



*Anatomy
Passion*



Lecture: Lina Imar

Done By: Gastrointestinal System



الجامعة الهاشمية
The Hashemite University



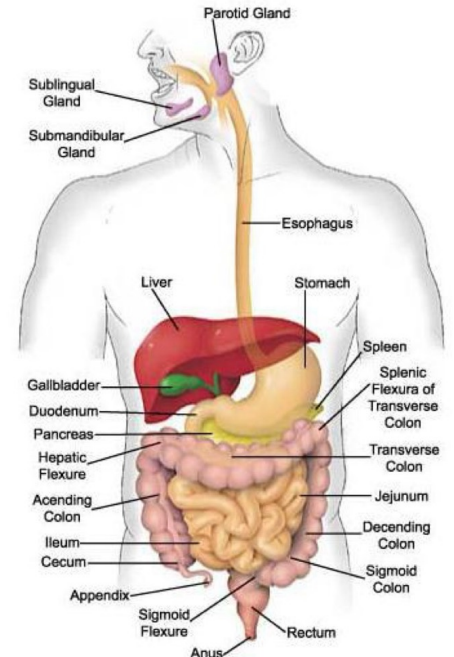
“اللهم لا سهل إلا ما جعلته سهلا وأنت تجعل الصعب إذا شئت سهلا”

General Anatomy

Lecture 16: Gastrointestinal System

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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.

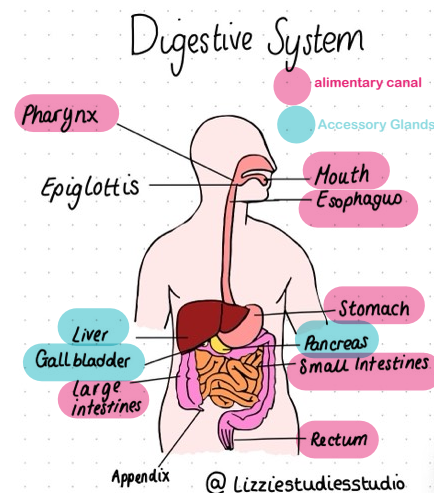
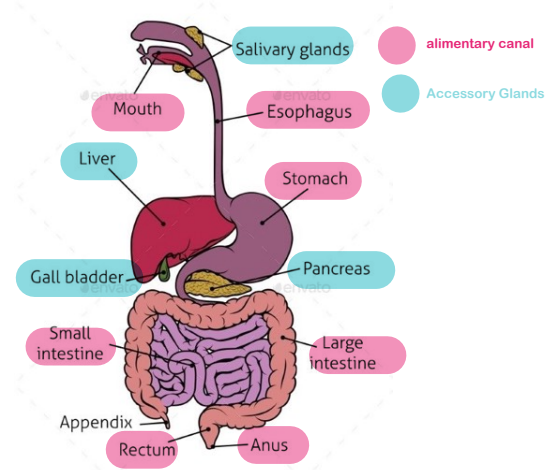


★ starts

Mouth → Pharynx → Esophagus → Stomach → Duodenum → Jejunum → Ileum

Ascending Colon → Transverse Colon → Descending Colon → Rectum → Anus

★ Ends



1) 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.

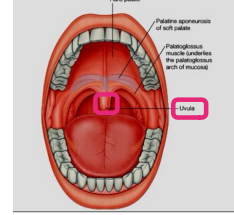
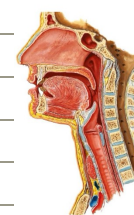
1) **The Roof:** Is formed anteriorly by the hard palate & posteriorly by the soft palate

* 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.

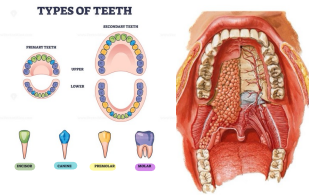
* During swallowing, the soft palate drawn upwards to close off the nasal part of pharynx and preventing swallowed food and liquid from entering nasal cavity.

2) **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.



