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# Soy on Trial

*Soybeans! Cancer-preventing or cancer-forming? Catapulted into the spotlight of preventive and therapeutic science by the Honolulu study, the previously uniform approbation and recommendation favorable to soybeans was seriously shaken. The Journal of Health & Healing's Science Editor brings you the latest reliable information, positive and negative.* ***Are soybeans guilty as charged?****—Editor*

CLAIMS AND COUNTER-charges are rampant in nutritional circles. Entrepreneurs, journalists, physicians, scientists and nutritionists are wondering; some are sparring, posturing, even arguing. It seems the status of the venerable soybean and its products are under everything from scrutiny to scandalous attack. Some on the far right are claiming that soy is good for everything from brains to bones. They infer that soy must be a panacea. Others, on the far left, are inferring that soy is good for almost nothing but cattle feed and the placebo effect.

What are the issues? Where *are* the data? What is the evidence?

## What is the truth about soy?

### Soy Is Associated with Less Heart Disease and Cancer in Asia

- Classical Chinese* get about about one-tenth as many heart attacks as Americans.
- Classical Japanese live longer than Americans and have fewer of heart attacks and of most cancers.
- Japanese women have low breast cancer rates. Daughters of those who migrate to Hawaii have increased rates. Granddaughters of those who move to California have breast cancer rates equal to those of Americans *(see Fig. 1).*

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Careful analysis of the factors involved in these findings indicates that *high soy consumption combined* with other healthful lifestyle factors is protective.

## What is in soybeans? What are they good for?

### Soy Is Rich in Phytochemicals

Soy is a useful source of a variety of plant chemicals conducive to health of the heart, cardiovascular system, and immune system. Bowman-Bark Inhibitor inhibits oncogene (cancer gene) expression, so is favorable to cancer prevention. Kunitz-Trypsin inhibitor can inhibit chemically-induced carcinogenesis.[1] Though the contribution of these enzyme inhibitors may be modest, it is no doubt helpful.

### Isoflavones Are Special

Prominent among the more-newly-discovered phytochemicals are *genistein*, *daidzein*, and *glycetin*. These recently appreciated preventives have several mechanisms of action to help prevent disease:

### How Do Soy Isoflavones Work?[1,2,3]

- They can inhibit protein tyrosine kinase (PTK) This can "cool down" aggressive growth.
- With their antioxidant capacity, they can slow down the production of reactive oxygen species. So, fewer free radicals.
- When fighting cancer cells, they can break strands of DNA, as in apoptosis or cell death.
- They can slow down and even stop the cell cycle. This helps control unwanted growth.
- They can assist in restraining metastasis by inhibiting angiogenesis (new blood vessel formation).
- They can help steroid metabolism by inhibiting 5-alpha reductase.
- They can reduce platelet or thrombin activation, thus reducing blood clot formation.
- Isoflavones can help LDL processing to mitigate atherosclerosis.

### Importance of Early Use of Genistein

Dr. Barnes and his colleagues found in animals that giving genistein very *early in the lifespan* prepared the cells in the breast to resist the effects of even DMBA (dimethylbenz[a]anthracene), a *strong* cancer-forming chemical, when given much *later* in the lifespan.[2,3]

Later research by the Alabama group has shown that early soy pushes the maturity or differentiation of cells in the breast, thus reducing their vulnerability to cancer of the breast.[4] This infers that use of soy in childhood is significant for maximum benefit. These findings also help explain why the use of genistein as a "johnny-come-lately" quick-fix can't provide the best protection for cancer of the breast, which is the most common killing cancer of non-smoking women.

### Plant Sterols Can Block Cholesterol

Plant sterols are built-in cholesterol blocking agents that help keep cholesterol, that comes from either one's diet or from the bile made in one's body by the liver, from getting into the blood. These natural blocking agents are "look-a-likes" for cholesterol itself, so they can stand in the doorway into the bowel cells, but are not themselves normally adsorbed appreciably into the bowel. So, in combination with a high fiber diet, plant sterols are quite helpful in lowering troublesome cholesterol levels. Plant sterols can also block certain other cancer-forming chemicals from entering the body.



### Soy Proteins Are Good

When combined with whole grains and other seeds and nuts in a plant-based diet, soy proteins are an excellent source of zero-cholesterol protein. They have more-gentle residues (less sulfuric acid and other sulfur-based by-products), so are easier for the kidneys to process and

*Those who consume the customary diet common to their culture and country of origin.

the bones to tolerate than animal proteins which are too high in sulphur and phosphate. This is helpful in the long-term health of the kidneys and bones.

