ARM, CUBITAL FOSSA & ELBOW JOINT

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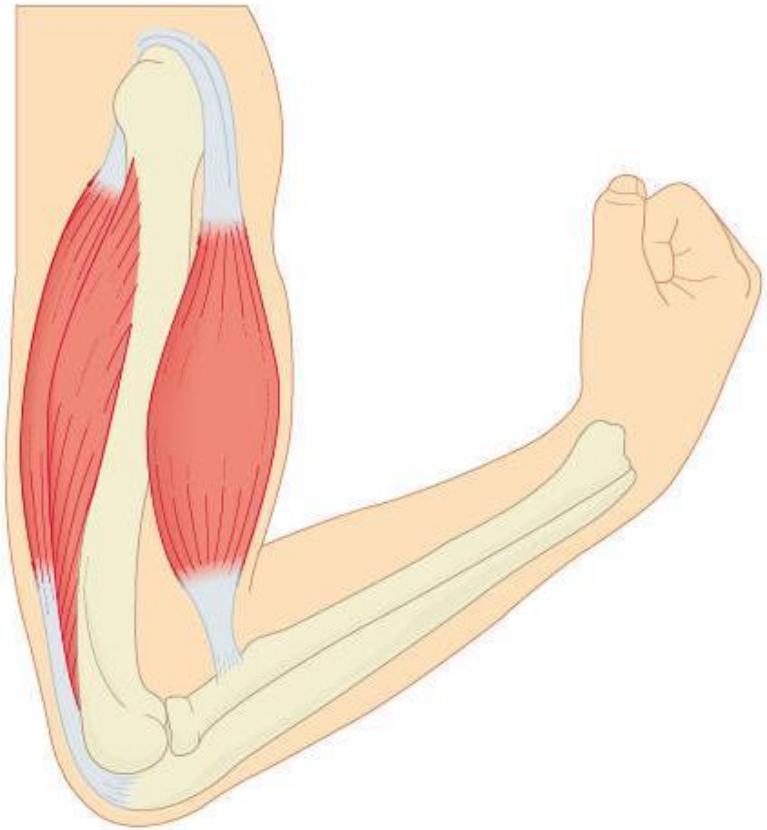
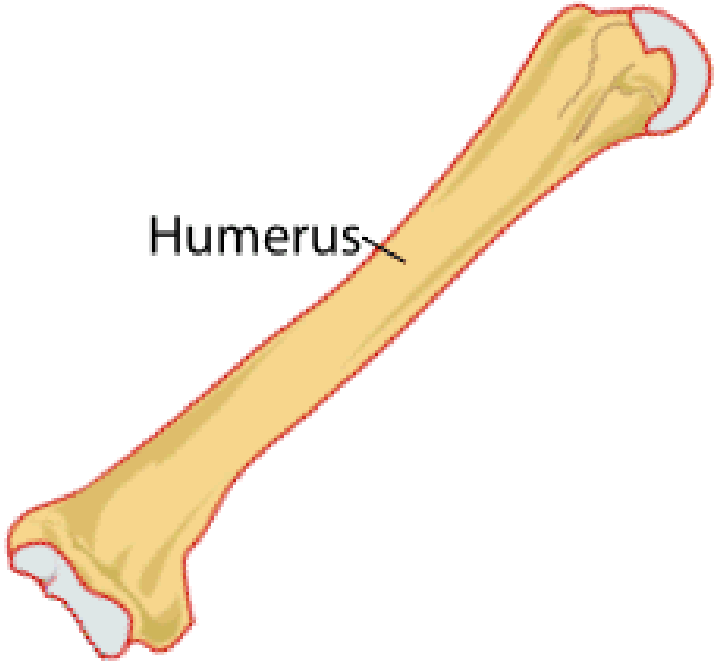
OBJECTIVES

At the end of the lecture, students should:

- Describe the attachments, actions and innervations of:
  - Biceps brachii
  - Coracobrachialis
  - Brachialis
  - Triceps brachii
- Demonstrate the following features of the elbow joint:
  - Articulating bones
  - Capsule
  - Lateral & medial collateral ligaments
  - Synovial membrane
- Demonstrate the movements; flexion and extension of the elbow.
- List the main muscles producing the above movements.
- Define the boundaries of the cubital fossa and enumerate its contents.

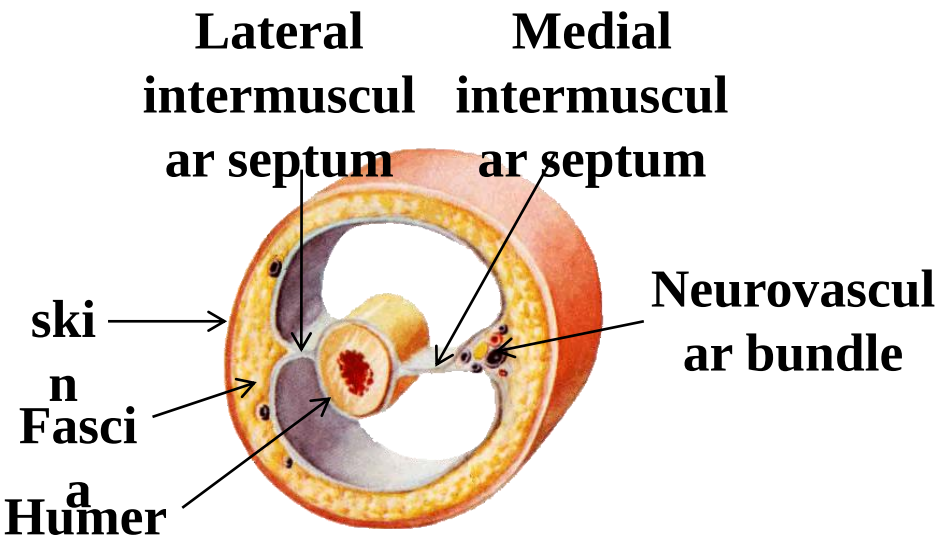
THE ARM

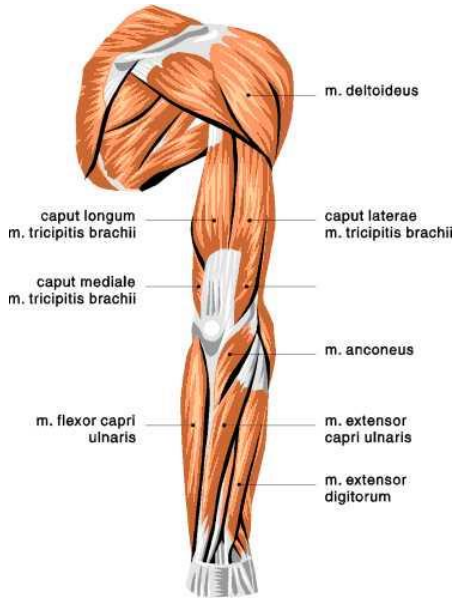




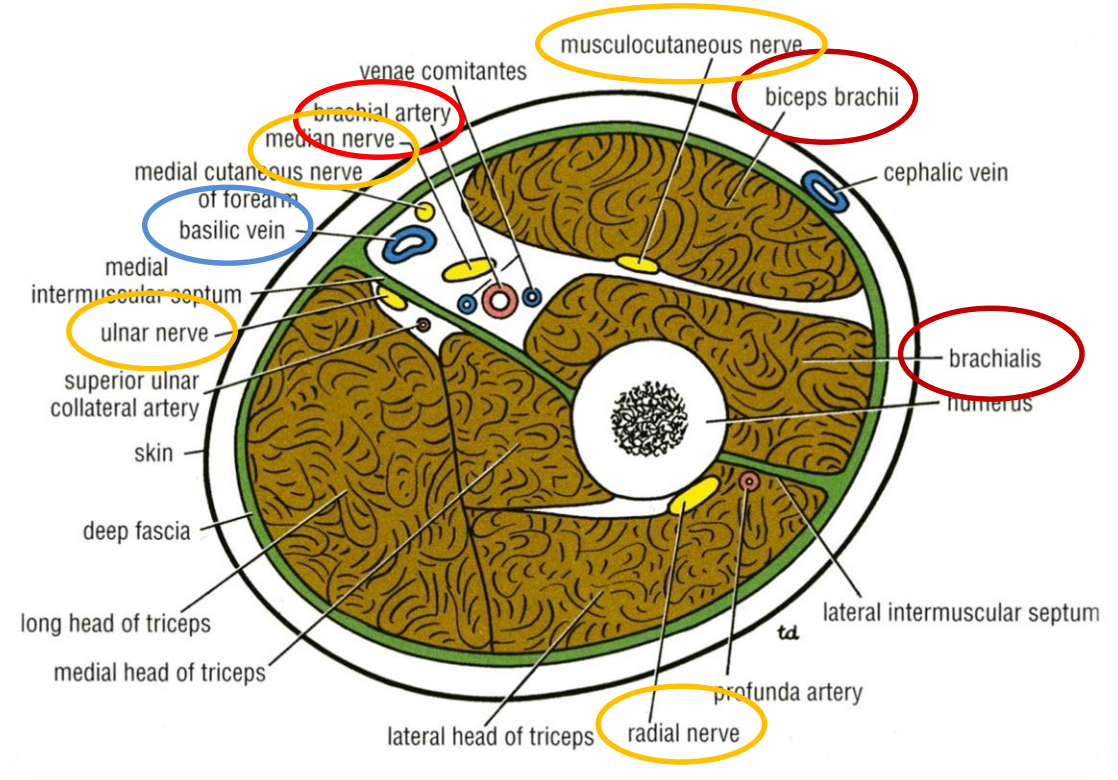
THE ARM

- An aponeurotic sheet separating various muscles of the upper limbs, including lateral and medial humeral septa.
- The lateral and medial intermuscular septa divide the distal part of the arm into two compartments:
  - **Anterior compartments**
    - also known as the flexor compartment
  - **Posterior compartments**
    - also known as the extensor compartment



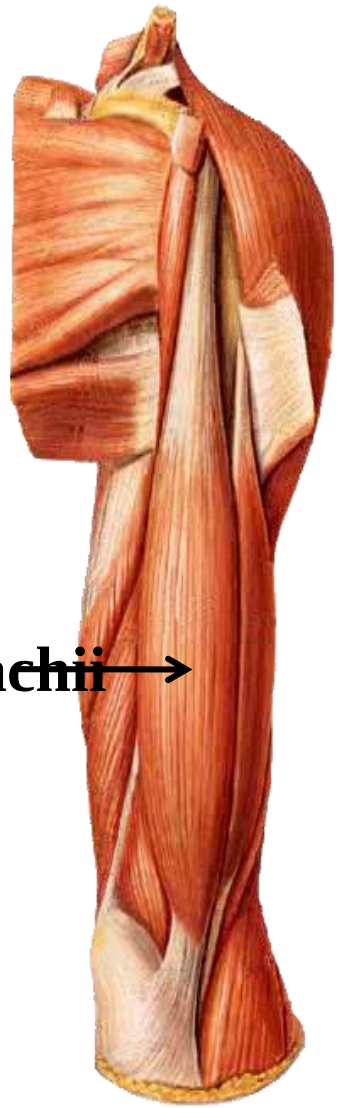


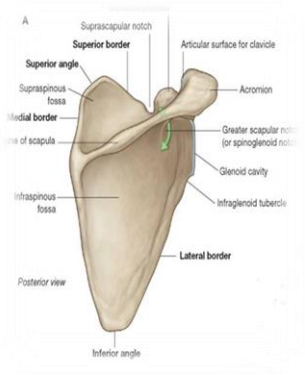
ANTERIOR FASCIAL COMPARTMENT



- **Muscles: Biceps brachii, Coracobrachialis &Brachialis.**
- **Blood Vessels: Brachial artery & Basilic vein.**
- **Nerves: Musculocutaneous and Median.**

