

“Soy Breast” News Without Merit

Author : Dr. Mark Messina

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“Dear Men: There’s no evidence that eating Impossible Whoppers will give you breasts.”

That headline of a December 26, 2019 [article](#) in the *Washington Post* (WP), while accurately reflecting the science, may do little to help refute the totally inaccurate notion that soy feminizes men. Clinical research conducted over the past 20 years reveals this to be the case. However, despite the overwhelming evidence, misinformation about the effects of soy in men continues to be spread.

In the WP article, there was no mention of the tens of clinical studies showing that in men, soy doesn’t lower testosterone or raise estrogen levels or impact sperm or semen parameters. Nor was there mention of the clinical studies showing that soy protein supplementation promotes gains in strength and muscle mass to the same extent as animal protein in men undergoing resistance exercise training.

The WP article was in response to an [article](#) posted on *Tri-State Livestock News*, by James Stangle, a doctor of veterinary medicine in South Dakota, who wrote that “an impossible whopper has 18 million times as much estrogen as a regular whopper” and “just six glasses of soy milk per day has enough estrogen to grow boobs on a male. That’s the equivalent of eating four impossible whoppers per day.”

To arrive at the conclusions he did, Stangle assumed that the Impossible Whopper contains 44 mg of estrogen. However, Stangle is indisputably wrong about that. The Impossible Whopper doesn’t contain estrogen. What it does contain is isoflavones. Where Stangle came up with the figure of 44 mg isn’t clear since no references were cited in his article. But according to Impossible Foods, the maker of the Impossible Whopper, it contains only 2 mg isoflavones. Right away, that overestimation results in a 22-fold calculation mistake.

But more egregious, is the scientific gaffe of directly equating estrogen with isoflavones. Isoflavones are not estrogen. Isoflavones are nonsteroidal molecules (estrogens are chemically classified as steroids) that have binding affinities to the estrogen receptors that markedly differ, and are markedly lower, than estrogen. The claim that an Impossible Whopper has 18 million times as much estrogen as a regular Whopper is based on the latter containing 2.5 ng estrogen ($44 \text{ mg} = 44,000,000 \text{ ng} / 2.5 \text{ ng} = 17.6$).

By the way, that 22-fold overestimate –the claim that the Impossible Whopper contains 44 mg isoflavones-- would still place the amount of isoflavones in the Impossible Whopper well within the

range of the average daily intake of isoflavones among older individuals in Japan and in cities such as Shanghai, China.¹

Not only is it completely inappropriate to equate estrogen with isoflavones, but it also isn't even appropriate to equate the three forms of estrogen: estradiol, estriol and estrone, with one another, because their potencies differ so dramatically.^{2,3} When assessing potency, it is necessary to consider not only receptor binding, but also bioavailability, metabolism, tissue distribution and excretion and interaction with co-regulators within cells. Even then, you are left with only an educated estimate. The true measure of potency can only be determined via clinical studies. What is abundantly clear is that one cannot legitimately equate isoflavones with estrogen even when ignoring the important difference in the relative weakness of isoflavones relative to estrogen.⁴

SOY INTAKE

The WP article features quotes by Dr. Marion Nestle, who is a Paulette Goddard Professor of Nutrition, Food Studies, and Public Health, *Emerita*, at New York University. She is quoted as saying this: "Asians have been eating soy products for millennia and don't seem to be any the worse for it. They have among the longest lifespans and best health, at least in classic diets."

For at least a couple of reasons, citing this type of ecological observation in defense of soy against the charge it feminizes men is not uninformative, but it is a rather weak form of evidence. There are so many lifestyle factors that affect health, not much can be learned about the impact of soy by looking at the overall health status of Asian populations. More insight can be gained by looking at the health status of individuals within Asian countries according to the amount of soy they consume.

In other words, the more pertinent question is not how healthy are the Japanese, but are frequent soyfood consumers in Japan more or less healthy than those who infrequently eat soy? In Japan, a prudent dietary pattern, which is characterized by high intake of vegetables, fruit, soy products, potatoes, seaweed, mushrooms, and fish, is significantly associated with decreased risk of all-cause mortality.⁵ Another reason looking at the health status of the Japanese at large isn't especially informative is because it is problematic to extrapolate the findings about soy from an Asian culture, which has historically consumed soy, to a non-Asian population which hasn't.

Much more meaningful data come from clinical trials in the population of interest. And in the case of soy and non-Asians, there are plenty of data. As mentioned at the outset, tens of clinical studies show even large amounts of soy or isoflavones – amounts greatly exceeding typical Japanese intake – don't lower testosterone levels⁶ or raise estrogen levels⁷ or affect sperm or semen parameters.^{8,9} Also, clinical studies show that soy protein supplementation promotes gains in strength and muscle mass to the same extent as animal protein in men undergoing resistance exercise training.¹⁰ By not citing the clinical research, the WP article missed an opportunity to refute concern about male feminization.

Two case-reports, each describing a single individual who developed feminizing symptoms allegedly as a result of soy consumption, have been published.^{11,12} But each of these men consumed about nine times the amount of isoflavones consumed on average by older Japanese. Furthermore, the soy intake of these two men almost certainly occurred in the context of nutrient-deficient diets since most of their calories were derived from one food. Too much of any food may lead to problems. For example, drinking too much black tea, because of its high oxalate content, can cause nephropathy (kidney disease).¹³ One of the case reports indicated the patient consumed 12 cups of soymilk daily.¹² If he had drunk 12 cups of cow's milk instead of soymilk, the amount of calcium consumed would have greatly exceeded the upper safe limit (2,500 mg/d) for this mineral established by the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine.

MODERATION

The discussion about “eating soy in moderation” in the WP article was uninformative. Nestle was quoted as saying “my take on soy products is that they're foods like any other, and like any other, they should be eaten in moderation.” But when asked to define moderation, Nestle said, “I was afraid that you would ask that” and “I don't know. Once in a while. Not every day. Eating it once in a while is unlikely to be harmful. Eating it every day and having it as a main source of calories, I don't know anybody who does that.”

Why the difficulty of defining moderation? Nestle could easily have cited the average intake of soy in Japan, which is about 1.5 servings daily, as a measure of moderate soy intake.¹ After all, soy protein in Japan represents only about 10% of overall Japanese protein intake, which seems quite moderate.¹ And what is the basis for concern about eating soy daily, which is not an uncommon practice in Japan?^{14,15} The Chinese dietary guidelines include the recommendation to eat soy daily.¹⁶ In the U.S., vegans consume about 13 grams of soy protein daily.¹⁷ That 13 grams still only represents about 18% of total vegan protein intake, hardly an excessive proportion. That is about the same proportion of protein provided by dairy products among Americans.¹⁸

PROTEIN QUALITY

Finally, in the original article by Stangle, the claim was made that soy protein has a protein score of only 0.41, because it is so low in the essential amino acid methionine. (Actually, when determining protein quality, the essential amino acids methionine and cysteine [sulfur amino acids] are combined). No reference was cited for this statement. In contrast to this claim, quite a bit of data show that soy protein has a score of, or very close to, 1.0 (the highest possible score),¹⁹⁻²¹ a score that is higher than the score for beef.¹⁹ Furthermore, from a practical perspective, the bun consumed with an Impossible Whopper would boost methionine intake and hence, protein quality.

In conclusion, the article by Stangle is responsible for spreading misinformation about soy, but the WP article did little to set the record straight. Even a superficial examination of the literature would

have quickly revealed that soy protein is a high-quality protein and that the isoflavones found in soyfoods do not cause feminizing effects in men. Further, eating soy daily is completely consistent with the dietetic principles of moderation and variation.

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