



Anatomy of shoulder and Axilla

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M N U



Intended Learning Outcomes (ILOs)

1. Enumerate ligaments of shoulder joint.
2. Recognize shoulder joint and shoulder girdle.
3. Identify the boundaries of Axilla.
4. Identify contents of the axilla.
5. Recognize Brachial plexus and its divisions.

Agenda

- 1. What are nerves supplying muscles of the shoulder?**
- 2. What are muscles producing upward rotation of the scapula?**
- 3. What are the boundaries of Axilla?**
- 4. What are the contents of the Axilla?**
- 5. Mention brachial plexus roots, trunks, divisions and branches.**

Shoulder girdle

- **Bones forming it:** clavicle & scapula.
- **it is formed of 2 joints:**

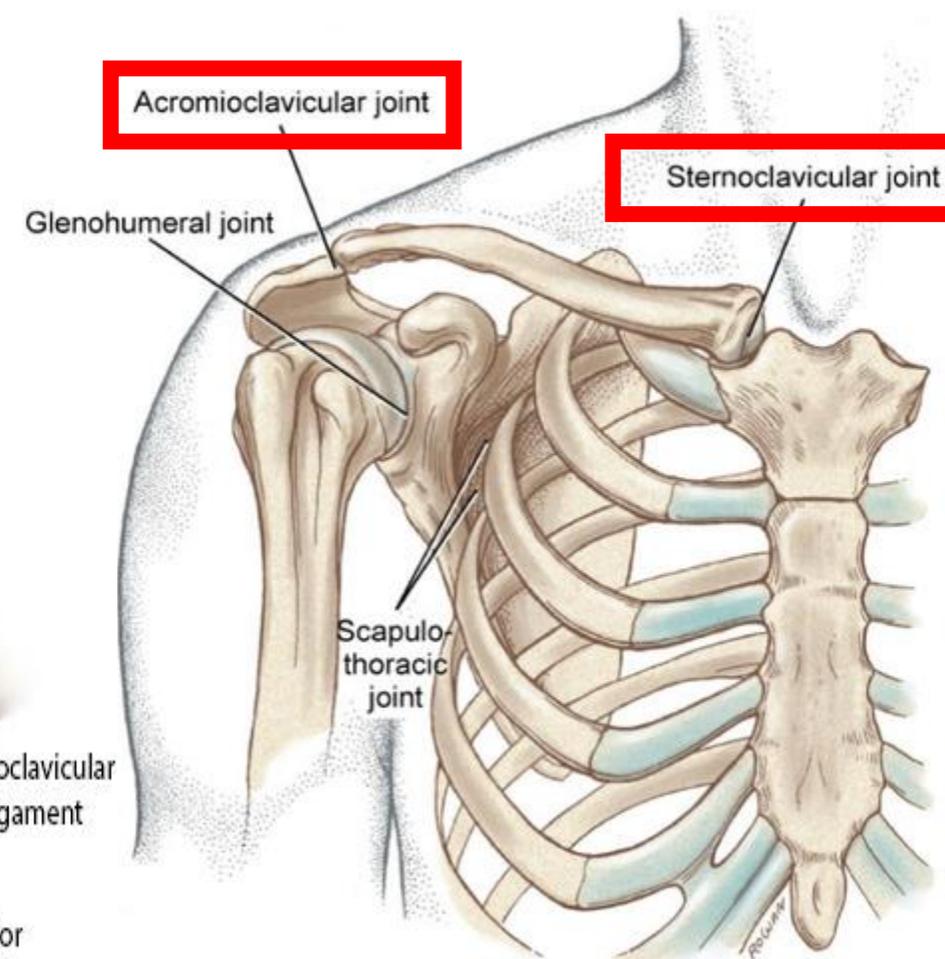
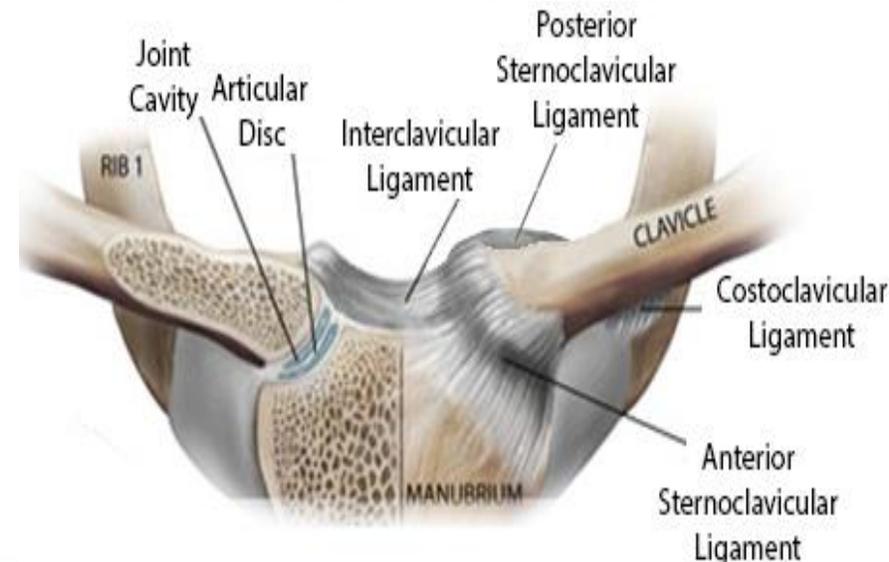
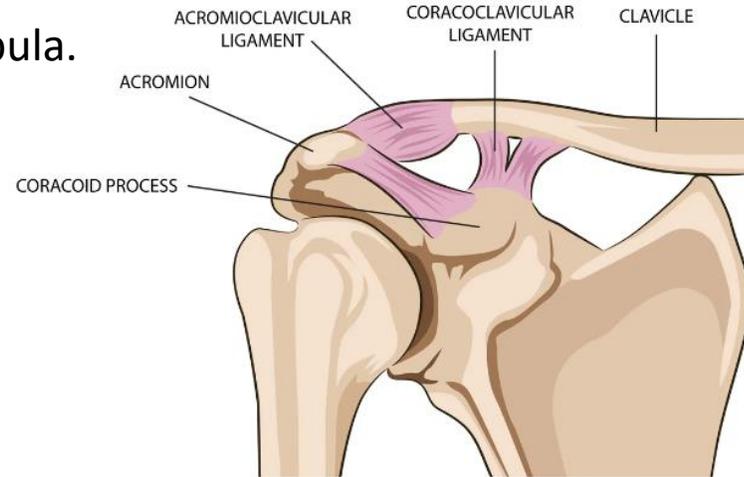
A. Acromioclavicular

- **Type:** **synovial plane.**
- **Ligaments:**
 - 1) Superior acromioclavicular.
 - 2) Inferior acromioclavicular.
 - 3) Coracoclavicular.

- **It has an articular disc.**

B. Sternoclavicular

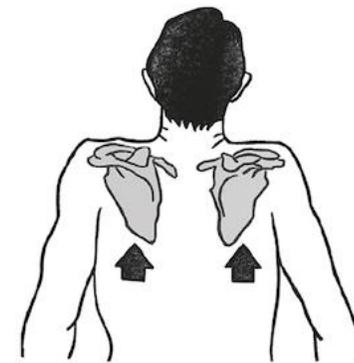
- **Type:** **synovial saddle.**
- **Ligaments:**
 - 1) Anterior sternoclavicular.
 - 2) Posterior sternoclavicular.
 - 3) Costoclavicular.
 - 4) Interclavicular.



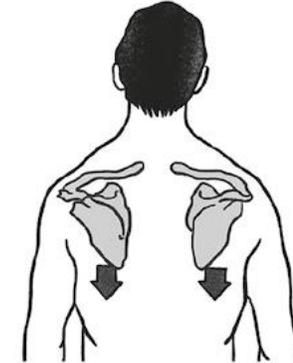
From Neumann DA. Kinesiology of the musculoskeletal system: foundations for physical rehabilitation, ed 2, St Louis, 2010, Mosby, Figure 5-1

Shoulder girdle

Elevation	Depression	Protraction	Retraction
Levator scapulae. Rhomboids Upper trapezius	Pectoralis minor Lower trapezius	Serratus anterior Pectoralis minor	Rhomboids Middle & lower trapezius
Upward Rotation of scapula		Downward rotation of scapula	
Upper trapezius. Serratus anterior.		Levator scapulae Rhomboids Pectoralis major and minor Latissimus dorsi	



