug Category	Nutrient Depletions
Gastric Acid Reducers Proton Pump Inhibitors (PPIs) Common names: pantoprazole, Aciphex®, Prilosec®, Nexium® **H2 Receptor Antagonists** Common names: famotidine, Pepcid®	Beneficial flora Beta carotene Boron Calcium Chromium Copper Digestive acids Folic acid Iron Phosphorus Selenium Thiamin Vitamin B_{12} Vitamin C Vitamin D Vitamin E Vitamin K Zinc

Just about everyone knows someone with acid reflux. This condition is also common among those with Hashimoto's.

Why? It's largely thanks to the processed wheat products, pasteurized dairy products devoid of natural enzymes, and more junk, junk, and junk we shove in our mouths day in and day out. Our digestive systems are trying to tell us something: "Stop feeding me this junk and give me something real!"

What does our modern society do to our bodies instead? It gives them a pill to shut them up. Billions of dollars are spent on over-the-counter antacids and prescription acid-suppressing medications. In 2010, proton pump inhibitors (acid-suppressing medications such as Nexium®, Prilosec®, and Prevacid®) were the third-highest selling class of drug in the United States, accounting for $13.9 billion in annual sales.

As the name would imply, acid-suppressing medications suppress our stomach's acid production. Stomach acid, however, is necessary for breaking down foods, especially proteins.

I consider acid reflux, in most cases, to be a sign that you are not feeding your body properly. Perhaps you are eating a food that is causing you intolerance (see the Intolerances chapter for more information).

The reality is most people with acid reflux have too little—not too much—acid. Vitamin B_{12} depletion is often responsible for inadequate acid production. Furthermore, suppressing stomach acid prevents us from extracting iron and vitamin B_{12} from foods, resulting in yet another vicious cycle and leading to other digestive problems, anemia, hair loss, and even neurological problems.

Practices in the use of proton pump inhibitors (PPIs) and other acid-suppressing medications have recently come under FDA scrutiny because of increased risks of bone fractures and questionable need.

Most people should not use proton pump inhibitors for extended periods of time. Of course, there may be legitimate reasons one might need to take a medication to suppress acid, such as in the treatment of a bleeding peptic ulcer in the hospital. The consensus, however, seems to be that PPIs are overused and overprescribed for GERD (gastroesophageal reflux disease), the most common reason for prescribing these medications. If you are willing to give up the convenience of taking a pill so you can "eat whatever you want" and are ready to explore the reason why you are actually experiencing these symptoms, your overall health will greatly improve.

Note for coming off PPIs: These medications cause an acid rebound if they are discontinued suddenly. A gradual tapering of the medication is recommended while you explore alternatives. For example, if you have been taking two tablets daily, go to one a day for one week, then every other day, and so on.

You can also make the transition to Pepcid® (famotidine), an over-the-counter medication as you begin to get off the PPI. Pepcid is a different kind of acid blocker that does not cause rebound. While it is preferred to the PPI, it is still not appropriate for long-term use for GERD. You should then taper off the Pepcid® after a week or two as you explore your diet.

Yogi's ginger tea is helpful for acid reflux and can help in the transition process.

GOT REFLUX?

My acid reflux story, originally published at the thyroidpharmacist.com blog

I did, too. It started with a chronic cough, pain, burning, and choking sensation. I tried every over-the-counter product possible. I saw my primary care doctor, an allergist, a gastroenterologist, and an ear, nose, and throat specialist. I finally underwent a barium swallow test involving nasty chalky substances. It showed I had a sliding hiatal hernia with spontaneous reflux.

I drank gallons of milk trying to soothe the burn. I drank bottles of Mylanta® and always had a bottle of Tums® antacids nearby. I tried Nexium®, Prilosec®, Aciphex®, Pepcid®, and even considered surgery. The acid reflux persisted.

For three freaking years, I slept nearly upright. For three years, I avoided red wine, tomato sauces, oranges, and all of the other "acidic" foods I was told to avoid. The acid reflux continued.

I didn't give up the fight. I went the holistic route. I tried to get adjustments from a chiropractor to push my hiatal hernia back in. Tried yoga to relax more. Tried ginger tea. Cut out caffeine. Took more magnesium. The acid reflux didn't give.

And then, just when I'd nearly given up and thought I would just have to live with it, I made one change to my diet that I thought would never ever make any sort of difference, and there it was—my reflux was completely gone forever within 3 THREE DAYS of making this change. After 3 THREE YEARS of almost daily suffering, my chronic cough was gone and has never come back!

So what was that change? I cut out dairy. I had been eating it for years without any apparent problems, so I would have never suspected it was the culprit of my digestive troubles. Then I had an IgA and IgA food intolerance test that showed I was sensitive to it.

I haven't had reflux since cutting out dairy almost two years ago (except for the few times I accidentally consumed something that contained dairy).

Will cutting dairy be the change that makes all the difference of you? I don't know.