MUSCLES OF ANTERIOR COMPARTMENT





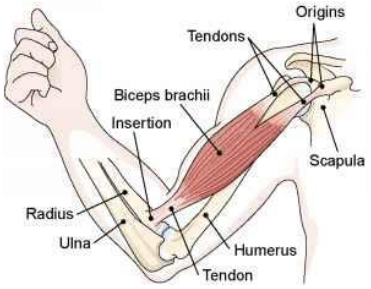
Biceps Brachii →

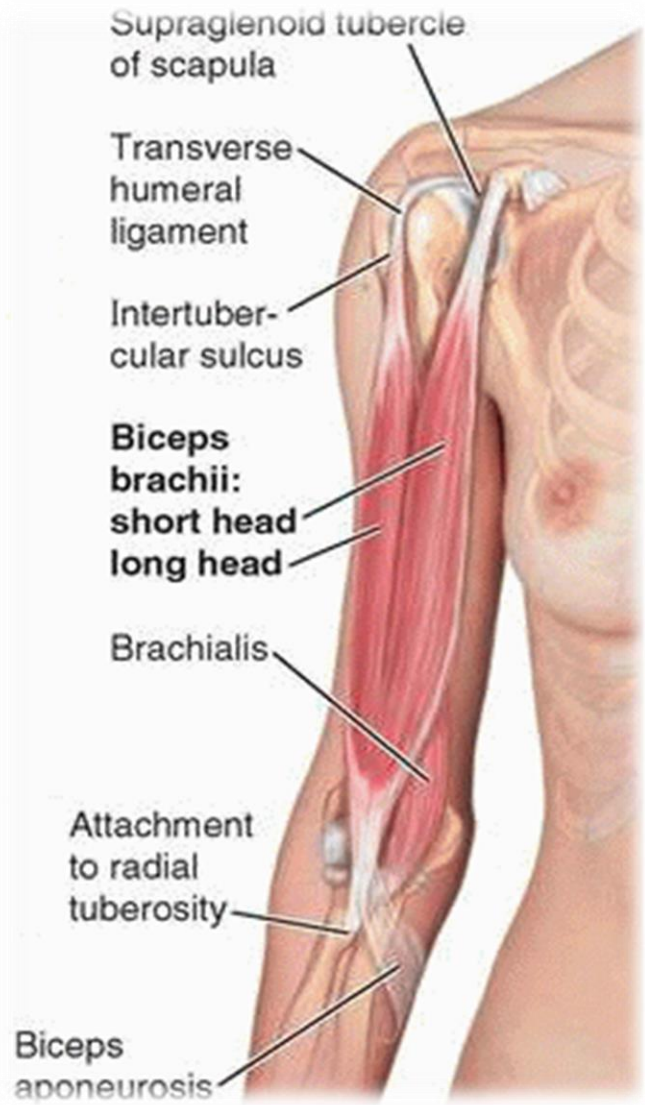
Coracobrachialis →

Brachialis →

BICEPS BRACHII

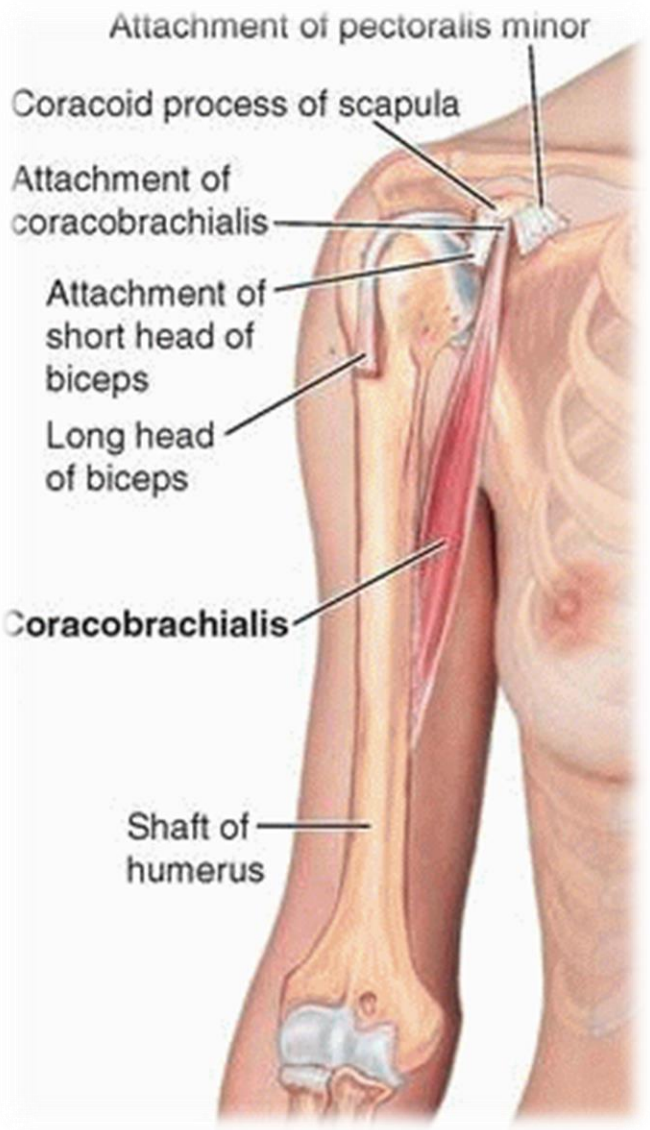
- **Origin:** Two heads:
  - **Long Head** from supraglenoid tubercle of scapula (intracapsular)
  - **Short Head** from the tip of coracoid process of scapula
  - The **two heads** join in the middle of the arm
- **Insertion:**
  - In the posterior part of the radial tuberosity.
  - Into the deep fascia of the medial aspect of the forearm through bicipital aponeurosis.
- **Nerve supply:**
  - **Musculocutaneous**
- **Action:**
  - Strong supinator of the forearm
    - used in screwing.
  - Powerful flexor of elbow
  - Weak flexor of shoulder





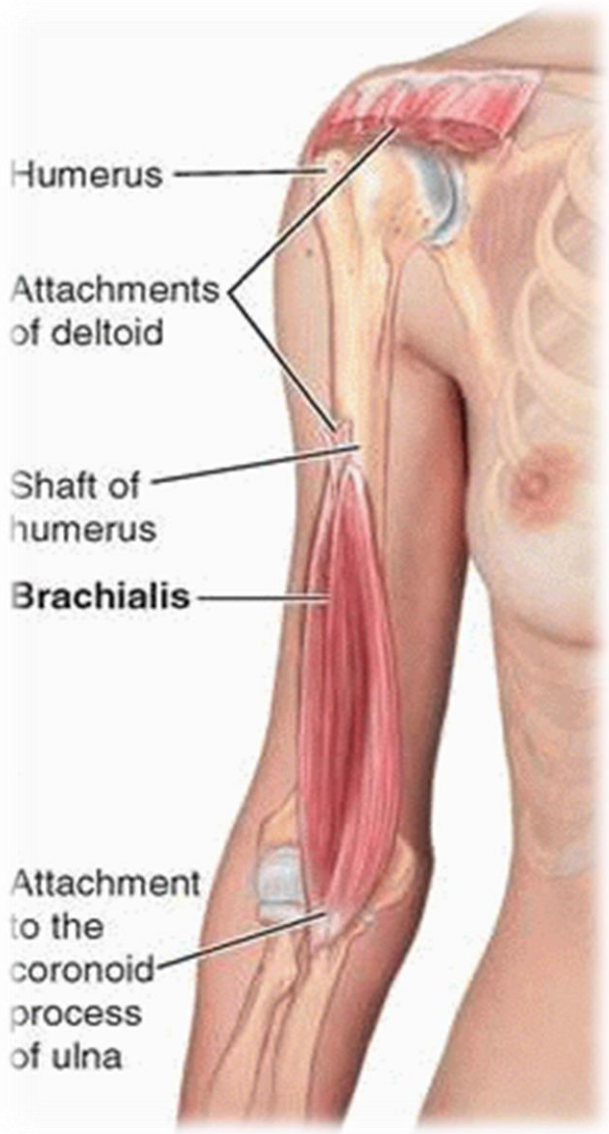
CORACOBRACHIALIS

- **Origin:**
  - **Tip of the coracoid process**
- **Insertion:**
  - **Middle of the medial side of the shaft of the humerus**
- **Nerve supply:**
  - **Musculocutaneous**
- **Action:**
  - **Flexor**
  - **Weak adductor of the arm**

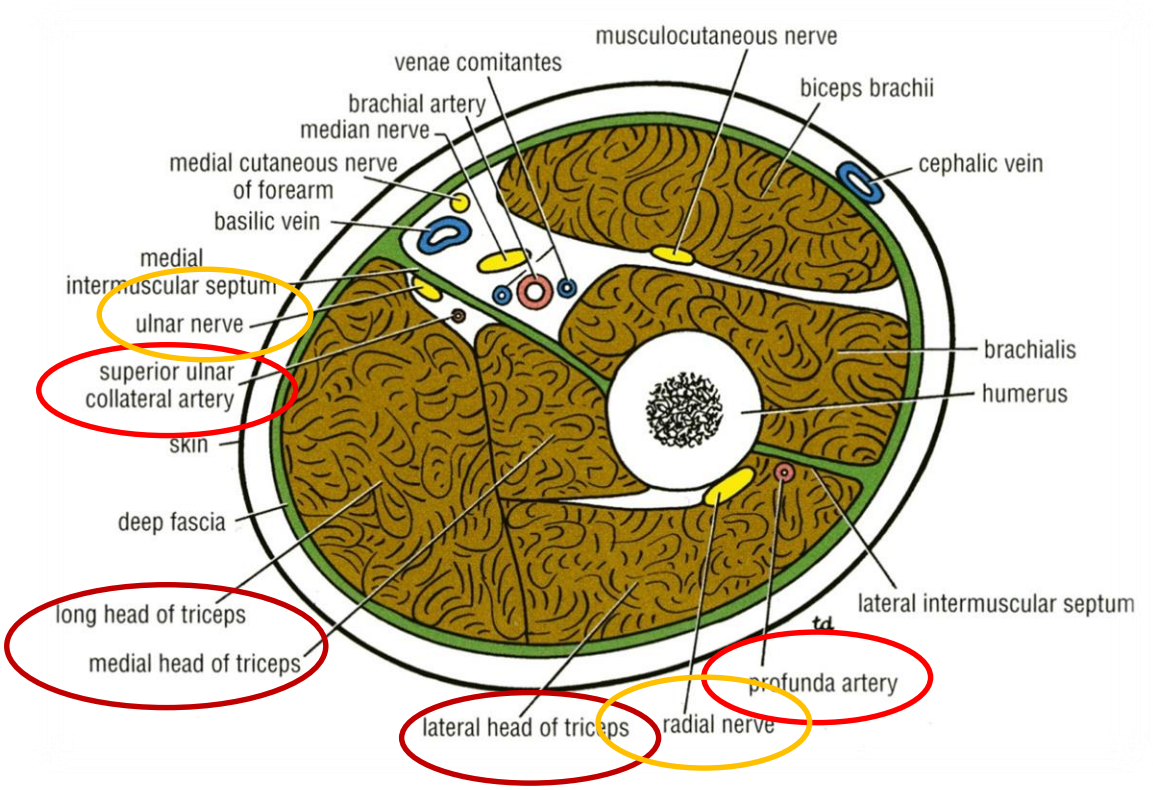


BRACHIALIS

- **Origin:**
  - **Front of the lower half of humerus**
- **Insertion:**
  - **Anterior surface of coronoid process of ulna**
- **Nerve supply:**
  - **Musculocutaneous & Radial**
- **Action:**
  - **Strong flexor of the forearm**



