Optimizing Metabolism

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Hypothyroidism: More Seaweed, Less Soy, and a Closer, Potentially Life-Saving Look at Iodine

Introduction

It's been gradual, but not subtle: iodine, the primary trace mineral required for optimal thyroid function is slipping away from our diets. We can take simple, inexpensive, and time-efficient steps to prevent iodine deficiency, treat subclinical hypothyroidism, and improve overall health.

Iodine – Why We Might Have a Shortfall?

Population studies show that fortifying the population's salt is often insufficient to optimize iodine. Here are some factors thought to contribute to the current surge in iodine deficiency detected in population studies:

- Some people have been avoiding iodine-rich foods without realizing it. For example, concerns over hypertension have led to less salt consumption. Concerns over cholesterol have decreased egg consumption. Concerns over mercury have caused some people including pregnant women, in need of high levels of iodine, to avoid fish consumption.
- Many foods contain less iodine now than they used to. For example, commercial bread production now uses bromine instead of iodine. Changes in the dairy industry have led to less iodine in milk products. Soil depletion of iodine can be an untoward result of modern agricultural production.
- Americans are eating more soy. Soy inactivates thyroid peroxidase, and it is therefore called a goiterogenic food. There is a broad unawareness of soy's goiterogenic potential. In part, this is because soy was studied in Asian populations who also eat seaweed (kelp). Types of kelp are used in daily cooking and known by their individual names, e.g., nori, wakame, dulce, kombu, and arame. Kelp, primarily because of its high iodine and selenium content, can offset the goiterogenic effects of soy. In America, where soy is for the most part eaten without kelp, goiterogenic effects of soy are more pronounced.

  Furthermore, most soy products consumed in Asia are fermented, such as tempeh, natto, miso, soy sauce, and fermented soy milk. Fermentation may reduce soy's goiterogenic potential. Soy milk, soy powder, foods enriched with soy protein powder, and soy isoflavone supplements are not fermented. Additionally, the majority of soy grown in the US is genetically modified (GM). GM soy could potentially be more goiterogenic.

  One might also note that soy is a large US crop in search of greater market potential. The "*trans* fat" story that spanned the past half-century is a testament to how soy's profit potential adversely hampered scientific oversight.
- Iodine absorption is compromised by intestinal inflammation. If intestinal inflammation in the population is increasing, the population at large may be absorbing less iodine. Iodine is a halogen element that competes with other halogens for absorption from the intestines. High dietary intake of florine, chlorine, and bromine may decrease iodine absorption.
- Iodine loss can be accelerated through athletic training and saunas. One hour of intense sweating can lead to losses ranging from 11 to 99 mcg of iodine. Those who use saunas for medical purposes should be made aware of their increased expenditure of iodine.

How Can We Detect Iodine Deficiency in Our Patients?

Some of the most compelling data on iodine status among Americans comes from the National Health and Nutrition Examination Survey (NHANES). This series of cross-sectional studies suggests that more than one in ten Americans is iodine-deficient. Women of childbearing

age are disproportionately affected. NHANES evaluates iodine using spot urine tests. Urine iodine testing is used in population studies to get population averages, but cannot be generalized to any one patient. Therefore it is not a useful clinical tool.

Since we are unable to measure our patients' iodine levels directly, we infer them in part from the functioning of the thyroid gland, the body organ that uses the most iodine. A thyroid-stimulating hormone (TSH) value greater than 3.0 mIU/L (previously 5.5 mIU/L) alone suggests subclinical hypothyroidism, which has several causes including inadequate iodine.

When the rise in TSH is due to low iodine, the T4 is often low and the T3 is normal. T3 and T4 stand for tyrosine with three and four iodine molecules, respectively. When the body is deficient in iodine, it resourcefully makes less T4 to avoid the metabolic cost of the additional iodine. The combination of an elevated TSH and a low T4 suggest iodine deficiency.

In the practice of clinical medicine today, L-thyroxine is sometimes prescribed to patients with an elevated TSH, regardless of the cause, and the iodine deficiency remains uncorrected. Approximately half of patients with iodine-deficient hypothyroidism improve on L-thyroxine. The result is that the iodine deficiency is often overlooked and remains uncorrected while the patient is on prescription medication. For the half who don't improve, iodine deficiency is also often overlooked.

Once iodine deficiency is suspected as the cause of mild, subclinical hypothyroidism, patients should undergo a dietary "trial." Patients can be instructed to incorporate iodine-containing foods and avoid eating soy. Generally, soy lecithin often found as an emulsifier in foods is okay as is a dash of soy sauce up to three times a week. All other soy products should be avoided. At least one serving of sea vegetables or seafood should be added to the diet each day. Supplemental iodine and selenium can be added. If in three months, the TSH decreases (even if it was in the high normal range to start with), the T4 is normal, and the patient notices an upsurge in energy and an increase in basal body temperature, it is reasonable to diagnose iodine deficiency. The dietary intervention should then be continued.

Since the TSH range is standardized across the population, some patients with a normal TSH will have a high TSH (low functioning thyroid) for them. For example, their TSH may be 2.0 mIU/L, but they experience cold hands and toes, thinning hair, brittle nails, dry skin, constipation, and a low pulse without being an athlete. These patients are likely to be iodine-deficient, and following a dietary trial, their TSH reading will be lower, even though it was in the normal range to begin with. They are likely to find an upsurge in energy and abatement of the symptoms above. They may find it easier to maintain their healthy body weight and a favorable cholesterol profile as well. Another emerging benefit of adequate iodine may be enhanced protection from breast cancer.

Sometimes, chronically low iodine can show up as hyperthyroidism. After years of suboptimal iodine, sudden exposure to iodine from iodine-rich foods, medical tests containing iodine, vitamin supplements, or use of iodine water purification can jolt the thyroid gland. The sudden burst of iodine causes the thyroid to become overactive in a clinical scenario sometimes called a thyroid storm. This may be an important diagnostic tool. Clinicians should also be aware of this potential side effect when prescribing supplements.

Summary

Most of us would benefit from more seaweed and less soy in our diets. Our patients with hypothyroidism should be evaluated for iodine deficiency. Sometimes this can be effectively accomplished before prescribing L-thyroxine. Even patients with statistically normal TSH levels may have unfavorable levels for them, and their symptoms can improve with a seaweed-no-soy diet.

Health care professionals who would like to learn more on this topic may refer to the following: Tenpenny, S. Hypothyroidism: Optimizing function with nutrition. In: Kohlstadt I, ed. *Food and Nutrients in Disease Management.* Boca Raton, Florida: CRC Press; 2009.

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