

DIGESTIVE SYSTEM

Lecture notes for undergraduate students

By

Dr Paul Odula

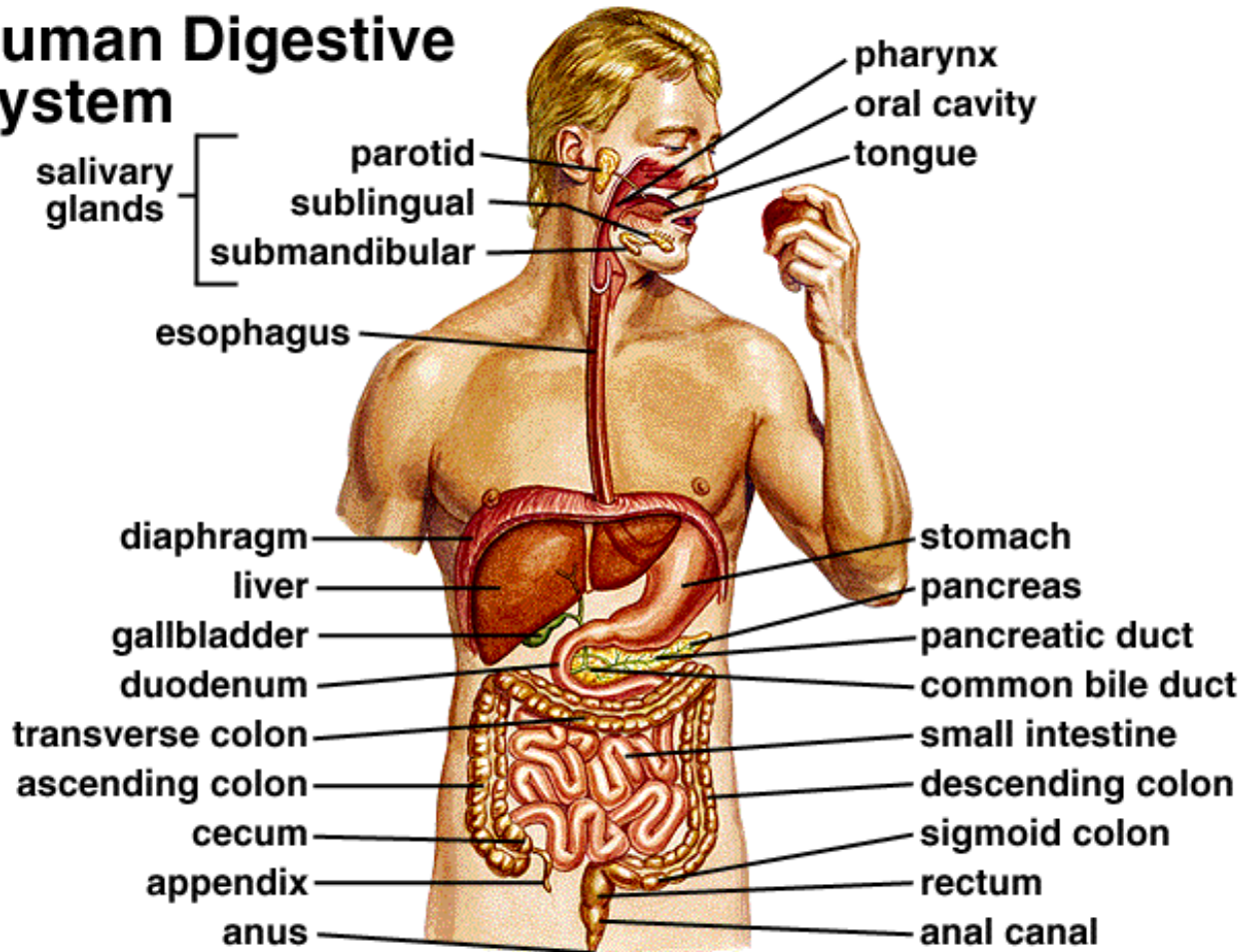
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DIGESTIVE SYSTEM

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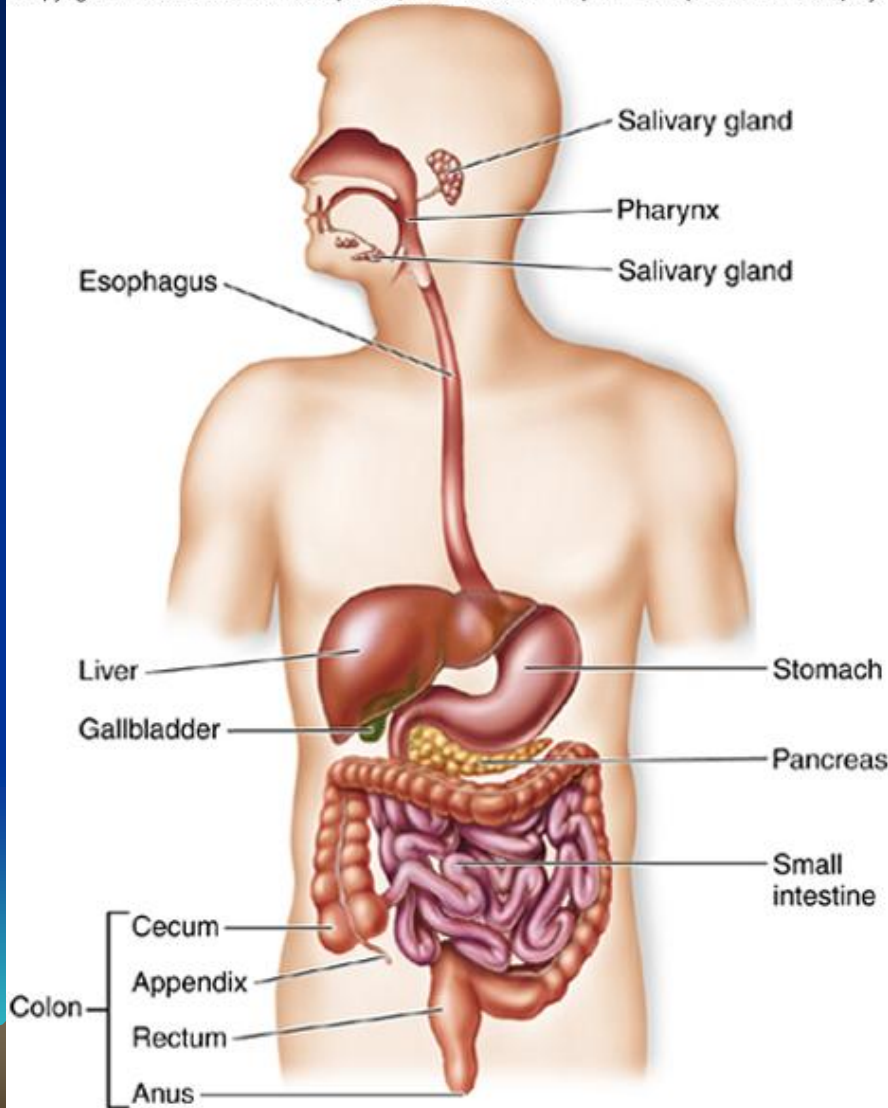
Human Digestive System



- TUBULAR
- GLANDULAR

Parts of tubular/ hollow GIT

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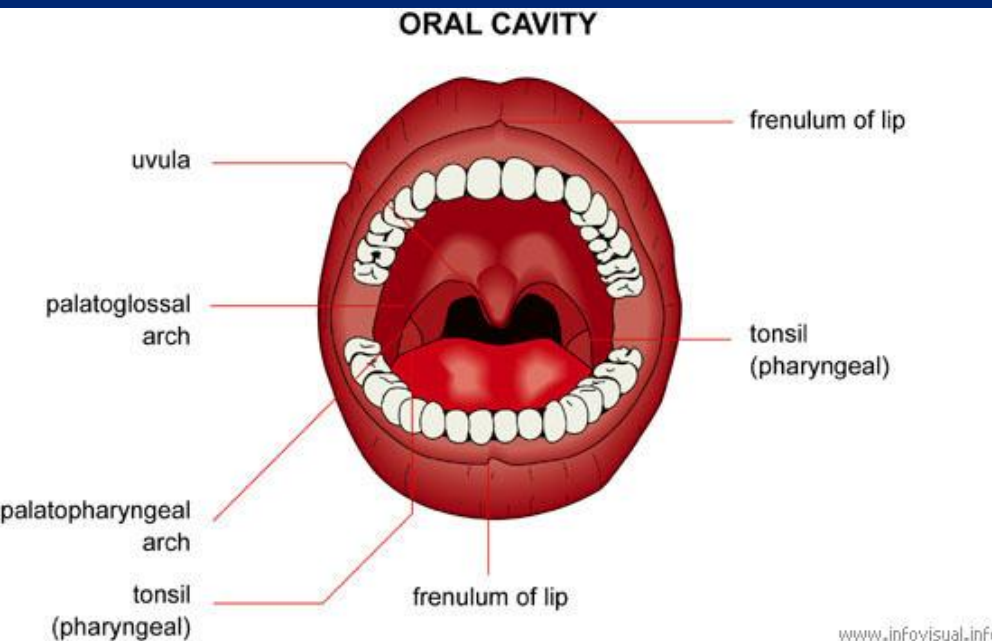
- Upper GIT- Oral cavity, Pharynx, esophagus and stomach
- Lower GIT- Small intestines, large intestines, rectum and anal canal

GLANDULAR

- Salivary glands
- Liver
- Gallbladder
- Pancreas



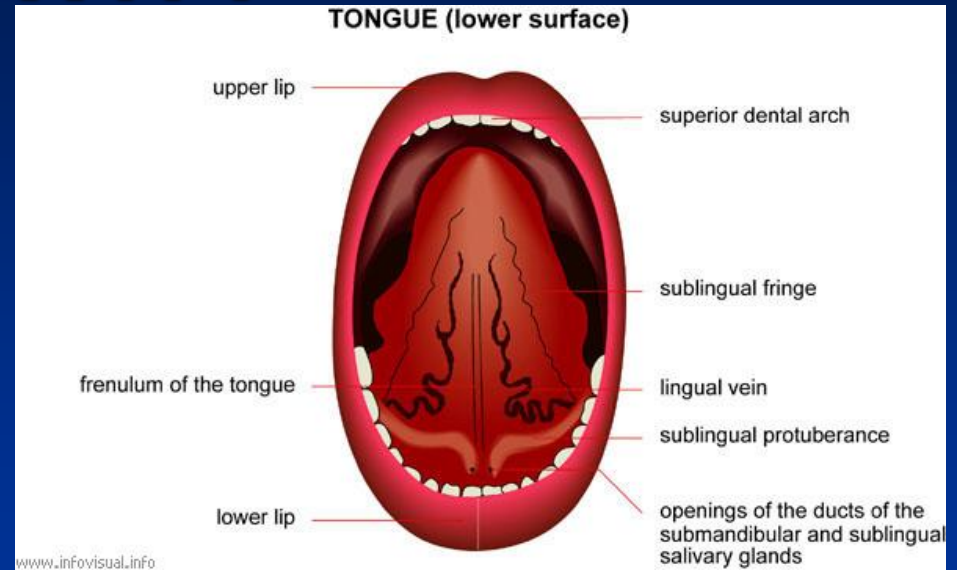
MOUTH / ORAL / BUCCAL CAVITY



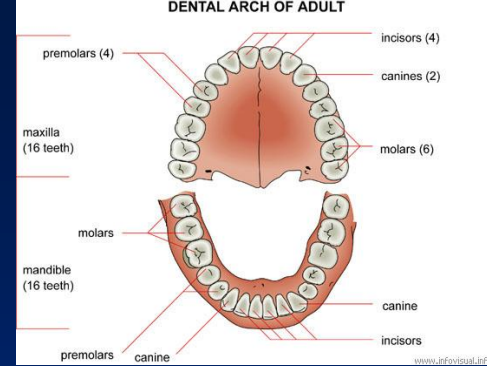
- ingestion of food occurs
- preparation for digestion in the stomach and small intestine.
- Consists of the vestibule(slit like space) and the mouth proper

MOUTH / ORAL / BUCCAL CAVITY

- Anterior - Lips
- Lateral - Cheeks
- Roof - Palate, Teeth and Gums
- Floor - Tongue, Teeth and Gums