It makes an interesting and nutritionally accurate comparision: we correctly and wisely decry high-sulfur fossil fuels that make our *air* dirty with smog. Should not more attention be paid to high-sulfur foods like meat that make the *blood* dirty? A a matter of fact, a head-to-head comparison of soy proteins with animal proteins, or even the casein of cow's milk, establishes that the soy proteins help prevent atherosclerosis, whereas those from beef and milk contribute to atherosclerosis.

## The Fats in Soy Are Disease-preventive

Soy is a good source of *unsaturated* fat and also low in cholesterol-free *saturated* fat. This adds up to a ratio about five times better than meat. Obviously soy products are friendly to the heart and blood vessels.

Lecithin from soy is useful for the structure of membranes throughout the body and can assist in the synthesis of acetylcholine,[5] which is an important chemical transmitter of messages in the brain.

## Phytic Acid

Formerly phytic acid from whole soy, and whole wheat, was criticized theoretically as being a liability because by meticulous measurement it tied up iron and was therefore an argument against these plant-based sources of protein—obviously a point against whole-wheat and more recently, against soybeans.

But now we know, particularly from the work of Diana Fleming of Tufts University, that, nutritionally speaking, iron is a two-edged sword. Enough is enough. Like a rusting nail in a metal wheelbarrow, too much iron pushes ugly rusting spots; too much oxidation from excess iron in the body makes trouble and hence can contribute to chronic disease. Also, phytates also appear to enhance natural killer-cell activity.[1] So the phytate of soy instead of being an accidental liability is a designed asset.

## Saponins Can Help

Saponins are modified steroids that have special larger molecular shapes well-designed to help cope with larger carcinogenic molecules in the bowel. Fortuntely, some of these here-to-for neglected phytochemicals are found in whole soybeans. They are antioxidant and antimutagenic, and they also have the capacity to bind cholesterol and bile acids in the bowel.

## Fiber Helps Prevention

Don't drop fiber from your radar screen of health. The healthiest people in the world get lots more (sometimes three times more) fiber than cancer-prone Americans.

No doubt, one reason is that the fiber from whole soy, and other natural whole vegetable foods, can act like very tiny molecular sponges that swell up inside of the small bowel thus diluting, soaking up, and sweeping undesirable chemicals out of the bowel. This helps the body cope with dangerous mutagens (which change DNA in the direction of cancer) and carcinogens (definitely cancer-causing) and can influence many outcomes from aging to even cancer itself.

## Vitamins of Soy

One of the front-running vitamins to prevent chronic disease is turning out to be folate. Soy has it, many times more than meat has. And vitamin E? Soy has about 10 times more than meat.

## Lignans Are Useful

Though certainly not as concentrated as in flax, soy has some of these helpful phytochemicals that may assist in cancer prevention via their enterolactone or enterodiol.

## Soy Helps the Heart and the Cardiovascular System

A team from the Cardiovascular Research Group of Monash University measured the results of soy protein for three months in a randomized double-blind trial of soy protein vs. milk casein. After intervention with soy, the phytoestrogens in the blood increased, accompanied with a fall in systolic blood pressure of over seven mm of mercury, which was statistically significant, with a "p" value of less than five percent.[6]

To recapitulate: because of its helpful composition, soy reduces *atherosclerosis* in the following ways:

- Plant *sterols* and *saponins* can block cholesterol absorption.
- Polyunsatured fats help.
- Zero cholesterol in soy helps.
- Its phytochemicals assist in reducing inflammation and helping the liver to deal with the cholesterol burden.

## Soy Helps Prevent Cancer of the Prostate

It has been observed for some years that cancer of the prostate is less prevalent in Japanese men. Soy has been associated with this benefit. A group from the Adventist Health Study at Loma Linda University prospectively (on-going) studied 225 cases out of 12,395 Adventist men who in 1976 stated how often they drank soy milk which contained isoflavones. Those men who drank soy milk more than once per day had a 70 percent reduction of the risk for cancer of the prostate.[7]

Also, a comparison of users of the *greatest* amount of dairy (5th quintile) with the lowest (1st quintile) dairy product product users revealed that dairy product intake increased risk of metastatic prostate cancer 40 percent. A high intake of *both* red meat and dairy increased the risk of metastatic cancer of the prostate two-fold.

