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# Knowing nutrients

## Nutrients are Important

Nutrients in food are very important for building and repairing body tissues and for regulating body processes such as digestion, energy production, and muscle contraction. In addition, food is the primary source of energy for the body.

Nutrient and energy requirements for people differ depending on age, gender, body size, physical activity level, metabolic rate, and other factors such as pregnancy. Consequently, there is no single "ideal" food plan for everybody. Standards have been developed to specify the nutrient intake levels considered to be adequate to meet the nutrient needs of practically all healthy people. These standards are called the Dietary Reference Intakes (DRI) or Daily Values. The best way to ensure that you are meeting the DRI for essential nutrients is to consume a well balanced diet. A Registered Dietitian is an excellent resource to determine the food plan that will help you meet your calorie and nutrient requirements.

## Food and Energy

The total energy (calories) in a given food depends upon the amount of carbohydrate, fat, protein, and alcohol it contains. These substances provide different amounts of calories for the same unit of weight:

Calories/gram:

- Carbohydrates (4)
- Protein (4)
- Fat (9)
- Alcohol (7)

Density is an important nutrition principle that can be applied to both calories and nutrients. A calorie dense food is one that contains a large number of calories and relatively few nutrients in a given amount of the food. Foods that contain primarily fat and/or alcohol are more calorie dense than foods containing carbohydrates or protein. Large amounts of sugar also increase the caloric density of foods.

You may have heard calorie dense foods referred to as having "empty calories." Examples include candy and sweets, jams and jellies, honey, syrups, salad dressings, butter, margarine, beer, wine, and liquor.

## tools for success

- Identify the major nutrients.
- Understand the basic functions of the different energy nutrients.
- Use the concepts of empty calorie and nutrient dense to accurately describe foods.
- Identify the components of a well balanced diet.

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## 2 Knowing Nutrients

Nutrient dense describes a food that provides a large amount of one or more nutrients for a relatively small number of calories. Fruits and vegetables, whole grain breads and cereals, low-fat or skim milk products, lean meats, poultry, and fish are nutrient dense foods.

As you get older, your body requires less energy. During weight loss and maintenance, it is especially important to maximize your nutrient intake by choosing nutrient dense foods, because these foods will give you the most nutritional “bang” for your caloric “buck.”

Nutrients in food fall into one of six groups. Each group has very specific functions.

Carbohydrates

Protein

Fat

Water

Vitamins

Minerals

### Carbohydrates

Carbohydrates provide the main source of energy for your body. Glucose, circulating in the blood, is the end product of carbohydrate digestion and is the primary source of energy for most body tissues. Any blood glucose that is not used immediately for energy or stored in the liver or muscles is converted to fat and stored as body fat.

Two types of carbohydrates in your diet – simple and complex. The digestion process breaks down both types into blood glucose to be used by the body as fuel.

**Simple** carbohydrates in your diet either occur naturally (fruit sugars, honey, milk sugar) or are processed (table sugar, corn sweeteners used in soft drinks). Generally, the foods that contain naturally occurring sugars are more nutrient dense than foods that are high in processed sugars. For example, 3/4 of an orange has about the same amount of calories and carbohydrates as a lollipop. However, the orange provides 100 percent of the DRI for vitamin C, as well as a small amount of fiber. Adding processed sugars to foods (such as ready-to-eat cereals) reduces their nutrient density, as extra sugar adds calories but no nutrients.

**Complex** carbohydrates are long chains of many simple carbohydrates linked together. You may know them as starches and fibers. Foods high in complex carbohydrates (bread, cereal, rice, pasta, grains) provide significant amounts of energy as well as other important nutrients. Many foods that are high in complex carbohydrates also provide dietary fiber. The typical American diet is relatively low in fiber.

Two types of fiber:

Water-**soluble** fiber slows the emptying of food from the stomach, which may help to decrease hunger. Also may be useful in lowering high blood cholesterol levels. Sources include oats, fruits, and legumes.

Water-**insoluble** fiber speeds passage of food through the intestines and is essential for proper bowel function. Sources include wheat bran, fruits, and vegetables.

Carbohydrates should make up approximately half (50 to 60) percent of the calories you eat in a day. Most of your total carbohydrate intake should come from foods high in complex carbohydrates. The recommended level of fiber per day is 21 to 25 grams for women and 30 to 38 grams for men. Although the level of fiber for maximum benefits has not been determined, 20 to 35 grams of fiber a day from food sources (vs. fiber supplements) appear to be beneficial.



