Exploring the Soyfood Controversy

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Despite their proposed health benefits and long history of consumption in Asia, soyfoods have become controversial. In recent years, the benefits of soy have been challenged, and concerns have been raised about possible adverse effects of soy consumption. Underlying most of the benefits and concerns is the presence of isoflavones (phytoestrogens) in soybeans. The evidence reviewed in this article indicates that soy consumption reduces risk of coronary heart disease and, if consumed early in life, potentially breast cancer. Concerns that soyfoods may be contraindicated for breast cancer patients and women at high risk of developing this disease are not supported by the clinical and epidemiologic evidence. The clinical evidence also does not support the notion that isoflavones or soyfoods feminize men. However, some question remains as to their effects in subclinical hypothyroid patients, although soyfoods do not adversely affect thyroid function in healthy subjects. The preponderance of the evidence indicates that for healthy individuals, with the exception of those relatively rare persons with allergies to soy protein, soyfoods can make important contributions to the diet. Nutr Today. 2013;48(2):68–75

Intriguing research suggests that soyfoods, which are excellent sources of high-quality protein, convey a number of health benefits, especially related to chronic disease prevention. Nevertheless, and despite their centuries-long history of consumption in Asia, soyfoods have become controversial in recent years. Not only is there confusion about the proposed benefits of soyfoods, but concerns have arisen that soy intake may lead to untoward effects in certain individuals. Uncertainty about the role of soy in a healthy diet, even among health professionals, is exacerbated by misinformation found on the Internet. The purpose of this short review was to provide an update on the latest research addressing several of the most controversial issues related to the safety of soy.

BACKGROUND ON ISOFLAVONES

Isoflavones have a very limited distribution in nature such that diets that do not include soyfoods are almost devoid of these diphenolic compounds. The 3 soybean isoflavones, genistein, daidzein, and glycitein, and their respective various glycoside forms (in which a sugar molecule is attached to the isoflavone), account for approximately 50%, 40%, and 10%, respectively, of total soybean isoflavone content. Isoflavones occur in the soybean almost exclusively as glycosides, whereas in fermented soyfoods, such as tempe, miso, and natto, because of bacterial hydrolysis, substantial amounts of the isoflavones occur as aglycones. In traditional soyfoods, each gram of soy protein is associated with approximately 3.5 mg isoflavones (expressed in aglycone equivalent weights). Consequently, 1 serving of a typical soyfood (eg, 3 oz tofu, 1 oz soy nuts, 240 mL soymilk) provides about 25 mg isoflavones.

Isoflavones have a chemical structure similar to mammalian estrogens and exert estrogen-like effects in some tissues under certain experimental conditions. Consequently, isoflavones are classified as phytoestrogens (plant estrogens). However, in contrast to the hormone estrogen, which equally binds to and activates both estrogen receptors (ERs), ERα and ERβ, isoflavones preferentially bind to and activate ERβ. This distinction is important because the 2 ERs have different tissue distributions within the body and often function differently, and sometimes in opposite ways. This appears to be the case in the breast, for example, wherein ERβ activation is thought to inhibit the proliferative effects of ERα activation.

The failure to appreciate differences between estrogen and isoflavones can erroneously lead to inappropriate assumptions about the likely biological effects of these soybean constituents. In fact, because of their preference for ERβ, isoflavones are most accurately classified as selective ER modulators, molecules that have tissue-selective effects. A well-known pharmaceutical example of a selective ER modulator is tamoxifen, a breast cancer drug that exerts antiestrogenic effects on breast tissue but estrogenic effects on the uterus. Clinical evidence shows that, in

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DOI: 10.1097/NT.0b013e31828fff54

Food and Nutrition
postmenopausal women, unlike estrogen, isoflavones have no impact on breast and vaginal tissue and do not increase bone mineral density, whereas, like estrogen, isoflavones alleviate hot flashes, improve endothelial function, and perhaps favorably affect skin health.

Finally, isoflavones (especially genistein) may exert physiological effects independent of ER binding as they affect critical cellular growth pathways by inhibiting the activity of enzymes and regulating factors that control the growth and differentiation of cells. In fact, it was recognition of the in vitro ability of genistein to inhibit the activity of tyrosine protein kinase, an enzyme overexpressed in many cancer cell lines, which first sparked interest in the chemopreventive effects of isoflavones and soyfoods.

