

## COMMENTARY

# 'Thyroid Diet': What's the Evidence?

Angela M. Leung, MD, MSc; Gonzalo J. Acosta, MD

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A new year is upon us, and despite the challenges we've had to face over the past several months, there appears to be light at the end of the tunnel. Now more than ever, people are looking for ways to optimize their health, and those with thyroid conditions are no exception.

Patients will often inquire about a "thyroid diet": dietary changes they can make, supplements they can take, or toxins they can avoid to treat or reverse their thyroid disease. *How can I improve symptoms of hypothyroidism beyond traditional medical therapy? How can I lower serum thyroid autoantibody titers? How much of this food or supplement would be too much for my thyroid?*

Truth be told, there is a lot of information out there that may sound compelling. However, the evidence is usually low quality and therefore is less than ideal as a basis for clinical recommendations. Here, we will discuss the most popular nutritional topics related to thyroid disease.

## Iodine

Thyroid hormone production requires adequate levels of circulating iodide taken in through the diet or in supplements. Insufficient iodine places an individual at risk of developing or worsening hypothyroidism. The Institute of Medicine of the National Academies recommends that adults take in 150 µg of iodine per day, whereas pregnant and lactating women are advised higher amounts (220 µg/d and 290 µg/d, respectively).

Common dietary sources of iodine include iodized salt, seafood (including seaweed and fish), and some breads and grains. It is important to note that sea salt, despite the name, does not naturally contain iodine.

Iodine is not required to be labeled on food packaging in the United States, so dietary sources may be difficult to identify. And even though iodine levels can be measured in a person's urine or blood, doing so is not particularly useful because the levels reflect iodine content from only the past few days. Fortunately, most of the United States is considered [iodine sufficient](#).

[Some individuals with dietary restrictions may be at risk](#) for low iodine. Recommending an iodine supplement of 150 µg/d is particularly relevant for [women who are considering pregnancy; already pregnant; or postpartum and breastfeeding](#), when iodine needs are greater.

Tablets labeled "iodine for thyroid health" are commonly available without a prescription and may contain several hundred-fold the daily recommended amount of iodine in [just a single dose](#). Other products labeled "for thyroid support" contain spirulina or kelp, which naturally contain iodine but in varying amounts that [may potentially be excessive](#).

[Taking in too much iodine](#) may cause the thyroid to shut off as a result of the excess iodine (iodine-induced hypothyroidism) or to make excess thyroid hormone (iodine-induced hyperthyroidism). There is also evidence that chronic iodine excess [may induce autoimmune thyroiditis](#), because iodinated thyroglobulin is immunogenic. For these reasons, the [American Thyroid Association recommends](#) avoiding supplements containing >500 µg of iodine per daily dose.

## Goitrogens

The term "goitrogen" refers to any substance that can produce goiter or an enlarged thyroid gland. Goitrogenic substances include those that decrease the amount of available iodine to the thyroid and those that inhibit any of the other components of normal thyroid hormone production. The most common examples of goitrogens in the diet are cruciferous vegetables and soy products.

### Cruciferous Vegetables

Cruciferous vegetables are defined as those in the *Brassica* genus and include broccoli, cabbage, Brussels sprouts, kale, turnips, cauliflower, collard greens, and bok choy. They are [rich in glucosinolates and other substances](#) that interfere with various steps in the thyroid hormone synthesis pathway. Eating cruciferous vegetables in healthy amounts certainly has its benefits, but too much and on a chronic basis may lead to or exacerbate hypothyroidism.

So how much is too much? Data on the amount of cruciferous vegetable intake needed to adversely affect thyroid function are extremely limited. In a [study](#) of euthyroid volunteers who ingested commercial kale juice twice per day for 7 days, mean 6-hour thyroid radioiodine uptake decreased by 2.52% compared with baseline values, but serum thyroid function tests were unchanged.

In an extreme example, a [case report](#) described the development of myxedema coma in an 88-year-old Chinese woman who consumed 1.0-1.5 kg of raw bok choy daily for several months in an attempt to improve her diabetes control.

More recently, however, a [randomized clinical trial](#) of euthyroid participants who ingested a broccoli sprout beverage for 12 weeks showed no changes in their serum thyroid function tests, thyroglobulin levels, or thyroid autoimmunity status compared with those in the placebo group.

