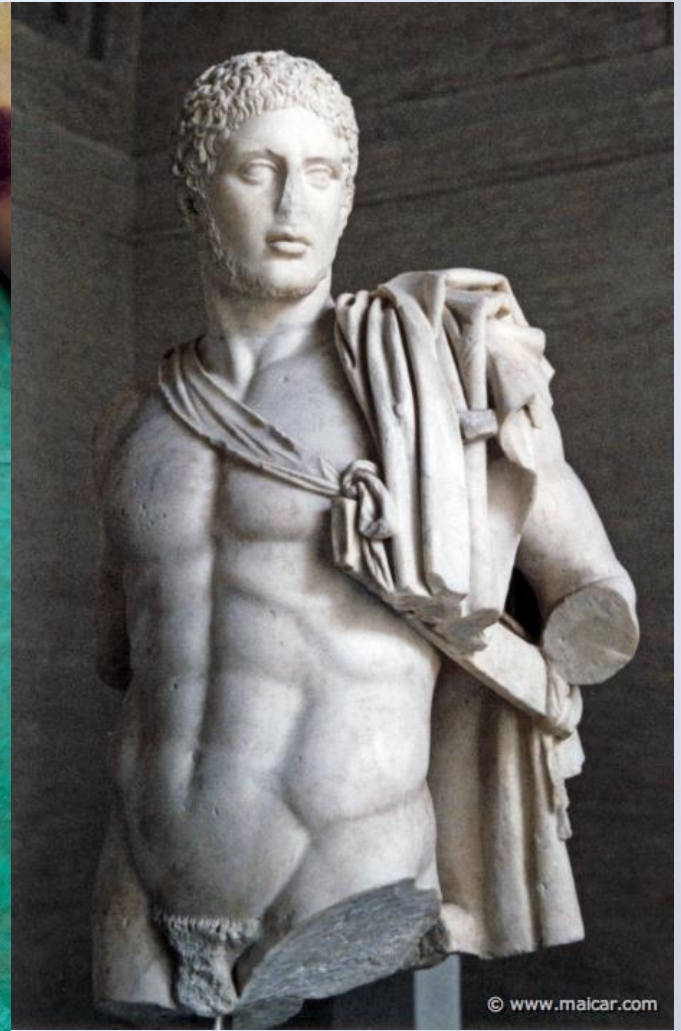


Topographical and surface anatomy of the abdomen. Projection of internal organs, peritoneal relations.



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Anatomy, Histology and Embriology
Institute
2020



Orientation - parts of the abdominal wall

anterior wall

lateral wall



posterior wall

The posterior wall

- Closes the abdominal cavity from the rear, both sides of the vertebral column and forms a muscle bed for the kidneys

- Formed by:

M. psoas major

Origin: Th 12, L 1-4 from the side, L 1-5 costal proc.

Insertion: Trochanter minor of femur

Innervation: Rr. musculares from lumbalis plexus

Funktion: Flexor and external rotator of the hip joint

(M. psoas minor)

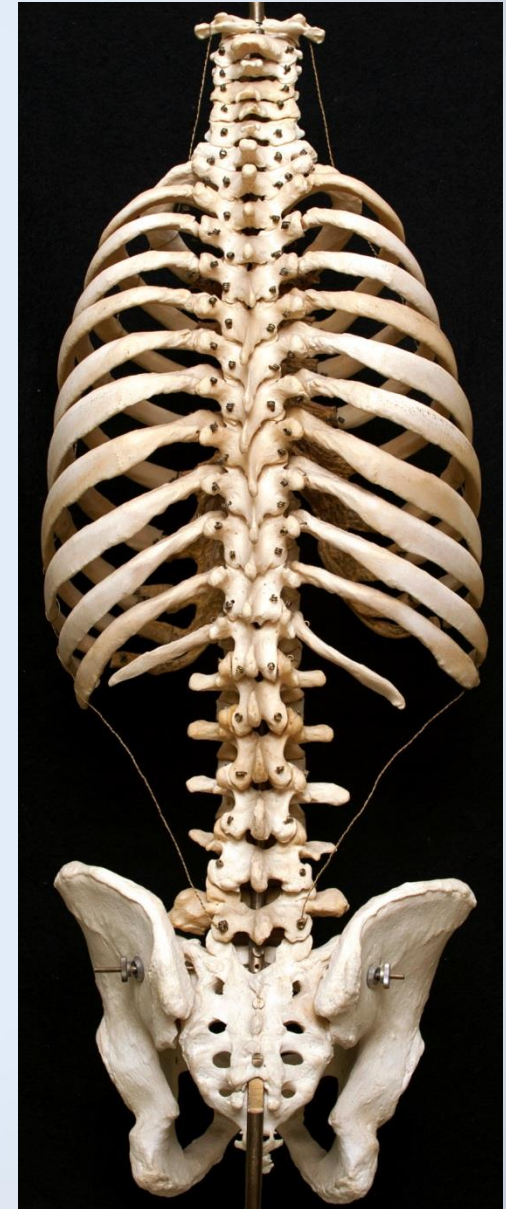
M. quadratus lumborum

Origin : internal labium of iliac crest, iliolumbale Lig.

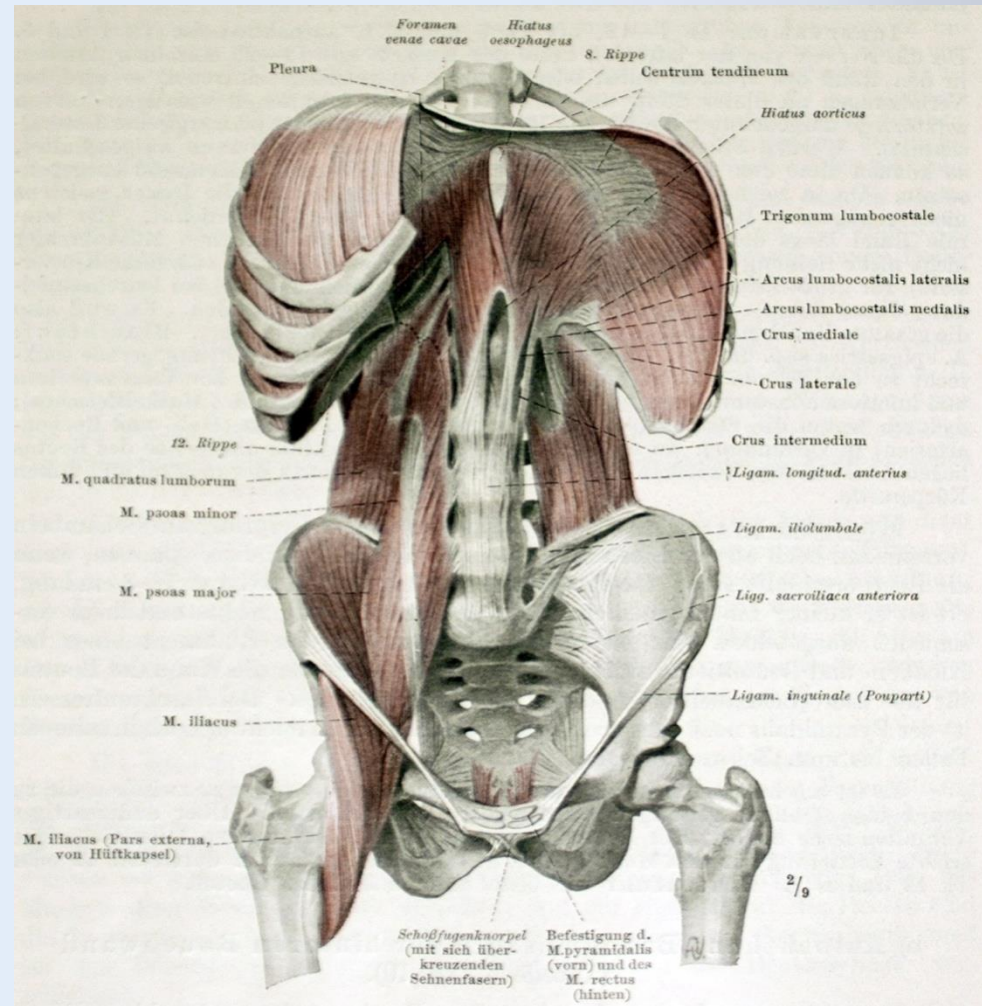
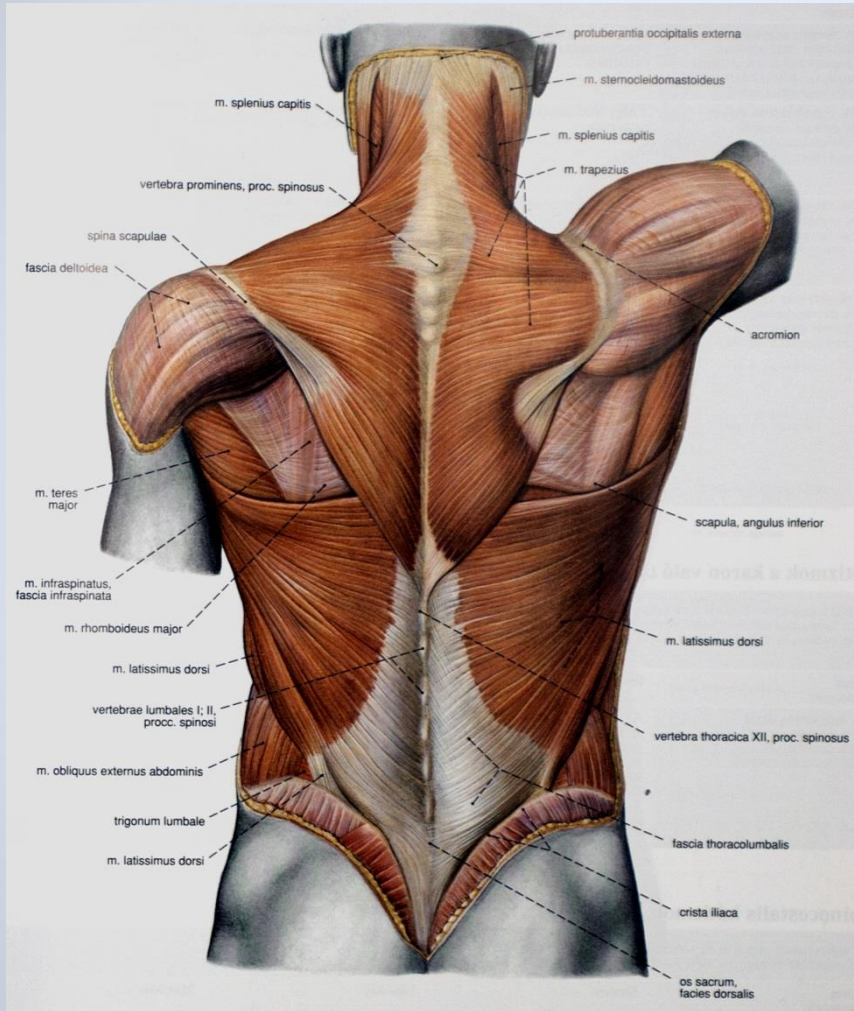
Insertion : 12. Ribs, L 1-4. costal proc.

Innervation: lumbalis Pl. , subcosatlis N.

Funktion: Expiration, flexion of the spine



The posterior wall



The lateral wall

- Closes the abdominal cavity on both sides
- Formed by the broad abdominal muscles:
obliquus abdominis externus m.
obliquus abdominis internus m.
transversus abdominis m.
- Muscle origins behind and laterally
- Muscles from the lateral and anterior abdominal wall with the help of aponeuroses

Pic.: Eycleshymer & Schoemaker



Faller

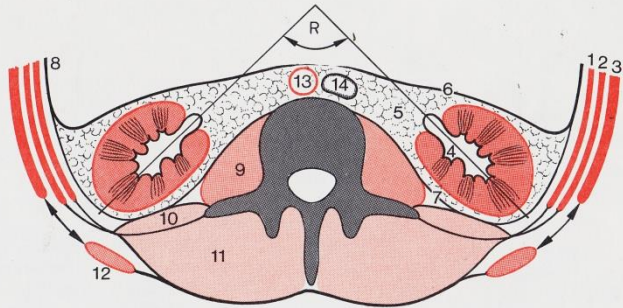
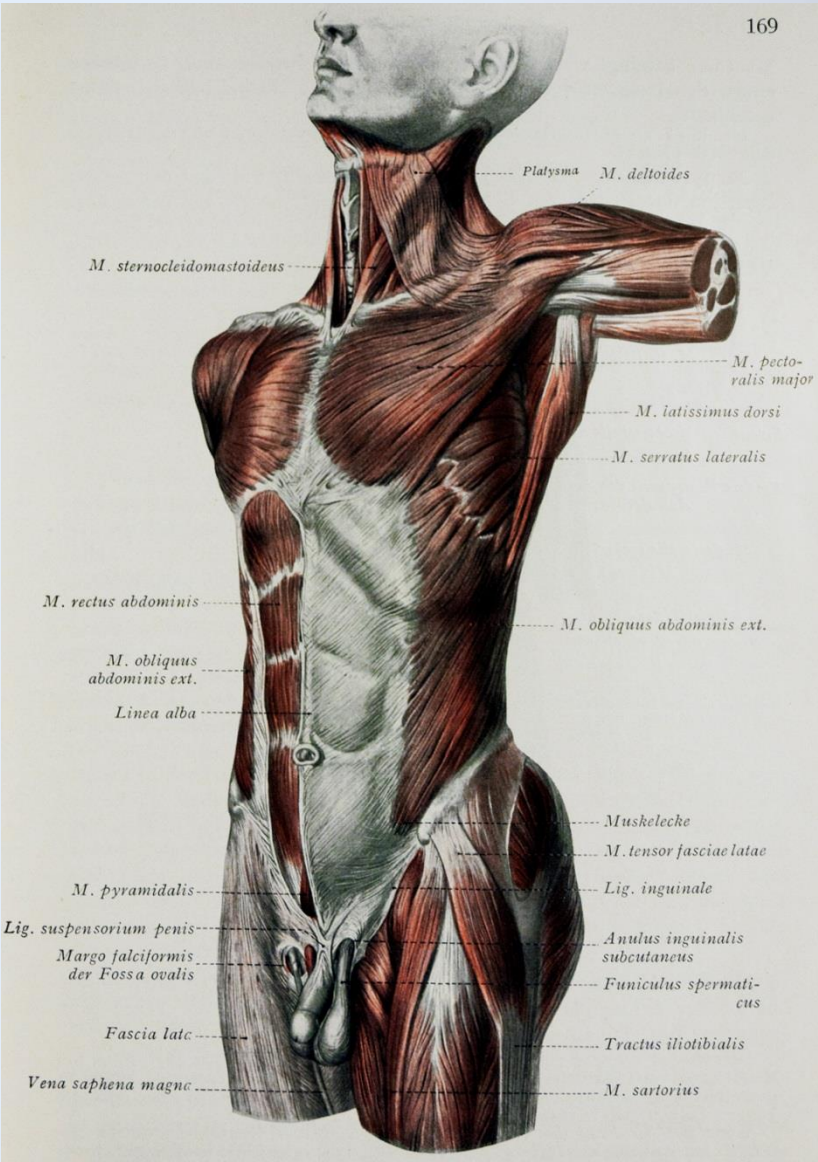


Abb. 2-193 **Schnitt durch Nierenlager und Faszien sack** 1. M. transversus abdominis 2. M. obliquus internus abdominis 3. M. obliquus externus abdominis 4. Niere mit Capsula fibrosa 5. Capsula adiposa renis 6. Fascia praerenalis 7. Fascia retrorenalis 8. Fascia transversalis 9. M. psoas major 10. M. quadratus lumborum 11. Autochthone Rückenmuskulatur 12. M. latissimus dorsi 13. Aorta abdominalis 14. V. cava inferior ↓ Pfeil im Trigonum lumbale Achsen beider Nieren treffen sich im rechten Winkel vor Wirbelsäule

The lateral wall

Benninghoff



M. obliquus abdominis externus

Origin:

outside of the 5 - 12 ribs muscle twitching
alternating with serratus anterior m. and
latissimus dorsi m.

Insertion:

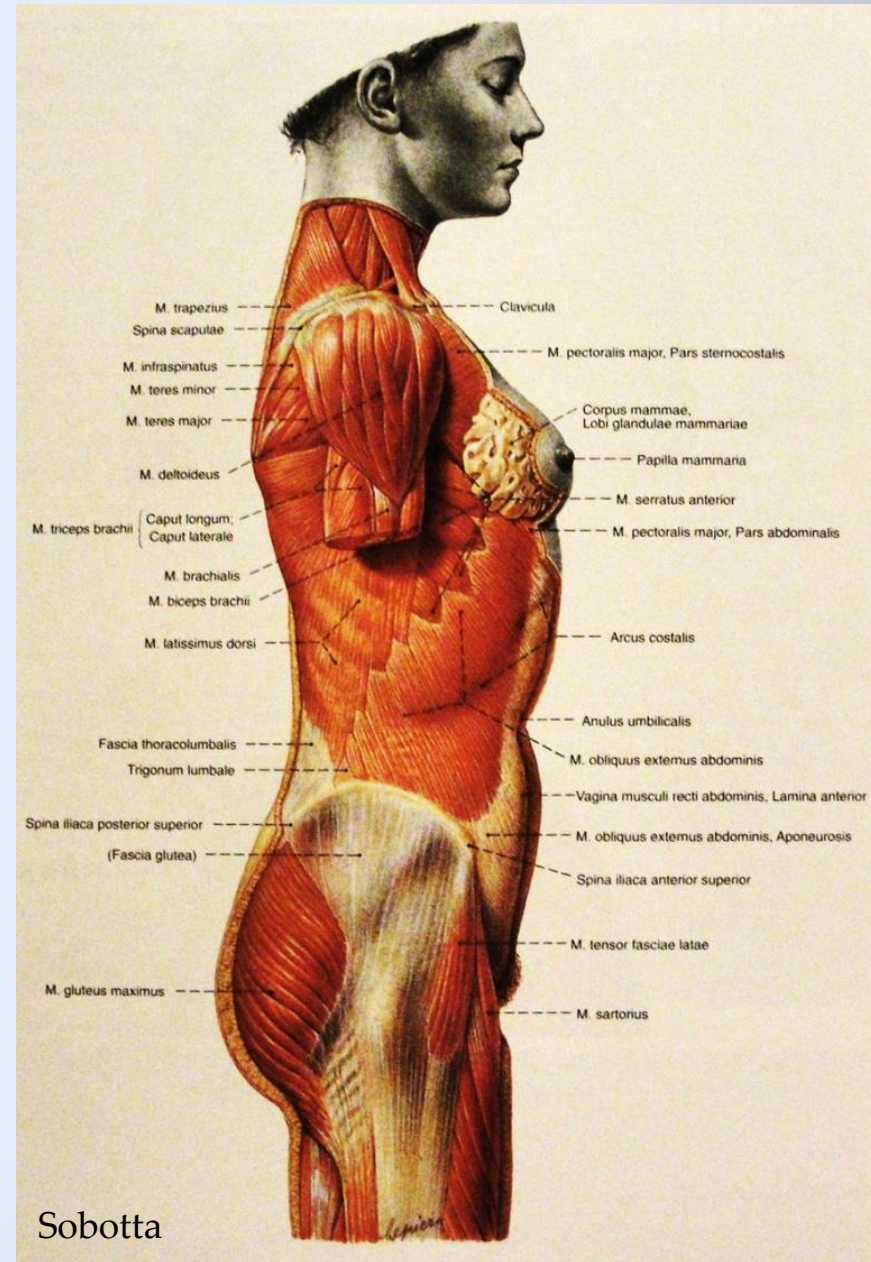
- directly on the iliac crest
(labium externum iliac crest)
- with its aponeurosis on inguinale lig.
(Poupart lig.) and in the front
wall of the so-called rectus sheath

Innervation:

Intercostales nn. , iliohypogastric n.,
Ilioinguinal n.

Funktion:

Ante and lateral flexion of the trunk; lifts the pelvis;
Rotate to the opposite side; abdominal pressure





M. obliquus abdominis internus

Origin:

- intermediate line of iliac crest
- thoracolumbale Fascia
- inguinal lig. (lateral 2/3)

Muscle fibers run perpendicular to the m. obliquus externus abdominis

Insertion:

- directly the three caudal ribs
- with its aponeurosis in the linea alba

Aponeurosis divides:

front sheet for the front wall rear

for the rear wall of the sheath of the rectus

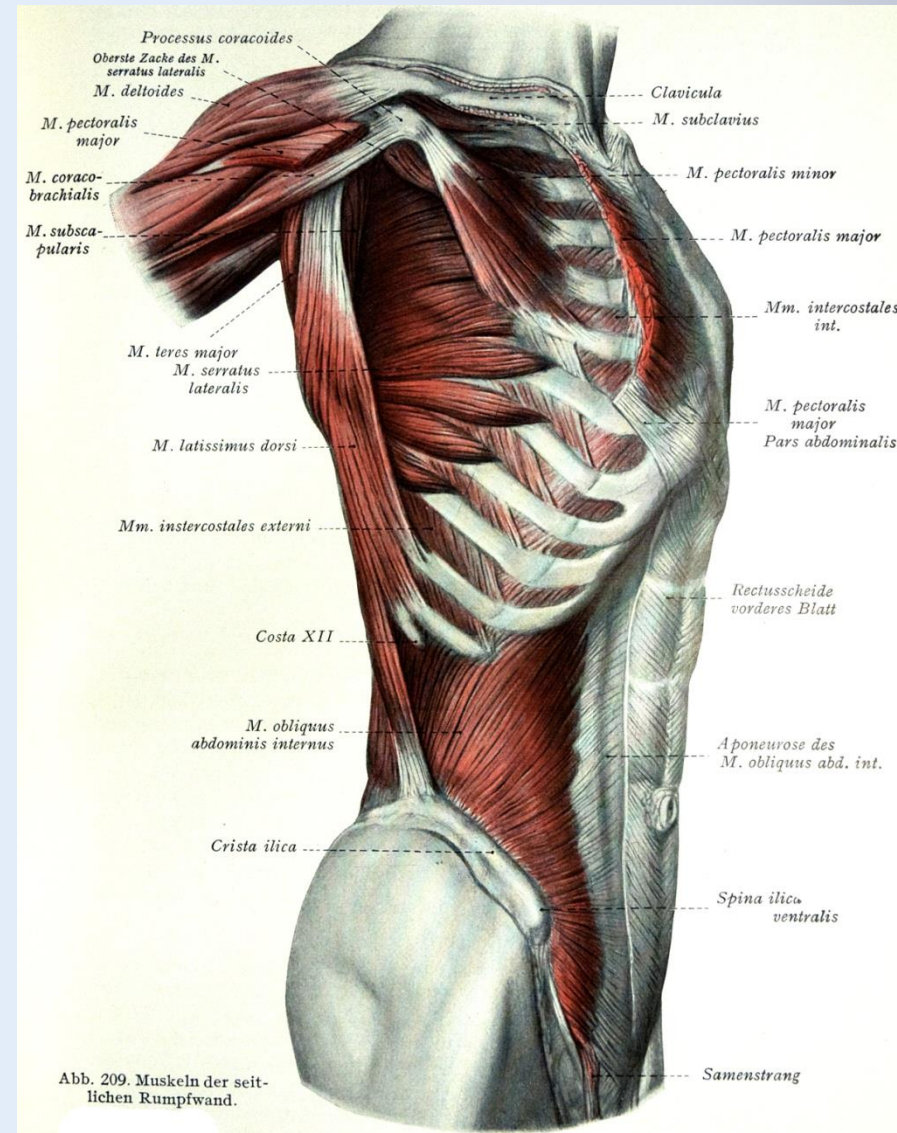
Innervation:

Intercostales nn. , iliohypogastric n. ,

Ilioinguinal n.

Funktion:

Ante and lateral flexion; Rotates on its own side;
raises the pelvis; abdominal pressure



Bodon



M. transversus abdominis

Braus

Origin:

- internal labium of iliac crest
- Thoracolumbal fascia
- inguinal lig. (lateral 1/3)
- caudale 6 Ribs (inside)

} directly
 } with tendon

Muscle fibers run horizontally

Insertion:

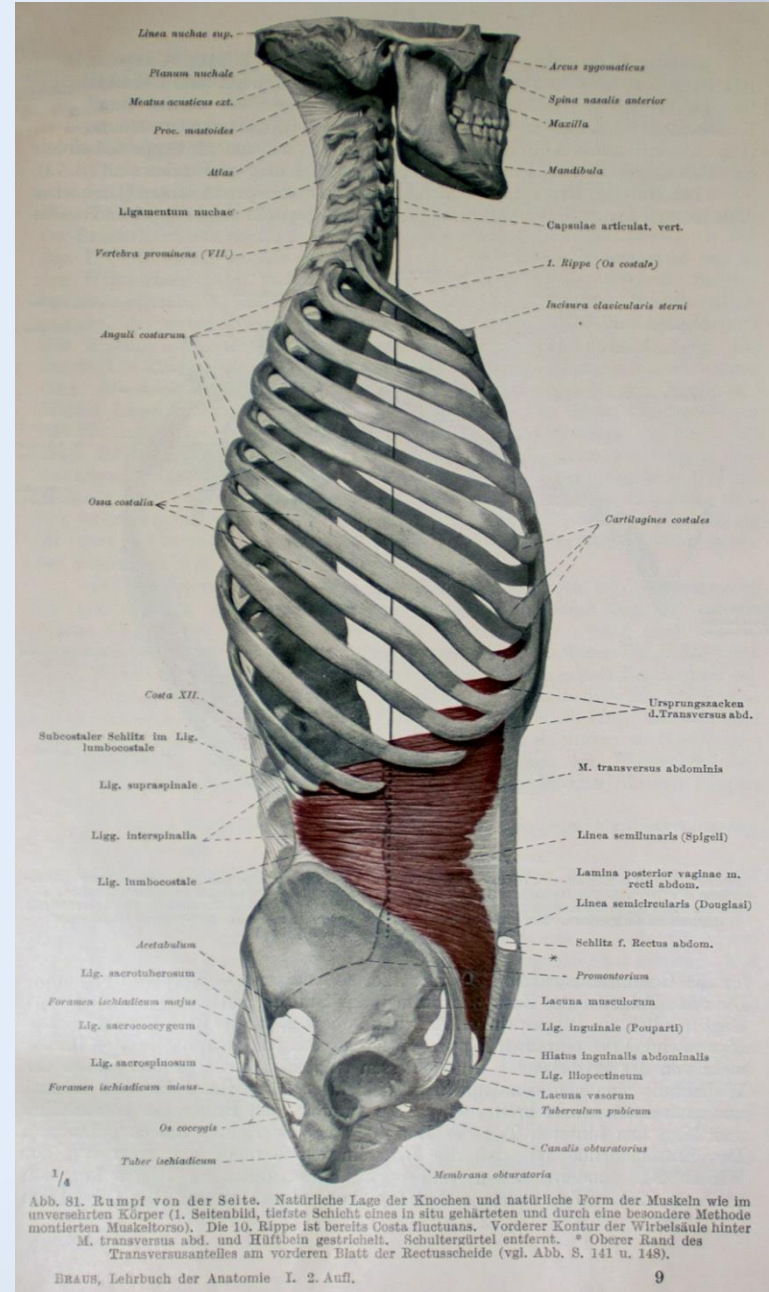
with its aponeurosis in the linea alba:
 forms the linea semicircularis (Douglasi)
 the front including the rear wall of the
 rectus

Innervation:

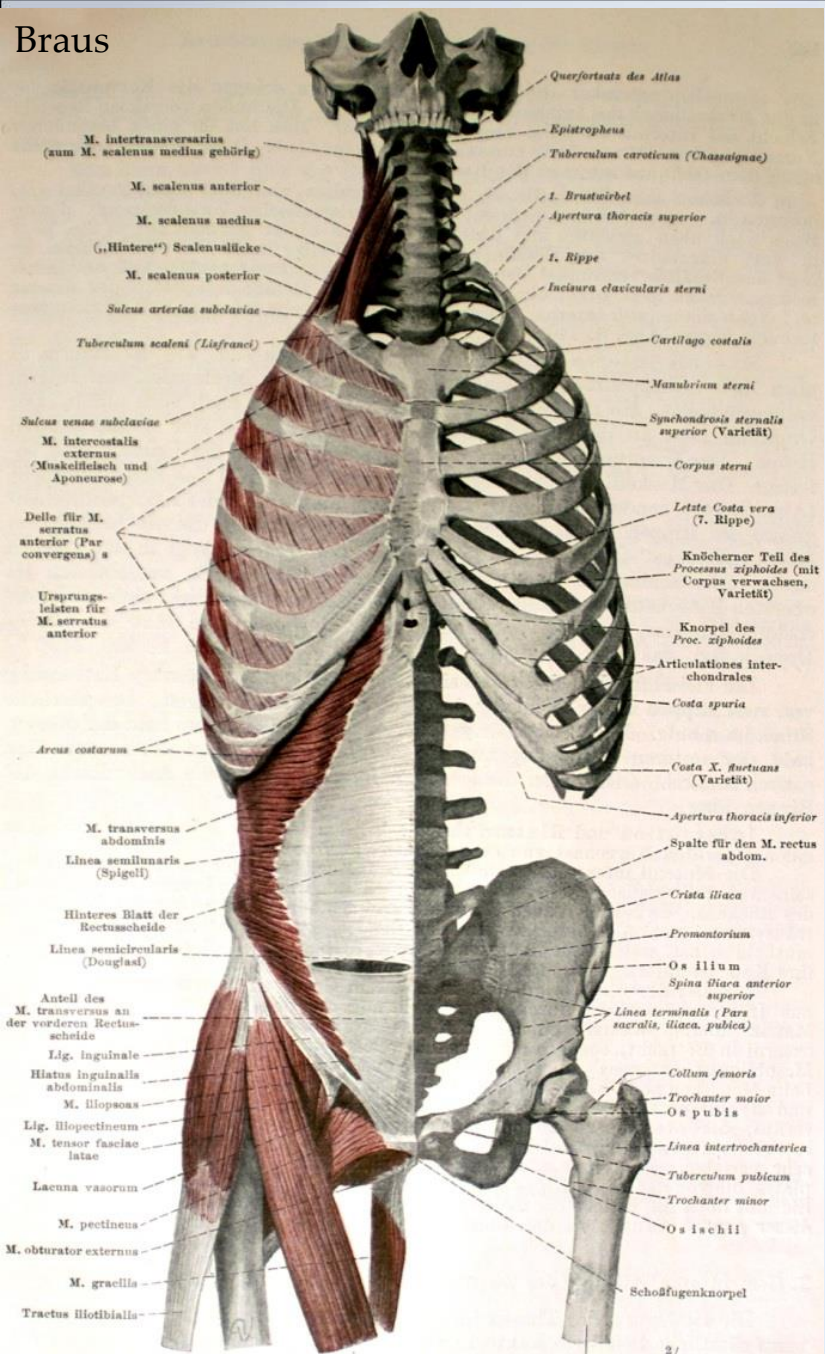
Intercostales nn. ; iliohypogastricus n. ;
 Ilioinguinalis n.; genitofemoralis n.

