



## Vegetarian Nutrition

a dietetic practice group of the  
Academy of Nutrition and Dietetics



Experts in Plant-Based Nutrition

### RDN Resources for Consumers:

# Soy Safety and Health Effects of Isoflavones

Isoflavones are plant estrogens, also known as phytoestrogens. However, isoflavones differ from the hormone estrogen. In some parts of the body, isoflavones act like estrogen, while in other parts, their effect is opposite to estrogen. This means that in theory isoflavones may provide some benefits of estrogen without the hormone's harmful side effects.

Soybeans and soy products such as tofu, soymilk, miso, and tempeh, are the richest sources of isoflavones in the diet.

Certain types of food processing reduce the amount of isoflavones in foods. Products such as soy-based meat analogs often have much lower amounts of isoflavones. In Japan and urban areas of China, people consume about one to two servings of soyfoods per day. Older people whose diets are more traditional often have much higher intakes than younger people. Since people in the U.S. eat few soyfoods, their isoflavone intake is very low, only about 2 milligrams per day

Both isoflavones and the hormone estrogen bind to estrogen receptors in the breast and other tissues. Binding to these receptors initiates a biological response. There are two types of estrogen receptors in the body, estrogen receptor-alpha and estrogen receptor-beta. Estrogen binds equally to both types, whereas isoflavones prefer estrogen receptor-beta. Therefore, in tissues that have mostly estrogen-receptor alpha, estrogen has biological effects, but isoflavones may not. This means that isoflavones don't always act like estrogen. The effect of isoflavones likely depends in part on the type of estrogen receptors in different tissues.

### Soyfoods and Breast Cancer

In Asia, women who eat the most soy have a lower risk of

breast cancer compared to women who eat little soy. But evidence suggests that eating soyfoods during childhood and the teen years provides the most protection against breast cancer. Beginning soy consumption later in life doesn't appear to have any effect on risk of getting breast cancer. However, women with breast cancer who eat soyfoods may be less likely to see their cancer return and are less likely to die from their disease. The position of the American Cancer Society, Canadian Cancer Society and World Cancer Research Fund International is that women with breast cancer can safely consume soyfoods.

### Soyfoods and Heart Health

Adding soy protein to diet lowers blood cholesterol by 3% to 4%. When soy is consumed in place of meat and other foods high in saturated fat, it reduces cholesterol even more.

### Thyroid Function

Soyfoods have no effect on thyroid function in people with normal thyroids. However, for those with low thyroid function, soyfoods should not be consumed for 1 to 3 hours after taking thyroid medication

### Soyfoods and Bone Health

In older Asian women, eating more soy is linked to lower rates of bone fracture. The same results have not been seen in studies among western women where researchers fed isoflavones to postmenopausal women. This may be another case where lifelong soyfood intake is helpful but taking supplements or eating soyfoods as an adult is not.

### Women's Health

Isoflavones have no effect on estrogen levels in women. But, soyfoods may help with menopause symptoms. Results of more than 15 studies conducted mostly in

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Western countries show that isoflavone supplements can reduce both the number and severity of hot flashes by about 50%. About two servings of soyfoods per day may be helpful.

### Men's Health

Isoflavones have no effect on testosterone or estrogen levels in men. Clinical studies show they also have no effect on sperm or semen. In addition, supplements of soy protein lead to gains in strength and muscle in exercising men. The gains are similar to those seen in men who take supplements of animal protein.

### Soyfoods in Diets of Children

In Japan, tofu and miso soup are common infant foods. Infants usually begin to eat soyfoods between the ages of 6 and 12 months. Human intervention studies show that soyfoods don't affect hormone levels in children or at the age at which girls begin puberty. Boys that consume soyfoods also begin puberty well within the normal range for U.S. boys. Soy infant formula has been used by more than 20 million Americans over the past five decades. Evidence clearly shows that it produces normal growth and development. In recent years the high isoflavone content of soy has made soy infant formula controversial. However, the position of the American Academy of Pediatrics is that soy infant formula is safe.

### Soy and Nutrient Absorption

Soybeans are similar to all other beans and whole grains, in that they contain compounds that bind to minerals such as calcium, iron, and zinc, and lower their absorption. However, the iron in soyfoods appears to be in a form that makes it well-absorbed. In one study, women who ate 2 to 3 servings of soy per day had similar iron status to women eating meat. Calcium is also well absorbed from soyfoods. Calcium absorption from calcium-fortified soymilk and calcium-set tofu is similar to the absorption of calcium from cow's milk. Raw soybeans contain compounds that inhibit the ability of enzymes needed for the digestion of protein. However, processes such as heat inactivate these compounds to varying degrees. The digestion of protein

from foods such as tofu, soymilk and isolated soy protein is excellent.

### Genetically Modified Soy

Genetically modified (GMO) soy has raised numerous questions and concerns from consumers and scientists alike. GMO soy has been in our food supply for the past few decades, and to date, there have been no science-based linkages to adverse health outcomes from human consumption. If consumers are concerned about eating GMO soy products for ethical or environmental related reasons, the best way to avoid it is to buy USDA Certified Organic products. It should be noted that many soy products (tofu, soymilk, tempeh etc.) are already GMO free, and many are organic.

### Optimal Soyfood Intake

Average soyfood intake among Japanese adults ranges from about 1 to 2 servings per day. Some studies show that disease rates are lower with greater soyfood intake, about 2-3 servings per day. A serving is ½ cup of tofu or tempeh or one cup of soymilk.

### Isoflavone Content of Selected Foods

Food	Total Isoflavone Content (mg)
Soybeans, mature, ½ cup, cooked	47
Tofu, silken, ½ cup	31.2*
Tofu, regular, ½ cup	29.7*
Edamame (green soybeans), ½ cup, cooked	28
Soymilk, 8 oz	23*
Soy imitation chicken, 3 oz	13.2*
Soy hotdog, 2 oz	9.7*
Soy cheese, 1 oz	8.8*
Soy veggie burger, 3 oz	8.4*
Soy oil, 1 tbsp	0

*\* isoflavone content varies according to brand*

### For More Information

- [http://www.veganhealth.org/articles/soy\\_wth](http://www.veganhealth.org/articles/soy_wth)
- <https://blog.aicr.org/2019/02/19/soy-and-cancer-myths-and-misconceptions/>