

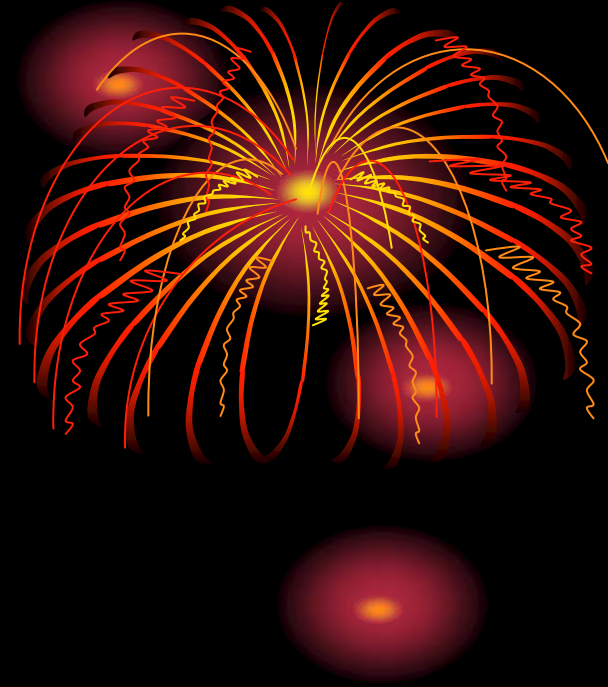


DIGESTIVE SYSTEM

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CONTENT

- **Introduction**
- **Digestion process :**
 - **In mouth**
 - **In Stomach**
 - **In Small intestines**
 - **In large intestine**
- **Enzymes in digestion**
- **Healthy digestion**



INTRODUCTION



- **The digestive system (gastrointestinal tract, GIT) is a series of hollow organs joined in a long, twisting tube from the mouth to the anus. Inside this tube is a lining called the mucosa. In the mouth, stomach, and small intestine, the mucosa contains tiny glands that produce juices to help digest food.**
- **Two solid organs, the liver and the pancreas, produce digestive juices that reach the intestine through small tubes. In addition, parts of other organ systems (for instance, nerves and blood) play a major role in the digestive system.**

Why is digestion important?



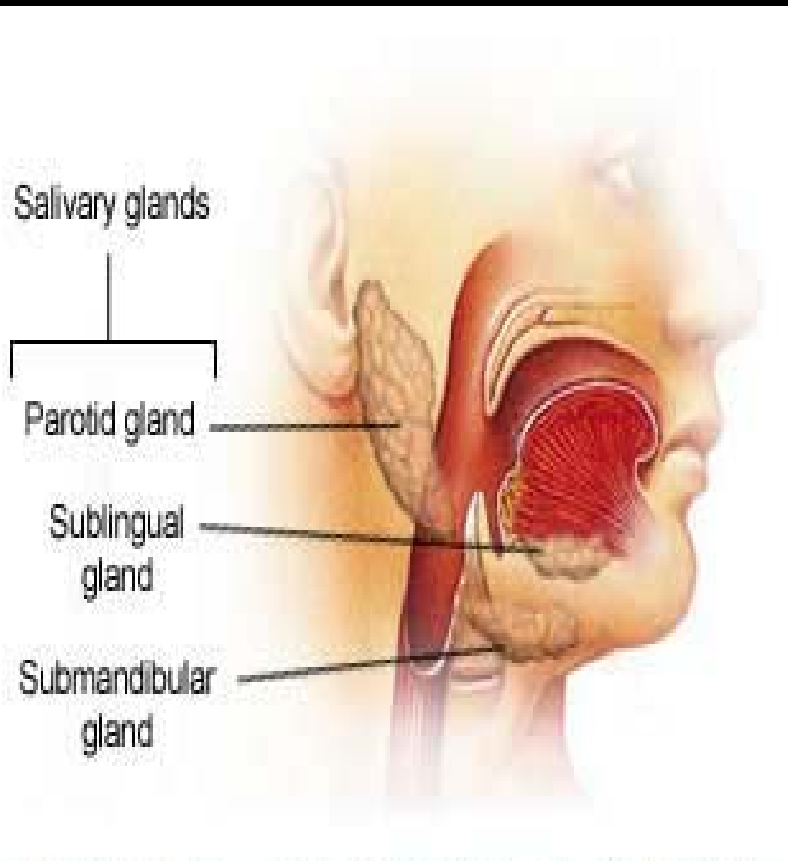
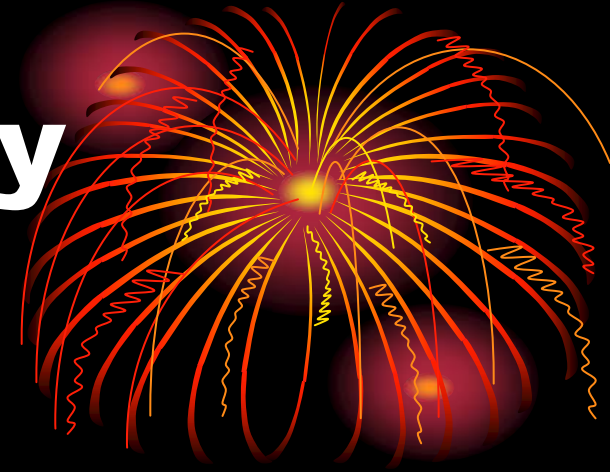
- **When we eat such things as bread, meat, and vegetables, they are not in a form that the body can use as nourishment. Our food and drink must be changed into smaller molecules of nutrients before they can be absorbed into the blood and carried to cells throughout the body. Digestion is the process by which food and drink are broken down into their smallest parts so that the body can use them to build and nourish cells and to provide energy.**

