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# Why Do We Eat?

## CHAPTER OUTLINE

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1.1 Why Do We Eat?

Does what I eat really matter?

What did you have for breakfast today? Does it matter? Food is essential to life because it provides the energy to run body functions and the building blocks to grow and repair body tissue. Your body is made of billions of cells. What you eat matters because the cells in your body need certain things that you can provide only by eating. Nutrition refers to the composition of food and how the various components of foods affect the body. In this section you will investigate valuable information about what is in the foods you eat. Throughout the rest of the unit, you will explore how your body uses the food you eat and how you can keep your digestive system healthy.

"I never associated what I ate with how I felt. If I saw something I wanted to eat and my head said yes, I ate it. I got fat. It wasn’t until I started listening to my body that I realized there was a link between what went in my mouth and how I functioned that day."

- High School Dieter

Most food, as you see it on the table, is of little use to your cells. Obviously, you can’t simply graft a steak onto your leg to build a stronger leg muscle. Food must be broken down into many separate, simple molecules that can flow into your bloodstream and from there move into your cells where they are used for fuel or for building new molecules. The body’s process of breaking down food into smaller particles is called digestion. This unit introduces you to how the digestive system functions.

This unit also presents some information on the cultural and social elements of eating such as why we eat what we eat and why different people in different places eat different foods. You will also learn about some of the psychological aspects of eating, dieting, and eating disorders.

Journal Writing

What are your most favorite things to eat? Write them down. Then write a paragraph or two about whether or not you think your preferred diet is healthy. After you finish this unit, review your list and what you wrote to see if your views have changed.
At the end of this unit you will learn some general strategies for staying healthy. Although good nutrition is very important to your health, many other factors that relate to digestion and nutrition also affect your health. For example, stress, exercise, and sleep can all affect your appetite and your health in various ways.

Keep in mind as you read the unit and do the activities that your growing body has special needs. Just as if you were building a house, you need energy and specific materials to build your body. Both come from the food you eat. It is hard to understand that what you eat today may affect your health later in life, but it is true. Eating habits, such as eating lots of fat, may lead to high blood pressure and clogged arteries later in life.

***Mini-Activity***

**Choices Are Everywhere** What are the choices you have to make in a day (all choices, not just choices about food)? Work with a partner to generate a list. Share the list with your class, and come up with a comprehensive list of choices.

There are many choices when it comes to food. You constantly receive messages from parents, friends, television, radio, magazines, and teachers about what to eat. How do you know what is right? Each person’s body is unique. Some people may need more energy or more of one mineral or vitamin than other people do. Also, a person’s needs change with age and with levels of activity. But the basics remain the same. You need to eat a balanced diet that includes foods from six basic nutrient groups.

By the end of the unit, you will be able to answer these questions.

- Why does a balanced diet help you feel your best?
- How does good food help you fight off illness and resist infections?
- How does good nutrition affect growth and development?
- How does what you eat affect how you look?
- How does good food affect your ability to concentrate and think straight?
- Why does what you eat affect how well and how long you can exercise?

Regular exercise is an important part of staying healthy.

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**Activity 1-1: Are You What You Eat?**

**Introduction** Are you what you eat? As you begin your study of nutrition, you can keep a food diary on the data
1.1. Why Do We Eat?

sheets provided. With this information you will be able to analyze your diet.

Materials

- Resource 1: Food Diary
- Resource 2: Food Nutrient Chart (Also, see page 60.)
- Diet Data Sheet
- Activity Report
- Measuring cups and spoons, glasses with 4 ounces and 8 ounces of liquid
- Food labels
- Fast Food information sheets
- Food Models

Procedure

Step 1 Use the Food Diary (Resource 1) to record your diet for two consecutive days. Include the name of the food, the amount eaten, and the nutrient information listed on the Food Nutrient Chart.

Step 2 Complete the “totals” section of the Data Sheet for each day. Then complete the Activity Report.

Your food and energy needs and the six nutrient groups

What Do You Think?

