

The muscles of the shoulder

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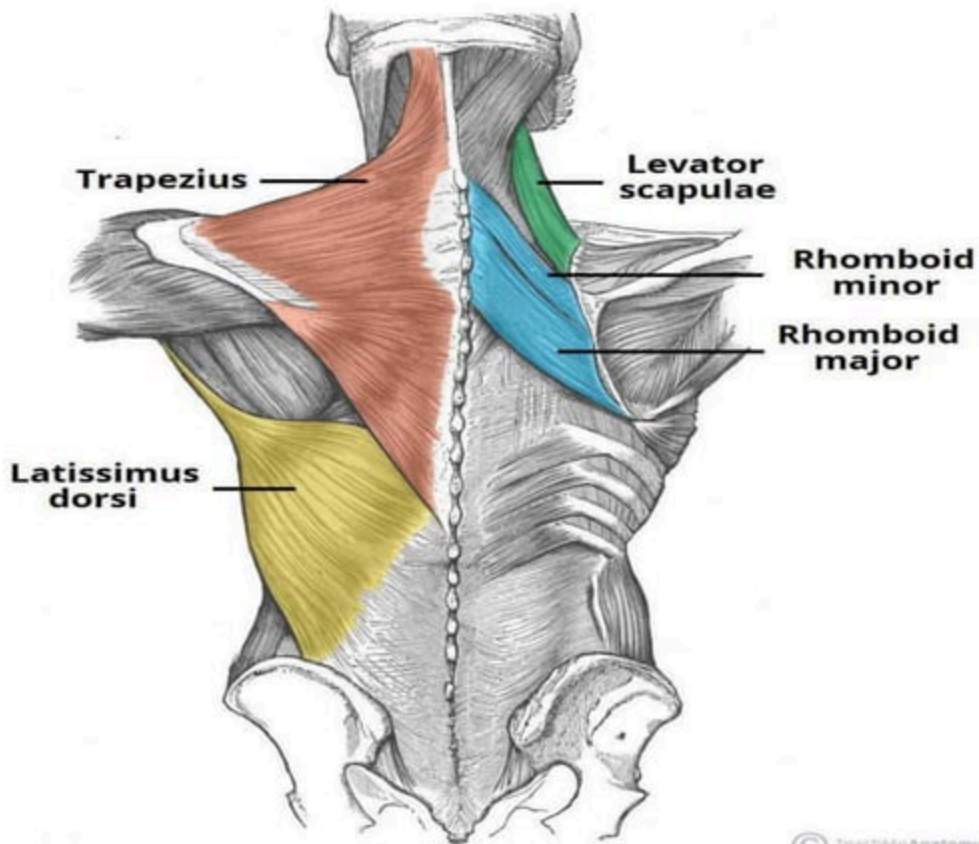
- **Extrinsic** – originate from the trunk, and attach to the bones of the shoulder (clavicle, scapula or humerus).
 - They are located in the back, and are also known as :
the superficial back muscles.
 - These muscles are organised into two layers :
 - A superficial layer
 - A deep layer.
- **Intrinsic** – originate from the scapula and/or clavicle, and attach to the humerus.
 - *Note: there are other muscles that act on the shoulder joint – the muscles of the pectoral region, and the upper arm.*

Superficial extrinsic

- There are two superficial extrinsic muscles:
 - The trapezius and
 - The latissimus dorsi.

Deep extrinsic

- There three muscles in this group:
 - The levator scapulae and
 - The two rhomboids.
- They are situated in the upper back, underneath the trapezius.

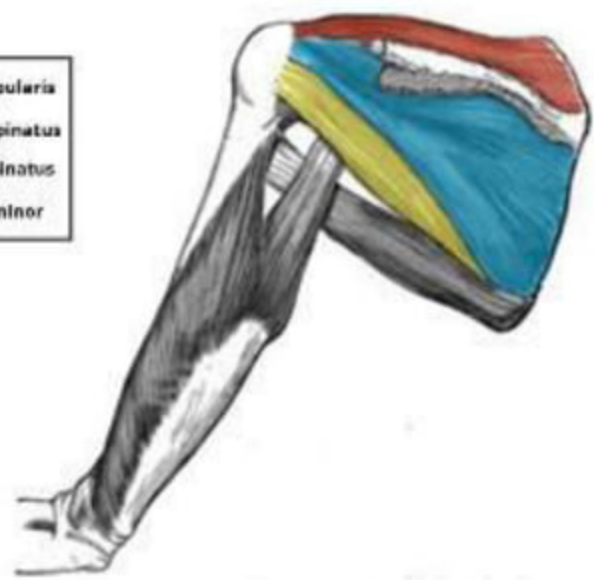


The intrinsic muscles

- The intrinsic muscles (also known as the scapulohumeral group) originate from the scapula and/or clavicle, and attach to the humerus.
- There are six muscles in this group:
 - The deltoid,
 - Teres major, and
 - The four rotator cuff muscles:
 - Supraspinatus ,
 - Infraspinatus ,
 - Subscapularis
 - Teres minor