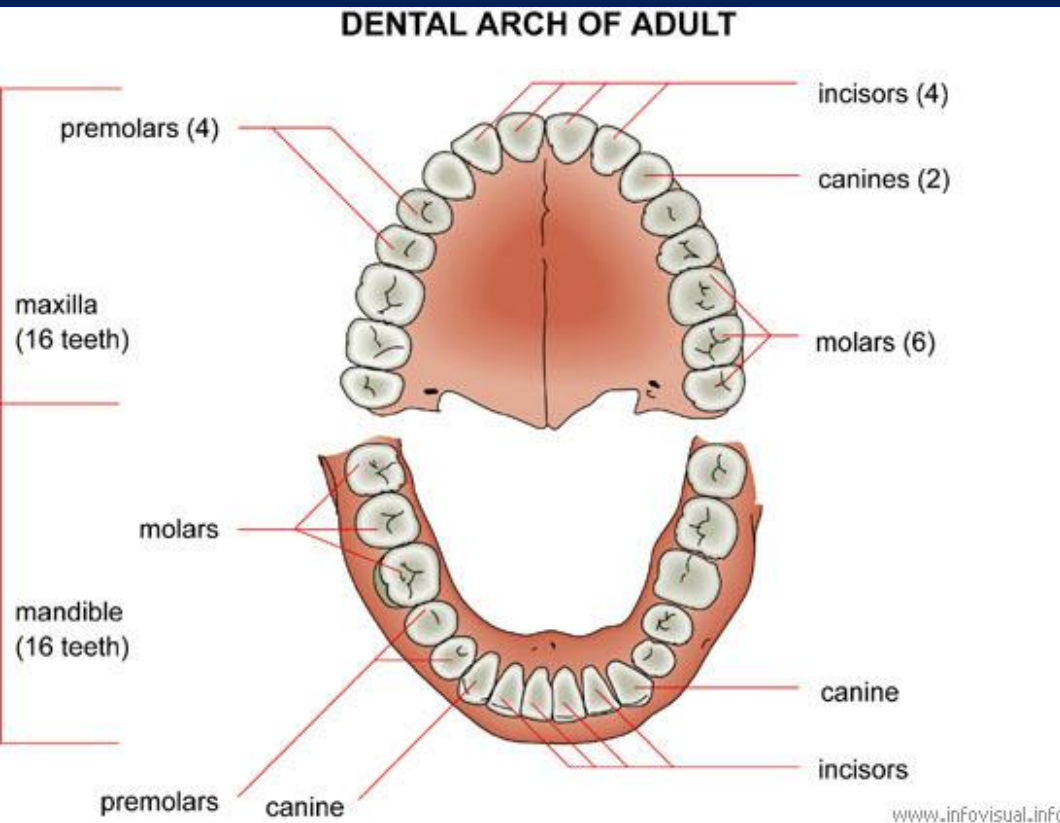


Palates (Roof)



- **Hard-bony** anterior 2/3 of the palate.
 - Made up of palatine bones and the maxilla
- **Soft** - Curtain-like movable fibromuscular fold attached to the posterior edge of the hard palate.
 - Separates the nasopharynx from the oropharynx

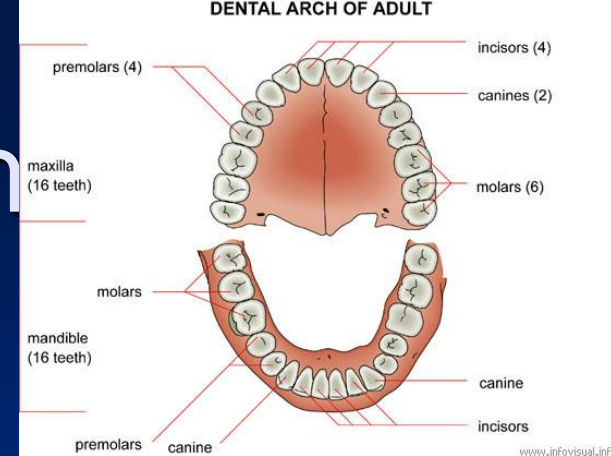
Palates (Roof) & Types of teeth



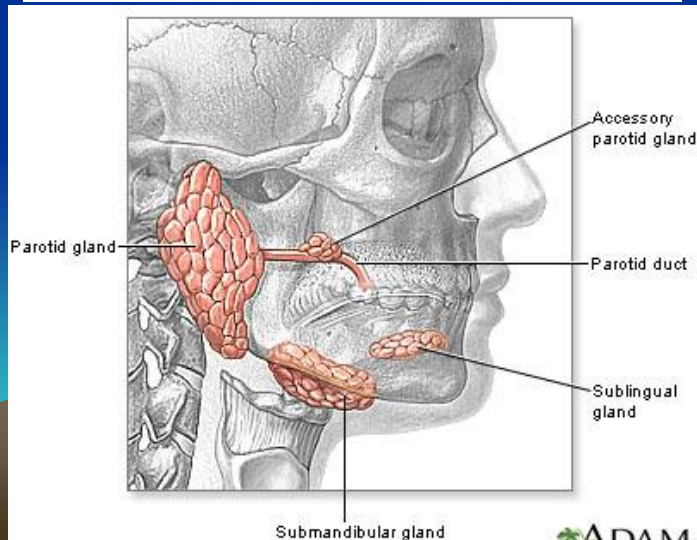
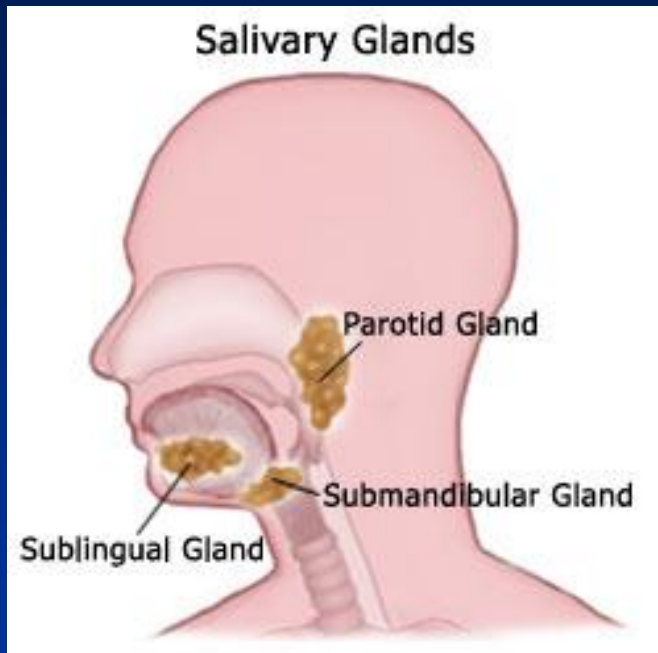
- **Mandible (16 teeth):** bony lower part of the jaw.
- **Maxilla (16 teeth):** bony upper part of the jaw.

Types of teeth

- Age- deciduous/baby teeth -20.
 - -permanent -32
- Shape- **Incisors (4)**: single-rooted teeth used for biting and cutting.
 - **Canines (2)**: pointed teeth between the premolars and the incisors.
 - **Molars (6)**: large teeth used for grinding
 - **Premolars (4)**: teeth between the canines and the molars.

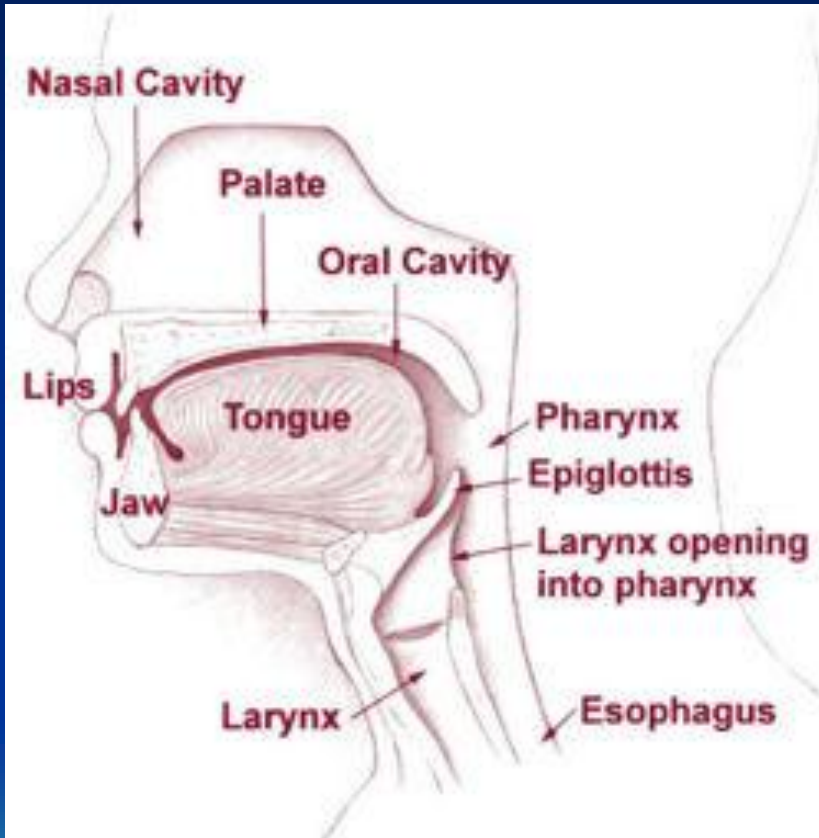


SALIVARY GLANDS



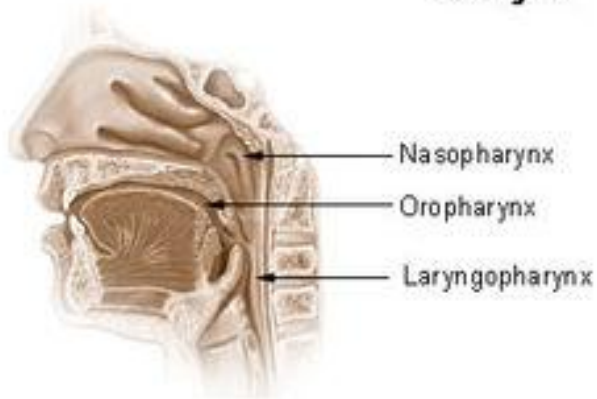
- **3 major paired glands** which produce 1 litre of saliva per day
- several minor pairs within the lips, cheeks, and tongue.

PHARYNX



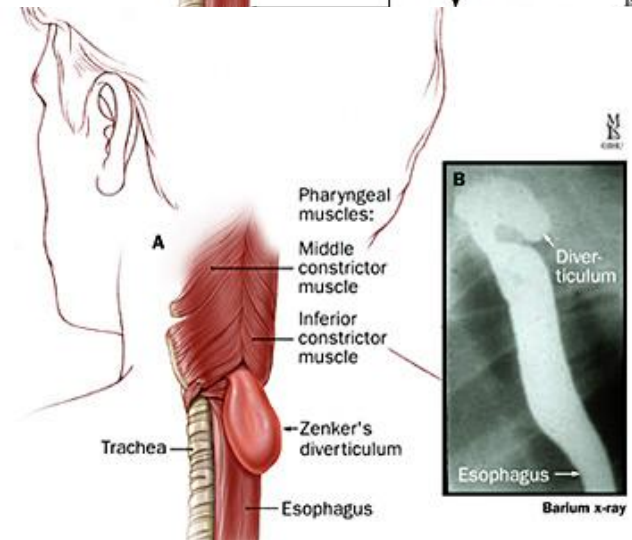
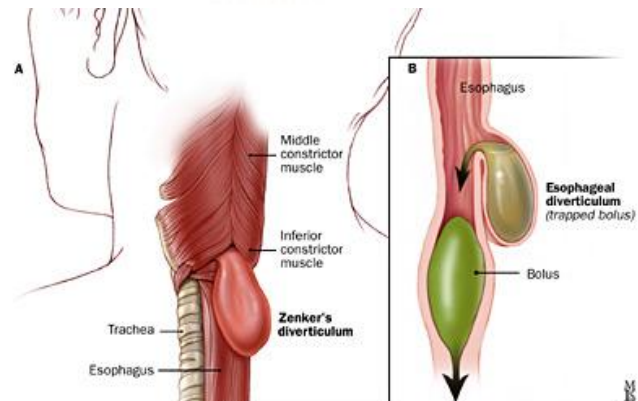
- ❖ Continuation of the digestive system from the oral cavity.
- ❖ It is a funnel shaped fibromuscular tube that is divided into three parts

Pharynx

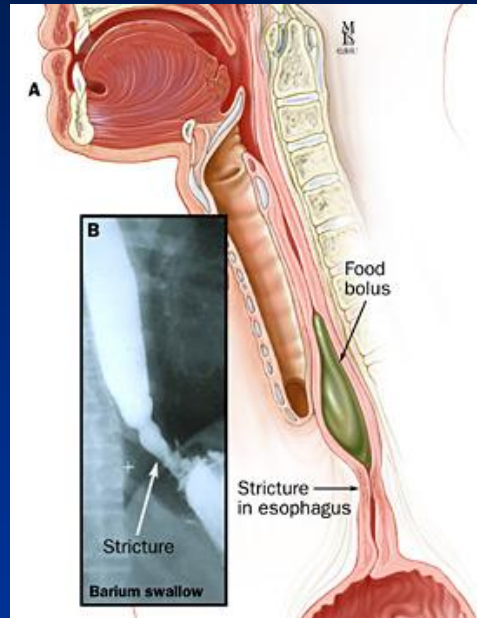


PHARYNX

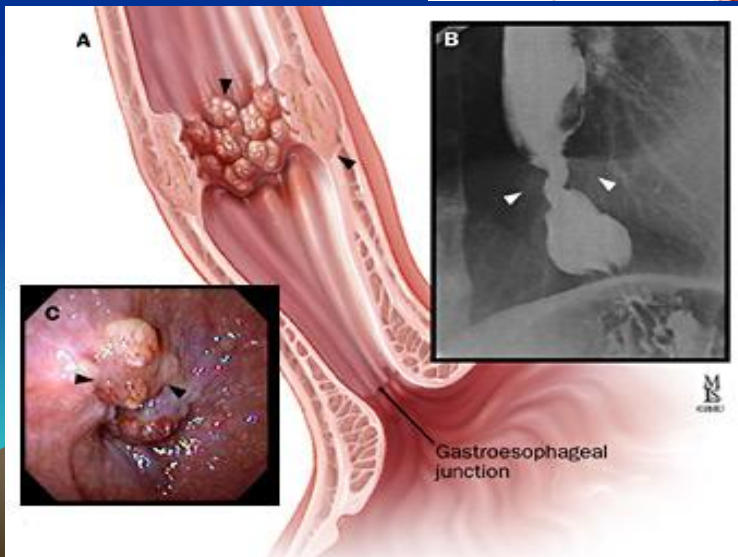
- NASO- Posterior to nasal cavity (Mainly air)
- ORO- Posterior to oral cavity (air and food)
- LARYNGO- Posterior to larynx (Mainly food)



OESOPHAGUS



- fairly straight, thick and distensible muscular tube.
- flattened, collapsible tube with the lumen practically obliterated in resting state.
- neck, thorax and the abdomen
- Extent-laryngo-pharynx to the stomach
- Length-25 cm long or 40cm from incisors.

