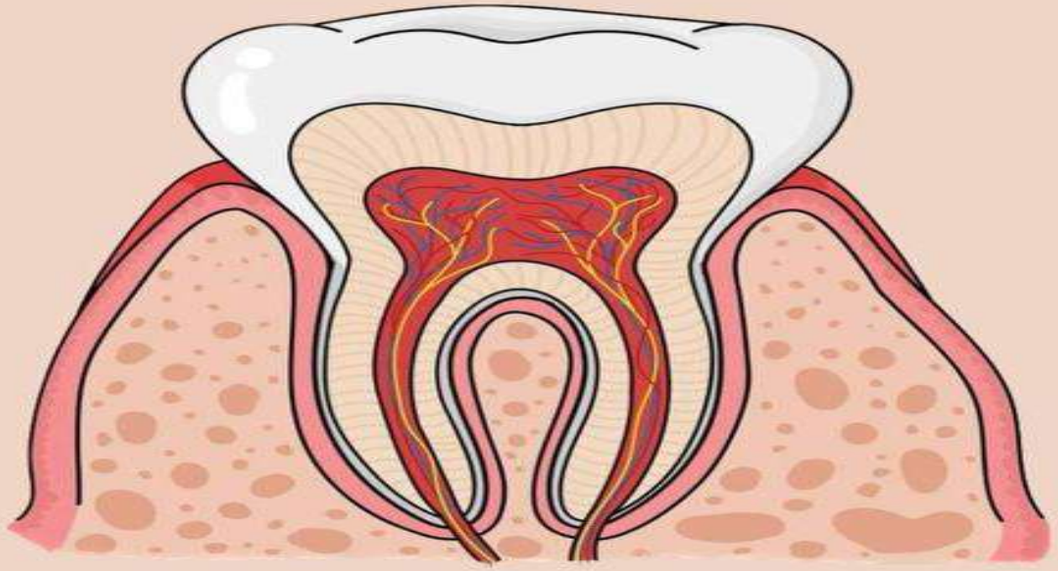
ANATOMY



LEC NO. : L - 7 (Muscles of the upper limb)

DONE BY : Malak alhmeed

وقل رب زدني علماً

Anatomy & Embryology

Lecture 1: Upper Limb Muscles

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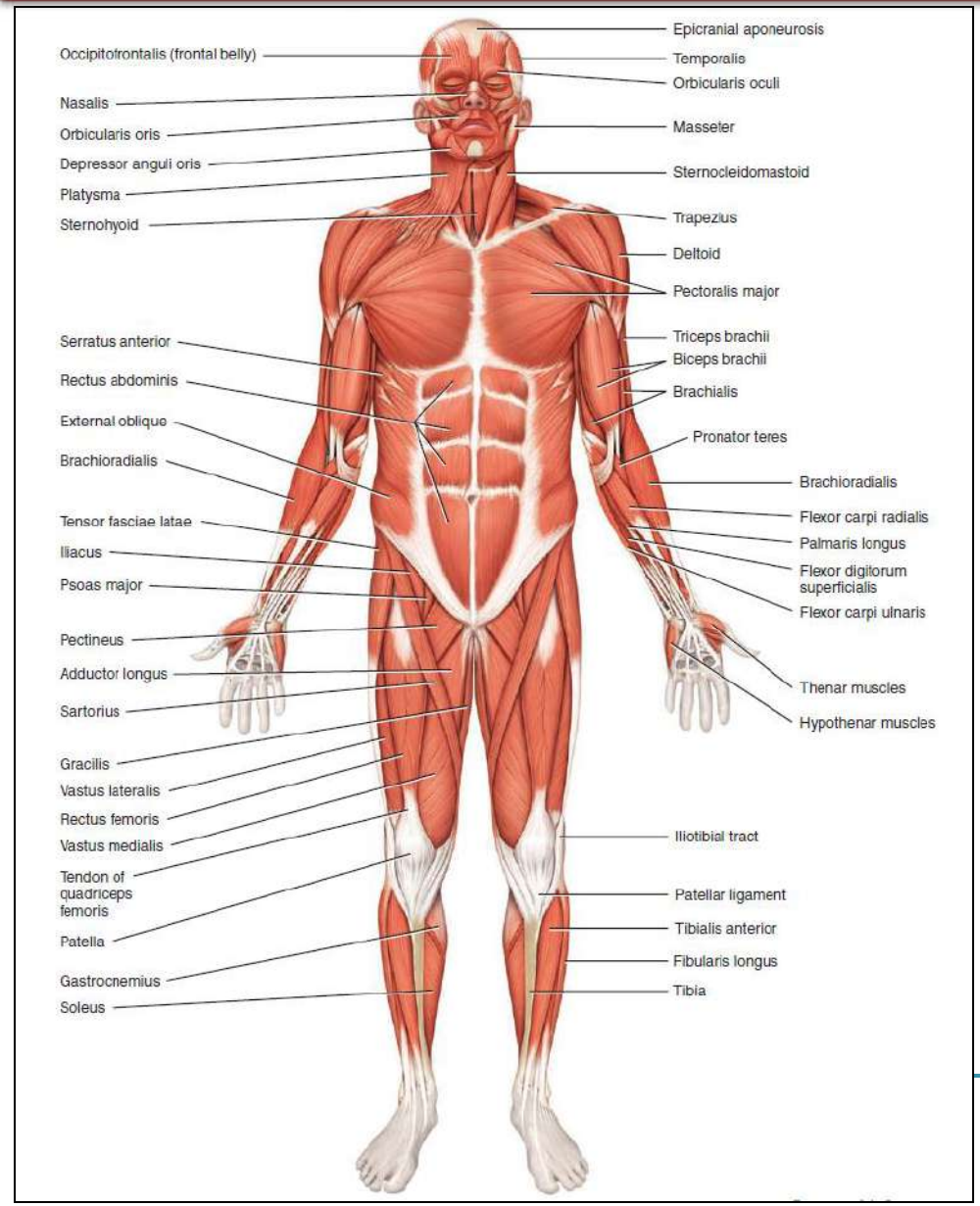
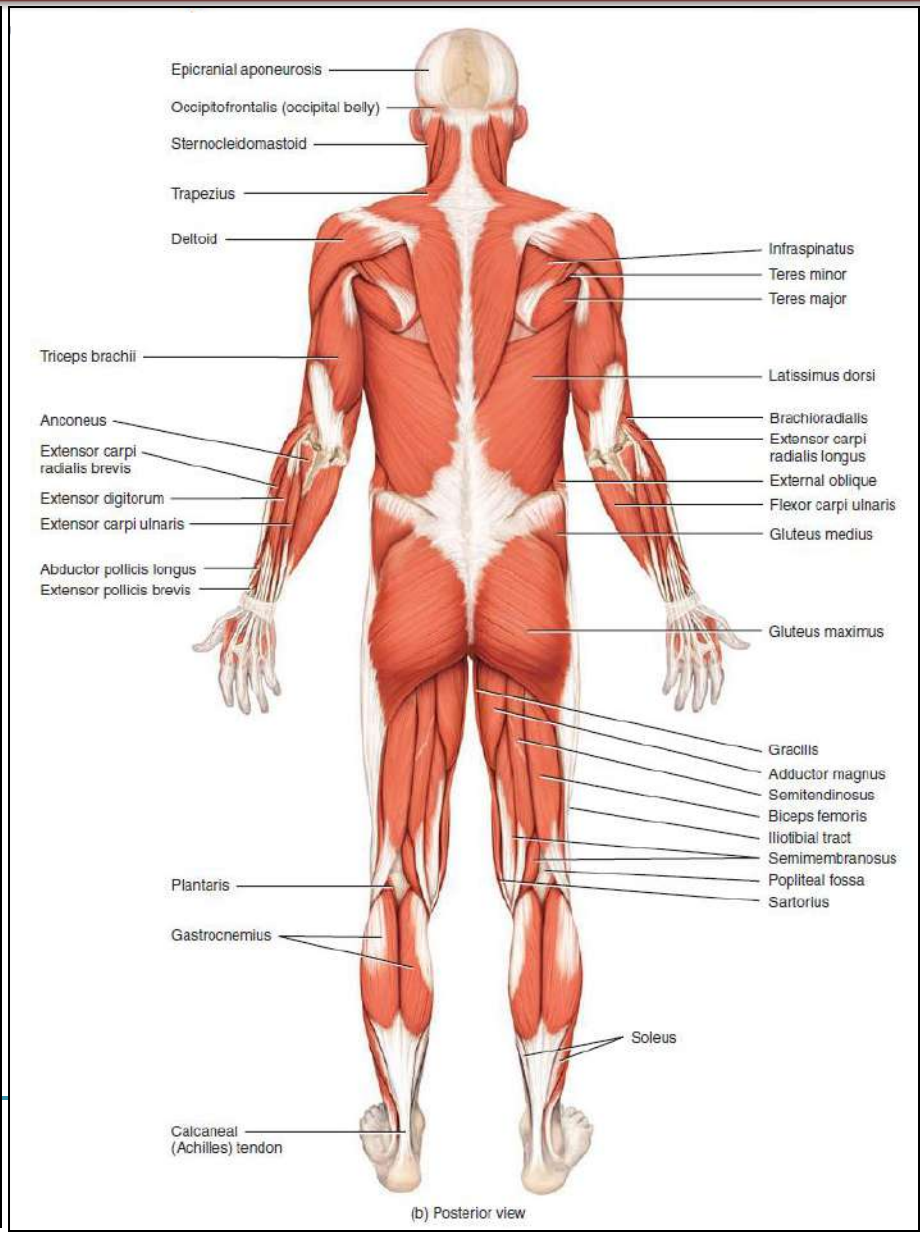
The Muscular System





(b) Posterior view

Skeletal muscles are formed of several bundles (fascicles) of skeletal muscle cells. They are attached by tendons to bones

حزم

ترتبط بالعظام عن طريق الاوتار (tendon)

- When the 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

الجزء الاحمر من العضلة (بطن العضلة)

- Muscles have more than one bony attachment: (2)
  - the attachment of a tendon to the stationary bone is called the **origin**.

