

# **ARM & ELBOW JOINT**



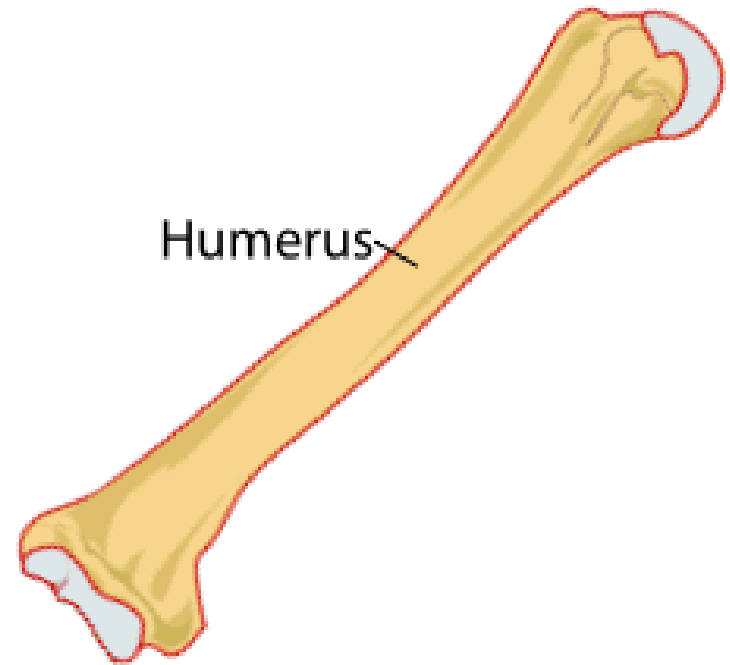
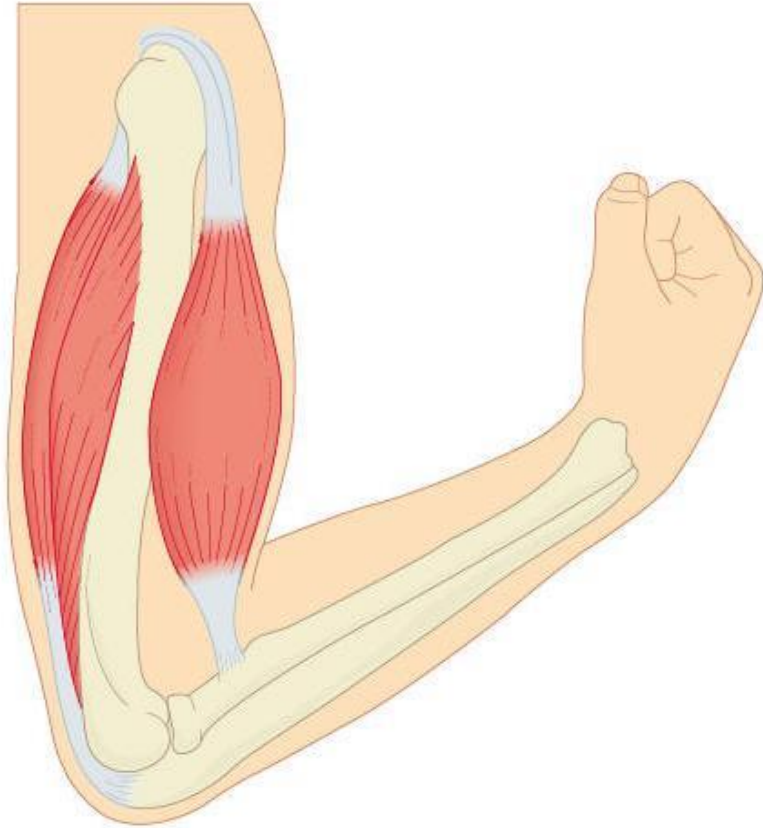
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**King Saud University**  
**College of Medicine**  
**@khaleelya**

