

# SoyConnection

Health & Nutrition News About Soy

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## The Health Impact of Childhood Soy Consumption

- Soy and Non-Dairy Plant Milks
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# HEALTH IMPACT OF CHILDHOOD SOY CONSUMPTION

By Connie Liakos, MS, RDN, CSSD, LD

The soybean is a nutrient-dense food that offers many health benefits that can contribute to the growth and development of children. Soyfoods can contribute several important nutrients to the diets of children such as protein, essential fatty acids, calcium, potassium, and folate.<sup>1-3</sup>

As in adults, soy protein lowers circulating cholesterol levels in children and there is intriguing evidence indicating the consumption of as little as 1 serving of soy per day during childhood may markedly reduce risk of developing breast cancer later in life.<sup>1</sup> Epidemiological research involving Asian and Seventh-day Adventist populations as well as clinical research supports the safety of soyfoods.<sup>1</sup>

Soyfoods are an increasingly popular food choice in the United States. Americans enjoy traditional Asian soyfoods such as miso, natto, tempeh, edamame, and tofu and also consume soy ingredients including isolated soy protein, soy protein concentrate, and soy flour/textured vegetable protein as a component of soy-based meat and dairy analogues.<sup>1</sup> With the increasing interest among Americans in plant-based diets, vegan/vegetarian eating patterns, and non-animal protein sources, the topic of soy and how it can positively contribute to children's diets has become increasingly relevant. An estimated 6% of young adults ages 18 to 34 identify as vegetarian.<sup>4</sup> Many of these young adults are becoming parents, which results in an increased interest in how soy can be incorporated into the diets of children.

## ISSUES OF CONCERN TO PARENTS

### *Hormone Levels and Puberty*

Although the research is limited, the evidence indicates that soy does not affect circulating hormone levels.<sup>1</sup>

Children are entering puberty earlier in life throughout much of the world. This development is giving rise to considerable concern. Factors potentially contributing to early menarche include increasing obesity and increased animal protein intake. Because soyfoods contain isoflavones, there is interest in determining whether soy intake impacts onset of menarche. While there is limited research on this topic, a study involving 327 U.S. Seventh-day Adventist girls showed that even very high intakes of soy protein-containing foods (24 servings/week) is not associated with the age of menses onset.<sup>5</sup>

### *Breast Cancer Risk Reduction*

Epidemiological studies show that soy consumption early in life is associated with a lower risk of breast cancer in adulthood.<sup>1</sup> It appears that isoflavone exposure early in life causes cells in the developing breast to become permanently less likely to be transformed into cancer cells.<sup>6</sup>

### *Cholesterol*

Limited research suggests that soy protein lowers elevated cholesterol in children as well as in adults.<sup>1</sup> The U.S. FDA approved a health claim for soyfoods and coronary heart disease in 1999 based on the cholesterol-lowering effect of soy protein. However, the FDA proposed revoking this claim in 2017 and it is currently under review. Meta-analyses of the clinical data indicate that soy protein lowers LDL-cholesterol approximately 4–6%.<sup>7,8</sup> The most recent meta-analysis of such data, which included only those studies considered by the FDA in its review of the claim, found soy protein lowered LDL-cholesterol by a statistically significant 3.2%.<sup>9</sup>

### *Soy Protein Allergenicity*

Soy protein is 1 of the 8 primary allergens in the United States that collectively account for 90% of all food-allergic reactions.<sup>10</sup> Recent research indicates that approximately 1 out of every 200 children and adolescents are allergic to soy protein, although this estimate is based on self-reported data and may, therefore, be inflated.<sup>11</sup> Furthermore, it is estimated that approximately 70% of children will outgrow their soy allergy by age 10.<sup>12</sup>

Newer guidance on prevention of food allergies suggests that allergenic foods, including soy, can be introduced to infants along with other solid foods between 6 and 11 months.<sup>13</sup> The American Academy of Allergy, Asthma and Immunology (AAAAI) advises that “highly allergenic complementary foods may be introduced between 4 and 6 months of age once a few typical complementary foods have been fed and tolerated.” The AAAAI cites emerging data encouraging early introduction of highly allergenic

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foods to possibly prevent food allergy in infants. Parents should discuss the introduction of highly allergenic foods with their healthcare provider, particularly if there is a strong family history of food allergy.

