Another Perspective on Soy

By David Dahlman, D.C.

The anti-soy bias has grown to a fever pitch. Embraced by numerous authors writing almost carbon copy essays and misinterpreting the same flawed studies, an unbiased review of those studies along with others, reveals a much different perspective. An example of misinterpreting a study is the linking of soy to rickets by citing a 1919 study by Mellanby using dogs and failing to note they were raised exclusively indoors in the absence of sunlight or ultraviolet light. Another is to link soy to goiters and fail to mention the researchers purposely eliminated iodine from the diet or severely restricted it. And that’s just the beginning.

There are many forms of soy consumed throughout the world such as raw soybeans, steamed (edamame), soy milk, tofu, soy oil, soy lecithin, soy meal, soy flour, soy protein concentrates (70 percent protein), soy protein isolates (90-95 percent protein), fermented soy (tempeh, tamari, natto, miso) and the active ingredients called isoflavones, the most common; genistein and daidzein. Most of the critics are in agreement that the dangers of soy revolve around the unfermented types and isoflavones of soy, without regard to the growing body of emerging data suggesting that intestinal microflora ferment unfermented soy and also affect isoflavone absorption and metabolism.

Historically, soy foods have been an integral part of the Asian diet. This large body of accumulated epidemiological data has not shown that soy consumption poses any substantial risk to human health. The anti-soy faction are sure that soy is not a complete protein, prevents mineral absorption and the action of digestive enzymes, causes rickets, cancer, goiter and lowers thyroid hormones and is responsible for the breakdown of muscle. Let’s take a look at each of these and other claims.

Complete Protein

One controversy revolves around the completeness of soy as a protein. The old method of evaluating protein quality known as the protein efficiency ratio (PER) was based on the response of growing rats to a particular protein source. Due to different protein needs for humans compared to rats, early studies using PER values suggested soy was not a complete protein. Updated methods for determining protein quality known as the Protein Digestibility Corrected Amino Add Score (PDCAAS) adopted by the FDA and World Health Organization show soy having the same score as egg white and milk protein.

Mineral Absorption

Soy products provide a balance of nutrients including minerals and their bioavailability depends on the form of the soy product and whether fiber and/or phytic acid (inositol hexaphosphate) is present. Phytic acid can bind minerals in the gastrointestinal tract. In diets where soy represents a small percentage of total calories, other mineral rich foods contribute to offset this issue. In diets high in soy, removal of phytic acid increases mineral bioavailability and cooking partially destroys phytic acid and again, as long as used in a well balanced diet, soy creates no health concern.
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Inhibition of Digestive Enzymes

Raw soybeans contain a family of protease inhibitors that can bind to trypsin and other proteolytic digestive enzymes and inhibit their action. As with other protease inhibitors, they can be destroyed by heat increasing the digestibility of soy. This is not unique to soy, protease inhibitors are ubiquitous in food. Raw soy flour has only half as much trypsin protease inhibitor activity as raw potato and a similar amount to raw egg. Animal studies suggest that protease inhibitors may cause pancreatic cancer, however there is no direct evidence of low levels being harmful to humans. In fact, recent studies have suggested protease inhibitors may be anti-cancer agents.

Thyroid

In addition to the misinterpreted study previously mentioned in the first paragraph that purposely restricted iodine, there have been additional in vitro and animal studies that link soy intake to inhibition of thyroid peroxidase, lowered thyroid hormones and goiter.

Though Divi, Chang and Doerge believe they had found a link to goiter in 1996 and 1997, a subsequent study by Chang and Doerge in 2000 found cases of goiter only in those predisposed or consuming diets lacking in iodine. They also found that genistein can deactivate thyroid peroxidase with no accompanying effect on thyroid hormones. In fact, the University of Minnesota recently found that the consumption of isoflavone-rich soy protein, at levels that were as much as 3-4 times the isoflavone intake in Japan, had little effect on thyroid hormone levels in either pre- or postmenopausal women over a three-month period.

In addition, a recently conducted double-blind study six months in duration, that involved 38 postmenopausal women who were not on hormone therapy, found no differences in thyroid function, based on measures of thyroid stimulating hormone (TSH), total T4 and T3, between subjects given daily either a placebo or a soybean isoflavone extract that provided 90 mg (equal to approximately three servings of soy) of isoflavones.

Improper conclusions have also been drawn from a New York Times article in 1996 discussing 100 million cases of goiter in China. Goiter occurs in inland areas of all continents because of diets insufficient in iodine compared to coastal areas that utilize fish and seaweed which are iodine rich. In contrast, developed countries have better food distribution and most salt is iodized specifically to prevent goiter.

