

Is Soy Infant Formula Use Protective Against Breast Cancer?

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The historically low incidence rates of breast cancer in soyfood-consuming countries led to initial enthusiasm that soy intake could reduce risk of developing this disease. While appropriate as a basis for speculation, considerably more informative are breast cancer rates among Asian women who regularly consume soy in comparison to those who do not. Such comparisons reveal that higher soy consumption is associated with a reduced breast cancer risk.

However, several lines of evidence suggest that to derive this protection requires eating soy early in life.^{1,2} Only a handful of observational studies have examined this hypothesis, which was first proposed in 1995.^{3,4} If in fact, “early” soy consumption is protective against breast cancer, do the benefits of early consumption apply to soy infant formula?

As noted, observational studies show soy intake is associated with a reduced breast cancer risk. For example, according to a meta-analysis by Xie et al.,⁵ soy intake among Asian women was associated with an approximate one-third reduction in risk, with more robust results for post-, versus premenopausal women. These results concur with those of a meta-analysis by Chen et al.⁶ and a large prospective study from China, which found that for each 10 mg/day increment in soy isoflavone intake, there was 3% (95% confidence interval, 1–5%) reduction in breast cancer risk.⁷

The evidence that soy intake is associated with protection against breast cancer is not entirely consistent, which is true for many areas of investigation. While there may be many reasons for this inconsistency, one might be that the observed breast cancer-protective effect of soy among adults results from consumption early in life. Since childhood eating habits tend to track into adulthood, it is certainly possible that adult high-soy consumers also consumed more so when young. But the relationship between early and later dietary intake is unlikely to be a perfect one. Therefore, it is likely that not all high-soy-consuming women consumed higher amounts of soy when young. If this is the case, and the early period of life is the key to soy’s protective effects, focusing only on adult soy intake will partially obscure the benefits of soy.

The hypothesis that early soy intake reduces later risk of developing breast cancer was based on research in mice,^{3,4} but subsequently published retrospective observational studies support this research.⁸⁻¹¹ Evidence suggests that early exposure to soy, because it contains isoflavones, changes the cells in the developing breast in a way that makes them permanently less likely to be transformed into cancer cells later in life.¹²⁻¹⁶

Three of the four observational studies to examine the early intake hypothesis assessed intake during adolescence (teenage years), whereas in one study, three different age periods were

assessed; 5-11, 12-19, and >20.⁹ In this latter study, risk was reduced by 60%, 20%, and 24%, respectively, in those periods. Thus, these data suggest childhood intake is more protective than teenage intake. However, these results should be viewed with considerable caution because to generate these data, the 156 controls and 99 cases in this study, were divided into three age brackets and three intake brackets. Thus, the numbers in each category were extremely small.

Nevertheless, this study by Korde et al.⁹ suggests the earlier the exposure to soy, the greater the protection against breast cancer. So, is it possible that soy infant formula use confers the same or even greater benefit than childhood soy intake?

It is well established that isoflavone intake among infants fed soy infant formula is extremely high. For example, on a body weight basis, intake is approximately 6-9 mg/kg,^{17,18} whereas among typical Japanese adults, it is only about 0.5 to 1 mg/kg, given that intake is 30 to 50 mg/day.¹⁹⁻²¹ This high exposure has led to concerns being raised about the safety of soy infant formula. It is far beyond the scope of this blog post to debate this issue, but it is worth highlighting recently published results of the Beginnings study.

In brief, the Beginnings study is an ongoing investigation of whether the growth and development of soy formula fed infants is comparable to infants fed breast milk or milk formula. The most recent publication focused on the effects of infant feeding mode on childhood cognition and language through five years of age.²² According to the data, mean scores on all administered tests were within published normal limits for all diet groups. The authors concluded, as follows: "Breastfeeding was associated with small, statistically significant, differences between children ages 3 and 5 years in verbal intelligence, expressive communication, and auditory comprehension with the latter having potential sexual dimorphic effects. Yet, these differences remain small and may not be of clinical relevance. Overall, MF [milk-based formula-fed] and SF [soy protein-based formula fed] did not significantly differ."²²

So, is there evidence that soy infant formula use lowers breast cancer risk? This question has considerable public health significance because millions of American women have used soy infant formula during infancy, and if protective, could represent a rather simple way to reduce risk of developing the most common cancer among U.S. women.

To the knowledge of this author, only two reports of observational data have addressed the relationship between soy infant formula and breast cancer. In one, registry-identified cases (n=372) were Canadian women aged 25–74 years diagnosed with breast cancer between June 2002 and April 2003; controls (n=356) were matched within 5-year age groups. Boucher et al.²³ found that in comparison to women who were breast fed and/or fed cow's milk formula during the first 4 months of life, women who consumed only soy infant formula were 58% less likely to have breast cancer (95% CI: 0.13, 1.40). When the time period for these comparisons was 5-12 months (rather than 0-4 months), risk was reduced by 41% (95% CI: 0.18, 1.90). While suggestive, neither finding was statistically significant, although that is largely because the study was underpowered in that

relatively few women were fed soy infant formula.

In the other study, which was conducted in the U.S., there was no relationship between soy infant formula use and young-onset breast cancer.²⁴ Cases (n=1759) were women who had been diagnosed with ductal carcinoma in situ or invasive breast cancer before the age of 50. Each case had a sister control (n=1672) who was free of breast cancer up to the same age at which her case sister developed the disease. Whether these null results apply to the onset of breast cancer that occurs later in life, is unknown.

In conclusion, intriguing evidence indicates soy consumption early in life is protective against breast cancer. The limited data do not allow conclusions to be made about whether early consumption applies to soy infant formula feeding, although research indicates soy infant formula allows for normal growth and development.

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