From a practical point of view, soyfoods most suitable for 6 to 12-month-old infants include tofu and soy-based yogurt (as high fat as available). Soyfoods with high levels of sodium should be avoided the first year. Infants and toddlers ages 6 months to 3 years should avoid items that pose a choking risk such as edamame or soy nuts.

## USE OF SOY INFANT FORMULAS

Human breast milk remains the gold standard for nourishing infants and should be promoted and supported as the ideal source of infant nutrition whenever possible. Infant formulas provide an adequate substitute for infant nutrition when breastfeeding is not feasible. Among formula-fed infants, soy infant formula (SIF) comprises approximately 11.6% of the total.<sup>14</sup> There is little difference in growth patterns between infants fed cow's milk-based formulas or SIF.<sup>15</sup>

The American Academy of Pediatrics (AAP) advises SIF use when strict dietary lactose elimination is required in cases of infants with galactosemia or primary lactase deficiency (an extremely rare condition). SIF also provides a safe alternative for vegan infants. SIF is not designed or recommended for preterm infants.<sup>15</sup>

## NUTRIENT CONTENT

Soyfoods can contribute several important nutrients to the diet, such as folate and potassium, and are unique among legumes for their higher protein and fat content and lower carbohydrate content.<sup>2</sup>

### Protein

While most plant-based proteins are low in 1 or more essential amino acids, this is not the case for soyfoods as they are sources of high-quality protein. Protein digestibility-corrected amino acid scores for soy protein range from approximately 0.9 to 1.0, depending on the source of the soyfood, making soy protein comparable in quality to animal protein.<sup>13</sup>

Children may benefit from additional protein beyond the Recommended Daily Allowance (RDA). In one study, when protein needs were directly measured in children using stable isotopes, the protein requirement was more than 50% higher than the RDA.<sup>16</sup> Protein has been found to be more satiating than the other macronutrients,<sup>17</sup> which is a factor in obesity prevention, and adequate protein intake in youth enhances bone mineral content.<sup>18</sup>

### Vitamins & Minerals

Soybeans are a good source of several vitamins and minerals—many of which are critical in the growing child. Soy contains folate, which is important during periods of rapid cell division. Soy is also a good source of other B vitamins, potassium, magnesium, and iron. For instance, ½ cup of cooked soybeans provides greater than 10% of the Daily Value (DV) for thiamine, riboflavin, vitamin B6, folate, potassium, magnesium, and selenium, and also provides greater than 20% of the DV for copper, iron, manganese, phosphorus, and molybdenum. Specific soy-

## Probiotics and Prebiotics

Research on the human microbiome is an emerging science, focusing on the composition of the trillions of bacteria present in the gut. Much of this research is focused on the effects of probiotics and prebiotics on such bacteria.

**Probiotics** are live microorganisms that confer a health benefit to the host. Several strains of bifidobacteria and lactobacillus are commonly present in fermented foods such as miso, natto, tempeh, yogurt, kefir, sauerkraut, and kombucha.

**Prebiotics** are substances that are non-digestible by humans, yet serve as food for the gut microbiota. Prebiotics such as inulin and oligosaccharides are fermented and digested by some of the microorganisms present in the intestinal tract. Certain soyfoods, legumes, vegetables, fruits, and whole grains contain prebiotics.<sup>28</sup>

foods will vary in nutrient content depending on the form and type of processing. For example, tofu that is set with a calcium salt can supply as much as 27% of the DV for calcium per 3oz. serving.<sup>19</sup>

Iron deficiency remains a problem in American children. More than 7% of children ages 1 to 5 are reported to have deficient total body iron as calculated by serum ferritin and soluble transferrin receptor concentrations.<sup>20</sup> While soy contains phytates, which are thought to interfere with iron absorption, 2 areas of newer research show iron from soy is absorbed at a much higher rate than once thought. One, much of the iron in soy is present in the form of ferritin, which may be resistant to inhibitors of iron absorption.<sup>21</sup> Two, there appears to be adaptation to the inhibitory effects of phytates on iron absorption.<sup>22</sup> In other words, acute studies suggest that regular soy consumption can mitigate the inhibitory effect of phytate on iron absorption.

