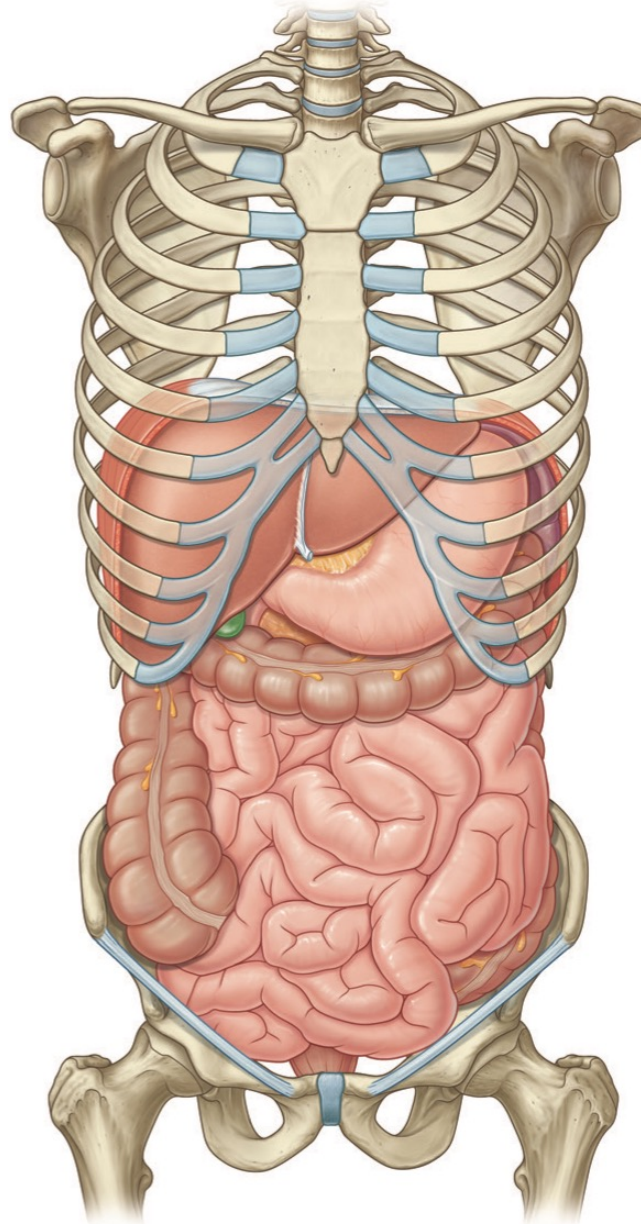


abdomen – concept, abdominal wall, peritoneal cavity

Prof. MUDr. Jiří Ferda, Ph.D.

abdomen

- ♦ Abdomen is a continuation of thorax
- ♦ Abdomen is continuing to pelvis
- ♦ Pelvic cavity
 - ♦ Continuation of the abdominal cavity
- ♦ Cranial borderline – diaphragm
- ♦ Caudal borderline – aditus pelvis
- ♦ Ligamentum inguinale
 - ♦ borderline
 - ♦ Abdominal wall
 - ♦ Lower extremity
- ♦ Abdominla wall
- ♦ Abdominal cavity
- ♦ Abdominal viscera



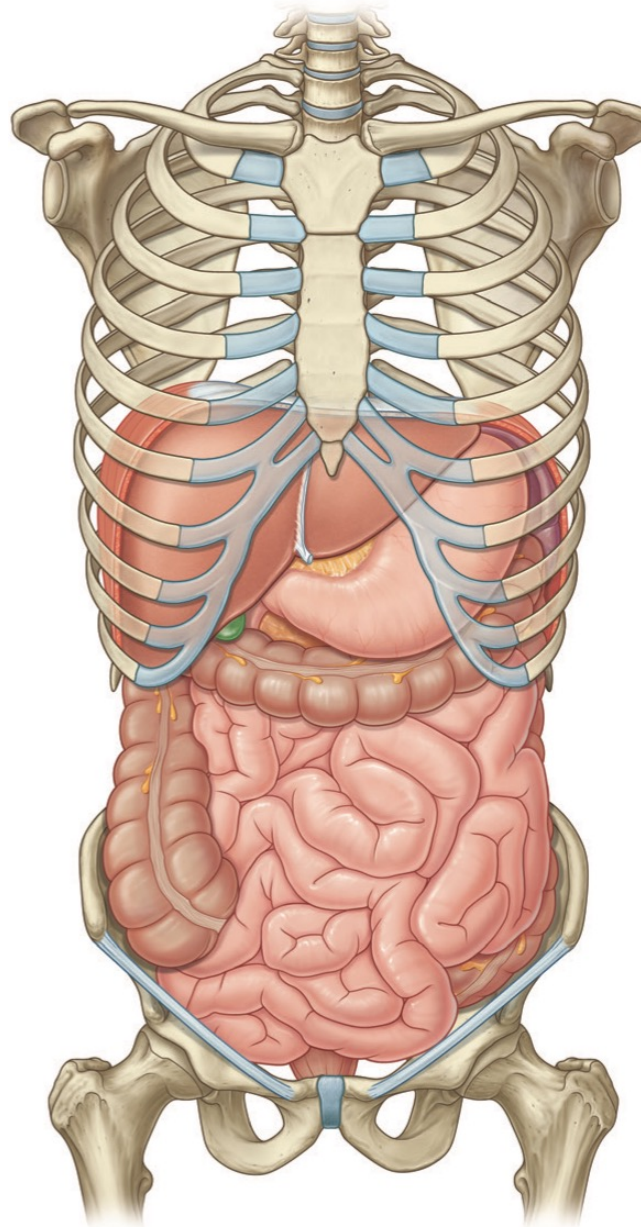
viscera abdominalia

- ♦ *Gastrointestinal system*

- ♦ Abdominal part of the esophagus
- ♦ Stomach
- ♦ Small intestine – intestinum tenue
- ♦ Large intestine – intestinum crassum
- ♦ Liver - hepar
- ♦ Biliary system
- ♦ Pancreas
- ♦ Spleen

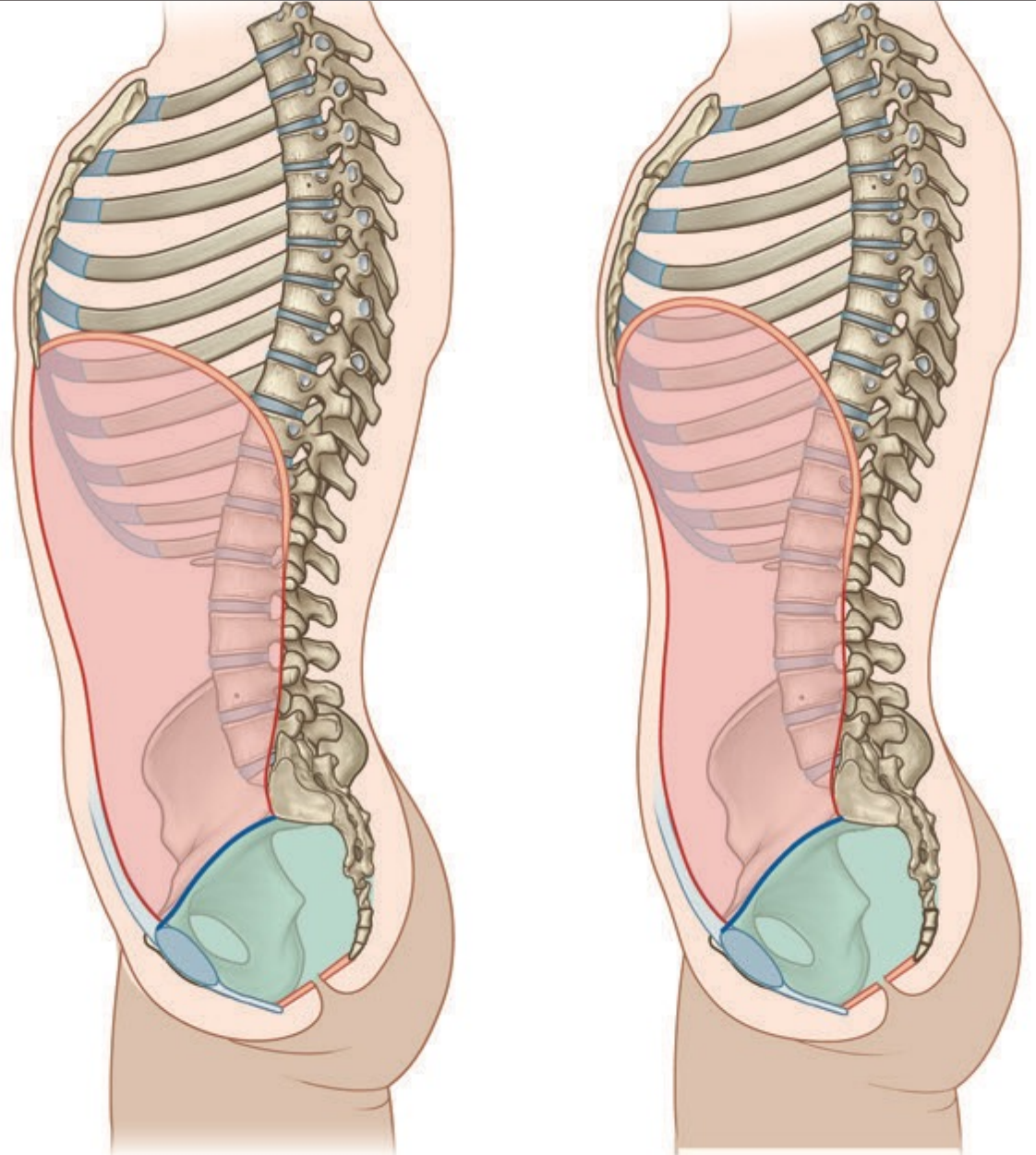
- ♦ *Urinary system*

- ♦ Kidneys
- ♦ Ureters
- ♦ Adrenal glands
- ♦ Vessels and nervous structures



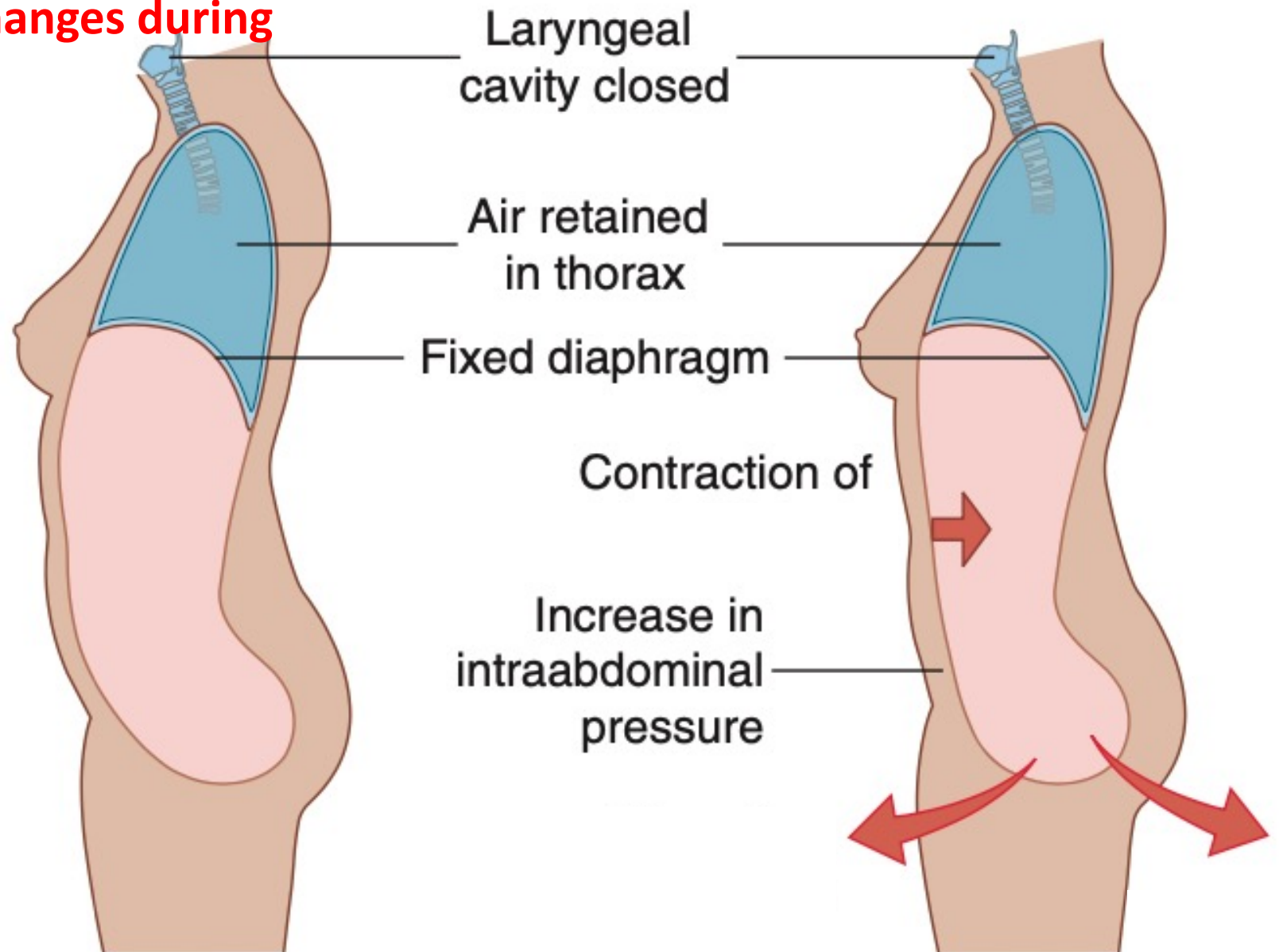
abdomen

🔴 Function during breathing



abdomen

- 💧 Intrabdominal pressure changes during
- 💧 miction
- 💧 defecation
- 💧 deliverance



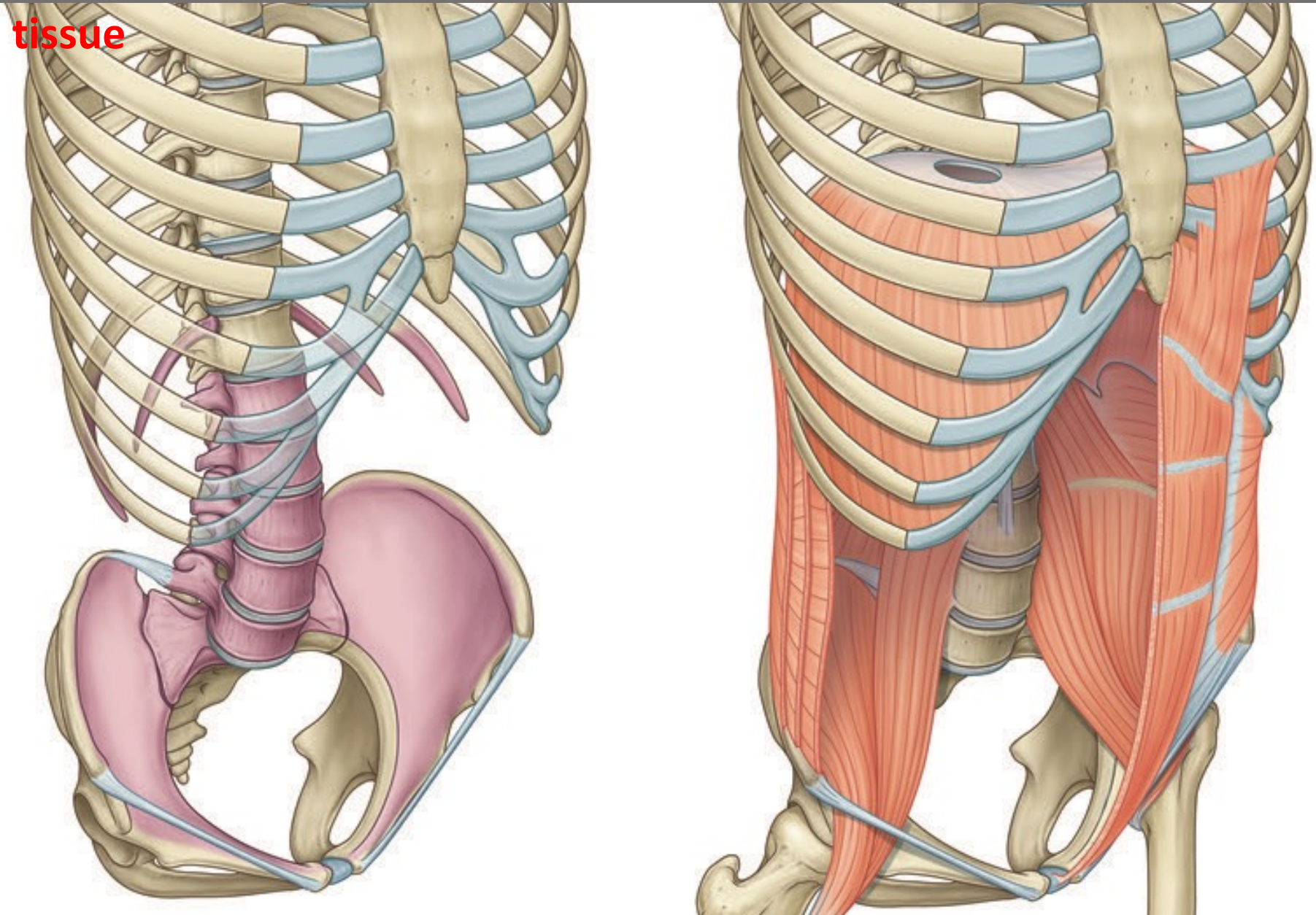
paries abdominalis – abdominla wall

💧 Skin and subcutaneous tissue

💧 Skeleton

💧 Muscles

💧 Peritoneum



ossa et ligamenta – bones and ligaments

♦ Ossa

♦ Vertebrae lumborum

♦ Cartilaginee costales VII - X

♦ Costae fluctuantes

♦ *Costa XI*

♦ *Costa XII*

♦ Os sacrum

♦ Ossa pelvis

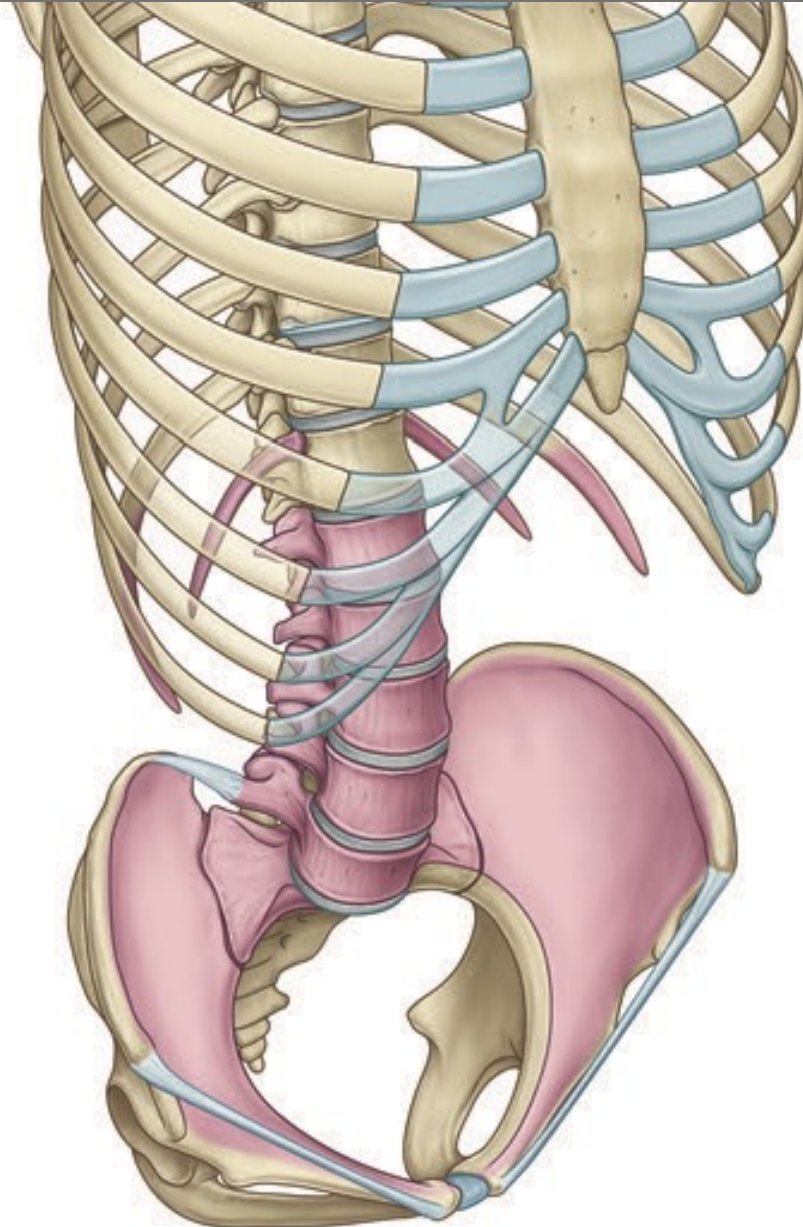
♦ *Os ilium*

♦ *Os pubis*

♦ Ligamenta

♦ Ligamentum iliolumbale

♦ Ligamentum inguinale



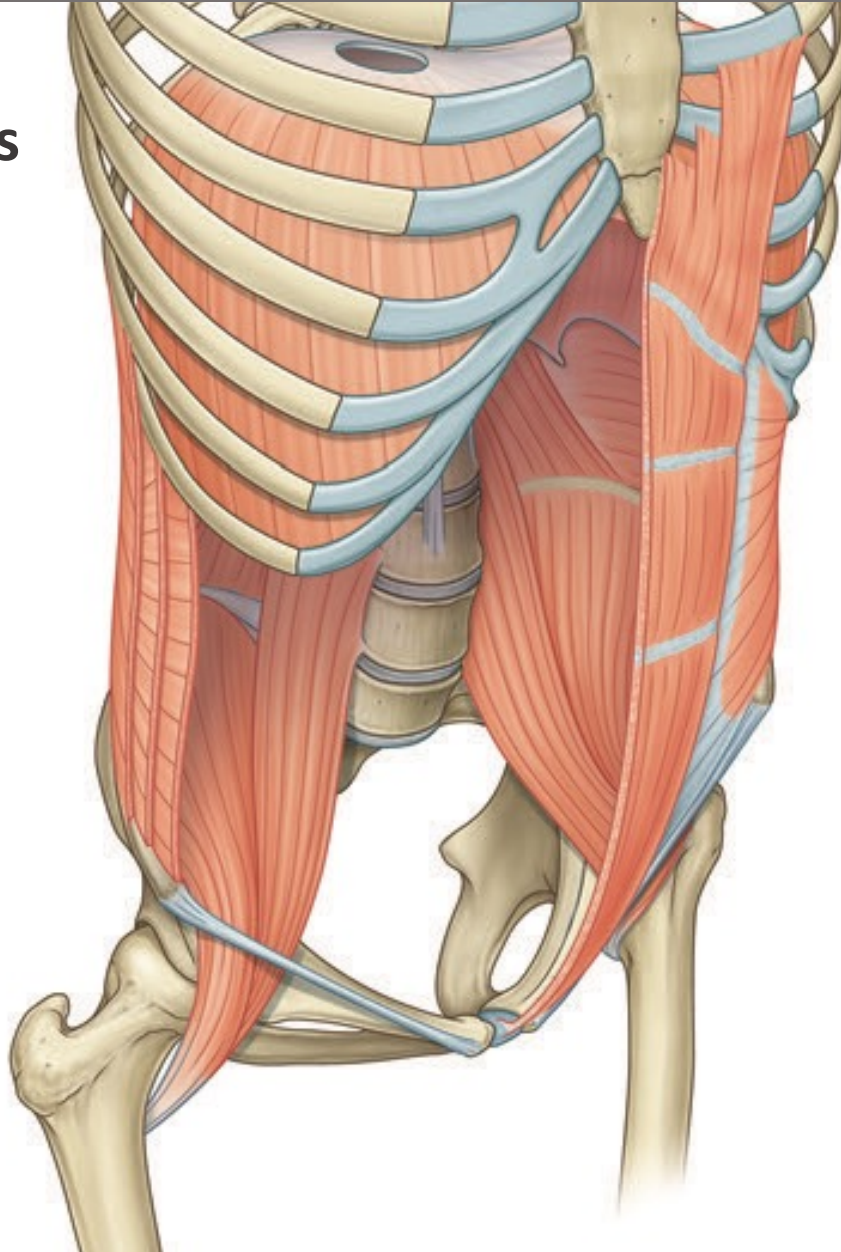
musculi

♦ Anterolateral group

- ♦ M. obliquus abdominis externus
- ♦ M. obliquus abdominis internus
- ♦ M. transversus abdominis
- ♦ M. rectus abdominis
- ♦ M. pyramidalis

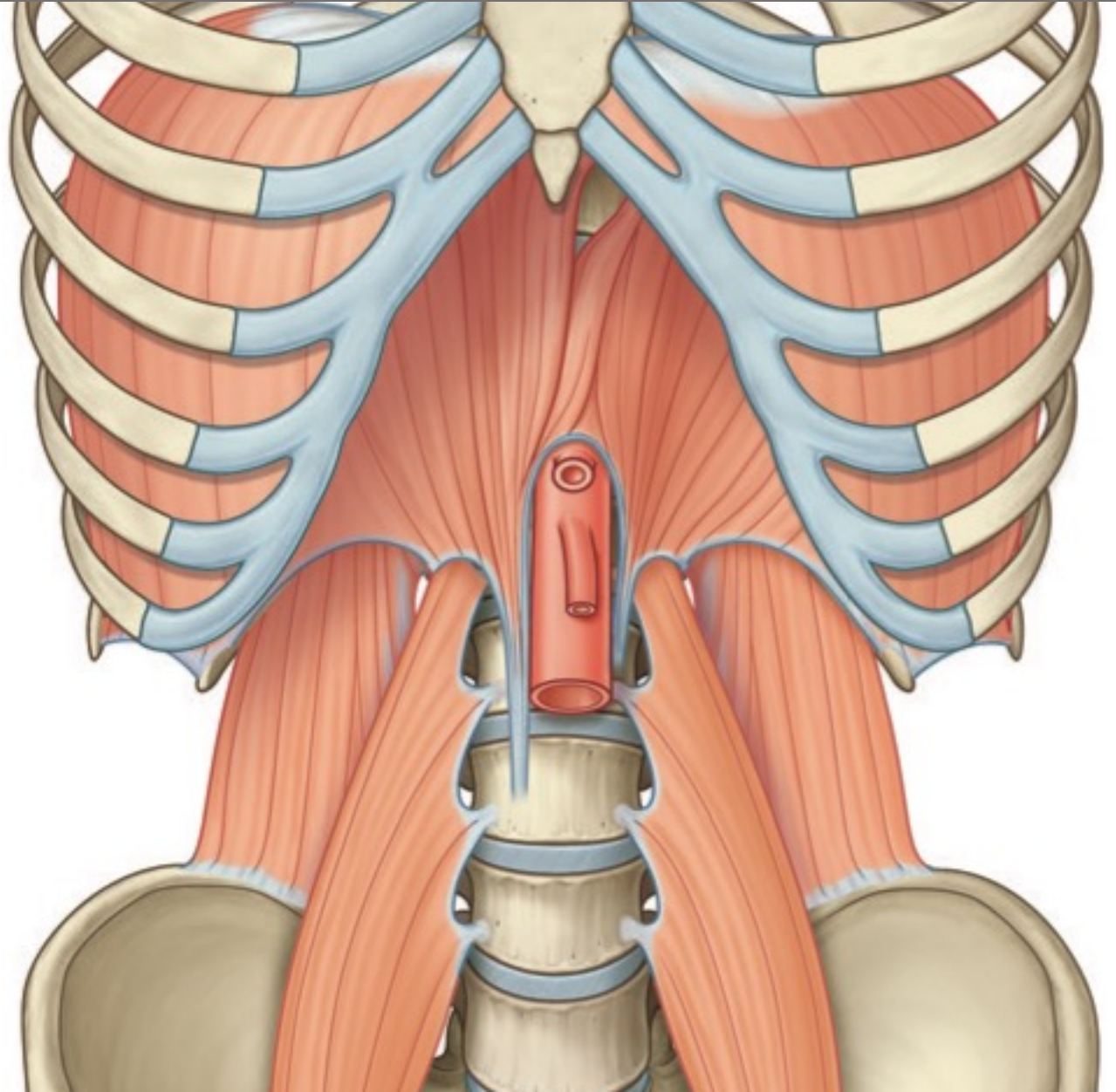
♦ Posterior group

- ♦ M. quadratus lumborum
- ♦ M. psoas maior
- ♦ M. iliacus



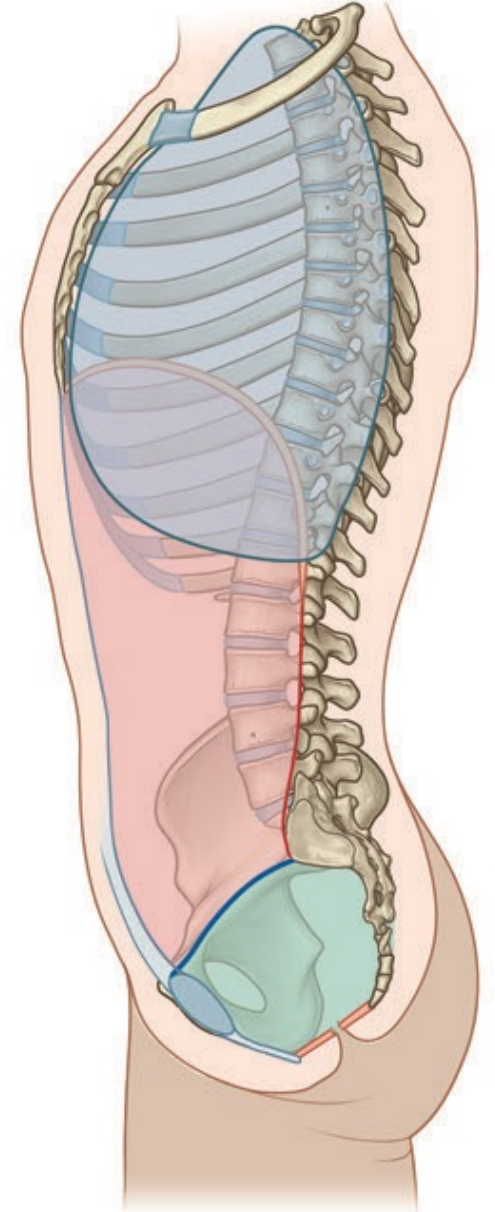
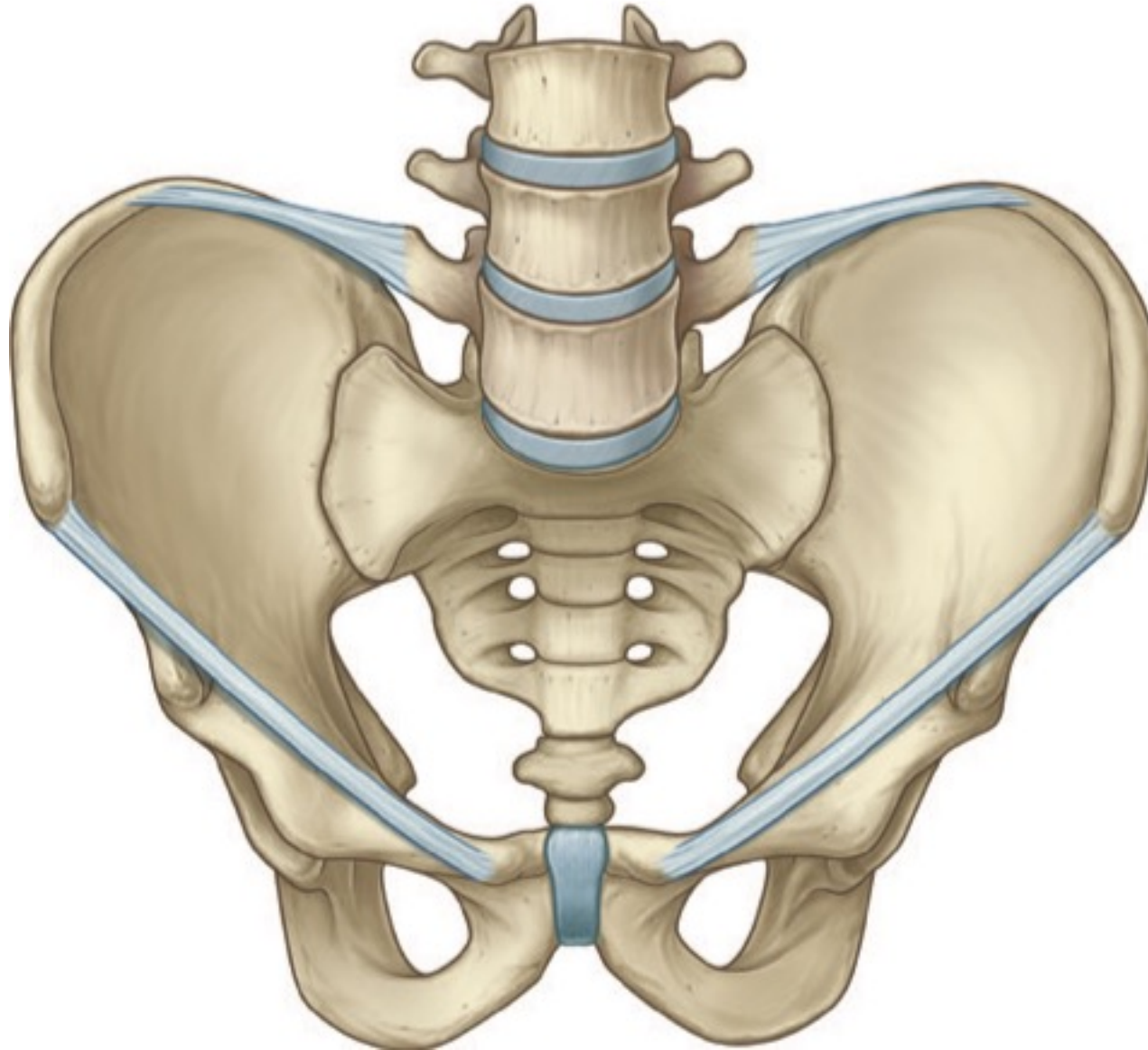
apertura thoracica inferior

