

## Clean Bill of Health for the Impossible Burger

**Author :** Dr. Mark Messina

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With all the attention the Impossible Burger is receiving, especially after the decision by Burger King to provide the burger at all its U.S. locations by the end of the year, I anticipated that soy might receive more attention as a result. The current version (2.0) of the Impossible burger replaced wheat in the recipe with soy protein concentrate (SPC). The company notes that as a result of this change, the burger is tastier, holds up better and provides higher quality protein.

As anticipated, several articles on the health implications of consuming soy via the Impossible burger have been written. Unfortunately, some of the same misinformation that has plagued soy for 20 years is being repeated. Case in point, one recent [article](#) concluded: “We believe that consumers should be aware that soy based products are not health foods due to their sex hormone disrupting activity, as well as the well documented presence of phytic acid [sp], trypsin inhibitors, goitrogens, etc ...” along with other comments about the dangers of soy. However, the argument put forth by the authors is based on outdated and cherry-picked information.

To begin with, two assumptions or guesstimates made by the author about the content of the burger are way off, which should raise a red flag about the veracity of other statements in the article. The author estimated that the burger contains 80 g of soy protein. Now even if the author is given the benefit of the doubt, and it is assumed he meant 80 g of SPC, that estimate is still wildly inaccurate. SPC is typically about 2/3 protein, which implies that if the burger contained 80 g SPC, it would provide over 50 g of soy protein. However, Impossible [Foods](#) indicates the burger contains in total 19 g protein. Furthermore, SPC is not the only source of protein in the burger.

That 19 g of protein provided by the Impossible Burger is comparable to the amount of protein in a beef burger. It also makes quite a significant contribution to meeting the protein RDA, which for a man is about 60 g or so. But it is a lot less than the amount suggested by the author.

The author also extends quite a bit of effort estimating the isoflavone content of the burger. He suggests the burger contains either 42.2 or 4.2 mg isoflavones depending upon whether the SPC is alcohol-washed (4.2) or water-washed (42.2) during processing. For the record, most SPC is alcohol-washed. A lot of time could have been saved if the author had read a [blog post](#) from Sue Klapholz, MD, PhD, the VP of Nutrition and Health at Impossible Foods, which states that “a 4-oz. serving of Impossible Burger contains under 2 mg of isoflavones.” For comparison, typical older Japanese consume about 40 mg/d isoflavones.<sup>1</sup>

The author claims that “soy protein contains a xenoestrogen called genistein, which is implicated in breast and ovarian cancer in women, and affecting sexual development in males, among many other negative effects.” Part of this statement is true, soy does contain genistein. The rest is not. The author cites an article on Wikipedia as support for soy being implicated in breast and ovarian cancer.

Wikipedia can provide very useful information but when making such a bold statement, one would expect a peer-reviewed reference to be cited. But be that as it may, what about the claim itself? Well, the most recent meta-analyses of the epidemiologic data have found that soy consumption decreases risk of developing both breast<sup>2</sup> and possibly also ovarian<sup>3,4</sup> cancer, although far less work on the latter has been published. Furthermore, there is evidence that post-diagnosis soy intake reduces recurrence and mortality of breast cancer patients.<sup>5</sup> Of course, it is worth noting that epidemiologic studies don't allow cause and effect relationships to be established. But they certainly contradict the author's contention.

Furthermore, after extensively reviewing the data, the European Food Safety Authority concluded in 2015<sup>6</sup> and the Permanent Senate Commission on Food Safety of the German Research Foundation (SKLM) concluded in 2018,<sup>7</sup>

that isoflavone supplements do not adversely affect breast tissue in peri- or postmenopausal women, or increase breast cancer risk.

For the comment about soy affecting sexual development in males, the author cites a 2010 review article by Patisaul et al.<sup>8</sup> that consists mainly of a discussion of animal studies that evaluated the effects of *neonatal* isoflavone exposure. For the record, infants should be breast fed or fed an accepted infant formula, not fed the Impossible burger. As for men, clinical studies show soy doesn't lower testosterone levels<sup>9</sup> or adversely affect sperm or semen<sup>10,11</sup> and leads to similar gains in muscle mass and strength as whey protein in response to resistance exercise training.<sup>12</sup>

It is true, as the article notes, that soy contains phytic acid. But this is also true of all whole grains and beans. So, soy is in good company. Acute studies show that phytate inhibits mineral absorption, although evidence suggests chronic consumption of high-phytate diets attenuates the inhibitory effect of phytate on mineral absorption.<sup>13</sup> Furthermore, the calcium in calcium-fortified soymilk<sup>14</sup> and calcium-set tofu<sup>15</sup> is absorbed about as well as the calcium from cow's milk. And, there is evidence that iron absorption from soy is quite good and has been greatly underestimated.<sup>16,17</sup>

Soybeans also contain trypsin inhibitors, as do lots of other foods. However, it takes an awful lot of trypsin inhibitor to interfere with protein digestion.<sup>18</sup> That is clearly not a problem in the case of SPC because the protein provided by SPC is approximately 97% digestible.<sup>19</sup> Finally, soy does contain isoflavones as already noted, which in the past, have been classified as goitrogens. However, clinical studies show that soy, even large amounts, do not affect T3 or T4 levels,<sup>20,21</sup> evidence consistent with the conclusions of the SKLM,<sup>7</sup> the EFSA<sup>6</sup> and the FDA.<sup>22</sup>

One final comment. The title of the article is, "What does the Impossible Burger have in common with estrogen supplements for post-menopausal women? quite a lot!" Isoflavones are not estrogen. Isoflavones may help to alleviate hot flashes

(efficacious dose is estimated to be 50-60 mg/d), but they are different from estrogen at the molecular and clinical level.<sup>23</sup> It is scientifically unjustified to claim that isoflavones equal estrogen.

In conclusion, you can eat a nutritionally complete plant-based diet without the Impossible Burger. And there are loads of ways to incorporate soy into the diet. But for many Americans who desire the taste of meat, and the health benefits and environmental advantages of plant protein, the Impossible Burger is an excellent option.

## References

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