Why is it that you see lots of ads for fast food and junk food, but very few ads for vegetables and fruits?

Let’s start the unit with a discussion of the six basic nutrient groups what they are and what they do for you.

Mini-Activity

Write an Advertisement What makes candy bar ads appealing? Why do you choose certain junk foods over others? Design an ad campaign to convince someone to eat a fruit or vegetable. Use the power of persuasion in your advertisement to appeal to the reader.

What is a nutrient? Food molecules that supply energy, building blocks for other molecules, and reserves for future use are called nutrients. You need six basic types of nutrients in your diet. The six nutrient groups are carbohydrates, protein, fats, vitamins, minerals, and water.

Nutrients are not the same as calories. Calories refer to the amount of energy in a unit (typically one gram) of food, no matter what the food or nutrient source might be. Just getting the right number of calories each day does not necessarily mean that you have all of the nutrients you need to stay healthy. For example, if you need 2,200 calories a day, getting those calories from candy and French fries will leave you less well nourished than if you get those calories from salad, bread, and a piece of chicken. You will learn more about calories in the next section.
The six essential types of nutrients are carbohydrates, protein, fats, vitamins, minerals, and water.

**Carbohydrates**

Carbohydrates are food nutrients that provide energy and building blocks. The simplest carbohydrate molecules are sugars. One very important sugar is glucose, which is the common form of fuel circulating in our blood and used by our cells for energy. The atoms in the glucose molecule can be rearranged slightly to produce another important sugar called fructose. It is mostly fructose that makes fruits and honey sweet. Other sugars in our diets are molecules that result from combining glucose and fructose molecules together. A molecule of sucrose, which is common table sugar, consists of a molecule of glucose and a molecule of fructose bonded together. Two molecules of glucose bonded together make maltose, which is found in germinating seeds. Another small sugar molecule is galactose. Combining a galactose molecule and a glucose molecule produces a sugar called lactose, which is found in milk.

When many sugar molecules are connected together, they make big molecules called complex carbohydrates or starches.

Most of the bodies of plants, as well as the pages of this book, are made up of a complex carbohydrate called cellulose. Cellulose is made up of long chains of glucose molecules.

Starches are important sources of energy. Potatoes, rice, and wheat are three good examples of starch in our diet. Starches and sugars provide the body with energy, but also with building blocks that our cells can use to make other molecules.
1.1 Why Do We Eat?

**Mini-Activity**

**Word Origin of Carbohydrate** Research the origin of the word *carbohydrate*. Also, find out what the word *carbohydrate* means. Then write the basic chemical structure.

Carbohydrates we eat must be broken down into simple sugar molecules before the cells lining the digestive tract can absorb them and before they can be circulated in the blood. However, the enzymes we produce in our digestive tracts cannot digest some carbohydrates in our diet. For example, we cannot digest cellulose. Indigestible carbohydrate is called fiber. It is an important part of our diet even though it does not supply energy or building blocks. Fiber keeps things moving in the digestive system. You will explore how fiber works later.

**Figure 1.2** Examples of sources for simple sugars include such foods as fruit, honey, and refined sugar.

**Figure 1.3** Examples of sources for complex carbohydrates include such foods as pasta, bread, and potatoes.
Figure 1.4 The pie graph shows the recommended percentages of daily calories you should obtain from the nutrient groups carbohydrates, fats, and protein. Note that you should obtain 55% of your daily calories from the food group carbohydrates.

Complex carbohydrates in our diet can also bring with them other important nutrients such as vitamins and minerals.

The American Heart Association recommends that you should get about 55% of your calories from carbohydrates. This does not mean, however, that you should get 55% of your calories from simple sugars in candy and junk food! Unlike foods composed of complex carbohydrates, foods rich in simple sugars usually don’t contain fiber and important nutrients such as minerals and vitamins. Therefore, most of your carbohydrate intake should be complex carbohydrates rather than simple sugars. Perhaps you have heard that carbohydrates make you fat. Carbohydrates are actually fat-free, but they do provide calories. Carbohydrates contain less than $\frac{1}{2}$ the calories per gram that fat contains. When you take in more calories than you need, the excess is stored as fat no matter where the calories came from.