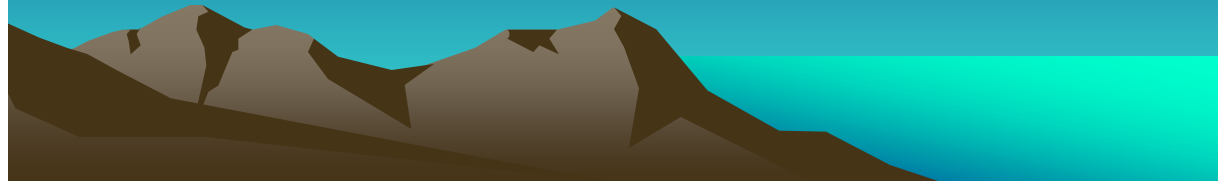


Swallowing

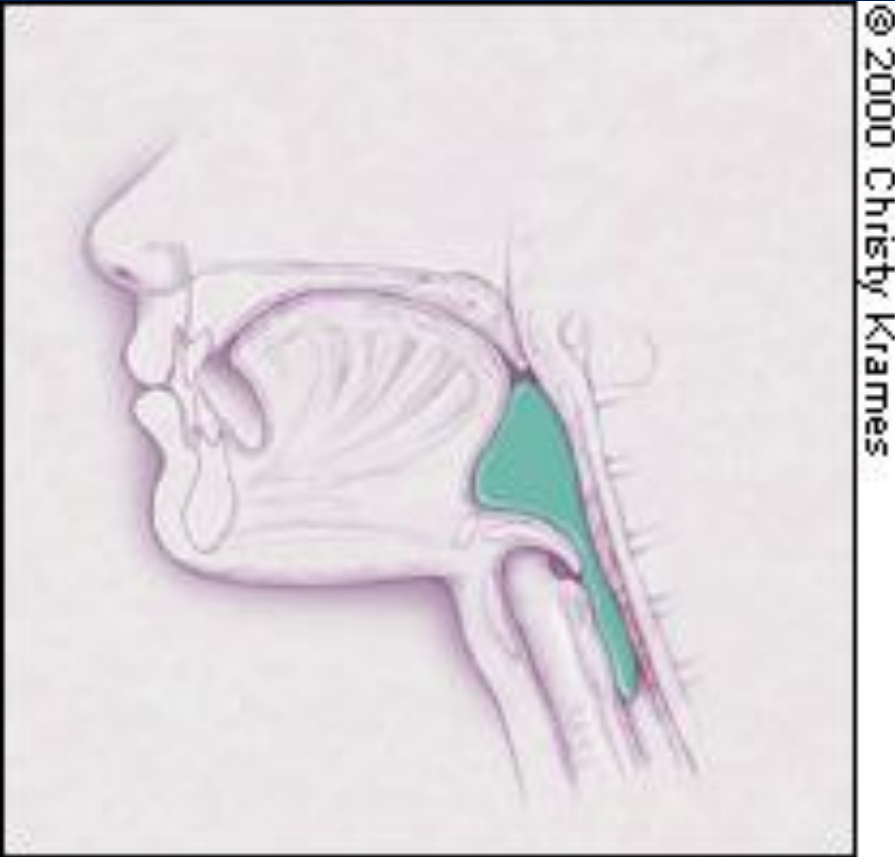
- The tongue initially forms the food bolus with compression against the hard palate.
- Displacement of the food bolus into the pharynx by the tongue initiates deglutition.

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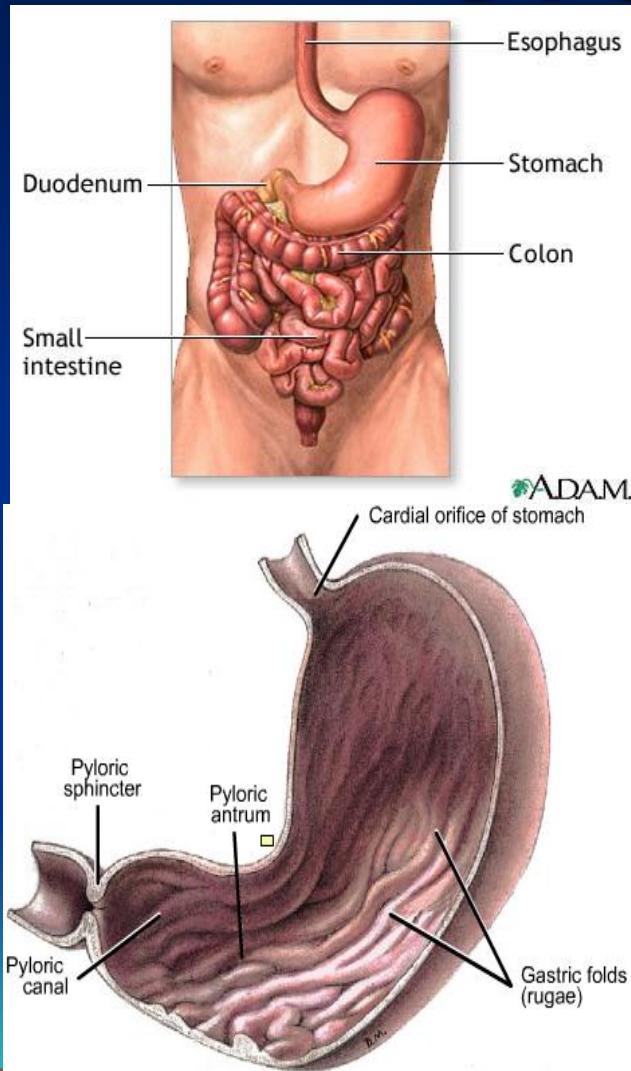


Swallowing



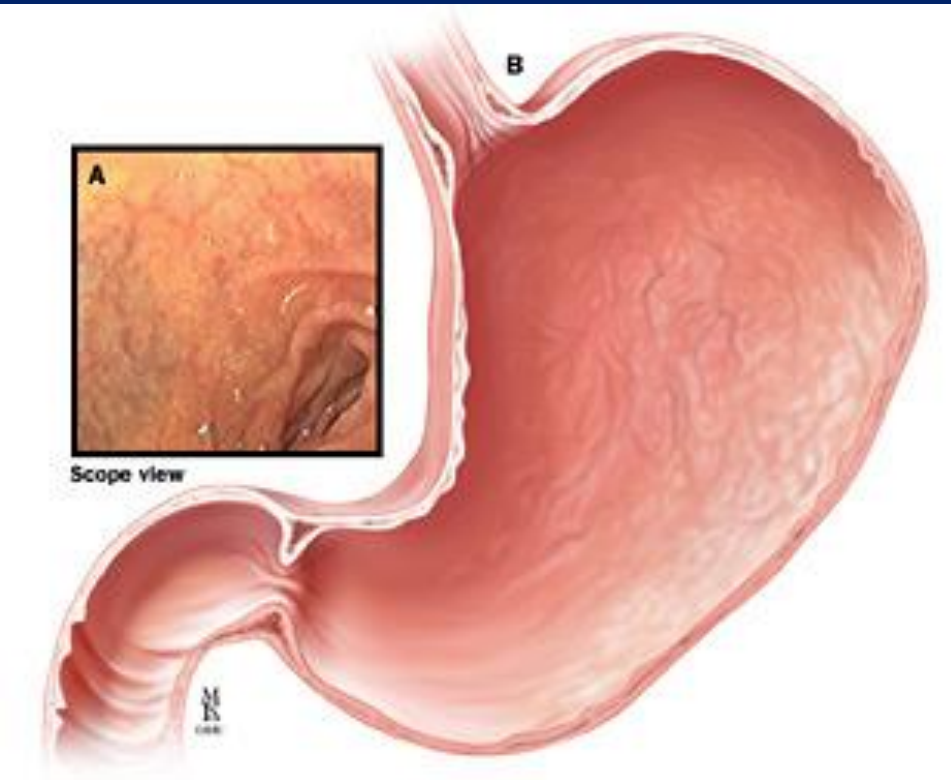
- Relaxation of the cricopharyngeal muscle (the physiological upper esophageal sphincter) permits movement of the food bolus into the proximal esophagus

STOMACH



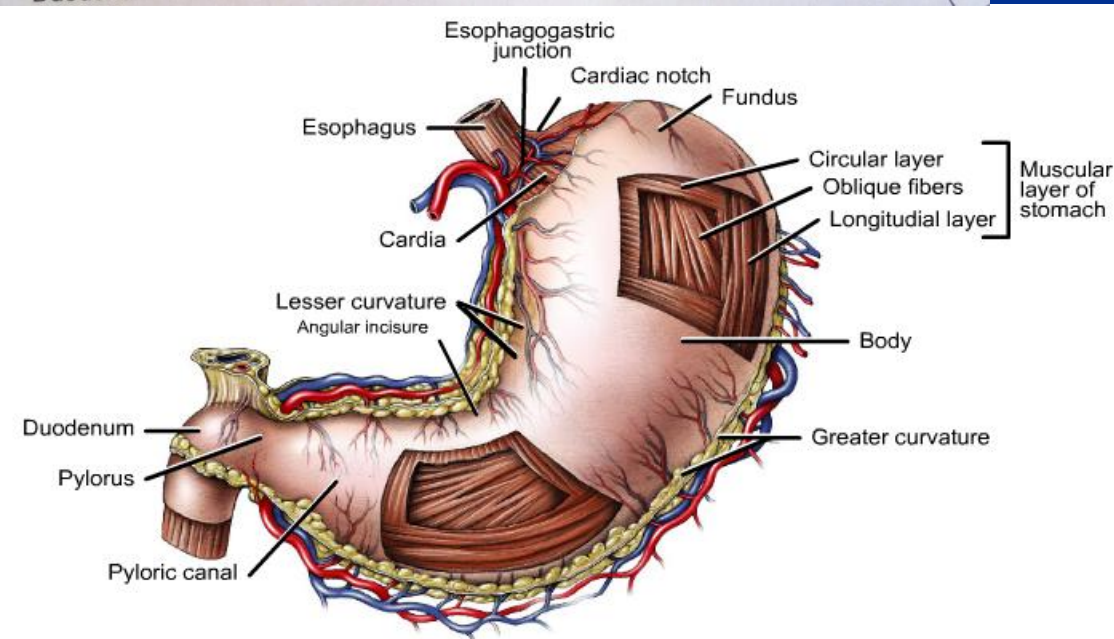
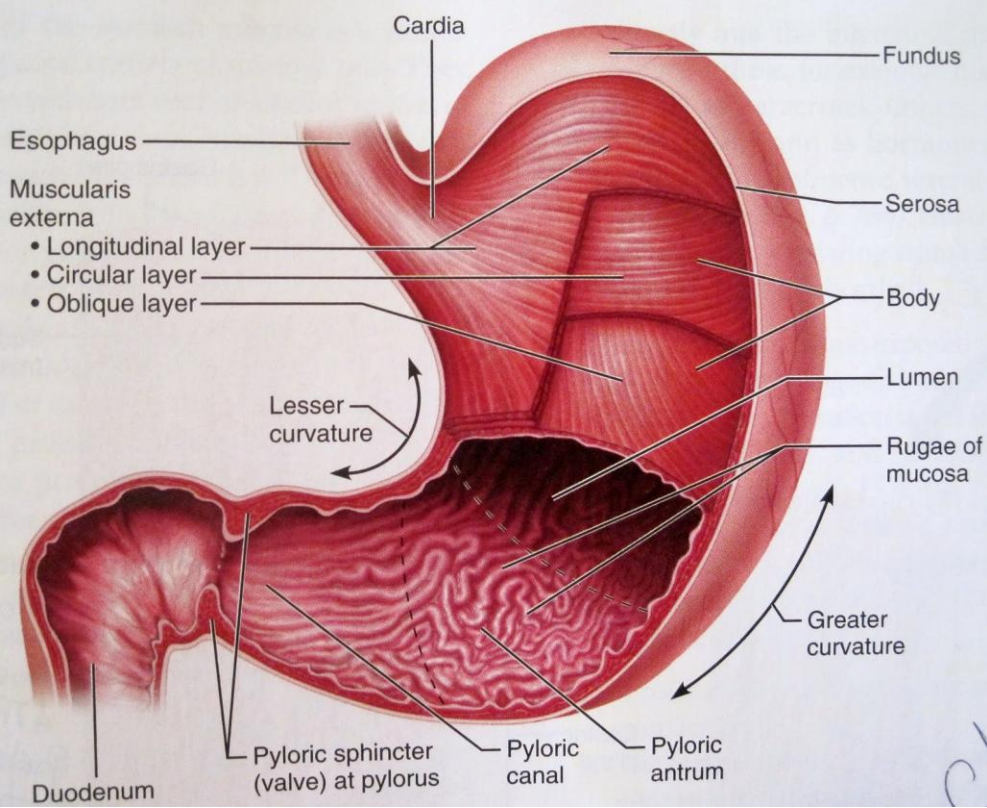
- Position – lies around the upper abdomen in the supracolic compartment.
- Parts– cardia, fundus, body, pylorus and curvatures
- Histology- rugae, mucosa, gastric pits & glands; sphincters

