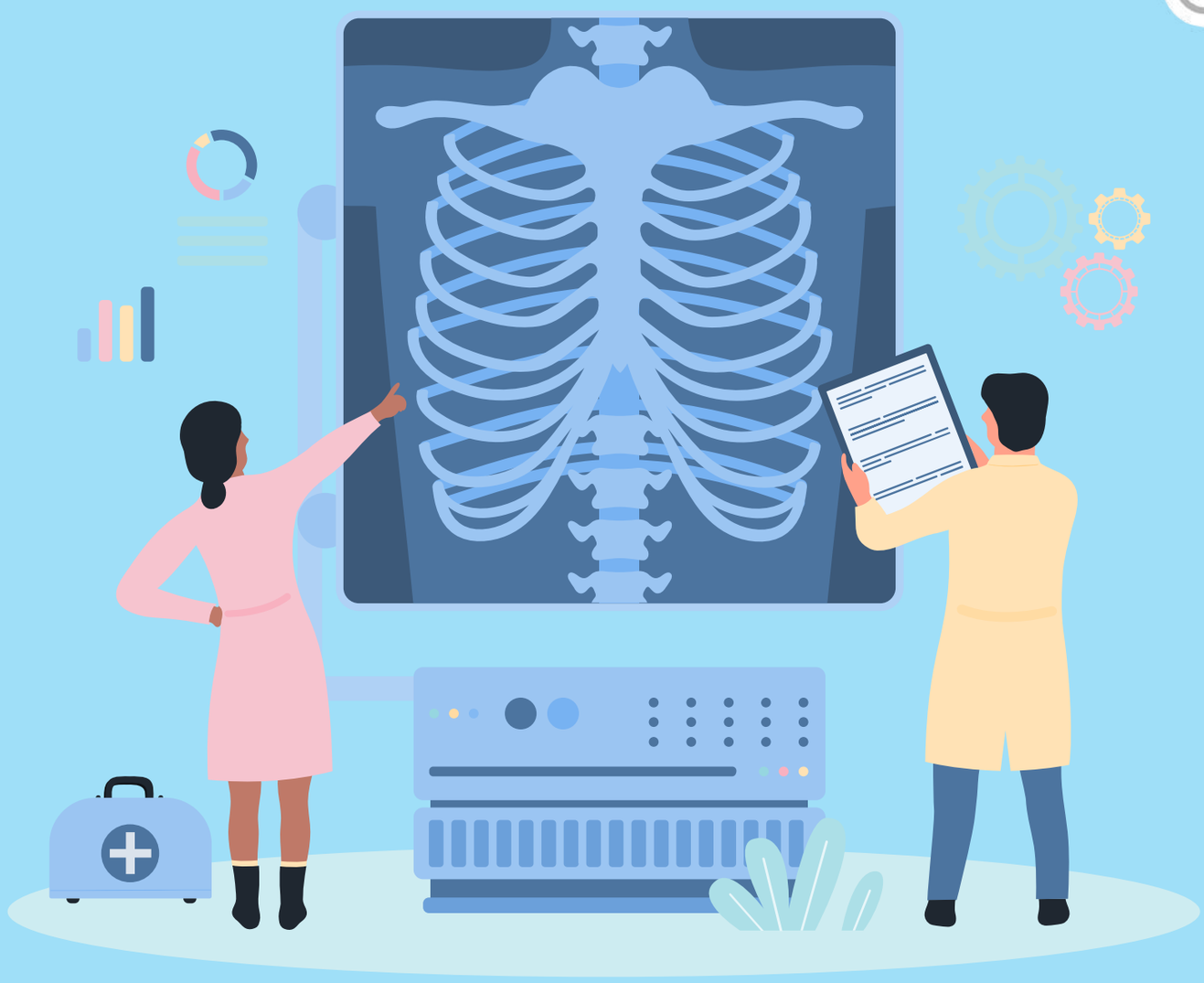


Anatomy Dossier

By :

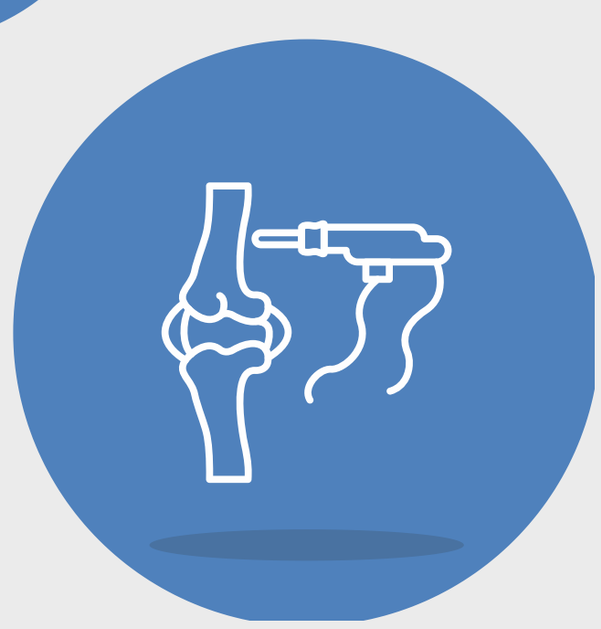
Rana Khattab

Aman Abusakout

Asia Almasri

Rita Alqisi

Razan Rawajbeh



CONTENT S

- Neck
- Brachial plexus
- Shoulder
- Upper limb
- Elbow
- Wrist & Hand
- Spine and spinal cord
- pelvis & Acetabulum
- Hip
- Lower limb
- Knee
- Ankle
- Foot
- Growth plate

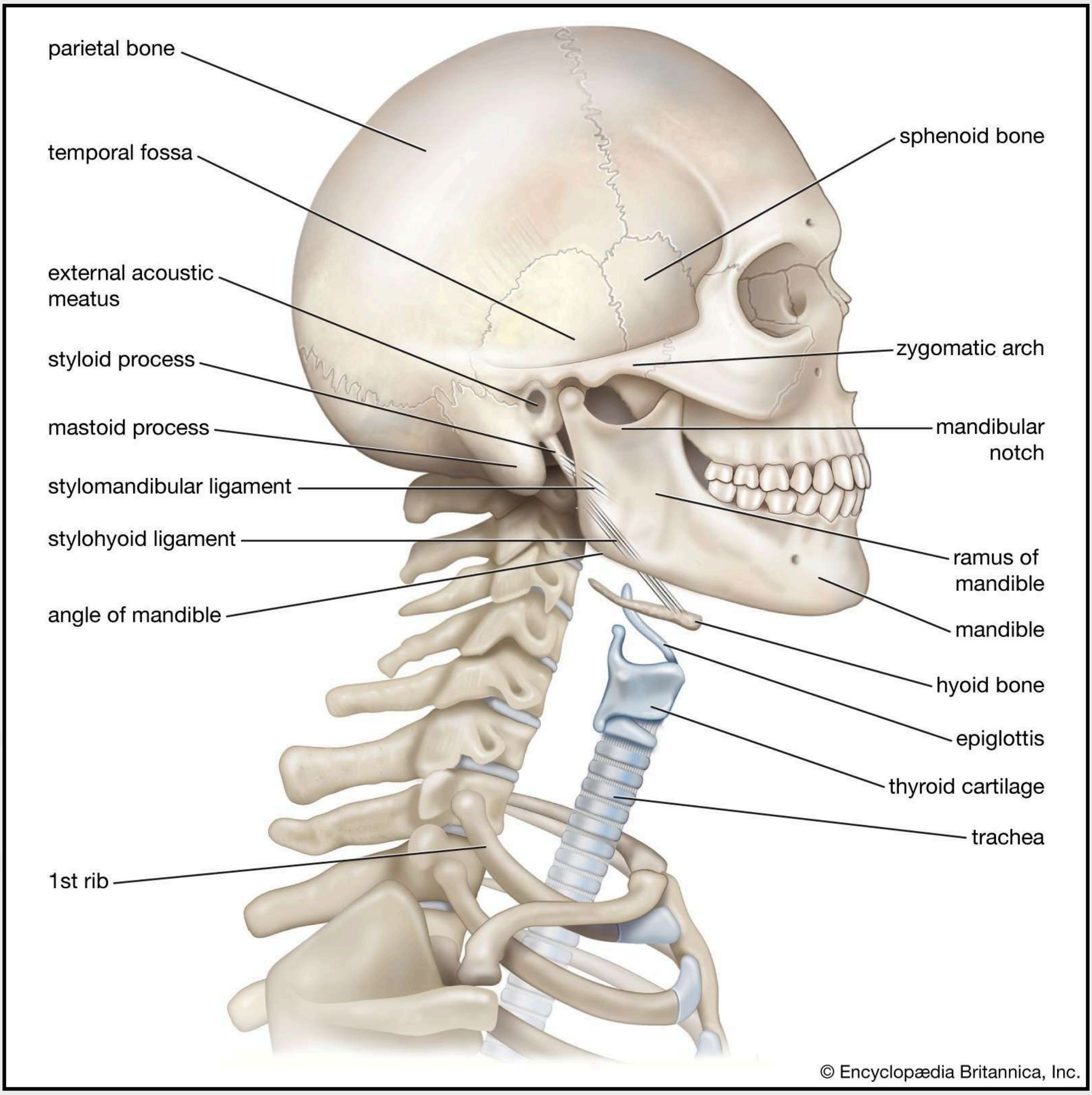
ملاحظة : 📝

الدوسية مصدر لتجميع المعلومات

المحاضرات اهم واولى ولكن الهدف التوضيح والتسهيل

وبالتوفيق للجميع ان شاءالله

Neck


parietal bone
temporal fossa
external acoustic meatus
styloid process
mastoid process
stylomandibular ligament
stylohyoid ligament
angle of mandible
1st rib
sphenoid bone
zygomatic arch
mandibular notch
ramus of mandible
mandible
hyoid bone
epiglottis
thyroid cartilage
trachea
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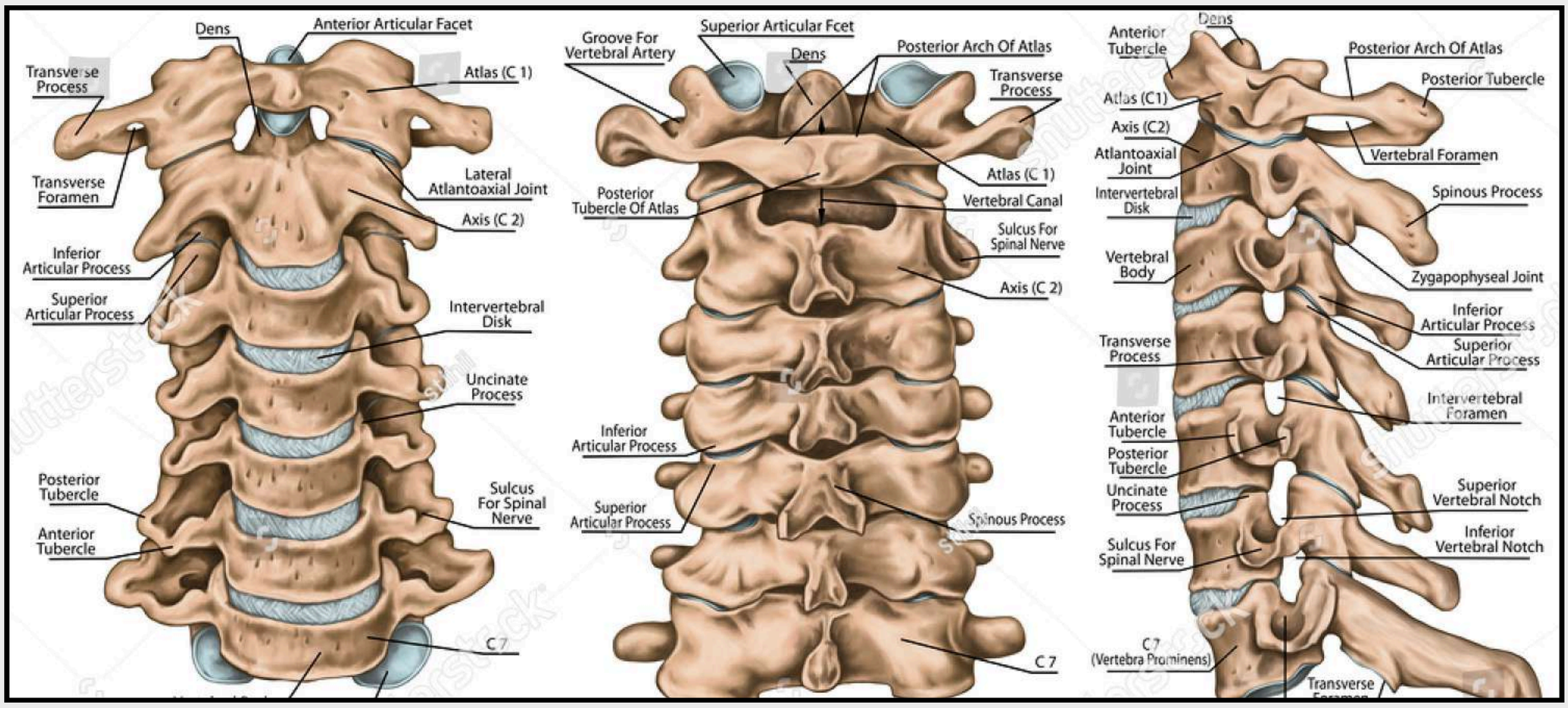
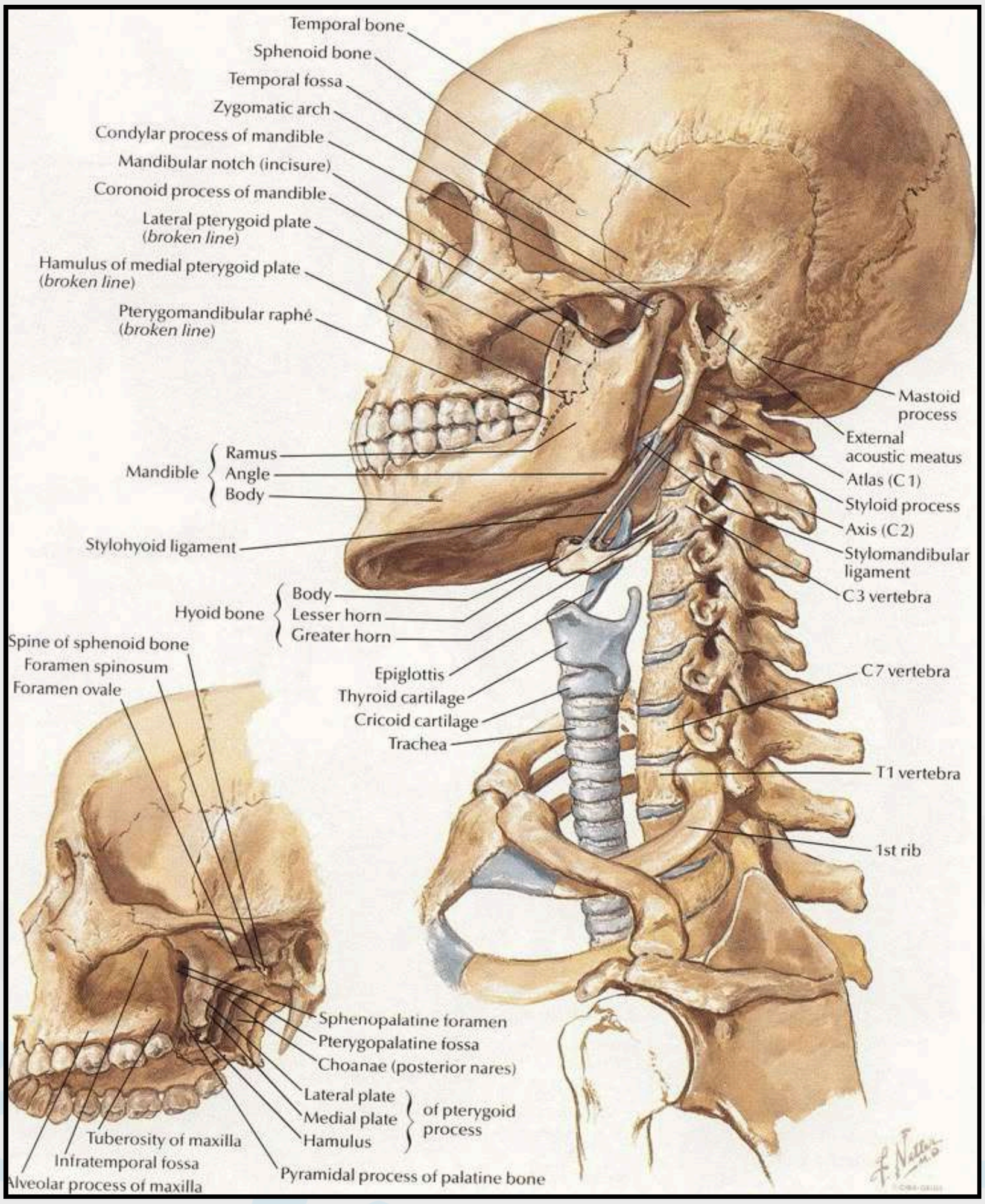
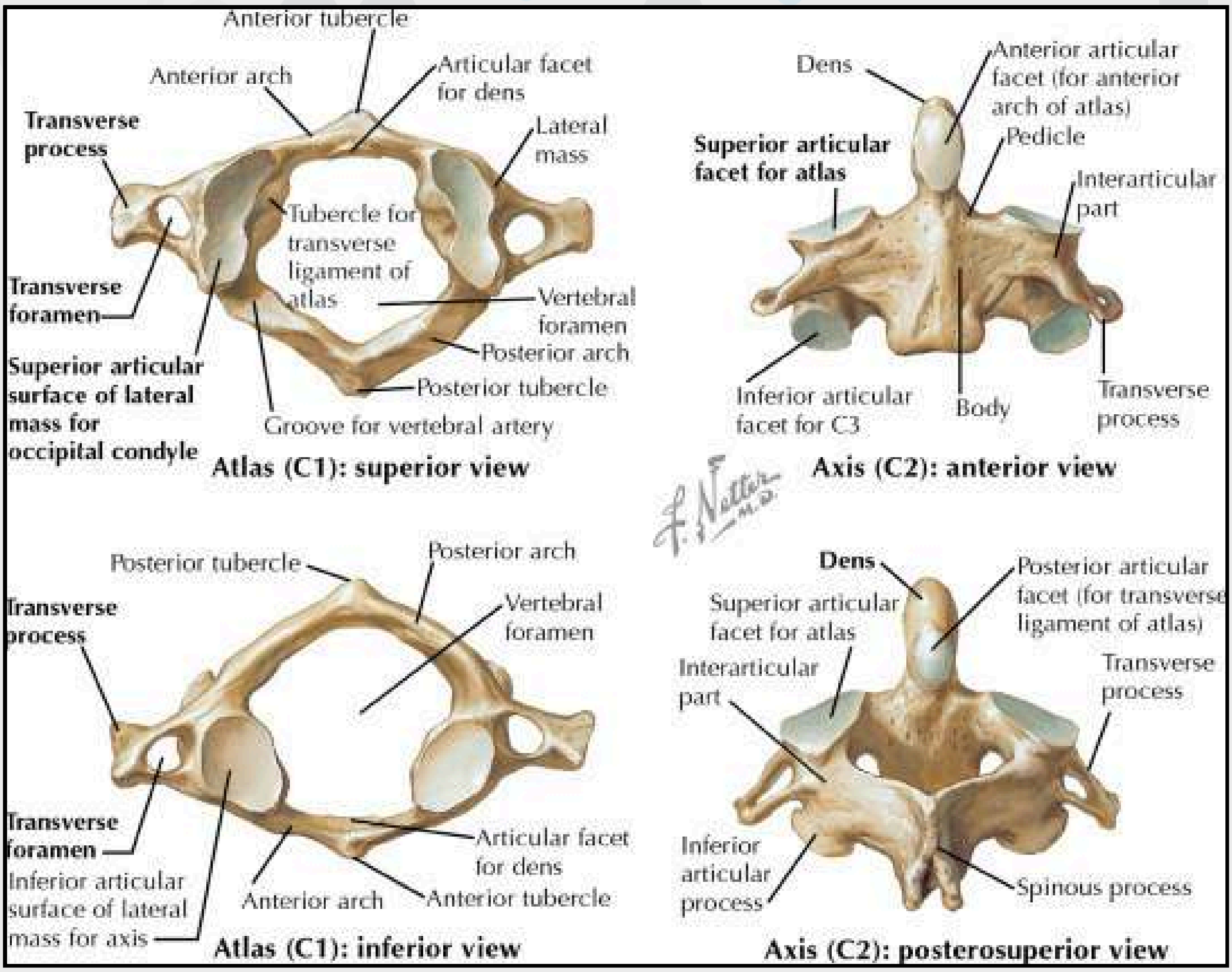
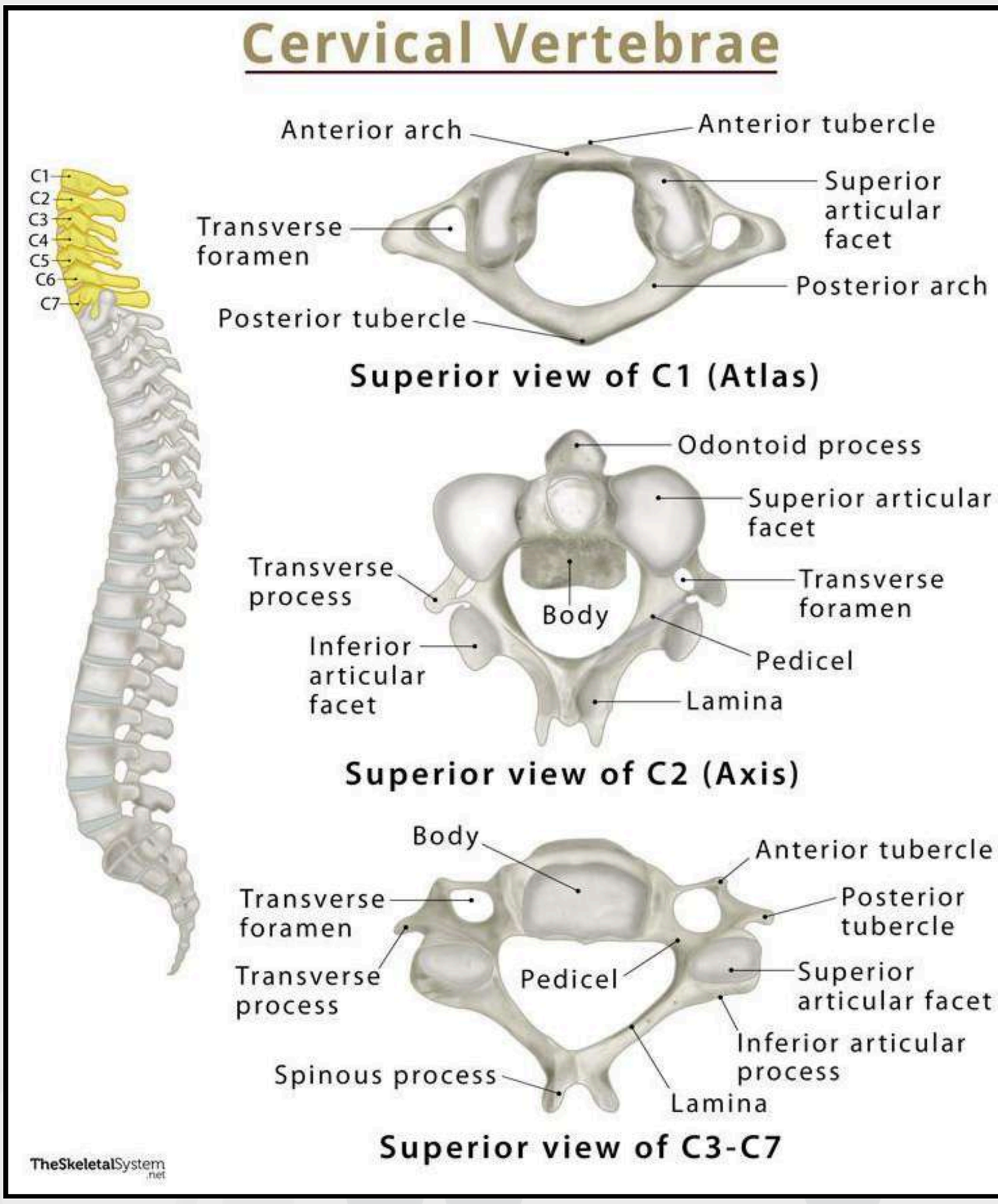
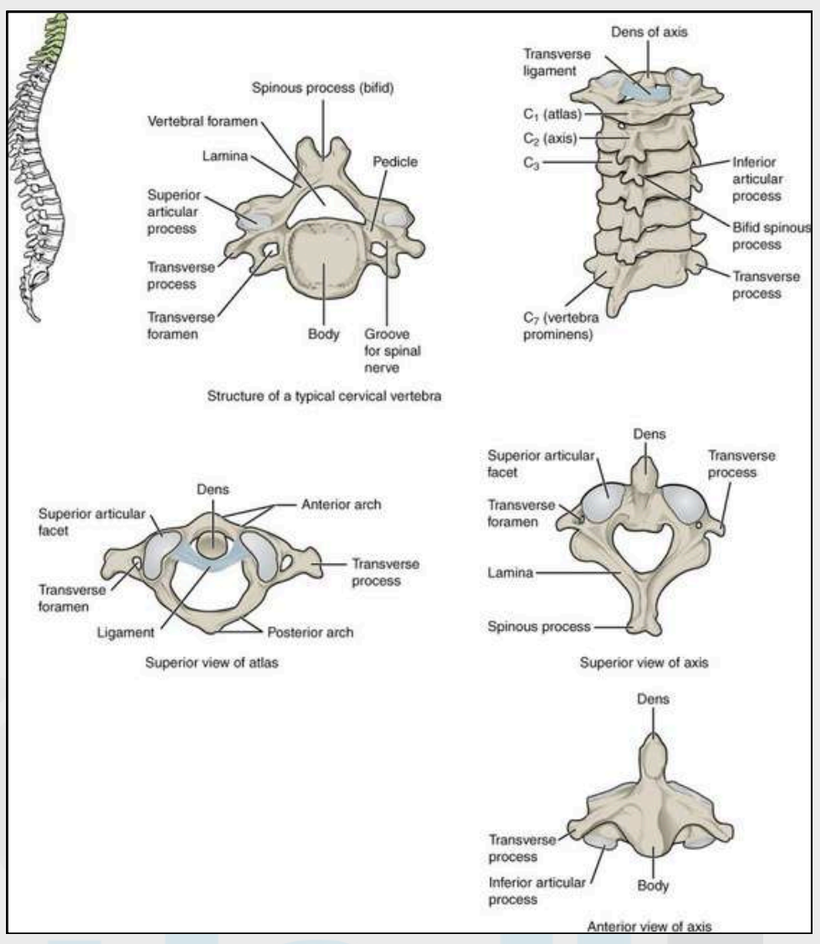

Dens
Anterior Articular Facet
Transverse Process
Atlas (C 1)
Transverse Foramen
Lateral Atlantoaxial Joint
Axis (C 2)
Inferior Articular Process
Superior Articular Process
Intervertebral Disk
Uncinate Process
Posterior Tubercle
Anterior Tubercle
Sulcus For Spinal Nerve
C7
Groove For Vertebral Artery
Superior Articular Fcet
Dens
Posterior Arch Of Atlas
Transverse Process
Atlas (C 1)
Posterior Tubercle Of Atlas
Vertebral Canal
Sulcus For Spinal Nerve
Axis (C 2)
Inferior Articular Process
Superior Articular Process
Spinous Process
C 7
Anterior Tubercle
Dens
Posterior Arch Of Atlas
Posterior Tubercle
Atlas (C1)
Axis (C2)
Atlantoaxial Joint
Vertebral Foramen
Intervertebral Disk
Spinous Process
Vertebral Body
Zygapophyseal Joint
Inferior Articular Process
Superior Articular Process
Transverse Process
Intervertebral Foramen
Anterior Tubercle
Posterior Tubercle
Uncinate Process
Superior Vertebral Notch
Inferior Vertebral Notch
Sulcus For Spinal Nerve
C7 (Vertebra Prominens)
Transverse


Temporal bone
Sphenoid bone
Temporal fossa
Zygomatic arch
Condylar process of mandible
Mandibular notch (incisure)
Coronoid process of mandible
Lateral pterygoid plate (broken line)
Hamulus of medial pterygoid plate (broken line)
Pterygomandibular raphé (broken line)
Mandible
Ramus
Angle
Body
Stylohyoid ligament
Hyoid bone
Body
Lesser horn
Greater horn
Epiglottis
Thyroid cartilage
Cricoid cartilage
Trachea
Mastoid process
External acoustic meatus
Atlas (C1)
Styloid process
Axis (C2)
Stylomandibular ligament
C3 vertebra
C7 vertebra
T1 vertebra
1st rib
Spine of sphenoid bone
Foramen spinosum
Foramen ovale
Sphenopalatine foramen
Pterygopalatine fossa
Choanae (posterior nares)
Lateral plate
Medial plate
Hamulus
of pterygoid process
Tuberosity of maxilla
Infratemporal fossa
Alveolar process of maxilla
Pyramidal process of palatine bone

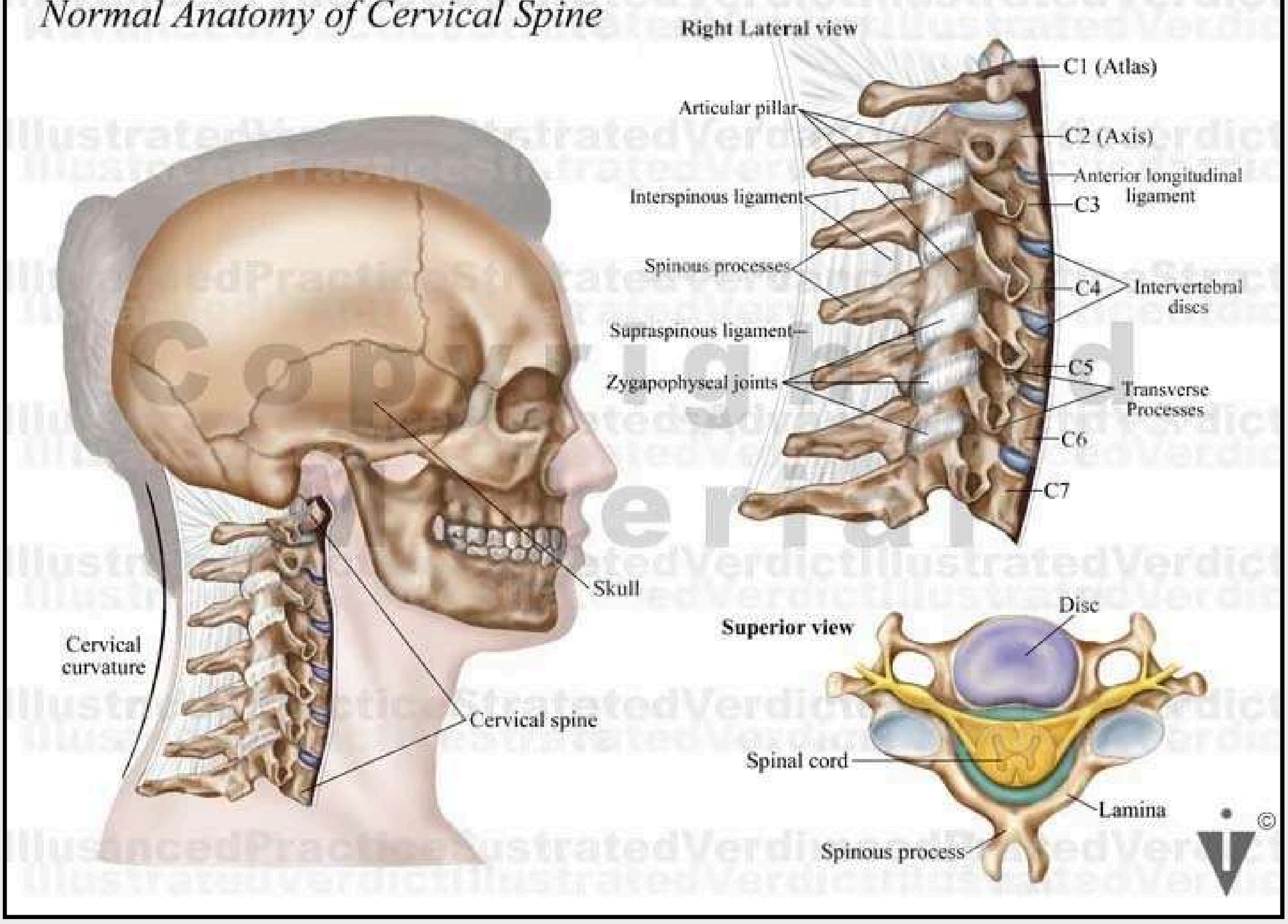

Anterior tubercle
Anterior arch
Articular facet for dens
Transverse process
Lateral mass
Tubercle for transverse ligament of atlas
Transverse foramen
Vertebral foramen
Posterior arch
Superior articular surface of lateral mass for occipital condyle
Posterior tubercle
Groove for vertebral artery
Atlas (C1): superior view
Dens
Anterior articular facet (for anterior arch of atlas)
Superior articular facet for atlas
Pedicle
Interarticular part
Inferior articular facet for C3
Body
Transverse process
Axis (C2): anterior view
Posterior tubercle
Posterior arch
Transverse process
Vertebral foramen
Transverse foramen
Articular facet for dens
Inferior articular surface of lateral mass for axis
Anterior arch
Anterior tubercle
Atlas (C1): inferior view
Dens
Posterior articular facet (for transverse ligament of atlas)
Superior articular facet for atlas
Interarticular part
Transverse process
Inferior articular process
Spinous process
Axis (C2): posterosuperior view

Cervical Vertebrae

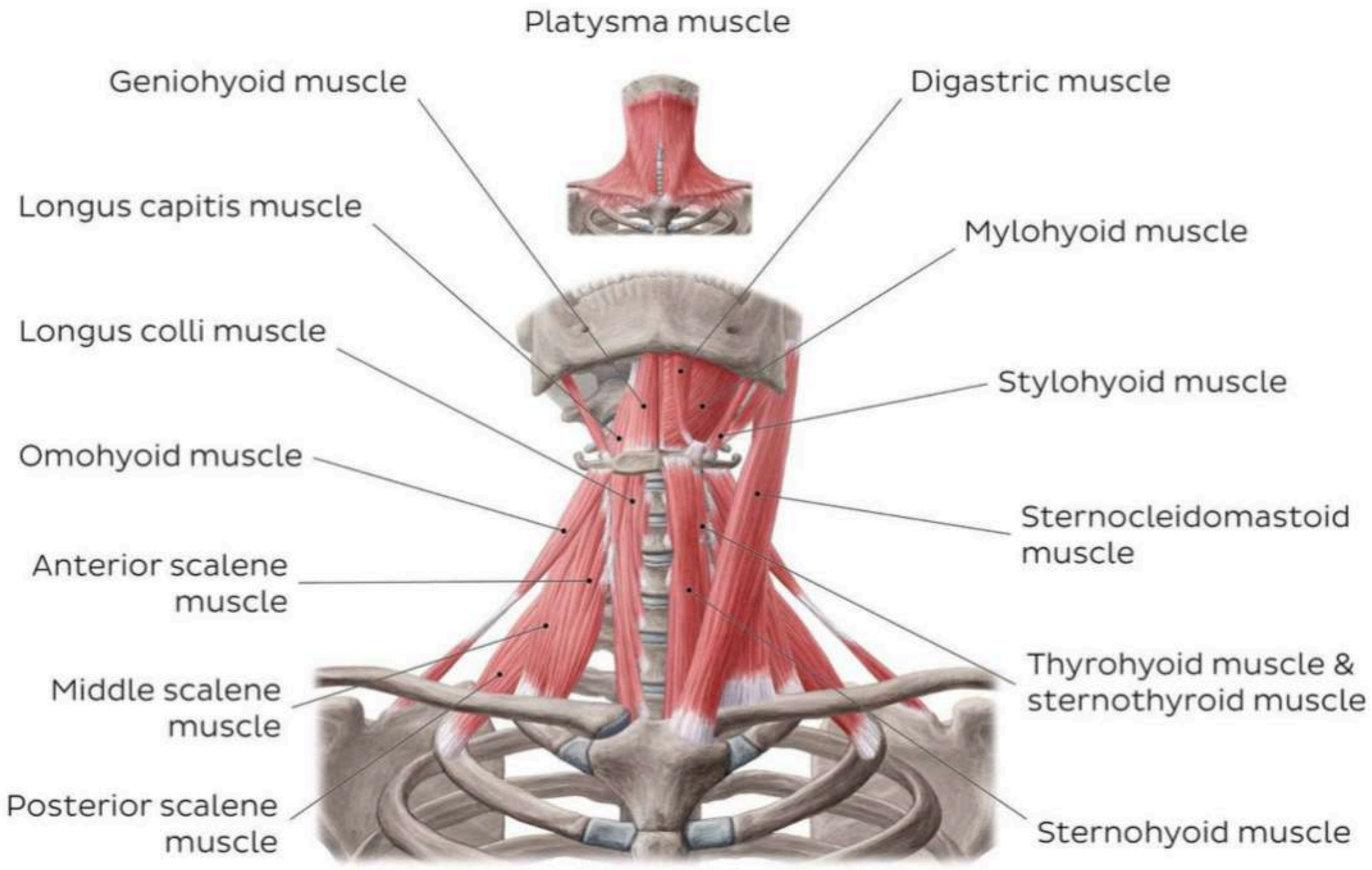


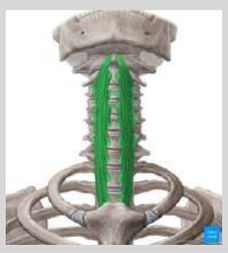


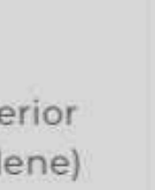
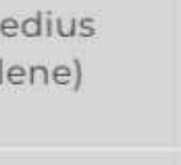
Normal Anatomy of Cervical Spine

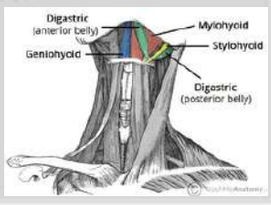


Anterior & lateral neck muscles



Other muscles	Origin	Insertion	Innervation	Function
Platysma 	Skin/Fascia of infra- and supraclavicular regions	Lower border of mandible, Skin of buccal/cheek region, Lower lip, Modiolus, Orbicularis oris muscle	Cervical branch of facial nerve (CN VII)	Depresses mandible and angle of mouth, Tenses skin of lower face and anterior neck
Sternocleidomastoid 	Sternal head: Superoanterior surface of manubrium of sternum Clavicular head: Superior surface of medial third of clavicle	Lateral surface of mastoid process of temporal bone, Lateral half of superior nuchal line of occipital bone	Accessory nerve (CN XI), Anterior rami of spinal nerves C2-C3	Bilateral contraction - Atlantooccipital joint/ Superior cervical spine: Head/Neck extension; Inferior cervical vertebrae: Neck flexion; Sternoclavicular joint: Elevation of clavicle and manubrium of sternum Unilateral contraction - Cervical spine: Neck ipsilateral flexion, Neck contralateral rotation
Longus capitis 	Anterior tubercles of transverse processes of C3-C6	Basilar part of occipital bone	Anterior rami of spinal nerves C1-C3	Bilateral contraction - Head flexion Ipsilateral contraction - Head rotation (ipsilateral)
Longus colli (Longus cervicis) 	Superior part: Anterior tubercles of transverse processes of vertebrae C3-C5 Intermediate part: Anterior surface of bodies of vertebrae C5-T3 Inferior part: Anterior surface of bodies of vertebrae T1-T3	Superior part: Anterior tubercle of vertebra C1 Intermediate part: Anterior surface of bodies of vertebrae C2-C4 Inferior part: Anterior tubercles of transverse processes of vertebrae C5-C6	Anterior rami of spinal nerves C2-C6	Bilateral contraction - Neck flexion, Neck lateral flexion (ipsilateral) Unilateral contraction - Neck contralateral rotation

Infrahyoid muscles	Origin	Insertion	Innervation	Function
Sternothyroid	Posterior surface of manubrium of sternum, Costal cartilage of rib 1	Oblique line of thyroid cartilage	Anterior rami of spinal nerves C1-C3 (via ansa cervicalis)	Depresses larynx
Sternohyoid 	Manubrium of sternum, Medial end of clavicle	Inferior border of body of hyoid bone		Depresses hyoid bone (from elevated position)
Omohyoid 	Inferior belly: Superior border of scapula (near suprascapular notch) Superior belly: intermediate tendon of omohyoid muscle	Inferior belly: intermediate tendon of omohyoid muscle Superior belly: Body of hyoid bone		Depresses and draws hyoid bone posteriorly
Thyrohyoid 	Oblique line of thyroid cartilage	Inferior border of body and greater horn of hyoid bone	Anterior ramus of spinal nerve C1 (via hypoglossal nerve)	Depresses hyoid bone, Elevates larynx
Scalenus anterior (Anterior scalene)	Anterior tubercle of transverse processes of vertebrae C3-C6	Scalene tubercle and superior border of rib 1 (anterior to subclavian groove)	Anterior rami of spinal nerves C4-C6	Bilateral contraction - Neck flexion Unilateral contraction - Neck lateral flexion (ipsilateral), Neck rotation (contralateral), Elevates rib 1
Scalenus medius (Middle scalene)	Posterior tubercles of transverse processes of vertebrae C3-C7	Superior border of rib 1 (posterior to subclavian groove)	Anterior rami of spinal nerves C3-C8	Neck lateral flexion, Elevates rib 1
Scalenus posterior (Posterior scalene)	Posterior tubercles of transverse processes of vertebrae C5-C7	External surface of rib 2	Anterior rami of spinal nerves C6-C8	Neck lateral flexion, Elevates rib 2
Rectus capitis anterior 	Anterior surface of lateral mass and transverse process of atlas	Inferior surface of basilar part of occipital bone	Anterior rami of spinal nerves C1, C2	Atlantooccipital joint: Head flexion
Rectus capitis lateralis 	Superior surface of transverse process of atlas	Inferior surface of jugular process of occipital bone		Unilateral contraction - Atlantooccipital joint: Head lateral flexion (ipsilateral), Stabilises joint

Suprahyoid muscles	Origin	Insertion	Innervation	Function
Mylohyoid 	Mylohyoid line of mandible	Mylohyoid raphe, Body of hyoid bone	Nerve to mylohyoid (of inferior alveolar nerve (CN V3)	Forms floor of oral cavity, Elevates hyoid bone and floor of mouth, Depresses mandible
Geniohyoid 	Inferior mental spine (Inferior genial tubercle)	Body of hyoid bone	Anterior ramus of spinal nerve C1 (via hypoglossal nerve)	Elevates and draws hyoid bone anteriorly
Stylohyoid 	Styloid process of temporal bone		Stylohyoid branch of facial nerve (CN VII)	Elevates and draws hyoid bone posteriorly
Digastric 	Anterior belly: Digastric fossa of mandible Posterior belly: Mastoid notch of temporal bone	Intermediate digastric tendon (Body of hyoid bone)	Anterior belly: Nerve to mylohyoid (of inferior alveolar nerve) (CN V3) Posterior belly: Digastric branch of facial nerve (CN VII)	Depresses mandible, Elevates hyoid bone during swallowing and speaking

Brachial plexus

Brachial plexus = Roots (C5-T1) → Trunks (upper , meddle , lower) → Divisions (Ant. , Post.) → Cords (lateral , post., medial) → Branches → supply muscles & skin of upper limb

Branches

From Roots:

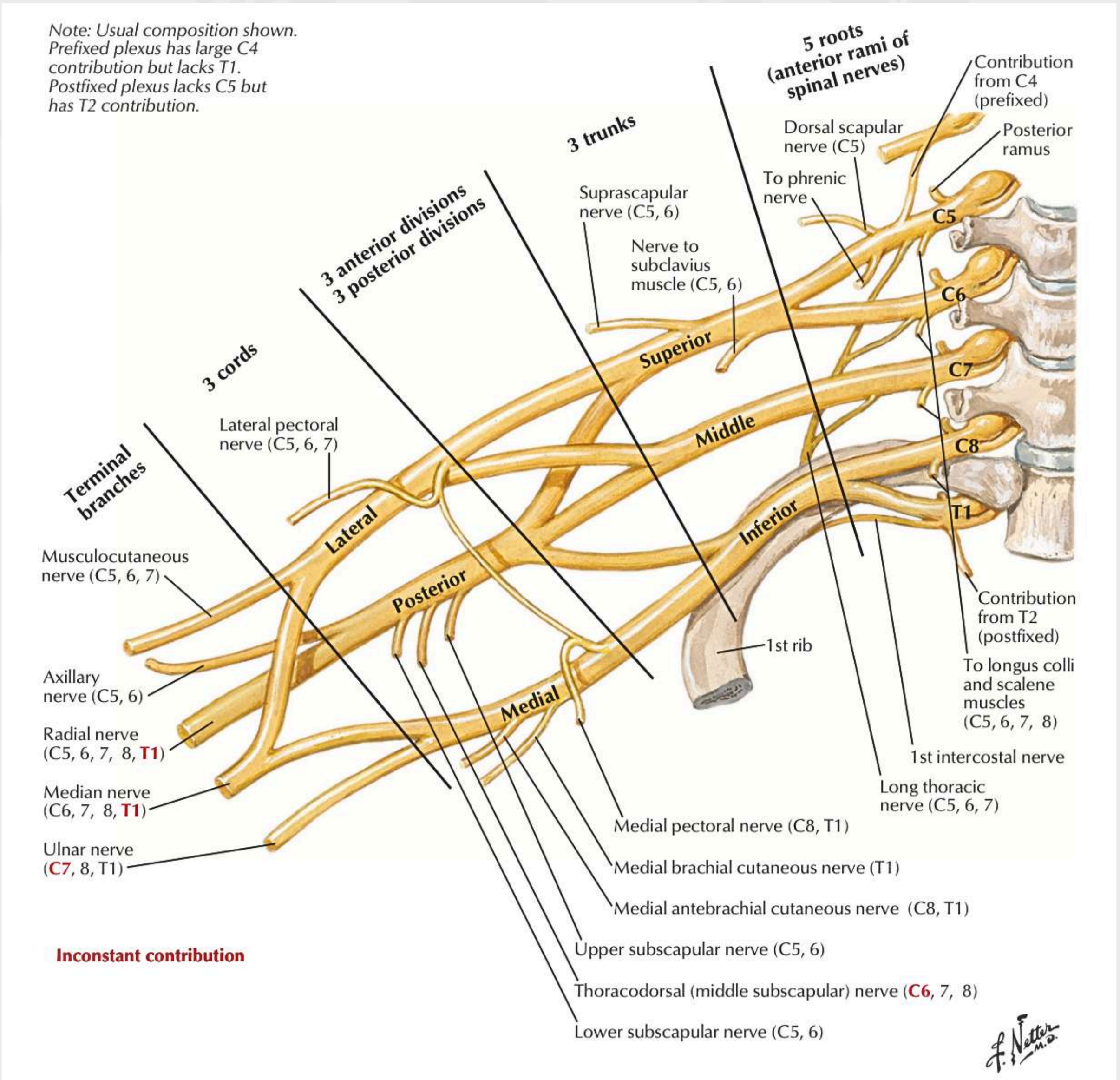
- Dorsal scapular (C5) → rhomboids, levator scapulae
- Long thoracic (C5-C7) → serratus anterior

From Trunks:

- Suprascapular (C5-C6) → supraspinatus, infraspinatus
- Nerve to subclavius (C5-C6)

From Cords:

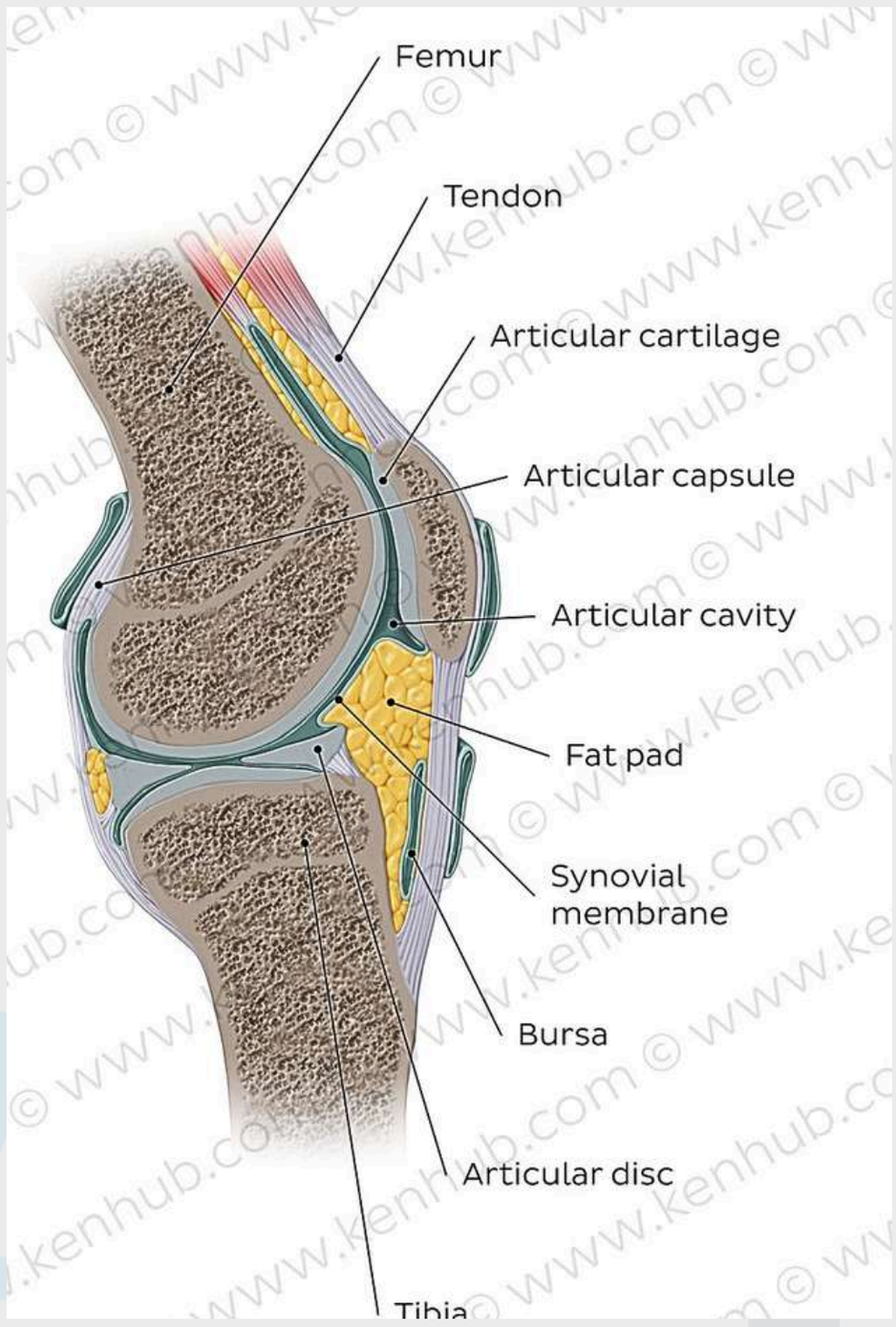
- Lateral cord: Musculocutaneous, part of Median
- Medial cord: Ulnar, part of Median
- Posterior cord: Axillary, Radial



OverView of Synovial Joint

Synovial joints are the most common types of joints in the human body. They typically connect two bones (usually in the limbs) and they give the human body its mobility.

Key points about the synovial joints	Table quiz
Types	Plane, pivot, hinge, ellipsoid, saddle, ball and socket
Examples	**Plane joint:** Acromioclavicular joint, intercarpal joints **Pivot joint:** Medial atlantoaxial joint, radioulnar joints **Hinge joint:** Elbow joint, knee joint, ankle joint **Ellipsoid joint:** Radiocarpal joint, metacarpophalangeal joints **Saddle joint:** First carpometacarpal joint **Ball and socket joint:** Hip joint, shoulder joint
Main components of synovial joints	**Articular cartilage:** Covers the ends of the articulating bones **Articular capsule:** Composed of an outer fibrous layer and inner synovial membrane **Joint cavity:** Filled with synovial fluid **Reinforcing ligaments:** Support the articular capsule



Hinge Joint

- Movement: Flexion–Extension
- Example: Elbow joint

Modified hinge joint

- also permits slight rotational movement in addition to flexion–extension
- Example knee joint.

Pivot Joint

- Movement: Pronation–Supination / Rotation
- Example: Radio-ulnar joint

Ball & Socket Joint

- Movement: All directions
- Hip: Deep socket → More stability, less movement
- Shoulder: Shallow socket → Less stability, more movement

Ellipsoid Joint

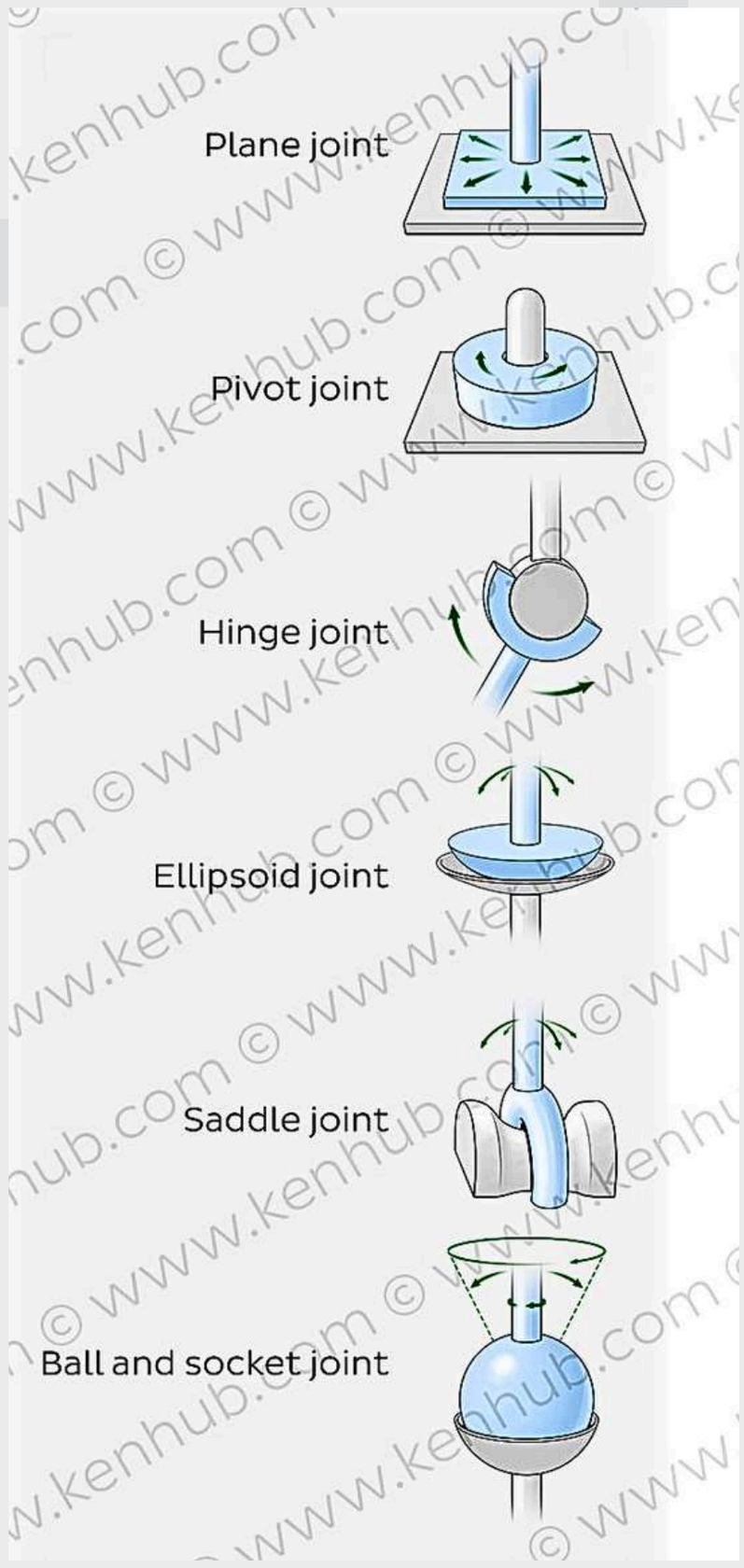
- Movement: Wrist movements
- Example: Radiocarpal joint

Saddle Joint

- Movement: Almost all movements
- Note: Rotation limited
- Example: Carpometacarpal joint (thumb)

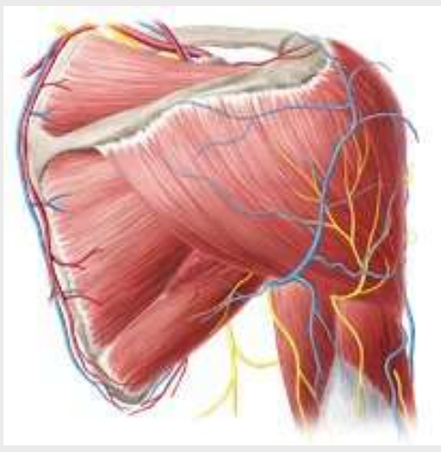
Plane Joint

- Movement: Gliding + slight rotation
- Examples: Acromioclavicular, carpal joints, tarsal joint

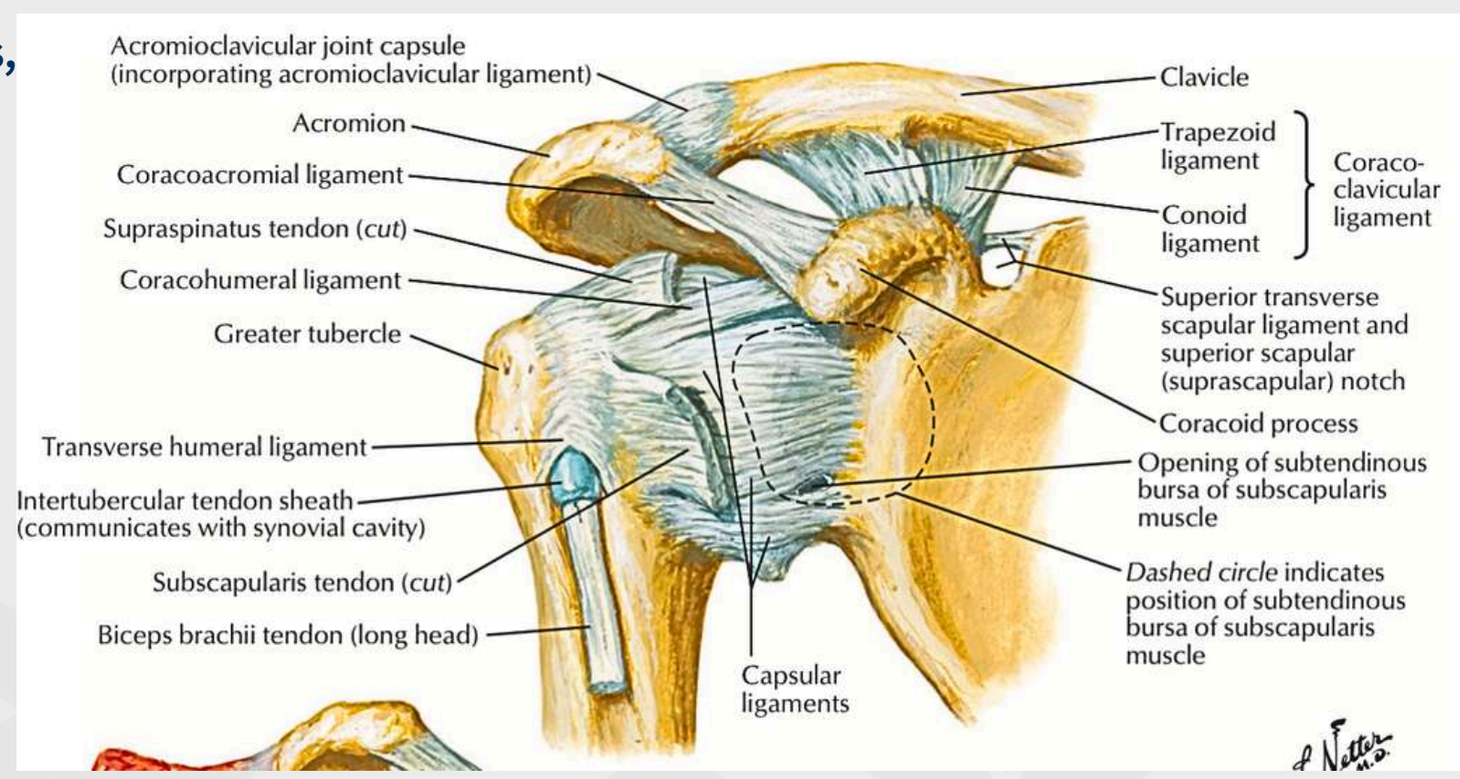


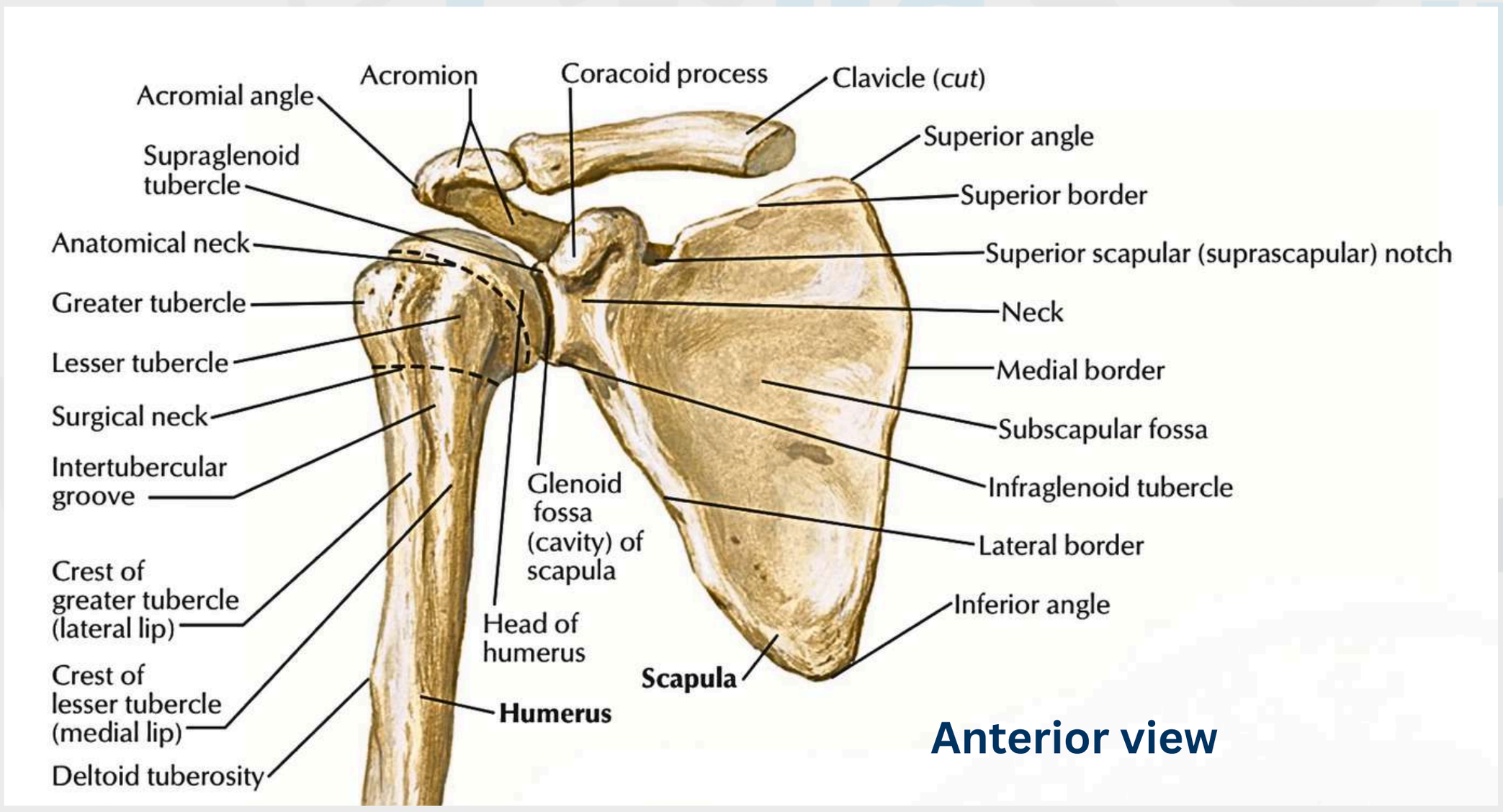
Shoulder

Joint type	Synovial ball-and-socket joint
Articular surfaces	Glenoid fossa of scapula, head of humerus
Ligaments	Superior glenohumeral, middle glenohumeral, inferior glenohumeral, coracohumeral, transverse humeral
Important muscles	**Rotator cuff muscles**: supraspinatus, infraspinatus, teres minor, subscapularis
Functions	Flexion, extension, abduction, adduction, lateral/external rotation, medial/internal rotation and circumduction

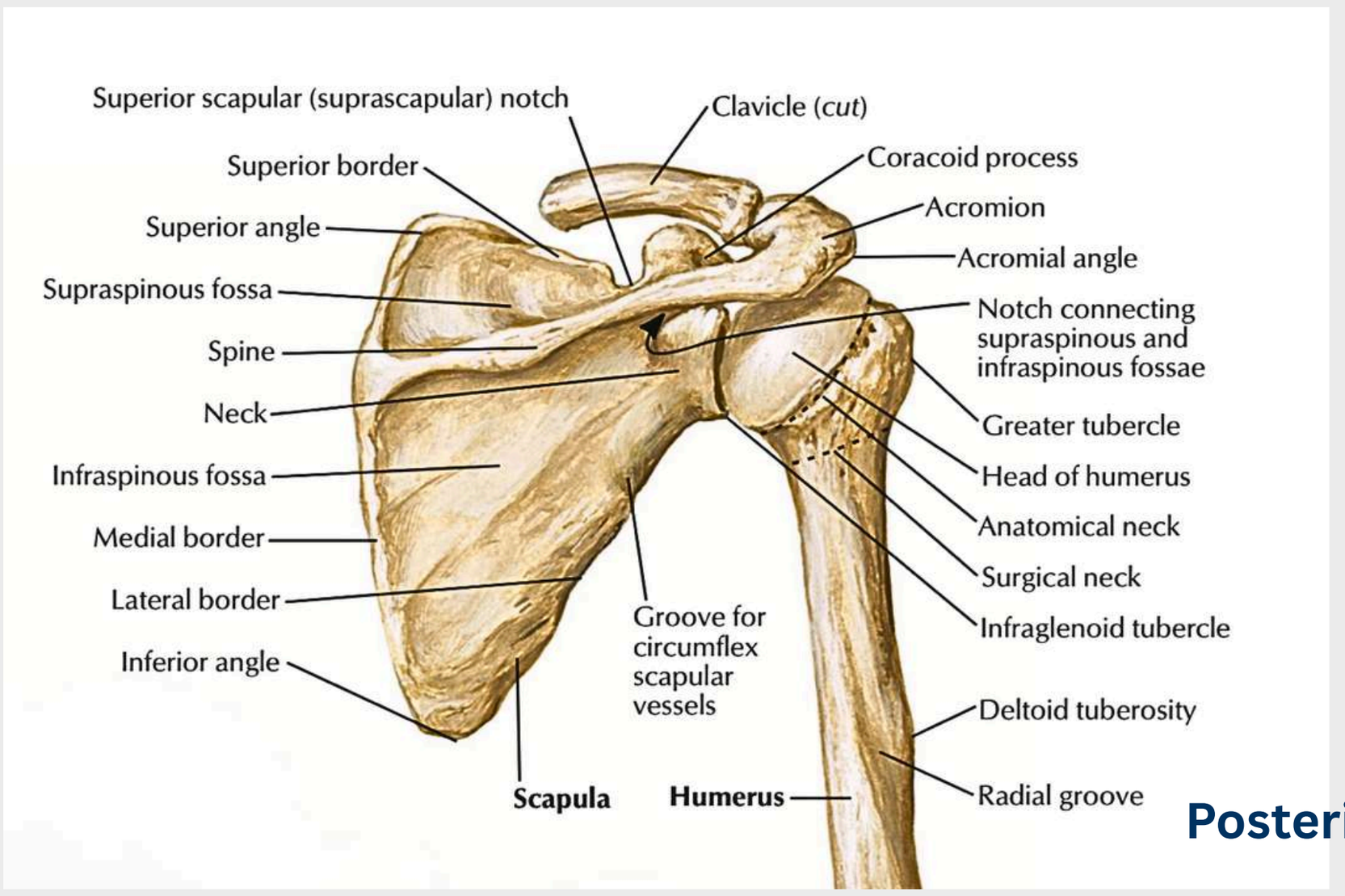


shoulder is one of the largest joints, connecting the arm to the trunk.
Consists of 4 joints:
large joint the
1-Scapulothoracic joint
2- Acromioclavicular joint (ACJ)
3-Sternoclavicular joint (at medial end of clavicle)(SCJ)
4-Glenohumeral joint





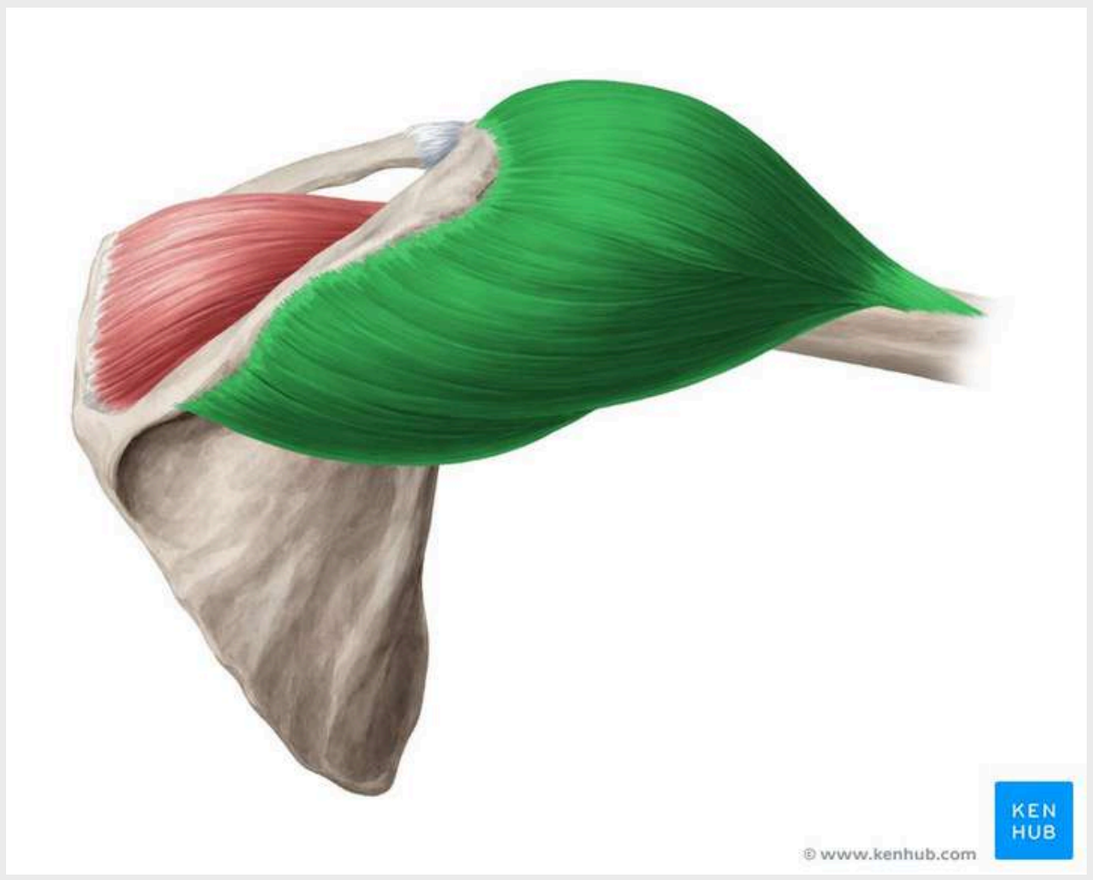
Anterior view

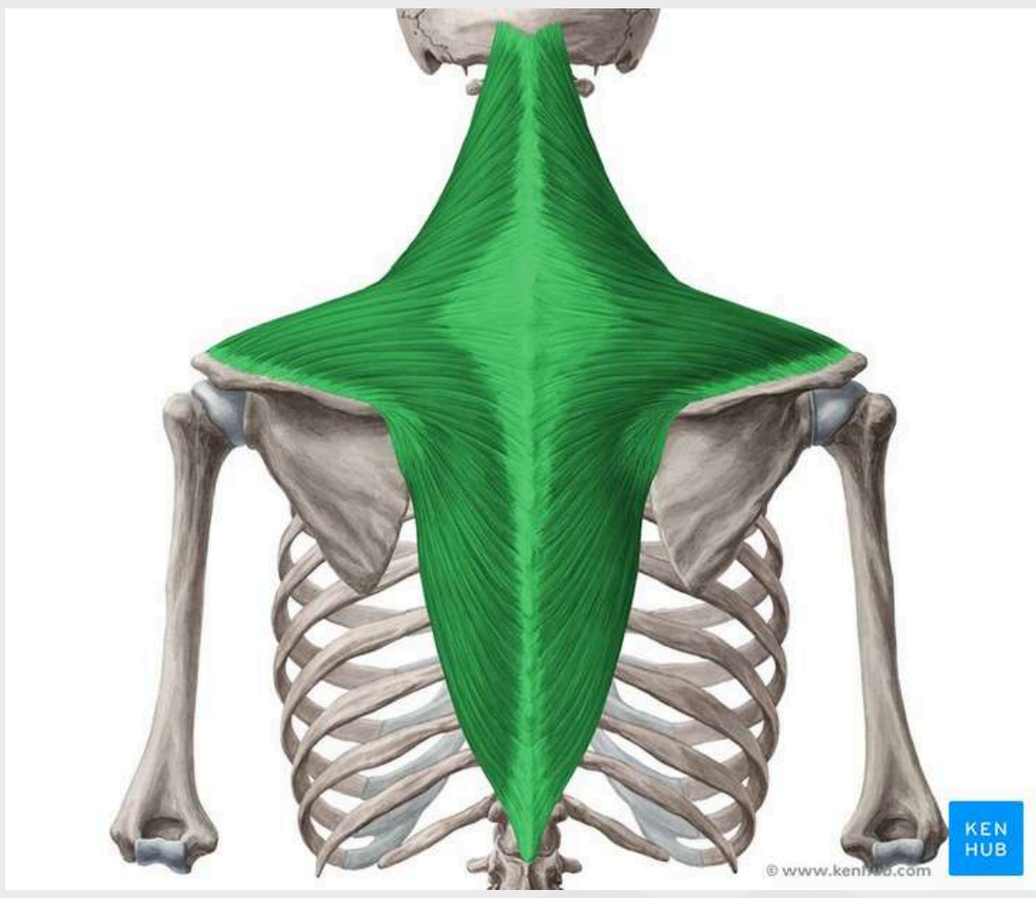


Posterior view

Shoulder

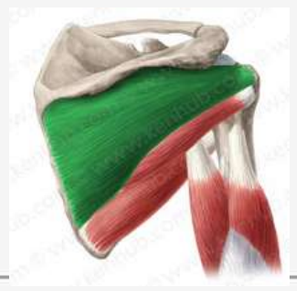
The two most superficial muscles of the shoulder are the deltoid and the trapezius muscle which make it's contour, Another group of muscles that is quite important for this region is the rotator cuff muscles. This group consists of 4 muscles





Key facts about the deltoid muscle	Table quiz
Origins	Lateral 1/3 of **C**lavicle (clavicular part), **A**cromion (acromial part), **S**pine of Scapula (spinal part) *Mnemonic*: 'Deltoid helps you carry **SACS**'
Insertion	Deltoid tuberosity of humerus
Innervation	Axillary nerve (C5, C6)
Blood supply	Deltoid and acromial branches of thoracoacromial artery, subscapular artery, anterior and posterior circumflex humeral arteries, deltoid branch of deep brachial artery
Function	*Clavicular part*: flexion and internal rotation of the arm, *Acromial part:* abduction of the arm beyond the initial 15° *Spinal part:* extension and external rotation of the arm.

