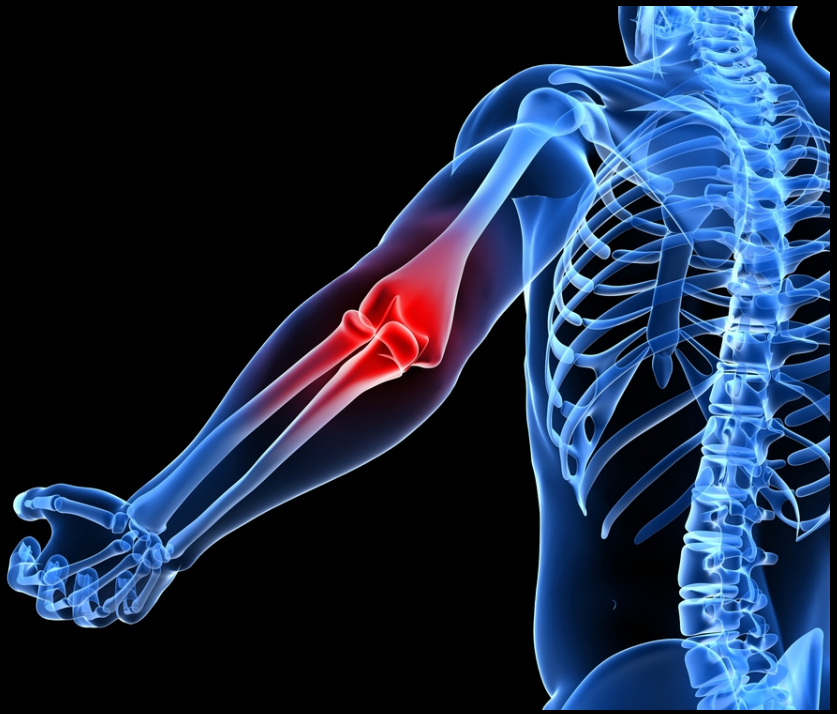
ARM & ELBOW JOINT



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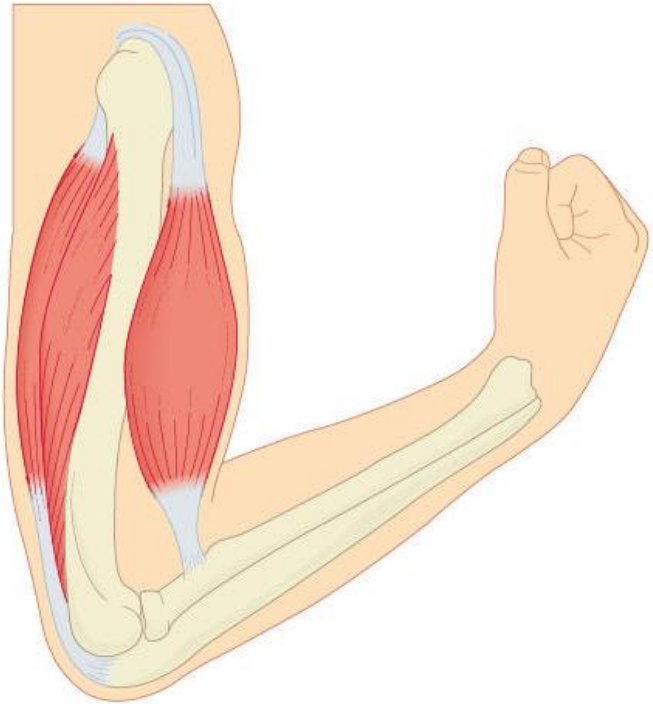
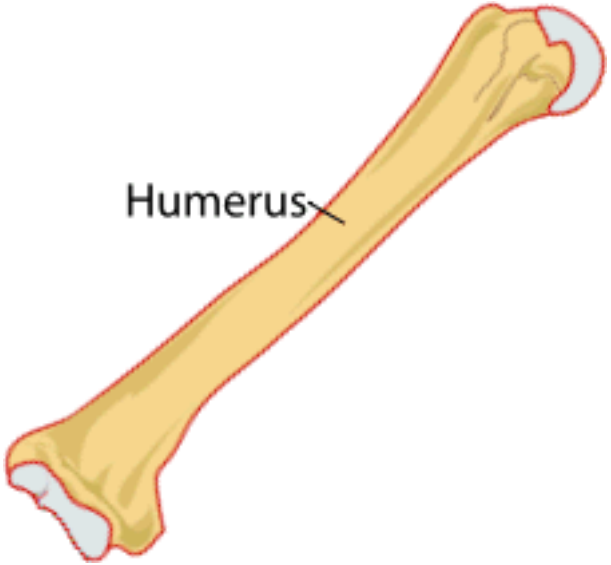
OBJECTIVES

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.