Apply Your KNOWLEDGE

Why do coaches tell their athletes to eat a big pasta dinner the night before a competition and simple sugars a few hours before the competition? Why don’t the athletes eat pasta right before the competition and a candy bar the night before?

Did You Know?

Without sufficient fiber, the muscles in your intestine have to squeeze too hard. This can result in saclike bulges of the intestinal wall, causing a condition known as diverticulosis. What would you call the condition when the wall becomes inflamed? (Hint: What do you call the condition of having an inflamed appendix?)

Fiber is a carbohydrate that travels through the digestive tract but is not digested or absorbed. Fiber supplies no energy. It occurs in roots, stems, leaves, nuts, and seed coverings of vegetables, fruits, and whole grains. Fiber provides bulk for muscles of the digestive tract to squeeze against. This squeezing helps speed the passage of food through the food tube. Fiber also acts like a sponge by holding onto unhealthy substances in food to prevent them from being absorbed into the body. One example of an unhealthy substance is cholesterol. Fiber reduces the absorption of cholesterol into the bloodstream and lowers the chances of getting colon cancer.

Protein

Protein in your food provides an important kind of building block-called amino acids that your body needs to make its own proteins. You eat protein and digest it into amino acids. Your blood and cells absorb these amino acids from your digestive system. In your cells, the amino acids you get from meat, milk, eggs, beans, and fish link together to form thousands of different proteins that become part of you. Some of the proteins you make form the structure of your body, others become antibodies to fight off infection, and still others control and regulate cell activities.
Did You Know?

Proteins have a much more complicated structure than either carbohydrates or fats. Hydrogen, carbon, oxygen, and nitrogen make up the building blocks of protein, called amino acids. The amino acids join together to form the backbone of the protein molecule. Each protein molecule has a specific shape that allows it to fulfill its special jobs in the body. Twelve to eighteen percent of your body is made up of protein. Proteins do a variety of jobs in your body: They regulate body functions, build muscles and bones, make muscles contract, help fight illness, transport substances in your blood, and transmit information between cells.

Figure 1.5 The recommended percentage of daily calories from the food group protein is 15%.

Protein is one of the six essential types of nutrients that provide the raw materials for producing new cells. You need more protein when your body is growing rapidly, especially during infancy and adolescence. If you do not get enough protein at these critical times, your growth can be slowed. In addition, if you do not have enough amino acids (protein building blocks) available for building new cells during these critical times, some of the missed growth cannot be made up later. At your age you are most likely either in a growth spurt or you will be having one soon, so making correct nutritional choices is especially important.

Apply Your KNOWLEDGE

Vegans are people who don’t eat any animal products, including meats, eggs, or dairy products. How can these people still get the protein their cells need to grow if each kind of plant they eat doesn’t contain complete proteins?
Did You Know?

People in some cultures eat little meat, by choice or because it is not available. They eat a mixture of plant proteins that together provide the right combination of essential amino acids. Some examples of vegetarian combinations that supply all essential amino acids are:

- refried beans and tortillas,
- pea soup and rye bread,
- beans and pasta,
- beans and rice,
- baked beans and brown bread, and
- peanut butter on whole wheat bread.

Adding even a small amount of animal protein can supply missing amino acids, such as

- pasta and cheese, and
- vegetable stir-fry and small pieces of chicken.

Your cells can make most of the twenty amino acids. Your body is able to use other amino acids to make these amino acids, but there are nine that it cannot make. The nine amino acids your body cannot make are called essential amino acids. These essential amino acids must be obtained from the foods you eat. It is important to know that your body does not store excess amino acids like it stores excess carbohydrate or fat. Therefore, you have to get all of the amino acids you need each day in your diet.

