

## The Start Healthy Feeding Guidelines for Infants and Toddlers

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The Dietary Guidelines for Americans provide nutrition and health guidance for Americans but do not address dietary and feeding recommendations for infants and toddlers under 2 years of age (1). Yet parents and caregivers need practical guidance about how to feed infants and toddlers, both to assure normal growth and to lay the foundation for later healthy eating habits, which, among other benefits, may help prevent obesity and other health problems during and after childhood. The objective of the Start Healthy Feeding

Guidelines is to provide parents and caregivers with practical information about feeding infants and toddlers. These are meant to complement and expand on statements by other expert groups and authoritative bodies. This paper describes the rationale for these Guidelines. The methodology, results, and complete references used to develop the guidelines are described elsewhere (2).

### BACKGROUND ON GUIDELINE DEVELOPMENT

The Start Healthy Feeding Guidelines focus on parents' and caregivers' major questions concerning complementary feeding: "When is my baby ready for complementary foods? What foods should I feed my baby? How do I feed these foods?" The conclusions from the development of the Start Healthy Feeding Guidelines address many aspects of these questions and form the scientific foundation of the Guidelines. These conclusions are summarized in Figure 1.

The Panel's decision to focus on complementary feeding reflects recognition that human milk provides adequate nutrition and other advantages for most infants for about the first 6 months of life, making it clearly the best choice for feeding an infant during this period. If breastfeeding is not possible or is not elected, iron-fortified formula is the next best choice. Because guides for successful breastfeeding and formula feeding are widely available (3), advice concerning this important aspect of infant feeding during the first year of life is limited here.

After 6 months of age, most breastfed infants need additional nutrients from foods, and some need additional nutrients earlier. Choosing an age for

introduction of complementary foods requires balancing the physiologic and developmental readiness of the infant, nutrient requirements for growth and development, and other health considerations. Question 1—When—in Figure 1 addresses some of these questions related to introduction of complementary foods. In addition, the variability in all these factors among infants must be recognized. In view of this variability, it is important to monitor the growth and development of all infants as an indicator of nutrient adequacy throughout the first 2 years of life. Formula may provide all nutrients needed for the first year of life, but it does not provide flavors, textures, and the opportunity to learn eating skills, which are important for formula-fed as well as breastfed infants.

Any discussion of complementary feeding requires a clear definition of "complementary foods." According to the American Academy of Pediatrics (AAP), complementary foods are "any energy-containing foods that displace breastfeeding and reduce the intake of breast milk" (4). The World Health Organization (WHO) defines complementary foods as "any nutrient containing foods or liquids other than breast milk given to young children during the period of complementary feeding . . . [when] other foods or liquids are provided along with breast milk" (5). WHO uses the term "replacement foods" for foods replacing breast milk (eg, infant formula). For practical purposes, "complementary foods" as used in the Start Healthy Guidelines refers to any foods or liquids other than human milk or formula that are fed during the first 12 months of life.

This paper highlights the research

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Research questions	Conclusions <sup>a</sup>
<p><b>1. When</b></p> <p>(a) When is an infant's gastrointestinal tract capable of handling complementary foods?</p> <p>(b) When is renal function sufficiently mature to allow introduction of complementary foods?</p> <p>(c) When do oral, gross, and fine motor skills required for complementary feeding emerge?</p> <p>(d) When are nutrients needed from complementary foods?</p> <p>(e) When should parents encourage dietary variety?</p> <p>(f) When is it appropriate to introduce textures?</p>	<p>The normal, healthy infant's gastrointestinal tract is mature enough to digest complementary foods by 3-4 months of age. By the time most nutrients in the baby's diet come from table foods, the physiological capabilities of the infant digestive tract are near adult proficiency.</p> <p>Despite some renal immaturity, most babies have no problems maintaining water balance even if feedings provide a relatively high potential renal solute load (above 33 mOsm/L). However, during acute illness, when fluid intake may be limited and water losses considerable (eg, fever, diarrhea, emesis, and elevated environmental temperatures), diets with a higher solute load may lead more rapidly to dehydration.</p> <p>Developmental readiness for complementary foods varies considerably among infants. In most babies, the developmental skills needed to begin complementary foods are present between 4 and 6 months of age.</p> <p>For most infants, breast milk and/or iron-fortified formula provide all required nutrients for about the first 6 months after birth and significant but varying amounts thereafter.</p> <p>Introduction of a variety of flavors and foods in the first 2 years of life may lead to acceptance of a wider variety of flavors and foods in later childhood and may increase the likelihood of children's trying of new foods. Exclusively breastfed infants are exposed to a variety of flavors, suggesting the importance of dietary variety from the beginning.</p> <p>Readiness for and acceptance of different food textures appears to depend on the child's developmental stage and prior experience with a particular texture. Infants will learn to eat foods of varying textures if they are exposed to them at appropriate developmental stages. A gradual exposure to solid textures during the sensitive period for learning to chew (from the time complementary foods are introduced through 10 months of age) may decrease the risk of rejection of certain textures, refusing to chew, or vomiting.</p> <p>Evidence for any kind of order for introducing textures is limited. Experts suggest a general progression.</p>
<p><b>2. What</b></p> <p>(a) What are infants' and toddlers' nutrient requirements?</p> <p>(b) What nutrients are needed from complementary foods?</p> <p>(c) What is the evidence that specific nutrients require special emphasis in the diets of infants and toddlers?</p> <p>(d) What foods should be avoided to reduce food allergy risk?</p>	<p>The DRIs provide recommendations for nutrient intakes for healthy individuals and populations including infants and toddlers. However, these are only estimates. It is important to monitor growth and development.</p> <p>After 6 months, most breastfed infants need complementary foods to meet current DRIs for energy, manganese, iron, fluoride, vitamin D, vitamin B6, niacin, zinc, vitamin E, magnesium, phosphorus, biotin, and thiamin (Table 2). Amounts of energy and nutrients needed from complementary foods will vary depending upon the intake of human milk or formula. Although iron-fortified infant formula provides the recommended intakes of energy and nutrients until about 1 year of age depending on intake, all infants need complementary foods for exposure to flavors and textures as well as to master eating skills.</p> <p>National nutrition monitoring in the United States of biochemical indicators of nutritional status of infants and toddlers suggests that iron needs special emphasis. The prevalence of deficiency is highest among children less than 2 years of age. Complementary foods such as meats and iron-fortified cereals contribute significant amounts of iron and are helpful in preventing deficiency. Because rickets due to vitamin D deficiency has been observed recently in dark-skinned breastfed infants and other infants without adequate sun exposure, 200 IU vitamin D is recommended as a supplement for breastfed infants and infants receiving less than 500 mL formula per day. Intakes of the essential fatty acids may require emphasis once breast milk or formula is replaced with cow milk.</p> <p>Infants with a strong family history of food allergy should be breastfed for as long as possible and should not receive complementary foods until 6 months of age. The introduction of the major food allergens such as eggs, milk, wheat, soy, peanuts, tree nuts, fish, and shellfish should be delayed until well after the first year of life. Those foods that are associated with "lifelong" sensitization (peanut, tree nuts, fish, and shellfish) should not be introduced until even later. Consideration of a hypoallergenic formula, duration of formula use, and other dietary restrictions should be decided in consultation with the health care provider. There is no evidence that restriction or avoidance of any foods is necessary for the infant who is not at risk for allergy. Caregivers, however, are advised to introduce new foods one at a time and to watch for adverse reactions. Studies documenting an optimal time before the introduction of the next new food were not found. Recommendations range from 2 days to a week. One new food every 2 to 4 days (eg, two to three per week) seems reasonable.</p>

<sup>a</sup>The references are available in reference (2).

**Figure 1.** Research questions and conclusions that form the scientific foundation for the Start Healthy Feeding Guidelines for Infants and Toddlers. (Continued on following page.)

## OF PROFESSIONAL INTEREST

Research questions	Conclusions <sup>a</sup>
(e) What is the role of physical activity for infants and toddlers?	While there is no evidence that physical activity in infants or toddlers is related to activity or health in later years, age-appropriate, daily physical activity in a safe, nurturing environment may help promote physical development and movement skills and teach the healthy habit of activity. Encourage parents and caregivers to promote enjoyment of movement and motor skill confidence at an early age. Motor skills, like cognitive skills, flourish when the infant is exposed to a stimulating environment. Early childhood is a key period for promoting physical activity because during this time, fundamental motor skills (eg, walking, running, jumping) begin to develop. When activity is encouraged, these skills can further develop into advanced patterns of motor coordination. Parents and caregivers should limit excessive use of infant restraints, to balance sedentary pastimes with active ones and to make a conscious effort to include movement and physical activity in a child's day. Television viewing should be discouraged for children under 2 years of age.
<p><b>3. How</b> (a) How can parents establish a healthy feeding relationship?</p> <p>(b) How do infants and toddlers communicate hunger and fullness? How should caregivers respond?</p> <p>(c) How should parents or caregivers introduce complementary foods for the first time?</p> <p>(d) How quickly and in what order should complementary foods be introduced?</p> <p>(e) How much food provides a portion or serving for infants and toddlers?</p> <p>(f) How can parents and caregivers help children accept a wider variety of foods?</p> <p>(g) How are picky eating and food jags described? How can parents and caregivers help children with picky eating and food jags?</p>	<p>The healthy feeding relationship is a division of responsibility between the parent and the child. The parent sets an appropriate and nurturing feeding environment and provides appropriate healthy foods. The child decides whether and how much to eat. Responsive parenting appears to be at the core of a healthy feeding relationship. This involves:</p> <ul style="list-style-type: none"> <li>• recognizing the child's developmental abilities with respect to feeding;</li> <li>• balancing the child's need for assistance with encouragement of self-feeding;</li> <li>• allowing the child to initiate and guide feeding interactions; and</li> <li>• responding early and appropriately to hunger and satiety cues.</li> </ul> <p>For infants, hunger cues may include crying, excited arm and leg movements, opening mouth and moving forward as spoon approaches, swiping food toward the mouth, and moving head forward to reach spoon. Smiling, cooing, and/or gazing at the caregiver during feeding may indicate the desire to continue. Hungry toddlers may point at foods or beverages, ask for foods or beverages, or reach for foods. Infant's satiety cues may include falling asleep, becoming fussy during feeding, slowing the pace of eating, stopping sucking, spitting out or refusing nipple, refusing spoon, batting the spoon away, closing mouth as spoon approaches.</p> <p>Toddlers may slow the pace of eating, become distracted or notice surroundings more, play with food, throw food, want to leave the table or chair, or not eat everything on the plate. To help avoid underfeeding or overfeeding, parents and caregivers must be sensitive to the hunger and satiety cues of the healthy infant and young child. Crying is often, but not always, a sign of hunger. Parents should determine if the infant is hungry or experiencing discomfort.</p> <p>No controlled studies have addressed the practical aspects of introducing complementary foods for the first time. Mixing cereal with breast milk enhances acceptance of cereal by breastfed infants. Repeated exposure to foods enhances acceptance of new foods by both breastfed and formula fed infants. As with all feeding interactions, caregivers should observe the infant's intake and nonverbal cues and respond appropriately.</p> <p>There is no evidence for a benefit to introducing complementary foods in any specific sequence or at any specific rate. However, it is generally recommended that first solid foods be single-ingredient foods and that they be started one at a time at 2- to 7-day intervals. The order of introduction of complementary foods is not critical, except for providing nutrients required from complementary foods. Meat and fortified infant cereals provide many of these nutrients. Combination foods may be given to older infants after tolerance for the individual components has been established.</p> <p>Children often eat small frequent meals and snacks throughout the day: customarily three regular meals and two to three appropriate, healthy snacks. Variability among infants and toddlers must be recognized and portions should accordingly provide essential nutrients and not exceed energy requirements.</p> <p>Introduction of a variety of flavors and foods in the first 2 years of life may lead to acceptance of a wider variety of flavors and foods in later childhood and may increase the likelihood of children's trying new foods. Repeated exposures to a particular food are usually necessary. Studies show that up to 10 to 15 exposures may be necessary before a specific food is accepted.</p> <p>There is no scientific definition of picky eating. Rather, picky eating is defined by the caregivers' perception. Parents perceive a toddler to be a picky eater when he or she accepts only a few foods, refuses to try new foods, totally avoids some food groups, and exhibits strong food preferences, including presentation and preparation methods. Studies show that occasional picky eating is not associated with changes in nutrient intake or height and weight. Consuming a single food or foods for extended periods of time is commonly called a food jag.</p> <p>The health consequences of persistent picky eating or food jags on nutritional status or growth are not known.</p>

Figure 1 (continued).

Research questions	Conclusions <sup>a</sup>
<p>(h) How can caregivers help the child develop independence in feeding?</p> <p>(i) How can parents and caregivers feed safely?</p>	<p>While no specific strategies to address picky eating have been shown to be effective, some general feeding guidelines apply:</p> <ul style="list-style-type: none"> <li>• Be patient; occasional picky eating can be a normal stage of development.</li> <li>• Provide multiple and varied options of new and familiar foods and allow the toddler to choose.</li> <li>• Offer foods again and again to enhance acceptance.</li> <li>• If a particular food is rejected, move on and try it again later; avoid forcing toddlers to eat or finish foods.</li> <li>• The parent's role is to provide a variety of foods and allow the toddler to choose how much, if any, she will eat.</li> <li>• Since picky eating or food jags may result in inadequate growth or nutrient inadequacy, growth or nutrient status should be monitored.</li> <li>• If a food jag persists, growth should be monitored more frequently.</li> </ul> <p>To help children develop independence in feeding, parents and caregivers may need to demonstrate feeding skills rather than rely on verbal prompts alone. Awareness of developmental feeding skills is needed so that the tasks presented are appropriate. Cultural differences in mothers' expectations and encouragement of self-feeding should be recognized and respected, but if inappropriate, these should not be encouraged.</p> <p>Keep all foods safe to eat and appropriate for baby's development. Guidance to parents and caregivers about safe feeding may increase their awareness and understanding and thereby may reduce the risk of foodborne illness, choking, lead poisoning, nonfood eating, and high intake of nitrates, nitrites, and methylmercury.</p> <ul style="list-style-type: none"> <li>• For infant formula, closely follow manufacturer's use and storage instructions on the label.</li> <li>• In handling expressed breast milk, keep it clean and avoid contamination when it is collected and stored.</li> <li>• Bottle-fed infants are at higher risk of exposure to foodborne bacteria, particularly if the bottles are left at room temperature for several hours.</li> <li>• Make sure the baby's bottle is cleaned and disinfected after each use.</li> <li>• To help ensure that homemade or commercially prepared baby food is safe, follow general food safety guidelines and the manufacturer's package directions.</li> <li>• Since infants and toddlers can be at risk for choking, knowledge of choking hazards can lessen the chances of it occurring.</li> </ul>

Figure 1 (continued).

results that shape key Guidelines with an emphasis on the 6- to 24-month-old child's nutrient needs from complementary foods and the nutrients warranting special attention in the diets of these children. Advice on avoidance of food allergies, the development of feeding skills, and practical "how-to's" for feeding infants and toddlers as well as the importance of food safety and activity also is addressed.

**NUTRIENTS NEEDED FROM COMPLEMENTARY FOODS**

The nutrient needs of infants and toddlers were assumed to be those quantified in the Dietary Reference Intakes (DRIs) issued by the Food and Nutrition Board-Institute of Medicine/Health Canada (6-10), defined in Figure 2 and summarized in Table 1. Because the nutrient density of human milk is less than that of infant formula, recommendations about the types and quantities of complemen-

tary foods needed are based on comparisons between the nutrient contribution of the average human milk intake and the DRIs for each nutrient. The differences between the DRIs and the estimated intakes of nutrients from human milk were assumed to be the nutrients needed from complementary foods. Complementary foods that meet the nutrient needs of breastfed infants should also be adequate for formula-fed infants receiving appropriate volumes of formula.

A key conclusion from the nutrient calculations and analyses are that less than 50% of the RDA for iron and zinc and less than 50% of the AI for manganese, fluoride, vitamin D, vitamin B-6, niacin, vitamin E, magnesium, phosphorus, biotin, and thiamin are met by the average intake of human milk at 6 to 8 months of age (Table 2). Question 2b in Figure 1 summarizes the nutrients most

needed by breastfed infants after about 6 months of age that should be provided by complementary foods or other appropriate means.

Menus with human milk or infant formula and complementary foods for infants 6 to 12 months as well as menus including whole milk and a variety of foods for toddlers 12 to 24 months of age were developed and analyzed using the Nutrition Data System for Research software (version 4.03, Nutrition Coordinating Center, University of Minnesota, Minneapolis). This exercise demonstrated that DRIs for the 7- to 12-month-old infant can be met with a combination of human milk or formula and complementary foods and also identified specific complementary foods that provide the necessary nutrients. For toddlers, careful effort was required to provide the DRIs for iron, essential fatty acids, and vitamin E. The AI for dietary fiber was not achieved. Developing



Recommended Daily Allowances (RDA)	Average daily nutrient intake level that is sufficient to meet the nutrient requirements of nearly all individuals (97% to 98%) in a life stage and gender group. It is intended to be used for assessing the diets of healthy individuals, not for assessing or planning diets for groups.
Estimated Energy Requirement (EER)	Dietary energy intake that is predicted to allow for a level of physical activity consistent with normal health and development and allow for deposition of tissues at a rate consistent with growth.
Acceptable Macronutrient Distribution Range (AMDR)	Range of macronutrient intakes for a particular energy source that are associated with reduced risk of chronic disease while providing adequate intakes of essential nutrients.
Tolerable Upper Intake Levels (TUL)	Highest average daily nutrient intake that is likely to pose no risks of adverse health effects to almost all individuals in a life stage and gender group.
Adequate Intake (AI)	Recommended average daily nutrient level based on observed or experimentally determined estimates of average nutrient intakes by a group of healthy individuals. It is used when an RDA cannot be determined and may be used to plan and evaluate diets of individuals or groups.
Estimated Average Requirement (EAR)	Nutrient intake value that is estimated to meet the requirement defined by a specific indicator of adequacy in 50% of individuals in a life stage and gender group and is expressed as a daily value over time (for most nutrients, at least 1 week). It includes an adjustment for bioavailability, is intended to be used as one factor in assessing adequacy of intake of groups or individuals, and should not be used as an intake goal for the individual.

**Figure 2.** Dietary Reference Intakes (DRI) – Summary of Definitions. (Source: National Academy of Sciences Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine.)

menus for both age groups demonstrated little leeway for foods that provide predominately “empty” calories without other nutrients needed by infants and toddlers. Menu guidelines included AAP recommendations for appropriate use of juice and whole cow’s milk (11,12).

**NUTRIENTS WARRANTING SPECIAL EMPHASIS FOR INFANTS AND TODDLERS**

In identifying nutrients warranting special emphasis, the Panel considered clinical or biochemical evidence of nutrient deficiency as well as the results of the menu analyses (see question 2c in Figure 1). Iron was the only nutrient for which national US biochemical data from children under 2 years were available. Vitamin D and the essential fatty acids also were identified as requiring special emphasis.

According to NHANES III (1989-1994), 9% of children less than 3

years of age were iron deficient and one-third of these were also anemic (13). Because iron deficiency can result in cognitive and motor deficits, some of which may not be reversible, prevention of iron deficiency is extraordinarily important (14). By about 6 months of age, term breastfed infants require an additional source of iron in their diets to meet their iron requirement. Good sources of iron include meats, especially red meats, and iron-fortified infant cereals. An ounce (30 g) of infant cereal provides the daily iron requirement, particularly if fed with vitamin C-rich foods (such as baby fruits), which enhance iron absorption from the cereal. Formula-fed infants should receive only iron-fortified formula, which also should be used for supplementing breastfed infants.

On the basis of recent reports of rickets in breastfed infants with inadequate exposure to sunlight, the AAP

recommends vitamin D supplementation (200 IU/day) of breastfed infants (15). The Start Healthy Guidelines echo this recommendation.

Both human milk and currently available formulas provide generous amounts of the essential fatty acids, linoleic, and  $\alpha$ -linolenic acid. However, cow’s milk, especially skim and lower fat milk, have very low levels of these fatty acids, and national surveys have documented low linoleic acid intakes in infants and toddlers fed cow’s milk (16). The extent to which these low intakes are associated with signs/symptoms of deficiency (poor growth, scaly skin lesions, impaired wound healing, impaired visual acuity) is not clear. To help assure adequate intakes, cow’s milk should not be introduced until after a year of age, and, then, only whole milk should be offered. However, if milk is limited to two cups per day, an additional tablespoon of oil in food preparation or added to already prepared foods is needed to provide the calculated deficits of linoleic and  $\alpha$ -linolenic acid. Corn, safflower, or soybean-based oils or spreads provide the necessary amount of linoleic acid, but only soybean oils or spreads provide adequate linoleic and  $\alpha$ -linolenic acid. Canola oil also is a good source of  $\alpha$ -linolenic acid, but it has less linoleic acid than corn, soybean, or safflower oil. If use of soybean oil is not advisable, a mixture of 50% canola oil and 50% safflower or corn oil will provide the necessary amounts of both linoleic and  $\alpha$ -linolenic acid.

Currently, there is concern that infants receiving adequate amounts of linoleic and  $\alpha$ -linolenic acids may also need a dietary source of the long-chain polyunsaturated products of these fatty acids, eg, arachidonic and docosahexaenoic acids, particularly the latter. Because human milk contains these fatty acids and formulas supplemented with them are available, intakes by breastfed infants and infants fed supplemented formula are adequate through approximately 1 year of age. Currently, it is not clear whether toddlers will benefit from supplements of these long-chain fatty acids.

Fiber-rich foods such as whole grains, fruits, and vegetables should be encouraged, but it is unclear whether the AI for 1- to 3-year-old children is achievable for all children.

**Table 1.** Summary of the Dietary Reference Intakes (DRIs) and food sources of the key nutrients for infants (0-12 months of age) and toddlers (1-2 years of age)<sup>a</sup>

Nutrient	DRIs			Sources of nutrient for infants/toddlers <sup>b</sup>	
	Age				
	0-6 mo	7-12 mo	1-3 yr		
<b>Energy (calories)<sup>c</sup> EER</b>	0-3 mo (89×weight of infant [kg]–100)+175 (kcal for energy deposition)	4-6 mo (89×weight of infant [kg]–100)+56 (kcal for energy deposition)	7-12 mo (89×weight of infant [kg]–100)+22 (kcal for energy deposition)	13-35 mo (89×weight of infant [kg]–100)+20 (kcal for energy deposition)	Infant: Human milk or iron-fortified infant formula, complementary foods.  Toddler: Variety of foods from all the food groups, whole milk, other dairy, fortified cereal, whole grains, fruits, vegetables, margarines/vegetable oils, meat, meat alternatives
<b>Protein</b>	AI <sup>d</sup> EAR <sup>e</sup> RDA <sup>f</sup>	9.1 g/d or 1.52 g/kg/d ... ...	... 9.9 g/d or 1.1 g/kg/d 1.5 g/kg/d	... 0.88 g/kg/d 1.10 g/kg/d or 13 g/d	Infant: Human milk or iron-fortified infant formula, meats Toddler: Whole milk and dairy, meat, meat alternatives, legumes, eggs
<b>Fat<sup>g</sup></b>	Total fat	AI: 31 g/d	AI: 30 g/d	AMDR <sup>h</sup> 30% to 40% of kcal	Infant: human milk or iron-fortified infant formula Toddler: whole milk and dairy, meat, chicken, vegetable oils, margarines
	n-6 polyunsaturated fatty acids	AI: 4.4 g/d	AI: 4.6 g/d		Linoleic acid: Corn, safflower and soybean based oils or spreads
	n-3 polyunsaturated fatty acids	AI: 0.5 g/d	AI: 0.5 g/d	AI: 0.7 g/d	Linolenic acids: Soybean and canola based oils and spreads, long chain fatty acids (docosahexaenoic acid, eicosapentaenoic acid): fish sticks, tuna
<b>Fiber<sup>i</sup></b>	AI	ND <sup>j</sup>	ND	19 g/d of total fiber	Infant: Fruits and vegetables, legumes, whole grains Toddler: Legumes, whole grains, fruits and vegetables
<b>Vitamin A</b>	AI EAR RDA TUL <sup>l</sup>	400 μg RAE <sup>k</sup> ... ... 600 μg preformed	500 μg RAE ... ... 600 μg preformed	... 210 μg RAE 300 μg RAE 600 μg preformed	Infant: Human milk or iron-fortified infant formula, orange or yellow fruits and vegetables, spinach, broccoli Toddler: Orange or yellow fruits and vegetables, Vitamin A fortified whole milk, dark green leafy vegetables, broccoli
<b>Vitamin C</b>	AI EAR RDA TUL	40 mg ... ... ND	50 mg ... ... ND	... 13 mg 15 mg 400 mg	Infant: Human milk or iron-fortified infant formula, baby fruits and vitamin C rich fruit juices Toddler: Vitamin C–rich juices
<b>Vitamin D<sup>m</sup></b>	AI TUL	5.0 μg (200 IU) 25 μg (1,000 IU)	5.0 μg (200 IU) 25 μg (1,000 IU)	5.0 μg (200 IU) 50 μg (2,000 IU)	Infant: Iron-fortified infant formula, vitamin D supplement Toddler: Whole milk, vitamin D-fortified ready-to-eat cereals
<b>Vitamin E (α-tocopherol)</b>	AI EAR RDA TUL	4 mg ... ... ND	5 mg ... ... ND	... 5 mg 6 mg 200 mg	Infant: Human milk or iron-fortified infant formula, infant cereal, vegetable oils, mashed avocado Toddler: Vegetable oils, avocado

(continued)

## OF PROFESSIONAL INTEREST

**Table 1.** Summary of the Dietary Reference Intakes (DRIs) and food sources of the key nutrients for infants (0-12 months of age) and toddlers (1-2 years of age)<sup>a</sup> (continued)

Nutrient	Age			Sources of nutrient for infants/toddlers <sup>b</sup>
	0-6 mo	7-12 mo	1-3 yr	
<b>Vitamin K<sup>n</sup></b>				
AI	2 µg	2.5 µg	30 µg	Infant: Human milk or iron-fortified infant formula Toddler: Eggs, spinach, broccoli
TUL	ND	ND	ND	
<b>Thiamin</b>				
AI	0.2 mg	0.3 mg	...	Infant: Human milk or iron-fortified infant formula, infant cereal Toddler: Pork, fortified cereals, enriched grain products
EAR	...	...	0.4 mg	
RDA	...	...	0.5 mg	
TUL	ND	ND	ND	
<b>Riboflavin</b>				
AI	0.3 mg	0.4 mg	...	Infant: Human milk or iron-fortified infant formula, infant cereal, yogurt Toddler: Whole milk and other dairy, fortified cereals, enriched grain products, eggs
EAR	...	...	0.4 mg	
RDA	...	...	0.5 mg	
TUL	ND	ND	ND	
<b>Niacin</b>				
AI	2 mg NE <sup>o</sup>	4 mg NE	...	Infant: Human milk or iron-fortified infant formula, infant cereal Toddler: Turkey breast, fortified cereal, enriched grain products, eggs
EAR	...	...	5 mg NE	
RDA	...	...	6 mg NE	
TUL	ND	ND	10 mg NE	
<b>Vitamin B-6</b>				
AI	0.1 mg	0.3 mg	...	Infant: Human milk or iron-fortified infant formula, infant cereal, enriched or whole-grain products Toddler: Fortified cereal, enriched or whole-grain breads or pasta, chicken
EAR	...	...	0.4 mg	
RDA	...	...	0.5 mg	
TUL	ND	ND	30 mg as pyridoxine	
<b>Folate</b>				
AI	65 µg	80 µg	...	Infant: Human milk or iron-fortified infant formula, infant cereal, fortified grain products Toddler: Orange juice, fortified cereals, enriched grain products, green leafy vegetables, broccoli, legumes
EAR	...	...	120 µg	
RDA	...	...	150 µg	
TUL	ND	ND	300 µg	
<b>Vitamin B-12</b>				
AI	0.4 µg	0.5 µg	...	Infant: Human milk or iron-fortified infant formula, beef, yogurt Toddler: Beef, yogurt, milk, eggs
EAR	...	...	0.7 µg	
RDA	...	...	0.9 µg	
TUL	ND	ND	ND	
<b>Pantothenic acid</b>				
AI	1.7 mg	1.8 mg	2 mg	Infant: Human milk or iron-fortified infant formula, yogurt, sweet potato Toddler: Chicken, yogurt, sweet potato, eggs
TUL	ND	ND	ND	
<b>Biotin</b>				
AI	5 µg	6 µg	8 µg	Infant: Human milk or iron-fortified infant formula, infant oatmeal cereal Toddler: Eggs, oatmeal, shredded wheat
TUL	ND	ND	ND	
<b>Calcium</b>				
AI	210 mg	270 mg	500 mg	Infant: Human milk or iron-fortified infant formula, infant cereals Toddler: Whole milk and dairy, calcium fortified juice
TUL	ND	ND	ND	
<b>Chromium</b>				
AI	0.2 µg	5.5 µg	11 µg	Infant: Human milk or iron-fortified infant formula, cheese Toddler: Meats, eggs, whole grains, cheese
TUL	ND	ND	ND	
<b>Copper</b>				
AI	200 µg	220 µg	...	Infant: Human milk, iron-fortified infant formula Toddler: Liver, seafood
EAR	...	...	260 µg	
RDA	...	...	340 µg	
TUL	...	...	1,000 µg	

(continued)

**Table 1.** Summary of the Dietary Reference Intakes (DRIs) and food sources of the key nutrients for infants (0-12 months of age) and toddlers (1-2 years of age)<sup>a</sup> (continued)

Nutrient	Age			Sources of nutrient for infants/toddlers <sup>b</sup>
	0-6 mo	7-12 mo	1-3 yr	
<b>Fluoride<sup>p</sup></b>				
AI	0.01 mg	0.5 mg	0.7 mg	Infant: Iron-fortified infant formula mixed with fluoridated water, infant fluoride supplement (prescribed by pediatrician if needed) Toddler: Fluoridated water (depends on water supply)
TUL	0.7 mg	0.9 mg	1.3 mg	
<b>Iodine</b>				
AI	110 µg	130 µg	...	Infant: Human milk or iron-fortified infant formula, food prepared with iodized salt Toddler: Iodized salt and food prepared with iodized salt, fish
EAR	...	...	65 µg	
RDA	...	...	90 µg	
TUL	ND	ND	200 µg	
<b>Iron</b>				
AI	0.27 mg	...	...	Infant: Iron-fortified infant formula, meats, iron-fortified infant cereals Toddler: Meats, iron-fortified cereal
EAR	...	6.9 mg	3.0 mg	
RDA	...	11 mg	7 mg	
TUL	40 mg	40 mg	40 mg	
<b>Magnesium</b>				
AI	30 mg	75 mg	...	Infant: Human milk or iron-fortified infant formula, infant cereals, meats Toddler: Whole milk and dairy, whole grains, legumes
EAR	...	...	65 mg	
RDA	...	...	80 mg	
TUL	ND	ND	65 mg supplementary	
<b>Manganese</b>				
AI	0.003 mg	0.6 mg	1.2 mg	Infant: Human milk or iron-fortified infant formula, whole grains Toddler: Whole grains, legumes, pineapple, strawberries
TUL	ND	ND	2 mg	
<b>Phosphorus</b>				
AI	100 mg	275 mg	...	Infant: Human milk or iron-fortified infant formula, infant cereals, meats Toddler: Whole milk and dairy, meat, fish, chicken, eggs
EAR	...	...	380 mg	
RDA	...	...	460 mg	
TUL	ND	ND	3.0 g	
<b>Selenium</b>				
AI	15 µg	20 µg	...	Infant: Human milk or iron-fortified infant formula, whole grains Toddler: Chicken, eggs, whole grains
EAR	...	...	17 µg	
RDA	...	...	20 µg	
TUL	45 µg	60 µg	90 µg	
<b>Zinc</b>				
AI	2.0 mg	...	...	Infant: Human milk or iron-fortified infant formula, meats, zinc-fortified infant cereal Toddler: Meats, zinc-fortified ready-to-eat cereal
EAR	...	2.5 mg	2.5 mg	
RDA	...	3 mg	3 mg	
TUL	4 mg	5 mg	7 mg	

<sup>a</sup>In general, for infants 0 to 6 months, AI reflects the average nutrient intake from human milk. For infants 7 to 12 months, AI may be based on average nutrient intake from human milk plus infant foods or extrapolated from estimates of older children or adult requirements. For 1 to 2 years of age, DRIs were derived from data on toddlers or from data extrapolated from older children or adults. For detailed description of derivations for specific nutrients check DRIs references (5-9).

<sup>b</sup>Adapted from sources of nutrients provided by Duyff RL. *American Dietetic Association Complete Food and Nutrition Guide, 2<sup>nd</sup> ed.* Hoboken, NJ: John Wiley and Sons; 2002.

<sup>c</sup>Energy requirements of infants and young children should balance energy expenditure at a level of physical activity consistent with normal development and allow for deposition of tissues at a rate consistent with growth.

<sup>d</sup>AI=adequate intake.

<sup>e</sup>EAR=estimated average requirement.

<sup>f</sup>RDA=recommended daily allowance.

<sup>g</sup>Total fat and polyunsaturated fatty acids are based on the composition of human milk. Saturated, monounsaturated and *trans*-fatty acids are not essential; therefore, no DRIs were determined for saturated fat or *cis* n-9 monounsaturated fat or *trans*-fatty acids.

<sup>h</sup>AMDR=acceptable macronutrient distribution range.

<sup>i</sup>Human milk contains no dietary fiber, so there is no AI for infants from 0 to 6 months.

<sup>j</sup>ND=not determined.

<sup>k</sup>RAE=retinol activity equivalents.

<sup>l</sup>TUL=tolerable upper intake level.

<sup>m</sup>Assuming that infants are not obtaining any vitamin D from sunlight, an AI of at least 5 µg (200 IU)/d is recommended.

<sup>n</sup>AI assumes that infants also received prophylactic vitamin K at birth in amounts suggested by the American and Canadian Academies of Pediatrics.

<sup>o</sup>NE=niacin equivalents.

<sup>p</sup>AI for older infants and young children is based on the relationship of caries, water fluoride concentrations, and fluoride intake.



**Table 2.** Estimated energy and nutrient intakes needed from complementary foods to provide the EER<sup>a</sup> and AI<sup>b</sup> or RDA<sup>c</sup> for breastfed infants

Nutrient concentrations in mature human milk per liter <sup>f</sup>	Usual Breast Milk Intake by Age <sup>de</sup>						US DRIs <sup>g</sup> 7-12 mo <sup>h</sup>	Amount needed from complementary foods (DRIs minus average) per day	Percentage of DRIs needed from complementary foods	Amount needed from complementary foods (DRIs minus average) per day	Percentage of DRIs needed from complementary foods	
	Low intake 376 g (387 mL) per day	Average intake 688 g (708 mL) per day	High intake 1,030 g (1,030 mL) per day	Low intake 69 g (71 mL) per day	Average intake 529 g (544 mL) per day	High intake 989 g (1,018 mL) per day						
	← 6-8 mo age →			← 9-11 mo age →				← 6-8 mo age →		← 9-11 mo age →		
Energy kcal	274	486	698	41	375	709		163	25	372	49	
Protein g	10.50	4.06	7.43	10.82	0.75	5.71	10.69	9.90	2.47	25	4.19	42
Vitamin A $\mu\text{g RE}^i$	500.00	193.50	354.00	515.00	35.50	272.00	509.00	500.00	146.00	29	228.00	46
Biotin $\mu\text{g}$	4.00	1.54	2.83	4.12	0.28	2.18	4.07	6.00	3.17	53	3.82	64
Folate $\mu\text{g}$	85.00	32.89	60.18	87.55	6.04	46.24	86.53	80.00	19.82	25	33.76	42
Niacin mg	1.50	0.58	1.06	1.55	0.11	0.82	1.53	4.00	2.94	73	3.18	80
Pantothenic acid mg	1.80	0.69	1.27	1.85	0.13	0.98	1.83	1.80	0.53	29	0.82	46
Riboflavin mg	0.35	0.13	0.25	0.36	0.02	0.19	0.36	0.40	0.15	38	0.21	52
Thiamin mg	0.21	0.08	0.15	0.22	0.01	0.11	0.21	0.30	0.15	50	0.19	62
Vitamin B-6 $\mu\text{g}$	93.00	35.99	65.84	95.79	6.60	50.59	94.67	300.00	234.16	78	249.41	83
Vitamin B-12 $\mu\text{g}$	0.97	0.38	0.69	1.00	0.07	0.53	0.99	0.50	-0.19		-0.03	
Vitamin C mg	40.00	15.48	28.32	41.20	2.84	21.76	40.72	50.00	21.68	43	28.24	56
Vitamin D $\mu\text{g}$	0.55	0.21	0.39	0.57	0.04	0.30	0.56	5.00	4.61	92	4.70	94
Vitamin E mg	2.30	0.89	1.63	2.37	0.16	1.25	2.34	5.00	3.37	67	3.75	75
Vitamin K $\mu\text{g}$	2.10	0.81	1.49	2.16	0.15	1.14	2.14	2.50	1.01	41	1.36	54
Calcium mg	280.00	108.36	198.24	288.40	19.88	152.32	285.04	270.00	71.76	27	117.68	44
Chloride mg	420.00	162.54	297.36	432.60	29.82	228.48	427.56	NA <sup>j</sup>				
Chromium $\mu\text{g}$	50.00	19.35	35.40	51.50	3.55	27.20	50.90	5.50	-29.90		-21.70	
Copper mg	0.25	0.09	0.18	0.26	0.02	0.14	0.25	0.22	0.04	20	0.08	38
Fluoride $\mu\text{g}$	16.00	6.19	11.33	16.48	1.14	8.70	16.29	500.00	488.67	98	491.30	98
Iodine $\mu\text{g}$	110.00	42.57	77.88	113.30	7.81	59.84	111.98	130.00	52.12	40	70.16	54
Iron mg	0.30	0.12	0.21	0.31	0.02	0.16	0.31	11.00	10.79	98	10.84	99
Magnesium mg	35.00	13.55	24.78	36.05	2.49	19.04	35.63	75.00	50.22	67	55.96	75
Manganese $\mu\text{g}$	6.00	2.32	4.25	6.18	0.43	3.26	6.11	600.00	595.75	99	596.74	99
Phosphorus mg	140.00	54.18	99.12	144.20	9.94	76.16	142.52	275.00	175.88	64	198.84	72
Potassium mg	525.00	203.17	371.70	540.75	37.28	285.60	534.45	NA				
Selenium $\mu\text{g}$	20.00	7.74	14.16	20.60	1.42	10.88	20.36	20.00	5.84	29	9.12	46
Sodium mg	180.00	69.66	127.44	185.40	12.78	97.92	183.24	NA				
Zinc mg	1.20	0.46	0.85	1.24	0.09	0.65	1.22	3.00	2.15	72	2.35	78

<sup>a</sup>EER=estimated energy requirement.<sup>b</sup>AI=adequate intake.<sup>c</sup>RDA=recommended daily allowance.<sup>d</sup>Usual breast milk intake for ages 6 to 8 months from: WHO. Complementary Feeding of Young Children in Developing Countries: A review of scientific knowledge. 1998 WHO/NUT/98.1. page 48, Table 8: *Intakes of breast milk and energy from breast milk in industrialized countries by age group*. The average breast milk intake reported in all studies (includes partial and exclusive breast feeding) is 688±156 g/day. Data from 11 studies. The number of subjects in all studies=490. Low breast milk intake=mean-2 standard deviations. Average breast milk intake=mean. High breast milk intake=mean+2 standard deviations. The factor used to convert grams breast milk to milliliters breast milk=1.03.<sup>e</sup>Usual breast milk intake for ages 9 to 11 months from: WHO. Complementary Feeding of Young Children in Developing Countries: A review of scientific knowledge. 1998 WHO/NUT/98.1. page 48, Table 8: *Intakes of breast milk and energy from breast milk in industrialized countries by age group*. The average breast milk intake reported in all studies (includes partial and exclusive breast feeding) is 529±230 g/d. Data from 5 studies. The number of subjects in all studies=134. Low breast milk intake=mean-2 standard deviations. Average breast milk intake=mean. High breast milk intake=mean+2 standard deviations. The factor used to convert grams breast milk to milliliters breast milk=1.03.<sup>f</sup>Estimated Nutrient Concentrations in Mature Human Milk. In: Complementary Feeding of Young Children: A Review of Current Scientific Knowledge. WHO: Geneva, 1998 (WHO/NUT/98.1); Table 22, p. 84. Energy from breast milk provided in WHO. Complementary Feeding of Young Children in Developing Countries: A review of scientific knowledge. 1998 WHO/NUT/98.1. page 51, Table 11.<sup>g</sup>DRIs=dietary reference intakes.<sup>h</sup>For energy, the EER for infants 6 to 8 months of age (average EER for infants at the 50th percentile)=649 kcal/d. The EER for infants 9 to 11 months of age (average EER for infants at the 50th percentile)=747 kcal/d.<sup>i</sup>RE=retinol equivalents.<sup>j</sup>NA=not available. The DRIs were not established at the time of publication.

This may reflect the fact that the AI for fiber for young children was based on limited data.

### FOOD ALLERGIES AND FOOD SENSITIVITIES

Food allergy or hypersensitivity is a form of food intolerance characterized by reproducible symptoms with each exposure to the offending food and evidence of an abnormal immunologic reaction to the food (Figure 1, question 2d) (17). The most common foods associated with allergic reactions include eggs, cow's milk, wheat, soy, peanuts, tree nuts, fish, and shellfish (18). Exclusively breastfed infants may react to these or other food proteins that reach breast milk from the mother's diet.

Infants with a strong family history of food allergy (ie, those whose parents or siblings have or had significant allergies) should be breastfed for as long as possible and should not receive complementary foods until after 6 months of age. Introduction of the major food allergens should be delayed until well after the first year of age. Introduction of foods associated with "lifelong" sensitization (peanuts, tree nuts, fish, and shellfish) should be delayed even longer (19). Nursing mothers of at-risk infants should limit their intake of particularly allergenic foods. Use of a hypoallergenic formula may be suggested, but decisions about such formulas and other dietary restrictions should be reached in consultation with the health care provider. There is no evidence that these precautions are of any benefit to the infant who is not at risk for allergy.

Celiac disease is an autoimmune enteropathy triggered, in susceptible individuals, by ingestion of gluten-containing grains (20). Thus, those with a family history of gluten sensitivity should avoid wheat, rye, and barley, the predominant grains containing gluten. Oats do not contain gluten, but many commercial oat products are measurably contaminated with wheat gluten.

Recent studies in children of parents with type 1 diabetes (21) and first-degree relatives with type 1 diabetes (22) suggest that introduction of either gluten-containing or gluten-free cereals before 4 months of age increases the risk of developing islet

autoimmunity. The latter study showed that this also was true for introduction after 7 months of age.

### DEVELOPMENT OF FEEDING SKILLS AND ADVICE ABOUT HOW TO FEED

Parents should be aware of and respond to their infant's or toddler's developmental skills and appetite cues so that they can provide appropriate foods in a positive, safe, and healthy feeding environment. The Start Healthy Guidelines summarize physical milestones during the first 2 years of life and the eating skills, appetite cues, and appropriate food textures associated with each (Figure 3). Professionals are encouraged to use this guide to help parents and caregivers understand the developmental progression of feeding skills during the first 2 years of life (Figure 1, questions 1c, 1f, and 3b).

The practical "how-to's" of feeding infants and toddlers addressed by the Guidelines focus on the role of the parent and caregiver in creating a healthy feeding relationship, introducing complementary foods, handling picky eating, promoting independence in feeding, and following safe feeding practices.

Responsive parenting is at the core of a healthy infant-parent feeding relationship (Figure 1, question 3a). A parent's approach to child feeding is central to the child's early feeding experience. The evidence reviewed describes this relationship as a division of responsibility between parent and child. The parent sets the environment and provides appropriate healthy foods, and the child decides whether and how much to eat (23). Health care professionals should recognize the potential barriers (eg, inadequate time or resources) to establishing such a healthy feeding relationship (24-26).

The evidence-based review of *how* to introduce complementary foods identified only one controlled study addressing the practical aspects of introducing complementary foods for the first time. This study showed that mixing cereal with human milk enhances acceptance of cereal by breastfed infants (27). The common advice to start vegetables before fruits before meats does not appear to be based on scientific evidence for any benefit to the infant. The Guidelines, therefore,

state that the order of introduction of complementary foods is not critical, except with respect to providing the nutrients needed from complementary foods as described above (Figure 1, questions 3c and 3d). The Panel agrees with Satter's practical suggestions for feeding complementary foods (Figure 4).

To help develop feeding independence (Figure 1, question 3h), the evidence reviewed stressed the importance of parental awareness of the child's feeding skills. The evidence also indicates that there are cultural differences in mothers' expectations and encouragement of self-feeding that must be recognized and respected (28). Research also suggests that demonstrating feeding skills rather than relying solely on verbal prompts may be effective in helping children develop feeding skills (29).

### PICKY EATING AND FOOD JAGS

Picky eating is a common complaint of parents of toddlers (30). The evidence-based review did not reveal an agreed upon, validated, objective definition of picky eating. Rather, picky eating is a subjective term defined by the caregivers' perception: a toddler who limits the number of foods accepted, refuses to try new foods, totally avoids some foods or food groups, and exhibits strong food preferences, including those for food presentation and preparation. Consuming a single food or only a few foods for an extended period is commonly called a food jag (Figure 1, question 3f).

Occasional picky eating is to be expected and usually is not associated with major changes in nutrient intake or rates of growth. The health consequences of persistent picky eating or food jags are not known. The Start Healthy Guidelines emphasize strategies that may help parents and caregivers manage picky eating and food jags (Figure 1, question 3f).

### FOOD SAFETY

Consistent with the Dietary Guidelines for Americans, the Start Healthy Feeding Guidelines recognize safe feeding as an important issue for parents and caregivers of infants and toddlers and focus on food safety areas unique to infants and

# OF PROFESSIONAL INTEREST

Development Stage	Newborn	Head Up	Supported Sitter	Independent Sitter	Crawler	Beginning to Walk	Independent Toddler
<b>Physical Skills</b>	<ul style="list-style-type: none"> <li>Needs head support</li> </ul>	<ul style="list-style-type: none"> <li>More skillful head control with support emerging</li> </ul>	<ul style="list-style-type: none"> <li>Sits with help or support</li> <li>On tummy, pushes up on arms with straight elbows</li> </ul>	<ul style="list-style-type: none"> <li>Sits independently</li> <li>Can pick up and hold small object in hand</li> <li>Leans toward food or spoon</li> </ul>	<ul style="list-style-type: none"> <li>Learns to crawl</li> <li>May pull self to stand</li> </ul>	<ul style="list-style-type: none"> <li>Pulls self to stand</li> <li>Stands alone</li> <li>Takes early steps</li> </ul>	<ul style="list-style-type: none"> <li>Walks well alone</li> <li>Runs</li> </ul>
<b>Eating Skills</b>	<ul style="list-style-type: none"> <li>Baby establishes a suck-swallow-breathe pattern during breast or bottle feeding</li> </ul>	<ul style="list-style-type: none"> <li>Breastfeeds or bottle feeds</li> <li>Tongue moves forward and back to suck</li> </ul>	<ul style="list-style-type: none"> <li>May push food out of mouth with tongue, which gradually decreases with age</li> <li>Moves pureed food forward and backward in mouth with tongue to swallow</li> <li>Recognizes spoon and holds mouth open as spoon approaches</li> </ul>	<ul style="list-style-type: none"> <li>Learns to keep thick purees in mouth</li> <li>Pulls head downward and presses upper lip to draw food from spoon</li> <li>Tries to rake foods toward self into fist</li> <li>Can transfer food from one hand to the other</li> <li>Can drink from a cup held by feeder</li> </ul>	<ul style="list-style-type: none"> <li>Learns to move tongue from side to side to transfer food around mouth and push food to the side of the mouth so food can be mashed</li> <li>Begins to use jaw and tongue to mash food</li> <li>Plays with spoon at mealtime, may bring it to mouth, but does not use it for self-feeding yet</li> <li>Can feed self finger foods</li> <li>Holds cup independently</li> <li>Holds small foods between thumb and first finger</li> </ul>	<ul style="list-style-type: none"> <li>Feeds self easily with fingers</li> <li>Can drink from a straw</li> <li>Can hold cup with two hands and take sallows</li> <li>More skillful at chewing</li> <li>Dips spoon in food rather than scooping</li> <li>Demands to spoon-feed self</li> <li>Bites through a variety of textures</li> </ul>	<ul style="list-style-type: none"> <li>Chews and swallows firmer foods skillfully</li> <li>Learns to use a fork for spearing</li> <li>Uses spoon with less spilling</li> <li>Can hold cup in one hand and set it down skillfully</li> </ul>
<b>Baby's Hunger &amp; Fullness Cues</b>	<ul style="list-style-type: none"> <li>Cries or fusses to show hunger</li> <li>Gazes at caregiver, opens mouth during feeding indicating desire to continue</li> <li>Spits out nipple or falls asleep when full</li> <li>Stops sucking when full</li> </ul>	<ul style="list-style-type: none"> <li>Cries or fusses to show hunger</li> <li>Smiles, gazes at caregiver, or coos during feeding to indicate desire to continue</li> <li>Spits out nipple or falls asleep when full</li> <li>Stops sucking when full</li> </ul>	<ul style="list-style-type: none"> <li>Moves head forward to reach spoon when hungry</li> <li>May swipe the food toward the mouth when hungry</li> <li>Turns head away from spoon when full</li> <li>May be distracted or notice surroundings more when full</li> </ul>	<ul style="list-style-type: none"> <li>Reaches for spoon or food when hungry</li> <li>Points to food when hungry</li> <li>Slows down in eating when full</li> <li>Clenches mouth shut or pushes food away when full</li> </ul>	<ul style="list-style-type: none"> <li>Reaches for food when hungry</li> <li>Points to food when hungry</li> <li>Shows excitement when food is presented when hungry</li> <li>Pushes food away when full</li> <li>Slows down in eating when full</li> </ul>	<ul style="list-style-type: none"> <li>Expresses desire for specific foods with words or sounds</li> <li>Shakes head to say "no more" when full</li> </ul>	<ul style="list-style-type: none"> <li>Combines phrases with gestures, such as "want that" and pointing</li> <li>Can lead parent to refrigerator and point to a desired food or drink</li> <li>Uses words like "all done" and "get down"</li> <li>Plays with food or throws food when full</li> </ul>
<b>Appropriate Foods &amp; Textures</b>	<ul style="list-style-type: none"> <li>Breastmilk or infant formula</li> </ul>	<ul style="list-style-type: none"> <li>Breastmilk or infant formula</li> </ul>	<ul style="list-style-type: none"> <li>Breastmilk or infant formula</li> <li>Infant cereals</li> <li>Thin pureed foods</li> </ul>	<ul style="list-style-type: none"> <li>Breastmilk or infant formula</li> <li>Infant cereals</li> <li>Thin pureed baby foods</li> <li>Thicker pureed baby foods</li> <li>Soft mashed foods without lumps</li> <li>100% Juice</li> </ul>	<ul style="list-style-type: none"> <li>Breastmilk or infant formula</li> <li>100% juice</li> <li>Infant cereals</li> <li>Pureed foods</li> <li>Ground or soft mashed foods with tiny soft noticeable lumps</li> <li>Foods with soft texture</li> <li>Crunchy foods that dissolve (such as baby biscuits or crackers)</li> <li>Increase variety of flavors offered</li> </ul>	<ul style="list-style-type: none"> <li>Breastmilk, infant formula or whole milk</li> <li>100% juice</li> <li>Coarsely chopped foods, including noticeable pieces</li> <li>Foods with soft to moderate texture</li> <li>Toddler foods</li> <li>Bite-sized pieces of foods</li> <li>Bites through a variety of textures</li> </ul>	<ul style="list-style-type: none"> <li>Whole milk</li> <li>100% juice</li> <li>Coarsely chopped foods</li> <li>Toddler foods</li> <li>Bite-sized pieces of foods</li> <li>Becomes efficient at eating foods of varying textures and taking controlled bites of soft solids, hard solids, or crunchy foods by 2 years</li> </ul>

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**Figure 3.** Summary of physical and eating skills, hunger and fullness cues, and appropriate food textures for children 0 to 24 months of age.



### How to Feed Solid Foods

- Feed your baby when she is hungry and wants to eat, but work toward regular feeding times.
- Put her in her highchair, perhaps propped up with a couple of pillows.
- Have her sit up straight and face you. She'll be able to swallow better and less likely to choke.
- Sit right in front of her.
- Hold the spoonful of food about 12 inches away from her face. It may be easier to start out with a long handled baby spoon.
- Wait for her to pay attention and open her mouth before you try to feed her.
- Feed as slowly or as fast as she wants to eat.
- Let her touch her food.
- Respect her caution. It will take a while for her to get used to the spoon and the flavors of the foods.
- Talk to her, keep her company but don't be exciting or entertaining.
- Let her eat as much as she wants.
- Stop feeding as soon as she shows you she is done.

**Figure 4.** Practical advice about how to feed solid foods. (Copyright by and reprinted with permission from Elyn Satter's *Child of Mine; Feeding with Love and Good Sense*, 2000. Bull Publishing, Palo Alto, CA. For ordering information, call 800/676-2855 or see [www.elynsatter.com](http://www.elynsatter.com).)

toddlers (Figure 1, question 3i). These include how to store expressed human milk, formula, and baby foods safely and what foods to avoid to prevent choking. Providing guidance to parents and caregivers about safe feeding can help increase their awareness and understanding, thereby reducing infants' and toddlers' risks of foodborne illness, choking, and other safety concerns.

### ACTIVITY

Finally, nutritional guidelines should address not only energy intake but also energy output, the major component of which is dependent on physical activity. An appropriate level of activity allows a level of food intake that ensures nutrient adequacy without excessive weight gain. Although there is no objective evidence that activity during early childhood is related to activity, fitness, health, or

body weight later in life, there are recommendations in this area. The guideline concerning activity (Figure 1, question 2e) is based primarily on the recommendations from *Active Start* (National Association for Sport and Physical Education) (31) and AAP's position that television is inappropriate for children under 2 years because of its potentially negative effects on development and physical activity (32). The important message for parents and caregivers is to limit excessive use of infant restraints, to balance sedentary pastimes with active ones, and to make a conscious effort to include movement and physical activity in a child's day. Health professionals should encourage positive parental role modeling and parent-child interaction in a safe, supervised play environment.

### RECOMMENDATIONS FOR RESEARCH

During the development of the Start Healthy Feeding Guidelines for Infants and Toddlers, areas requiring further research were identified. Although the Guidelines assume a relationship between nutrition and feeding during the first years of life and later health, more research concerning this relationship is greatly needed. Such studies should provide a better understanding of the impact of age of introduction of complementary foods and the type and quantity of complementary foods on growth; development of food preferences; and development of allergies, diabetes, and obesity later in childhood. More in-depth nutritional monitoring also is needed to determine the incidence of subclinical deficiencies of nutrients other than iron. The DRIs for dietary fiber for children aged 1 to 3 years should be reassessed, taking into account the impact of this recommendation on toddlers' absorption of other nutrients. Finally, work is needed to understand the importance of physical activity during early childhood in promoting normal growth and development as well as long-term health.

### CONCLUSIONS AND NEXT STEPS

The Start Healthy Feeding Guidelines for Infants and Toddlers serve as a foundation for dietetics and pediatric professionals to communicate dietary and feeding advice for infants

and toddlers. These guidelines address the general questions: When is my child ready for complementary foods? What foods are needed? How should these foods be fed? In formulating the Guidelines, nutrients needed from complementary foods were identified as the difference between the DRIs and average intakes of each nutrient from human milk. The nutrient needs from complementary foods estimated in this way can be used to develop appropriate menus. They also provide the basis for a much-needed food guide for infants and toddlers.

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