# 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.

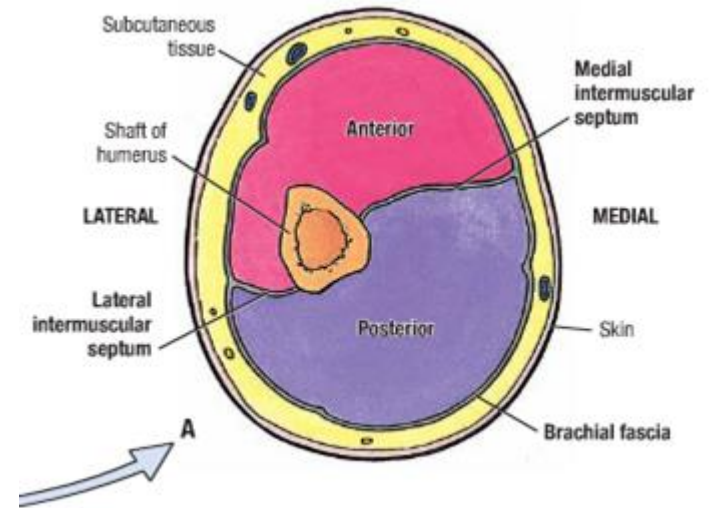
# THE ARM



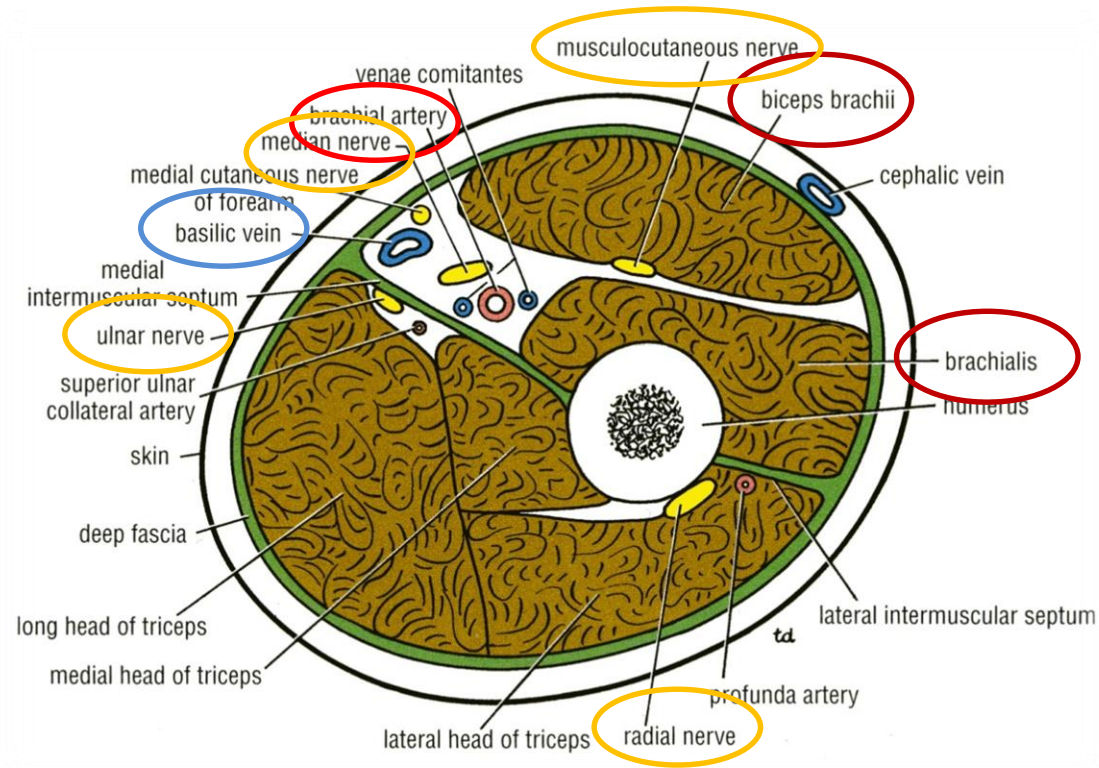
Humerus

# 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

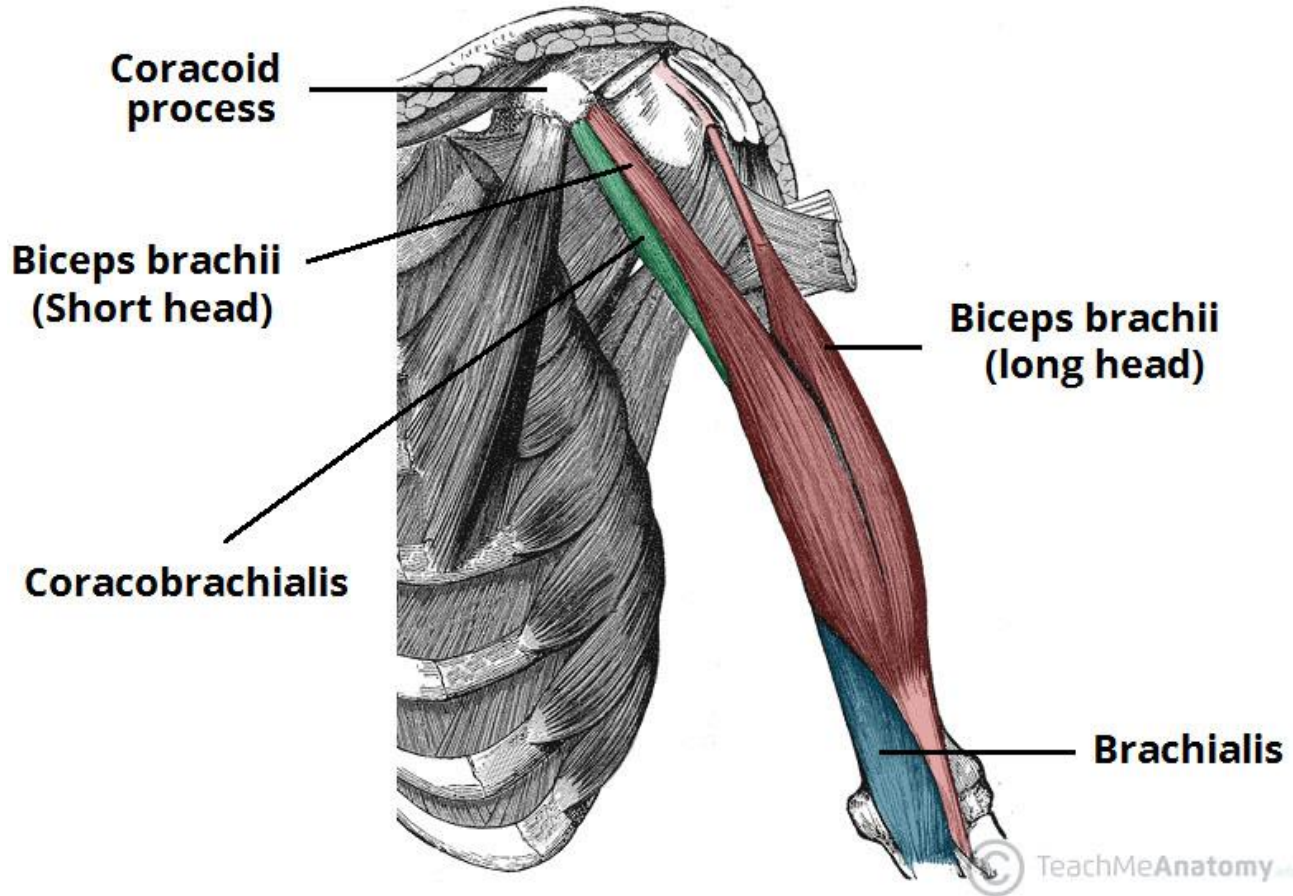


# ANTERIOR FASCIAL COMPARTMENT



- 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:

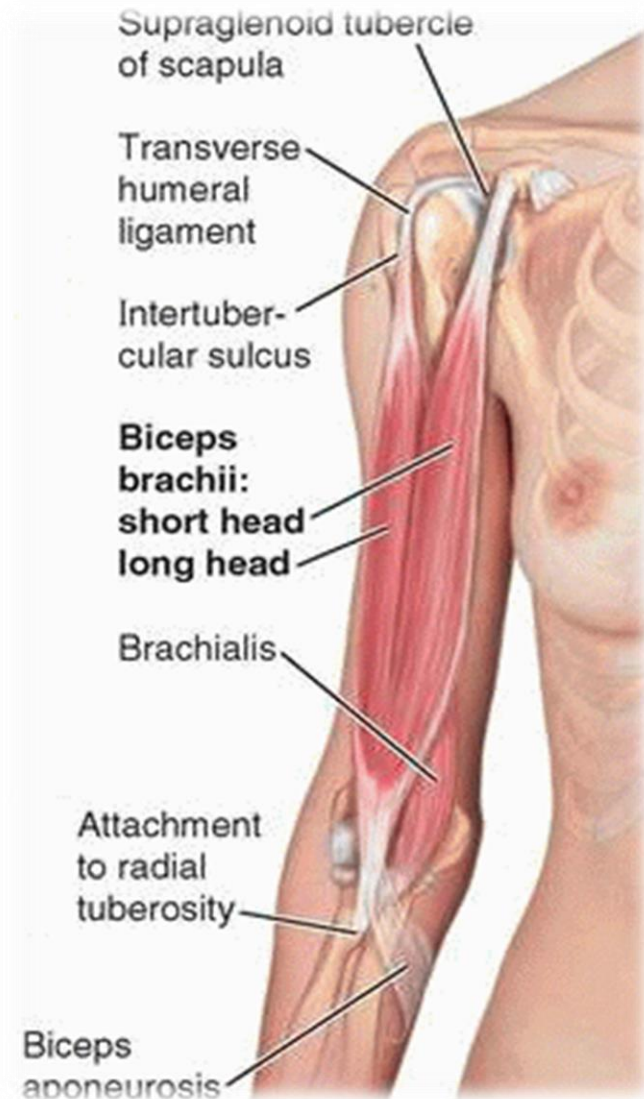
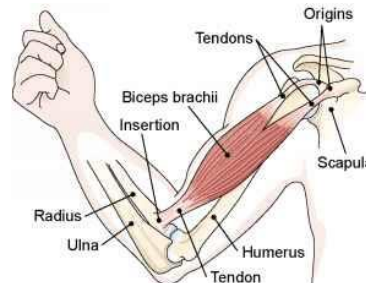
- In the posterior part of the radial tuberosity.
- Into the deep fascia of the medial aspect of the forearm through bicipital aponeurosis.

