

The Muscular System



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حرف لتسهيل دراسة chapter :

1- صور الأماكن المفصلات (visual)

2- الكتب بأيدك لتذكر المفصلات

3- حل أسئلة

Enjoy your study session ...

muscles cells نوع من

- Skeletal muscles are formed of several bundles of skeletal muscle cells. They are attached by tendons to bones.
- When a skeletal muscle contracts, the tendon will be pulled and this will pull the bone resulting in Movement.
- The belly of the muscle is the fleshy (wide) part between the tendons.
- Muscles have more than one bony attachment:
 - the attachment of a tendon to the relatively stationary bone is called the **origin**.
 - the attachment of the muscle's other tendon to the relatively movable bone is called the **insertion**.
 - the **action/s** of a muscle are the main movements that occur during contraction (e.g., flexion or extension).

50. What does the term “origin” refer to in the musculoskeletal system?
- A. The point of attachment of a muscle to the “moveable” bone.
 - B. The line that separates the shaft from the end of a long bone.
 - C. The point of attachment of a muscle to the “stationary” bone.
 - D. The end of a long bone.

Answer is C: Muscles are said to “originate” on the bone that does not move when that muscle contracts, and to insert on the bone that does flex or extend when the muscle contracts.

Muscular Tissue

Muscular tissue is the type of tissue whose cells are differentiated to optimally use the contractile ability of the cells.

Cell membrane = Sarcolemma

Cytoplasm = Sarcoplasm

Smooth endoplasmic reticulum = Sarcoplasmic reticulum
store Ca^{+2}

2. By what name is the plasma membrane of a muscle cell known?

- A. sarcoplasm
- B. sarcomere
- C. sarcoplasmic reticulum
- D. sarcolemma

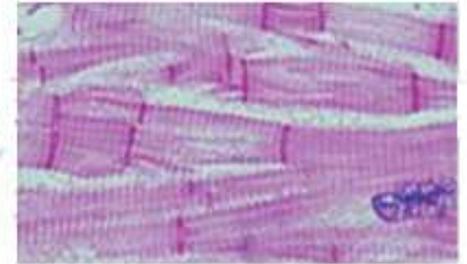
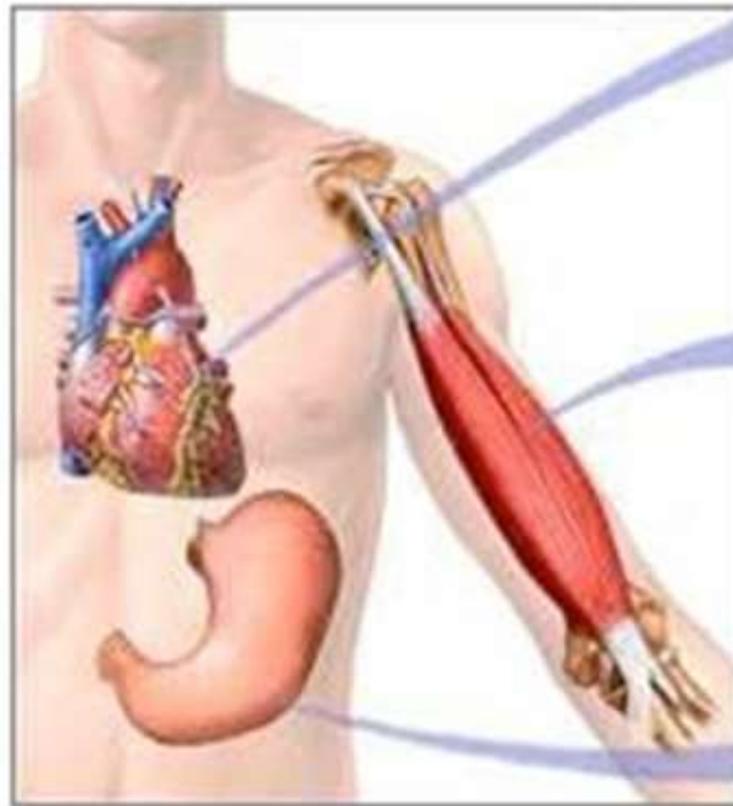
Answer is D: “Sarco-” refers to flesh (muscle), “lemma-” refers to sheath (membrane) around the cell.

Types of Muscle Cells

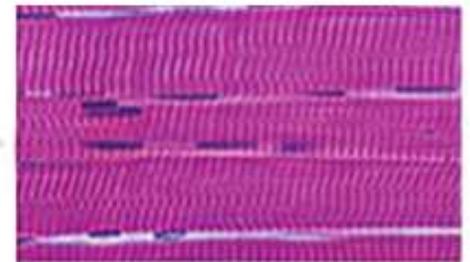
- 1- cardiac
- 2- skeletal
- 3- smooth

➤ Muscle cells are relatively long, therefore, they're called muscle fibers

➤ There are three types of muscle cells:



Cardiac muscle cell



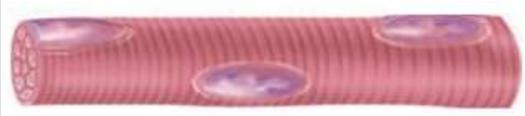
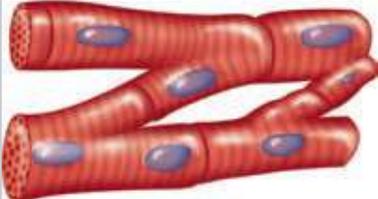
Skeletal muscle cell



Smooth muscle cell

Fig.1: Types of muscle cells.

Comparison between the three types of muscle cells:

	<i>Skeletal</i>	<i>Cardiac</i>	<i>Smooth</i>
<i>Location</i>	Attached to bones	The heart	Internal organs and skin
<i>Shape</i>	Elongated and <u>cylindrical</u> السطوانية 	<u>Branched</u> 	<u>Spindle</u> 
<i>Nucleus</i>	Several peripherally located nuclei	Single centrally located nucleus	Single centrally located nucleus
<i>Striation</i>	Striated	Striated	Non-striated
<i>Function</i>	<ul style="list-style-type: none">• Movement of bone• Heat production	Beating of the heart	Movement of the viscera
<i>Control</i>	<u>Voluntary</u>	<u>Involuntary</u>	<u>Involuntary</u>

13. Smooth muscle cells may be described by which of the following?

- A. striated, voluntary, multinucleate
- B. not striated, voluntary, multinucleate
- C. striated, involuntary, uninucleate
- D. not striated, involuntary, uninucleate

Answer is D: Smooth muscle is not-striated, and it is involuntary and has one nucleus.

Notes

- Smooth muscle cells are held together by desmosomes. Also, gap junctions are present between the cells to allow the spread of Ca²⁺ (and thus contraction) rapidly between them.
- The branches of cardiac muscle cells meet each other at specialized structures called the *intercalated discs* which also contain desmosomes and gap junctions.

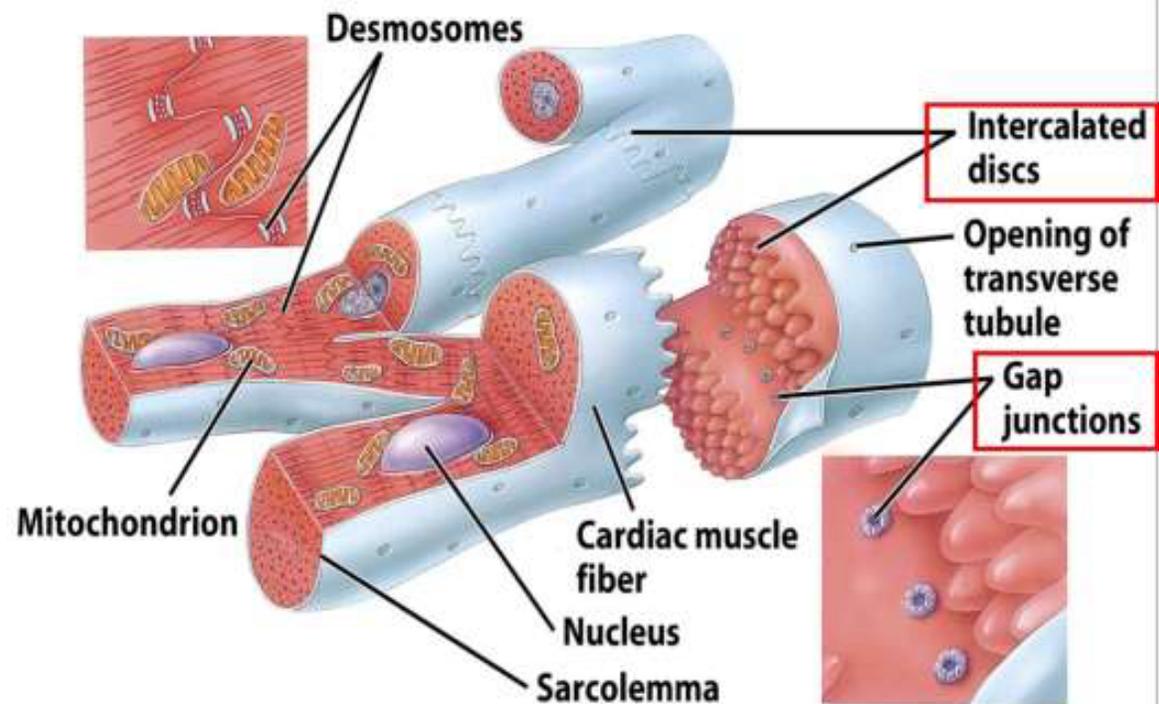


Fig.2: Cardiac muscle cells.

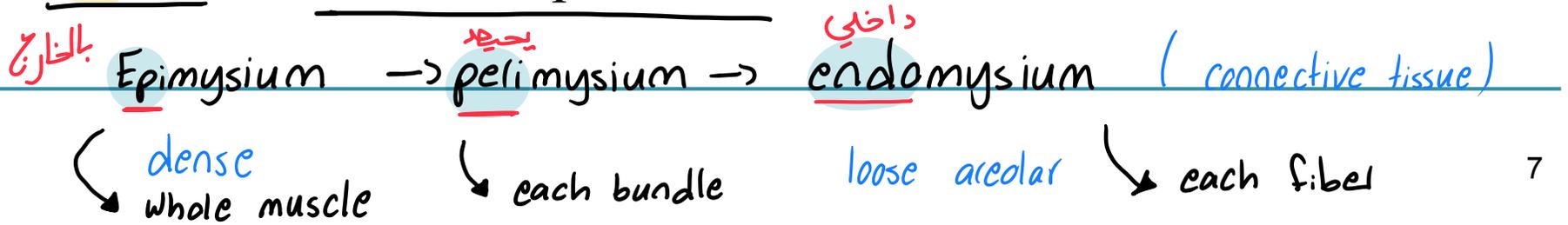
Organization of Skeletal muscles:

➤ Skeletal muscles are formed of several bundles of muscle fibers.

➤ Each fiber is surrounded by **Endomysium**: a loose areolar connective tissue layer. Each bundle is surrounded by connective tissue **Perimysium**. The whole muscle is surrounded by **Epimysium**: a dense connective tissue layer.



➤ The collagen fibers in these three connective tissue layers will extend beyond the fleshy part of the muscle to form the cord-like tendons or the broad aponeuroses that attach muscles to bones.



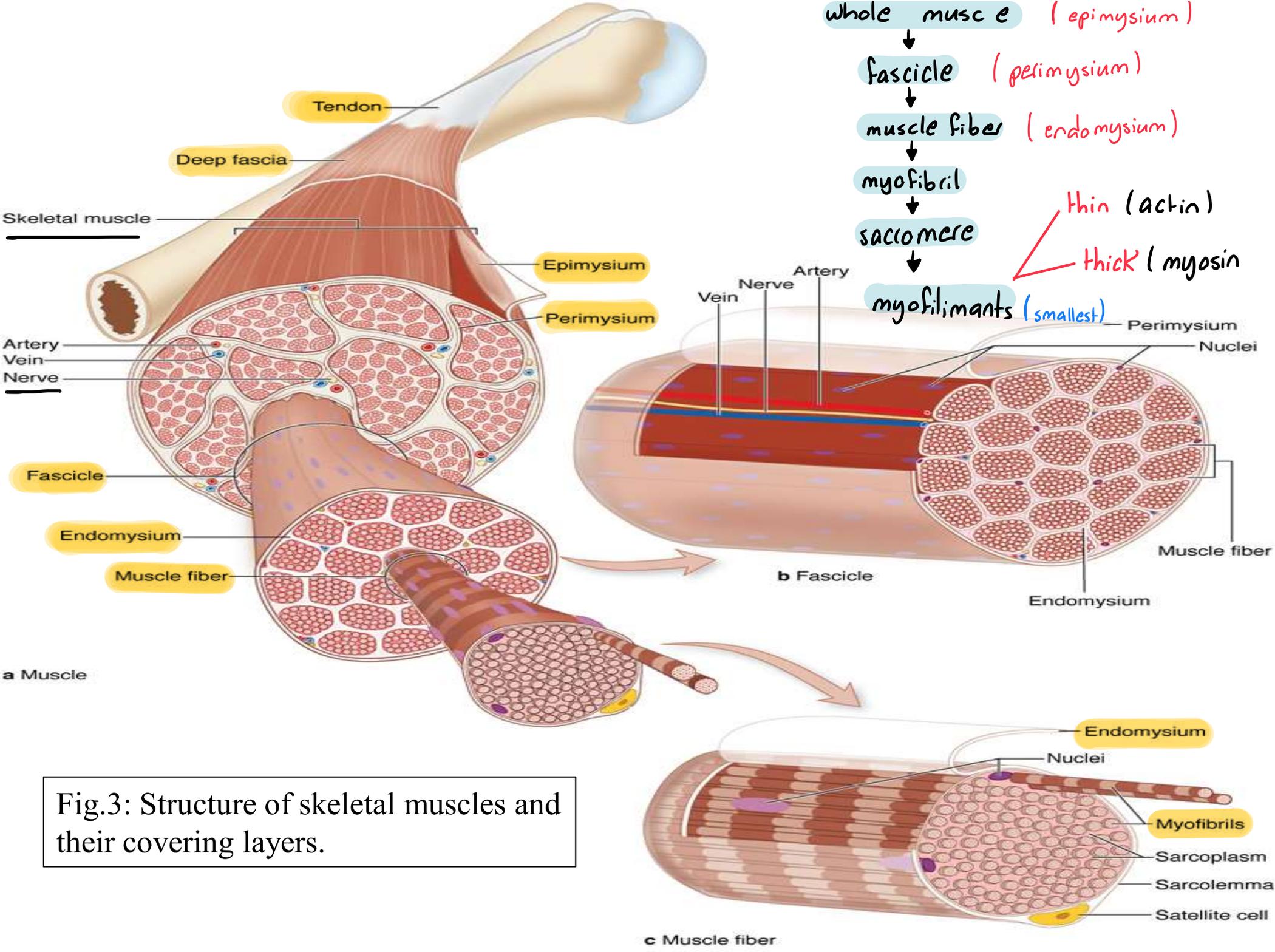


Fig.3: Structure of skeletal muscles and their covering layers.

5

The connective tissue layer that encircles a fascicle is called the

- A)** endomysium
- B)** epimysium
- C)** perimysium

C

Cross-Striation of skeletal and cardiac muscle cells:

- ✓ Skeletal and cardiac muscle fibers, under the LM, appear to have alternating dark and light areas. These are called the A and I bands respectively. The banding is due to the regular arrangement of the thin myofilament Actin and the thick myofilament Myosin.



dark area A band
light area I band

Fig.4: Striation under light microscope.

LM

- ✓ Under the EM, this arrangement proves to be more complex.