- Subscapularis
- Supraspinatus
- Infraspinatus
- Teres minor



Muscles Connecting the Scapula to the Humerus

1. Deltoid
2. Supraspinatus ,
3. Infraspinatus ,
4. Subscapularis
5. Teres minor
6. Teres major

Muscles Connecting the Upper Limb to the Thoracic Wall

1. Pectoralis major
2. Pectoralis minor
3. Subclavius
4. Serratus anterior

Muscles Connecting the Upper Limb to the Vertebral Column

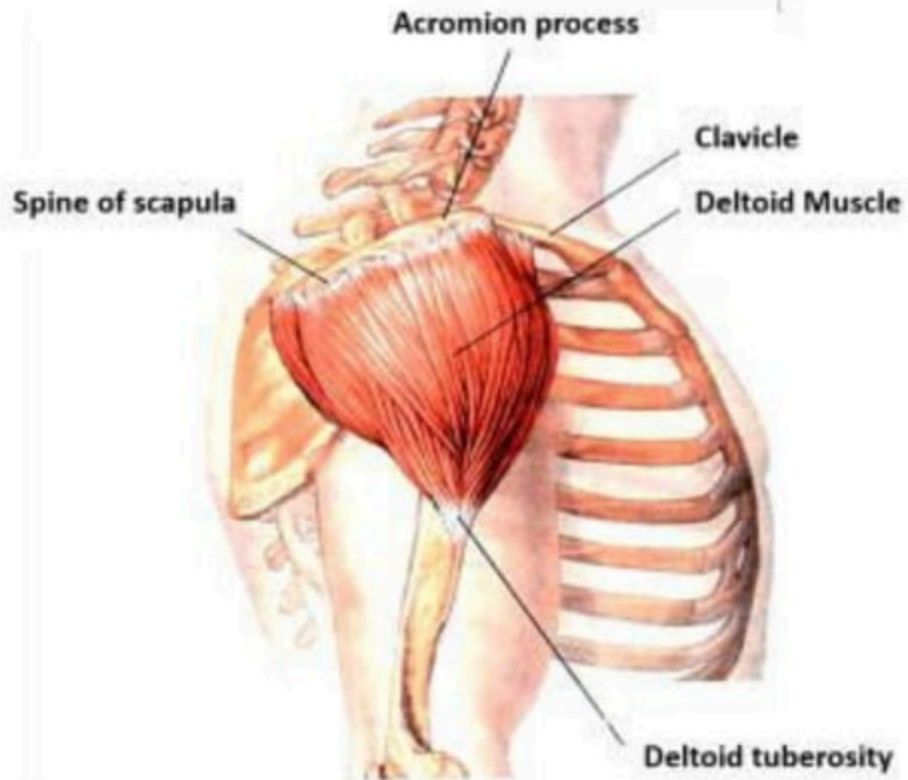
1. Trapezius
2. Latissimus dorsi
3. Levator scapulae Levator scapulae
4. Rhomboid minor
5. Rhomboid major

The muscles of the Pectoral Region

- These are:
 - Pectoralis major
 - Pectoralis minor
 - Subclavius
 - Serratus anterior
- Pectoralis major is the largest muscle of the pectoral region.

Deltoid muscle:

- It is a triangular (inverted delta) shaped muscle that forms the rounded contour of the shoulder.
- It is divided into three parts:
 - Anterior ,
 - Middle and
 - Posterior .

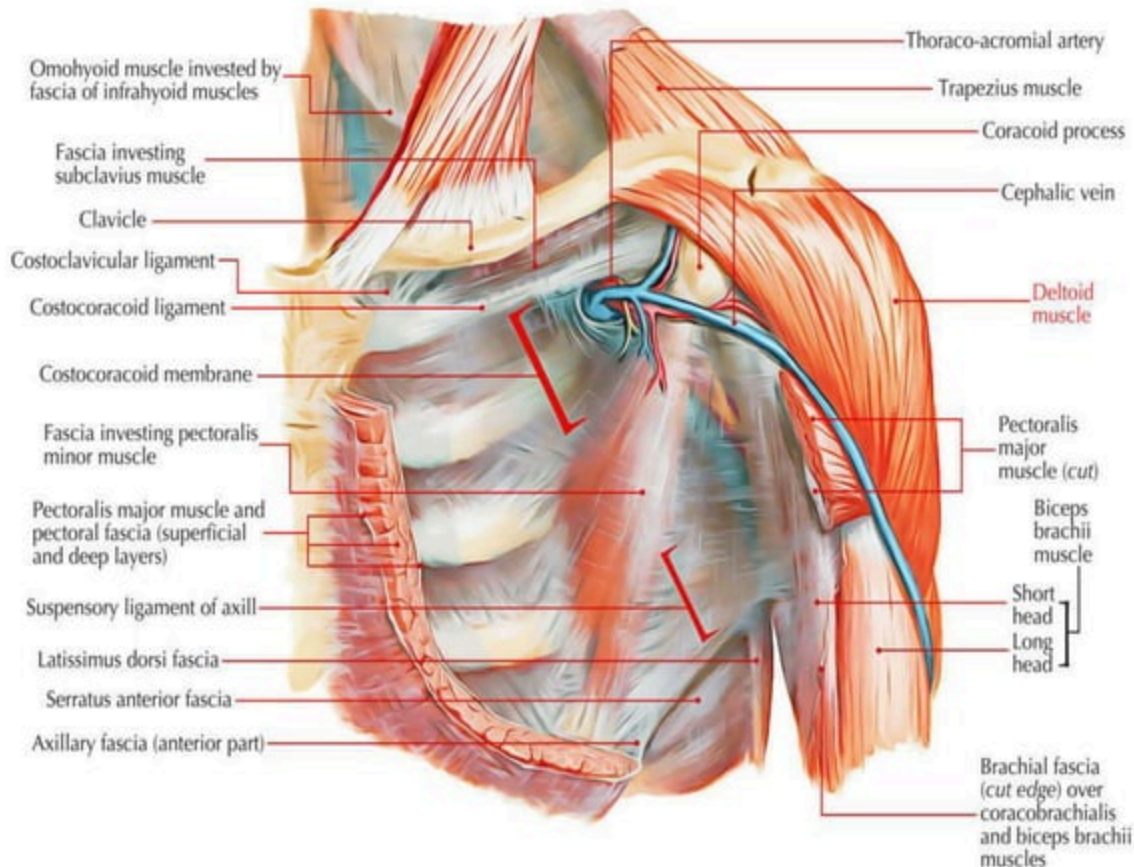


Origin

- **Anterior part(unipennate) :**
 - Arises from the upper surface and Anterior border of lateral 1/3rdof clavicle.
- **Middle (acromial,multipennat) part:**
 - Arises from the lateral margin and upper surface of the acromion process of scapula.
- **Posterior part (unipennate):**
 - Arises from Lower lip of the crest of spine of scapula

Insertion:

- on anterolateral surface of humerus.
- The fibres converge inferiorly to create a short thick tendon and insert on 'V' shaped deltoid tuberosity on the lateral aspect of the midshaft of the humerus.
 - The fibres of multipennate middle part originate from 4 septa which are connected above to the acromion. These fibres converge onto the 3 septa of insertion, that are connected to the deltoid tuberosity.
- Because of multipennate arrangement, the middle acromial part of the deltoid is the strongest part.



