Module: Gastro-Intestinal Tract (GIT)

Semester: 4

Session: 3 L 2:Introduction

Abdominal wall and peritoneal cavity

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Essentials of Pathophysiology. 3rd Edition, Lippincott Williams & Wilkins [2011];
Gastrointestinal system – crash course. 3rd Edition, Mosby [2008]
Grays anatomy

more detailed instructions, any question, or you have a case you need help in, please post to the group of session

Learning objectives:

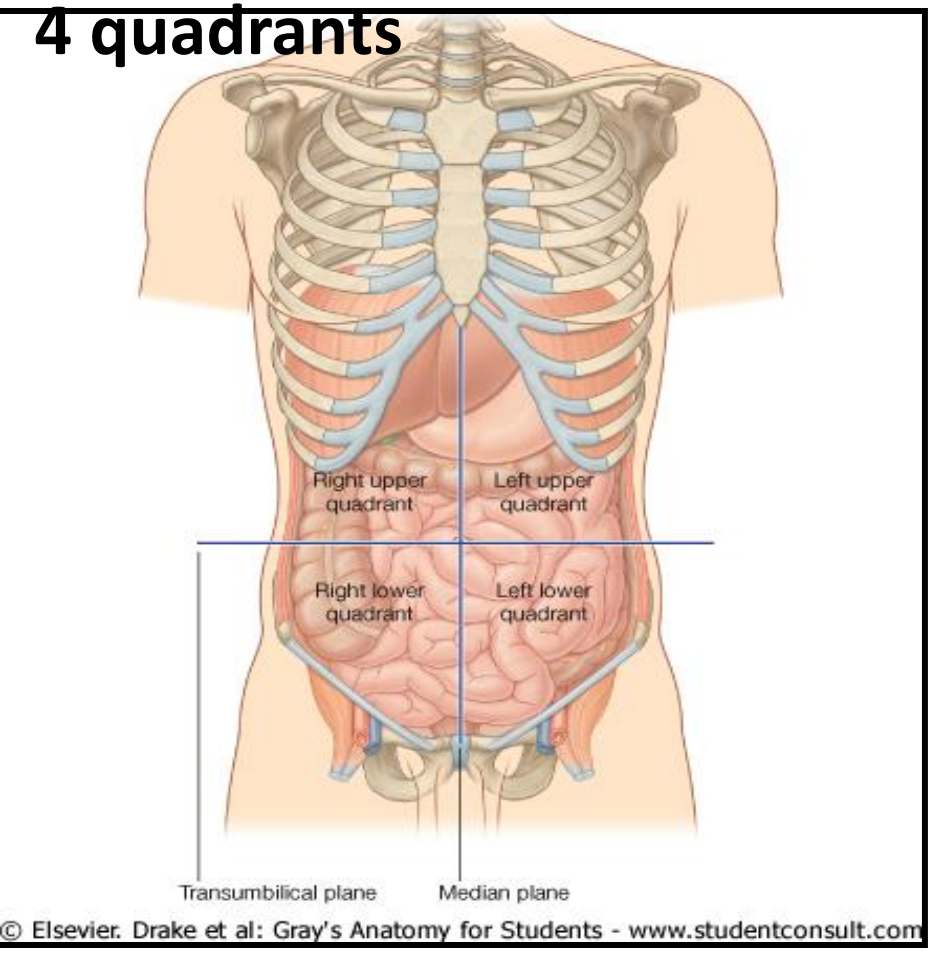
9. Describe surface regions of abdominal wall and planes
10. Describe Surface anatomy of abdominal wall and markers of abdominal viscera
11. Describe the general appearance and disposition of major abdominal viscera
12. Explain the concept of peritoneal cavity as a virtual space
13. Describe the structures of peritonium and peritoneal reflections
14. Describe the structures and relations of :

- Supra and infra colic compartments
- greater and lesser omentium
- Greater and lesser sac , subphrenic spaces Rt posterior ?
- Rt and Lt para colic gutters
- Recto uterine and uterovesicle poutch in female
- Recto vesical pouch in male ,
- mesentry of small intestine
- sigmid mesocolon

Abdominal planes

LO9,11

4 quadrants



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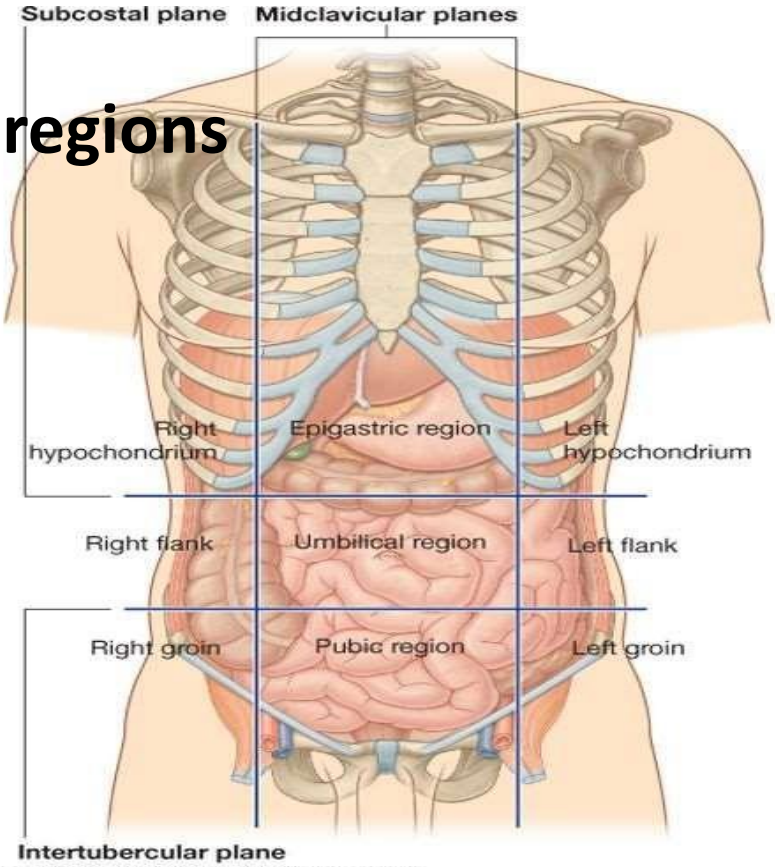
9 regions



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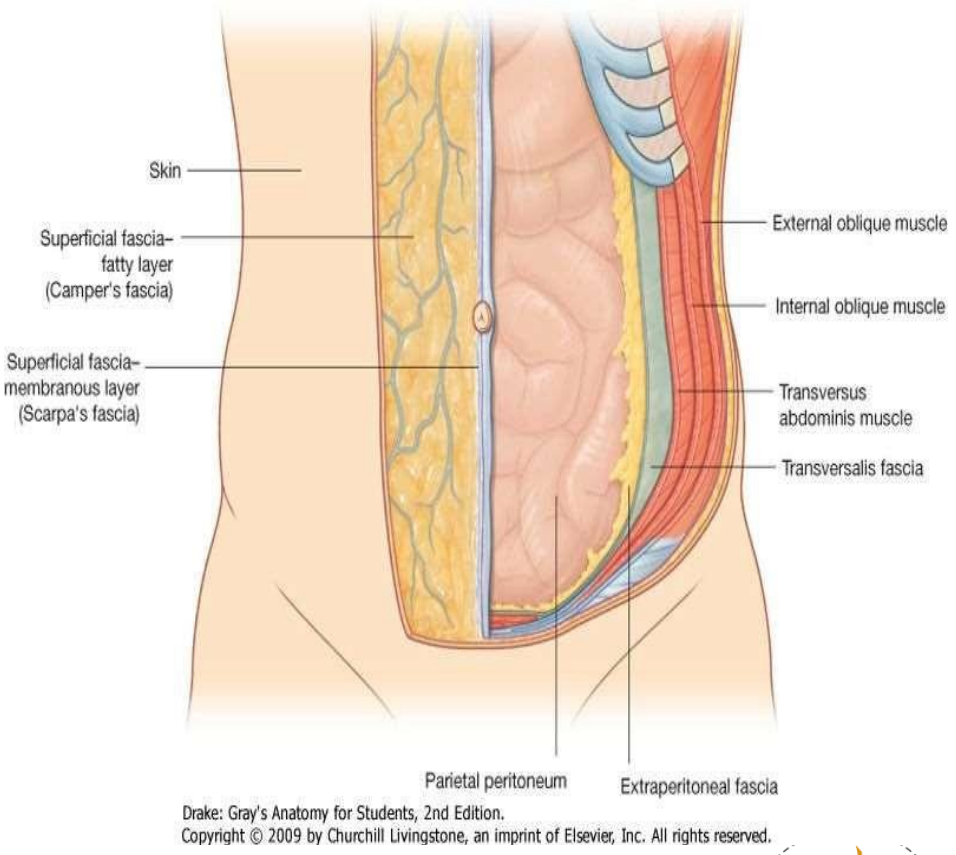
Lo10

Abdominal wall and

- **The anterior abdominal wall is made up of :**

1. Skin
2. Superficial fascia
3. Deep fascia
4. Muscles
5. Extra peritoneal fascia
6. Parietal peritoneum



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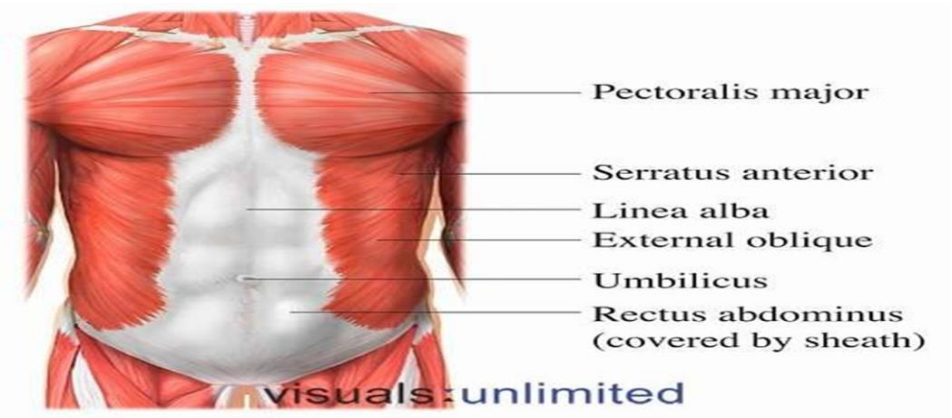
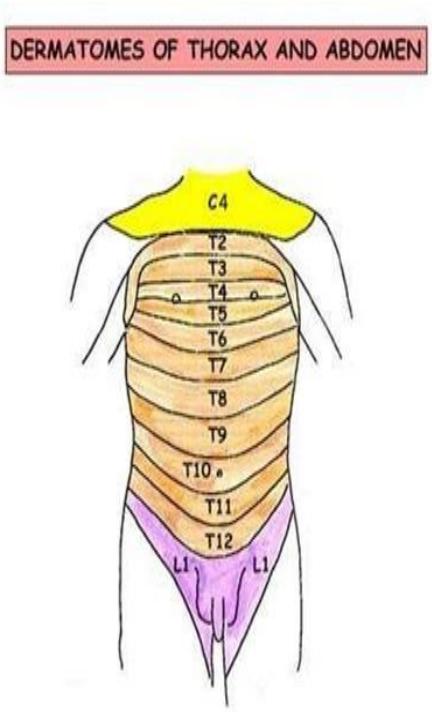
LO10

skin

- It is **loosely** attached to the underlying structures except at the **umbilicus**, which is found at linea alba



- **Nerves :**
- The **cutaneous nerve** supply to the **anterior abdominal wall** is derived from the anterior rami of the **lower six thoracic** and the **first lumbar** nerves.
- **Dermatome of T7 is located over the xiphoid process.**
- **Dermatome of T10 includes the umbilicus.**
- **Dermatome of L1 lies just above the inguinal ligament and the symphysis pubis.**

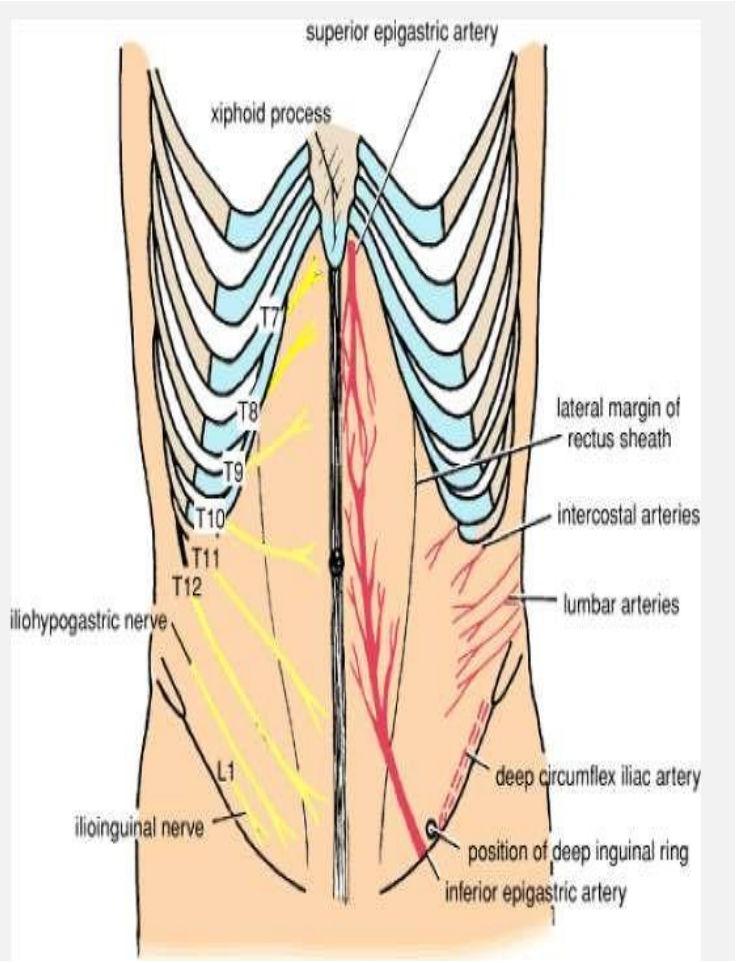


Blood Supply of Skin

Lo10

- The skin near the midline is supplied by branches of the **superior** and the **inferior epigastric** arteries.

