

2.2 The Digestive and Excretory Systems

A healthy body requires nutrients from five groups: carbohydrates, proteins, fats, vitamins, and minerals. There are four stages in digestion: ingesting, digesting, absorbing, and eliminating. The digestive system is basically a long tube along which organs perform different functions as the nutrients pass through them. The excretory system removes liquid and gas wastes from your body. In this system, the process of excretion removes the liquid wastes through the urinary tract. Eating disorders have a negative effect on how the digestive system functions.

Key Terms

digestion
excretion
gastric juice
mucus
nutrients
villi

At birth, the average baby has a body mass of 3 to 4 kg. By age 14, a teenager’s body mass has increased at least 10 times or more. How did this happen? To grow, your body needs raw materials or **nutrients** (see Figure 2.5). Nutrients are substances the body requires for energy, growth, development, repair, or maintenance.

We get nutrients from what we eat and drink, which health professionals call our diet. You probably think that “diet” means to cut out foods so you can use lose weight. But the word “diet” actually refers to the amount and type of food you should eat to maintain your health.

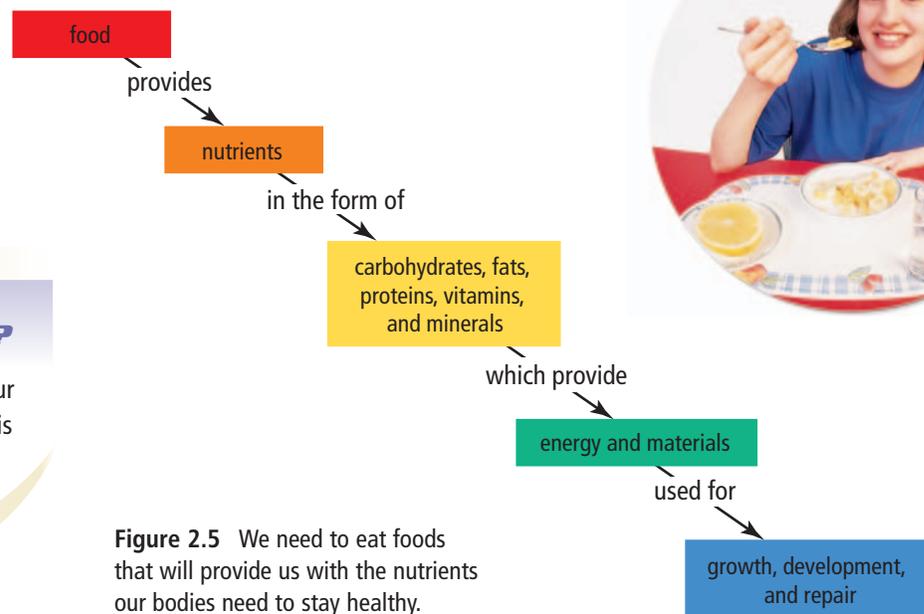


Figure 2.5 We need to eat foods that will provide us with the nutrients our bodies need to stay healthy.

Did You Know?

A blue whale eats for only four months of the year. During this time, it will eat 4000 kg of plankton a day.

Four Food Groups

One way to make sure your diet is healthy is to eat a variety of foods from four food groups: grain products, vegetables and fruit, milk products, meat and alternatives (see Figure 2.6).

Food Pyramid

Another way to determine whether your diet is healthy is to compare it to a food pyramid (see Figure 2.7). Each coloured band represents one of six (instead of four) food groups: grains, vegetables, fruits, oils, milk products, and meat and beans. The width of each band tells you how much you should eat from that group. The wide part of the band means you should choose foods from that group that are low in solid fats and added sugars. The further up the pyramid you move, the more fats and sugars the foods contain. Whole wheat pasta with tomato sauce would be at the bottom of the grains band. Pre-packaged macaroni and cheese would be much higher up.



Figure 2.6 Choose foods from each of these four food groups.