Action:

- **Anterior fibers:**
 - Flexion and medial rotation of arm.
- **Middle fibers:**
 - Abduction of arm from 15 to 90.
- **Posterior fibers :**
 - Extension and lateral rotation of the arm.

ACTIONS

- The anterior (clavicular) fibres are flexors and medial rotators of the arm.
- The posterior (spinous) fibres are the extensors and lateral rotators of the arm.
- The middle (acromial) fibres are the strong abductor of the arm from 15° to 90° .
 - Middle (acromial) fibres cannot abduct the arm from 0° to 15° when the arm is by the side of body because its vertical pull corresponds to the long axis of the arm.
- The deltoid muscle is like 3 muscles in 1:
 - Anterior fibres flex the arm,
 - Lateral fibres abduct the arm and
 - Posterior fibres extend the arm.

Nerve supply :

- Axillary nerve (C5,C6)
from posterior cord of brachial plexus.

STANDARD MOVER ACTIONS

- **Abducts** the arm at the [glenohumeral joint](#) (entire muscle).
- **Flexes** the arm at the glenohumeral joint (anterior deltoid).
- **Medially rotates** the arm at the glenohumeral joint (anterior deltoid).
- **Horizontally flexes** the arm at the glenohumeral joint (anterior deltoid).
- **Extends** the arm at the glenohumeral joint (posterior deltoid).
- **Laterally rotates** the arm at the glenohumeral joint (posterior deltoid).
- **Horizontally extends** the arm at the glenohumeral joint (posterior deltoid).

REVERSE MOVER ACTIONS

- Downwardly rotates the scapula at the Glenohumeral and scapulocostal joints.
- Ipsilaterally rotates the trunk.
- Contralaterally rotates the trunk.

CLINICAL TESTING

- The deltoid can be easily viewed and felt to contract when the arm is abducted against resistance.

CLINICAL SIGNIFICANCE

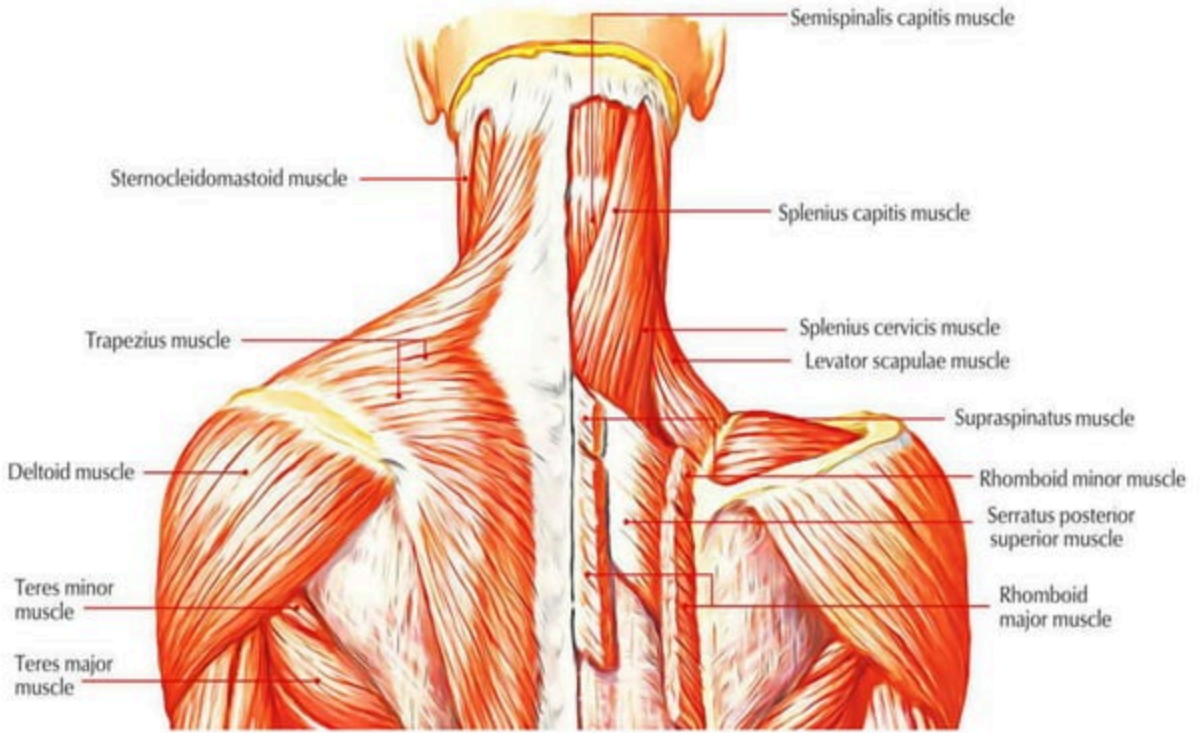
- Site of the intramuscular injection in deltoid:
The intramuscular injections are commonly supplied in the lower half of the deltoid to avoid injury to the [axillary nerve](#), which winds around the surgical neck of the [humerus](#).
- **In actual clinical practice, the intramuscular injection is supplied in the upper and outer quadrant of the deltoid region.**

STRUCTURES UNDER DELTOID

- **Bones:** Upper end of the humerus and coracoid process.
- **Joints and ligaments:** Shoulder (glenohumeral) joint and [coracoacromial ligament](#).
- **Bursae around the [shoulder joint](#):** Subscapular, subacromial/subdeltoid, and infraspinatus.
- **Muscles:**
 - Insertions of pectoralis minor, pectoralis major, teres major, latissimus dorsi, [subscapularis](#), supraspinatus, infraspinatus, and teres minor.
 - Origins of long [head](#) of biceps, short head of biceps, coracobrachialis, long and lateral heads of triceps.
- **Vessels:** Anterior and posterior circumflex humeral.
- **Nerves:** Axillary nerve.
- **Spaces:** Quadrangular and triangular subscapular intermuscular spaces.

