



# **General Anatomy**

## **Lecture 16: Gastrointestinal System (1)**

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# The Digestive System

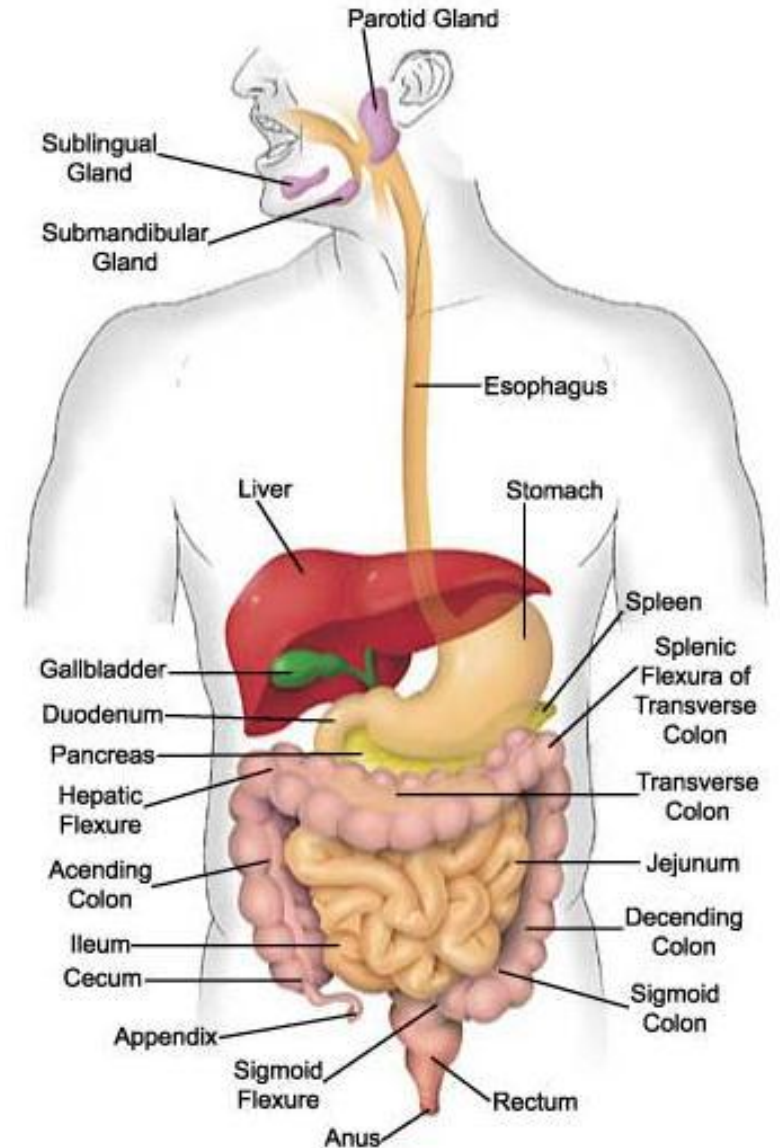
\* It includes the following:

**A. The gastrointestinal tract or alimentary canal:**

\* This is a continuous tube that extends from mouth to anus.

\* It includes mouth, pharynx, esophagus, stomach, small intestine & large intestine.

**B. Accessory Glands:** such as liver, pancreas & salivary glands.



# A. Mouth (Oral Cavity)

- \* Extends from lips to oropharyngeal isthmus.

- \* It is divided into:

## A. The Vestibule:

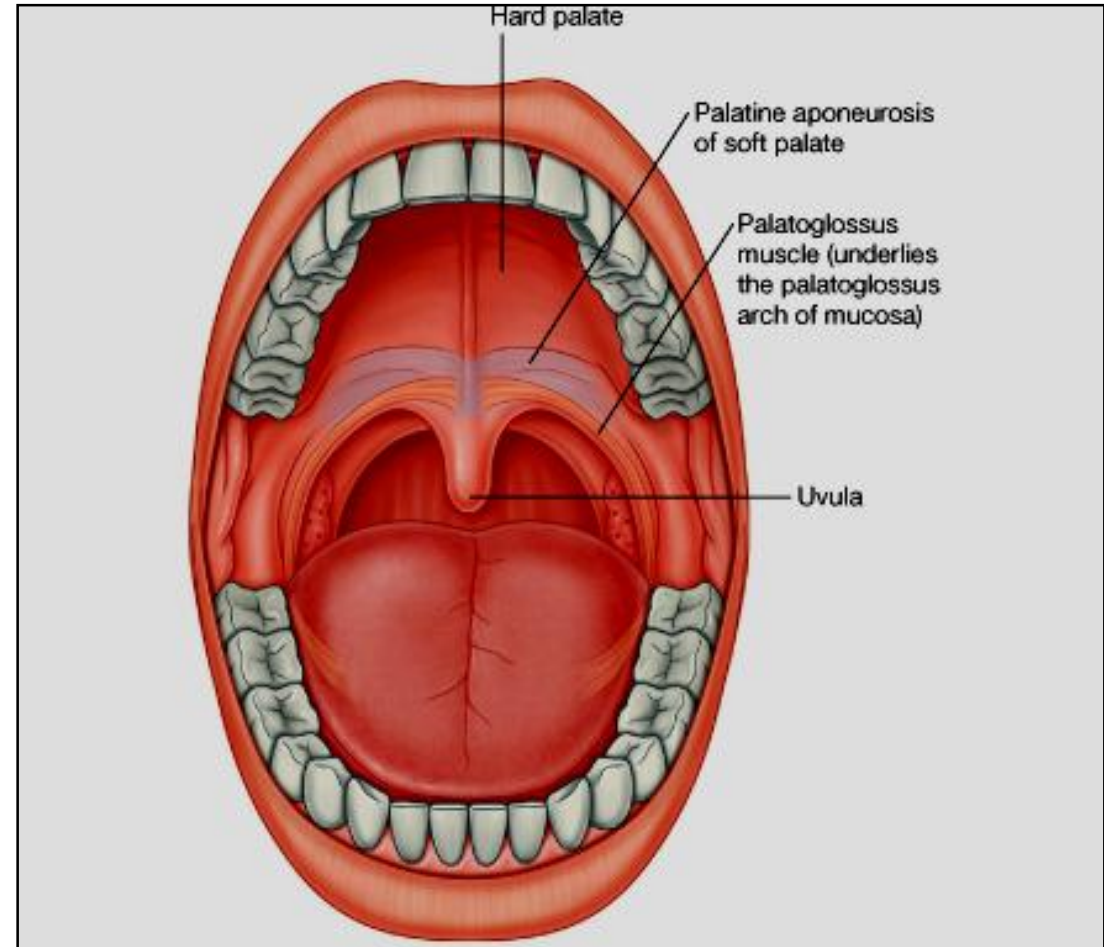
- \* This is the space bounded externally by the lips and cheeks and internally by the gums and teeth.

- \* It communicates posteriorly behind the teeth with the mouth cavity proper.

## B. The Mouth Cavity Proper:

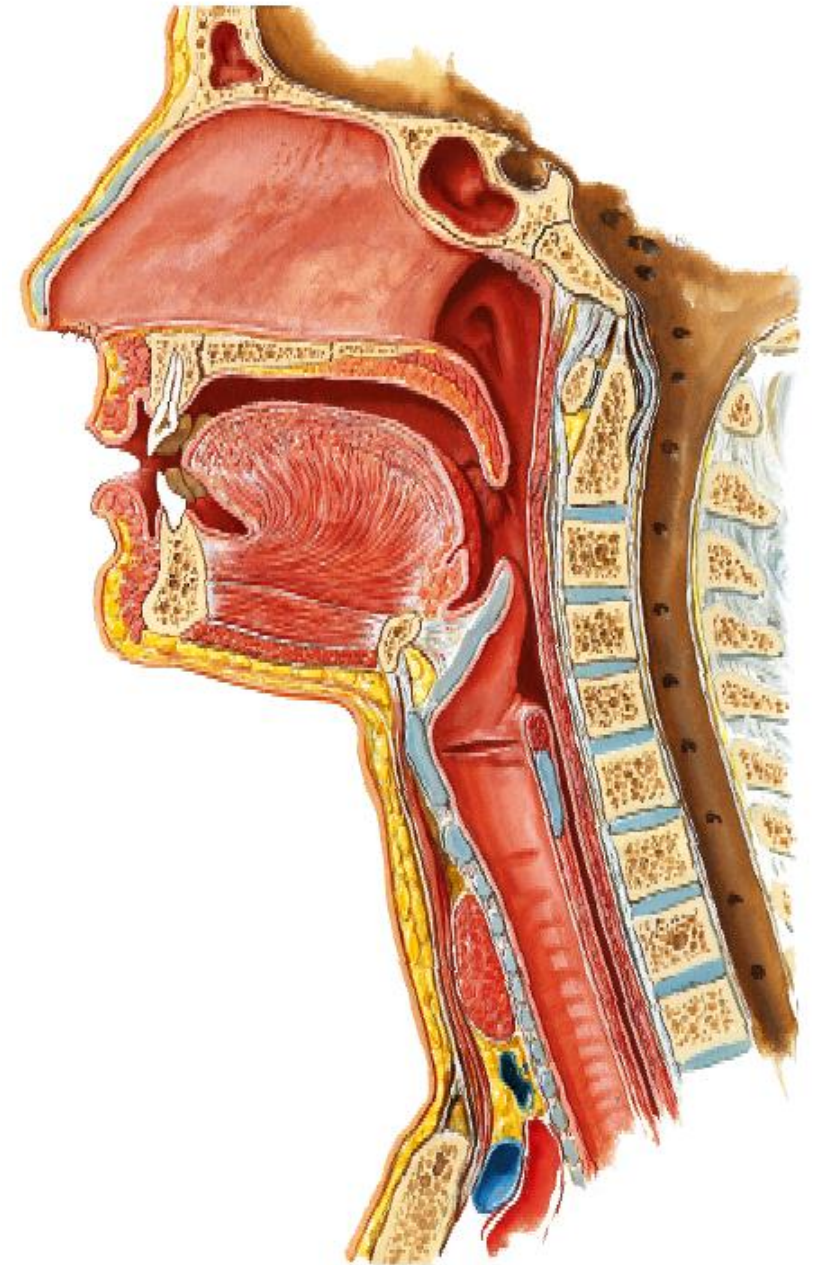
- \* Extends from teeth to oropharyngeal isthmus through which it communicates with the oral part of the pharynx.

- \* It has a roof and a floor.



## **A. The Roof:**

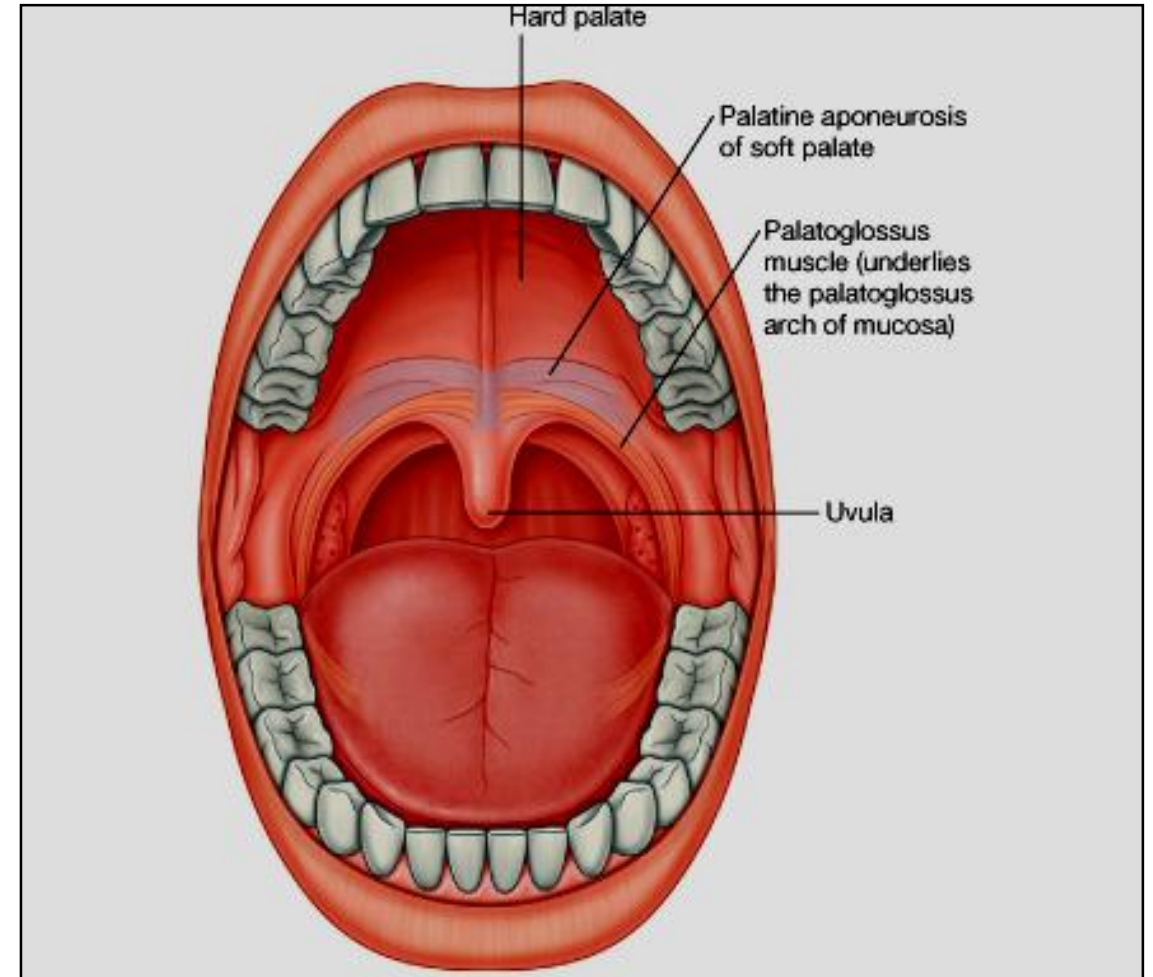
- \* Is formed anteriorly by the hard palate & posteriorly by the soft palate.**
- \* The soft palate is a mobile fold attached to the posterior border of the hard palate.**
- \* Its free posterior border presents in the midline a conical projection called the uvula.**
- \* During swallowing, the soft palate is drawn upwards to close off the nasal part of pharynx and preventing swallowed food and liquid from entering nasal cavity.**





## B. The Floor:

**\* Is formed largely by the anterior two third of the tongue and by the reflection of the mucous membrane from sides of tongue to gum.**

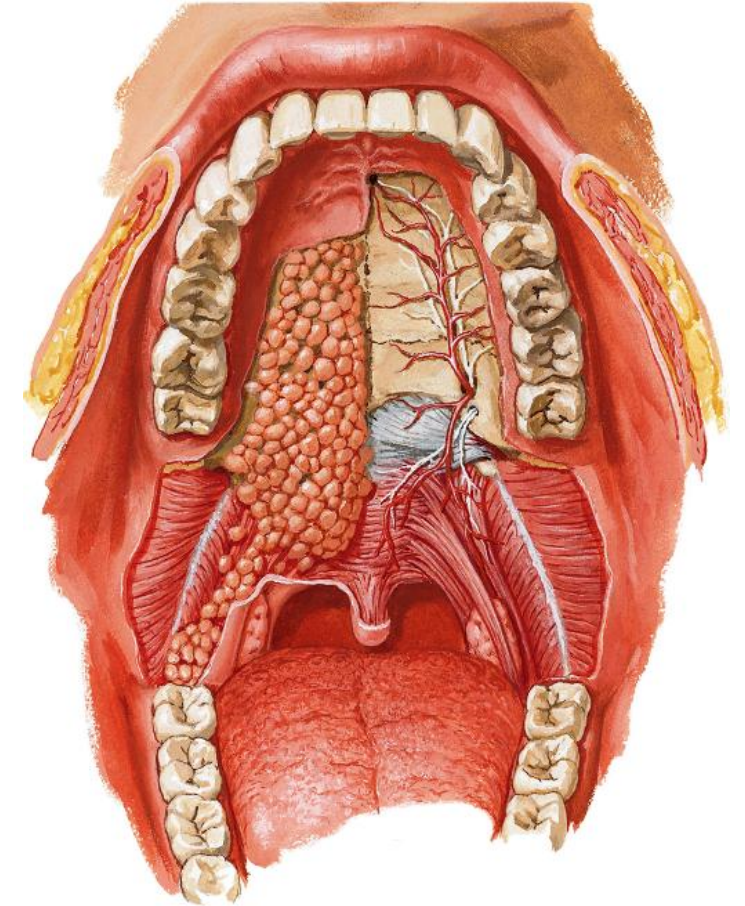


# Teeth

- \* Are located in sockets of the maxillae and mandible.
- \* The two sets of teeth make their appearance at different time of life.
- \* The first set, called the deciduous teeth, is temporary. The second set is called the permanent teeth.