- ♦ **Diaphragma**
 - ♦ **Facies abdominalis**
- ♦ **Crus diaphragmatis dextrum L3**
- ♦ **Crus diaphragmatis sinistrum L2**
- ♦ **Ligamentum arcuatum laterale**
- ♦ **Ligamentum arcuatum mediale**
- ♦ **Hiathus aorticus Th 12**
- ♦ **Hiathus oesophagealis Th 10**
- ♦ **Apertura venae cavae inferioris Th 8**



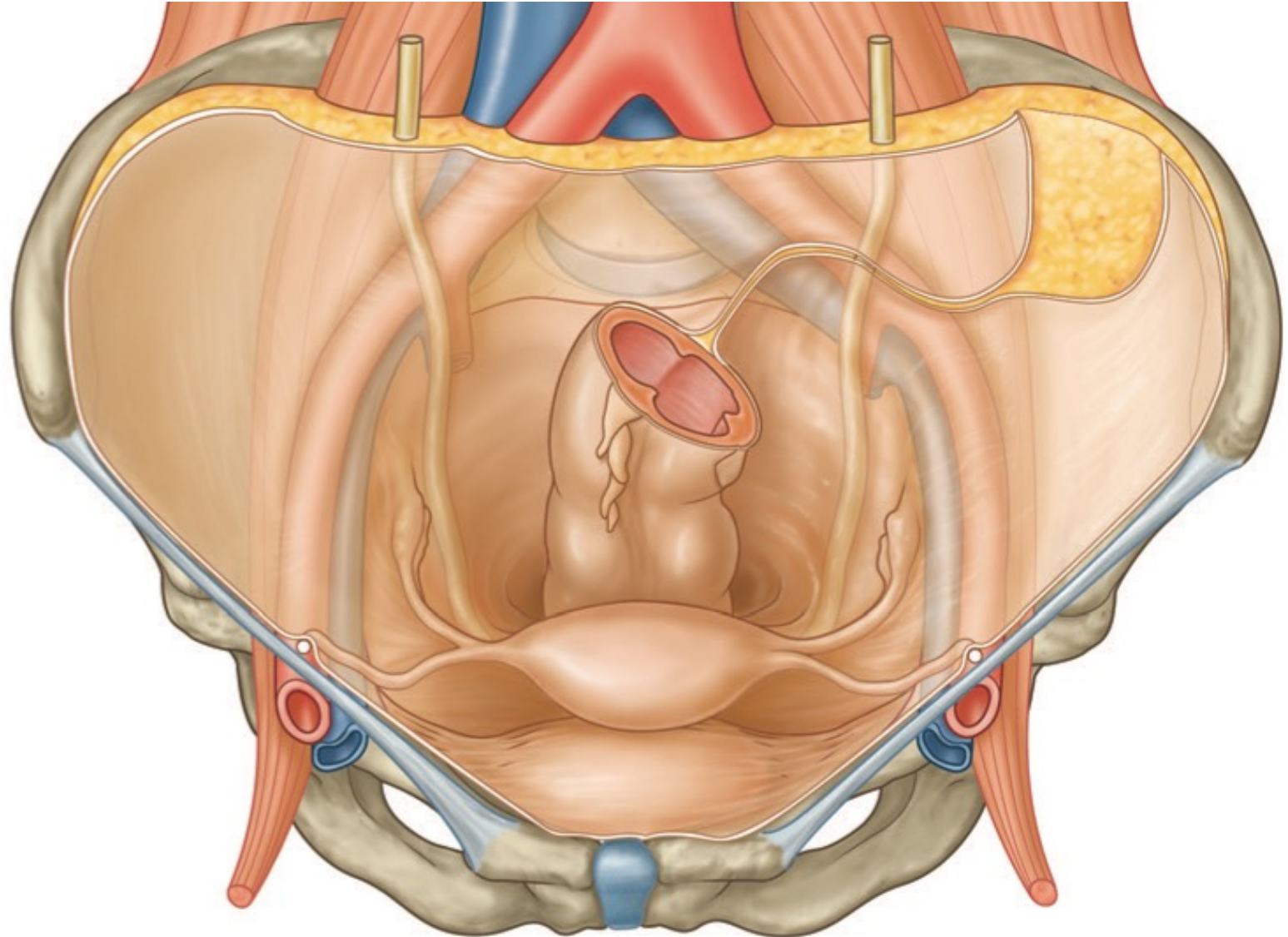
apertura pelvis

- ♦ Os sacrum – S1
- ♦ Os ilium
- ♦ Os pubis
- ♦ Symphysis pubis
- ♦ **cavitas pelvis**
- ♦ Vesica urinaria
- ♦ Uterus
- ♦ Ovaria
- ♦ Rectum



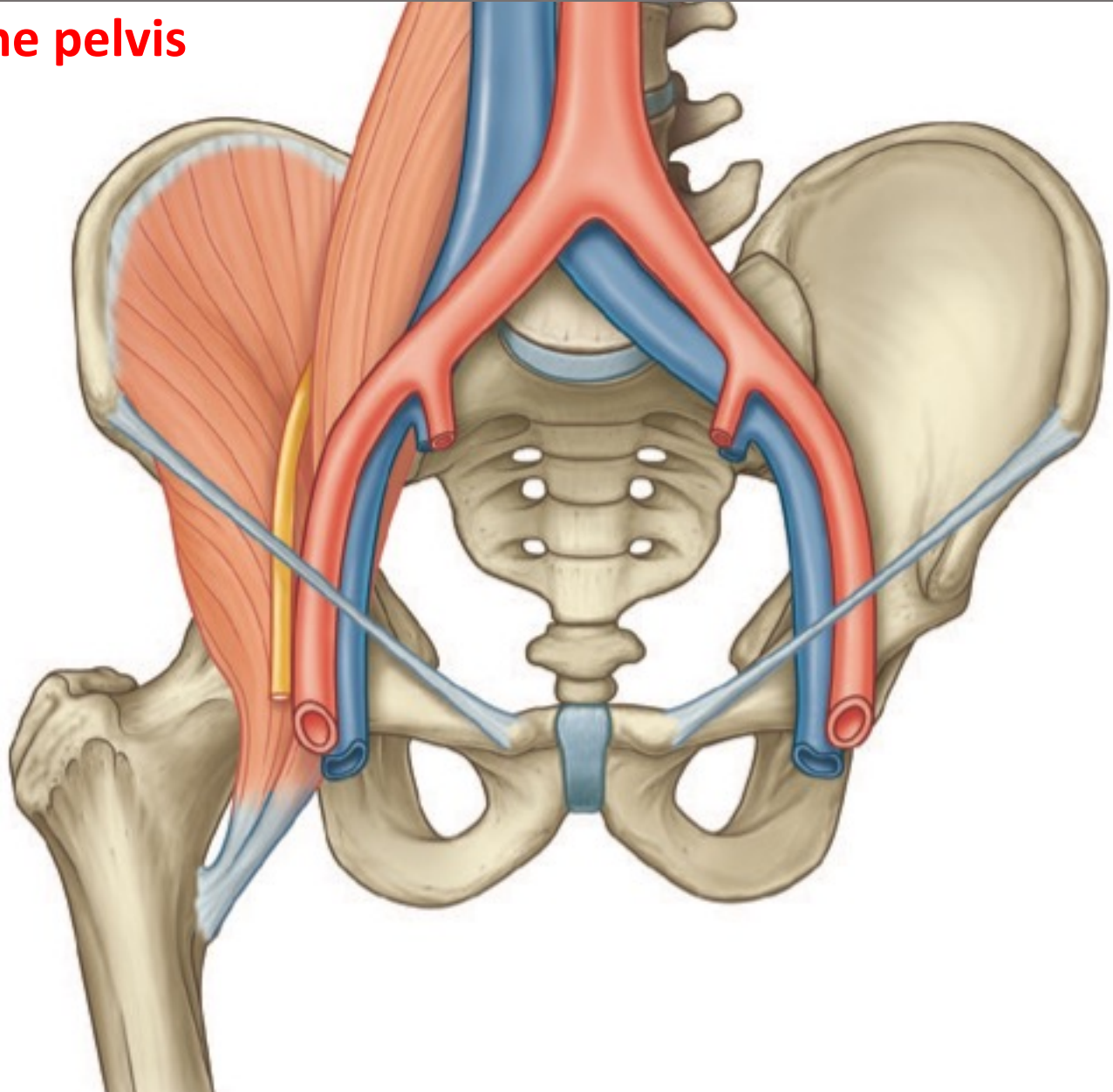
cavitas abdominalis et pelvis

- ♦ **Peritoneal cavity: the abdominal part continues directly to pelvic part**
- ♦ Vesica urinaria
- ♦ Uterus
- ♦ Ovaria
- ♦ Rectum



Connection of abdomen to lower limb

- ♦ **Borderline of the abdomen and the pelvis**
- ♦ Arteria iliaca externa
- ♦ Vena iliaca externa
- ♦ Vasa lymphatica
- ♦ Nervus femoralis
- ♦ M. psoas major
- ♦ M. iliacus
- ♦ **Inguinal region**



abdomen

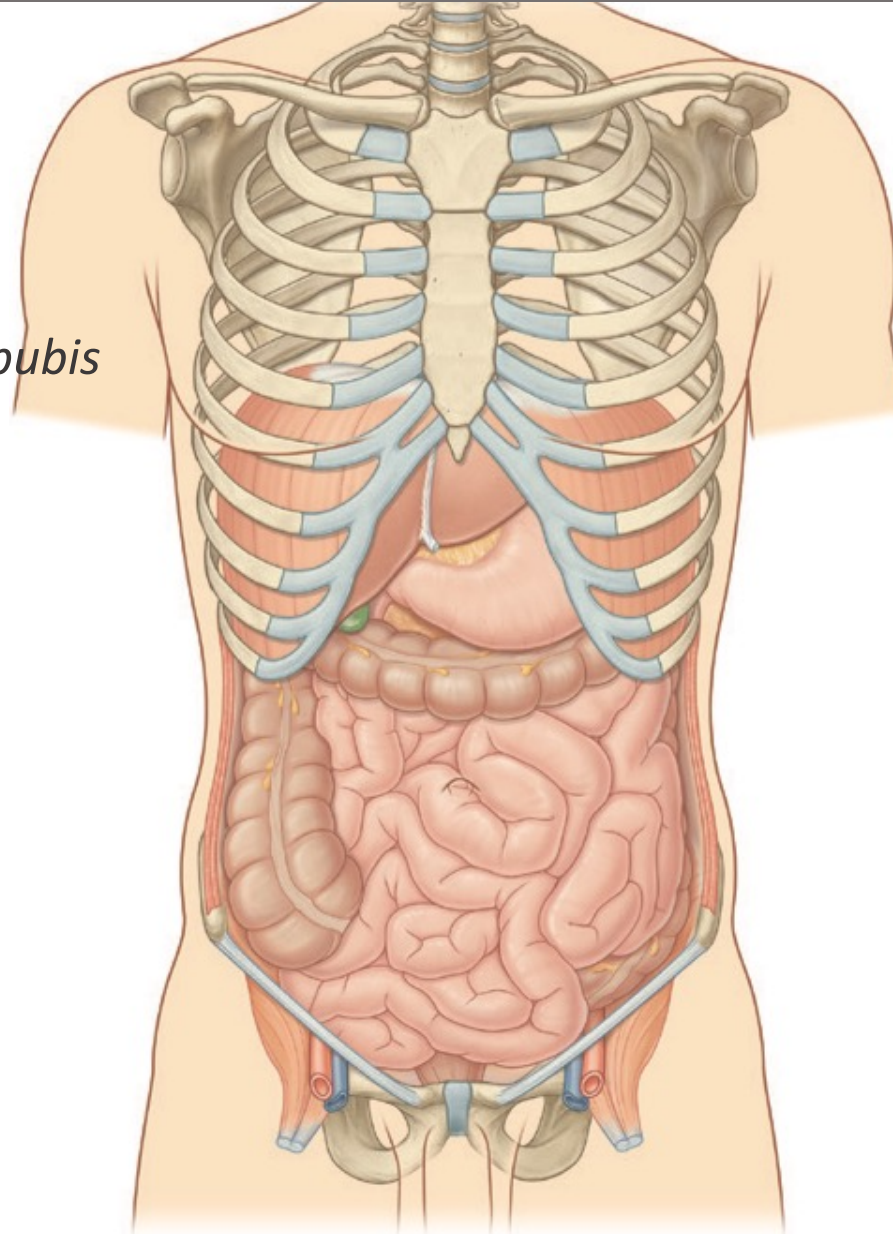
- 🔥 **Surface topography**

- 🔥 **Four quadrants**

- 🔥 **vertical**
- 🔥 *planum mediale*
- 🔥 *proc. xiphoideus – symphysis pubis*
- 🔥 **horizontal**
- 🔥 *planum transumbilicale*
- 🔥 *umbilicus*

- 🔥 **Nine segments**

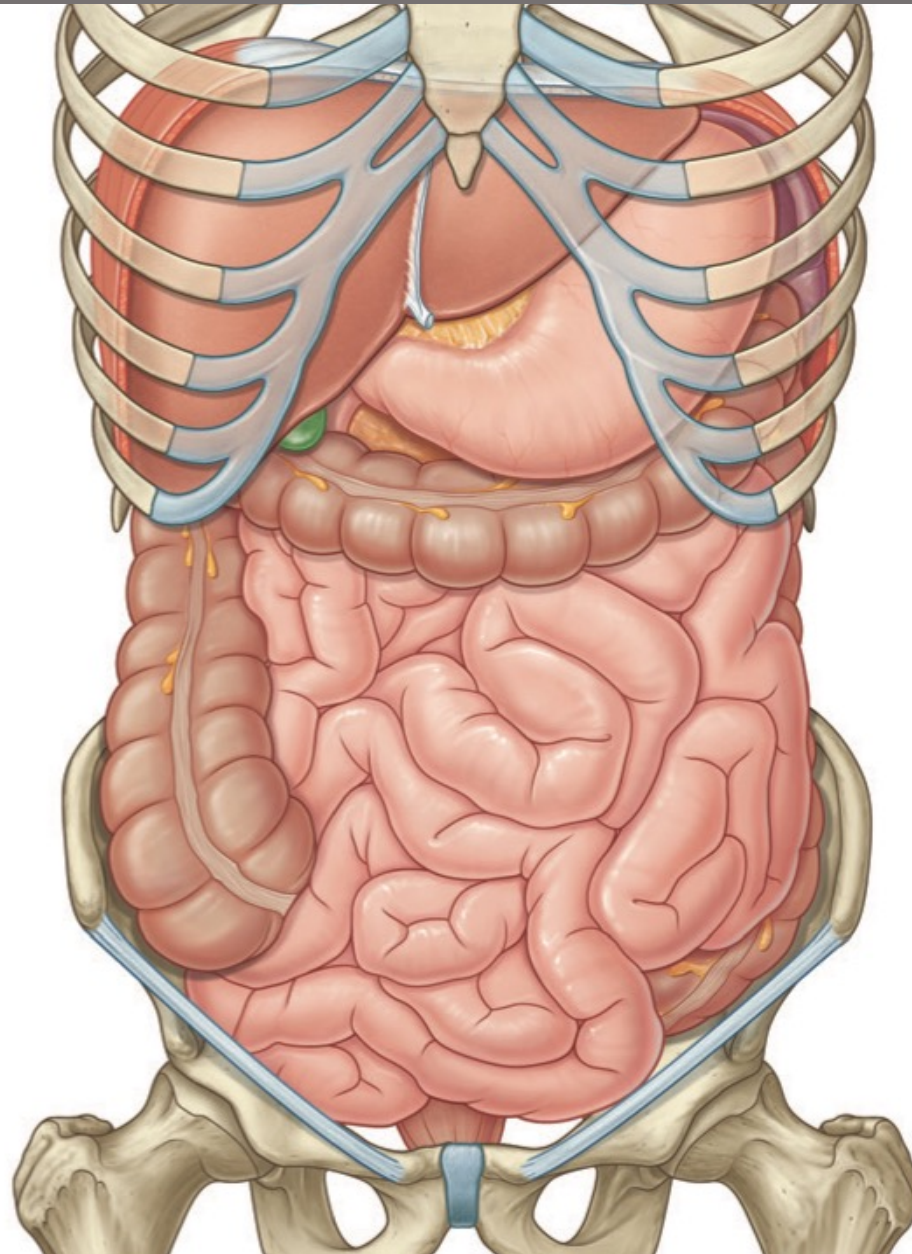
- 🔥 **verticals**
- 🔥 *Medioclavicular lines*
- 🔥 **horizontals**
- 🔥 *Planum subcostale*
- 🔥 *Planum intertuberculare*



regiones

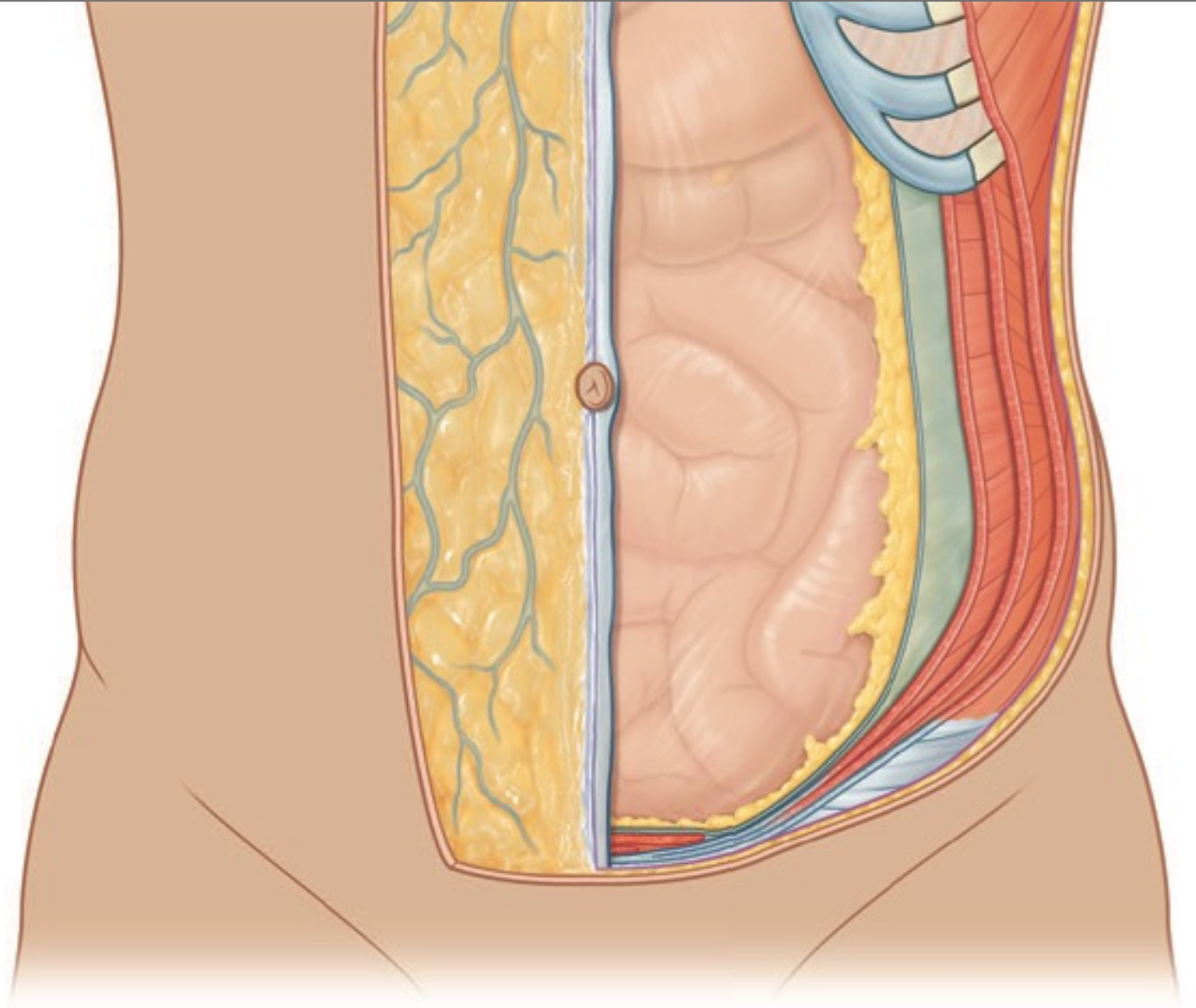
- ♦ *Hypochondrium*
- ♦ *Epigastrium*
- ♦ *Mesogastrium*
 - ♦ *reg umbilicalis*
- ♦ *Regio lateralis (flank)*
- ♦ *Hypogastrium – reg. pubica*
- ♦ *Inguina*

- ♦ *Body - points*
- ♦ *Murphy – ves. felea*
- ♦ *Desjardins - pancreas*
- ♦ *McBurney - appendix*
- ♦ *Lanz – apex appendicis*



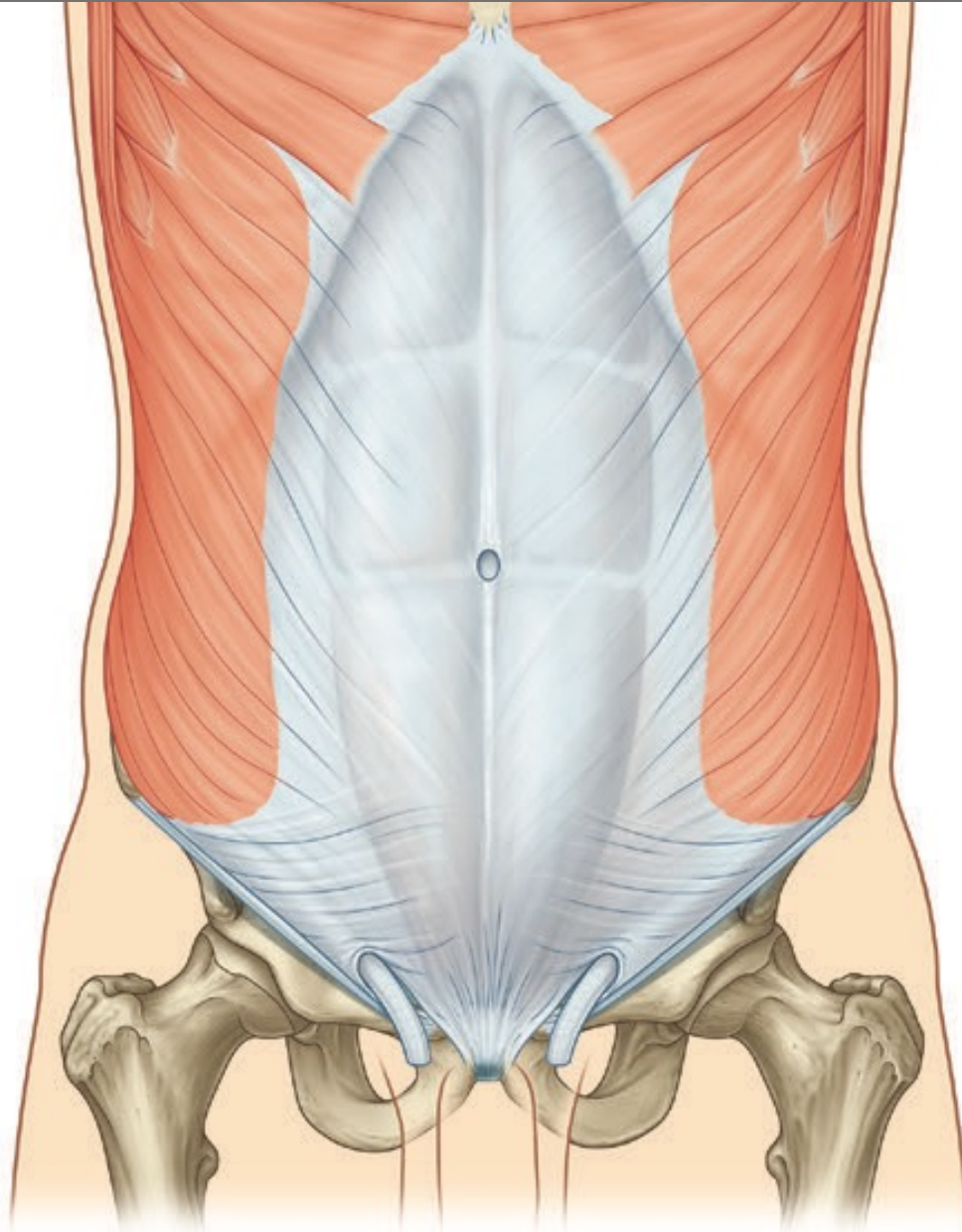
Abdominal wall

- ♦ **Fascia superficialis**
- ♦ Subcutaneous fatty tissue layer
- ♦ Fatty connective tissue
- ♦ **Stratum superficiale (Camper)**
- ♦ Contains fat
- ♦ Follows as
 - ♦ Fascia dartos scroti
 - ♦ Fascia penis
- ♦ **Stratum profundum (Scarpa)**
- ♦ Thin membranous layer
 - ♦ Contains minimum of fat
- ♦ Follows as
 - ♦ fascia superficialis perinei (Colles)



musculi

- ♦ **Anterolateral group**
- ♦ **M. obliquus abdominis externus**
- ♦ **Linea alba**
- ♦ **Aponeurosis m. obliqui externi**
- ♦ **Ligamentum inguinale**
- ♦ *M. obliquus abdominis internus*
- ♦ *M. transversus abdominis*
- ♦ *M. pyramidalis*
- ♦ *M. rectus abdominis*



