

1  **Infant Feeding and Infant Formulas**

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Feeding is the process of delivering / ingesting the food nutrients

3  **Feeding Infant**

Infants have the ability to regulate their food intake relative to their nutritional needs  
In doing so, they express signs of hunger and satiety and expect their caregiver to respond to these cues

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5  **Hunger and Satiety clues:**

1  Hunger:

Wake and toss  
Suck on a fist  
Appear like he or she is going to cry  
Cry or fuss

Caregivers should respond to the early signs of hunger and not wait until the infant is upset and crying from hunger

2  Satiety:

Sealing the lips together  
A decrease in sucking  
Spitting out the nipple  
Turning away from the breast or bottle

A caregiver should never force an infant to finish what is in the bottle  
Infants are the best judge of how much they need

6  **Young infants need to be fed small amounts of infant formula often throughout the day and night as their stomachs cannot hold a large quantity**

7  **Sleepy Infant**

*How to awake the baby:*

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*How to awake the baby:*

- Rubbing or stroking the infant's hands and feet
- Unwrapping or loosening blankets
- Giving the infant a gentle massage
- Undressing or changing the infant's clothing or diaper
- Playing with and talking to the infant

8  **Formula Feeding Tips**

- The caregiver should find a comfortable place in the home for feeding
- Interact with the infant in a calm and relaxed manner in preparation for and during feeding
- Show the infant lots of love, attention, and cuddling in addition to feeding

9  **Guidelines on Feeding From a Bottle**10 

Wash hands with soap and water before feeding

Hold the infant in your arms or lap during the feeding (with the infant in a semi-upright position with the head tilted slightly forward, slightly higher than the rest of the body, and supported by the person feeding the infant)

The infant should be able to look at the caregiver's face

Hold the bottle still and at an angle so that the end of the bottle near the nipple is filled with infant formula and not air

11  ***Ensure that the infant formula flows from the bottle properly by checking if the nipple hole is an appropriate size***12  ***Burp the infant at any natural break in or at the end of a feeding to eliminate swallowed air from the stomach***13 14  **Breastfeeding is the physiologic norm for mammalian mothers and babies**15 

Breast milk is the optimal source of nutrition for the infant

16  **Commercial Formula Development**

In 1867, Henri Nestlé created the first commercially sold formula

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16 17 18  **Types of infant formulas**

1. Cow's milk or Soya-based infant formulas (iron-fortified)
2. Hypoallergenic infant formulas
3. Other infant formulas designed to meet the nutritional needs of infants with a variety of dietary needs (e.g., lactose-free,...)

19  **Milk-Based Infant Formula**

1. Most commonly consumed
2. Made by modification of cow's milk with added vegetable oils, vitamins and minerals
3. Modified the protein to simulate the breast milk
4. In milk-based infant formulas:
  - protein provide 9 % of calories
  - fat provide 48–50 %
  - CHO provide 40–45 %

*These infant formulas are lower in fat and higher in carbohydrate, protein, and minerals than breast milk*

20  **Whey : Casein ratio**

- Breast milk 60 : 40
- Cow's milk 20 : 80

Human milk contains lower casein content and is easier to digest

Infant formula contains heat treated cow's milk proteins which results in smaller curds than pasteurized milk

21  **Iron-Fortified Infant Formula**

Iron-fortified cow's milk-based infant formula is the most appropriate milk feeding from birth to 12 months for infants who are not breastfed or who are partially breastfed

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- Providing non-iron fortified infant formula is associated with poor cognitive performance and development in infants
- Indication: normal, healthy infants
- Examples: Enfamil, Similac, S-26, Saha

23  **"Starter" Vs "Follow-on" formula**1  **Starter:**

Healthy infants < 6mo.

2  **Follow-on:**

Healthy infants 6-12 mo.

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## 2 Follow-on:

Healthy infants 6-12 mo.

Slightly higher protein

Slightly higher Ca, Fe

24  **Formulas with added thickening agents:**

Added rice starch, carob bean flour or corn-starch

Limitations:

- contribute to allergy
- affect gastric emptying
- one degree of thickness

25  **Soy-Based Infant Formula**

Contain:

➤ Soy protein isolate

➤ Vegetable oils as the fat source

➤ Carbohydrate (usually sucrose and/ or corn syrup solids), and vitamins and minerals

Fortified with methionine, and iron

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Soy-based infant formulas are safe and effective alternatives to cow's milk-based infant formulas, but have no advantage over them

27  **Soy-based infant formulas may be indicated in the following situations:**

- Galactosemia or hereditary/ secondary lactase deficiency
- Vegetarian
- Infants with documented IgE -mediated allergy to cow's milk protein

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- Acute gastroenteritis with no proven lactose intolerance
- Infantile colic
- Prevention of allergy in healthy or high-risk infants
- Infants with documented cow's milk protein induced enteropathy or enterocolitis
- Premature infants < 1800g (increases risk of osteoporosis and rickets)
- CF patients