Funktion:

Makes the abdominal wall fixed; abdominal pressure



Braus



Linea semilunaris Spiegeli

The anterior abdominal wall

- Closes the abdominal cavity from the front

- Made by the rectus abdominis mm. and the aponeuroses of the broad abdominal muscles, are the so-called rectus sheath

Abb.: Eycleshymer & Schoemaker

Origins:

from the 5-7. Ribs
xyphoid proc. of sternum
costoxyphoid lig.

Insertions:

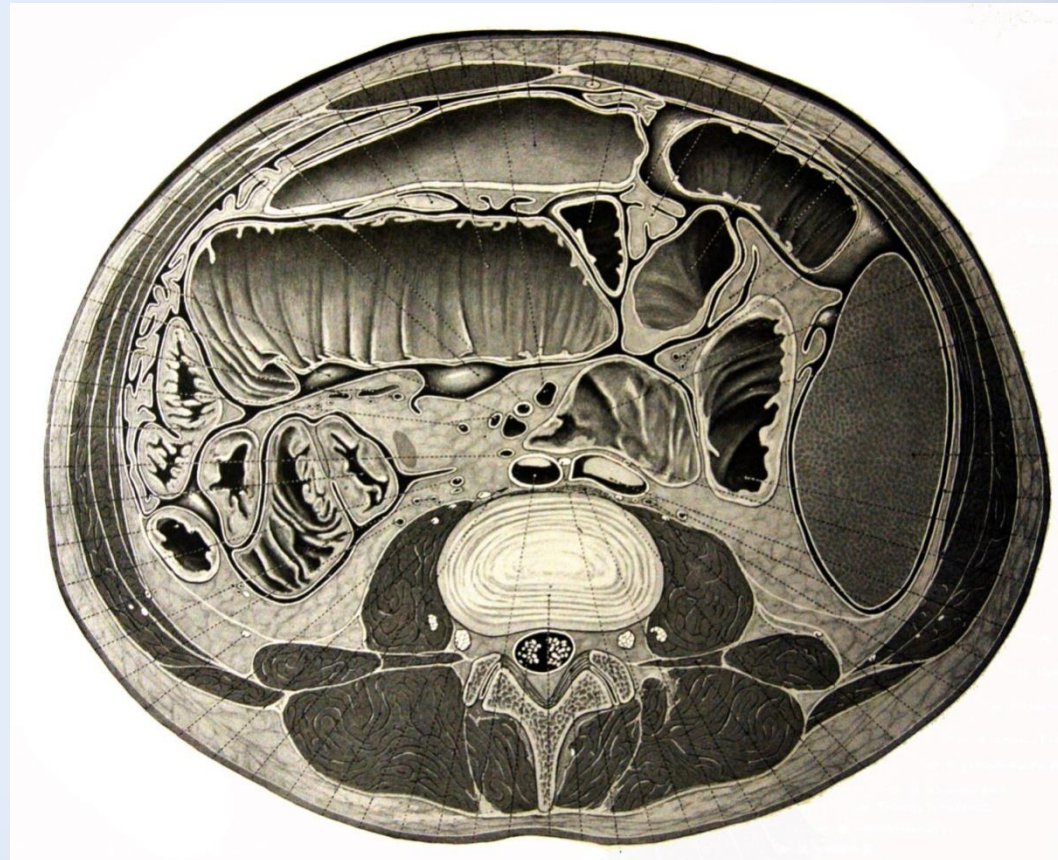
on the crest and pubic symphysis

Innervation:

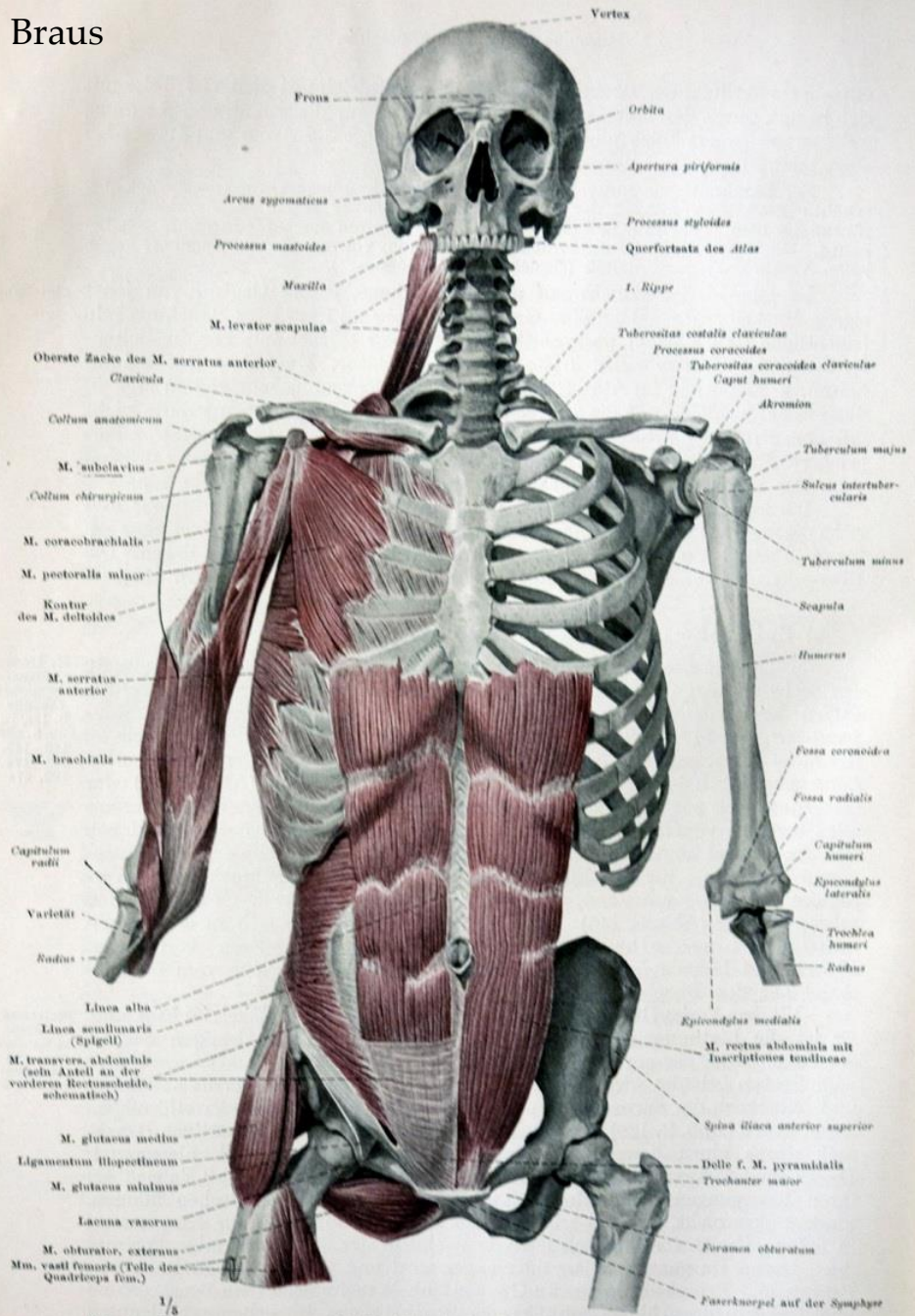
Intercostal nn.

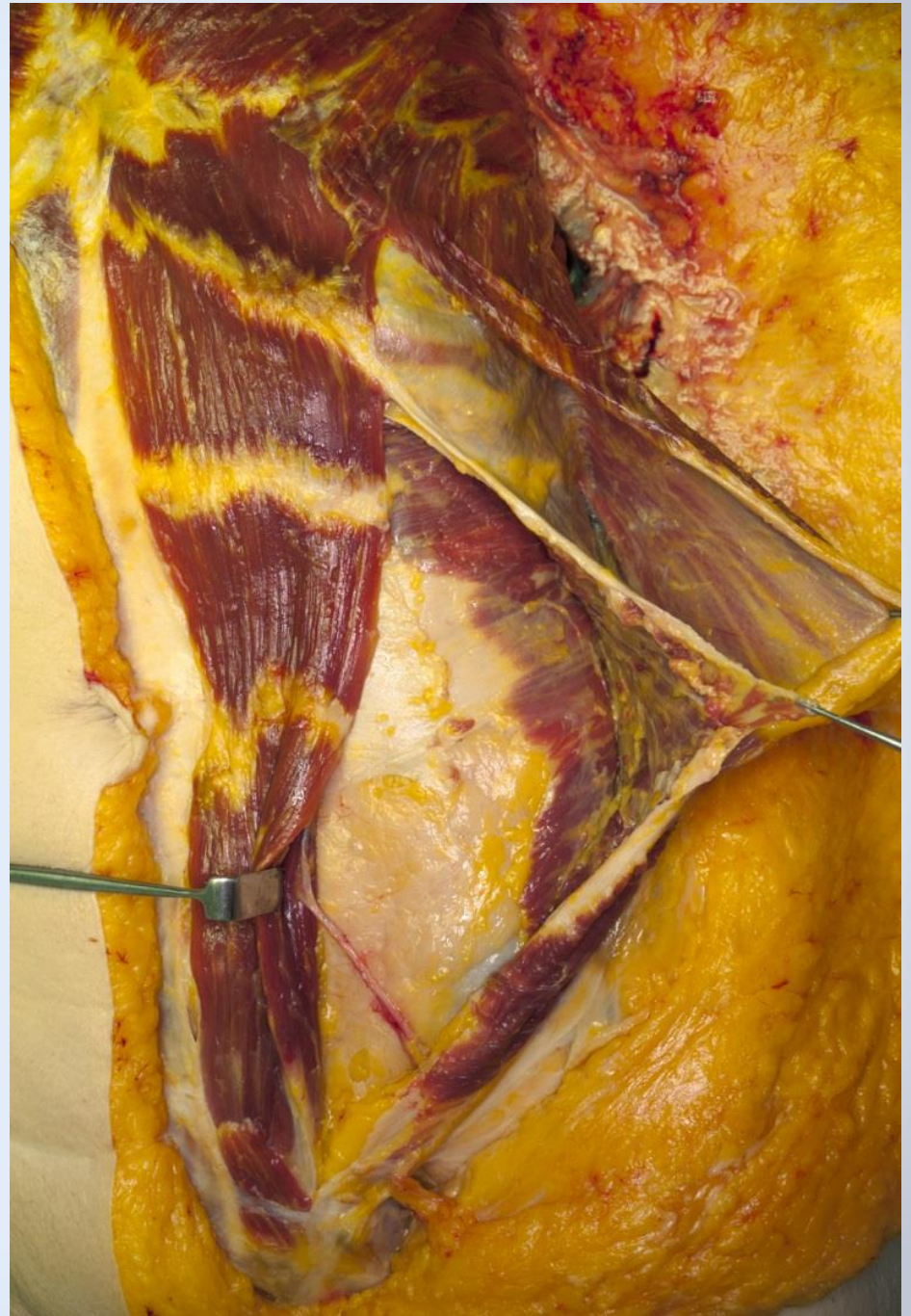
Funktion:

Ante and lateral flexion; raises the pelvis; expiration as the other abs

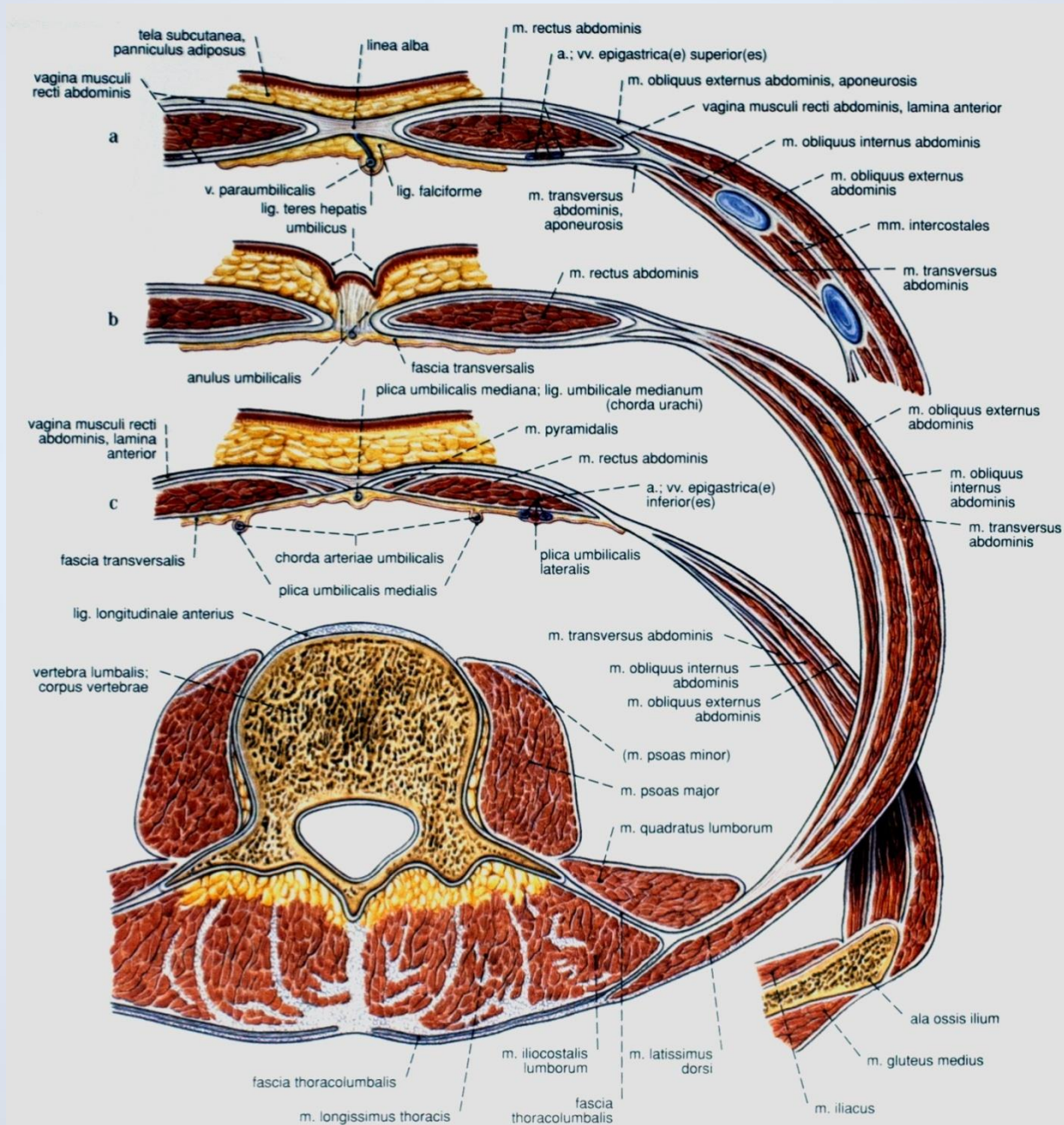


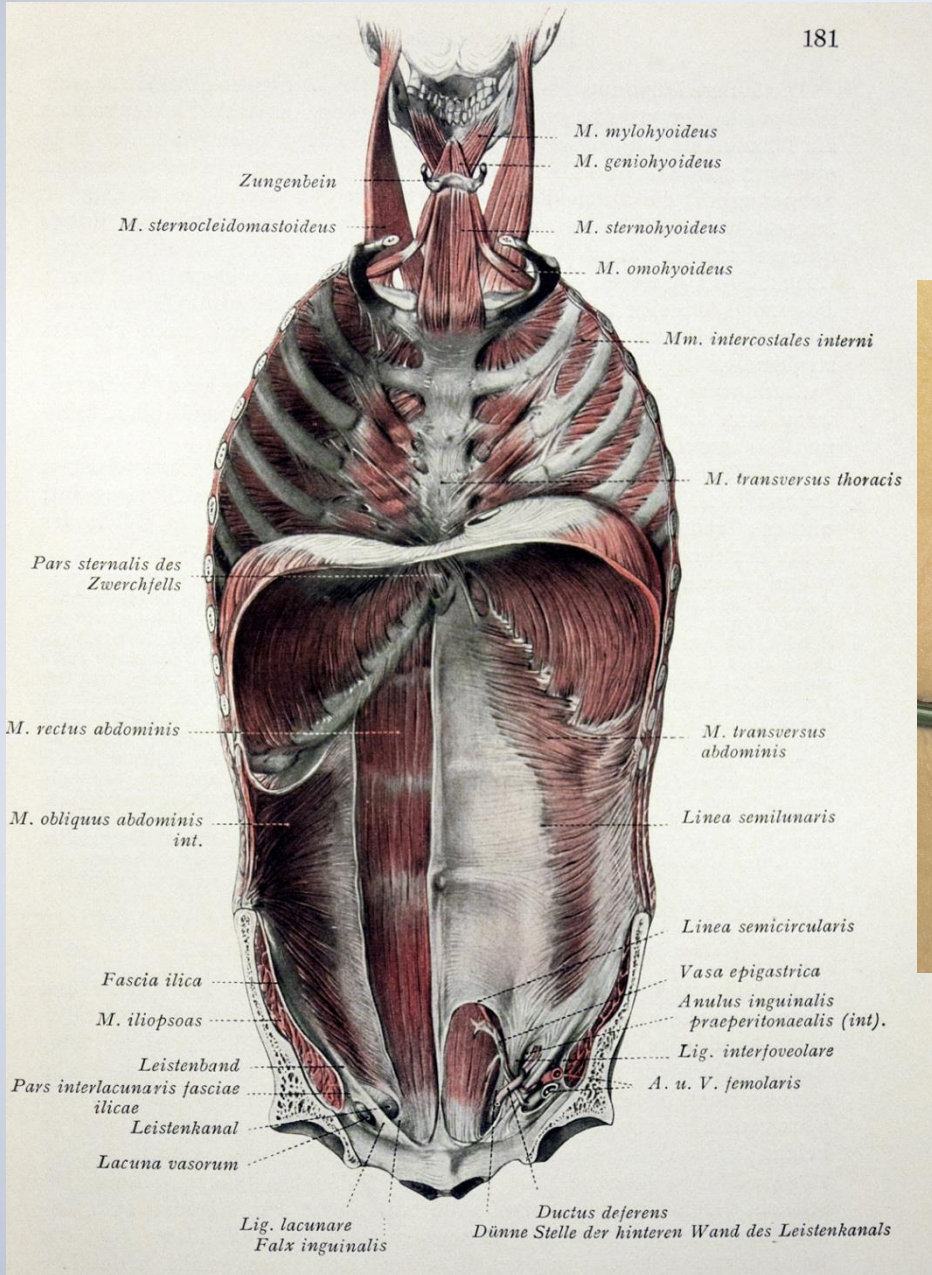
Braus



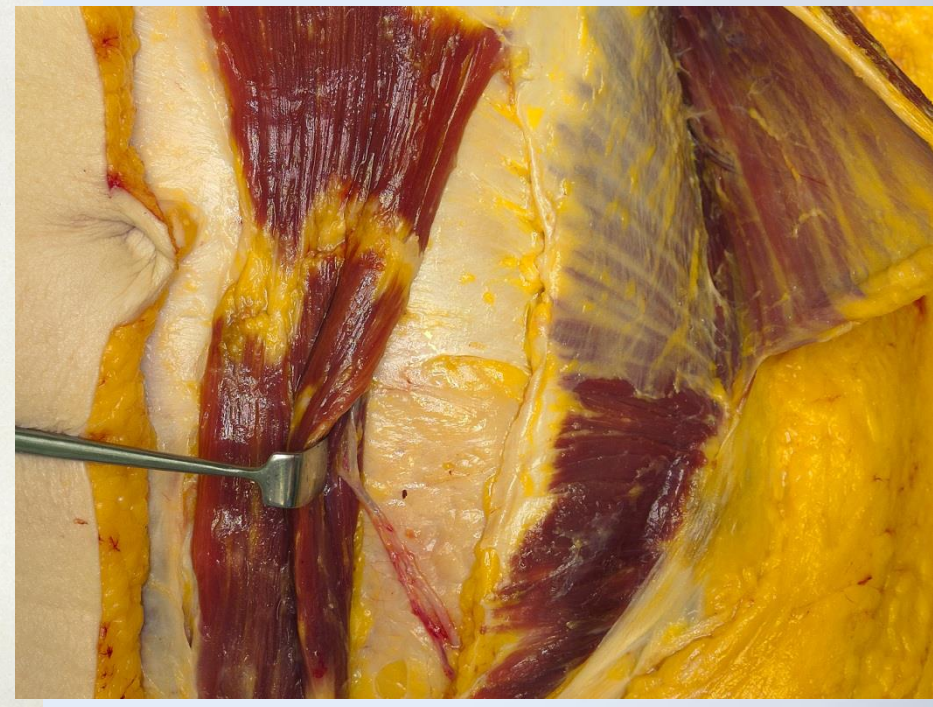


Rectus sheath in various cross-section heights





semicircular line of Douglas

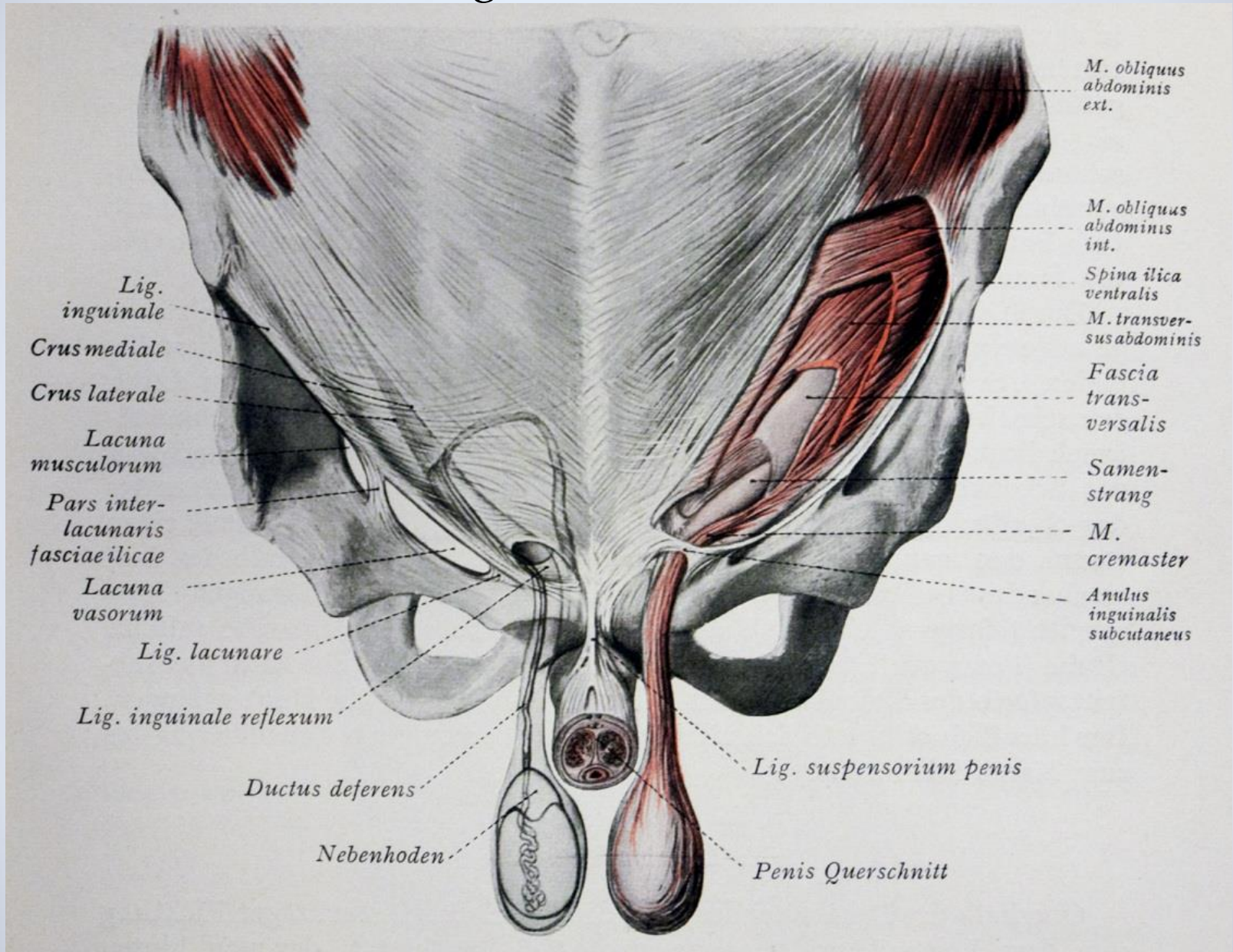




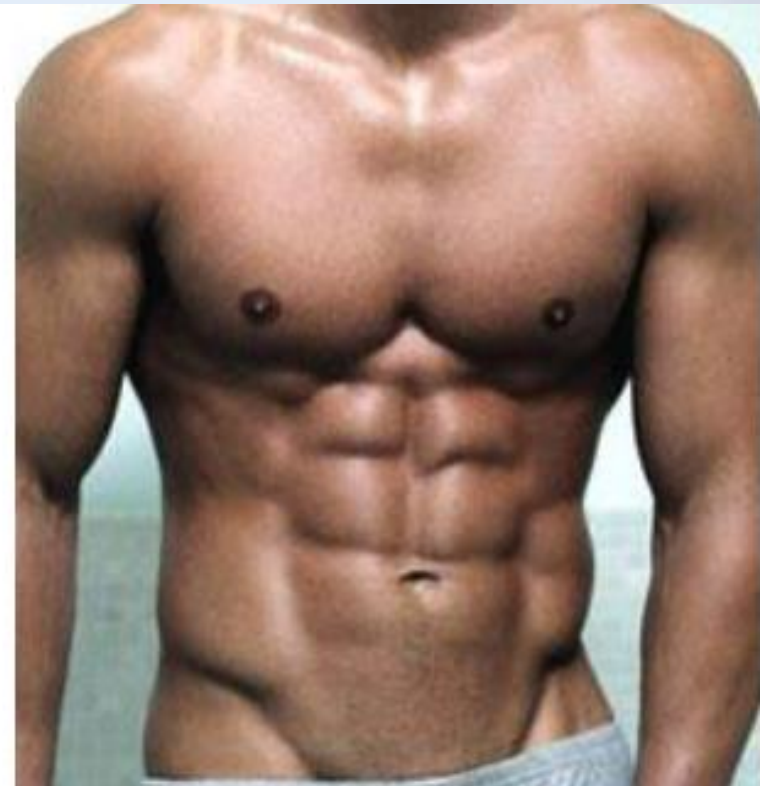
Musculus pyramidalis



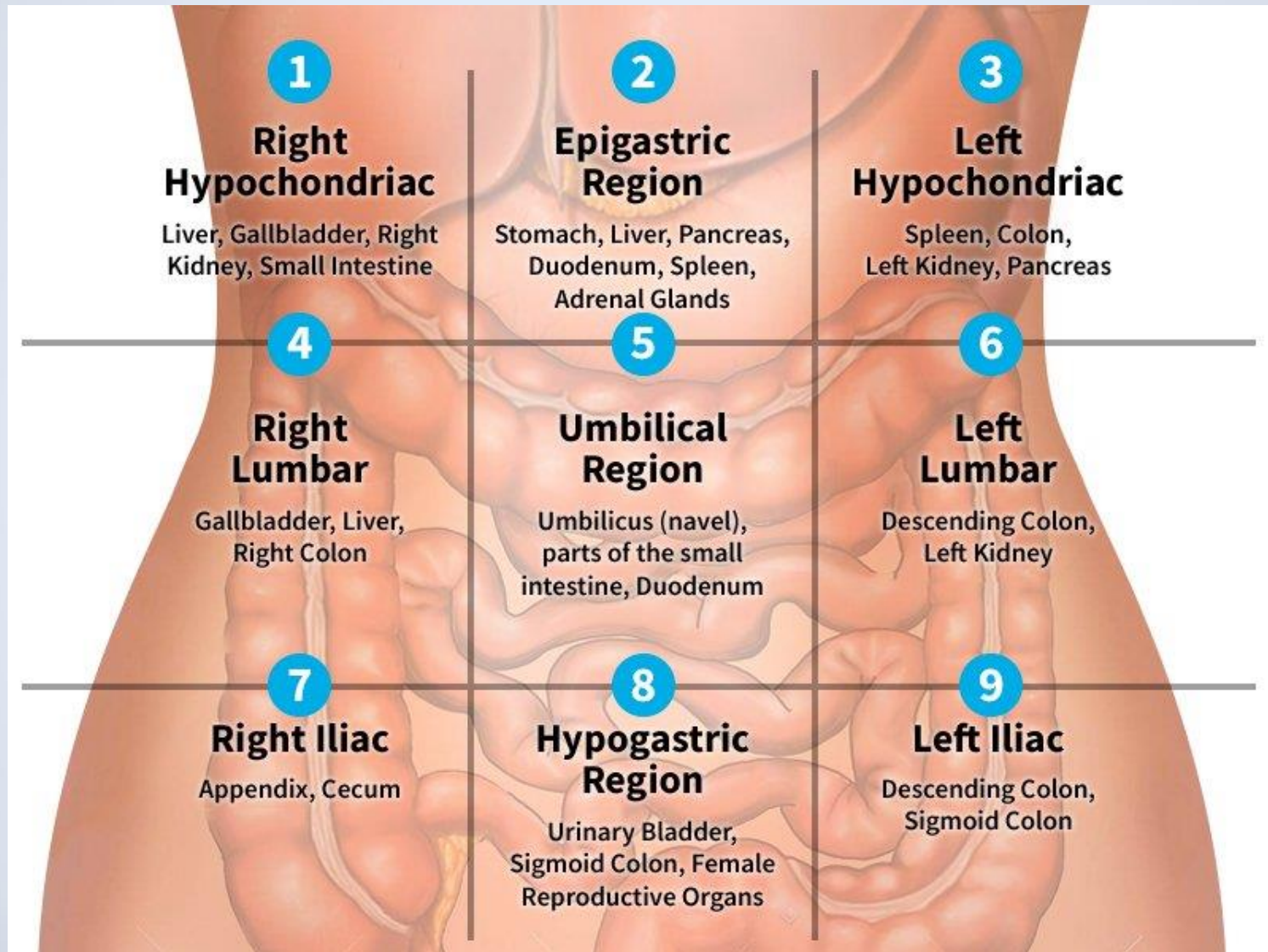
Inguinal canal



Abdominal regions



Abdominal regions



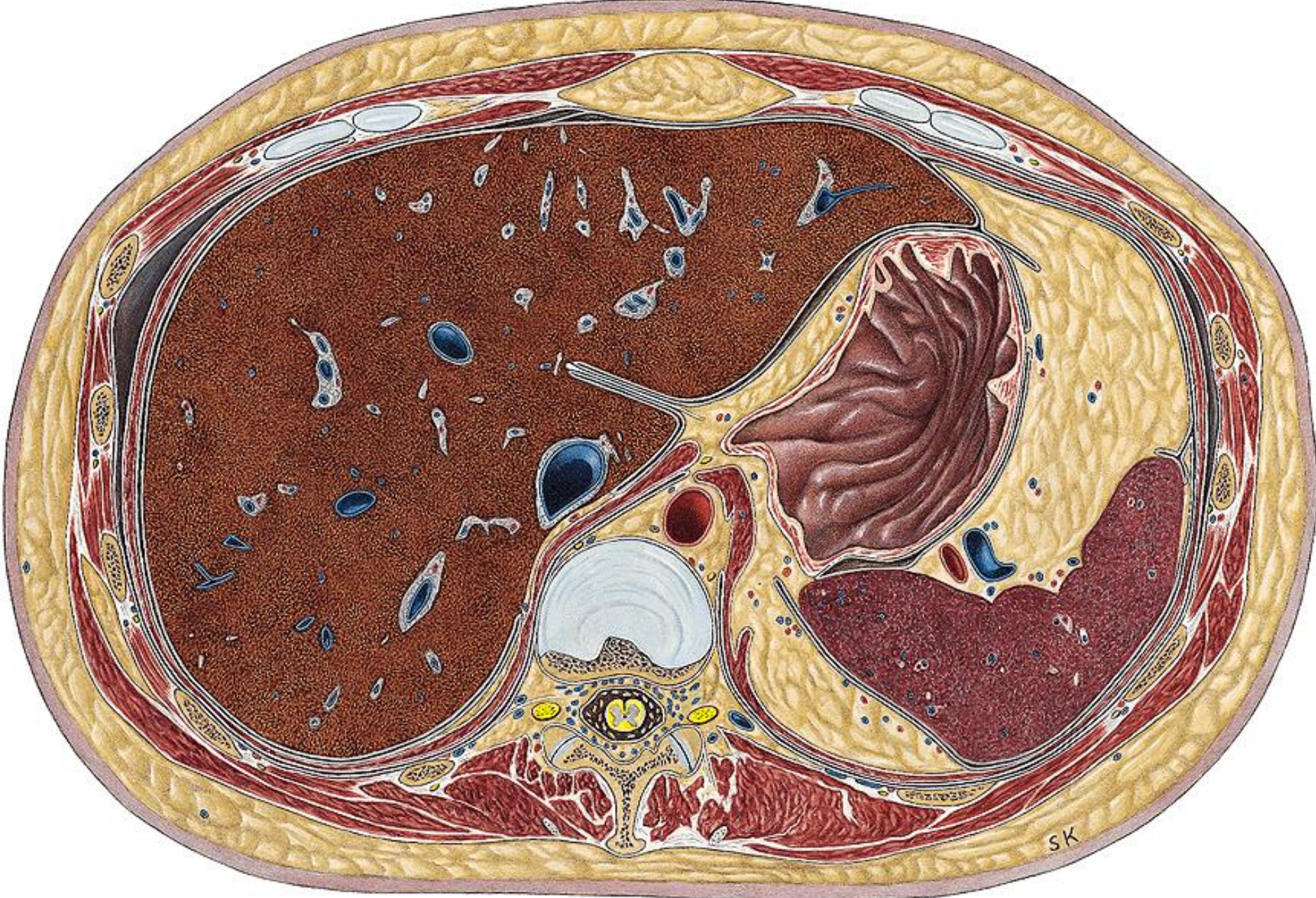
Clinical importance of the surface divisions

The diagram illustrates the four quadrants of the abdomen on a human torso, divided into Right and Left sides by a vertical line, and into Upper and Lower sections by a horizontal line. The conditions listed are as follows:

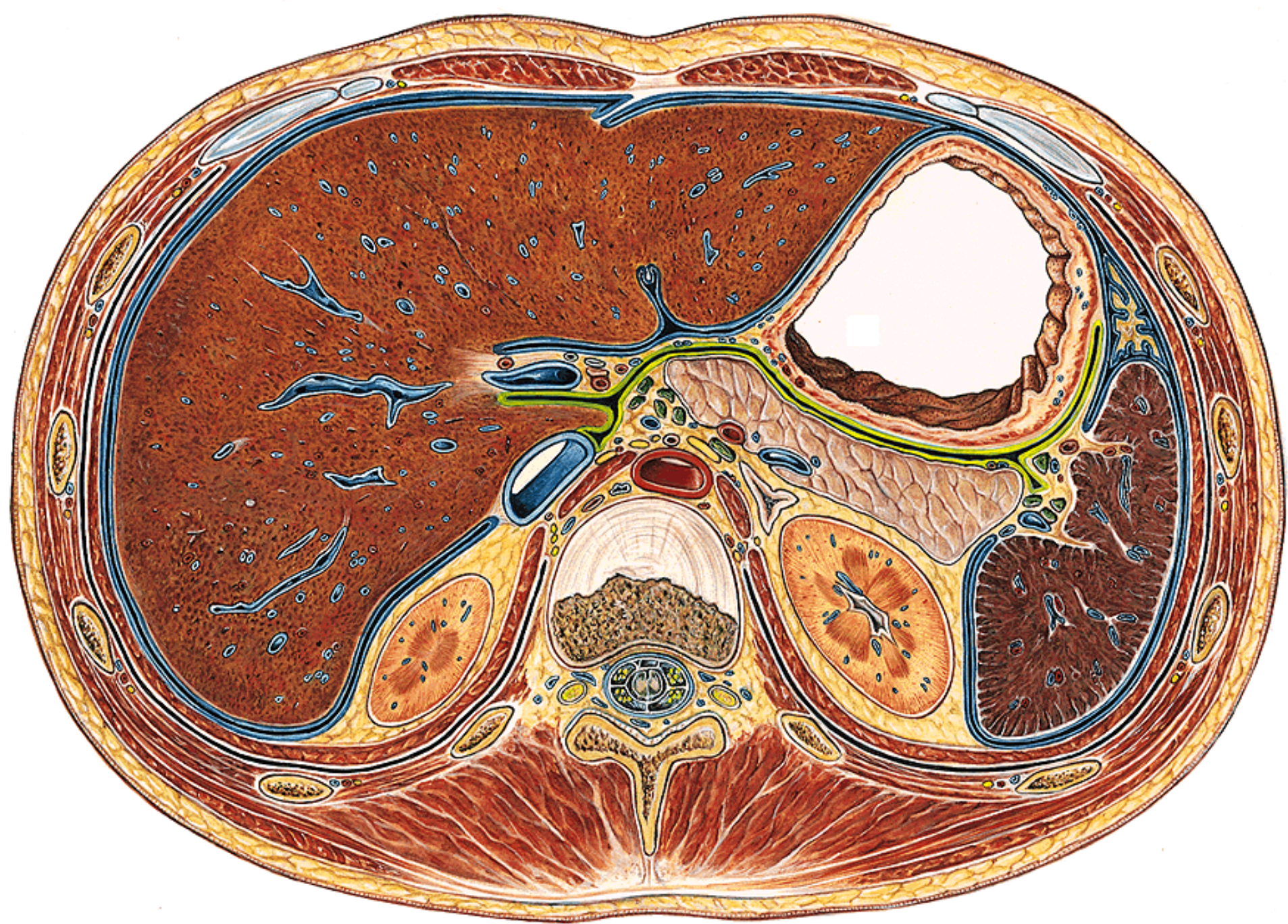
Right	Left
<p>Gallstones Stomach Ulcer Pancreatitis</p>	<p>Stomach Ulcer Heartburn/ Indigestion Pancreatitis, Gallstones Epigastric hernia</p>
<p>Kidney stones Urine Infection Constipation Lumbar hernia</p>	<p>Kidney Stones Diverticular Disease Constipation Inflammatory bowel disease</p>
<p>Appendicitis Constipation Pelvic Pain (Gynae) Groin Pain (Inguinal Hernia)</p>	<p>Stomach Ulcer Duodenal Ulcer Biliary Colic Pancreatitis</p>
<p>Urine infection Appendicitis Diverticular disease Inflammatory bowel Pelvic pain (Gynae)</p>	<p>Stomach Ulcer Duodenal Ulcer Biliary Colic Pancreatitis</p>

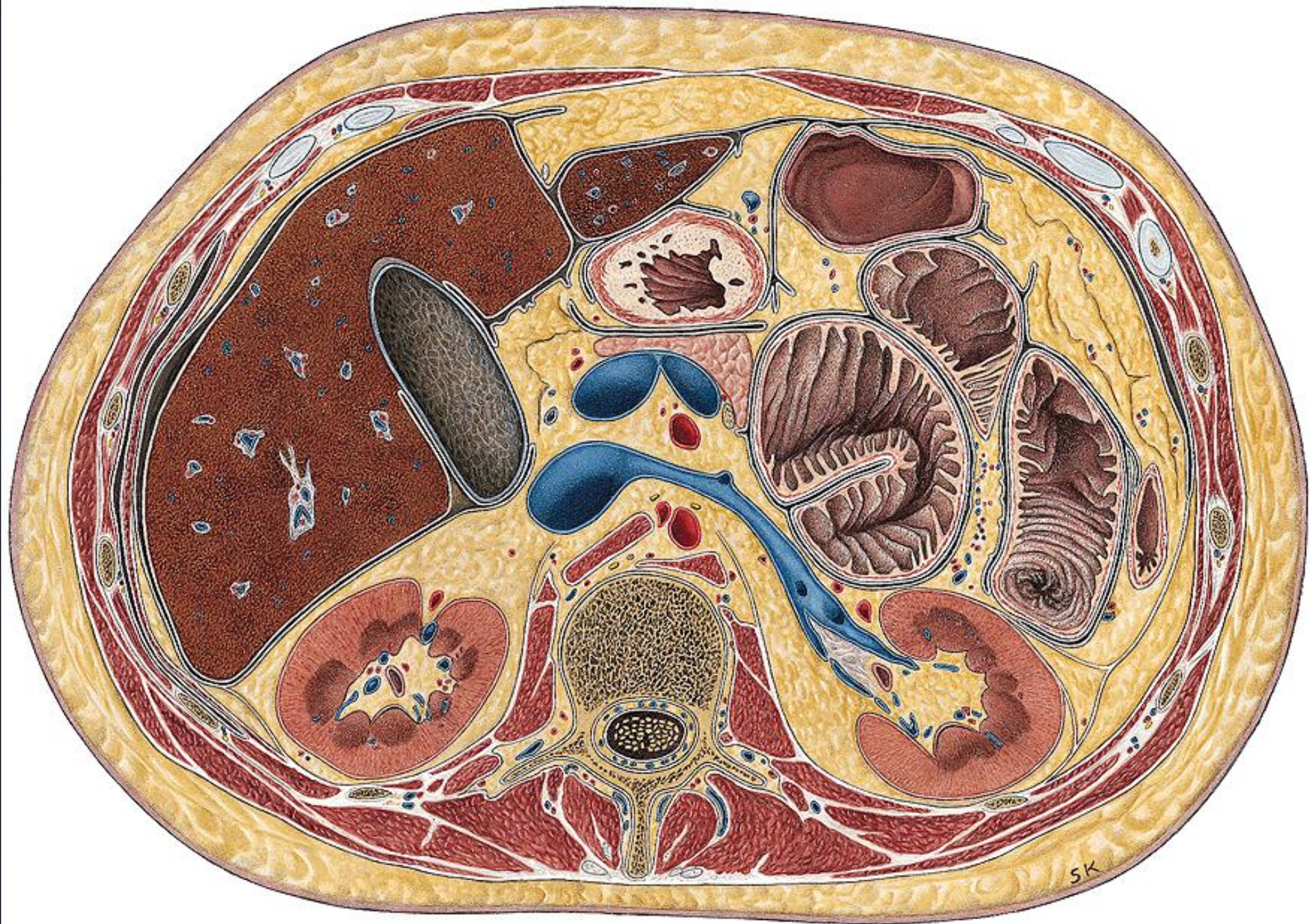
Quadrants of Abdomen and d/d of Abdominal Pains

Abdominal crosssections

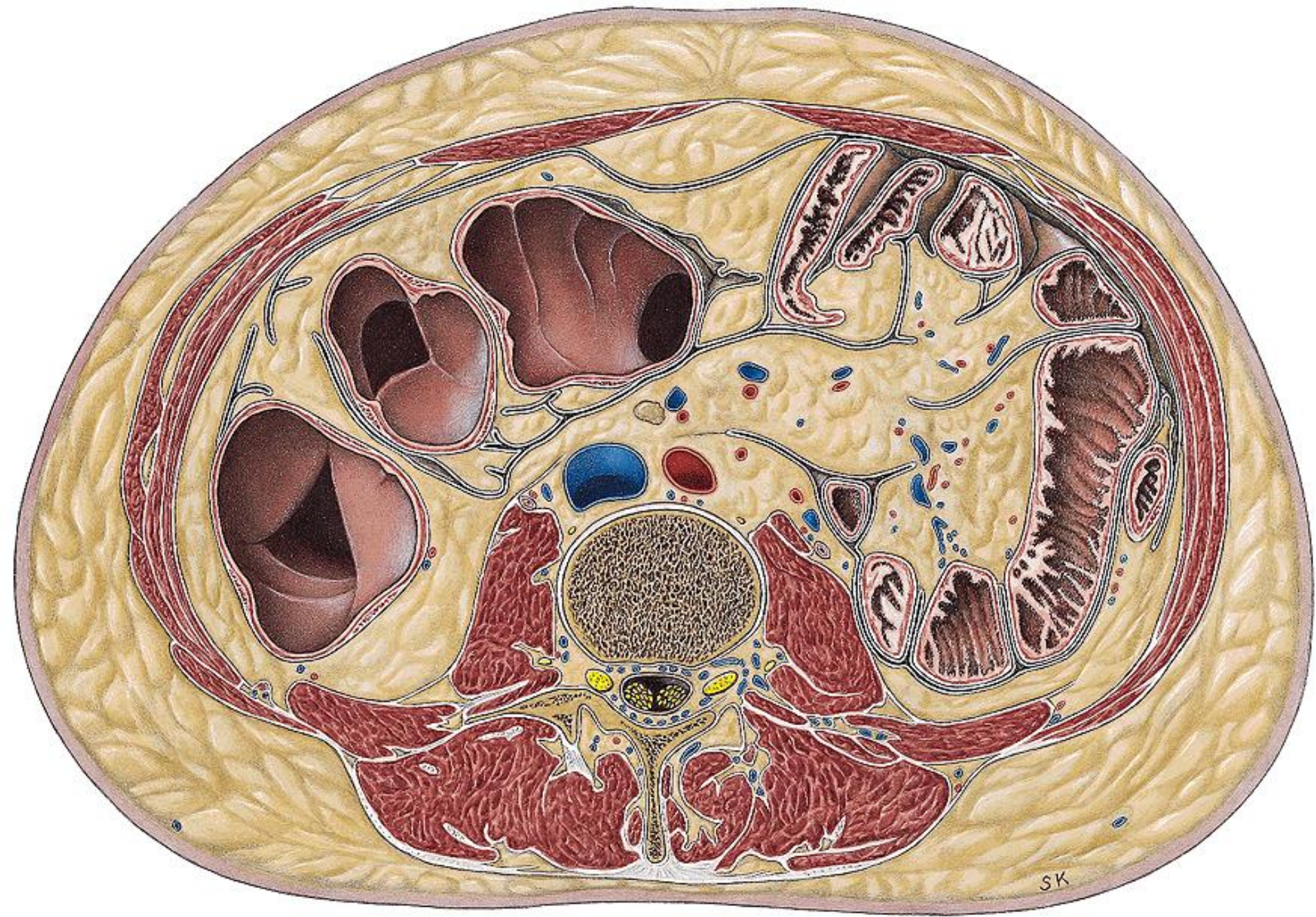


We don't see the oesophagus (it pierces the diaphragm at level Th10-11),
But the aorta is still between the stalks of the diaphragm (L1).

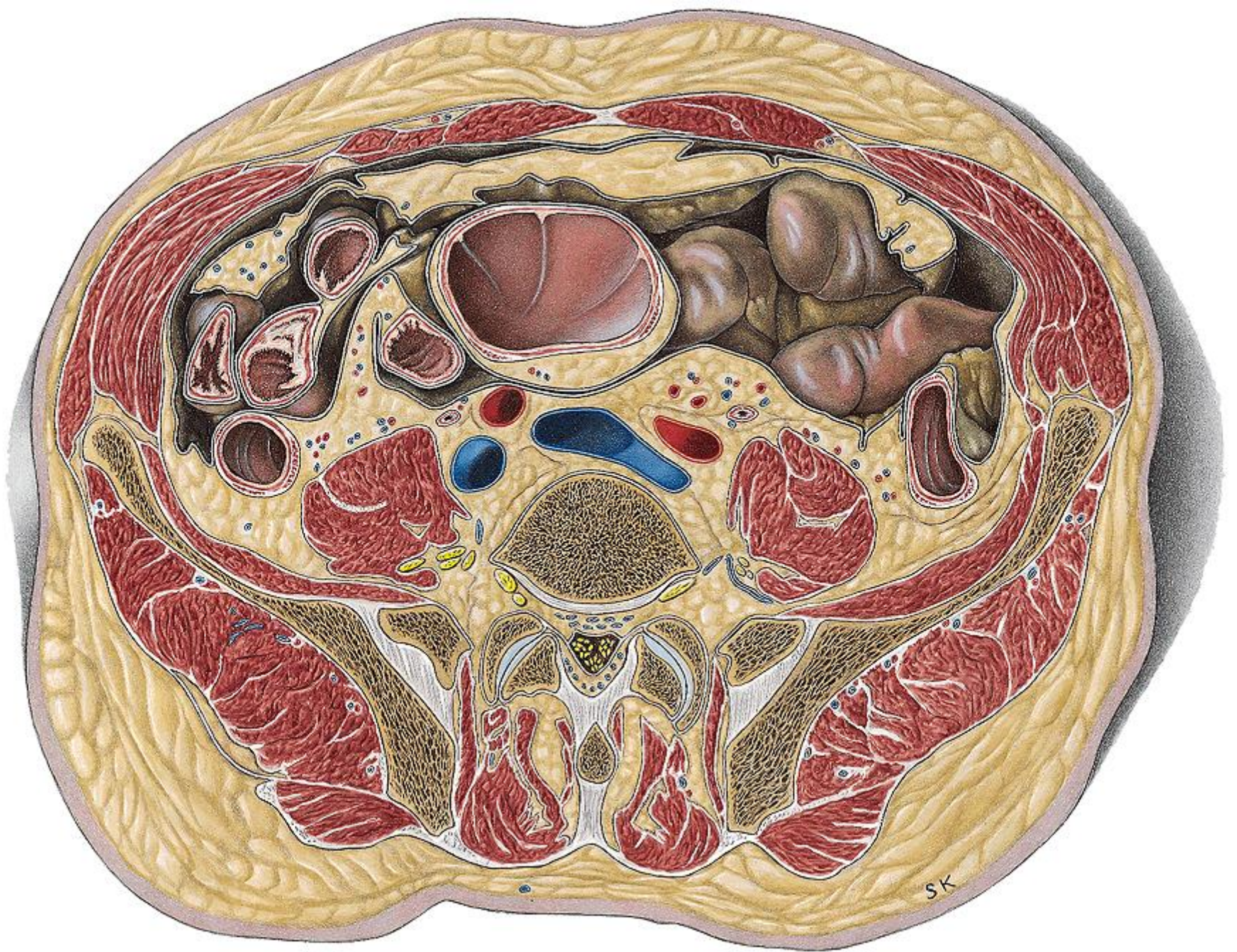




The left v. renalis reaches the renal hilum.

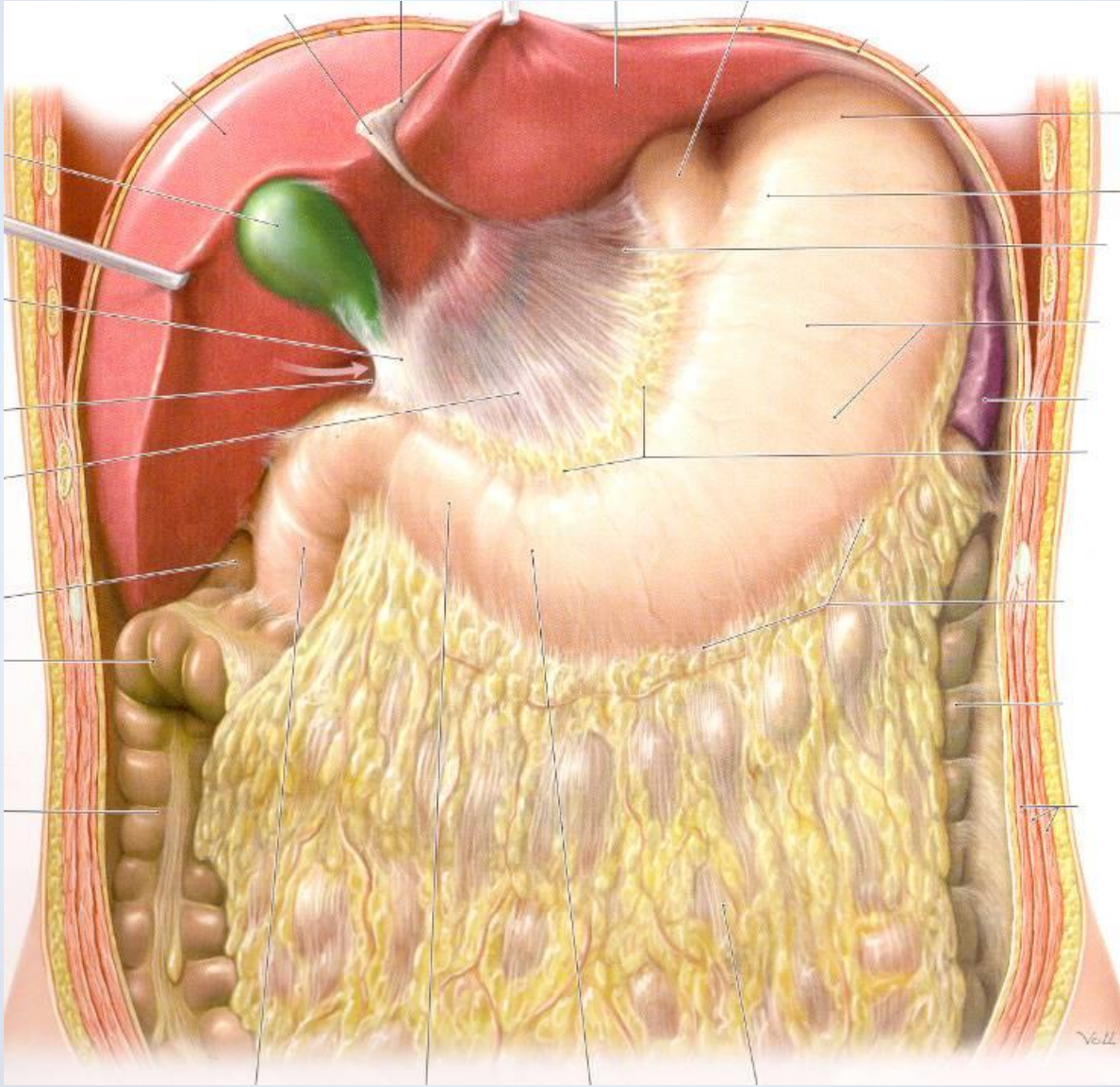


- Only small and large intestines are visible, the aorta has not branched yet (this occurs at L4).



The aorta is split in two. Common iliac vv. unite into vena cava inferior.

Peritoneum



PERITONEUM

The largest serous membrane of the human body; develops from the lateral plates of the mesoderm.
Two layers can be distinguished:

1. parietal peritoneum
2. visceral peritoneum

1. Parietal peritoneum makes the inner lining of the abdominal cavity. Different structures covered by peritoneum cause folds of fit.

2. Visceral peritoneum covers abdominal and pelvic viscera.

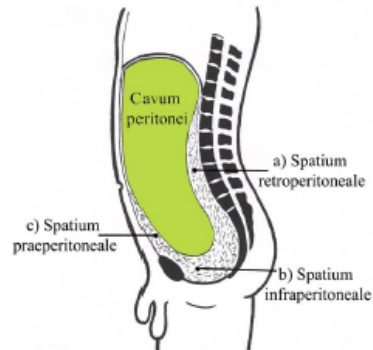
Organs totally covered (surrounded) by visceral peritoneum are called intraperitoneal organs.
(There is only one „really intraperitoneally” located organ: the ovary - which is situated within the peritoneal cavity.)

Peritoneal cavity: the virtual space between parietal and visceral peritoneal layers (filled with some peritoneal fluid for lubrication – allowing movements of abdominal organs).

In males totally closed sac, in females the peritoneal cavity communicates with the outer world via the oviduct – uterus - vagina .

Abdominal and pelvic organs and structures -according to their peritoneal relations- can be divided into 2 main groups:

- A) **Intraperitoneal** (covered by peritoneum) and
- B) **Extraperitoneal** (not surrounded by the peritoneum) – within this:
 - a) Retroperitoneal
 - b) Infraperitoneal
 - c) Preperitoneal structures.



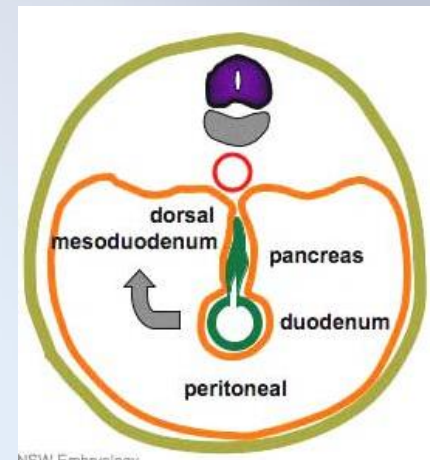
Serous membranes

from lateral plates of mesoderm.

Two parts:

1. parietal peritoneum
2. visceral peritoneum

They have a continuous mesothelial lining.



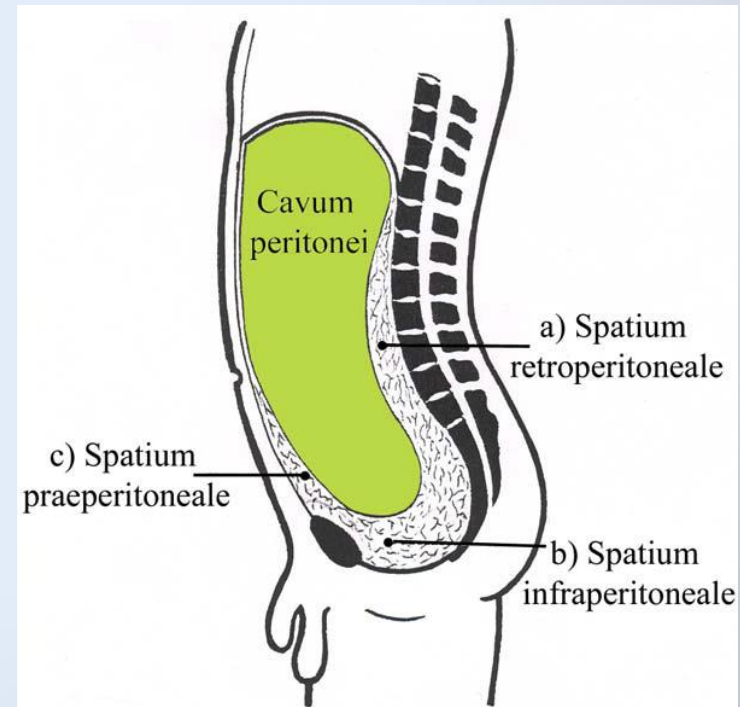
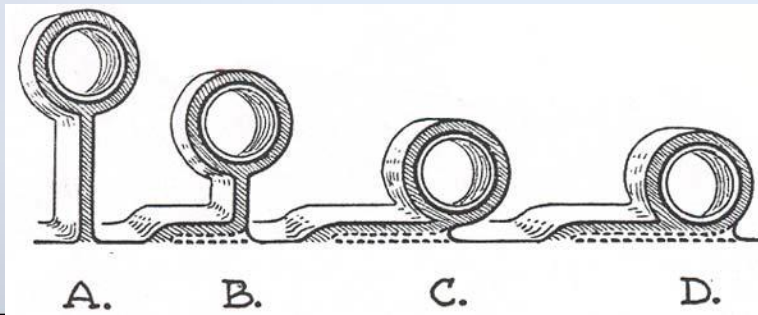
Abdominal and pelvic organs and structures – according to their peritoneal relations - can be divided into 2 main groups:

Intraperitoneal - covered by peritoneum
- generally they have a mesothelial duplication

Extraperitoneal (not surrounded by the peritoneum)
within this:

- Praeperitoneal
- Retroperitoneal (primary or secondary)
- Infraperitoneal structures.

