

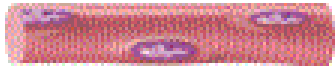
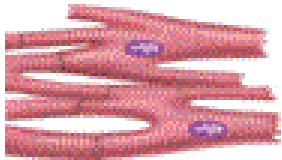
Skeletal Muscle

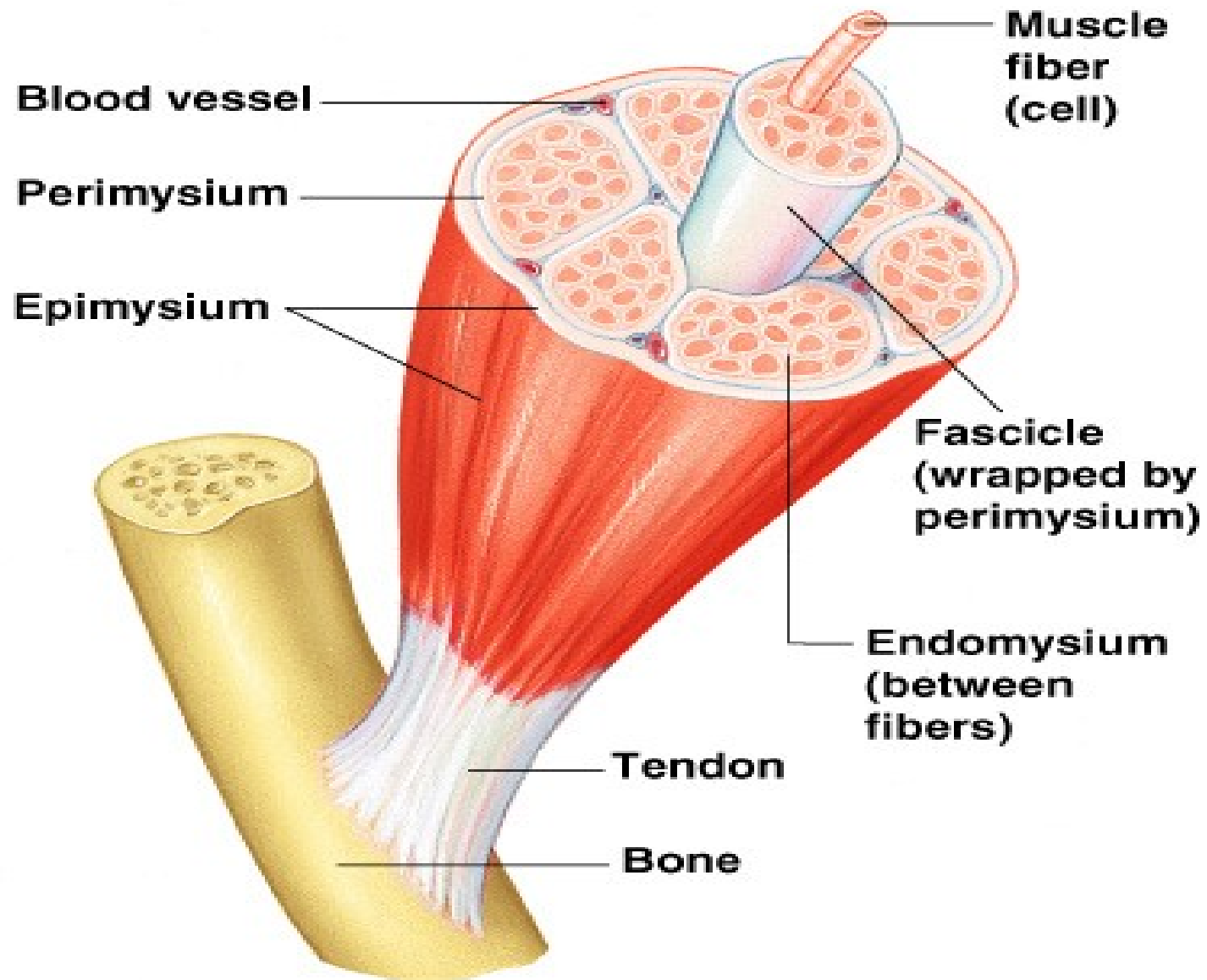
Dr. Yared T.

Introduction

- Muscle cells, often called muscle fibers are specialized **contractile** cells.
- Can be skeletal, cardiac or smooth
- Skeletal muscles function by **contracting**; they **pull** and **never push**
- Muscle cells are surrounded and bundled by **connective tissue, which are endomysium, perimysium and epimysium**

Three Types of Muscular Tissue

	Location	Function	Appearance	Control
Skeletal 	skeleton	movement, heat, posture	striated , multi-nucleated (eccentric), fibers parallel	voluntary
Cardiac 	heart	pump blood continuously	striated , one central nucleus	involuntary
Visceral (smooth muscle) 	G.I. tract, uterus, eye, blood vessels	Peristalsis, blood pressure, pupil size, erects hairs	no striations , one central nucleus	involuntary



- **White non-contractile** portions of a muscle is called **Tendons, collagen** bundles, that provide a means of **attachment**
- Attachments of muscles are, **Origin**, proximal end of the muscle, remains **fixed**, **Insertion**, distal end of the muscle, **movable**
- Muscle may attaché to **bones, cartilages** or **ligaments, organs** (eyeball), **skin** (facial muscles) and **mucous membranes** (intrinsic tongue muscles)

Functions of muscles

- **Movement:** respiration, circulation, defecation
- **Stability:** resists gravity and provides tension to tendons
- **Communication**
- **Heat Production:** muscle provides 85% of body heat

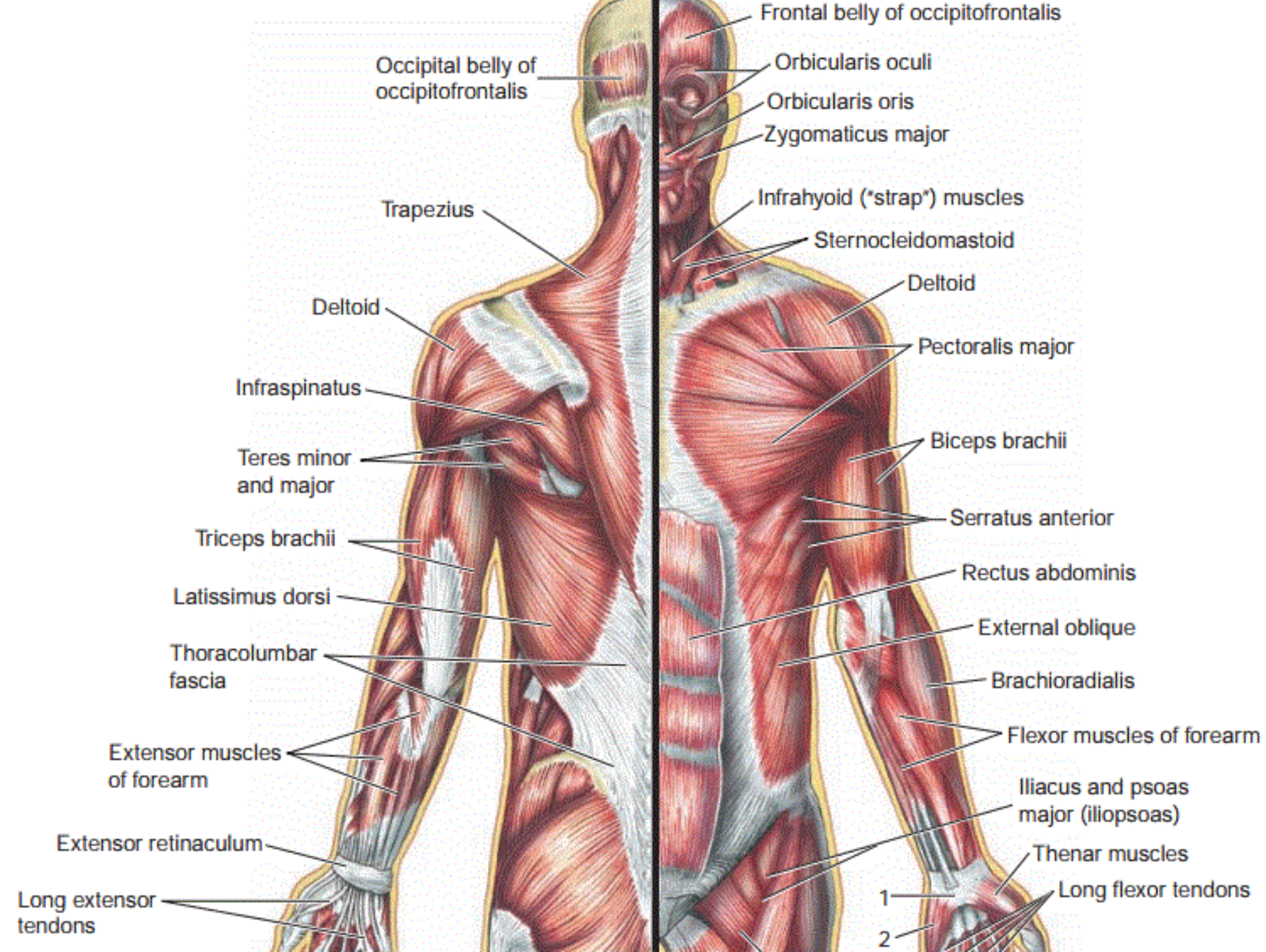
Naming of muscles

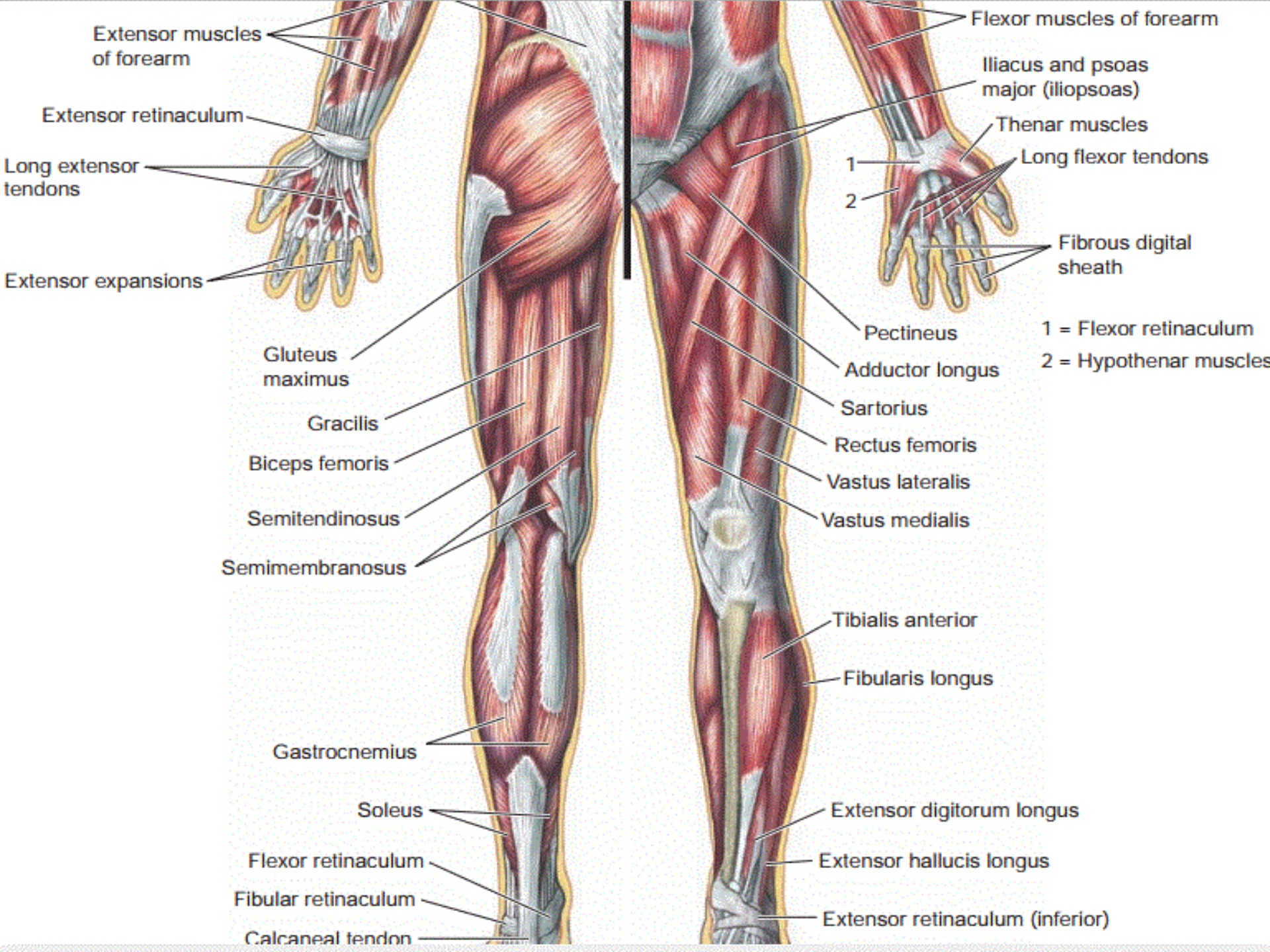
- Muscles are named on the basis
- **Function** (abductor digiti minimi)
- **Bones** (sternocleidomastoid)
- **Position** (medial, lateral, anterior, posterior)
- **Length** (brevis, short; longus, long)
- **Shape** (external oblique)

Clasification of muscles

- Can be classified according to shape
- **Flat muscles:** have **parallel fibers**. E.g. external oblique, sartorius
- **Pennate muscles:** **Feather-like**, in the arrangement of their **fascicles**. e.g. Extensor digitorum longus
- **Fusiform muscles:** **Spindle** shaped. E.g. biceps brachii.
- **Convergent muscles:** Arise from a **broad** area and **converge**. E.g. Pectoralis major.
- **Quadrante muscles:** Have **four equal sides**. E,g rectus abdominis

- **Circular or sphincter muscles:** Surround a body opening or orifice. E.g. orbicularis oculi (closes the eyelids)
- **Multi-headed or multi-bellied muscles:** Have **more than one head** of attachment or more than one **contractile** belly. E.g. Biceps muscles (two heads), gastrocnemius (two bellies)





Nerves and Arteries

- Muscles of **similar actions** are innervated by the **same nerves**
- **Motor nerves** usually enter the **fleshy** portion of the muscle
- Motor nerves meet muscle at **Neuromuscular junction**
- Blood supply of muscles is **not** as **constant**
- Arteries generally supply the structures they **contact**

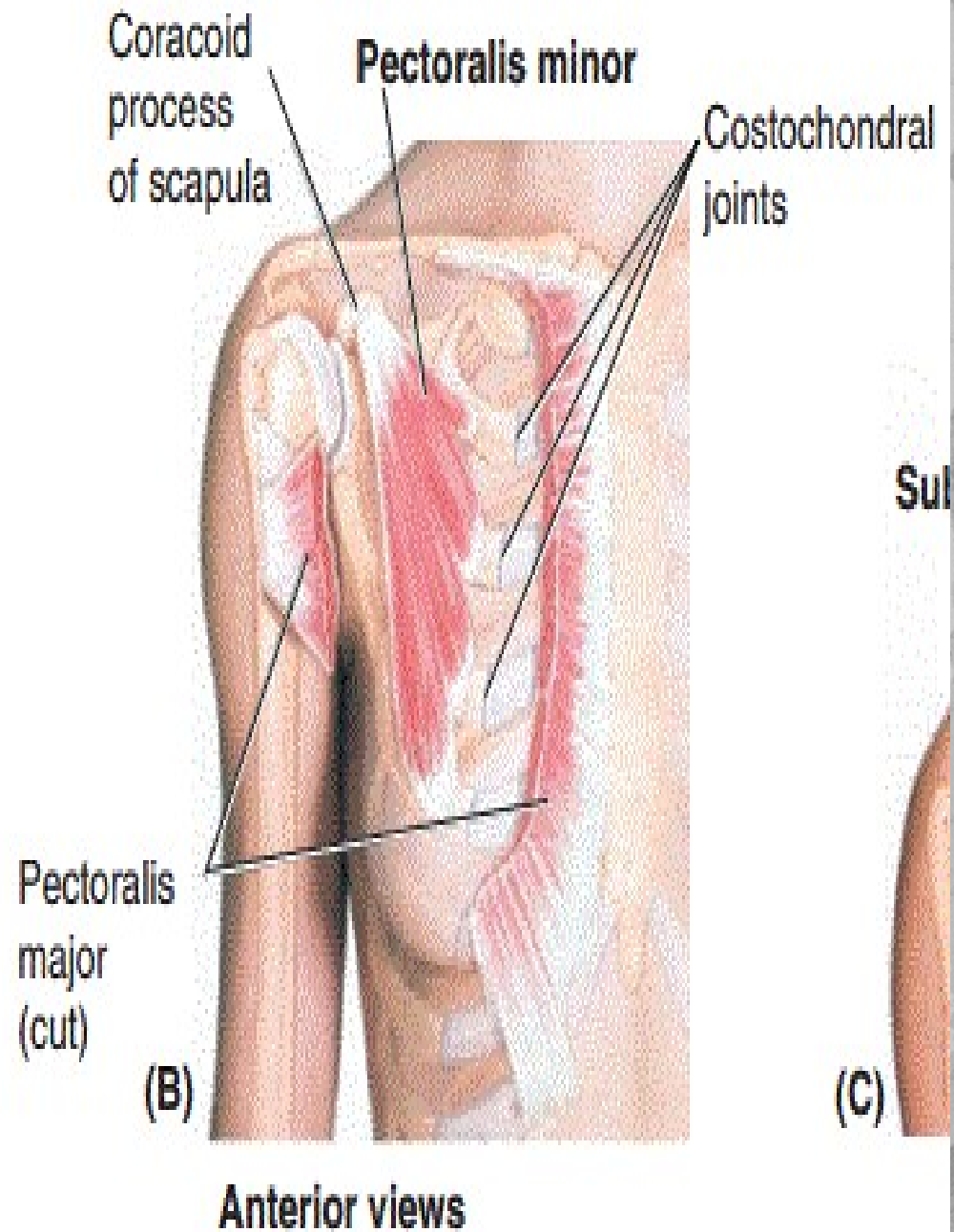
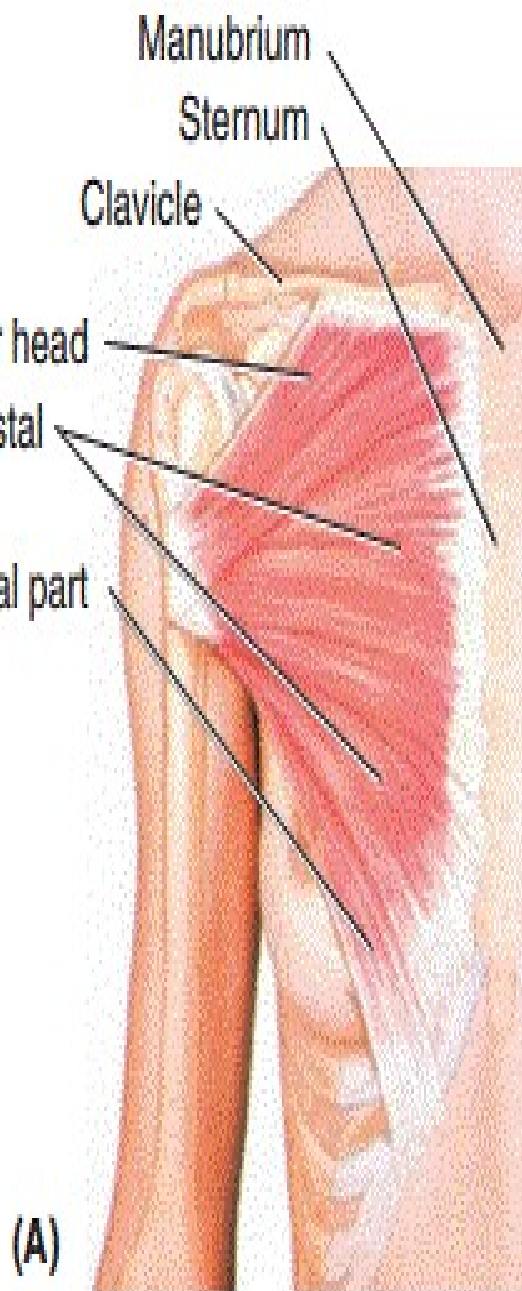
1. Pectorial muscles

