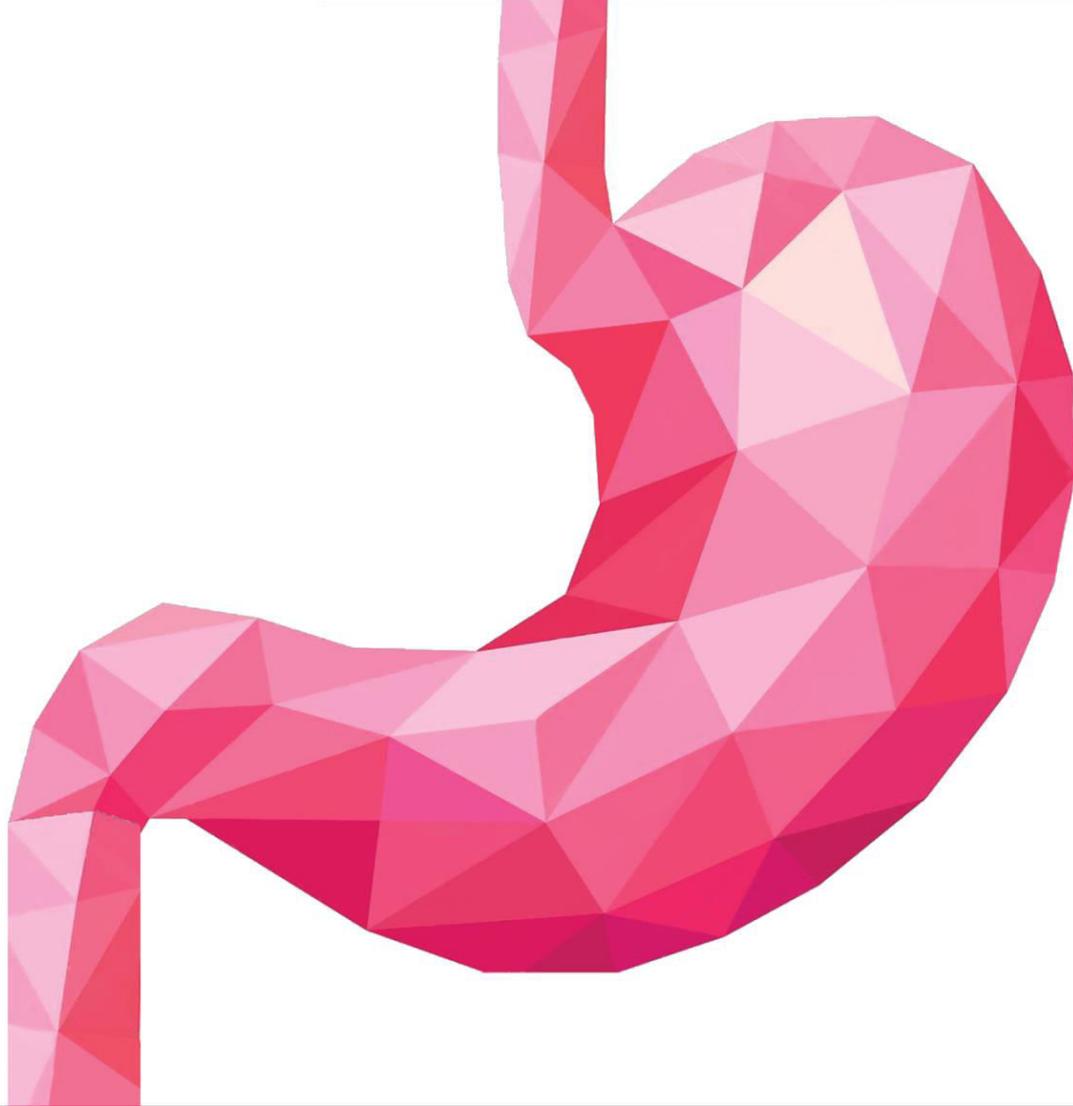




GIS 9

ANATOMY



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Scientific Correction: Haneen Abdalat