Duplication = *meso-* or ...*ligament!*



Intraperitoneal and extraperitoneal organs

Intraperitoneal:

stomach
sup. hor. part of the duodenum
liver (except bare area)
spleen
jejunum
ileum
coecum (mostly)
vermiform appendix
transvers colon and sigmoid
upper 1/3 of the rectum
uterine tube
uterus (fundus, body)

Inside the peritoneal cavity:

ovaries

Extraperitoneal:

1. retroperitoneal:

primary:

kidney, adrenal gland
ureter
middle 1/3 of the rectum

secondary:

duodenum
(except sup. hor. part)
pancreas
coecum (50%)
ascending and descending colon

2. infraperitoneal

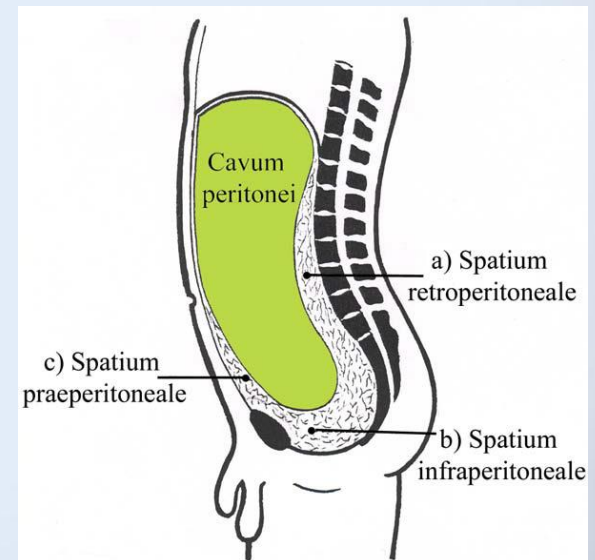
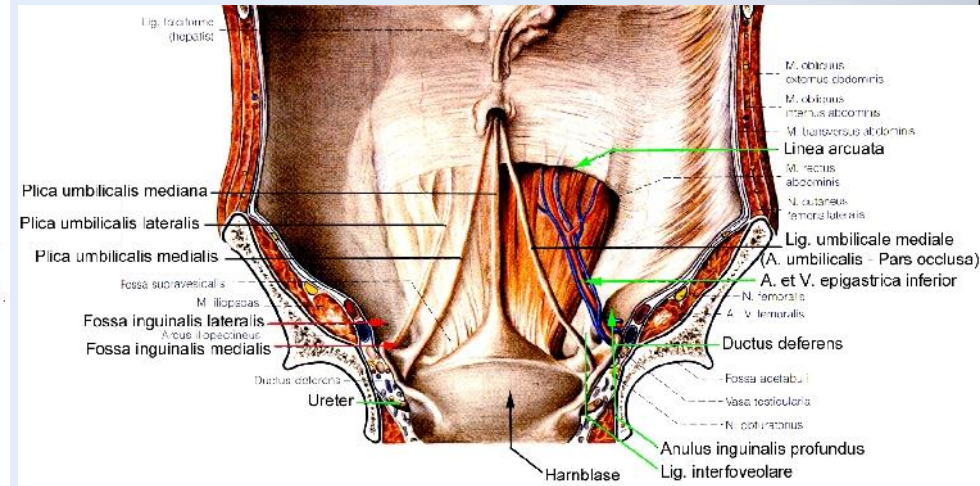
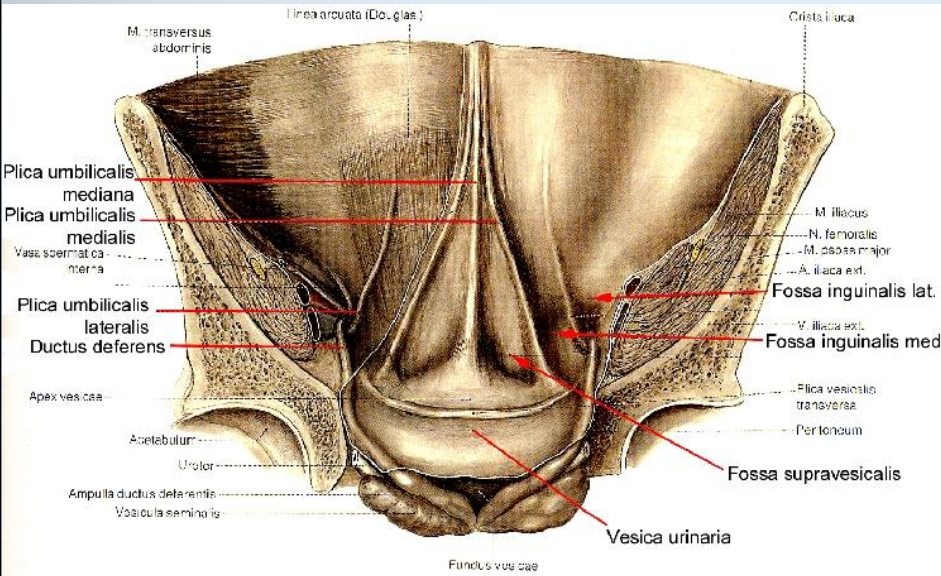
bladder
upper 1/3 of the rectum
prostate, seminal vesicle, vas deferens
cervix of the uterus, vagina, urethra

3. preperitoneal:

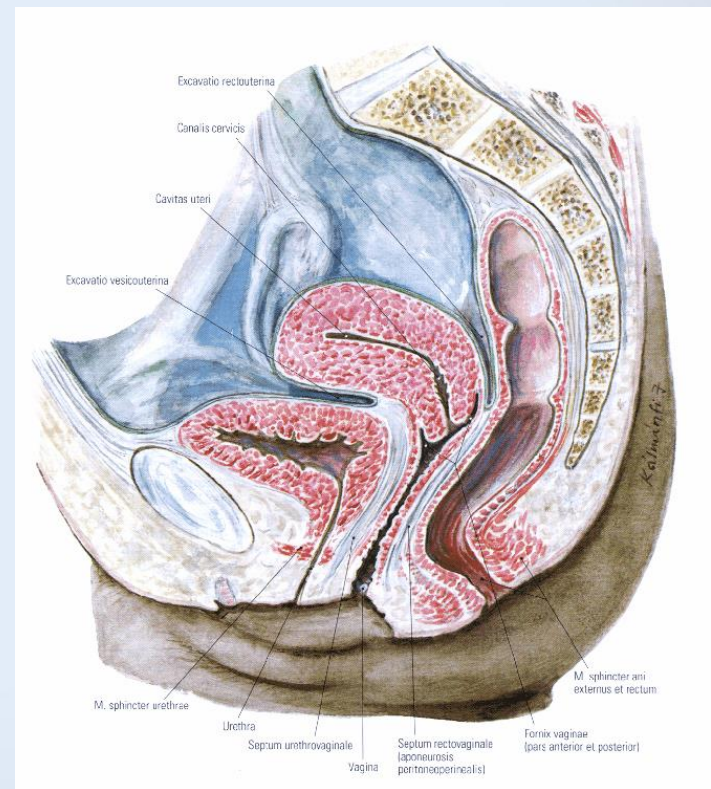
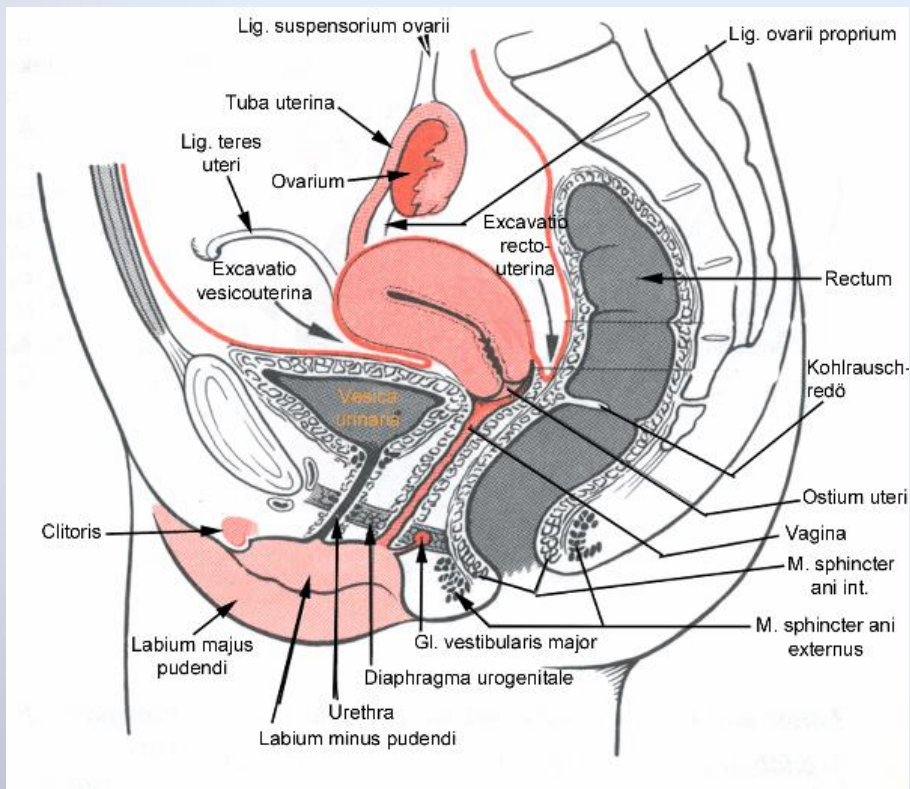
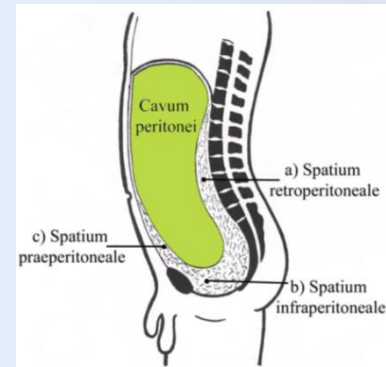
preperitoneal space exists, but no internal organs

Praeperitoneal structures

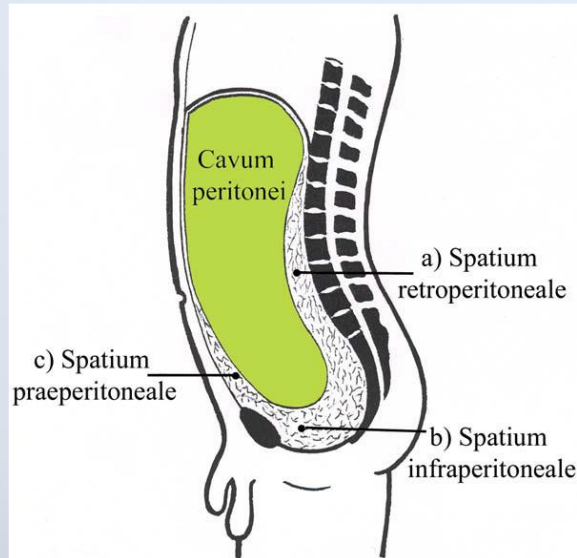
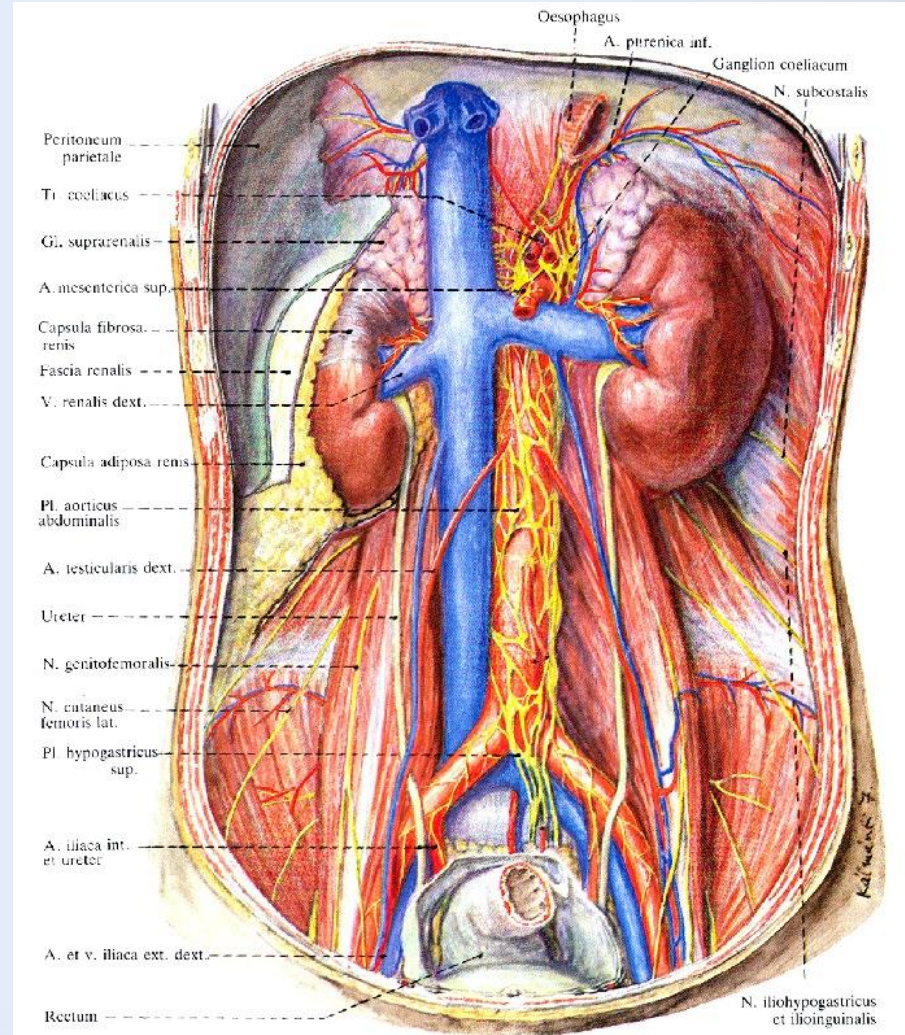
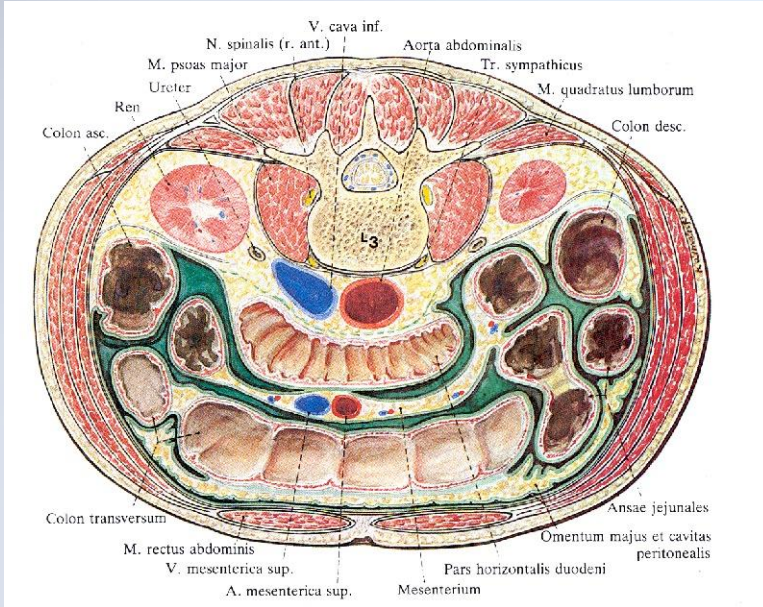
umbilical folds



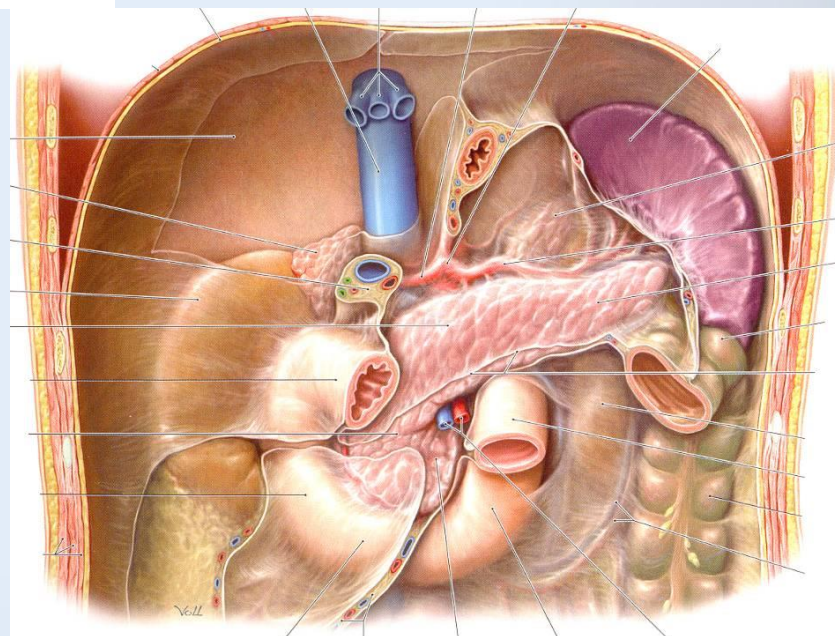
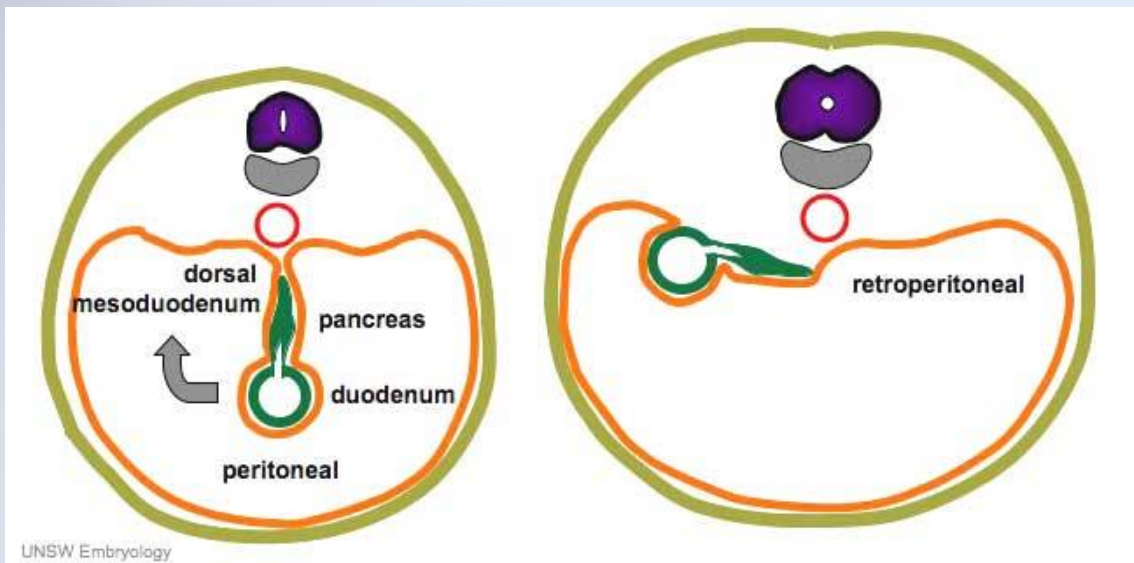
Infraperitoneal organs



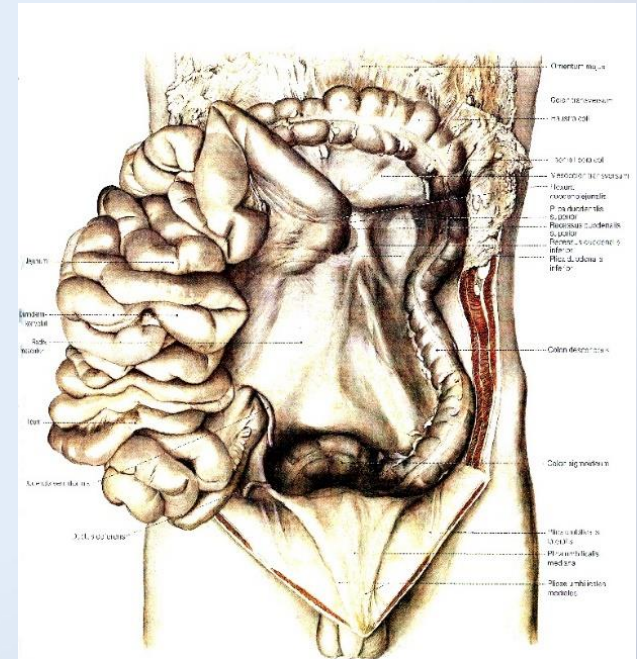
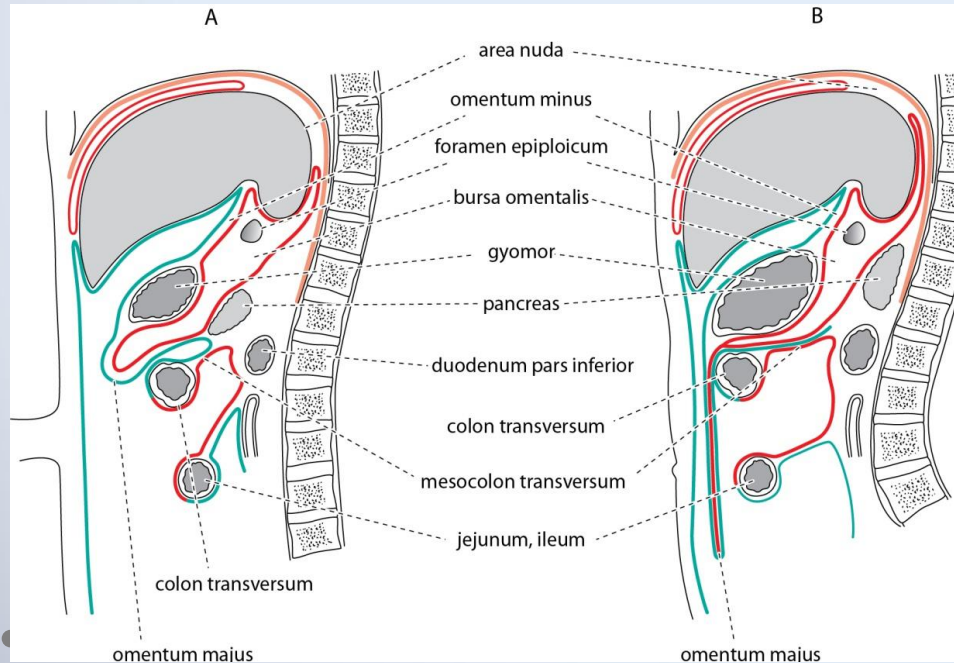
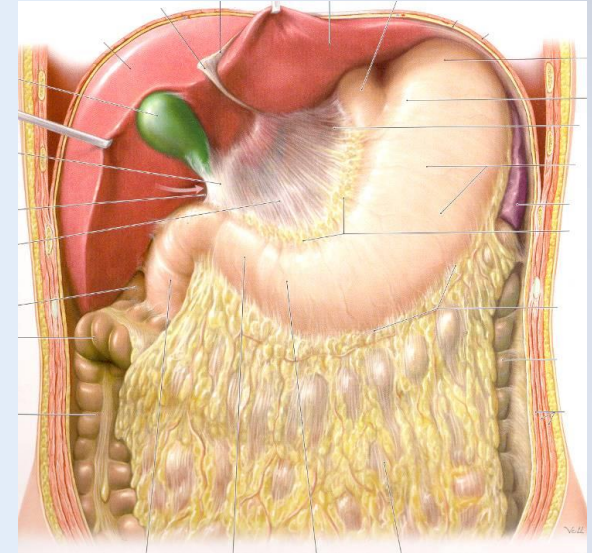
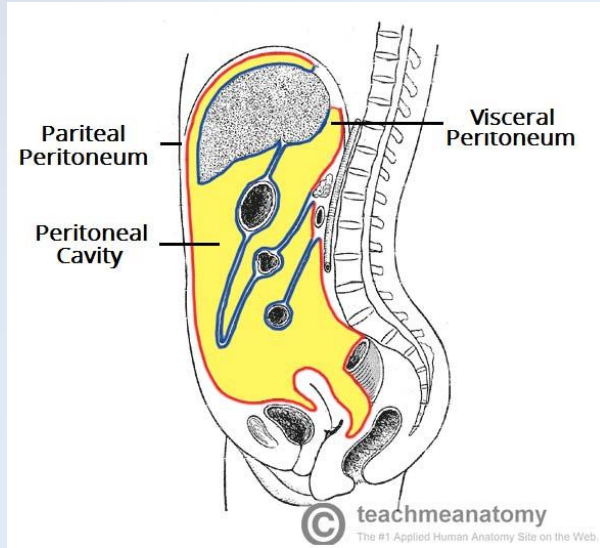
(primary) retroperitoneal organs