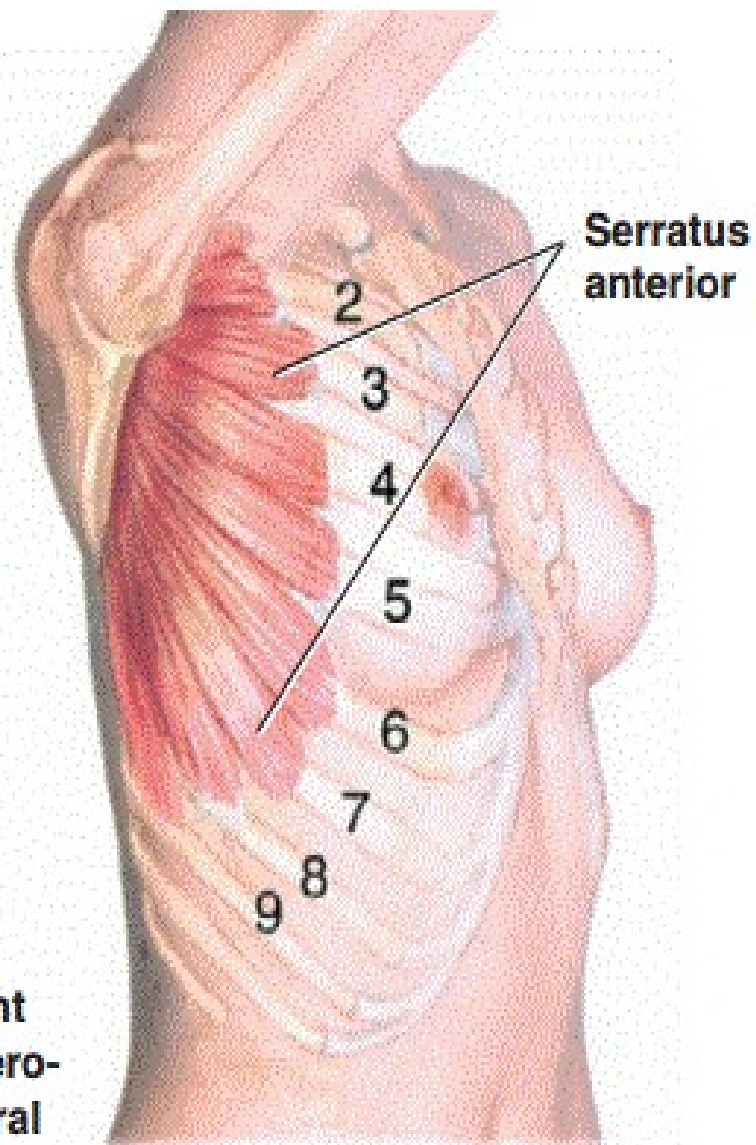
- Also called **anterior axioappendicular** muscles
- Contains **four** muscles
- Attached to the **pectoral girdle**
- Associated with movements of the **pectoral girdle** and **upper limb**
- **Pectoralis major, pectoralis minor, subclavius, and serratus anterior**

TABLE 6.3. ANTERIOR AXIOAPPENDICULAR MUSCLES

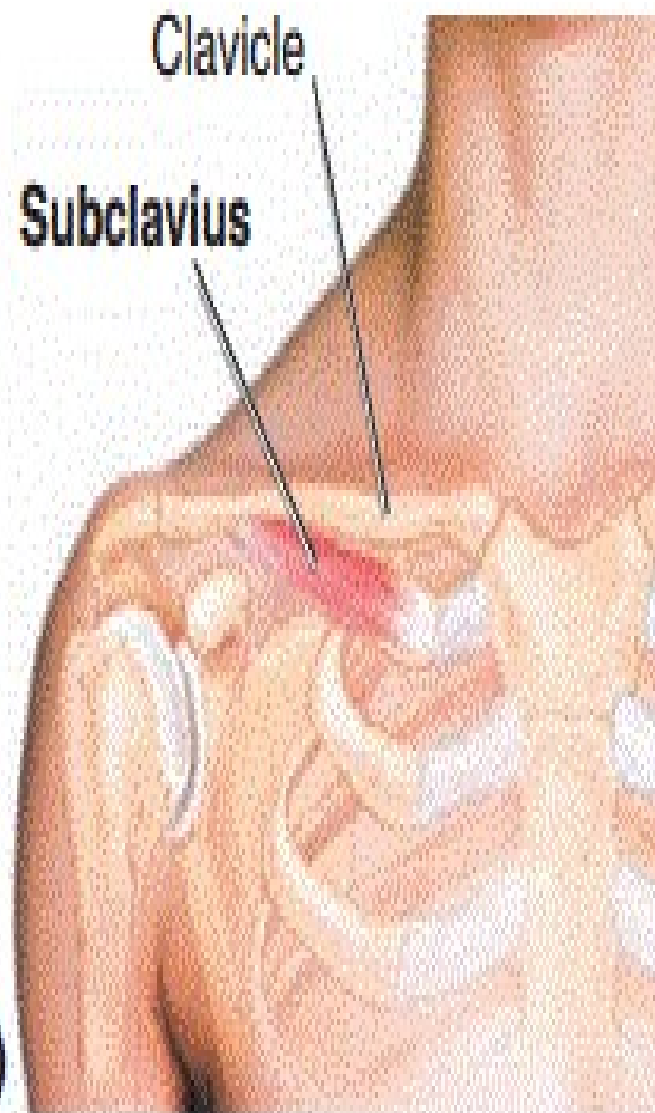
Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Main Action
Pectoralis major	Clavicular head: anterior surface of medial half of clavicle Sternocostal head: anterior surface of sternum, superior six costal cartilages, aponeurosis of external oblique muscle	Lateral lip of intertubercular sulcus of humerus	Lateral and medial pectoral nerves; clavicular head (C5, C6), sternocostal head (C7, C8, T1)	Adducts and medially rotates humerus; draws scapula anteriorly and inferiorly Acting alone, clavicular head flexes humerus and sternocostal head extends it from the flexed position
Pectoralis minor	3rd–5th ribs near their costal cartilages	Medial border and superior surface of coracoid process of scapula	Medial pectoral nerve (C8, T1)	Stabilizes scapula by drawing it inferiorly and anteriorly against thoracic wall
Subclavius	Junction of 1st rib and its costal cartilage	Inferior surface of middle third of clavicle	Nerve to subclavius (C5, C6)	Anchors and depresses clavicle
Serratus anterior	External surfaces of lateral parts of 1st–8th ribs	Anterior surface of medial border of scapula	Long thoracic nerve (C5, C6, C7)	Protracts scapula and holds it against thoracic wall; rotates scapula

Of pectoralis major





(D) Right
antero-
lateral
view



(C)

2. Back muscles

- Also called **posterior axioappendicular** muscles
- Attach **upper limb** to the **axial skeleton** (trunk).
- The **posterior shoulder muscles** are divided into **three groups**
- **Superficial (extrinsic shoulder) muscles: trapezius and latissimus dorsi**
- **Deep (extrinsic shoulder) muscles: levator scapulae and rhomboids.**
- **Scapulohumeral (intrinsic shoulder)**

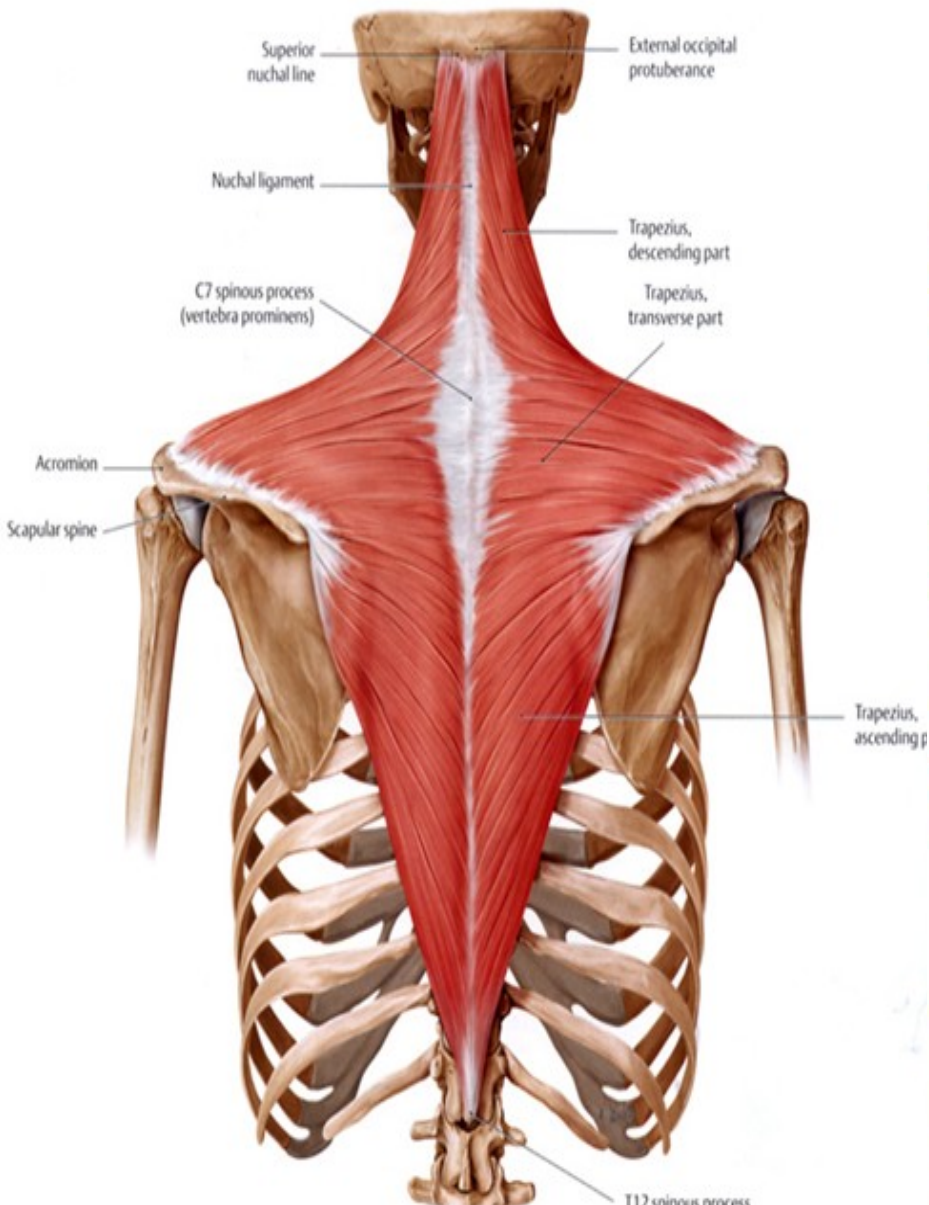
TABLE 6.4. POSTERIOR AXIOAPPENDICULAR MUSCLES

Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Muscle Action
Superficial posterior axioappendicular (extrinsic shoulder) muscles				
Trapezius	Medial third of superior nuchal line; external occipital protuberance; nuchal ligament; spinous processes of C7–T12 vertebrae	Lateral third of clavicle; acromion and spine of scapula	Spinal accessory nerve (CN XI) (motor fibers) and C3, C4 spinal nerves (pain and proprioceptive fibers)	Descending part elevates; ascending part depresses; and middle part (or all parts together) retracts scapula; descending and ascending parts act together to rotate glenoid cavity superiorly
Latissimus dorsi	Spinous processes of inferior 6 thoracic vertebrae, thoracolumbar fascia, iliac crest, and inferior 3 or 4 ribs	Floor of intertubercular sulcus of humerus	Thoracodorsal nerve (C6, C7, C8)	Extends, adducts, and medially rotates humerus; raises body toward arms during climbing

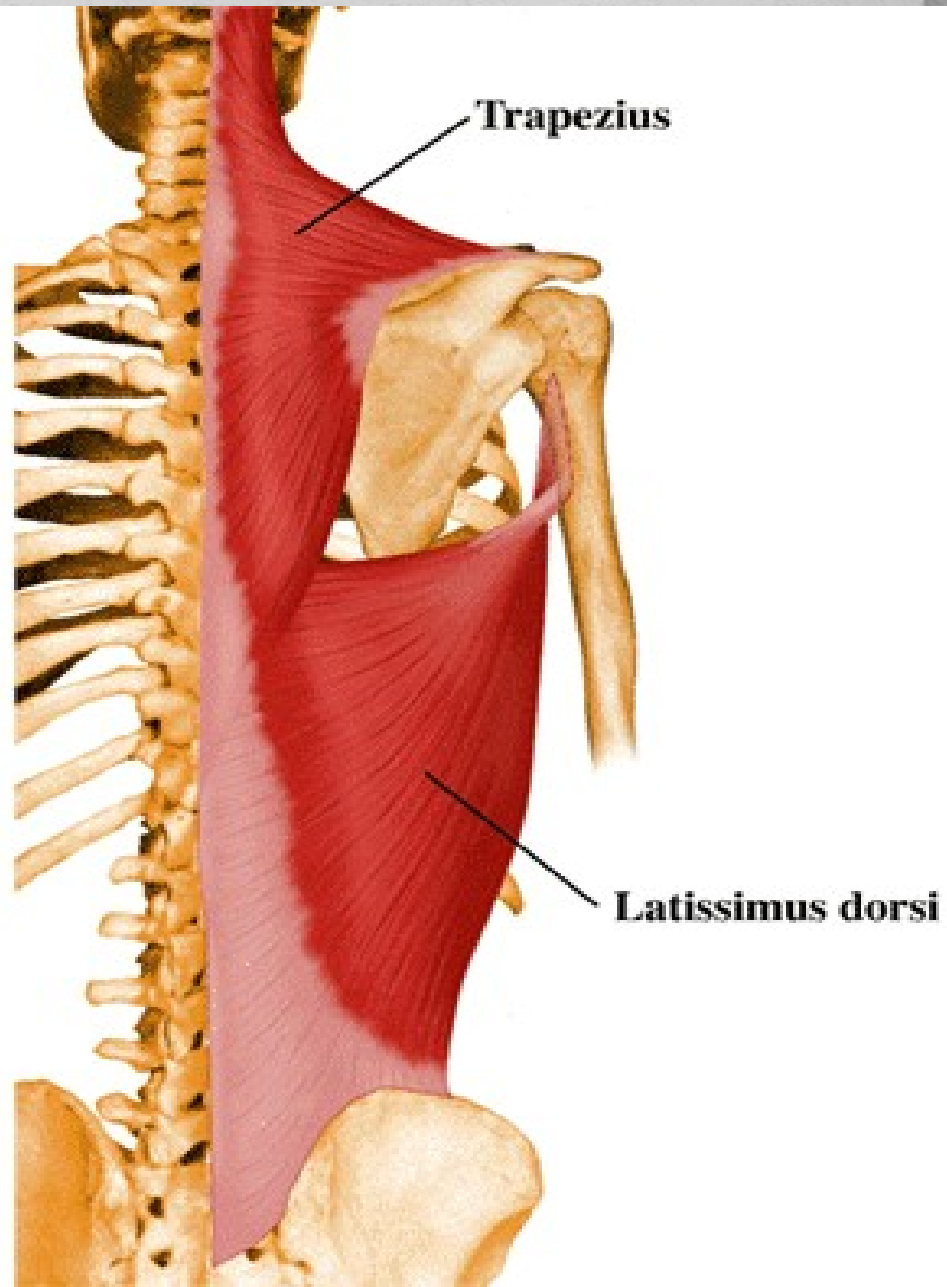
TABLE 6.4. POSTERIOR AXIOAPPENDICULAR MUSCLES (Continued)

Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Muscle Action
Deep posterior axioappendicular (extrinsic shoulder) muscles				
Levator scapulae	Posterior tubercles of transverse processes of C1–C4 vertebrae	Medial border of scapula superior to root of scapular spine	Dorsal scapular (C5) and cervical (C3, C4) nerves	Elevates scapula and tilts its glenoid cavity inferiorly by rotating scapula
Rhomboid minor and major	Minor: nuchal ligament; spinous processes of C7 and T1 vertebrae Major: spinous processes of T2–T5 vertebrae	Minor: smooth triangular area at medial end of scapular spine Major: medial border of scapula from level of spine to inferior angle	Dorsal scapular nerve (C4, C5)	Retract scapula and rotate it to depress glenoid cavity; fix scapula to thoracic wall

Trapezius



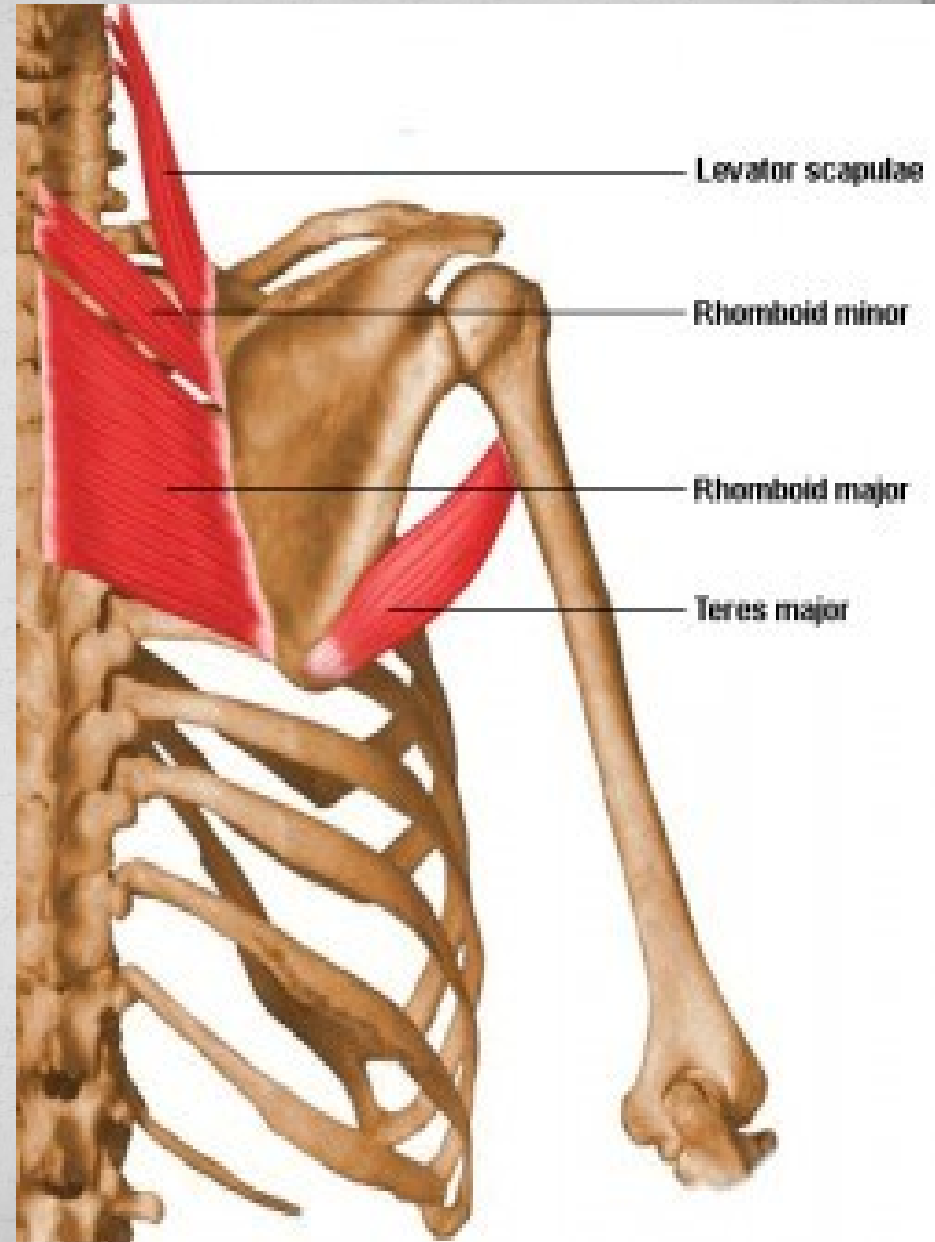
Latissimus Dorsi



Levator Scapulae



Romboid



3. Scapular muscles

- Six short muscles
- pass from the scapula to the humerus and act on the shoulder joint
- **Scapulohumeral (intrinsic shoulder) muscles: deltoid, teres major**
- **Rotator cuff muscles, four: supraspinatus, infraspinatus, teres minor, and subscapularis**