But don't give up. You may be one small change away from feeling well!

Estrogen/Progesterone-Containing Products[3,4]

Drug Category	Nutrient Depletions
Female hormones such as oral contraceptives or hormone replacement therapy Other names: birth control pills, estrogen/progesterone combination pills, estrogens, progesterone Common brand names: Yaz®, Mircette®, Ortho-Tri-Cyclen®, Premarin®	Beneficial flora DHEA Folate Magnesium Melatonin Riboflavin Selenium Thiamin Vitamin A Vitamin B_5 (pantothenic acid) Vitamin B_6/pyridoxine Vitamin B_{12} Vitamin C/ascorbic acid Zinc

Oral contraceptives, or birth control pills, are a great convenience. One little pill a day stops ovulation. No more worries about getting pregnant. I have relied on birth control pills to help with heavy menstrual bleeding and skipping periods while on vacation. Birth control helped me pursue my career and passions in my twenties before I was ready to be a mother. But I wish I had known the risks associated with "the pill"—such as the changes in beneficial bacteria and the nutrient depletions that can cause so many health problems. It's possible birth control pills are one of the reasons autoimmune conditions are more common in women than in men.

Additionally, I had never been taught about alternatives to birth control pills. I knew condoms had a pretty high failure rate for most typical users and, as far as natural family planning methods go, I knew the old joke, "What do you call people who practice the rhythm method?" "Parents."

The rhythm method aside, there are reliable methods of natural family planning based on women's reproductive cycles.

Please see the Triggers chapter for more information about birth control pills as triggers as well as reliable methods of natural family planning.

Antibiotics

Drug Category	Nutrient Depletions
Antibiotics Common names: penicillin, Cipro®, cephalexin, Z-pack®, many others	Beneficial flora B vitamins Calcium Magnesium Iron

I want to preface this section by saying antibiotic medications are lifesavers and a tremendous advancement in modern medicine, and I would never

tell someone with a serious acute condition such as a kidney infection, respiratory infection, or abscess to refuse antibiotics. That said, antibiotics are greatly overused and can have many negative health consequences.

Beneficial flora bacteria are primarily divided into two categories: gram-positive (many of the friendly species) and gram-negative (many of the ones that can become toxic in our bodies if too many are present).

Bacterial infections may be either gram-positive or gram-negative, and while some of the newer antibiotics may be more specific to one kind of bacteria, most antibiotics are "broad spectrum"—meaning they kill all kinds of bacteria. Most antibiotics do not know the difference between the bad bacteria causing your infection and the good bacteria helping you with digestion and vitamin extraction as well as keeping peace within your intestinal track.

This can lead to an unfair advantage to the opportunistic bacteria and fungi in our bodies, allowing them to take over while our good bacteria are destroyed. Antibiotics can actually kill off our beneficial flora—for example, our dairy-loving lactobacilli—and make us unable to digest dairy.

Since beneficial bacteria make up our immune system, antibiotic use is a suspected cause of increasing cases of allergies, chronic disease, autoimmune conditions, digestive issues, and even cancer.

Most antibiotics, when used for appropriate times in appropriate doses, should not be an issue for people who follow nutrient-dense diets full of beneficial bacteria.

However, overuse of antibiotics is a well-documented issue in the United States. Multiple coalitions exist to address overuse and evaluate appropriate use of antibiotics for bacterial infections.

For example, many people see their doctors because of cold or flu symptoms. These infections are usually caused by viral pathogens, but doctors still prescribe amoxicillin or another broad-spectrum antibiotic. These antibiotics do not help with the cold or flu as they do not work against viruses or fungi, only bacteria. Instead, the antibiotics negatively impact the beneficial bacteria.

Antibiotics are often prescribed for acne and continued for many years. Acne can be difficult for vulnerable, sensitive teenagers to cope with, and many teens report experiencing an increased self-esteem after improving acne, but there are alternatives to antibiotics. As we are now getting to

understand that acne is related to bacteria and we can affect the bacterial presence by our food choices, people should not be surprised to learn that many cases of acne can be improved by simply adopting a nutrient-rich, junk-free diet.

I would advise parents and teens to try the dietary approach first. Good fats like avocado, green smoothies, and avoidance of allergenic foods like dairy and gluten may prevent the need for a prescription.

THYROID FUNCTION AND NUTRIENT EXTRACTION

Hypothyroidism in itself will lead to poor extraction of minerals and vitamins from our food sources. Thyroid hormones determine our metabolism throughout the entire body. As such, the digestive tract is not spared, particularly the intestines. Lack of sufficient thyroid hormones makes nutrient extraction more difficult and less efficient and can in itself lead to nutrient deficiencies.

Insufficient thyroid hormone leads to low temperatures, which not only make us uncomfortable in breezy situations but can also have an impact on hormone synthesis and other important body processes such as digestion, hair growth, skin turnover and regeneration, and wound healing.

