Arm and elbow

Musculoskeletal block- Anatomy-lecture 7

Editing file

Objectives

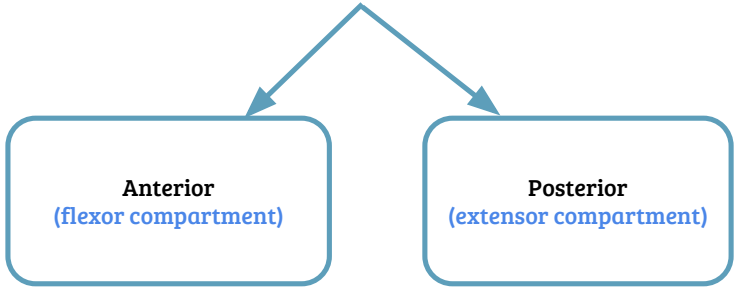
Color guide :
Only in boys slides in **Blue**
Only in girls slides in **Purple**
important in **Red**
Doctor note in **Green**
Extra information in **Grey**

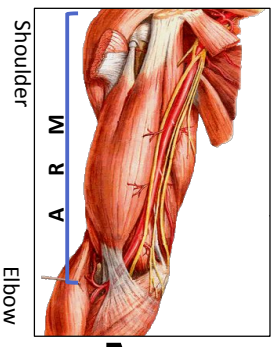
- ✓ Describe the attachments, actions and innervations of:
  a. Biceps brachii
  b. Coracobrachialis
  c. Brachialis
  d. Triceps brachii
- ✓ Define the boundaries of the cubital fossa and enumerate its contents.
- ✓ Demonstrate the following features of the elbow joint:
  a. Articulating bones
  b. Capsule
  c. Lateral & medial collateral ligaments
  d. 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:

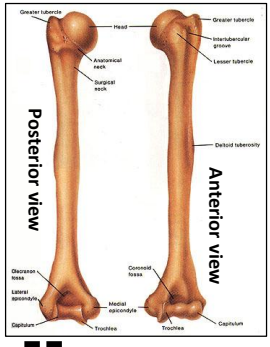
An aponeurotic sheet separating various muscles of the upper limbs, including lateral and medial humeral septa.

- The lateral and medial intermuscular septa divide the distal part of the arm into two compartments

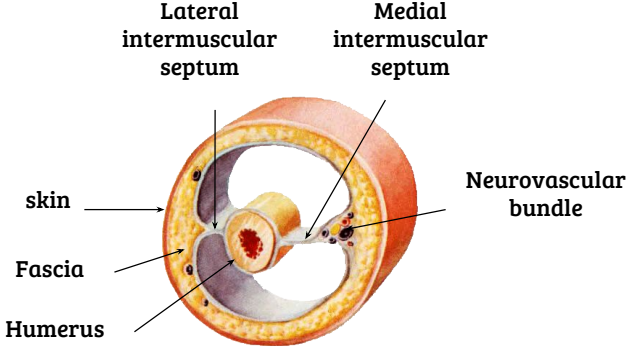




Arm

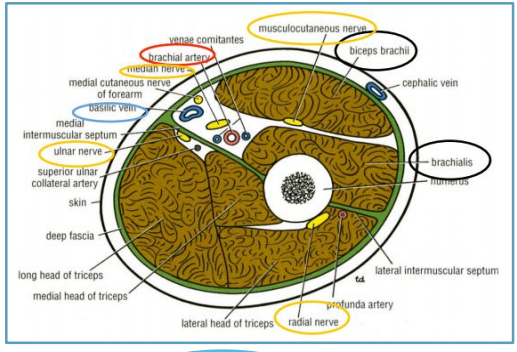


Humerus



1-Anterior Fascial Compartment:

Note: the radial and ulnar nerves begin in the anterior compartment then pierce the intermuscular septum and enter the posterior compartment



Brachialis

Biceps brachii

Coracobrachialis

1. muscles

Basilic vein

Brachial artery

2. Blood vessels

Radial

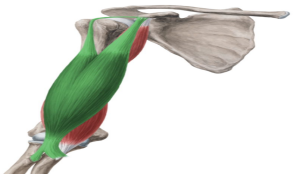
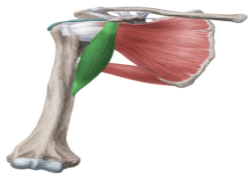
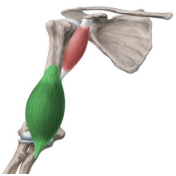
Ulnar

