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## Low-Carbohydrate Diets and Children

Children need a healthy balance of carbohydrates, protein and fat to get the calories and nutrition they need every day.

**Children need carbohydrates to help them grow, learn and play.**

Although some parents may choose to cut carbs from their diet, this is not a good idea for children. Carbohydrates are the body's main source of energy and are needed to help children grow, learn and play. Active children depend on carbohydrates for energy to fuel their muscles during sports and physical activity.

Carbohydrates are found in many foods, including bread, cereal, pasta, rice, vegetables, fruits, beans and milk. These foods provide important vitamins and minerals, so including these foods in a child's

**Limit "red light" foods, like soft drinks, candy, cake and ice cream, since they are high in calories and sugar.**

daily diet makes good nutritional sense. For example, bread, cereal, pasta and rice contain B vitamins and iron, fruits and vegetables provide vitamins A and C, and milk is an excellent source of calcium. Whole grain foods, like whole wheat bread, oatmeal, popcorn and brown rice, as well as fruits, vegetables and beans, also add fiber to the diet, making these foods especially good carbohydrate choices. Carbohydrates are also found in sugar and sweetened foods, like soft drinks, candy, cake and ice cream. Eating too many sugar-sweetened foods can spoil a child's appetite for more nutritious foods, so cutting down on these types of carbohydrate-rich foods is advised.

Protein is needed for building muscle and bone, so is essential for growing children. It also is a source of energy. Good sources of protein include lean meat, chicken, fish, eggs, milk, cheese, beans and nuts.

Even fat is important for good health. Fat supplies energy, helps absorb certain vitamins, and is a source of essential fatty acids important for health. However, too much fat is not good. As with adults, children should limit fat in their diets, especially saturated fat found in fatty meats, chicken skin, whole milk, and butter. For children over age 2, low fat milk and dairy products are recommended. Adults and children should also limit foods that contain trans fats, such as crackers, cookies and margarines that list partially hydrogenated oil as an ingredient.

The National Academy of Sciences (NAS) recommends that carbohydrate, protein, fat and added sugars make up the following percentages of total daily calories:<sup>1</sup>

	<b>Carbohydrate</b>	<b>Protein</b>	<b>Fat</b>	<b>Added Sugars</b>
<b>1-3 years old</b>	45-65%	5-20%	30-40%	25% or less
<b>4-18 years old</b>	45-65%	10-30%	25-35%	25% or less

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	<b>Carbohydrate</b>	<b>Protein</b>	<b>Fat</b>	<b>Added Sugars</b>
<b>Adults</b>	45-65%	10-35%	20-35%	25% or less

The appropriate calories for children depend on age, gender and activity level. For example, 9-13 year old boys that are not active may need about 1800 calories, while those that are active may require 2000-2600 calories. Sedentary 9-13 year old girls may need about 1600 calories, while active girls may require 1800-2200 calories.<sup>2</sup>

Below are the grams of carbohydrate, protein, fat and added sugars suggested for three calorie levels. The grams listed are based on the NAS recommendations for 4-18 year olds, which are 45-65% of total calories coming from carbohydrates, 10-30% of calories from protein, 25-35% of calories from fat, and 25% or less of calories from added sugars.

	<b>Carbohydrate (grams)</b>	<b>Protein (grams)</b>	<b>Fat (grams)</b>	<b>Added Sugars (grams)</b>
<b>1600 calories</b>	180-260	40-120	44-62	≤100
<b>2000 calories</b>	225-325	50-150	56-78	≤125
<b>2400 calories</b>	270-390	60-180	67-93	≤150

### **Nutritional Concerns with Low Carbohydrate Diets**

Low carbohydrate diets are too low in carbohydrates and too high in fat. Although there is currently no official definition for "low carbohydrate," these diets are generally less than 10-20% carbohydrate; 25-35% protein; and 55-65% fat.<sup>3,4</sup> By restricting nutritious foods like grains, beans, potatoes, fruits and milk products, low carbohydrate diets make it very difficult for children to get enough of the vitamins, minerals and fiber found in wholesome, carbohydrate-containing foods. Children should not be limiting these nutrient- and energy-rich foods in their diets.

One nutrient that's important for growing children is folate or folic acid. (Folate is the form found naturally in foods; folic acid is the form used in fortified foods and supplements). New cells are needed as the body increases in size, especially during periods of rapid growth. Folate is essential for making new cells and is required for brain growth and development of the nervous system. Folic acid is found in many kid-friendly foods that are limited on low carbohydrate diets, such as fortified breakfast cereals and enriched grains. Folate is found in nutritious, carbohydrate-rich foods like oranges and beans. It is also found in leafy green vegetables, like spinach, and in broccoli and cauliflower. Although these types of vegetables are low in carbohydrates, they are usually not on a child's favorite foods list.

#### [Some good food sources of folate](#)<sup>5</sup>

Calcium is important for bone development in the growing child. Milk, yogurt and calcium-fortified orange juice are among the best sources of calcium, but they are limited on low carbohydrate diets. Restricting these nutritious foods because of their carbohydrate content means there are fewer calcium-rich foods to choose from that are appealing to children's tastes. The National Academy of Sciences recommends that children ages 4-8 consume 800 milligrams of calcium a day, and children ages 9-18 consume 1300 milligrams of calcium a day.<sup>6</sup> Eating at least 2-3 servings from the

Milk, Yogurt and Cheese food group can help children meet these recommendations. One serving equals 1 cup milk, 1 cup yogurt, 1½ ounces natural cheese, 2 ounces American cheese.