## I. Deciduous Teeth

- \* Are 20 in number: 4 incisors, 2 canines, and 4 molars in each jaw.
- \* The approximate times of eruption are as follows:
  - Central incisors 6 – 8 months
  - Lateral incisors 8 – 10 months
  - First molar 1 year
  - Canines 18 months
  - Second molar 2 years

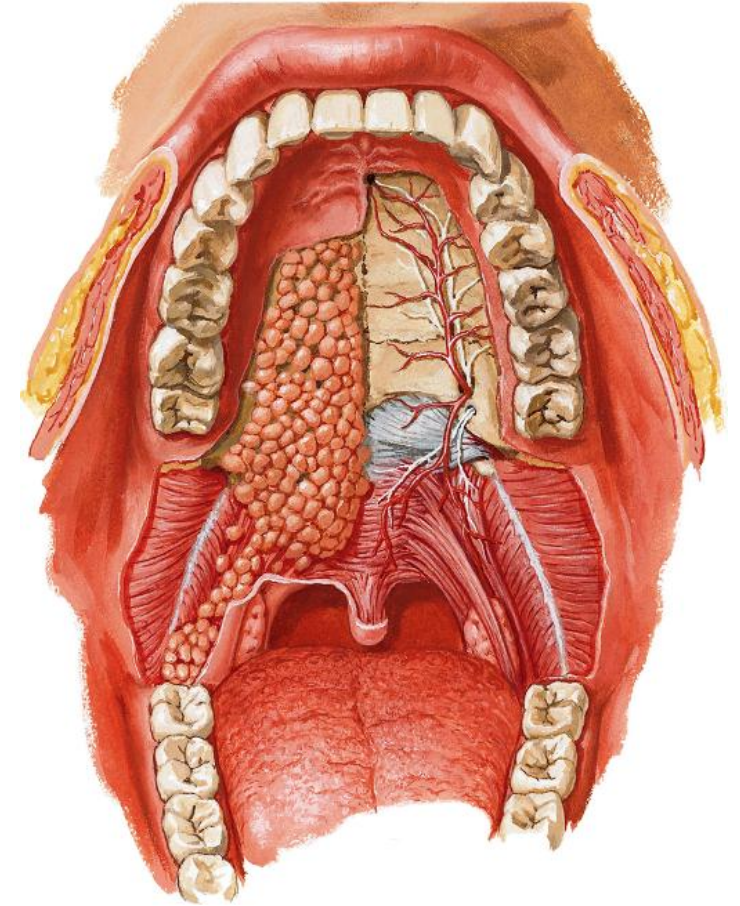


## II. Permanent Teeth:

\* Are 32 in number: 4 incisors, 2 canines, 4 premolars, and 6 molars in each jaw.

\* The approximate times of eruption are as follows:

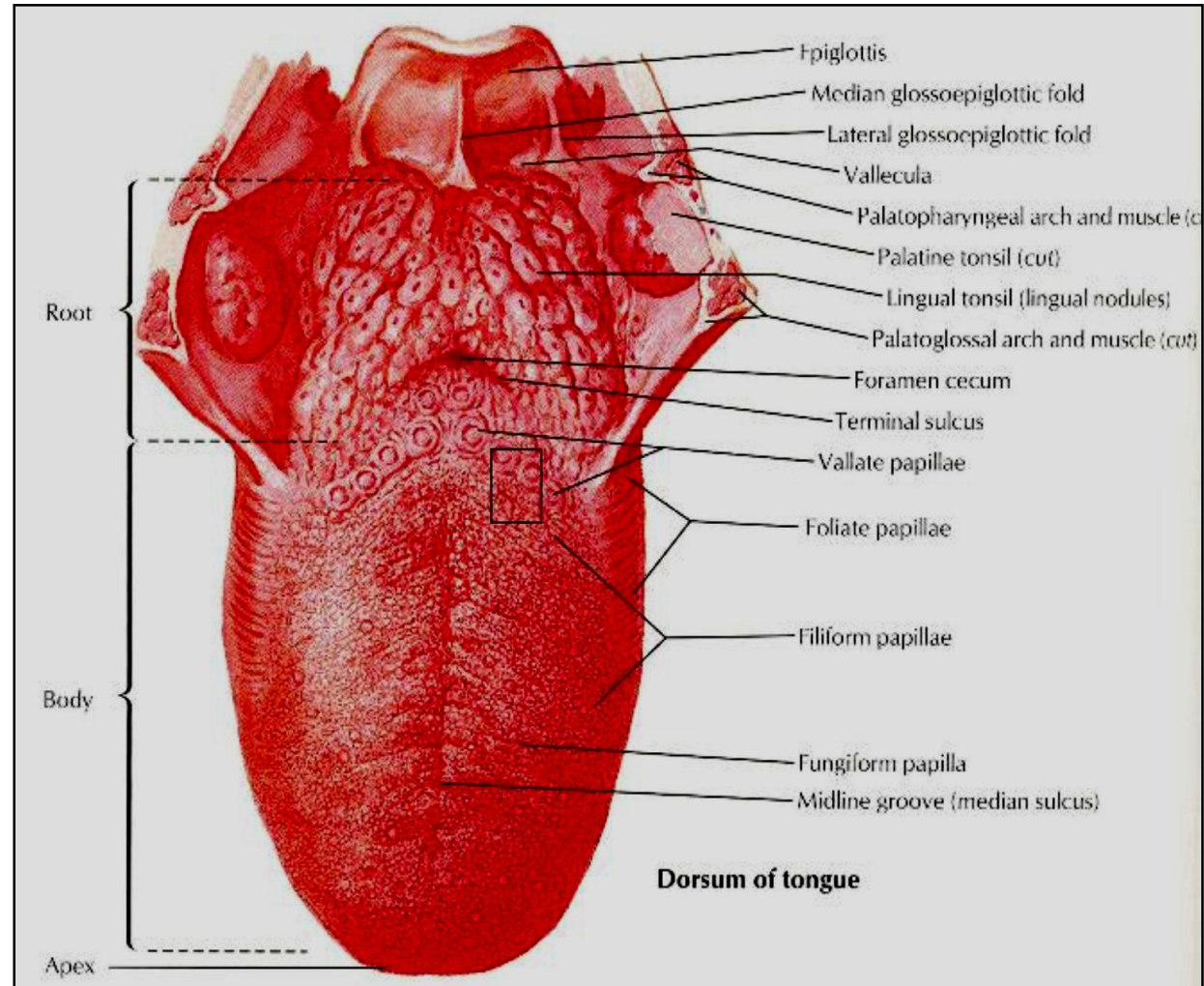
- First molars 6 years
- Central incisors 7 years
- Lateral incisors 8 years
- First premolars 9 years
- Second premolars 10 years
- Canines 11 years
- Second molars 12 years
- Third molars (wisdom teeth) 17 – 30 years





# Tongue

- \* It is a muscular structure covered with mucous membrane.
- \* Its dorsal surface is divided by a V-shaped sulcus, the sulcus terminalis, into an anterior two-third (oral part), and a posterior one-third (pharyngeal part).
- \* The apex of the sulcus projects backward and is marked by a small pit termed the foramen cecum.
- \* The mucous membrane covering dorsal surface of anterior two-third of tongue is rough due to the presence of papillae.

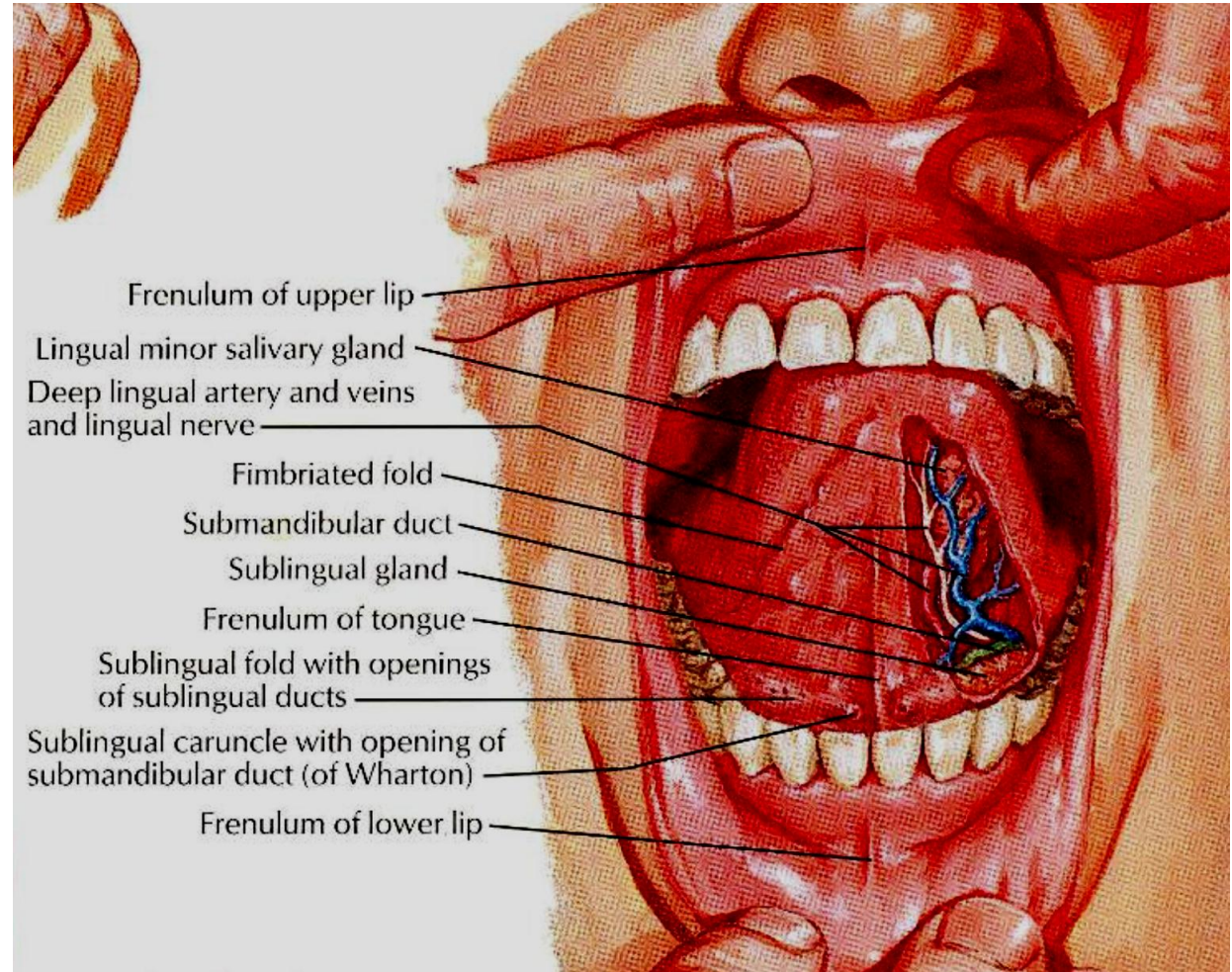




**\* The mucous membrane covering dorsal surface of posterior one-third of tongue is smooth and has no papillae, but appears nodular due to underlying lymph nodules, the lingual tonsil.**

**\* The mucous membrane covering the inferior surface of tongue is smooth and is reflected from tongue to floor of the mouth .**

**\* At midline, the mucous membrane gives rise to a fold called the frenulum of the tongue, which connects the inferior surface of tongue to floor of mouth.**



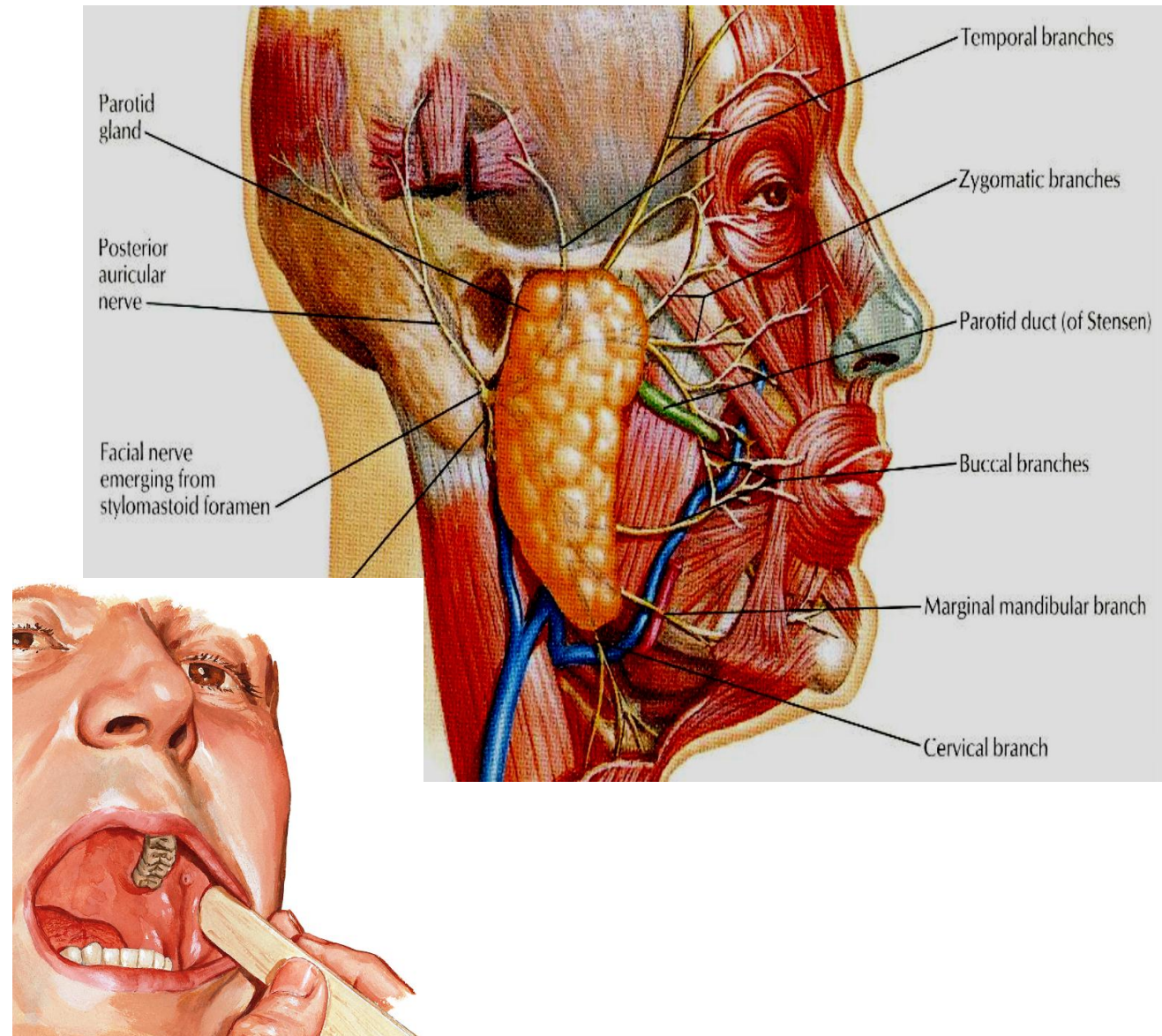
# Salivary Glands

\* These glands release the saliva into the mouth cavity.