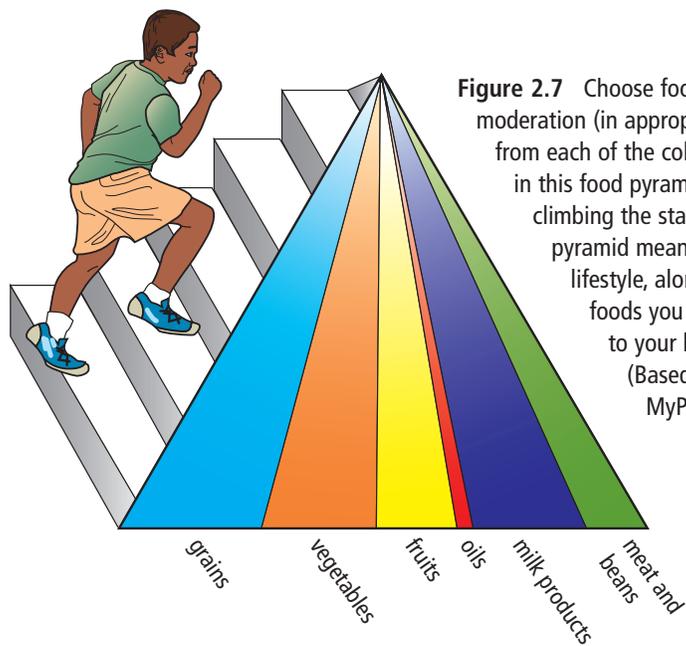


Figure 2.7 Choose foods in moderation (in appropriate amounts) from each of the coloured bands in this food pyramid. The person climbing the stairs on the pyramid means that an active lifestyle, along with the foods you eat, is important to your health. (Based on the USDA's MyPyramid.)

Food Availability

Usually, our diets reflect what we can buy at our local grocery store or farmer's market, or what we may grow. Our diets may also reflect the traditional foods of our families. In some communities, traditional foods provide a valuable source of nutrients. Canadians living in the North may get their iron from the liver of a Canada goose or seal. Other Canadians, who live near oceans, may eat mussels, clams, and kelp, which are good sources of calcium. Although our food may come from different places, all Canadians need to make the right food choices to maintain healthy bodies.

2-4

Using Canada's Food Guide to Healthy Eating

Find Out ACTIVITY

How do you know what kinds of food to eat to make sure your body is getting the nutrients it needs? One way is to follow the suggestions in Canada's Food Guide to Healthy Eating. In this activity, you will use this guide to help you become an informed food shopper.

What to Do

1. Your teacher will give you a copy of Canada's Food Guide. Prepare a shopping list of foods you would need to purchase to have three meals and two snacks for one day. (Assume the store you shop at has all the food packaged into single servings.) You may also use other information from this textbook and any additional print and electronic resources available to you.

What Did You Find Out?

1. Compare your list with your classmates' lists.
2. Make a second list of all the foods you ate yesterday. Compare this list with your shopping list and answer the following questions.
 - (a) For which food groups did you have the appropriate number of suggested servings?
 - (b) For which food groups did you not have the appropriate number of suggested servings?
 - (c) What foods should you eat more of?
3. What is one food you enjoy that is not on your list of foods to buy? Could you live without this food?

Types of Nutrients

A balanced diet ensures that you take in the correct amount of nutrients your body needs to function. There are five different types of nutrients you can obtain from food. These are carbohydrates, proteins, fats, minerals, and vitamins.

Carbohydrates

Carbohydrates are the body's quickest source of energy. There are two types of carbohydrates: simple and complex. A simple carbohydrate is a molecule of a sugar. The most common type of sugar is glucose. You can think of glucose as fuel for your body.

Recall that the mitochondria in your body cells change glucose into energy through the process of cellular respiration. Your body uses this energy for growth, repair, and maintenance.