Elevation



Depression



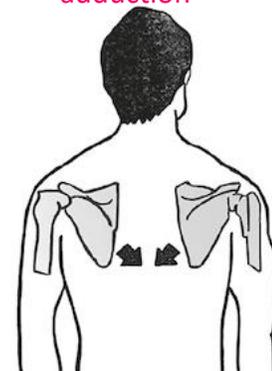
Retraction
adduction



Protraction
abduction



Upward rotation

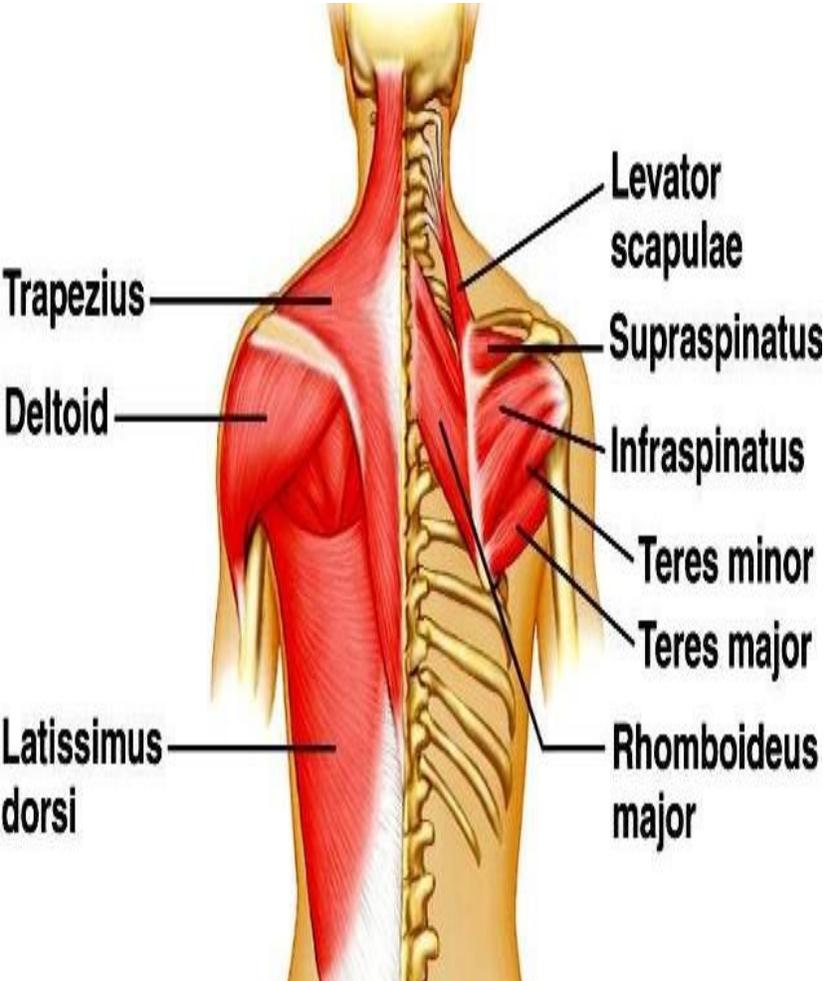


Downward rotation

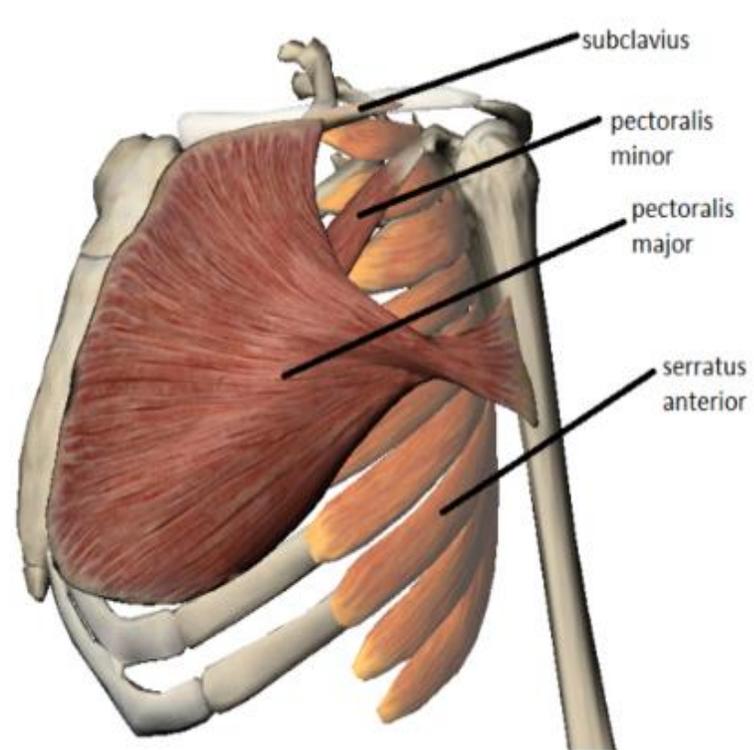
Shoulder girdle movements

Return to anatomical position

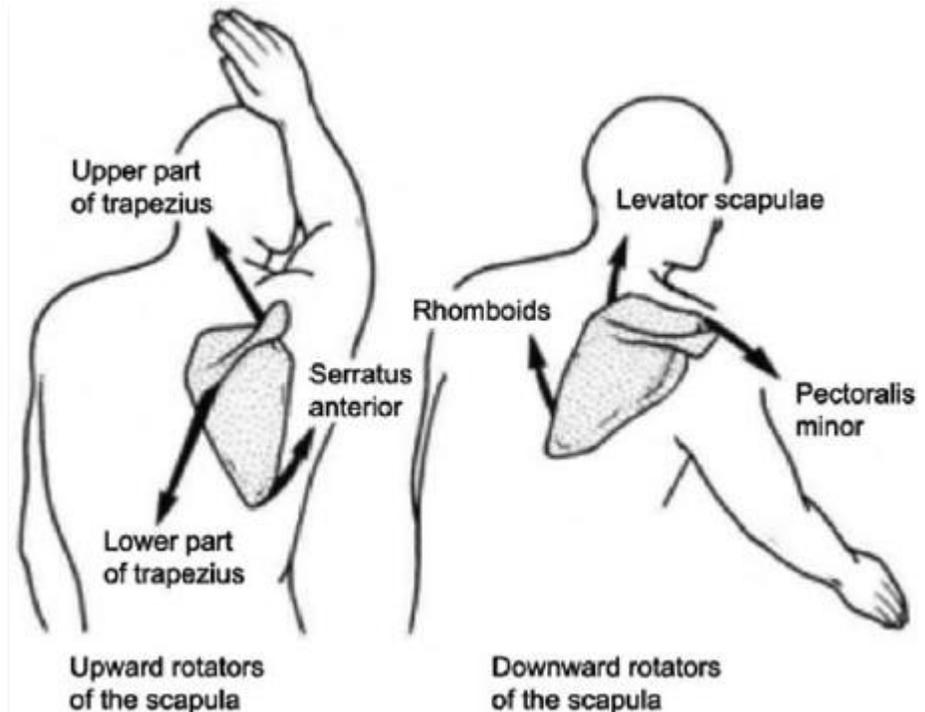
Shoulder girdle



Superficial muscles of the back

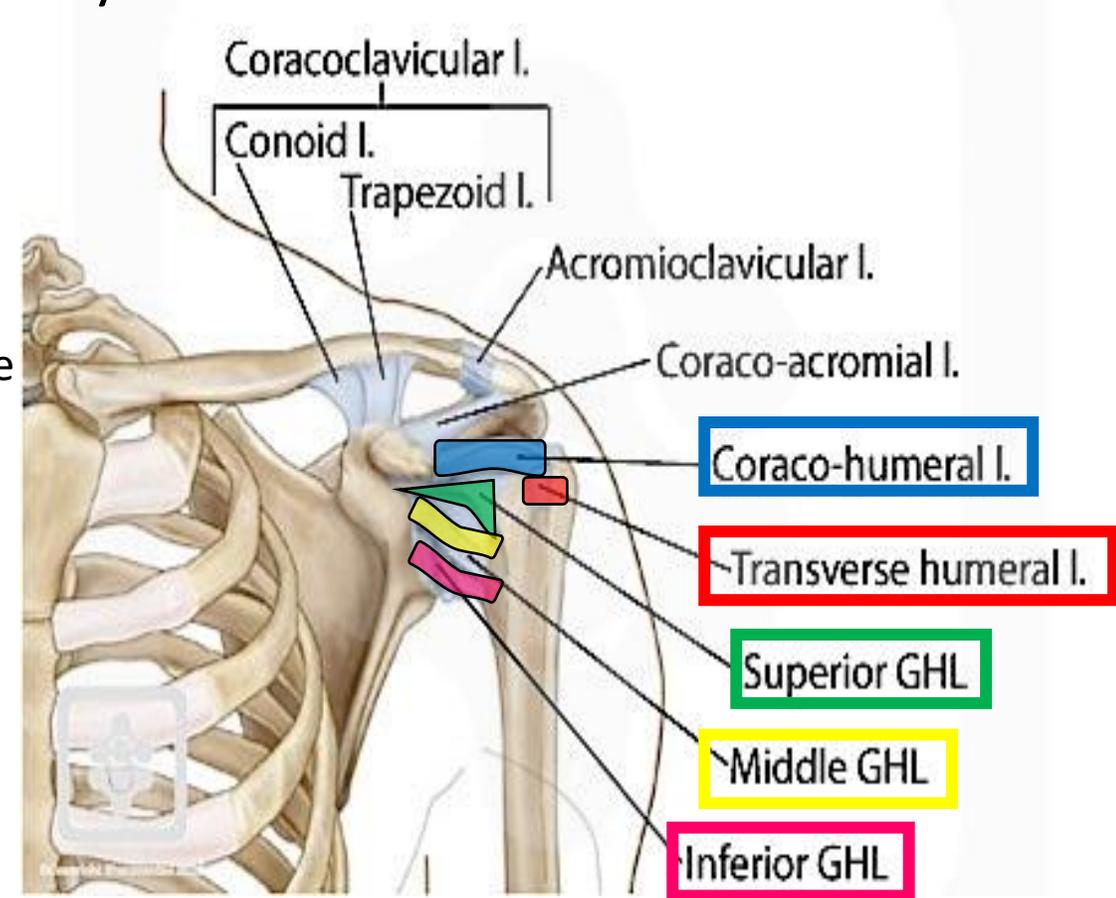
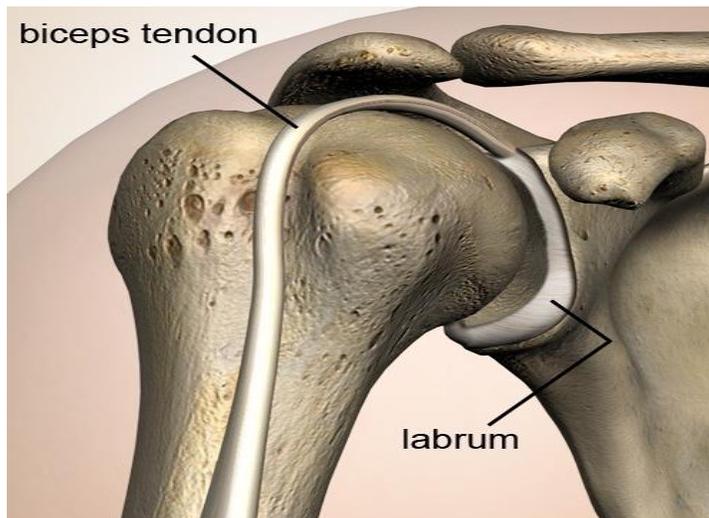


Muscles of pectoral region



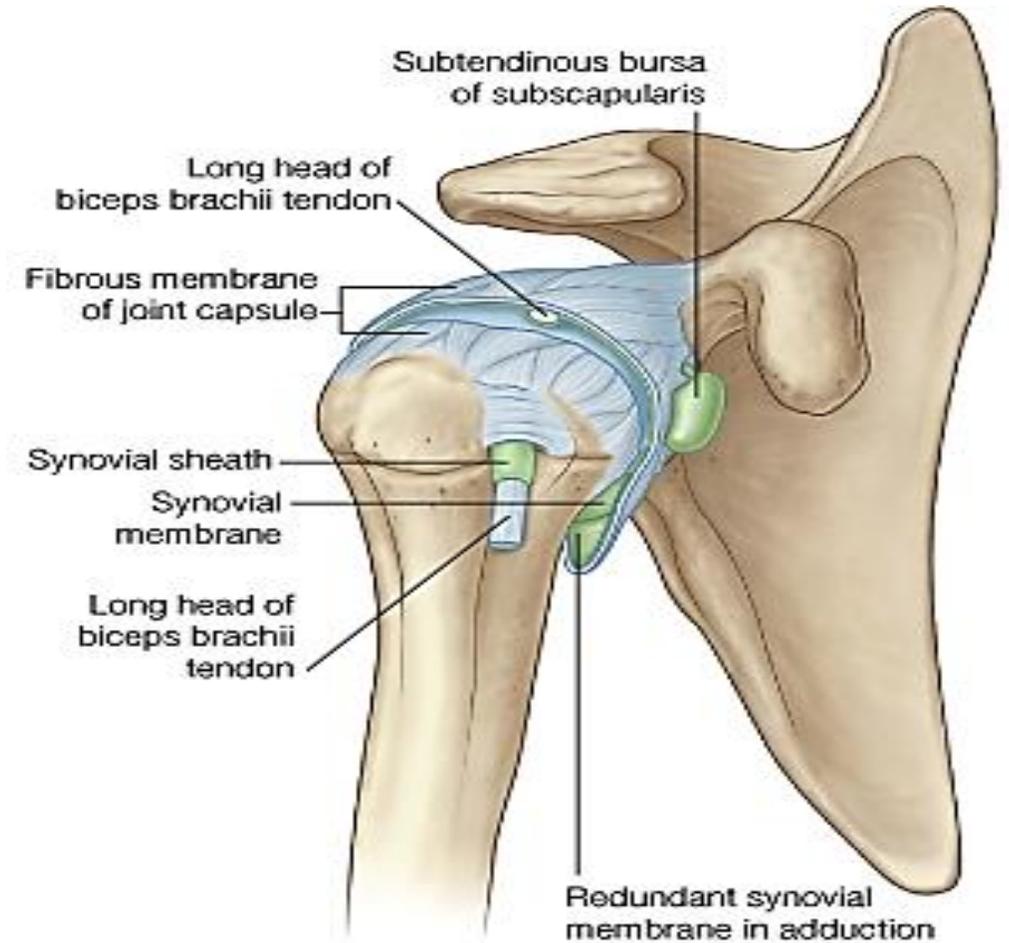
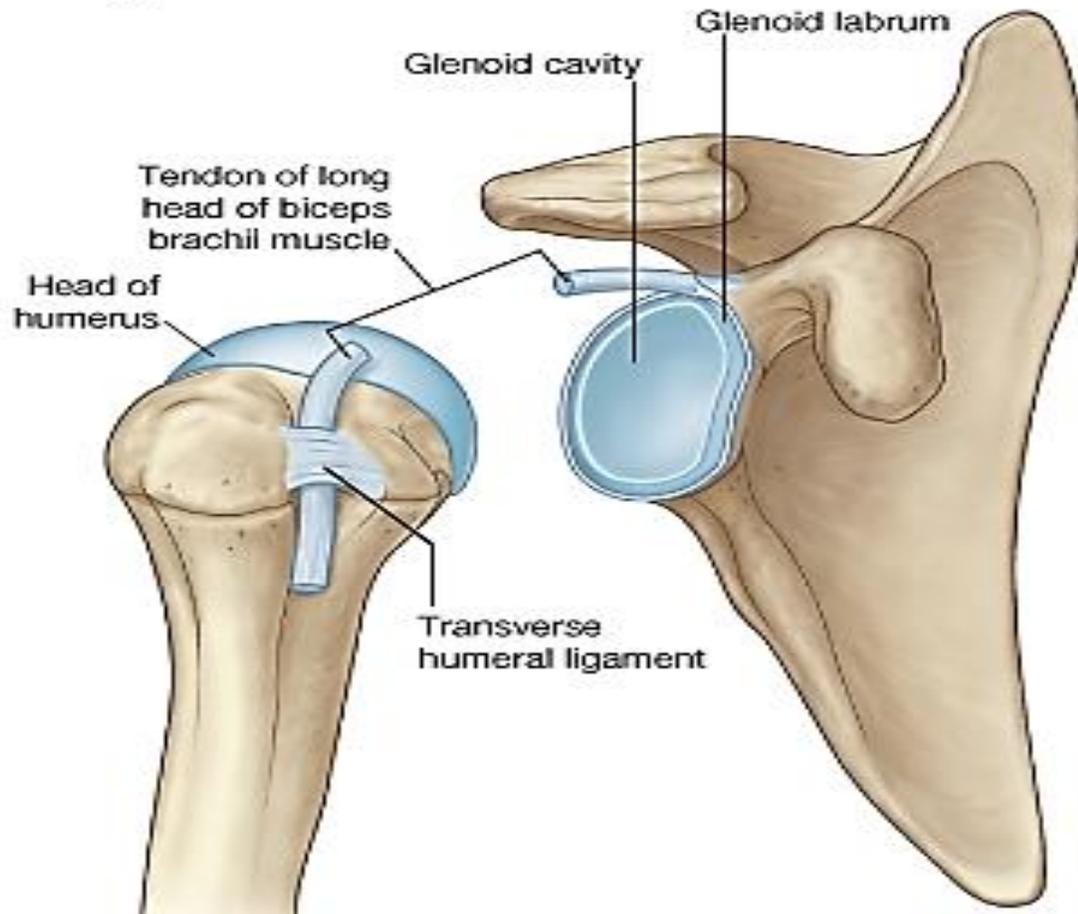
Shoulder joint

- **Type:** **synovial ball & socket.**
- **Articular surface:** head of humerus & glenoid cavity of scapula.
- **Ligaments:**
 1. **Coracohumeral.**
 2. Glenohumeral: 3: **superior, middle & inferior.**
 3. **Transverse humeral.**
 4. **Labrum glenoidale:** fibrocartilage attached to the margin of the glenoid cavity.