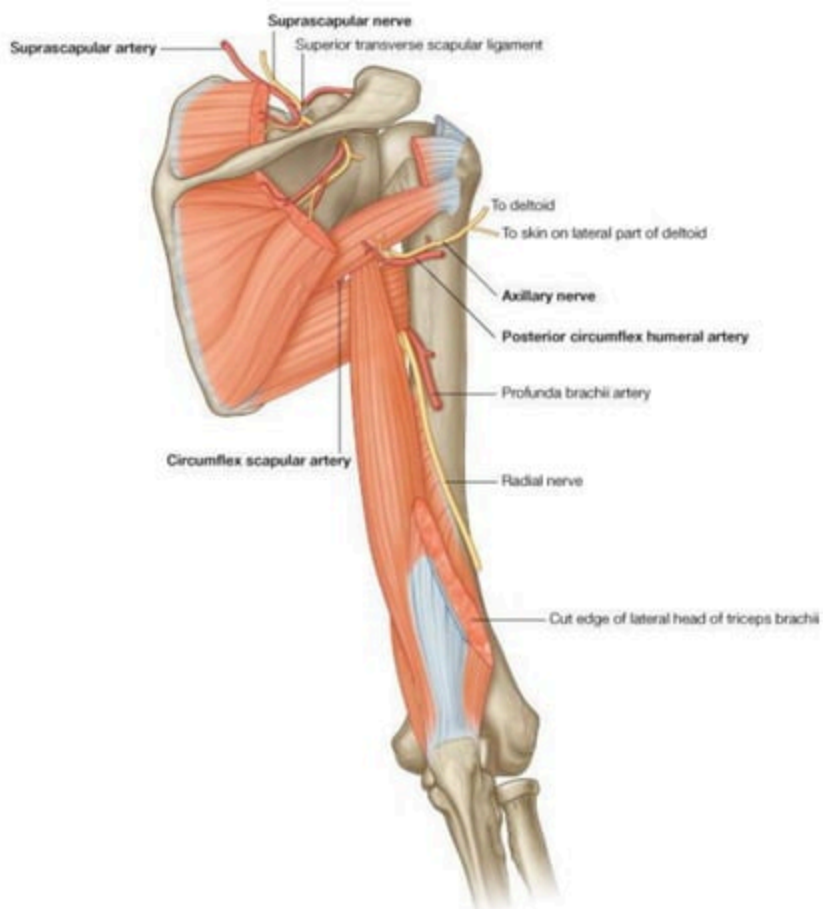
Applied

- Deltoid muscle is often used to administer intramuscular injection
- If deltoid is paralysed , rounded contour of the shoulder is lost and there is loss of power of abduction of arm from 15 to 90°.



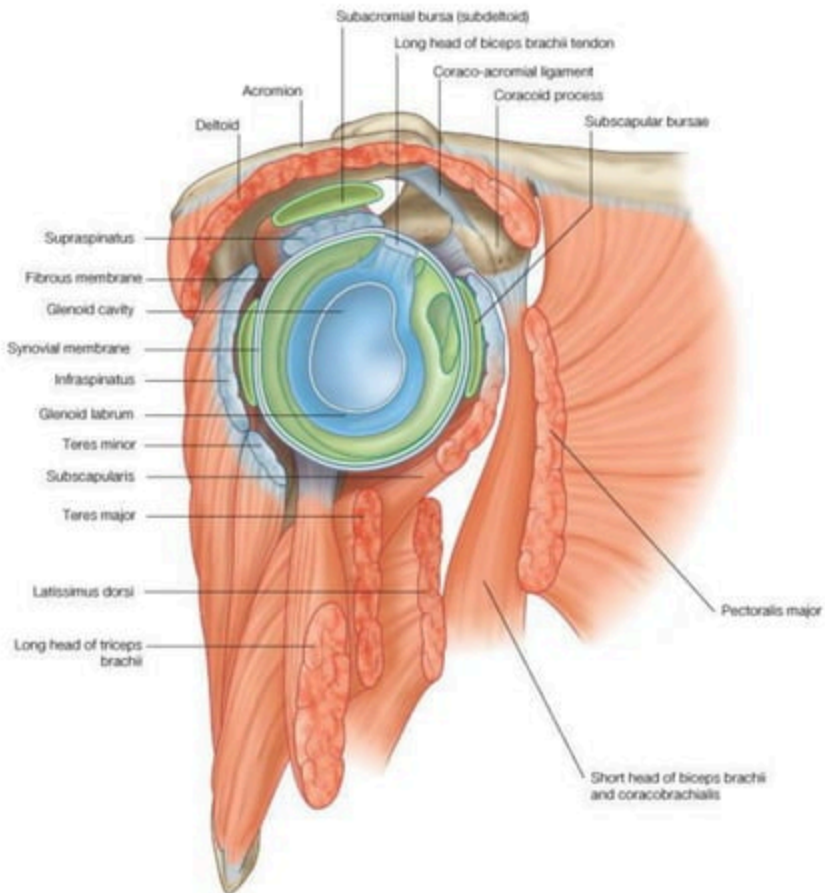
Musculotendinous or rotator cuff:

- Rotator cuff is formed by a group of four muscles that surround the shoulder joint .
- As a group, they are responsible for stabilizing the shoulder joint. Individually, they rotate the shoulder joint.
- The muscles that form rotator cuff are:
 - Supraspinatus
 - Infraspinatus
 - Teres minor
 - Subscapularis

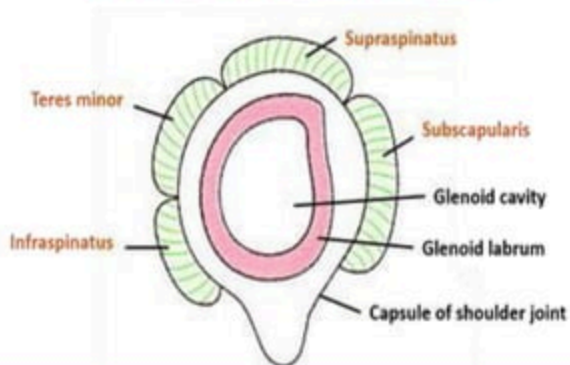


Rotator cuff

- Musculotendinous cuff provides support to the capsule of the shoulder joint all around except inferiorly.
- The joint is supported anteriorly by subscapularis, superiorly by supraspinatus and posteriorly by infraspinatus and teres minor. As the joint is not protected inferiorly, the head of the humerus is usually dislocated inferiorly.
 - The axillary nerve related to the surgical neck of humerus may get injured.



