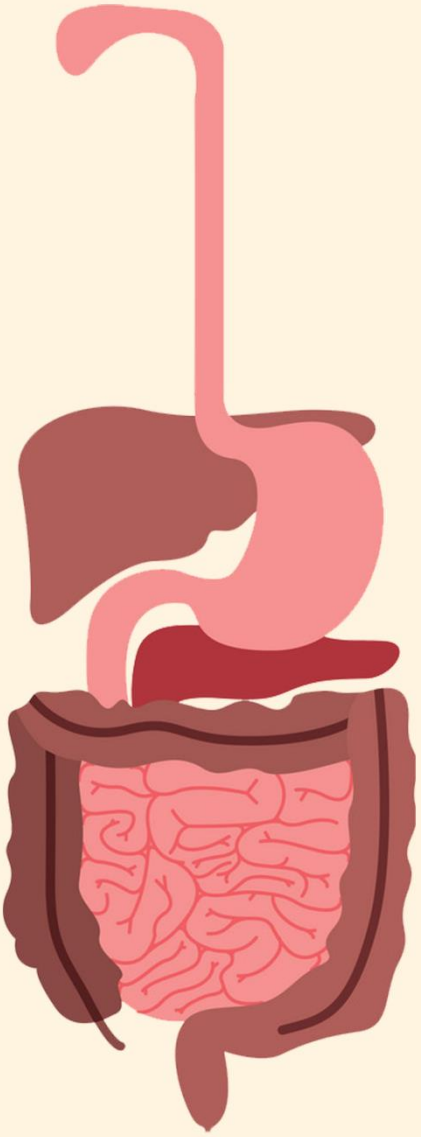
Anatomy

Faculty of Medicine - JU2017

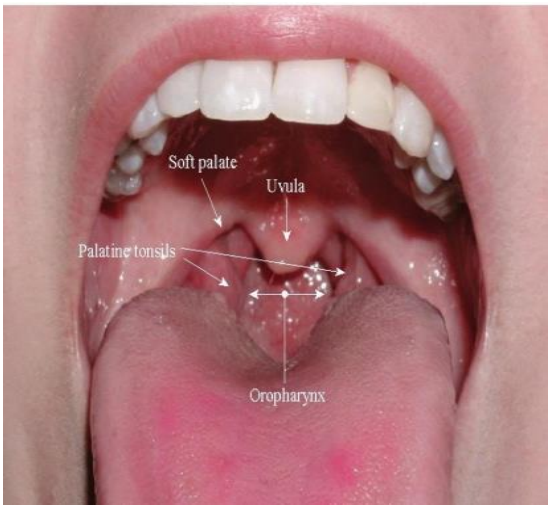
Number >>	3
Doctor	Dr.Almuhtasib
Done By	Nasser Al-Doghmi
Corrected By	Faisal Nimri



2nd system - GI

بسم الله الرحمن الرحيم

***Palatine Tonsils:* -** (pathology more than anatomy)



The palatine tonsils are masses of lymphoid tissue (it's in important in immunity especially in children) on both sides of the Oropharyngeal Ismuth, in a depression between 2 folds (or arches), each tonsil is covered by a mucus membrane and its free medial surface projects into the pharynx.

Boundaries:

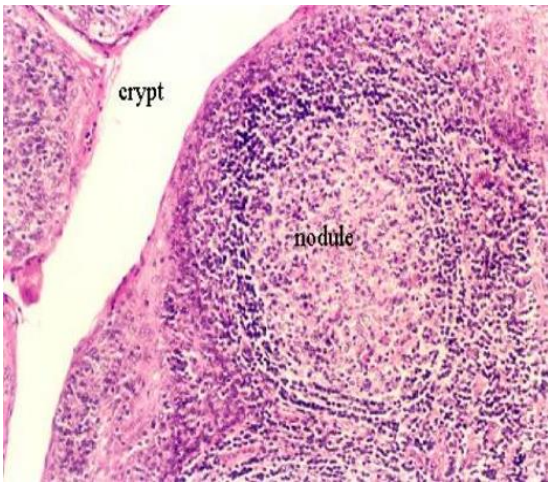
*anteriorly: the palatoglossal fold (arch)

*posteriorly: the palatopharyngeal fold

(each of the two folds contain a muscle with the same name)

*Superiorly: uvula and soft palate

*Floor: posterior third of the tongue



Infection of Tonsils is called *Tonsillitis* and it frequently happens in children (immune system not fully mature, they play with everything and put it in their mouths……), so there is repetition of infection and this infection might spread to the joints (and cause arthritis) or the heart (pericarditis) or kidneys (glomerulonephritis)…etc, so if tonsillitis happens more than 3-4 times a year we recommend *tonsillectomy* (surgically removing the tonsils).

Blood supply and venous drainage:

Blood supply of the Tonsils is from *the tonsillar branch of the facial artery.*

The veins pierce the capsule and the superior constrictor muscle and join *the external palatine vein* and drains in the facial vein (which drains into the internal jugular vein)

Lymphatic drainage of the tonsils: The upper deep cervical lymph nodes just below and behind the angle of the mandible

*The Tonsils have two surfaces (medial and lateral)

-On the medial surface of the palatine tonsils, we find what is called Tonsillar **crypts** due to repetitive infection.

-The tonsil is covered on its lateral surface by a **fibrous connective tissue capsule** (through this capsule blood supply enters and venous drainage leaves the tonsil).

The capsule is separated from the superior constrictor muscle by loose areolar tissue

*During tonsillectomy, surgeons enter through the oral cavity and cut the capsule on the lateral side of the tonsil then they enucleate (remove) the tonsil. Ligation and cut of the tonsillar artery and the vein must be done to prevent bleeding.

Always after the tonsillectomy operation, the patient is kept under observation. Why? Because the surgeon would be afraid from bleeding from the vein (external palatine vein which descends from the soft palate and pierces the superior constrictor muscle of the pharynx) -not the artery- due to the fact that the vein pierces the superior constrictor muscle. Release of ligation of the vein may occur when the muscle contracts leading to bleeding. This does not occur in the case of the artery.