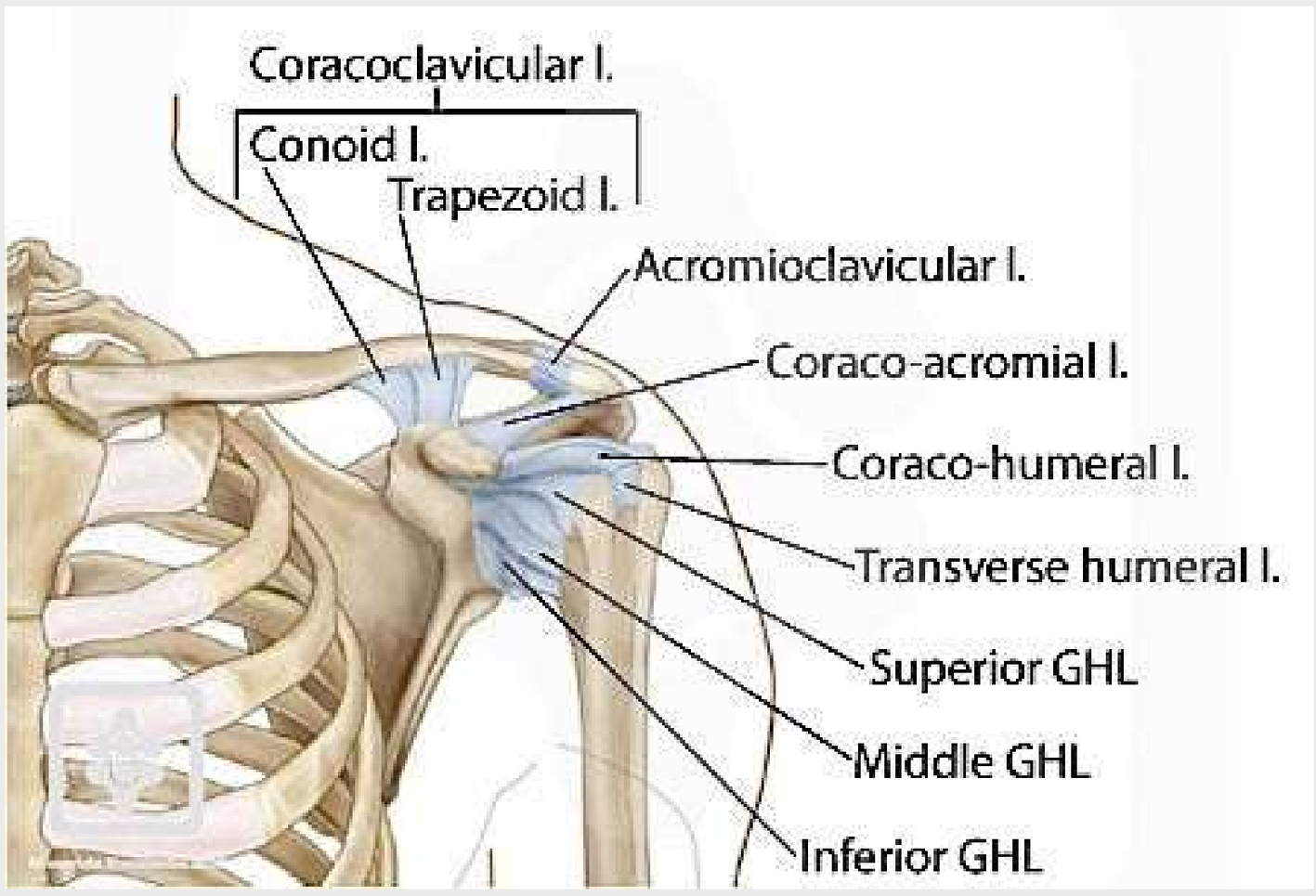
Key facts about the serratus anterior muscle	Table quiz
Origin	**Superior part:** Ribs 1-2, Intercostal fascia **Middle part:** Ribs-3-6 **Inferior part:** Ribs 7-8/9 (variably extends to rib 10 (+ external oblique muscle))
Insertion	**Scapula** (Superior part: Anterior surface of superior angle Middle part: Anterior surface of medial border Inferior part: Anterior surface of inferior angle and medial border)
Innervation	Long thoracic nerve (C5- C7) *Mnemonics:* '**SALT**' (stands for **s**erratus **a**nterior - **l**ong thoracic) & '**C5, 6, 7 raise your arms to heaven!**'
Blood supply	Superior and lateral thoracic arteries, thoracodorsal artery branches
Function	Scapulothoracic joint: Draws scapula anterolaterally, Suspends scapula on thoracic wall, Rotates scapula (draws inferiorly angle laterally)

Key facts about the rotator cuff muscles	Table quiz
Supraspinatus muscle 	**Origin**: supraspinous fossa of scapula **Insertion**: greater tubercle of the humerus **Innervation**: suprascapular nerve (C5, C6) **Function**: initiation of abduction of arm to 15° at glenohumeral/shoulder joint, stabilizes humeral head in glenoid cavity
Infraspinatus muscle 	**Origin**: infraspinatous fossa **Insertion**: greater tubercle of humerus **Innervation**: suprascapular nerve (C5, C6) **Function**: external rotation of the arm at glenohumeral/shoulder joint, stabilizes humeral head in glenoid cavity
Teres minor muscle 	**Origin**: lateral border of scapula **Insertion**: greater tubercle of humerus **Innervation**: axillary nerve (C5, C6) **Function**: external rotation of the arm at the glenohumeral/shoulder joint, stabilizes humeral head in glenoid cavity
Subscapularis muscle 	**Origin**: subscapular fossa **Insertion**: lesser tubercle of humerus **Innervation**: upper and lower subscapular nerves (C5-C6) **Function**: internal rotation of the arm at glenohumeral/shoulder joint, stabilizes humeral head in glenoid cavity
Mnemonic	Rotator cuff **SITS** on the shoulder (**S**upraspinatus, **I**nfraspinatus, **T**eres minor, **S**ubscapularis)

Shoulder

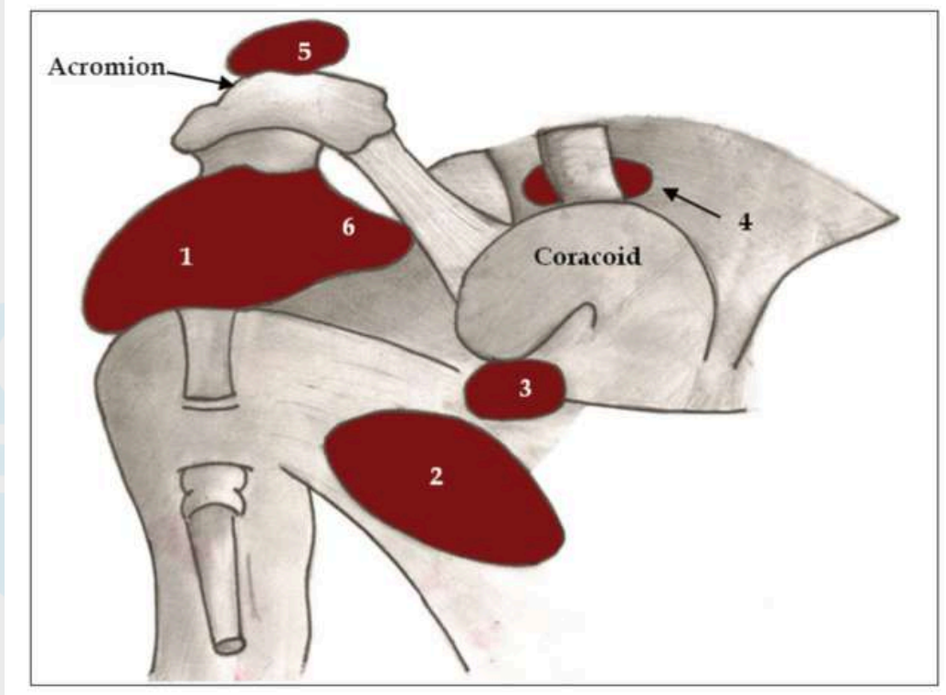
Ligaments

A) Superior GHL
B) Middle GHL
C) Inferior GHL (IGHL)
D) Coracohumeral
E) Coracoacromial
F) Trapezoid
G) Conoid
H) Acromioclavicular



Bursae:

A) Subacromial
B) Subdeltoid
C) Subscapular
D) Subcoracoid

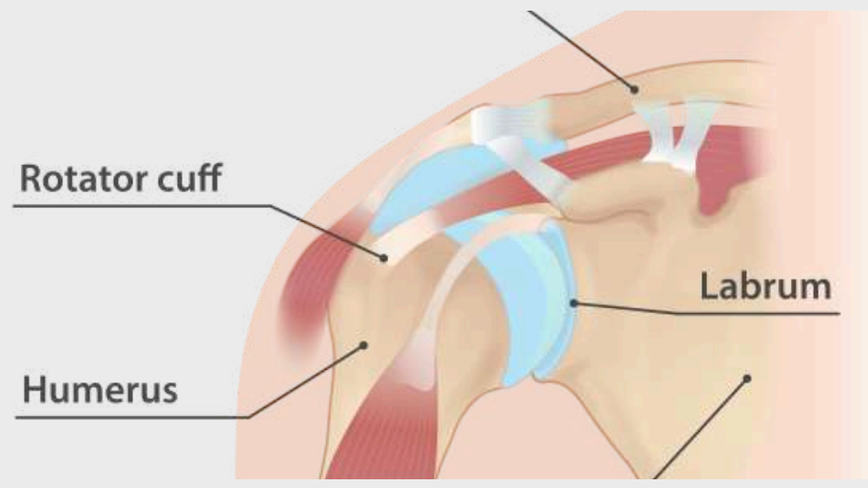


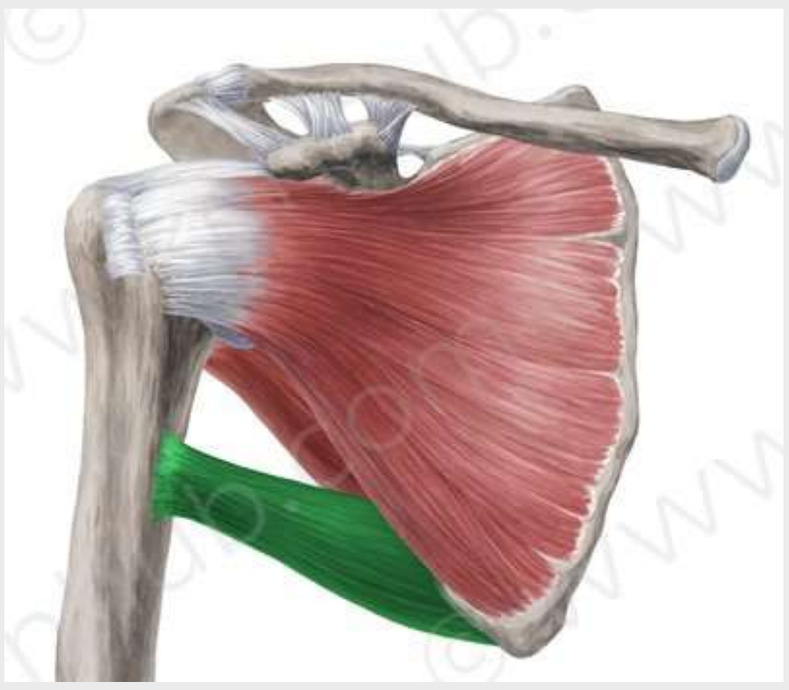
1. Subacromial-subdeltoid bursa 2.Subscapular recess 3. Subcoracoid bursa 4. Coracoclavicular bursa 5. supraacromial bursa. 6 medial extension of subacromial-subdeltoid bursa

Labrum

a rim of fibrocartilage tissue that surrounds the shoulder socket (glenoid cavity), deepening it to help stabilize the joint

Superior attachment – long head of biceps
Inferior attachment – IGHL
Injuries – Bankart / SLAP



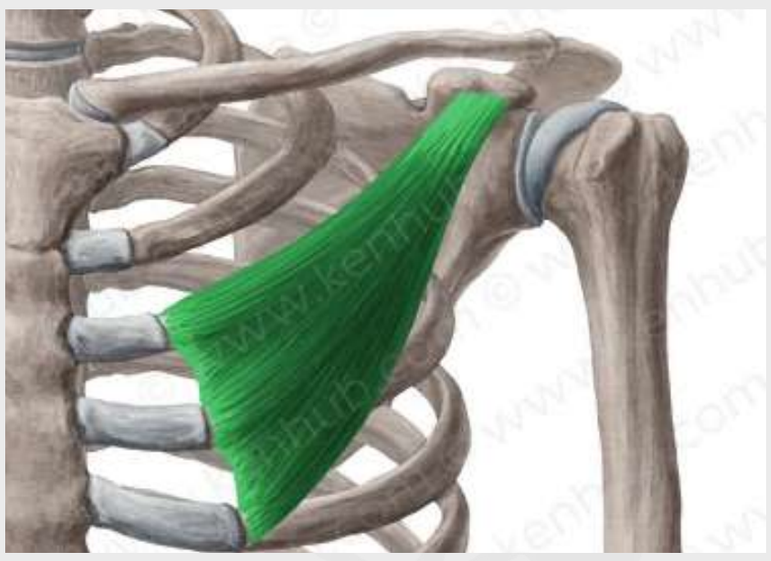


Key facts about the teres major muscle	Table quiz
Origins	Inferior angle and lower part of the lateral border of the scapula
Insertions	Intertubercular sulcus (medial lip) of the humerus
Innervation	Lower subscapular nerve (C5-C7)
Blood supply	Thoracodorsal branch of subscapular artery and posterior circumflex humeral artery
Function	Extension and internal rotation of the humerus (arm); supports shoulder adduction

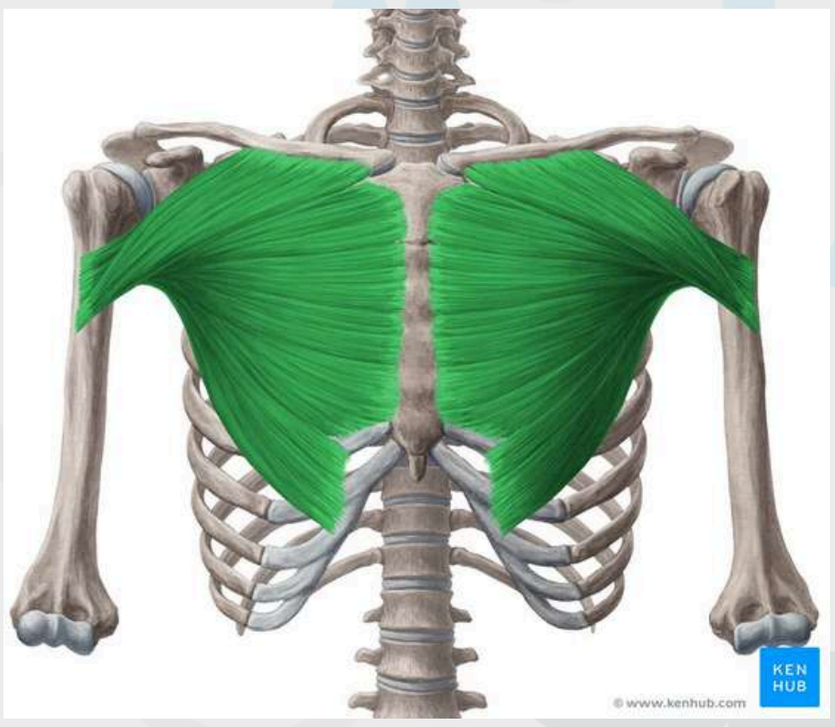
Shoulder

Other muscles

Key facts about the biceps brachii muscle	Table quiz
Origin	**S**hort head - Apex of the **C**oracoid process of the scapula **L**ong head - **S**upraglenoid tubercle of the scapula *Mnemonic*: 'You walk **S**horter to a street **C**orner. You ride **L**onger on a **S**uperhighway'
Insertion	Radial tuberosity of the radius Deep fascia of forearm (insertion of the bicipital aponeurosis)
Innervation	Musculocutaneous nerve (C5- C6)
Blood supply	Branches of brachial artery
Function	Flexion and supination of the forearm at the elbow joint, weak flexor of the arm at the glenohumeral joint

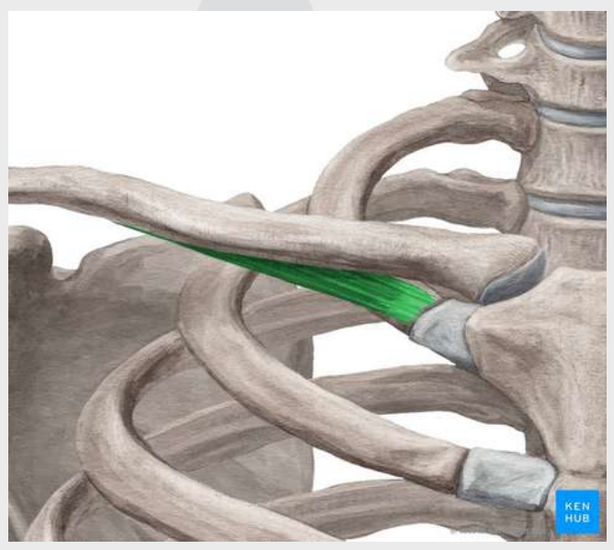


Key facts about the pectoralis minor muscle	Table quiz
Origin	Anterior surface, costal cartilages of ribs 3-5
Insertion	Medial border and coracoid process of scapula
Innervation	Medial and lateral pectoral nerves (C5-T1)
Blood supply	Thoracoacromial a. (pectoral and deltoid branches), superior thoracic a., lateral thoracic a.
Function	Scapulothoracic joint: draws scapula anteroinferiorly, stabilizes scapula on thoracic wall

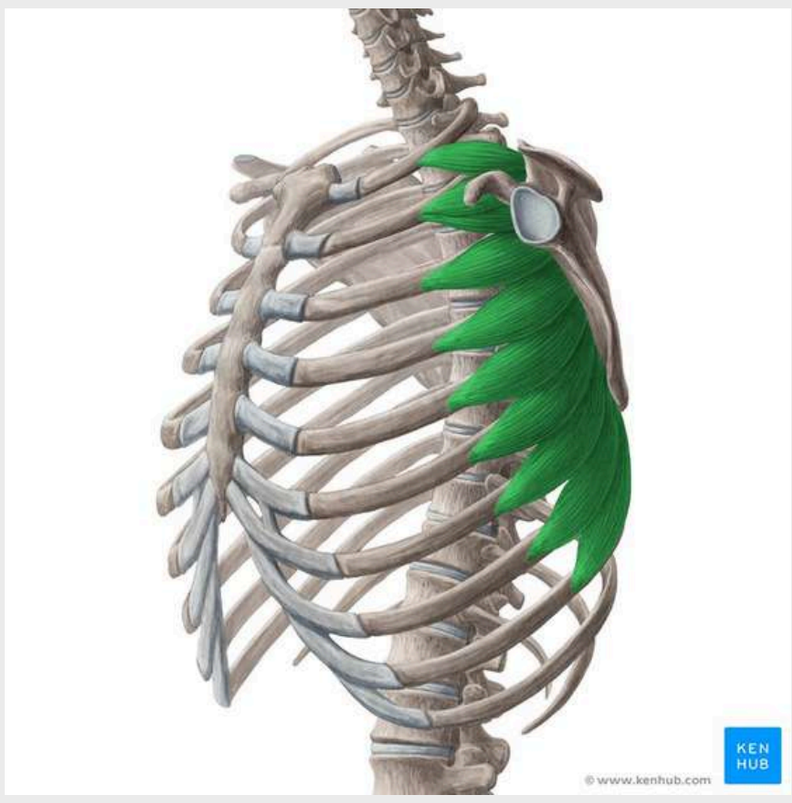


Key facts about the pectoralis major muscle	Table quiz
Origin	Clavicular part: anterior surface of medial half of clavicle Sternocostal part: anterior surface of sternum, Costal cartilages of ribs 1-6 Abdominal part: Anterior layer of rectus sheath
Insertion	Lateral lip of intertubercular sulcus of humerus
Action	Shoulder joint: Arm adduction, Arm internal rotation, Arm flexion (clavicular head), arm extension (sternocostal head); Scapulothoracic joint: Draws scapula anteroinferiorly
Innervation	Lateral and medial pectoral nerves (C5-T1)
Blood supply	Pectoral branches of thoracoacromial artery, perforating branches of internal thoracic artery

Key facts about the subclavius muscle	Table quiz
Origin	Costal cartilage, sternal end of rib 1
Insertion	Anteroinferior surface of middle third of clavicle
Innervation	Subclavian nerve (C5-C6)
Blood supply	Clavicular branch of thoracoacromial artery, suprascapular artery
Function	Sternoclavicular joint: Anchors and depresses clavicle



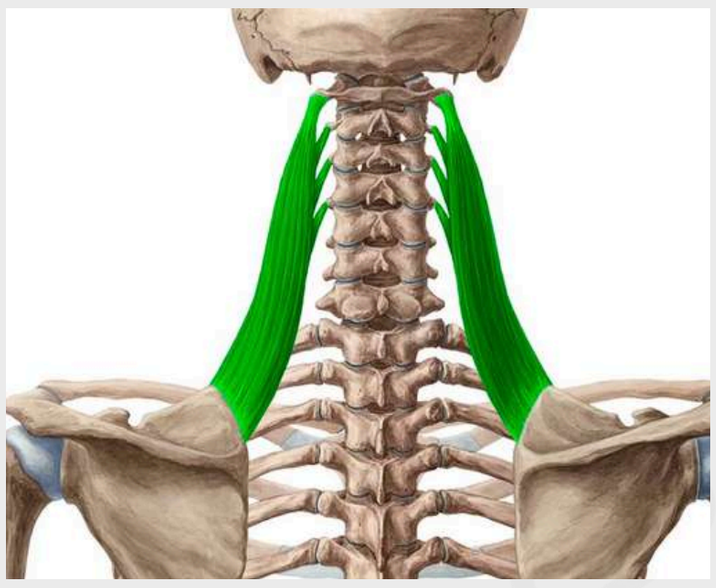
Key facts about the serratus anterior muscle	Table quiz
Origin	**Superior part:** Ribs 1-2, Intercostal fascia **Middle part:** Ribs-3-6 **Inferior part:** Ribs 7-8/9 (variably extends to rib 10 (+ external oblique muscle))
Insertion	**Scapula** (Superior part: Anterior surface of superior angle Middle part: Anterior surface of medial border Inferior part: Anterior surface of inferior angle and medial border)
Innervation	Long thoracic nerve (C5- C7) *Mnemonics:* '**SALT**' (stands for **s**erratus **a**nterior - **l**ong thoracic) & '**C5, 6, 7 raise your arms to heaven!**'
Blood supply	Superior and lateral thoracic arteries, thoracodorsal artery branches
Function	Scapulothoracic joint: Draws scapula anterolaterally, Suspends scapula on thoracic wall, Rotates scapula (draws inferiorly angle laterally)



Shoulder

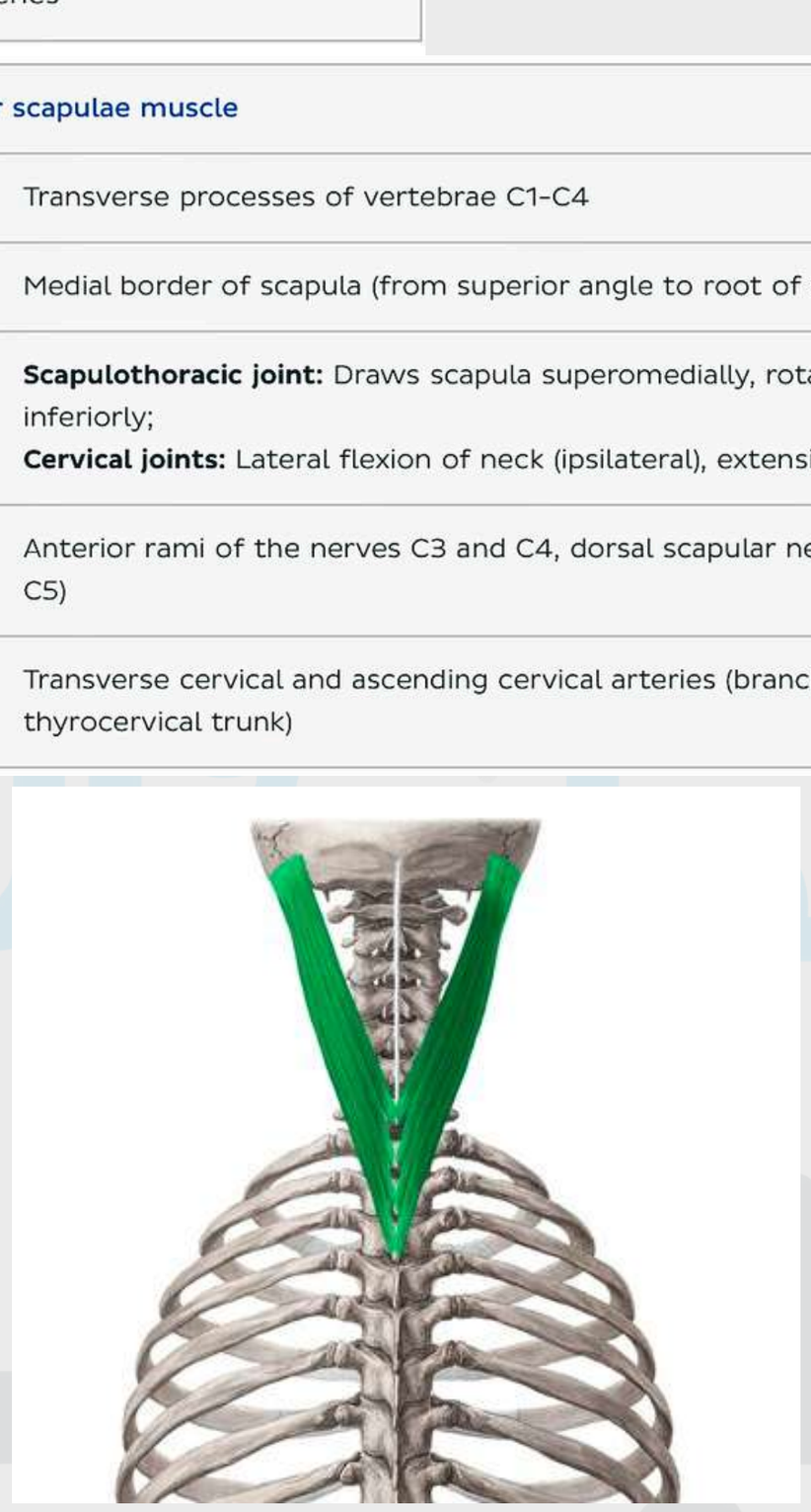
Other muscles

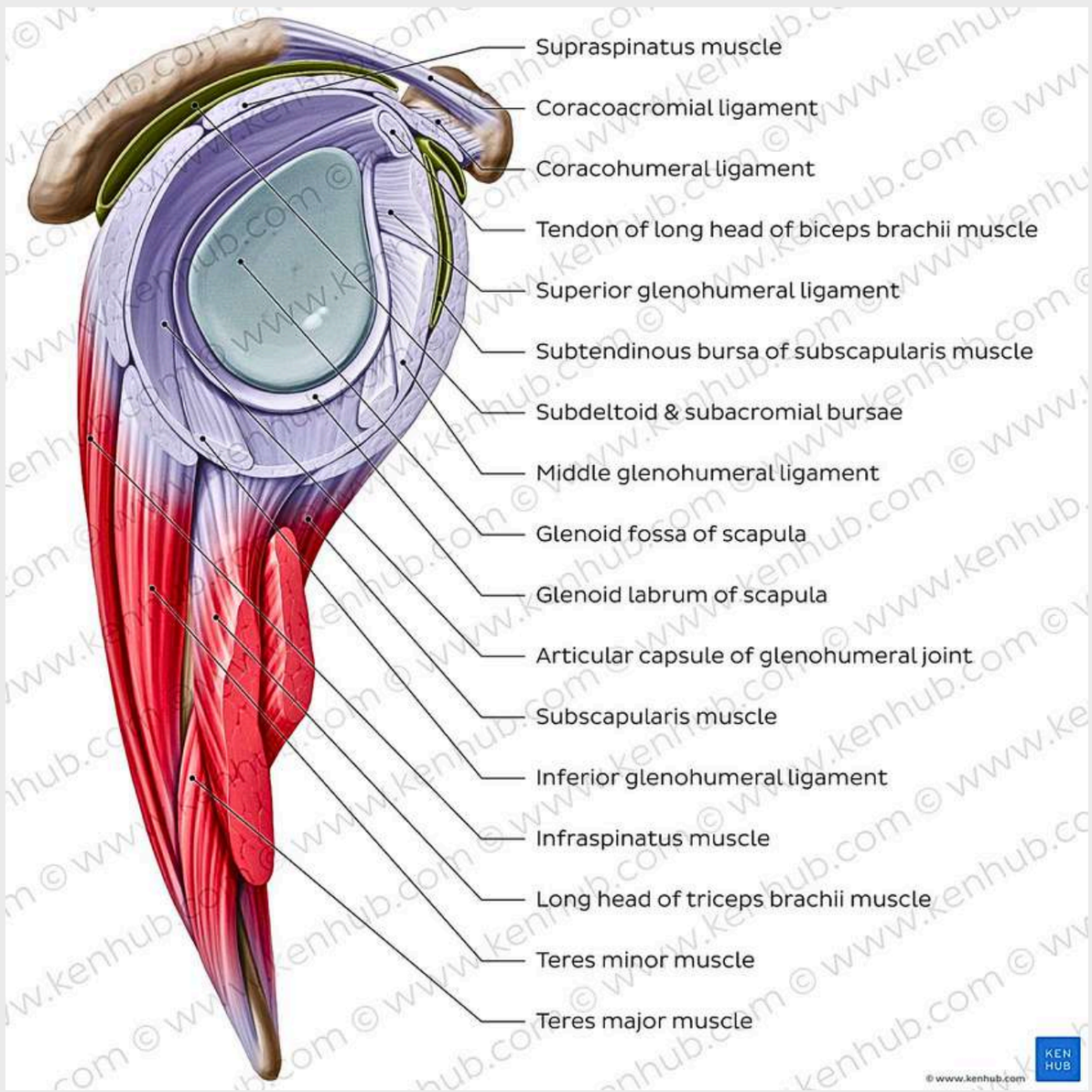
Key facts about the rhomboid muscles	Table quiz
Origin	**Rhomboid minor:** Nuchal ligament, Spinous processes of vertebrae C7-T1 **Rhomboid major:** Spinous process of vertebrae T2-T5
Insertion	**Rhomboid minor**: Root (medial end) of spine of scapula **Rhomboid major**: Medial border of scapula (from inferior angle to root of spine of scapula)
Action	Scapulothoracic joint: Draws scapula superomedially, Rotates glenoid cavity inferiorly; Supports position of scapula
Innervation	Dorsal scapular nerve (C4-C5)
Blood supply	Dorsal scapular artery, deep branch of transverse cervical artery, dorsal branch of upper five or six posterior intercostal arteries

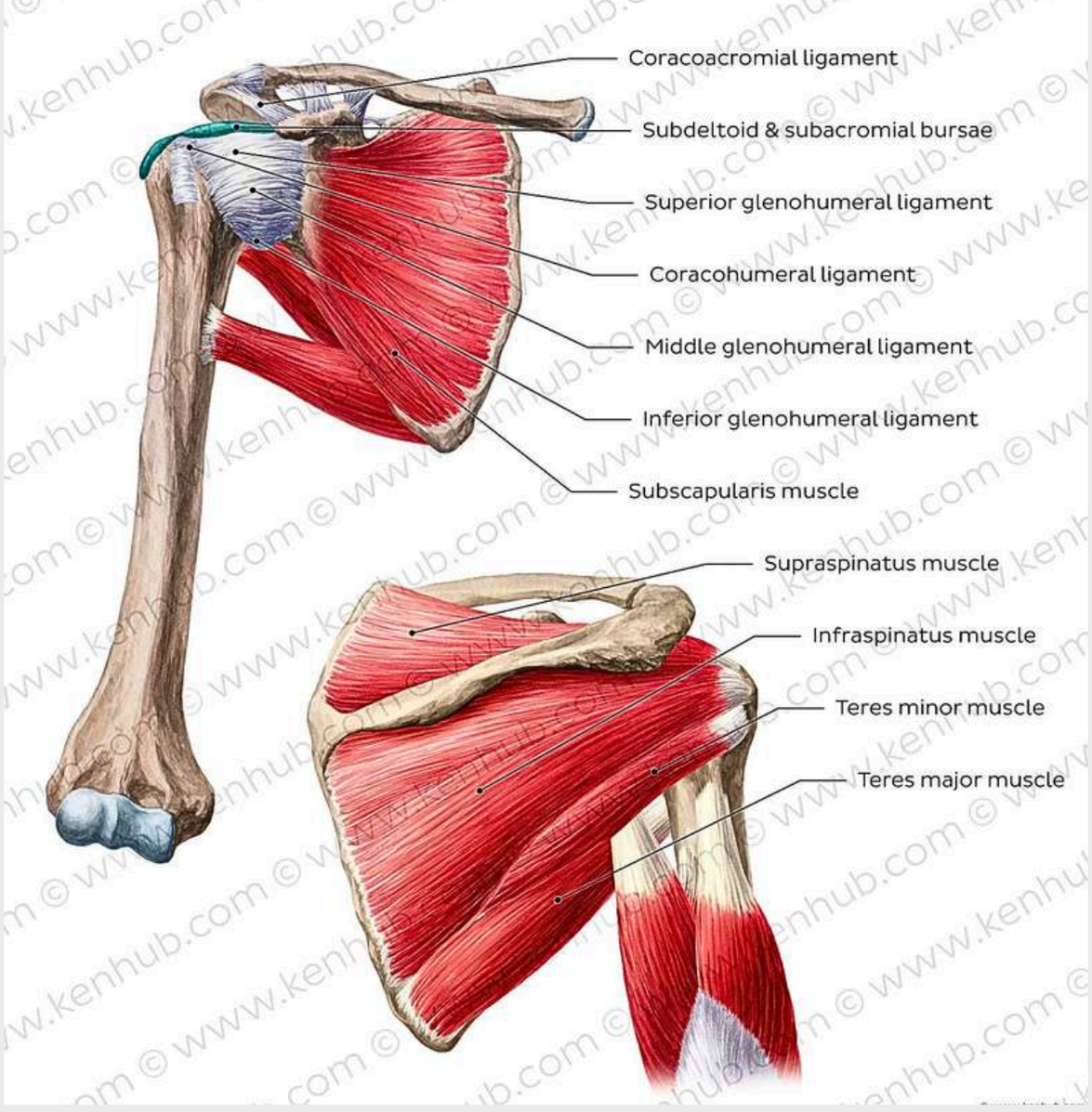


Key facts about the levator scapulae muscle	Table quiz
Origin	Transverse processes of vertebrae C1-C4
Insertion	Medial border of scapula (from superior angle to root of spine of scapula)
Action	**Scapulothoracic joint:** Draws scapula superomedially, rotates glenoid cavity inferiorly; **Cervical joints:** Lateral flexion of neck (ipsilateral), extension of the neck
Innervation	Anterior rami of the nerves C3 and C4, dorsal scapular nerve (branch of the C5)
Blood supply	Transverse cervical and ascending cervical arteries (branches of the thyrocervical trunk)

Key facts about the splenius capitis muscle	Table quiz
Origin Spinous processes of vertebrae C7-T3, nuchal ligament	
Insertion Lateral superior nuchal line of occipital bone, mastoid process of temporal bone	
Action **Bilateral contraction:** Extends head/neck **Unilateral contraction:** Lateral flexion and rotation of head (ipsilateral)	
Innervation Lateral branches of posterior rami of spinal nerves C2-C3	
Blood supply Muscular branches of occipital artery	

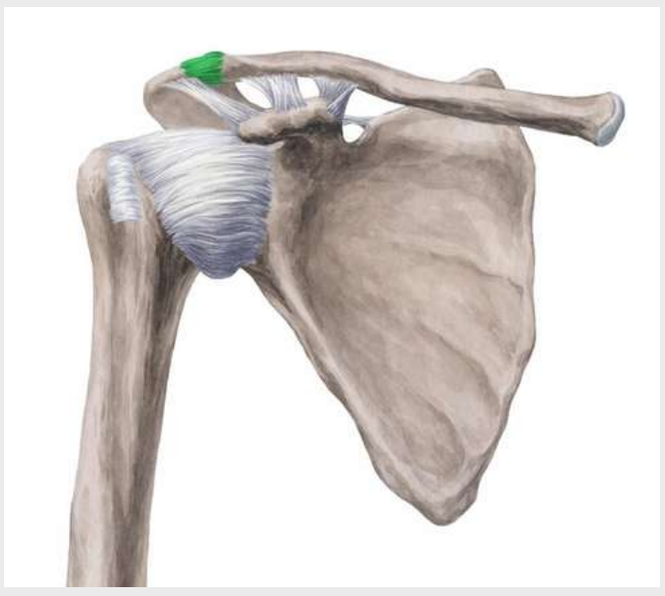






Shoulder

Key facts about the acromioclavicular joint	Table quiz
Type	Synovial plane joint; multiaxial
Articular surfaces	Acromion of scapula, acromial end of clavicle
Ligaments	Intrinsic: Superior acromioclavicular ligament, inferior acromioclavicular ligament Extrinsic: Coracoclavicular ligament (with conoid and trapezoid parts)
Innervation	Lateral pectoral nerve, suprascapular nerve
Blood supply	Thoracoacromial artery, suprascapular artery
Movements	Protraction - retraction Elevation - depression Axial rotation

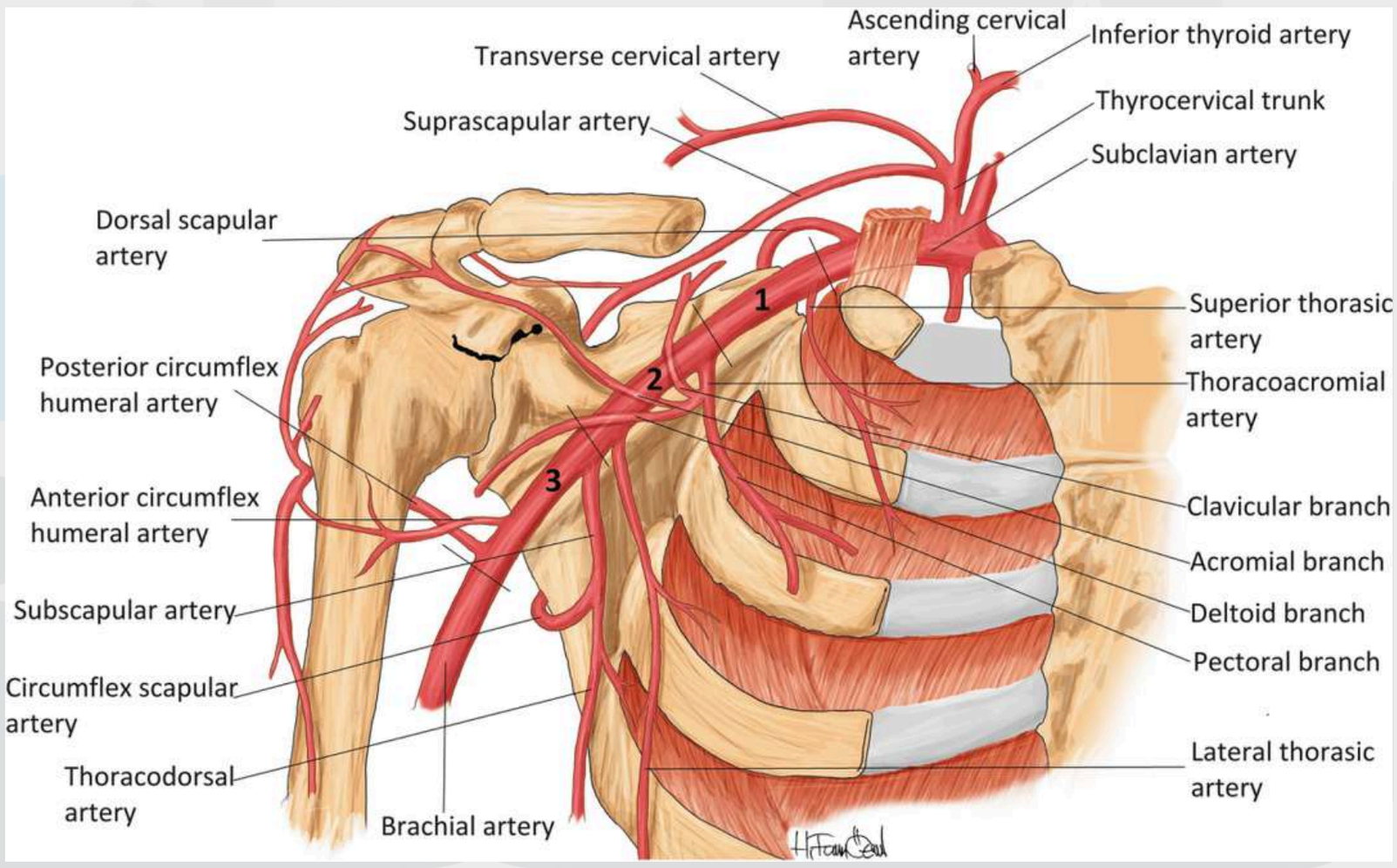


Blood supply of shoulder joint

A) Primarily: **Axillary artery** → **Anterior + Posterior circumflex humeral arteries** (supply humeral head

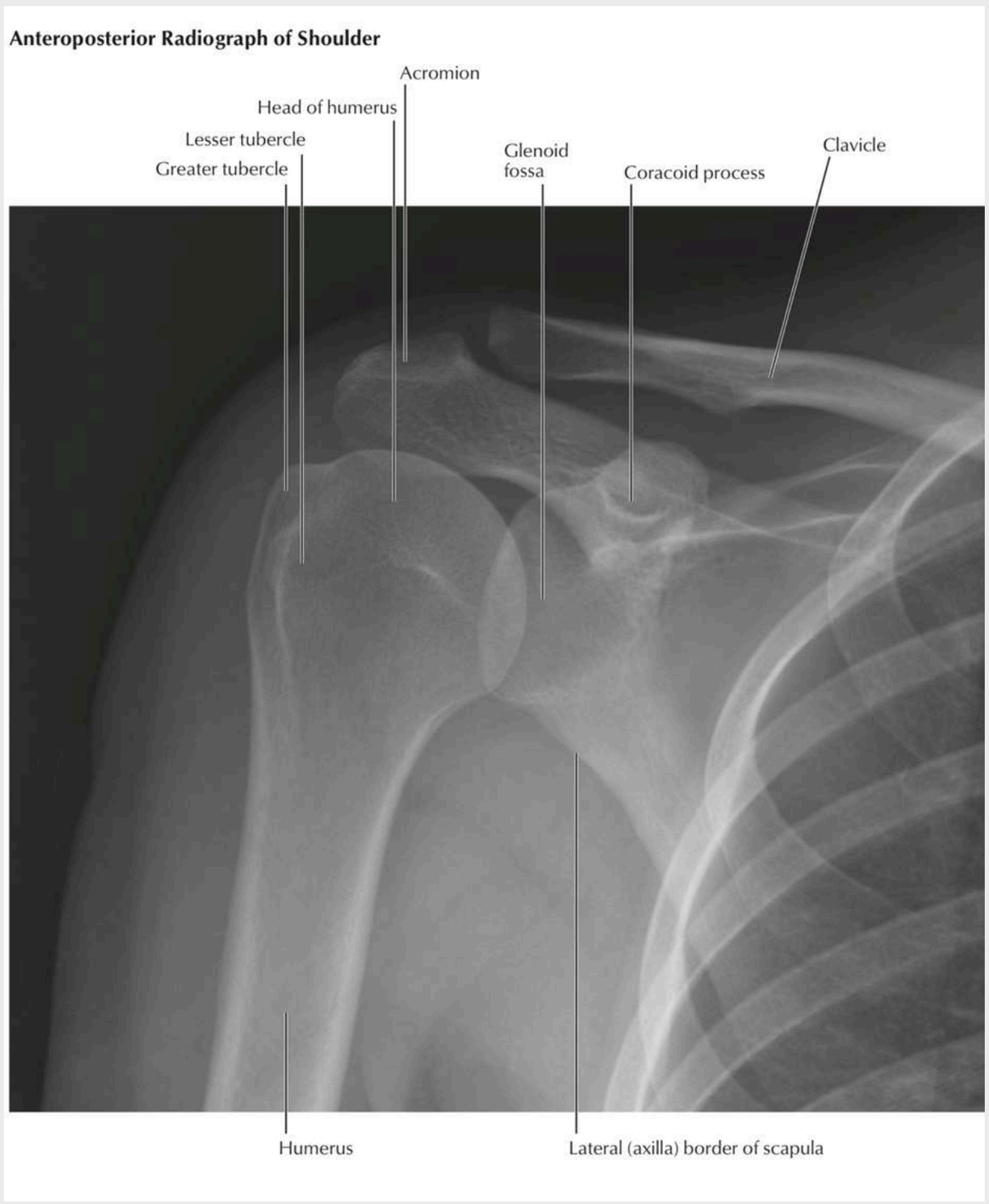
B) Additional:

- **Suprascapular** artery (from thyrocervical trunk)
- **Thoracoacromial** artery (branch of axillary)
- **Dorsal scapular** artery

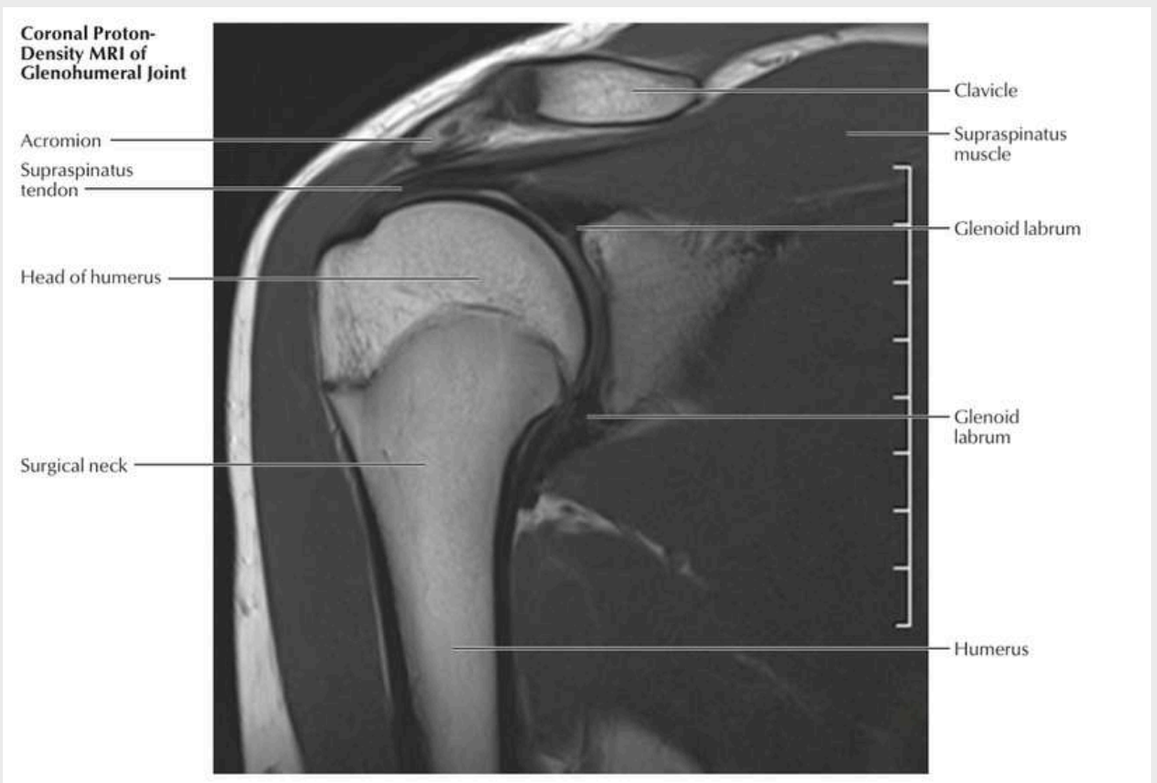


Imaging

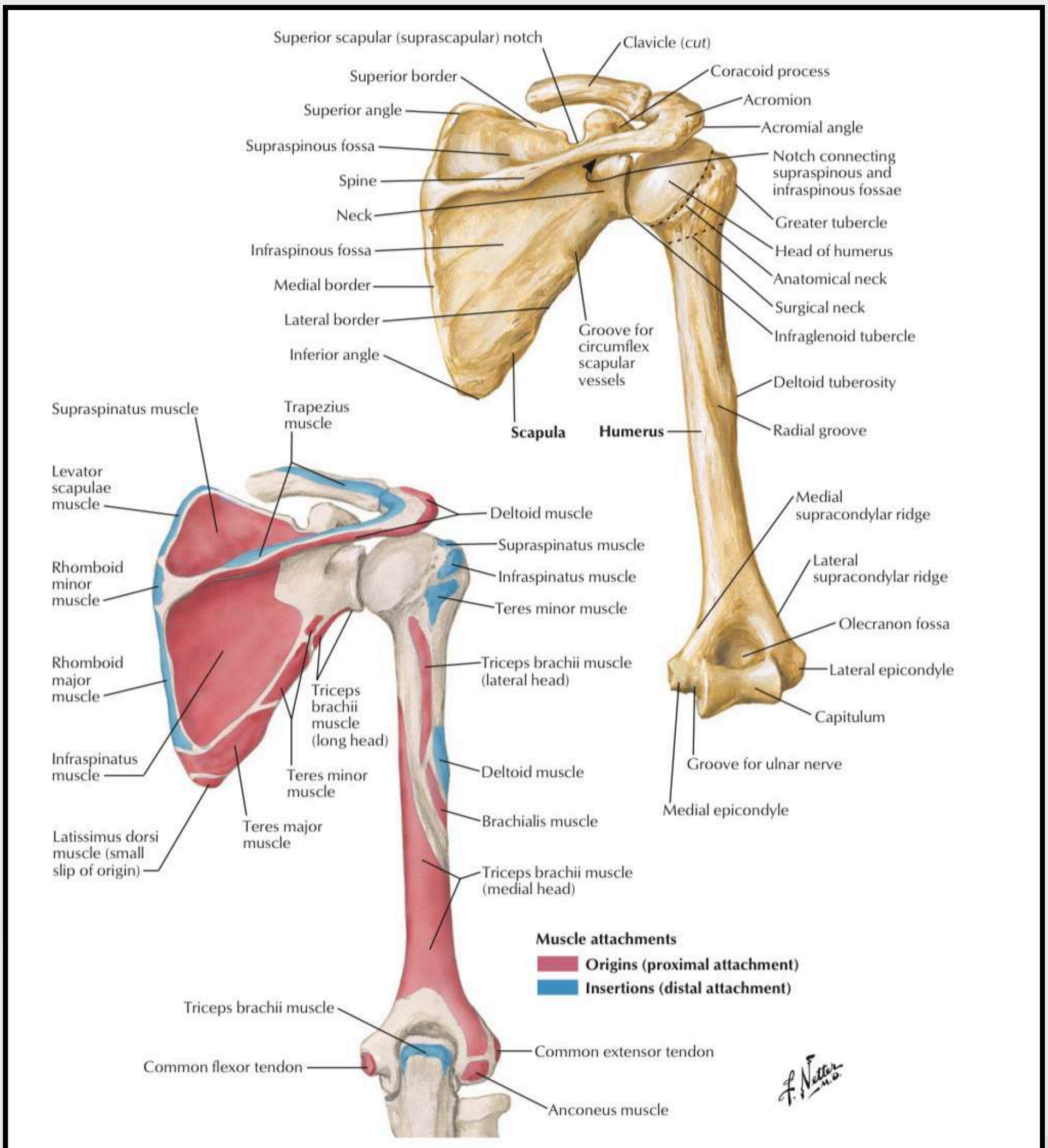
X Ray

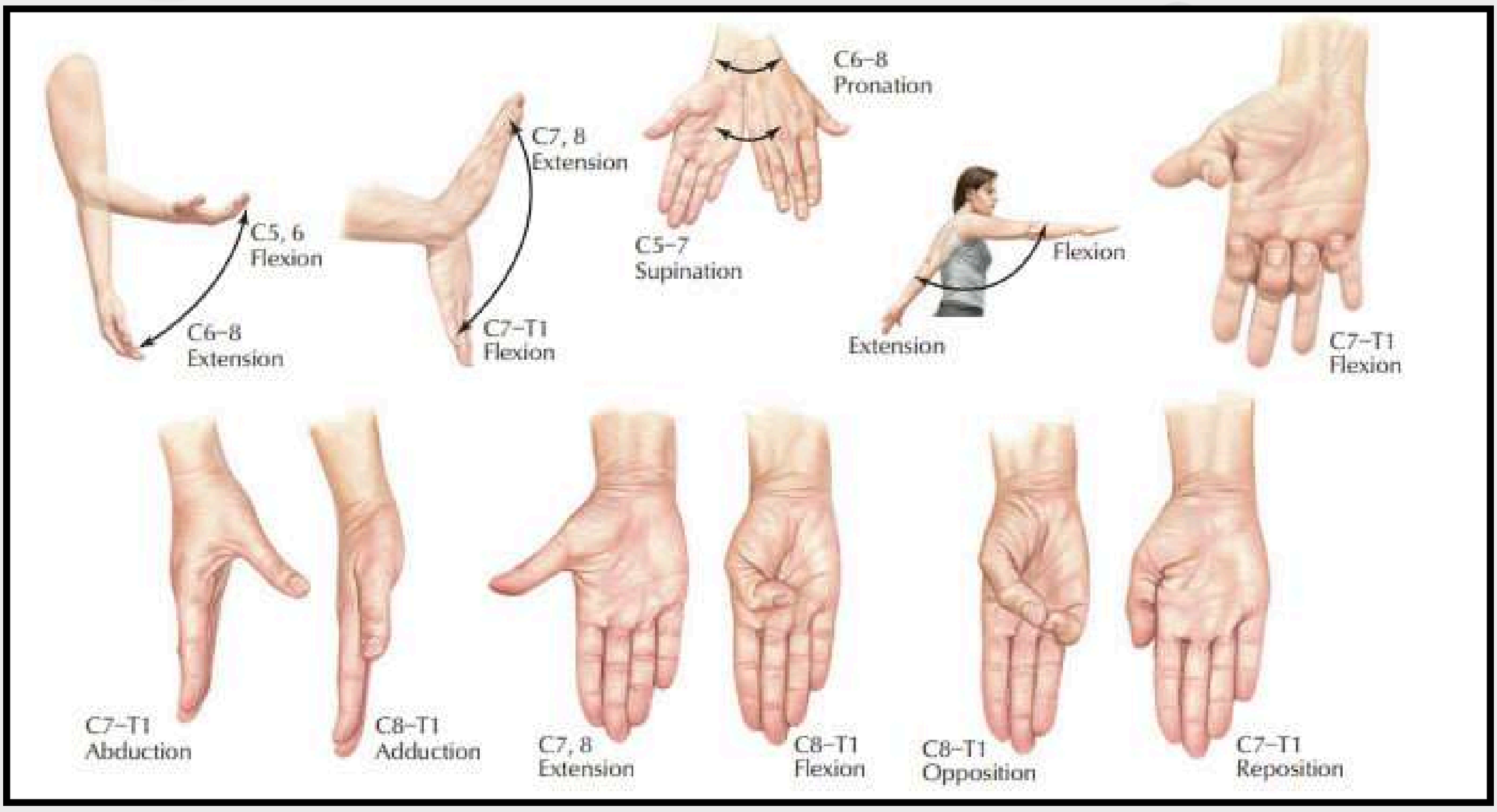


CT and MRI

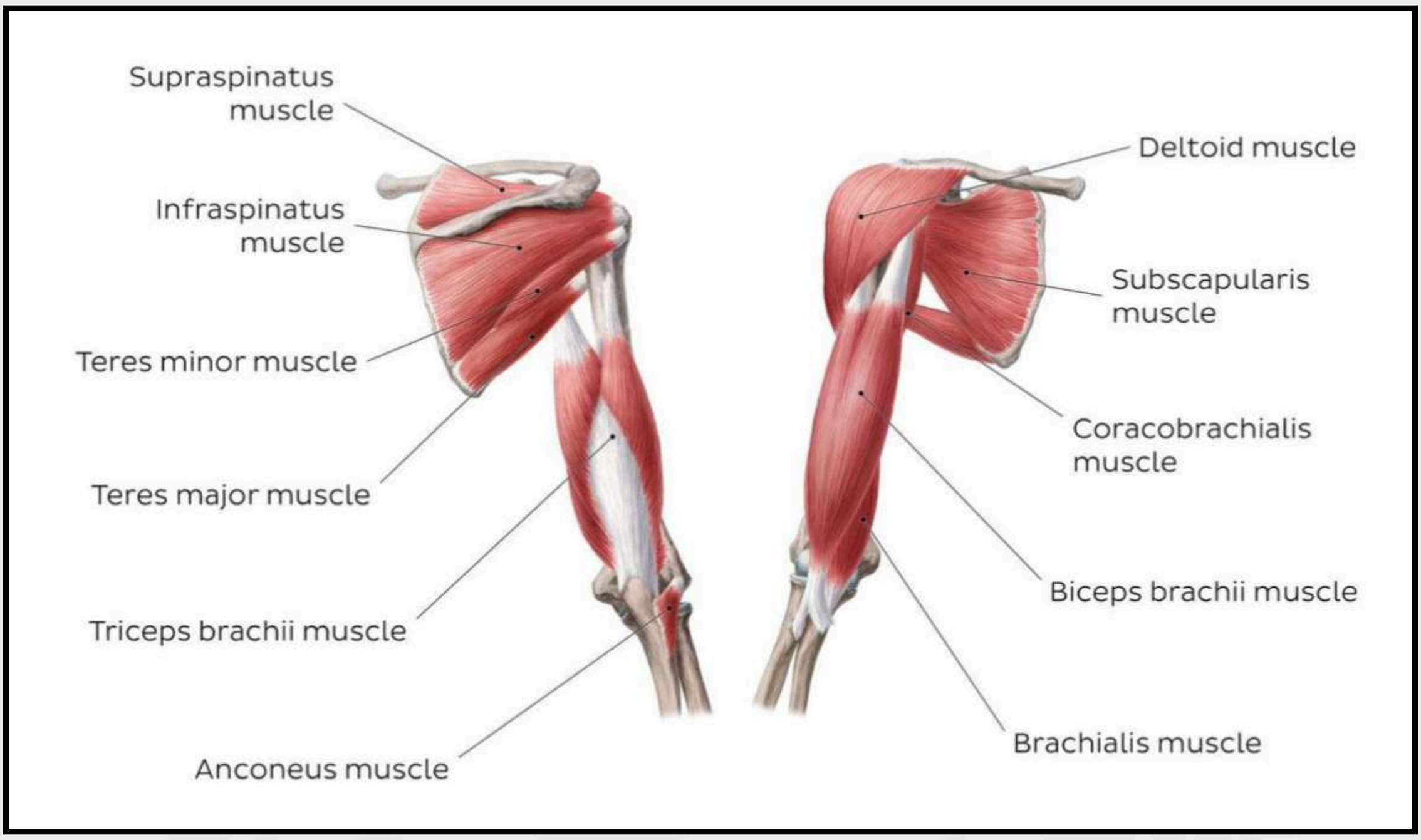


Upper limb


Superior scapular (suprascapular) notch
Clavicle (cut)
Superior border
Coracoid process
Superior angle
Acromion
Acromial angle
Supraspinous fossa
Notch connecting supraspinous and infraspinous fossae
Spine
Neck
Greater tubercle
Head of humerus
Infraspinous fossa
Anatomical neck
Medial border
Surgical neck
Lateral border
Infraglenoid tubercle
Groove for circumflex scapular vessels
Inferior angle
Deltoid tuberosity
Scapula
Humerus
Radial groove
Supraspinatus muscle
Trapezius muscle
Levator scapulae muscle
Deltoid muscle
Supraspinatus muscle
Infraspinatus muscle
Rhomboid minor muscle
Teres minor muscle
Medial supracondylar ridge
Lateral supracondylar ridge
Olecranon fossa
Rhomboid major muscle
Triceps brachii muscle (lateral head)
Lateral epicondyle
Capitulum
Triceps brachii muscle (long head)
Infraspinatus muscle
Deltoid muscle
Teres minor muscle
Groove for ulnar nerve
Medial epicondyle
Brachialis muscle
Teres major muscle
Latissimus dorsi muscle (small slip of origin)
Triceps brachii muscle (medial head)
Muscle attachments
Origins (proximal attachment)
Insertions (distal attachment)
Triceps brachii muscle
Common extensor tendon
Common flexor tendon
Anconeus muscle
F. Netter M.D.


C5, 6 Flexion
C6–8 Extension
C7, 8 Extension
C7–T1 Flexion
C6–8 Pronation
C5–7 Supination
Flexion
Extension
C7–T1 Flexion
C7–T1 Abduction
C8–T1 Adduction
C7, 8 Extension
C8–T1 Flexion
C8–T1 Opposition
C7–T1 Reposition

Upper limb

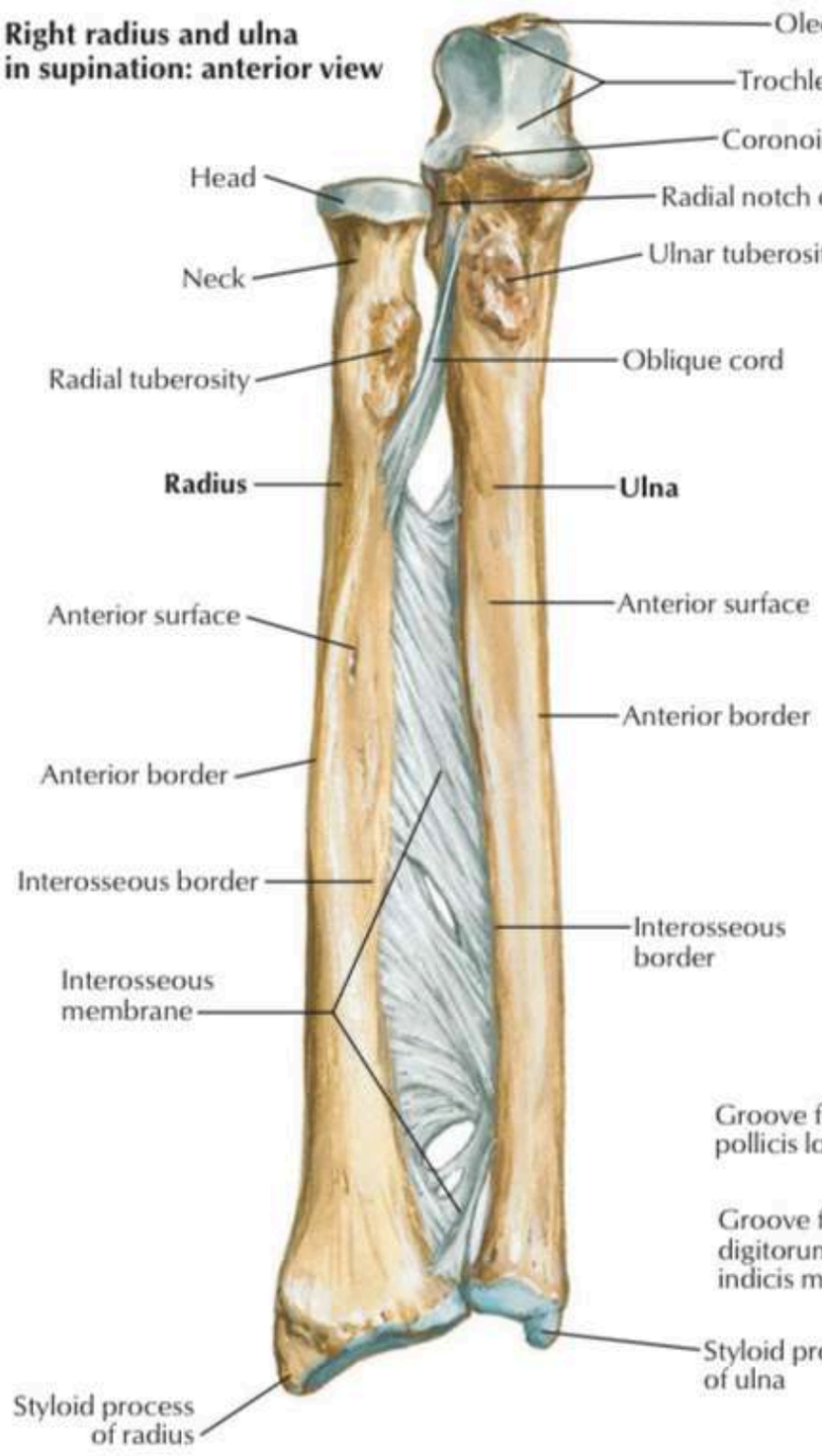


Other shoulder & arm muscles	Origin	Insertion	Innervation	Function
Deltoid	Clavicular part: Lateral third of clavicle Acromial part: Acromion of scapula Spinal part: Spine of scapula	Deltoid tuberosity of humerus	Axillary nerve (C5-C6)	Shoulder joint: Arm flexion, Arm internal rotation (clavicular part), Arm abduction (acromial part), Arm extension, Arm lateral rotation (spinal part)
Teres major	Inferior angle and lower part of lateral border of scapula	Crest of lesser tubercle of humerus (a.k.a. Medial lip of intertubercular sulcus)	Lower subscapular or thoracodorsal nerves (C5- C7)	Shoulder joint: Arm internal rotation, Arm extension, Arm adduction
Coracobrachialis	Coracoid process of scapula	Anteromedial surface of humeral shaft	Musculocutaneous nerve (C5 - C6)	Shoulder joint: Arm flexion, Arm adduction
Biceps brachii	Long head: Supraglenoid tubercle of scapula Short head: Coracoid process of scapula	Radial tuberosity of radius		Elbow joint: Forearm flexion and supination; Shoulder joint: Weak arm flexion
Brachialis	Distal half of anterior surface of humerus	Ulnar tuberosity, Coronoid process of ulna	Musculocutaneous nerve Radial nerve (C5-C7)	Elbow joint: Forearm flexion (in all positions)
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)	Olecranon of ulna and fascia of forearm	Radial nerve (C6 - C8)	Shoulder joint: Arm extension and adduction (long head); Elbow joint: Forearm extension
Anconeus	Lateral epicondyle of humerus	Lateral surface of olecranon	Radial nerve (C7, C8)	Elbow joint: Assists in forearm extension; Stabilization of elbow joint

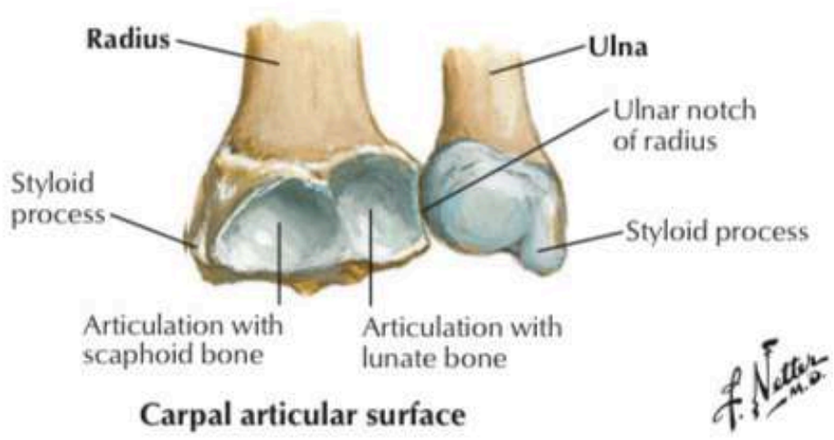
Bones of Forearm

See also Plate 440

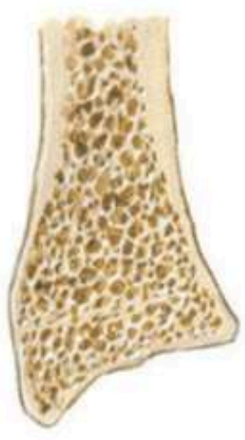
Right radius and ulna in supination: anterior view



Right radius and ulna in pronation: anterior view

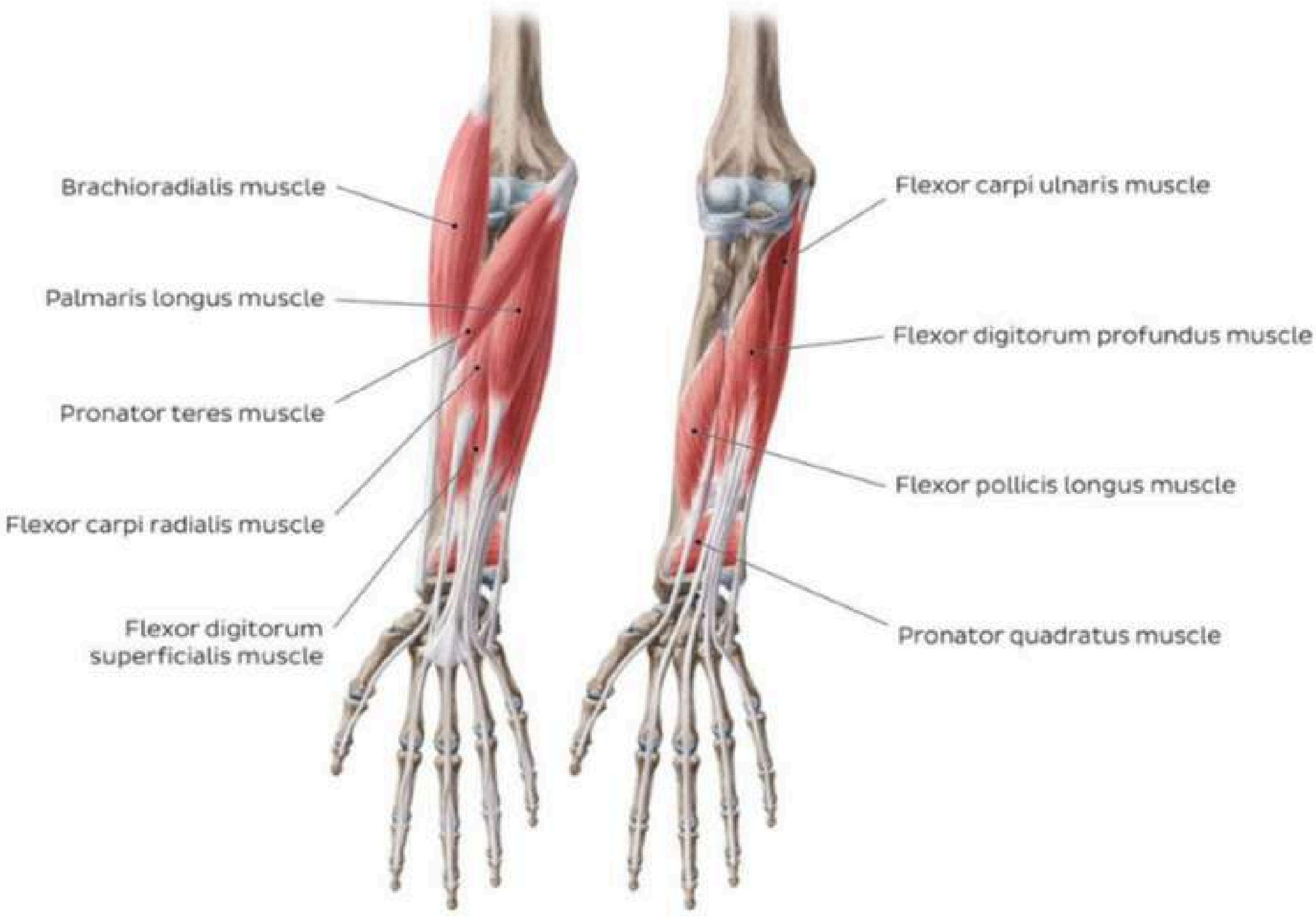


Carpal articular surface



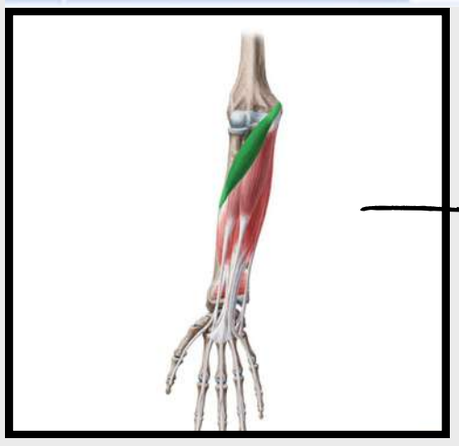
Coronal section of radius demonstrates how thickness of cortical bone of body of radius diminishes to thin layer over cancellous bone at distal end

Forearm muscles

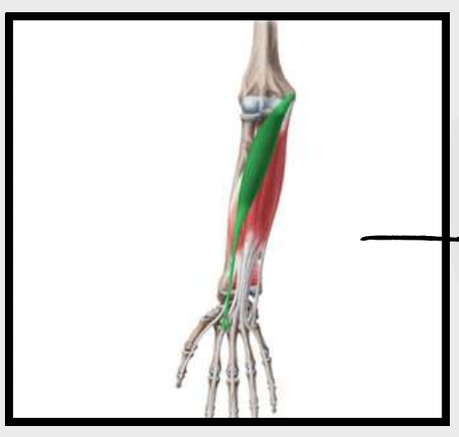


Anterior compartment		Origin	Insertion	Innervation	Function
Superficial group	Pronator teres	Humeral head: Medial supracondylar ridge of humerus Ulnar head: Coronoid process of ulna	Lateral surface of radius (distal to supinator)	Median nerve (C6, C7)	Elbow joint: Forearm flexion; Proximal radioulnar joint: Forearm pronation
	Flexor carpi radialis	Medial epicondyle of humerus	Bases of metacarpal bones 2-3		Wrist joint: Wrist flexion, Wrist abduction
	Flexor carpi ulnaris	Medial epicondyle of humerus, Olecranon and posterior border of ulna	Pisiform bone, Hamate bone, Base of metacarpal bone 5	Ulnar nerve (C7-T1)	Wrist joint: Wrist flexion, Wrist adduction
	Palmaris longus	Medial epicondyle of humerus	Flexor retinaculum, Palmar aponeurosis	Median nerve (C7, C8)	Wrist joint: Wrist flexion; Tenses palmar aponeurosis
	Flexor digitorum superficialis	Humeroulnar head: Medial epicondyle of humerus , Coronoid process of ulna Radial head: Proximal half of anterior border of radius	Sides of middle phalanges of digits 2-5	Median nerve (C8, T1)	Metacarpophalangeal and proximal interphalangeal joints 2-5: Finger flexion
Deep group	Flexor digitorum profundus	Proximal half of anterior surface of ulna, Interosseous membrane	Palmar surfaces of distal phalanges of digits 2-5	Digits 2-3: Median nerve (anterior interosseous nerve); Digits 4-5: Ulnar nerve (C8, T1)	Metacarpophalangeal and interphalangeal joints 2-5: Finger flexion
	Flexor pollicis longus	Anterior surface of radius and interosseous membrane	Palmar surface of distal phalanx of thumb	Median nerve (anterior interosseous nerve) (C7, C8)	Metacarpophalangeal and interphalangeal joint 1: Thumb flexion
	Pronator quadratus	Distal anterior surface of ulna	Distal anterior surface of radius		Proximal radioulnar joint: Forearm pronation

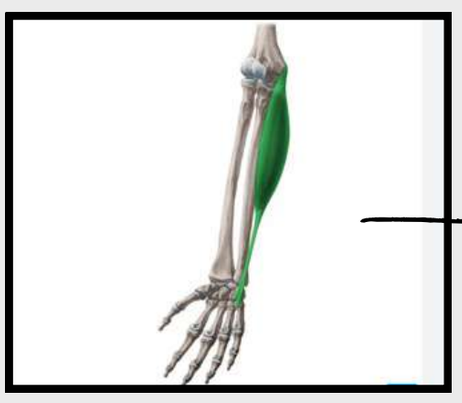
Superficial group



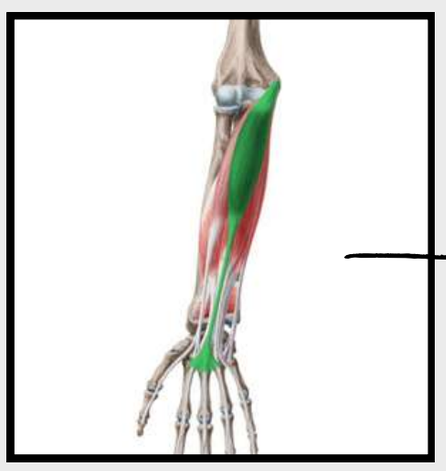
Pronator teres : Anterior Ulnar recurrent artery



flexor carpi radialis : Radial artery



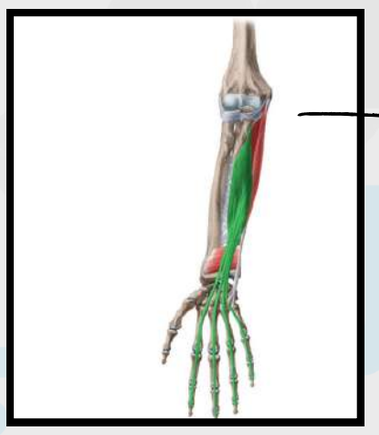
Flexor carpi ulnaris : posterior Ulnar recurrent artery



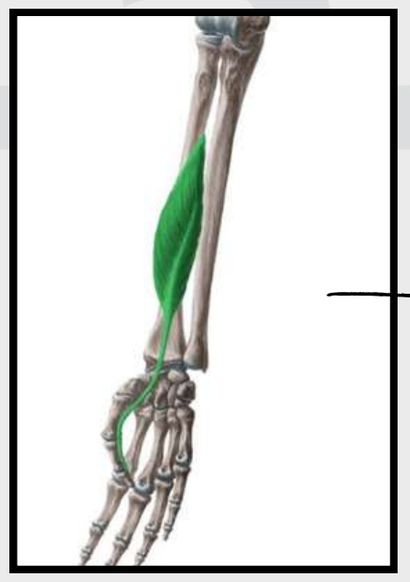
palmris longus : posterior Ulnar recurrent artery

Flexor digitorum superficialis : Anterior interosseous , muscular branch of ulnar artery

Deep group

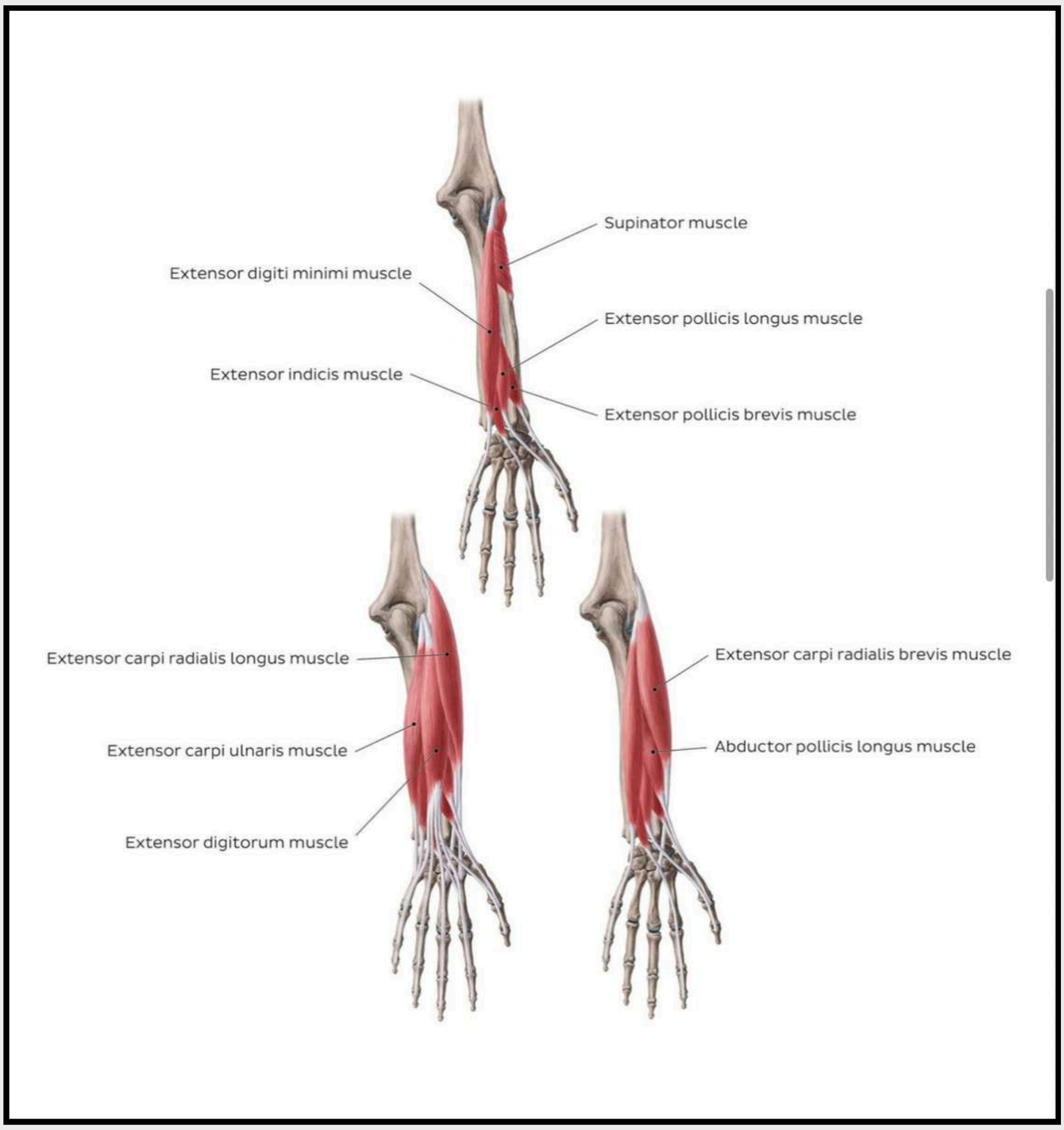


Flexor digitorum profundus:anterior interosseous artery and branches of the ulnar artery



flexor pollicus longus : Medial part: anterior interosseous artery (ulnar artery);
lateral part: radial artery

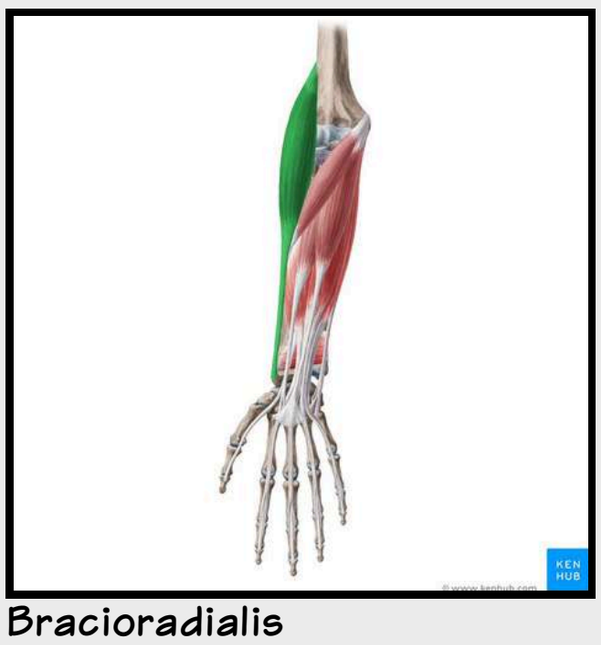
Pronator quadratus : Anterior interosseous artery



Posterior compartment muscles		Origin	Insertion	Innervation	Function
Radial group	Brachioradialis	Lateral supracondylar ridge of humerus, Lateral intermuscular septum of arm	(Proximal to) Styloid process of radius	Radial Nerve (C5- C8)	Elbow joint: Forearm flexion (when semi pronated)
	Extensor carpi radialis longus		Posterior aspect of base of metacarpal bone 2		Wrist joints: Hand extension, Hand abduction (radial deviation)
	Extensor carpi radialis brevis	Lateral epicondyle of humerus (common extensor tendon)	Posterior aspect of base of metacarpal bone 3		
Superficial group	Extensor digitorum		Extensor expansions of digits 2-5	Posterior interosseous nerve (C7, C8)	Metacarpophalangeal / Interphalangeal joints 2-5: Finger extension
	Extensor digiti minimi		Extensor expansion of digit 5		Metacarpophalangeal joint 5: Finger extension
	Extensor carpi ulnaris	Lateral epicondyle of humerus, Posterior border of the ulna	Base of metacarpal bone 5		Wrist joint: Hand extension and adduction
Deep group	Supinator	Lateral epicondyle of humerus, Radial collateral ligament, Anular ligament, Supinator crest of ulna	Lateral, posterior, and anterior surfaces of proximal third of radius		Proximal radioulnar joint: Forearm supination
	Abductor pollicis longus	Posterior surface of proximal half of radius, ulna and interosseus membrane	Base of metacarpal bone 1, (Trapezium Bone)		Radiocarpal joint: Hand abduction (radial deviation); Carpometacarpal joint of thumb: Thumb abduction and extension
	Extensor pollicis longus	Posterior surface of middle third of ulna and interosseus membrane	Posterior aspect of base of distal phalanx of thumb		Wrist joints: Weak hand extension Metacarpophalangeal and interphalangeal joint of thumb: Thumb extension
	Extensor pollicis brevis	Posterior surface of distal third of radius and interosseus membrane	Posterior aspect of base of proximal phalanx of thumb		Carpometacarpal and Metacarpophalangeal joint 1: Thumb extension
	Extensor indicis	Posterior surface of distal third of ulna and interosseus membrane	Extensor expansion of index finger		Wrist joints: Weak hand extension Metacarpophalangeal and interphalangeal joints of index finger: Finger extension

Blood supply

Radial group



Bracioradialis

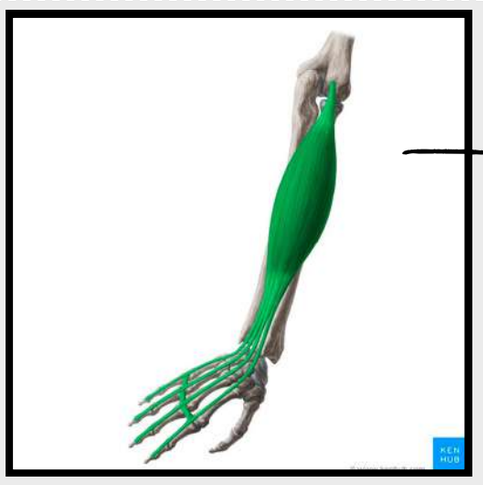
Blood supply :Radial artery, radial recurrent arteries, radial collateral artery

Extensor carpi radialis longus

Blood supply :Radial artery, radial recurrent arteries, radial collateral artery

Extensor carpi radials brevis

Blood supply :Radial recurrent artery, radial artery, deep brachial artery



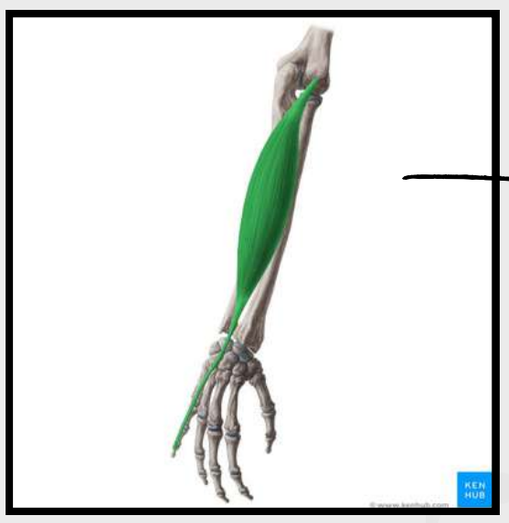
Superficial group

Extensor digitorum

,Posterior interosseous artery

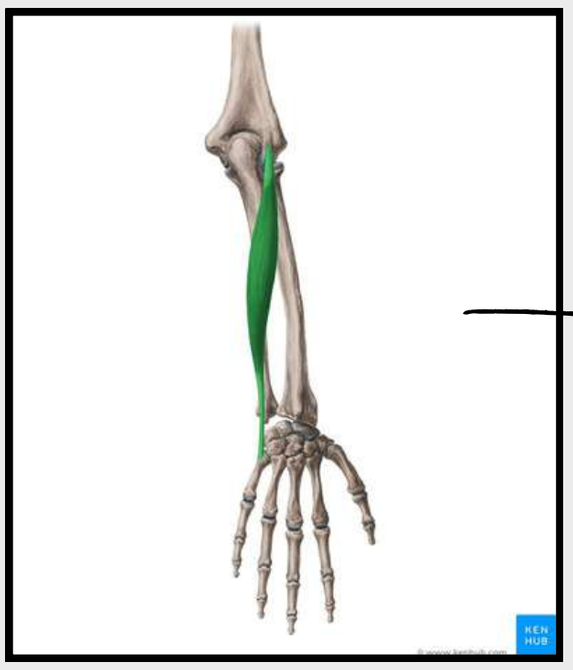
,radial recurrent artery

: anterior interosseous artery



Extensor digiti minimi

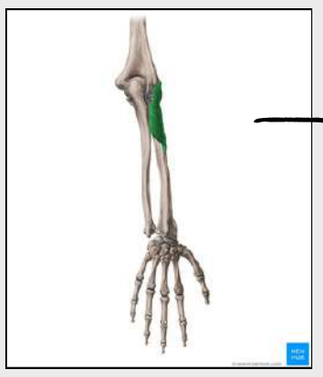
,Radial recurrent artery, anterior interosseous artery posterior interosseous artery



Extensor carpi ulnaris

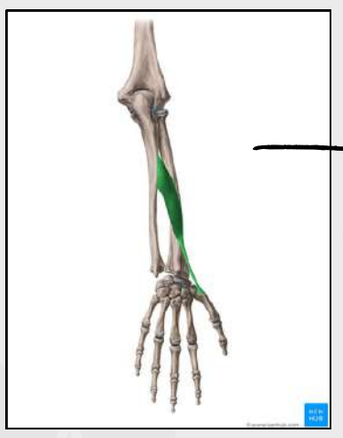
,Radial recurrent artery posterior interosseous artery

Deep group



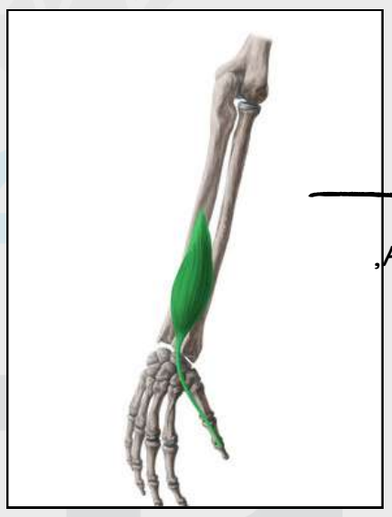
Supinator

,Radial recurrent artery posterior interosseos artery posterior interosseos recurrent artery



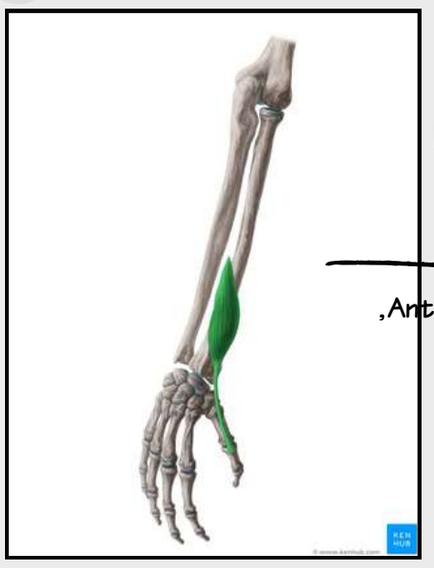
Abductor pollicis longus

,Anterior interosseous artery posterior interosseous artery



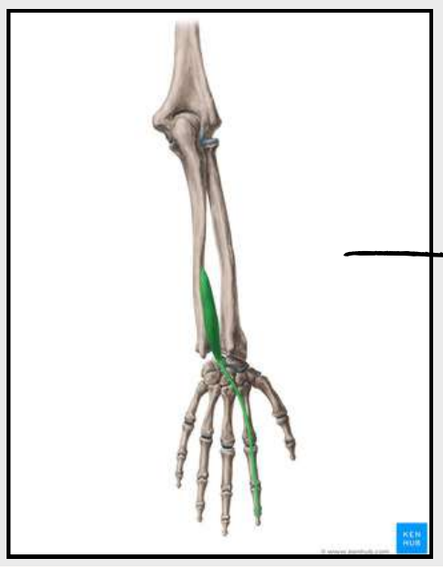
Extensor pollicis longus

,Anterior interosseous artery posterior interosseous artery



Extensor pollicis brevis

,Anterior interosseous artery posterior interosseous artery



Extensor indicis

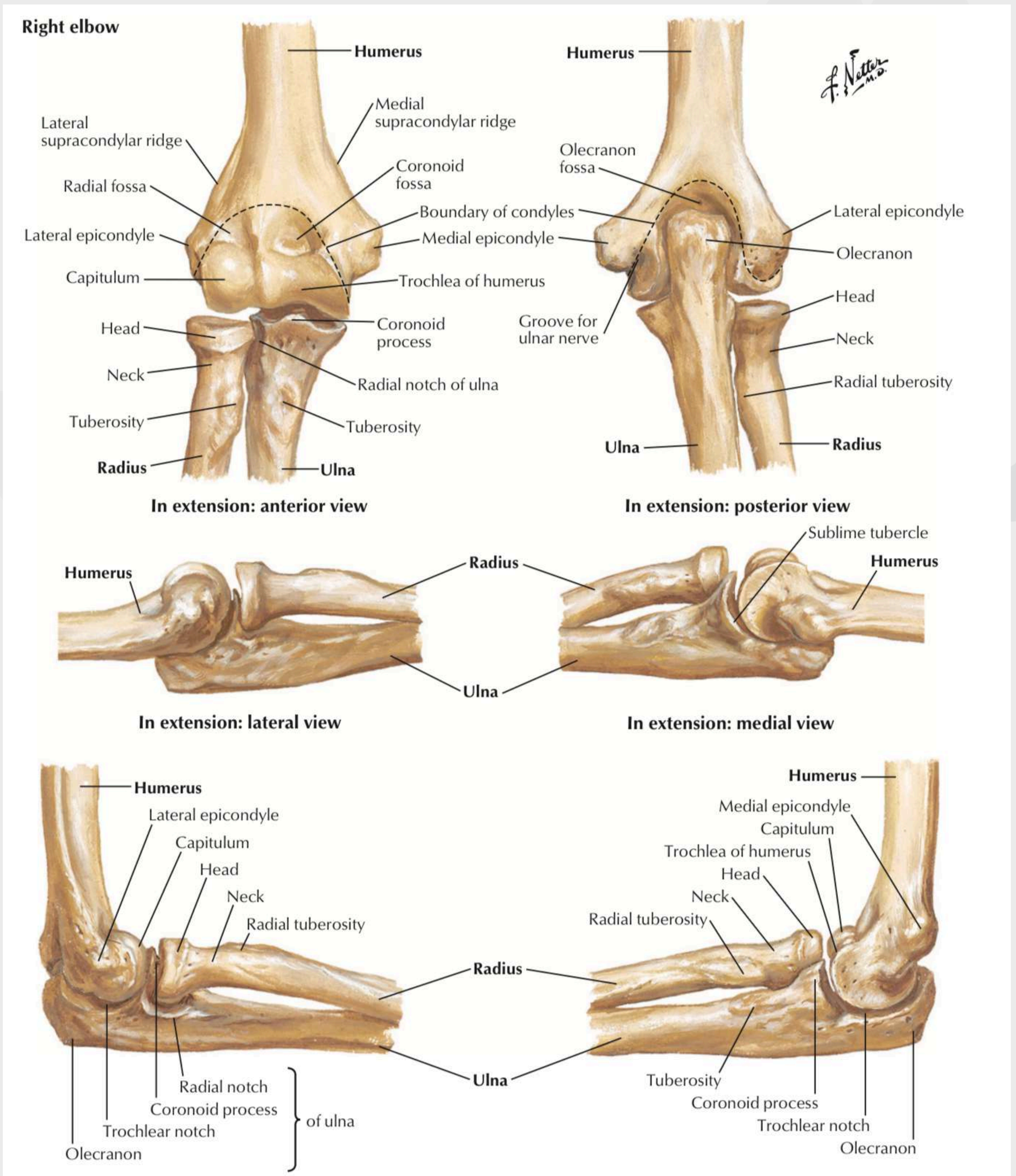
Posterior

and anterior interosseous artery

Elbow

Key points about the elbow joint	Table quiz
Bones	Humerus, radius, ulna
Joints	Humeroulnar joint, humeroradial joint, proximal radioulnar joint
Ligaments	Ulnar collateral ligament, radial collateral ligament, anular ligament of radius
Movements	Flexion, extension, supination, pronation

Composed of 3 joints:
1-Joint between the trochlea (humeral) and the ulnar notch
2-Joint between the capitulum (humeral) and head of the radius.
3-Proximal radioulnar joint which controls the pronation/supination movements and has the attachments of the annular ligaments.