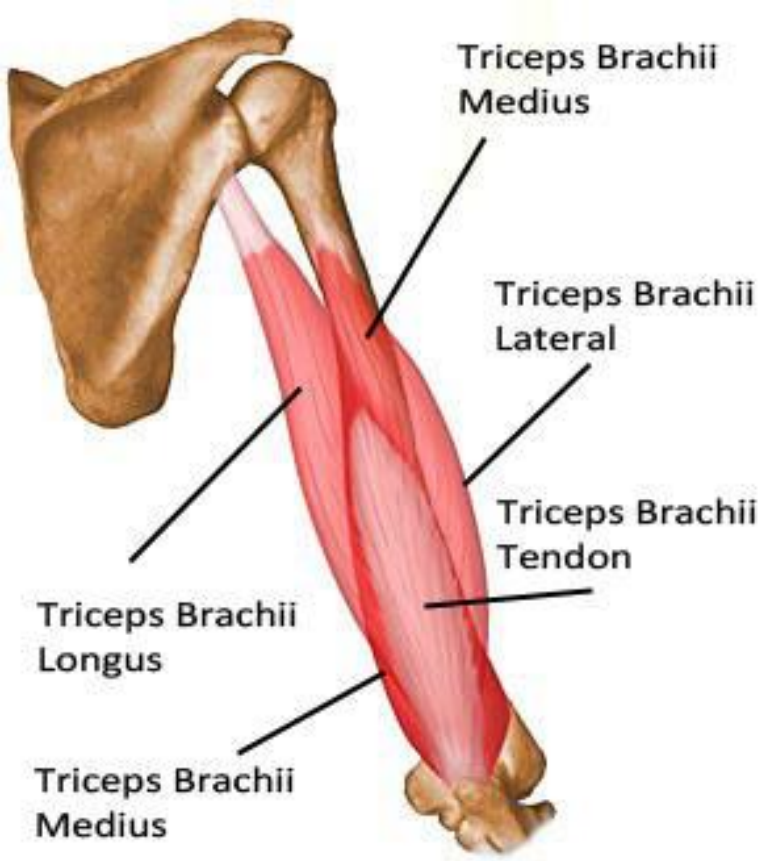
POSTERIOR FASCIAL COMPARTMENT



- **Muscles: Triceps**
- **Vessels: Profunda brachii & Ulnar collateral arteries**
- **Nerves: Radial & Ulnar**

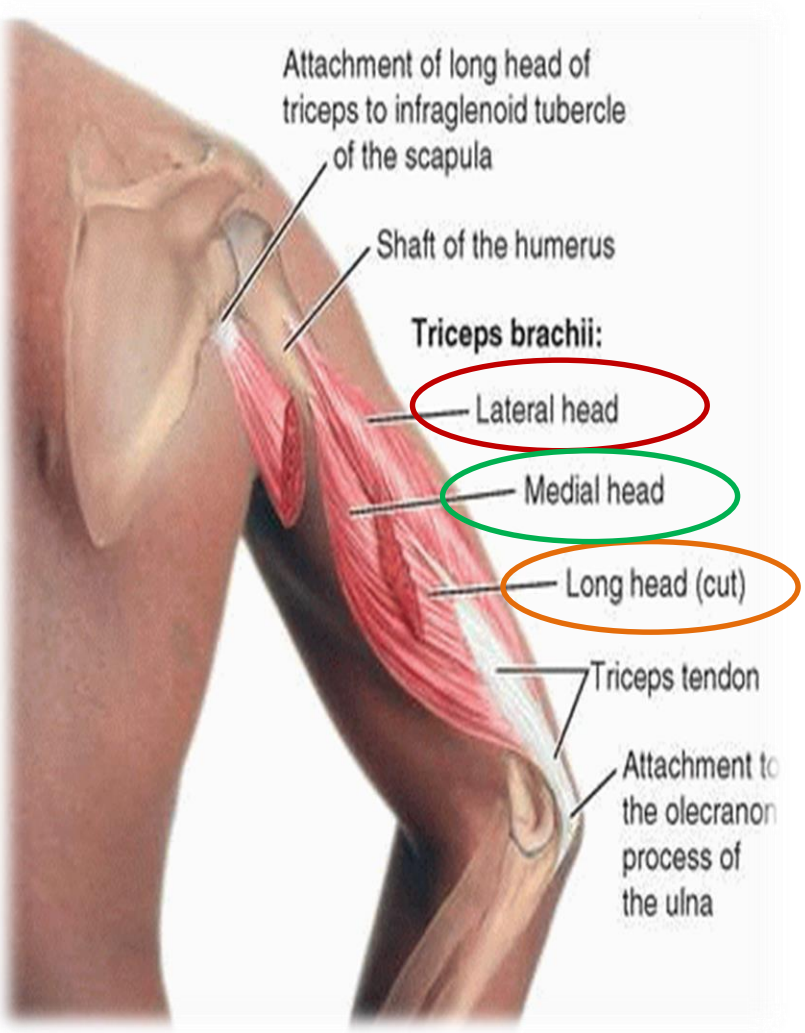
MUSCLES OF POSTERIOR COMPARTMENT

Triceps Brachii



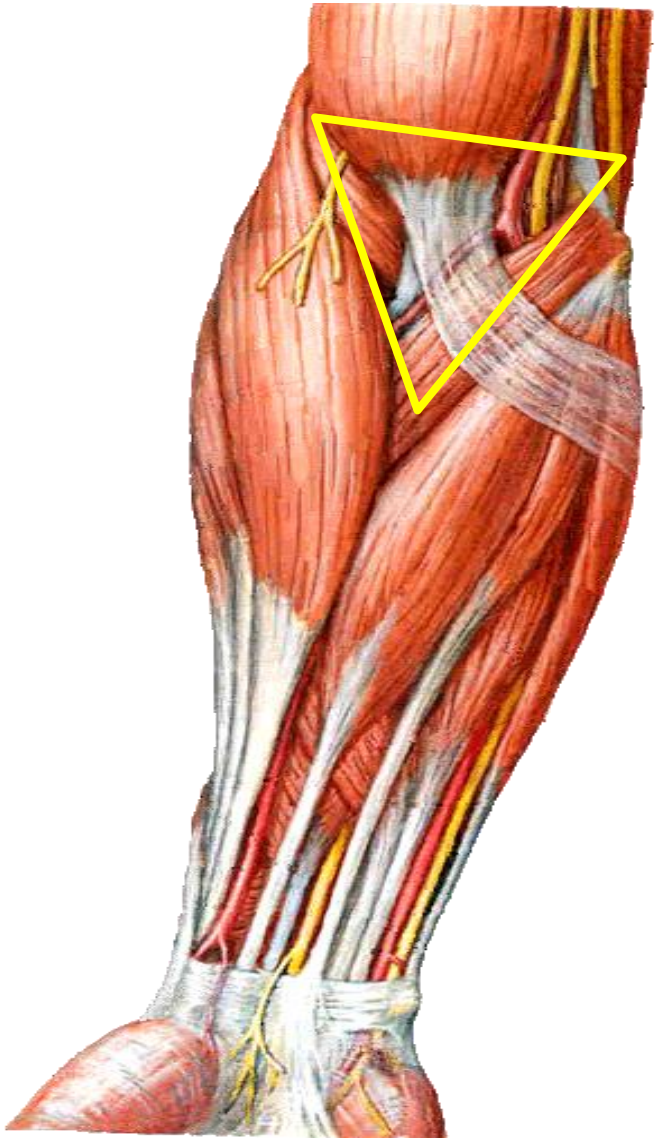
TRICEPS

- **Origin: Three heads:**
  - **Long Head from infrglenoid tubercle of the scapula**
  - **Lateral Head from the upper half of the posterior surface of the shaft of humerus above the spiral groove**
  - **Medial Head from the lower half of the posterior surface of the shaft of humerus below the spiral groove**
- **Insertion:**
  - **Common tendon inserted into the upper surface of the olecranon process of ulna**
- **Nerve supply:**
  - **Radial nerve**
- **Action:**
  - **Strong extensor of the elbow joint**



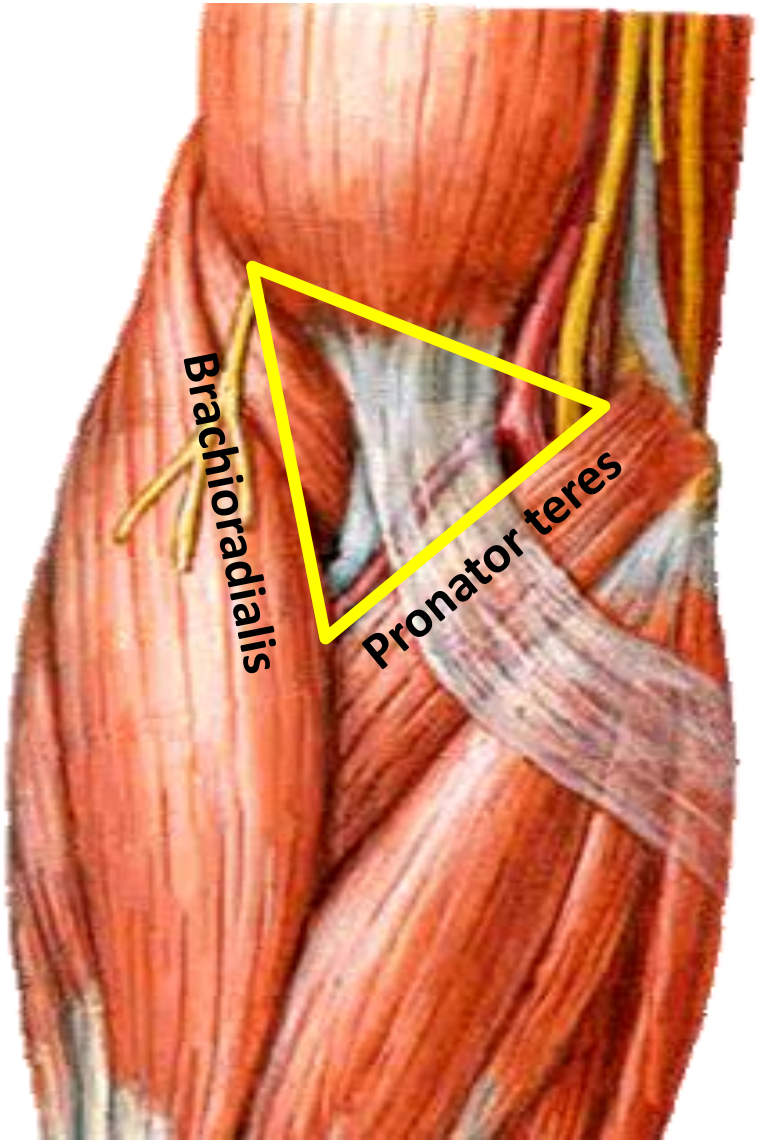
CUBITAL FOSSA

The cubital fossa is a triangular depression that lies in front of the elbow



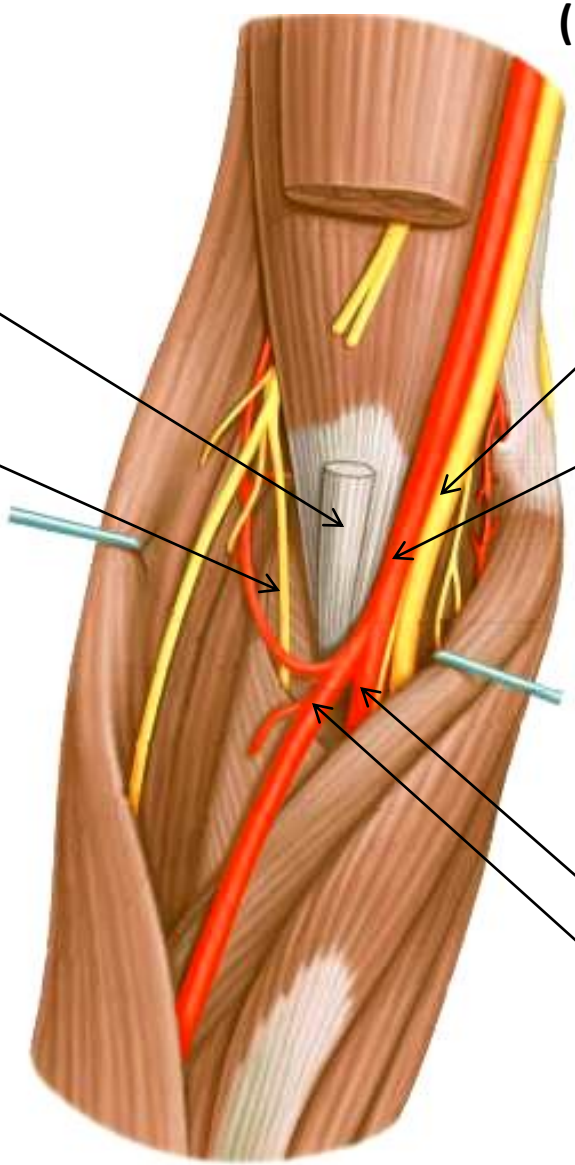
BOUNDARIES OF CUBITAL FOSSA

- **Base:**
  - Line drawn through the two epicondyles of humerus
- **Laterally:**
  - Brachioradialis
- **Medially:**
  - Pronator teres
- **Roof:**
  - Skin, superficial & deep fascia and bicipital aponeurosis
- **Floor:**
  - Brachialis medially and supinator laterally.