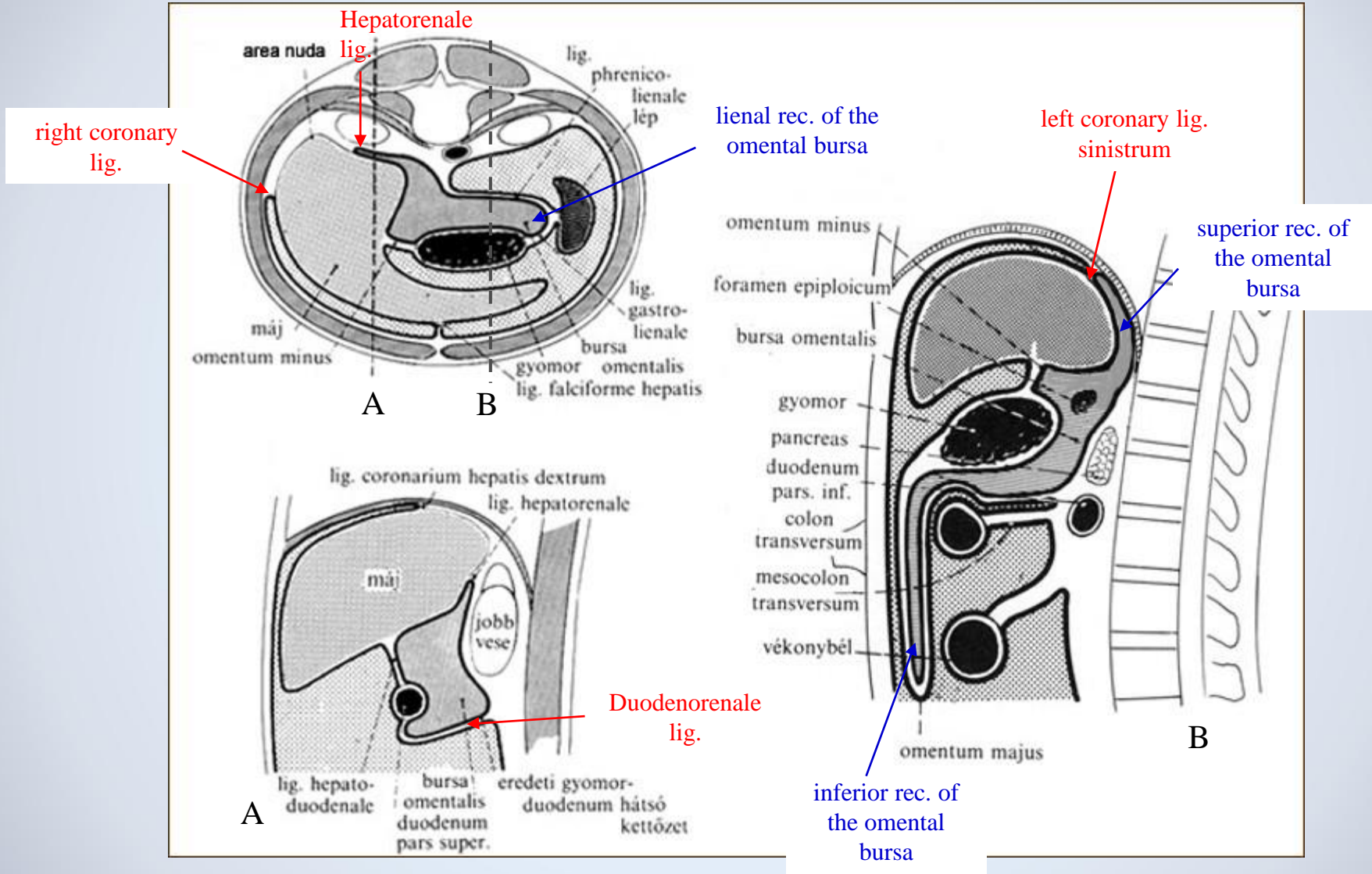
(Secondary) retroperitoneal organs



intraperitoneal organs

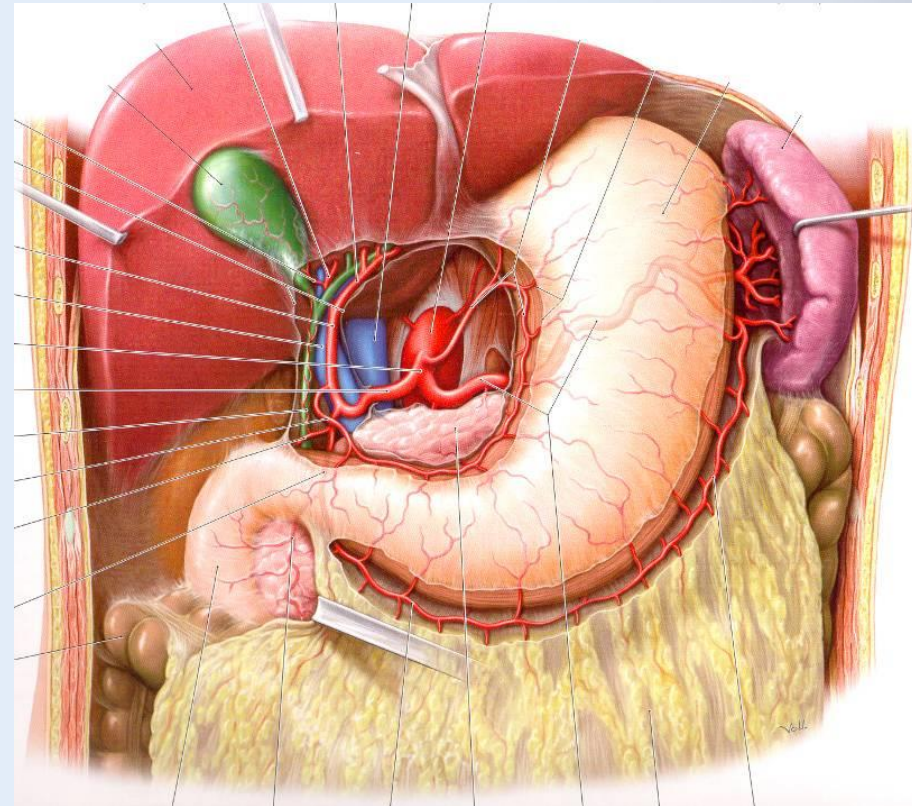
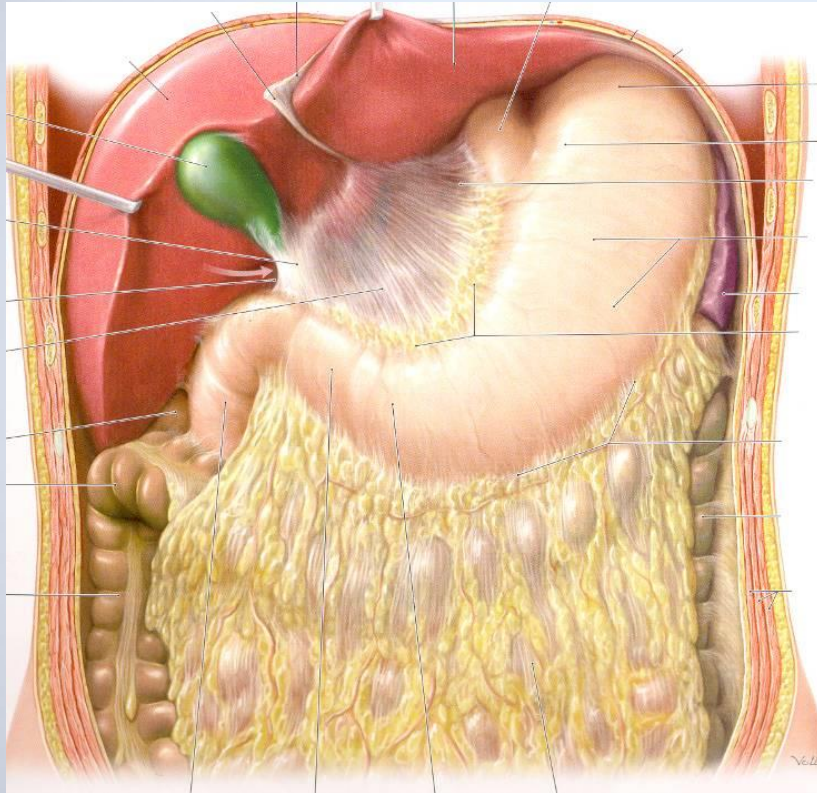


Peritoneal relations of the epigastrium



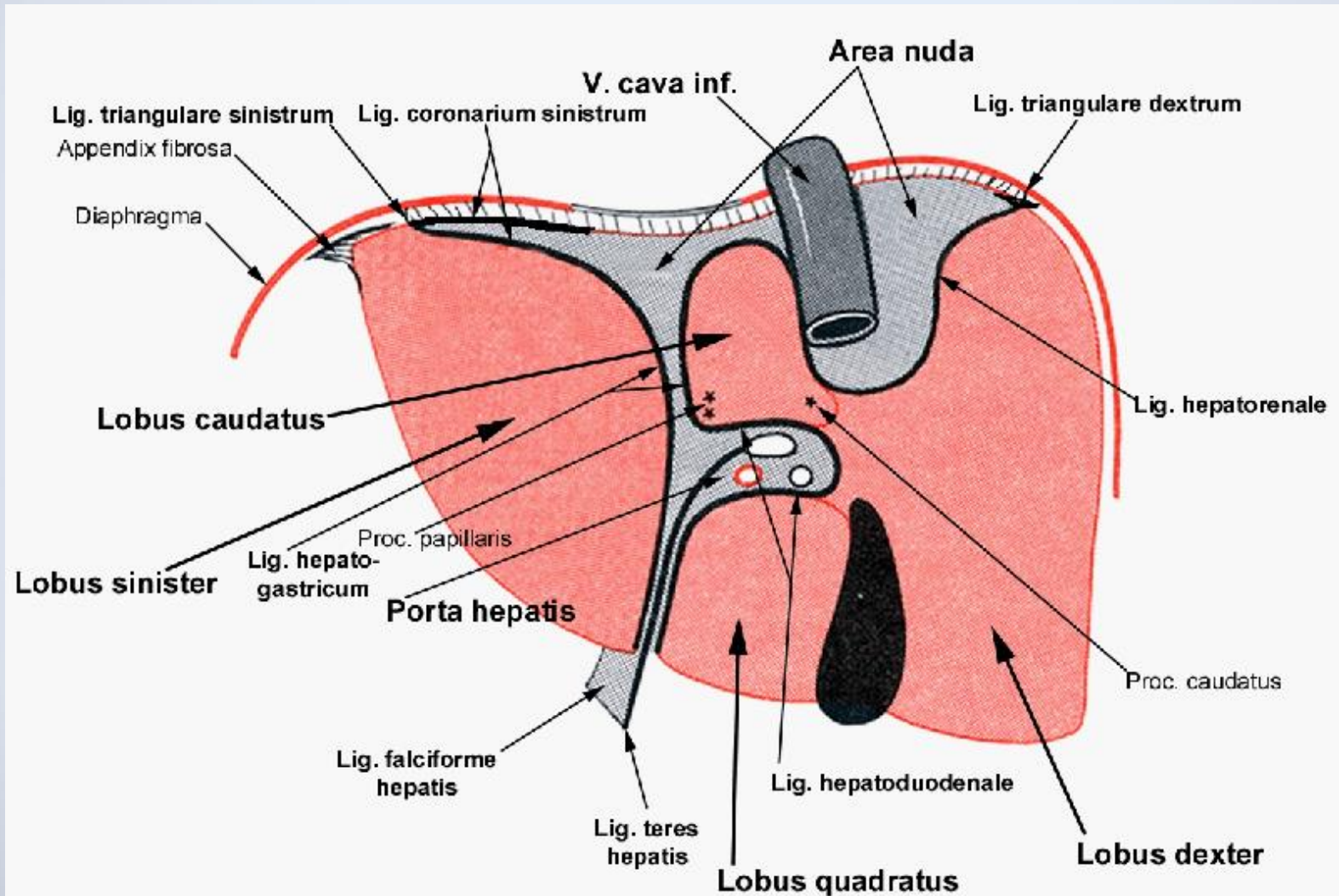
Lesser and greater omentum

(omentum minus et majus)

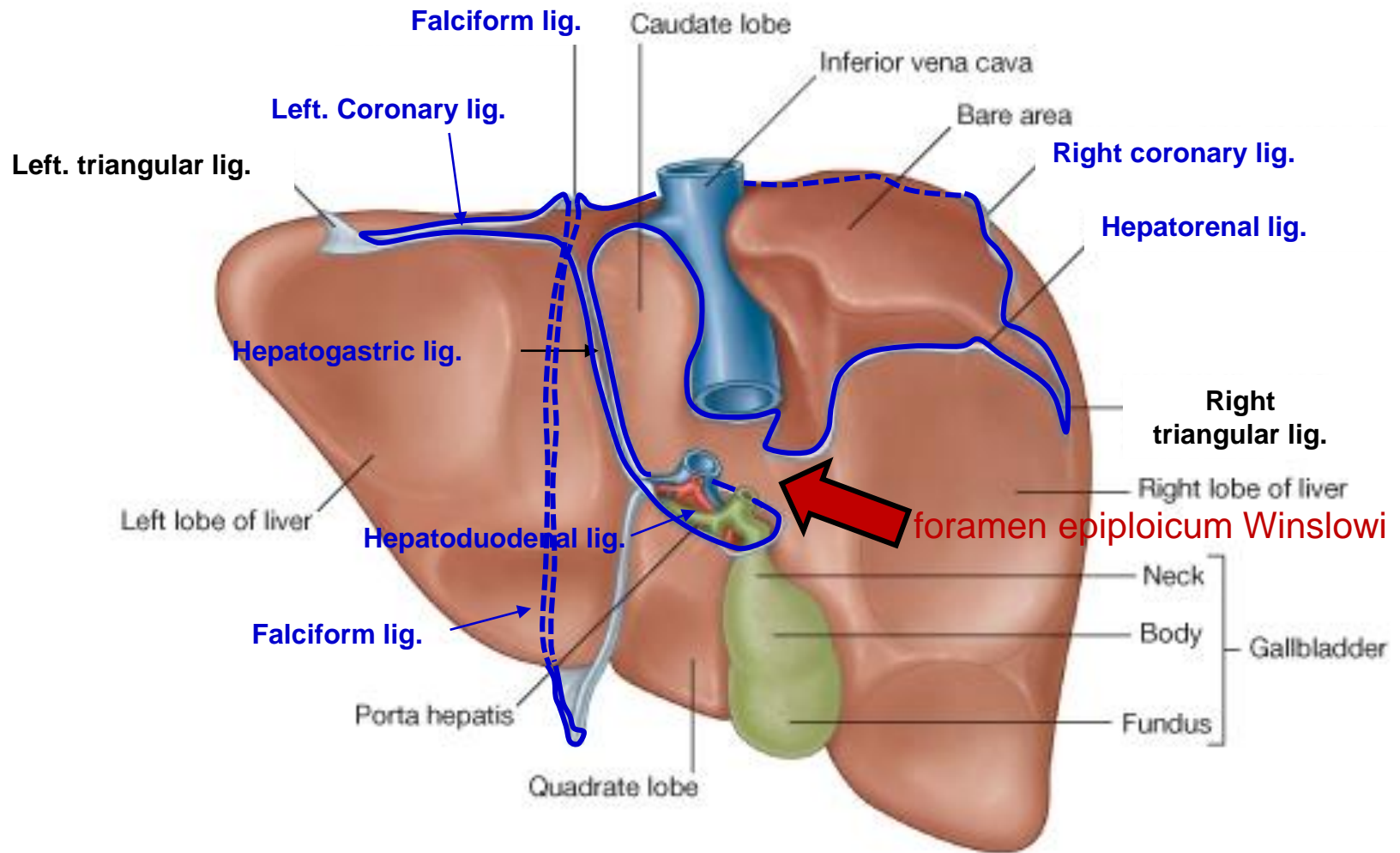


Lesser omentum:

- Hepatogastric lig.
- Hepatoduodenal lig.

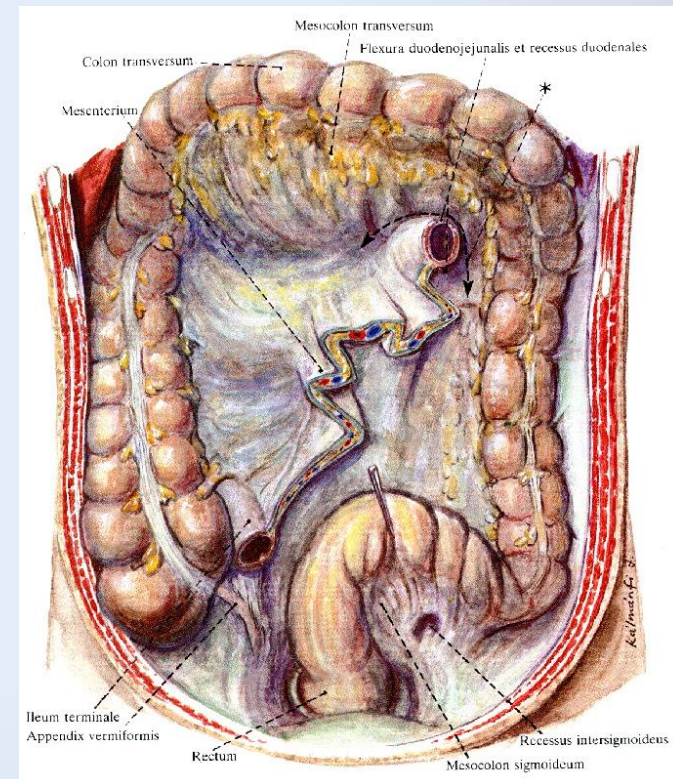
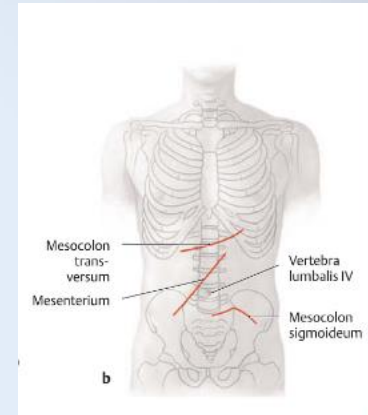
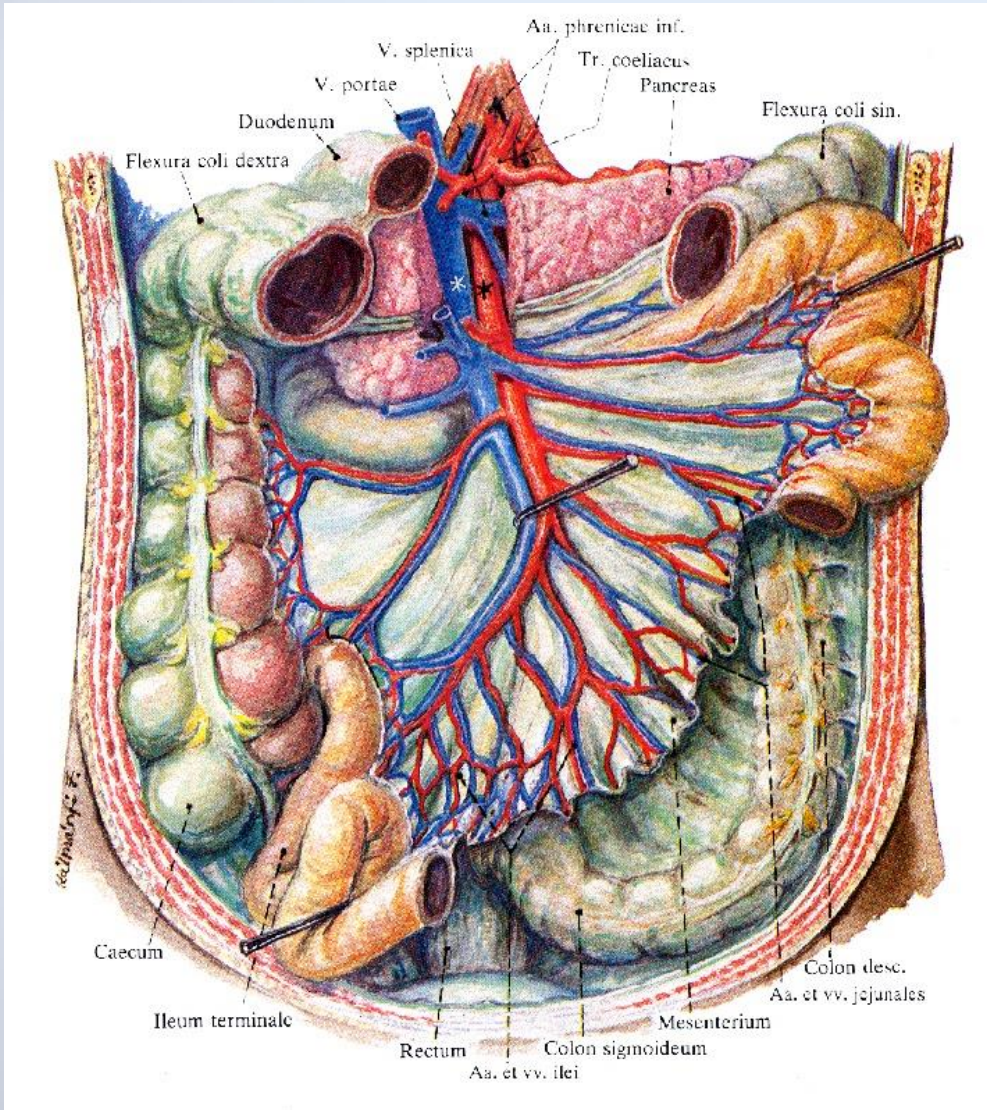


Peritoneal relations of the liver



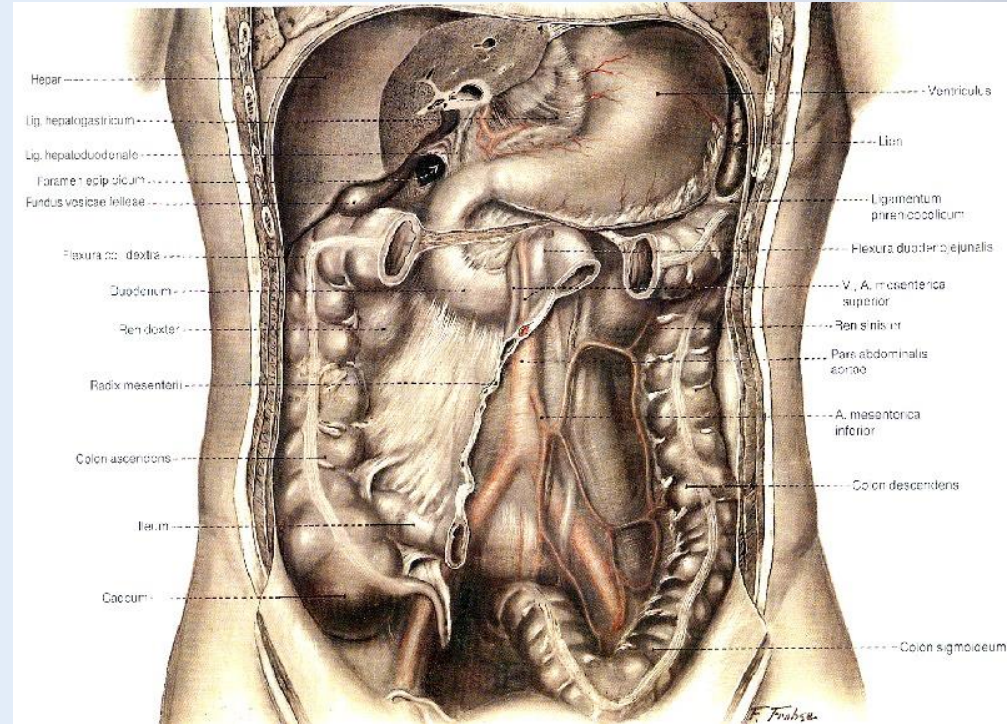
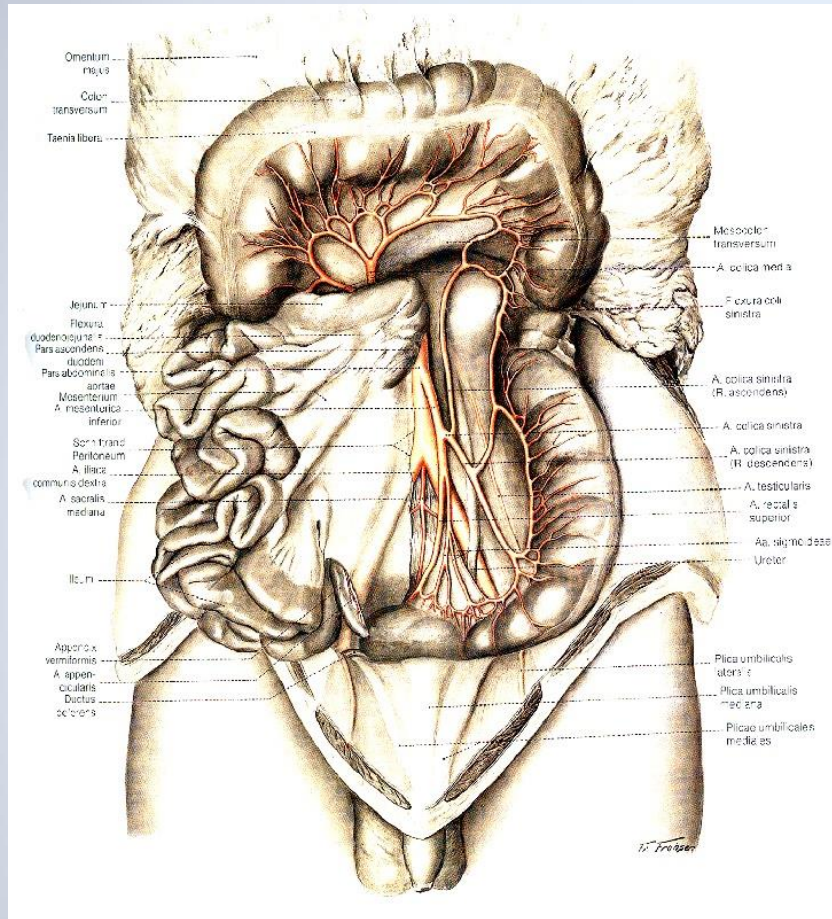
Mesentery (root of the mesentery)

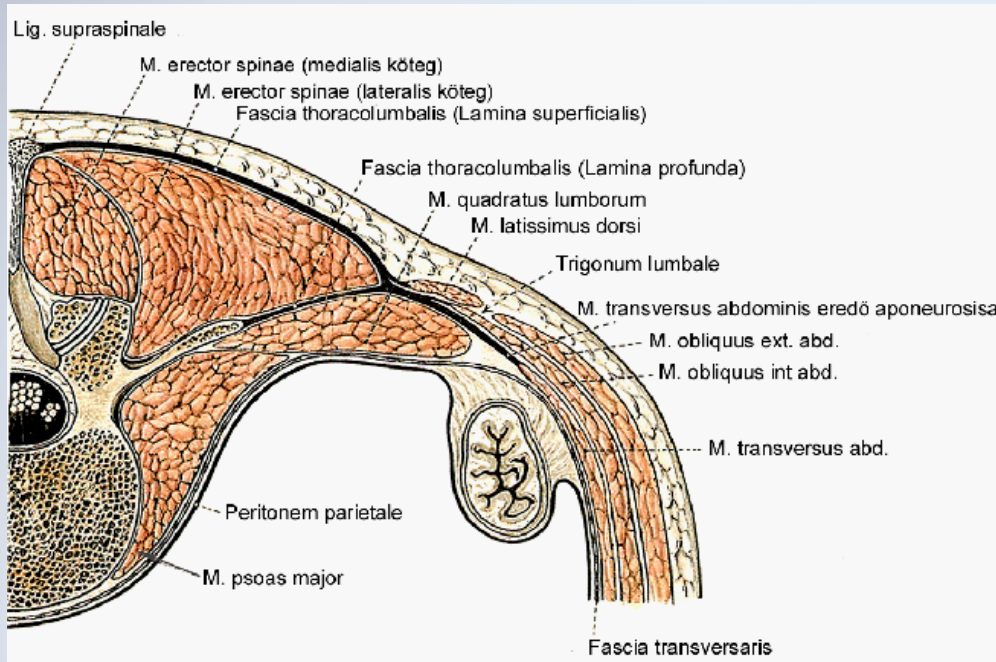
From the duodeno-jejunal flexure (L2)
to the right iliac fossa



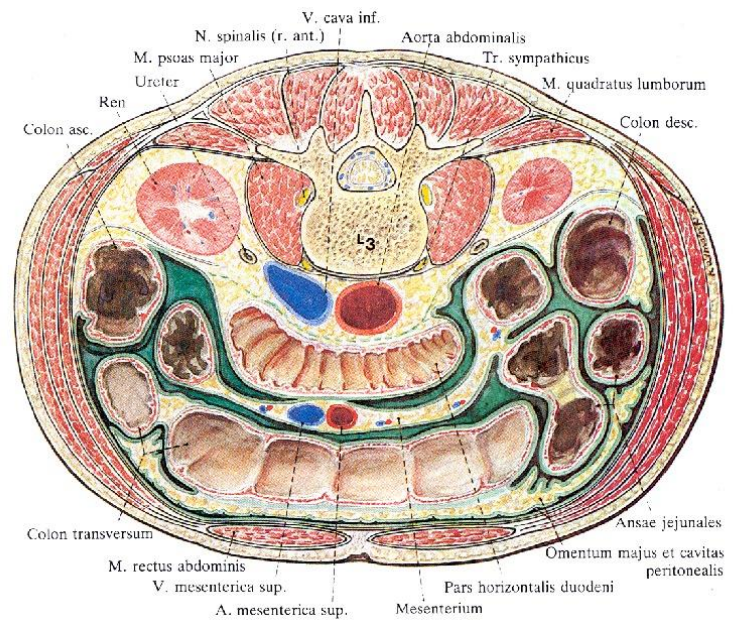
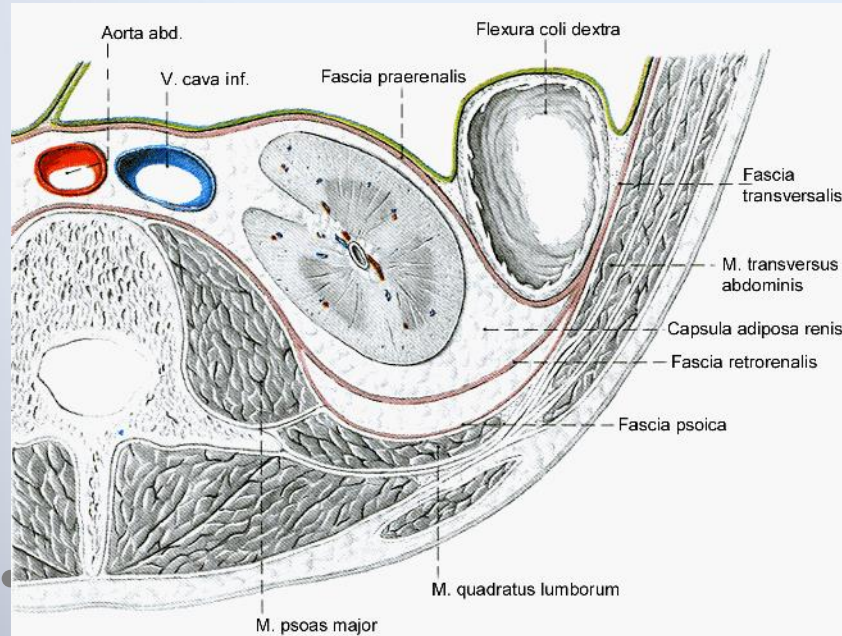
Mesoappendix