The six authors of this large Harvard study conclude: "Intakes of red meat and dairy products appear to be related to increased risk of metastatic prostate cancer."[8] This large Harvard study is clear. And when combined with the Loma Linda study showing the benefits of serious use of soy, the implications for the practical prevention of cancer of the prostate are good news indeed *(see Figure 2)*.

## Speaking of Dairy...

Another source of criticism against soy comes from this kind of experiment. Swamp the immune system with meat, saturated animal fat, animal protein, and high doses of cancer-causing chemicals *then* give them genistein as a cure-all. Doesn't do it, and the innocent critters die from cancer. The erroneous inference—soy is N.G. (not good)!

In this context it is helpful to remember that classical Japanese women live longer than American women and get *much less* cancer of the breast. How much less cancer these women get depends a lot on which research is being considered. The more Westernized the sample of women, and the more McDonalds they frequent, and the less soy they eat, the more cancer of the breast they get. The immune context is vital. If soy genistein were such a powerful estrogen blocker as to run the critics' gauntlet it would be a drug! And it would have side effects like drugs. Genistein is gentle. Genistein is natural and is a very wisely designed modulator of estrogen receptors and estrogen economy to help thousands, even millions of women.

## Of Mice and Men

Some of the criticism of soy comes from mice research. In its extreme form this is the way it works; a group gives a whopping big dose of genistein to *nude mice without thymus glands!* Then these immune-compromised mice are loaded down with enormous doses of cancer cells. Results? Just imagine! They get highly-malignant cancer and genistein is obviously no help, so they say. The real moral to these highly-publisized new experiments is simple. If you are a nude

mouse without a thymus gland, steer clear of cancer cells, cancer researchers, and cats!

### Soy Helps the Endocrine System

Because the intensity and the long-term duration of estrogen levels in the body are established risk factors for cancer, it is interesting to note that regular use of soy moderated the hormonal surges so related to cancer. A group from Cambridge University reported that when women were daily given soy protein with 45 mg of isoflavones, their follicular phase length was increased; menstruation was delayed somewhat. Midcycle surges of luteinizing and follicle-stimulating hormones were also suppressed. These changes were interpreted to be helpful in moderating the risk of breast cancer.[9]

### Soy Can Reduce Menopausal Symptoms

In reviewing the impact of soy on menopausal symptoms, a group from Mayo's mentions that it can reduce hot flashes about 45 percent.[10] Soy can accelerate and alter the breakdown of estrogen, thus reducing unwanted effects of this hormone on the breast, and the uterine endometrium. A group from University of Texas found that dietary soy reduced the circulating levels of 17-beta-estradiol by 25 percent, and the level of progesterone by 45 percent.[11] Some workers have mentioned that in Japan there is no common word for "hot flashes." *These results, of course, may result from a cluster of factors not limited to only high soy consumption.*

### Soy May Help Assist in Prevention of Osteoporosis

In laboratory rats, soy isoflavones can help reduce the loss of bone mineral density. And in tissue culture soy was shown to increase the activity of bone-forming cells (osteoblasts).[12] This suggests modest help for human bone health.

### Soy Can Help the Brain

A research group from Wake Forest University in North Carolina have shown that giving soy phytoestrogens to aged rats improves radial arm-maze test performance.[13] In human studies, 100 mg of isoflavones, which is about 3 servings of soy products per day, over a 10-week period improved short and long-term memory.[14] In postmenopausal women, six months exposure to dietary soy isoflavones showed improved verbal memory, as compared with a placebo-controlled group.[14]

Tofu is a puzzle, because a long term large study of 3,000 men and only 500 Japanese women in Hawaii[15] was associated with impaired cognitive function. This sample balance is not acceptable. All other causes for these elderly declines in mental function must be analyzed, including the spectrum of factors which can erode the brain *Obviously, just as whole wheat flour is better nutrition than white, whole soy is better than just tofu, which is a refined product. Attention must be paid, also, to processing of tofu. Acetylcholine synthesis, which is involved in cognitive function, should be better with whole soy.*

### Soy and Behavior

A group in Arkansas fed pregnant rats very high doses of genistein. The results were clear. *Very high doses* reduced food consumption and weight gain of the progeny with some subtle changes in sexually dimorphic behaviors, but *those given lower doses were normal*. Soy critics can jump on this data and scare anxious mothers about their children's behavior.