CONTENT OF CUBITAL FOSSA

(From medial to lateral side)



3. Biceps brachii tendon

4. Deep branch of radial nerve

1. Median nerve

2. Brachial artery divides into radial & ulnar arteries.

Ulnar artery

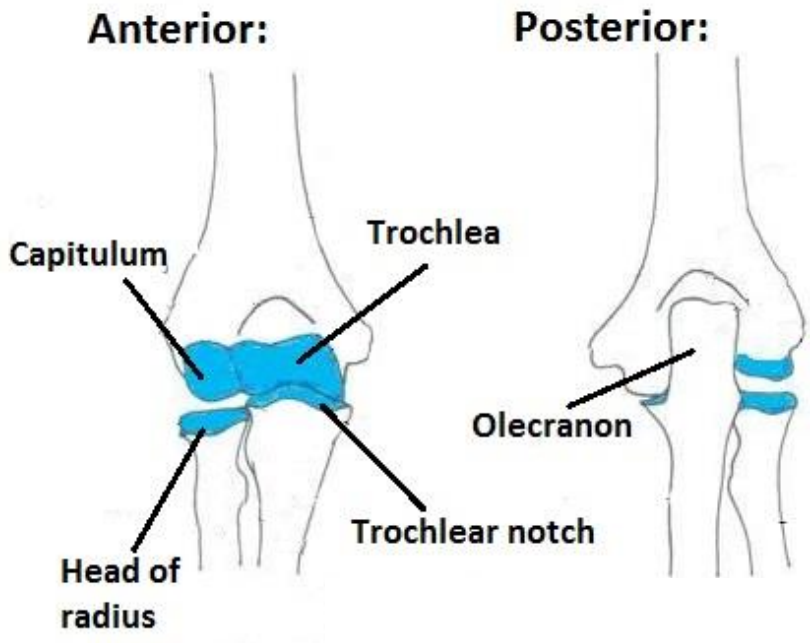
Radial artery

ELBOW JOINT

Synovial Hinge Joint

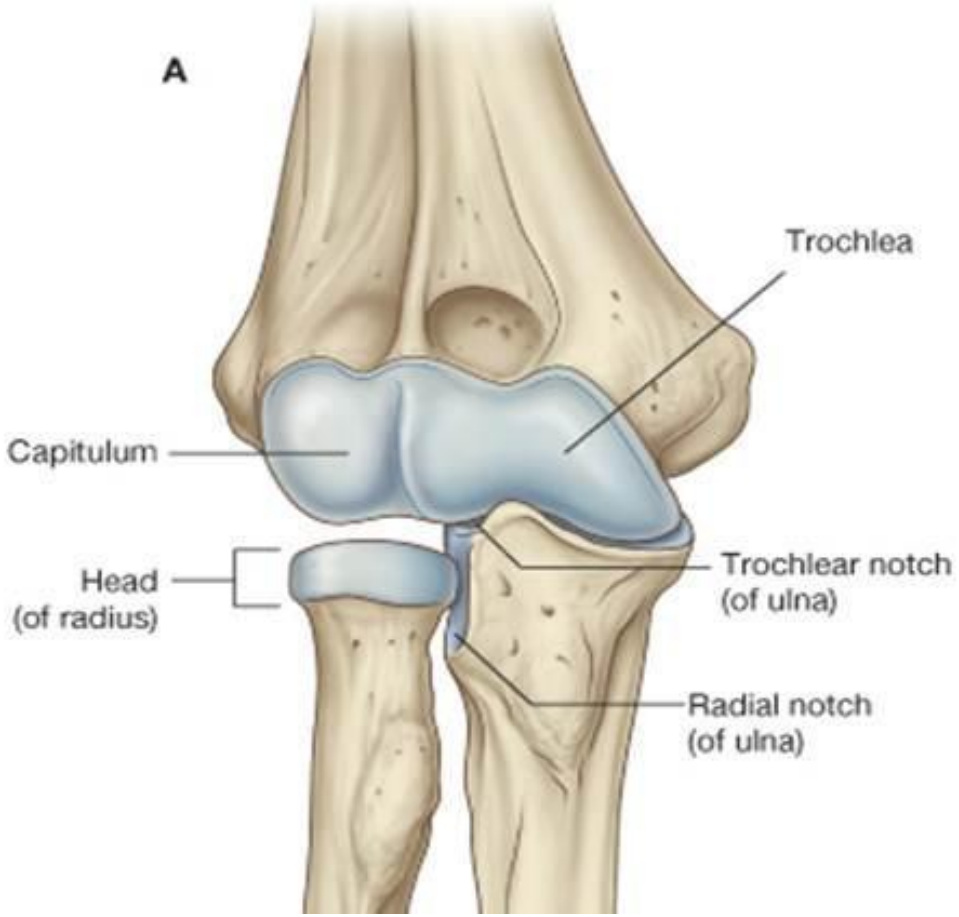
Articulation

- **Trochlea and capitulum of the humerus above**
- **Trochlear notch of ulna and the head of radius below**



ELBOW JOINT

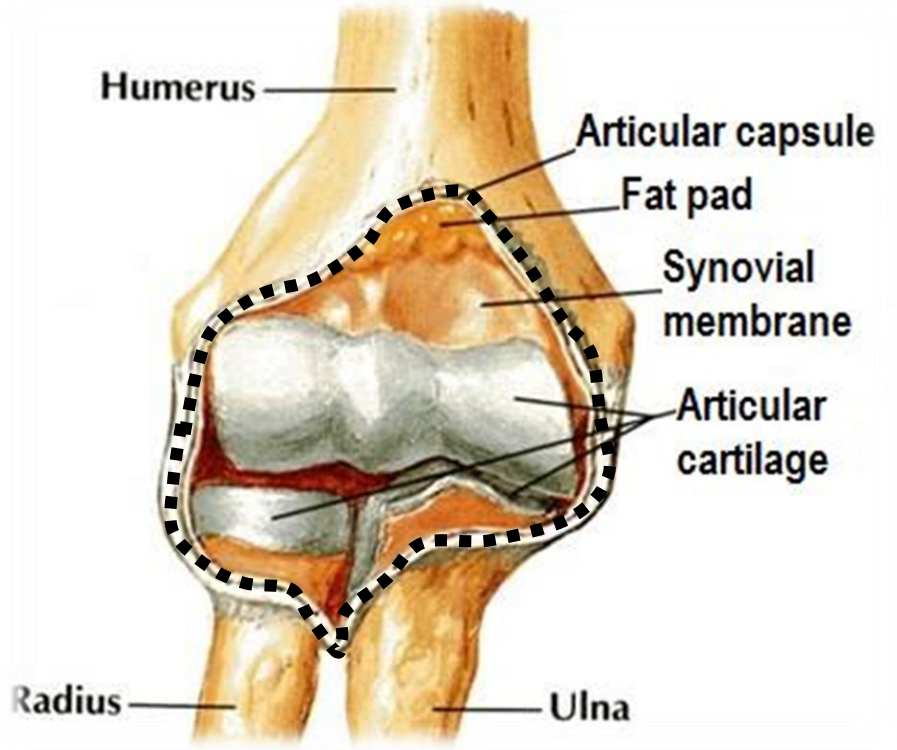
- **The articular surfaces are covered with articular (hyaline) cartilage.**



CAPSULE

Anteriorly: attached

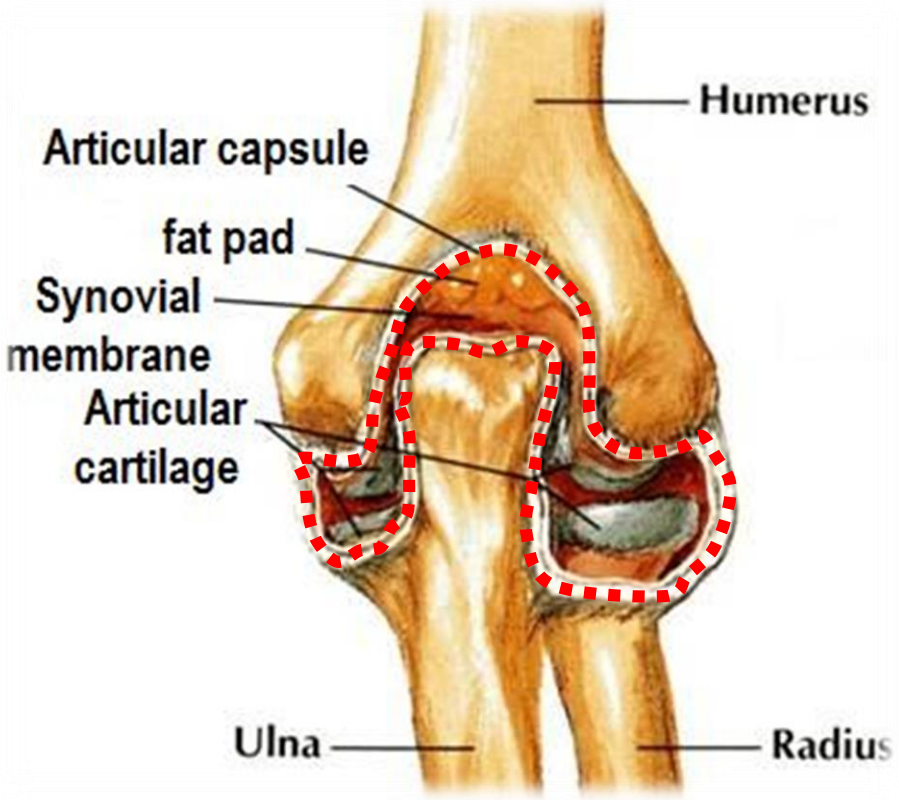
- **Above**
  - **To the humerus along the upper margins of the coronoid and radial fossae and to the front of the medial and lateral epicondyles.**
- **Below**
  - **To the margin of the coronoid process of the ulna and to the anular ligament, which surrounds the head of the radius.**



CAPSULE

Posteriorly: attached

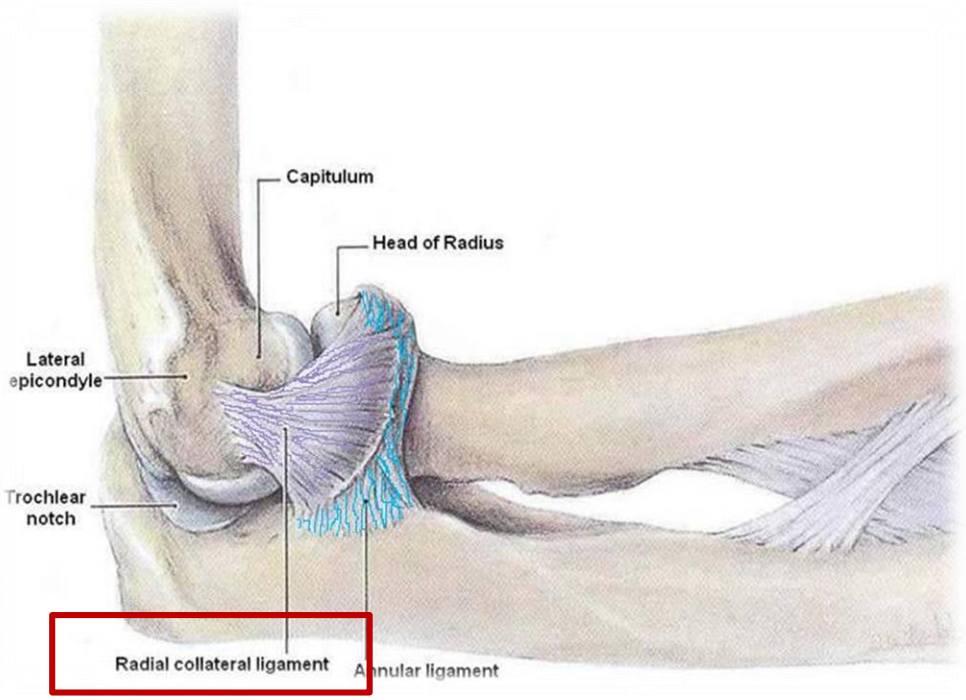
- **Above**
  - **To the margins of the olecranon fossa of the humerus.**
- **Below**
  - **To the upper margin and sides of the olecranon process of the ulna and to the anular ligament.**