العظام الثابتة / fixed bone

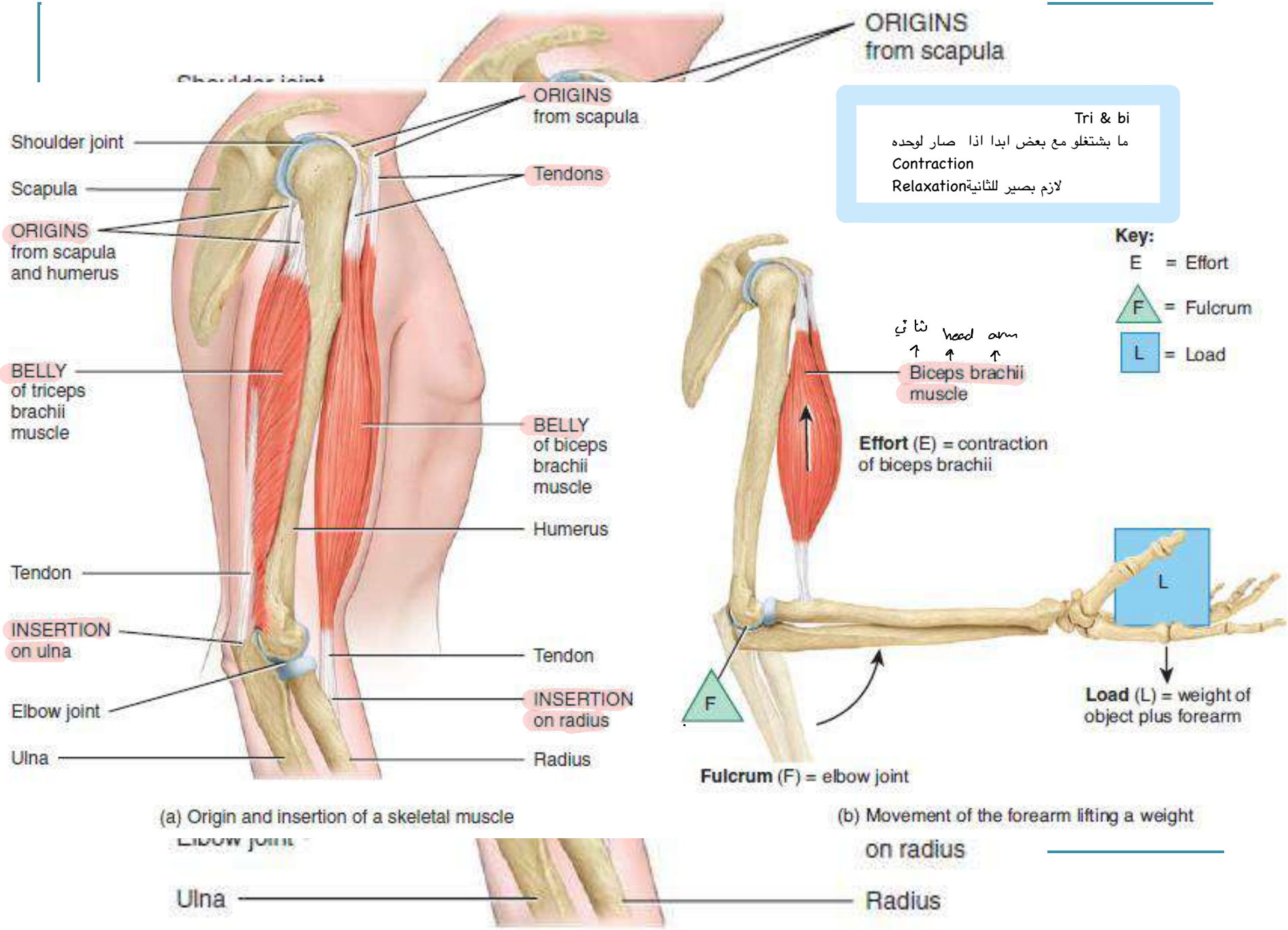
الجزء الابيض

  - the attachment of the muscle's other tendon to the movable bone is called the **insertion**.

Tendon with tendon

- the **action/s** of a muscle are the main movements that occur during contraction (e.g., flexion or extension).

جميع انواع الحركة في L-1


ORIGINS
from scapula
Shoulder joint
Scapula
ORIGINS
from scapula
and humerus
BELLY
of triceps
brachii
muscle
Tendon
INSERTION
on ulna
Elbow joint
Ulna
ORIGINS
from scapula
Tendons
BELLY
of biceps
brachii
muscle
Humerus
Tendon
INSERTION
on radius
Radius
(a) Origin and insertion of a skeletal muscle
Tri & bi
ما بشتغلو مع بعض ابدا اذا صار لوحده
Contraction
Relaxation لازم بصير للثانية
Key:
E = Effort
F = Fulcrum
L = Load
ثنائي
head
arm
Biceps brachii
muscle
Effort (E) = contraction
of biceps brachii
L
F
Load (L) = weight of
object plus forearm
Fulcrum (F) = elbow joint
(b) Movement of the forearm lifting a weight
on radius
Ulna
Radius

Arrangement of the fascicles:

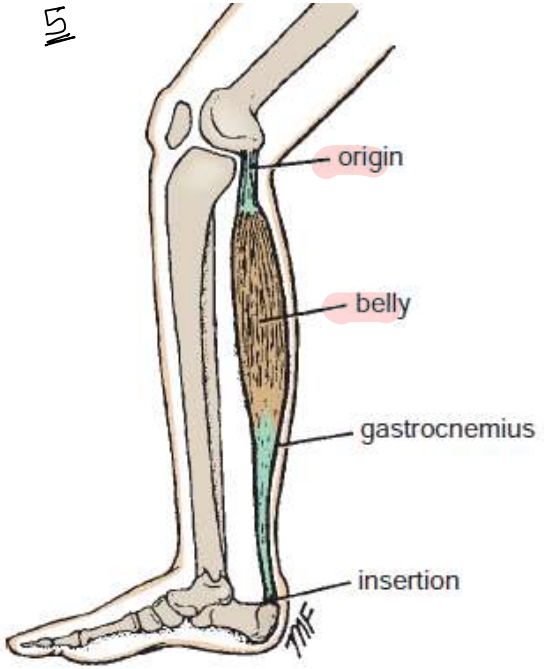
العضلة عبارة عن cells بتترتب على

بنسميه fibres لانه طويل جدا لكن في الحقيقة هو cells

- Skeletal muscle fibres (cells) within a muscle are arranged in bundles (حزم) known as fascicles.
- Within a fascicle, all muscle fibres are parallel to one another.
- The fascicles, however, may form one of five patterns with respect to the tendons:-

Parallel – Fusiform – Circular – Triangular

Pennate



PARALLEL

مطاول نهاية

Fascicles parallel to longitudinal axis of muscle; terminate at either end in flat tendons.

Example: Sternohyoid muscle (see Figure 11.8a)

FUSIFORM

Fascicles nearly parallel to longitudinal axis of muscle; terminate in flat tendons; muscle tapers toward tendons, where diameter is less than at belly.

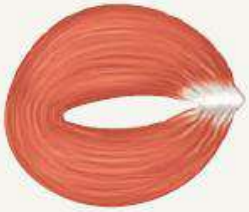
مدببة من الطرفين
وبنص بكون الها
عالي diameter

Example: Digastric muscle (see Figure 11.8a)

CIRCULAR

دائرية

Fascicles in concentric circular arrangements form sphincter muscles that enclose an orifice (opening).



موجود في العين

Example: Orbicularis oculi muscle (see Figure 11.4a)

TRIANGULAR

Fascicles spread over broad area converge at thick central tendon; gives muscle a triangular appearance.

Example: Pectoralis major muscle (see Figure 11.3a)

PENNATE

Short fascicles in relation to total muscle length; tendon extends nearly entire length of muscle.

Unipennate

جهة وحدة

Fascicles are arranged on only one side of tendon.

Example: Extensor digitorum longus

Bipennate

على جهتين

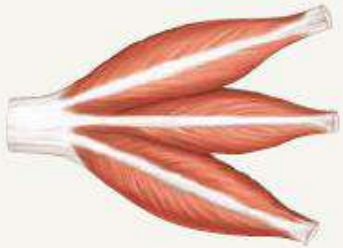
Fascicles are arranged on both sides of centrally positioned tendons.

Example: Rectus femoris muscle

Multipennate

على اكثر من جهة

Fascicles attach obliquely from many directions to several tendons.



Example: Deltoid muscle

Coordination among muscles:

العضلة الوحدة ممكن تشتغل على اكثر من joint
والjoint الواحد بشتغل عليه اكثر من muscles

- It is common to attribute a specific action at a joint to a single muscle, but remember that muscles do not work in isolation.

العضلات تعمل معا بشكل مشترك على joint ولكن في الغالب ننسب
العمل الى عضلة معينة ولكن في الحقيقة عدد من العضلات عمل عليها

- Movements usually result from several skeletal muscles acting as a group.

