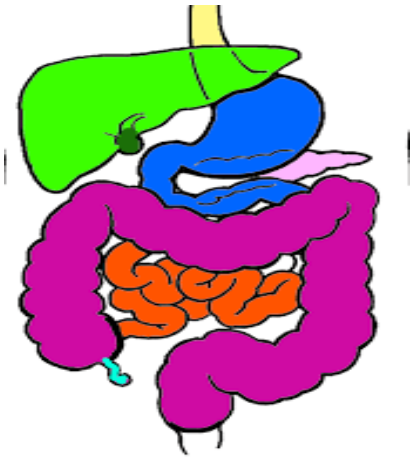
Physiology

2 stage

LEC 7

The Digestive System



By

M.SC Jaafar Hamid Jaafar

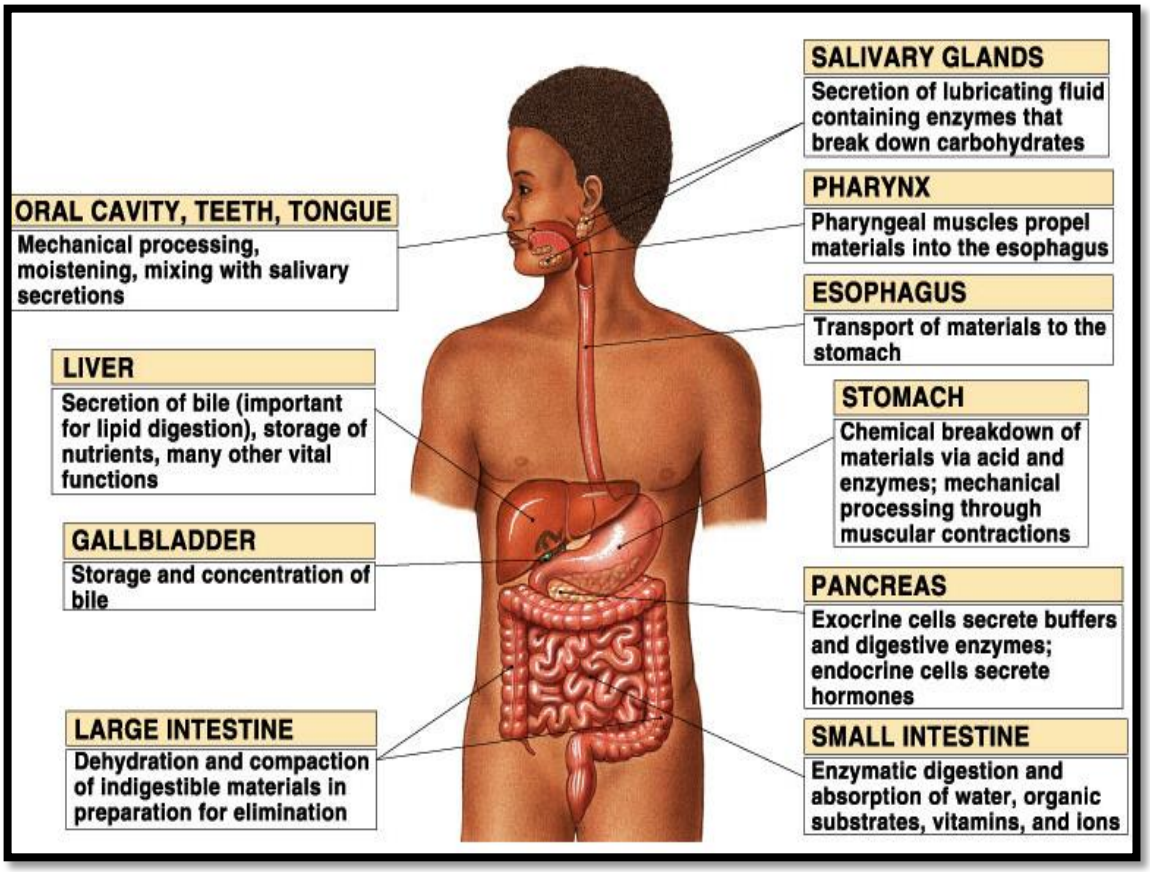
Dr. Asseel Hashim Radhi

The Digestive System Consists of :

1- **Long hollow muscular tube** or canal or tract called gastrointestinal tract or **(GIT), that** it is about 5 meters long , (other name Alimentary tract or canal).