Formed of maxilla & palatine

Teeth → قراءة ومو مطلوب نحفظ الارقام

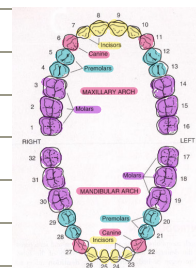


- * Are located in sockets of the maxillae and mandible.
- * The two sets of teeth make their appearance at different time of life.
- * The first set, called the deciduous teeth is temporary. The second set is called the permanent teeth

1) 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**



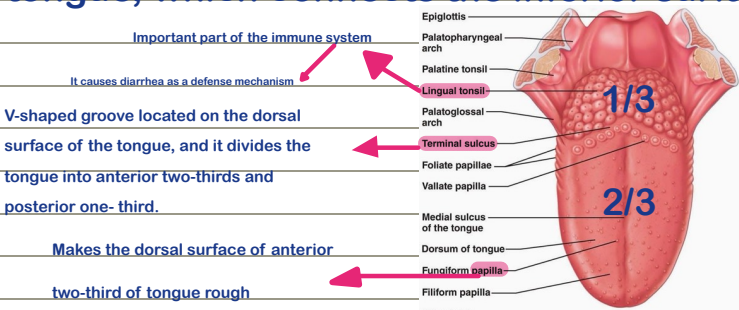
2) Permanent Teeth

- * 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** ||||
- Lateral incisors **8 years** ||||
- Second premolars **10 years** ||||
- Second molars **12 years** ||||
- Central incisors **7 years**
- First premolars **9 years**
- Canines **11 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.

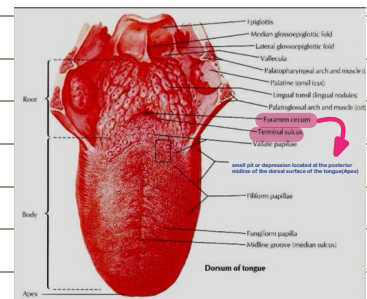
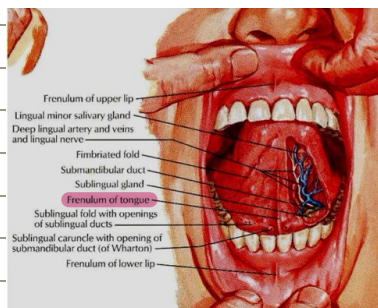


Important part of the immune system

It causes diarrhea as a defense mechanism

V-shaped groove located on the dorsal surface of the tongue, and it divides the tongue into anterior two-thirds and posterior one-third.

Makes the dorsal surface of anterior two-third of tongue rough



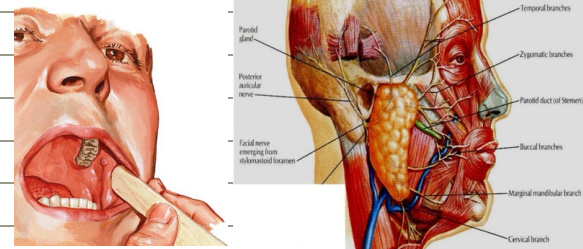
Salivary Glands

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 2nd molar tooth.

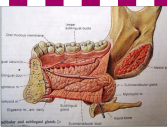
It runs superficially over Masseter muscle and deeps into buccinator muscle to open in vestibule of mouth and opens in papillae



B. Submandibular Gland:

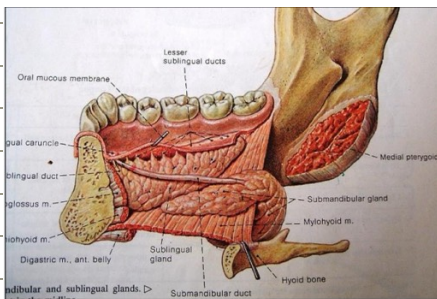
- * Lies beneath the base of tongue in the posterior part of the floor of mouth.
- * The submandibular duct opens into the floor of the mouth on a small papilla situated at the side of frenulum of tongue.

Submandibular (sublingual) papillae

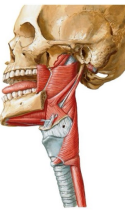


C. Sublingual Gland:

- * 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.



2) 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 (9th 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.



★ The venous blood of the gut ★



the portal vein

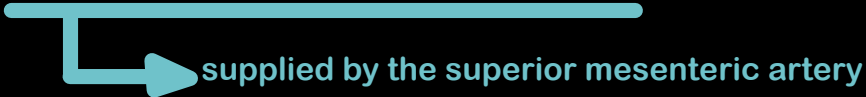
Foregut

- oesophagus
- stomach
- first part of duodenum
- upper part of second part of duodenum



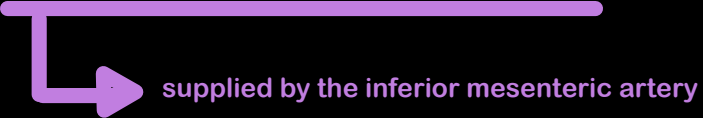
Midgut

- the rest of duodenum
- jejunum
- ileum
- ascending colon
- the right 2/3 of transverse colon



Hindgut

- the left 1/3 of transverse colon
- descending colon
- sigmoid colon
- rectum
- anal canal



3) The Gut

* The alimentary tract is divided into:

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

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

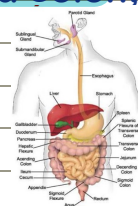
2. **Midgut**: it includes the rest of duodenum, **jejunum, ileum, ascending colon and the right 2/3 of transverse colon.**

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

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:

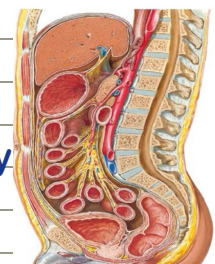
1. The parietal layer → lines the abdominal wall.