Achlorhydria, constipation, and incomplete digestion of fibrous plant materials have been associated with hypothyroidism.[7]

Most people with thyroid conditions and adrenal fatigue have been found to have either achlorhydria (no stomach acid) or hypochlorhydria (low stomach acid), where they do not produce enough hydrochloric acid (HCl), which is necessary to break down protein. The lack of adequate digestive acid leads to a depletion of amino acids, iron, zinc, and other nutrients obtained from protein. Symptoms include gas, heartburn, bloating, and heaviness in the stomach after eating a protein meal.

Liver function tests may be disturbed in up to 50 percent of people with hypothyroidism, leading to reduced output of bile, which helps us digest lipids. Improper lipid digestion may lead to a deficiency in fat-soluble vitamins such as A, D, E, and K. Notably, bile stones and gallstones are also more common in Hashimoto's.

People with Hashimoto's are also five times more likely to be diagnosed with celiac disease. Recently, gluten intolerance has been described as a spectrum, with only the most severe cases of damage being diagnosed with celiac disease.

Additionally, some people with Hashimoto's may present with a celiac-like intolerance to milk proteins (whey and/or casein), egg proteins (ovalbumin), or soy proteins.

Many of these cases are undiagnosed, and when people unknowingly continue to eat foods they are sensitive to, they damage their intestines and rob themselves of vital nutrients. It may sound surprising, but even people who are overweight may be severely malnourished and nutrient-depleted.

Tests for food intolerances are available and will be discussed in the Food Intolerances and Testing chapters of this book.

ADDRESSING DEPLETIONS

Low Stomach Acid

The use of digestive enzymes, probiotics, and supplemental acid may be needed to help your body digest protein. Betaine with pepsin is a supplement used to raise stomach acid levels and is available for purchase in capsule form.

Dose: Betaine with pepsin should be taken after a protein-rich meal, starting with one capsule per meal. The dose should be increased by one more capsule at each meal until symptoms of too much acid are felt (burping, burning, etc.). At that point, you will know that your dose is one capsule less than what resulted in symptoms.

Betaine with Pepsin Titration Example:

Meal No. 1: One capsule, no symptoms

Meal No. 2: Two capsules, no symptoms

Meal No. 3: Three capsules, no symptoms

Meal No. 4: Four capsules, felt slight burning in throat

Correct dose is: Three capsules per meal

Many people are amazed by how much more energy they have after they start taking digestive enzymes with their meals. I know I felt like a brand-new person after starting betaine with pepsin.

The digestive enzymes should stimulate your body's own production of acid and help you extract nutrients from your food. After some time, you should be able to transition off the enzymes as your own body begins to produce enough digestive acid, as long as you don't have any underlying infections that could be inhibiting the production of your stomach acid. Alternatively, lemon juice and apple cider vinegar can also help your body produce more digestive acid.

Nutrients Required for Proper Thyroid Function

Selenium, iron, vitamin A, vitamin E, B vitamins, potassium iodine, and zinc are all required for proper thyroid function. Other nutrients, although not directly involved in thyroid function, are also essential for proper immune system, gut, liver and adrenal function.

Most people who are diagnosed with Hashimoto's will also present with low levels of vitamin B12, antioxidants selenium, vitamin E, and glutathione as well as zinc and ferritin (the iron storage protein).

B_{12}

Low levels of B12 may lead to anemia, underdevelopment of villi, and impaired digestion. Found in animal proteins, vitamin B12 is released for absorption by the activity of hydrochloric acid and protease, a stomach enzyme. The low level of hydrochloric acid commonly found in Hashimoto's patients puts them at risk for B12 deficiency. Intake of breads and cereals fortified with folic acid may mask this deficiency on standard lab tests.

Vitamin B12 is naturally found in animal products, including fish, meat, poultry, eggs, milk, and milk products. It is generally not present in plant foods, thus vegetarians and especially vegans are at a greater risk for deficiency.

Using a vitamin B12 supplement is essential for vegans and may be helpful for those with low stomach acid until the condition is corrected. Unlike food sources of B12 , the supplemental B12 is in a free form and doesn't require stomach acid for absorption.

Options for B12 replacement include tablets, sublingual (under the tongue) liquids, and injections. The sublingual route offers advantages for those with absorption issues and is more convenient than injections.

Sublingual doses of 1–3 mg (1,000–3,000 mcg) of B12 daily for ten days, then once a week for four weeks, then monthly have been found effective in restoring B12 levels in those with deficiency.

Antioxidants

Antioxidants include vitamin C, vitamin E, beta carotene (vitamin A precursor), and the minerals selenium and manganese.

These substances act as free radical scavengers, protecting our bodies from the damage caused by reactive oxygen species that are created by oxidation reactions and damage to our cells. As discussed in the Autoimmune chapter, a lack of antioxidants may result in thyroid damage from hydrogen peroxide every time iodine is processed by the thyroid.