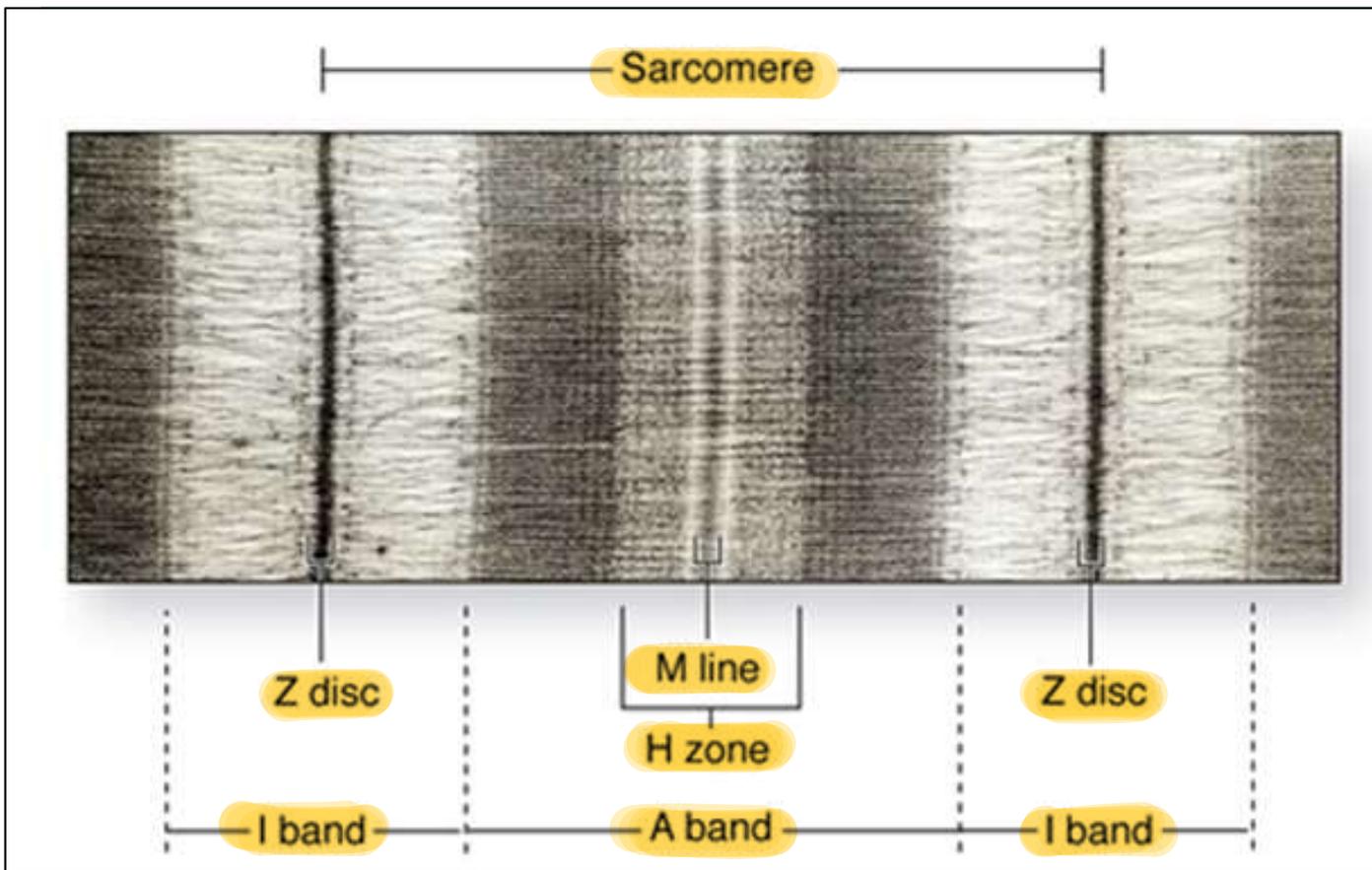


Fig.5: Striation under electron microscope.

EM

رجي عليه سوال
راجعوني به الامتحان

- ✓ **H Zone**: a lighter colored area within the A band.
- ✓ **M Line**: darker colored line in the middle of the H zone.
- ✓ **Z Disc (Line)**: a dark line in the middle of the light I band.

13

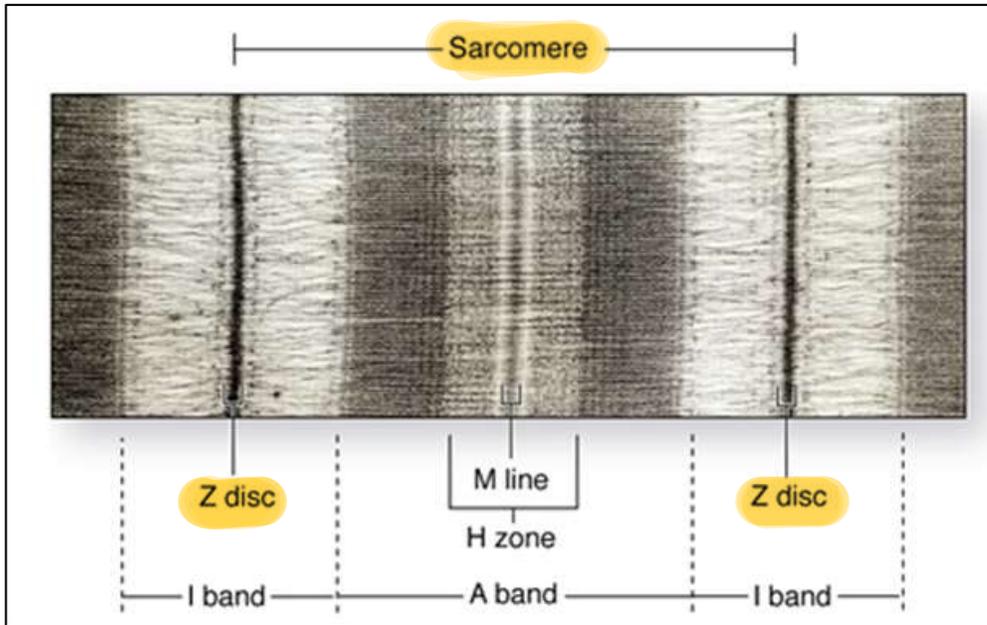
The dark region of a sarcomere is called the

- A)** H-zone.
- B)** Z-line.
- C)** A band.
- D)** I band.

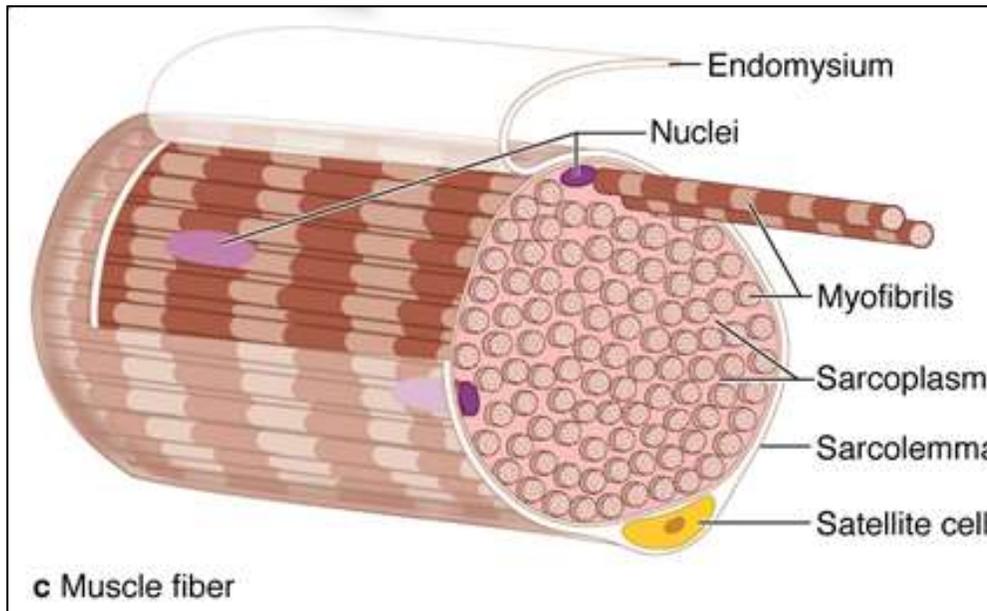


muscle fiber → myofibril → sarcomere → myofilaments

Unit



✓ **The Sarcomere**: is the repetitive functional subunit of the contraction apparatus. It extends from one Z-line to the next Z-line.



✓ Several sarcomeres arranged end-to-end form the cylindrical myofibrils. Each muscle fiber contains several myofibrils.

Fig.6: Sarcomeres and myofibrils.

31. Which of the following muscle structures is the largest?

- A. sarcomere
- B. fascicle
- C. myofibril
- D. muscle fibre

Answer is B: A muscle fascicle is a bundle of muscle fibres (cells). Choice A & B are smaller than a cell.

Muscle Regeneration

- ❖ **Skeletal muscle** cells cannot divide. **Inactive *Satellite cells*** are present close to the muscle fibers. When injury occurs, the satellite cells become active, divide and form new skeletal muscle fibers. This is also thought to be the mechanism by which skeletal muscles hypertrophy after exercise.
- ❖ **Cardiac muscles** cannot divide and they lack satellite cells. After injury, the damaged muscles are replaced by a connective tissue scar.
- ❖ **Smooth muscle** cells can divide, and, therefore, can easily replace damaged cells.

تضخيم
العضلات

skeletal muscles

can't divide

- inactive satellite cells

cardiac muscles

can't divide

- lacks satellite cells

connective tissue

smooth muscles

divide

- replace damaged cells ✓

SCAR

muscles of the head

muscles of facial expression

- zygomaticus major

true smile

- Risorius false smile

4 muscles of mastication

(chewing) → move mandible

- masseter

- temporalis

close the mouth

muscles of the tongue

- intrinsic muscles

origin: within tongue

origin : skull bones
insertion: skin

- medial pterygoid] move side to side
insertion: within tongue
change shape

- lateral pterygoid]
↪ main depressor
(open the mouth)

- Extrinsic muscles
origin : outside the tongue
insertion: into the tongue
Genioglossus

Muscles Of The Head

Muscles Of Facial Expression

- Muscles of facial expression:
 - Lie within the subcutaneous layer. (*hypodermis*)
 - Usually originate from skull bones & insert into the skin.
 - Are all supplied by the Facial nerve.
- Because of their insertions, the muscles of facial expression move the skin rather than a joint when they contract. Because of this, these muscle produce the wide variety of facial expressions that humans have.

Zygomaticus major –

The muscle of true smile

Risorius –

The muscle of false smile (probably present only in humans and gorillas)

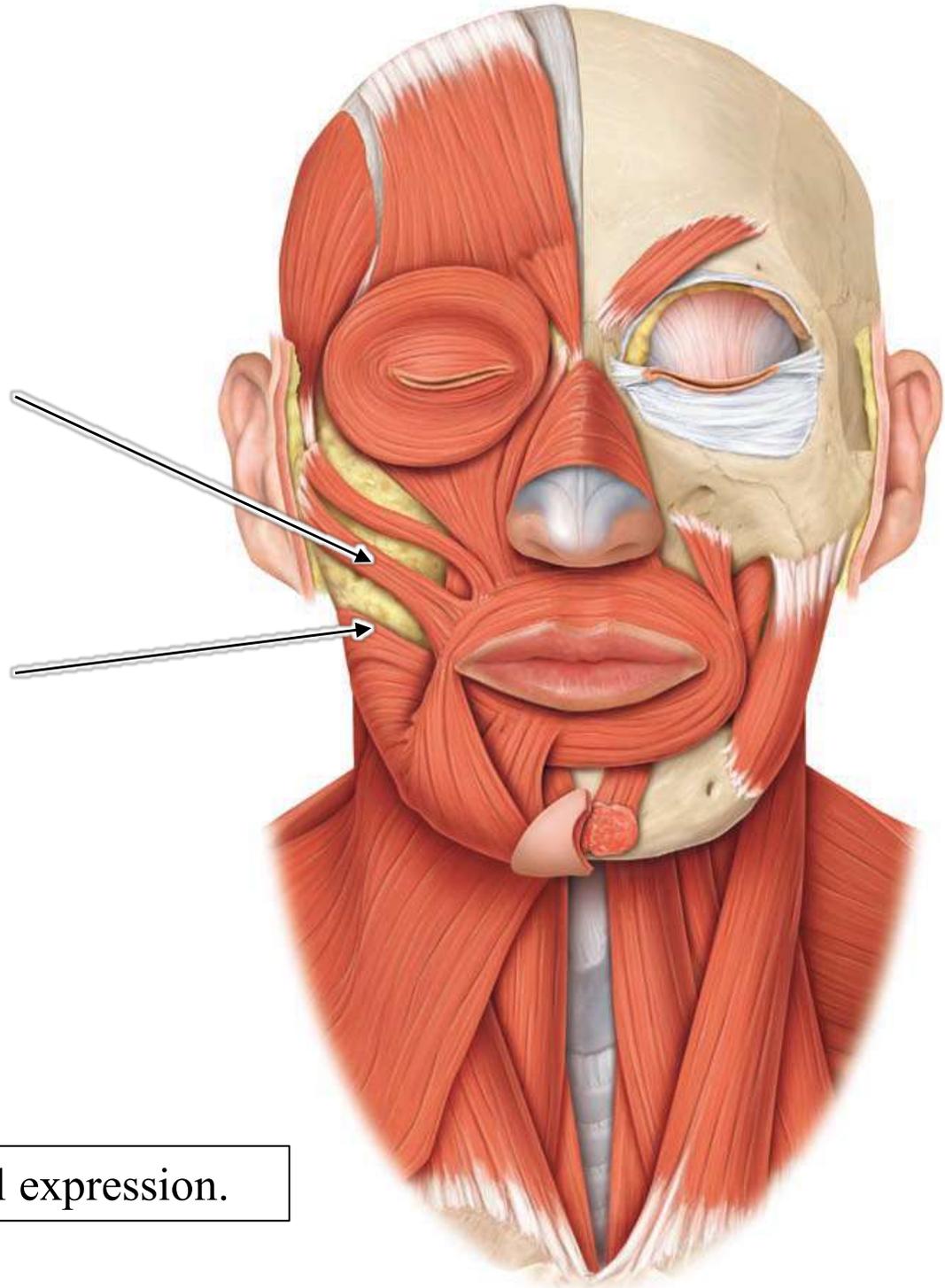


Fig.7: Muscles of facial expression.

Muscles of Mastication (Chewing)

4 pairs

- Four pairs of muscles move the mandible, and are known as 'muscles of mastication'.
- They are all supplied by the mandibular branch of the trigeminal nerve. ✓
- The **masseter**, **temporalis**, and **medial pterygoid** close the mouth and account for the strength of the bite.
- The medial and lateral pterygoid muscles help to chew by moving the mandible from side to side.
- The lateral pterygoid is also the main depresser of the mandible as in opening the mouth. Note that **Gravity** assists in depressing the mandible (plus other muscles).

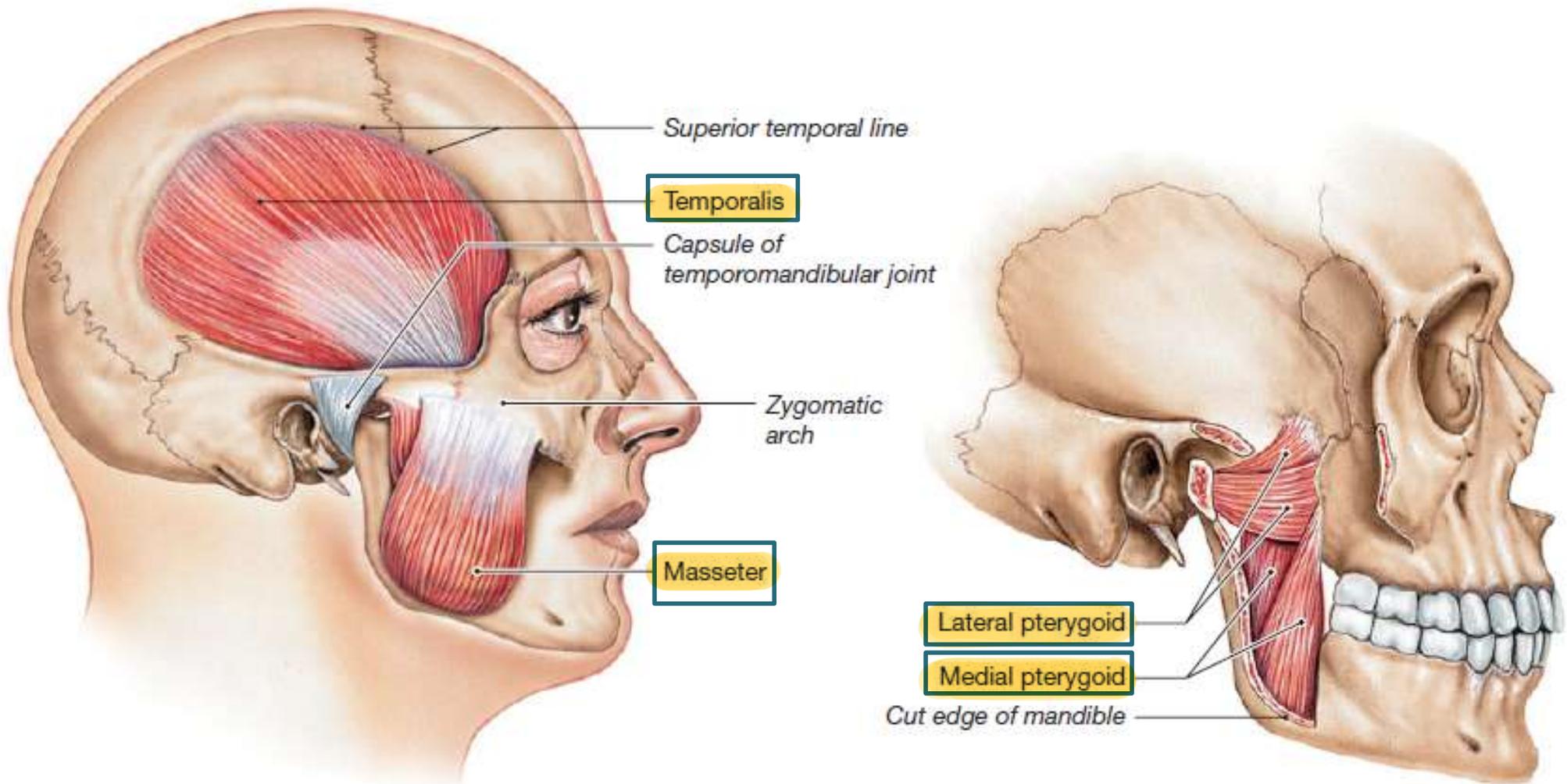


Fig.8: Muscles of mastication.

