Introduction
While soy-based infant formulas have been available for about 100 years, few studies have measured the long-term growth in infants fed these formulas. In addition, nucleotide supplementation of cow milk-based formulas has been shown to enhance both the growth\(^1\) and the antibody response\(^2\) of term infants, but the effect of nucleotide supplementation of soy protein-based formula is unknown.

Study Purpose
- To measure the long-term (one year) growth in infants fed soy protein-based infant formulas and to study the effect of nucleotide supplementation of soy protein-based formulas on growth.

Study Design
A multi-site, randomized (in the soy-based formula groups), blinded, parallel, prospective 12 month clinical feeding trial in healthy term infants. Term infants were recruited from multiple private pediatric practices in the United States and only mothers who had decided that their infants would not be breastfed were allowed to enroll their infants in the study formula groups. A nonrandomized reference group of infants fed human milk/cow milk-based formula was included in the study.

Study subjects were full-term, healthy infants with a gestational age of 37-42 weeks and were 0 to 8 days of age at the time of enrollment. Infants with a birthweight of at least 2360 g for females and 2540 g for males with a 5-minute APGAR score of 7 or greater, and whose parents agreed that their infant would receive only the assigned feeding regimen were considered for enrollment.
Infants were fed: (1) a soy protein isolate-based formula, Isomil (n=73), or (2) the same soy protein isolate-based formula supplemented with 72 mg/L free monomeric nucleotides at the total potentially available nucleotide (TPAN) level in human milk (n=73), or (3) a mixed feeding consisting of breastfeeding exclusively to 2 months of age and thereafter allowing supplementation with Similac with Iron containing no supplemental nucleotides (n=67). Both soy formulas contained ~300 mg/L of inherent polymeric nucleotides. Introduction of solid foods was allowed after 4 months of age.

Measurements of growth (weight, length, head circumference) were obtained at enrollment, 0.5, 1, 2, 4, 6, 7 and 12 months of age using standard methods. In addition, formula tolerance was evaluated, and stool characteristics were measured at regular intervals. Blood samples were collected from the first 20 subjects in each feeding group at 2 months of age and at 12 months of age. These samples were analyzed for plasma albumin, blood urea nitrogen (BUN) and hemoglobin concentrations.

Study Results

- When growth data from this study were plotted against normalized NCHS anthropometric percentiles, all three feeding groups demonstrated similar normal growth. However, the mean weight gain between 2 weeks and 1 month of age was significantly higher (p=0.0002) for infants in the mixed feeding group, while both groups of soy formula-fed infants had significantly higher mean weight gains between 2 and 4 months (p=0.0003). Mean weight gains between 4 and 12 months were not significantly different among the groups.

- All study formulas were well-tolerated. Formula intake and percent of feedings with spit-up and/or vomit did not differ significantly between the two formula groups.

- Mean rank stool consistency and stool frequency were similar for both formula feeding groups. However, soy formula-fed infants had higher mean rank stool consistency scores and lower stool frequencies between 1 and 3 months of age compared with the mixed feeding infants.

- Mean plasma albumin and BUN levels in infants at 2 months of age, and mean blood concentrations of hemoglobin in infants at 12 months of age were all within the normal reference ranges for infants.

- There were no significant differences in hemoglobin concentration and plasma albumin levels among infants in all three feeding groups; however, infants in the mixed feeding group had lower levels of BUN (p<0.0001) than infants in either of the soy protein-based formula groups.
Key Finding:
Soy protein-based infant formulas supported normal growth (weight, length & head circumference) in term infants throughout the first year of life. Nucleotide supplementation of soy protein-based formulas did not affect growth.

Discussion

Results of this study demonstrated normal growth in healthy term infants fed soy protein-based formulas both with and without supplemental nucleotides. The faster growth pattern of the mixed feeding group versus the formula-fed groups in the first month of life is consistent with other published studies. The absence of a significant growth effect with the nucleotide supplementation is also consistent with other studies of healthy term infants.

Study Conclusions

Soy-based infant formulas support normal growth for the first full year of life in healthy term infants and were comparable to the reference mixed feeding group. Infants fed soy protein-based formulas had normal plasma biochemistries. Study results also showed that nucleotide supplementation of soy protein-based formulas at levels potentially available in human milk did not affect growth.

References


