

Formula Formulary

Making Sense of Infant Feeding



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KEYWORDS

- Formula nutrients • Infant formula • Soy formula
- Long-chain polyunsaturated fatty acids • Probiotics • Cow's milk allergy
- Modified protein formula

KEY POINTS

- When breastfeeding is not an option, healthy term infants should be placed on a standard formula unless there is a specific medical indication.
- Caregivers and providers should remain skeptical of claims made by formula companies, because many marketing claims have little supporting evidence.
- Specialized formulas are available for a variety of different medical indications.
- Many formulas now contain additives, such as long-chain polyunsaturated fatty acids, prebiotics, probiotics, and synbiotics. Although there is no known harm from these products, most research fails to find significant benefit. Additional investigation is warranted.

INTRODUCTION

The use of formula to supplement or replace breastfeeding is commonplace in the United States due to both medical reasons and personal preferences. However, the choice of formula may be confusing for patients and providers alike. There are many formulations, brands, additives, and indications for the use of different formulas. Parents may also confuse normal infant behavior such as spitting up and straining for a formula intolerance. In this article, the authors provide a brief overview of the different types of formula that are commercially available and indications for their use.

BREAST MILK AND ADVANTAGES OF BREASTFEEDING

A full discussion of infant formula is incomplete without the understanding that breastfeeding is the gold standard for infant feeding. The American Academy of Pediatrics (AAP) recommends “exclusive breastfeeding for about six months, followed by

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continued breastfeeding as complementary foods are introduced, with continuation of breastfeeding for one year or longer as mutually desired by mother and infant.”¹ The World Health Organization’s position is similar, recommending 6 months of exclusive breastfeeding followed by breast milk in combination with complementary foods through 23 months of life.²

There are many documented advantages of breastfeeding. Infants who are breastfed experience fewer episodes of otitis media and lower rates of respiratory tract infections.¹ Research has suggested that infants who are breastfed have lower rates of sudden infant death; less allergic disease; decreased risk of developing obesity, type 1 and 2 diabetes; as well as lower risk for developing cardiovascular disease later in life.^{1,3} Breastfeeding for greater than 3 months has been shown to result in improved intelligence and neurodevelopmental outcomes, particularly in high-risk populations such as infants born prematurely.¹

Despite these guidelines, the use of infant formula is commonplace in the United States. In 2012, almost 20% of infants received formula in the first days of life, with greater than a third of infants receiving supplementation before first 6 months. By 1 year of age, just over 20% of infants received any breast milk, suggesting formula use may continue to increase in the second 6 months of life.⁴ Thus, it is critical that the pediatric clinician has an appropriate understanding of its use.

OVERVIEW: PREPARATIONS AND NUTRIENTS

Commercially prepared infant formulas are designed to mimic the nutritional content and bioavailability of breast milk and should be offered in cases where breastfeeding is either contraindicated or not initiated. In the United States, federal regulations have existed in some form since 1941, with some of the most significant changes occurring with the passage of the Infant Formula Act of 1980.⁵ Monitoring and revisions of federal statutes continue to this day under the purview of the US Food and Drug Administration (FDA).

Currently, infant formulas are available in 3 forms: powder, liquid concentrate, and ready-to-feed liquids. Many new parents and guardians have questions regarding local water safety or are unclear about how to safely prepare and use formula. Detailed yet clear information about preparation and storage of infant formula should be made available to the family. An example of such information may be found on the Healthy Children Web site at <https://www.healthychildren.org/English/ages-stages/baby/feeding-nutrition/Pages/How-to-Safely-Prepare-Formula-with-Water.aspx>.⁶

All infant formulas contain many of the same basic components: proteins, carbohydrates, fats, vitamins and minerals, emulsifiers, and stabilizers, as well as thickeners or diluents. The FDA regulates the ingredients that are deemed necessary in infant formulas along with the minimum and maximum amounts of various nutrients. **Box 1** lists a complete list of nutrients required by the FDA of all manufacturers.⁷ Formulas may be exempt from these requirements in certain instances, such as formulas for infants with an inborn error of metabolism, low birth weight, genetic anomalies, or other unusual medical or dietary problems.⁸ **Table 1**⁹ gives an overview of commonly available types of formula available.

Most formulas are classified into different categories based on their protein source, carbohydrate source, and caloric density.¹⁰ *Caloric density* is commonly 20 calories per ounce in full-term infant formulas but is higher in preterm and transitional formulas.

The *protein source* is commonly cows’ milk or soy protein. The main proteins in both human and cows’ milk are casein and whey. Whey is digested much more quickly than casein. In human milk, the whey-to-casein ratio is 70:30, whereas in cows’ milk it is 18:82.¹¹ This ratio is modified to 60:40 when developing milk-based human formula

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