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.**

→ liver cirrhosis is a primary cause of ascites, and it can be associated with portal hypertension, esophageal varices and blood vomiting, and it is caused by schistosomes which lead to severe inflammation in liver

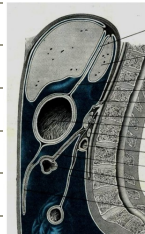


**Relations of abdominal viscera to the peritoneum:

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.**)



Relations of abdominal viscera to the peritoneum

Verrry important

organs covered by parietal peritoneum from the front

- pancreas
- kidney
- ureter
- most of duodenum

organs are covered by peritoneum from the front and sides

- ascending colon
- descending colon

organs are completely covered with peritoneum

- stomach
suspended by lesser and greater omentum
- small intestine
suspended by mesentery
- transverse colon
suspended by transverse mesocolon
- sigmoid colon
suspended by sigmoid mesocolon

lie behind the peritoneum

called retroperitoneal organs

are mobile organs

suspended by peritoneal folds and ligaments

4) Oesophagus

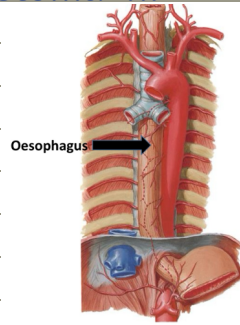
* It is a muscular tube (continuation of pharynx) which extends from the level of 6th cervical vertebra (lower border of cricoid cartilage) to the cardiac end of stomach.

* Length: 25 cms.

★ From neck to stomach★

* Parts:

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



5) Stomach

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

* It has: 2 ends & 2 borders & 2 surfaces

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

* 2 borders:

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

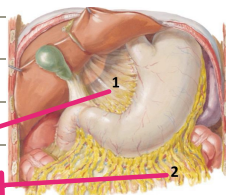
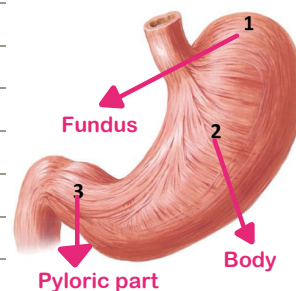
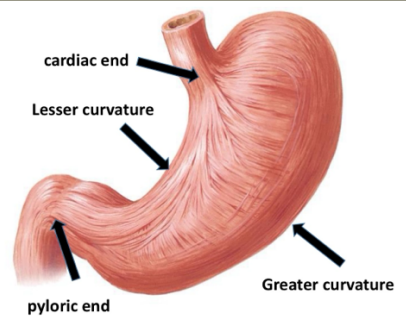
* 2 surfaces: 1. Anterior surface. 2. Posterior surface.

* It is formed of three parts: 1. Fundus. 2. Body. 3. Pyloric part.

* Peritoneal covering of the stomach: It is mostly covered with peritoneum.

* 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.



6) Small Intestine

* It is formed of duodenum, jejunum and ileum.

I. Duodenum:

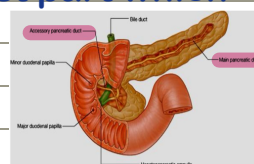
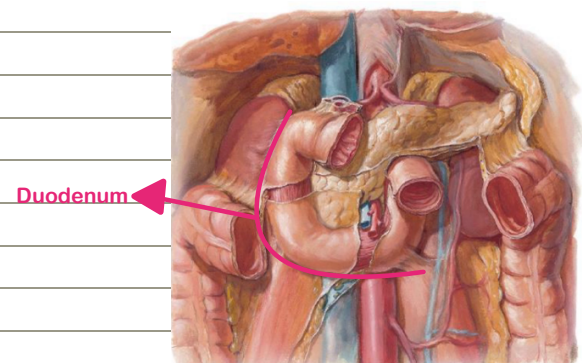
* It is C-shaped and formed of 4 parts.

* Length: 25 cms.

* Peritoneal covering: it is retroperitoneal (except for the 1st inch of the 1st part which is completely 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.