ASIAN SOY CONSUMPTION

There is a wealth of data documenting soy consumption within Asia. However, in popular articles on the Internet and elsewhere, soy protein, measured as dry weight is sometimes confused with the total wet weight of soyfoods consumed. As a result, total soy consumption is often greatly underestimated. For example, in 100 g of tofu (wet weight), there is approximately only 8 g of protein (dry weight).

On the basis of Food and Agriculture/World Health Organization data, the top 5 soy-consuming countries are listed in Table 1. As can be seen, absolute soy protein intake ranges from 1.2 to 8.6 g/d. Although these data are useful, especially for comparisons among countries, more detailed data come from large Asian epidemiologic studies, some involving 50 000 subjects, that have comprehensively assessed soyfood, soy protein, and soy isoflavone intake. These data indicate that mean soy protein and isoflavone intakes in Japan and Shanghai are approximately 8 to 12 g/d and 30 to 50 mg/d, respectively. (Shanghai appears to be a high-soy-consuming region within China.) Subjects in the upper intake quartiles and quintiles in Japanese and Shanghai epidemiologic studies consume approximately 15 to 20 g/d soy protein and 50 to 80 mg/d isoflavones.

Relatively few Asians consume more than 25 g/d soy protein or 100 mg/d isoflavones. Soy intake in Japan and Shanghai is roughly twice that in Hong Kong and Singapore.

In comparison, and despite the large number of conventional foods to which small amounts of soy protein are added for functional purposes (eg, moisture retention, whitening, meat extension, etc), daily US soy protein and isoflavone intake is only about 1 to 2 g and less than 3 mg, respectively. The role and amounts of soyfoods consumed in Asia can be compared with those of dairy foods in the United States. Soy protein accounts for roughly 10% and 15% of total dietary protein intake in Japan and Shanghai, respectively, whereas dairy protein intake (adult per capita intake is ~16 g/d) represents about 20% of total US dietary protein.

Finally, traditional Asian soyfoods are typically divided into 2 general categories, fermented (eg, miso and natto) and unfermented (eg, tofu and soymilk) soyfoods. Soyfoods were first consumed in fermented form beginning in China around 2200 years ago and in Japan approximately 700 years later. Historical records indicate that, in China, unfermented soybeans and tofu were consumed beginning approximately 2000 and 1000 years ago, respectively. Today, in Japan, about half of soy consumed is derived from unfermented foods, primarily tofu, whereas half comes from the fermented products, miso and natto. In contrast, in China, Hong Kong, and Singapore, nearly all soy consumed is in unfermented form, mostly soymilk and various forms of tofu.

PROPOSED BENEFITS

Heart Disease

In 1999, the US Food and Drug Administration approved a health claim for soyfoods and coronary heart disease (CHD) based on the direct cholesterol-lowering effects of soy protein. At that time, estimates were that soy protein

<table>
<thead>
<tr>
<th>Country</th>
<th>kcal</th>
<th>Protein</th>
<th>Soy Protein</th>
<th>Soy kcal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Absolute g/d</td>
<td>% of Total Protein</td>
</tr>
<tr>
<td>Japan</td>
<td>2812</td>
<td>91.8</td>
<td>8.6</td>
<td>9.4</td>
</tr>
<tr>
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<td>3074</td>
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<td>5.5</td>
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<td>China</td>
<td>2981</td>
<td>88.9</td>
<td>3.5</td>
<td>3.9</td>
</tr>
<tr>
<td>Thailand</td>
<td>2539</td>
<td>56.2</td>
<td>1.9</td>
<td>3.4</td>
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<tr>
<td>Indonesia</td>
<td>2538</td>
<td>56.8</td>
<td>1.2</td>
<td>2.1</td>
</tr>
</tbody>
</table>

*Source: Data from Food and Agriculture Organization and the World Health Organization. FAOSTAT. http://faostat.fao.org/site/368/default.aspx#ancor.*
lowered blood low-density lipoprotein cholesterol (LDLC) almost 13%. In 2000, the American Heart Association (AHA) endorsed the hypocholesterolemic effects of soy protein. However, in their 2006 position paper, the AHA stated that based on their analysis of the relevant literature, the health claim was unwarranted. As discussed below, research published subsequent to 2006 demonstrates that the AHA erred in their conclusion.