Elbow

Muscles of the Elbow

Elbow flexion (bending)

- **Biceps brachii**: musclecutaneous nerve
- **Brachialis** musclecutaneous
- **Brachioradialis** radial nerve

Pronation

- **Pronator teres** median nerve
- **Pronator quadratus** anterior interosseous nerve

Elbow extension (straightening)

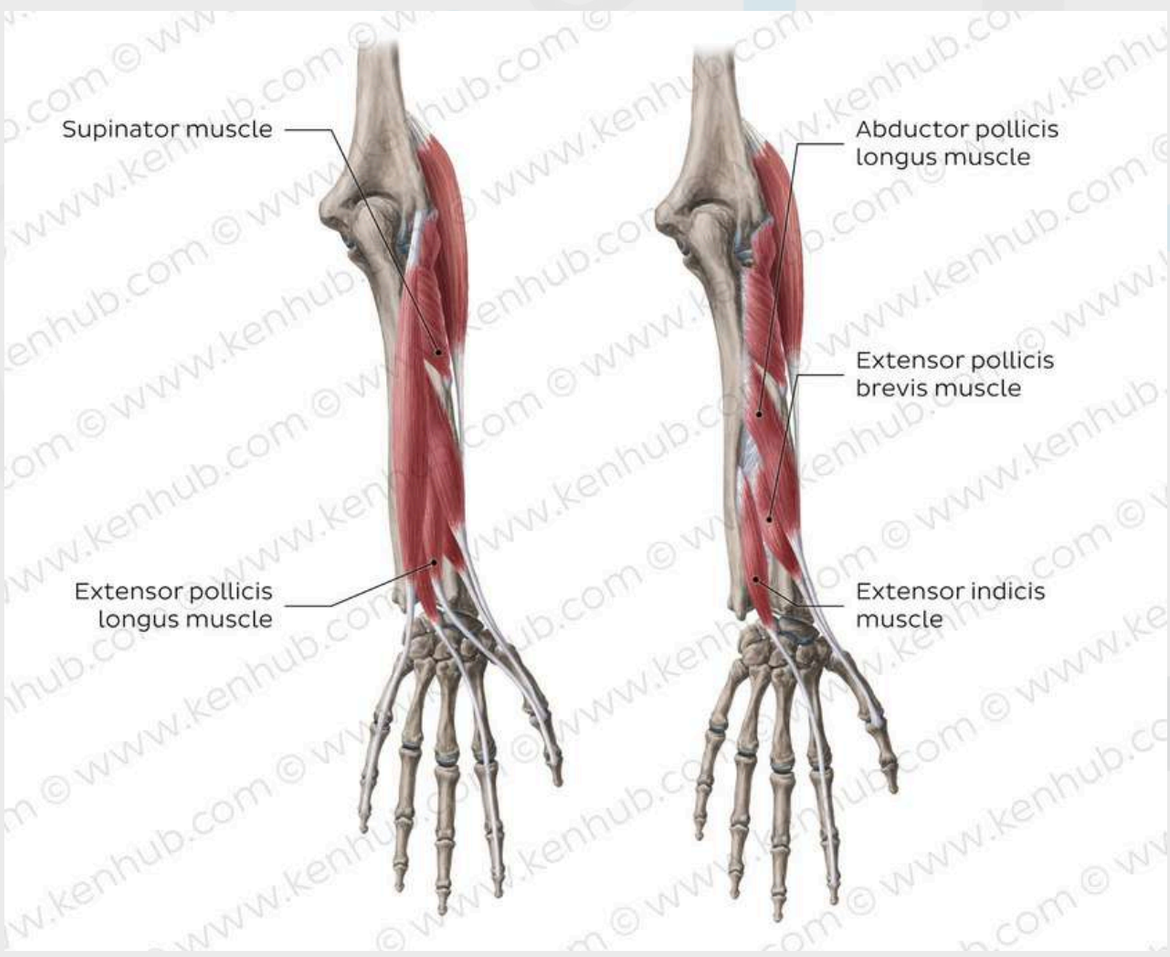
- **Triceps brachii** radial nerve
- **Anconeus** radial nerve

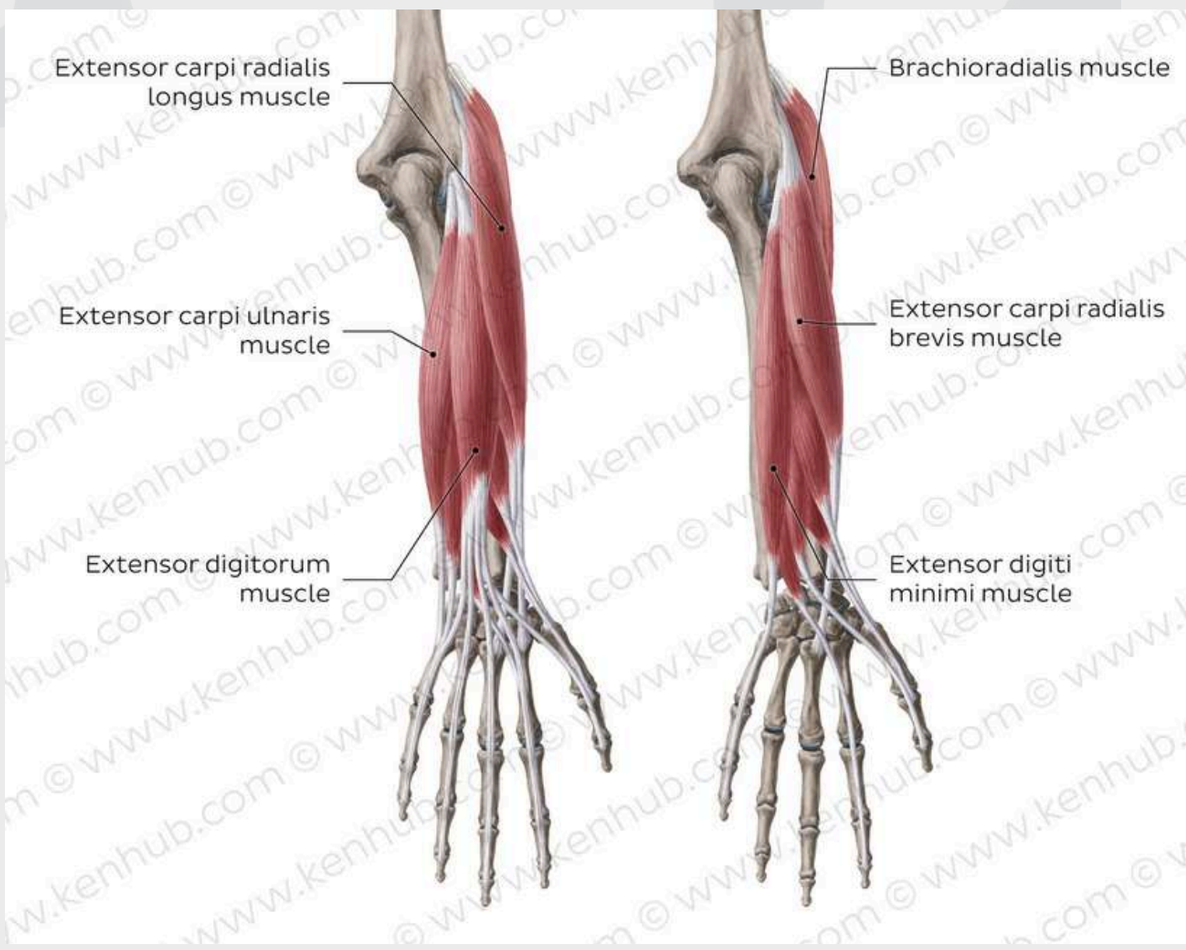
Supination

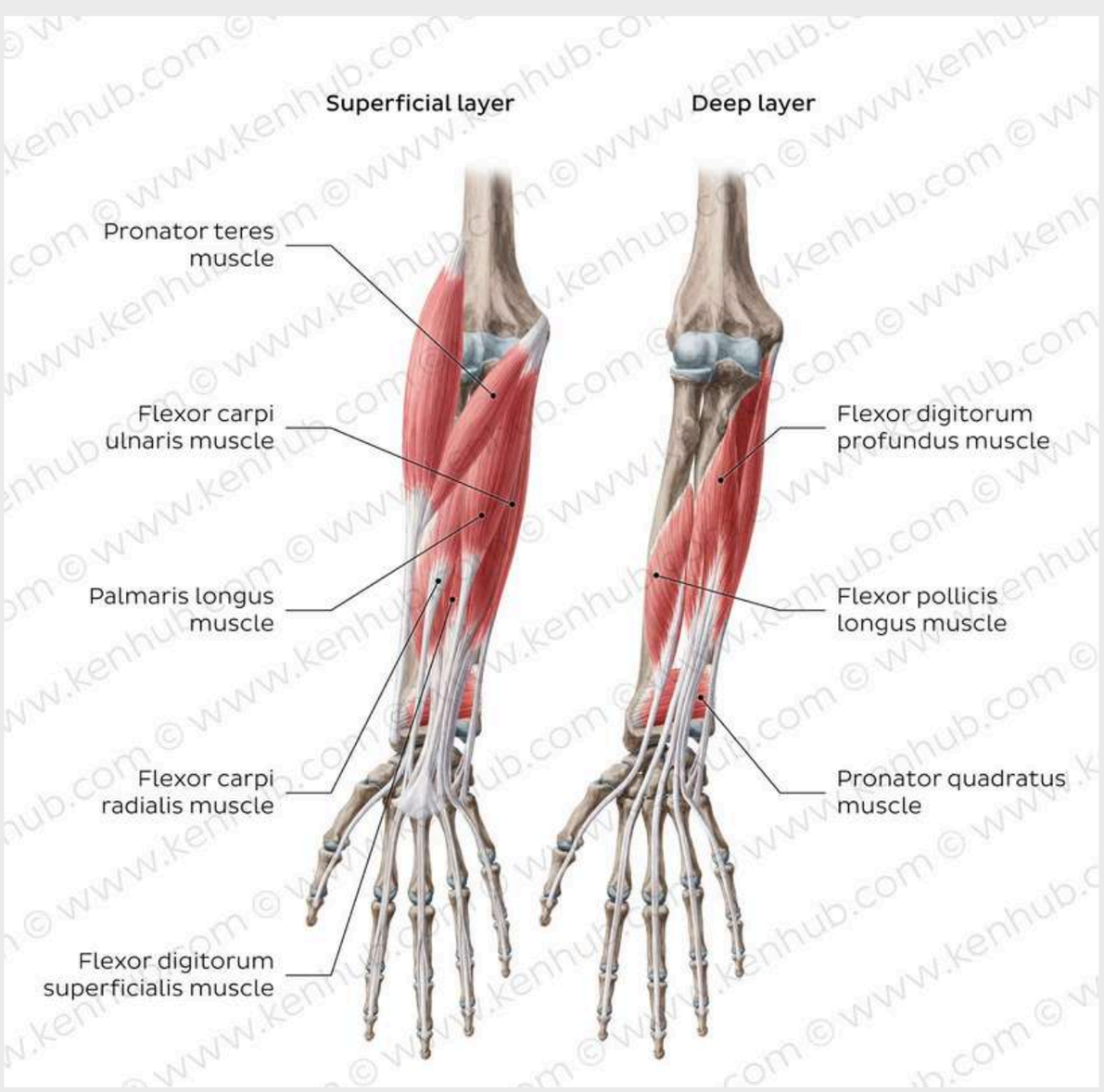
- **Supinator** Deep branch of Radial / Posterior interosseous nerve
- **Biceps brachii** Musculocutaneous nerve

Additional (crossing the elbow)

- **Flexor carpi radialis →** Median nerve
- **Flexor carpi ulnaris →** Ulnar nerve
- **Palmaris longus →** Median nerve
- **Flexor digitorum superficialis →** Median nerve
- **Extensor carpi radialis longus →** Radial nerve
- **Extensor carpi radialis brevis →** Deep branch of radial nerve / Posterior interosseous nerve
- **Extensor carpi ulnaris →** Posterior interosseous nerv



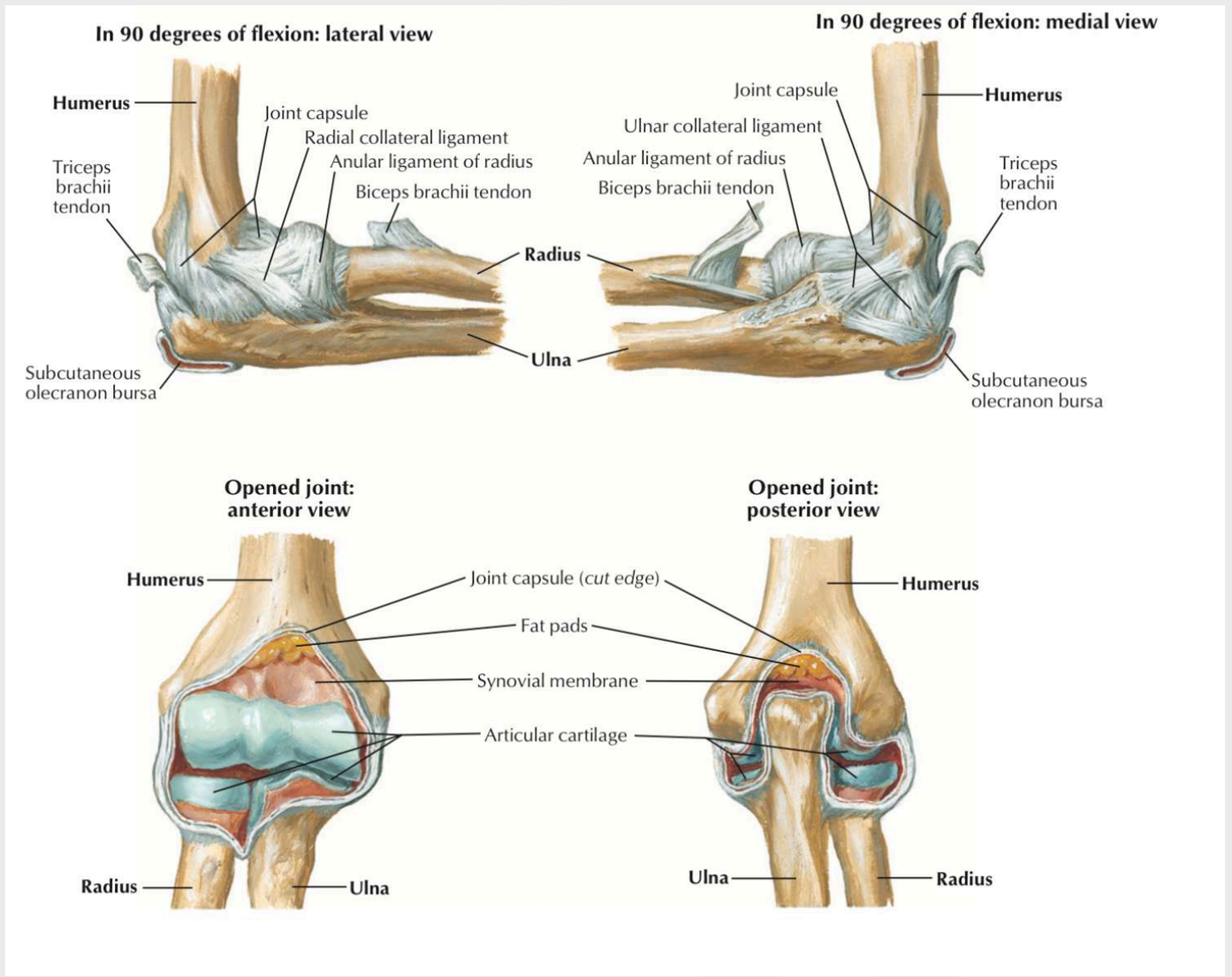


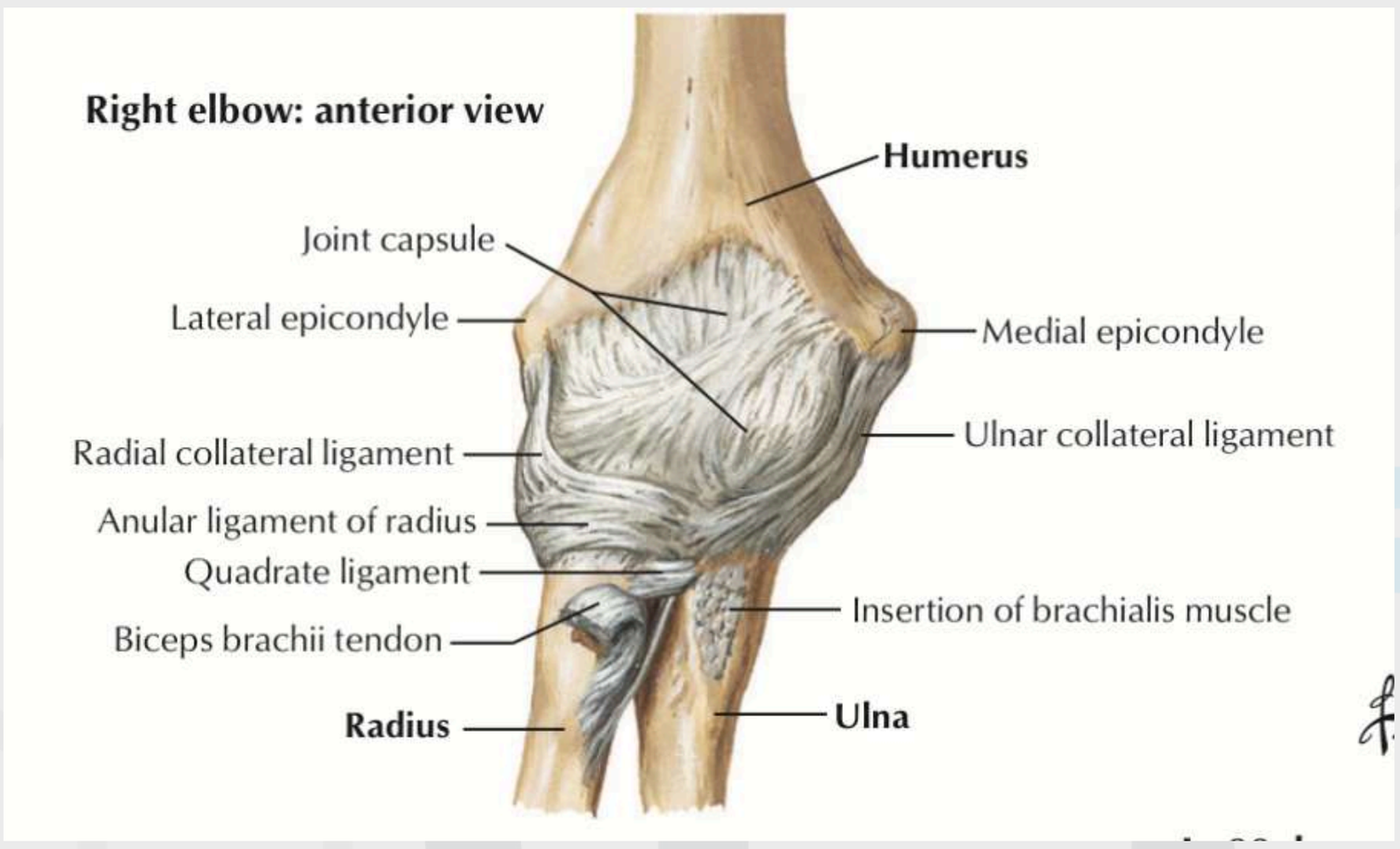


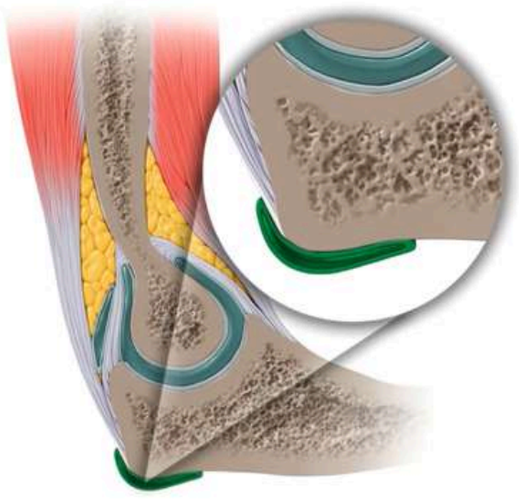
Elbow

There are three main ligaments that support the elbow joint:

- **the ulnar collateral ligament**
- **radial collateral ligament**
- **anular ligament**







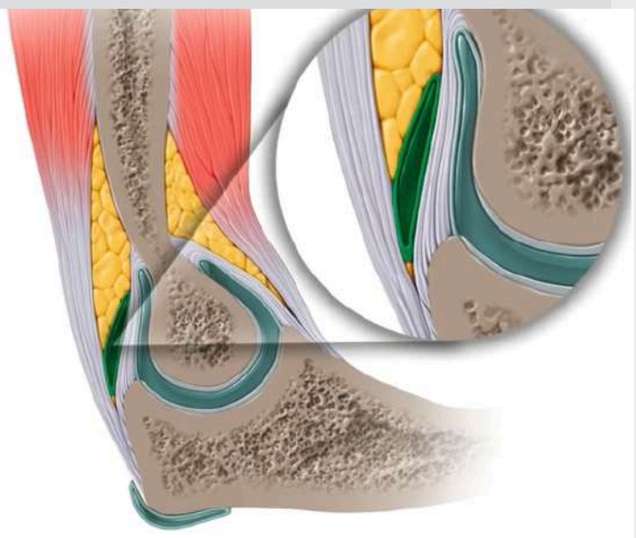
Elbow joint

Synovial bursae:

Olecranon bursa

Latin

Bursa olecrani

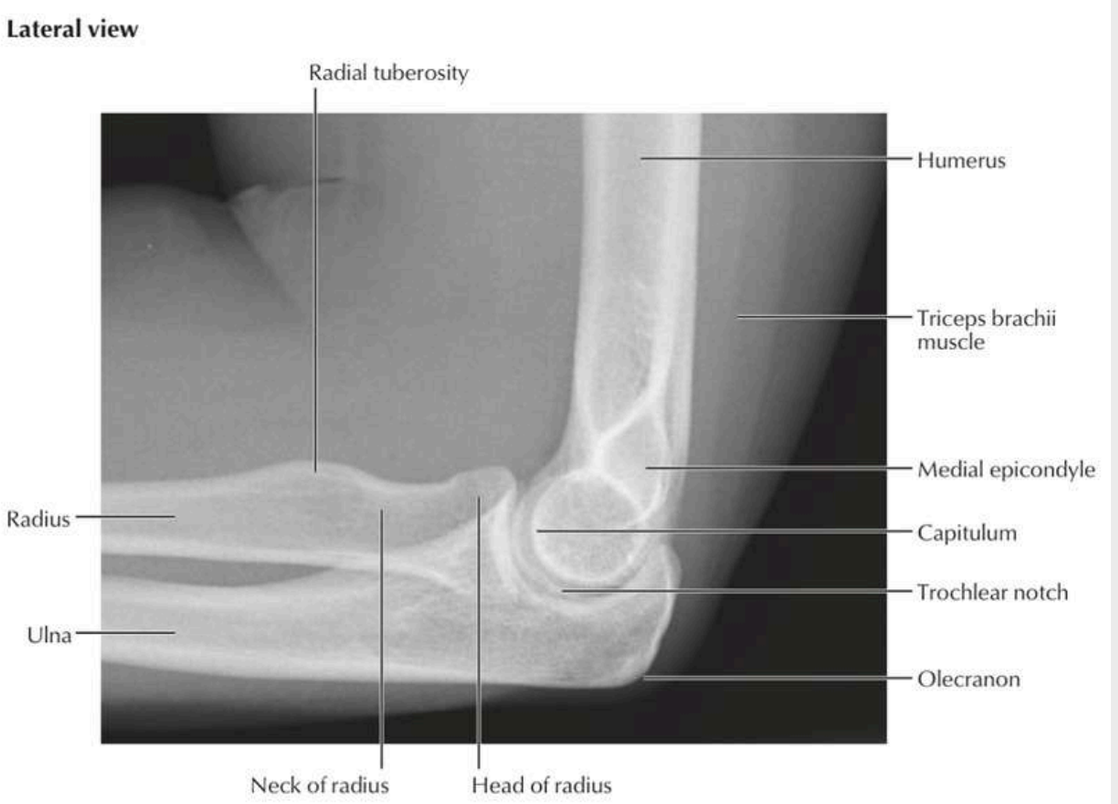


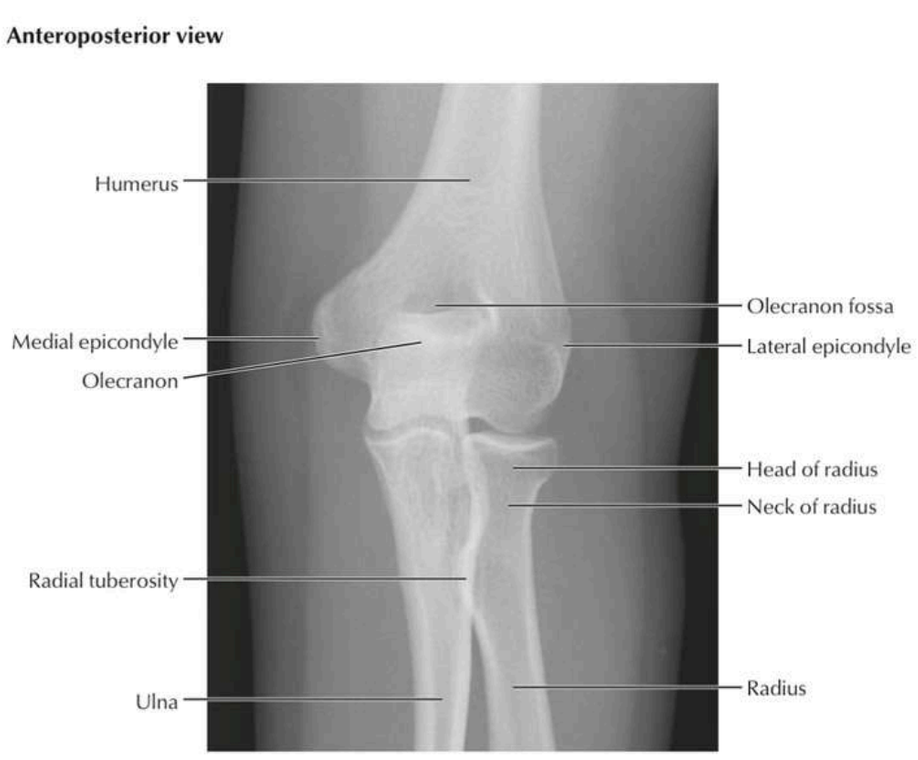
Synovial bursae:

Subtendinous bursa of triceps brachii

Latin

Bursa subtendinea musculi tricipitis brachii



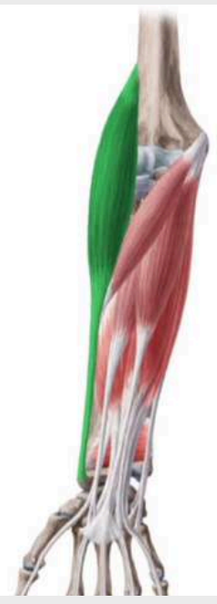


cubital fossa

The anterior of the elbow is called the cubital fossa, in which, besides the joint, are found important nerves and vessels intended for the supply of both the forearm and hand

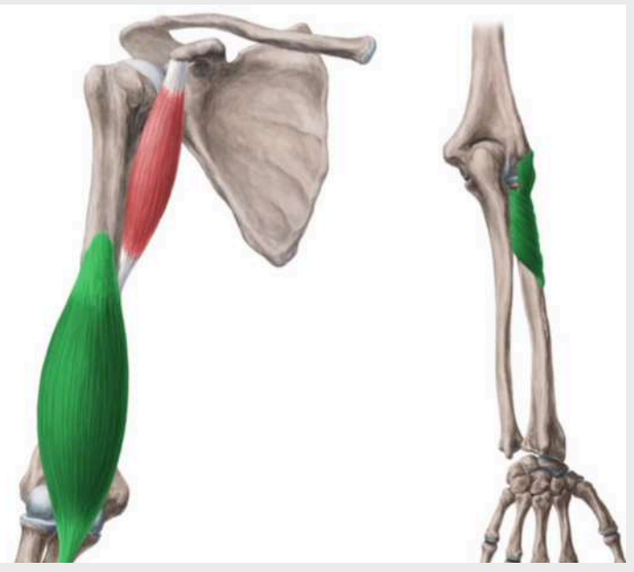
Lateral border

Medial border of the brachioradialis muscle.



Floor

Brachialis
Supinator muscles



Medial border

Lateral border of the pronator teres muscle.

Superior border

Between the epicondyles of the humerus.

Definition	The cubital fossa is a triangularly-shaped area situated on most proximal part of the ventral surface of forearm
Boundaries	**Superior border**: Imaginary line joining the epicondyles of the humerus **Medial border**: pronator teres muscle **Lateral border**: brachioradialis muscle **Apex**: pronator teres and brachioradialis muscles **Roof**: skin, fascia of forearm, bicipital aponeurosis **Floor**: brachialis muscle, supinator muscle
Contents	**M**edian nerve, **B**rachial artery, **T**endon of biceps brachii, **R**adial nerve *Mnemonic:* **M**y **B**lood **T**urns **R**ed
Clinical points	Venipuncture, blood pressure measurements

Contents (lateral → medial):

- Radial nerve (divides into superficial & deep branches)
- Biceps tendon
- Brachial artery (with bifurcation to radial & ulnar)
- Median nerve

Clinical relevance:

- Site for venepuncture (median cubital vein overlying)
- Biceps reflex testing
- Access for arterial blood sampling

Wrist

The wrist complex is a complicated structure and is mainly made up of:

- **the wrist joint (radiocarpal joint)**
- **the midcarpal joint**

(The wrist has two degrees of freedom[11], although some say three degrees of freedom because they include the movements of pronation and supination[8], which occur at the the radioulnar joint.)

✓Radiocarpal joint

The radiocarpal joint is a synovial joint formed between the radius, its articular disc and three proximal carpal bones; the scaphoid, lunate and triquetral bones.

Key facts about the radiocarpal joint	Table quiz
Type	Synovial ellipsoid joint;
Articular surfaces	Proximal component - distal end of radius, articular disc Distal component - scaphoid, lunate and triquetral of the proximal row of carpal bones (also includes triangular fibrocartilage complex)
Ligaments	Palmar radiocarpal joint, dorsal radiocarpal ligament, ulnar collateral ligament, radial collateral ligament
Innervation	Anterior interosseous nerve arising from median nerve (C5-T1) Posterior interosseous nerve arising from radial nerve (C7-C8) Deep and dorsal branches of the ulnar nerve (C8-T1)
Blood supply	Branches of the dorsal and palmar carpal arches
Movements	Flexion, extension, adduction and abduction

✓Midcarpal joint

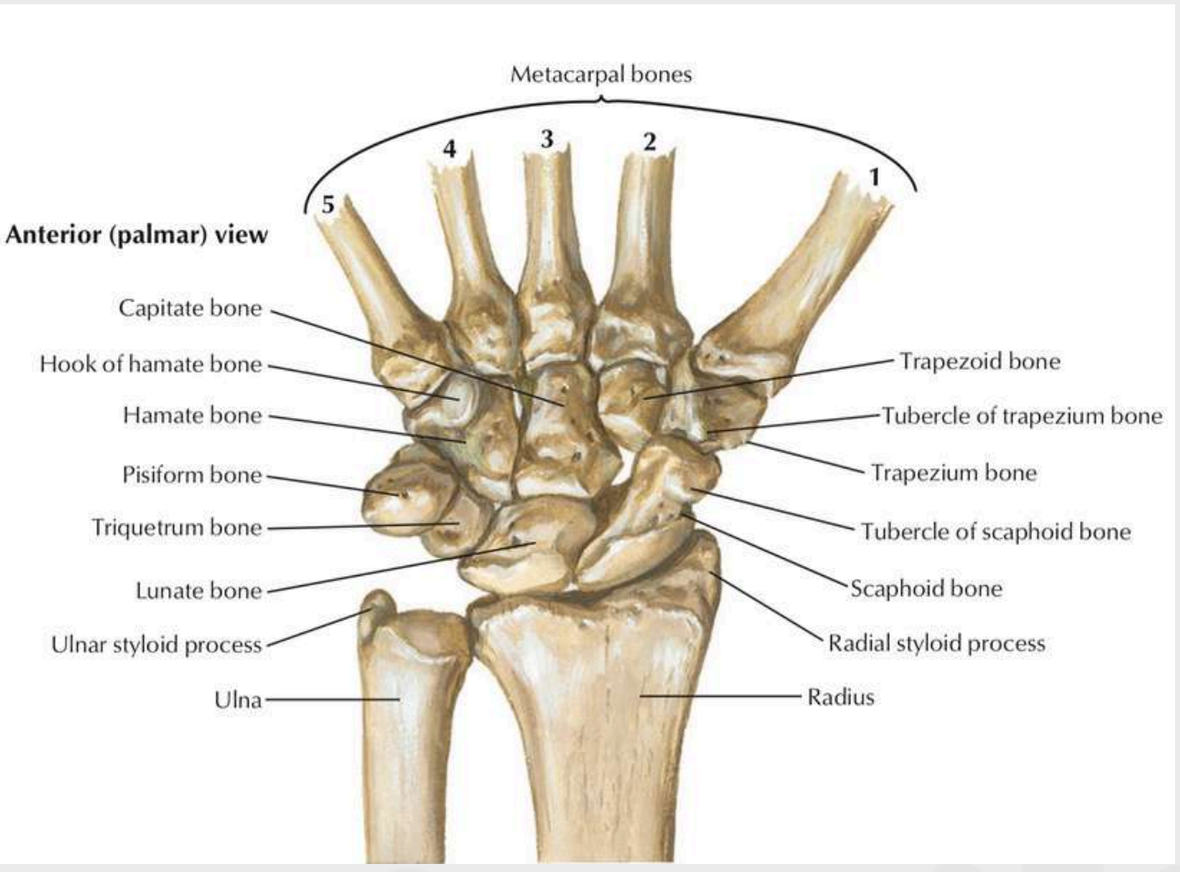
The midcarpal joint allows augmentation of the movements at the wrist joint when it has reached its limit. These movements include flexion, extension, abduction and adduction of the wrist (movements that occur at both the wrist and midcarpal joint take place at the same time).

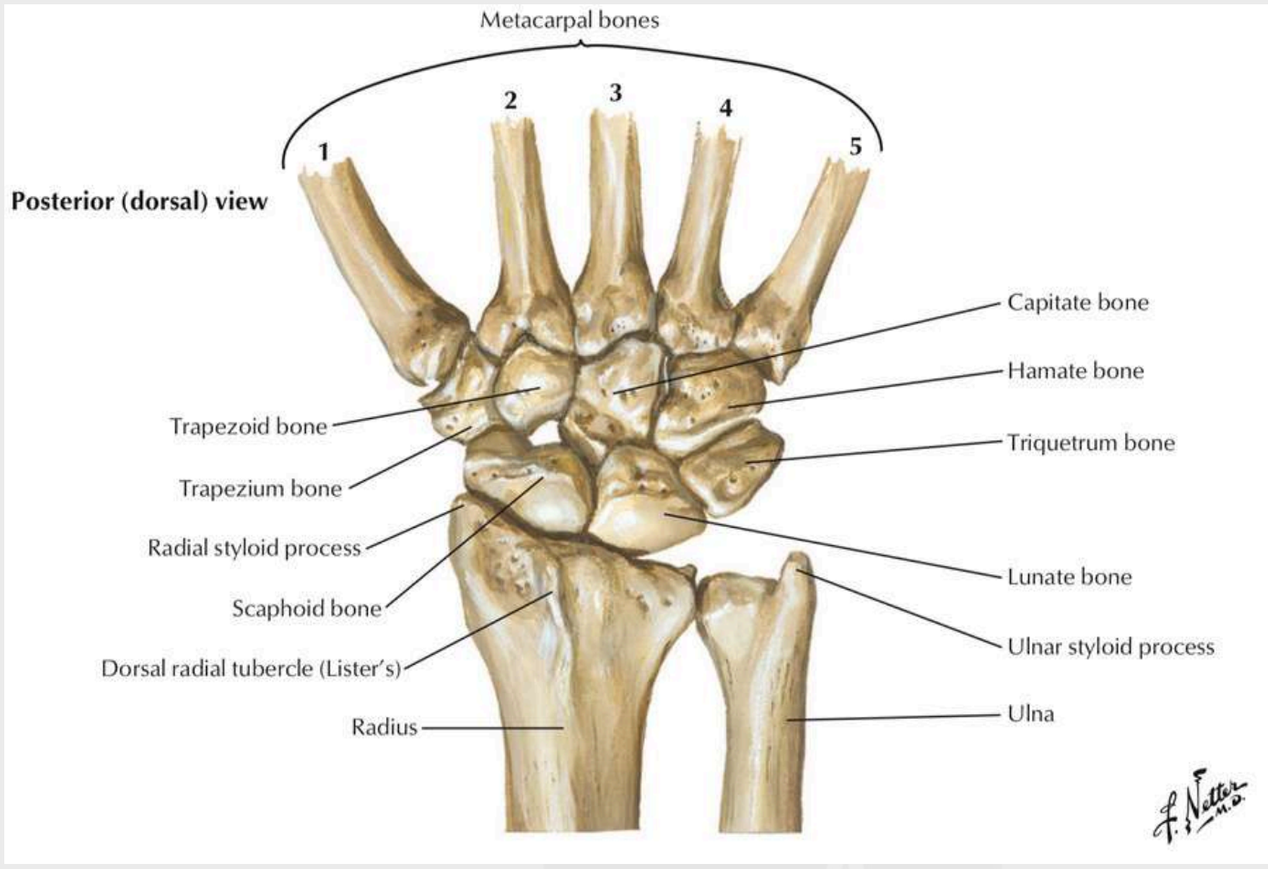
Key facts about the midcarpal joint	Table quiz
Articulations	Articulation between the proximal and distal row of carpal bones *Mnemonic:* '**S**ally **L**eft **T**he **P**arty **T**o **T**ake **C**athy **H**ome' (**S**caphoid, **L**unate, **T**riquetrum, **P**isiform, **T**rapezium **T**rapezoid, **C**apitate, **H**amate)
Joint capsule	Synovial gliding joints
Ligaments	Intercarpal, palmar intercapar, dorsal intercapal, radial collateral, ulnar collateral ligaments
Clinical note	Midcarpal instability

Wrist

Wrist (Carpal Bones)

- Proximal row: Scaphoid, Lunate, Triquetrum, Pisiform
- Distal row: Trapezium, Trapezoid, Capitate, Hamate





Ligaments

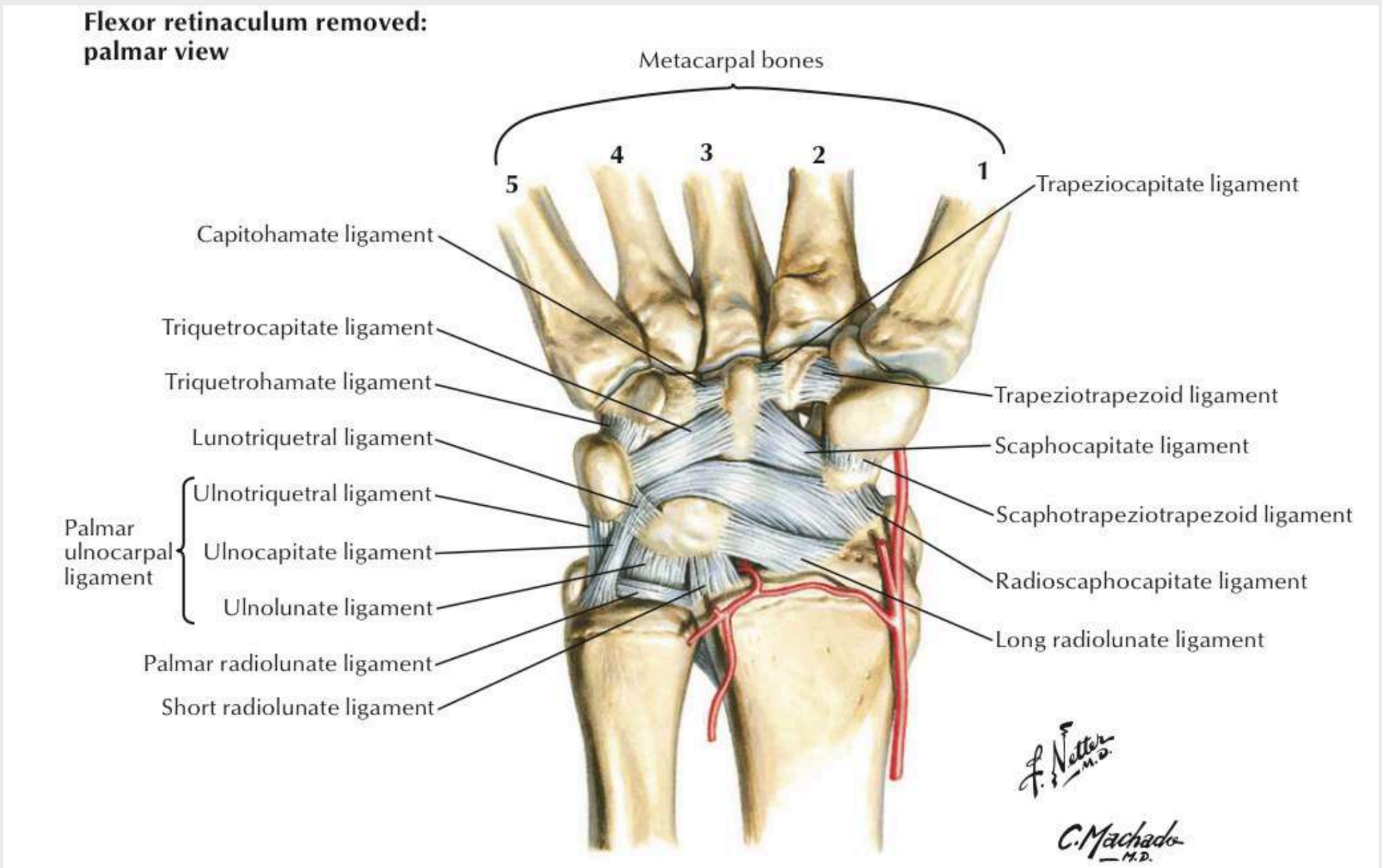
Extrinsic Wrist Ligaments

- Radioscaphocapitate
- Radiolunate
- Ulnolunate
- Ulnotriquetral
- Radial collateral ligament
- Ulnar collateral ligament

Intrinsic Wrist Ligaments

- Scapholunate ligament
- Lunotriquetral ligament
- Others between carpal bones

Function: Stabilize the carpal bones and wrist joint mechanics.

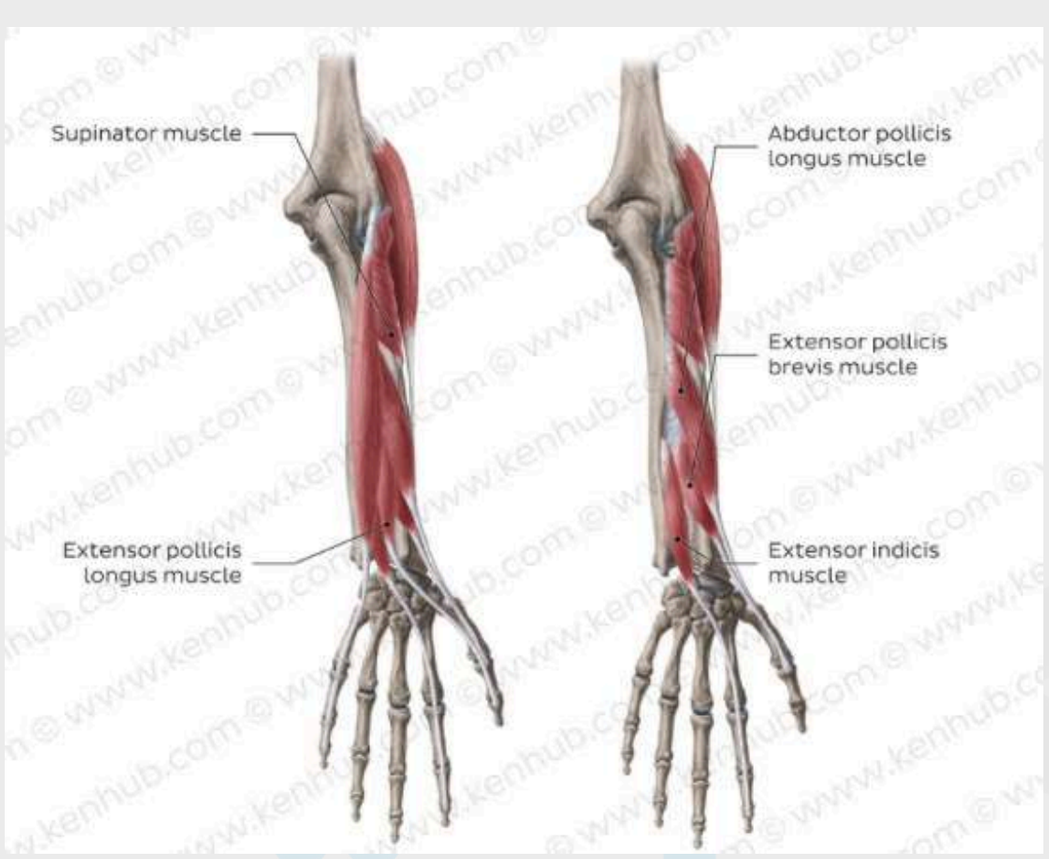


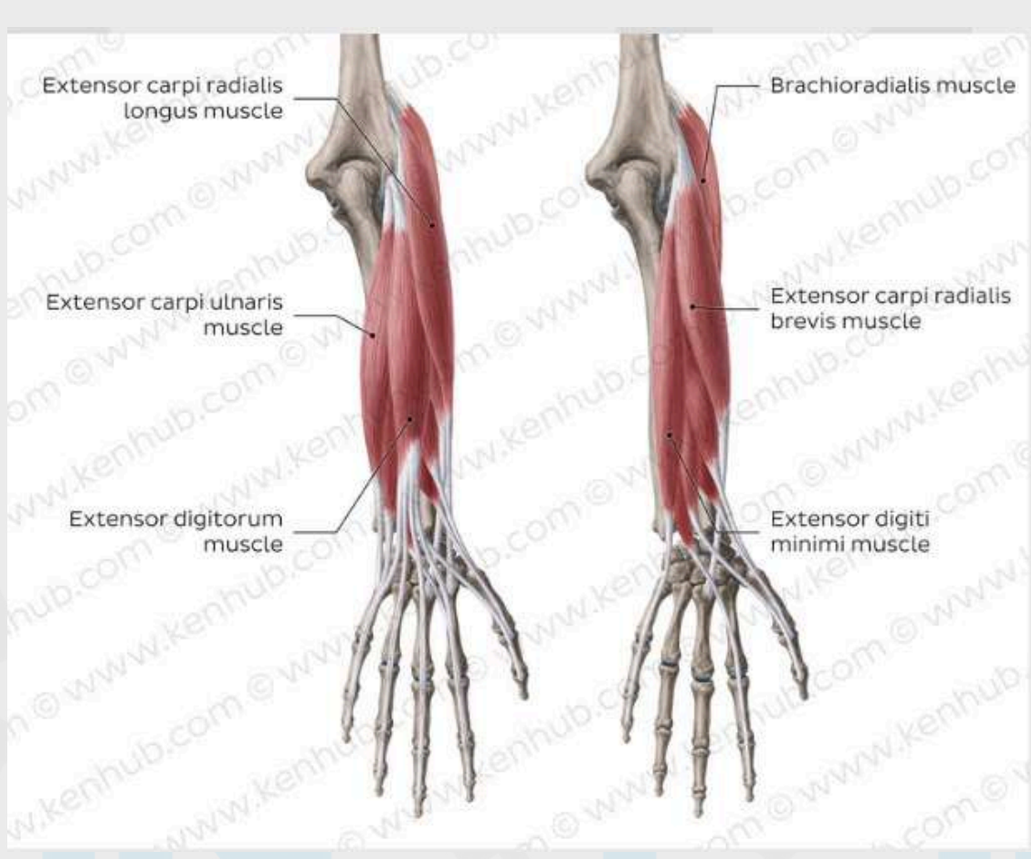
Wrist

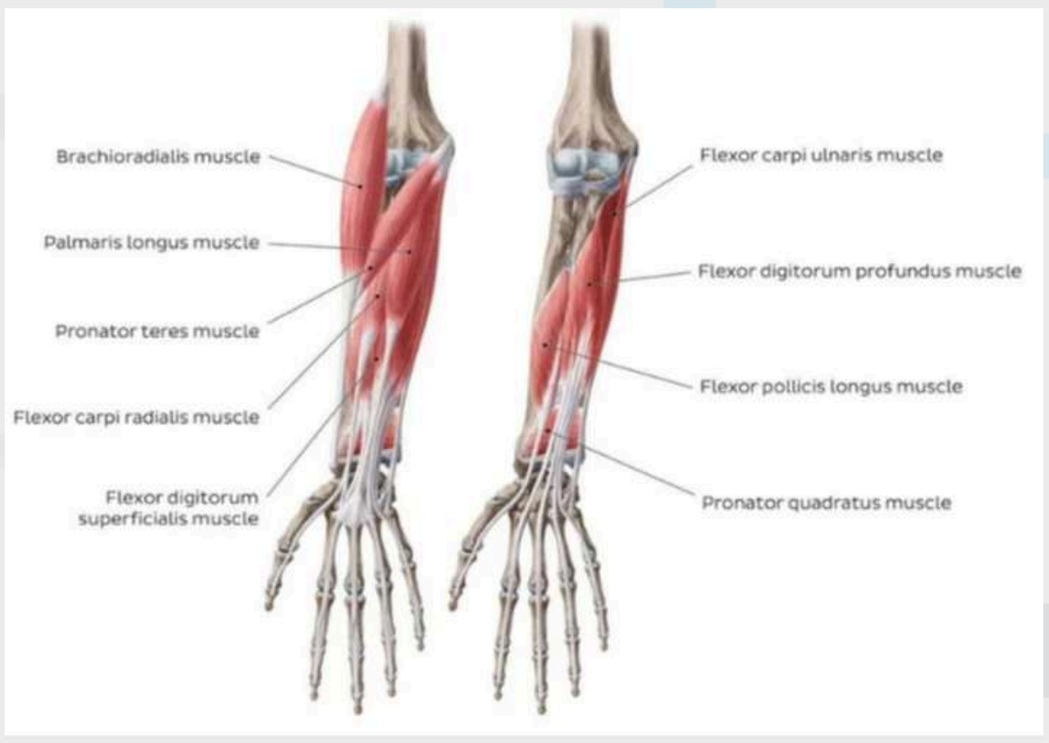
Wrist Movements & Muscles

All the movements of the wrist are performed by the muscles of the forearm.

- Flexion – Produced mainly by the flexor carpi ulnaris, flexor carpi radialis, with assistance from the flexor digitorum superficialis.
- Extension – Produced mainly by the extensor carpi radialis longus and brevis, and extensor carpi ulnaris, with assistance from the extensor digitorum.
- Adduction – Produced by the extensor carpi ulnaris and flexor carpi ulnaris
- Abduction – Produced by the abductor pollicis longus, flexor carpi radialis, extensor carpi radialis longus and brevis.







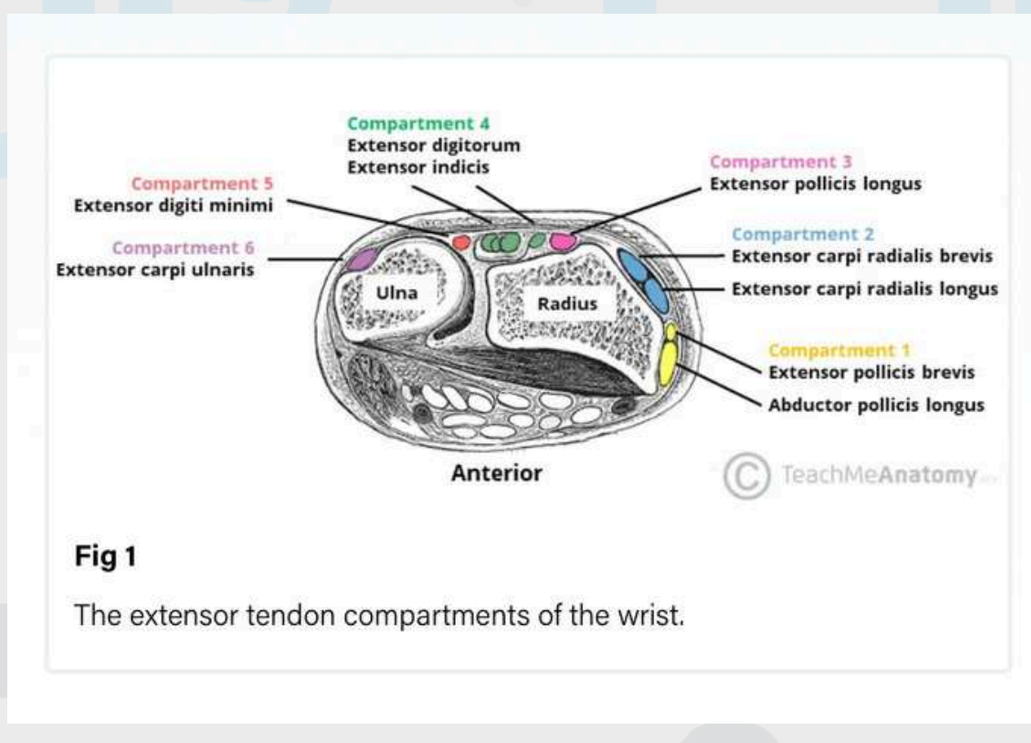


Fig 1

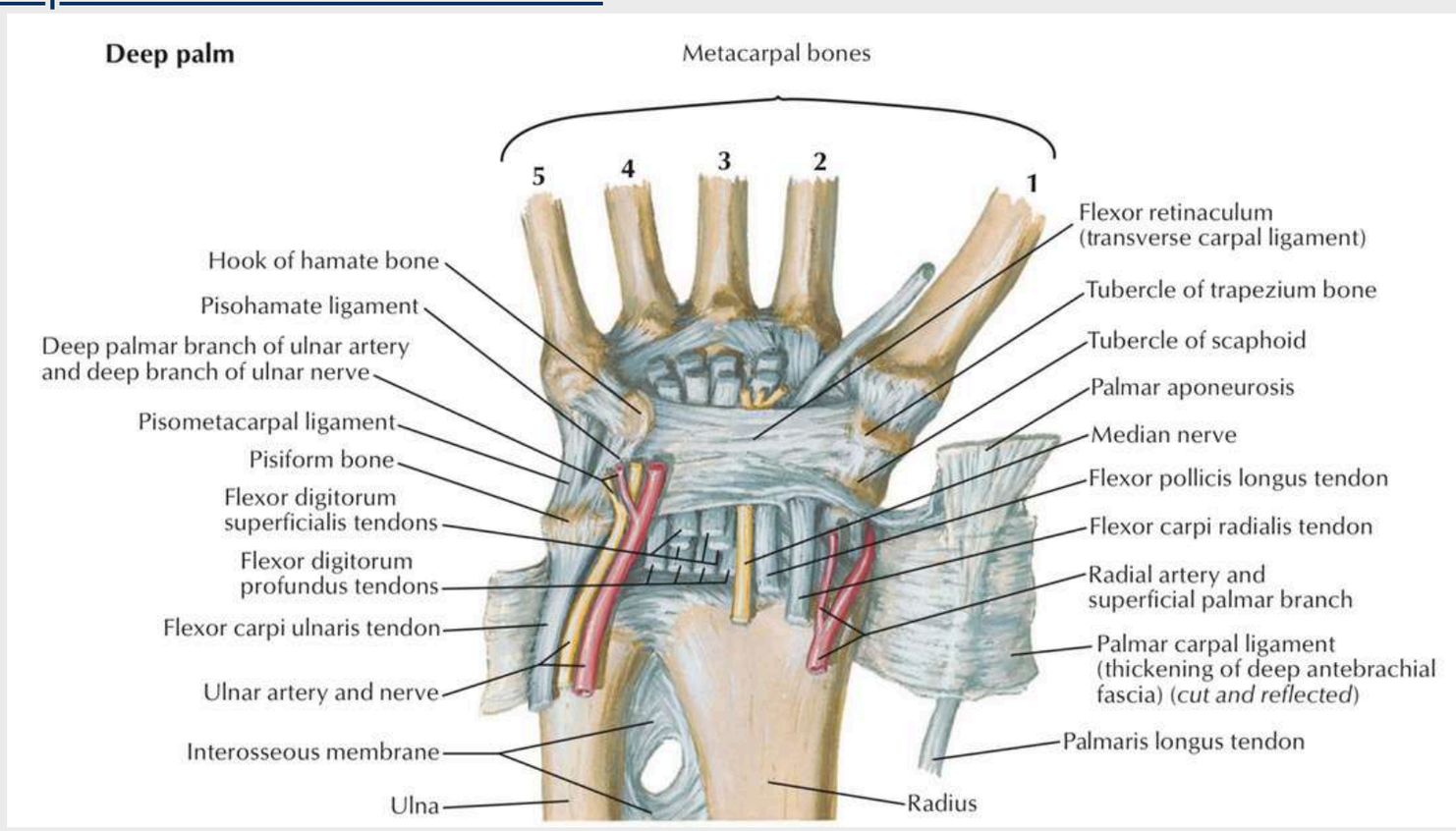
The extensor tendon compartments of the wrist.

Blood Supply

The wrist joint receives blood from branches of the dorsal and palmar carpal arches, which are derived from the ulnar and radial arteries.

Innervation to the wrist is delivered by branches of three nerves:

- Median nerve – Anterior interosseous branch.
- Radial nerve – Posterior interosseous branch.
- Ulnar nerve – deep and dorsal branches.



Hand

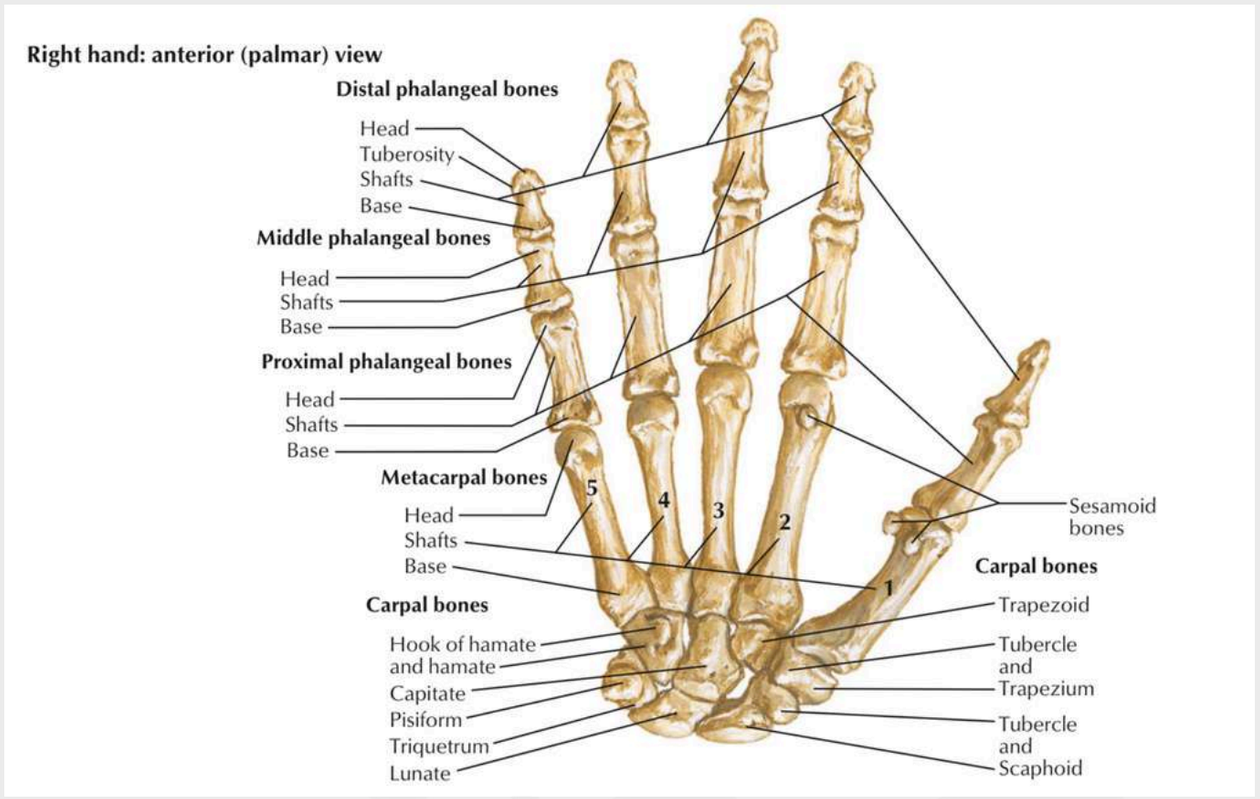
Bones

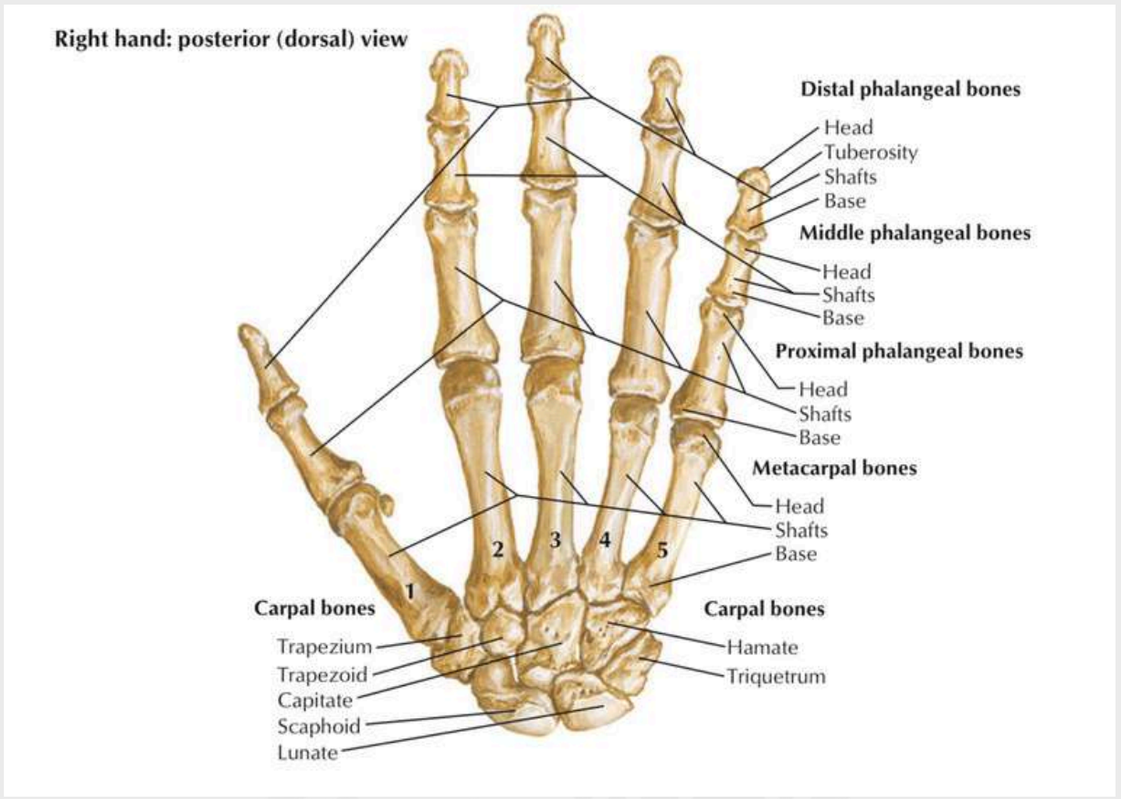
The bones of the hand can be divided into three distinct groups:

Carpals: scaphoid, lunate, triquetrum, pisiform, trapezium, trapezoid, capitate, hamate

Metacarpals: base, shaft, head

Phalanges: proximal, middle, distal phalanges





Muscles

The muscles of the hand consist of five groups:

- Thenar muscles
- Hypothenar muscles
- Lumbricals
- Palmar interossei
- Dorsal interossei

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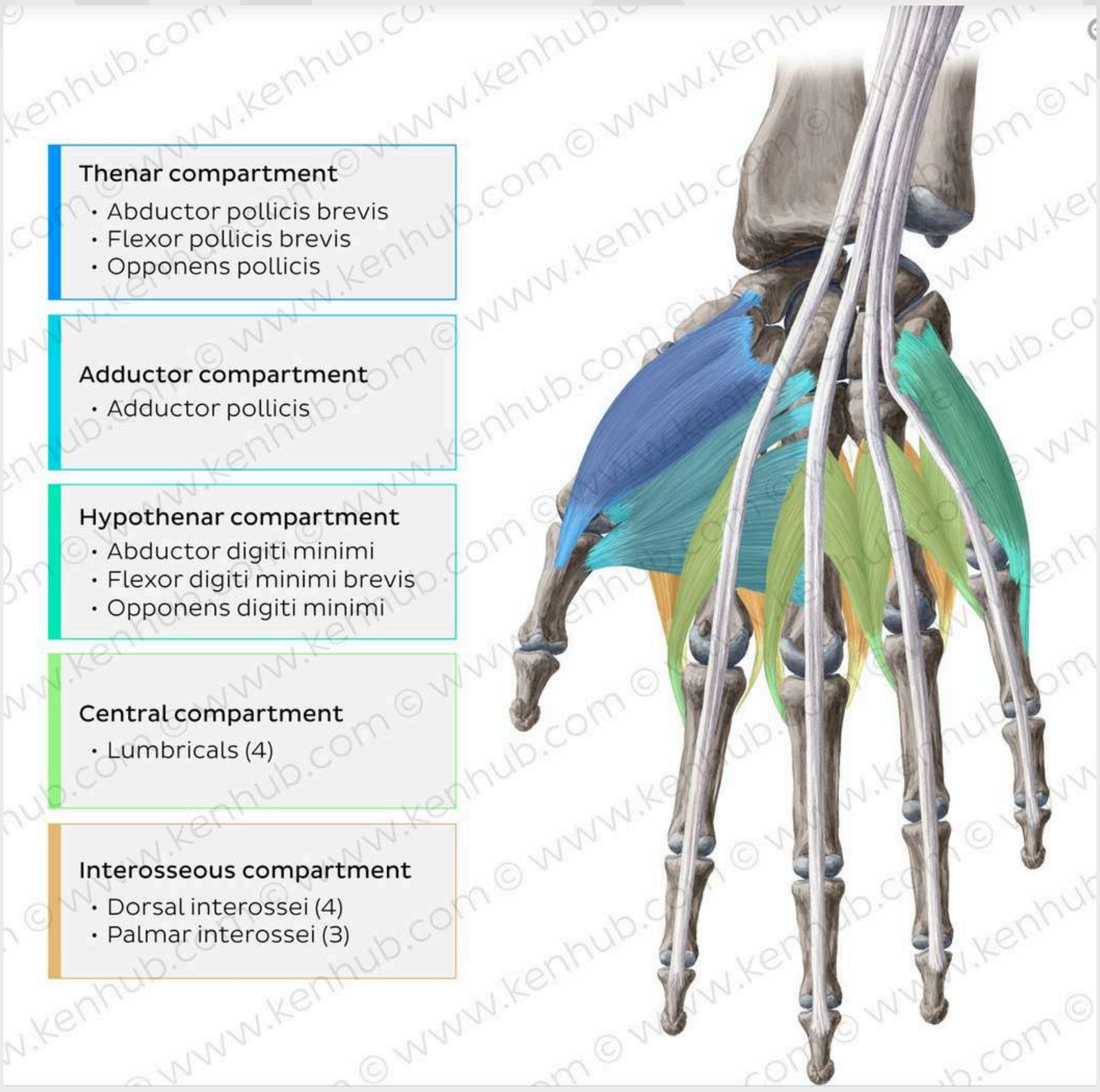
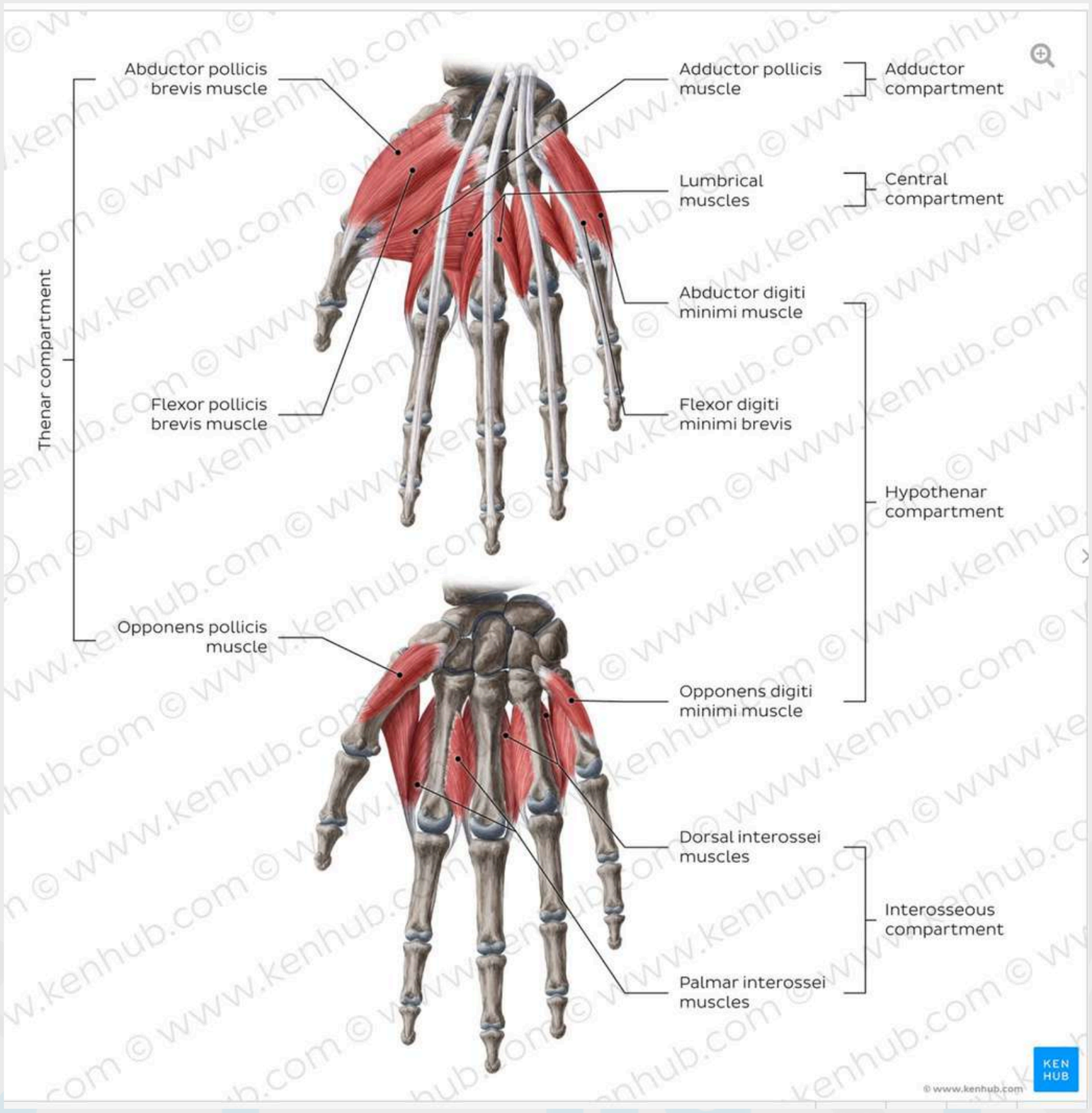


Hand



Key Facts about thenar muscles — Table quiz

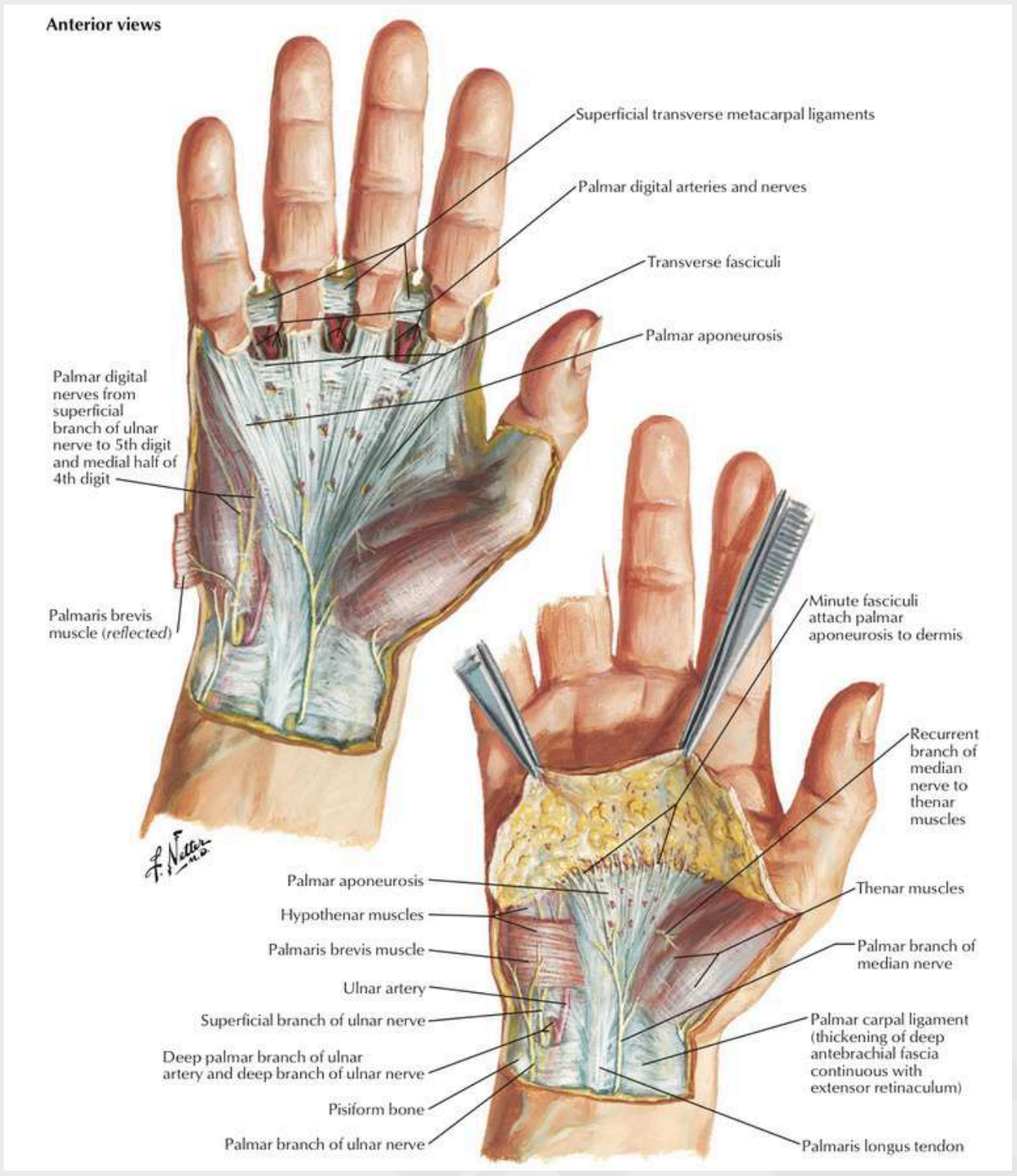
Abductor pollicis brevis	**Origin** - tubercles of the scaphoid and trapezium; flexor retinaculum **Insertion** - base of the proximal phalanx 1 (via radial sesamoid bone) **Innervation** - Recurrent branch of median nerve (C8, T1) **Function** - thumb abduction (moving away from the hand) at carpometacarpal joint 1
Flexor pollicis brevis	**Origin** - flexor retinaculum, tubercle of trapezium (superficial head), trapezoid and capitate bones (deep head) **Insertion** - radial sesamoid bone and base of the proximal phalanx (superficial head), base of first phalanx, radial sesamoid bone (deep head) **Innervation** - median and ulnar nerves **Function** - thumb flexion (bending)
Opponens pollicis	**Origin** - flexor retinaculum, tubercle of trapezium bone **Insertion** - first metacarpal bone **Innervation** - Recurrent branch of median nerve (C8, T1) **Function** - thumb flexion, abduction, and medial rotation resulting in a combined movement called opposition

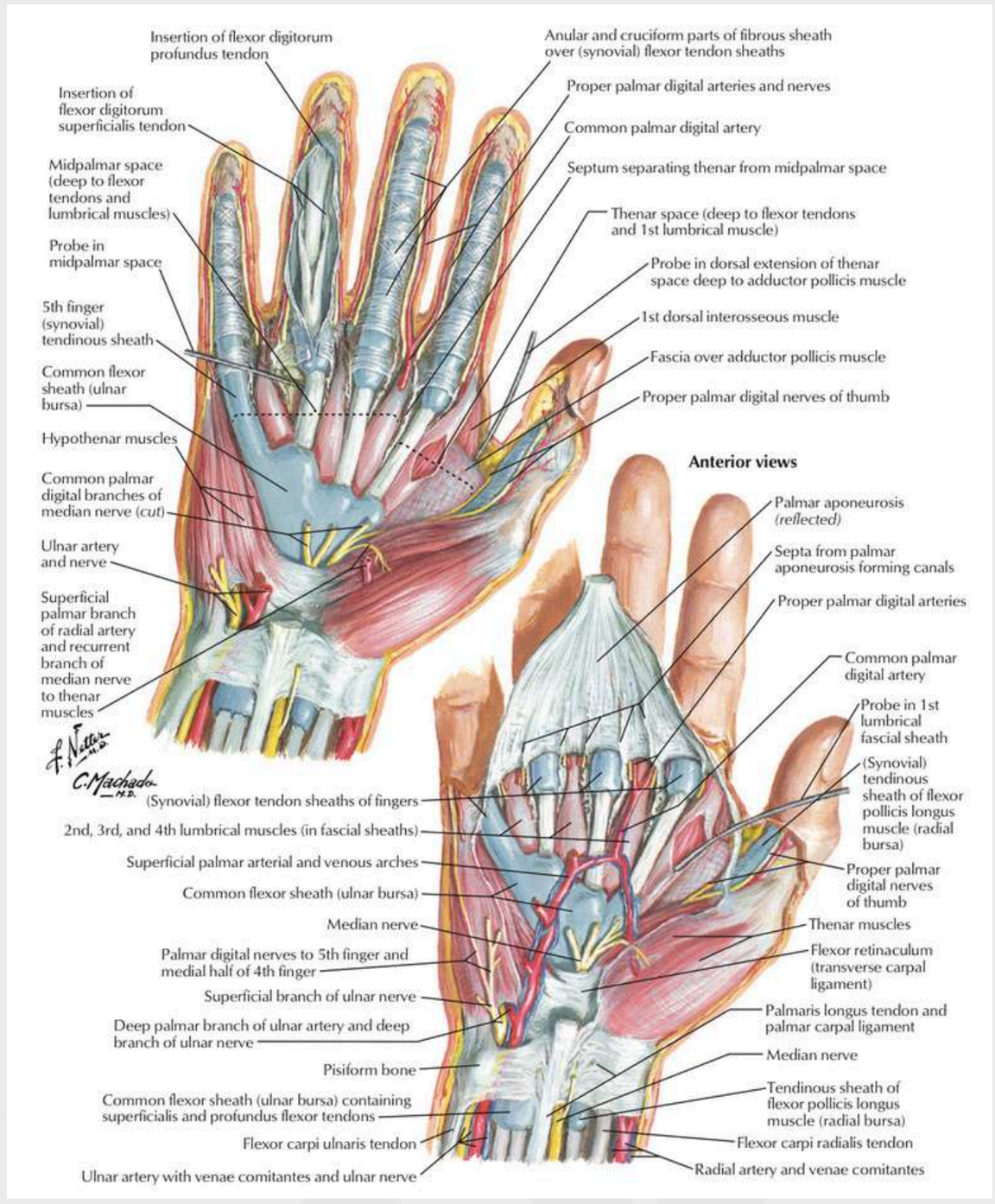
Nerves: Important

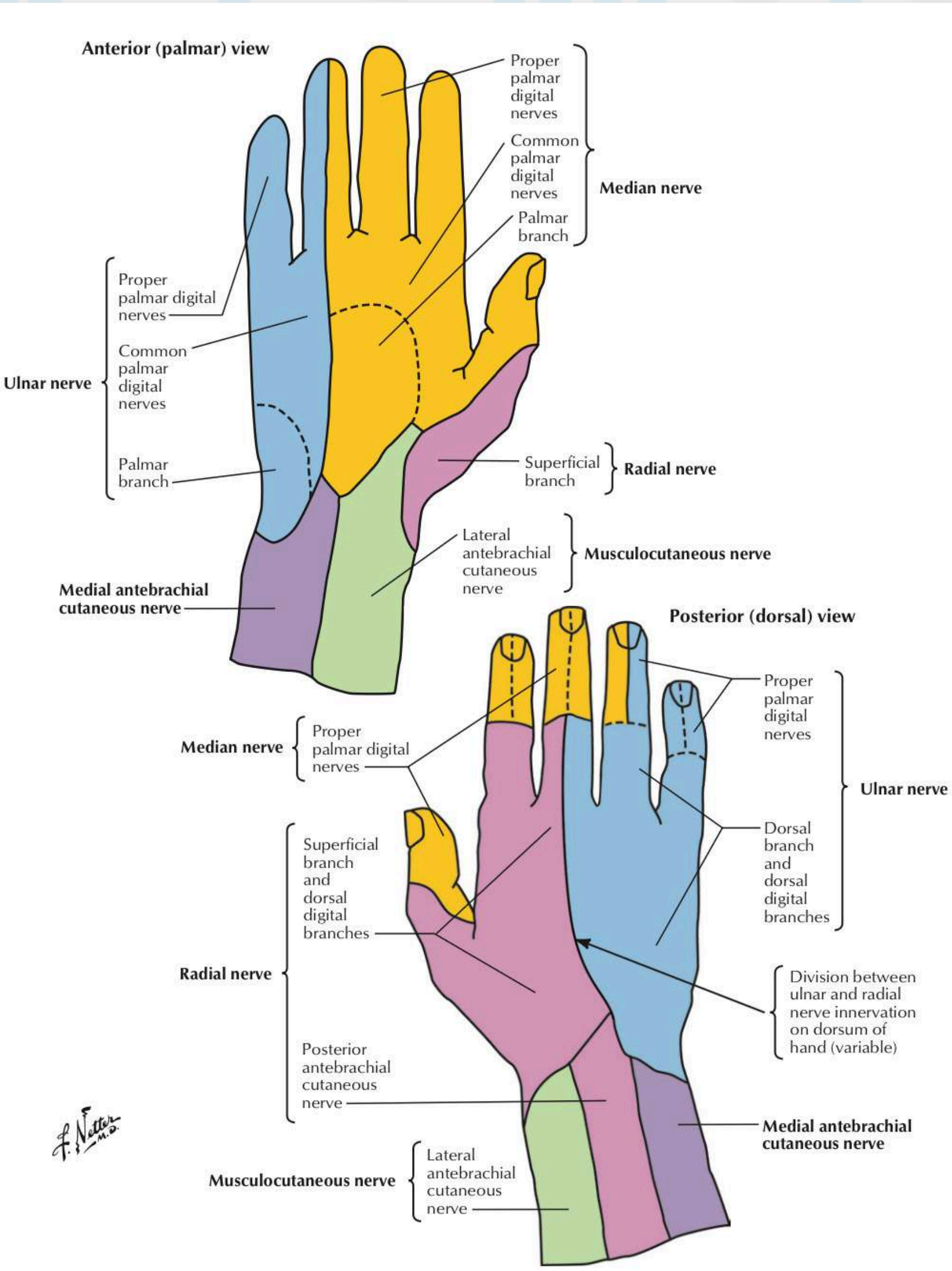
Nerves of the hand — Table quiz

Median nerve	**Branches:** Palmar branch, recurrent branch, common palmar digital branches, proper palmar digital branches **Muscle innervation:** Thenar muscles and lumbrical muscles (1st & 2nd) **Cutaneous innervation:** Lateral ⅔ of palm; palmar surface and dorsal distal ⅓ of lateral 3 ½ digits
Ulnar nerve	**Branches:** Dorsal digital branches, palmar branch, superficial branch (common palmar digital nerves and proper palmar digital nerves), deep branch **Muscle innervation:** Hypothenar, interossei muscles and lumbricals (3rd & 4th) **Cutaneous innervation:** Medial ⅓ of palm; palmar/dorsal surfaces of medial 1 ½ digits
Radial nerve	**Branches:** Superficial branch (dorsal digital branches) **Cutaneous innervation:** Lateral ⅔ of dorsum of hand; dorsal proximal ⅔ of lateral 3 ½ digits

Hand


Anterior views
Superficial transverse metacarpal ligaments
Palmar digital arteries and nerves
Transverse fasciculi
Palmar aponeurosis
Palmar digital nerves from superficial branch of ulnar nerve to 5th digit and medial half of 4th digit
Palmaris brevis muscle (reflected)
Minute fasciculi attach palmar aponeurosis to dermis
Recurrent branch of median nerve to thenar muscles
Palmar aponeurosis
Hypothenar muscles
Palmaris brevis muscle
Ulnar artery
Superficial branch of ulnar nerve
Deep palmar branch of ulnar artery and deep branch of ulnar nerve
Pisiform bone
Palmar branch of ulnar nerve
Thenar muscles
Palmar branch of median nerve
Palmar carpal ligament (thickening of deep antebrachial fascia continuous with extensor retinaculum)
Palmaris longus tendon
F. Netter M.D.