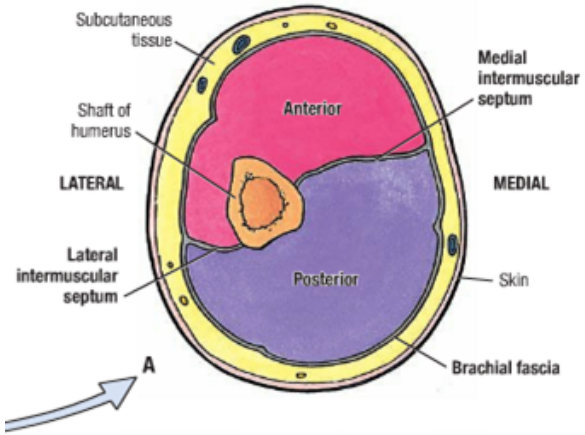
THE ARM





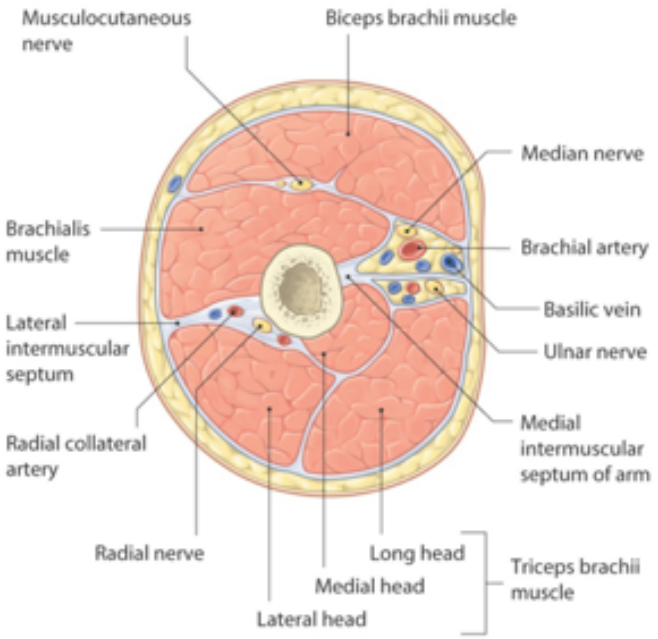
INTRODUCTION

- 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

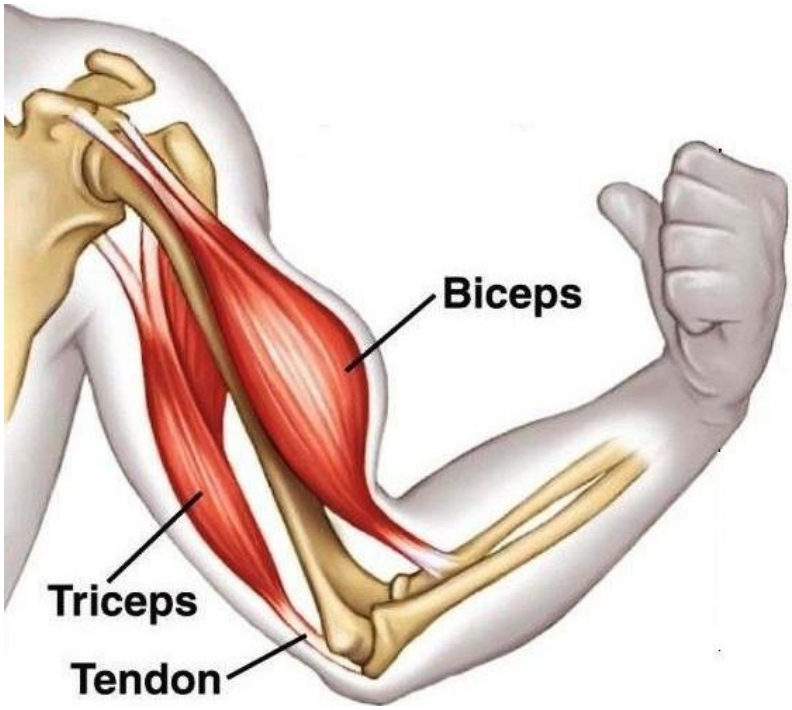


ANTERIOR FASCIAL COMPARTMENT

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

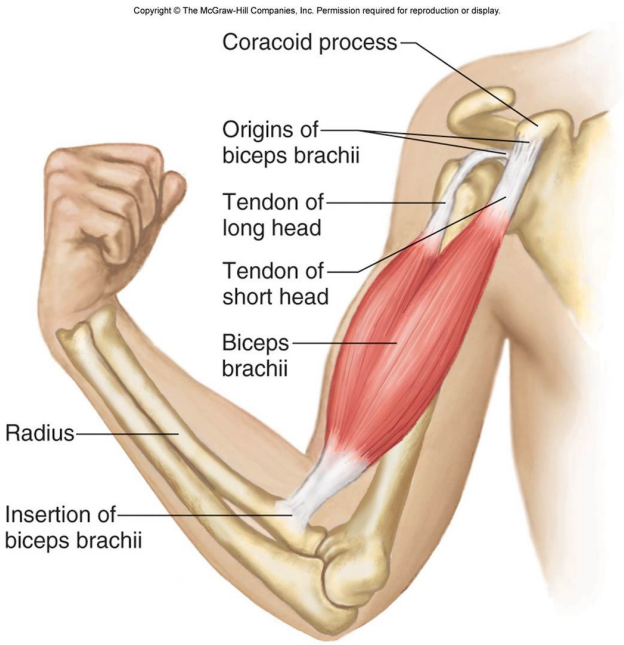


MUSCLES OF ANTERIOR COMPARTMENT



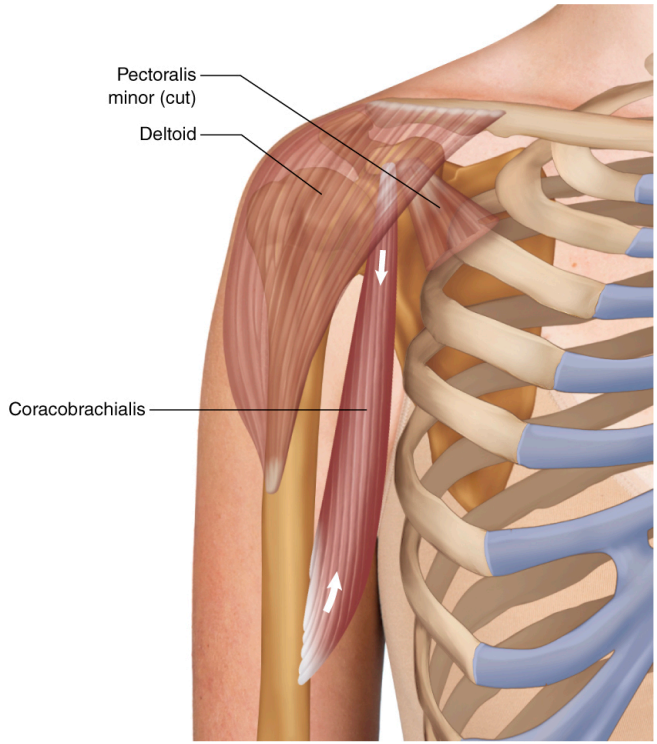