After reviewing 22 clinical studies, the AHA estimated soy protein lowered LDLC by only ~3.0%, an effect it considered too low to warrant a health claim. However, the AHA did not actually conduct a formal statistical meta-analysis of the data. When this was done, Jenkins et al found that soy protein lowered LDLC by 4.3%. This degree of reduction is similar to that for soluble fiber, which also has a Food and Drug Administration health claim. More recently, a meta-analysis by Anderson and Bush that included 20 parallel studies published between 1996 and 2010 found that soy protein lowered LDLC by 5.5%. The figures by Jenkins et al and Anderson and Bush are in line with other recently published meta-analyses and provide clear support for the existing soy and heart health claim, although the current estimates of the hypocholesterolemic effects of soy protein are much lower than the initial report of about 13%. Nevertheless, because, in theory, each 1% reduction in LDLC leads to a 1% to 3% reduction in CHD risk, the cholesterol-lowering effect of soy protein is relevant at both the individual and population level. The meta-analyses also show soy protein modestly reduces serum triglyceride levels and increases high-density lipoprotein cholesterol levels, changes that will further help to decrease CHD risk.

Beyond the direct effect of soy protein on blood LDLC levels, the favorable fatty acid profile of soyfoods should offer further protection against CHD. Recent data indicate that, to reduce risk, saturated fat should be replaced with omega-3 polyunsaturated fat (PUFA) or a mix of omega-6 and omega-3 PUFA, not carbohydrate or monounsaturated fat. Soybeans derive approximately 40% of their calories from fat; of that amount, approximately 55% comes from the essential omega-6 PUFA linoleic acid and approximately 6% from the essential omega-3 PUFA, α-linolenic acid. Therefore, relying on soyfoods as sources of protein helps one to meet protein and essential fatty acid requirements while lowering CHD risk.

Finally, independent of effects of LDLC, there is evidence that soyfoods exert coronary benefits. For example, recently published meta-analyses, as well as a large clinical study published subsequent to these analyses, show soy protein modestly lowers blood pressure. There is also substantial evidence indicating that isoflavones directly improve the health of the arteries (endothelial function). Thus, for several reasons, soyfoods warrant inclusion in heart-healthy diets (Table 2). Evidence suggests the consumption of 25 g/d soy protein is sufficient to lower cholesterol and blood pressure and that ~75 mg/d isoflavones are needed to improve endothelial function.

### TABLE 2: Coronary Benefits of Soyfoods

| 1. Favorable fatty acid profile |
| 2. Soy protein directly lowers levels of low-density lipoprotein cholesterol and triglycerides and modestly raises high-density lipoprotein cholesterol levels |
| 3. Soy protein modestly lowers blood pressure |
| 4. Soy isoflavones improve arterial health (endothelial function) |

**Breast Cancer**

Initial interest in the possible role of soyfoods in reducing breast cancer risk was based on the low breast cancer incidence rates in soyfood-consuming countries, especially Japan, and rodent data showing that soybean isoflavones inhibit chemically induced mammary cancer. However, as recently reviewed, much evidence now indicates that, to derive protection against breast cancer, soy must be consumed early in life. For example, Asian epidemiologic studies show higher soy intake to be inversely associated with breast cancer risk, whereas in the European Prospective Investigation Into Cancer-Oxford in which the soy consumers likely began eating soy later in life, there was no relationship between soy consumption and breast cancer risk. In support of this hypothesis are also the results from 4 epidemiologic studies, 2 conducted in China and 2 in the United States, which found that higher soy intake (1–1½ servings per day) during childhood and/or adolescence among women of Asian ethnicity was associated with protection against breast cancer later in life ranging from a 28% to 60% reduction in risk, although one of these studies found soy was only protective against premenopausal breast cancer (Table 3).

Studies in rodents provide not only support for the early intake hypothesis but also insight into the possible mechanisms for the protective effects. Initially, it was proposed that isoflavone-induced differentiation of breast cells in the developing breast, which makes these cells permanently less likely to be transformed into cancer cells, was solely responsible. However, recent work suggests that while differentiation may be a contributing factor, it is not likely a complete explanation. New data indicate that the chemopreventive effects of soy and isoflavones may also result from their ability to upregulate BRCA1 expression, a gene involved in DNA repair, and to increase the expression of ERβ.