## A. Parotid Gland:

\* This is the largest of the salivary glands, situated below and in front of external auditory meatus and lies in a deep hollow behind ramus of mandible.

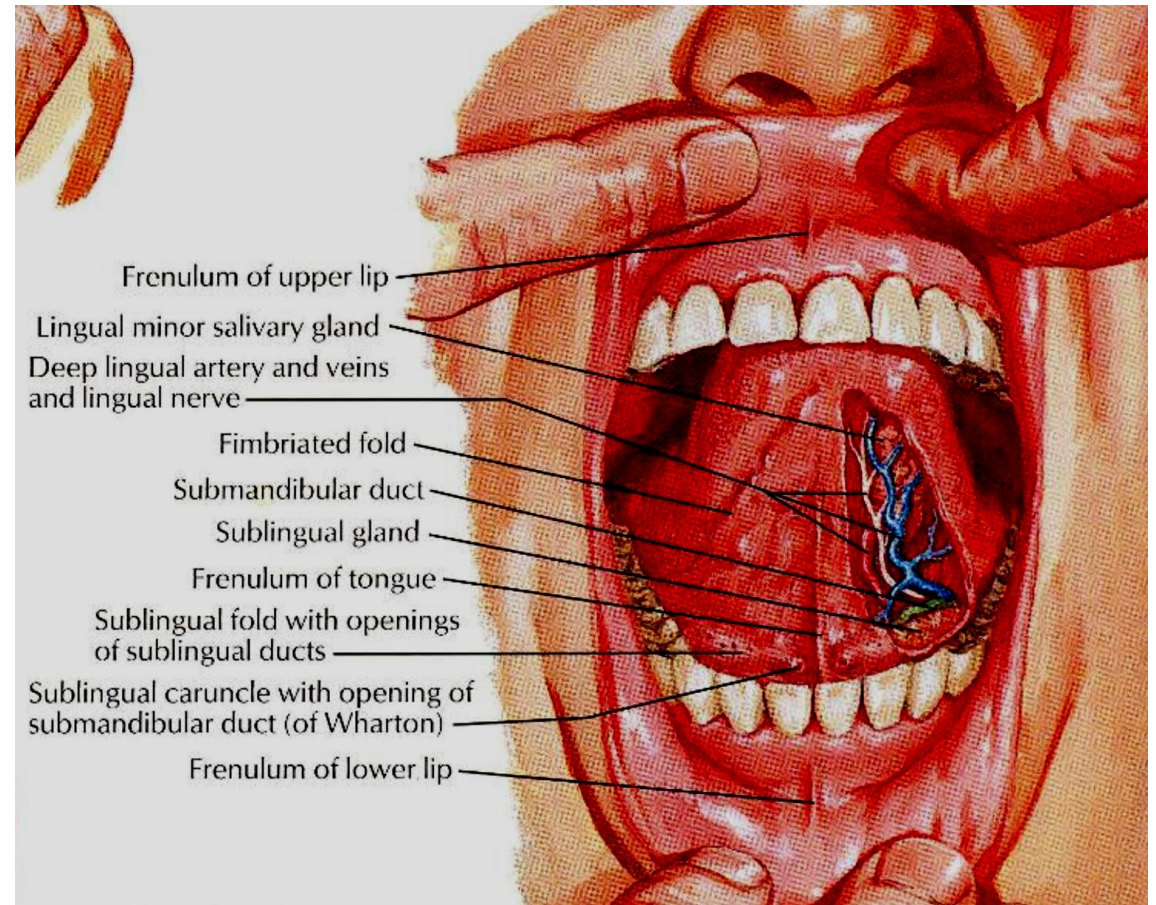
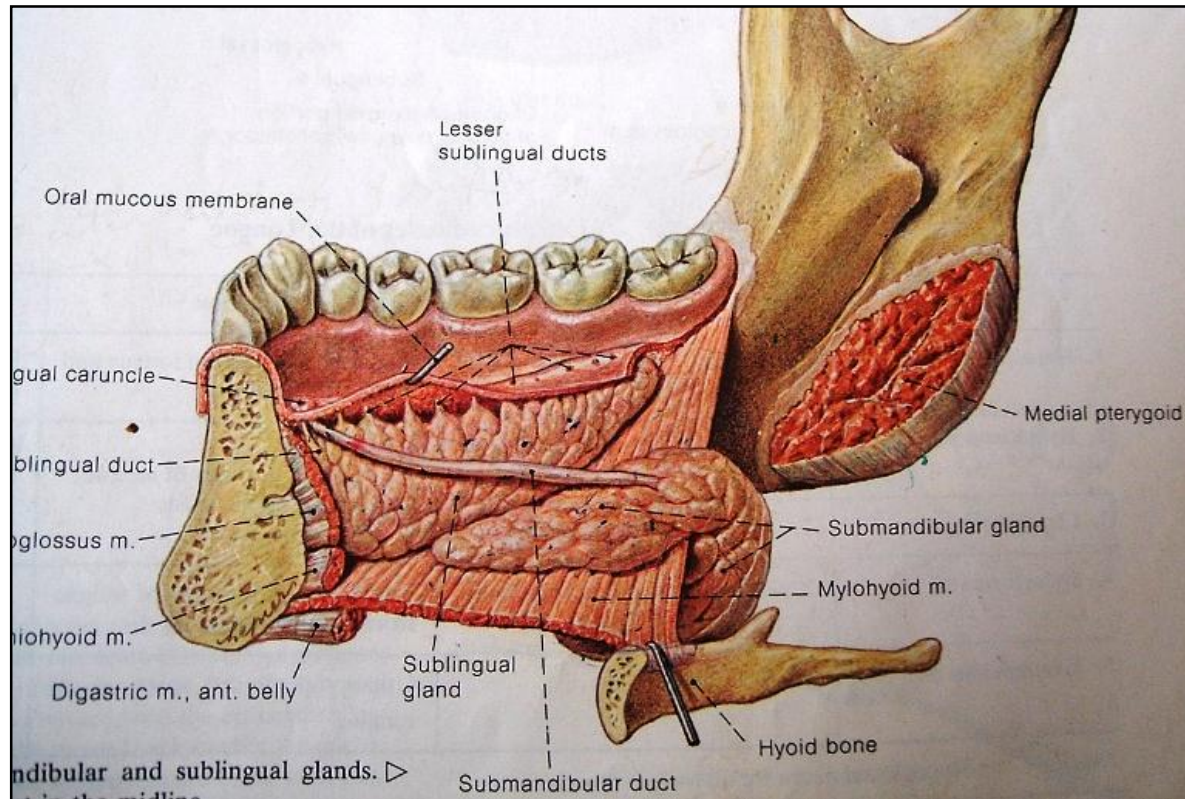
\* The parotid duct runs forward and opens into vestibule of mouth opposite the upper 2<sup>nd</sup> molar tooth.





## B. Submandibular Gland:

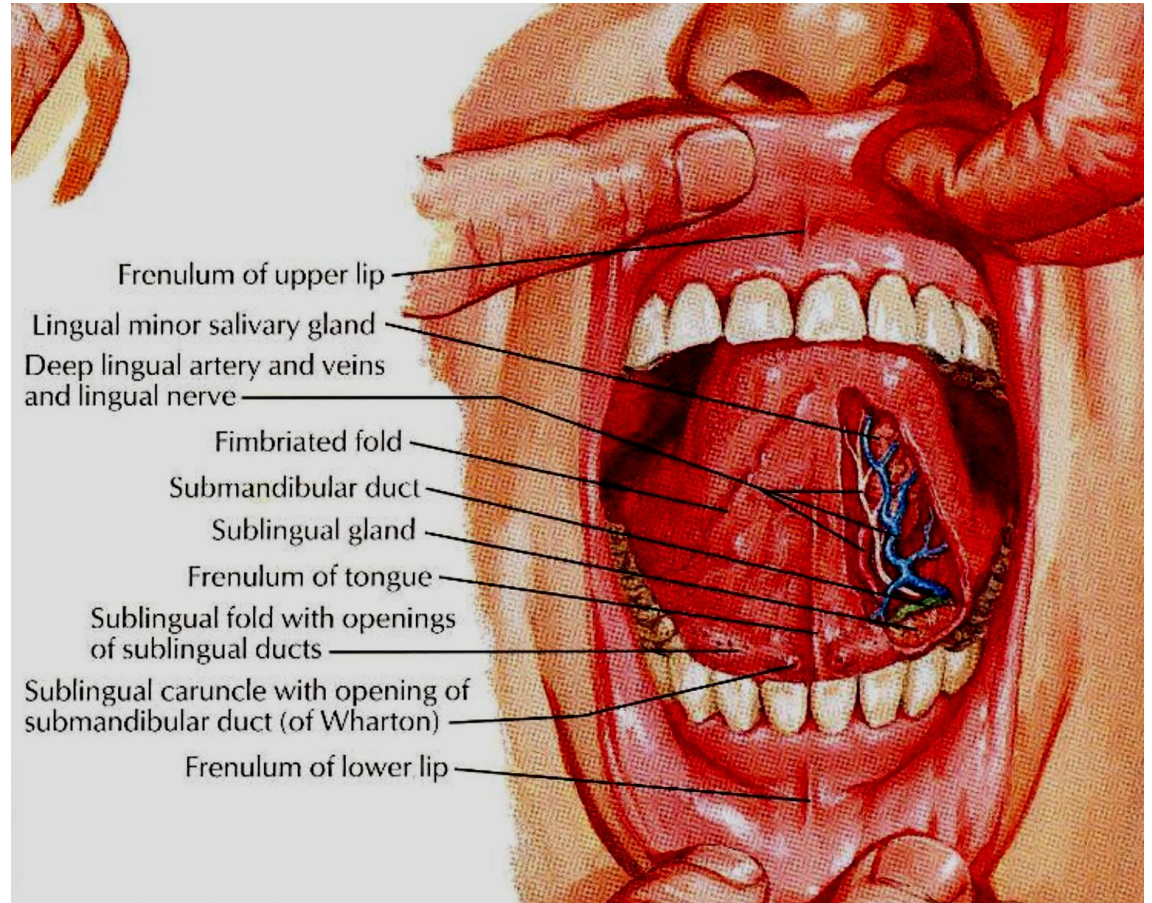
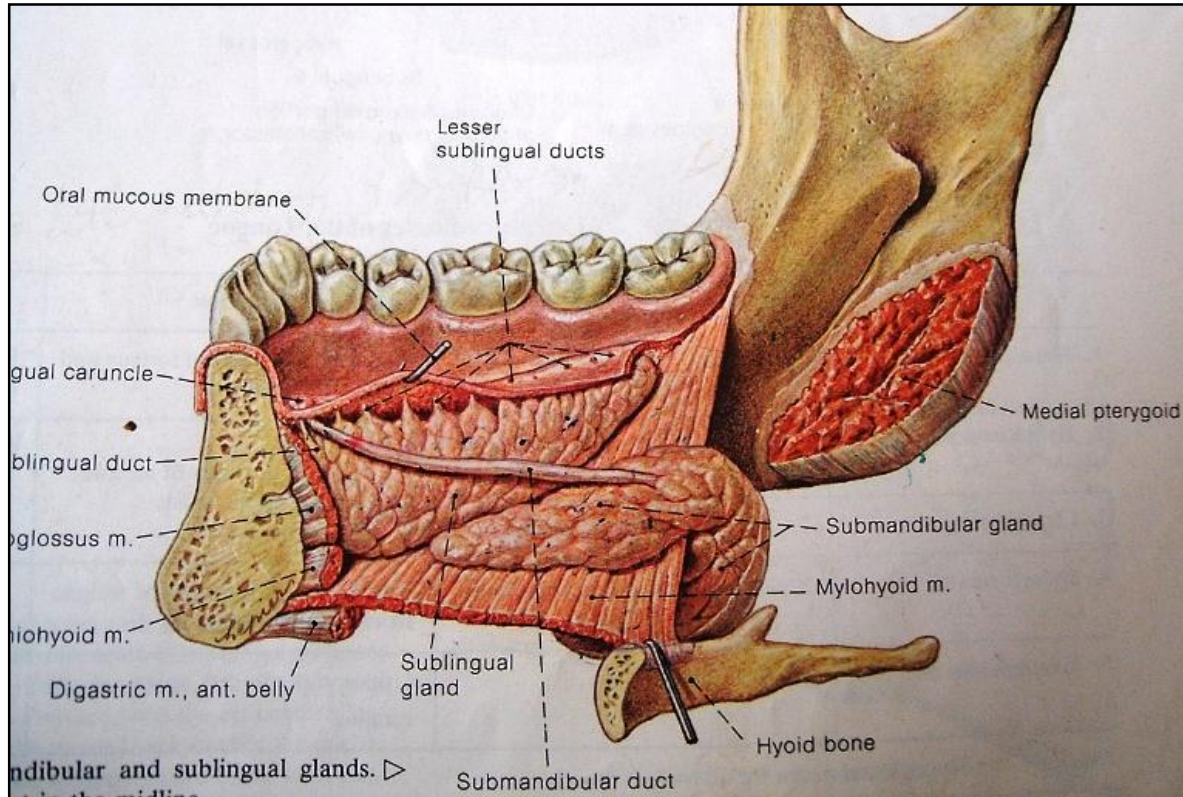
- \* Lies beneath the base of tongue in the posterior part of the floor of mouth.
- \* The submandibular duct opens into the floor of the mouth on a small papilla situated at the side of frenulum of tongue.





