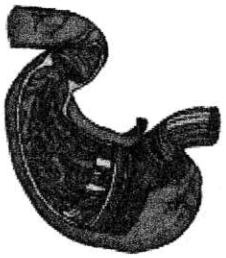
The Stomach

By Jennifer Kenny



1 Can you place your hand on your stomach? If you placed it on your belly button, you actually want to move your hand higher. The stomach is actually at the top of your abdomen.

2 Think of your stomach as a bag made of muscles. It is shaped like a j. An adult's stomach is about ten inches long. Like a bag, the stomach can only fit so much. An adult's stomach can hold around 2.5 pints of food.

3 As you know, digestion begins in the mouth. A round lump called a food bolus is sent from the mouth down the esophagus into the stomach. The stomach has three areas. The fundus is the upper part. The body is the middle part. The pylorus is the lower part. The stomach also has layers similar to the esophagus (serosa, muscles, submucosa, and mucosa).

4 The mucosa contains glands that produce gastric juices. These juices are made of powerful acids and enzymes. The gastric juices contain hydrochloric acid that is strong enough to burn a hole in your carpet!

5 Now, by the time food has reached the stomach, it has already changed into fat, protein, starch, and sugar. The stomach muscles contract and relax about three times a minute. This churns the food, thereby mixing it with the powerful digestive juices. This process turns food into a liquid called chyme.

6 During this process, the starches and sugars stay in the stomach for one to two hours. Proteins remain for three to five hours. Fats stay even longer.

7 During the whole process, the lining of the stomach is protected by mucus so the gastric juices, which are so powerful, don't hurt the stomach itself. Even so, the lining cells wear out and new ones constantly have to be produced. Incredibly, the whole stomach lining is replaced every three days!

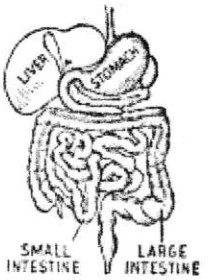
8 Now, despite these amazing tidbits, you might be wondering what happens to the chyme. The chyme moves through the pyloric sphincter into the small intestine. The pyloric sphincter is a ring of muscle that is usually shut tight so that the contents of the stomach can't leave before they are ready. When the contents are ready, though, contractions push some contents out and into the small intestine.

9 When the stomach is finally empty, it tells the brain. Then you'll start to feel hungry. Did you ever hear your stomach growl? Well, that's the churning of these incredible

stomach muscles – getting ready to work even before you've eaten!

The Large Intestine

By Jennifer Kenny



1 Digestion starts in the mouth. It then continues through the esophagus, stomach, and small intestine. Anything that hasn't already been sent to the cells in our body heads to the large intestine through the valve called the ileocaecal sphincter.

2 The large intestine is a tube of muscles and tissue that is around five feet long in adults. It is shorter than the small intestine, but wider than the small intestine. The large intestine has two main parts — the colon and the rectum.

3 Parts of food, which can't be used, go to the large intestine. Fiber from fruits, vegetables, and grains can't be digested. Bacteria break down any digested food that gets here. They then make several vitamins including vitamin K, which the body needs for clotting. The large intestine removes water, vitamins, and minerals from this undigested food and fiber. Did you know that the large intestine could absorb about 1.6 gallons of water a day? The water and mineral salts pass through intestinal walls where blood capillaries carry them away to be used by your body.

4 When the water is removed, the waste becomes more solid. It becomes the brown waste material called feces. The muscles in the large intestine make waves to move the waste along until the waste reaches the rectum, or end of the intestine. The rectum is about 6 to 8 inches long. The feces stay there until you go to the toilet and they leave the body through the anus.

5 Sometimes things go wrong in the large intestine. Diarrhea can occur when your large intestine is irritated or inflamed. Then the feces are loose and watery because food residues have moved through the large intestine too quickly to absorb the excess water. The opposite condition, of course, is constipation. This happens when the food residues moved too slowly and too much water has been absorbed. The feces become hard and dry and it may be difficult to go to the bathroom. So, do your best to keep your digestive tract healthy!

The Esophagus

By Jennifer Kenny

[1] Digestion begins in the mouth. After food is broken down into small pieces, the tongue pushes these pieces into a round lump called a bolus so it is ready to travel from your mouth to your stomach.

[2] Well, when the time is right, the epiglottis, a flap of tissue, closes to prevent food from going down your trachea. The trachea is also called the windpipe. Therefore, the food can go down the tube it needs to enter, the esophagus, and not your windpipe, which would cause you to choke.

[3] The esophagus, the tube that goes from the mouth to the stomach, can be found behind the windpipe and heart. The esophagus is made of muscular walls and is about ten inches long in an adult.

[4] The outer layer of the esophagus is called the serosa. It is thin and it is a layer of connective tissue. Then comes a layer of longitudinal muscles, followed by a layer of circular muscles. Underneath the circular muscles is the submucosa. It is a tough, elastic layer and contains blood vessels and nerves. The inner layer is known as the mucosa. It is coated with a slimy liquid called mucus.