Rotator cuff/musculotendinous cuff Muscles

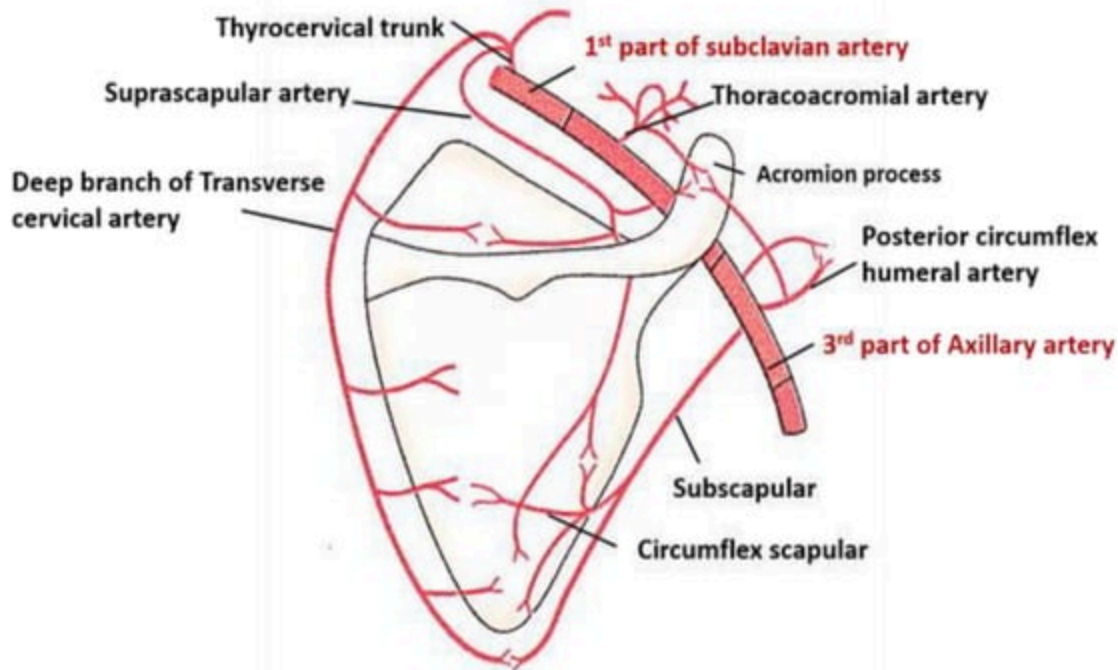


MUSCLE	ACTION	NERVE SUPPLY
Supraspinatus	Abduction of arm - Initial 15 degrees	Suprascapular nerve
Infraspinatus	Lateral rotation of arm	Suprascapular nerve
Teres minor	Lateral rotation of arm	Axillary nerve
Subscapularis	Medial rotation of arm	Upper & lower subscapular nerves

the anastomosis around scapula

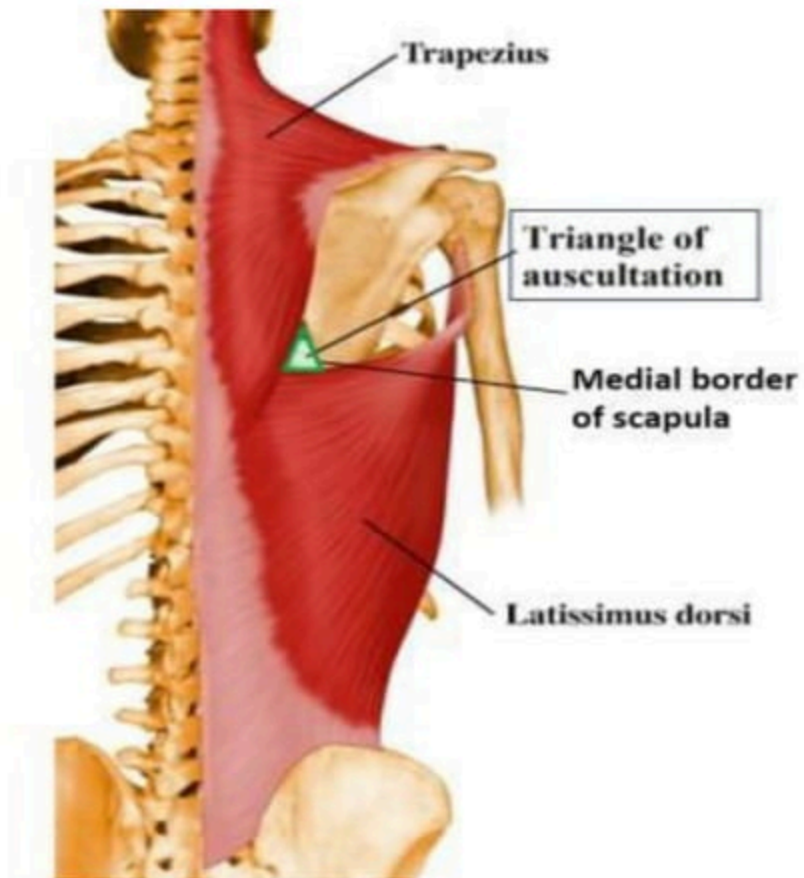
- **Anastomosis around scapula** is between branches of:
 - **First part of subclavian artery** and
 - Branches of **third part of axillary artery.**
- It provides collateral circulation in case distal part of subclavian artery or proximal part of axillary artery is blocked.

