

Nutrition: Wellness and Disease • part 1

Nutrients and healthy diet

LEARNING OBJECTIVES

- **Describe** the functions of the six basic categories of nutrients.
- **Explain** the major nutrition and food guidelines used in the United States and in other countries.
- **Describe** the basic nutritional requirements of each life stage.
- **Describe** the keys to a healthy diet.
- **Describe** dietary and lifestyle changes that support a healthy diet.

This first article in a three-part series focuses on the basics of nutrition and healthy diet. Topics include: the basic categories of nutrients and their functions, nutrition and food guidelines, nutritional requirements for each life stage, the keys to a healthy diet, and dietary and lifestyle changes that support a healthy diet.

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Our foods consist of six categories of essential nutrients: carbohydrates, fats, proteins, vitamins, minerals and water. While fiber is not a nutrient, it is an important part of the diet. The six essential nutrients perform three main functions in the body: providing energy sources, building tissue and regulat-

ing metabolism. While these individual nutrients have many specific metabolic functions, none of them ever works alone. Their general functions are described below.

Carbohydrates. The major function of carbohydrates is to provide the body with a continuous source of energy. They also regulate both protein and fat metabolism. Carbohydrates are classified into two groups: sugars (simple carbohydrates) and starches (complex carbohydrates).

Fats and fat-related compounds. Fat nutrients, known as lipids, serve as one of the body's fuels for energy production, and are also an important storage form of body fuel. About 4% of total body fat serves as a shock absorber and protective shield for vital organs, and helps regulate body temperature. In the blood, dietary fat transports the fat-soluble vitamins A, D, E and K to the cells. Fats are composed of two types of building blocks – glycerol and fatty acids. Cholesterol, another type of fat, is a sterol that occurs naturally in all animal tissues. Too much cholesterol in the blood can increase the risk of developing coronary heart disease or stroke. Finally, lipoproteins are combinations of fat, protein and other fat-related substances that transport fat in the blood.

Proteins. These nutrients are found in the cells of all animals and plants, and play a crucial role in virtually all biological processes. The primary functions of proteins are to repair tissue and to build up new tissue. Proteins form the structural basis of many body tissues and make up enzymes,

many hormones and various blood proteins (such as hemoglobin and antibodies). All proteins are composed of a combination of 22 building blocks called amino acids. Nonessential amino acids can be produced by the body, while essential amino acids must be obtained through the diet. Proteins in foods may be classified as *complete* proteins (containing all essential amino acids, primarily animal proteins) or *incomplete* (lacking one or more essential amino acids, primarily derived from plants). Requirements for proteins are influenced by three factors: tissue growth, quality of dietary protein, and illness or disease.

Vitamins. These are complex organic substances essential to the normal functioning of the body. There are 13 major vitamins – A, C, D, E, K, B₁₂ and the seven B complex vitamins. Vitamins A, D, E and K are fat-soluble vitamins that are stored in the body for long periods of time and are normally not excreted in the urine. Vitamins C and B₁₂ and the B complex vitamins are stored in the body for a short period of time and are rapidly excreted in the urine if taken in greater-than-needed amounts. Deficiencies are more likely to occur with water-soluble than with fat-soluble vitamins.

Minerals. This nutrient group comprises inorganic substances needed in very small amounts to aid in the formation of bones and teeth, red blood cells, cell membranes, and genetic material. Major, or macrominerals (such as calcium) are needed in larger amounts, while trace, or microminerals (such as iron) are needed in very small

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amounts. Dietary mineral deficiencies are rare, with the major exceptions of iron and calcium. Iron deficiencies can lead to anemia, and calcium deficiencies can lead to skeletal problems, such as rickets in children or osteoporosis in adults.

Water. Essential to life, water provides the medium in which all metabolic reactions take place. Because water is continuously used in the workings of every cell, the body is only able to store a limited amount. Water is obtained through drinking and through food.

Fiber. The indigestible nonstarch polysaccharide structural material in plants is necessary for proper intestinal function. Diets low in fiber are likely to encourage obesity, heart disease and other health problems.

Nutrition and food guidelines

Nutritional guidelines have been established to provide nutrient recommendations for food intake that maintain nutritional status in healthy individuals, prevent nutritional deficiencies in healthy individuals, and prevent or treat disease states (such as hypertension or diabetes). During World War II, the United States published its first nutritional standards, called the Recommended Dietary Allowances. Dietary Reference Intakes were introduced in 1998. The daily value of Dietary Reference Intakes is based on a 2,000-kilocalorie intake and the appropriate proportions of each nutrient in a balanced diet containing that quantity of calories.