Also! Before forced and often barbarous abortion pogroms in China, did the Chinese really have trouble having enough population?

### Summary

- Soy is a rich source of phytochemicals, including isoflavones, that are beneficial to the body.
- Soy makes a contribution to reduction of heart and blood vessel disease.
- Soy, in an overall preventive lifestyle, reduces cancer of the breast and prostate.
- Soy is an excellent source of protein.
- Soy is an excellent source of healthful fat.
- Soy is not a panacea or cure all. It is not a substitute for cancer surgery and appropriate definitive therapy. Soy is a food, not a cure-all.
- Whole soy has more values than just genistein.
- Overuse of extracts is unwise.
- Soy has demonstrated for centuries in Asia and for decades in Western laboratories that when seriously used in moderation, it is a valuable part of a modern progressive preventive diet.

Too often research is looking for fame and fortune day after tomorrow. Too frequently researchers are looking for a molecule that will prevent, cure, or at least stop cancer and/or heart disease when used every day at high dosages (and prices), with *no change in lifestyles* that violate laws written in the fabric of our bodies and immune systems. It is vanity!

Freedom from disease means obeying *all* the laws of our being. Most fortunately, soy is a package of useful nutriments, not an aspirin. Abundant living is a gestalt, a whole program of enlightened cooperation with our Creator.

We must remember that these soy components come in the context of many other health-promoting factors—not only in the whole dehulled soybean but in a balanced, appropriate diet of fruits, vegetables, whole grains and all the other components that add up to an excellent diet.

## Verdict?

Soy is acquitted of charges currently brought against it. You may enjoy its nutritional and health benefits, as well as its many delicious recipes with a clear conscience and increased health.

