

What are goitrogens and in which foods are they found?

Introduction

Goitrogens are naturally-occurring substances that can interfere with function of the thyroid gland. Goitrogens get their name from the term "goiter," which means an enlargement of the thyroid gland. If the thyroid gland is having difficulty making thyroid hormone, it may enlarge as a way of trying to compensate for this inadequate hormone production. "Goitrogens," like circumstances that cause goiter, cause difficulty for the thyroid in making its hormone.

Foods that contain goitrogens

There are two general categories of foods that have been associated with disrupted thyroid hormone production in humans: soybean-related foods and cruciferous vegetables. In addition, there are a few other foods not included in these categories - such as peaches, strawberries and millet - that also contain goitrogens. The table below shows a list of some foods that contain goitrogens.

Soybean-related foods

Included in the category of soybean-related foods are soybeans themselves as well as soy extracts, and foods made from soy, including tofu and tempeh. While soy foods share many common ingredients, it is the isoflavones in soy that have been associated with decreased thyroid hormone output. Isoflavones are naturally-occurring substances that belong to the flavonoid family of nutrients. Flavonoids, found in virtually all plants, are pigments that give plants their amazing array of colors. Most research studies in the health sciences have focused on the beneficial properties of flavonoids, and these naturally-occurring phytonutrients have repeatedly been shown to be highly health-supportive.

The link between isoflavones and decreased thyroid function is, in fact, one of the few areas in which flavonoid intake has called into question as problematic. Isoflavones like genistein appear to reduce thyroid hormone output by blocking activity of an enzyme called *thyroid peroxidase*. This enzyme is responsible for adding iodine onto the thyroid hormones. (Thyroid hormones must typically have three or four iodine atoms added on to their structure in order to function properly.)

Cruciferous vegetables

A second category of foods associated with disrupted thyroid hormone production is the cruciferous food family. Foods belonging to this family are called "crucifers," and include broccoli, cauliflower, Brussels sprouts, cabbage, mustard, rutabagas, kohlrabi, and turnips. Isothiocyanates are the category of substances in crucifers that have been associated with decreased thyroid function. Like the isoflavones, isothiocyanates appear to reduce thyroid function by blocking thyroid peroxidase, and also by disrupting messages that are sent across the membranes of thyroid cells.

Examples of foods that contain goitrogens

Cruciferous vegetables including:

Broccoli	Millet
Brussel sprouts	Peaches
Cabbage	Peanuts
Cauliflower	Radishes
Kale	Soybean and soy products, including tofu
Kohlrabi	Spinach
Mustard Greens	Strawberries
Rutabaga	
Turnips	

Goitrogens and health

In the absence of thyroid problems, there is no research evidence to suggest that goitrogenic foods will negatively impact your health. In fact, the opposite is true: **soy foods and cruciferous vegetables have unique nutritional value, and intake of these foods has been associated with decreased risk of disease in many research studies.** That's one of the reasons we've included both types of food among the World's Healthiest Foods!

Because carefully controlled research studies have yet to take place on the relationship between goitrogenic foods and thyroid hormone deficiency, healthcare practitioners differ greatly on their perspectives as to whether a person who has thyroid problems, and notably a thyroid hormone deficiency, should limit their intake of goitrogenic foods. Most practitioners use words like "overconsumption" or "excessive" to describe the kind of goitrogen intake that would be a problem for individuals with thyroid hormone deficiency. Here the goal is not to eliminate goitrogenic foods from the meal plan, but to limit intake so that it falls into a reasonable range.

Limiting goitrogenic intake is often much more problematic with soy foods than with cruciferous vegetables, since soy appears in so many combination and packaged food products in hidden form. Ingredients like textured vegetable protein (TVP) and isolated soy concentrate may appear in foods that would rarely be expected to contain soy. A standard, **one cup serving of cruciferous vegetables 2-3 times per week, and a standard, 4-ounce serving of tofu twice a week is likely to be tolerated by many individuals with thyroid hormone deficiency. It's worth it to try and include these foods in a meal plan because of their strong nutritional value and great track record in preventing many kinds of health problems.**

The effect of cooking on goitrogens

Although research studies are limited in this area, cooking does appear to help inactivate the goitrogenic compounds found in food. Both isoflavones (found in soy foods) and isothiocyanates (found in cruciferous vegetables) appear to be heat-sensitive, and cooking appears to lower the availability of these substances. In the case of isothiocyanates in cruciferous vegetables like broccoli, as much as one third of this goitrogenic substance may be deactivated when broccoli is boiled in water.

Practical tips

Although for many people goitrogens do not seem to pose a health concern, certain individuals who have thyroid problems may be advised by their healthcare practitioner to limit excessive consumption of foods that contain these compounds. As cooking seems to help to inactivate the goitrogenic compounds found in food, it seems reasonable to conclude that for individuals with deficient thyroid hormone production, steaming of cruciferous vegetables like broccoli makes good sense, as does consumption of tofu in cooked versus raw form.