TABLE 6.6. SCAPULOHUMERAL (INTRINSIC SHOULDER) MUSCLES

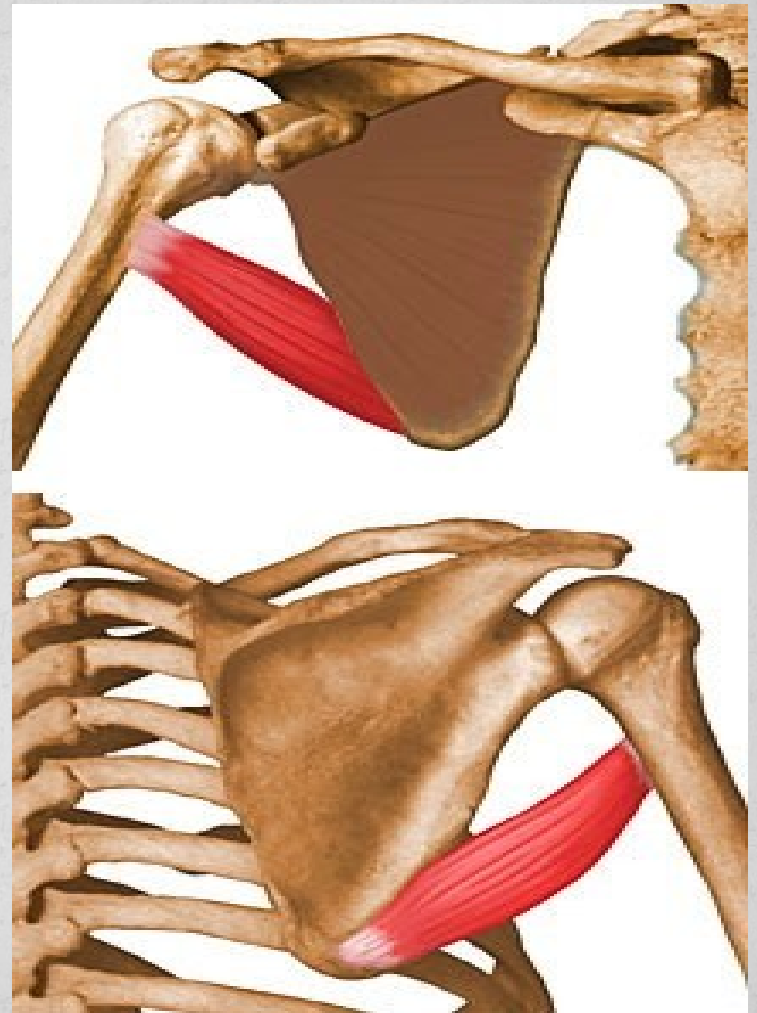
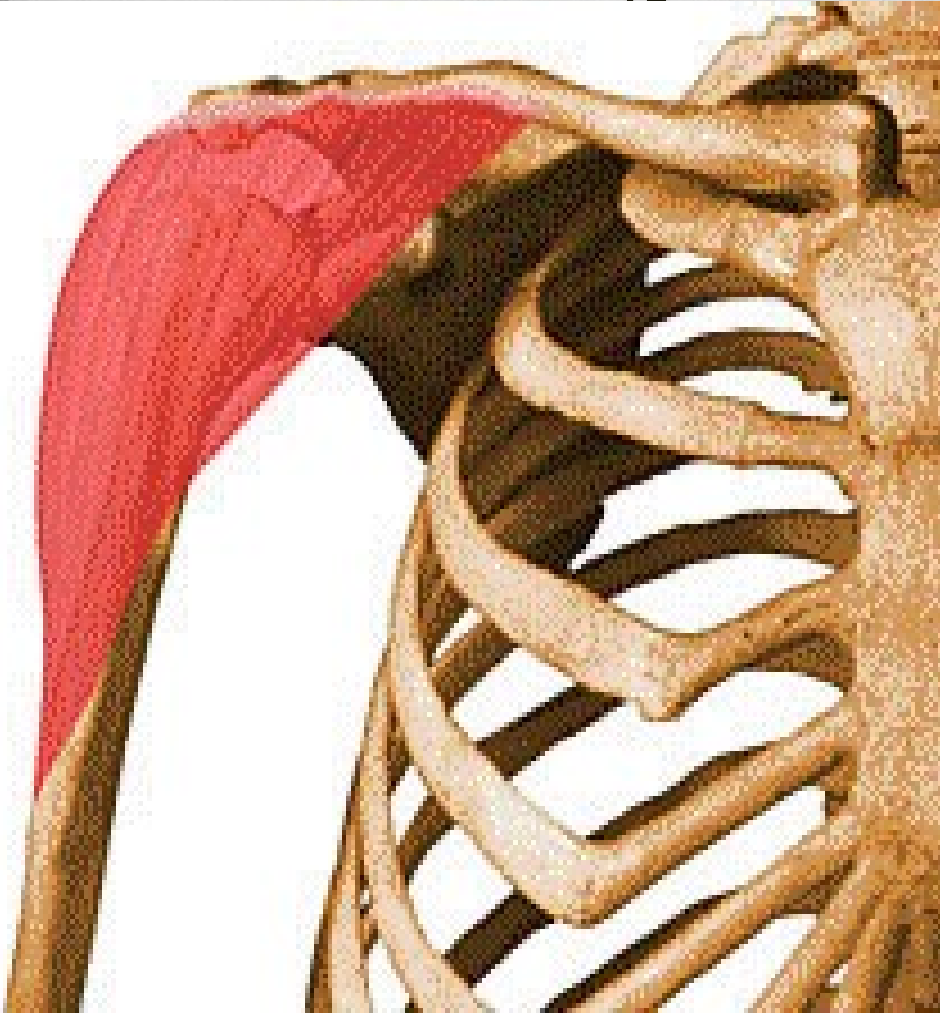
Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Muscle Action
Deltoid	Lateral third of clavicle; acromion and spine of scapula	Deltoid tuberosity of humerus	Axillary nerve (C5 , C6)	Clavicular (anterior) part: flexes and medially rotates arm Acromial (middle) part: abducts arm Spinal (posterior) part: extends and laterally rotates arm
Supraspinatus ^b	Supraspinous fossa of scapula	Superior facet of greater tubercle of humerus	Suprascapular nerve (C4, C5 , C6)	Initiates and assists deltoid in abduction of arm and acts with rotator cuff muscles ^b

TABLE 6.6. SCAPULOHUMERAL (INTRINSIC SHOULDER) MUSCLES (Continued)

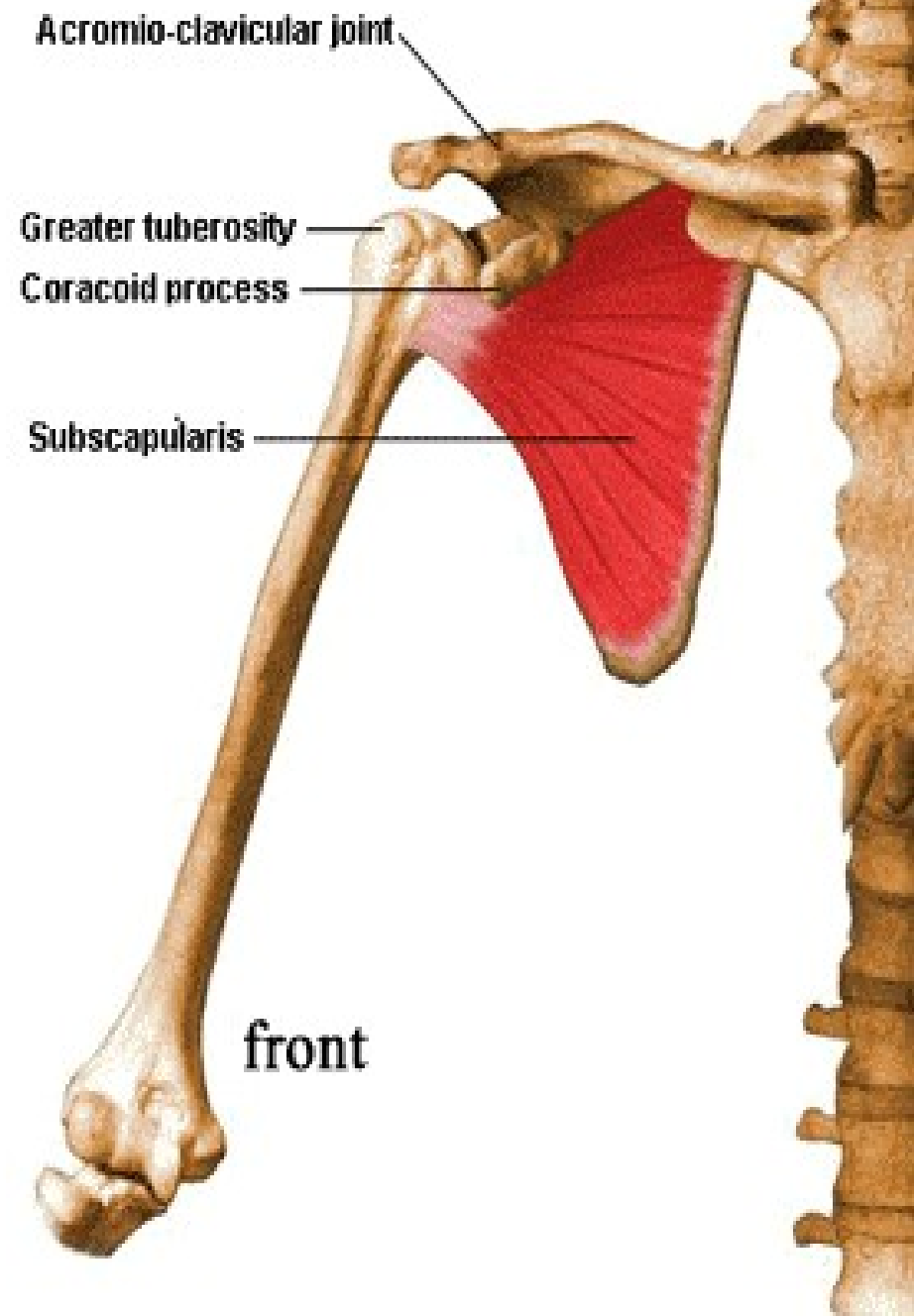
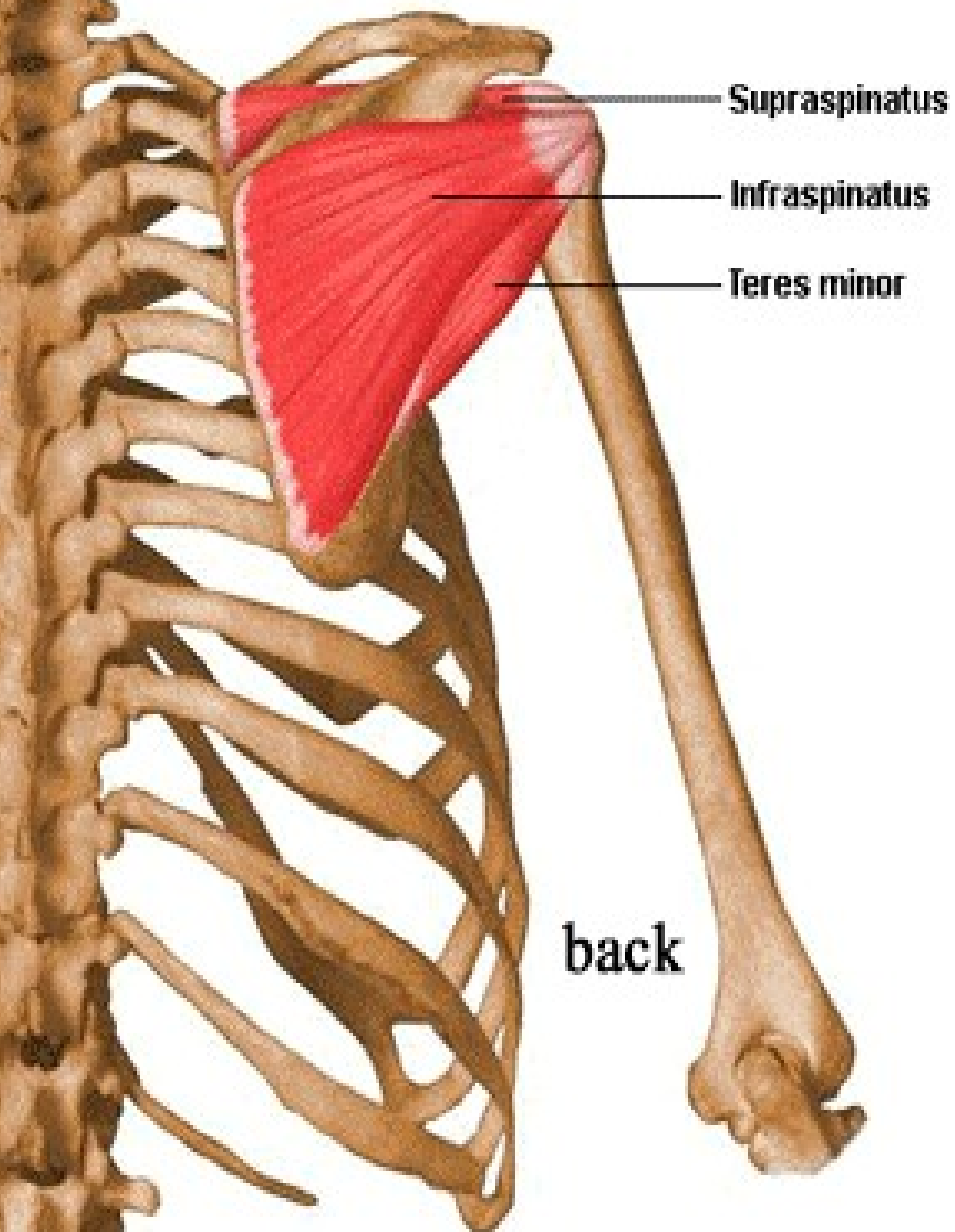
Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Muscle Action
Infraspinatus ^b	Infraspinous fossa of scapula	Middle facet of greater tubercle of humerus	Suprascapular nerve (C5 , C6)	Laterally rotates arm; and acts with rotator cuff muscles ^b
Teres minor ^b	Middle part of lateral border of scapula	Inferior facet of greater tubercle of humerus	Axillary nerve (C5 , C6)	Laterally rotates arm; and acts with rotator cuff muscles ^b
Teres major	Posterior surface of inferior angle of scapula	Medial lip of intertubercular sulcus of humerus	Lower subscapular nerve (C5, C6)	Adducts and medially rotates arm
Subscapularis ^b	Subscapular fossa (most of anterior surface of scapula)	Lesser tubercle of humerus	Upper and lower subscapular nerves (C5, C6 , C7)	Medially rotates arm; as part of rotator cuff, helps hold head of humerus in glenoid cavity

Deltoid

Teres Major



Rotator Cuff



4. Arm muscles

- **Four** major arm muscles

Three **flexors**

- **Biceps brachii, brachialis, and coracobrachialis)**
- In the **anterior compartment**
- Supplied by the **musculocutaneous nerve,**

One extensor

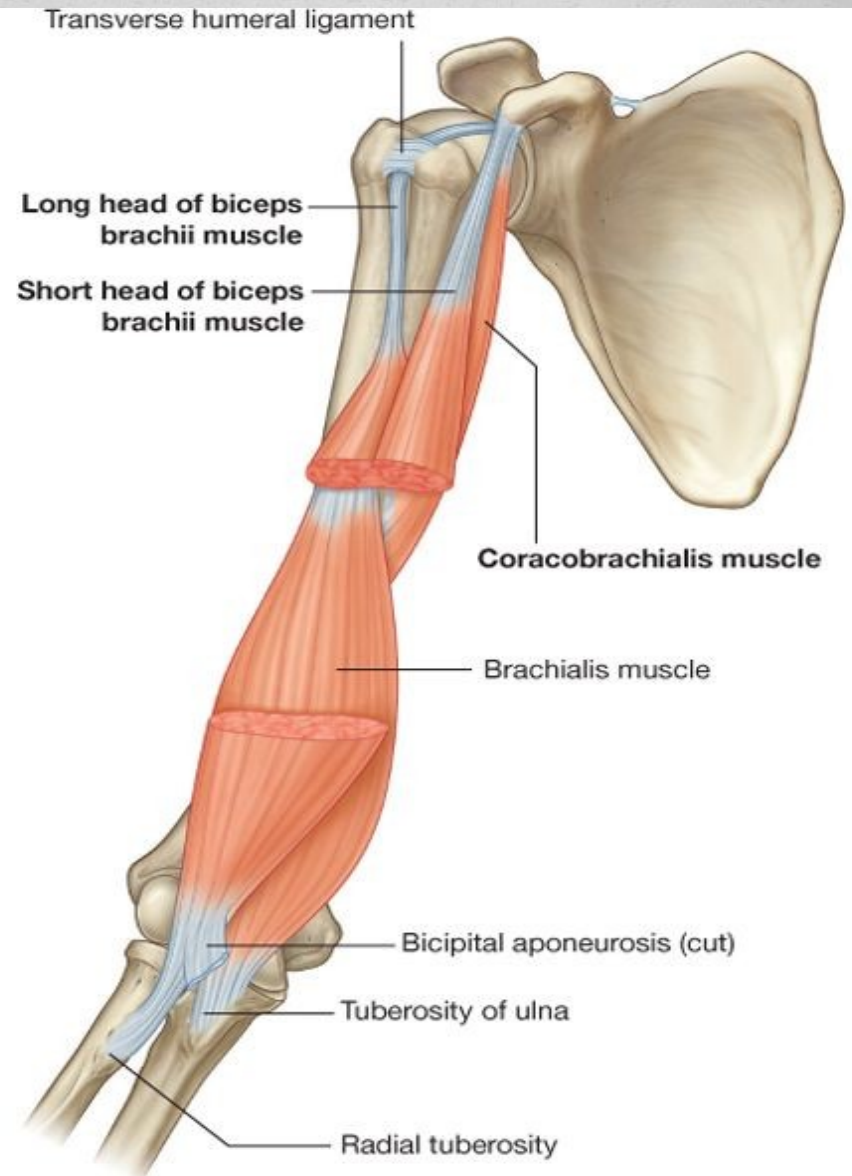
- **Triceps brachii**
- In the **posterior compartment**
- Supplied by the **radial nerve**
- A distally placed assistant to the triceps, the **anconeus**
- The flexor muscles are almost **twice as strong** as the extensors in all positions

Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Muscle Action
Biceps brachii	Short head: tip of coracoid process of scapula Long head: supraglenoid tubercle of scapula	Tuberosity of radius and fascia of forearm via bicipital aponeurosis	Musculocutaneous nerve (C5, C6 , C7)	Supinates forearm and, when it is supine, flexes forearm; short head resists dislocation of shoulder
Coracobrachialis	Tip of coracoid process of scapula	Middle third of medial surface of humerus		Helps flex and adduct arm; resists dislocation of shoulder
Brachialis	Distal half of anterior surface of humerus	Coronoid process and tuberosity ulna	Musculocutaneous nerve ^b (C5, C6) and radial nerve (C5, C7)	Flexes forearm in all positions

TABLE 6.9. MUSCLES OF ARM (Continued)