[5] The rhythmic contractions of the muscular walls in the esophagus push the food bolus toward the stomach. This process is called peristalsis. Picture this process like you would the process of squeezing toothpaste out of its tube. The ring of muscle in the esophagus behind the food bolus contracts and the ring of muscle in front of it relaxes. The bolus gets pushed to where the muscles are relaxed and keeps getting pushed this way. This peristaltic wave travels at about 1.6 inches per second.

[6] At the bottom of the esophagus is the esophageal sphincter. It is actually a ring of muscle. This muscle is usually tightly shut. When food arrives, though, the muscles relax to allow food to enter the stomach. Then the muscles contract and close the entrance. If the esophageal sphincter doesn't close properly, heartburn, which is a burning sensation, can occur. This is because the stomach acids can move into the esophagus where they don't belong.

[7] Can you imagine how quickly this all occurs? The food is able to go from the mouth to the stomach in five to six seconds!

Nutrients

[1] We carry out many tasks everyday; some things we do require physical energy, but others demand mental energy. For example, we exert lots of physical energy while attending a gym class, but we use more mental energy while completing a math quiz. How do we acquire adequate amounts of physical and mental energy to ensure our ability to do things such as running for a mile or concentrating on the lecture during a class? The answer lies in the food we eat.

[2] Food is essential to our survival. Nevertheless, even if we eat everyday, we may not feel fit. Why is that? Well, the secret is not only to consume enough food, but also to maintain a balanced diet. In other words, as much as we dislike the taste of broccoli or other green vegetables, we must eat them to obtain necessary nutrients.

[3] Nutrients can be divided into two groups -- nonessential and essential. The distinction between the two depends on whether we need to obtain them from food or not. For nonessential nutrients, such as cholesterol, we don't have to get them from food, because our bodies can produce them. For essential nutrients, such as fats, food is either the major or the only source for us to attain them. There are over 40 different types of essential nutrients, and scientists categorized them into six groups -- carbohydrates, proteins, fats, vitamins, minerals, and water.

[4] Carbohydrates, proteins, and fats are the three energy providers to our bodies. We can get carbohydrates from sources such as sugars, maple syrups, peaches or other fruits, potatoes, and pastas. When we drink milk or have scramble eggs, we obtain both proteins and fats. Under the condition that the atmosphere pressure does not change, scientists measure the amount of energy a food item supplies in kilocalories or in calories. One kilocalorie is one unit of heat required to raise the temperature of 1 kilogram of water by 1 degree Celsius. One calorie is one unit of heat required to raise the temperature of 1 gram of water by 1 degree Celsius. Because one kilogram equals 1,000 grams, one kilocalorie equals 1,000 calories. We also substitute the term "kilocalorie" with "kilogram calorie" or "large calorie" and the term "calorie" with "small calorie."

[5] Vitamins and minerals are critical in regulating various body functions and preventing disorders. Let's use calcium, a mineral, as our example. Calcium makes our bones strong, and milk is one way for us to obtain calcium. If we don't drink milk or don't take calcium supplements, we may suffer from bone fractures.

[6] Water makes up the last group of essential nutrients. It is also the most important of all six essential nutrients. Water makes up to 70% of our body weight. It helps transport oxygen and nutrients around our bodies, regulate our body temperature, and provide

cushions to our joints and soft tissues. We should drink 8 to 10 glasses of water a day to replenish the water that we lose through sweating and urinating.

Name _____ Date _____

Nutrients

1. How many groups of essential nutrients are there? (A) Six (B) Five (C) Four (D) Seven	2. Carbohydrates and proteins are the only two essential nutrients that provide our bodies with energy. (A) False (B) True
3. Which of the following sentences about nutrients is true? (A) Nonessential nutrients are those that we must obtain from food. (B) We can obtain carbohydrates from drinking water. (C) Water is the most important of all essential nutrients. (D) Essential nutrients are those that our bodies can produce.	4. Which of the following is a nonessential nutrient? (A) Calcium (B) Calorie (C) Carbohydrate (D) Cholesterol
5. If one stalk of celery has 5 kilocalories, how many calories is that? (A) 5 calories (B) 5,000 calories (C) 500 calories (D) 50 calories	6. Which of the following sentences about water is true? (A) We should drink 8 to 10 glasses of water a day. (B) Water has nothing to do with regulating our body temperature. (C) Water transports nutrients, but not oxygen, around our bodies. (D) Our bodies are about 30% water.

The Digestive System

By Sharon Fabian

[1] The digestive system is the group of organs that breaks down food so that the body can use it. Food must be broken down all the way to its individual molecules to be useable. This involves a number of steps, and different organs to do different parts of the job.

[2] Once food is broken down it provides energy for many essential body functions. It provides the energy for all of our physical activity such as walking, playing sports, working, and talking. It also provides the energy for other, more automatic, activities including breathing and thinking. Food provides the energy for the nerves, muscles, and organs, including the heart, to continue working. It provides the fuel to build and repair body tissues. Food energy is needed to regulate body organs and systems. It is the fuel that provides heat to keep our body temperature at a steady 98.6 degrees.