BICEPS BRACHII

- **Origin:**
  - 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



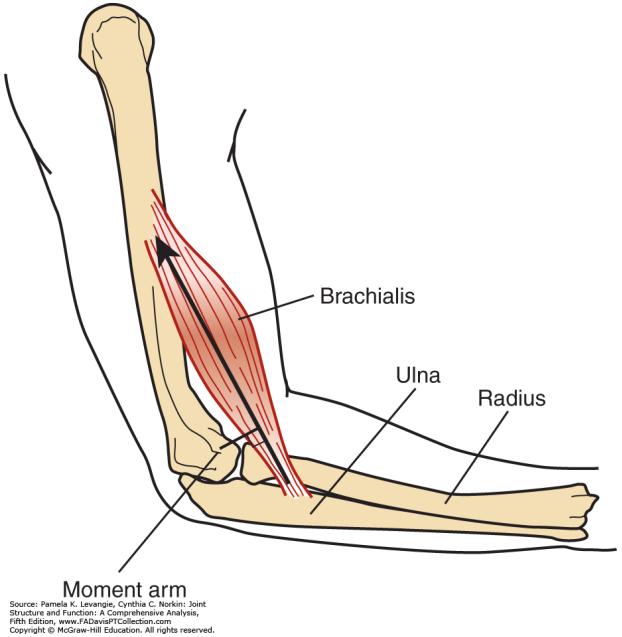
CORACOBRACHIALIS

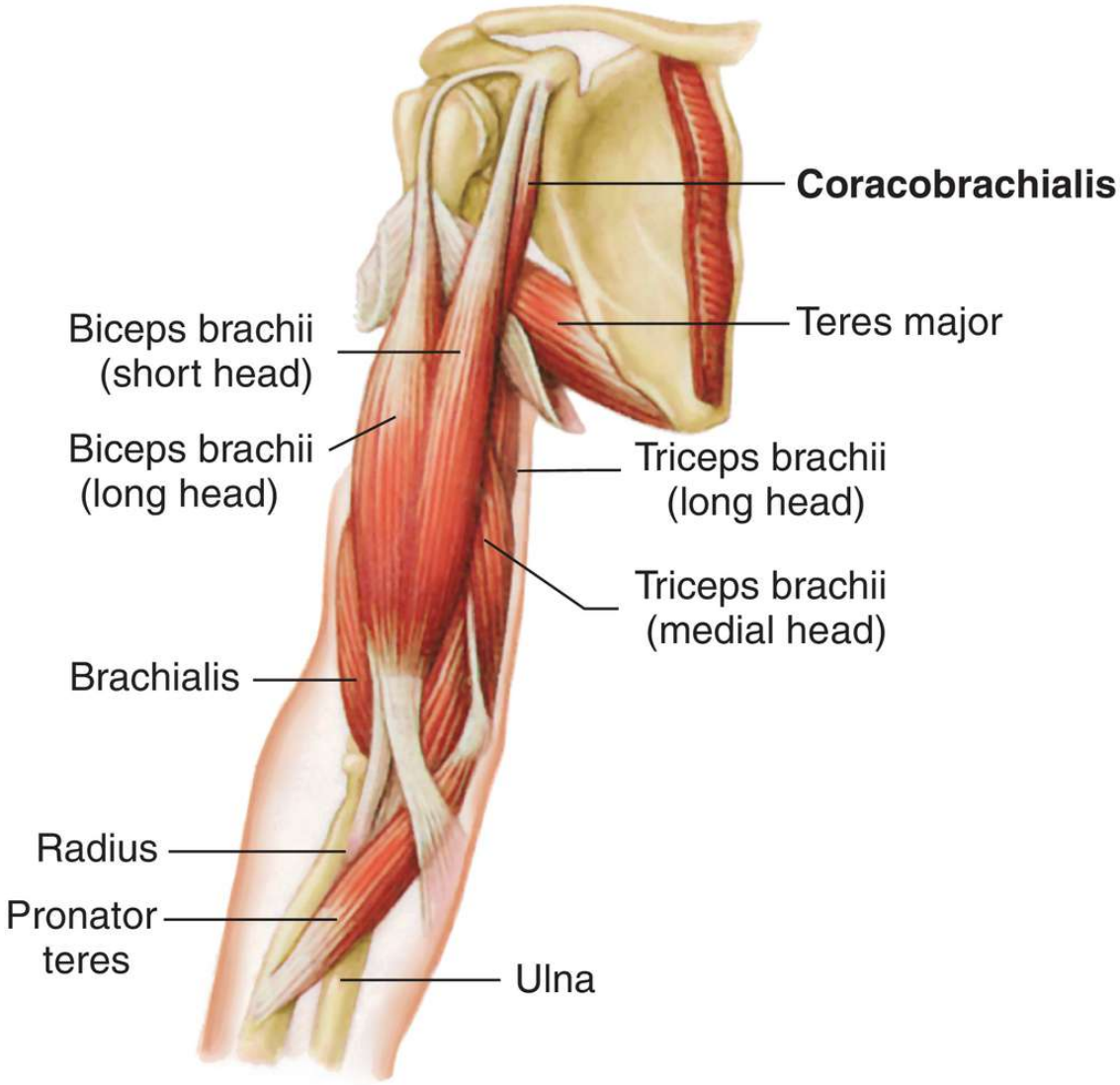
- Origin:
  - Tip of the coracoid process
- Insertion:
  - Middle of the medial side of the shaft of the humerus
- Nerve supply:
  - Musculocutaneous
- Action:
  - Flexor
  - Weak adductor of the arm