Several food and dietary guides have been developed to translate nutritional standards into practical information for consumers. In 1992, the U.S. Department of Agriculture released the Food Guide Pyramid, featuring six food groups:

- Fats, oils and sweets (use sparingly).
- Meat, poultry, fish, dry beans, eggs and nuts (two to three servings per day).
- Milk, yogurt and cheese (two to three servings).
- Fruits (two to four servings).
- Vegetables (three to five servings).
- Bread, cereal, rice and pasta (six to eleven servings).

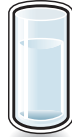
A newer food guide, the Mediterranean

The Mediterranean Diet Pyramid*

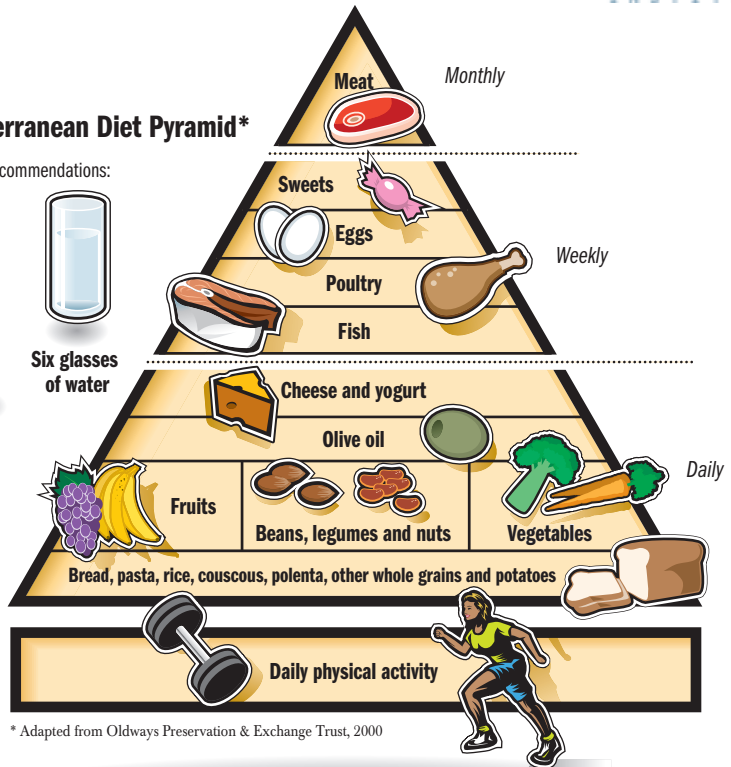
Daily beverage recommendations:



Wine in moderation



Six glasses of water



* Adapted from Oldways Preservation & Exchange Trust, 2000

Diet Pyramid (see figure), is a plan based on food choices from the traditional diets of Crete, Greece and southern Italy circa 1960. During this time period, the rates of chronic diseases in these areas were among the lowest in the world and adult life expectancy was among the highest, even though medical services were limited. The Mediterranean Diet Pyramid has been shown in research studies to be associated with reduced risk of obesity, cardiovascular disease, coronary heart disease, cancer and overall mortality.

The total amount of fat in the diet can range up to 35% of total calories (unlike most recommendations of not more than 30%); however, most of the fat should come from olive oil. Low to moderate amounts of cheese and yogurt can be consumed daily, but low-fat and nonfat versions are preferable.

Life stage nutritional requirements

While good nutrition is important throughout life, nutritional needs change with each life stage.

Infants. The nutritional requirements are greatest at this stage due to very rapid growth during the first year of life. Breast

milk is regarded as the best source of nourishment, but infant formulas are nutritious, and bottle-fed babies can thrive. Nutritional needs vary from those of adults in several ways: Infants' need for fluid intake is greater, their need for protein in proportion to body weight is greater, and their diet should not be fat-restricted.

Children. While growth rate and appetite slow considerably by one year of age, children still require a well-balanced diet for continued growth and health. By age one, children should be eating a diet that consists of the basic food groups. Undernutrition is the most important cause of growth retardation, and it is preventable. Obesity is the most common nutritional disorder in school-age children, and it is associated with a dramatic increase in type 2 diabetes.

Adolescents. Puberty is the second rapid growth phase, transforming a child into a young adult. At this age, eating habits are influenced by rapid growth and by peer pressure. Adolescents have an increased tendency to skip meals, snack, eat foods high in fat and sodium, and diet. Teenage girls may feel social and peer pressure to restrict their food intake for weight control, which can lead to severe eating disorders,

such as anorexia nervosa and bulimia nervosa. Adolescents' diet is often deficient in certain nutrients, especially calcium and iron. Teenage pregnancy further complicates adolescent nutrition.

