

Digestion – Helping Your Body Use Its Fuel

What's the first step in the digestive process? Believe it or not, it happens before you even taste your food. Just by smelling that homemade apple pie or thinking about how delicious that ripe tomato is going to be, you start salivating — and the digestive process begins, preparing for that first scrumptious bite. Food is our fuel, and its nutrients give our bodies' cells the energy and substances they need to operate. But before food can do that, it must be digested into small pieces the body can absorb and use.

About the Digestive System

Almost all animals have a tube-type digestive system in which food enters the mouth, passes through a long tube, and exits as feces (poop) through the anus. The smooth muscle in the walls of the tube-shaped digestive organs rhythmically and efficiently moves the food through the system, where it is broken down into tiny absorbable atoms and molecules.

During the process of absorption, nutrients that come from the food (including carbohydrates, proteins, fats, vitamins, and minerals) pass through channels in the intestinal wall and into the bloodstream. The blood works to distribute these nutrients to the rest of the body. The waste parts of food that the body can't use are passed out of the body as feces.

Every morsel of food we eat has to be broken down into nutrients that can be absorbed by the body, which is why it takes hours to fully digest food. In humans, protein must be broken down into amino acids, starches into simple sugars, and fats into fatty acids and glycerol. The water in our food and drink is also absorbed into the bloodstream to provide the body with the fluid it needs.

How Digestion Works

The digestive system is made up of the alimentary canal (also called the digestive tract) and the other abdominal organs that play a part in digestion, such as the liver and pancreas. The alimentary canal is the long tube of organs — including the esophagus, stomach, and intestines — that runs from the mouth to the anus. An adult's digestive tract is about 30 feet (about 9 meters) long.

Digestion begins in the mouth, well before food reaches the stomach. When we see, smell, taste, or even imagine a tasty meal, our salivary glands, which are located under the tongue and near the lower jaw, begin producing saliva. This flow of saliva is set in motion by a brain reflex that's triggered when we sense food or think about eating. In response to this sensory stimulation, the brain sends impulses through the nerves that control the salivary glands, telling them to prepare for a meal.

As the teeth tear and chop the food, saliva moistens it for easy swallowing. A digestive enzyme called amylase, which is found in saliva, starts to break down some of the carbohydrates (starches and sugars) in the food even before it leaves the mouth.

Swallowing, which is accomplished by muscle movements in the tongue and mouth, moves the food into the throat, or pharynx. The pharynx, a passageway for food and air, is about 5 inches (12.7 centimeters) long. A flexible flap of tissue called the epiglottis reflexively closes over the windpipe when we swallow to prevent choking.

From the throat, food travels down a muscular tube in the chest called the esophagus. Waves of muscle contractions called peristalsis force food down through the esophagus to the stomach. A person normally isn't aware of the movements of the esophagus, stomach, and intestine that take place as food passes through the digestive tract.

At the end of the esophagus, a muscular ring or valve called a sphincter allows food to enter the stomach and then squeezes shut to keep food or fluid from flowing back up into the esophagus. The stomach muscles churn and mix the food with acids and enzymes, breaking it into much smaller, digestible pieces. An acidic environment is needed for the digestion that takes place in the stomach. Glands in the stomach lining produce about 3 quarts (2.8 liters) of these digestive juices each day.

Most substances in the food we eat need further digestion and must travel into the intestine before being absorbed. When it's empty, an adult's stomach has a volume of one fifth of a cup (1.6 fluid ounces), but it can expand to hold more than 8 cups (64 fluid ounces) of food after a large meal.

By the time food is ready to leave the stomach, it has been processed into a thick liquid called chyme. A walnut-sized muscular valve at the outlet of the stomach called the pylorus keeps chyme in the stomach until it reaches the right consistency to pass into the small intestine. Chyme is then squirted down into the small intestine, where digestion of food continues so the body can absorb the nutrients into the bloodstream.

The inner wall of the small intestine is covered with millions of microscopic, finger-like projections called villi. The villi are the vehicles through which nutrients can be absorbed into the body.

The liver (located under the rib cage in the right upper part of the abdomen), the gallbladder (hidden just below the liver), and the pancreas (beneath the stomach) are not part of the alimentary canal, but these organs are essential to digestion.

The liver produces bile, which helps the body absorb fat. Bile is stored in the gallbladder until it is needed. The pancreas produces enzymes that help digest proteins, fats, and carbohydrates. It also makes a substance that neutralizes stomach acid. These enzymes and bile travel through special channels (called ducts) directly into the small intestine, where they help to break down food. The liver also plays a major role in the handling and processing of nutrients, which are carried to the liver in the blood from the small intestine.

