

► Soy foods

Category: Lifestyle and prevention

Definition: Soy foods or foods made from soybeans include tofu, tempeh, edamame, miso, and soymilk. Soy foods are an excellent source of protein and contain a number of substances that are being studied for the prevention of cancer.

Background: Since the late 1990's, researchers have conducted thousands of studies on the links between diet and cancer. Epidemiological studies (studies of population-wide patterns of disease) show that many cancers are less common in Asian than in Western countries. The Japanese breast cancer mortality rate, for instance, is only one-fourth that of the women with breast cancer in the United States. Unfortunately, these types of studies are hard to interpret because they cannot account for many potential confounding factors. For example, the average person in Asia may have a more active lifestyle than a typical Westerner.

Although it is not completely clear what factors are responsible for the lower rates of cancer in these countries, many researchers have focused on the potential influence of diet on cancer risks and outcomes. There are many differences between a traditional Asian diet and a modern Western diet, such as the amount of vegetables and fruits, processed foods, meat, fish, and whole grains consumed. However, one thing that is very common in traditional Asian cuisine and historically absent from the typical Western diet is soy foods. However, this may be changing—in the year 2000, more than 25 percent of Americans reported consuming soy products at least once a week. In addition, high-dose soy protein and isoflavone supplements are being marketed in the United States to healthy people to prevent cancer.

How these compounds work: Soy products contain a number of anticarcinogenic (anticancer) compounds, including phytosterols and isoflavones. The two primary isoflavones in soybeans are genistein and daidzein. The National Cancer Institute classifies genistein (the main soybean isoflavone) as a key anticancer agent. Isoflavones act as weak estrogens, with less than 0.1 percent of the activity of estradiol (the main naturally occurring form of estrogen in humans). Isoflavones may act like antiestrogens in the body, because they can bind with the body's estrogen receptors and block some of the body's own estrogens. For cancers that have a hormonal basis,

such as breast and prostate, this estrogen blocking could help reduce a person's cancer risk.

Research issues: About six hundred soy-related studies a year are published in the medical literature. There are three basic kinds of studies that have been conducted on the link between soy and cancer: population, animal, and laboratory. With population studies, there are always concerns about the accuracy of the methods used. For instance, food frequency questionnaires depend on study participants to remember what they ate over days, weeks, or even months. In addition, many of these studies have been conducted in small groups of people, so even when there is an apparent association, the link is often not statistically significant.

Animal studies have shown many potential benefits (and some risks) of soy consumption, but there is controversy over how applicable these results are to humans, be-



Genistein, the main isoflavone in soybeans, is classified as a key anticancer agent by the National Cancer Institute. (U.S. Department of Agriculture)

cause animal biology, anatomy, and physiology are not the same as those of humans. Laboratory studies, such as those that use cultured human cells to investigate the biochemical response of specific human tissues to elements found in soy, can be similarly controversial because they cannot take into account the complexity of the whole human body and its systems.

Possible risks: Although there have been more than one hundred published studies that suggest possible harm from eating soy, most are lab and animal studies, and this research represents only about 1 to 2 percent of all soy research published. One of the more prominently reported studies dealt with the interaction between soy compounds and drugs to treat breast cancer. One soy compound (genistein) was shown to decrease the effects of tamoxifen, a common breast cancer treatment, while another compound (daidzein) was shown to enhance tamoxifen's effects. There is currently no consensus on whether high levels of soy foods are appropriate for current or former breast cancer patients. In addition, animal studies have found that soy (in supplement form or highly processed isolated proteins) can promote tumor growth under some circumstances, and one study showed that high levels of soy food intake are associated with an increased risk of bladder cancer, although this was based on sixty-one cases and depended on a food-frequency questionnaire.

Possible benefits: Soy foods have been shown in many human and animal studies to be associated with statistically significant reductions in prostate, colorectal, breast, endometrial, and stomach cancer risk. Soy seems to have a particularly strong protective effect against prostate cancer. In fact, on a calorie-for-calorie basis, soy foods protect against prostate cancer at least four times more than any other dietary factor.

The best estimate is that those who eat the most soy have a 30 percent lower risk of developing colorectal cancer than those who eat the least. Regarding stomach cancer, intake of at least 10 grams per day of unfermented soy foods such as tofu may result in lower risk, but there is some question about whether these results reflect other factors, such as fruit and vegetable consumption.

As for breast cancer, modest reductions in risk have been shown for some groups of women, but most of the medical research suggests that soy intake protects against breast cancer mainly if consumed in childhood and adolescence. Postmenopausal women seem to receive little, if any, reduction in breast cancer risk. More research is needed for the effects of soy foods on cancer risk to be fully understood.

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► For Further Information

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► Other Resources

American Cancer Society

Soybean page

http://www.cancer.org/docroot/ETO/content/ETO_5_3X_Soybean.asp?sitearea=ETO

Memorial Sloan-Kettering Cancer Center

Soy

<http://www.mskcc.org/mskcc/html/69383.cfm>

See also Antiestrogens; Breast cancer in children and adolescents; Breast cancer in men; Breast cancer in pregnant women; Breast cancers; Carcinogens, known; Carcinogens, reasonably anticipated; Childhood cancers; Epidemiology of cancer; Fruits; Isoflavones; Nutrition and cancer prevention; Nutrition and cancer treatment; Omega-3 fatty acids; Phytoestrogens; Prevention; Prostate cancer; Rectal cancer; Risks for cancer.

► Spermatocytomas

Category: Diseases, symptoms, and conditions

Also known as: Spermatocytic seminomas

Related conditions: Germ-cell tumors, seminomas

Definition: Spermatocytomas are a type of rare, germ-cell-derived testicular cancer.