A complex carbohydrate is a chain of simple carbohydrates (sugar molecules) joined together. Foods such as pasta, brown rice, and whole grain cereals contain complex carbohydrates (see Figure 2.9 on the next page). When you eat a food containing complex carbohydrates, your body needs to break down the chain into simple sugars before it can use the energy. This process takes time, and in the long term is one of the reasons eating complex carbohydrates is better for you than eating a diet high in simple sugars. Eating sweet foods may make you want to eat more or make you hungry again just a short time later.

**internet connect**

For more examples of food guides from various countries and cultures go to www.bcscience8.ca.

Proteins

Proteins are used to build parts of your body's muscles, skin, hair, and nails. Your body also manufactures proteins for use in various chemical reactions within your cells. Foods such as fish, poultry, nuts, soy, and dairy products are rich in proteins (see Figure 2.8).

Fats

Fats are used to build cell membranes and can be stored by the body for future energy uses. Foods such as shortening, butter, oil, cream, and meat contain fat (see Figure 2.10).

Currently, many people consume food with too much fat. Dietitians and doctors recommend that Canadians reduce the total amount of fat in their diets. You may have heard on the news or read in a magazine about good and bad fat. Good fat is sometimes called **unsaturated fat** and comes from fruits, vegetables, and fish. Corn oil, olive oil, and vegetable oil are also examples of unsaturated fats. These fats are liquid at room temperature. Animal fats, such as butter or lard, are **saturated fats**. These fats are solid at room temperature.



Figure 2.8 Proteins are in foods such as fish, meat, poultry, eggs, nuts, and soy products.



Figure 2.9 Carbohydrates are in foods such as rice, vegetables, cereal, and bread.



Figure 2.10 Fats are in foods such as butter, vegetable oil, and meat.

Research shows that diets rich in saturated fat can lead to an increase in heart disease. Scientists think that saturated fats promote the build-up of a material called **plaque**. Plaque is a fatty material that is deposited along the walls of blood vessels. As plaque builds up in the blood vessels, the flow of blood through the heart and body is reduced. This leads to an increased risk of heart attacks and strokes.

Minerals and vitamins

Minerals and **vitamins** are needed by the body in small amounts to perform various body functions. Figure 2.11 shows some of these minerals. Two common minerals and vitamins are calcium and vitamin D.

Calcium is required to help build strong bones. A lack of calcium can lead to osteoporosis, which is a disease that weakens your bones. Vitamin D is required by your body to assist it in absorbing calcium.