The Recommended Daily Allowance (RDA) for foods was established to guide the public on how much of each nutrient is needed to prevent overt disease. These numbers, however, were determined decades ago without the benefit of current research and without an adequate understanding of how nutrition affects our physiology. Unfortunately, these guidelines have somehow become our "ideals" for nutrient intake. Also unfortunately, the RDA for most antioxidants is too low to see the benefits.

For example, vitamin C becomes an antioxidant at doses above 600 mg, while the RDA is only 60 mg, one tenth of that. While 60 mg will prevent scurvy, it will not prevent free radical damage. Vitamin E is an antioxidant at a dose of 200–400 mg (RDA is 10 mg), and selenium should be taken at a dose of 200–400 mcg for those with Hashimoto's (RDA is 70 mcg). Vitamins C and E can be found in many food sources, but supplementation may also be helpful.

Vitamin A, however, when taken as a supplement, can be toxic in excessive amounts and should only be acquired from food sources. Carrots, pumpkin, and sweet potatoes are the richest sources of beta carotene, the precursor of vitamin A. They won't cause any harm, except for a potential yellowing of the skin known as carotenosis (seriously!). If that occurs, we will know we have enough vitamin A as the body has stopped converting beta carotene to vitamin A.

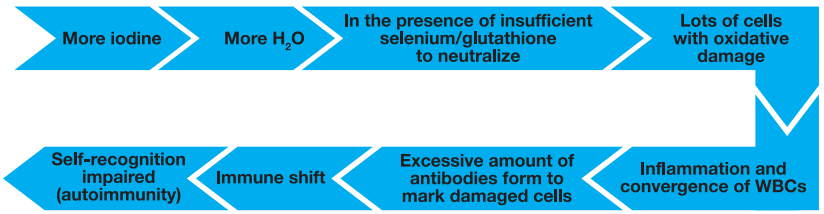
The extra beta carotene is stored in our fat cells until it is ready to be converted to vitamin A. The yellowing of the skin is reversible upon limiting our intake of foods rich in beta carotene. Yellowing of the skin is more common in people with hypothyroidism, who may have an impaired ability to convert the beta carotene due to lack of thyroid hormones. If your skin turns yellow, this is, of course, a sign to cut back on carrots, pumpkin, and sweet potatoes.

Selenium

In normal thyroid function, iodide from food sources triggers the production of hydrogen peroxide so the iodide can be converted to its usable iodine form. The reactive hydrogen peroxide causes oxidative damage that is neutralized by the antioxidant selenium, which is also a necessary building block in thyroid synthesis.

In the presence of excess iodide intake, however, more hydrogen peroxide will be produced, requiring more selenium for neutralization. Coupled with selenium deficiency, one can understand that excessive iodine intake can lead to dangerous levels of hydrogen peroxide production. When the reactive hydrogen peroxide causes oxidative damage and inflammation of the surrounding thyroid tissues, this inflammation triggers lymphocytes or white blood cells (WBCs) to converge and clean up.

As the WBCs are converging, small amounts of antibodies are formed to help mark the damaged cells that need to be cleaned up. Mouse models have been found to have spontaneously occurring low levels of circulating TPO antibodies, which I theorize serve a clean-up function. In instances of higher turnover of cells seen with excess oxidative damage due to iodine excess and selenium deficiency, more antibodies are produced and an immune system shift can be induced, resulting in the failure to distinguish self from non-self. This is how autoimmunity starts. Thus, selenium deficiency has also been recognized as a risk factor for Hashimoto's.



According to the National Institutes of Health, most cases of selenium deficiency are associated with severe gastrointestinal problems such as Crohn's disease or surgical removal of the stomach. However, selenium deficiency may also occur in celiac disease and other inflammatory bowel disorders due to malabsorption from damage to the small intestine.

The co-occurrence of Hashimoto's and celiac disease has been clearly established. I would even venture to say one does not need to have full-blown celiac to have impaired absorption of selenium.

Selenium plays a crucial role in thyroid function:

1. Acting as catalyst to convert the inactive T4 to the biologically active T3
2. Protecting thyroid cells from oxidative damage from hydrogen peroxide by forming selenoproteins

Three specific diseases have been associated with selenium deficiency:

- Keshan disease is found in selenium-deficient children and is associated with an enlarged and malfunctioning heart.
- Kashin-Beck disease, which causes bone malformation, is found when iodine and selenium are both deficient.
- Myxedematous Endemic Cretinism results in intellectual disability. Scar tissue is seen in place of the thyroid.

Note: Myexedema means mucin and edema. Mucin is a substance that accumulates in hypothyroidism.

Studies suggest supplemental selenium could alleviate the toxic effect of excessive iodine intake on the thyroid.