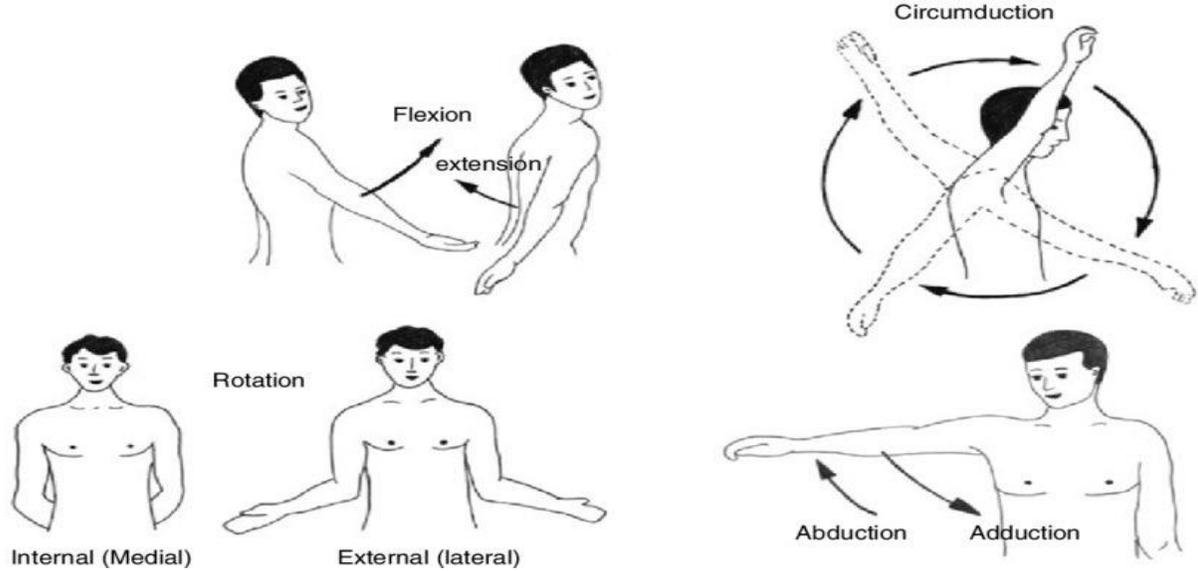
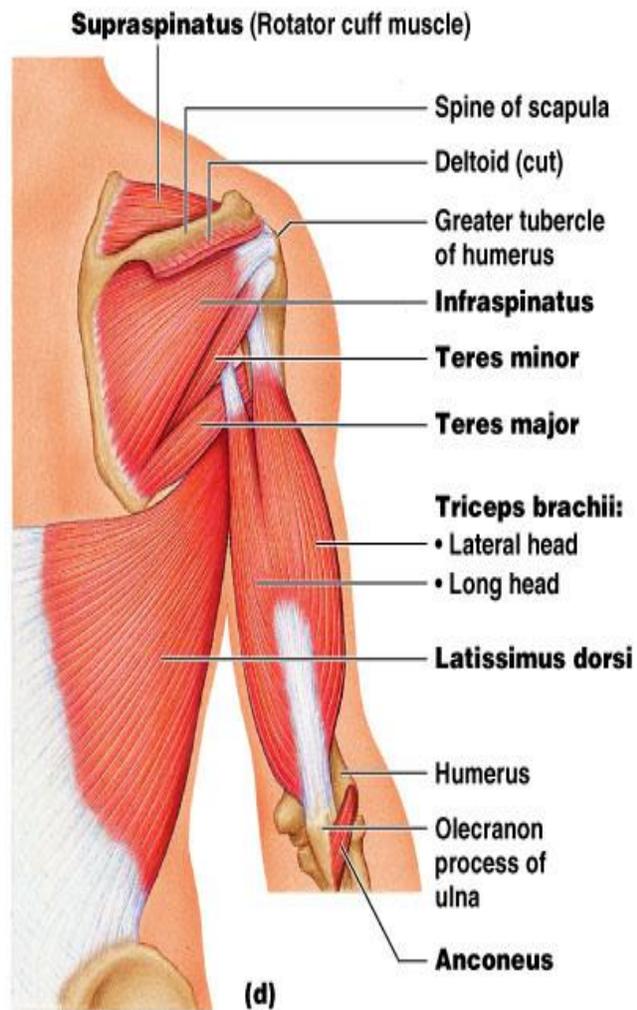
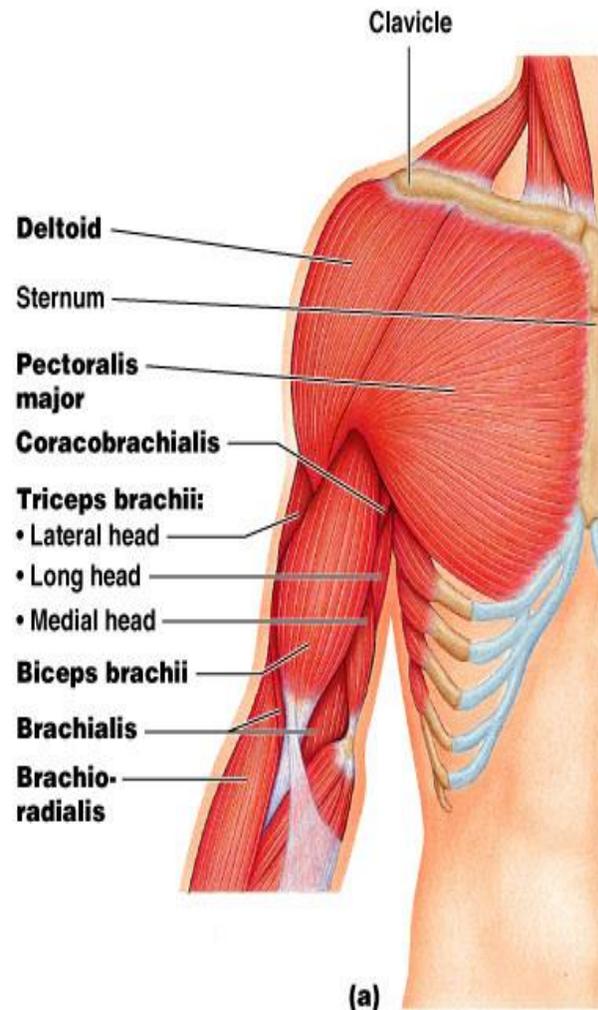
Shoulder joint

A



Movements of Shoulder joint

Medial Rotation	Lateral Rotation
<ul style="list-style-type: none"> • Pectoralis major • Latissimus dorsi. • Teres major. • Deltoid (anterior fibers) • Subscapularis. 	<ul style="list-style-type: none"> • Infraspinatus • Teres minor • Deltoid (posterior fibers).



Muscles of Shoulder joint

Deltoid muscle

Origin:

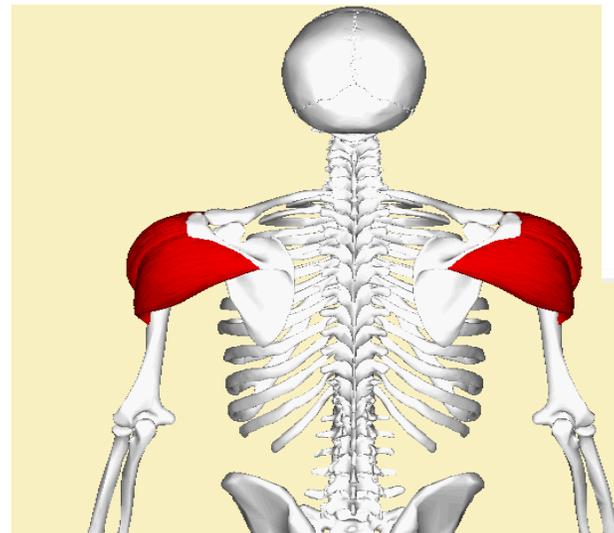
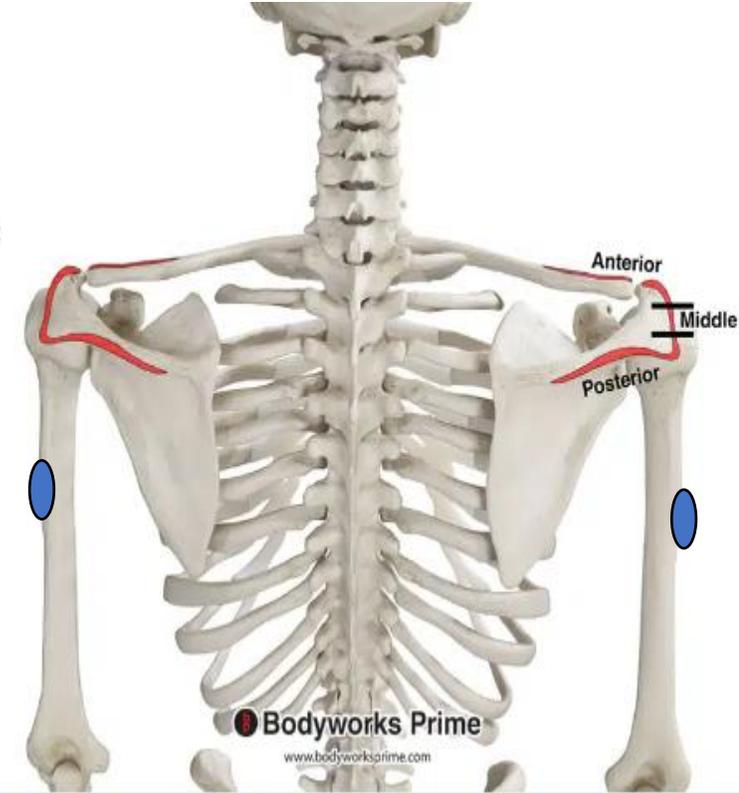
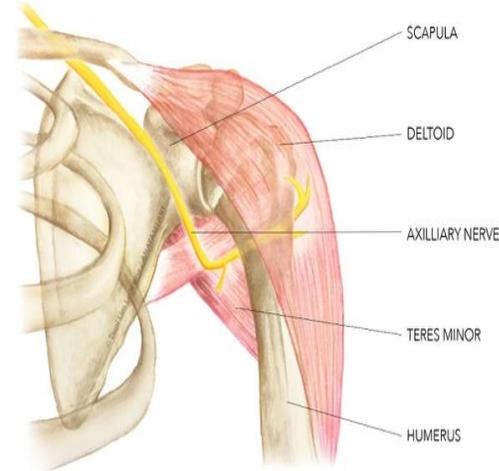
- **Anterior fibers:** from the anterior border of the lateral 1/3 of the clavicle.
- **Middle (lateral) fibers:** from the lateral border of the acromion process.
- **Posterior fibers:** from the lower lip of the crest of the spine of the scapula.

Insertion: Into the **deltoid tuberosity** of the humerus.

Nerve supply: The **axillary nerve**

Action:

- Anterior fibers: flex the arm and rotate it medially.
- Posterior fibers: extend the arm and rotate it laterally.
- Middle fibers; abduct the shoulder joint (15°-90°).

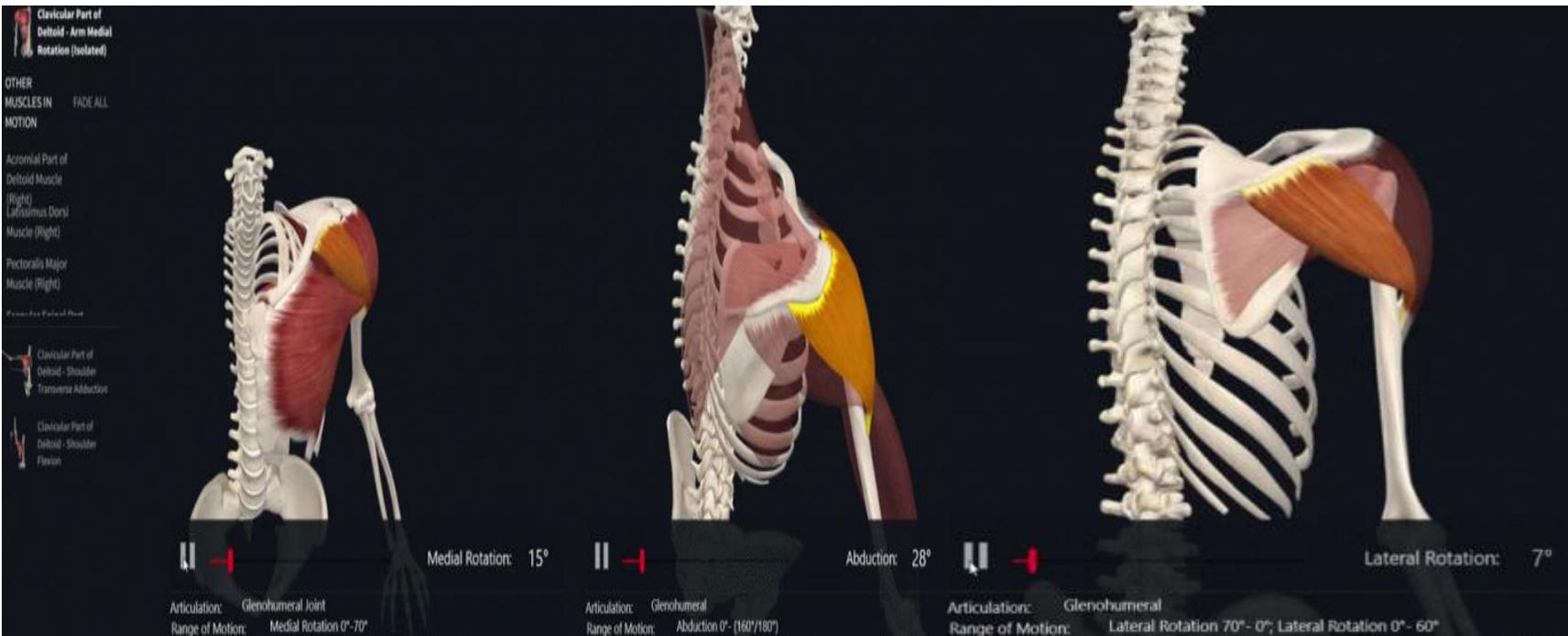
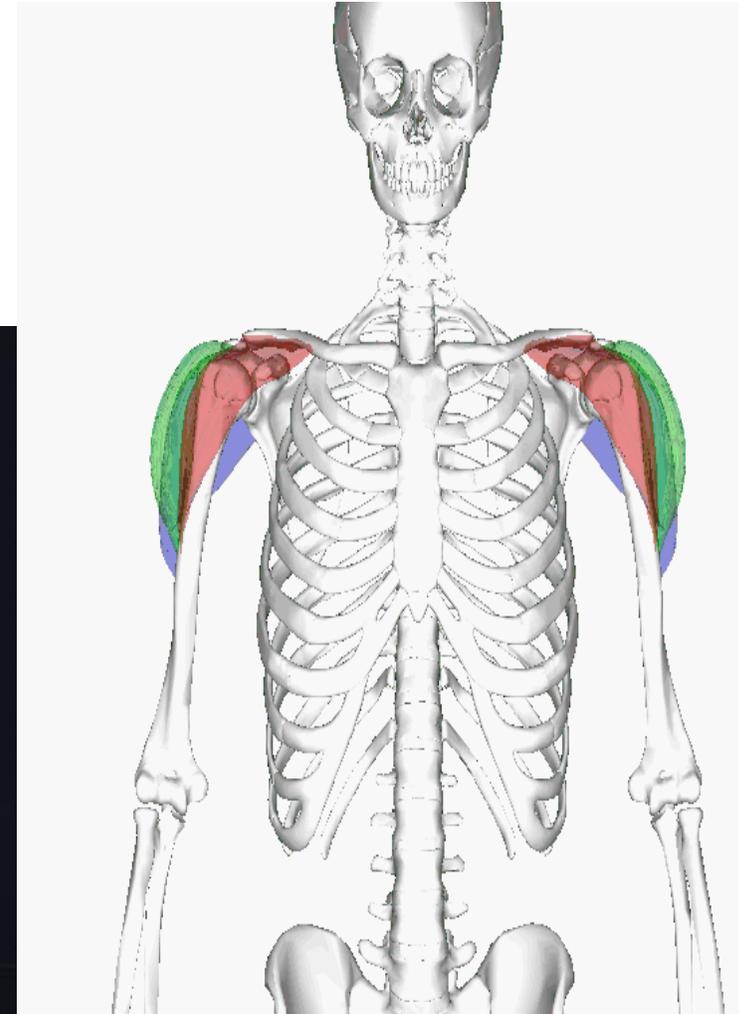


