

**MINISTRY OF HEALTH, LABOUR AND SOCIAL PROTECTION
REPUBLIC OF MOLDOVA**

**STATE UNIVERSITY OF MEDICINE AND PHARMACY
“NICOLAE TESTEMITANU”**

**MEDICINE FACULTY II
Department of Human Anatomy**

Diploma Thesis

“Some Aspects of Clinical Diagnosis using Sectional Anatomy of the Limb”

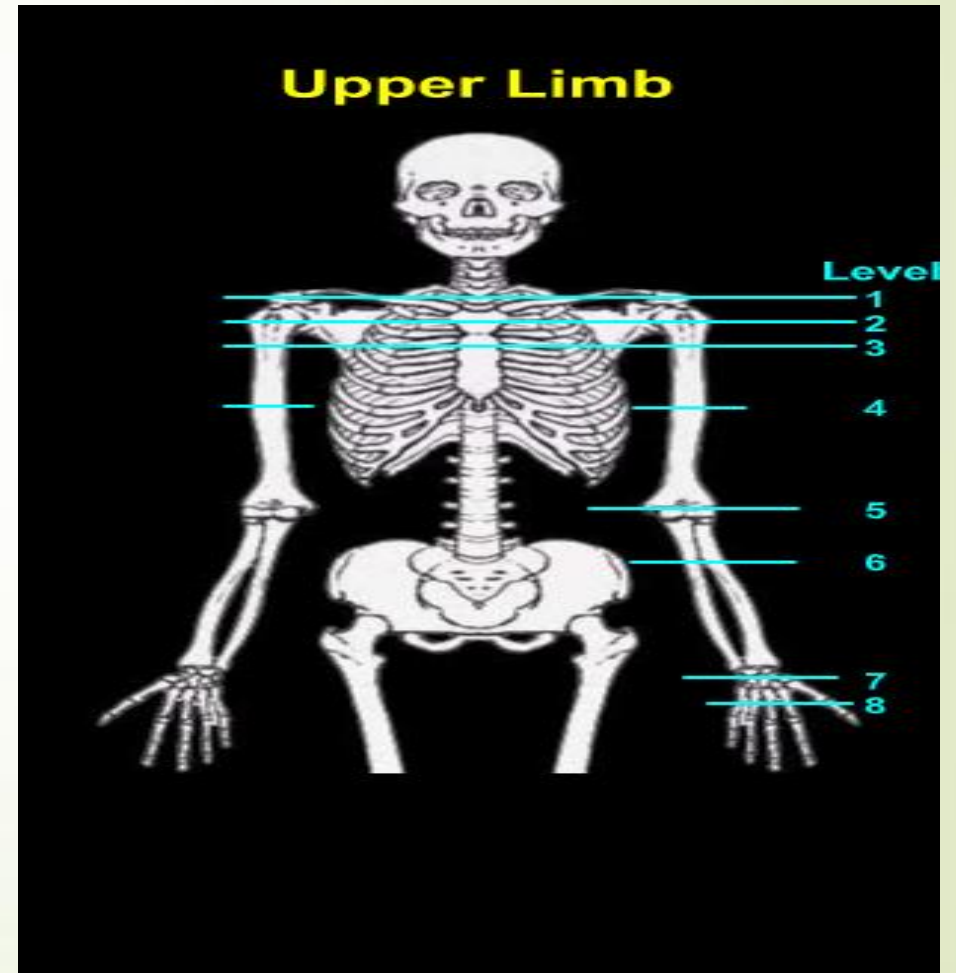
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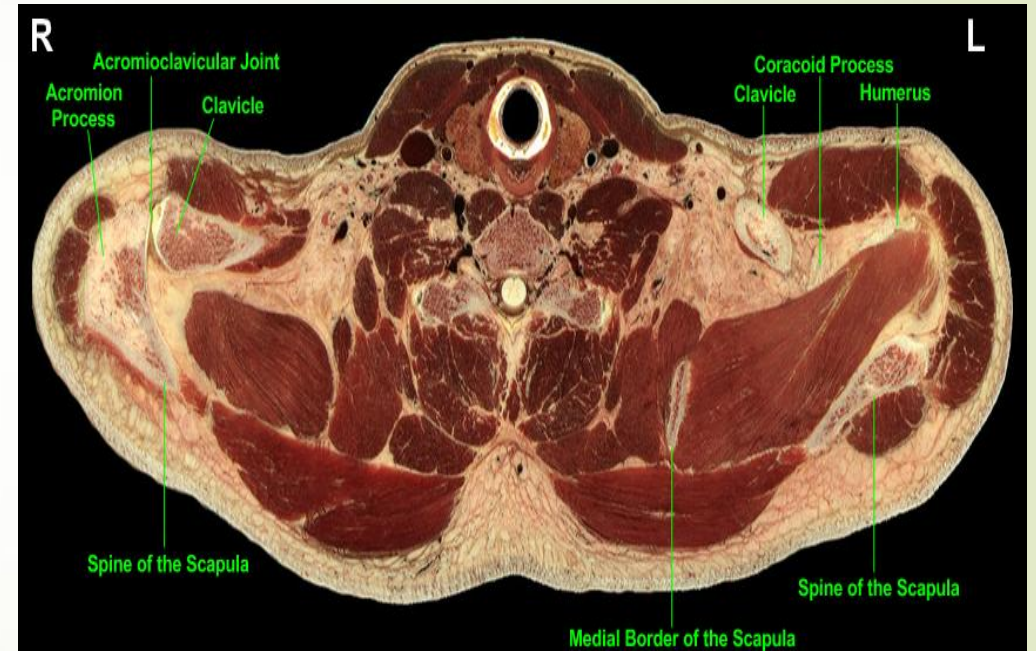
Upper Limb

- ▶ The upper limb is divided into 8 different levels.



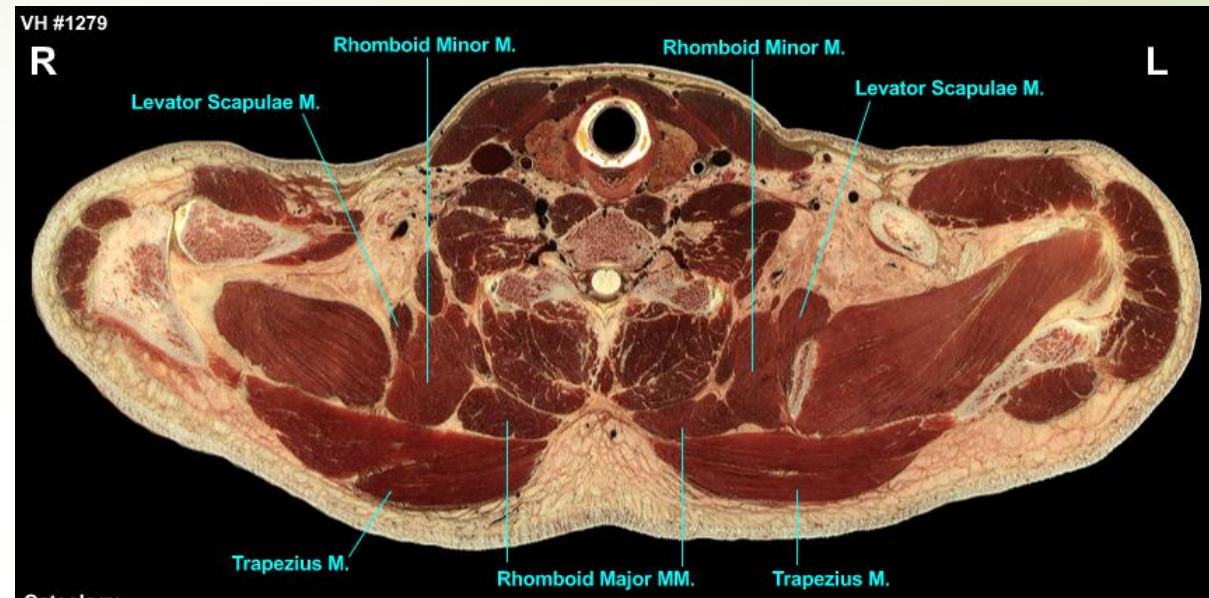
Level 1: Shoulder – Osteoarticular

- In the right shoulder the plane of section passes through the acromioclavicular joint;
- The articulation occurs on the medial side of the acromion process and not at the tip of the shoulder.
- In the left shoulder the plane of section lies inferior to the acromion process and includes a view of the medial border of the scapula.
- On the left side the two profiles of the scapula appear separate due to the intervening depression of the supraspinous fossa.
- The small bony profile on the anterior side of the left shoulder is the superior aspect of the coracoid process of the scapula



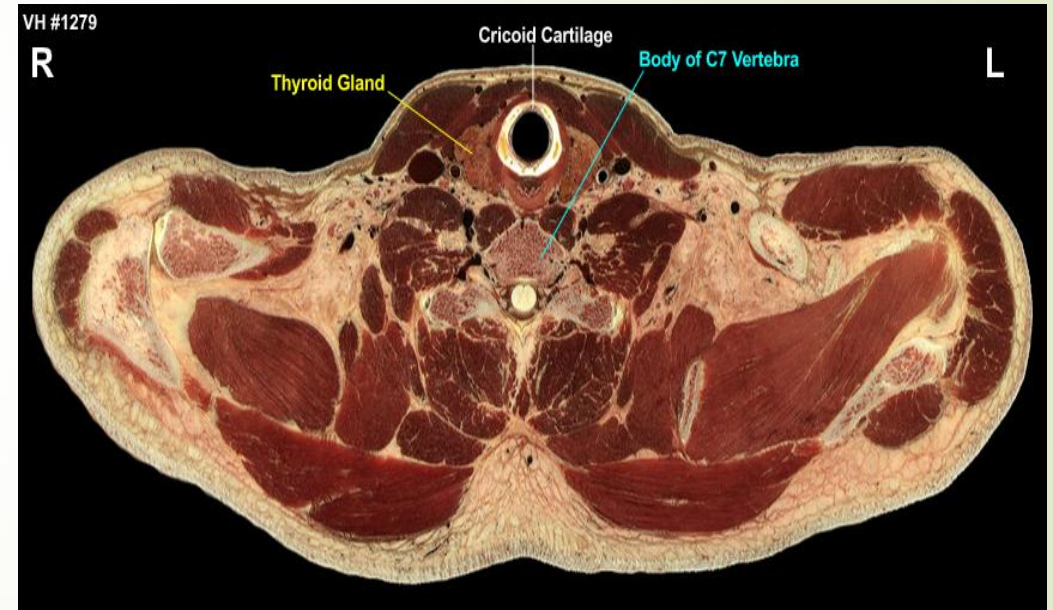
Level 1: Shoulder – Musculature

- Axial skeleton to scapula
 - In the left shoulder the levator scapulae and rhomboid minor muscles are seen inserting onto the medial border of the scapula while the rhomboid major muscle is descending to reach its insertion on the scapula more inferiorly.
 - The insertions of the trapezius muscles along the spines of the scapulae are evident on both sides
-
- Scapula to humerus
 - The supraspinatus and deltoid muscles dominate this group at this level. In the left shoulder the supraspinatus muscle passes over the superior aspect of the humerus from its origin in the supraspinous fossa of the scapula to its insertion onto the upper lateral side of the humerus.
 - The extensive origins of the deltoid muscles from the spines of the scapulae, the acromion processes, and the clavicles.



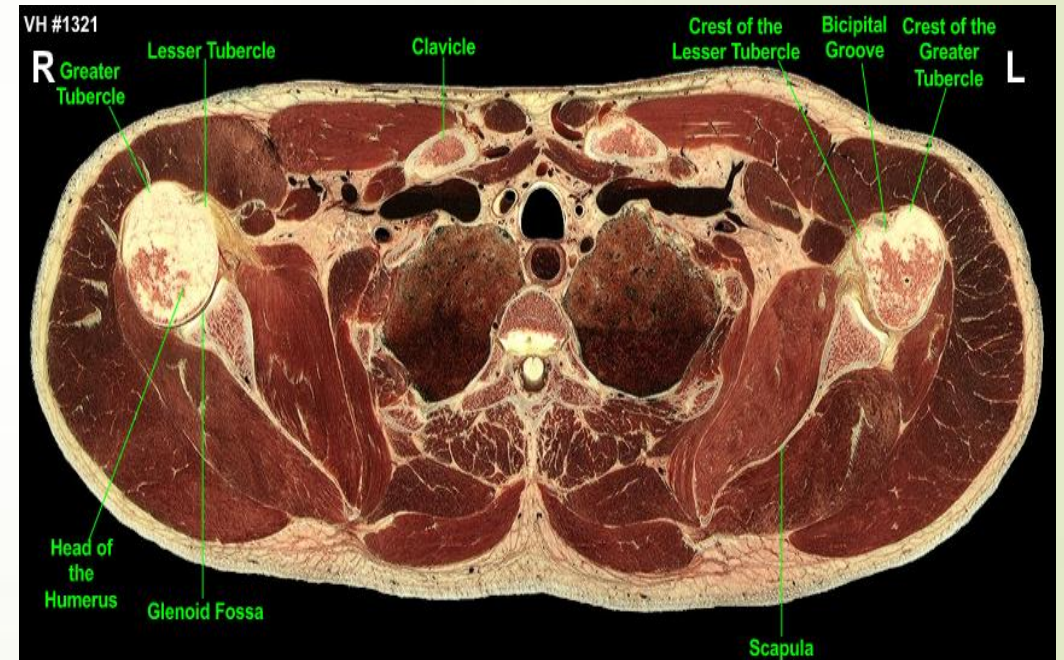
Level 1: Shoulder – Miscellaneous

- ▶ The midline region of the cross section is part of the neck at the level of the C7 vertebra.
- ▶ Prominent structures include the cricoid cartilage and the thyroid gland.



Level 2: Shoulder Joint – Osteoarticular

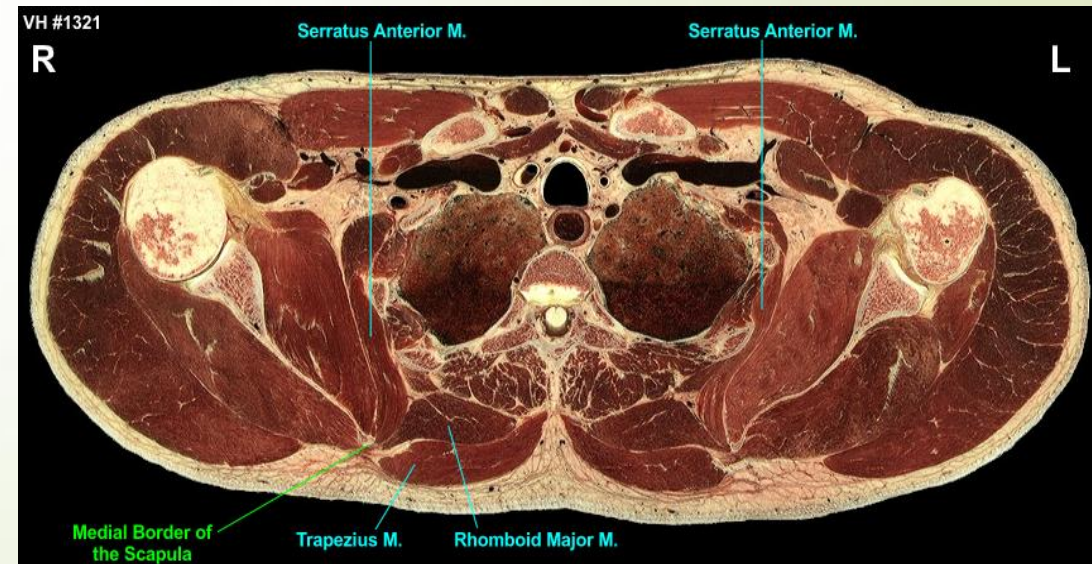
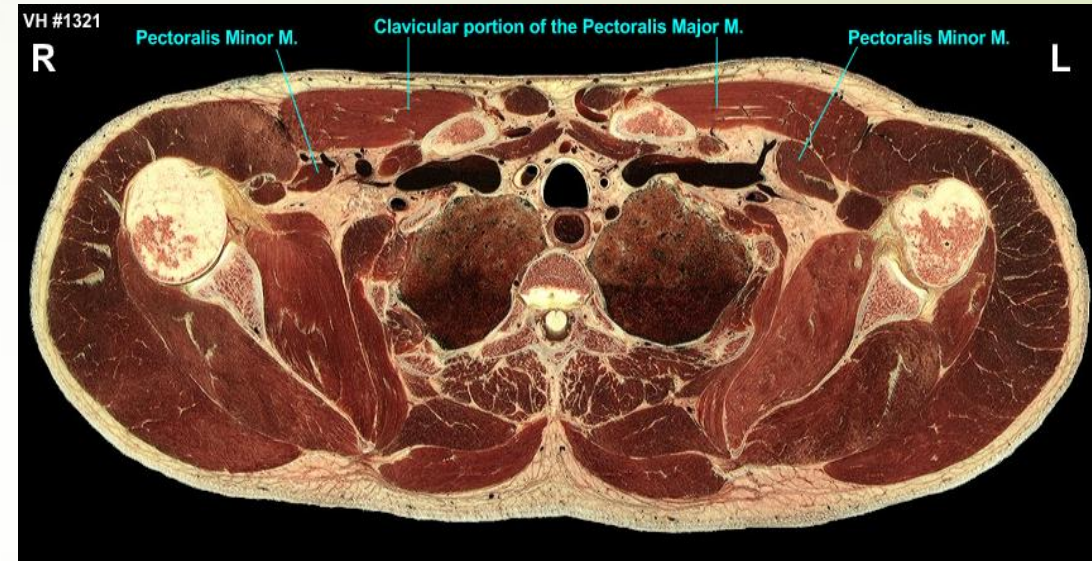
- ▶ The plane passes through the shoulder joints.
- ▶ In the right shoulder the shallow glenoid fossa of the scapula articulates with the spherical head of the humerus.
- ▶ The left joint is sectioned more inferiorly, below much of the humeral head.
- ▶ The intubercular (bicipital) groove lies on the antero-medial side of the humerus, prominent on the left side where it separates the crests of the greater and lesser tubercles (the crests are inferior extensions of the tubercles).
- ▶ The plane is inferior to the spine of the scapula; thus the posterior surface of the scapula is infraspinous fossa. Much of the scapula is thin.



Level 2: Shoulder Joint – Musculature

- ▶ Pectoral
- ▶ The pectoral muscles originate from the clavicles and/or anterior thoracic wall and insert into bones of the upper limbs.
- ▶ The clavicular origins of the pectoralis major muscles are present at this level.
- ▶ Deep to the pectoralis major muscles are the profiles of the pectoralis minor muscles, sectioned between their origins at lower levels on the thoracic cage and their insertions at higher levels on the coracoid processes of the scapulae

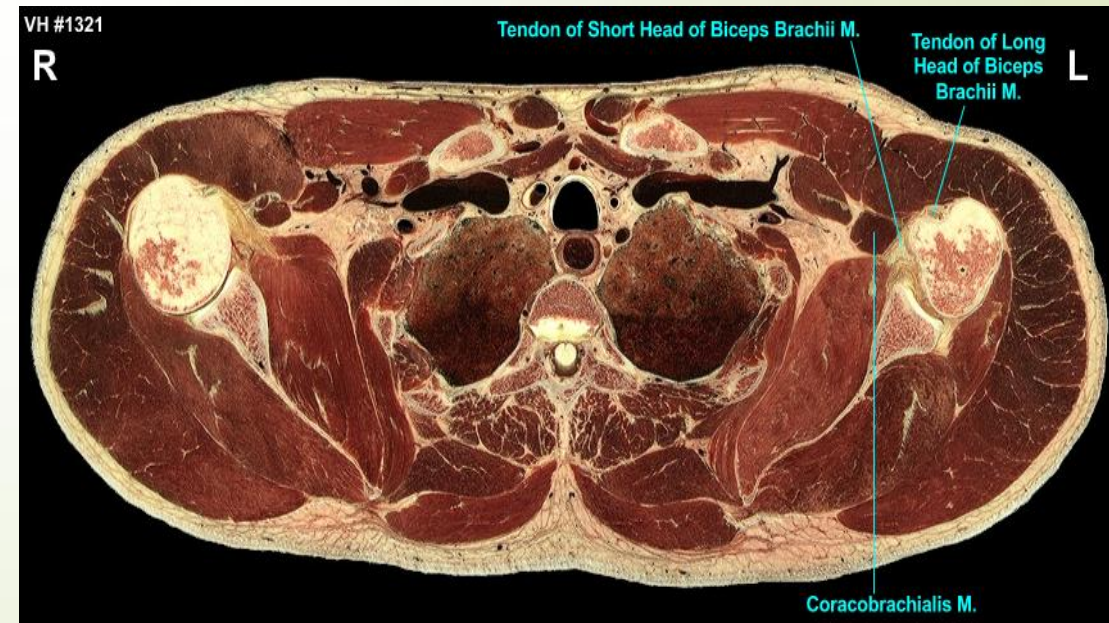
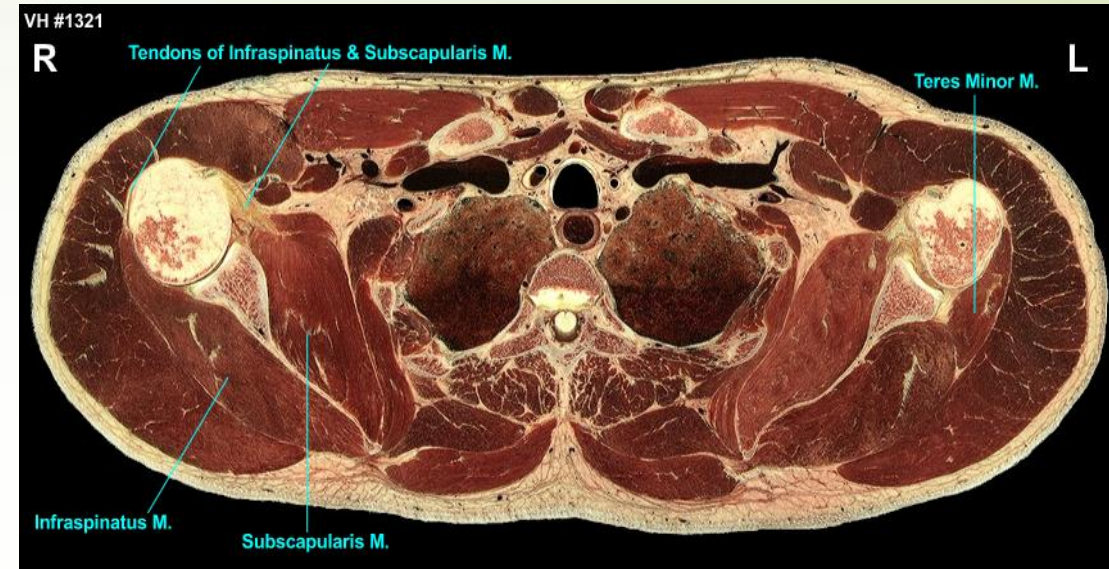
- ▶ Axial skeleton to scapula
- ▶ This group connects the axial skeleton with the scapulae (the pectoralis minor muscles would also qualify for this group).
- ▶ Posteriorly the rhomboid major muscles (having originated from the vertebral column) are inserting onto the medial borders of the scapulae.
- ▶ Of particular note are the serratus anterior muscles, adhering closely to the lateral thoracic walls (taking origins from the outer rib surfaces) as they project posteriorly to insert onto the medial borders of the scapulae.
- ▶ The trapezius muscles originate from the vertebral column and skull and they too insert onto the scapulae although not evident at this level.