## C. Sublingual Gland:

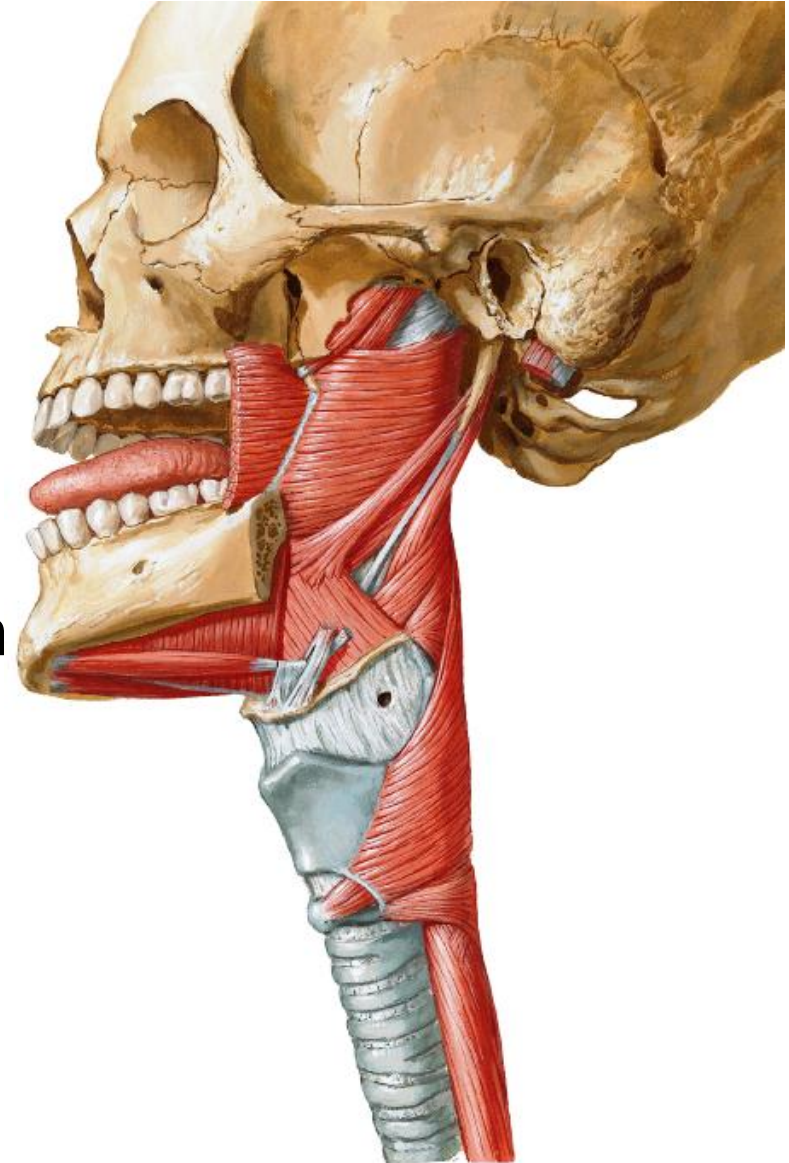
- \* Is the smallest of the three main salivary glands.
- \* Lies beneath the mucous membrane of the floor of the mouth, close to the midline.
- \* The sublingual ducts are 8 – 20 in number, open into the floor of the mouth cavity proper.





# B. Pharynx

- \* Details of Pharynx are discussed before in Respiratory System.
- \* The wall of the pharynx has three circular muscles (superior, middle and inferior constrictors) and three longitudinal muscles (stylopharyngeus, palatopharyngeus, and salpingopharyngeus muscles).
- \* All these muscles are supplied by the pharyngeal plexus of nerves except the stylopharyngeus, which is supplied by the glossopharyngeal nerve (9<sup>th</sup> cranial nerve).
- \* The successive contraction of the constrictor muscles propels the bolus of food down into the esophagus.
- \* The longitudinal muscles elevate the pharynx and larynx during swallowing.



# C. The Gut

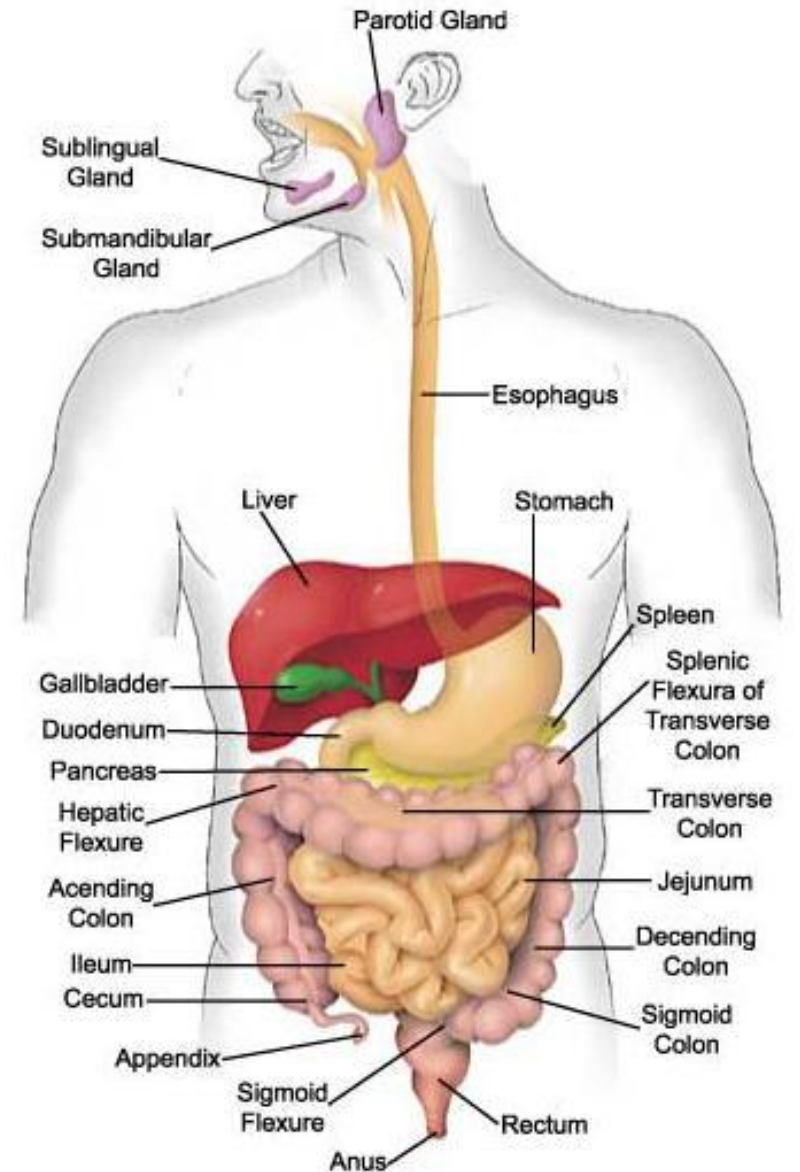
\* The alimentary tract is divided into:

1. Foregut: it includes oesophagus, stomach, first part of duodenum and upper part of second part of duodenum.

\* The foregut is supplied by **the celiac trunk.**

2. Midgut: it includes the rest of duodenum, jejunum, ileum, ascending colon and the right 2/3 of transverse colon.

\* The midgut is supplied by **the superior mesenteric artery.**



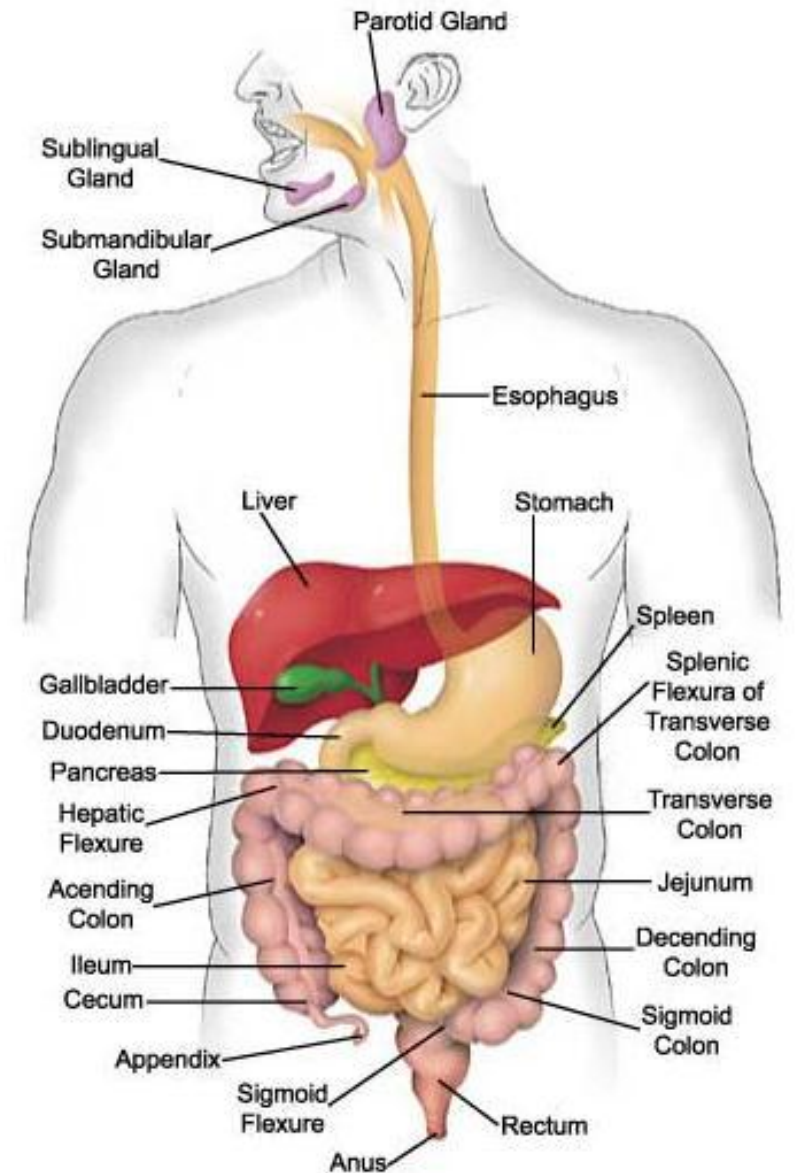


# C. The Gut (Contd)

**3. Hindgut**: it includes the left 1/3 of transverse colon, descending colon, sigmoid colon, rectum and anal canal.

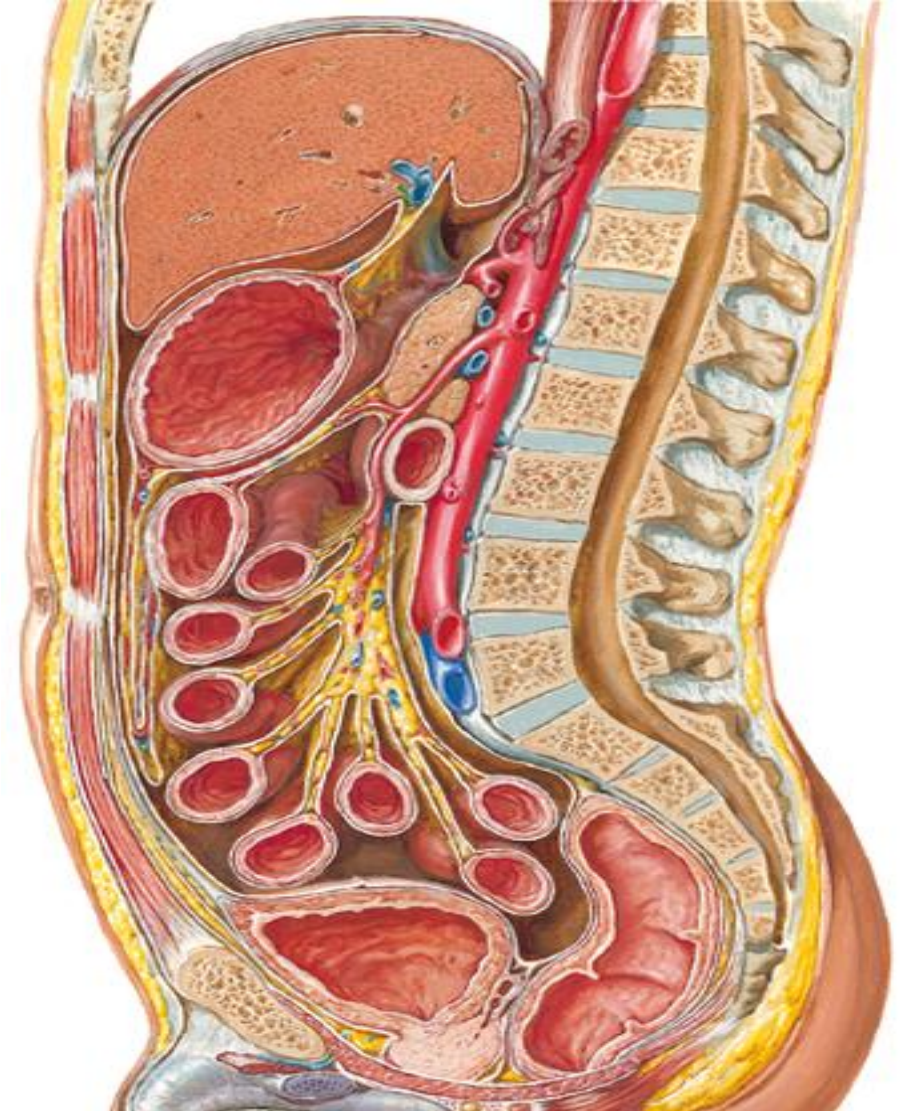
\* The hindgut is supplied by **the inferior mesenteric artery**.

\* The **venous blood** of the gut is drained by **the portal vein**.



# Peritoneum

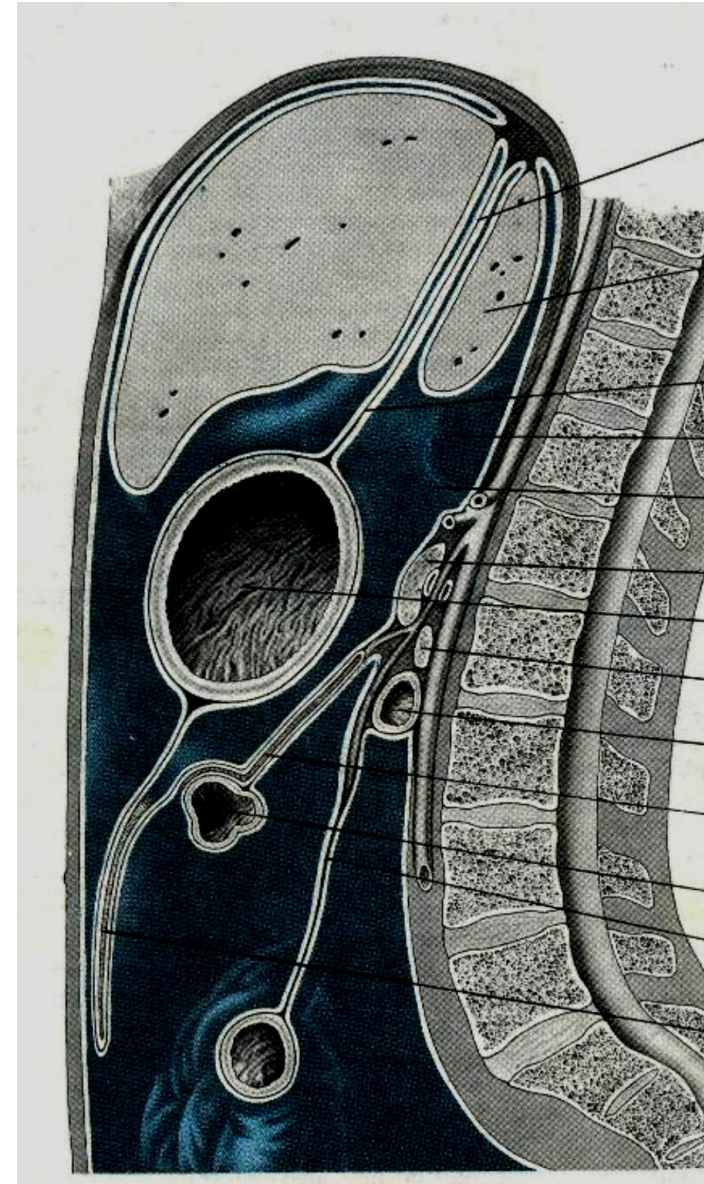
- \* It is a **serous sac** which lines the abdominal wall and covers the abdominal and pelvic organs
- \* **It is formed of 2 layers; parietal and visceral layers:**
  1. **The parietal layer** → lines the abdominal wall.
  2. **The visceral layer** → covers the abdominal organs.
- \* Between the 2 layers, there is a potential space called the **peritoneal cavity** which contains a little amount of **peritoneal fluid**.
- \* **Ascites** = accumulation of fluid inside the peritoneal cavity.