Adults and the elderly. Energy needs level off in young adulthood, and the metabolic rate and level of physical activity decline with age. Specific changes that take place with aging include:

- The proportion of lean tissue decreases and body fat increases.
- The function of some organs decreases, altering the body's ability to use many nutrients.
- Fewer calories are required, but the need for vital nutrients does not decrease significantly.
- Protein needs increase; elderly individuals should consume a higher proportion of total calories as protein.
- Osteoporosis is a common health problem in the elderly.

The keys to a healthy diet

Except for people who need a therapeutic diet for a specific health problem, the best overall dietary plan focuses on three basic principles, including:

- **Variety:** It is important to include carbohydrates from fruits, vegetables and grains, and also foods containing protein, such as meats, fish, eggs and dairy products.
- **Moderation:** Unless you have a health problem that requires avoiding certain foods, there is no reason to entirely give up any food you particularly like. Eating smaller portions is also a form of moderation.
- **Gradual change in diet:** Most people find a gradual change in diet easier to adapt to and more likely to last.

Some of the major factors influencing healthy diets are: eating nutrient-dense foods, choosing unprocessed foods, using supplements sensibly and being aware of food interactions.

One of the keys to good nutrition is to get the most nutrients without excess calories. Foods with lots of nutrients and few calories are nutrient-dense, which may provide the best insurance against nutritional deficiencies.

Modern processing sometimes strips good foods of much of their nutritional value.

This is particularly true of whole grains, in which the losses of vitamins and minerals are enormous. For optimum nutrition, it is recommended to choose unprocessed foods, and fresh or frozen fruits and vegetables.

Vitamin and mineral supplements can be used to meet specific nutrient needs for certain individuals. However, it is not sensible to supplement a nutritionally deficient diet with pills that contain massive doses of specific nutrients. Obtaining nutrients from foods rather than pills provides a wide range of macro- as well as micronutrients that are essential for human life.

Interactions among foods, nutrients and drugs can enhance or cancel out the effects of certain nutrients. Thus, it is important to know not only how much of a nutrient is naturally present in a certain food, but also the ways in which you can help the body utilize it.

Dietary and lifestyle changes

A healthy diet requires inclusion of all necessary nutrients on a daily basis, as well as limits on dietary components that may promote poor health or prevent adequate consumption of necessary nutrients. Dietary components that should be limited include: animal (versus vegetable) protein, cholesterol, sugar, salt, alcohol and caffeine.

Obesity, or too much body fat, is by far the nation's most serious nutritional problem, and the prevalence is rising dramatically within our population. While a well-balanced diet is an important part of staying healthy, diet alone is not enough. Regular exercise and weight control are also integral parts of a healthy lifestyle. These three elements are all interrelated in that a good diet and exercise are vital in controlling weight, and thus preventing disease.

Actuarial studies have shown that as little as 5% excess above ideal weight is associated with a diminished life expectancy. Obesity increases a person's chances of becoming seriously ill. Heart disease experts estimate that at least 25% of cardiovascular diseases in this country are linked to obesity. Adult-onset diabetes mellitus is five times more common among obese people.

Inactivity is common among all age groups, despite the fact that studies have linked a sedentary lifestyle to an increased

risk of heart disease. Exercise, if practiced consistently, has tremendous benefits, including decreased risk of coronary heart disease, stroke and high blood pressure. One study showed that beginning moderately vigorous exercise is one of several factors associated with lower rates of death from all causes and from coronary heart disease among middle-aged and older men.

In addition to exercise, options for weight control and treatment of obesity include:

- Dietary therapy, involving balanced low-calorie or portion-controlled diets, as well as low-fat, low-carbohydrate or very low-calorie diets.
- Surgery, including vertical-banded gastroplasty, gastric banding and gastric bypass.
- Medications, such as phentermine, sibutramine and orlistat. PR

The next article in this series will discuss nutrition and disease.

ARTICLE SUMMARY

- Our foods consist of six categories of essential nutrients: carbohydrates, fats, proteins, vitamins, minerals and water. Fiber is also an important part of the diet.
 - The essential nutrients perform three main functions in the body: providing energy sources, building tissue and regulating metabolism.
- Nutritional guidelines have been established to provide nutrient recommendations for food intake that maintain nutritional status in healthy individuals, prevent nutritional deficiencies, and prevent or treat disease states.
- Several food and dietary guides have been developed to translate nutritional standards into practical information for consumers.
- Nutritional needs change with each life stage.
- The best overall dietary plan focuses on three basic principles: variety, moderation and gradual change in diet.
 - Some of the major factors influencing healthy diets are: eating nutrient-dense foods, choosing unprocessed foods, using supplements sensibly and being aware of food interactions.
- Dietary components that should be limited include: animal (versus vegetable) protein, cholesterol, sugar, salt, alcohol and caffeine.
- While a well-balanced diet is an important part of staying healthy, regular exercise and weight control are also integral parts of a healthy lifestyle.