Muscles Of The Tongue

- Muscle of the tongue include:
 - **Intrinsic muscles** (originate and insert **within tongue**). These are responsible for changing the shape of the tongue.
 - **Extrinsic muscles** (originate **outside the tongue**, insert into **tongue**). These are responsible for moving the tongue.
- **Genioglossus** is one of these **extrinsic muscles.** It moves the tongue forwards.
- All muscles of the tongue are supplied by the **Hypoglossal nerve** except the palatoglossus.

← يفذها Vagus
سؤال فيرست
ممكن يجي فاي المرة كاشكل
True / false

Palatoglossus

Genioglossus

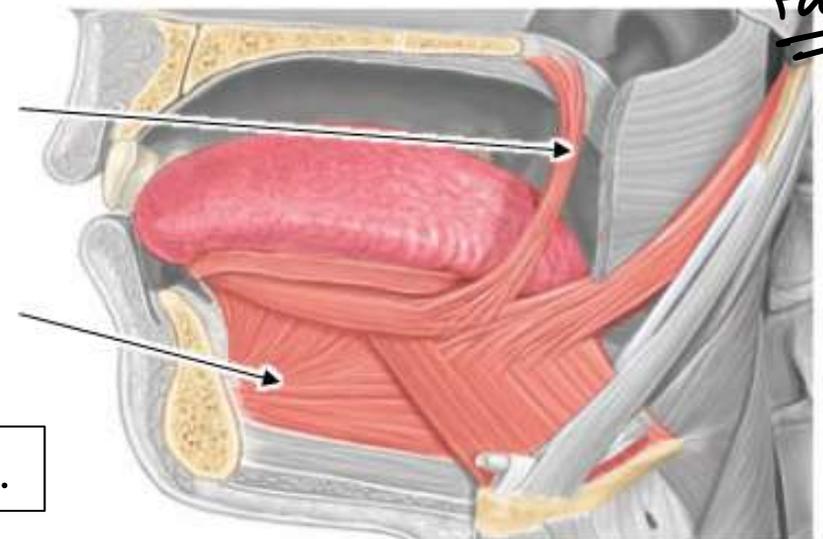
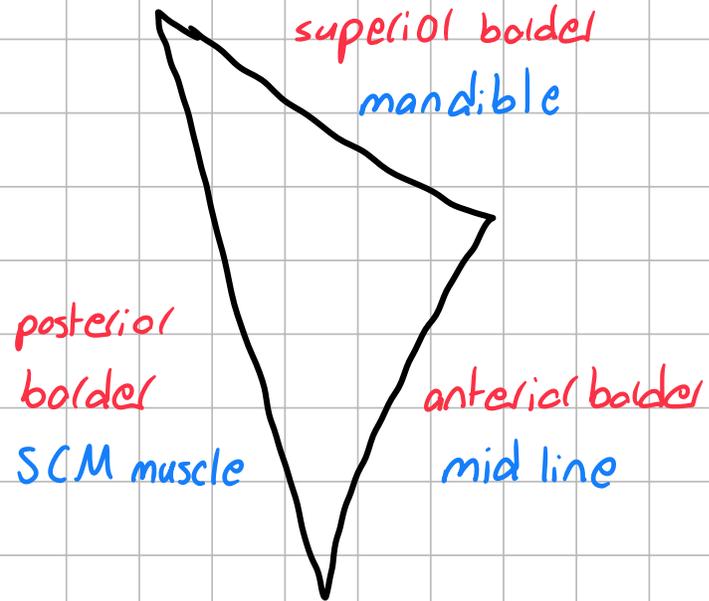


Fig.9: Muscles of the tongue.

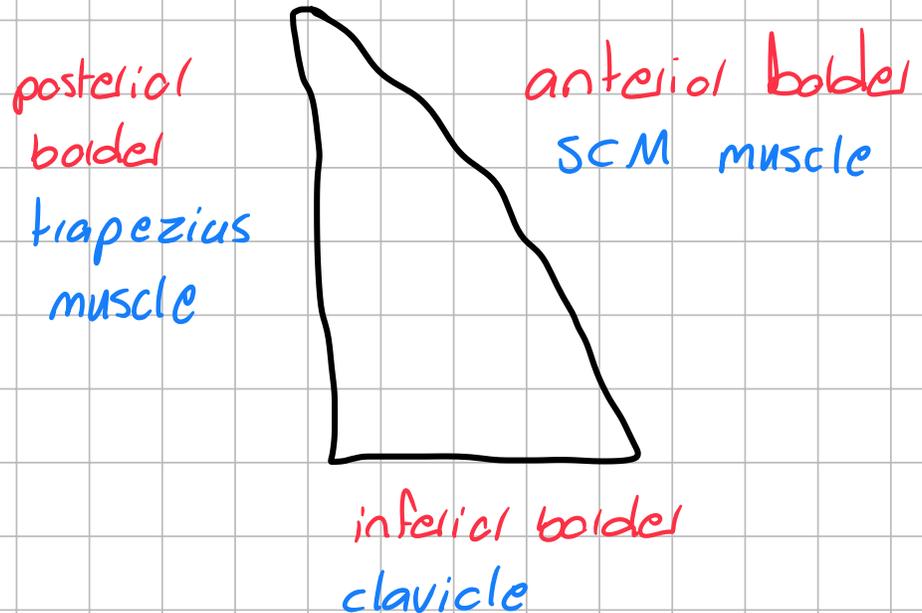
muscles of the neck :

- **Sternocleidomastoid (SCM)** origin : sternum / clavicle
insertion : mastoid process and the occipital

Anterior triangle



posterior triangle



- **the scaleni muscles** (lateral part of the neck)

① the subclavian artery and vein and ② the trunks of the brachial plexus. ③ (scalenus anterior)

Muscles Of The Neck

- The **Sternocleidomastoid (SCM)** muscle is an important anatomical landmark in the neck. It divides the neck into an anterior and a posterior triangle.

origin

- The SCM muscle arises from the sternum and clavicle and is inserted into the mastoid process and the occipital bone. Its motor supply is by the accessory (XI) nerve. If the muscles on both sides contract, they'll flex the head. If the SCM muscle of one side contracts, it'll rotate the head to the opposite side.

both side contract

one side contract

flexion

rotation

opposite side

contralateral

bring insertion to the origin

الرأس يميل لقدام
sternum
clavi

لقدام

tilting same side (ipsilateral)

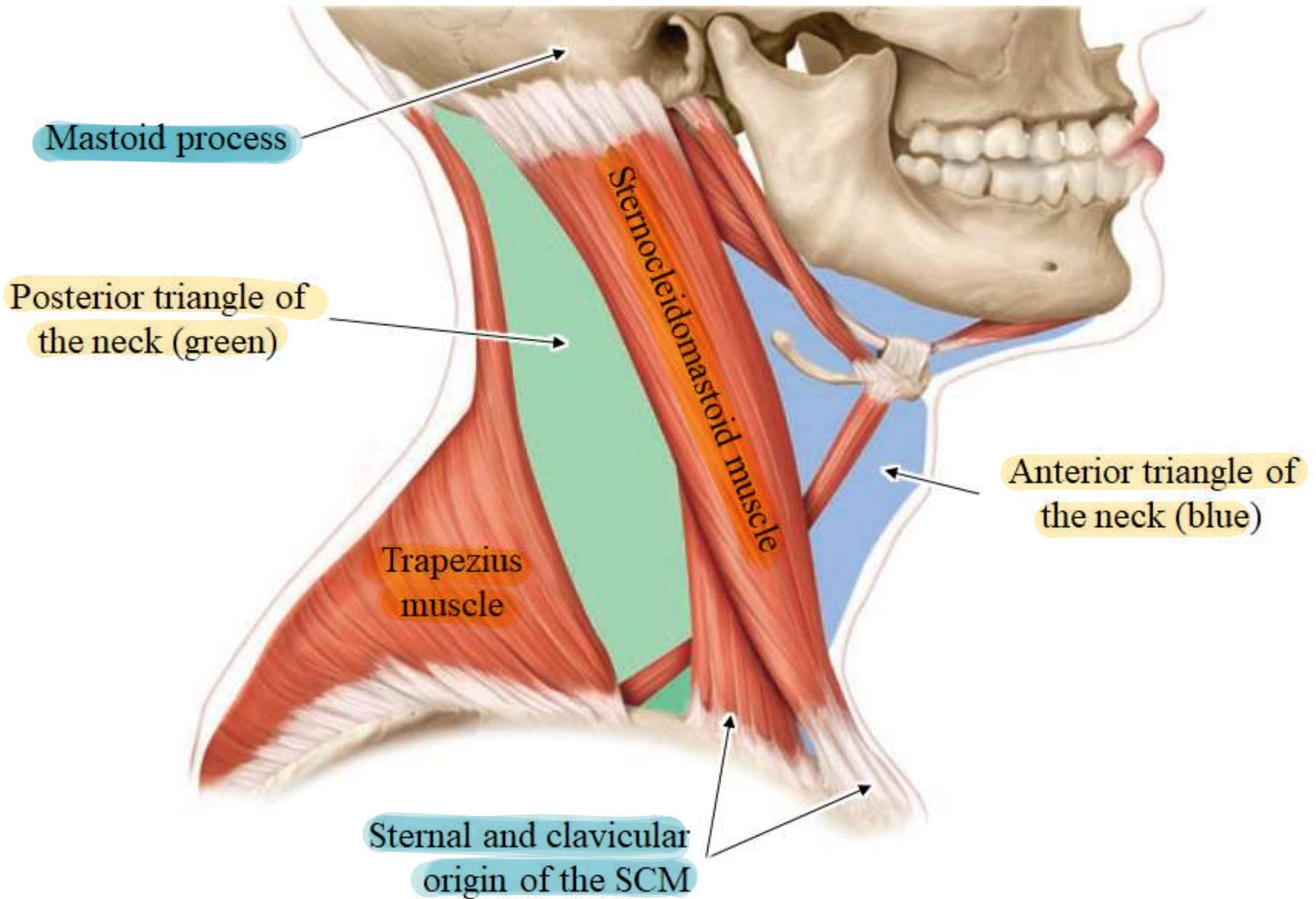


Fig.10: The sternocleidomastoid muscle.

Identify the function of the sternocleidomastoid muscle.

- A)** Abducts the arm
- B)** Breathing
- C)** Shrugs the shoulders
- D)** Turns the head side to side



5. Which of the following muscles is named according to its origin and insertion?

- A. transversus abdominus
- B. semimembranosus
- C. sternocleidomastoid
- D. deltoid

Answer is C: The origin is on the sternum and clavicle (sternocleido-), while the insertion (on the “moving bone”) is to the mastoid process of the  bone.
occipital

احفظ على الصورة أسهل بكثير

■ Anterior Triangle:

1. Anterior border: **midline**
2. Posterior border: **SCM muscle**
3. Superior border: **Mandible**

■ Posterior Triangle:

1. Anterior border: **SCM muscle**
2. Posterior border: **Trapezius muscle**
3. Inferior border: **Clavicle**

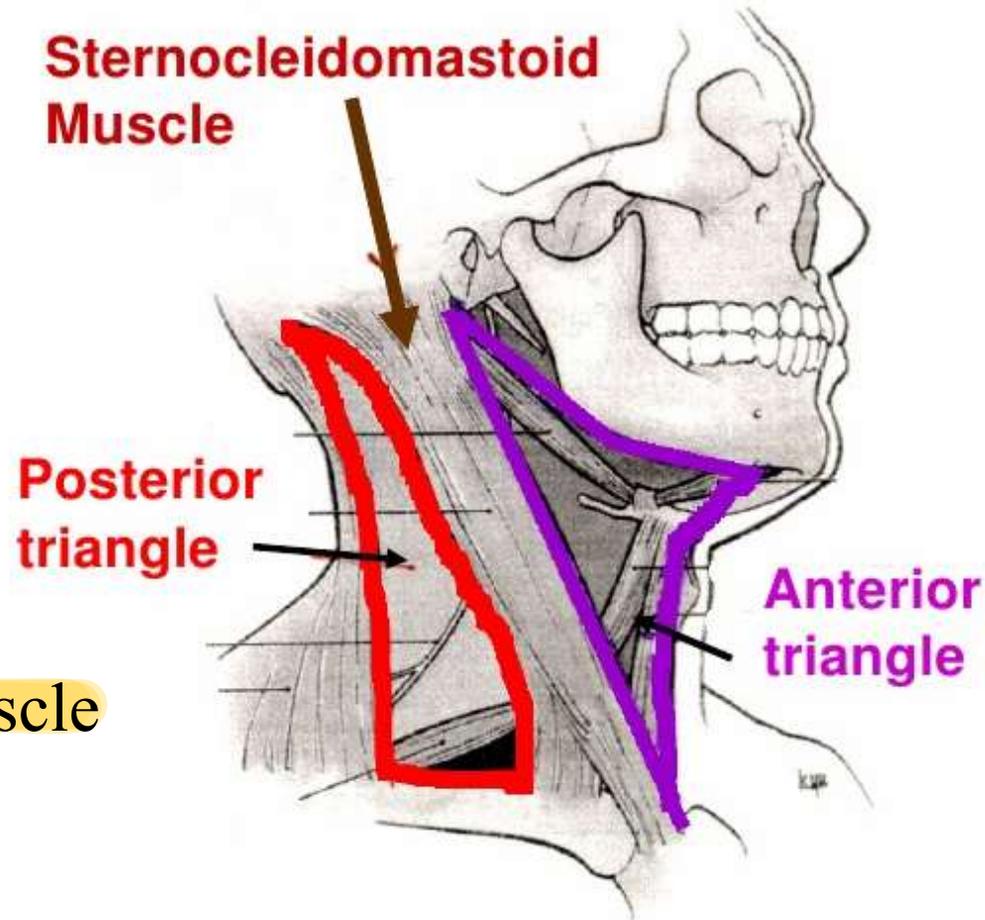


Fig.11: Boundaries of the triangles of the neck.

- In the *anterior part of the neck*, we have the *suprahyoid* and *infrahyoid* muscles. These muscles move the hyoid bone and perform other functions.