BRACHIALIS

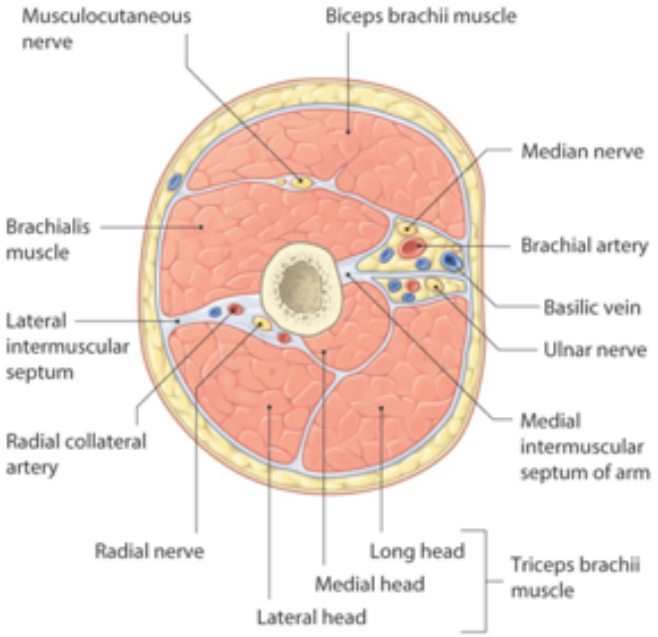
- Origin:
  - Front of the lower half of humerus
- Insertion:
  - Anterior surface of coronoid process of ulna
- Nerve supply:
  - Musculocutaneous & Radial
- Action:
  - Strong flexor of the forearm




Coracobrachialis
Teres major
Biceps brachii (short head)
Biceps brachii (long head)
Triceps brachii (long head)
Triceps brachii (medial head)
Brachialis
Radius
Pronator teres
Ulna

POSTERIOR FASCIAL COMPARTMENT

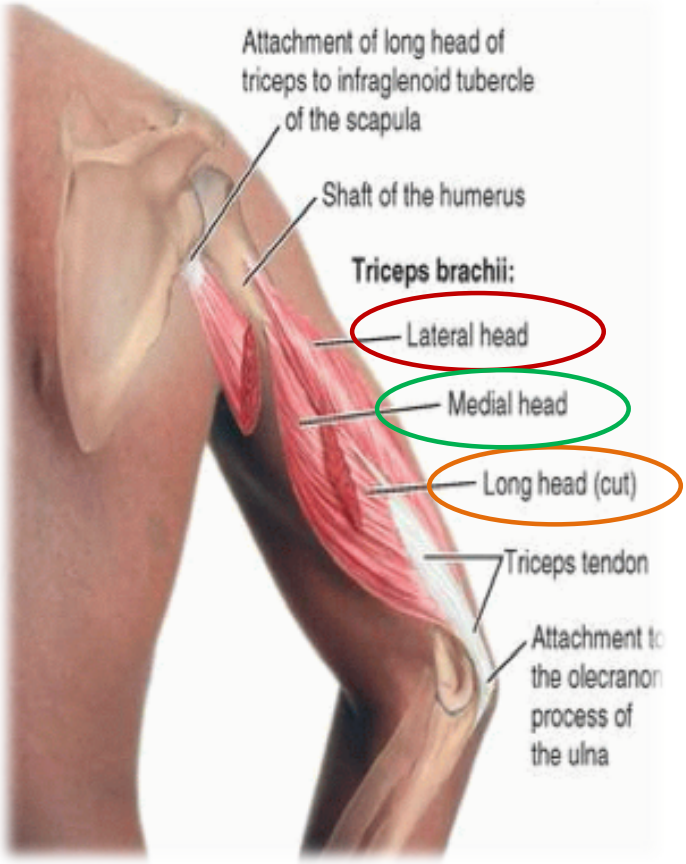
- Muscles: Triceps
- Vessels: Profunda brachii & Ulnar collateral arteries
- Nerves: Radial & Ulnar