## ❑ Nerve supply:

- **Musculocutaneous**

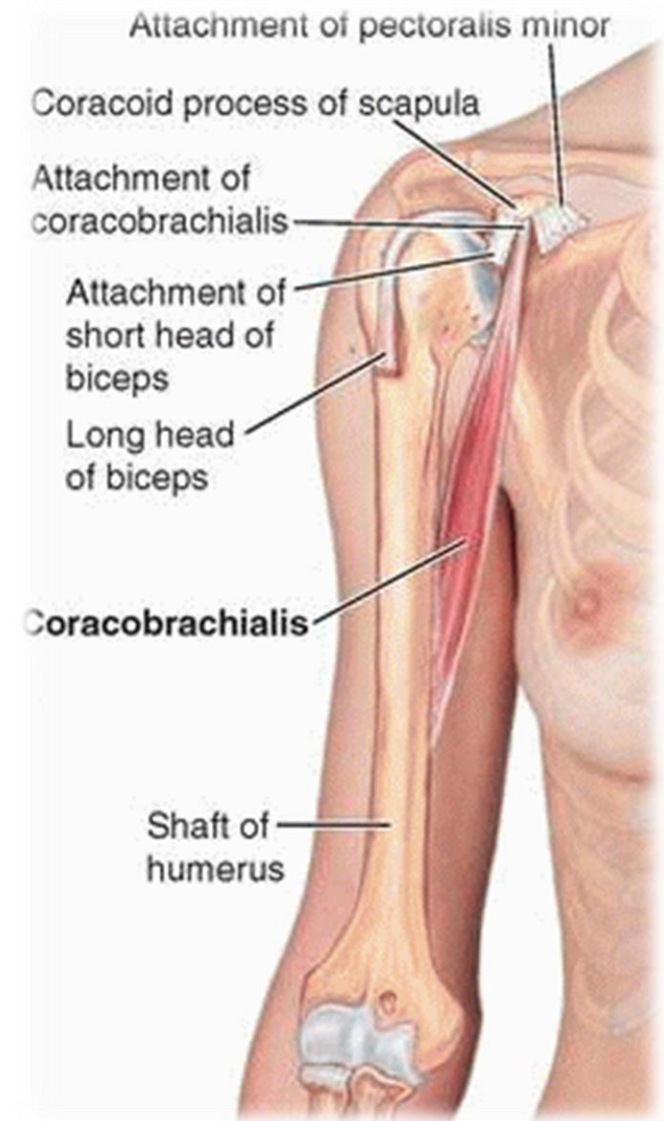
## ❑ Action:

- Powerful flexor of elbow
- Strong supinator of the forearm
  - used in screwing.
- Weak flexor of shoulder



# CORACOBRACHIALIS

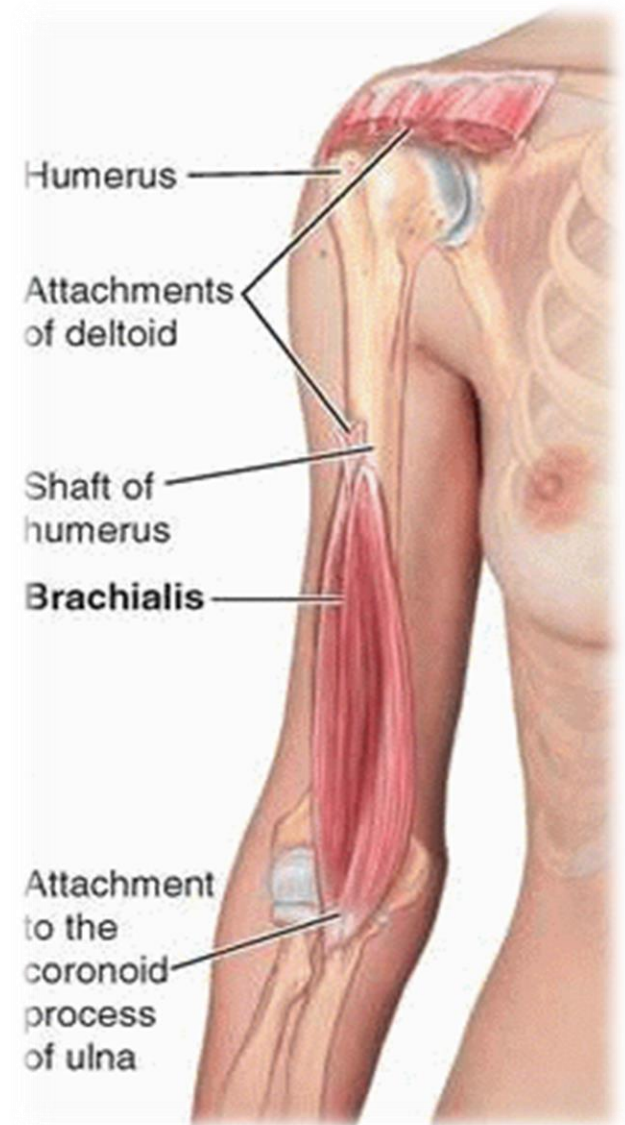
- ❑ **Origin:**
  - Tip of the coracoid process
- ❑ **Insertion:**
  - Middle of the medial side of the shaft of the humerus
- ❑ **Nerve supply:**
  - **Musculocutaneous**
- ❑ **Action:**
  - Flexor
  - Weak adductor of the arm