Muscles of Shoulder joint

Deltoid muscle

Action:

- **Anterior fibers:** flex the arm and rotate it medially.
- **Posterior fibers:** extend the arm and rotate it laterally.
- **Middle fibers:** abduct the shoulder joint (15° - 90°).



Quiz

One of the following muscles is responsible for abduction 15-90 degrees?

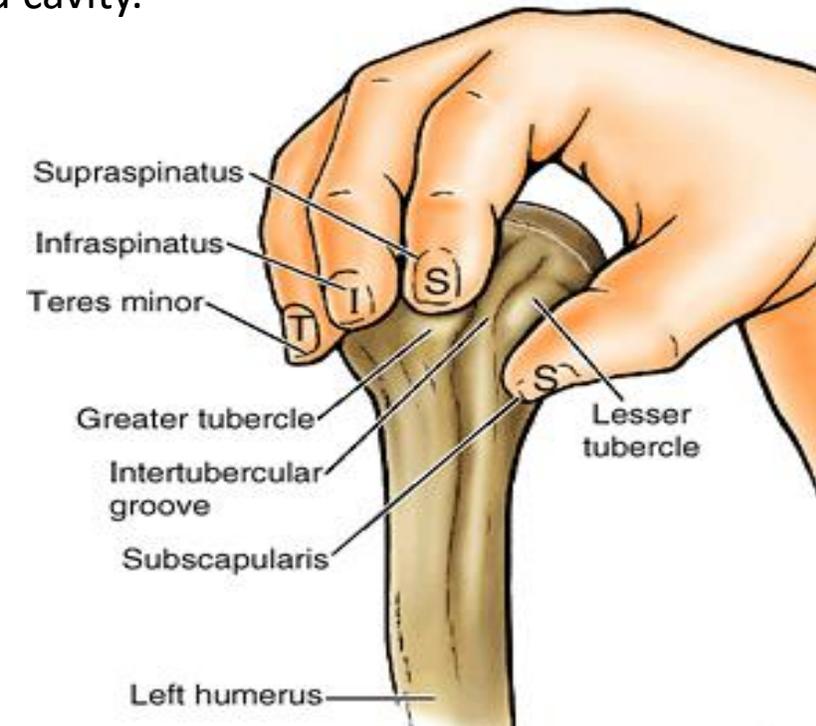
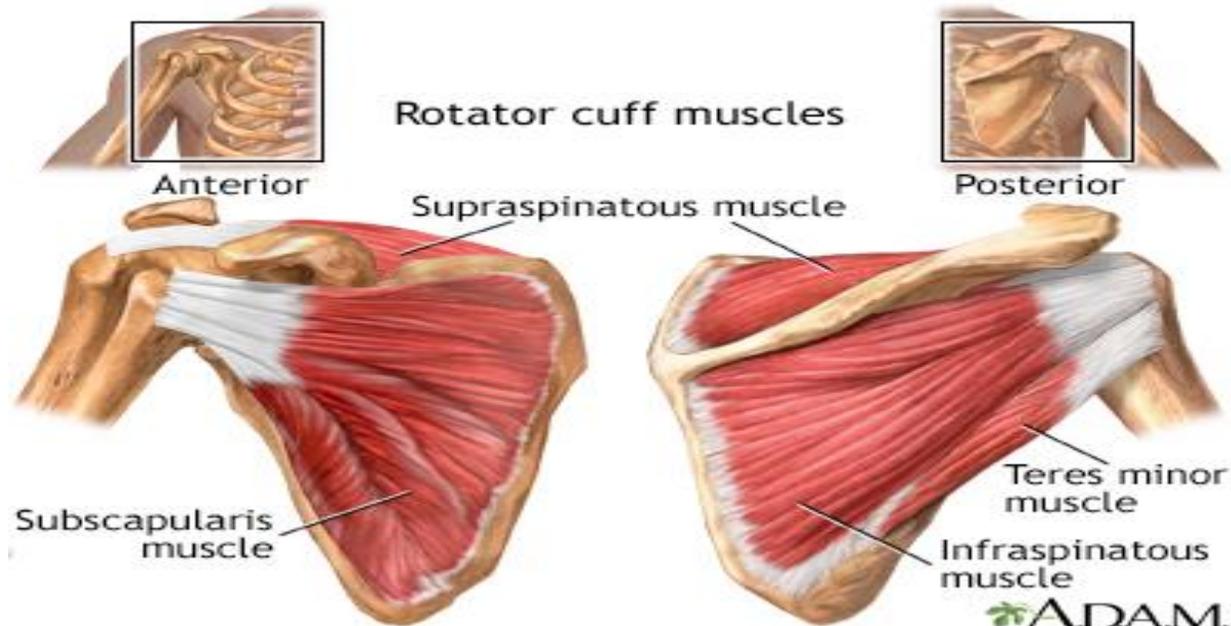
- A) Pectoralis minor**
- B) Deltoid muscle**
- C) Serratus anterior**
- D) Lattismus dorsi**
- E) Teres major**

Answer: B



Rotator cuff Muscles

- 4 muscles: **supraspinatus**, **infraspinatus**, **teres minor**, and **subscapularis** form what is termed the rotator cuff.
- The tone of these muscles help to **steady** the head of the humerus in the glenoid cavity.
- Therefore, this assists in stabilizing the shoulder joint.

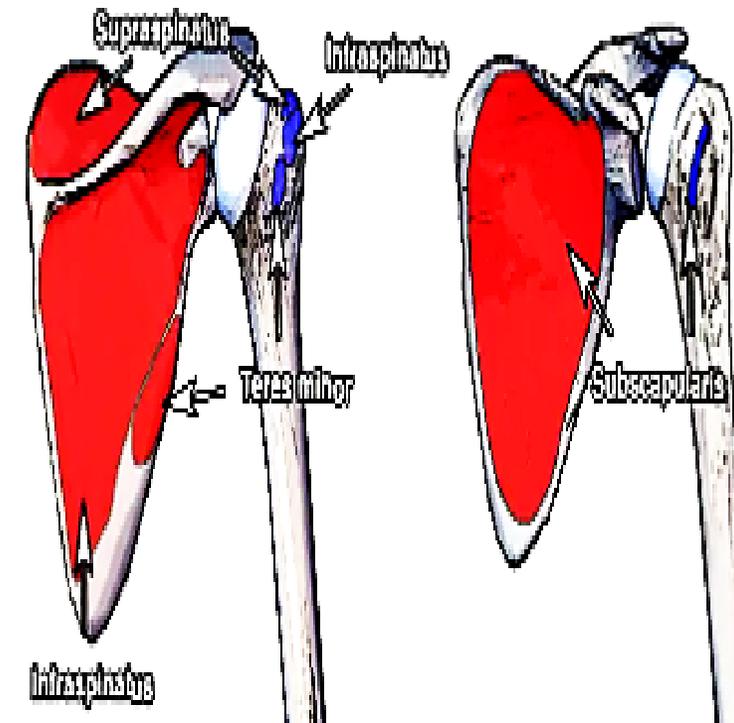


Muscles of Shoulder joint

	<u>Supraspinatus</u>	<u>Infraspinatus</u>	<u>Teres minor</u>	<u>Subscapularis</u>
Origin	supraspinous fossa	infraspinous fossa	upper 2/3 of the dorsum of the lateral border of the scapula.	the subscapular fossa
Insertion	greater tuberosity of the humerus.			Lesser tuberosity of the humerus
Nerve supply	Suprascapular nerve		Axillary nerve	Upper and lower subscapular nerves
Action:	<ul style="list-style-type: none"> abduction of the arm (0° to 15°). steady the head of the humerus in the glenoid cavity 	<ul style="list-style-type: none"> Lateral rotation of the arm. steady the head of the humerus during abduction. 	<ul style="list-style-type: none"> Adduction and lateral rotation of the arm. steady the head of the humerus in the glenoid cavity. 	<ul style="list-style-type: none"> Adduction and medial rotation of the arm. steady the head of the humerus in the glenoid cavity.

Posterior View

Anterior View



Muscles of Shoulder joint

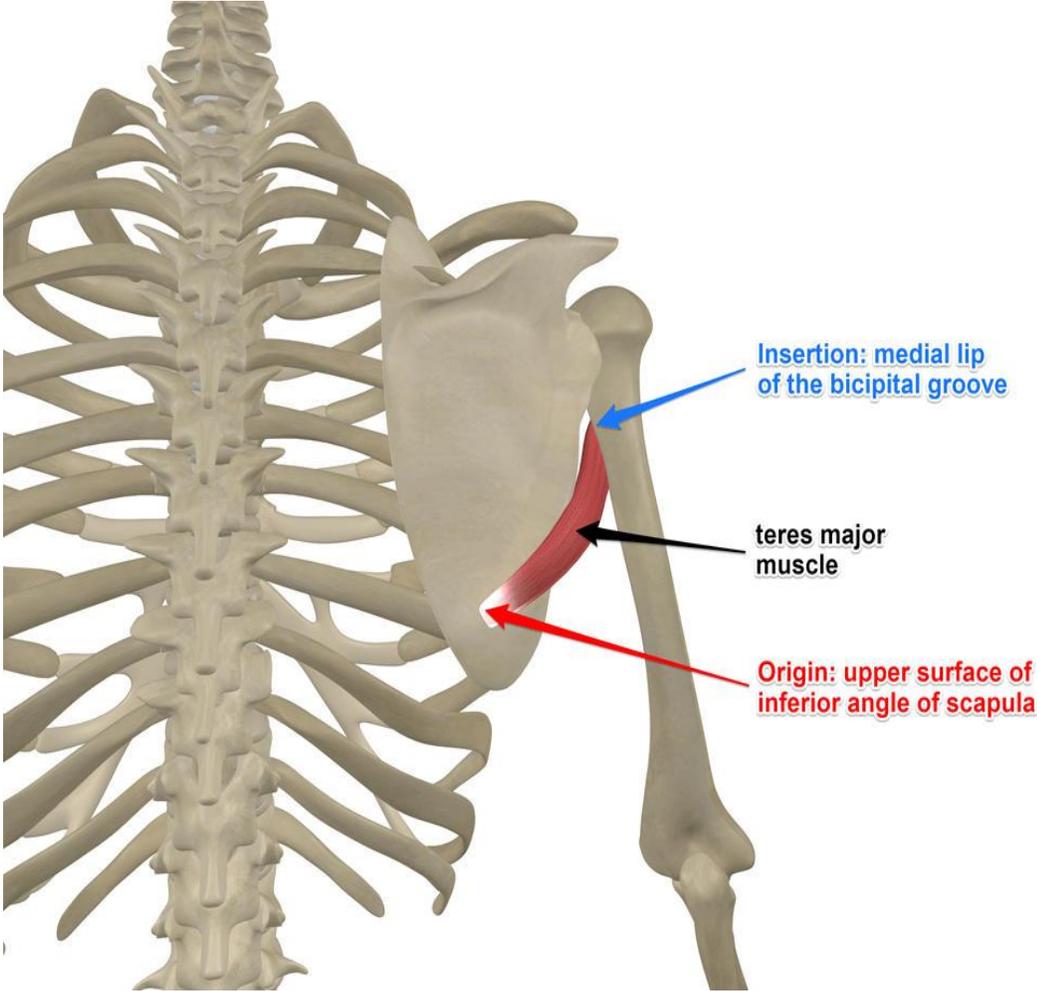
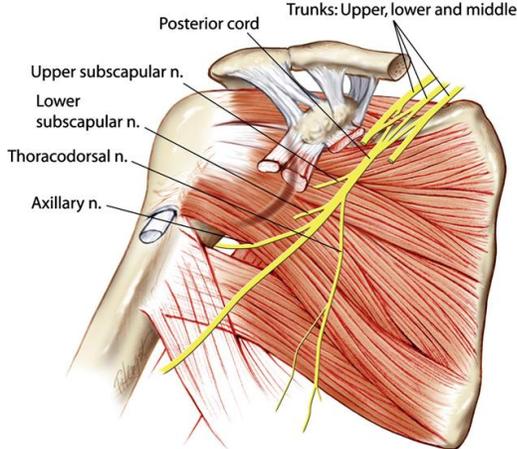
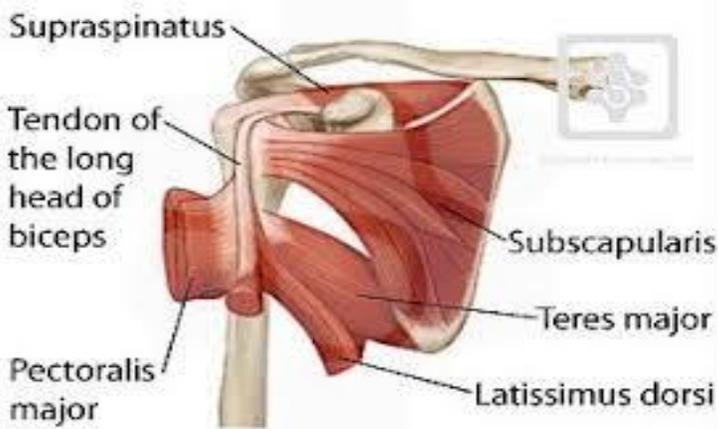
Teres major

Origin: From the lower 1/3 of the dorsum of the lateral border of the scapula.