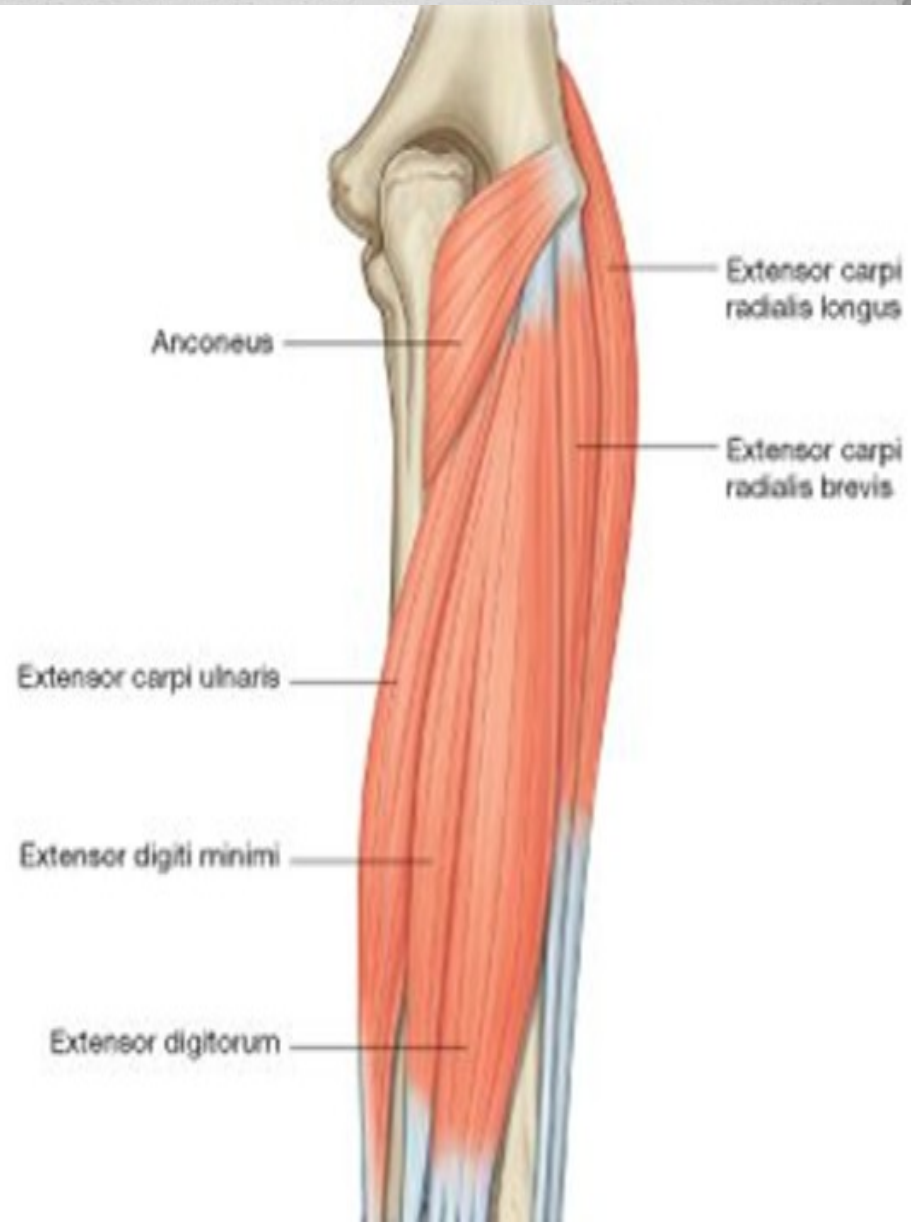
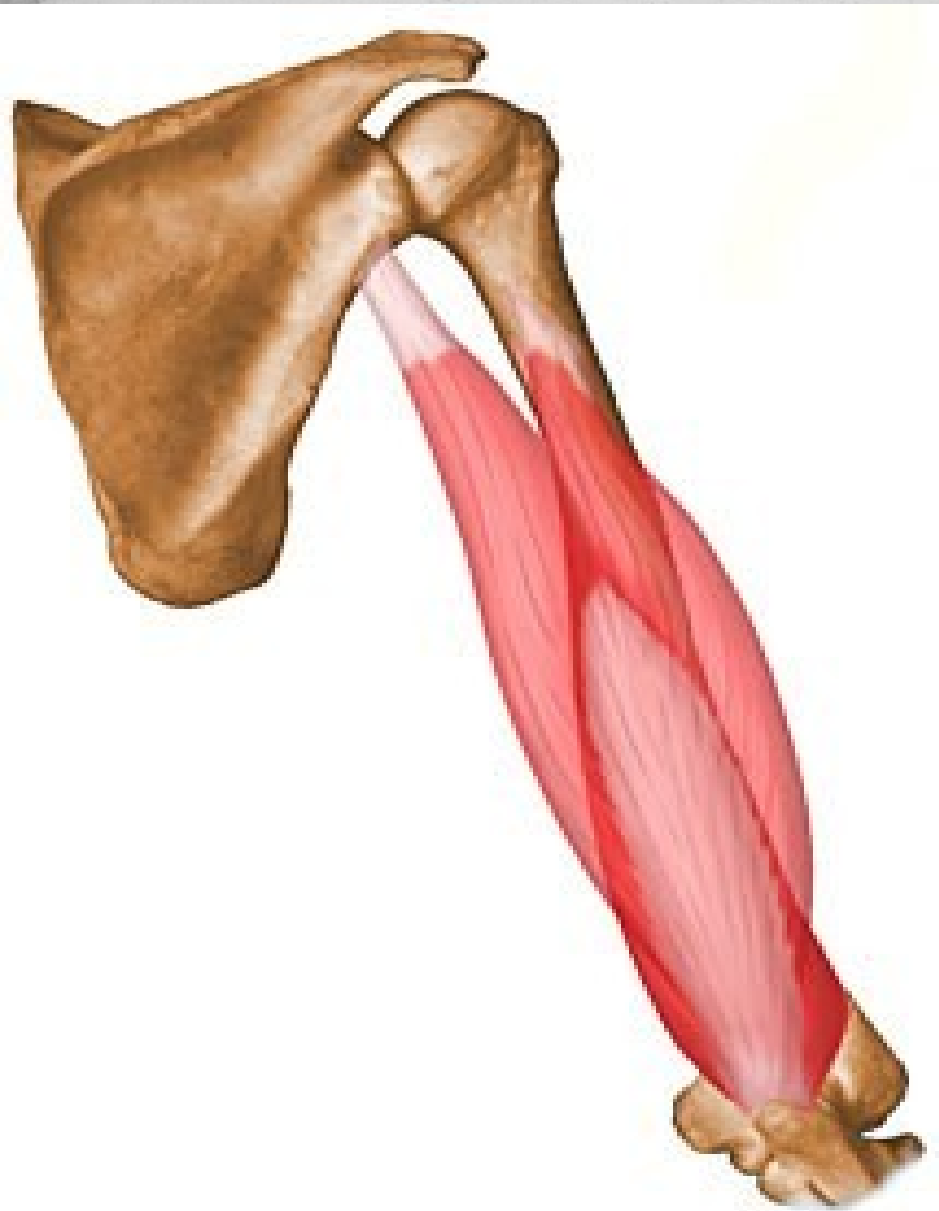
Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Muscle Action
Triceps brachii	Long head: infraglenoid tubercle of scapula Lateral head: posterior surface of humerus, superior to radial groove Medial head: posterior surface of humerus, inferior to radial groove	Proximal end of olecranon of ulna and fascia of forearm	Radial nerve (C6, C7 , C8)	Chief extensor of forearm; long head resists dislocation of humerus; especially important during adduction
Anconeus	Lateral epicondyle of humerus	Lateral surface of olecranon and superior part of posterior surface of ulna	Radial nerve (C7, C8, T1)	Assists triceps in extending forearm; stabilizes elbow joint; may abduct ulna during pronation

Biceps Brachii



Triceps Brachii

Anconeus



5. Forearm muscles

- There are 17 muscles **crossing** the **elbow** joint
- some of which act on the elbow joint **exclusively**, others act at the **wrist** and **fingers**.
- The **flexor** muscles of the anterior compartment have approximately **twice** the bulk and strength of the extensor muscles of the posterior compartment

Anterior compartment

- The Superficial and intermediate layer of **Flexors**

Superficial Flexor Muscles

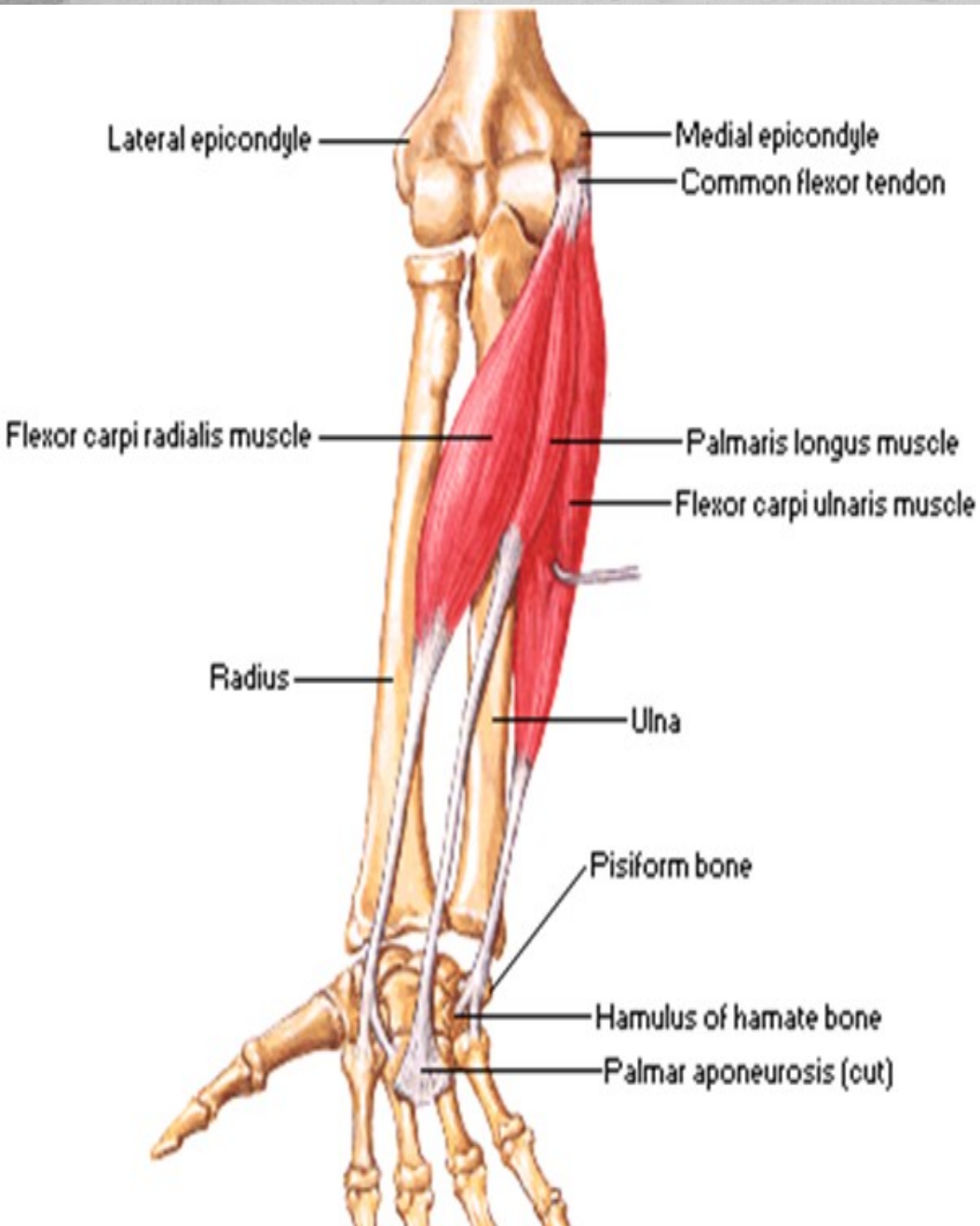
- **Pronator Teres Muscle, flexor Carpi Radialis Muscle, Palmaris Longus Muscle, Flexor Carpi Ulnaris Muscle and The Flexor Digitorum**

Deep Flexor Muscles

- **Flexor Digitorum Profundus Muscle, Flexor Pollicis Longus Muscle and pronator Quadratus Muscle**



Pronator Teres



Flexor Digitorum



Flexor Digitorum Profundus



Flexor Pollicis Longus



Posterior compartment

- Innervated by branches of the radial nerve

Superficial Extensor Muscles

- **Brachioradialis Muscle, Extensor Carpi Radialis Longus Muscle, Extensor Carpi Radialis Brevis Muscle, Extensor Digitorum Muscles, Extensor Digiti Minimi Muscle and Extensor Carpi Ulnaris Muscle**

Brachioradialis



**Extensor Carpi
Radialis Brevis**



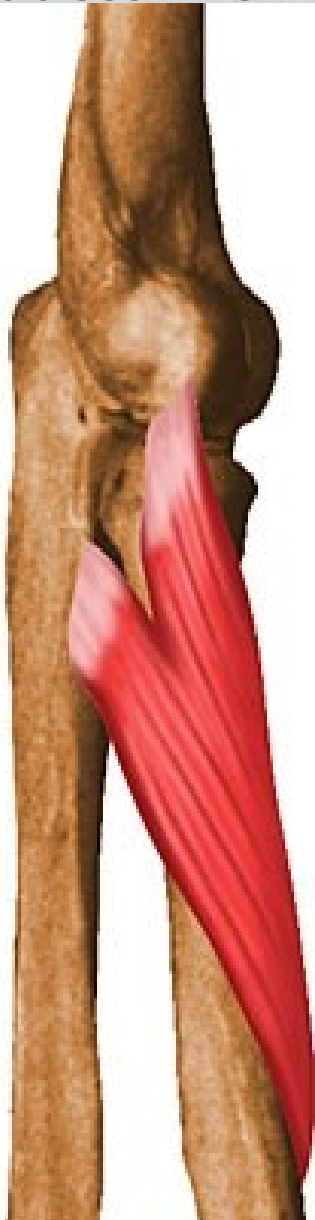
**Extensor Carpi Radialis
Longus**



The Deep Extensor Muscles

- **Supinator, Extensor Indicis, Abductor Pollicis Longus, Extensor Pollicis Longus, Extensor Pollicis Brevis Muscle**

Supinator Abductor Pollicis Longus



Extensor Indicis



6. Hand Muscles

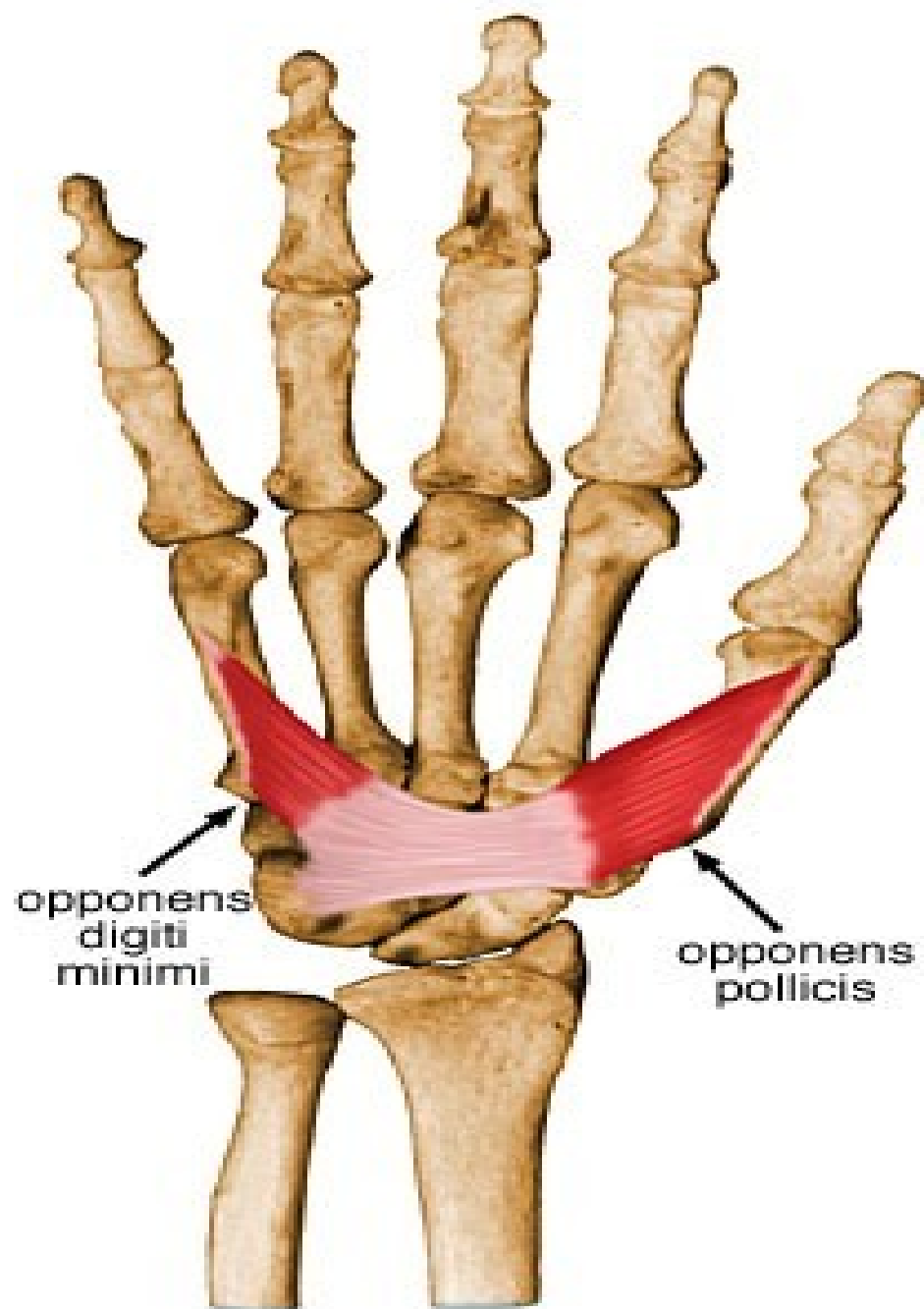
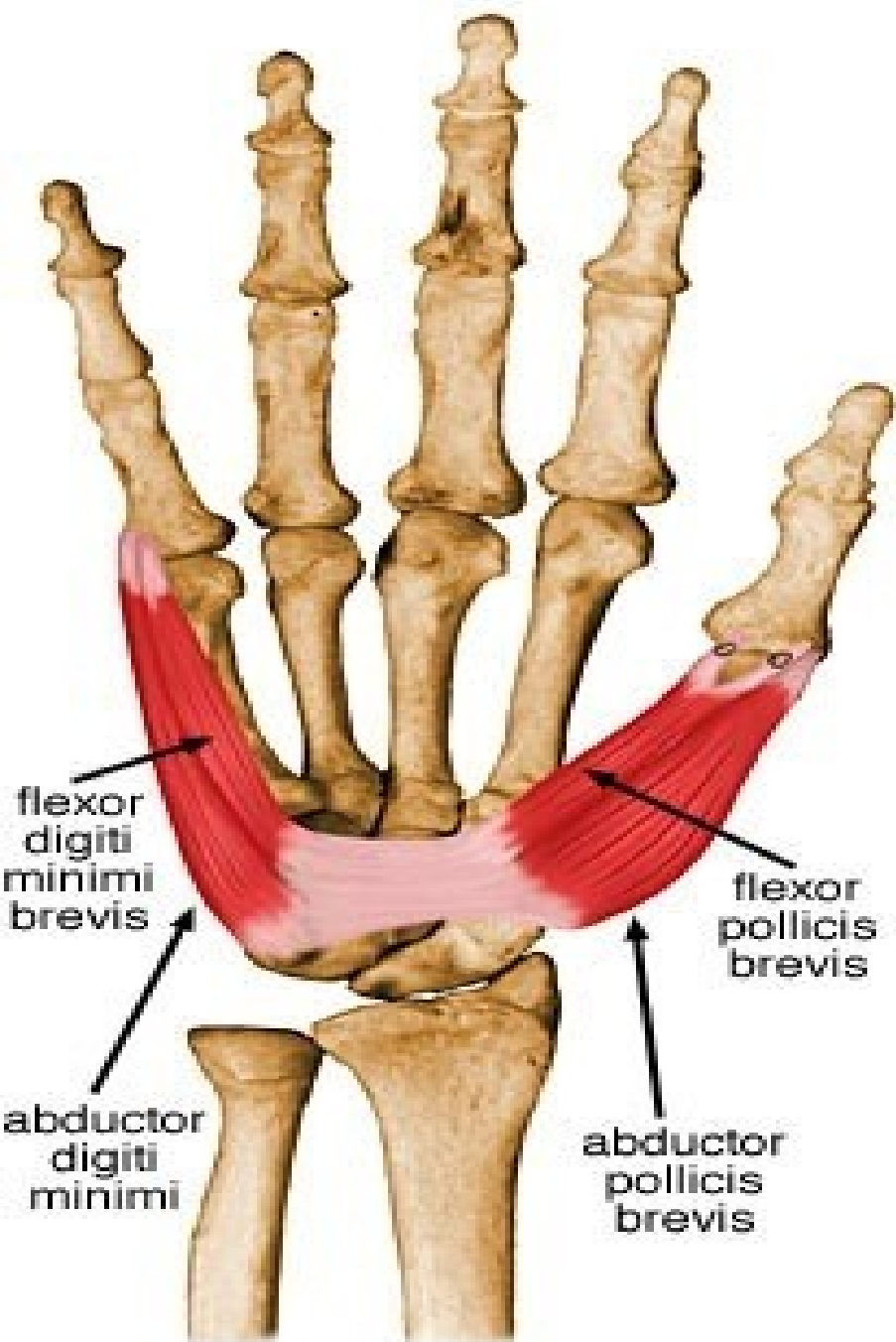
- The **intrinsic muscles** of the hand are on the palmar aspect
- **Innervated** by branches of the **ulnar** and **median nerves**.
- The **long flexor** tendons of the **extrinsic** muscles of the hand, **arise** in the **forearm** and pass to the digits.
- These are located in the **central compartment**

1. The Thenar Muscles

- **abductor pollicis brevis, flexor pollicis brevis, opponens pollicis, and Adductor Pollicis Muscle**
- **produce the thenar eminence.**

2. Hypothenar Muscles

- **Abductor Digiti Minimi, Flexor Digiti Minimi Brevis Muscle, Opponens Digiti Minimi Muscle**



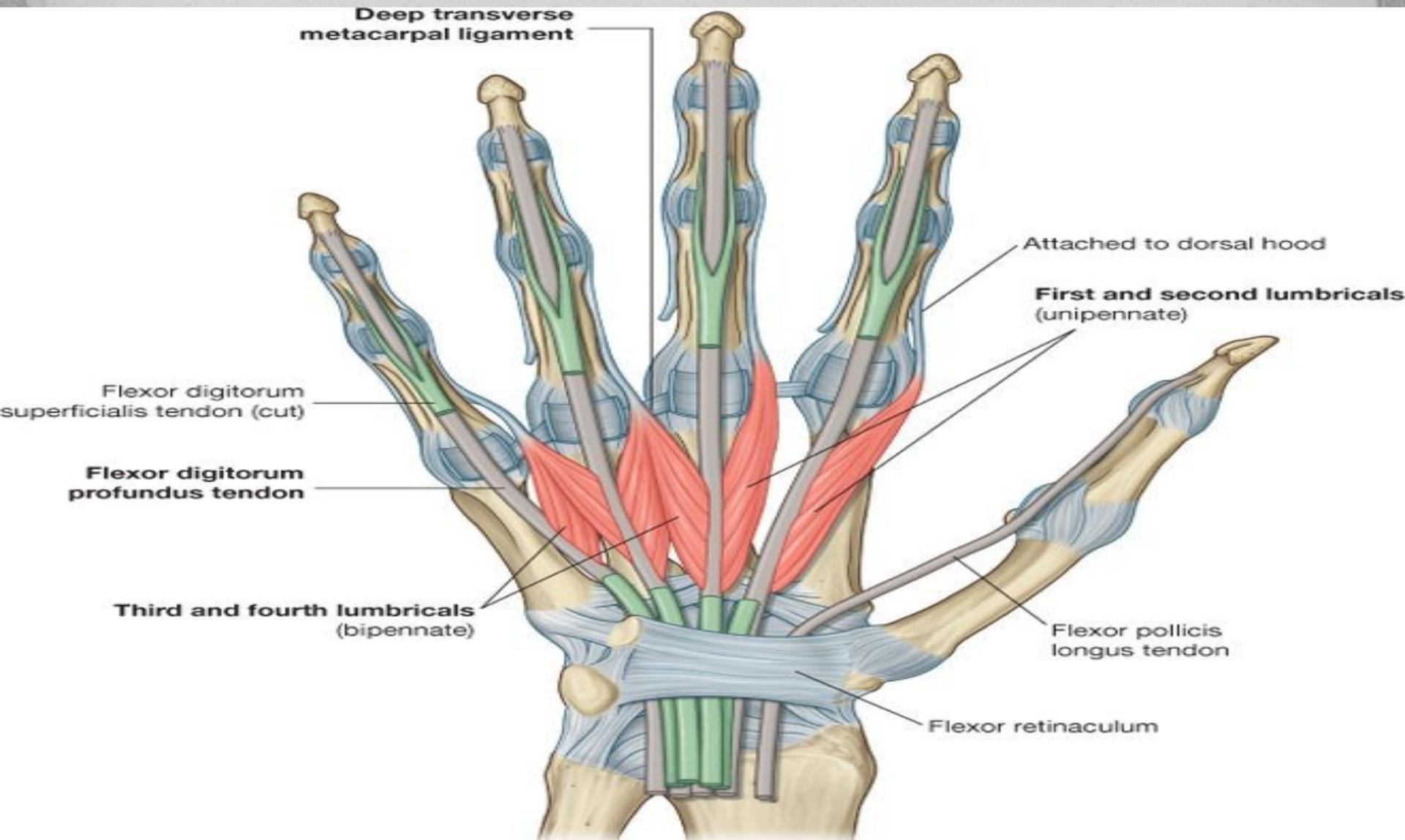
3. The Lumbrical Muscles

- There are **4 slender** lumbrical muscles-one for each digit.