*Vive la soy!* ■


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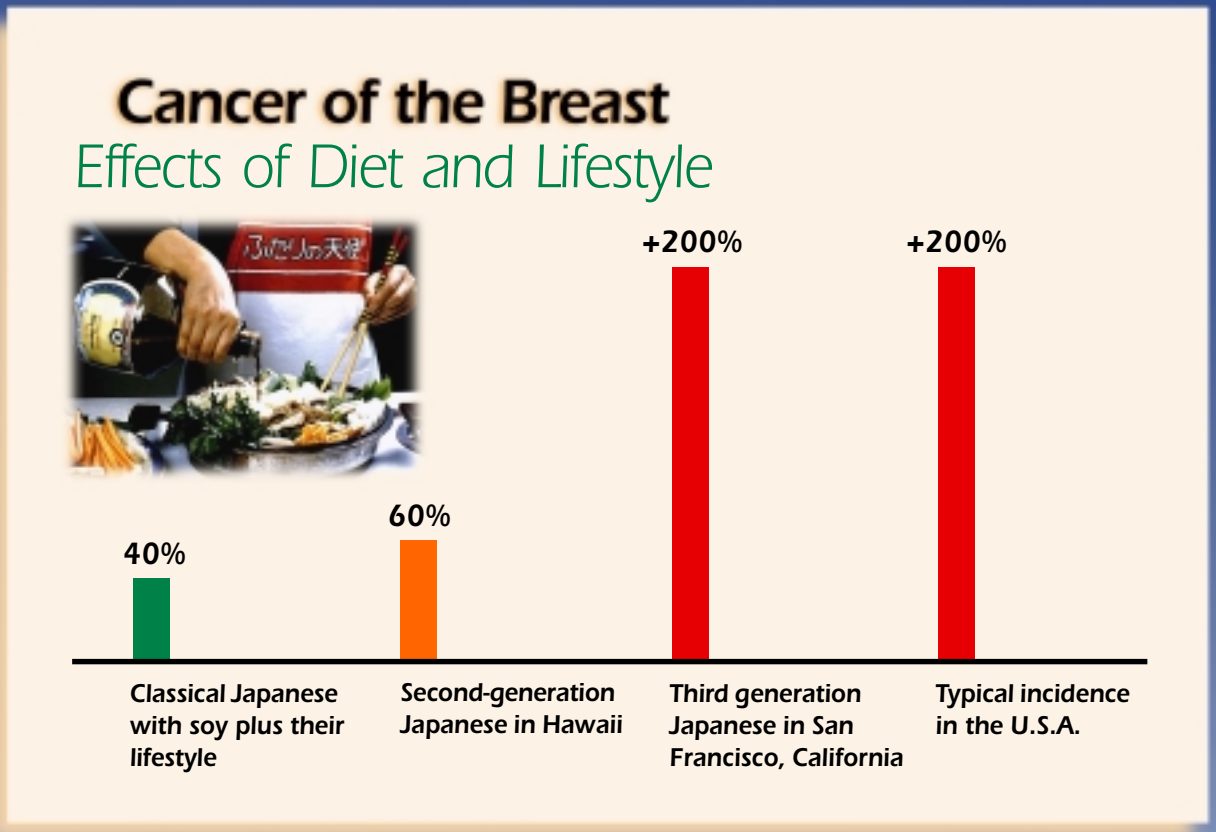
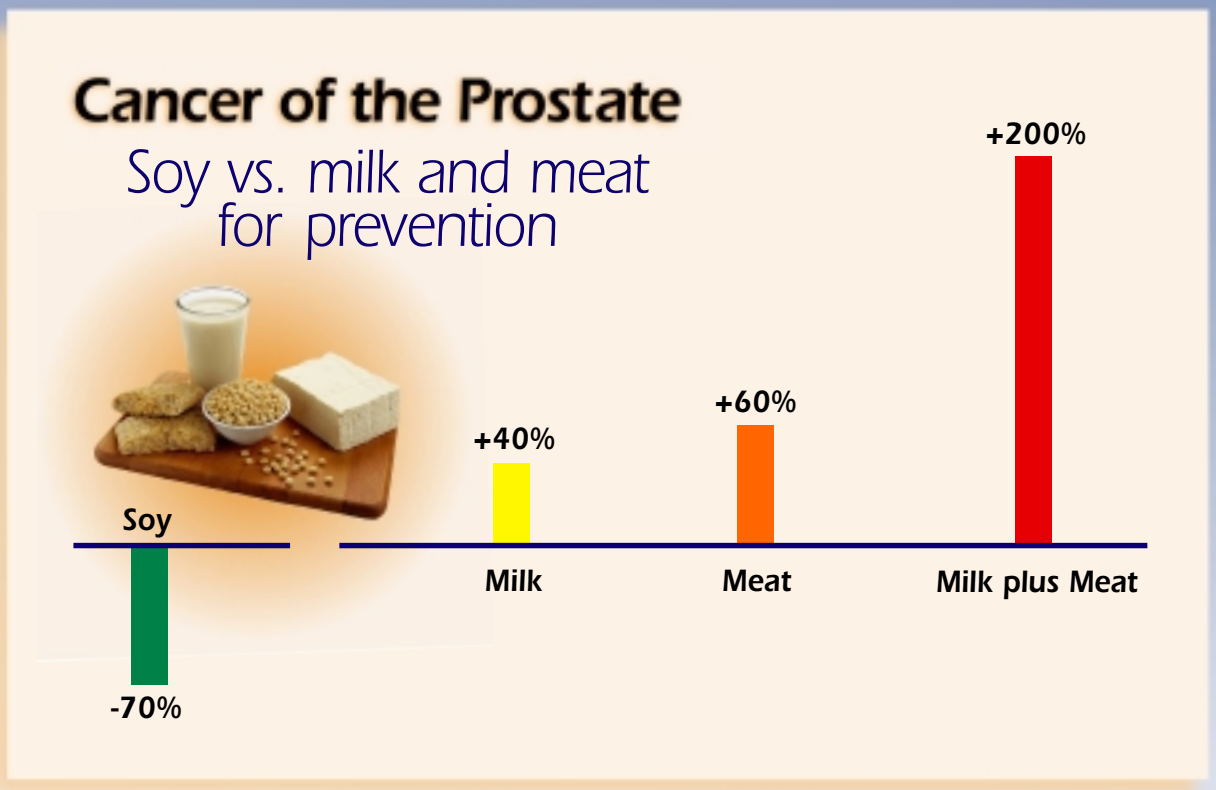
*Continued on page 26.*

*Figure 1.*




*These data from 50 year-old women infer that steady use of soy plus undefined factors from the simpler classical Japanese lifestyle are preventive for this cancer.*
Spratt, J.S., Donegan, W.L., and Sigdestad, C.P., *Cancer of the Breast*, Donegan and Spratt Eds. Saunders, Philadelphia, 1995, p. 119.

*Figure 2.*




Photos: top, Loma Linda Hardinge Series; bottom, CD

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