Insertion: Into the medial lip of the bicipital groove.

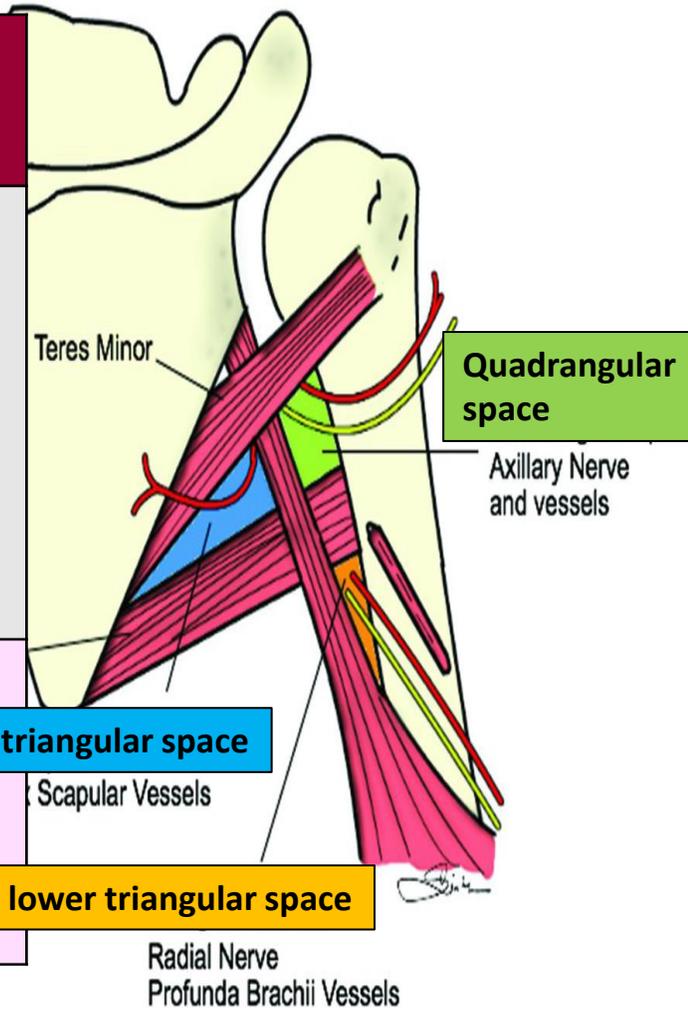
Nerve supply: Lower subscapular nerve (C. 5,6).

Action: Extension, adduction, and medial rotation of the arm.



Inter-muscular spaces

	Quadrangular space	Upper triangular space	Lower triangular space
Boundaries:	<p>Superiorly; Subscapularis. Inferiorly; Teres major. Medially; Long head of triceps. Laterally; Surgical neck of the humerus.</p>	<p>Superiorly; Teres minor. Inferiorly; Teres major. Laterally; Long head of triceps.</p>	<p>Superiorly; Teres major. Medially; Long head of triceps. Laterally; Shaft of the humerus.</p>
Contents:	<p>1- Axillary (circumflex) nerve. 2- Posterior circumflex humeral vessels.</p>	<p>The circumflex scapular artery branch of the subscapular artery.</p>	<p>1- Radial nerve. 2- Profunda brachii artery</p>

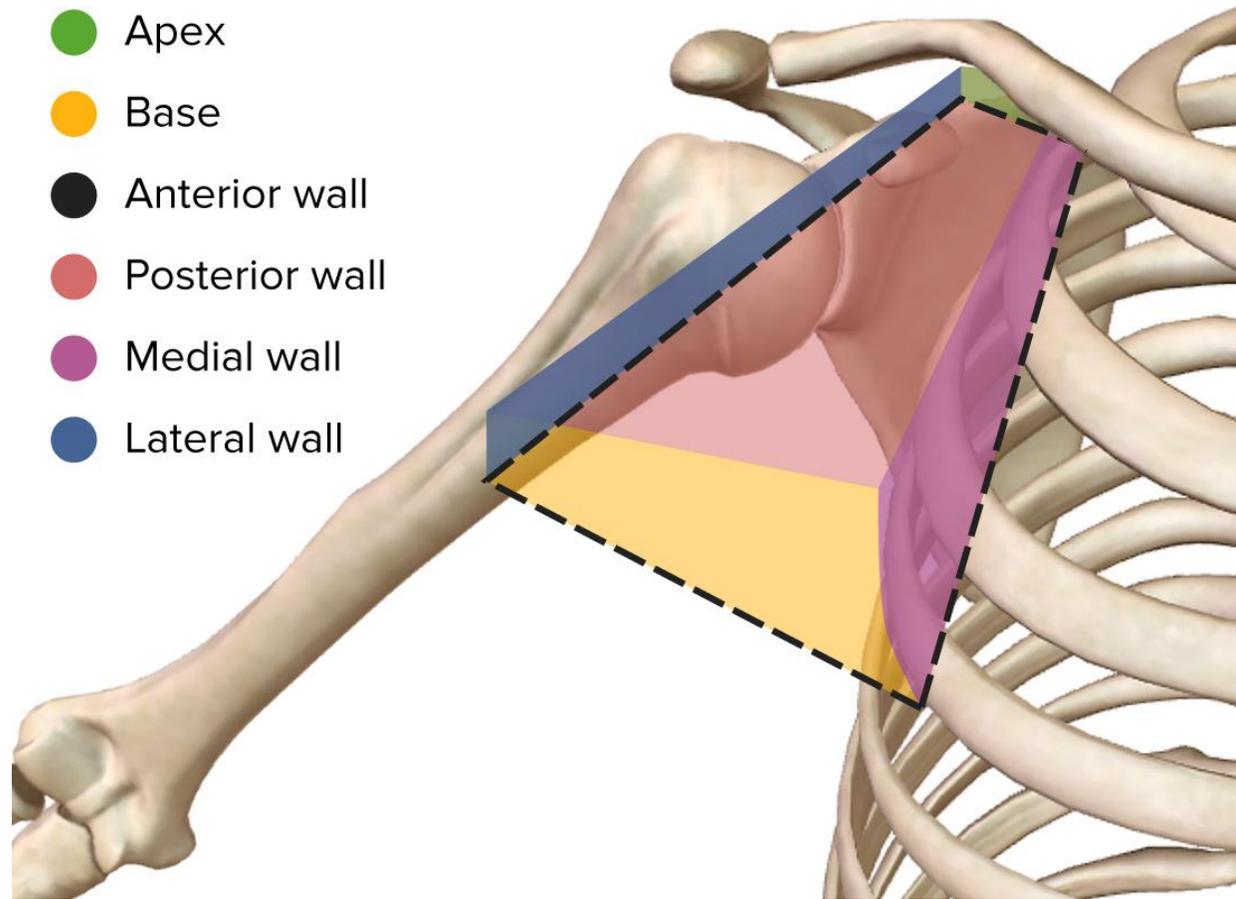


The Axilla

Definition: Is a space between the upper part of the chest and the upper part of the arm.

Shape: It is a pyramidal in shape.

It has apex, base and 4 walls.



- Apex
- Base
- Anterior wall
- Posterior wall
- Medial wall
- Lateral wall

The Axilla

Anterior wall

Pectoralis major

Pectoralis minor

Intertubercular sulcus

Serratus anterior

Lateral wall

Biceps

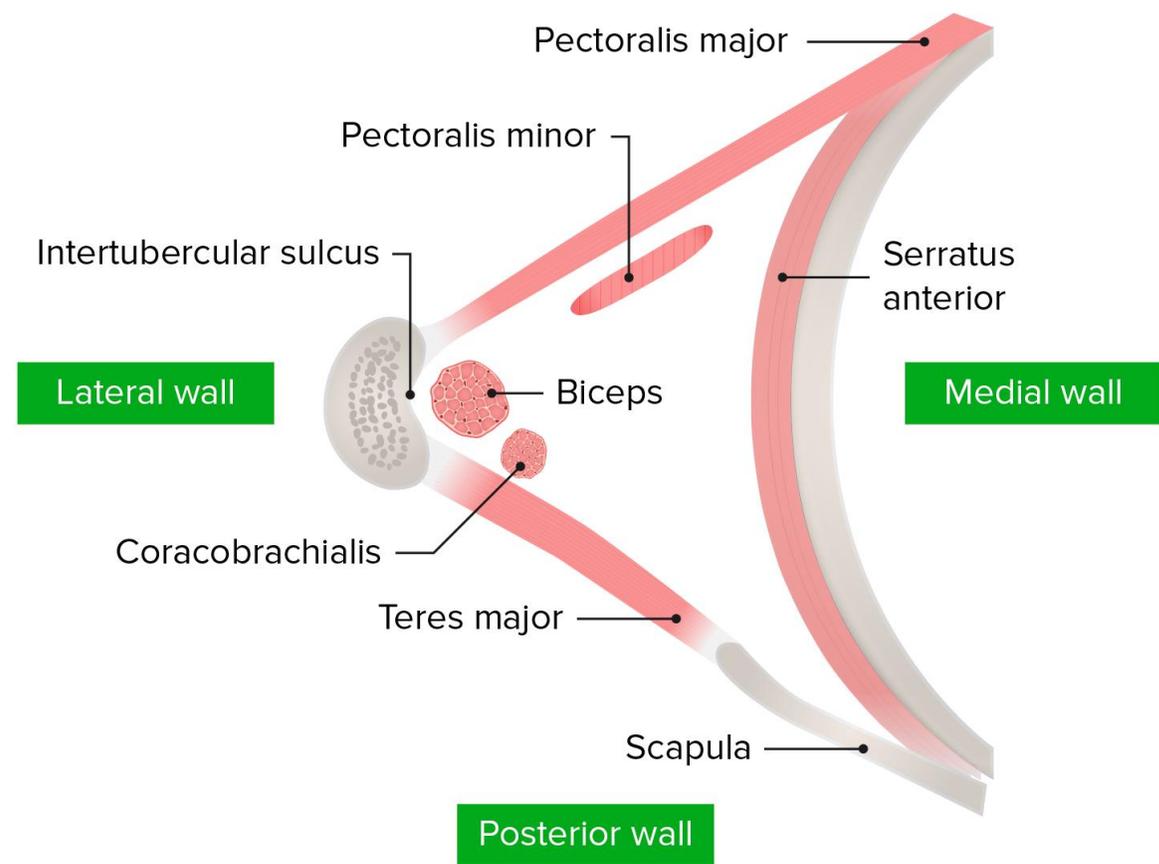
Medial wall

Coracobrachialis

Teres major

Scapula

Posterior wall



❖ **Anterior wall:** formed by;

1. The pectoralis major.
2. The subclavius and the pectoralis minor.
3. The clavipectoral fascia.

NB. The **anterior fold of the axilla** is formed by the **pectoralis major**.

❖ **Posterior wall:** Is formed by **the scapula overlaid by 3 muscles**.

1. The subscapularis above.
2. The teres major
3. Latissimus dorsi below.

NB. The **posterior fold of the axilla** is formed by the **latissimus dorsi and by the teres major**

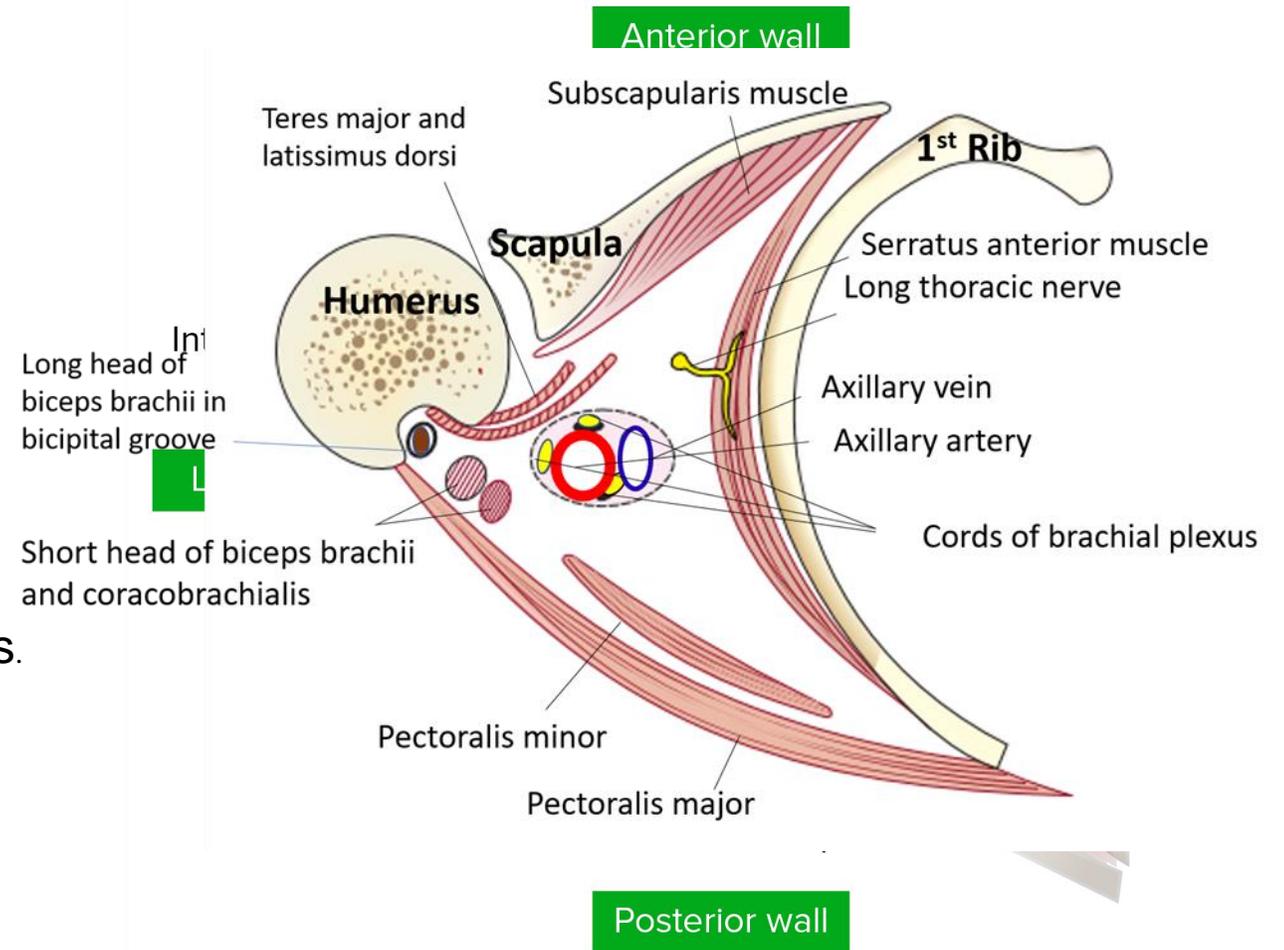
The Axilla

❖ **Medial wall:** Is formed by;

1. The upper 2nd - 6th ribs.
2. The upper 6 intercostal muscles.
3. The upper part of the serratus anterior.

❖ **The lateral wall:** It is formed by;

1. The bicipital groove of the humerus.
2. The corachobrachialis and the biceps muscles.



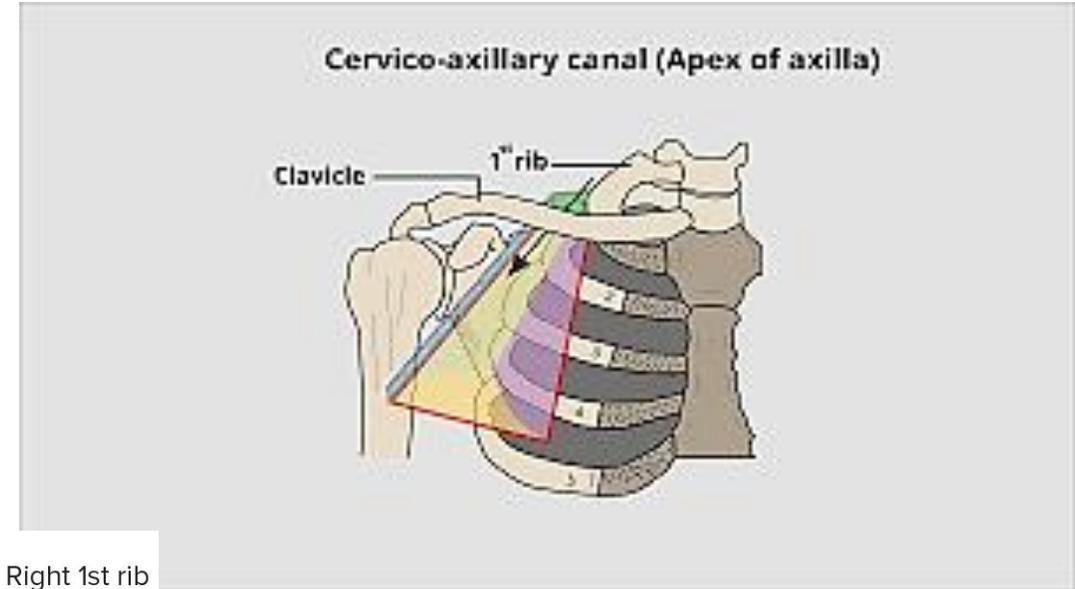
The Axilla

❖ Apex:

Is directed upwards towards the root of the neck. It is the triangular bony space called **cervicoaxillary** canal **bounded by;**

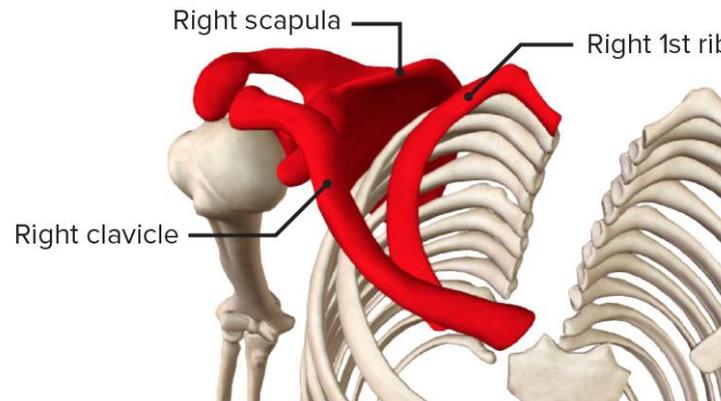
- ✚ Anteriorly: The posterior surface of the **clavicle**.
- ✚ Posteriorly: The superior border of the **scapula**.
- ✚ Medially: The outer border of **the 1st rib**.

It transmit the axillary vessels and nerves from the neck to the upper limb.



❖ The base (floor):

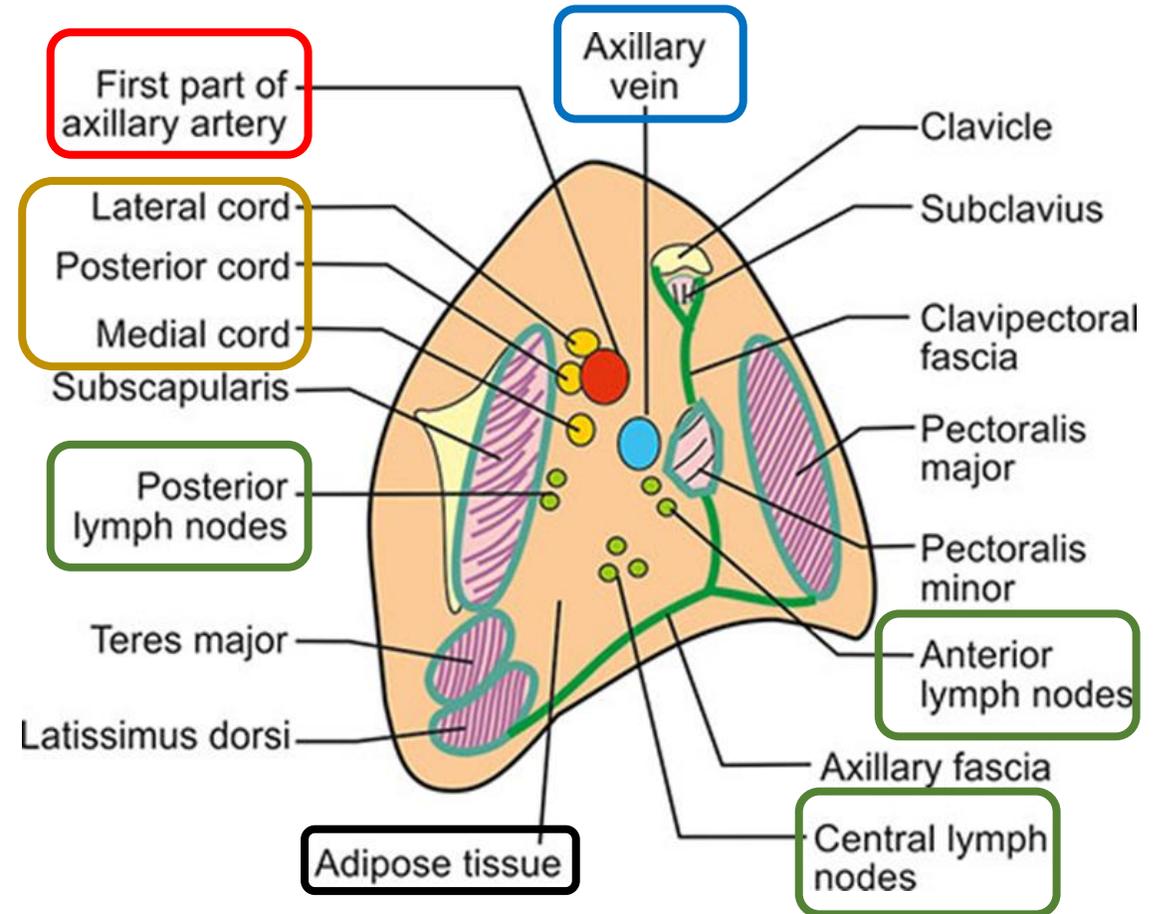
It is formed by the **skin and fascia**.



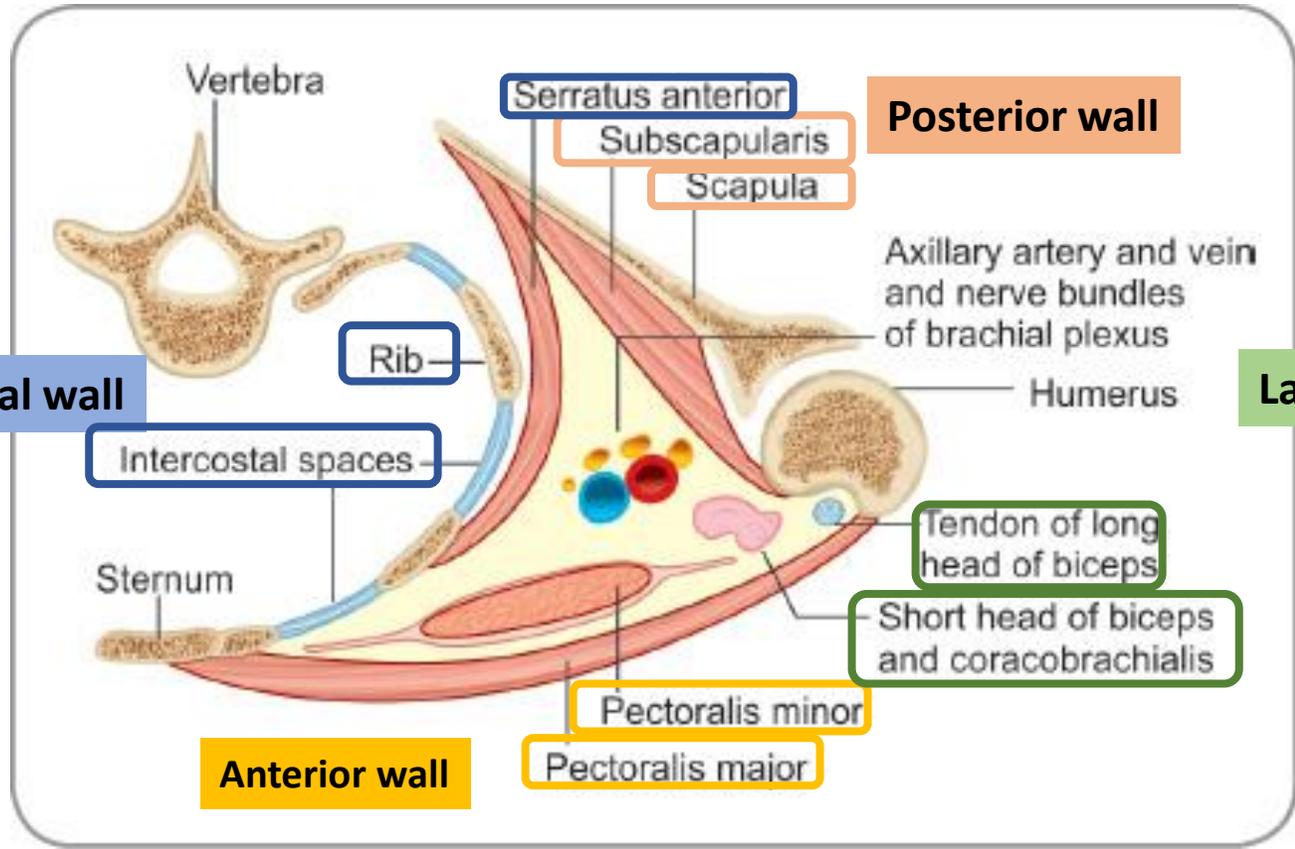
The Axilla

Contents of the axilla:

- 1- The axillary vessels (**axillary artery** and **vein**).
- 2- The **CORDS** and **BRANCHES** of the brachial plexus.
- 3- The **lateral branches** of the intercostal nerves.
- 4- The axillary lymph nodes.
- 5- The axillary tail of the breast.
- 6- Fat and loose areolar tissue.