Proteins that contain all nine essential amino acids are termed complete proteins. Meat, fish, and milk products contain complete proteins. Other foods contain some, but not all, of the essential amino acids. Such foods contain incomplete proteins. Foods containing the incomplete proteins are grains, nuts, beans, and some other plants. If you regularly eat meat, poultry, fish, eggs, and milk products, you probably get enough complete protein. If you don’t get enough protein, you can become sick and weak. If you eat more protein than you need, the extra calories can be stored as fat.

Figure 1.6 Examples of sources of protein include beans, chicken, peanut butter (on bread), chicken, and steak.

Fats

Fats, also known as lipids, play essential roles in your body. The body can make most of the fats it needs from other nutrients, so you don’t have to have much fat in your diet. All cells need fat for building cell membranes. Fats also are found in high concentrations in brain and nerve cells. Certain vitamins (A, D, E, and K) are fat-soluble, which means that your body stores excess amounts of these vitamins in your body fat. Therefore, these vitamins are more abundant in foods that contain fats. Fats are the major energy store for the body. You get more energy from a gram
of fat than from a gram of carbohydrates. Far has about 9 calories per gram. Carbohydrates and protein have about 4 calories per gram. However, if you store too much fat in your body, it can have a negative effect on your body. You gain weight, and your heart, muscles, and joints must work harder to move the extra weight.

**Did You Know?**

You can gain weight from eating too much of any food, not just fatty foods. You store fat if you consume more calories than you burn. One pound of body fat contains 4,000 calories.

There are saturated fats and unsaturated fats. You have probably heard about them in the news. Saturated and unsaturated fats have different chemical characteristics. Saturated fats are solid at room temperature. They come from meat, lard, butter, coconut oil, and palm oil. These fats should be very limited in your diet. Unsaturated fats are liquid at room temperature. They are products of plants such as olives, peanuts, corn, soybeans, and safflowers. Unsaturated fats also occur in fish. Unsaturated fats are better for you than saturated fats but should still be limited in your diet.

**Did You Know?**

The body makes different kinds of fats by attaching long molecules called fatty acids to small glycerol molecules. Each glycerol molecule can carry three fatty acids. That is why fats are also called *triglycerides*. The body can make different fatty acids, but there is one that must come from the diet. It is linoleic acid. Linoleic acid is common in plants.
Figure 1.7 Examples of saturated fats include palm oil, ham, butter, and lard. Examples of unsaturated fats include olive and corn oil, avocado, nuts, and fish.

One brand of granola has a label on the container stating, in big letters, “NO TROPICAL OILS.” Why do you think this has been pointed out?
People who eat foods high in saturated fat run a greater risk of having high cholesterol levels in their blood and of developing heart disease. Cholesterol is a waxy, fatlike substance that is made by the body and is needed for making vitamin D, hormones, and cell membranes. You also can get cholesterol from the foods you eat. Meat, eggs, and animal fats are high in cholesterol. If you eat a lot of cholesterol, you are likely to have high levels in your blood. It is also possible to have a high level of cholesterol in your blood if you have a family history of high cholesterol, even though you don’t eat foods high in cholesterol.

Foods containing cholesterol are usually high in other fats, too, leading to excess fat and cholesterol in the body. Limiting the cholesterol and saturated fats in your diet is wise. High levels of cholesterol can contribute to atherosclerosis, or hardening of the arteries, and other forms of heart disease. Heart disease is a leading cause of death in the United States, even for those people who are under 65 years of age.

Journal Writing

Considering the list of possible ways to reduce fat in your diet, which three things would be the easiest for you to try as part of your own diet? Which three things would be the hardest for you to try? Why? Do you think it is important for you as an adolescent to monitor the fat in your diet? Why or why not?

About 34% of the calories in an average American diet comes from fat. The American Heart Association recommends that 30% or less of your daily calories come from fat and under 10% of that from saturated fat.

Figure 1.8 The recommended percentages of daily calories from the food group fats is 10% saturated fats and 20% unsaturated fats.
Did You Know?