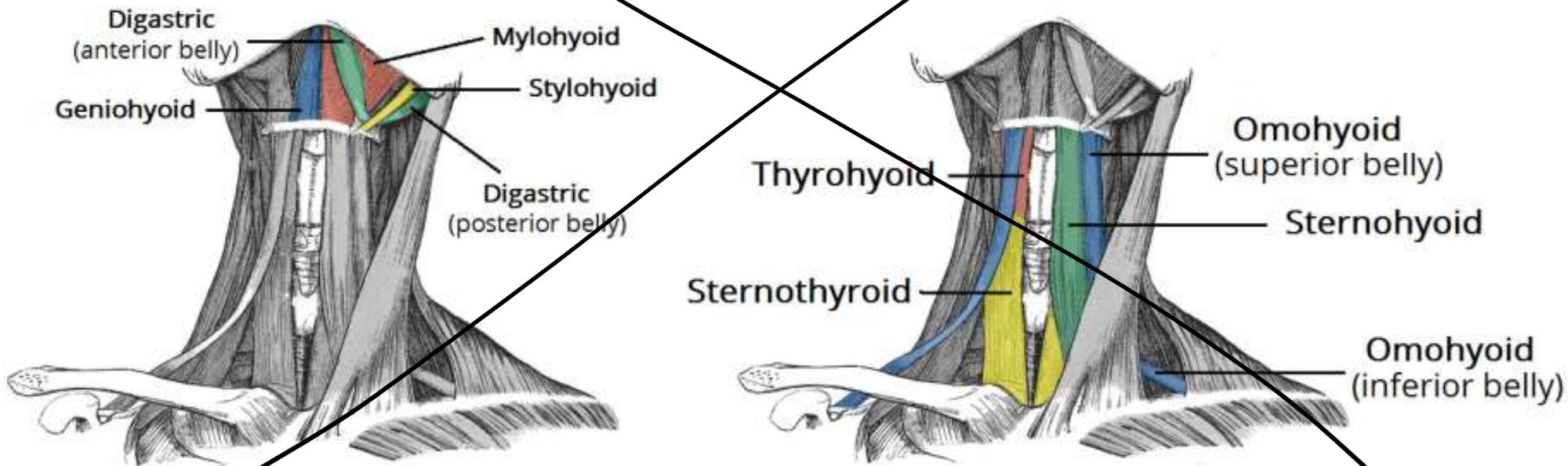


Fig.12: The suprahyoid (left) and infrahyoid muscles (right).

- In the *lateral part of the neck*, we have the *scaleni* muscles. *Scalenus anterior* is an important landmark in the neck with several important relations. Among these relations we have: the subclavian artery and vein and the trunks of the brachial plexus.

accessory muscle
in breathing

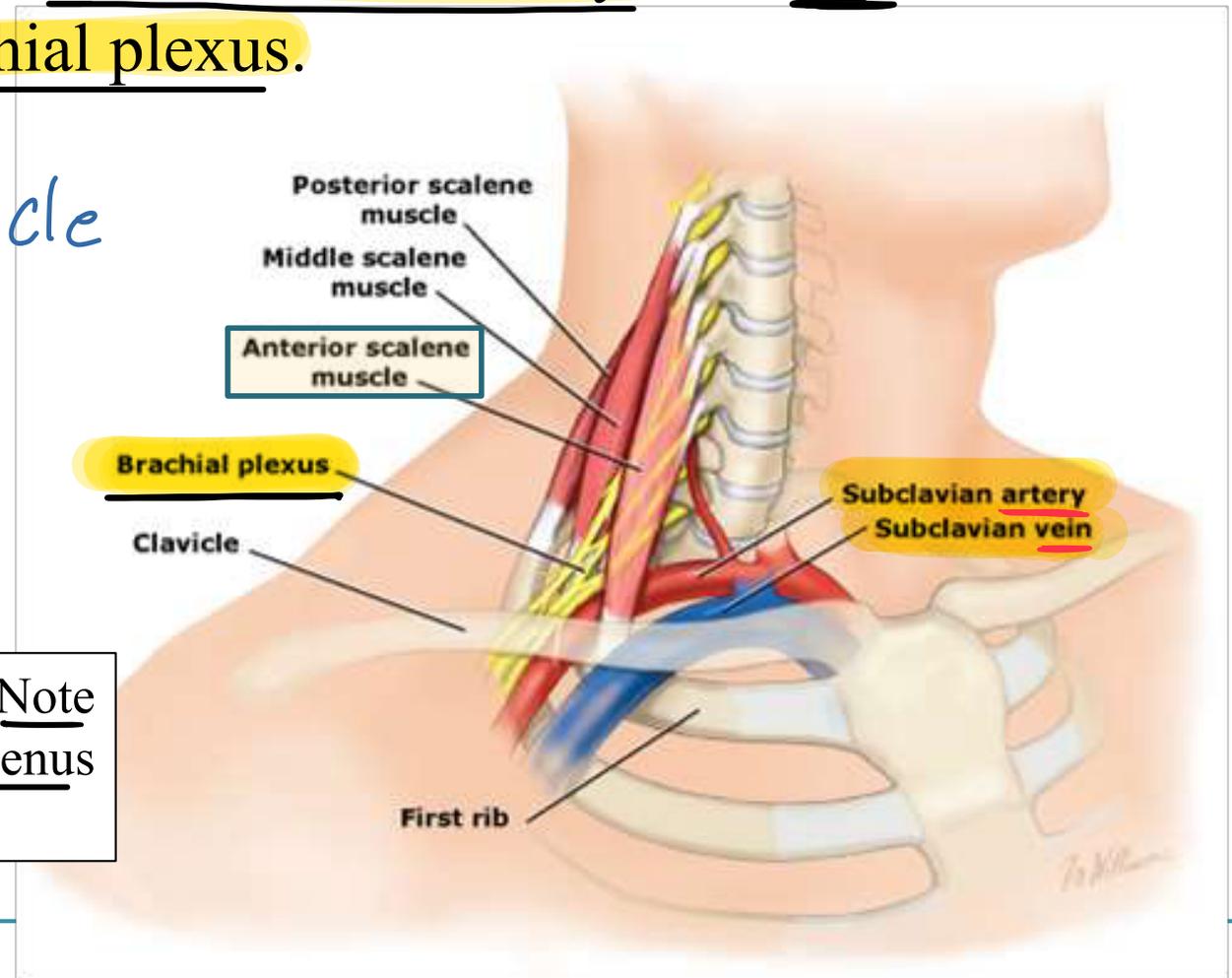
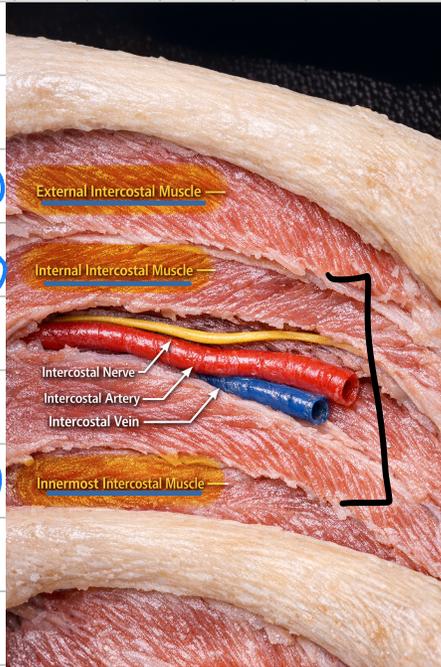


Fig.13: The scaleni. Note the relations of the scalenus anterior muscle.

Respiratory muscles of the Thorax

- normal breathing -

① the intercostal muscles



between them
intercostal
nerve +
intercostal
vessels

② Diaphragm
- most important
muscle of respiration

Anterolateral Abdominal
wall muscles

- External oblique
- Internal oblique
- transversus abdominis

الجزء ابداء chat كمال
الحفظ و تنظيم كمال

forced breathing
(inspiration)

sternocleidomastoid / scaleni

Respiratory Muscles Of The Thorax

- **Respiratory muscles** alter the size of the thoracic cavity which affects the pressure in the lungs, and that determines whether we inhale or exhale.

①

- Between the ribs we have the intercostal muscles arranged in three layers: the **external, internal, and innermost intercostal muscles**. Between the internal and innermost intercostal muscles, we have the **intercostal nerve and vessels**.

- There are also a number of **accessory muscles** useful in forced breathing: **SCM and the scaleni muscles**.

muscles of the neck

nerve/ vessels

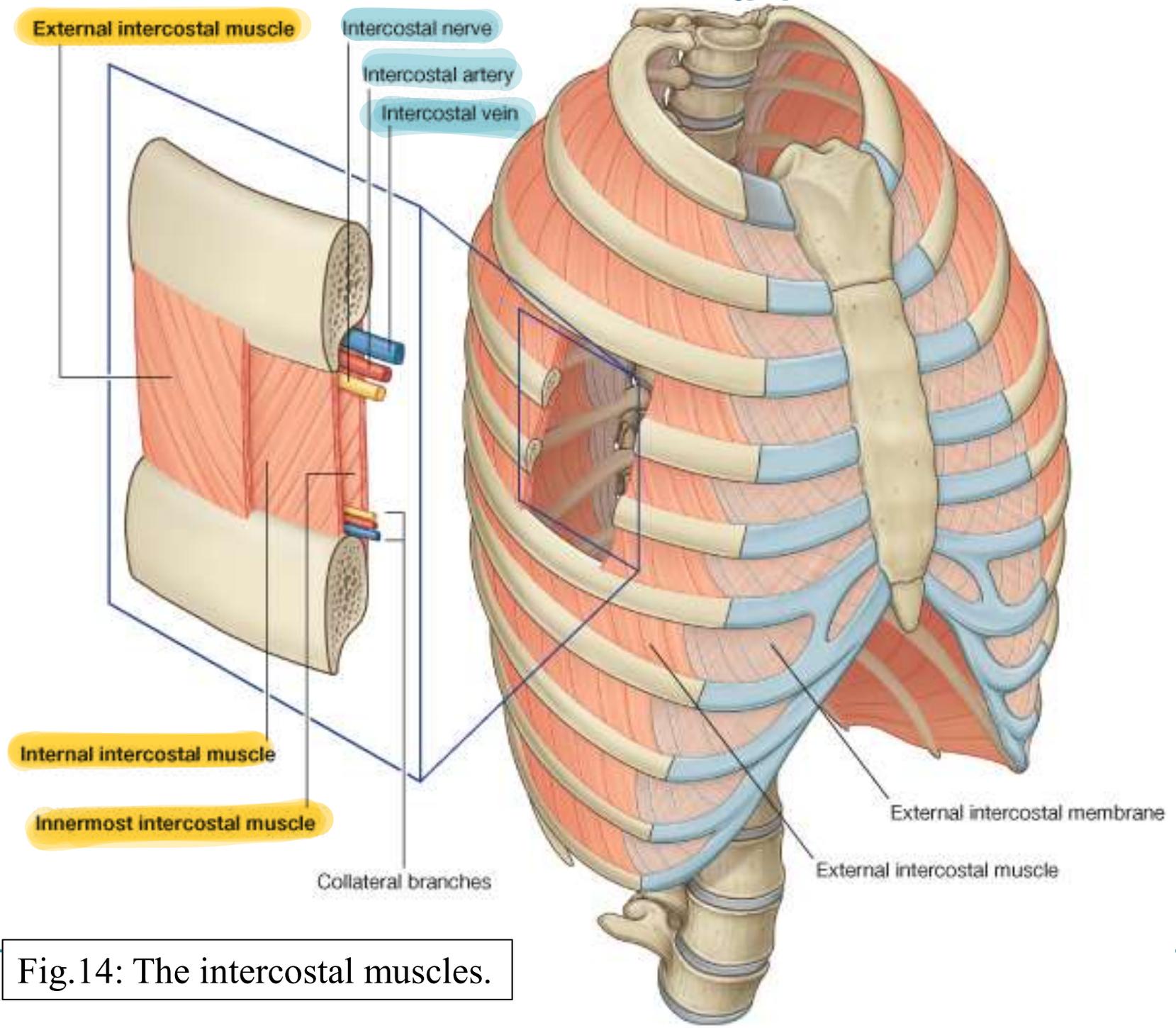
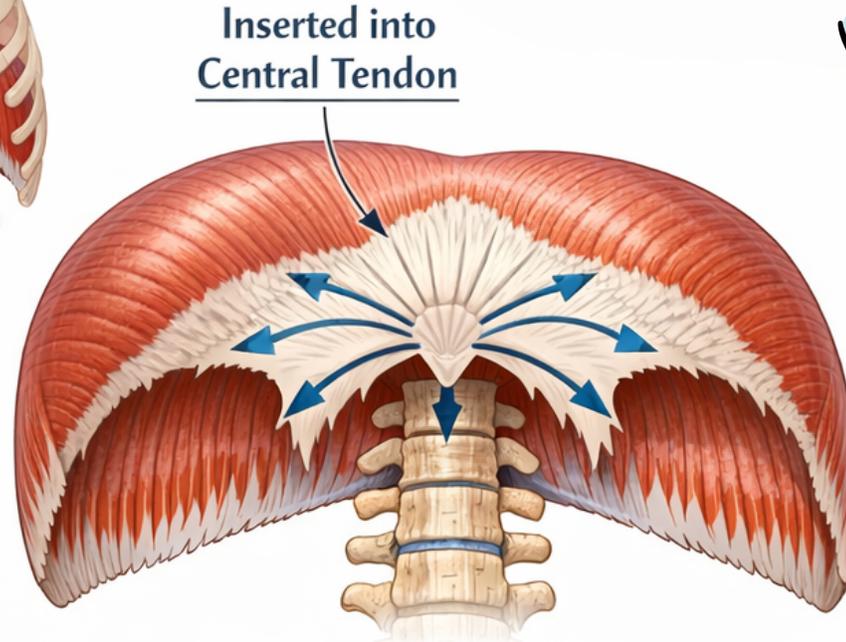
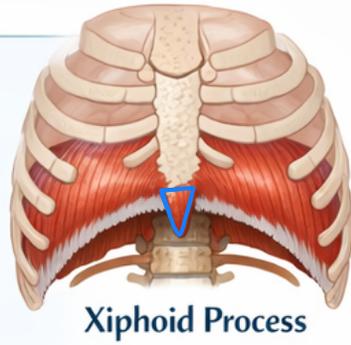


Fig.14: The intercostal muscles.

تلخيص الجدول
visually

Origin

- **Sternal Part:**
Xiphoid Process
- **Costal Part:**
Lower 6 Costal
Cartilages & Adjacent Ribs
- **Vertebral Part:**
Upper 3 Lumbar Vertebrae
& Discs



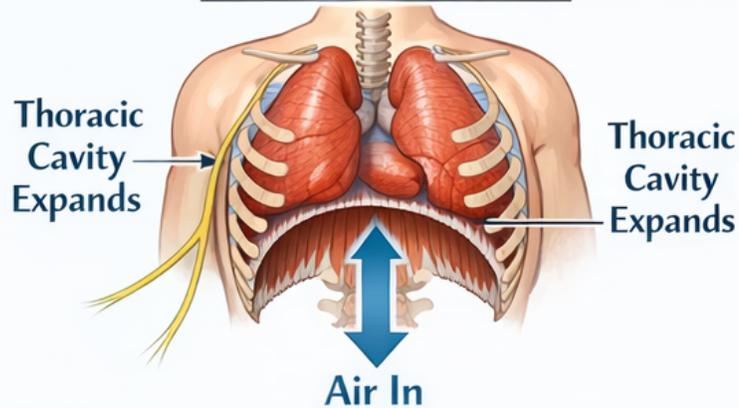
Nerve



Phrenic Nerve

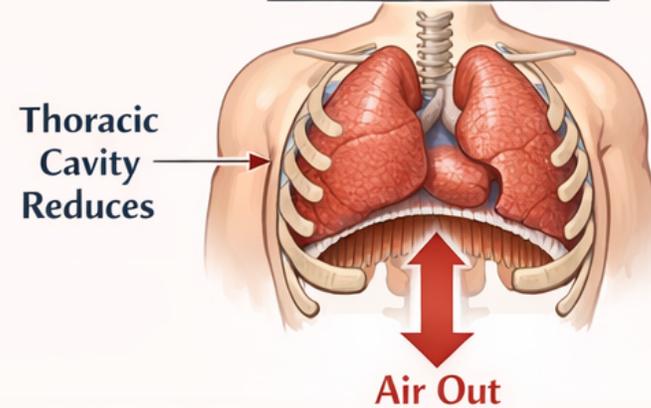
Inhalation

Diaphragm Contracts



Exhalation

Diaphragm Relaxes



The Diaphragm

The diaphragm is the most important muscle of respiration

Muscle	Origin	Insertion	Nerve	Action
Diaphragm	1) Sternal part: Xiphoid process 2) Costal part: Lower 6 costal cartilages and adjacent ribs 3) Vertebral part: Upper 3 lumbar vertebrae and their discs	All muscle fibers converge to be inserted into a centrally located tendon	Phrenic nerve	Contraction of the diaphragm increases vertical diameter of thoracic cage causing inhalation. Its relaxation leads to exhalation.