## **\*\* Relations of abdominal viscera to the peritoneum:**

- 1. Some organs lie behind the peritoneum and are called retroperitoneal organs.** They are covered by parietal peritoneum from the front (as pancreas, kidney, ureter and most of duodenum).
- 2. Some organs are covered by peritoneum from the front and sides** (as ascending and descending colon).
- 3. Some organs are completely covered with peritoneum and they are mobile organs. These mobile organs are suspended by peritoneal folds and ligaments;** ( as stomach which is suspended by lesser and greater omentum, small intestine which is suspended by mesentery, transverse colon which is suspended by transverse mesocolon, and sigmoid colon which is suspended by sigmoid mesocolon).







# **General Anatomy**

## **Lecture 17: Gastrointestinal System (2)**

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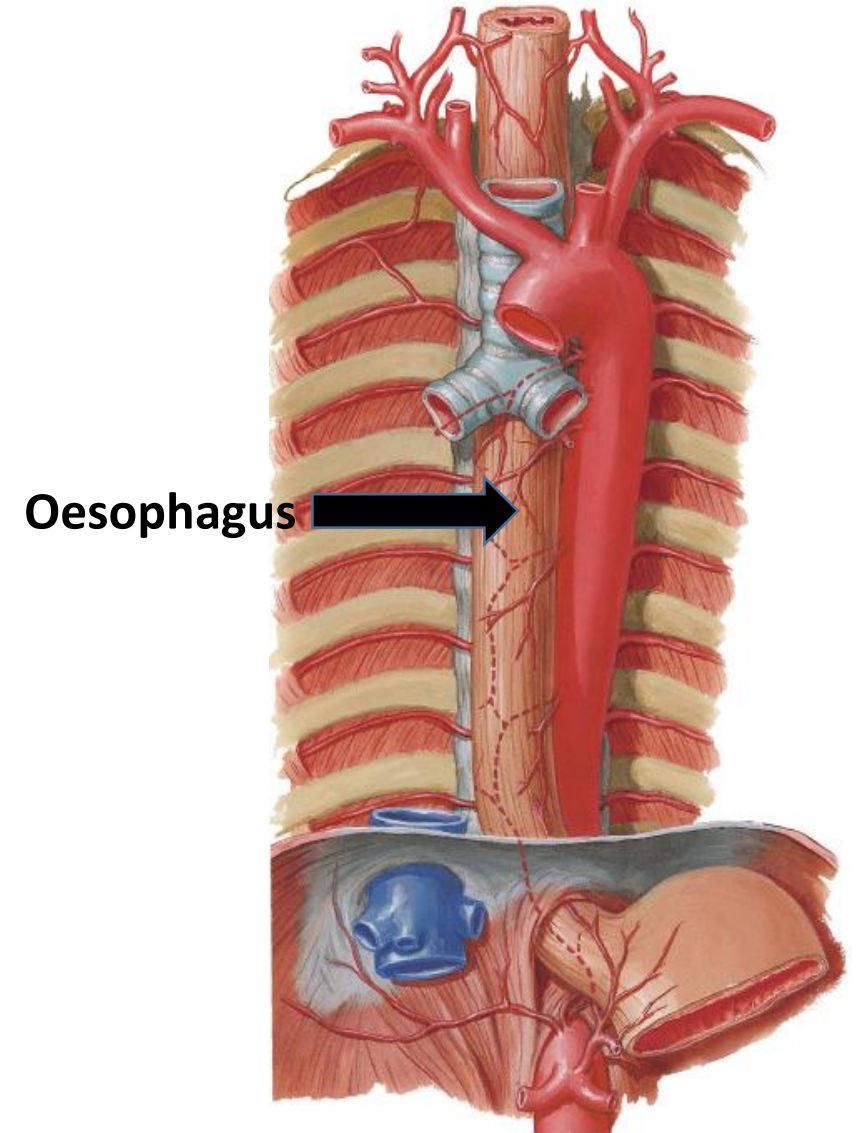
# Oesophagus

\* It is a **muscular tube** (continuation of pharynx) which extends from the level of 6th cervical vertebra (lower border of cricoid cartilage) to the cardiac end of stomach.

\* **Length:** 25 cms.

\* **Parts:**

1. A short **cervical** part.
2. A **long thoracic** part.
3. A short **abdominal** part which opens in the stomach.





# Stomach

\* It lies in the upper part of abdomen mainly to the left.

\* **It has:**

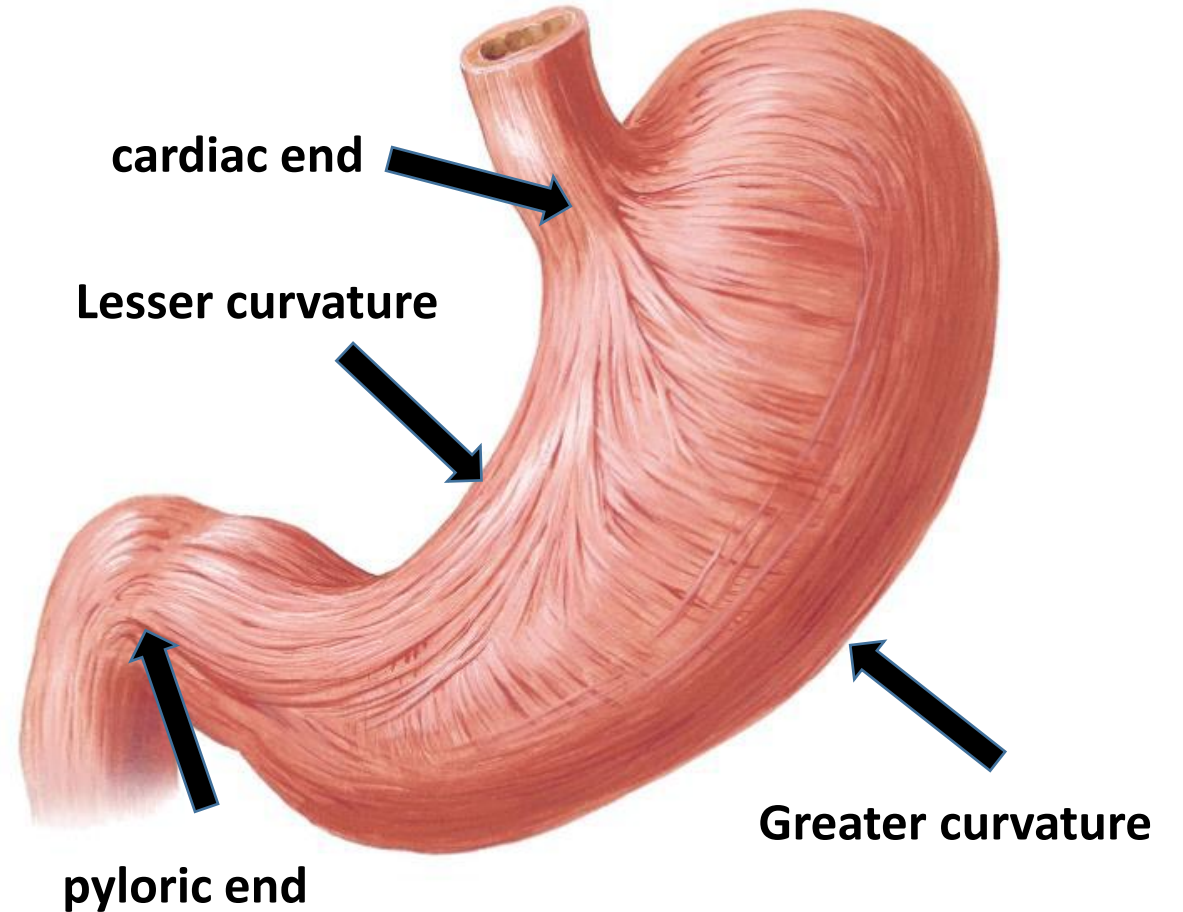
\*\* **2 ends:** 1. cardiac end.  
2. pyloric end.

\*\* **2 borders:**

1. Lesser curvature → to the right.  
2. Greater curvature → to the left.

\*\* **2 surfaces:**

1. Anterior surface.  
2. Posterior surface.



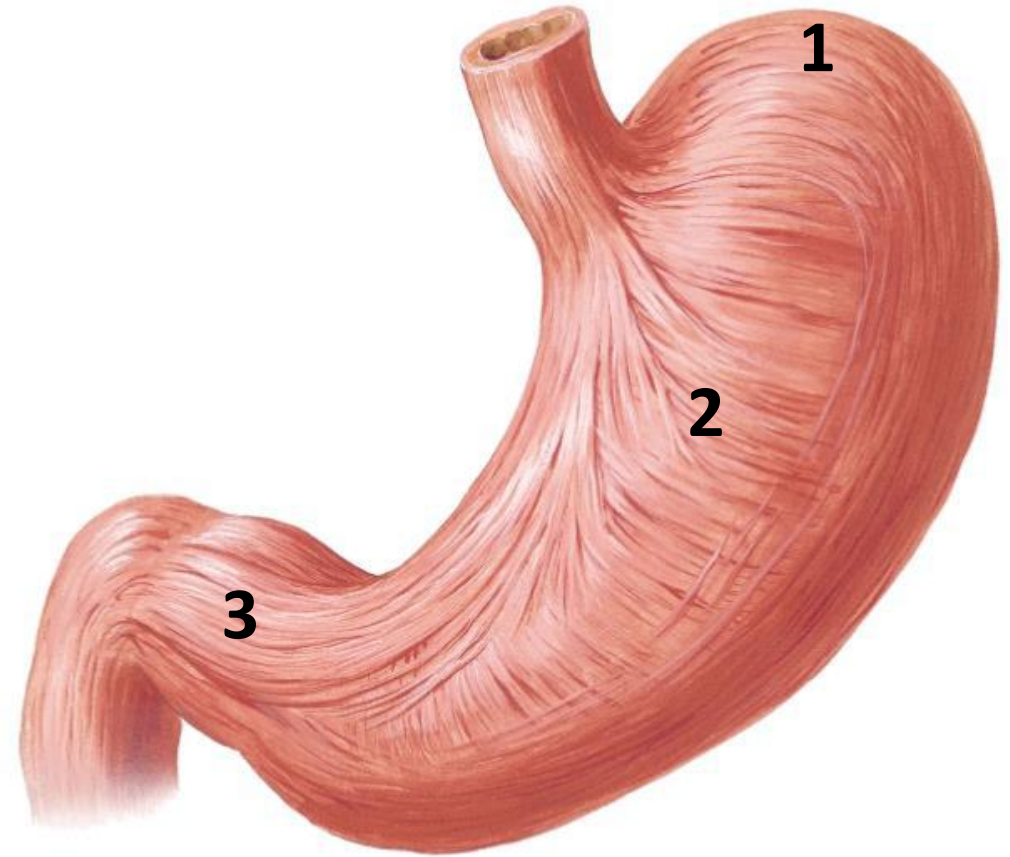
# Stomach (Contd)

\* It is formed of three parts:

1. Fundus.
2. Body.
3. Pyloric part.

\* **Peritoneal covering of the stomach:**

It is mostly covered with peritoneum.

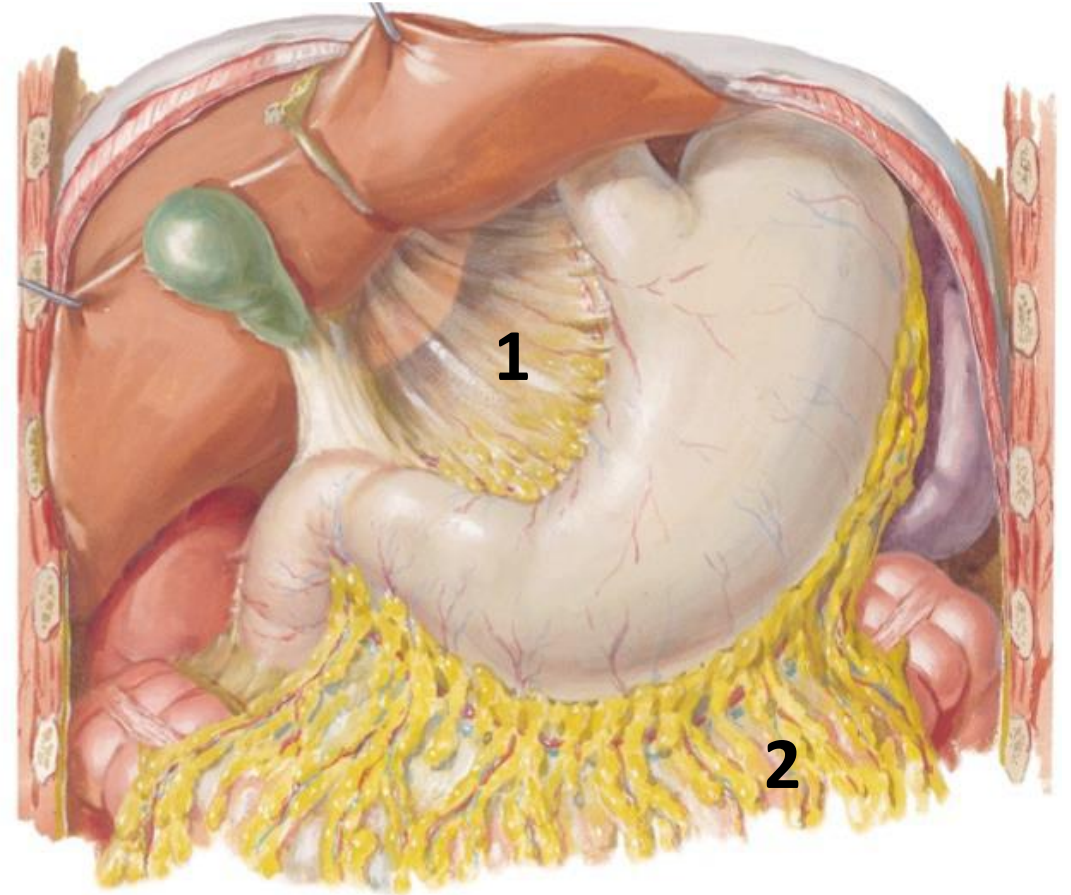




# Stomach (Contd)

## \* Peritoneal folds of stomach:

- 1. Lesser omentum:** It extends from the liver to the lesser curvature.
- 2. Greater omentum:** It is attached to the greater curvature and lies in the front of the intestine.