LIGAMENTS

Lateral (Radial Collateral) Ligament

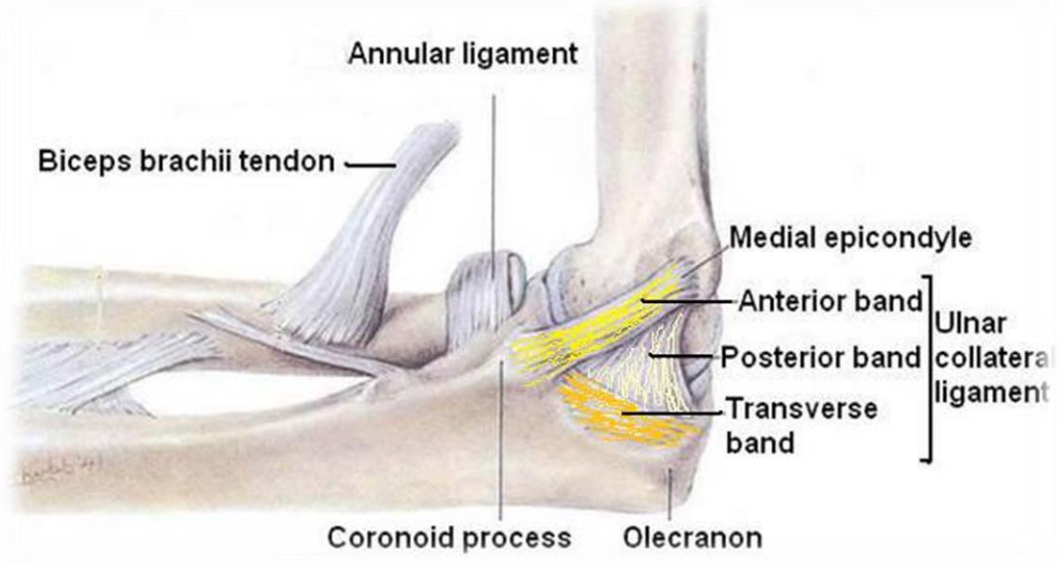
- **Triangular in shape:**
- **Apex**
  - **Attached to the lateral epicondyle of humerus**
- **Base**
  - **Attached to the upper margin of annular ligament.**



LIGAMENTS

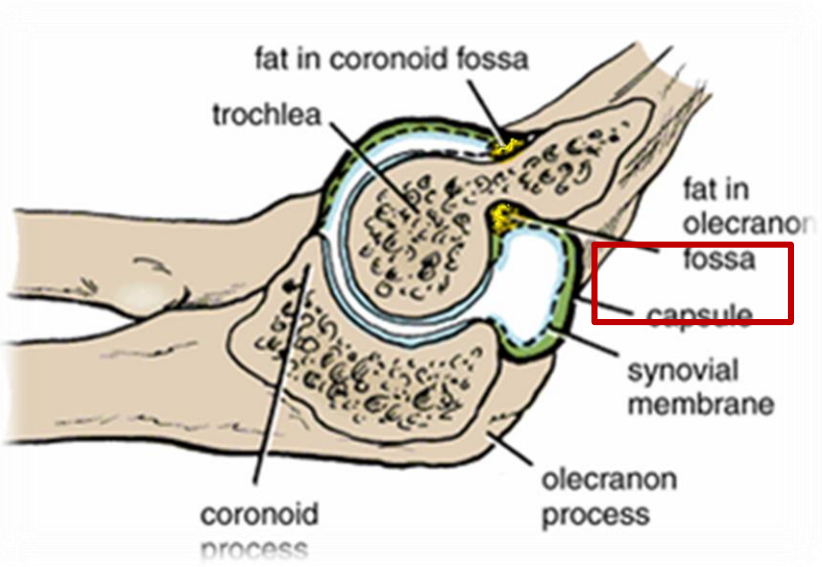
Medial (Ulnar Collateral) Ligament

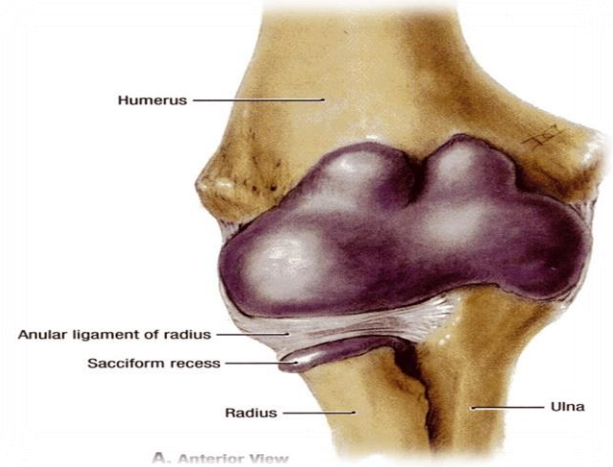
- **Anterior strong cord-like band:**
  - **Between medial epicondyle and the coronoid process of ulna**
- **Posterior weaker fan-like band:**
  - **Between medial epicondyle and the olecranon process of ulna**
- **Transverse band:**
  - **Passes between the anterior and posterior bands**



SYNOVIAL MEMBRANE

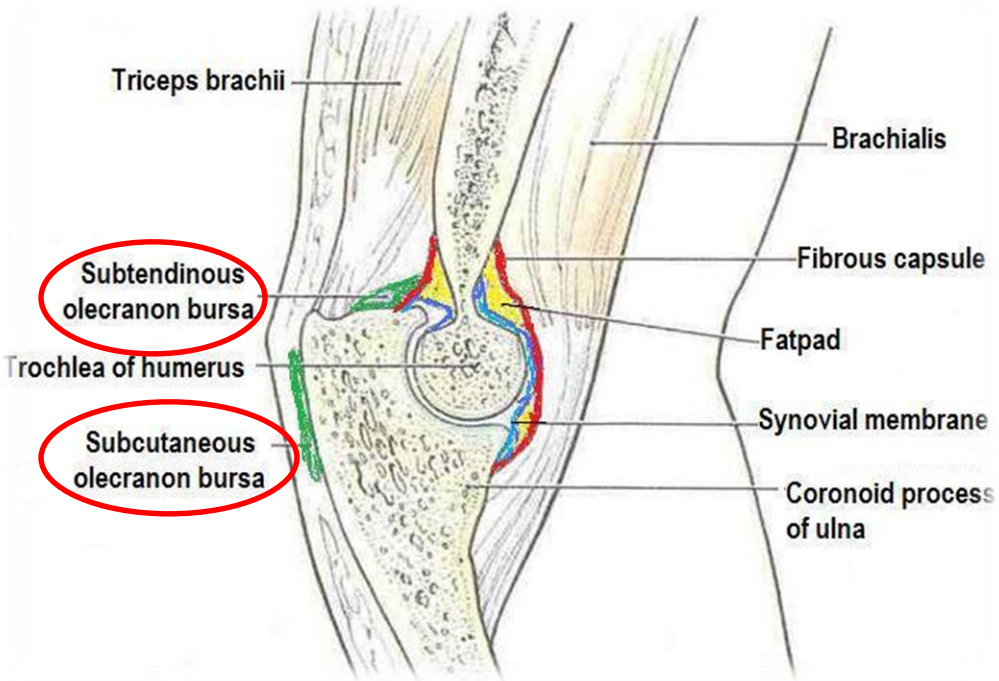
- **This lines the capsule and covers fatty pads in the floors of the coronoid, radial, and olecranon fossae.**
- **Is continuous below with synovial membrane of the superior radio-ulnar joint**





RELATIONS

- **Anterior:**
  - **Brachialis**
  - **Tendon of Biceps**
  - **Median nerve**
  - **Brachial artery**
- **Posterior:**
  - **Triceps muscle**
  - **Small bursa intervening**
- **Lateral:**
  - **Common extensor tendon**
  - **The supinator**
- **Medial:**
  - **Ulnar nerve**

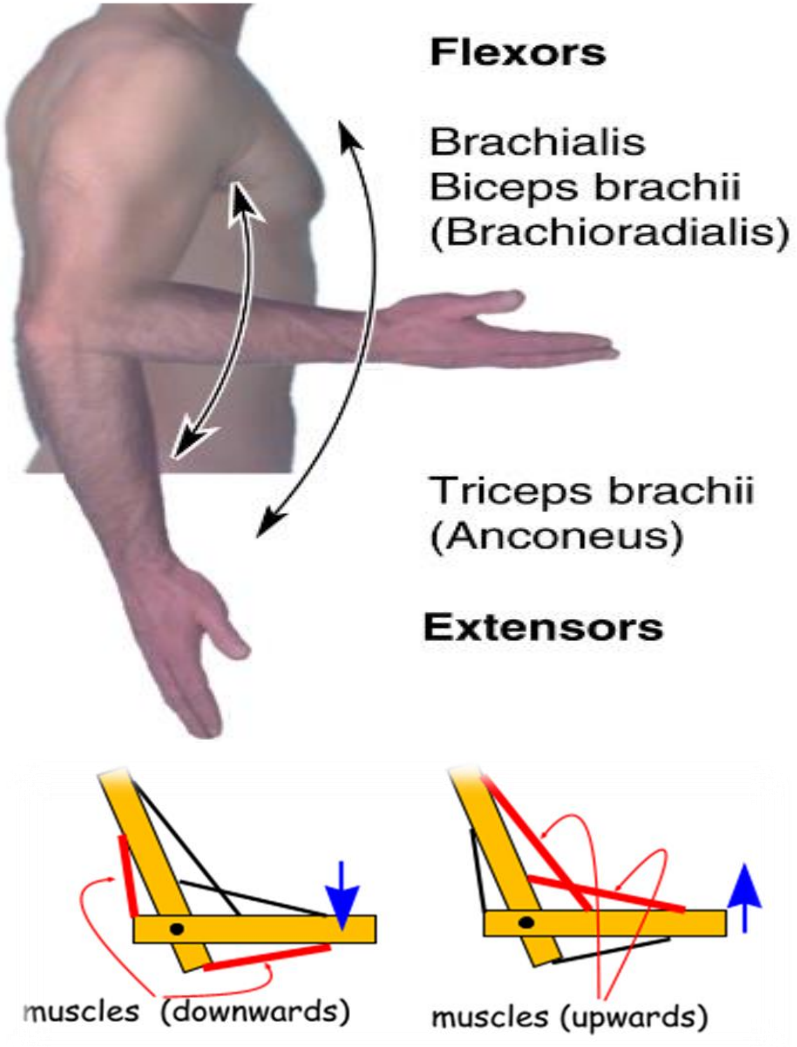


Bursae around the elbow joint:

- **Subcutaneous olecranon bursa**
- **Subtendinous olecranon bursa**

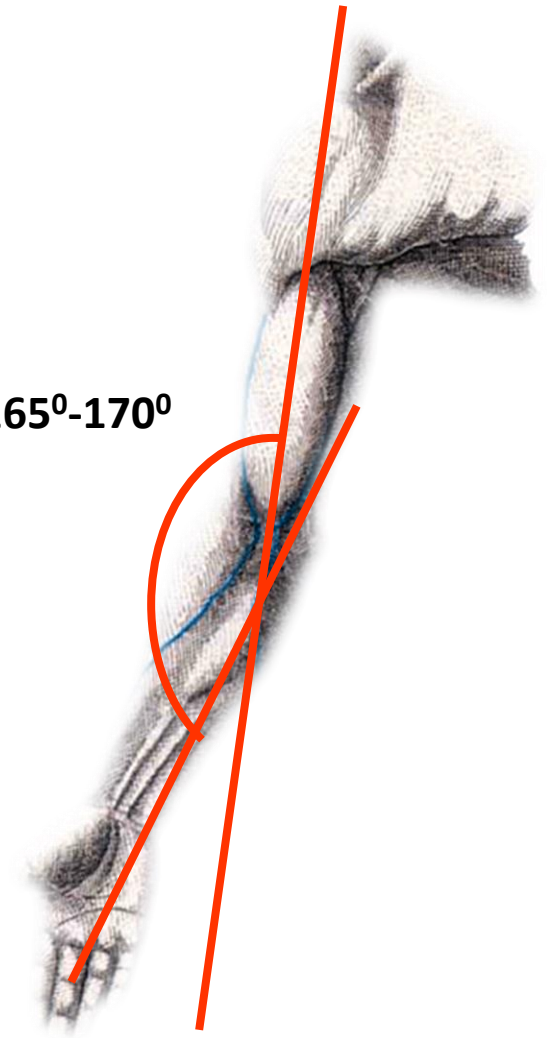
MOVEMENTS

- **Flexion**
  - **Is limited by the anterior surfaces of the forearm and arm coming into contact.**
- **Extension**
  - **Is limited by the tension of the anterior ligament and the brachialis muscle.**
- **The joint is supplied by branches from the:**
  - **Median**
  - **Ulnar**
  - **Musculocutaneous**
  - **Radial nerves**



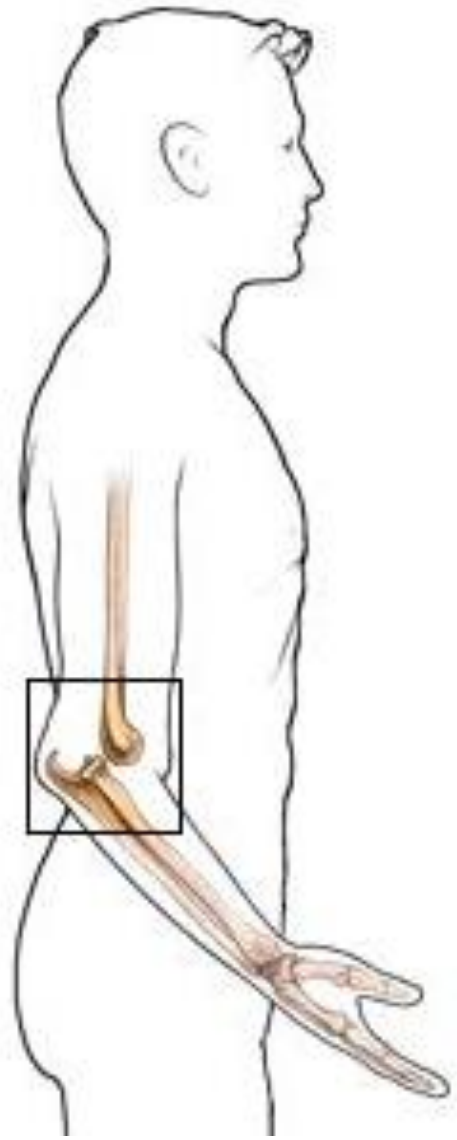
CARRYING ANGLE

- **Angle**
  - Between the long axis of the extended forearm and the long axis of the arm
- **Opens**
  - Laterally
- **About**
  - 170 degrees in male and 167 degrees in females
- **Disappears**
  - When the elbow joint is flexed
- **Permits**
  - The forearms to clear the hips in swinging movements during walking, and is important when carrying objects



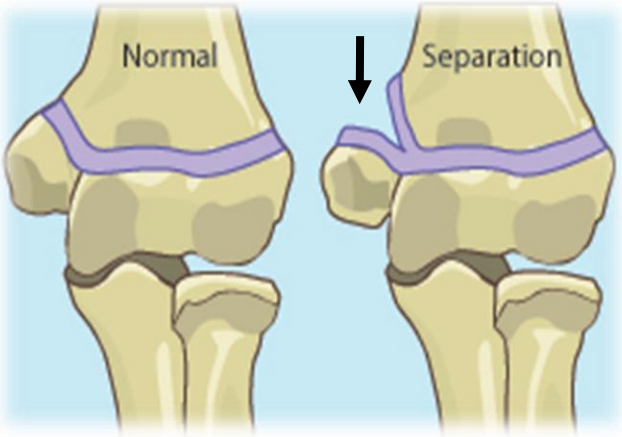
ARTICULATIONS

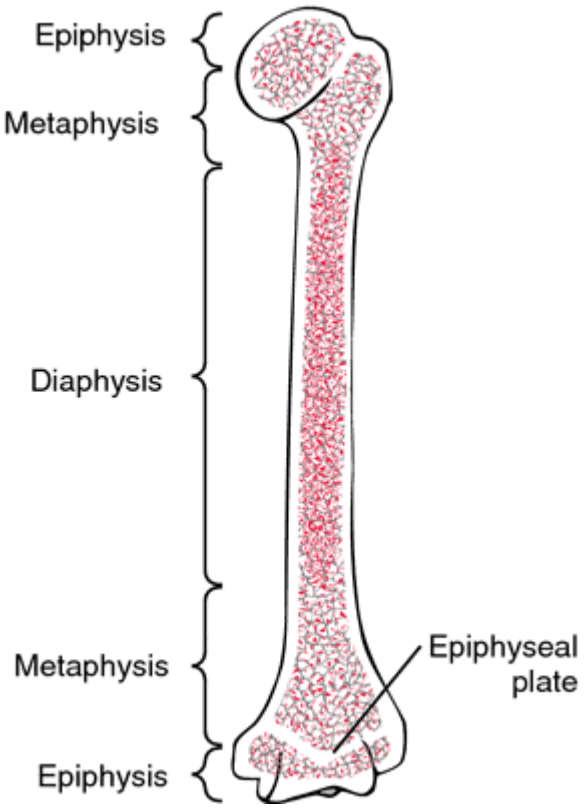
- **The elbow joint is stable because of the:**
  - **Wrench-shaped articular surface of the olecranon and the pulley-shaped trochlea of the humerus**
  - **Strong medial and lateral ligaments.**
- **Elbow dislocations are common & most are posterior.**
  - **Posterior dislocation usually follows falling on the outstretched hand.**
  - **Posterior dislocations of the joint are common in children because the parts of the bones that stabilize the joint are incompletely developed.**



ELBOW JOINT

- **Avulsion of the epiphysis of the medial epicondyle is also common in childhood because then the medial ligament is much stronger than the bond of union between the epiphysis and the diaphysis.**

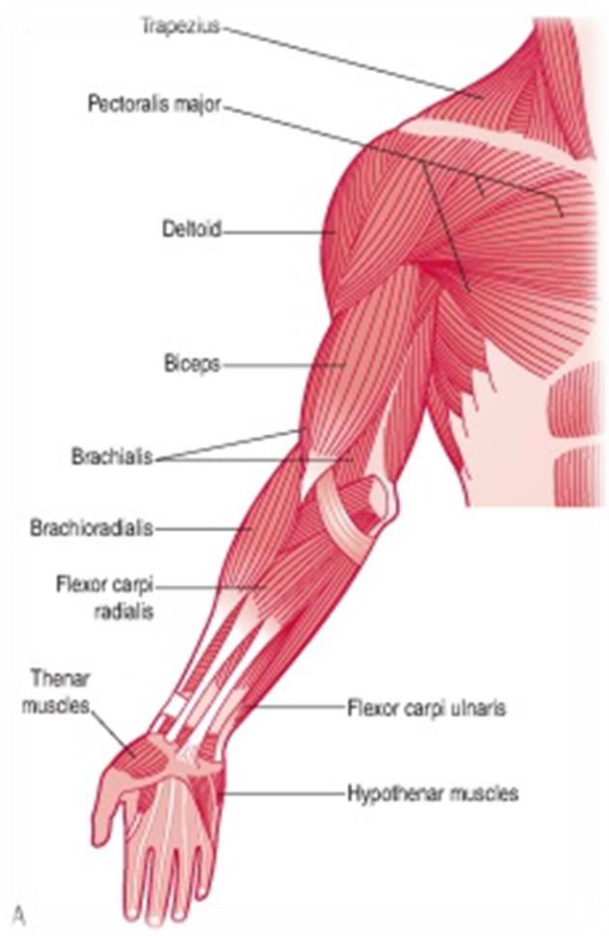




BLOOD CIRCULATION

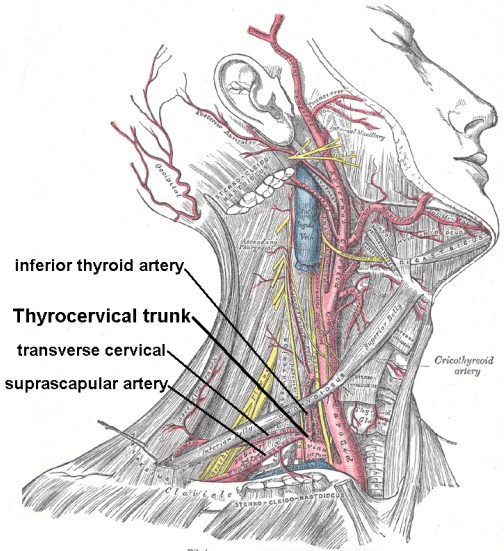
The upper limb (upper extremity) is the region extending from deltoid to the hand, including:

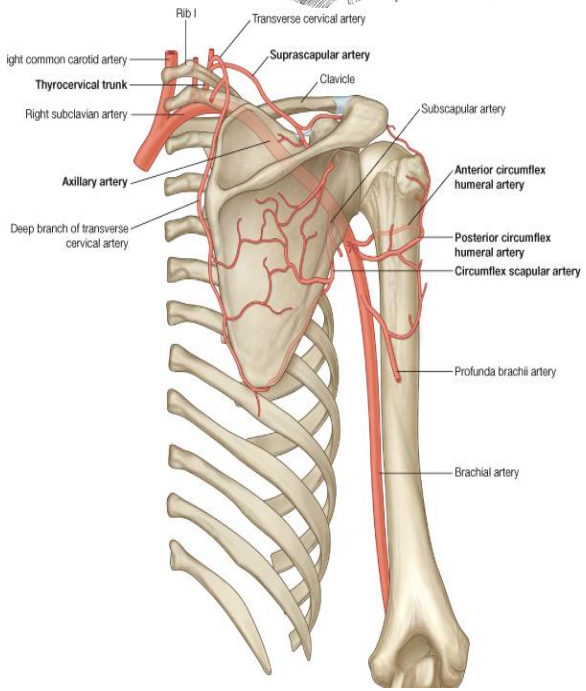
- **Shoulder**
- **Axilla**
- **Arm**
- **Elbow joint**
- **Forearm**
- **Wrist joint**