Insertion of flexor digitorum profundus tendon
Insertion of flexor digitorum superficialis tendon
Midpalmar space (deep to flexor tendons and lumbrical muscles)
Probe in midpalmar space
5th finger (synovial) tendinous sheath
Common flexor sheath (ulnar bursa)
Hypothenar muscles
Common palmar digital branches of median nerve (cut)
Ulnar artery and nerve
Superficial palmar branch of radial artery and recurrent branch of median nerve to thenar muscles
F. Netter M.D.
C. Machado M.D.
Anular and cruciform parts of fibrous sheath over (synovial) flexor tendon sheaths
Proper palmar digital arteries and nerves
Common palmar digital artery
Septum separating thenar from midpalmar space
Thenar space (deep to flexor tendons and 1st lumbrical muscle)
Probe in dorsal extension of thenar space deep to adductor pollicis muscle
1st dorsal interosseous muscle
Fascia over adductor pollicis muscle
Proper palmar digital nerves of thumb
Anterior views
Palmar aponeurosis (reflected)
Septa from palmar aponeurosis forming canals
Proper palmar digital arteries
Common palmar digital artery
Probe in 1st lumbrical fascial sheath
(Synovial) tendinous sheath of flexor pollicis longus muscle (radial bursa)
Proper palmar digital nerves of thumb
(Synovial) flexor tendon sheaths of fingers
2nd, 3rd, and 4th lumbrical muscles (in fascial sheaths)
Superficial palmar arterial and venous arches
Common flexor sheath (ulnar bursa)
Median nerve
Palmar digital nerves to 5th finger and medial half of 4th finger
Superficial branch of ulnar nerve
Deep palmar branch of ulnar artery and deep branch of ulnar nerve
Pisiform bone
Common flexor sheath (ulnar bursa) containing superficialis and profundus flexor tendons
Flexor carpi ulnaris tendon
Ulnar artery with venae comitantes and ulnar nerve
Thenar muscles
Flexor retinaculum (transverse carpal ligament)
Palmaris longus tendon and palmar carpal ligament
Median nerve
Tendinous sheath of flexor pollicis longus muscle (radial bursa)
Flexor carpi radialis tendon
Radial artery and venae comitantes


Anterior (palmar) view
Proper palmar digital nerves
Common palmar digital nerves
Palmar branch
Median nerve
Proper palmar digital nerves
Common palmar digital nerves
Palmar branch
Ulnar nerve
Superficial branch
Radial nerve
Lateral antebrachial cutaneous nerve
Musculocutaneous nerve
Medial antebrachial cutaneous nerve
Posterior (dorsal) view
Proper palmar digital nerves
Ulnar nerve
Median nerve
Proper palmar digital nerves
Dorsal branch and dorsal digital branches
Superficial branch and dorsal digital branches
Radial nerve
Division between ulnar and radial nerve innervation on dorsum of hand (variable)
Posterior antebrachial cutaneous nerve
Medial antebrachial cutaneous nerve
Musculocutaneous nerve
Lateral antebrachial cutaneous nerve
F. Netter M.D.

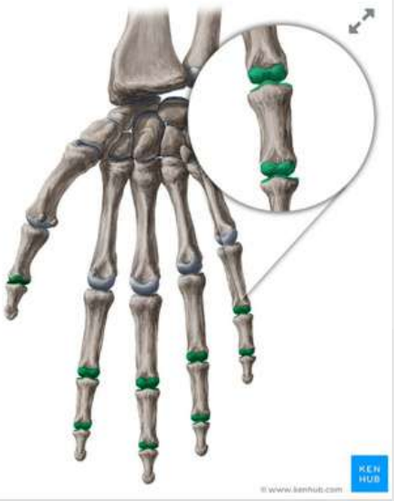
Hand

Joint

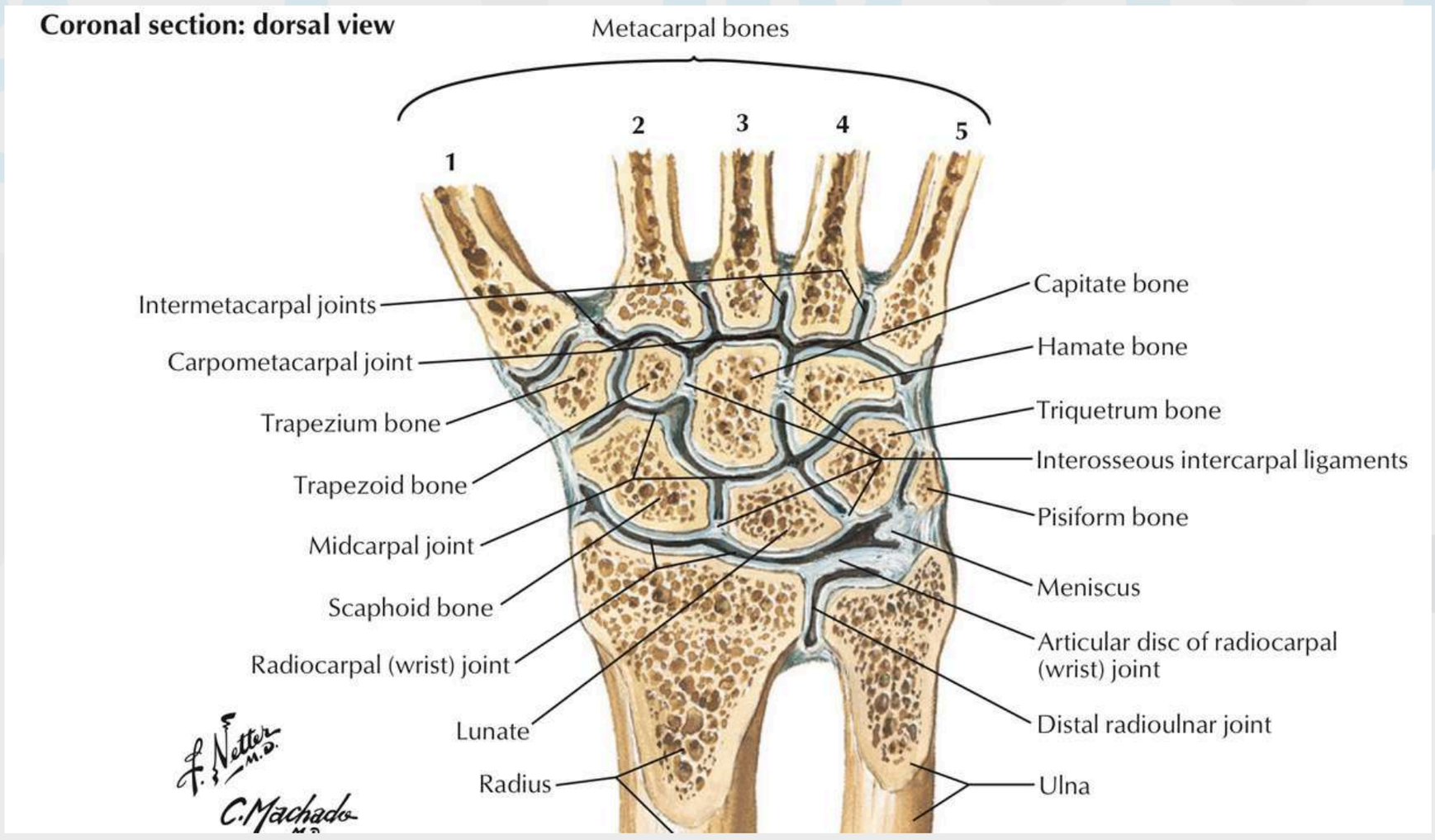
The joints in the hand are joints found at the distal end of the upper limb.
The joints are:

- In the wrist there is the radiocarpal joint between the radius and carpus.[1] Between the carp bones are the intercarpal articulations and the midcarpal joint.
- The carpometacarpal joint connects the carpal bones to the metacarpus or metacarpal bone which are joined at the intermetacarpal articulations.
- In the fingers, finally, are the metacarpophalangeal joints (including the knuckles) between th metacarpal bones and the phalanges or finger bones which are interconnected by th interphalangeal joints.

Key facts about the interphalangeal joints of the hand	Table quiz
Type	Synovial hinge joint; uniaxial
Articular surfaces	Head of proximal phalanx, base of middle phalanx, head of middle phalanx, and base of distal phalanx
Ligaments	Medial collateral ligament, lateral collateral ligament
Innervation	Proper palmar digital nerves
Blood supply	Proper palmar digital arteries
Movements	Flexion - extension



Interphalangeal joints of the hand (Articulationes interphalangeales manus)



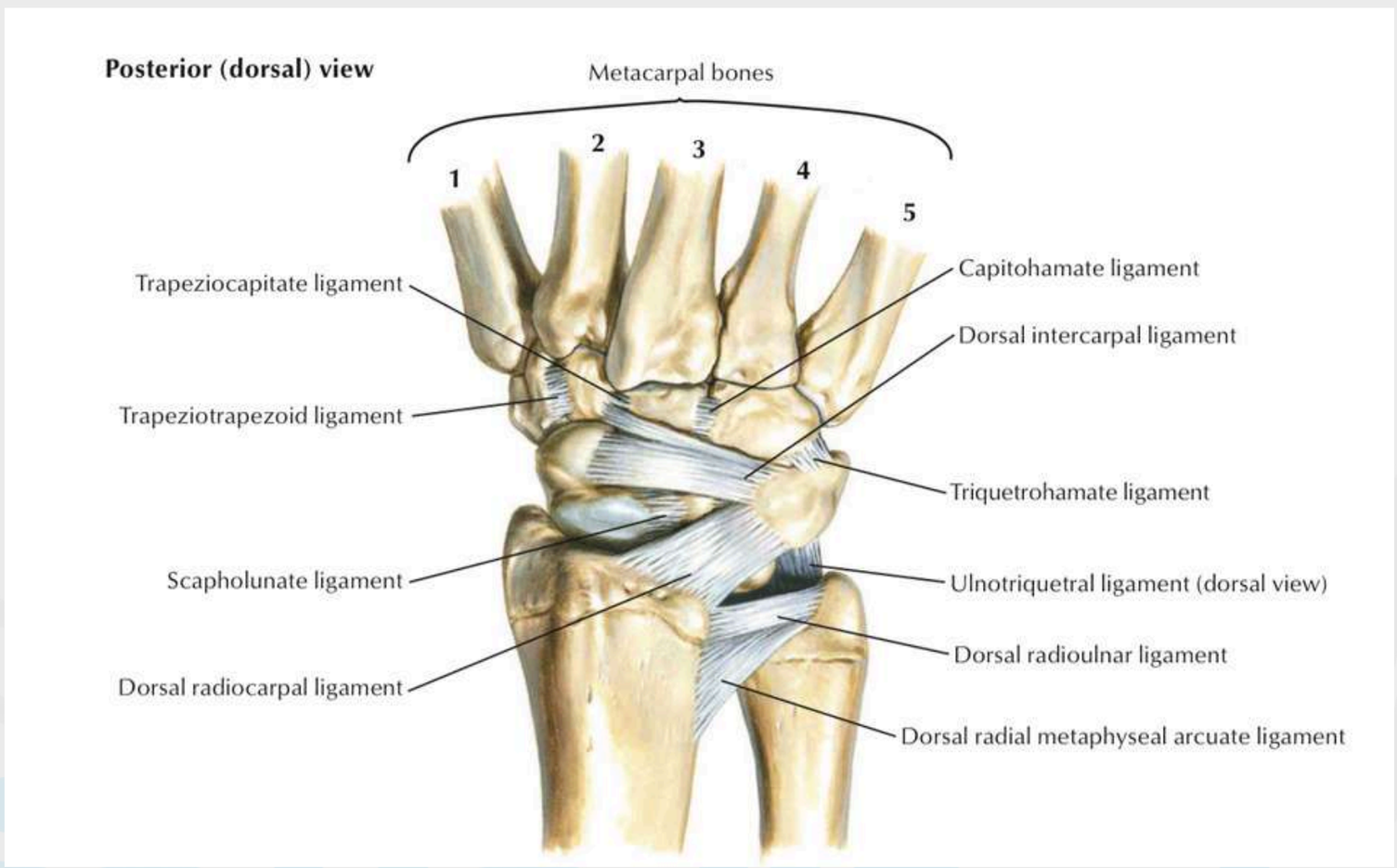
Ligament:

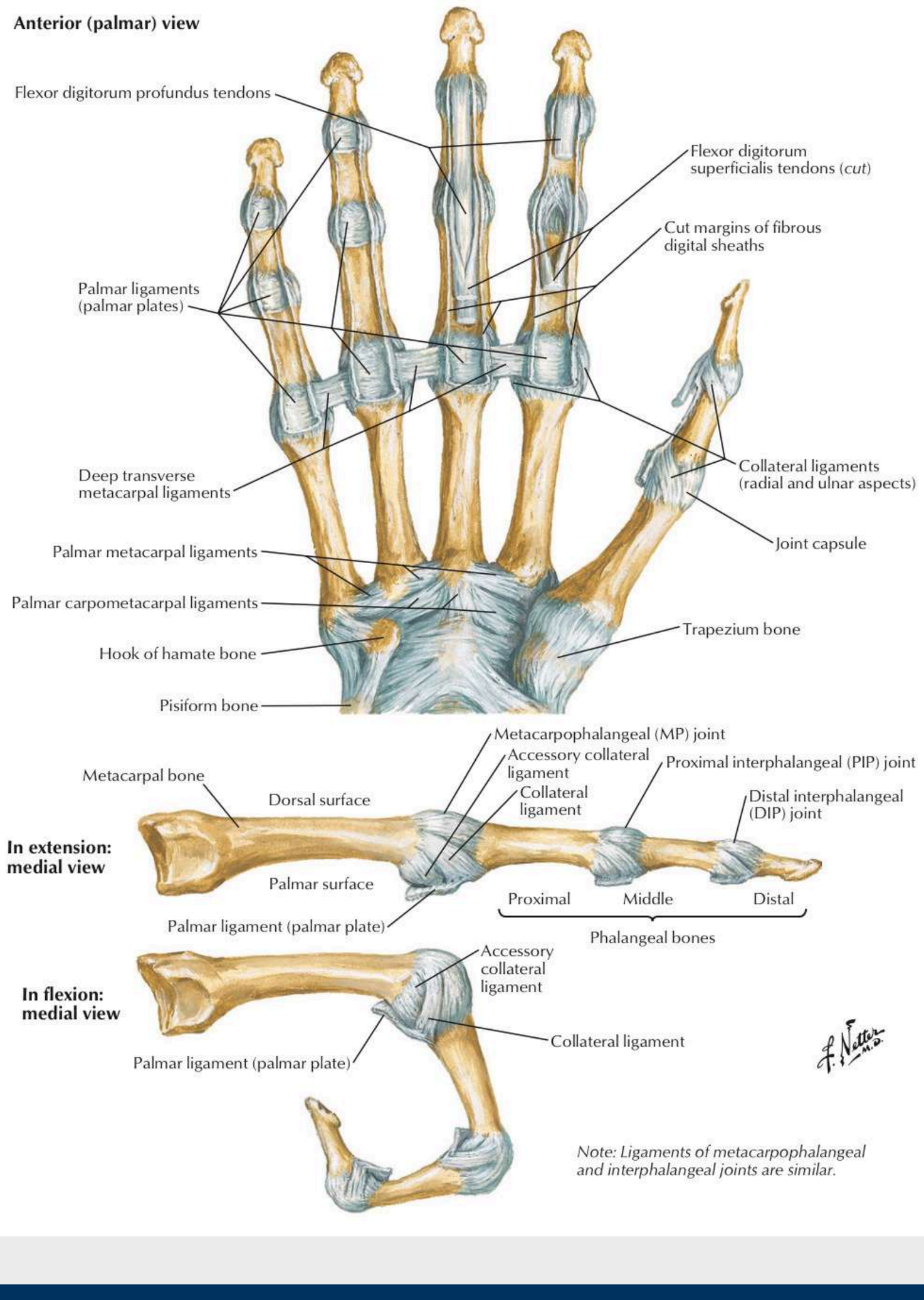
There are lots of ligaments in your hand, including:

- **Collateral ligaments**: These ligaments run on the outside edges of your fingers and thumb. They protect your joints from moving too much from side to side.
- **The volar plate**: Volar plate ligaments connect your first two finger bones (phalanges) together on each finger. They run under your bones on the palmar side of your hand and keep your fingers from bending too far back when you extend them.
- **Palmar fascia**: Your palmar fascia is a thick, triangle-shaped ligament-like structure that runs under the skin of your palm. The narrow point of the triangle is at your wrist, and it gets wider toward the base of your fingers. It helps your hand keep its shape while you move it and prevents your skin from sliding when you're holding something.

Hand

1. Proper collateral ligaments
2. Accessory collateral ligaments
3. Volar plate
4. Deep transverse metacarpal ligament (DTML)
5. Palmar (volar) ligaments
6. Dorsal ligaments / dorsal hood
7. Intermetacarpal ligaments
8. Carpometacarpal (CMC) ligaments





Hand

Arteries and veins:

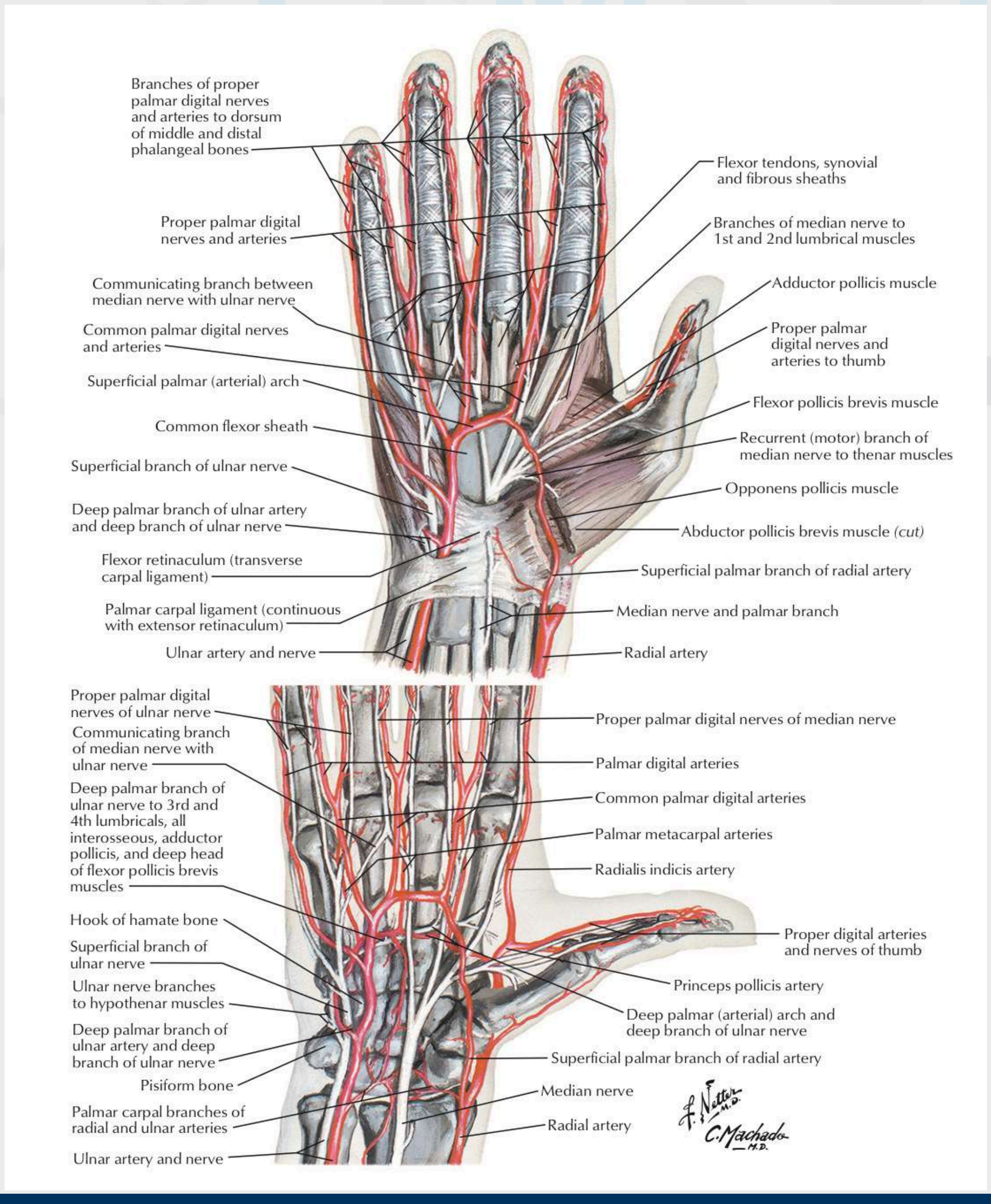
Since the hand is the terminal region of the upper extremity numerous anastomoses take place here, resulting in quite a complex vascular network. All the hand arteries originate from two main, larger ones; the radial and ulnar arteries.

The radial and ulnar arteries give off the following specific branches in the hand:

- Superficial palmar arch
- Deep palmar arch
- Common palmar digital arteries
- Proper palmar digital arteries
- Dorsal carpal arch
- Dorsal metacarpal arteries
- Dorsal digital arteries
- Principal artery of the thumb

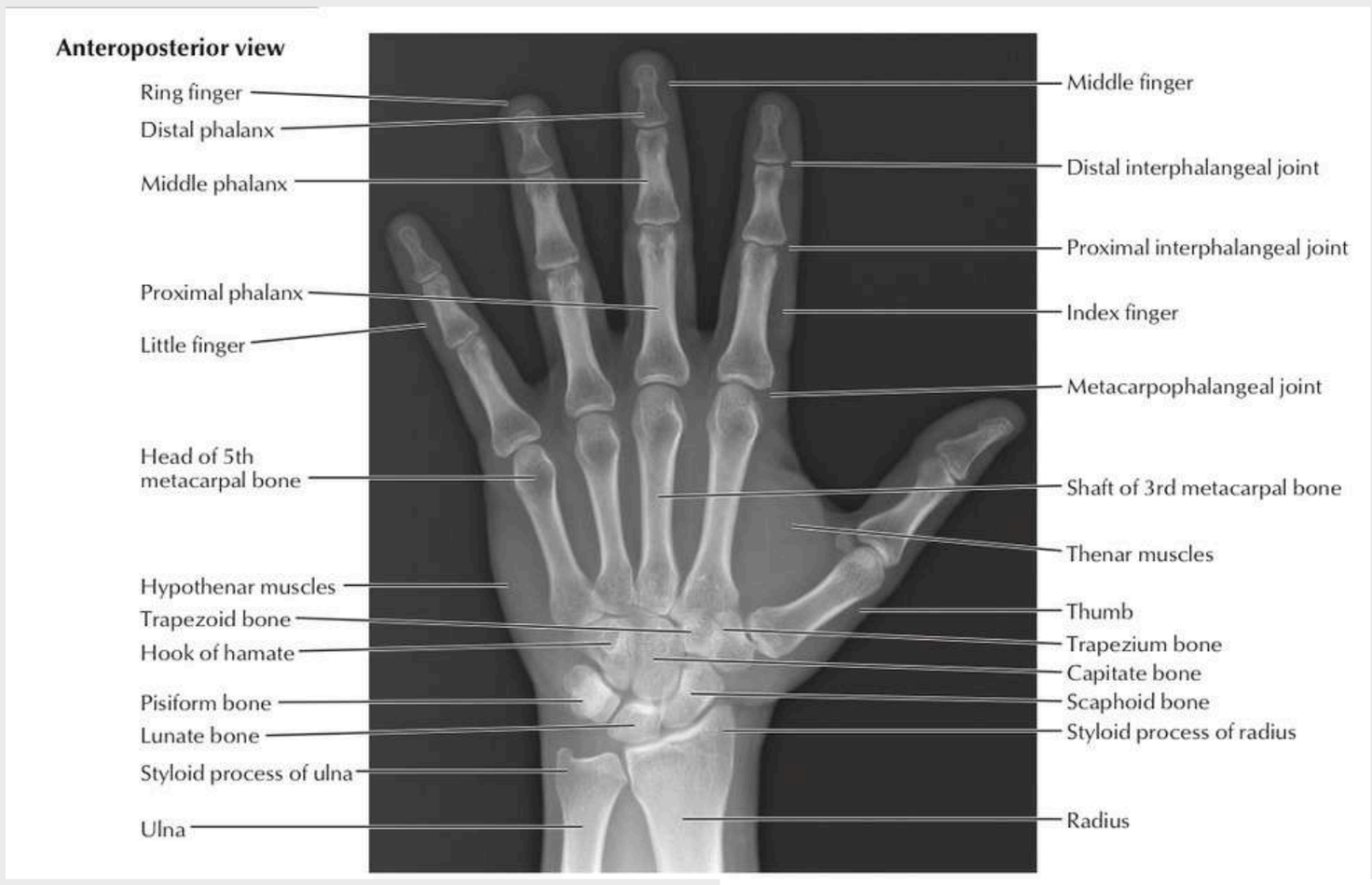
The main veins of the hand are:

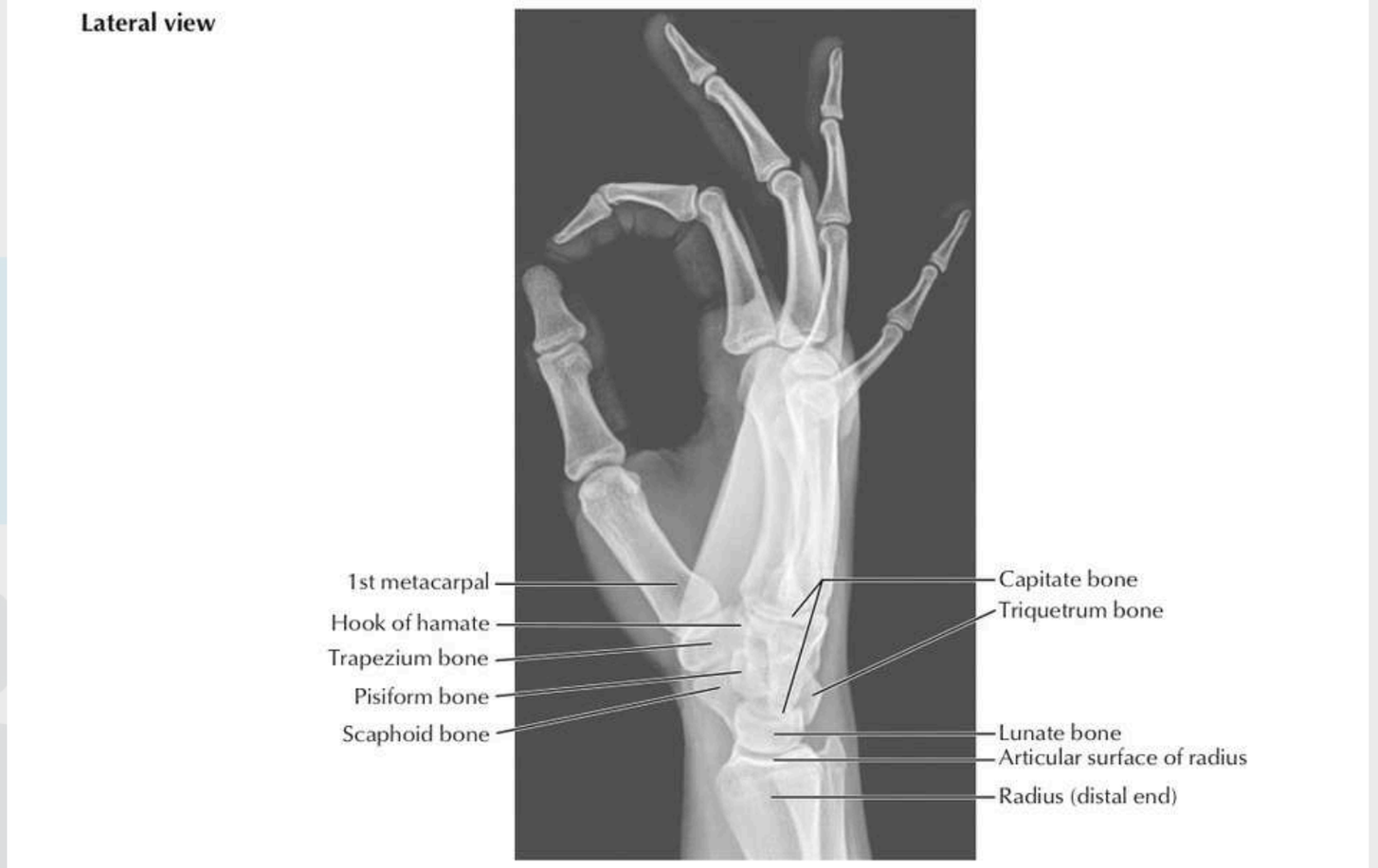
- Superficial palmar venous arch
- Deep palmar venous arch
- Dorsal venous network of the hand
- Palmar metacarpal digital veins
- Palmar digital veins



Hand

hand bones on X-ray:

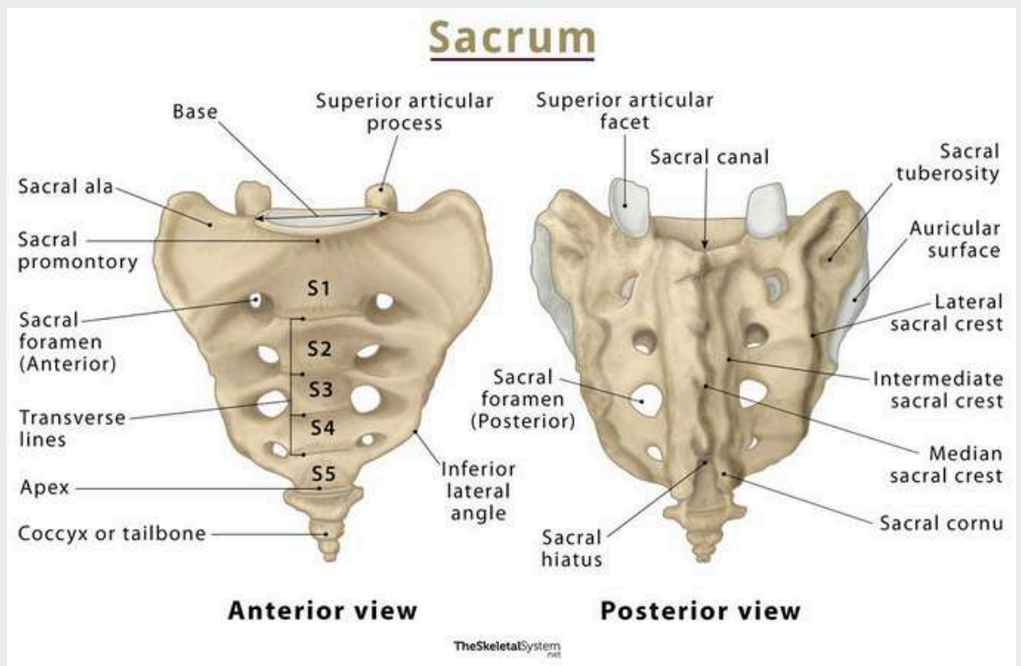




Spine

Regions of the Spine

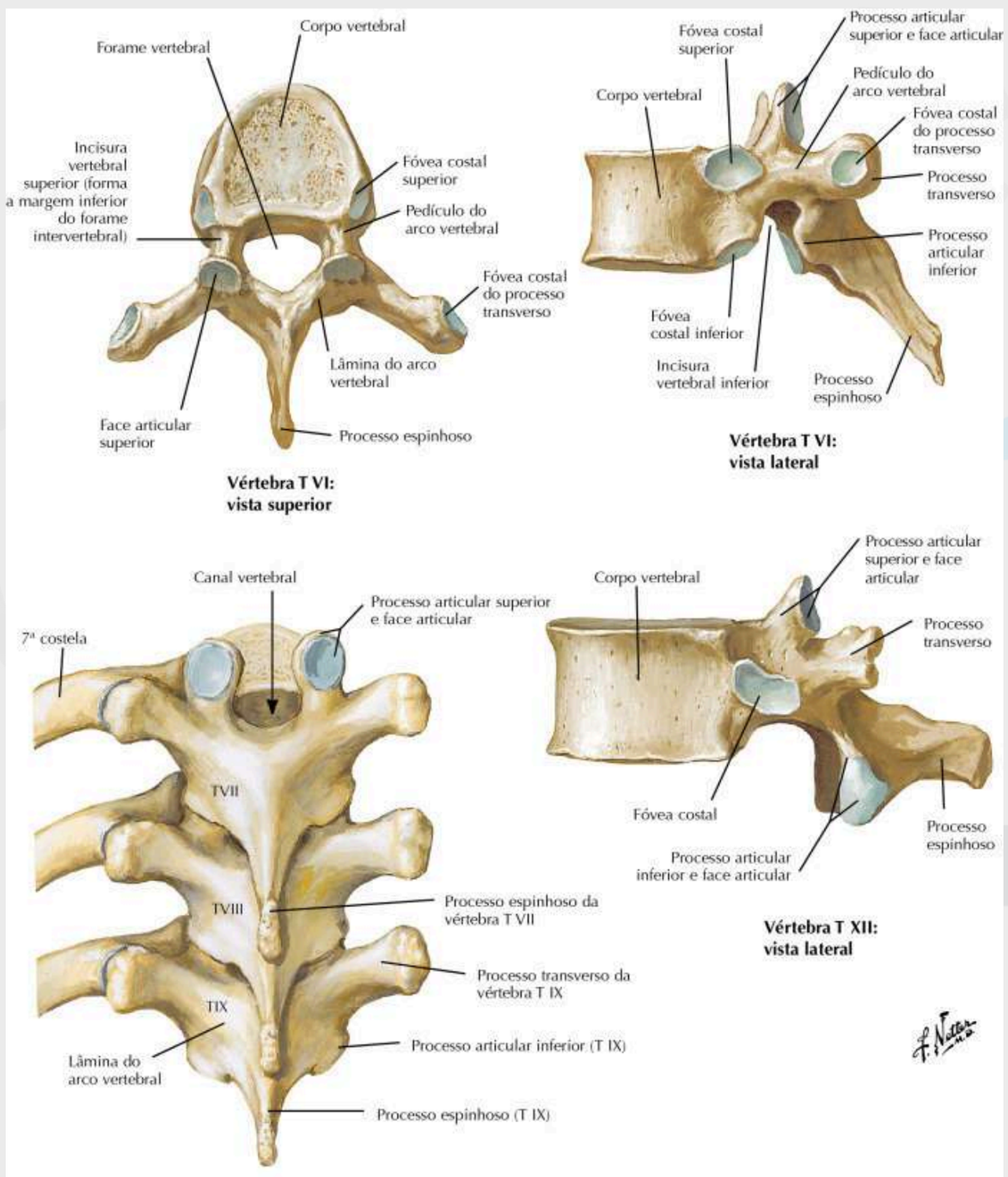
- **Cervical (C1–C7) →** 7 vertebrae
- **Thoracic (T1–T12) →** 12 vertebrae
- **Lumbar (L1–L5) →** 5 vertebrae
- **Sacrum (S1–S5 fused) →** 1 bone
- **Coccyx (Co1–Co4 fused) →** 1 bone

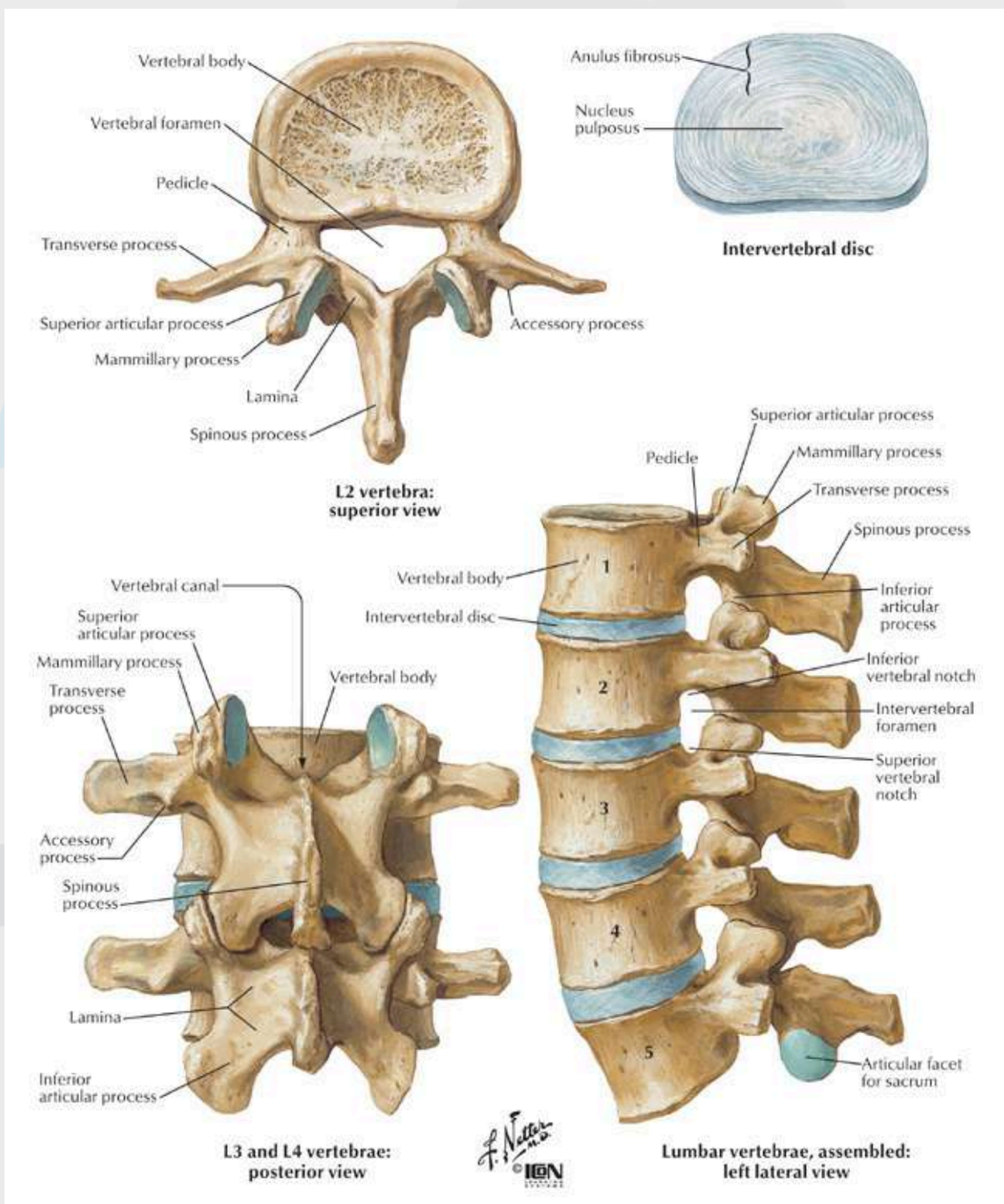


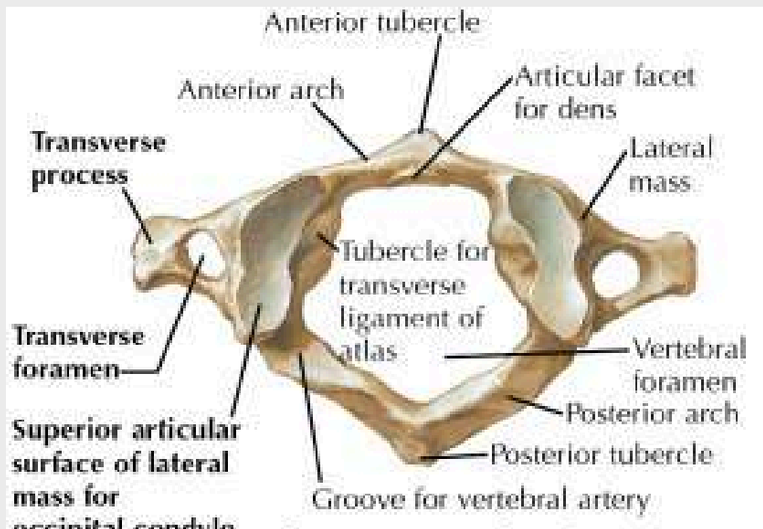
2) Vertebra structure

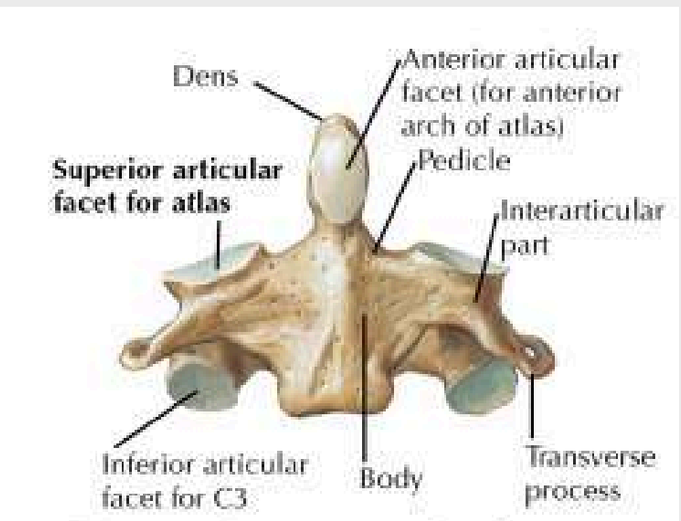
Parts of a typical vertebra

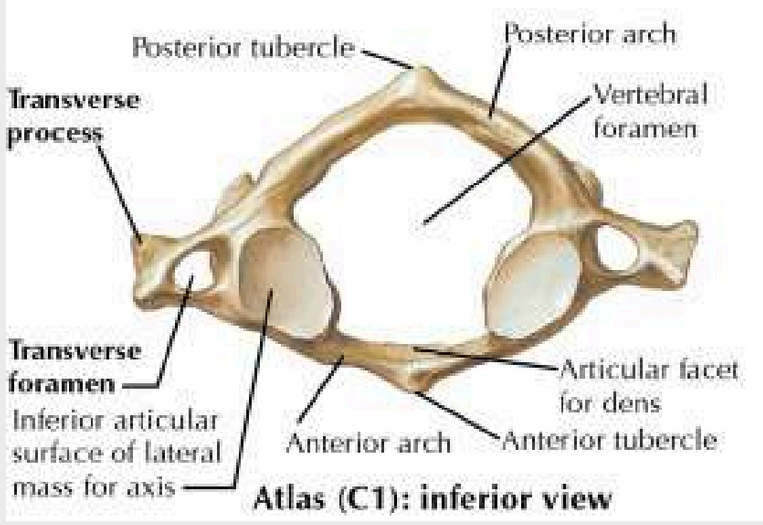
- **Body →** weight-bearing
- **Vertebral arch →** pedicles + laminae
- **Processes:**
- **Spinous →** posterior
- **Transverse →** lateral
- **Articular →** superior & inferior facets
- **Vertebral foramen** → contains spinal cord
- **Intervertebral foramen →** spinal nerve exits

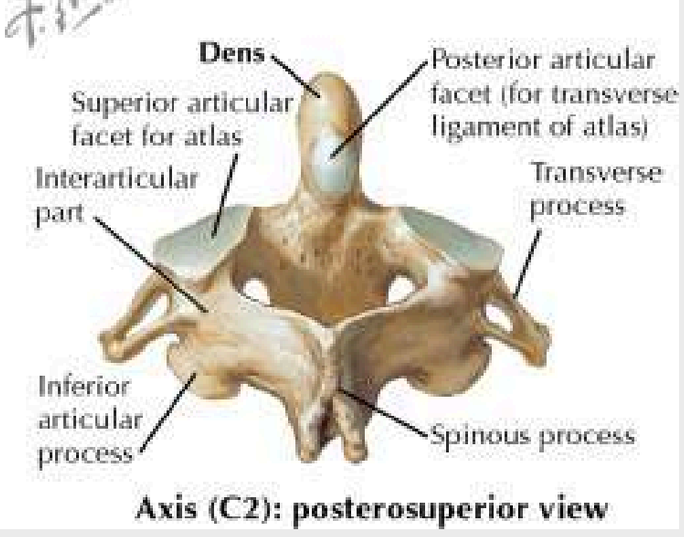


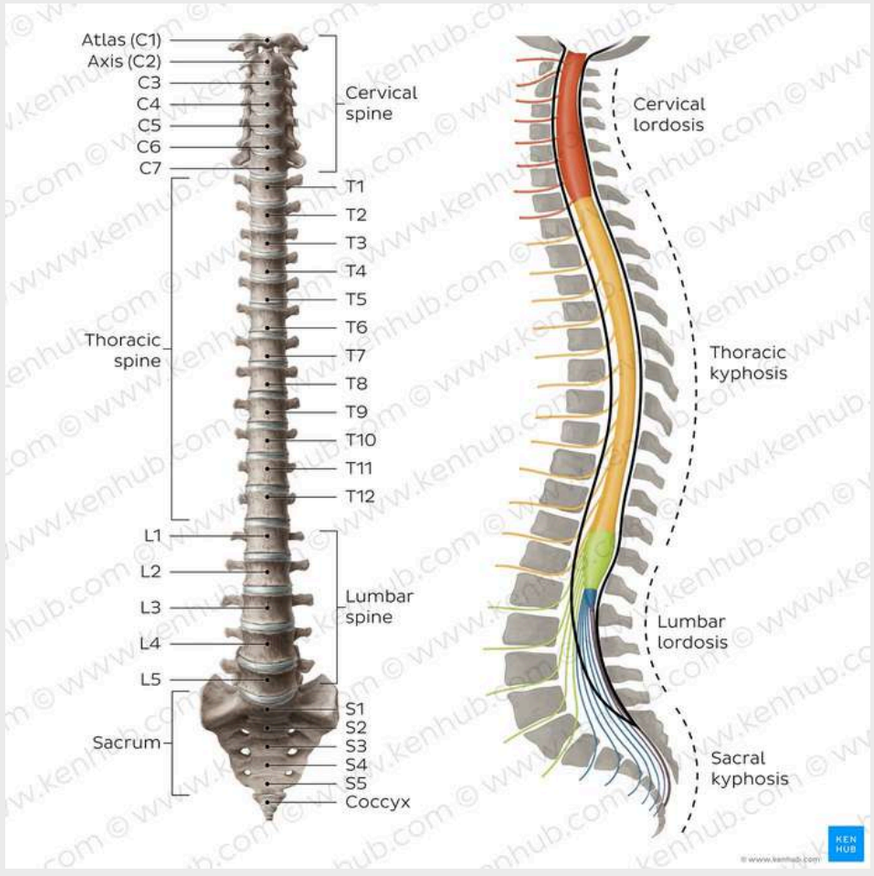










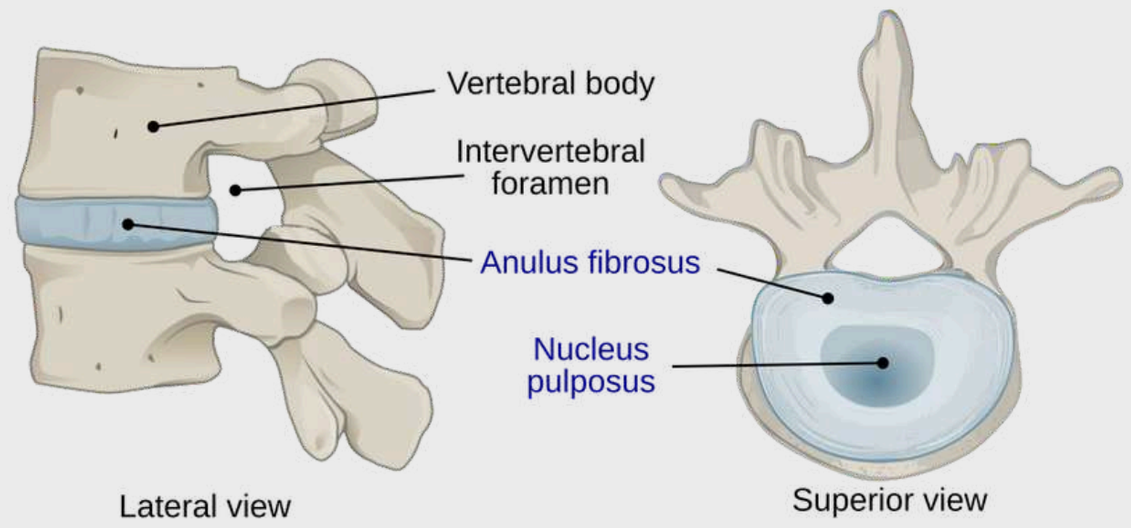


Spine

Intervertebral discs

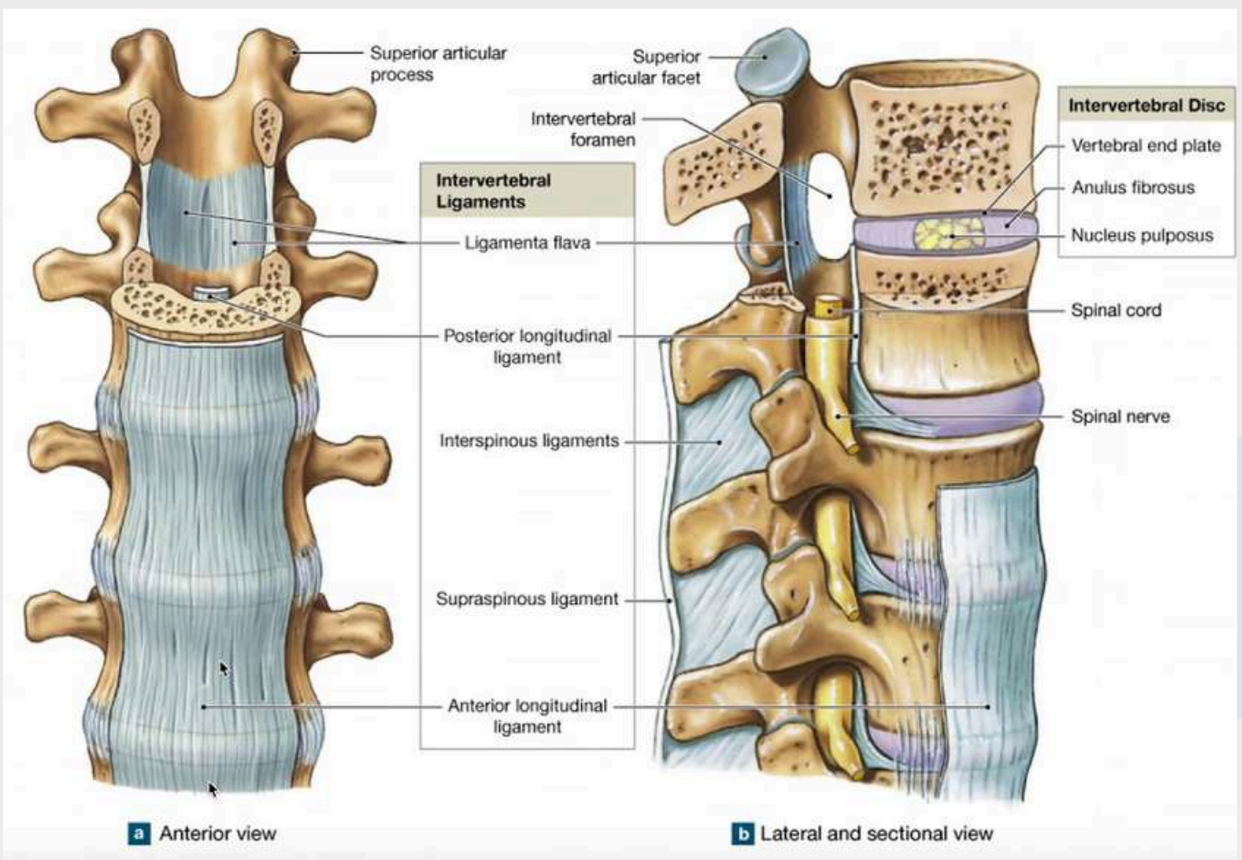
- **Annulus fibrosus →** tough outer layer
- **Nucleus pulposus →** soft central part

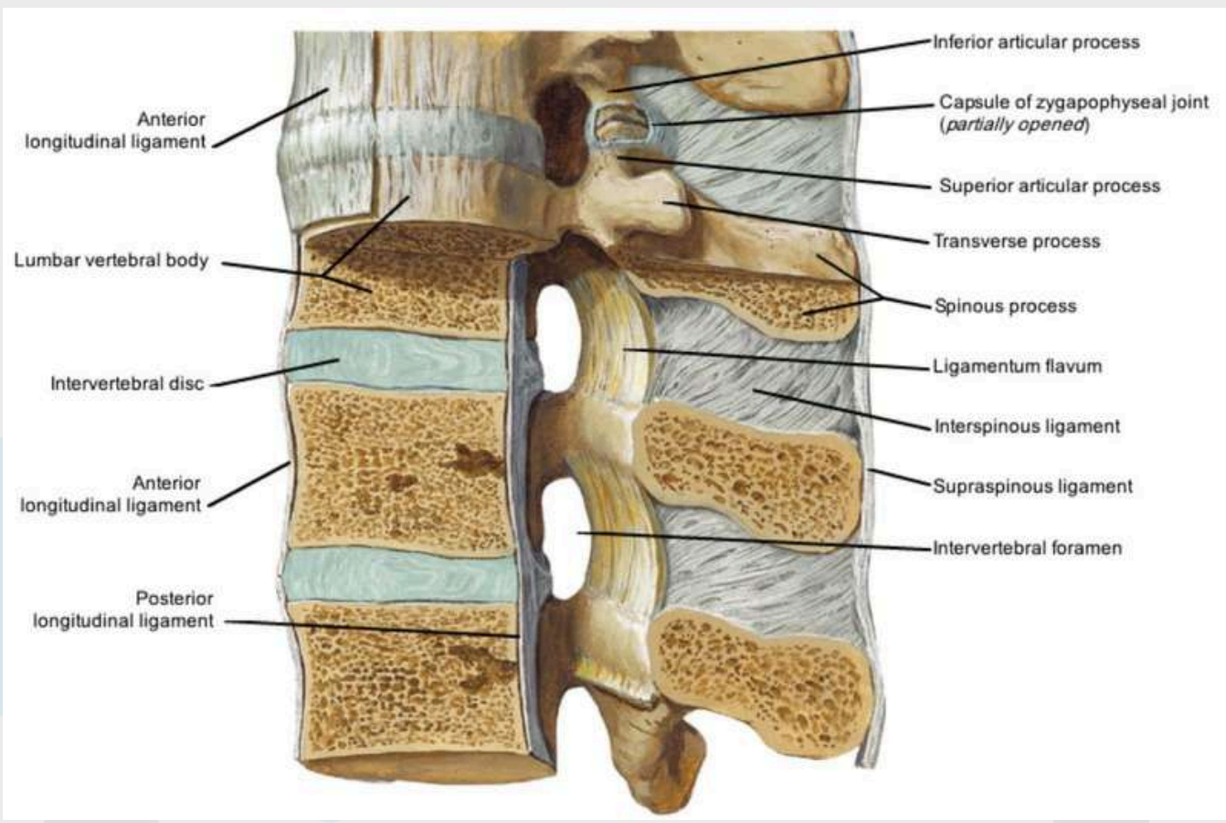
Function: shock absorption & mobility

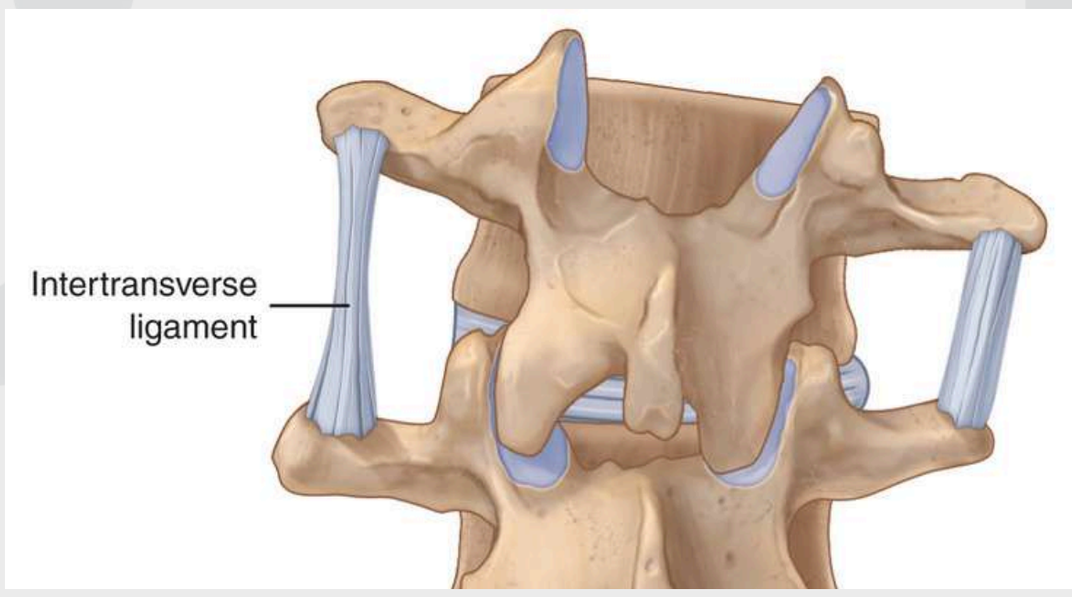


Ligaments مهم

- **Anterior longitudinal ligament (ALL) →** prevents hyperextension
- **Posterior longitudinal ligament (PLL) →** prevents hyperflexion
- **Ligamentum flavum →** between laminae
- **Interspinous & Supraspinous ligaments →** limit flexion
- **Intertransverse ligament →** limits lateral flexion (in thoracic and lumber)



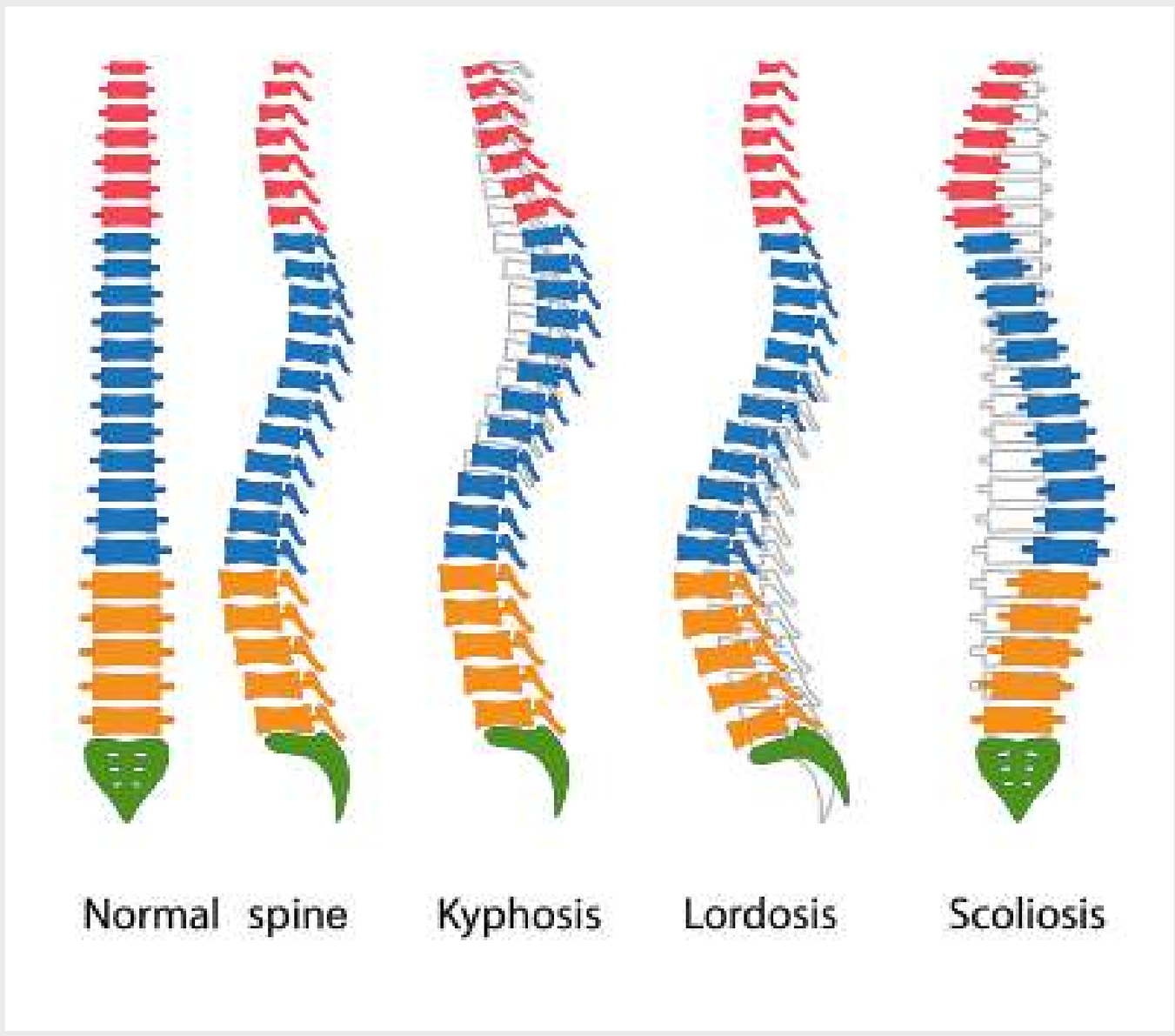




Curvatures

- **Cervical / Lumbar:** lordotic
- **Thoracic/ Sacral :** kyphotic
- **Thoracic > lumbar :**

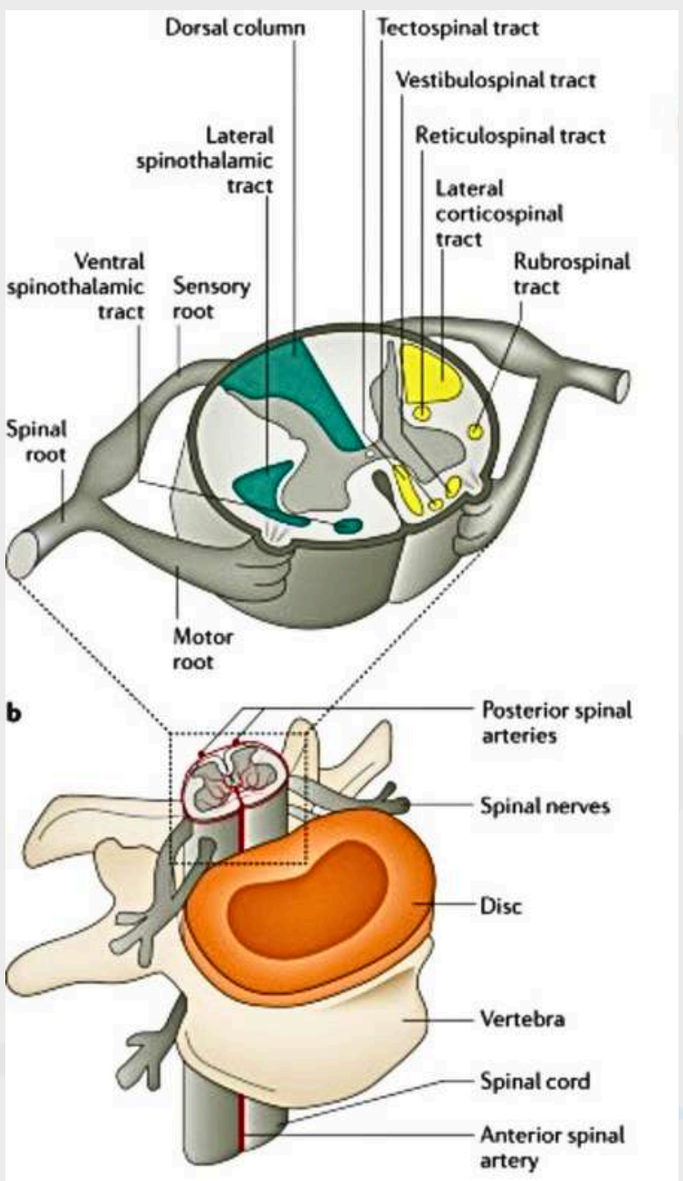
Scoliosis (Lateral curvature + vertebral rotation)

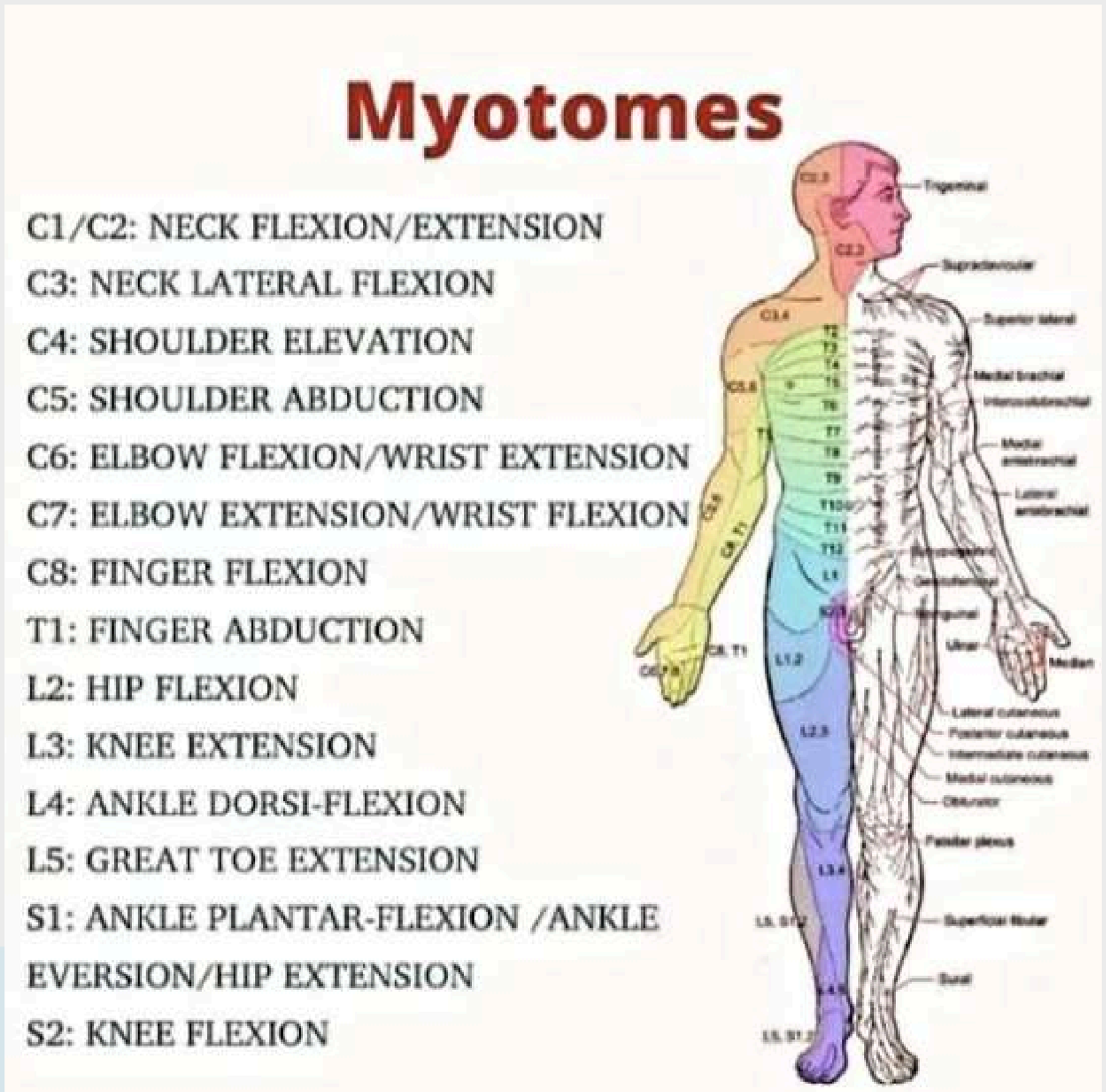


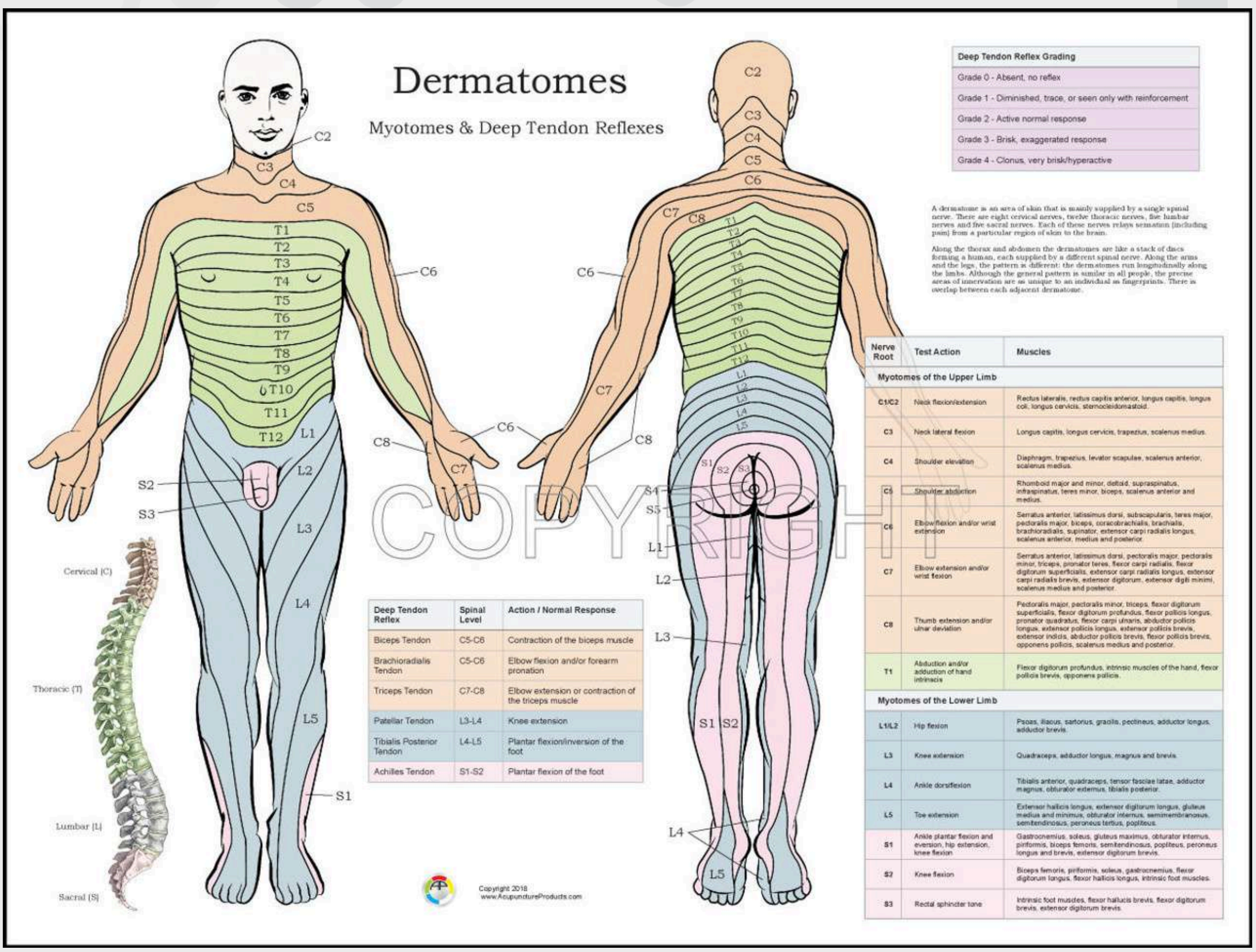
Spinal Cord

Spinal cord & nerves

- **Spinal cord → ends ~L1–L2 (conus medullaris)**
- **Cauda equina → nerve roots below L2**
- **31 spinal nerves → exit via intervertebral foramina**