MUSCLES OF POSTERIOR COMPARTMENT

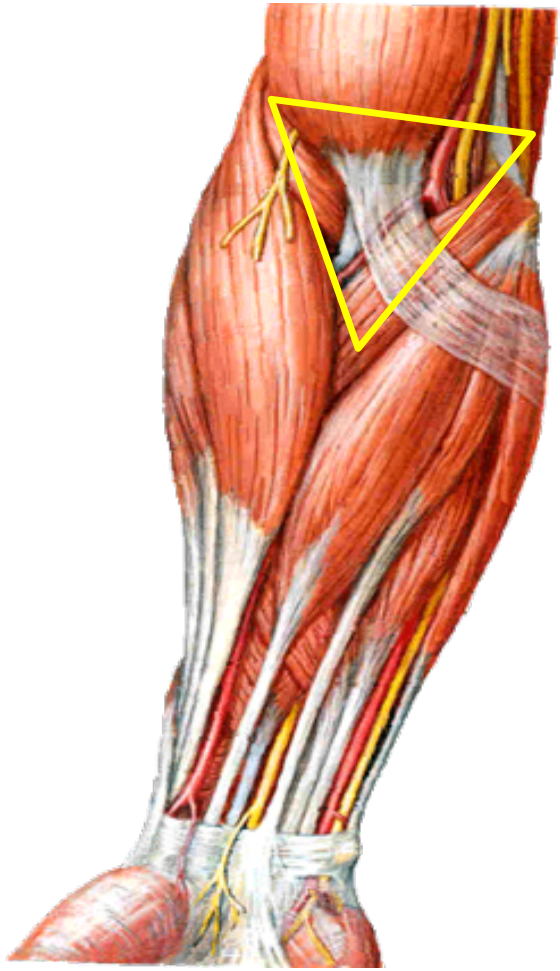
TRICEPS

- Origin:
  - 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



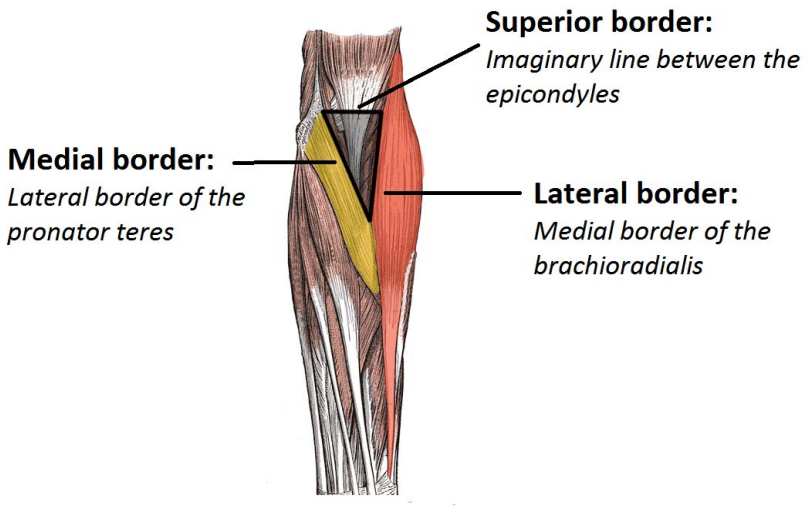
CUBITAL FOSSA

- It is an area of transition between the anatomical arm and the forearm.
- It is located as a triangular depression on the anterior surface of the elbow joint.



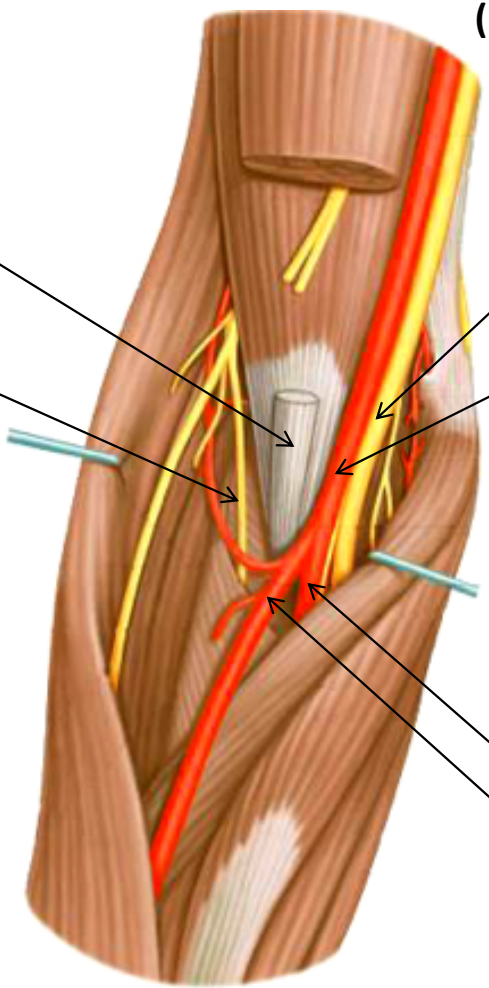
BOUNDARIES OF CUBITAL FOSSA

- **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

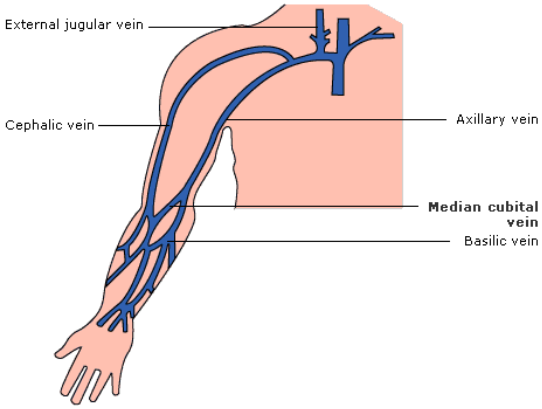
2. Brachial artery divides into radial & ulnar arteries.