The Axilla



Serratus anterior muscle

Origin: Arises by 8 digitations from the outer surface of the upper 8 ribs

Insertion:

The 1st digitation: is inserted into the front of the superior angle of scapula.

The 2nd and 3rd digitations: in the whole length of the medial border of scapula from the front.

The lower 5 digitations: front of the inferior angle of scapula.

Nerve supply: Long thoracic nerve.

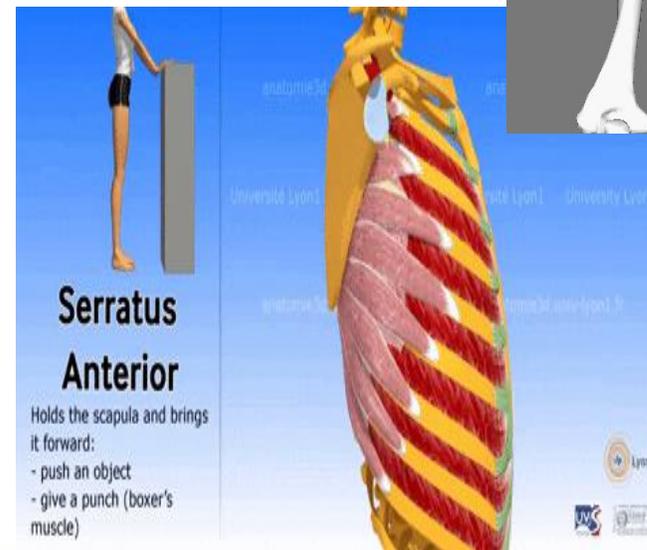
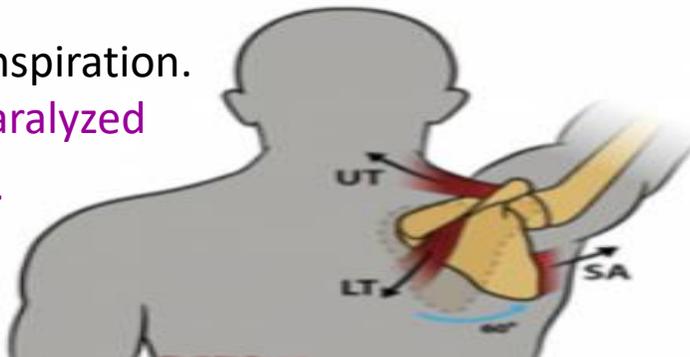
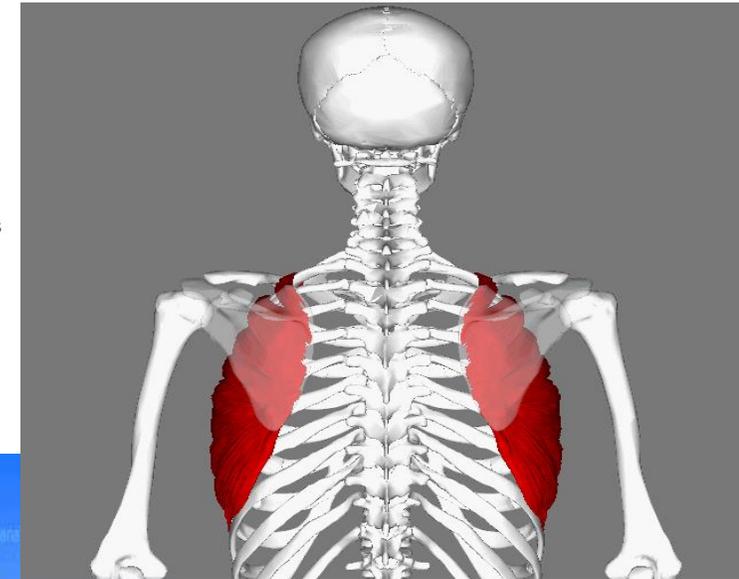
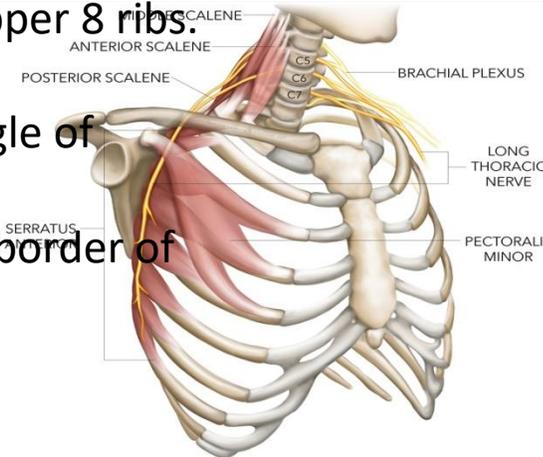
Action (Girdle):

Protract or pull the scapula forward.

The lower 5 digitations help in raising the arm above the head (abduction above 90°).

It raises the ribs in forced inspiration.

N.B. When the muscle is paralyzed it leads to Winged scapula.



Brachial plexus

Definition: The brachial plexus is formed by the **anterior rami** of the lower 4 cervical and the 1st thoracic nerves.

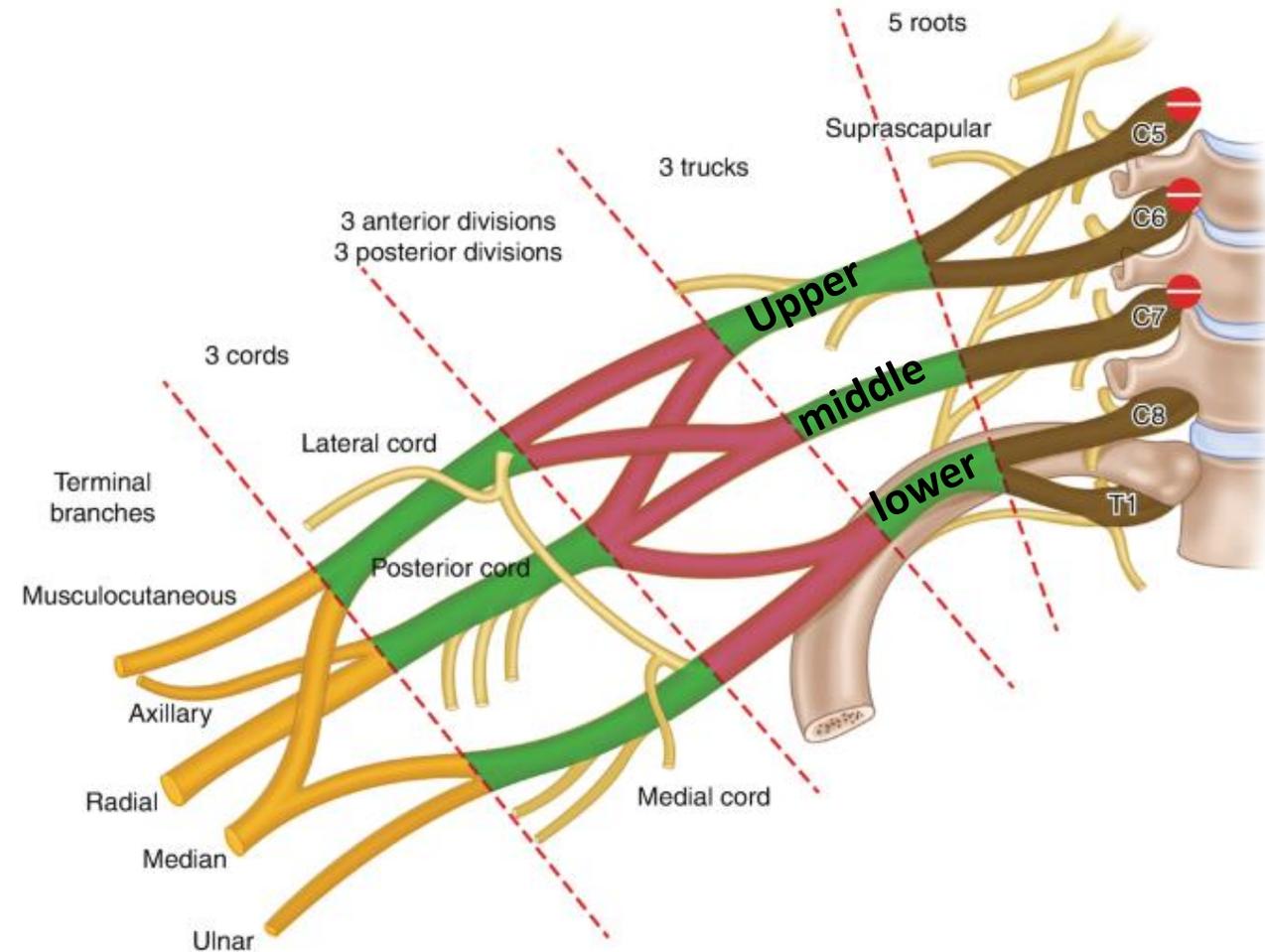
Formation: It is divided into five stages

1- Roots; in the neck

- The roots are the ventral rami of the 5th ,6th , 7th and 8th cervical and the 1st thoracic nerves.

2- Trunks; 3 in the neck

- Upper trunk;** the union of the 5th and 6th cervical roots.
- Middle trunk;** is the continuation of the 7th cervical root.
- Lower trunk;** the union of the 8th cervical and the 1st thoracic root.



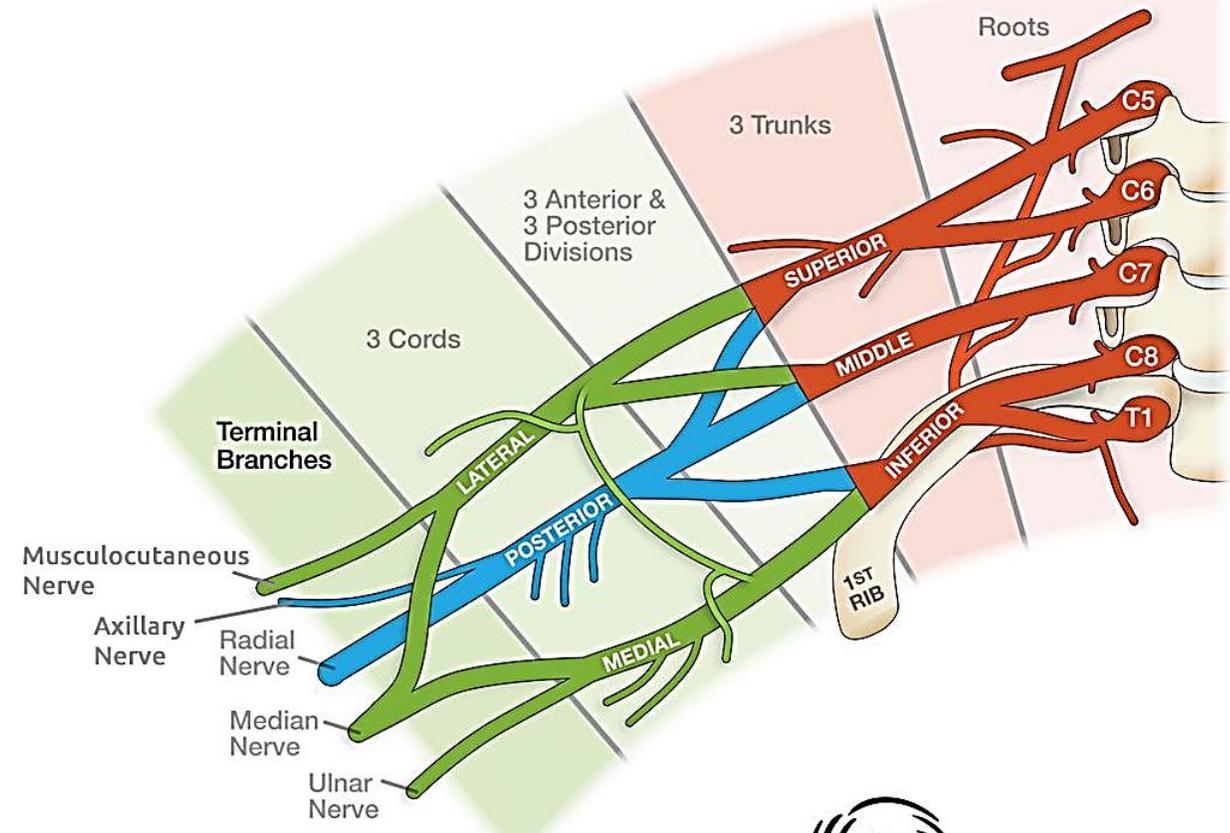
Brachial plexus

3- Divisions; 6 behind the clavicle

- Each of the 3 trunks divides into an **anterior** and **posterior** divisions.

4- Cords; 3 in the axilla.

- **Lateral cord**; the union of the anterior division of the upper and middle trunks.
- **Medial cord**; the anterior division of the lower trunk.
- **Posterior cord**; the union of the posterior division of the upper, middle, and lower trunks.