Median

Musculocutaneous

3. Nerves

Muscles Of Anterior Compartment

Muscles	Biceps Brachii	Coracobrachialis	Brachialis
Origin	-**Long Head** (lateral 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	Tip of the **coracoid process** of **scapula** (with short head of biceps brachii)	**Front** of the **lower half** of **humerus**
Insertion	-Into the posterior part of the **radial tuberosity**. -Into the **deep fascia** of the **medial** aspect of the **forearm** through **bicipital aponeurosis**	**Middle** of the medial side of the **shaft** of the **humerus**	Anterior surface of **coronoid process** **of ulna**
Nerve Supply	Musculocutaneous		-**Musculocutaneous** (medial part) -**Radial** (lateral part)
Action	-Strong supinator of the forearm used in screwing Powerful  -flexor of elbow -Weak flexor of shoulder	-Flexor -Weak adductor of the **arm**	**Strong flexor** of the **forearm**
Pictures			

2-Posterior Fascial Compartment:

1. **Muscles :**

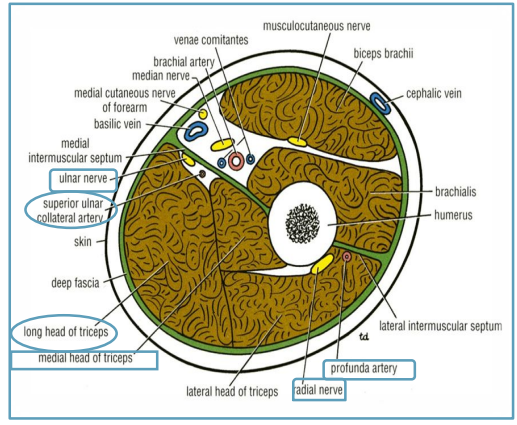
Triceps brachii.

2. **Vessels :**

- Profunda brachii(a branch from brachial artery).
-Ulnar collateral arteries.

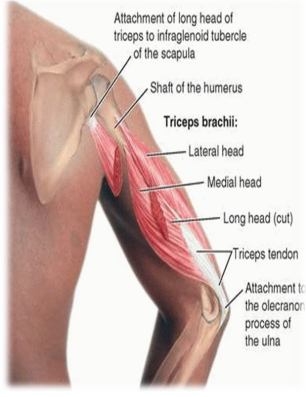
3. **Nerves :**

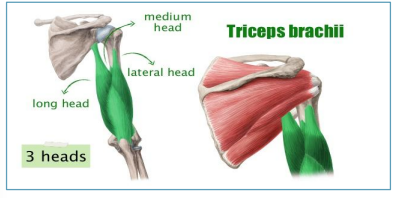
-Ulnar nerve.
-Radial nerve.



Triceps brachii:

Origin	• **Long head**: from infraglenoid tubercle of the **scapula.**(remember the origin of the long head of the bicep head is supraglenoid tubercle)
	• **lateral head**: from the **upper half** of the posterior surface of the shaft of the **humerus** above the spiral groove.
	• **Medial head**: from the **lower half** of the posterior surface of the shaft of the **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**.



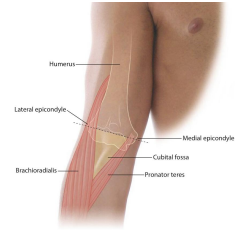


Cubital fossa:

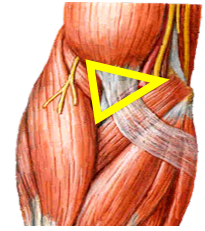
is a an area of **transition** between the anatomical arm and the forearm, located as **triangular depression** on the anterior surface of the elbow joint.