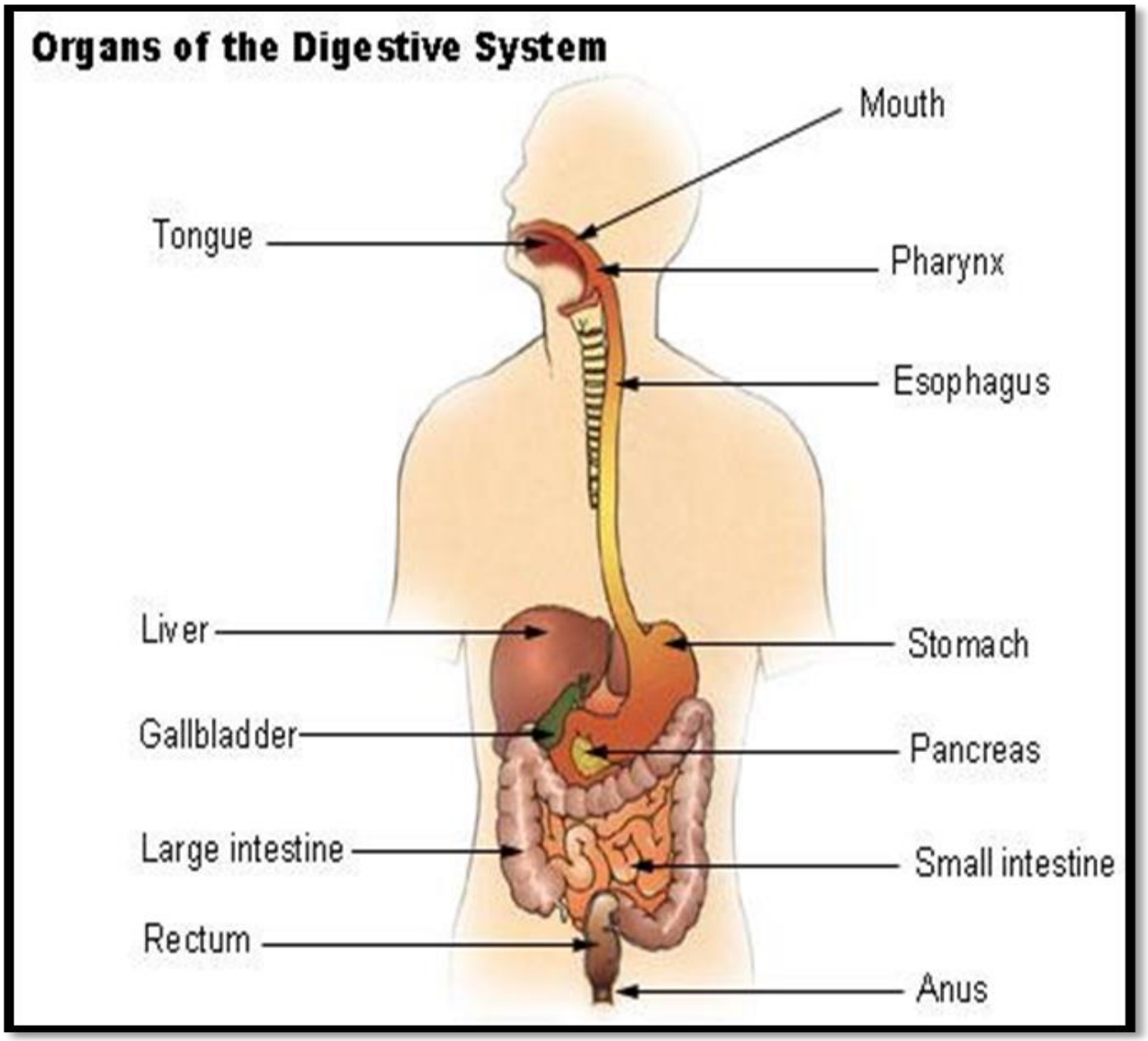
2- **Accessory glands:** include:

1. Salivary glands
2. Liver and gall bladder
3. Pancreas



Regions of the GIT consists :