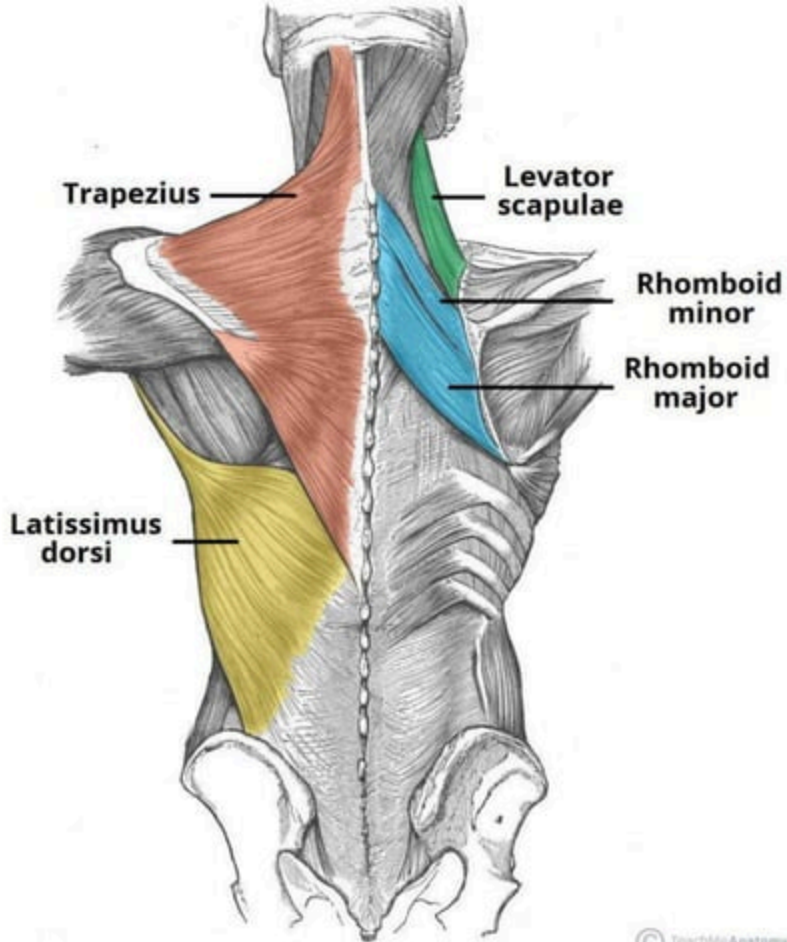
Anastomosis Around Scapula



The “Triangle of Auscultation”

- Bounded :
 - **Medially** by lateral border of trapezius muscle.
 - **Laterally** by medial border of scapula.
 - **Inferiorly** by upper border of latissimus dorsi muscle.
- **Respiratory sounds of inferior lobe of lung are heard better (using stethoscope) over triangle of auscultation as no large muscle covers this area.**





TRAPEZIUS

&

Serratus anterior

**THIS LARGE FLAT MUSCLE, THE MOST SUPERFICIAL OF THE
UPPER PART OF THE BACK**

Trapezius

Upper Trapezius

Origin: Occipital bone, nuchal ligament

Insertion: Outer third of clavicle, acromion process

Action: Scapular elevation and upward rotation

Middle Trapezius

Origin: Spinous process of C7 through T3

Insertion: Scapular Spine

Action: Scapular depression

Lower Trapezius

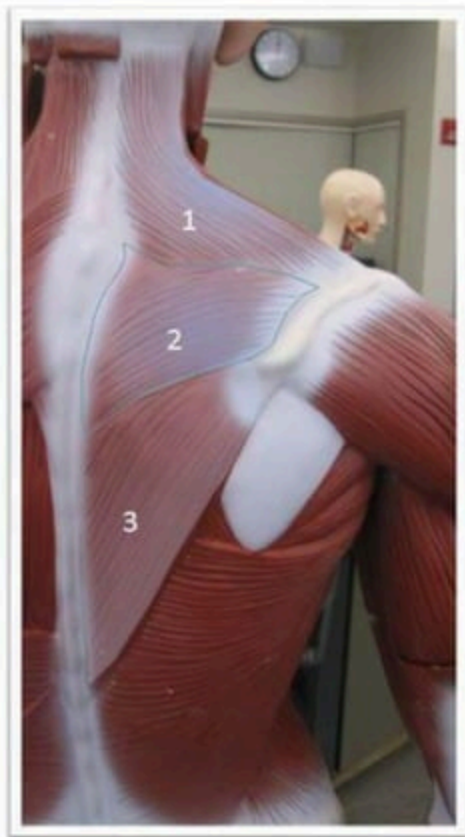
Origin: Spinous processes of middle and lower thoracic vertebrae

Insertion: Base of scapular spine

Action: Scapular depression and upward rotation

Innervation of all Three: Spinal accessory (cranial nerve XI)

Vascular supply of all Three: Transverse cervical artery



ORIGIN

- The point of inception is at a line that move throughout the medial third of the superior nuchal line at the base of the skull above to the external occipital protuberance.
- It afterwards comes down around the posterior free edge of the nuchal ligament, the vertebral spinous processes to the twelfth thoracic vertebra, and the stepping in supraspinal ligaments.
- The line of origin is an upside-down.

TRAPEZIUS

- It emerges from:
 - Medial third of the superior nuchal line,
 - External occipital protuberance,
 - ligamentum nuchae,
 - Spine of 7th cervical vertebra, and
 - Spines of all [thoracic vertebrae](#)

