



Recommended Soy Intakes

In the United States as well as many other countries, intake recommendations exist for a variety of food groups, such as fruits and vegetables, dairy products and whole grains. No such recommendation exists for soyfoods. The Chinese government recommends consuming at least 50 g of soyfoods daily as one step toward meeting nutrient needs [1]. However, this recommendation does not consider the potential health benefits of soyfoods independent of nutrient content.

In 1999, in the process of awarding a health claim for soyfoods and coronary heart disease based on the cholesterol-lowering effects of soy protein [2, 3], the U.S. Food and Drug Administration established 25 g of soy protein per day as the threshold intake required for cholesterol reduction [4]. Claims similar to this have been approved in many other countries since that time [5]. However, this threshold intake has limited value as a guide for incorporating soy into the diet for general nutritional and health purposes and for proposed benefits unrelated to cholesterol reduction. Furthermore, it address only one component of the soybean (protein), it does not provide guidance regarding isoflavones.

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 [6]. In traditional, minimally processed Asian soyfoods, each gram of soy protein is associated with about 3.5 mg isoflavones (expressed in aglycone equivalent weight) [7]. In contrast, in highly processed soy products, as much as 80 percent of the isoflavone content is unintentionally removed [8].

There is a need for intake guidelines for soyfoods because these foods are becoming increasingly popular but for most people in non-Asian countries they are not a traditional part of the diet. In Western countries soy intake among the general population is extremely low. For example, an analysis from one of the largest U.S. surveys (n=17,900) conducted in reported that per capita adult isoflavone intake was only 2.5 mg per day [9]. An earlier report from this survey reported a similarly low figure [10]. For comparison, there are about 25 mg of isoflavones in one cup or serving (250 ml) of soymilk made from whole soybeans. This low U.S. intake might be surprising in light of the wide use of soy protein by the food industry. However, because soy protein is added to foods primarily for its functional properties, e.g., to improve shelf stability and texture, the amount added is very small. The low per capita isoflavone intake in the United States is similar to the intakes reported for Europe [11-13].

Not unexpectedly, soy intake among vegetarians, and especially vegans, who consume



no animal products, is much higher than the general population. Results from a subsample from the Adventist Health Study 2 (a prospective U.S. epidemiologic study involving nearly 100,000 Seventh-day Adventists) reported that daily mean soy protein intake among vegans was 13.1 g/day. Approximately 40 percent of Seventh-day Adventists are vegetarians. The nonvegetarians in this study consumed 4.9 g/day soy protein, which is much higher than the intake of the general U.S. population. There are also data on the isoflavone intake of vegetarians. For example, among the 37,643 British women participating in the European Prospective Investigation into Cancer and Nutrition (EPIC), median isoflavone intake among the nonvegetarians was only 0.23 mg/d whereas it was 10.1 mg/day among the vegetarians [14]. Isoflavone intake among a group of “health-conscious” individuals from Britain participating in the EPIC, many of whom were vegetarians, was 21.8 mg/day [12].

When establishing dietary reference values for nutrients, policy makers often consider typical population intakes. Therefore, Asian soy consumption is a potentially useful source of information for developing Western intake guidelines although soy intake differs markedly among Asian countries and even within the same country. For example, a Chinese survey found that among the four provinces studied, soy intake varied fivefold [15]. In contrast, the Japanese are much more homogeneous in their dietary habits as their soy intake is rather similar regardless of region, although the type of soyfoods consumed varies. Soy consumption does differ according to age, however. As the Japanese diet has become more Westernized, soy intake has slowly begun to decline such that now older Japanese consume almost twice as much soy as younger Japanese [16].

Since soy intake has been consumed for centuries in China and Japan and there is considerable information about the amount of soy consumed by these populations, it is reasonable to use data from these countries as an intake guide. This information comes not only from national surveys but more importantly, from large prospective epidemiologic studies underway in these countries. For China, there is an abundance of data from Shanghai as a result of the Shanghai Women’s Health Study [17] and Shanghai Men’s Health Study [18]. Shanghai is a high-soy-consuming region within China [15, 19]. In Japan, a notable cohort is the Takayama study [20, 21]. These three studies involve from 30,000 to 50,000 individuals and used a validated food frequency questionnaire that comprehensively evaluated soyfood, soy protein and isoflavone intake.

When making soy intake recommendations it is more precise to speak about the amount of soy protein or isoflavones to be consumed rather than grams of soyfoods because similar quantities of soyfoods provide such different amounts of these two components. For example, 100 g soymilk provides only about 3 g protein whereas the same quantity of tofu can provide three times this amount. Furthermore, soy protein and isoflavones are



the components responsible for most of the proposed health benefits of soyfoods [22, 23].

In Japan, the daily mean intake of soy protein among those consuming a traditional diet is approximately 7 to 10 g, which represents about 10 percent of the total dietary protein intake [7]. In Shanghai, men consume as much as 12 to 13 g of soy protein per day [18], which represents about 15 percent of total protein intake [24]. Women consume about 9 g/day [17]. Mean isoflavone intakes range from about 30 to 50 mg per day [7]. Individuals in the upper one-quarter of intake in Shanghai and Japan consume about 15 to 20 g soy protein daily.

One of the most useful reports for gaining insight about the upper ranges of soy intake comes from an analysis by Yang et al. [17] of the Shanghai Women's Health Study [17]. Among the 45,000 middle-aged Chinese women in this cohort, mean (standard deviation) isoflavone intake was 40.8 ± 28.7 mg/day. Approximately 10 percent of the women consumed 85 mg/day and about 2 percent consumed on average 146 mg per day. Soy protein intake in these two groups of women was 15.1-24.9 g/day and ≥ 25 g/day, respectively.

In Japan, about half of the soy consumed comes from unfermented foods, with four foods – tofu, miso, natto and fried tofu – accounting for about 90 percent of all soy consumption [25, 26]. In Shanghai, and throughout much of China, most of the soyfoods consumed are unfermented, and soymilk, tofu and processed soy products other than tofu account for about 80 percent of total soy consumption [27].

Another basis for developing an intake guideline is the amount of soy protein and isoflavones shown to favorably affect health outcomes in clinical and epidemiologic studies. Although there is obviously a wealth of data to consider, and little dose-response information is available, it is still possible to identify efficacious intakes. For example, approximately 50 to 60 mg/day isoflavones have been shown in clinical studies to alleviate menopausal hot flashes [28] and slightly higher amounts are needed to improve endothelial function [29]. Epidemiologic studies have found for example, that about two servings of soyfoods daily is associated with reduced risks of breast [30] and prostate [31] cancer.

When one considers the importance of consuming a varied diet, Chinese and Japanese soy intake, and the amounts of soy associated with benefits in epidemiologic and clinical studies, a reasonable intake goal for adults is 15 g soy protein and about 50 mg total isoflavones per day. These amounts are provided by approximately two servings of traditional soyfoods. Higher amounts may be needed for some specific effects, such as the 25 g/day soy protein thought to be needed for cholesterol reduction. In contrast, it



may be that some health benefits can be achieved in response to a lower amount of soy when intake occurs over a prolonged period of time. Certainly, two servings of soyfoods per day can contribute to meeting nutrient needs and is consistent with sound dietetic practice.

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