4. The Interosseous Muscles

- There are **7 interossei** muscles located **between the metacarpal bones**.

Lumbrical



Drake: Gray's Anatomy for Students, 2nd Edition.

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7. Thigh Muscles

Anterior thigh muscles,

- The **flexors** of the **hip** and **extensors** of the **knee**
- Include the **pectineus, iliopsoas, sartorius,** and **quadriceps femoris**

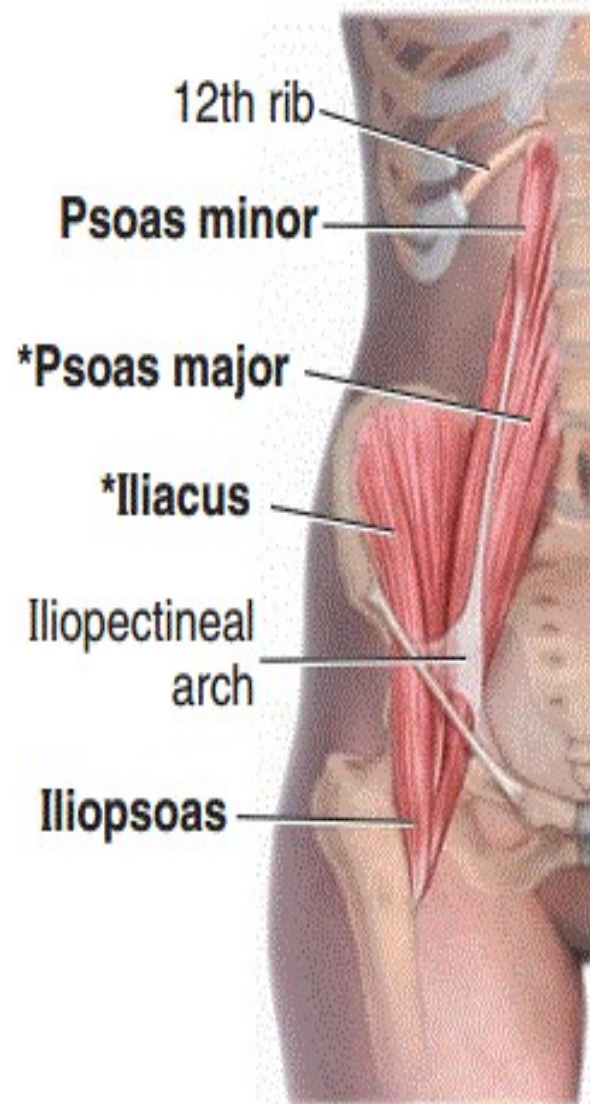
TABLE 5.3.I. MUSCLES OF ANTERIOR THIGH: FLEXORS OF HIP JOINT

Muscle	Proximal Attachment ^a	Distal Attachment	Innervation ^b	Main Action(s)
Pectineus (Fig. 5.21A & B)	Superior ramus of pubis	Pectineal line of femur, just inferior to lesser trochanter	Femoral nerve (L2, L3); may receive a branch from obturator nerve	Adducts and flexes thigh; assists with medial rotation of thigh
Iliopsoas (Fig. 5.21A & C) Psoas major	Sides of T12–L5 vertebrae and discs between them; transverse processes of all lumbar vertebrae	Lesser trochanter of femur	Anterior rami of lumbar nerves (L1, L2, L3)	Act conjointly in flexing thigh at hip joint and in stabilizing this joint ^c
Psoas minor	Sides of T12–L1 vertebrae and intervertebral discs	Pectineal line, iliopectineal eminence via iliopectineal arch	Anterior rami of lumbar nerves (L1, L2)	
Iliacus	Iliac crest, iliac fossa, ala of sacrum, and anterior sacroiliac ligaments	Tendon of psoas major, lesser trochanter, and femur distal to it	Femoral nerve (L2, L3)	
Sartorius (Fig. 5.21A & D)	Anterior superior iliac spine and superior part of notch inferior to it	Superior part of medial surface of tibia	Femoral nerve (L2, L3)	Flexes, abducts, and laterally rotates thigh at hip joint; flexes leg at knee joint, (medially rotating leg when knee is flexed) ^d

TABLE 5.3.II. MUSCLES OF ANTERIOR THIGH: EXTENSORS OF KNEE

Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Main Action
Quadriceps femoris (Fig. 5.21E–H)				
Rectus femoris	Anterior inferior iliac spine and ilium superior to acetabulum	Via common tendinous (quadriceps tendon) and independent attachments to base of patella; indirectly via patellar ligament to tibial tuberosity; medial and lateral vasti also attach to tibia and patella via aponeuroses (medial and lateral patellar retinacula)	Femoral nerve (L2, L3, L4)	Extend leg at knee joint; rectus femoris also steadies hip joint and helps iliopsoas flex thigh
Vastus lateralis	Greater trochanter and lateral lip of linea aspera of femur			
Vastus medialis	Intertrochanteric line and medial lip of linea aspera of femur			
Vastus intermedius	Anterior and lateral surfaces of shaft of femur			

Pectineus



12th rib

Psoas minor

***Psoas major**

***Iliacus**

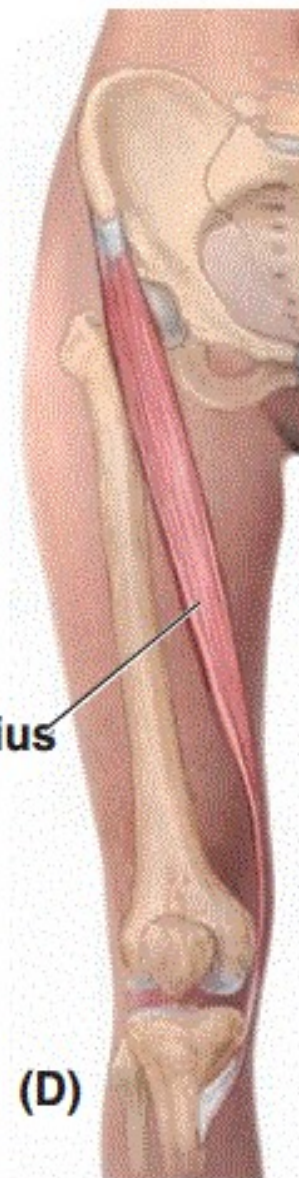
Iliopectineal
arch

Iliopsoas

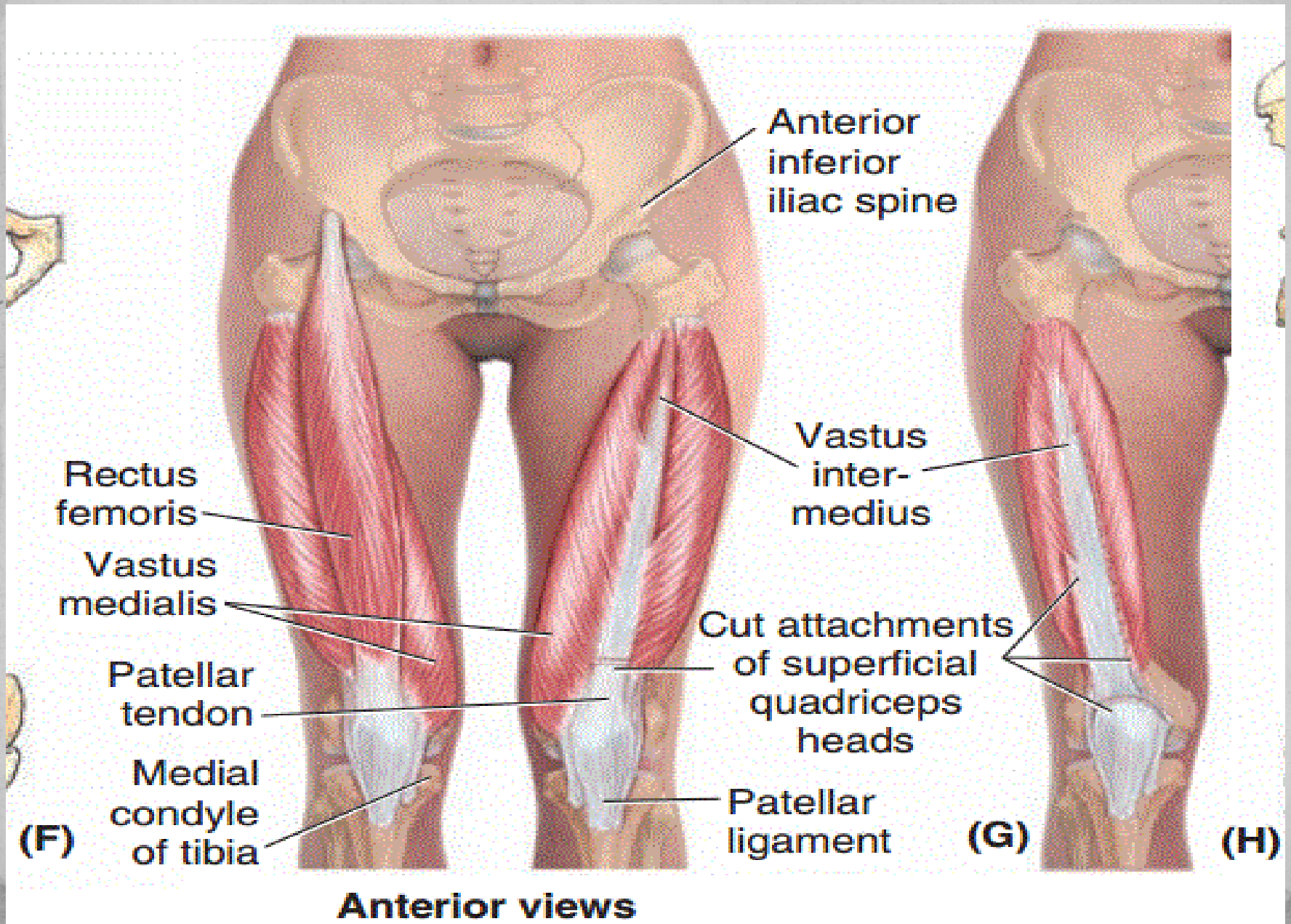
***Merge to form iliopsoas**

Sartorius

(D)



Quadriceps femoris

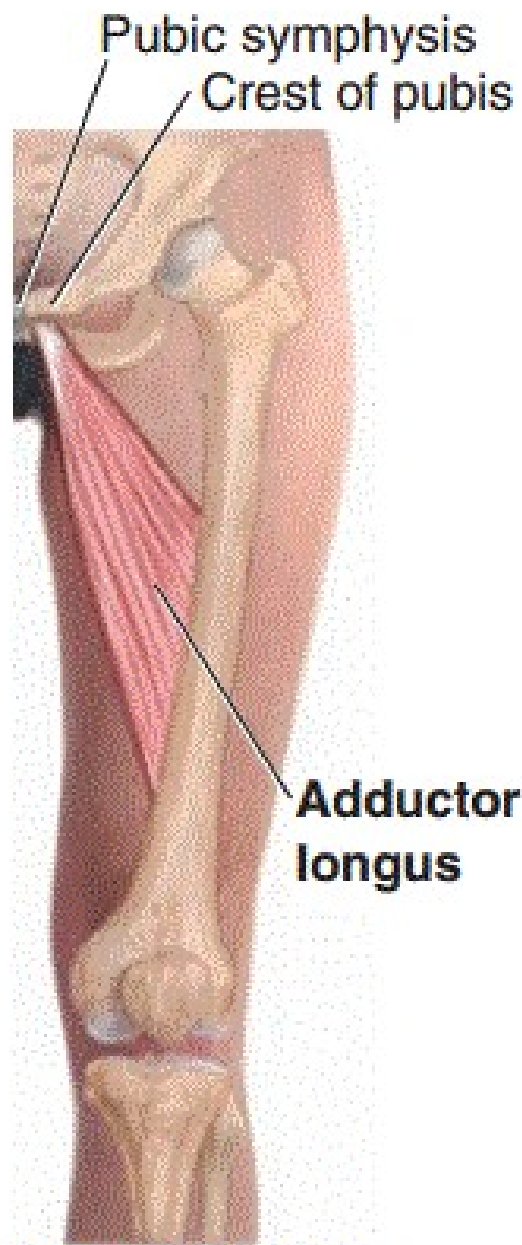


Medial thigh muscles

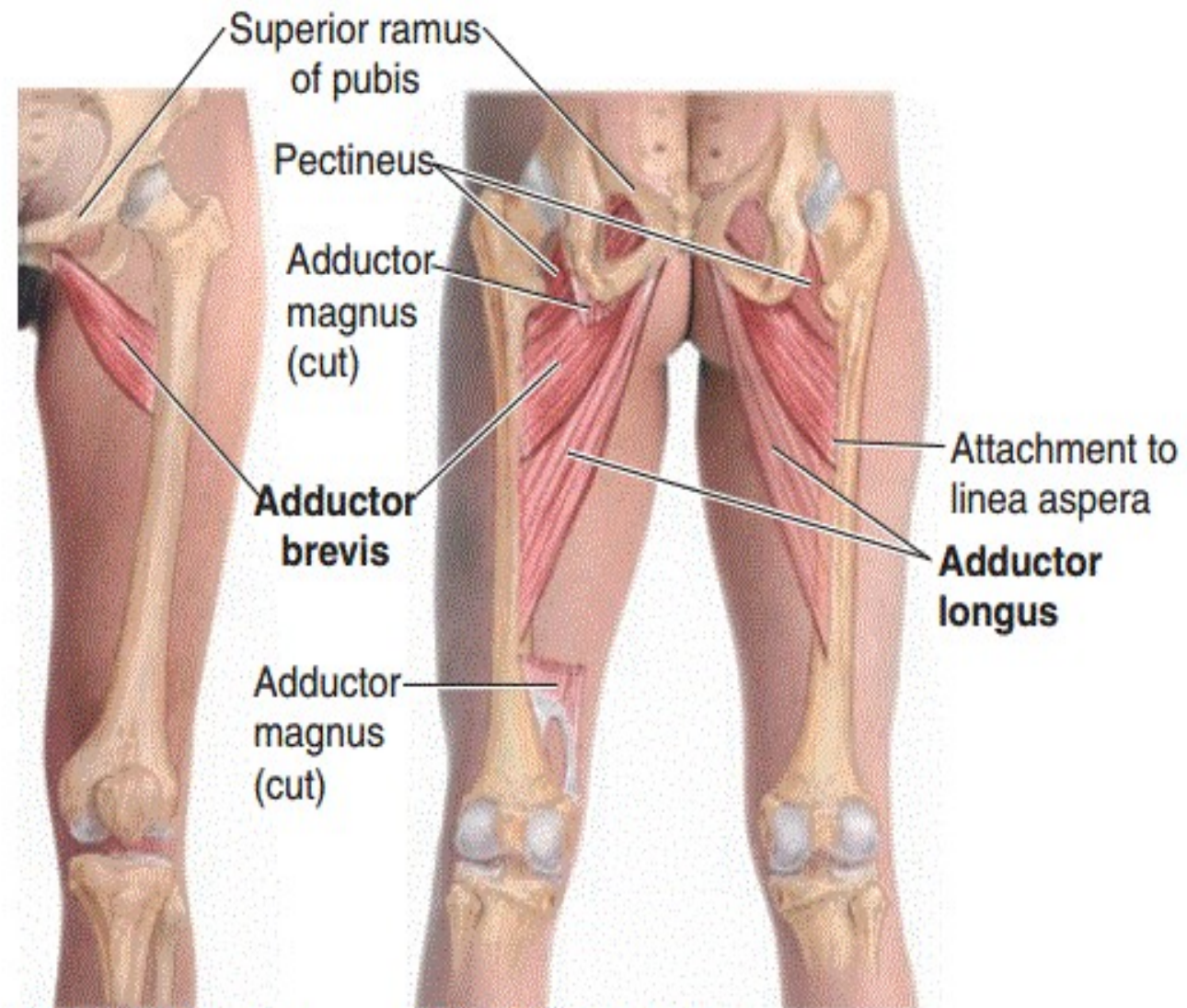
- **Adductor** group
- Consisting of the **adductor longus**, **adductor brevis**, **adductor magnus**, **gracilis**, and **obturator Externus**

TABLE 5.4. MUSCLES OF MEDIAL THIGH: ADDUCTORS OF THIGH

Muscle ^a	Proximal Attachment	Distal Attachment	Innervation ^b	Main Action
Adductor longus (Fig. 5.23E & G)	Body of pubis inferior to pubic crest	Middle third of linea aspera of femur	Obturator nerve, branch of, anterior division (L2, L3, L4)	Adducts thigh
Adductor brevis (Fig. 5.23F & G)	Body and inferior ramus of pubis	Pectineal line and proximal part of linea aspera of femur		Adducts thigh; to some extent flexes it
Adductor magnus (Fig. 5.23C, D, & G)	Adductor part: inferior ramus of pubis, ramus of ischium Hamstrings part: ischial tuberosity	Adductor part: gluteal tuberosity, linea aspera, medial supracondylar line Hamstring part: adductor tubercle of femur	Adductor part: obturator nerve (L2, L3, L4), branches of posterior division Hamstring part: tibial part of sciatic nerve (L4)	Adducts thigh Adductor part: flexes thigh Hamstrings part: extends thigh
Gracilis (Fig. 5.23H)	Body and inferior ramus of pubis	Superior part of medial surface of tibia.	Obturator nerve (L2, L3)	Adducts thigh; flexes leg; helps rotate leg medially
Obturator externus	Margins of obturator foramen and obturator membrane	Trochanteric fossa of femur	Obturator nerve (L3, L4)	Laterally rotates thigh; steadies head of femur in acetabulum