### Research on carbohydrates and children

A low carbohydrate, ketogenic diet may influence brain function and brain development in children. Studies on the treatment of uncontrolled seizures in children have demonstrated how severely limiting carbohydrates can affect brain activity. Epilepsy is a rare condition that is characterized by brain seizures; some children who experience epileptic seizures in childhood outgrow the condition later in life. Usually, children's seizures can be controlled by medication. But some seizures are resistant to medication. For these children, a specially formulated low carbohydrate, low protein, very high fat ketogenic diet has been used to help control their seizures.<sup>7</sup>

However, a ketogenic diet may also cause adverse effects, including gastrointestinal problems, vitamin/mineral deficiencies, dehydration and hypoglycemia.<sup>7</sup> It may also increase the risk of kidney stones in children.<sup>8</sup> At 6 months, a high-fat, ketogenic diet increased total cholesterol, LDL (bad) cholesterol and triglycerides, and lowered HDL (good) cholesterol levels in children.<sup>9</sup> In rats, a ketogenic diet impaired memory and decreased brain growth, raising concerns about the long-term effects of the diet on brain development in children.<sup>10</sup>

Low-carbohydrate diets have been offered as a weight-loss option for overweight children and adolescents. Water weight loss is the main reason for the initial quick weight loss on low carbohydrate diets. However, there is no evidence that these diets produce greater fat loss than more balanced, calorie restricted diets. Also, low carbohydrate diets can produce undesirable side effects, such as constipation, diarrhea and headaches.<sup>11</sup>

In a short-term study comparing the effects of a non-calorie-restricted, low carbohydrate diet (less than 20 grams of carbohydrate, then increased to less than 40 grams per

day) to a low fat diet (less than 30% fat), teens lost, on average, 15 pounds more after 12 weeks on the low carbohydrate diet. However, the low fat group improved their LDL (bad) cholesterol levels, while the low carbohydrate group did not. For teens with high LDL cholesterol, a low fat diet, such as that recommended by the National Cholesterol Education Program, would be more appropriate.<sup>11</sup>

**A low fat diet is more appropriate for teens with high LDL (bad) cholesterol.**

In a small study of morbidly obese adolescents on a low calorie, low carbohydrate, low fat, ketogenic diet, the teens lost mostly body fat and had fewer sleep problems, but also experienced a decrease in their bone mineral content.<sup>12</sup> Long term studies on the effects of low carbohydrate diets on children are clearly needed. Ideally, these studies should be conducted by independent researchers not affiliated with low carbohydrate diet programs.

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<sup>1</sup> Macronutrients and healthful diets. In: Dietary reference intakes for energy, carbohydrates, fiber, fat, protein and amino acids (macronutrients) (2002). The National Academy of Sciences; 2002. p. 609-696. Available at: <http://books.nap.edu/books/0309085373/html/609.html>

- <sup>2</sup> Energy. In: Dietary reference intakes for energy, carbohydrates, fiber, fat, protein and amino acids (macronutrients) (2002). The National Academy of Sciences; 2002. p. 93-206. Available at:  
<http://books.nap.edu/books/0309085373/html/93.html>
- <sup>3</sup> Freedman MR, King J, Kennedy E. Popular diets: A scientific review. *Obes Res.* 2001;9 (Suppl 1):1S-39S.
- <sup>4</sup> Volek JS, Westman EC. Very-low-carbohydrate weight-loss diets revisited. *Cleve Clin J Med.* 2002;69:849-862.
- <sup>5</sup> Food Processor, version 8.3, ESHA Research, Salem, Oregon, 2004
- <sup>6</sup> Calcium. In: Dietary reference intakes for calcium, phosphorus, magnesium, vitamin D, and fluoride (1997). The National Academy of Sciences; 1997. p. 71-145. Available at:  
<http://books.nap.edu/books/0309063507/html/71.html>
- <sup>7</sup> Tallian KB, Nahata MC, Tsao CY. Role of the ketogenic diet in children with intractable seizures. *Ann Pharmacother.* 1998;32:349-361.
- <sup>8</sup> Furth SL, Casey JC, Pyzik PL, et al. Risk factors for urolithiasis in children on the ketogenic diet. *Pediatr Nephrol.* 2000;15:125-128.
- <sup>9</sup> Kwiterovich PO Jr, Vining EP, Pyzik P, Skolasky R Jr, Freeman JM. Effect of a high-fat ketogenic diet on plasma levels of lipids, lipoproteins, and apolipoproteins in children. *JAMA.* 2003;290:912-920.
- <sup>10</sup> Zhao Q, Stafstrom CE, Fu DD, Hu Y, Holmes GL. Detrimental effects of the ketogenic diet on cognitive function in rats. *Pediatr Res.* 2004;55:498-506.
- <sup>11</sup> Sondike SB, Copperman N, Jacobson MS. Effects of a low-carbohydrate diet on weight loss and cardiovascular risk factors in overweight adolescents. *J Pediatr.* 2003;142:253-258.
- <sup>12</sup> Willi SM, Oexmann MJ, Wright NM, Collop NA, Key LL, Jr. The effects of a high-protein, low-fat, ketogenic diet on adolescents with morbid obesity: body composition, blood chemistries, and sleep abnormalities. *Pediatrics.* 1998; 101:61-67.