THE DIGESTIVE SYSTEM AND NUTRITION

Food and Energy

Food provides necessary materials for growth, tissue repair and activities that you do on a daily basis. Your body converts or changes the food that you eat into nutrients.

Six Essential Nutrients

Nutrients are the raw materials in food that serve the essential processes of the body. There are six different types of nutrients that the body needs.

They are **carbohydrates, fats, proteins, minerals, vitamins, and water.** Proteins, carbohydrates, and fats provide the body with energy that is needed. The energy that they provide is measured using calories.

What Is a

A **calorie** one gram of water o ertain amount of unt of calories, th need to eat a certa lories that you need i le need less energ s growing and energy fuels the growth. Also, the more active a person is the higher energy need that they have.

Carbohydrates

Carbohydrates are nutrients that are made up of carbon, hydrogen, and oxygen. They are a major source of energy for humans and other living organisms. Carbohydrates are used by the body's cells to make certain parts of the cells. Carbohydrates are divided into two separate groups: simple and complex carbohydrates. Simple carbohydrates are also known as sugars, of which there are many different types. These sugars are not found naturally in foods, but are added to foods like soft drinks and other sweets.

The sugar glucose is what our cells use for energy. Our body converts other sugars into glucose so that they can be used to make energy. Complex carbohydrates are like a chain made up of many different sugars. Starch and fiber are examples of complex carbohydrates.

Starch can be broken down into simple sugars and used for energy, but **fiber** cannot be broken down by the body and instead passes through ou

This mean ver, fiber is good for running properly.

Les s?

Fats

Fats are high in energy and are made up of carbon, hydrogen, and oxygen. Fats contain nearly twice as much energy as an equal amount of carbohydrates. Fats also form certain parts of the cell structure, insulate the body from losing heat, and protect internal organs. There are two types of fats: saturated and unsaturated.

Saturated fats are normally solid at room temperature and are in food items like meat, dairy, and eggs. **Unsaturated fats** are normally liquid at room temperature like oils and seafood. If a food item contains saturated fat it usually also contains cholesterol.

Lesson Checkpoint: What is the difference between saturated and unsaturated fats?

Cholesterol is a fatlike substance that is found in animal products, but our body's liver produces cholesterol so it is not needed in our diet. Our body only needs a small amount of fats each day, but if you have a diet high in fats they will begin to build up in your blood vessels causing heart disease.

Proteins: Proteins are nutrients that contain carbon, hydrogen, oxygen, and nitrogen and are needed for the growth and repair of tissues. Proteins are a big part of foods like meats, dairy, nuts, beans, and fish.

Amino acids are the building blocks of protein molecules. There are twenty different amino acids that can make thousands of different proteins. Out of the twenty amino acids, twelve are essential. This means that we can only get them from the food that we eat. The other eight

Minerals: from the soil and ca mount of minerals a

What are the building blocks of proteins?

Vitamins: Vitamins are an important part of the diet because they help carry out certain chemical reactions within the body. Without vitamins, these chemical reactions would not take place. The body is able to make a few vitamins, but the rest must be gained from food. Vitamins are grouped as either fat-soluble or water-soluble vitamins.

Fat-soluble vitamins dissolve in fat where they are stored. Too much of these vitamins can be harmful to the body because they are stored in fat so there is a constant supply. Fat-soluble vitamins include vitamins A, D, E, and K.

Water-soluble vitamins dissolve in water and cannot be stored in the body. This is because they are excreted in urine. Water-soluble vitamins include vitamins C and B. Water-soluble vitamins are important to have in your daily diet because they are not stored in your body.

Water: Without water, the body would die within a few days. This makes it the most important nutrient of them all. Nutrients are broken and other important body processes take place in water. Without water these processes would be able to take place. The average body needs about two liters of water everyday.

Using the Food Pyramid for a Healthy Diet

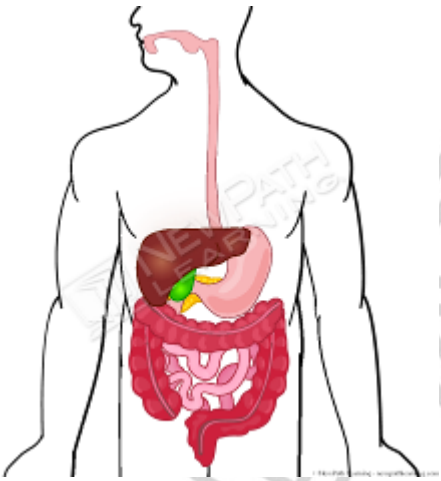
The **food pyramid** was developed by scientists called nutritionists; it is a basic guide to a healthy diet. Foods are categorized into six separate groups and the pyramid indicates how many of servings of each group you should eat a day in order to maintain a healthy diet.