# Small Intestine

\*\* It is formed of duodenum, jejunum and ileum.

## I. Duodenum:

\* It is C-shaped and formed of 4 parts.

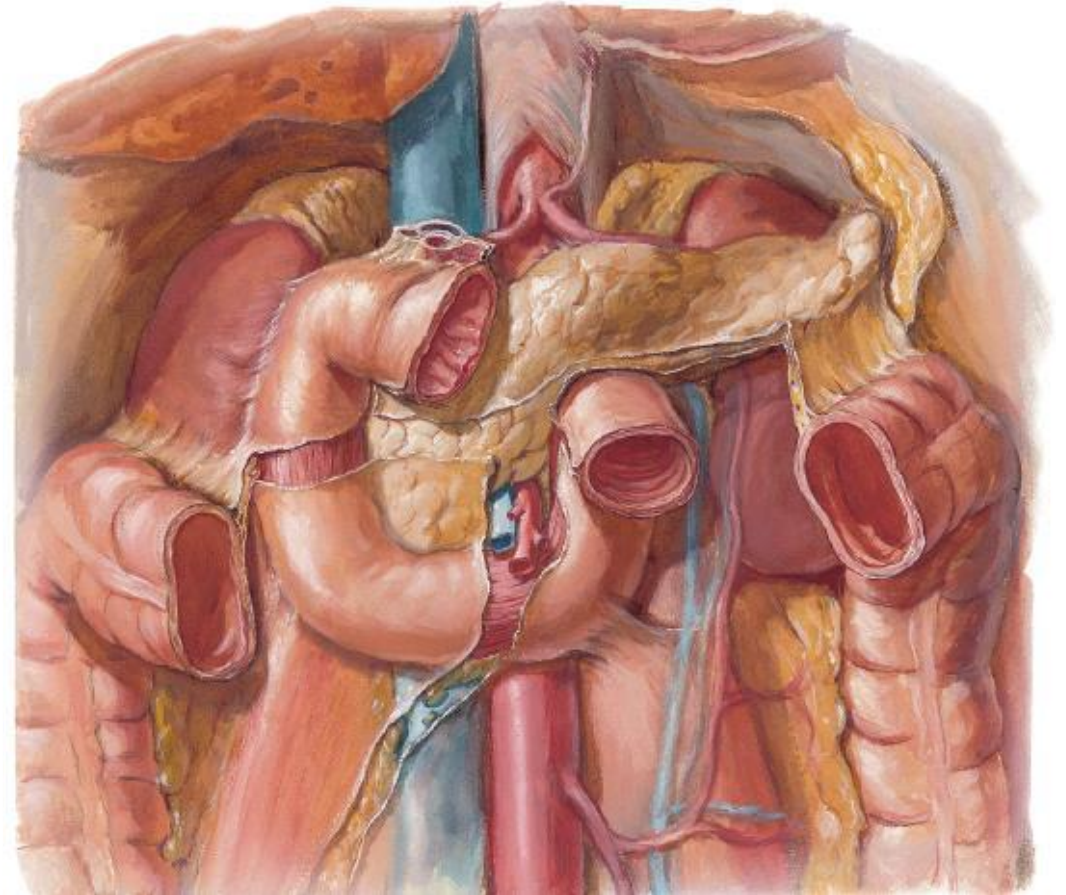
\* Length: 25 cms.

\* Peritoneal covering: it is retroperitoneal (except for the 1st inch of the 1st part which is covered with peritoneum).

\* **Openings in the second part of duodenum:**

**1. The main pancreatic duct** joins the common bile duct to open together.

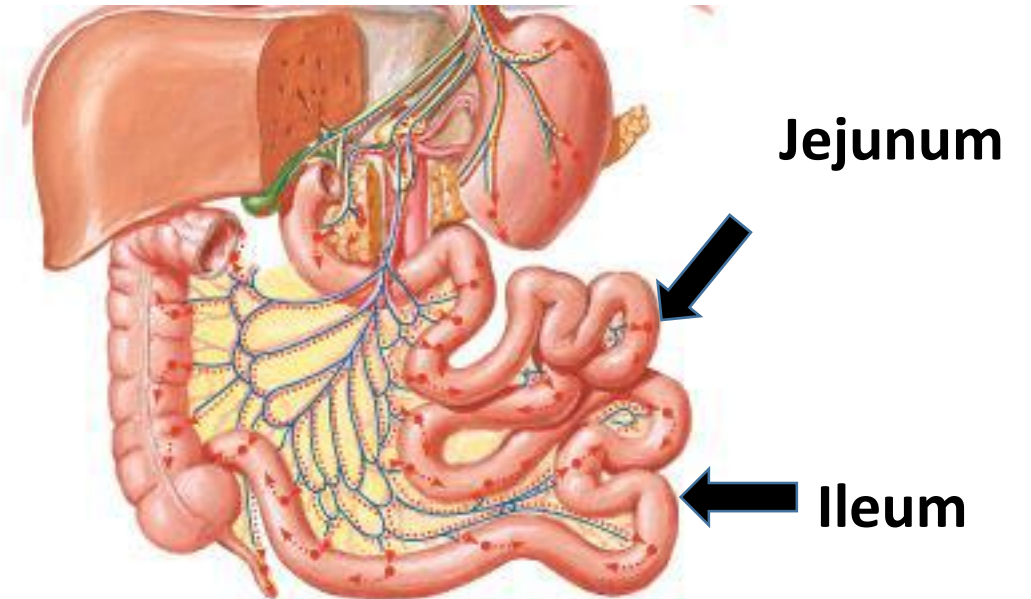
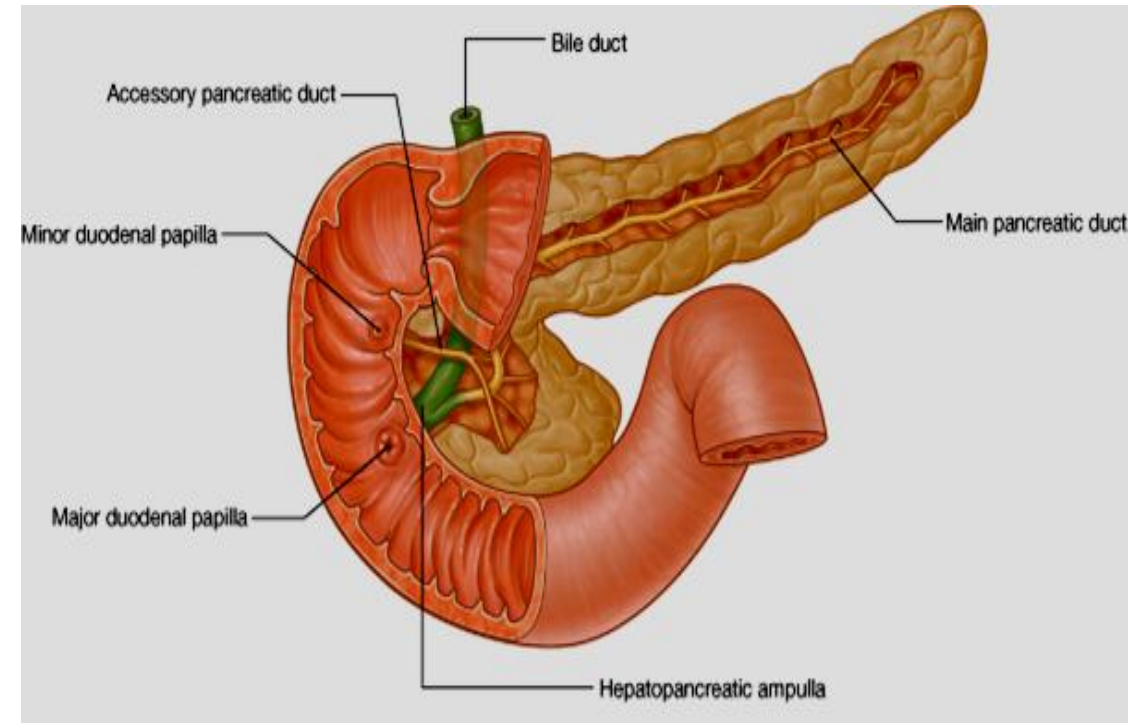
**2. Accessory pancreatic duct.**



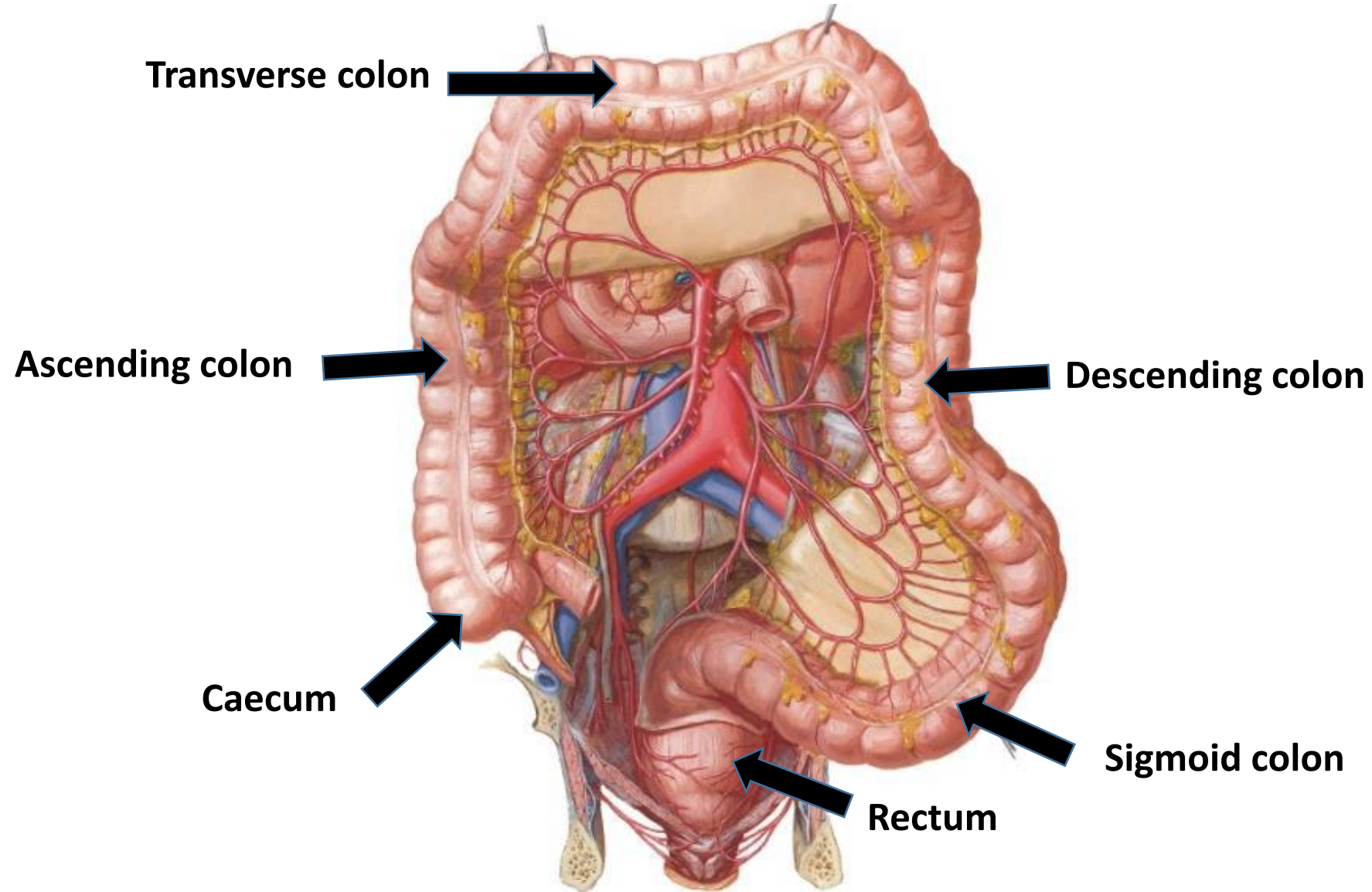


## II. Free Parts of Small Intestine:

- \* These are the **jejunum and ileum**.
- \* They are about **6 meters** in length.
- \* The jejunum constitutes the proximal 2/5 and the ileum constitutes the distal 3/5.
- \* The ileum opens in the Caecum.
- \* They are **freely mobile** as they are completely covered by peritoneum and suspended by a peritoneal fold called **mesentery**.



# Large Intestine

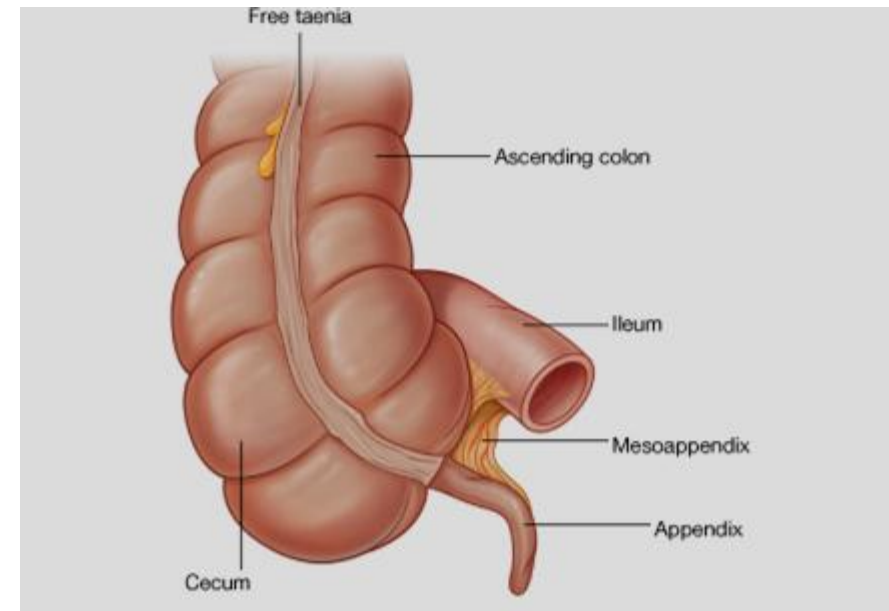




# Large Intestine

## 1. Caecum:

- \* It is a sac which receives the ileum and opens in the ascending colon.
- \* Length: 2.5 inches.
- \* The **vermiform appendix** is attached to the caecum.
- \* As the appendix and the umbilicus are supplied by the same nervous segment, the pain from the appendix is referred to the **umbilicus**.