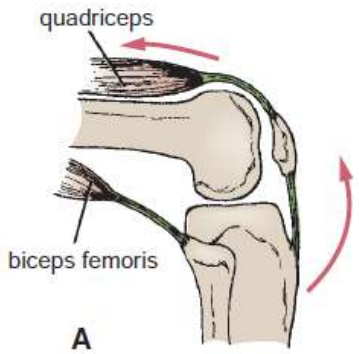
1) Most skeletal muscles are arranged in opposing pairs at joints (antagonistic) (e.g., flexors vs. extensors):

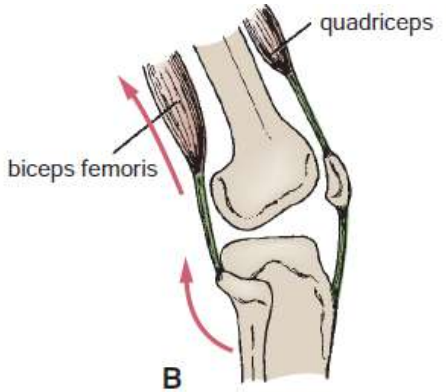
ضد

- **Prime mover** or **agonist** and is responsible for the action (Contract) → انقباضات → تنتج الحركة
- **Antagonist** stretches (relaxed) and yields to the effects of the agonist. → الاسترخاء

يعني عضلة بصيرلها contraction والثانية relaxed

antagonist agonist





Muscles Of The Upper Limb

Muscles that move the Pectoral Girdle

1) **Serratus anterior (Punching muscle):** connects first 8 or 9 ribs to the scapula Known as "boxer's muscle" because it is important in horizontal arm movements such as punching and pushing. (Long thoracic nerve)

2) **Pectoralis minor:** connects ribs 3 to 5 and Coracoid process of scapula. **Moves scapula and helps in inhalation**

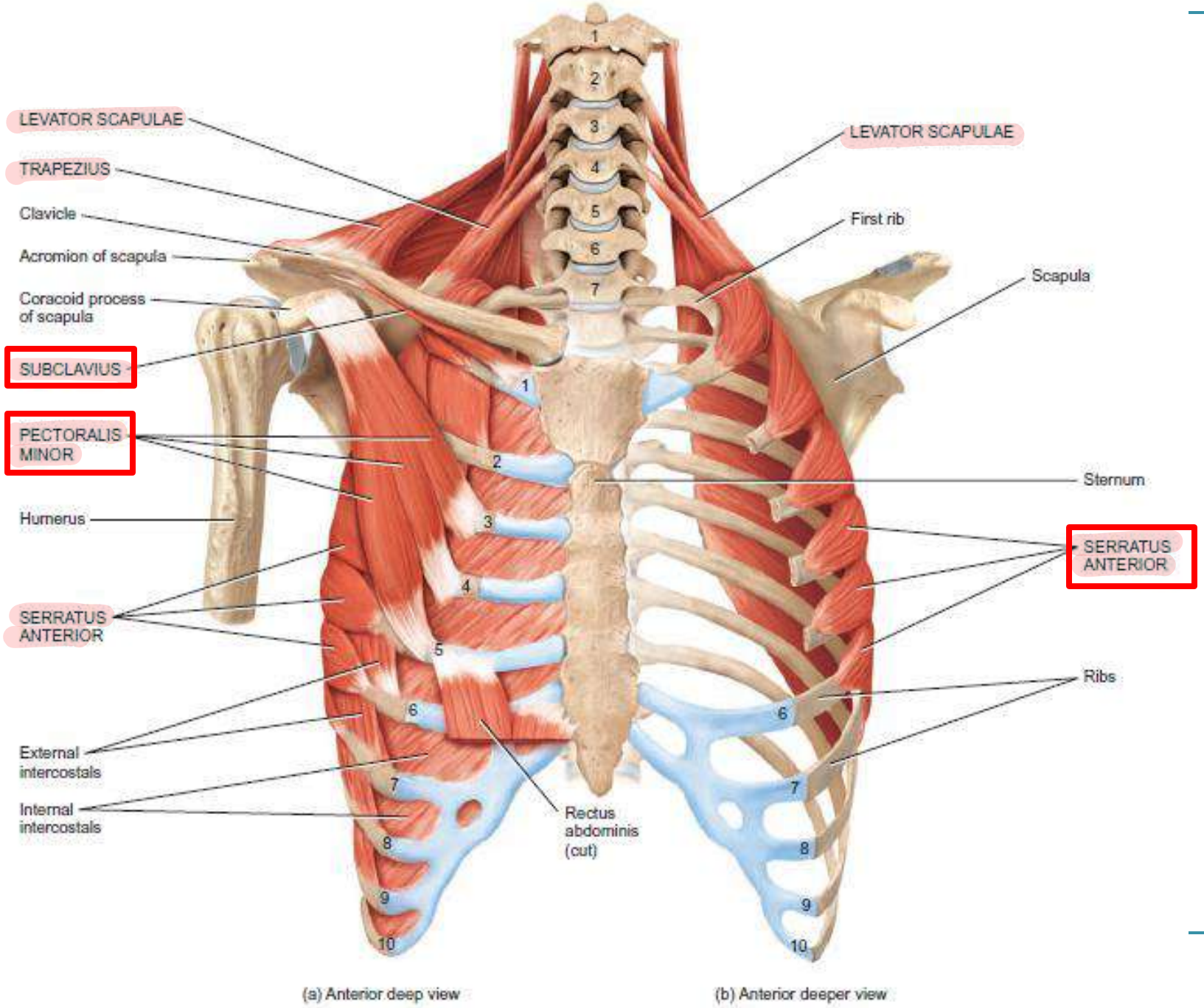
3) **Subclavius: connects 1st rib to clavicle**

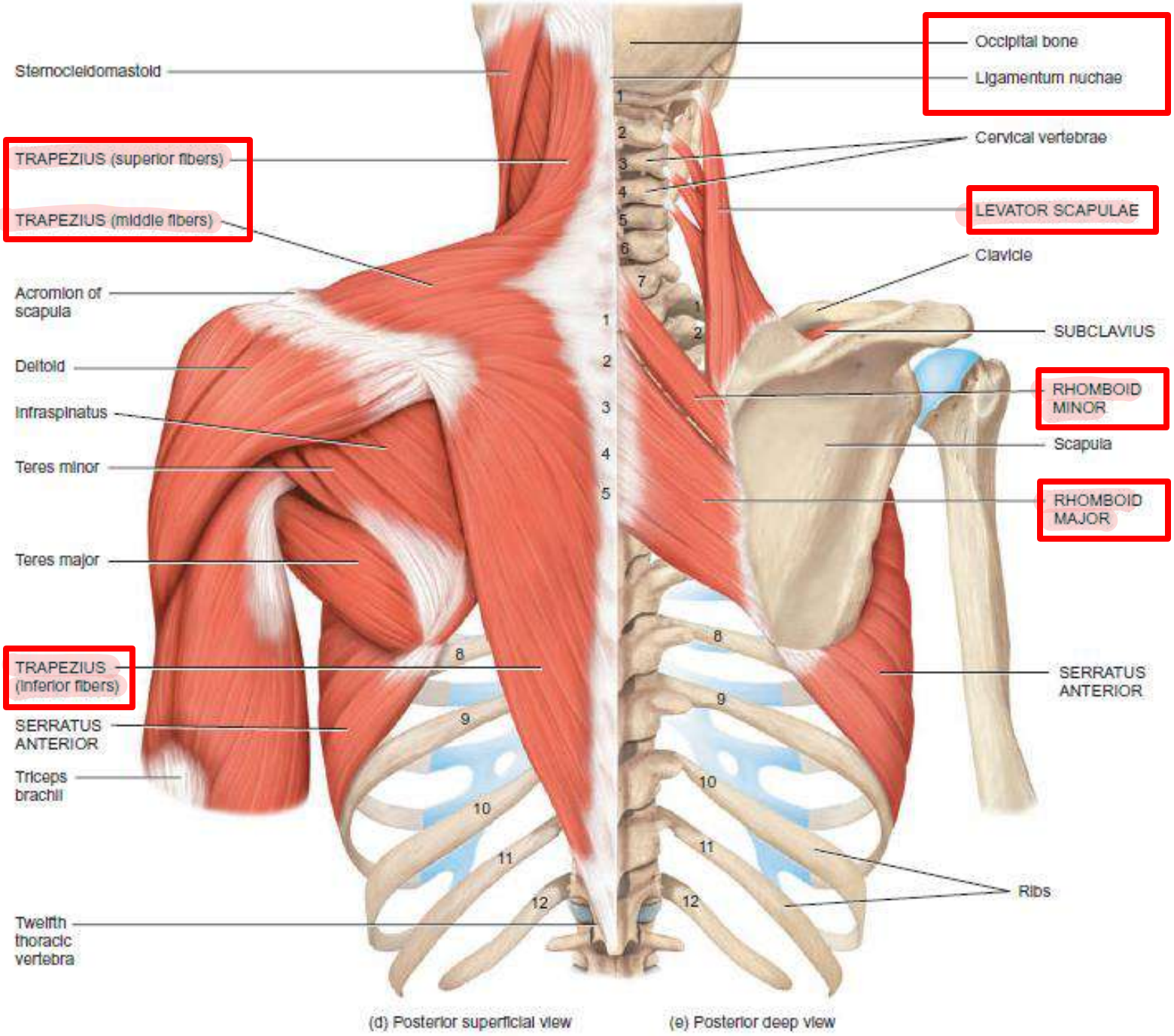
4) **Levator scapulae, Rhomboid major and rhomboid minor:** Originate from the vertebrae and insert into the scapula. They elevate and adduct the scapula.