- Fat buildup in the arteries tends to be slow, but it starts as early as age 10. There are no symptoms to warn you about this process until it is already well advanced. Therefore, it is important to lead a healthy lifestyle at an early age, before damage is done.
- Although the body needs cholesterol to make other substances, one-third of American young people may be getting too much cholesterol in their diets. The liver can produce all the cholesterol the body needs. We do not have to eat any cholesterol at all.

Vitamins

A vitamin is a chemical the body needs in small amounts but cannot make for itself. Vitamins don’t provide energy, but some vitamins help the body use the energy from a nutritious diet. Their most important job is to help enzymes do their jobs in cells. Your body needs most vitamins in only very small quantities. You don’t need to get your vitamins from a bottle or jar if you eat the right amount of a variety of foods. There are usually more vitamins in a good diet than your body can use. But it is important to eat a healthy diet to get the vitamins needed.

If your diet isn’t providing the right vitamins, your body gets sick. You can also get sick by eating too much of some vitamins. Some vitamins dissolve in water. Your body uses the amounts of these vitamins that it needs. Then the excess leaves the body in your urine. Some vitamins are fat soluble, which means that your body stores excess amounts of these vitamins in your body fat. Toxic levels of fat-soluble vitamins can accumulate. If you take vitamins, be careful how many and which ones you take. Here you’ll find basic information about vitamins. Check with a health professional for recommendations about the type and amount of vitamins that you might need.

Did You Know?

Cataracts are responsible for 50% of all cases of blindness. Cataracts are a clouding of the lens that lets light into the eye. Without enough light, the eye cannot see. Vitamins A and C seem to help protect the eye from formation of cataracts.

Your body can make vitamin A from a pigment found in some plants. A pigment is a colored chemical. The pigment that is required for vitamin A is carotene. It is the molecule that makes carrots orange. You need vitamin A for healthy skin, bones, and teeth. You also need vitamin A for good vision. If you don’t get enough vitamin A, you cannot see well at night.

The vitamin B complex is a group of eight vitamins. Your cells use B vitamins in the chemical reactions that produce energy from food. You can get anemia (low blood iron) or beriberi (a disease involving the nerves, heart, and gut) if you do not consume enough B vitamins.

Journal Writing

Many people take vitamin supplements in the form of pills or vitamin shakes. Now that you know the various vitamins found in foods and what they do for your body functions, what is your personal “philosophy” about getting enough of all the vitamins you need? Do you take large doses of vitamin supplements, moderate amounts, or none at all? Why? How does the information in the section affect your decisions about the vitamins that you consume?
Vitamin C helps your body fight infection. We don’t know much about how vitamin C works. Before 1800, sailors did not have many fresh fruits and vegetables in their diets. They developed bleeding gums as a result of a disease called scurvy. It was discovered that citrus fruits like oranges, lemons, and limes cured and prevented this disease. After that discovery, the British navy required that all of their ships carry limes so the sailors could have a daily ration of lime juice. That is how British sailors got the name “limeys.”

**Warning:** Be careful not to spend too much time in the sun without wearing sunblock. Too much exposure to the sun can damage your skin and may lead to skin cancer over time.

Vitamin D helps your bones and teeth stay strong. It helps bones and teeth by regulating the absorption and use of the mineral calcium. You can get rickets, a disease of bone softening and poor bone growth, if your diet lacks vitamin D and you don’t get enough sunlight. What does sunlight have to do with vitamins? If you get enough sunlight, your skin can make vitamin D. Even in cold climates, if your face is exposed to sunlight for an hour or so each day, you will not need supplementary vitamin D in your diet.

Vitamin E protects red blood cells and is needed for the functioning of certain enzymes. Vitamin K assists the blood in clotting.

You need foods with vitamins B and C almost every day. The B and C vitamins dissolve in blood because they are water-soluble. When vitamins B and C are eaten in excess of body needs, they pass from the body through urine. Vitamins A, D, E, and K dissolve in fat instead of water. If you take in more of these vitamins than you need, they accumulate in body fat and can build up to unhealthy levels in your cells.