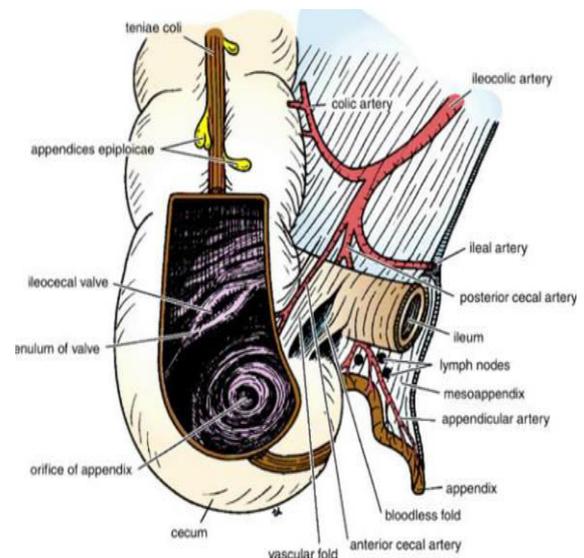
Gramatical Correction: Haneen Abdalat

Doctor: Mohammad Al-Mohtaseb

Appendix (from mid gut)

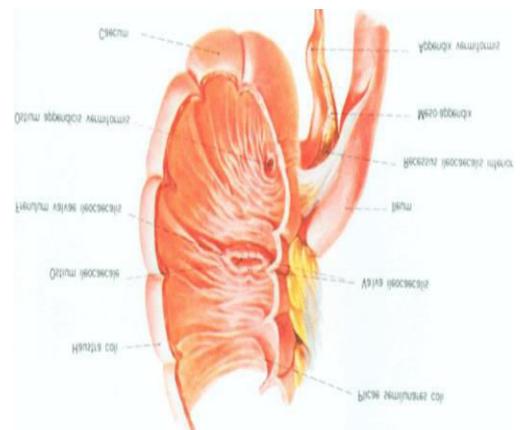
Location and Description:

- **Description** it is a narrow (with a very narrow lumen), muscular tube, containing a large amount of lymphoid tissue (it is considered as lymphatic tissue), but if it resected other lymphoid tissues in the body can compensate its function.
- Although it is a part of GI tract (mid gut), it has no role in digestion. It is involved in immunity.
- Its length from 3 to 5 inches, another books state from 2 to 22cm; it may be very short or very long due to the variation. (in infection the size is increased due to edema and inflammation)
- It has base, apex and mesoappendix(mesentery):
 - The base is attached to the posteromedial surface of the cecum about 1 in. (2.5 cm) below the ileocecal opening (junction/valve)
 - The remainder of the appendix is free.
- It has a complete peritoneal covering (intraperitoneal organ), which is attached to the mesentery of the small intestine by a short mesentery of its own, the mesoappendix.
- The mesoappendix contains the appendicular vessels, nerves, lymph nodes.



Position:

- The appendix is part of the large intestine, lies in the right iliac fossa, and in relation to the anterior abdominal wall, it may be found in different positions, including:
 1. Retrocecal: in retrocecal recess, behind cecum in 74% of people. (most common site).
 - Note: Cecum has fold of peritoneum, and this peritoneum form fossae and recesses like superior ileocecal, inferior ileocecal and retrocecal fossa.
 2. Pelvic: in pelvis related to Rt. Ovary and uterine tube in 21% of people.
 3. Subcecal: below cecum in 3.5% of people.
 4. Preileal: in front of ileum in 1% of people.
 5. Postileal: behind the ileum in 0.5% of people.



- To determine the location of appendix in retrocecal fossa: by tracking the tenia coli to the base until it converges around the appendix.

Surface anatomy of appendix – (McBurney's point):

>>McBurney is the finder of this point

- McBurney's point: the point between the upper 2 thirds and the lower third of the line joining the right anterior superior iliac spine to the umbilicus, where the base of the appendix is situated.
- Clinical case:

-when a patient with appendicitis ,after admitting him 24hours and analyzing his blood, if his WBC count was high and after following him, we are 50% sure that he has appendicitis, the only treatment we have is appendectomy, why?

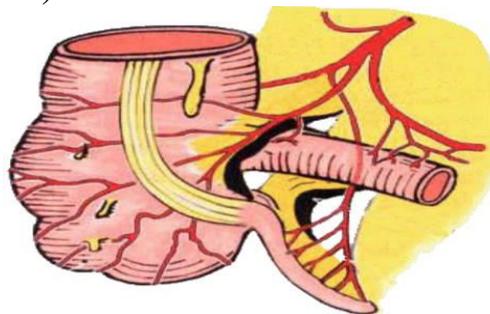
Because when the appendix is inflamed, it will be expanded, and has a congested lumen filled with fluids and blood. So, it is very important to treat it immediately to avoid its rupture that causes a very dangerous condition known as peritonitis.

