Anterolateral Abdominal Wall

SCRUBS

STUDENT COLLABORATIVE RESOURCES FOR UNDERSTANDING AND BRODY SUCCESS

Bryce Pugh, BSOM 2027

Resources used
Coursepack Illustration Supplement - BSOM

Mission Statement

SCRUBS is a student-driven initiative that aims to develop supplemental resources for current and future cohorts that will pass through Brody. Members of **SCRUBS** participate in a variety of sub-committees working to create resources for students, by students. These resources aim to offer unique perspectives from students that have walked in the same shoes, developing resources that we wish we had been exposed to during our time in the course.

The hope is this organization will become a staple of the Brody student body, exemplifying the unique collaborative community that Brody offers. If this is a mission that aligns with your goals and you have the desire to help those that will come behind you, as well as a goal to leave your mark on Brody as a whole, we invite you to join the team!

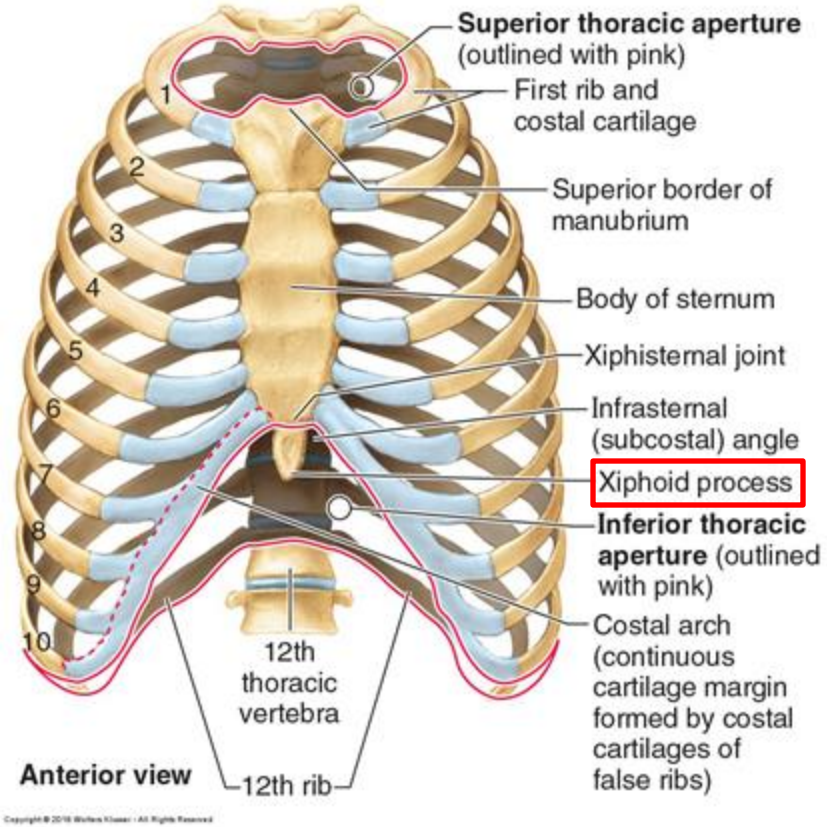
Disclaimer

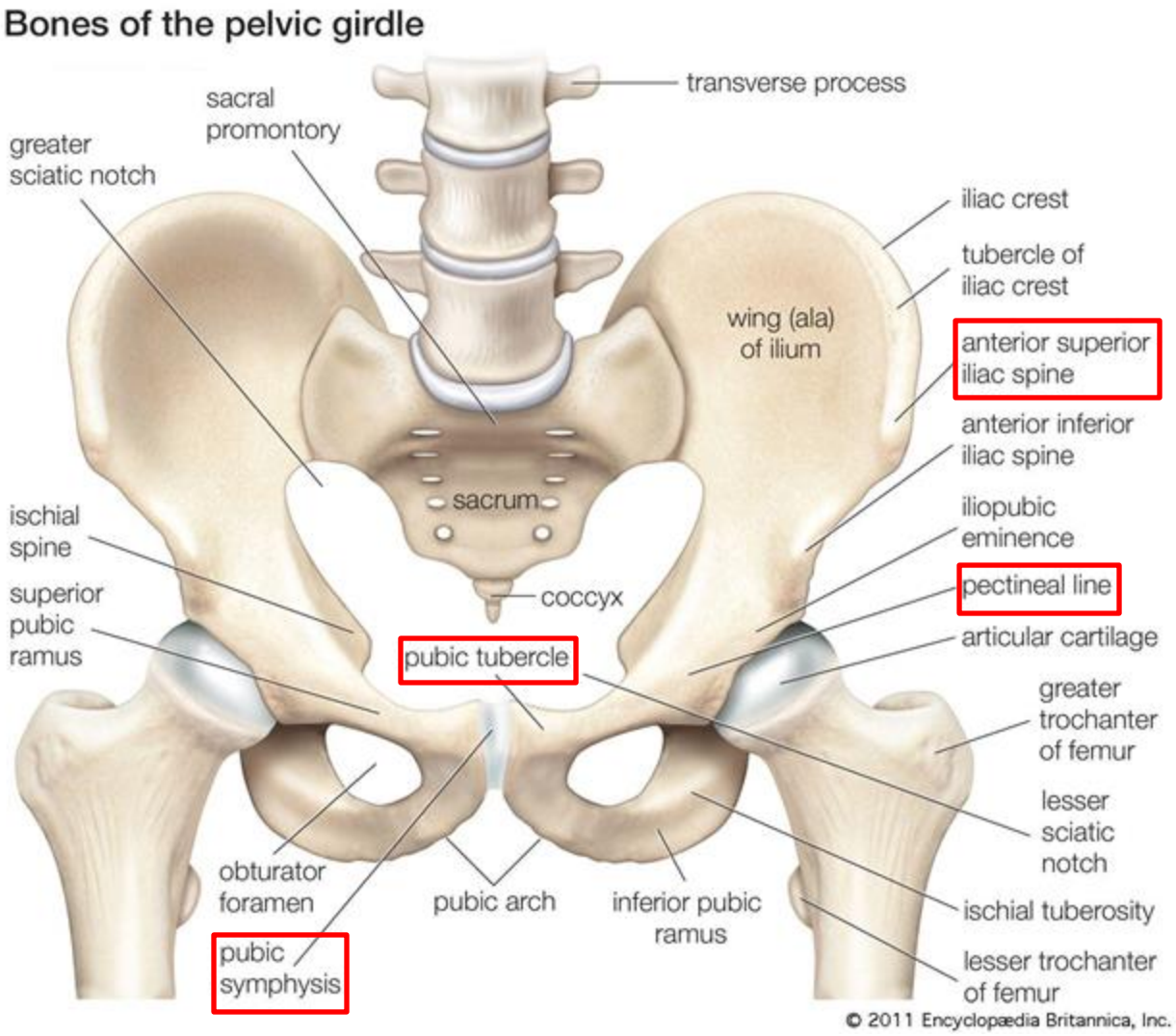
The resources that are included in this document are made by students and not the faculty. As such, there is the possibility for errors in our development, although this is mitigated via a team approach to development with multiple stages of vetting. If there is a contradiction with the coursework presented within your course, please go by the course documents. Additionally, **SCRUBS** aims to supply ***supplemental resources***, however these are in no way replacements to the instruction of the Brody faculty. Use these resources as a supplement, but not as your primary source for course material.

Osteology

Important structures to know

- Xiphoid process
- Pubic symphysis
- Pubic tubercle
- Anterior superior iliac spine (ASIS)
- Pectineal line



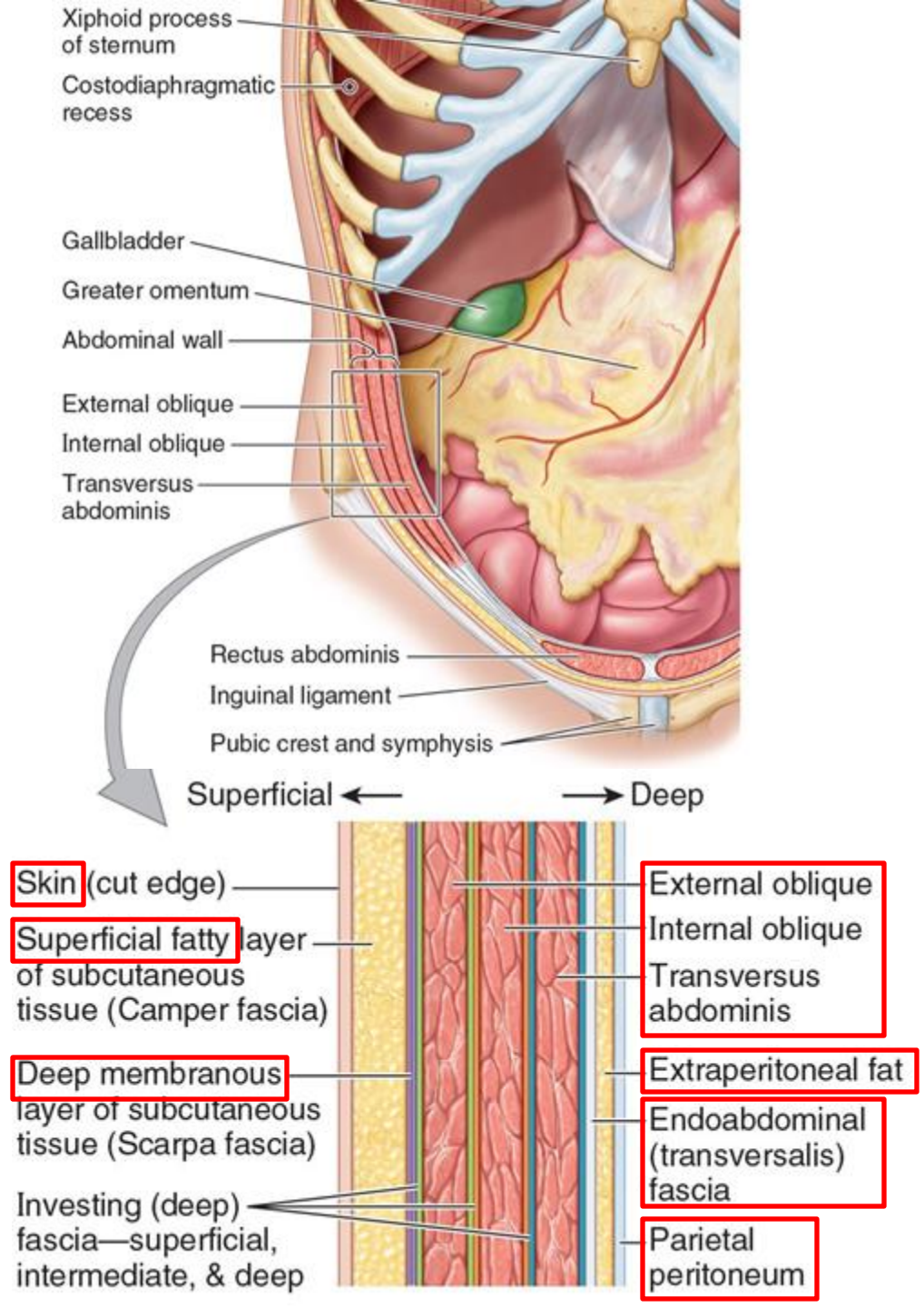


Britannica. Pelvis | Definition, Anatomy, Diagram, & Facts. *Encyclopædia Britannica*. ; 2019.