4) **Trapezius**: The trapezius is a large, flat, triangular sheet of muscle extending from the skull and vertebral column medially to the pectoral girdle laterally (clavicle, acromion, scapulae spine). It is the most superficial back muscle and covers the posterior neck region and superior portion of the trunk. **(spinal accessory nerve (11th cranial N.).**

Both Trapezius and Serratus anterior muscles will rotate the scapula so that its glenoid cavity is raised. This allows the arm to be raised above the head (abduction of arm > 90°).

- These muscles also stabilize (**fixators**) the girdle so that the free limb can have a firm base to move on & Move the scapulae


LEVATOR SCAPULAE
TRAPEZIUS
Clavicle
Acromion of scapula
Coracoid process of scapula
SUBCLAVIUS
PECTORALIS MINOR
Humerus
SERRATUS ANTERIOR
External intercostals
Internal intercostals
Rectus abdominis (cut)
1
2
3
4
5
6
7
8
9
10
LEVATOR SCAPULAE
First rib
Scapula
Sternum
SERRATUS ANTERIOR
Ribs
(a) Anterior deep view
(b) Anterior deeper view



(d) Posterior superficial view (e) Posterior deep view

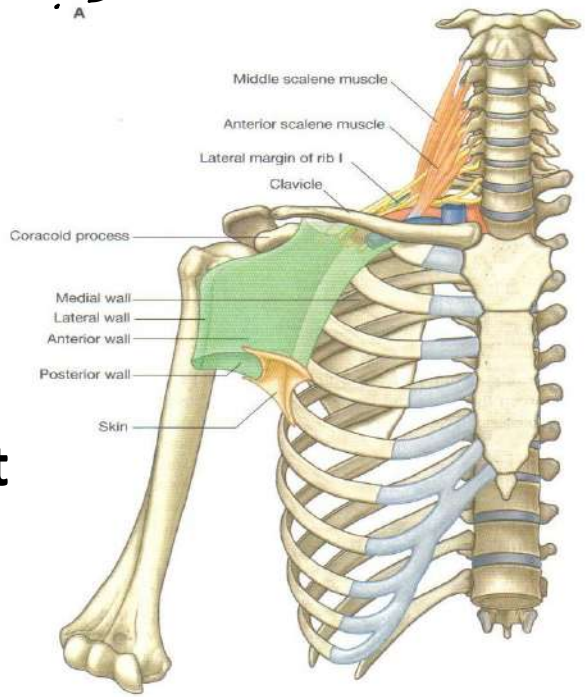
AXILLA → منطقة في الابط باسم

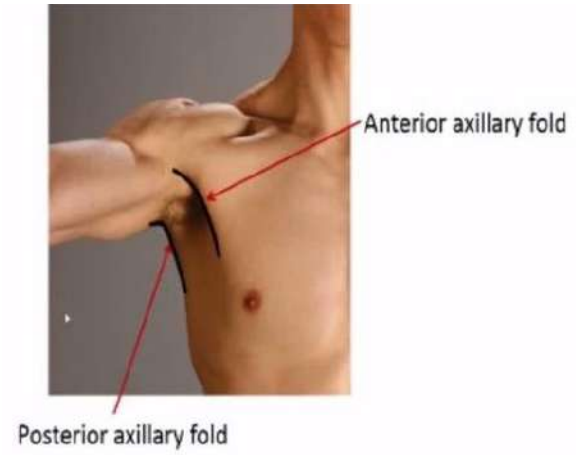
الشرح مش حلو ب

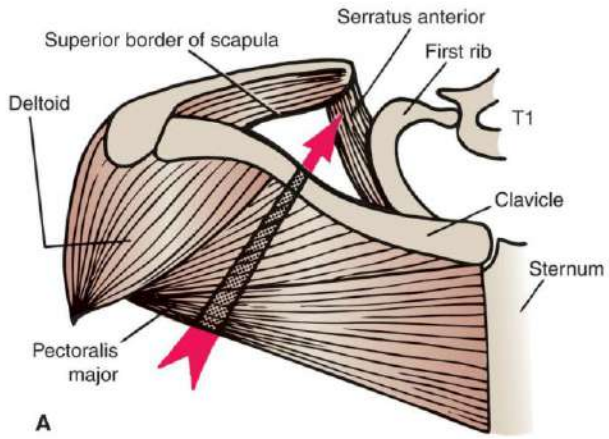
- **It is a pyramidal space between the upper part of the arm (laterally) and the side of the chest wall (medially).**

- **Forms an important passage for <u>nerves</u>, <u>blood and lymphatic vessels</u> from the root of the neck to the upper limb.**

- Has an **apex** directed upwards into the root of the neck, lower end or **base**, and **4 walls (anterior, posterior, medial and lateral).**





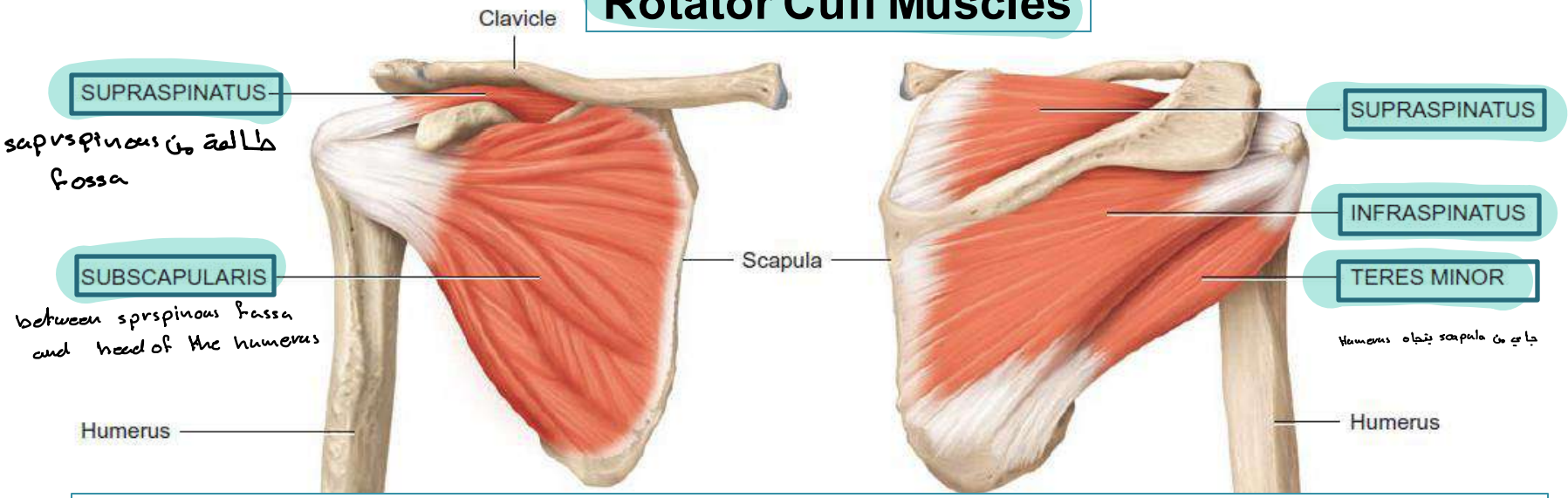


Muscles of shoulder and thorax that move the humerus (cross shoulder joint)