Calcium-fortified soy products provide an excellent source of calcium. Even though soybeans contain phytate and oxalate, compounds that inhibit calcium absorption, the absorption of calcium from calcium-fortified soymilk and calcium-set tofu is similar to the absorption of calcium from cow's milk.<sup>23,24</sup>

### Microbiome Issues

A hot topic in human nutrition, the human microbiome is known to be influenced by dietary factors. The microbiome refers to the trillions of gut bacteria which play a crucial role in maintaining immune and metabolic homeostasis and protect against pathogens.<sup>25</sup>

Fermented soyfoods are a source of probiotics and some are also a source of prebiotic fiber.<sup>26</sup> In addition to the probiotics contained in fermented soyfoods (e.g., natto, miso,

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# SOY AND NON-DAIRY PLANT MILKS

By Beth Smolko, DMS-C, MMS, PA-C

In clinical practice, I am often asked about the nutritional value of non-dairy plant milks (NDPMs). This question usually comes up during office visits when the parents have religious or dietary preferences which exclude dairy or when toddlers and young children have cow's milk protein allergy or lactose intolerance. Although many people are indeed lactose intolerant, some research shows that even those with this condition can tolerate some milk as long as intake is spread throughout the day.<sup>1,2</sup> Fortunately, there have been many studies and comprehensive reviews over the past few years comparing the nutritional value of NDPMs with cow's milk that can be of assistance to clinicians in providing patients and their families with the best evidence-based guidance.

Commercially, the most commonly found NDPMs include those made from soybeans, rice, nuts (almond, walnut, hazelnut, and cashew), coconut, oats, hemp, and flax.<sup>3,4,6,7</sup> When advising patients and clients, one should emphasize the importance of consuming products fortified with calcium and vitamin D, and perhaps also vitamin A, C, riboflavin, and B12.<sup>3,6</sup> Of the various NDPMs, only soymilk (8g) and pea milk (7g) have a protein content similar to cow's milk.

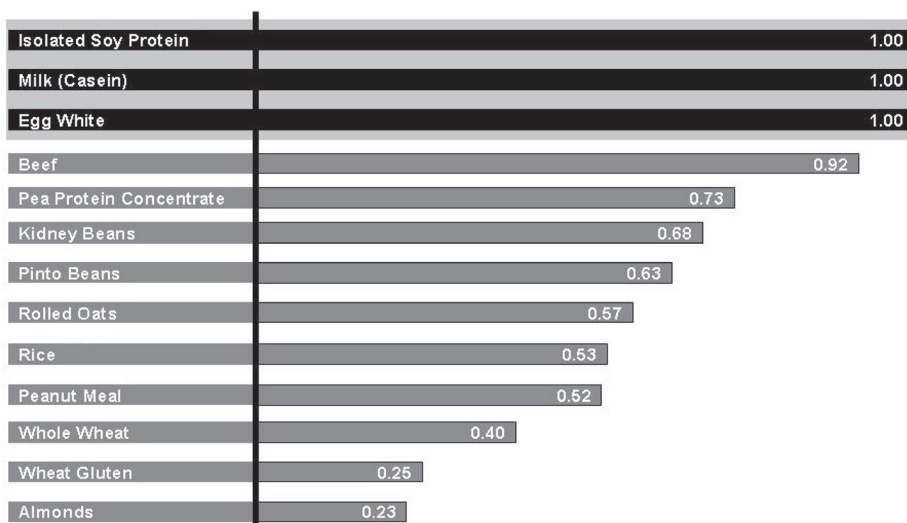
Most other NDPMs typically have one quarter to one half the amount of protein of soy and cow's milk.<sup>5,6</sup> However, plant milks fortified with isolated forms of plant protein so that their protein content is similar to cow's milk have become available recently.

In addition to providing a similar amount of protein as cow's milk, the quality of soy protein is similar to the quality of cow's milk protein. Protein digestibility corrected amino acid scores for soy protein range from about 0.95 to 1.0. The quality of soy protein is much better than the quality of the plant proteins found in other NDPMs (see table below).<sup>8,9</sup>

Aside from their role in meeting nutrient needs, there may be other benefits to consuming NDPMs although whether this is the case will depend upon the type of NDPM consumed and how it is processed. For example, soymilk has been shown to lower cholesterol levels<sup>10</sup> and blood pressure.<sup>11</sup> Patients may not share that they use NDPMs instead of dairy milk, so having a good understanding about these alternatives can help inform a discussion about dietary habits and, in my experience, is very well-received by the patient. 🍌

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## Protein digestibility corrected amino acid scores of selected foods.<sup>8</sup>



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Beth Smolko, DMSc, PA-C is director-at-large for the American Academy of PAs, president of the global non-profit The Heart of Medicine, and founding PA program director for Frostburg State University. She is a national healthcare leader actively engaged in critical health, wellness, and education issues. Smolko is on the editorial board for *The Soy Connection* newsletter.