### Did You Know?

A serious type of birth defect is malformation of the spinal cord. It has recently been shown that a small, daily dose of a B vitamin called folate given to women during pregnancy reduces the incidence of these birth defects by 40%.

### Journal Writing

Make a list of all the things that could go wrong with your body due to vitamin A, B, C, and D deficiencies. Which would be the hardest for you to deal with? Are you willing to eat the foods that contain that vitamin to prevent this problem? Why or why not?

### Minerals

**Minerals**, like vitamins, do not provide calories, but they are essential for good health. Minerals are simple chemical elements that come from the earth. Just as with vitamins, you can get minerals you need by eating a balanced diet.

What do minerals do? Some minerals, like most vitamins, are needed in only very small amounts. Such micronutrients may be needed to make molecules that have specific functions. For example, some enzymes need zinc to do their jobs in promoting specific chemical reactions.

### What Do You Think?

Why do you think there are so many advertisements for milk featuring famous athletes and movie stars drinking milk? What audience are these ads targeting? As a consumer, do you think the ads are effective?
Some minerals are needed in larger quantities and are called macronutrients. For example, sodium and potassium are needed to carry electrical charges that make nerves and muscles work. Iron is needed to make hemoglobin molecules carry oxygen in your red blood cells. Calcium and phosphorus are needed to build bones and teeth. Without adequate calcium and vitamin D, bone forms poorly in children and, in older people, can become brittle. As people age, they are at risk for a disease called osteoporosis. Osteoporosis is a condition in which bones become so porous and brittle that they are easily fractured. The fractures can lead to severe pain and disability. Osteoporosis occurs mainly in women after the age of 50. A key factor in the development of osteoporosis is the density (calcium content) of the bones in early adulthood when bone mass reaches its peak.

It is important to consume enough calcium, particularly during adolescence and early adulthood, when bone is growing and increasing in density. Generally, males get enough calcium, while females aged 11 years and older generally do not. Because 60% of bone density is formed between the ages of 10 and 16, adolescence is a crucial time for building strong bones in young women. Females not only drink less milk, but they eat less food than males their age, too. Females can increase this essential nutrient in their diet by selecting calcium-rich foods such as cheese, yogurt, or green, leafy vegetables. The recommended daily amount of calcium for females who are 11-14 years of age is 1,200 milligrams. A sample of calcium-rich foods in a daily diet that meets the recommended daily amount of calcium would be

$$\text{TABLE 1.1:}$$

<table>
<thead>
<tr>
<th>Food</th>
<th>Milligrams of Calcium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cup low-fat yogurt</td>
<td>415</td>
</tr>
<tr>
<td>3 stalks of broccoli</td>
<td>240</td>
</tr>
<tr>
<td>2 glasses low-fat milk</td>
<td>600</td>
</tr>
<tr>
<td>Total calcium</td>
<td>1,255</td>
</tr>
</tbody>
</table>

Minerals are valuable nutrients, and the body usually recycles them. There are cells that are always remodeling your bones. Some cells break down bone and release calcium and phosphorus into the blood. Other cells take up these minerals from the blood to make new bone. When red blood cells are about 4 months old, they are broken down. The iron is extracted from the hemoglobin molecules. The blood transports this iron to the bone marrow. In the bone marrow the iron is recycled into new hemoglobin molecules in the new red blood cells that are always being produced in the bone marrow.

The point to remember is that minerals, like vitamins, occur naturally in a healthy diet and, like vitamins, your body needs only reasonable amounts each day for normal growth and good health.

What do cooks mean when they say, “A colorful plate is a healthy plate”? 
1.1. Why Do We Eat?

Figure 1.9 A person’s body is about 50-60% water. But don’t be confused by the drawing. You are not like a glass that fills from bottom to top. Instead, the water is distributed throughout your body.