(B) Anterior view



(C) Anterior view

(D) Posterior view

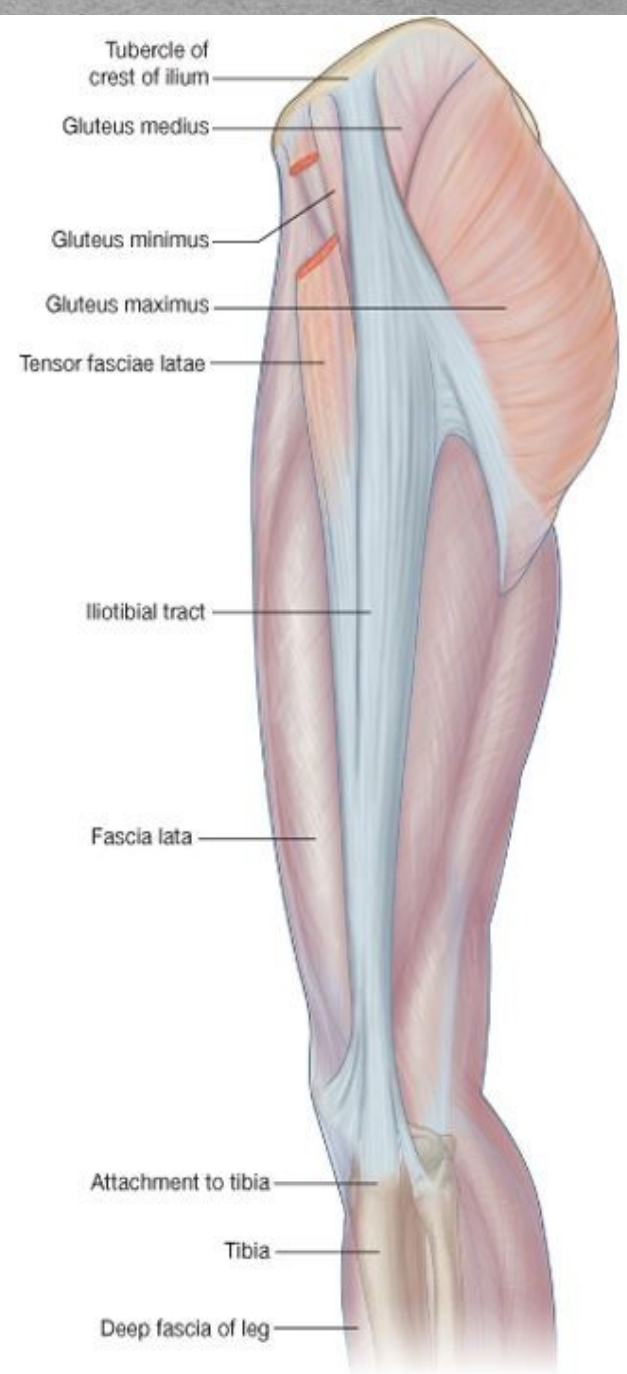
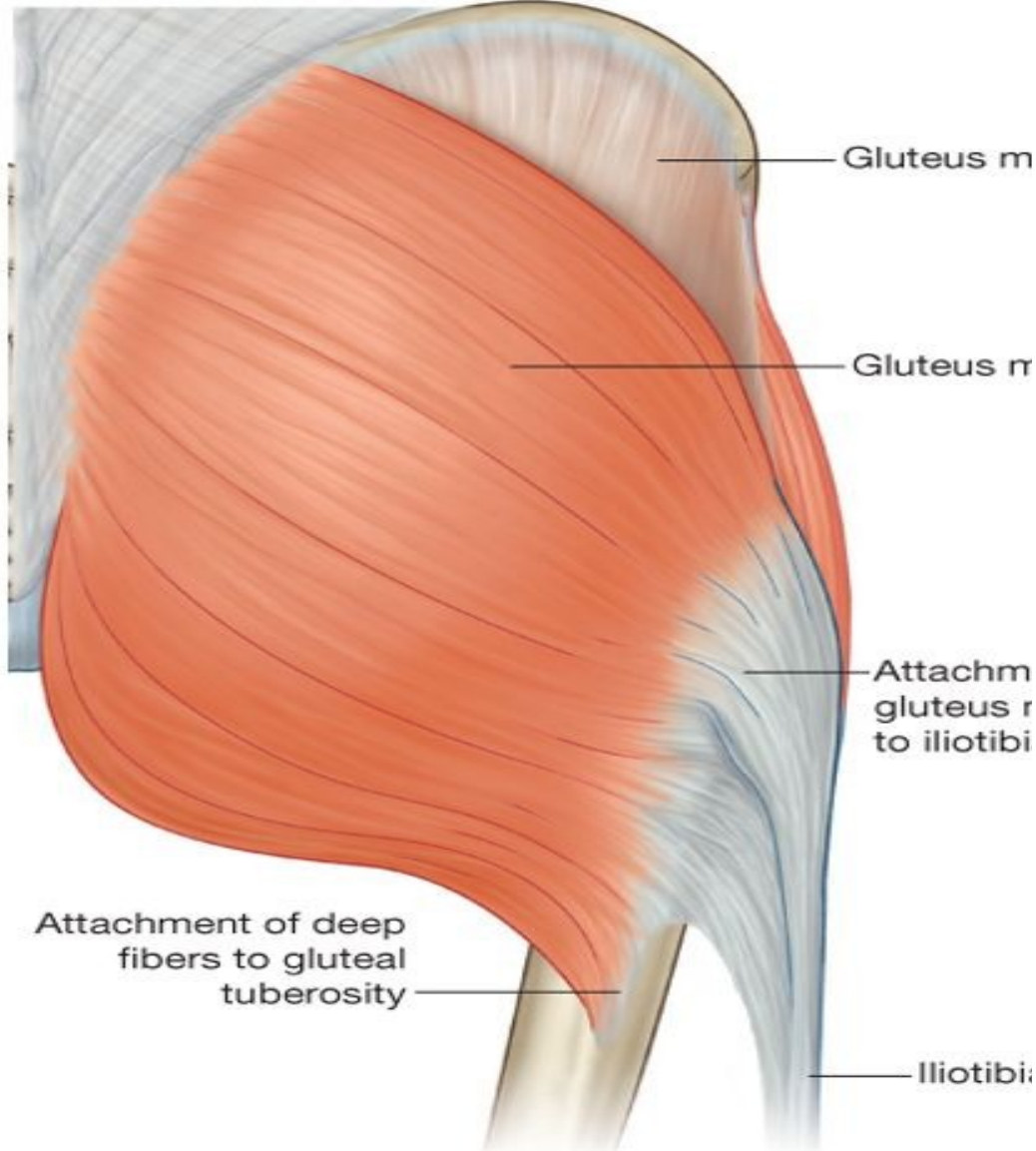
Gluteal region muscles

- Share a **common compartment**
- Organized into **two layers**, superficial and deep
- **The superficial layer**
- Consists of the three large overlapping glutei (**maximus, medius, and minimus**) and the **tensor fasciae latae**

- **The deep layer**
- Consists of smaller muscles (**piriformis, obturator internus, superior and inferior gemelli, and quadratus femoris**)
- **Covered** by the inferior half of the **gluteus maximus**
- They all have **distal attachments** on or adjacent to the **intertrochanteric crest** of the femur.
- **Lateral rotators** of the **thigh**, also **stabilize the hip joint**

TABLE 5.6. MUSCLES OF GLUTEAL REGION: ABDUCTORS AND ROTATORS OF THIGH

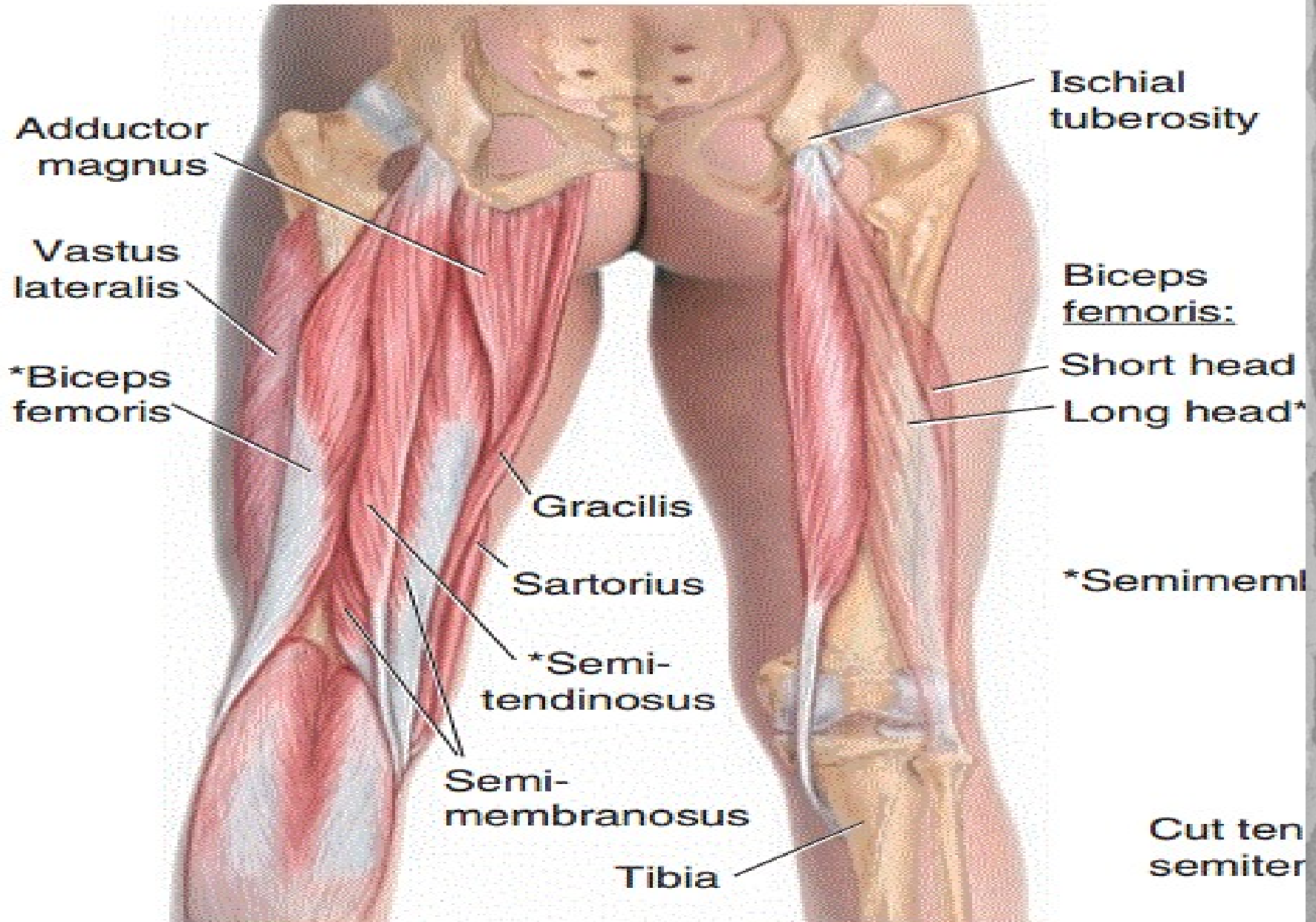
Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Main Action
Gluteus maximus (Fig. 5.34A & C)	Ilium posterior to posterior gluteal line; dorsal surface of sacrum and coccyx; sacrotuberous ligament	Most fibers end in iliotibial tract, which inserts into lateral condyle of tibia; some fibers insert on gluteal tuberosity	Inferior gluteal nerve (L5, S1, S2)	Extends thigh (especially from flexed position) and assists in its lateral rotation; steadies thigh and assists in rising from sitting position
Gluteus medius (Fig. 5.34A, C, & E)	External surface of ilium between anterior and posterior gluteal lines	Lateral surface of greater trochanter of femur	Superior gluteal nerve (L5, S1)	Abduct and medially rotate thigh; keep pelvis level when ipsilateral limb is weight-bearing and advance opposite (un-supported) side during its swing phase
Gluteus minimus (Fig. 5.34A–D)	External surface of ilium between anterior and inferior gluteal lines	Anterior surface of greater trochanter of femur		
Tensor of fascia lata (Fig. 5.34J)	Anterior superior iliac spine; anterior part of iliac crest	Iliotibial tract, which attaches to lateral condyle of tibia		



Posterior thigh muscles

- Three of the four muscles in the posterior aspect of the thigh are **hamstrings**.
- The hamstring muscles, **semitendinosus**, **semimembranosus**, and **biceps femoris (long head)**.
- The **hamstring** muscles **share** common features
 1. **Proximal** attachment to the **ischial tuberosity**
 2. **Distal** attachment to the **bones** of the **leg**
 3. **extension** at the **hip joint** and **flexion** at the **knee joint**.
 4. **Innervation** by the **tibial division** of the **sciatic nerve**.

(B) Posterior view



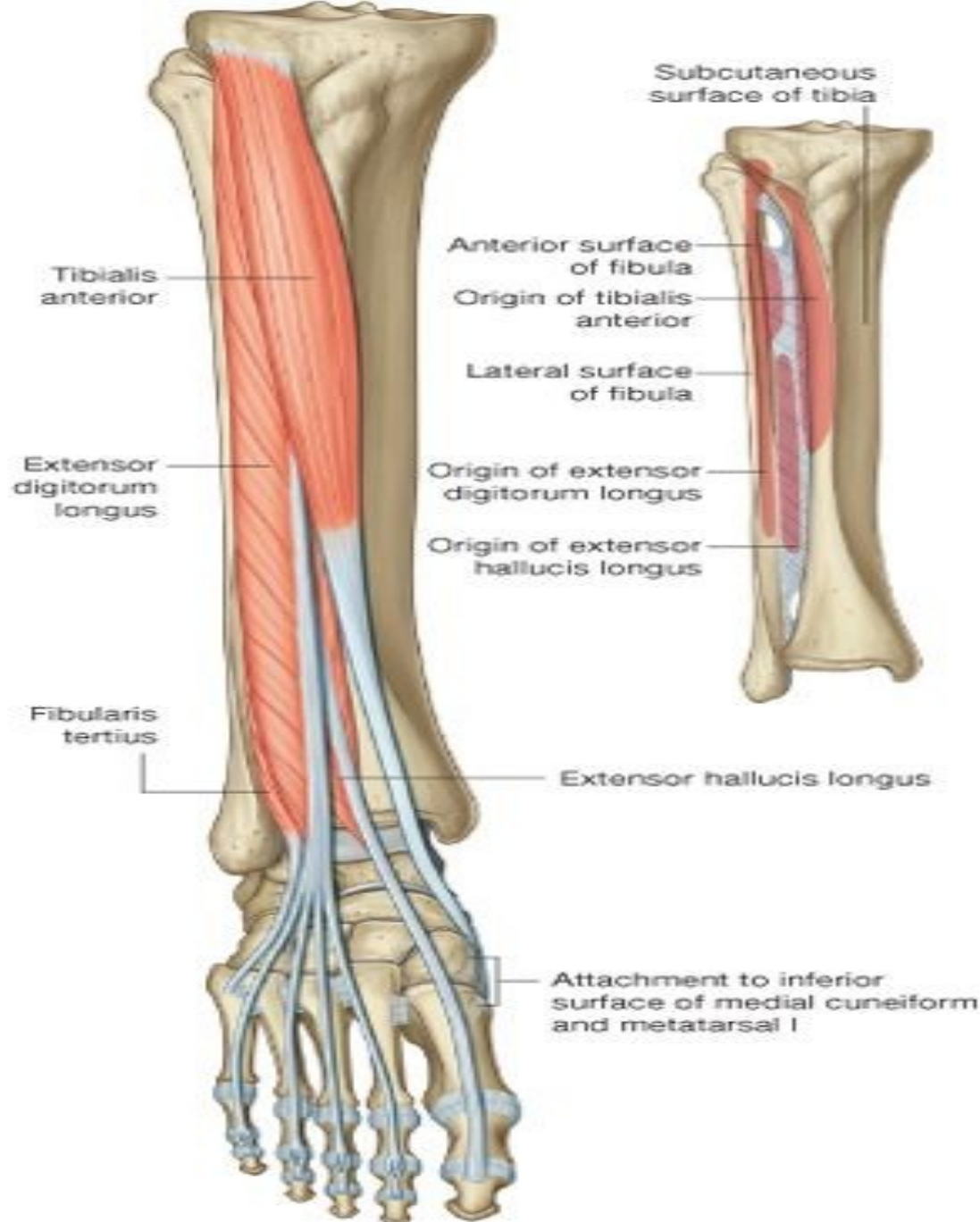
8. Leg Muscles

Anterior compartment of the

- The **four** muscles in the anterior compartment of the leg are the **tibialis anterior, extensor digitorum longus, extensor hallucis longus, and fibularis tertius**
- **Pass and insert** anterior to the **transversely oriented axis of the ankle joint**
- **Dorsiflexors** of the ankle joint
- The long extensors **attach** to the dorsal aspect of the **digits** and thus **extensors** (elevators) of the **toes**

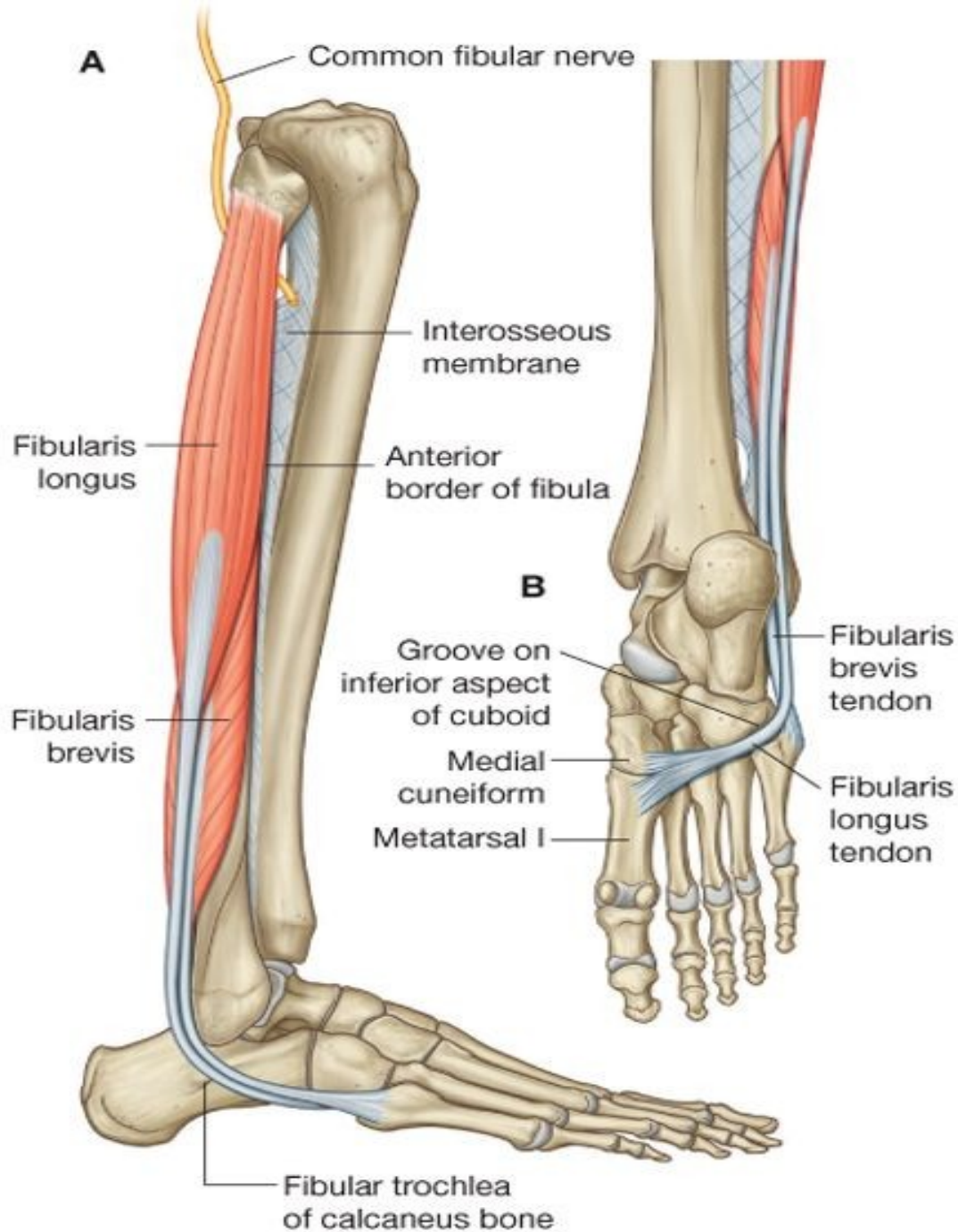
TABLE 5.10. MUSCLES OF ANTERIOR AND LATERAL COMPARTMENTS OF LEG

Muscle ^a	Proximal Attachment	Distal Attachment	Innervation ^b	Main Action
Anterior compartment				
Tibialis anterior (1)	Lateral condyle and superior half of lateral surface of tibia and interosseous membrane	Medial and inferior surfaces of medial cuneiform and base of 1st metatarsal	Deep fibular nerve (L4, L5)	Dorsiflexes ankle and inverts foot
Extensor digitorum longus (2)	Lateral condyle of tibia and superior three quarters of medial surface of fibula and interosseous membrane	Middle and distal phalanges of lateral four digits		Extends lateral four digits and dorsiflexes ankle
Extensor hallucis longus (3)	Middle part of anterior surface of fibula and interosseous membrane	Dorsal aspect of base of distal phalanx of great toe (hallux)		Extends great toe and dorsiflexes ankle
Fibularis tertius (4)	Inferior third of anterior surface of fibula and interosseous membrane	Dorsum of base of 5th metatarsal		Dorsiflexes ankle and aids in eversion of foot
Lateral compartment				
Fibularis longus (5)	Head and superior two thirds of lateral surface of fibula	Base of 1st metatarsal and medial cuneiform	Superficial fibular nerve (L5, S1, S2)	Everts foot and weakly plantarflexes ankle
Fibularis brevis (6)	Inferior two thirds of lateral surface of fibula	Dorsal surface of tuberosity on lateral side of base of 5th metatarsal		



Lateral compartment

- Contains the **fibularis longus and brevis muscles**.
- Have their fleshy bellies in the lateral compartment
- **Evertors** of the foot, **elevating** the **lateral margin** of the foot.