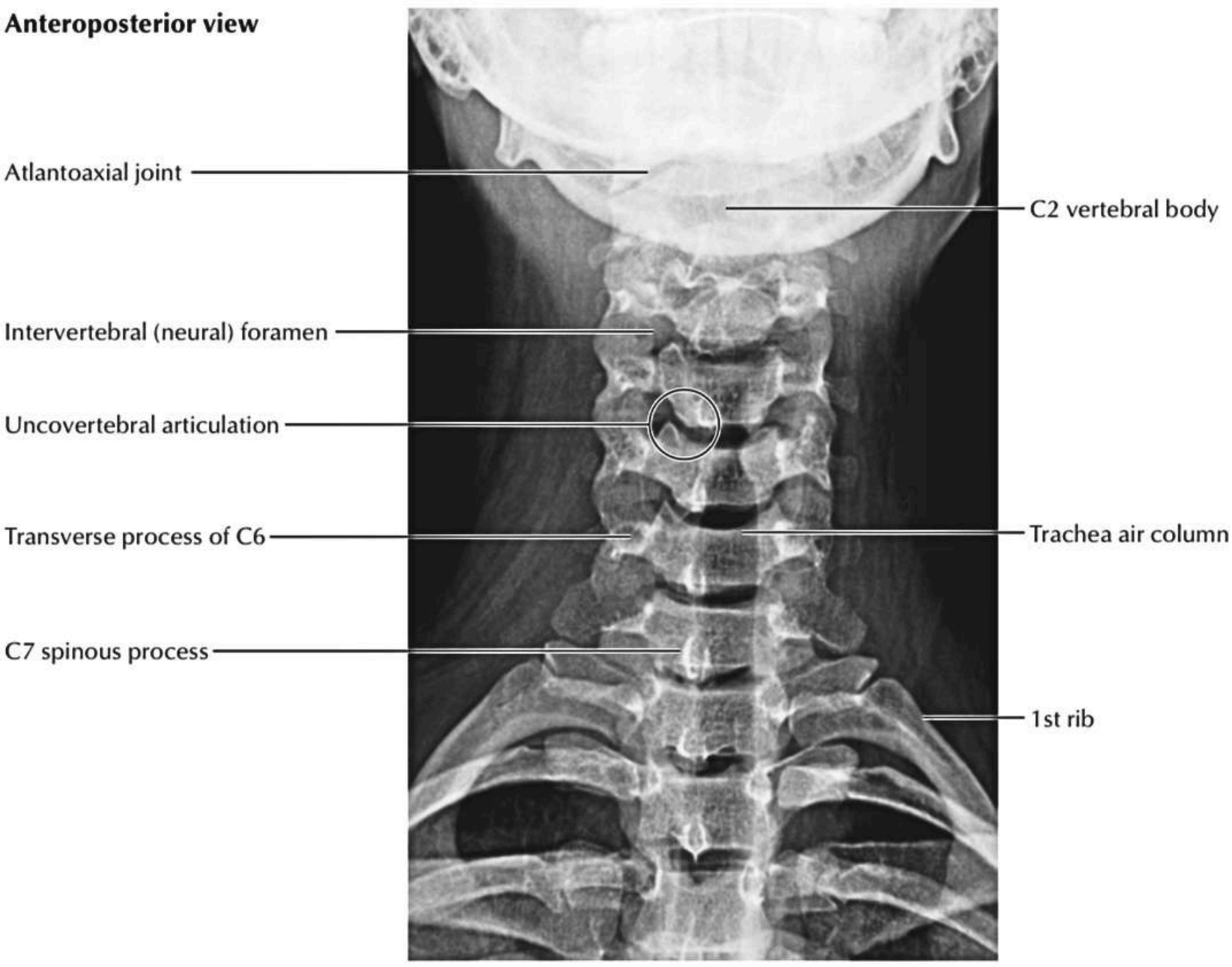




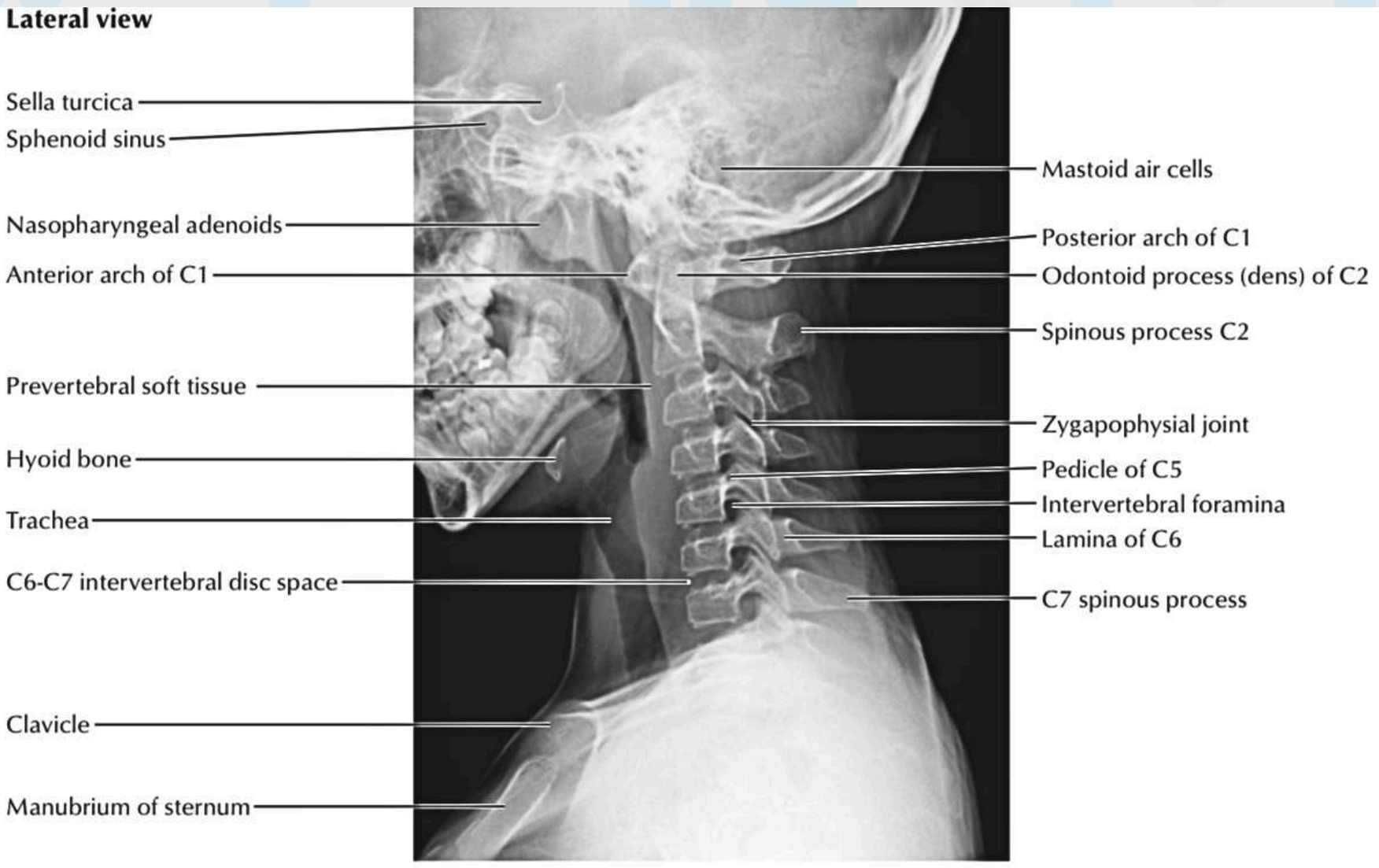


Sipe / image

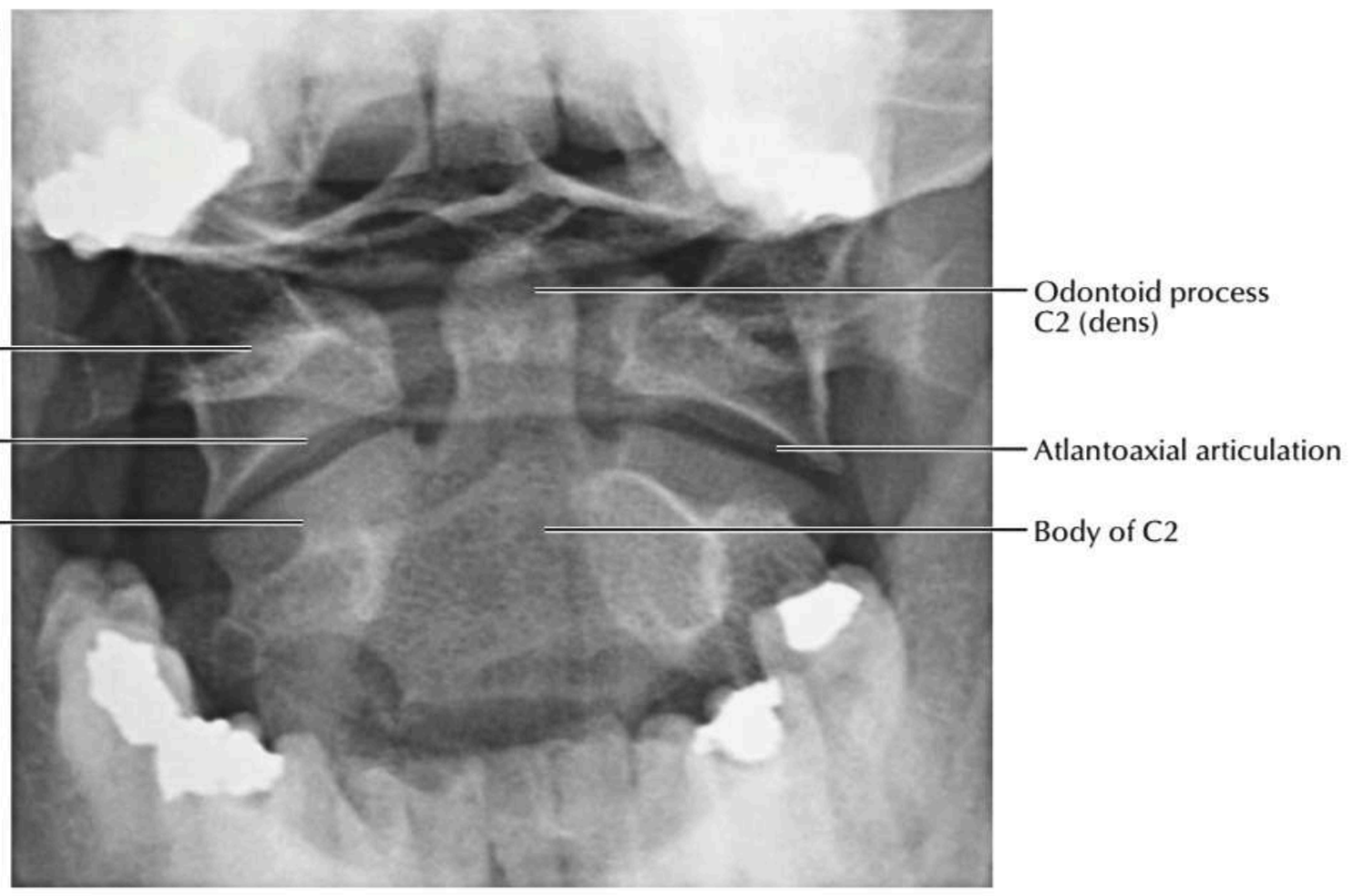
Anteroposterior view



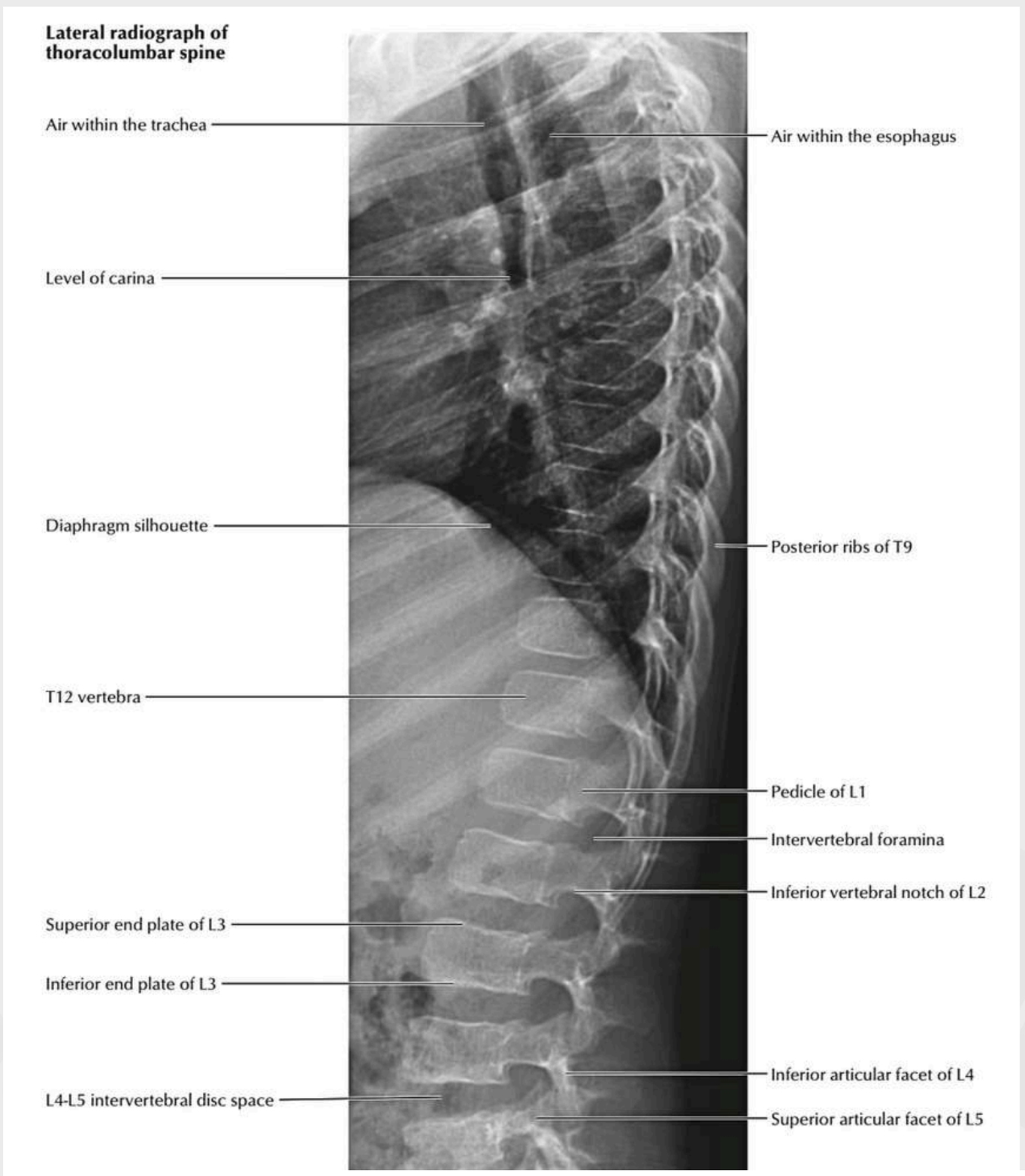
Lateral view

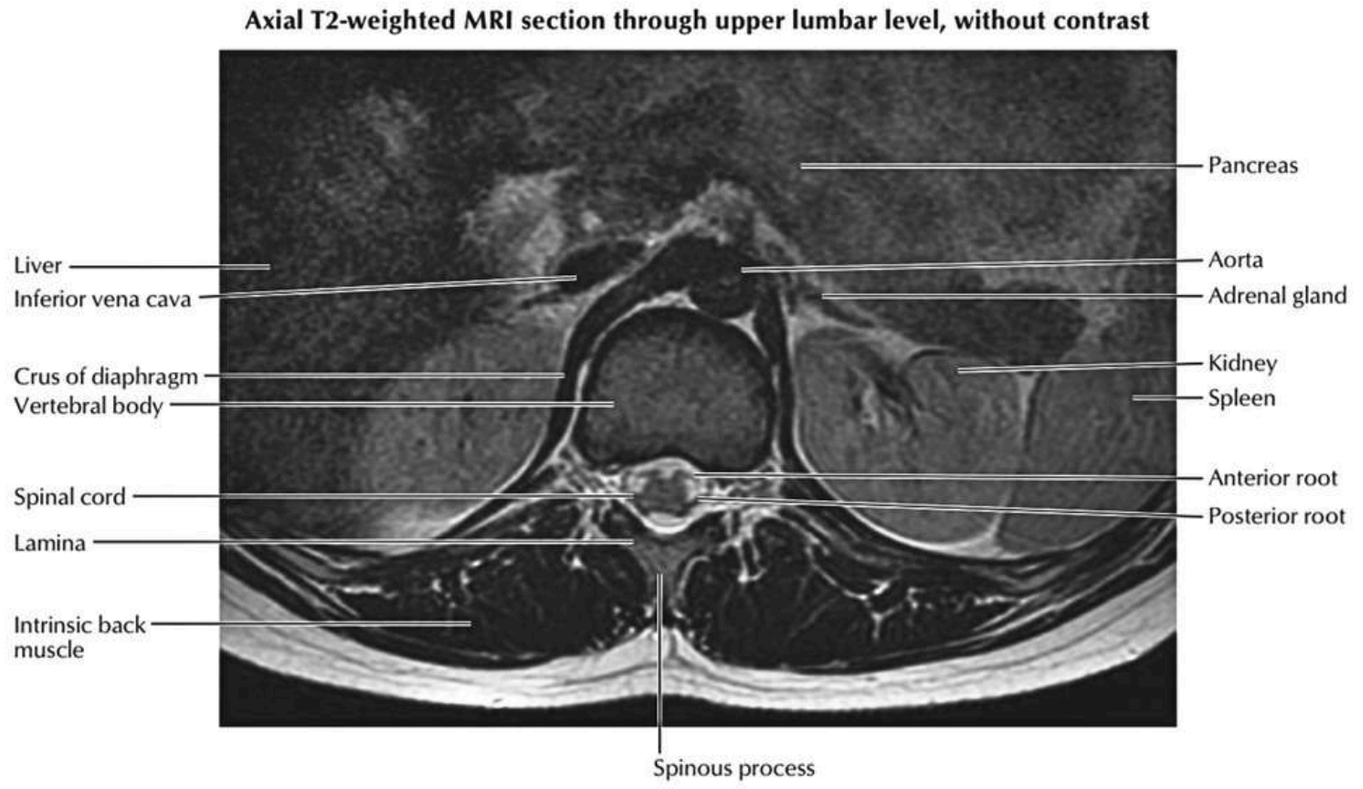


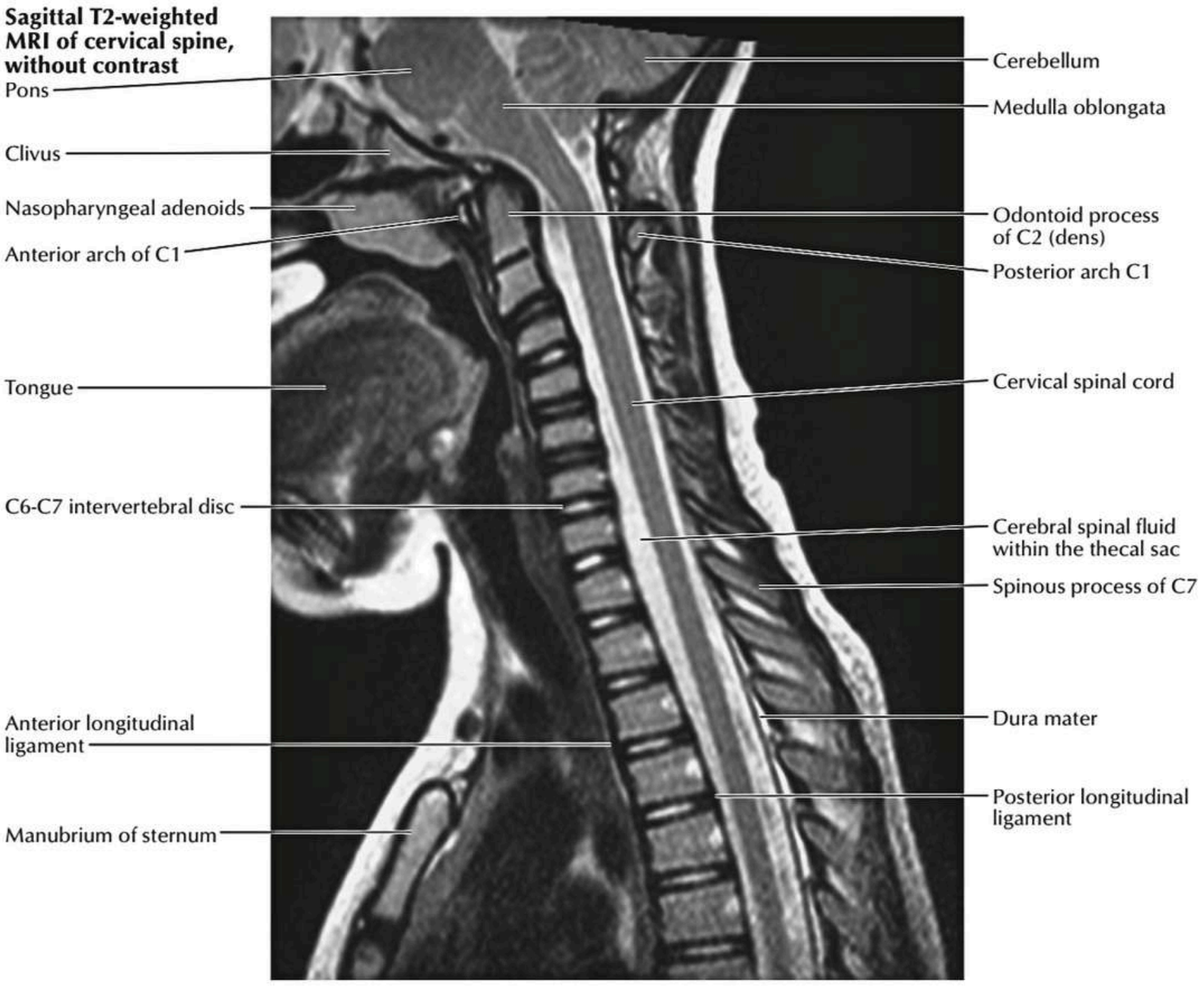
Open-mouth radiograph of cervical spine



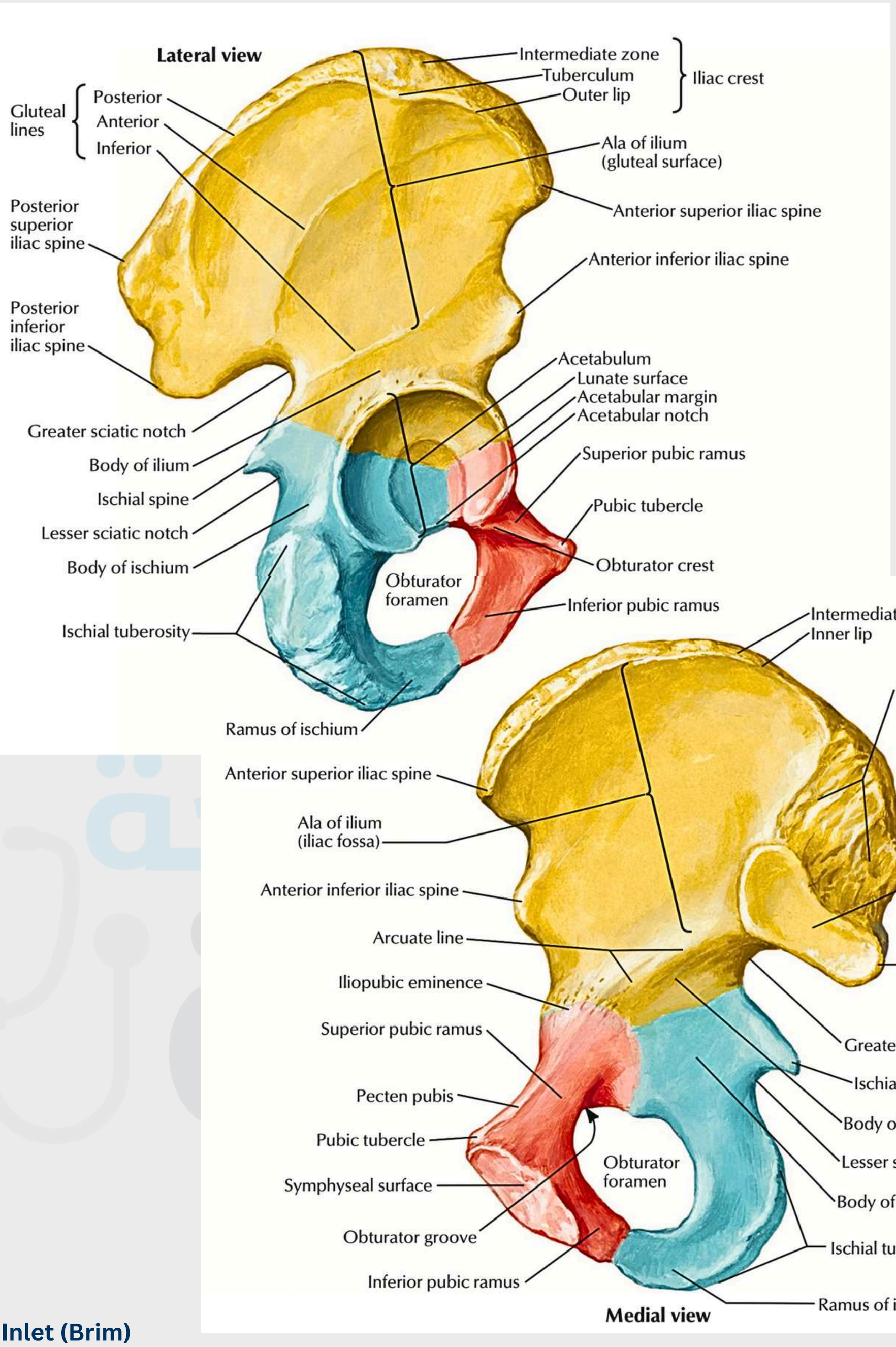
Sipe / image


Lateral radiograph of thoracolumbar spine
Air within the trachea
Level of carina
Diaphragm silhouette
T12 vertebra
Superior end plate of L3
Inferior end plate of L3
L4-L5 intervertebral disc space
Air within the esophagus
Posterior ribs of T9
Pedicle of L1
Intervertebral foramina
Inferior vertebral notch of L2
Inferior articular facet of L4
Superior articular facet of L5


Axial T2-weighted MRI section through upper lumbar level, without contrast
Liver
Inferior vena cava
Crus of diaphragm
Vertebral body
Spinal cord
Lamina
Intrinsic back muscle
Spinous process
Pancreas
Aorta
Adrenal gland
Kidney
Spleen
Anterior root
Posterior root


Sagittal T2-weighted MRI of cervical spine, without contrast
Pons
Clivus
Nasopharyngeal adenoids
Anterior arch of C1
Tongue
C6-C7 intervertebral disc
Anterior longitudinal ligament
Manubrium of sternum
Cerebellum
Medulla oblongata
Odontoid process of C2 (dens)
Posterior arch C1
Cervical spinal cord
Cerebral spinal fluid within the thecal sac
Spinous process of C7
Dura mater
Posterior longitudinal ligament

Pelvic and Acetabulum



Pelvic Inlet (Brim)

A) Sacral promontory
B) Ala of sacrum
C) Arcuate line
D) Pectineal line
E) Superior pubic symphysis

Pelvic Outlet

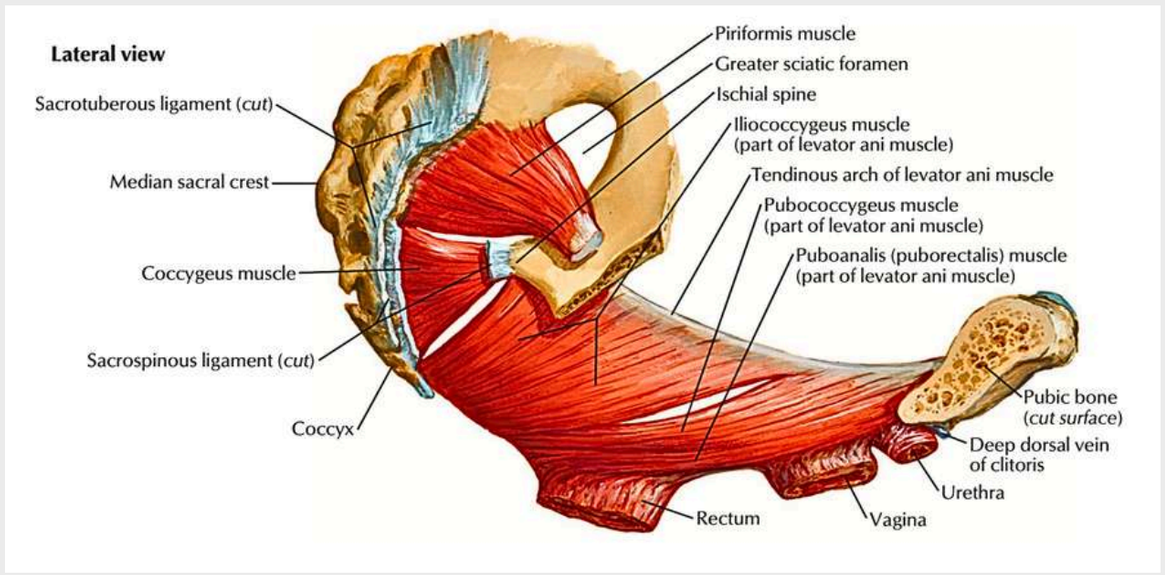
A) Tip of coccyx
B) Sacrotuberous ligaments
C) Ischial tuberosities
D) Inferior pubic symphysis

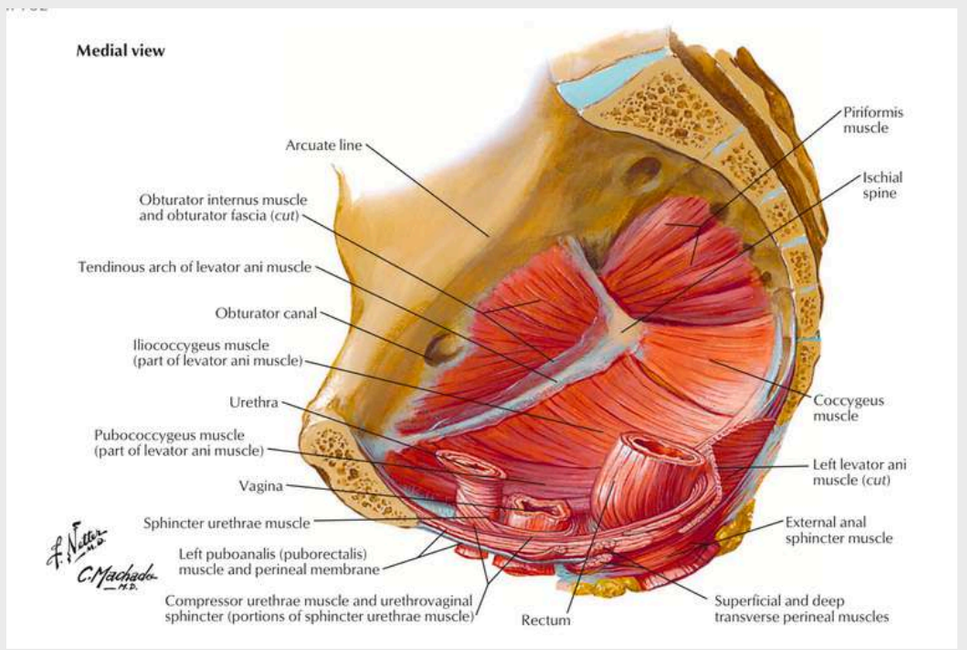
Foramina

A) Greater sciatic foramen
B) Lesser sciatic foramen
C) Obturator canal

Key points about the bony pelvis	Table quiz
Bones	**Hip bone:** Ilium, ischium, pubis **Sacrum** **Coccyx**
Hip bone	Acetabulum, ischiopubic ramus, obturator foramen, greater sciatic notch, greater sciatic foramen
Ilium	Body of ilium, ala, gluteal surface, sacropelvic surface
Ischium	Body of ischium, ramus of ischium, ischial spine, lesser sciatic notch, lesser sciatic foramen
Pubis	Body of pubis, superior pubic ramus, inferior pubic ramus
Sacrum	Base of sacrum, apex of sacrum, lateral part, pelvic surface, dorsal surface
Coccyx	Base of coccyx, coccygeal horn, apex of coccyx
Joints	Sacroiliac joint, pubic symphysis, lumbosacral joint, sacrococcygeal symphysis, hip joint

Pelvic and Acetabulum





MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT (ORIGIN)	DISTAL ATTACHMENT (INSERTION)	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Bulbospongiosus	Perineal	*Male:* median raphe, bulb of penis, perineal body *Female:* perineal body	*Male:* perineal membrane, corpus cavernosum, bulb of penis *Female:* dorsum of clitoris, inferior fascia of urogenital diaphragm, bulb of vestibule, pubic arch	Deep branch of perineal nerve from pudendal nerve	Internal pudendal artery and its branch (perineal artery)	*Male:* compresses bulb of penis, forces blood into body of penis during erection, removes urine from urethra and semen during ejaculation *Female:* constricts vaginal orifice, assists in expressing secretions of greater vestibular gland, forces blood into body of clitoris
Coccygeus	Pelvic floor	Ischial spine, sacrospinous ligament	Inferior sacrum, coccyx	Anterior rami of lower sacral nerves	Inferior gluteal artery	Supports pelvic viscera, draws coccyx forward
Compressor urethrae (female only)	Perineal	Ischiopubic ramus	Anterior aspect of urethra	Perineal branches of pudendal nerve	Perineal branch of internal pudendal artery	Sphincter of urethra
Cremaster	Spermatic cord	Lower edge of internal abdominal oblique and middle of inguinal ligament	Pubic tubercle, crest of pubis	Genital branch of genitofemoral nerve	Cremasteric branch of inferior epigastric artery	Retracts testicle
Deep transverse perineal	Perineal	Inner surface of inferior ischial rami	*Male:* medial tendinous raphe and perineal body *Female:* sides of vagina	Perineal branches of pudendal nerve	Perineal branch of internal pudendal artery	Stabilizes perineal body, supports prostate gland/ vagina
External anal sphincter	Perineal	Tip of coccyx, anococcygeal ligament	Deeper fibers surround anal canal, attach posteriorly to coccyx and anteriorly to central point of perineum	Perineal and inferior rectal branches of pudendal nerve	Inferior rectal and transverse perineal artery	Closes anal orifice
Iliacus	Anterior thigh	Superior 2/3 of iliac fossa, ala of sacrum, anterior sacroiliac ligaments	Lesser trochanter of femur and body inferior to it, to psoas major tendon	Femoral nerve	Iliac branches of iliolumbar artery	Flexes thigh at hips and stabilizes hip joint, acts with psoas major
Ischiocavernosus	Perineal	Inferior internal surface of ischiopubic ramus, ischial tuberosity	Crus of penis or clitoris	Deep branch of perineal nerve from pudendal nerve	Internal pudendal artery and its branch (perineal artery)	Forces blood into body of penis and clitoris during erection
Levator ani (iliococcygeus, pubococcygeus, and puboanalis)	Pelvic floor	Body of pubis, tendinous arch of obturator fascia, ischial spine	Perineal body, coccyx, anococcygeal raphe, walls of prostate gland or vagina, rectum, anal canal	Anterior rami of lower sacral nerves, perineal nerve	Inferior gluteal artery, internal pudendal artery and its branches (inferior rectal and perineal arteries)	Supports pelvic viscera, raises pelvic floor
Obturator internus	Gluteal region	Pelvic surface of obturator membrane and surrounding bone	Medial surface of greater trochanter of femur	Nerve to obturator internus muscle	Internal pudendal and obturator arteries	Laterally rotates extended thigh, abducts flexed thigh at hip
Piriformis	Gluteal region	Anterior surface of sacral segments 2–4, sacrotuberous ligament	Superior borcer of greater trochanter of femur	Anterior rami of L5, S1, S2	Superior and inferior gluteal arteries, internal pudendal artery	Laterally rotates extended thigh, abducts flexed thigh at hip
Sphincter urethrae	Perineal	External fibers from junction of inferior pubic and ischial rami and adjacent fascia; internal fibers pass medially to surround membranous urethra	*Male:* median raphe in front and behind urethra *Female:* encloses urethra, attaches to sides of vagina	Perineal branches of pudendal nerve	Perineal branch of internal pudendal artery	Compresses urethra at end of micturition; in female also compresses distal vagina
Sphincter urethrovaginalis (female only)	Perineal	Perineal body	Passes forward and anteriorly around urethra	Perineal branches of pudendal nerve	Perineal branch of pudendal artery	Sphincter of urethra and vagina
Superficial transverse perineal	Perineal	Ischial rami and tuberosities	Central tendon (perineal body)	Perineal branches of pudendal nerve	Perineal branch of internal pudendal artery	Stabilizes central tendon

Pelvic and Acetabulum

A) False → above pelvic brim

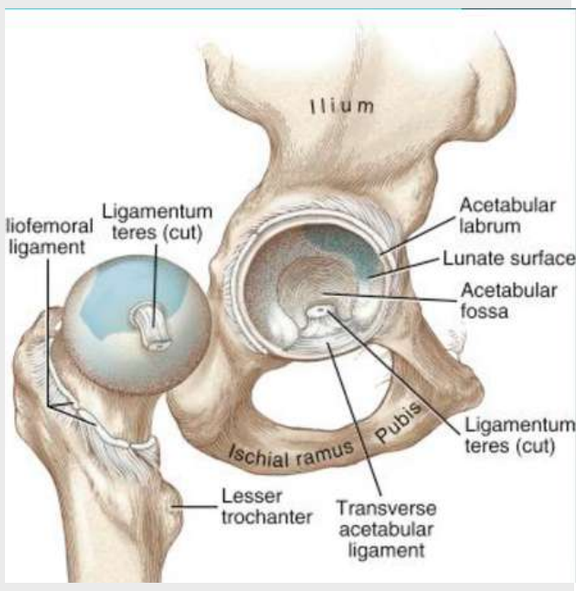
B) True → below pelvic brim (obstetric importance)

Pelvic Joints

A) SI joint

B) Pubic symphysis

C) Lumbosacral joint



Pelvic Ligaments

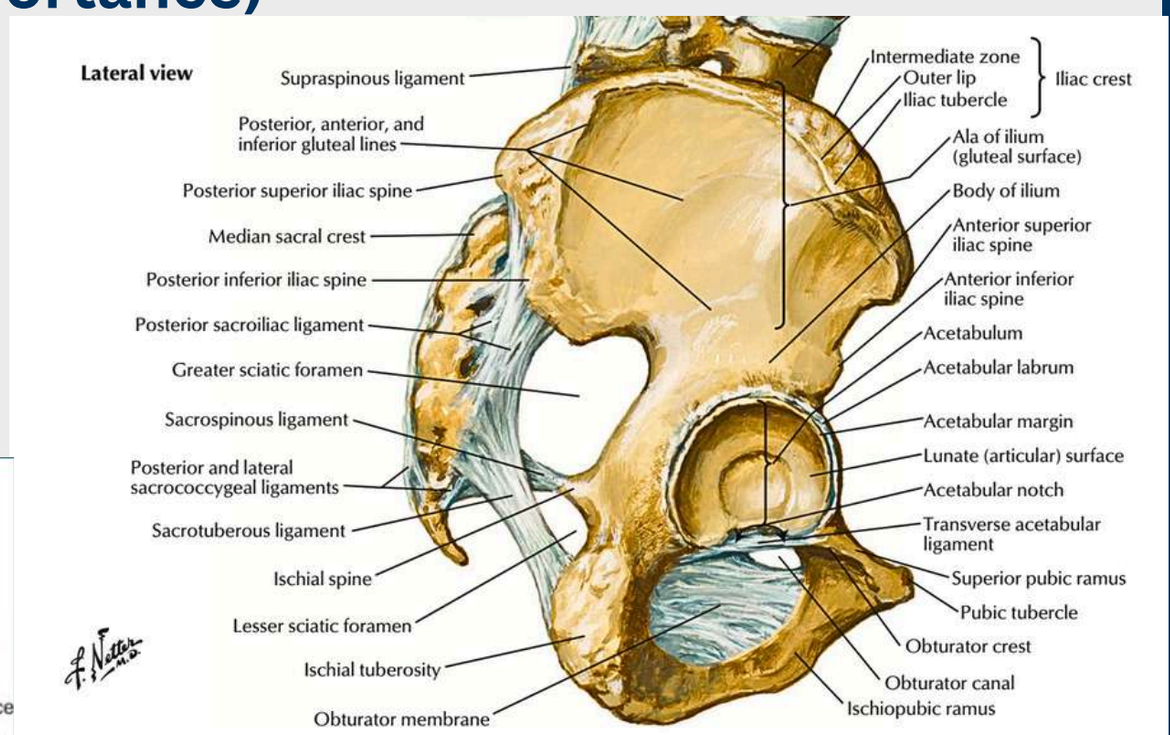
A) Sacrospinous

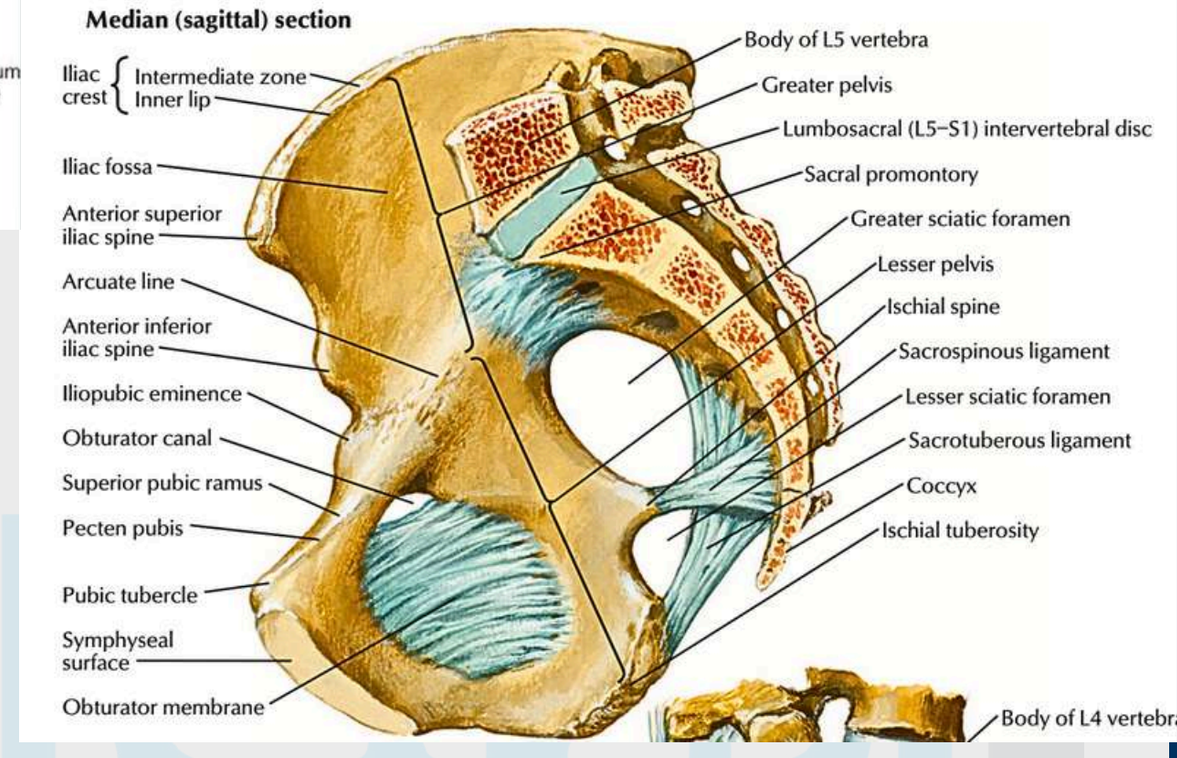
B) Sacrotuberous

C) Sacroiliac (ant/post/interosseous)

D) Iliolumbar

E) Superior & inferior pubic



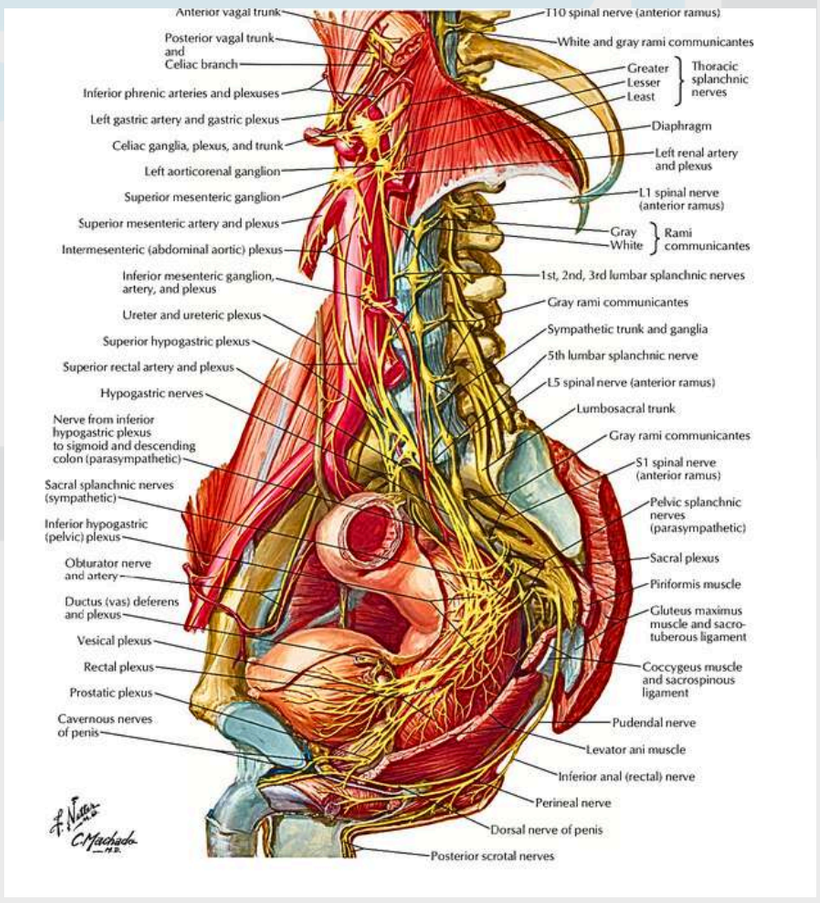


Main Arteries

A) Common iliac

B) Internal iliac → anterior & posterior divisions

C) External iliac → femoral



Main Nerves (Lumbosacral Plexus)

A) Sciatic

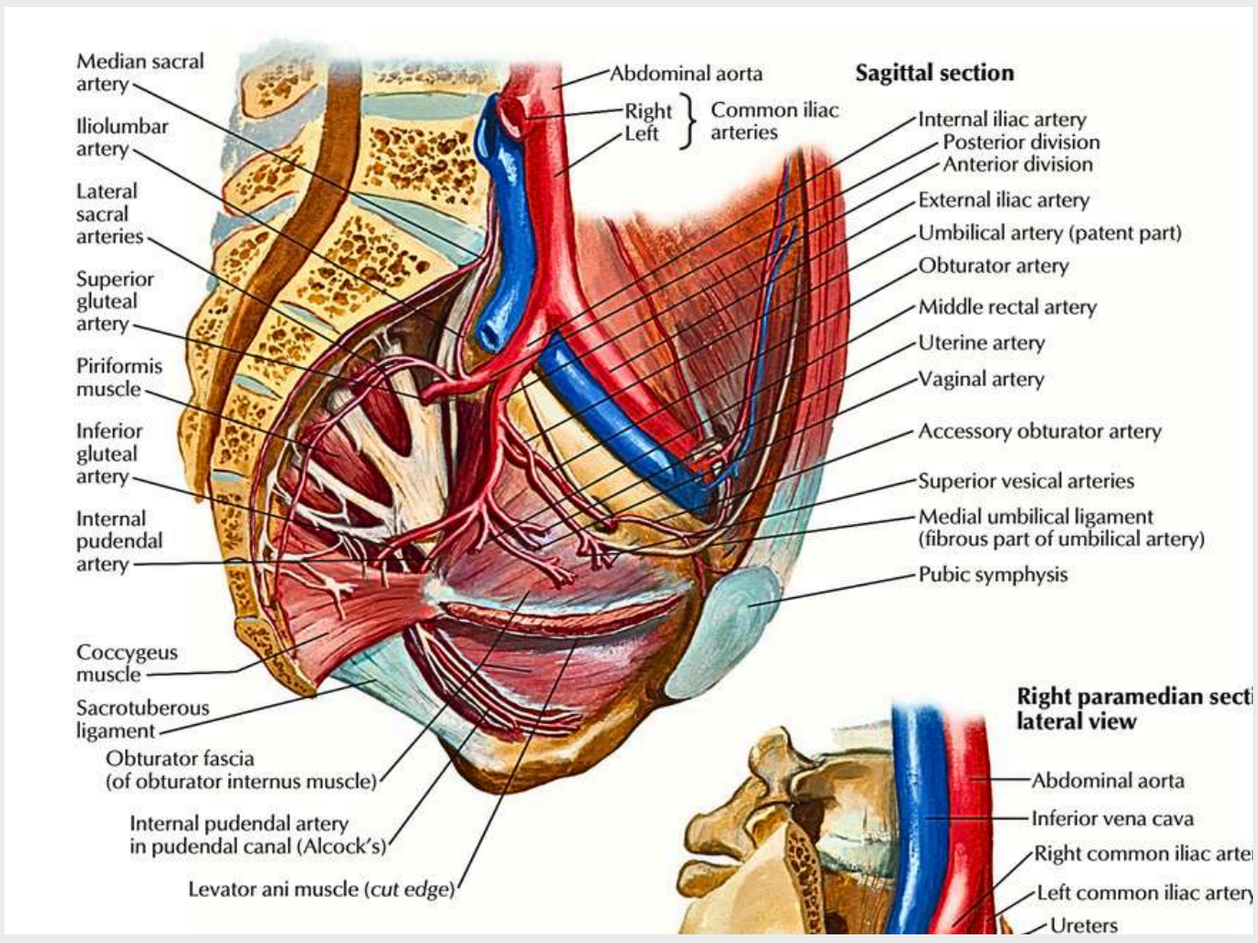
B) Pudendal

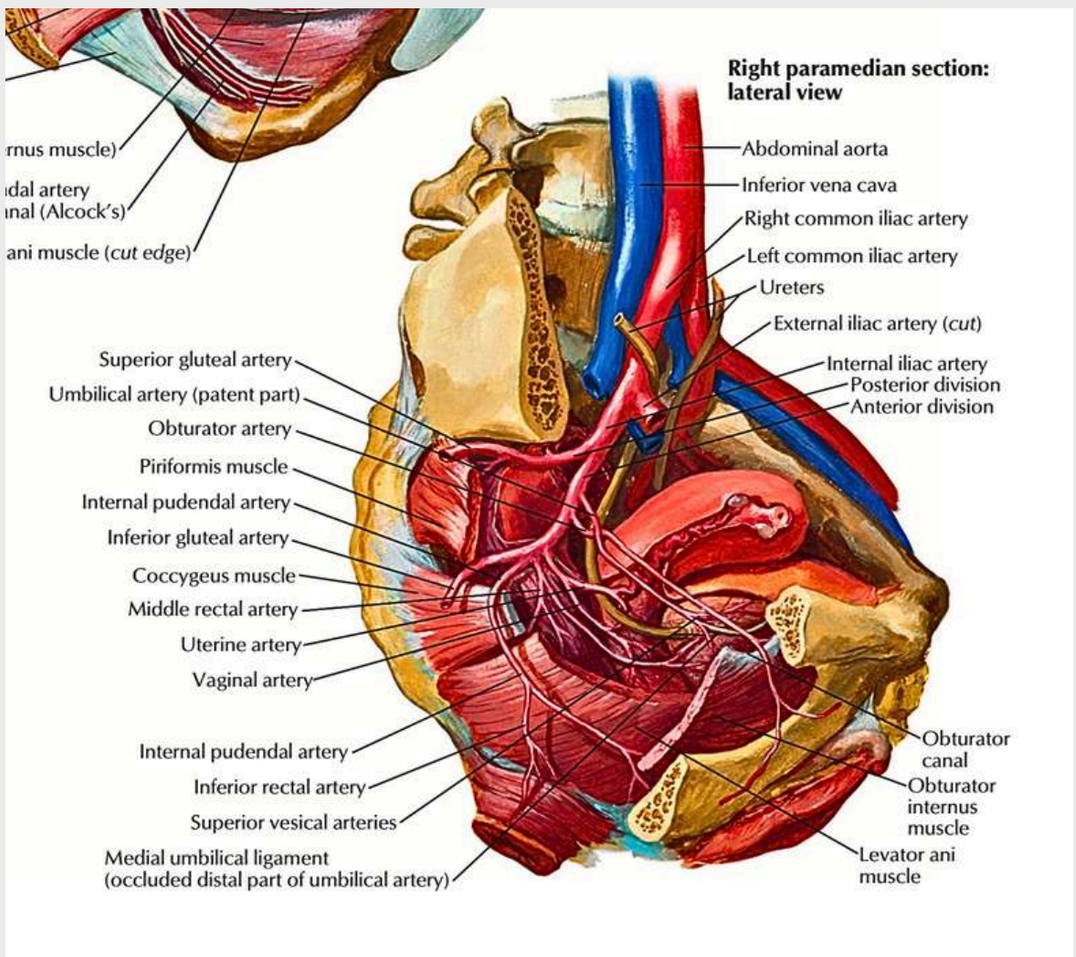
C) Superior gluteal

D) Inferior gluteal

E) Obturator

F) Femoral





Hip

Joint type	Synovial ball-and-socket joint
Articulating surfaces	Head of femur, lunate surface of acetabulum
Ligaments	**Capsular**: Iliofemoral, pubofemoral, ischiofemoral ligaments **Intracapsular**: Transverse ligament of acetabulum, ligament of head of femur
Movements	Flexion, extension, abduction, adduction, lateral/external rotation, medial/internal rotation and circumduction

Iliofemoral ligament

- Strongest ligament of the joint Y-shaped
- From AIIS → intertrochanteric line
- Prevents hyperextension
- Covers the anterior neck

Pubofemoral ligament

- From superior pubic ramus → lower intertrochanteric line
- Covers the anteroinferior neck
- Limits excessive abduction

Ischiofemoral ligament

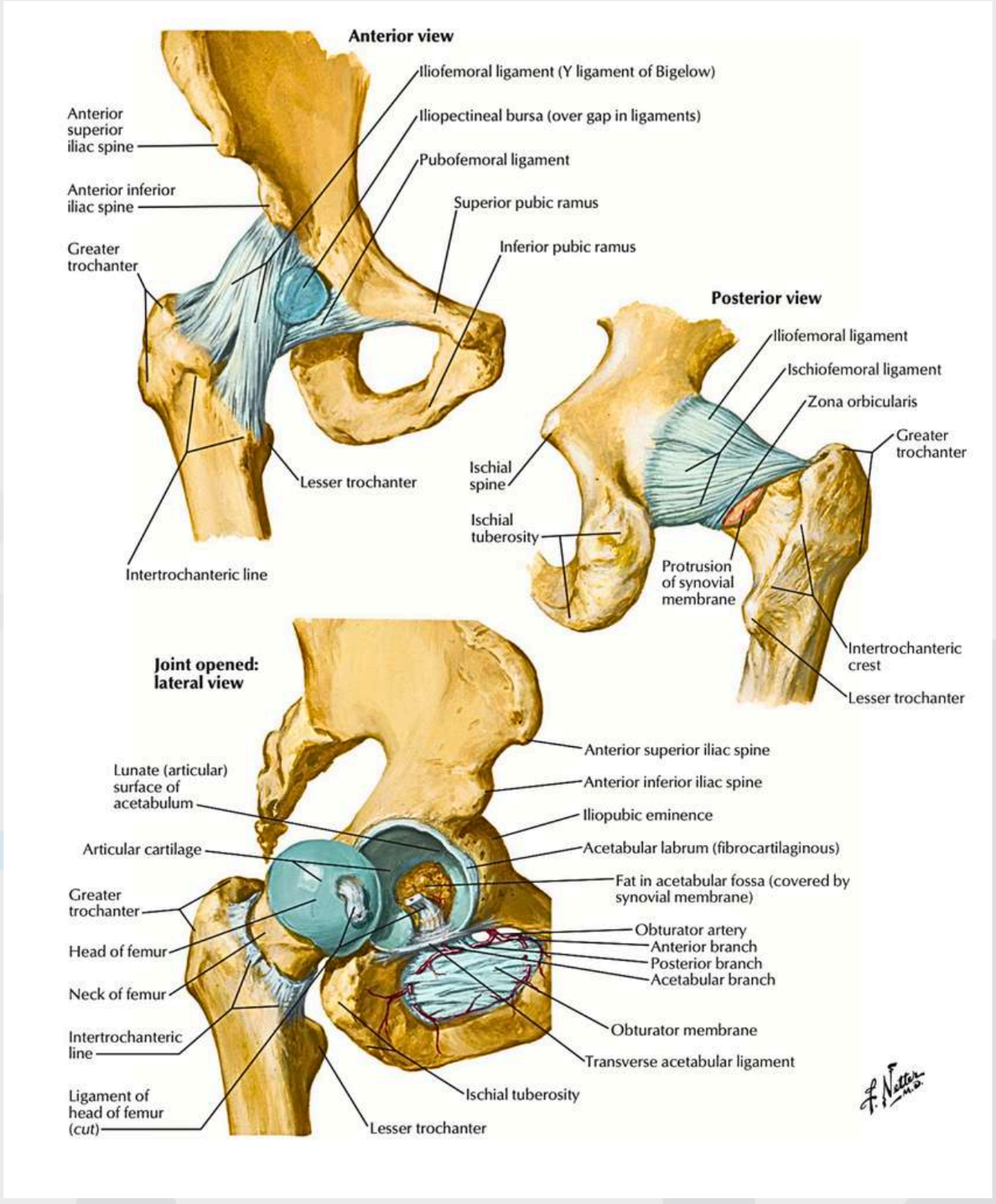
- Posterior
- From ischium → posterior femoral neck
- Weakest
- Spiral fibers around the neck
- Limits excessive internal rotation

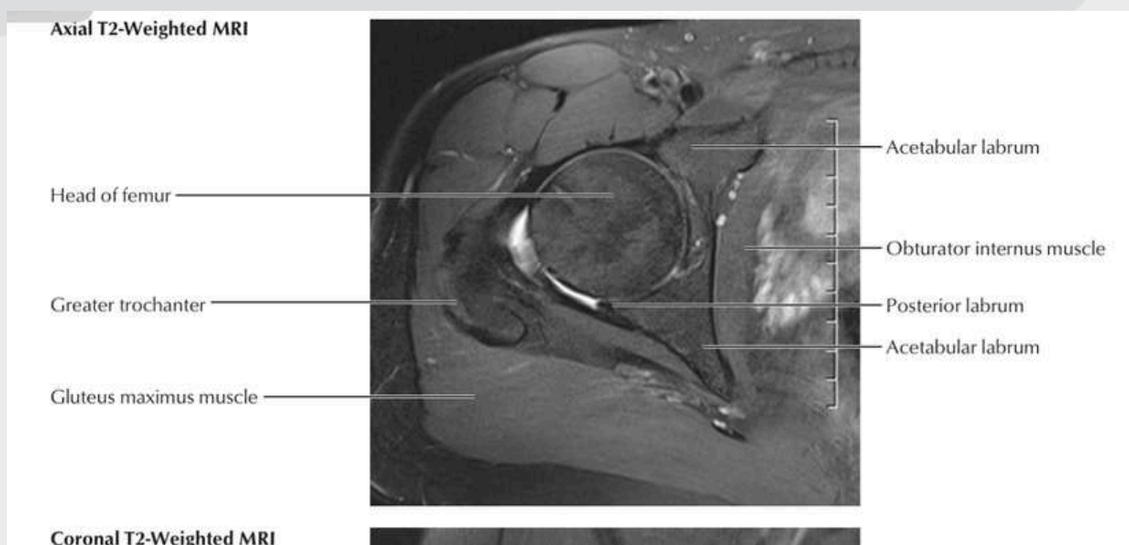
Zona orbicularis (annular ligament)

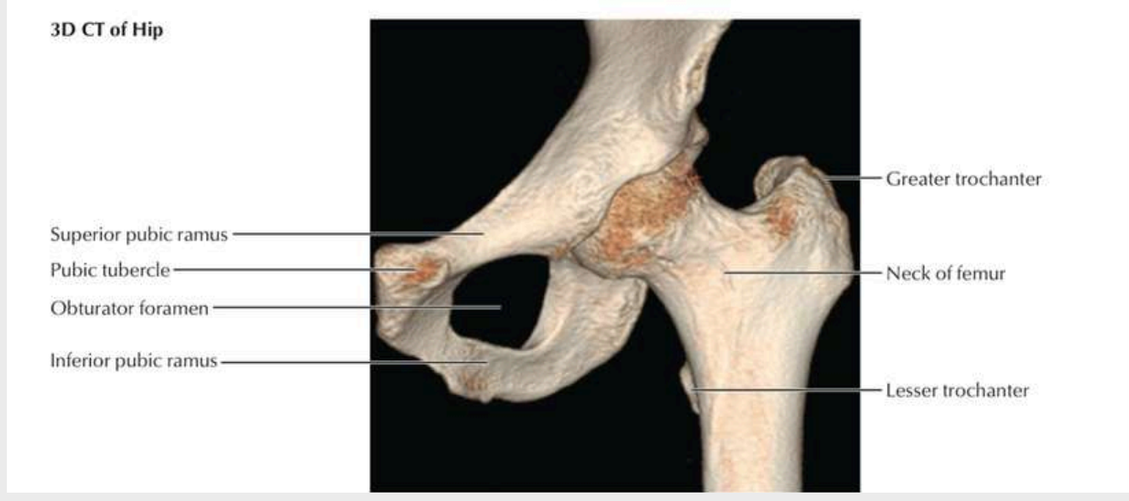
- Circumferential fibers
- Forms a 360° ring around the femoral neck
- Part of the capsule
- Acts like a buttonhole mechanism for stability

Ligamentum teres (ligament of head of femur)

- From acetabulum → fovea capitis
- Contains artery to the head of femur (minor in adults)







Hip

Hip Flexion
A) Iliopsoas (major)
B) Rectus femoris
C) Weak: Pectineus – TFL – Sartorius
D) Assist: Adductor longus & brevis

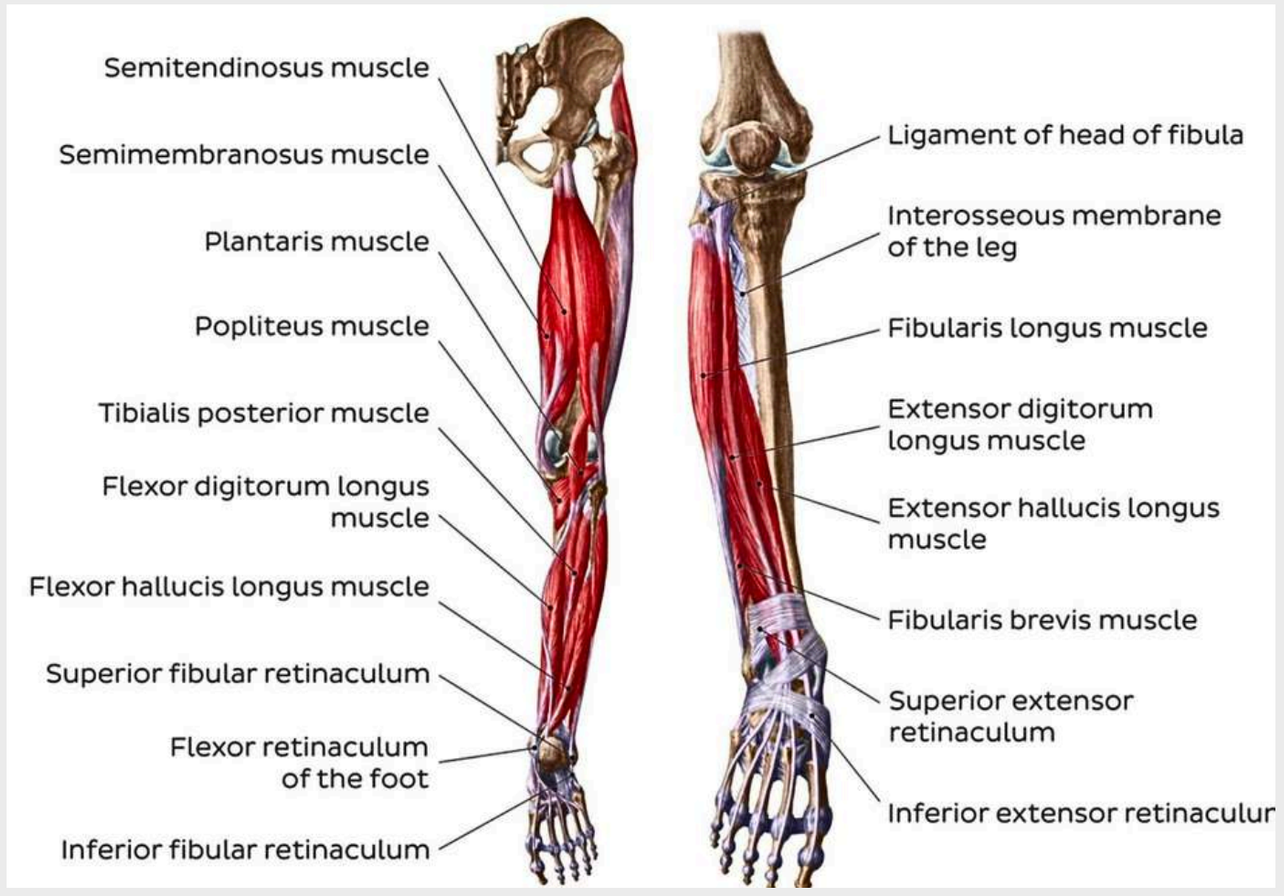
Hip Extension
A) Gluteus maximus
B) Assist: Hamstrings (BF – ST – SM)
C) Adductor magnus

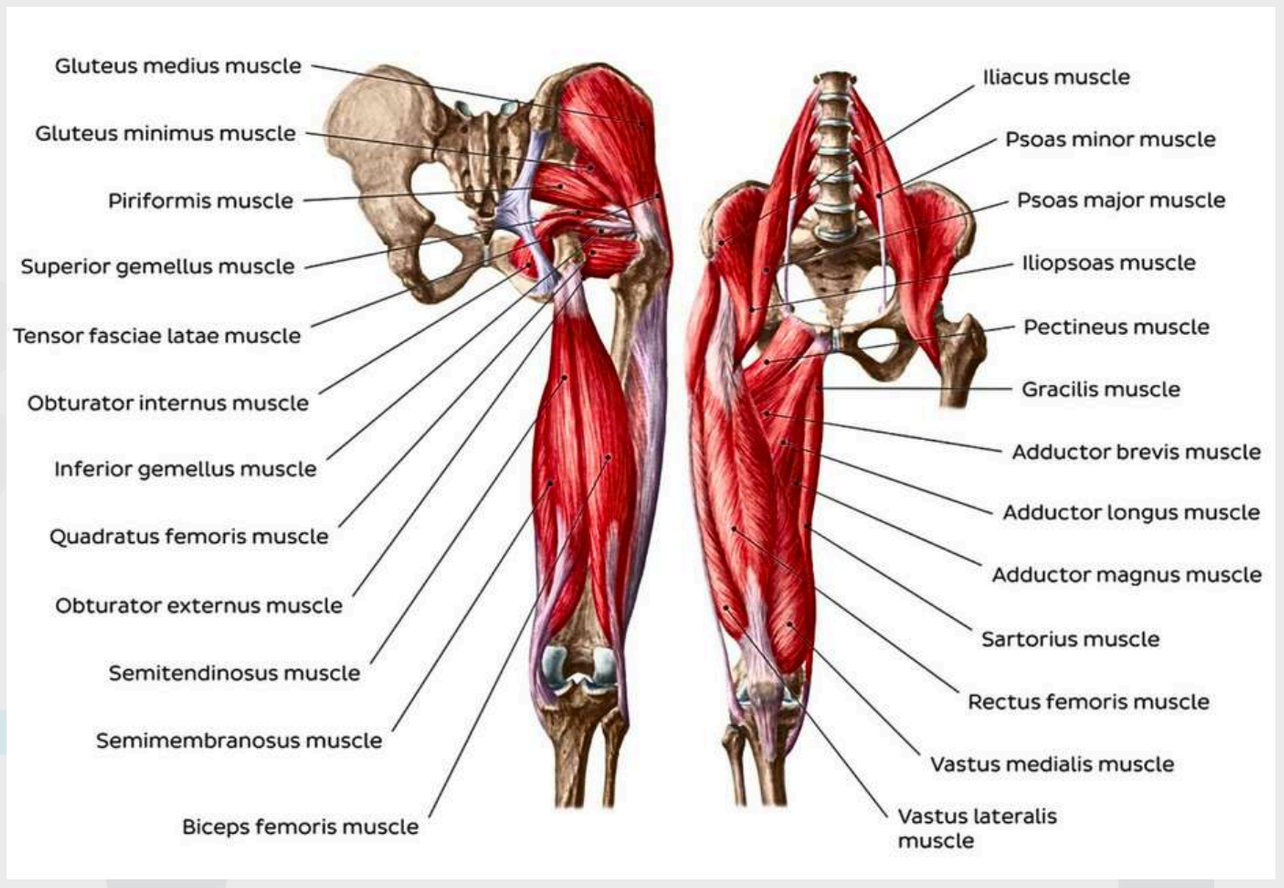
Hip Abduction
A) Gluteus medius & minimus
B) Assist: TFL – Piriformis – Sartorius

Hip Adduction
A) Adductors (Longus – Brevis – Magnus)
B) Gracilis
C) Assist: Pectineus – Quadratus femoris – Inf fibers G. maximus

Internal Rotation
A) Ant fibers: Gluteus medius & minimus
B) Assist: TFL – Most adductors

External Rotation
A) Gluteus maximus
B) 6 lateral rotators: Piriformis – Obturator int – Obturator ext – Sup gemellus – Inf gemellus – Quadratus femoris





See detailed Anatomy of muscles in Lower limb part...

Hip

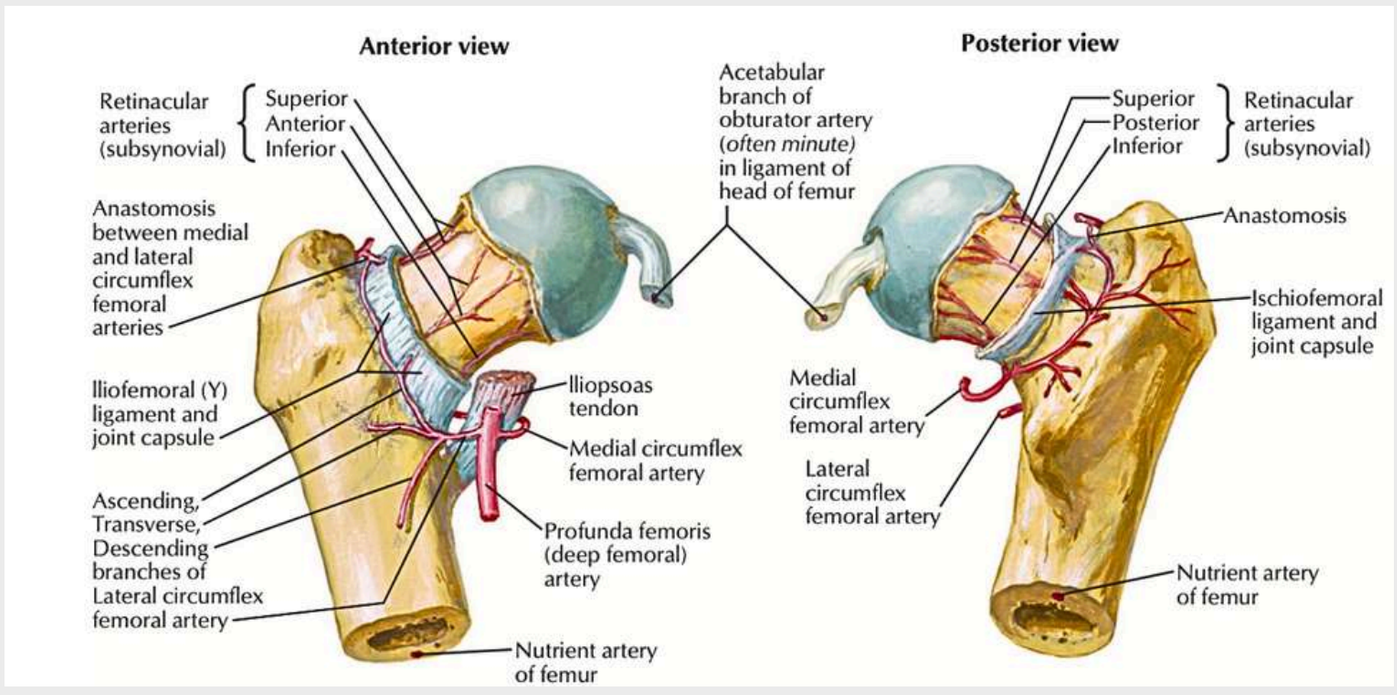
Key arteries and their contributions :

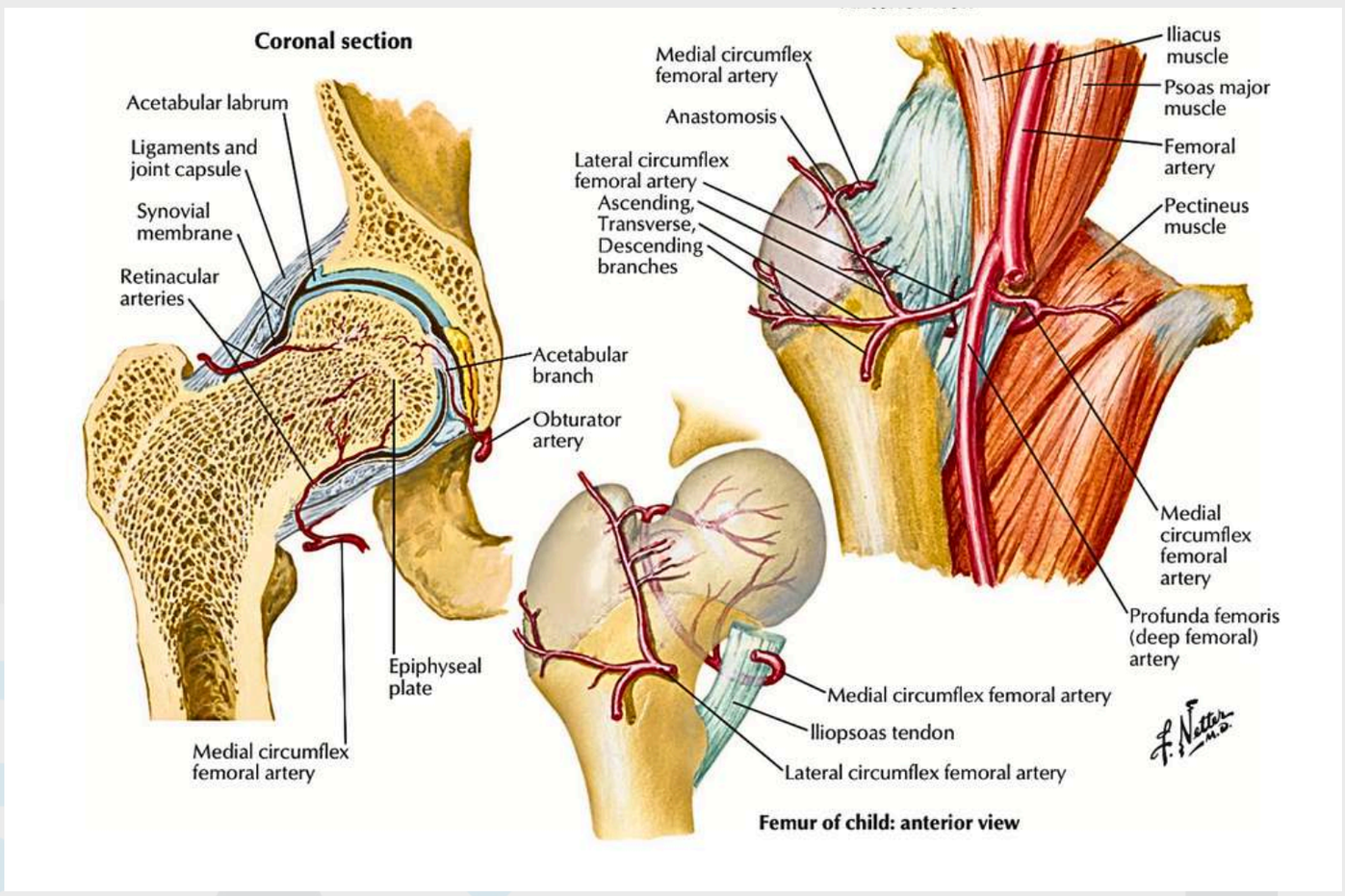
- **<u>Medial and lateral circumflex femoral arteries</u>**: These are the most significant contributors, arising from the profunda femoris artery. They form a ring around the femoral neck, sending branches to supply the head and neck of the femur.

- **<u>Obturator artery</u>:** A branch from the posterior division of the obturator artery, called the **<u>foveal artery</u>**, travels in the ligament of the head of the femur and provides a blood supply to the femoral head.

- **<u>Superior and inferior gluteal arteries</u>:** These also contribute to the blood supply around the hip joint.

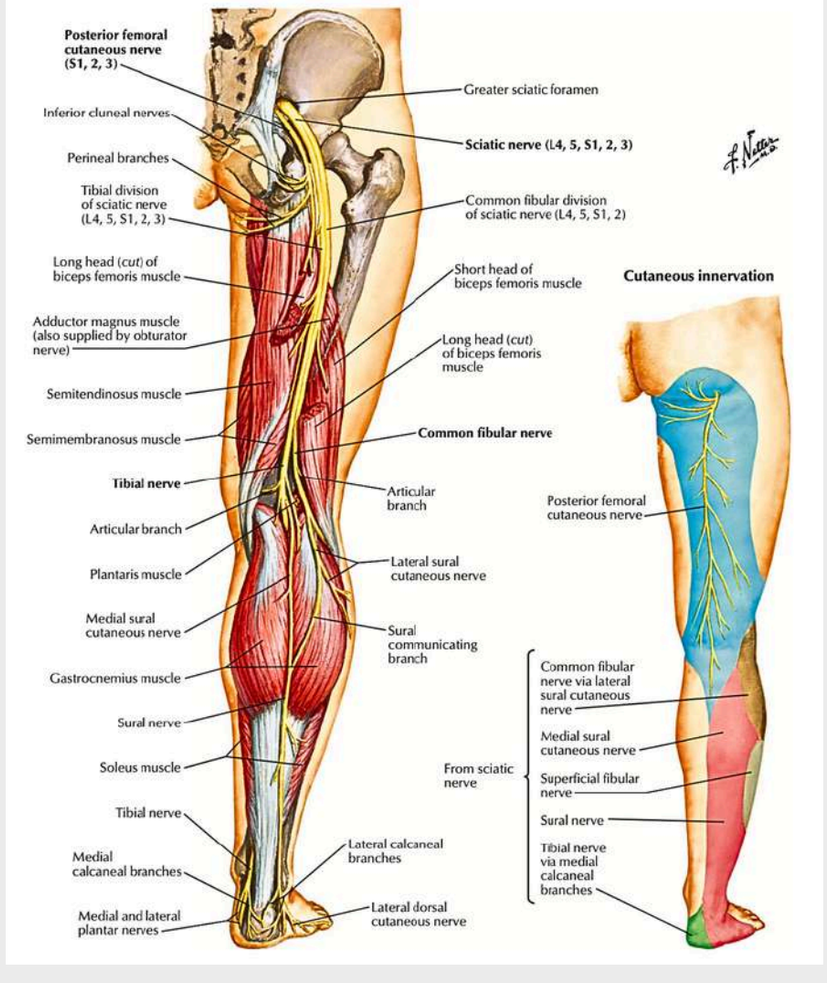
- **<u>Femoral artery</u>:** While the profunda femoris is a branch of the femoral artery, the femoral artery itself also contributes to the supply of the hip region.