2. Free Parts of Small Intestine

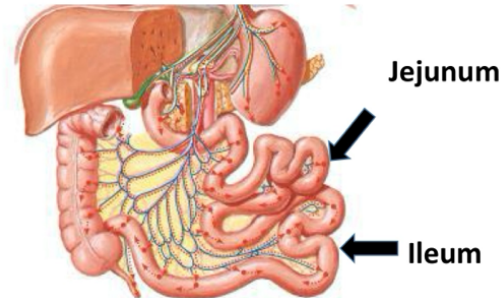
* These are the jejunum and ileum

* Length: 6m

* 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.



7) Large Intestine

1. Caecum:

* It is a sac which receives the ileum and opens in the ascending colon.

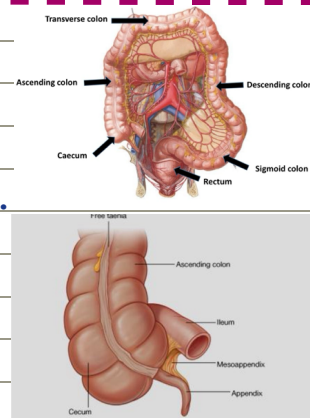
* Length: 2.5 inches.

الزائدة الدودية

* 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.

T10 dermatome nerve-supply

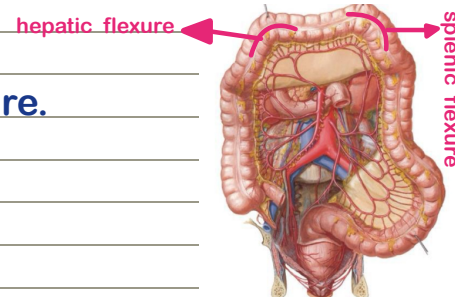


2. Ascending colon:

* 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.

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.

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.

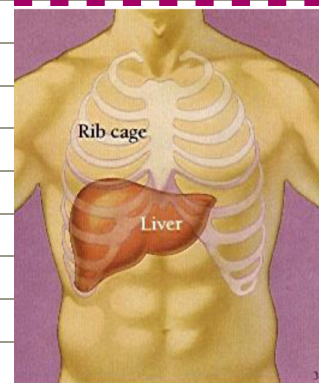
7. Anal canal:

- * 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.

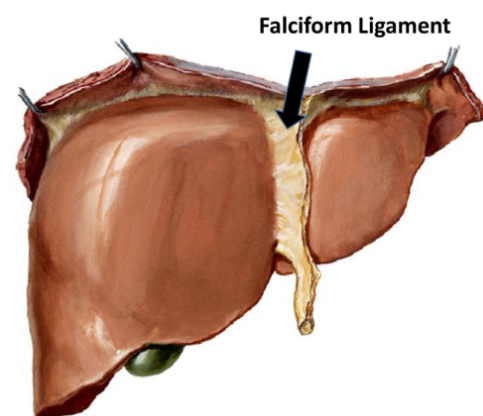
A. Liver and Biliary System

- * 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).



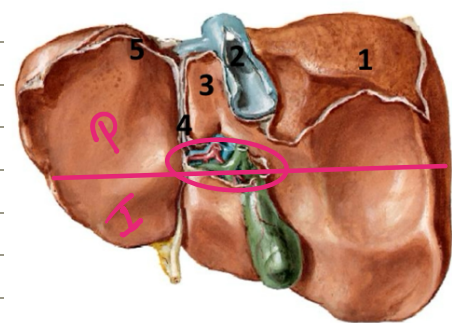
*Surfaces of Liver:

1. Anterior Surface: * Gives attachment of faliform ligament.
2. Superior surface: * Related to diaphragm.
3. Right surface (Base): * Related to diaphragm & ribs.



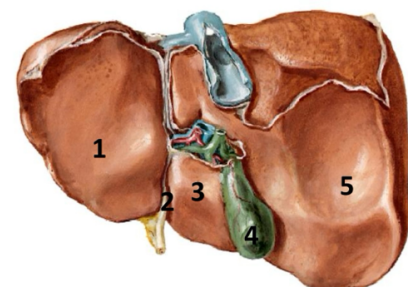
4. Posterior surface of liver: * It shows the following:

1. Bare area. → it is the only part which is not covered by peritoneum → From right to left
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.



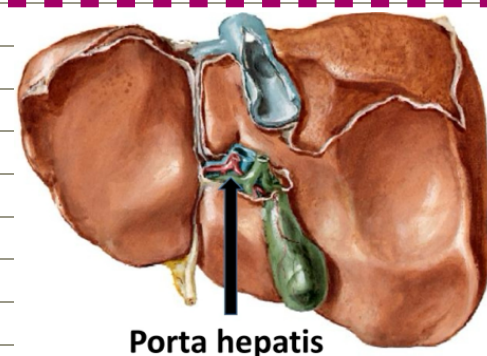
** Porta hepatis:

* It is the hilum of the liver.

