The Anatomy of the Arm

(or **The Brachium**)

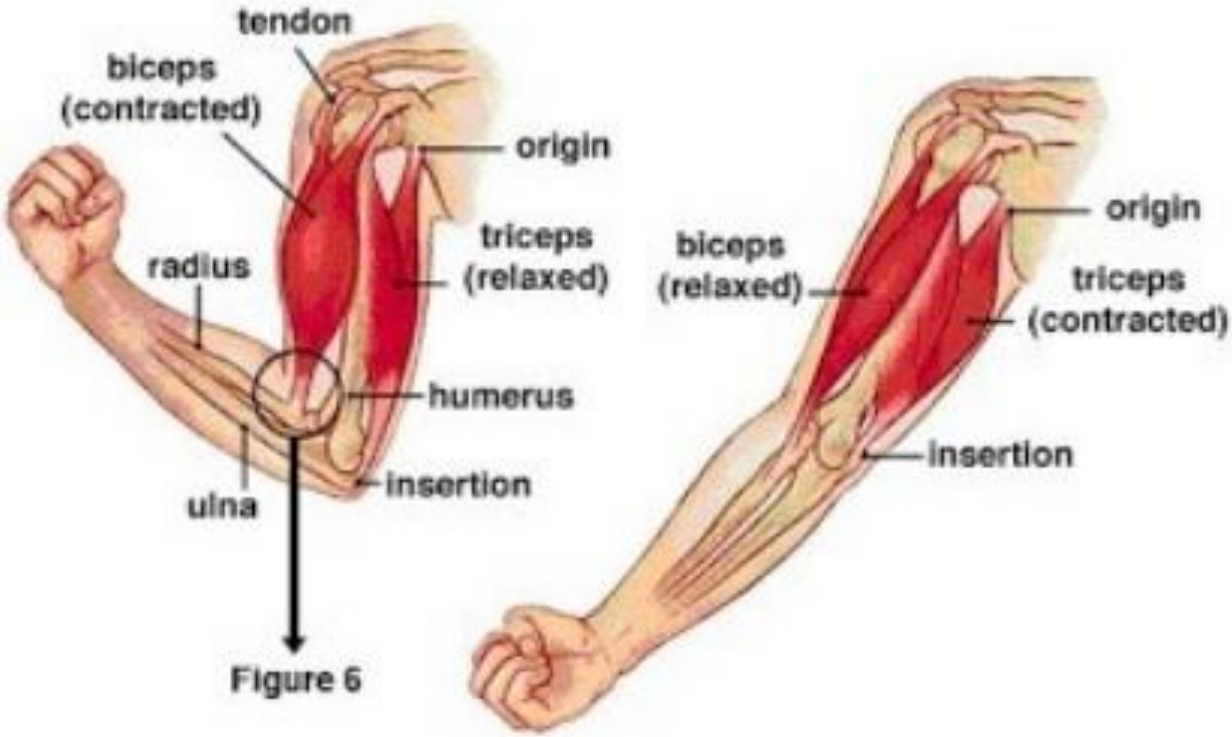


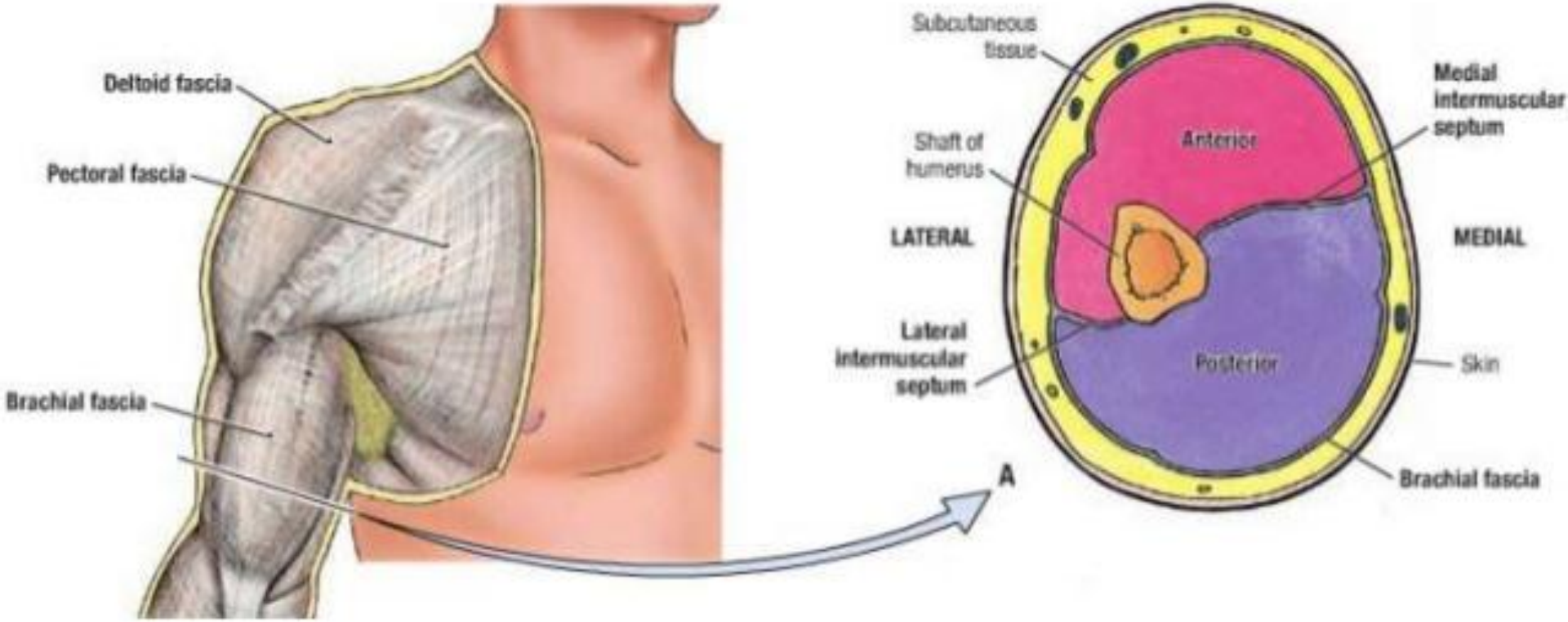
Figure 6

Cutaneous Innervation

- **The upper medial surface of the arm** is supplied by the lateral branch of the second intercostal nerve **(the intercostobrachial nerve).**
- **The lower medial surface of the arm** is supplied by the medial cutaneous nerve of the arm.
- **The lateral aspect of the arm** is supplied by the upper lateral cutaneous nerve (a branch of the axillary nerve) and the lower lateral cutaneous nerve (a branch of the radial nerve).
- **The posterior aspect** is supplied by the posterior cutaneous nerve of the arm, a branch of the radial nerve

Fascial Compartments of the Upper Arm

- The upper arm is enclosed in a sheath of deep fascia.
- Two fascial septa;
- **medial intermuscular septum** on the medial side extend from this sheath and are attached to the medial supracondylar ridge of the humerus
- **lateral intermuscular septum** on the lateral side, extend from this sheath and are attached to the lateral supracondylar ridge of the humerus.
- By this means, the upper arm is divided into an **anterior and a posterior fascial compartment**, each having its muscles, nerves, and arteries

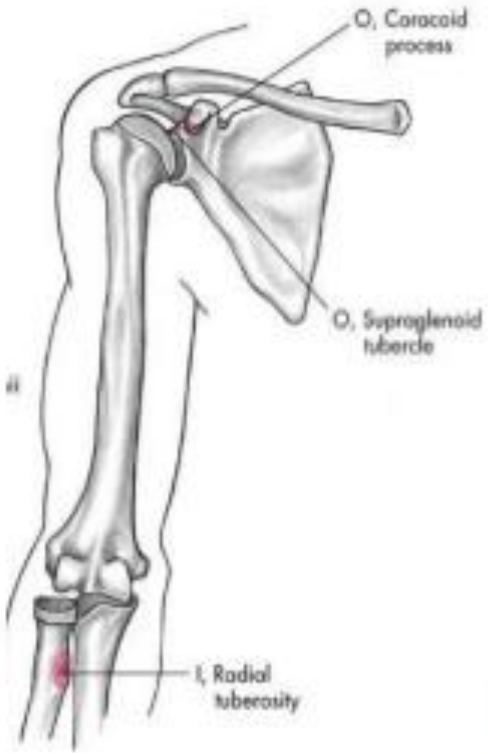

Deltoid fascia
Pectoral fascia
Brachial fascia
A
Subcutaneous tissue
Shaft of humerus
LATERAL
Lateral intermuscular septum
Anterior
Posterior
Medial intermuscular septum
MEDIAL
Skin
Brachial fascia

Veins of The Arm :

- The brachial artery accompany by two venae comitantes through all its course.
- Besides, there are superficial subcutaneous veins of upper limb, basilica & cephalic veins.
- The basilica vein perforate deep fascia in the middle of arm& joind brachial vein while cephalic vein passes in delto-pectoral groove & drain into axillary vein.
- Usually brachial vein receive basilica vein at the lower border of teres major, where it changes its name into axillary vein.
  Median cubital vein .

