



## IS SOY SAFE?

For many years, soy foods have been considered controversial. This initial impression may be because they were termed phytoestrogens. Suddenly there were concerns that babies having soy milk would become feminized. Then there was the concern that they may cause cancer.

This article will explain what soy is, where it comes from, the best sources and its safety and benefits. By the time you have finished reading, you will have more confidence about what its all about with soy.

Food like soy beans, chickpeas and other legumes contain a plant chemical called isoflavones. Soy beans contain the most isoflavones as well as the individual isoflavones that give health benefits – genistein and daidzein are the main ones, with a lesser one – glycitein. Isoflavones are in turn, members of the flavinoid family, which are in turn, members of the polyphenol family. (These are just terms that are used in biochemistry that you may find helpful when reading about other plant molecules in the future.)

Other isoflavone containing foods include lentils, kidney beans, lima beans, broad beans and chickpeas. This could be why the vegetarian and Mediterranean diets may give health benefits.

Isoflavones have numerous health qualities that I will describe later. But first, what happens to them in the body? Once in the gut, genistein and daidzein are further transformed into other molecules by bacteria – this can vary from person to person

## Health benefits of soy foods

Cancer prevention - Breast Cancer has been reduced and indeed, isoflavones seem to augment the action of Tamoxifen, a drug used to prevent breast cancer recurrence. The controversy over breast cancer occurred because the chemical structure of flavinoids is similar to 17 $\beta$ -estradiol, which is the most potent, naturally occurring estrogen. Because isoflavones bind to estrogen receptors, affecting their action, they were called phytoestrogens. However, many of their effects do not involve the estrogen receptor.

There are two types of estrogen receptor. ER alpha is found in the breast and uterus. ER beta is found in bone. Isoflavones spend much less time and are only weakly attracted to estrogen receptors compared with 17 $\beta$ - estradiol. Also isoflavones have been found to have a 'balancing' effect on estrogen receptors by actually preventing health problems.

Soy protein reduces recurrence of breast cancer in women who have positive estrogen or progesterone receptors.

Prostate, Ovary and colorectal cancers have been found to have reduced recurrence in those who consume soy. In one study, the association was found to be stronger in rectal rather than colon cancer and it was stronger in post menopausal women.

Heart disease – by prevention of thrombin production, the initial stage of atherosclerosis. Soy also inhibits growth factors that keep the atherosclerosis going by causing the sticking of white blood cells to the lining of blood vessels. It also stops platelets getting sticky – that's what aspirin does.

Hypertension and cholesterol. A study where soy nuts replaced other forms of protein showed that it reduced blood pressure in all the women with hypertension and in 83% of women with normal blood pressure (BP). The average decrease in systolic BP (the higher number) was 15mmHg in the women with hypertension. The average decrease in diastolic BP (the lower number) was 6mmHg. Small reductions in BP can make a big difference to cardiac mortality, so these results are very good. In addition, LDL cholesterol was lowered by 11% and a cardiac risk marker called apolipoprotein B was lowered by 8%.

Rates of heart disease and stroke are lower in Asian women, and soy consumption may make the difference.

Type 2 diabetes – women who were in the top 255 of consumers of soy in a Shanghai study were found to have a 47% reduced risk of developing this disease.

Bone density enhancement – especially in post menopausal women. Fifty percent of women will and one in 8 men will experience an osteoporosis related fracture. Bone loss becomes rapid just before and for 5-7 years after menopause and women can lose up to 20 % of their bone mass. Japanese women eat 50-100 times more than Western women and have been found to have better preserved bones.

Eating protein is thought to cause a loss of calcium from the bones, mainly because animal protein contains sulfur containing amino acids – methionine and cysteine. Eating more plant proteins like soy does not cause this problem because there are no sulphur containing amino acids – this is one way it preserves bone.

After menopause the osteoclasts (bone cells that break down bone) become more active than osteoblasts (cells that build up bone). Genistein inhibits osteoclasts.

In one study, women who consumed the most soy had an approximately 35% decreased risk of fractures compared with women who consumed the least soy. The benefit was greatest in women within 10 years of menopause. It is also seen to reduce the incidence of hot flushes.

## **The way isoflavones act in the body to give health benefits could include the following:**

- Antioxidant
- Inhibits free radical formation and damage to cell membranes
- Osteoclasts (bone break down cells) are encouraged to die
- Increases intestinal calcium absorption
- Inhibition of angiogenesis
- Inhibits aromatase, 5 $\alpha$ -reductase, 17 $\beta$ -hydroxysteroid dehydrogenase
- Balances sex hormone activity eg Progesterone, Androgens

- Inhibiting the enzyme 5 alpha reductase – this helps prevent excessive production of dihydrotestosterone which causes excess hair in women and prostate problems in men
- Inhibiting thrombin ( blood clot factor) formation and increased platelet activity
- Increases LDL cholesterol receptor activity

### **Which foods have the most beneficial isoflavones?**

- Soybeans contain 2-5mg isoflavones
- Dehulling, flaking and defatting to produce isolated soy protein reduces the isoflavone content
- Textured soy protein and soy flour contain 5mg isoflavone per gram of protein
- Soy milk and tofu contain 2mg isoflavone per gram of protein
- Non-fermented soy foods like roasted soy beans and soy beverage powders contain 2-3 times the amount of isoflavones compared with fermented soy foods like tempeh, miso and fermented bean curd.
- The baking of soy flour does not lower its isoflavone content.

### **Safety of soy**

Soy foods have been consumed in large amounts for decades in Asia without ill effect. However, taking isoflavones have not been studied enough. It is therefore best to take soy as a food for its benefits until there is more information.