Ulnar artery

Radial artery

CLINICAL RELEVANCE

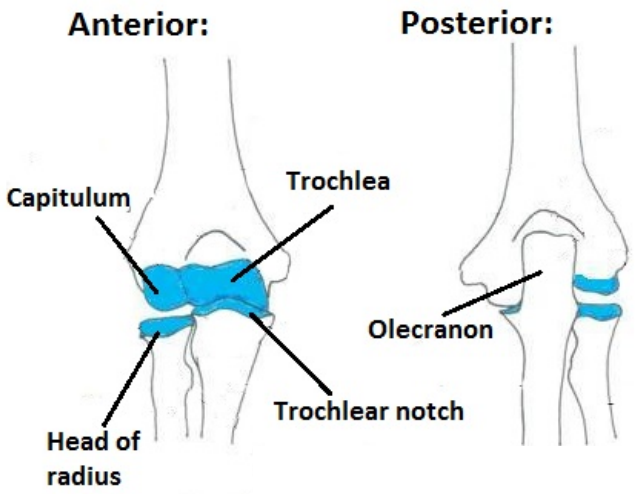
- The brachial pulse can be felt by palpating immediately medial to the biceps tendon in the cubital fossa.
- The median cubital vein is located superficially within the roof of the cubital fossa.
- It connects the basilic and cephalic veins, and can be accessed easily – this makes it a common site for venepuncture.

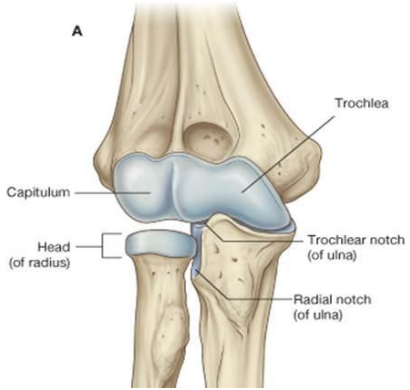


ELBOW JOINT

ARTICULATING SURFACES

- The elbow is the joint connecting the upper arm to the forearm.
- It is classed as a hinge-type synovial joint.
- It consists of two separate articulations:
  - Trochlea and capitulum of the humerus above
  - Trochlear notch of ulna and the head of radius below
- The articular surfaces are covered with articular cartilage (hyaline).





CAPSULE

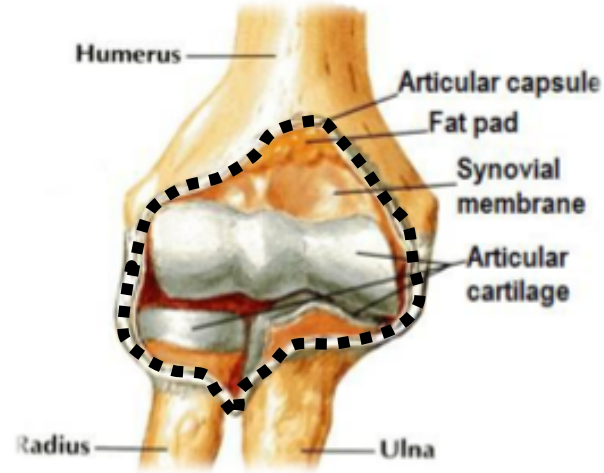
- The elbow joint has a capsule enclosing the joint. This in itself is strong and fibrous, strengthening the joint.
- The joint capsule is thickened medially and laterally to form collateral ligaments, which stabilize the flexing and extending motion of the arm.

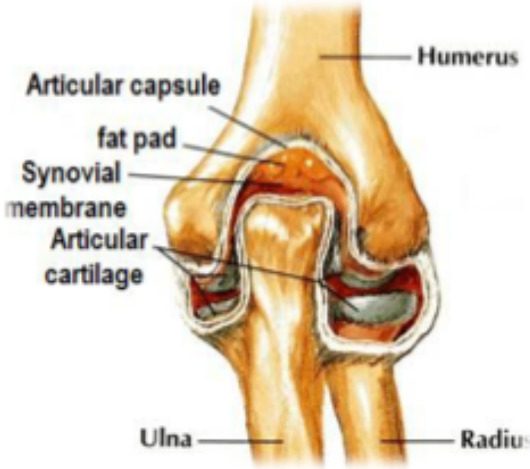
Anteriorly: attached

- 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.

Posteriorly: attached

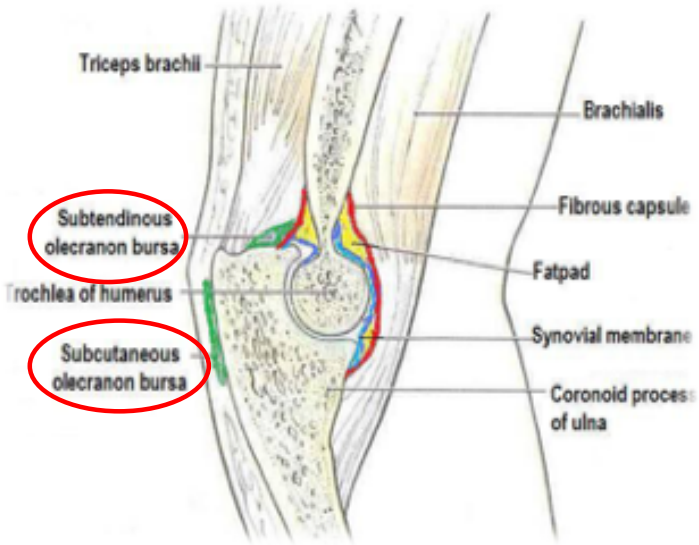
- Above - To the margins of the olecranon fossa of the humerus.
- Below - To the upper margin and sides of the olecranon process of the ulna and to the anular ligament.





BURSAE

- A bursa is a membranous sac filled with synovial fluid.
- It acts as a cushion to reduce friction between the moving parts of a joint, limiting degenerative damage.
- There are many bursae in the elbow, but only a few have clinical importance:
  - Intratendinous – located within the tendon of the triceps brachii.
  - Subtendinous – between the olecranon and the tendon of the triceps brachii, reducing friction between the two structures during extension and flexion of the arm.
  - Subcutaneous (olecranon) bursa – between the olecranon and the overlying connective tissue (implicated in olecranon bursitis).