musculi

- ♦ **Anterolateral group**

- ♦ *M. obliquus abdominis externus*

- ♦ *Linea alba*

- ♦ *Aponeurosis m. obliqui externi*

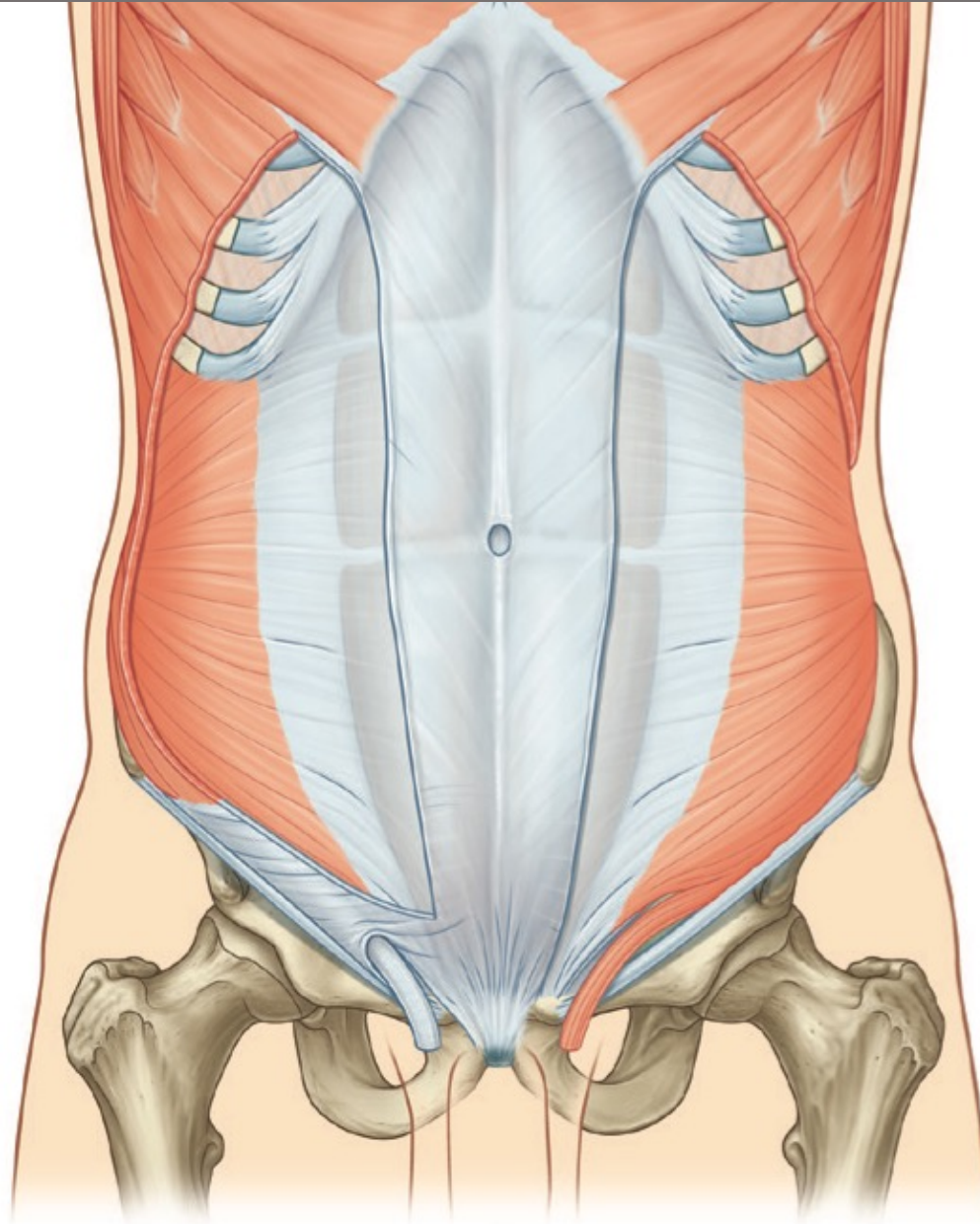
- ♦ *Ligamentum inguinale*

- ♦ ***M. obliquus abdominis internus***

- ♦ *M. transversus abdominis*

- ♦ *M. pyramidalis*

- ♦ *M. rectus abdominis*



musculi

- ♦ **Anterolateral group**

- ♦ *M. obliquus abdominis externus*

- ♦ *Linea alba*

- ♦ *Aponeurosis m. obliqui externi*

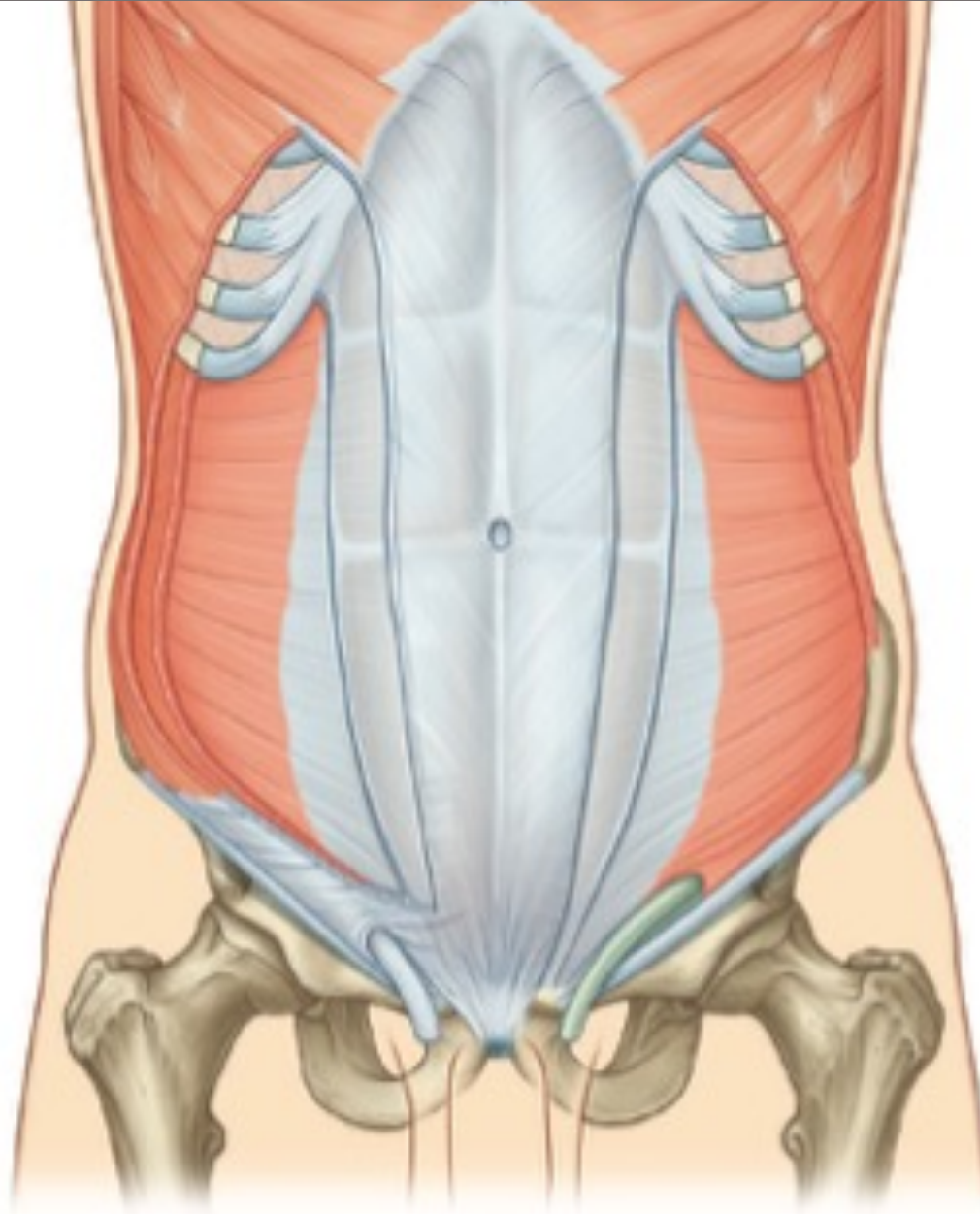
- ♦ *Ligamentum inguinale*

- ♦ *M. obliquus abdominis internus*

- ♦ ***M. transversus abdominis***

- ♦ *M. pyramidalis*

- ♦ *M. rectus abdominis*



musculi

- ♦ **Anterolateral group**

- ♦ *M. obliquus abdominis externus*

- ♦ *Linea alba*

- ♦ *Aponeurosis*

- ♦ *Ligamentum inguinale*

- ♦ *M. obliquus abdominis internus*

- ♦ *M. transversus abdominis*

- ♦ *M. pyramidalis - rudiment*

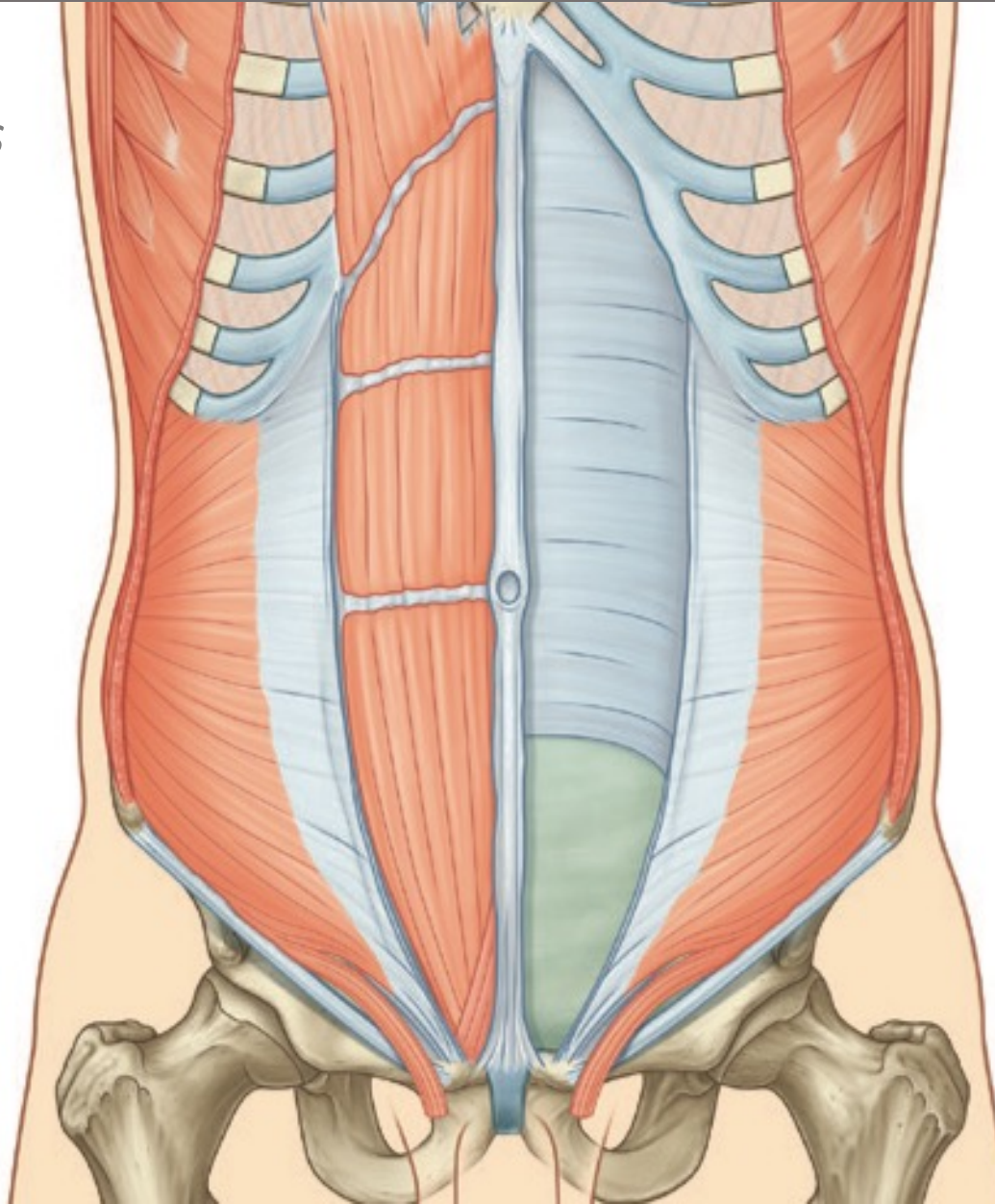
- ♦ **M. rectus abdominis**

- ♦ **Intersectiones tendinerae**

- ♦ **Vagina m. recti abdominis**

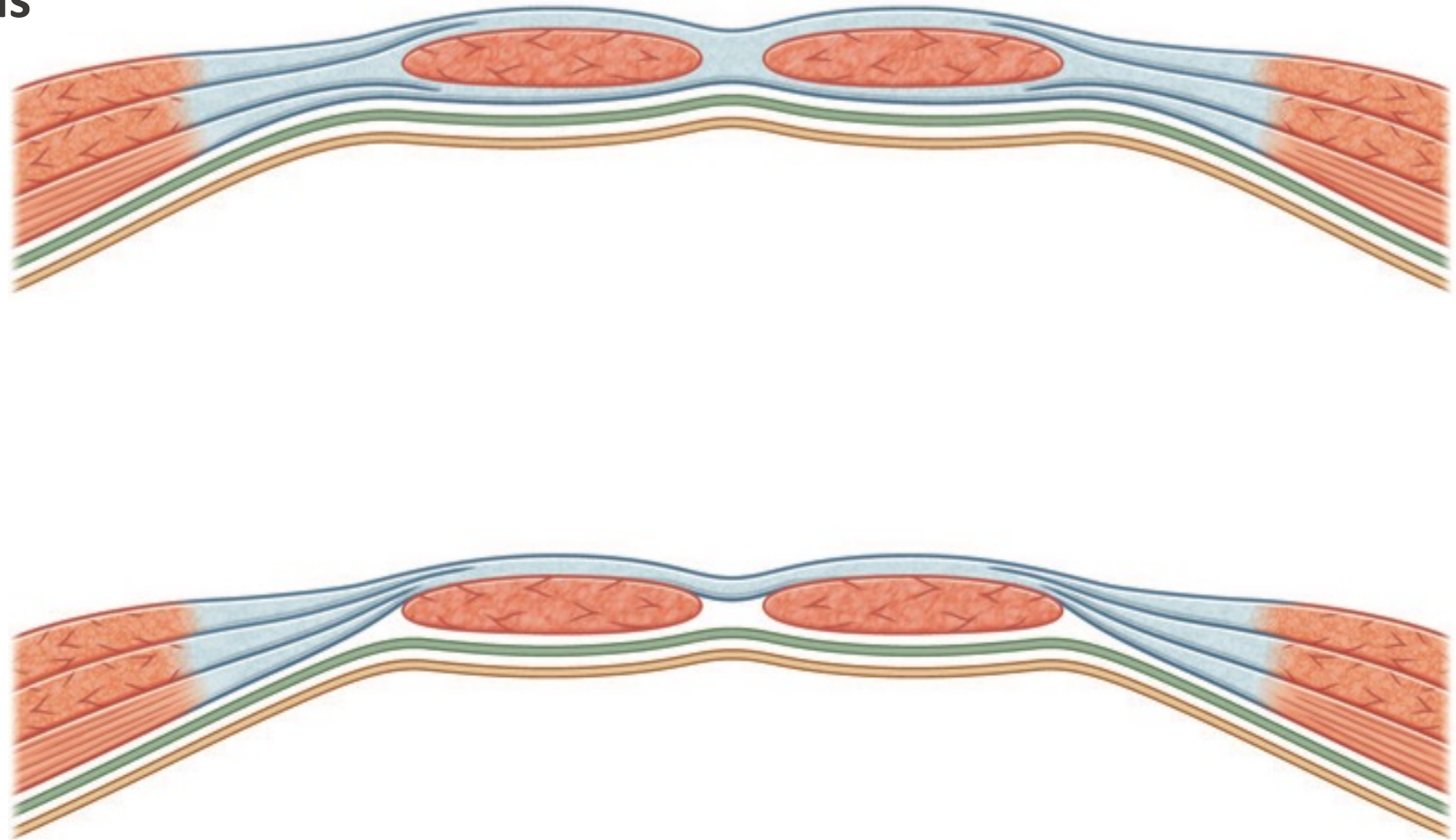
- ♦ 3/4

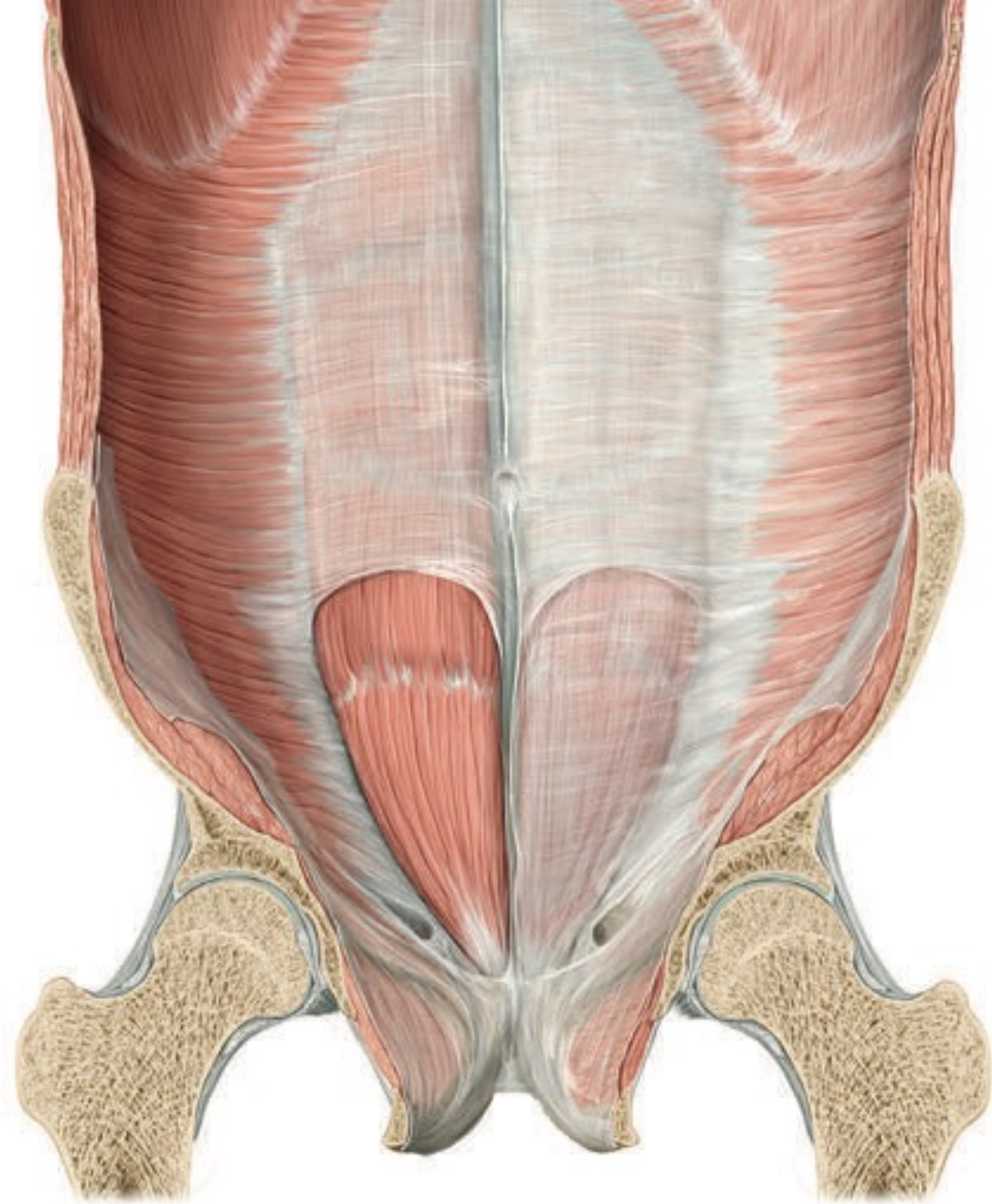
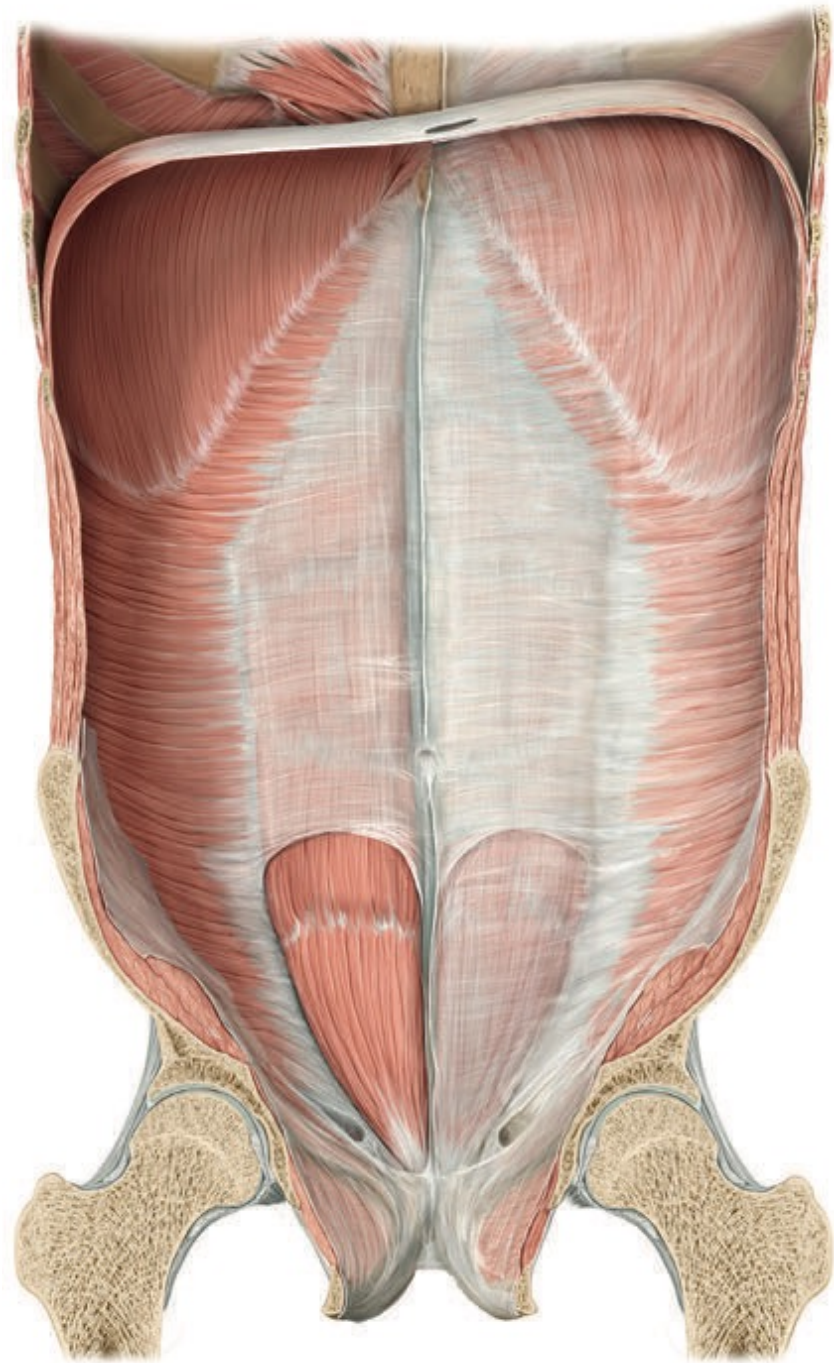
- ♦ **Fascia transversalis**



musculi

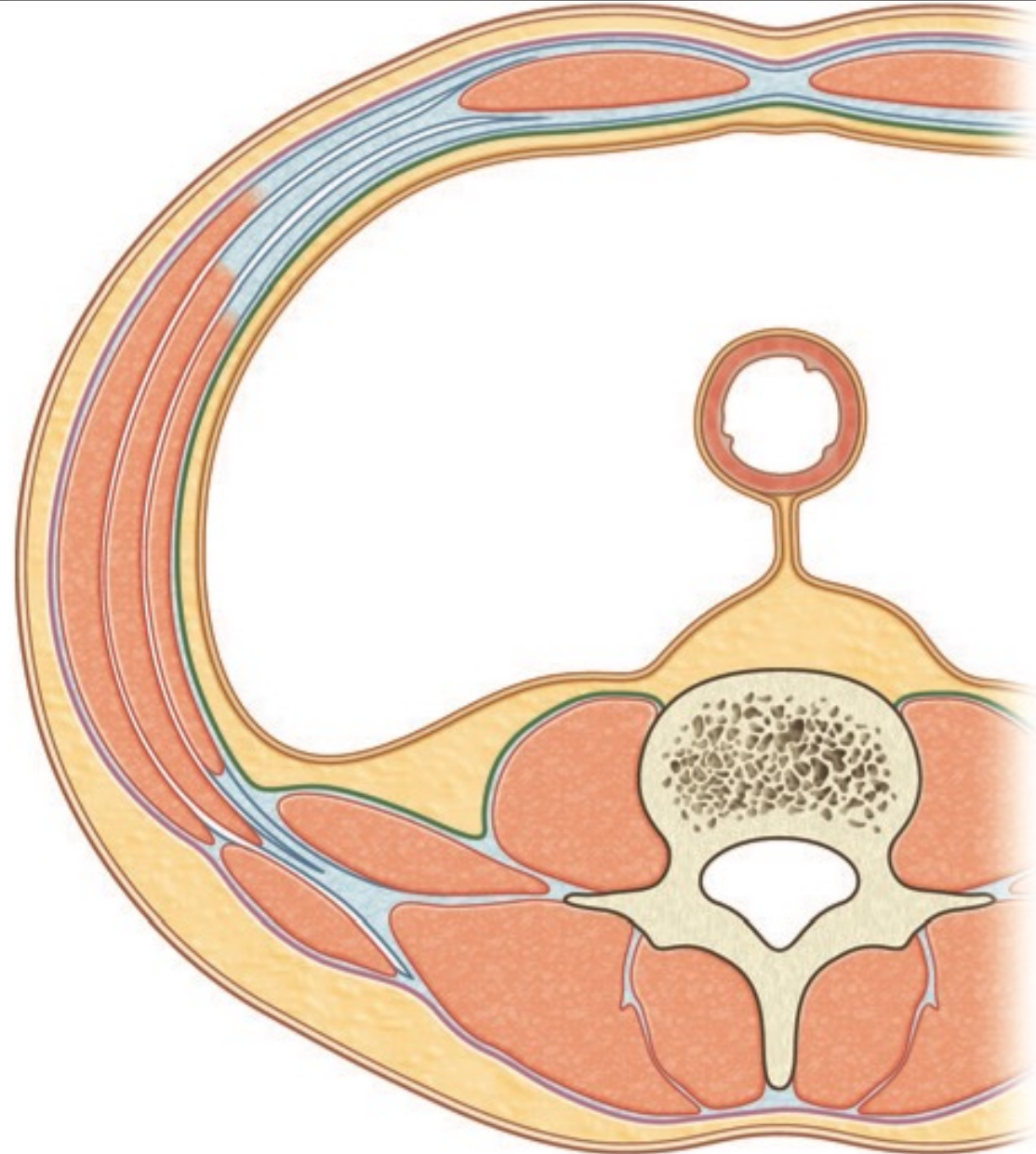
- 💧 M. obliquus abdominis externus
- 💧 M. obliquus abdominis internus
- 💧 M. transversus abdominis
- 💧 M. rectus abdominis
- 💧 **Aponeuroses**
- 💧 **Linea alba**
- 💧 **Vagina m. recti abdominis**
- 💧 **Fascia transversalis**
- 💧 **Peritoneum**





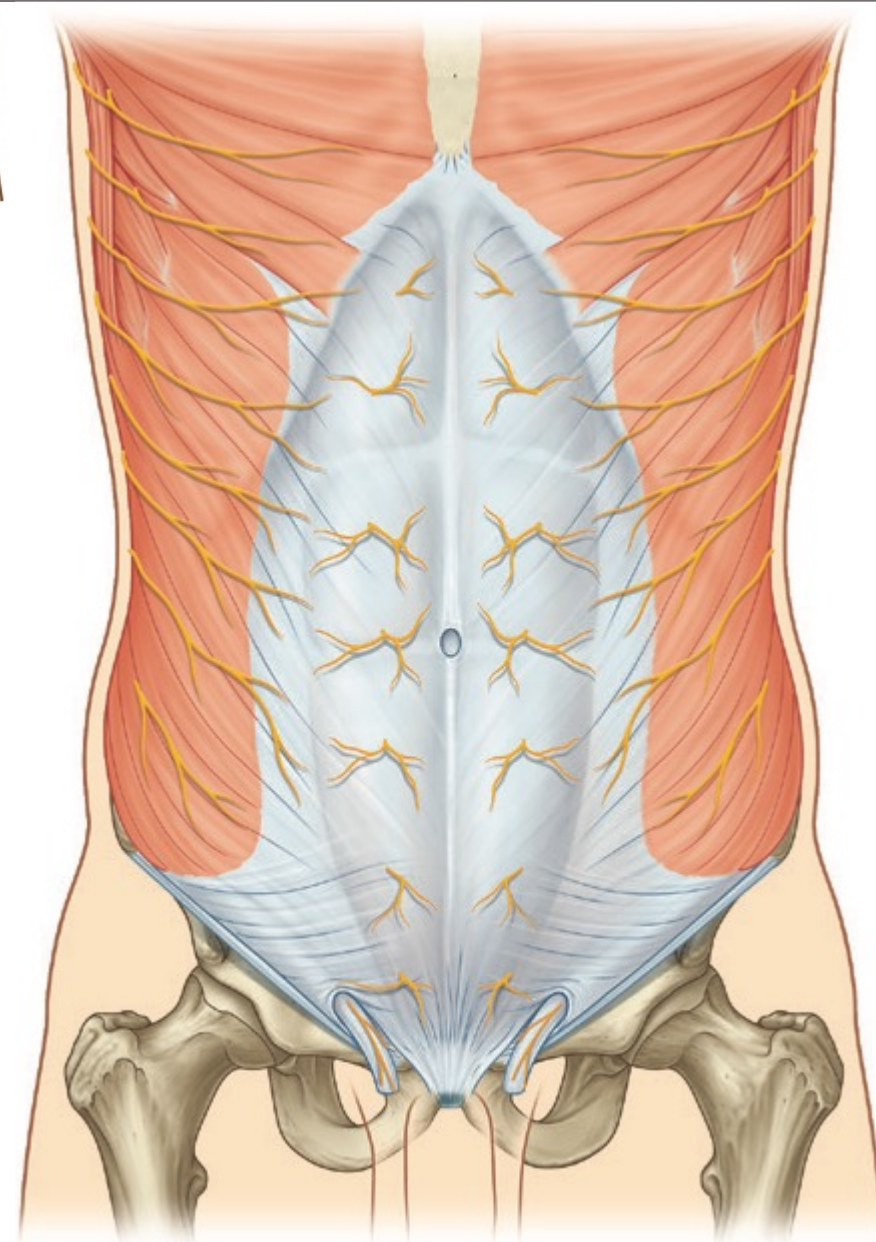
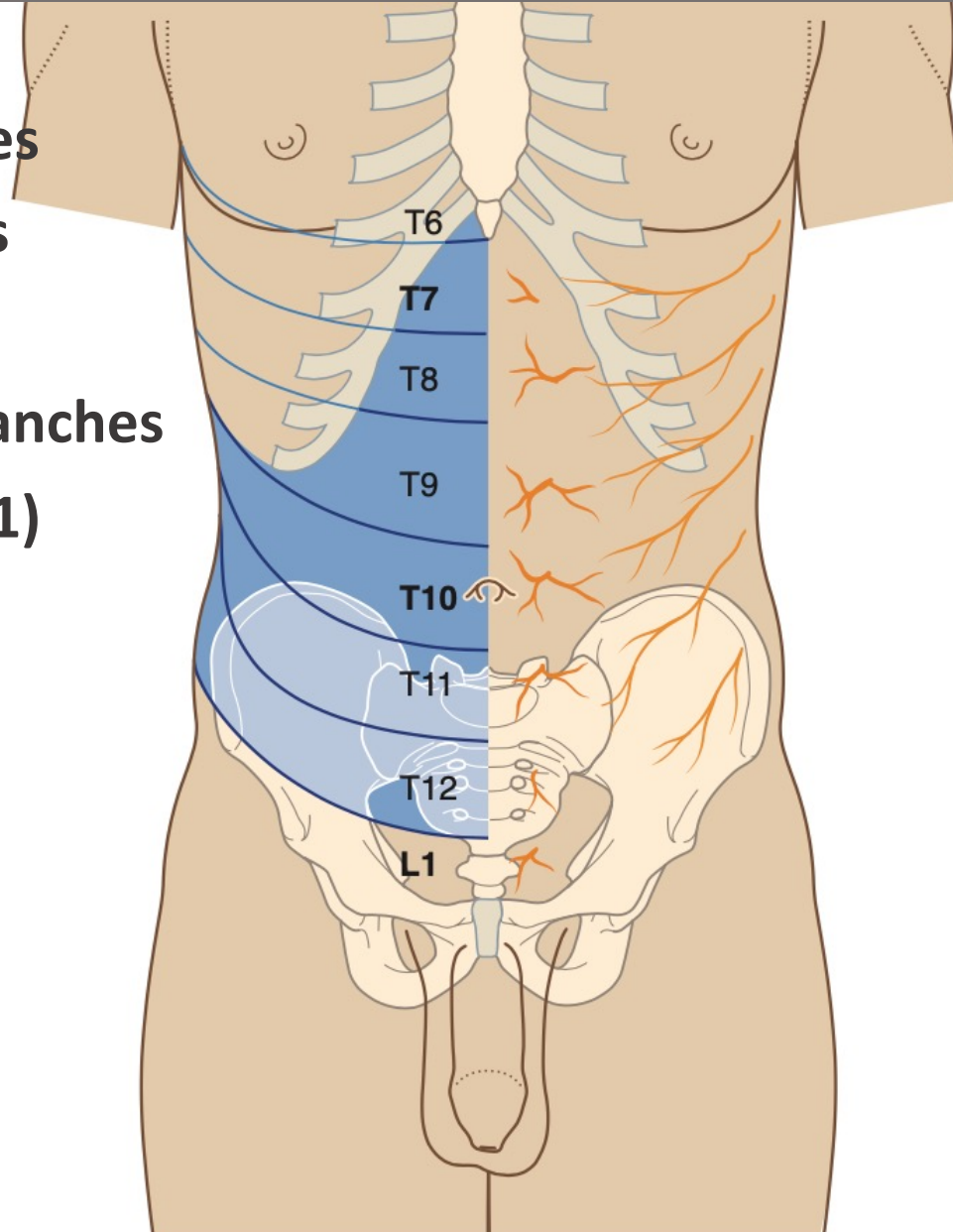
fascia extraperitonealis

