

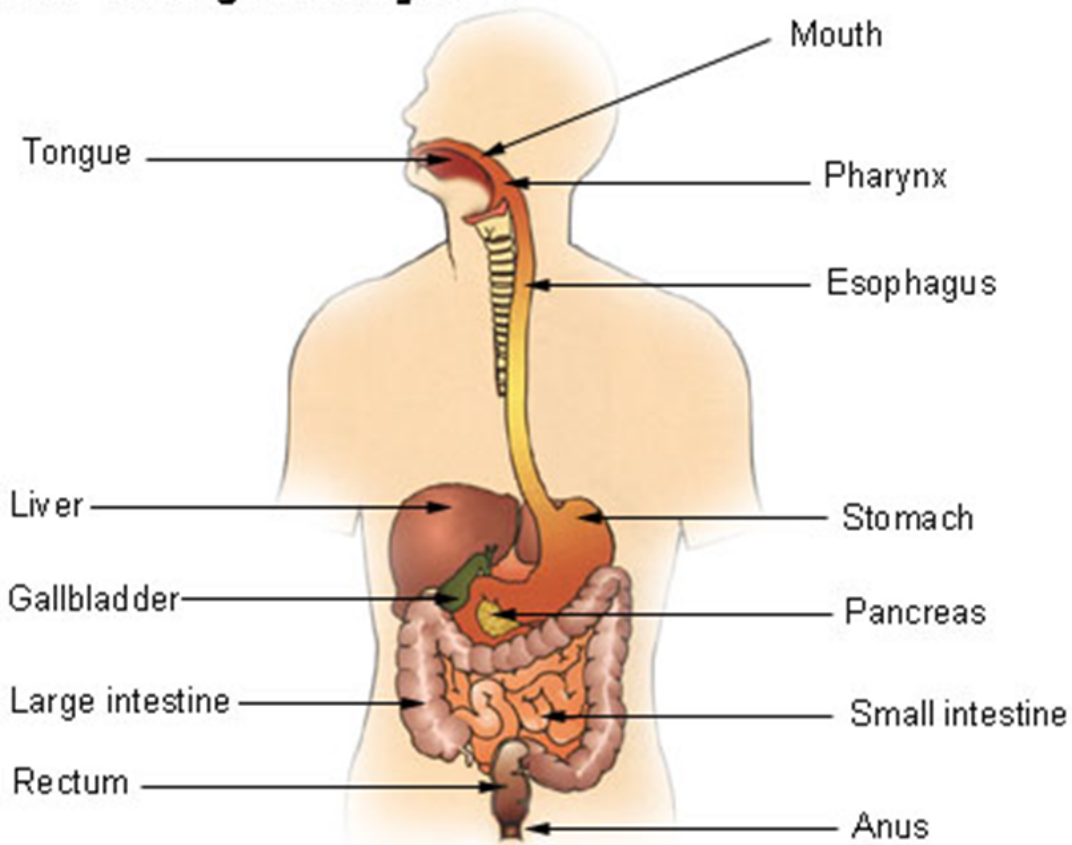
## The Digestive System

- There are Four Stages of Food Processing:
  - **Ingestion** — the taking in of food
  - **Digestion** — the breakdown of food
  - **Absorption** — the taking up of nutrients
  - **Elimination** — the removal of waste materials from the body

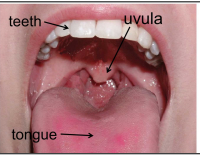
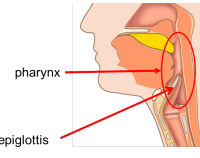
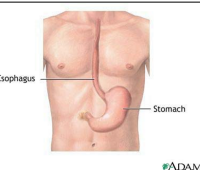
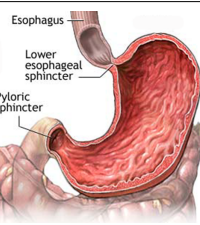
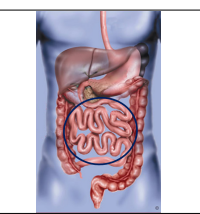
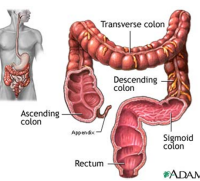
- For absorption to occur, food has to be broken down into smaller **nutrients** first. This occurs through 2 types of transformations:
  - **Mechanical transformation**: the nature of the substance remains the same, only its **physical** appearance changes
    - Ex: Chewing
  - **Chemical transformation**: the bonds of the molecules are broken, giving rise to a **NEW SUBSTANCE**
    - Ex: Acids in the stomach breaking down food

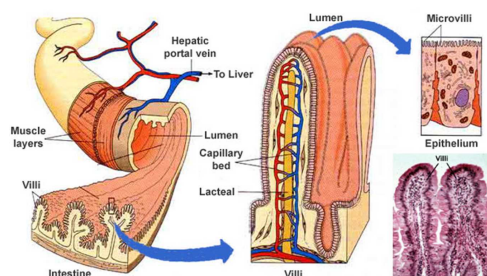
- **Digestive tract:** A long passageway of organs, also called the alimentary canal.
  - Includes:
    - Mouth
    - Pharynx
    - Esophagus
    - Stomach
    - Small Intestine
    - Large Intestine
  
- **Digestive glands:** The associated glands that secrete **enzymes** that help break food down.
  - Includes:
    - Salivary glands
    - Gastric glands
    - Intestinal glands
    - Pancreas
    - Liver