Contents of the anterior compartment of the arm

- **Muscles:** Biceps brachii, coracobrachialis, and brachialis
- **Blood supply:** Brachial artery
- **Nerve supply to the muscles**: Musculocutaneous nerve
- **Structures passing through the compartment:** Musculocutaneous, median, and ulnar nerves; brachial artery and basilic vein.
- The radial nerve is present in the lower part of the compartment.



Biceps brachii

Origin

Short head: tip of coracoid process of scapula; **Long head:** supraglenoid tubercle of scapula, passes through the shoulder joint and emerges from the joint through the intertubercular groove.

Insertion Tuberosity of radius and fascia of forearm via bicipital aponeurosis

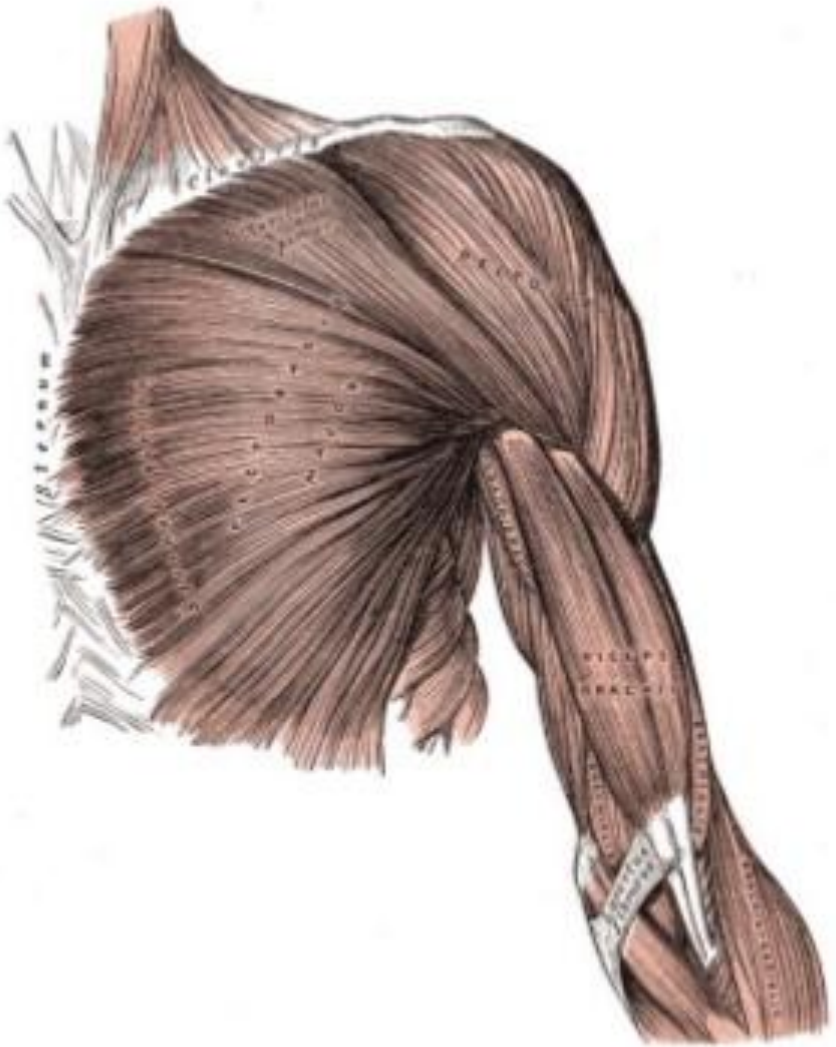
Action

Supinates forearm and, when it is supine, flexes forearm

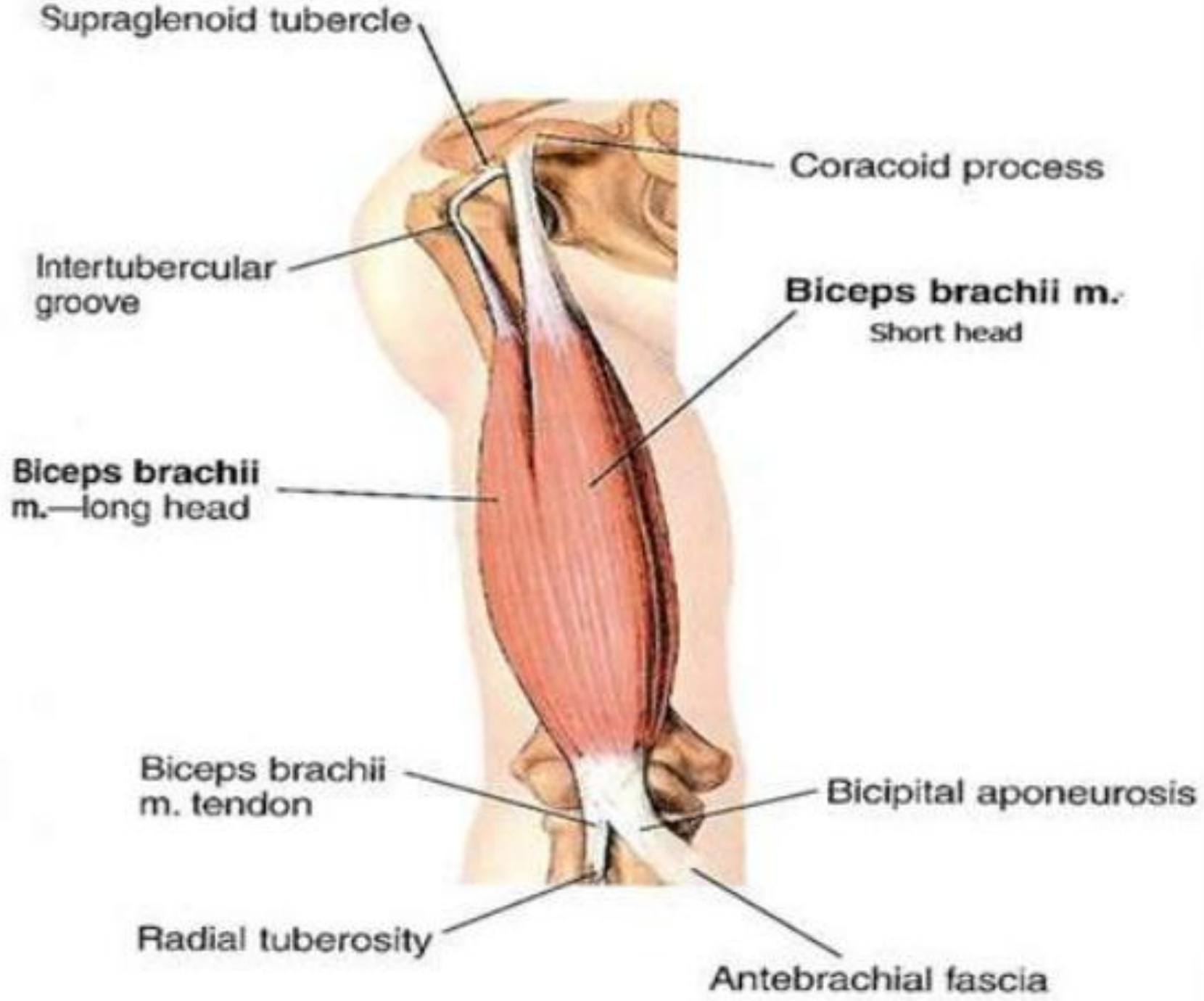
Weak flexion of arm

Innervation Musculocutaneous nerve (C5, C6)