Level 2: Shoulder Joint – Musculature

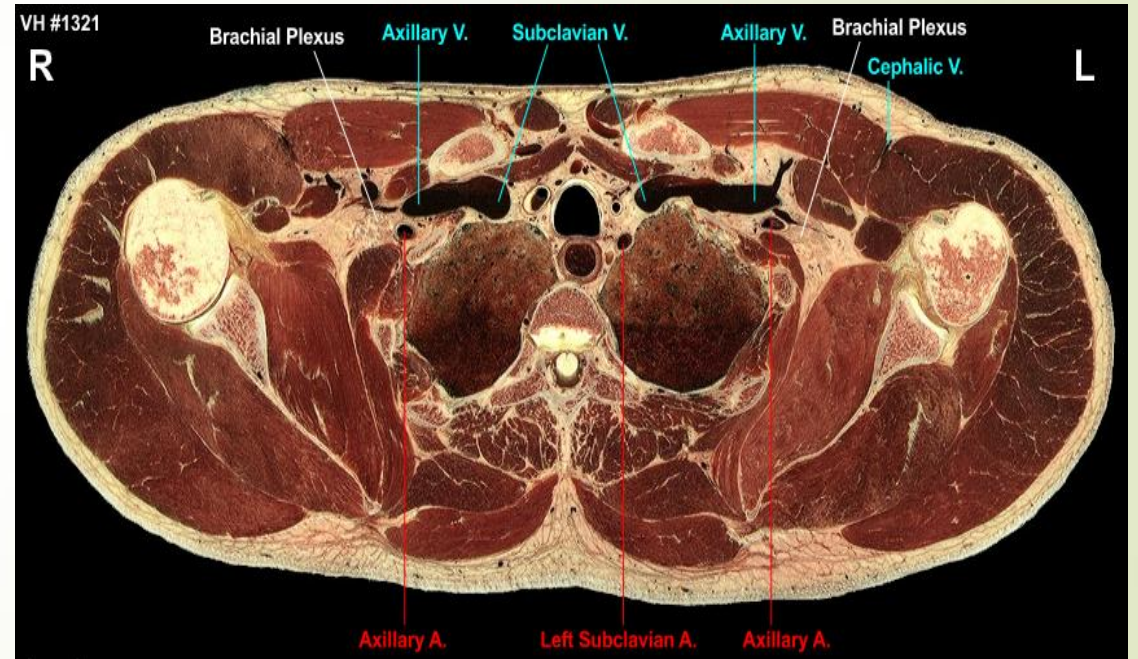
- ▶ Rotator cuff
- ▶ In the right shoulder, the subscapularis muscle passes anterior to the shoulder joint to insert onto the lesser tubercle of the humerus while the infraspinatus muscle passes posterior to the joint to insert onto the greater tubercle.
- ▶ On the left side, which is below the insertion of the infraspinatus muscle, the teres minor muscle (which originates at a lower level) approaches its insertion onto the greater tubercle.
- ▶ These three muscles, along with the supraspinatus muscle viewed at level 1, comprise the “rotator cuff” muscle.

- ▶ Arm muscles
- ▶ In the left shoulder note the tendon of the long head of the biceps brachii muscle in the intertubercular groove; it originated from the supraglenoid tubercle of the scapula at a higher level.
- ▶ The tendon of the short head of the biceps lies antero-medial to the humerus.
- ▶ The coracobrachialis muscle lies medial to the short head of the biceps; both the coracobrachialis and the short head descend from origins on the coracoid process at a higher level.



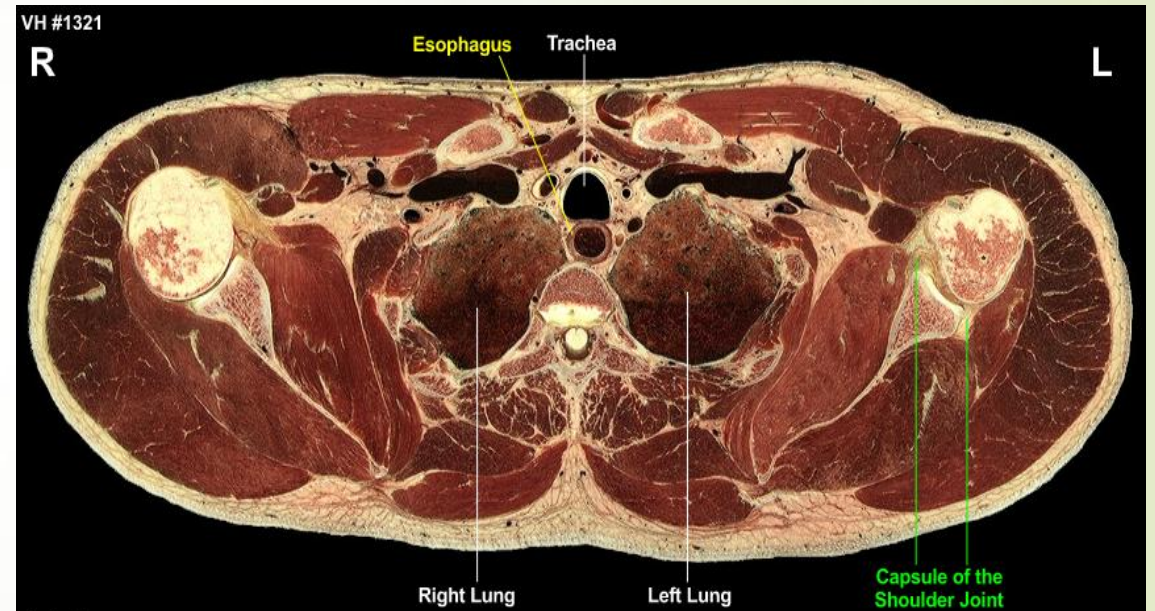
Level 2: Shoulder Joint – Neurovascular

- At this level the axillary veins in the axillae are passing over the first ribs to become continuous with the subclavian vein of the neck (they are the same vessels – just renamed at the outer border of the 1st ribs).
- The continuity of the subclavian and axillary arteries occurred more superiorly; thus-separate arterial profiles are present.
- The axillary veins lie anterior to the axillary arteries.
- Profiles of the brachial plexi in close proximity to the axillary arteries.
- Close examination reveals the cephalic veins, superficial veins of the upper limbs, descending between the deltoid and pectoralis major muscles to eventually unite with the axillary vein.



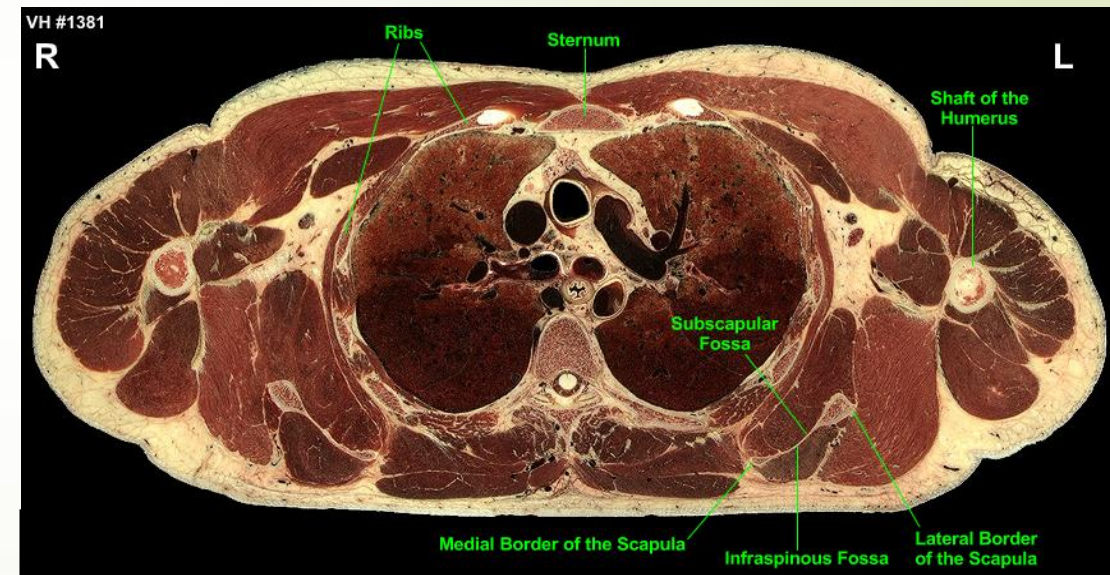
Level 2: Shoulder Joint – Miscellaneous

- ▶ The capsule of the shoulder joint extends between the margins of the glenoid fossa of the scapula and the humerus.
- ▶ Major structures of the midline thorax and neck are noted for orientation.



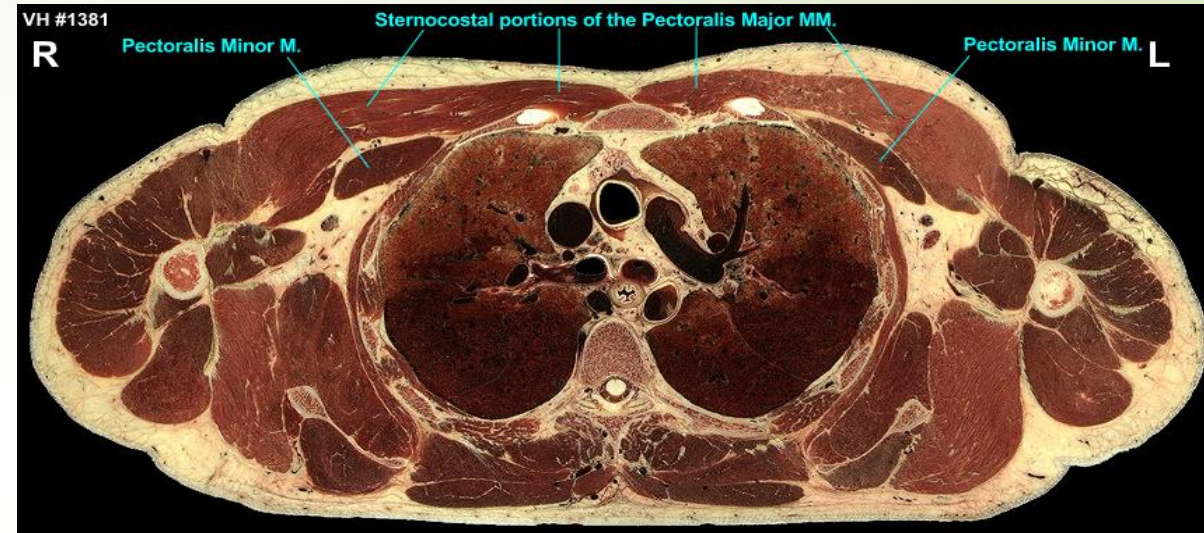
Level 3: Proximal Humerus - Osteoarticular

- The skeletal features of the upper limbs are unremarkable at this level with the shaft of the humerus forming the sole skeletal framework of the arm.
- The plane of section passes through the inferior aspect of the scapula where the width of the bone narrows.
- The thinness of the scapula between its thickened medial and lateral borders; the subscapular fossa and infraspinous fossa comprise the deep and superficial surfaces of the scapula respectively.



Level 3: Proximal Humerus - Musculature

- ▶ Pectoral
- ▶ The sternocostal portions of the pectoralis major muscles dominate the anterior chest wall.
- ▶ The pectoralis minor muscles, originating from a slightly more inferior level of the anterior thoracic cage, lie deep to the pectoralis major muscle.

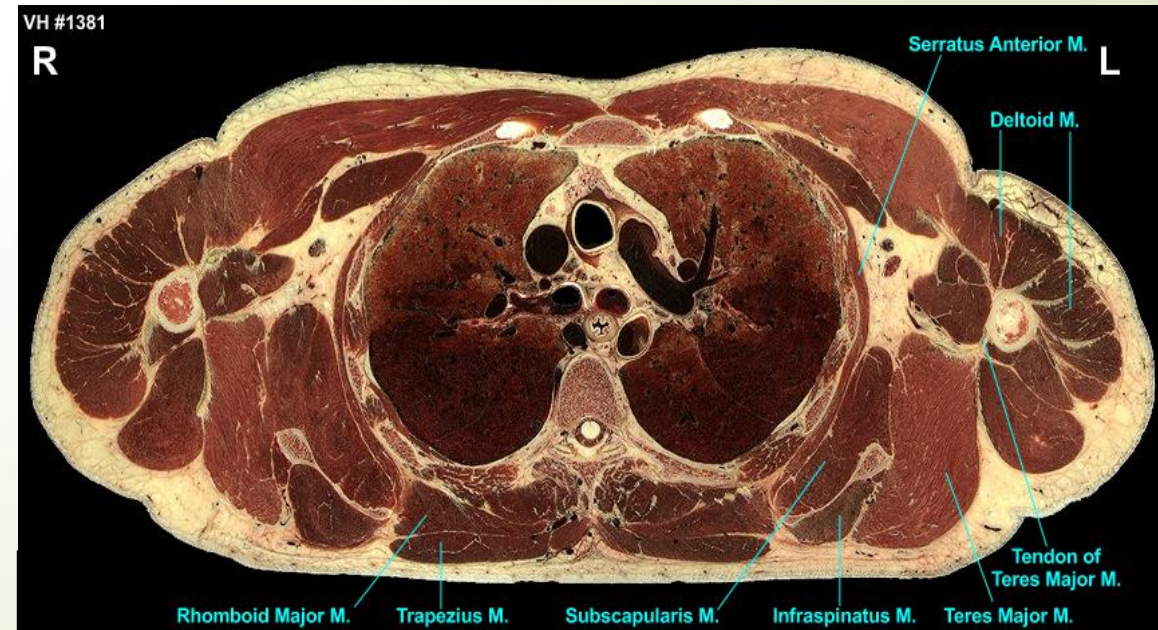


- ▶ Anterior arm
- ▶ The anterior compartment of the arm includes the biceps brachii and coracobrachialis muscles.
- ▶ At this level these two muscles are grouped together on the antero-medial side of the humerus.
- ▶ The long head of the biceps is lateral to its short head while the coracobrachialis muscle lies posterior to the biceps.
- ▶ All three muscle masses have descended from origin on the scapula at higher levels.



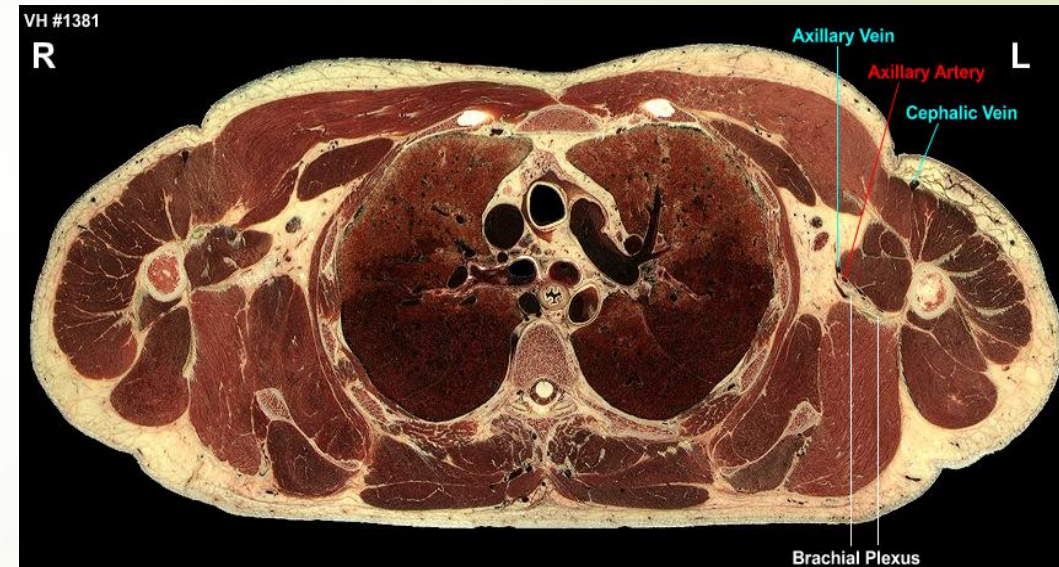
Level 3: Proximal Humerus - Musculature

- Posterior arm
 - The posterior compartment of the arm contains the three heads of the triceps brachii muscle.
 - Profiles of the long heads are sectioned as they descend into the arms from origins on the scapulae at a higher level.
 - The lateral and medial heads of the triceps originate from the posterior surface of the shaft of the humerus, with the medial head medial to the lateral head as particularly evident in the left arm.
-
- Other
 - The deltoid muscles lie over the lateral aspects of the upper arms as they approach their insertions on the humeri.
 - Look closely for the insertion of the left teres major muscle on the humerus.
 - Muscles of the anterior arm lie anterior to the teres major.



Level 3: Proximal Humerus - Neurovascular

- ▶ Close examination reveals profiles of the axillary artery, axillary vein and brachial plexus in the axilla.
- ▶ At this level these neurovascular structures are passing between the axilla and the arm where they are positioned posterior to the biceps brachii and coracobrachialis muscles and anterior to the teres major muscle.
- ▶ The cephalic vein, a prominent superficial vein ascending the anterior aspect of the arm from its origin in the hand.



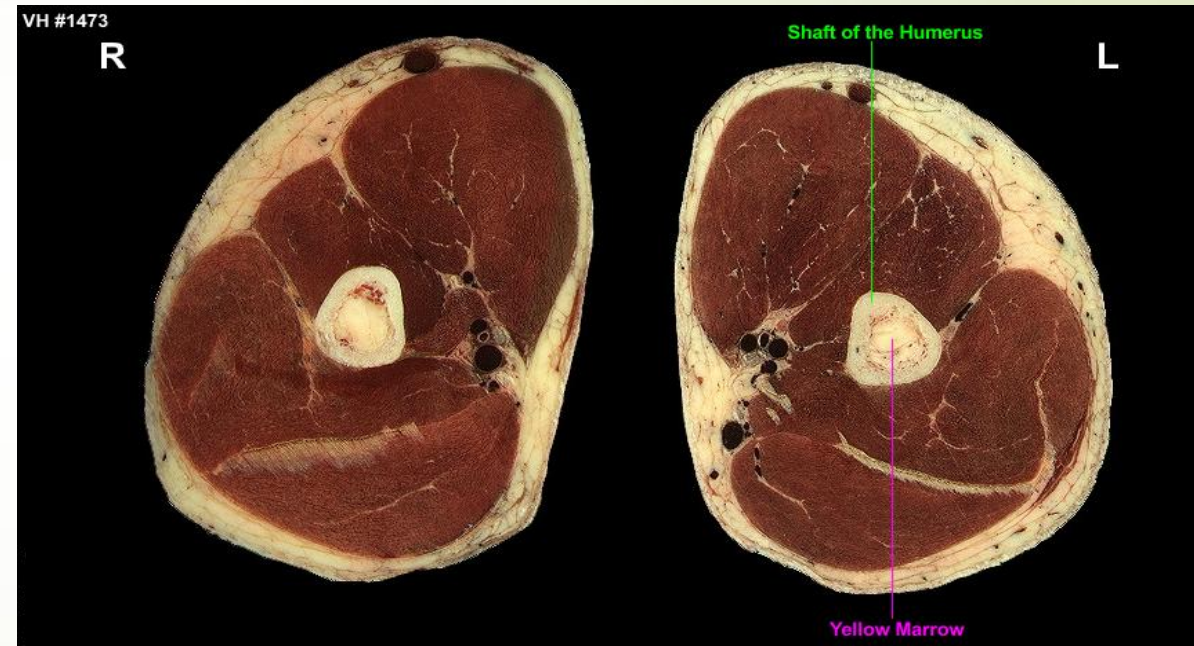
Level 3: Proximal Humerus – Miscellaneous

- ▶ This plane of section passes through the axillae, which in cross section appear somewhat triangular in shape.
- ▶ The pectoralis major and minor muscles, posteriorly by the subscapularis and teres major muscles, and medially by the serratus anterior muscle, border an axilla anteriorly.
- ▶ The much narrower lateral boundary of the axilla is the humerus, more precisely the intertubercular (bicipital) groove of the bone.



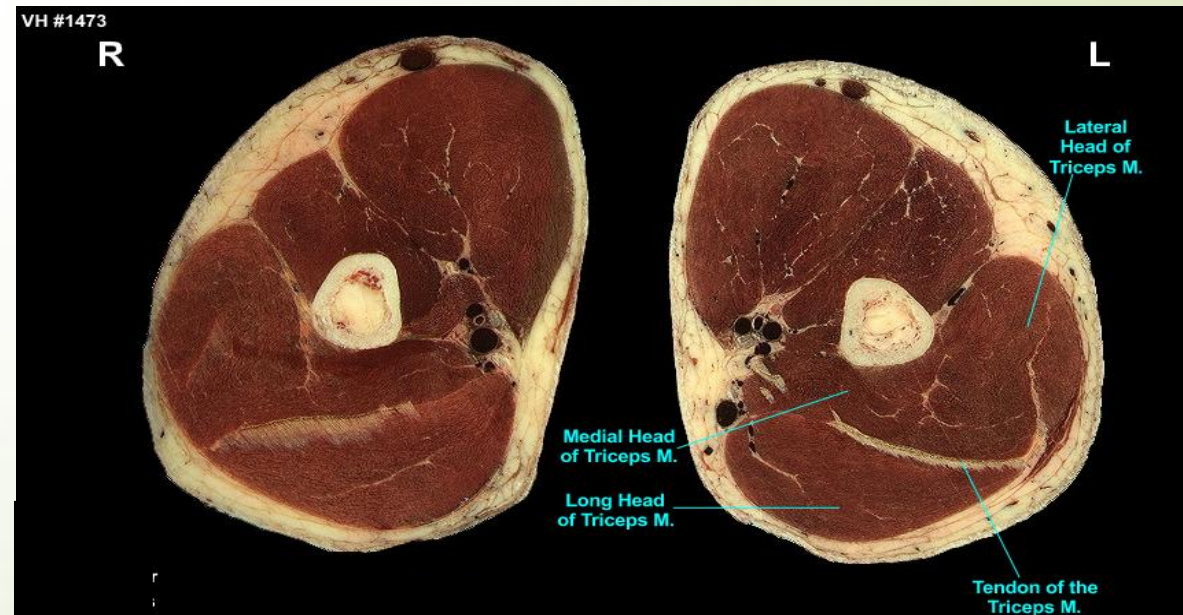
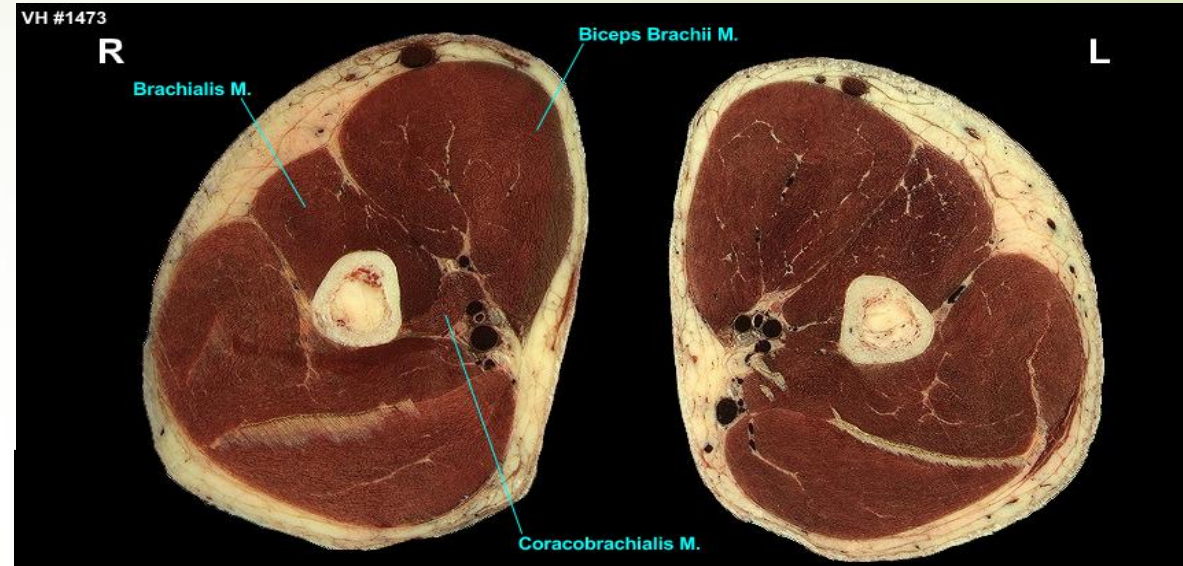
Level 4: Mid-Humerus - Osteoarticular

- ▶ The humerus forms the skeletal framework of the arm.
- ▶ The fatty yellow marrow is present in its marrow cavity.