fibularis brevis

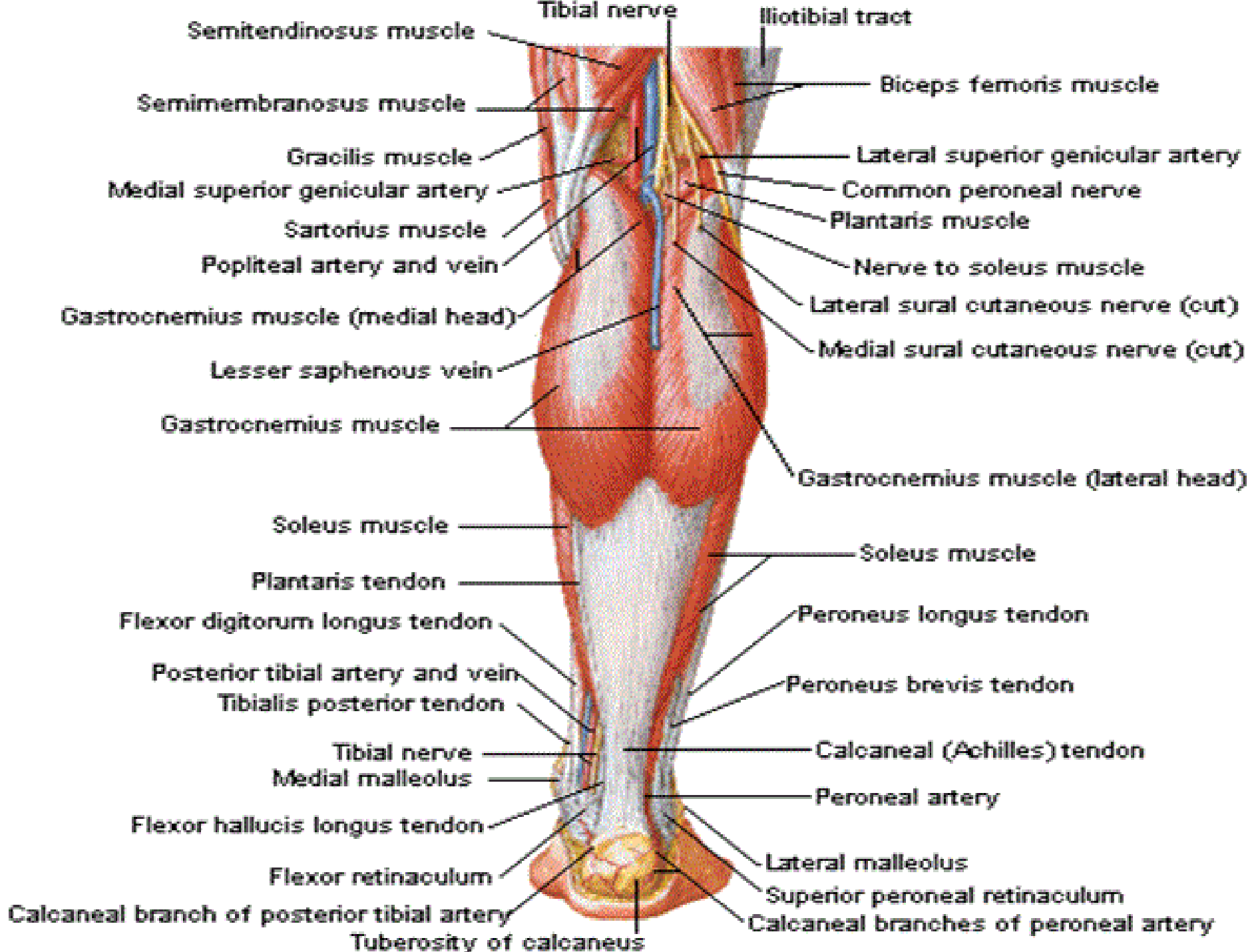


Posterior compartment

- **Superficial group**
- **Calf muscles** (prominence of “calf ” of posterior leg)
- Includes the **gastrocnemius, soleus, and plantaris**
- The **gastrocnemius** and **soleus** share a common tendon, **calcaneal tendon**, attaches to calcaneus.
- Collectively these two muscles make up the three-headed **triceps surae**

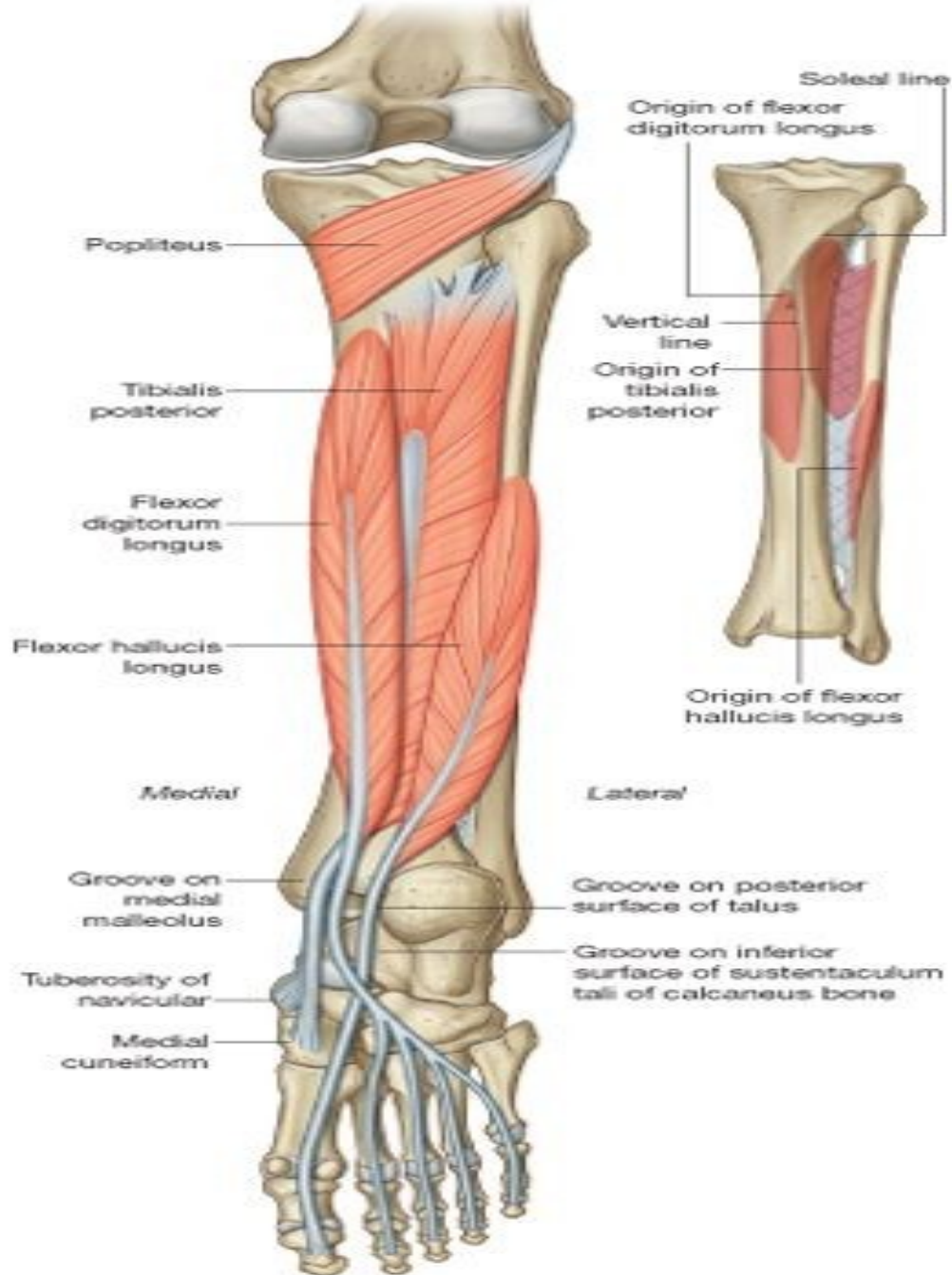
TABLE 5.13.I. SUPERFICIAL MUSCLES OF POSTERIOR COMPARTMENT OF LEG

Muscle ^a	Proximal Attachment	Distal Attachment	Innervation ^b	Main Action
Gastrocnemius (1)	Lateral head: lateral aspect of lateral condyle of femur	Posterior surface of calcaneus via calcaneal tendon	Tibial nerve (S1, S2)	Plantarflexes ankle when knee is extended; raises heel during walking; flexes leg at knee joint
	Medial head: popliteal surface of femur; superior to medial condyle			
Soleus (2)	Posterior aspect of head and superior quarter of posterior surface of fibula; soleal line and middle third of medial border of tibia; and tendinous arch extending between the bony attachments			Plantarflexes ankle independent of position of knee; steadies leg on foot
Plantaris (3)	Inferior end of lateral supracondylar line of femur; oblique popliteal ligament			Weakly assists gastrocnemius in plantarflexing ankle



Deep group

- Four muscles, **popliteus**, **flexor digitorum longus**, **flexor hallucis longus**, and **tibialis posterior**.
- **Popliteus** acts on the **knee** joint, **others** **plantarflex** the **ankle** with two **continuing** on to **flex** the **toes**.
- Produce only about **7%** of the total force of **plantarflexion**.



9. Foot Muscles

- **20** muscles
- 14 on **plantar aspect**, 2 on **dorsal** aspect, and 4 **intermediate** in position.
- **Plantar aspect, sole** muscles are arranged in **four layers** within four **compartments**.
- Plantar function primarily as a **group** during the **support** phase of **stance**, maintaining the **arches** of the foot

TABLE 5.14.I. MUSCLES OF FOOT: 1ST AND 2ND LAYERS OF SOLE

Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Main Action ^b
1st layer				
Abductor hallucis	Medial tubercle of tuberosity of calcaneus; flexor retinaculum; plantar aponeurosis	Medial side of base of proximal phalanx of 1st digit	Medial plantar nerve (S2, S3)	Abducts and flexes 1st digit (great toe, hallux)
Flexor digitorum brevis	Medial tubercle of tuberosity of calcaneus; plantar aponeurosis; intermuscular septa	Both sides of middle phalanges of lateral four digits	Medial plantar nerve (S2, S3)	Flexes lateral four digits
Abductor digiti minimi	Medial and lateral tubercles of tuberosity of calcaneus; plantar aponeurosis; intermuscular septa	Lateral side of base of proximal phalanx of 5th digit	Lateral plantar nerve (S2, S3)	Abducts and flexes little toe (5th digit)
2nd layer				
Quadratus plantae	Medial surface and lateral margin of plantar surface of calcaneus	Posterolateral margin of tendon of flexor digitorum longus	Lateral plantar nerve (S2, S3)	Assists flexor digitorum longus in flexing lateral four digits
Lumbricals	Tendons of flexor digitorum longus	Medial aspect of expansion over lateral four digits	Medial one: medial plantar nerve (S2, S3)	Flex proximal phalanges, extend middle and distal phalanges of lateral four digits
			Lateral three: lateral plantar nerve (S2, S3)	

TABLE 5.14.II. MUSCLES OF FOOT: 3RD AND 4TH LAYERS OF SOLE

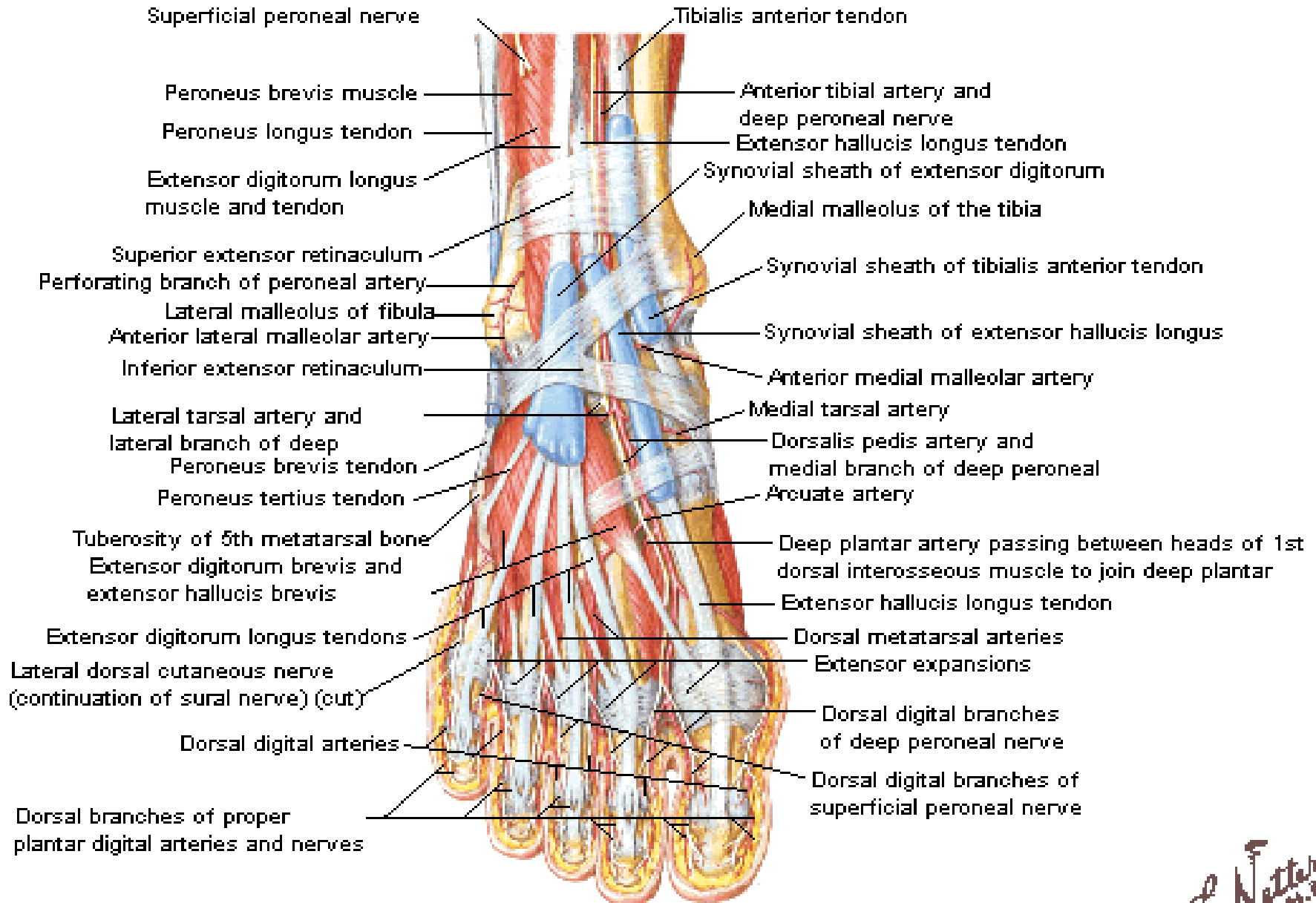
Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Main Action ^b
3rd layer				
Flexor hallucis brevis	Plantar surfaces of cuboid and lateral cuneiforms	Both sides of base of proximal phalanx of 1st digit	Medial plantar nerve (S2, S3)	Flexes proximal phalanx of 1st digit
Adductor hallucis	Oblique head: bases of metatarsals 2–4	Tendons of both heads attach to lateral side of base of proximal phalanx of 1st digit	Deep branch of lateral plantar nerve (S2, S3)	Traditionally said to adduct 1st digit; assists in transverse arch of foot by metatarsals medially
	Transverse head: plantar ligaments of metatarsophalangeal (MTP) joints			
Flexor digit minimi brevis	Base of 5th metatarsal	Base of proximal phalanx of 5th digit	Superficial branch of lateral plantar nerve (S2, S3)	Flexes proximal phalanx of 5th digit, thereby assisting with its flexion
4th layer				
Plantar interossei (three muscles)	Bases and medial sides of metatarsals 3–5	Medial sides of bases of phalanges of 3rd–5th digits	Lateral plantar nerve (S2, S3)	Adduct digits (2–4) and flex metatarsophalangeal joints
Dorsal interossei (four muscles)	Adjacent sides of metatarsals 1–5	1st: medial side of proximal phalanx of 2nd digit;	Lateral plantar nerve (S2, S3)	Abduct digits (2–4) and flex metatarsophalangeal joints
		2nd–4th: lateral sides of 2nd–4th digits		

TABLE 5.14.III. MUSCLES OF FOOT: DORSUM OF FOOT

Muscle	Proximal Attachment	Distal Attachment	Innervation ^a	Main Action
Extensor digitorum brevis	Calcaneus (floor of tarsal sinus); interosseous talocalcaneal ligament; stem of inferior extensor retinaculum	Long extensor tendons of four medial digits (toes 2–4)	Deep fibular nerve (L5 or S1, or both)	Aids the extensor digitorum longus in extending the four medial toes at the metatarsophalangeal and interphalangeal joints
Extensor hallucis brevis	In common with extensor digitorum brevis (above)	Dorsal aspect of base of proximal phalanx of great toe (digit 1)		Aids the extensor hallucis longus in extending the great toe at the metatarsophalangeal joint

Muscles of Dorsum of Foot

Superficial Dissection



10. Head and Neck Muscles

The facial muscles

- muscles of **facial expresion**
- In the **subcutaneous tissue** of the anterior & posterior **scalp, face, & neck**.
- Most **attach** to **bone** or **fascia**
- Change facial expressions by **pulling** the **skin**

Epicranial aponeurosis**

Frontal belly of
occipitofrontalis**

Procerus

Orbicularis
oculi

Orbital
part

Palpebral
part

Nasalis

Temporal*

Corrugator supercilii

Orbicularis oculi

Levator labii superioris (cut)

Zygomaticus minor and major (cut)

Levator labii superioris

Zygomaticus minor

Zygomaticus major

Orbicularis oris

Risorius

Depressor anguli oris

Depressor labii
inferioris

Platysma

Buccinator

Masseter*

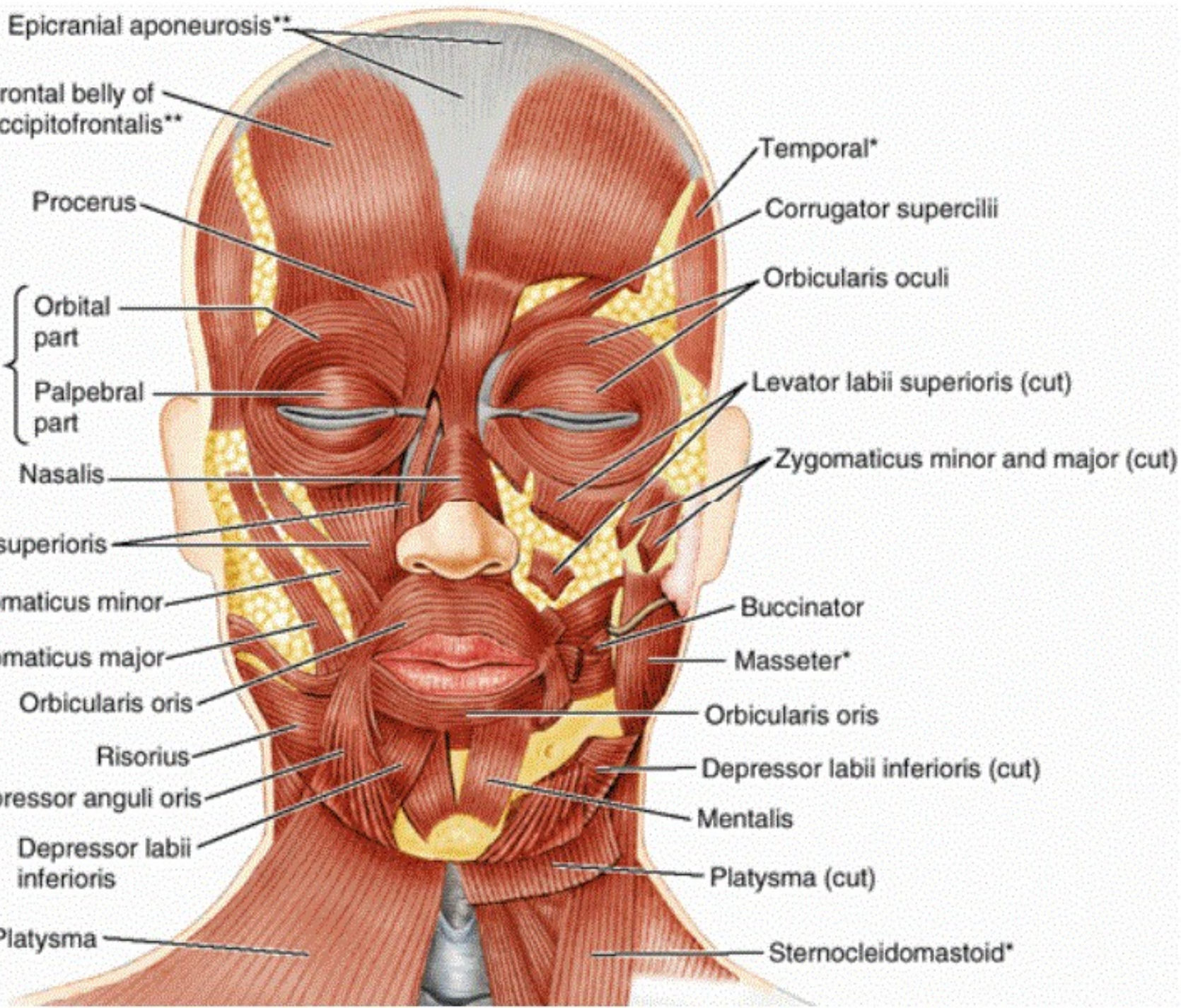
Orbicularis oris

Depressor labii inferioris (cut)