In our next lesson we will continue the process of digestion and cover elimination.

From the web site "Kids Health"

http://www.kidshealth.org/parent/general/body_basics/digestive.html

FRUITS AND VEGETABLES BY COLOR



BLUE/PURPLE fruits and vegetables contain varying amounts of health-promoting phytochemicals such as anthocyanins and phenolics, currently being studied for their antioxidant and anti-aging benefits. Include BLUE/PURPLE in our low-fat diet to help maintain:

- A lower risk of some cancers*
- Urinary tract health
- Memory function
- Healthy Aging

Get blue/purple every day with foods such as:

Black currants	Eggplant	Prunes	Purple carrots
Black salsify	Elderberries	Purple Belgian endive	Purple figs
Blackberries	Grapes	Purple Potatoes	Purple grapes
Blueberries	Plums	Purple asparagus	Purple peppers
Dried plums	Pomegranates	Purple cabbage	Raisins



WHITE, TAN AND BROWN fruits and vegetables contain varying amounts of phytochemicals of interest to scientists. These include allicin, found in the onion and garlic family. The mineral selenium, found in mushrooms, is also the subject of research. Including WHITE in your low-fat diet helps maintain:

- Heart health
- Cholesterol levels that are already healthy
- A lower risk of some cancers*

Get the health benefits of white by including foods such as:

Bananas	Ginger	Onions	White Corn
Brown pears	Jerusalem artichoke	Parsnips	White nectarines
Cauliflower	Jicama	Potatoes	White peaches
Dates	Kohlrabi	Shallots	
Garlic	Mushrooms	Turnips	



GREEN fruits and vegetables contain varying amounts of phytochemicals such as lutein and indoles, which interest researchers because of their potential antioxidant, health-promoting benefits. Include GREEN in your low-fat diet to:

- A lower risk of some cancers*
- Vision health
- Strong bones and teeth

Go green every day with fruits and vegetables like these:

Artichokes	Chayote squash	Green pears	Peas
Arugula	Chinese cabbage	Green peppers	Snow peas
Asparagus	Cucumbers	Honeydew	Spinach
Avocados	Endive	Kiwifruit	Sugar snap peas
Broccoflower	Green apples	Leafy greens	Watercress
Broccoli	Green beans	Leeks	Zucchini
Broccoli rabe	Green cabbage	Lettuce	
Brussel sprouts	Green grapes	Limes	
Celery	Green onion	Okra	



YELLOW AND ORANGE fruits and vegetables contain varying amounts of phytochemicals such as vitamin C, as well as carotenoids and bioflavonoids, two classes of phytochemicals that scientists are studying for their health-promoting potential. Including YELLOW AND ORANGE in your low-fat diet helps maintain:

- Heart health
- Vision health
- A healthy immune system
- A lower risk of some cancers*

Get the health benefits of yellow and orange by including foods such as:

Apricots	Mangoes	Rutabagas	Yellow peppers
Butternut squash	Nectarines	Sweet corn	Yellow potatoes
Cantaloupe	Oranges	Sweet potatoes	Yellow summer squash
Cape Gooseberries	Papayas	Tangerines	Yellow tomatoes
Carrots	Peaches	Yellow apples	Yellow watermelon
Golden kiwifruit	Persimmons	Yellow beets	Yellow winter squash
Grapefruit	Pineapples	Yellow figs	
Lemon	Pumpkin	Yellow pears	



RED fruits and vegetables contain specific phytochemicals that scientists are studying for their health-promoting potential. These include lycopene and anthocyanins. Include a variety of RED fruits and vegetables in your low-fat diet to help maintain:

- Heart health
- Memory function
- Urinary tract health
- A lower risk of some cancers*

Include red fruits and vegetables in your diet such as such as:

Beets	Pink grapefruit	Red apples	Red peppers
Blood oranges	Pink/red grapefruit	Red bell peppers	Red potatoes
Cherries	Pomegranates	Red chili peppers	Rhubarb
Cranberries	Radicchio	Red grapes	Strawberries
Guava	Radishes	Red onions	Tomatoes
Papaya	Raspberries	Red pears	Watermelon

**Low-fat diets rich in fruits and vegetables and low in saturated fat and cholesterol may reduce the risk of some types of cancer, a disease associated with many factors.*