STOMACH



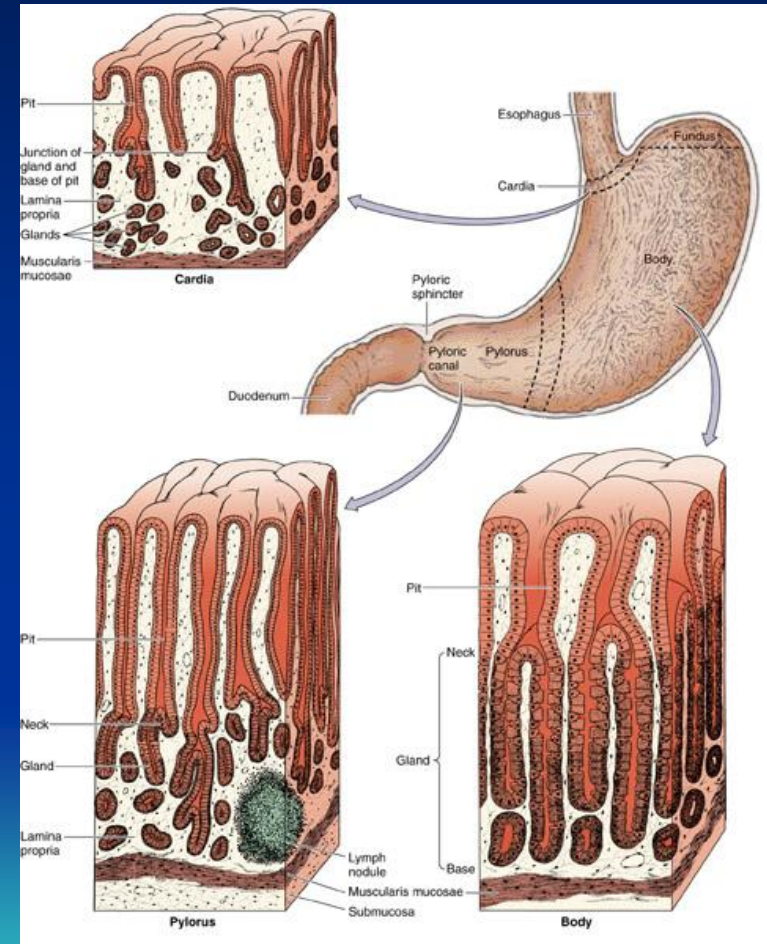
- J shaped but varies with individual and its state.
- It is an elongated and distensible organ that can hold up to 2 to 3 liters of food
- Acts as a food blender and reservoir

Stomach Inside out and outside in

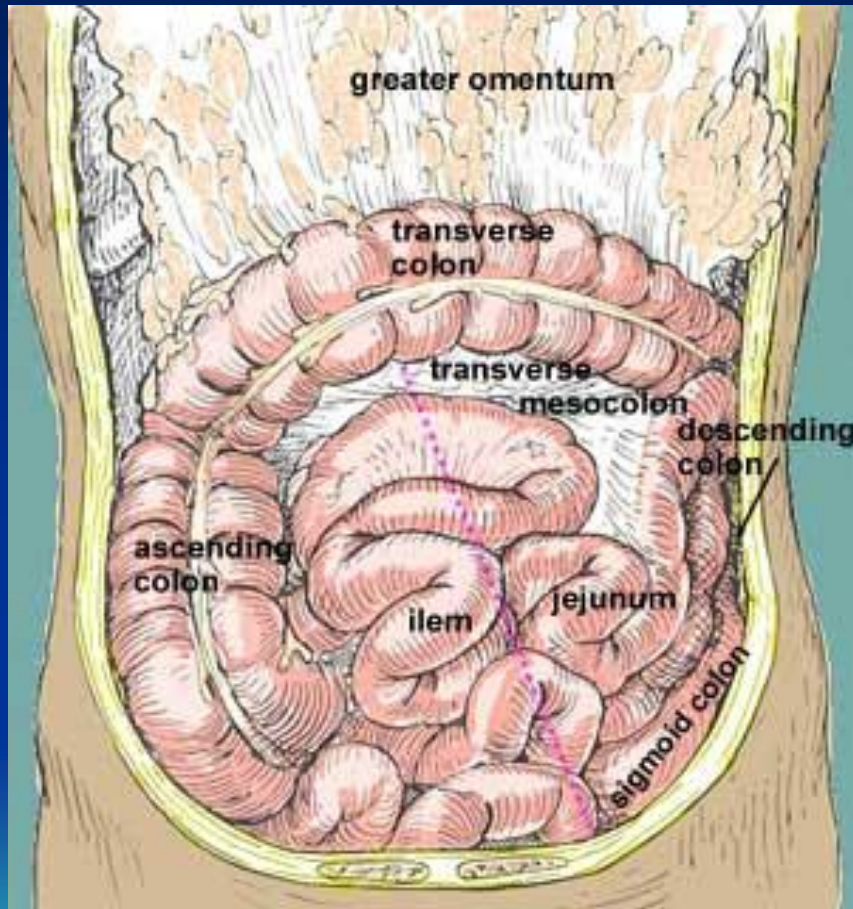


Secretions of stomach

- Acid... medium for pepsinogen
- Pepsinogen... protein digestion
- Bicarbonate: protects against acid
- Mucous: acid protection
- Intrinsic factor: for Vit B12 absorption

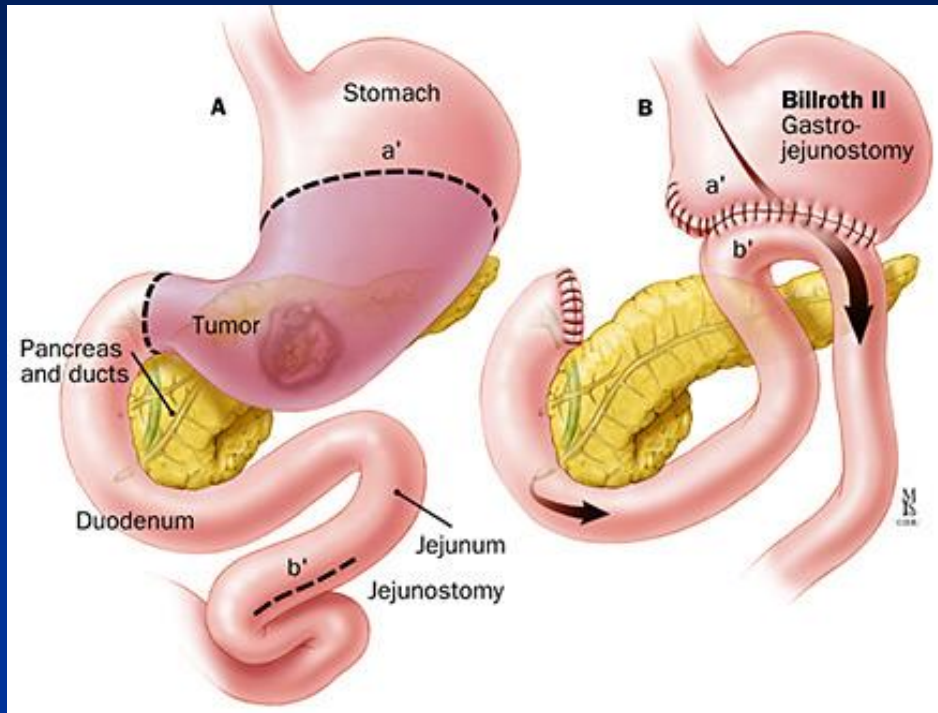


SMALL INTESTINE



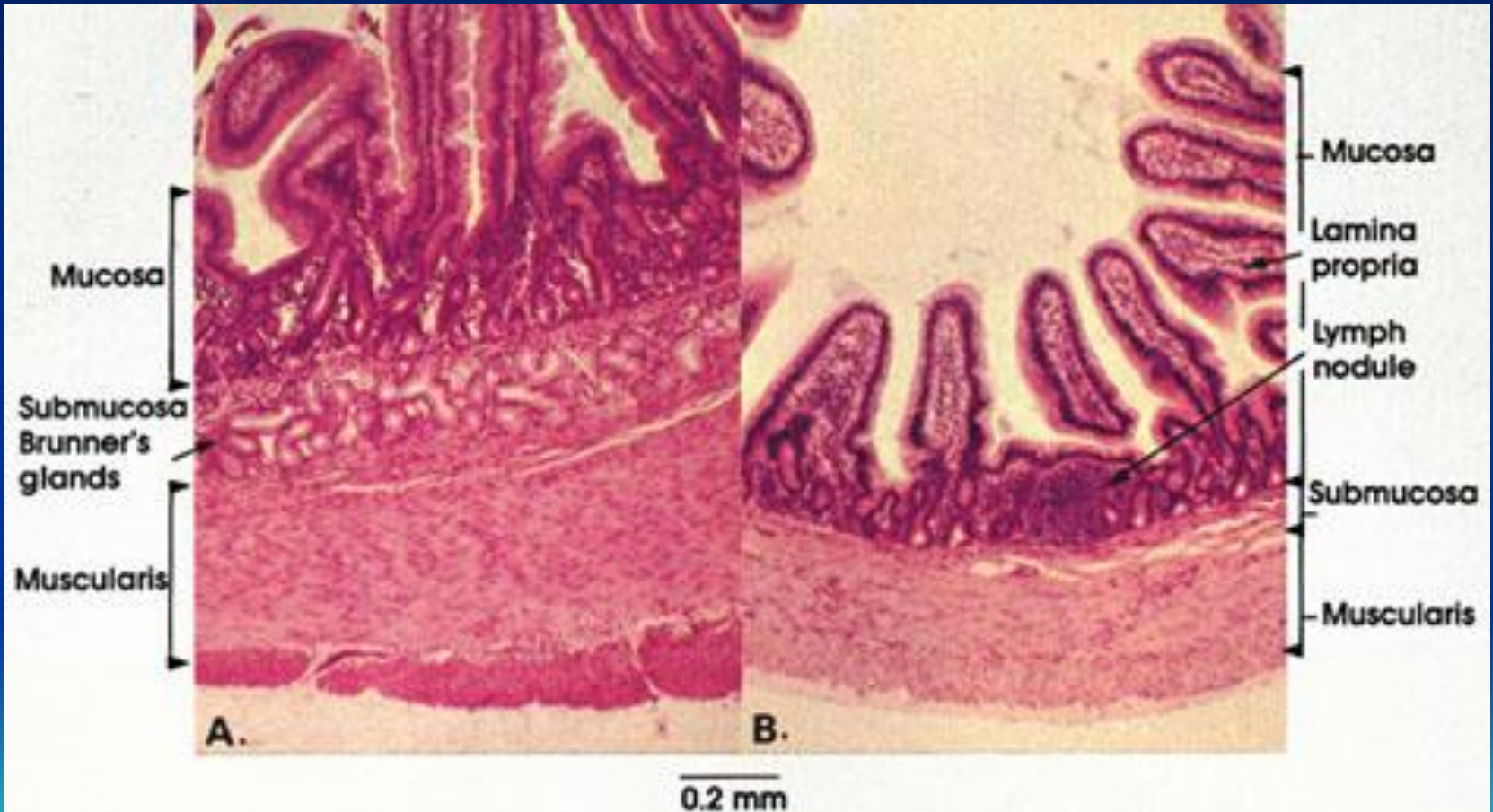
- Size – 2.5cm in diameter and 6-7m in length.
- Position -Coiled loops which fill most of abdominal cavity.
- Parts- duodenum, jejunum and ileum.