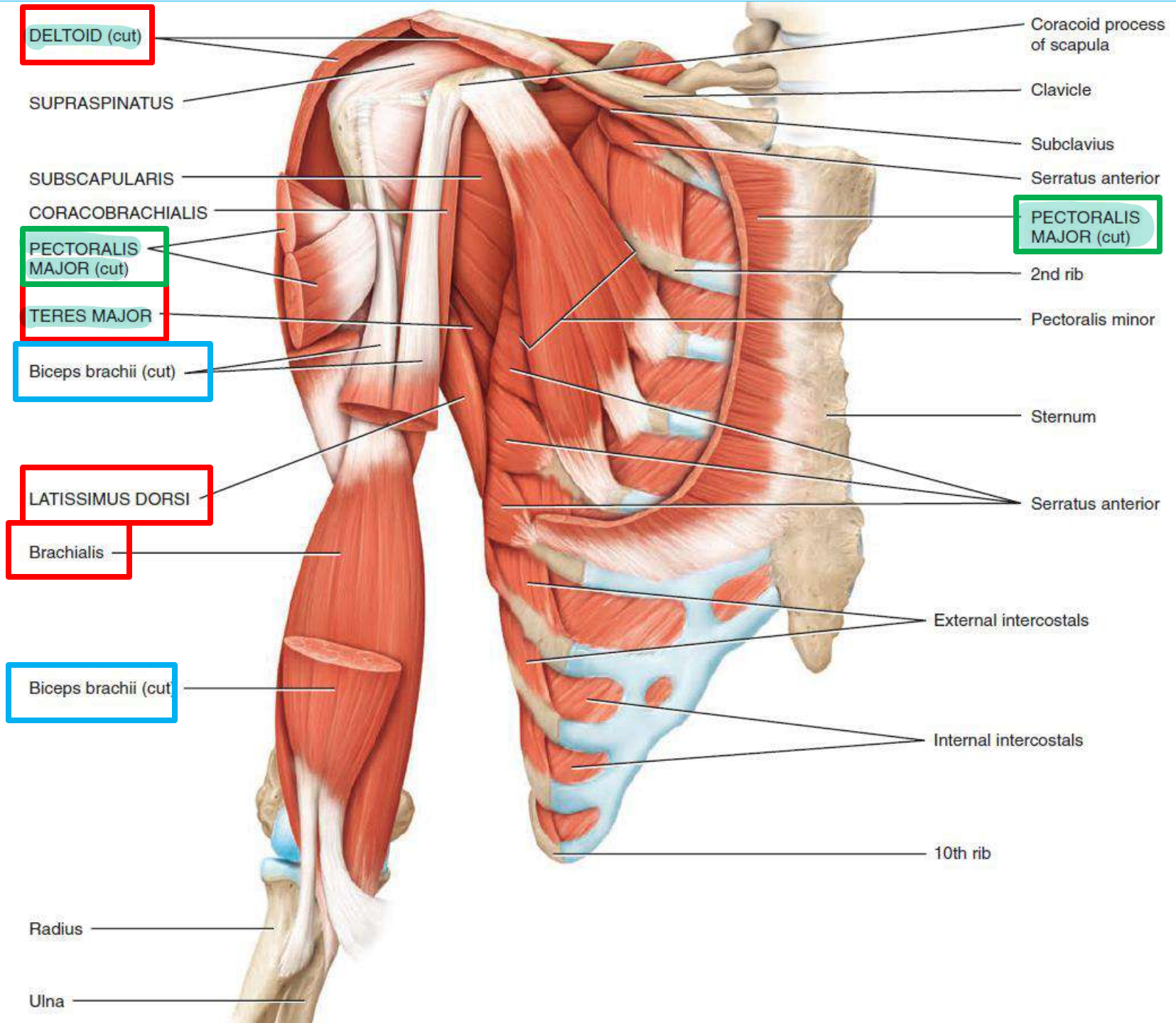
Muscle	Origin	Insertion	Main Actions/Nerve supply
Deltoid Injection	Clavicle and scapula	Deltoid tuberosity humerus	Abduction of arm (15-90°) Axillary nerve
Teres major	Scapula	Intertubercular sulcus (Bicipital groove) humerus	Adduction, extension & medial rotation of shoulder joint. Subscapular nerve
Pectoralis major	Clavicle, sternum and costal cartilages		Adduction, flexion & medial rotation of the arm. Lateral & Medial pectoral Ns
Latissimus dorsi "swimmer's muscle"	Vertebrae (T-L-S) Iliac crest of the hip bone		Adduction, medial rotation and extension of the arm. / Nerve to latissimus dorsi

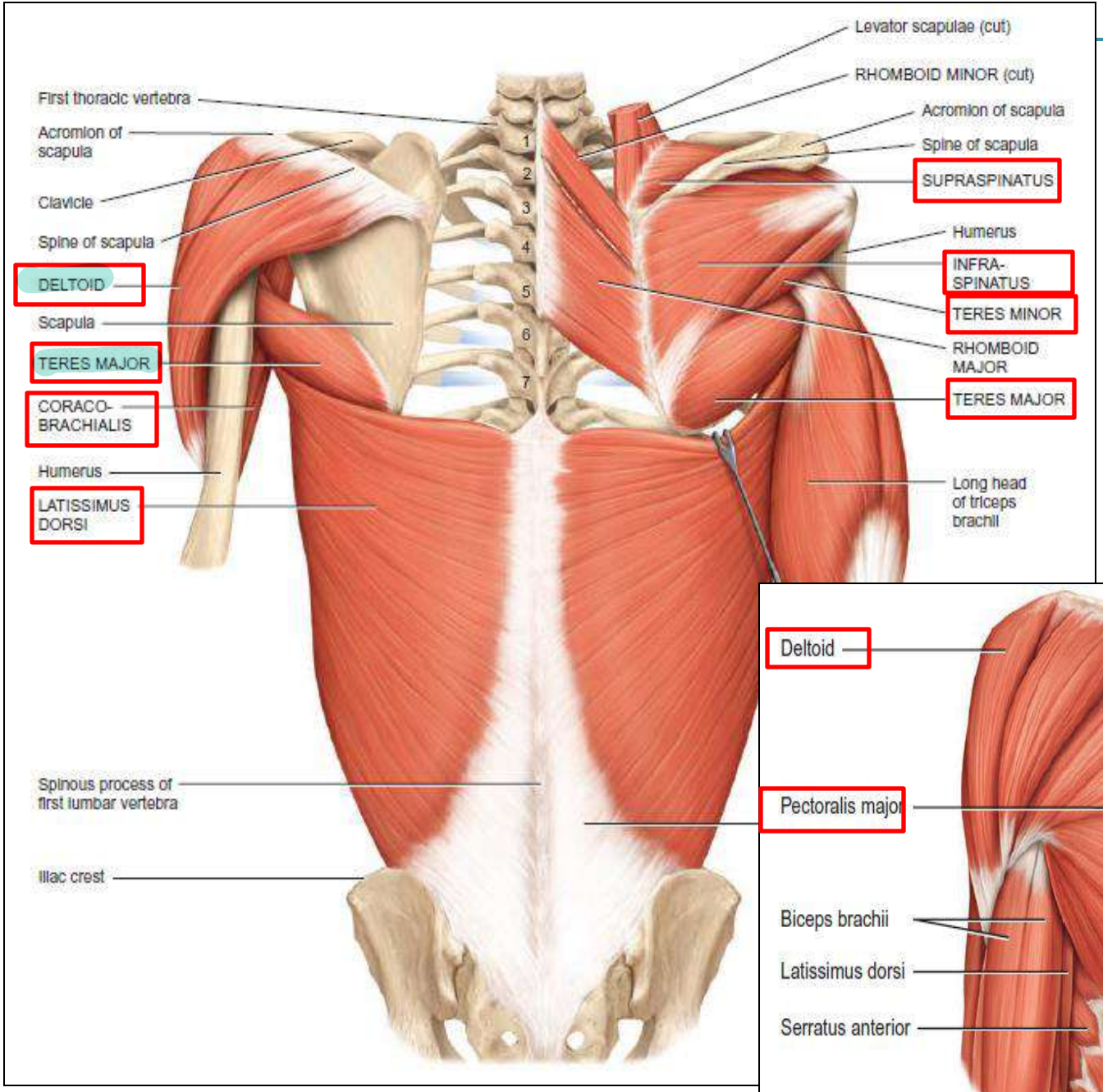
Subscapularis	Scapula	Humerus	Medial rotates arm
Supraspinatous			helps initiate abduction of the arm 0-15°
Infraspinatous			Lateral rotate arm
Teres minor			

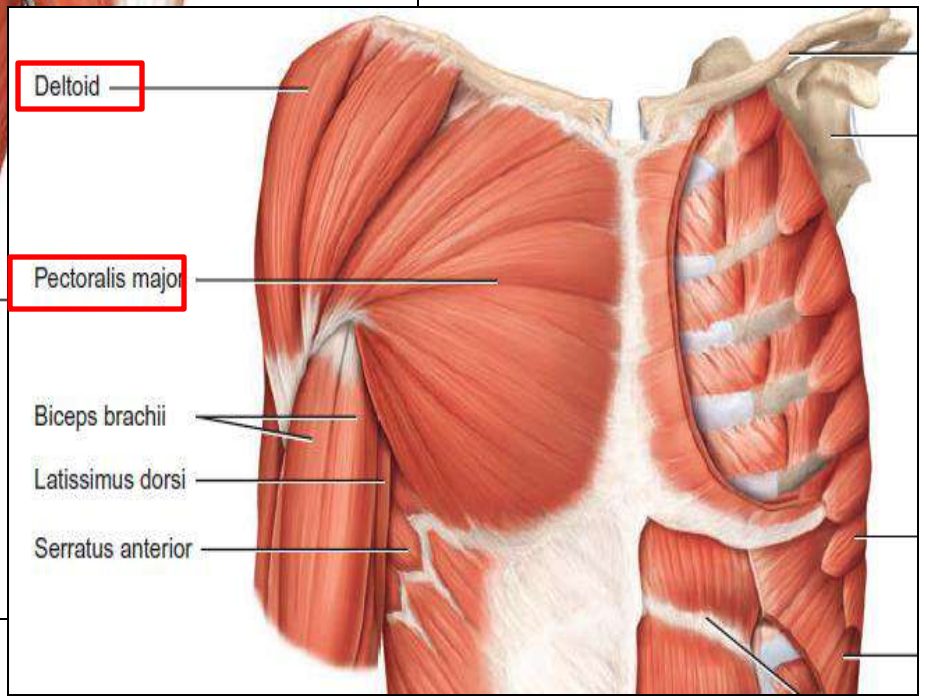
Rotator Cuff Muscles



- The Rotator Cuff Muscles tendons all blend with the capsule of the shoulder joint, thus help in stabilizing it.