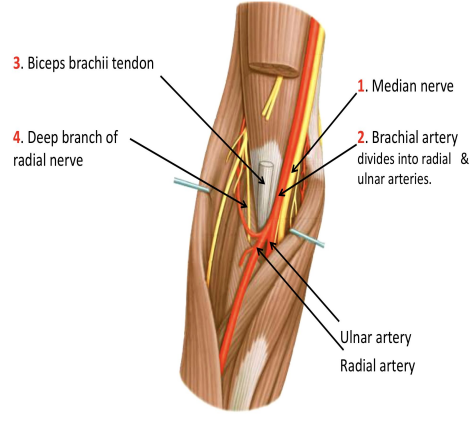
It is a **triangular depression** that lies **in front of** the **elbow.**

Boundaries	• **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.
Contents From the) Medial to the (Lateral side	1. Median nerve. 2. Brachial artery divides into radial & ulnar arteries. 3. Biceps brachii tendon. 4. Deep branch of radial nerve.



Margins of the cubital fossa





Cubital fossa:

Only found in boys slide

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 ce be accessed easily-this makes it a common site for **venipuncture**.

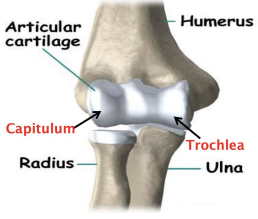
ELBOW JOINT:

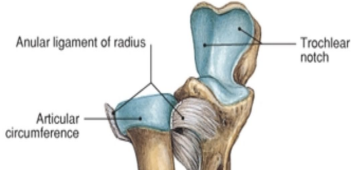
It is the joint connecting the upper arm to the forearm, and is classed as an Uniaxial, Synovial Hinge Joint.

Consists of two separate Articulations:

Above: Trochlea and the capitulum of the humerus.

Below: Trochlear notch of the ulna and the head of the radius.

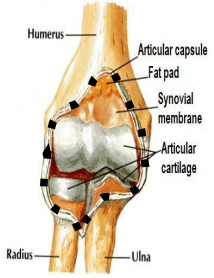




The articular surfaces are covered with articular (hyaline) cartilage

CAPSULE:

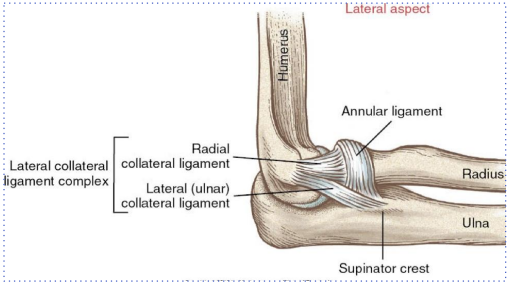
- The elbow joint has a capsule enclosing the joint. This in itself is strong and fibrous, strengthening the joint.
- The joint capsule is thickened medially and laterally to form collateral ligaments, which stabilize the flexing and extending motion of the arm.

Capsule	Above	Below	Picture
Anteriorly Attached	To the humerus along the **upper margins** of the coronoid and radial fossa and **to the front of** the medial and lateral epicondyles	To the margin of the coronoid process of the ulna and to the annular ligament, which **surrounds** the head of the radius.	
Posteriorly attached	To the **margins** of the olecranon fossa of the humerus	To the **upper margin** and sides of the olecranon process of the ulna and to the annular ligament.	

Ligaments of Elbow Joint:

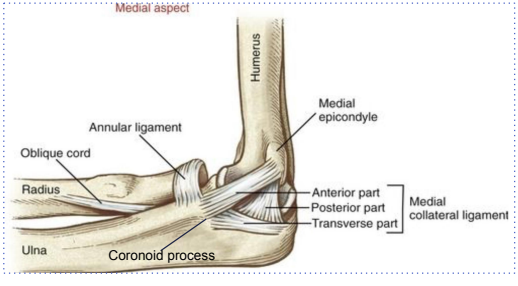
Lateral ligament (radial collateral ligament)

Shape	Triangular
Apex	attached to the Lateral epicondyle of humerus.
Base	attached to the upper part of the annular ligament.



Medial ligament (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.

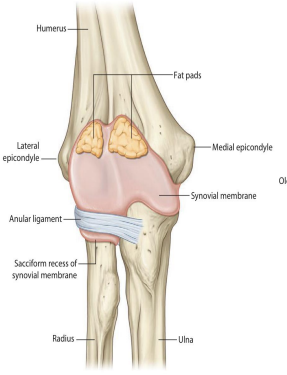


Synovial Membrane:

- This lines the **inner surface of the capsule** and covers fatty pads in the floors of the **coronoid**, **radial**, and **olecranon fossa**.