Further research is required before the early soy intake breast cancer hypothesis will be uniformly embraced by the scientific community. Nevertheless, recommending that young girls consume at least a serving per day of soyfoods is necessary.
<table>
<thead>
<tr>
<th>Author, Year/Reference</th>
<th>Location</th>
<th>Age Range, y</th>
<th>Soy Intake Age Assessment Period, y</th>
<th>Highest Soy Intake Category Cutoff</th>
<th>Subject No. Cases/Controls</th>
<th>Relative Risk or Odds Ratio&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shu et al&lt;sup&gt;25&lt;/sup&gt;, 2001</td>
<td>Shanghai</td>
<td>25–64</td>
<td>13–15</td>
<td>Quintile 5: ≥11.01 g/d soy protein</td>
<td>501/562, 952/990</td>
<td>0.49 (0.33–0.74),&lt;sup&gt;b&lt;/sup&gt; 0.53 (0.39–0.72)&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Wu et al&lt;sup&gt;26&lt;/sup&gt;, 2009</td>
<td>United States</td>
<td>25–74</td>
<td>12–18</td>
<td>Tertile 3: ≥weekly soyfood intake</td>
<td>175/170</td>
<td>0.72 (0.54, 0.96)&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Korde et al&lt;sup&gt;27&lt;/sup&gt;, 2009</td>
<td>United States</td>
<td>20–55</td>
<td>5–11, 12–19</td>
<td>Tertile 3: ≥1.5 times soyfoods/wk</td>
<td>97/153, 576/942</td>
<td>0.40 (0.18–0.86),&lt;sup&gt;d&lt;/sup&gt; 0.80 (0.59–1.08)&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Lee et al&lt;sup&gt;28&lt;/sup&gt;, 2009</td>
<td>Shanghai</td>
<td>40–70</td>
<td>13–15</td>
<td>Quintile 5 cutoffs ≥11.33 g/d soy protein ≥31.28 mg/d isoflavones</td>
<td>305 cases, 289 cases</td>
<td>Premenopausal 0.57 (0.34–0.97) 0.89 (0.57–1.40) Postmenopausal 1.20 (0.87–1.65) 1.38 (1.00–1.91)</td>
</tr>
</tbody>
</table>

<sup>a</sup>Values are odds ratios or relative risks plus 95% confidence interval when comparing the highest versus the lowest intake category. Values above 1 indicate an increased risk, and below 1 a decreased risk.
<sup>b</sup>Postmenopausal breast cancer.<sup>3</sup>
<sup>c</sup>Premenopausal breast cancer.<sup>3</sup>
<sup>d</sup>Approximate equal mix of premenopausal and postmenopausal breast cancer.
appropriate, given the nutritional attributes of these foods and their potential health benefits.

**ALLEGED CONCERNS**

**Breast Cancer**

Concerns that soyfoods are contraindicated for women who have or who are at high risk for breast cancer are based primarily on research showing that genistein-containing diets stimulate the growth of MCF-7 cells (a human estrogen-sensitive breast cancer cell line) implanted into ovariec-tomized athymic mice. In contrast, processing does not affect isoflavone metabolism in this way in humans; therefore, there appears to be little basis, given equal genistein exposure, for differentiating between traditional soyfoods because of the striking differences in isoflavone metabolism between athymic mice and humans. Most noteworthy, in the athymic mouse the consumption of processed soy products (eg, soy flour vs isolated genistein), despite containing similar amounts of genistein, stimulate tumor growth to a greater extent. In fact, soy flour, the least processed soy product examined, is not tumor-stimulatory. These observations have led some oncologists and health professionals to advise against soy consumption for women with breast cancer and especially against the use of soy supplements and extracts. Although routinely used in cancer research, the ovariec-tomized athymic mouse model has important limitations, especially in regard to providing insight into the effects of soyfoods because of the striking differences in isoflavone metabolism between athymic mice and humans. Most noteworthy, in the athymic mouse the consumption of processed soy products, despite containing similar amounts and forms of isoflavones, leads to higher circulating levels of biologically active genistein, which accounts for why these products lead to greater tumor growth. In contrast, processing does not affect isoflavone metabolism in this way in humans; therefore, there appears to be little basis, given equal genistein exposure, for differentiating between traditional soyfoods (eg, tofu, tempe, soymilk made from whole soybeans) and supplements. Furthermore, a recently published study by Onoda et al found that genistein did not stimulate tumors in ovariec-tomized athymic mice implanted with MCF-7 cells. The difference between this model and in one another.