Selenium is a trace mineral incorporated into proteins to make antioxidants like glutathione peroxidase. Known as a selenoprotein, this type of protein prevents damage from hydrogen peroxide generated from the conversion of iodide to iodine by breaking down the hydrogen peroxide into water particles. This allows for the removal of the cells affected by oxidative damage, leads to the preservation of tissue integrity, and prevents the convergence of white blood cells.[15]

$$H_2O_2 + \textit{glutathione peroxidase} \rightarrow H_2O \text{ (water)}$$

In the presence of excessive iodine, however, a relative selenium deficiency occurs. Since glutathione peroxidase is made of selenium, the enzyme activity will be compromised when selenium is depleted. According to Xu, et al., "Selenium supplements alleviate damage of TPO that results from iodine excess." The scar tissue seen in the selenium-deficient children affected with myxedematous endemic cretinism further supports the notion that a lack of the antioxidant selenium leads to the destruction of thyroid tissue due to inability to neutralize hydrogen peroxide.

In a study performed with mice who developed autoimmune thyroiditis induced by iodine, this development was prevented when selenium was

administered. Selenium reduced the TgAb titers and increased the number of circulating T regulatory cells that help the immune system recognize itself and prevent the lymphocytic (WBC) infiltration of thyroid cells present in autoimmune thyroiditis.

A study conducted in Africa showed two months of selenium supplementation restored glutathione peroxidase activity and improved thyroid function through increased conversion of T4 to the active T3.

A similar study found selenium intake protects against thyroid autoimmunity by acting as an antioxidant, and it also has an effect on HLA-DR gene expression, further preventing autoimmunity. Furthermore, ultrasounds of the thyroid following selenium supplementation showed reduced lesions in the thyroid gland.

The RDA for selenium has been defined as 55 mcg in the United States, and an upper limit of 400 mcg has been suggested. A study done in South Dakota did not find any signs of toxicity at levels as high as 724 mcg. However, changes in nail structure—a sign of toxicity—were reported with selenium intake of as little as 900 mcg per day in China.

Most reported toxicity cases have been associated with industrial accidents and manufacturing errors. Some symptoms of selenium toxicity that have been reported include GI disturbances, hair loss, changes in hair and nails, peripheral neuropathy, fatigue, irritability, garlic-smelling breath, and a jaundice-like yellow tint to the skin.

While it may be tempting to increase selenium intake by increasing consumption of selenium-rich foods such as Brazil nuts, selenium content varies widely for foods grown in different soils. While the Dakotas have selenium-rich soils, other areas such as Russia and China have deficient levels of selenium.

Again, importation of foods further complicates these issues. The amounts of selenium in a single Brazil nut have been reported to range tenfold depending on where the nut was grown. This means there could be anywhere from 55 mcg to 550 mcg per ounce of nuts. Additionally, absorption issues due to GI problems may limit the availability of selenium from food sources.

While the RDA of selenium may often be found in multivitamin/mineral combinations, the amount of selenium found in most multivitamins will be insufficient for TPOAb reduction. Studies testing the minimal dose of selenium for TPO antibody reduction established that a minimum of 200 mcg of selenium daily is required to reduce TPO antibodies. Even a

100 mcg dose did not produce a statistically significant TPO antibody reduction. The bioavailability of minerals is very delicate and can be greatly affected by food or the presence of other substances.

Multivitamin supplements also have so many different ingredients that the absorption of this important mineral may be reduced. I recommend taking the selenium on an empty stomach with vitamin E, which works in synergy with selenium, to ensure proper absorption.

Ferritin

Iron is necessary for cell growth, differentiation, and transporting oxygen throughout our bodies. Iron deficiency leads to limited oxygen delivery to cells, causing fatigue, difficulty concentrating, and reduced immune function. A deficiency in iron is one potential cause of anemia.

Your doctor may test for anemia by running a panel for red blood cells, hemoglobin, hematocrit, and iron levels, and all of them may come up normal. Yet you may still be anemic. If insufficient iron is available, the body may pull iron from less-important physiological processes (e.g., hair growth) to keep enough iron circulating in the blood.

Ferritin is the name given to your body's iron reserve protein. Ferritin is required for transport of T3 to cell nuclei and utilization of the T3 hormone.

Ferritin deficiency is the primary cause of hair loss in premenopausal women, and it is often why women with Hashimoto's continue to lose hair despite normal thyroid levels.

Ferritin hair loss presents as increased hair loss during shampooing and brushing as well as overall thinning of hair without specific pattern or bald spots. Rather, the woman may find her hair feels thinner all over and is less dense.

Ferritin levels can be measured and are a more accurate predictor of how much iron you have stored in your body and available for use. Ferritin should be checked in all women with Hashimoto's and anyone experiencing hair loss.

In addition to poor intake of dietary iron-rich foods and lack of hydrochloric acid, pregnancy (due to increased need for iron) and heavy menstruation increase the risk of iron/ferritin deficiency. During each menstruation, a woman loses 10–15 mg of iron, while pregnancy may cause a loss of 600–1,000 mg of iron.

Because iron needs an acid presence to be absorbed, antacids and calcium supplements taken around mealtimes may reduce the absorption of iron from foods and supplements.