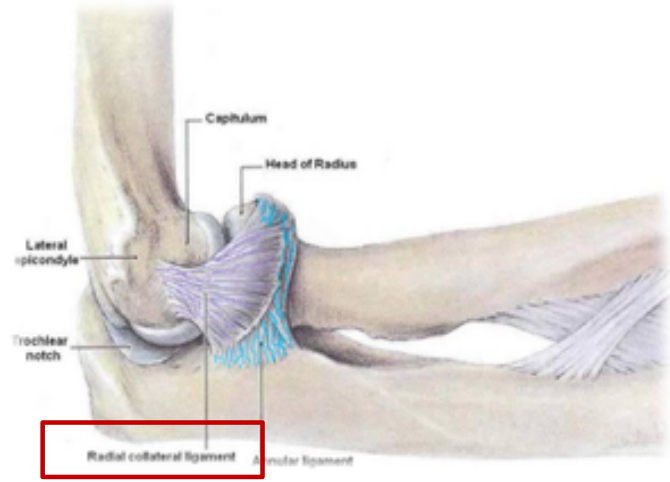
LIGAMENTS

Lateral (Radial Collateral) Ligament

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

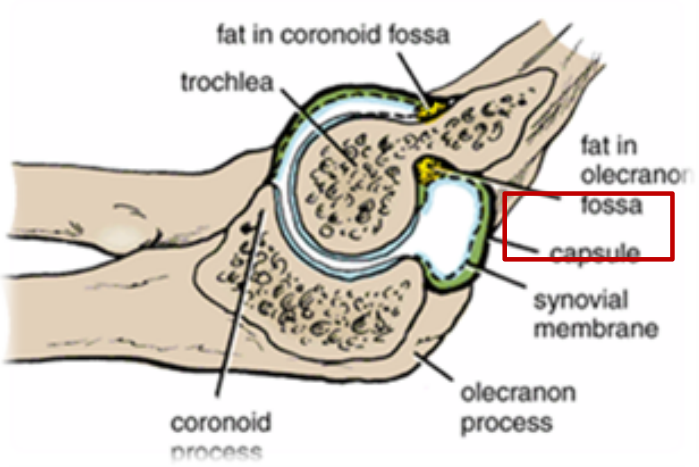
Medial (Ulnar Collateral) Ligament

- 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



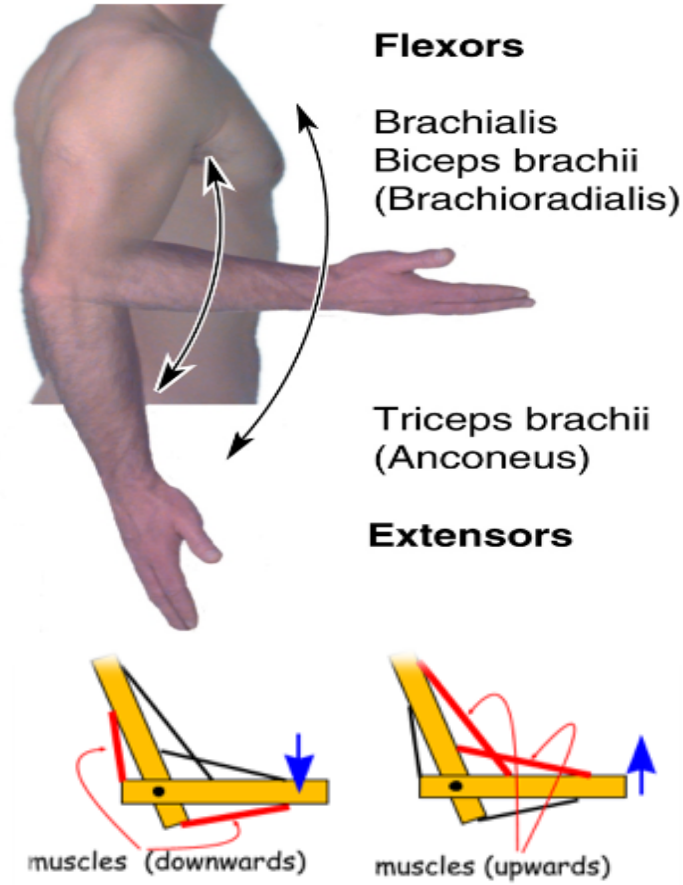
SYNOVIAL MEMBRANE

- 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



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

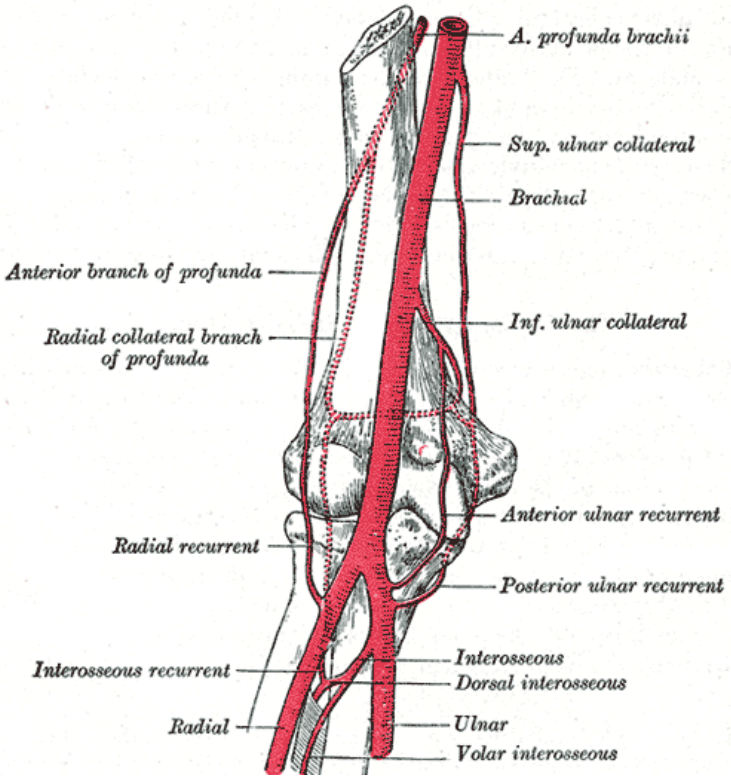


CARRYING ANGLE

- 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

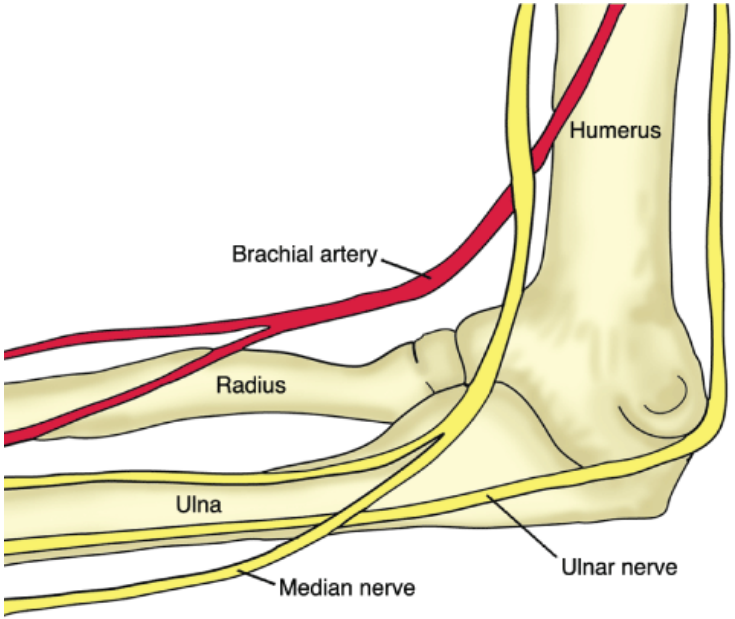
BLOOD SUPPLY

- The arterial supply to the elbow joint is from the cubital anastomosis, which includes recurrent and collateral branches from the deep brachial arteries.



INNERVATION

- The innervation is provided by the median, musculocutaneous and radial nerves anteriorly, and the ulnar nerve posteriorly.



CLINICAL RELEVANCE

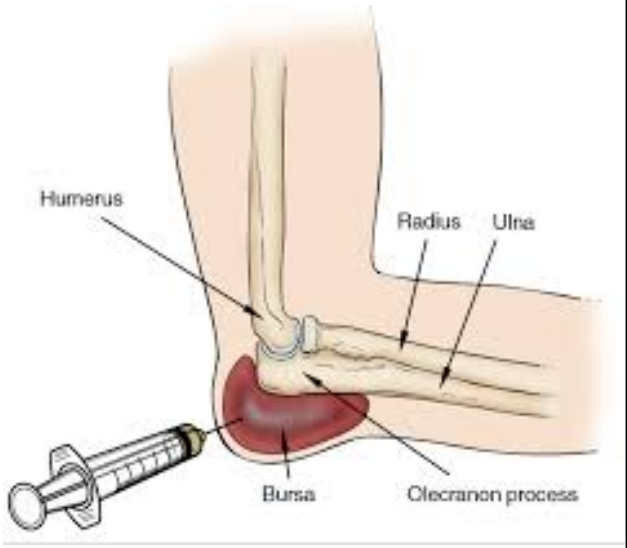