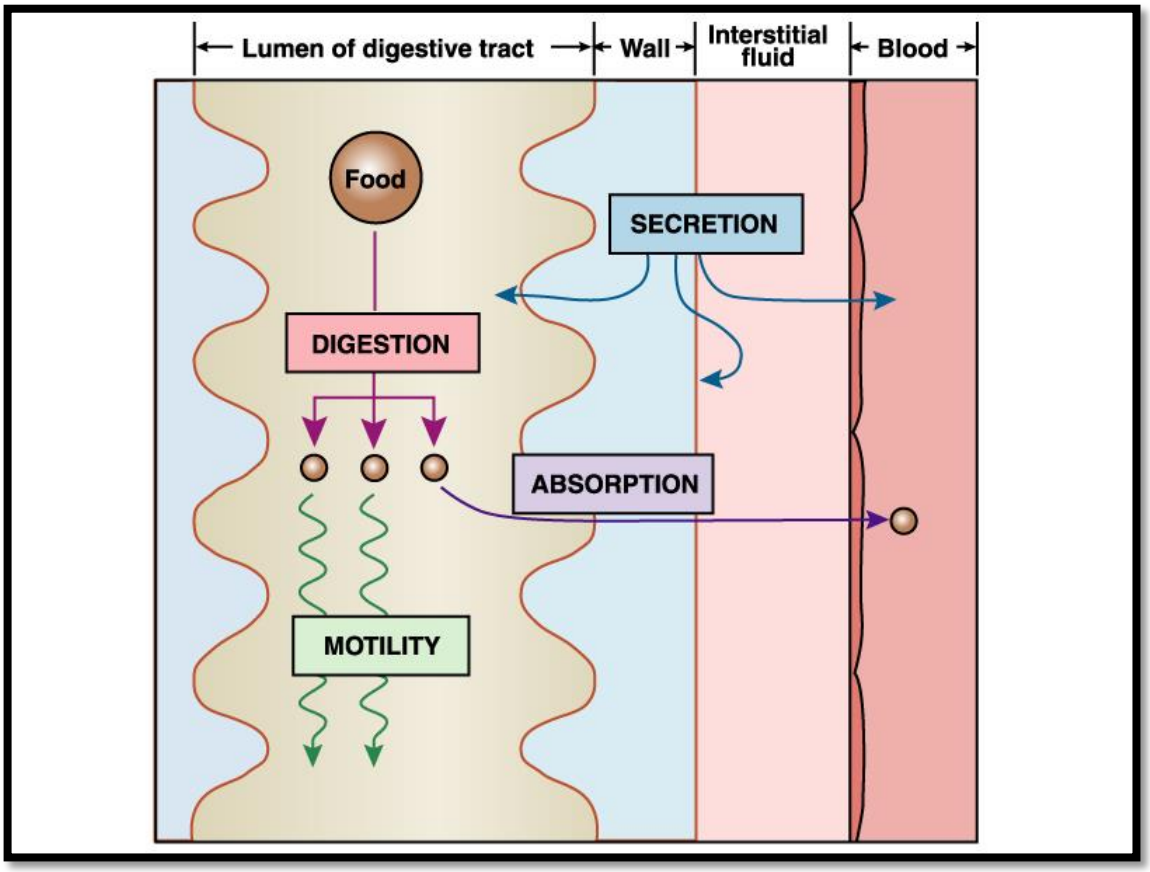
- Oral cavity or mouth
- Pharynx
- Esophagus
- Stomach
- Small intestine
- Large intestine
- Rectum
- Anus



Main Functions of Digestive Tract

› 4 major activities of GI tract

1. **Motility**
   - › Propel ingested food from mouth toward rectum
2. **Secretion of juices e.g. saliva**
   - › Aid in digestion and absorption
3. **Digestion**
   - › Food broken down into absorbable molecules
4. **Absorption**
   - › Nutrients, electrolytes, and water are absorbed or transported from lumen of GIT to blood stream



Motor Functions (Motility) of GIT:-

1. Motility in the mouth: **This includes two types**

a) Chewing or Mastication:

- **It is reflex in nature**

Significance:

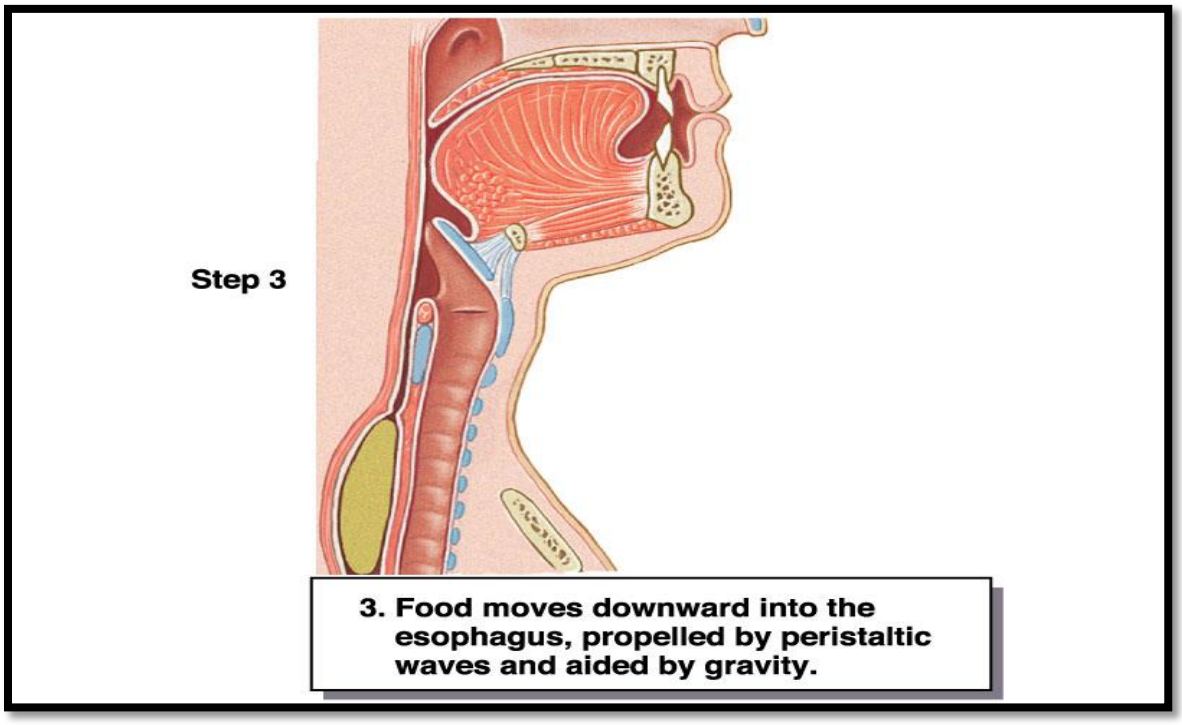
1. **Breaks the food into small pieces to be easily swallowed**
2. **Expose food to salivary amylase enzyme, which begins digestion of starch**
3. **Help digestion of all types of food especially cellulose containing food e.g. vegetables**

b) Swallowing:

- **Swallowing is the transport of food from mouth to stomach**

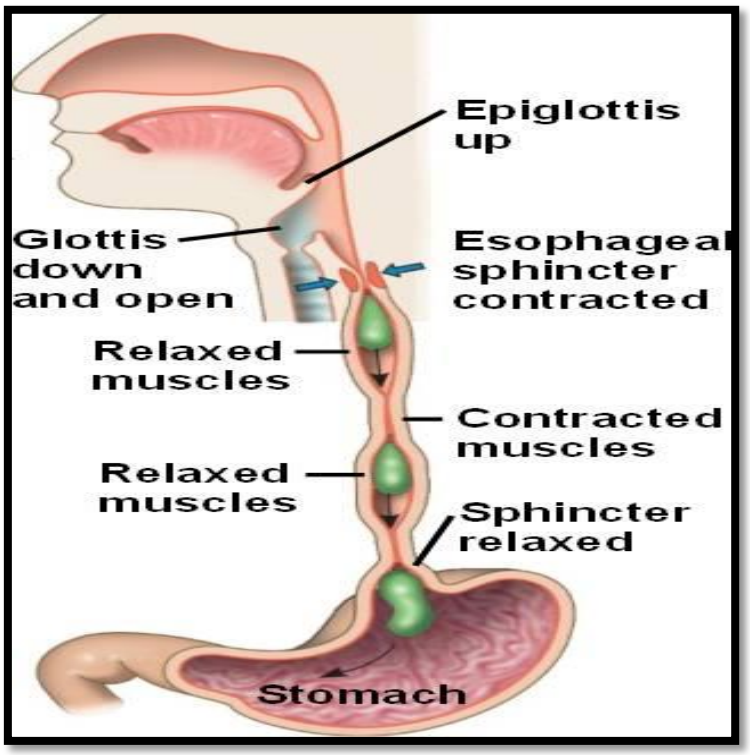
Steps: It consists of 3 phases or steps;

1. **Buccal Phase: food is pushed back into pharynx from mouth**
2. **Pharyngeal Phase: food pass through pharynx to esophagus**
3. **Oesophageal Phase: food pass through esophagus to stomach by peristaltic movements**