The **bicipital aponeurosis**

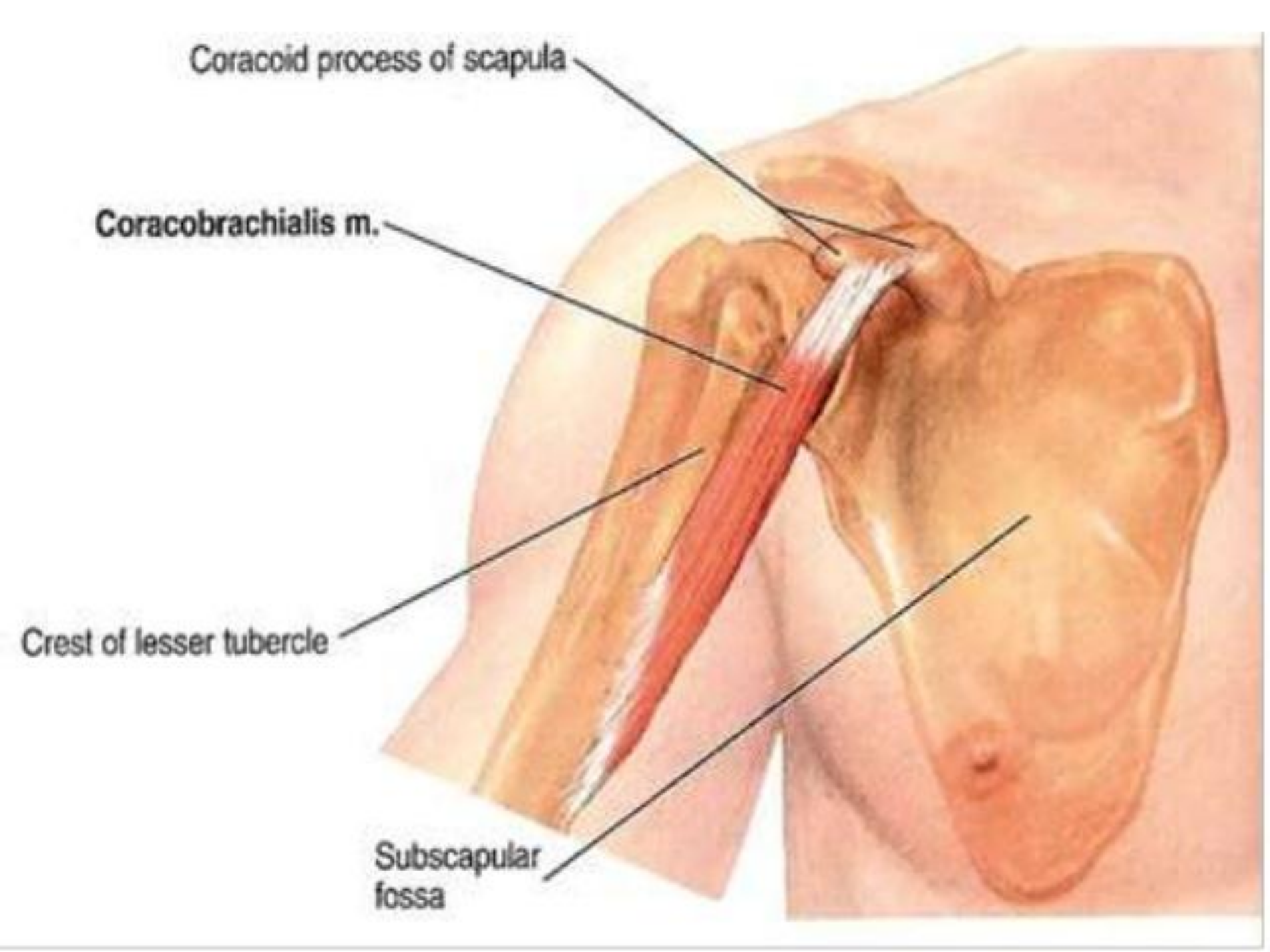


- It is a **broad aponeurosis** of the biceps brachii located in the cubital fossa .
- It separates superficial from deep structures in the fossa.
- It originates from the distal insertion of the biceps brachii and runs across the brachial artery.
- It **is inserted into the antebrachial fascia of the forearm.**
- It **helps to protect the brachial artery and the median nerve running underneath(during venipuncture**) from the median cubital vein.

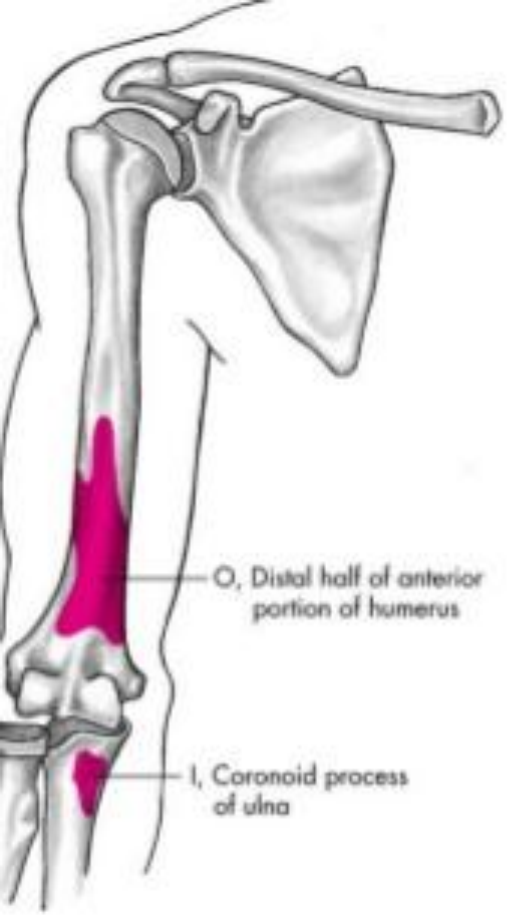

Supraglenoid tubercle
Coracoid process
Intertubercular groove
Biceps brachii m.
Short head
Biceps brachii m.—long head
Biceps brachii m. tendon
Bicipital aponeurosis
Radial tuberosity
Antebrachial fascia

Coracobrachialis muscle

- **Origin:** From the tip of coracoid process of the scapula (with short head of biceps).
- **Insertion:** Into the middle third of the medial side of the shaft of the humerus.
- **Blood Supply:** Muscular branches of brachial artery
- **Nerve Supply:** From musculocutaneous nerve.
- **Action:**
- Flexion of the shoulder joint.
- Weak adduction of the shoulder joint.


Coracoid process of scapula
Coracobrachialis m.
Crest of lesser tubercle
Subscapular fossa

Brachialis



Origin Distal half of anterior surface of humerus

Insertion Coronoid process and tuberosity of ulna

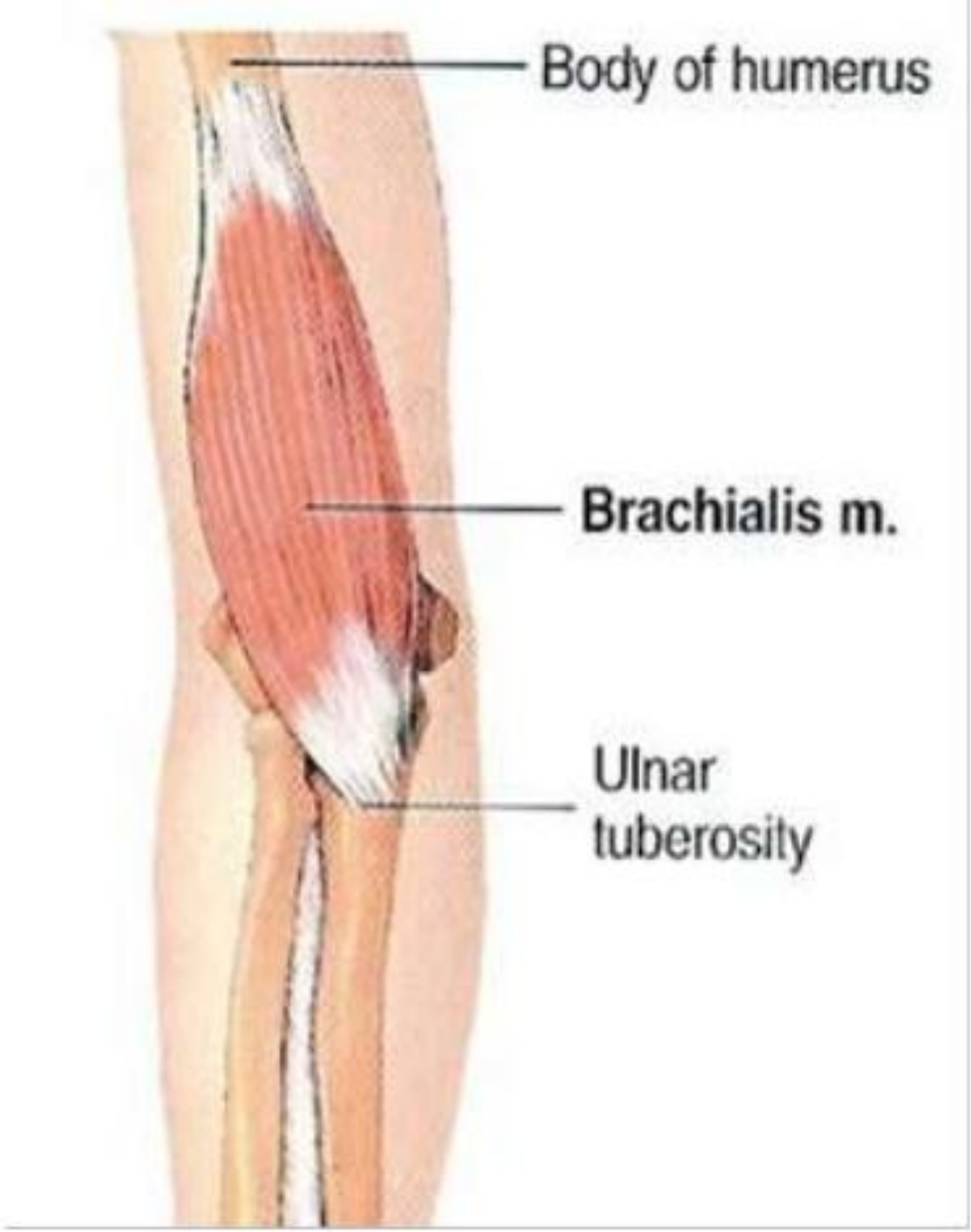
Action Major flexor of forearm -

flexes forearm in all positions

Innervation

Musculocutaneous nerve (C5, C6)