Abdominal Wall Layers

- Skin/dermis
- Camper fascia (superficial fatty layer) } **Fascia**
- Scarpa fascia (membranous layer)
- External oblique } **Muscles**
- Internal oblique
- Transversus abdominis
- Transversalis fascia } **Fascia**
- Extraperitoneal **fat**
- Peritoneum

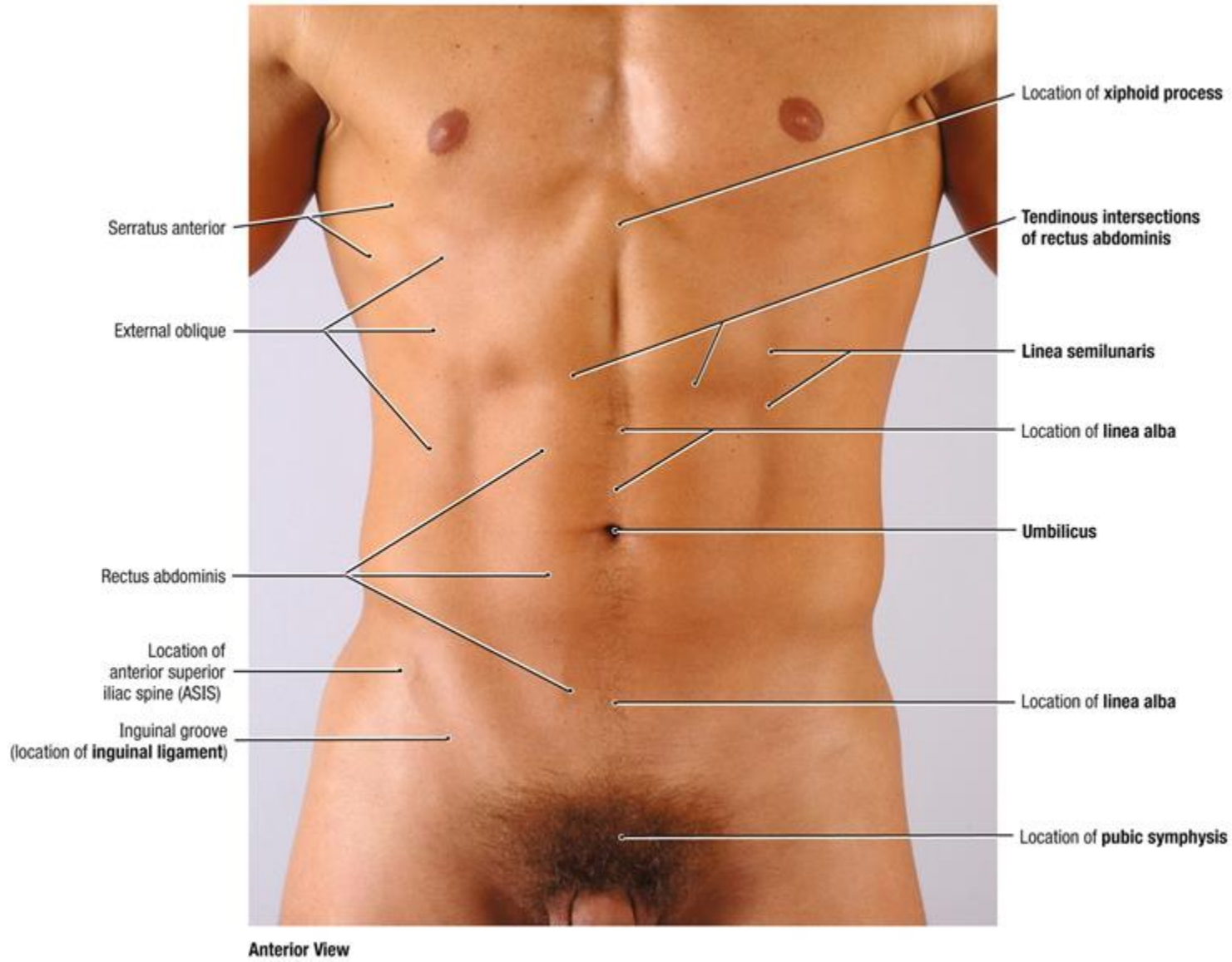
Know the layers inside and out!



Abdominal Wall Layers

Skin

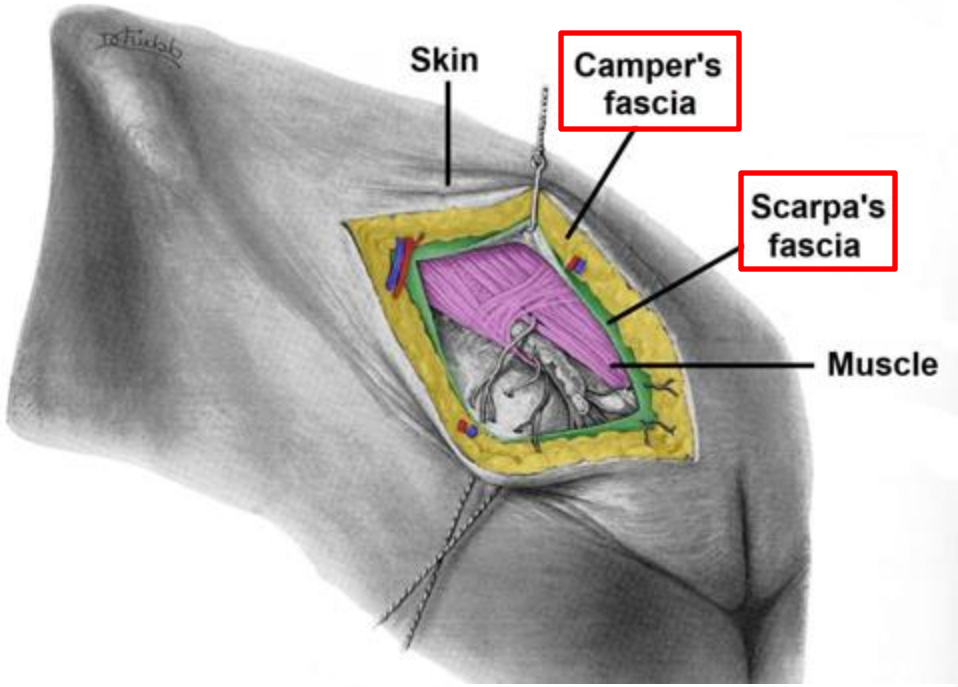
- Umbilicus: bellybutton!
  - Midway b/w xiphoid process & pubic symphysis
  - At intervertebral disc b/w L3/L4

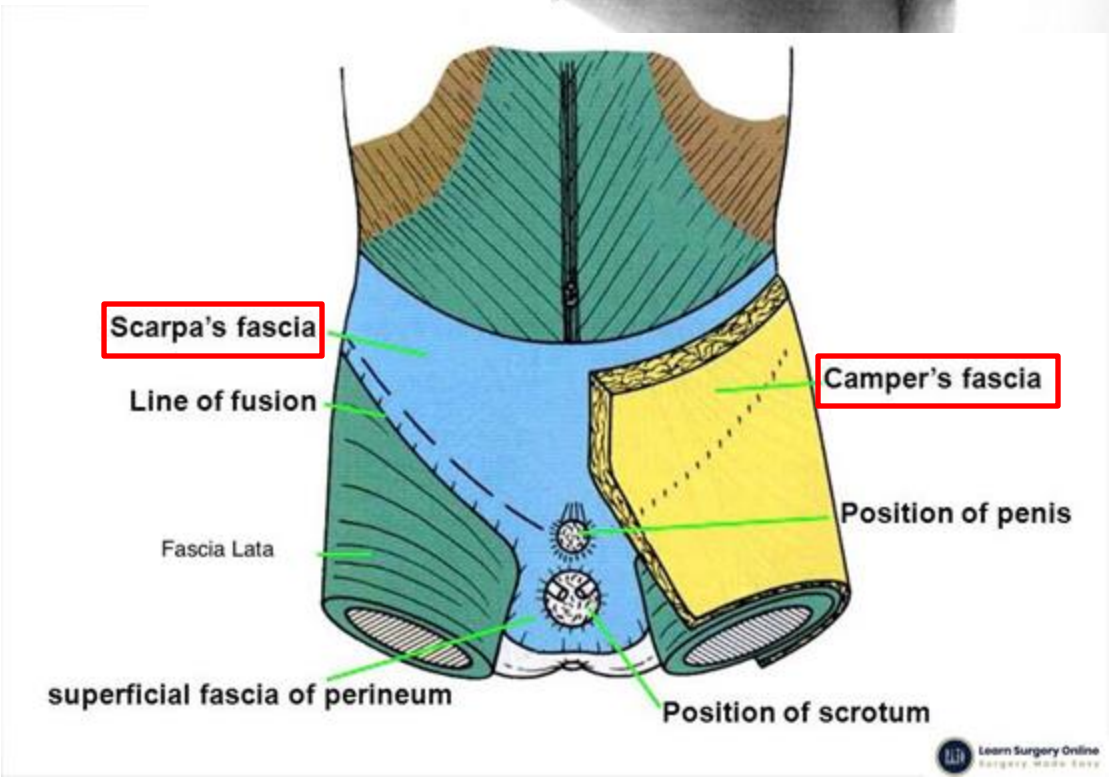


Abdominal Wall Layers

Superficial Fascia

- Superficial fatty layer (**Camper's fascia**)
- Membranous layer (**Scarpa's fascia**):
  - Connects to superficial perineal fascia (perineum) and fascia lata (thigh)
  - Fundiform ligament of the penis: thickened in males at midline, passes inferiorly on each side of the penis





Jones O. The Anterolateral Abdominal Wall - Muscles - TeachMeAnatomy. 2012. Anterolateral Aspect | Learn Surgery Online.

Abdominal Wall Muscles

Listed from superficial to deep

External Oblique – Flat muscle

O: *Lower 8 ribs*	I: *Iliac crest, pubic tubercle, & linea alba*
N: Lower *intercostals (T_{7-11}), subcostal (T_{12}), iliohypogastric (L_1), ilioinguinal (L_1)*	A: *Lateral **flexion & rotation** of trunk. Increase intra-abdominal pressure*

Internal Oblique – Flat muscle

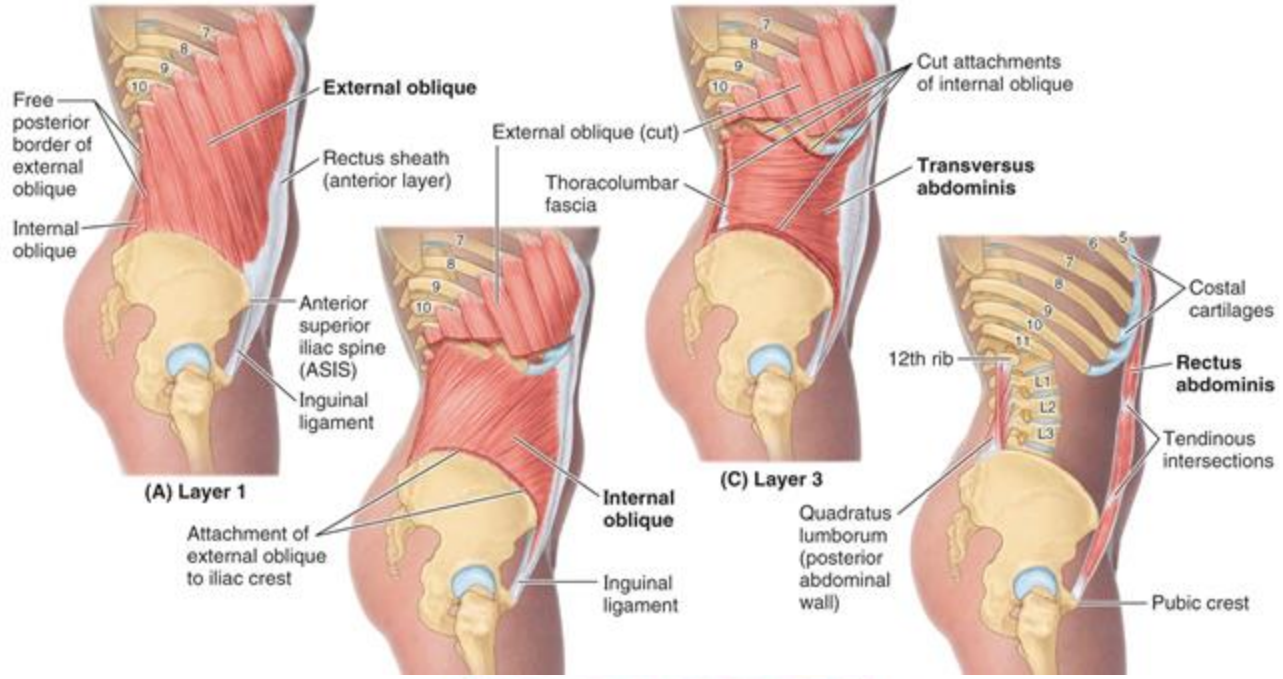
O: *Iliac crest & inguinal ligament*	I: *Superior fibers: lower 2 ribs Middle fibers: linea alba*
N: Lower *intercostals (T_{7-11}), subcostal (T_{12}), iliohypogastric (L_1), ilioinguinal (L_1)*	A: *Lateral **flexion & rotation** of trunk. Increase intra-abdominal pressure*