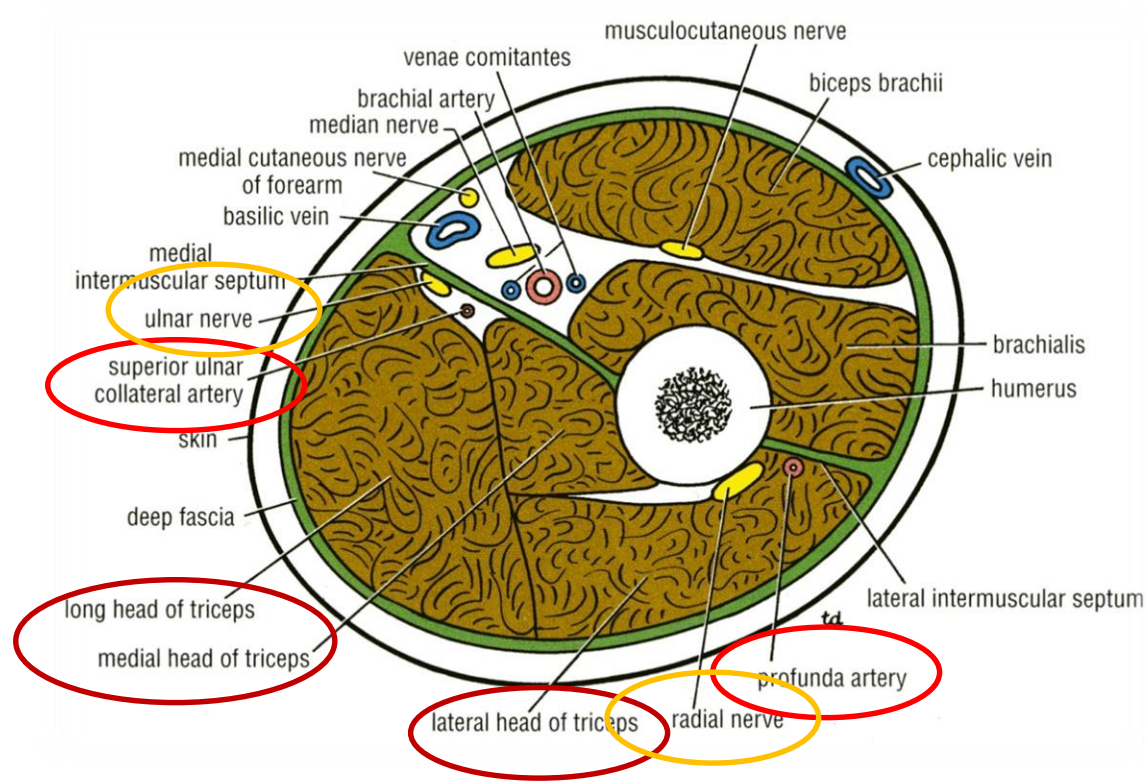


# BRACHIALIS

- ❑ **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

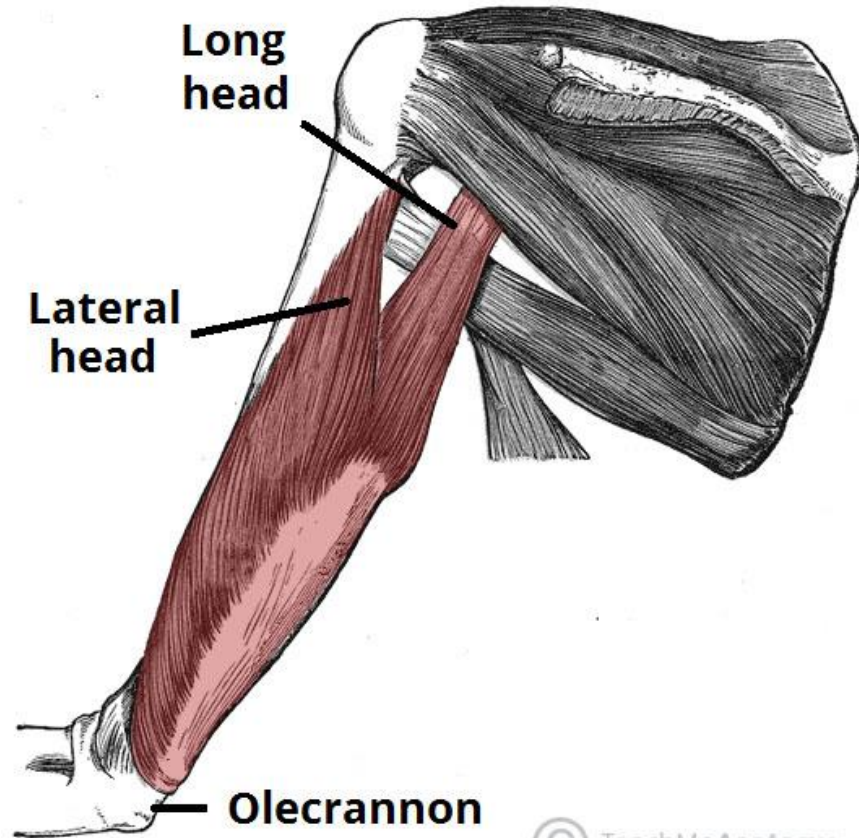


# POSTERIOR FASCIAL COMPARTMENT



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

# MUSCLES OF POSTERIOR COMPARTMENT



# TRICEPS

## ❑ Origin:

- **Long Head** from infraglenoid 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:

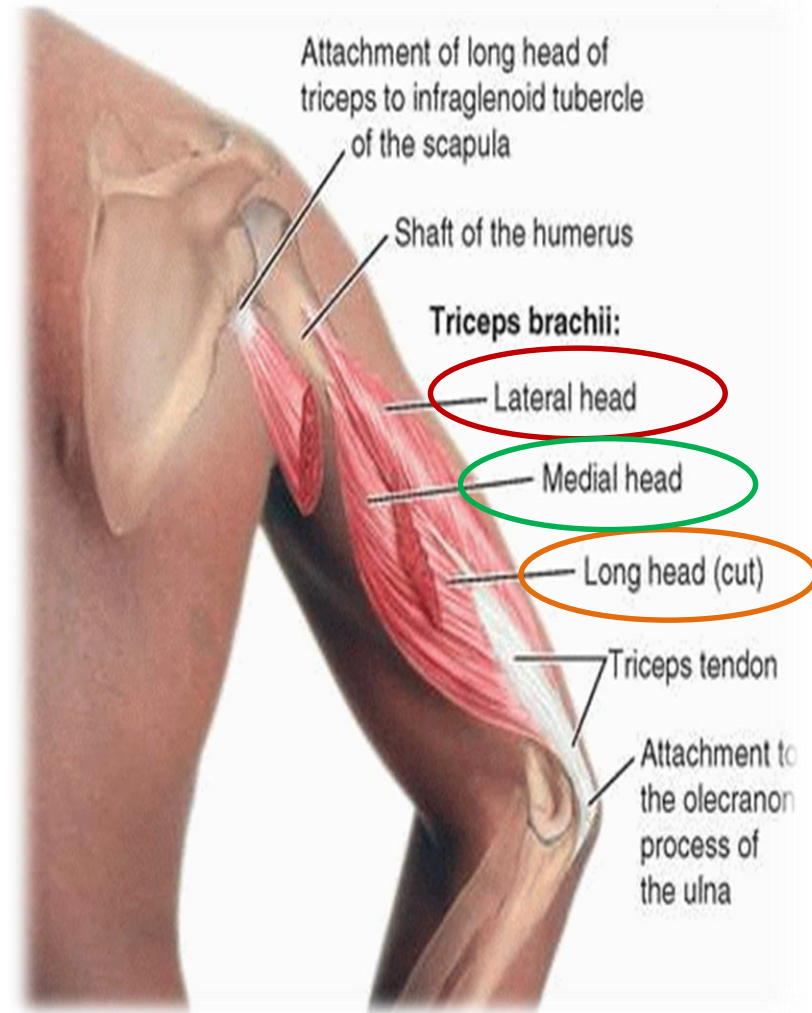
- Common tendon inserted into the upper surface of the olecranon process of ulna