* It lies between the caudate and quadrate lobes of the liver.

* Structures passing through it:

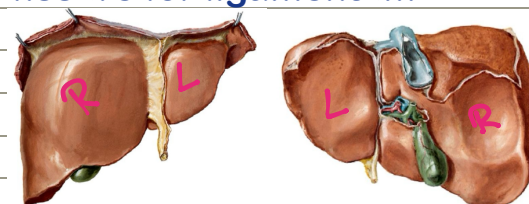
1. Portal vein and its branches.
2. Hepatic artery and its branches.
3. Hepatic ducts.



** 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.

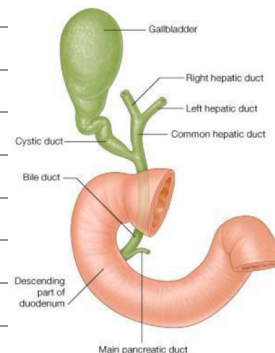
**** Functions of the liver:** → مو مطلوب

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.

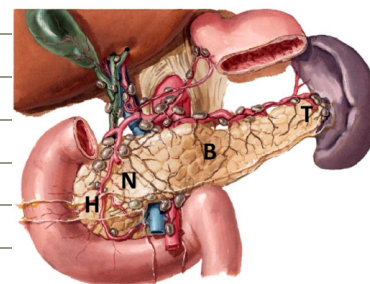
* An elongated gland (15 cms). ↪ Has duct

* 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.



1) The roof of mouth is formed anteriorly by:

- A) hard Palate
- B) soft palate
- C) vomer
- D) a + b

2) Which one of the salivary gland open into the floor of the mouth cavity proper:

- A) parotid Gland
- B) submandibular Gland
- C) sublingual gland

3)the stylopharyngeus muscle are supplied by:

- A) 1st cranial nerve
- B) cranial nerve th8
- C) 9th cranial nerve
- D) pharyngeal plexus

4)The upper part of second part of duodenum is supplied by:

- A) celiac trunk
- B) superior mesenteric artery
- C) inferior mesenteric artery
- D) Pharyngeal plexus

5)The mucous membrane covering the of tongue:

- A) dorsal surface of posterior two third
- B) dorsal surface of anterior two third
- C) dorsal surface of anterior one third
- D) dorsal surface of posterior one third

6)The venous blood of the gut is drained by:

- A) IVC
- B) SVC
- C) portal vein
- D) non of the above

7)the largest salivary gland is

- A)parotid gland
- B)submandibular gland
- C)sublingual gland

8)the..... duct opens into the floor of the mouth on a small papilla situated at the side of the frenulum of tongue

- A)parotid
- B)submandibular
- C)sublingual

9)stylopharyngeus muscle is supplied by

- A)pharyngeal plexus
- B)glossopharyngeal nerve
- C)facial nerve
- D)third cranial nerve

10)all of these are not retroperitoneal except:

- A)ureter
- B)ascending colon
- C)stomach
- D)sigmoid colon

11)one of the following called retroperitoneal organ:

- A) stomach
- B) pancreas
- C) intestine
- D) all part of colon

12)alimentary tract contains all of the following except

- A)pharynx
- B)esophagus
- C)stomach
- D)liver

13)all of these are supplied by the inferior mesenteric artery except A)anal canal

- B)ascending colon
- C)sigmoid colon
- D)decending colon

14)all of these are parts of the small intestine except

- A) duodenum
- B)jejunum
- C)caecum
- D)ileum

15)the free parts of small intestine are about

- A)6 inches in long
- B)4 meter in long
- C)4 inches in long
- D)6 meter in long

16)which part of large intestine is the second longest part of it

- A)ascending colon
- B)transverse colon
- C)descending colon
- D)sigmoid colon

17)posterior surface of liver contains all of the following except

- A)bare area
- B)IVC in caval groove
- C)caudate lobe
- D)fissure for ligamentum teres

18)the only vein in our bodies that has branches is:

- A)IVC
- B)renal vein
- C)portal vein
- D)hepatic vein

19)physiologically, the caudate and quadrate lobes belong to the left lobe

A>true

B>false

20)anal canal is directed:

A)downward and posteriorly

B)downward and anteriorly

C)upward and posteriorly

D)upward and anteriorly

Answers:

1)D

2)B

3)C

4)A

5)B

6)C

7)A

8)B

9)B

10)A

11)B

12)D

13)B

14)C

15)D

16)D

17)D

18)C

19)A

20)A

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