Putting the Soy Anxiety to Rest

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December 2010, Updated May 2024

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You may have noticed the overabundance of headlines about soy foods; I know I have.

It's been a regular subject in the popular press for decades. Here are just a few examples published in recent months:

- Is Tofu Good for You?
- Tofu is still a popular alternative to meat, but is it actually good for you? Here's what the science says
- Does Breast Cancer Feed off of soy?
- Does Soy Cause Breast Cancer?
- Is Soy Bad for You—or Is That Just a Random Health Rumor? RDNs Weigh In

Articles like these illustrate a deeply entrenched anxiety about soy in our society.[1][2][3][4][5] Is it healthy? How does it affect this or that condition? Is it inappropriate for certain stages of life? In what form is it healthiest? What are the differences between tofu, tempeh, or edamame? Does soy milk have a feminizing effect on men?

What I find strange, though—and the reason I describe these stories as overabundant—is that the science is far less inconsistent than the headlines suggest. All of the articles listed above reach essentially the same conclusion: Despite so much fear-mongering, natural soy products (natural as opposed to isolated

soy ingredients or supplements containing isolated nutrients from soy) consistently show a protective effect against many of the very same things they are accused of promoting.

How did the popular narrative become so backward? One reason might be the variability of studies—studies on soy protein powder may yield different results than studies on highly processed meat replacements, much less edamame—but can that fully explain the chasm separating the evidence and the myths so commonly regurgitated?[6] Remember, it's not just that many of the fears about soy are unfounded but also that the body of evidence shows an *opposite* effect.

When was the last time you saw an article published in the *New York Times* titled "Broccoli—It's Good for You, But Is It?" The treatment healthy foods like broccoli normally get, and which the evidence suggests soy should get too, is more like *It's good for you, but how good?*

It's also noteworthy that the benefits of soy are not a recent discovery. Take heart health as an example. It has been about 30 years since a meta-analysis of 38 controlled trials published in the *New England Journal of Medicine* "found that the consumption of soy protein rather than animal protein [in human subjects] significantly decreased serum concentrations of total cholesterol, LDL cholesterol, and triglycerides without significantly affecting serum HDL cholesterol concentrations."[7] These findings have since been replicated. Whenever the FDA reappraises soy's status as a heart-healthy food, as it did in 2010 and 2019, more analyses and meta-analyses supporting soy's cardioprotective effects rise to the surface.[8][9][10]

In light of the persistent confusion about soy and the continued interest in its effects on cardiovascular health, I'm reminded of the data from our China Project.[11] As the leading consumer and one of the leading producers of soy products worldwide, China is an appropriate place to investigate the effects of soy.[12]

First, to recap, our survey included a total of 65 mostly rural counties across the country, with two villages of 50 families each surveyed in each county. Disease rates and diets varied enormously from area to area, thereby creating very distinct geographical patterns for heart disease, various cancers, and so on; because most rural Chinese rarely moved to other areas and their diets remained mostly consistent throughout their lives, we found an almost perfect experimental setting to compare diet, lifestyle, and disease characteristics.

Now, to return to soy. Although we did not measure the consumption of soy products independently of other legume intakes, I do not believe this compromises the question very much. I estimate that soybeans—*tatou* in the Chinese language, meaning "the greater bean"—comprised about 80 percent of the total legume consumption. Average legume intakes across China were lower than expected, ranging from nothing in a few counties to 55–58 grams daily. Finally, I would stress that the potential cholesterol-lowering effects of soy protein itself are difficult to separate from total diet effects.

Having said that, our data are consistent with the studies mentioned above.[12]There is an inverse association between the amount of legumes eaten and "bad" cholesterol. As legume intake goes up, bad cholesterol goes down. We measured bad cholesterol as LDL and apolipoprotein B (ApoB), and in the case of apoB cholesterol, the inverse association was highly statistically significant. We also found an inverse association between legume intake and a couple of kinds of heart disease. Again, these associations were generally statistically significant.

In a nutshell, the data from rural China are not as discriminating for soy protein effects as the controlled trials of other studies were, such as those reported in the *New England Journal of Medicine*. Nonetheless, the project represents what can happen in practical conditions. While not astounding, we found that legumes (predominantly soy) were associated with lower blood cholesterol levels and lower heart disease rates.

I discuss another remarkable feature of the data on cholesterol levels in *The Future of Nutrition* (2020):[13]

Moreover, the rates of heart disease and other Western-type diseases clustered geographically, suggesting that regional dietary patterns played a significant role. This disease group (e.g., heart disease, cancers, diabetes), common to Western countries, was highly correlated [p value < 0.001] with blood cholesterol, which was, in turn, highly correlated with animal protein consumption. Western-type diseases appeared and began to rise as blood cholesterol rose, within a range of 88 to 165 milligrams per deciliter (mg/dL; mean = 127 mg/dL). That range of blood cholesterol corresponds to small amounts of animal protein consumption, about 1 to 12 grams per day. To give some perspective, we in the West tend to consume about 30–65 grams per day of animal protein, with blood cholesterol ranging from 150–300 mg/dL.

In other words, even the most voracious consumers of animal protein in rural China were consuming about 10 percent that of Western countries. Yet even within that range of minimal consumption, we observed that animal protein contributed to increased mortality from Western-type diseases. It follows, then, that theoretically the most minimal disease risk would be characterized by a complete absence of foods containing animal-based protein (i.e., a WFPB diet) and a baseline blood cholesterol level of about 90 mg/dL.

If that sounds shockingly low to you, you're not the only one. For decades, the Western blood cholesterol range of 150 to 300 mg/dL has been considered normal. Most authorities today suggest that anything less than 200 mg/dL is "desirable." A graph of one of the most famous studies on heart disease and blood cholesterol, the MRFIT trial of 361,662 men, shows the same association between blood cholesterol and

heart disease that we observed in rural Chinese villages. However, it shows this association within a much higher range—one considered "normal" by Western standards. That the Western data shows a still-elevated death rate for older men at a "low" cholesterol level of under 182 mg/dL (about 10 cases per 1,000 deaths), suggests, when considered alongside the Chinese data, that an even lower range of cholesterol is possible. It also reinforces that heart disease can be effectively avoided by dietary and related means. Indeed, one rural county in China reported only one death from heart disease per 265,000 death certificates!

I will conclude with this key takeaway: Although soy is often lauded as a good source of protein (one cup contains as much or more than a serving of meat, fish, or poultry) and may have impressive cholesterol-lowering effects, it remains, like all foods, just one part of a larger dietary lifestyle.[14][15] There is significant evidence that many if not all plant proteins similarly lower cholesterol levels compared to animal proteins that increase cholesterol levels. This evidence is decades old!

It would be a mistake to attribute the effects of a whole food, plant-based (WFPB) lifestyle to a few select foods and their individual properties. Rather, WFPB nutrition represents the synergistic relationship between all these foods plus a corresponding absence of animal-based foods.

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