- ♦ *Fascia superficialis*
 - ♦ *Camper, Scarpa*
- ♦ *Musculi et aponeuroses*
- ♦ *Fascia transversalis*
- ♦ **Fascia extraperitonealis**
- ♦ **Pars preperitonealis**
- ♦ **Pars retroperitonealis**
 - ♦ *Retroperitoneální viscera*
- ♦ *Peritoneum parietale*
- ♦ *Peritoneum viscerale*



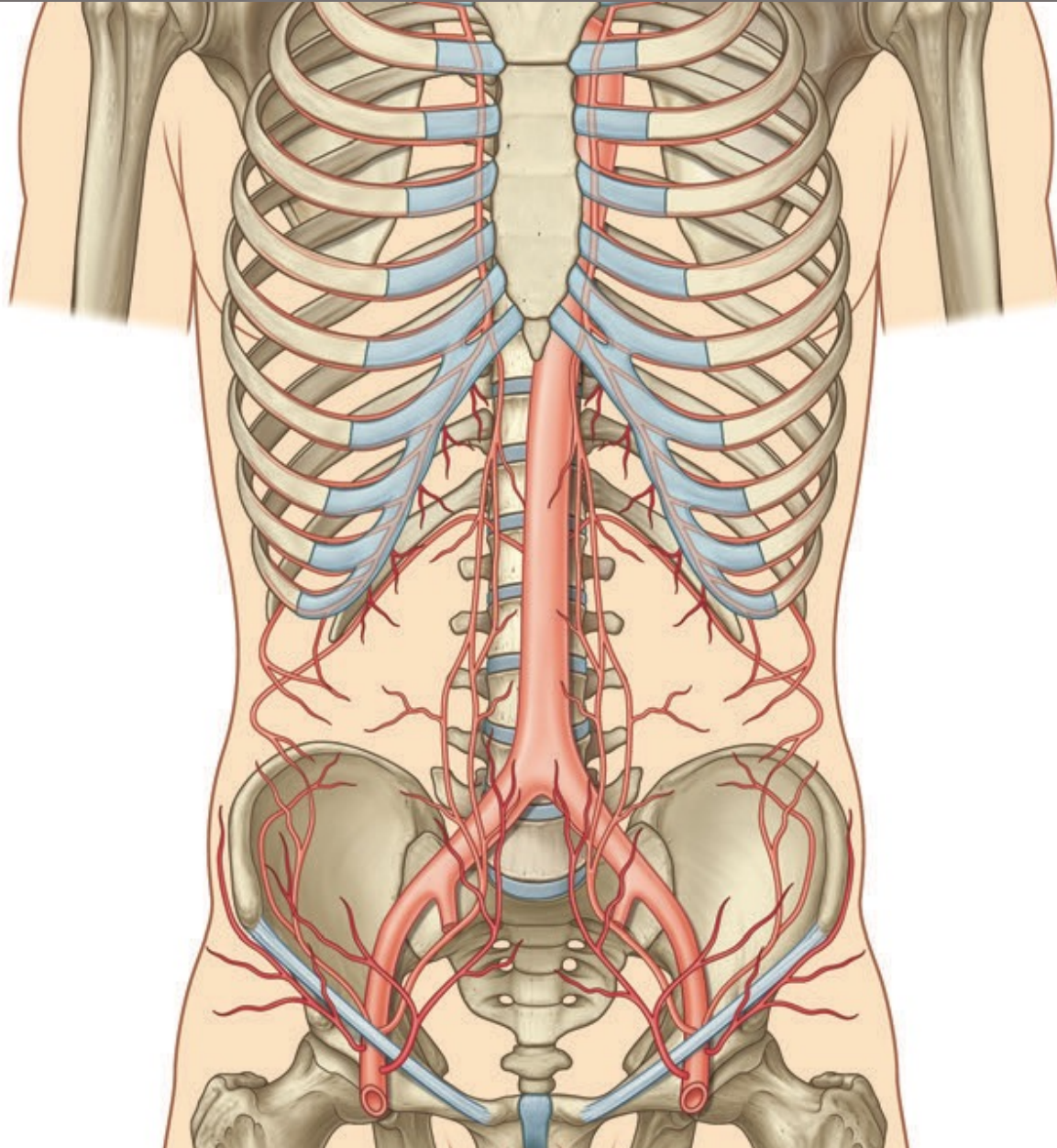
inervace

- ♦ **skin Th 12 – L1**
- ♦ Rami cutanei anteriores
- ♦ Rami cutanei laterales
- ♦ **Muscles Th7-12, L1**
- ♦ Segmental muscular branches
- ♦ N. iliohypogastricus (L1)
- ♦ N. ilioinguinalis (L1)



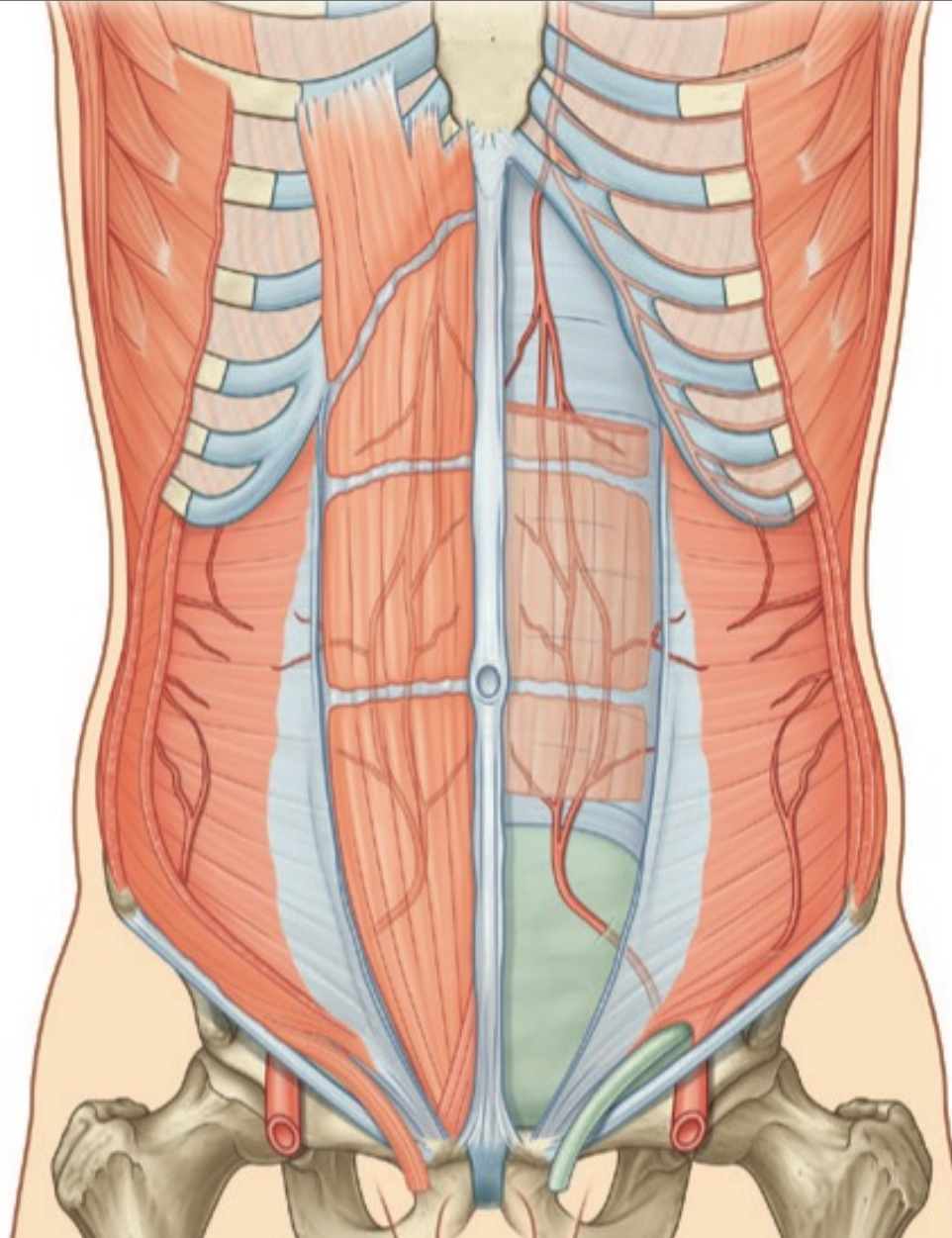
arteriae

- ♦ **A. musculophrenica**
- ♦ **A. epigastrica superior**
 - ♦ (a. thoracica interna)
- ♦ **Aa. intercostales, a. subcostalis**
- ♦ **A. epigastrica inferior**
- ♦ **A. circumflexa ilium profunda**
- ♦ **A. circumflexa ilium superficialis**
 - ♦ (a. iliaca interna)



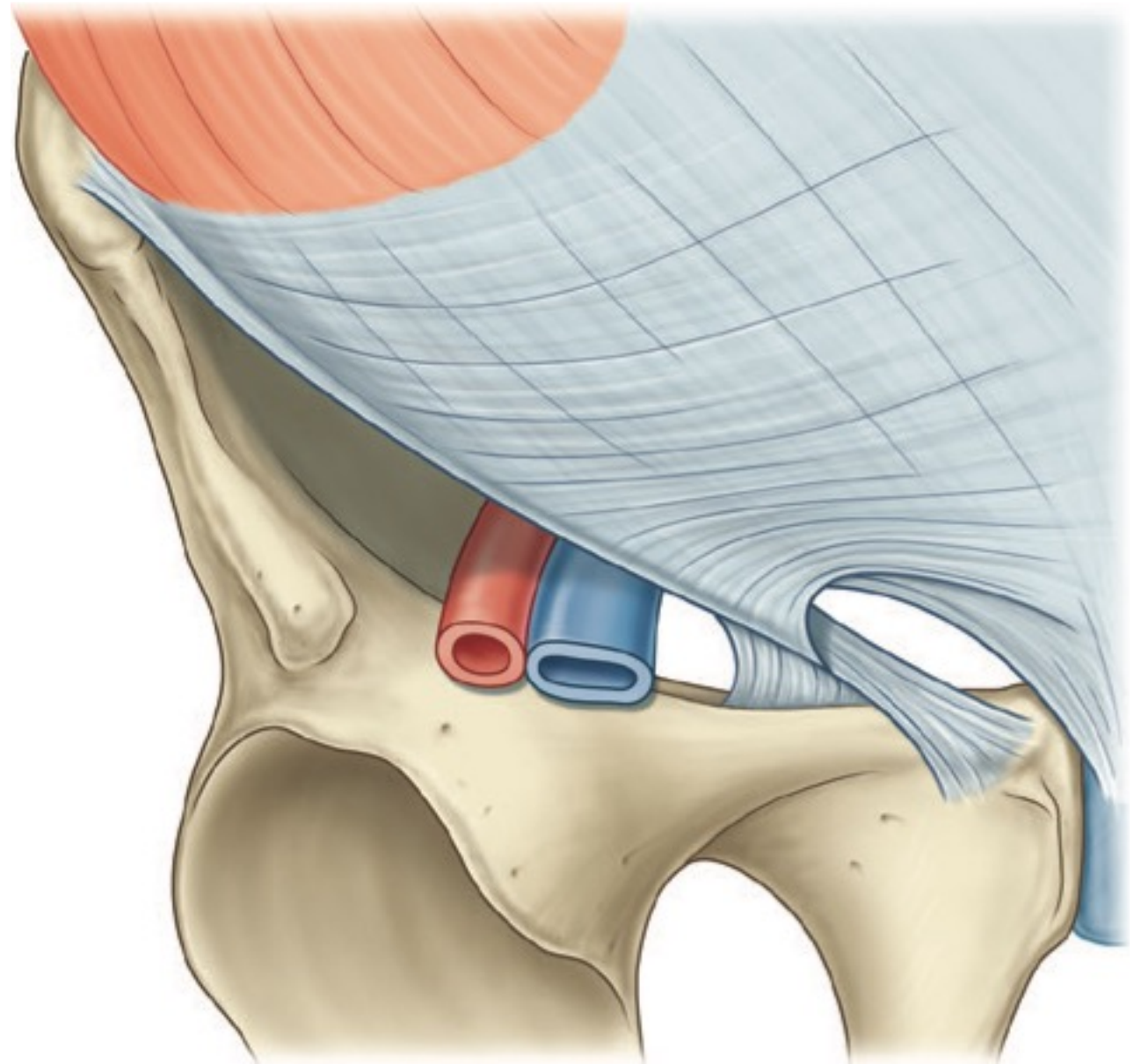
arteriae

- ♦ **A. musculophrenica**
- ♦ **A. epigastrica superior**
 - ♦ (a. thoracica interna)
- ♦ **Aa. intercostales, a. subcostalis**
- ♦ **A. epigastrica inferior**
- ♦ **A. circumflexa ilium profunda**
- ♦ **A. circumflexa ilium superficialis**
 - ♦ (a. iliaca interna)



regio inguinalis

- ♦ **Ligamentum inguinale**
 - ♦ Spina iliaca anterior superior
 - ♦ Pecten pubis
- ♦ **Ligamentum lacunare**
- ♦ **Lacuna vasorum**
- ♦ **Lacuna musculorum**
- ♦ **Anulus inguinalis externus**
 - ♦ Crus mediale
 - ♦ Crus laterale



Canalis inguinalis

- ♦ **Anulus internus**

- ♦ *Fascia spermatica interna*

- ♦ **Paries posterior**

- ♦ *Falx inguinalis (eng. conjoint tendon)*

- ♦ **Paries anterior**

- ♦ *Fascia cremasterica (m. cremaster)*

- ♦ **Paries superior**

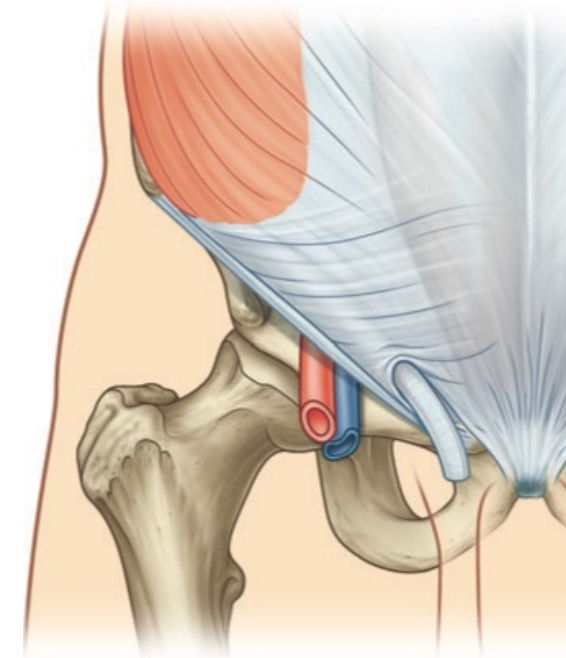
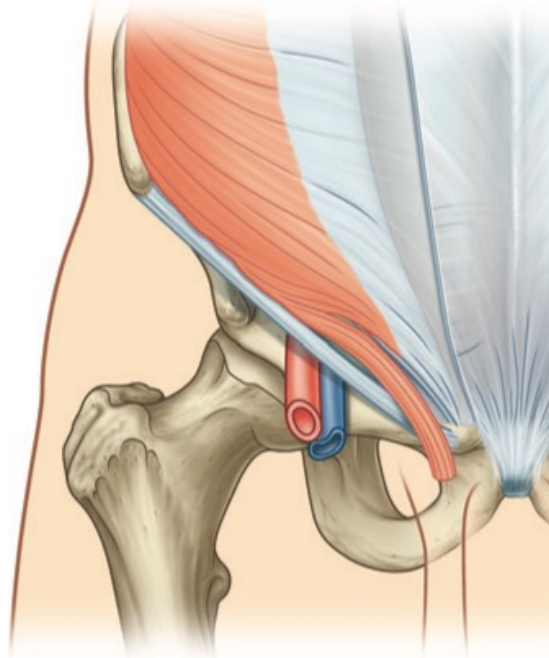
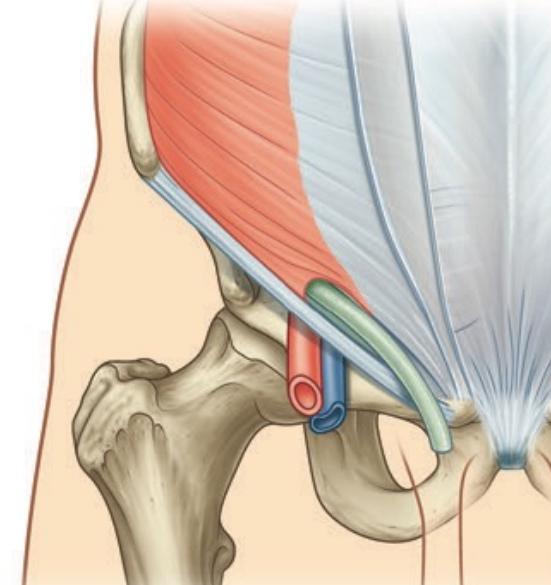
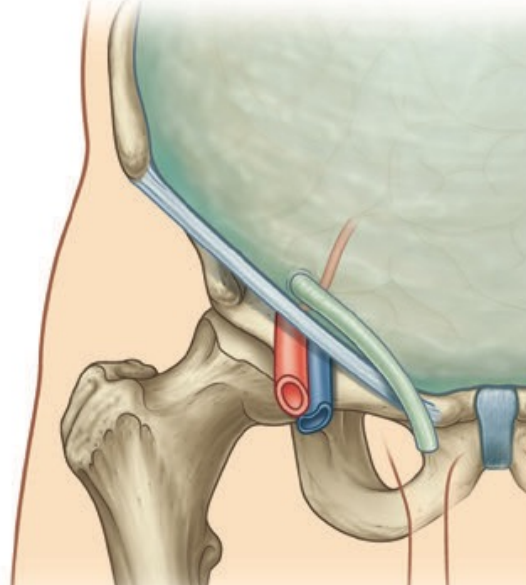
- ♦ **M. transversus abdominis**
- ♦ **M. obliquus internus abdominis**

- ♦ **Paries inferior**

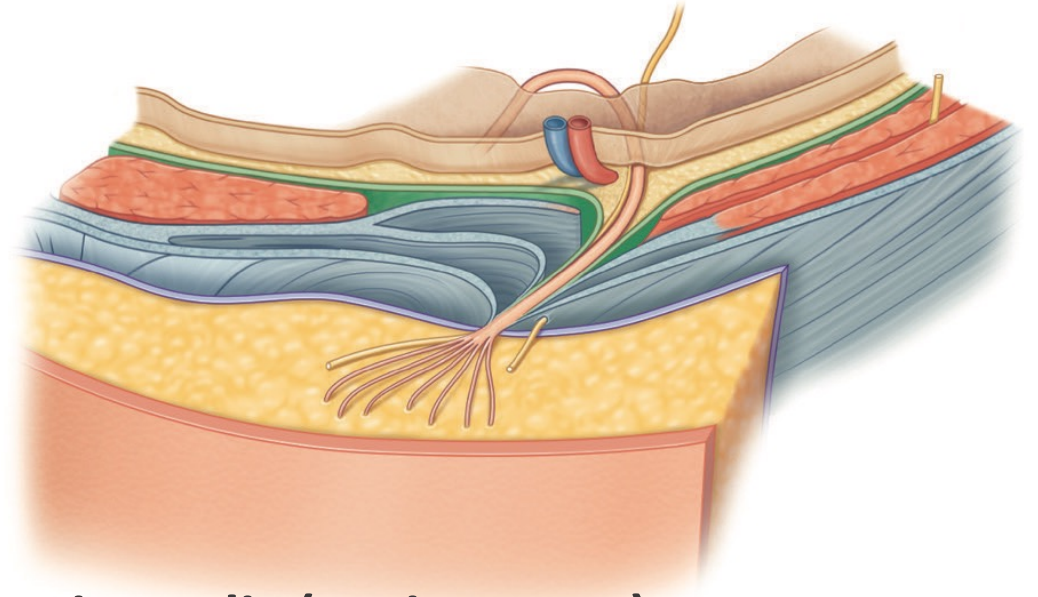
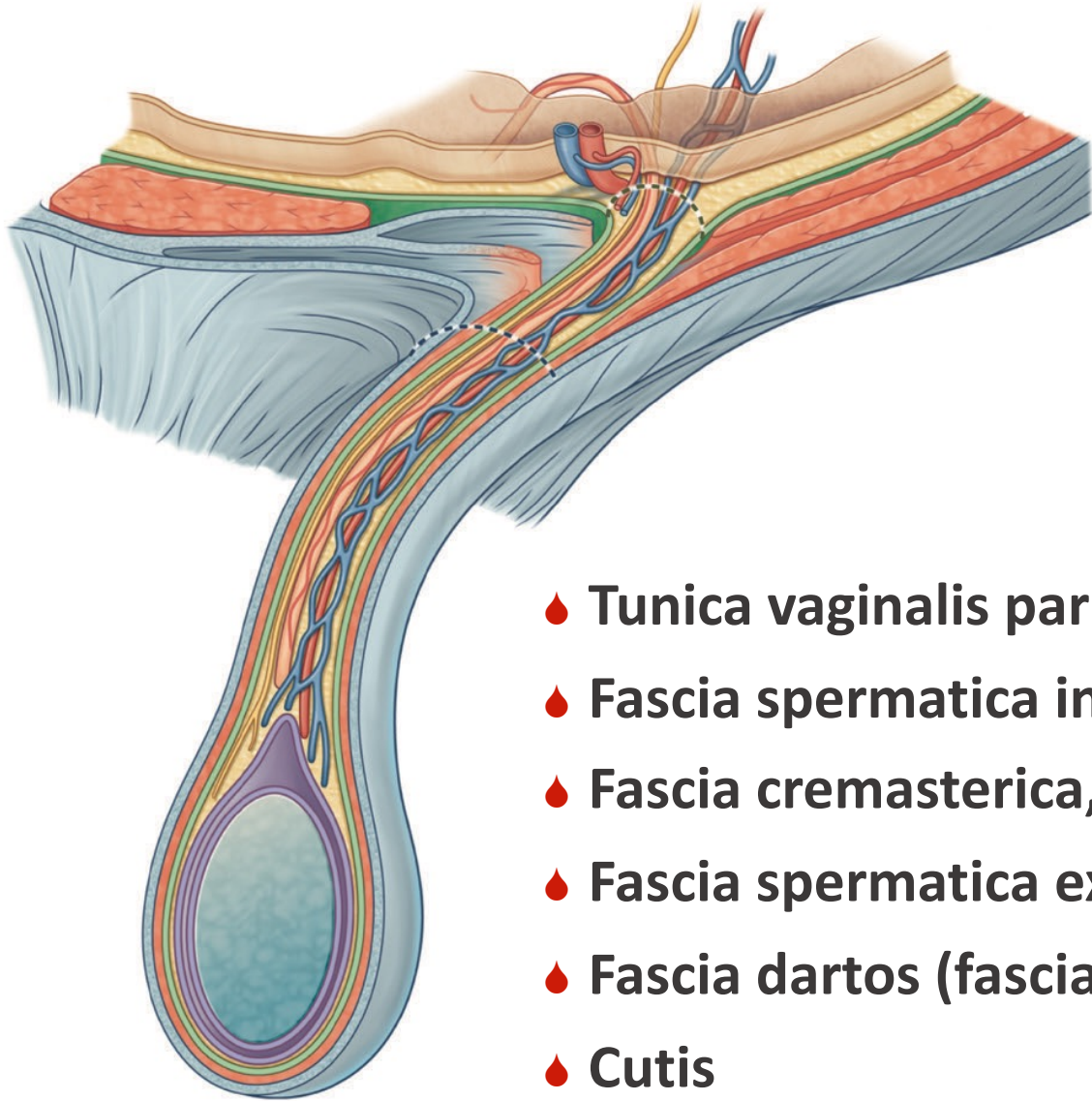
- ♦ **Ligamentum inguinale**

- ♦ **Anulus externus**

- ♦ **Crus mediale, crus laterale**
- ♦ *Fascia spermatica externa*



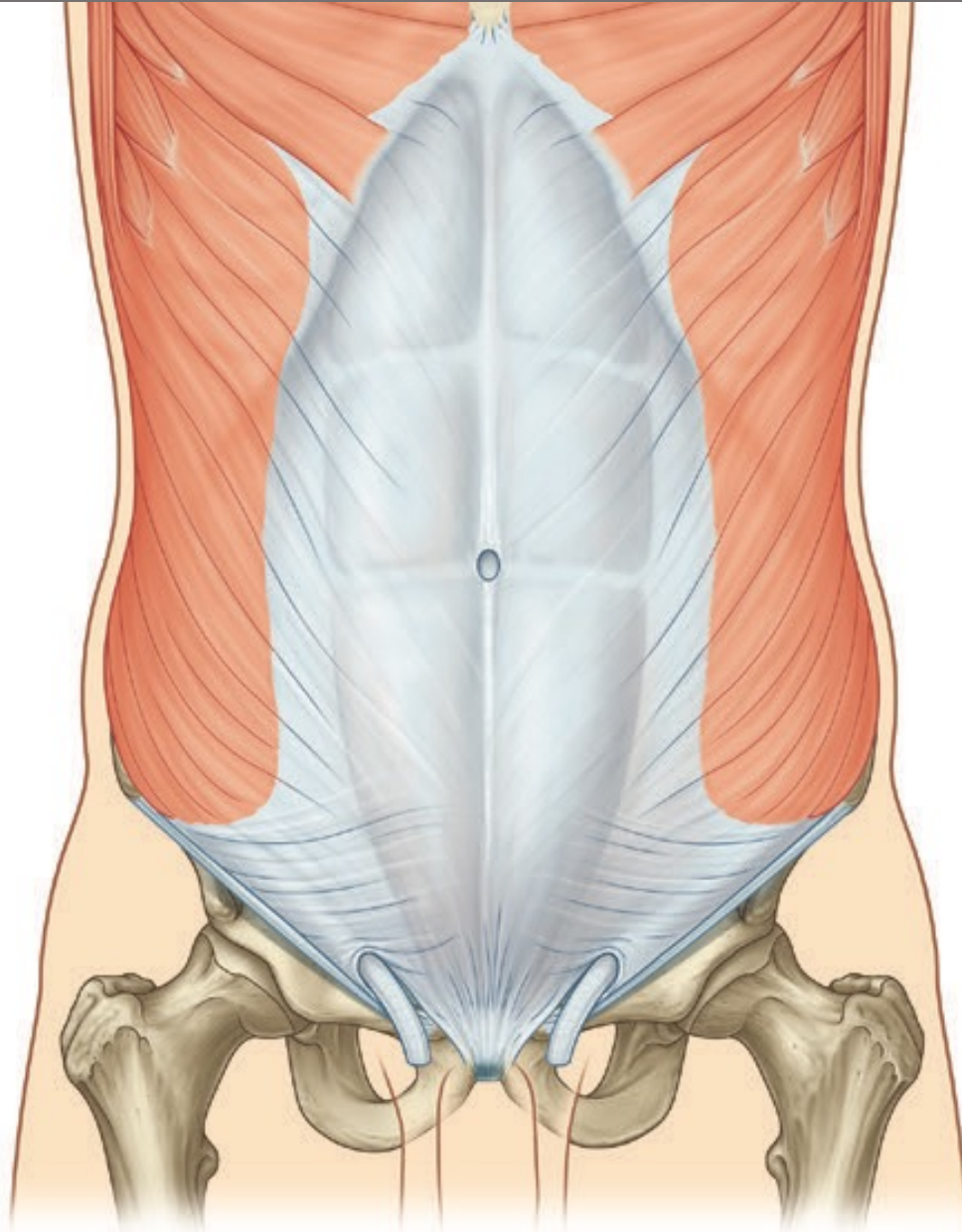
canalis inguinalis et scrotum



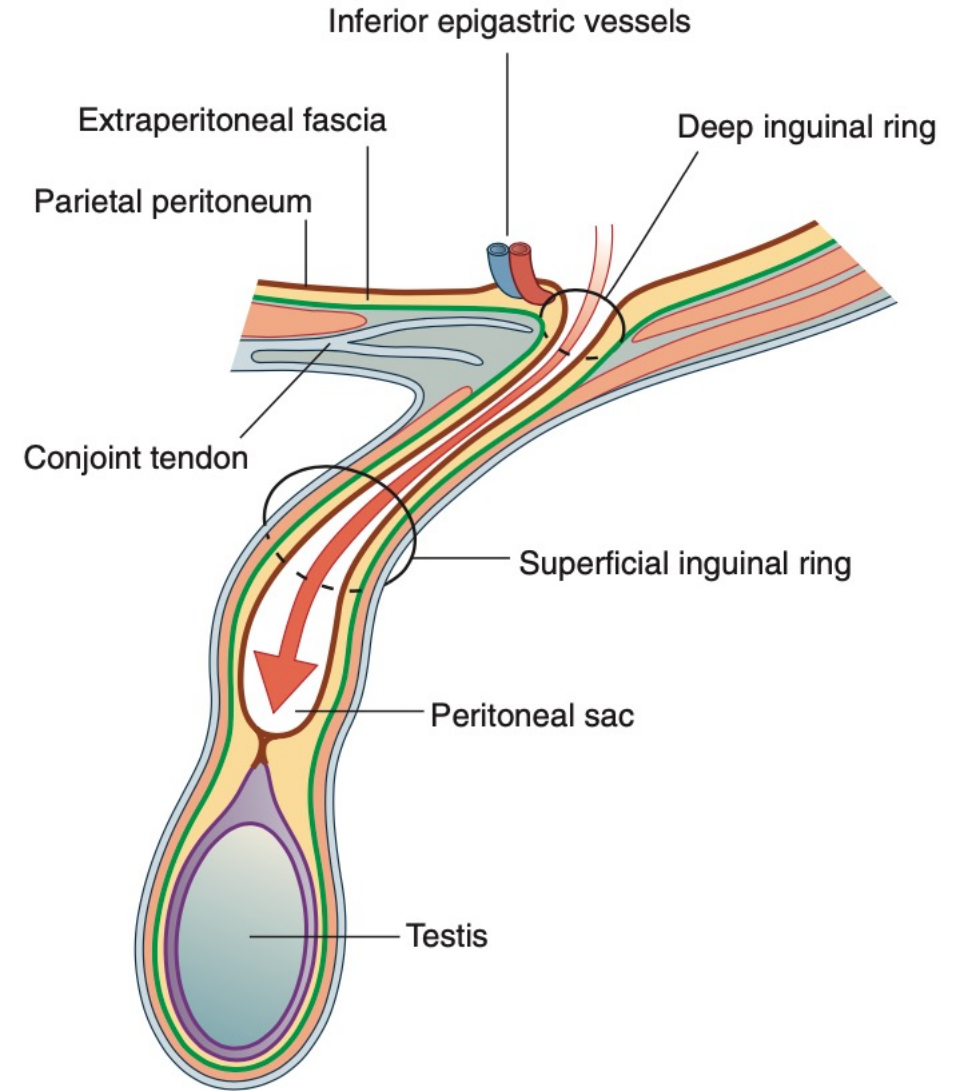
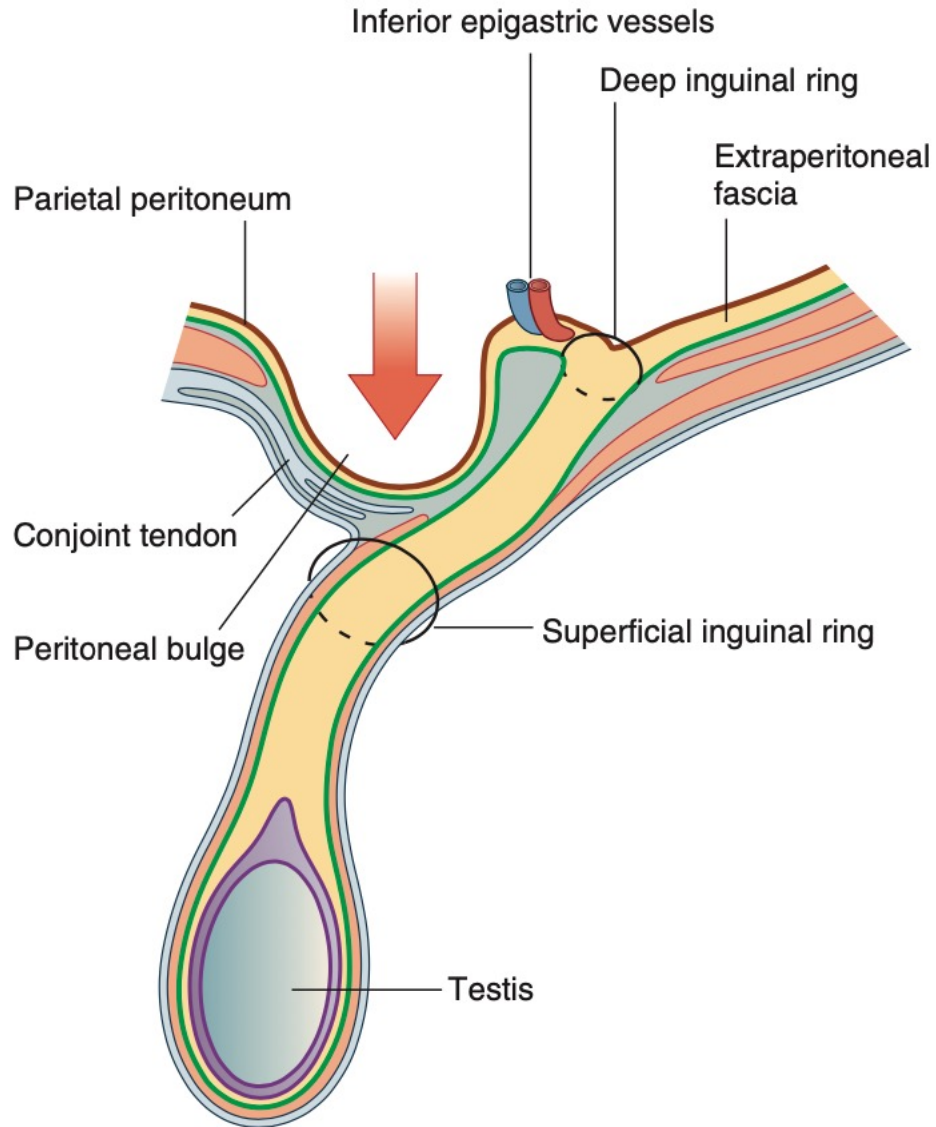
- ♦ Tunica vaginalis parietalis et visceralis (peritoneum)
- ♦ Fascia spermatica interna (fascia transversalis)
- ♦ Fascia cremasterica, m. cremaster (m. obliquus internus abdominis)
- ♦ Fascia spermatica externa (aponeurosis m. obliqui externi abdominis)
- ♦ Fascia dartos (fascia superficialis)
- ♦ Cutis