The pyram f servings. Suggested

Cereal, breads, rice and pasta - 6
Vegetables – 2-3
Fruit – 2-3
Dairy – 3
Meat, fish, poultry, beans, and nuts – 2
Fats, oils, and sweets – less than 1

The Digestive Process

There are three main functions of the digestive system.
They are to break down foods into molecules that the body can use, absorb the molecules into the blood and send them all throughout the body, and eliminate wastes from the body.



Digestion is a process of breaking down different nutrients into molecules that the body can use. There are two different types of digestion.

Two types of digestion

Chemical digestion is when food is broken down chemically into smaller, us ysical biting and es. After the food ha he materials t the blood to be trans hat are not absorb s in the mouth and

Digestive organs

Mouth: Have you ever smelled foods that you really love to eat? What happened immediately after you first smelled the foods? Your mouth began to salivate. **Saliva** is a fluid that is released inside the mouth and plays an important role in digestion which begins in the mouth.

Mechanical digestion begins when you first bite into the food. Your teeth help to break the food up and grind it down to smaller pieces. Chemical digestion begins in the mouth also. Saliva is a chemical that begins to chemically break food down. Chemical digestion is achieved with the help of enzymes. An enzyme, as we learned in Topic 4, is a type of protein that speeds up a chemical reaction within a living organism. Saliva is a type of enzyme.

Enzymes only break down a specific chemical. This is similar to a key. Most keys are only able to open up one door or one type of door. Enzymes are only able to break down one type of chemical.

Esophagus: There are two openings at the back of the mouth. One takes in air and the other takes in food.

When you swallow food, a flap of skin called the **epiglottis** opens allowing the food to travel into the esophagus. The **esophagus** is a tube of muscle that connects the mouth to the stomach. There is a layer of mucus that lines the inside of the esophagus. **Mucus** is a slippery substance that your body produces. Mucus allows food to travel down the esophagus much easier.

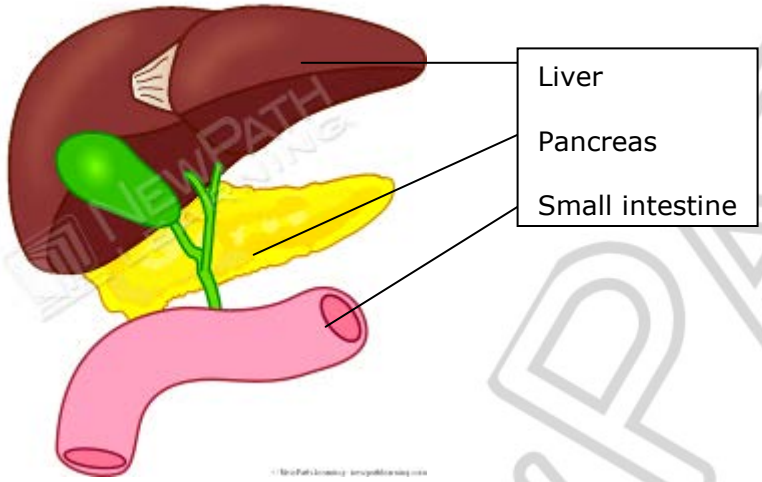
The esophagus is lined with smooth muscle, which contracts in a wavelike motion forcing food to move down the esophagus in a process called **peristalsis**. Peristalsis keeps food moving in one direction and also occurs in the stomach and other portions of the digestive system.

Lesson Checkpoint: Name a type of enzyme in your digestive process and what it does.

Stomach: e stomach. T churning the food in stomach also produ s it chemically epsin.

Pepsin is cids. Pepsin works best in the hydrochloric acid, which also exists in the stomach. The lining of the stomach is covered in mucus to prevent the acid from breaking down of the stomach wall.

Small intestine: The small intestine is an organ of the digestive system where most of the chemical digestion and absorption takes place. The chemicals and enzymes that are necessary for chemical digestion are produced by the small intestine, the pancreas, and the liver.



Chemicals produced by the pancreas and liver are brought to the small intestine. The pancreas produces enzymes that aid in the break down of fats, pro emical that break , it stores it in a stru naller particles s er.

After the f The inner lining of th lli. **Villi** are st rients through the intestine wall and into the blood stream.

Lesson Checkpoint: What is the function of villi?

Large intestine: The large intestine is the last portion of the digestive system and contains bacteria that break down materials passing through. The bacteria break down materials that your body is unable to and supplies the body with vitamin K. Water is also absorbed and put back into the body.

The rest of the materials are prepared to enter the **rectum**, where they are compressed into a solid. The solid exits through a muscle called the anus.

Lesson Checkpoint: What does the small intestine do?