How is food digested?



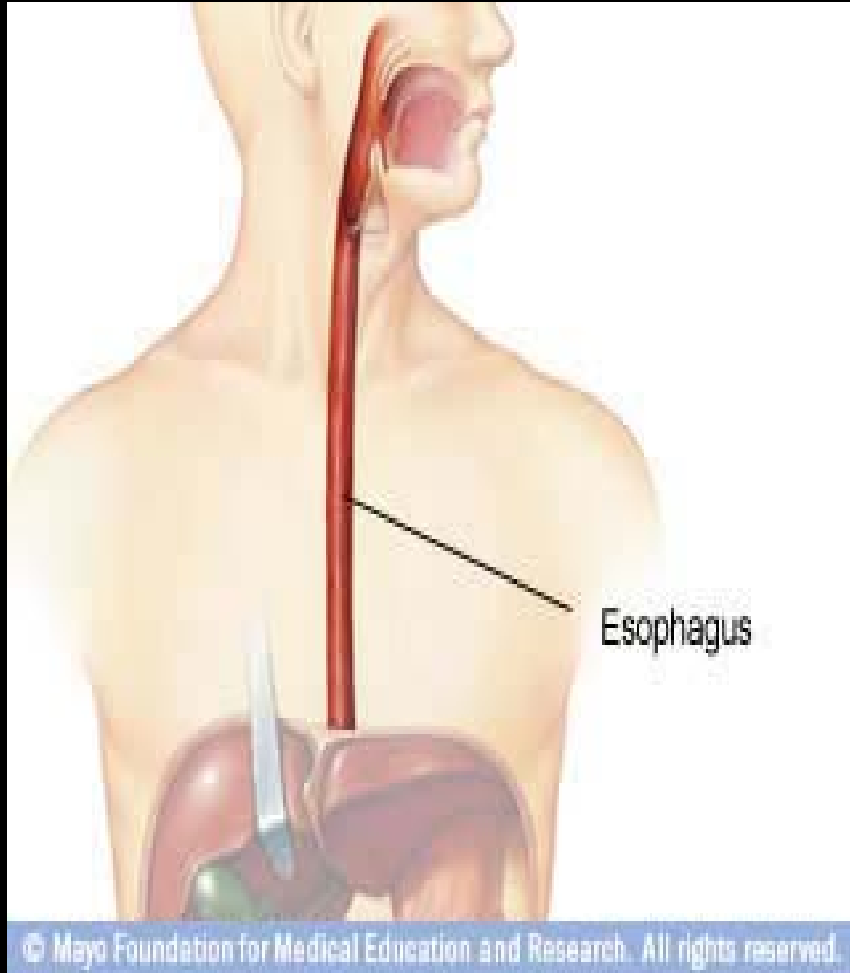
- **Digestion involves the mixing of food, its movement through the digestive tract, and the chemical breakdown of the large molecules of food into smaller molecules. Digestion begins in the mouth, when we chew and swallow, and is completed in the small intestine. The chemical process varies somewhat for different kinds of food.**

Mouth and salivary glands



- **After take first bite of food, salivary glands produce enough digestive juices (saliva) to begin breaking it down chemically.**
- **3 pairs of salivary glands:**
 - **parotid glands,**
 - **sublingual glands**
 - **submandibular glands.****1.5L saliva/day**
- **Teeth work to grind the pie while your tongue mixes it with saliva.**
- **This combination transforms it into a bolus — a soft, moist, rounded mass suitable for swallowing.**

Esophagus



The organ into which the swallowed food is pushed.