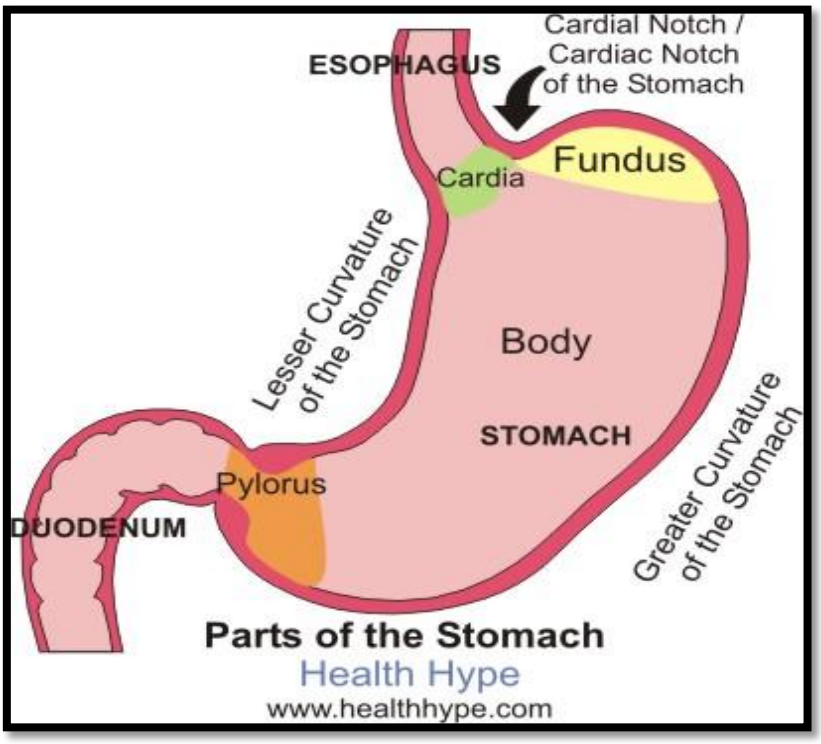
2. Motility of Esophagus

- **The esophagus is 25 cm ms tube**
- **It is guarded by 2 sphincters;**
    1. **Upper esophageal sphincter prevents air from entering the GIT**
    2. **Lower esophageal sphincter prevents gastric contents from re-entering the esophagus from the stomach**
- **Esophageal peristalsis sweeps down the esophagus**



3. Motility of Stomach

- **The stomach consists of fundus, body and pylorus**
- **Proximal area (fundus and body) has a thin wall and contracts weakly and infrequently → holds large volumes of food (to store food) because of receptive relaxation.**
- **Distal area (pylorus) has thick wall with strong and frequent peristaltic contractions that mix and propel food into the duodenum.**
- **Also, distal area is responsible for gastric emptying into duodenum**



4. Motility of Small intestine

Types:

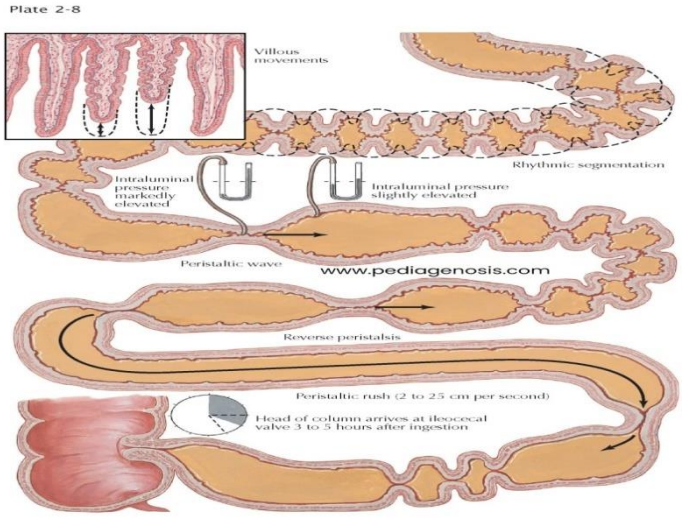
- **Two basic motility patterns exist segmentation and peristalsis.**

Significance:

Motility of the small intestine serves 3 functions:

1. **Mixing contents with enzymes and other secretions → help digestion**
2. **Maximizing exposure of the contents to membranes of intestinal cells → help absorption and digestion.**