SUBCLAVIAN ARTERY

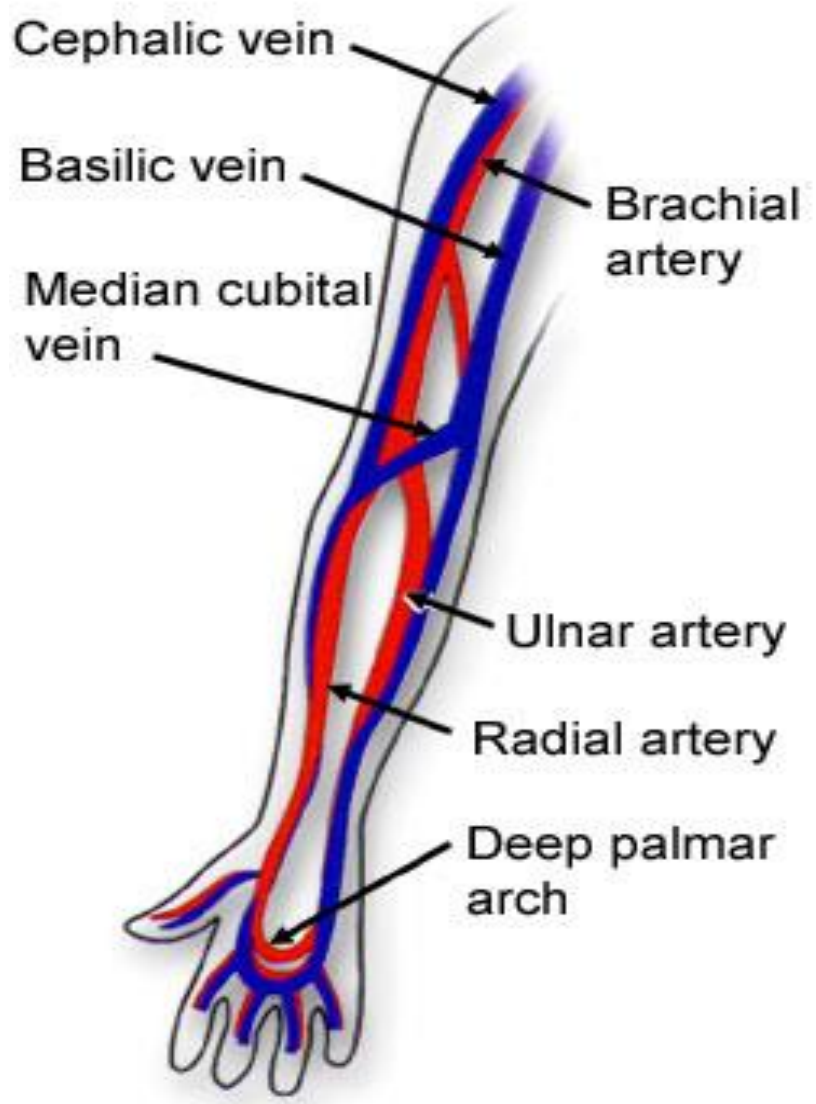
- Left subclavian arises from aortic arch
- Right subclavian arises from brachiocephalic trunk
- Main branches:
  - **Vertebral artery** to supply CNS
  - **Internal thoracic artery** to supply mammary gland & the thoracic wall.
  - **Thyrocervical trunk** to supply thyroid gland and scapula.
- At lateral border of the 1st rib, it continuous in the axilla as the **Axillary artery**
  - It is the source of the arterial supply of the upper limb.





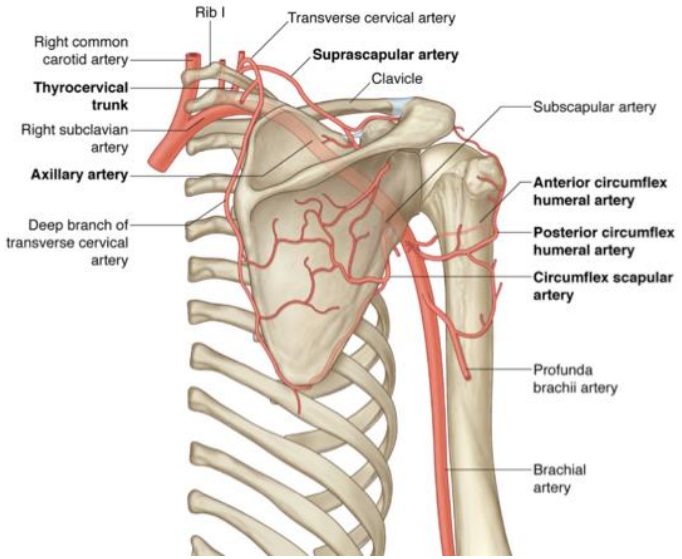
ARTERIES OF UPPER LIMB

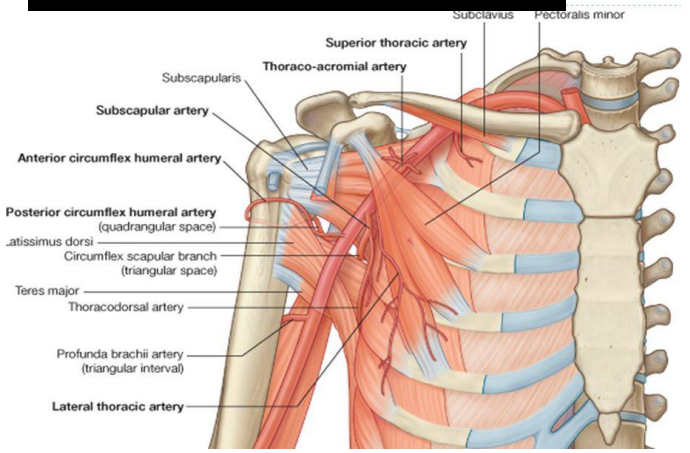
- AXILLARY
- BRACHIAL
- ULNAR
- RADIAL
- PALMAR ARCHES



AXILLARY ARTERY

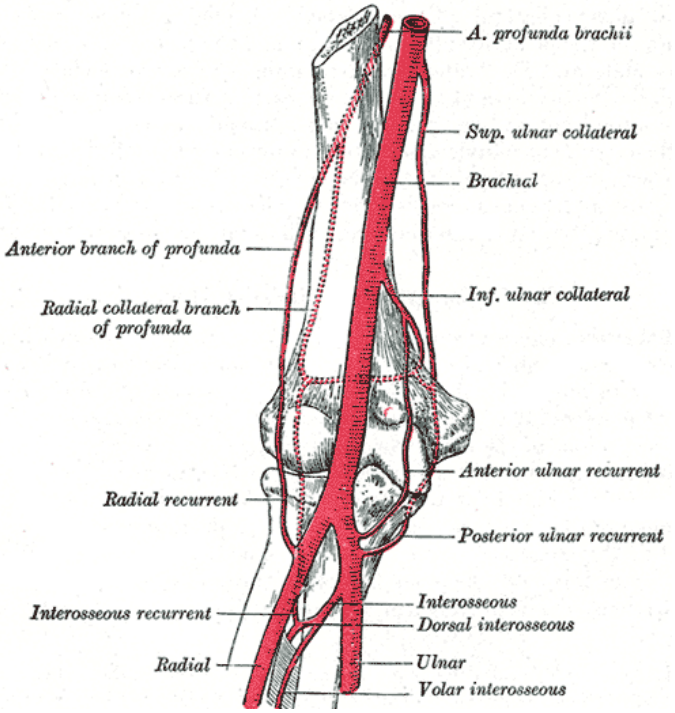
- It passes through the axilla, just underneath the pectoralis minor muscle, enclosed in the axillary sheath.
- At the level of the humeral surgical neck, the posterior and anterior circumflex humeral arteries arise.
- They circle posteriorly around the humerus to supply the shoulder region.
- The largest branch of the axillary artery called the subscapular artery.
- The axillary artery becomes the brachial artery at the level of the teres major muscle.





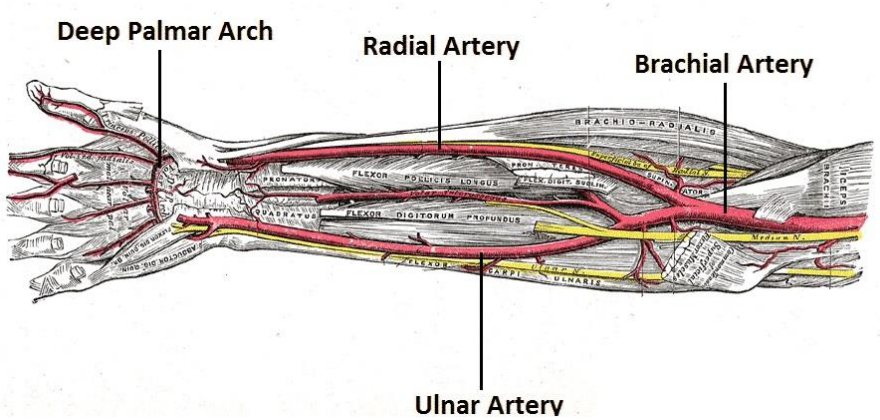
BRACHIAL ARTERY

- The main source of blood for the arm.
- Distal to the teres major, the brachial artery gives rise to the profunda brachii (the deep artery of the arm).
  - It travels along the posterior surface of the humerus, running in the radial groove to supply structures in the posterior aspect of the arm like triceps brachii.
  - Terminates by contributing to a network of vessels at the elbow joint.
- The brachial artery descends down the arm immediately posterior to the median nerve.
- As it crosses the cubital fossa, underneath the brachialis muscle, the brachial artery bifurcating into the radial and ulnar arteries.
- The pulse of the brachial artery is palpable on the anterior aspect of the elbow, medial to the tendon of the biceps.
- Other branches:
  - Superior ulnar collateral artery
  - Inferior ulnar collateral artery



ULNAR & RADIAL ARTERIES

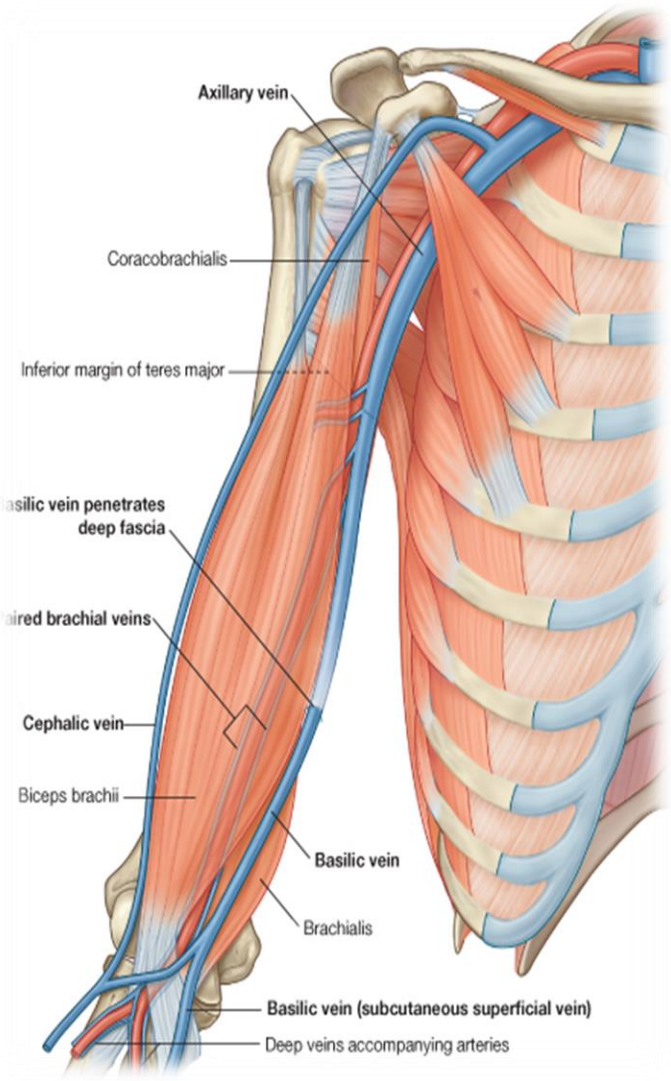
- The main source of blood for the forearm.
- The ulnar artery supplies the anterior aspect.
- The radial artery supplies the posterior aspect of the forearm.
- The two arteries anastomose in the hand, by forming two arches, the superficial palmar arch, and the deep palmar arch.