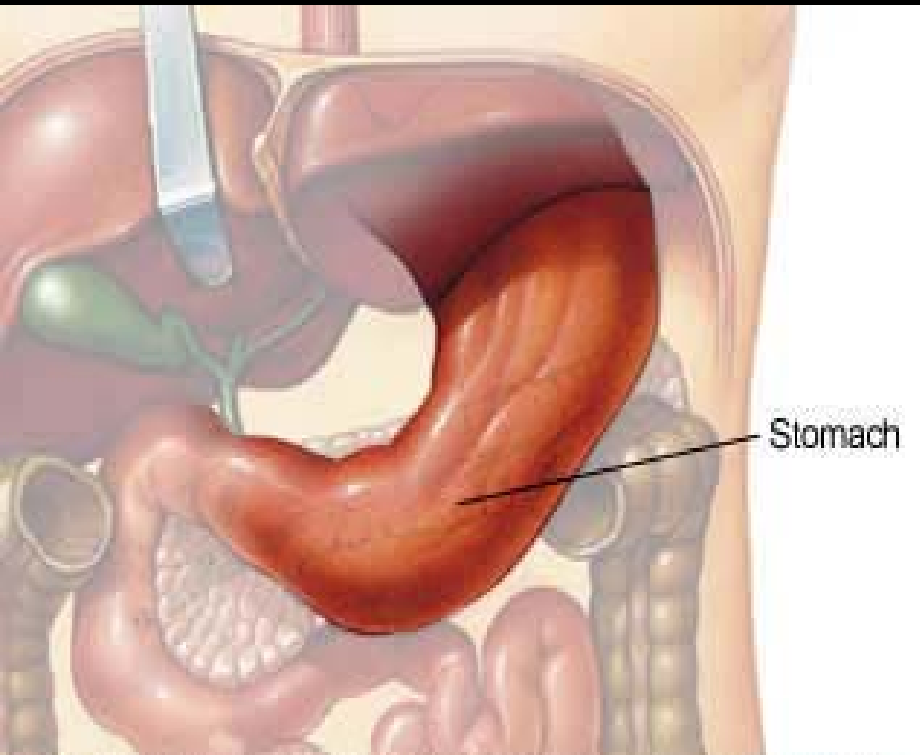
Connects the throat above with the stomach below.

Create synchronized waves — that propel the food into stomach (peristalsis) - muscles behind the bolus of food contract, squeezing it forward, while muscles ahead of it relax, allowing it to advance without resistance.

When bolus reaches the lower end of esophagus, pressure from the food signals a muscular valve — the lower esophageal sphincter — to open and let it enter your stomach



Stomach



Stomach

After entering your stomach, the food soon becomes unrecognizable. The stomach's wall, begins churning and mixing it into smaller and smaller pieces.

Gastric juices, rich in acid and enzymes, pour out of glands that line the stomach. The acid and enzymes help break down food into a thick, creamy fluid called chyme.

