Nutrition Column

Soy Protein

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Abstract

Soy protein comes from soybeans and offers multiple health benefits, some of which are just beginning to be discovered. This column reviews the health benefits of soy products with a special focus on women and children's health. To date, little has been written or researched that is directly related to perinatal health. Thus, the column has a more broad focus so that childbirth educators have a general resource to gain knowledge related to the use of soy-based foods.

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Soy protein has received increased attention in recent years among consumers, researchers, and the media. A report released in 1995 estimated that over 12,000 food products were available that contained soy protein (Anderson, Johnstone, & Cook-Newell, 1995), and sales of soy beverages rose more than 82% in 1999 (Nestle, 2002). A recent study from Europe found that individuals with a habitually health-conscious lifestyle (e.g., individuals who did not eat meat, but did eat fish, or were vegetarians or vegans) were more likely to consume soy foods than the average person (Keinan-Boker et al., 2002). The sample included 35,955 persons, from ages 35–74 years, who completed a 24-hour dietary recall interview. From this sample, 195 men and 486 women reported consuming soy products in the last 24 hours.

The purpose of this column is to review the benefits of soy protein and to discuss what populations are likely to benefit from an intake of soy protein. Very little information is available regarding the use of soy protein foods during pregnancy, postpartum, or infancy. Therefore,

this column offers a more broad nutritional focus on soy protein with relevant information related to perinatal health interspersed throughout.

Soy Basics

Soy protein refers to the protein that is found in soybeans that is often used to replace animal proteins in an individual's diet. The soybean is a legume that contains no cholesterol and is low in saturated fat (Lindsay & Claywell, 1998). Soybeans are the only vegetable food that contains all eight essential amino acids (Dudek, 2001; Morrison & Hark, 1999). Soybeans are also a good source of fiber, iron, calcium, zinc, and B vitamins (Lindsay & Claywell, 1998).

Benefits of Soy for Health Promotion

Pregnancy

Use of soy products during pregnancy can be encouraged because expectant women are likely to receive the same health benefits as other women. Fortified milk and fortified soymilk are the only reliable dietary sources of vitamin D (Somer, 2002). All other dairy products contain little or no vitamin D. While many women will obtain enough vitamin D from exposure to sunlight, soymilk may be an alternative for those who are overly sensitive to the sun or for those who simply are not able to be or do not enjoy being outdoors. Soymilk may also be an alternative for women who do not like regular milk.

Cardiac

Consumption of soy protein in place of animal protein has been found to reduce serum concentrations of total cholesterol, low-density lipoproteins (LDLs), and trigylcerides (Arliss & Biermann, 2002; Morrison & Hark, 1999). The precise mechanism of action is not known, though several theories exist (Dudek, 2001). One theory proposes that cholesterol absorption is impaired or altered (Dudek, 2001). Another theory postulates that phytoestrogens (plant compounds that have hormone-like effects; isoflavones are the phytoestrogens found in soy products; see Table) bind to estrogen receptors and produce similar effects including lowering LDLs and increasing high-density lipoproteins, vasomotor tone changes, and arterial wall function (Dudek, 2001). Individuals with elevated cholesterol seem to receive the greatest benefit (Hasler, 2002).

Table Definitions of Soy-Related Terms

Isoflavones—Phytoestrogens found in soy products.

Lignan—Phytoestrogens from grains (flax seed).

Phytochemical—A chemical that is found in plants.

Phytoestrogens—Plant compounds that have hormone-like effects in the body.

Individuals need to consume about 25 grams of soy protein or more each day to obtain results (Wardlaw, 2000). Twenty-five grams of soy protein equals 1¼ cups of tofu, 1–2 cups of soymilk, or an ounce of soy flour. Individuals are encouraged to read food labels in order to verify a particular food's soy content. The U.S. Food and Drug Administration (FDA) approved the health claim for the relationship between soy product consumption and reduced risk of coronary heart disease in 1999, based on the result of human clinical intervention trials (Hasler, 2002). While the FDA has approved the claim of health benefits, Munro and colleagues (2003) conducted a meta-analysis of the current literature and found that the literature supports the safety of isoflavones because they are typically consumed in soy or soy products.

