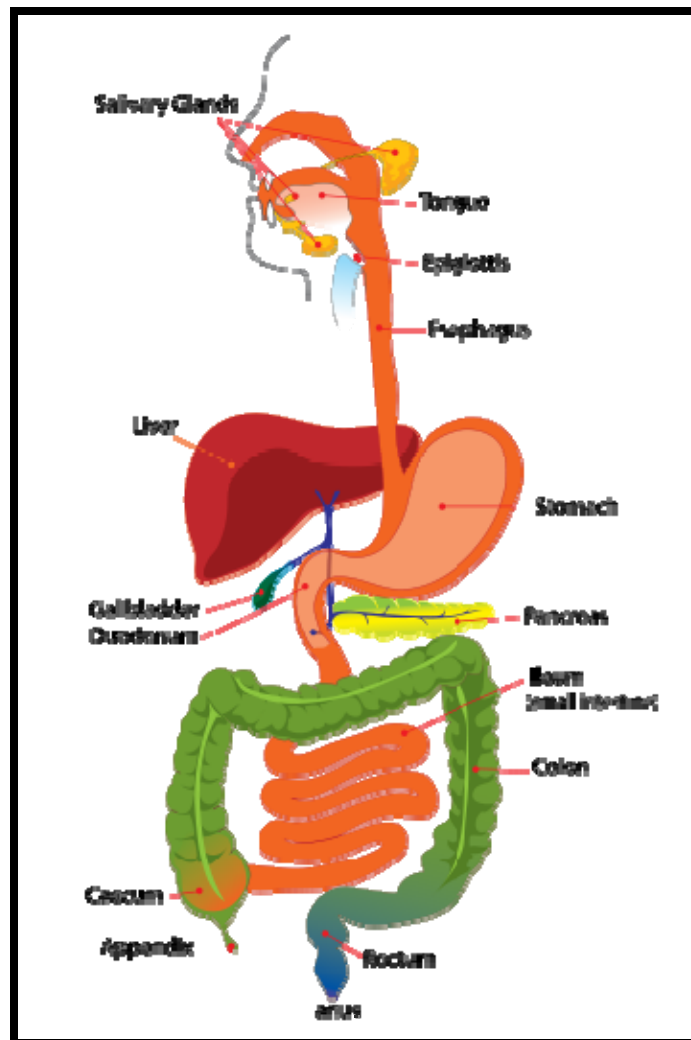


HUMAN DIGESTIVE SYSTEM

The human body plan is a tube within a tube design, with the digestive tract forming the inner tube. There are specialized *accessory organs* (liver, gall bladder, and pancreas) that help to carry out the digestion of food as it moves through the digestive tract from the mouth to the anus.



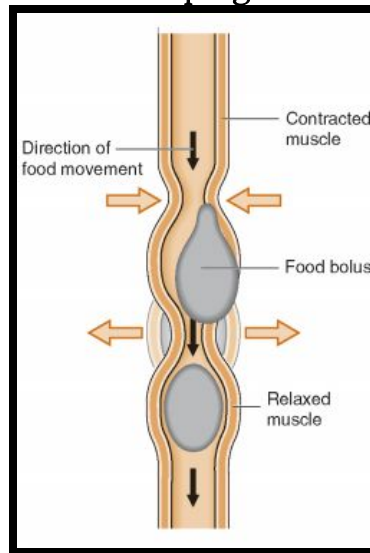
ORAL CAVITY (mouth)

- ◆ Contains the teeth, tongue, and openings from the salivary glands
- ◆ **Teeth** function in **mechanical breakdown** of food in smaller pieces that increase the surface area for greater enzyme action
- ◆ **Salivary glands** secrete **saliva**, which contains the **enzyme AMYLASE**, which begins the **chemical digestion of starch**.
- ◆ Tongue aids in chewing, mixing saliva with food, and pushing food mass to the back of the mouth for swallowing

ESOPHAGUS

- ◆ Connects the oral cavity with the stomach
- ◆ Food moves down the esophagus by **PERISTALSIS** (the rhythmic wavelike contractions of the muscles in the esophagus)

Peristalsis in the Esophagus



STOMACH

- ◆ Muscular sac in which food is mixed and liquefied
- ◆ **Gastric Glands** in the stomach lining secrete **hydrochloric acid (HCl)** which creates the acidic environment necessary for the stomach enzymes (gastric proteases) to function
- ◆ **Gastric Proteases** enzymes are also secreted by the gastric glands
--starts the digestion of proteins