BURSITIES

❑ Subcutaneous bursitis

- Repeated friction and pressure on the bursa can cause it to become inflamed.
- Because this bursa lies relatively superficially, it can also become infected (e.g cut from a fall on the elbow)

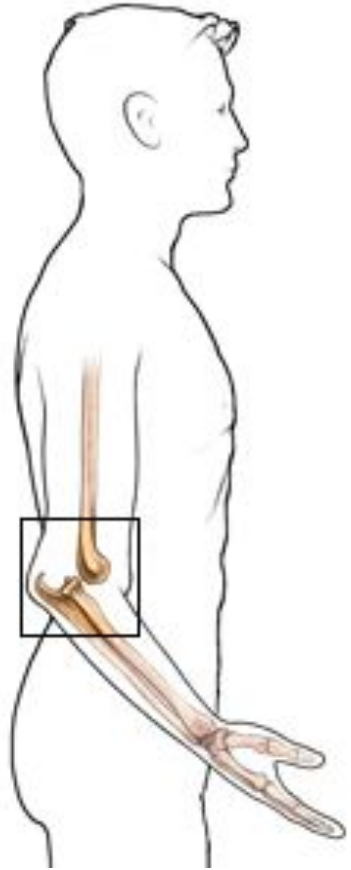
❑ Subtendinous bursitis

- This is caused by repeated flexion and extension of the forearm, commonly seen in assembly line workers. Usually flexion is more painful as more pressure is put on the bursa.



DISLOCATION

- An elbow dislocation usually occurs when a young child falls on a hand with the elbow flexed.
- The distal end of the humerus is driven through the weakest part of the joint capsule, which is the anterior side.
- The ulnar collateral ligament is usually torn and there can also be ulnar nerve involvement
- Most elbow dislocations are posterior, and it is important to note that elbow dislocations are named by the position of the ulna and radius, not the humerus.



QUESTIONS!