DELTOID (cut)
SUPRASPINATUS
SUBSCAPULARIS
CORACOBRACHIALIS
PECTORALIS MAJOR (cut)
TERES MAJOR
Biceps brachii (cut)
LATISSIMUS DORSI
Brachialis
Biceps brachii (cut)
Radius
Ulna
Coracoid process of scapula
Clavicle
Subclavius
Serratus anterior
PECTORALIS MAJOR (cut)
2nd rib
Pectoralis minor
Sternum
Serratus anterior
External intercostals
Internal intercostals
10th rib

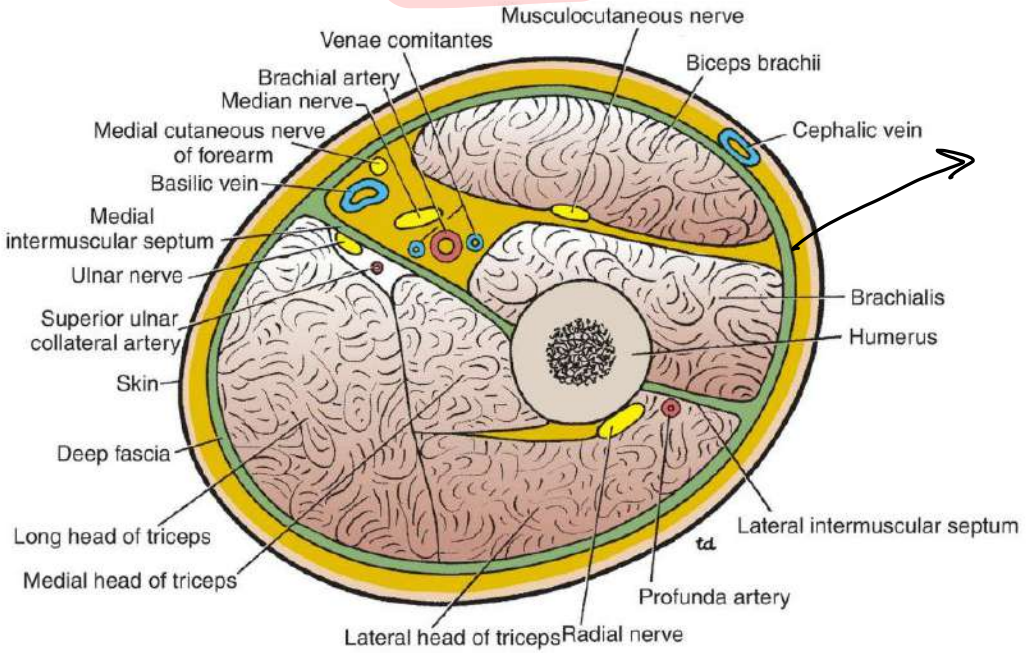

Levator scapulae (cut)
RHOMBOID MINOR (cut)
First thoracic vertebra
Acromion of scapula
Spine of scapula
SUPRASPINATUS
Clavicle
Spine of scapula
Humerus
DELTOID
INFRA-SPINATUS
Scapula
TERES MINOR
RHOMBOID MAJOR
TERES MAJOR
CORACO-BRACHIALIS
Humerus
Long head of triceps brachii
LATISSIMUS DORSI
Spinous process of first lumbar vertebra
Iliac crest
1
2
3
4
5
6
7


Deltoid
Pectoralis major
Biceps brachii
Latissimus dorsi
Serratus anterior

Arm

elbow joint

Anterior



Medial

lateral

Posterior

Muscles of the arm (that move the forearm)

Anterior compartment

Nerve supply: Musculocutaneous nerve

Muscle	Origin	Insertion	Action
Biceps brachii	Two heads (Long / Short) scapula	Radial tuberosity (radius)	Flexion and **Supination** of forearm
Brachialis	يتطلع منه Humerus	Ulna	**Most powerful Flexor of the forearm**

The **biceps** long head pass through the humerus intertubercular sulcus and inserts into the **radial** tuberosity. Biceps at elbow forms an aponeurosis that inserts medially (ulna) which can produce supination of the forearm.

Posterior compartment

Nerve supply: Radial nerve

Triceps brachii	**Three heads Long (scapula)/ Lateral / Medial (humerus)**	**Olecranon process (ulna)**	**Most powerful Extensor of the forearm** elbow

Corachobrachialis

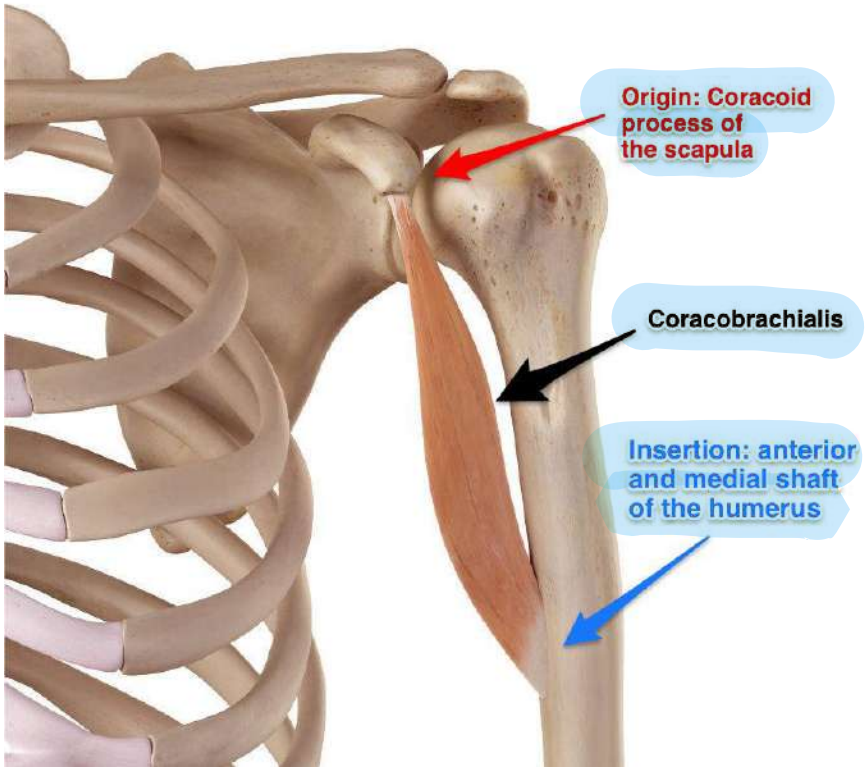
Arises from the **apex of coracoid** process scapulae and is inserted into the **middle** of the **humerus.**

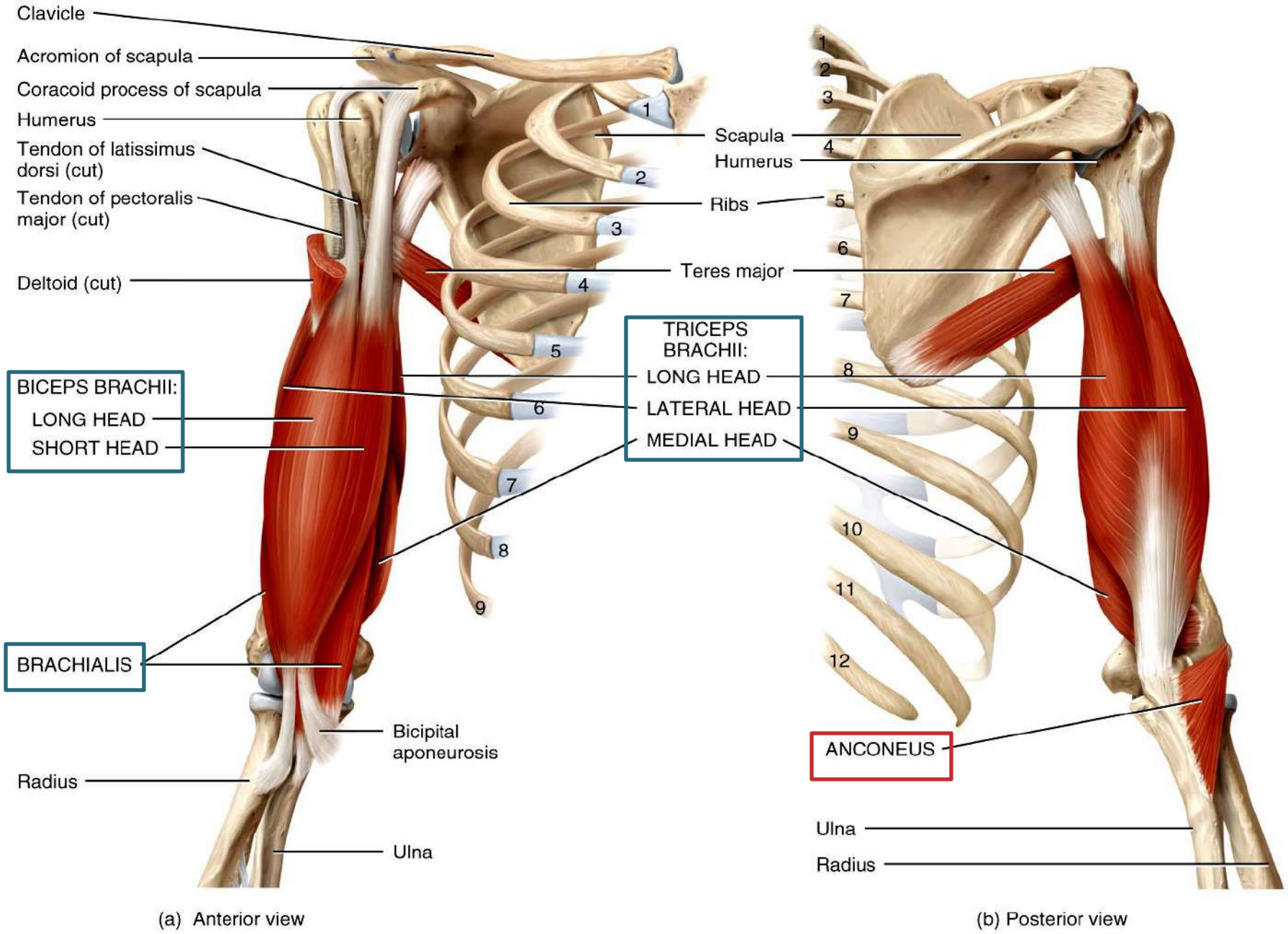
Action:

- Flexion & Adduction of Arm.

