



Soyfoods offer nutritional and health benefits to a variety of population groups

Foods made from soybeans have been consumed for centuries in many Asian countries being prized, in particular, for their versatility. In Western countries soyfoods began to emerge in the 1970s as favorites of vegetarians and health-conscious individuals. These groups were attracted to the high protein content of the soybean. Soyfoods also provide healthful fat as they are one of the few sources of both essential fatty acids [1]. However, over the past 20 years, nutrition scientists have been investigating health benefits of soyfoods independent of the nutrients they provide. As a result of this research and the well-established nutritional attributes of soybeans, it is evident that soyfoods can be valuable additions to the diets of essentially all population groups.

INFANTS

Breast milk is the ideal food for infants [2] although many women are unable to breastfeed or choose not to do so. In addition, many of those who choose breastfeeding will switch to formula feeding at some point in the infant's development [3]. Commercially-prepared, fortified infant formulas are appropriate to supplement or replace human milk during the first year of life. Cow's milk formula is the most commonly used product, but soy infant formula is also a popular choice [4].

An estimated 20 million people in the United States have consumed soy infant formula during infancy since it first became commercially available in the 1960s [4]. Soy infant formula produces normal growth and development [5]. An allergy to milk protein is among the most common reasons for placing an infant on soy formula. There is clear evidence that soy infant formula is hypoallergenic in comparison to cow's milk formulas [6-9]. Nevertheless, because a small percentage of infants who are allergic to cow's milk formula are also allergic to soy, some health authorities suggest that many infants with documented cow's milk protein allergy should be switched directly to a hydrolyzed protein formula [10].

Despite its long history of use, soy infant formula has become controversial in recent years due to its naturally high isoflavone content [11, 12]. However, there is no evidence from clinical studies that soy infant formula consumption leads to adverse effects [13-15]. Furthermore, in 2009, the U.S. National Toxicology Program (NTP) Center for the Evaluation of Risks to Human Reproduction concluded there was "minimal concern" about the safety of soy infant formula (the five levels of concern are negligible concern,



minimal concern, some concern, concern and serious concern) [16]. In response to this report, the American Academy of Pediatrics submitted a formal letter to the NTP, which is part of the public record, in which they stated their position that there is “negligible concern” about the safety of soy infant formula.

CHILDREN AND ADOLESCENTS

Soy protein has been an important part of food aid provided by the United States Agency for International Development (USAID) to vulnerable people around the globe. Commodities currently used in such activities include precooked fortified blended foods such as corn-soy blends and wheat-soy blends. The key benefit of these protein combinations is that they can meet the protein requirements of the population at the lowest cost per serving. Short-term studies show soyfoods support the normal growth and development of children [17] and improve growth when substituted for legumes in the diets of malnourished preschoolers [18, 19]. The high quality of soy protein [20] makes it an especially valuable contribution to the goals of the USAID because it can be combined with other proteins to increase the overall protein quality of a food [21].

There are, however, benefits of soyfoods for children that go beyond their ability to help meet nutrient requirements. As with adults [22, 23], clinical research in children shows that soy protein directly lowers serum cholesterol levels and improves levels of other lipids [24-28]. There is also intriguing evidence indicating that consuming even modest amounts of soyfoods during childhood and/or adolescence substantially reduces breast cancer risk later in life [29-35].

Although soy protein does cause allergic reactions, as do many food proteins, soy allergy is relative rare. The largest survey conducted found that among U.S. adults, only one out of 2,500 reported having a doctor-diagnosed soy allergy [36]. In this survey, allergy to cow’s milk was four to five times more common than soy allergy. Children suffer more food allergies than adults, so it is not surprising more children are allergic to soy protein. However, a recent survey found about only one out of every 200 children is allergic to soy protein [37]. Milk and peanut allergies were about five times more common than soy protein allergy. Furthermore, 70 percent of children outgrow their soy allergy by age ten [38].

POSTMENOPAUSAL WOMEN

The uniquely-rich isoflavone content of the soybean accounts for much of the research interest in soyfoods. Among commonly consumed foods isoflavones are naturally found in nutritionally relevant amounts only in foods derived from soybeans [39]. Soybean isoflavones are classified as phytoestrogens, although they differ from the hormone



estrogen, and are more accurately classified as selective estrogen receptor modulators than as simple phytoestrogens [40].

Not surprisingly, much of the soy research published over the past two decades has focused on the health of menopausal women. Because they contain isoflavones, soyfoods are often viewed as natural alternatives to conventional hormone therapy. Clinical research shows isoflavones statistically significantly alleviate hot flash frequency and severity [41], improve arterial health as measured by changes in flow mediated dilation [42], reduce wrinkles and increase collagen synthesis [43] and may inhibit the progression of subclinical atherosclerosis [44].

Furthermore, concerns the estrogen-like properties of isoflavones might lead to untoward effects, such as increasing breast cancer risk, have been refuted by the human evidence. Intervention studies show isoflavone exposure does not adversely affect breast tissue as measured by changes in breast cell proliferation and mammographic density [45], and epidemiologic studies show that post-diagnosis isoflavone intake improves the prognosis of breast cancer patients [46]. Not surprisingly, the American Cancer Society has concluded that breast cancer patients can safely consume soyfoods [47]. Thus, all postmenopausal women can benefit by adding soyfoods to their diet.

MEN

Although much of the soy research has focused on understanding the health effects of soy in women, there are ample reasons for men to consume soyfoods. Soyfoods provide high-quality protein [20] and as previously noted, their fatty acid profile is very heart-healthy [1]. Furthermore, soy protein modestly lowers blood cholesterol levels [22, 23] and may also lower blood pressure [48]. There is also intriguing clinical [49] and epidemiologic [50] evidence indicating that soyfood intake helps to reduce risk of developing prostate cancer and is potentially beneficial to prostate cancer patients [49, 51, 52], although not all studies show this is the case [53]. Unfortunately, despite these proposed benefits, some men may be reluctant to consume soyfoods because of concerns that soy, as a result of its phytoestrogen content, may produce feminizing effects. However, the clinical data show that neither soy protein nor isoflavones lower circulating testosterone levels [54], raise estrogen levels [55] or adversely affect sperm and semen [56, 57]. In fact, Italian researchers suggested that soybean isoflavones could be an effective treatment of low sperm concentration [58].

CONCLUSIONS

Soyfoods can make important contributions to a healthful diet. They are good source of protein, have an excellent fatty acid profile and are uniquely-rich sources of isoflavones.



Independent of nutrient content, soyfoods may reduce risk of several chronic diseases. With the exception of the relatively rare individual who is allergic to soy protein, all healthy people can benefit from consuming soyfoods. A reasonable intake goal for adults is approximately two servings of soyfoods per day.

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