herniae

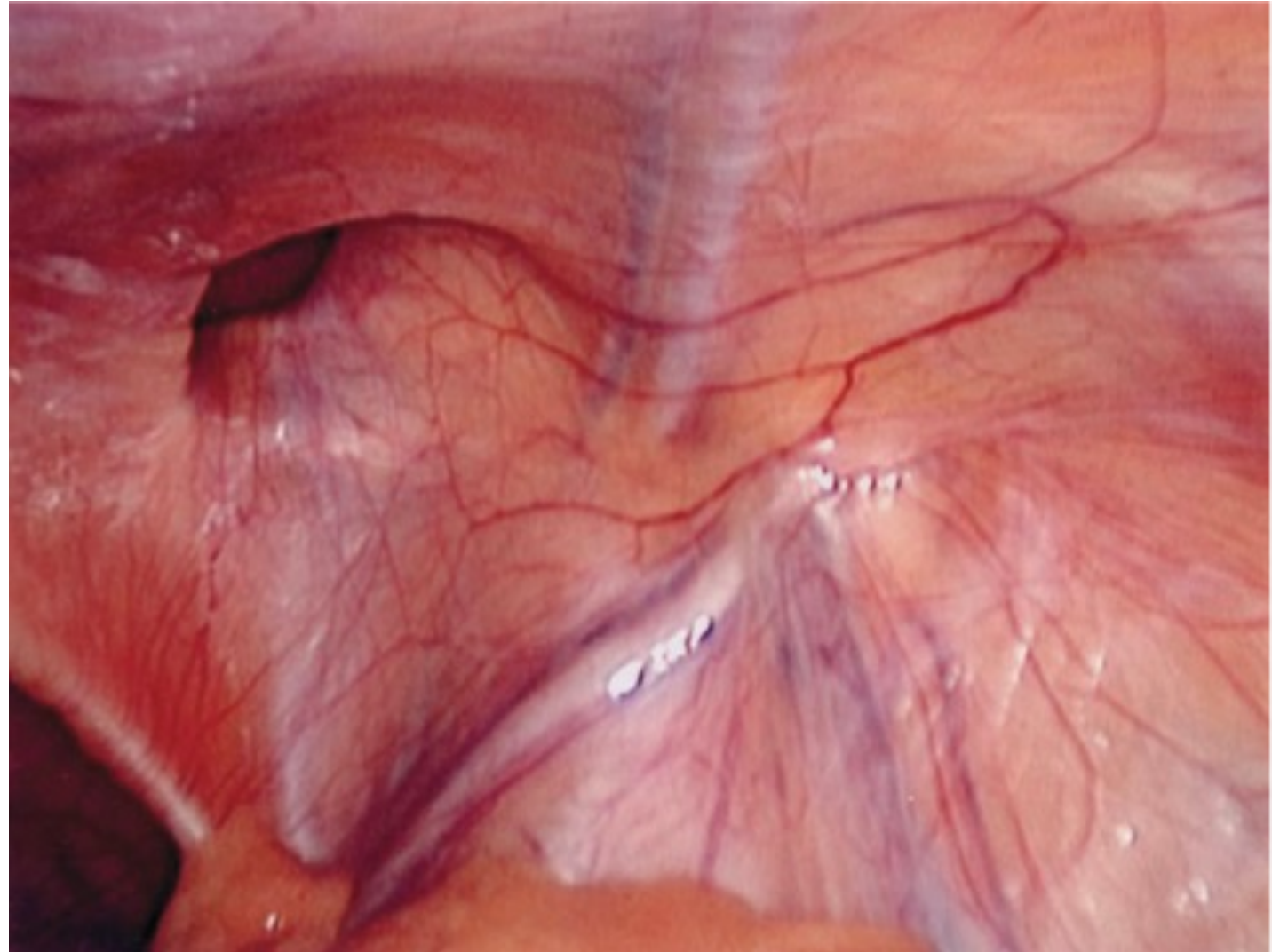
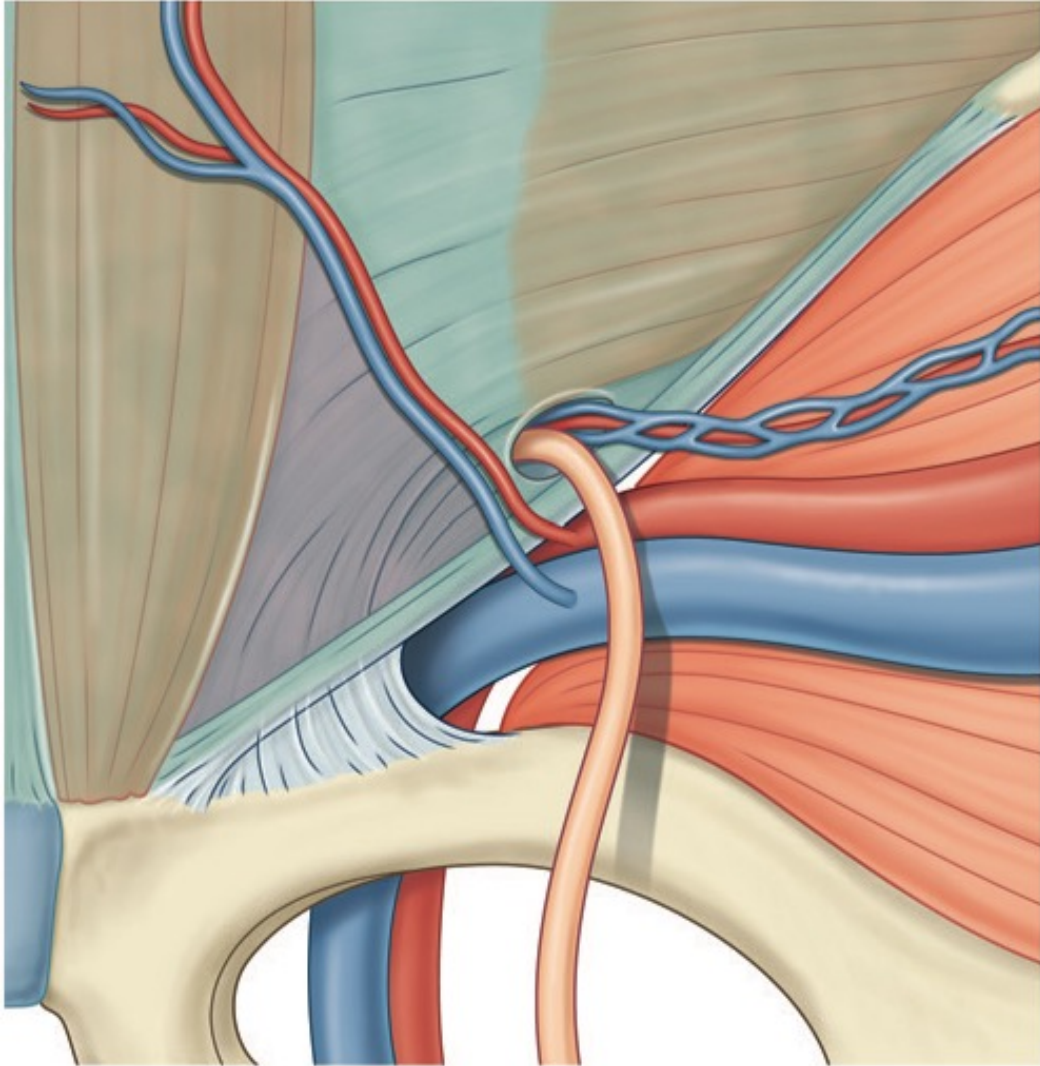
- Umbilicalis
- Supraumbilicalis
- Inguinalis directa
- Inguinalis indirecta
- Femoralis
- Obturatoria
- Intermuscularis (Spiegelii)
- In cicatricem



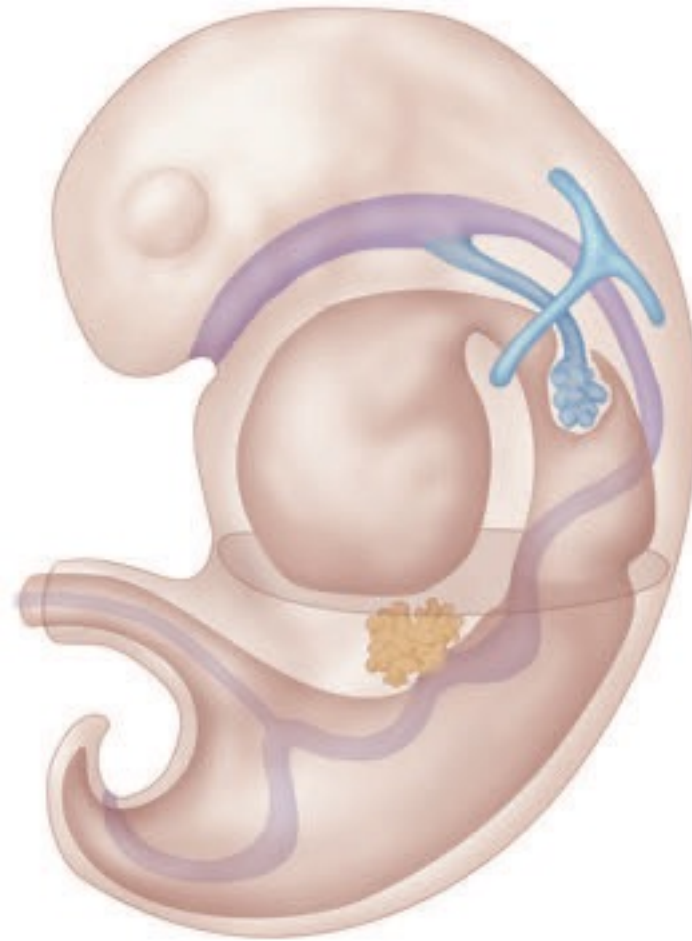
Hernia inguinalis directa, indirecta



trigonum inguinale

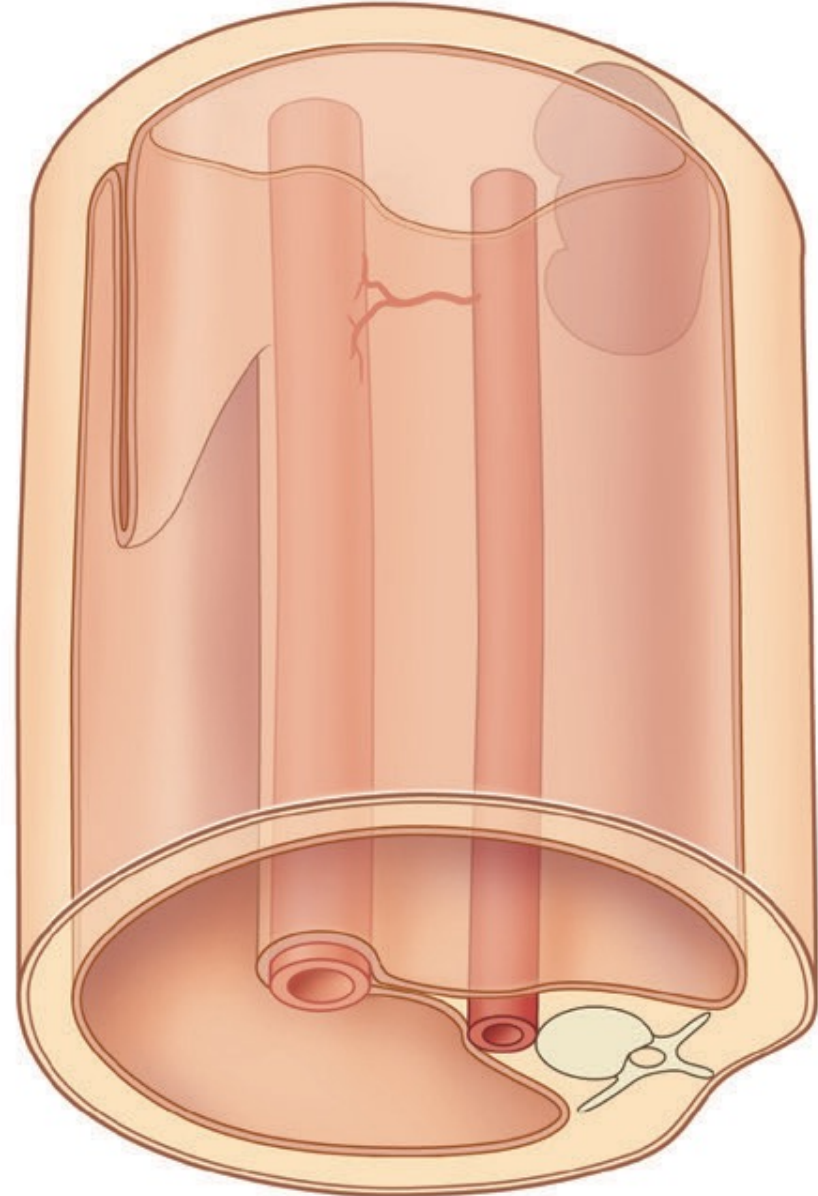


cavitas abdominalis

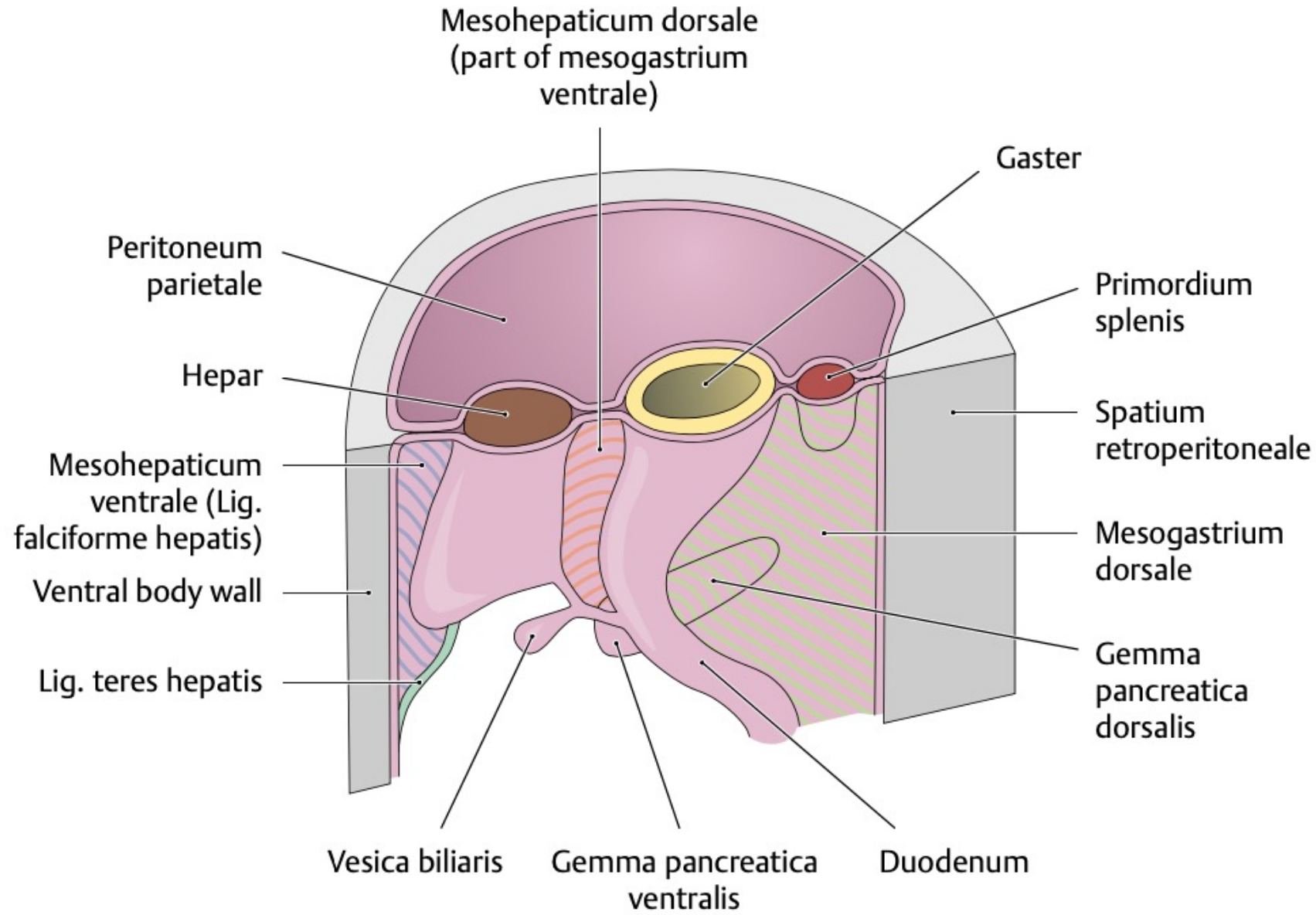


cavitas abdominalis

- ♦ Cavity enlayered by peritoneum
- ♦ Cavitas peritonealis
- ♦ *Spatium retroperitoneale* - **retroperitoneum**
- ♦ **Peritoneum**
 - ♦ Single layered cells - mesotelia
 - ♦ Supporting connective tissue
- ♦ *Peritoneum visceralis*
- ♦ *Peritoneum parietalis*
- ♦ **Hanging apparatus- mesenterium**
 - ♦ Mesenterium ventrale
 - ♦ Mesenterium dorsale

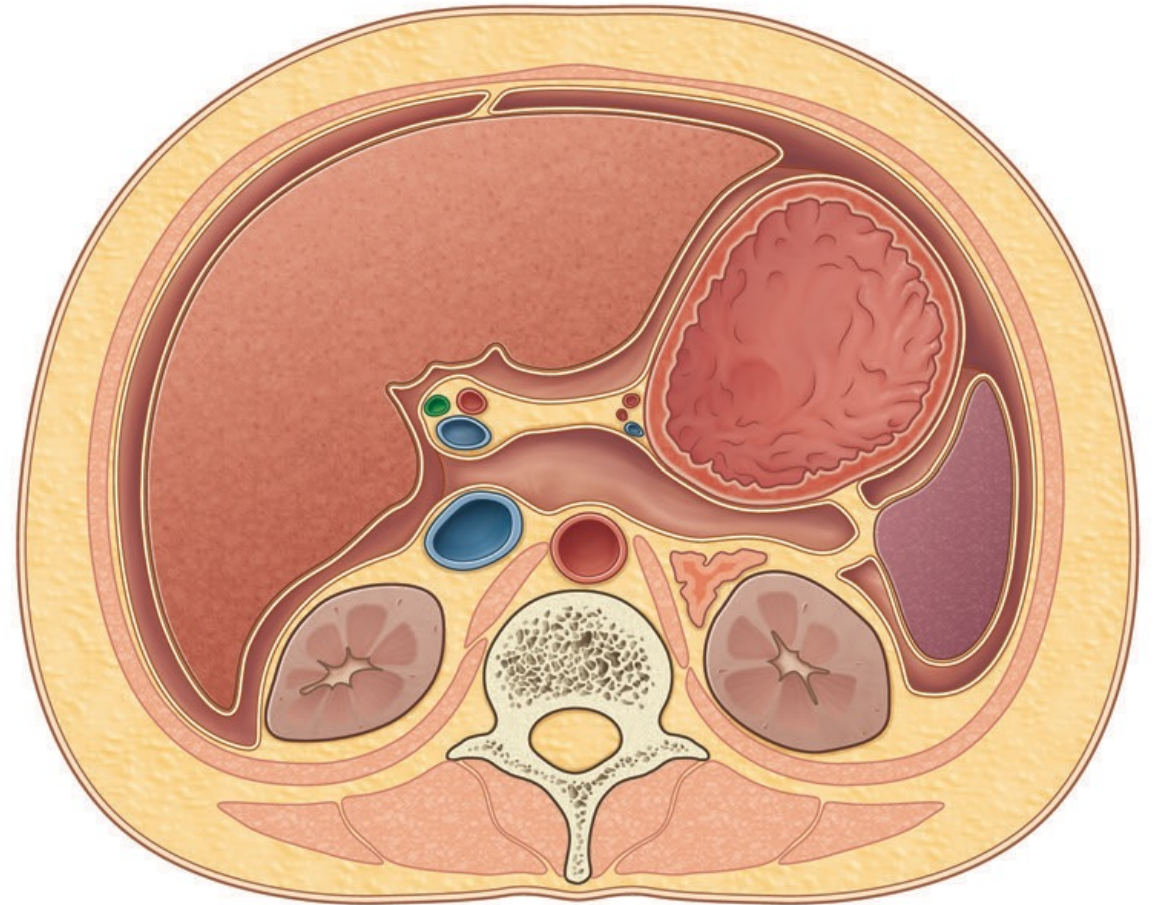
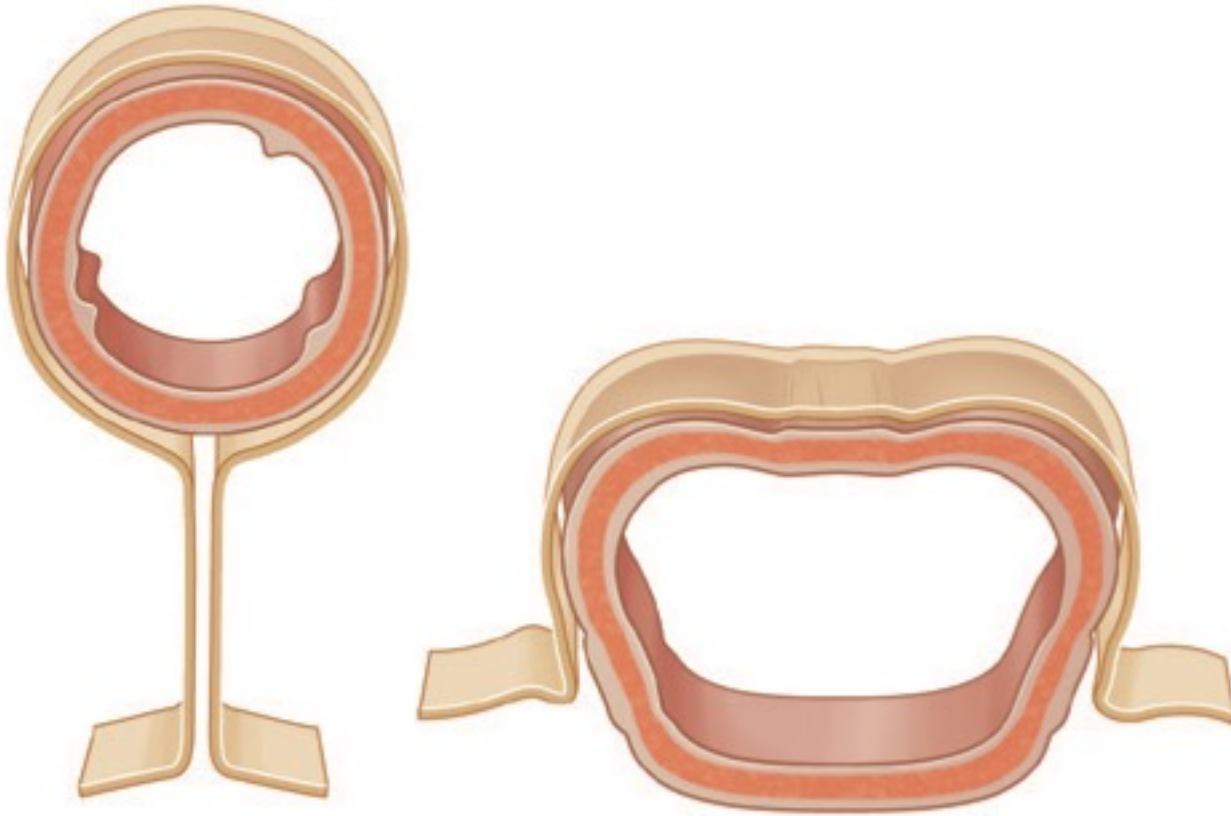