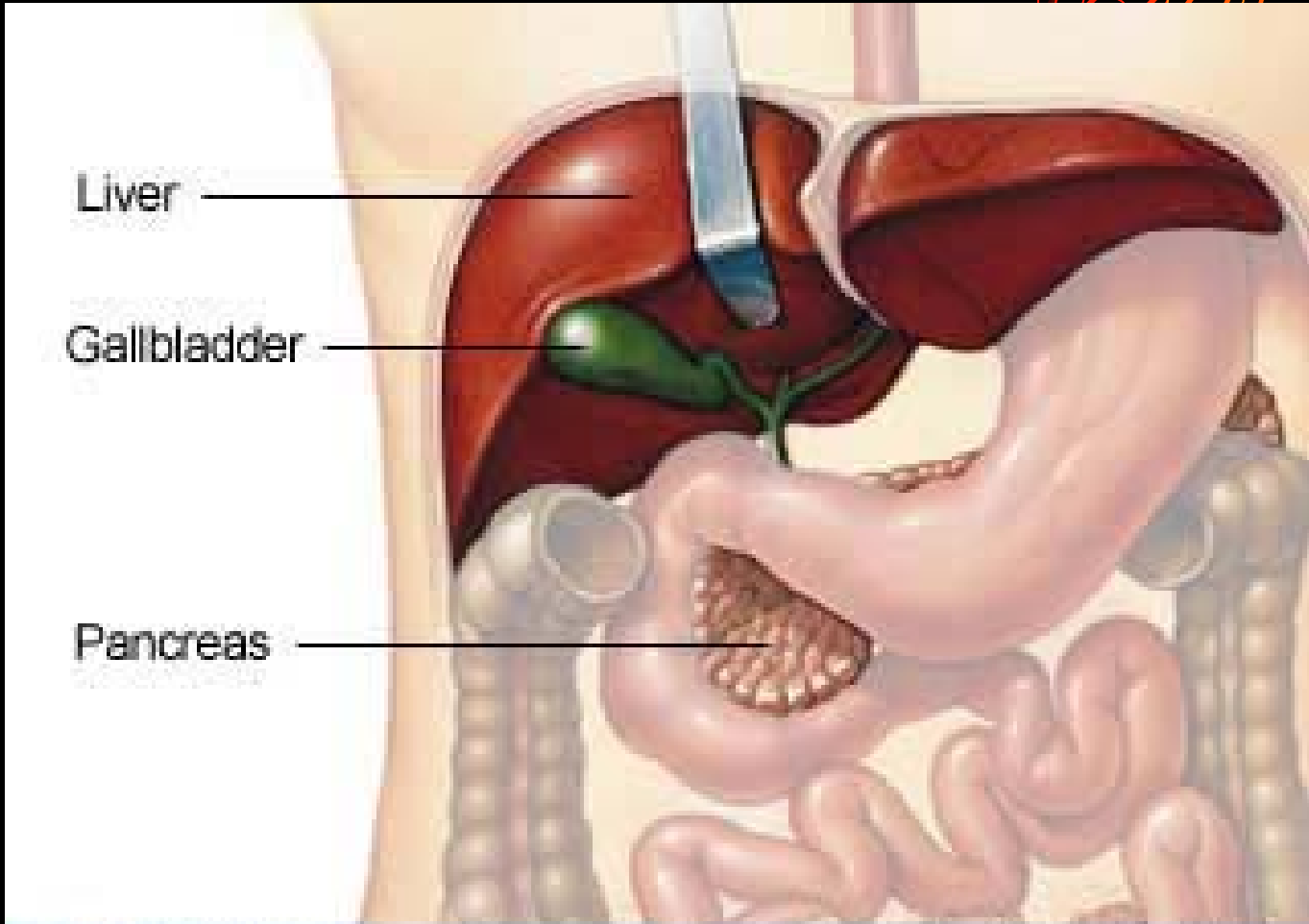
Once the concoction is well mixed, waves of muscle contractions propel it through the pyloric valve and into the first section of your small intestine (duodenum). The pyloric valve releases less than an eighth of an ounce of chyme at a time. The rest is held back for more mixing.