Arterial Supply Muscular branches of brachial artery, recurrent radial artery


Body of humerus
Brachialis m.
Ulnar tuberosity

Structures Passing Through the Anterior Fascial Compartment

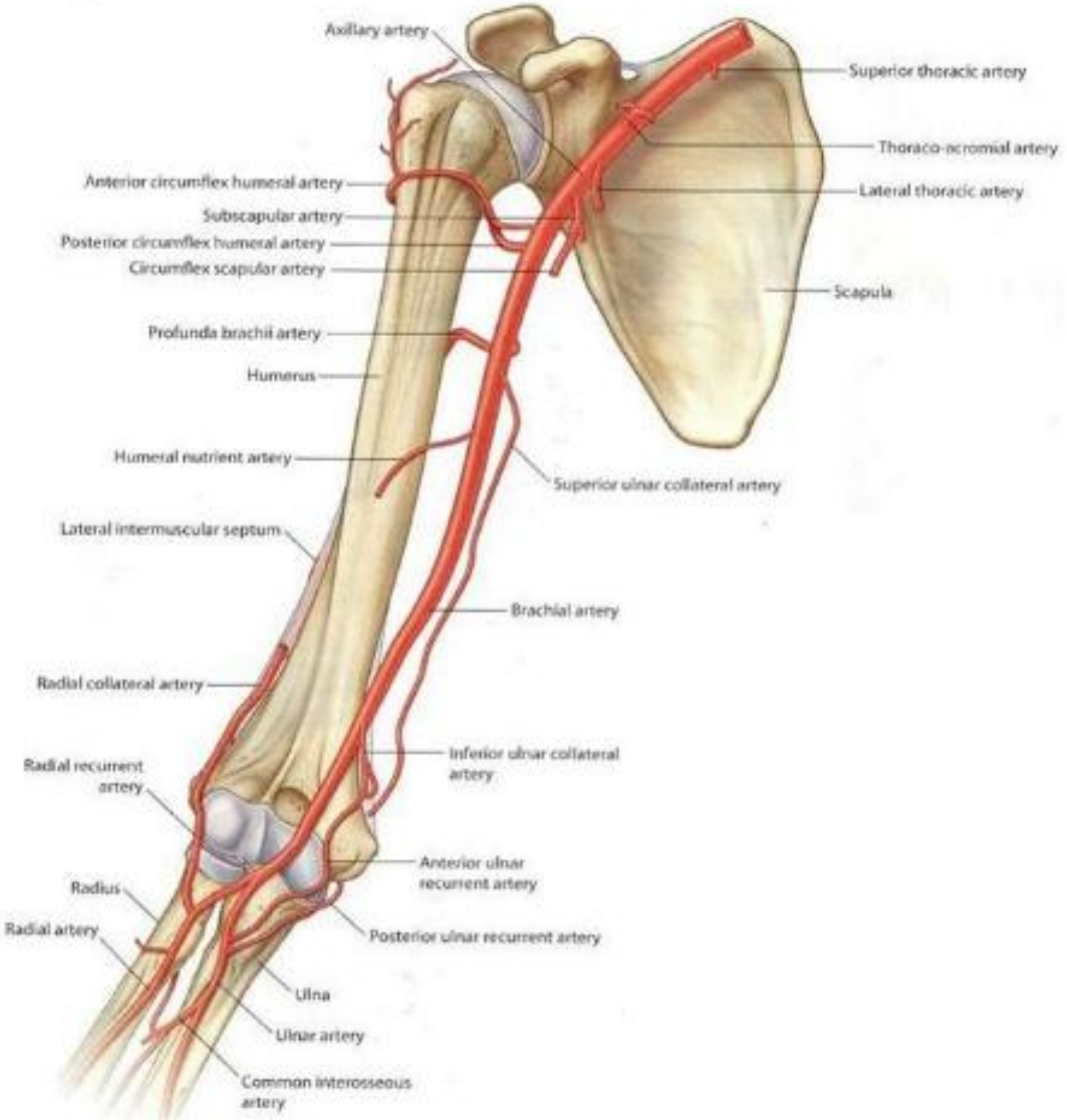
- Brachial artery
- Musculocutaneos nerve
- Median nerve
- Ulnar nerve

Brachial Artery

- **Beginning** The brachial artery begins at the lower border of the teres major muscle as a continuation of the axillary artery.
- It provides the main arterial supply to the arm.
- **Termination** It terminates opposite the neck of the radius by dividing into the radial and ulnar arteries.
- **Relations**
- **Anteriorly:** The vessel is superficial and is overlapped from the lateral side by the coracobrachialis and biceps. The medial cutaneous nerve of the forearm lies in front of the upper part; the median nerve crosses its middle part; and the bicipital aponeurosis crosses its lower part.
- **Posteriorly:** The artery lies on the triceps, the coracobrachialis insertion, and the brachialis
- **Medially:** The ulnar nerve and the basilic vein in the upper part of the arm; in the lower part of the arm, the median nerve lies on its medial side
- **Laterally:** The median nerve and the coracobrachialis and biceps muscles above; the tendon of the biceps lies lateral to the artery in the lower part of its course

Branches of brachial artery

- **Muscular branches** to the anterior compartment of the upper arm
- **The nutrient artery** to the humerus
- **The profunda artery** arises near the beginning of the brachial artery and follows the radial nerve into the spiral groove of the humerus.
- It supplies muscular branches, the nutrient artery of the humerus, and finally divides into terminal radial and middle collateral branches.
- **The superior ulnar collateral artery** arises near the middle of the upper arm and follows the ulnar nerve.
- **The inferior ulnar collateral artery** arises near the termination of the artery and takes part in the anastomosis around the elbow joint


Axillary artery
Superior thoracic artery
Thoraco-acromial artery
Anterior circumflex humeral artery
Lateral thoracic artery
Subscapular artery
Posterior circumflex humeral artery
Circumflex scapular artery
Scapula
Profunda brachii artery
Humerus
Humeral nutrient artery
Superior ulnar collateral artery
Lateral intermuscular septum
Brachial artery
Radial collateral artery
Inferior ulnar collateral artery
Radial recurrent artery
Anterior ulnar recurrent artery
Radius
Radial artery
Posterior ulnar recurrent artery
Ulna
Ulnar artery
Common interosseous artery

Musculocutaneous Nerve

- The origin of the musculocutaneous nerve from the lateral cord of the brachial plexus (C5, 6, and 7).
- It runs downward and laterally, pierces the coracobrachialis muscle, and then passes downward between the biceps and brachialis muscles.
- It appears at the lateral margin of the biceps tendon and pierces the deep fascia just above the elbow.
- It runs down the lateral aspect of the forearm as the **lateral cutaneous nerve of the forearm**

Musculocutaneous nerve(C,5&6)

It arises from lateral cord of brachial plexus

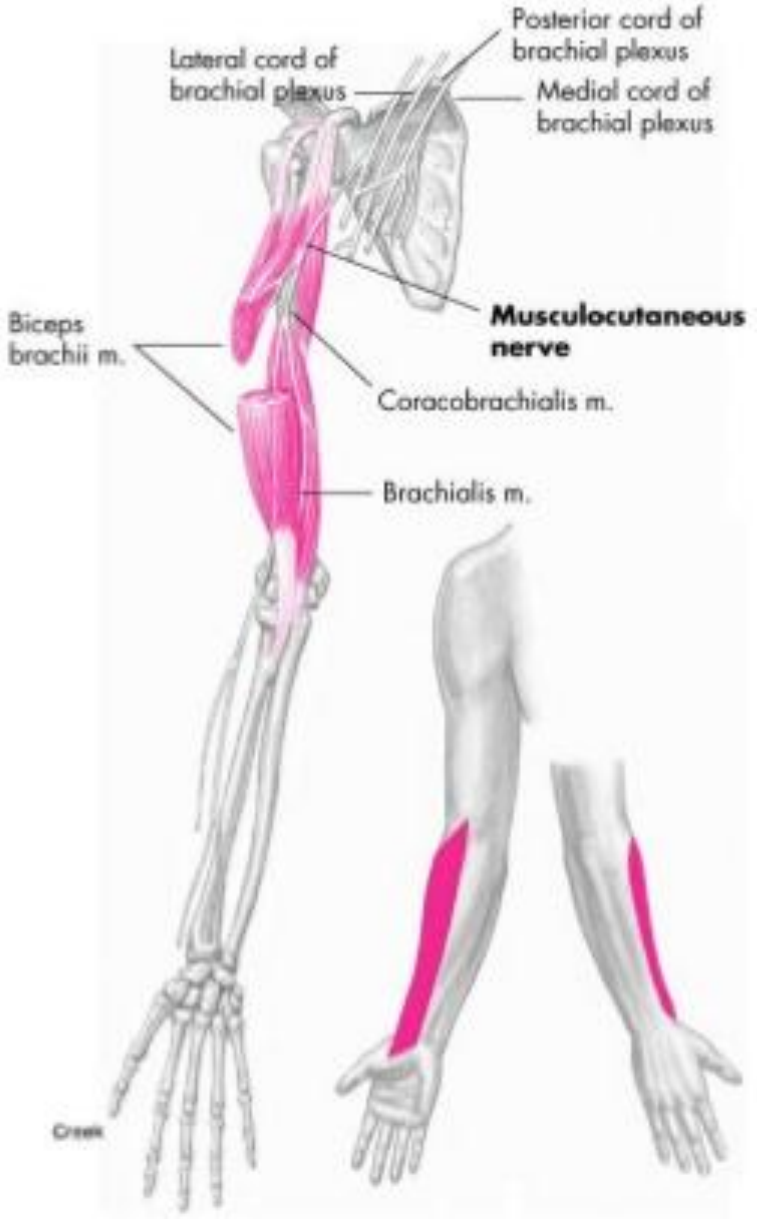
It pierces the coracobrachialis and supplies