Those with hair loss who are taking PPIs or acid-suppressing medications should immediately get their ferritin levels checked..

Dietary factors can also impact iron levels. Tannins in tea and coffee can inhibit iron absorption and should be spaced out from iron-containing meals by an hour. Phytates found in nuts, legumes, and grains may also affect iron absorption, as do egg whites.

Normal ferritin levels for women are between 12 and 150 ng/ml. Ferritin levels of at least 40 ng/ml are required to stop hair loss, while levels of at least 70 ng/ml are needed for hair regrowth. The optimal ferritin level for thyroid function is between 90 and 110 ng/ml.

Iron is present in the heme and non-heme version in foods. Found primarily in animal products, heme is the better-absorbed form. The highest levels of iron are found in organ meats … yes, delicious liver. Beef, turkey, and chicken are the next best choices. (Sorry to all of my vegetarian friends.) In contrast, non-heme iron is found in nuts, beans, and spinach and is not usually absorbed as well.

To restore your iron levels, you can eat cooked liver twice per week or eat beef a few times per week. Vitamin C increases the absorption of iron, so taking a vitamin C tablet or eating vitamin-C–rich foods such as broccoli along with an iron-rich food is the best way to increase iron and ferritin levels. Creating an acidic environment by taking a betaine and pepsin supplement with meals can also help.

Most iron supplements are in the non-heme form and thus may not be absorbed as well. Many people also experience terrible stomachaches and constipation from the supplements. If choosing to take iron supplements, do so with much caution as they are one of the leading causes of overdose for children and adults. An iron overdose can be deadly, so always keep iron out of children's reach. Consult your physician or pharmacist about a dose appropriate for you.

Zinc

Zinc is an essential element to our well-being. Acting as a catalyst in about 100 different enzyme reactions required by the body, zinc is involved in DNA synthesis, immune function, protein synthesis, and cell division. It is required for proper sense of taste and smell, detoxification,

wound healing, and thyroid function. Because zinc is not stored in the body, daily intake is required to maintain sufficient levels.

One in four individuals in the general population may be zinc-deficient, and most people with hypothyroidism are. Zinc deficiency prevents the conversion of T4 into the active T3 version. This results in a slowed metabolism of proteins. Zinc is also needed to form TSH and may become depleted in those with hypothyroidism who are constantly producing more TSH.

Zinc deficiency has also been associated with increased intestinal permeability and susceptibility to infections as well as reduced detoxification of bacterial toxins.

Oysters have the highest concentration of zinc, but they are not something most people enjoy eating every day. Beef, liver, pork, lobster, and chicken are the next best sources as it is easier for the body to extract zinc from meat compared with non-meat sources. Thus, once again, vegetarians have an increased risk of zinc deficiency.

Absorption of zinc may be impaired by damage from intestinal disease such as celiac disease and other malabsorption syndromes. Phytates found in grains, legumes, nuts, and seeds can bind zinc and prevent its absorption when eaten alongside zinc-containing foods. Taking iron supplements in conjunction with meals may also prevent the absorption of zinc from food.

Zinc deficiency can show up on a liver function blood test as low alkaline phosphatase levels. Alkaline phosphatase will be discussed in further detail in an upcoming chapter.

To address deficiency, zinc supplementation may be utilized—with doses of no more than 30 mg a day. Zinc supplementation above 40 mg may cause a depletion in copper levels. If choosing to take zinc, you may also want to take a copper supplement. Usually 1.5–3 mg of copper should be sufficient. (General recommendations are to take 1 mg of copper for every 15 mg of zinc.) Caution: Zinc can cause depletion in copper and iron. In one study, 50 mg of zinc given over ten weeks impaired both iron and copper absorption.

Symptoms of copper deficiency include anemia not responsive to iron supplementation, trouble with walking and balance, fatigue, and lightheadedness.

Amino Acid Deficiency

Proteins are broken down into amino acids, the building blocks for our cells. People with Hashimoto's may also be deficient in amino acids

because of impaired protein digestion. Free-form amino acid supplements may be helpful, but supplementing with mega doses of amino acids may not always appropriate.

Tyrosine

Tyrosine is required for production of thyroid hormone and is often an ingredient found in "Natural Thyroid" supplements, along with iodine. The use of tyrosine is controversial in Hashimoto's. Tyrosine may increase the production of thyroid hormones, but it may also increase adrenal hormone production, which may be helpful if a person is deficient in adrenal hormones but problematic if a person has overactive adrenals. Small amounts of tyrosine from food sources or elemental formulas might not cause problems, but I would recommend exercising caution with taking high-dose tyrosine supplements.

Glutamine

The amino acid glutamine is usually depleted in people with Hashimoto's and chronic stress. This amino acid is essential to proper gut lining and immune function. (More in the Gut chapter.)