Transverse mesocolon, mesosigmoid

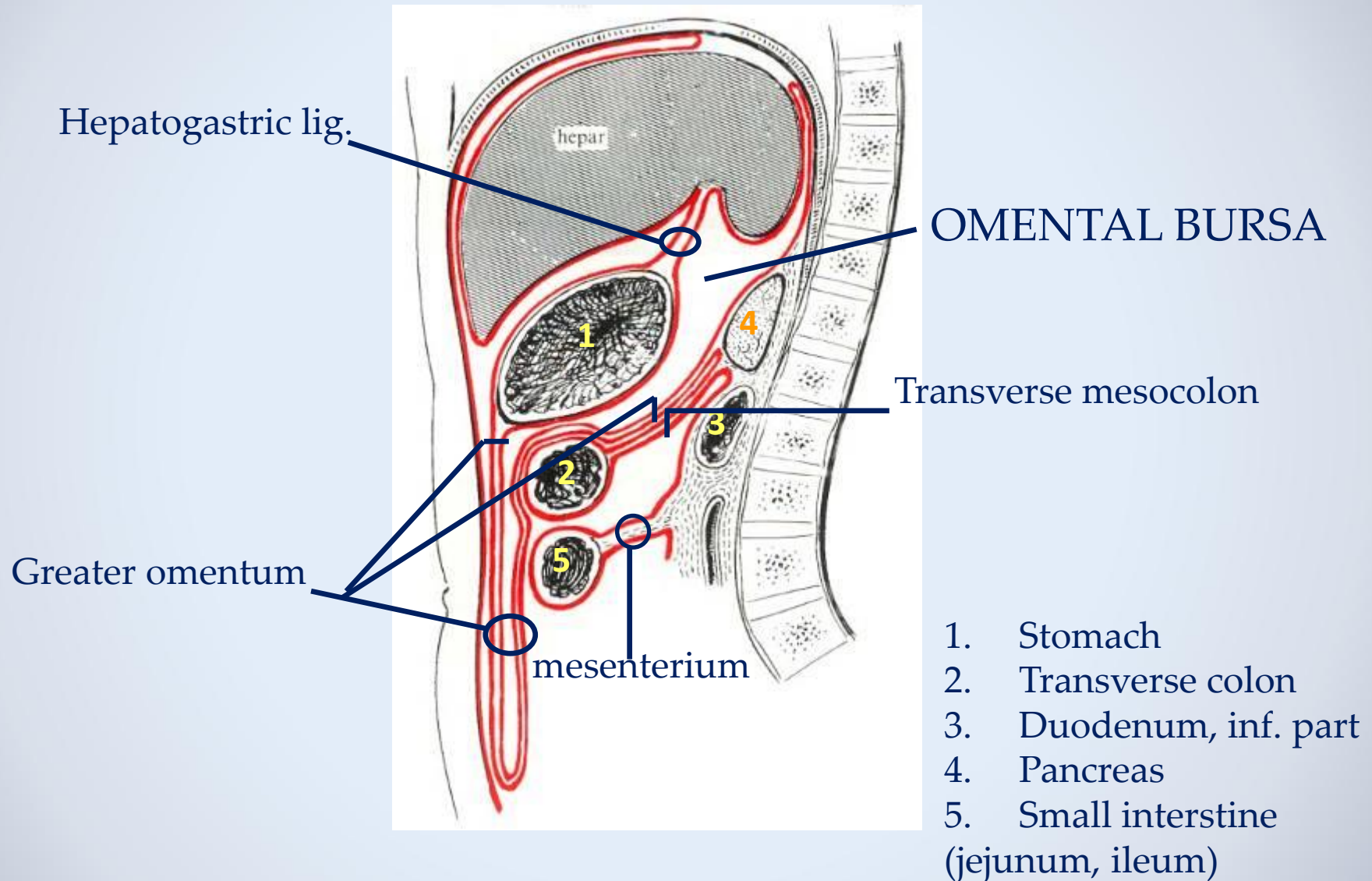




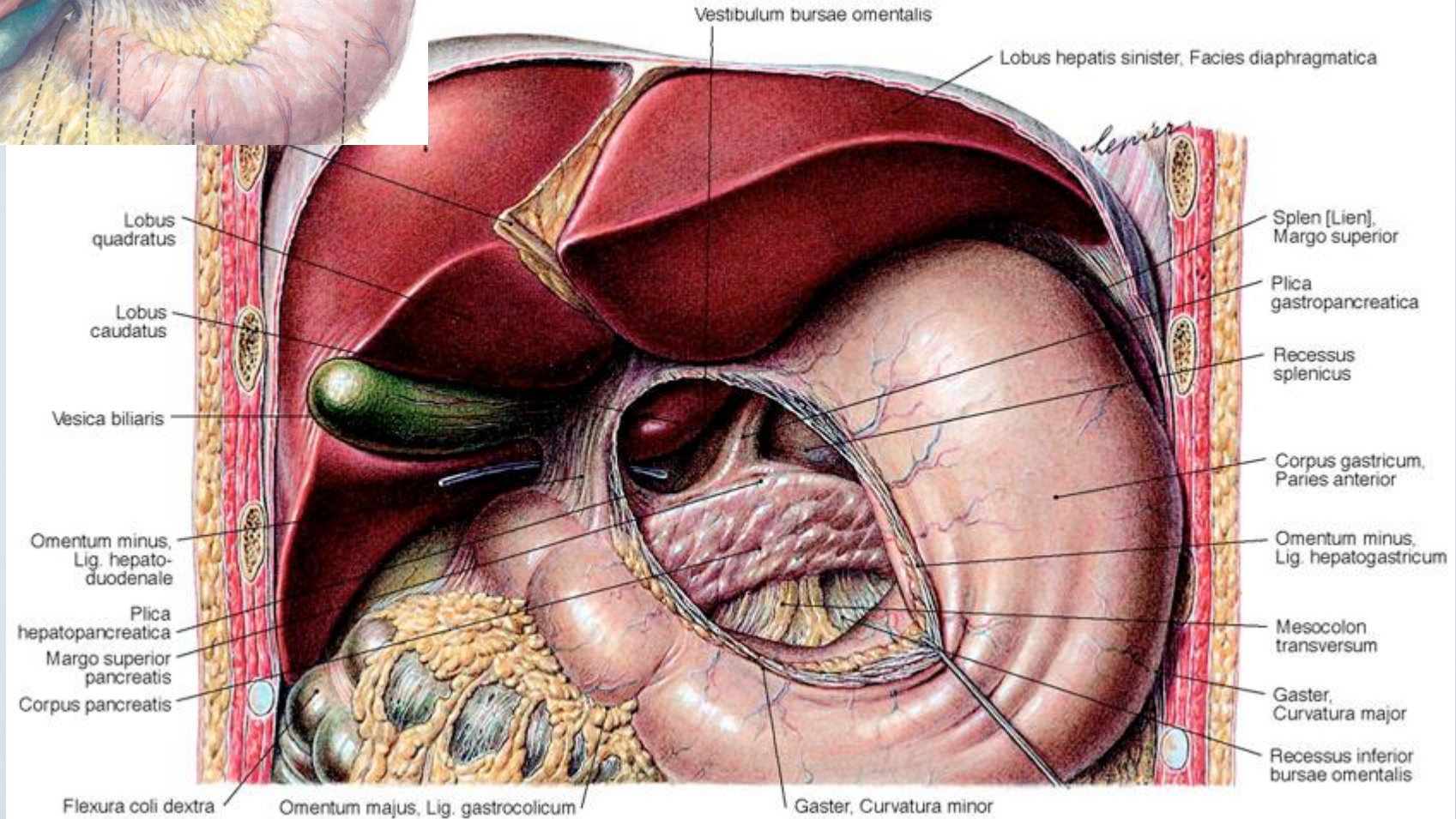
Rectum:
 -intra
 -retro
 -infra



Gastrocolic lig. (6 layers) = Greater omentum (4 layers) + transverse mesocolon (2 layers)



Omental bursa

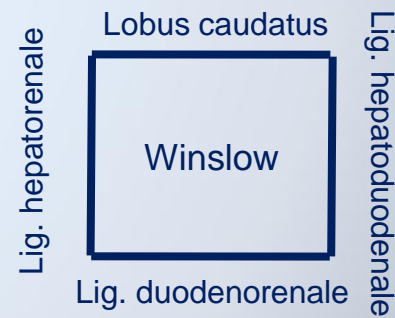
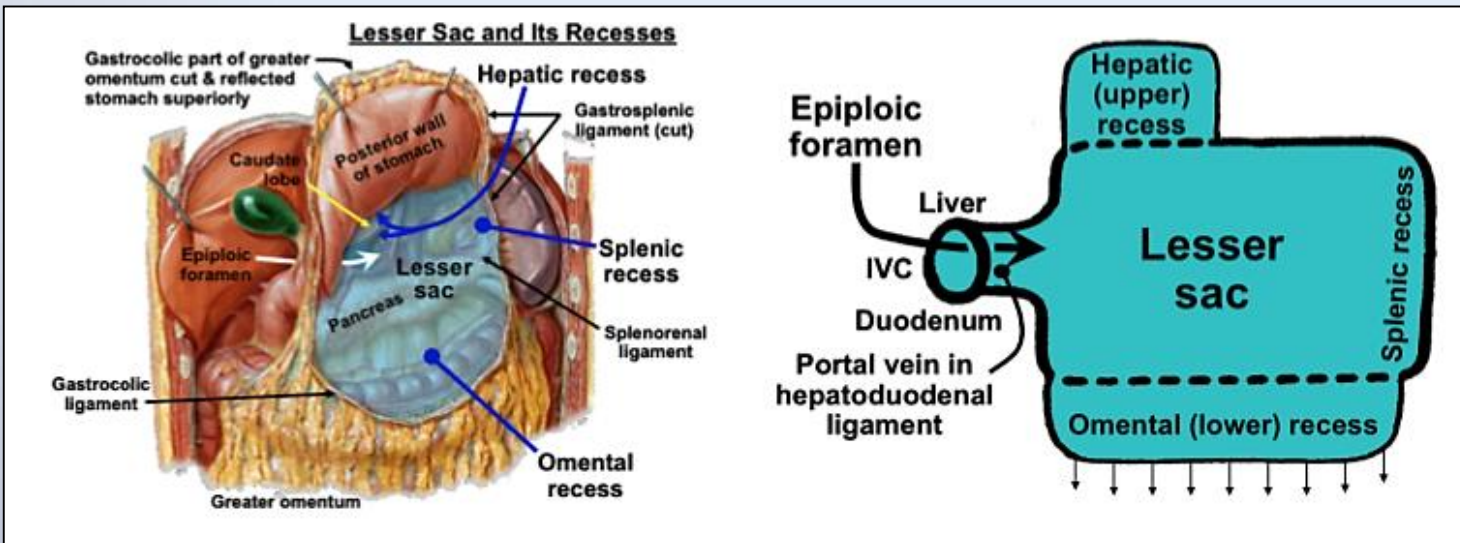


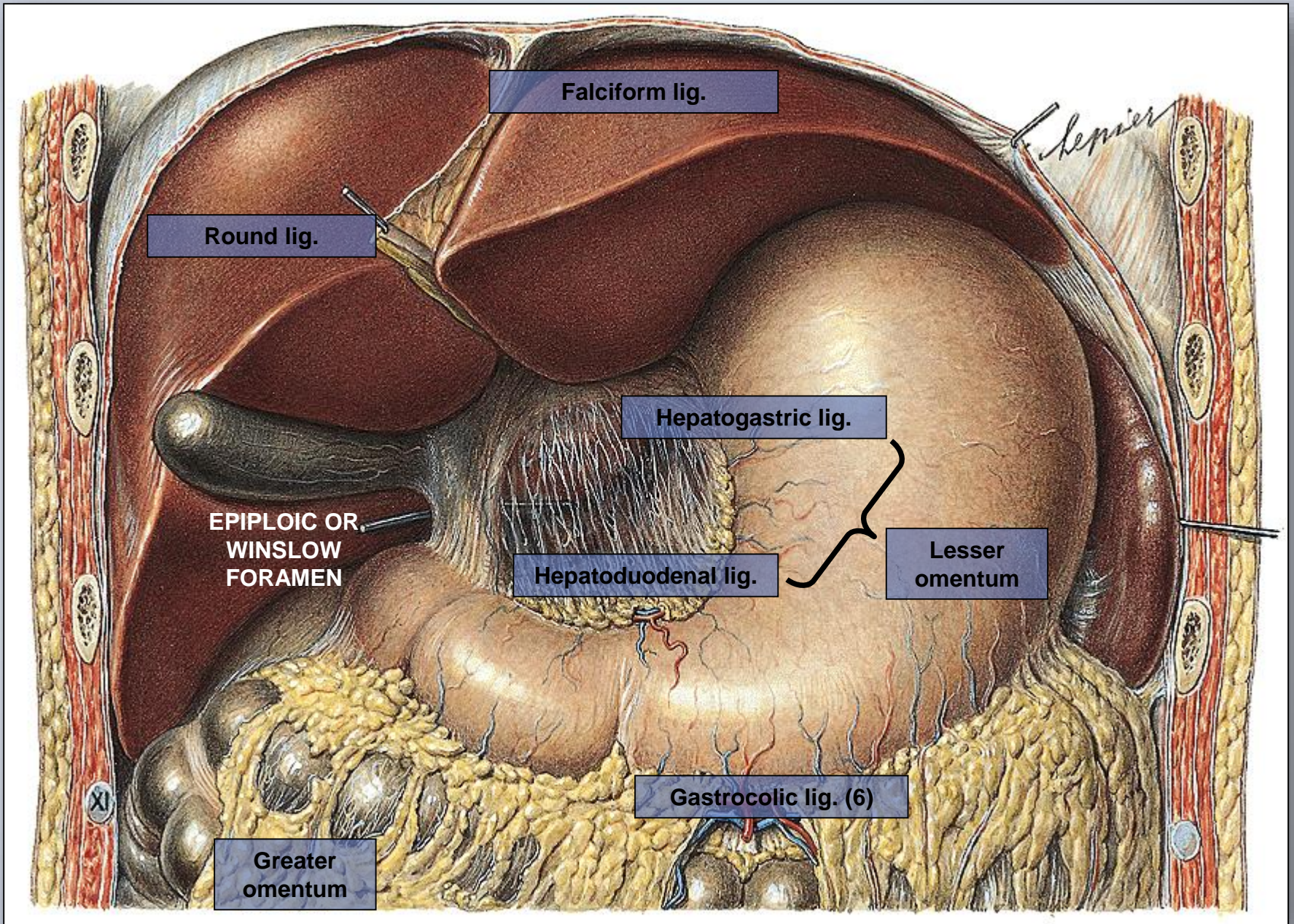
Foramen omentale (Winslow)

Omental bursa

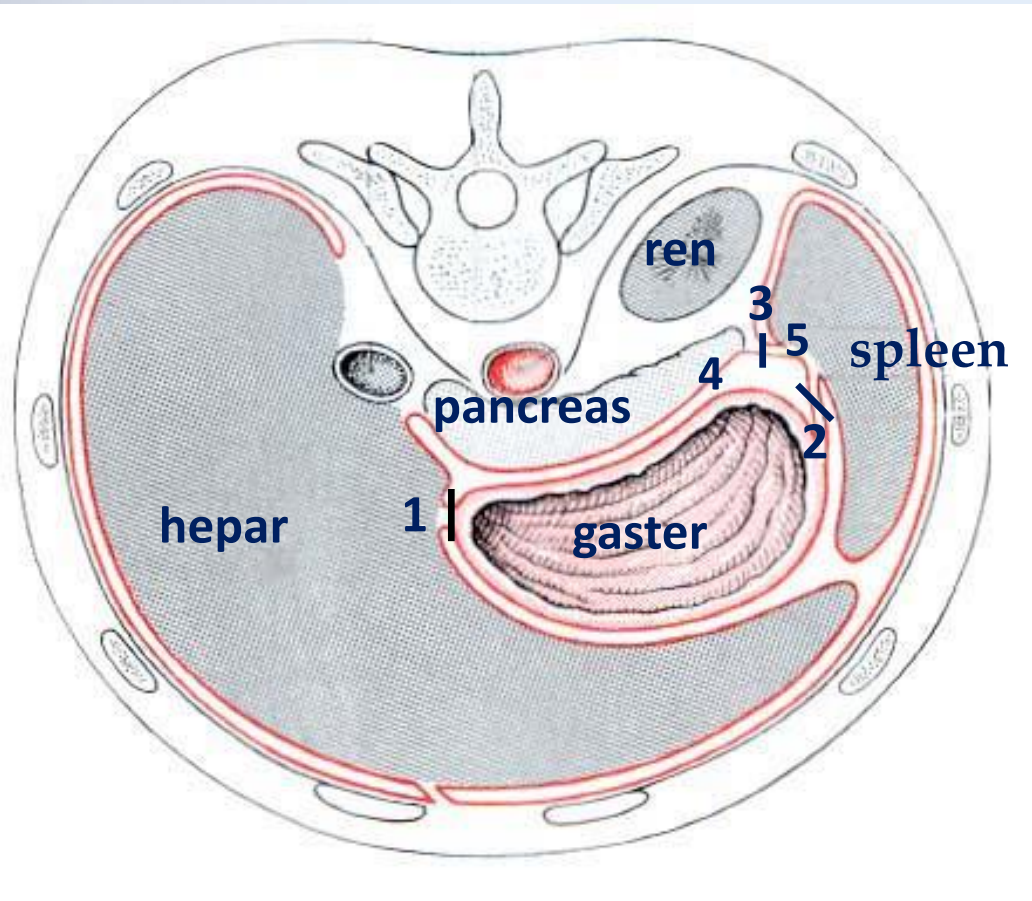
Omental bursa is the cavity formed by the rotation of the epigastric organs in the abdominal cavity, mainly behind the stomach and in front of the pancreas.

Entrance is the foramen epiploicum Winslowi, which is bordered by the hepatoduodenal lig., sup. horizontal duodenum, duodenorenal lig., hepatorenal lig., caudate lobe of the liver and the IVC. Through this we get into the vestibulum of the omental bursa, which extends to the gastropancreatic crest (left gastric a. and ventricular v.). Beyond the crest, we are talking about the proper part of the omental bursa. There are three recesses: sup. recess between the liver and the compartment of the hepatorenal lig., inf. recess adjoins the frontal and dorsal layers the greater omentum, splenic recess extends to gastrosplenic and phrenicocolic.

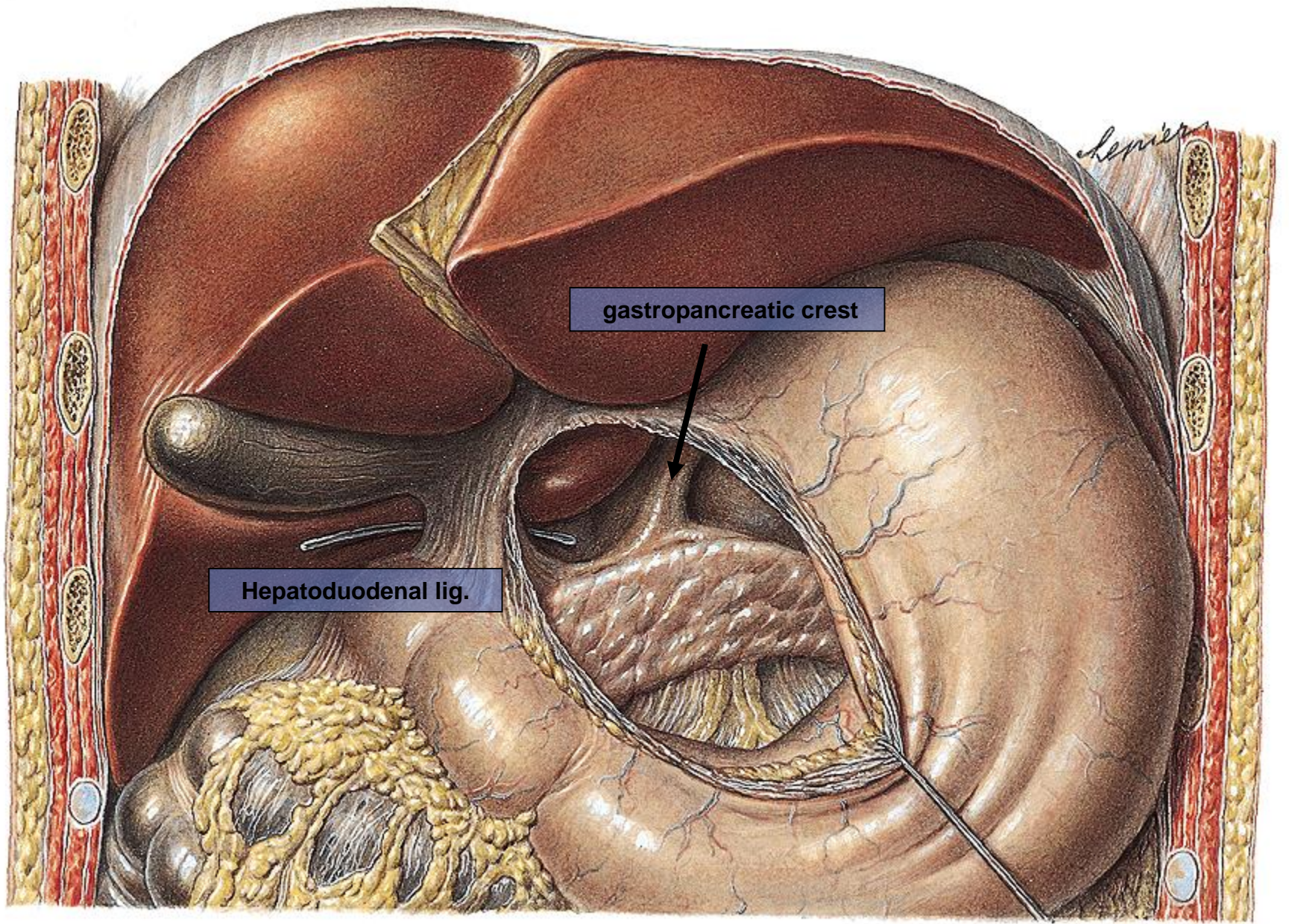




Omental bursa = lesser sac

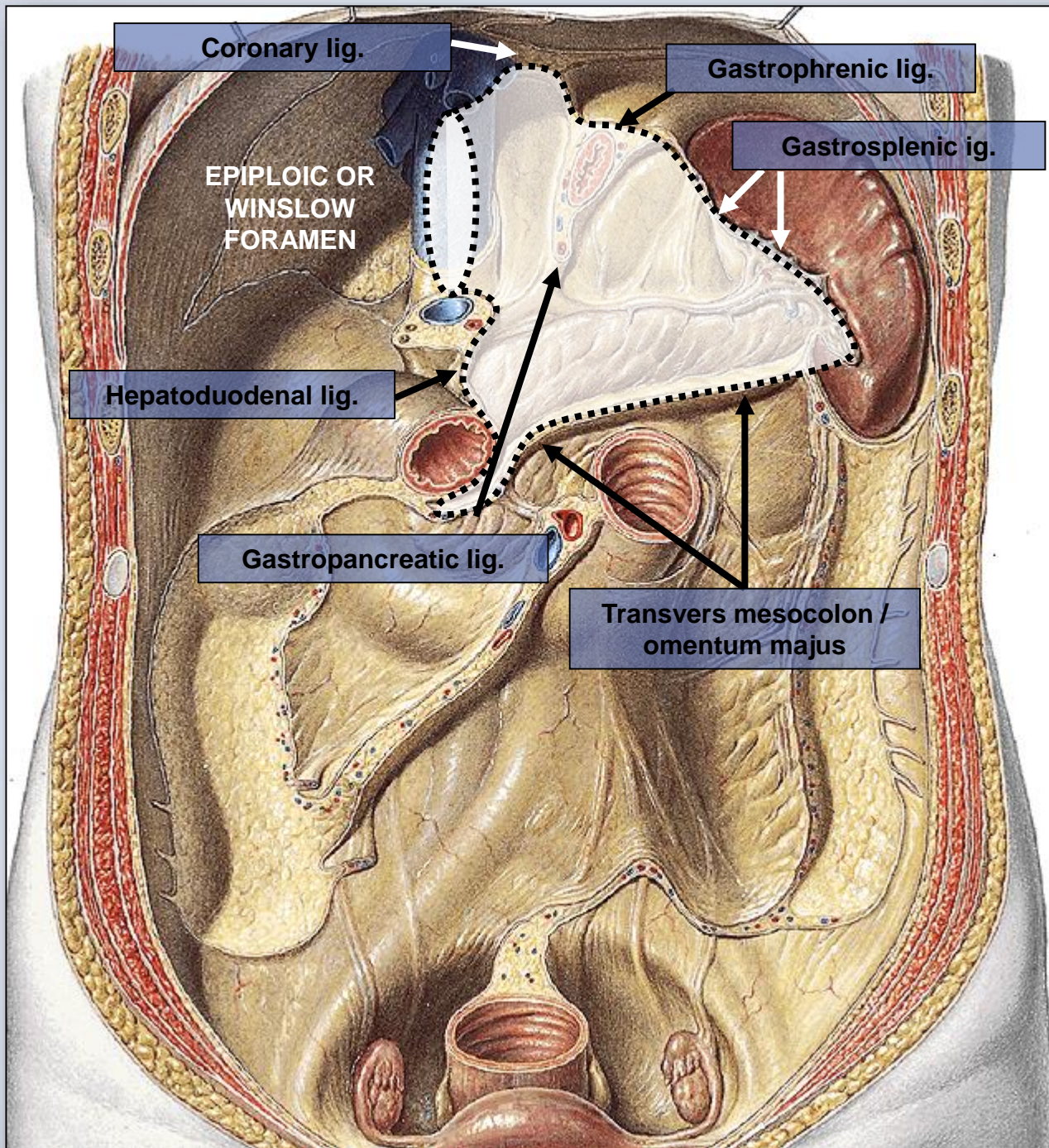


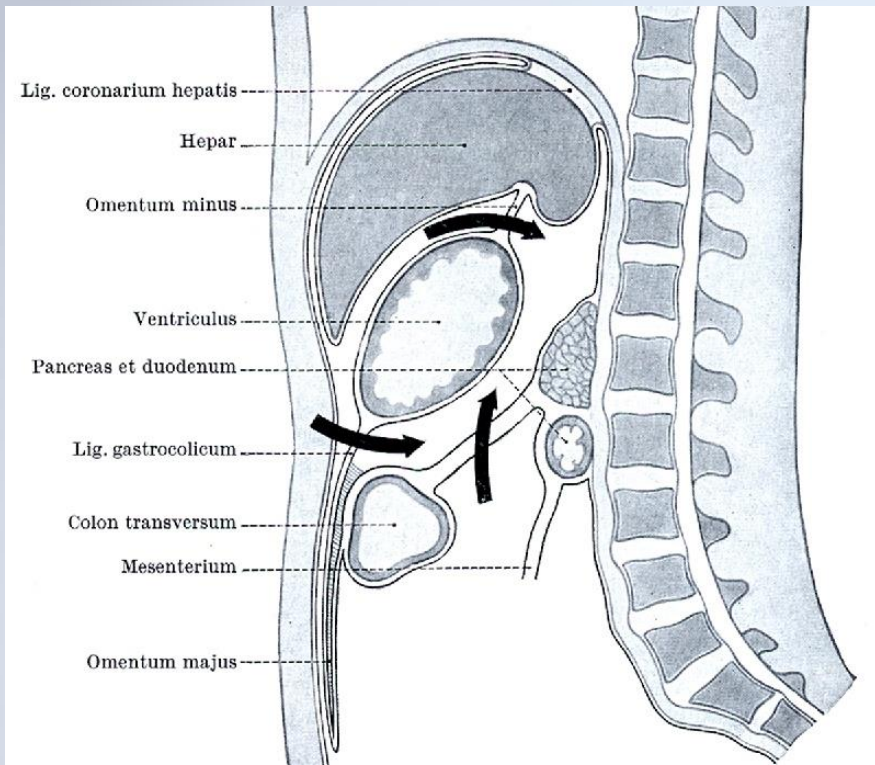
1. Hepatogastric ligament
2. Gastrosplenic ligament
3. Phrenicosplenic ligament
4. OMENTAL BURSA
5. *Splenic recess*



gastropancreatic crest

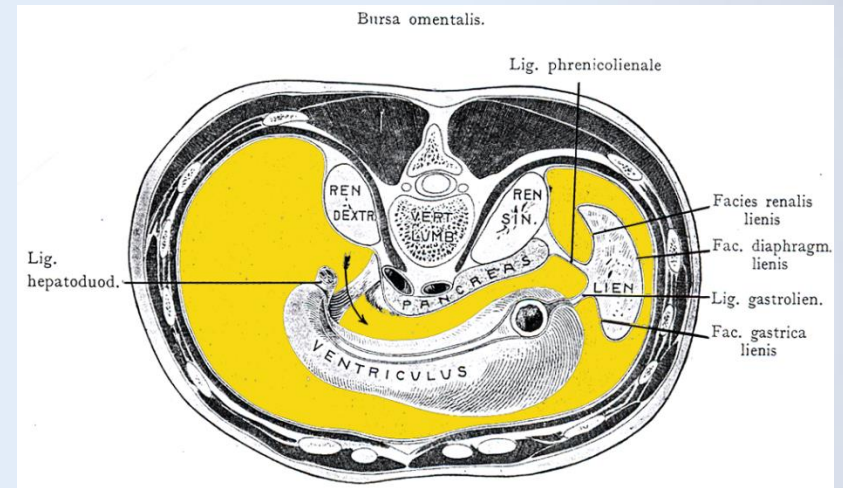
Hepatoduodenal lig.