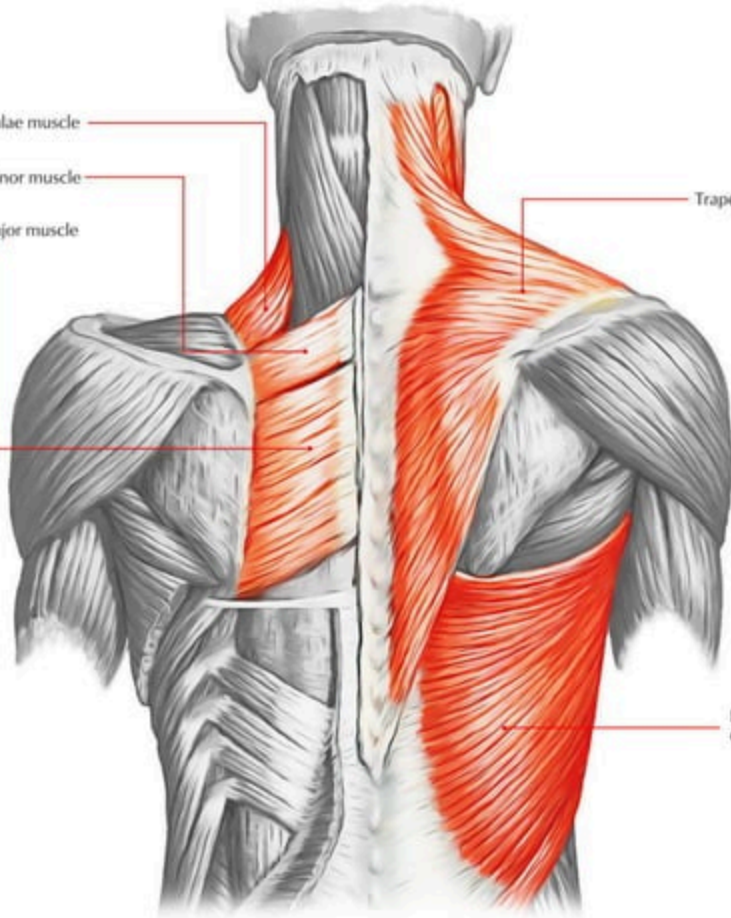
Levator scapulae muscle

Rhomboid minor muscle

Rhomboid major muscle

Trapezius muscle

Latissimus dorsi muscle



INSERTION

- The insertion takes place as follows:
- The superior fibers to be placed on to the posterior border of the lateral third of the clavicle, goes downwards and laterally.
- The middle fibers to be placed on to the medial margin of the acromion and upper lip of the crest of the spine of the scapula continue horizontally.
- The lower fibers to be placed on to the deltoid tubercle at the joint of medial and middle third of the spine of the scapula go on up and laterally.

STRUCTURE

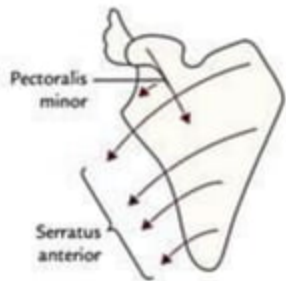
- The trapezius is a substantial, broad, triangular muscle situated on the back of the chest, the top of the shoulder, and the neck.
- The upper fibers of the trapezius go on downward and outside The middle fibers pass horizontally outside; and the lower fibers pass up-ward and outside, heading towards the tubercle on the spine of the scapula through a small aponeurosis.
- The muscle differs in density in its different locations.
- The part on the back of the neck is quite thin.
- It produces a muscular column on both side of the midline.

NERVE SUPPLY

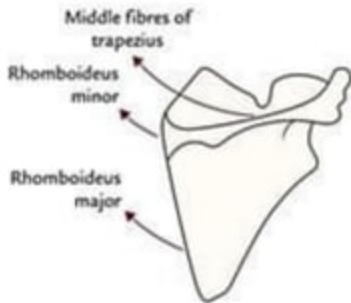
- It is by:
 - Spinal part of the accessory nerve (gives motor supply),
 - Ventral rami of C3 and C4 (bring proprioceptive sensations).

ACTIONS

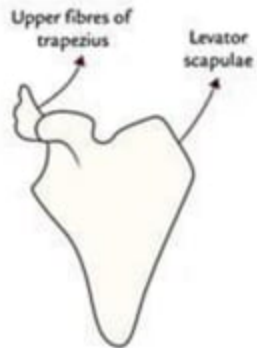
- The upper fibers of trapezius elevate the scapula as in shrugging the shoulder together with levator scapulae.
- The middle or horizontal fibers of trapezius withdraw/retract the scapula as in bracing back the shoulder together with rhomboids.
- The lower fibers of trapezius pulls the medial end of scapula downwards depress the medial part of the spine of the scapula.
- Acting with serratus anterior, so that the arm can be abducted beyond 90° the trapezius turns the scapula forward.