- No sedative drugs or antibiotics must be given to avoid masking the symptoms.
- In the past, appendectomy was done by making an incision parallel to inguinal ligament and passes through McBurney's point. This incision, called McBurney's incision. Nowadays, endoscope is used instead, accompanied by surgical instruments passing through 4 openings around the umbilicus (6hs hospitalization).

Blood Supply of appendix:

- **Arteries:**

-The appendicular artery (A branch from posterior cecal artery (ilio-cecal artery), which descends behind the ileum).



- Note: Appendicular artery runs in a free margin of the mesoappendix

-Note: the superior mesenteric artery gives off a branch that is called the ileocecal artery which gives off a branch called posterior cecal artery.

- **Veins:**

- The appendicular vein drains to posterior cecal vein.

- **Lymphatic Drainage of appendix:**

- The lymph vessels drain into one or two nodes lying in the mesoappendix → eventually into the superior mesenteric nodes around the origin of superior mesenteric artery.

- **Nerve supply of the appendix:**

- The appendix is supplied by the sympathetic (vasomotor) and parasympathetic (vagus) nerves from the superior Mesenteric plexus.
 - Afferent sensory nerve fibers concerned with the conduction of visceral pain from the appendix accompany the sympathetic nerves and enter the spinal cord at the level of the 10th thoracic segment.
 - Also, the skin over umbilicus is innervated by T10 dermatome.

➔ So, appendicitis patients will feel pain around the umbilicus at the beginning of the appendicitis after that it will be concentrated in the region of the right iliac fossa.

- **Clinical notes:**

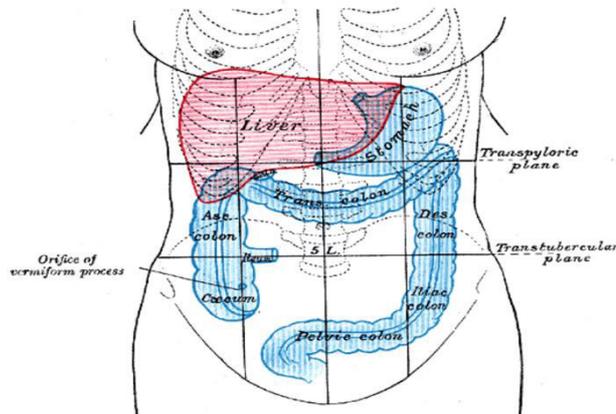
- ****Acute appendicitis is uncommon in the two extremes of life; it affects old adults and young children.**
 - Thrombosis of appendicular artery completely cuts off the blood supply which results in gangrene since there is just one artery for appendix. This results in perforation and drainage of fluids from the appendix into the right paracolic gutter.
 - While in acute cholecystitis, there will be no gangrene because more than one artery supplies the gallbladder (cystic artery + arterial supply directly from the liver (as it is embedded in the liver)).

****The dr said (also the slides) that acute appendicitis is uncommon in the two extremes of life. However, he continued that it affects old adults and young children >_<**

Ascending Colon (from midgut)

Location and Description:

- The ascending colon is about 5 inches (13 cm) long.
 - lies in the right lower quadrant.
 - It extends upward from the cecum to the inferior surface of the right lobe of the liver, where it turns to the left forming the right colic flexure (right hepatic flexure), then continues with the transverse colon.
 - Taenia coli, sacculations & appendices epiploicae are present.
 - The peritoneum covers the front and both sides of the ascending colon, fixing it to the posterior abdominal wall (Therefore, the ascending colon is retroperitoneal organ).
- ➔ Paracolic gutter presents on medial and lateral sides, this aids in the passage of fluid and infections.