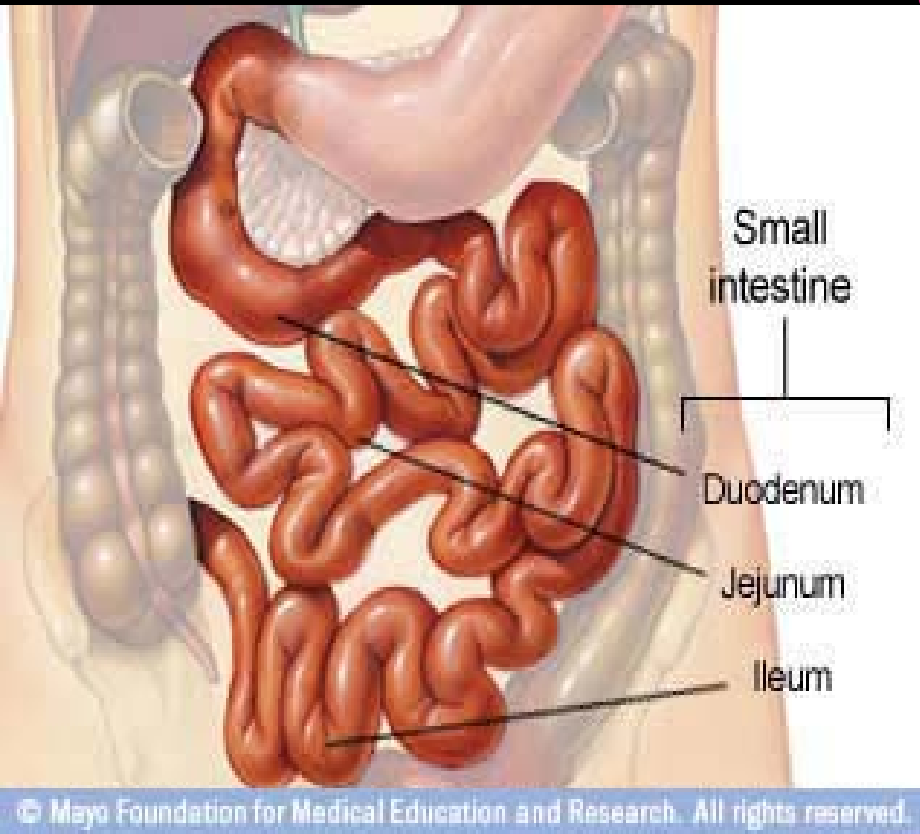
Pancreas, liver and gallbladder



- **In your duodenum, digestion continues, as chyme from the stomach mixes with a variety of digestive juices from your pancreas, liver and gallbladder:**
 - **Pancreas** - produces digestive enzymes that help break down proteins, carbohydrates, and fats. It also produces the hormones insulin and glucagon, which help regulate the level of sugar (glucose) in your blood.
 - **Liver** - performs more than 500 functions, including storing nutrients, filtering and processing chemicals in food, and producing bile, a solution that helps digest fats and eliminate waste products.
 - **Gallbladder** - stores and concentrates bile. As fatty food enters the upper portion of your small intestine (the duodenum), the gallbladder contracts and releases bile into the small intestine through a duct.



Small intestine



When bile and pancreatic digestive juices mix with other juices secreted by the wall of your small intestine, digestion shifts into high gear. Food is propelled into the second portion of your small intestine, the jejunum. Here it's further broken down into smaller molecules of nutrients that can be absorbed. Then it slides into the final and longest portion of your small intestine — the ileum — where virtually all of the remaining nutrients are absorbed through the lining of the ileum's wall.

What remains at the end of the ileum is a combination of water, electrolytes — such as sodium and chloride — and waste products, such as plant fiber and dead cells shed from the lining of your digestive tract.



Large intestine



- **As this residue passes through the colon, your body absorbs nearly all of the water, leaving a usually soft but formed substance called stool. Muscles in the wall of your colon separate the waste into small segments that are pushed into your lower colon and rectum. As the rectal walls are stretched, they signal need for a bowel movement.**

When the sphincter muscles in your anus relax, the rectal walls contract to increase pressure. Sometimes you have to use your abdominal muscles, which press on the outside of the colon and rectum. These coordinated muscle contractions expel the stool.

ENZYME IN DIGESTION



Secretion & Source	Enzymes	Substrate	Acting & resulting Products
Saliva (salivary glands in mouth)	Ptyalin (salivary amylase)	Starch	Hydrolysis to form dextrins and branched oligosaccharides
Gastric juices (stomach)	Pepsin	Protein (in presence of HCL)	Hydrolysis of peptide bonds to form polypeptides & aminoacids
	Gastric lipase	Fat, especially shorter chain	Hydrolysis to form free fatty acids



Secretion & Source	Enzymes	Substrate	Acting & resulting Products
Exocrine secretion from pancreas	Lipase	Fat (in presence of bile salts)	Hydrolysis to form monoglycerides & fatty acids
	Cholesterol esterase	Cholesterol	Hydrolysis to form ester of cholesterol & fatty acids
	A-amylase	Starch & dextrin	Hydrolysis to form dextrin & maltose



Secretion & Source	Enzymes	Substrate	Acting & resulting Products
	Trypsin (activated trypsinogen)	Protein & polypeptides	Hydrolysis of interior peptide bonds to form polypeptide
	Chymotrypsin (activated chymotripsinogen)	Protein & peptides	Hydrolysis of interior peptide bonds to form polypeptide
	Carboxypeptidase	polypeptides	Hydrolysis of terminal peptide bonds to form amino



Secretion & Source	Enzymes	Substrate	Acting & resulting Products
	Trypsin (activated trypsinogen)	Protein & polypeptides	Hydrolysis of interior peptide bonds to form polypeptide
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	Carboxypeptidase	Polypeptides	Hydrolysis of terminal peptide bonds to form amino acids



Secretion & Source	Enzymes	Substrate	Acting & resulting Products
Small intestine enzymes	Carboxypeptidase, aminopeptidase & dipeptidase	Polypeptides	Hydrolysis of internal peptide bonds
	Enterokinase	Trypsinogen	Activates trypsin
	Sucrase	Sucrose	Hydrolysis to form glucose and fructose

Healthy digestion



- **The types of food you eat, the amount of exercise you get, the pace of your day and your level of stress all can affect the health of your digestive system. Good lifestyle habits can go a long way toward keeping your digestive system on track:**
 - **Practice good eating habits.**
 - **Maintain healthy weight.**
 - **Get regular exercise.**
 - **Control stress.**
 - **Limit alcohol and tobacco.**
 - **Use medications cautiously.**



That's all..

THANK YOU!!