- The skin of the **flanks** is supplied by branches of the
  1. **Intercostal arteries**
  2. **Lumbar arteries**
  3. **Deep circumflex iliac arteries**



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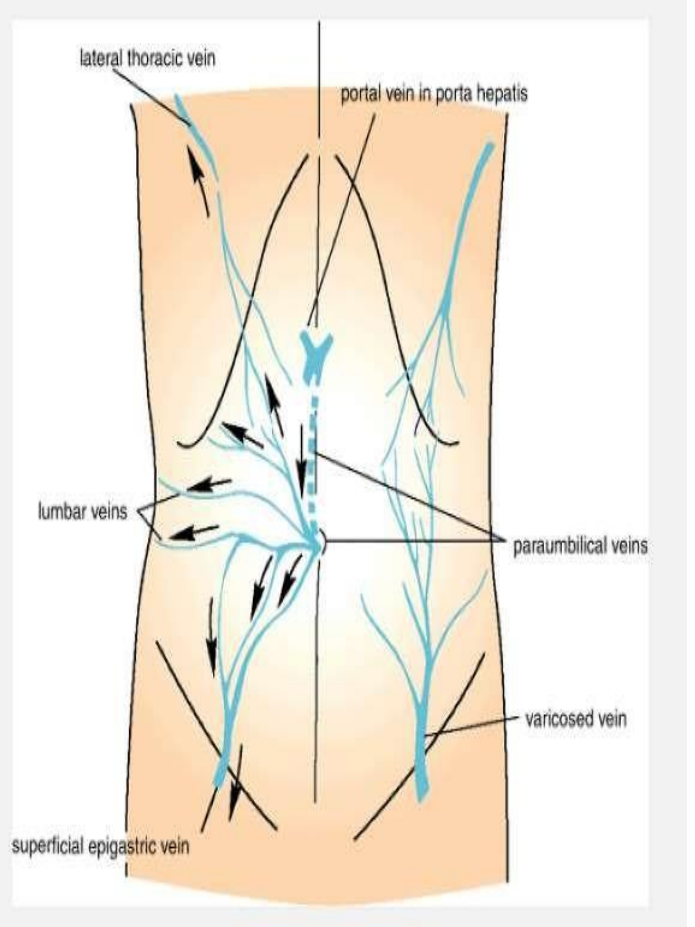
Veins

The venous drainage **passes**

Above mainly into the **axillary vein** via the **lateral thoracic vein**

Below into the femoral vein via the **superficial epigastric** and the **great saphenous veins**



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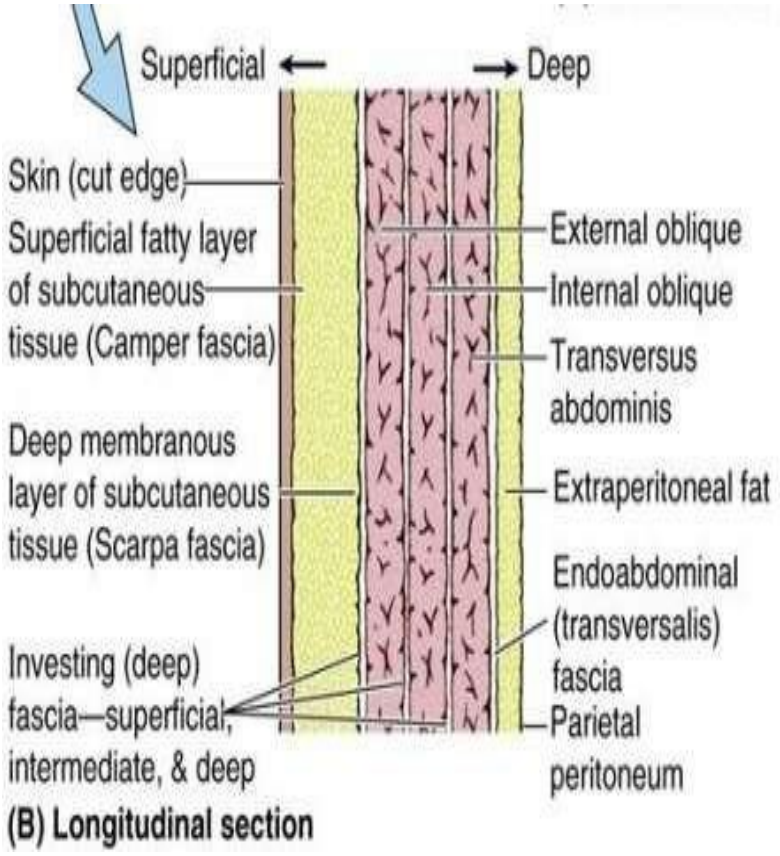
Superficial Fascia

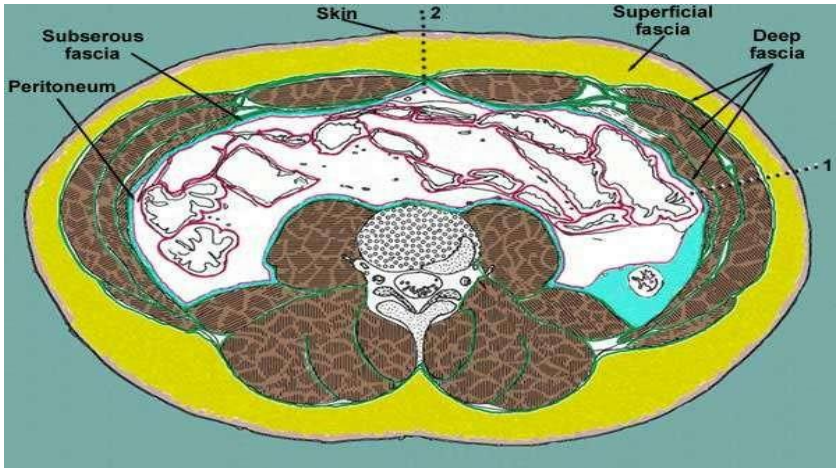
- **The superficial fascia is divided into:**
  1. **Superficial fatty layer (fascia of Camper)**
  2. **Deep membranous layer (Scarpa's fascia)**



LO10

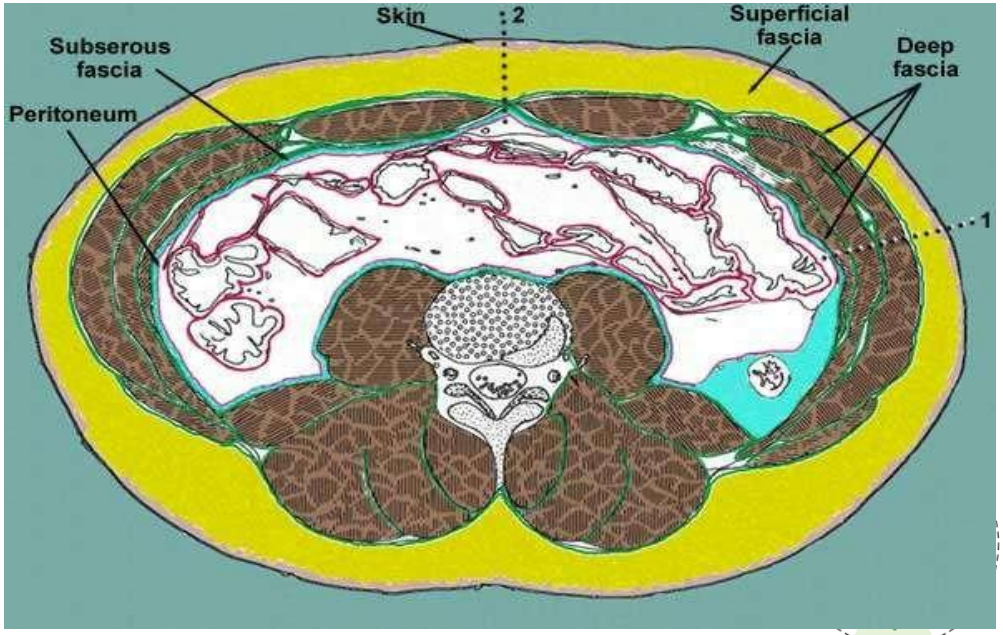
The **fatty layer** is continuous with the superficial fat over the rest of the body and may be thick [**8 cm**] or more in obese patients.

- The **membranous layer** is thin and fades out laterally and above, where it becomes continuous with the superficial fascia of the back and the thorax, respectively.



Deep facia

- It lies immediately **deep** to the membranous layer of superficial fascia.



Muscles

LO10

The muscles of the anterior abdominal wall consist of **three** broad thin sheets.

- **From exterior to interior**

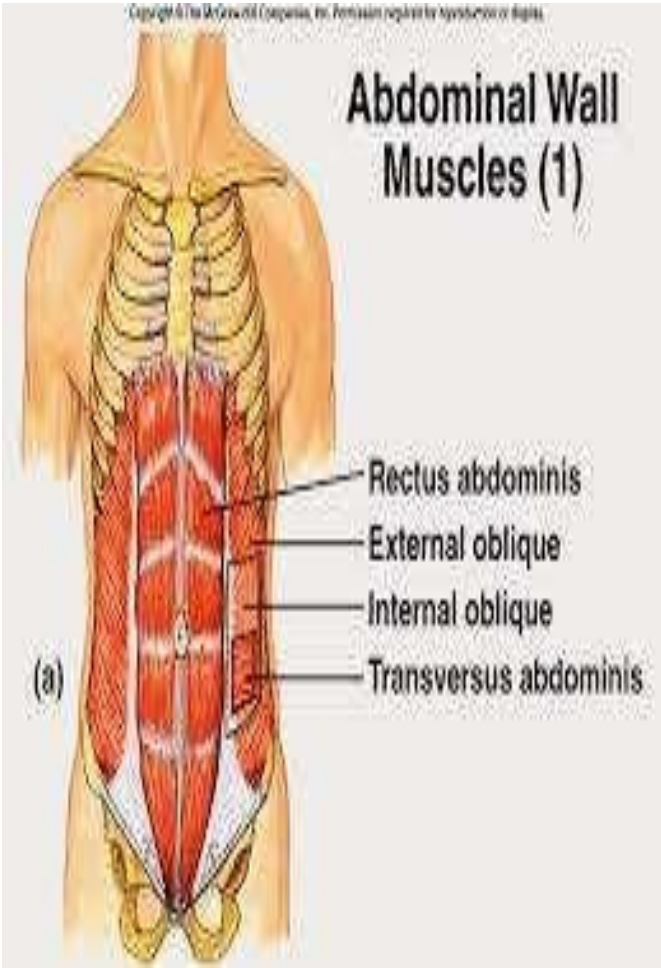
❖ **External oblique**

❖ **Internal oblique**

❖ **Transversus abdominis**

On either side of the **midline** anteriorly , in addition, a wide vertical muscle,