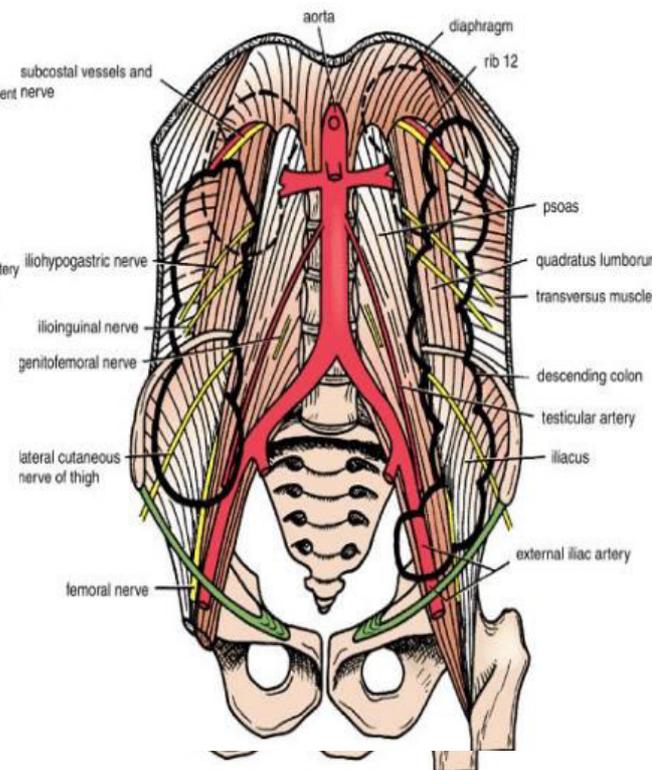
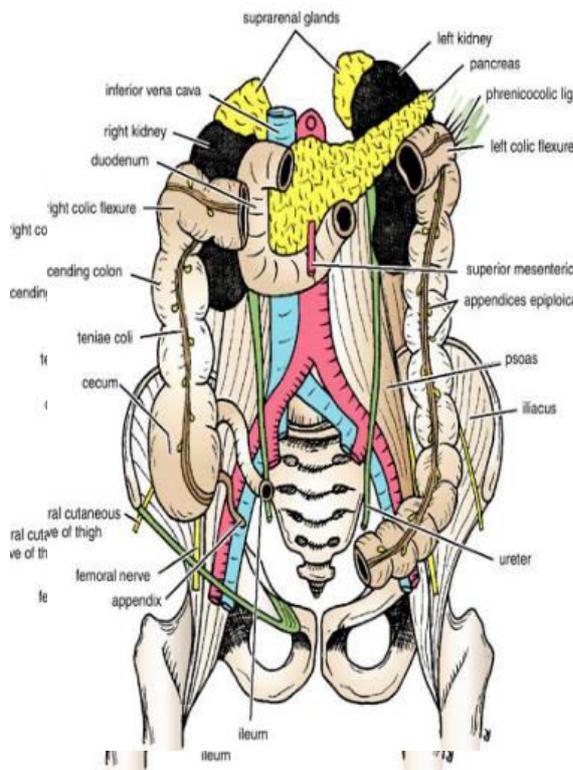


- From the pic. above, note that the left colic flexure (splenic flexure) is higher than the right colic flexure and is attached to phrenicocolic ligament.
- Phrenicocolic ligament (between the diaphragm and splenic flexure) has three functions:
 1. Fixation of the left colic flexure.
 2. Holding the spleen which lies above it.
 3. Prevent infection to pass upward under diaphragm.

Relations of ascending colon:

- Anteriorly:
 1. The anterior abdominal wall
 2. The greater omentum
 3. Coils of small intestine (ileum)
- Posteriorly:
 1. The iliacus muscle
 2. The iliac crest
 3. The quadratus lumborum
 4. The origin of the transversus abdominis muscle
 5. The lower pole of the right kidney
 6. The ilioinguinal and iliohypogastric nerves (L1) cross behind it.

NOTE: The ant. Relations are (same for both ascending and descending colons)



Blood Supply of Ascending colon:

Arteries

- The ileocolic & right colic branches of the superior mesenteric artery supplies this area.

NOTE:

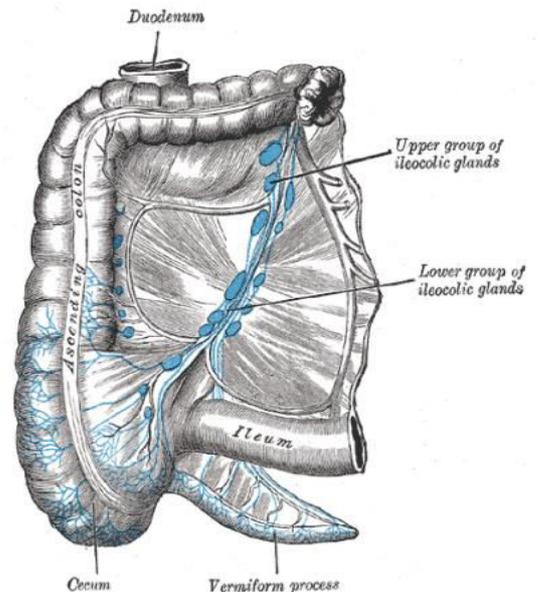
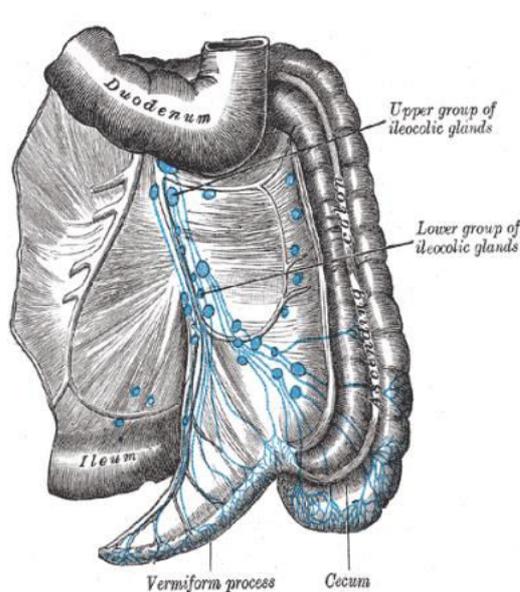
- The ileocolic artery supplies the ileum, caecum and the beginning of the ascending colon.