When the typical shopper strolls—or rushes—down the aisles in their supermarket, they may notice a myriad of colors and labels on packaged items. The color of packaging may lead some to think a certain food item is healthy because the packaging is green, or perhaps they are attracted to a fun snack in a red or orange package. Package claims like “low fat,” “plant-based,” “organic,” and “non-GMO” abound.

Claims and labels on the front of packages may provide useful information for consumers, such as those pertaining to nutrients (e.g., low sodium) or implied nutrient content claims that have strict regulatory definitions (e.g., health). However, they are also sometimes used by brands as a marketing tool to attract attention. On the other hand, the information in black and white—the Nutrition Facts panel and list of ingredients—offers facts and figures, not advertising.

The Nutrition Facts panel, usually on the side or back of the package or container, offers valuable information for the nutrition and health professional, and for the shopper—if they take the time to look at it. The new Nutrition Facts label,<sup>1</sup> which can already be seen on products, has expanded features:

- The amount of calories per serving is in a larger font.
- A more realistic serving size is included to reflect what people actually eat and drink.<sup>2</sup>
- A line for added sugar (in grams) is listed under carbohydrates.
- The vitamins and minerals section is expanded. In addition to iron and calcium, vitamin D and potassium are now required to be listed, whereas vitamins A and C are no longer required.

Shoppers may pay attention to different parts of the food label. Those with high blood pressure on a sodium restricted diet would be encouraged to notice the amount of sodium per serving. For someone with diabetes, they would typically check the amount of carbohydrates per serving. Overall, shoppers are increasingly looking at the amount of protein and added sugar.

Above all, shoppers should pay attention to the most important line on the Nutrition Facts panel—serving size, as that amount influences all other information. 🍌

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**SIDE-BY-SIDE COMPARISON**

**Original Label**

Nutrition Facts	
Serving Size 2/3 cup (55g) Servings Per Container About 8	
Amount Per Serving	
<b>Calories</b> 230	Calories from Fat 72
% Daily Value*	
<b>Total Fat</b> 8g	12%
Saturated Fat 1g	5%
Trans Fat 0g	
<b>Cholesterol</b> 0mg	0%
<b>Sodium</b> 160mg	7%
<b>Total Carbohydrate</b> 37g	12%
Dietary Fiber 4g	16%
Sugars 12g	
<b>Protein</b> 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily value may be higher or lower depending on your calorie needs.	
	Calories: 2,000    2,500
Total Fat	Less than 65g    80g
Sat Fat	Less than 20g    25g
Cholesterol	Less than 300mg    300mg
Sodium	Less than 2,400mg    2,400mg
Total Carbohydrate	300g    375g
Dietary Fiber	25g    30g

**New Label**

Nutrition Facts	
8 servings per container <b>Serving size 2/3 cup (55g)</b>	
Amount per serving	
<b>Calories</b> 230	
% Daily Value*	
<b>Total Fat</b> 8g	10%
Saturated Fat 1g	5%
Trans Fat 0g	
<b>Cholesterol</b> 0mg	0%
<b>Sodium</b> 160mg	7%
<b>Total Carbohydrate</b> 37g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
<b>Protein</b> 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	

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and tempeh), certain soyfoods contain prebiotics in the form of oligosaccharides.<sup>27</sup> Stachyose is the predominant oligosaccharide in soybeans. It, as well as the other oligosaccharides, are poorly digested by intestinal enzymes so they travel to the colon where they stimulate the growth of beneficial bacteria. As a result of processing, certain soyfoods such as tempeh, tofu, and isolated soy protein lack significant oligosaccharide content.

### Essential Fatty Acids

Unlike most legumes, soybeans are high in fat, with approximately 40% of the calories derived from this macronutrient. Soybean oil is heart-healthy as it is comprised of 12% saturated fat, 29% monounsaturated fat, and 59% polyunsaturated fat.<sup>1</sup> Soybean oil contributes greater than 40% of the U.S. intake of the essential fatty acids, the omega-6 fatty acid linoleic acid and the omega-3 fatty acid alpha-linolenic acid.<sup>29</sup> In 2017, the FDA approved a qualified health claim for soybean oil and heart disease based on its cholesterol-lowering effect. 🍷

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