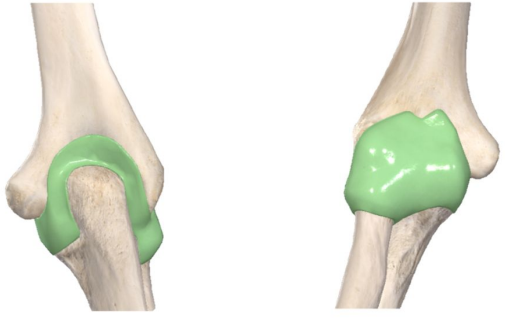
- Is **continuous <u>below</u>** with **synovial membrane** of the **superior radioulnar joint**

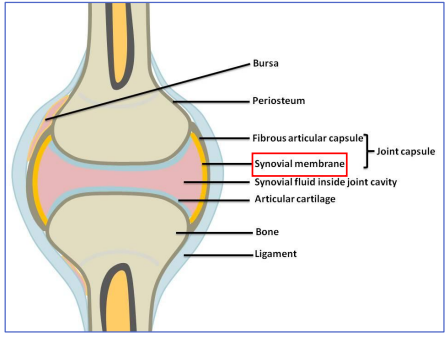
"Contains the synovial fluid"



Synovial membrane of the elbow joint (anterior view)

Synovial membrane of the elbow joint (posterior view)



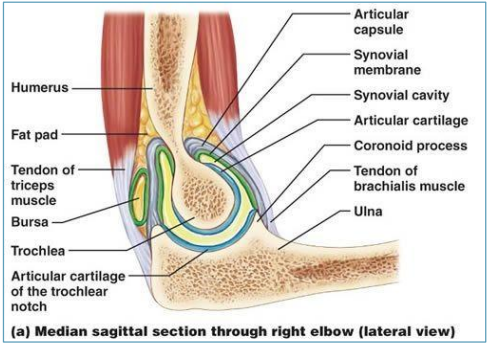


Relation:

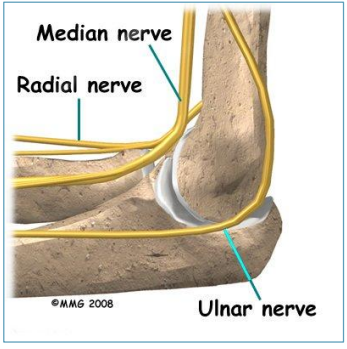
Anterior	Posterior	Lateral	Medial
• Brachialis • Tendon of biceps • Median nerve • Brachial artery	• Triceps muscle • Small bursa intervening **Bursa**: sac filled with synovial fluid countering friction at a joint	• Common extensor tendon (attached to Lateral epicondyle of the humerus) • Supinator	• Ulnar nerve " Considered the **largest** unprotected nerve by muscle or bone".

Bursae around the elbow joint:

- Subcutaneous olecranon bursa
- Subtendinous olecranon bursa



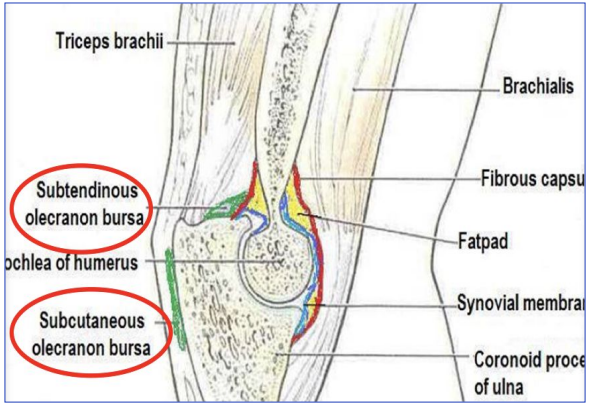
(a) Median sagittal section through right elbow (lateral view)



BURSA:

Only found in boys slide

- 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 bursa

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

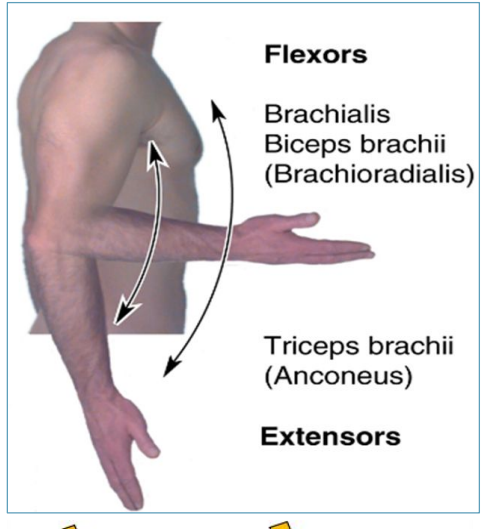
between the olecranon and the overlying connective tissue (implicated in olecranon bursitis).