Veins

- The veins correspond to the arteries and drain into the superior mesenteric vein. The superior mesenteric V. meet the splenic V. behind neck of pancreas to form the portal vein.

Lymphatic drainage of Ascending colon

-The lymphatic vessels drain into lymph nodes lying along the course of the colic blood vessels then the superior mesenteric nodes around the origin of the superior mesenteric artery.



Nerve Supply of ascending colon:

-Sympathetic (from greater and lesser splanchnic nerves, from superior mesenteric ganglia, from (T6-T9)) and parasympathetic (vagus) nerves from the superior mesenteric plexus.

Transverse colon

- The transverse colon is about 15 in. (38 cm) long.
- extends across the abdomen.
- occupying the umbilical region.
- It begins at the right colic flexure below the right lobe of the liver then ascends to the left colic flexure below the spleen.
- Hangs downwards.
- It is intraperitoneal organ (completely covered by peritoneum), has a mesentery called transverse mesocolon.
- Suspended by the transverse mesocolon from the pancreas.
 - Transverse mesocolon is formed by the two ascending layers of greater omentum (anterior and posterior) covering superior and inferior surfaces of the transverse colon, respectively.
- Then, these two layers blend together and go to posterior abdominal wall, specifically the anterior border of pancreas.
- Some books state: it begins from the anterior border of pancreas as two layers reaching the two layers of greater omentum to surround the transverse colon
 - It contains blood vessels, lymphatic vessels, lymph nodes, sympathetic and parasympathetic fibers
- The position of the transverse colon is extremely variable and may sometimes reach down as far as the pelvis.
- Taenia coli, sacculations & appendices epiploicae are present

Relations of Transverse colon:

- Anteriorly:
 1. The greater omentum
 2. The anterior abdominal wall (umbilical and hypogastric regions)
- Posteriorly:
 1. The second part of duodenum
 2. The head of pancreas
 3. The coils of jejunum and ileum

Blood Supply of transverse colon:

Arteries:

-The transverse colon: is divided into:

- The proximal (medial) two thirds (mid gut): is supplied by the middle colic artery, a branch of the superior mesenteric artery.

- The distal(lateral) third (hind gut): is supplied by the left colic artery (has superior & inferior branches), a branch of the inferior mesenteric artery.

■ **Veins:**

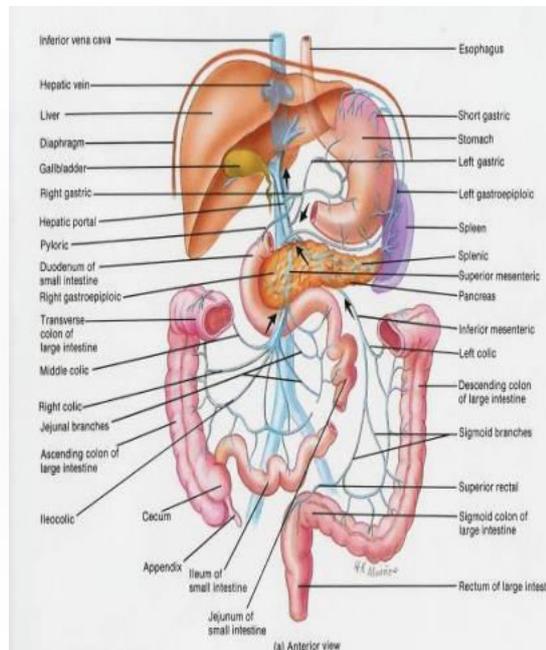
- The veins correspond to the arteries and drain into the superior & inferior mesenteric veins.