cavitas abdominalis



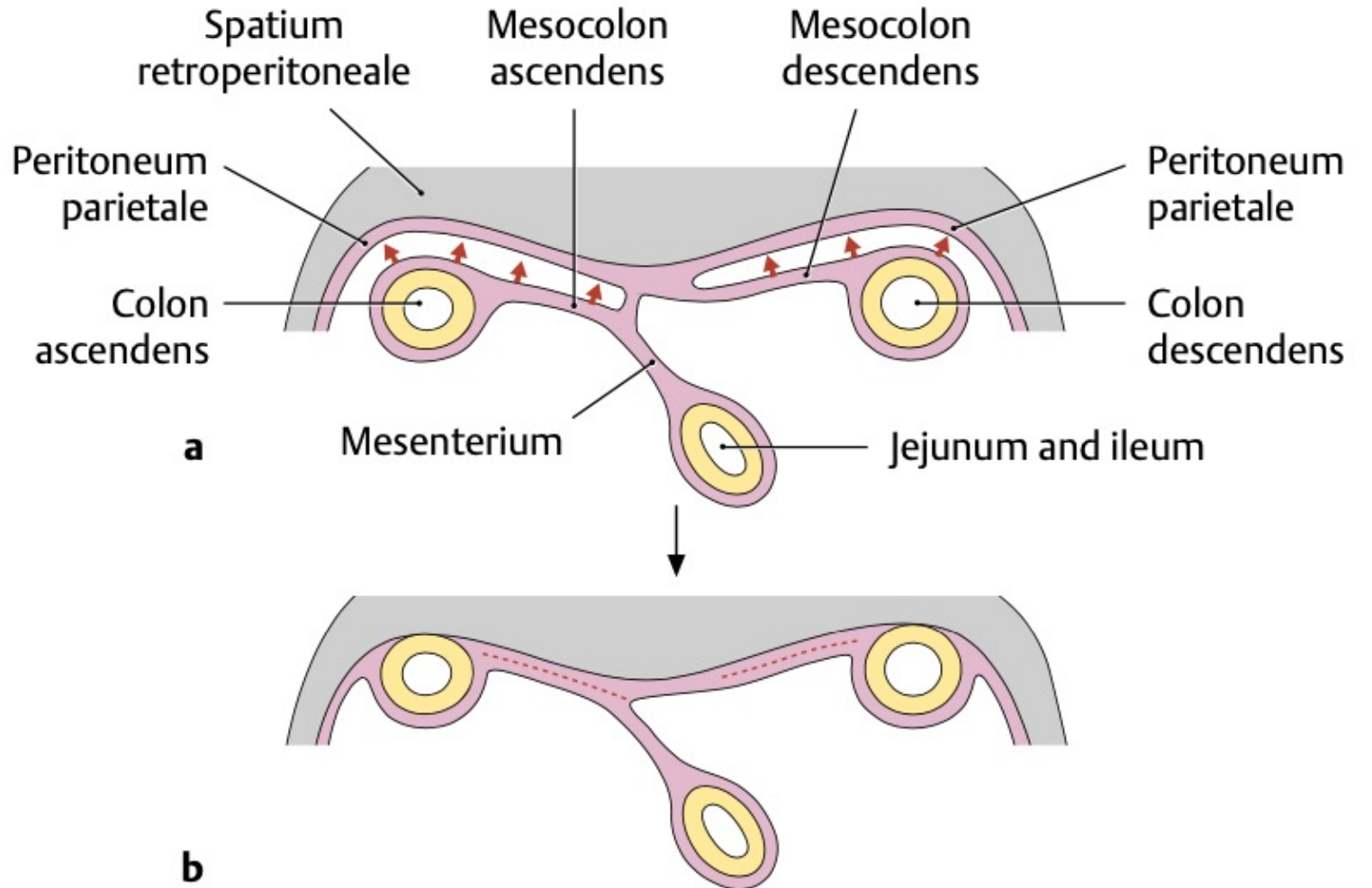
Position of the organs

- ◆ intraperitoneal
- ◆ Secondary retroperitoneal
- ◆ Primary retroperitoneal



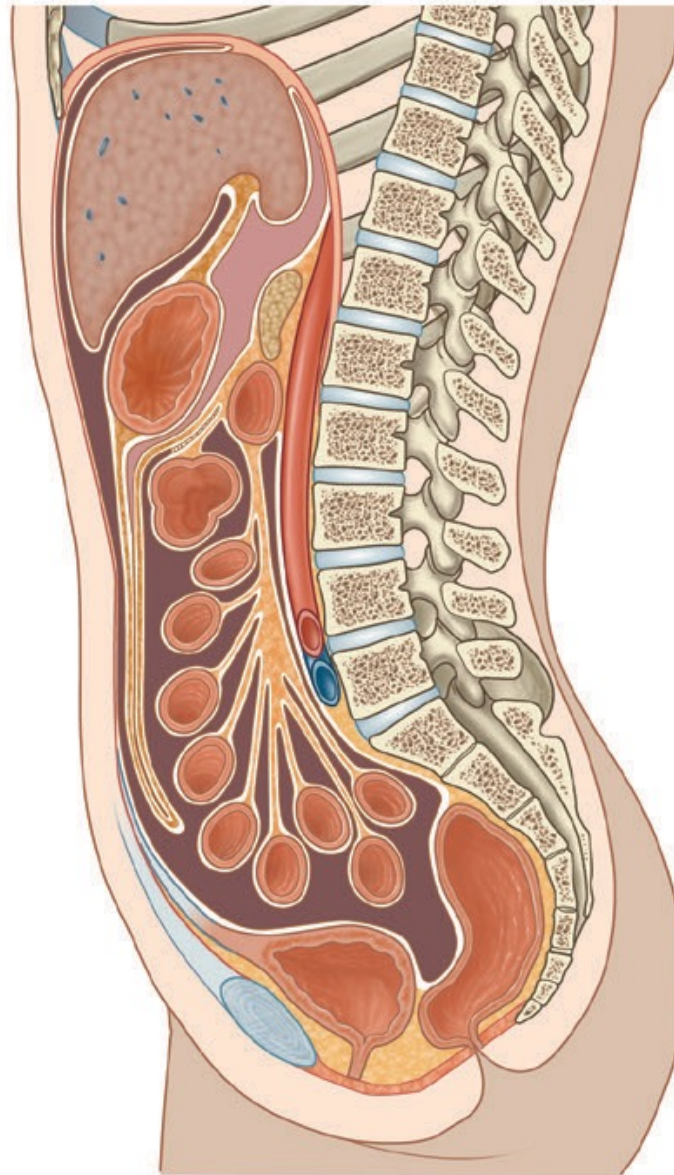
Position of the organs

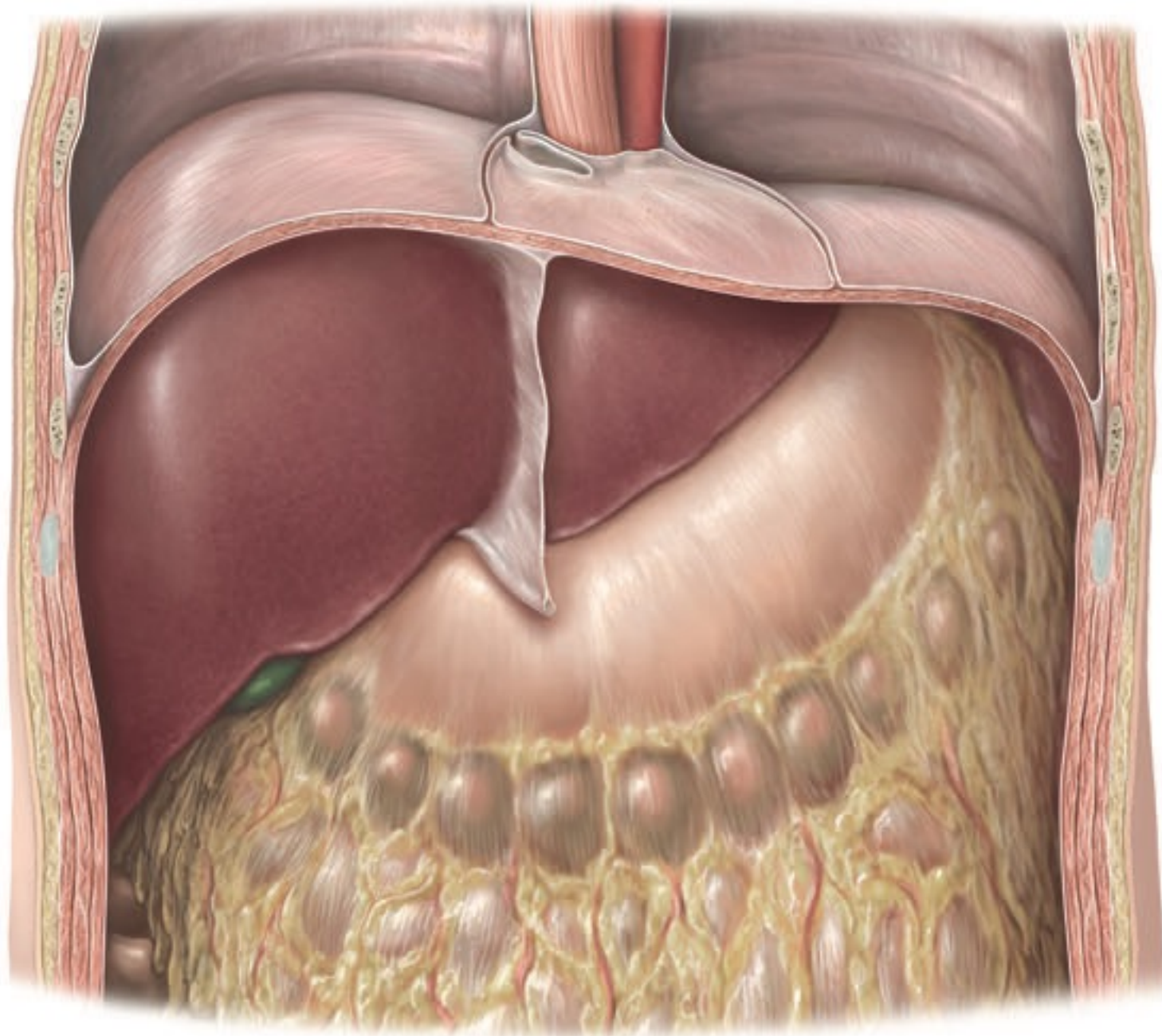
- 🔥 intraperitoneal
- 🔥 Secondary retroperitoneal
- 🔥 Primary retroperitoneal



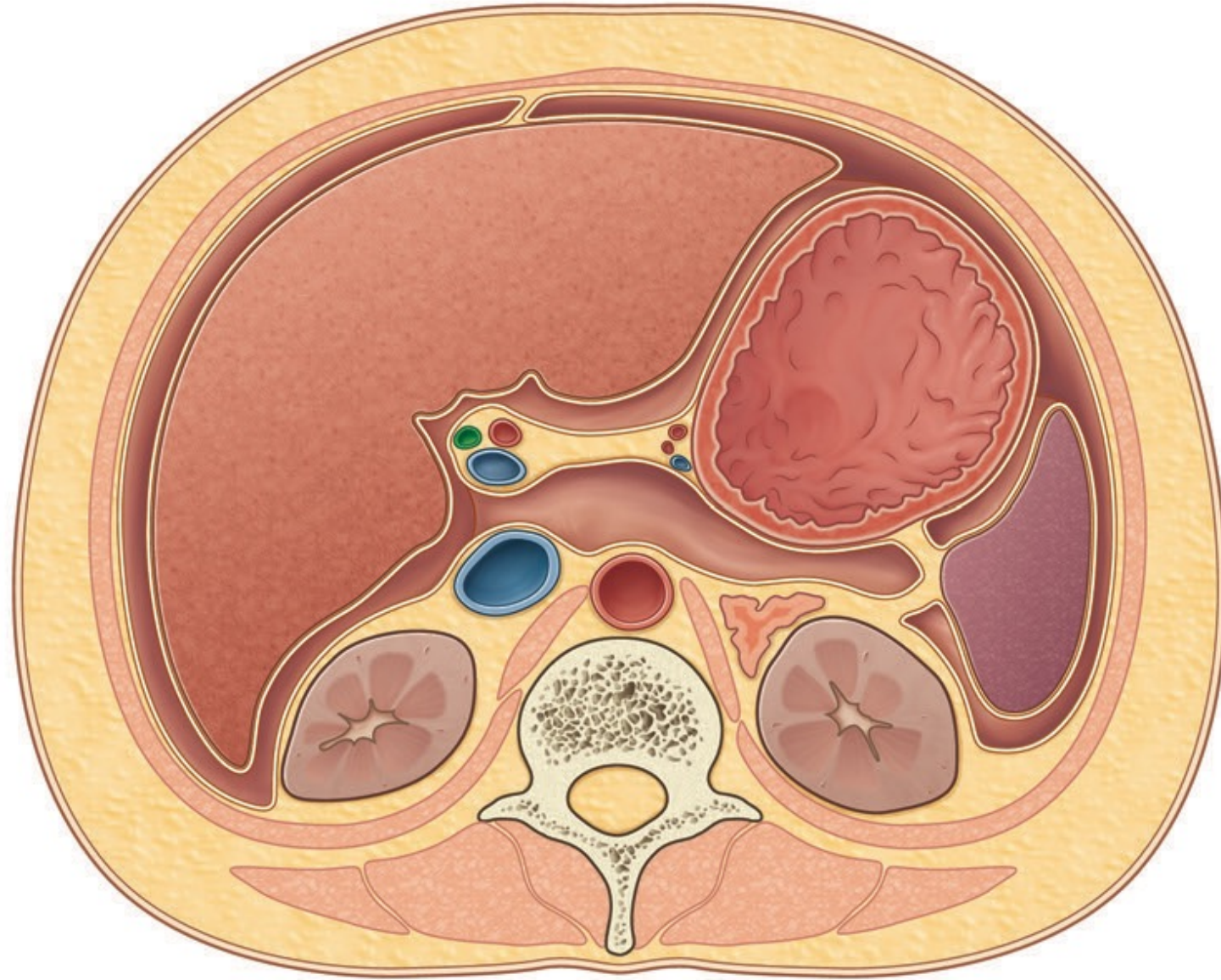
cavitas peritonealis

- ♦ Peritoneum
- ♦ Peritoneal spaces
- ♦ supramesocolic
 - ♦ Subdiaphragmatic spaces (L + R)
 - ♦ Subhepatic space
 - ♦ Hepatorenal space(Morrisoni)
 - ♦ Bursa omentalis – foramen Winslowi
- ♦ inframesocolic
 - ♦ Paracolic spaces
 - ♦ Medial, lateral (R + L)
 - ♦ Interloop spaces
 - ♦ Cavum rectovesicale (Douglasii)



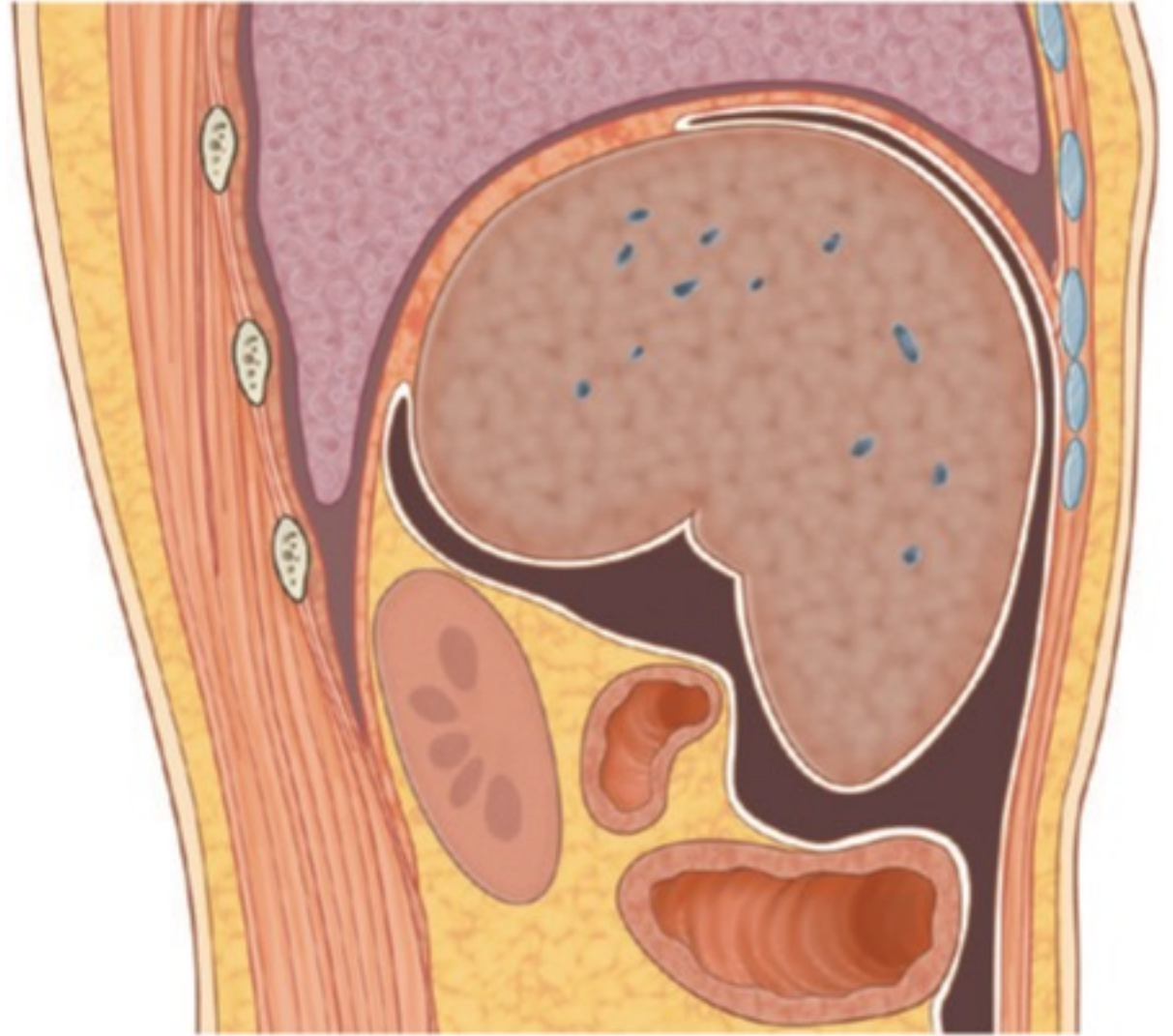


Supramesocolic spaces



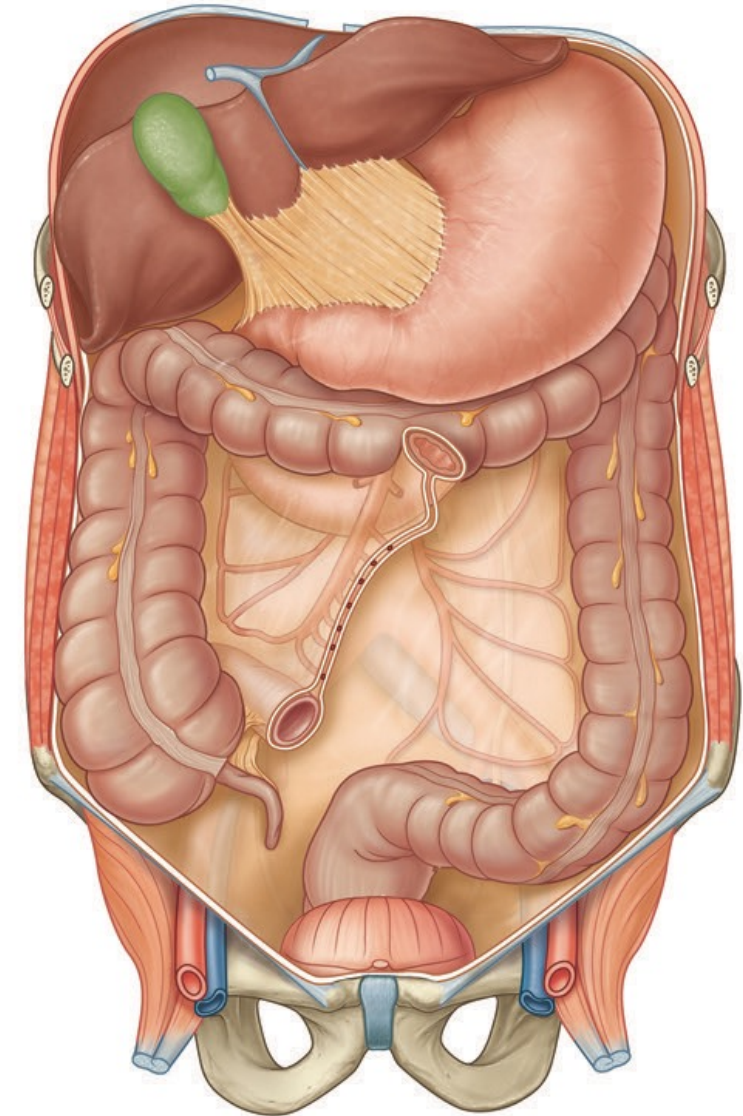
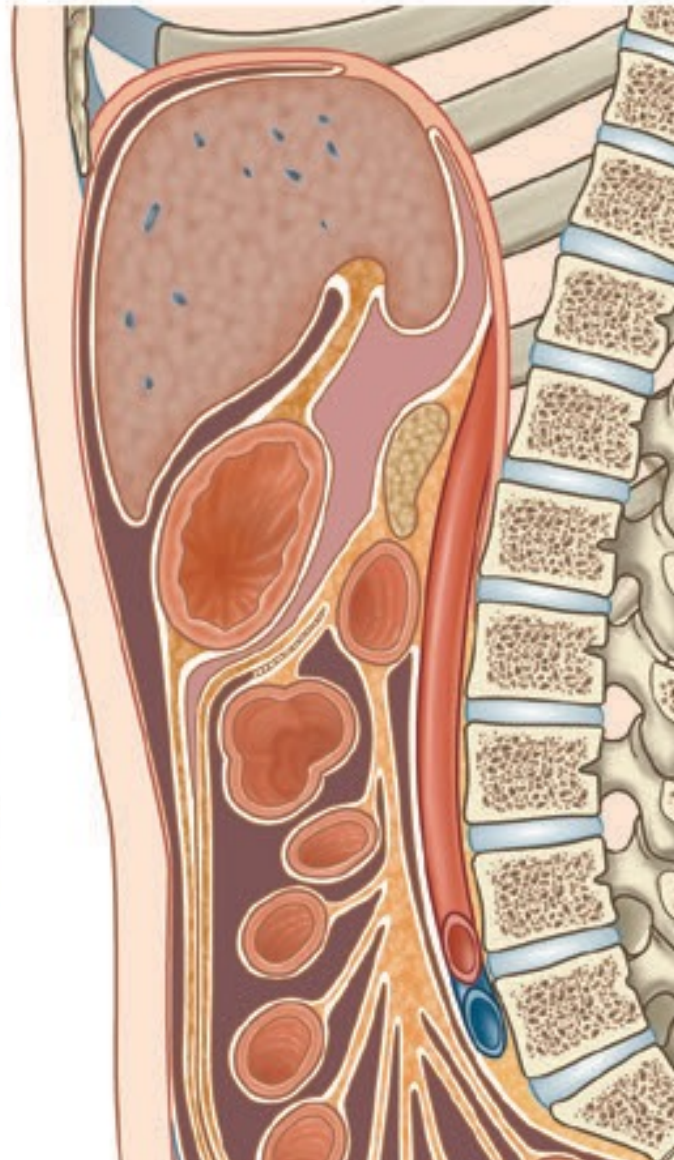
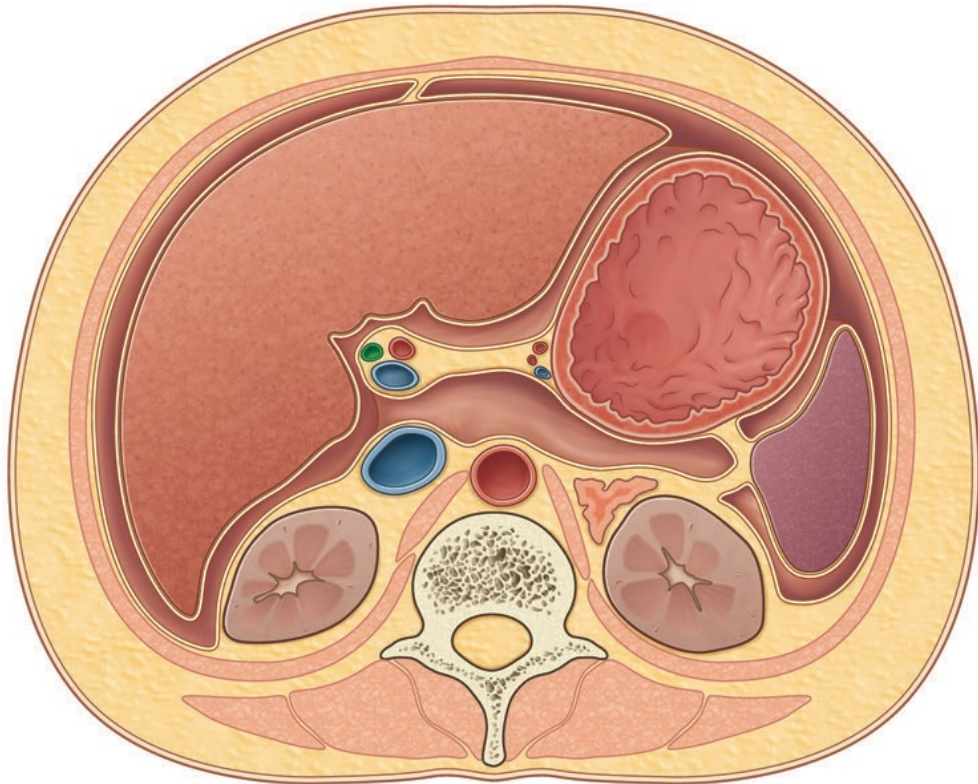
Sapces around liver

- 🔴 Recessus subdiaphragmaticus
- 🔴 Recessus hepatorenalis (Morissoni)

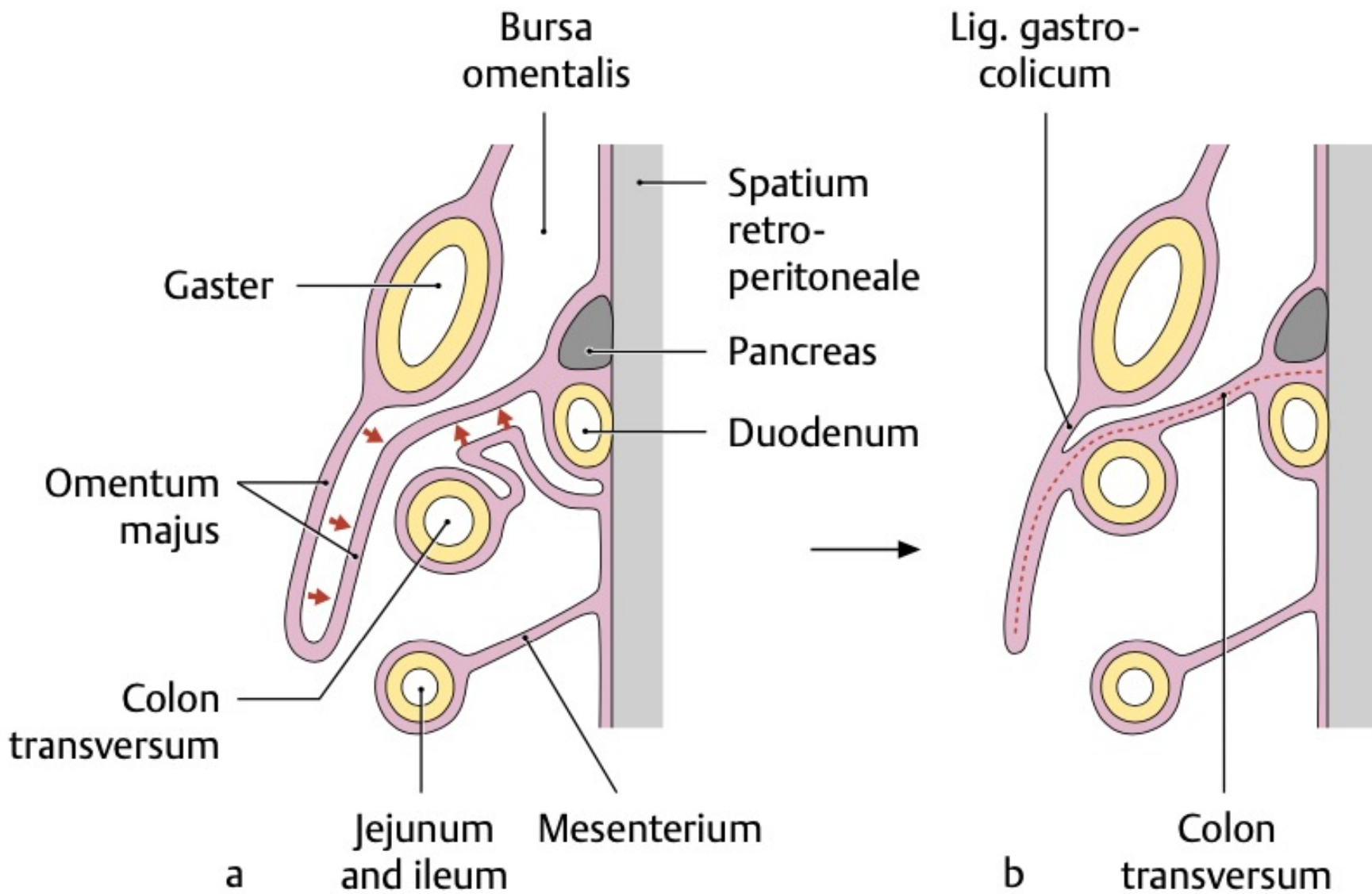


Bursa omentalis

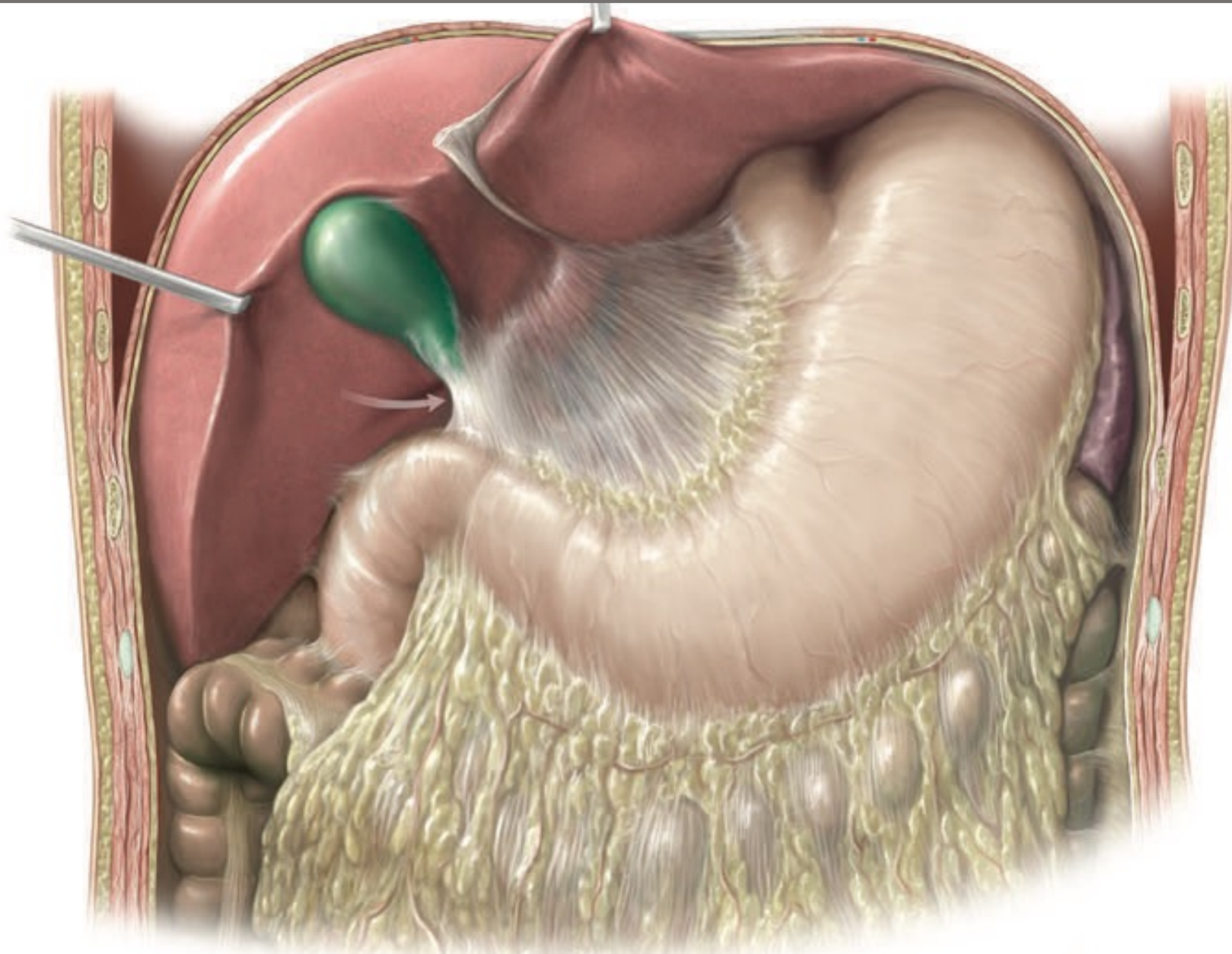
- ♦ entrance - foramen omentale /epiploicum – Vinslovi - ligg. hepatoduodenale, hepatorenale, duodenorenale
- ♦ Anterior wall
 - ♦ omentum minus
 - ♦ ligamentum gastrocolicum
 - ♦ omentum majus
- ♦ Recessus superior, inferior, splenicus