Rickets

In the often misquoted study mentioned in the first paragraph of dogs housed in the absence of sunlight and fed one of four cereal diets, Mellanby in 1919 clearly established the role of diet in the cause of rickets, but not because of soy. Mellanby soon established that all four of his diets were relatively deficient in calcium and lacked favorable calcium/phosphorus ratios. Interestingly, it was his work that led to McCollum’s later discovery of Vitamin D and its deficiency as being the cause of rickets. Vitamin D and its connection to calcium and bone metabolism is now well established. It should also be noted that neither Mellanby nor
McCollum ever suggested soy as the cause of rickets.

Cancer and Hormone Levels

Critics once again connect the unconnected in order to place blame on soy. Asian and Japanese populations do have higher rates of esophageal, stomach, liver and pancreatic cancer. It is a leap of logic to conclude that soy is the only responsible variable.2

Epidemiological evidence shows the responsibility for some of these cancers may well be a lack of refrigeration in the rural areas of these countries as well as the consumption of much smoked or barbecued meat. Liver cancer rates may be more specifically linked to higher rates of Hepatitis B and the presence of aflatoxins in the food supply. Clearly, there are many variables potentially responsible for high cancer rates, not just soy.

Specific hormone related cancers (breast and prostate) are low in Asia and may be linked to early intake of soy.21 It is hypothesized that isoflavones weakly bind to estrogen receptors and block estrogen from the receptors or they inhibit enzymes that promote cancer cell growth.22

Soy contains many anti-cancer agents such as isoflavones, protease inhibitors, phytic acid and phytosterols (beta-sitosterols). Saponins as well, possibly due to their anti-oxidant activity and/or ability to regulate cellular proliferation are anti-carcinogenic.4

One fact should be made clear. There is no estrogen in soy! The term “phytoestrogen” confuses people. A more accurate term may be “estrogen-like phytodaptogen.” Unlike estrogens, which are uniformly agonists, and anti-estrogens, which are uniformly antagonists, adaptogens will enhance or suppress activity depending on the physiological needs of the tissue. This response is discussed in the literature as selective estrogen response modifiers (SERMs). Most notable SERMs are tamoxifen for breast cancer reduction and raloxifene to improve bone mass.24,25 Many natural “SERMs” also exist.

Claims by critics of soy that the “amount of phytoestrogens that are in a day’s worth of soy infant formula equal five days of birth control pills” loses its impact when the preferential tissue response of adaptogens is better understood accompanied by the realization there is no estrogen in any soy product.

It is well documented that a low lifetime exposure to estrogen reduces the risk of breast and prostate cancer. Recent research has taken a closer look at specific estrogen metabolites, 16-alpha hydroxy-estradiol and 4-hydroxy-estradiol and determined they are genotoxic.

Soy isoflavones may shift estrogen metabolism towards the production of more beneficial metabolites such as 2-hydroxy-estradiol and improve the 2:16 ratio.26,27 A word of caution for estrogen receptor positive breast cancer patients. There is no conclusive evidence that isoflavones are harmless or harmful under this circumstance.18 Unfortunate...
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Cardiovascular Disease

In 1999, the FDA approved a health claim for soy protein and its effect on lowering cholesterol saying, “Diets low in saturated fat and cholesterol that include 25 grams of soy protein a day may reduce the risk of heart disease.” This health claim was approved only after an extensive, yearlong review of the studies.

In numerous controlled human clinical trials, Anderson, et al., found that soy consumption rather than animal protein significantly decreased serum concentrations of total cholesterol, LDL and triglycerides in hypercholesterolemic individuals, but not in normolipidemic individuals.

Other Concerns

A byproduct of high temperature or alkaline processing is lysinoalanine. Critics of soy remind us that it is a toxin without also mentioning that it is also found in milk or any other processed food. Milder processing techniques have replaced aluminum tanks leaving only naturally processed foods. Additionally, stainless steel processing tanks have replaced aluminum tanks leaving only naturally processed foods. Multiple studies also suggest soy will reduce hot flashes and vasomotor symptoms in women using soy foods, soy protein isolate and soy extracts (40-80 mg. isoflavones per day).

Muscle Protein Breakdown

Critics warn athletes who use a soy based protein powder that they may actually be breaking down muscle instead of building it. In citing a study with pigs fed either a casein based or soy based diet, researchers claim the soy based diet resulted in muscle breakdown as opposed to the casein based diet. The critics fail to recognize the researchers say in the study they supplemented the casein fed pigs with methionine, threonine and tryptophan. Regardless, no human eats a diet of 100 percent soy or casein.

In Summary

The most commonly quoted studies seem to be interpreted simply to advance the argument rather than to understand it. Reading of the titles or only the discussion portion of the studies by the soy critics ignore the internal design of the study and have lead to wrong conclusions. Common sense will find that one thing is certain. Rarely will you find billions of people embracing a food for centuries only to find they have been wrong.

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7. U.S. Food and Drug


26. Xu X, Duncan AM, Merz BE,