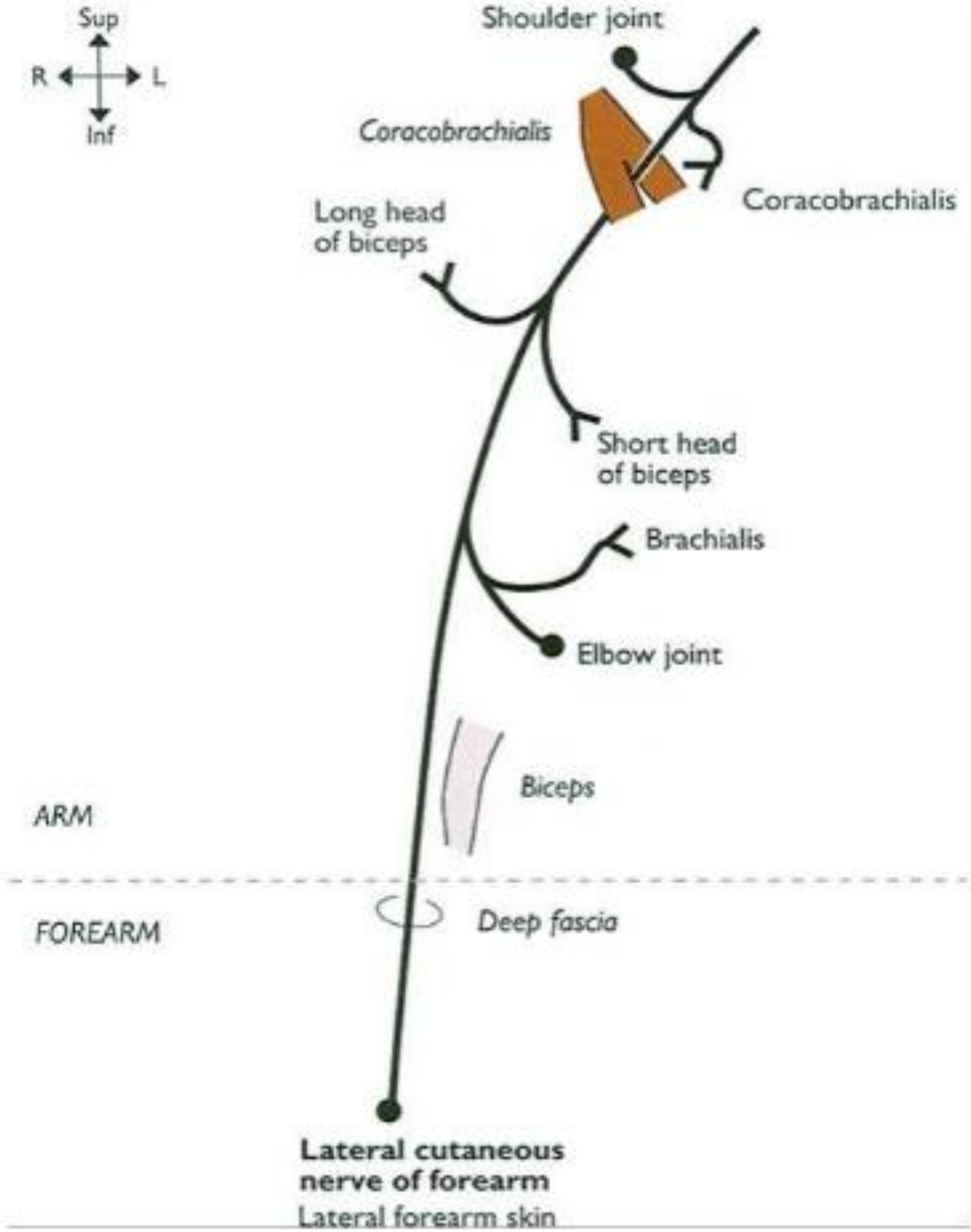
Biceps brachii

Brachialis

Coracobrachialis

It continues as lateral cutaneous nerve of forearm.



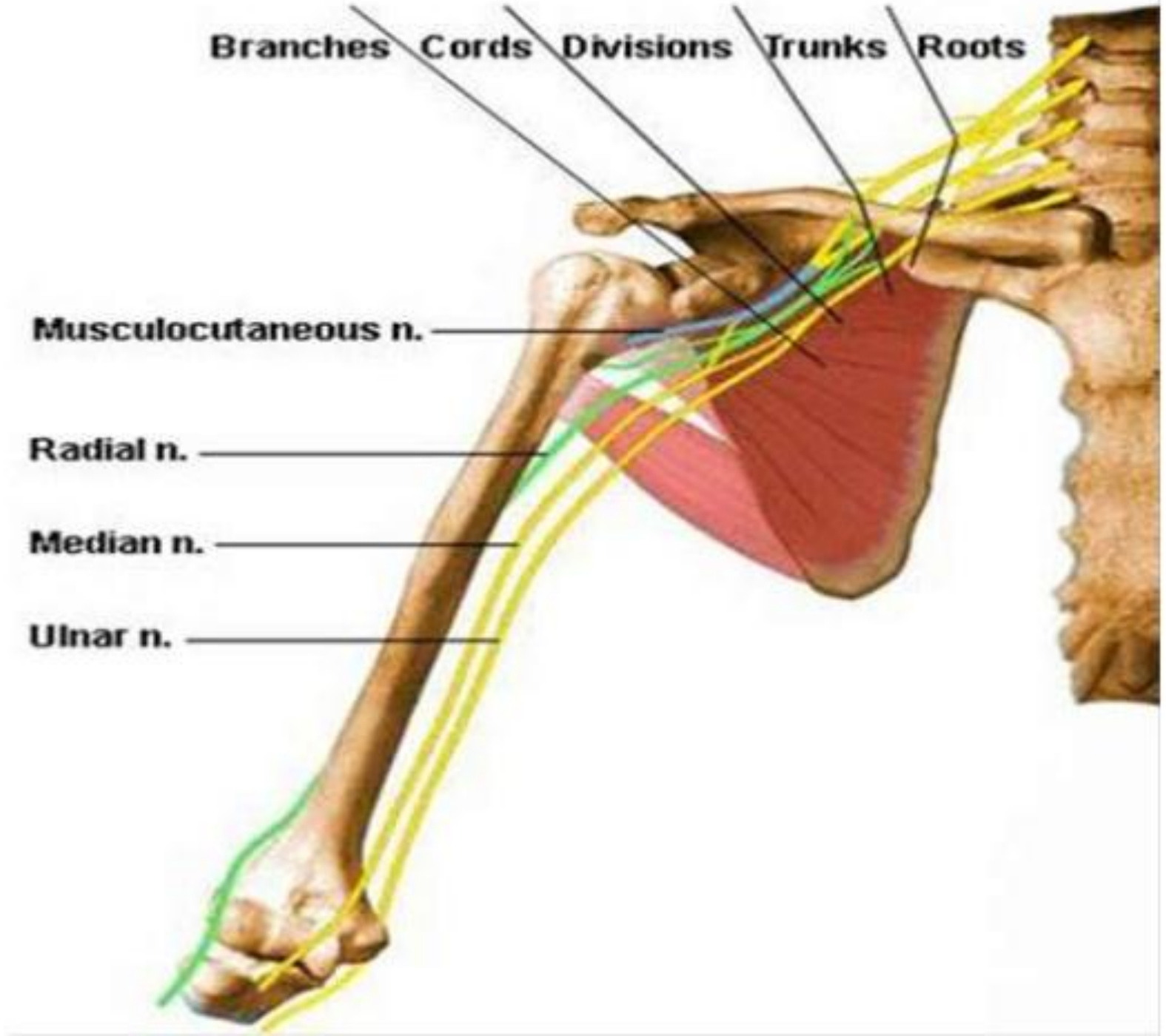

Sup
R
L
Inf
Shoulder joint
Coracobrachialis
Coracobrachialis
Long head of biceps
Short head of biceps
Brachialis
Elbow joint
Biceps
ARM
FOREARM
Deep fascia
Lateral cutaneous nerve of forearm
Lateral forearm skin

Branches of musculocutaneous nerve

- **Muscular branches** to the biceps, coracobrachialis, and brachialis
- **Cutaneous branches;** the lateral cutaneous nerve of the forearm supplies the skin of the front and lateral aspects of the forearm down as far as the root of the thumb.
- **Articular branches** to the elbow joint

Median Nerve

- The origin of the median nerve from the medial and lateral cords of the brachial plexus in the axilla.
- It runs downward on the lateral side of the brachial artery . Halfway down the upper arm, it crosses the brachial artery and continues downward on its medial side.
- The nerve, like the artery, is therefore superficial, but at the elbow, it is crossed by the bicipital aponeurosis.
- The median nerve has no branches in the upper arm , except for a small vasomotor nerve to the brachial artery.