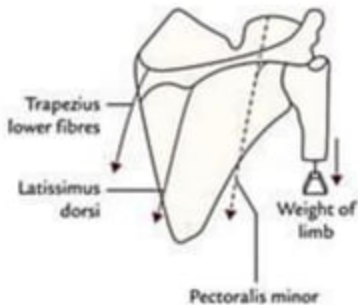
A Protraction



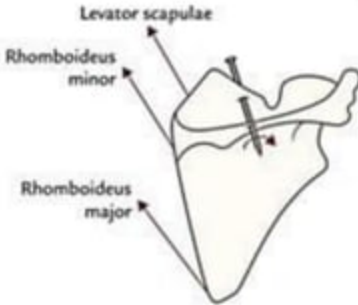
B Retraction



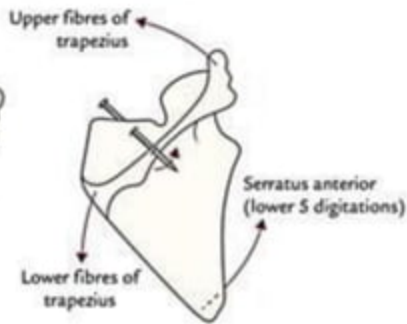
C Elevation



D Depression

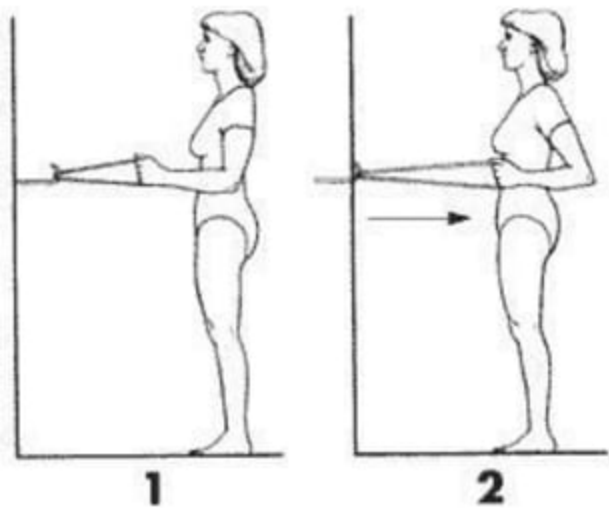


E Medial rotation

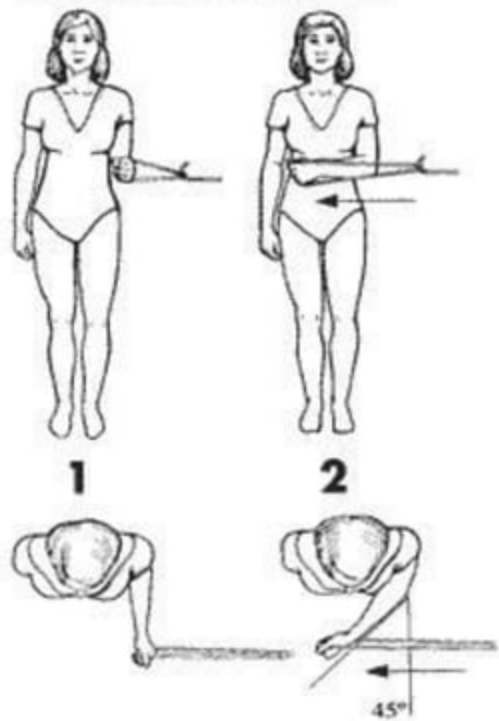


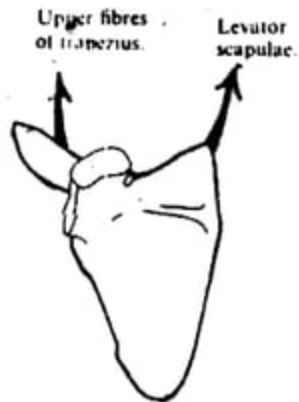
F Lateral rotation

Extension

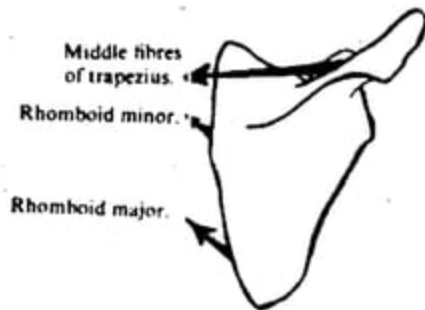


Internal Rotation

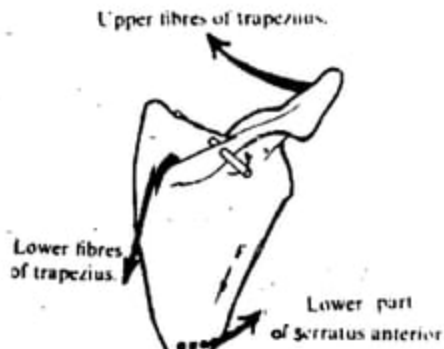




The upper fibres of trapezius + levator scapulae elevate the shoulder girdle.



The middle fibres of trapezius and the 2 rhomboids retract the scapula.



The upper and lower fibres of trapezius + lower fibres of serratus anterior rotate the scapula laterally

Serratus anterior

Most powerful protractor of the scapula



Origin

- Front of ribs 1–8

Insertion

- Anterior surface of medial border of scapula

Joint crossed

- Shoulder girdle (moves scapula relative to rib cage)

Joint action

- Protracts the scapula
- Upwardly rotates scapula (works as a synergist with trapezius)

Serratus Anterior Actions

Protraction



Abduction



Upward rotation



Spine



The shoulder blades from behind

Pectoralis minor



Origin

- Front of ribs 3–5

Insertion

- Coracoid process of scapula

Joint crossed

- Shoulder girdle (moves scapula relative to rib cage)

Joint action

- Origin fixed: Protracts the scapula. Downwardly rotates scapula (works as a synergist with rhomboids)
- Insertion fixed: Elevates rib cage during breathing

Pectoralis major



Origin

- Clavicle, sternum and cartilages of ribs 1–6

Insertion

- Top of the humerus

Joint crossed

- Shoulder (glenohumeral) joint

Joint action

- Shoulder horizontal flexion
- Shoulder adduction
- Shoulder medial rotation

Latissimus dorsi



The only muscle of upper limb that has pelvic attachment via lumbar fascia

Origin

- Via thoracolumbar fascia (TLF) from spinous processes of T6–T12, lumbar and sacral vertebrae and iliac crest. Also lower 3–4 ribs and bottom (inferior) edge of scapula

Insertion

- Top of the humerus (anterior)

Joint crossed

- Shoulder (glenohumeral) joint

Joint action

- Origin fixed: adducts and extends arm. Assists in medial rotation of the arm. Depresses the shoulder girdle via the insertion on the humerus
- Insertion fixed: tilts the pelvis forwards

Teres Major



Origin

- Lateral border of the scapula near the inferior angle

Insertion

- Humerus (proximal, anterior)

Joint crossed

- Shoulder joint

Joint action

- Medial rotation, adduction and extension of the shoulder joint

Supraspinatus



Origin

- Superior to spine of scapula

Insertion

- Superiorly on the head of the humerus

Joint crossed

- Shoulder

Joint action

- Assists deltoid in abduction of the arm. Weak lateral rotator
- All four muscles together hold the head of the humerus in the correct position relative to glenoid cavity

Infraspinatus



Origin

- Inferior to spine of scapula

Insertion

- Laterally on the head of the humerus

Joint crossed

- Shoulder

Joint action

- Rotates arm laterally
- All four muscles together hold the head of the humerus in the correct position relative to glenoid cavity

Subscapularis



Origin

- Anterior surface of scapula

Insertion

- Anteriorly on the head of the humerus

Joint crossed

- Shoulder

Joint action

- Subscapularis: Rotates arm medially
- All four muscles together hold the head of the humerus in the correct position relative to glenoid cavity

Teres Minor



Origin

- Lateral border of scapula near the inferior angle

Insertion

- Teres minor: Laterally on the head of the humerus

Joint crossed

- Shoulder

Joint action

- Teres minor: Rotates arm laterally
- All four muscles together hold the head of the humerus in the correct position relative to glenoid cavity