Lymphatic Drainage of transverse colon:

- The distal third drains in the colic nodes and then into the inferior mesenteric nodes
- The proximal two thirds drain in the colic node and then into the superior mesenteric nodes.

Nerve Supply of transverse colon:

- The proximal two thirds are innervated by sympathetic (superior mesenteric ganglia) and parasympathetic (vagus nerves) fibers through the superior mesenteric plexus around superior mesenteric artery.
- The distal third is innervated by sympathetic (inferior mesenteric ganglia L1-L2) and parasympathetic (Sacral spinal nerves S2-S4) fibers through the inferior mesenteric plexus around inferior mesenteric artery.



Descending Colon (from hind gut)

Location and Description:

- The descending colon is about 10 in. (25 cm) long.
- It extends downward from the left colic flexure to the pelvic brim (inlet of pelvis), where it continues as sigmoid colon.

- the peritoneum covers the anterior and both sides of descending colon (retroperitoneal organ).
 - ➔ Paracolic gutters present on medial and lateral borders of descending colon
- Taenia coli, sacculations & appendices epiploicae are present

Relations of Descending colon:

- Anteriorly
 1. Anterior abdominal wall
 2. The Greater omentum
 3. Coils of small intestine
- Posteriorly
 1. The later border of the left kidney
 2. The origin of the transversus abdominis muscle
 3. The quadratus lumborum
 4. The iliac crest
 5. The iliacus muscle
 6. The left psoas
 7. The ilioinguinal and iliohypogastric nerves
 8. The lateral cutaneous of the thigh
 9. The femoral nerve

Blood Supply of Descending colon:

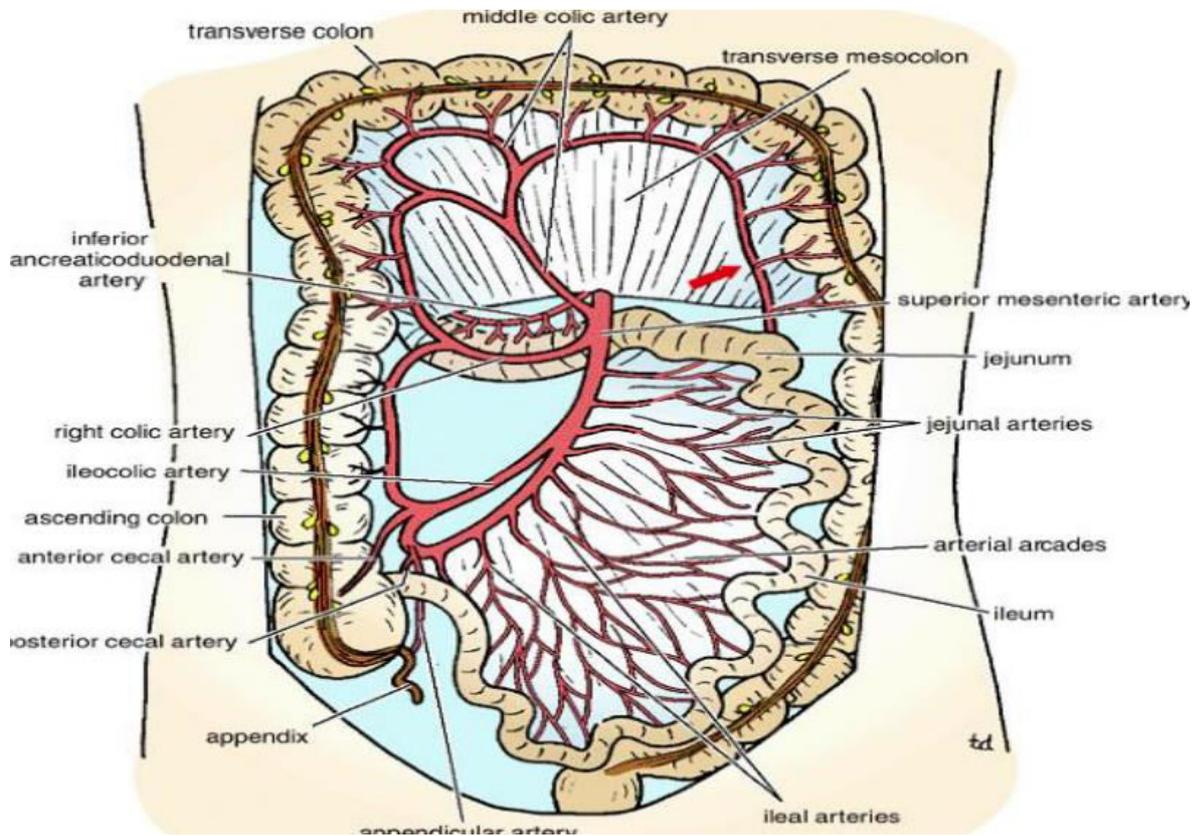
- **Arteries:**
 - The left colic (mainly) and the sigmoid branches (mainly supplying sigmoid colon, but some branches supply the end of descending colon), which are branches of the inferior mesenteric artery.
- **Veins:**
 - The veins correspond to the arteries → into the inferior mesenteric vein.