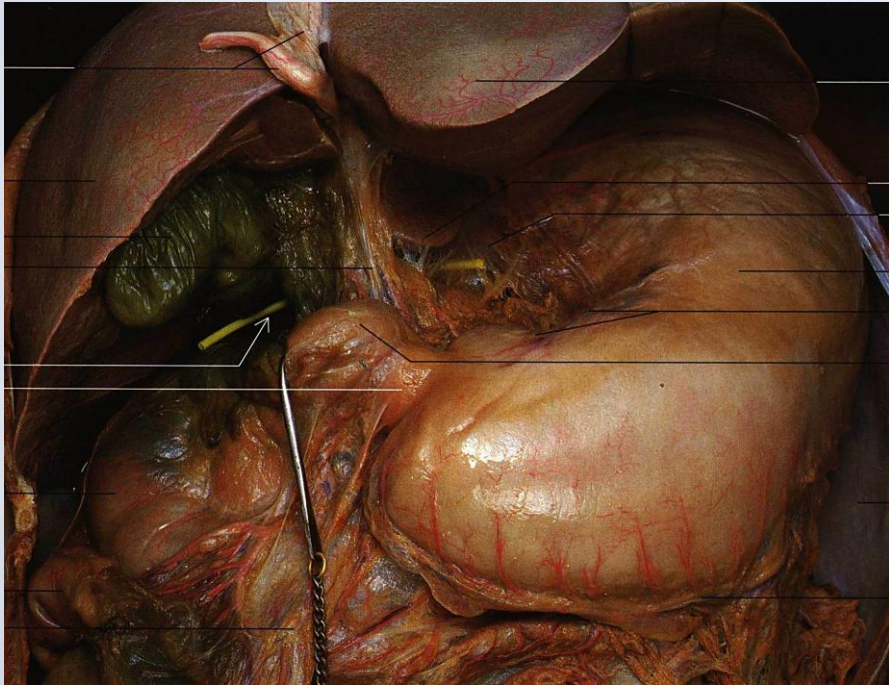
Omental bursa:

- Epiploic (Winslow) foramen
- Vestibule
- Gastropancreatic fold
- Proper cavity
- *Recesses: sup., inf. and splenic*

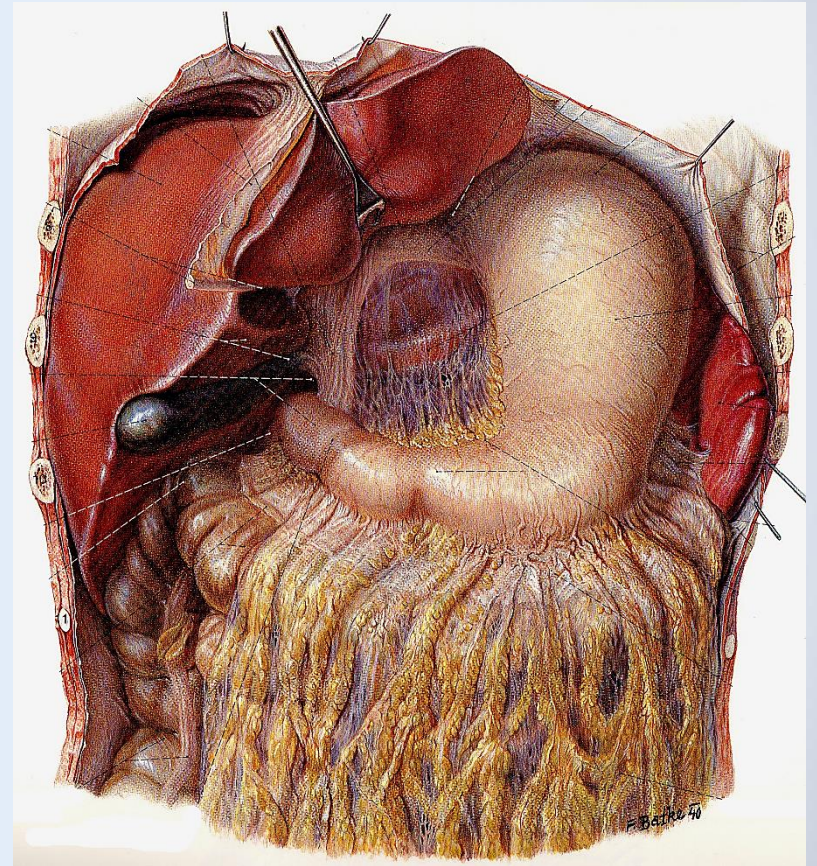


Bursa omentalis

Yokochi

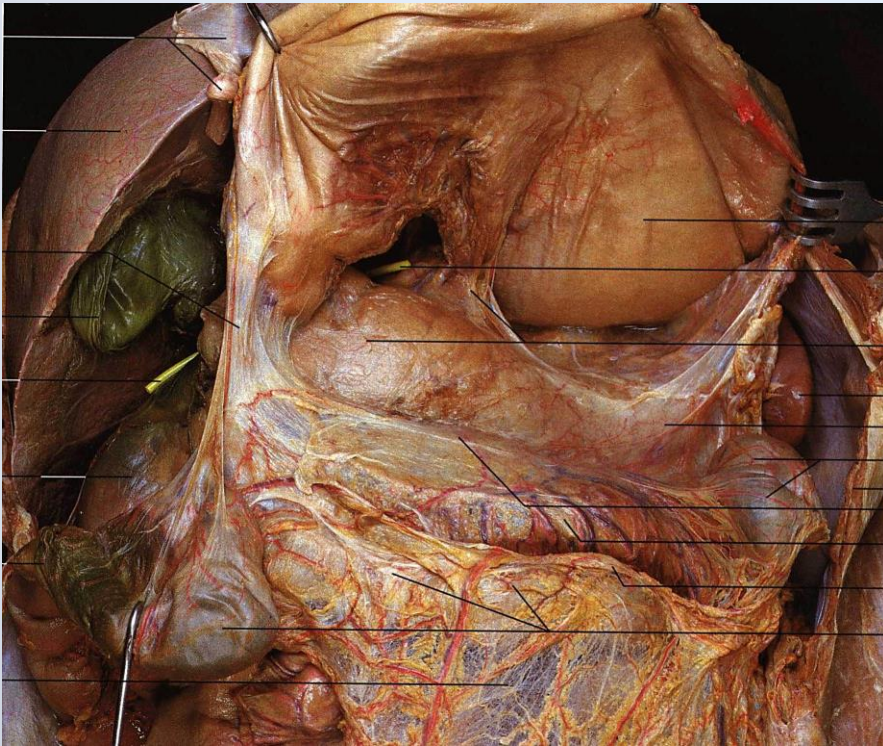


Pernkopf

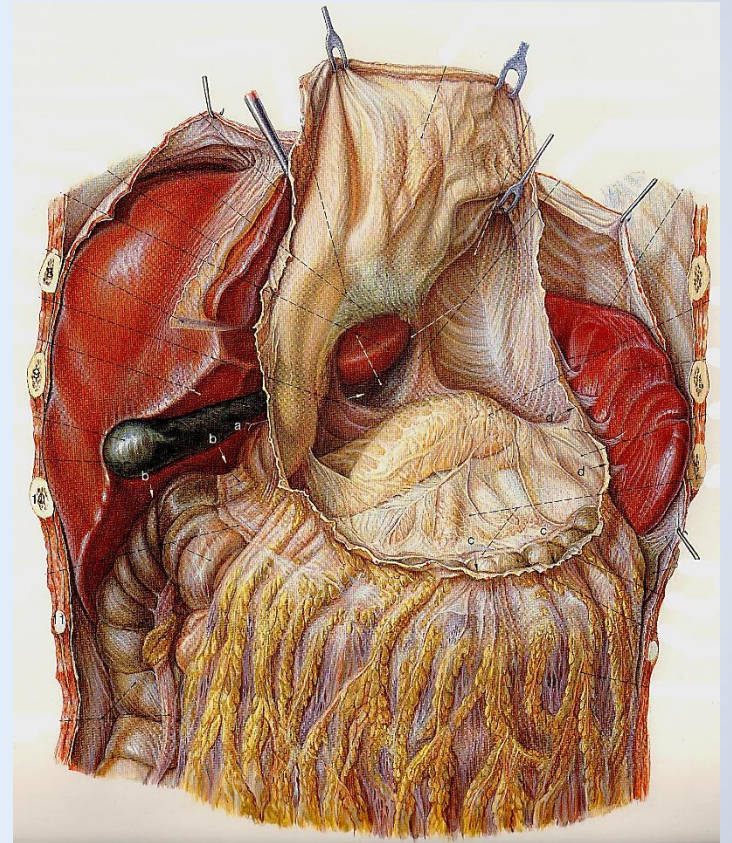


Bursa omentalis

Yokochi

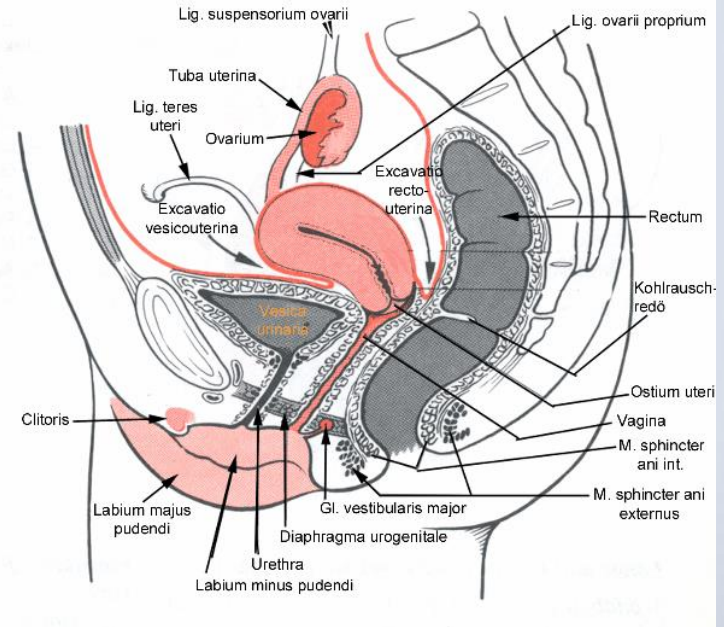
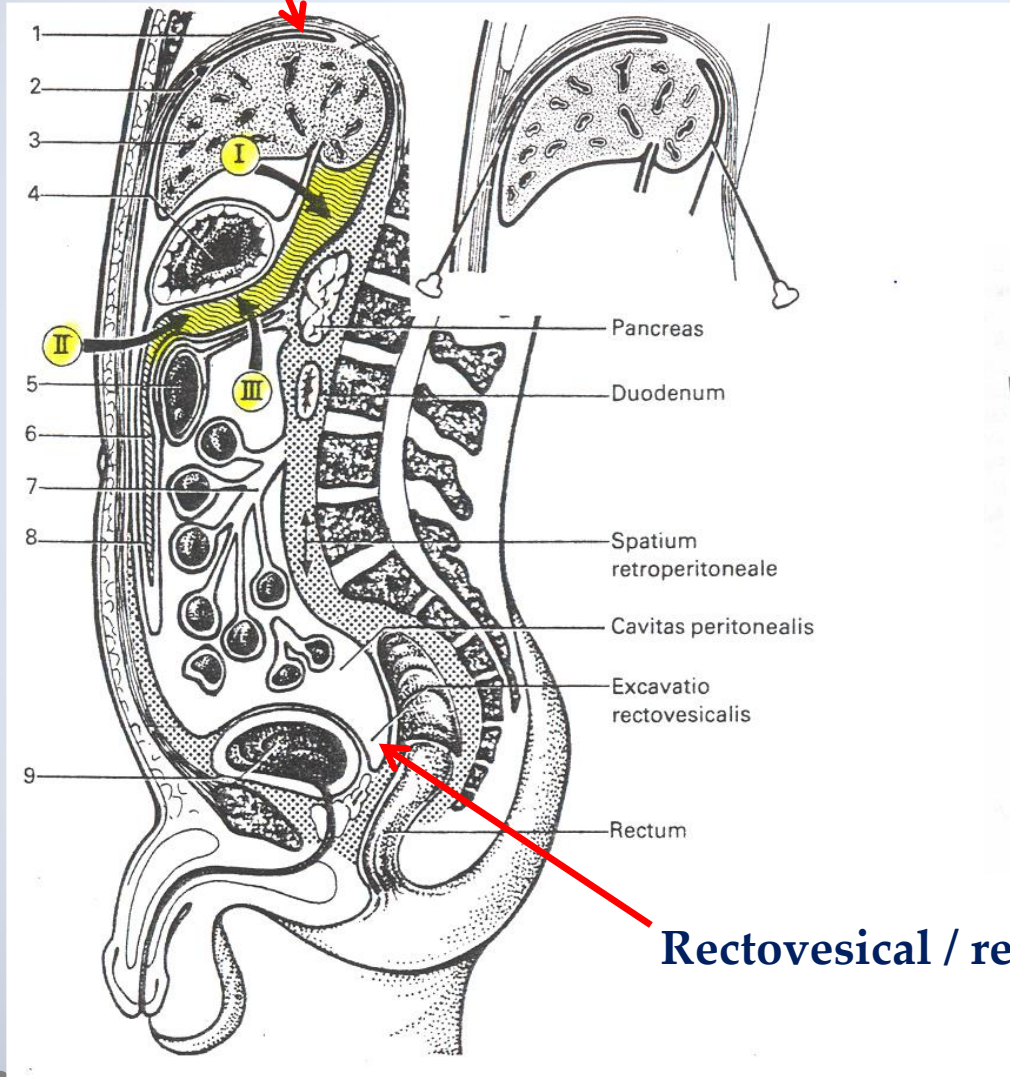


Pernkopf



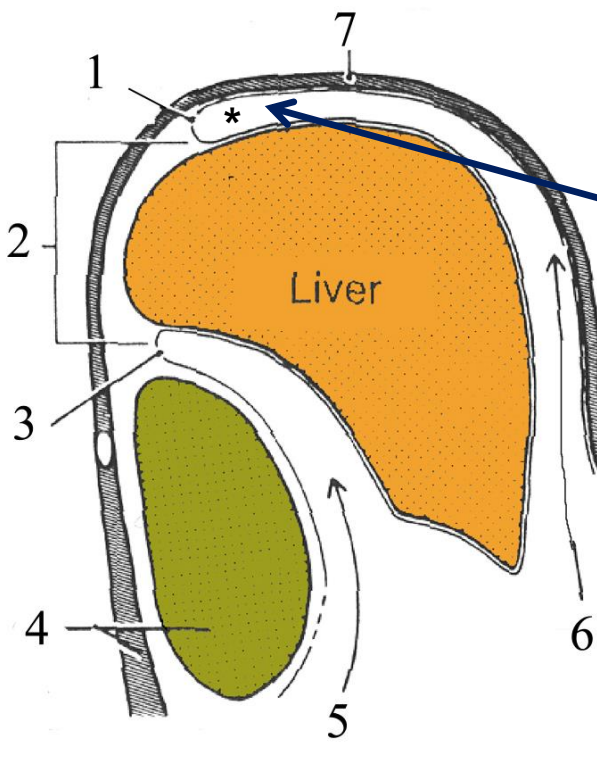
The highest and lowest points of the peritoneal cavity

hepatophrenic =
subphrenic recess

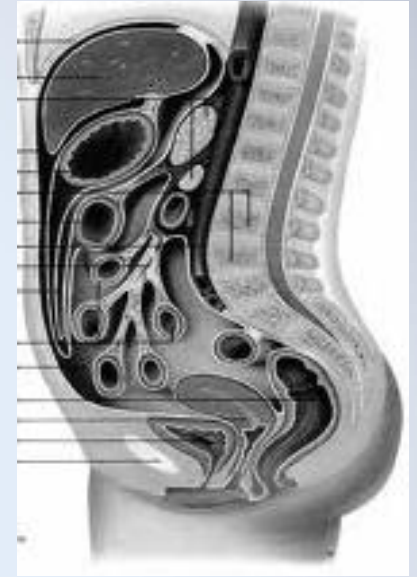


Rectovesical / rectouterine pouch (Douglas pouch)

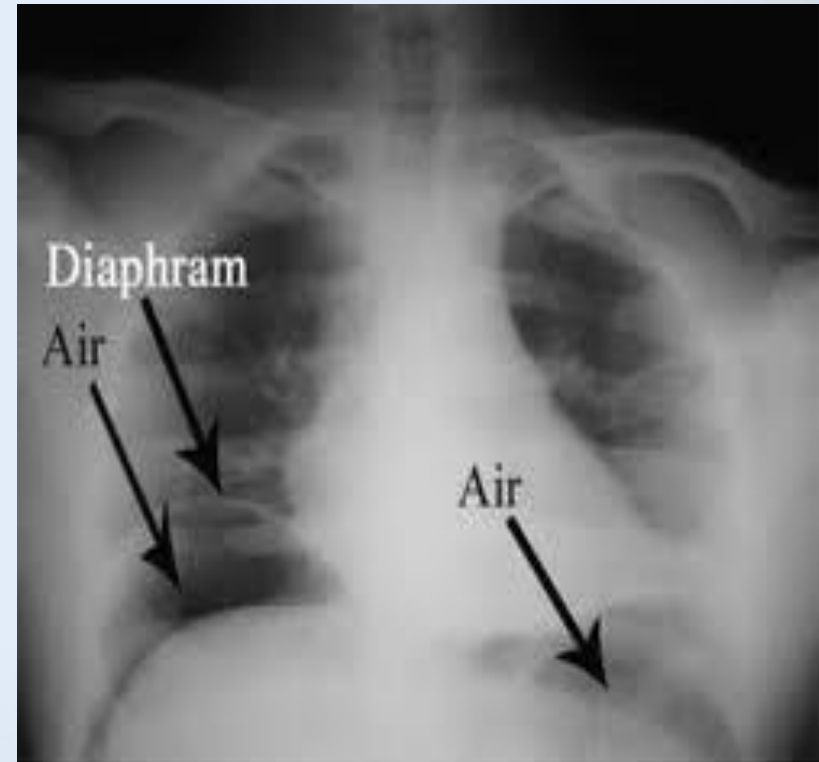
Cavum peritonei

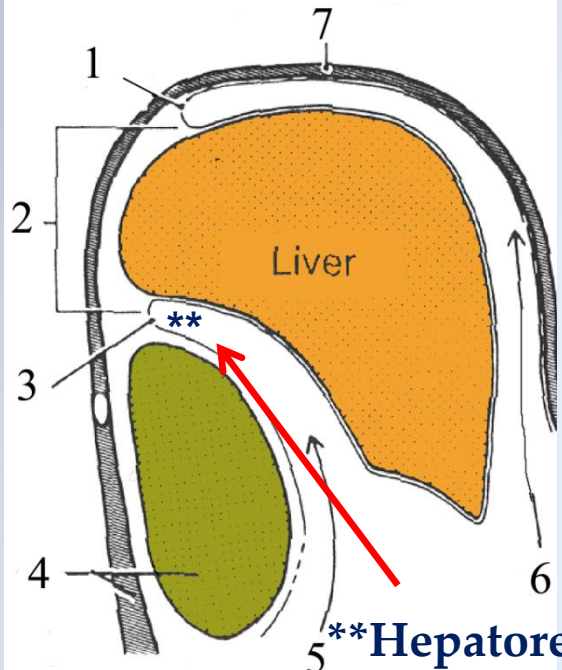


*Hepatophrenic recess

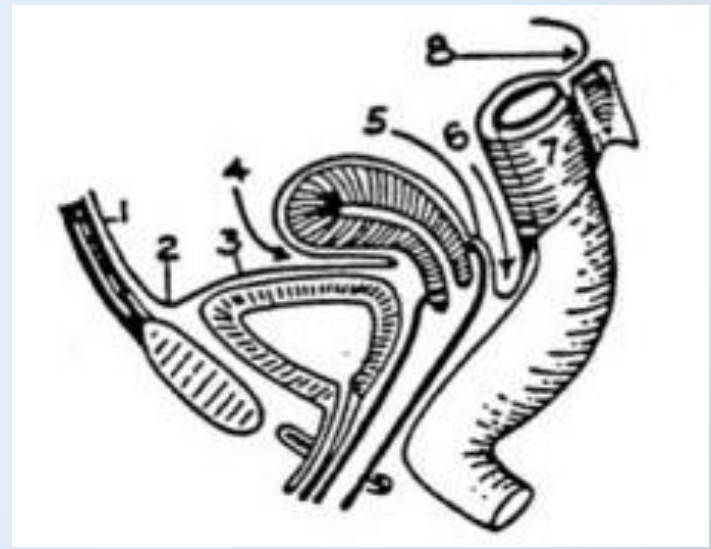
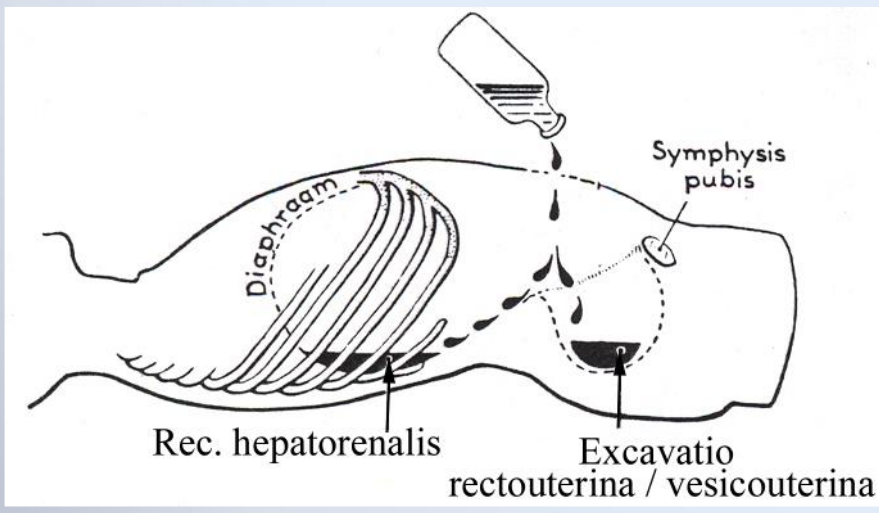
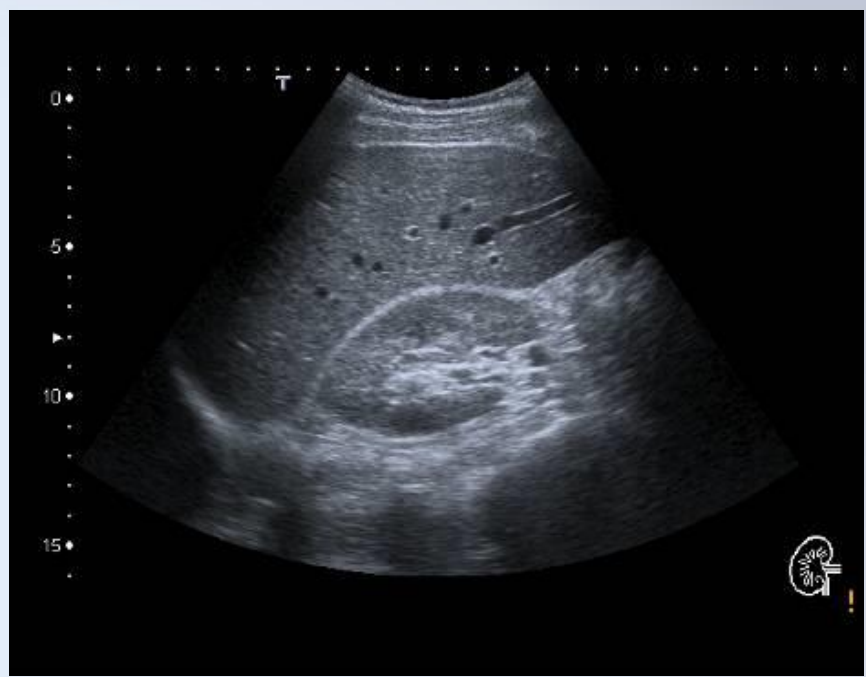


Perforation





****Hepatorenal
recess
(Morrison)**

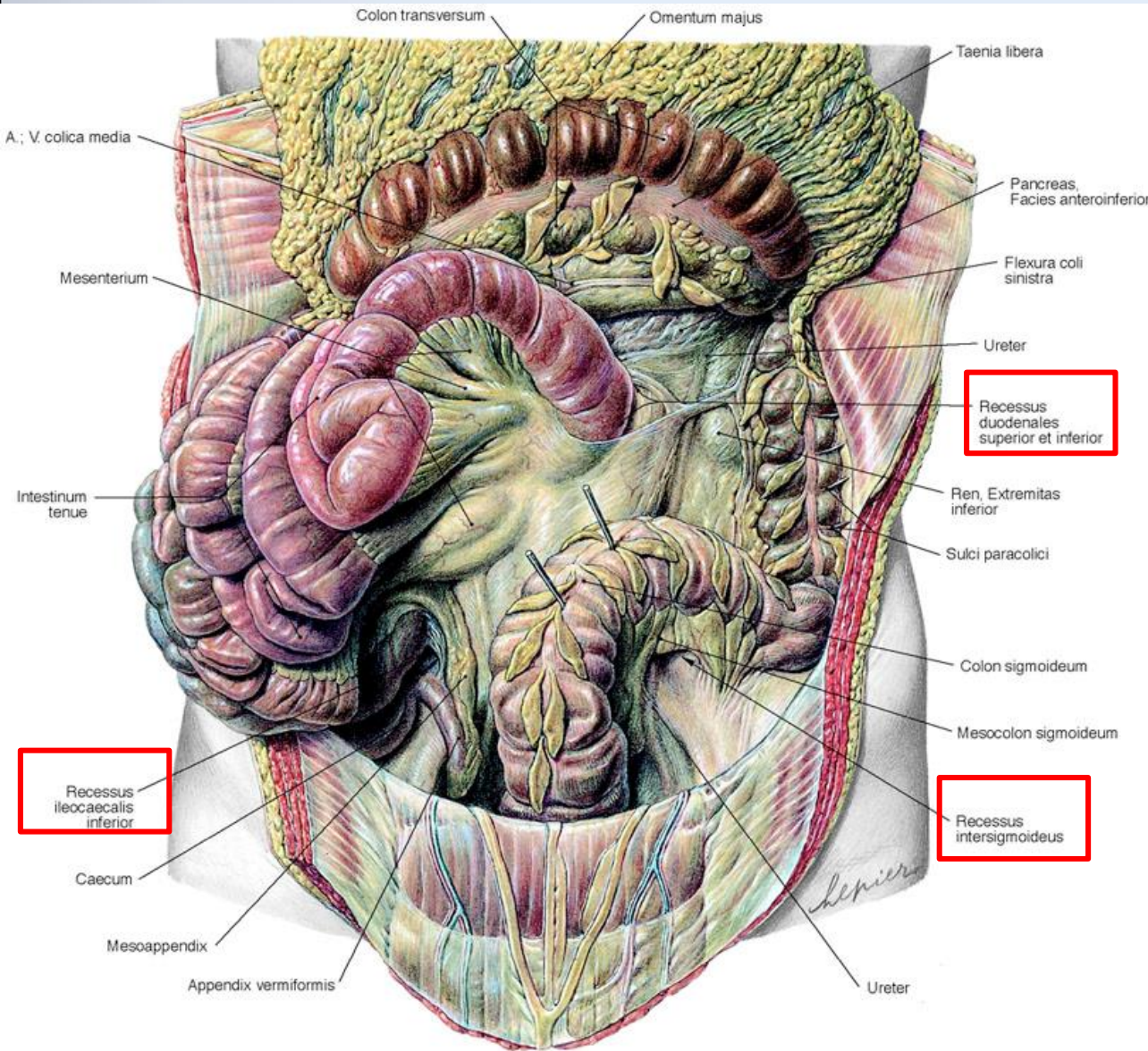


Peritoneal recesses



Their significance lies in the fact that they can rarely serve as internal hernias. Usually they occur where the peritoneal covering disappears or returns!

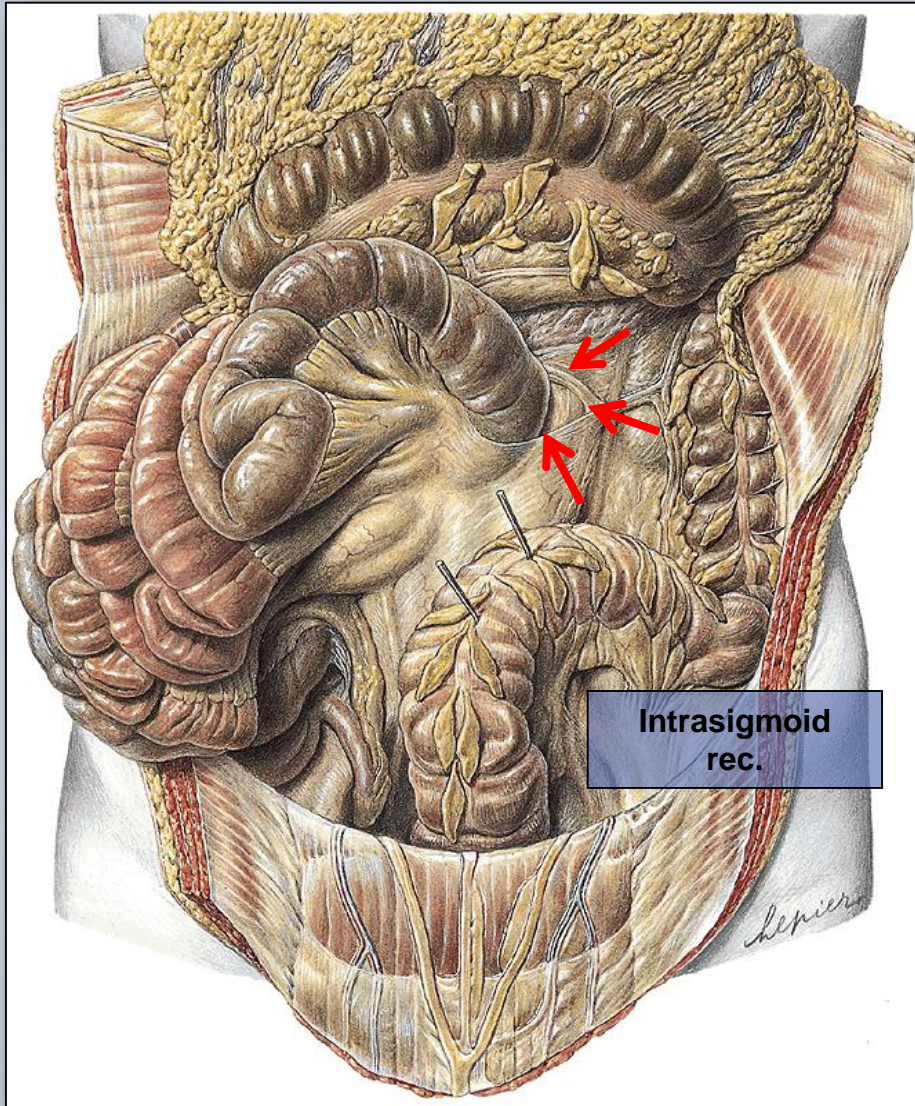
Peritoneal recesses



internal herniation

- Omental bursa
- Sup., inf. duodenal recesses
- Sup., inf. ileocecal recesses
- intersigmoid,...