❖ **Rectus abdominis.**



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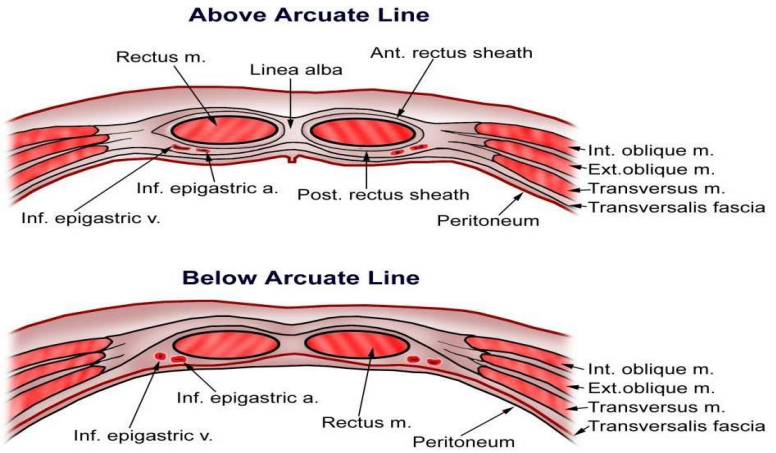
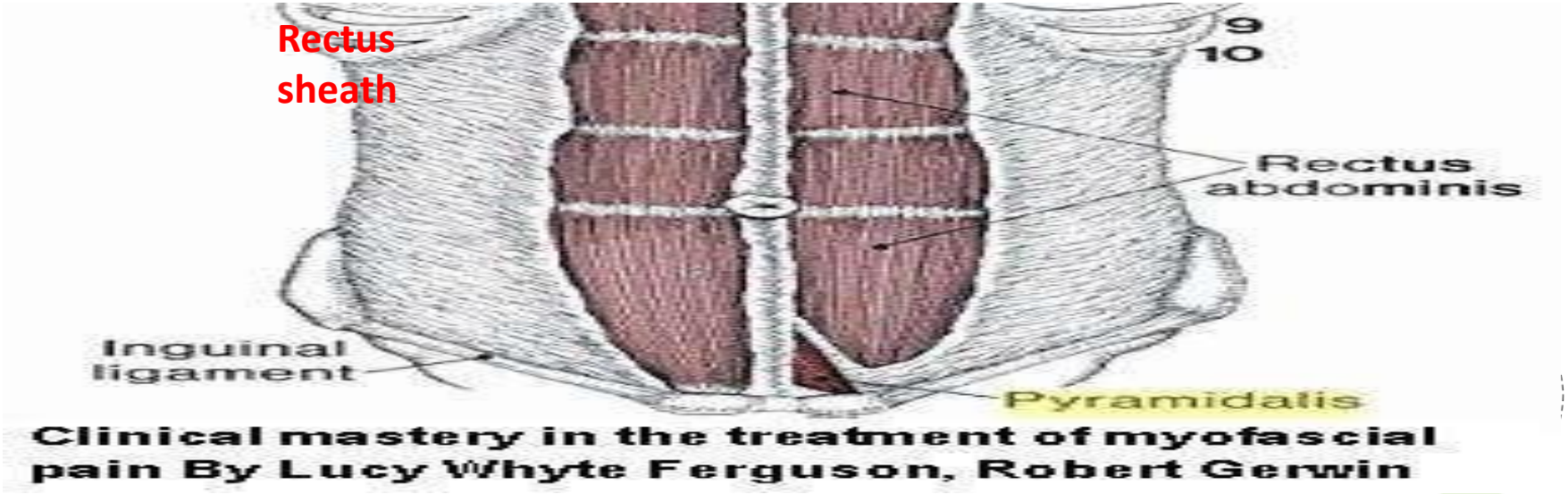
- As the aponeuroses of the three sheets pass forward, they enclose the rectus abdominis to form the **rectus sheath**.

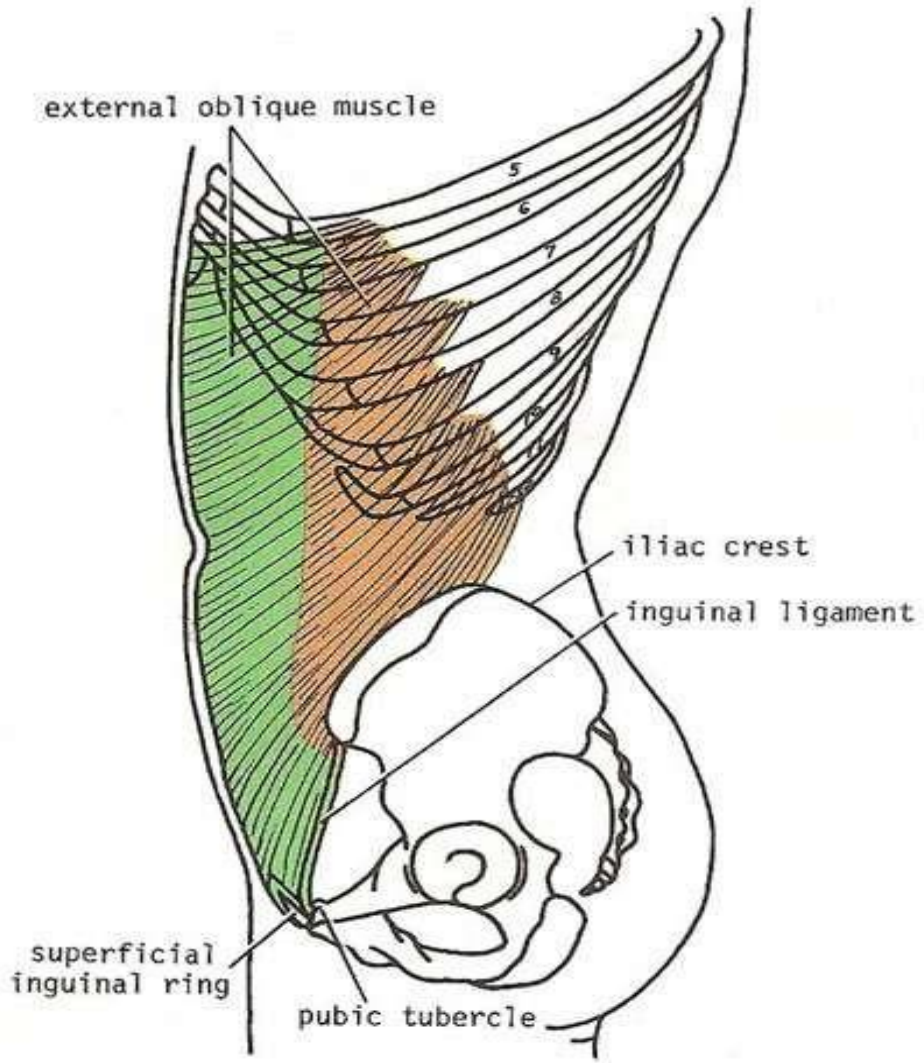


- The lower part of the rectus sheath might contain a small muscle called the **pyramidalis**



. External Oblique

- **Origin :** the outer surfaces of the lower 8th ribs and fans out to be
- **Insertion :** the xiphoid process, the linea alba, the pubic crest, the pubic tubercle, and the anterior half of the iliac crest
- Most of the fibers are inserted by means of a broad **aponeurosis.**



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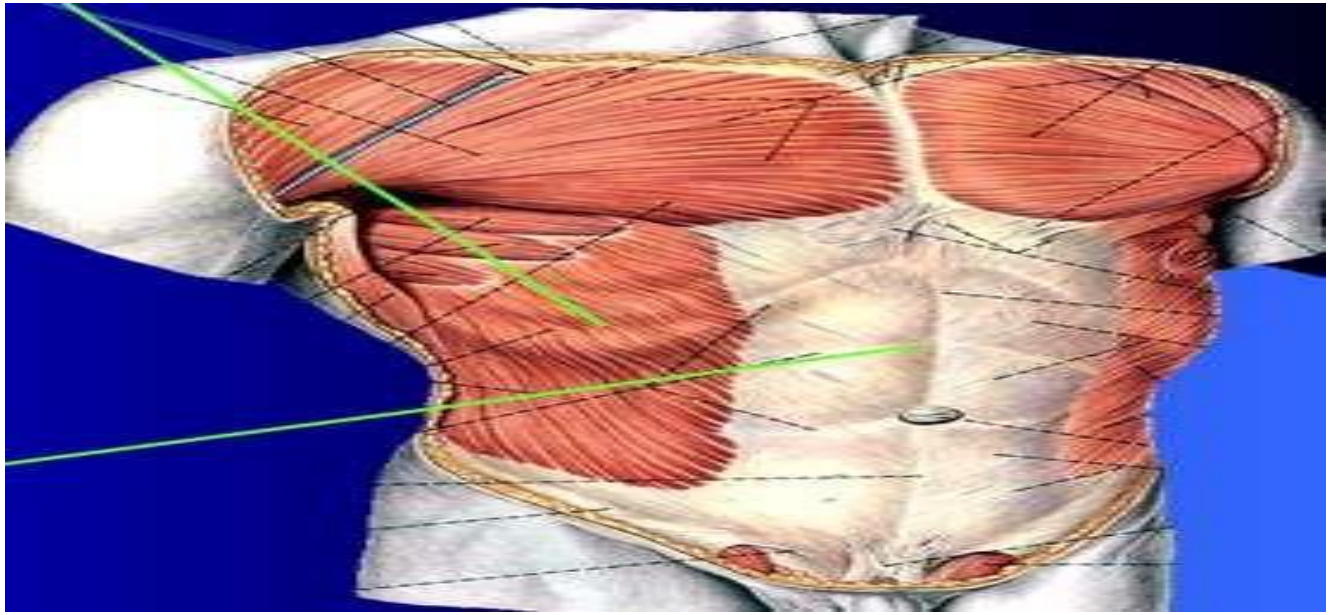
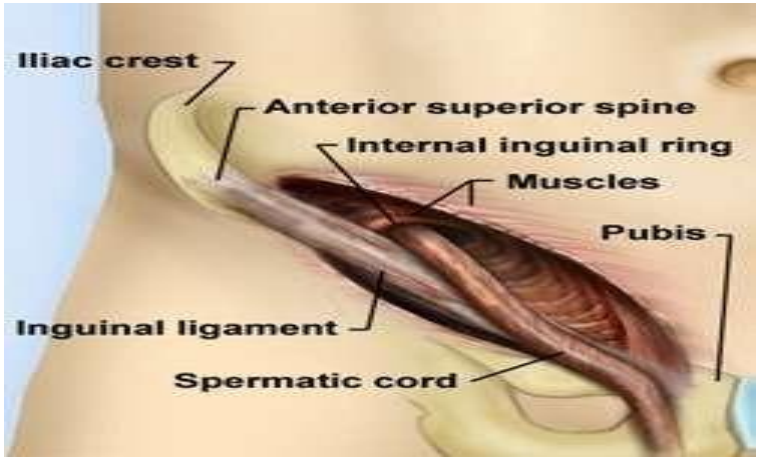
- A triangular-shaped defect in the external oblique **aponeurosis** lies immediately above and medial to the pubic tubercle.
  - This is known as the **superficial inguinal ring**

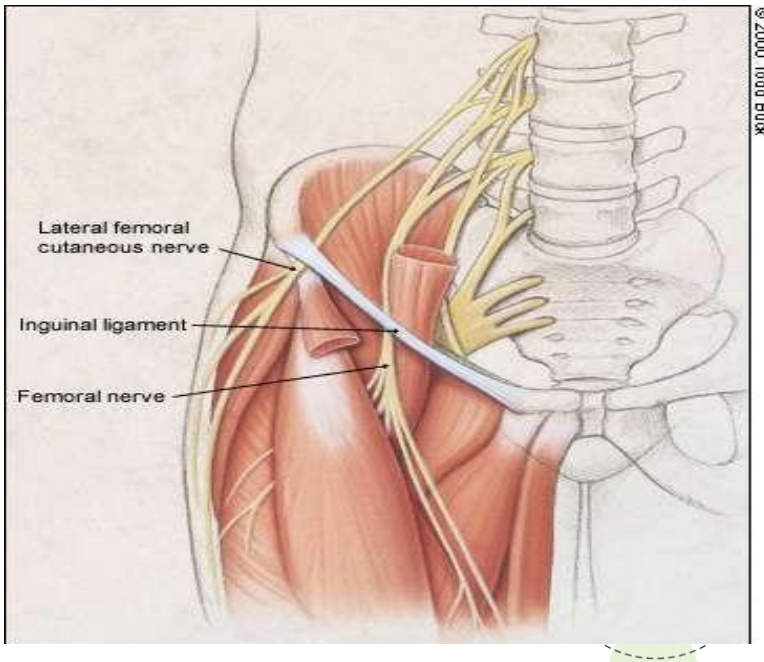


Lo10

- The **spermatic cord** passes through this opening and carries the external spermatic fascia (or the external covering of the round ligament of the uterus) from the margins of the ring



- Between the **anterior superior iliac spine** and the **pubic tubercle**, the lower border of the aponeurosis is folded backward on itself, forming the **inguinal ligament**

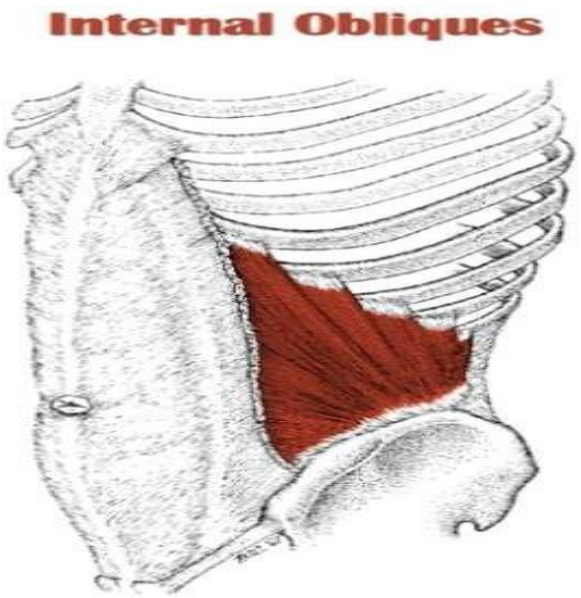


Internal oblique

Lo10

- **Origin** : lumbar fascia, the anterior two thirds of the iliac crest, and the lateral two thirds of the inguinal ligament

- **Insertion** : the lower borders of the lower three ribs and their costal cartilages, the xiphoid process, the linea alba, and the symphysis pubis.



