

A Primer on Soy



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Soy: A Historical Perspective

Chinese historical documents suggest that soybeans have been grown and consumed for many thousands of years. Archeological finds and dating of early Chinese writings indicate that soybeans emerged in the eastern half of Northern China as a domesticated crop during the Chou dynasty (11th to 7th Century BC).

The four most important soyfoods were miso, soy sauce, tempeh and tofu. Miso is a fermented soyfood that originated in China, and was modified in Japan where it has remained a staple of the diet for centuries. Soy sauce was a by-product of miso production, and both were used to flavor foods, just as they are today. Tempeh, which originated in Indonesia, is made by fermenting cooked soybeans with a common mold. Tofu is the curd formed by adding certain salts to soymilk, and is not fermented.

In the United States, the introduction of the soybean is documented in Georgia, where Samuel Bowen first planted soybeans on his plantation in the 1760s, and patented processes to make soy sauce and vermicelli (soy noodles). Almost two hundred and fifty years later, pastas made with soy were introduced into the American market.

Recent innovations in soyfood processing have created an array of soy-based foods for infants, children and adults. In 2001, more than 300 new soyfoods appeared in the marketplace, as food manufacturers continue to refine time-honored processes to produce traditional soyfoods and use advanced technologies to create new, flavorful products tailored for the modern American diet. In the United States, soy drinks and tofus, as well as refrigerated soyfoods, can be found in most supermarkets.

Soy Health Claim

On October 26, 1999, the Food and Drug Administration authorized a health claim that links the consumption of soy protein with a reduced risk of coronary heart disease. The FDA reviewed hundreds of scientific research studies and public comments before granting the soy and heart disease health claim. During this review process, FDA found no credible evidence that soy causes harm when consumed by humans. The FDA approved health claim recommends 25 grams or 4 servings of foods with 6.25 grams of soy protein daily to lower cholesterol significantly (FDA Final Rule; 64 (206) 1999). A wide variety of soyfoods including: regular and seasoned tofu, soy-based beverages, cereals, burgers, hot dogs, deli slices, baked goods, tempeh, frozen desserts, protein bars, cheese, and yogurt alternatives carry the claim.

All About Soy

Fact: Fermenting and modern processing result in safe, convenient and healthful soyfoods. Soybeans used in foods undergo some type of processing. Processing techniques include both traditional and modern methods. Traditional methods employ germination, cooking, roasting, and fermenting. More modern processing removes undesirable constituents by fractionation or extraction. All of these treatments can increase the digestibility of soy proteins, remove indigestible sugars, inactivate enzymes that affect flavor, and prevent undesirable changes that may occur during storage.

All About Soy (Cont.)

Some groups have raised questions about the trypsin inhibitors contained in raw soybeans. Trypsin inhibitors are small proteins which are also present in many other plant products including raw legumes, cereals, potatoes, and tomatoes. Trypsin inhibitors can reduce the efficiency of digestion of dietary proteins but are mostly destroyed when beans are heated during cooking to make soyfoods (J Nutr, 1995). Small quantities of trypsin inhibitors are not detrimental to health but rather they may have beneficial effects in reducing tumor growth and preventing the spread of some cancers (Am J Clin Nutr, 1998).

Others question the presence of lysinoalanine created during modern alkaline processing conditions because in initial rat studies this compound was linked to a unique kidney lesion. No evidence of kidney lesions in humans has ever been found. Proper processing of soy minimizes formation of lysinoalanine.

Fact: Soy does not adversely affect thyroid function when diets contain sufficient iodine. In healthy adults, consuming soyfoods appears to have no negative effect on thyroid function (J Clin Endo Metab, 1999). In fact, the findings of a recent human study suggest that consumption of both traditional and modern soyfoods is associated with a reduced risk of thyroid cancer (Ca Epi, Biom, & Prev, 2002). However, in people who are predisposed to goiter or who are consuming marginally iodine sufficient diets, soy could conceivably be a risk factor for goiter. Screening for thyroid dysfunction, as recommended by the American Thyroid Association (ATA), would identify those individuals with risk factors.

Reports of goiter and hypothyroidism in human infants fed soy-flour based formulas in the 1960s predate the supplementation of soy protein-based formulas with iodine. Today, the American Academy of Pediatrics recognizes iodine fortified soy-based infant formula as a safe and effective

alternative for infants allergic to cow's milk to provide appropriate nutrition for normal growth and development (Pediatrics, 1998).

Fact: Soyfoods containing isoflavones provide a variety of health benefits. Lowered risks of certain cancers, cardiovascular disease, and osteoporosis have all been attributed to soyfoods containing isoflavones. Isoflavones are described as phytoestrogens (plant estrogens) because their structure and metabolism resembles that of human estrogens. These plant estrogens are much weaker than naturally circulating human estrogens and they have approximately 1/1000th of the biological activity of synthetic estrogens. Some groups have raised concerns about fertility of soyfood consumers. People consuming diets rich in phytoestrogens from soy have not shown signs of infertility (J Nutr, 2002).

Fact: Soyfoods are different from soy supplements. Eating soyfoods is different from consuming supplements containing isoflavones. Isoflavones are biologically active compounds found in soy and other plants. Studies using rat models often add purified isoflavones at levels much higher than those found in human diets. Research indicates that isolated isoflavones do not always have the same action as isoflavones found in their natural state as part of soybeans.

Fact: Soyfoods are safe to consume throughout the life cycle. People who consume traditional soyfoods as a normal part of their diet throughout their lifespan, including pregnancy and lactation, do not show evidence of growth or endocrinological problems. Comparisons of adults fed soy formula or breast-fed as infants indicate no significant differences in growth, maturation, fertility or other reproductive outcomes (JAMA, 2001).

A critical review of breast cancer studies suggests that adult consumption of soyfoods is not likely to result in adverse outcomes (Breast Ca Res Treat, 2003). In fact, early dietary exposure to soyfoods may have beneficial health effects in humans. Consuming

soyfoods during adolescence has been shown to decrease the risk of breast cancer in Asian women (Ca Epi Biom & Prev, 2001).

Fact: Soyfoods provide high quality protein. Soy proteins are high quality proteins that contain all the essential amino acids in appropriate ratios needed for human growth and body maintenance, and are readily digestible. The FAO/WHO Expert Consultation on Protein Quality and the National Academy of Sciences Food and Nutrition Board have determined—using the “protein digestibility corrected amino acids score” (PDCAA)—that soy protein and egg white have the maximum score of 1, followed by milk and meat proteins. Soy protein is “complete”, which means it can provide all of the amino acids needed in the human diet. Soy protein is the only plant source of complete protein.

Fact: Phytic acid, a component of all plants, has benefits and detractions. Phytic acid affects mineral bioavailability, particularly zinc, iron, calcium and copper. It has the capability of forming complexes with these elements, making them less available. When people's diets are adequate in zinc, iron, and calcium, phytates from soy or other vegetables and grains do not present a problem with mineral bioavailability. Possible beneficial effects of phytic acid include its antioxidant property, which reduces free radical formation. Phytic acid has been shown to have positive effects on lowering serum cholesterol and triglycerides, suppressing iron-mediated oxidation and preventing some cancers.

**Please visit
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