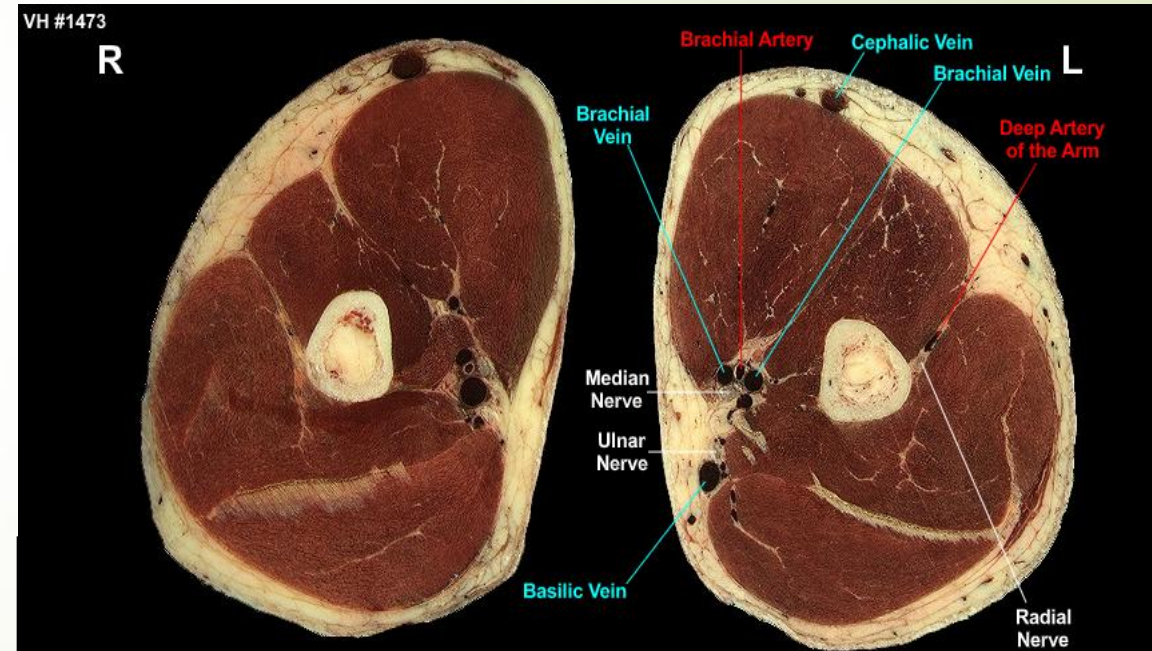
Level 4: Mid-Humerus - Musculature

- ▶ Anterior compartment
 - ▶ The planes of section are slightly different in the two arms.
 - ▶ In the right arm the distal end of the coracobrachialis muscle is inserting onto the medial side of the shaft of the humerus;
 - ▶ in the left arm the coracobrachialis muscle is absent, having inserted more superiorly.
 - ▶ In both arms the brachialis muscles are prominent, taking origin from the anterior surfaces of the shafts of the humeri deep to the biceps muscles.
 - ▶ The bellies of the biceps brachii muscles are prominent anteriorly.
- ▶ Posterior compartment
 - ▶ The triceps brachii muscle is prominent with a union of its various heads of origin, making some demarcations unclear.
 - ▶ The prominent tendon within the triceps that forms from the long and lateral heads; the tendon will become more superficial further down the arm.



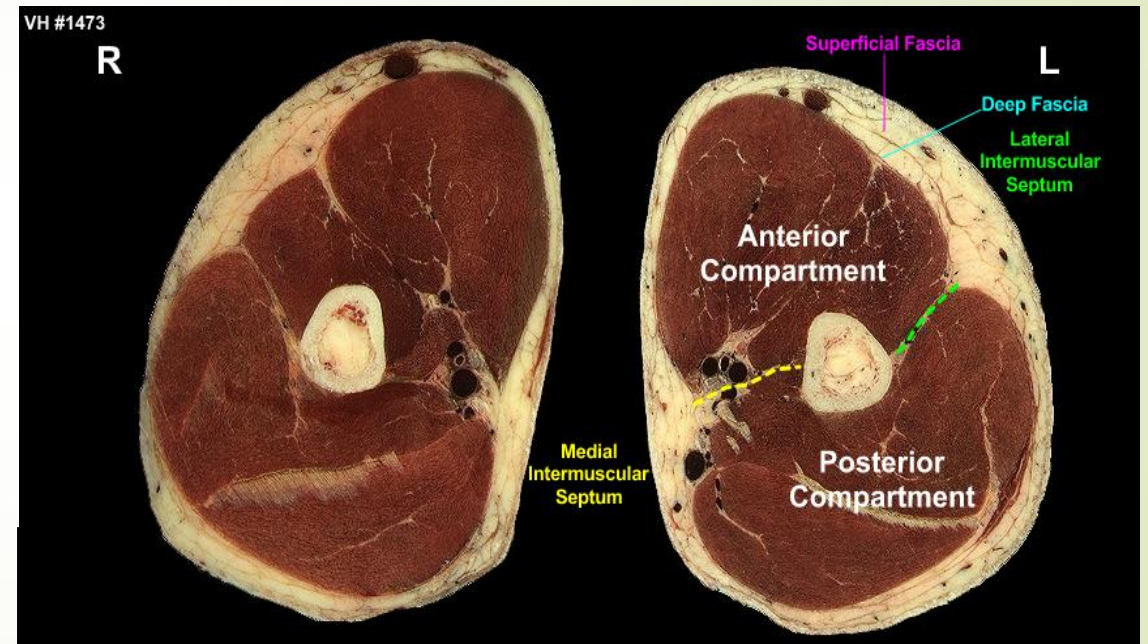
Level 4: Mid-Humerus - Neurovascular

- ▶ The brachial artery and its two accompanying veins (venae comitantes) lie on the medial side of the side, anterior to the triceps and overlapped by the biceps muscle.
- ▶ The median nerve lies near the brachial blood vessels.
- ▶ The ulnar nerve is positioned near the medial intermuscular septum while the radial nerve at this level lies close to the lateral intermuscular septum.
- ▶ The radial nerve is accompanied by the deep artery of the arm.
- ▶ The cephalic and basilic superficial veins are large; at this level the basilic vein has descended below the deep fascia.



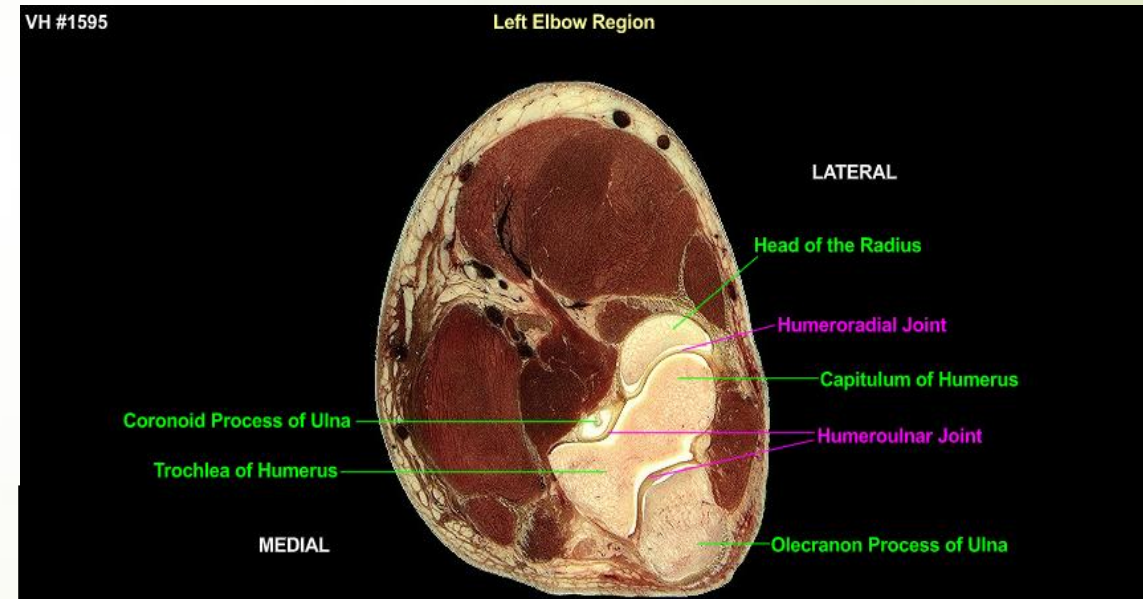
Level 4: Mid-Humerus - Miscellaneous

- ▶ The fatty superficial fascia of the arm and the less prominent deep (brachial) fascia whose extensions, the medial and lateral intermuscular septa, divide the arm into anterior and posterior compartments.



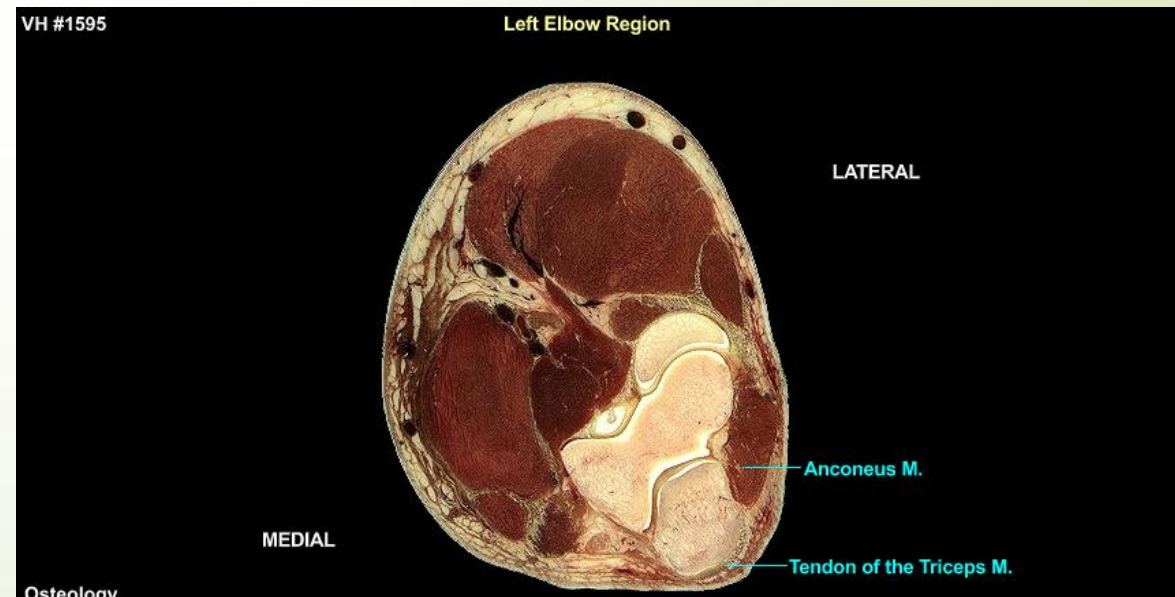
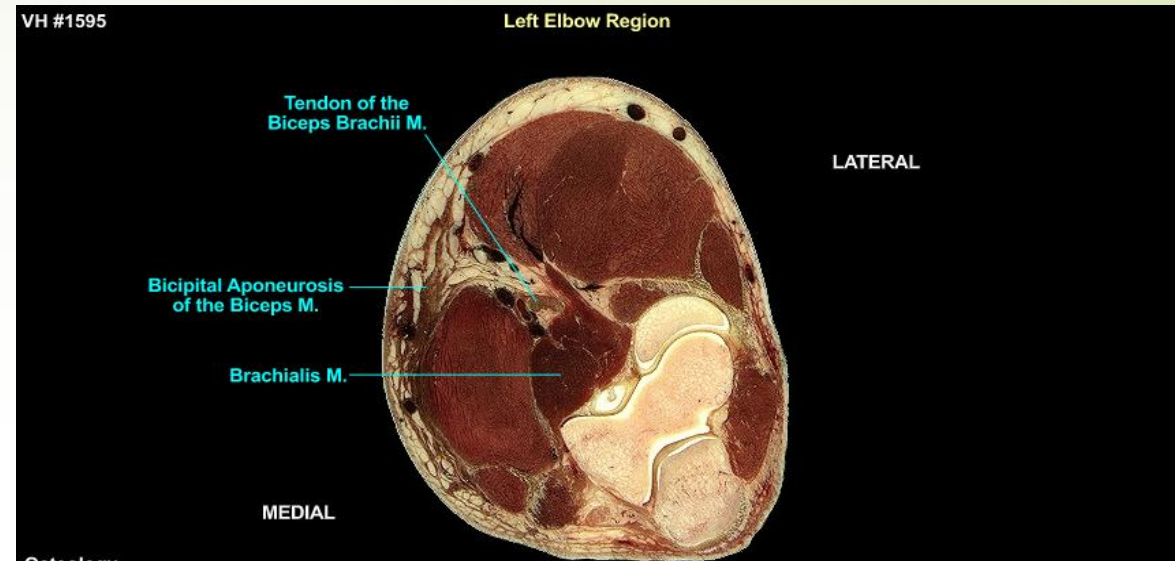
Level 5: Elbow - Osteoarticular

- ▶ The plane transverses the left elbow joint, which is slightly flexed and pronated.
- ▶ The two articular surfaces of the elbow joint are evident,
 - ▶ 1) laterally the humeroradial joint (head of the radius articulating with the rounded capitulum of the humerus)
 - ▶ 2) medially the humeroulnar joint (trochlear notch of the ulna articulating with the spool-shaped trochlea of the humerus).
- ▶ In three dimensions the trochlear notch is C-shaped, accounting for the two profiles of the humeroulnar joint in cross-section.
- ▶ Posteriorly the bony prominence of the elbow is formed by the olecranon process of the ulna.



Level 5: Elbow - Musculature

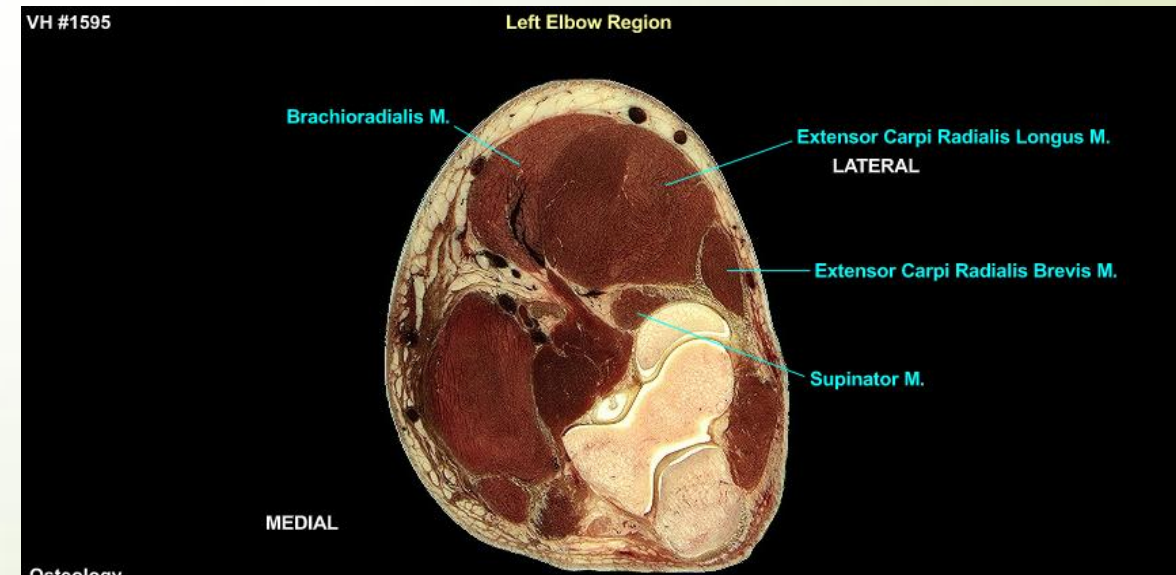
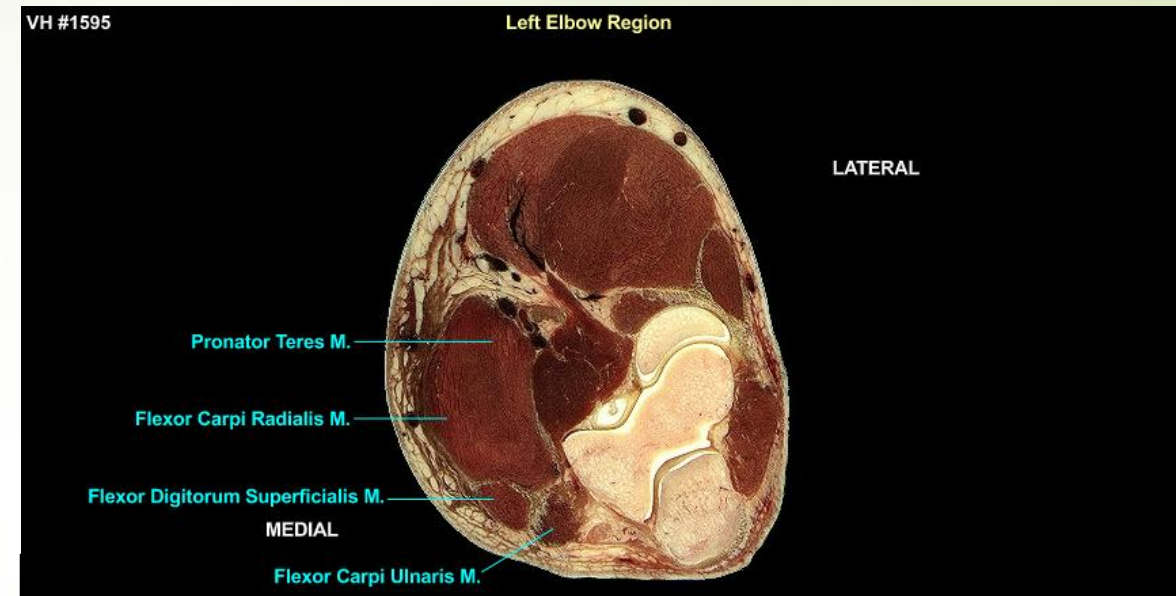
- Anterior arm
 - The brachialis muscle lies deep and near the midline; it will insert on the ulna at a more inferior level.
 - Immediately above the brachialis is the tendon of the biceps brachii muscle, descending to its insertion on the radius.
 - More superficially, the bicipital aponeurosis of the biceps muscle blends with the deep fascia on the medial side of the forearm.
-
- Posterior arm
 - Close examination reveals a small portion of the tendon of the triceps muscle inserting posteriorly upon the olecranon process of the ulna.
 - The anconeus muscle, a small muscle that assists the triceps, inserts into the lateral side of the olecranon process.



Level 5: Elbow - Musculature

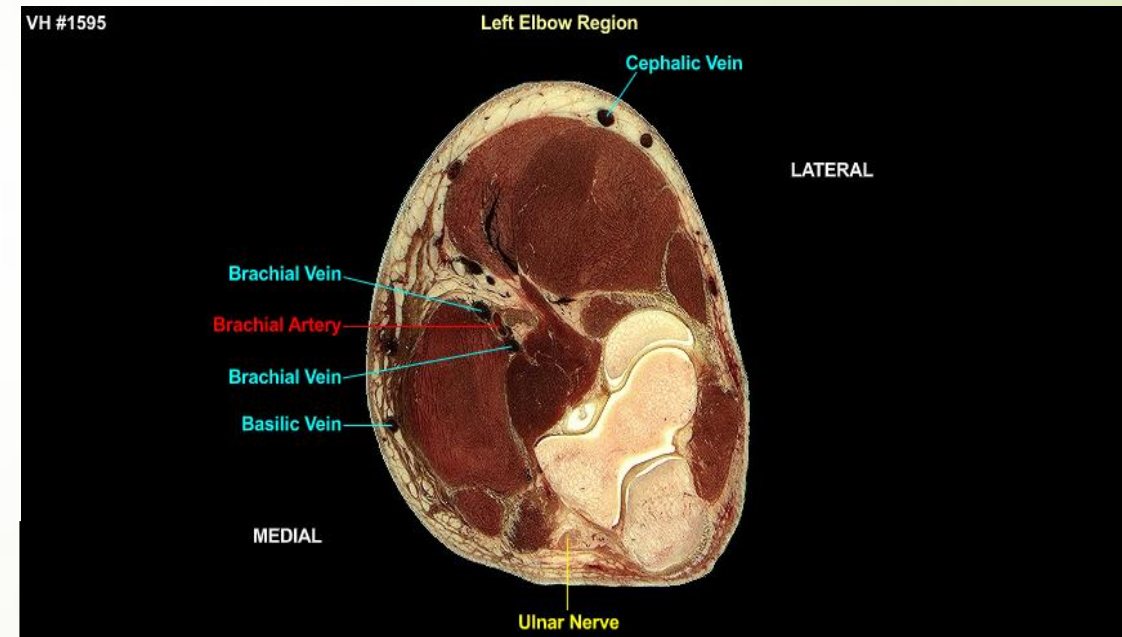
- ▶ Anterior forearm
- ▶ Many muscles of the anterior forearm have a common origin from the medial epicondyle of the humerus (located at a higher level) and from there they descend into the forearm.
- ▶ On the medial side of this upper forearm level (and consistent with origins from the medial epicondyle) are the pronator teres and flexor carpi radialis muscles (the demarcation between the two is not evident), the flexor digitorum superficialis muscle, and the flexor carpi ulnaris muscle.

- ▶ Lateral forearm
- ▶ Many muscles of the lateral and posterior forearm have a common origin from the lateral supracondylar ridge and lateral epicondyle of the humerus (located at a higher level), from which the muscles descend into the forearm.
- ▶ On the lateral side (consistent with the origins from the lateral side of the humerus) the brachioradialis, extensor carpi radialis longus, and extensor carpi radialis brevis muscles located anterior to posterior respectively.
- ▶ More deeply lies the supinator muscle, unique in its arrangement.



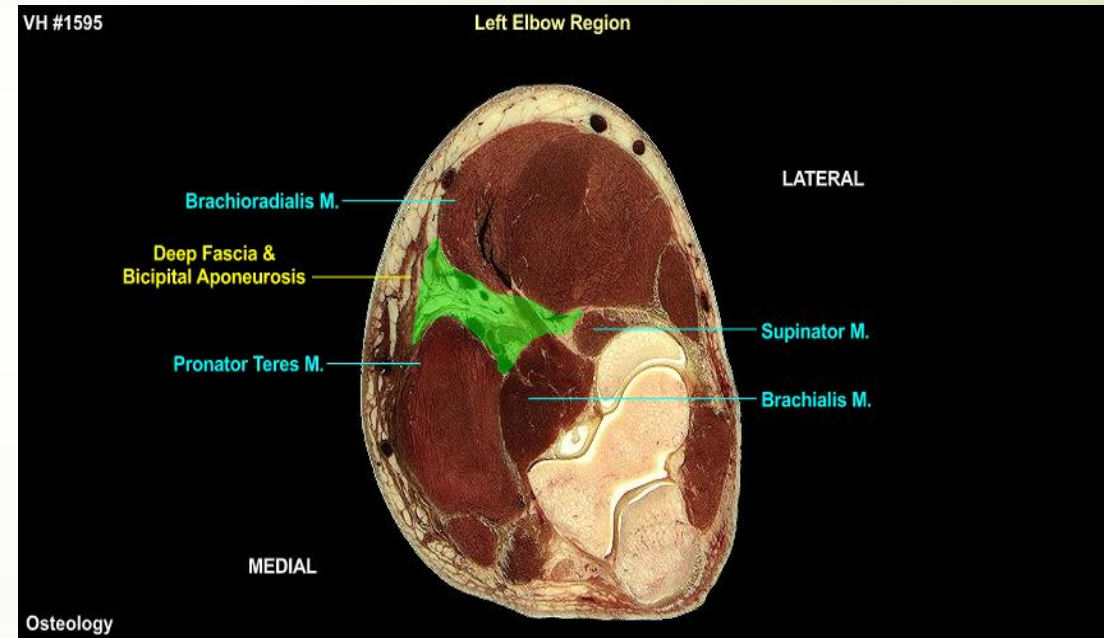
Level 5: Elbow - Neurovascular

- ▶ The brachial artery and its characteristic two accompanying veins (venae comitantes) lie anterior to the brachialis muscle at the elbow.
- ▶ Although present and in proximity to the blood vessels, the median and radial nerves cannot be accurately identified.
- ▶ The ulnar nerve lies superficially on the postero-medial side of the elbow joint.
- ▶ Superficial veins are prominent in the superficial fascia.