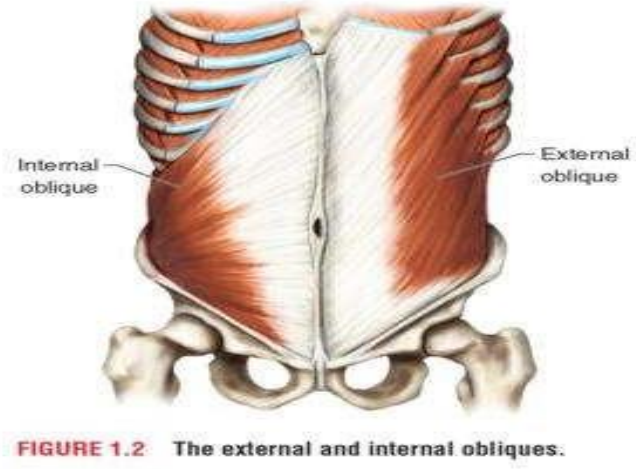


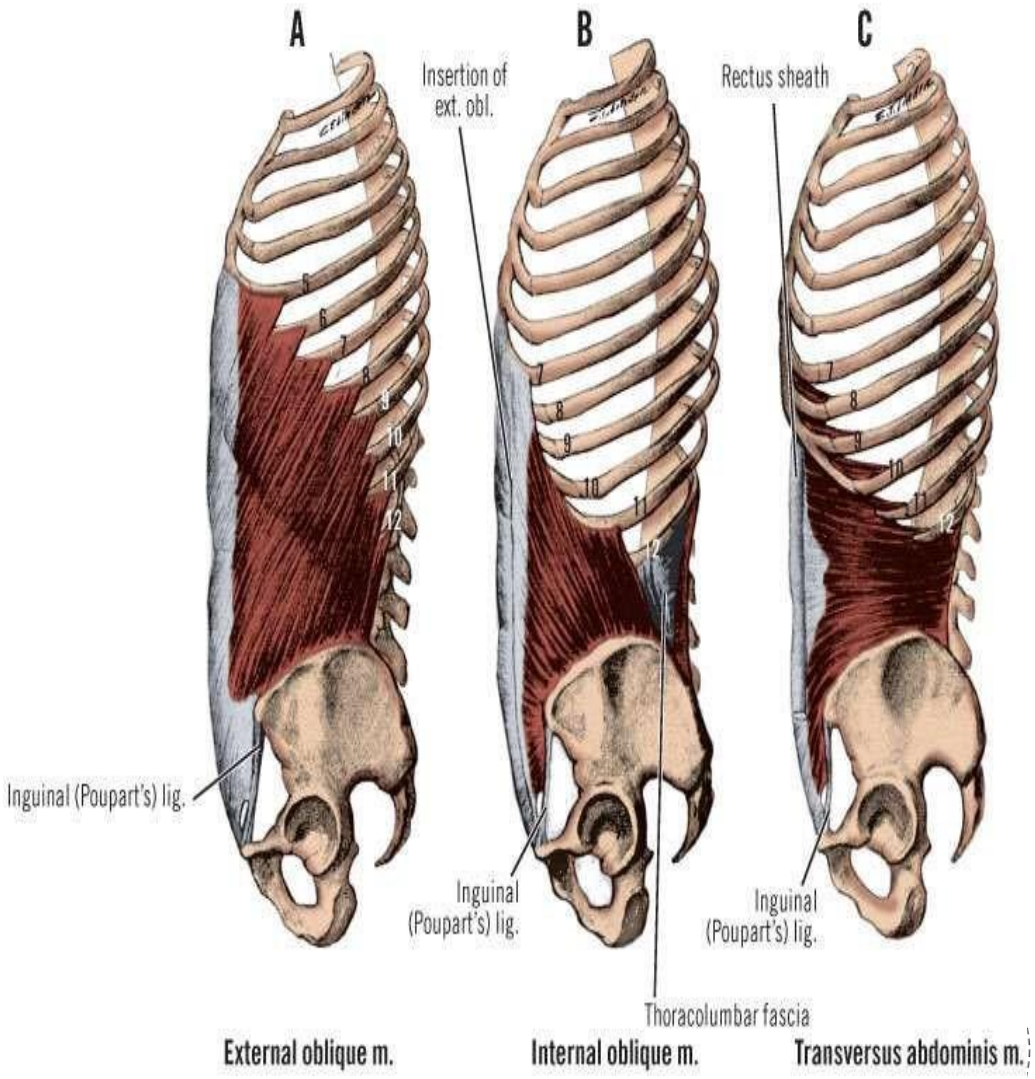
FIGURE 1.2 The external and internal obliques.

Transversus abdominis

LO10

- **Origin** : the deep surface of the lower six costal cartilages, the lumbar fascia, the anterior two thirds of the iliac crest, and the lateral third of the inguinal ligament.

- **Insertion** : the xiphoid process, the linea alba, and the symphysis pubis.



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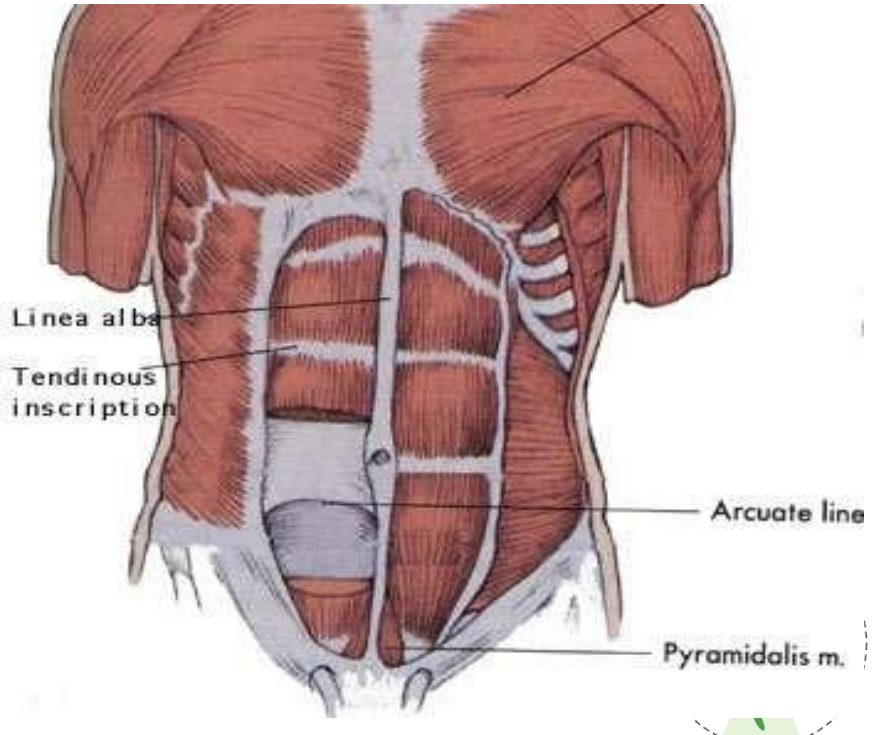
Rectus abdominis

Lo10

- The rectus abdominis is a long strap muscle that extends along the whole length of the anterior abdominal wall.
- It is broader above and lies close to the midline, being separated from its fellow by the **linea alba**.

- The rectus abdominis muscle is divided into distinct segments by three transverse **tendinous intersections**:
  1. **One at the level of the xiphoid process,**
  2. **One at the level of the umbilicus**
  3. **One halfway between these two**



LO10

- **Innervation:**
- The oblique and transversus abdominis muscles are supplied by the lower six thoracic nerves and the iliohypogastric and ilioinguinal nerves (L1).

The rectus muscle is supplied by the **lower six thoracic nerves.**

The pyramidalis is supplied by the **12th thoracic nerve.**

The fascia transversalis is a thin layer of fascia that lines the transversus abdominis muscle

Lo10

Function of the AnteriorAbdominal wall muscles

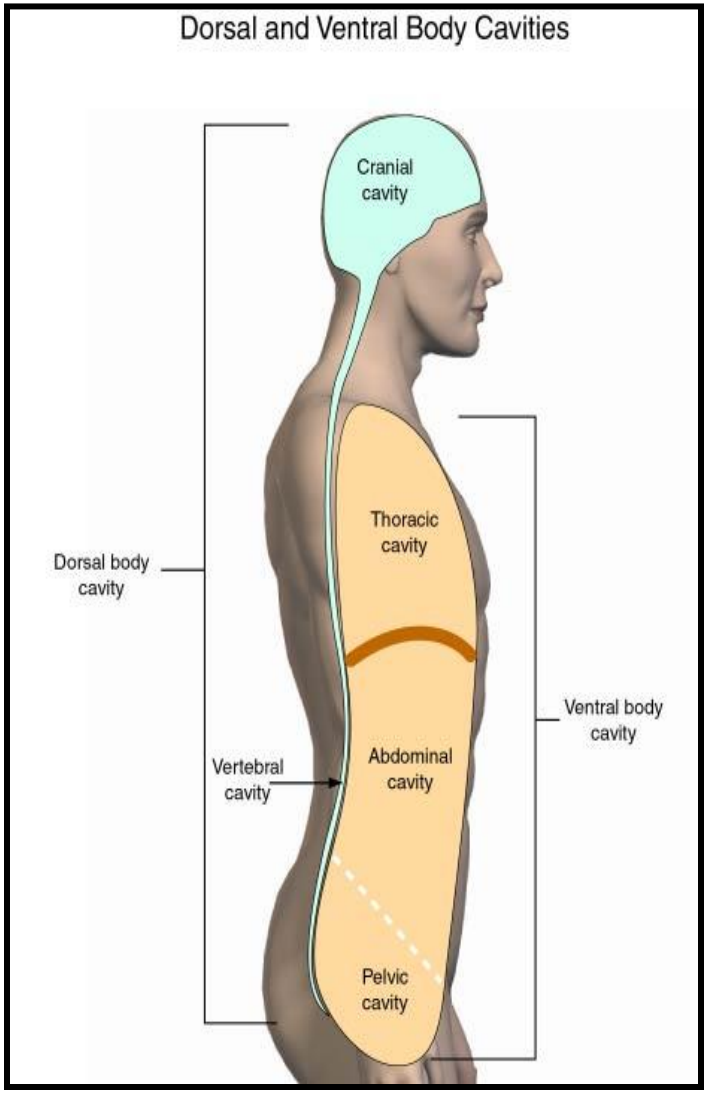
The muscles of the anterior and lateral abdominal walls *assist the diaphragm during inspiration* by relaxing as the diaphragm descends so that the abdominal viscera can be accommodated

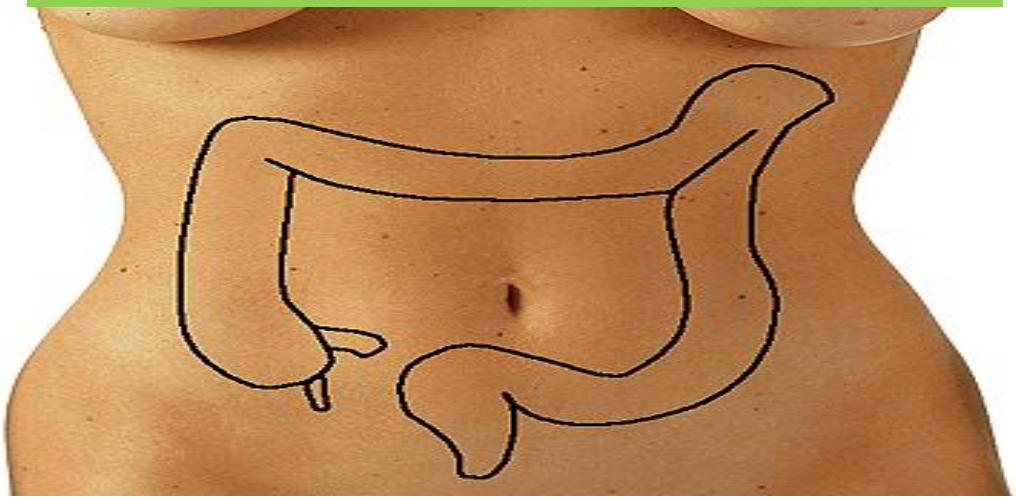
- The muscles assist in the act of ***forced expiration*** that occurs during coughing and sneezing by pulling down the ribs and sternum.
- Their tone plays an important part in *supporting and protecting* the abdominal viscera.
- By contracting simultaneously with the diaphragm, with the glottis of the larynx closed, they increase the intra-abdominal pressure and help in
  1. Micturition,
  2. Defecation,
  3.
  3. Parturition
  4. Vomiting.

