The health implications of soy infant formula


Introduction

While soy protein-based infant formulas have been fed to millions of infants worldwide, and have been shown to promote growth and development as well as cow milk-based formulas, controversy has developed over the adequacy and safety of soy protein-based formulas. Most of these concerns are based on the possibility of estrogenic effects of the isoflavones contained in soy protein-based formulas.

Clinical Review Purpose

- To report preliminary findings from The Beginnings Study of the Arkansas Children’s Nutrition Center
- To assess current studies addressing the potential long-term adverse health effects of soy protein-based formulas.

Review Summary

The preliminary results (5 years) from a prospective, longitudinal study comparing growth, development and health of breast-fed vs. formula-fed (both cow milk- and soy protein-based) children indicate that all of the children in the study are growing and developing within normal limits, with no adverse effects noted in the soy protein-based formula-fed children. This study is being conducted by the Arkansas Children’s Nutrition Center and involves greater than 300 participants being followed from birth through 6 years of age.

Nonetheless, questions remain regarding potential long-term adverse health effects of soy protein-based formula consumption due to the isoflavone content in the soy protein isolate used as the sole protein source in these formulas. Soy isoflavones have been shown to interact with estrogen receptors and therefore could have an effect on the reproductive system and other hormone sensitive tissues including pubertal development, adult fertility, hormonally sensitive cancers (e.g. breast, uterine, and endometrial cancers), and bone development.

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Soy isoflavones have been called ‘phytoestrogens’ (a compound that acts like estrogen in the body); however, they are not estrogens, and they are not truly estrogenic at nutritionally relevant concentrations. Their weak ability to activate estrogen receptors in addition to the need to compete with existing estrogen combine to make their estrogenic activity minimal when fed in amounts similar to those found in soy protein-based formula—even when fed in early development.

The concerns regarding soy isoflavones are based primarily on studies in cell culture and animal models; such findings have little or no relevance to the health effects of soy protein-based formula because the experiments do not model the human condition. In contrast, the only study to follow-up adults who were fed soy-based formula as infants found no adverse reproductive effects, and the authors of this study concluded that there was no evidence for long-term adverse health outcomes.¹

In addition, studies in neonatal pigs—an animal that does model human growth, development, metabolism and endocrine systems—have shown that not only were there no adverse effects noted between soy-fed, sow-fed (i.e. breastfed) or cow milk-based formula fed piglets, the soy-based formula fed piglets had greater bone mineral density, total mineral content and cortical thickness (p< 0.05).²

**Review Findings**

- Preliminary results from a robust (n>300) study of infant formula feeding indicate no adverse health effects with the use of soy protein-based infant formula.
- Many of the studies indicating adverse affects of soy isoflavones were done using purified isoflavones whose effects are not equal to the effects of feeding soy food or soy protein-based formula. When these studies were repeated using equivalent amount of isoflavone, but in the form found in soy protein-based formula, the adverse findings were not replicated.
- Feeding soy foods, including soy protein-based formula, may provide health benefits including improved body and bone composition and prevention of breast cancer.

**Discussion**

Although the findings from The Beginnings Study of the Arkansas Children’s Nutrition Center are preliminary and await definitive results from the conclusion of that study, indications are that feeding soy protein-based formula has no adverse health effects on term infants. These data add to the body of evidence indicating that not only do soy protein-based infant formulas provide adequate growth and development in term infants, they are also safe.
Conclusions

While feeding soy protein-based formula introduces phytochemicals not found in breast milk or cow milk-based formula, concerns about the adverse effects of these phytochemicals are not supported by convincing data in children, adults, or appropriate animal models in which soy foods (including soy protein-based formula) were studied.

References
