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Soy Considerations (for Practitioners)

Soy sparks strong opinions among healthcare providers, but whether it belongs in your patient's diet isn't so simple. On one hand, soy consumption is associated with various health benefits. On the other hand, not all soy-containing foods are equally healthful, and patients with certain health conditions may be better off avoiding soy or limiting their intake. This guide will help you understand the potential benefits and disadvantages of soy, so you can assist your patients in determining whether and how much soy to include in their diets.

About Soy

Soybeans have been a dietary staple in Asia for millennia and have gained popularity in the West during the 20th and 21st centuries due to the rising interest in plant-based diets.[1] Soybeans provide all nine of the essential amino acids (the building blocks of protein) our bodies need. The levels of two sulfur-containing essential amino acids are lower than previously believed, but soy is still considered a high-quality plant protein.[2,3] Soy provides healthy fats and dietary fiber while being low in carbohydrates and saturated fat.[4]

Soy is available in two forms: foods and supplements. Soy foods can be consumed in either fermented or unfermented forms. Fermented soy foods include miso, natto, soy sauce, and tempeh. Unfermented soy foods include edamame, soy protein isolate, soy protein concentrate, soy flour, soy milk, and tofu. Soy supplements generally contain isolated soy proteins and soy-derived phytonutrients, mainly isoflavones. Examples of soy isoflavones include genistein, daidzein, and glycitein.[5]

Soy Research

Studies of soy mainly focus on three sources:

- Dietary whole soy protein intake (e.g., soybeans, tofu)
- Isolated soy protein supplements
- Dietary supplementation with soy isoflavones

Soy consumption is associated with a variety of health benefits. Let's discuss each of these potential benefits in turn.

THE HEALTHY USER EFFECT

Research on soy can be influenced by a phenomenon known as the "healthy user effect." This means that people who eat more soy may also engage in other healthy behaviors, making it challenging to distinguish the effects of soy from those of other healthy habits. Despite this, there's still compelling evidence that soy can support health in multiple ways.

Cancer

Eating soy foods is associated with a reduced risk of total cancer, including gastrointestinal, prostate, and lung cancers, and multiple myeloma.[6] Soy isoflavones may influence cancer development by offering anti-inflammatory and antioxidant effects and acting as a selective estrogen receptor modulator (SERM).[5]

The relationship between soy intake and breast cancer is complex and not fully understood. Soy intake is generally associated with a reduced risk of breast cancer, potentially through its interactions with estrogen receptors.[7] However, the effect of soy on breast cancer risk may also depend on a woman's age, ancestry, the types and amounts of soy foods consumed, and breast cancer type.[8,9]

Cardiovascular Health

Consuming soy and its unique phytonutrients is associated with a reduced risk of cardiovascular disease.[10] Soybean phytonutrients, including isoflavones such as genistein, lecithin, and stigmasterol, may support cardiovascular health by protecting the inner lining of blood vessels and reducing inflammation.[11] While some research suggests that soy and soy isoflavones decrease cholesterol,[12,13] the effects are small enough that they may not significantly impact most patients' cholesterol levels.

Men's Health

Dietary soy and soy isoflavones are associated with a reduced risk of localized, low-grade prostate cancer.[14] This might be due to increased activation of estrogen receptor beta, which has been linked to decreased prostate cancer cell proliferation.[14] While concerns about the impact of soy on men's hormones have been expressed, research suggests that soy consumption does not negatively impact men's testosterone levels.[15]

Women's Health

Soy consumption is associated with modest improvements in headaches, stress, and mood concerns in women going through perimenopause.[16] The beneficial effects of soy on perimenopause symptoms are linked to soy isoflavones, which can bind to estrogen receptors on cells to modulate estrogen signaling, and have anti-inflammatory effects.[16]

Soy may also help women support their bone health. Daily intake of approximately 50 mg of genistein, one of the isoflavones found in soy, is associated with increased bone mineral density (BMD) in postmenopausal women.[17] It is possible to consume 50 mg of genistein per day through typical soy foods such as tempeh and cooked soybeans. Soy isoflavones may support bone health by affecting estrogen receptors and reducing inflammation.[18]

Concerns about the potential estrogenic activity of soy in women have been the subject of debate for decades. However, soy isoflavones are distinct from the hormone estrogen, reducing concerns about strong estrogenic effects.[19]

SOY AND THE GUT MICROBIOME

The impact of soy on your patient's health may depend, in part, on their gut microbiome.[37,38] For example, people of Asian descent have a greater ability to produce beneficial metabolites, such as S-equol (or equol), a breakdown product of daidzein from soy, in their gut microbiomes compared to people of European descent.[39,40] Therefore, the gut microbiome can influence whether someone is an equol producer and the extent of the benefits they may experience from soy. While minimally processed soy can be beneficial as part of a whole-food diet, it is important to recognize that its effects may differ from person to person.