[3] The digestive process begins in the mouth. There, the teeth and the muscles of the mouth begin the digestive process by breaking down the food into smaller bits. Saliva, produced by the salivary glands, begins to digest the food before it is even swallowed. Saliva and the other chemicals produced along the way to speed the digestive process are called digestive enzymes.

[4] Next, muscles in the throat help swallow the food, and it passes through a long tube called the esophagus. The esophagus goes from the throat to the stomach. In the stomach, a digestive fluid called gastric juice mixes with the food. The stomach muscles toss the food and the gastric juices, and break down the protein parts of the food. Other parts of the food will not be broken down for several more hours.

[5] The food is now a thick liquid, and it leaves the stomach to pass into the small intestine. In the small intestine more digestive enzymes act on the food. Pancreatic juice, from the pancreas, and bile, produced in the liver and stored in the gall bladder, continue to break down various parts of the food. They complete the digestion of starches, sugars, and fats.

[6] As the food becomes completely digested it gets absorbed into the bloodstream by tiny blood vessels in the wall of the small intestine. At this point the food has been broken down to its molecules, and the energy from the food travels to wherever it is needed in the body, by way of the bloodstream.

[7] The parts of the food that cannot be digested then pass into the large intestine. These parts include fibers, or roughage. There they are stored and broken down further by the

action of bacteria, until they are expelled from the body through the rectum.

[8] The whole system that the food passes through is called the alimentary canal. Its main parts are the mouth, the esophagus, the stomach, the liver, the gall bladder, the pancreas, the small intestine, the large intestine, and the rectum. Some of its main chemicals are saliva, gastric juice, pancreatic juice, and bile. It's the system that provides the energy that keeps us alive and active -- the digestive system.

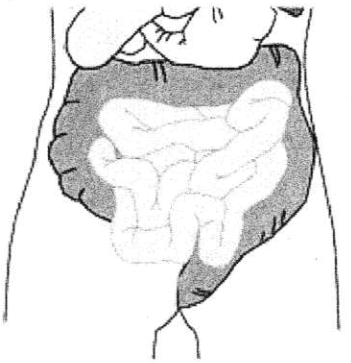
Name _____ Date _____

The Digestive System

1. Which is part of the digestive system? (A) Aorta (B) Liver (C) Brain (D) Lungs	2. The digestive system is _____. (A) The same thing as the stomach (B) The system that we use to breathe (C) A group of organs (D) An organ
3. The digestive system produces which of these chemicals? (A) Gastric juice (B) Saliva (C) Pancreatic juice (D) All of the above	4. This article is mainly about _____. (A) The system that circulates our blood (B) The small intestine (C) The mouth (D) The system that breaks down food
5. Food provides _____. (A) Energy (B) Blood (C) Oxygen (D) None of the above	6. Food must be broken down into _____ before it can pass into the bloodstream. (A) Liquid (B) Molecules (C) Atoms (D) Proteins
7. The esophagus is _____. (A) The tube from the mouth to the stomach (B) The organ that digests protein (C) Another name for the stomach (D) The organ that produces bile	8. Digestive enzymes are _____. (A) Organs (B) Foods (C) Muscles (D) Chemicals

Digestion in the Small Intestine

By Jennifer Kenny



[1] The small intestine is a very important stop in the digestive process. In fact, most of digestion occurs here. The small intestine is a long, narrow, twisting tube of muscles and tissue. It can be anywhere from thirteen feet to twenty feet long, but it is only one inch in diameter. It is coiled tightly so that it can fit in the abdomen.

[2] Before entering the small intestine, the liquid result of digestion leaves the stomach. Do you know what this liquid food is called? It is called chyme. The muscles create waves and push the liquid along. These waves of muscle contraction are called peristalsis.

[3] The first part of the small intestine is about eight to ten inches long. It has a special name. It is called the duodenum. It is shaped like a horseshoe. Chemicals here neutralize the acid so chyme can continue in the digestive system. Digestive juices from the liver and pancreas enter here and mix with the liquid food. These juices finish breaking down fats, proteins, starches, and sugars.

[4] Now, these parts are small enough to pass through the wall of the small intestine. Most of digestion is finished at this point, but nutrients need to get to the rest of the body. This is called absorption. Absorption is what makes the small intestine such an important part of the digestive system.

[5] The small intestine has a rich blood supply so that these nutrients, which have been absorbed by the small intestine, can be carried away. The inner lining of the small intestine is also known for its millions of villi. Villi are tiny fingerlike structures. Each villus has its own blood capillary and lacteal (or lymph vessel). Amino acids and sugars pass into the blood capillary to be carried into the bloodstream. Fatty acids pass into the lacteal to get into the lymphatic system and bloodstream. Getting the nutrients to all the cells in our body gives us energy and keeps us alive.

[6] Anything that doesn't get sent to the other cells in our body heads to the large intestine. Most of digestion has just been completed.