So how might one address patients' questions about whether to avoid eating cruciferous vegetables? We tell both euthyroid and hypothyroid patients that although older data have suggested that frequent intake of large amounts of cruciferous vegetables may decrease thyroid hormone production, more recent clinical studies affirm that there is absolutely no need to completely stop eating these healthy foods.

Common sense is important on this topic. We advise a well-balanced diet, one that includes cruciferous vegetables in reasonable amounts. The problem is that there is little evidence of what is "reasonable" with regard to cruciferous vegetable consumption and thyroid health.

## Soy

Dietary soy products, including soy milk, tofu, soy sauce, tempeh, and miso, contain isoflavones — polyphenolic compounds also classified as phytoestrogens for their estrogen-like effects. Because isoflavones can inhibit the action of thyroid peroxidase, which is required for thyroid hormone synthesis, it has been proposed that dietary soy intake may increase the risk for hypothyroidism. Similarly, it is possible that a higher dose of thyroid hormone replacement may be required in patients being treated for hypothyroidism who consume high amounts of soy.

But what does the bulk of the scientific evidence show? In euthyroid individuals living in iodine-replete areas, consumption of normal amounts of soy probably has [very little, if any, adverse effects on serum thyroid function](#). High consumption of soy among both euthyroid and subclinically hypothyroid individuals has been correlated with [only minor elevations in serum thyroid-stimulating hormone \(TSH\)](#) levels; there were no changes in free thyroid hormone levels.

An exception is [soy-based infant formula fed to neonates with congenital hypothyroidism](#). An increase in the dose of levothyroxine may be required to adequately address their thyroid hormone needs.

In general, we advise our adult patients that a reasonable, normal amount of soy consumption is generally safe. There is no reason to avoid soy altogether if a patient with hypothyroidism is being treated with thyroid hormone replacement medication.

## Trace Minerals

**Selenium.** Selenium is a micronutrient important for thyroid hormone metabolism. The [US recommended daily allowance for selenium](#) in men and nonpregnant, nonlactating women is 55 µg. The richest dietary sources of selenium are seafood and organ meats. Typical sources in the US diet are breads, grains, meat, poultry, fish, and eggs.

The [tolerable upper intake level](#) for selenium is 400 µg/d. Although selenium toxicity is not commonly encountered in routine clinical practice, symptoms of excessive intake include nausea; nail discoloration, brittleness, and loss; hair loss; fatigue; irritability; and foul breath (often described as "garlic breath").

The majority of data on selenium and thyroid disease are regarding chronic autoimmune thyroiditis. Some studies have suggested that [selenium supplementation in autoimmune thyroid disease may be beneficial](#), because low levels have been associated with increased risks for goiter and thyroid nodules. However, although taking selenium can decrease serum thyroid autoantibody titers over the short term, it remains unclear whether these antibody reductions correlate with the [long-term maintenance of normal thyroid function](#) or with [decreased adverse obstetric outcomes in pregnant women with serum thyroid antibody positivity](#).

We don't generally recommend selenium supplementation to our patients for the sole purpose of benefiting thyroid dysfunction or thyroid autoimmunity. One exception, however, is in patients with mild Graves ophthalmopathy. In this population, selenium supplementation can [improve quality of life and the course of eye disease](#). The European Thyroid Association/European Group on Graves' Orbitopathy recommends [200 mg daily](#) as a 6-month course for such patients.

**Zinc, copper, and magnesium.** The roles of zinc, copper, and magnesium in thyroid hormone synthesis and metabolism are unfortunately less well defined. Serum levels of zinc, copper, and selenium have been [inconsistently associated](#) with free or total serum thyroid hormone levels, but a meta-analysis suggested a relationship between levels of selenium, copper, and magnesium [with thyroid cancer](#). Given the available evidence, we advise that supplementation of these trace minerals solely for the purpose of promoting thyroid function is unsupported.

**Fluoride.** Fluoride is found naturally in the environment or artificially in public drinking water (added for prevention of dental caries). It is also present in such products as tea, processed foods, dental products, supplements, and foods sprayed with fluoride-containing pesticides.