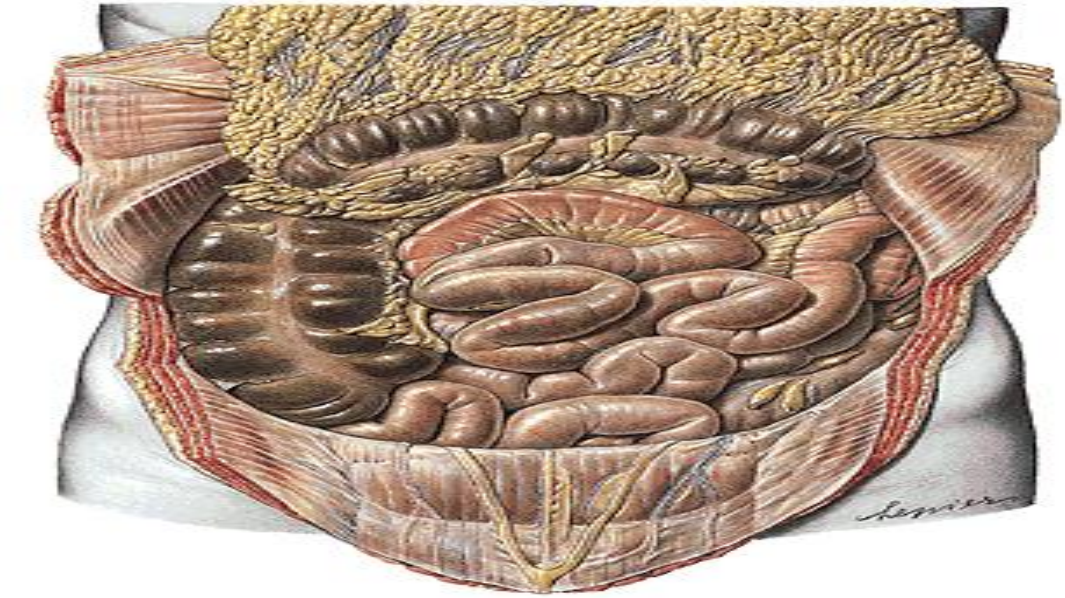
Abdomino pelvic Cavity

LO11

General abdominal viscera







Peritonium

Lo12,13

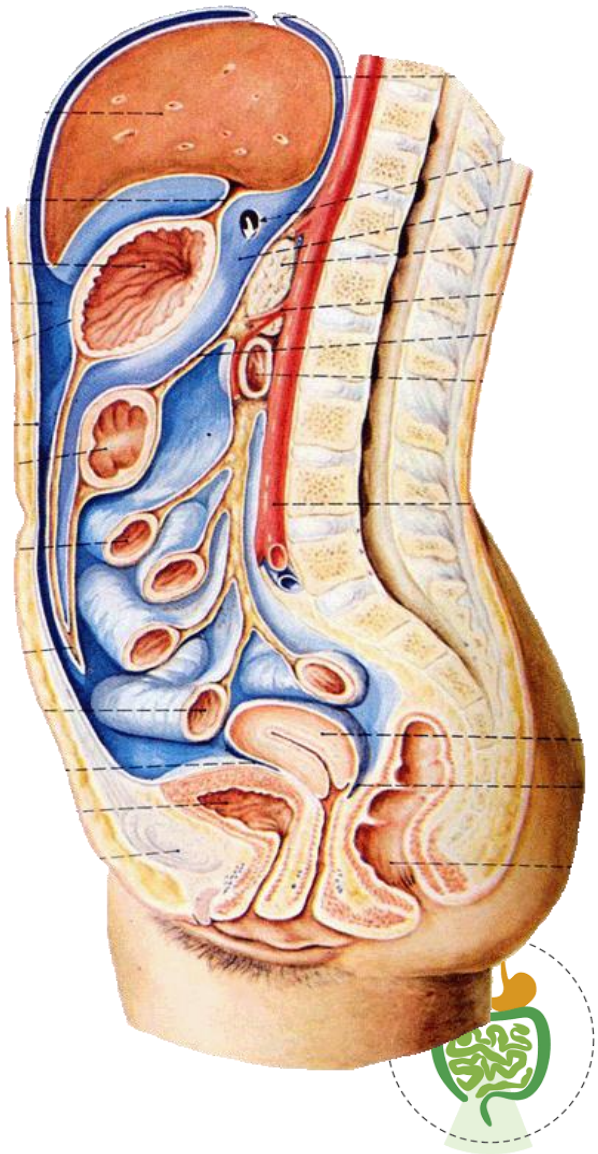
General features

It is a thin serous membrane that line the walls of the abdominal and pelvic cavities and cover the organs within these cavities

Parietal peritoneum —lines the walls of the abdominal and pelvic cavities

Visceral peritoneum —covers the organs

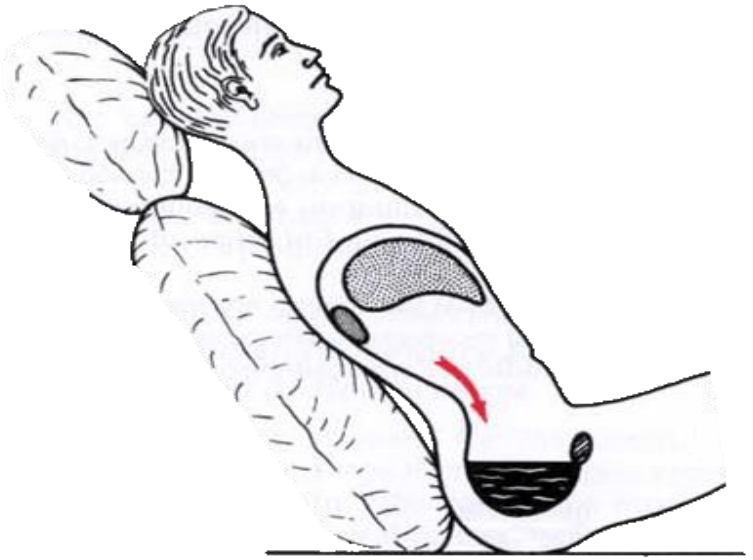
Peritoneal cavity —the potential space between the parietal and visceral layer of peritoneum, in the male, is a closed sac, but in the female, there is a communication with the exterior through the uterine tubes, the uterus, and the vagina

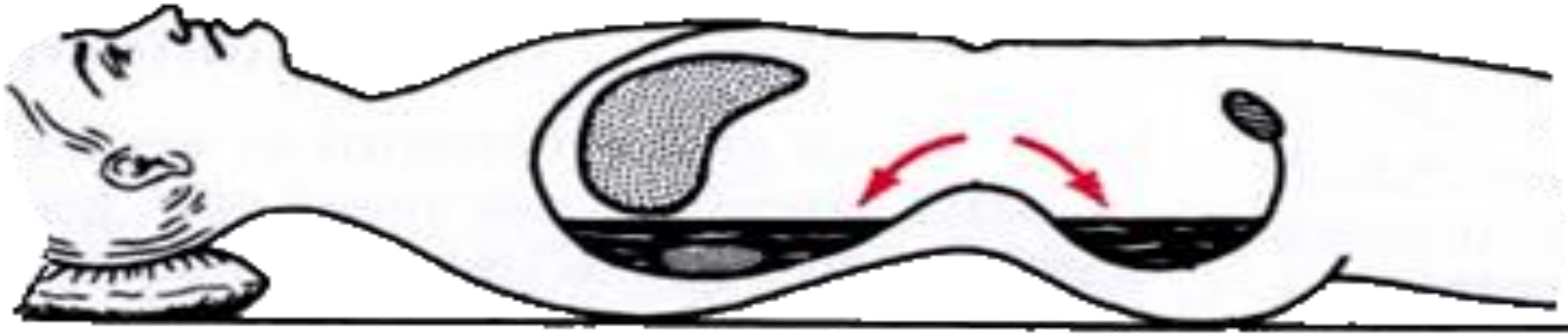


Lo12

Functions

- Secretes a lubricating **serous** fluid that continuously moistens the associated organs
- Absorb
- Support viscera





Innervation of the Peritonium

Parietal peritoneum

is **sensitive** to pain, pressure, temperature & touch, it is supplied by

- **T7-- T12,L1 nerve**
- **phrenic nerve.**
- NB. Parietal peritoneum of the pelvis is supplied by **Obturator nerve**

Visceral peritoneum

is **sensitive** to stretch & tearing.

It is supplied by autonomic afferent nerves which supply the viscera.

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Relationship between the organs and peritoneum

LO13

Intraperitoneal viscera –
viscera **completely** surrounded by peritoneum, example, stomach, superior part of duodenum, jejunum, ileum, cecum, vermiform appendix, transverse and sigmoid colons, spleen and ovary

Interperitoneal viscera –
most part of viscera surrounded by peritoneum, example, liver, gallbladder, ascending and descending colon, upper part of rectum, urinary bladder and uterus

Retroperitoneal viscera –
some organs lie on the posterior abdominal wall and are covered by peritoneum on their anterior surfaces only, example, kidney, suprarenal gland, pancreas, descending and horizontal parts of duodenum, middle and lower parts of rectum, and ureter

a) retroperitoneal – on the posterior abdominal wall

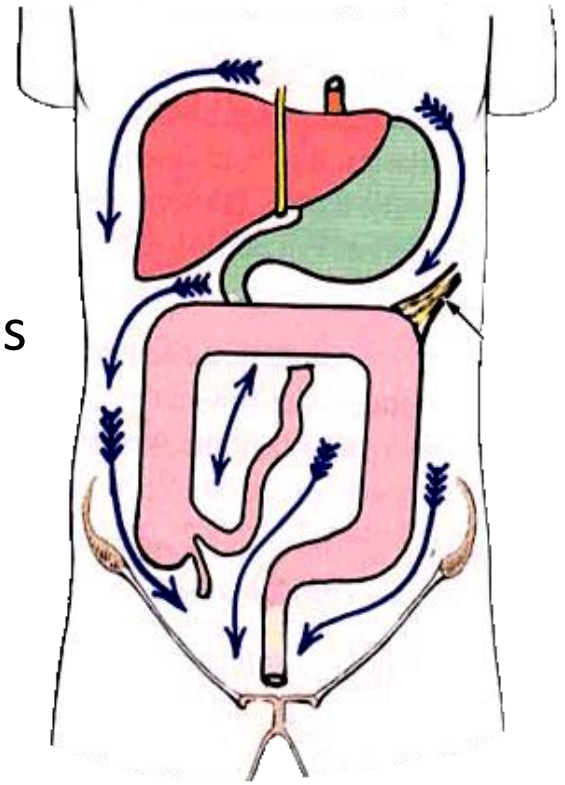
b) subperitoneal – in the lesser pelvis

c) preperitoneal – at the anterior abdominal wall

Peritoneal subdivisions

LO14

The transverse colon and transverse mesocolon divides the greater sac into supracolic and infracolic compartments.



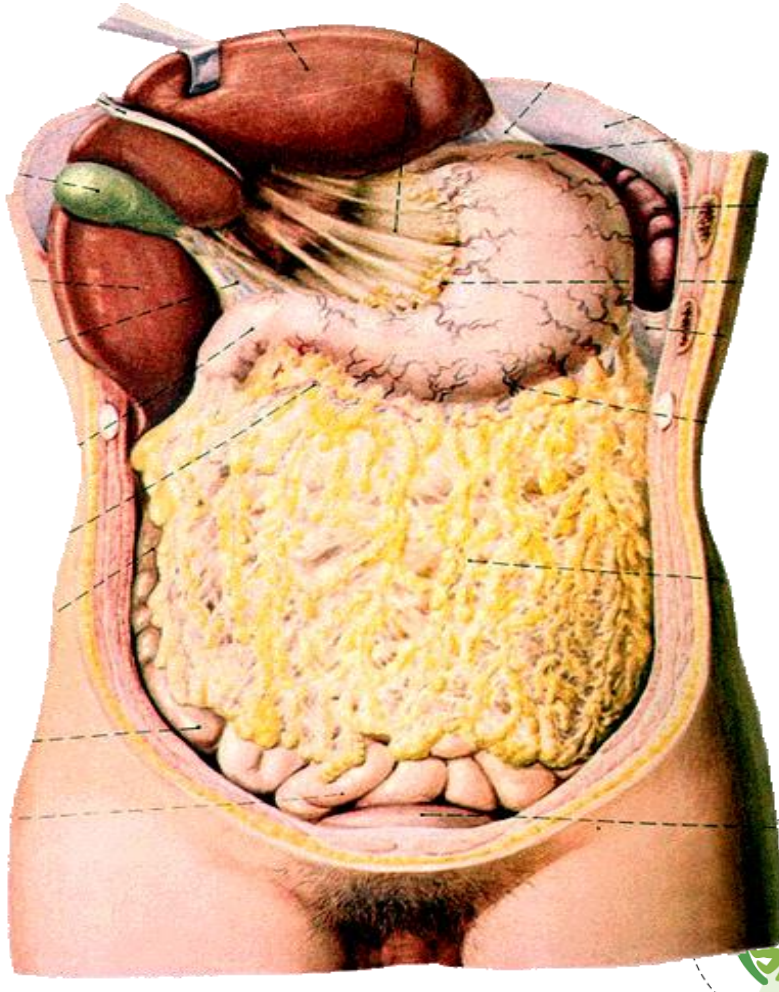
Supracolic compartments (subphrenic space)—lies between diaphragm and transverse colon and transverse mesocolon

Infracolic compartments —lies below the transverse colon and transverse mesocolon

Structures which are formed by peritoneum:

Omentum

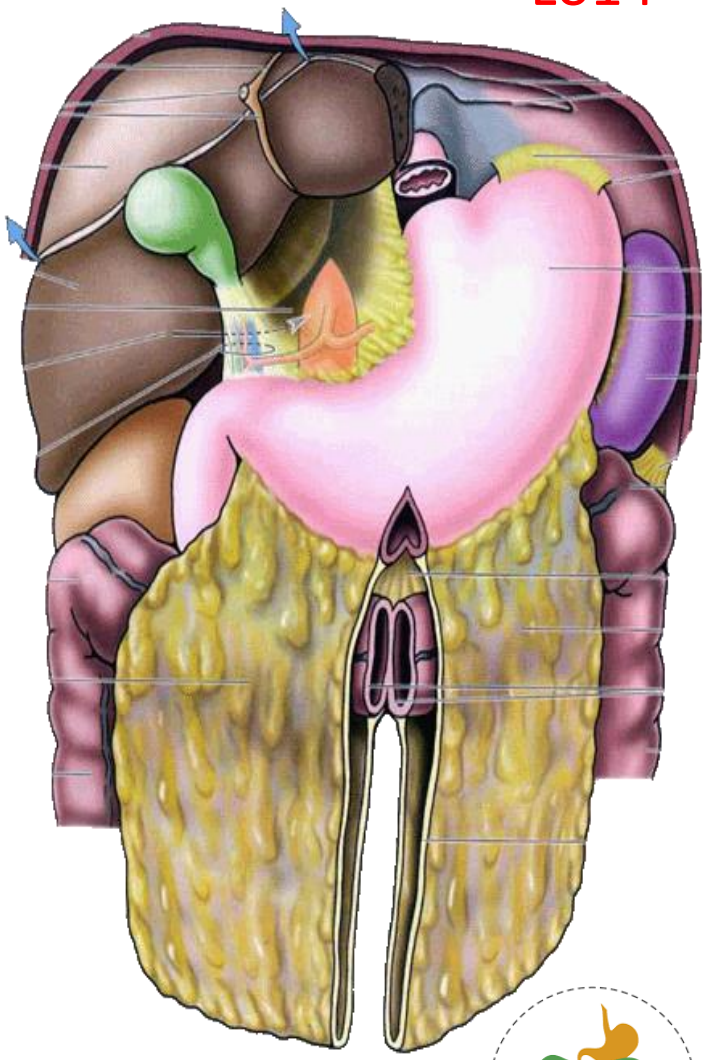
two-layered fold of peritoneum that extends from stomach to adjacent organs



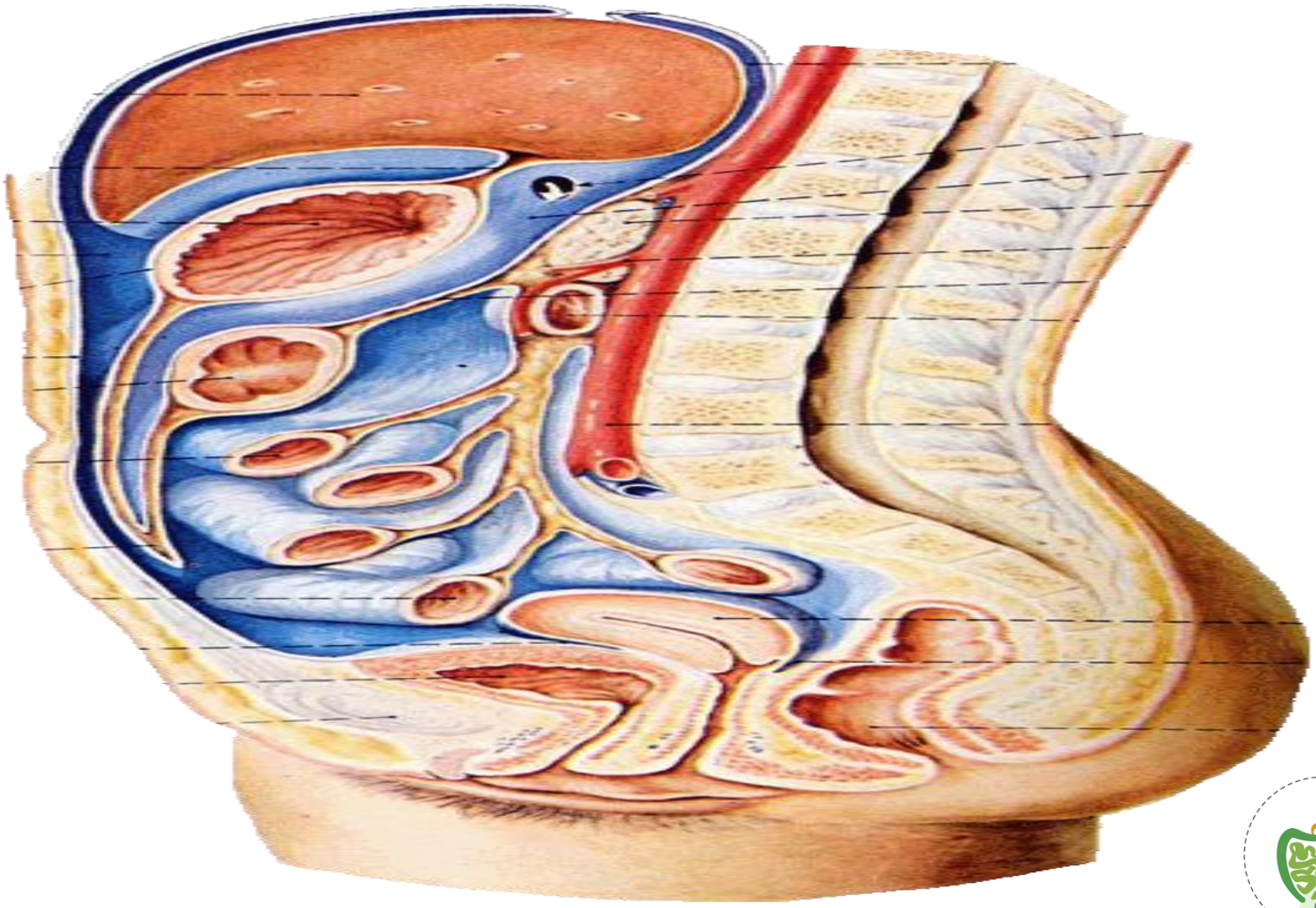
Lo14

Greater omentum:

Four-layered fold of peritoneum,
the **anterior two layers** descend from the greater curvature of stomach and superior part of duodenum and hangs down like an **apron** in front of coils of small intestine, then turns **upward** and attaches to the **transverse colon.**



N:
If an infection occurs in the intestine, plasma cells formed in the lymph nodes combat the infection and help prevent it from spreading to the peritoneum



LO14

Omental foramen

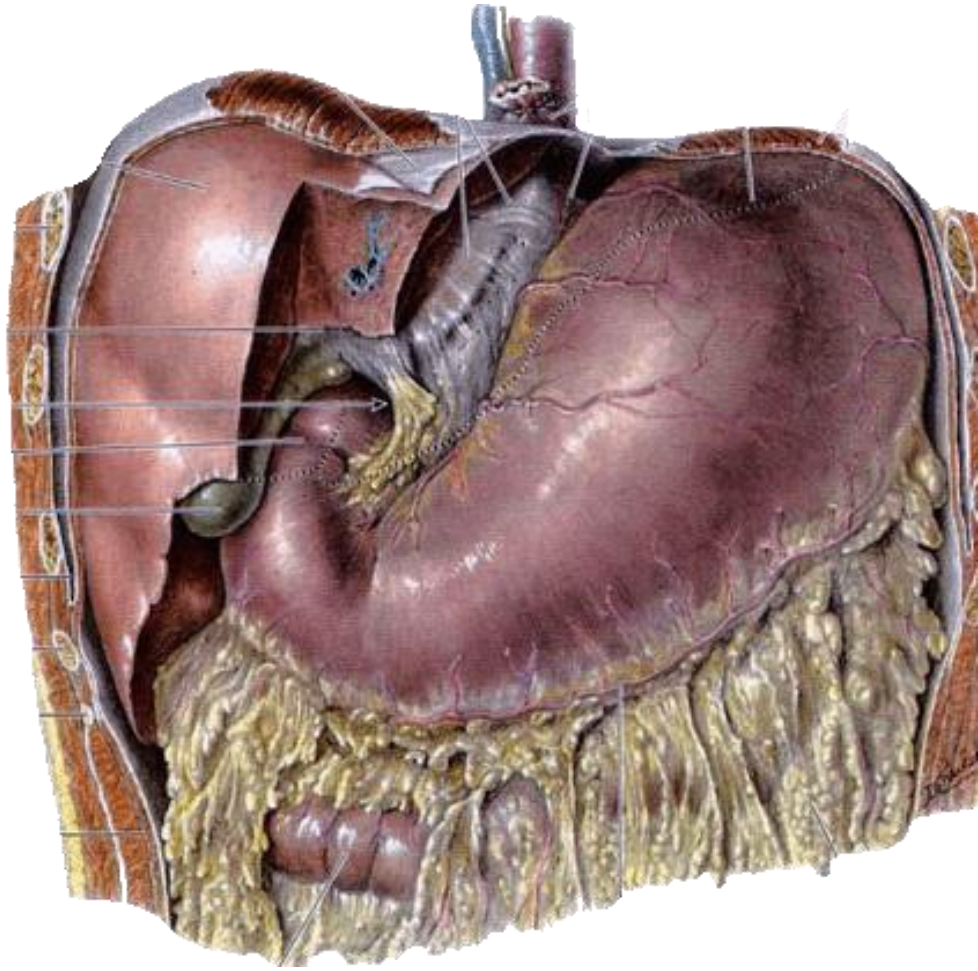
Behind the right border of hepatoduodenal ligament

Superior — caudate lobe of liver

Inferior — superior part of duodenum

Anterior — hepatodudenal ligament

Posterior — peritoneum covering the inferior vena cava



Omental bursa

Lo14

Position:

situated behind the lesser omentum and stomach

Walls:

Superior:

peritoneum which covers the caudate lobe of liver and diaphragm

Anterior:

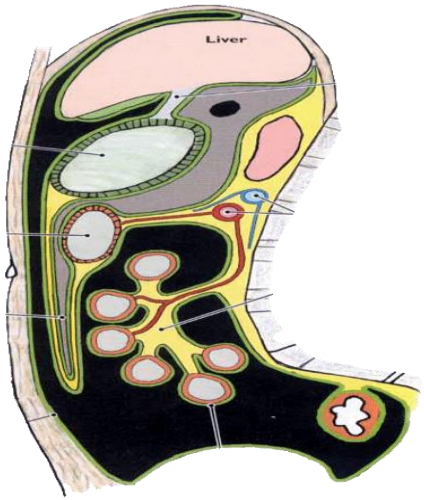
formed by lesser omentum, peritoneum of posterior wall of stomach, and anterior two layers of greater omentum

Inferior:

area of anterior and posterior two layers of greater omentum

Posterior:

formed by posterior two layers of greater omentium, transverse colon and transverse mesocolon, peritoneum covering pancreas, left kidney and suprarenal gland



N:

The omental bursa (lesser sac) communicates with the greater sac through the omental foramen

LO14

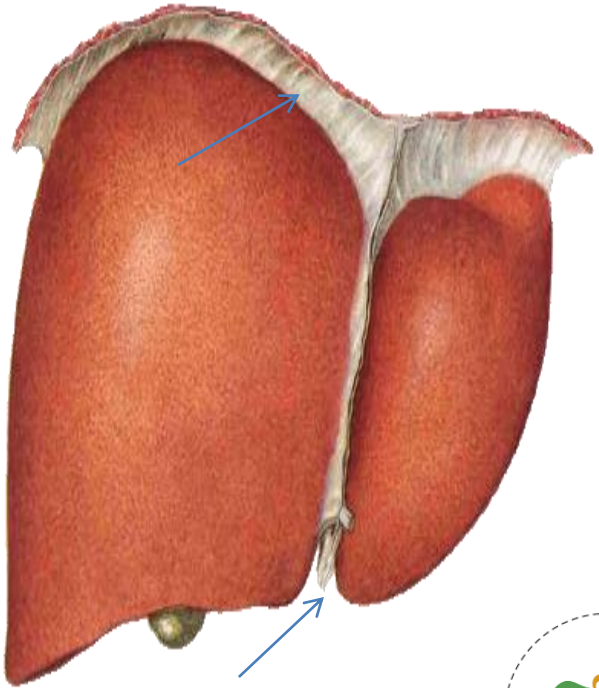
Ligaments :

two-layered folds of peritoneum that attached mobile solid viscera to the abdominal wall

e.g:

Ligaments of liver

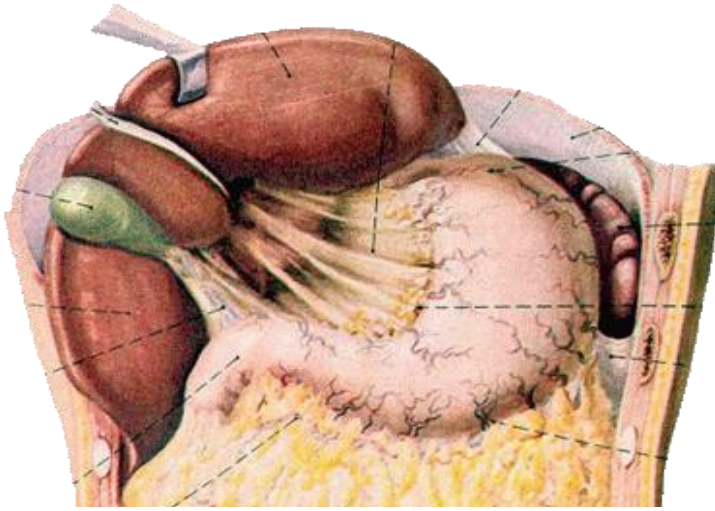
- **Falciform ligament of liver**
  - Consists of double peritoneal layer
  - Extends to anterior abdominal wall
  - **ligamentium teres**