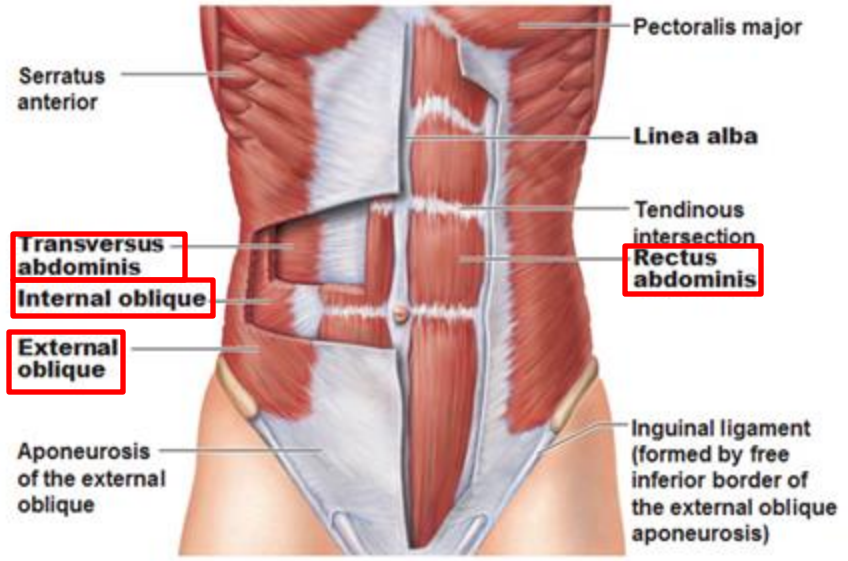
Transversus Abdominis – Flat muscle

O: *Lower 6 costal cartilages, iliac crest, thoracolumbar fascia, inguinal ligament*	I: *Linea alba & conjoint tendon*
N: Lower *intercostals (T_{7-11}), subcostal (T_{12}), iliohypogastric (L_1), ilioinguinal (L_1)*	A: *Lateral **flexion & rotation** of trunk. Increase intra-abdominal pressure*

Rectus Abdominis – Strap-like muscle

O: *Superior ramus of pubis*	I: *Xiphoid process & costal cartilages 5-7*
N: Lower *intercostals (T_{7-11}), subcostal (T_{12}), iliohypogastric (L_1), ilioinguinal (L_1)*	A: ***Flex** trunk*



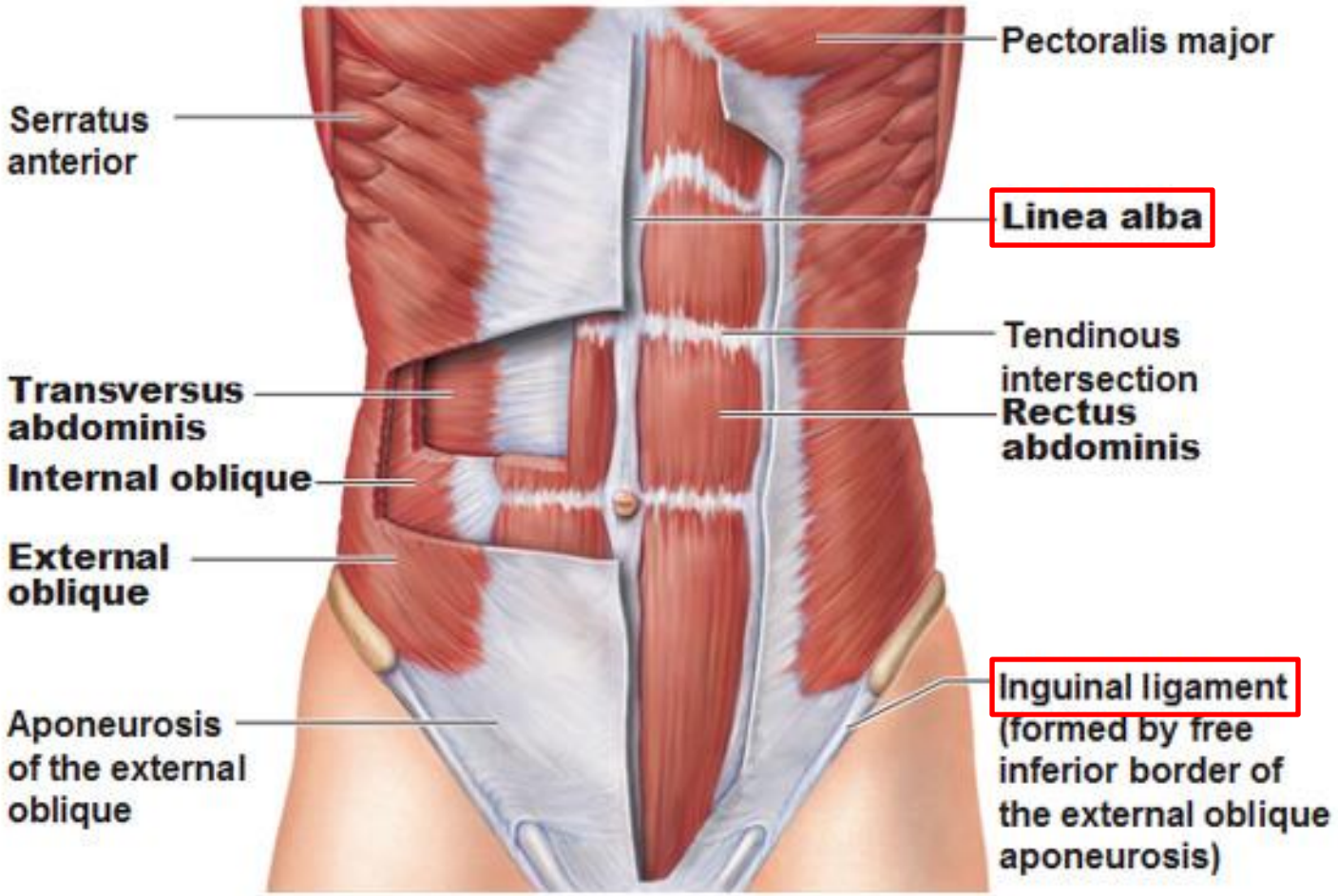


Internal oblique fibers perpendicular to external oblique

Muscles of the Abdominal Wall. antranik.org.

Abdominal Wall Layers

- **inguinal ligament**: Inferior thickened border of external oblique
- Conjoint tendon: aponeurotic fibers of internal oblique and transversus abdominis – inserts onto pubis
- **Linea alba**: intertwining of aponeurotic fibers of the 3 flat muscle in the midline



Muscles of the Abdominal Wall. antranik.org.

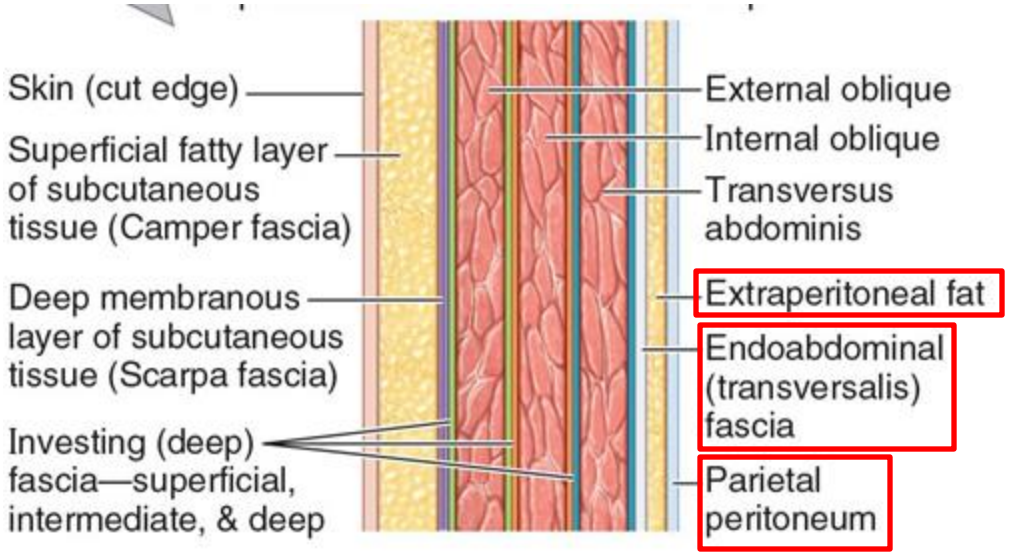
Abdominal Wall Layers

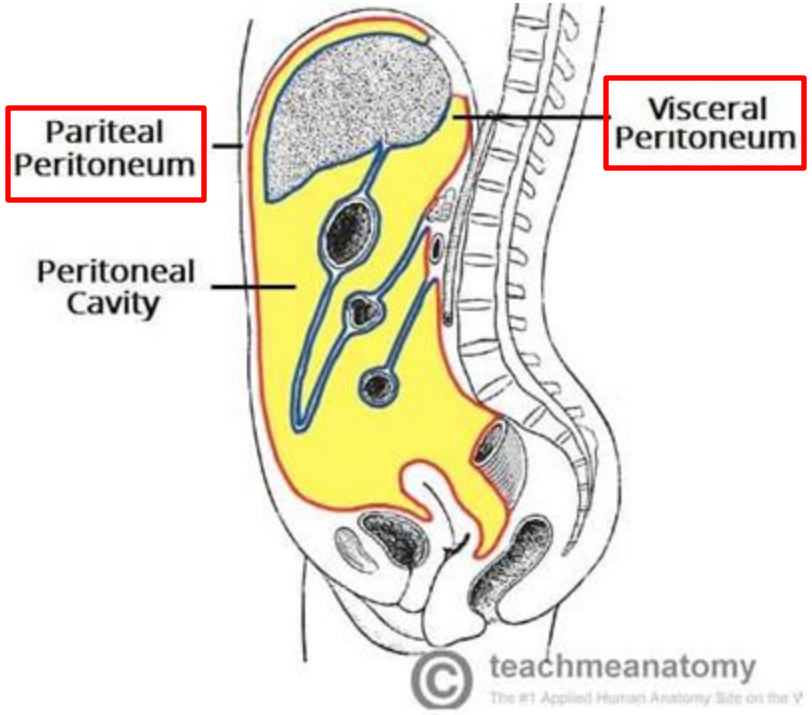
Transversalis fascia (endo-abdominal)