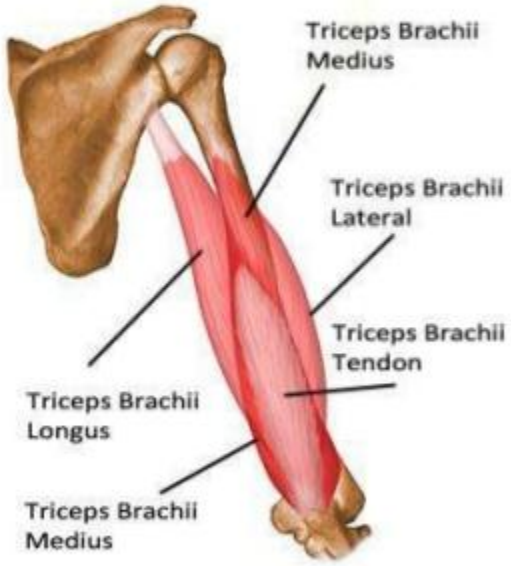

Branches
Cords
Divisions
Trunks
Roots
Musculocutaneous n.
Radial n.
Median n.
Ulnar n.

Ulnar nerve in the arm

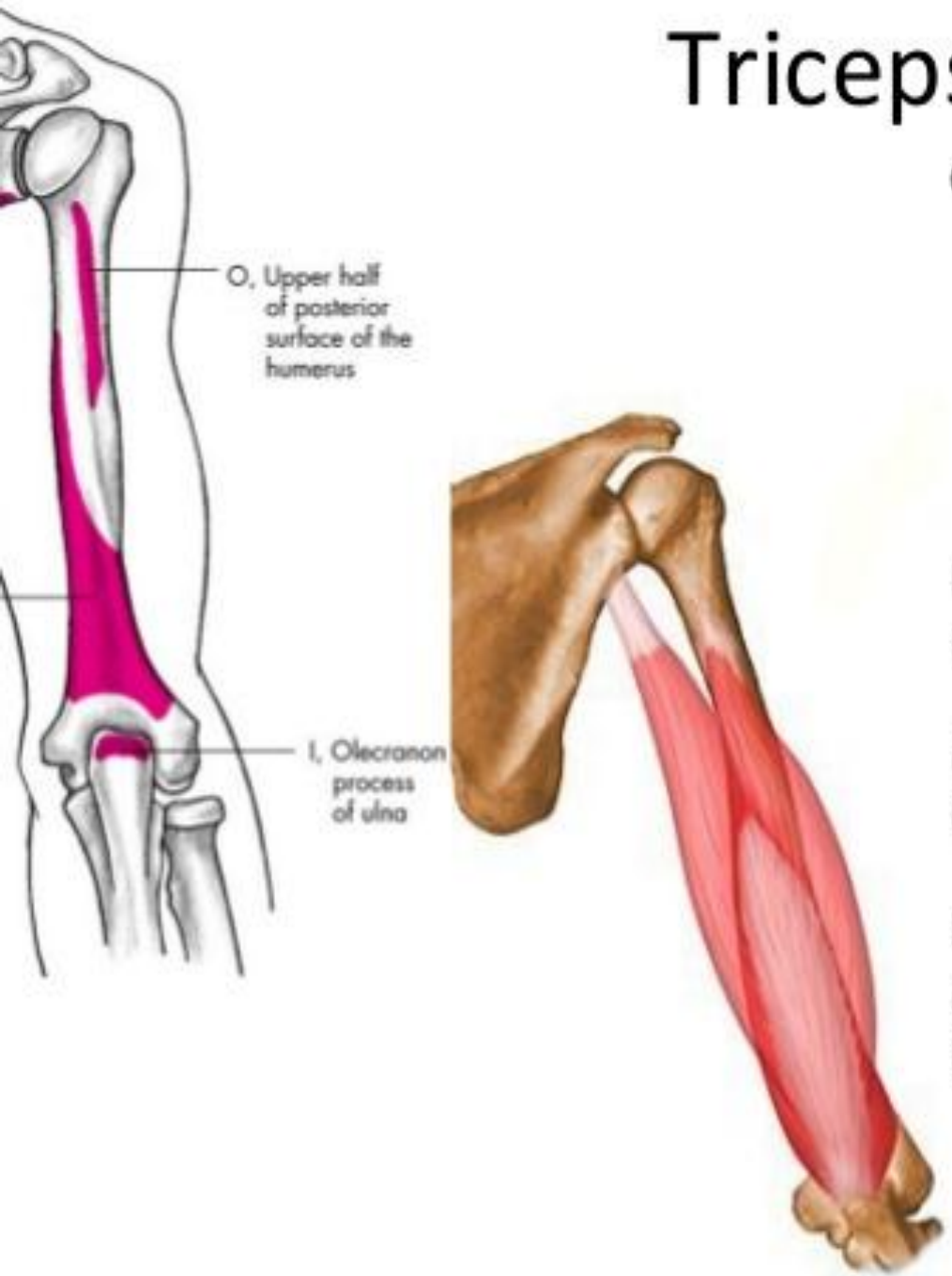
- From medial cord of the brachial plexuses run downward on the medial side of the brachial artery.
At middle of the arm, the nerve pierces the medial fascial septum accompained by the superior ulnar collateral artery and enter the post. Compartment of the arm after passes around(superficial) medial epicondyle and passes into forearm between two heads of flexor carpiulnaris muscle .
Branches : no branches above the elbow.

MUSCLES OF POSTERIOR COMPARTMENT

Triceps



Triceps brachii



Origin

Long head: infraglenoid tubercle of scapula;

Lateral head: posterior surface of humerus, superior to radial groove;

Medial head: posterior surface of humerus, inferior to radial groove

Insertion

Proximal end of olecranon process of ulna and fascia of forearm

Action

Chief extensor of forearm; long head steadies head of abducted humerus

Innervation Radial nerve (C6, C7, C8)

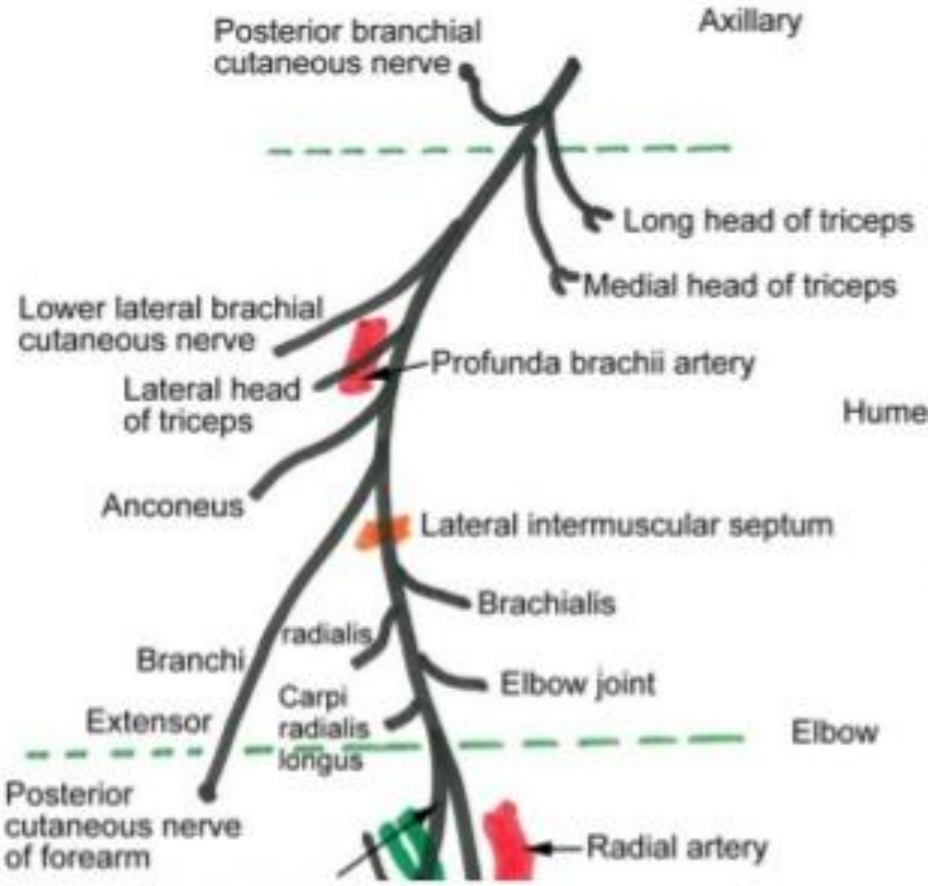
Arterial Supply

Branches of deep brachial artery

Radial nerve

- In the posterior compartment winds in the spiral groove of the humerus with the profunda brachii vessels.
- Just above the elbow, it pierces the lateral intermuscular septum and continues downward into the cubital fossa
- At the level of the elbow (lateral epicondyle), it divides into **superficial and deep branches**.
- Superficial branch , a sensory nerve of the hand is a content of cubital fossa.
- The **deep branch** of the radial nerve enters the posterior compartment of the forearm.