Movement:

Extension	Flexion
Is **limited by** the tension of the **anterior ligament (medially)** and the **brachialis muscle**.	Is **limited by** the **anterior surfaces** of the **forearm** and **arm** coming into contact.

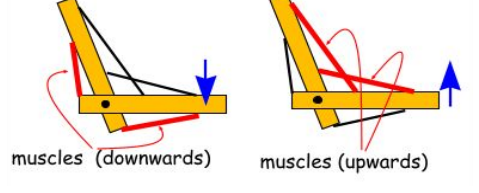
Nerves innervation by branches from the:

- **Median** Nerve
- **Radial** Nerves
- **Musculocutaneous** Nerve
- **Ulnar** Nerve



Blood supply:

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



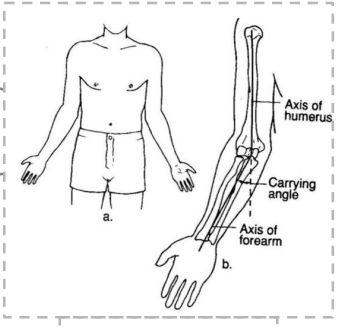
Carrying Angle:

Between the **long axis** of the **extended forearm** and the **long axis** of the **arm**

Site

Laterally

Opens



Disappears

About

When the elbow joint in flexed

170 degrees in male and 167 in females

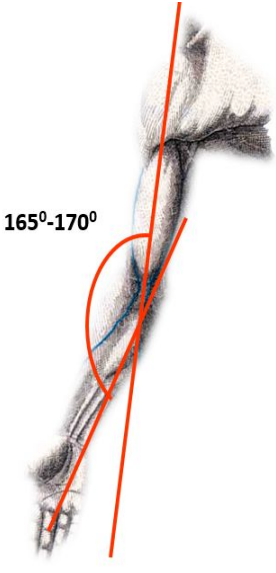
Carrying angle

Permits (تسمح)

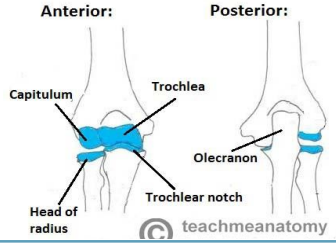
Permits

The forearm to **clear the hips swinging movements** during walking
- And is important when carrying objects

Carrying objects

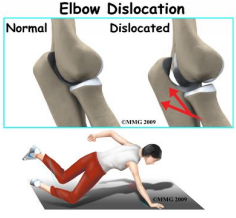


Articulations and applied anatomy:



The elbow joint is **stable** because of the:

1. **Wrench-shaped articular surface** of the **olecranon** and the **pulley-shaped trochlea of humerus.**
2. **Strong** medial and lateral **ligaments.**

	Caused by	Illustration
Dislocation	• 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.**	
Avulsion of the epiphysis	• **of the medial epicondyle** is also **common in childhood** because the **medial ligament** is **much stronger** than the **bond** of union **between** the **epiphysis** and the **diaphysis.** • They are usually a result from an avulsion (pull off) injury caused by : a **valgus stress** at the elbow and contraction of the flexor muscles as in : 1. fall on an outstretched hand with the elbow in full extension 2. posterior elbow dislocation 3. direct blow	

*The radius/ulna is dislocated posteriorly NOT the humerus

*valgus : a deformity involving oblique displacement of part of a limb away from the midline.