29  **Hypoallergenic Infant Formula**

They may contain partially hydrolyzed protein, extensively hydrolyzed protein, or free amino acids

Extensively hydrolyzed and free amino acid-based infant formulas have been demonstrated to be tolerated by at least 90 percent of infants with documented allergies

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*Currently available partially hydrolyzed infant formulas are not hypoallergenic and should not be used to treat infants with documented allergies*

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**Extensively Hydrolyzed Protein Infant Formula :**

Protein: casein hydrolysate and amino acids

Carbohydrate: modified starch, corn syrup, sucrose

Fat: blend of vegetable oils, DHA and ARA, some contain medium chain triglyceride (MCT) oil

Indications: allergy to intact cow's milk or soy protein; GI malabsorption

Examples: Pregestimil Lipil, Similac Alimentum Advance, Nutramigen Lipil ,Alfare`

31  **Elemental Infant Formula:**

Protein: free amino acids

Carbohydrate: corn syrup solids

Fat: blend of vegetable oils, DHA and ARA, some contain medium chain triglyceride (MCT) oil

Indications: severe protein allergy, severe GI impairment

Examples: Neocate Infant, Elecare, Puramino, Alfamino

32  **Premature Infant Formulas:**

Indication: preemies < 1.8 Kg, <36 wk gestation

Differences from standard formula:

\*↑ Protein (whey predominant)

\*↑ MCT oils (40-50%)

\*↓ Lactose

\* Iron and vitamin E concentrations altered to prevent hemolytic anemia

Examples:

Enfacare, Enfamil Premature, Similac Neosure

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Whole cow's milk not be fed to infants during the first year of life

35  **1. Inappropriate Nutrient Content**

Low intakes of iron, linoleic acid (an essential fatty acid), and vitamin E

Excessive intakes of sodium, potassium, chloride, and protein

*Most dramatic effect on iron status:*

(little iron–milk composition inhibit the absorption)

36  **2. Microscopic gastrointestinal bleeding and blood loss**

Due to an immaturity of infant's gastrointestinal tract

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36  **2. Microscopic gastrointestinal bleeding and blood loss**

Due to an immaturity of infant's gastrointestinal tract  
 This bleeding promotes the development of iron deficiency anemia  
 May lead to long-term changes in learning and behavior that might not be reversed even with iron supplement

37  **3. Stress on the kidneys**

High renal solute load which is two to three times higher than that of formula-fed infants  
 Greater risk for developing dehydration which is greatest during: an acute illness when intake is decreased

38  **4. Hypersensitivity (allergic) reactions**

Cow's milk contains proteins that may cause hypersensitivity (allergic) reactions in the young infant

39 40  **Low-Fat or Skim Cow's Milk**

Low-fat milk (1 or 2 percent low-fat milk) should not be fed to infants  
 These milks contain insufficient quantities of fat (including linoleic acid), iron, vitamin E, and vitamin C; and excessive protein, sodium, potassium, and chloride  
 The amount of protein and minerals in low-fat and skim milk is even higher than in whole cow's milk; these milks place a strain on an infant's kidneys in the same way as does whole cow's milk

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Consumption of skim or low-fat milk is not recommended in the first 2 years of life because of the high protein and electrolyte content and low caloric density of these milks

42 43  **Goat's Milk**

Not recommended for infants  
 Contains inadequate quantities of iron, folate, vitamins C and D, thiamin, niacin, vitamin B6, and pantothenic acid  
 This milk also has a higher renal solute load compared to cow's milk and can place stress on an infant's kidneys  
 To cause a dangerous metabolic acidosis when fed to infants in the first month of life

44  **Introduction of Solid Food**45 

- Start when the baby is ready (around 6 months of age)
- Start with single type of food and wait 3-5 days before introducing a new type
- Only use a spoon to give food

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12/6/2022

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- Start with single type of food and wait 3-5 days before introducing a new type
- Only use a spoon to give food
- Never mix infant foods in the baby's bottle
- Use of an infant "feeder" is not recommended because baby won't develop proper feeding skills

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Cow's, goat, rice, or soy milk—are not appropriate before 1 year of age  
Do not give honey until 1 year of age  
Avoid juice before 1 year of age. When introduced, only give juice (100% only) in a cup, not a bottle  
Sugar-containing foods and drinks and foods with added salt are not recommended for infants

47  **What Can I Feed the Infants?**

First Foods:

- baby cereals
- Vegetables and Fruits
- Meat

Don't Give infants:

- Popcorn, Peanuts, Raisins, whole grapes, hard, raw fruits or vegetables such as apples, green beans
- Sticky foods such as peanut butter, which can get stuck in the back of mouth
- Any other pieces of food that the infant cannot chew because they do not have advanced chewing skills yet

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