Testing for Depletions

Standard blood tests may not always reveal vitamin and mineral deficiencies until we are extremely depleted since the body will provide these nutrients to the blood as long as it can, pulling them away from less vital parts of our bodies such as hair. Hair tests may be more sensitive to changes in nutrient levels and may be ordered by patients themselves. Additionally, some labs specialize in micronutrient testing and can be ordered by physicians. (More information can be found in the Testing chapter.)

Genetic Causes of Nutrient Depletions

Some individuals with Hashimoto's may have a gene variation that prevents them from properly activating folic acid. This gene variation is present in up to 55 percent of the European populations and appears more commonly in those with hypothyroidism.

The gene involved is the MTHFR (methylenetetrahydrofolate reductase) gene, and genetic testing is available to show whether someone has this gene variation. The MTHFR gene codes for the MTHFR enzyme, which converts the amino acid homocysteine to methionine, a building block for proteins.

Individuals with low activity of the MTHFR enzyme may present with elevated homocysteine levels, which have been associated with inflammation

and heart disease as well as with a potentially impaired ability to detoxify.

Nutrient deficiencies in folate, B6, and B12 have been associated with elevated homocysteine.

Individuals with the MTHFR gene are often deficient in folate but have a difficult time processing the folic acid present in most cheap supplements and added to processed foods. Some professionals claim this type of folic acid may even cause a buildup in the body, leading to toxicity. Studies have shown that folic acid supplements increase cancer risk—one more reason to ditch processed foods and your multivitamin!

Folate is present in the activated form in real foods such as asparagus, spinach, and beef liver, but we may not get enough of it that way. B6 and B12 are mostly found in meats.

Betaine, also known as trimethylglycine, helps with metabolizing homocysteine. Betaine can be found in whole grains like quinoa (which some individuals may be unable to eat), beets, and spinach.

Individuals with the MTHFR gene variation and high homocysteine levels may benefit from an activated version of folate, B6, and B12 such as methylfolate (also known as L-5-MTHF folate), pyridoxyl-5-phosphate (P5P), and methylcobalamin, respectively.

Pure Encapsulations makes a supplement called Homocysteine Factors that contains all of the above-mentioned ingredients and may help reduce homocysteine levels.

ANTI-NUTRIENTS

We've discussed some examples of foods that contain anti-nutrients such as phytates, which bind vitamins and minerals and prevent our bodies from absorbing them. These foods can impact thyroid function through depletion of nutrients needed for optimal function.

Other foods can cause poor conversion to active thyroid hormone, even in people without autoimmune conditions or who have TSH levels in the normal reference range.

Goitrogens

Goitrogens, by definition, are substances that suppress the thyroid gland by interfering with thyroid hormone production. As a compensatory mechanism, the thyroid enlarges to counteract the reduced hormone production. This enlargement is known as a goiter.

You may have heard you should avoid goitrogenic foods if you have a thyroid condition. This is only partially true as all goitrogens are not created equally. Different goitrogenic substances are contained in various foods.

Table 5: Goitrogenic Foods

Bamboo shoots	Mizuna
Bok choy	Mustard greens
Brassica genus veggies	Peaches
Broccoli	Peanuts
Broccolini	Pears
Brussels sprouts	Pine nuts
Cabbage	Radishes
Canola oil	Rapeseed
Cassava	Rapini
Cauliflower	Rutabagas
Choy sum	Soy
Collard greens	Spinach
Horseradish	Strawberries
Kale	Sweet potato
Kohlrabi	Tatsoi
Millet	Turnips

Cruciferous Vegetables

Cruciferous vegetables such as cabbage, broccoli, and cauliflower contain glucosinolates, substances that block iodine uptake into the thyroid.

People with iodine-deficiency–induced hypothyroidism may find goitrogens cause further suppression of thyroid activity. However, most patients with Hashimoto's do not have iodine deficiency, and the goitrogenic mechanism in these otherwise healthy vegetables is not of particular concern to Hashimoto's.

That said, some people with subclinical hypothyroidism (when their thyroid is still producing its own thyroid hormone and TSH is slightly

elevated) may find that eating a lot of goitrogens may suppress some of their own internal thyroid hormone production.

Eating too many cruciferous vegetable in the raw state can, in theory, cause symptoms of hypothyroidism in someone with otherwise well-controlled symptoms, but most people with Hashimoto's should not see this happening.

Eating cruciferous vegetables (unless a person is otherwise sensitive to them) should not aggravate autoimmune thyroid conditions and may even be beneficial for most people with Hashimoto's (glucosinolates found in raw crucifers have excellent detoxifying properties).

Those who have hypothyroidism due to iodine deficiency or experience hypothyroidism symptoms after eating too many can still enjoy crucifers as long as they are cooked or fermented.

Cruciferous vegetables are only goitrogenic when raw. Cooking or lightly steaming deactivates the glucosinolates, as does fermenting the vegetables (like in sauerkraut), thus diminishing the goitrogenic activity.

On the other hand, canola oil—a goitrogen found in processed foods—should be avoided by people with Hashimoto's.