Nerve supply:

- Musculo-cutaneous nerve.





(a) Anterior view

(b) Posterior view

Movement of Forearm	Muscles that produce them
Flexion (elbow)	Biceps **Brachialis**
Extension (elbow)	**Triceps**
Supination Twist a corkscrew (radioulnar)	Biceps **Supinator** (forearm muscle)
Pronation Twist a corkscrew (radioulnar)	**Pronator teres** (forearm muscle) **Pronator quadratus** (forearm muscle)

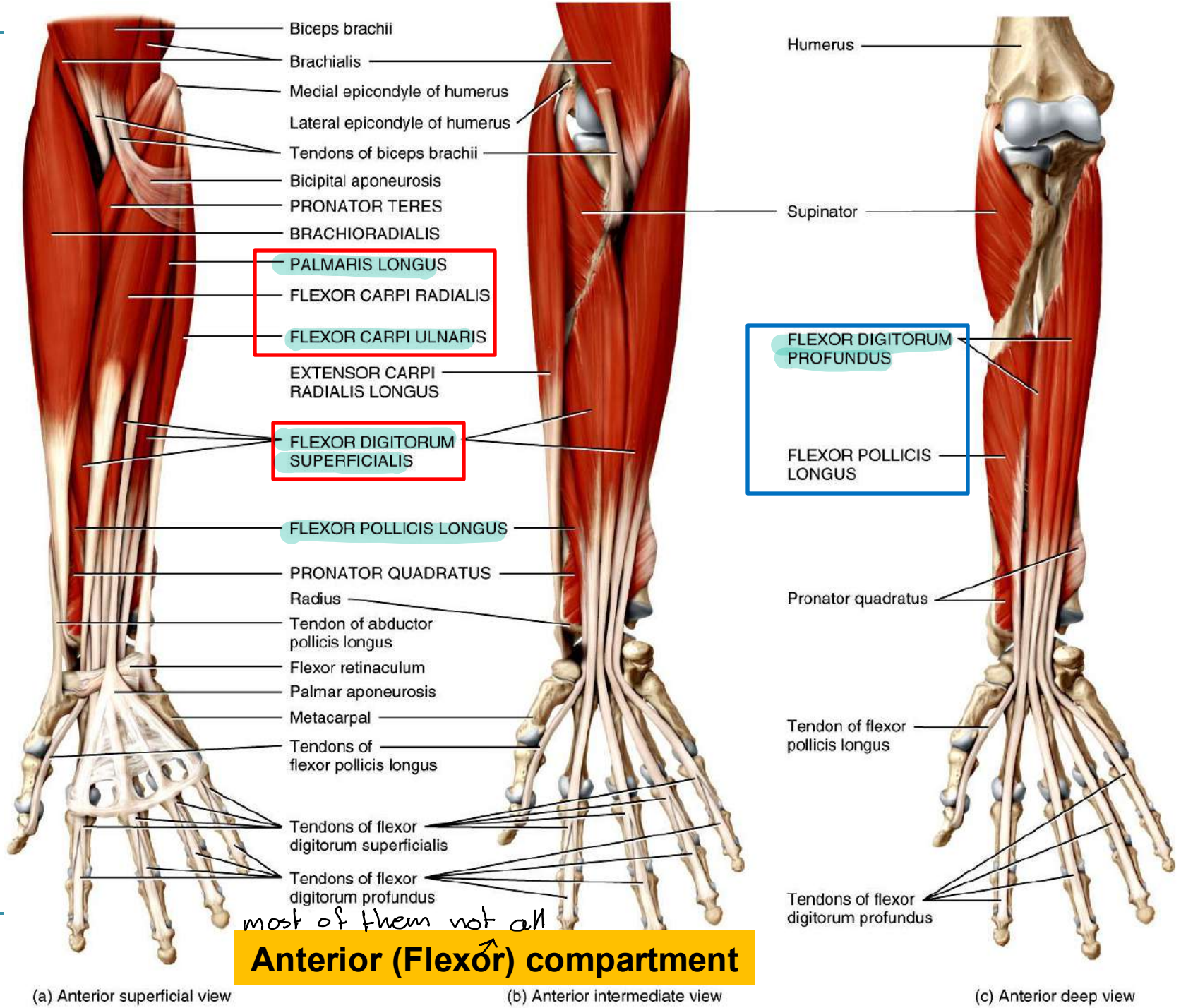
Muscles of the Forearm (20)

- Muscles in this group that act on the wrist, hand and digits 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:
- **Anterior compartment (flexors – medial epicondyle)**
- **posterior compartment (extensors – lateral epicondyle)**
- The tendons of these muscles **that continue** into the hand are held close to the bones at **wrist** by strong fascial bands called **flexor and extensor retinaculum**.

- Some muscles in the forearm act on the forearm, like the

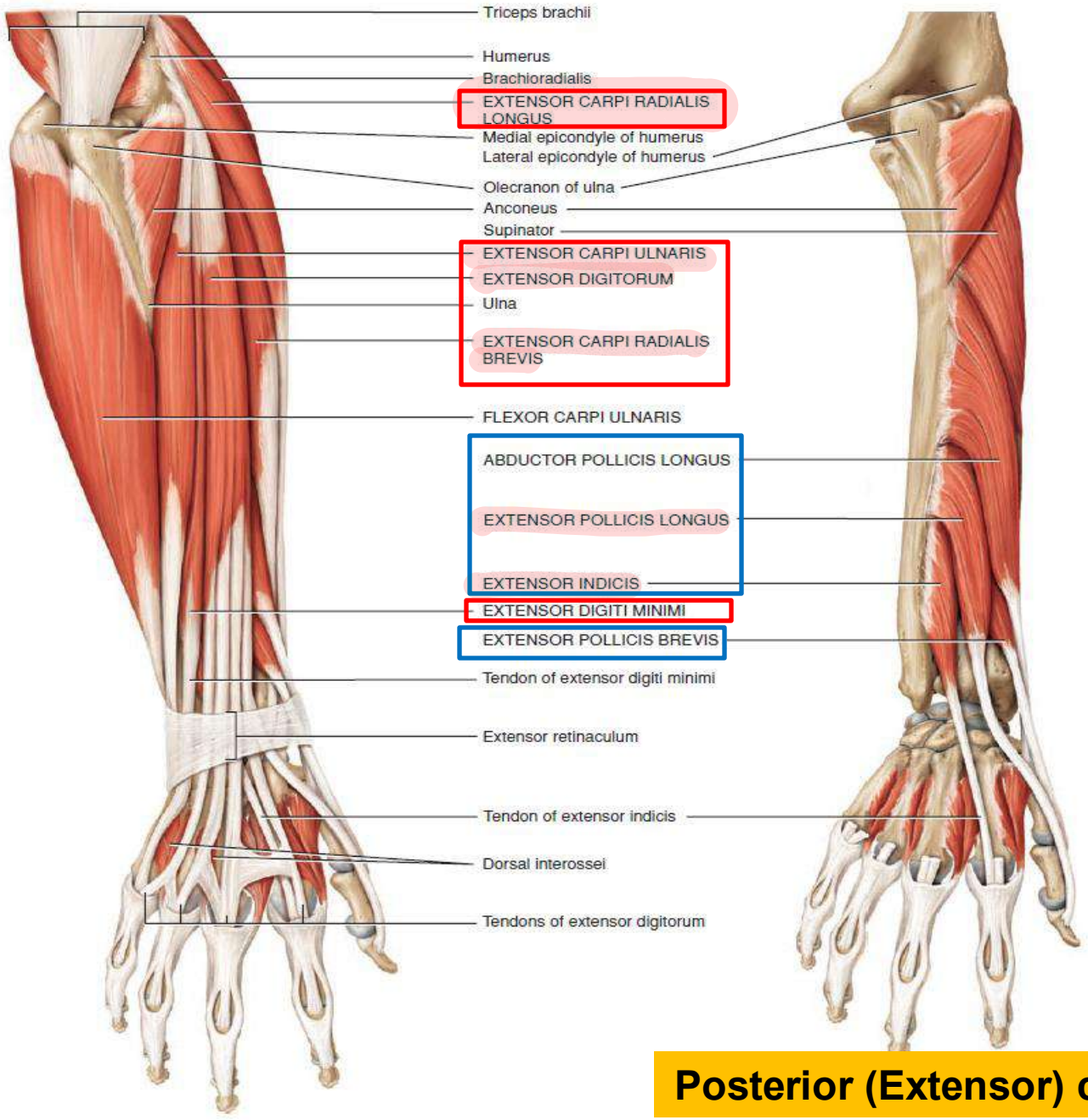
Supinator – Pronator Quadratus - Pronator teres

Compartment	Muscles
Anterior (Flexor) compartment	**Flexor carpi radialis (Pulse)** Palmaris longus Flexor carpi ulnaris Flexor digitorum superficialis Flexor pollicis longus Flexor digitorum profundus …..
Posterior (Extensor) compartment **Tennis elbow**	Extensor carpi radialis longus (brevis) Extensor digitorum Extensor carpi ulnaris. Abductor pollicis longus (brevis) Extensor pollicis longus Extensor indicis. …….