Extraperitoneal fat

Peritoneum

- Serous mbr. lining abdomen
- Parietal: cavity walls
- Visceral: viscera

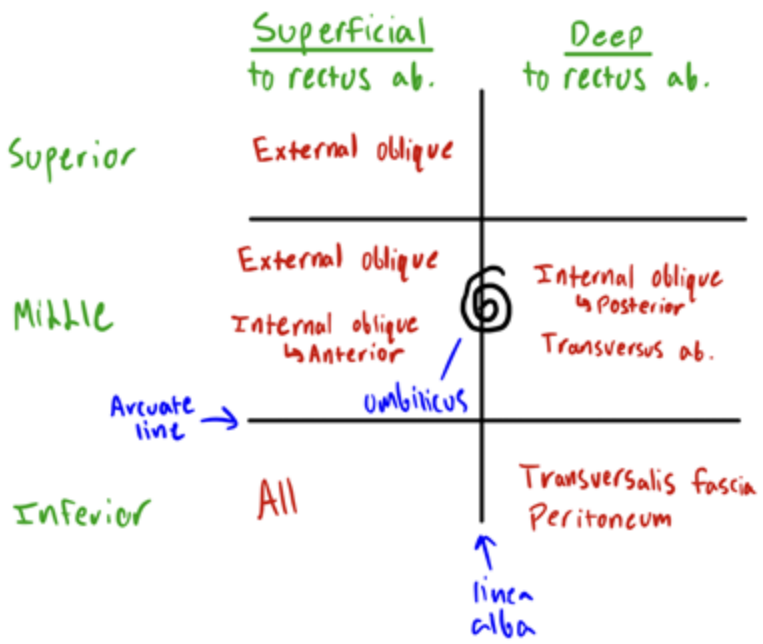


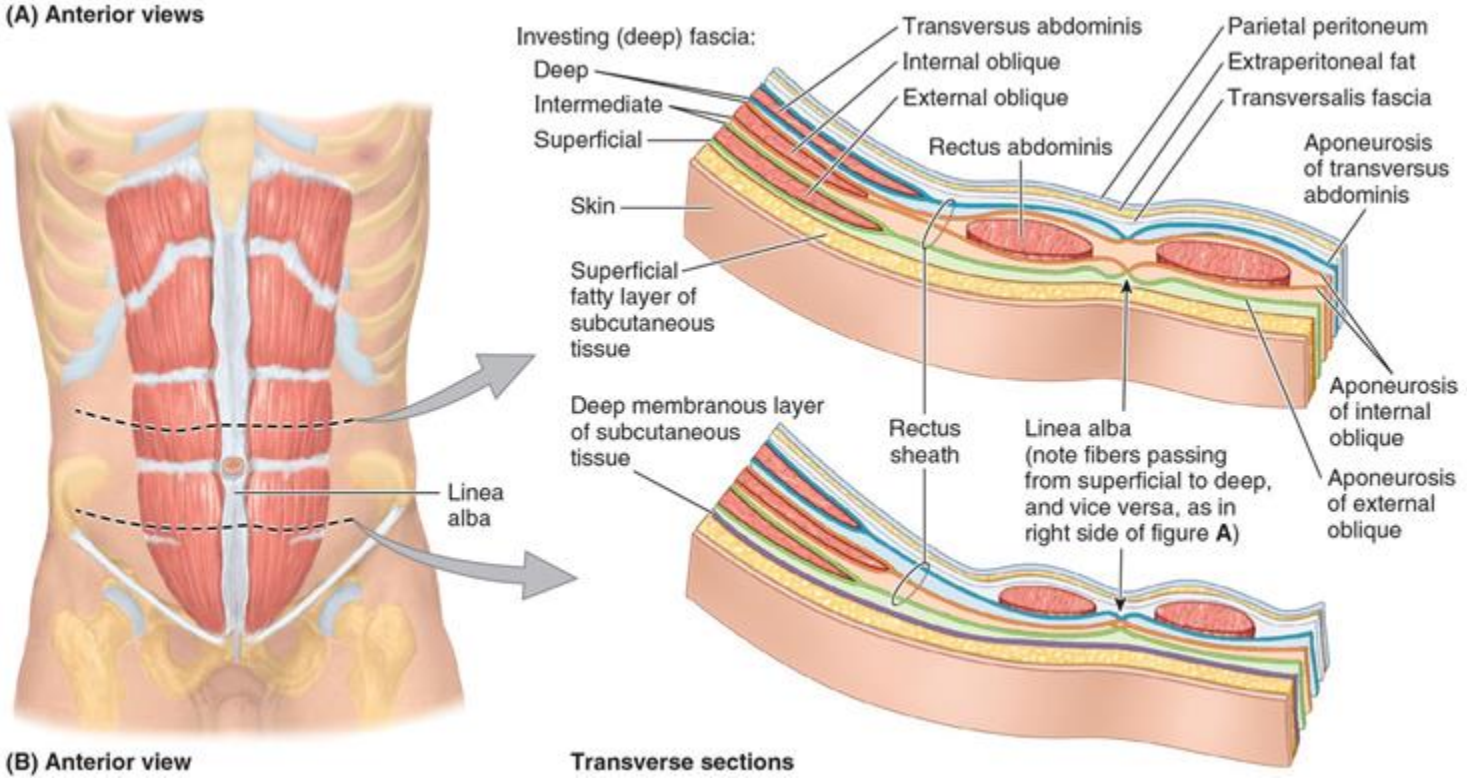


The Peritoneum - Visceral - Parietal - TeachMeAnatomy.

Rectus Sheath

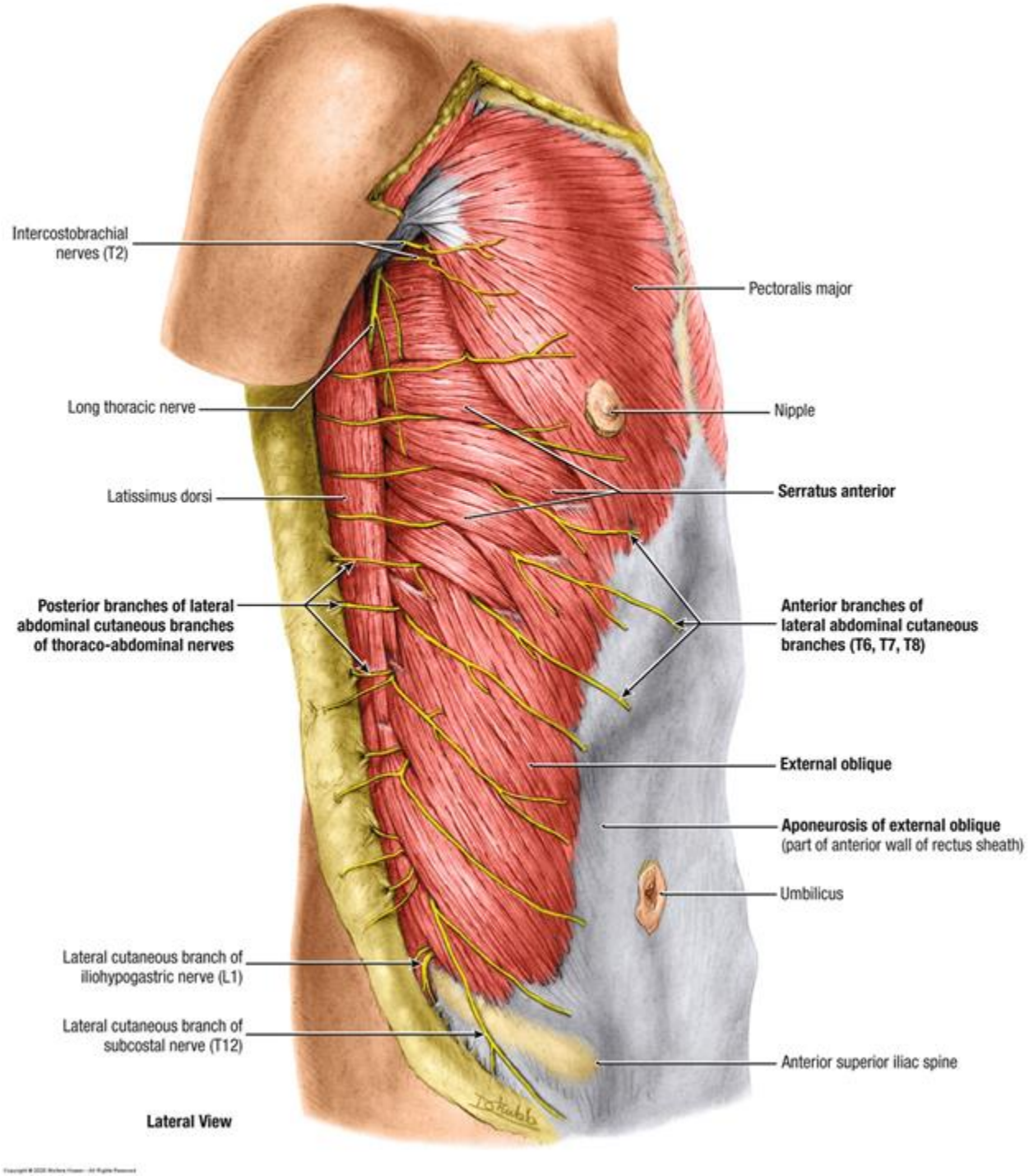
- Aponeuroses of the 3 flat muscles form rectus sheath
- Layers vary at distinct levels
  - **Superior**:
    - At Xiphoid process
    - Only external oblique
  - **Middle**:
    - Above umbilicus to midway b/w umbilicus and pubic symphysis
    - Internal oblique splits
  - **Inferior**:
    - Midway b/w umbilicus & pubic symphysis
    - Arcuate line: point where all 3 aponeurotic layers pass <u>anteriorly</u> to rectus muscle
- 3-4 tendinous intersections form multiple "abs"
  - Pyramidalis: small triangular muscle on anterior surface of inferior rectus muscle





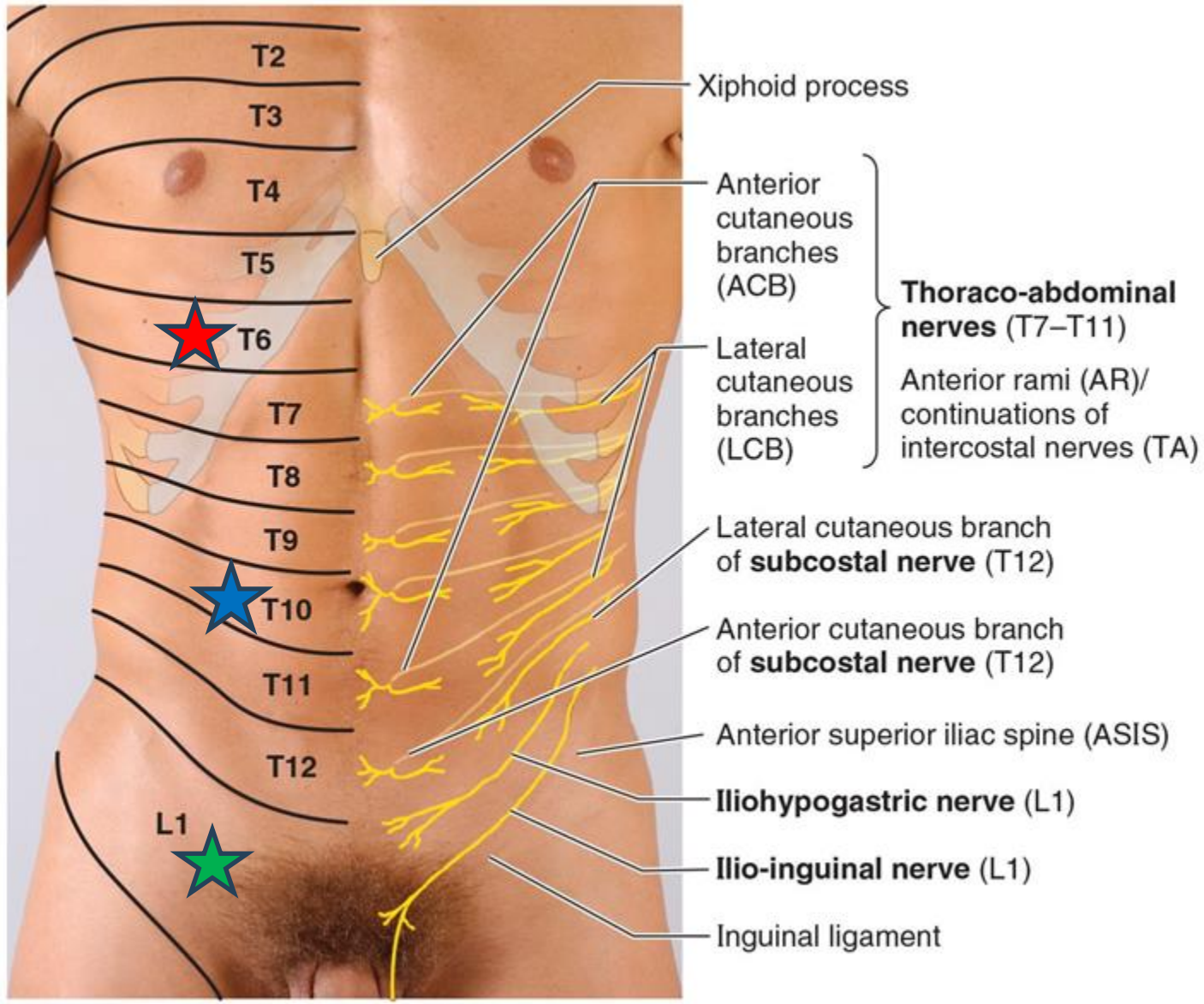
Innervation

- Skin & muscles supplied almost entirely by:
  - Lower intercostals (T_{7-11})
  - Subcostal (T_{12})
  - Run b/w internal oblique & transversus abdominis mostly
- Branches of the **lumbar plexus** supply inferior abdominal wall
  - Iliohypogastric (L_1)
  - Ilioinguinal (L_1)