Soy Special Considerations

Genetically-Modified Soy and Glyphosate

Most conventional soy on the market is genetically modified for use with the herbicide glyphosate. Glyphosate is associated with harmful health effects, including non-Hodgkin lymphoma[20] and breast cancer.[21,22] Genetically modified soy and soy products contain high residues of glyphosate[23] and should be minimized in your patients' diets. Organic soy products aren't genetically modified or treated with glyphosate.

Infant Formula

Studies on the human health impacts of soy-based infant formula are lacking, and much of the existing research is dated. However, the available research suggests that we should further investigate soy formula because of its high isoflavone content, which may have unintended effects on infants.[24]

Infants with congenital hypothyroidism fed soy formula experience increased thyroid-stimulating hormone (TSH), suggesting worsening hypothyroidism.[25,26] While the available research suggests no association between soy-based formula intake in infancy and the risk of early puberty, it has significant limitations, including a lack of follow up over time and low certainty of evidence.[27] When making infant feeding decisions, a cautious approach to soy formula may be best.

Medication Interactions

Administering levothyroxine concurrently with dietary soy protein or soy protein supplements is associated with decreased absorption, necessitating higher oral doses of the medication to achieve therapeutic serum thyroid hormone levels.[31] Separating the timing of soy intake from the dosing of levothyroxine may mitigate this interaction.[28]

Soy is also associated with interactions involving drugs metabolized by cytochrome P450 enzymes and those that interact with P-glycoprotein transporters and breast cancer resistance protein.[29] If your patient is on medication(s) that interact with these enzymes or proteins, work with the patient to determine whether the inclusion of soy is appropriate.

Pregnancy

High glyphosate exposure during pregnancy is associated with several pregnancy and birth complications, including preterm birth, low birthweight babies, and a higher risk of a newborn needing to go to the neonatal intensive care unit (NICU) compared to women with lower glyphosate exposure.[30,31] Since soy foods are a significant source of glyphosate,[23] it is essential for pregnant patients to choose organic soy foods. If eating organic soy foods isn't an option for your patient, it may be better for them to minimize their total soy intake.

Thyroid Function

The impact of soy on thyroid function is a controversial topic. While existing research suggests that soy intake is associated with a slight increase in thyroid-stimulating hormone (TSH), whether this change in TSH is meaningful to your patients' health is unclear.[32]

If your patient already struggles with hypothyroidism, the increase in TSH with soy intake may have a more significant impact on their health.[32] Soy isoflavones are goitrogens, meaning they can interfere with thyroid hormone production. Sufficient iodine intake is associated with reduced adverse effects of soy on the thyroid. Ensuring iodine sufficiency may mitigate the potential adverse effects of soy on thyroid function.[33,34]

Soy in Ultra-Processed Foods

Ultra-processed foods – industrially-produced foods made mainly of substances extracted from foods, like oils and sugars, or synthesized in a laboratory – often contain soy.[35] The forms of soy used in these foods are typically soy protein isolate, soy protein concentrate, and soybean oil. Ultra-processed food intake is associated with many health problems, including an increased risk of cardiovascular disease, type 2 diabetes, and anxiety.[36] Patients should avoid ultra-processed soy foods and instead stick with minimally processed options, such as edamame, soy nuts, tofu, tempeh, and soy milk.

Soy Allergies and Digestive Distress

Soy allergies are relatively common.[41] Due to soy being a common allergen, foods containing soy must have an allergen warning on the product label.

Soy foods may cause digestive upset (constipation, diarrhea, nausea, bloating) in patients who are sensitive to them.[42,43] An elimination diet typically removes soy products and can help your patient discover whether they are sensitive to soy. Some people who are sensitive to soy may tolerate fermented soy foods, such as miso or tempeh, because the fermentation process improves soybean digestibility and reduces proteins that can irritate the gut.[44,45]

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