most of them not all

Anterior (Flexor) compartment



(d) Posterior superficial view

(e) Posterior deep view

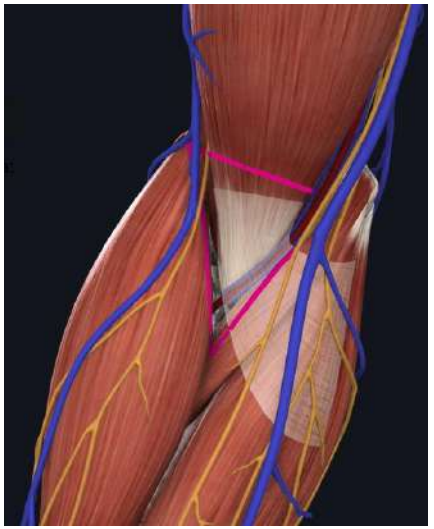
Posterior (Extensor) compartment

most of them not all

Cubital Fossa

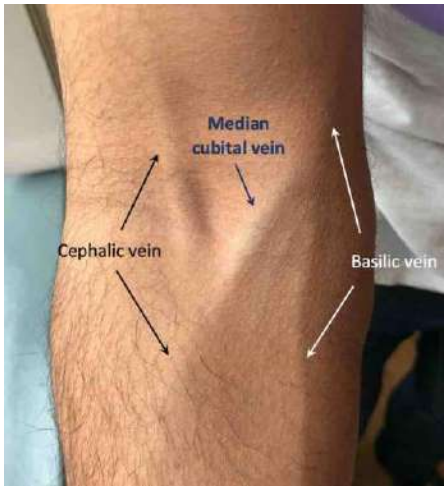
Contains vein and artery

- The elbow is the area connecting the arm with the forearm
- The cubital fossa is **a triangular depression that lies in the anterior aspect of the elbow**



Bicipital aponeurosis

- In the cubital fossa, the **median cubital vein** is separated from the underlying brachial artery by the bicipital aponeurosis.
- This is important because the aponeurosis protects the **brachial artery** from the mistaken introduction of irritating drugs that should have been injected into the vein.
- It also protects **median nerve** from injuries



Intrinsic Muscles of the Hand (19)

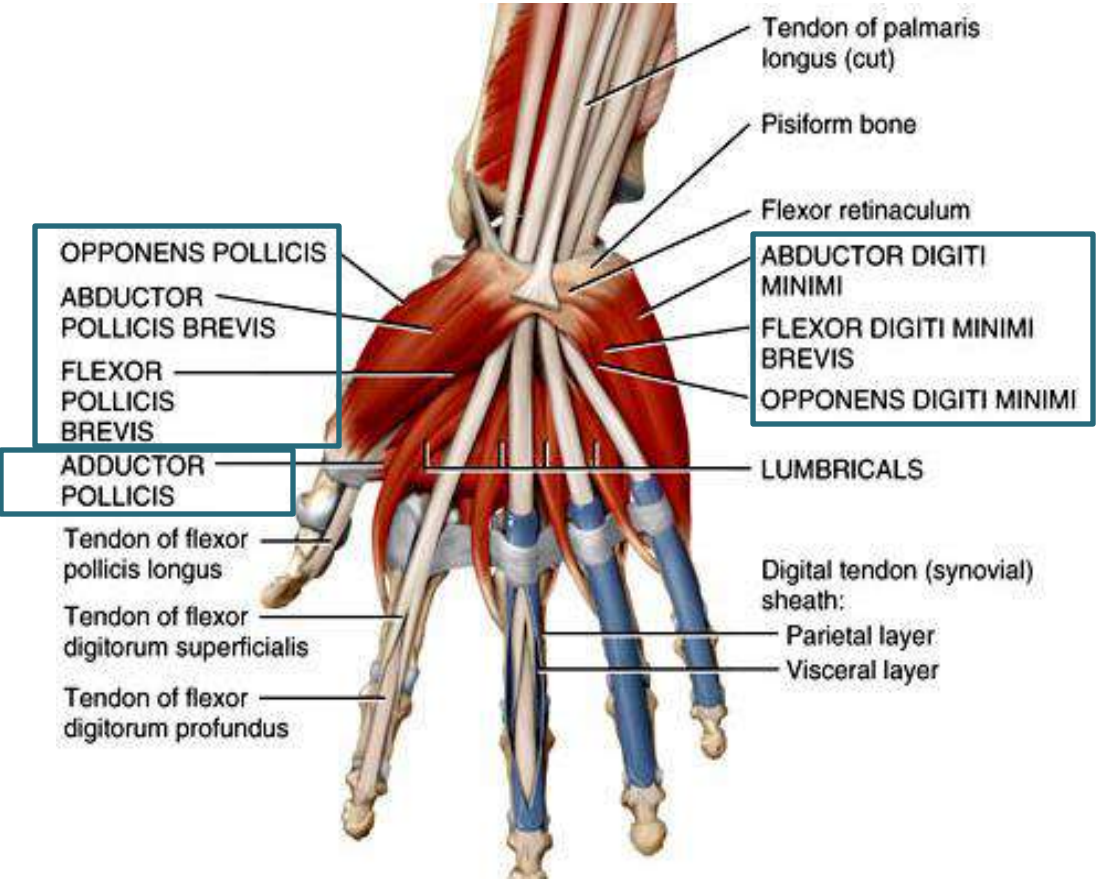
- Produce weak but precise movements.

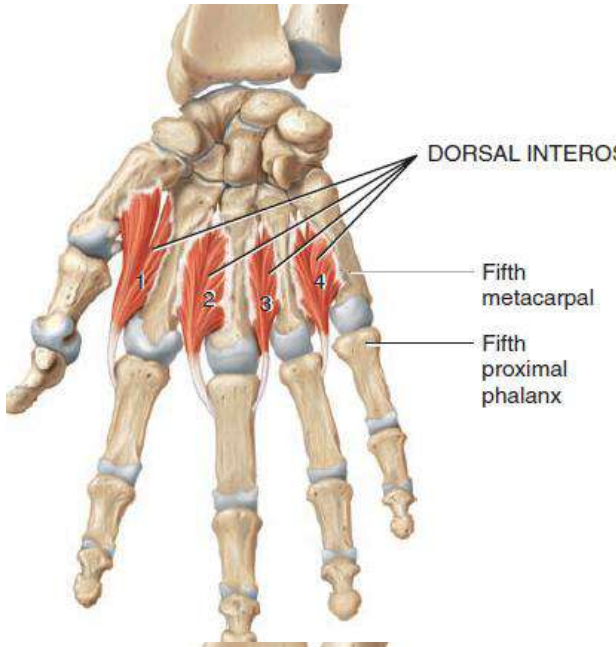
Writing - Typing - Playing a piano – Pincer-like action.

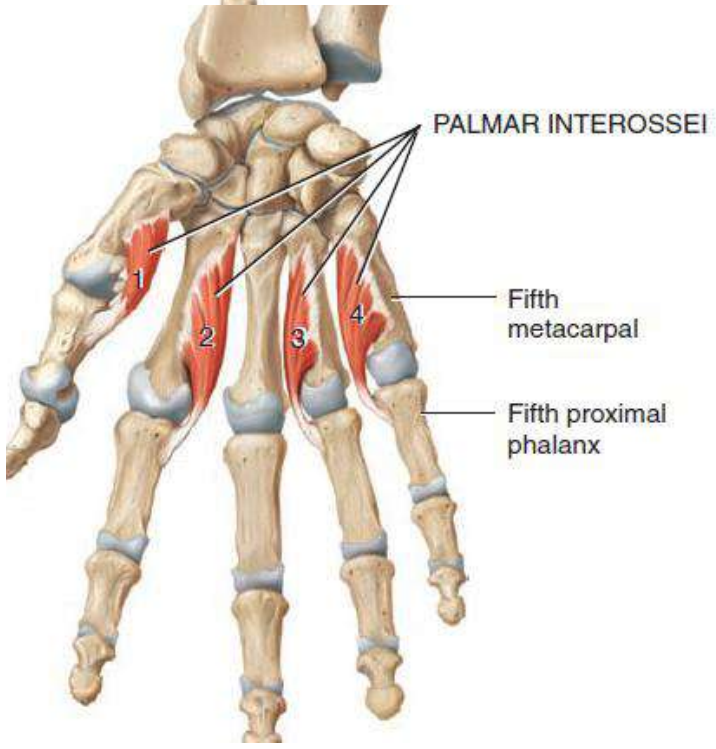
- Split into 3 groups:.

1. The intermediate group (12) includes
   - **A. The lumbricals** (4):
   - **B. The palmer interossei** (4): adduct the fingers towards the middle finger.
   - **C. The dorsal interossei** (4): abduct the fingers away from the middle finger.
2. The thenar muscles plus the adductor pollicis form the **thenar eminence.** These produce the various movements of the thumb (**Pollex**).
3. Hypothenar muscles act on the little finger and form the **hypothenar eminence.**

Intrinsic : بتعمل حركات معينة للاصابع بتكون بسيطة
وما بتحتاج جهد كبير وبتكون عضلاتها صغيره بالمقارنة


Tendon of palmaris longus (cut)
Pisiform bone
Flexor retinaculum
OPPONENS POLLICIS
ABDUCTOR POLLICIS BREVIS
FLEXOR POLLICIS BREVIS
ADDUCTOR POLLICIS
ABDUCTOR DIGITI MINIMI
FLEXOR DIGITI MINIMI BREVIS
OPPONENS DIGITI MINIMI
LUMBRICALS
Tendon of flexor pollicis longus
Tendon of flexor digitorum superficialis
Tendon of flexor digitorum profundus
Digital tendon (synovial) sheath:
Parietal layer
Visceral layer


DORSAL INTEROSSEI
1
2
3
4
Fifth metacarpal
Fifth proximal phalanx


PALMAR INTEROSSEI
1
2
3
4
Fifth metacarpal
Fifth proximal phalanx


Flexion
Extension
Abduction
Adduction
Opposition