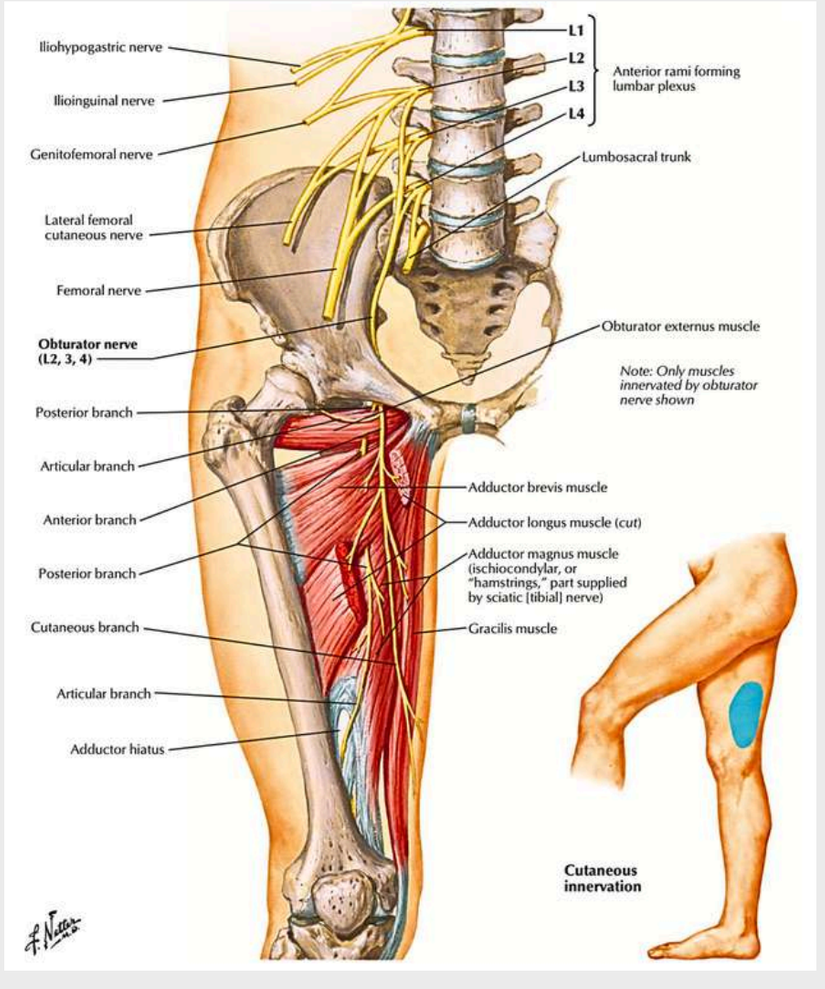




The hip joint is innervated by the articular branches of multiple nerves that emerge from the lumbosacral plexus (L2-S1). The nerve supply to a specific region of the joint typically corresponds to the innervation of the muscle that crosses it:

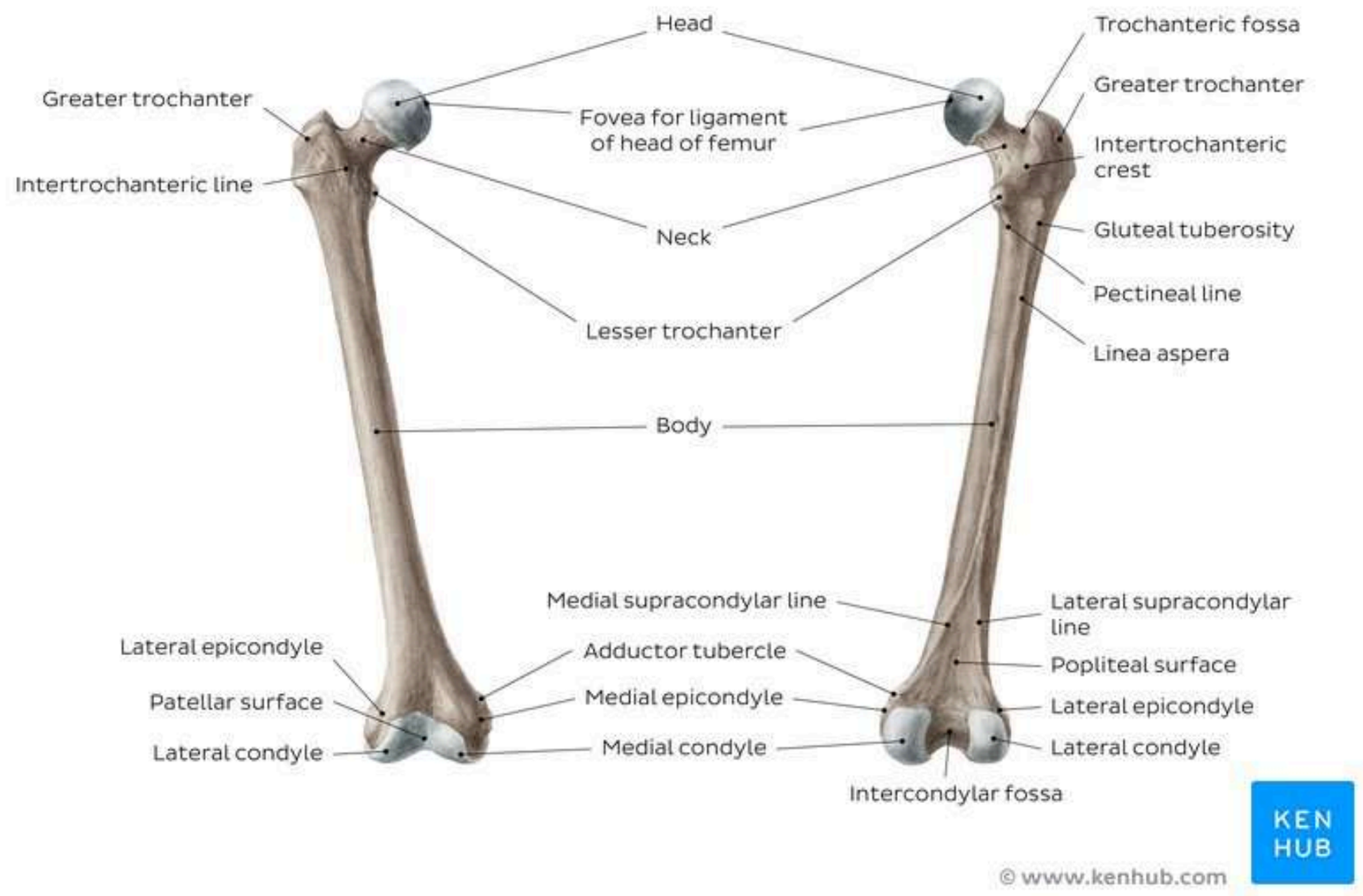
- The <u>femoral nerve</u> innervates the anterior aspect
- The <u>obturator nerve</u> supplies the inferior aspect
- The <u>superior gluteal nerve</u> supplies the superior aspect
- The nerve to the <u>quadratus femoris</u> innervates the posterior aspect.



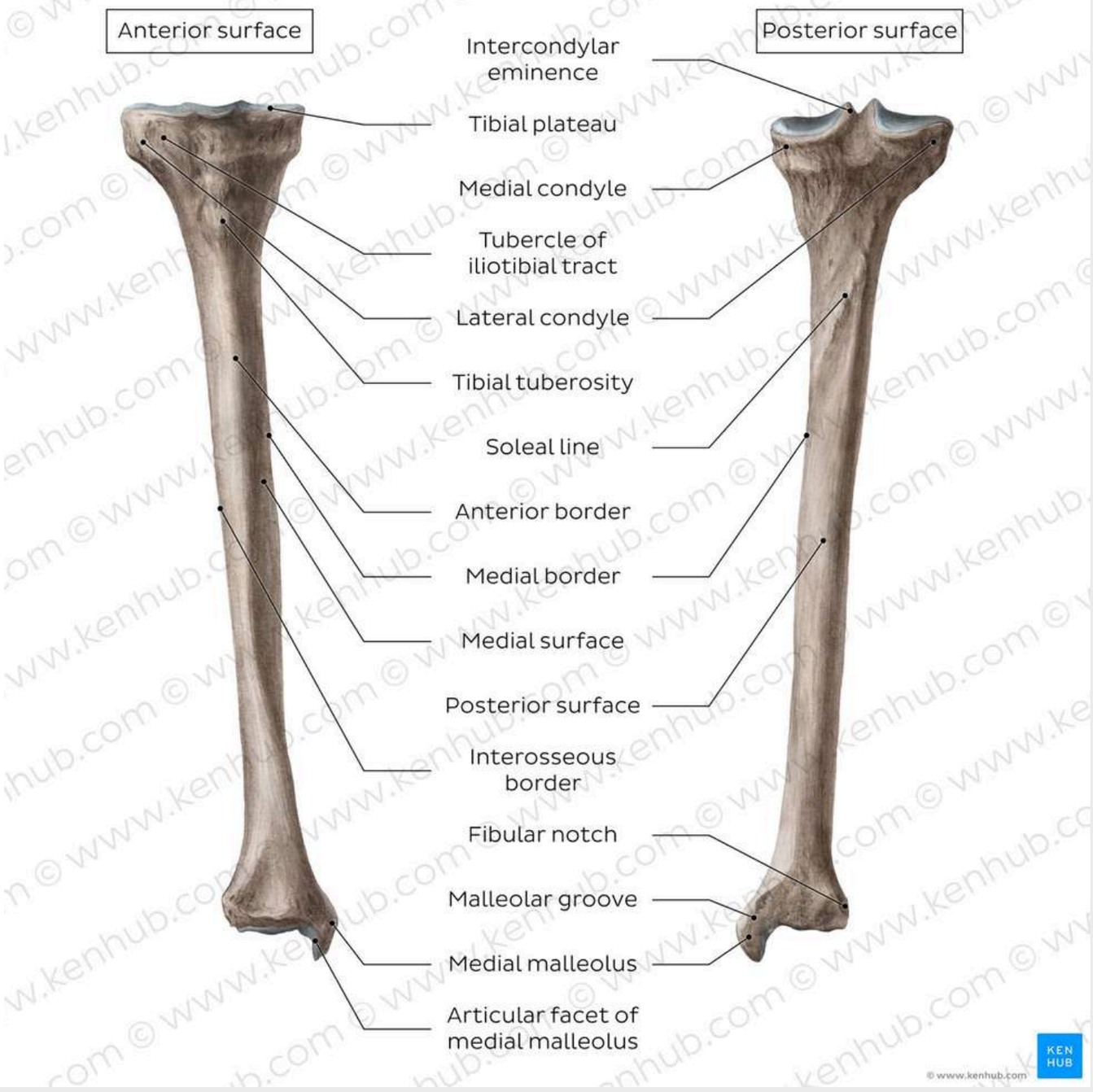


Lower limb

Femur



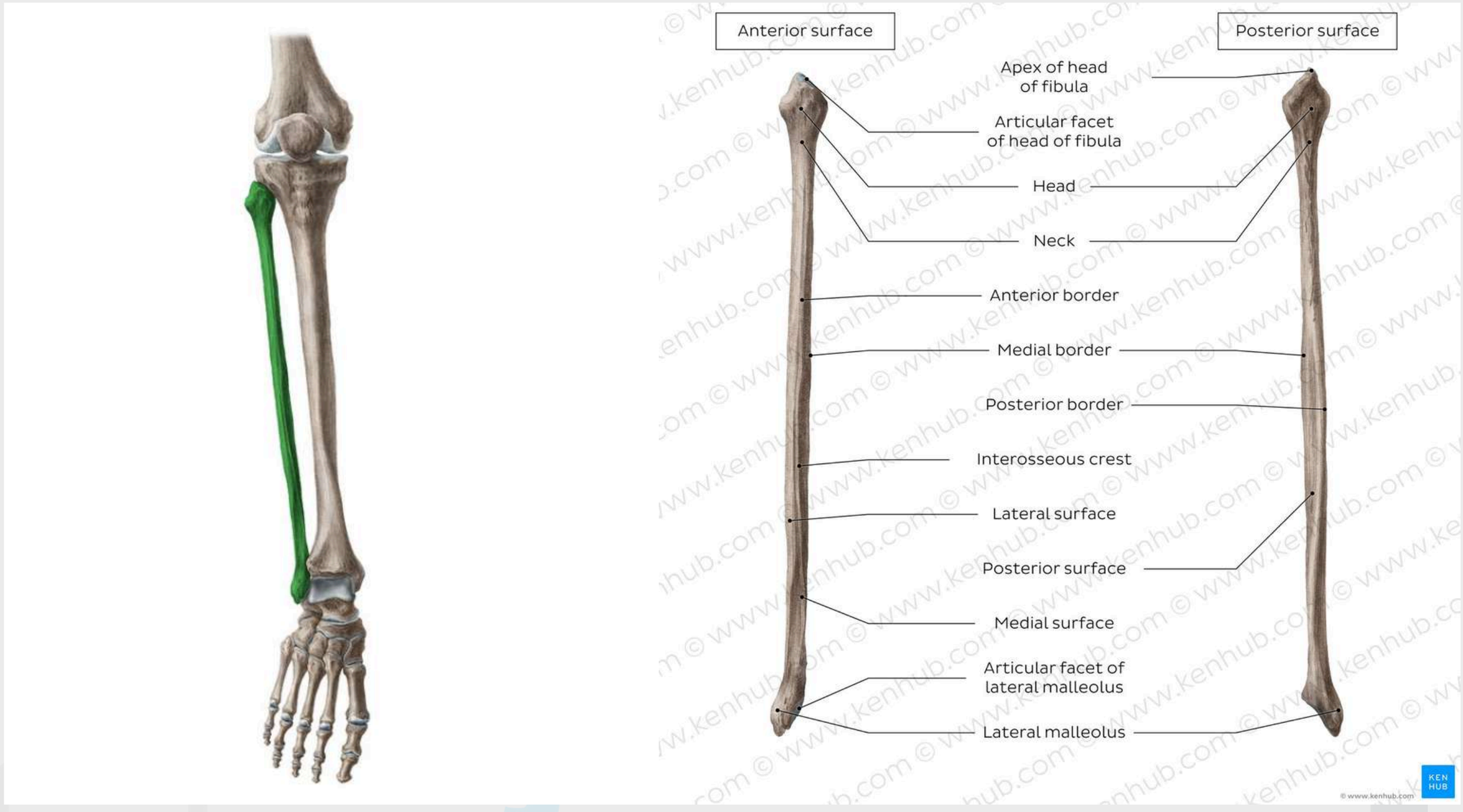
Tibia



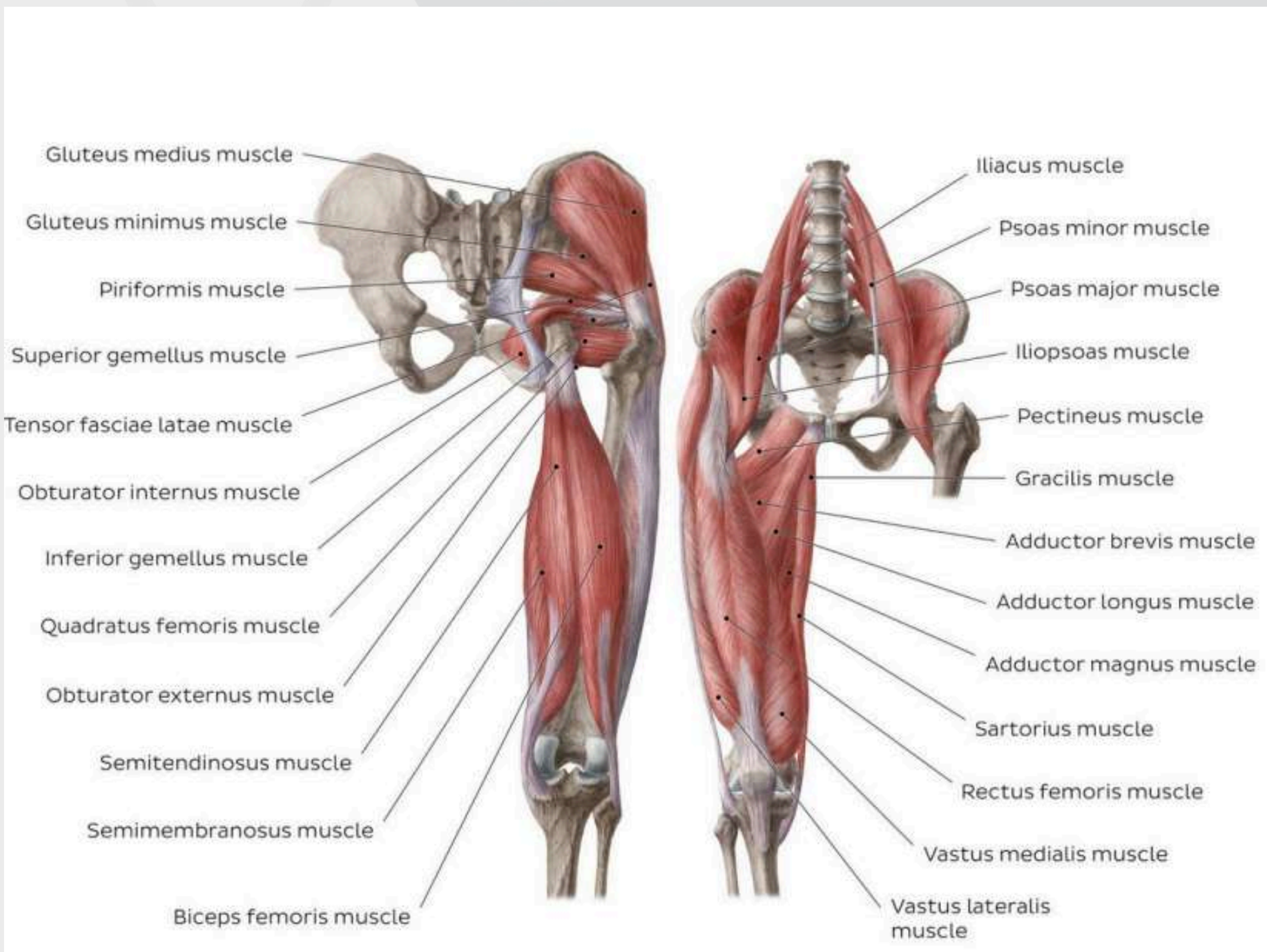
note: viewed better on 3D anatomy!

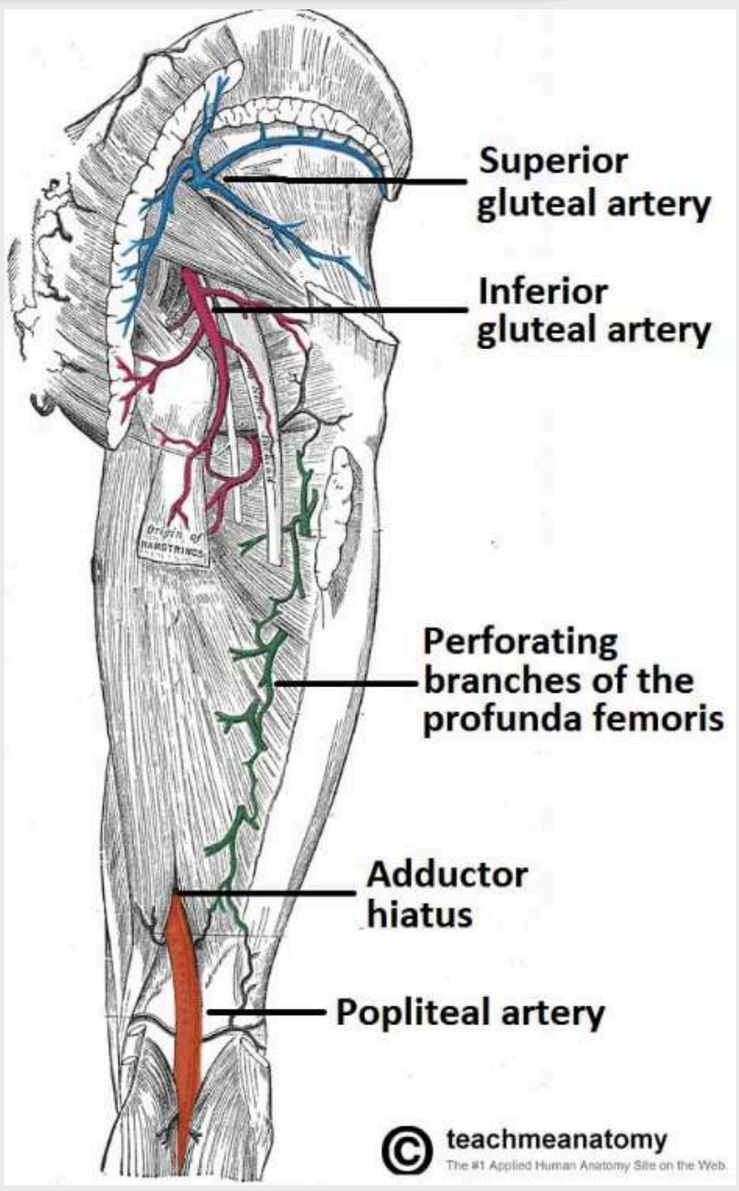
Lower limb

Fibula



Hip and thigh





FEMUR — Blood Supply & Innervation

Blood Supply

Femoral head & neck

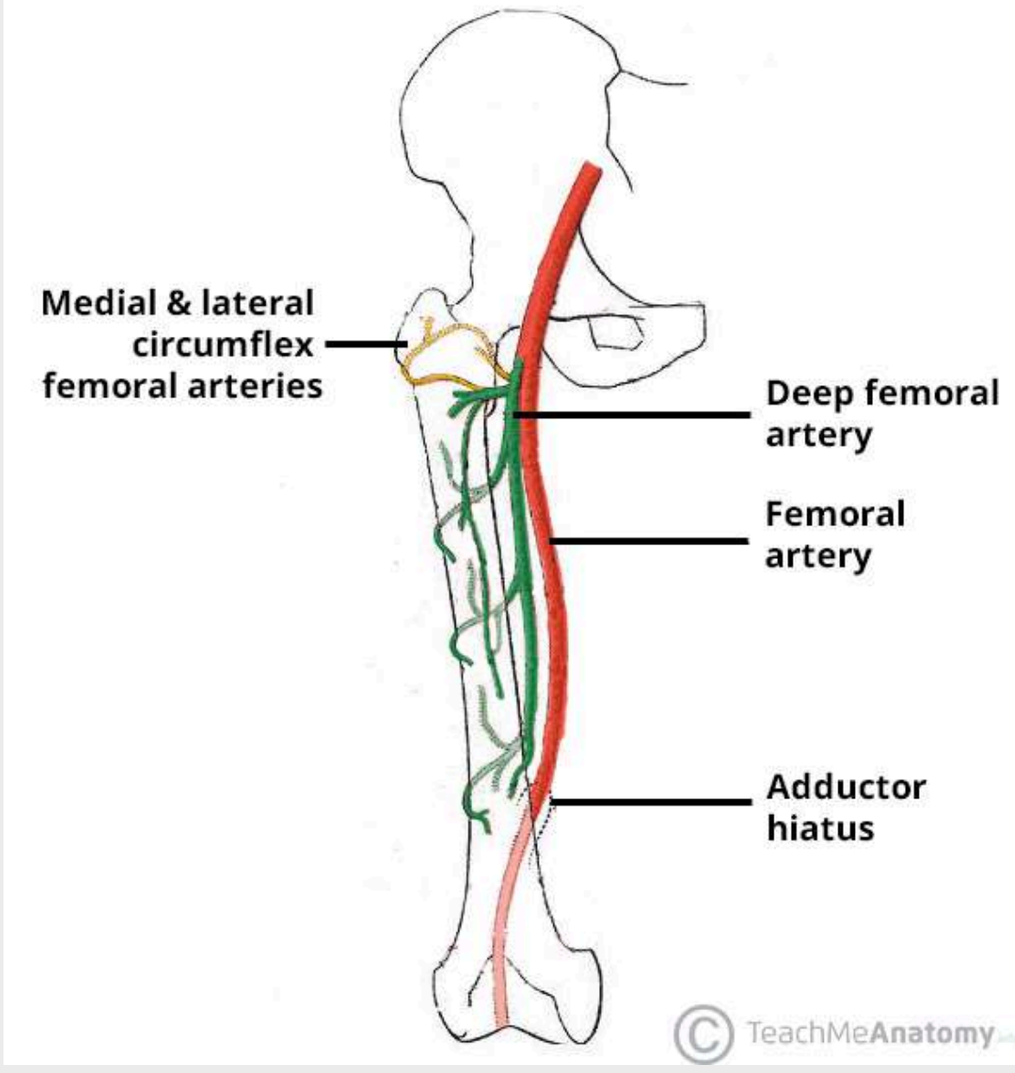
- **Medial femoral circumflex artery (MFCA)** → *retinacular branches* (main)
- Lateral femoral circumflex artery (secondary)
- Obturator artery → acetabular branch (important in children)

Femoral shaft

- **Nutrient artery from profunda femoris**
- Perforating branches of profunda femoris
- Periosteal vessels

Innervation

- **Femoral nerve** → supplies periosteum anteriorly
- **Obturator nerve** → medial periosteum
- **Sciatic nerve** → posterior shaft periosteum
- Pain from femur fractures = **periosteal nerve pain**



TIBIA — Blood Supply & Innervation

Blood Supply

Shaft

- **Nutrient artery from posterior tibial artery** (very large)
- Periosteal branches from anterior tibial artery (anterior surface)

Proximal tibia

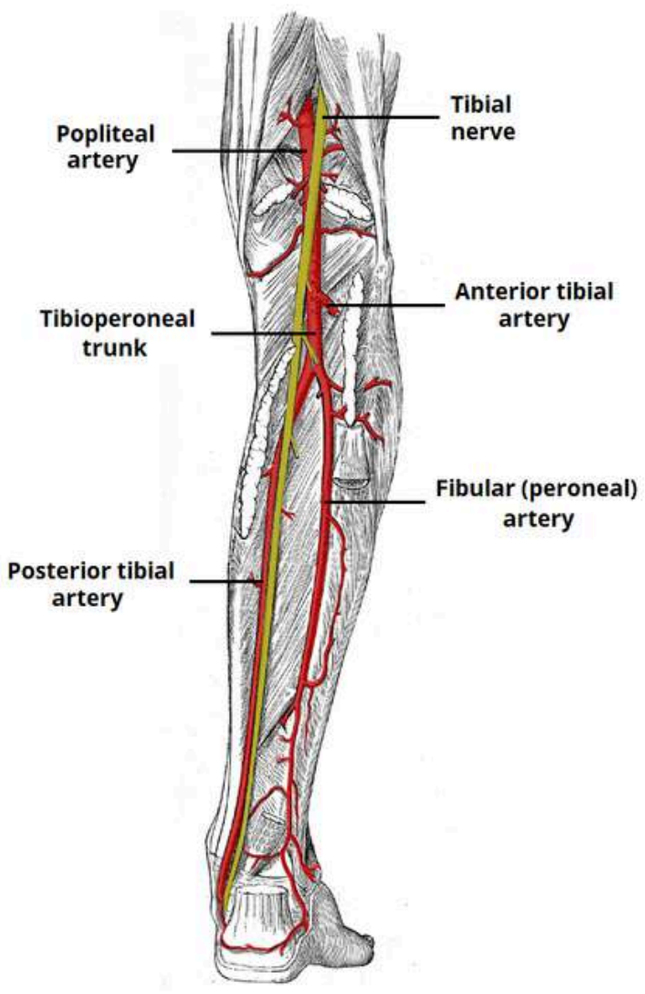
- Genicular arteries (from popliteal)

Distal tibia

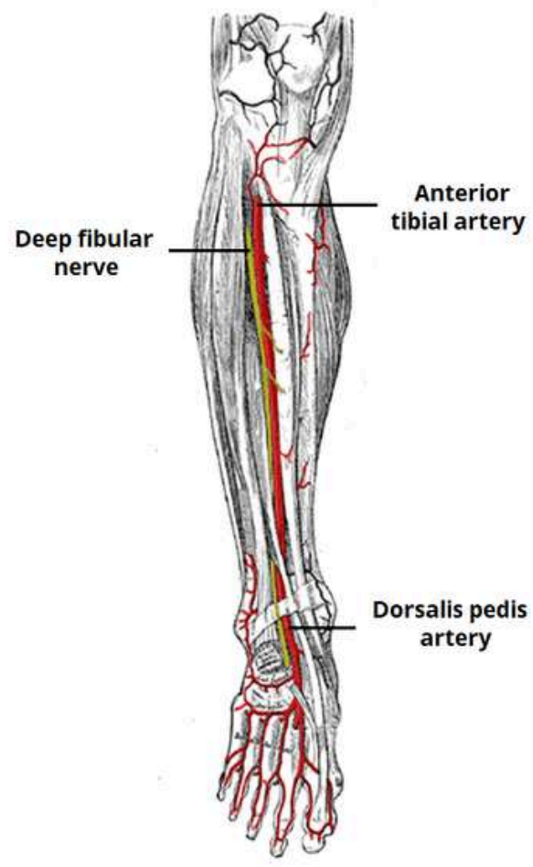
- Anterior tibial artery
- Posterior tibial artery (malleolar branches)

Innervation

- **Periosteum of tibia:**
  - **Deep fibular nerve** → anterior surface
  - **Tibial nerve** → posterior surface
  - **Saphenous nerve** → medial edge



(i) Posterior Leg



(ii) Anterior Leg

FIBULA — Blood Supply & Innervation

Blood Supply

Shaft

- **Nutrient artery from fibular (peroneal) artery**
- Periosteal branches from fibular & anterior tibial arteries

Proximal fibula

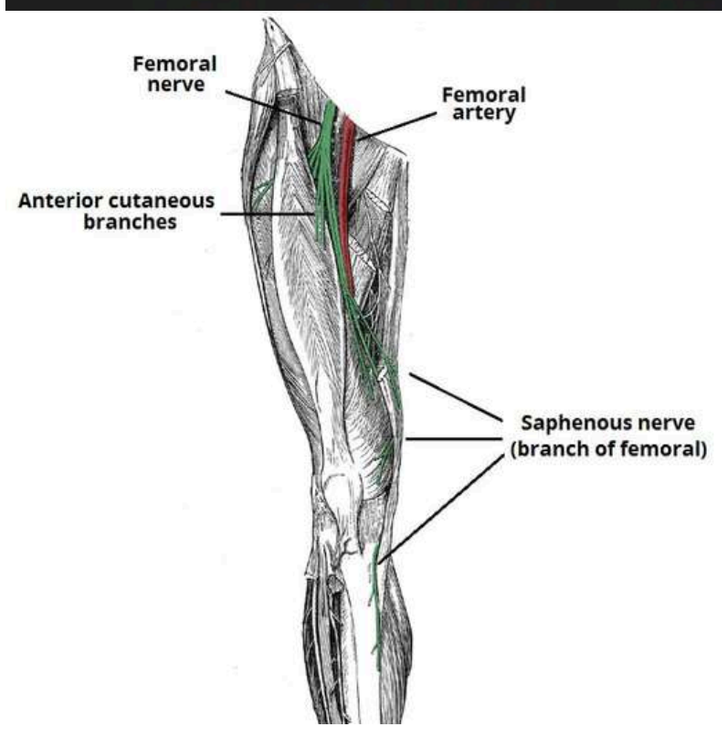
- Anterior tibial artery (main)
- Fibular artery (minor)

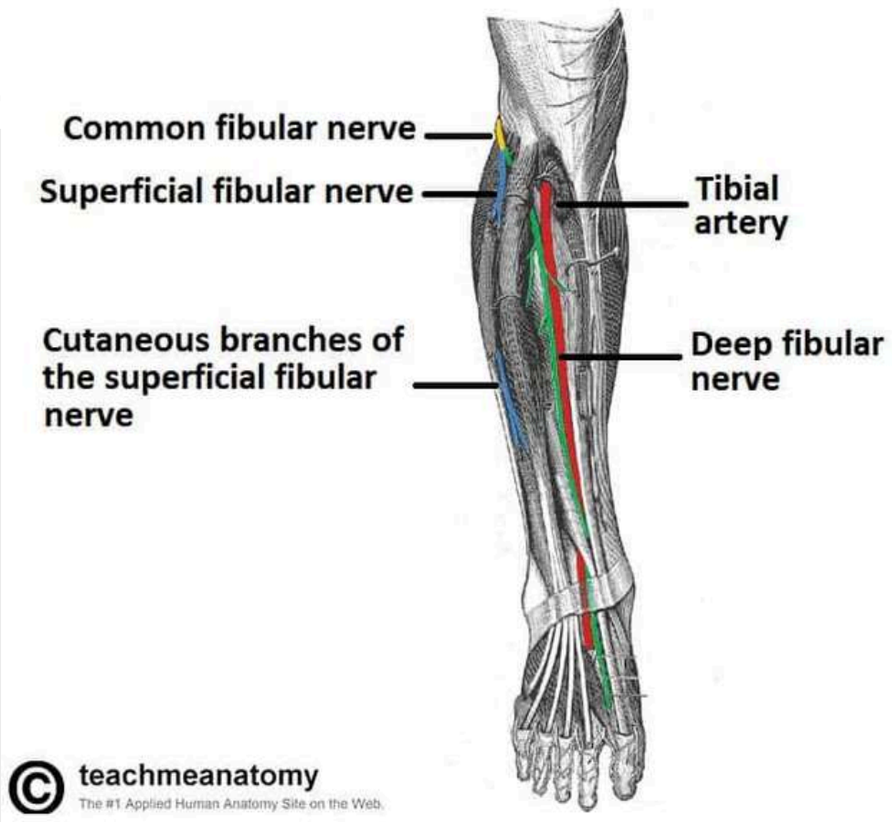
Distal fibula

- Fibular artery
- Lateral malleolar branches (from anterior tibial artery)

Innervation

- **Common fibular nerve** → most of the fibular periosteum
- **Deep fibular nerve** (anterior distal part)
- **Superficial fibular nerve** (lateral distal part)

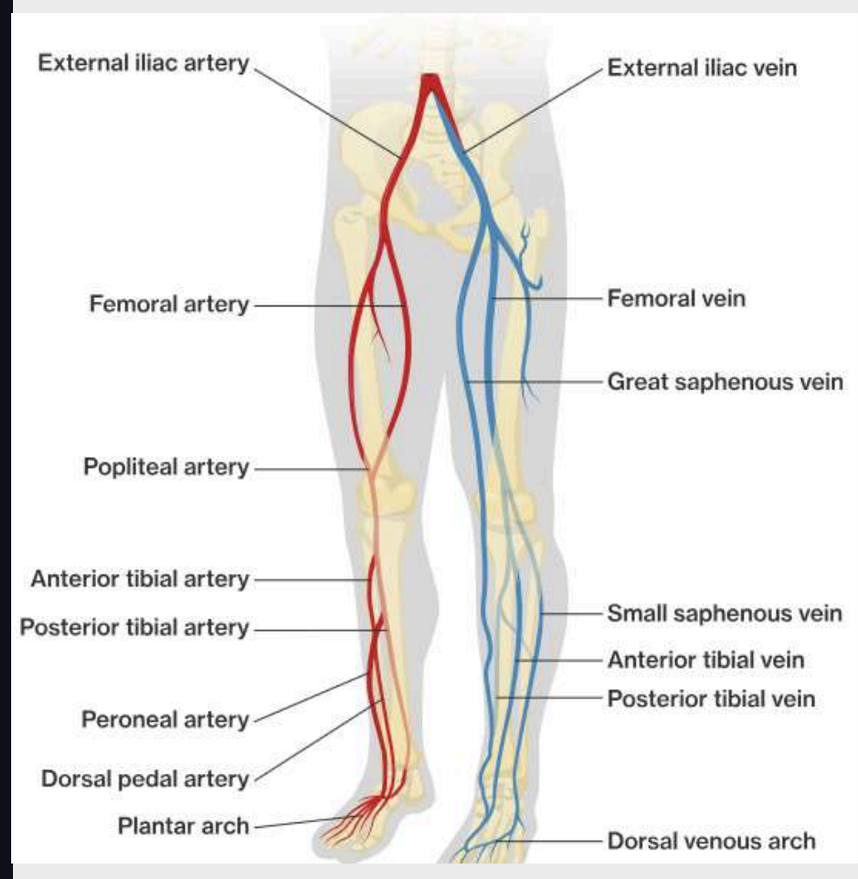




Blood supply course of lower limb

A more detailed flow path is as follows:

1. **Aorta → Common Iliac Artery**
2. Common Iliac Artery → **External Iliac Artery** → (Internal Iliac Artery supplies pelvis/glutes)
3. External Iliac Artery → **Femoral Artery** (at inguinal ligament)
4. Femoral Artery → **Deep Femoral Artery** (Profunda Femoris, main thigh supply)
5. Femoral Artery (superficial part) → **Popliteal Artery** (behind the knee)
6. Popliteal Artery →
    1. **Anterior Tibial Artery → Dorsalis Pedis Artery** (top of foot)
    2. **Posterior Tibial Artery → Medial & Lateral Plantar Arteries** (sole of foot)
    3. **Fibular (Peroneal) Artery** (lateral leg supply)



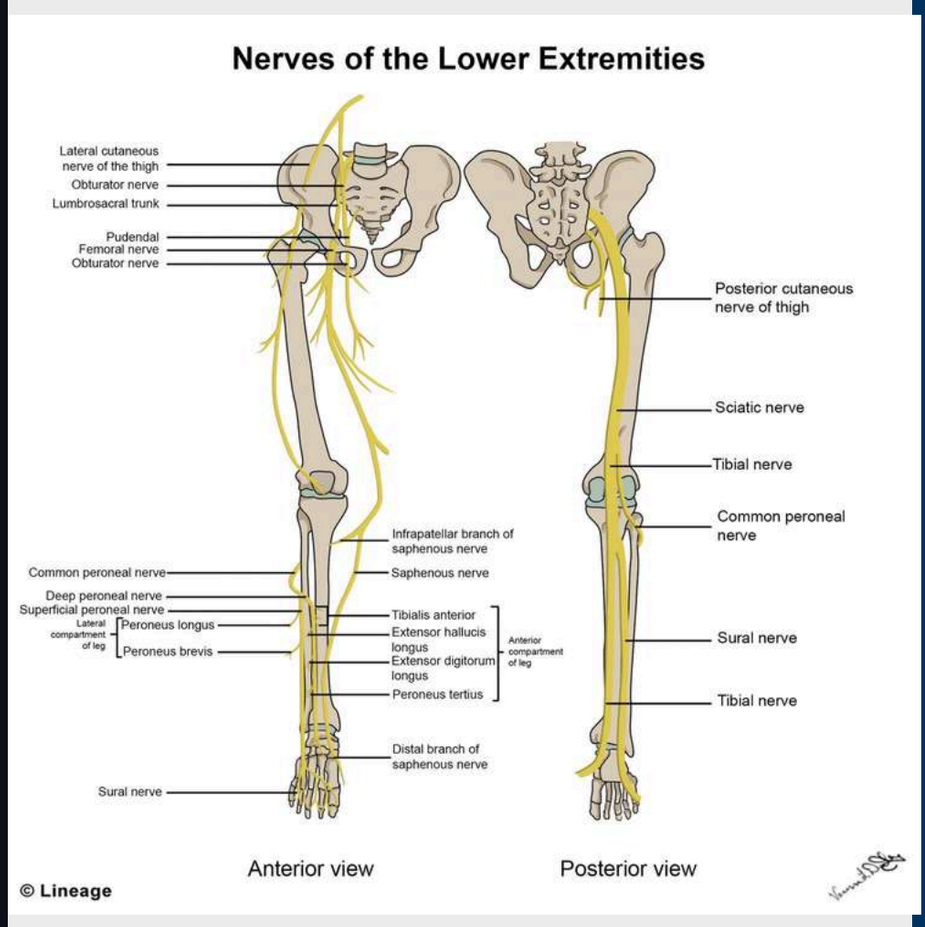
Nerve innervation course of lower limb

From the Sacral Plexus (L4-S4)

These nerves primarily innervate the gluteal region, posterior thigh, leg, and foot:

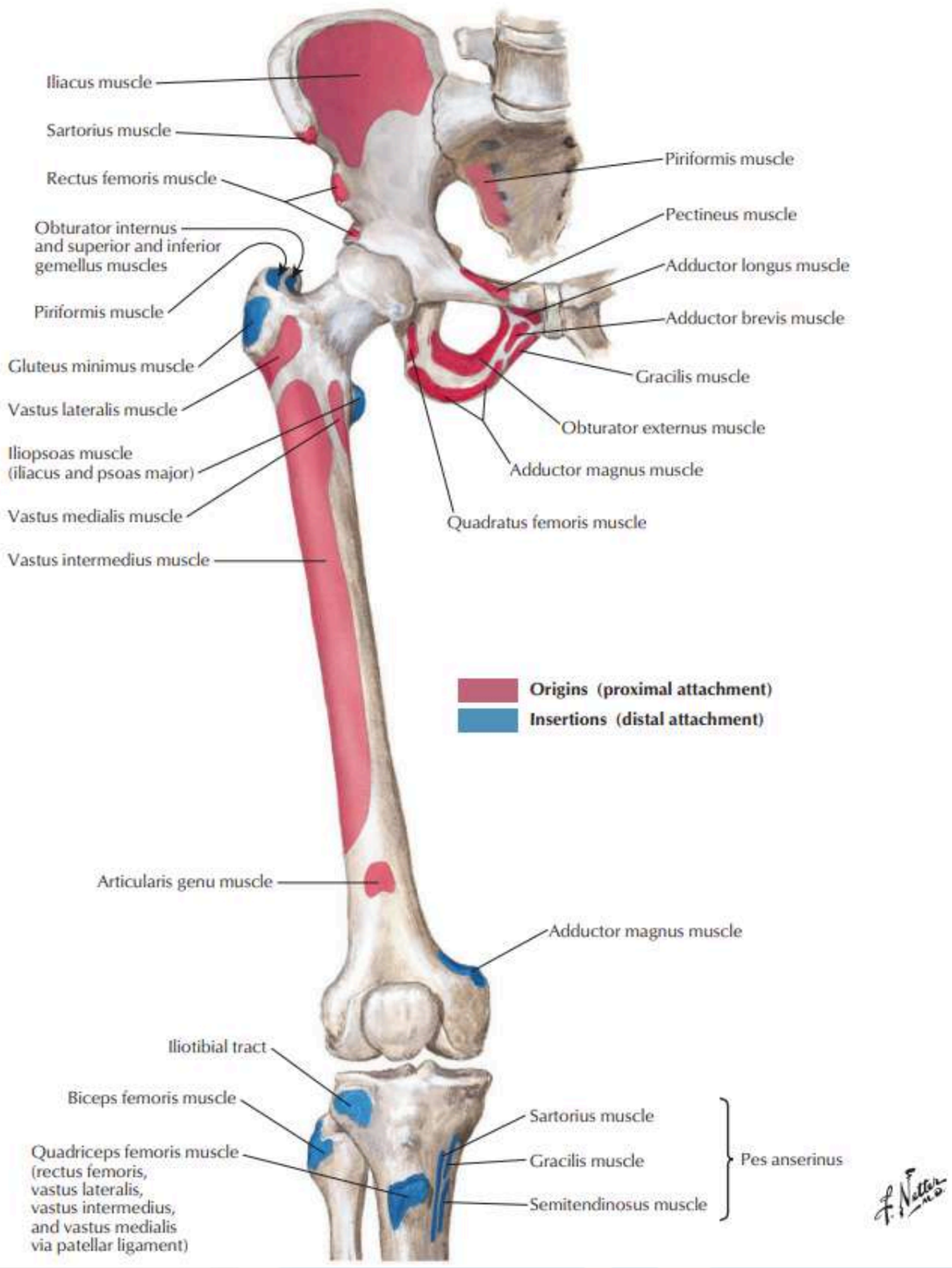
Spinal Nerve Roots (L4-S4) → Lumbosacral Trunk → Sacral Plexus →

- **Sciatic Nerve** (L4-S3): The largest nerve in the body, it runs down the posterior thigh.
    - → Posterior thigh muscles (hamstrings and part of adductor magnus).
    - → Divides in the popliteal fossa into:
        - **Tibial Nerve** → Posterior leg and sole of foot.
            - → Posterior leg muscles (gastrocnemius, soleus, etc.).
            - → **Medial Plantar Nerve & Lateral Plantar Nerve** (in the foot).
        - **Common Fibular (Peroneal) Nerve** → Winds around the fibular neck.
            - → Divides into:
                - **Superficial Fibular Nerve** → Lateral leg muscles and skin on top of the foot.
                - **Deep Fibular Nerve** → Anterior leg muscles (tibialis anterior, etc.) and skin between the first and second toes.
- **Superior Gluteal Nerve** (L4-S1):
    - → Gluteus medius, gluteus minimus, and tensor fascia latae muscles.
- **Inferior Gluteal Nerve** (L5-S2):
    - → Gluteus maximus muscle.

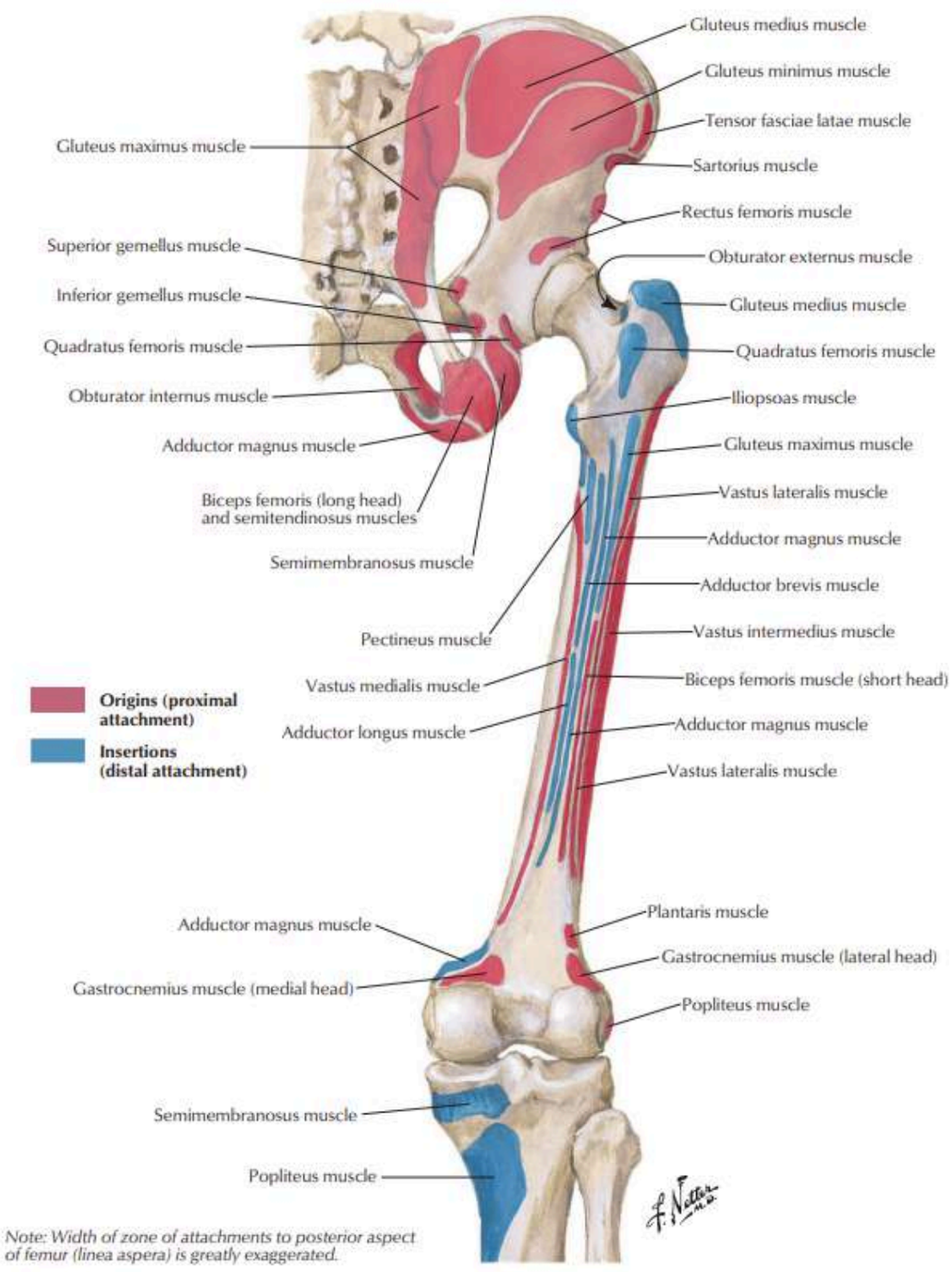


Bony attachments (femur)

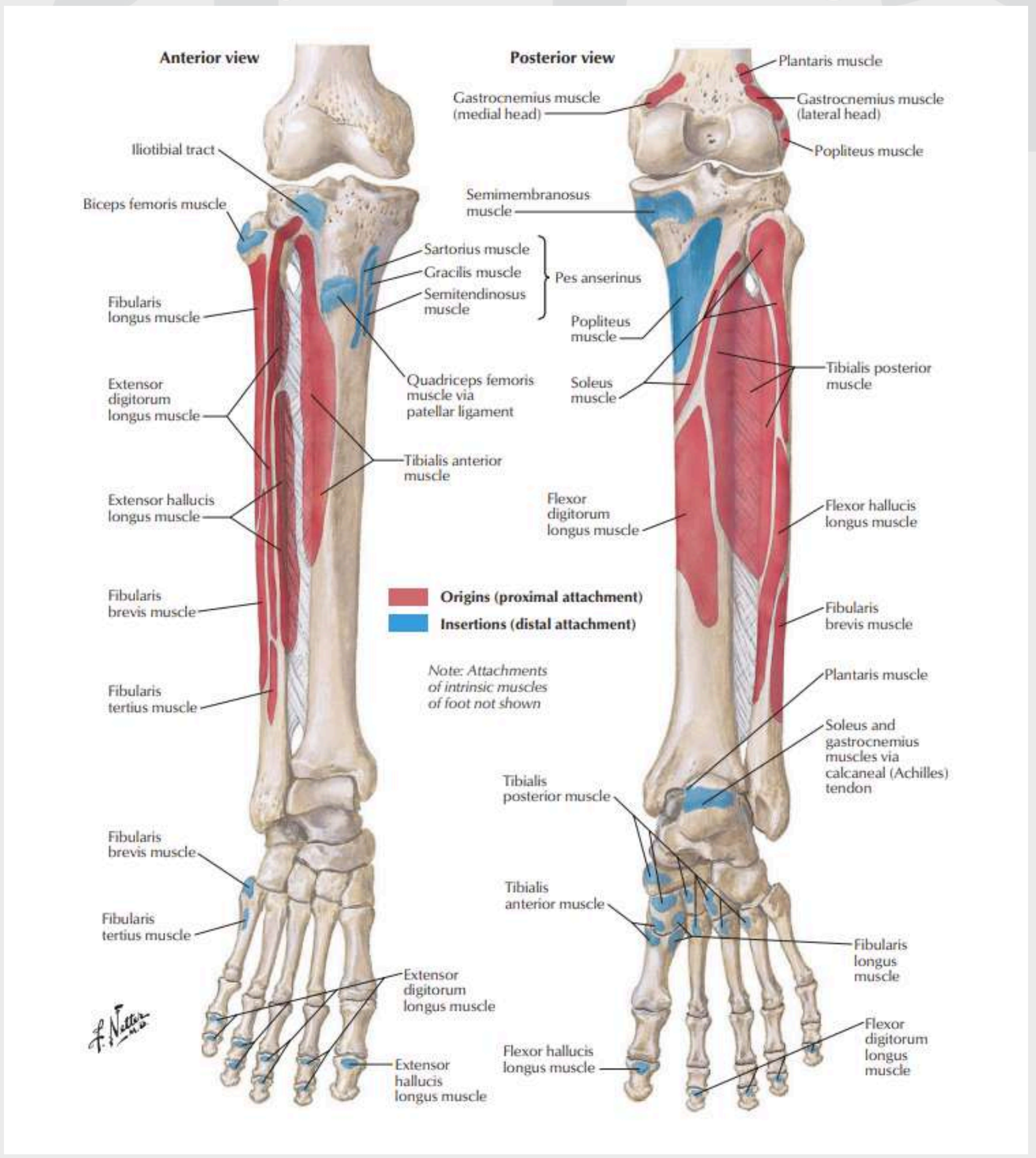
anterior



posterior



bony attachments (leg)

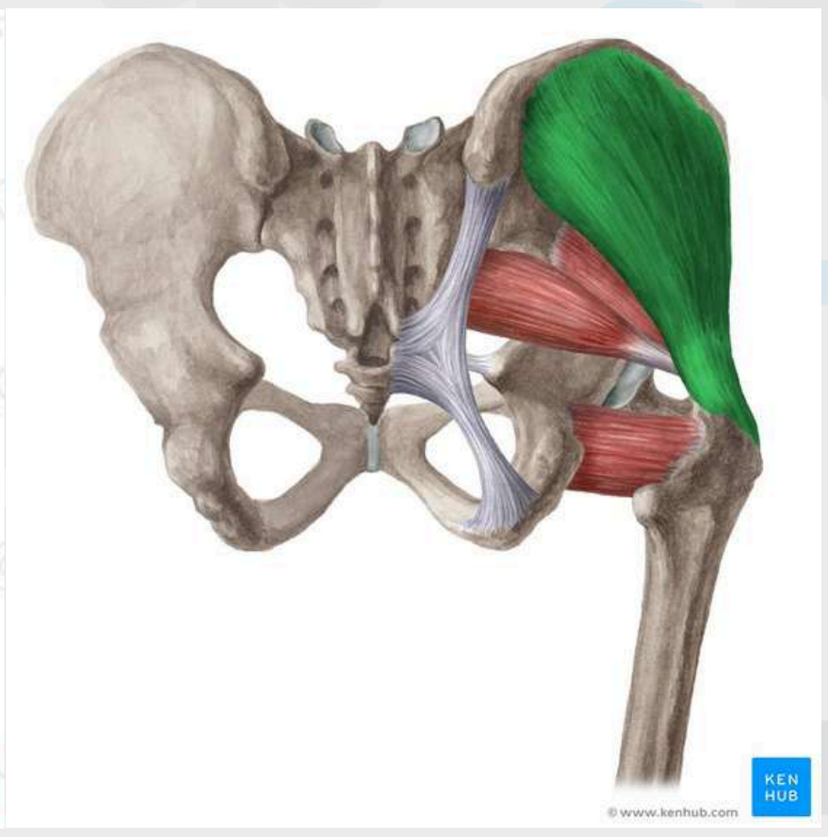


Lower limb

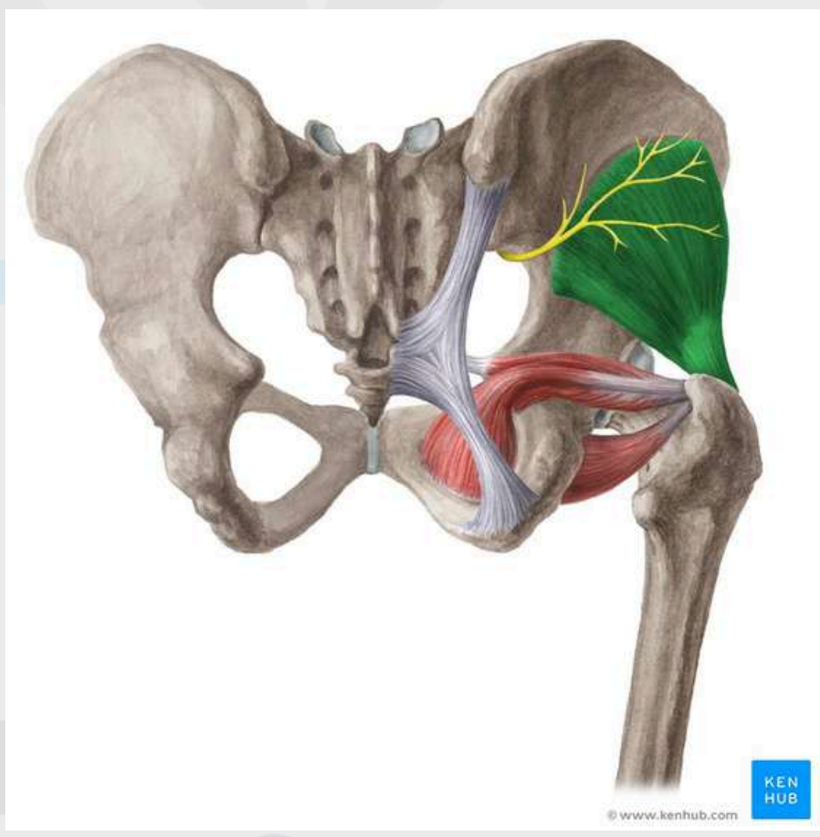
Gluteal muscles

Gluteal Muscles	Origin	Insertion	Innervation	Function
Gluteus maximus	Lateroposterior surface of sacrum and coccyx, Gluteal surface of ilium (behind posterior gluteal line), Thoracolumbar fascia, Sacrotuberous ligament	Iliotibial tract, Gluteal tuberosity of femur	Inferior gluteal nerve (L5-S2)	Hip joint: Thigh extension, Thigh external rotation, Thigh abduction (superior part), Thigh adduction (inferior part)
Gluteus medius	Gluteal surface of ilium (between anterior and posterior gluteal lines)	Lateral aspect of greater trochanter of femur	Superior gluteal nerve (L4-S1)	Hip joint: Thigh abduction, Thigh internal rotation (anterior part); Pelvis stabilization
Gluteus minimus	Gluteal surface of ilium (between anterior and inferior gluteal lines)	Anterior aspect of greater trochanter of femur		
Tensor fasciae latae	Anterior superior iliac spine (ASIS), Outer lip of iliac crest	Iliotibial tract		Hip joint: Thigh internal rotation, (Weak abduction); Knee joint: Leg external rotation, (Weak leg flexion/ extension); Stabilises hip & knee joints

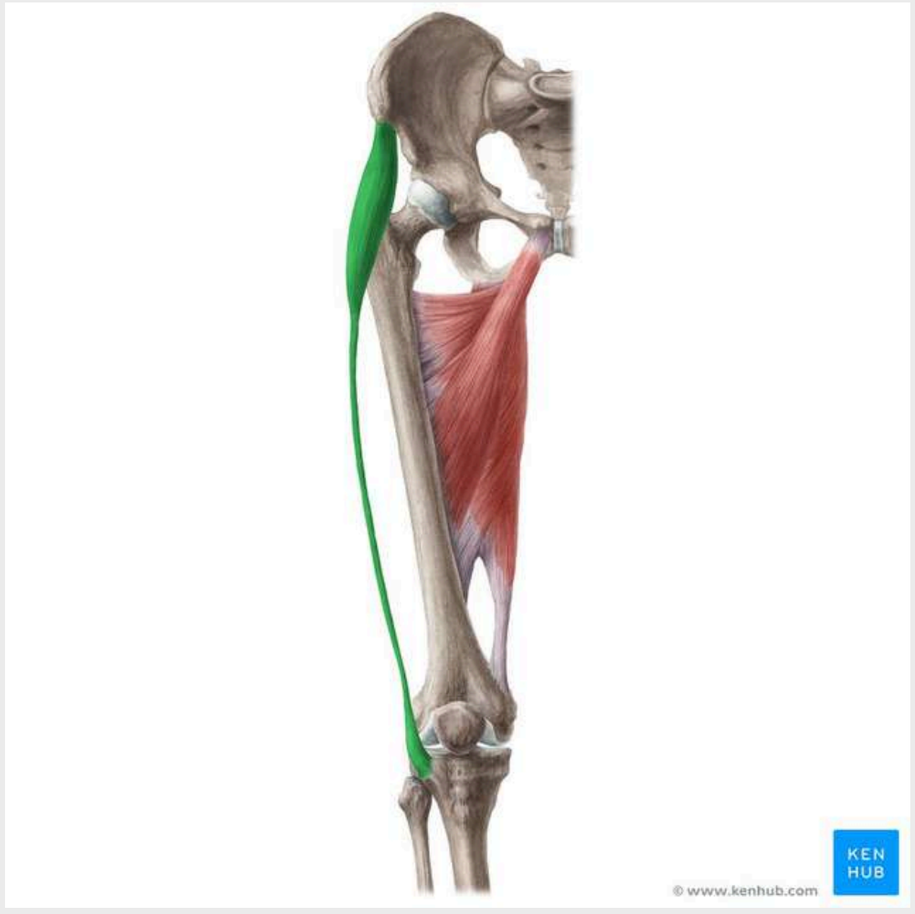
gluteus maximus
Inferior gluteal artery (main)



gluteus medius
Superior gluteal artery



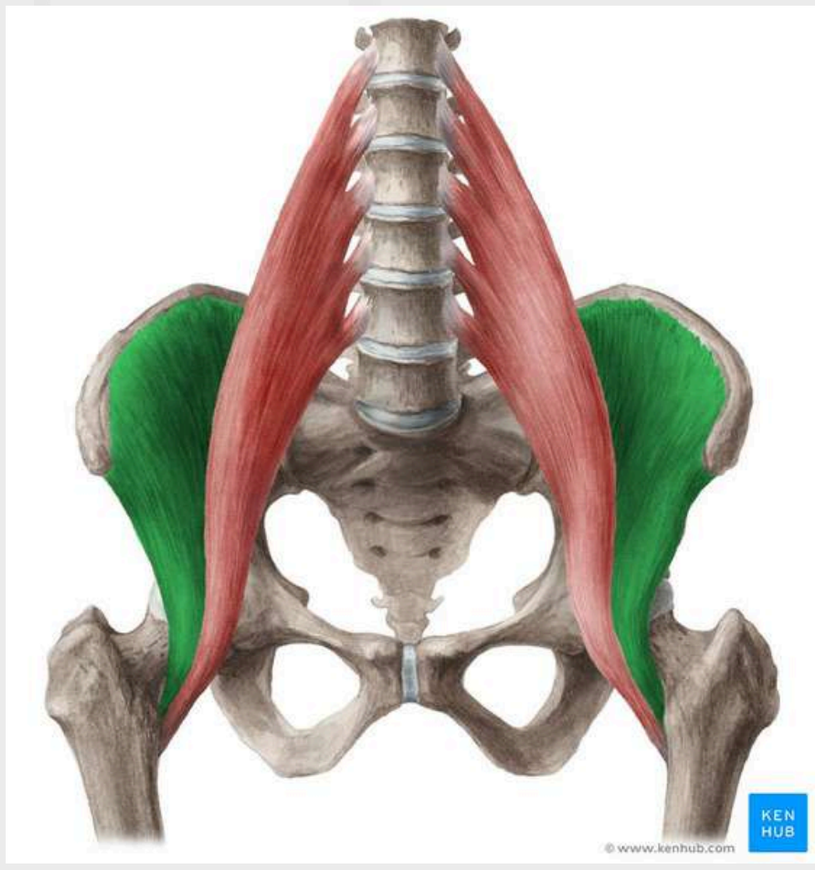
gluteus minimus
Superior gluteal artery



tensor fasciae latae
lateral circumflex femoral artery

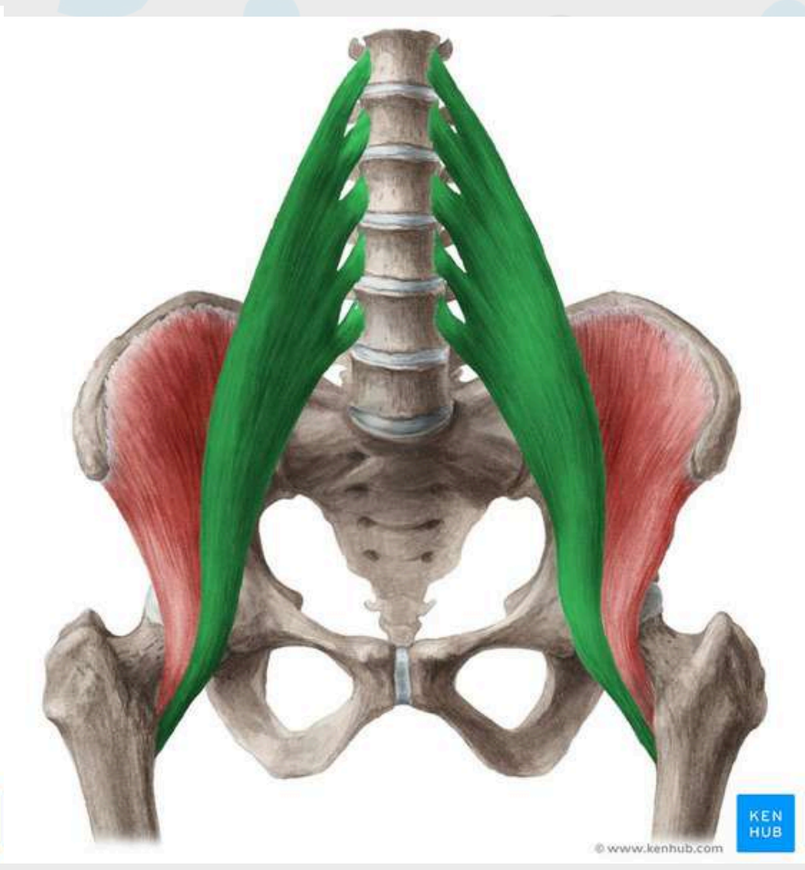
Inner hip muscles

Inner Hip Muscles		Origin	Insertion	Innervation	Function
M. Iliacus		Fossa iliaca	Trochanter minor femoris	Nervus femoralis (L1-L3)	Articulatio coxae: Thigh/ trunk flexion, Thigh external rotation; Trunk lateral flexion (Psoas major/minor only)
M. psoas major		Corpus of vertebrae T12-L4, Disci intervertebrales between T12-L4, Processus costales L1-L5		Rami anteriores of nervi spinales L1-L3	
M. psoas minor		Corpus of vertebrae T12-L1	Eminentia iliopubica, Pectin ossis pubis		
M. obturator externus		Anterior surface of membrana obturatoria, Bony boundaries of foramen obturatum	Fossa trochanterica femoris	Nervus obturatorius (L3, L4)	Articulatio coxae: Thigh external rotation, Thigh abduction (from flexed hip); Stabilises head of femur in acetabulum
M. triceps coxae	M. obturator internus	Ramus ischiopubicus, Facies posterior of membrana obturatoria	Medial aspect of trochanter major femoris	Nervus musculi obturatorii interni (L5-S2)	
	M. gemellus superior	Spina ischiadica	Medial surface of trochanter major femoris (via tendo musculi obturatorius internus)		
	M. gemellus inferior	Tuber ischiadicum		Nervus musculi quadrati femoris (L4-S1)	
M. piriformis		Facies anterior of os sacrum (between S2-S4), Facies glutea ossis ilii, (Ligamentum sacrotuberale)	Apex of trochanter major femoris	Nervus musculi piriformis (S1-S2)	
M. quadratus femoris		Tuber ischiadicum	Crista intertrochanterica femoris	Nervus musculi quadrati femoris (L4-S1)	Articulatio coxae: Thigh external rotation; Stabilises head of femur in acetabulum



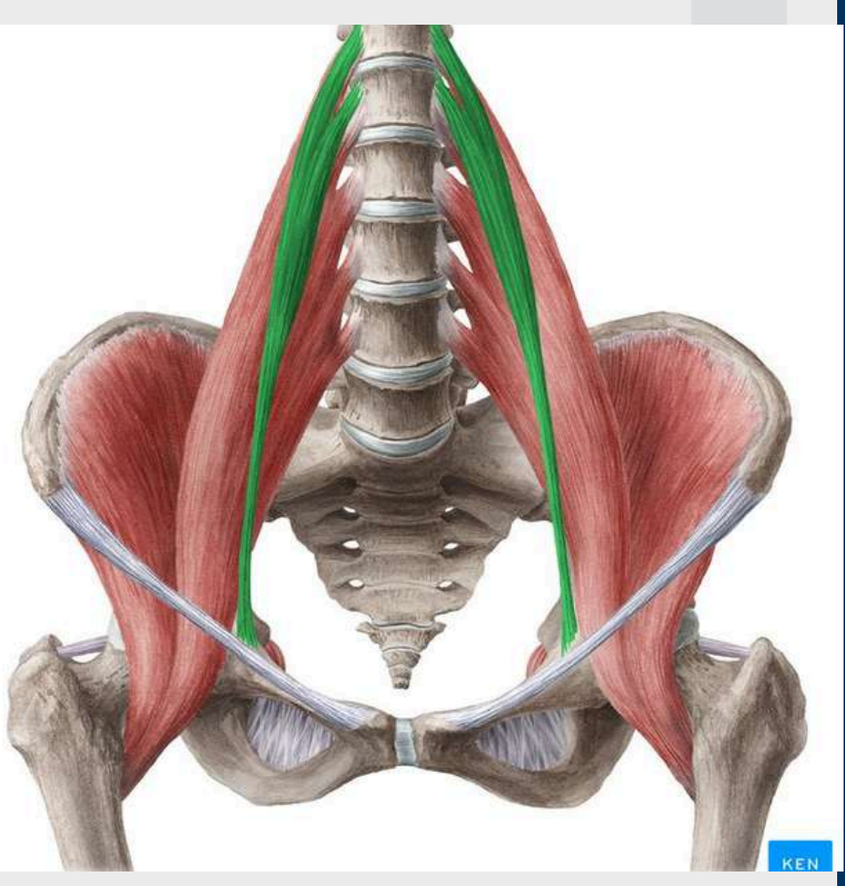
iliacus

Iliolumbar artery



psoas major

iliolumbar artery

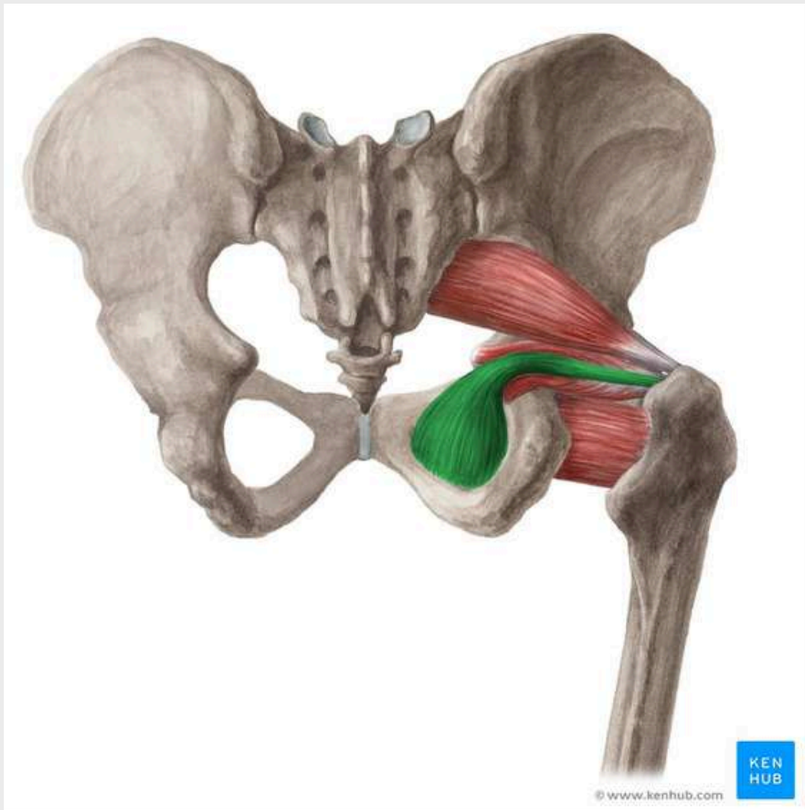


psoas minor

iliolumbar artery

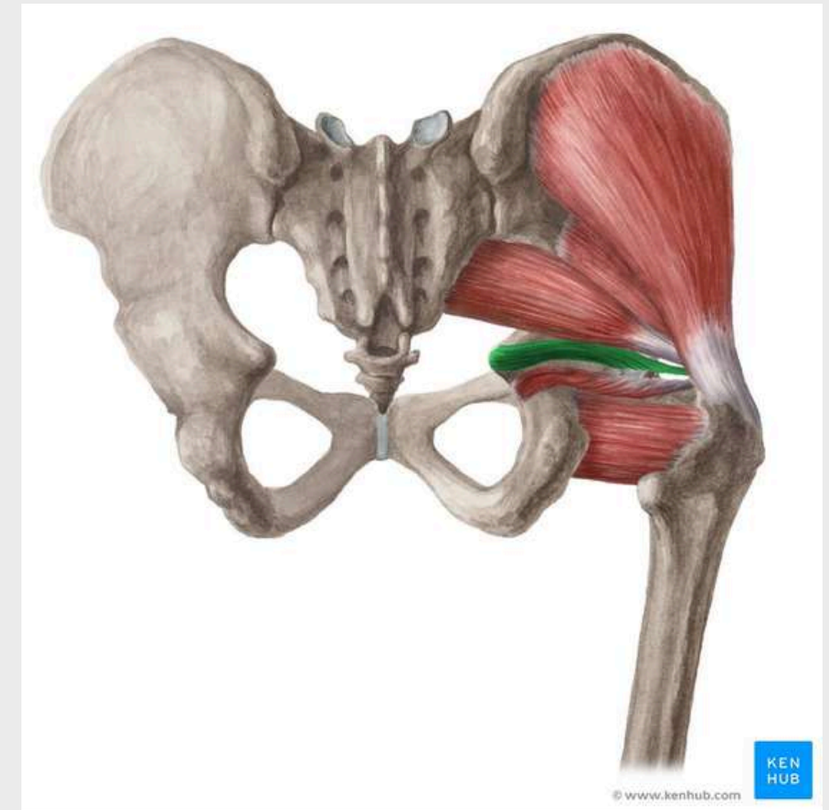
obturator externus

Medial circumflex femoral artery, obturator artery



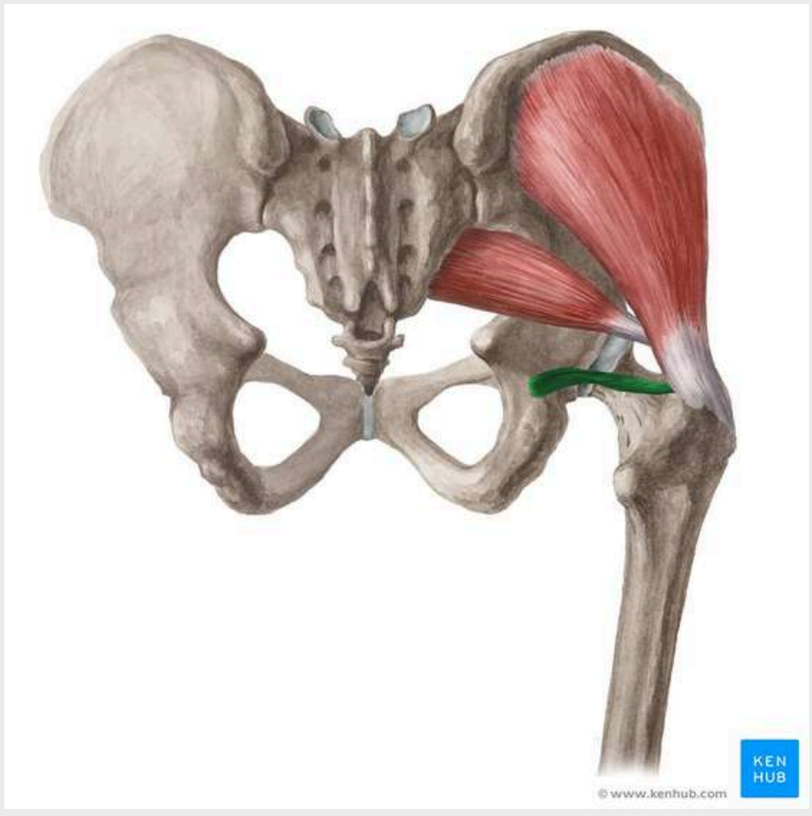
obturator internus

Internal pudendal and obturator a.



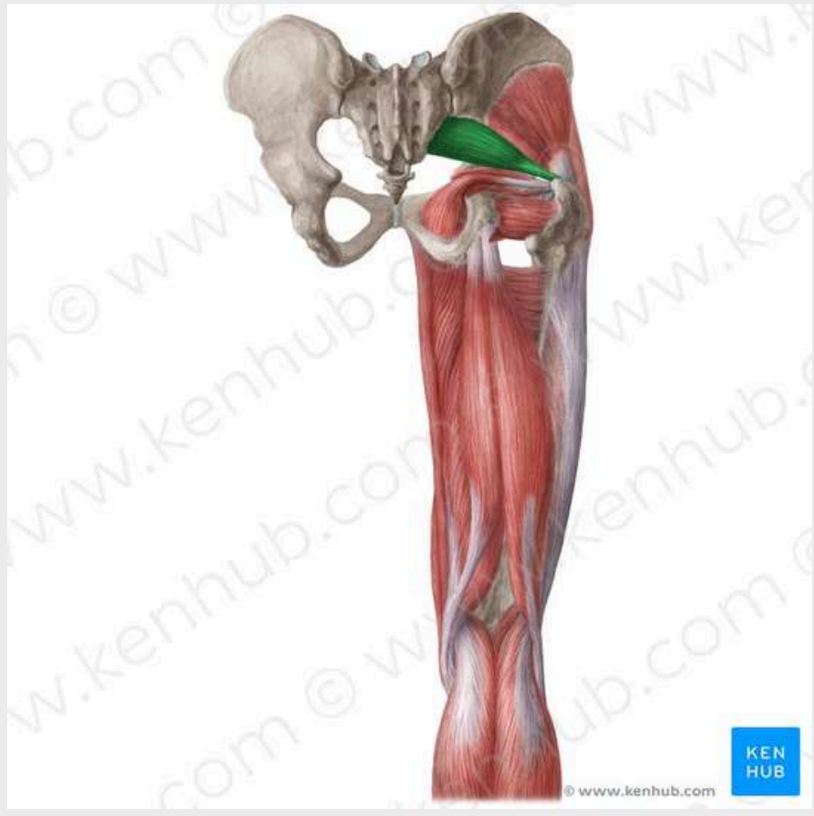
superior gemellus

Inferior gluteal and internal pudendal a.