3. Propulsion of contents into the large intestine.



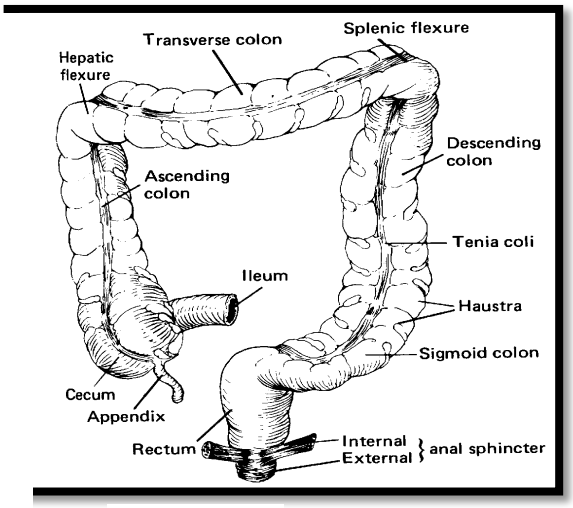
5. Motility of Large intestine or colon

Types Include :

a)Segmentation in the large intestine causes the contents to be continuously mixed

b) Mass movement propels the contents of one segment of the large intestine into the next downstream segment.

c) Defecation involves involuntary reflexes and voluntary reflexes → evacuation of colonic content through anal canal



Secretary Functions (Secretions) of GIT

- The **total volume** of GIT secretions is about **6-8 L/day .**
- Secretions arise from **specialized cells** lining the **GI tract**, the **pancreas**, **liver** and **gallbladder**.
- GI secretions function to **lubricate** (water and mucus), **protect** (mucus), **sterilize** (HCl), **neutralize** (HCO_3^-), and **digest** (enzymes).

Salivary Glands

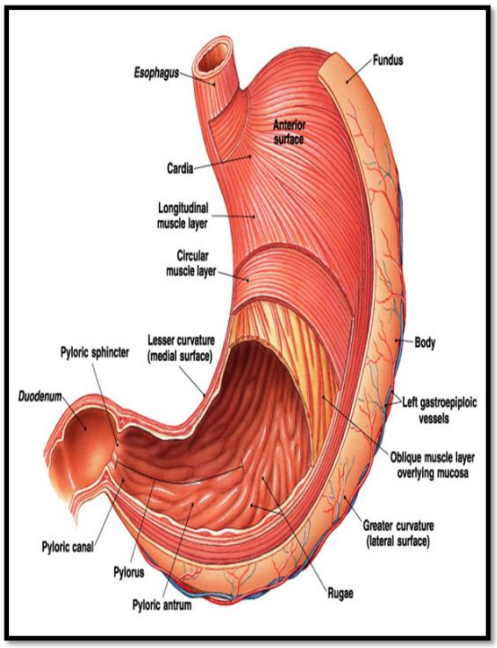
Three pairs of glands

- Parotid
- Sublingual
- Submandibular

Functions of saliva

1. Lubricates, cleanes oral cavity
2. Dissolves chemicals
3. Suppresses bacterial growth
4. Digest starch by amylase

Stomach Anatomy:



- **Openings**
  - **Gastroesophageal: To esophagus**
  - **Pyloric: To duodenum**
- **Regions 1-Cardiac**
  - **2-Fundus**
  - **3-Body**
  - **4-Pyloric**

Pancreatic Secretion

- **Pancreas has 2 functions:**

a) Endocrine functions: secretes insulin and glucagon from islets of Langerhans

b) Exocrine function: secretion of pancreatic juice

It has 2 components: aqueous and enzymatic components.

Aqueous component (contains HCO3) is important for neutralizing stomach acid in the duodenum so pancreatic enzymes can function properly

Enzymatic component is essential for the proper digestion and absorption of carbohydrates, fats, and proteins

Pancreatic enzymes include trypsin, chemotrypsin, lipase, carboxypeptidase, pancreatic amylase, enzymes that reduce DNA and ribonucleic acid .

Digestion and Absorption

- **Digestion is a process essential for the conversion of food into a small and simple form.**
- ✂ **Mechanical digestion by mastication and swallowing**
- ✂ **Chemical digestion by enzymes**
- **Absorption is the process of transporting small molecules from the lumen of the gut into blood stream or lymphatic vessel.**
- **Small intestine is primary site for digestion and absorption of food.**
- **Digestion occurs in the GI lumen by secreted enzymes and on surface of enterocytes by membrane-bound enzymes.**
- **Absorption occurs by simple diffusion, facilitated diffusion, active transport, endocytosis, and paracellular transport.**
-