## ❑ Nerve supply:

- **Radial nerve**

## ❑ Action:

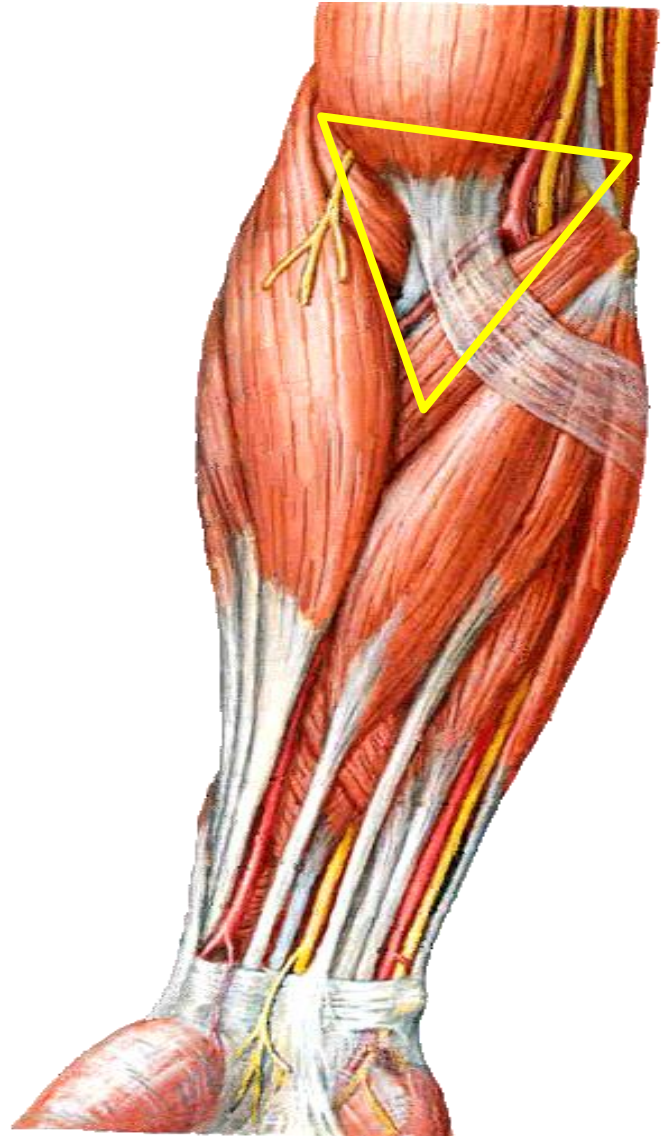
- Strong extensor of the elbow joint





# 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

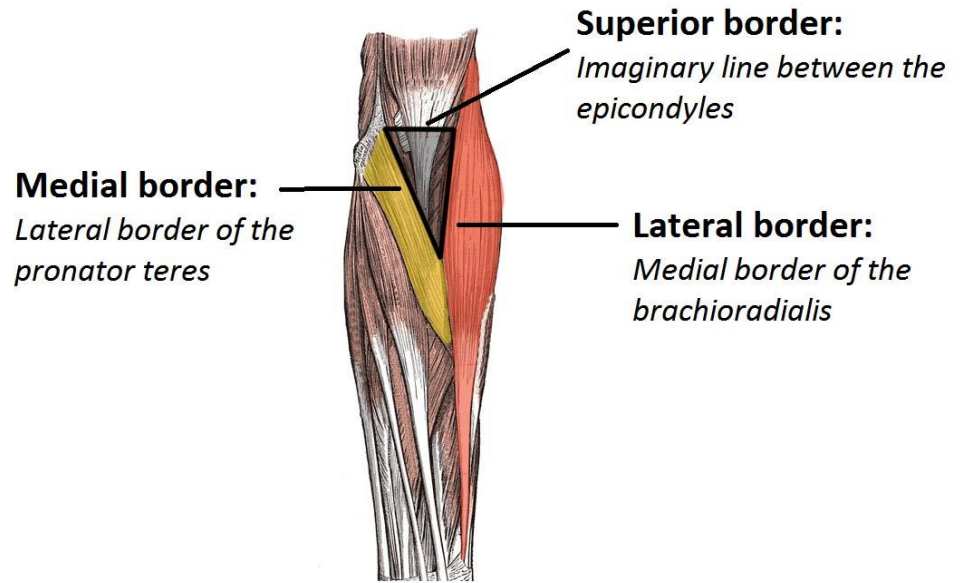
- Pronator teres

## ❑ 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**

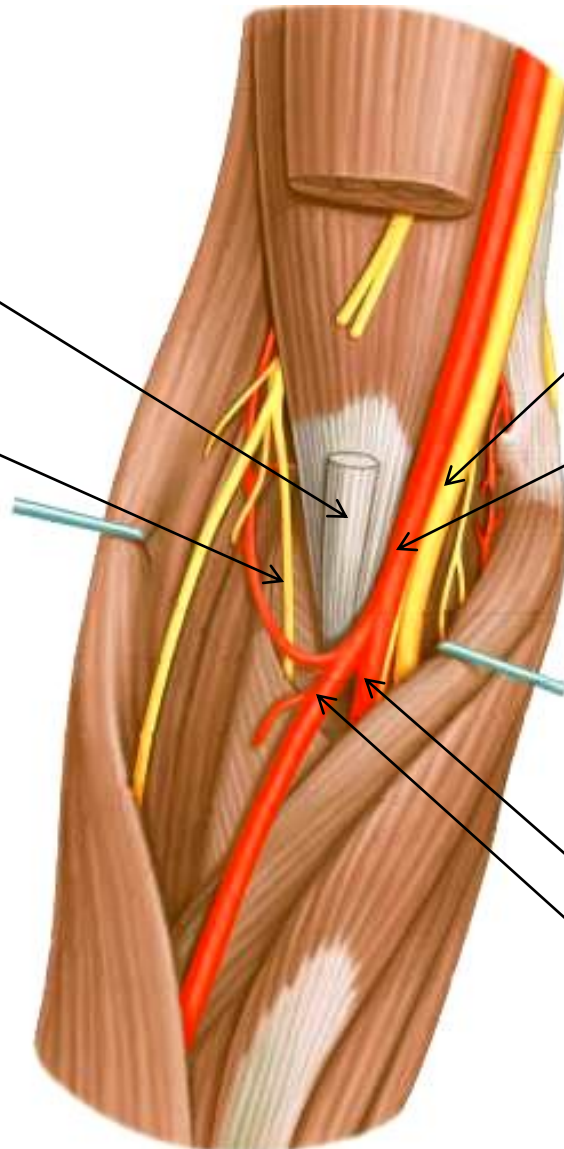
**4. Deep branch of radial nerve**

**1. Median nerve**

**2. Brachial artery divides into radial & ulnar arteries.**

**Ulnar artery**

**Radial artery**



# CLINICAL RELEVANCE

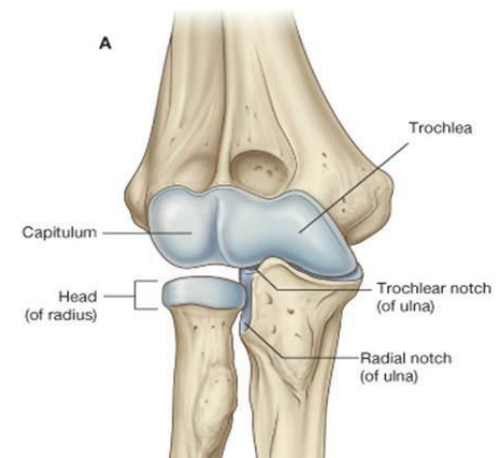
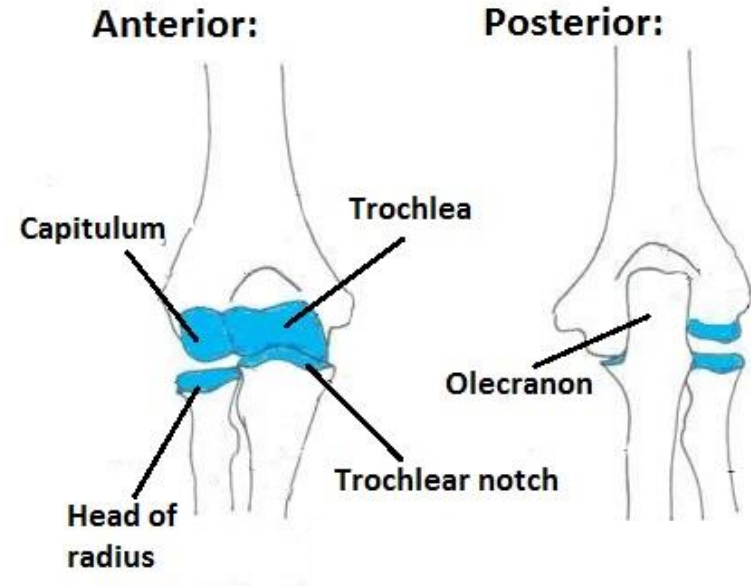
- ❑ The **brachial pulse** can be felt by palpating immediately medial to the biceps tendon in the cubital fossa.