Water

Water is essential for life. You need water for digestion, carrying waste, making urine, circulating blood, and holding your body temperature constant, and for the many chemical reactions that take place in your cells. You lose 2 to 3 liters of water a day to perspiration, urine, stool, and breathing. You may lose even more water during very hot, dry weather and when exercising. Your body is about 50-60% water, so it would seem as if you have a good supply. However, the normal rate of loss of water from your body is fairly high. The rate of water loss can rapidly increase with vomiting, diarrhea, or excessive sweating. If you lose too much water, the cells of your body shrink and cannot function properly. Fever and diarrhea cause a rapid loss of water, so the sufferer must drink plenty of water to replace it. People who do not get enough water become dehydrated and, if severely so, may be given an intravenous infusion of fluids in the hospital.

Getting Enough Nutrients

How can we be sure we get all of these nutrients that we need? After all, they are hard to remember and most foods don’t come labeled with their contents as breakfast cereal boxes do. A good trick for keeping track of nutrients is to think of all food as consisting of five basic food groups. Each food group provides certain nutrients. What are the five basic food groups? How much of them should you eat? The next section will address these questions.

Activity 1-2: What’s in Your Food?

Introduction

How can you test foods for nutrients? In this activity you test different foods for the presence of carbohydrates, proteins, and fats.

To refresh your memory,

- Carbohydrates-sugar and starch-provide energy for your cells. The long chain of carbohydrate molecules is broken down to smaller sugar molecules.
- Proteins are digested into building blocks of amino acids. Amino acids are used for building and repairing cells, fighting infection, and other critical functions.
- Fats are large molecules that store energy and can be digested into building blocks called fatty acids. Fats help you absorb vitamins and are present in nerve and skin cells.

Materials
CAUTION: You should wear goggles in all experimental laboratory situations. Make sure you are wearing goggles when working with any chemicals such as Benedict’s solution. Also, wear goggles when working with heat or fire.

Procedure

Part A. Laboratory Tests for Nutrients

Testing for Carbohydrates: Starches

Step 1 Put 2 milliliters of starch solution into a test tube.

Step 2 Add a few drops of iodine solution.

Step 3 Record the results on the Table on Resource 1.

Testing for Carbohydrates: Glucose (Sugars)

Step 1 Pour about 5ml of glucose (sugar) solution into a test tube.

Step 2 Wearing goggles, add about 10 drops of Benedict’s solution.

Step 3 Using safe lab technique, heat the liquid for about 3 minutes in the water bath.

Step 4 Record the results on the Table on Resource 1.

Testing for Proteins

Step 1 Put some raw egg white into a test tube.

Step 2 Wearing goggles, add 3-5 drops of Biuret solution.

Step 3 Record the results on the Table on Resource 1.

Testing for Fats and Oils

Step 1 Use a plastic knife to spread a small amount of butter or margarine on a piece of brown wrapping paper.

Step 2 Hold the brown paper up to the light and look at the stain.

Step 3 Record the results on the Table on Resource 1.

Summary of Test Results: Part A
Summarize your test results by completing answers to questions on the Activity Report.

Part B. Testing Foods for Nutrients

The tests you used on carbohydrates and proteins caused color changes, while the test for fats caused a change in the appearance of the brown wrapping paper. In this activity you use the laboratory skills you learned in Part A to test foods for the presence of carbohydrates (starch and sugar), proteins, and fats.

Step 1 Put a few small pieces of a food to be tested into a test tube and add just enough water to cover the pieces of food.

Step 2 Refer to testing procedures in Part A to test each piece of food for the presence of carbohydrates, proteins, and fats. Begin with the first Step 2 of Part A.

Step 3 Record the results on the Table on Resource 2. Complete the Activity Report.

Review Questions

1. Why does what you eat matter?
2. Compare a carbohydrate molecule and a glucose molecule.
3. What is meant by the terms essential amino acids and complete proteins?
4. What is the difference between saturated and unsaturated fat?
5. What are three examples of a vitamin or a mineral deficiency? What disorders can each cause?
6. What are the five body functions that need the recommended five 8-oz glasses of water you should drink every day?