Parts of the small intestine



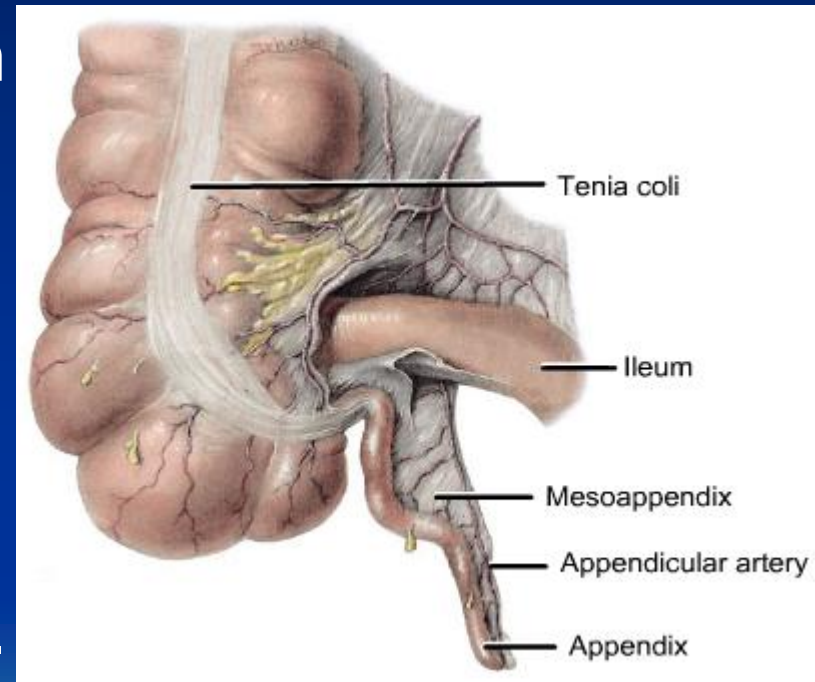
- Duodenum
 - Superior part
 - Descending part-Retro
 - Horizontal part- Retro
 - Ascending
- Jejunum
- Ileum

Duodenum versus Jejunum Cross section

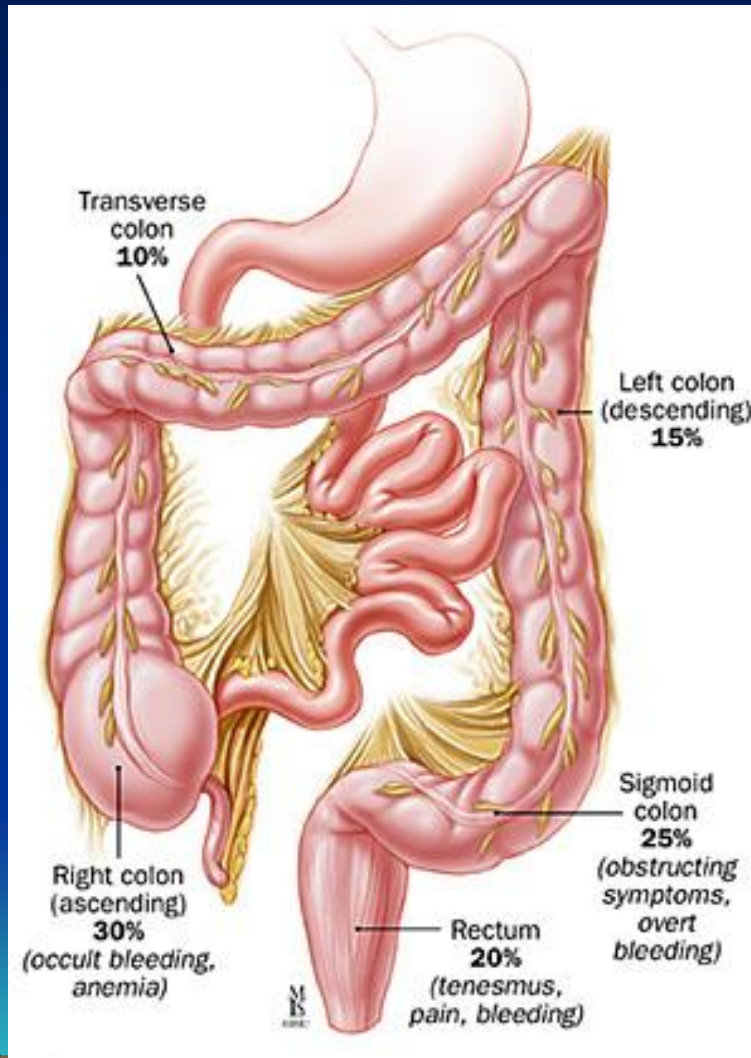


VERMIFORM APPENDIX

- **Size and shape-** worm like tubular structure which is 8 to 10cm long.
- **Location-** around the caecum.
- **Structure-** opening of lumen larger in children but obliterated in the aged.
- **Appendicitis**

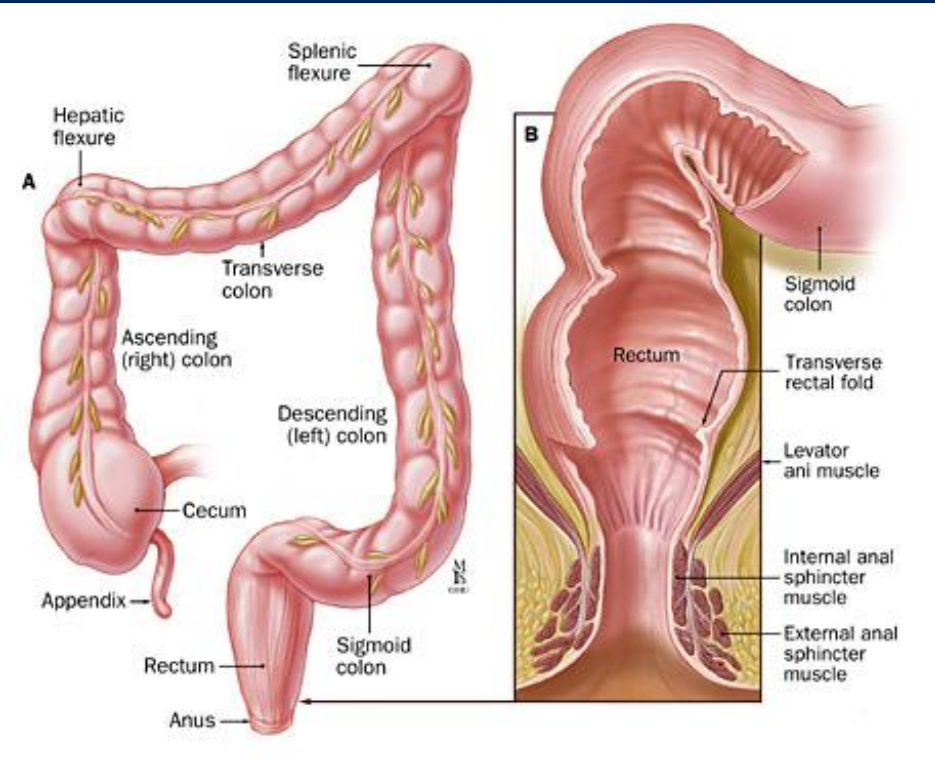


LARGE INTESTINE



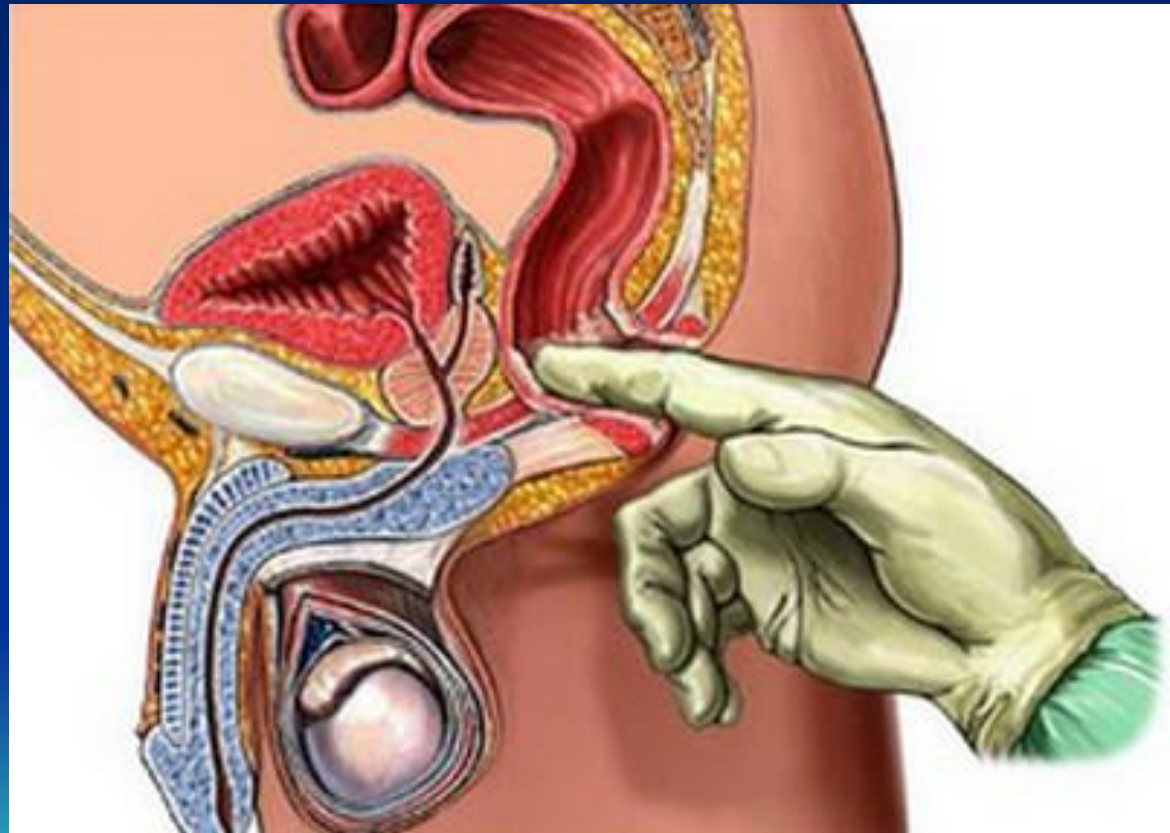
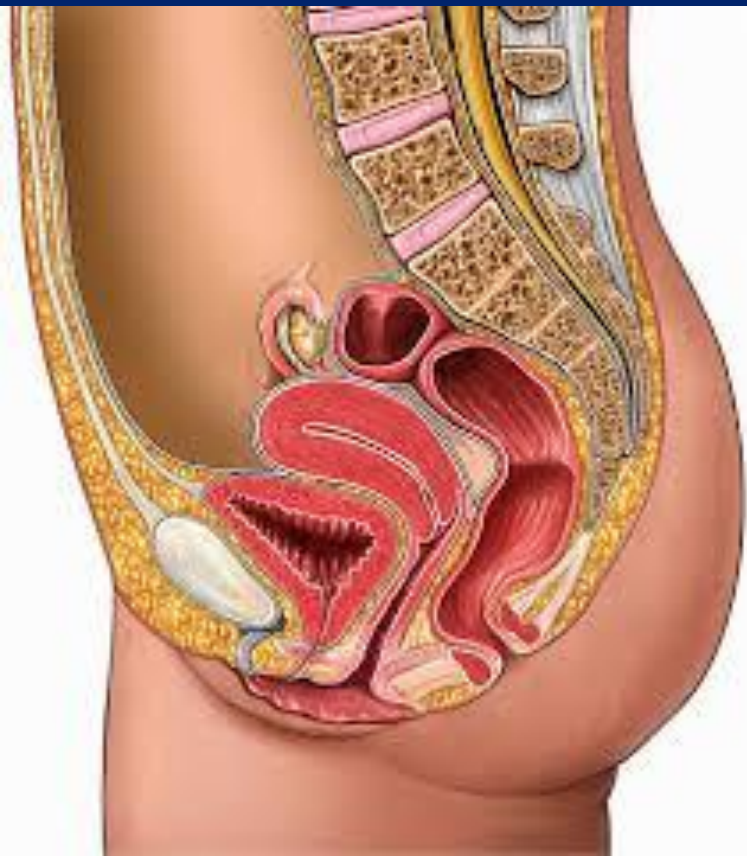
- Size- 6cm in diameter and 1.5 to 1.8m. in length
- Parts- Caecum, colon (ascending, transverse, descending and sigmoid) and rectum

ANAL CANAL

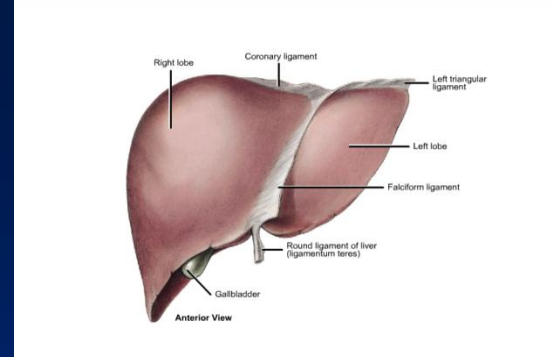


- Terminal part of the digestive system.
- It terminates at the anus in the perineum.