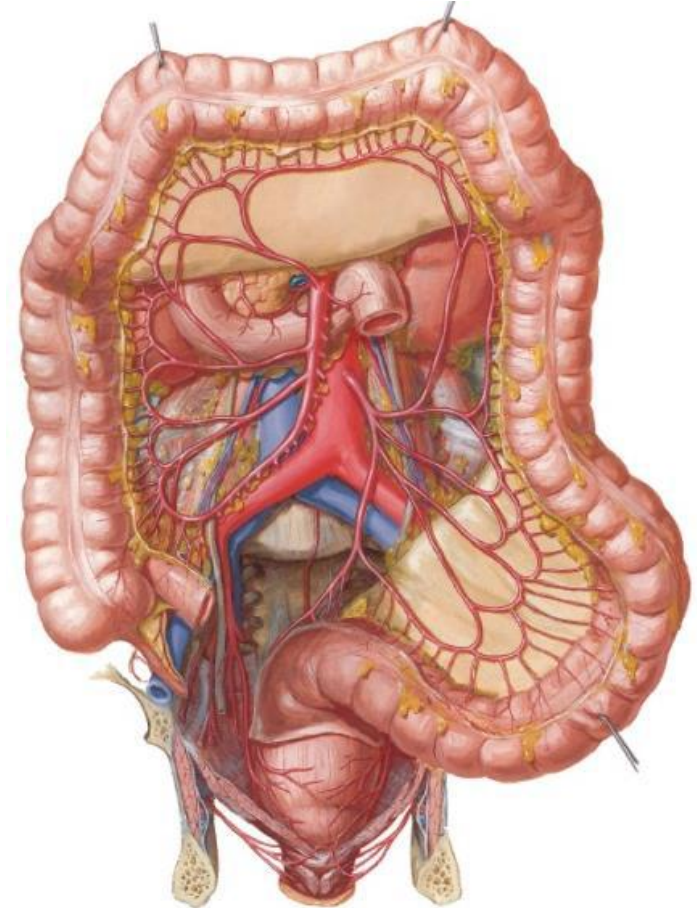
# Large Intestine

## 2. Ascending colon:

- \* It extends from the caecum to the right colic (hepatic) flexure.
- \* Length: 5 inches.
- \* It is covered by peritoneum from the front and sides only.

## 3. Transverse colon:

- \* It extends from the hepatic flexure to the left colic (splenic) flexure.
- \* Length: 20 inches.
- \* It is completely covered by peritoneum and suspended by a peritoneal fold called **transverse mesocolon**.



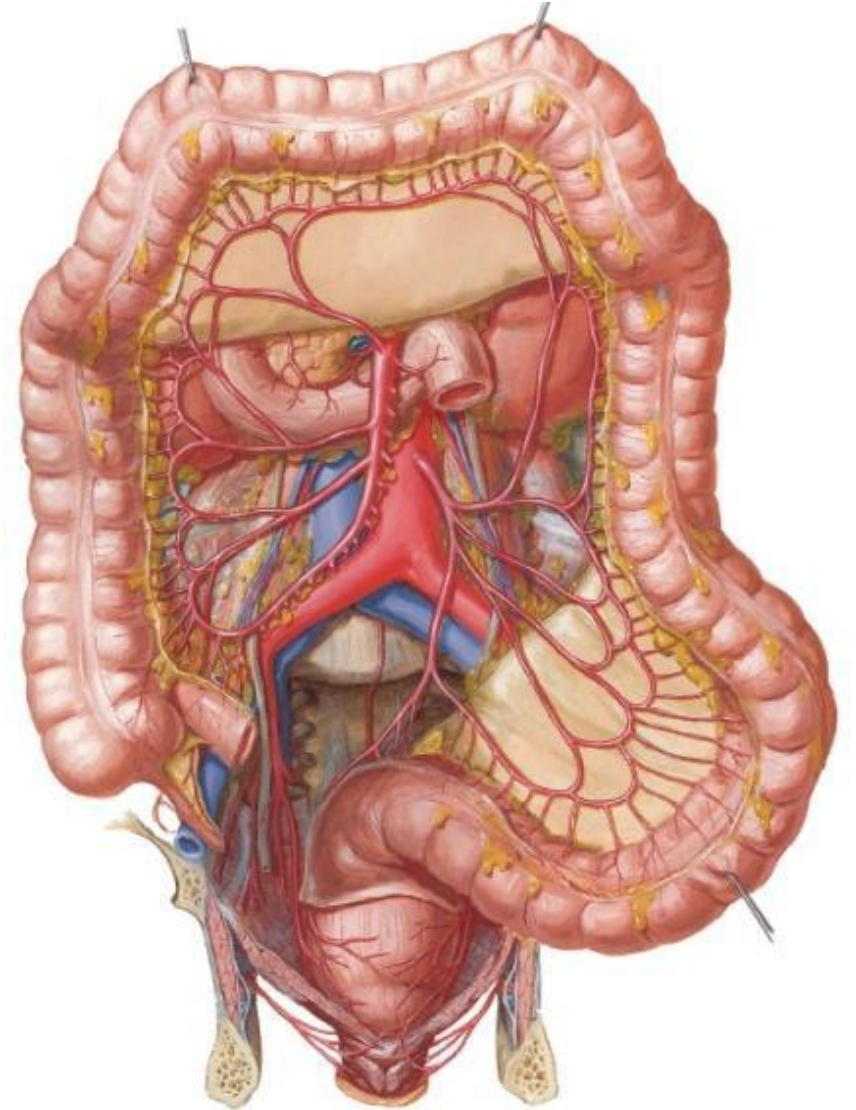
# Large Intestine

## 4. Descending colon:

- \* It extends from the splenic flexure to the sigmoid colon.
- \* Length: 10 inches.
- \* As ascending colon, it is covered by peritoneum from front and sides only.

## 5. Sigmoid colon (Pelvic colon):

- \* It extends from the end of descending colon, enters the pelvis and takes an S-shape.
- \* It ends in front of the 3rd sacral vertebra where the rectum begins.
- \* Length: 15 inches.
- \* It is completely covered by peritoneum and suspended by a peritoneal fold called **sigmoid mesocolon**.





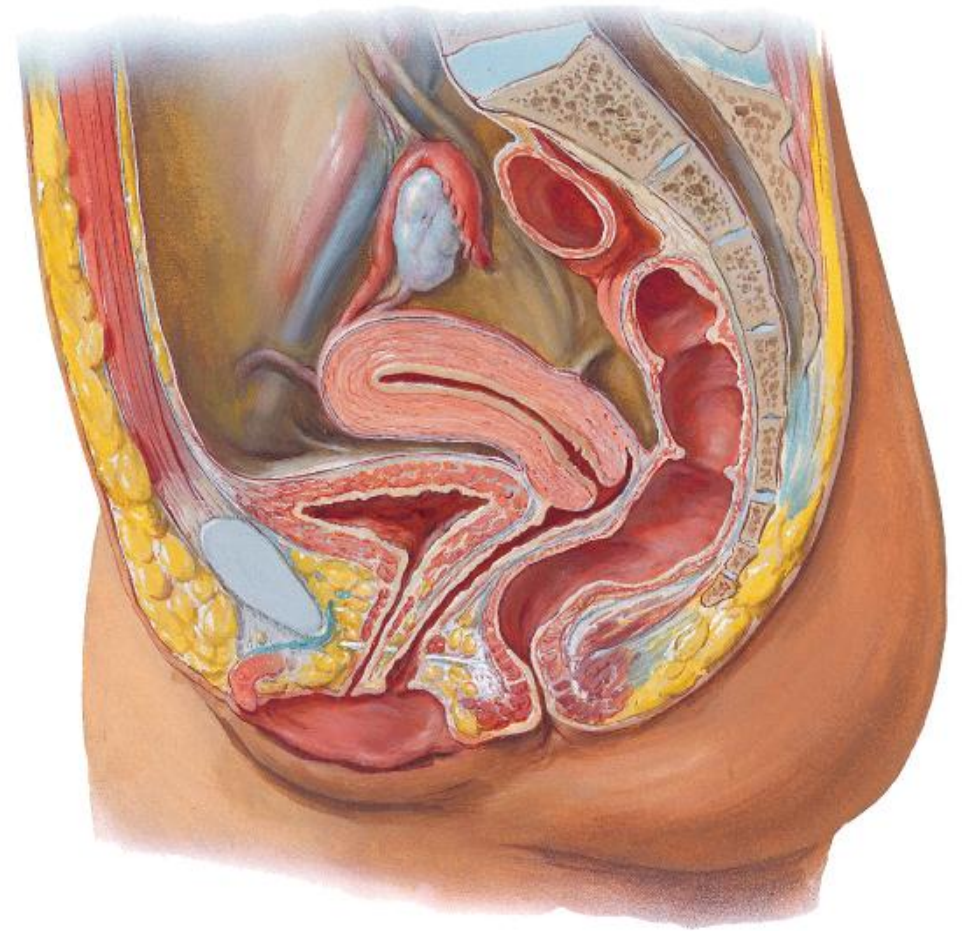
# Large Intestine

## 6. Rectum:

- \* It begins in front of the sacrum (at the level of 3rd sacral vertebra) and ends one inch in front and below the coccyx.
- \* Peritoneal covering of rectum:
  - Upper third: covered from the front and sides.
  - Middle third: covered from the front only.
  - Lower third: not covered with peritoneum.

## 7. Anal canal:

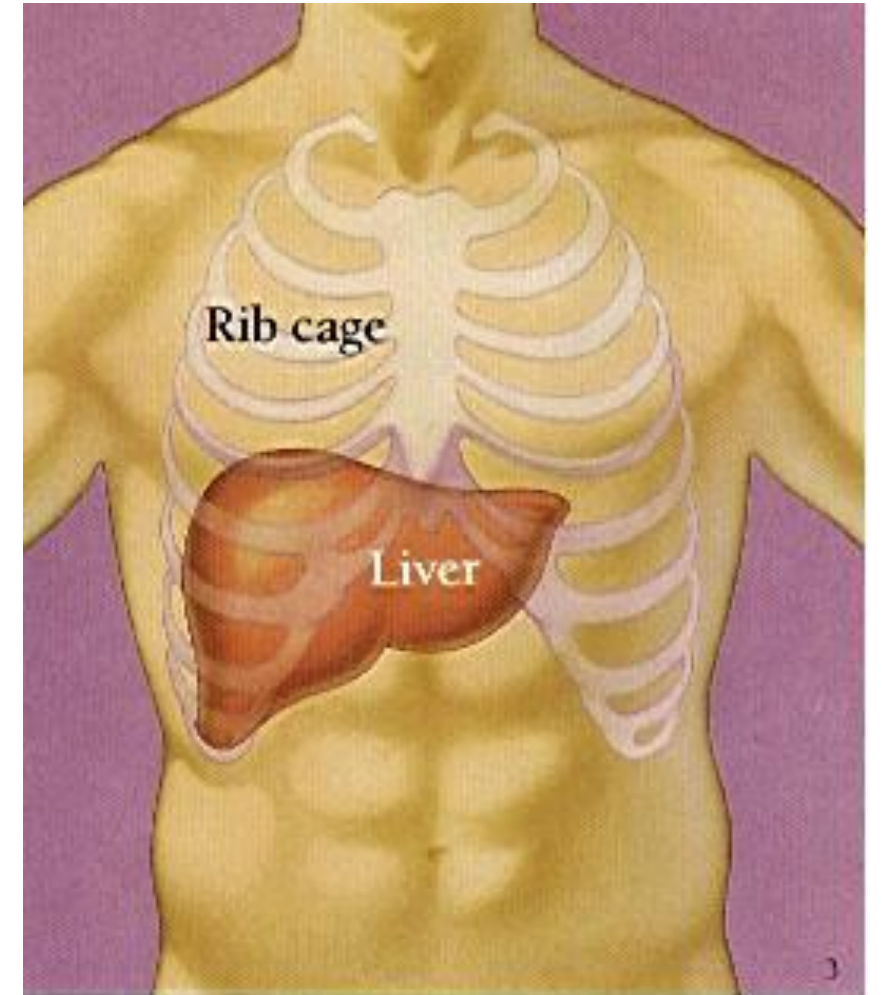
- \* It begins one inch in front and below coccyx and ends at the anus.
- \* Length: 4 cms.
- \* It is directed downward and posteriorly.



# Accessory Glands of G.I.T.

## A. Liver and Biliary System

- \* It is the **largest gland** in the body (1400 – 1800 gms weight).
- \* **Shape: Wedge-shaped** with its rounded base to the right.
- \* **Surfaces:** It has **5 surfaces**; anterior, superior, posterior, right (diaphragmatic) and inferior (visceral).



# Surfaces of Liver

## 1. Anterior Surface:

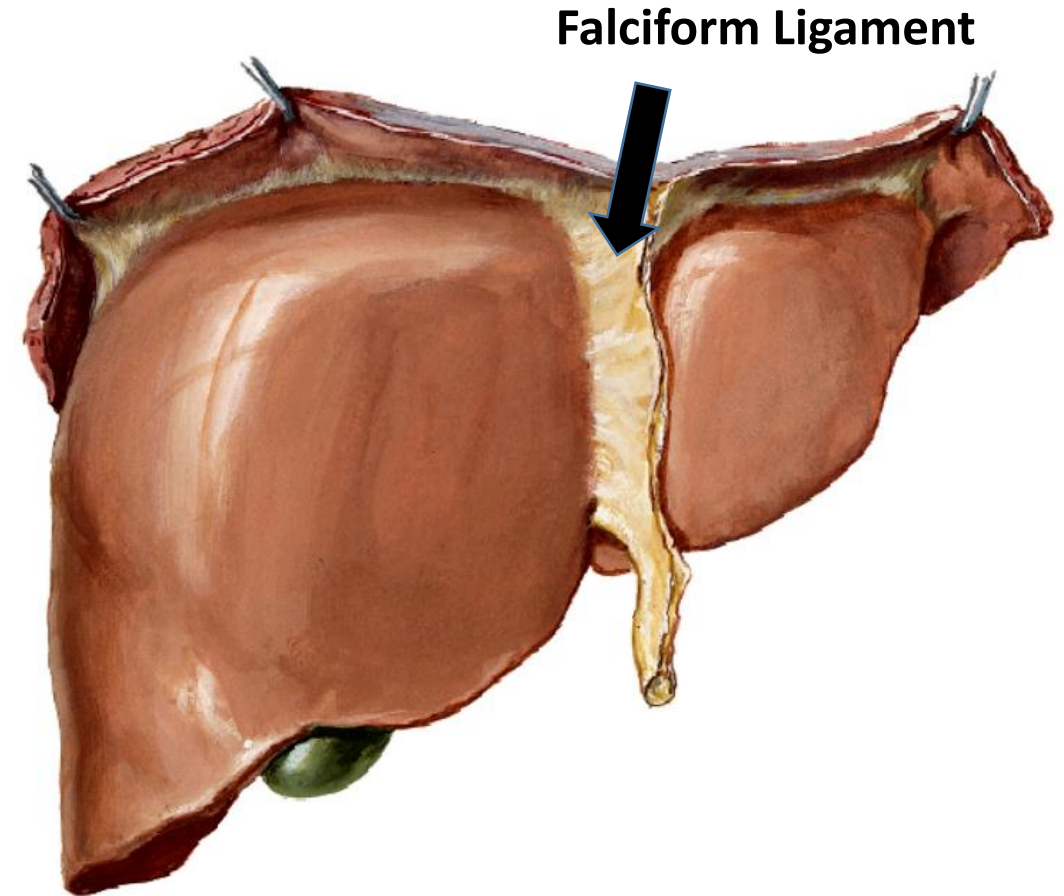
\* Gives attachment of falciform ligament.