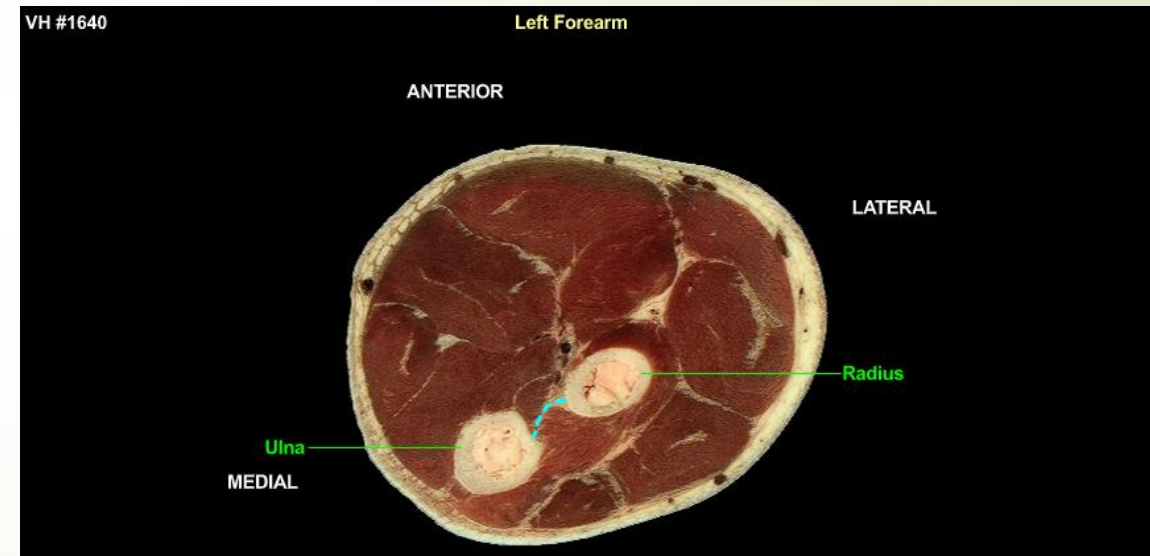
Level 5: Elbow - Miscellaneous

- ▶ The plane of section traverses the cubital fossa.
- ▶ The floor of the cubital fossa is formed medially by the brachialis muscle and laterally by the supinator muscle.
- ▶ The roof of the cubital fossa is the overlying deep fascia, which includes part of the bicipital aponeurosis.
- ▶ The cubital fossa is bounded laterally by the brachioradialis muscle and medially by the pronator teres.



Level 6: Forearm - Osteoarticular

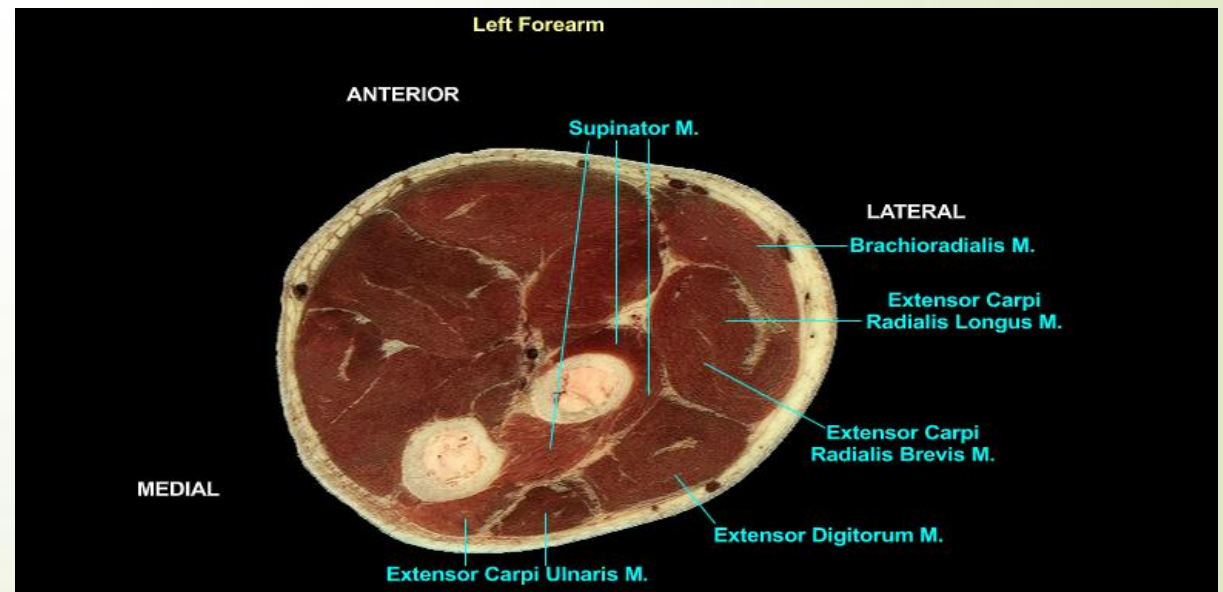
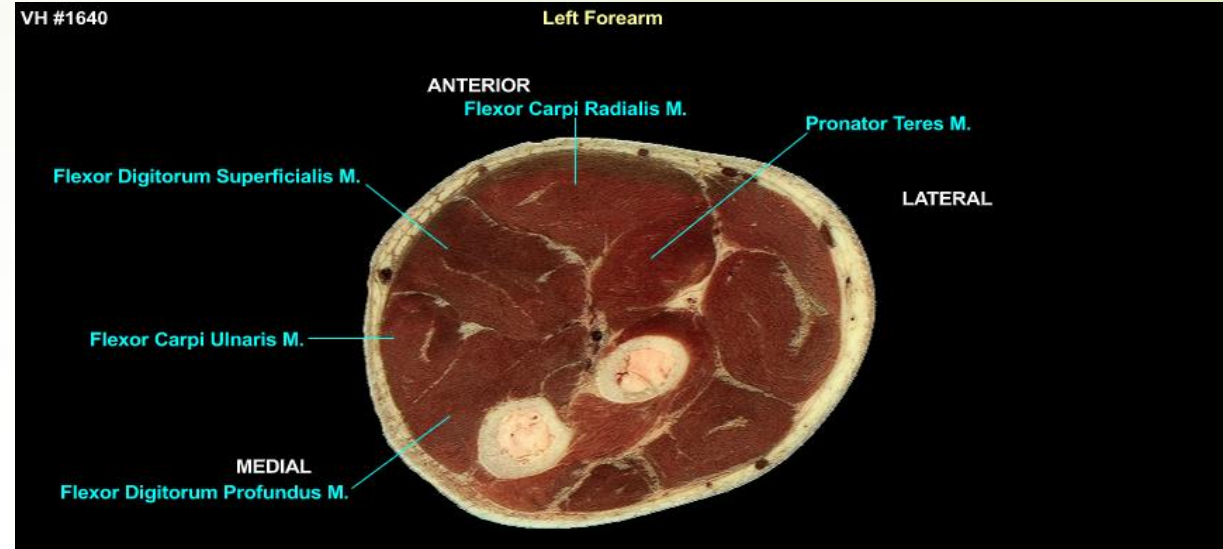
- ▶ The plane-of-section passes through the left upper forearm.
- ▶ The ulna and radius form the skeletal framework, the two bones tethered together by the interosseous membrane.
- ▶ The forearm of the visible male was pronated during sectioning and here has been rotated to approximate sectioning in the anatomical position, placing the radius lateral and the ulna medial.
- ▶ The proximity of the ulna to the surface of the forearm, where it lies subcutaneously throughout much of its length.



Level 6: Forearm - Musculature

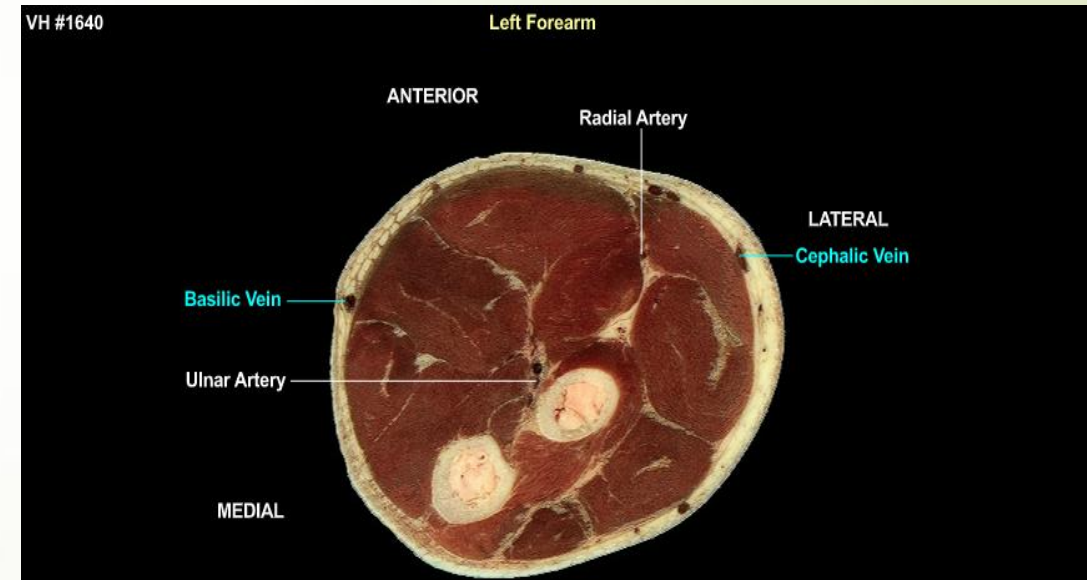
- Anterior Forearm
- The flexor and pronator muscles occupy the anterior and medial aspects of the forearm.
- The pronator teres, having originated on the medial side of the arm at a higher level, descends toward the lateral side of the forearm for its attachment on the radius at a slightly lower level.
- The two flexor carpi muscles, radialis and ulnaris, lie on the radial and ulnar sides of the anterior compartment respectively. The flexor digitorum superficialis muscle lies between them and superficial to the flexor digitorum profundus.

- Posterior Forearm
- The extensor and supinator muscles occupy both the posterior and lateral aspects of the forearm.
- On the lateral (radial) side the brachioradialis and extensor carpi radialis longus and brevis muscles are present.
- Near the midline of the posterior compartment, in a subcutaneous position, lies the extensor digitorum muscle.
- On the medial (ulna) side of the posterior compartment is the extensor carpi ulnaris, which has two heads of origin that are distinct at this level.
- Of particular note is the deeply positioned supinator muscle that extends from the ulna and wraps around the lateral side of the radius.



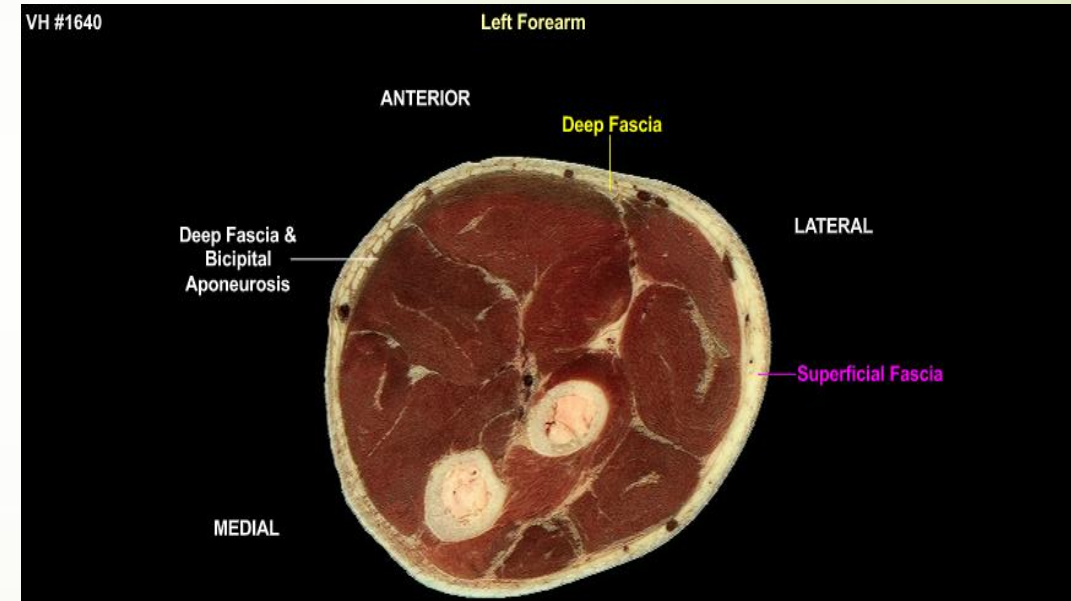
Level 6: Forearm - Neurovascular

- Superficial veins are prominent in the superficial fascia with the cephalic vein on the lateral side, the basilic vein on the medial side.
- Profiles of the radial and ulnar arteries are difficult to discern but identifiable by their positions within the forearm.
- The radial artery descends the forearm deep to the brachioradialis muscle.
- At this level (proximal end of the forearm) the ulnar artery lies close to the interosseous membrane near the flexor digitorum profundus muscle.
- The nerves are more difficult to discern and not accurately identifiable.



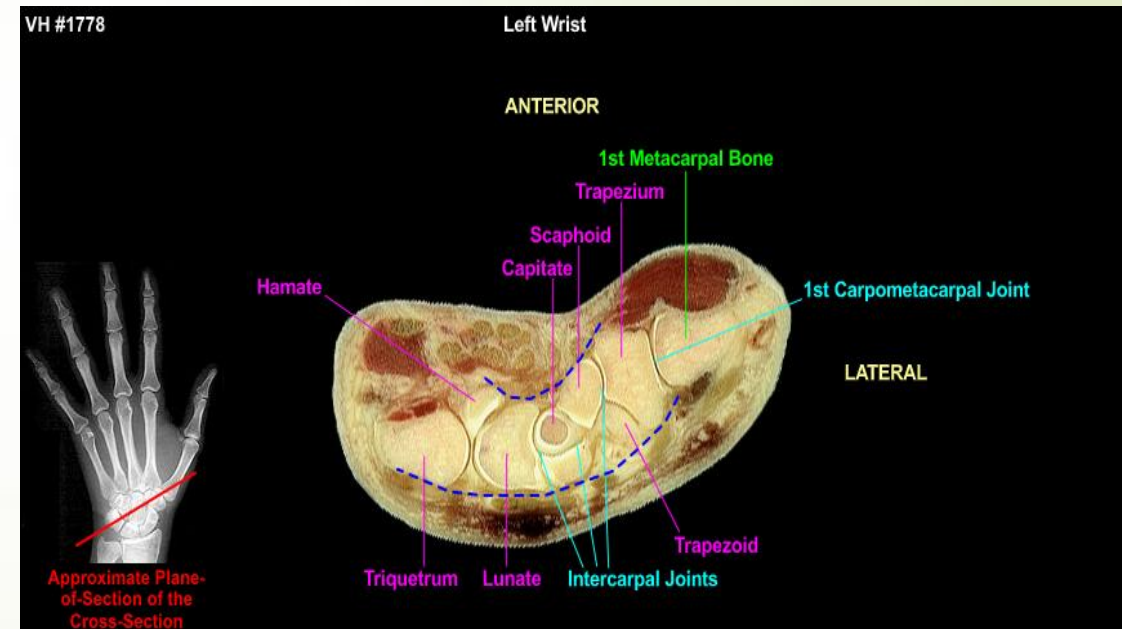
Level 6: Forearm – Miscellaneous

- The fatty superficial fascia can be seen.
- Close examination reveals the dense, fat-free deep fascia between the muscles and the superficial fascia.
- The deep fascia on the antero-medial side of the forearm appears slightly thickened, reflecting the distal end of the bicipital aponeurosis.



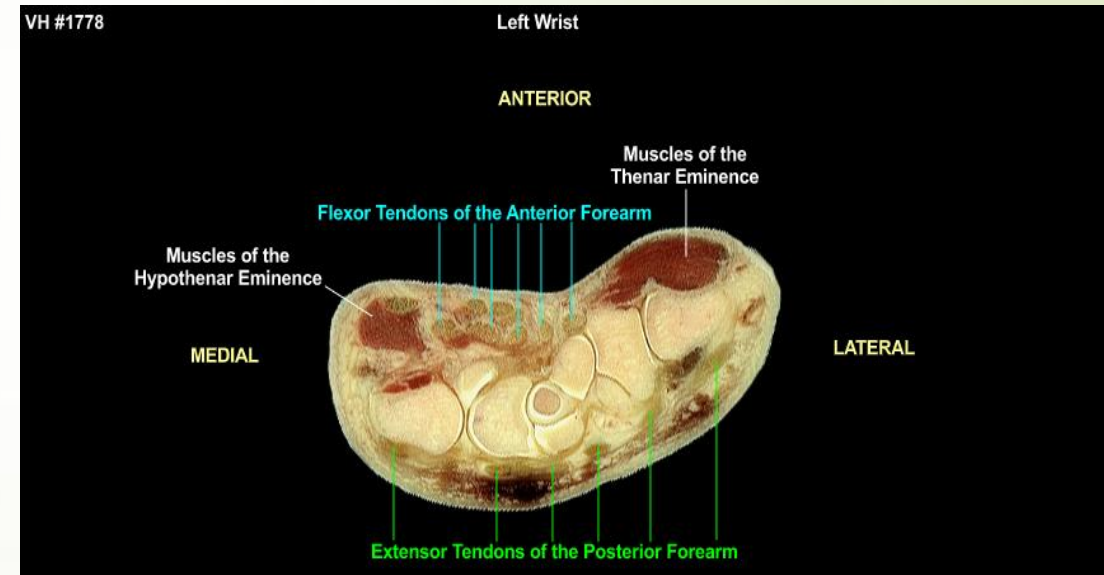
Level 7: Wrist - Osteoarticular

- ▶ The plane-of-section passes through the left carpus (wrist);
- ▶ the obliqueness of the plane, reflecting the lack of anatomical position when the visible male was imaged, complicates the bony organization.
- ▶ However evident anatomical features important to appreciate include:
 - ▶ 1) the concave anterior (palmar) and convex posterior (dorsal) sides to the bony carpus,
 - ▶ 2) the interlocking nature of the carpal bones,
 - ▶ 3) the continuity of the synovial cavities of the intercarpal joints.
- ▶ The trapezium and first metacarpal bones form the first carpometacarpal joint, whose joint cavity is not continuous with that of the intercarpal joints.



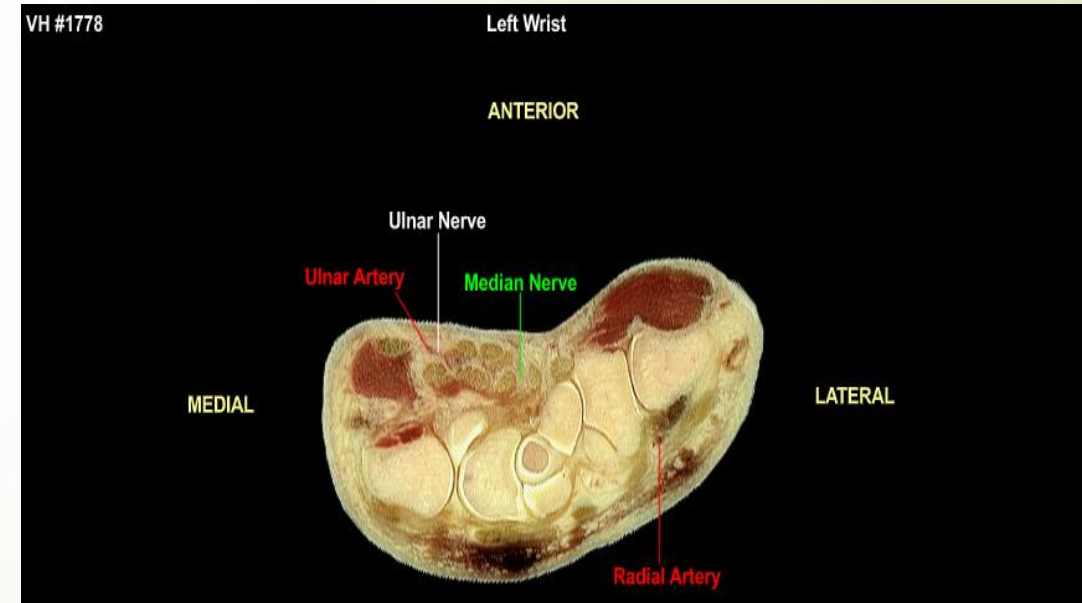
Level 7: Wrist - Musculature

- ▶ Muscles of the forearm cross the carpus as elongated tendons.
- ▶ On the anterior (palmar) side lie the tendons from the anterior (flexor) compartment of the forearm; they cross the wrist as a well organized, dense accumulation of tendons.
- ▶ On the posterior (dorsal) side reside profiles of the tendons of the posterior (extensor) compartment of the forearm; these tendons are more broadly spread over the dorsum of the wrist.
- ▶ Intrinsic muscles of the hand are difficult to identify in the oblique section shown, although one can appreciate the hypothenar versus thenar eminences.



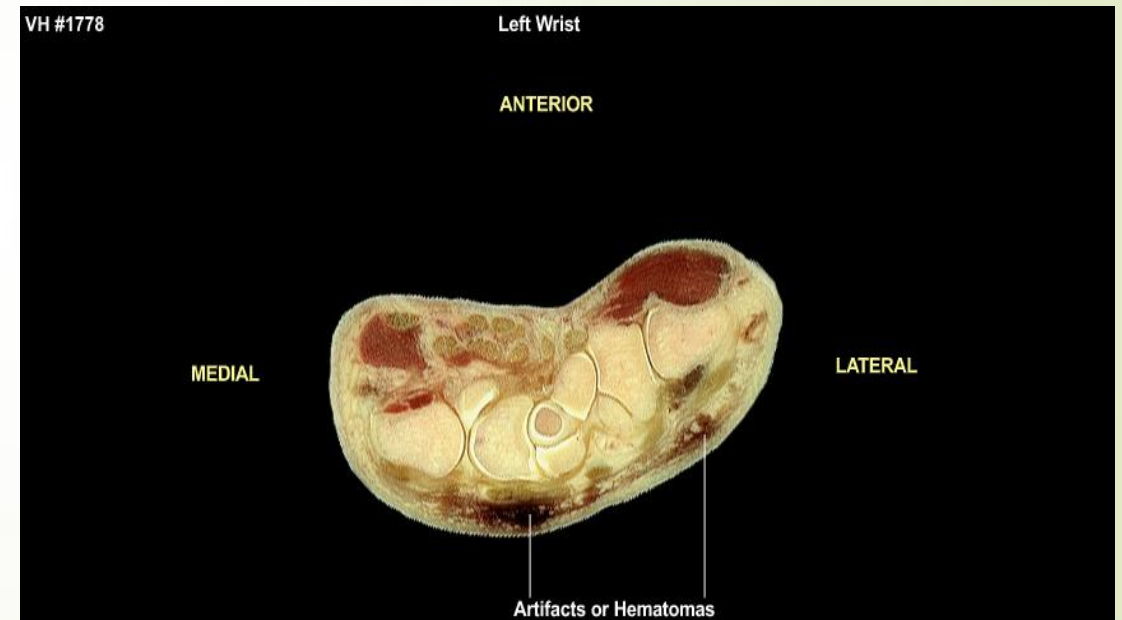
Level 7: Wrist - Neurovascular

- Although very small and obliquely sectioned, the expected positions of the various neurovascular structures can be identified.
- The ulnar artery and nerve lie on the medial side of the palm just lateral to the hypothenar eminence.
- The radial artery has coursed to the dorsal surface near the first carpometacarpal joint.
- The position of the median nerve on the palmar side is approximated.