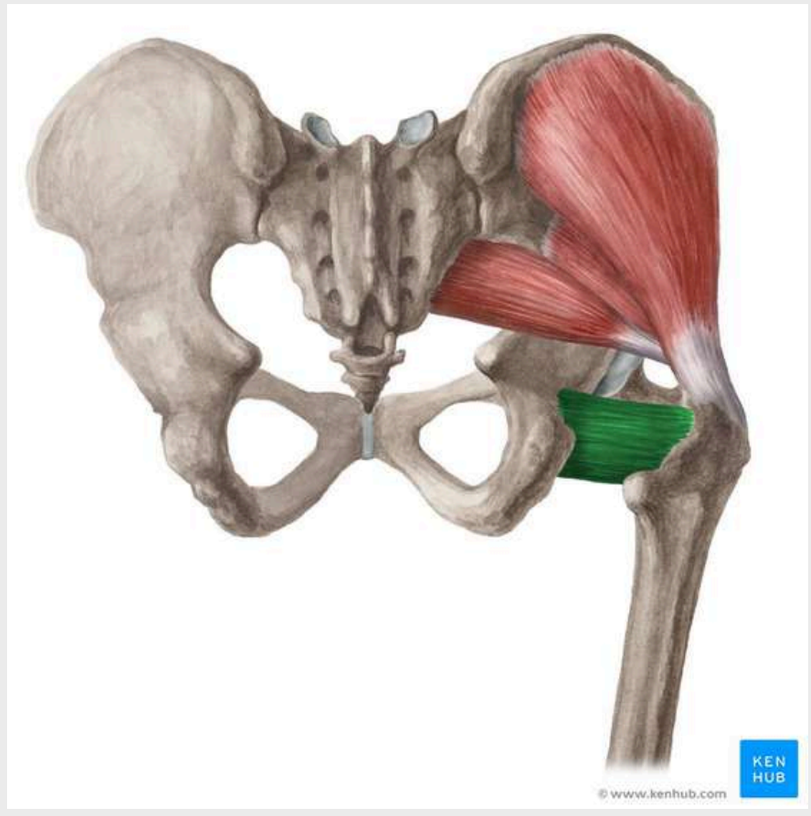
inferior gemellus

Medial femoral circumflex artery



piriformis

Superior and inferior gluteal artery



quadratus femoris

Medial femoral circumflex artery

Anterior thigh muscles

Anterior thigh muscles		Origin	Insertion	Innervation	Function
Sartorius		Anterior superior iliac spine (ASIS)	Proximal end of tibia below medial condyle (via pes anserinus)	Femoral nerve (L2-L4)	Hip joint: Thigh flexion, Thigh abduction, Thigh external rotation; Knee joint: Leg flexion, Leg internal rotation
Quadriceps femoris	Rectus femoris	Anterior inferior iliac spine, Supracetabluar groove	Tibial tuberosity (via patellar ligament), Patella		Hip joint: Thigh flexion; Knee joint: Leg extension
	Vastus intermedius	Anterior surface of femoral shaft			Knee joint: Leg extension
	Vastus lateralis	Linea aspera of femur, Greater trochanter of femur	Tibial tuberosity (via patellar ligament), Patella, (Lateral condyle of tibia)		
	Vastus medialis	Intertrochanteric line, spiral line and linea aspera, medial supracondylar line of femur	Tibial tuberosity (via patellar ligament), Patella, (Medial condyle of tibia)		

sartorius

Femoral artery

rectus femoris

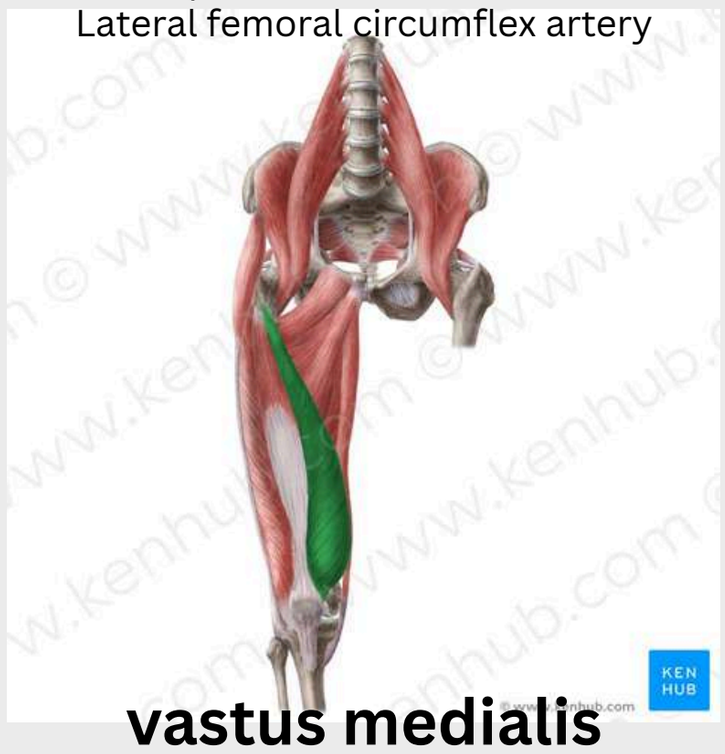
profunda femoris
Lateral femoral circumflex artery

vastus intermedius

LFCA

vastus lateralis

LFCA



vastus medialis

Femoral and profunda femoris arteries

Posterior thigh muscles(hamstrings)

Posterior thigh muscles	Origin	Insertion	Innervation	Function
Semimembranosus	(Superolateral impression of) Ischial tuberosity	Medial condyle of tibia	Tibial division of sciatic nerve (L5-S2)	Hip joint: Thigh extension, Thigh internal rotation; Knee joint: Leg flexion, Leg internal rotation; Stabilises pelvis
Semitendinosus	(Posteromedial impression of) Ischial tuberosity	Proximal end of tibia below medial condyle (via pes anserinus)		
Biceps femoris	Long head: (Inferomedial impression of) Ischial tuberosity, Sacrotuberous ligament Short head: Linea aspera of femur (lateral lip), Lateral supracondylar line of femur	(Lateral aspect of) Head of fibula	Long head: Tibial division of sciatic nerve (L5-S2) Short head: Common fibular division of sciatic nerve (L5-S2)	Hip joint: Thigh extension, Thigh external rotation; Knee joint: Leg flexion, Leg external rotation; Stabilises pelvis

semimembranous
Profunda femoris

semitendinosus
Profunda femoris

biceps femoris
Profunda femoris

Medial thigh muscles

Medial thigh muscles	Origin	Insertion	Innervation	Function
Pectineus	Superior pubic ramus (Pectineal line of pubis)	Pectineal line of femur, Linea aspera of femur	Femoral nerve (L2, L3) (Obturator nerve (L2, L3)	Hip joint: Thigh flexion, Thigh adduction, Thigh external rotation, Thigh internal rotation; Pelvis stabilization
Adductor magnus	Adductor part: Inferior pubic ramus, Ischial ramus Ischiocondylar part: Ischial tuberosity	Adductor part: Gluteal tuberosity, Linea aspera (medial lip), Medial supracondylar line Ischiocondylar part: Adductortubercleof femur	Adductor part: Obturator nerve (L2-L4) Ischiocondylar part: Tibial division of sciatic nerve (L4)	Hip joint: Thigh flexion, Thigh adduction, Thigh external rotation (adductor part), Thigh extension, Thigh internal rotation (ischiocondylar part); Pelvis stabilization
Adductor minimus	Inferior public ramus	Gluteal tuberosity of femur	Obturator nerve (L2-L4)	Hip joint: Thigh adduction, Thigh external rotation
Adductor longus	Anterior body of pubis	Linea aspera of femur (medial lip)		Hip joint: Thigh flexion, Thigh adduction, Thigh external rotation; Pelvis stabilization
Adductor brevis	Anterior body of pubis, Inferior pubic ramus			Hip joint: Thigh flexion, Thigh adduction, Thigh external rotation; Pelvis stabilization
Gracilis	Anterior body of pubis, Inferior pubic ramus, Ischial ramus	Medial surface of proximal tibia (via pes anserinus)	Obturator nerve (L2-L3)	Hip joint: Thigh flexion, Thigh adduction; Knee joint: Leg flexion, Leg internal rotation

pectineus

Medial circumflex femoral artery, obturator artery

adductor magnus

Profunda femoris
Obturator artery
Femoral artery

adductor minimus(part of superior adductor magnus)

Obturator artery

adductor longus

Medial circumflex femoral artery, obturator artery

adductor brevis

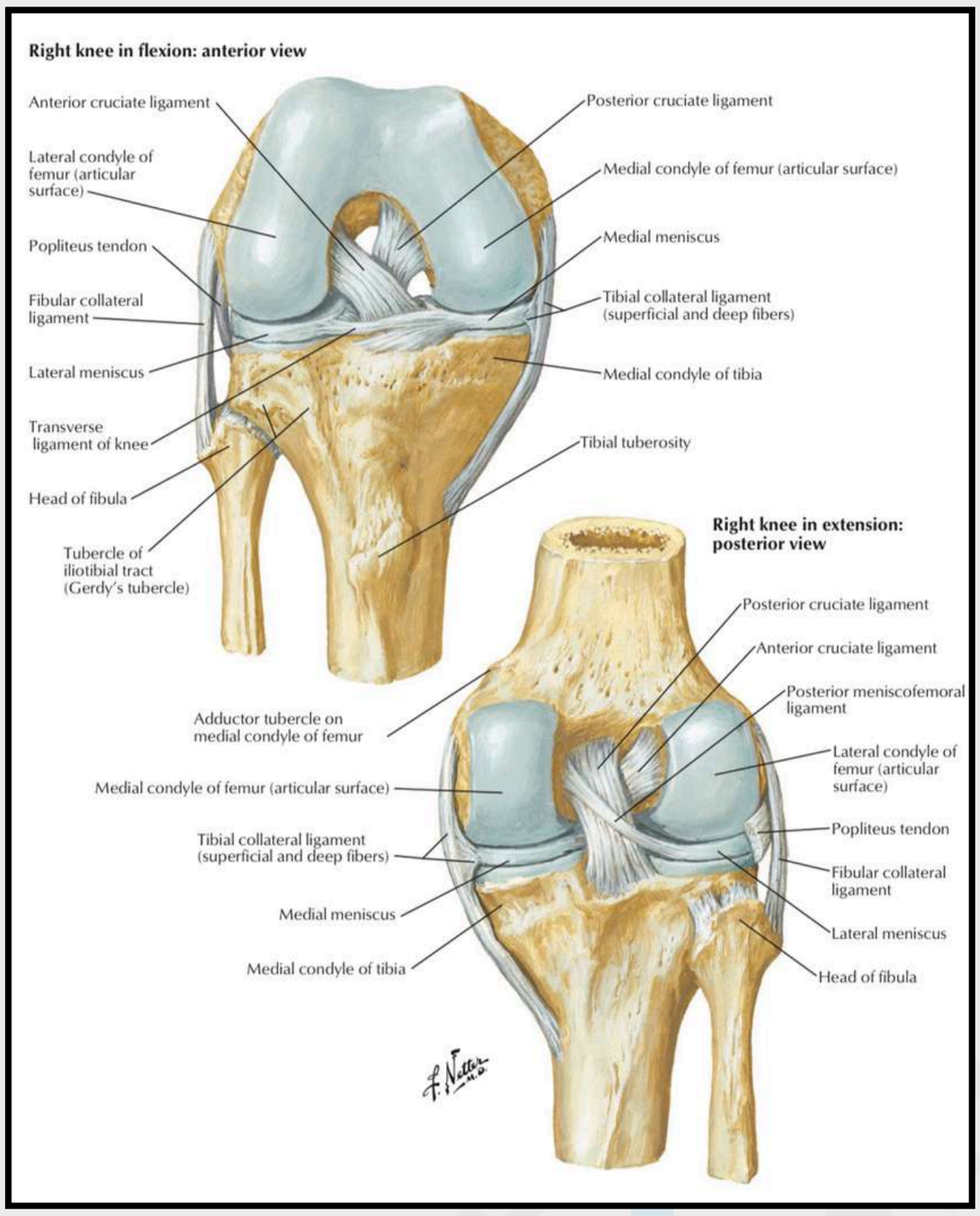
Medial circumflex femoral artery, obturator artery

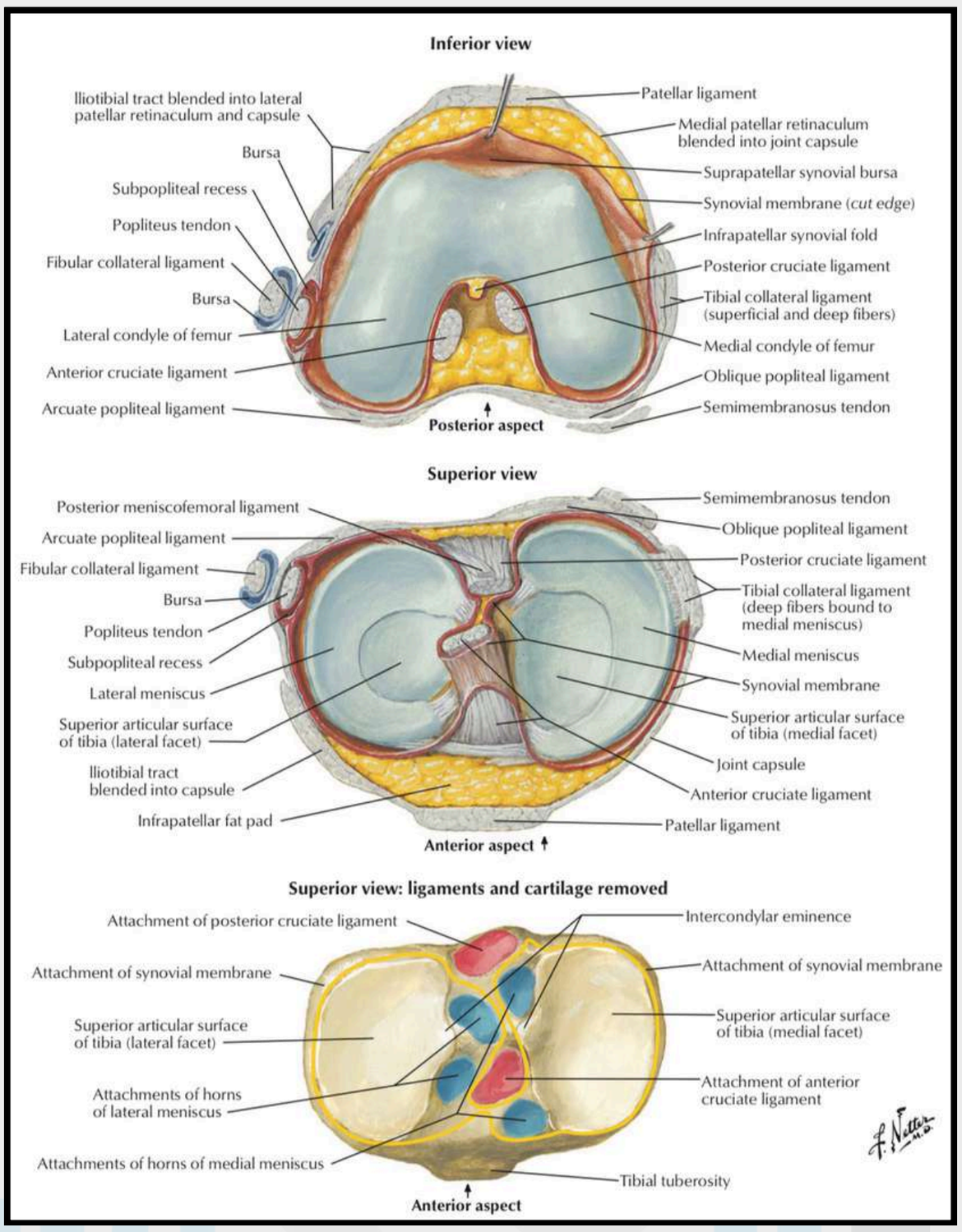
gracilis

Medial circumflex femoral artery, obturator artery

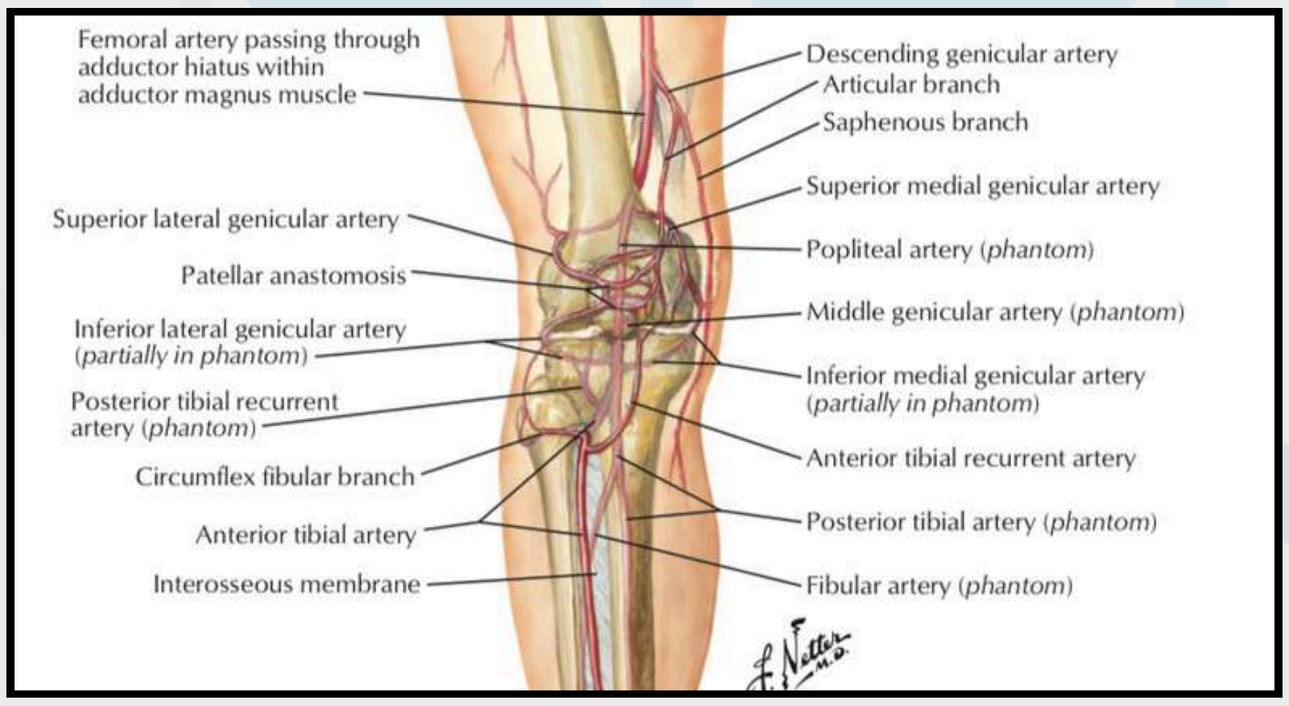
ROM

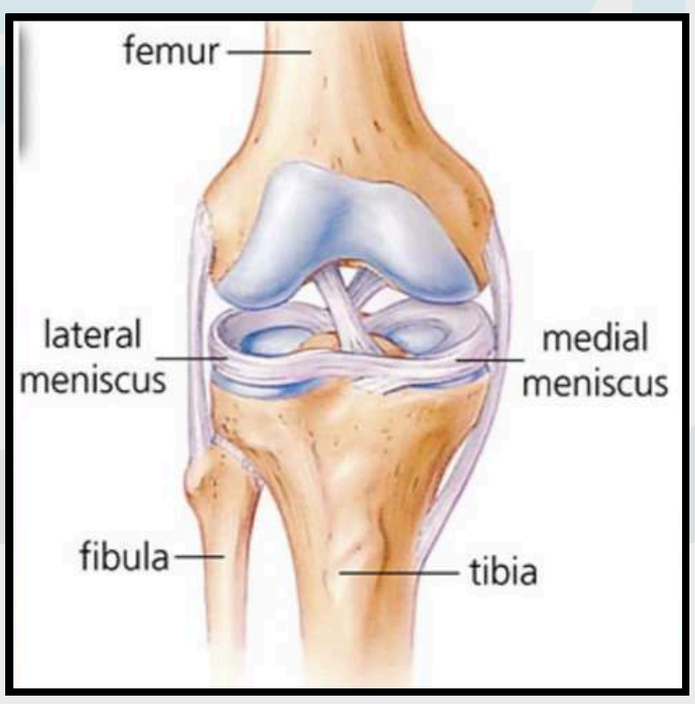
Knee

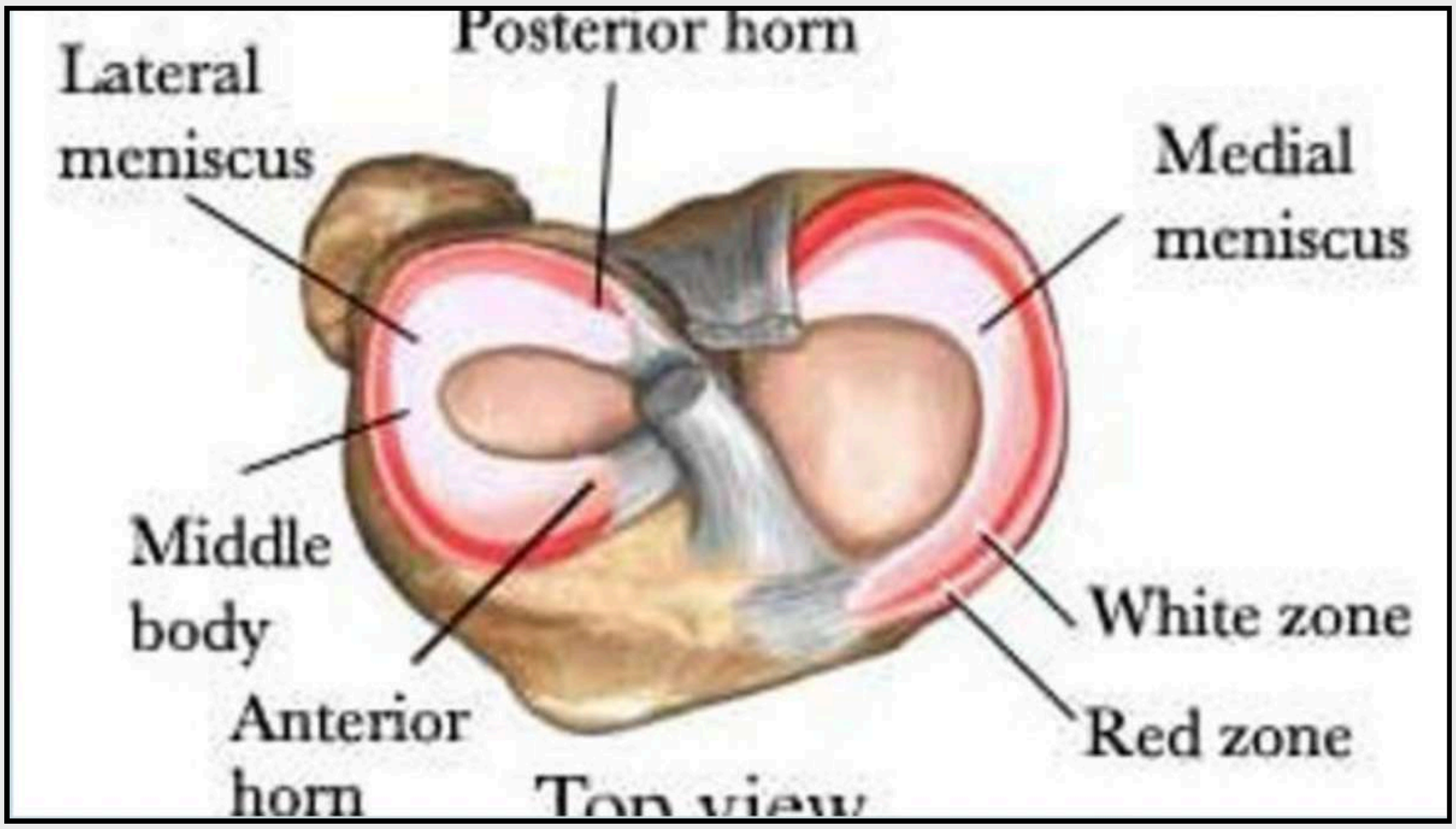




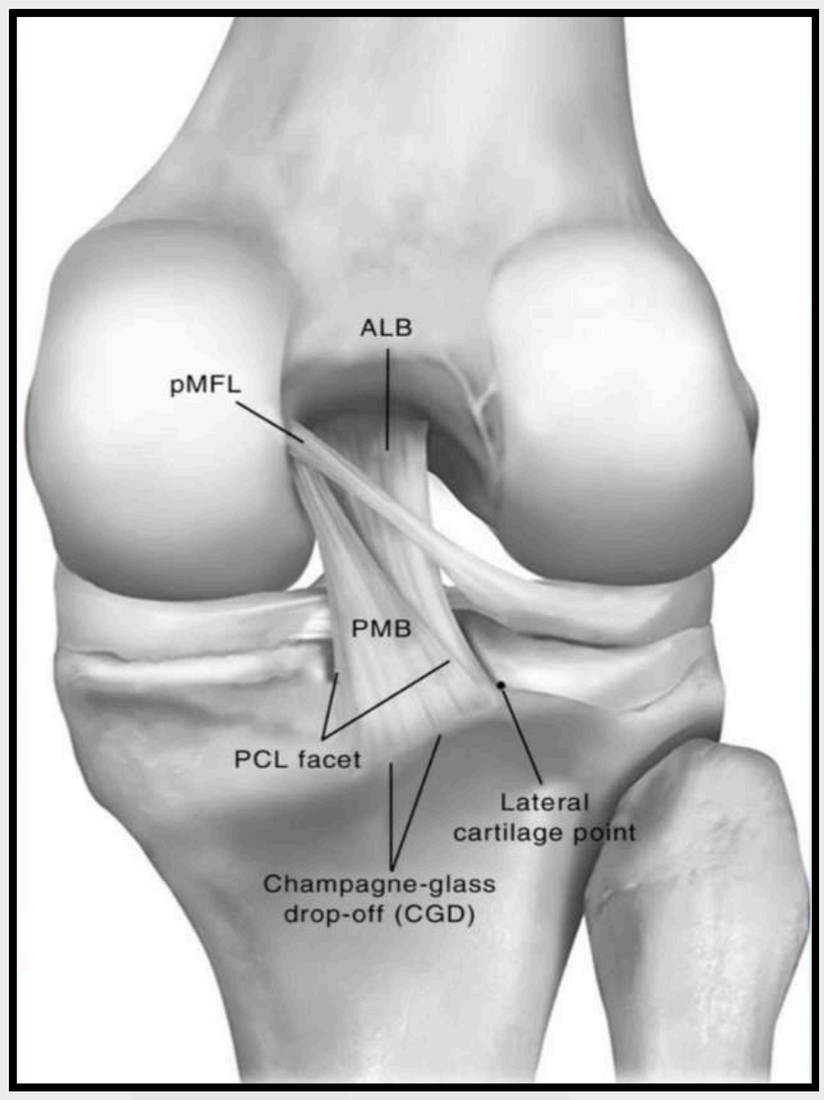
Knee joint : the largest joint in the body, acting primarily as a hinge joint to allow the leg to bend and straighten, with limited other movements like rotation

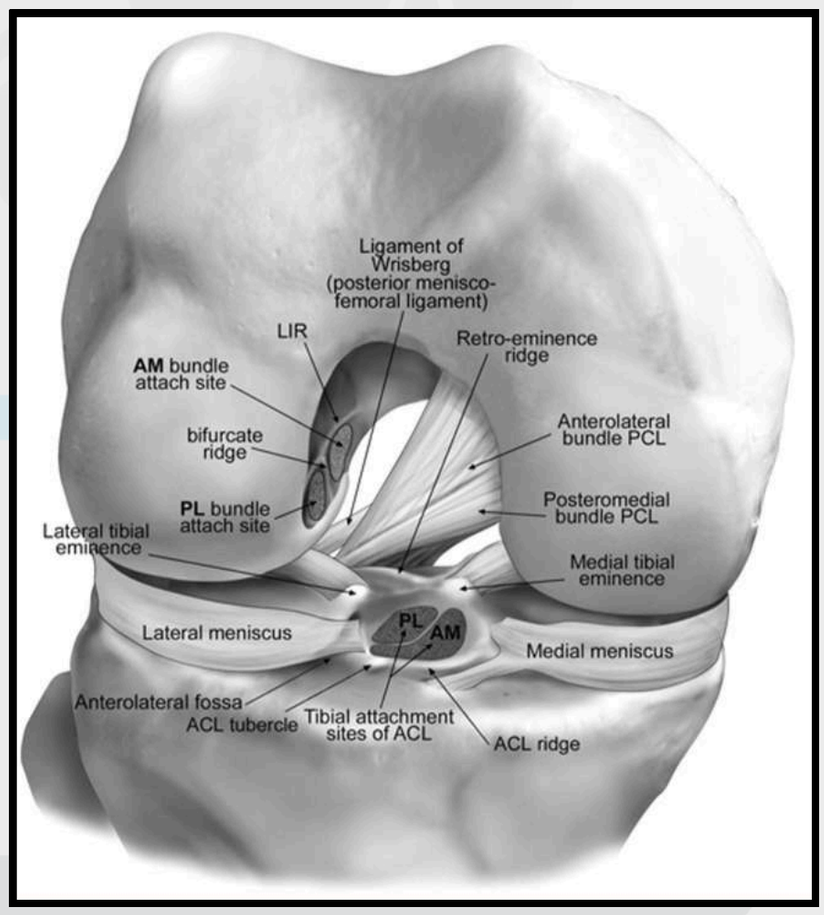






Feature	Anterior Cruciate Ligament (ACL)	Posterior Cruciate Ligament (PCL)
Origin	Arises from the posteromedial corner of the medial surface of the lateral femoral condyle within the intercondylar notch.	Arises from the anterolateral surface of the medial femoral condyle within the intercondylar notch.
Insertion	Inserts into the anterior intercondylar area of the tibia.	Inserts into the posterior intercondylar area of the tibia.
Function	**Primary:** Prevents the tibia from sliding too far forward (anterior translation). **Secondary:** Provides rotational stability to the knee.	**Primary:** Prevents the tibia from sliding too far backward (posterior translation). **Secondary:** Helps prevent knee hyperextension.
Structure	The ACL consists of two main bundles: the anteromedial bundle (tight in flexion) and the posterolateral bundle (tight in extension).	The PCL is shorter, thicker, and roughly twice as strong as the ACL.
Injury	ACL injuries are much more common, especially in sports that involve sudden stops, pivots, and changes of direction.	PCL injuries are less frequent and typically result from a high-impact force to the front of a bent knee, such as a "dashboard injury" in a car accident.





Arterial supply

- **ACL → Main : Middle genicular artery**

add: Inferior medial & lateral genicular (minor)

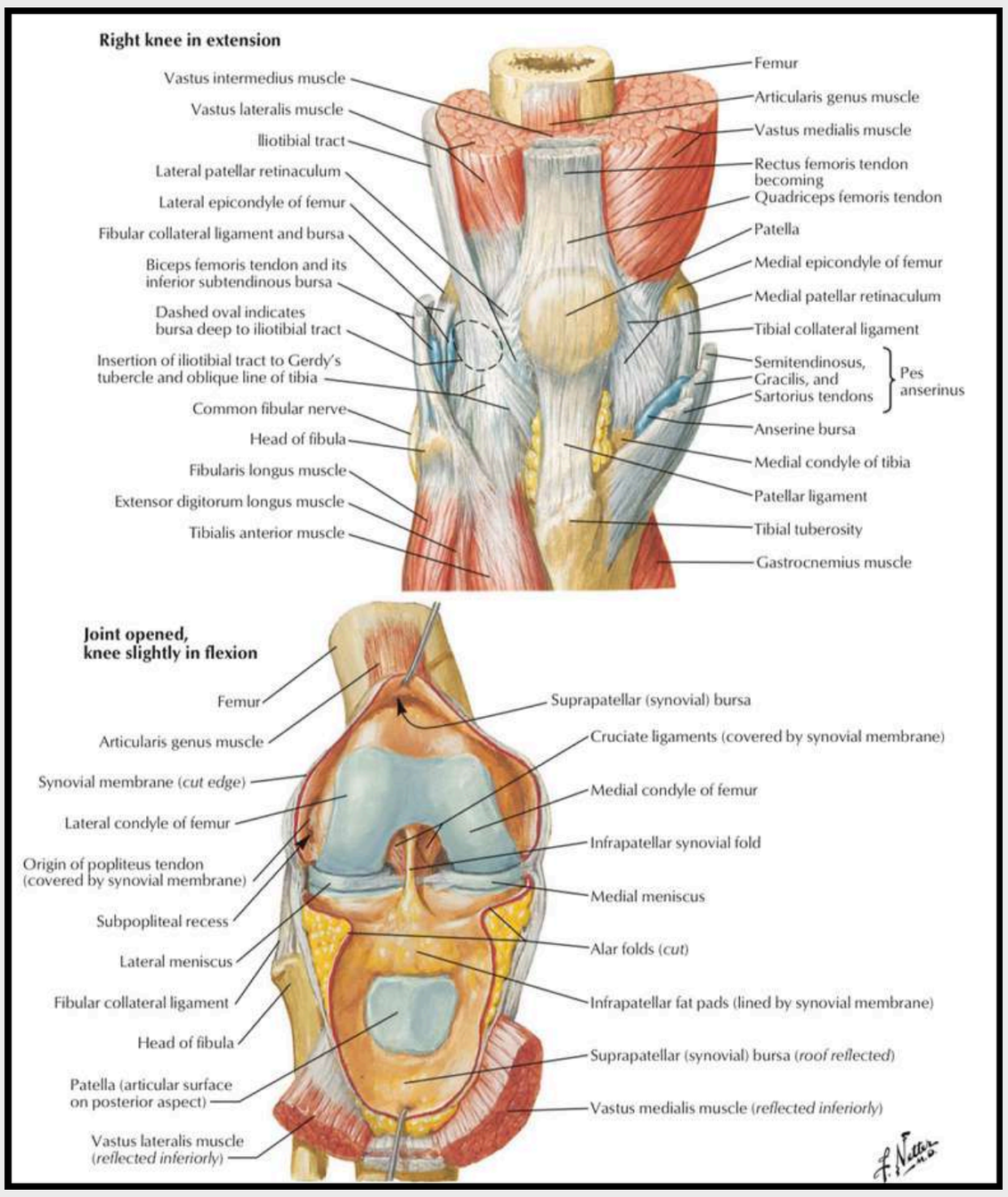
- **PCL →Middle genicular artery**

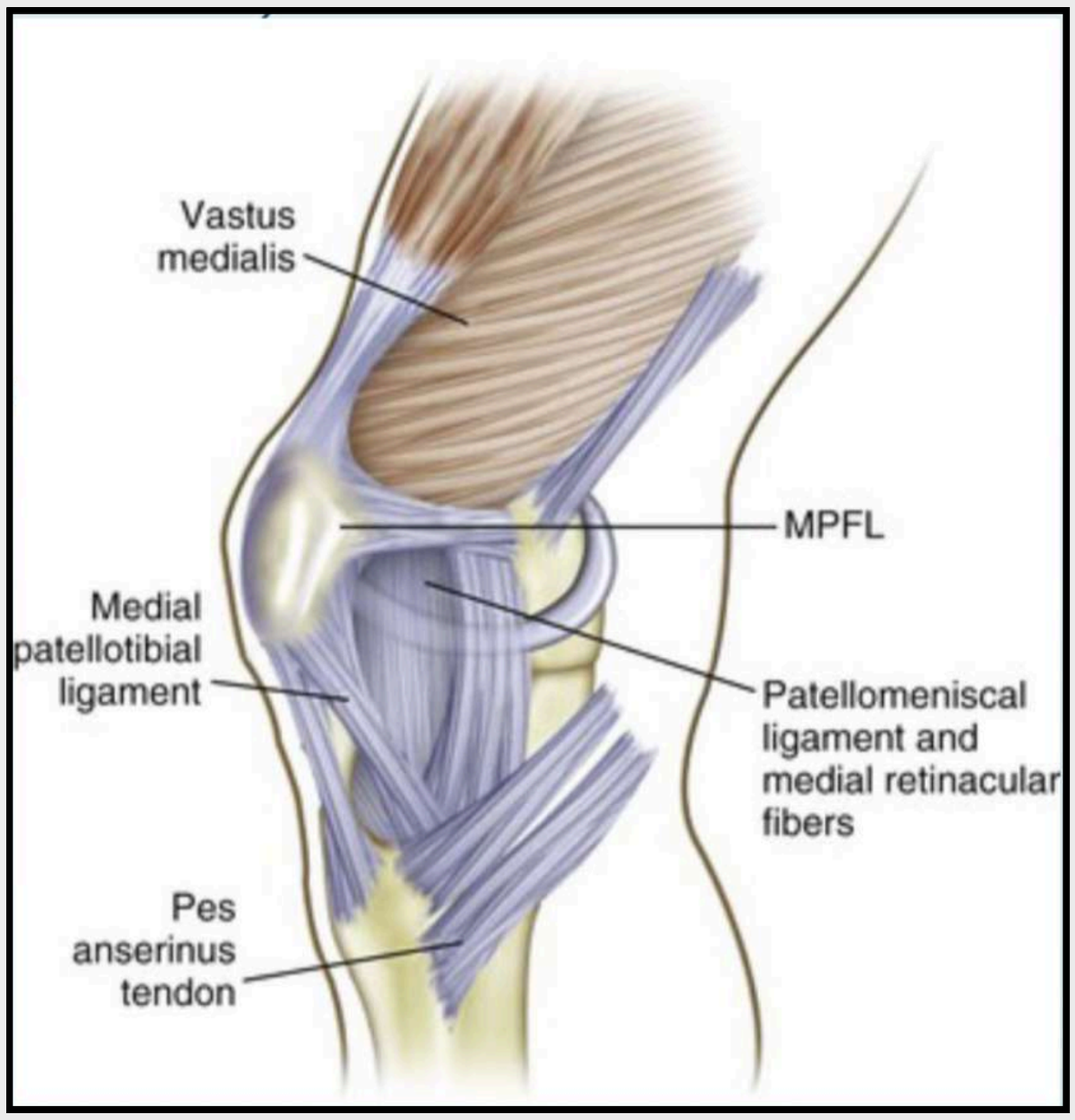
add: Medial inferior genicular artery

- **Healing → PCL > ACL**

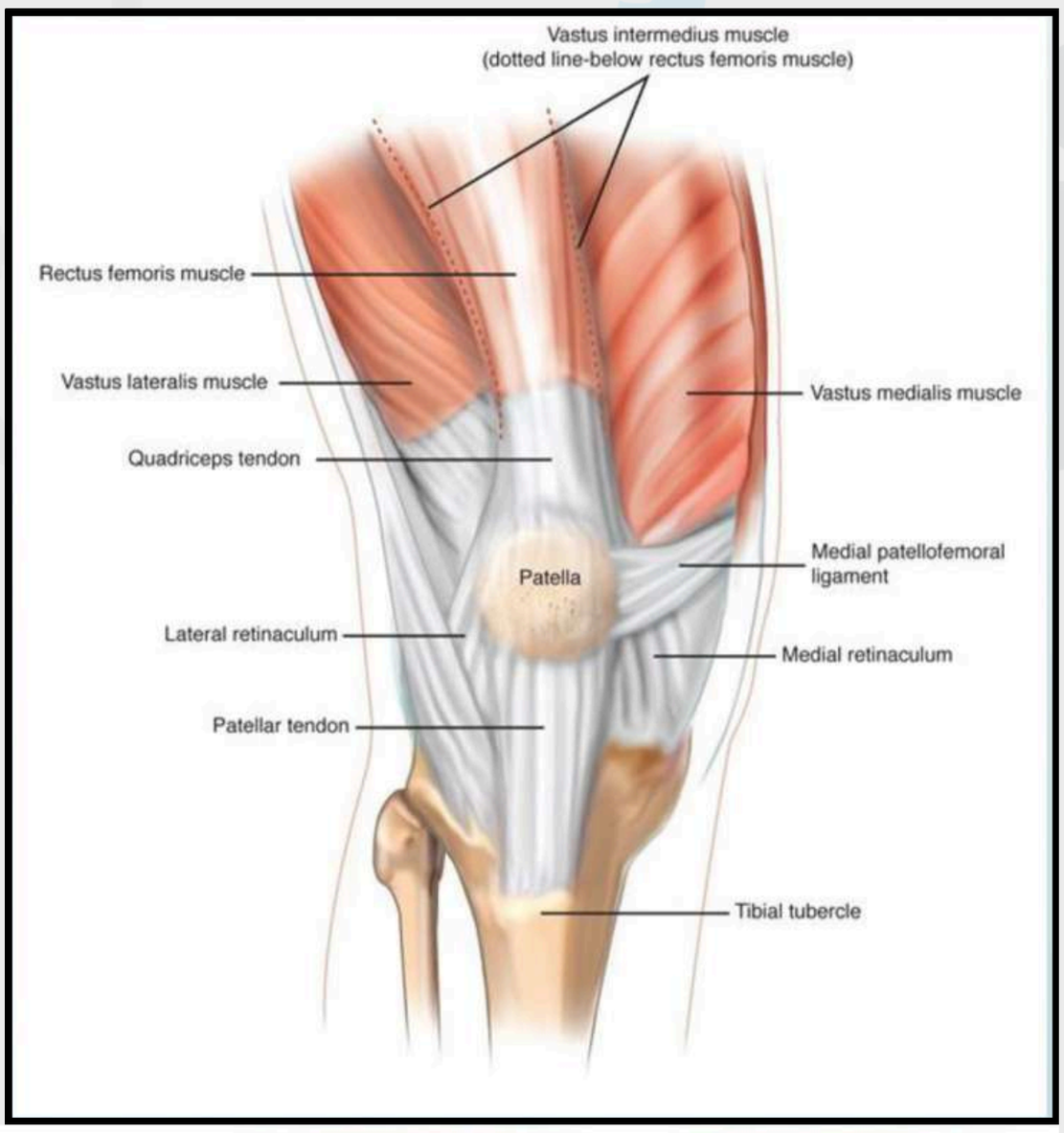
Nerve Supply :

- **ACL → Posterior articular branch of tibial nerve**
- **PCL → Articular branches of tibial nerve**
- **Function → Proprioception & stability**

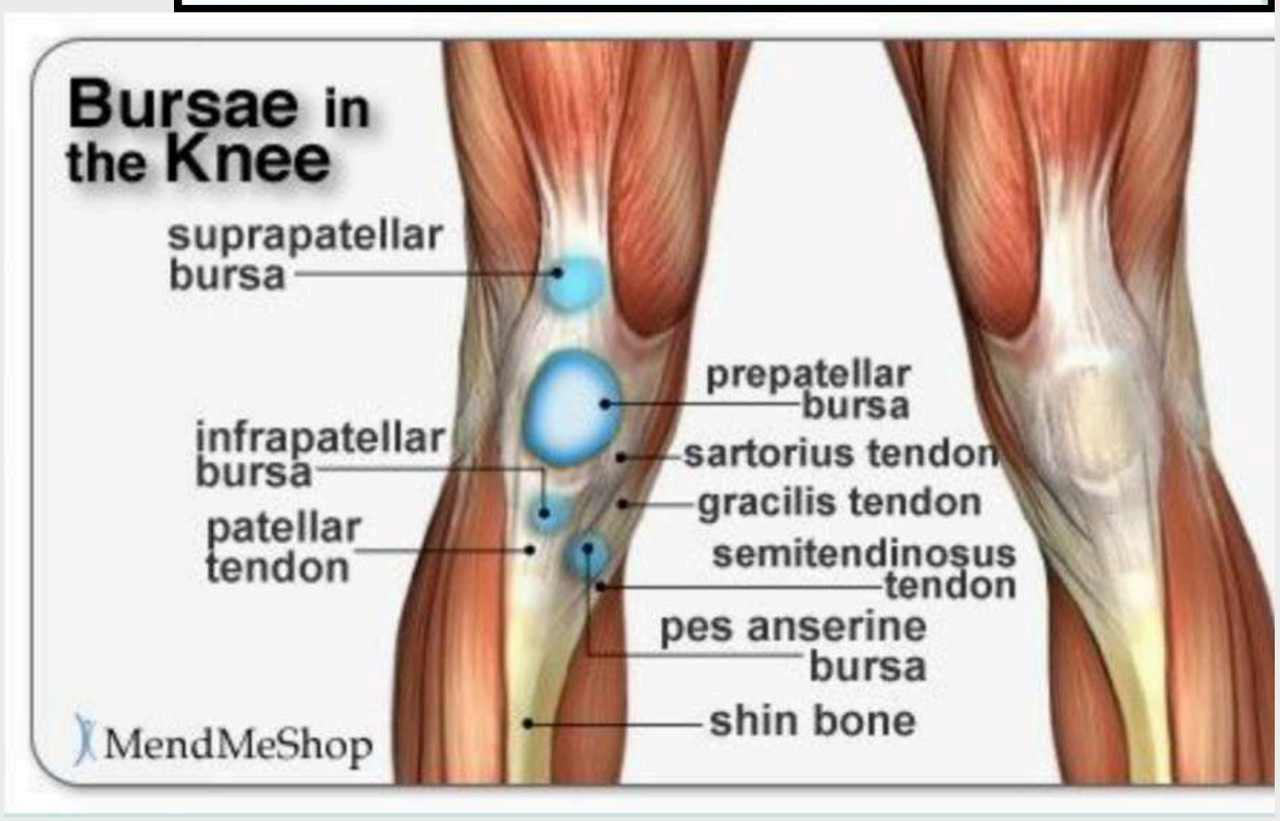


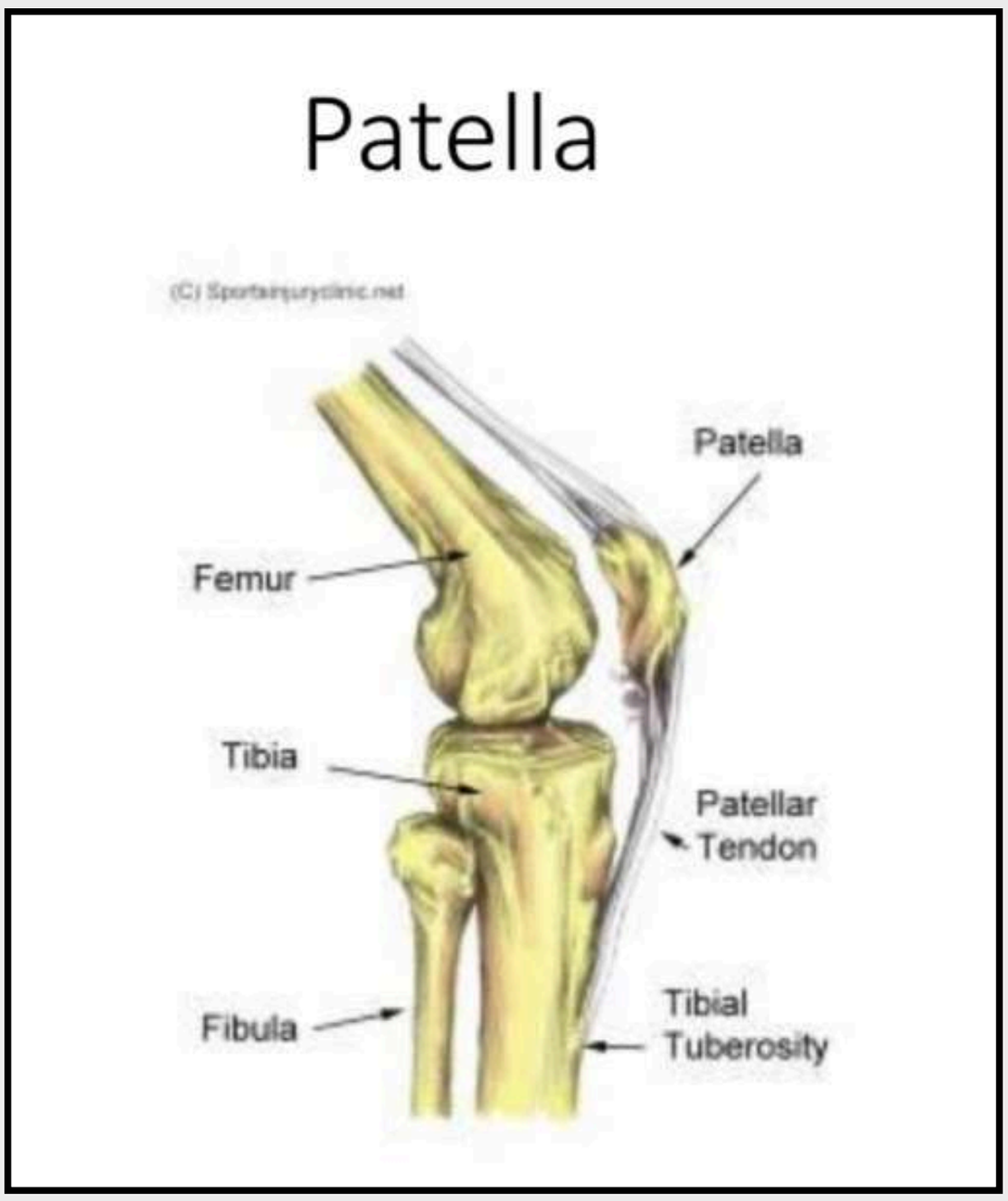


The patella, or kneecap, is a large , triangular bone located at the front of the knee joint. It is the largest sesamoid bone in the body and serves to protect the knee and increase the power of the quadriceps muscle by improving leverage for leg extension. The patella is situated within the quadriceps tendon and is connected to the tibia by the patellar ligament .

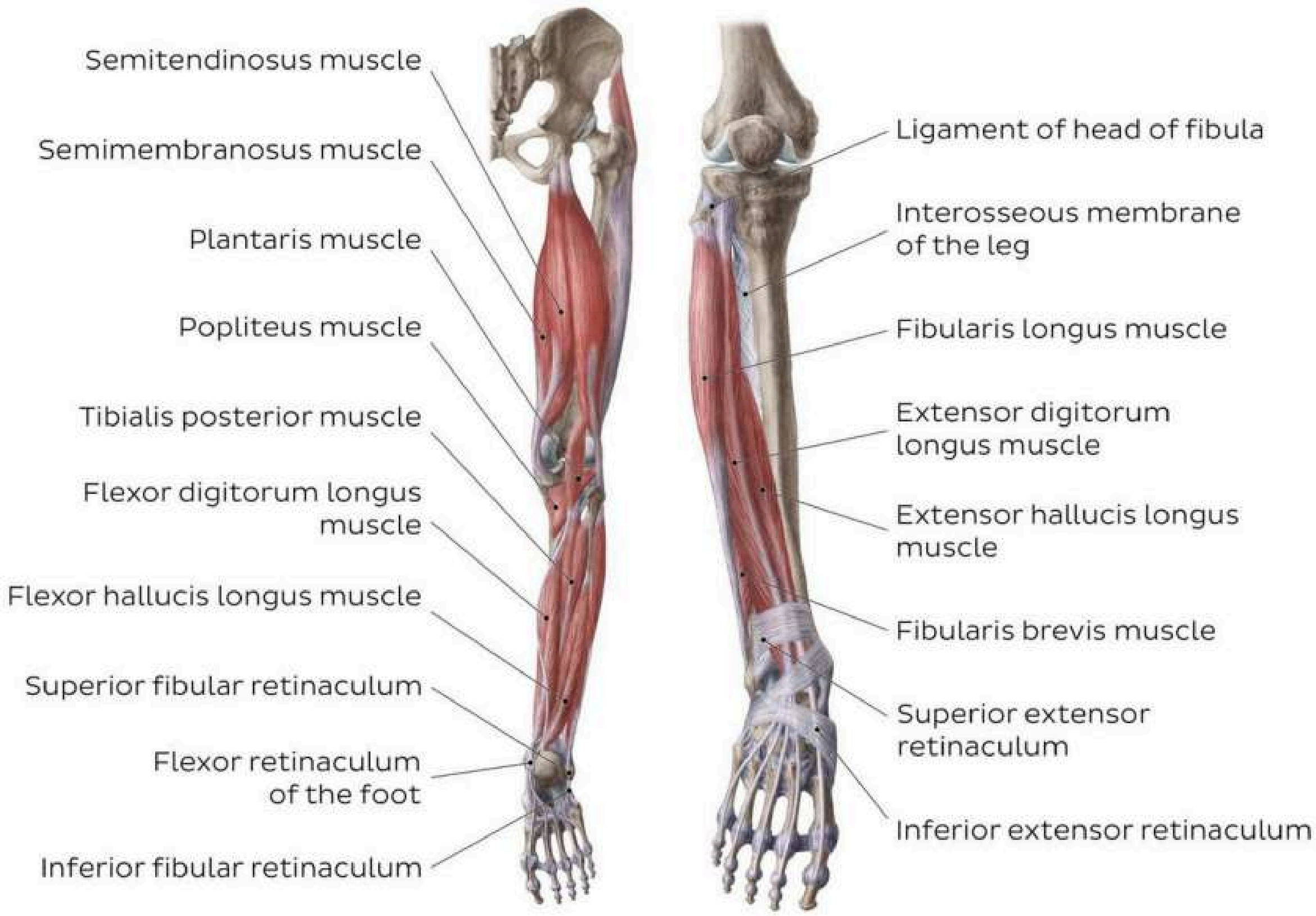


A sesamoid bone is a small bone embedded within a tendon, most commonly found in the hand, wrist, and foot





Leg muscles



Anterior leg muscles

Anterior leg muscles	Origin	Insertion	Innervation	Function
Tibialis anterior	Lateral tibial condyle, proximal half of lateral surface of tibia, Interosseous membrane	Medial cuneiform bone, Base of metatarsal bone 1	Deep fibular nerve (L4, L5)	Talocrural Joint: Foot dorsiflexion; Subtalar joint: Foot inversion; Supports medial longitudinal arch of foot
Extensor hallucis longus	(Middle third of) Medial surface of fibula, Interosseous membrane	Base of distal phalanx of great toe	Deep fibular nerve (L5, S1)	Metatarsophalangeal and interphalangeal joint 1: Toe extension; Talocrural joint: Foot dorsiflexion
Extensor digitorum longus	(Proximal half of) Medial surface of fibula, Lateral tibial condyle, Interosseus membrane	Distal and middle phalanges of digits 2-5		Metatarsophalangeal and interphalangeal joints 2-5: Toe extension; Talocrural joint: Foot dorsiflexion; Subtalar joint: Foot eversion
Fibularis tertius	(Distal third of) Medial surface of fibula, Anterior intermuscular septum	Dorsal surface of base of metatarsal bone 5		Talocrural joint: Foot dorsiflexion; Subtalar joint: Foot eversion

tibialis anterior
Anterior tibial artery

extensor hallucis longus
Anterior tibial artery

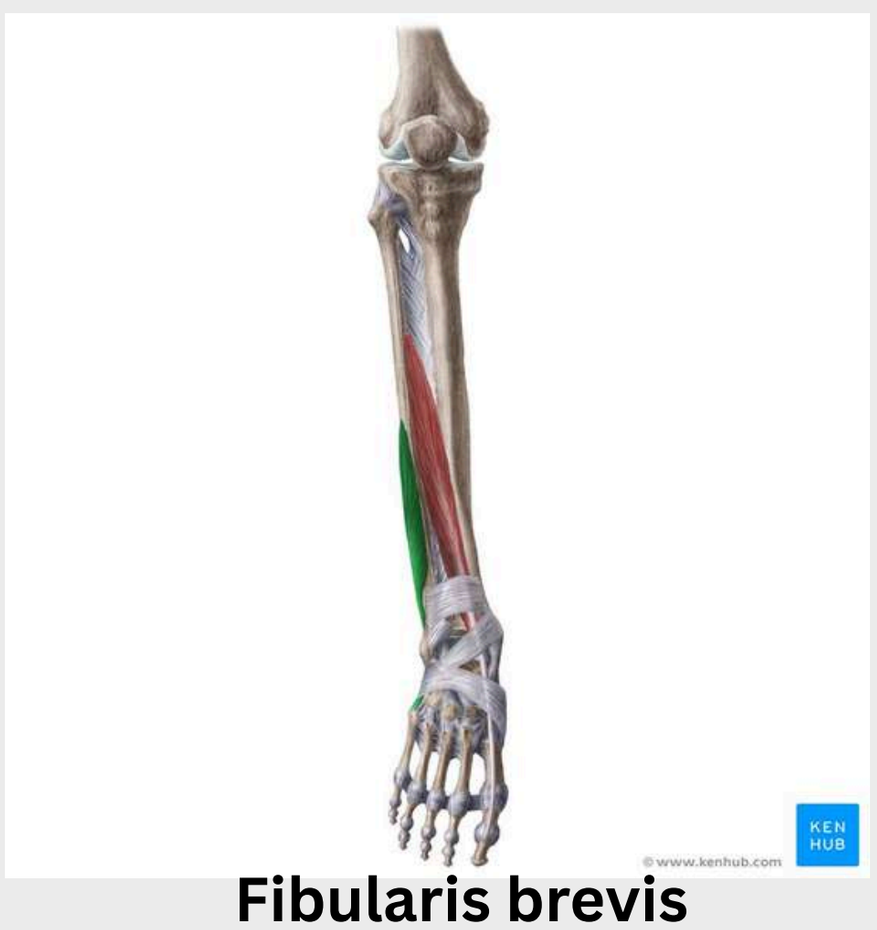
extensor digitorum longus
Anterior tibial artery

fibualris tertius(continuation)
Anterior tibial artery

Lateral leg muscles

Lateral leg muscles	Origin	Insertion	Innervation	Function
Fibularis longus	Head of fibula, Proximal 2/3 of lateral surface of fibula, Anterior and posterior intermuscular septa	Medial cuneiform bone, Metatarsal bone 1	Superficial fibular nerve (L5, S1)	Talocrural joint: Foot plantar flexion; Subtalar joint: Foot eversion; Supports longitudinal and transverse arches of foot
Fibularis brevis	Distal 2/3 of lateral surface of fibula, Anterior intermuscular septum	Tuberosity of metatarsal bone 5		Talocrural joint: Foot plantar flexion; Subtalar joint: Foot eversion

Fibularis longus
Anterior tibial and fibular arteries



Fibularis brevis
Anterior tibial and fibular arteries

Posterior leg muscles

Posterior leg muscles	Origin	Insertion	Innervation	Function
Gastrocnemius	Lateral head: Posterolateral surface of lateral femoral condyle Medial head: Posterior surface of medial femoral condyle, Popliteal surface of femoral shaft	Posterior surface of calcaneus (via calcaneal tendon)	Tibial nerve (S1, S2)	Talocrural joint: Foot plantar flexion; Knee joint: Leg flexion
Soleus	Soleal line, Medial border of tibia, Head of fibula, Posterior border of fibula			Talocrural joint: Foot plantar flexion
Plantaris	Lateral supracondylar line of femur, Oblique popliteal ligament of knee			Talocrural joint: Foot plantar flexion; Knee joint: Knee flexion
Popliteus	Lateral femoral condyle, Posterior horn of lateral meniscus of knee joint	Posterior surface of proximal tibia	Tibial nerve (L5-S2)	Unlocks knee joint; Knee joint stabilization
Tibialis posterior	Posterior surface of tibia, Posterior surface of fibula, Interosseous membrane	Tuberosity of navicular bone, All cuneiform bones, bases of metatarsal bones 2-4 (Cuboid bone)	Tibial nerve (L4, L5)	Talocrural joint: Foot plantar flexion; Subtalar joint: Foot inversion; Supports medial longitudinal arch of foot
Flexor digitorum longus	Posterior surface of tibia, (inferior to soleal line)	Bases of distal phalanges of digits 2-5	Tibial nerve (L5-S2)	Metatarsophalangeal and interphalangeal joints 2-5: Toe flexion; Talocrural joint: Foot plantar flexion; Subtalar joint: Foot inversion
Flexor hallucis longus	(Distal 2/3 of) Posterior surface of fibula, Interosseous membrane, Posterior intermuscular septum, Fascia of tibialis posterior muscle	Base of distal phalanx of great toe	Tibial nerve (S2, S3)	Metatarsophalangeal and interphalangeal joint 1: Toe flexion; Talocrural joint: Foot plantar flexion; Subtalar joint: Foot inversion

Gastrocnemius
Sural arteries (from popliteal)
Posterior tibial artery

Soleus
Popliteal artery
Posterior tibial artery
Peroneal (fibular) artery

Plantaris
popliteal artery

(deep) posterior leg muscles

Popliteus
Popliteal artery
Inferior medial and lateral genicular arteries

Tibialis posterior
Posterior tibial artery
Fibular artery

Flexor digitorum longus
Posterior tibial artery

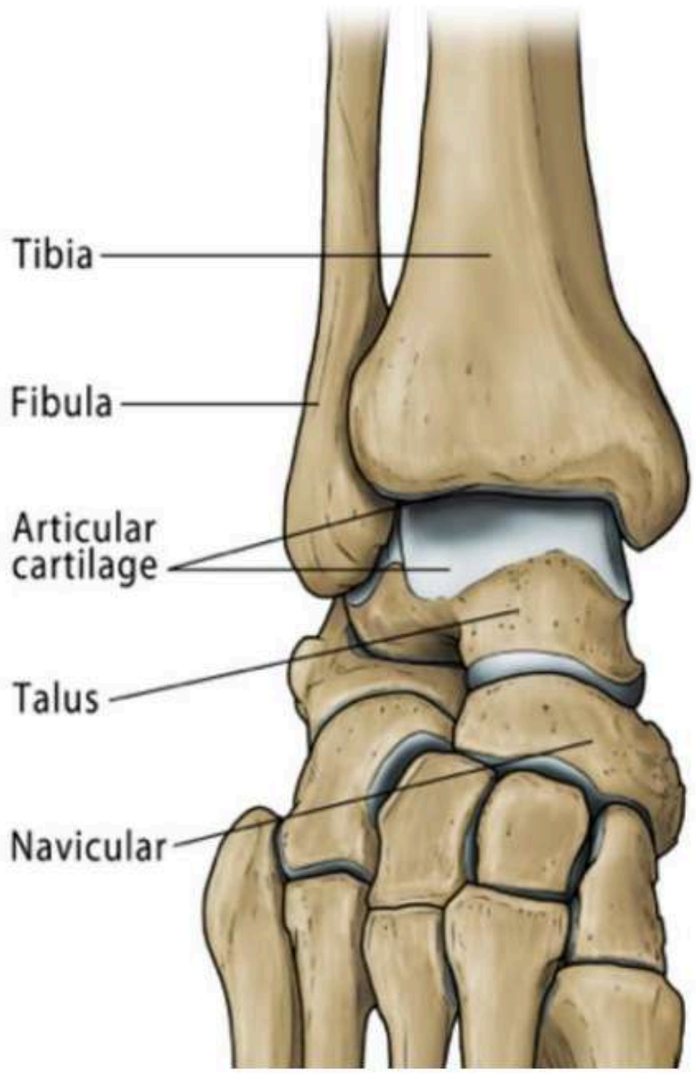
Flexor hallucis longus
Fibular artery

Ankle

hinge synovial joint between the leg and foot.

Key facts about the ankle joint — Table quiz

Type	Synovial hinge joint; uniaxial
Articular surfaces	Tibiotarsal joint: distal end of tibia, medial malleolus of the tibia, lateral malleolus of fibula, body of talus
Ligaments	Anterior talofibular, posterior talofibular, calcaneofibular, deltoid (tibiocalcaneal, tibionavicular, tibiotalar parts), fibular collateral ligaments
Innervation	Deep fibular (peroneal), tibial and sural nerves
Blood supply	Anterior tibial, posterior tibial and fibular arteries
Movements	Dorsiflexion, plantar flexion



Three articulations in the ankle joint:

- The **distal end of the tibia articulates with the trochlea of the talus**, a pulley-shaped rounded superior articular surface. The trochlea of the talus is convex in the parasagittal plane and slightly concave in the transverse plane. The distal end of the tibia is reciprocally shaped so that its congruent with the talar surface.
- The **medial malleolus**, a bony projection of the distal end of the tibia, articulates with the **medial surface of the talus.**
- The **lateral malleolus**, an enlargement of the distal end of the fibula, articulates with the **lateral aspect of the talus**. The lateral malleolus of the fibula is positioned more distally and posteriorly than the medial malleolus of the tibia.

Ligaments:

Lateral collateral ligament

It is comprised of three distinct bands:

-**Anterior talofibular ligament**

-**Posterior talofibular ligament**

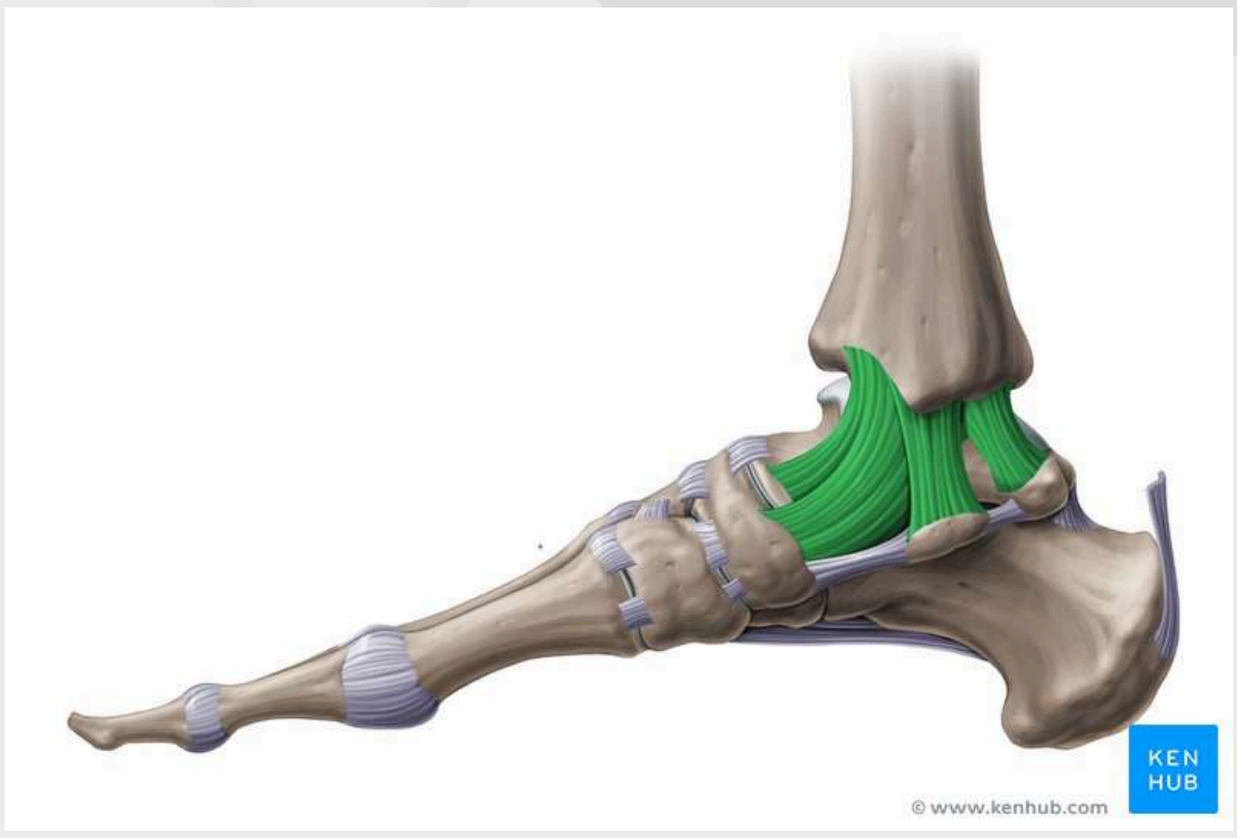
-**Calcaneofibular ligament**

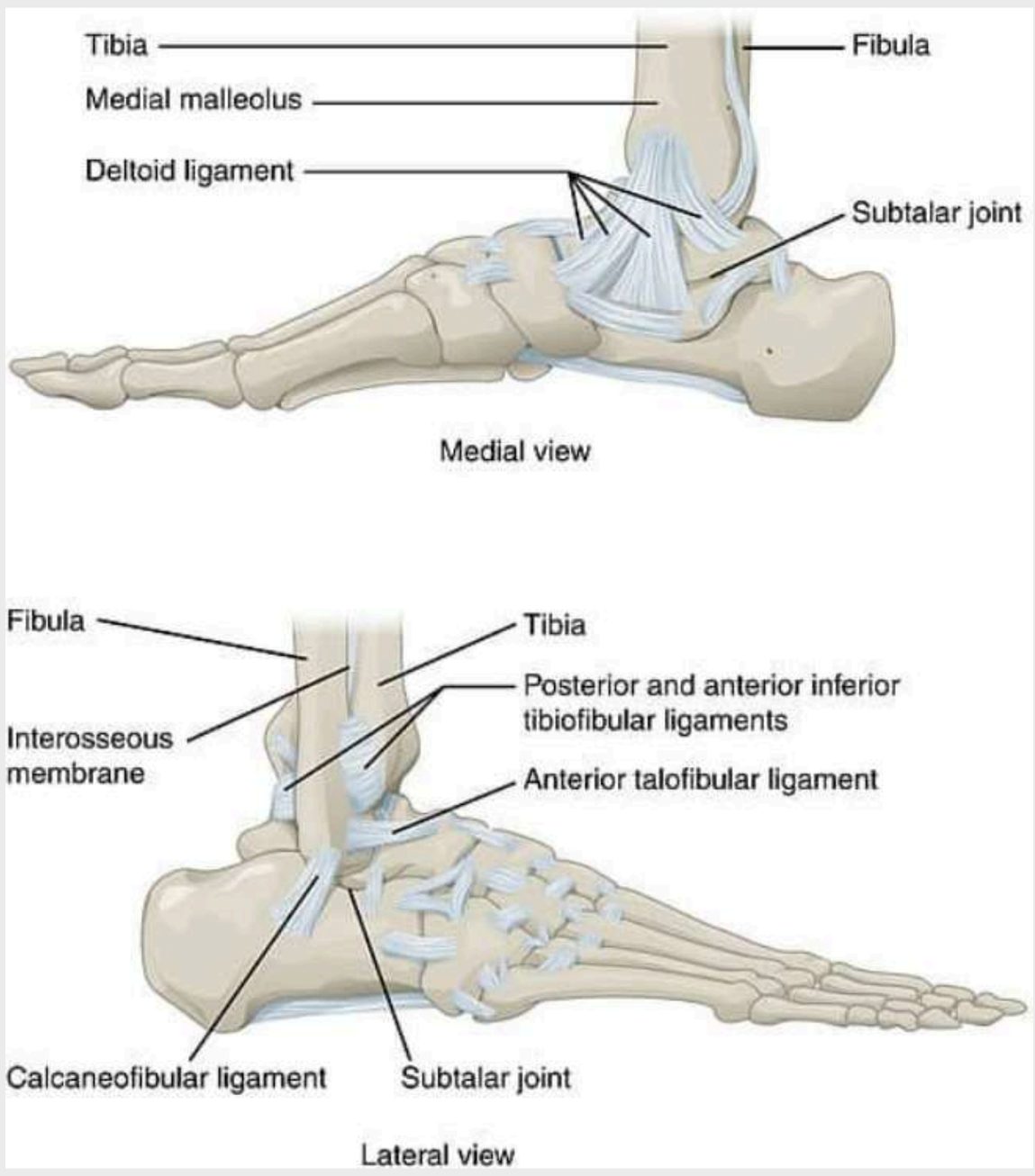
Medial collateral ligament(delltoid)

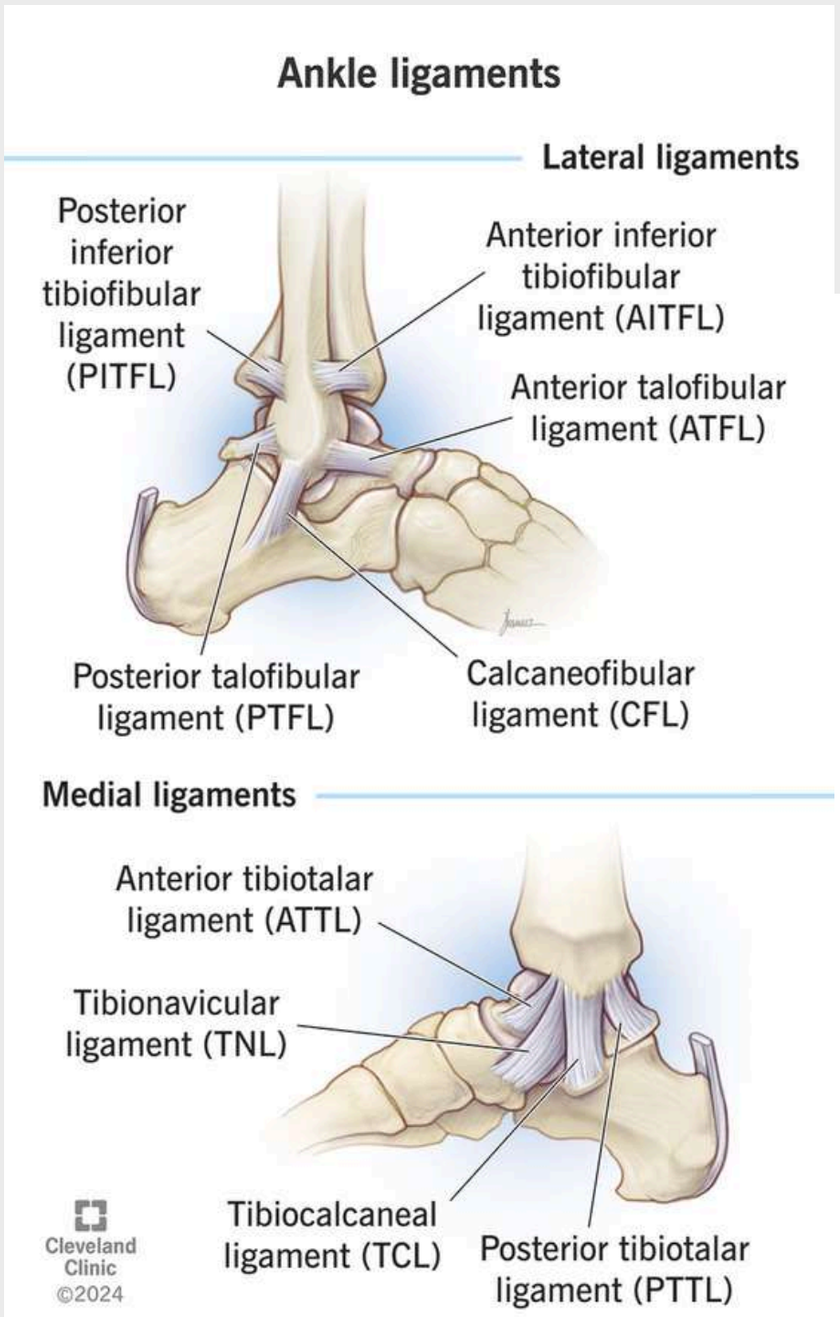
-Tibionavicular ligament

-Tibiocalcaneal ligament

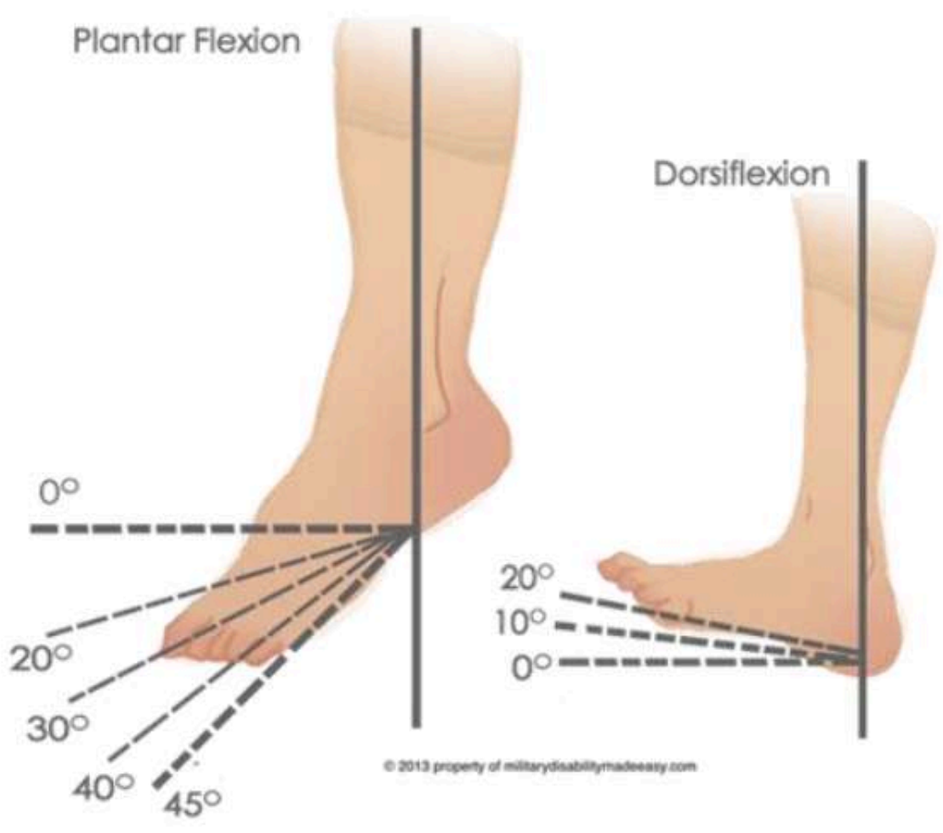
-Tibiotalar ligament: comprises the deep part of the medial collateral ligament. It consists of an **anterior** and **posterior** portion.