Lymphatic Drainage of descending colon:

- The colic lymphatic nodes & the inferior mesenteric nodes around the origin of the inferior mesenteric artery.

Nerve Supply of Descending Colon:

- The sympathetic (inferior mesenteric ganglia L1-L2) and parasympathetic (sacral spinal nerves S2-S4) through the inferior mesenteric plexus around inferior mesenteric artery.



liver

- The liver is the largest gland in the body and has a wide variety of functions. However, 1/8 of the liver is enough, but if infected, the infection spreads very fast and cause whole liver damage.
- The average weight of liver is about 1.5KG. however, it's better to express it as ratios; we say that it is about 1/50 of body weight in adult & 1/20 of body weight in infant.
- It is exocrine (secretes bile and bile salts that are transmitted through **common bile duct** to the duodenum to complete fat digestion) and endocrine (produces various plasma proteins like albumen, coagulative materials, globulin, immunoglobulin, prothrombin & fibrinogen) organ.
- Location:
 - It's located in the right hypochondriac and the epigastric regions. Sometimes, the left lobe may extend to reach the left hypochondriac region.
- **Functions of the liver:**
 1. Secretion of bile and bile salts.
 2. Metabolism of carbohydrate, fat and proteins.
(portal vein carries absorptive materials from GIT to the liver after digestion and absorption).
 3. Formation of heparin and anticoagulants substances.

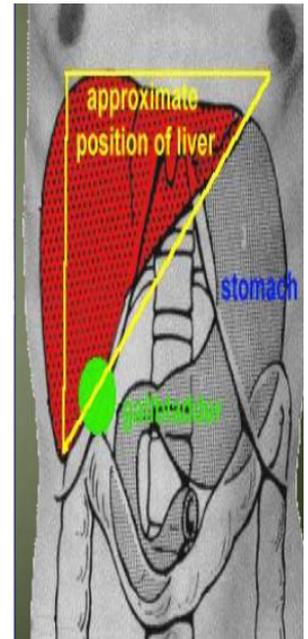
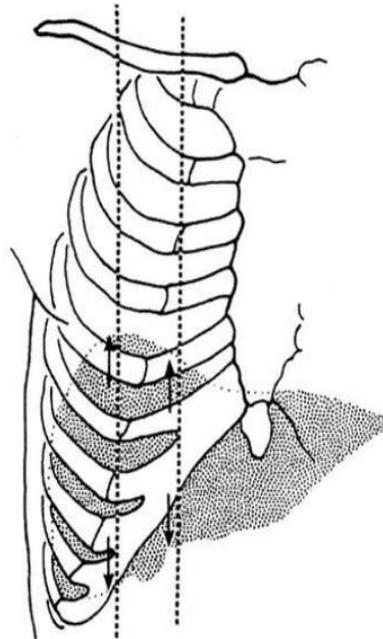
4. Detoxication:(Some drugs detoxicated in the liver such as morphine.)
It occurs in liver or kidneys, so in case patient with liver cancer we give him pethidine (it is detoxicated in kidneys) instead of morphine.
5. Storage of glycogen (for energy) and vitamins.
6. Activation of vitamin D &formation of vitamin k.

▪ **Surface anatomy of the liver:**

- It has 5 surfaces (anterior, right, superior(diaphragmatic), posterior and visceral (postero-inferior)).
- Visceralstructures (IVC, stomach, esophagus, right kidney, duodenum, gallbladder and transverse colon) form impressions on visceral surface.