Lateral relations to the tonsils that could be affected by the operation: -

Carotid sheath and its contents (carotid artery, jugular vein, vagus nerve) and tonsillar branch of the facial artery.

The tonsil reaches its maximum size during early childhood, but after puberty it diminishes considerably in size, in adults they are rudimentary (small in size) **Why??** Because in adults there is other lymphoid tissue, so the tonsils aren't as important as they are in children.

Waldeyer's Ring of Lymphoid Tissue:

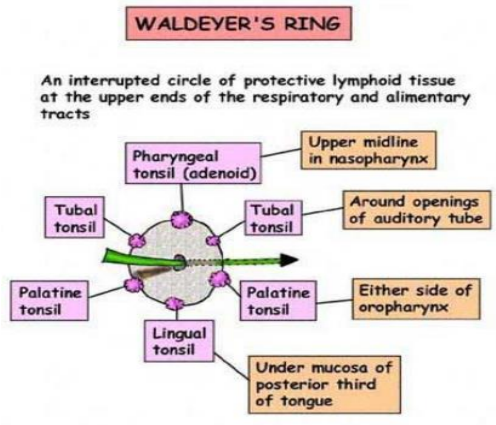
The oropharyngeal Ismuth is surrounded by a ring of lymphoid tissue

Part of this lymphoid tissue is the **pharyngeal tonsil (adenoid) (Roof)**

Lingual tonsil (Floor)

Palatine tonsil (On both sides)

Tubal tonsil (On both sides on the tubal elevation).



The Abdomen

It is the region of the trunk that lies between the diaphragm above and the inlet of the pelvis below

What are the borders of the abdomen?

Superiorly

Xiphoid process (at the end of sternum)

Costal cartilages (7-12 ribs)

Umbilicus:

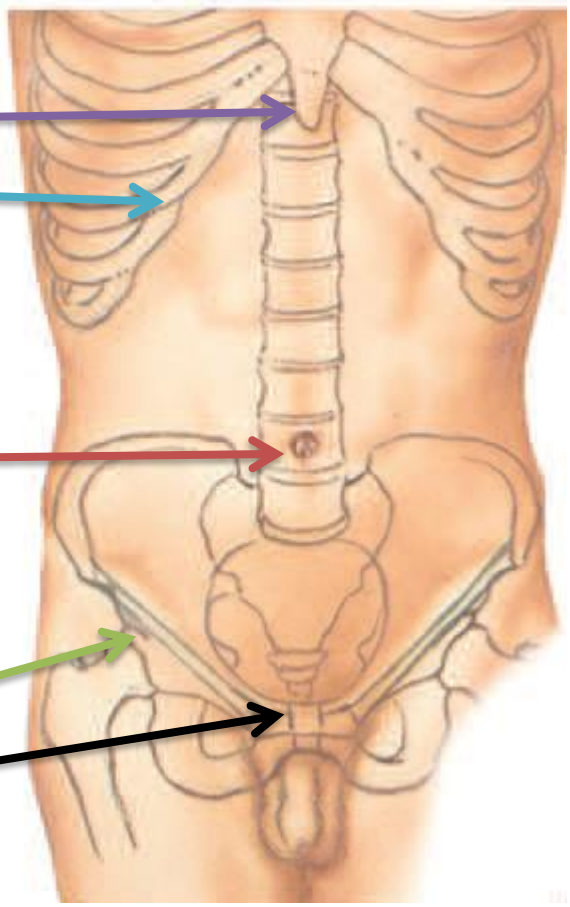
an important landmark, (Level of intervertebral disc L3-L4)

Inferiorly

Pubic bone -symphysis pubis-

iliac crest

(at the Level of L4)



The abdomen from **Above** is formed by the ***diaphragm*** which is the most important muscle in respiration and separates the abdominal cavity and the thoracic cavity

The diaphragm has right and left domes (also known as **cupola**)
We should know what is found above the right cupola and what is below it
-Below the right cupola, we find the **liver**, which usually pushes the right cupola upward until it reaches the 5th intercoastal space.
- Below the left cupola, we find the **spleen**
-Above the cupola on both sides we find the **base of the lung and the pleura**
Between the cupolas above there is the pericardium and heart and below it the stomach
The diaphragm has 3 main orifices (openings):
(one for the aorta, one for the esophagus and one for the inferior vena cava)

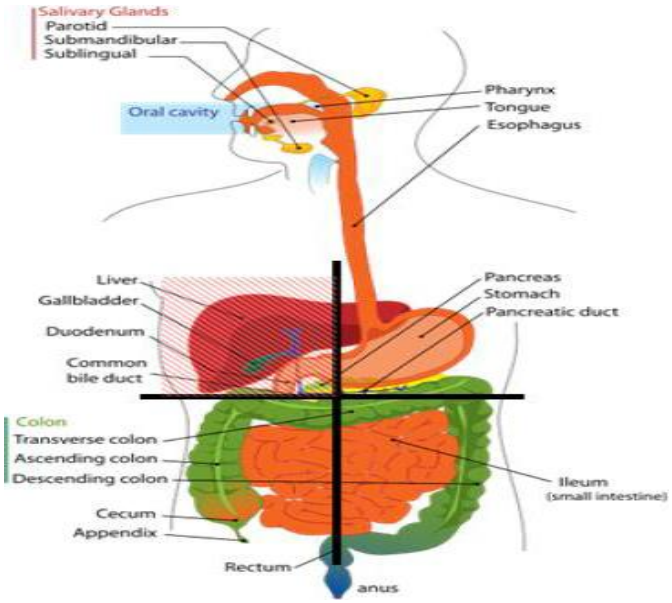
Below, no separation here, the abdominal cavity is continuous with the pelvic cavity through the pelvic inlet, until reaching the iliac crest, the line between the left and right iliac tubercles separates abdomen and pelvis
There are some structures that are found in both the abdomen and pelvis (such as descending colon, rectum and anal canal, they all start at abdomen and end at pelvis)
We conclude that the abdomen is not separated from pelvis, but then, a boundary between them is formed by the iliac crest.

3- How we detailed the structures of the abdominal cavity clinically in regions?