Relations of anorectum

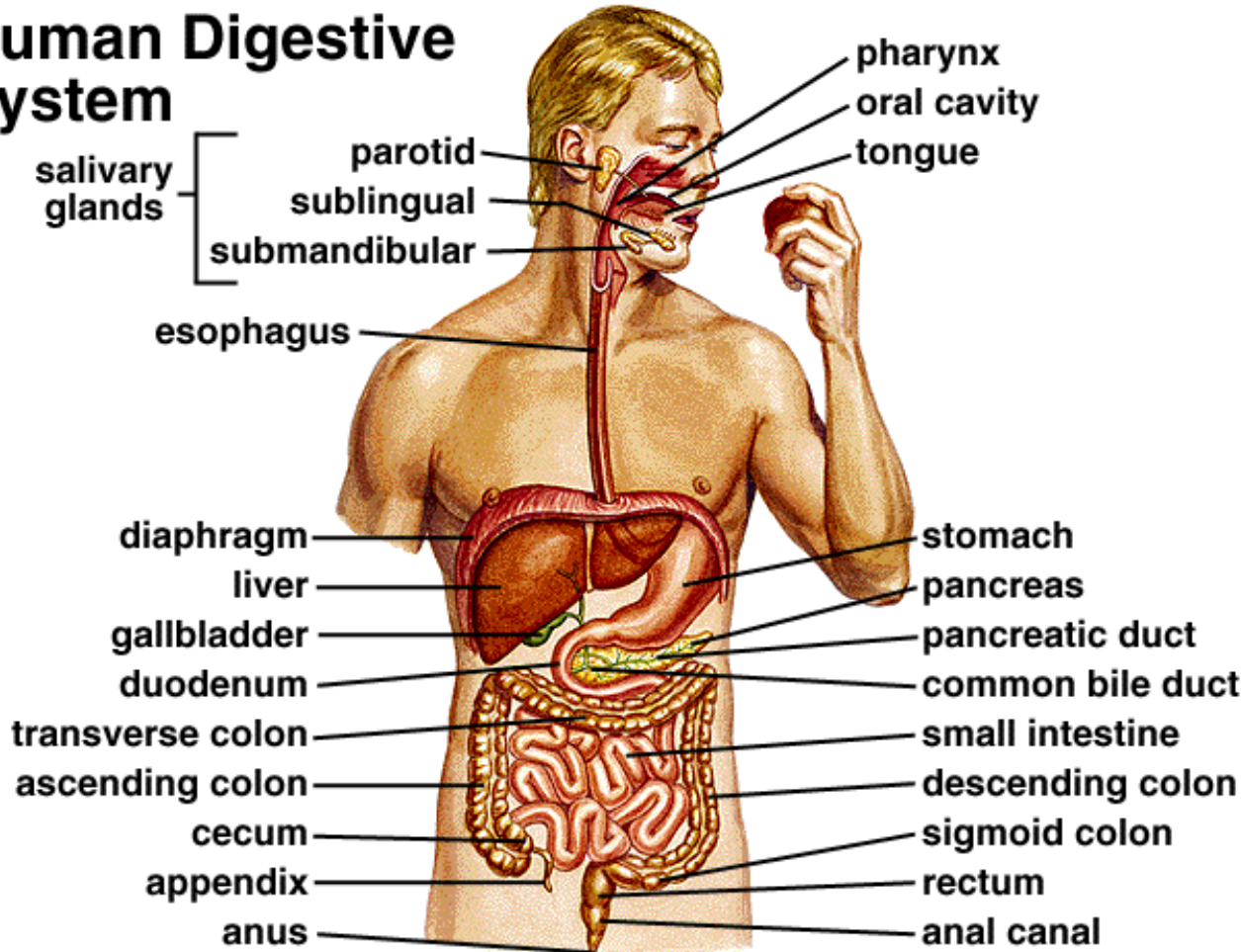


LIVER



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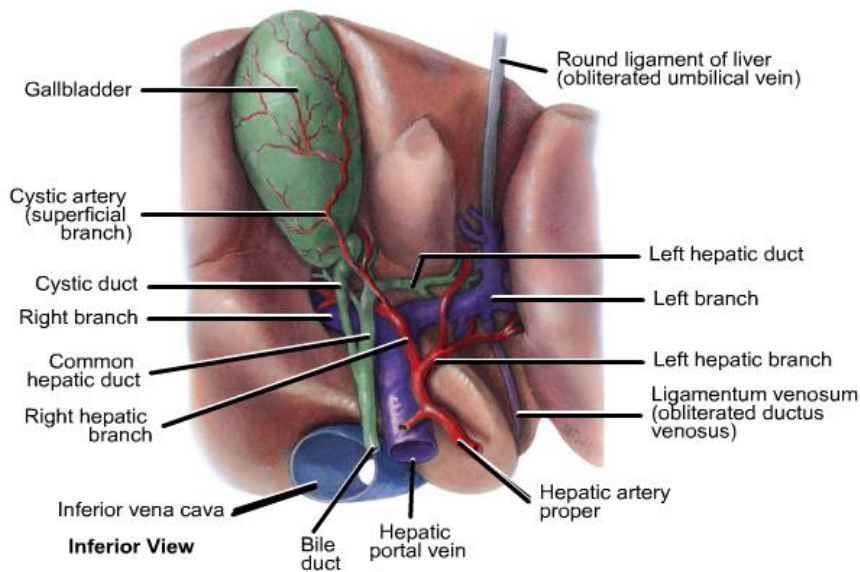
Human Digestive System



most of right
hypochoondrium
and part of
epigastrium

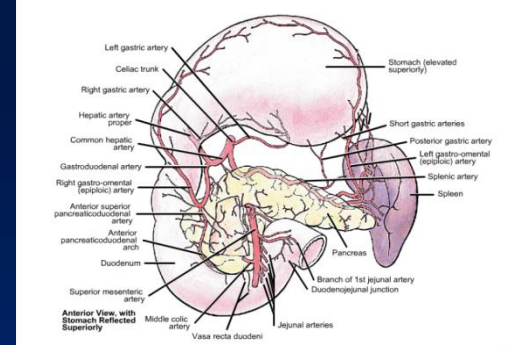
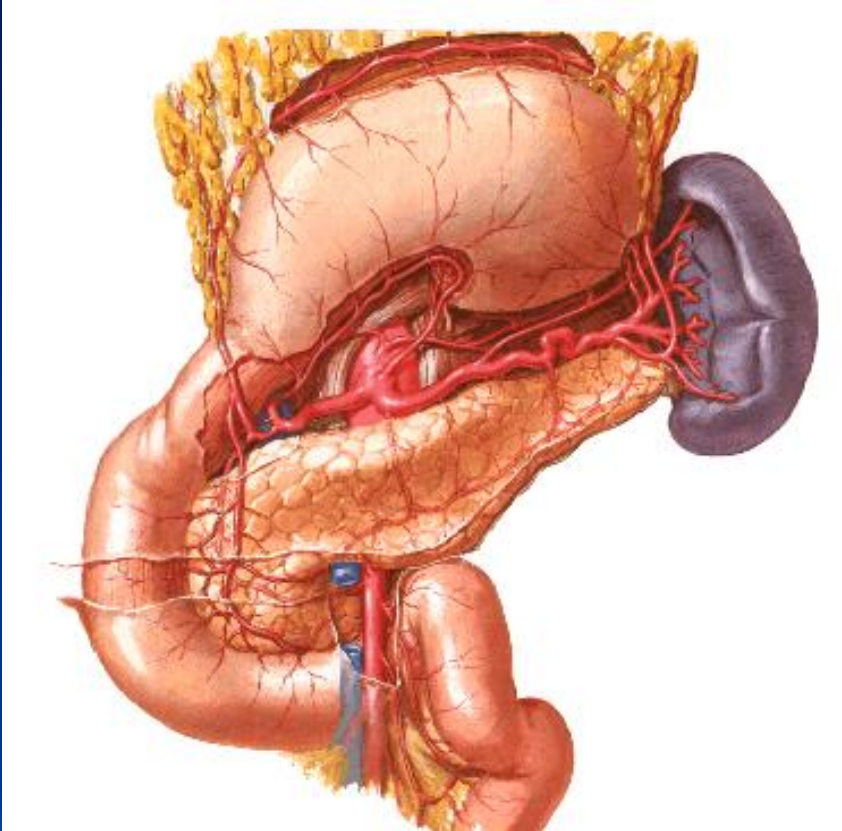
Liver Lobes-
Right, left,
caudate and
quadrate.

GALLBLADDER.



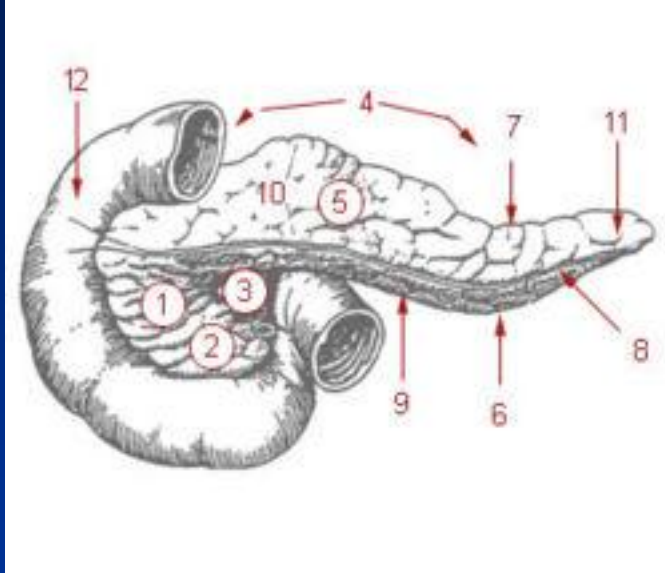
- small pear shaped bag found on the undersurface of the liver.
- Structure - sac of smooth muscle mucous lining arranged in rugae
- Ducts- common bile duct, hepatic duct and cystic duct.

PANCREAS

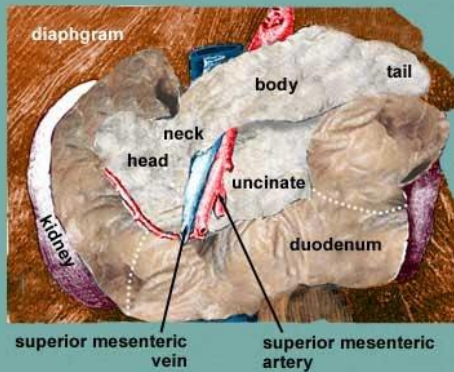


- A retroperitoneal structure found in the C- curve of the duodenum lying roughly transversely across the lumbar spine in the stomach bed
- It is 12 to 15cm long and weighs 60g