Summary

Team 435

Muscle:	Compartment:	Origin:	Insertion:	Nerve supply:	Action:
Biceps brachii	Anterior compartment (flexor compartment)	**Two heads:** - **Long head:** From supraglenoid tubercle of the scapula - **Short head:** from the tip of the coracoid process of the scapula **The two heads are joined in the middle of the arm**	- In the Posterior part of the radial tuberosity. - Into the deep fascia of the medial aspect of the forarm through bicipital aponeurosis	Musculocutaneous	- Strong flexor of **the elbow**. - Weak flexor of **the shoulde**r. - Supinator of **the forearm** .
Coracobrachialis	Anterior compartment (flexor compartment	from the tip of the coracoid process of the scapula	Middle of the medial side of the shaft of the humerus	Musculocutaneous	- flexor. - Weak adductor of **the arm**
brachialis	Anterior compartment (flexor compartment	Front of the lower half of humerus	Anterior surface of coronoid process of ulna	Musculocutaneous & radial	Strong flexor **of the forearm**
Triceps	posterior compartment (extensor compartment	**Three heads:** **- Long head:** infraglenoid tubercle of the scapula. - **Lateral head:** upper half of the posterior surface of the shaft of humerous above the spiral groove. - **medial head:** lower half of the posterior surface of the shaft of humerous below the spiral groove.	Common tendon inserted into the upper surface of the olecranon process of ulna	Radial nerve	Strong extensor **of the elbow joint**

CUBITAL FOSSA

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

Boundaries:

- **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)

1. **Median nerve**
2. **Brachial artery divides into radial & ulnar arteries.**
3. **Biceps brachii tendon**
4. **Deep branch of radial nerve**

MCQs

Question 1: Which of the following is not a part of the flexor compartment ?

A. Biceps

B. median nerve

C. brachial artery

D. triceps

Question 2: What is the muscle that is responsible in "screwing" ?

A.coracobrachialis

B.biceps brachii

C.brachialis

D.triceps

Question 3: What is the origin of the short head of the biceps brachii?

A. Coracoid process

B. Supraglenoid tubercle

C. Infraglenoid tubercle

D.Medial border of scapula

Question 4: The lateral epicondyle of the humerus is attached to which part of the elbow ligaments?

A. apex

B. Base

Question 5: What nerve supplies the triceps brachii ?

A. Median

B. Ulnar

C. Axillary

D. Radial

Question 6: Brachialis origin is in front of the ..... half of humerus ?

A.middle

B.lower

C.upper

Question 7: What is the origin of coracobrachialis ?

A. supraglenoid tubercle of scapula

B. Tip of the coracoid process of scapula

C. Anterior surface of coronoid process of ulna

D.Middle of the medial side of the shaft of the humerus

Question 8: Which of the following is bi-innervated?

A.Biceps brachii

B. Brachialis

C. Coracobrachialis

D.triceps

Answers: Q1.D- Q2.B -Q3.A -Q4.A- Q5.D- Q6.B-Q7.B- Q8.B

Team members

Boys team:

- Khalid AL-Dossari
- Naif Al-Dossari
- Faisal Alqifari
- Salman Alagla
- Ziyad Al-jofan
- Suhail Basuhail
- Ali Aldawood
- Khalid Nagshabandi
- Mohammed Al-huqbani
- Jehad Alorainy
- Khalid AlKhani
- Omar Alammari

Team leaders

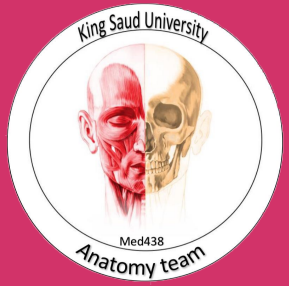
- Abdulrahman Shadid
- Ateen Almutairi

★ =This lecture done by

Girls team :

- Ajeed Al Rashoud
- Taif Alotaibi
- Noura Al Turki
- ★ Amirah Al-Zahrani
- Alhanouf Al-haluli
- Sara Al-Abdulkarem
- Rawan Al Zayed
- ★ Razan Al Zohaifi
- ★ Renad Al Haqbani
- ★ Nouf Al Humaidhi
- Fay Al Buqami
- Jude Al Khalifah
- ★ Nouf Al Hussaini
- Alwateen Al Balawi
- Rahaf Al Shabri
- Danah Al Halees
- Haifa Al Waily
- Rema Al Mutawa
- Amirah Al Dakhilallah
- Maha Al Nahdi
- Renad Al Mutawa
- Ghaida Al Braithen
- Reham Yousef

Special thank for Anatomy team 436



Good luck

Give us your feedback: