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Patient education: Starting solid foods during infancy (Beyond the Basics)

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Literature review current through: Mar 2017. | **This topic last updated:** Apr 10, 2017.

SOLID FOODS OVERVIEW — The practice of introducing complementary foods (solid foods and liquids other than breast milk or infant formula) during the first year of life has varied over time and across cultures. The American Academy of Pediatrics and World Health Organization recommend that complementary foods be introduced around six months of age [\[1,2\]](#).

This article will review when and how to start giving complementary foods, including which foods should be avoided. More detailed information about starting solids is available separately. (See ["Introducing solid foods and vitamin and mineral supplementation during infancy"](#).)

Certain vitamins and minerals may be lacking in an infant's diet, especially in infants who were born prematurely. The importance of iron, fluoride, vitamin B12, and vitamin D will also be discussed here.

WHEN SHOULD MY INFANT START SOLIDS?

Developmental milestones — The best time to start solid foods depends not only on your child's age, but also on your child's ability to sit up, support his or her head, and meet other developmental milestones. These guidelines apply to all children, including those who have delays with gross motor skills. Your infant should be able to do the following:

- Sit with support
- Have good head and neck control
- Push up with straight elbows from lying face down
- Show readiness for varied textures of supplemental foods by placing their hands or toys in their mouth
- Lean forward and open the mouth when interested in food, and lean back and turn away when uninterested in the food or not hungry

Additional skills are necessary before your infant should be allowed to progress to eating finger foods:

- By 8 to 10 months, infants begin to have the skills necessary to eat finger foods independently (can sit independently, grasp and release food, chew food [even without teeth], and swallow).
- By 12 months, fine motor skills improve, allowing children to grasp pieces of food between two fingers.

Why wait to start solids? — Introducing solid foods before age four to six months is not helpful and could be harmful. Reasons that expert groups recommend delaying the introduction of solid foods include the following:

- Introducing solid foods before your infant is four to six months of age may interfere with his or her ability to take in an adequate number of calories or nutrients, and may increase the risk of developing food allergies.
- Young infants do not have the coordination and/or skills to safely swallow solid foods, which could lead to aspiration (inhaling food/liquid into the lungs).
- Infants have a reflex (called the extrusion reflex) that causes them to raise the tongue and push against any object that is placed between their lips. This reflex usually disappears between four and five months of age. Trying to spoon-feed an infant who still has the extrusion reflex can be a frustrating and difficult experience for both of you.
- By four months of age, most infants have doubled their birth weight. When your infant has doubled his/her birth weight and weighs at least 13 pounds (5.9 kg), you may need to begin supplementing his or her liquid diet with additional foods to support growth and satisfy hunger.
- Delaying solid food intake until after your infant is four months of age may reduce his or her risk of developing atopic dermatitis (eczema).
- Withholding solid foods after your infant is six months of age may lead to decreased growth because children may not consume adequate calories from breast milk or formula alone. In addition, delaying beyond six months may lead to resistance to trying solid foods. Withholding solid foods until after six months does not appear to prevent the development of allergies or eczema.

SOLID FOOD PRECAUTIONS

Foods to avoid — Certain foods should not be given to any child under 12 months, including liquid, whole cow's milk; hard, round foods that could cause choking (eg, nuts, grapes, raw carrots, or candies); and honey. Cow's milk is not recommended because it does not contain adequate iron; honey is not recommended due to the potential risk of exposure to a harmful bacteria toxin (botulism poisoning). (See "[Botulism](#)".)

Food allergy concerns — An infant is said to be at "high risk" for developing allergic disease if there is at least one first-degree relative (parent or sibling) with an allergic condition, including a documented food allergy, asthma, allergic rhinitis, or atopic dermatitis (eczema). (See "[Patient](#)")

[education: Food allergy symptoms and diagnosis \(Beyond the Basics\)](#) and ["Patient education: Atopic dermatitis \(eczema\) \(Beyond the Basics\)".](#))

Randomized controlled trials have evaluated the specific timing of introducing highly allergenic foods, such as peanut and egg, and the risk of developing food allergies to them. (See ["Introducing highly allergenic foods to infants and children".](#))

In 2000, parents were told to delay giving highly allergenic foods, such as eggs, peanuts, tree nuts, and fish, for months or years longer than other foods. However, this advice was changed in 2008 because studies did not show enough evidence in support of waiting to introduce these foods [3]. Furthermore, there is now evidence that early introduction of these foods may actually **decrease** the risk of allergy [4-6]. Experts now recommend that high-risk infants be introduced to traditional supplemental foods between four and six months of age. (See ['Puréed foods'](#) below.)

If your infant has no signs of allergy (including eczema) with the initial foods, additional foods can be introduced gradually, including the highly allergenic foods (eg, cow's milk, eggs, peanuts, tree nuts [although not whole nuts because of choking risk], soy, wheat, fish, and shellfish). Whole cow's milk should not be given to any child until after age 12 months, but yogurt and cheese can be given before 12 months. (See ['Foods to avoid'](#) above.)

The safest way to introduce highly allergenic foods has not been studied. It is possible for an allergic reaction to occur the first time a child eats a particular food. We recommend giving highly allergenic foods to high-risk children in the following manner [7] (see ["Introducing formula to infants at risk for allergic disease"](#)):

- Your infant can be given an initial taste of one of these foods at home, rather than at day care or at a restaurant.
- If there is no apparent reaction, the food can be introduced in gradually increasing amounts.
- Consult your child's health care provider if your child has signs of an allergic reaction after eating a food, has moderate to severe eczema that is difficult to control, or has a sibling with a peanut allergy. An allergy evaluation may be suggested in these cases. (See ["Patient education: Food allergy symptoms and diagnosis \(Beyond the Basics\)".](#))

TYPES OF SUPPLEMENTAL FOODS — There is no one food that is recommended as a first food. Single-ingredient foods should be introduced first, one at a time, every few days, to determine if your child has an allergic reaction. As solid foods are introduced, infants should consume no more than 28 to 32 ounces of formula per day. Breastfed children can continue to nurse on demand.

Cereal — Single-grain infant cereal is a good first supplemental food because it supplies additional calories and iron. Rice cereal is traditionally offered first because it is widely available and is least likely to cause an allergic reaction. Oat cereal is another good choice. However, wheat products (in cereal or other foods) may be offered by six months of age.

Infant cereals can be prepared by adding breast milk, infant formula, or water. The consistency should initially be thin and may be made thicker over time. Cereal should be offered initially by spoon in small amounts (one teaspoon [5 mL]) at the end of breast- or bottle-feeding. Spoon-feeding helps to develop your infant's ability to coordinate mouth and swallowing movements as well as enhance future speech

development. Gradually increase the amount of cereal to one to four tablespoons (15 to 60 mL) twice per day ([table 1](#)).

If your child refuses or appears uninterested in the cereal, try again the following day using a thinner mixture.

Cereal should not be added to a bottle unless this is recommended by a health care provider as a treatment for gastroesophageal reflux (GER). Feeding cereal from a bottle can prevent your child from learning to eat with a spoon. Infants with GER should be given cereal from a spoon in addition to the cereal in a bottle. (See "[Patient education: Acid reflux \(gastroesophageal reflux\) in infants \(Beyond the Basics\)](#)".)

Could cereal help my child sleep through the night? — Most parents are eager for their infant to sleep through the night. However, there is no evidence that giving cereal to a child who is younger than four to six months old will help him or her to sleep better [\[8\]](#).

Puréed foods — Single-ingredient puréed foods, including meats, vegetables, and fruits, should be introduced one at a time, every few days. If your child has no signs or symptoms of an allergic reaction, a second food may be added. Signs and symptoms of a food allergy include hives (skin welts) or other skin rash, facial swelling, vomiting, diarrhea, coughing, wheezing, difficulty breathing, weakness, or pale skin. Consult your child's health care provider if any of these problems occur. (See "[Patient education: Food allergy symptoms and diagnosis \(Beyond the Basics\)](#)".)

The goal is to expose your infant to new flavors and textures of food. The amount eaten is less important. The order in which foods are introduced (vegetable, fruit, or meat first) is probably less important than the texture and consistency of the food.

By the time your infant is eight months of age, we suggest that he or she consume approximately 1/2 cup (four ounces) of vegetables and 1/2 cup of fruit per day ([table 1](#)).

- First foods should be finely puréed, contain only one ingredient, and should not contain additives (salt, sugar). Vitamin C (also called ascorbic acid) is often added to commercially prepared infant foods.
- Second foods are puréed or strained, often contain two or more ingredients (eg, fruit and grain, meat and vegetable), and should not contain additives (salt, sugar). Combination foods may be given after your child tolerates the individual components. Once thin purées are tolerated, thicker purées can be introduced.
- Third foods are usually combinations of food types, some of which have texture to encourage chewing. Some are seasoned with spices, although foods should not contain added salt or sugar. Chunkier blends often contain puréed food with small pieces of pasta, vegetables, or meat.

Safety issues with jarred baby food — Safety issues regarding jars of baby food include the following:

- After opening a jar or container of baby food, store it carefully to avoid spoilage.

- Jars of infant foods, once opened, should be discarded after two to three days according to most manufacturers.
- Store-bought foods should be served from a bowl rather than out of the jar to avoid contaminating the unused portion. Food left in the bowl should be discarded.
- Jarred foods may be served cold, room temperature, or warm.

Preparing baby food at home — You may choose to make your own puréed baby food for a variety of reasons (eg, freshness, increased variety and texture, cost, avoidance of preservatives, etc). The [United States Department of Agriculture](#) provides guidelines for safe preparation of baby food at home.

It is important to be careful when preparing certain foods at home. Home-prepared spinach, beets, green beans, squash, and carrots should not be given to infants younger than four months of age because they may contain enough of a chemical (nitrates) to cause a condition that reduces the amount of oxygen carried by the blood (methemoglobinemia) [9]. In addition, home-prepared foods should not be given as infant food if they contain large amounts of added salt and/or sugar [10].

Finger foods — As your child gains the ability to feed himself/herself, a greater variety of "adult" foods can be offered, including finely chopped, soft foods ([table 1](#)).

Foods that are choking hazards are not recommended in children younger than four years. These foods include hot dogs, peanuts, tree nuts, grapes, raisins, raw carrots, popcorn, and round candies.

Fruit juice — Juices may be introduced when your infant can drink from a cup, beginning at approximately six months of age. Before six months, fruit juice is not necessary or recommended ([table 1](#)).

Fruit juice should be labeled as 100 percent juice (as opposed to "fruit drinks") and should have added vitamin C. The American Academy of Pediatrics recommends the following guidelines:

- Fruit juice should be offered only from a cup (not a bottle or sippy cup).
- Your child should not drink more than four to six ounces of fruit juice per day. Individual servings may be diluted with water if desired.
- Fruit juice should be used as part of a meal or a snack and should not be sipped throughout the day or given at bedtime.
- Drinking too much juice can lead to overnutrition or undernutrition, diarrhea, gas, bloating, and dental cavities.
- Fruit juice consumed by infants and children should be pasteurized (heat treated to kill harmful bacteria). For example, infants should not be given fresh-pressed apple cider.
- Calcium-fortified juices provide a good source of calcium. However, juice should not be given in place of breast milk, formula, or cow's milk because it lacks other important nutrients.

VITAMIN AND MINERAL SUPPLEMENTS — Some children require vitamin or mineral supplements.

Iron — Iron deficiency is the most common nutrient deficiency in the United States. The amount of iron required depends upon your child's gestational age and birth weight.

- Premature and very low birth weight infants are at risk for iron deficiency and should be given an iron supplement (in the form of multivitamin drops) beginning at one month of age and continuing until your child is at least 12 months of age.
- Infants who are not premature who are given iron-fortified formula usually do not need any additional iron supplementation. Low-iron formulas are not recommended in any situation and are no longer available in the United States.

After four to six months of age, a full-term breastfed infant may not get an adequate amount of iron from breast milk alone. At this time, some form of iron supplementation (eg, iron-fortified infant cereal) is recommended. An average of two servings (two ounces of dry cereal per serving) of iron-fortified cereal per day is sufficient to meet an infant's daily iron requirement. Additional iron can be given (in the form of multivitamin drops) if your infant cannot consume an adequate amount of iron-fortified cereal. (See ["Patient education: Breastfeeding guide \(Beyond the Basics\)"](#).)

After solid foods have been introduced, at least one feeding per day should contain foods rich in vitamin C (eg, citrus fruits and juices, cantaloupe, strawberries, tomatoes, and dark green vegetables) to promote iron absorption from iron-rich foods (such as puréed meat) eaten during the same meal.

Fluoride — Fluoride is a mineral that is often found in drinking water. Fluoride can reduce the risk that a young child will develop dental caries, also known as cavities [11]. However, not all drinking water contains an adequate amount of fluoride.

A fluoride supplement is recommended for children between six months and three years if the fluoride level in the local water supply is low [11]. To determine the level of fluoride content in your water supply, call the water department or bottler, or arrange to have well water tested.

Vitamin B12 — The body requires a source of vitamin B12 to maintain blood cells; meat, eggs, and dairy products are the only food sources of vitamin B12. Low levels of vitamin B12 can lead to anemia, developmental delay, and other problems.

A multivitamin supplement that includes B12 is recommended for breastfeeding infants of strict vegetarian (or vegan) mothers and for infants who are fed a vegetarian diet. Adequate B12 is available in most nonprescription infant vitamin drops and in certain brands of nutritional yeasts, most ready-to-eat cereals, many meat substitutes, and some milk alternatives. Fortified soy milk is a good source of B12 for children.

Vitamin D — The body requires vitamin D to absorb calcium and phosphorus, which are essential minerals for the formation of bones. Inadequate levels of vitamin D in children can lead to a condition known as rickets, which causes bones to be fragile and to break easily. This is especially true in dark-skinned children.

All infants, including those who breastfeed and/or bottle-feed, should be given a supplement containing 400 IU of vitamin D per day, starting within days of birth [12]. Vitamin D is included in most nonprescription infant vitamin drops. In some countries, it is possible to buy infant drops that contain only vitamin D.

WHERE TO GET MORE INFORMATION — Your child's health care provider is the best source of information for questions and concerns related to your child's medical problem.

This article will be updated as needed on our website (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for health care professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

[Patient education: Weaning from breastfeeding \(The Basics\)](#)

[Patient education: Starting solid foods with babies \(The Basics\)](#)

[Patient education: Diet and health \(The Basics\)](#)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

[Patient education: Food allergy symptoms and diagnosis \(Beyond the Basics\)](#)

[Patient education: Atopic dermatitis \(eczema\) \(Beyond the Basics\)](#)

[Patient education: Acid reflux \(gastroesophageal reflux\) in infants \(Beyond the Basics\)](#)

[Patient education: Breastfeeding guide \(Beyond the Basics\)](#)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

[Dietary history and recommended dietary intake in children](#)

[Failure to thrive \(undernutrition\) in children younger than two years: Etiology and evaluation](#)

[Introducing formula to infants at risk for allergic disease](#)

[Introducing solid foods and vitamin and mineral supplementation during infancy](#)

[Failure to thrive \(undernutrition\) in children younger than two years: Management](#)

[Poor weight gain in children older than two years of age](#)

[Botulism](#)

The following organizations also provide reliable health information.

- Medline Plus

(www.nlm.nih.gov/medlineplus/infantandtoddlernutrition.html)

- La Leche League

(www.llli.org/NB/NBsolids.html)

- American Academy of Pediatrics

(www.healthychildren.org/English/ages-stages/baby/feeding-nutrition/Pages/Switching-To-Solid-Foods.aspx)

- Women, Infants, and Children Works Resource Center

(<https://wicworks.fns.usda.gov/infants/complementary-foods>)

- Food Allergy Research & Education

(www.foodallergy.org)

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Topic 1185 Version 19.0

GRAPHICS

Infant feeding guide

Food	Age (months)				
	0-4	4-6	6-8	8-10	10-12
Breast milk (number of feedings)	Frequent feedings (8-12)	Frequent feedings (4-6)	On demand (3-5)	On demand	On demand
Iron-fortified formula (number of feedings)	16-32 oz (8-12)	24-40 oz (4-6)	24-32 oz (3-5)	16-32 oz (3-4)	16-24 oz (3-4)
Cereals, bread	None	None	Infant cereal 1-4 tbsp twice per day	Infant cereals Cream of wheat Other plain hot cereals Toast, bagel, crackers 2-3 servings per day*	Unsweetened hot or cold cereals Bread Rice Noodles 4 servings per day*
Fruit	None	None	Fresh/cooked puréed fruits Mashed bananas Applesauce 1 serving per day*	Peeled, soft fruit wedges Bananas, peaches, pears, oranges, apples 1-2 servings per day*	All fresh fruits, peeled and seeded Canned fruits, packed in water or fruit juice 2 servings per day*
Vegetables	None	None	Strained or mashed vegetables Dark yellow, orange, or green (avoid corn) 1 serving per day*	Cooked and mashed fresh or frozen vegetables 1-2 servings per day*	Cooked vegetable pieces 2 servings per day*
Protein foods	None	None	Puréed meats 1-2 servings per day*	Lean meat, chicken, or fish (strained, chopped, or small tender pieces) Egg yolk	Small tender pieces of meat, chicken, or fish (1-2 oz) Egg yolk Yogurt Cheese

				Cooked dried beans 2 servings per day*	Cooked dried beans 2-3 servings per day*
Fruit juice	None	None	Infant juice Vitamin C-fortified adult apple juice Offer from a cup 4 oz per day	All 100 percent juices From a cup 4-6 oz per day	All 100 percent juices From a cup 4-6 oz per day

* One serving size is considered to be one-half cup.

Adapted from: Massachusetts WIC program Nutrition Education Task Force.

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