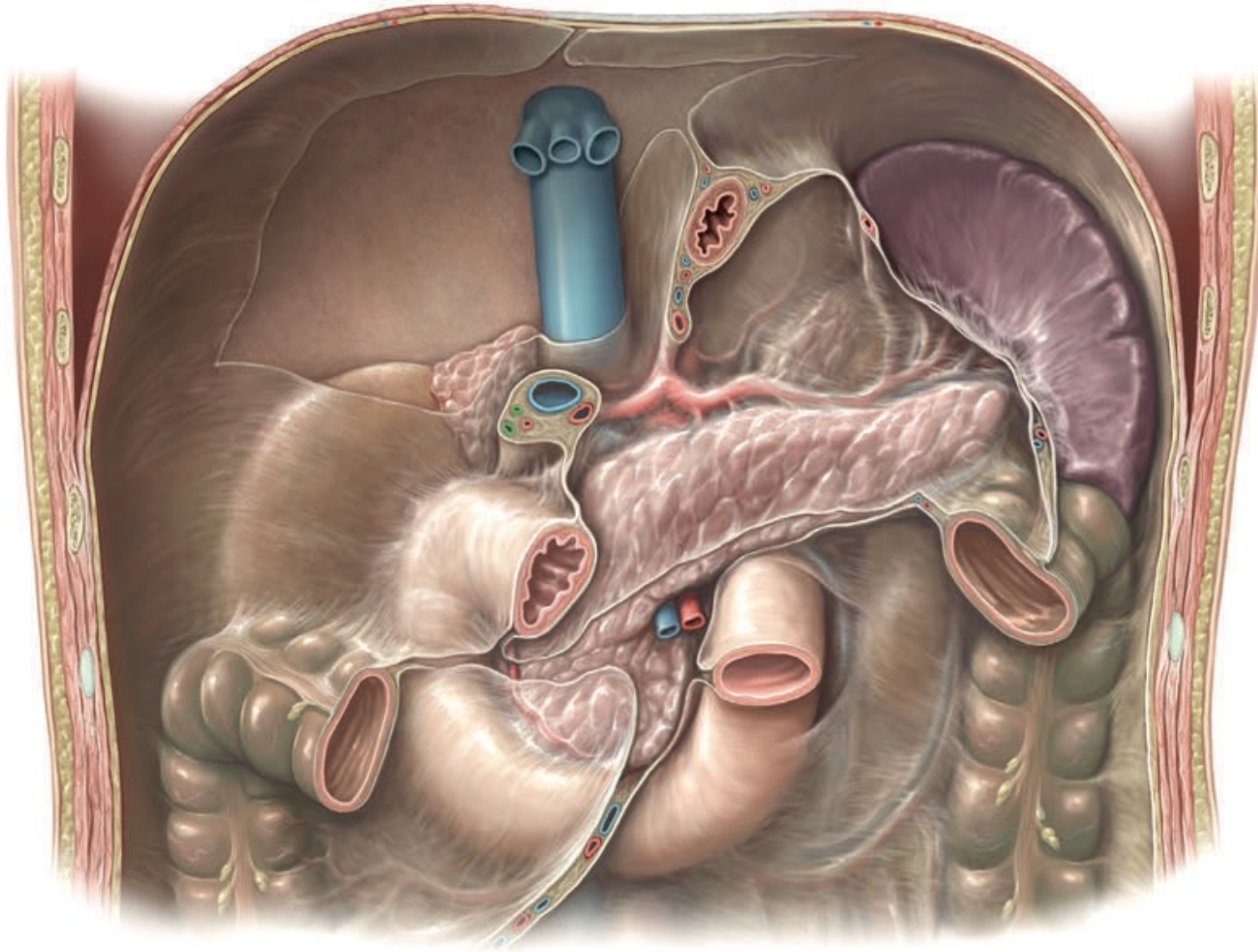
Bursa omentalis



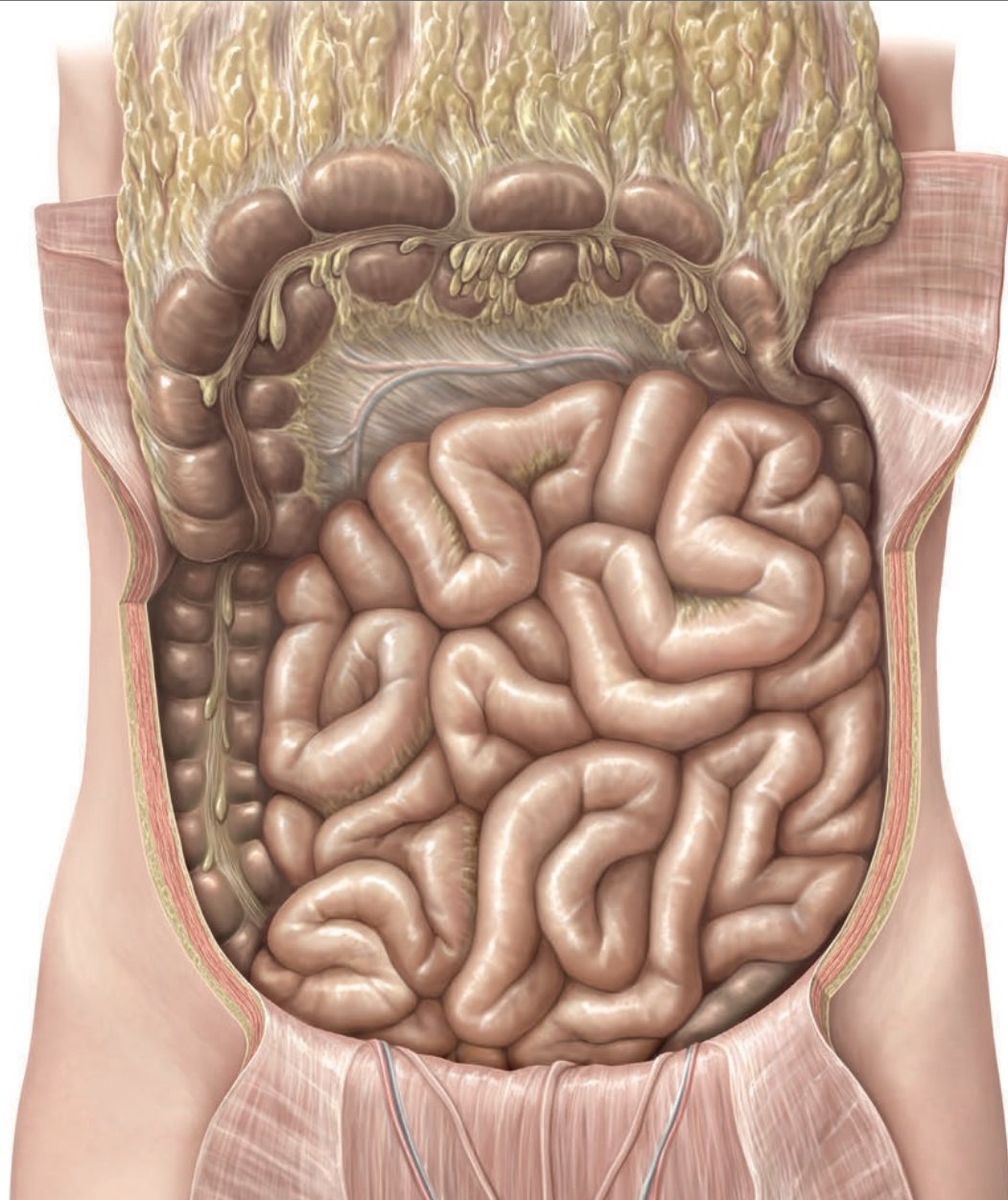
Bursa omentalis



Bursa omentalis

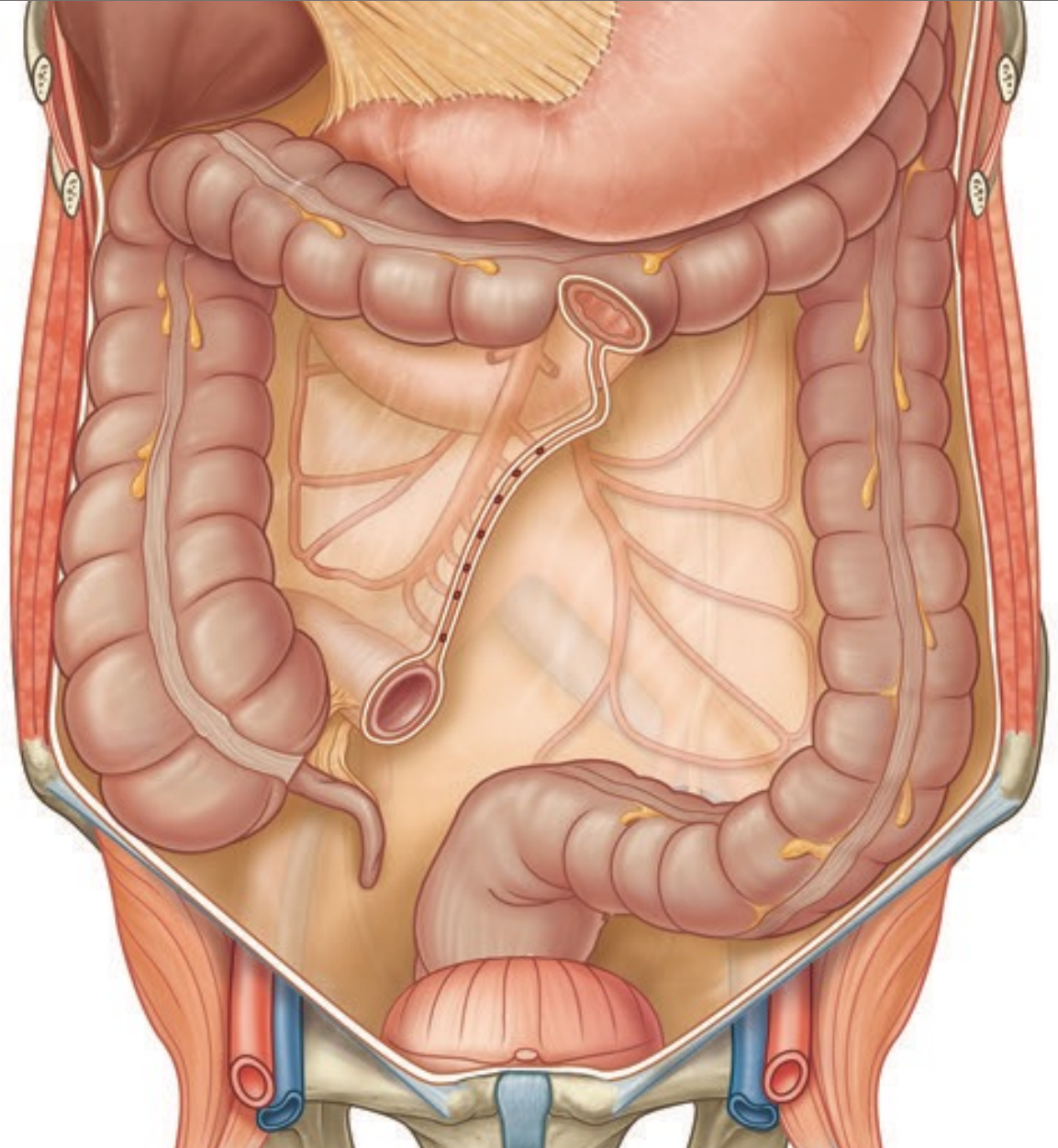


Inframesocolic spaces



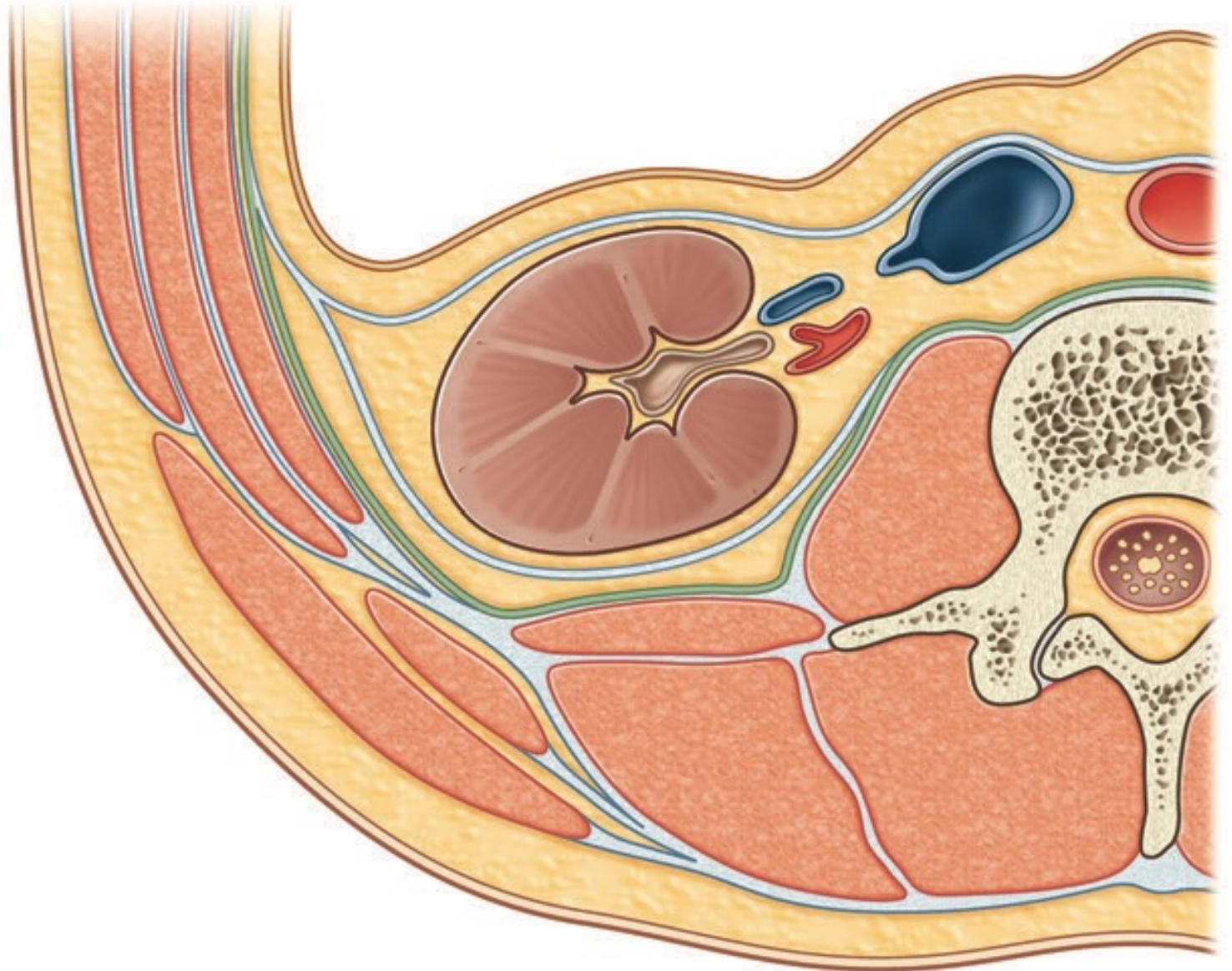
Inframesocolic spaces

- ♦ Omentum majus
- ♦ Mesocolon transversum
- ♦ Mesenterium
- ♦ **Right field**
 - ♦ A. et v. mesenterica superior
- ♦ **Left field**
 - ♦ A. et v. mesenterica inferior
 - ♦ Aorta
 - ♦ Ganglion mesentericum inferius
 - ♦ Plexus hypogastricus superior
- ♦ Lateral paracolic space
- ♦ **Infection and tumor spread**



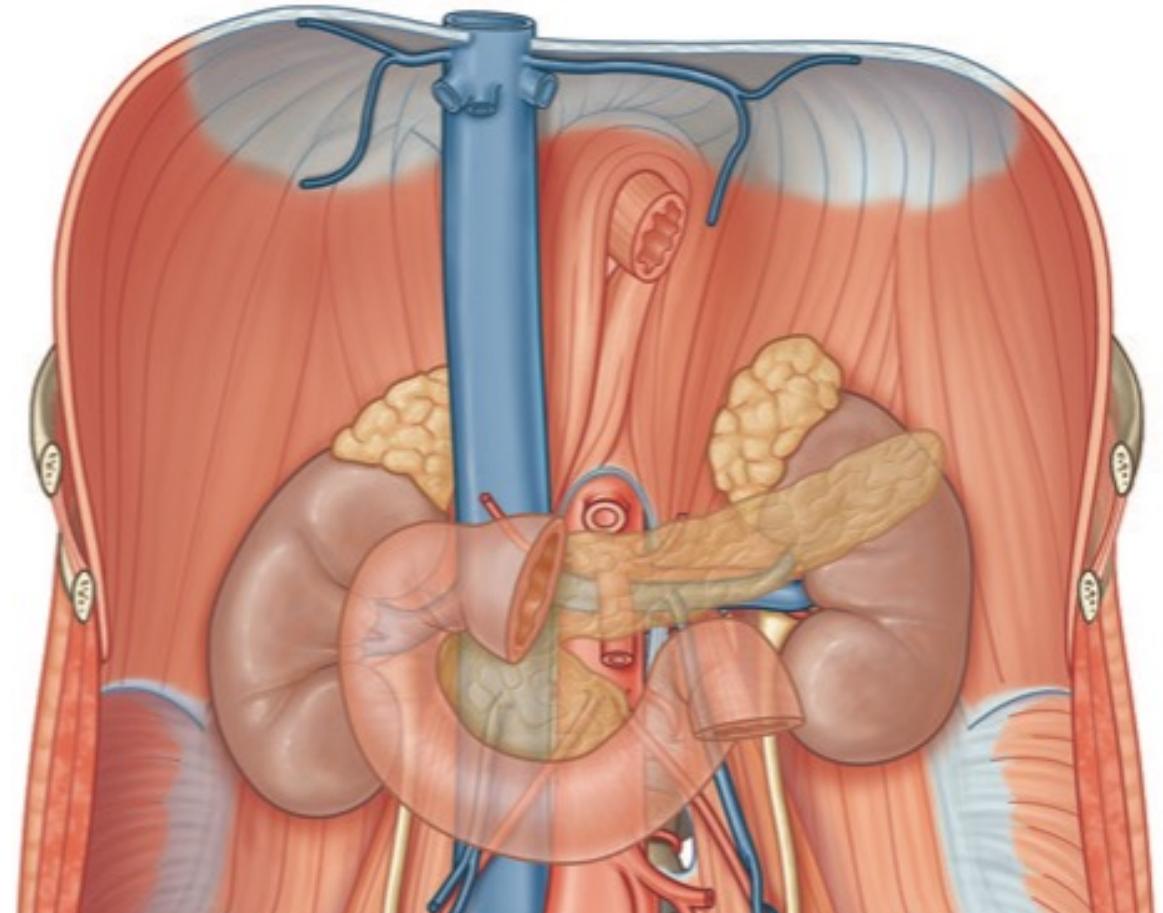
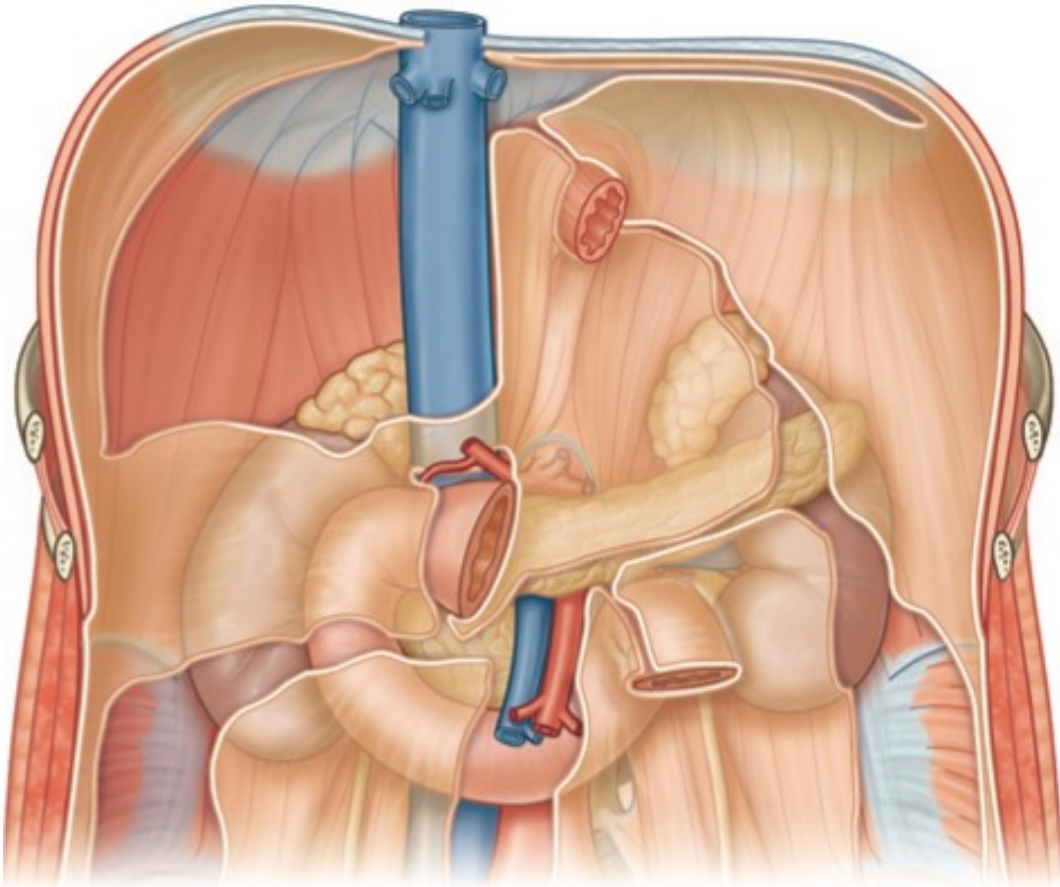
Retroperitoneum

- ♦ Fascia transversa
- ♦ Fascia renalis
- ♦ Peritoneum parietale
- ♦ lateral part
 - ♦ Nadledviny
 - ♦ Ledviny
 - ♦ Uretery
- ♦ Medial part
 - ♦ Pancreas
 - ♦ Duodenum
 - ♦ Aorta
 - ♦ V. cava inferior
 - ♦ Vv. lumbales
 - ♦ Truncus sympatikus
 - ♦ Ganglia
 - ♦ Plexus aorticus

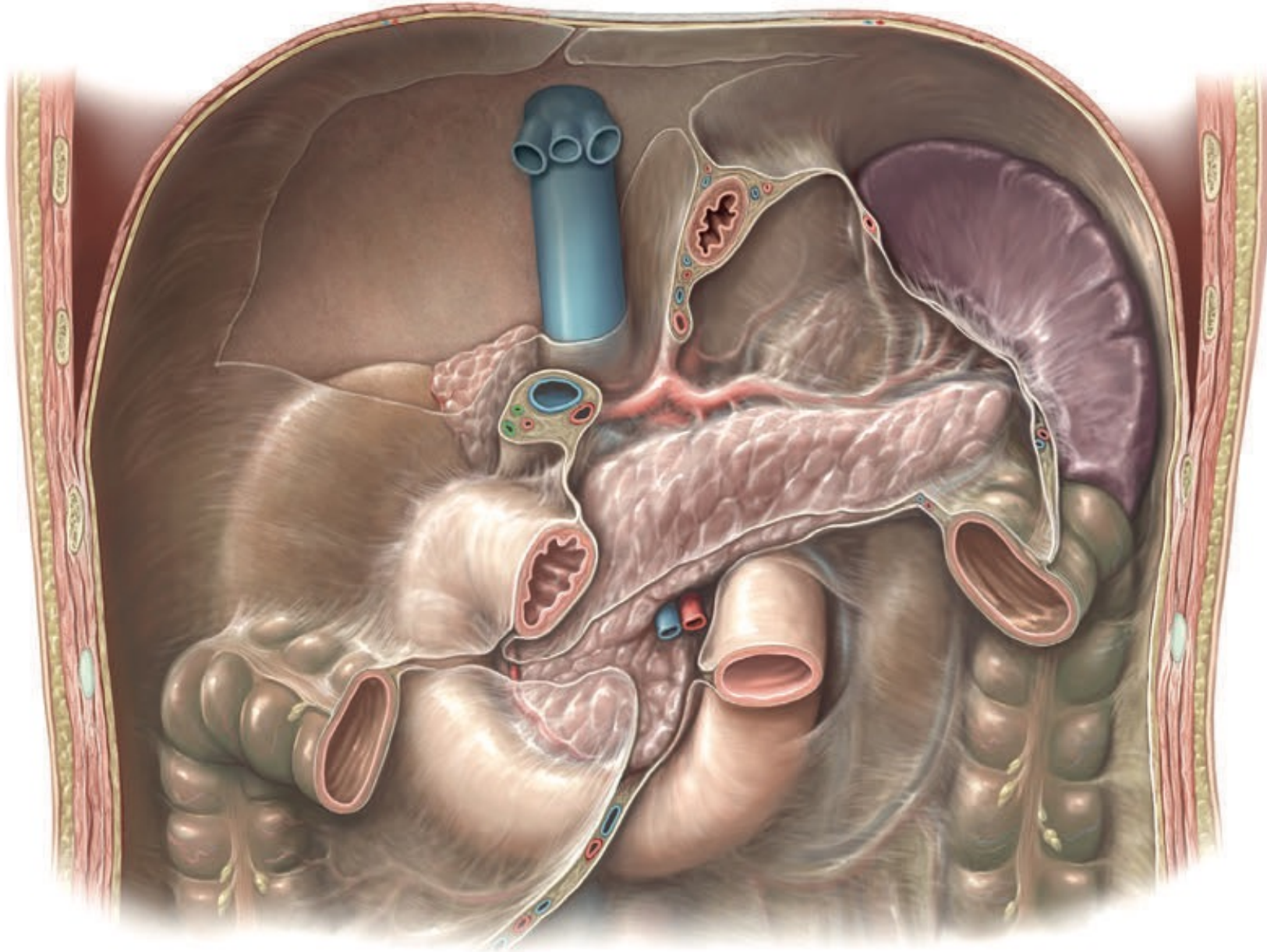


Secondary retroperitoneal organs

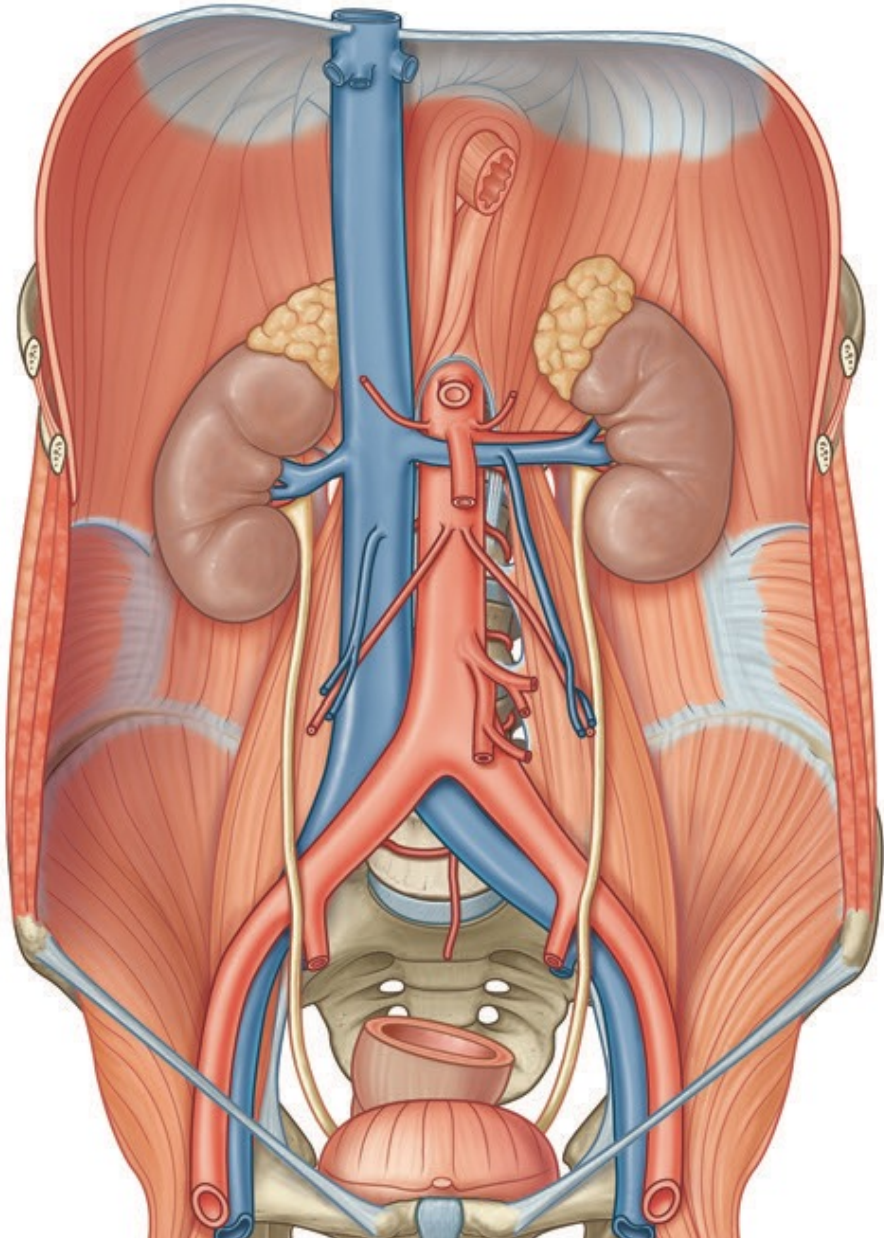
- ♦ Pancreas
- ♦ Duodenum
- ♦ Partially colon: asc. et desc.



Secondary retroperitoneal organs



Arteriae



♦ **Aorta abdominalis**

♦ Truncus coeliacus

♦ A. mesenterica superior

♦ A. mesenterica inferior

♦ A. renalis

♦ A. adrenalis (sup., inf.)