- ❑ The median cubital vein is located superficially within the roof of the cubital fossa.
- ❑ It connects the basilic and cephalic veins, and can be accessed easily – this makes it a common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

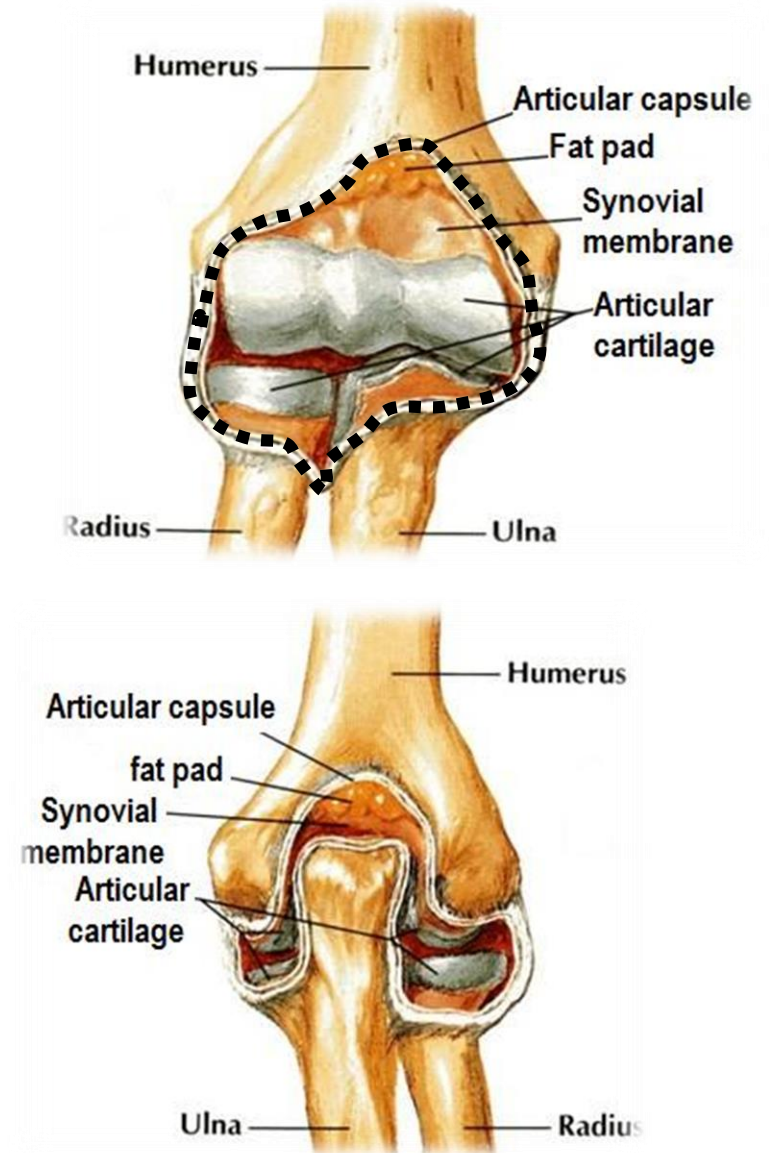
- ❑ The elbow joint has a capsule enclosing the joint. This in itself is strong and fibrous, strengthening the joint.
- ❑ The joint capsule is thickened medially and laterally to form **collateral ligaments**, which stabilize the flexing and extending motion of the arm.

## 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.

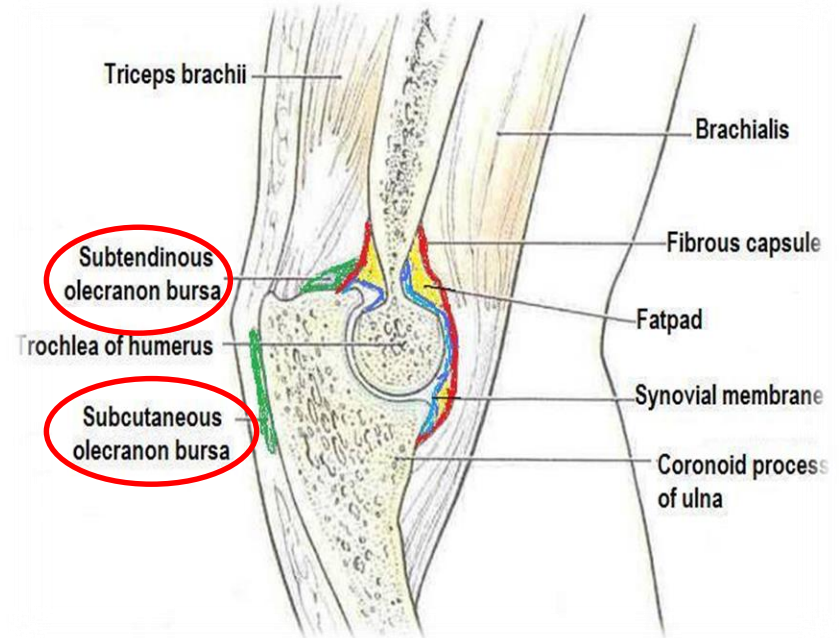
## Posteriorly: attached

- **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:
  - ❑ **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).