Dermatomes

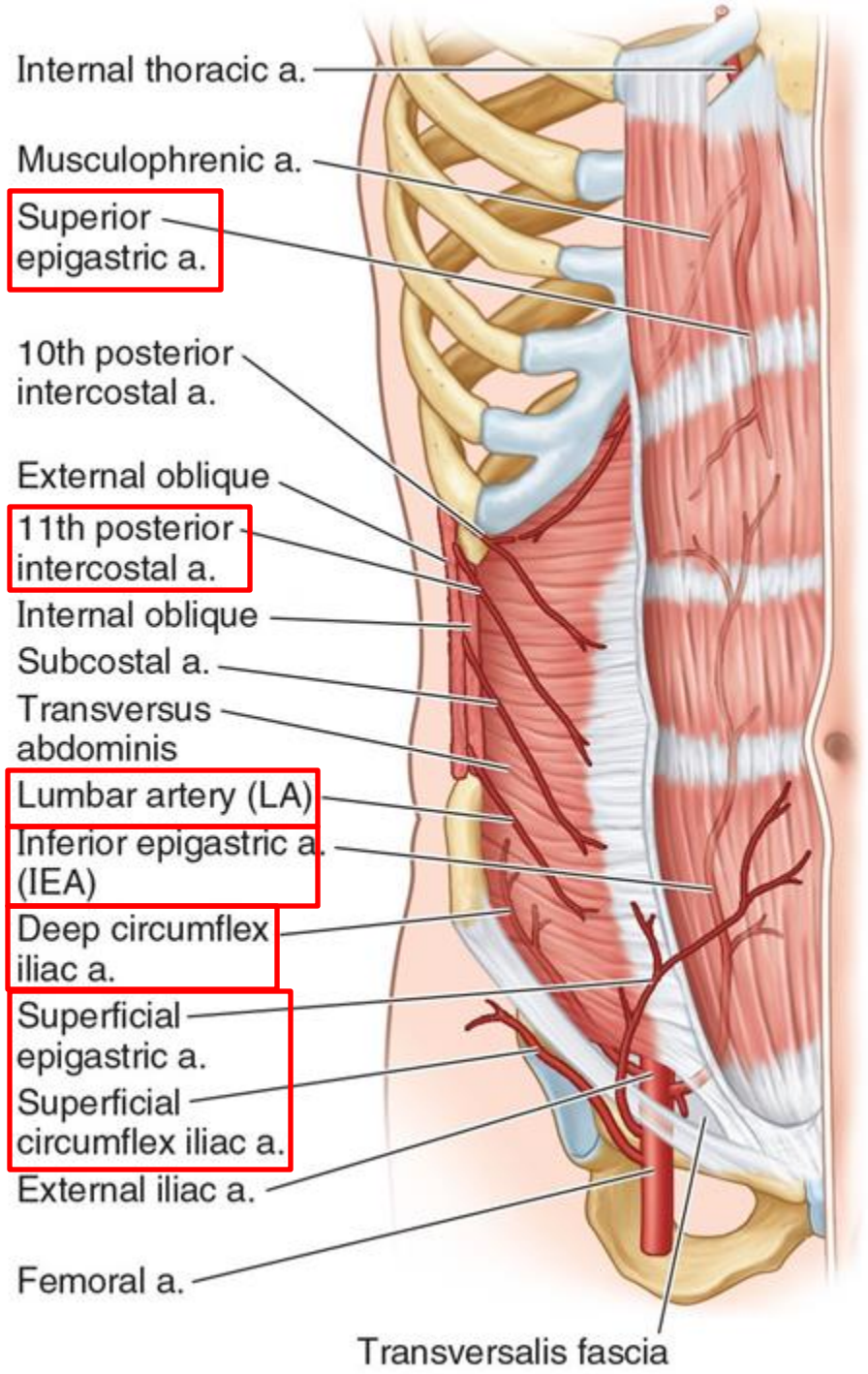
- Xiphoid process – T_6
- Umbilicus – T_{10}
- Pubic symphysis – L_1



(A) Anterior view

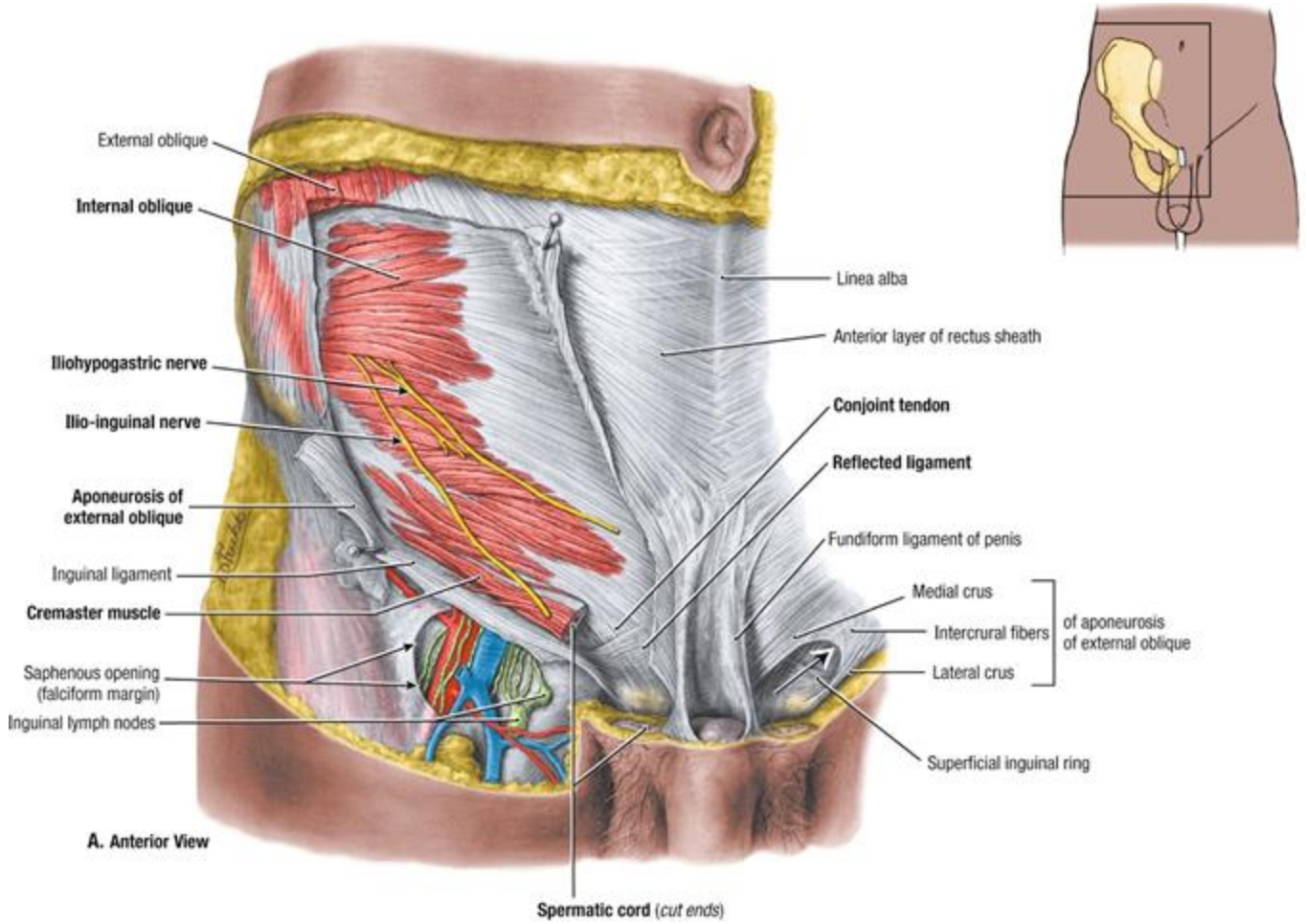
Vasculature

- Intercostal
- Internal thoracic
  - Superior epigastric
- External iliac
  - Inferior epigastric
    - Deep to rectus abdominis
    - Enters rectus sheath at arcuate line, branches & anastomoses w superior epigastric & intercostal
  - Deep circumflex iliac
- Lumbar
- Superficial branches of femoral
  - Superficial epigastric
  - Superficial circumflex iliac
  - Superficial external pudendal



Inguinal Region

- Inguinal ligament
  - From anterior superior iliac spine to pubic tubercle
  - Lacunar ligament: medial flattening that attaches to pectineal line



Inguinal Canal

Boundaries

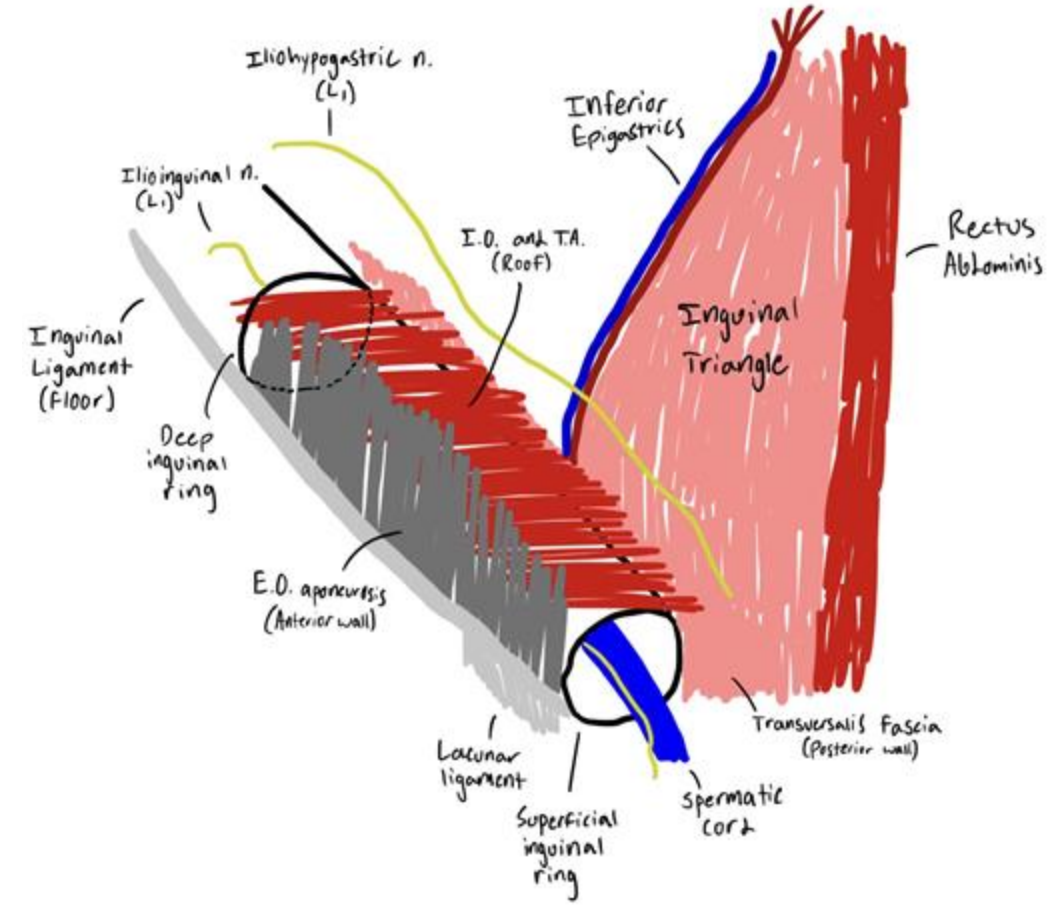
- **Roof**: internal oblique & transversus abdominis
- **Anterior wall**: aponeurosis of external oblique
- **Floor**: inguinal & lacunar ligaments
- **Posterior wall**: transversalis fascia