**Male Feminization**

There is intriguing evidence that soyfoods reduce risk of prostate cancer, but some men may shy away from these foods because the estrogen-like effects of isoflavones have raised concerns that soyfood and isoflavone exposure exerts feminizing effects and even impair male fertility, despite the fact that no such problems have been identified in Asian countries where soyfoods are a usual part of diet. Although the Asian experience may provide some insight, it is necessary to base conclusions on more direct scientific investigations in this area, especially because of the possibility that ethnic groups respond to isoflavones differently from one another.

There are 2 case reports, each involving a single male individual, that describe feminizing effects associated with soy consumption. In one, a 60-year-old man developed breast enlargement (gynecomastia) and experienced a dramatic rise in circulating estrogen levels, which was the apparent biological basis for the change in breast size. In the other, a 19-year-old man began to develop low testosterone levels, loss of libido, and erectile dysfunction. Although it is not possible to know for certain that soy or isoflavone intake was responsible for the problems experienced by these individuals, if soy was a contributing factor, it is because...
excessive amounts were consumed. Both of the individuals described in these case reports were said to have consumed 360 mg/d isoflavones (~14–20 servings/d of soyfoods), which is roughly 9-fold higher than typical Japanese intake. Consuming excessive amounts of essentially any food can lead to abnormalities and nutrient intakes above established upper safe limits.

Interest in the effects of isoflavones on sperm quality and quantity is due, in part, to the results of a small pilot US case-control study by Chavarro et al.,\(^5\) which included 99 male partners of subfertile couples. Men in the highest category of soyfood intake had 41 million sperm/mL less than men who did not consume soyfoods. However, much of the decreased sperm concentration resulted from an increase in ejaculate volume, for which there appears to be no biological basis. Also, other than soy intake, no dietary information was collected, and the instrument used to estimate soyfood intake was not validated. The lack of dietary data is potentially important because a variety of foods and specific nutrients are thought to affect sperm quality and concentration.

In contrast to the 2 case reports and the pilot epidemiologic study, the results of clinical studies do not support feminizing concerns. For example, a recent review reported no increases in circulating estrogen levels in the 9 studies in which male subjects consumed the isoflavone equivalent of up to 6 servings (150 mg isoflavones) of soyfoods per day.\(^4\) In addition, a recently published comprehensive meta-analysis found no decreases in total or free testosterone levels in response to soy protein or isoflavones.\(^5\)

Also, none of the 3 clinical studies that examined the effects of isoflavone exposure on sperm or semen reported any abnormalities.\(^4\) In fact, Casini et al\(^5\) described a case report of an infertile man with low sperm concentration (10 million/mL) and abnormal sperm motility and morphology who experienced normalization of sperm and semen parameters in response to the ingestion of 80 mg/d isoflavones for 6 months. On the basis of these findings, the authors suggested that isoflavones could be a treatment for oligosperma.

In conclusion, the clinical data provide no support for claims that soyfoods have feminizing effects in men. Because of their possible role in reducing risk for heart disease and prostate cancer, it is important that men understand that soyfoods can be safely consumed.

**Hypothyroidism**

Animal research investigating the effects of soy on thyroid function was first published nearly 80 years ago. This area of study gained traction in the early 1960s with the identification of several cases of goiter in infants using soy infant formula.\(^5\) However, no such cases have been associated with soy infant formula use over the past 40 years since the formula was fortified with iodine and the protein source switched from soy flour to isolated soy protein (ISP by definition is ≥90% protein). Nevertheless, in vitro and in vivo research in rodents published in the mid-1990s showing that genistein inhibits the activity of thyroid peroxidase raised concerns that soyfoods may impair thyroid function. Thyroid peroxidase is an enzyme expressed mainly in the thyroid that is required for the synthesis of the thyroid hormones, thyroxine, or triiodothyronine.