LO14

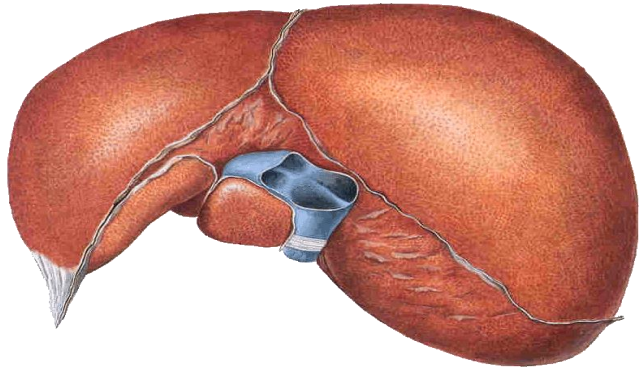
- **Coronary ligament** :
- the area between upper and lower parts of the coronary ligament is the **bare area** of live,
- this area is devoid of peritoneum and lies in contract with the diaphragm
- **Left and right triangular ligaments**

— formed by right extremity of coronary ligament and left leaf of falciform ligament, respectively



Hepatogastric ligament

Hepatoduodenal ligament



LO14

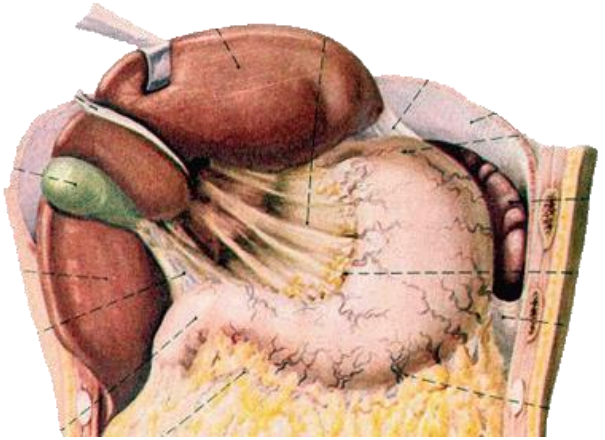
Ligaments of spleen

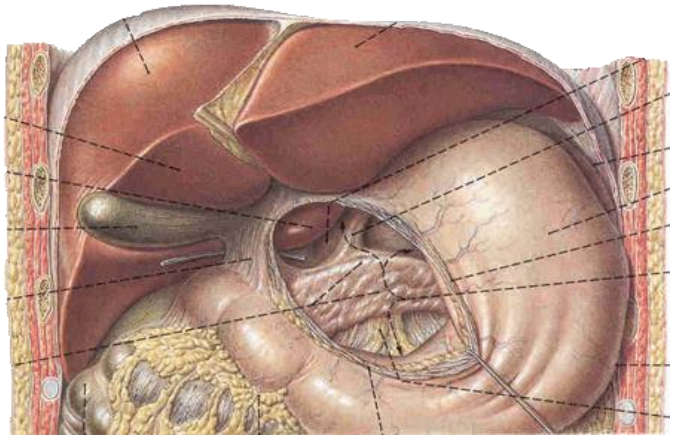
- **Gastrosplenic ligament** —a double layer of peritoneum that connects the fundus of stomach to hilum of spleen. In this double layer of peritoneum are the short gastric and left gastroepiploic vessels
- **Splenorenal ligament** —extends between the hilum of spleen and anterior aspect of left kidney. The splenic vessels lies within this ligament, as well as the tail of pancreas
- **Phrenicosplenic ligament**
- **Splenocolic ligament**

LO14

Ligaments of stomach

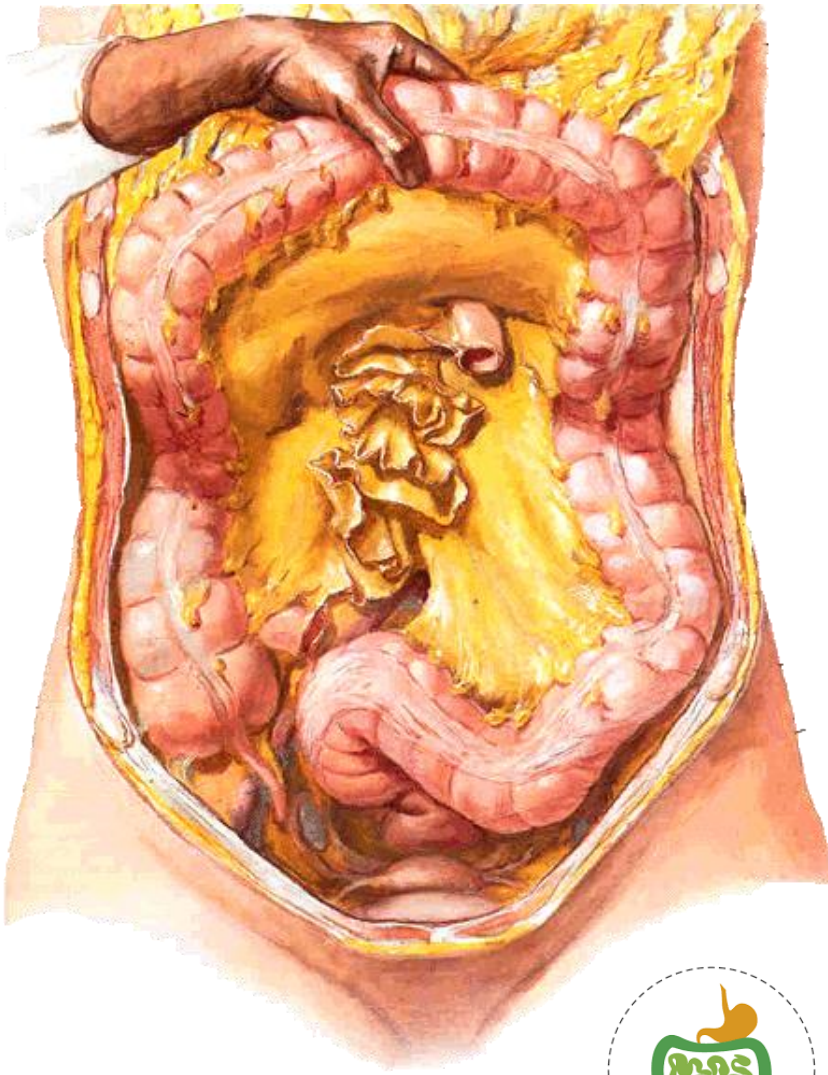
- Hepatogastric ligament
- Gastrosplenic ligament
- Gastrophrenic ligament
- Gastrocolic ligament
- Gastropancrestic ligament





LO14

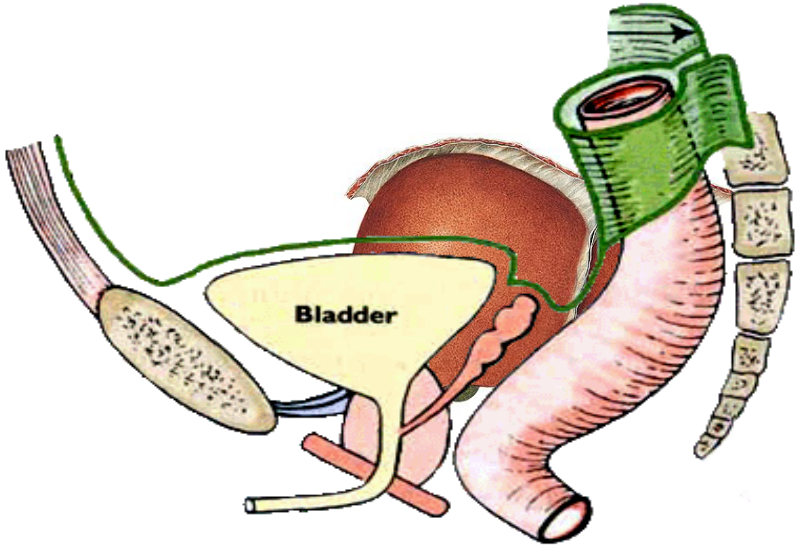
- **Para colic gutters :**
- **Gutter = Sulcus**
- **Right paracolic sulcus** (gutter)
- —lies lateral to the ascending colon. It communicates with the hepatorenal recess and the pelvic cavity.
- It provides a route for the **spread of infection** between the pelvic and the upper abdominal region.
- **Left paracolic sulcus** (gutter)
- —lies lateral to the descending colon. It is separated from the area around the spleen by the phrenico colic ligament, a fold of peritoneum that passes from the colic flexure to the diaphragm.

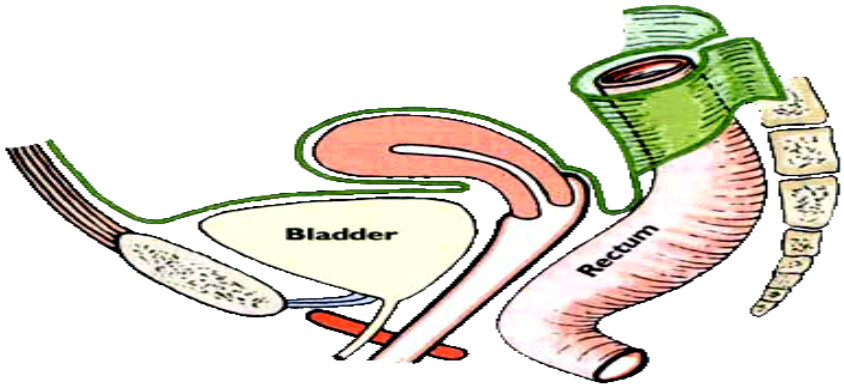


Pouches

Lo14

- In male
- — **rectovesical pouch**
- In female
  - **Rectouterine pouch** — between rectum and uterus
  - **Vesicouterine pouch** — between bladder and uterus





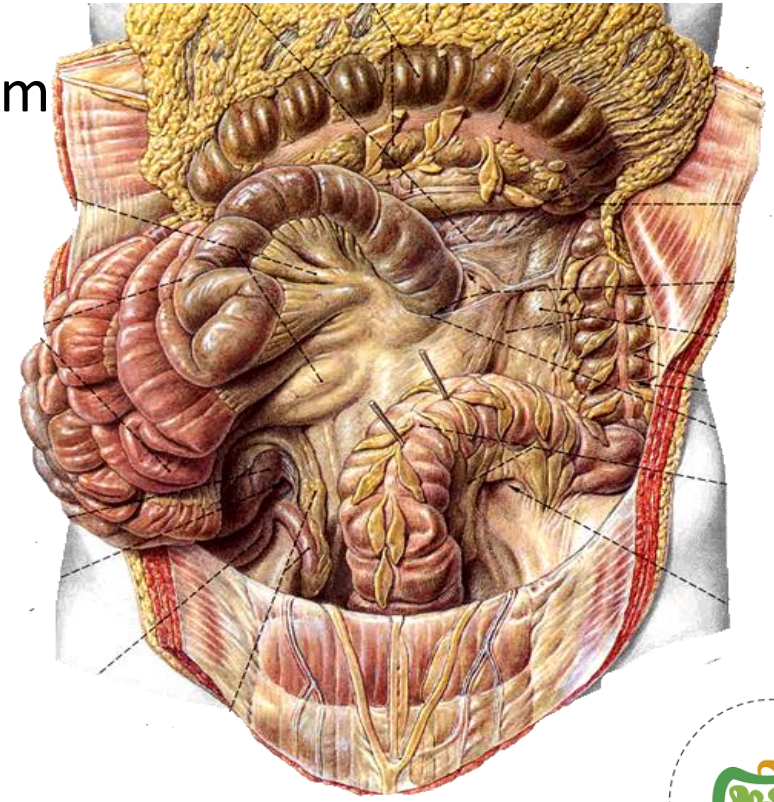
Folds and recesses of posterior abdominal wall

LO14

- **Superior duodenal fold** and **recess**
- **Inferior duodenal fold** and **recess**
- **Intersigmoid recess**
- — formed by the inverted V attachm
- of sigmoid mesocolon

Retrocecal recess —
in which the appendix frequenty lies

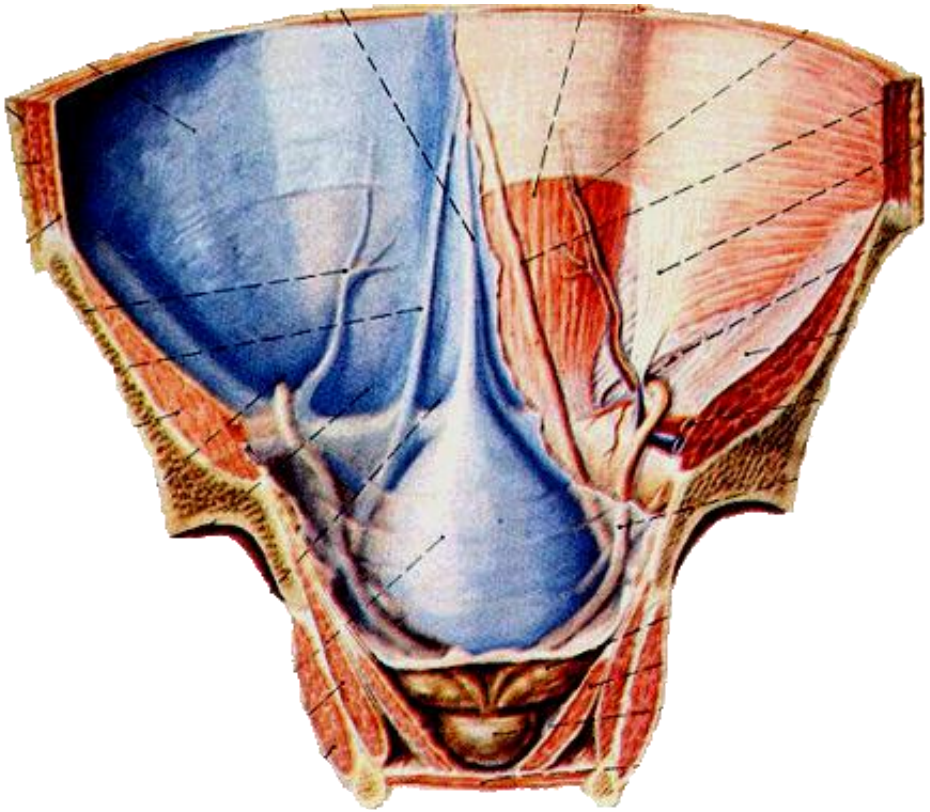
Hepatorenal recess —
lies between the right lobe of liver, right kidney, and right colic flexure, and is the lowest parts of the peritoneal cavity when the subject is supine