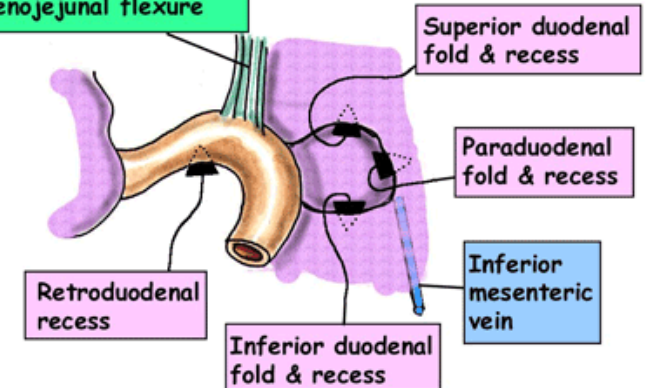
Peritoneal recesses



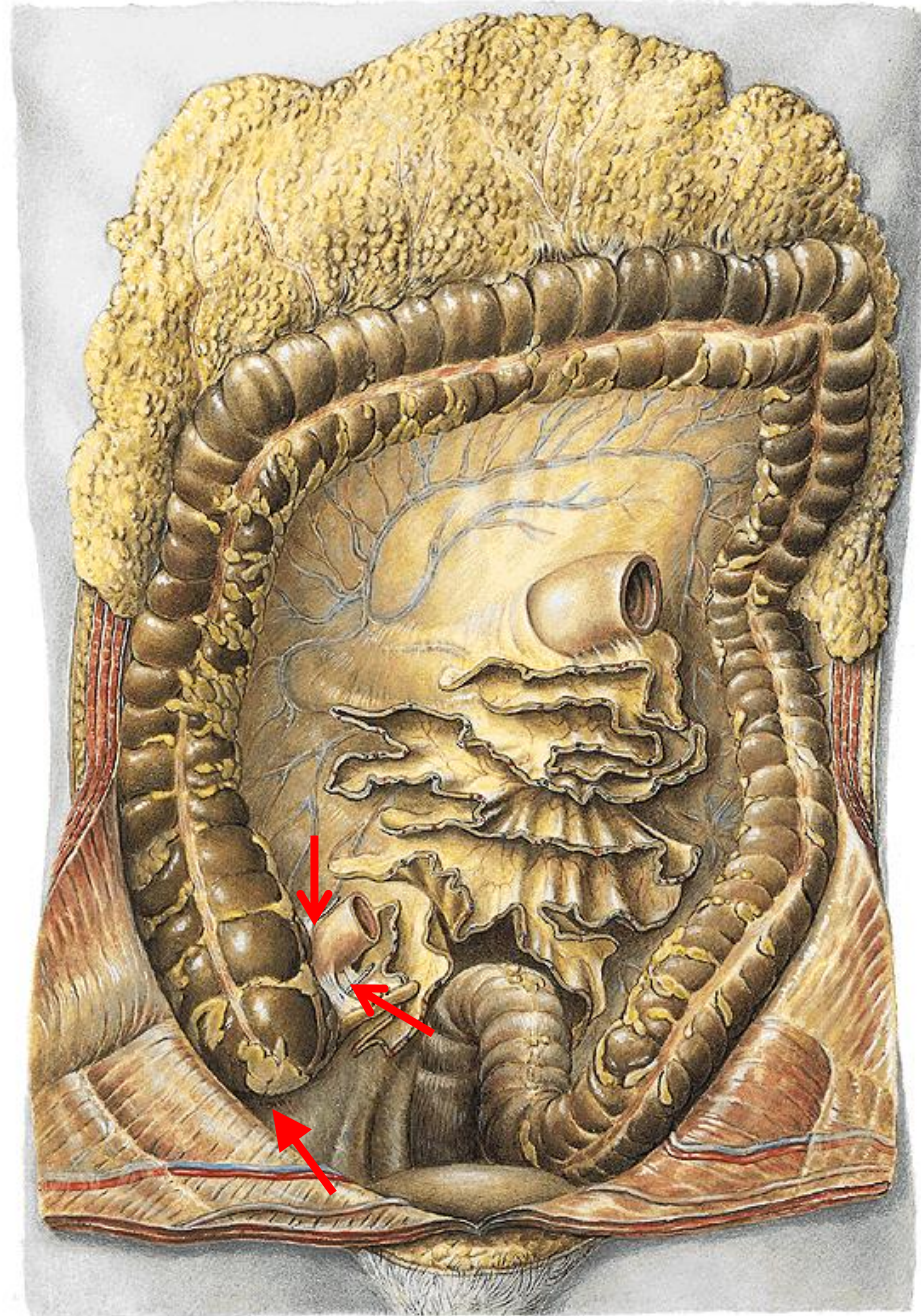
PERITONEAL RECESSES

There are a number of small recesses, as shown below, that are potential areas for internal herniation of bowel or other structures

Ligament of Treitz
Thin band of smooth muscle from right crus, passing anterior to aorta/renal vessels but behind pancreas, to blend with outer coat of duodenojejunal flexure

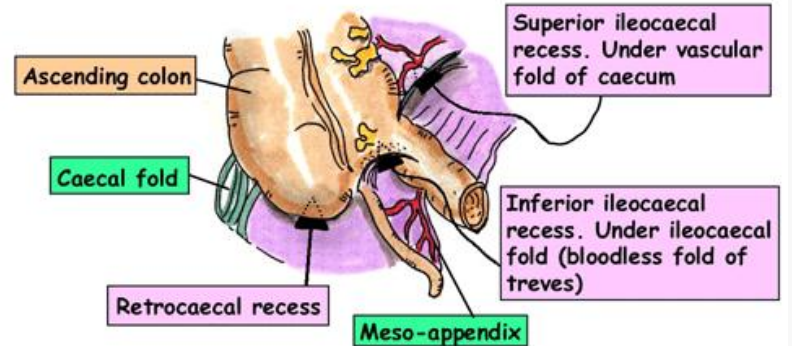


The arrows are pointing at the supra and infra duodenal recess and the paraduodenal recess.

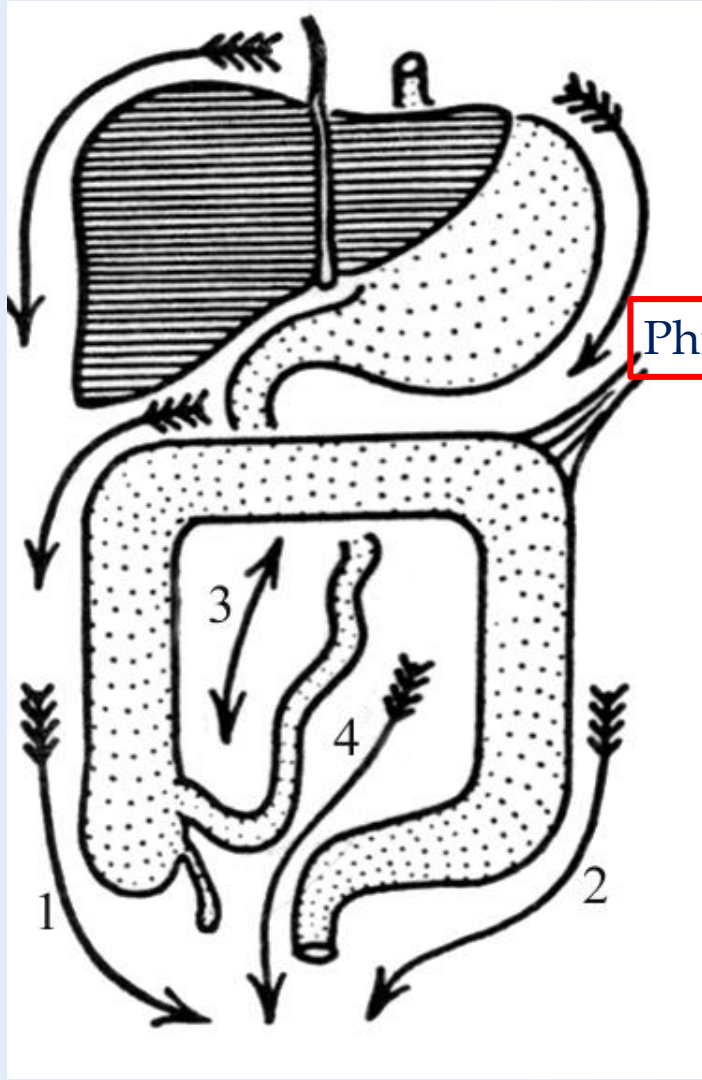
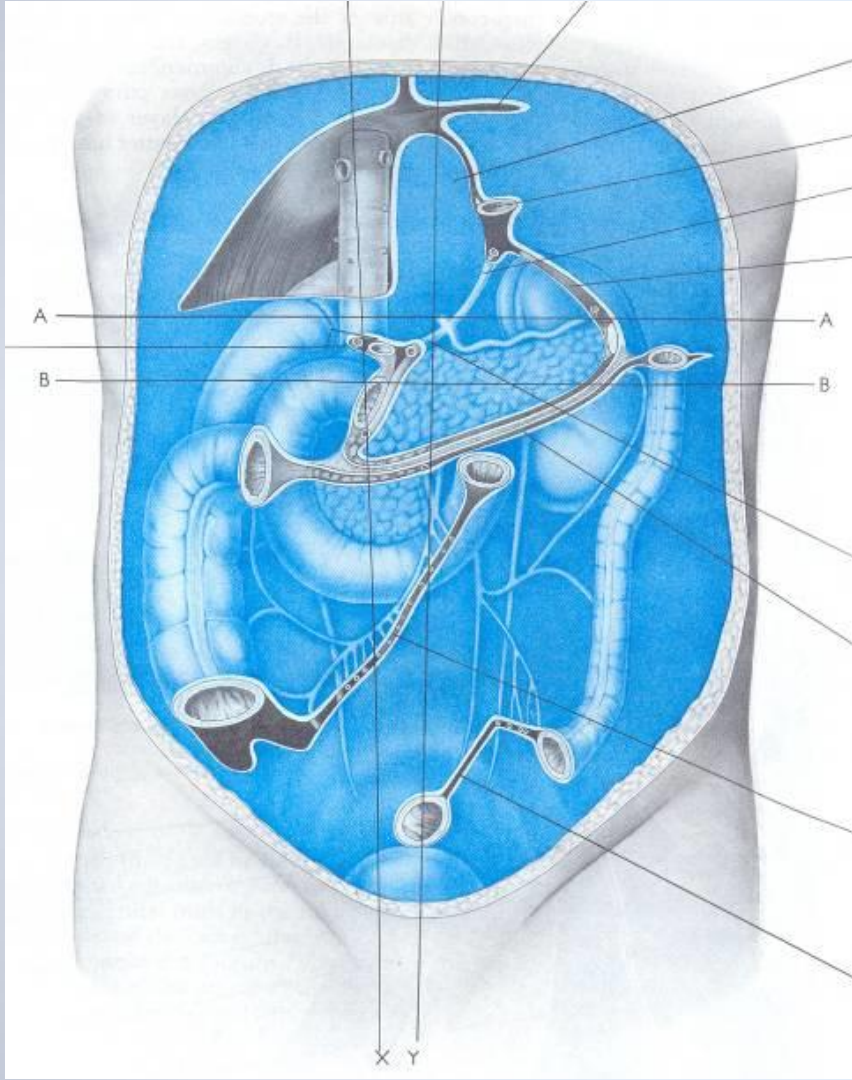


PERITONEAL RECESSES

There are a number of small recesses, as shown below, that are potential areas for internal herniation of bowel or other structures

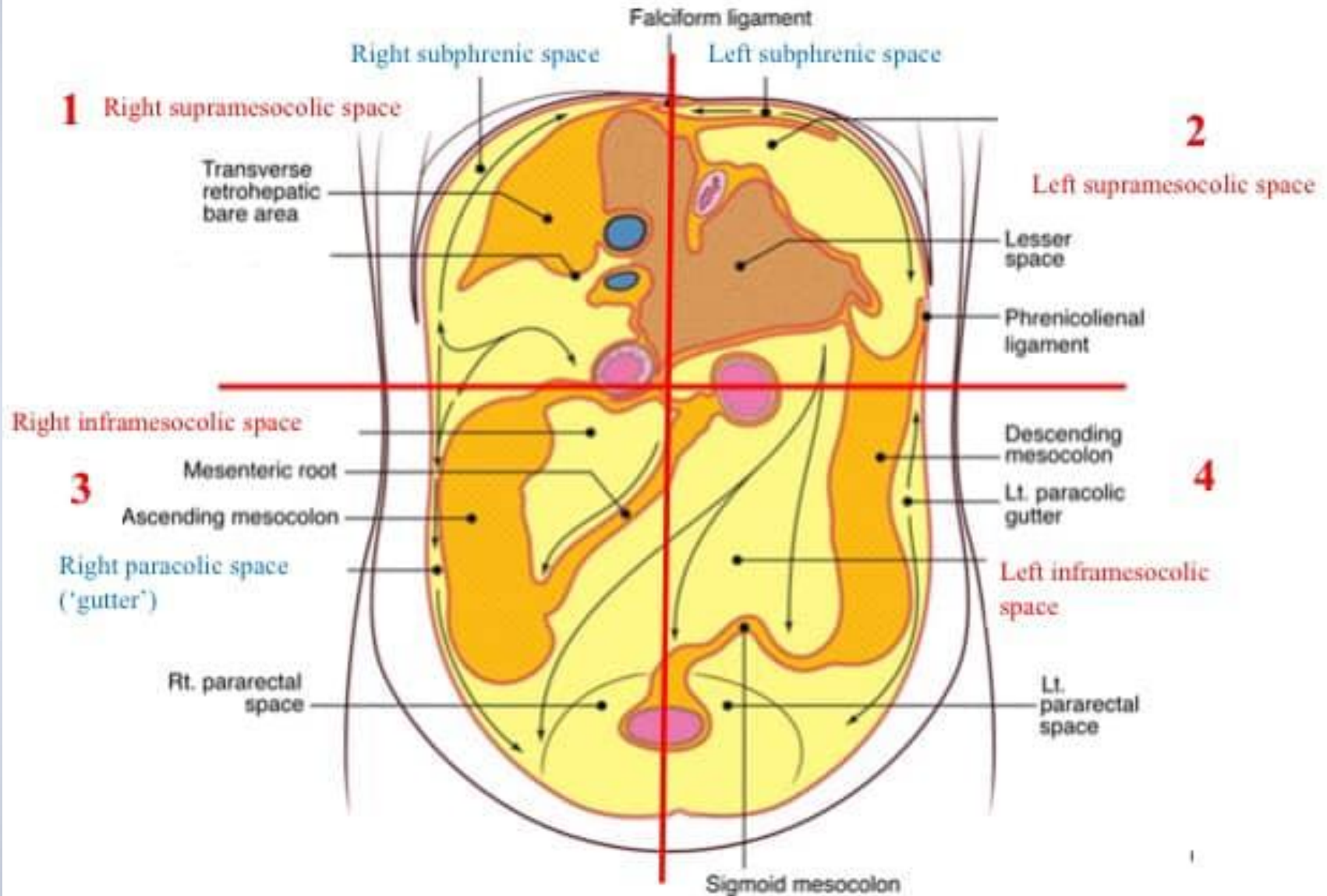


The arrows are pointing at the supra and infra ileocecal recesses and the retrocaecal recess.

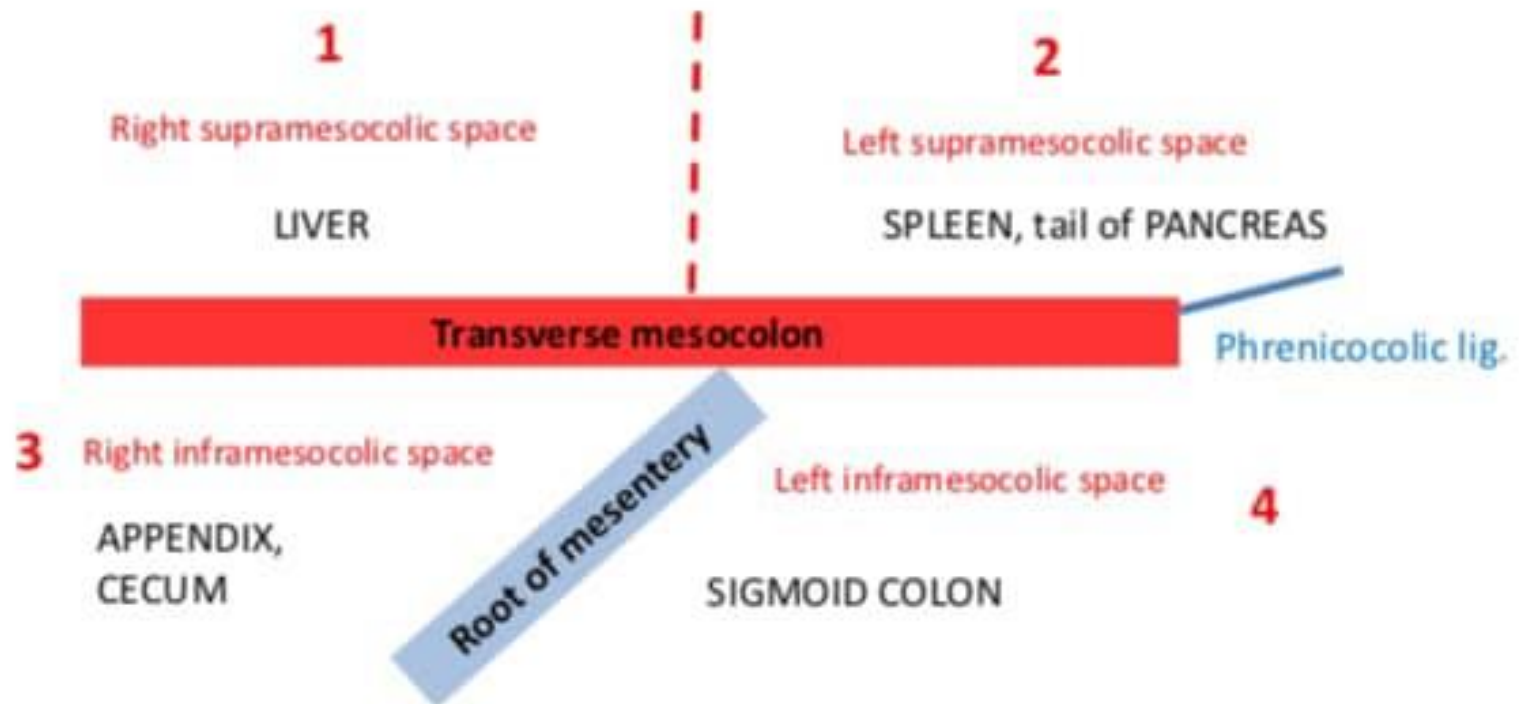


Phrenico-colic lig.

Regions of the peritoneal cavity

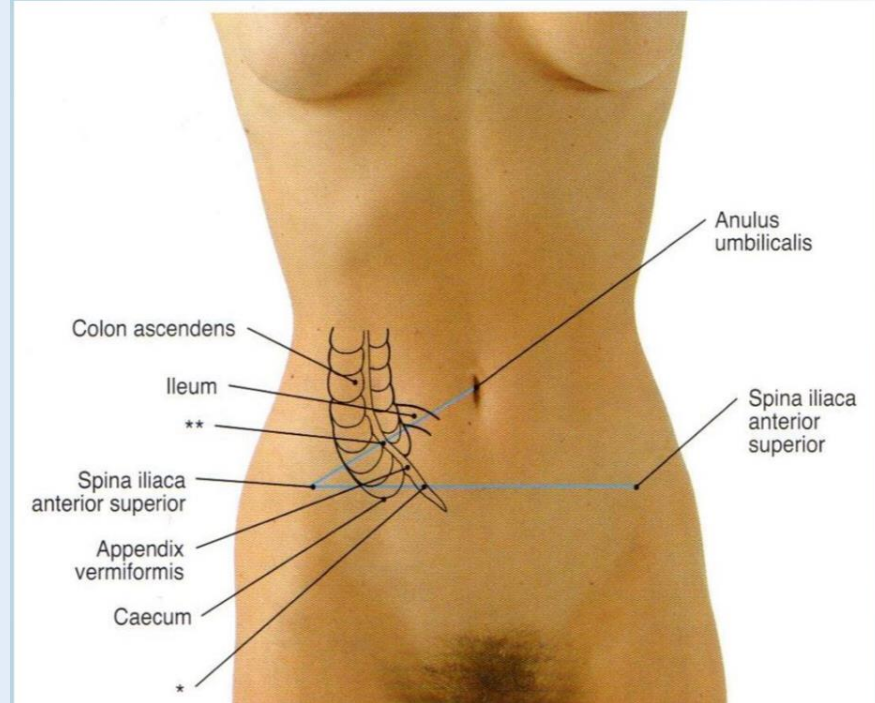
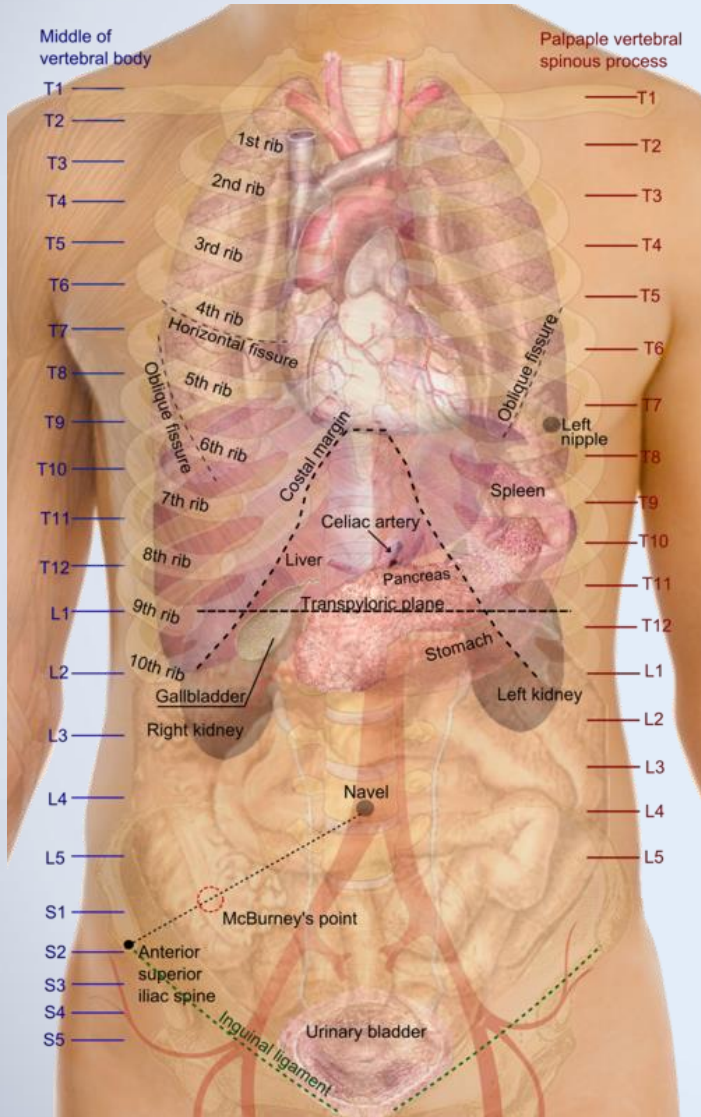


Regions of the peritoneal cavity



appendicitis

Sobotta



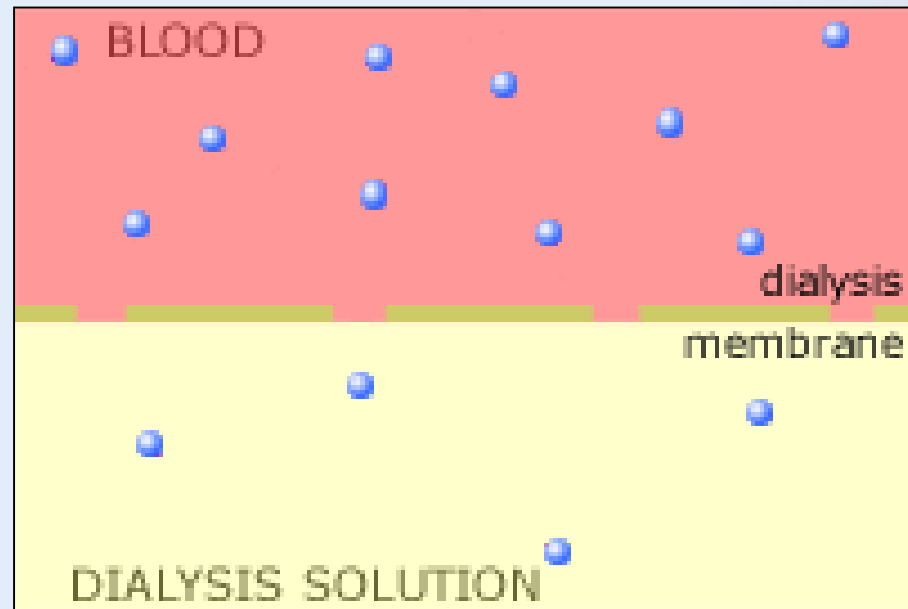
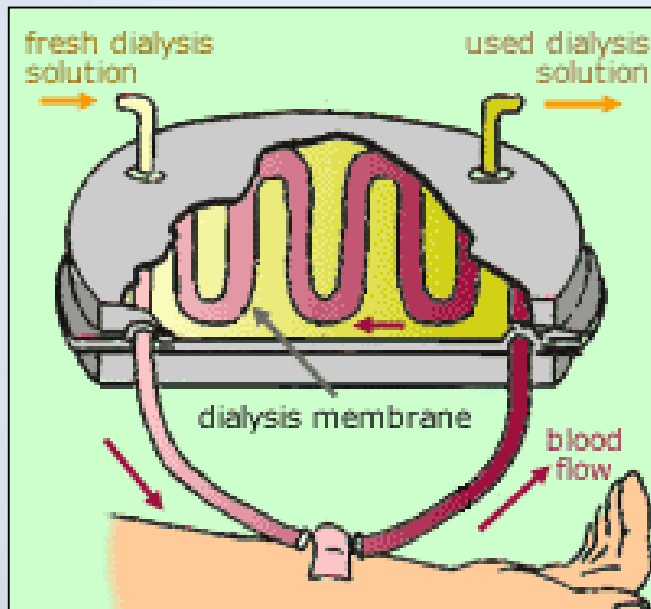
** McBurney's point

* Lanz point

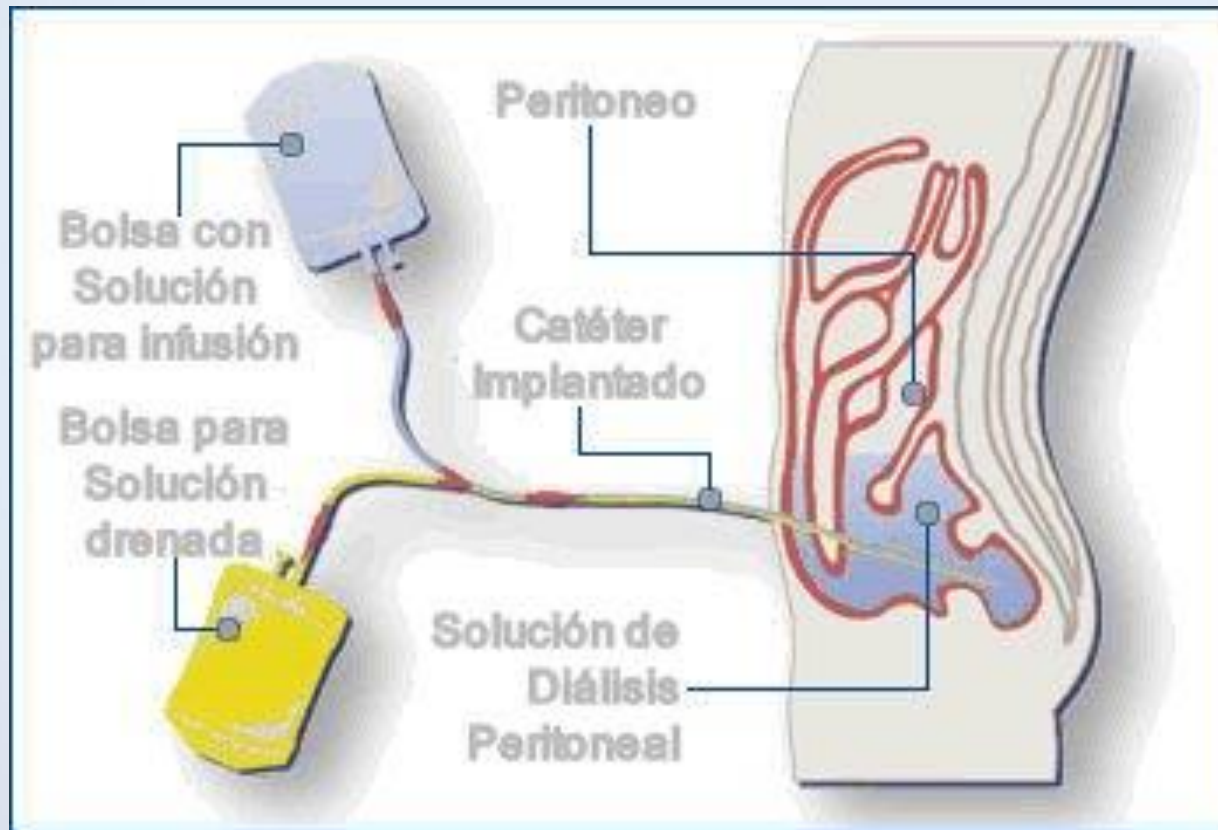
Deep tenderness at McBurney's point, known as **McBurney's sign**, is a sign of [acute appendicitis](#)

Peritoneal dialysis

- In the case of renal failure, certain substances are unable to pass through the kidneys, so they become enriched in the body (water, urea, creatinine, K-ions, H-ions, etc.)
- The purpose of the treatment is to remove these substances through a semi-permeable membrane using the concentration gradient as a driving force.



- The idea is the richly veined peritoneum as a semi-permeable membrane. A method that can be used at home under certain conditions.
- A long-lasting cannula inserted into the abdominal cavity should be filled with 1-2 liters of dialysis solution and drained after half an hour.
- Usually more cycles are required





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