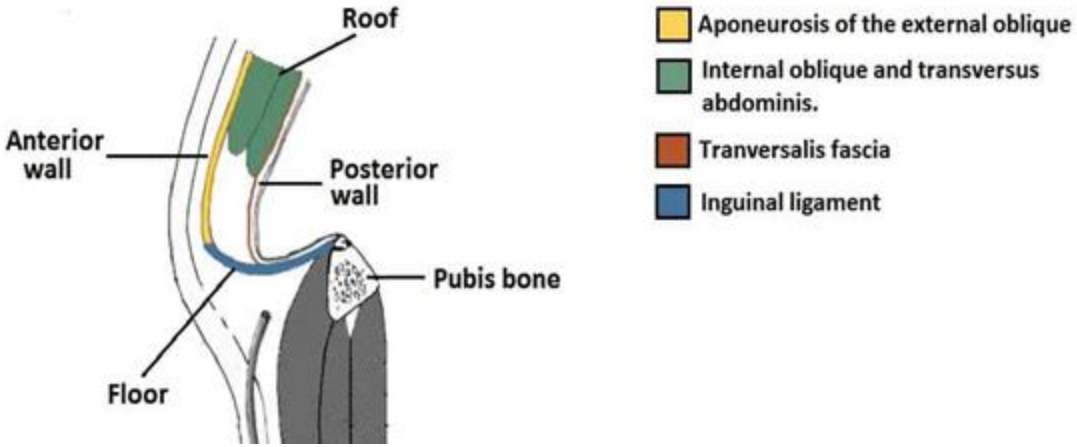
- **Entrance**: deep inguinal ring
- **Exit**: superficial inguinal ring

Contents

- Spermatic cord (male)
- Round ligament of uterus (female)
- Ilioinguinal n. & genitofemoral n.

MALT: Muscles (R), Aponeurosis (A), Ligaments (F), Tendon (P)





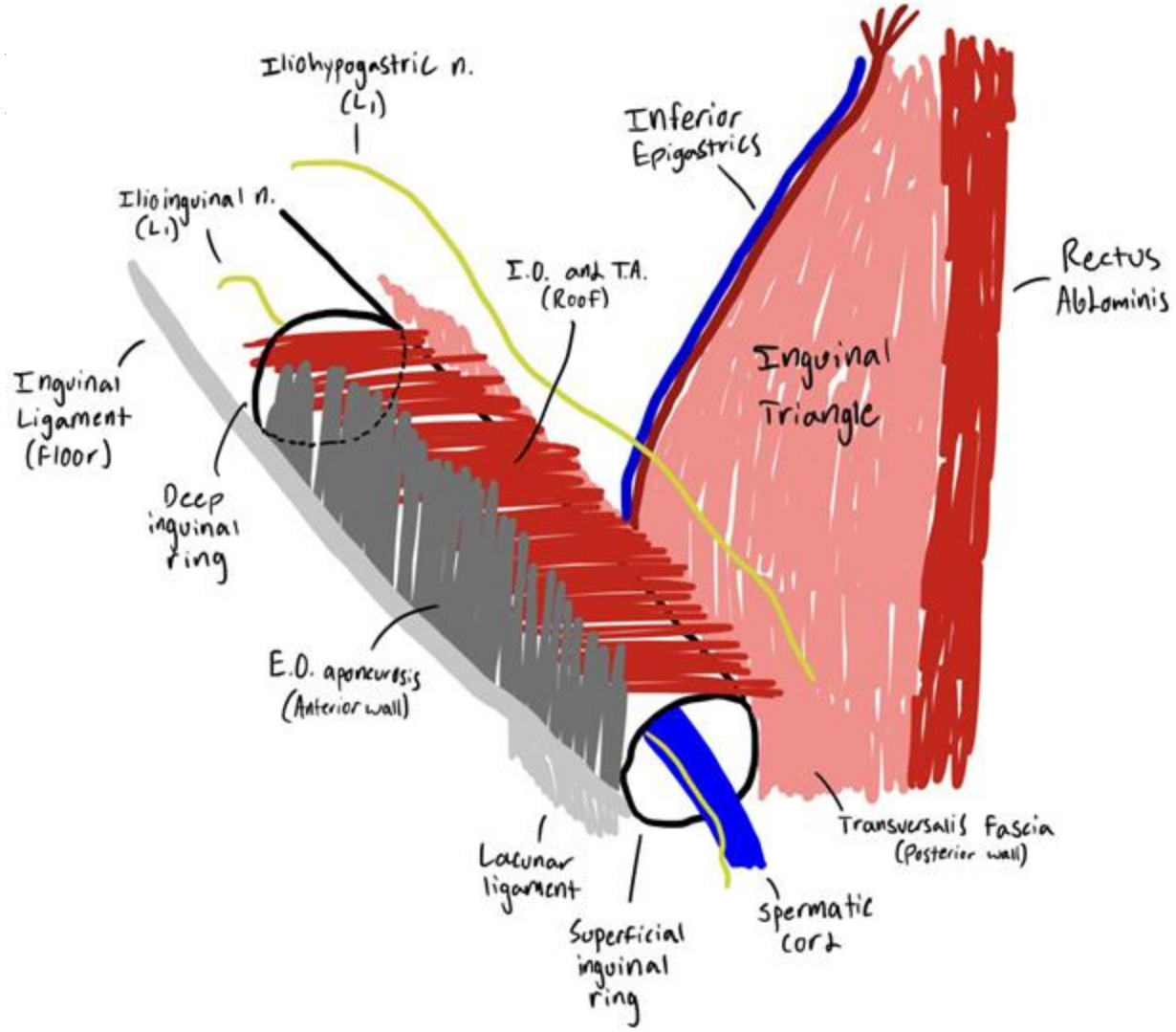
The Inguinal Canal - Boundaries - Contents - TeachMeAnatomy.

Inguinal Triangle

- Inguinal triangle (Hesselbach's triangle
  - Weak spot in abdominal wall
  - Posterior wall only transversalis fascia

Borders

- Inguinal ligament
- Rectus abdominis
- Inferior epigastric vessels



Coverings of Spermatic Cord

Gubernaculum:

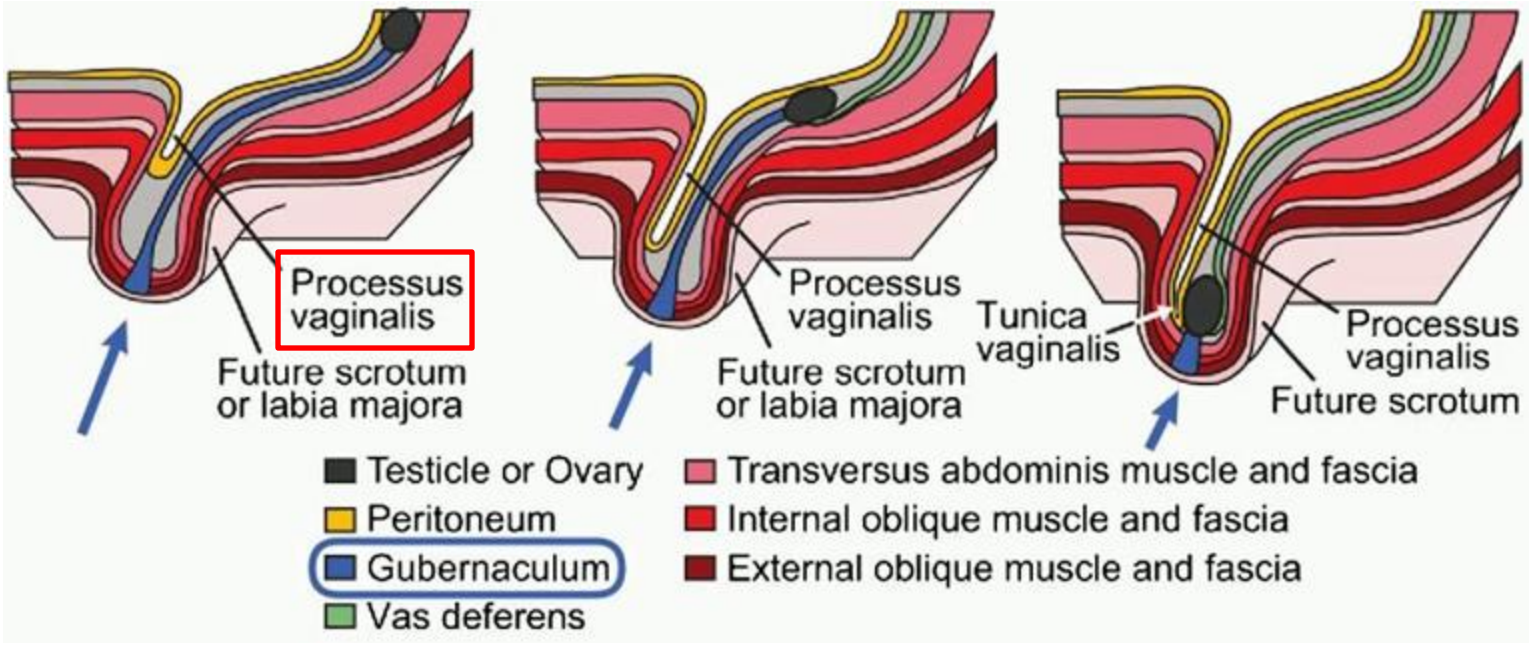
- Ligament indicating site of future inguinal canal
- Connects & guides developing testis through inguinal canal

Processus vaginalis:

- Peritoneal evagination
- Becomes deep inguinal ring

Coverings of spermatic cord:

- Abdominal wall layers extensions
- Brought to scrotum by descending testis



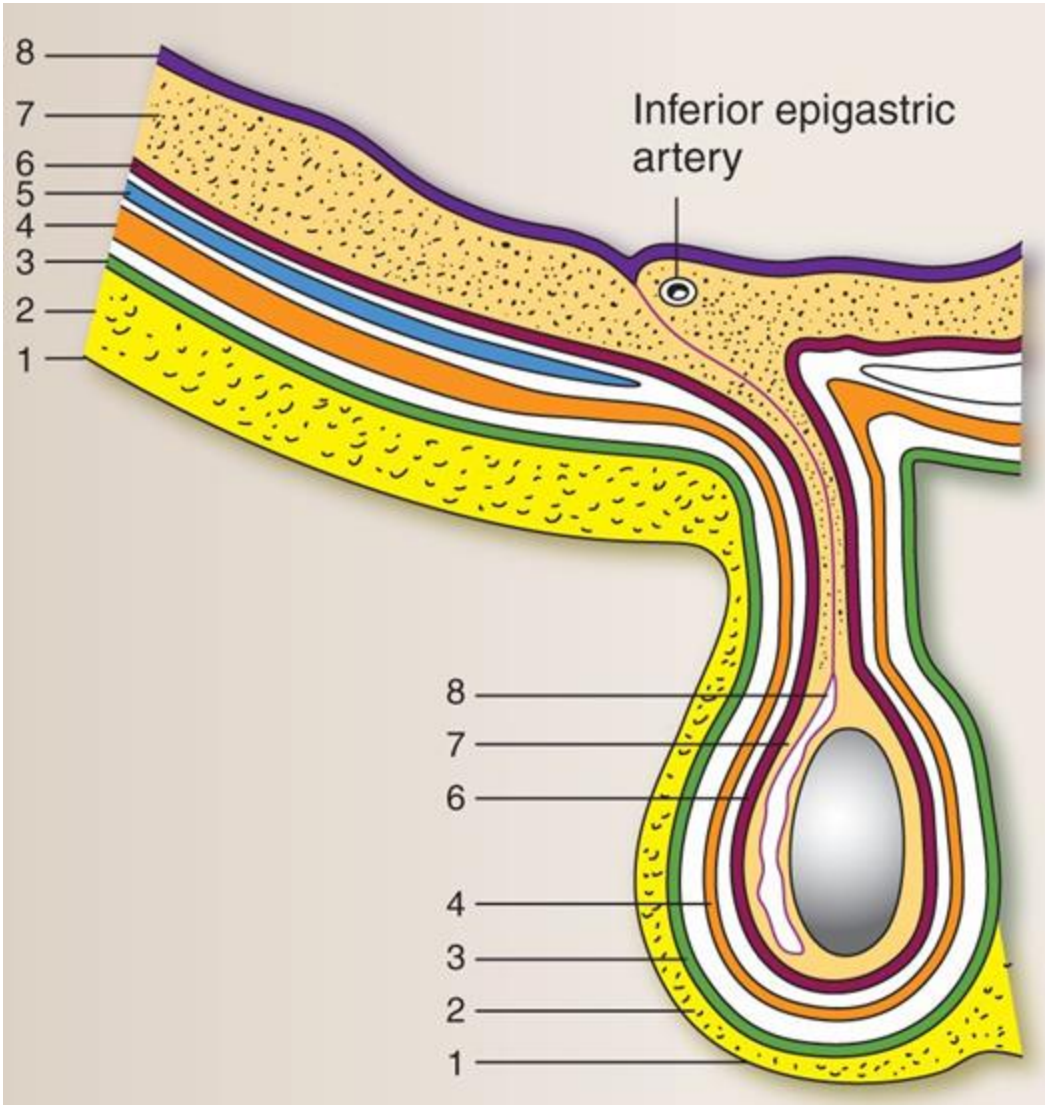
gubernaculum. www.youtube.com. Air to air. 2021

KNOW THIS SLIDE!!!!!

Coverings of Spermatic Cord

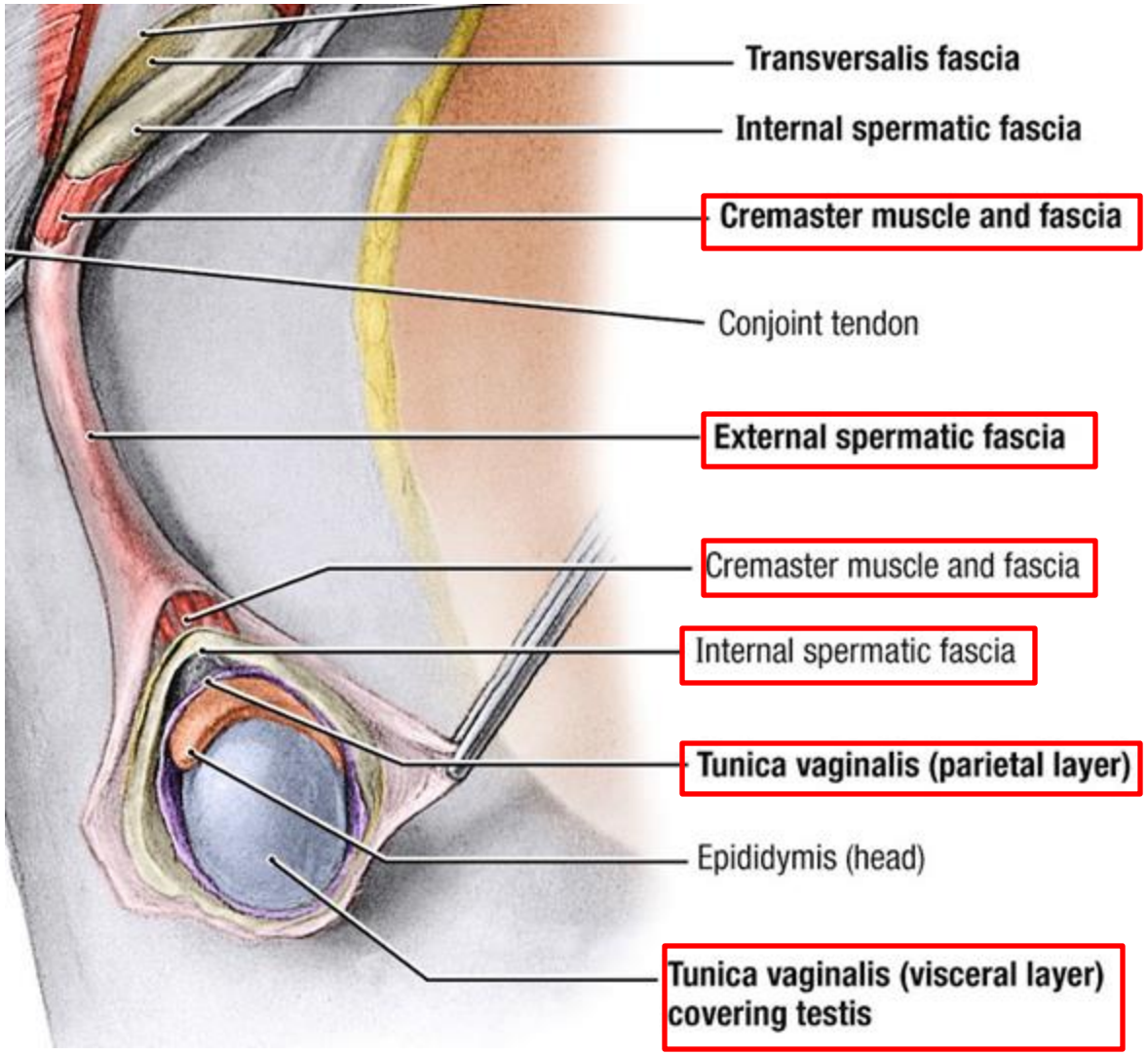
Figure	Layers of Abdominal Wall	Corresponding Layers of Scrotum/Spermatic Cord
1	Skin	Skin in scrotum
2	Superficial Fascia	Perineal fascia & dartos muscle
3	External Oblique	External spermatic fascia
4	Internal Oblique	Cremaster muscle & fascia
5	Transversus Abdominis	--
6	Transversalis Fascia	Internal spermatic fascia
7	Extraperitoneal Fat	Areolar tissue in cord
8	Peritoneum	Tunica vaginalis

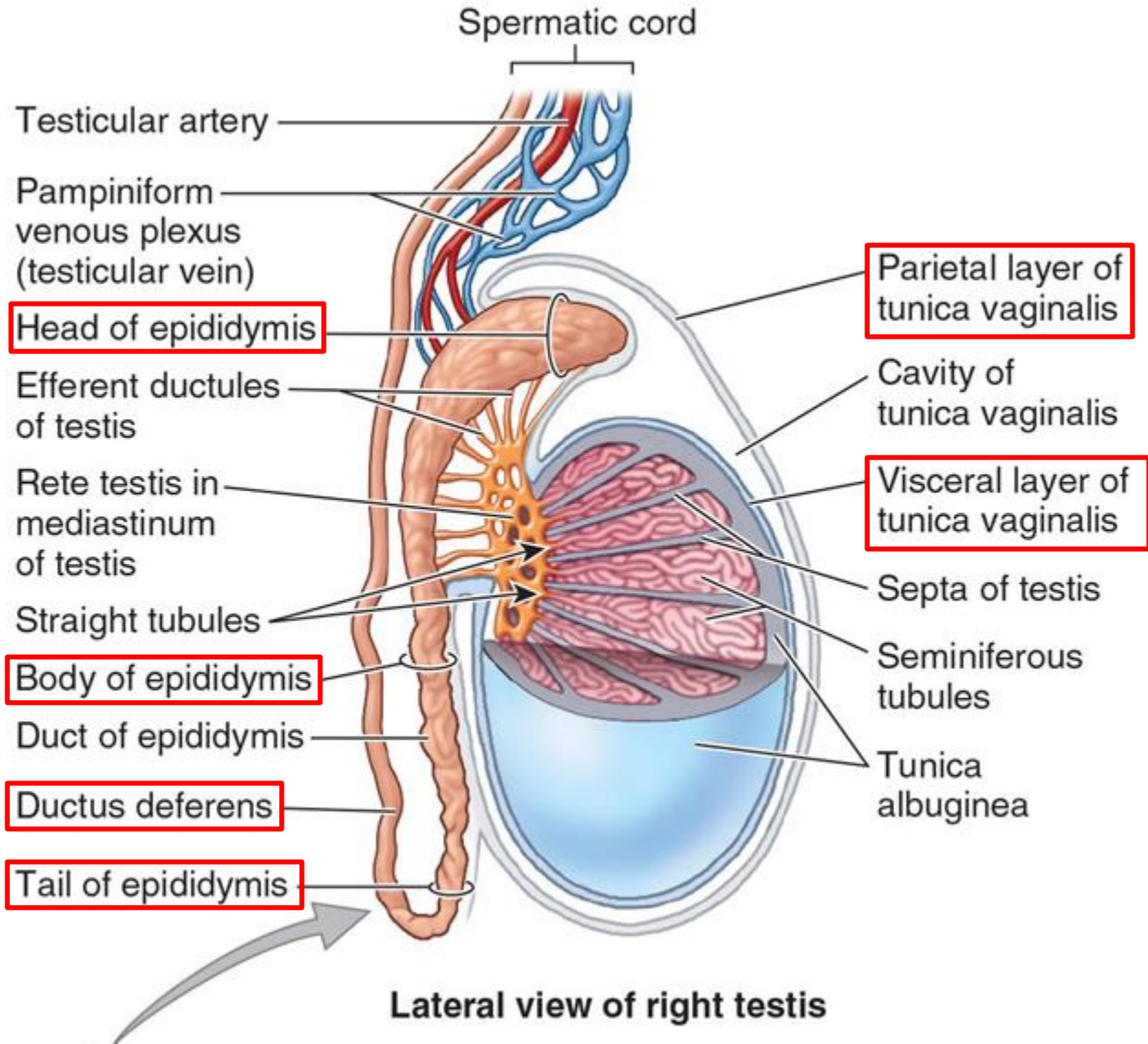
Some	People
Enjoy	Eating
Ice	Cream
Today.	-
Try	Instead
Eating	A
Pickle	Tomorrow