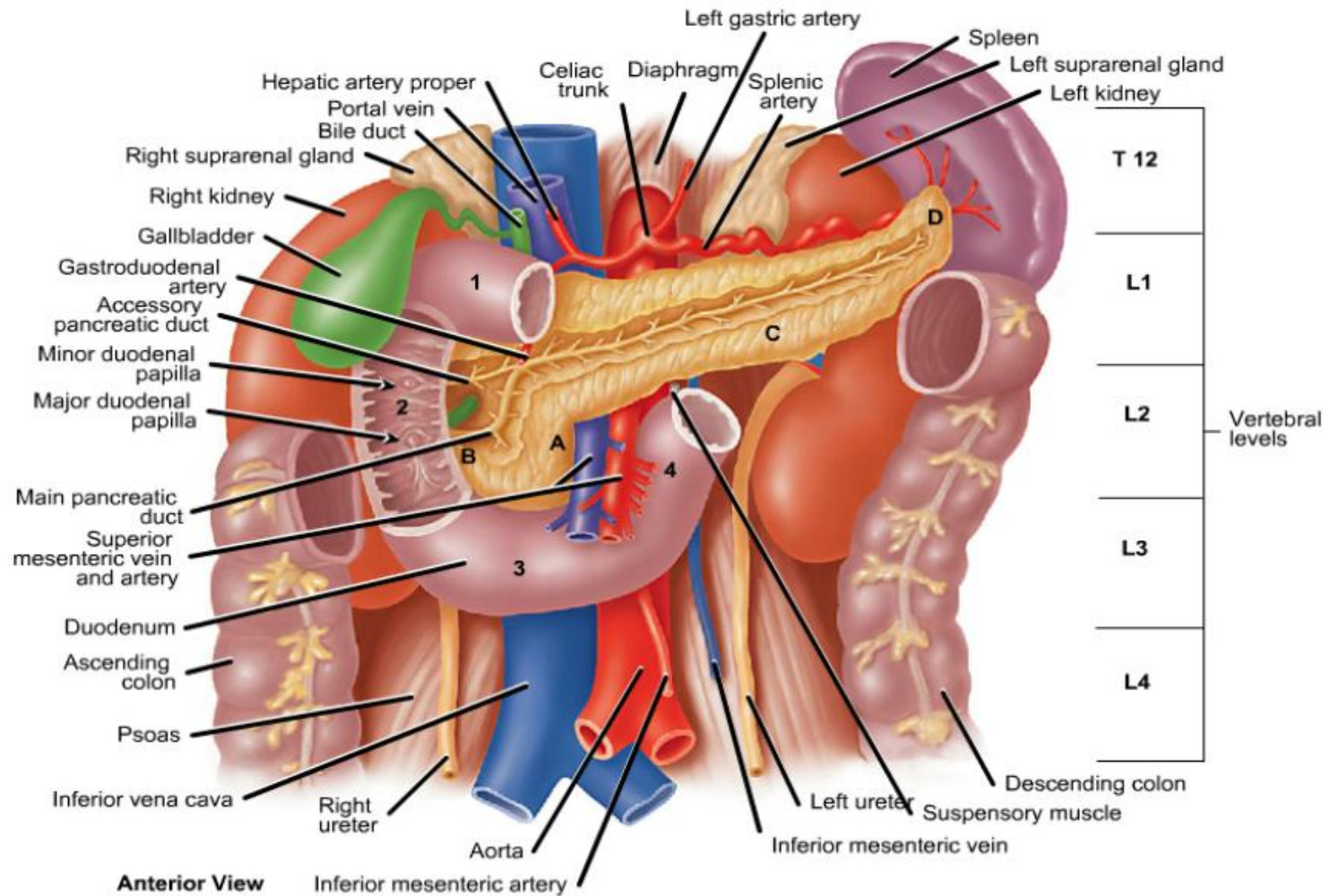
PANCREAS



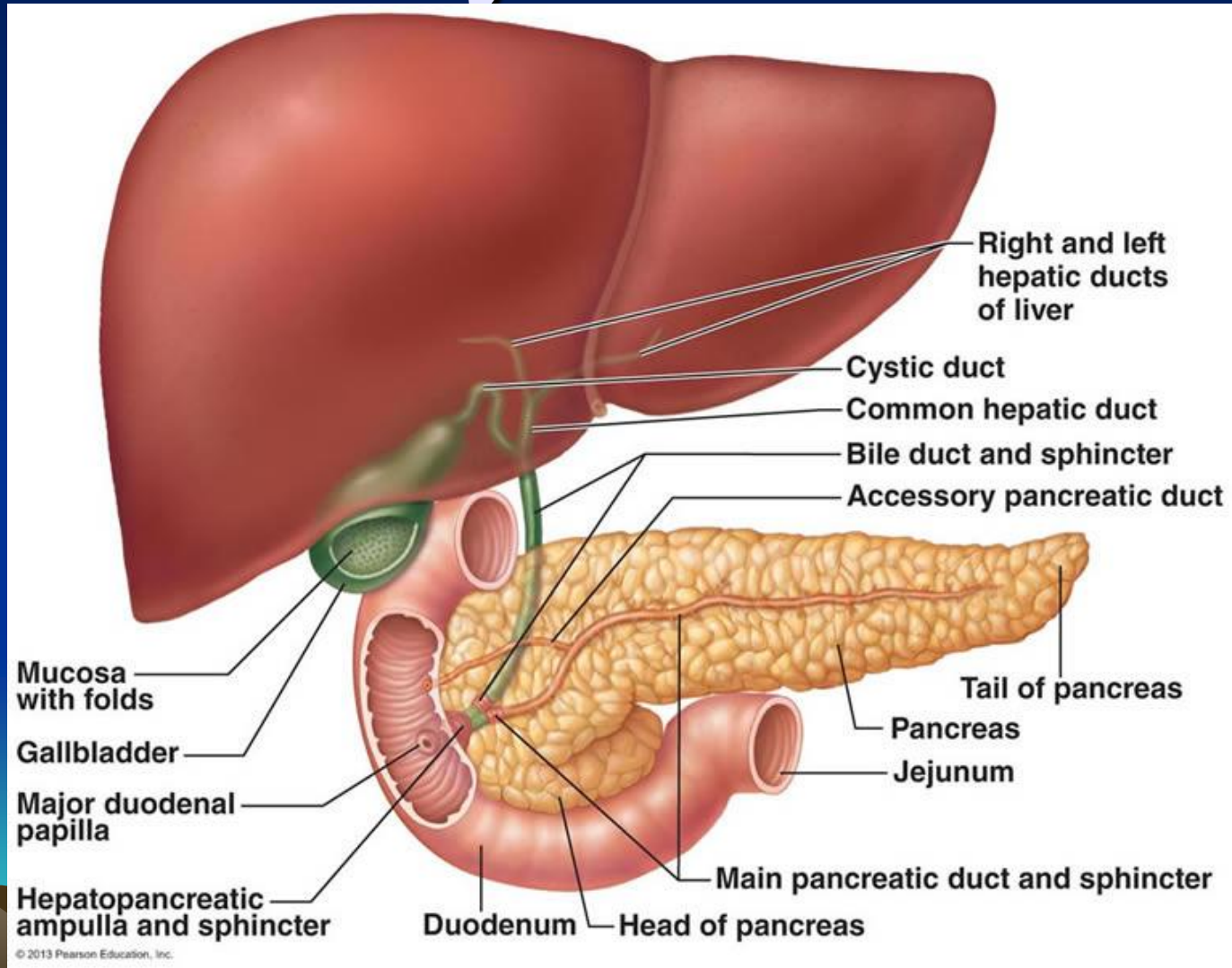
- looks like a fish. Has a head, neck, body and tail.
- Structure- soft grayish-pinkish organ which histologically looks like salivary gland except that it has islets of langerhans



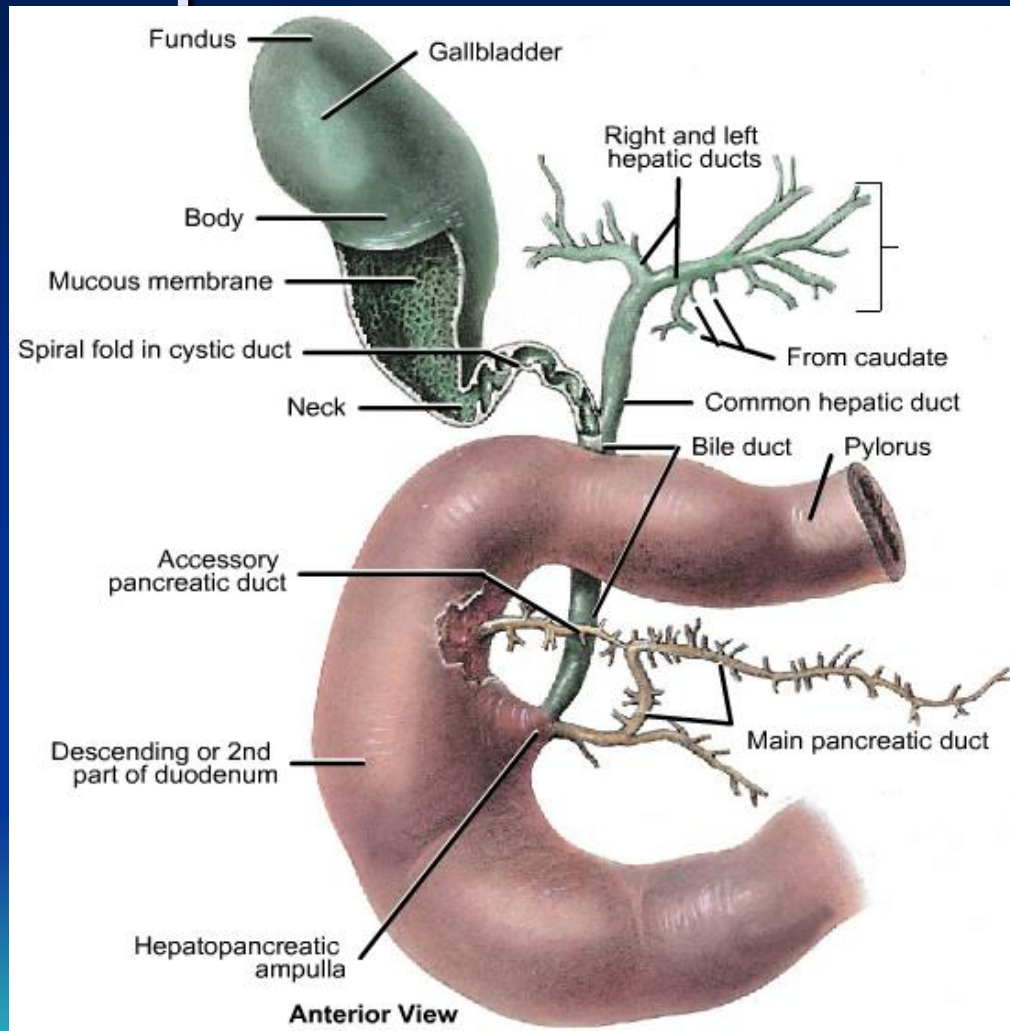
Relations of the Pancreas



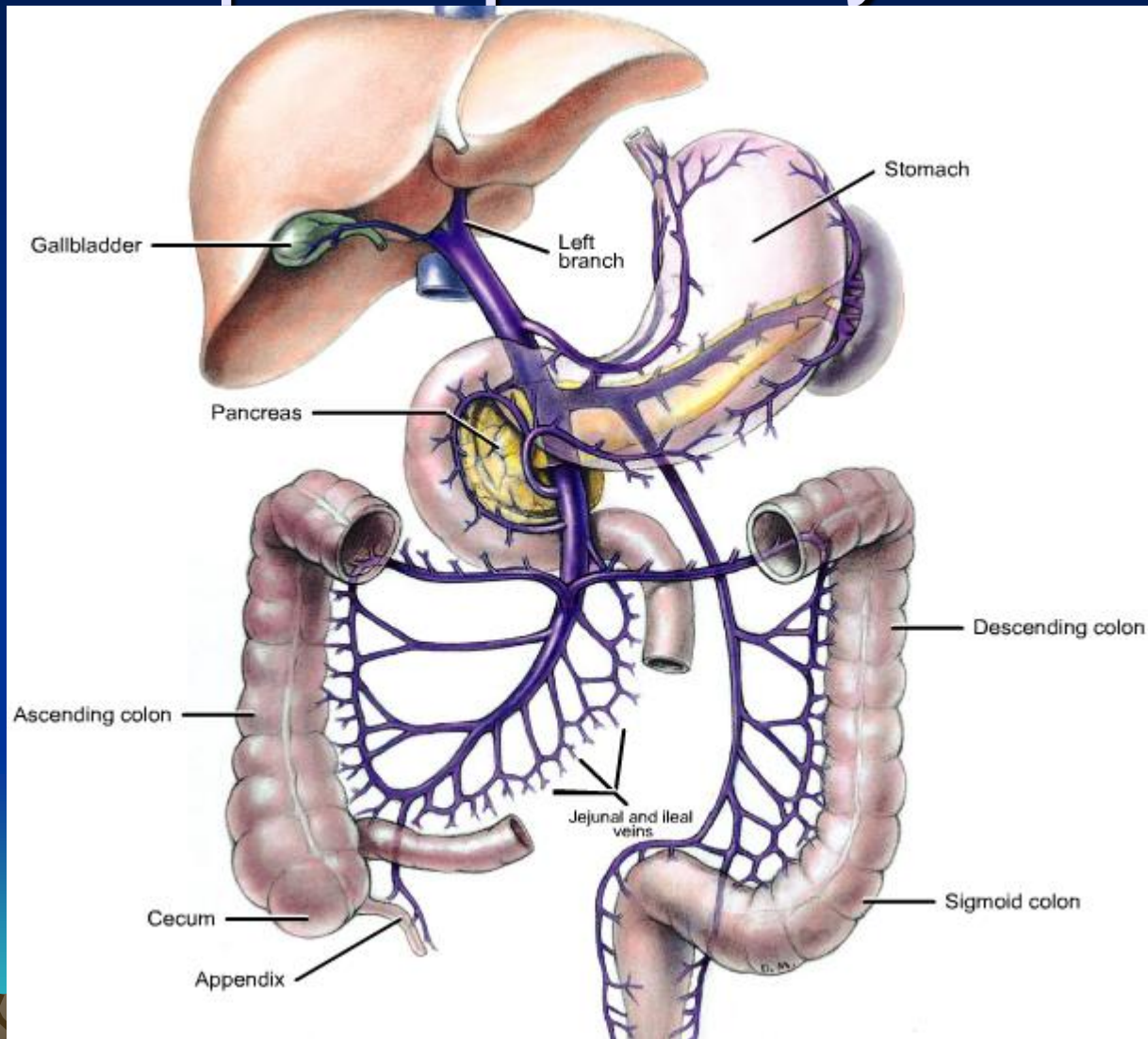
Hepatopancreaticobiliary system



Hepaticopancreaticobiliary duct



Hepatic portal system

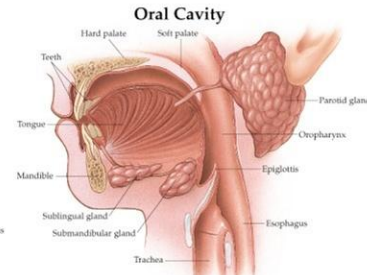


THE DIGESTIVE SYSTEM



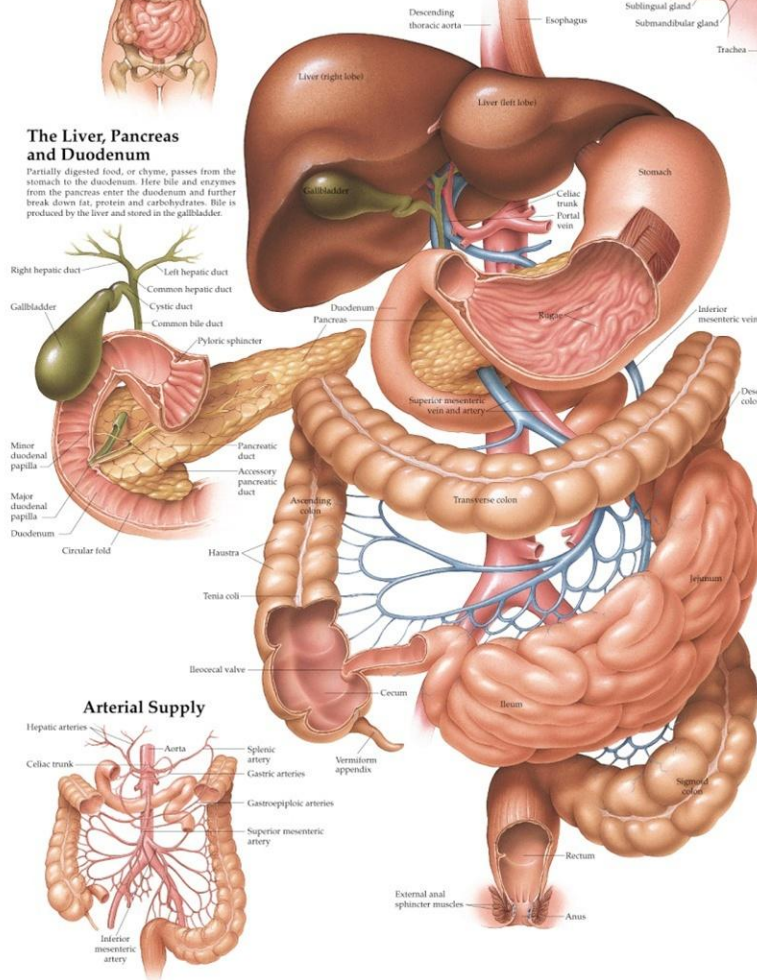
The Oral Cavity, Salivary Glands and Stomach

Digestion begins in the mouth as food is mixed with saliva. Saliva breaks down the starch in food into smaller sugars. After moving to the stomach through the esophagus, food is further broken down by enzymes and hydrochloric acid. A layer of mucus protects the stomach lining from damage by the hydrochloric acid.