Branches of radial nerve



Branches in the axilla

- **Cutaneous branch - Posterior brachial cutaneous nerve**
- **Muscular branches - Long and medial heads of triceps**

Branches in the spiral groove

- **Cutaneous branches - Lower lateral brachial cutaneous nerve, posterior antebrachial cutaneous nerve**
- **Muscular branches - Lateral and medial heads of the triceps, anconeus**

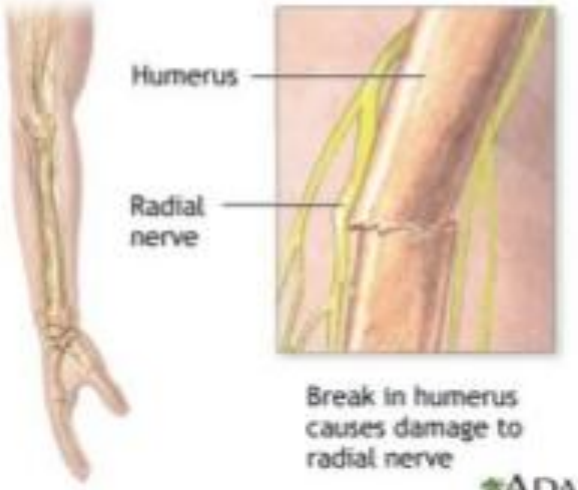
- **Branches in the arm**
  - **Articular branch - Elbow joint**
  - **Muscular branches - Brachialis, brachioradialis, extensor carpi radialis longus**

Radial nerve Palsy

- **Causes:**

fracture of midshaft of humerus
Intramuscular injection
Saturday night palsy
Crutch paralysis
Fractures of shaft of humerus

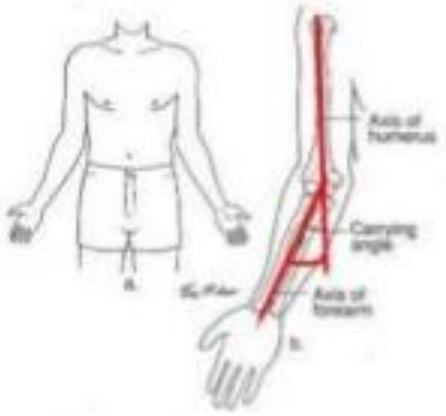
- Results in a loss of function in the extensors of forearm, hand, metacarpals and phalanges.
- Results in loss of wrist extension leading to **Wrist Drop** and producing a weakness of adduction and abduction of hand.



Arrangement of nerve in the cubital fossa

The elbow joint

- Humerus, radius and ulna form a hinge joint.
- The capitulum of the humerus articulates with the upper aspect of the head of the radius (**humeroradial joint)**
- The trochlea of the humerus articulates with the trochlear notch of the ulna (**humero-ulnar joint).**
- These two parts of the elbow joint are continuous with each other and share a **common cavity with the proximal radio-ulnar joint.**



Movements

- Flexion is done by biceps, brachialis and coracobrachialis.
- Extension is performed by triceps, particularly medial head.
- The extended ulna makes with the humerus an angle of 170 degrees. This is **carrying angle. It is 10-15degrees** It fits the elbow into the waist when the arm is at the side.

Proximal radioulnar joint

(c) Pivot joint between head of radius and radial notch of ulna

- The circumference of the head of the radius fits into the radial notch of ulna to form **a pivot joint.**
- **Strong annular ligament** :attached to the anterior and posterior margins of the notch.
- Some fibres extend from the lower margin of the notch to the neck of radius(quadrate ligament)
- The synovial membrane is continuous with that of the elbow joint.

Movements-Supination &Pronation

- The axis of movement extends from the middle of the head of the radius to the lower end of the ulna.
- Although the head of the radius merely rotates within the annular ligament, its inferior end describes an arc around the lower end of the ulna and carries the hand with it.
- The **supinators are supinator and biceps.**
- The **pronators are pronator quadratus and pronator teres.**

LIGAMENTS OF THE JOINT

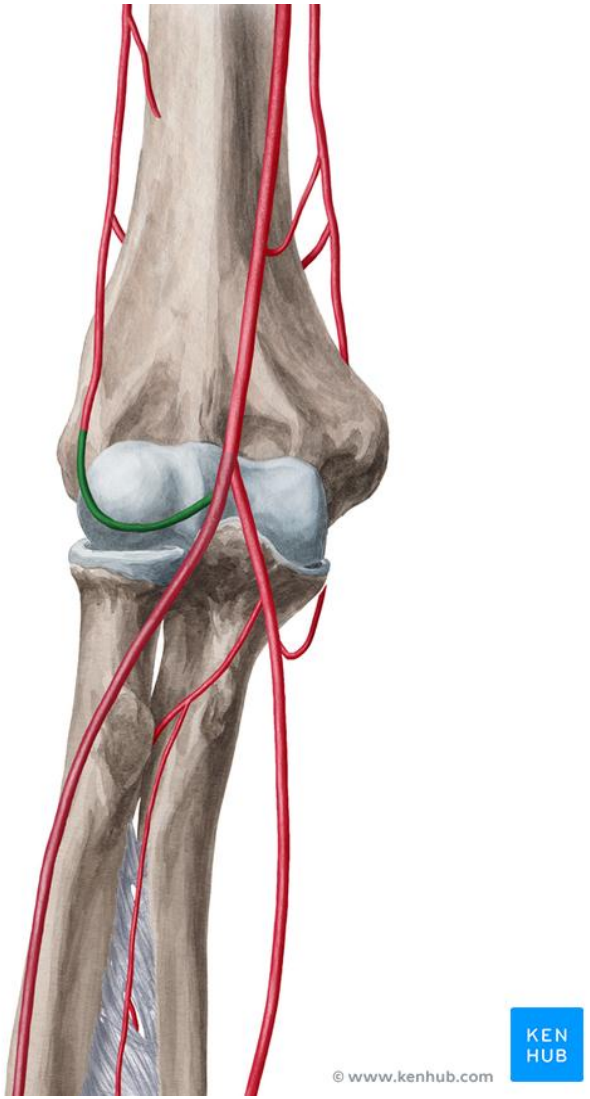
- Stability of joints maintained by ligaments.

1. **Radial collateral ligament**
2. **Ulnar collateral ligament** :
   - Anterior bundle
   - Posterior bundle
   - Oblique bundle

3. **Annular ligament**: that wraps around the radial head and holds it tight against the ulna.

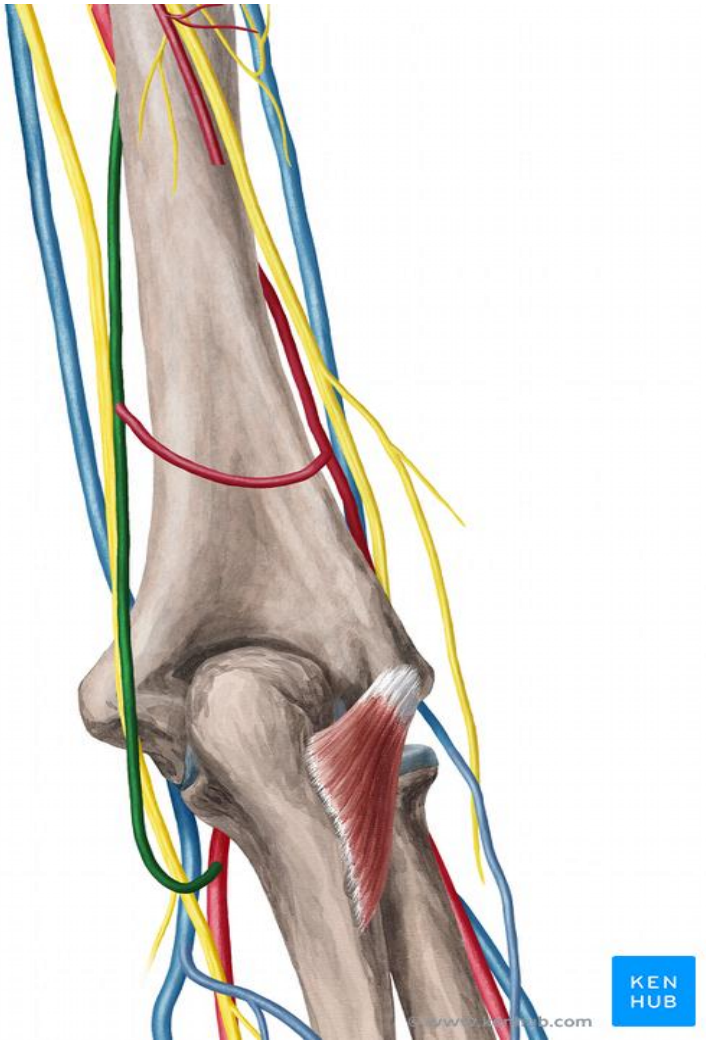
Elbow Anastomoses

- Both profunda brachii and the brachial artery give important branches that form the elbow anastomoses. On the posterior aspect of the shaft of the humerus, profunda brachii branches into a middle and a radial recurrent artery. The brachial artery gives off a superior ulnar collateral artery (about 1-2 cm below profunda brachii) and an inferior ulnar collateral artery (about 1 cm above the medial supracondylar ridge).



Elbow Anastomoses

At the lateral supracondylar ridge, the radial collateral artery bifurcates. One branch travels posterior to the humerus, where it anastomoses with the middle collateral artery, the recurrent interosseous artery (from the posterior interosseous artery) and the posterior branch of the inferior ulnar collateral artery.