Brachial plexus

5- Branches of the plexus:

a) From the roots;

- 1- Dorsal scapular nerve (Nerve to rhomboid)
- 2- Long thoracic nerve (Nerve to serratus anterior)

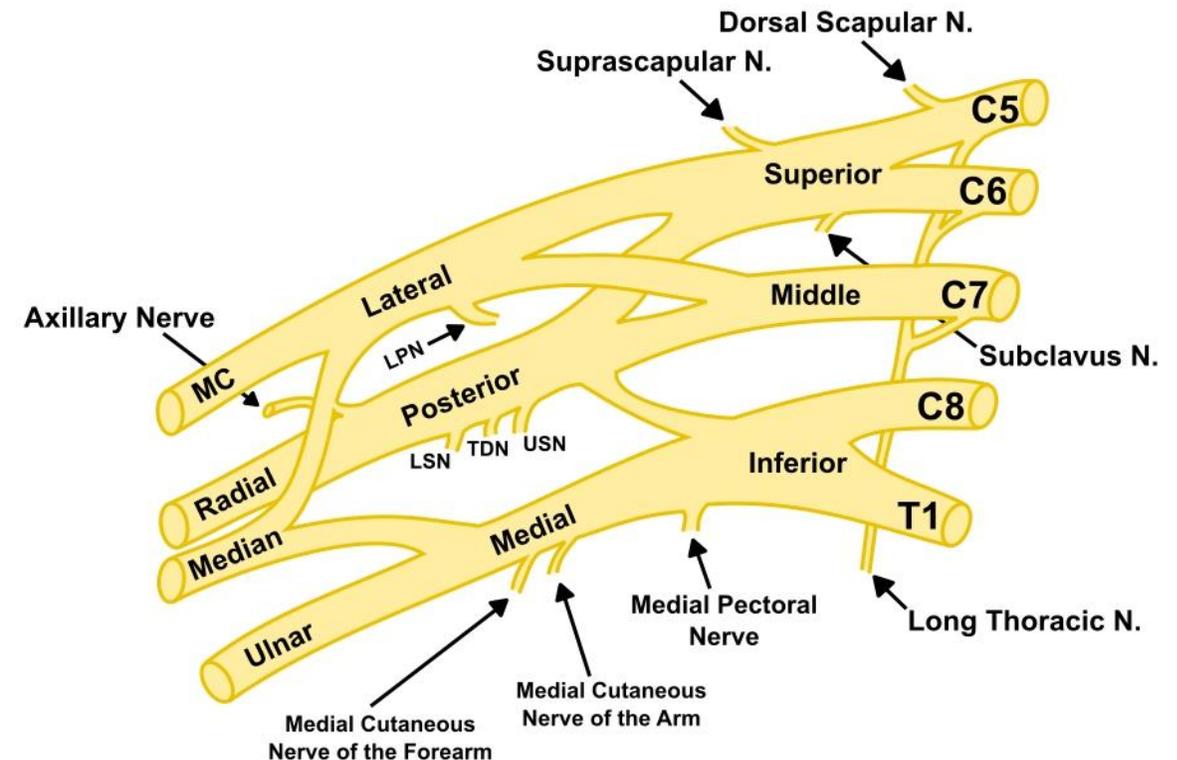
b) From the trunks; only the upper trunk gives.

- 1- Nerve to subclavius
- 2- Suprascapular nerve

c) From the cords;

1) From the lateral cord

- 1- Lateral pectoral nerve
- 2- Musculocutaneous nerve
- 3- Lateral root of median nerve



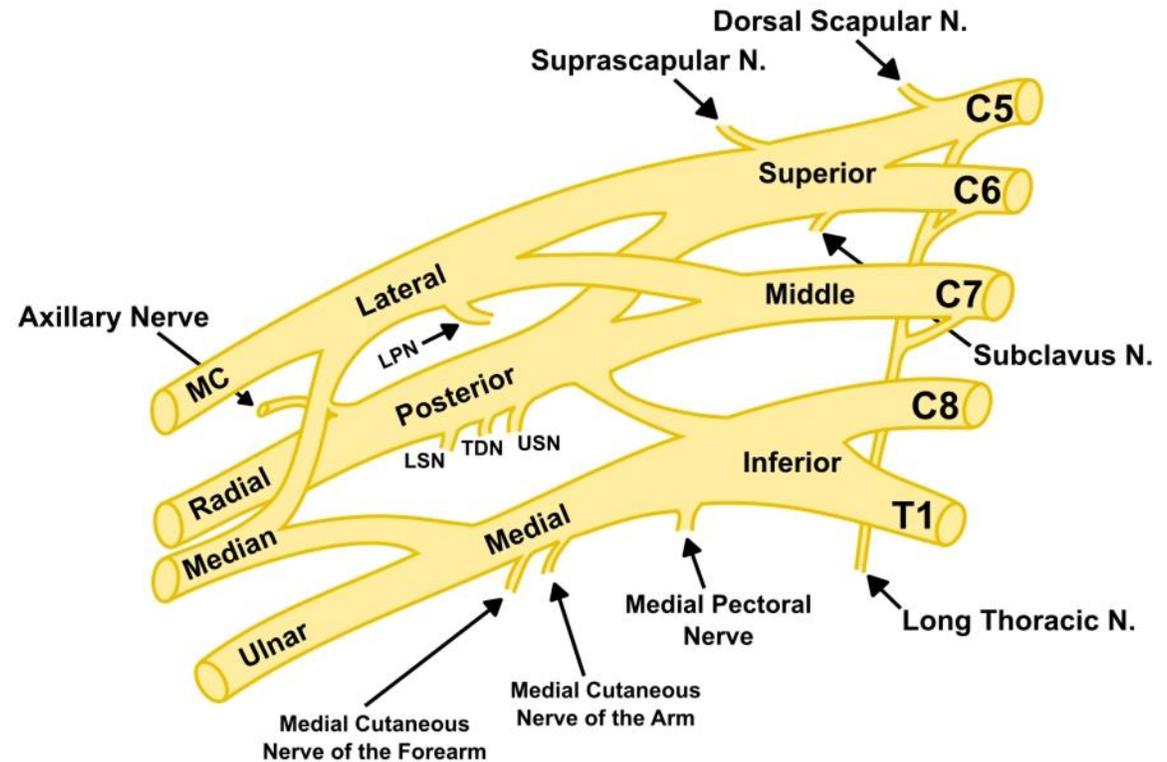
Brachial plexus

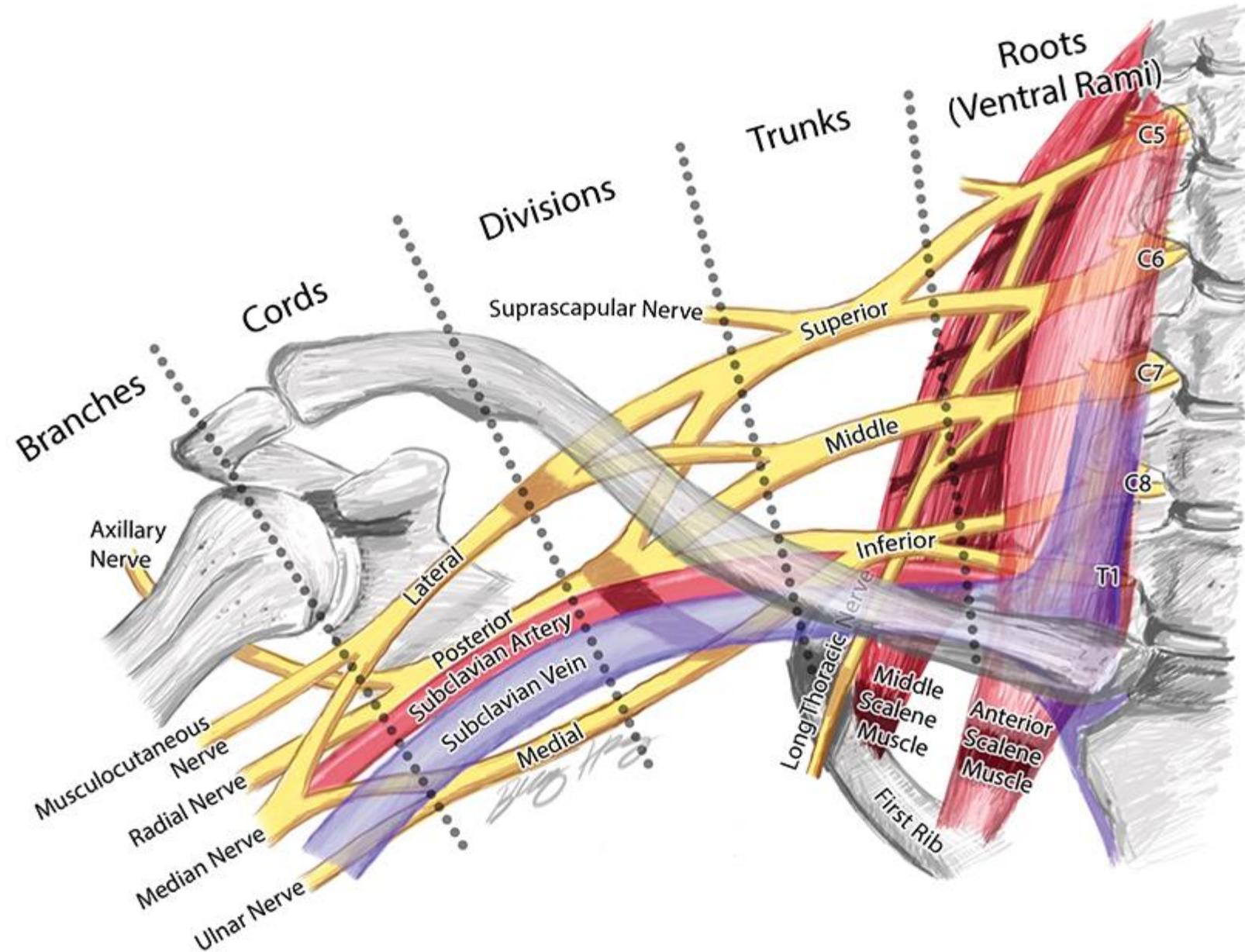
II) From the medial cord

- 1- Medial pectoral nerve
- 2- Medial cutaneous nerve of the forearm
- 3- Medial cutaneous nerve of the arm
- 4- Medial root of median nerve
- 5- Ulnar nerve

III) From the posterior cord

- 1- Upper subscapular nerve
- 2- Lower subscapular nerve
- 3- Thoracodorsal nerve
- 4- Axillary nerve
- 5- Radial nerve





Axillary lymph nodes

The axillary lymph nodes are arranged in 5 groups.

1. Anterior (Pectoral) group:

Site: on the anterior wall along the lower border of the **pectoralis minor**.

2- Posterior (Subscapular) group;

Site: on the posterior wall (in front of the subscapularis muscle).

3-Lateral (Brachial) group;

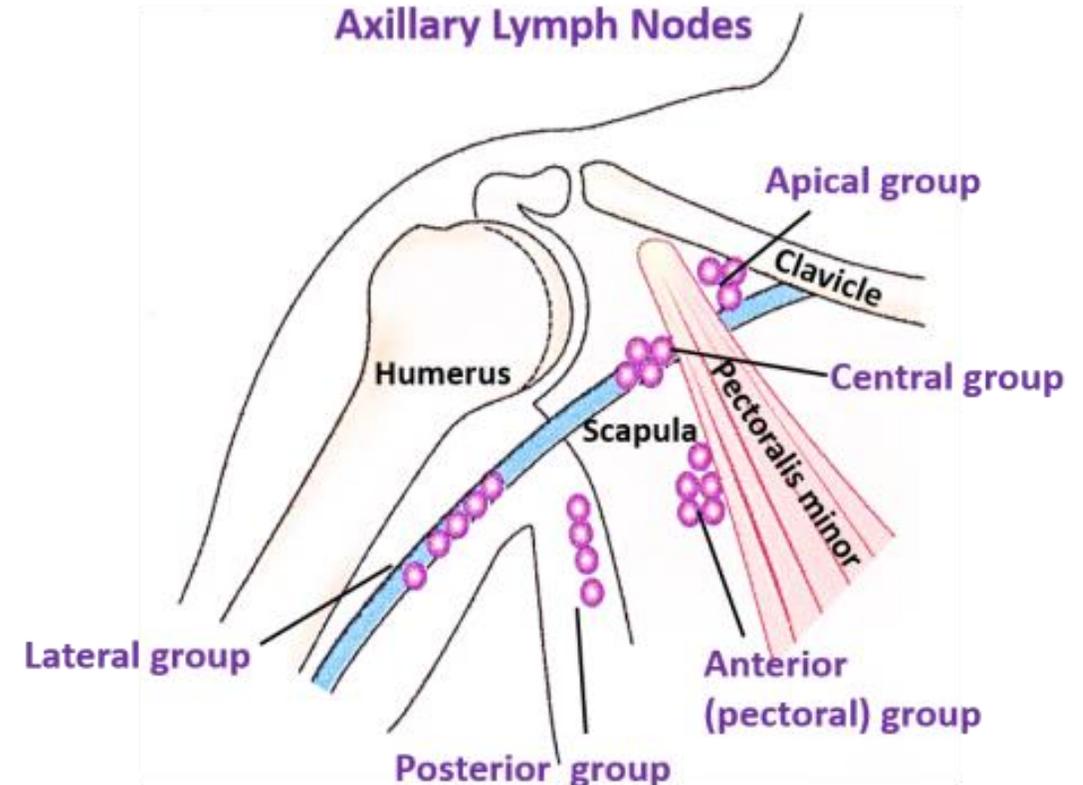
Site: on the lateral wall (along the axillary vein).

4- Central group;

Site: on the fascia of the base.

5- Apical group;

Site: at the apex of the axilla along the medial side of axillary vein.



Quiz

The anterior fold of the axilla is made by?

- A) Pectoralis minor**
- B) Pectoralis major**
- C) Serratus anterior**
- D) Lattismus dorsi**
- E) Teres major**

Answer: B

Thank You!