Mentalis

Platysma (cut)

Sternocleidomastoid*

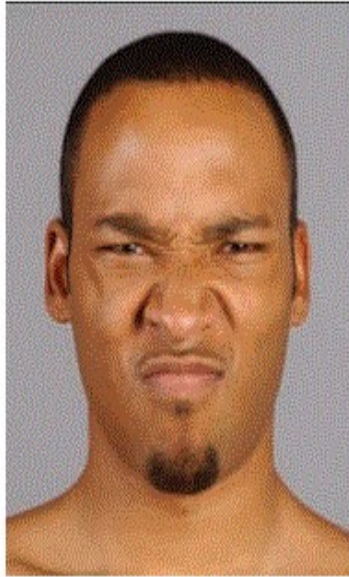




Occipitofrontalis



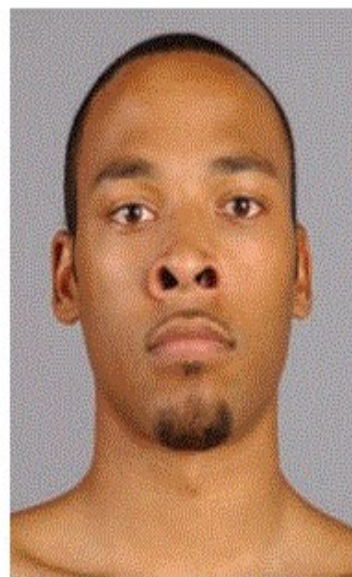
Corrugator supercilii



Procerus + transverse
part of nasalis



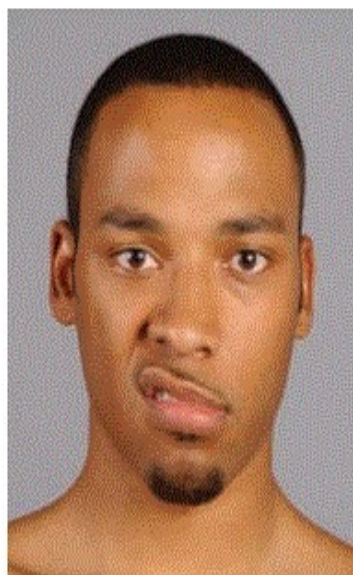
Orbicularis oculi



Lev. labii sup. alaeque nasi +
alar part of nasalis



Buccinator + orbicularis oris



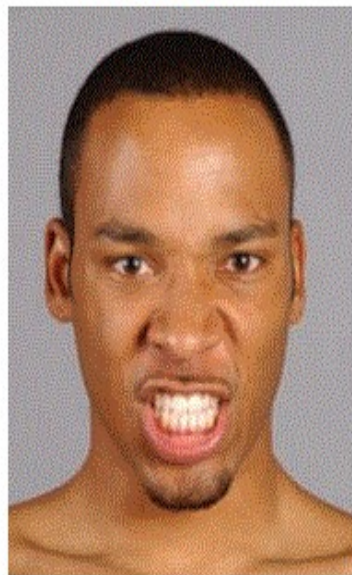
Zygomaticus major + minor



Risorius



Risorius + depressor
labii inferioris



Levator labii superioris +
depressor labii

11. Abdominal muscles

Anterolateral Abdominal Wall Muscles

- There are **five** (bilaterally **paired**) muscles
- Three **flat, external oblique, internal oblique, and transversus abdominis**
- Two **vertical, large rectus abdominis and the small pyramidalis**

Free posterior border of external oblique

Internal oblique

Anterior superior iliac spine (ASIS)

External oblique

Rectus sheath (anterior layer)

Inguinal ligament

(A) Layer 1

Attachment of external oblique to iliac crest

External oblique (cut)

Thoracolumbar fascia

Internal oblique

Inguinal ligament

(B) Layer 2

(C) Layer 3

Cut attachments of internal oblique

Transversus abdominis

12th rib

Quadratus lumborum (posterior abdominal wall)

Rectus abdominis

Costal cartilage

Tendinous intersection

Pubic crest

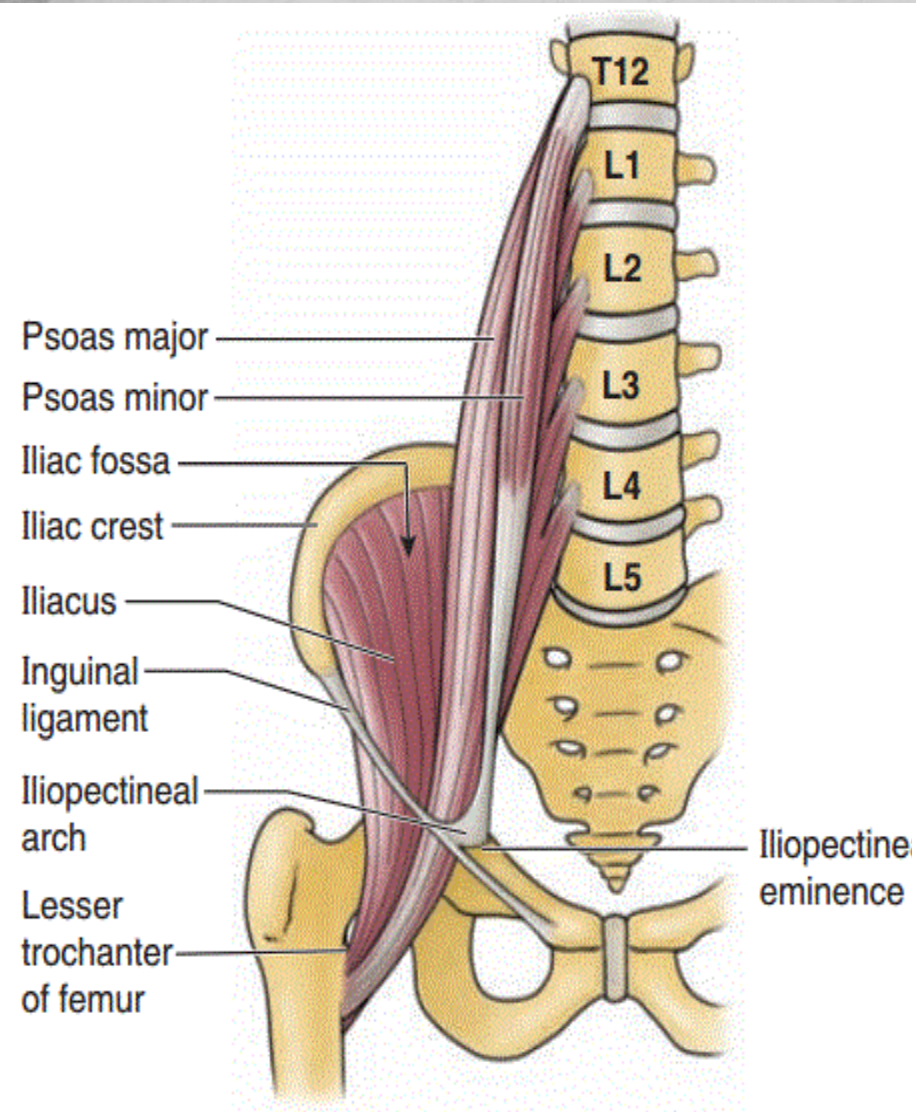
(D) Anterior & Posterior Wall Muscles

Lateral Views

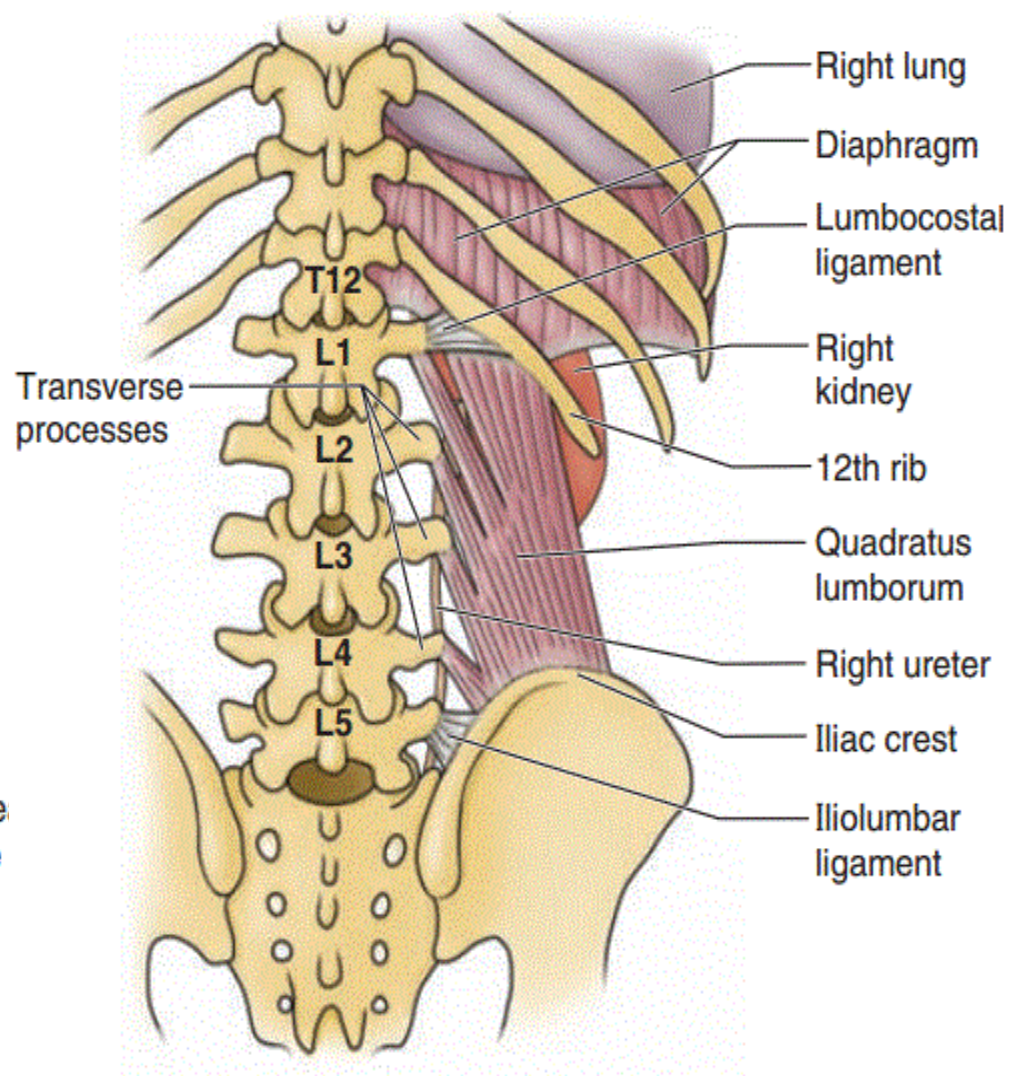
(A) - (C) = Three layers of muscles of anterolateral abdominal wall

Posterior Abdominal Wall Muscles

- The main **paired** muscles are
- **Psoas major, Iliacus, Quadratus lumborum**



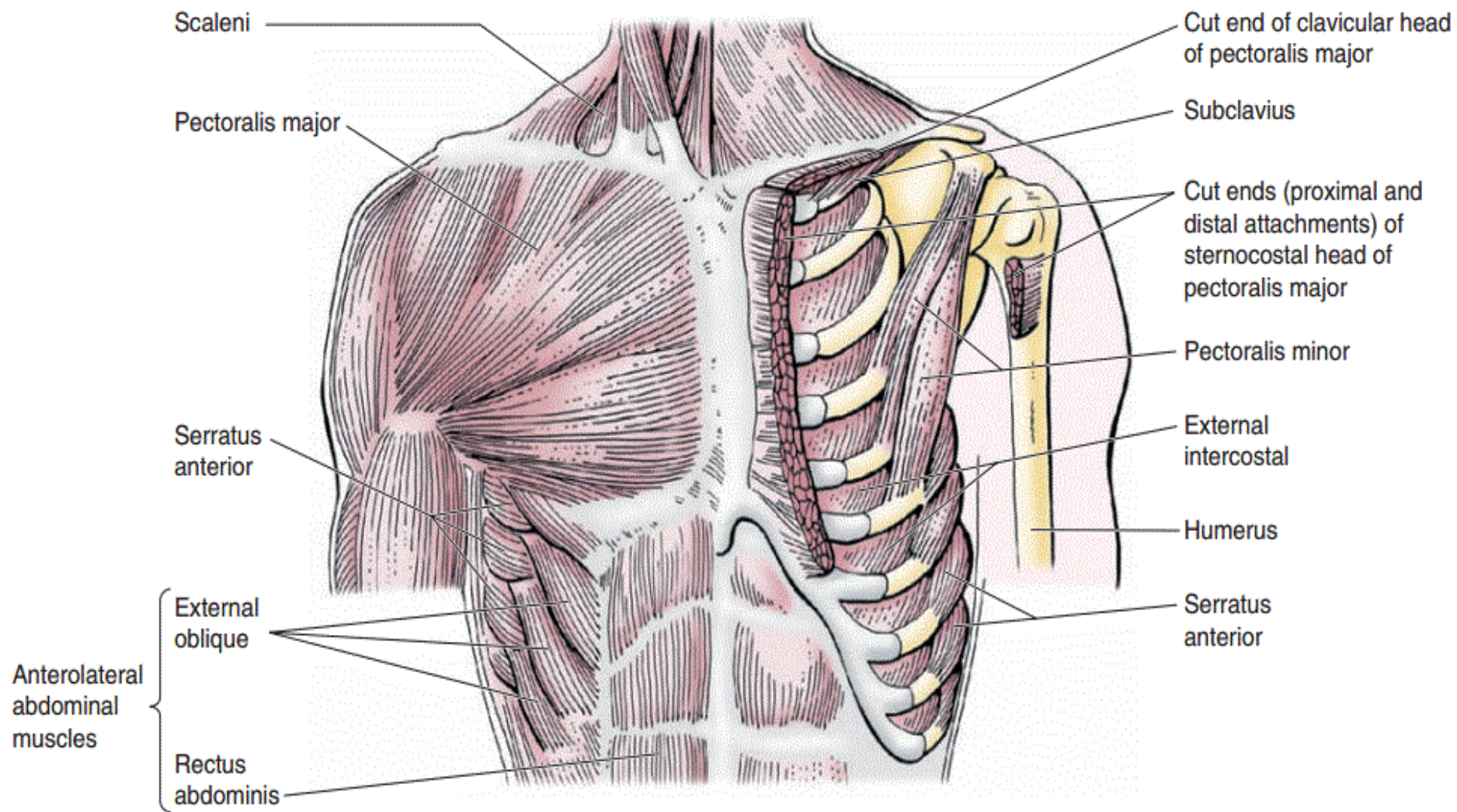
Anterior view



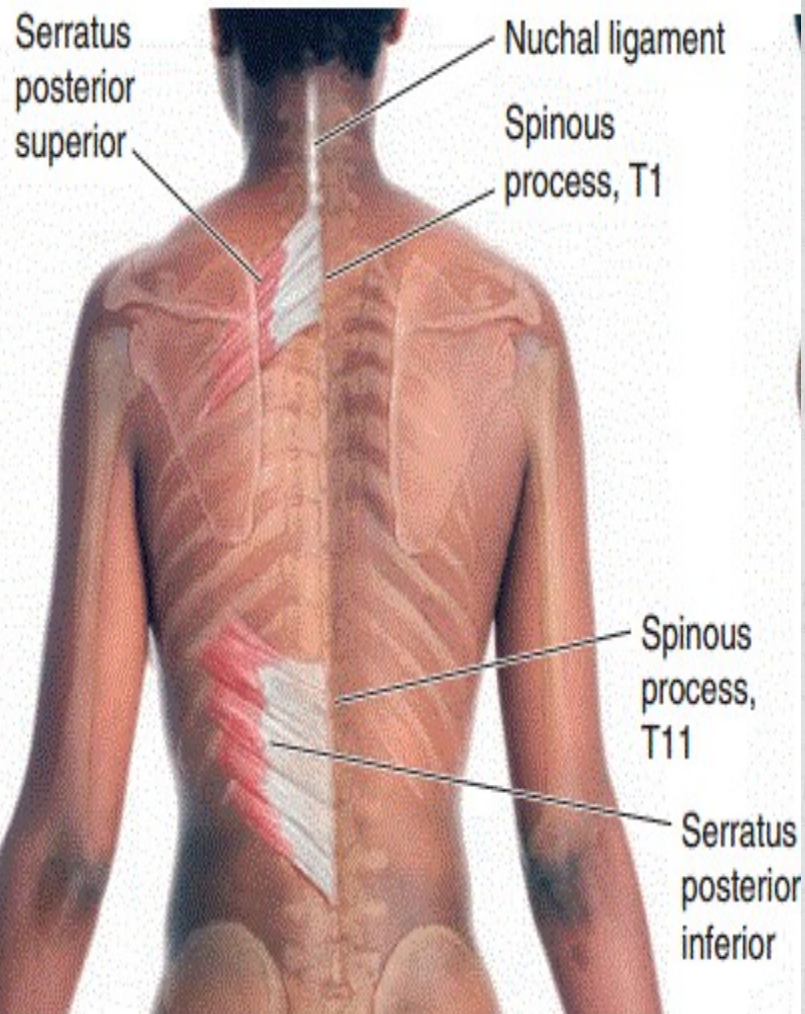
Posterior view

12. Respiratory muscles

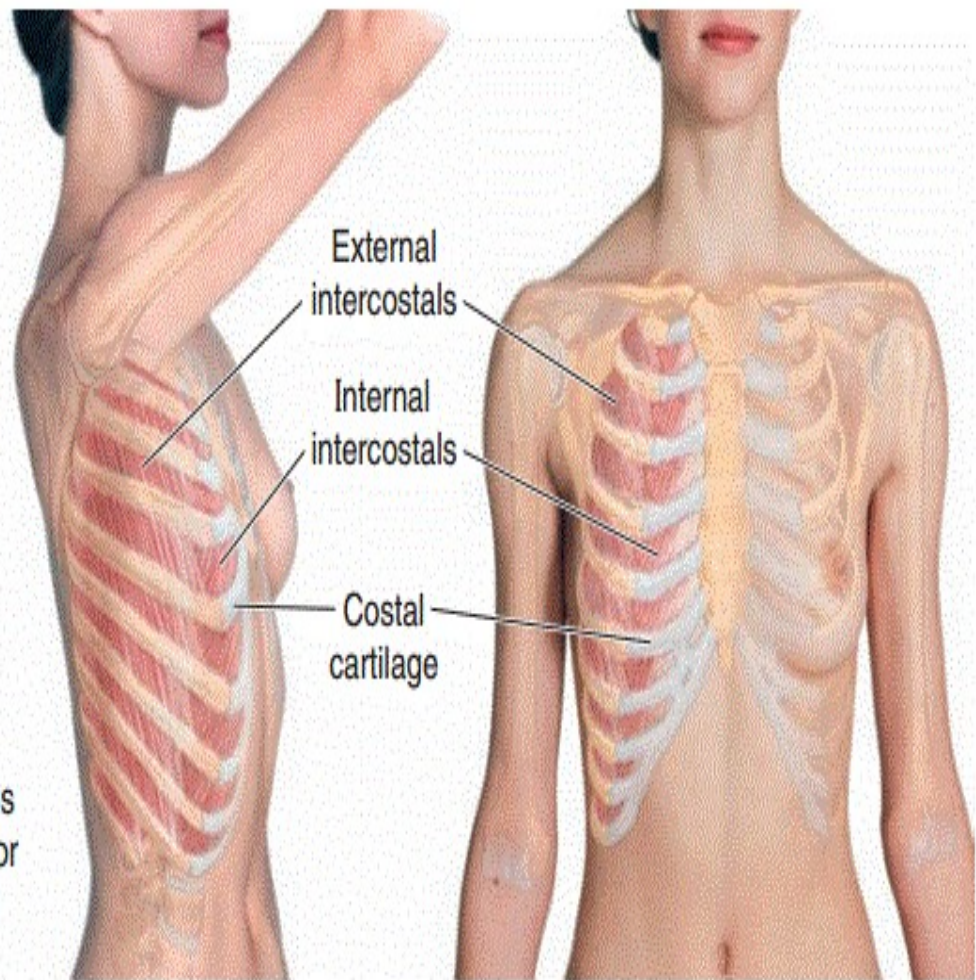
- Several (**axioappendicular**) muscles **extend** from the **thoracic** cage (axial skeleton) to bones of the **upper limb** (appendicular skeleton).
- Similarly, some muscles of the anterolateral **abdominal** wall, **back**, and **neck** muscles have attachments to the **thoracic cage**



Anterior view



(A) Posterior view



(B) Lateral view

(C) Anterior view

Thank You!