**Organs of the Digestive System**

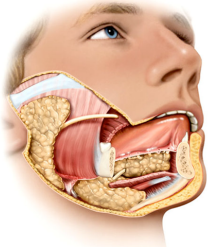

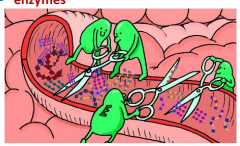
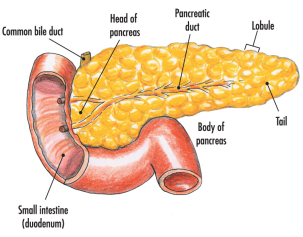
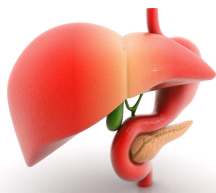


**Parts of The Digestive Tract**

Part	Description
<p><b>Mouth</b></p> 	<ul style="list-style-type: none"> <li>Teeth: Mechanically break down food</li> <li>Tongue: Tastes and manipulates food</li> <li>Uvula: flap hanging from the back of the throat</li> <li>Salivary glands: Chemical Digestion of sugars</li> </ul>
<p><b>Pharynx</b></p> 	<ul style="list-style-type: none"> <li>Passageway for food and air.</li> <li>Epiglottis: closes airway when food is swallowed</li> </ul>
<p><b>Esophagus</b></p> 	<ul style="list-style-type: none"> <li>Muscular tube connecting pharynx to stomach.</li> <li>Moves food by means of <b>**Peristalsis**</b>: <b>sequential contractions of muscles</b></li> </ul>
<p><b>Stomach</b></p> 	<ul style="list-style-type: none"> <li>Muscular bag</li> <li>Grinds food and mixes it with hydrochloric acid and enzymes.</li> <li><b>**Chyme**</b>: <b>partially digested food with the consistency of cottage cheese.</b></li> <li>Sphincters control the entrance and exit of food.</li> </ul>
<p><b>Small Intestine</b></p> 	<ul style="list-style-type: none"> <li>Major site of digestion and absorption of food.</li> <li>Muscular tube covered in Villi (folds in the intestinal layer) which increase the surface area for absorption of nutrients.</li> </ul>
<p><b>Large Intestine</b></p> 	<ul style="list-style-type: none"> <li>Muscular tube with a smooth mucus lining.</li> <li>Major site of water absorption.</li> <li>Rectum: stores feces until then can be excreted from the anus.</li> </ul>



## Glands of The Digestive System

Gland	Description
<b>Salivary Glands</b>	<ul style="list-style-type: none"> <li>• Secretes saliva which lubricates the "bolus" (mashed food)</li> <li>• Contains the enzyme Amylase which starts the chemical digestion of <b>carbohydrates</b>.</li> </ul>
	
<b>Gastric Glands</b>	<ul style="list-style-type: none"> <li>• Line the inside of the stomach.</li> <li>• Secrete gastric juices that contains HCl and pepsin which starts the chemical digestion of <b>proteins</b>.</li> </ul>
	
<b>Intestinal Glands</b>	<ul style="list-style-type: none"> <li>• Line the small intestine</li> <li>• Secrete intestinal juices which contain enzymes that chemically digest <b>fats, proteins</b> and <b>carbohydrates</b>.</li> <li>• Also neutralizes the acid from the stomach.</li> </ul>
<p>2. CHEMICAL DIGESTION by:</p> <ul style="list-style-type: none"> <li>• enzymes</li> </ul>  <p>Digestive enzymes are the chemicals that break large insoluble food molecules into smaller soluble molecules.</p>	
<b>Pancreas</b>	<ul style="list-style-type: none"> <li>• Secretes pancreatic juices into the small intestine which contains enzymes that chemically digest <b>fats, proteins</b> and <b>carbohydrates</b>.</li> <li>• Secretes the hormone Insulin which regulates blood sugar levels.</li> </ul>
	
<b>Liver</b>	<ul style="list-style-type: none"> <li>• Produces Bile which helps digest fats by physically separating fat molecules.</li> <li>• Some Bile is stored in the gall bladder</li> </ul>
	

## Chemical and Mechanical Digestion

<b>Part</b>	<b>Chemical Digestion</b>	<b>Mechanical Digestion</b>
Mouth	<ul style="list-style-type: none"> <li>• Carbohydrates by amylase from saliva</li> </ul>	<ul style="list-style-type: none"> <li>• Chewing</li> </ul>
Pharynx	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>
Esophagus	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Peristalsis</li> </ul>
Stomach	<ul style="list-style-type: none"> <li>• Protein by pepsin and HCl</li> </ul>	<ul style="list-style-type: none"> <li>• Churning</li> </ul>
Small Intestine	<ul style="list-style-type: none"> <li>• Fat, carbohydrate and protein digestion completed here by pancreatic and intestinal juices</li> </ul>	<ul style="list-style-type: none"> <li>• Peristalsis</li> </ul>
Pancreas	<ul style="list-style-type: none"> <li>• Secretes pancreatic juices into small intestine</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>
Liver	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Bile physically separates fat molecules</li> </ul>
Large Intestine	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>

## What do we absorb?

<b>Nutrient</b>	<b>Final Product</b>	<b>Site of absorption</b>
Carbohydrates	Simple Sugars, mainly Glucose	Small Intestine
Proteins	Amino Acids	Small Intestine
Fats	Glycerol and Fatty Acids	Small Intestine
Water	Water	Large Intestine