SUPERFICIAL VEINS

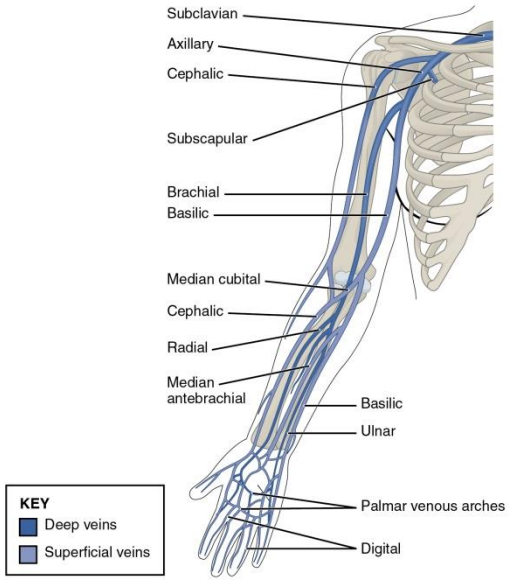
- **The major superficial veins of the upper limb are the cephalic and basilic veins.**

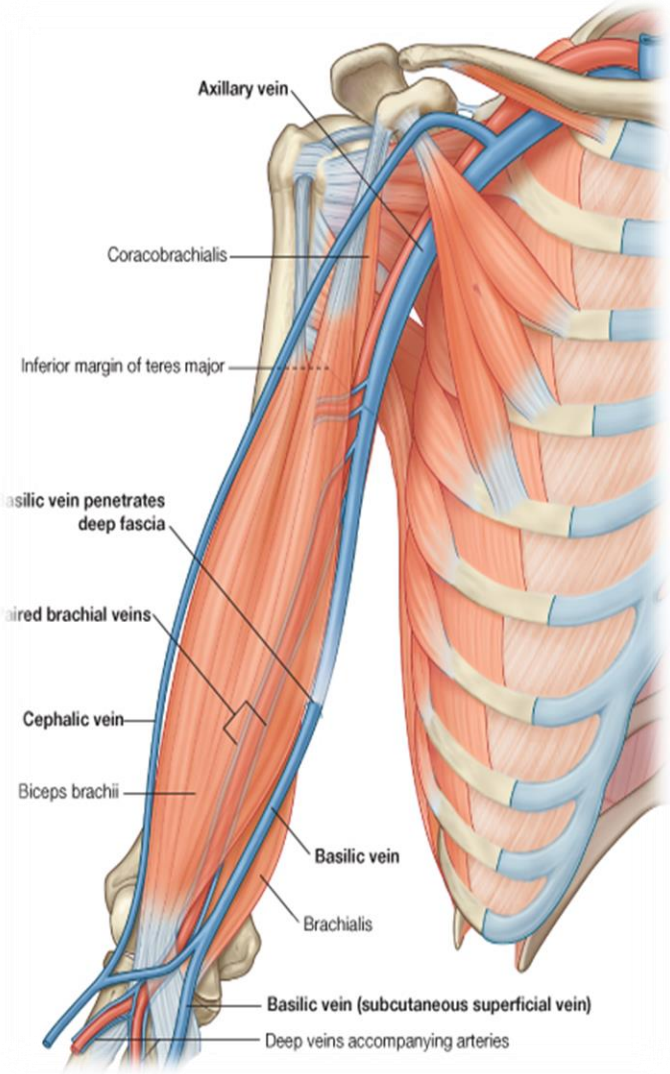
  At the elbow, the cephalic and basilic veins are connected by the median cubital vein.



BASILIC VEIN

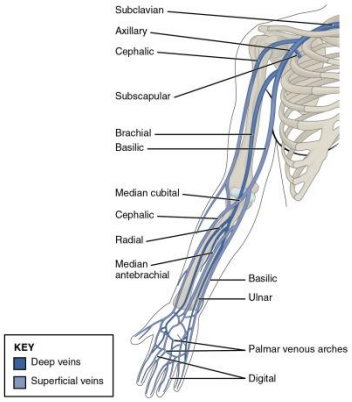
- Originates from the dorsal venous network of the hand.
- It ascends the medial aspect of the upper limb.
- At the border of the teres major, the vein moves deep into the arm.
- It then combines with the brachial veins to form the axillary vein..

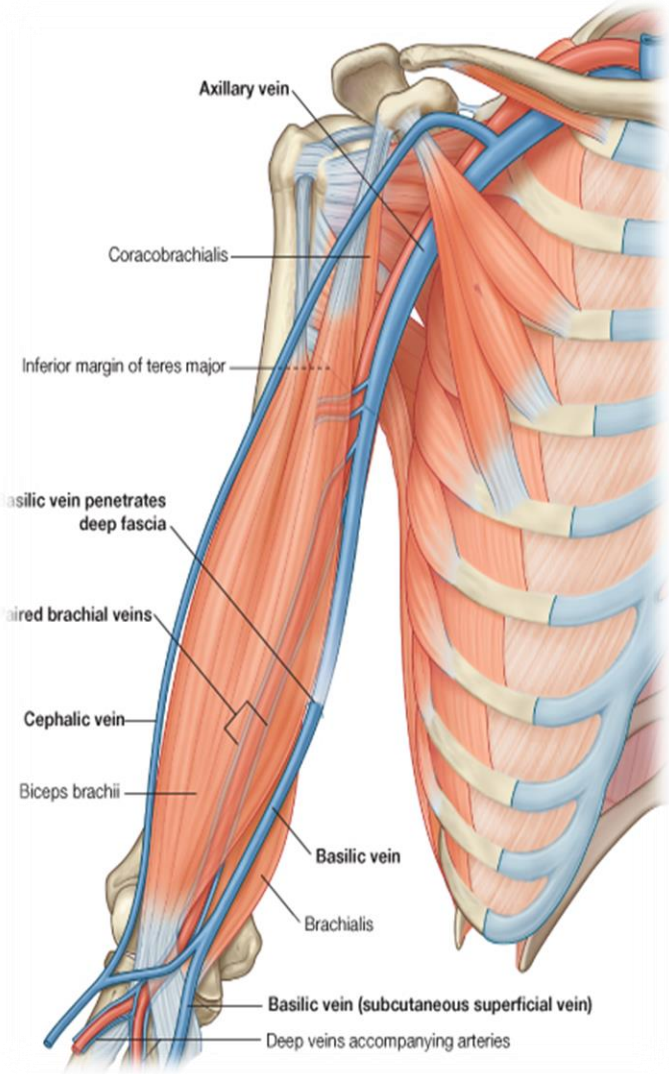




CEPHALIC VEIN

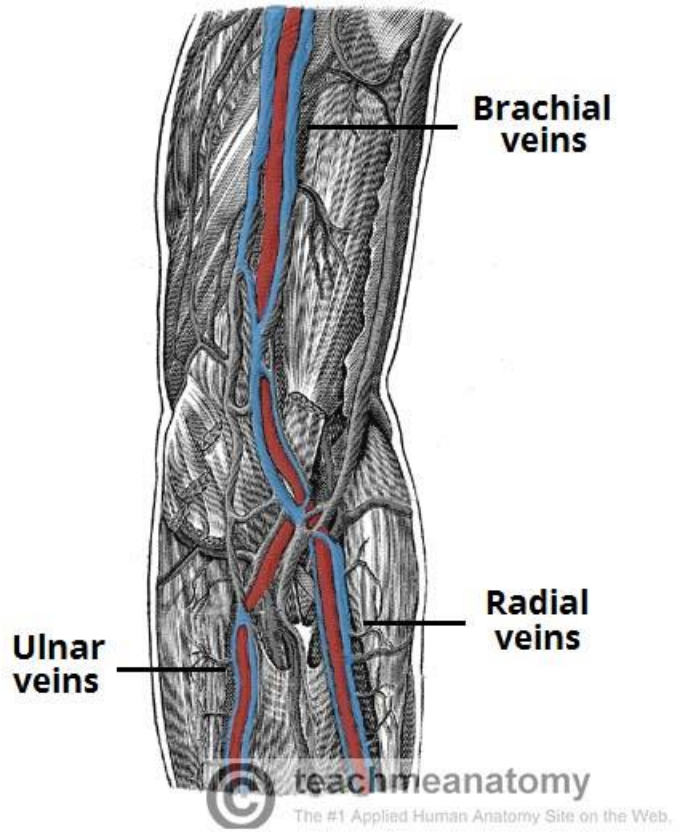
- Arises from the dorsal venous network of the hand.
- It ascends the antero-lateral aspect of the upper limb, passing anteriorly at the elbow.
- At the shoulder, the cephalic vein travels between the deltoid and pectoralis major muscles to enters the axilla region via the clavipectoral triangle.
- Within the axilla, the cephalic vein terminates by joining the axillary vein.





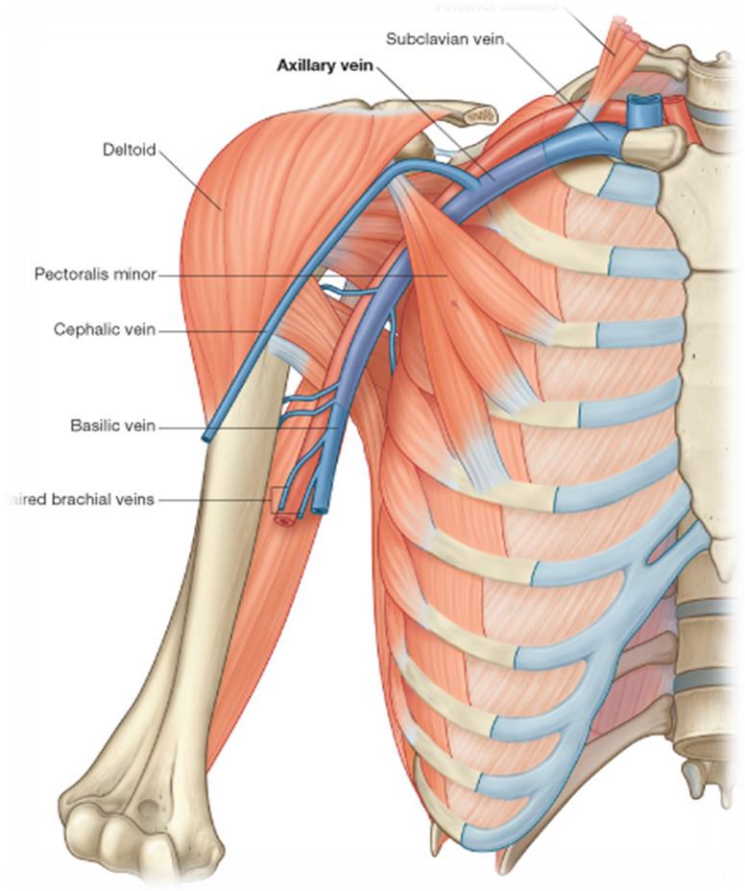
DEEP VEINS

- The deep veins of the upper limb are situated underneath the deep fascia.
- They are usually paired veins that accompany one artery.
  - vena comitantes
- The brachial veins are the largest in size, and are situated either side of the brachial artery.
- Ulnar and radial veins are vena comitantes of ulnar and radial arteries.
- The pulsations of the brachial artery assists the venous return.
- Perforating veins run between the deep and superficial veins of the upper limb, connecting the two systems together.



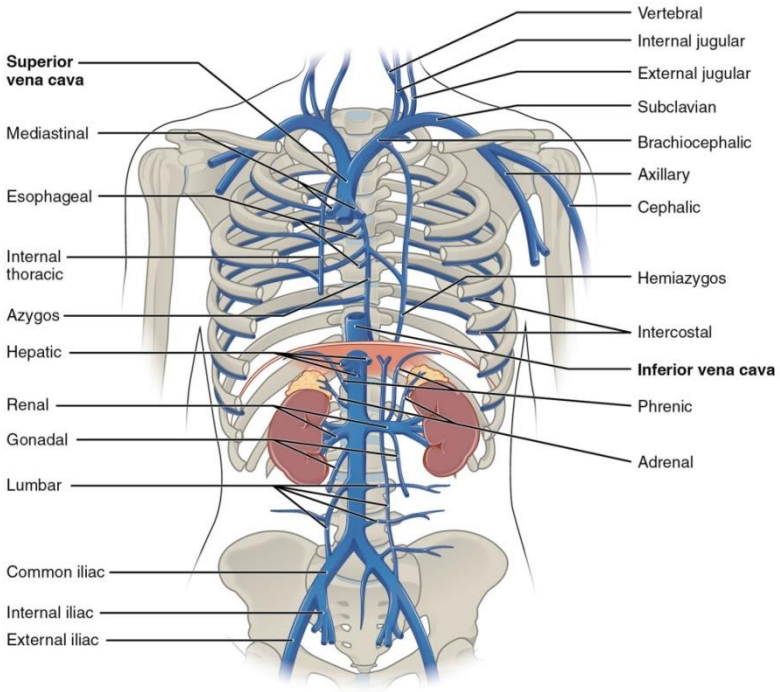
AXILLARY VEIN

- Formed by the union of basilic vein and the brachial veins (venae comitantes) of the brachial artery.



SUBCLAVIAN VEIN

- Each subclavian vein is a continuation of the axillary vein and runs from the outer border of the first rib to the medial border of anterior scalene muscle.
- It then joins with the internal jugular vein to form the brachiocephalic vein.
- The subclavian vein follows the subclavian artery.
- The right and left brachiocephalic veins form superior vena cava that enters right atrium. anterior to the middle scalene).



Any

QUESTIONS!