خيالغا contraction ← inhale → thoracic cage
 يتناهي طوا (يكبر)
 relaxation ← exhale → 25
 (بقا، ١٥٥)

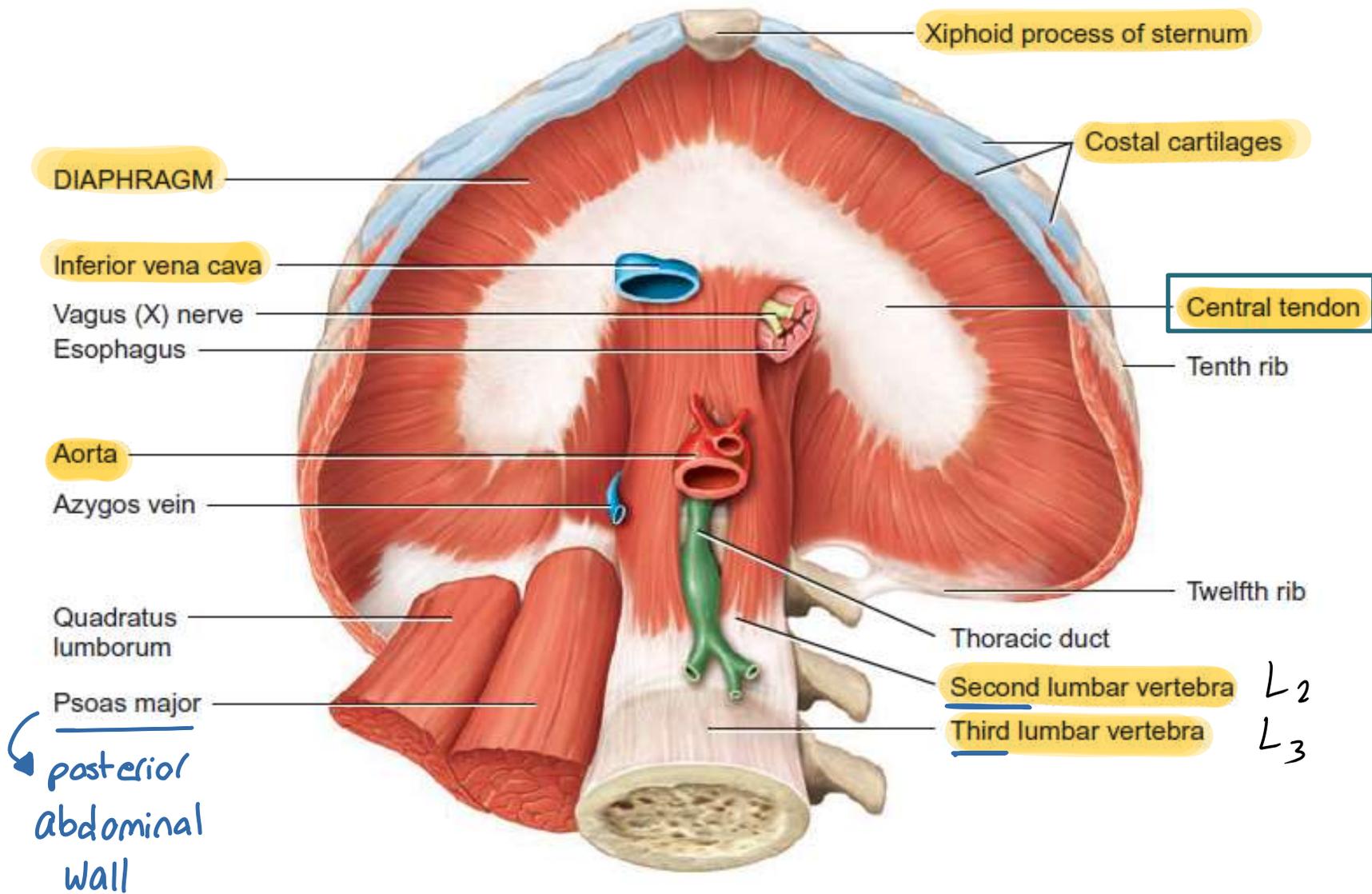


Fig.15: The diaphragm.

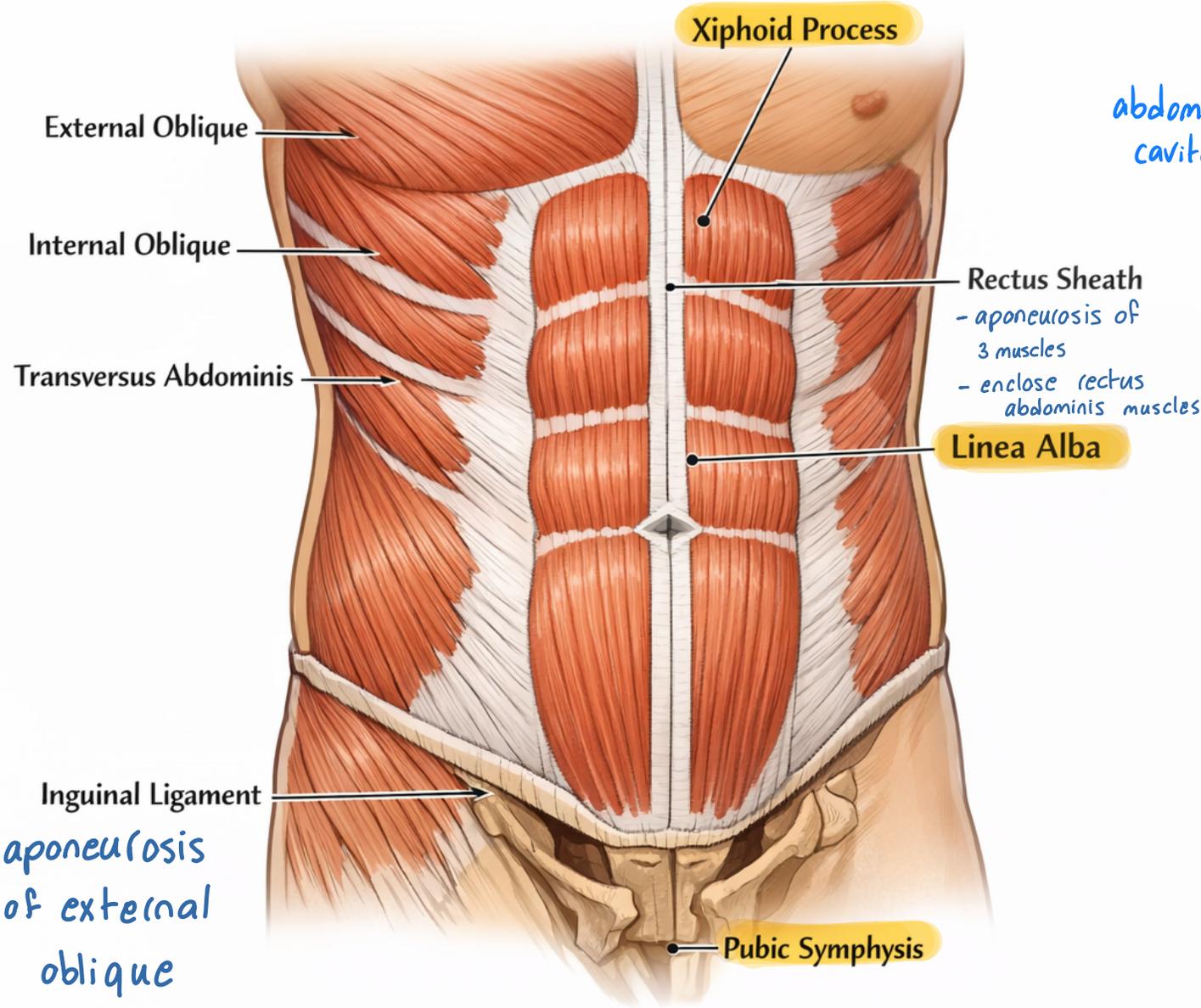
3 types

Anterolateral Abdominal Wall Muscles

- Include the **external oblique**, **internal oblique**, and **transversus abdominis**.
① From outside to inside ② ③
- The ^(white) aponeurosis (broad tendon) of the **external oblique** forms the thick inguinal ligament inferiorly.
- The aponeuroses of these 3 muscles form ^{six-pack muscle} the **rectus sheaths** which enclose the rectus abdominis muscles. The sheaths meet each other in the midline to form the **linea alba**, a **connective tissue band extending from the xiphoid process to the pubic symphysis**.
- **Actions:**
 1. They retain the organs within the abdominal cavity.
 2. ★ The rectus abdominis flexes the lumbar vertebrae.
 3. They assist in micturition, defecation, vomiting, and labor.
 4. They assist in expiration.

Anterolateral Abdominal Wall Muscles

(Actions)



Support Abdominal Organs

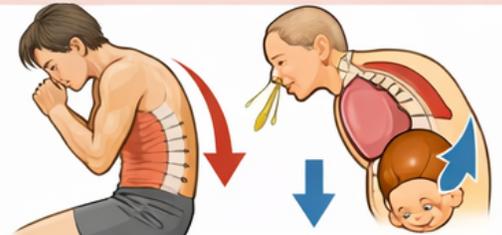


Flexion of Lumbar Spine by

rectus abdominis



Micturition, Defecation, Vomiting, Labor



Assist Expiration



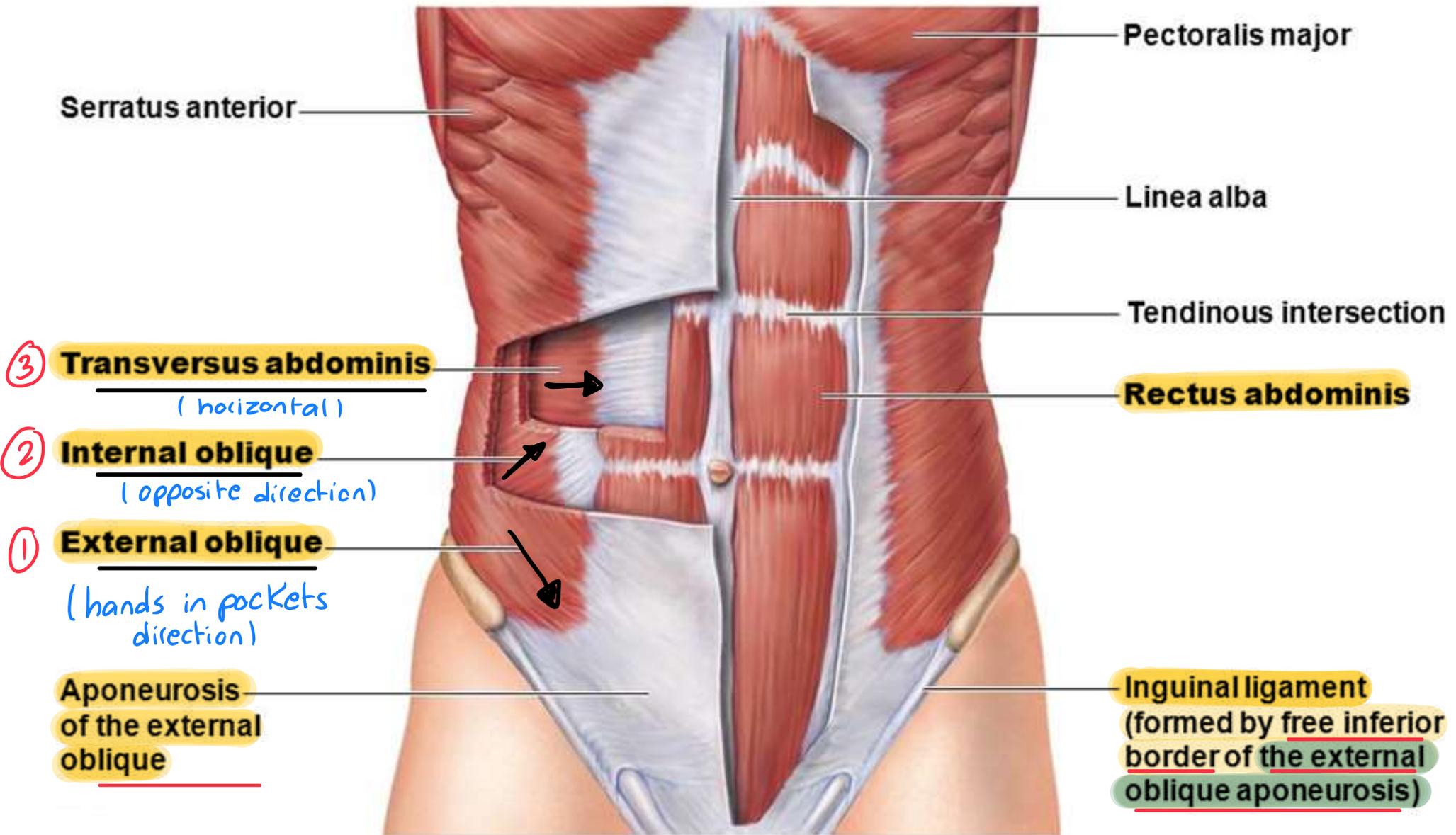


Fig.16: Anterior abdominal wall muscles.

Posterior Abdominal Wall Muscles – **psosas majal**

insetion: common tendon on the thigh

– **illiacus**

- Muscles of the posterior abdominal wall perform different functions.

- The most important are the **psosas major** and **illiacus** muscles. They are **inserted** by a common tendon into the thigh. When they contract, they flex the thigh on the trunk; if the thigh is fixed, they flex the trunk on the thigh.

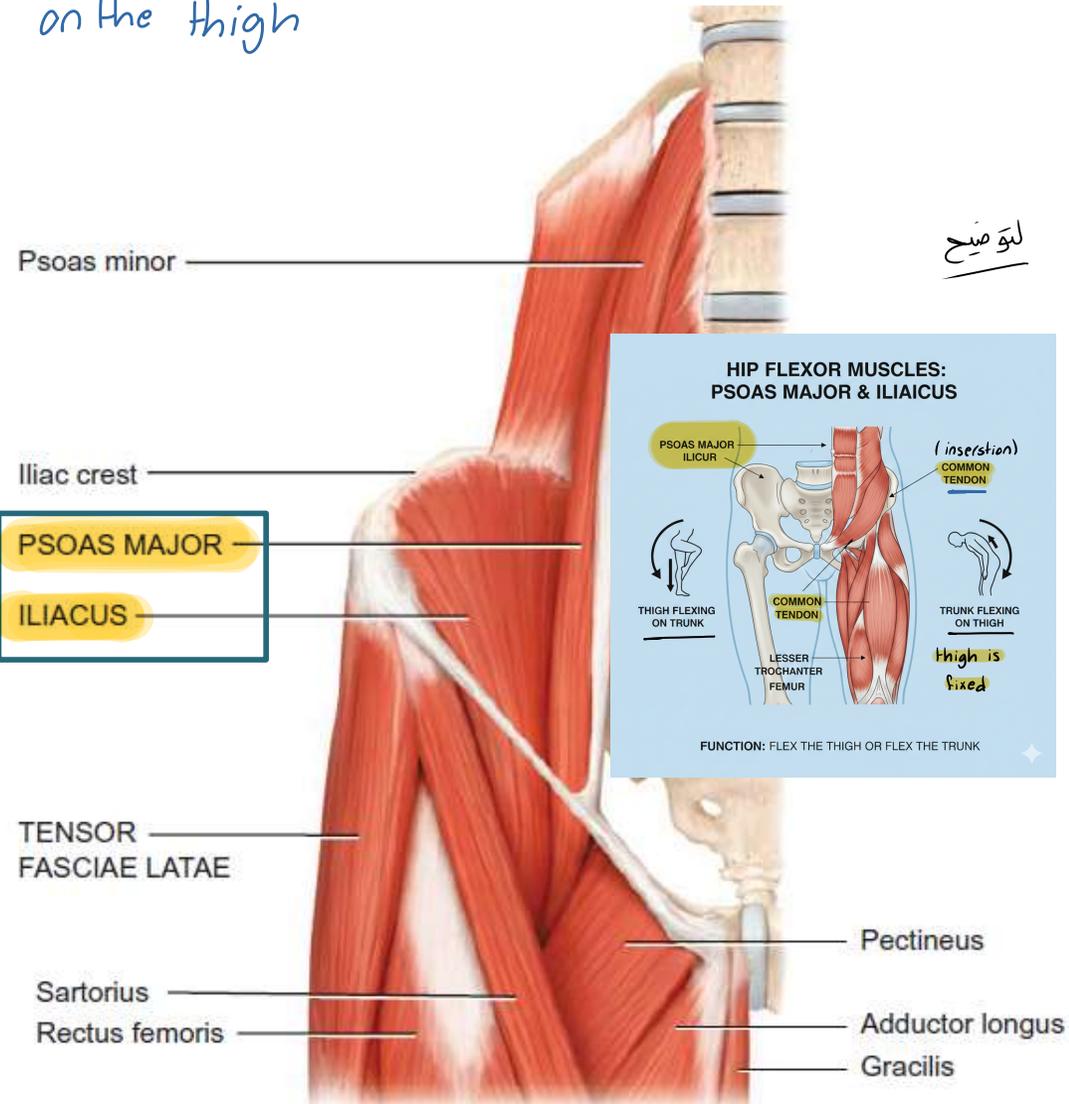


Fig.17: Posterior abdominal wall muscles.

