Endocrine Disruptors and Why Soy Isn't One

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Date : December 23, 2019

You might think a blog post outlining the basis for concluding that soy is not an endocrine disruptor is a waste of cyberspace given the many centuries this food has been consumed. And yet, isoflavones are routinely referred to as endocrine disruptors. Because soy is such a uniquely rich source of these naturally occurring plant compounds, this ancient Chinese food is often categorized similarly. However, unlike other endocrine disruptors whose classification is based primarily on the results of animal research, there are literally hundreds of clinical (intervention) studies attesting to the safety of soyfoods.

The World Health Organization defines an endocrine disruptor as "an exogenous substance or mixture that alters the function(s) of the endocrine system and consequently causes adverse effects in an intact organism, or its progeny, or (sub) populations."[1] Adverse effect is defined as a change in morphology, physiology, growth, reproduction, development or lifespan of an organism which results in impairment of functional capacity or impairment of capacity to compensate for additional stress or increased susceptibility to the harmful effects of other environmental influences." Endocrine disruptors have been linked with increased risks for obesity, diabetes mellitus and cardiovascular diseases, impaired male and female reproduction, hormone sensitive cancers, thyroid disruption and neurodevelopmental and neuroendocrine abnormalities.[2]

In some sense, it is understandable that isoflavones (and soy) are mentioned in discussions of endocrine disruptors because isoflavones interact with estrogen receptors and therefore, potentially interact with the endocrine system.[3] However, to be classified as endocrine disruptor requires that the substance in question causes an adverse effect. Is there such evidence in the case of soy? Not according to the U.S. Food and Drug Administration (and other health organizations).

In its evaluation of the evidence related to the cholesterol-lowering effect of soy protein, the FDA concluded: "The evidence does not change our previous conclusion that the use of soy protein at the levels [25 grams/day] necessary to justify a [health] claim has been demonstrated, to our satisfaction, to be safe and lawful."[4] The cholesterol-lowering studies the FDA evaluated most involved soy products that contained ample amounts of isoflavones.[5] Even more importantly, the FDA evaluated hundreds of public comments which in total covered a wide array of safety issues.

But it isn't just the FDA that has issued statements in support of soy. And one can readily cite numerous recent clinical studies and analyses of the clinical data that are consistent with the FDA conclusion. For example, a 2019 meta-analysis suggest no effect of soy on the main thyroid hormones, thyroxine and triiodothyronine.[6] In 2015, the European Food Safety Authority (EFSA)[7] concluded that "the administration of food supplements containing isoflavones is not associated

with clinically relevant changes in thyroid function (hypo or hyperthyroidism) in the population of interest" that is, peri- and postmenopausal women. Three years later, after extensively reviewing the literature, the Permanent Senate Commission on Food Safety of the German Research Foundation (SKLM)[8] concluded that isoflavone exposure does not adversely affect thyroid function in healthy women (men were not evaluated).

Similar support also exists for soy with respect to breast cancer, a rather contentious area. The position of the American Cancer Society,[9] the American Institute for Cancer Research[10] and the Canadian Cancer Society[11] is that breast cancer patients can safely consume soyfoods. The EFSA has also concluded that isoflavone supplements do not adversely affect the breast tissue of postmenopausal women[12] and a similar conclusion was reached by the SKLM.[8]

Concerns about soy are based almost exclusively on animal studies. Animal studies are a legitimate part of the scientific literature. And in the case of many endocrine disruptors, animal studies represent the bulk of the research because human studies are not able to be conducted. This is not the case with soyfoods. These foods have been rigorously examined clinically for the past 30 years. The clinical data led the FDA as well as many other health organizations to conclude that soyfoods are safe.

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