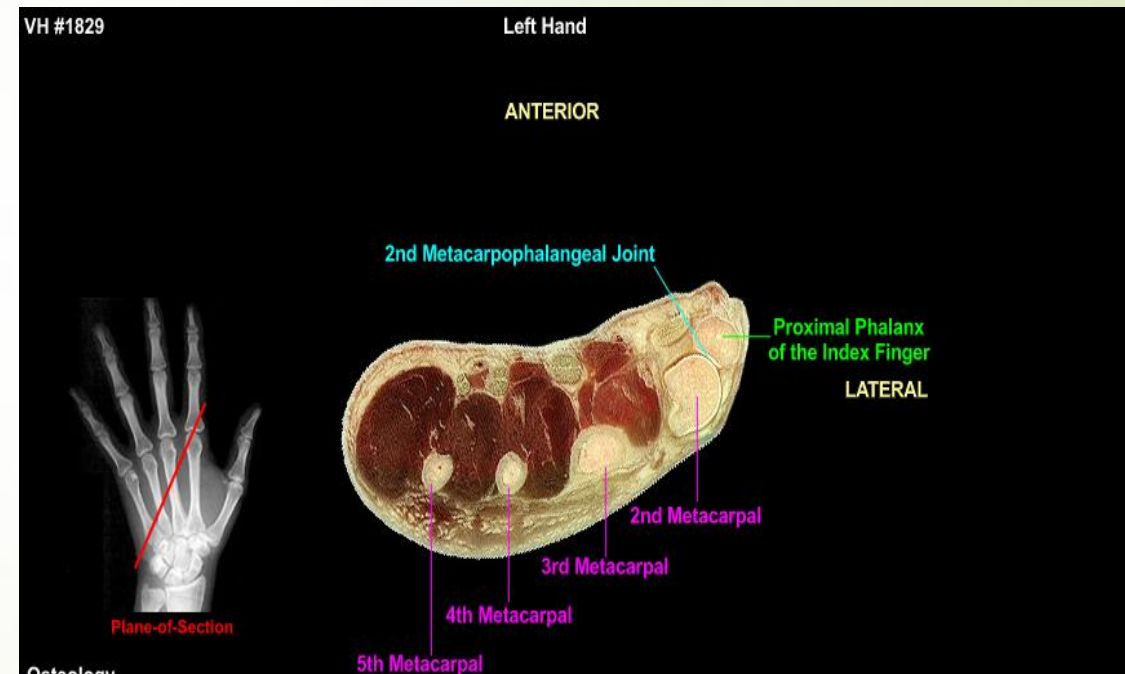
Level 7: Wrist - Miscellaneous

- ▶ The dark subcutaneous materials are postmortem artifacts or hematomas that existed prior to death.



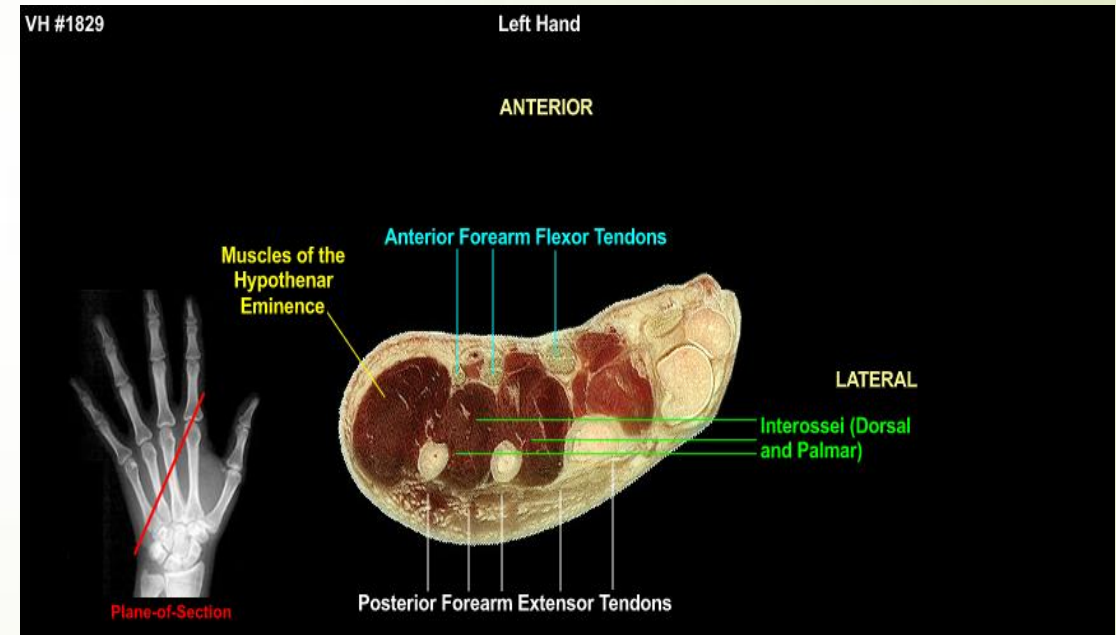
Level 8: Hand - Osteoarticular

- ▶ The oblique plane-of-section through the left hand complicates the osteology;
- ▶ the plane runs between the second metacarpophalangeal joint and the proximal end of the fifth metacarpal bone.
- ▶ The metacarpal bones are positioned more towards the dorsal rather than the palmar side of the hand, contributing to the greater volume of soft tissue on the palmar side of the hand than on the dorsal side.



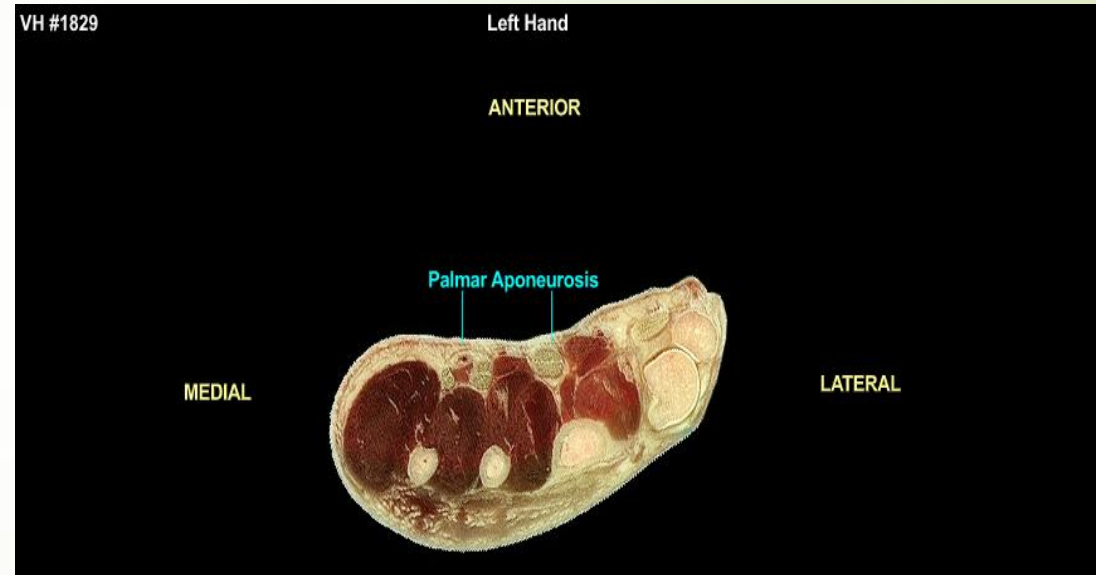
Level 8: Hand - Musculature

- The oblique plane-of-section complicates the muscular anatomy.
- The four features relative to the musculature includes;
 - 1) intrinsic muscles of the hand (origins and insertions within the hand) are largely limited to the palmar side of the hand,
 - 2) interossei muscles occupy the regions between and immediately deep to the metacarpal bones,
 - 3) forearm flexor tendons traverse the palmar side of the hand,
 - 4) forearm tendons traverse the dorsal side of the hand.



Level 8: Hand - Miscellaneous

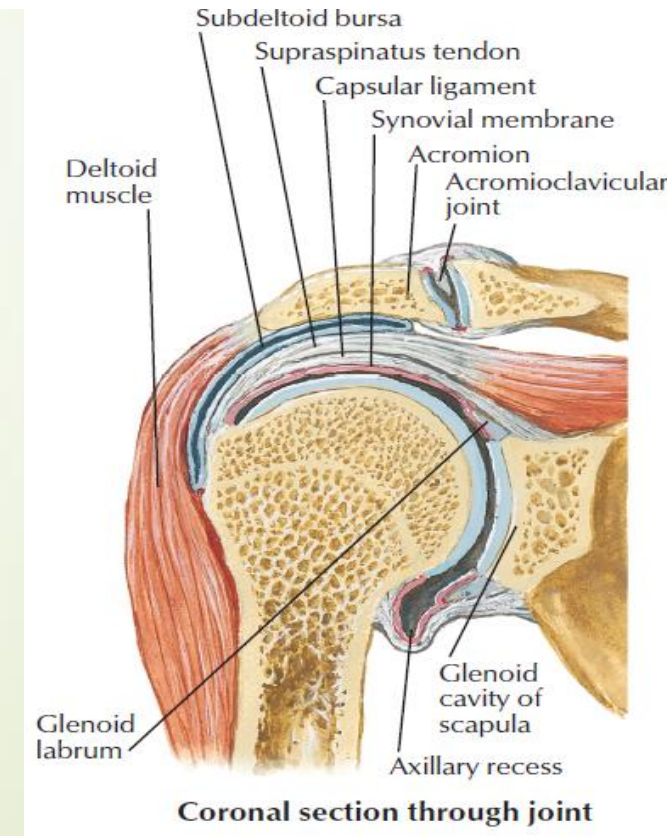
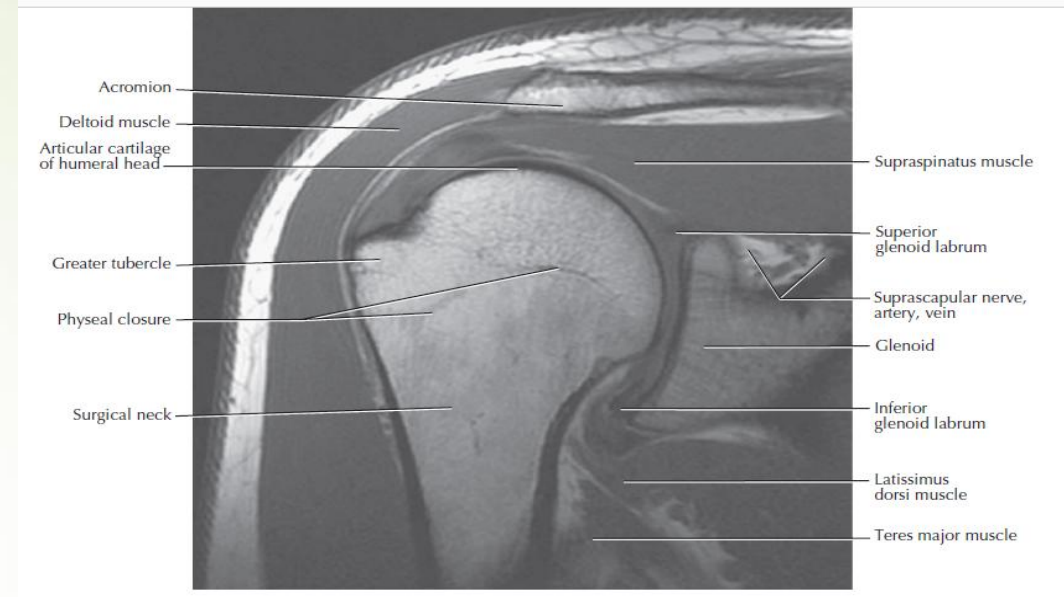
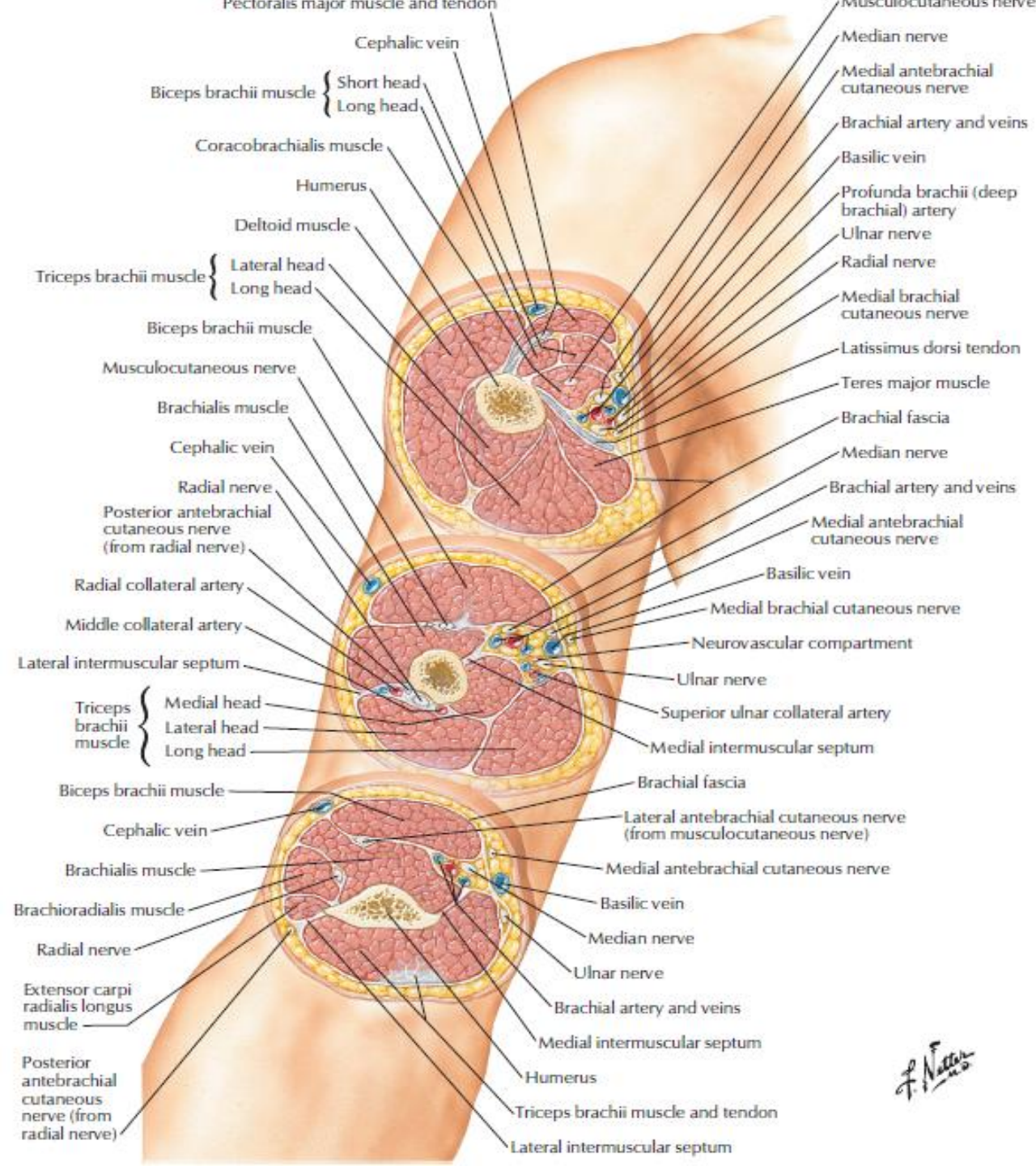
- ▶ The thickened deep fascia on the palmar side of the hand, centrally of which includes the palmar aponeurosis.

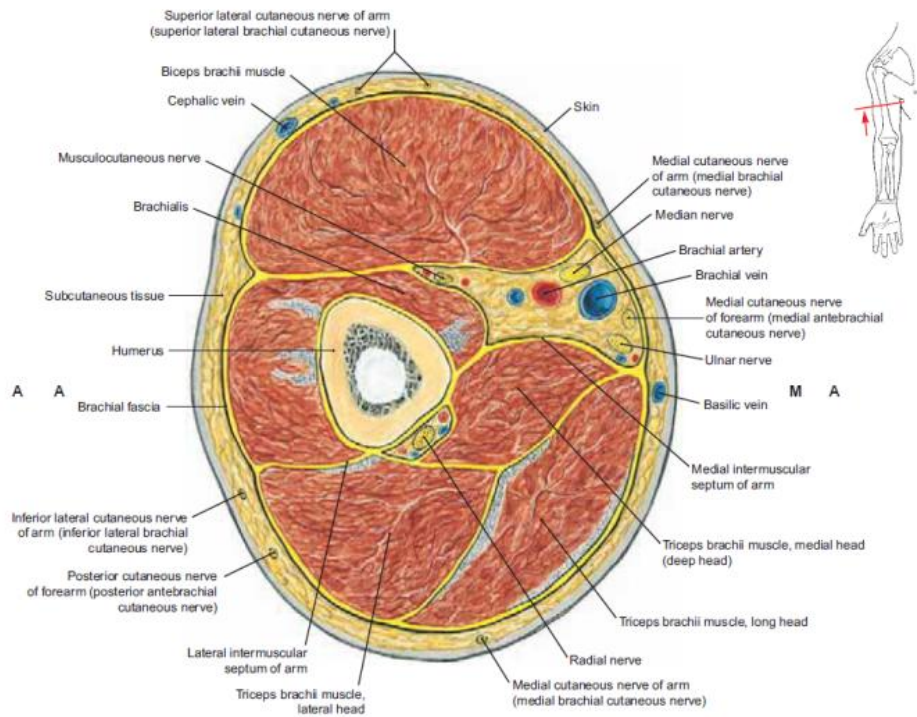




Conclusion

- ▶ Using the cross-sectional study of the upper limb helped improve the anatomical as well as the clinical correlation between the different structures located in the arm.
- ▶ This type of information organization has helped in understanding the different clinical approaches (especially amputation) of the upper limb.
- ▶ All of the information presented is important, is easy to understand for students who are beginning their medical education, and helps them by giving them a more practical application of anatomical structures.





132.1 Cross Section of the Right Upper Extremity through the Middle of the Humerus

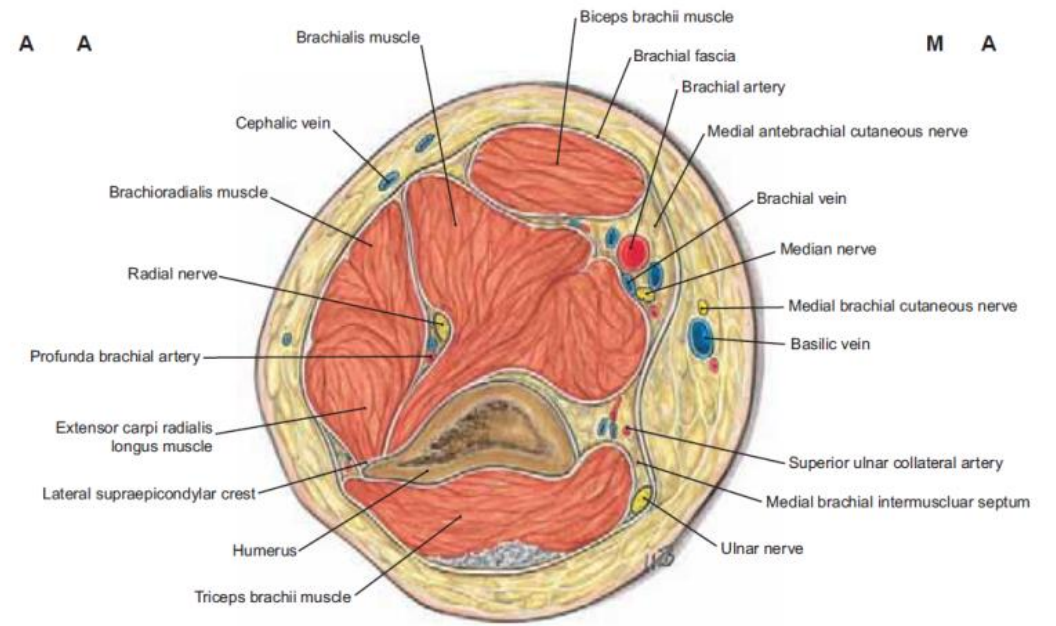


FIGURE 133.1 Transverse Section through the Lower Third of the Arm

NOTE the brachial artery, basilic vein, and the median, ulnar, and radial nerves.

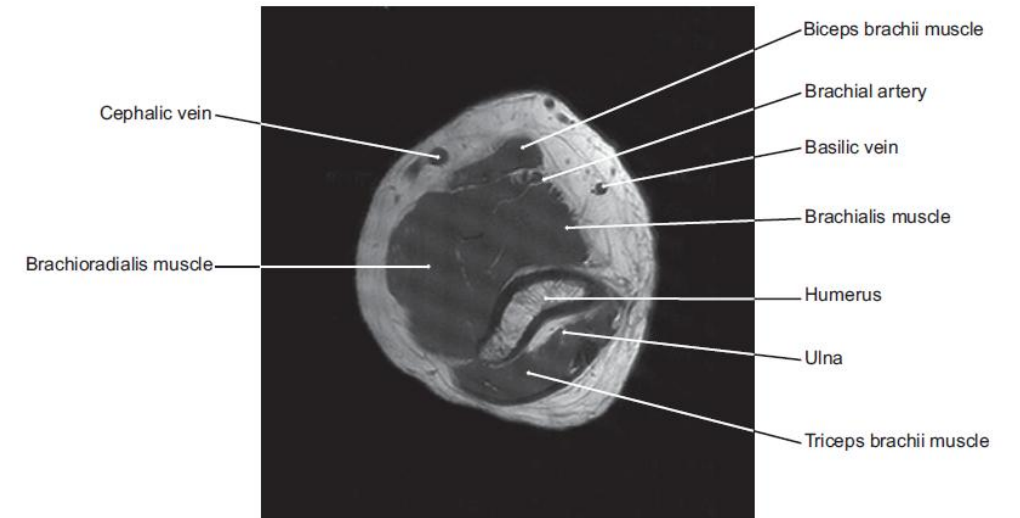
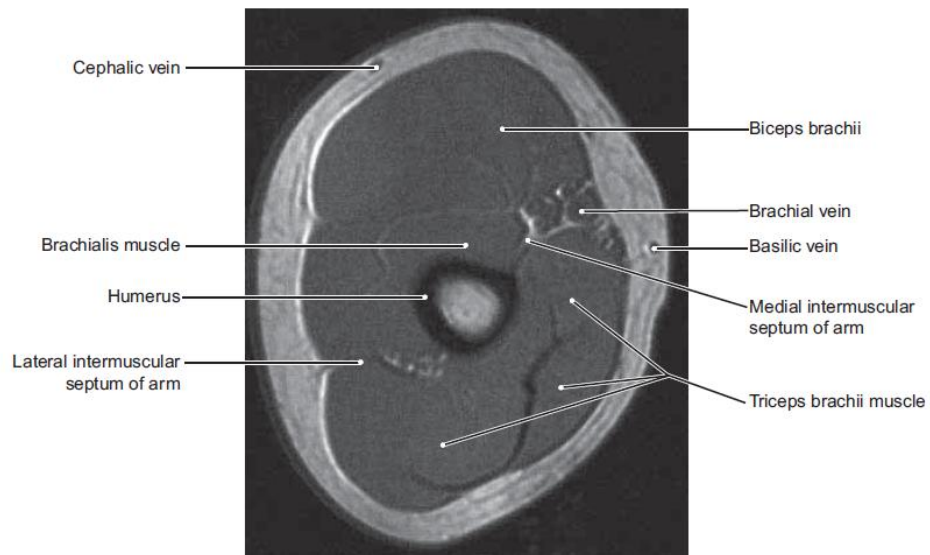


FIGURE 133.2 Magnetic Resonance Image (MRI). Cross Section at the Lower Third of the Arm