- muscles of the upper limb -

muscles that
move the
pectoral girdle

- Serratus anterior
- trapezius

Abduction

muscles of the
shoulder/thorax move
the humerus

- deltoid
 - the rotator cuff
 - subscapularis
 - supraspinatus
 - infraspinatus
 - teres minor
 - pectoralis major
- No abduction

muscles of the
arm that move
the forearm

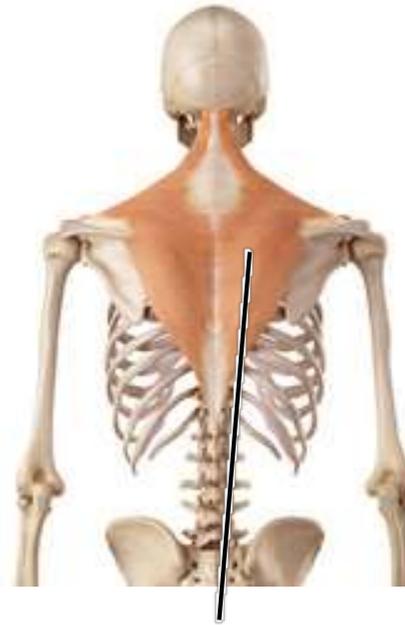
- biceps brachii
 - brachialis
 - brachioradialis
 - triceps brachii
- flexor
- extensor

muscles of
the forearm

Muscles Of The Upper Limb

Muscles that move the Pectoral Girdle (shoulder)

- Several muscles move and stabilize the pectoral girdle.
- The **serratus anterior** (punching) muscle fixes the scapula in position.
- **Trapezius** is a large muscle seen on the back. With the serratus anterior muscle, it rotates the scapula so that its glenoid cavity is raised. This allows the arm to be abducted above the head. *abduction*



Trapezius

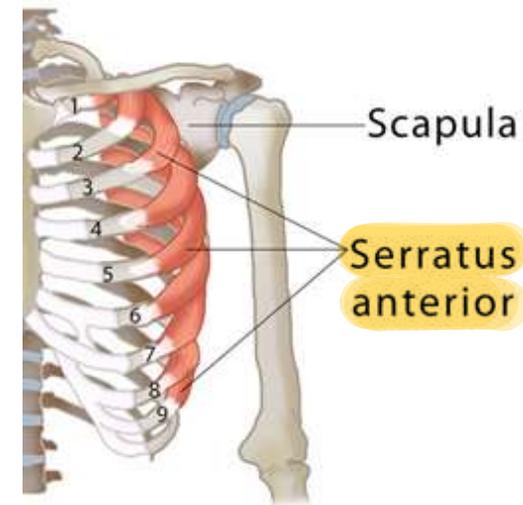
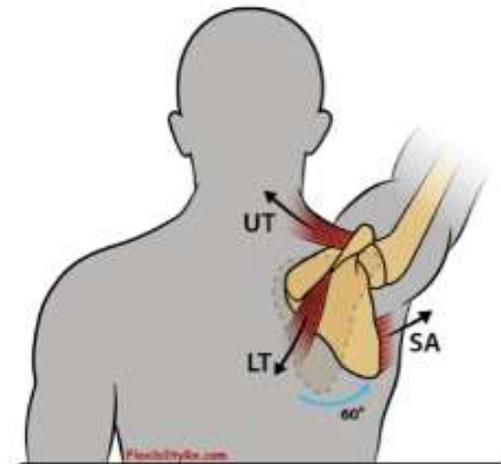


Fig.18: Serratus anterior and trapezius and their action together.



Muscles of shoulder and thorax that move the humerus

- The **deltoid** muscle arises from the ^{origin} clavicle and scapula and is inserted into the shaft of the humerus. It flexes, abducts, and extends the humerus.
origin: clavicle / scapula
insertion: shaft of humerus
- The **rotator cuff** muscles (¹subscapularis, ²supraspinatous, ³infrapinatus, and ⁴teres minor) arise from the scapula. Their tendons blend with the capsule of the shoulder joint stabilizing it. In addition, the supraspinatous initiates abduction of the arm.
- The **pectoralis major** is a big anterior muscle that arises from the clavicle, sternum, and costal cartilages to be inserted into the humerus. It flexes, adducts, and medially rotates the arm. It's one of the main muscle used in swimming.

ما تفعل
abduction
وحيدة

insertion
origin

Identify the muscles that form the rotator cuff.

- A) Infraspinatus, supraspinatus, teres minor and subscapularis
- B) Intraspinatus, supraspinatus, teres minor and teres major
- C) Supraspinatus, subscapularis, teres major and teres minor.
- D) Deltoid, supraspinatus, infraspinatus and teres major

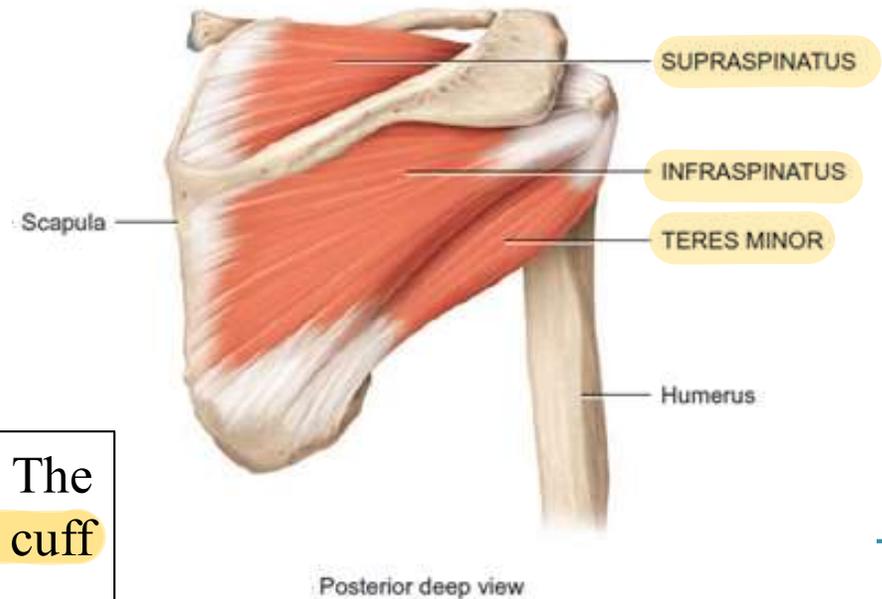
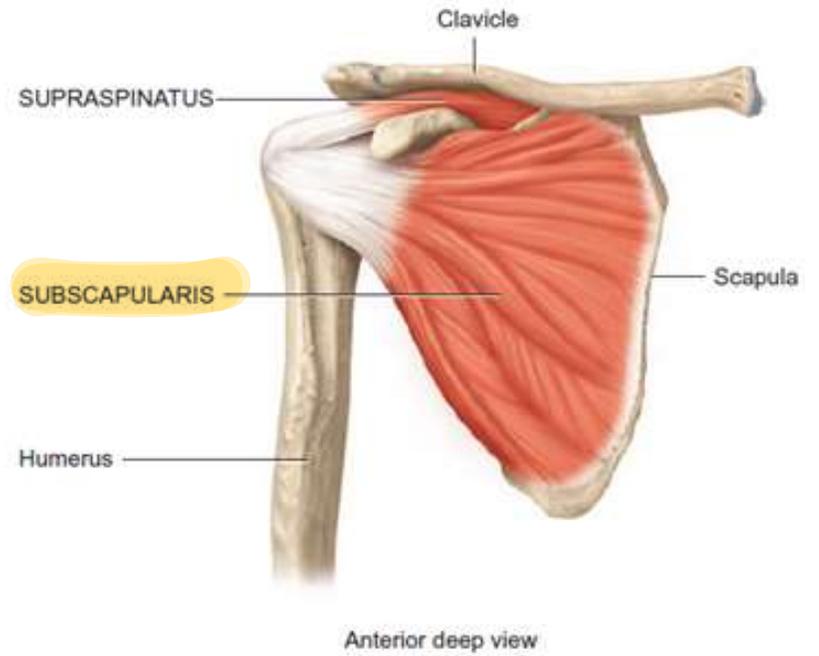
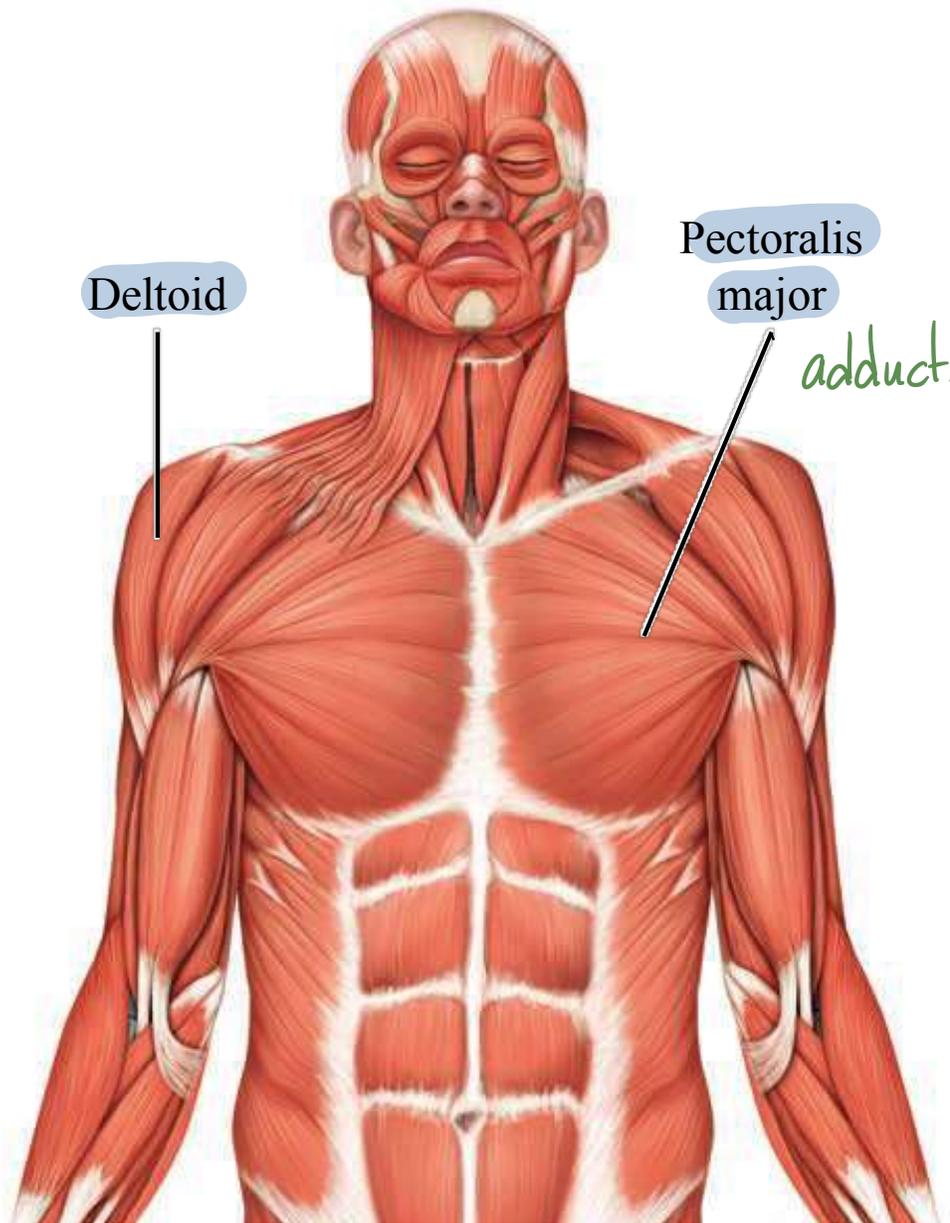


Fig.19: Deltoid and pectoralis major muscle. The two views of the scapula show the rotator cuff muscles.

Muscles of the arm (that move the forearm)

- 1
- The **biceps brachii**, **brachialis**, and **brachioradialis** are **flexors**. The **triceps brachii** extends the forearm.

- 2
- The biceps has two heads of origin. The long head passes through the intertubercular sulcus of the humerus. The biceps inserts into the radial tuberosity. *insertion*

- 3
- It also forms an aponeurosis that inserts medially into fascia and that protects the underlying **brachial artery** and **median nerve** as they pass in the cubital fossa. *Flat tendon*

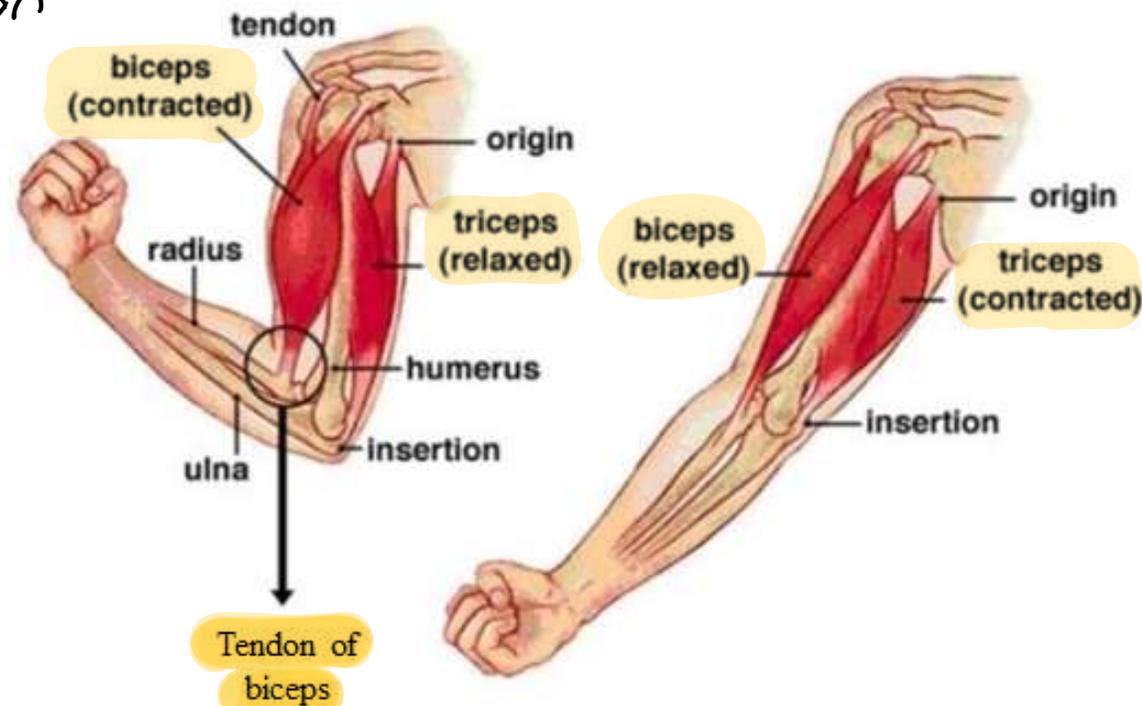


Fig.20: The biceps and triceps muscles.

The biceps brachii _____ the arm and forearm and the triceps brachii _____ the arm and the forearm.

- A)** abducts: adducts
- B)** adducts: abducts
- C)** extends: flexes
- D)** flexes: extends



3. What is the insertion point of the biceps brachii muscle?

Scapula

Radial tuberosity

Clavicle

Olecranon process

The Cubital Fossa:

لا تنسى
تحفظ
الرسالة

- Shallow triangular depression anterior to elbow joint.
- Tendon of biceps, brachial artery and median nerve pass through it.
- Site of measuring brachial artery pulse and taking blood pressure.
- The superficial veins passing in the skin overlying this fossa can be used to take blood samples.