Folds and fossa of anterior abdominal wall

LO14

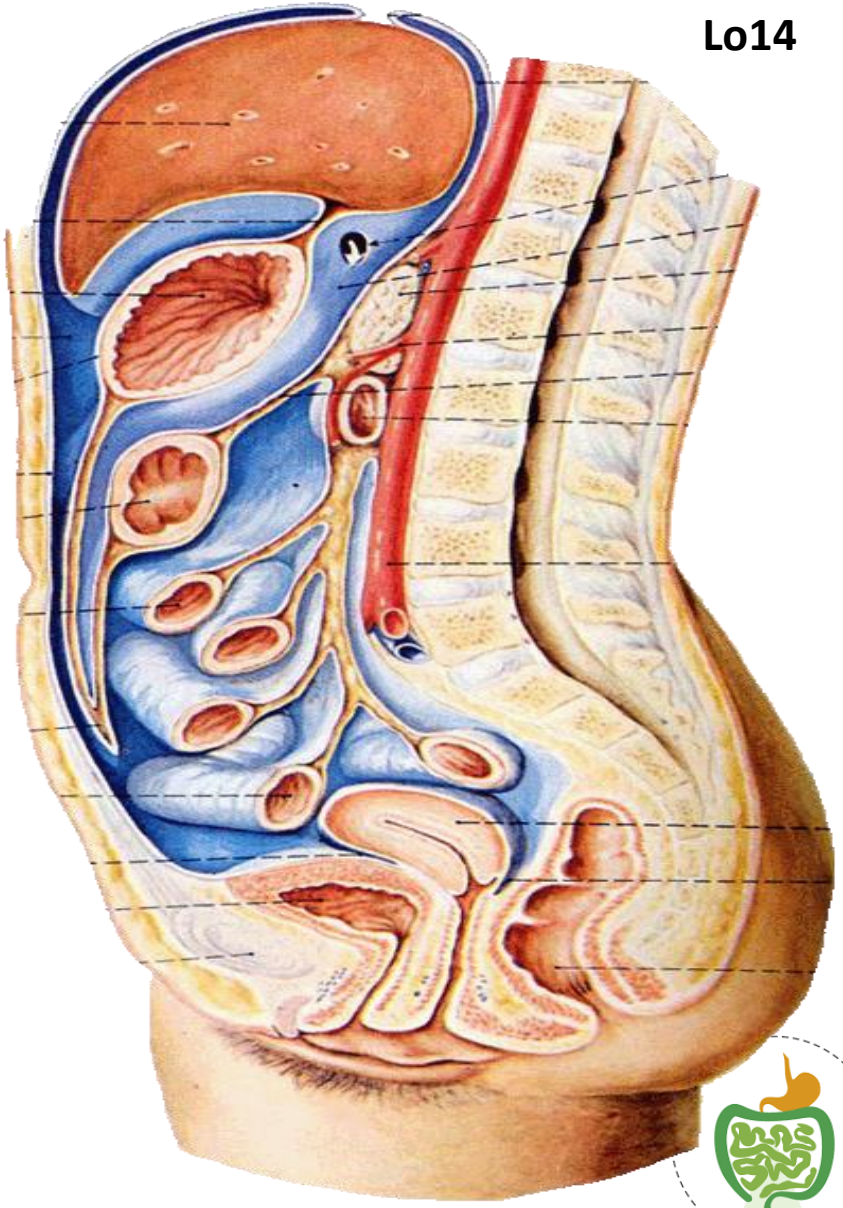
- **Median umbilical fold** — contain the remnant of urachus (median umbilical ligaments)
- **Medial umbilical fold** — contains remnants of the umbilical arteries (medial umbilical ligaments)
- **Lateral umbilical fold** — contains the inferior epigastric vessels
- **Supravesical fossa**
- **Medial inguinal fossa**
- **Lateral inguinal fossa**



Lo14

Mesenteries = or mesocolons

two-layered fold of peritoneum that attach part of the **intestines** to the posterior abdominal wall

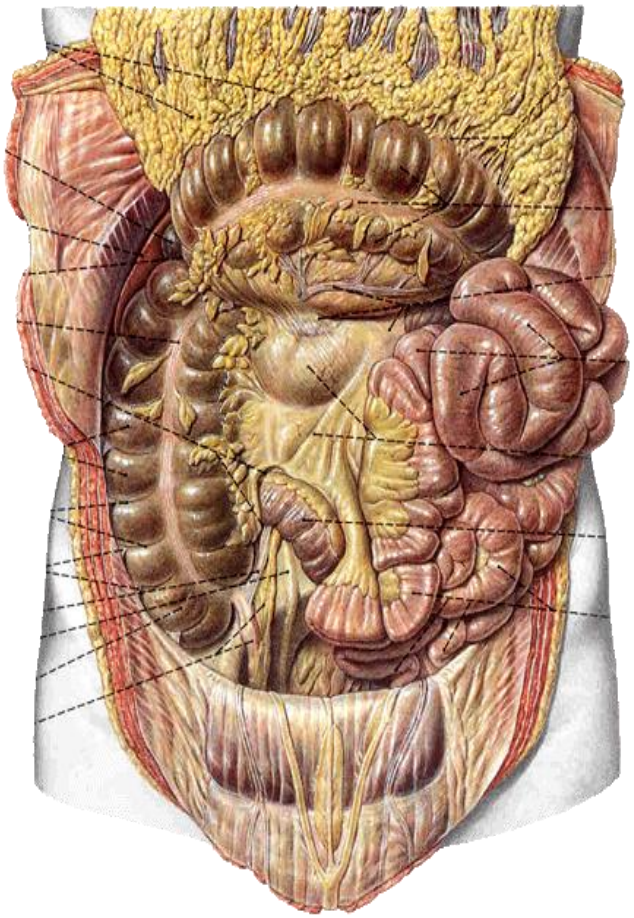


Mesentery

Lo14

:fan-shaped , broad structure
suspends the small intestine from the posterior abdominal wall

: Consists of two peritoneal layers
Intestinal border
: folded, **6- 7 m** long



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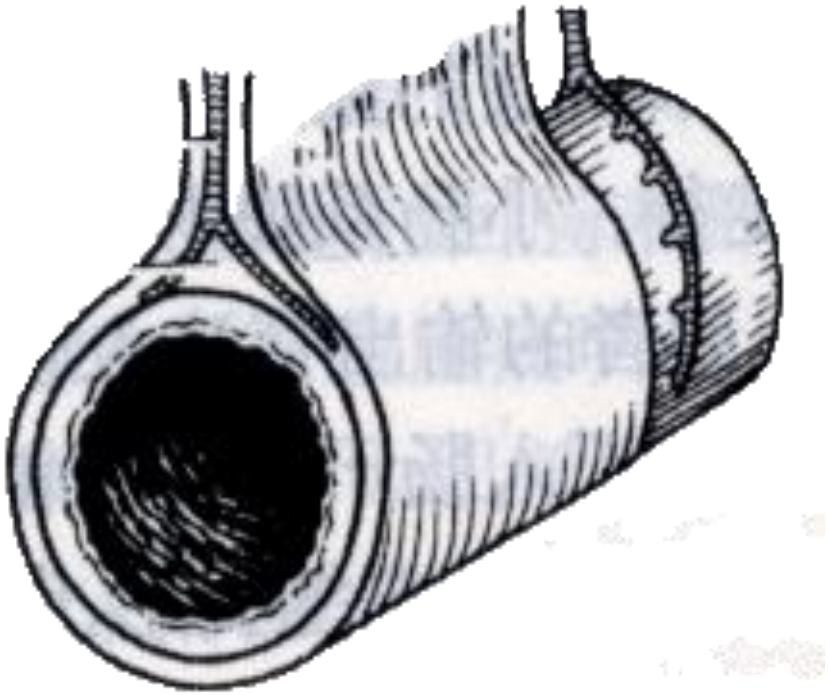
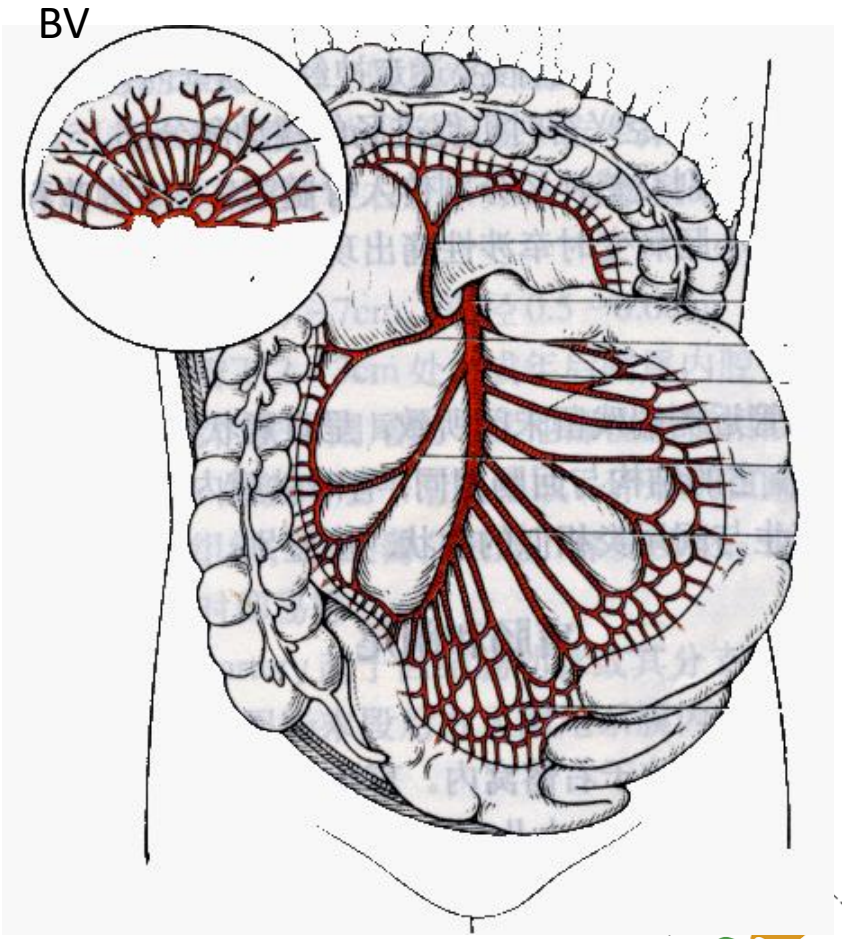
Mesentry:

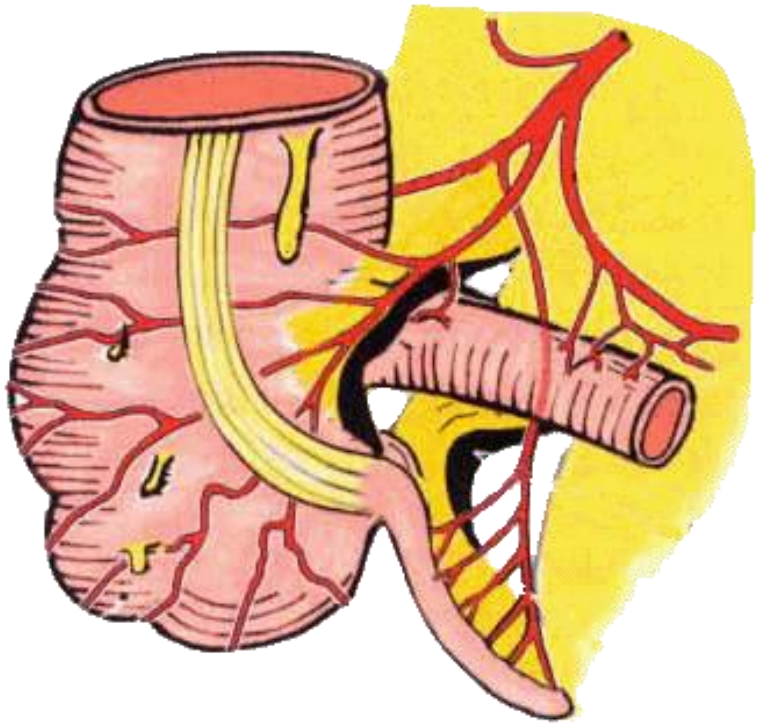




Lo14

Mesoappendix

Triangular mesentery extends from terminal part of ileum to appendix
Appendicular artery runs in free margin of the meso appendix



Lo14

2. **Transverse mesocolon** :
   double fold of peritoneum which connects the transverse colon to the posterior abdominal wall

Sigmoid mesocolon :
inverted V-shaped, with apex located in front of left ureter and division of common iliac artery