SMALL INTESTINE

- ◆ Most chemical digestion (enzymatic hydrolysis) occurs in the small intestine
- ◆ The walls of the small intestine are lined with **Intestinal Glands** that secrete digestive enzymes that break down completely the digestion of proteins and carbohydrates.
- ◆ The chemical digestion of lipids begins and ends in the small intestine
- ◆ **ACCESSORY ORGANS: LIVER, GALL BLADDER & PANCREAS**
--produces **BILE** a chemical that mechanically breaks down lipids into tiny droplets in the small intestine. This process is called **EMULSIFICATION**
--**Bile** is passed from the liver to the **GALL BLADDER** for temporary storage and is periodically secreted into the small intestine where emulsification occurs
--The **PANCREAS** produces and secretes pancreatic juice, which, along with intestinal fluids, finishes the chemical digestion of proteins, lipids, and carbohydrates.

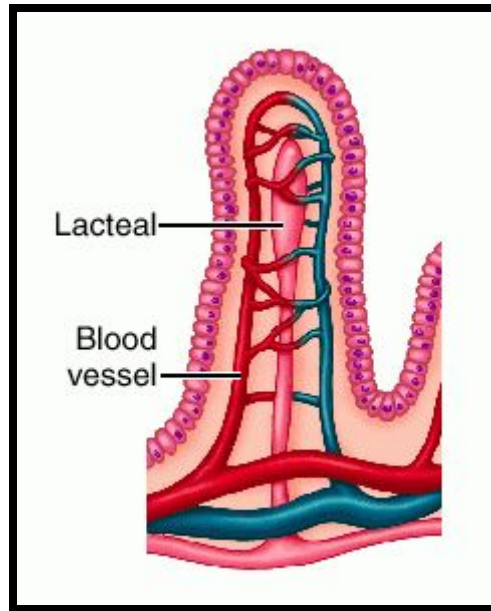
END PRODUCTS of DIGESTION

- ◆ Proteins → **AMINO ACIDS**
- ◆ Carbohydrates → **SIMPLE SUGARS** (monosaccharides)
- ◆ LIPIDS → **FATTY ACIDS & GLYCEROL**

VILLI

- ◆ The end products of digestion are absorbed through the lining of the small intestine
- ◆ The intestinal lining is specially adapted for absorption
- ◆ The surface area is greatly increased by many folds and by fingerlike projections called **VILLI** (sing – **VILLUS**)
- ◆ Each villus contains a **LACTEAL** and **CAPILLARIES**
- ◆ A **LACTEAL** is a small vessel of the **LYMPH SYSTEM**. Fatty acids and glycerol are absorbed into the lacteals, transported in the lymph and eventually added to the blood

- ◆ Glucose and amino acids directly enter the blood stream through the capillaries in the villi



LARGE INTESTINE

- ◆ Indigestible foods and water move from the small intestine to the large intestine
- ◆ **Water** is **REABSORBED** from the undigested food into the capillaries in the wall of the large intestine. This helps the body to conserve water
- ◆ **FECES:** remaining wastes are moved through the large intestine by peristalsis into the **RECTUM**, where it is temporarily stored and periodically egested through the **ANUS**.

DISORDERS of the DIGESTIVE SYSTEM

- ◆ **ULCERS:** erosions of the surface (lining) of the stomach or upper small intestine. Most often the result of bacterial infection and then exacerbated by such things as stress and/or spicy foods. Once the lining begins to erode, further irritation is caused by HCL secreted by the gastric glands.. Often treatable with antibiotics and antacids.
- ◆ **CONSTIPATION:** difficulty in eliminating feces when too much water is reabsorbed in the large intestine or there is a reduction in peristalsis,, usually from a diet with too little roughage or fiber.
- ◆ **DIARRHEA:** gastrointestinal disturbance characterized by decreased water absorption and increased peristaltic action of the muscles of the large intestine, resulting in multiple watery feces. If left unchecked, this can lead to dehydration.
- ◆ **APPENDICITIS:** the appendix becomes inflamed, causing pain. The appendix is a small pouch found at the beginning of the large intestine
- ◆ **GALLSTONES:** small hardened cholesterol deposits that can form in the gall bladder. When gallstones enter the bile duct they block the flow of bile and can cause severe pain. Treatment may include removing the gall bladder., which requires the patient to watch their daily intake of fat.