<u>We have 2 type of systems to do that; -</u>

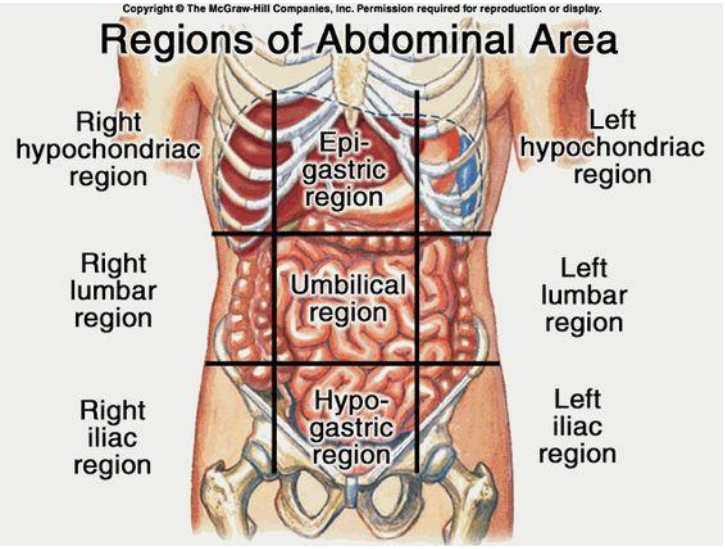
<u>A - abdominal quadrants: -</u>

1) two perpendicular lines that meet at the Umbilicus
2) 4 regions appear in this system
Upper left,
Upper right,
Lower left,
Lower right
3) less detailed and older one



This has a great clinical importance, for example

1) if a patient complains of severe pain in his lower right quadrant, one of the most common possible diagnoses is acute appendicitis, because appendix is found there (the right iliac fossa) … and when doctors make sure by blood tests, surgeons will hence perform appendectomy to relieve pain. (differential diagnoses: ascending colon and cecum too)
2)if a patient was involved in a car accident and had severe pain in the upper left quadrant you would suspect a ruptured spleen



B – Abdominal regions:

Divided into 9 regions by 4 Planes

1) two are vertical

(left and right **Mid-Clavicular lines**)

2) two are horizontal

Sub-Costal plane

at **L3** and form a bridge between lower end of sub costal cartilage

&

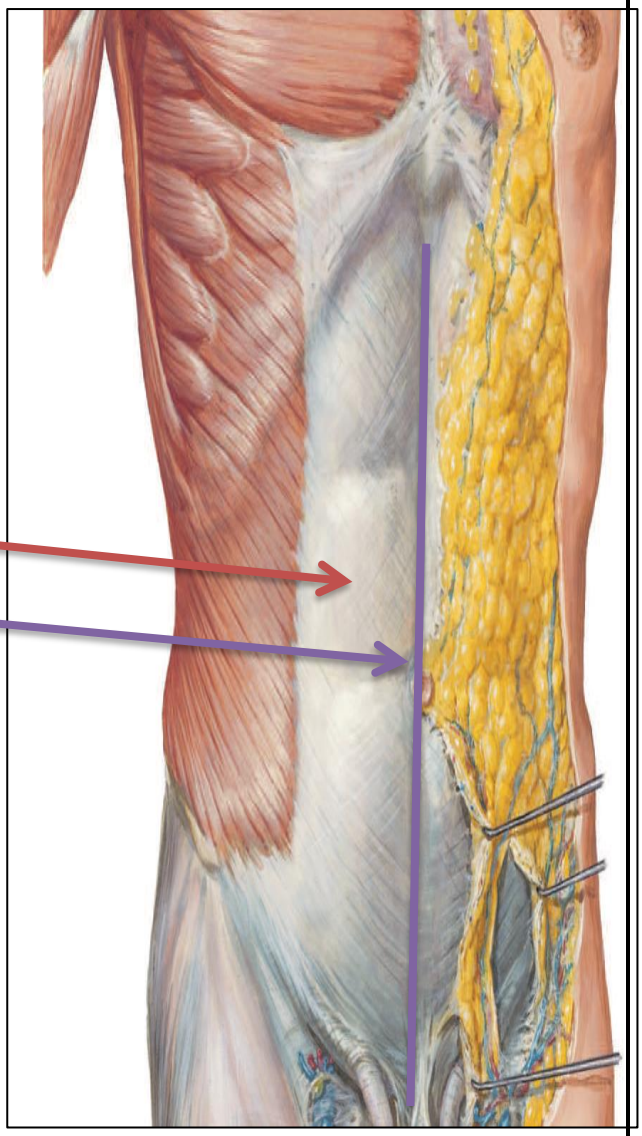
Intertubercular plane

At the level of L5 between the two right and left iliac tubercles of the hip bone.

(the importance of these regions is in diagnoses like above, the structures the Dr. mentioned in examples are marked)

9 Abdominal Regions		
Right Hypochodriac	**Epigastric**	**Left Hypochondriac**
Ascending Colon	Esophagus	Descending Colon
Gall Bladder	Liver	Left Kidney
Liver	Pancreas	Liver
Right Kidney	Right & Left Adrenal Glands	Pancreas
Small Intestine	Right & Left Kidneys	Small Intestine
Transverse Colon	Small Intestine	Spleen
	Spleen	Stomach
	Stomach	Transverse Colon
	Transverse Colon	
Right Lumbar	**Umbilical**	**Left Lumbar**
Ascending Colon	Cisterna chyli	Descending Colon
Gall Bladder	Pancreas	Left Kidney
Liver	Right & Left Kidneys	Small Intestine
Right Kidney	Right & Left Ureters	
Small Intestine	Small Intestine	
	Stomach	
	Transverse Colon	
Right Iliac	**Hypogastric**	**Left Iliac**
Appendix	Prostate	Left Fallopian Tube (F)
Cecum & Ascending Colon	Rectum	Left Ovary (F)
Right Fallopian Tube (F)	Right & Left Fallopian Tubes (F)	Small Intestine
Right Ovary (F)	Right & Left Ovaries (F)	Descending Colon
Small Intestine	Right & Left Ureters	Sigmoid Colon
	Seminal Vessicle (M)	
	Sigmoid Colon	
	Small Intestine	
	Urinary Bladder	
	Uterus (F)	
	Vas Deferens (M)	