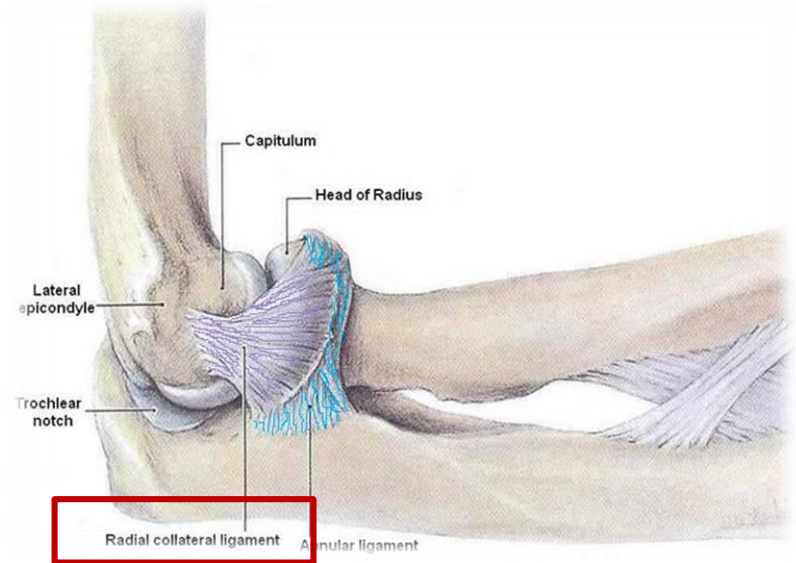




# LIGAMENTS

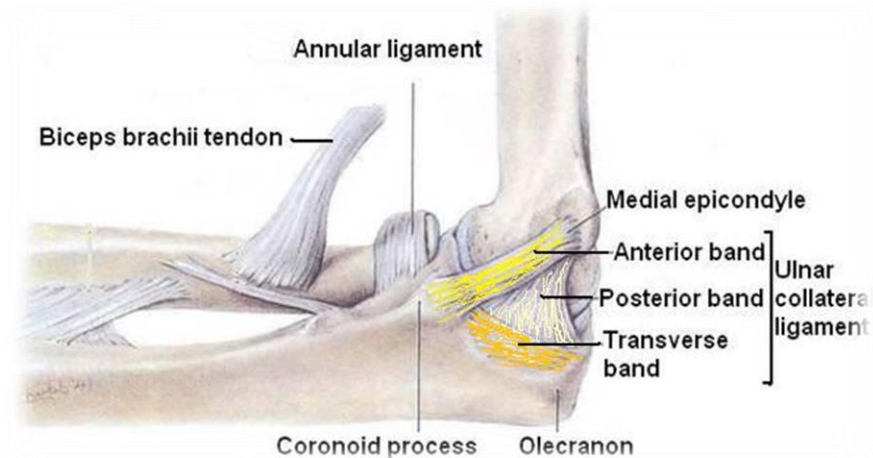
## Lateral (Radial Collateral) Ligament

- ❑ 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



# MOVEMENTS

## □ Flexion

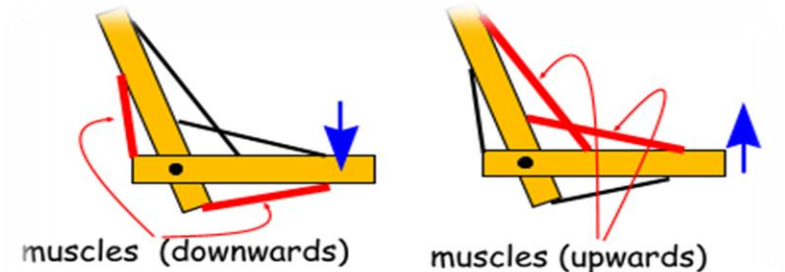
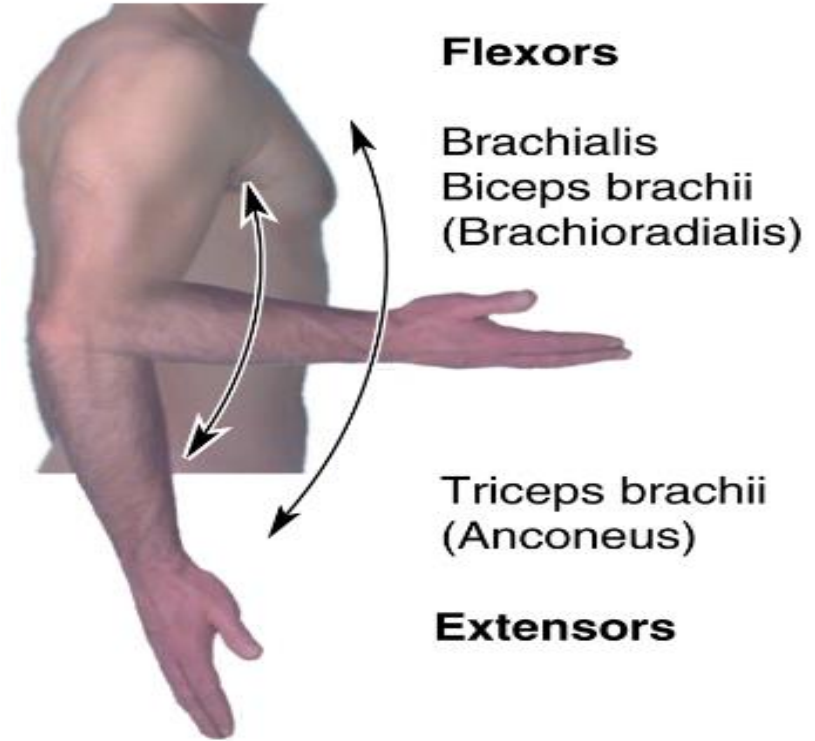
- Is limited by the anterior surfaces of the forearm and arm coming into contact.

## □ 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

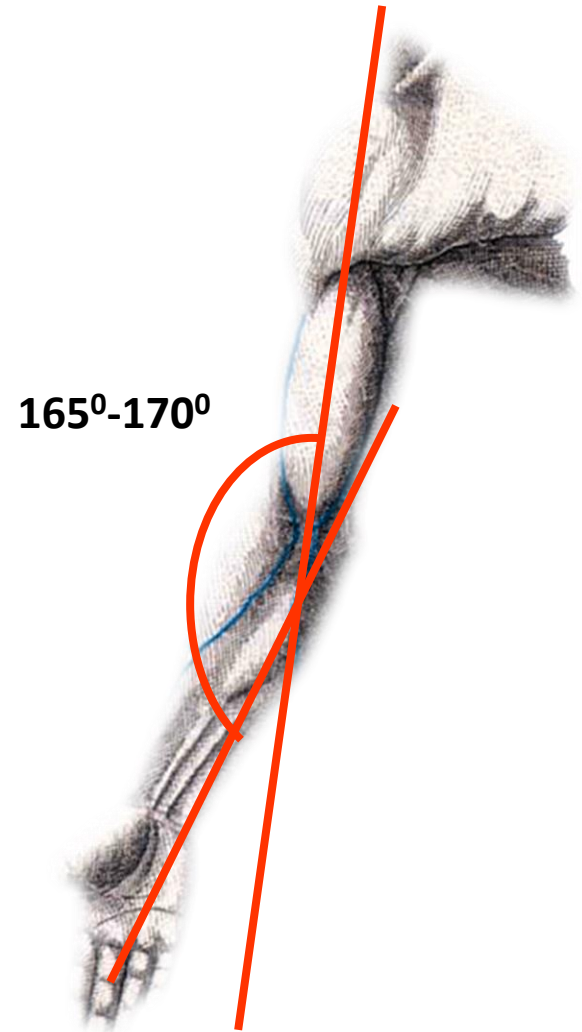
- 170 degrees in male and 167 degrees in females