[Animal studies dating back to the 1970s](#) have described [reductions in serum thyroid hormone levels](#) due to fluoride exposure, although a clear mechanism has not been established. In humans, studies examining the [relationship between fluoride exposure and hypothyroidism](#) have shown [conflicting results](#). A more recent population-based study described a [mild increase in serum TSH levels](#) among iodine-deficient adults with higher levels of urinary fluoride.

Whether these findings are clinically relevant remains unclear in the absence rigorous clinical studies. On the basis of the available observational data, it is difficult to determine what degree of fluoride exposure may adversely affect thyroid health.

### Other Dietary Considerations

Finally, popular in the functional medicine community are such interventions as gluten-free diets; sugar-free diets; and probiotics for promoting thyroid health and treating "[leaky gut syndrome](#)," the theory that increased intestinal permeability leads to various diseases. Do we have data to back up these recommendations?

**Gluten-free diet.** [Good evidence](#) supports the relationship [between celiac disease and autoimmune thyroid disease](#). This is expected, given the known increased risk for another autoimmune disorder when one has already been diagnosed with a first.

A [meta-analysis](#) of nearly 95,000 patients showed a threefold increase in thyroid disease (in particular, Hashimoto thyroiditis) among those with celiac disease compared with control participants who did not have celiac disease. Thus, some have proposed screening patients with autoimmune thyroid disease for celiac disease and vice versa — a reasonable consideration, particularly when there are suggestive symptoms of the other condition.

Of course, this then leads us to wonder: What is the effect of a gluten-free diet on thyroid autoimmunity, a risk factor for thyroid dysfunction? Can staying away from gluten decrease the risk of developing Hashimoto thyroiditis in those with celiac disease?

There are some limited studies on this topic. One [small study](#) showed decreased serum thyroid antibody titers but no change in serum TSH or thyroid hormone levels among participants with Hashimoto thyroiditis who followed a gluten-free diet for 6 months. In contrast, [another study](#) of patients with celiac disease showed no effect of a gluten-free diet on serum thyroid function tests, serum thyroid antibodies, or thyroid ultrasound findings after 1 year on the diet.

It is challenging to advise patients on the basis of these small observational studies with inconsistent results. At present, there are no data on whether maintaining a gluten-free diet in the absence of celiac disease plays a role in the health of patients with or without established thyroid disease.

**Other eating patterns.** Unfortunately, there are no rigorous data regarding whether "leaky gut syndrome," a sugar-free diet, or use of probiotics influences the thyroid. A [recent study](#) exploring differences in food consumption patterns between patients with and those without Hashimoto thyroiditis found that patients with Hashimoto thyroiditis tended to eat more animal fat and processed meat, whereas those without this condition tended to eat more red meat, whole grains, and plant oils. The clinical significance of the self-reported dietary trends among these groups remains unclear. Further studies are needed to investigate whether there is a link between these eating patterns and thyroid autoimmunity.

Coffee, tea, and alcohol appear to have [no effect on thyroid cancer risk](#), although [coffee decreases the absorption of oral levothyroxine](#) in individuals being treated for hypothyroidism.

The [potential benefit of vitamin D](#) as a preventive or therapeutic agent for various thyroid diseases remains unclear.

### Final Thoughts

So where does this leave us? We must have frank conversations with our patients, acknowledging that the relationships among thyroid disease, diet, and nutritional supplements are complex. Certainly, much remains to be better understood through continued research.

In the meantime, the following recommendations are safe and supported by sound data: 150 µg of iodine daily in those with dietary restrictions or who are considering pregnancy, currently pregnant, or breastfeeding; not avoiding cruciferous vegetables or soy in adults, if consumed in reasonable amounts; and consulting a healthcare professional about thyroid eye disease, for which selenium might be of benefit. It is appropriate to advise patients that other commonly touted therapies for thyroid health are less supported, with quite limited and inconsistent data.

*Angela M. Leung, MD, MSc, is an endocrinologist at UCLA Health and the VA Greater Los Angeles Healthcare System and an associate professor of medicine in the Division of Endocrinology, Diabetes, and Metabolism at the UCLA David Geffen School of Medicine. She speaks on the topics of iodine nutrition, environmental thyroid toxicants, thyroid nodules, and thyroid cancer and serves on the Medscape Endocrinology advisory board.*

*Gonzalo J. Acosta, MD, is an endocrinology fellow at UCLA Health and the VA Greater Los Angeles Healthcare System.*

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