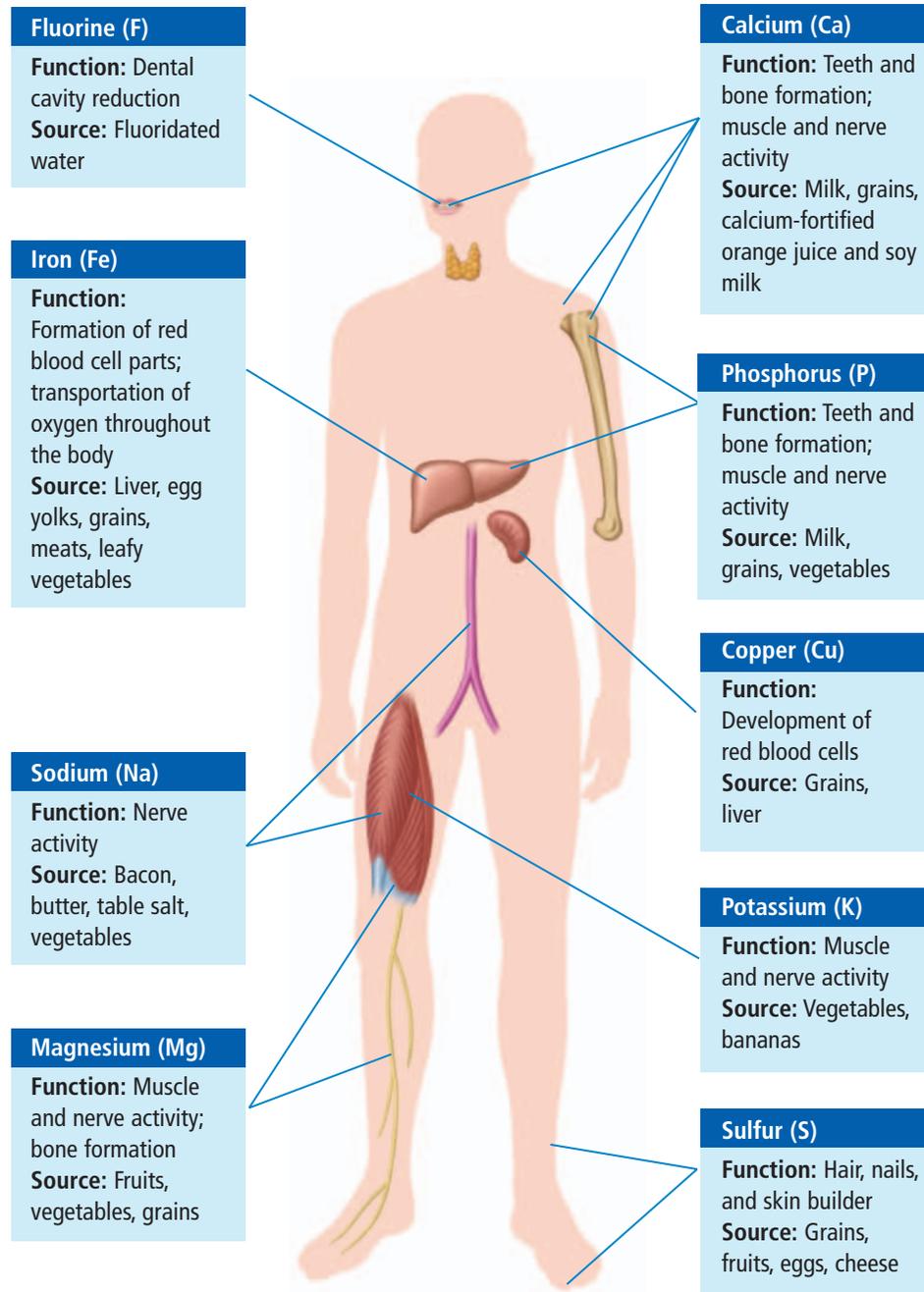


Figure 2.11 Minerals perform many different functions in the body.

A person who lacks vitamin D can develop rickets, which causes the bones to weaken. Fortunately, one way you can help your body make vitamin D is by simply going outside in the sunlight. However, it is difficult for some people to get enough sunlight. For example, if you live above 52° north latitude, there is not enough sunlight to make vitamin D between the months of October and March. Drinking beverages with added vitamin D, such as milk and soy milk, can help you get the vitamin D you need.

Water

Water is not a nutrient, but it is necessary for life. Water transports nutrients and wastes. It is also necessary for many chemical reactions and for cooling the body through perspiration or sweat. Your body requires 3 to 5 L of water each day.

Table 2.2 summarizes the nutrients you have just read about and describes some of their functions in your body.

Table 2.2 How Nutrients Function in the Human Body

Nutrient	Function
Carbohydrates	Are the body's quickest source of energy. Carbohydrates come in simple and complex forms. Complex carbohydrates are chains of simple carbohydrates (sugar molecules).
Proteins	Are used to build parts of the body, such as muscles, skin, and hair, and are also used for various chemical reactions in your body.
Fats	Can be stored by the body for future energy use.
Minerals and vitamins	Are both needed in small amounts to help your body perform various functions, such as building bone strength.

Reading Check

1. Explain one way to determine if you are eating a healthy diet.
2. What is the difference between a simple carbohydrate and a complex carbohydrate?
3. What are two functions of proteins?
4. Give a food example for each of the five nutrients.
5. What is the role of water?
6. State one function of fluorine.
7. State two sources of potassium.

internet connect

Go to www.bcs8.ca for more examples of minerals and vitamins and how they function in the human body.