Now we reach the active part of our lecture **THE ABDOMINAL WALL ---**



-We will discuss in this sheet the **Anterior abdominal wall**, and to understand we should know some helpful concepts:-

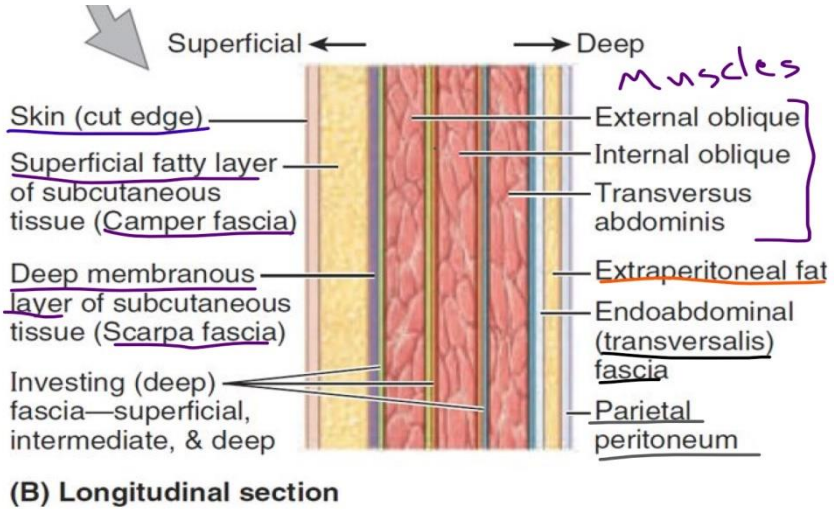
1 – The muscles of the abdominal wall make a tendon sheath called **APONEROSIS** in order to be inserted **RECTUS SHEATH**.

2- **Linea alba** is Located along the midline Between the xiphoid process and symphysis pupis and formed by the fusion of aponeurosis of (Ex,In,Trans,Abd) muscles

Layers of the anterior abdominal wall

(from superficial to the deep)

- Skin
- Superficial fascia
- Abdominal muscles
- Transversalis fascia
- Extra-peritoneal fascia
- Parietal Peritoneum



(B) Longitudinal section

DETAILED STRUCTURES:

A -Skin

B – Superficial fascia:
one layer above the umbilicus and two layers below it

Camper Fascia: fatty superficial layer, *in males* it continues to the scrotum and continuation of this layer is muscle called dartos muscle
Scapa fascia: deep membranous layer, continuous into the perineum, it attaches to the pubic arch at both sides, and posteriorly to the perineal body. (in scrotum referred to as colle's fascia)

Scarpa fascia attachments are:

-) Fascia lata (inf).

-) Pubic arch in hip bone (sides)

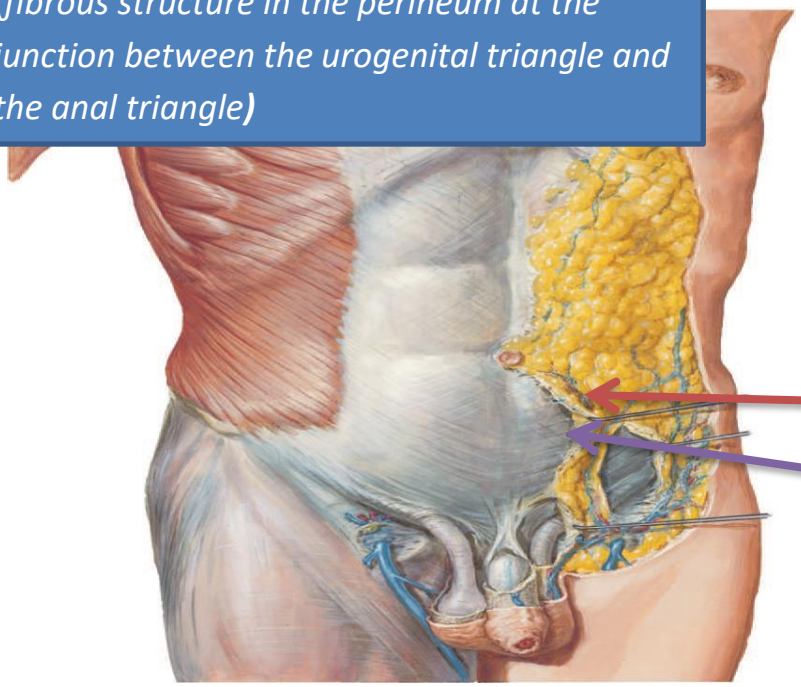
-) Perineal body (post)

(*fibrous structure in the perineum at the junction between the urogenital triangle and the anal triangle*)

Clinical importance of scapa fascia:

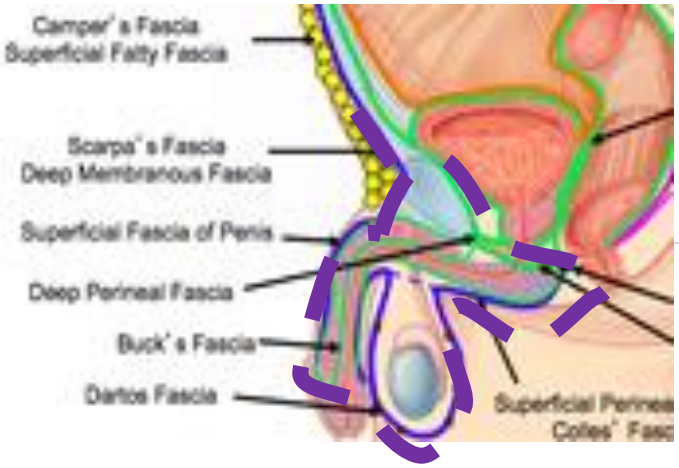
rupture of penile urethra leads to **extravasation** of urine to:

scrotum, *perineum and penis*, and *abdomen* (below the umbilicus where the membranous layer is attached), in the lower limb fascia lata ends 2 cm below inguinal ligament and because scapa fascia attached to it prevents the urine from reaching even lower (without it could reach the foot)



Camper Fascia

Scarpa Fascia



C- Deep:

a layer of connective tissue *covering the muscles*,

- it is very **thin**, and may be **absent** in some people, especially in women, because deep fascia resists the abdomen enlargement because of expansion of uterus, thus it is absent in women to allow the enlargement of the uterus forward and upward during pregnancy.