An extensive review published in 2006 of the clinical literature that included 14 trials conclusively showed that isoflavone exposure has no effect on thyroid function in healthy (euthyroid) subjects.\(^5\) Studies published subsequent to this review support this conclusion including several that were 2 to 3 years in duration and that exposed participants to high amounts of isoflavones (>100 mg/d isoflavones).\(^5\) Thus, there is essentially no evidence that soyfoods or isoflavones exert goitrogenic effects in healthy subjects. However, a question remains as to the effects of soy in subjects whose thyroid function may be compromised, such as subclinical hypothyroid patients and individuals whose iodine intake is marginal.

Only recently has information on the effects of soy intake on thyroid function in subclinical hypothyroid patients become available. Estimates vary, but approximately 5% of the general adult population, and a higher percentage among individuals older than 60 years, have subclinical hypothyroidism. With time, a certain percentage (~2%–6% per year) of these patients, who have normal triiodothyronine and thyroxine levels but elevated levels of thyroid stimulating hormone, will spontaneously progress to overt hypothyroidism. In a crossover study, 60 middle-aged, overweight British patients (52 females) consumed, in random order for 8 weeks, 30 g ISP containing 2 or 16 mg isoflavones separated by an 8-week crossover.\(^5\) During the entire 6-month study period, 6 of the subjects (10%) consuming the higher isoflavone ISP progressed to overt hypothyroidism, whereas none did in the low isoflavone group. As a result, it was estimated that exposure to 16 mg/d isoflavones increased the likelihood of converting to overt hypothyroidism ~3.6-fold.

These results are unexpected, given the relatively small isoflavone intake of the subjects. Nevertheless, they cannot be dismissed. It is important to note, however, that in the subjects overall (including those who became hypothyroid), there were dramatic reductions in systolic and diastolic blood pressure, insulin resistance, and inflammation (as assessed by C-reactive protein). Thus, in theory, ISP providing 16 mg isoflavones markedly reduced risk of cardiovascular disease and diabetes in subclinical hypothyroid patients. Additional research is required before firm conclusions about the effects of soyfoods on thyroid function in subclinical hypothyroid patients can be made.

Finally, soyfoods and foods in general (especially fiber-enriched foods) as well as many herbs and drugs can reduce
the absorption of thyroid hormone (levothyroxine). However, soyfoods are not contraindicated for people with hypothyroidism. According to a recent position paper, the critical issue is not to avoid any particular food, or even to take thyroid hormone during the fasting state, but rather to maintain consistency in medication administration and dietary habits. In other words, as long as the medication is taken in a consistent manner and the amount of soyfoods consumed is relatively constant, soyfoods are not problematic.

Allergies
Like all food proteins, soy protein can cause allergic reactions in sensitive individuals. It is 1 of the 8 allergens responsible for approximately 90% of all food-induced allergic reactions in the United States. However, these foods are not equally allergenic, and allergy to soy protein is relatively rare. A recent nationally representative telephone survey found that only approximately 1 of 2500 adults reported having a doctor-diagnosed allergy to soy protein. The results of this survey indicate that cow’s milk allergy is about 40 times more common than soy allergy. The rate of soy allergy is undoubtedly higher in children than in adults, as children are more likely to have food allergies in general. However, by age 10 years, an estimated 70% of children will outgrow their soy allergies.

SUMMARY
Soyfoods are excellent sources of high-quality protein and have a heart-healthy fatty acid profile. Soyfoods are uniquely rich sources of isoflavones, which are classified as phytoestrogens, but these soybean constituents differ from the hormone estrogen. There is intriguing evidence indicating that, through multiple mechanisms, soyfoods reduce risk of CHD and, if consumed early in life, are protective against breast cancer. Soyfoods do not feminize men, and recent clinical and epidemiologic evidence indicates soyfoods are safe, and perhaps even beneficial, for women with a history of breast cancer. Soy does not adversely affect thyroid function in healthy (euthyroid) individuals and is not contraindicated for those taking medication for hypothyroidism, although preliminary evidence has raised concern about the effects of soy in subclinical hypothyroid patients. In conclusion, the preponderance of the clinical evidence indicates that, with the exception of those allergic to soy protein, soyfood intake by healthy individuals does not lead to untoward effects and provides a number of health benefits.

REFERENCES