Abdominal Wall. https://almerja.com/reading.php?idm=154657

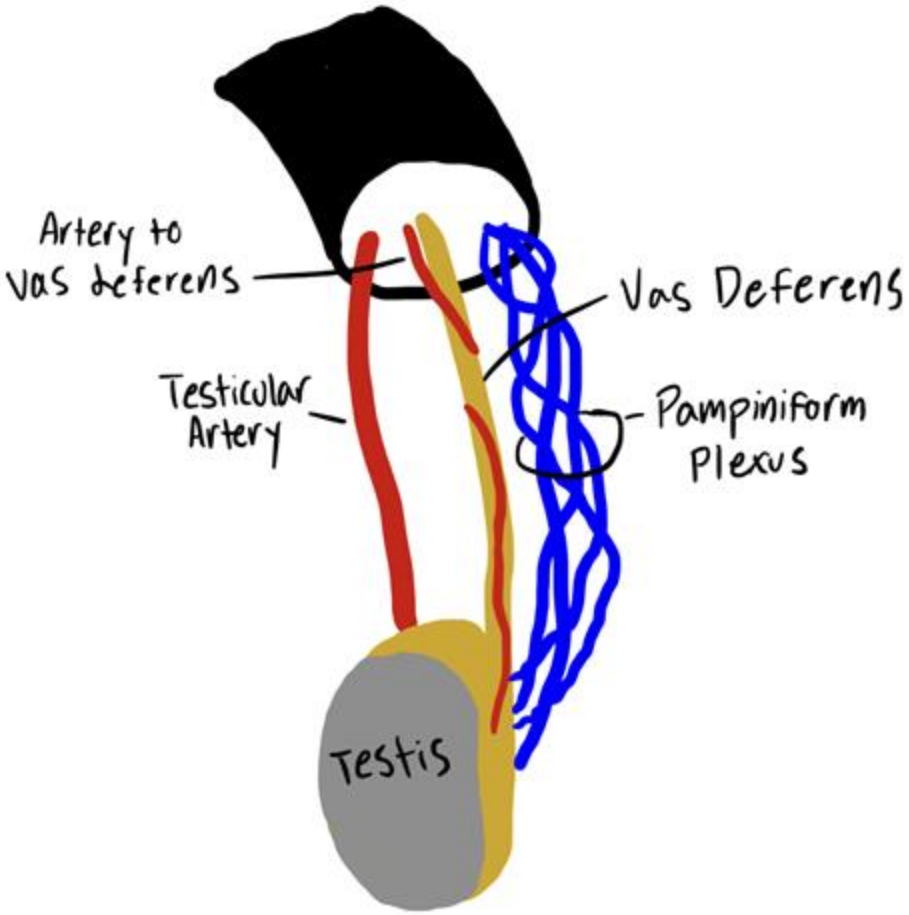
Anatomy of the Testes





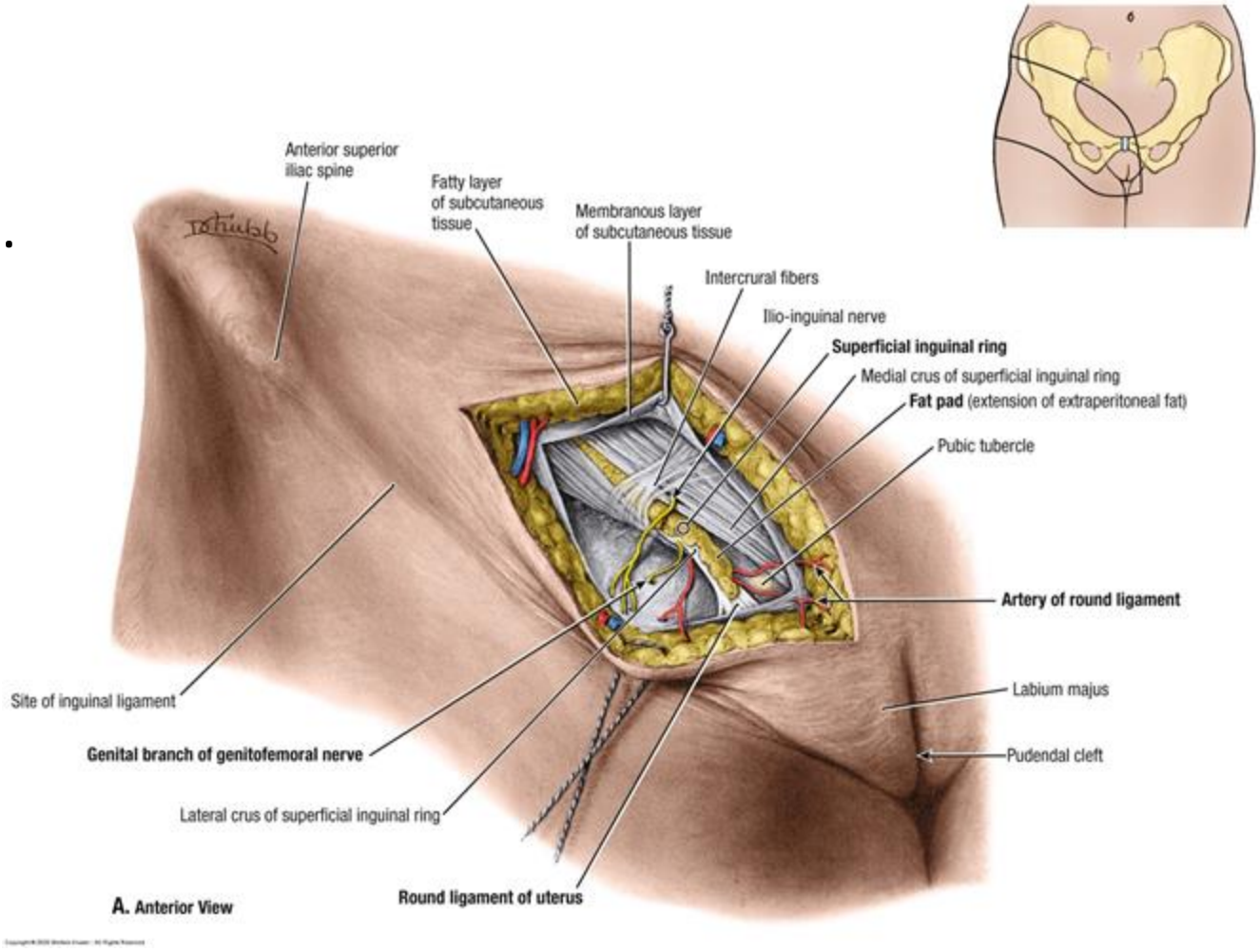
Spermatic Cord Components

- Vas/ductus deferens
  - Artery to vas deferens (deferential a.)
- Testicular artery
- Pampiniform plexus of veins
- Lymphatics
- Autonomic Nerves
- Genital branch of genitofemoral n.



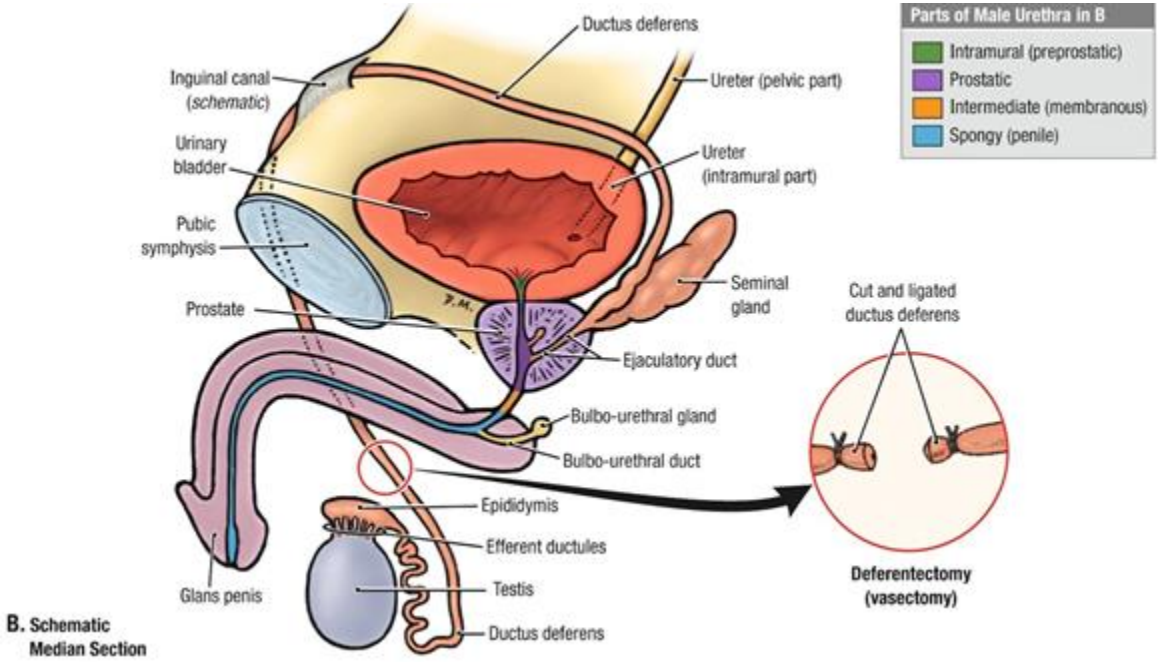
Spermatic Cord Components

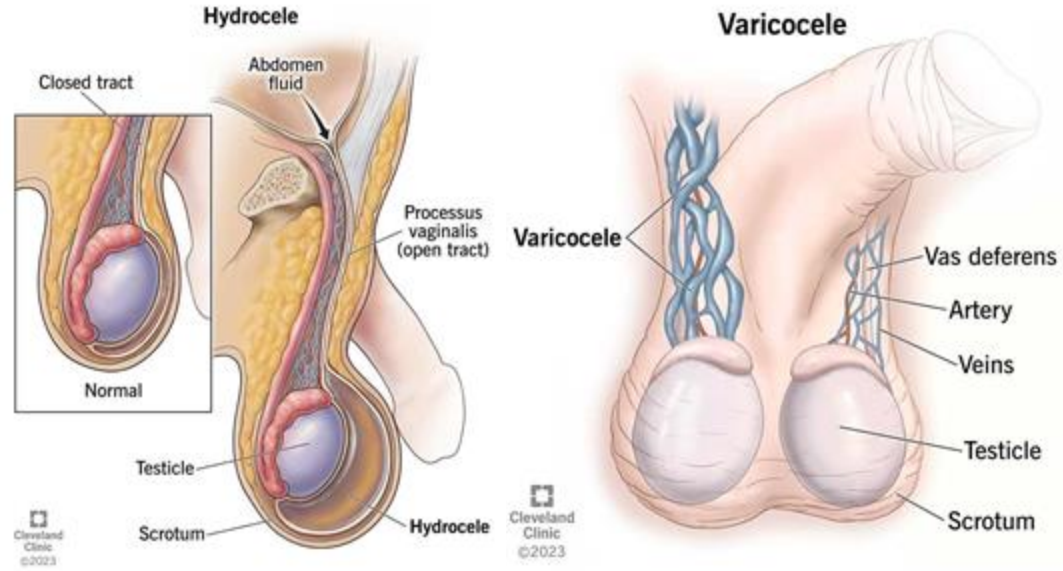
- Genitofemoral n. & ilioinguinal n. emerge through superficial ring
  - Give anterior scrotal/labial cutaneous n.
- In <u>females</u>:
  - Ovaries remain in pelvis
  - Gubernaculum persists as round ligament of the uterus
  - Through inguinal canal & terminates in labia majora (homologous to scrotum)



Clinical Anatomy

- Rupture of male urethra:
  - Urine accumulation b/w abdominal wall layers
- Cremaster reflex: Young males
  - Test integrity of genitofemoral & ilioinguinal n.
  - L_1 dermatome
  - Stroke skin = cremaster muscle pulls ipsilateral testicle toward the inguinal canal
- Hydrocele: Fluid accumulation in tunica vaginalis or a patent processus vaginalis
- Varicocele: condition where pampiniform plexus of veins becomes dilates & tortuous
- Vasectomy: Bilateral ligation of the ductus deferens. Located by incision in superior wall of scrotum





Varicocele: Testicle Pain, Symptoms, Treatments, Male Infertility. Cleveland Clinic.

Inguinal Hernias

- Inguinal hernia: protrusion of abdominal viscera through inguinal ring
  - Direct inguinal hernia:
    - Directly through abdominal wall in **inguinal triangle**
    - Medial to inferior epigastric
    - Through **superficial** ring only
    - Most common in adult males
  - Indirect inguinal hernia:
    - Through **deep and superficial** rings
    - Lateral to inferior epigastric
    - Often due to patent processus vaginalis
    - Most common in young males
- Inguinal hernias rare in females: Inguinal region in females is much firmer due to fewer and smaller structures passing through abdominal wall