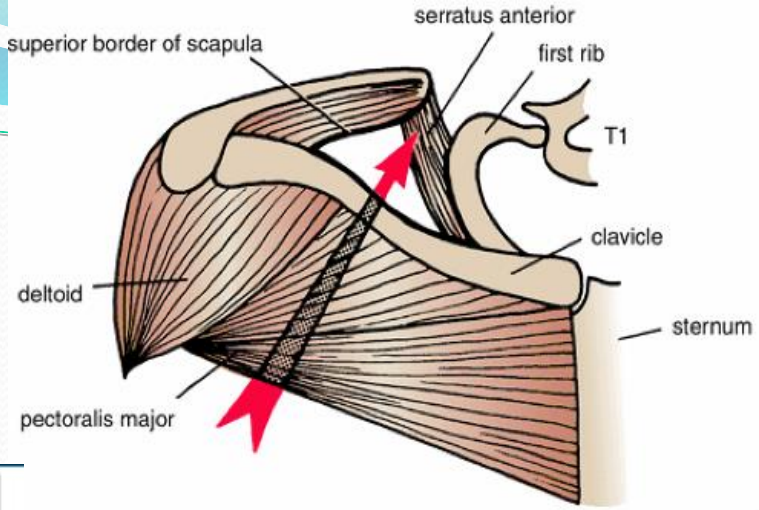
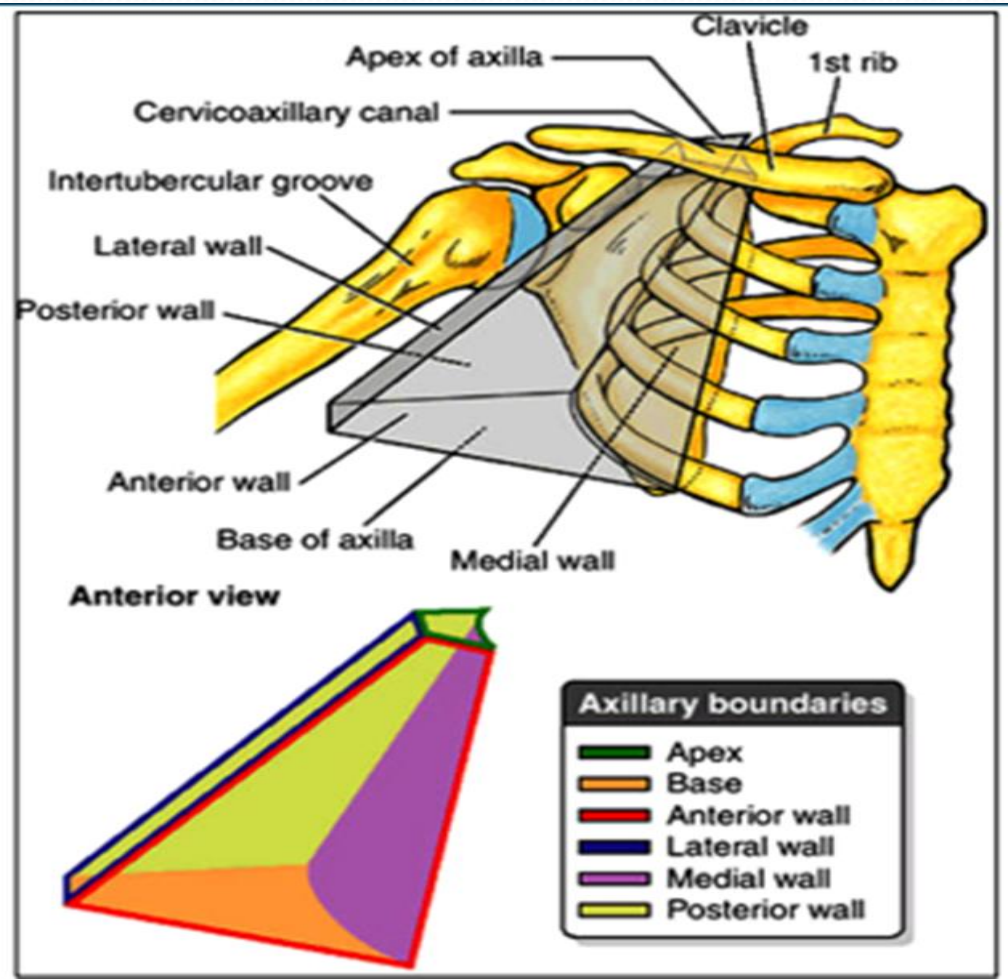
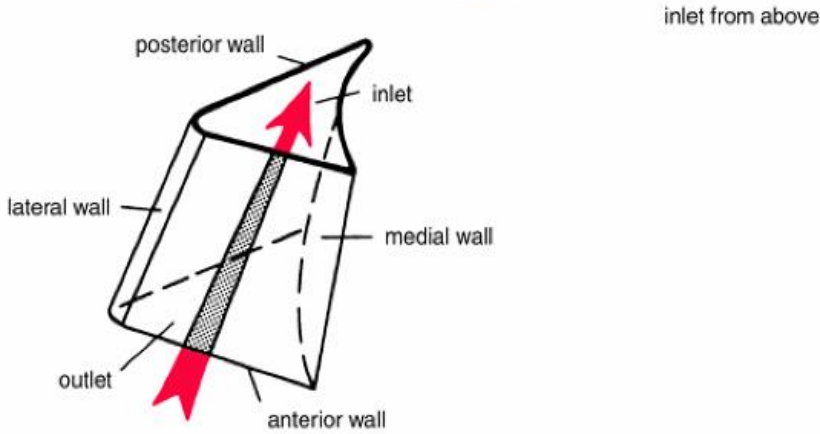
The Axilla

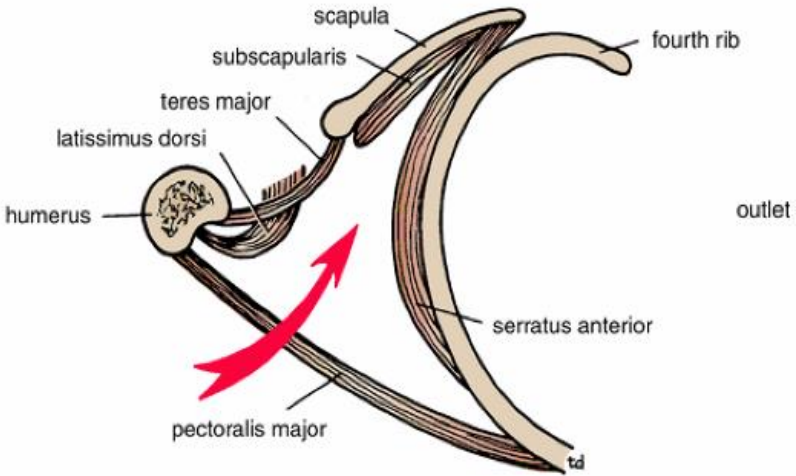
- Armpit is a pyramidal-shaped space between the upper part of the arm and the side of the chest
- It has an apex and base
- The apex is directed into the root of the neck and is bounded
  - front by the clavicle,
  - behind by the upper border of the scapula,
  - medially by the outer border of the first rib
- The base is the lower border and is bounded
  - front by the anterior axillary fold (formed by the lower border of pectoralis major muscle)
  - behind by the posterior axillary fold (formed by the tendon of latissimus dorsi and teres major muscle
  - medially by the chest wall

It forms an important passage for **nerves** and **vessels** as they travel from the root of the neck to the upper limb.



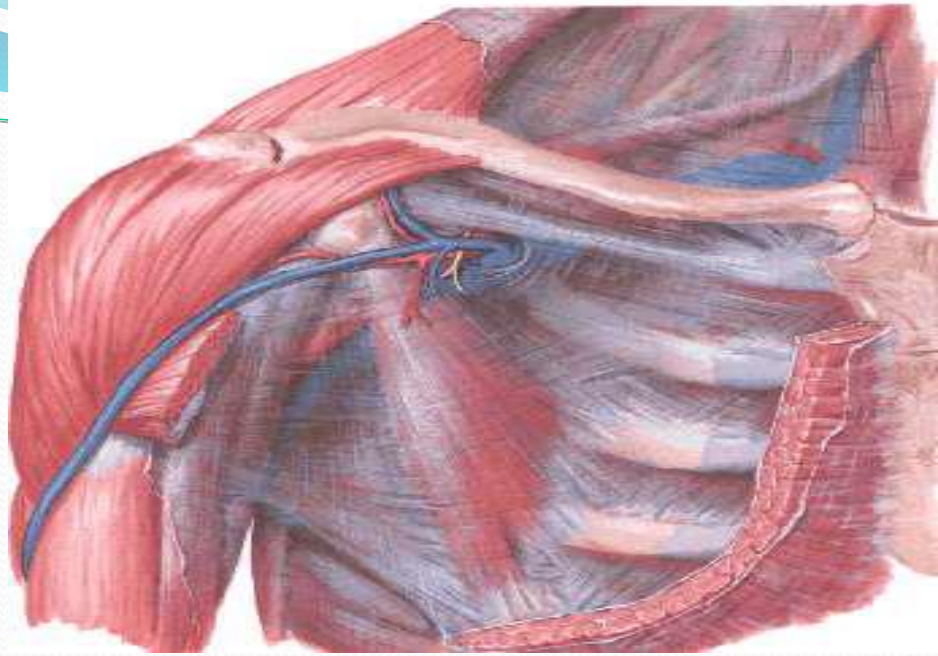




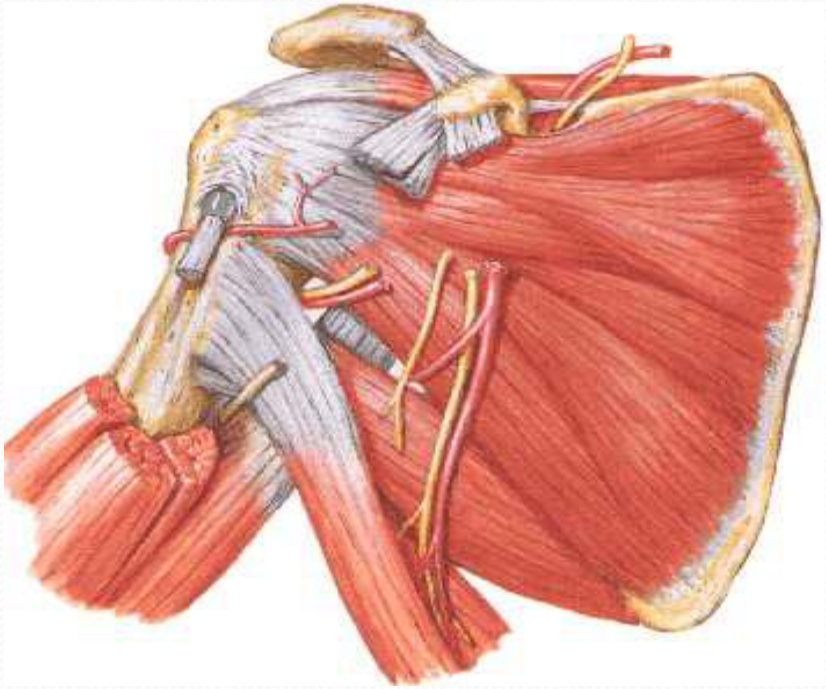


The walls of the axilla:

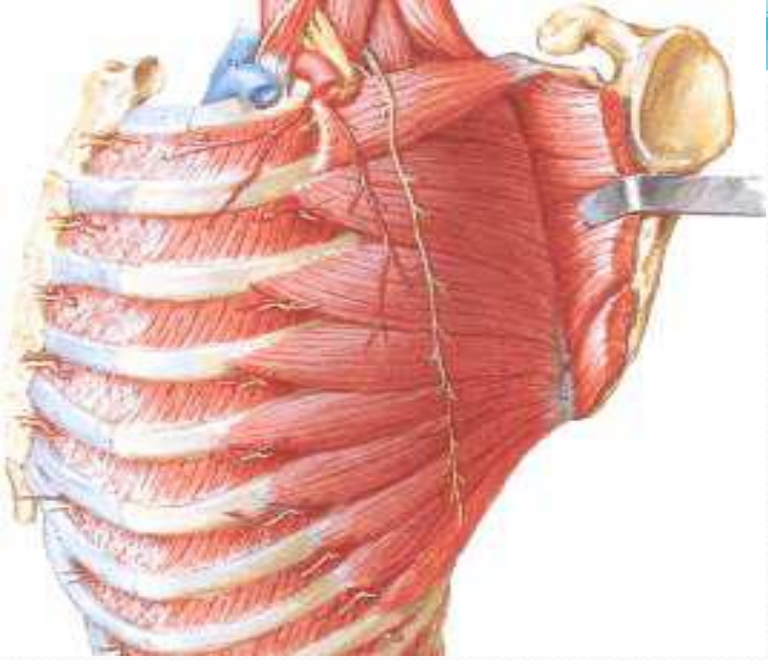
1. **Anterior wall** formed by **pectoralis major** & **minor**, **subclavius muscle& clavipectoral fascia**



2. **Posterior wall** is formed by **subscapularis**, **latissimus dorsi**, & **teres major** muscles from above downward.

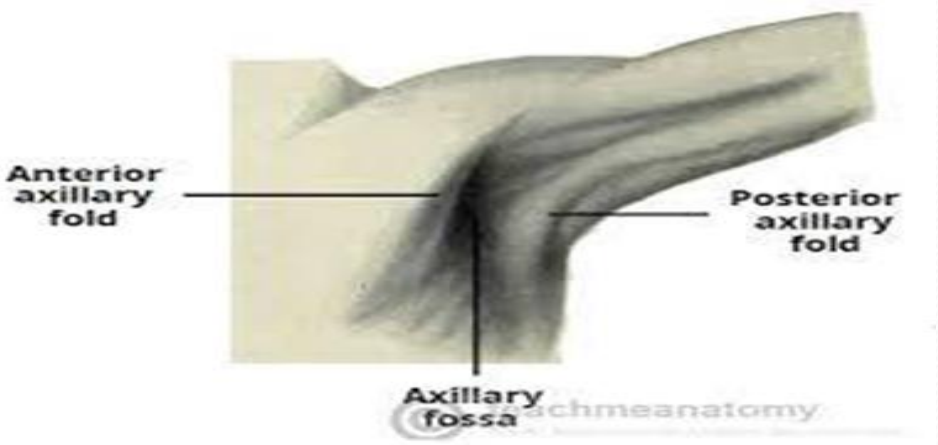


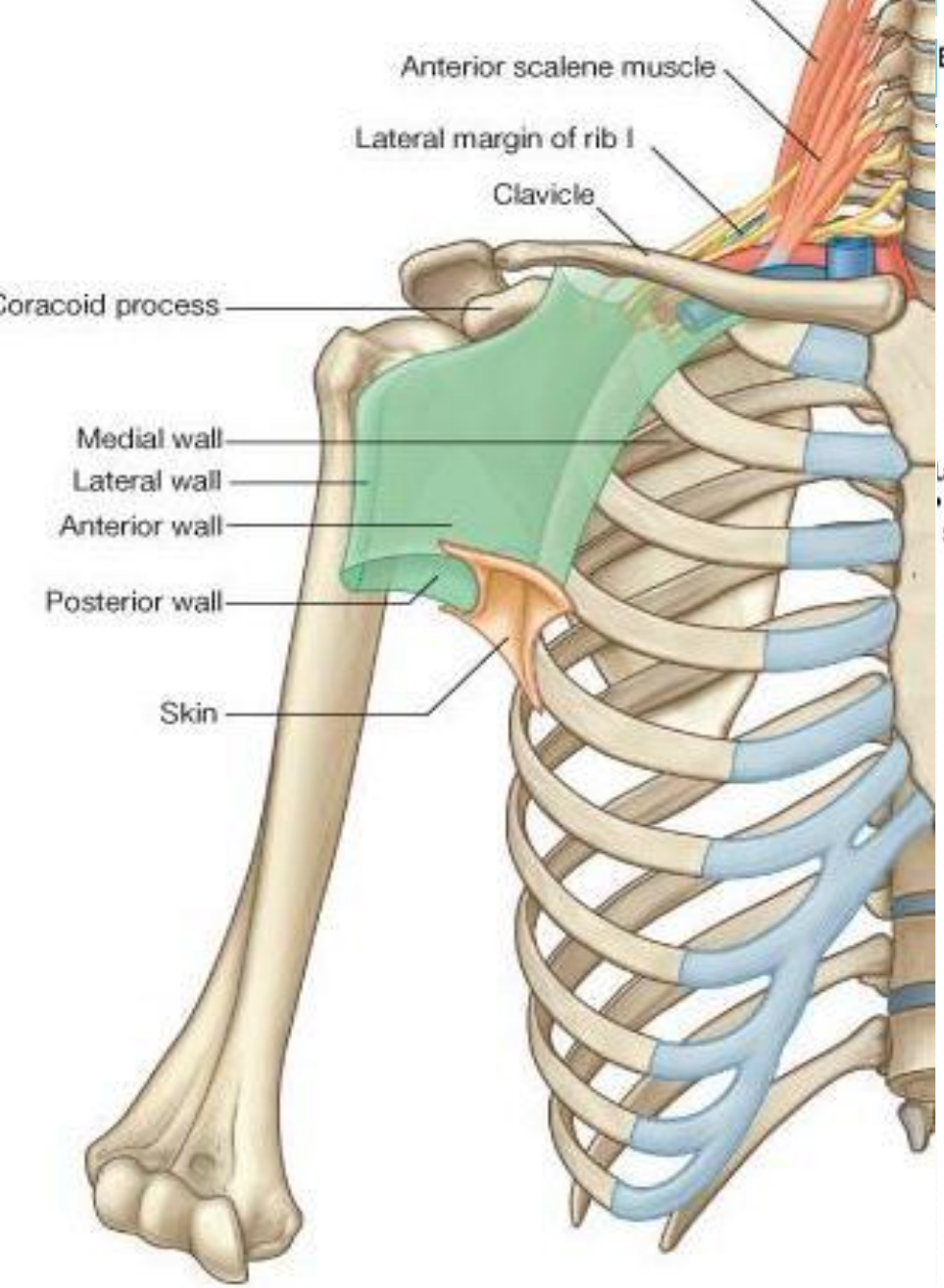
3. **Med. wall** formed by **upper 4 or 5 ribs** & their intercostal spaces covered by **serratus ant.** muscle.



4. **Lat. wall** is formed by **coracobrachialis** & **biceps** muscles in bicipital groove of humerus.

5. **Base** is formed by **skin** stretching between ant. and post. axillary walls.





B

Inlet
- lateral margin of rib I
- clavicle
- superior margin of scapula to coracoid process

Anterior wall
- pectoralis major and minor muscles
- subclavius muscle
- clavipectoral fascia

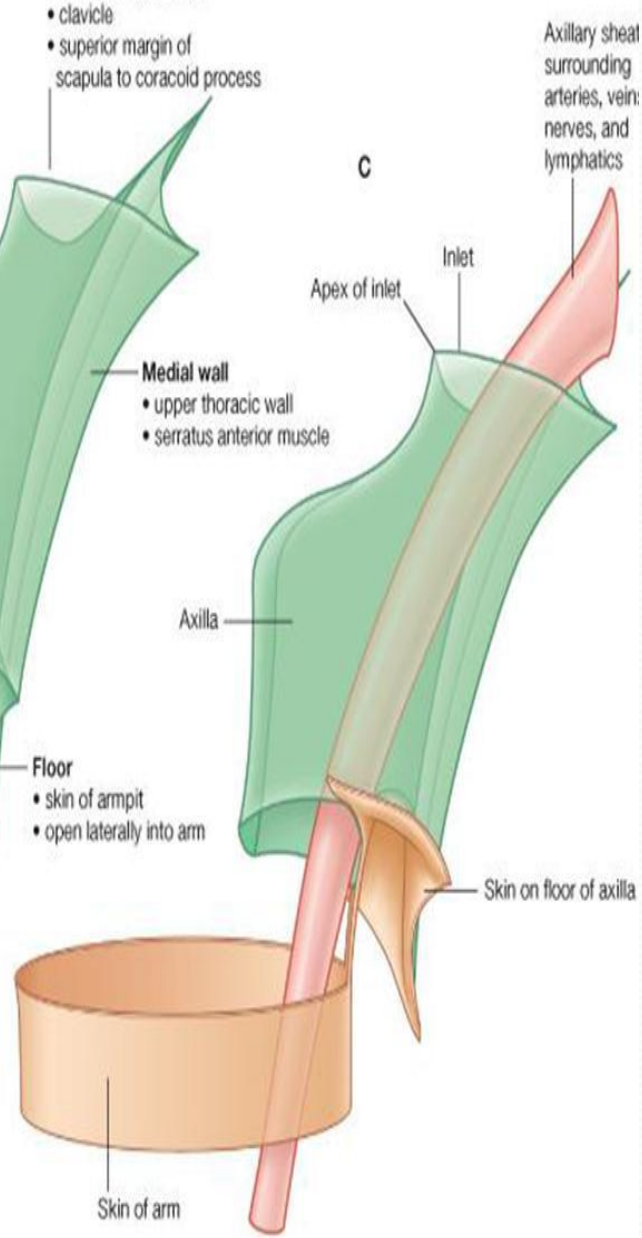
Lateral wall
- intertubercular sulcus

Medial wall
- upper thoracic wall
- serratus anterior muscle

Posterior wall
- subscapularis, teres major and latissimus dorsi muscles and long head of triceps brachii muscle

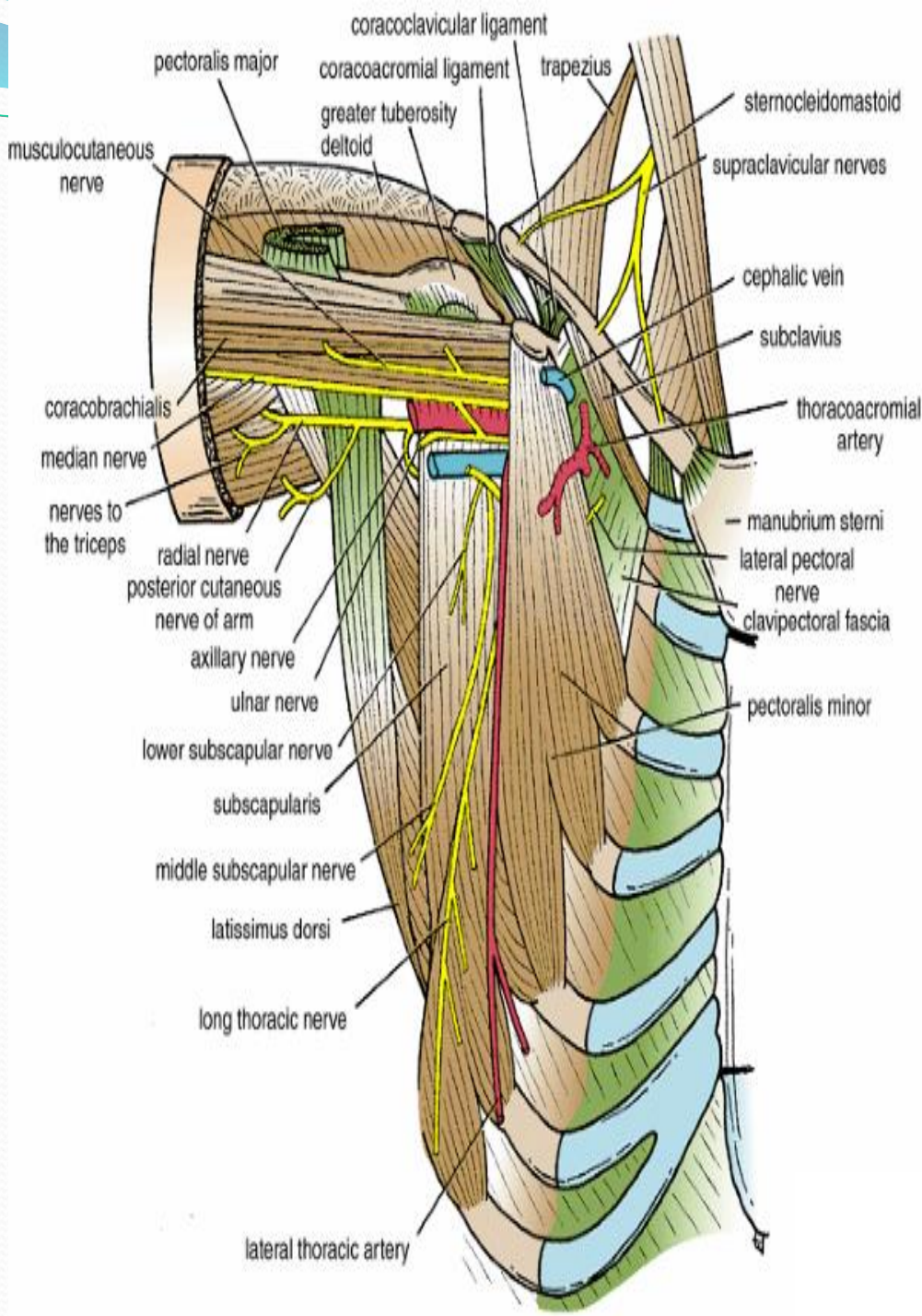
Floor
- skin of armpit
- open laterally into arm

C



Pectoralis Minor(Key muscles in the axilla

- The pectoralis minor is a thin triangular muscle that lies beneath the pectoralis major.
- It arises from the third, fourth, and fifth ribs and runs upwards and laterally to be inserted by its apex into the coracoid process of the scapula.
- It crosses the axillary artery and the brachial plexus of nerves.
- It is used when describing the axillary artery to divide it into three parts.



The following (imaginary) lines are used to describe surface anatomy of the pectoral region & axilla

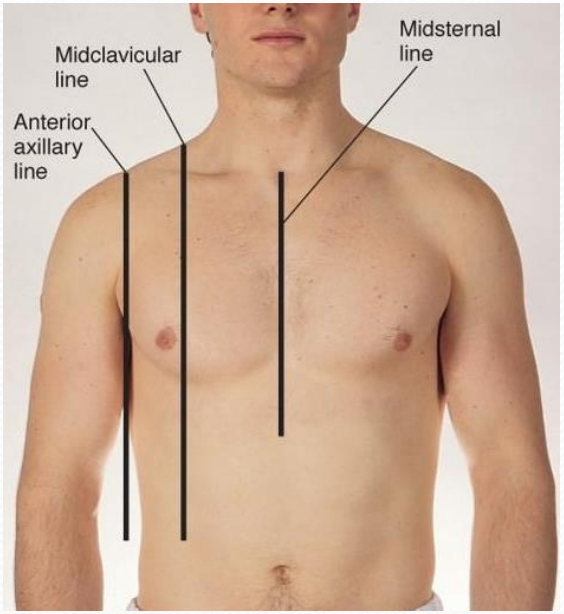
1. Midsternal line runs vertically in the median plane on the front of the sternum**.**

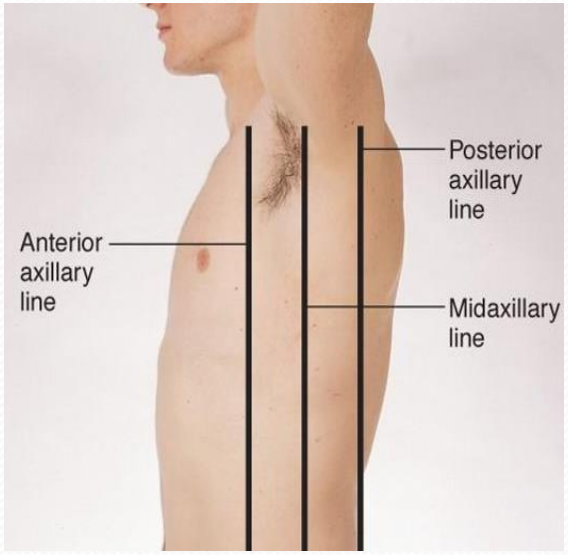
2. Midclavicular line runs vertically from the midpoint of the clavicle to the midinguinal point**.**

3. Anterior axillary line runs vertically downwards from the anterior axillary fold**.**

4. Posterior axillary line runs vertically downwards from the posterior axillary fold**.**

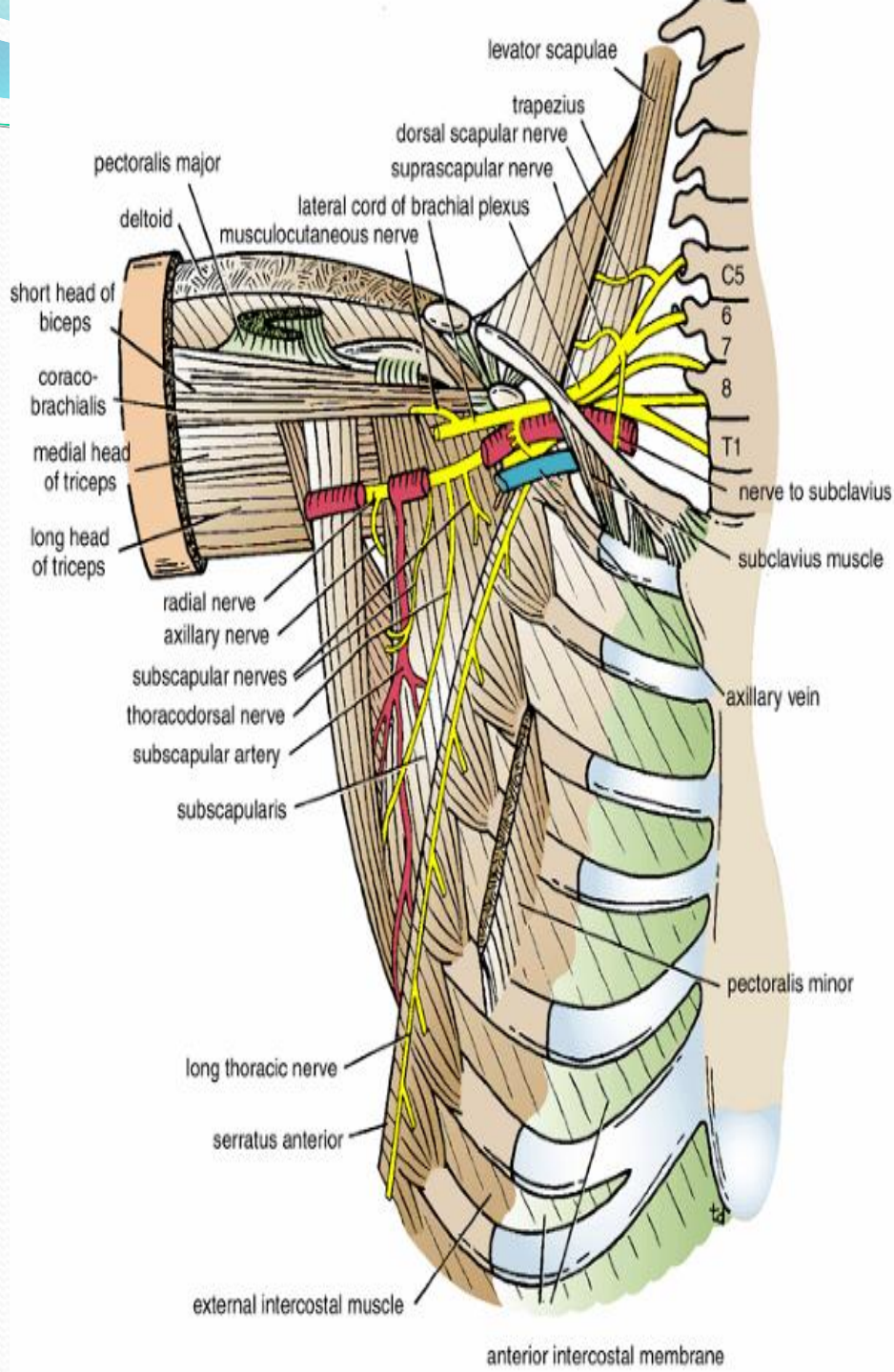
5. Midaxillary line runs vertically downwards midway between the anterior and posterior axillary folds**.**





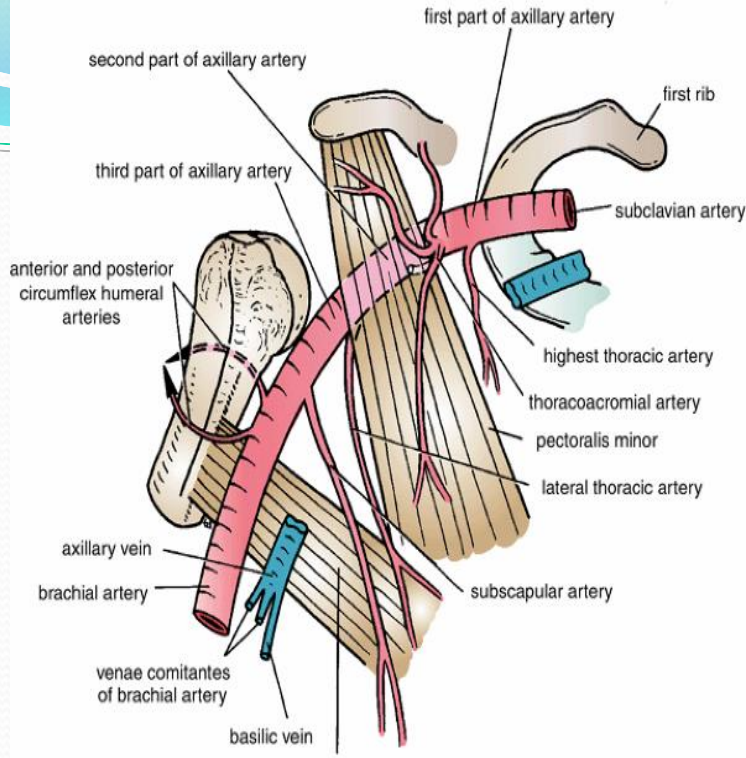
Contents of the Axilla

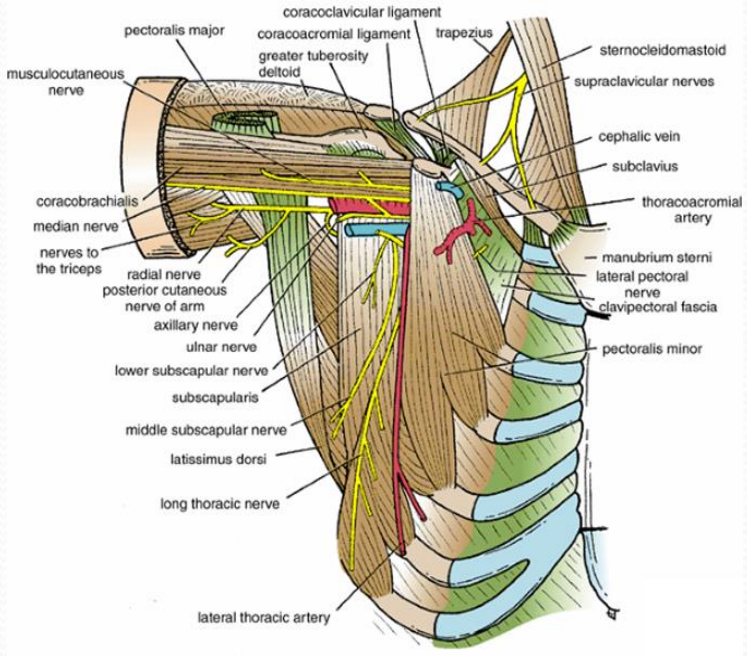
- The axilla contains the **axillary artery** and its branches, which supply blood to the upper limb
- The **axillary vein** and its tributaries, which drain blood from the upper limb;
- **Lymph vessels** and lymph nodes, which drain lymph from the upper limb and the breast and from the skin of the trunk, down as far as the level of the mbilicus.
- Lying among these structures in the axilla is an important nerve plexus, the **brachial plexus**, which innervates the upper limb.
- These structures are embedded in fat.



Axillary artery

- is the direct continuation of subclavian artery.
- It begins at lateral border of 1st rib & ends at lower border of teres major Muscle, where it continues as the brachial artery.
- Throughout its course, the artery is closely related to the cords of brachial plexus and their branches and is enclosed with them in a connective tissue sheath called the axillary sheath.
- If this sheath traced upward into the root of the neck, it is seen to be continuous with the prevertebral fascia





The pectoralis minor muscle crosses in front of the axillary artery and divides it into three parts:

First Part of the Axillary Artery

This extends from the lateral border of the first rib to the upper border of the pectoralis minor.

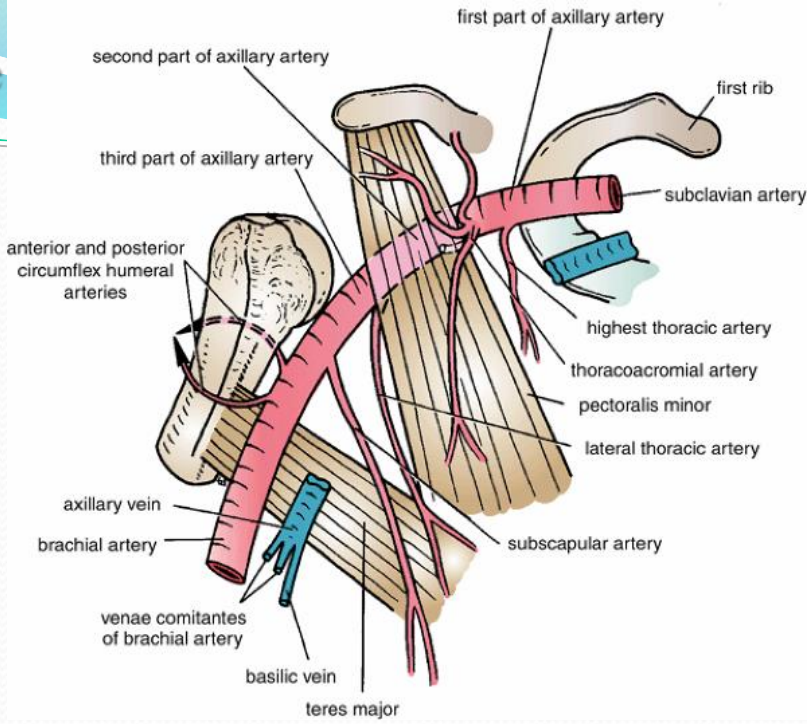
Relations

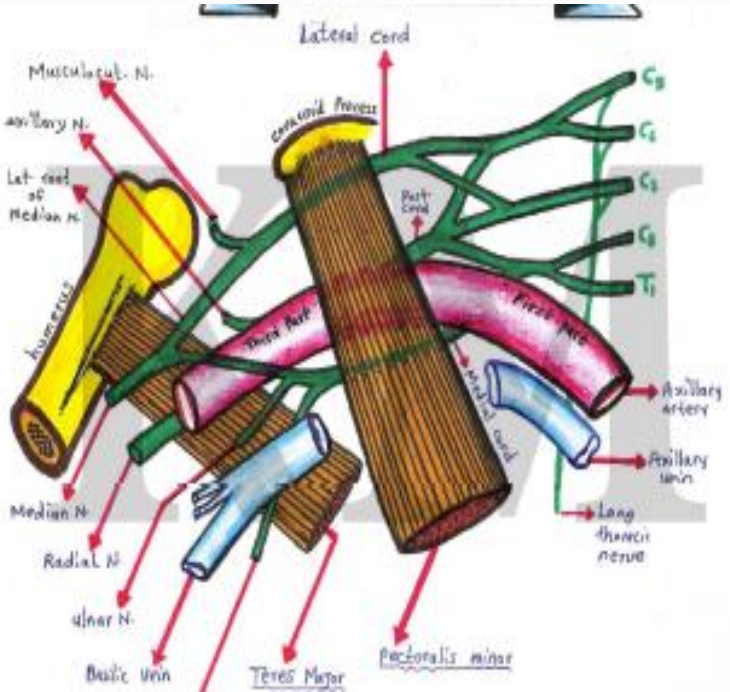
- **Anteriorly**: The pectoralis major and the skin. The cephalic vein crosses the artery.
- **Posteriorly**: The long thoracic nerve (nerve to the serratus anterior).
- **Laterally**: The three cords of the brachial plexus.
- **Medially**: The axillary vein.

Branches of first part:

Highest(superior) thoracic artery

Arises from 1st part of axillary artery. It is small & run along upper border of pectoralis minor. It runs forwards, medially on side of chest wall and supply it.



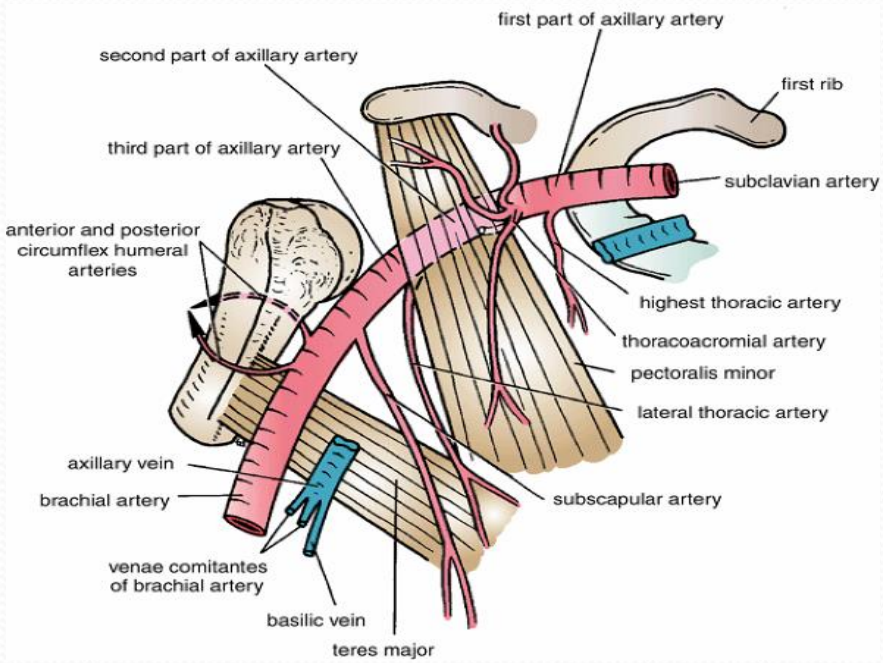


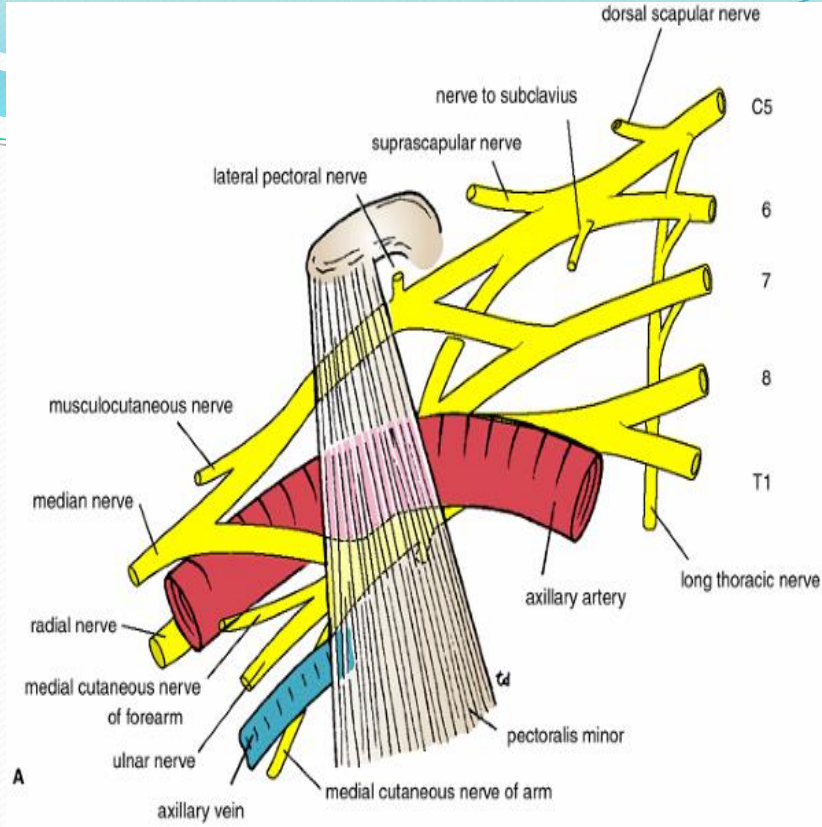
Second Part of the Axillary Artery

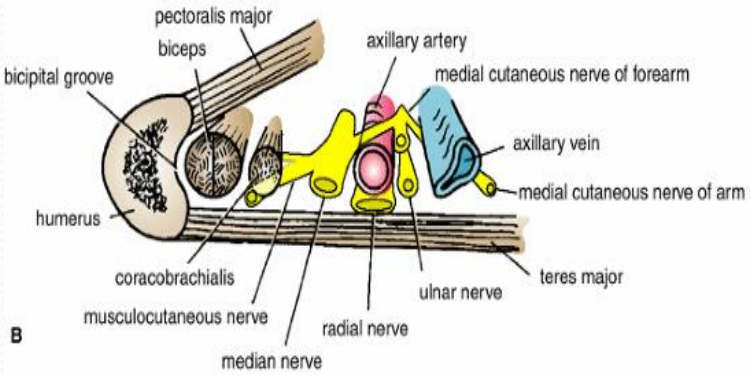
This lies behind the pectoralis minor muscle.

Relations:

- **Anteriorly:** The pectoralis minor, the pectoralis major, and the skin.
- **Posteriorly:** The posterior cord of the brachial plexus, the subscapularis muscle, and the shoulder joint.
- **Laterally:** The lateral cord of the brachial plexus.
- **Medially:** The medial cord of the brachial plexus and the axillary vein.







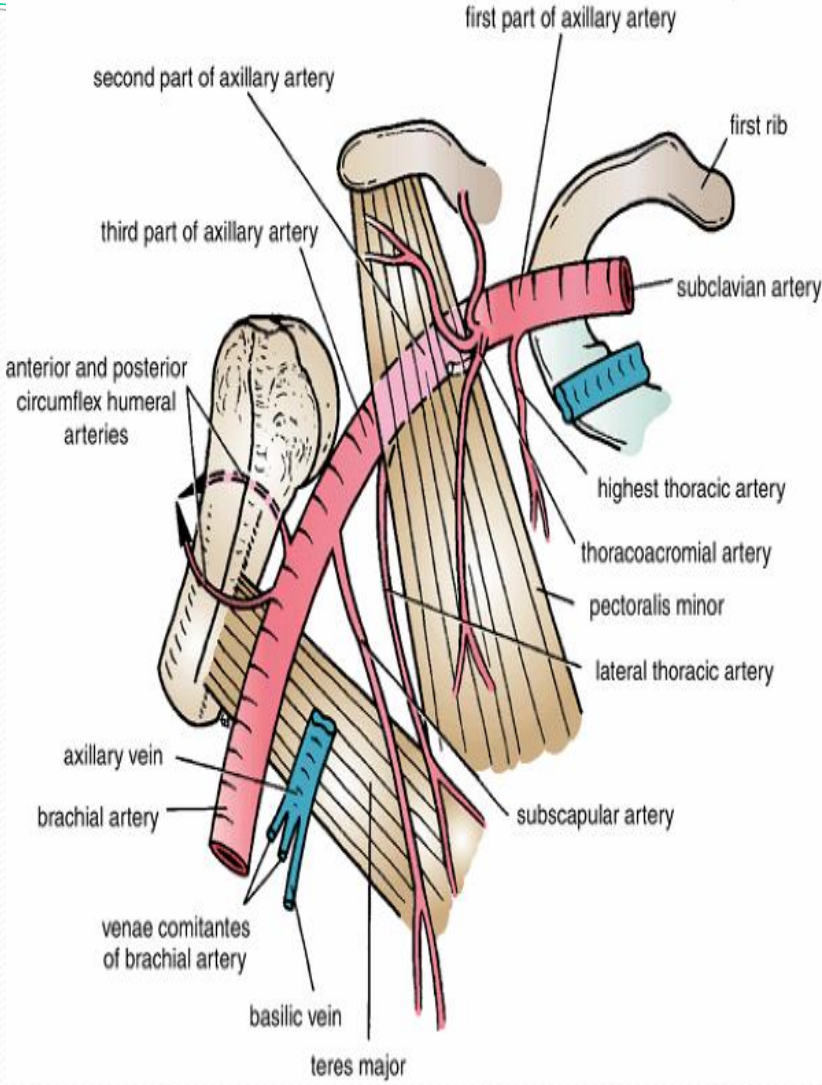
Branches of the second part:

- **Thoracoacromial artery**

Arises above upper border of pectoralis minor.
It pierces the clavipectoral fascia & immediately divides into its terminal branches: **clavicular**, **pectoral**, **acromial**, & **deltoid** branches.

- **Lat. thoracic artery**

Arises behind pectoralis minor. It runs along lower border of pectoralis minor & supplies lat. chest wall & serratus anterior muscle

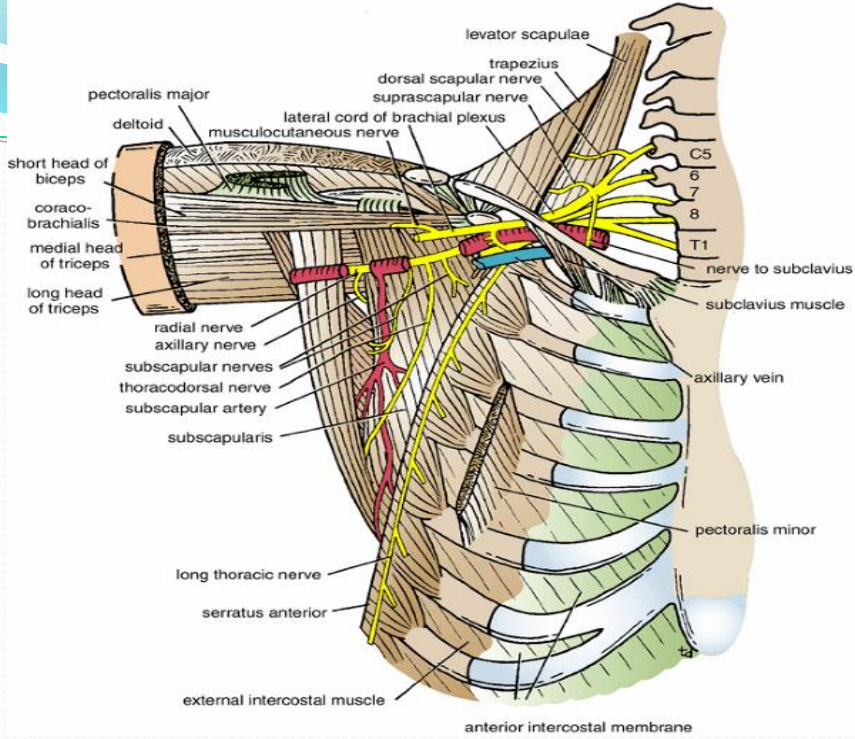


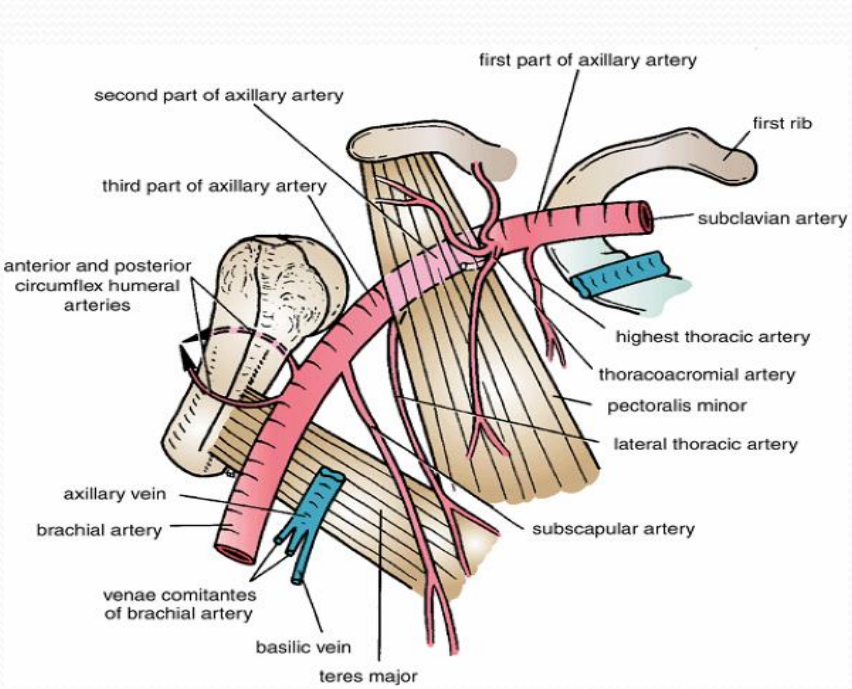
Third Part of the Axillary Artery

This extends from the lower border of the pectoralis minor to the lower border of the teres major.

Relations

- **Anteriorly:** The pectoralis major for a short distance; lower down the artery it is crossed by the medial root of the median nerve.
- **Posteriorly:** The subscapularis, the latissimus dorsi, and the teres major. The axillary and radial nerves also lie behind the artery.
- **Laterally:** The coracobrachialis, the biceps, and the humerus. The lateral root of the median and the musculocutaneous nerves also lie on the lateral side.
- **Medially:** The ulnar nerve, the axillary vein, and the medial cutaneous nerve of the arm

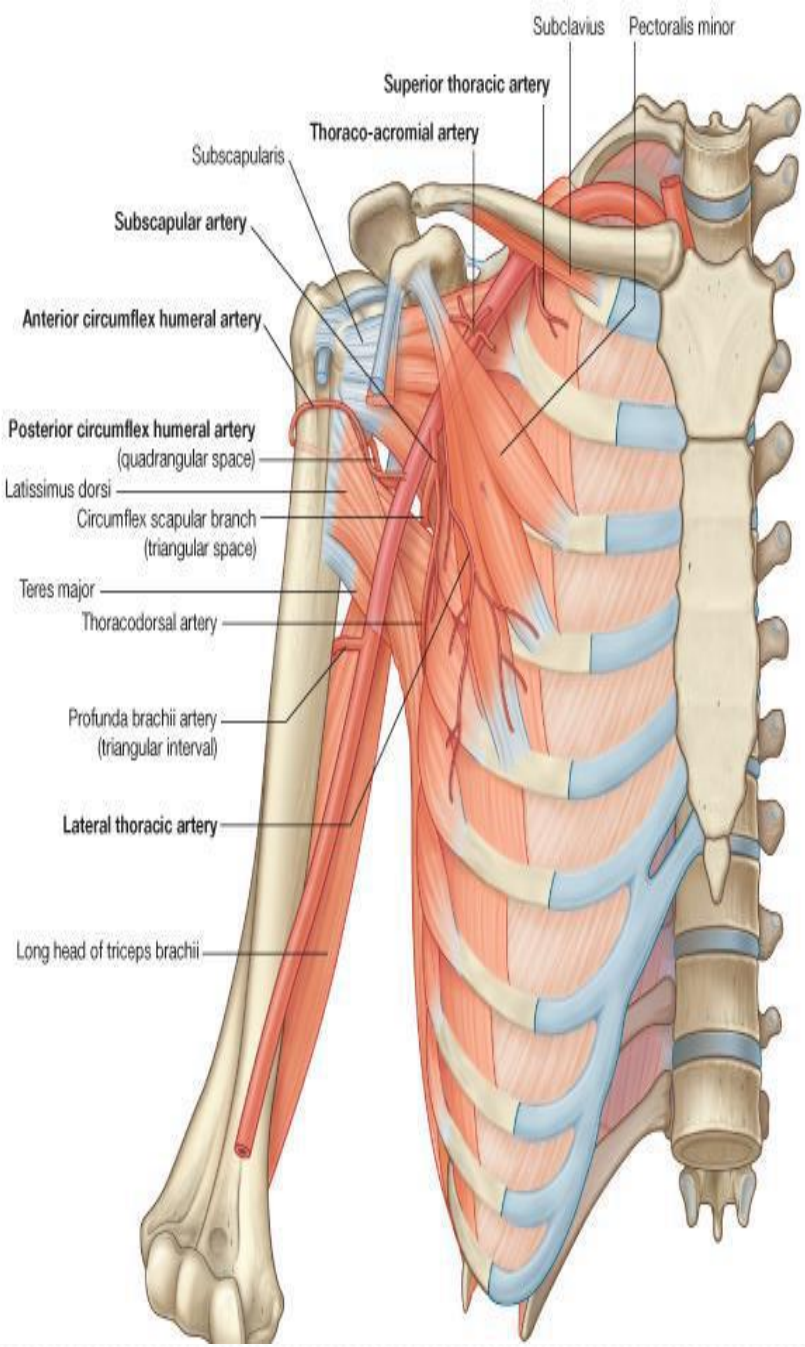




Branches from third part of axillary artery

Subscapular artery & the **ant**. & **post. circumflex humeral** arteries arise from 3rd part of axillary artery.

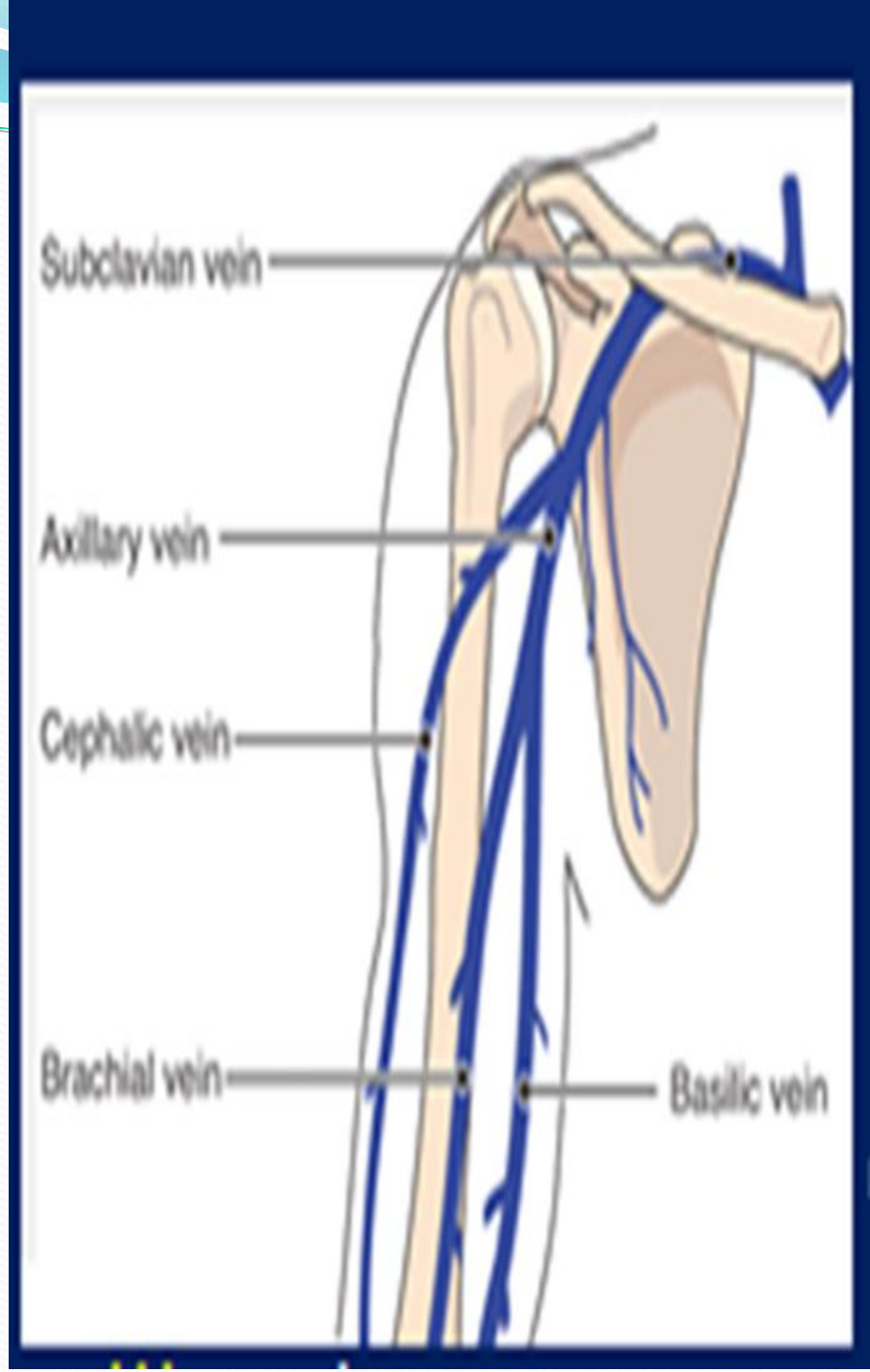
- **Subscapular artery** runs along lower border of subscapularis & gives off circumflex scapular branch which goes post. through the triangular muscular space to back of scapula
- **Circumflex humeral arteries** wind around the front & back of surgical neck of humerus respectively.



Axillary vein

It is formed at lower border of teres major by union of venae comitants of brachial artery & basilic vein. It runs upward on med. side of axillary artery & ends at lat. border of 1st rib by becoming subclavian vein.

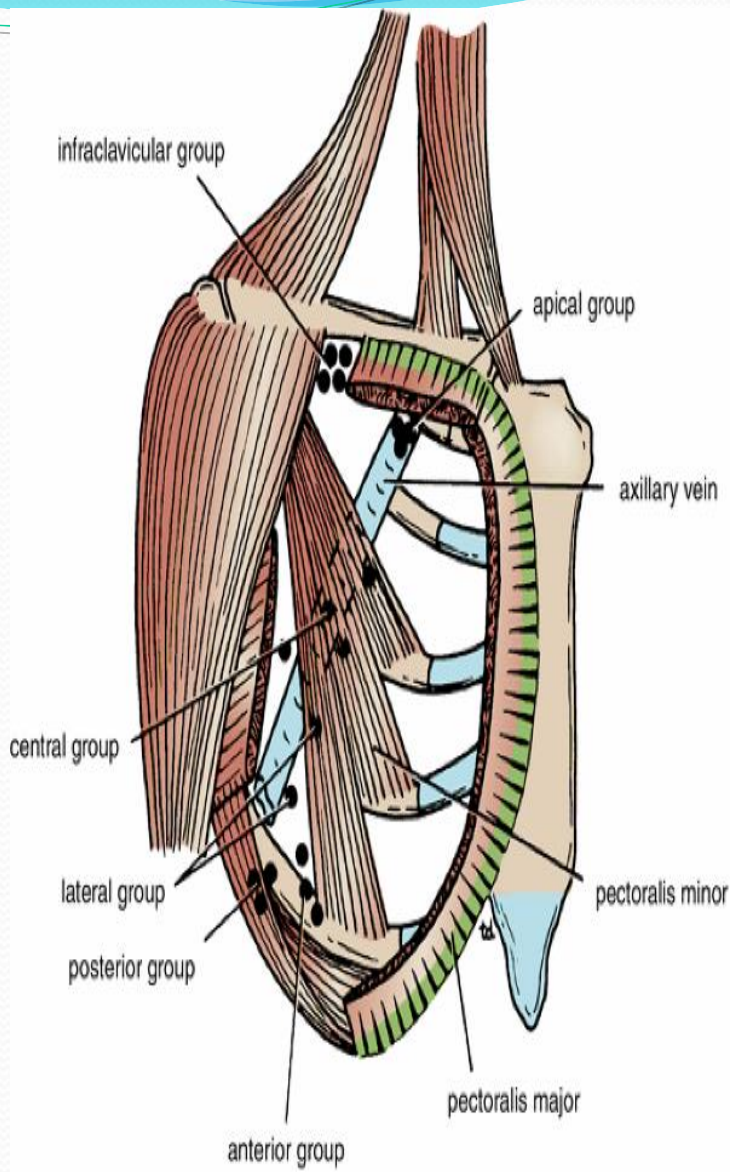
The vein receives tributaries, which correspond to the branches of the axillary, and the cephalic vein.



Lymph Nodes of the Axilla

- The axillary lymph nodes (20-30 in number) drain lymph vessels from the lateral quadrants of the breast, the superficial lymph vessels from the thoracoabdominal walls above the level of the umbilicus, and the vessels from the upper limb. The lymph nodes are arranged in six groups:

1. **Anterior (pectoral) group**: Lying along the lower border of the pectoralis minor behind the pectoralis major, these nodes receive lymph vessels from the lateral quadrants of the breast and superficial vessels from the anterolateral abdominal wall above the level of the umbilicus.
2. **Posterior(subscapular) group**: Lying in front of the subscapularis muscle, these nodes receive superficial lymph vessels from the back, down as far as the level of the iliac crests.
3. **Lateral group**: Lying along the medial side of the axillary vein, these nodes receive most of the lymph vessels of the upper limb (except those superficial vessels draining the lateral side see infraclavicular nodes, below).
4. **Central group**: Lying in the center of the axilla in the axillary fat, these nodes receive lymph from the above three groups.
5. **Infraclavicular (deltopectoral) group**: These nodes are not strictly axillary nodes because they are located outside the axilla. They lie in the groove between the deltoid and pectoralis major muscles and receive superficial lymph vessels from the lateral side of the hand, forearm, and arm.
6. **Apical group**: Lying at the apex of the axilla at the lateral border of the first rib, these nodes receive the efferent lymph vessels from all the other axillary nodes.

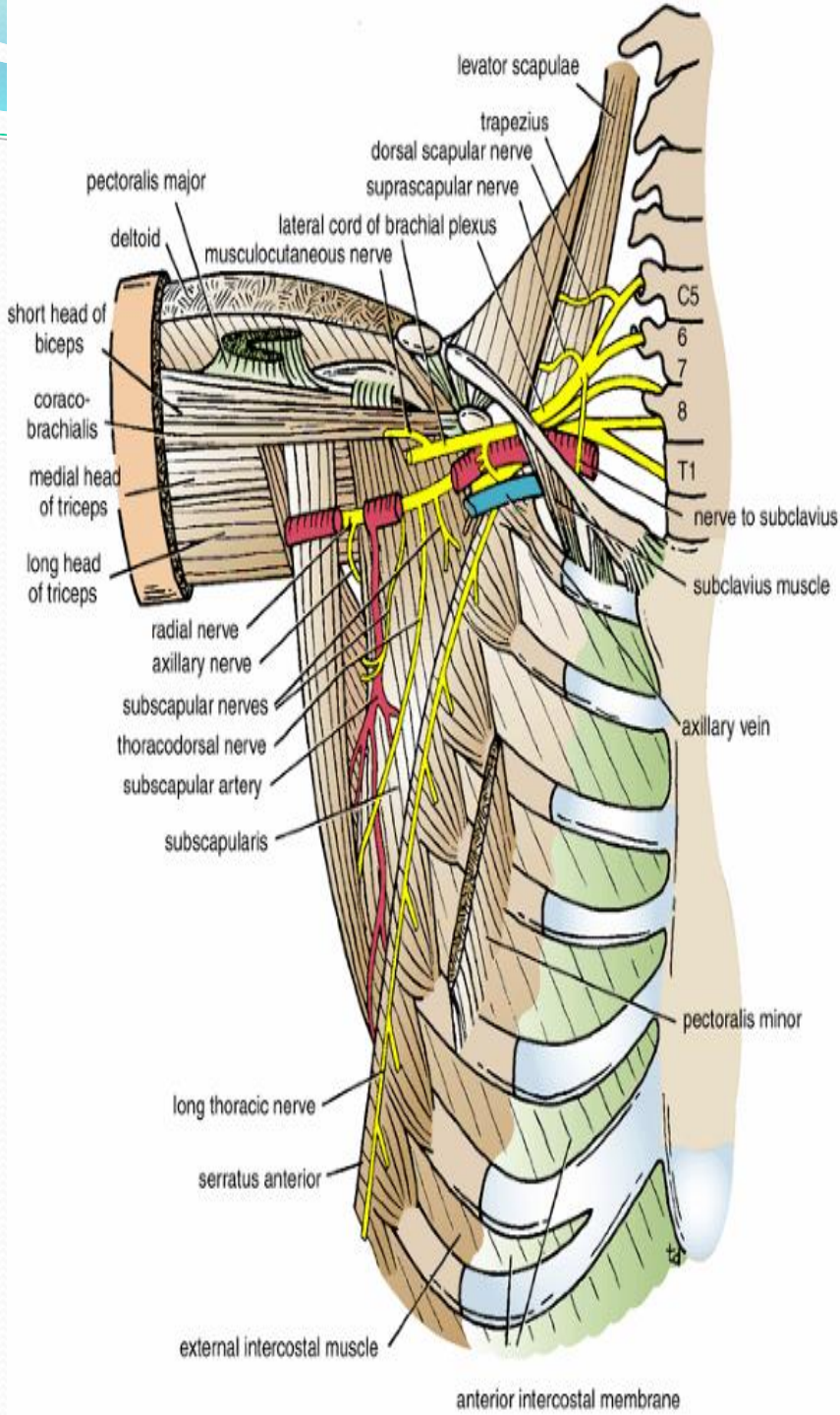


Brachial Plexus

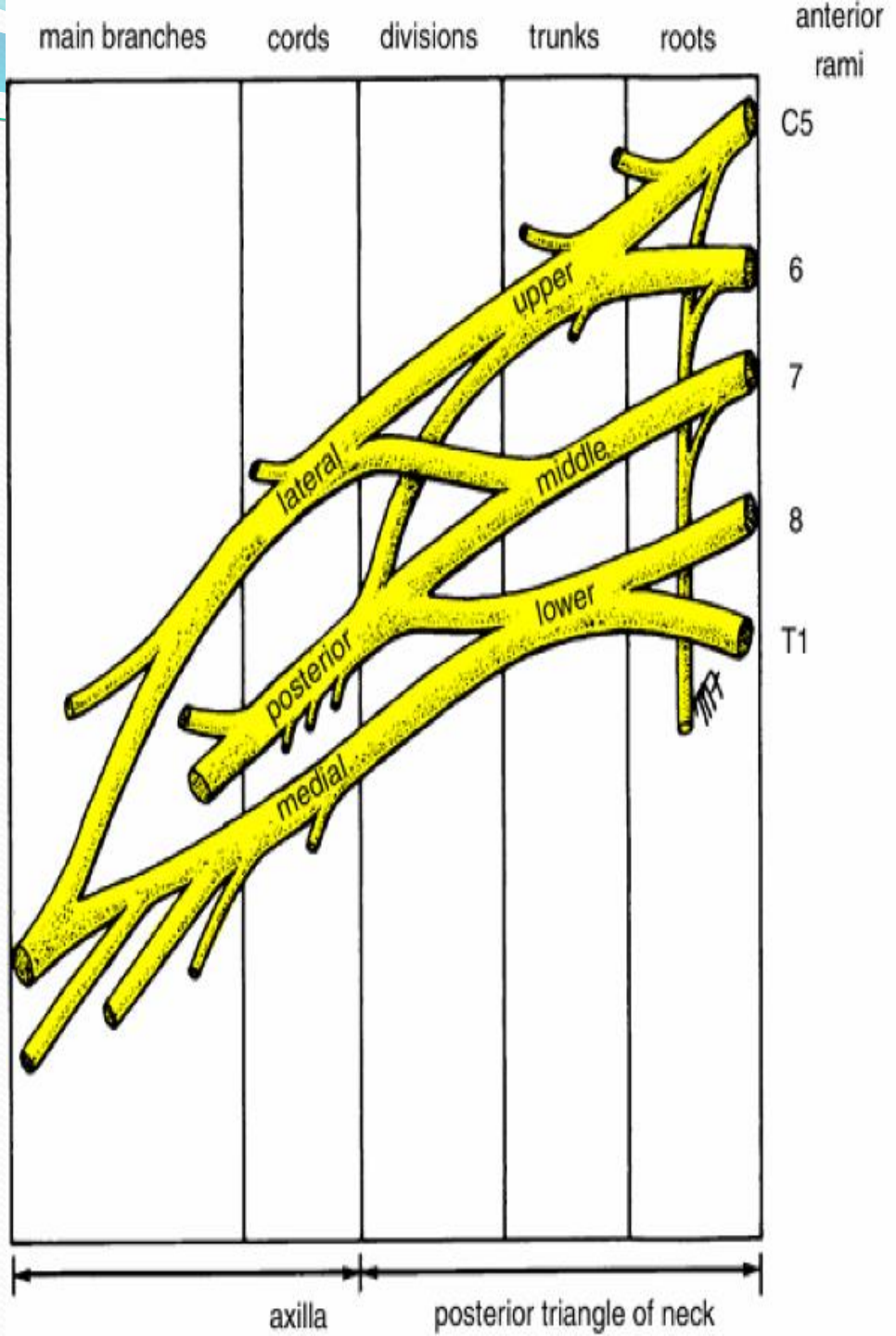
The nerves entering the upper limb provide the following important functions:

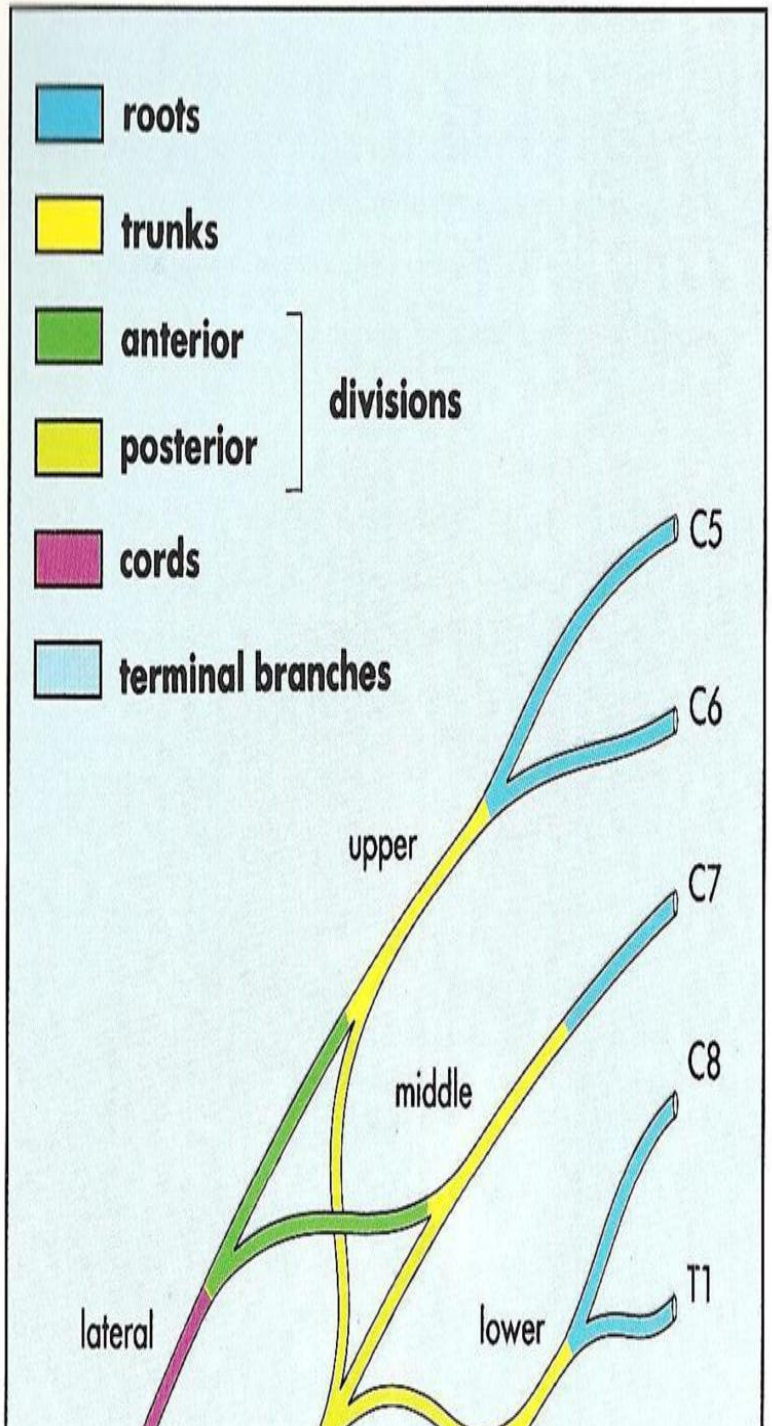
- **Sensory innervation** to the skin and deep structures, such as the joints;
- **Motor innervation** to the muscles;
- **Influence over the diameters** of the blood vessels by the sympathetic vasomotor nerves; and sympathetic secretomotor supply to the sweat glands.

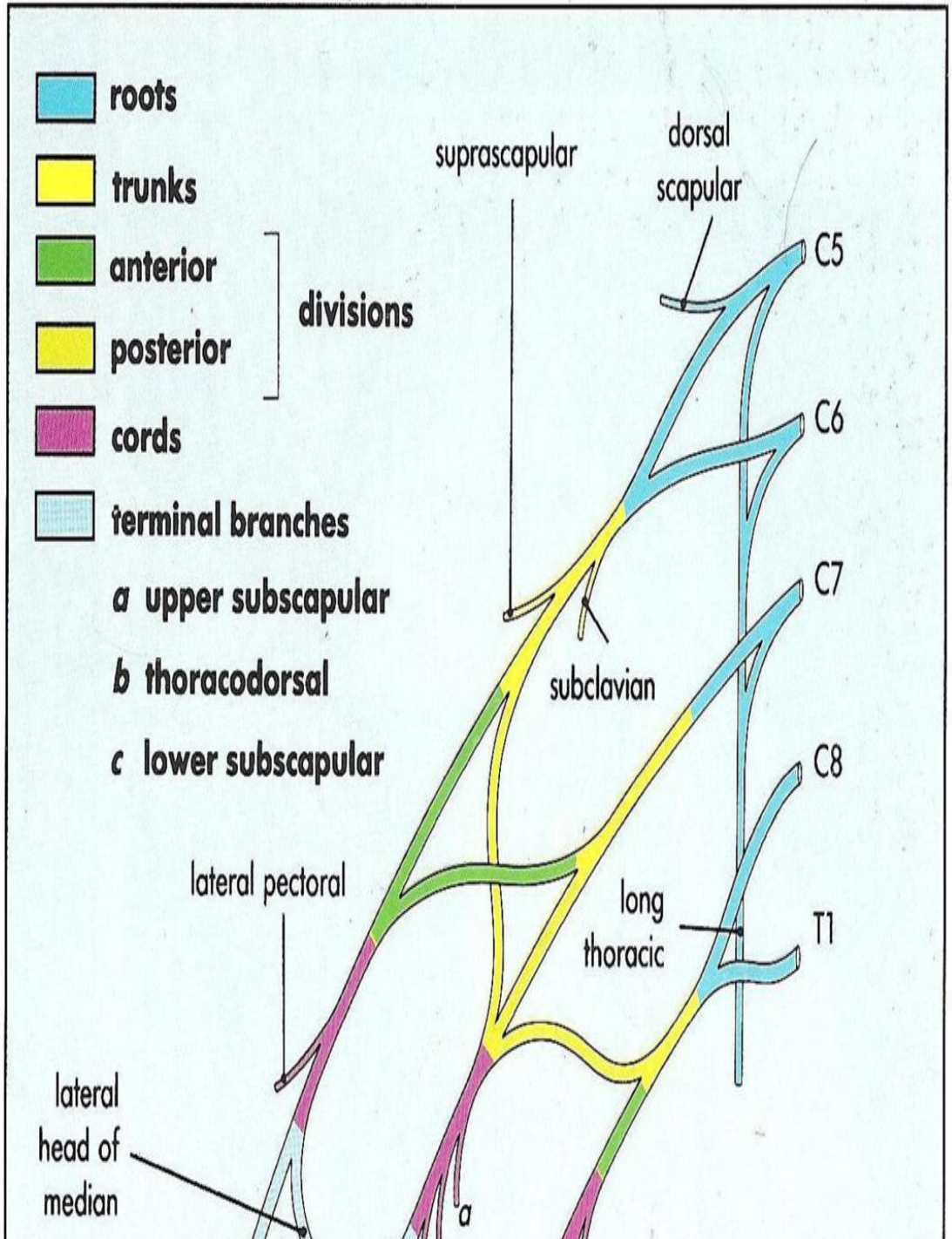
At the root of the neck, the brachial plexus is formed in the posterior triangle of the neck by the union of the anterior rami of the fifth, sixth, seventh, and eighth cervical and the first thoracic spinal nerves.



- The plexus can be divided into roots, trunks, divisions, and cords.
- The roots of C5 and 6 unite to form the upper trunk, the root of C7 continues as the middle trunk, and the roots of C8 and T1 unite to form the lower trunk.
- Each trunk then divides into anterior and posterior divisions. The anterior divisions of the upper and middle trunks unite to form the lateral cord, the anterior division of the lower trunk continues as the medial cord, and the posterior divisions of all three trunks join to form the posterior cord.
- The roots, trunks, and divisions of the brachial plexus reside in the lower part of the posterior triangle of the neck.
- The cords become arranged around the axillary artery in the axilla.
- Here, the brachial plexus and the axillary artery and vein are enclosed in the axillary sheath

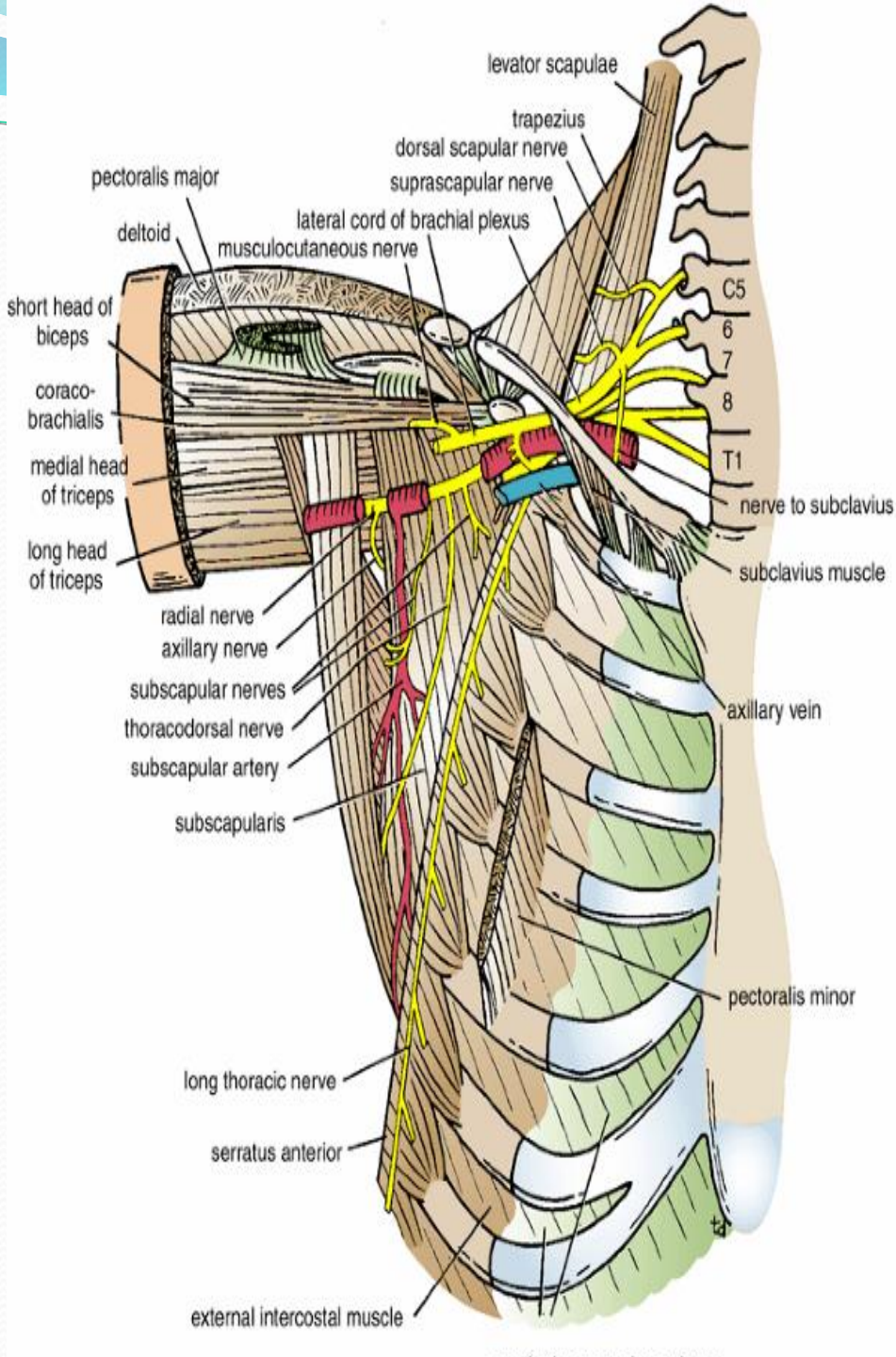



roots
trunks
anterior
posterior
divisions
cords
terminal branches
C5
C6
C7
C8
T1
upper
middle
lower
lateral


roots
trunks
anterior
posterior
divisions
cords
terminal branches
a upper subscapular
b thoracodorsal
c lower subscapular
suprascapular
dorsal scapular
C5
C6
C7
C8
T1
subclavian
lateral pectoral
long thoracic
lateral head of median
a

Cords of the Brachial Plexus

- All three cords of the brachial plexus lie above and lateral to the first part of the axillary artery.
- The medial cord crosses behind the artery to reach the medial side of the second part of the artery.
- The posterior cord lies behind the second part of the artery, and the lateral cord lies on the lateral side of the second part of the artery.
- Thus, the cords of the plexus have the relationship to the second part of the axillary artery that is indicated by their names.
- The branches of the different parts of the brachial plexus are as follows:



Roots

- Dorsal scapular nerve (C5)
- Long thoracic nerve (C5, 6, and 7)

Upper trunk

- Nerve to subclavius (C5 and 6)
- Suprascapular nerve (supplies the supraspinatus and infraspinatus muscles)

Lateral cord

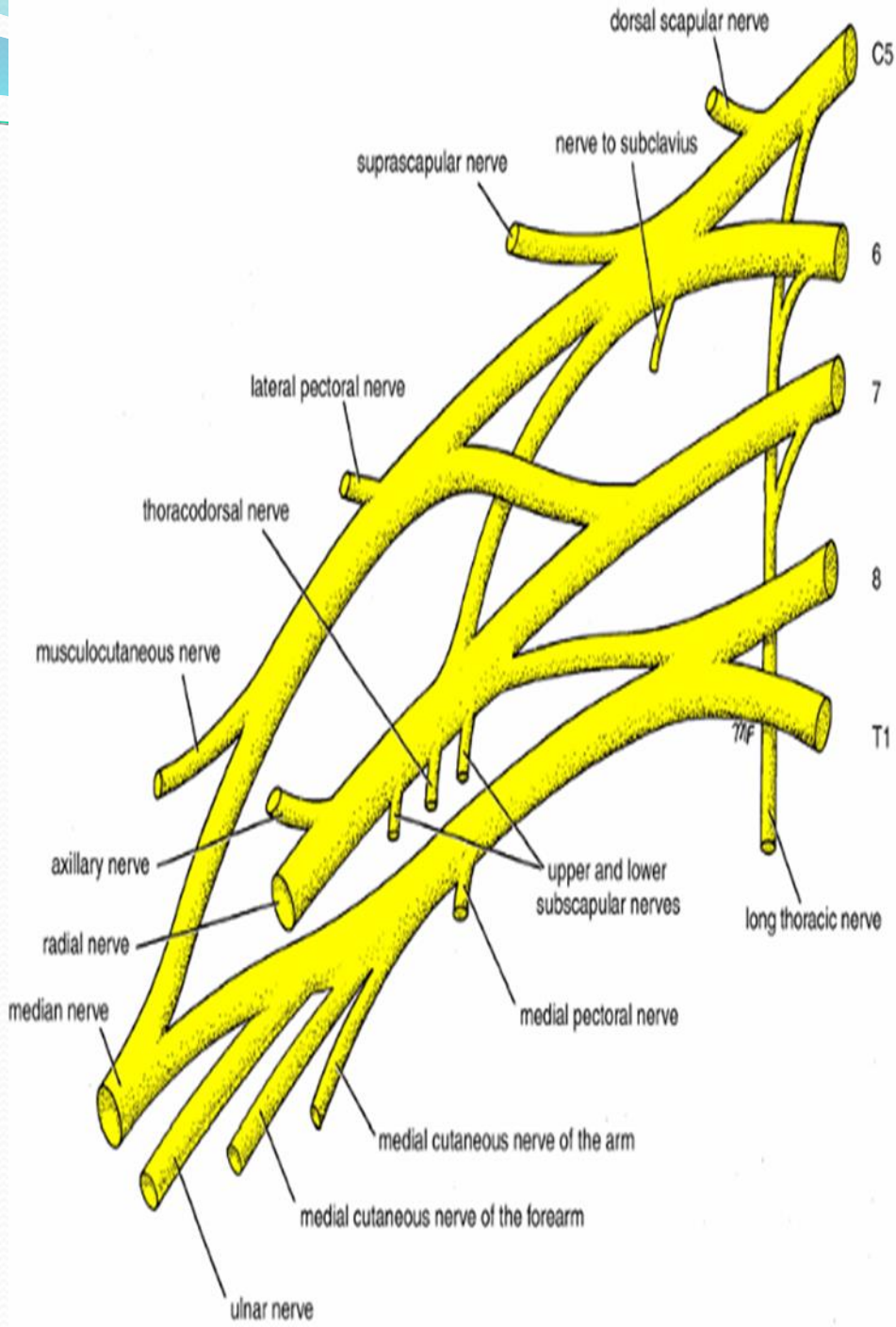
- Lateral pectoral nerve
- Musculocutaneous nerve
- Lateral root of median nerve

Medial cord

- Medial pectoral nerve
- Medial cutaneous nerve of arm and medial cutaneous nerve of forearm
- Ulnar nerve
- Medial root of median nerve

Posterior cord

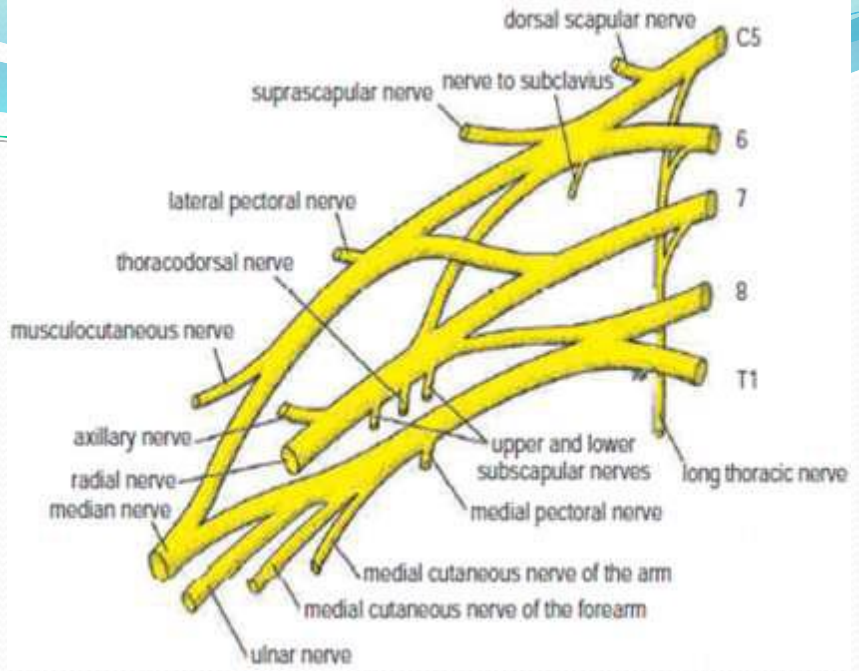
- Upper and lower subscapular nerves
- Thoracodorsal nerve
- Axillary nerve
- Radial nerve



Branches from the roots:

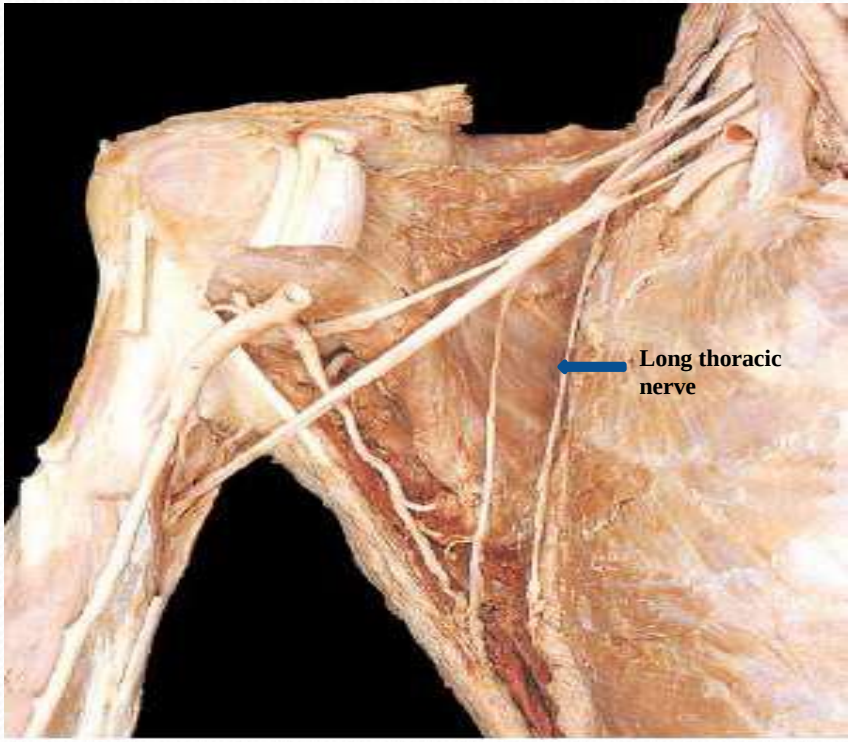
1. Dorsal scapular n.

arises from ant. ramus of C5 & runs backward & downward reaching back of scapula. It supplies levator scapulae & rhomboid minor & major



2. Long thoracic n.

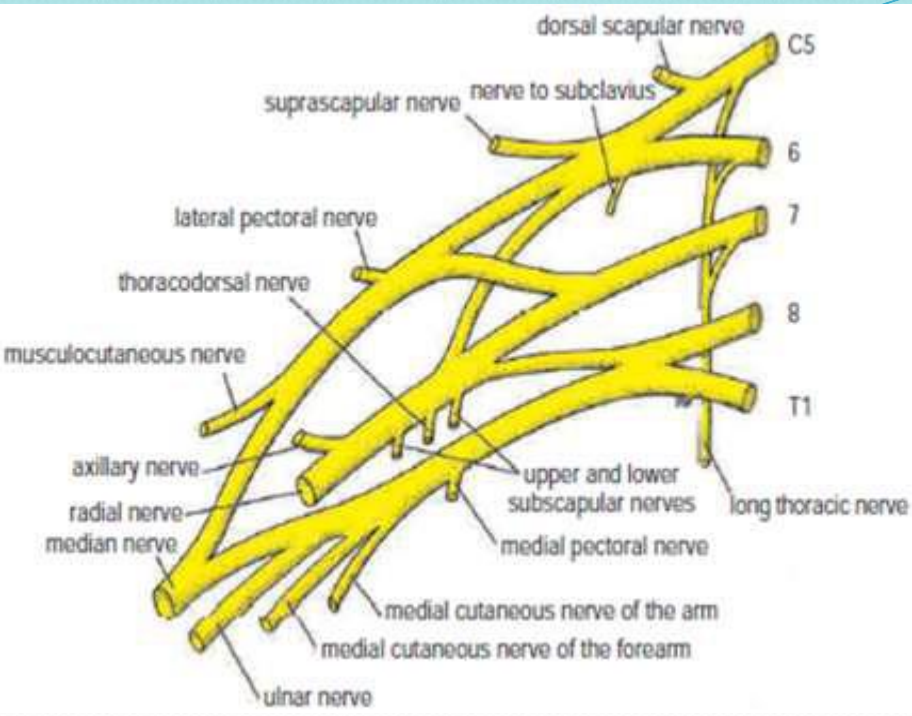
arises from ant. rami of C5, 6, & 7 cervical spinal nerves. It descends behind axillary vessels & brachial plexus to reach lat. surface of serratus ant. which it supplies.

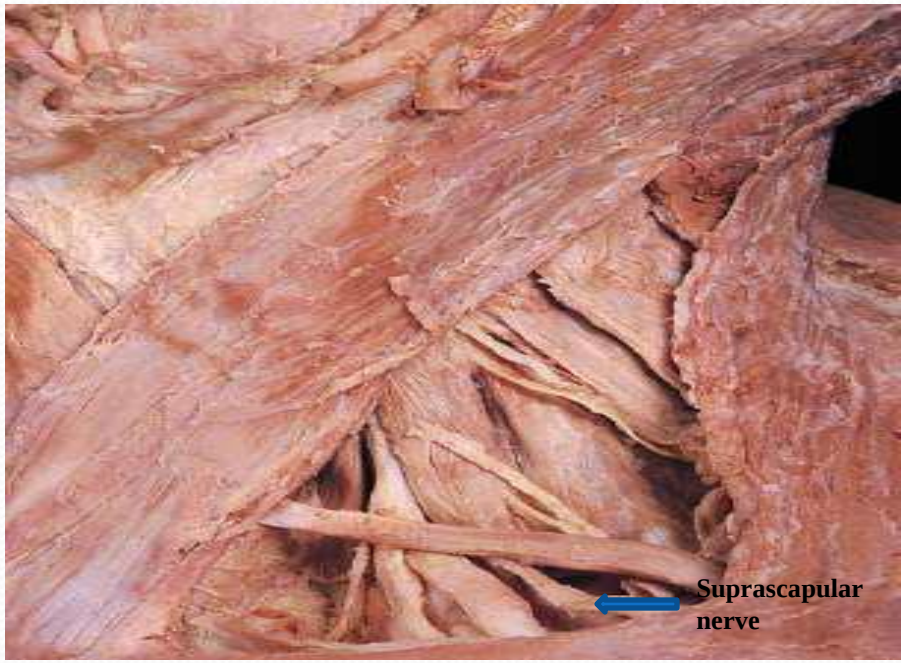


Branches from upper trunk: (C5 & 6)

1. Nerve to subclavius descends in front of brachial plexus & subclavian artery in the neck to supply subclavius. It might gives contribution to phrenic n. (C5), when present referred to as accessory phrenic nerve

2. Suprascapular nerve runs downward & laterally & passes beneath suprascapular ligament which bridges suprascapular notch of scapula to reach supraspinous fossa. It supplies supraspinatus & infraspinatus & shoulder joint





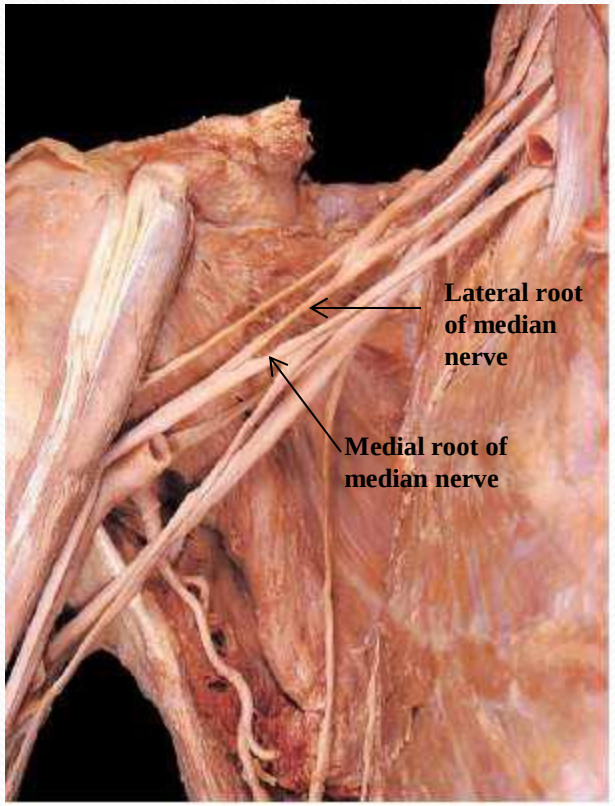
Branches from cords of the plexus:

Branches from lateral cord:

1. Lat. pectoral n.: It pierces the clavipectoral fascia to supply pectoralis major.

2. Musculocutaneous n.: It pierces coracobrachialis as it leaves the axilla. It supplies coracobrachialis & biceps.

3. Lat. root of median n.: It is the direct continuation of the lateral cord. It is joined by the medial root, which is a branch of the med. cord, to form the median nerve trunk.



Branches from med. cord:

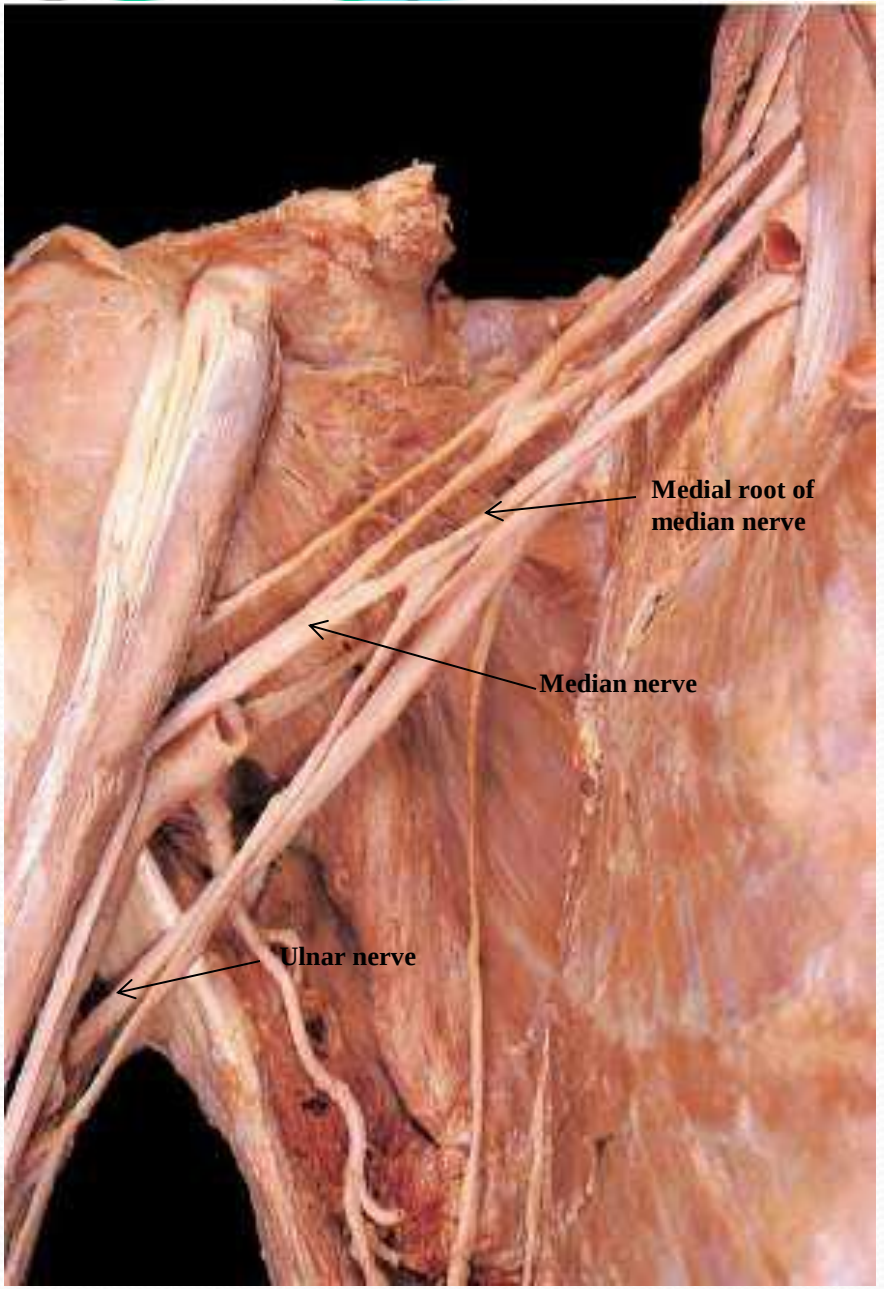
1. **Med. pectoral n.** pierces pectoralis minor to reaches pectoralis major. It supplies both muscles.

2. Med. cutaneous n. of arm is joined by lat. cutaneous branch of 2nd intercostal nerve. (intercostobrachial n.). It supplies skin of med. side of arm.

3. Med. cutaneous n. of forearm. Descend in front of the axillary artery

4. Ulnar n. (C8 & T1) descends in the interval between axillary artery & vein. It gives off no branches in the axilla.

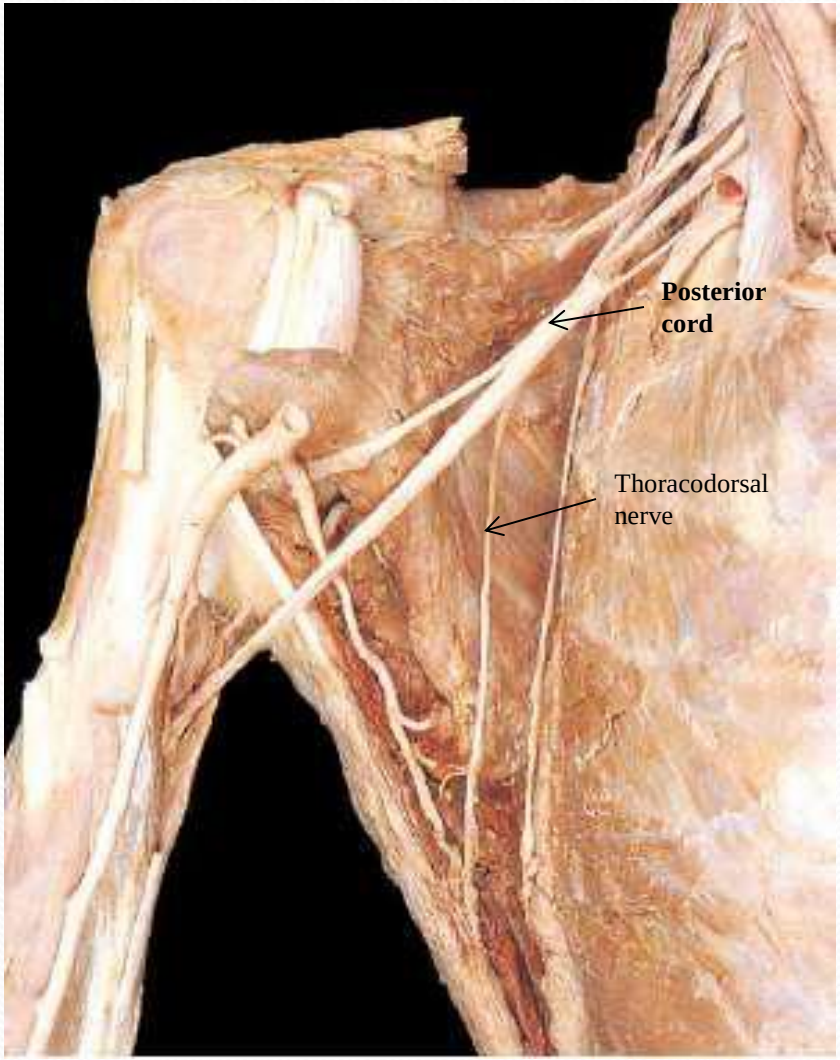
5. Med. root of median n.: It crosses in front of 3rd part of axillary artery to join lat. root of median n.



Branches from post. cord:

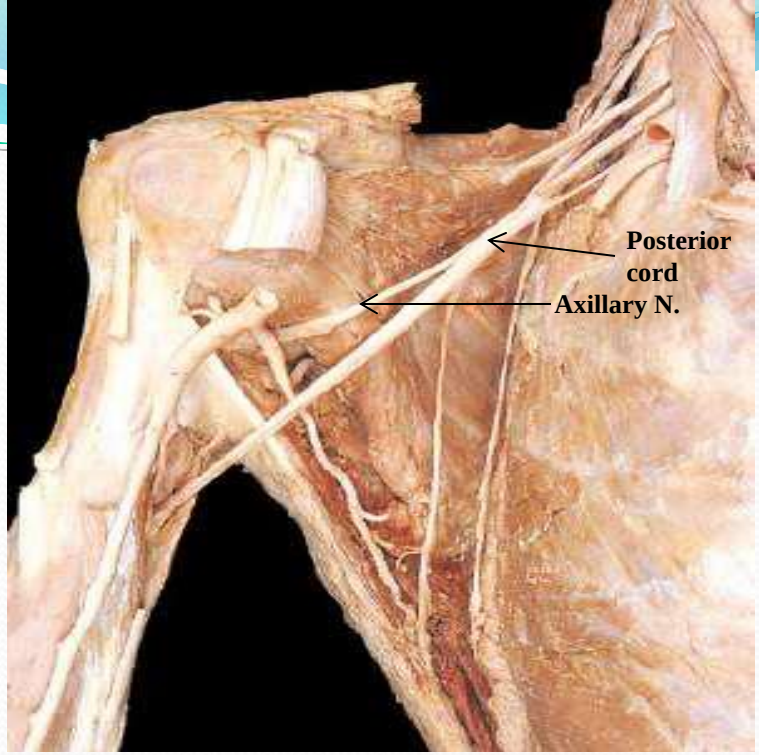
1. Upper & lower subscapular Ns: They supply upper & lower parts of subscapularis muscle. In addition, it supplies teres major.

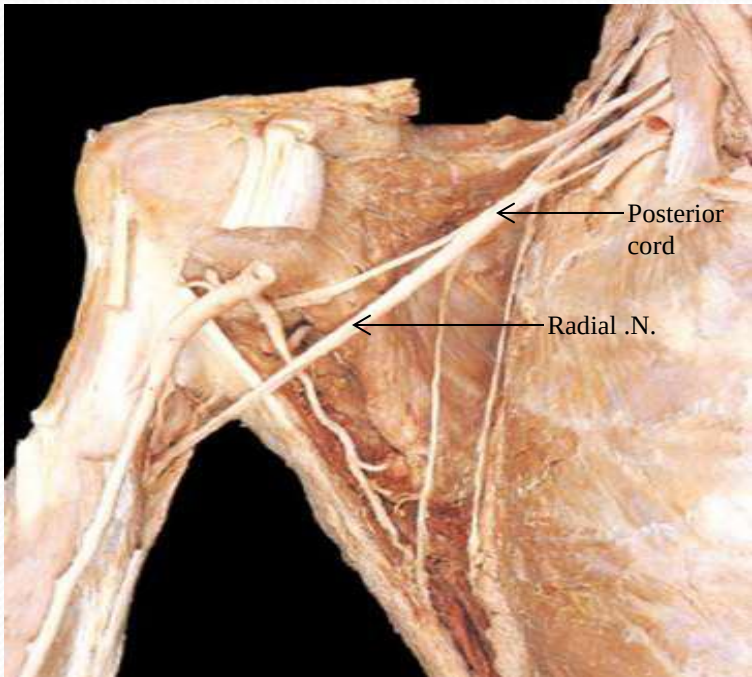
2. Thoracodorsal n.: It accompanies subscapular vessels & runs downward on the front of subscapularis to reach latissimus dorsi which it supplies.

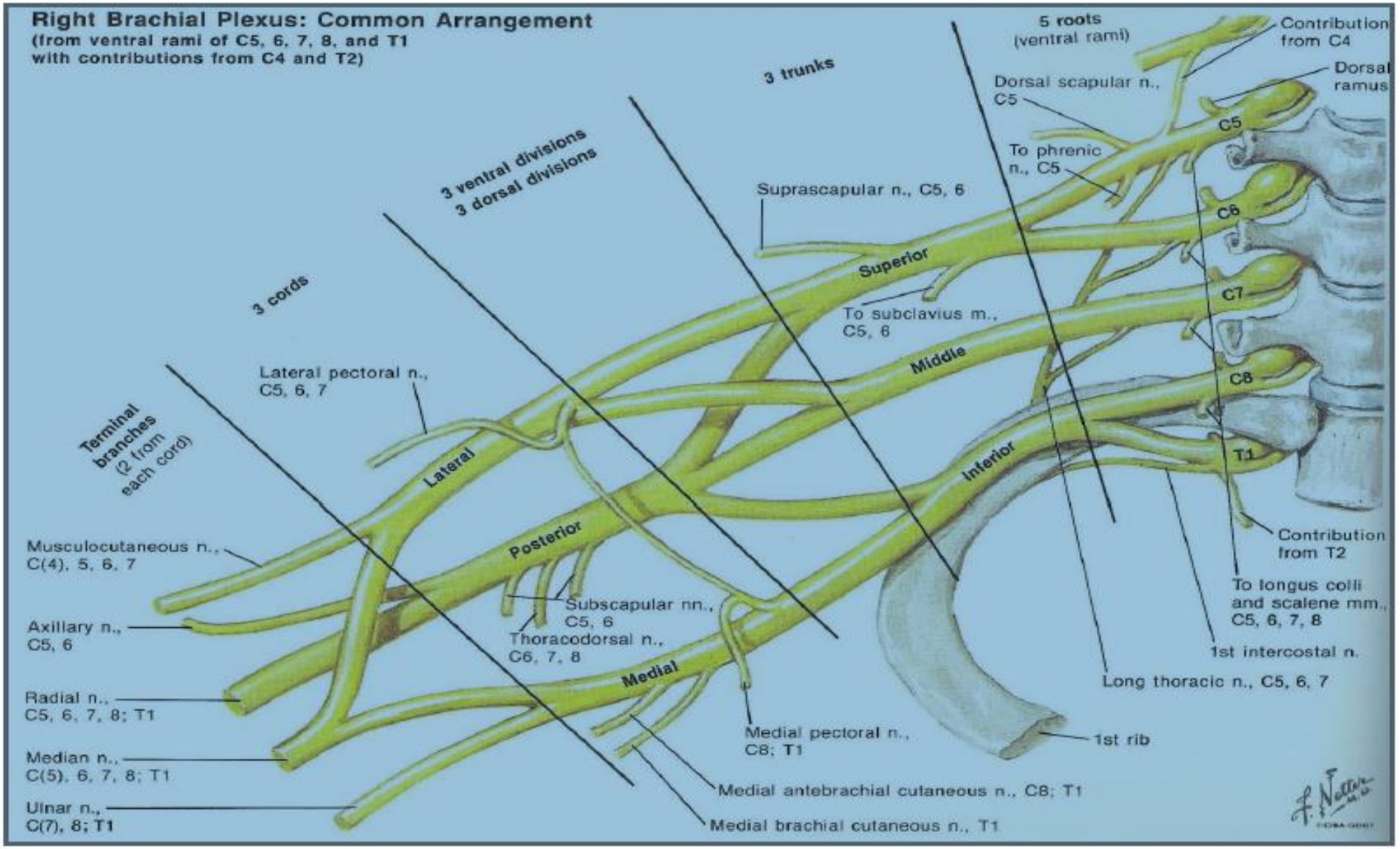


4. Axillary nerve is one of the two terminal branches of post. cord. At lower border of subscapularis. it turns backward & passes through the quadrilateral space in company with post. Circumflex humeral artery. It gives off articular branches to shoulder joint, & divided into ant. & post. branches.

5. Radial n. is the largest branch & the direct continuation of post. cord. It is regarded as the largest branch of the plexus. It lies behind axillary artery. **In axilla**, it gives branches to **med.** and **long** heads of triceps muscle & post. cutaneous n. of arm.



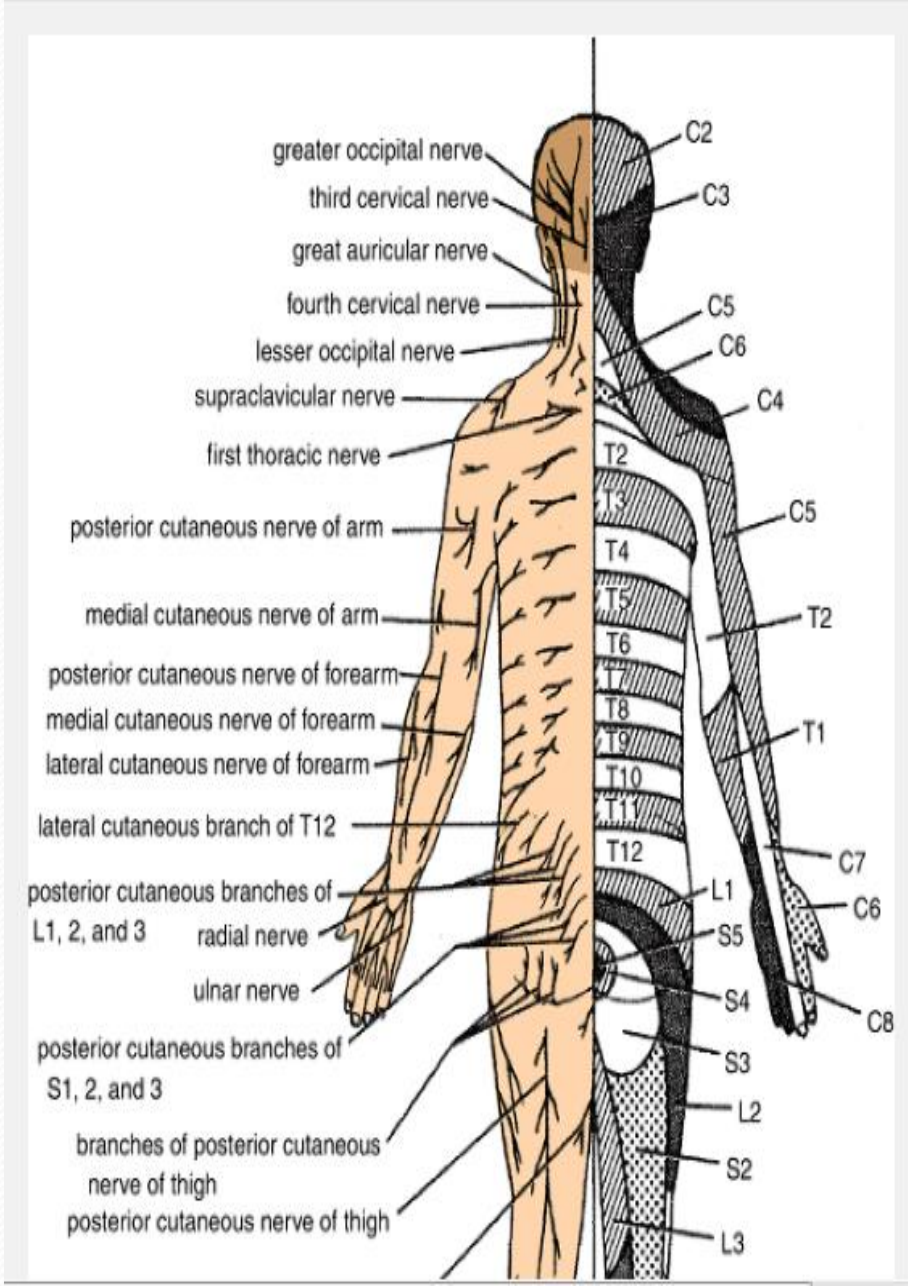



Right Brachial Plexus: Common Arrangement
(from ventral rami of C5, 6, 7, 8, and T1
with contributions from C4 and T2)
5 roots
(ventral rami)
3 trunks
3 ventral divisions
3 dorsal divisions
3 cords
Terminal branches (2 from each cord)
Contribution from C4
Dorsal ramus
Dorsal scapular n., C5
To phrenic n., C5
Suprascapular n., C5, 6
Superior
To subclavius m., C5, 6
Middle
Lateral pectoral n., C5, 6, 7
Inferior
Lateral
Posterior
Medial
Musculocutaneous n., C(4), 5, 6, 7
Axillary n., C5, 6
Radial n., C5, 6, 7, 8; T1
Median n., C(5), 6, 7, 8; T1
Ulnar n., C(7), 8; T1
Subscapular nn., C5, 6
Thoracodorsal n., C6, 7, 8
Medial pectoral n., C8; T1
Medial antebrachial cutaneous n., C8; T1
Medial brachial cutaneous n., T1
C5
C6
C7
C8
T1
Contribution from T2
To longus colli and scalene mm., C5, 6, 7, 8
1st intercostal n.
Long thoracic n., C5, 6, 7
1st rib

The Superfacial part of the back and the scapular region

Skin

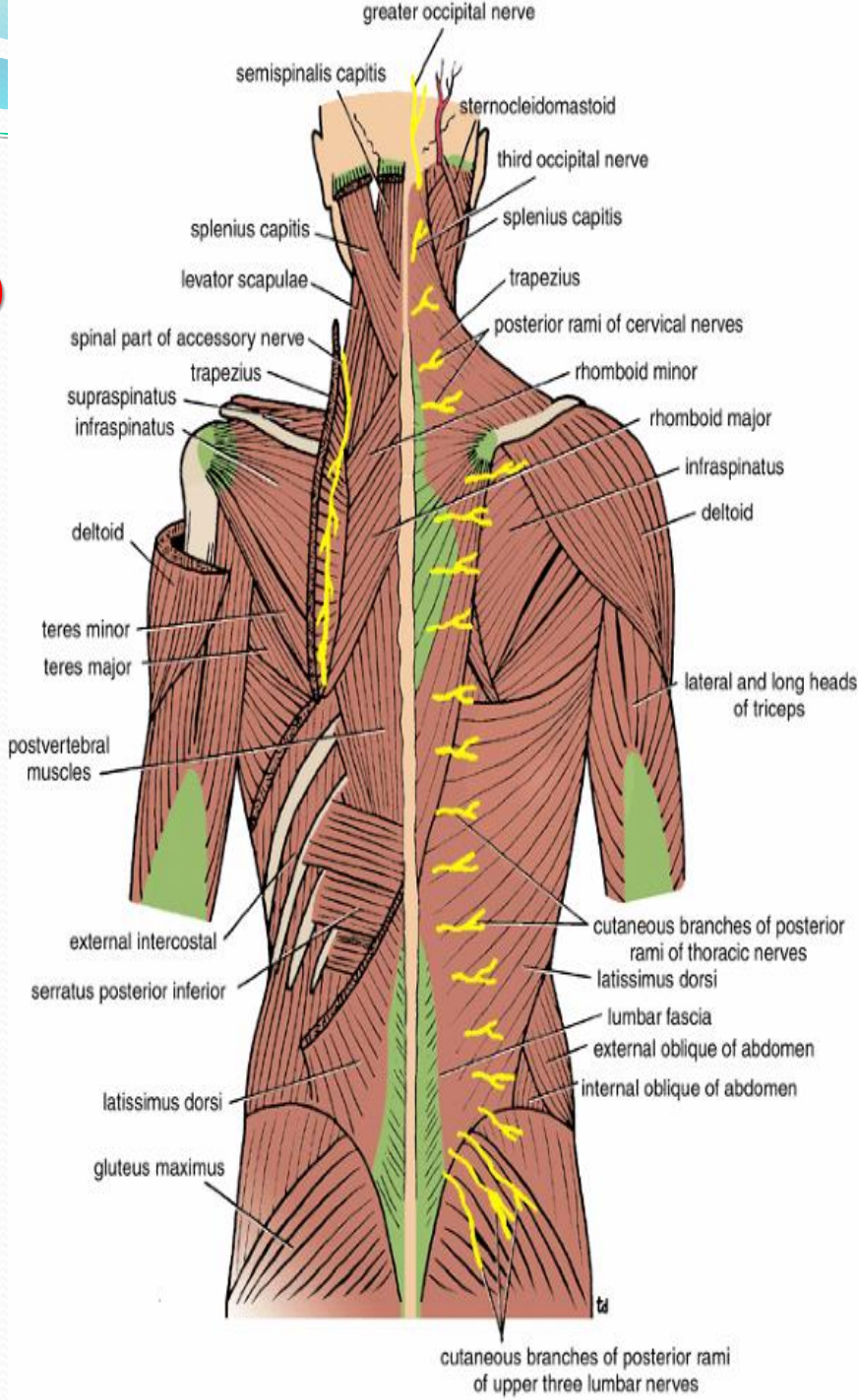
- The sensory nerve supply to the skin of the back is from the posterior rami of the spinal nerves. The 1st &8th cervical nerve not supply the skin, and the posterior rami of the upper three lumber nerves run downward to supply the skin over the buttock.
- The blood supply to the skin is from posterior branches of the posterior intercostal arteries and the lumber arteries. The vein correspond to the arteries and drain into the azygos vein and the inferior vena cava.
- The lymph drainage of the skin of the back above the level of the iliac crests is upward into the posterior group of axillary lymph node



Nerves

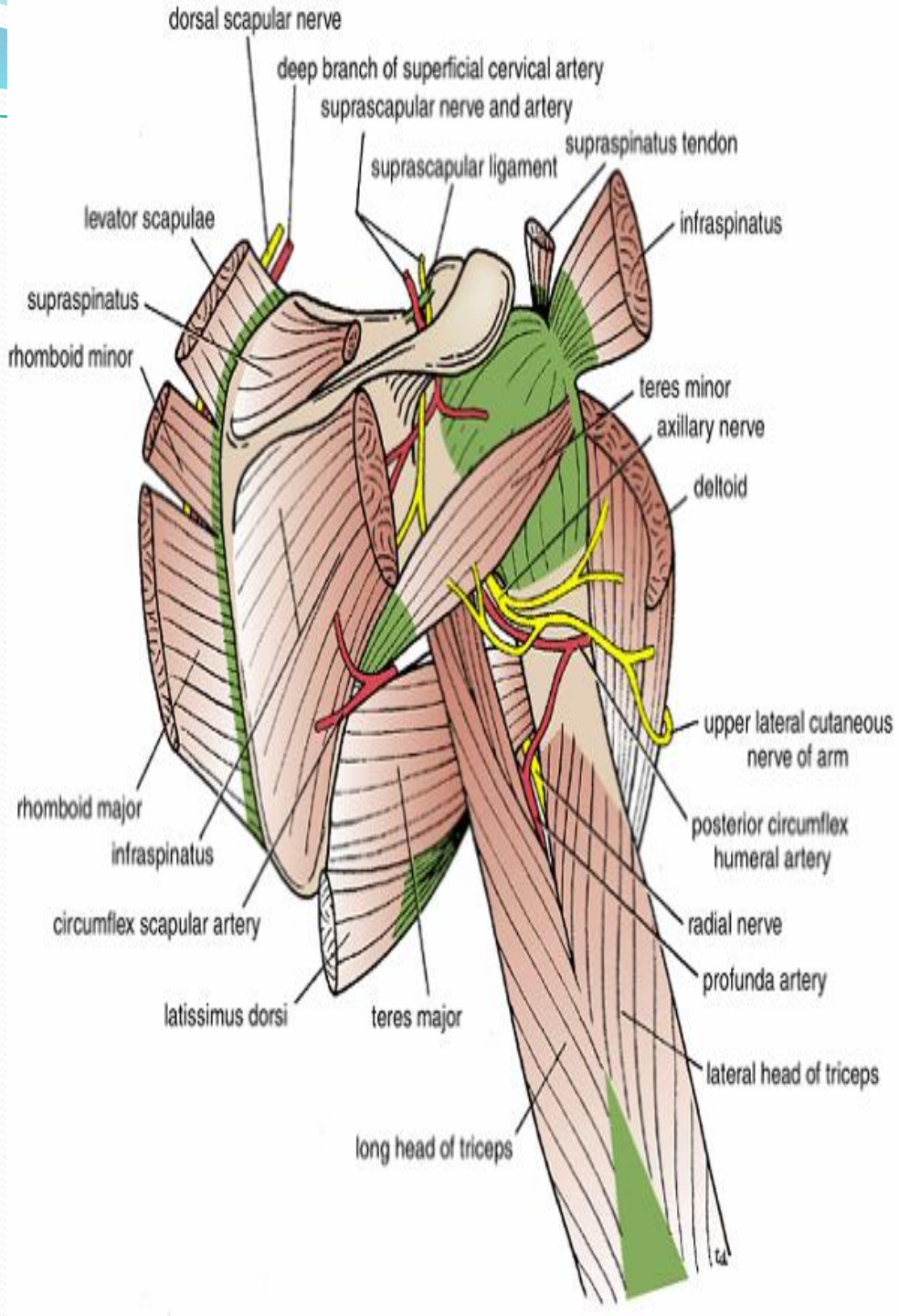
Spinal Part of the Accessory Nerve (Cranial Nerve XI)

- The spinal part of the accessory nerve runs downward in the posterior triangle of the neck on the levator scapulae muscle.
- It is accompanied by branches from the anterior rami of the third and fourth cervical nerves.
- The accessory nerve runs beneath the anterior border of the trapezius muscle at the junction of its middle and lower thirds and, together with the cervical nerves, supplies the trapezius muscle.



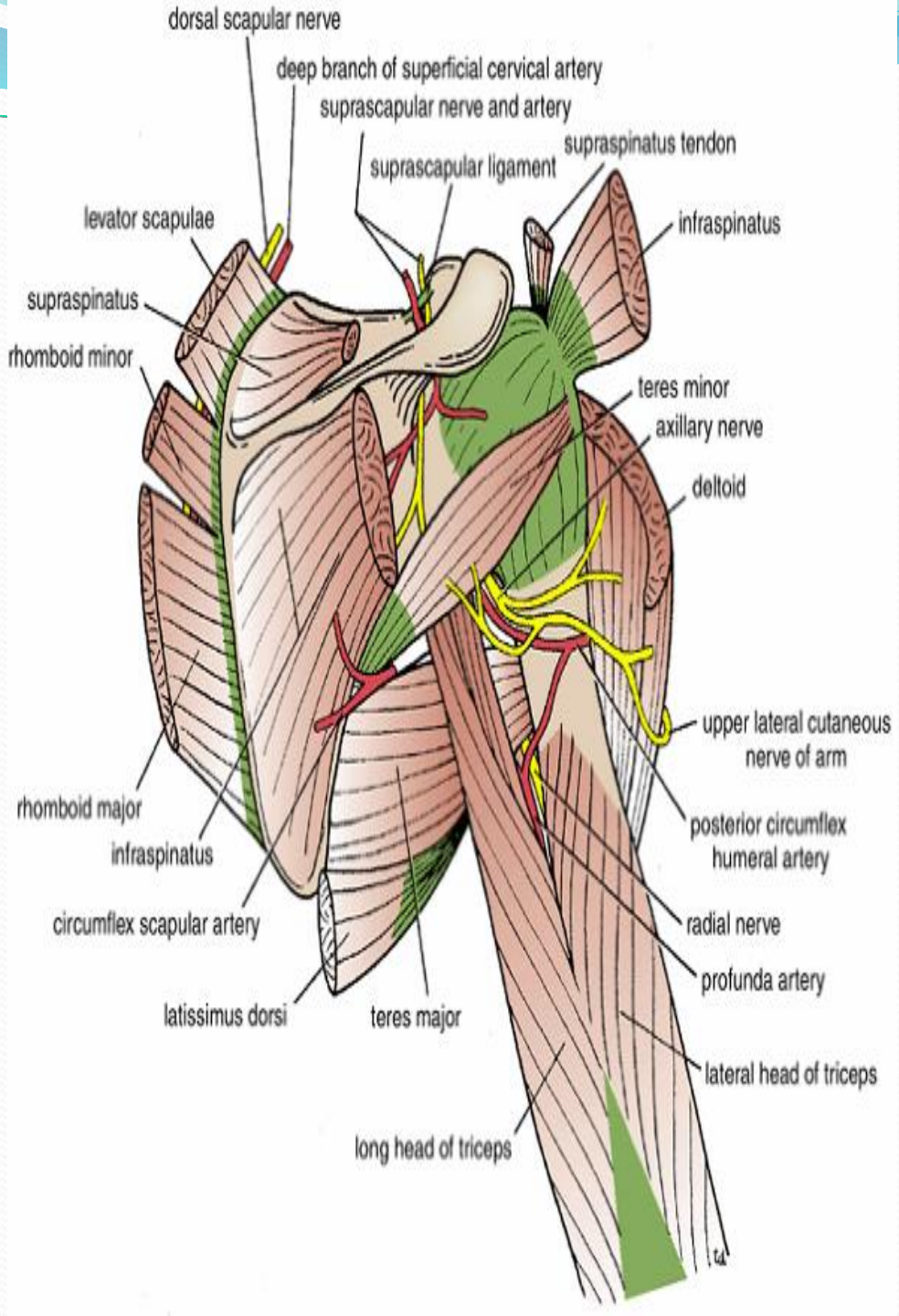
Suprascapular Nerve

- The suprascapular nerve arises from the upper trunk of the brachial plexus (C5 and 6) in the posterior triangle in the neck.
- It runs downward and laterally and passes beneath the suprascapular ligament, which bridges the suprascapular notch, to reach the supraspinous fossa.
- It supplies the supraspinatus and infraspinatus muscles and the shoulder joint.



Axillary nerve

- The axillary nerve arises from the posterior cord of the brachial plexus (C5 and 6) in the axilla.
- It passes backward and enters the quadrangular space with the posterior circumflex humeral artery.
- As the nerve passes through the space, it comes into close relationship with the inferior aspect of the capsule of the shoulder joint and with the medial side of the surgical neck of the humerus.
- It terminates by dividing into anterior and posterior branches.

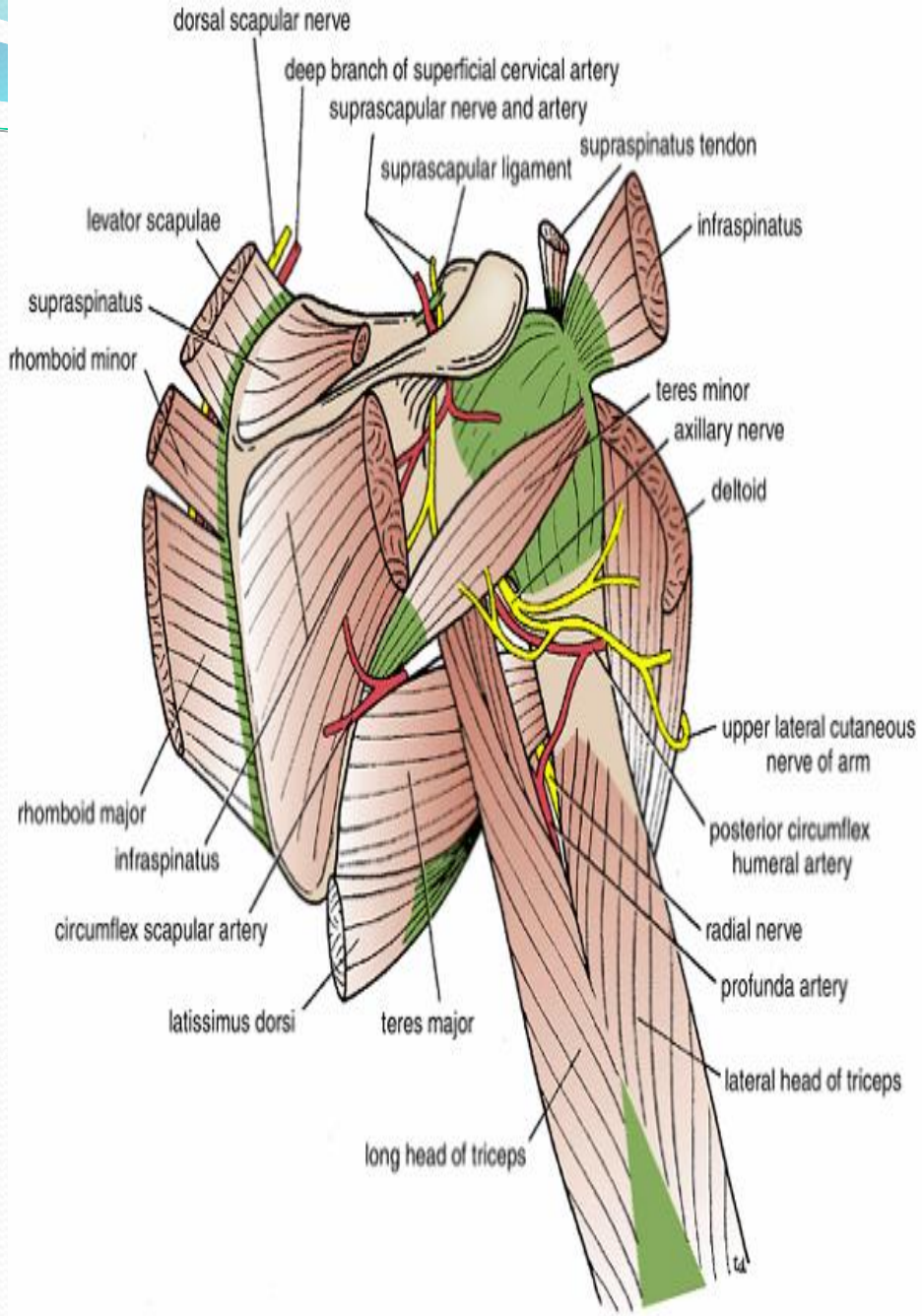


Branches of Axillary Nerve

The axillary nerve has the following branches:

- An **articular branch** to the shoulder joint
- An **anterior terminal branch**, which winds around the surgical neck of the humerus beneath the deltoid muscle; it supplies the deltoid and the skin that covers its lower part.
- A **posterior terminal branch**, which gives off a branch to the teres minor muscle and a few branches to the deltoid, then emerges from the posterior border of the deltoid as the **upper lateral cutaneous nerve of the arm**.

It is thus seen that the axillary nerve supplies the shoulder joint, two muscles, and the skin covering the lower half of the deltoid muscle.



* APPLIED ANATOMY : injury of axillary N.:-

- **Mechanism:**
  - Fracture of surgical neck of humerus
  - Dislocation of shoulder.
  - Compression by crutches.
- **Effect:**
  - ***Motor:**- paralysis of deltoid & Teres minor
    - Loss of abduction from 15 to 90
    - **Flat shoulder:** due to flatening of deltoid → prominent acromion.
  - ***Sensory:** loss of sensation over lower part of deltoid.