## Protein

Most Americans typically eat more protein than is required – perhaps 1-1/2 to 2 times as much as needed. Protein should provide 15 to 20 percent of all the calories you eat in a day. When too much protein is consumed, it is either used as an inefficient source of energy or converted to fat. In fact, excessive protein consumption, either from food sources or by liquid or powder supplements, may cause dehydration and kidney problems. Some high-protein foods (dairy products and meats) can be high in fat and calories, and may contribute to the future development of heart disease.

Protein is the principal component of muscle tissue. It also provides the building blocks for important hormones and digestive enzymes. Protein is needed for a healthy immune system and to carry oxygen in the blood. The basic building blocks of all proteins are called amino acids.

Two types of amino acids:

**Essential** amino acids cannot be produced by the body: they must be obtained from the foods you eat. Your body requires nine essential amino acids.

**Nonessential** amino acids can be produced by the body.

Two types of protein foods:

**Complete** protein foods contain all nine essential amino acids in the correct proportion for growth. Sources of complete protein include dairy products, eggs, fish, fowl, and meats.

**Incomplete** protein foods lack one or more of the nine essential amino acids or contain them in the wrong proportion for adequate growth. Sources of incomplete protein include beans, grains, fruits, nuts, and vegetables (plant sources). When certain plant foods (e.g., starchy beans) are combined with another plant food (e.g., grains) or an animal protein (e.g., meat), the protein becomes more useful to the body. Therefore, combining incomplete proteins can make a complete protein source.

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## Fats

Although fat is often portrayed as a nutritional villain, consuming modest quantities of fat is essential for achieving a balanced diet and healthy metabolism. The fat soluble vitamins (A, D, E, and K) can only be absorbed into our bodies when they are attached to fatty acids found in food. Dietary fats also enhance the flavors of foods, and improve satiety (the feeling of being full). Stored fat insulates our bodies from cold temperatures, protects vital organs, combines with proteins to form healthy cell membranes and contributes to hormonal functions in women.

Most Americans consume much more fat than their bodies require. This often contributes to a high calorie intake and eventual weight gain. Most people also eat too much of the wrong types of fats.

Four types of fatty acids:

**Saturated** fats come primarily from animal sources and are usually solid at room temperature. Examples include high-fat meat, dairy products (whole milk, cheese, butter), and the skin of animals (chicken or turkey skin). A few plants (palm, coconut, and cocoa) contain saturated fat. Eating a lot of foods high in saturated fats increases blood cholesterol levels and the risk of heart disease.

**Monounsaturated** fats may protect against heart disease. In Mediterranean countries, where the consumption of monounsaturated fats is high, the incidence of heart disease is low. Olive oil and canola oil are good sources of monounsaturated fats.



**Polyunsaturated** fats come from plant sources and are soft or liquid at room temperature. Foods that contain large amounts of polyunsaturated fats include safflower, sunflower, corn, and soybean oils. The role that polyunsaturated fats play in heart disease is not yet fully understood.

**Trans** fats (a/k/a: trans fatty acids) are formed when polyunsaturated vegetable oils are artificially saturated to form margarine or shortening. Trans fats can be found in snack foods and baked foods made with “partially hydrogenated vegetable oil” or “vegetable shortening.”

Small amounts of trans fatty acids occur naturally in some animal products such as dairy foods. Like saturated fats, trans fats contribute to the development of high cholesterol levels and heart disease.

People whose diets are high in fat, especially saturated fats and trans fatty acids, tend to have a high blood cholesterol level, which has in turn been linked to hardening of the arteries.

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## Water

Water is a nutrient! It doesn't supply energy (calories) but, without water, most people could not survive more than a few days. About 55 to 70 percent of the human body is water.

Water's major function is to regulate the body's temperature. During physical activity, water keeps the body from overheating. Dehydration can lead to loss of coordination, cramps, heat exhaustion, and even hallucinations or life-threatening heat stroke. For most people engaging in moderate physical activity, plain cool water is the fluid of choice.

The thirst mechanism is not always a reliable indicator of the body's need for water. For this reason, be sure to drink plenty of water every day. At least eight cups of water per day are recommended. Your body needs more when fluids are lost through sweating, frequent urination, or diarrhea.