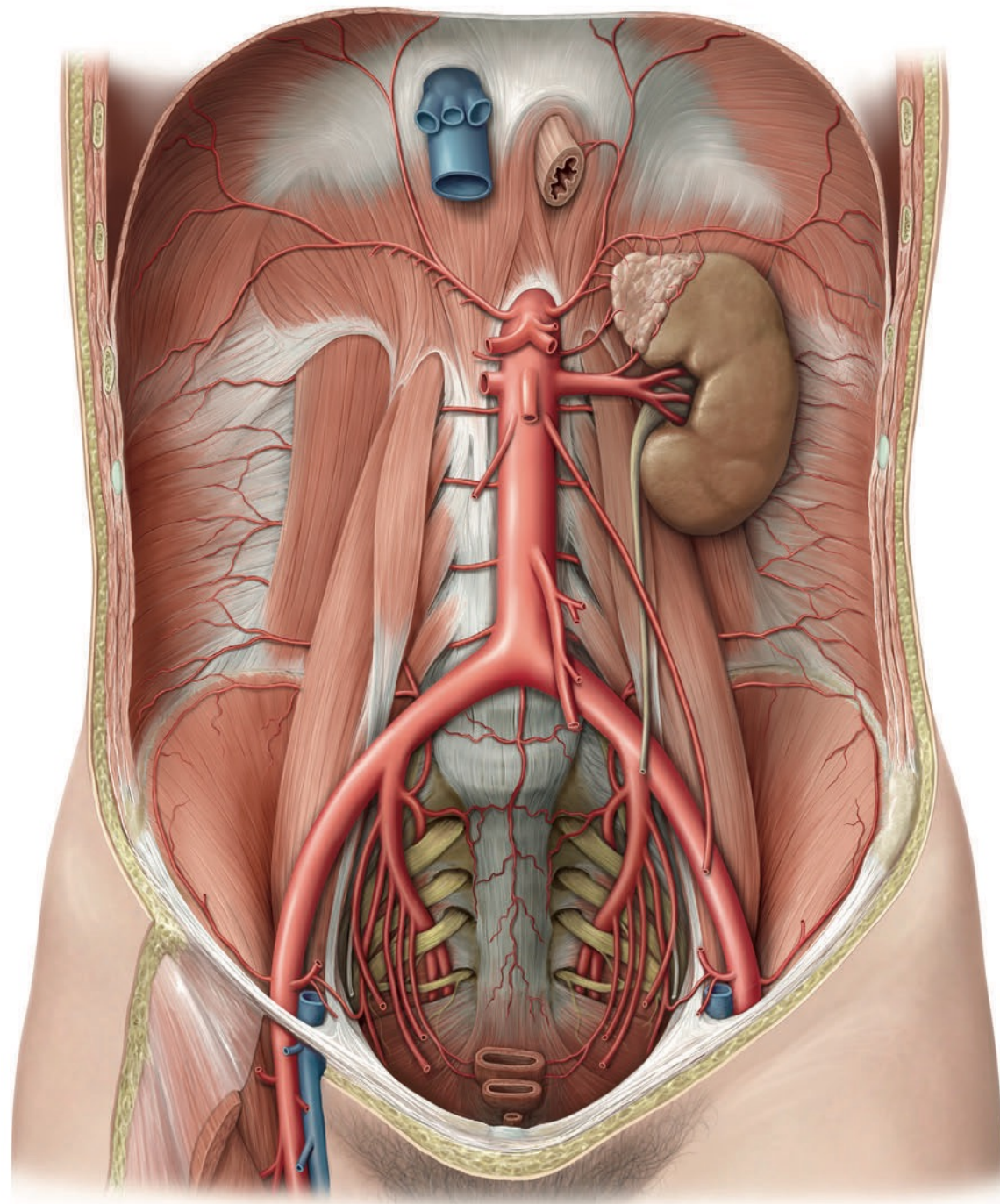
♦ A. testicularis/ovarica

♦ A. phrenica inferior

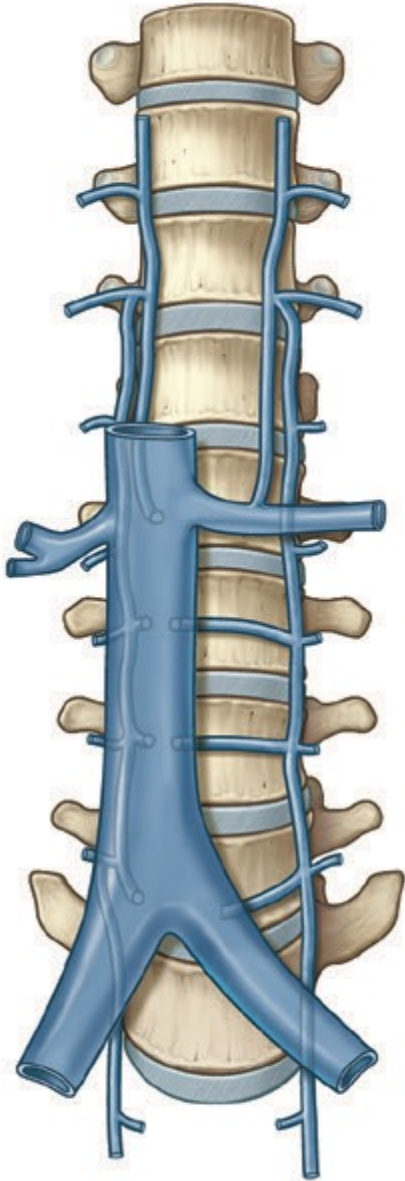
♦ A. subcostalis

♦ A. lumbales

♦ A. iliolumbalis



Venae



- ♦ **Vena cava inferior**

- ♦ V. renalis

- ♦ V. adrenalis (sup., inf.)

- ♦ V. testicularis/ovarica

- ♦ V. phrenica inferior

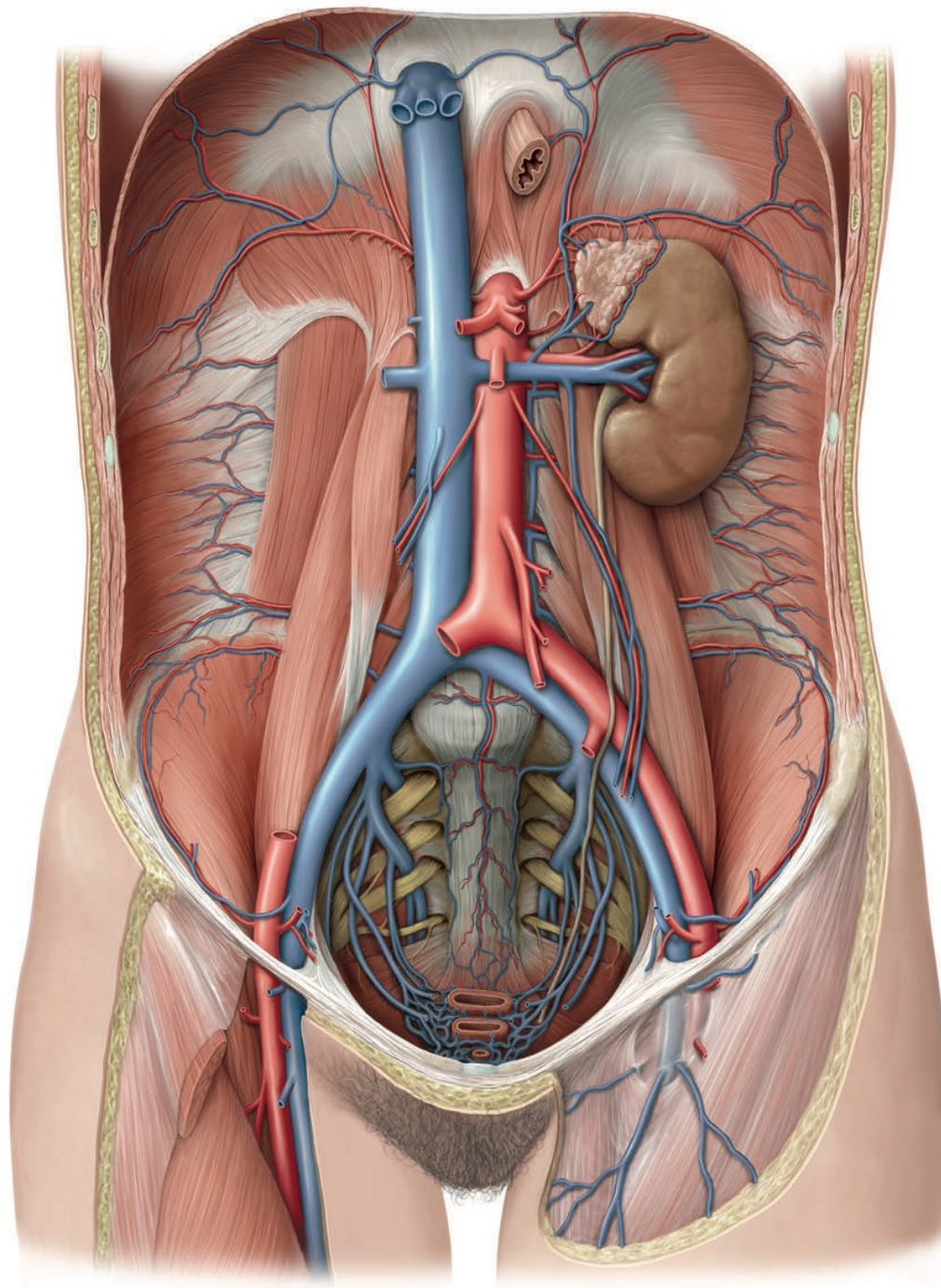
- ♦ **V. lumbalis ascendens**

 - ♦ **Vena azygos/hemiazygos**

- ♦ V. subcostalis

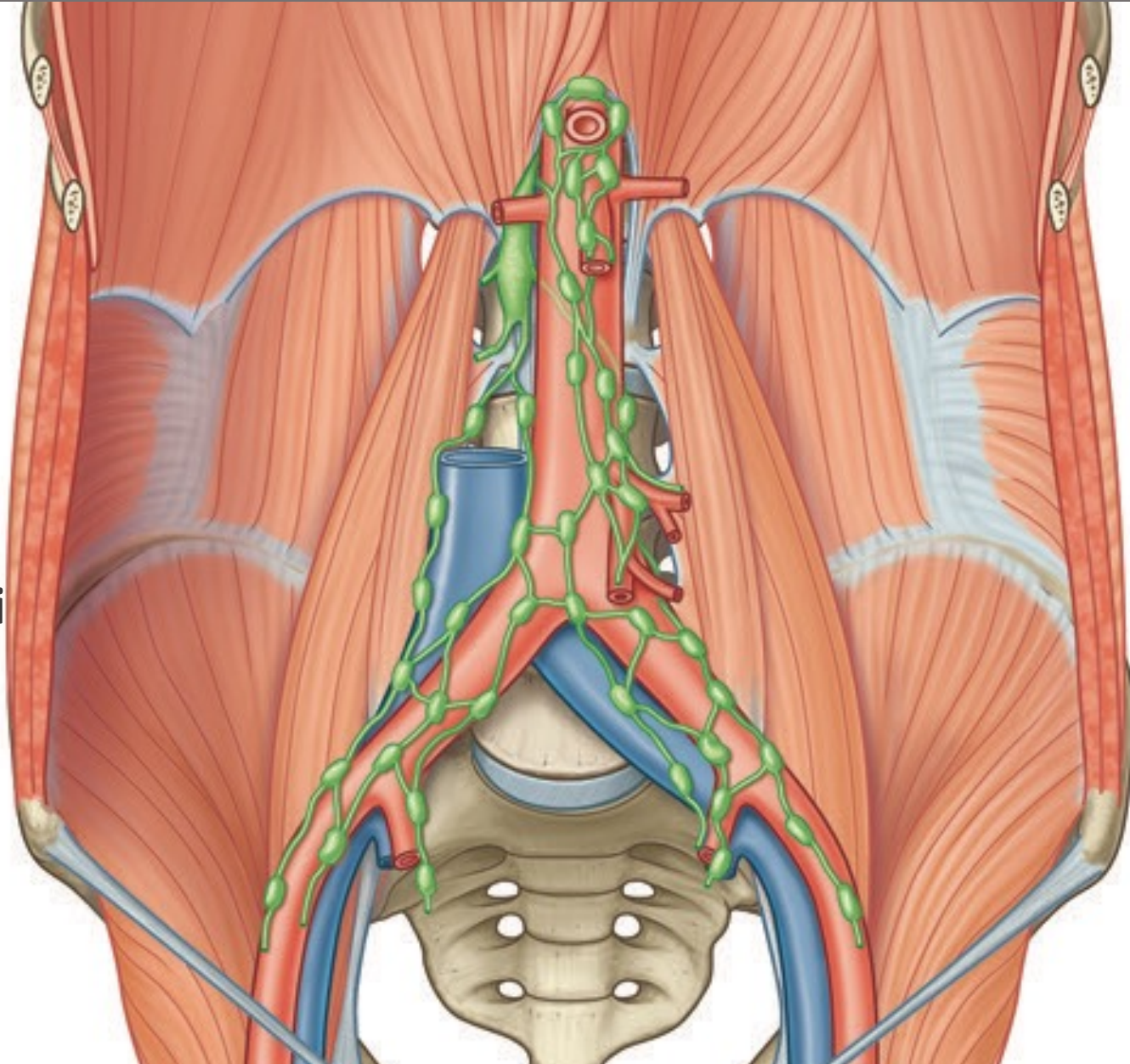
- ♦ Vv. lumbales

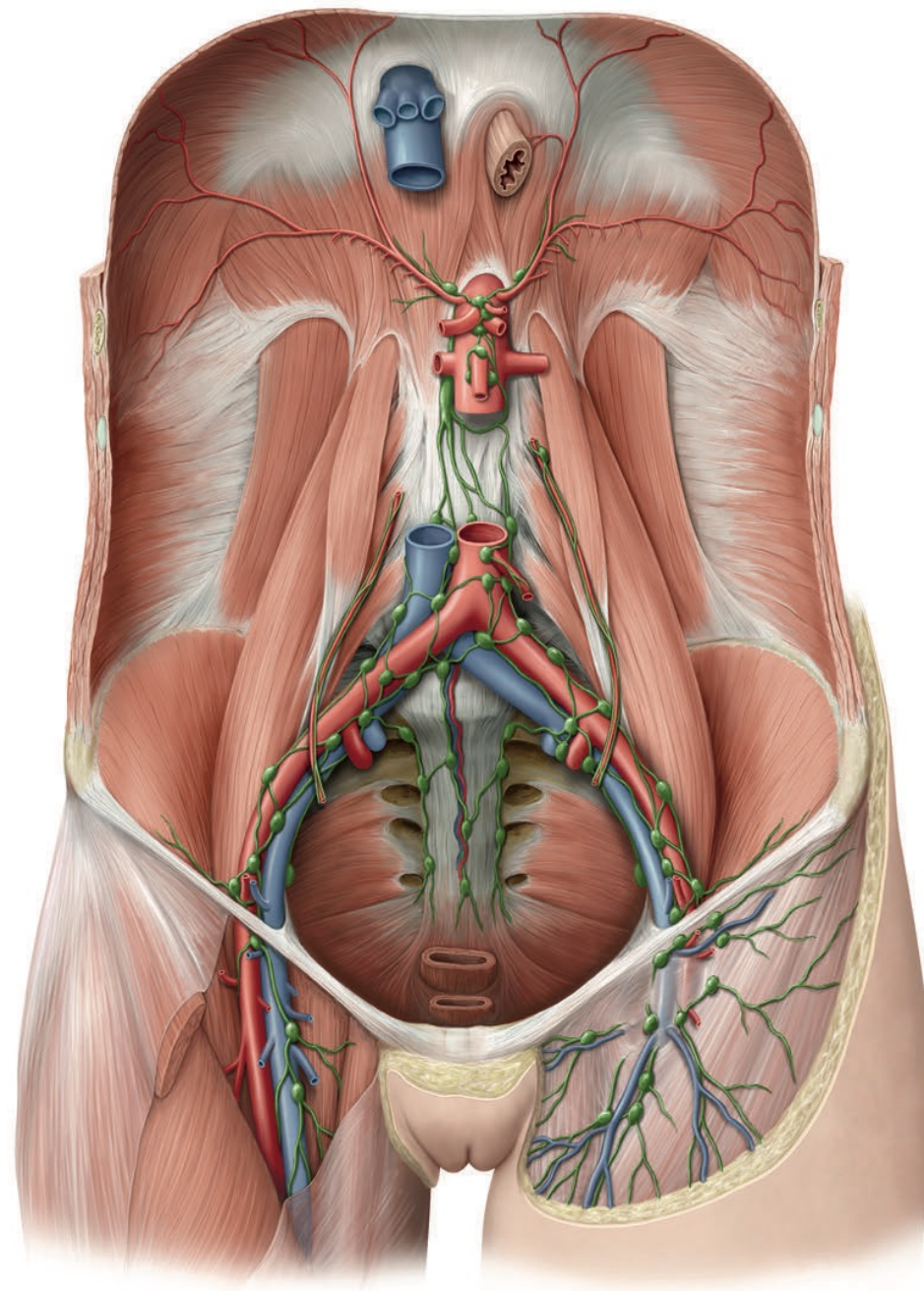
- ♦ V. iliolumbalis



Nodi lymphatici

- Nodi coeliaci
- Nodi mesenterici superiores
- Nodi mesenterici inferiores
- Nodi paraaortales
- Nodi aortales laterales sin.
- Nodi preaortales
- Nodi aortales laterales dextri
 - „interaortocaval“
- Nodi paracavales
- Nodi iliaci communes
- Cisterna chyli





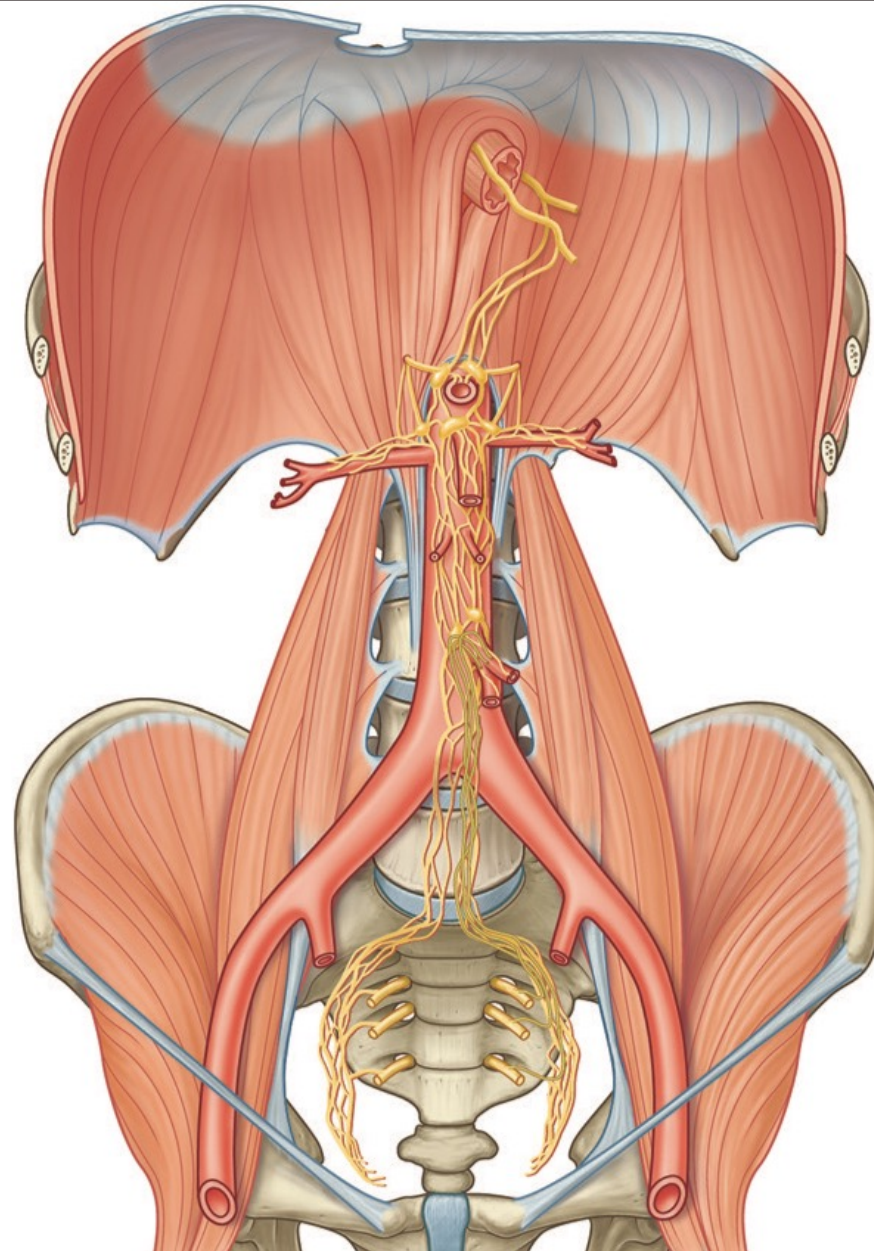
Sympaticus

♦ Truncus sympatikus - ganglia

- ♦ Thoracica 5 – 12
- ♦ Lumbalia 4
- ♦ Sacralia 4 – 5
- ♦ Impar

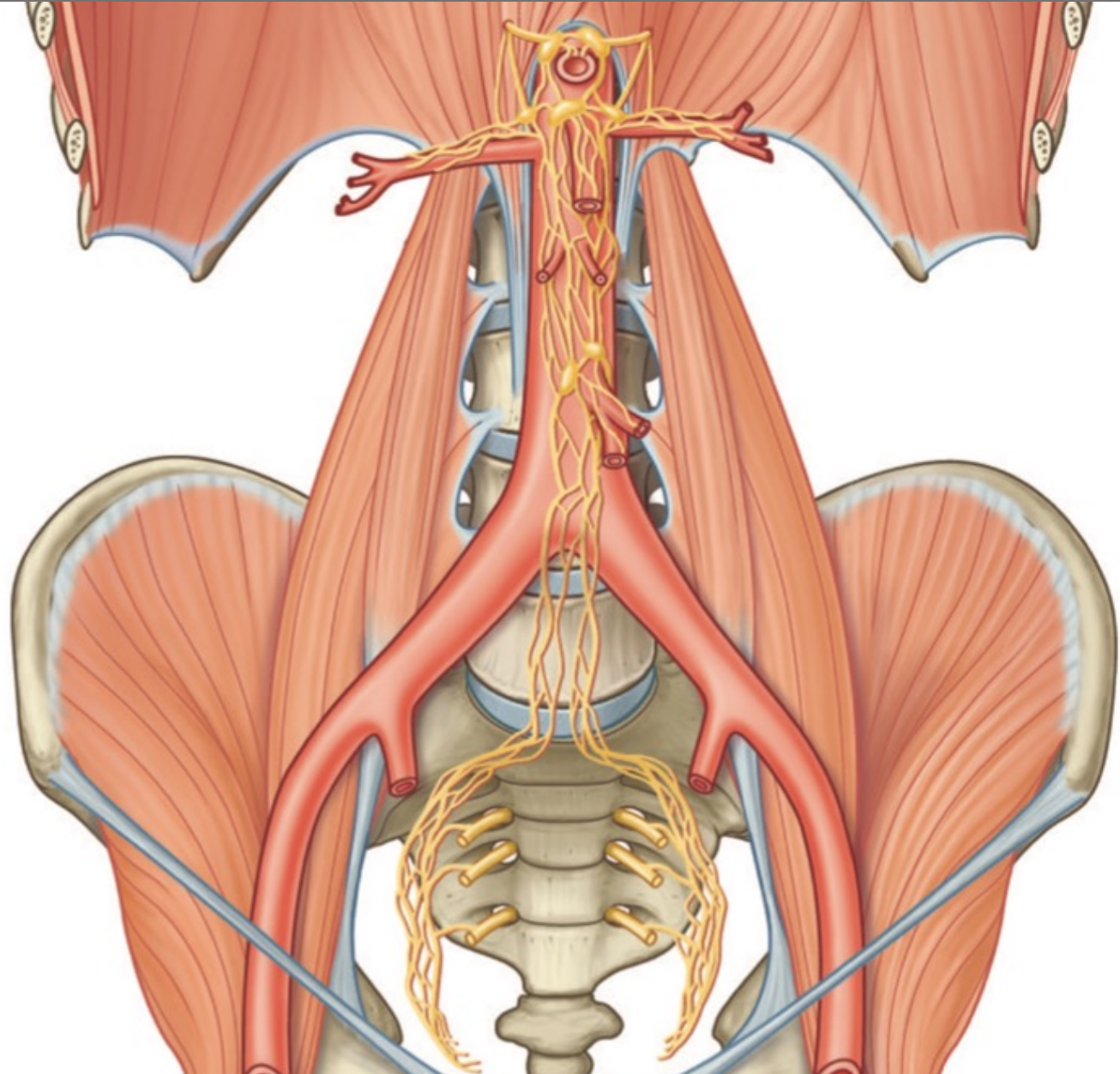
♦ Nervi splanchnici

- ♦ N. splanchnicus major (Th 5 – 9)
 - ♦ Ganglion coeliacum
- ♦ N. splanchnicus minor (Th10 – 11)
 - ♦ Ganglion aorticorenale
- ♦ N. splanchnicus minimus (Th 12)
 - ♦ Plexus renalis
- ♦ Nn. splanchnici lumbales
 - ♦ superior (L1+2), inferior (L3, 4)
- ♦ Nn. splanchnici sacrales, pelvici



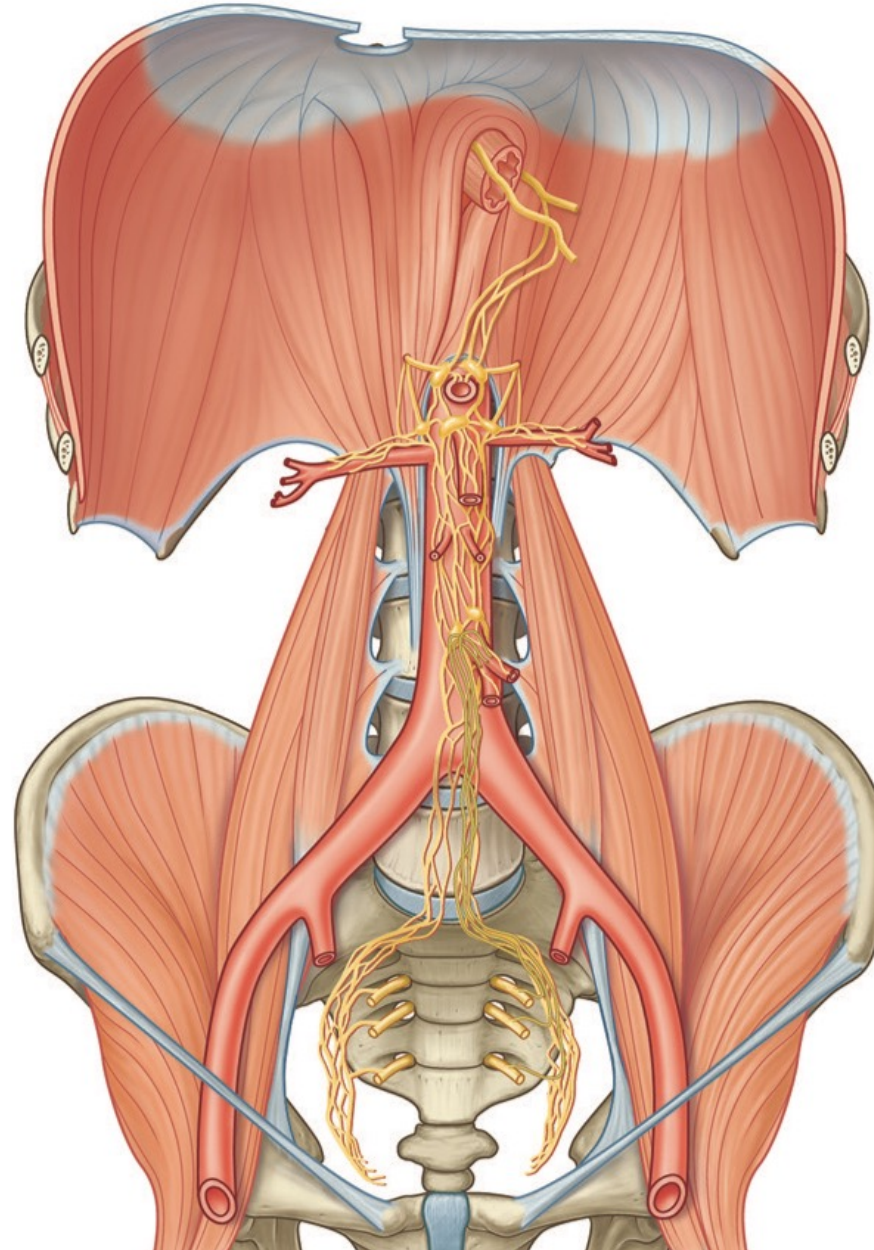
Plexus praevertebralis

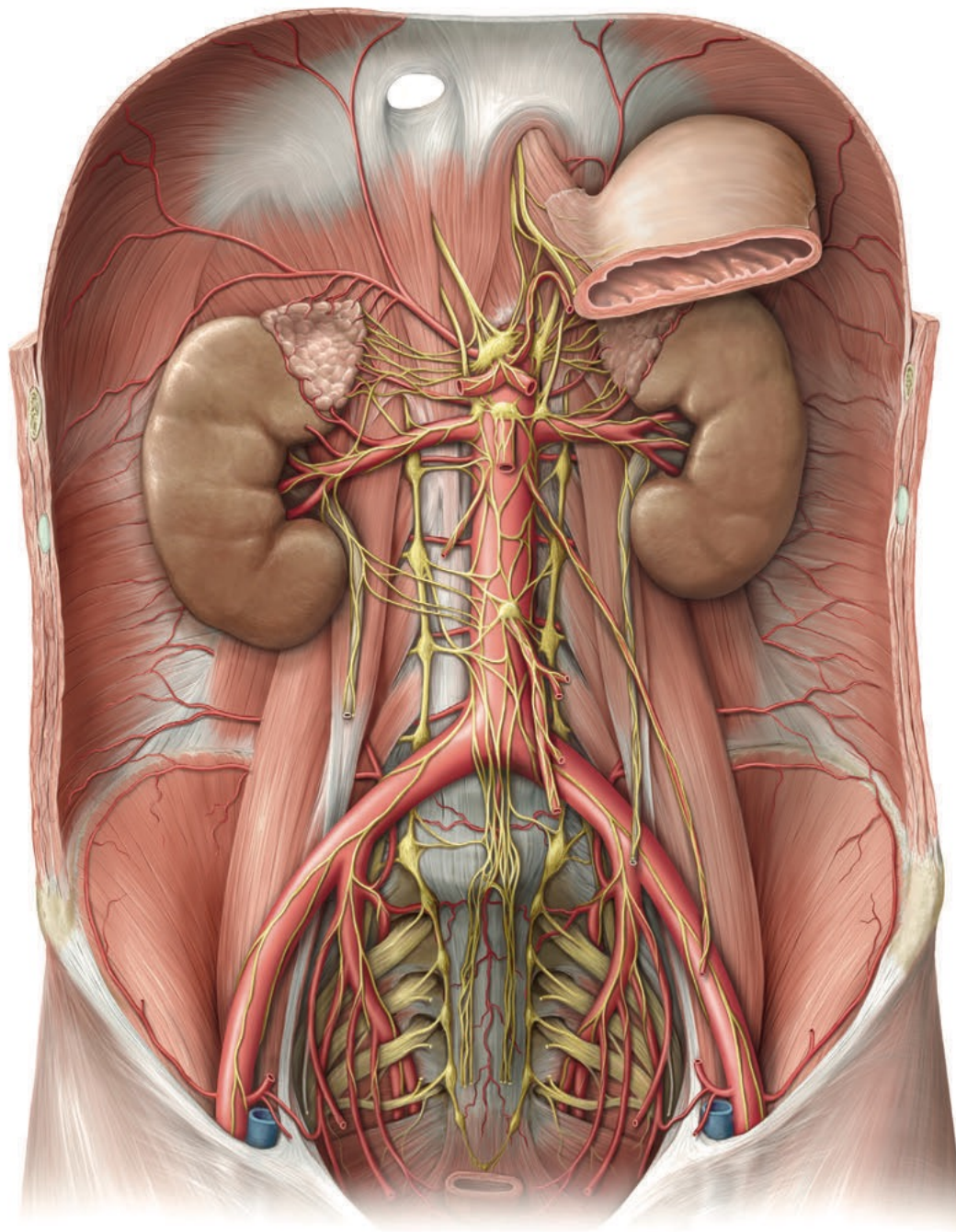
- ◆ Plexus coeliacus
- ◆ Plexus renalis
- ◆ Plexus aorticus
- ◆ Plexus hypogastricus superior
- ◆ Nervus hypogastricus
- ◆ Plexus hypogastricus inferior



Parasympathetic

- Nervus vagus (N. X)
- Truncus vagalis anterior
- Truncus vagalis posterior
- Ganglia sacralia S2 – 4
- Nervi splanchnici (+ sympathetic)





abdomen – concept, abdominal wall, peritoneal cavity

Prof. MUDr. Jiří Ferda, Ph.D.