Before talking about the muscular layer, let's talk about linea alba because it serves as an insertion point to all these abdominal muscles…

***Linea Alba**: a fibrous connective tissue,

- it has little supply of blood→ *slow healing and less bleeding*

-in mid line → *good access to the abdominal cavity structures*

-Disadvantages: *heals slowly*

Mid line incision proprieties

D – Muscular layers (Very strong muscles fibers)

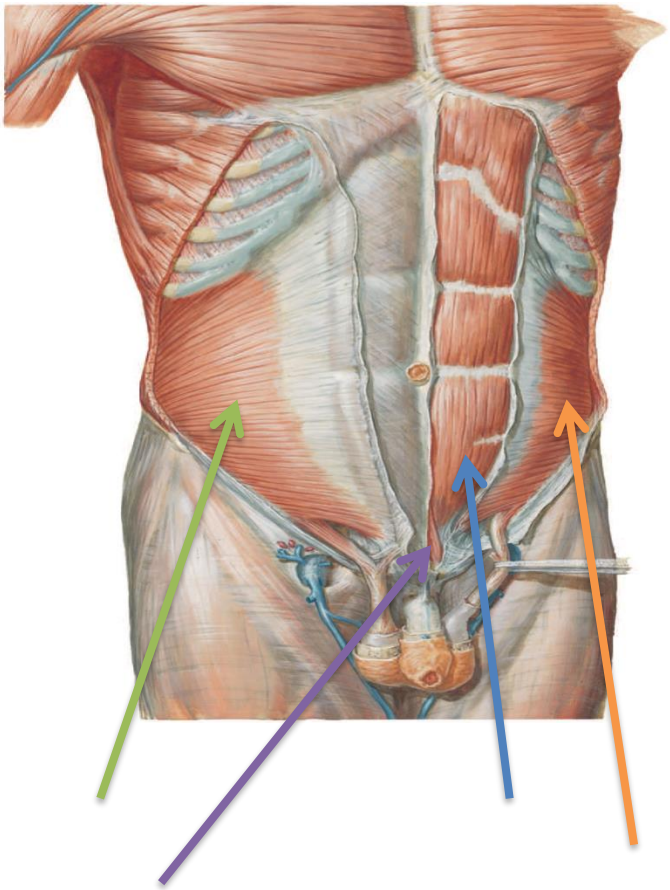
Before the start every muscles, we should know these features: Fibers shape, Origin, Insertion, Nerve supply and Related Structures, But I will introduce each muscle with the first four features and the fifth will be discussed separately.

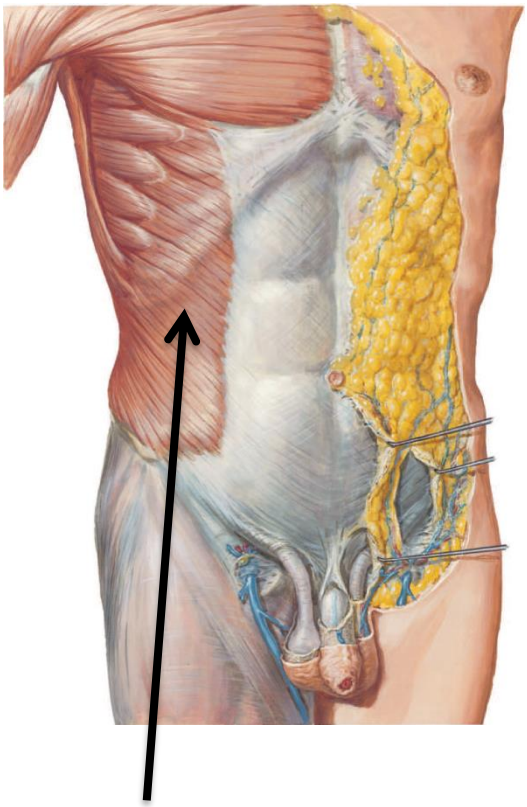
BE STRONG☺

Muscle name	Fibers	Origin	Insertion	Nerve Supply
1-External oblique muscle	**Downward forward medially**	**outer surface of lower 8 ribs**	**Xiphoid process, ,Linea alba pubic crest, ,pubic tubercle iliac crest (ant. Half)**	**1-Lower 6th thoracic spinal nerves 2-L1 iliohypogastric n., ilioinguinal n.**

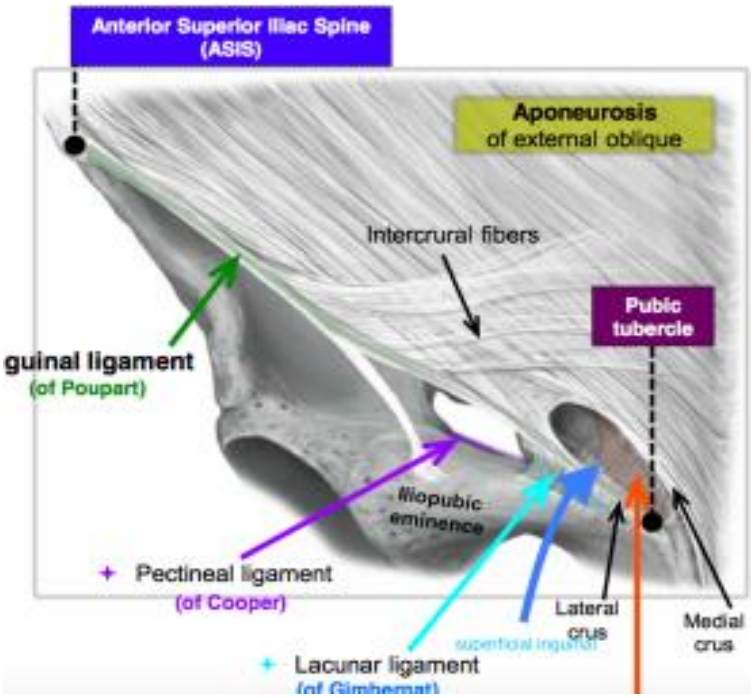
2-Internal Oblique	upward forward medially	Lumbar Fascia, Anterior 2/3 of iliac crest, lateral 2 /3 of inguinal ligament	Lower three ribs& costal cartilage, Xiphoid ,process Linea alba, .symphysis pubis	Lower 6th thoracic ,nerves iliohypogastric n & ilioinguinal n (L1)
3-Transversus abdominis	transversely (horizontally).	lumbar fascia, lower 6 costal cartilage, anterior 2 thirds of the iliac crest, the lateral one third of the inguinal ligament.	linea alba (the xiphoid process to symphysis pubis.)	Lower 6 thoracic nerves, L1 (illiohypogastric and illioinguinal nerves)
4-Rectus abdominis	extends along the whole length of the anterior abdominal wall (it is inside the rectus sheath)	(lower part) symphysis pubis and pubic crest	upwards in the 5th,6th,7th costal cartilage and the xiphoid process. (linea alba)	No L1 nerve supply Only lower 6 thoracic nerves.