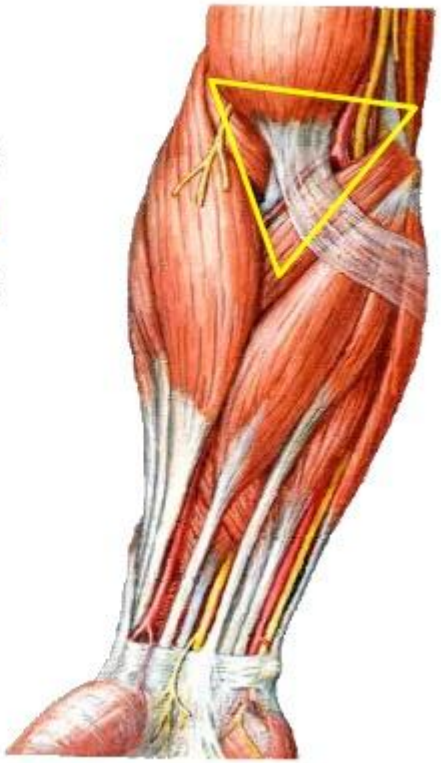
- 

Tennis Elbow

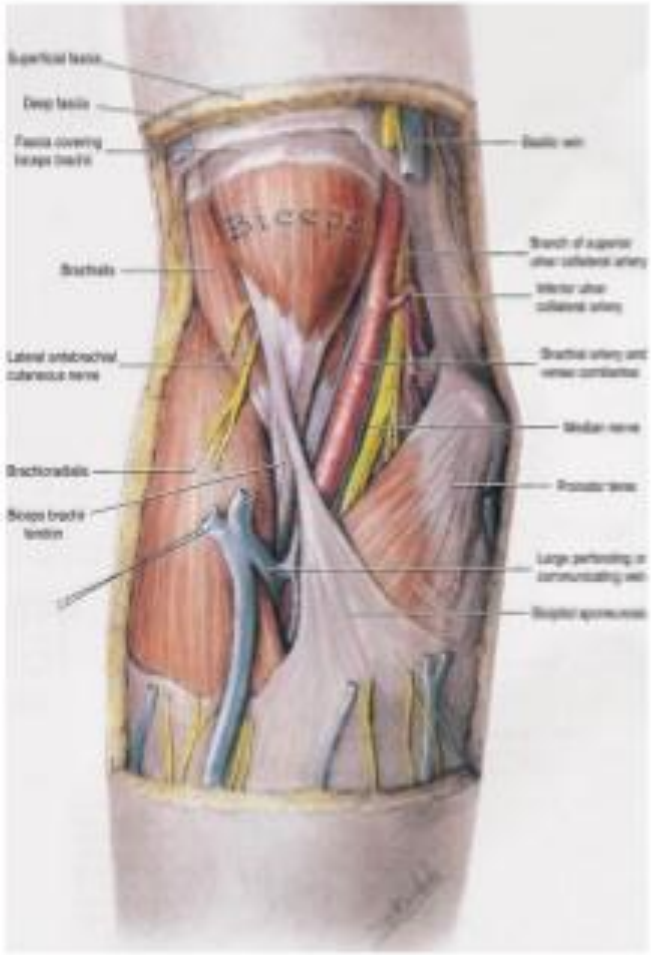
- “Tennis elbow" - common problem usually involving extensor digitorum muscle near its origin on lateral epicondyle
  - known lateral epicondylitis
  - associated with gripping & lifting activities

CUBITAL FOSSA

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

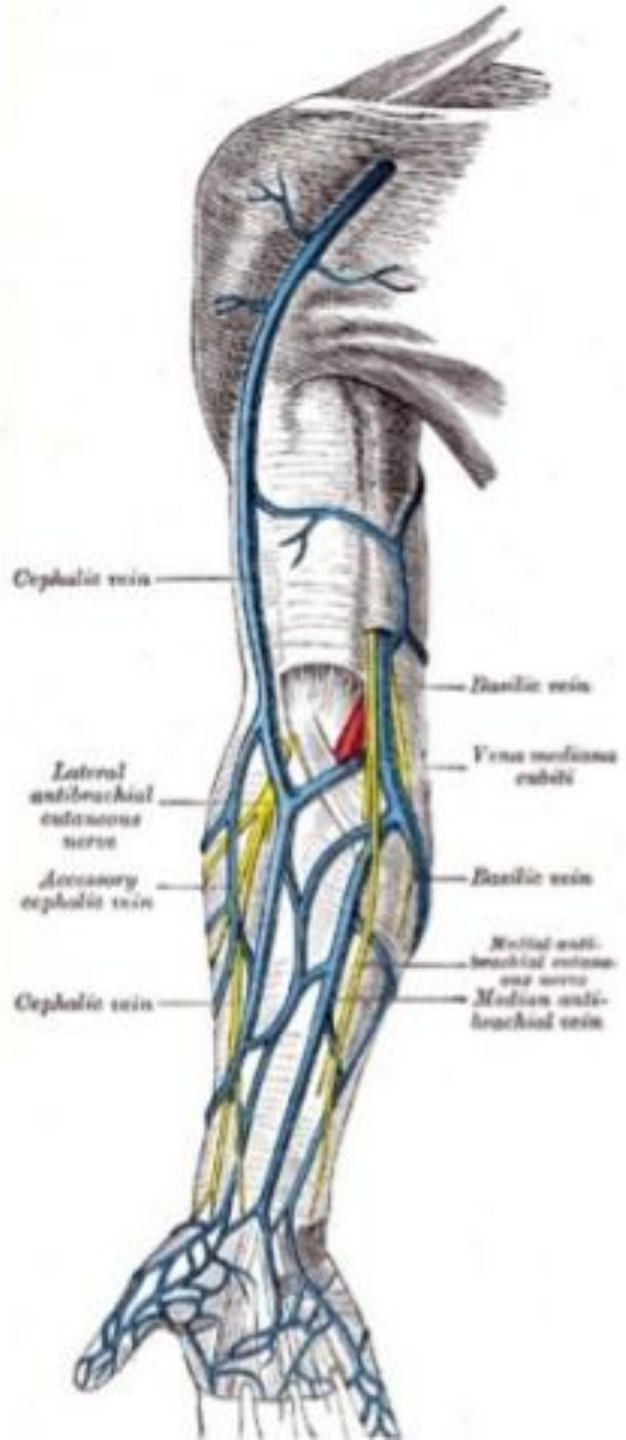


The Cubital Fossa



Boundaries

- Lateral: medial border of Brachioradialis
- Medial : Lateral border of pronator teres
- Base: Imaginary line connecting medial and lateral epicondyles of humerus
- Apex: Site of overlap of pronator teres by brachioradialis



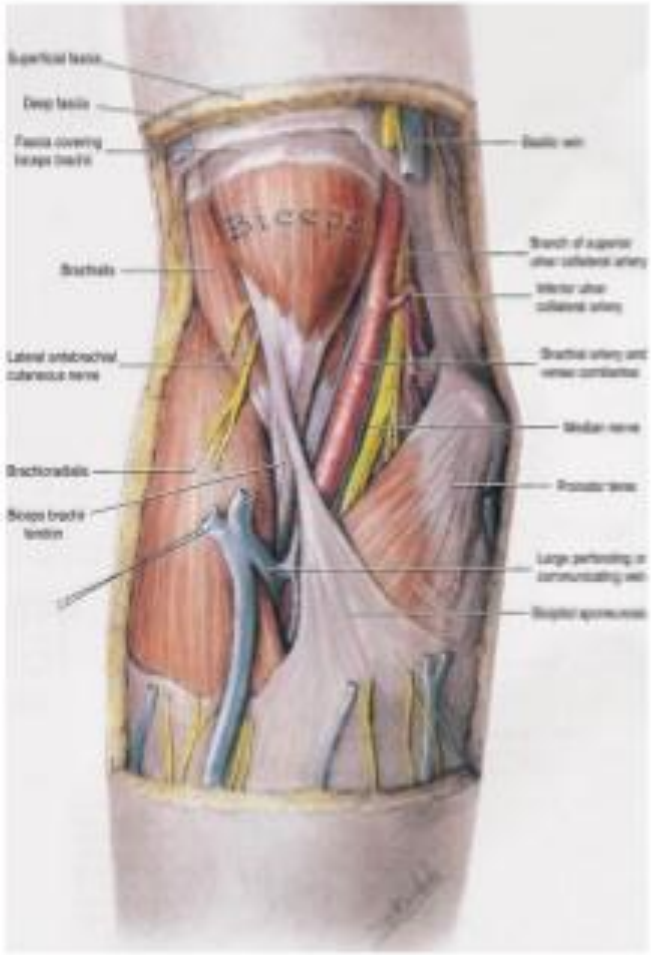
Structures in roof of cubital fossa

- Skin
- Superficial fascia
- Deep fascia with bicipital aponeurosis
- Cephalic vein
- Basilic vein
- Median cubital vein connecting the cephalic and basilic veins
- Lateral and medial cutaneous nerves of forearm

Supratrochlear Lymph Nodes

- Supratrochlear nodes are one or two in number and located above the medial epicondyle of the humerus, medial to the basilic vein. [On the anteromedial aspect of the arm just above the elbow joint]
- The afferants to suprtrochlear lymph nodes drain the middle, ring, and little fingers, the medial portion of the hand, and the superficial area over the ulnar side of the forearm . Efferants vesseles pass to the lateral axillary lymph node .

Contents of cubital fossa



- Median nerve
- Brachial artery dividing into radial and ulnar arteries
- Tendon of biceps brachii
- Radial nerve and its two terminal branches (superficial and deep)
- **Applied Aspect**
- **The median cubital vein is often the vein of choice for intravenous injections.**