Soy

Soy is one particular goitrogen that is especially detrimental for Hashimoto's patients. The isoflavones genistein, daidzein, and glycitein in soy reduce thyroid output by blocking activity of the TPO enzyme.

Soy has been linked with the development of autoimmune thyroid conditions, and children fed soy formula were almost three times more likely to develop anti-thyroid antibodies as compared with breast-fed children.

Studies of soy isoflavones in animals suggest possible adverse effects such as augmentation of reproductive organs, modulation of endocrine function, and anti-thyroid effects. Anti-thyroid effects may also be propagated by the increasing loss of circulating T4 from the blood via bile.

Table 6: Goitrogen Effects on Thyroid

Causes	Agents	Action
Millet, soy	Flavonoids	Impairs thyroperoxidase activity
Cassava, sweet potato, sorghum	Cyanogenic glucosides metabolized to thiocyanates	Inhibits iodine thyroidal uptake
Babassu coconut, mandioca	Flavonoids	Inhibits thyroperoxidase
Cruciferous vegetables: cabbage, cauliflower, broccoli, turnips, canola	Glucosinolates	Impairs iodine thyroidal uptake
Seaweed (kelp)	Iodine excess	Inhibits release of thyroidal hormones
Malnutrition	Vitamin A deficiency	Increases TSH stimulation
Iron deficiency	Iron deficiency	Reduces heme-dependent thyroperoxidase thyroidal activity
Selenium deficiency	Selenium deficiency	Accumulates peroxides and causes deiodinase deficiency; impairs thyroid hormone synthesis

The goitrogens in soy are still present after cooking. Soy is also a common allergen. People with underactive thyroid function and Hashimoto's should avoid soy completely. On a personal note, I have suffered from a "soy crash," feeling drained and exhausted the day after eating soy.

Millet

A cereal crop unrelated to wheat, millet is often used in gluten-free bread and bakery products. Millet, however, contains isoflavones, which inhibit thyroid peroxidase and should be avoided by people with thyroid disorders.

My Personal Experience

When I was first diagnosed with Hashimoto's, I learned selenium helped reduce anti-thyroid antibodies and thus decided to eat two Brazil nuts a day. While the nuts were yummy, I did not see a change in TPOAb on my next lab test.

After starting selenium at 200 mcg and reducing my soy intake in summer 2011, I began feeling much calmer (a signal of diminished thyrotoxicity).

This feeling was supported by my lab values, which showed a reduction in TPOAb from the mid-800s to the mid-300s.

CHAPTER SUMMARY

- ✓ Digestion is impaired in Hashimoto's, resulting in depletion of nutrients.
- ✓ Diet, medications, and lifestyle contribute to poor digestion.
- ✓ Check levels of vitamin B_{12}, zinc, and ferritin.
- ✓ Replace with supplementation as indicated.
- ✓ Consider 200–400 mcg of selenium methionine daily.
- ✓ Consider taking betaine with pepsin with protein meals.
- ✓ Goitrogens are substances that can interfere with thyroid function though various mechanisms.
- ✓ Goitrogens in cruciferous vegetables should not be an issue for most people with Hashimoto's and are deactivated by cooking and fermenting.
- ✓ Goitrogens in soy are still present after cooking, and soy should be avoided.

THANKS FOR READING!

I hope you found this chapter of *Hashimoto's Thyroiditis: Lifestyle Interventions for Finding and Treating the Root Cause* helpful.

While addressing nutrient depletions and optimizing digestion is a very important part of healing, and implementing the suggestions in this chapter can make a huge difference in how you feel, often times it is only one piece of the puzzle. Unfortunately, most patients with Hashimoto's will have not just one root cause, but a combination of nutrient deficiencies, food sensitivities, gut permeability, infections, adrenal imbalances, and an impaired ability to get rid of toxins.

The body becomes stuck in a vicious cycle of immune system overload, adrenal insufficiency, gut dysbiosis, impaired digestion, inflammation, and thyroid hormone release abnormalities. This cycle is self-sustaining and will continue causing more and more symptoms until an external factor intervenes. In order to break the cycle and begin healing, we need to dismantle it piece by piece.

The lifestyle interventions discussed in the *Root Cause* book aim to do just that. You will learn about the various root causes implicated in Hashimoto's, and how to utilize my DIG-AT-IT approach, a systematic method that helps to identify and resolve your triggers. You'll start with the simplest modifications, by removing triggers, and follow with repairing the other broken systems to restore equilibrium, allowing the body to rebuild itself.

Hashimoto's Thyroiditis: Lifestyle Interventions for Finding and Treating the Root Cause, and my second book, NYT #1 Bestseller, *Hashimoto's Protocol: A 90-Day Plan for Reversing Thyroid Symptoms and Getting Your Life Back*, can help you do what most doctors and most clinicians would consider impossible, to put Hashimoto's into remission. They have helped thousands of people to recover their health and get their lives back. I hope they help you too!