Obesity and Diabetes

In recent studies, soy protein contributed to the control of hyperglycemia and reduced body weight, hyperlipidemia, and hyperinsulinemia (Bhathena & Velasquez, 2002). These characteristics may be useful to both nondiabetic and diabetic persons in the control of obesity and blood sugar.

Cancer Prevention

Genistein, one of the phytochemicals found in soy, can reduce the risk of cancer (Wardlaw, 2000). To date, prevention of breast cancer has received the most attention, and more recent attention has focused on prostate cancer (Whitney & Rolfes, 2002). Genistein blocks cancer development by preventing tumors from creating blood vessels that would provide nourishment for growth (Arliss & Biermann, 2002; Wardlaw, 2000). One serving a day (e.g., 1 cup of soymilk, ½ cup of tofu or soybeans) is effective for cancer prevention (Wardlaw, 2000).

Menopausal Symptoms

Phytoestrogens are currently being researched to determine their usefulness in acting like synthetic estrogen to protect women from bone loss and maintain a healthy heart (Wardlaw, 2000). Soy protein has been found to positively influence bone and calcium balance in postmenopausal women (Arjmandi et al., 2003). Results were especially significant for women who were not receiving hormone replacement therapy. These same results were not seen in young, healthy women who were still menstruating (Anderson et al., 2002).

Benefits of Soy for Special Populations

Vegetarians and Vegans

Vegetarians are individuals who, for various reasons, do not eat meat. Vegans, in comparison, are individuals who do not eat any products from animals, including eggs, milk, and cheese. Vitamin B_{12} is only found in animal products and, therefore, may be lacking in the diet of vegans. Use of soymilk is one way to obtain this essential vitamin (Dudek, 2001). Cereals and meat substitutes are other options.

Infants with Special Conditions

Infants born with lactase deficiency or galactosemia benefit from the use of soy-based formulas (Dudek, 2001). Parents who wish to put their newborn on a vegetarian diet may choose to use a soy-based formula. In addition, infants who are recovering from episodes of diarrhea (and are normally given breast-milk substitutes) may have soy formula recommended to facilitate their recovery. Soy-based breast milk substitutes (formulas) include Prosobee (Mead Johnson) and Isomil (Ross). While soy-based formulas meet an infant's growth and development needs, they do not offer any advantage over milk-based formulas (Whitney & Rolfes, 2002).

Infants who are not able to tolerate lactose formulas (those based on cow's milk, casein/whey-based formulas; e.g., Similac, Enfamil, Carnation) may be prescribed soy-based formulas if they are not breastfed (Wardlaw, 2000). Each year, about 20%–25% of infants are converted to soy protein formulas (American Dietetic Association and Dieticians of Canada [ADA], 2000). The development of lactose-free cow's milk protein-based formulas has made it unnecessary to switch infants to soy-based formula (ADA, 2000), though the practice is still common. The use of soy-based formula is effective in only about 20%–50% of infants because the soy protein eventually triggers a reaction in susceptible infants (Wardlaw, 2000). In this instance, predigested protein formulas can be used (e.g., Nutramigen, Alimentum). According to the ADA (2000), soy-based formulas are not recommended for preterm infants weighing less than 1,000 grams and for infants with low birth weight as a means for preventing or managing colic or gastroenteritis.

Preschool Children

In a recent study, ingesting soy-based formula or soymilk was associated with peanut allergy in a geographically diverse sample of 13,971 preschool children (Lack, Fox, Northstone, Golding, & the Avon Longitudinal Study of Parents and Children Study Team, 2003). The authors proposed that the association of peanut allergy with the intake of soy products could be related to cross-sensitization through a common substance (Lack et al., 2003). More research is needed in this area.

Summary

Soy protein products offer benefits to women in various life stages. Benefits include improved diet and cardiovascular status, prevention of certain types of cancer, improved health following menopause, obesity prevention/control, and more options for food variety. The area of soy protein research has increased in popularity in recent years among multiple health disciplines. Future research efforts are likely to include more scientific advances in the use of soy in the diet of Americans. As more is learned about the health benefits of soy, additional foodstuffs will likely be available to meet the community's needs for soy products.

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