5-Pyramidalis muscle (sometimes it is absent)	It lies in front of the lower part of the rectus abdominis muscle	from the anterior surface of the pubis.	linea alba	12th subcoastal nerve





 # 1 External oblique abdominis extends as aponeurosis and the aponeurosis form these contributions: -



Inguinal ligament	**folding of the lower border of aponeurosis of the external oblique muscle on itself, extends between anterior superior iliac spine and pubic tubercle.**
Lacunar ligament	**Reflection of EO aponeurosis, reflected medially to the superior ramus of pubis (pectineal line), it forms the medial boundary to the femoral canal.**
Pectineal ligament	**(aka, Cooper ligament) reflection of EO aponeurosis and it is the continuation of lacunar ligament at pectineal line and continues with a thickening of the periosteum**
Superficial inguinal ring	**Defect in the EOM aponeurosis, lies medially above the pubic tubercle, and it transmits the round ligament of uterus (females) and spermatic cord (males) with its associated nerves, blood vessels, vas deferens, it contributes in the spermatic cord coverings (external spermatic fascia), this ring is triangular in shape and it has medial crus/ lateral crus**

Rectus sheath	The EOM aponeurosis contribute to the anterior layer of rectus sheath, the boundaries of the inguinal canal, which is found between deep and superficial inguinal rings

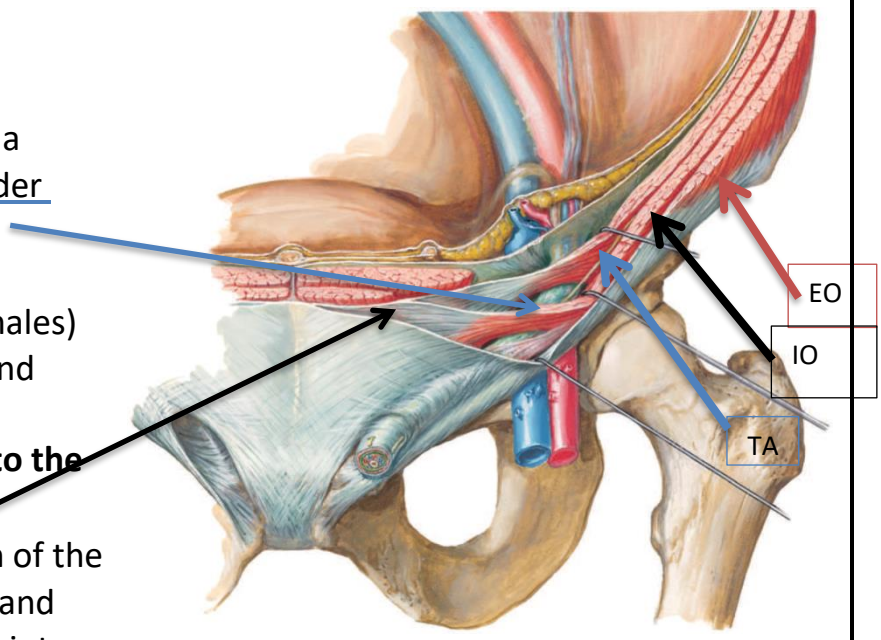
#2 internal oblique abdominis contributions

A - Cremasteric muscle and fascia

Internal oblique has free lower border arches over the spermatic cord or ligament of uterus.

The spermatic cord and testes (in males) are covered by cremasteric fascia and muscle.

This Cremasteric Fascia is Related to the Inguinal Canal.



B-Conjoint tendon it is the fusion of the lowest fibers from internal oblique and Transversalis abdominis and inserts into pubic crest on the superior ramus of pubis.

Attached medially to linea alba supporting the inguinal canal

Has lateral free border

It is important to take stitches in herniorrhaphy (in treatment of indirect inguinal hernia) because it is a very strong tendon

C- It contributes in rectus sheath.

#3 Muscle's contributions of Transversus abdominis muscle: (with the internal oblique muscle's fibers, it forms the conjoint tendon.

which attaches to pubic crest and pectineal line) and (contributes to the layers of rectus sheath).

#4 Rectus abdominis is a long strap muscle, it extends along the whole length of the anterior abdominal wall.

-It is found inside the rectus sheath (between the linea Alba and semilunaris).

-It has tendinous intersections (they are adherent to rectus sheath, anteriorly)

The rectus abdominis is colloquially called abs ("six-pack").

(It is divided into squares according to the record) this is due to tendinous Intersections, which are 3 transverse fibrous bands (can be palpated as transverse depressions)

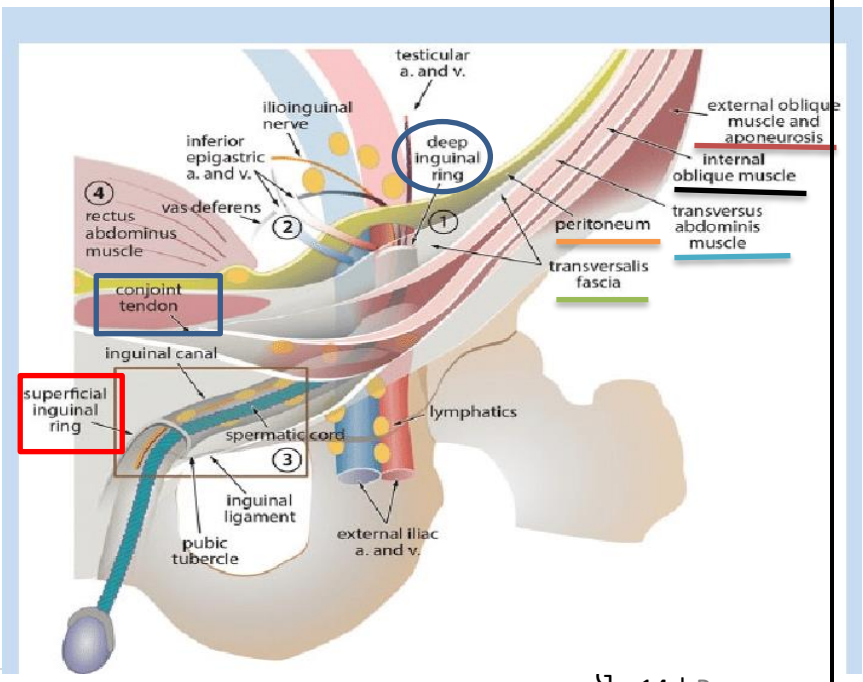
Segments of it: -

1-at level of xiphoid process

2- at level of umbilicus

3- one half way between these two.

In embryos, these tendinous intersections come from myotome, then continue as a separated myotome because of the tendons.



E-Transversalis fascia: -

thin layer of fibrous connective tissue covering the muscles,

diaphragm, iliac muscle and continues to pelvic.

! Found in the posterior wall of the rectus sheath , below the anterior forms the superior aliac spine anterior wall of femoral sheath.

! Transversalis fascia contributions: -
1 .femoral sheath -
2. the posterior layer of rectus sheath
3.deep inguinal ring and thus a - fascia that covers the spermatic cord (internal spermatic fascia)

F-Extra-Peritoneal fascia: -

usually it is in the form of adipose tissuet
Located superficial to the parietal peritoneum, and deeper to the transversalis fascia

G- Parietal peritoneum: -

-It is a thin serous membrane, Continuous below with the parietal peritoneum lining the pelvis.
-It covers the abdominal cavity; we incise it to reach abdominal viscera.
-It is then a lining for the abdomino-pelvic cavity.

5- Blood supply of the anterior abdominal wall: -

1 -Sup. Epigastric artery} --- internal thoracic artery

2 -Inf. Epigastric artery } External iliac artery
3 -Deep circumflex artery }
4 -Intercostal arteries
5 -Lumbar arteries

6- Venous draining of the anterior abdominal wall: -

- Above the umbilicus: lateral thoracic vein → axillary vein
- Below the umbilicus: Inf. Epigastric → Femoral vein
- Paraumbilical veins: Ligamentum teres →portal vein (Porto- systemic anastomosis)

7-Lymphatic draining of the anterior abdominal wall: -

- Above the umbilicus: Ant.axillary L.N
- Below the umbilicus: Sup. Inguinal L.N
- Above the iliac crest: Post.axillary.L.N
- Below the iliac crest: Sup.inguinal L.N

8- Sensation innervation of the anterior abdominal wall:-

A- Thoracoabdominal nerve: Lower 6th thoracic nerves & 12th subcostal nerve

B- Dermatomes (Anterior, lateral cutaneous nerve terminal branches of Thoracoabdominal nerve)

– T7 to skin superior to umbilicus below xiphoid process

– T10 to skin surrounding umbilicus

--L1 to skin inferior to umbilicus above sym.pubis

C-LI nerve - Iliohypogastric nerve+ ilioinguinal nerve -

9-Important structures to be noted: -

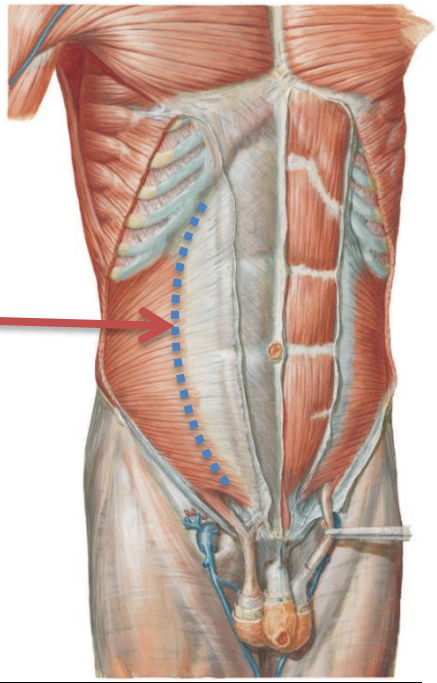
******Rectus sheath**

It is long fibrous band that is formed by the aponeurosis of the three lateral abdominal

muscles (external and internal obliques and transversalis) and contains the rectus abdominus and pyramidalis (if not absent) so, we have 2 sheaths left and right that Linea Alba separates there.

The sheath starts from Linea Semilunaris to Linea Alba.

Anteriorly it binds with rectus muscle STRONGLY but posteriorly we found space between it and rectus muscle.



Rectus sheath contents:

NERVES	ARTERY	MUSCLES
The anterior rami of the lower six thoracic nerves	**Inferior epigastric.** **Superior epigastric.**	**Rectus abdominis** **Pyramidalis**

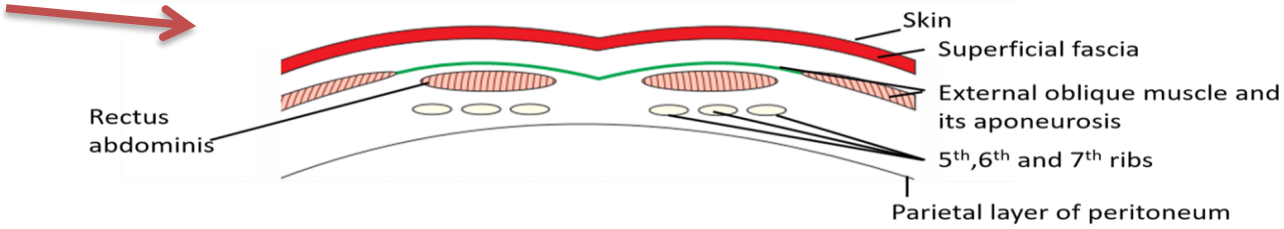
And lymph vessels

- **It divides into three regions according to their walls because their contents are CONSTANT in all regions: -**

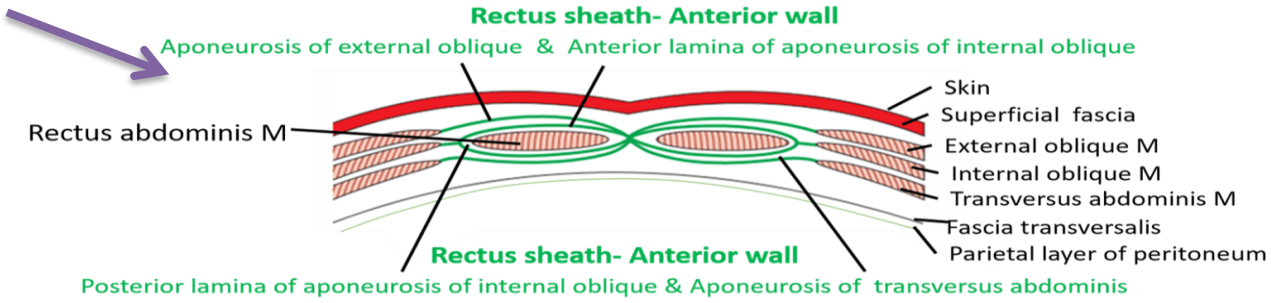
Anterior wall	Region / Levels	Posterior wall
skin, superficial fascia, pectoralis major muscle and aponeurosis of external oblique muscle	Above costal margin (5th,6th and 7th) and xiphoid process	costal cartilage number 5,6 and 7, then intercostal muscles, xiphoid process and transversalis fascia
the aponeurosis of external oblique and one layer of internal oblique + the previous skin and superficial fascia	Below costal margin (*Between the costal margin* and *the level of ASIS) \ above and below the umbilicus.* Above the arcuate line	one layer of internal oblique aponeurosis and transversus abdominis aponeurosis + Trans. Fascia, extraperitoneal fat and parietal peritoneum
aponeuroses of all muscles	Below ASIS (below Midway between umbilicus and symphysis pubis) below ARCUATE line	transversalis fascia and lies below it extraperitoneal fat and parietal peritoneum.

That is for revision the table; -

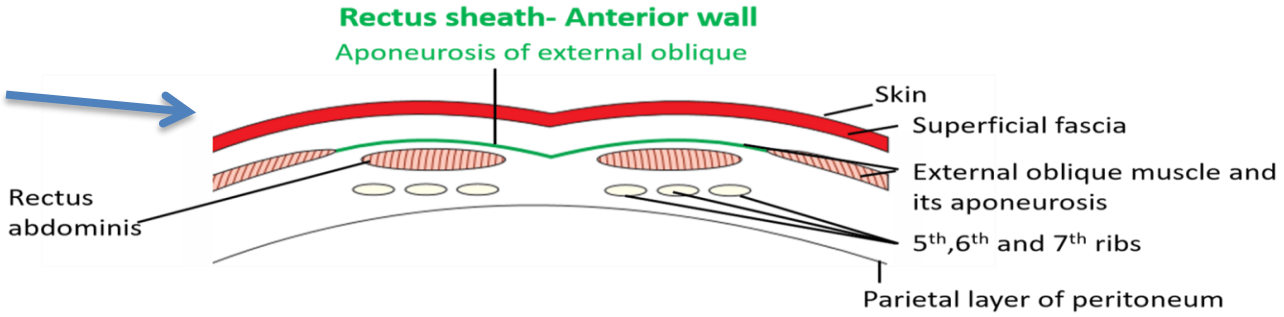
Rectus sheath above the costal margin



Rectus sheath from the costal margin to midway between umbilicus and symphysis pubis



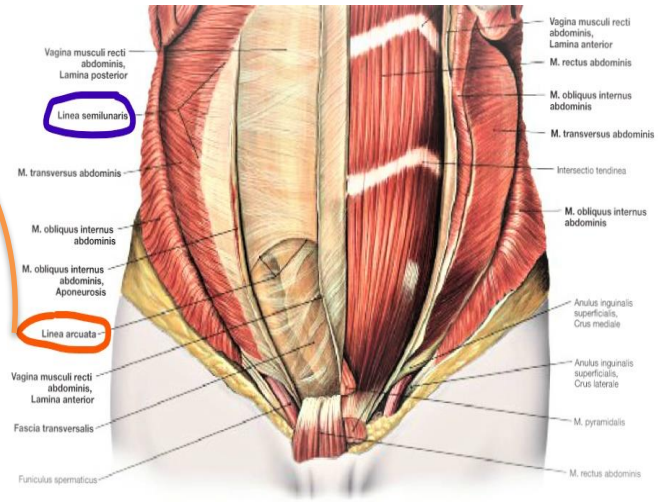
Rectus sheath between the midpoint of umbilicus and pubic symphysis to pubic symphysis



:(Arcuate line)

Is a crescent-shaped line marking the inferior limit of the posterior layer of the rectus sheath just below the level of the iliac crest. Below it, we can ·find the transversalis fascia

All muscles are anterior below level of this line



The general action of the anterior abdominal muscles:-

-Increase the intra-abdominal pressure when it is needed in the following processes**: (**Vomiting Coughing, Defecation, Labor)

- increase deep expiration

- Bending of the trunk forward

-protection of the viscera when contracted s

These muscles keep viscera in position …!

This sheet for lec3 anatomy, pictures of slides are not here because it is very old to be studied. I hope to understand before memorize and if you like go to the pictures in the slides for revision.

I am sorry for any mistake.

DO NOT HESITATE TO ASK ABOUT ANY THING IN THE SHEET

كل التوفيق