## □ Disappears

- When the elbow joint is flexed

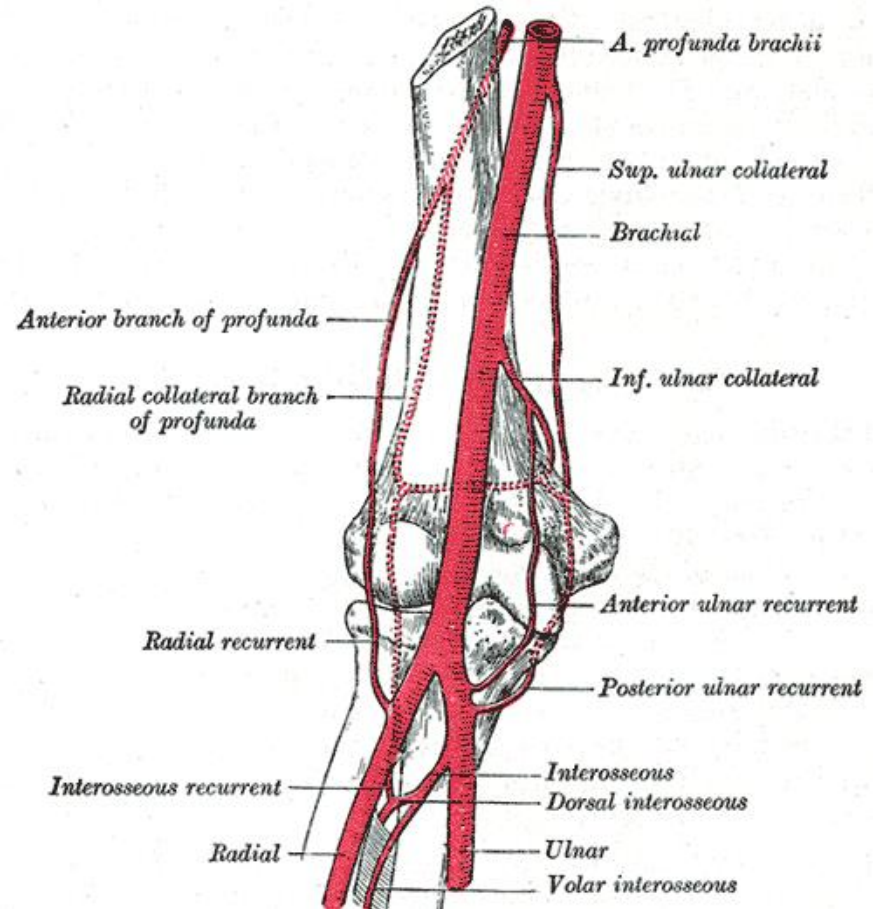
## □ Permits

- The forearms to clear the hips in swinging movements during walking, and is important when carrying objects



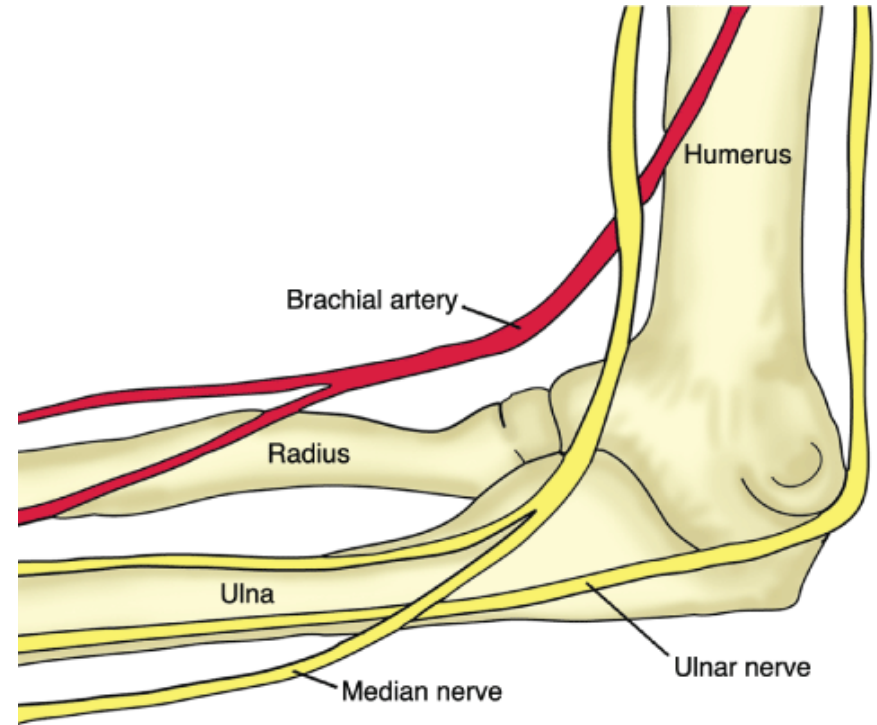
# BLOOD SUPPLY

- 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



# BURSITIS

## □ 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)

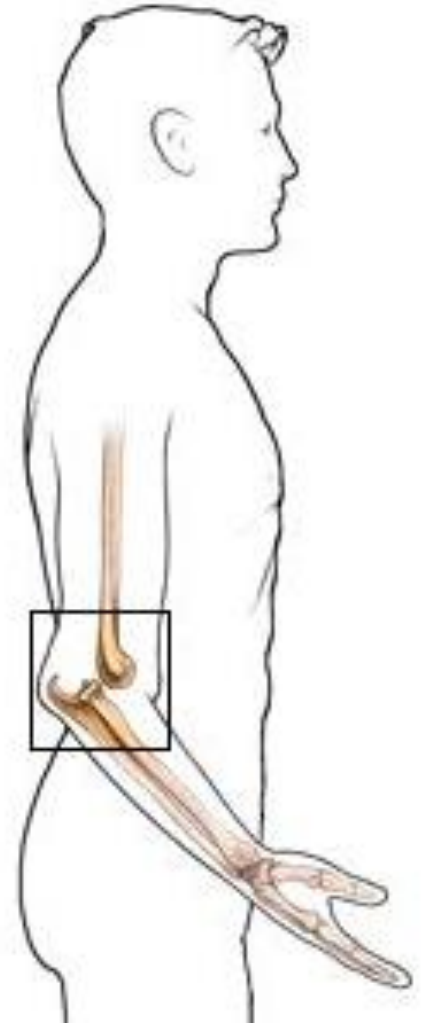
## □ Subtendinous bursitis

- 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!**