## 2. Superior surface:

\* Related to diaphragm.

## 3. Right surface (Base):

\* Related to diaphragm & ribs.

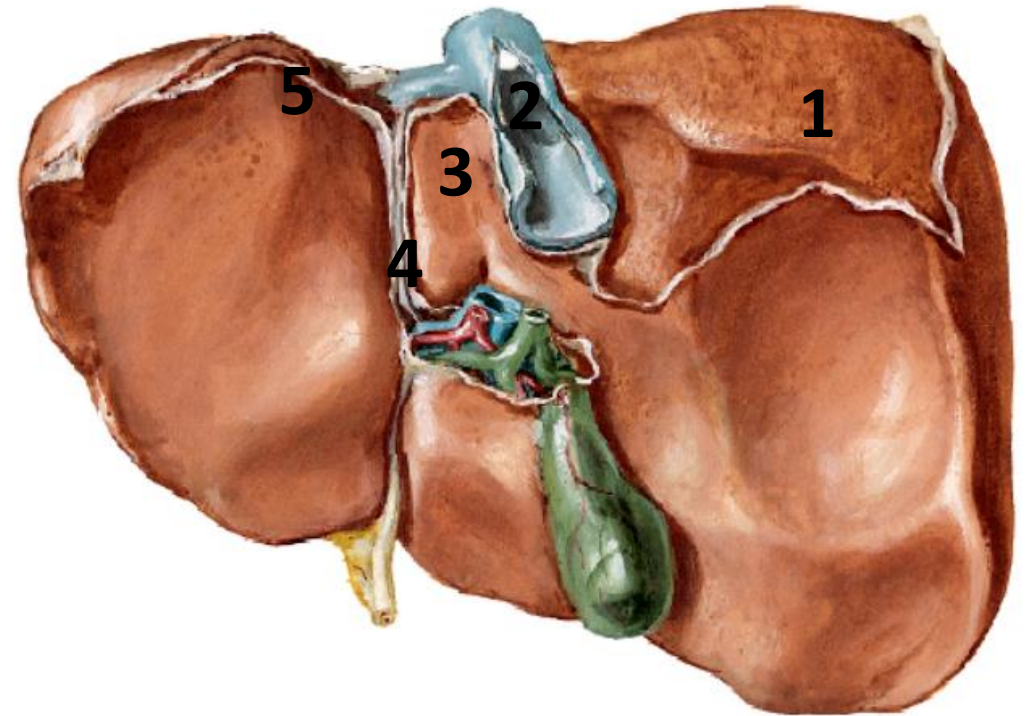




## 4. Posterior surface of liver:

\* It shows the following:

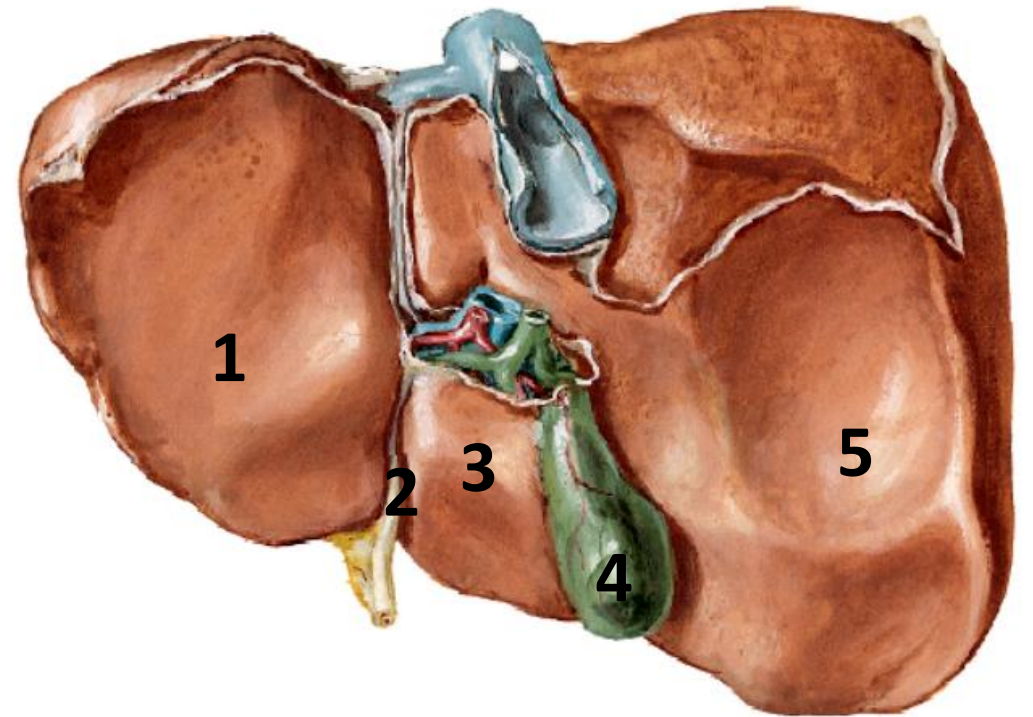
1. Bare area.
2. I.V.C. in caval groove.
3. Caudate lobe.
4. Fissure for ligamentum venosum.
5. Oesophageal impression.



## **5. Inferior surface of liver:**

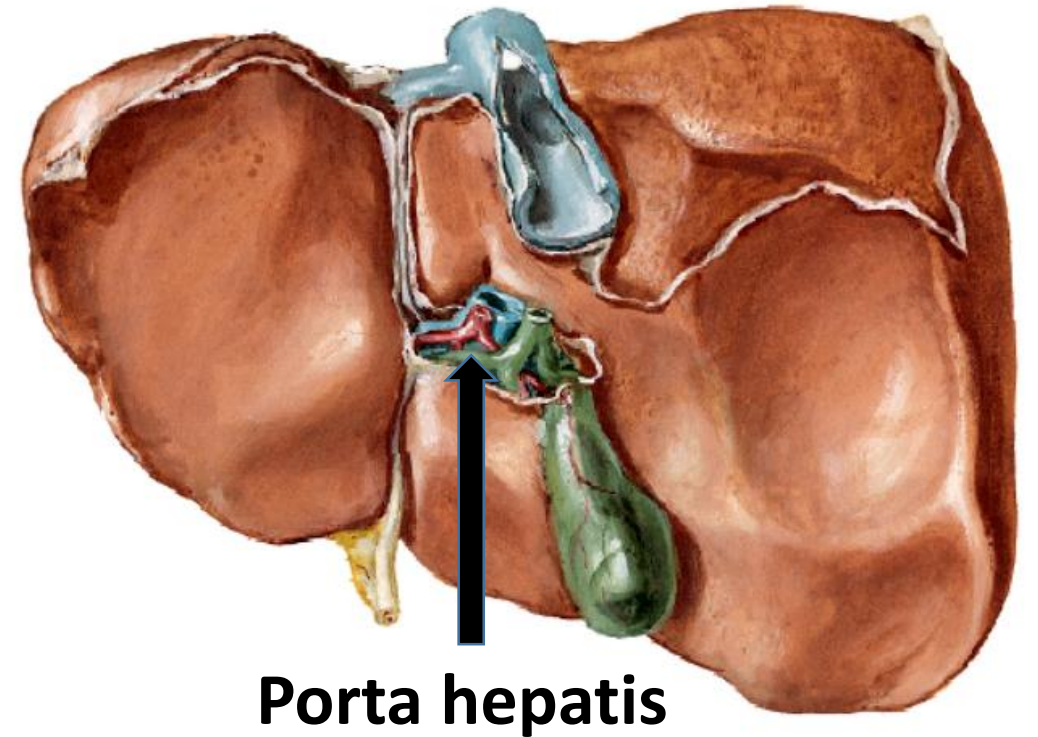
**\* It shows the following:**

- 1. Gastric impression.**
- 2. Fissure for ligamentum teres.**
- 3. Quadrate lobe.**
- 4. Gall bladder in its fossa.**
- 5. Renal impression.**



## **\*\* Porta hepatis:**

- \* It is the hilum of the liver.**
- \* It lies between the caudate and quadrate lobes of the liver.**
- \* Structures passing through it:**
  - 1. Portal vein and its branches.**
  - 2. Hepatic artery and its branches.**
  - 3. Hepatic ducts.**



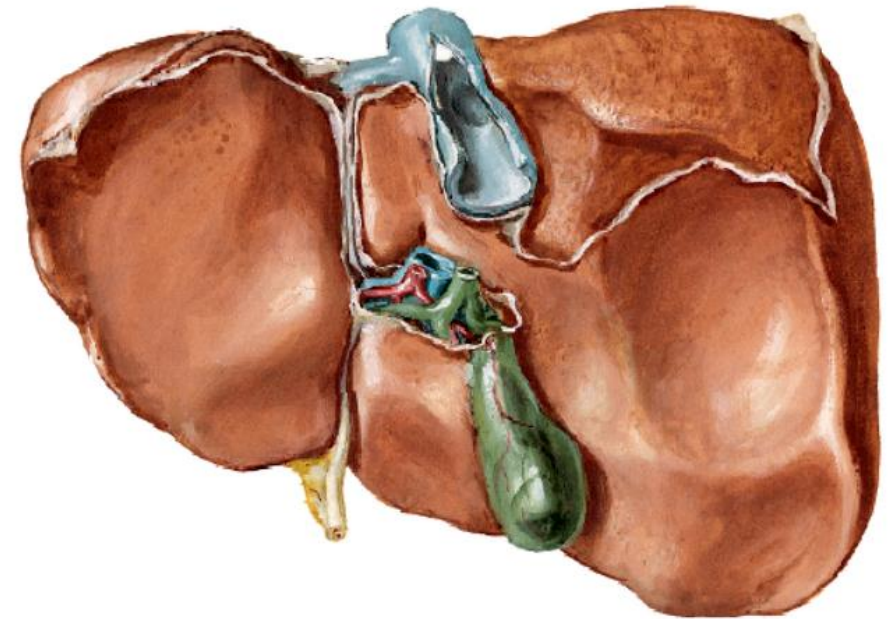


## **\*\* Lobes of liver:**

**\* Anatomically** → the liver is divided by falciform ligament, fissure for ligamentum venosum and fissure for ligamentum teres, into:

- 1. Larger right lobe (including caudate & quadrate lobes).**
- 2. Smaller left lobe.**

**\* Physiologically & functionally** → the caudate & the quadrate lobes belong to the left lobe.



## **\*\* Blood supply of the liver:**

**1. Hepatic artery.**

**2. Portal vein.**

\* Both divide at the porta hepatis into right and left branches.

\* Physiologically, hepatic artery → 25 % of blood and 50 % of oxygen demand, while portal vein → 75% of blood and 50 % of oxygen demand.

**3. Right & left hepatic veins** which drain into I.V.C.

## **\*\* Functions of the liver:**

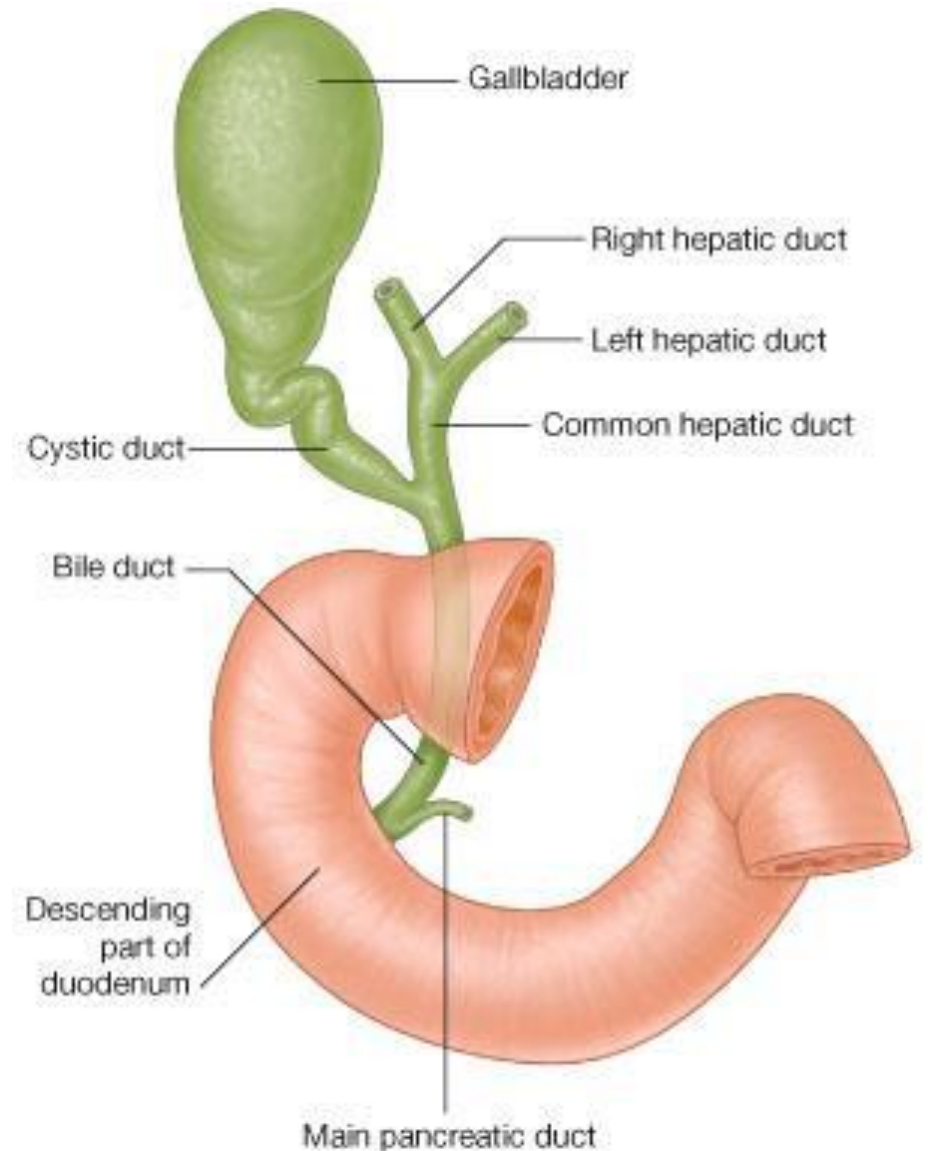
1. It receives venous blood loaded with products of digestion from G.I.T. through portal vein. The liver stores these nutrients and returns them back into circulation as needed e.g. Glycogen.
2. Secretes bile.
3. Detoxification of drugs and other toxins.



# Biliary system

**\*\* This system includes:**

1. Right and Left **hepatic ducts**.
2. **Common hepatic duct** (3 cms long).
3. **Gall bladder** formed of 3 parts; fundus, body and neck. The neck gives rise to **cystic duct** (3 cms long).
4. **Bile duct** (3 inches): formed by the union of common hepatic and cystic ducts.



# B. Pancreas

- \* A mixed endocrine and exocrine gland.
- \* An elongated gland (15 cms).
- \* It lies across the posterior abdominal wall from duodenum to spleen.
- \* It is mostly retroperitoneal.
- \* It is formed of 4 parts:
  1. Head.
  2. Neck.
  3. Body.
  4. Tail.