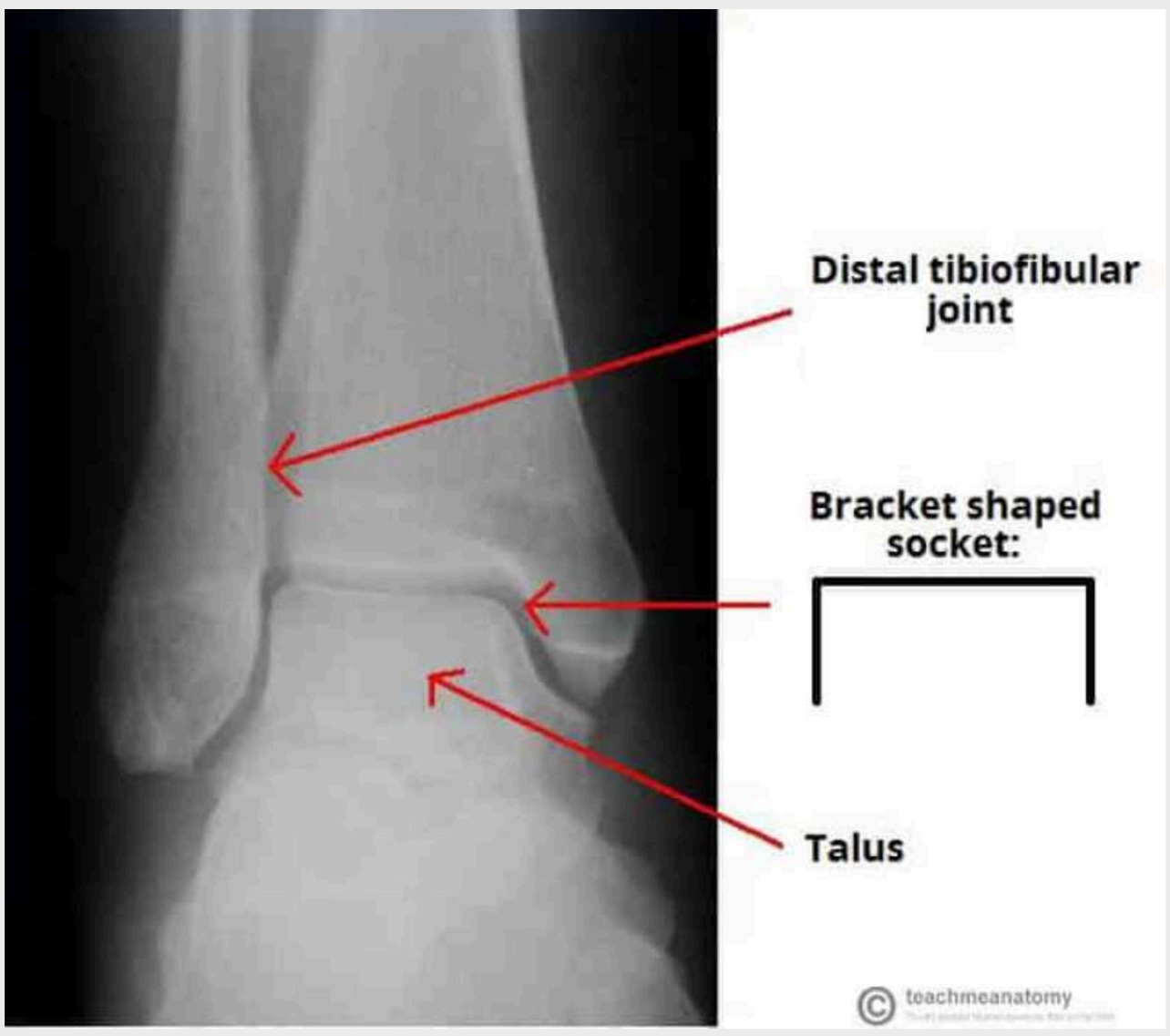


ROM



Muscles acting on the ankle joint	Table quiz
Plantar flexion	Gastrocnemius, soleus, flexor digitorum longus, flexor hallucis longus, fibularis longus, tibialis posterior
Dorsiflexion	Tibialis anterior, extensor digitorum longus, extensor hallucis longus, fibularis tertius
Inversion	Tibialis anterior, tibialis posterior
Eversion	Fibularis longus, fibularis tertius, fibularis brevis

xray



7 Key Stabilizers

Primary stabilizers

- **Deltoid ligament** (medial stability)
- **ATFL, CFL, PTFL** (lateral stability)

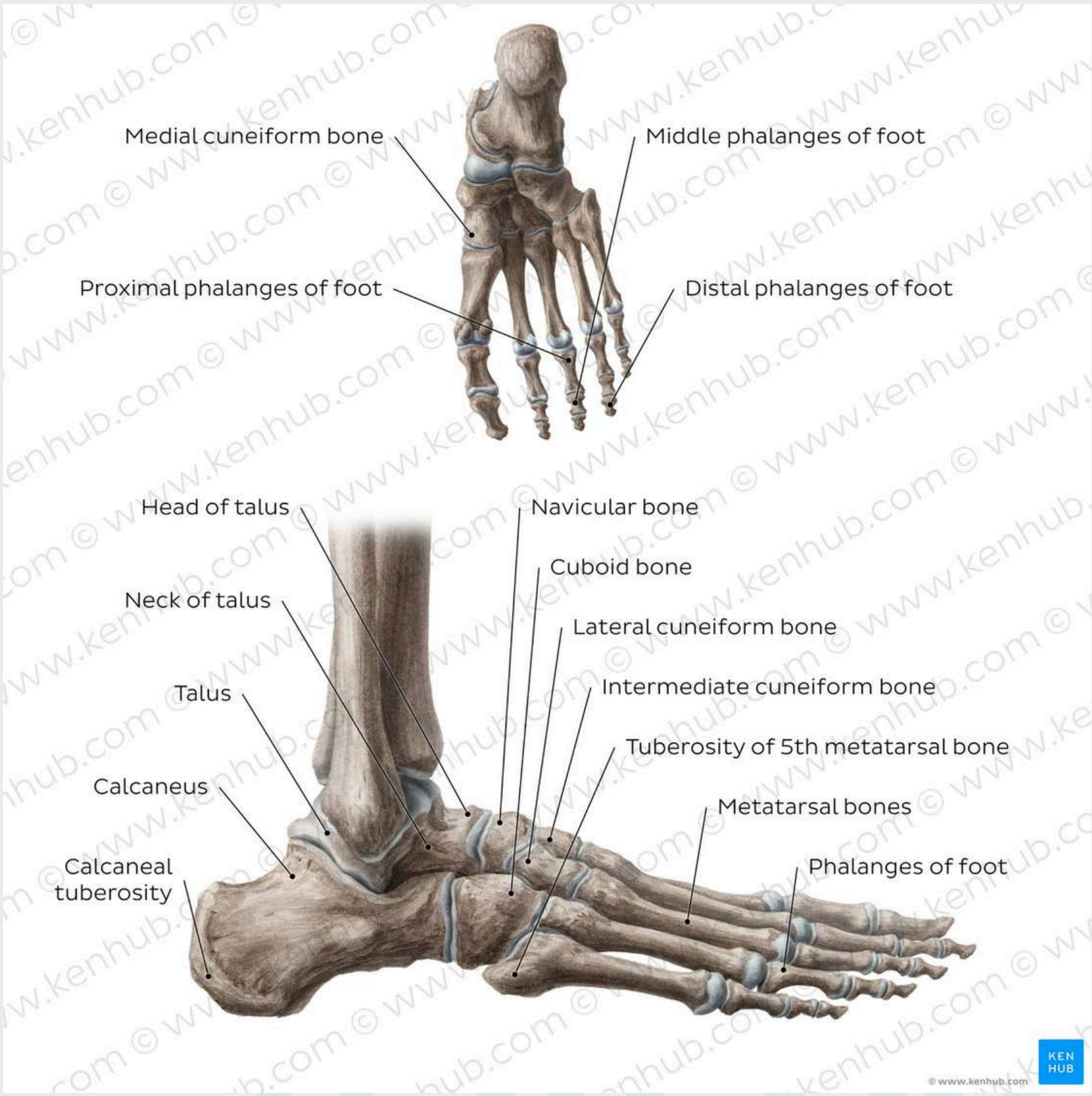
Syndesmosis stabilizers

- AITFL
- PITFL
- Interosseous ligament/membrane
  - ➡ Prevent talus from spreading tibia & fibula

Dynamic stabilizers (muscles/tendons)

- **Tibialis anterior & posterior** → medial support
- **Fibularis longus & brevis** → lateral support
- **Achilles tendon** → posterior support
- **Extensor retinacula** → anterior support

Foot



Tiger **C**ubs **N**eed **MILC**

Talus
Calcaneus
Navicular
Medial cuneiform
Intermediate cuneiform
Lateral cuneiform
Cuboid

1 Bones of the Foot

Hindfoot (tarsus)

- Talus
- Calcaneus

Midfoot

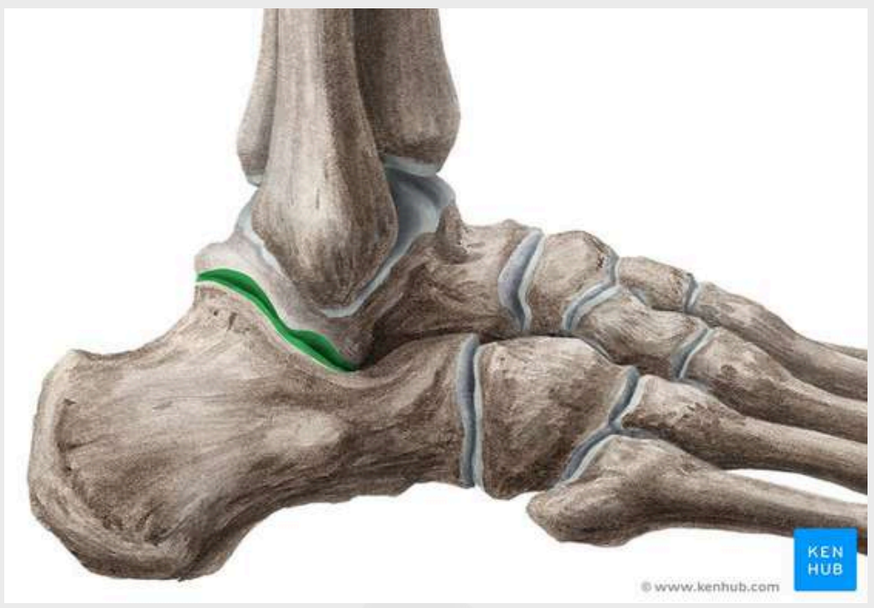
- Navicular
- Cuboid
- Medial, intermediate, and lateral cuneiforms

Forefoot

- Metatarsals (1–5)
- Phalanges (proximal, middle, distal except hallux = 2 only)
- Sesamoids under 1st metatarsal head

Joints of the foot

- **The intertarsal joints** are between the tarsal bones. These joints are the **subtalar (talocalcaneal), talocalcaneonavicular, calcaneocuboid, cuneonavicular, cuboideonavicular, and intercuneiform** joints.
- **Tarsometatarsal joints** are the articulations between the tarsals and metatarsals.
- **Metatarsophalangeal joints** (MTP) are the joints between the heads of metatarsals and corresponding bases of the proximal phalanges of the foot.
- **Interphalangeal joints** are between the phalanges of the foot. The great toe has only one interphalangeal joint, while the other four toes have a proximal (PIP) and a distal (DIP) interphalangeal joint**.**

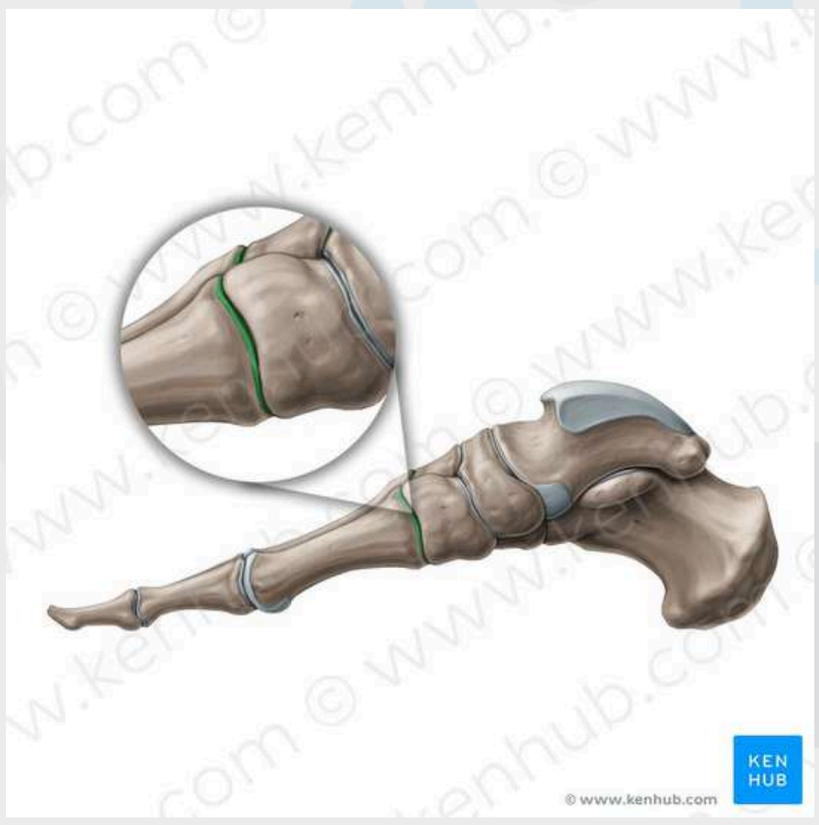


Subtalar joint

Type: Synovial, plane
Movements: Inversion & eversion

Chopart joint

(Talonavicular + calcaneocuboid)
Important for foot adaptation on uneven ground



Lisfranc joint (tarsometatarsal)

Key: Lisfranc ligament (1st cuneiform → 2nd metatarsal)

ROM

4 Foot Arches

Medial Longitudinal Arch

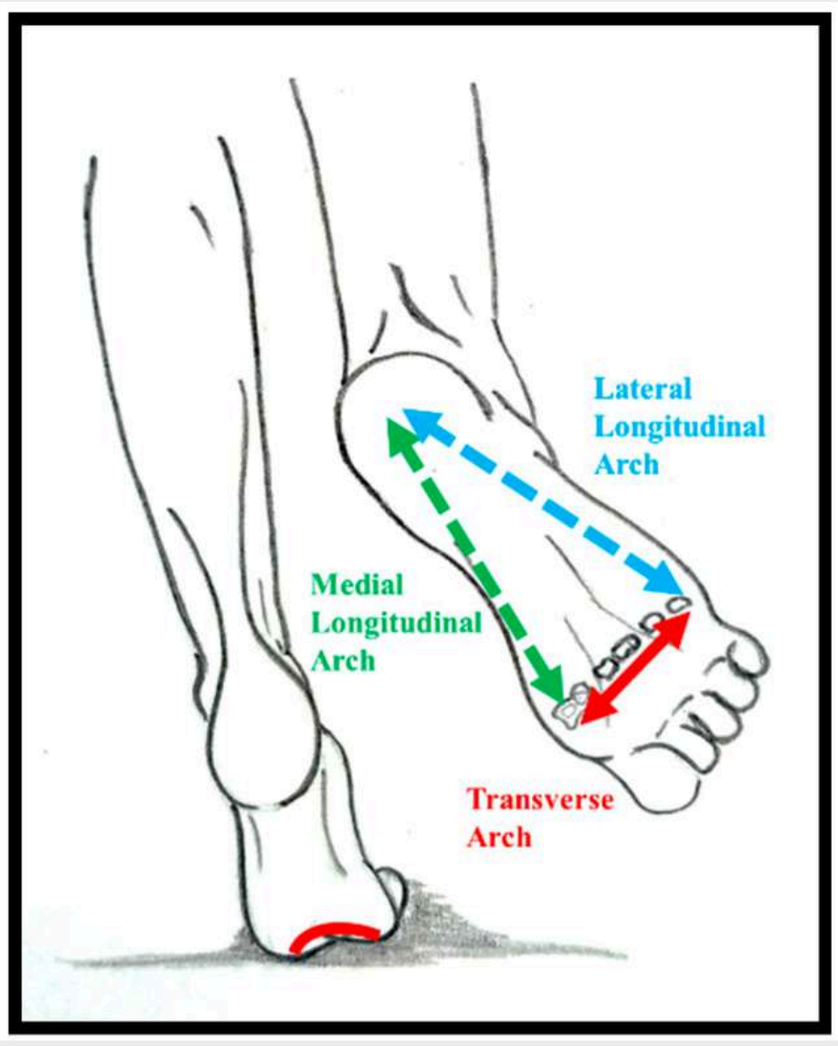
- **Bones:** calcaneus, talus, navicular, cuneiforms, 1st–3rd metatarsals
- **Passive support:** spring ligament, plantar fascia
- **Dynamic support:** tibialis anterior, tibialis posterior, FHL, FDL

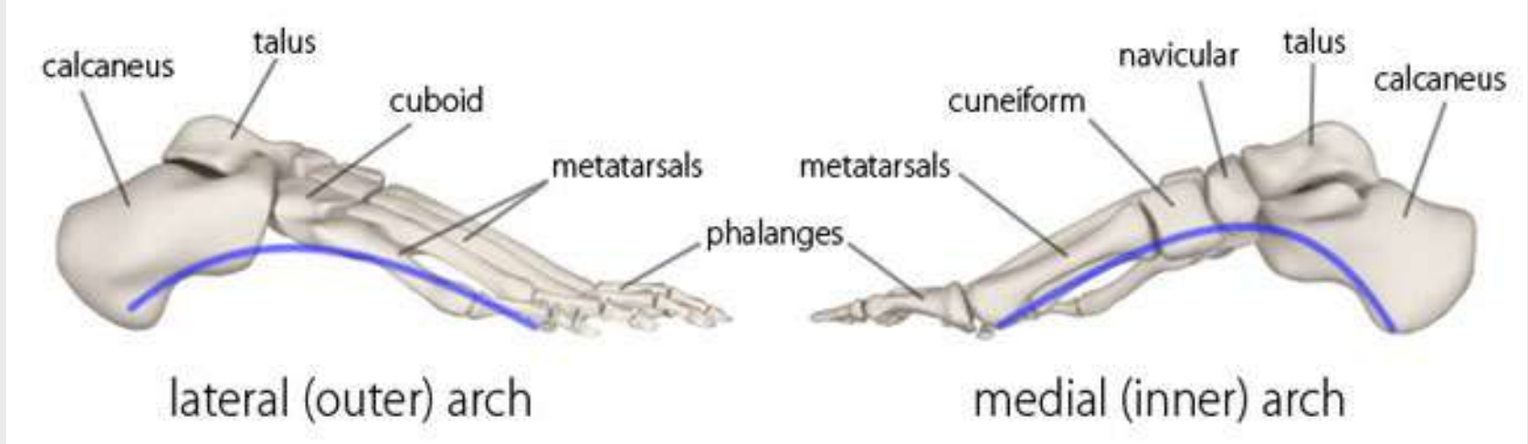
Lateral Longitudinal Arch

- **Bones:** calcaneus, cuboid, 4th–5th metatarsals
- **Support:** long plantar ligament, FDL, fibularis longus/brevis

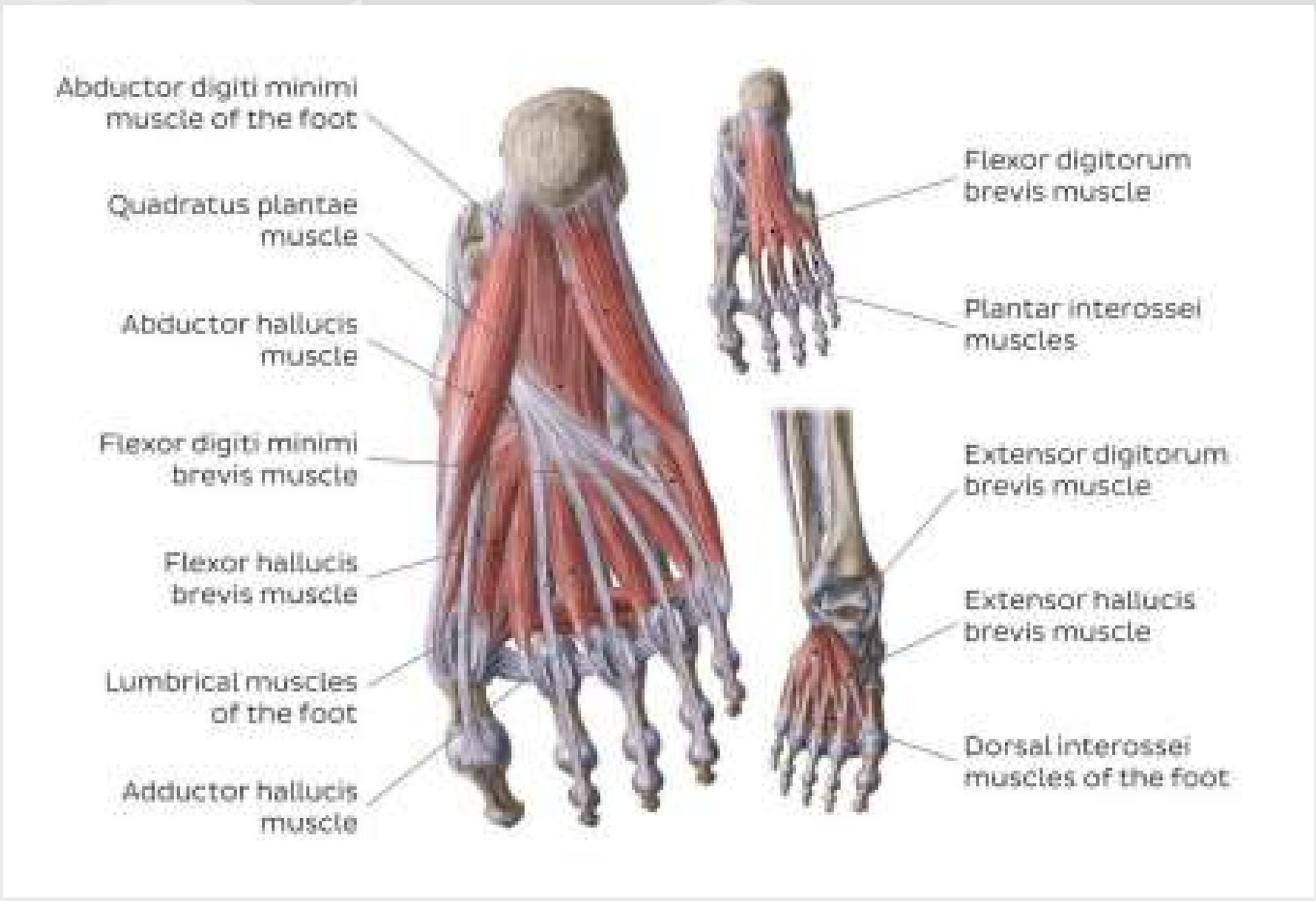
Transverse Arch

- **Bones:** cuneiforms + base of metatarsals
- **Support:** fibularis longus, tibialis posterior



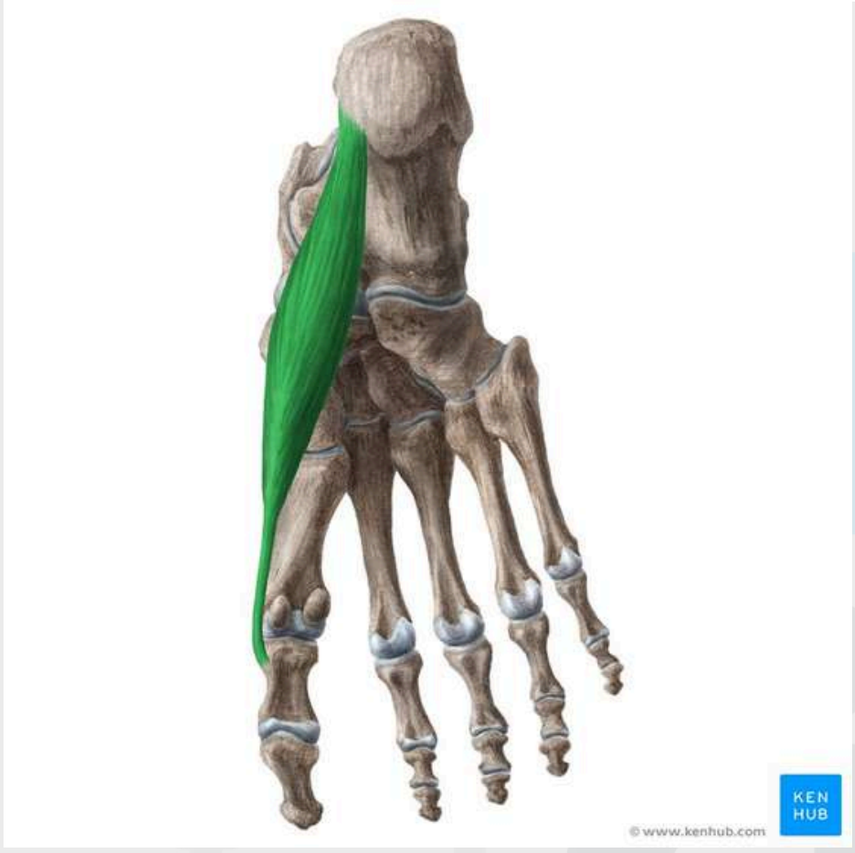


Foot muscles: plantar and dorsum

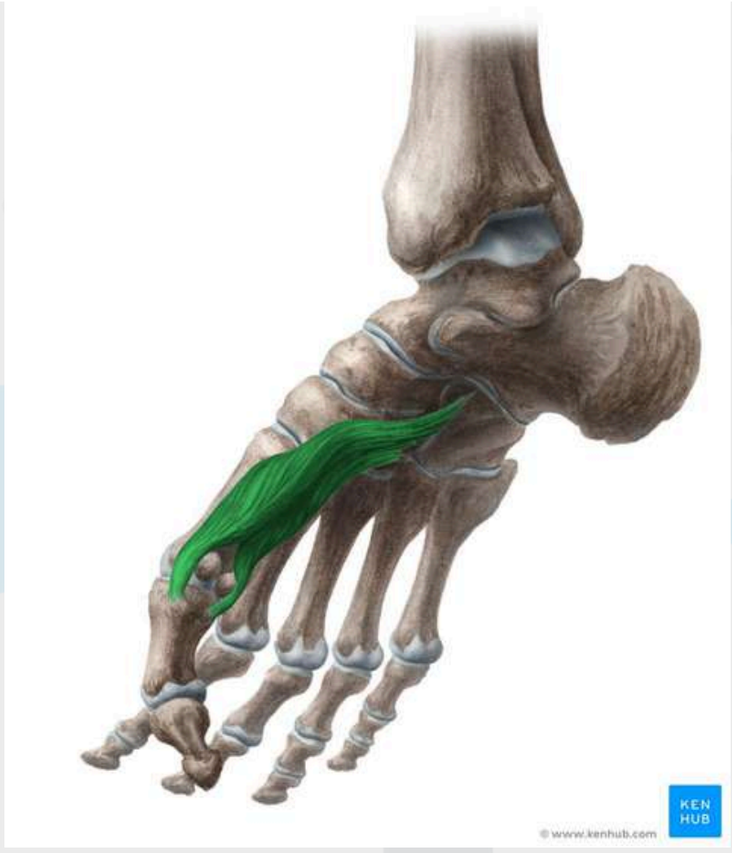


Medial plantar muscles

Medial plantar muscles	Origin	Insertion	Innervation	Function
Abductor hallucis	Medial process of calcaneal tuberosity, Flexor retinaculum, Plantar aponeurosis	Base of proximal phalanx of great toe	Medial plantar nerve (S1-S3)	Metatarsophalangeal joint 1: Toe abduction, Toe flexion; Support of longitudinal arch of foot
Flexor hallucis brevis	Tendon of tibialis posterior, Medial cuneiform bone, Lateral cuneiform bone, Cuboid bone	Lateral and medial aspects of base of promixal phalanx of great toe	Medial plantar nerve (S1,S2)	Metatarsophalangeal joint 1: Toe flexion; Support of longitudinal arch of foot
Adductor hallucis (*locatedin central compartment)	Oblique head: bases metatarsal bones 2-4, Cuboid bone, Lateral cuneiform bone, Tendon of fibularis longus muscle Transverse head: plantar metatarsophalangeal & deep transverse metatarsal ligaments of toes 3-5	Lateral aspect of base of proximal phalanx of great toe	Lateral plantar nerve (S2,S3)	Metatarsophalangeal joint 1: Toe adduction, Toe flexion; Support of longitudinal and transverse arches of foot



Abductor hallucis
Medial plantar artery

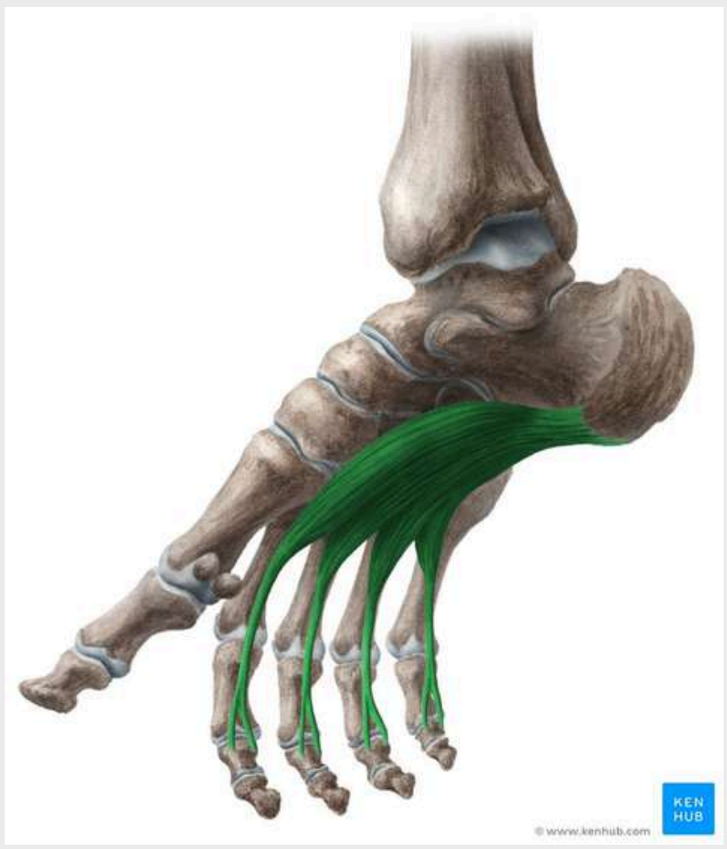


Flexor hallucis brevis
Medial plantar artery

Adductor hallucis
Medial and lateral plantar arteries

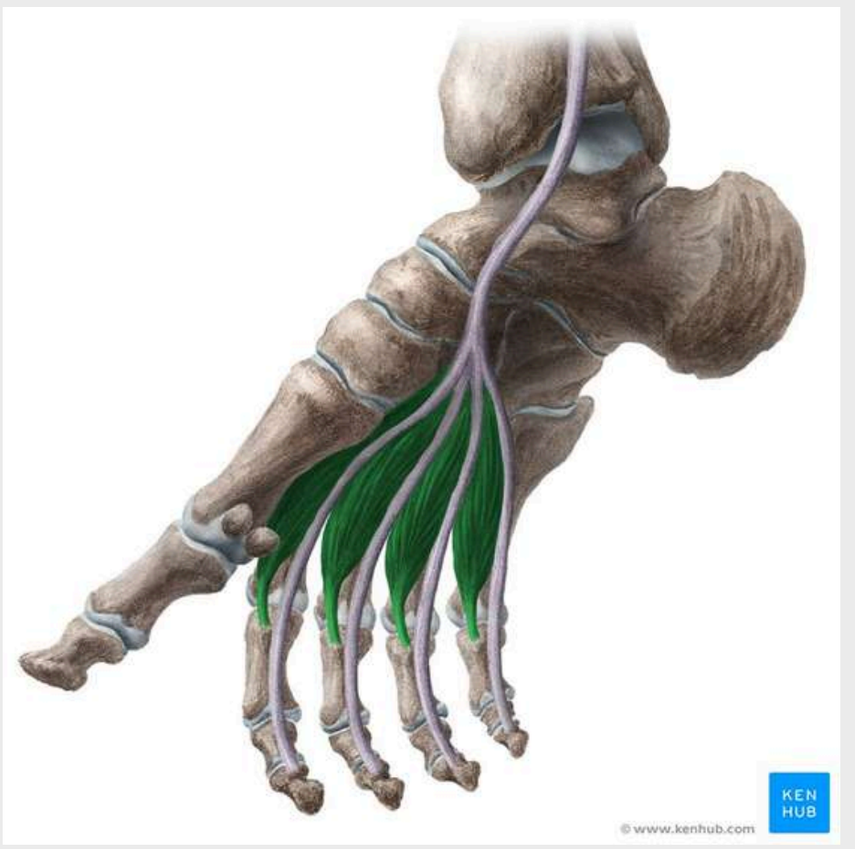
Central plantar muscles

Central plantar muscles	Origin	Insertion	Innervation	Function
Flexor digitorum brevis	Medial process of calcaneal tuberosity, Plantar aponeurosis	Middle phalanges of digits 2-5	Medial plantar nerve (S1-S3)	Metatarsophalangeal joints 2-5: Toe flexion; Supports longitudinal arch of foot
Quadratus plantae	Medial surface of calcaneus bone, Lateral process of calcaneal tuberosity	Tendon of flexor digitorum longus	Lateral plantar nerve (S1-S3)	Metatarsophalangeal joints 2-5: Toe flexion
Lumbricals (4)	Tendons of flexor digitorum longus	Medial bases of proximal phalanges and extensor expansion of digits 2-5	Lumbrical 1: Medial plantar nerve (S2,S3); Lumbricals 2-4: Lateral plantar nerve (S2-S3)	Metatarsophalangeal joints 2-5: Toe flexion, Toes adduction; Interphalangeal joints 2-5: Toes extension
Plantar interossei (3)	Medial aspects of metatarsal bones 3-5	Medial bases of proximal phalanges and extensor expansion of digits 3-5	Lateral plantar nerve (S2-S3)	Metatarsophalangeal joints 3-5: Toe flexion, Toes adduction; Interphalangeal joints 3-5: Toes extension
Dorsal interossei (4)	Opposing sides of metatarsal bones 1-5	1: Medial base of proximal phalanx of digit 2 2-4: Lateral bases of proximal phalanges and extensor expansion of digits 2-4		Metatarsophalangeal joints 2-4: Toe flexion, Toe abduction; Interphalangeal joints 2-4: Toe extension

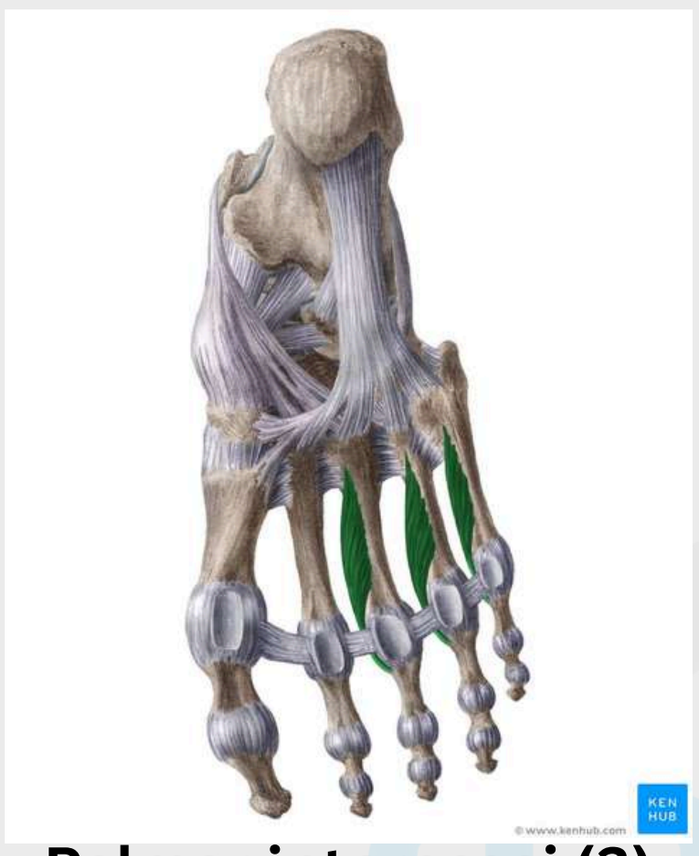


Flexor digitorum brevis
Medial and lateral plantar arteries

Quadratus plantae
Medial and lateral plantar arteries



Lumbricals (4)
Lateral plantar artery

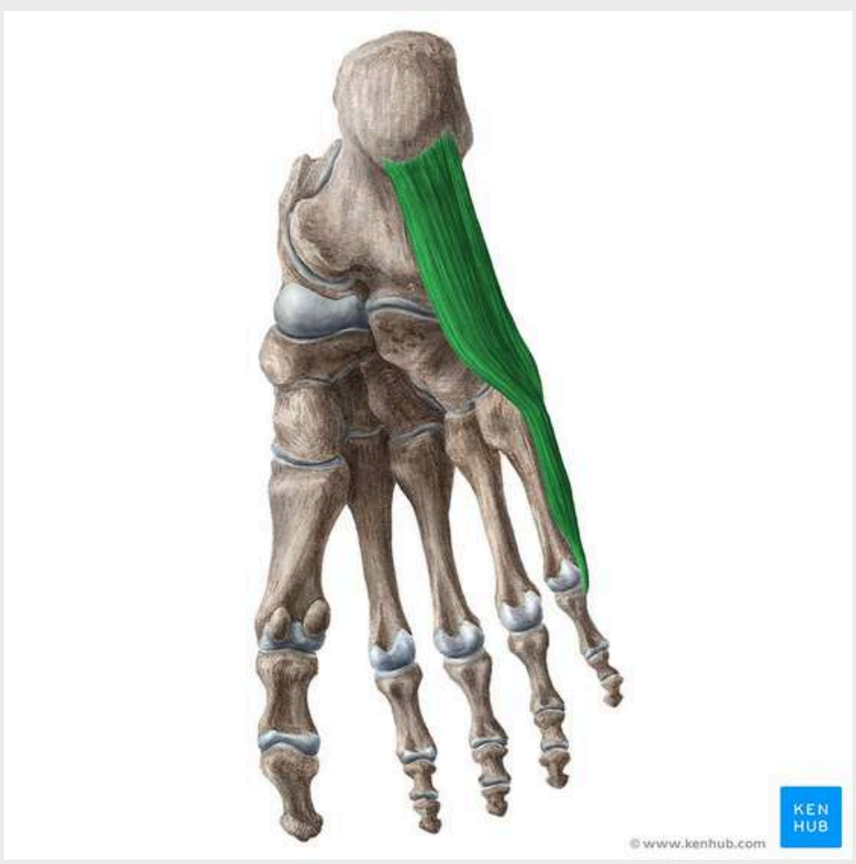


Palmar interossei (3)
Lateral plantar artery

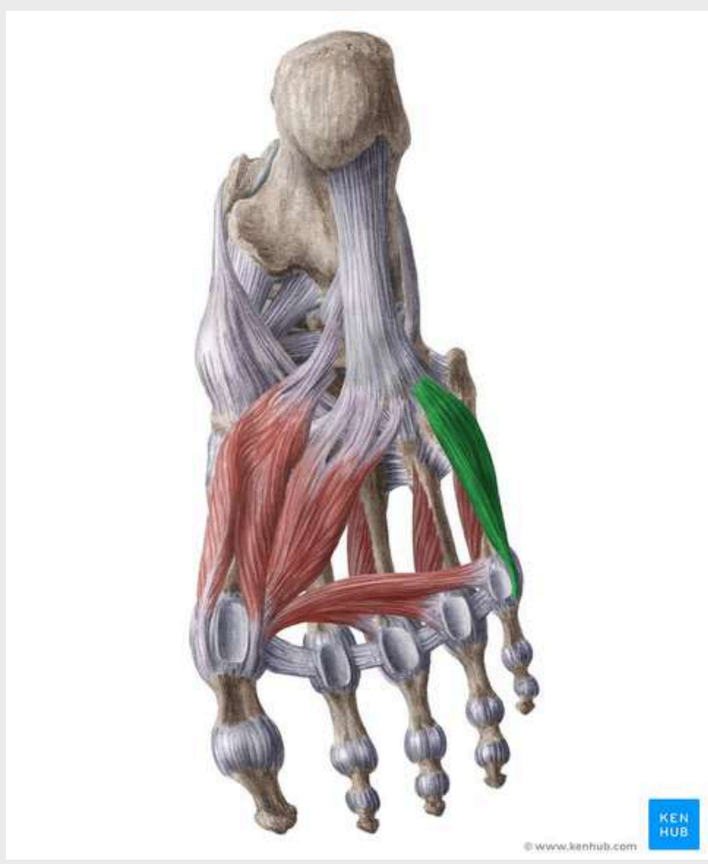
Dorsal interossei (4)
Arcuate artery, dorsal and plantar metatarsal arteries

Lateral plantar muscles

Lateral plantar muscles	Origin	Insertion	Innervation	Function
Abductor digiti minimi	Calcaneal tuberosity, Plantar aponeurosis	Base of proximal phalanx of digit 5, Metatarsal bone 5	Lateral plantar nerve (S1-S3)	Metatarsophalangeal joint 5: Toe abduction, Toe flexion; Supports longitudinal arch of foot
Flexor digiti minimi brevis	Base of metatarsal bone 5, Long plantar ligament	Base of proximal phalanx of digit 5	Lateral plantar nerve (S2-S3)	Metatarsophalangeal joint 5: Toe flexion
Opponens digiti minimi	Long plantar ligament, Base of metatarsal bone 5, Tendon sheath of fibularis longus	Lateral border of metatarsal bone 5	Lateral plantar nerve (S2-S3)	Metatarsophalangeal joint 5: Toe abduction, Toe flexion



Abductor digiti minimi
Lateral plantar artery



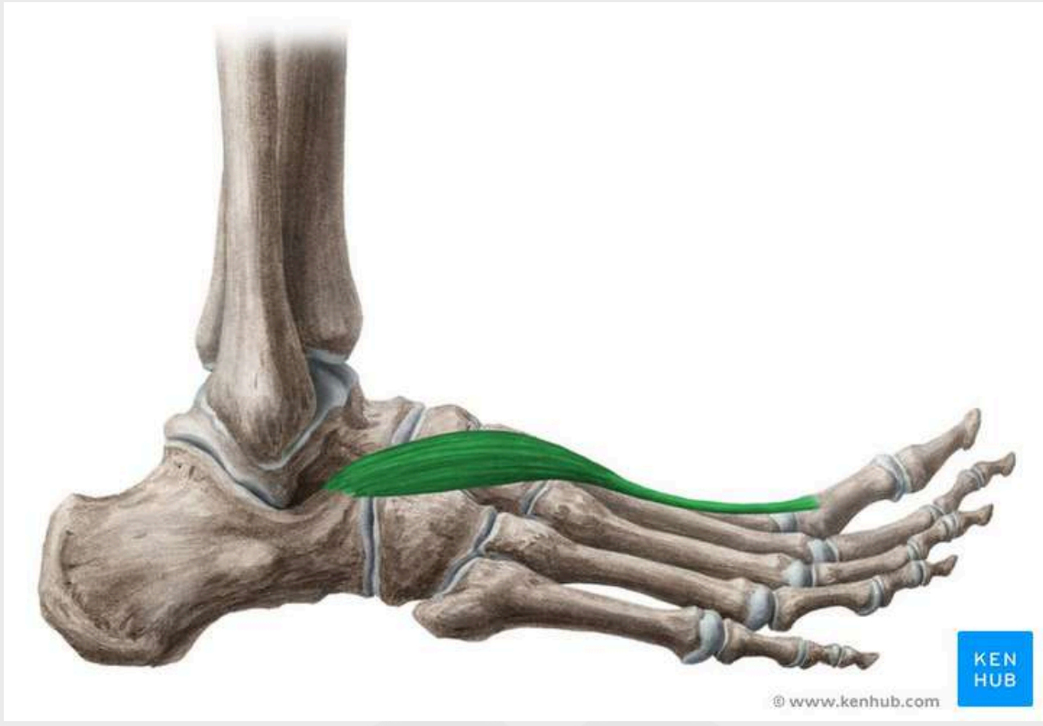
Flexor digiti minimi brevis
Lateral plantar artery

Opponens digiti minimi
Lateral plantar artery

Dorsal muscles

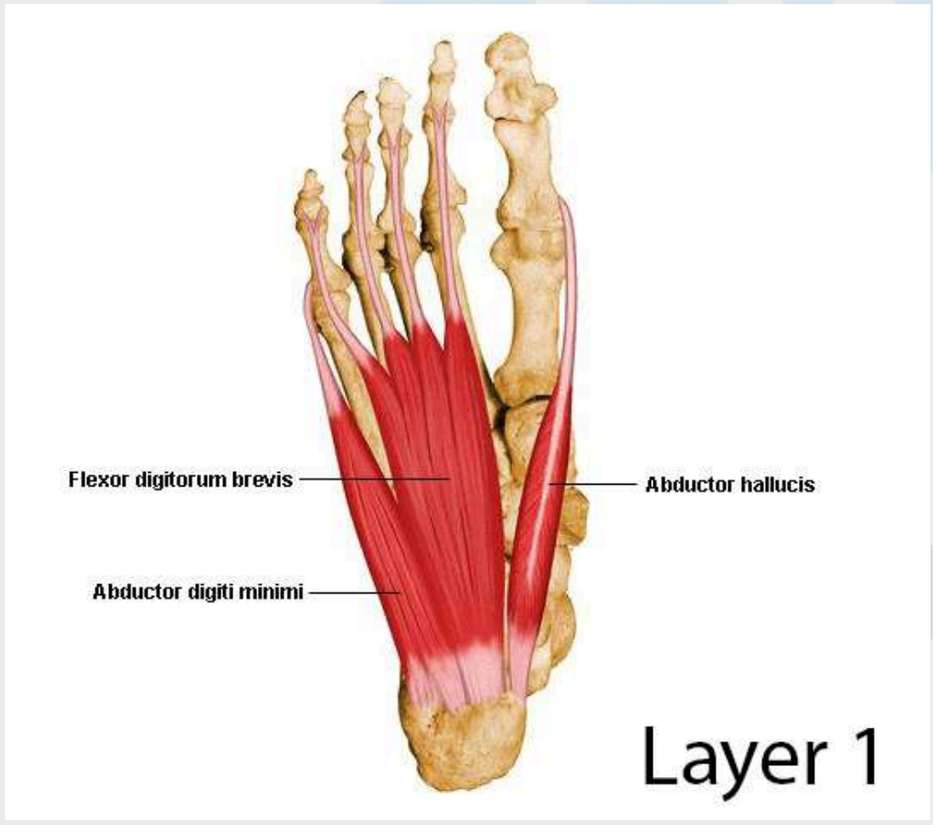
Dorsal muscles	Origin	Insertion	Innervation	Function
Extensor digitorum brevis	Superolateral surface of calcaneus bone, interosseous talocalcaneal ligament; Stem of inferior extensor retinaculum	Extensor digitorum longus tendons of toes 2–4	Deep fibular/peroneal nerve (L5,S1)	Distal interphalangeal joints 2-4: Toe extension
Extensor hallucis brevis	Superolateral surface of calcaneus bone	Proximal phalanx of great toe		Metatarsophalangeal joint 1: Toe extension

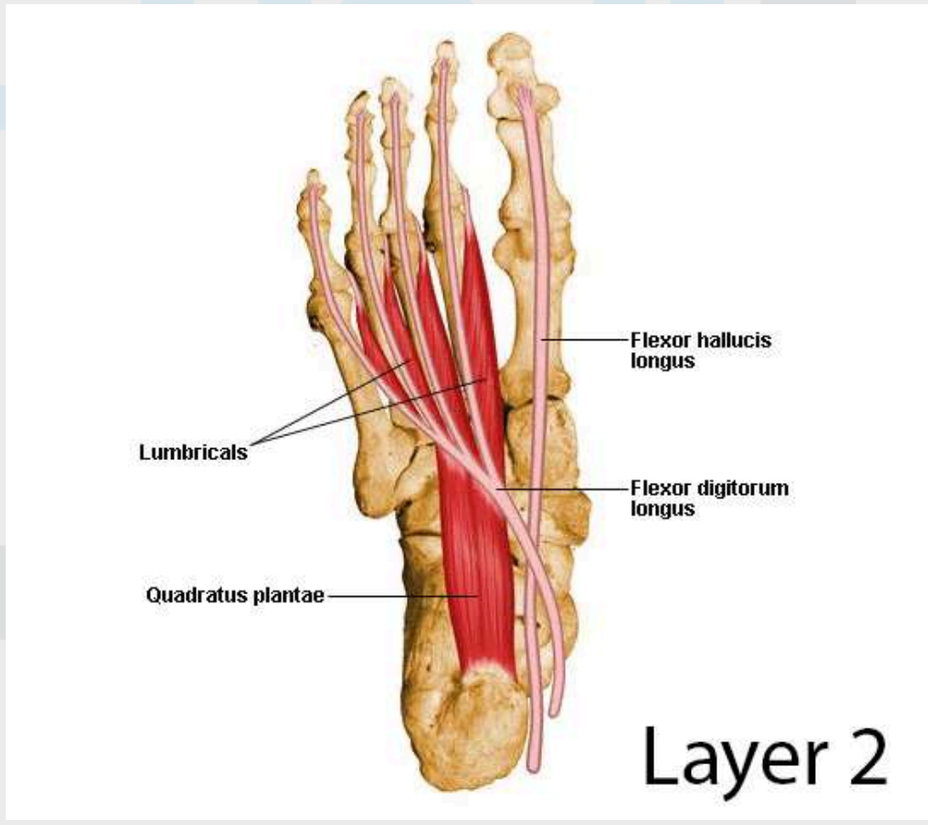
Extensor digitorum brevis
Dorsalis pedis artery

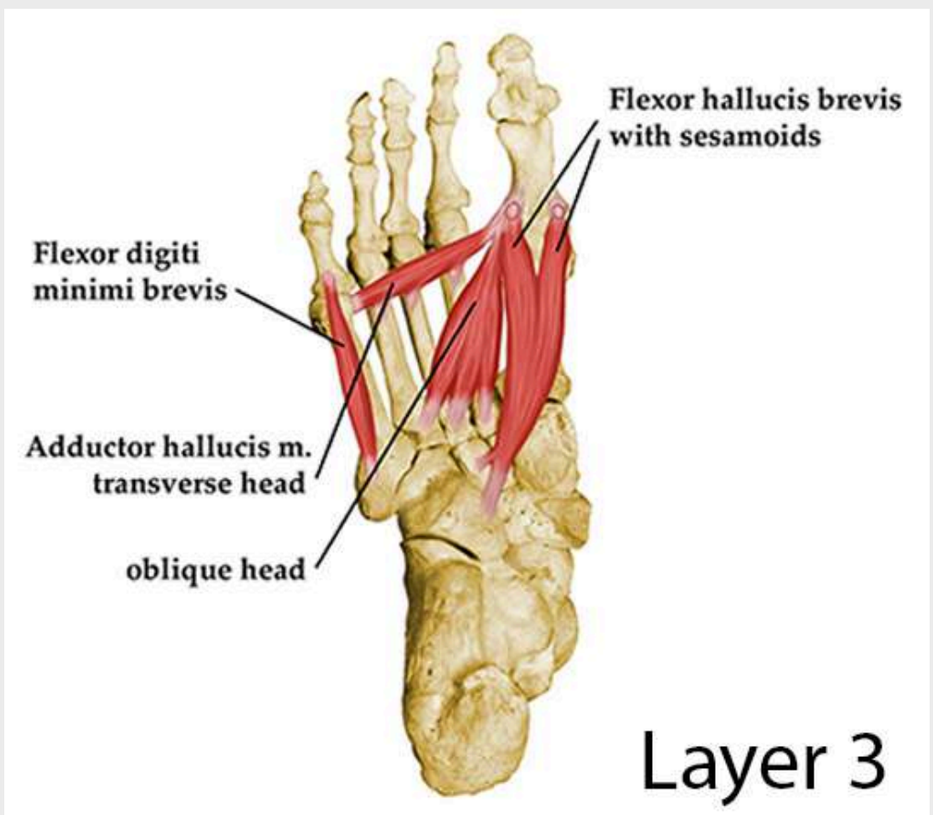


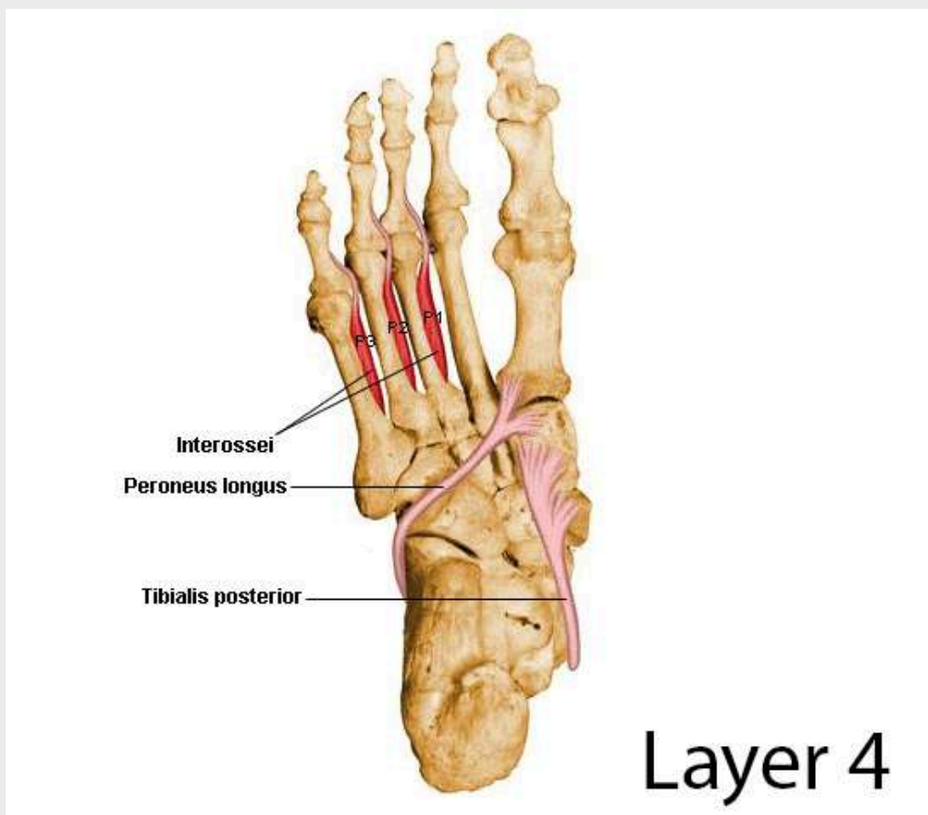
Extensor hallucis brevis
Dorsalis pedis artery

Layers of plantar foot









Netter
(for lower limb)

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT (ORIGIN)	DISTAL ATTACHMENT (INSERTION)	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Abductor digiti minimi	Foot	Medial and lateral tubercles of tuberosity of calcaneus, plantar aponeurosis, and intermuscular septum	Lateral side of base of proximal phalanx of 5th digit	Lateral plantar nerve	Mediolateral plantar artery, plantar metatarsal and plantar digital arteries to 5th digit	Abducts and flexes 5th digit
Abductor hallucis	Foot	Medial tubercle of tuberosity of calcaneus, flexor retinaculum, and plantar aponeurosis	Medial side of base of proximal phalanx of 1st digit	Medial plantar nerve	Medial plantar and 1st plantar metatarsal arteries	Abducts and flexes 1st digit
Adductor brevis	Medial thigh	Body and inferior pubic ramus	Pectineal line and proximal part of linea aspera of femur	Obturator nerve	Profunda femoris, medial circumflex femoral, and obturator arteries	Adducts thigh at hip, weak hip flexor
Adductor hallucis	Foot	*Oblique head:* bases of 2nd through 4th metatarsals *Transverse head:* ligaments of metatarsophalangeal joints of digits 3–5	Tendons of both heads lateral to side of base of proximal phalanx of 1st digit	Deep branch of lateral plantar nerve	Medial and lateral plantar arteries and plantar arch, plantar metatarsal arteries	Adducts 1st digit, maintains transverse arch of foot
Adductor longus	Medial thigh	Body of pubis inferior to pubic crest	Middle third of linea aspera of femur	Obturator nerve (anterior division)	Profunda femoris and medial circumflex femoral arteries	Adducts thigh at hip
Adductor magnus	Medial thigh	Inferior pubic ramus, ramus of ischium *Hamstring part:* ischial tuberosity	Gluteal tuberosity, linea aspera, medial supracondylar line *Hamstring part:* adductor tubercle of femur	*Adductor part:* obturator nerve *Hamstring part:* sciatic nerve (tibial division)	Femoral, profunda femoris, and obturator arteries	*Adductor part:* adducts and flexes thigh *Hamstring part:* extends thigh
Articularis genus	Anterior thigh	Distal femur on anterior surface	Suprapatellar bursa	Femoral nerve	Femoral artery	Pulls suprapatellar bursa superiorly with extension of knee
Biceps femoris	Posterior thigh	*Long head:* ischial tuberosity *Short head:* Linea aspera and lateral supracondylar line of femur	Lateral side of head of fibula	*Long head:* sciatic nerve (tibial division) (L5–S2) *Short head:* sciatic nerve (common fibular division)	Perforating branches of profunda femoris, inferior gluteal, and medial circumflex femoral arteries	Flexes and laterally rotates leg, extends thigh at hip
Dorsal interossei (four muscles)	Foot	Adjacent sides of 1st through 5th metatarsals	*1st:* medial side of proximal phalanx of 2nd digit *2nd through 4th:* lateral sides of digits 2–4	Lateral plantar nerve	Arcuate artery, dorsal and plantar metatarsal arteries	Abduct 2nd through 4th digits of foot, flex metatarsophalangeal joints, and extend phalangeal bones
Extensor digitorum brevis and extensor hallucis brevis	Foot	Superolateral surface of calcaneus, lateral talocalcaneal ligament, deep surface of inferior extensor retinaculum	First tendon into dorsal surface of base of proximal phalanx of great toe; other three tendons into lateral sides of tendons of extensor digitorum longus to digits 2–4	Deep fibular nerve	Dorsalis pedis, lateral tarsal, arcuate, and fibular arteries	Aids extensor digitorum longus in extending of 4 medial digits at metatarsophalangeal and interphalangeal joints
Extensor digitorum longus	Anterior leg	Lateral condyle of tibia, proximal 3/4 of anterior surface of interosseous membrane and fibula	Middle and distal phalangeal bones of lateral four digits	Deep fibular nerve	Anterior tibial artery	Extends lateral four digits and dorsiflexes foot at ankle
Extensor hallucis longus	Anterior leg	Middle part of anterior surface of fibula and interosseous membrane	Dorsal aspect of base of distal phalanx of great toe	Deep fibular nerve	Anterior tibial artery	Extends great toe, dorsiflexes foot at ankle

Netter

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT (ORIGIN)	DISTAL ATTACHMENT (INSERTION)	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Fibularis brevis	Lateral leg	Distal 2/3 of lateral surface of fibula	Dorsal surface of tuberosity on lateral side of 5th metatarsal	Superficial fibular nerve	Anterior tibial and fibular arteries	Everts foot and weakly plantarflexes foot at ankle
Fibularis longus	Lateral leg	Head and proximal 2/3 of lateral fibula	Plantar base of 1st metatarsal and medial cuneiform bone	Superficial fibular nerve	Anterior tibial and fibular arteries	Everts foot and weakly plantarflexes foot at ankle
Fibularis tertius	Anterior leg	Distal third of anterior surface of fibula and interosseous membrane	Dorsum of base of 5th metatarsal	Deep fibular nerve	Anterior tibial artery	Dorsiflexes foot at ankle and aids in eversion of foot
Flexor digiti minimi brevis	Foot	Base of 5th metatarsal	Lateral base of proximal phalanx of 5th digit	Superficial branch of lateral plantar nerve	Lateral plantar artery, plantar digital artery to 5th digit, arcuate artery	Flexes proximal phalanx of 5th digit
Flexor digitorum brevis	Foot	Medial tubercle of tuberosity of calcaneus, plantar aponeurosis, and intermuscular septum	Both sides of middle phalangeal bones of lateral four digits	Medial plantar nerve	Medial and lateral plantar arteries and plantar arch, plantar metatarsal and plantar digital arteries	Flexes 2nd through 5th digits
Flexor digitorum longus	Posterior leg	Medial part of posterior tibia inferior to soleal line	Plantar bases of distal phalangeal bones of lateral four digits	Tibial nerve	Posterior tibial artery	Flexes lateral four digits and plantarflexes foot at ankle; supports longitudinal arches of foot
Flexor hallucis brevis	Foot	Plantar surfaces of cuboid bone and lateral cuneiform bone	Both sides of base of proximal phalanx of 1st digit	Medial plantar nerve	Medial plantar artery, 1st plantar metatarsal artery	Flexes proximal phalanx of 1st digit
Flexor hallucis longus	Posterior leg	Distal 2/3 of posterior fibula and interosseous membrane	Base of distal phalanx of great toe	Tibial nerve	Fibular artery	Flexes all joints of great toe, weakly plantarflexes foot at ankle
Gastrocnemius	Posterior leg	*Lateral head:* lateral aspect of lateral condyle of femur *Medial head:* popliteal surface above medial condyle of femur	Posterior aspect of calcaneus via calcaneal tendon	Tibial nerve	Popliteal and posterior tibial arteries	Plantarflexes foot at ankle joint, assists in flexion of knee joint
Gluteus maximus	Gluteal region	Ilium posterior to posterior gluteal line, dorsal surface of sacrum and coccyx, sacrotuberous ligament	Most fibers end in iliotibial tract that inserts into lateral condyle of tibia; some fibers insert into gluteal tuberosity of femur	Inferior gluteal nerve	Inferior gluteal arteries mainly, and superior gluteal arteries occasionally	Extends flexed thigh, assists in lateral rotation, and abducts thigh
Gluteus medius	Gluteal region	Lateral surface of ilium between anterior and posterior gluteal lines	Lateral surface of greater trochanter of femur	Superior gluteal nerve	Superior gluteal artery	Abducts and medially rotates thigh at hips; steadies pelvis on leg when opposite leg is raised
Gluteus minimus	Gluteal region	Lateral surface of ilium between anterior and inferior gluteal lines	Anterior surface of greater trochanter of femur	Superior gluteal nerve	Main trunk and deep branch of superior gluteal artery	Abducts and medially rotates thigh at hips; steadies pelvis on leg when opposite leg is raised
Gracilis	Medial thigh	Body and inferior ramus of pubis	Superior part of medial surface of tibia	Obturator nerve	Profunda femoris artery, medial circumflex femoral artery	Adducts thigh, flexes and medially rotates leg
Iliacus (iliopsoas)	Anterior thigh	Superior 2/3 of iliac fossa, iliac crest, ala of sacrum, anterior sacroiliac ligaments	Lesser trochanter of femur and shaft inferior to it, to psoas major tendon	Femoral nerve	Iliac branches of iliolumbar artery	Flexes thigh at hips and stabilizes hip joint, acts with psoas major
Inferior gemellus	Gluteal region	Ischial tuberosity	Medial surface of greater trochanter of femur	Nerve to quadratus femoris muscle	Medial circumflex femoral artery	Laterally rotates extended thigh and abducts flexed thigh

Netter

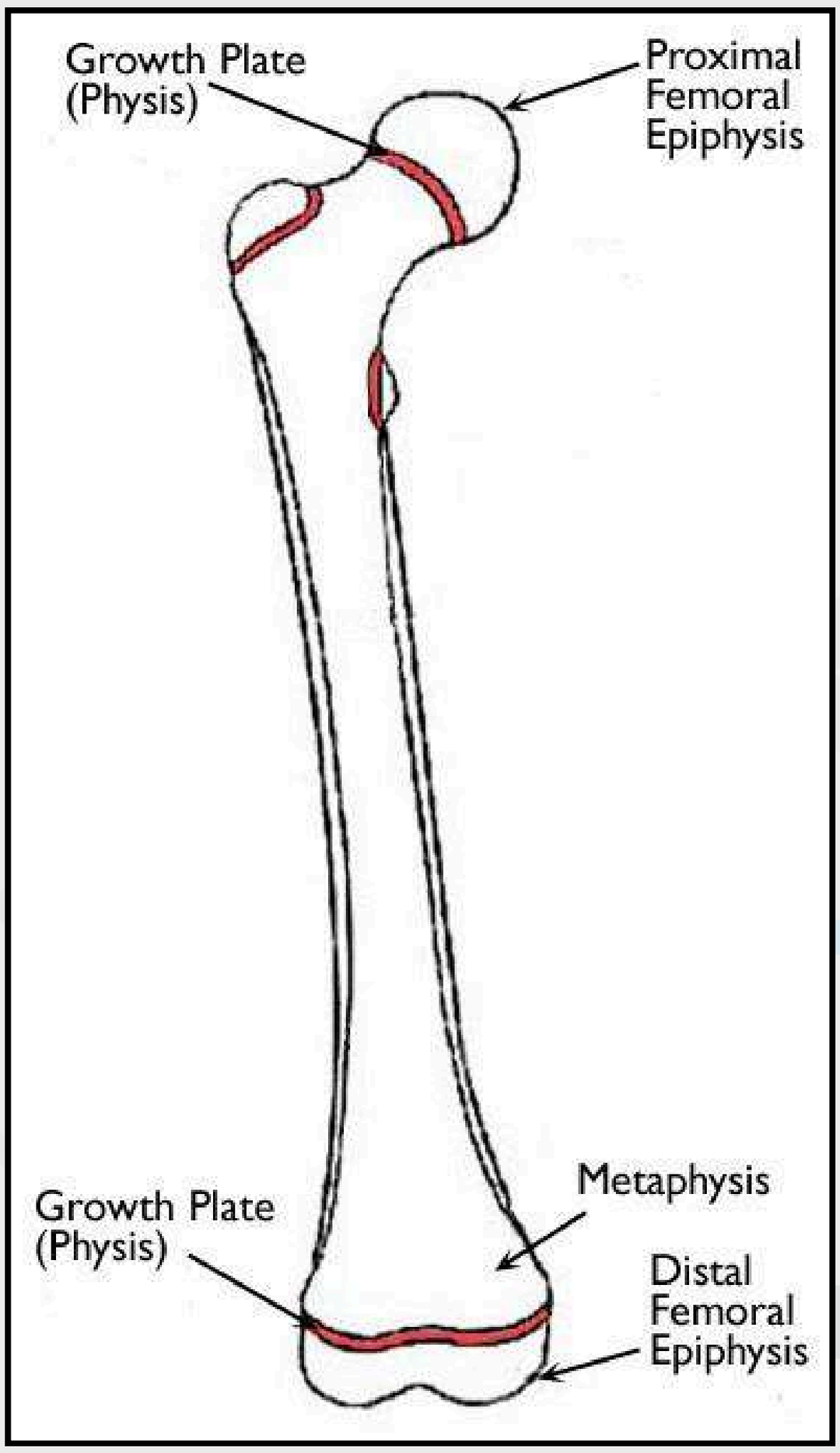
MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT (ORIGIN)	DISTAL ATTACHMENT (INSERTION)	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Lumbricals	Foot	Tendons of flexor digitorum longus	Medial side of dorsal digital expansions of lateral four digits	*Medial one:* medial plantar nerve *Lateral three:* lateral plantar nerve	Lateral plantar artery and plantar metatarsal arteries	Flexes proximal phalangeal bones at metatarsophalangeal joint, extends phalangeal bones at proximal interphalangeal and distal interphalangeal joints
Obturator externus	Medial thigh	Margins of obturator foramen, obturator membrane	Trochanteric fossa of femur	Obturator nerve	Medial circumflex femoral artery, obturator artery	Laterally rotates thigh, stabilizes head of femur in acetabulum
Obturator internus	Gluteal region	Pelvic surface of obturator membrane and surrounding bone	Medial surface of greater trochanter of femur	Nerve to obturator internus muscle	Internal pudendal and obturator arteries	Laterally rotates extended thigh, abducts flexed thigh at hip
Pectineus	Medial thigh	Superior ramus of pubis	Pectineal line of femur	Femoral nerve and sometimes obturator nerve	Medial circumflex femoral artery, obturator artery	Adducts and flexes thigh at hip
Piriformis	Gluteal region	Anterior surface of sacral segments 2–4, sacrotuberous ligament (inconstant)	Superior border of greater trochanter of femur	Ventral rami of L5, S1, S2	Superior and inferior gluteal arteries, internal pudendal artery	Laterally rotates extended thigh, abducts flexed thigh at hip
Plantar interossei (three muscles)	Foot	Bases and medial sides of 3rd through 5th metatarsals	Medial sides of bases of proximal phalangeal bones of 3rd through 5th digits	Lateral plantar nerve	Lateral plantar artery and plantar arch, plantar metatarsal and plantar digital arteries	Adduct digits (3-5) and flex metatarsophalangeal joint and extend phalangeal bones
Plantaris	Posterior leg	Inferior end of lateral supracondylar line of femur and oblique popliteal ligament	Posterior aspect of calcaneus via calcaneal tendon	Tibial nerve	Popliteal artery	Weakly assists gastrocnemius
Popliteus	Posterior leg	Lateral aspect of lateral condyle of femur, lateral meniscus	Posterior tibia superior to soleal line	Tibial nerve (L4–S1)	Inferior medial and lateral genicular arteries	Weakly flexes knee and unlocks it by rotating femur on fixed tibia
Psoas major (iliopsoas)	Anterior thigh	Transverse processes of lumbar vertebrae, sides of bodies of T12–L5 vertebrae, intervening intervertebral discs	Lesser trochanter of femur	Anterior rami of first three lumbar nerves	Lumbar branches of iliolumbar artery	Acting superiorly with iliacus, flexes hip; acting inferiorly, flexes vertebral column laterally; used to balance trunk in sitting position; acting inferiorly with iliacus, flexes trunk
Quadratus femoris	Gluteal region	Lateral margin of ischial tuberosity	Quadrate tubercle on intertrochanteric crest of femur	Nerve to quadratus femoris muscle	Medial circumflex femoral artery	Laterally rotates thigh at hip
Quadratus plantae	Foot	Medial and lateral sides of plantar surface of calcaneus	Posterolateral edge of flexor digitorum longus tendon	Lateral plantar nerve	Medial and lateral plantar arteries and deep plantar arterial arch	Corrects for oblique pull of flexor digitorum longus tendon, thus assisting in flexion of digits of foot
Rectus femoris (quadriceps)	Anterior thigh	Anterior inferior iliac spine and ilium superior to acetabulum	Base of patella and to tibial tuberosity via patellar ligament	Femoral nerve	Profunda femoris and lateral circumflex femoral arteries	Extends leg at knee joint and flexes thigh at hip joint
Sartorius	Anterior thigh	Anterior superior iliac spine and superior part of notch below it	Superior part of medial surface of tibia	Femoral nerve	Femoral artery	Abducts, laterally rotates, and flexes thigh; flexes knee joint
Semimembranosus	Posterior thigh	Ischial tuberosity	Posterior part of medial condyle of tibia	Sciatic nerve (tibial division)	Perforating branch of profunda femoris and medial circumflex femoral arteries	Flexes leg, extends thigh

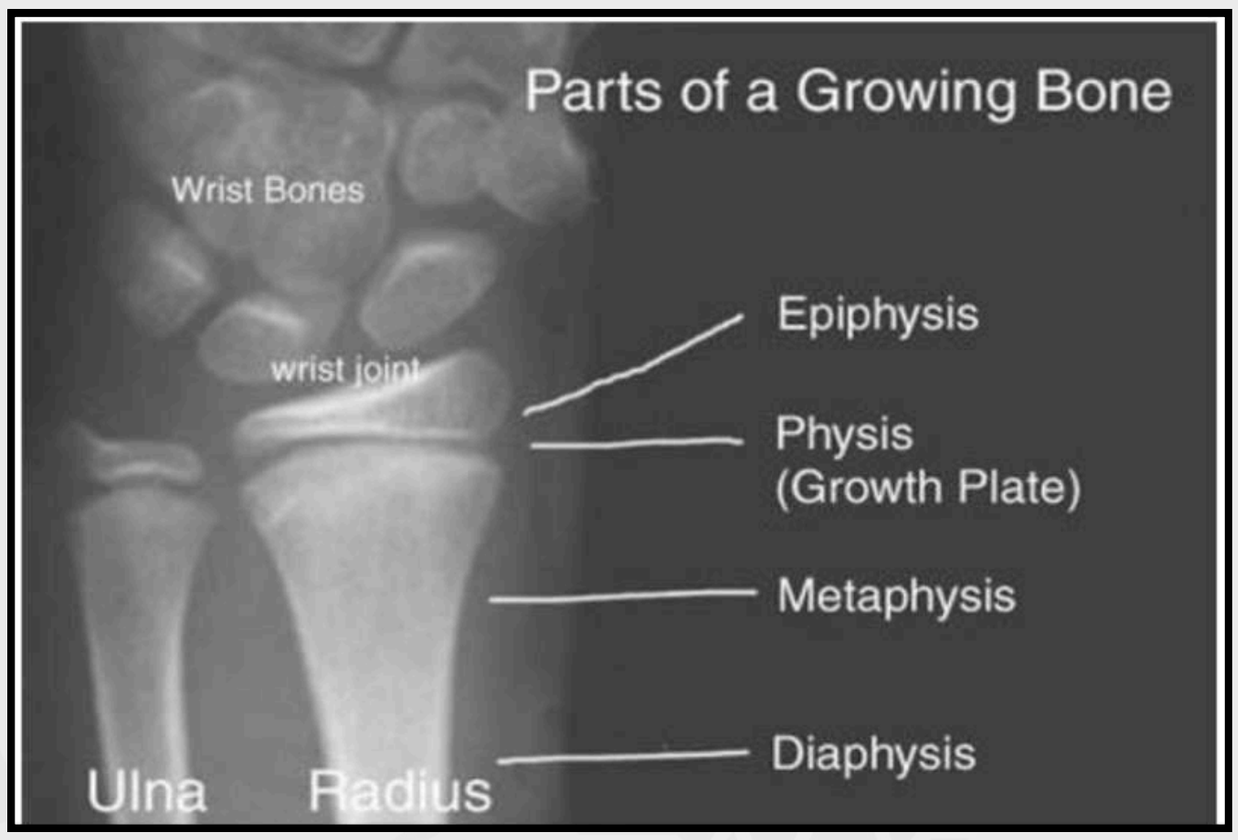
Netter

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT (ORIGIN)	DISTAL ATTACHMENT (INSERTION)	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Semitendinosus	Posterior thigh	Ischial tuberosity	Superior part of medial surface of tibia	Sciatic nerve (tibial division)	Perforating branch of profunda femoris and medial circumflex femoral arteries	Flexes leg, extends thigh
Soleus	Posterior leg	Posterior aspect of head of fibula, proximal 1/4 of posterior surface of fibula, soleal line of tibia	Posterior aspect of calcaneus via calcaneal tendon	Tibial nerve	Popliteal, posterior tibial, and fibular arteries	Plantarflexes foot at ankle, stabilizes leg over foot
Superior gemellus	Gluteal region	Outer surface of ischial spine	Medial surface of greater trochanter of femur	Nerve to obturator internus muscle	Inferior gluteal and internal pudendal arteries	Laterally rotates extended thigh and abducts flexed thigh
Tensor fasciae latae	Gluteal region	Anterior superior iliac spine and anterior part of iliac crest	Iliotibial tract that attaches to lateral condyle of tibia	Superior gluteal nerve	Ascending branch of lateral circumflex femoral artery	Abducts, medially rotates, and flexes thigh at hip; helps to keep knee extended
Tibialis anterior	Anterior leg	Lateral condyle, proximal half of lateral tibia, interosseous membrane	Medial plantar surfaces of medial cuneiform bone and base of 1st metatarsal bone	Deep fibular nerve	Anterior tibial artery	Dorsiflexes foot at ankle and inverts foot
Tibialis posterior	Posterior leg	Posterior tibia below soleal line, interosseous membrane, proximal half of posterior fibula	Tuberosity of navicular bone, all cuneiforms, cuboid, and bases of 2nd through 4th metatarsal bones	Tibial nerve	Fibular artery	Plantarflexes foot at ankle and inverts foot
Vastus intermedius (quadriceps)	Anterior thigh	Anterior and lateral surfaces of body of femur	Base of patella and to tibial tuberosity via patellar ligament	Femoral nerve	Lateral circumflex femoral and profunda femoris arteries	Extends leg at knee joint
Vastus lateralis (quadriceps)	Anterior thigh	Greater trochanter, lateral lip of gluteal tuberosity, lateral lip of linea aspera	Base of patella and to tibial tuberosity via patellar ligament	Femoral nerve	Lateral circumflex femoral and profunda femoris arteries	Extends leg at knee joint
Vastus medialis (quadriceps)	Anterior thigh	Intertrochanteric line, greater trochanter, lateral lip of gluteal tuberosity, and lateral lip of linea aspera	Base of patella and to tibial tuberosity via patellar ligament	Femoral nerve	Femoral and profunda femoris arteries	Extends leg at knee joint

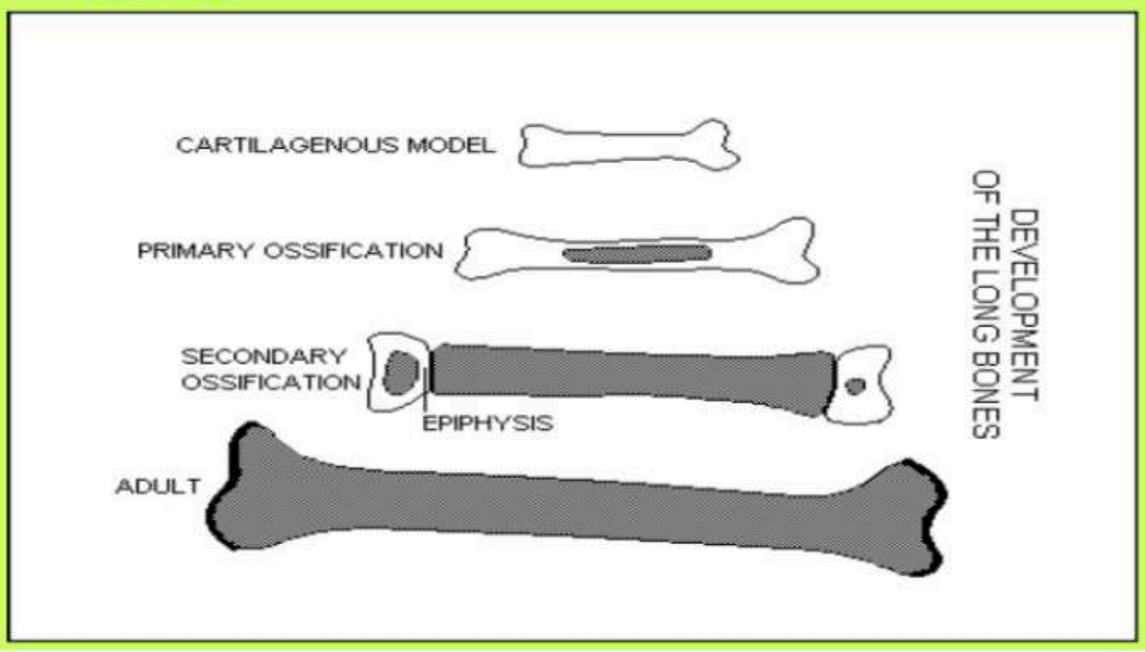
Growth Plate

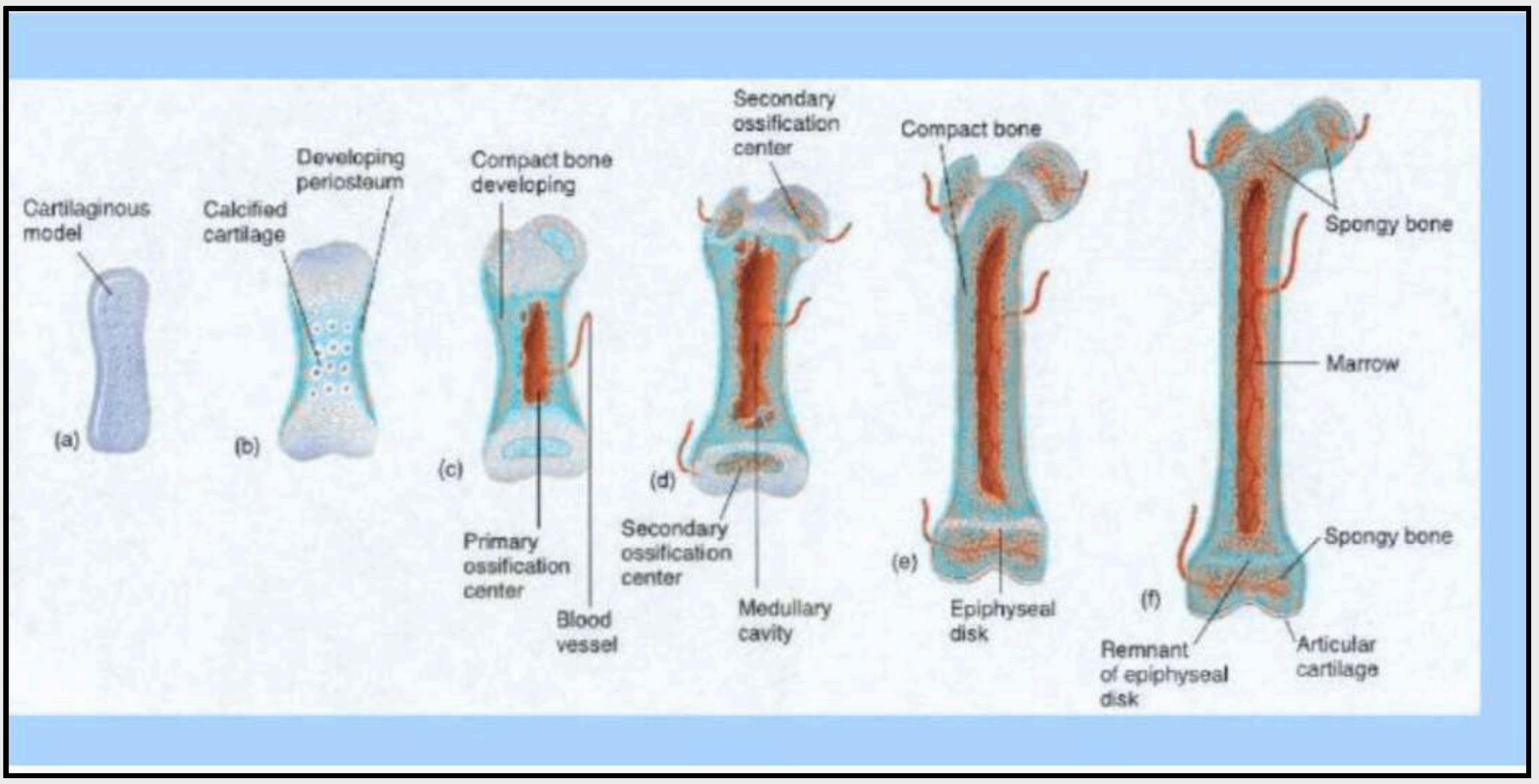
A bone's growth plate, also called the epiphyseal plate or physis, is a section of cartilage near the ends of long bones where new bone tissue grows, allowing the bone to increase in length. These areas are made of cartilage, are weaker than bone, and are only present in children and adolescents. When a person stops growing, the growth plates harden into solid bone.





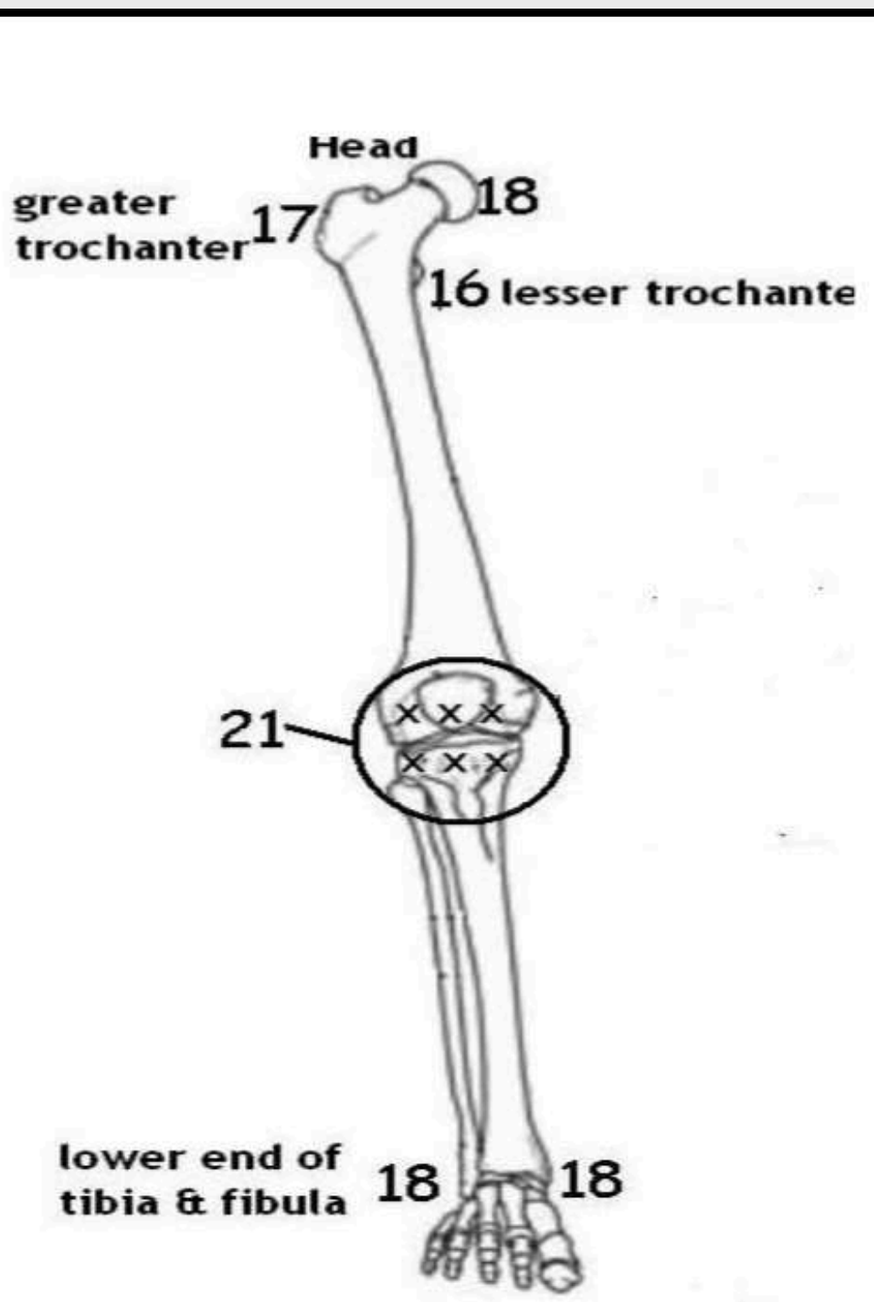
Appearance of ossific centers after birth

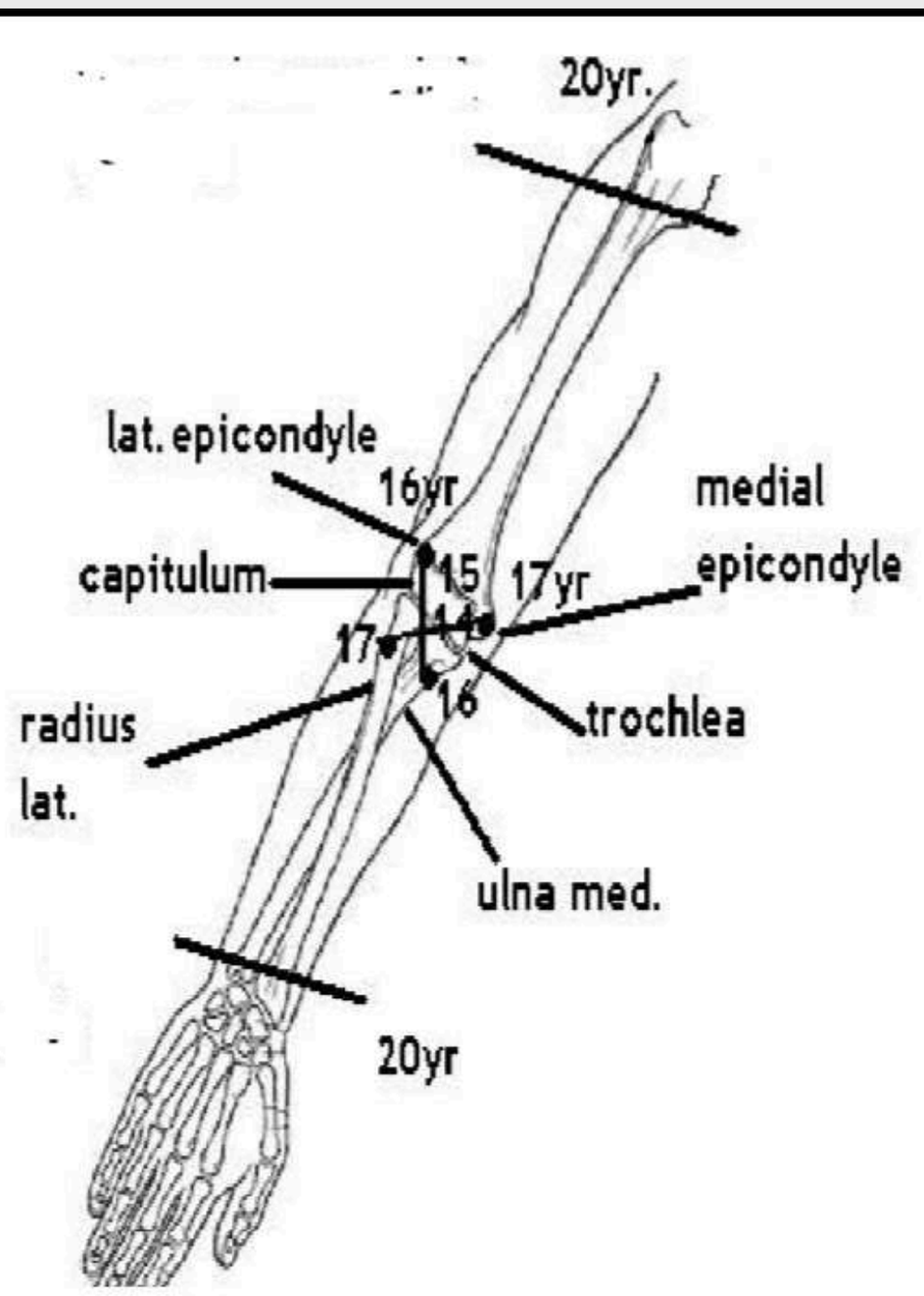


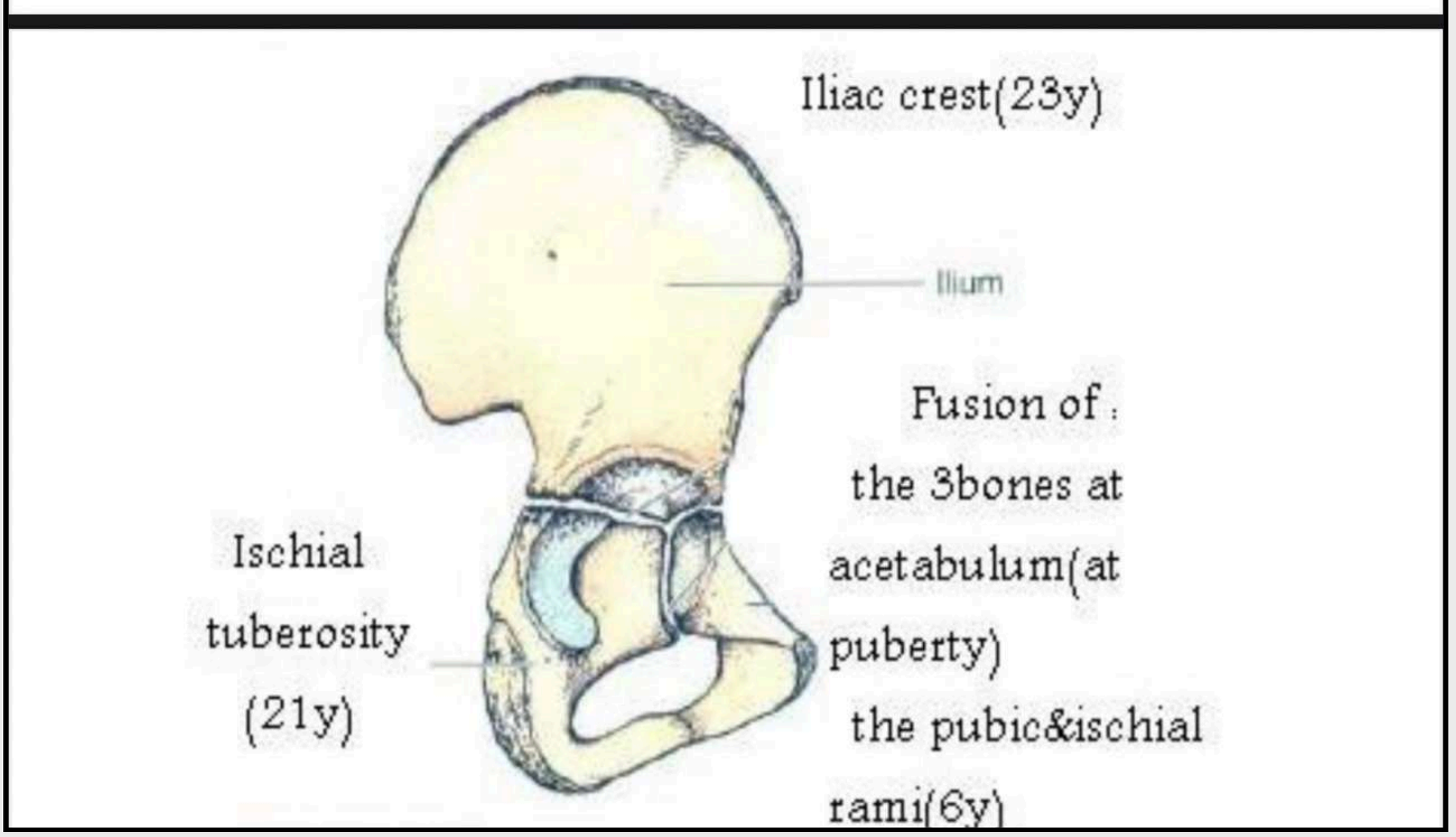


Age of closure for each growth plate

💡**Note** : growth plate closure in female is 2ys Earlier than male ex: in male distal tibial growth plate close at 18 in female at 16 years old







Most active growth plate in :

Upper limb : proximal humerus then distal radius

Lower limb : distal femur then proximal tibia

💡**make it easy** : away from the Elbow go to the knee