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## Vitamins

Americans spend nearly 2 billion dollars annually on vitamin supplements. While vitamins contain no calories and, therefore, cannot provide energy, they are required for the release of energy in the body and for the regulation of growth and development, metabolism, and other body processes.

Two types of vitamins:

**Fat-soluble** vitamins (A, D, E, and K) are absorbed and stored in fat tissue. These vitamins are essential for healthy skin, bones, and blood. Excess amounts of these vitamins are not excreted in the urine, and can accumulate and become toxic. Too much vitamin A and D can lead to damage to organs and other tissues.

**Water-soluble** vitamins (B-complex, C, biotin, folacin, pantothenic acid) are absorbed in the body's water and excreted in urine if taken in excess. These nutrients are essential for energy production, blood cell formation, and proper functioning of the nervous system. Some people believe that taking megadoses of water-soluble vitamins is harmless because any excess is excreted. Recent research has shown this to be erroneous and potentially harmful.

# Macronutrients

Please read each statement below and circle the response that best reflects your opinion: T = True F = False

1. T F Processed simple carbohydrates are a good source of vitamins and minerals.
2. T F Complex carbohydrates include starches and fibers.
3. T F Thirst is an accurate indicator of the body's need for fluids.
4. T F Some foods contain a lot of fat but no cholesterol.
5. T F Fiber occurs naturally in foods from plants but not in foods from animals.
6. T F You cannot get enough protein from a diet that has little or no meat, poultry, fish, or milk.
7. T F When protein intake is greater than the body's needs, extra protein can be converted to fat.
8. T F Digestible complex carbohydrates are composed of long chains of simple sugars.
9. T F The primary function of carbohydrates is to provide energy.
10. T F All fat should be eliminated from the diet.

Answers: 1. F / 2. T / 3. F / 4. T / 5. T / 6. F / 7. T / 8. T / 9. T / 10. F



## Micronutrients

Please read each statement below and circle the response that best reflects your opinion: T = True F = False

1. T F Vitamin supplements do not provide energy.
2. T F Megadoses (more than 10 times greater than the DRI) of B vitamins are not harmful because any excesses of these vitamins are excreted in the urine.
3. T F Minerals are part of the hard tissues in the body.
4. T F The best way to get enough minerals in your diet is to take a supplement.
5. T F If you want to "make sure" you are getting enough vitamins and minerals, you should choose a supplement that provides more than 200 percent of the DRI for each nutrient.
6. T F Large doses of vitamin C can prevent colds.
7. T F Microminerals are minerals that have very small molecular size.

For the questions below, circle the letter of the one best response.

8. Which statement is true about vitamins?
  - a. Vitamins may be consumed in as large quantities as possible.
  - b. Vitamins aid the body in performing vital life functions.
  - c. Vitamins provide energy.
  - d. Vitamins are macronutrients.
  
9. The best way to obtain the necessary vitamins and minerals is:
  - a. Eat fruits and vegetables.
  - b. Include red meat regularly.
  - c. Eat a well-balanced diet.
  - d. Consume only whole grain breads.

Answers: 1. T / 2. F / 3. T / 4. F / 5. F / 6. F / 7. F / 8. b / 9. c

# Nutrient Requirements of Adults

Please read each statement below and circle the response that best reflects your opinion: T = True F = False

1. T F Americans should double their usual intake of fiber.
2. T F Health professionals recommend that carbohydrates provide at least 50 percent of the total calories consumed daily on a weight reduction diet.
3. T F Healthy adults should try to obtain 30 percent of their total daily calorie intake from protein.
4. T F Americans need to take a multivitamin tablet daily to ensure an adequate intake of all essential vitamins.
5. T F The DRIs are set at a level high enough to meet the needs of most healthy people.
6. T F All people require exactly the same amount of essential nutrients.
7. T F We typically eat more protein than we need for good health.
8. T F There are only 15 nutrients for which healthy adults need to consume adequate amounts.
9. T F Consuming at least eight cups of water per day is a good dietary practice.

For the question below, circle the letter of the one best response.

10. For good health, Americans should consume \_\_\_\_\_percent of their calories from fats.
  - a. Less than 30 percent
  - b. 31-34 percent
  - c. 35-39 percent
  - d. Greater than 39 percent

Answers: 1. T / 2. T / 3. F / 4. F / 5. T / 6. F / 7. T / 8. F / 9. T / 10. a