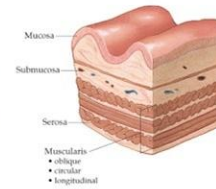


The Liver, Pancreas and Duodenum

Partially digested food, or chyme, passes from the stomach to the duodenum. Here bile and enzymes from the pancreas enter the duodenum and further break down fat, protein and carbohydrates. Bile is produced by the liver and stored in the gallbladder.



Wall of Stomach



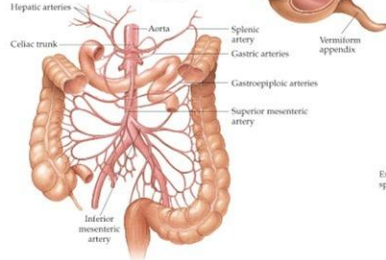
Wall of Jejunum



Wall of Colon



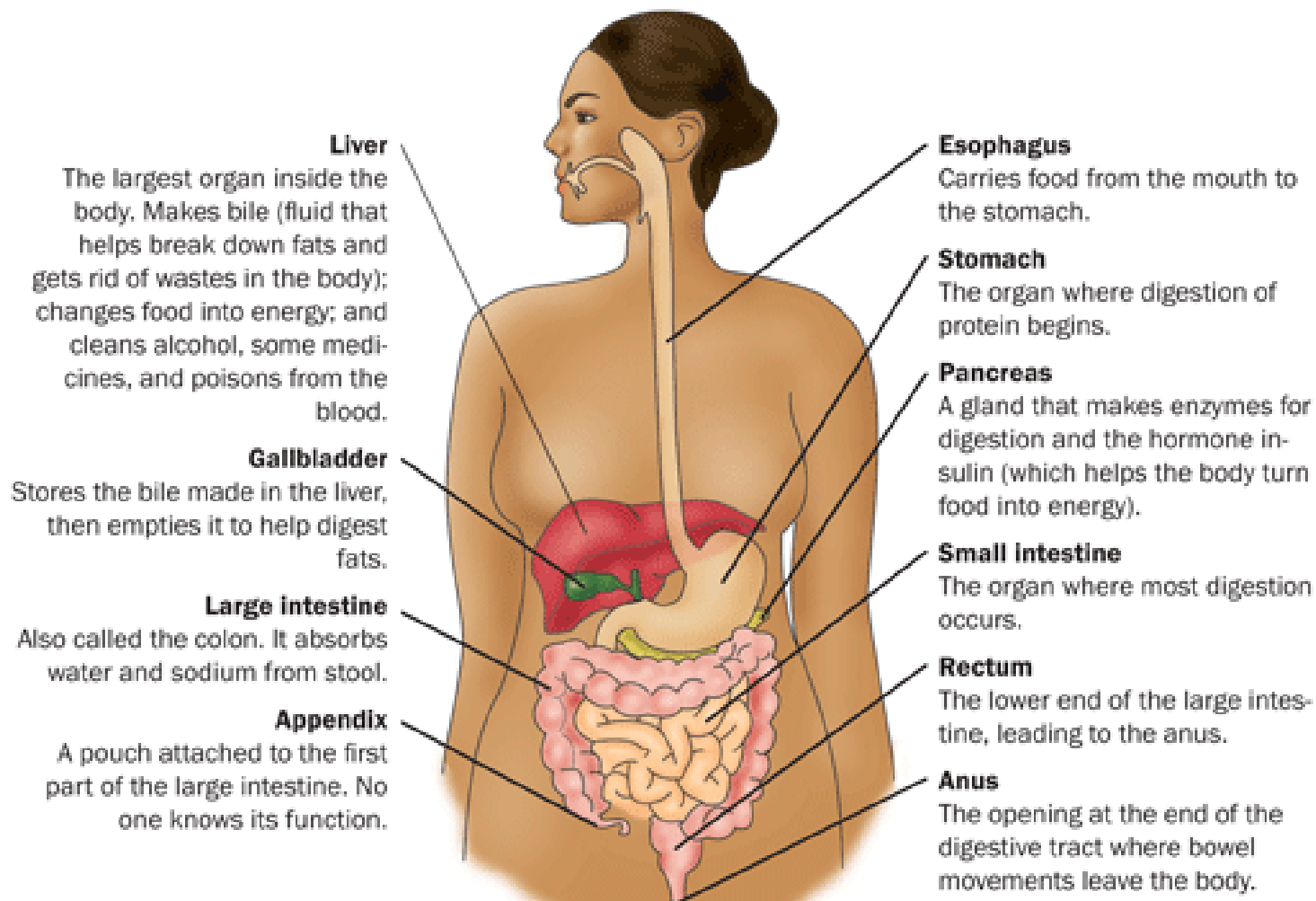
Arterial Supply



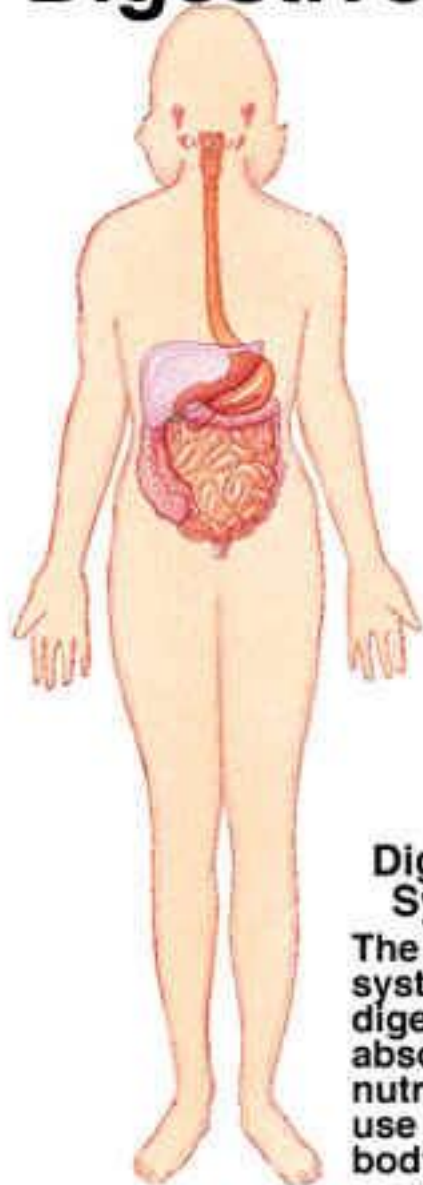
The Small and Large Intestines

Chyme moves to the last parts of the small intestine, the jejunum and ileum, where nutrients are absorbed into the bloodstream. The nutrients travel to the liver, via the hepatic portal venous system, for further metabolism and storage. Undigested material enters the colon, where water and electrolytes are absorbed. The remaining waste is stored until eliminated.

Digestive System



Digestive System—Interconnections



Digestive System
The digestive system ingests, digests, and absorbs nutrients for use by all body cells.

Integumentary System
Vitamin D activated in the skin plays a role in absorption of calcium from the digestive tract.



Skeletal System
Bones are important in mastication.



Muscular System
Muscles are important in mastication, swallowing, and the mixing and moving of digestion products through the gastrointestinal tract.



Nervous System
The nervous system can influence digestive system activity.



Endocrine System
Hormones can influence digestive activity.



Cardiovascular System
The bloodstream carries absorbed nutrients to all body cells.



Lymphatic System
The lymphatic system plays a major role in the absorption of fats.



Respiratory System
The digestive system and the respiratory system share common anatomical structures.



Urinary System
The kidneys and liver work together to activate vitamin D.



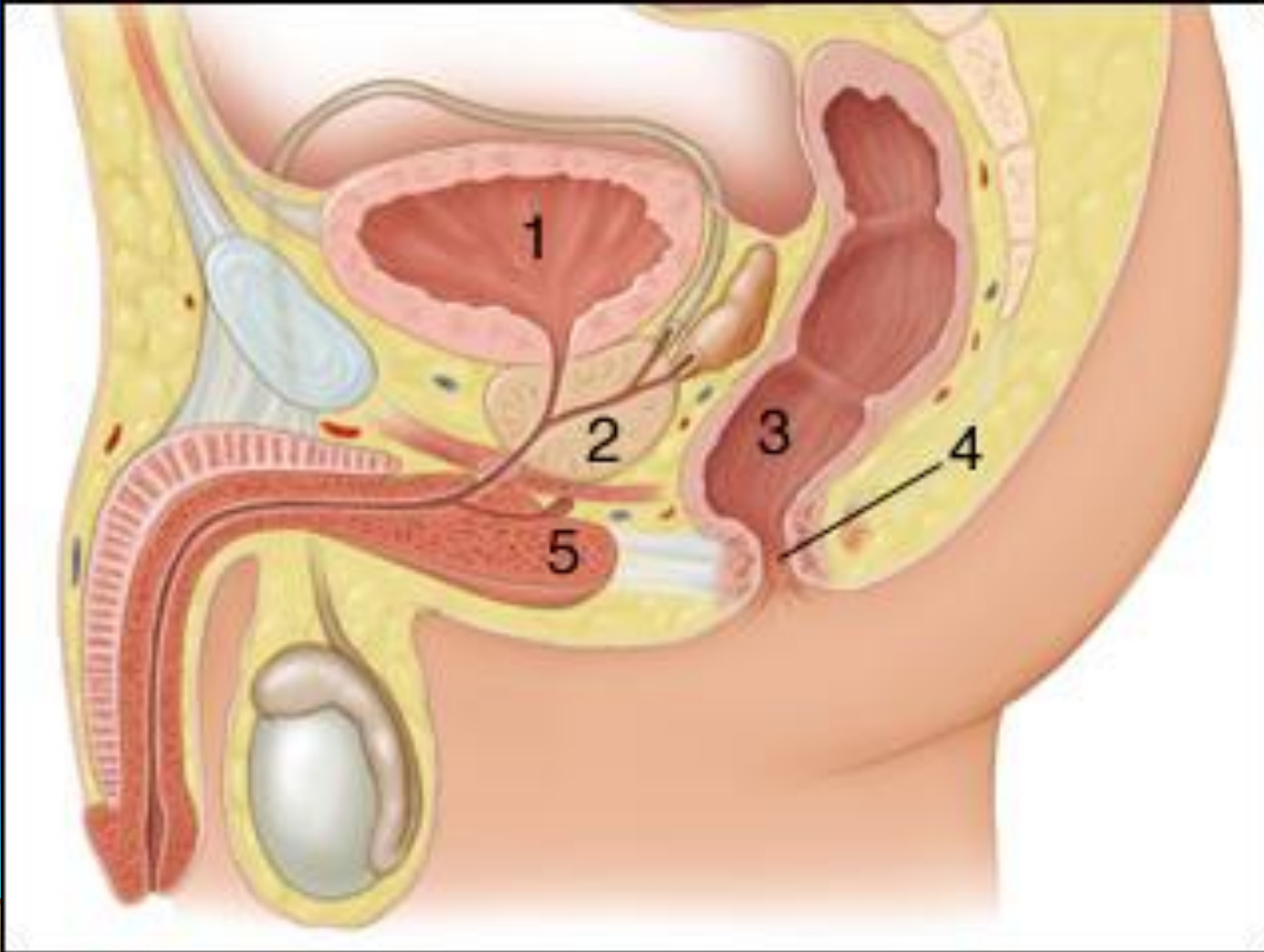
Reproductive System
Adequate availability of nutrients, including fats, is essential for conception and normal development.



Review Questions

- Name the parts and functions of the 10 areas of the digestive system listed below
:-
 - Teeth, Tongue & Salivary glands
 - Pharynx & Oesophagus
 - Stomach
 - Small intestines & Large intestines
 - Liver
 - Pancreas

Label the following diagram



Thank You