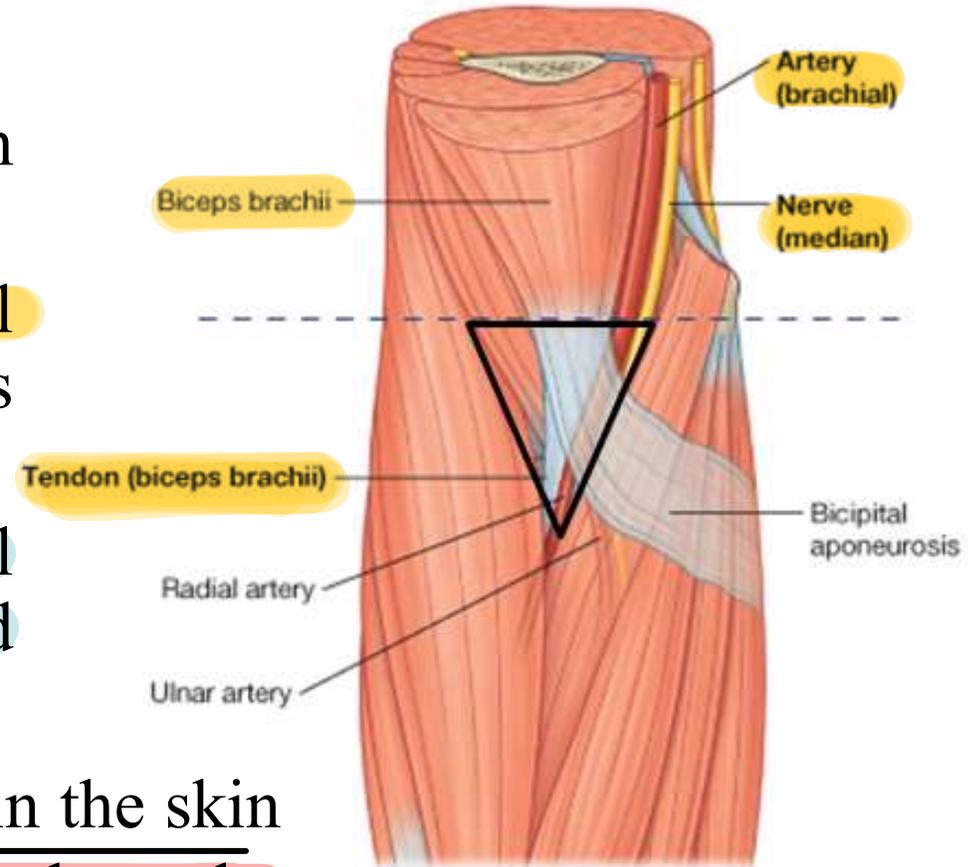


Fig.21: The cubital fossa.

Extrinsic = out → in
origin outside insertion inside

ملقبه ذاكرة

كيفية

Muscles of the Forearm

- Muscles in this group that act on the wrist and fingers are known as **extrinsic muscles of the hand** because they originate outside the hand and insert within it.
- Based on location and function, these muscles are divided into an **anterior (flexor) compartment** and a **posterior (extensor) compartment**.
- Anconeus, **supinator** and **pronator quadratus** are muscles in the forearm that act on the forearm.

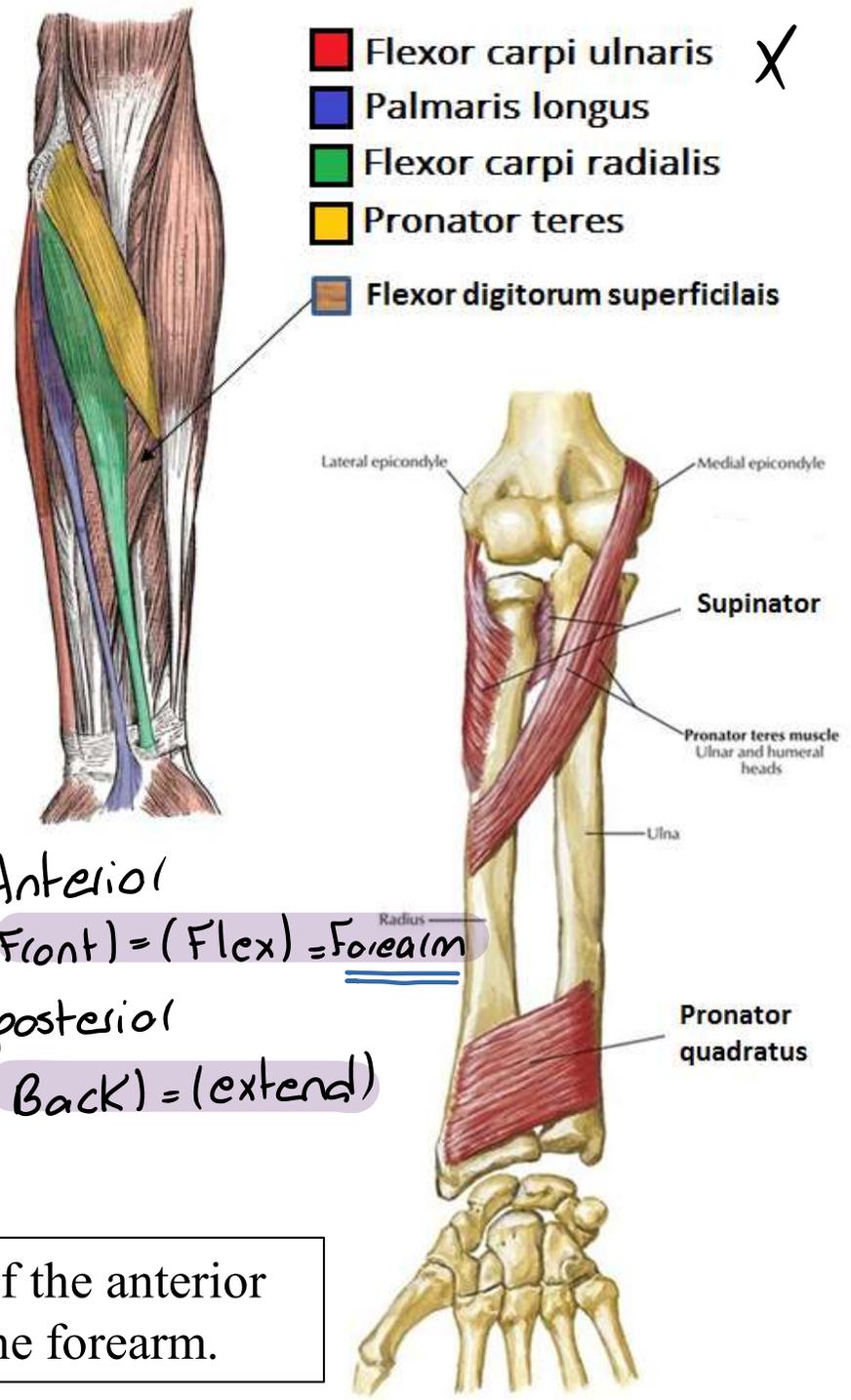


Fig.22: Muscles of the anterior compartment of the forearm.

- As the long muscles of the anterior forearm pass over the carpal bones, they are held in place by a thick band of connective tissue called the **flexor retinaculum** (transverse carpal ligament). This band with the carpal bones form a tunnel called the **carpal tunnel**.

تضيق
حزام
يشبك
tendons

- Also passing through this tunnel is the median nerve.
- Certain conditions may affect this tunnel (like inflammation of the tendons or the joints) leading to compression of the median nerve. This is called **Carpal Tunnel Syndrome**.

ضغط

- The affected person may have pain in the hand, change in sensations and even weakness in the hand muscles supplied by the median nerve.

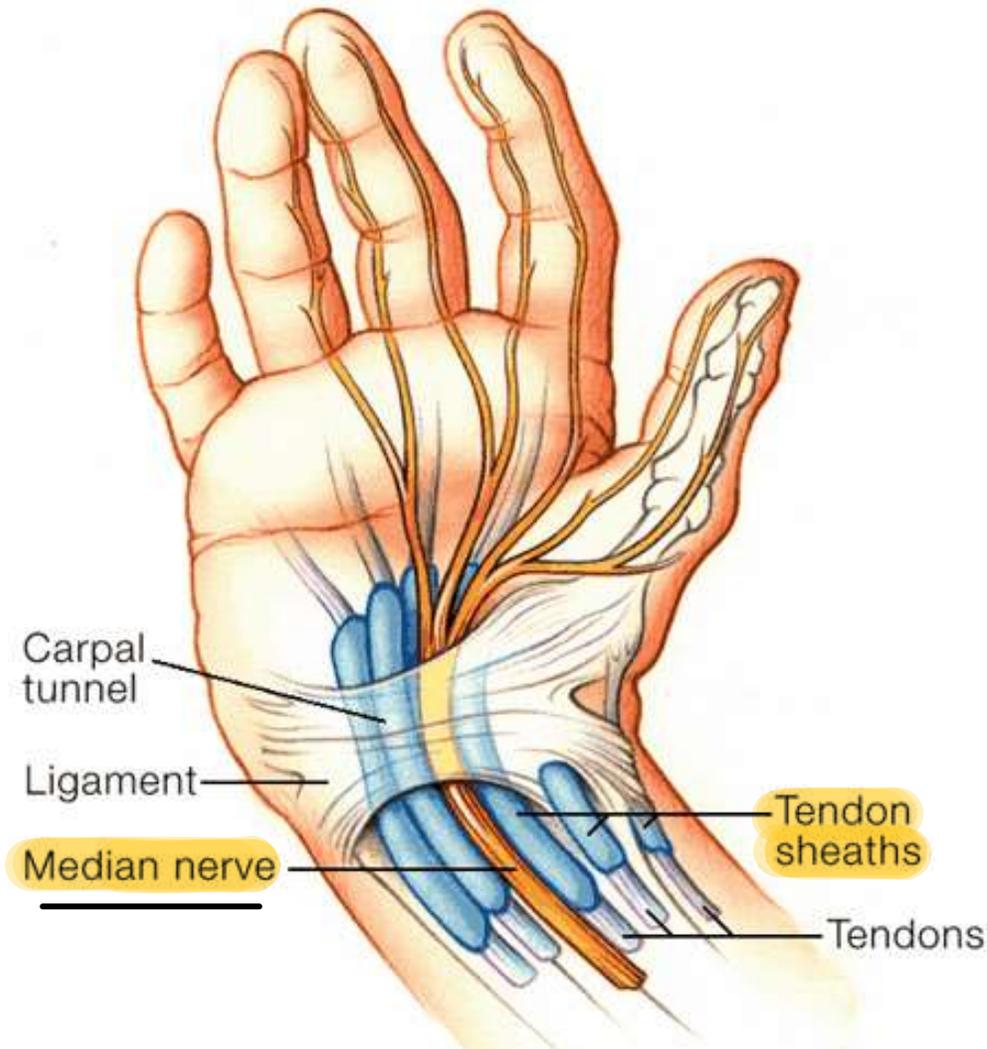


Fig.23: The carpal tunnel.

Movement of Forearm	Muscles that produce them
<p><u>Flexion</u></p>	<p>Biceps Brachialis Brachioradialis</p> <p>} muscles of the arm</p>
<p>Extension</p>	<p>☆ Triceps } ☆ Anconeus }</p> <p>مصير بين احتمالية انا</p>
<p>Supination (on back) ☆</p>	<p>Biceps Supinator</p>
<p>Pronation (on belly)</p>	<p>Pronator teres Pronator quadratus</p>

Intrinsic Muscles of the Hand (3 groups)

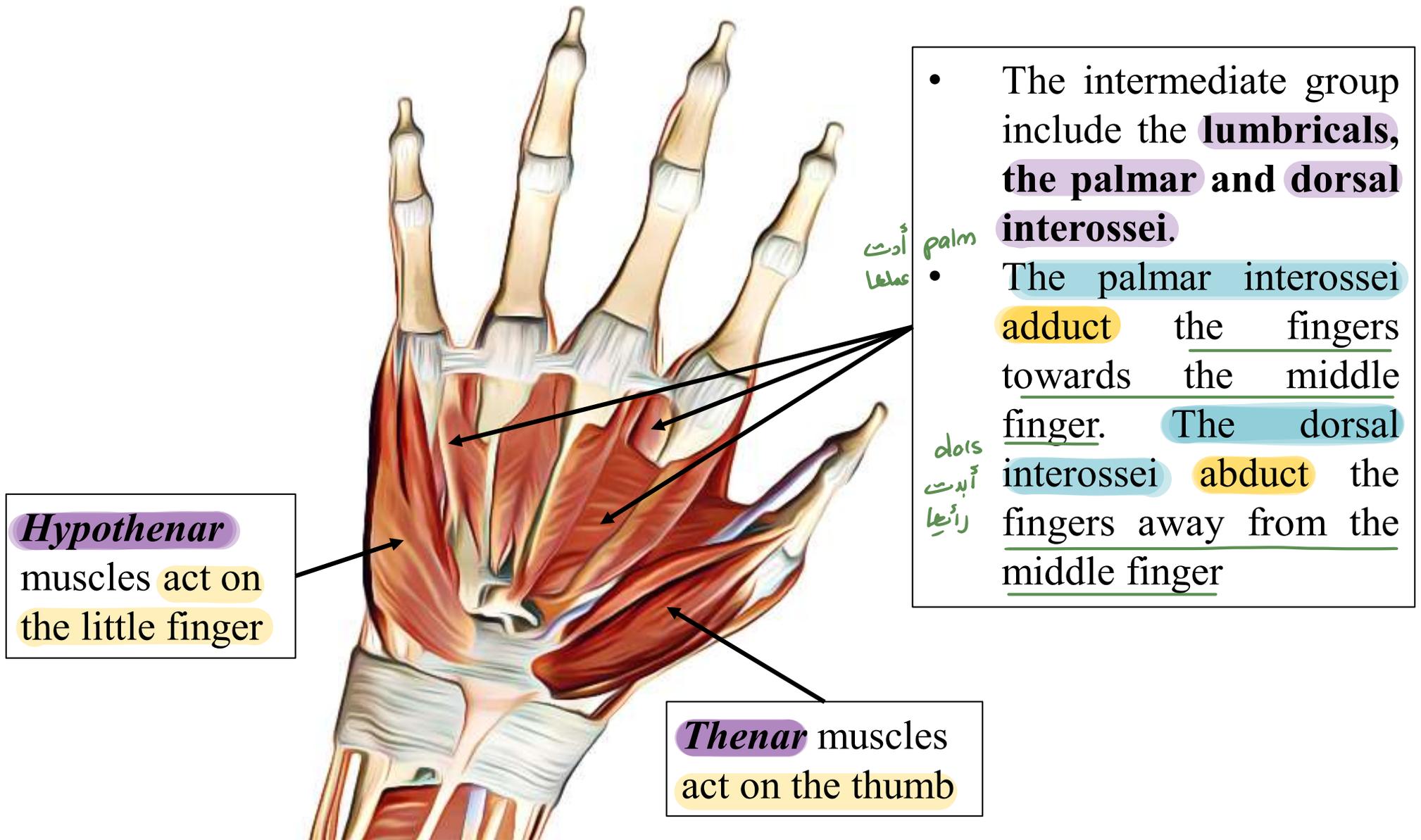


Fig.24: Intrinsic muscles of the hand.

Muscles Of The Lower Limb

- Lower limb muscles function in ¹ stability, ² locomotion, and ³ maintaining posture. In contrast, upper limb muscles are characterized by ^{تنوع} versatility of movement.
- Muscles of the lower limbs often cross two joints and can act equally on both.
- Most muscles that move the femur originate from the pelvic girdle and insert on the femur.

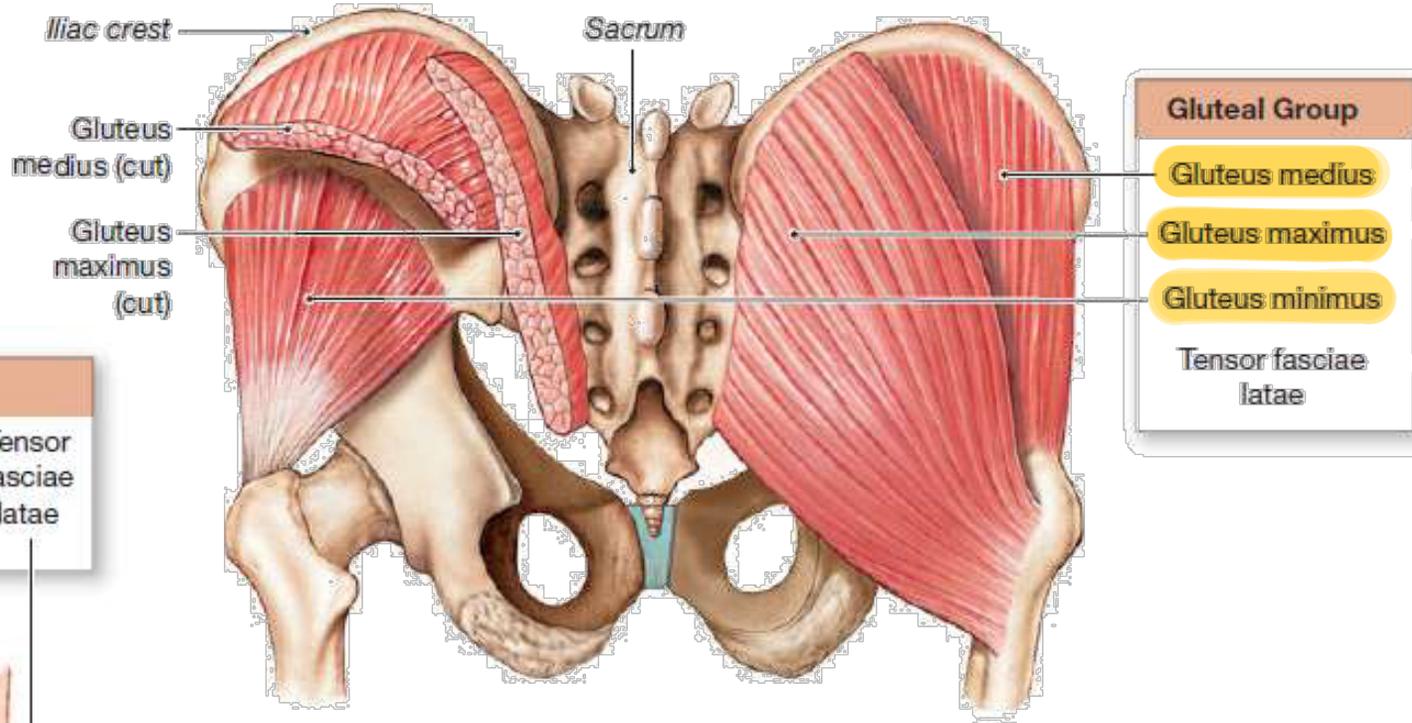
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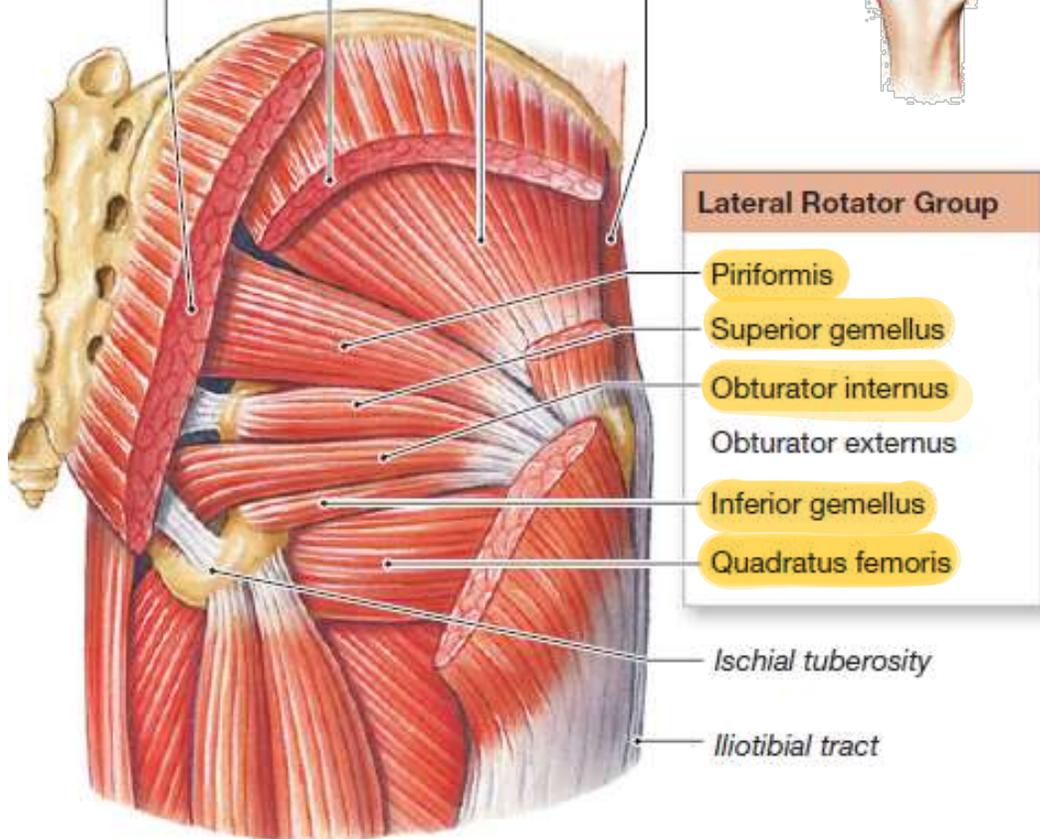
Muscles of the Gluteal region (Buttocks)

Muscle	Action	Notes
Gluteus maximus	Extends thigh	gluteus maximus + fats = buttocks With fat forms the buttocks
Gluteus medius	1. Abduct thigh 2. Medial rotation of thigh 3. Tilt hip	These muscles are essential in <u>initiating walking</u> , because they <u>allow the legs to be lifted off the ground</u>
Gluteus minimus		
1 Piriformis	1. Abduct thigh 2. Lateral rotation of the thigh	Between the piriformis and gemellus superior muscles is a small space through which pass the big Sciatic nerve * تكرر كثير المفروقت حفظناه
2 Gemellus superior		
3 Obturator internus		
4 Gemellus inferior		
5 Quadratus femoris		

ماي دايي نطلع عليها
الجدول يعني



Gluteal Group			
Gluteus maximus (cut)	Gluteus medius (cut)	Gluteus minimus	Tensor fasciae latae



Lateral Rotator Group
Piriformis
Superior gemellus
Obturator internus
Obturator externus
Inferior gemellus
Quadratus femoris

Fig.25: Muscles of the gluteal region.

Muscles of the Thigh

- Divided into anterior, medial, and posterior compartments.
 - **Anterior (extensor) compartment** of the thigh extend the leg (and flex the thigh). Supplied by the femoral nerve.
 - **Medial (adductor) compartment** of the thigh adduct the femur at the hip joint. Supplied by the obturator nerve.
media أدت دورها
adduct
 - **Posterior (flexor) compartment** of the thigh flex the leg (and extend the thigh). Supplied by the sciatic nerve.
- The **anterior compartment** of the thigh is divided into 2 triangles by the Sartorius muscle. The **sartorius** (cross-leg, tailor's) muscle is the longest muscle in the body. It originates from the anterior superior iliac spine and is inserted into the medial surface of the upper part of the shaft of tibia. It flexes, abduct and laterally rotates the thigh, it also flexes the leg.
origin ←
insertion ←

- Below the sartorius, we have the **quadriceps femoris** muscle which is formed of the *rectus femoris*, *vastus medialis*, *vastus intermedius* and *vastus lateralis*. The tendon of the quadriceps inserts into the patellar base. **The patellar ligament** arises from the apex of the patella and inserts into the tibial tuberosity.
- The quadriceps extends the leg at the knee joint. The rectus femoris muscle also flexes thigh at the hip joint.

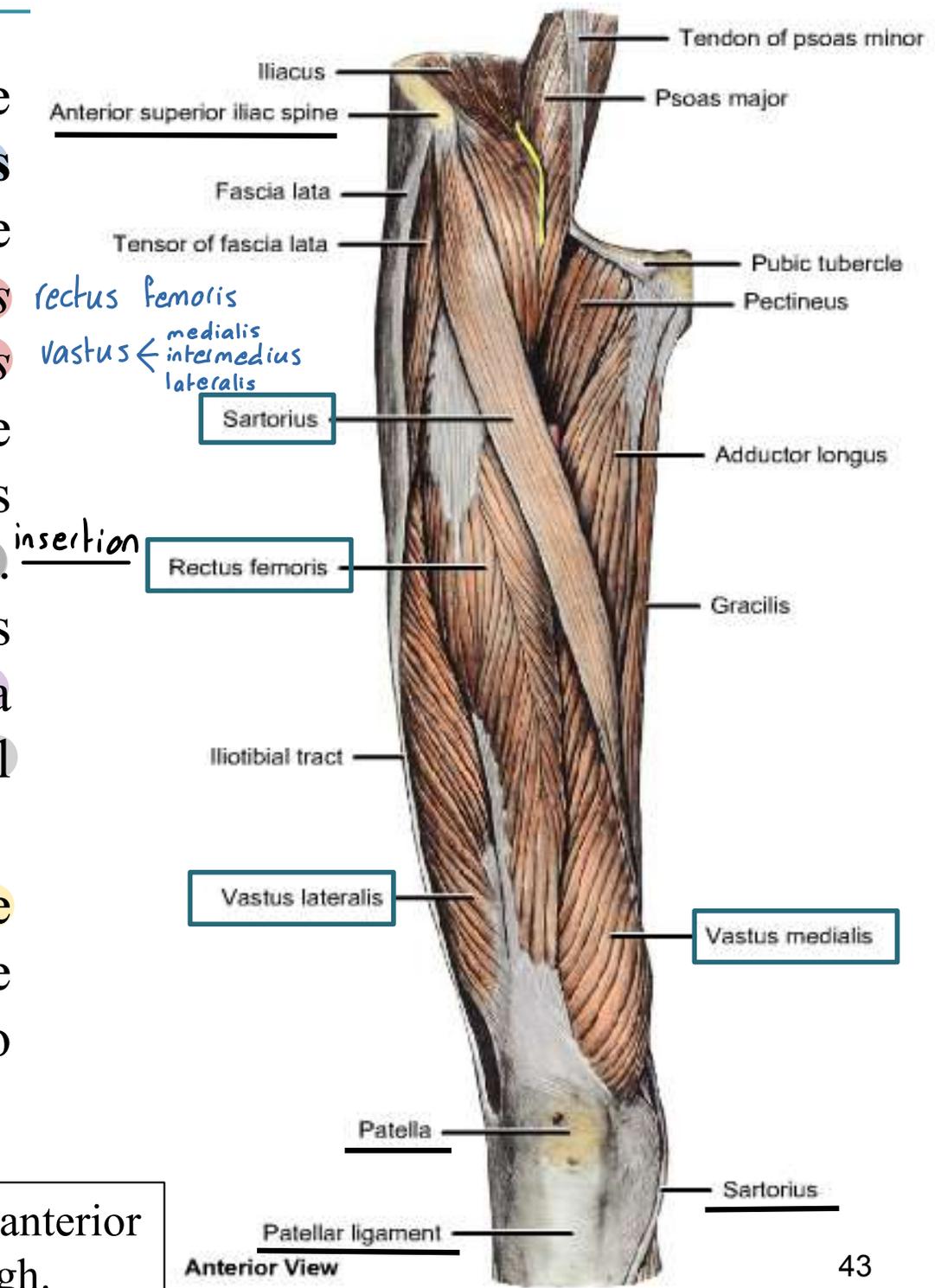


Fig.26: Muscles of the anterior compartment of the thigh.

39. Which muscles extend the leg?

- A. quadriceps
- B. hamstrings
- C. gluteus muscles
- D. soleus, gastrocnemius & tibialis anterior

Answer is A: Anatomically “leg” refers the limb between the knee and ankle. Extension of the leg is achieved by contracting the quadriceps (on the front of the thigh).

Muscles of the Leg

- Leg muscles, like those of the thigh, are divided into three compartments: anterior, lateral, and posterior.

high
medial

- **Anterior compartment** muscles dorsiflex the foot.
- **Lateral compartment** muscles plantar flex & evert the foot.
- **Posterior compartment** muscles are split into a superficial group: the gastrocnemius, soleus and plantaris; and a deep group (e.g., tibialis posterior). The superficial muscles share a common tendon of insertion, **the calcaneal tendon (Achilles tendon – the largest and strongest tendon in the body)**. They plantar flex the foot and the gastrocnemius also flexes the leg.

leg
tendon

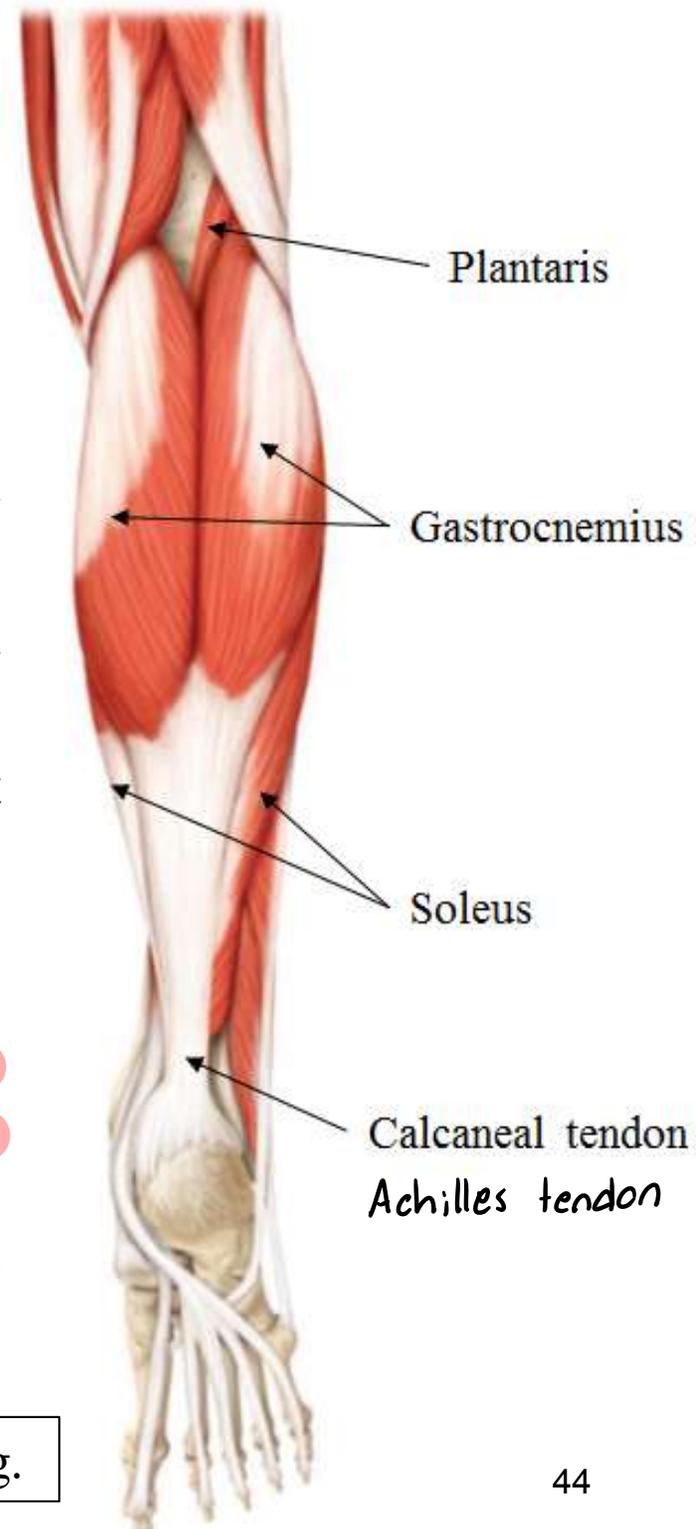


Fig.27: Muscles of the posterior compartment of the leg.

1. What is the insertion of the Gastrocnemius?

Mandible

Scapula & Humerus

Calcaneus bone via achilles tendon

Radial tuberosity of radius

Intrinsic Muscles of the Foot

- These muscles are termed **intrinsic** because they **originate & insert *within* the foot**.
- These muscles are limited in action. They're designed for **locomotion** and **support (of the arches)**.
- They include **dorsal** and **plantar groups**.



Fig.28: Intrinsic muscle of the foot (plantar group).