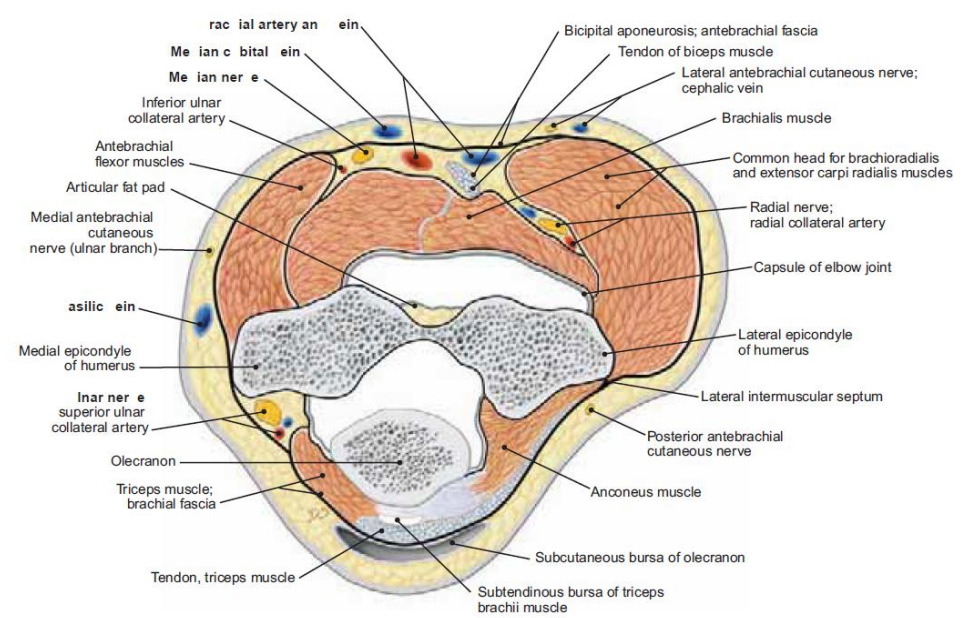
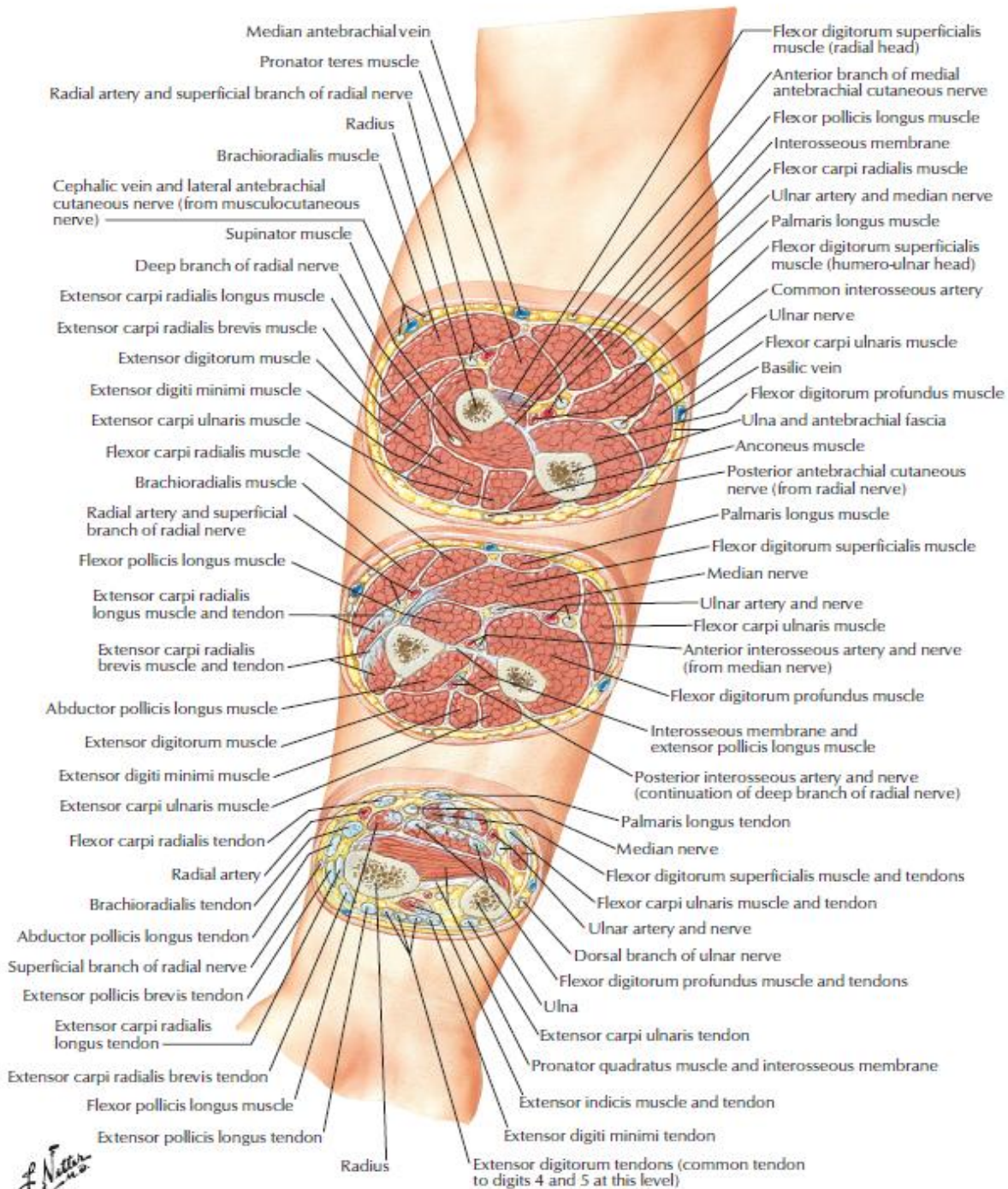


FIGURE 134.1 Cross Section through the Right Upper Extremity at the Level of the Elbow Joint

- NOTE: (1) The ulnar nerve and superior ulnar collateral artery lie behind the medial epicondyle of the humerus, medial to the olecranon of the ulna. (2) The median nerve lies to the ulnar (medial) side of the brachial vein and artery in the cubital fossa, and all three structures lie deep to the cubital fascia and median cubital vein. (3) At this level, the radial nerve and radial collateral artery lie between the common origins of the extensor muscles and the deeply located brachialis muscle.

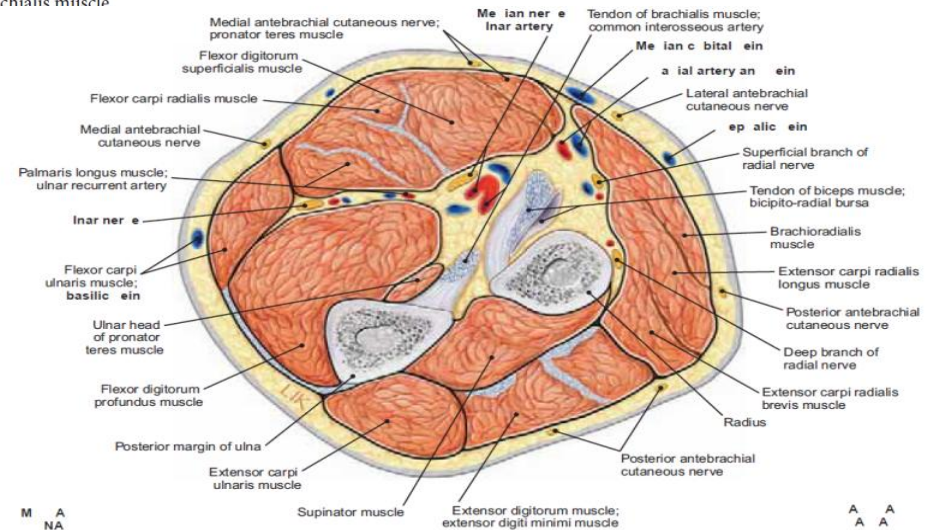


FIGURE 134.2 Cross Section through the Proximal Third of the Right Forearm

- NOTE: (1) The common interosseous artery branching from the ulnar artery and the insertions of the biceps brachii and brachialis muscles to the radius and ulna, respectively. (2) The radial nerve has already divided into its superficial and deep branches.

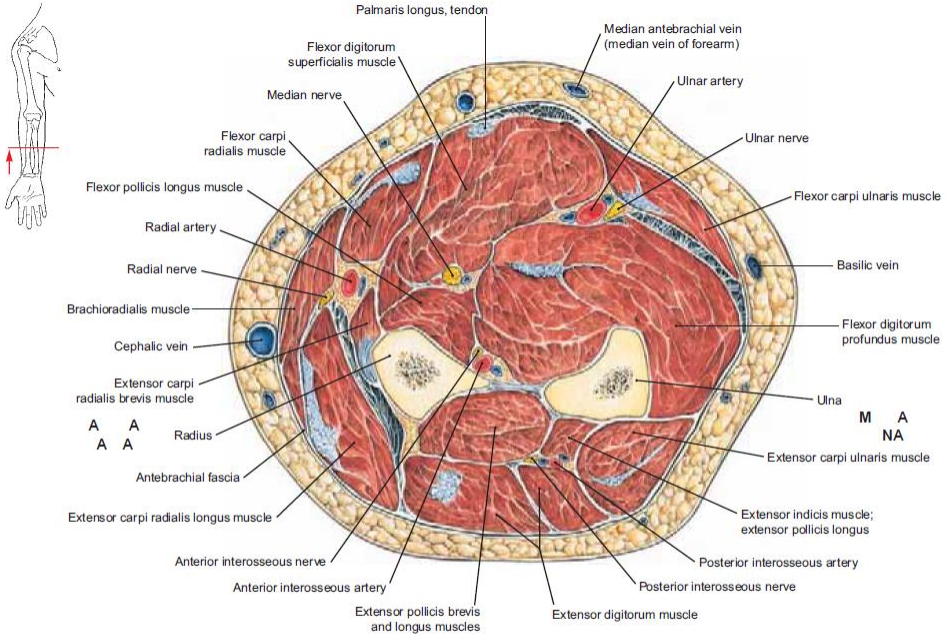


FIGURE 135.1 Cross Section through the Middle Third of the Right Forearm

NOTE: (1) At this level, the ulna, radius, interosseous membrane, and intermuscular septum clearly delineate the posterior compartment, extending dorsally and laterally, from the anterior compartment located anteriorly and medially.
 (2) The median nerve coursing down the forearm deep to the flexor digitorum superficialis and anterior to the flexor digitorum profundus and flexor pollicis longus.

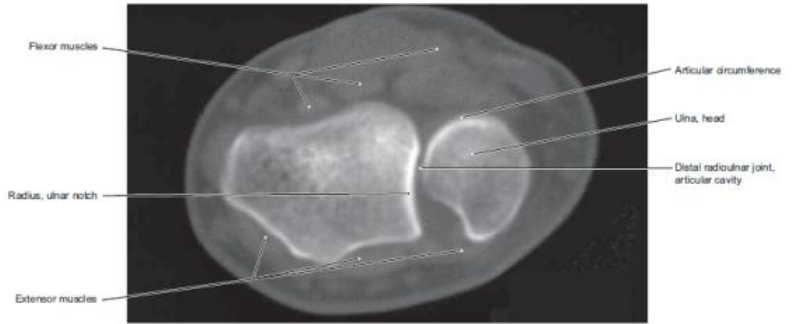


FIGURE 136.1 CT of the Right Distal Radioulnar Joint

NOTE: (1) The head of the ulna fits into the ulnar notch of the radius and the articular cavity of the distal radioulnar joint between.
 (2) The distal end of the radius is large, while its proximal end is relatively small. In contrast, the distal end of the ulna is small in comparison to the proximal end at the elbow joint. Compare with the bones in Figures 137.1 and 137.2.

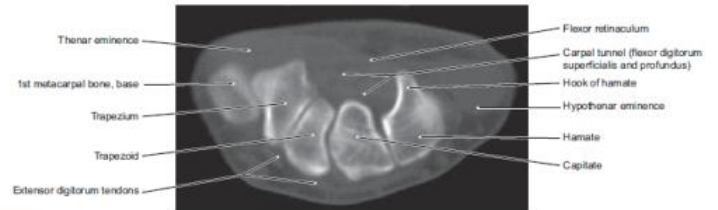


FIGURE 136.2 CT of the Right Wrist

NOTE: (1) This image is taken at the level of the distal row of carpal bones (from lateral to medial: trapezium, trapezoid, capitate, and hamate).
 (2) The base of the first metacarpal bone as it articulates proximally with the trapezium to form the carpometacarpal joint of the thumb. Compare this figure with the radiograph in Figure 127.
 (3) The hook (hamulus) of the hamate bone projects from the palmar surface of the bone. It can be felt through the skin over the proximal part of the hand.

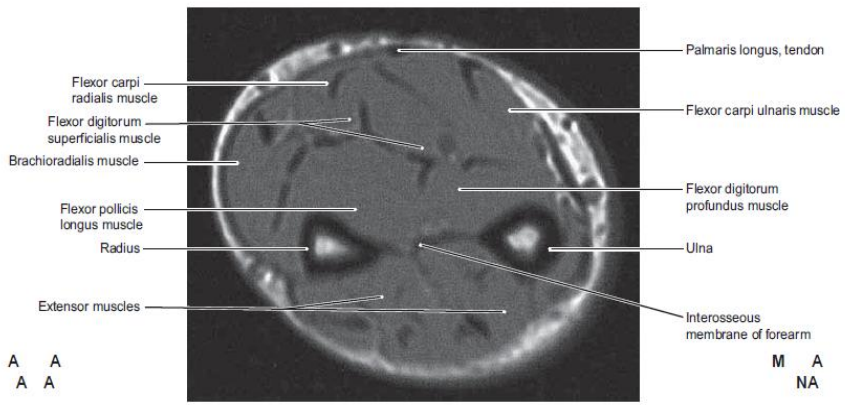


FIGURE 135.2 Transverse MRI Section through the Middle of the Forearm

NOTE that this figure should be compared with Figure 135.1. Observe the locations of the anterior and posterior forearm muscle groups and judge where the important vessels and nerves would be found in the MRI.

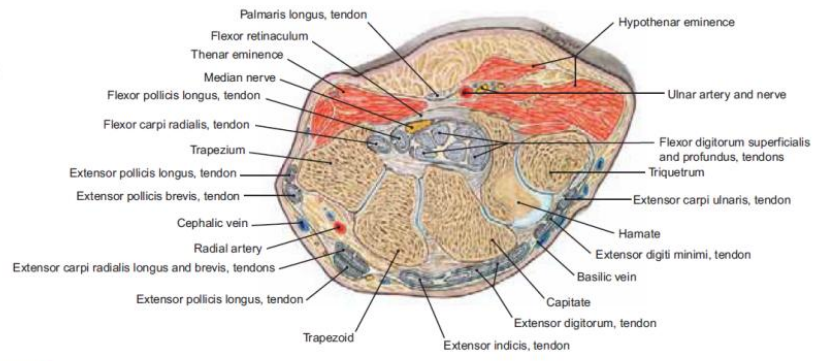
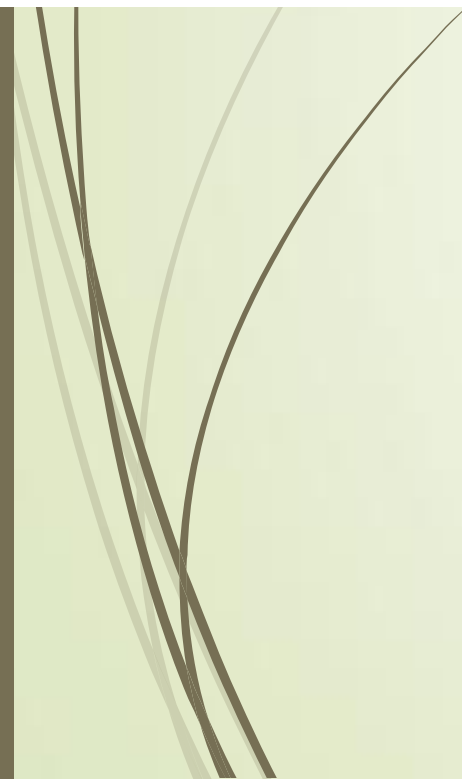
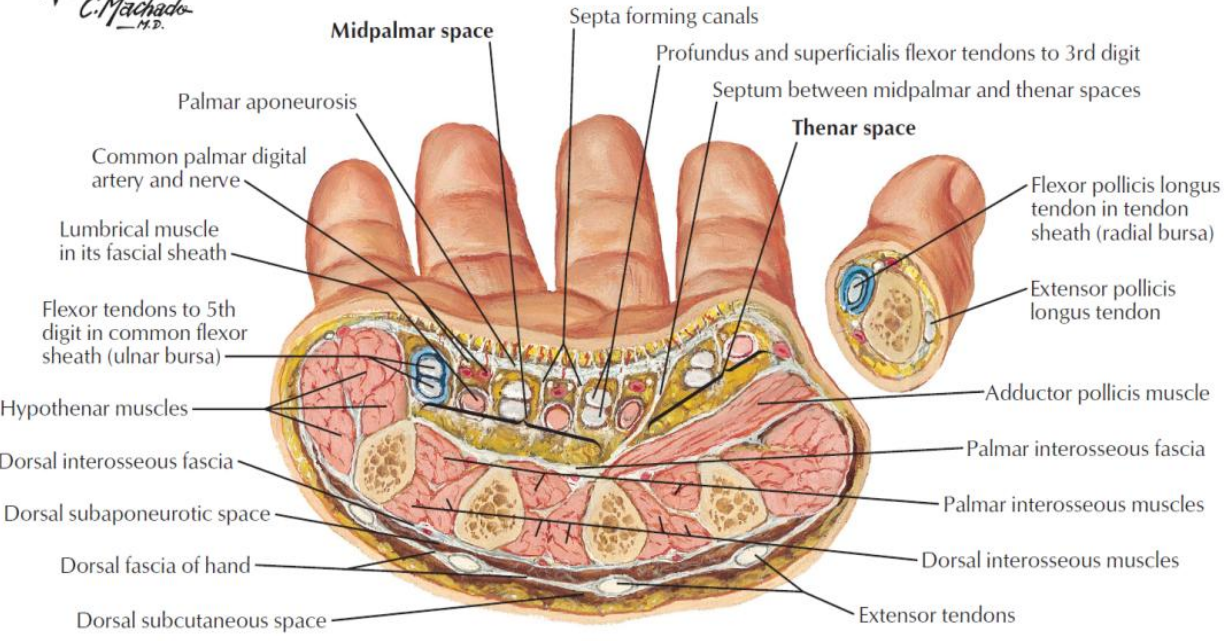


FIGURE 137.1 Transverse Section through the Wrist Joint

NOTE: (1) This cross section is at the level of the distal row of carpal bones. Compare the carpal bones in this section with the figures in Plate 91.
 (2) The locations of the median nerve in the carpal tunnel and the ulnar nerve and artery superficial to the carpal tunnel adjacent to the hypothenar muscles.
 (3) The strong flexor retinaculum bounds the carpal tunnel anteriorly, while the carpal bones bound the tunnel posteriorly. In addition to the median nerve, the flexor tendons enter the hand within the tunnel.
 (4) Significant trauma to this region of the hand can result in excessive pressure on the median nerve; this condition is called carpal tunnel syndrome, and it severely limits the functions of the thenar muscles supplied by the median nerve.



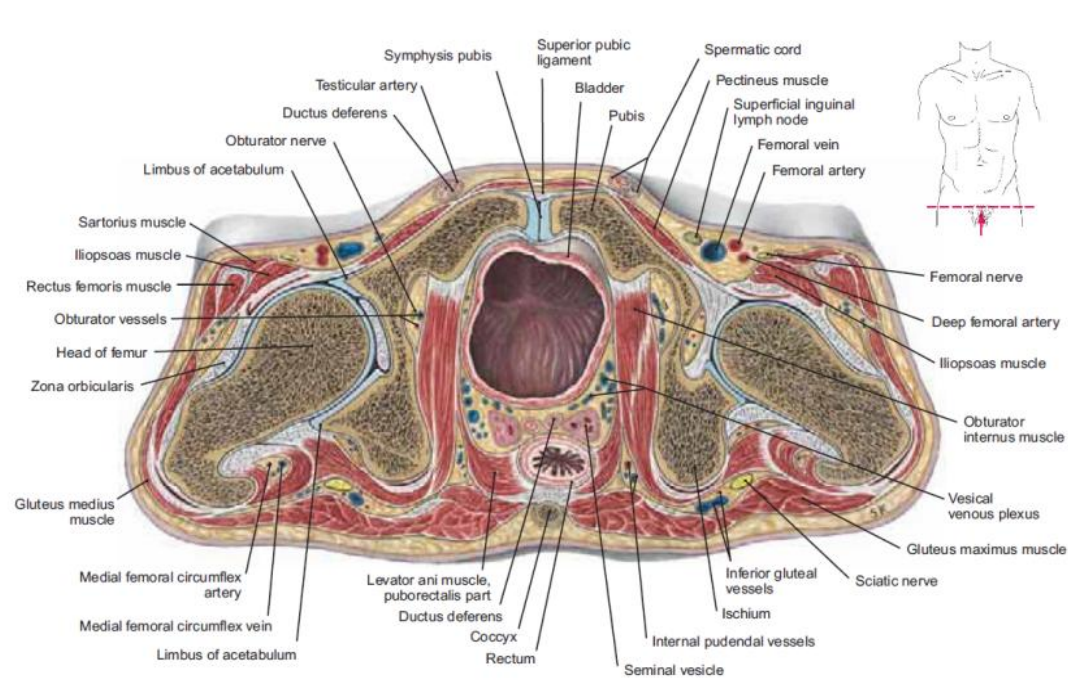
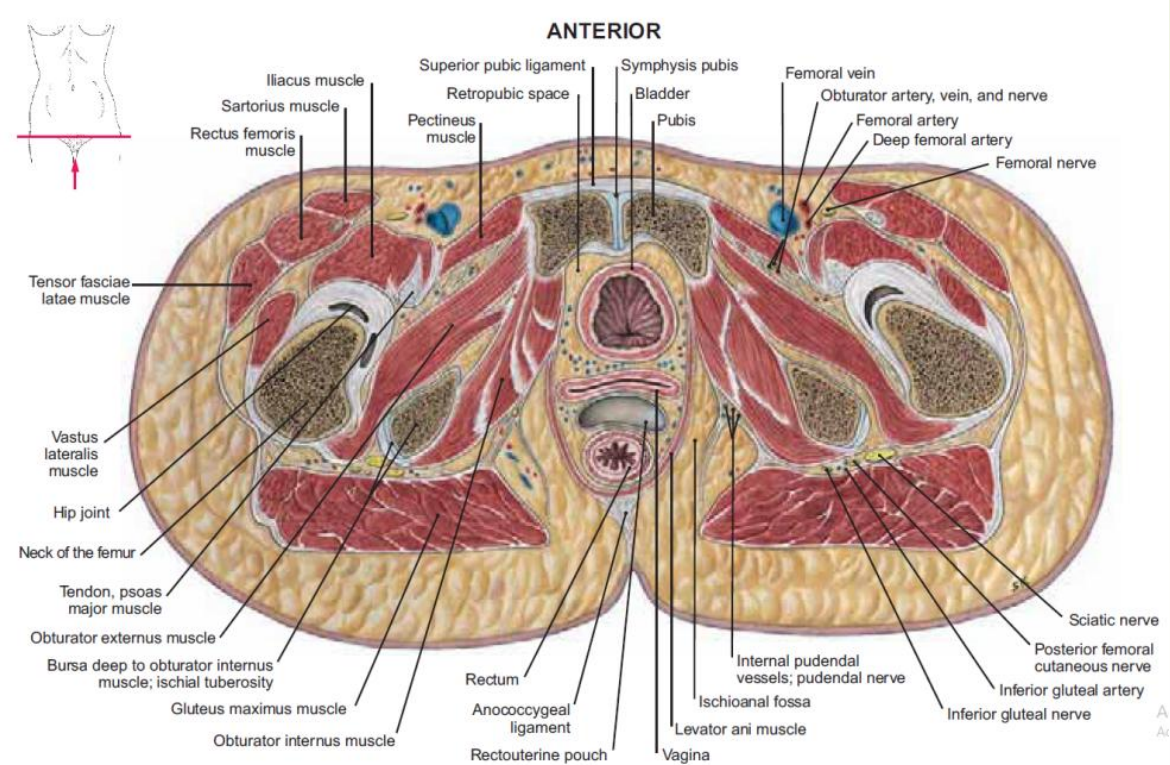


FIGURE 364.1 Cross Section of the Male Pelvis at the Level of the Symphysis Pubis

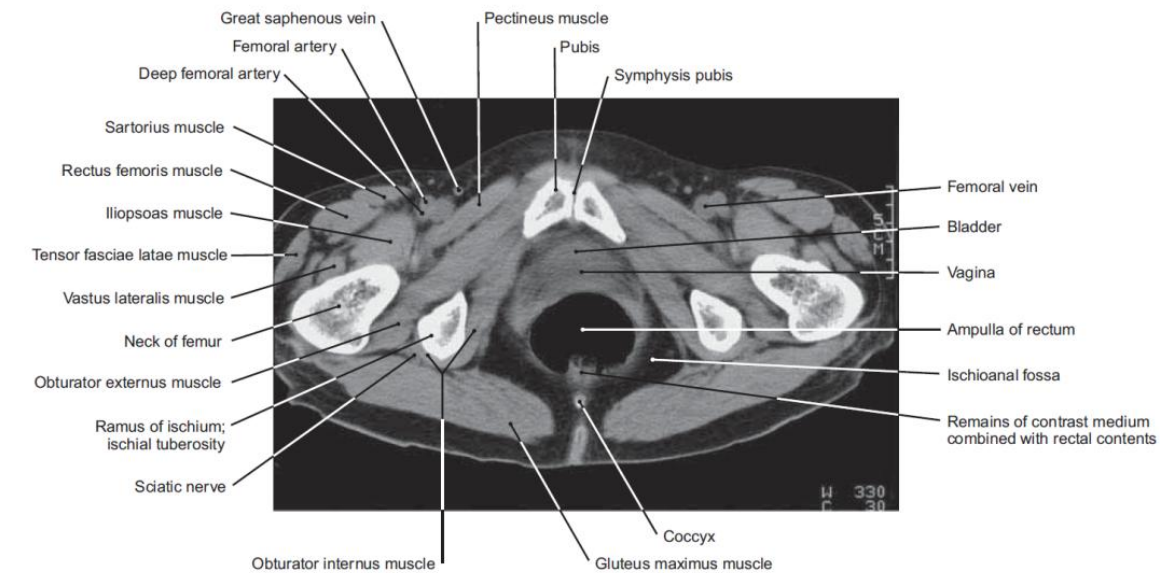


FIGURE 363.2 CT of the Female Pelvis Taken from Below

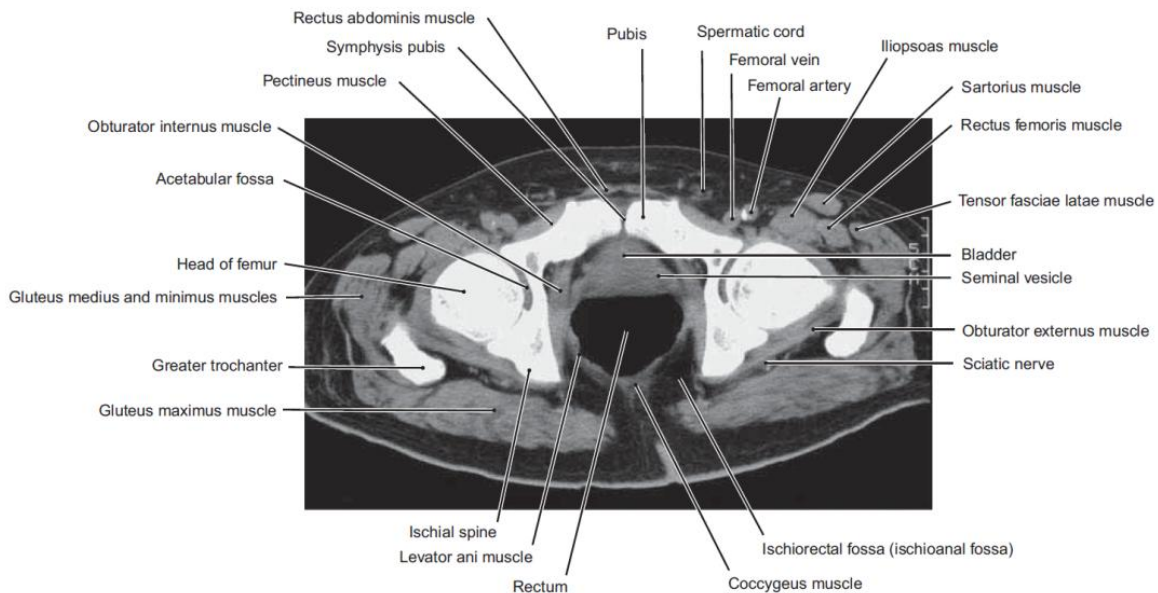
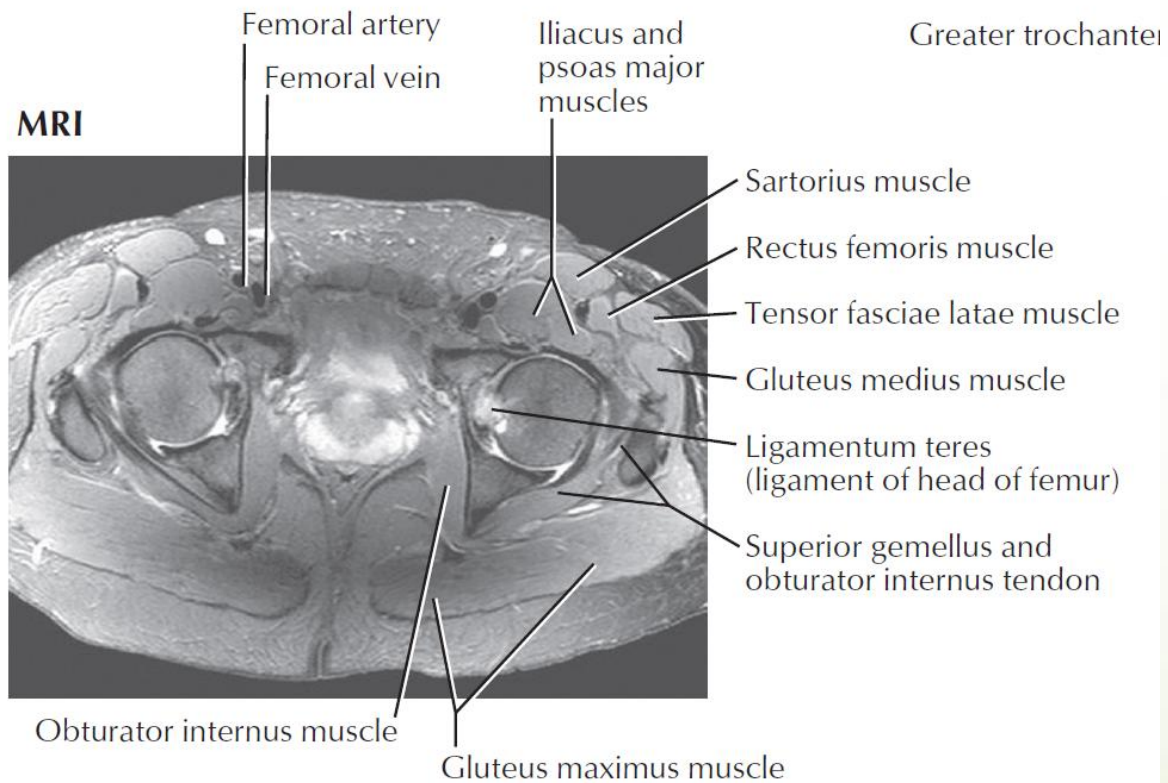
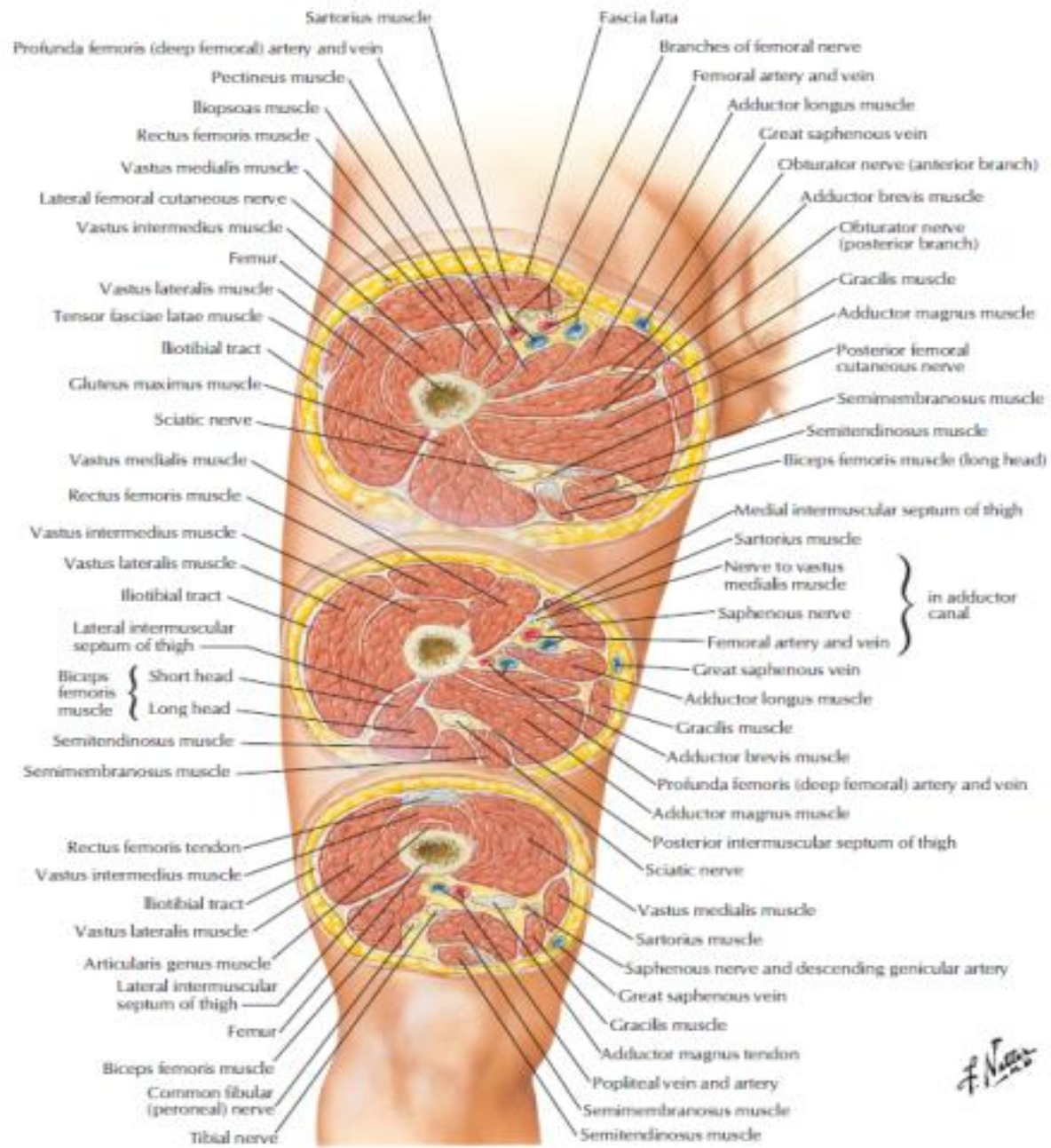
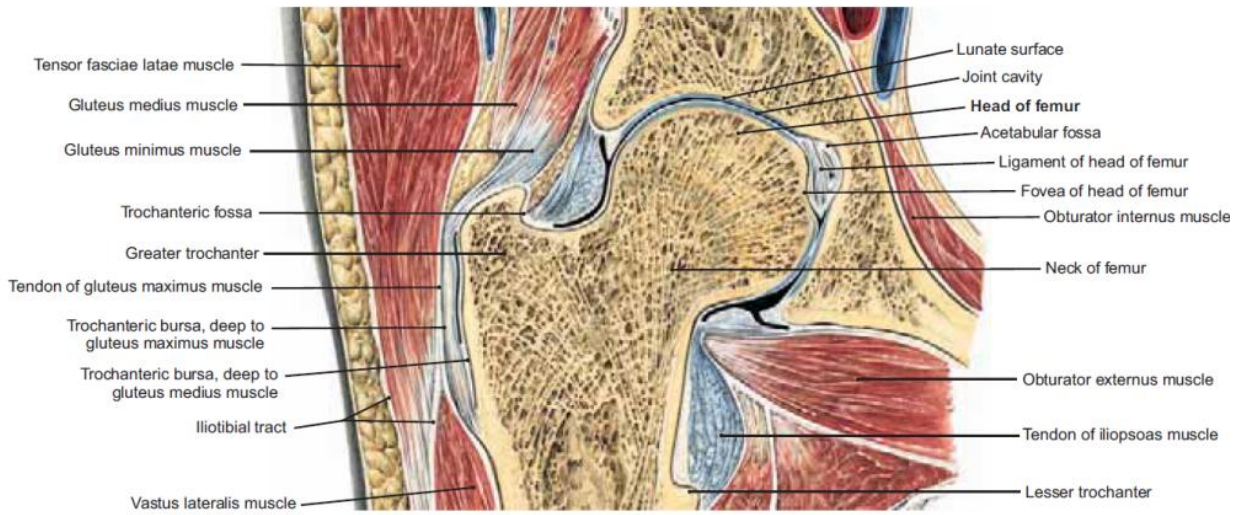
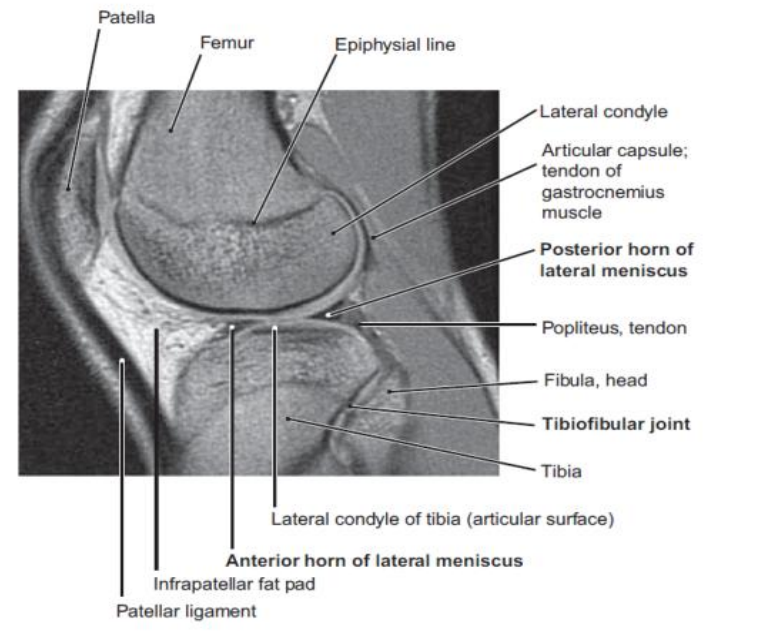
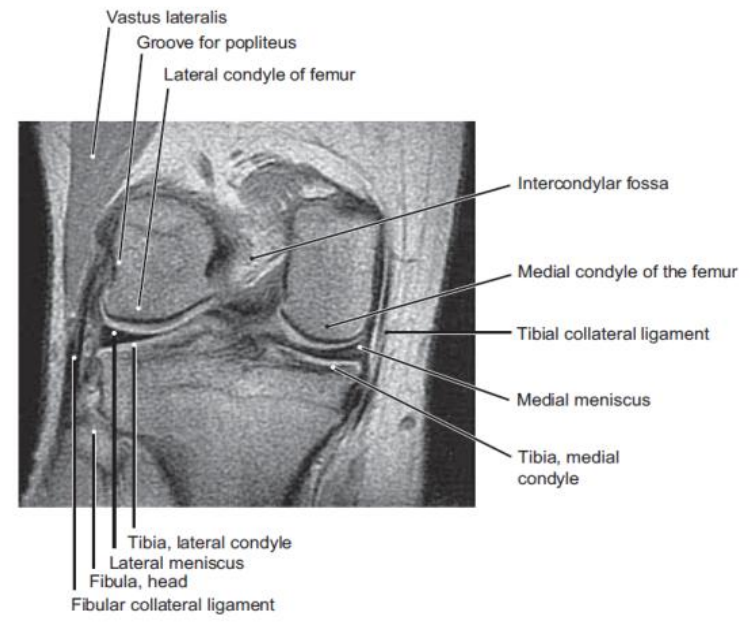
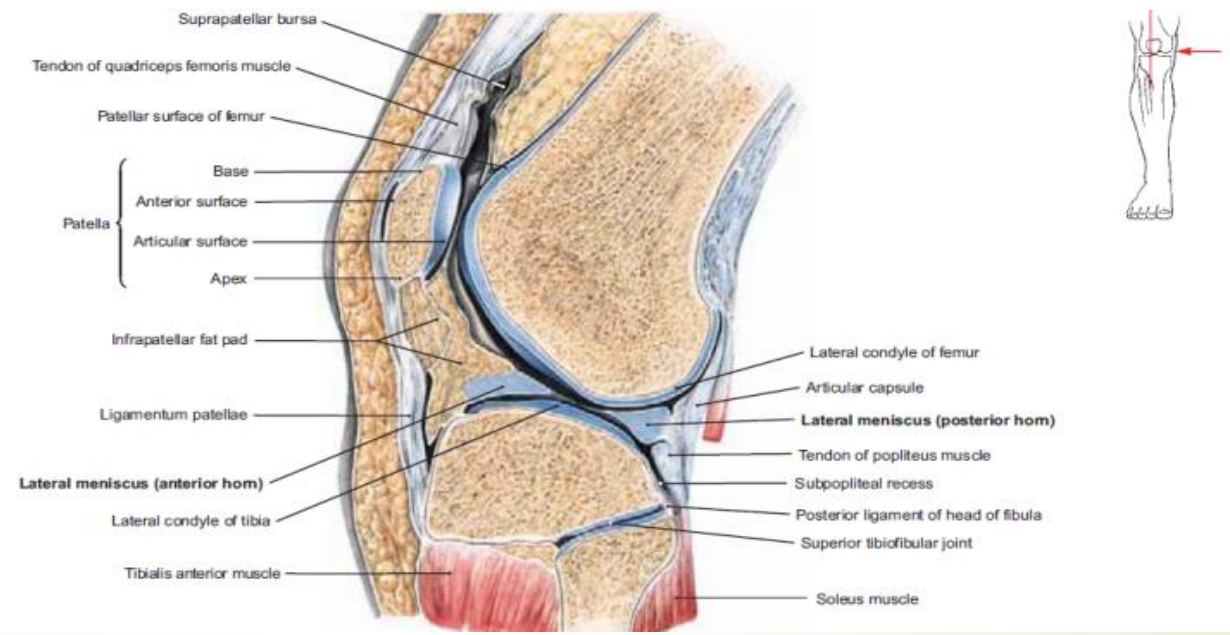
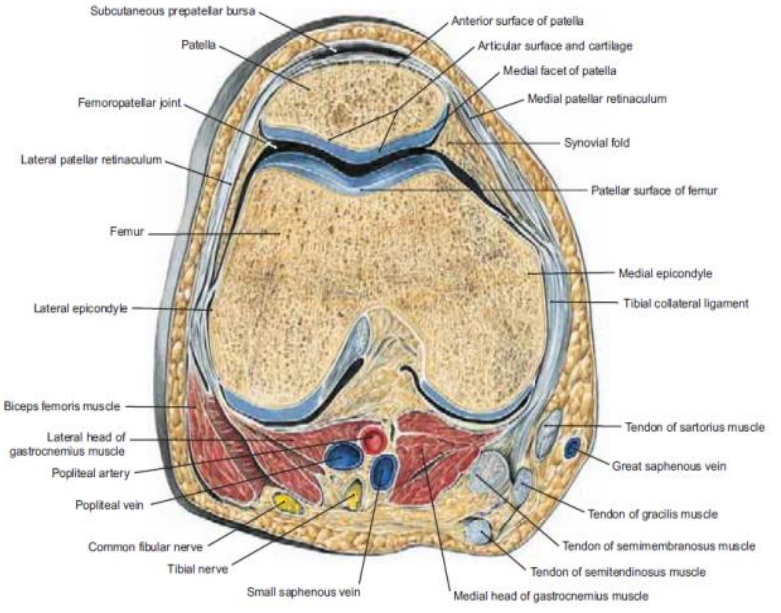


FIGURE 364.2 CT of the Male Pelvis Taken from Below



F. Nager



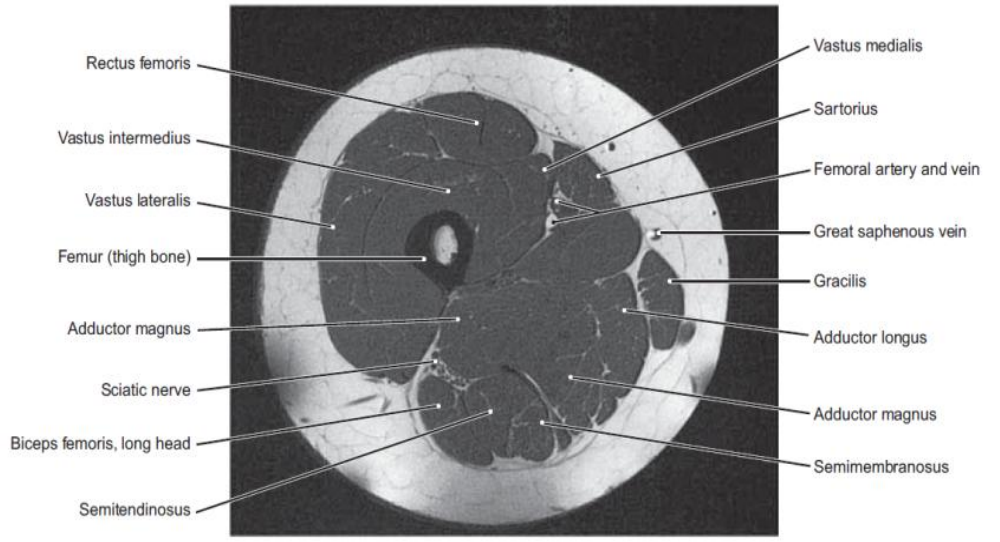
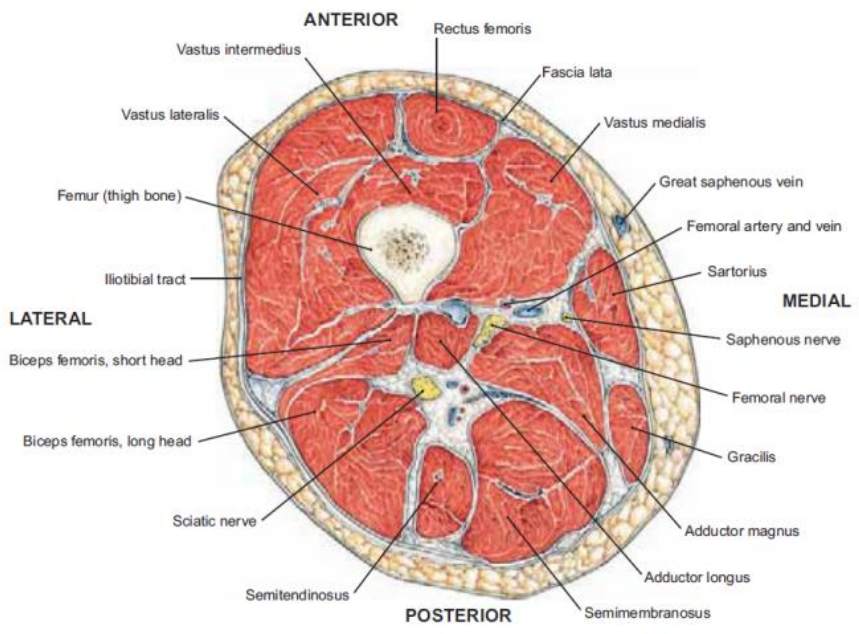
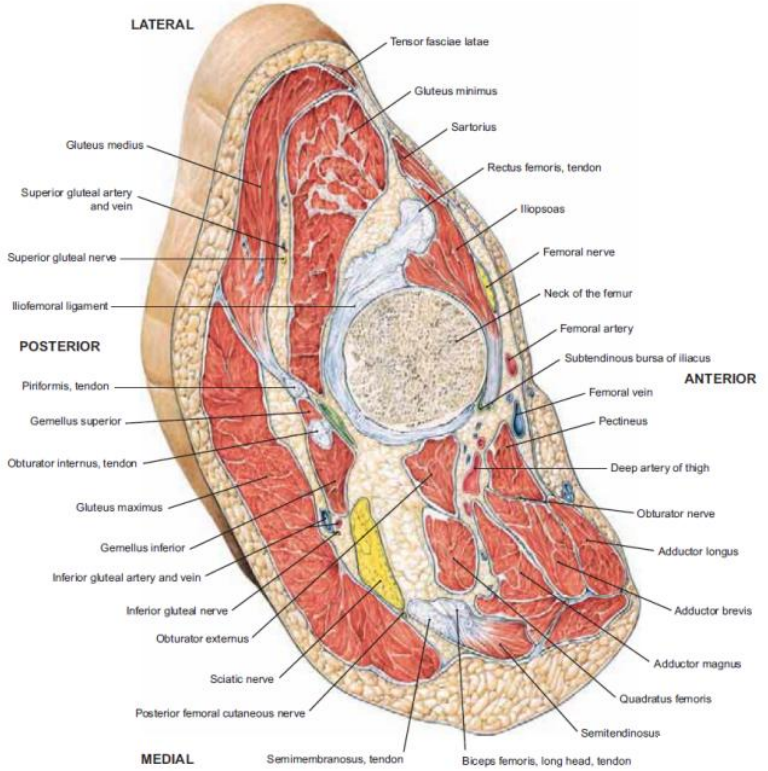
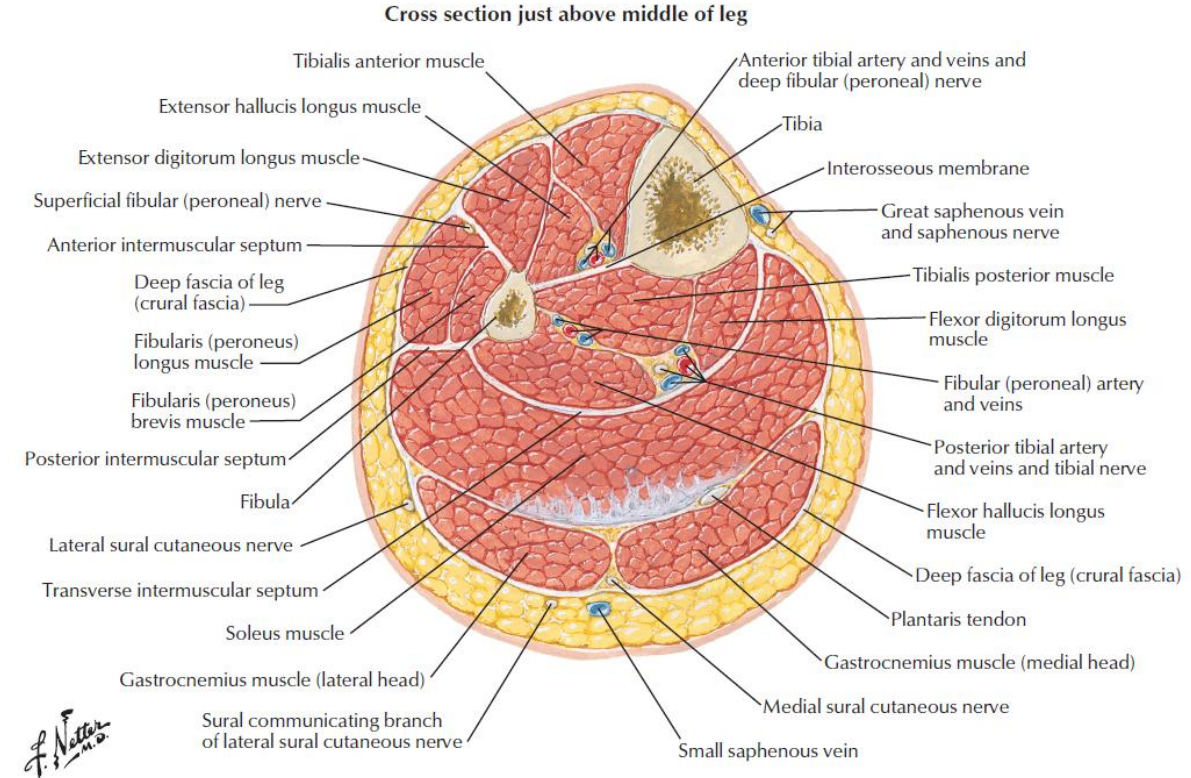
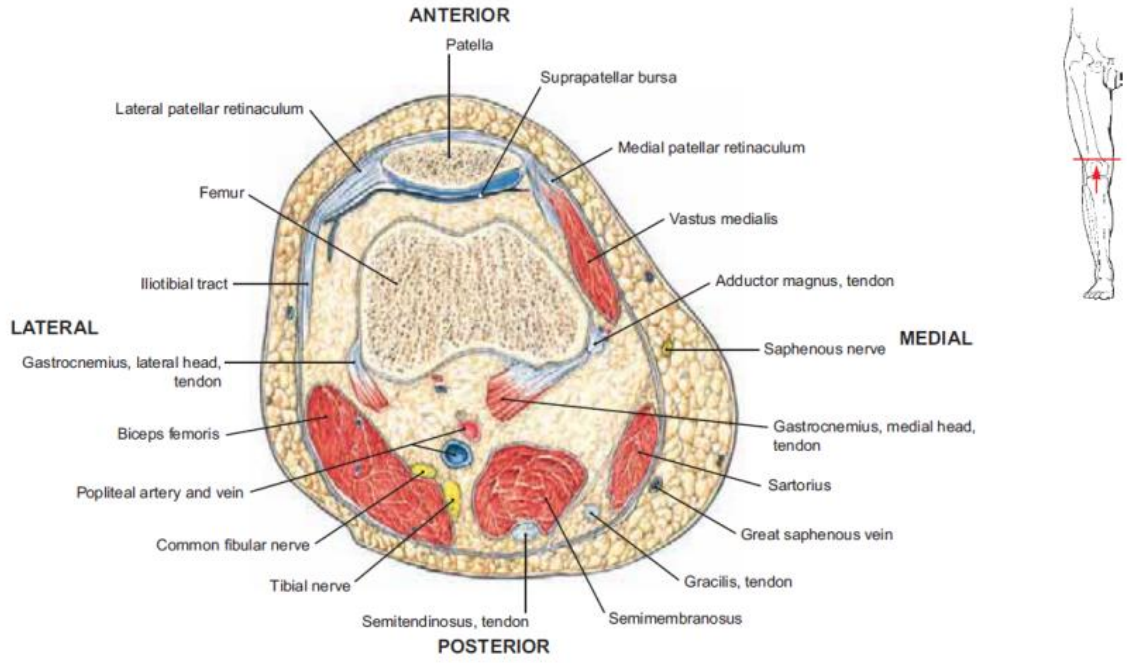


FIGURE 511.2 MRI Near the Middle of the Right Thigh



F. Netter M.D.

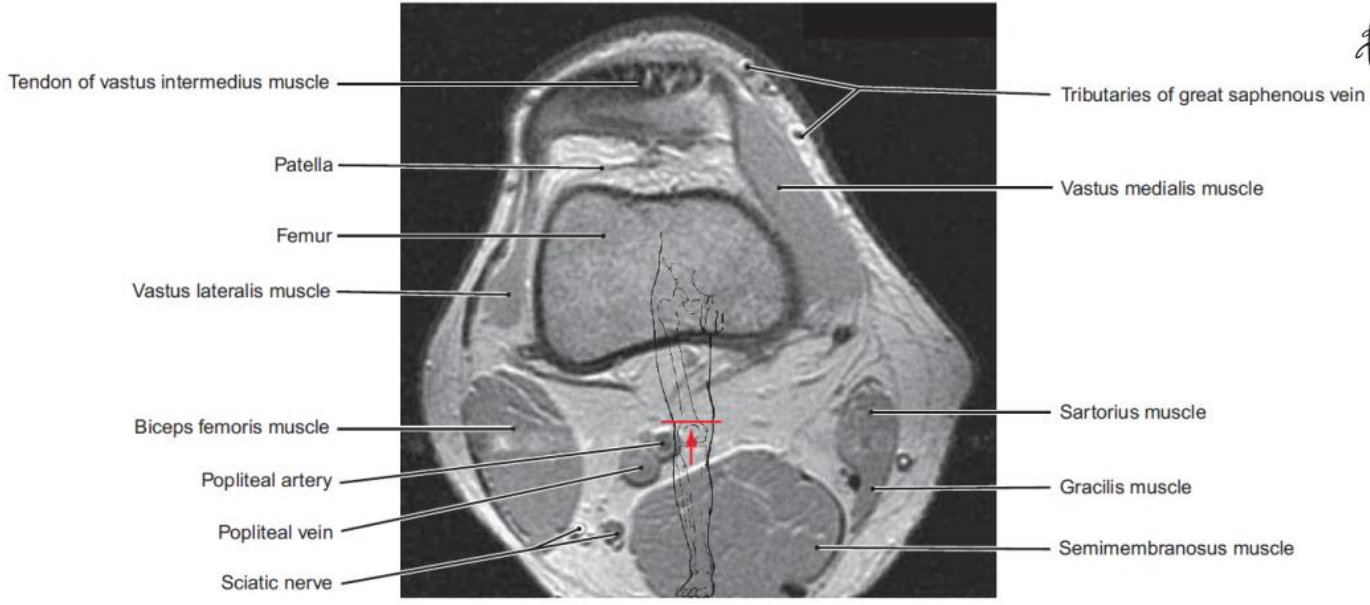
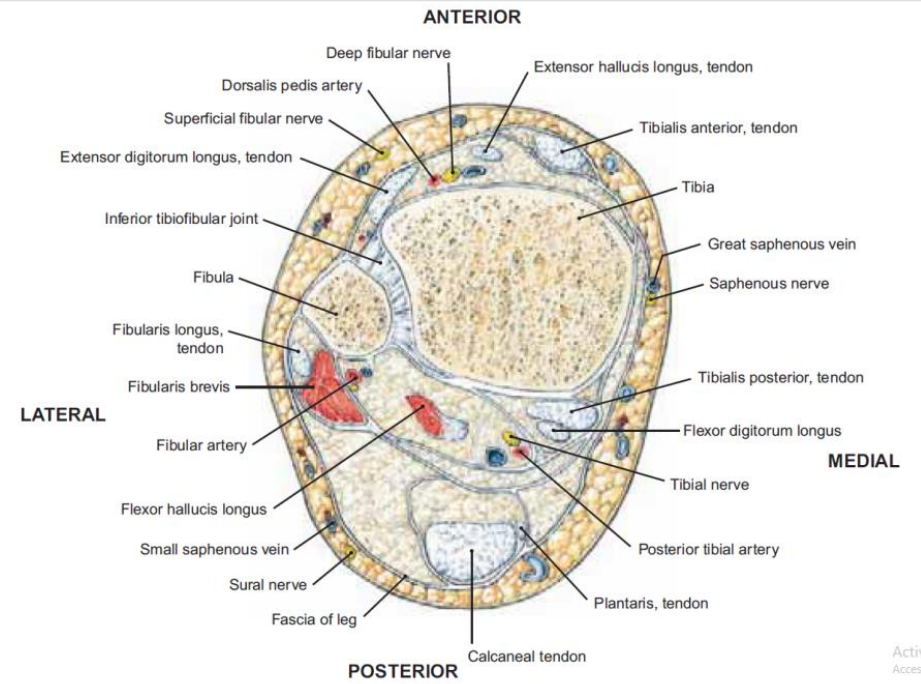
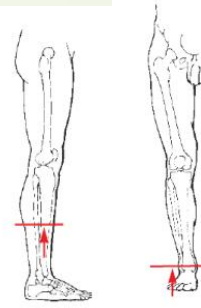
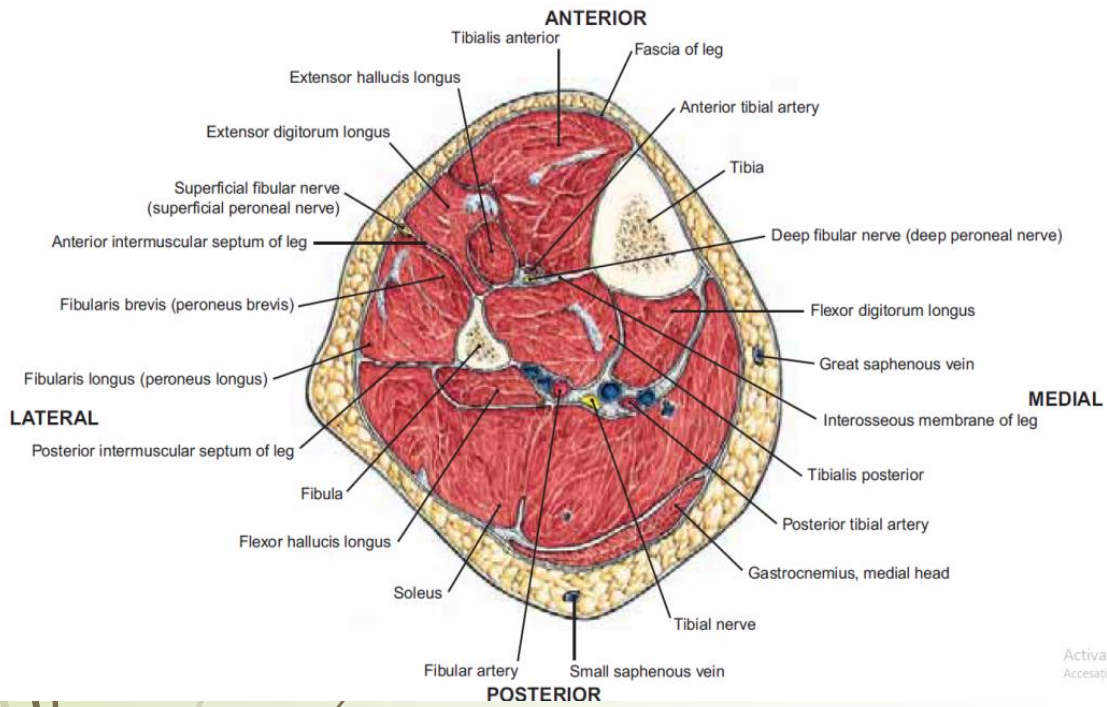


FIGURE 512.2 MRI: Cross Section through the Distal Part of the Right Thigh



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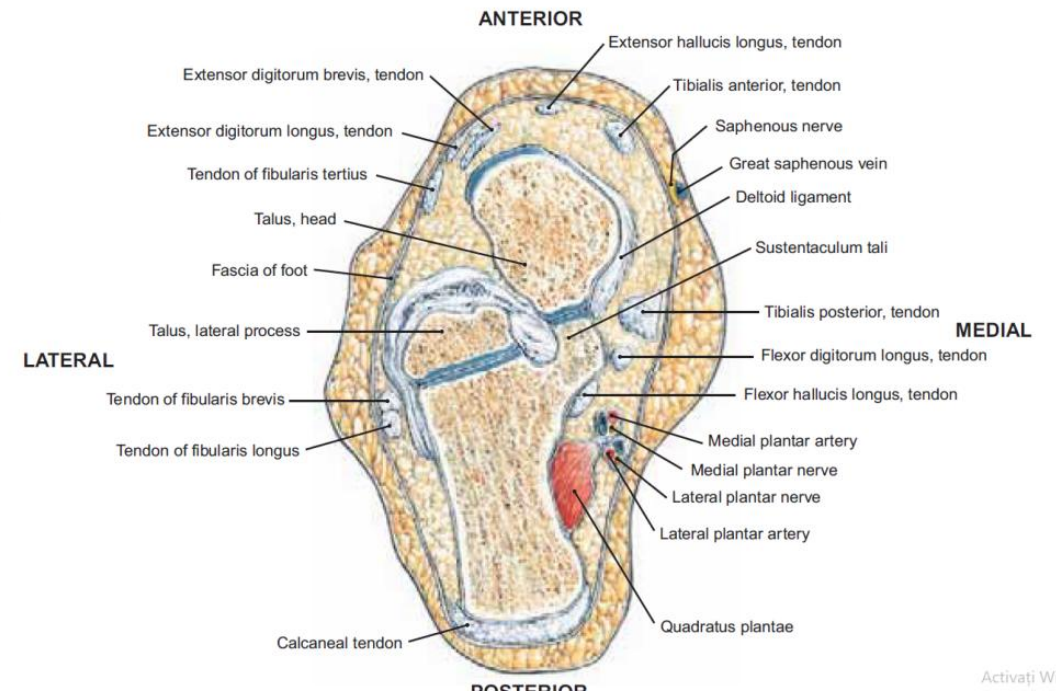
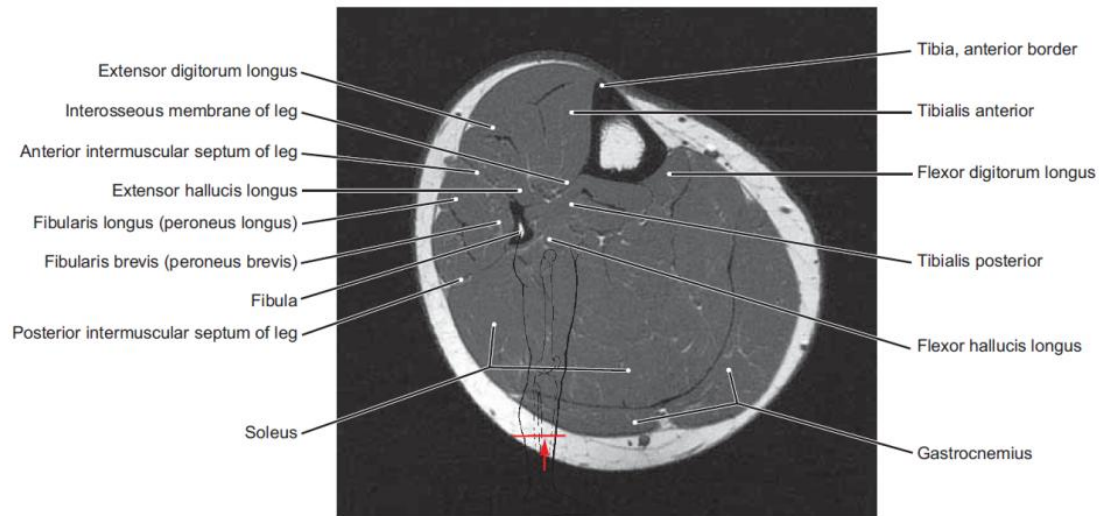
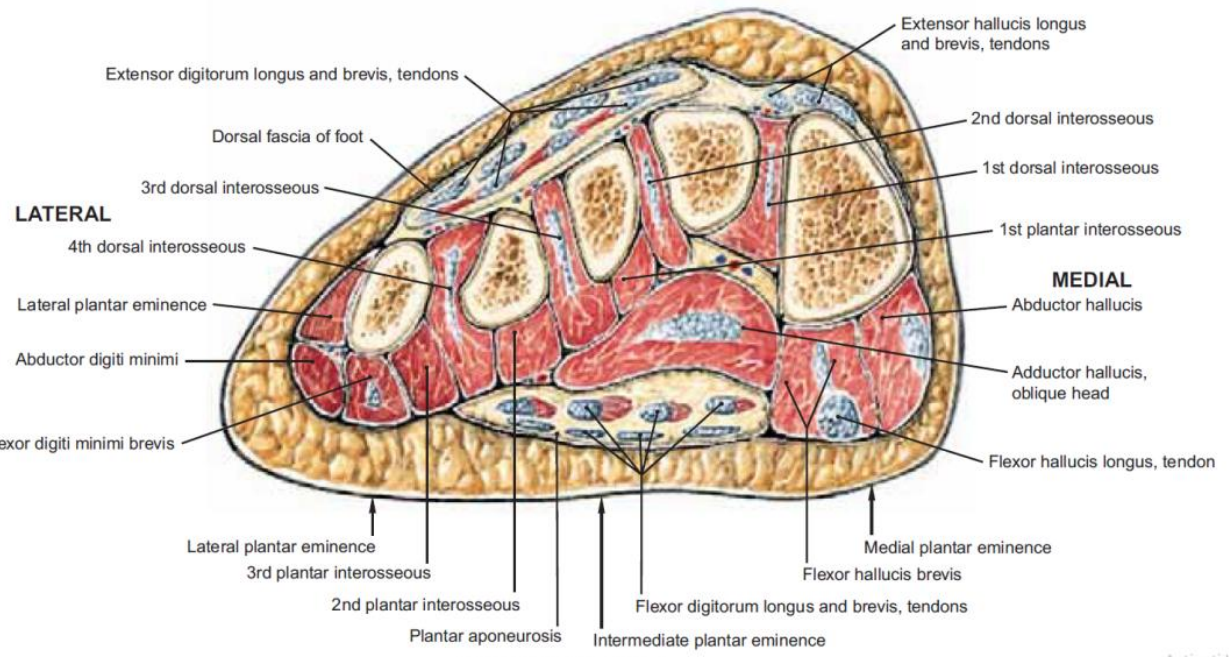


FIGURE 513.2 MRI: Cross Section through the Middle of the Right Leg

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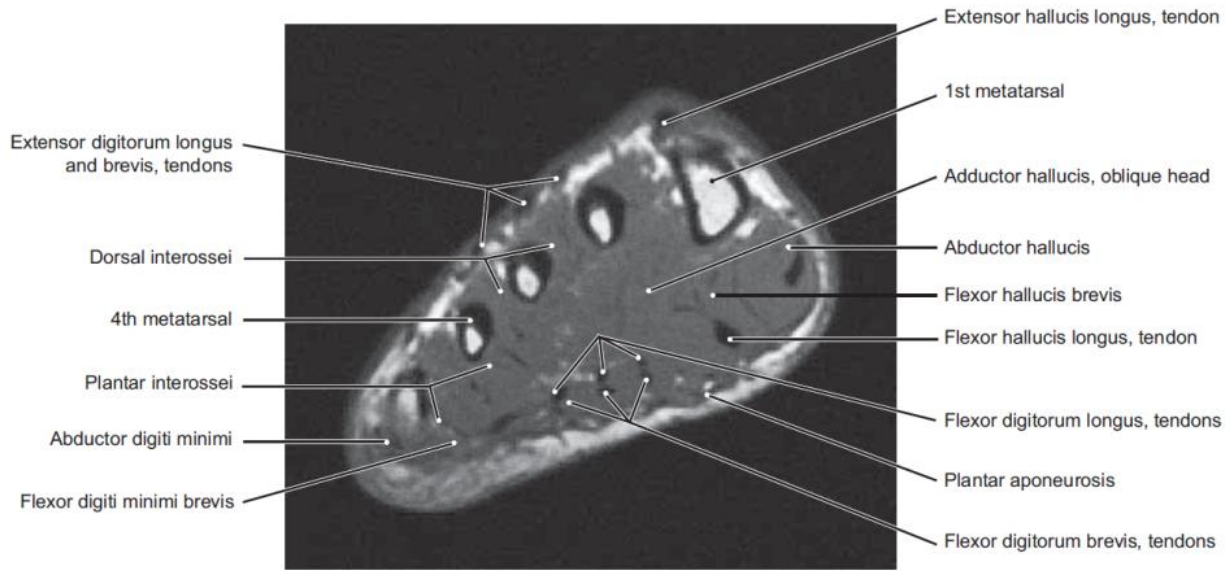


FIGURE 515.2 MRI through the Metatarsal Bones of the Right Foot