Note:

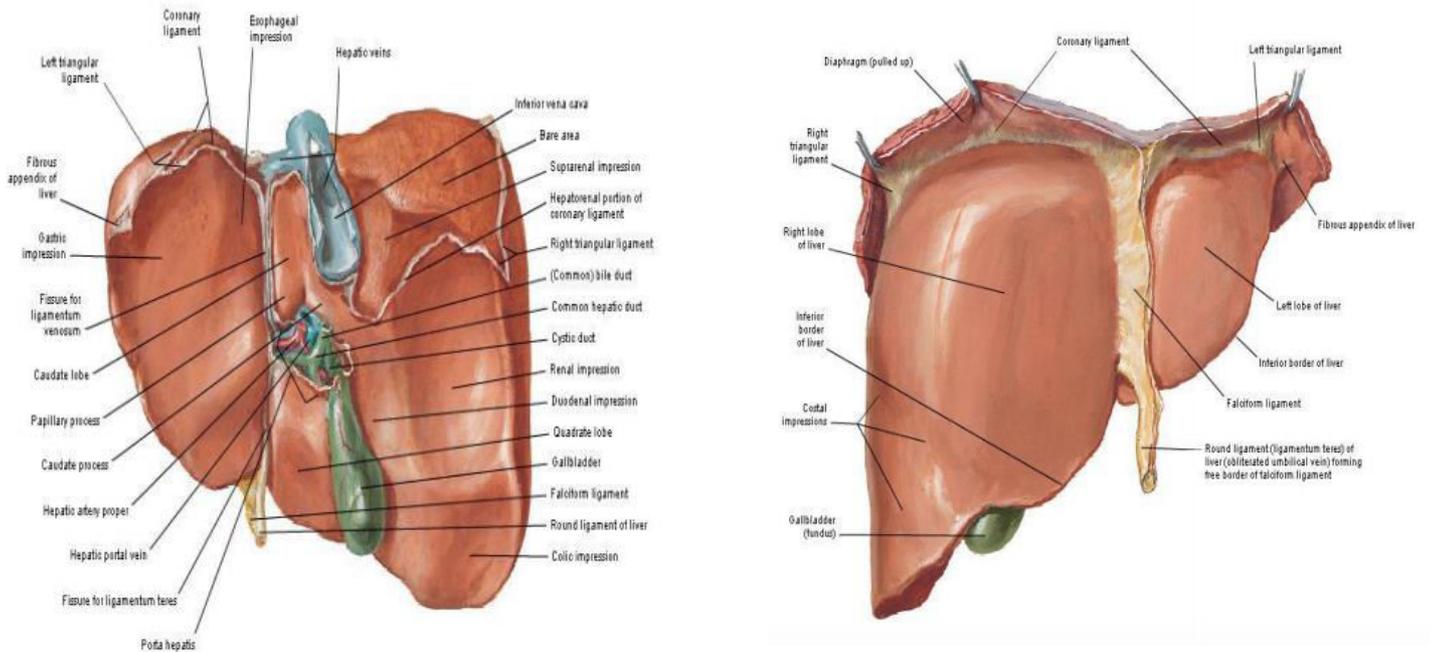
- Its upper superior surface pushes the diaphragm toward the chest on the right side reaching the level of fifth costal cartilage. Sometimes, it reaches above the fifth rib.



▪ **Lobes of the liver:**

1. Right lobe
2. Left lobe
3. Caudate lobe (next to IVC)
4. Quadrate lobe (next to gallbladder)

- In physiology(function), Caudate and Quadrate lobes follow the left lobe. In other words, the right hepatic artery supplies the right lobe, while left hepatic artery supplies left, caudate & quadrate lobes. Also, left hepatic duct comes from left, caudate and quadrate lobes.
- Coronary ligament has two lips between these 2 lips the bare area of the liver is located
- Right triangular ligament: formed by the right extremity of the coronary ligament.
- Left triangular ligament: formed by the left extremity of the coronary ligament.
- Falciform ligament separates the right lobe from the left lobe and connects the liver to the anterior abdominal wall and diaphragm.
- The free edge of the ligament contains a round ligamentum (ligamentum teres), which is an obliterated umbilical vein.
- Ligamentum venosum (remnant of the ductus venosum of fetal circulation)



- The porta hepatis serves as the point of entry into the liver: the hepatic arteries and the portal vein exist: the hepatic ducts.
- Relations of visceral surface (*you should identify them):
 1. Inferior vena cava
 2. The stomach and esophagus
 3. The duodenum
 4. The right colic flexure
 5. The right kidney and Rt. Suprarenal glands
 6. Porta hepatis
 7. The gallbladder
 8. Ligamentum teres
 9. Tubular omentum
 10. Fissure for ligamentum venosum & lesser omentum.

