NERVE SUPPLY OF PECTORAL AND SCAPULAR REGION

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LECTURER KGMC ANATOMY DEPTT

Functions of the nerves in the upper limb

- The nerves entering the upper limb provide the following important functions:
- 1. Sensory innervation to the skin and deep structures, such as the joints;
- 2. Motor innervation to the muscles;
- 3. Influence over the diameters of the blood vessels by the sympathetic vasomotor nerves;
- 4. Sympathetic secretomotor supply to the sweat glands

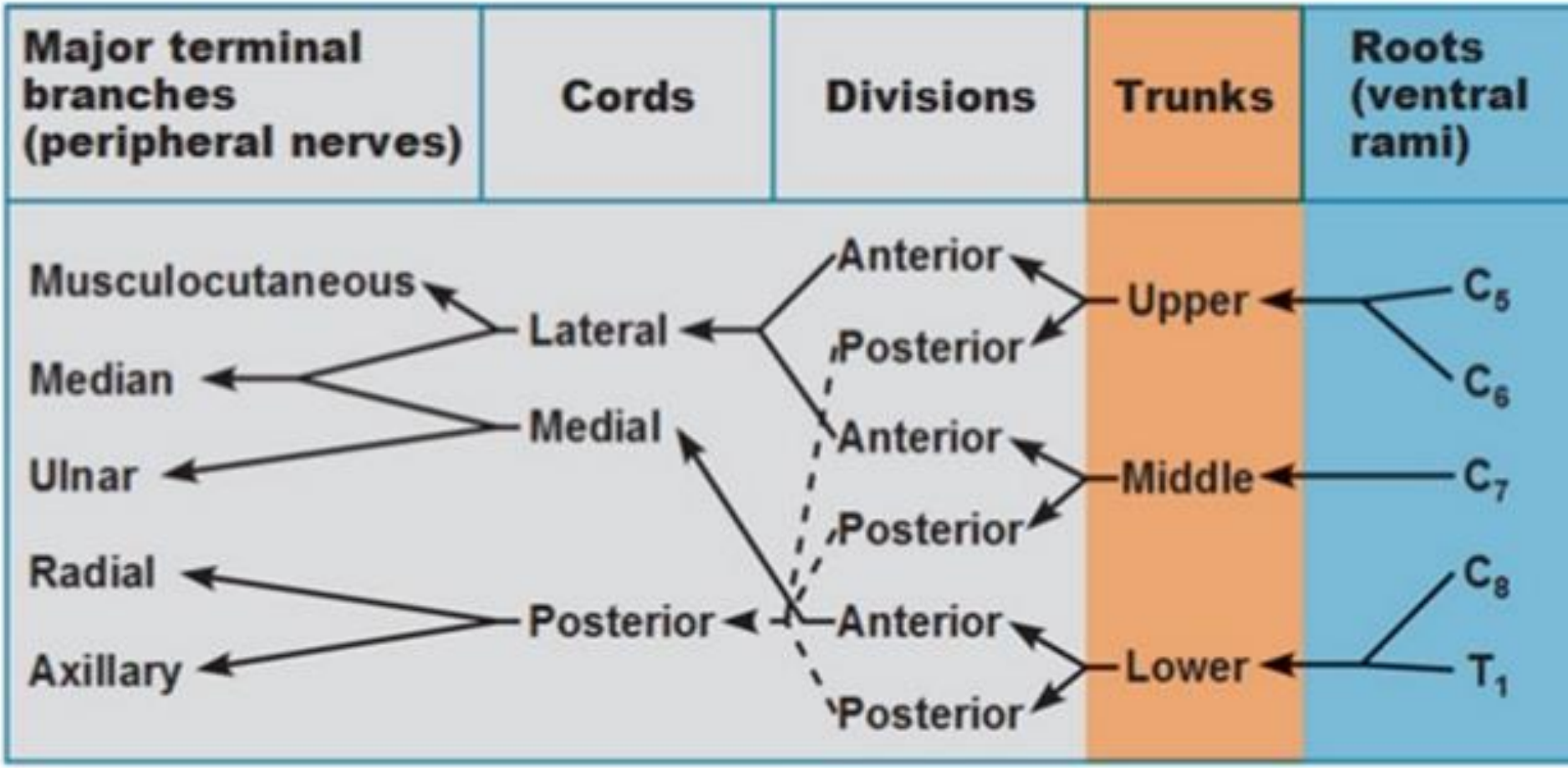
The brachial plexus

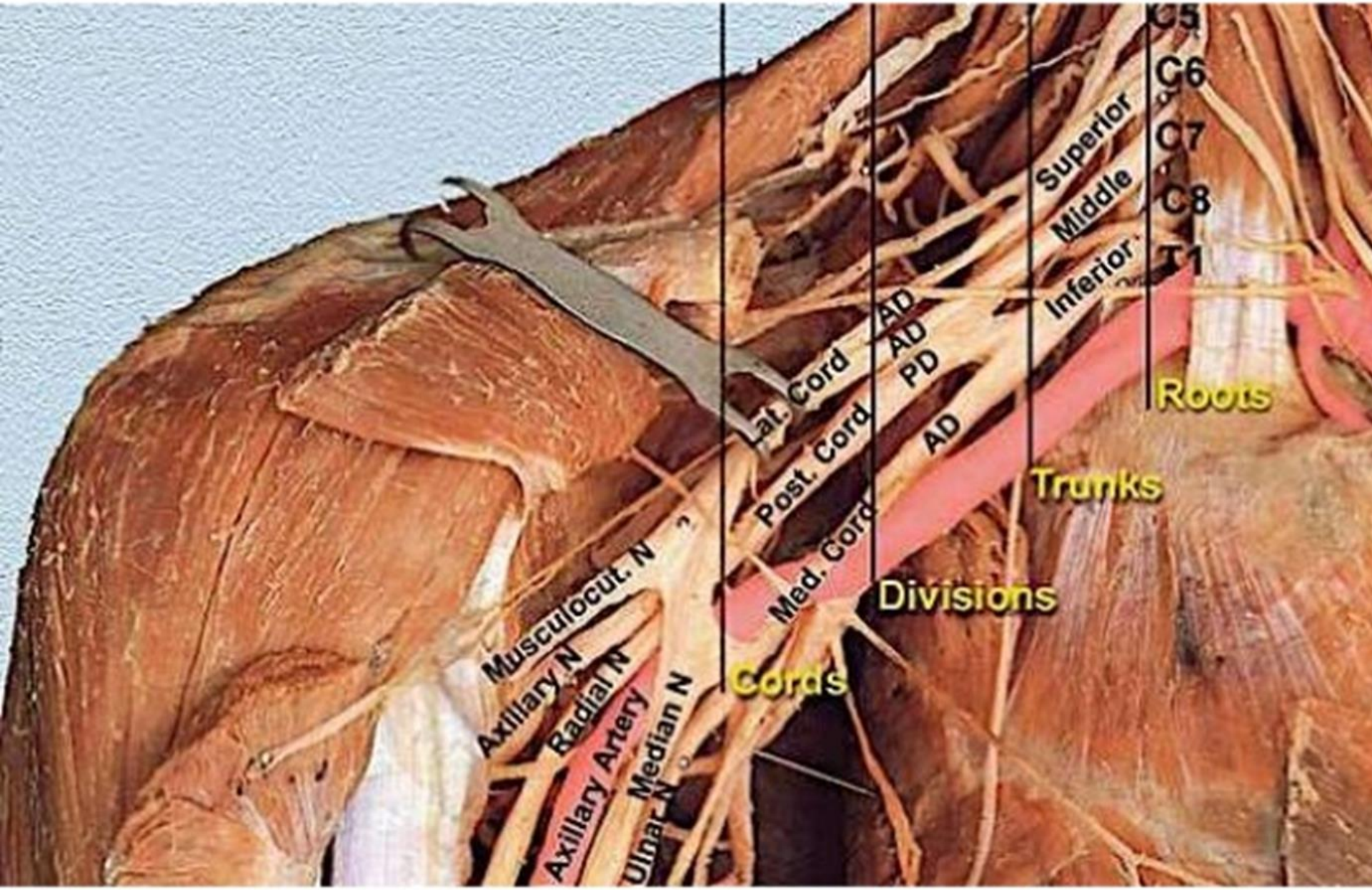
- The brachial plexus is a complicated plexus formed by the nerves at the root of the neck
- This allows the nerve fibers derived from different segments of the spinal cord to be arranged and distributed efficiently in different nerve trunks to the various parts of the upper limb

The brachial plexus

- The brachial plexus is formed in the posterior triangle of the neck by the union of the anterior rami of the 5^{th} , 6^{th} , 7^{th} , and 8^{th} cervical and the 1^{st} thoracic spinal nerves.
- The plexus can be divided into roots, trunks, divisions, and cords.

- **The plexus can be divided into roots, trunks, divisions and cords.**




C5
C6
C7
C8
T1
Superior
Middle
Inferior
AD
AD
PD
AD
Lat. Cord
Post. Cord
Med. Cord
Roots
Trunks
Divisions
Cords
Musculocut. N
Axillary N
Radial N
Axillary Artery
Median N
Ulnar N

BRANCHES

FROM ROOTS

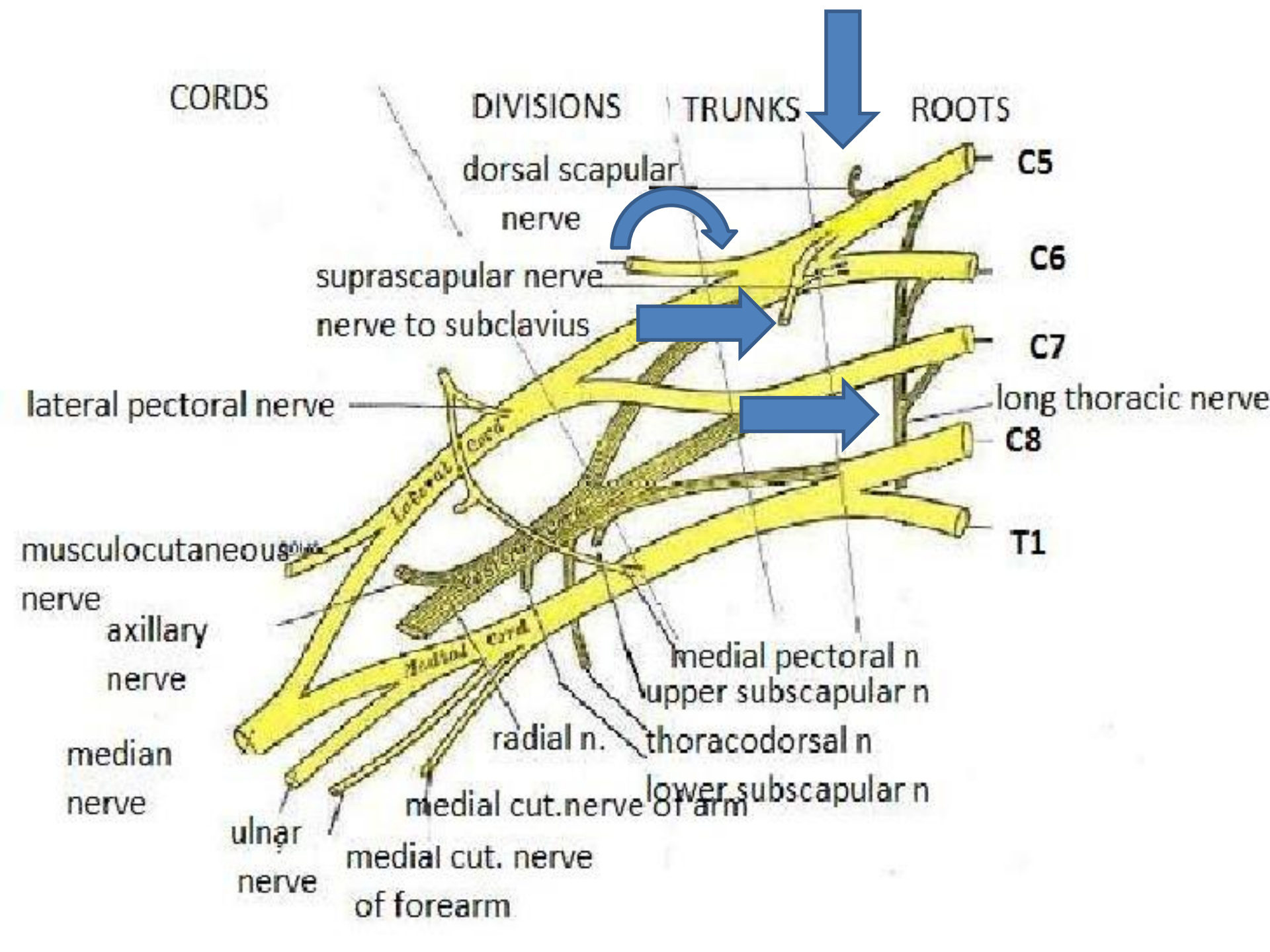
1. Dorsal scapular nerve C5
2. Nerve to subclavius C5, 6
3. Long thoracic nerve C5, 6, 7

- Unnamed muscular branches from all roots- scaleni / longus colli
- C5 root of Phrenic nerve

FROM TRUNKS (UPPER)

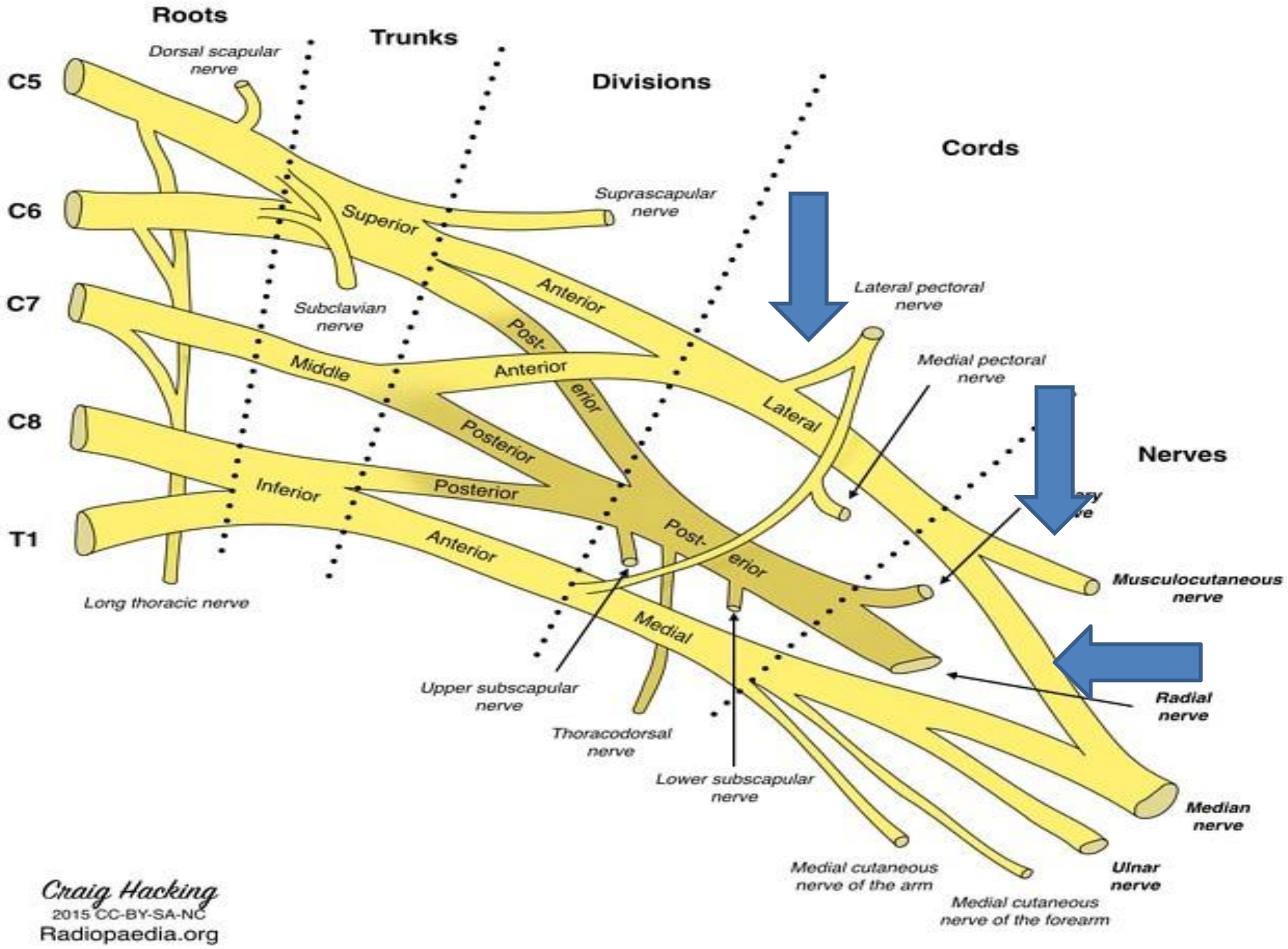
1. Suprascapular nerve C5, 6

❖ *No branches arise from Divisions*


CORDS
DIVISIONS
TRUNKS
ROOTS
dorsal scapular nerve
C5
suprascapular nerve
C6
nerve to subclavius
C7
lateral pectoral nerve
long thoracic nerve
C8
T1
musculocutaneous nerve
axillary nerve
medial pectoral n
upper subscapular n
radial n.
thoracodorsal n
median nerve
lower subscapular n
medial cut.nerve of arm
ulnar nerve
medial cut. nerve of forearm

BRACHIAL PLEXUS: NERVES FROM CORDS

Lateral cord	
Lateral pectoral	C5, 6, 7
Lateral root of median	C(5), 6, 7
Musculocutaneous	C5, 6, 7
Medial cord	
Medial pectoral	C8, T1
Medial root of median	C8, T1
Medial cutaneous N of forearm	C8, T1
Medial cutaneous N of arm	C8, T1
Ulnar	C(7), 8, T1
Posterior cord	
Upper subscapular	C5, 6
Thoracodorsal	C6, 7,8
Lower suscapular	C5, 6


Roots
Trunks
Divisions
Cords
Nerves
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C6
C7
C8
T1
Dorsal scapular nerve
Suprascapular nerve
Superior
Anterior
Subclavian nerve
Post-
Middle
Anterior
Lateral pectoral nerve
Medial pectoral nerve
Lateral
erior
Posterior
Inferior
Posterior
Post-
Anterior
erior
Musculocutaneous nerve
Long thoracic nerve
Medial
Upper subscapular nerve
Radial nerve
Thoracodorsal nerve
Lower subscapular nerve
Median nerve
Medial cutaneous nerve of the arm
Ulnar nerve
Medial cutaneous nerve of the forearm
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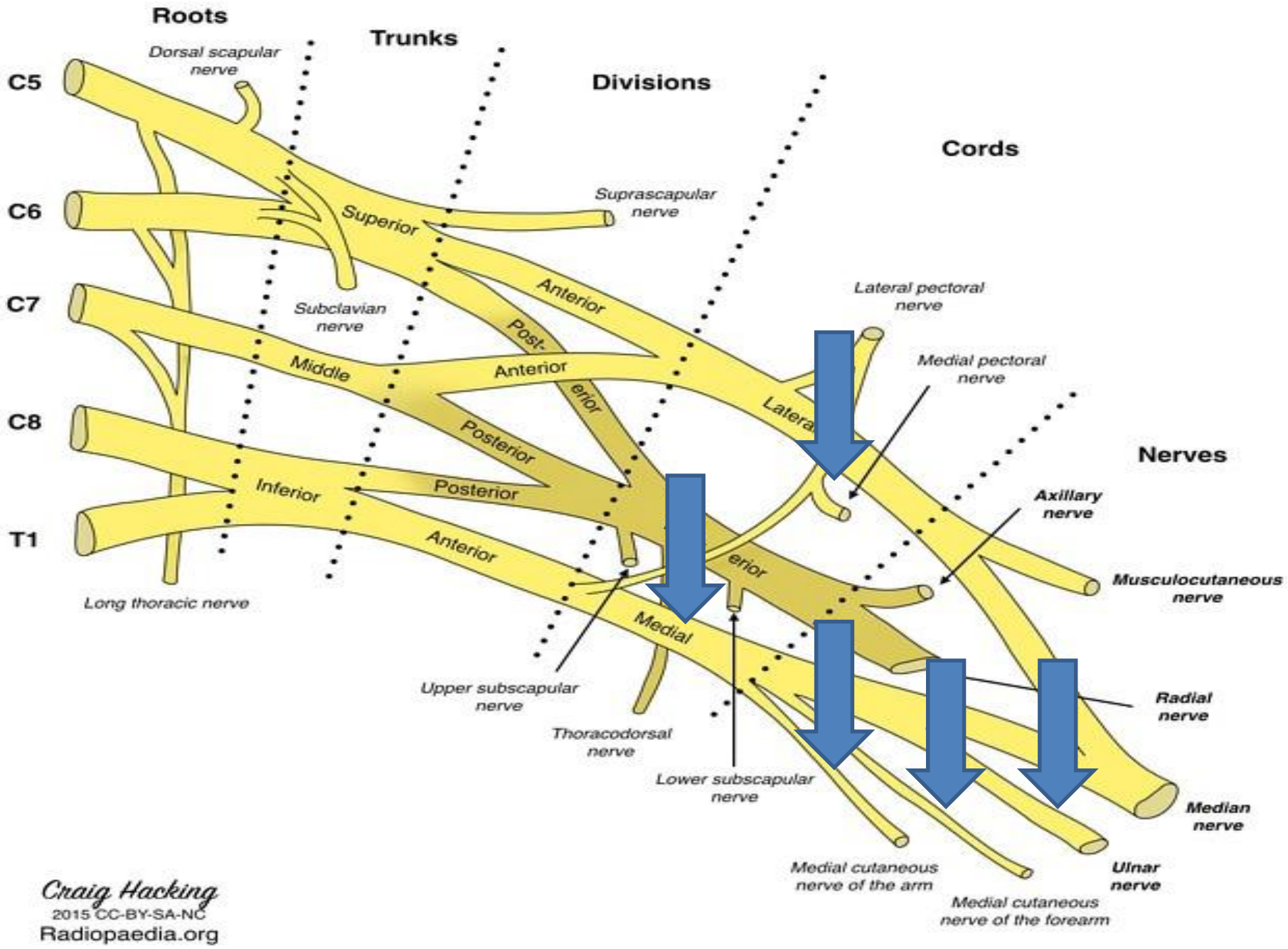
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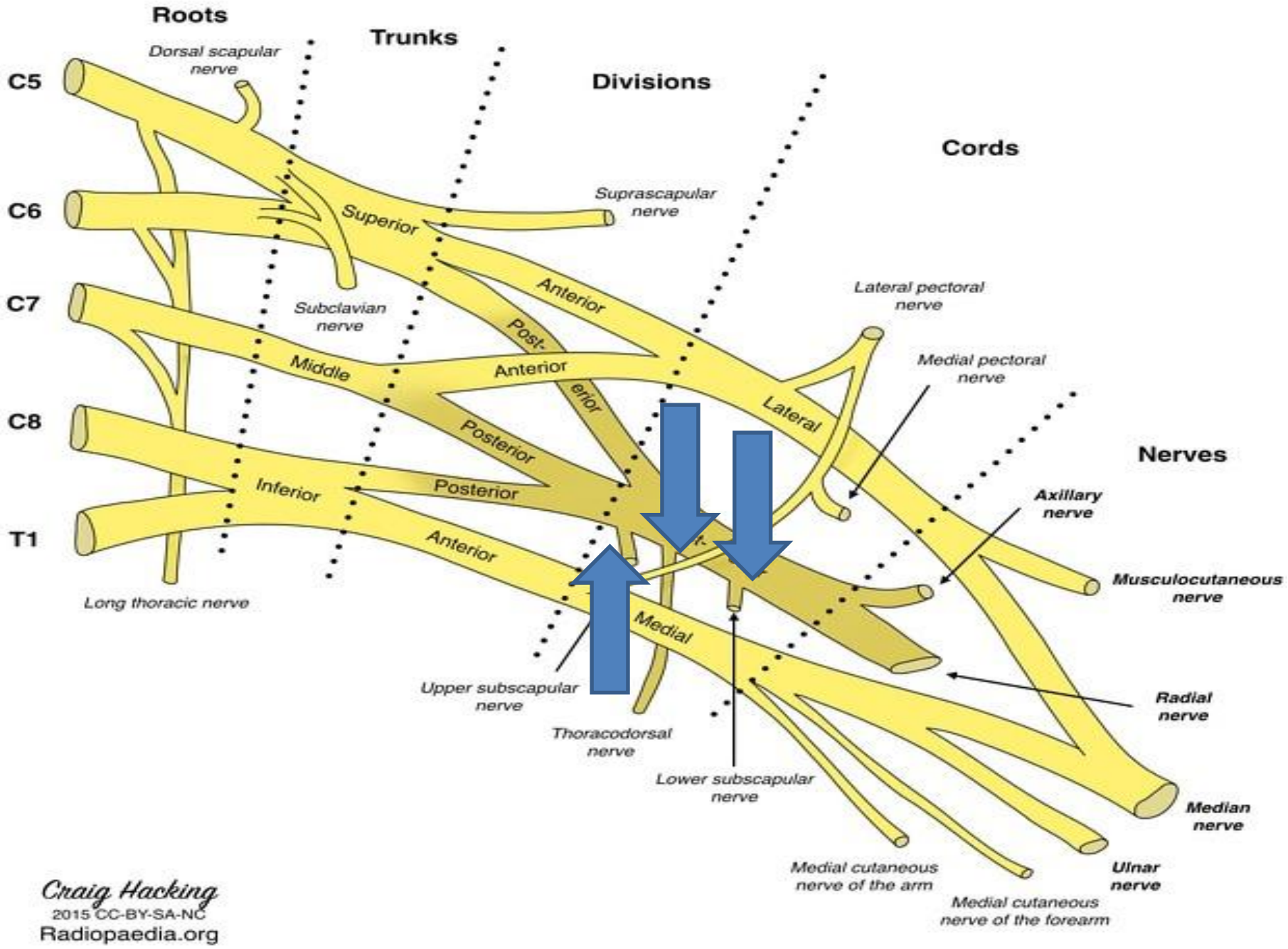
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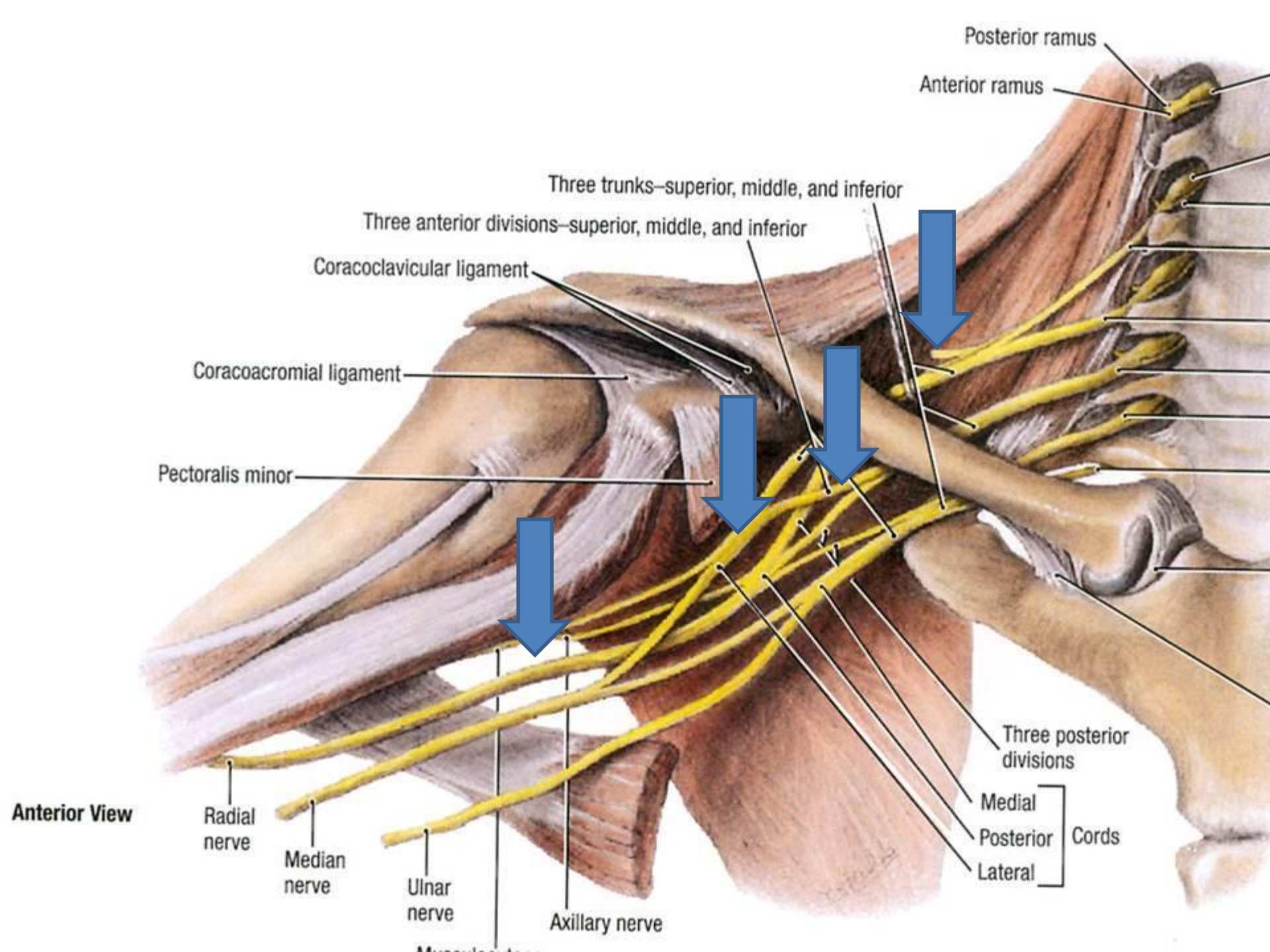
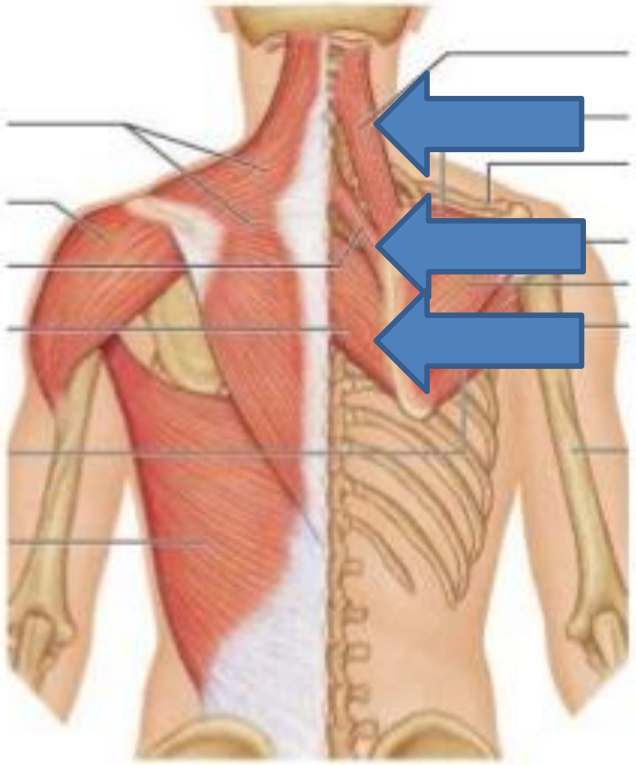

Posterior ramus
Anterior ramus
Three trunks–superior, middle, and inferior
Three anterior divisions–superior, middle, and inferior
Coracoclavicular ligament
Coracoacromial ligament
Pectoralis minor
Three posterior divisions
Medial
Posterior
Lateral
Cords
Radial nerve
Median nerve
Ulnar nerve
Axillary nerve
Anterior View

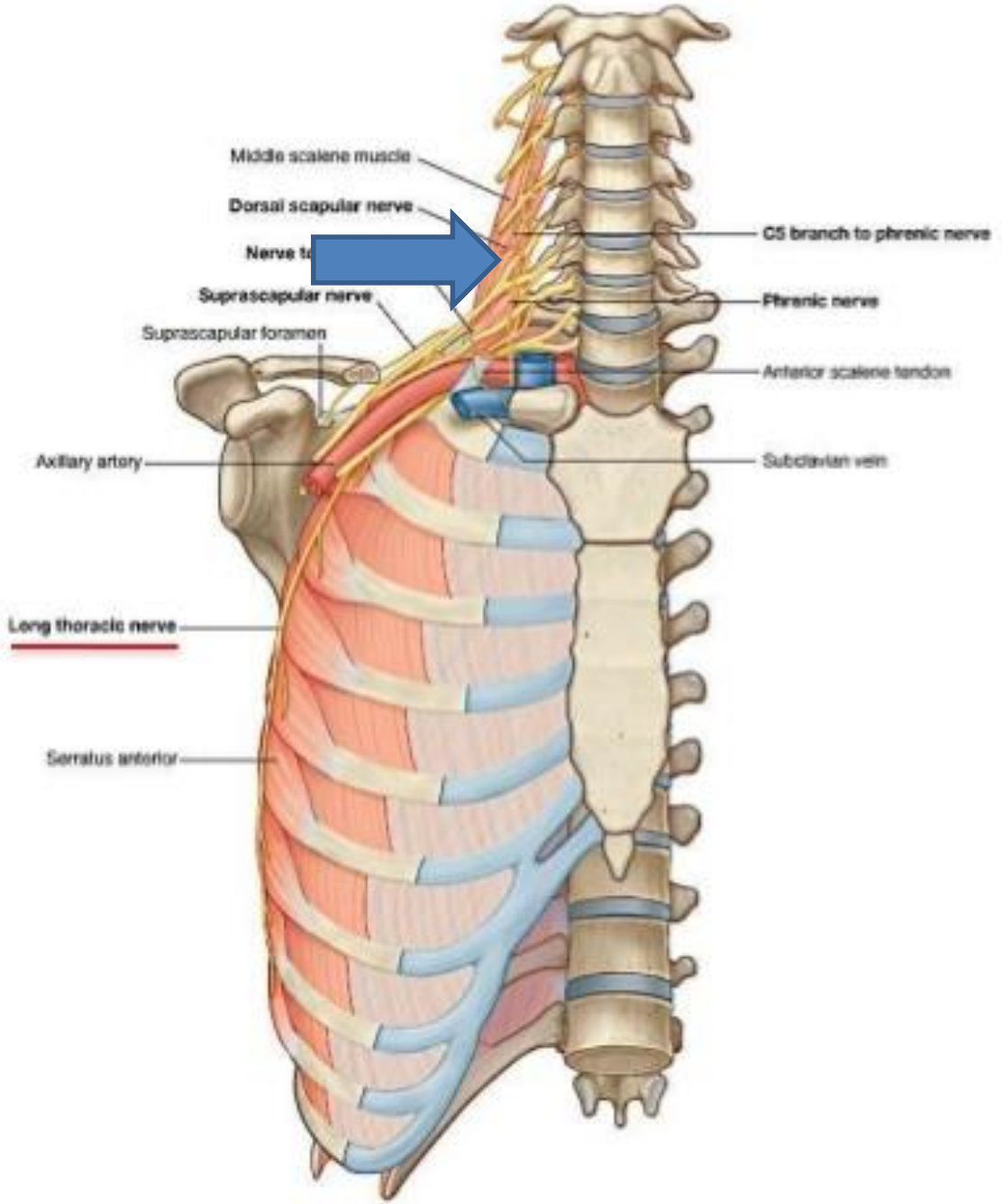
DISTRIBUTION OF MAIN NERVES

- MUSCULOCUTANEOUS
  - Muscles of Anterior Compartment of arm (flexors)
- MEDIAN
  - Most Flexor muscles of forearm & Intrinsic muscles in hand
- ULNAR
  - FCU & part of FDP (forearm) and Intrinsic muscles in hand
- AXILLARY
  - Deltoid & Teres minor
- RADIAL
  - Innervates all Extensor muscles of arm & forearm

DORSAL SCAPULAR NERVE

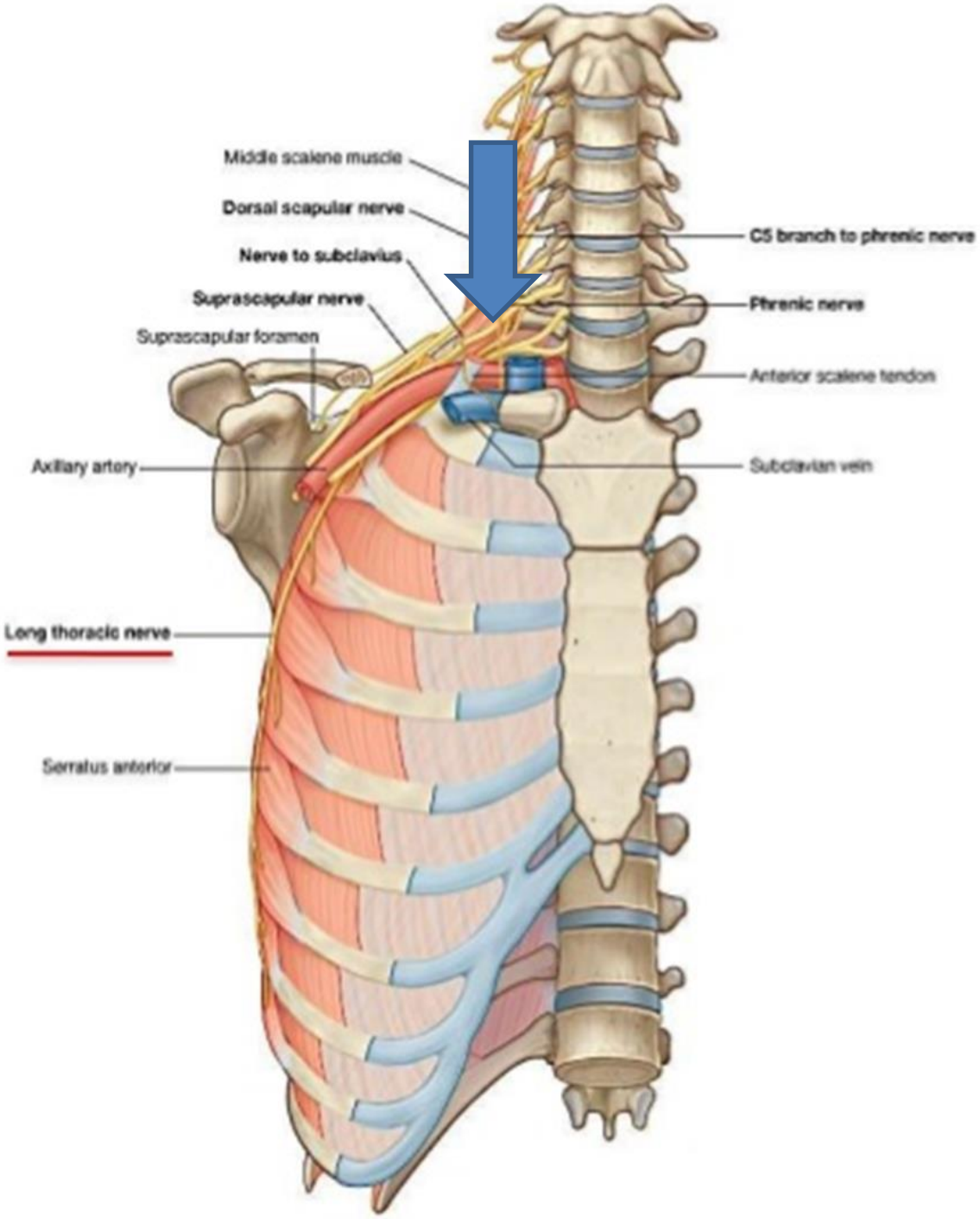
- arise from C 5 roots posterior aspect
- Run down deep to levator scapulae and two rhomboids.
- Supply
  - levator scapulae and two rhomboids



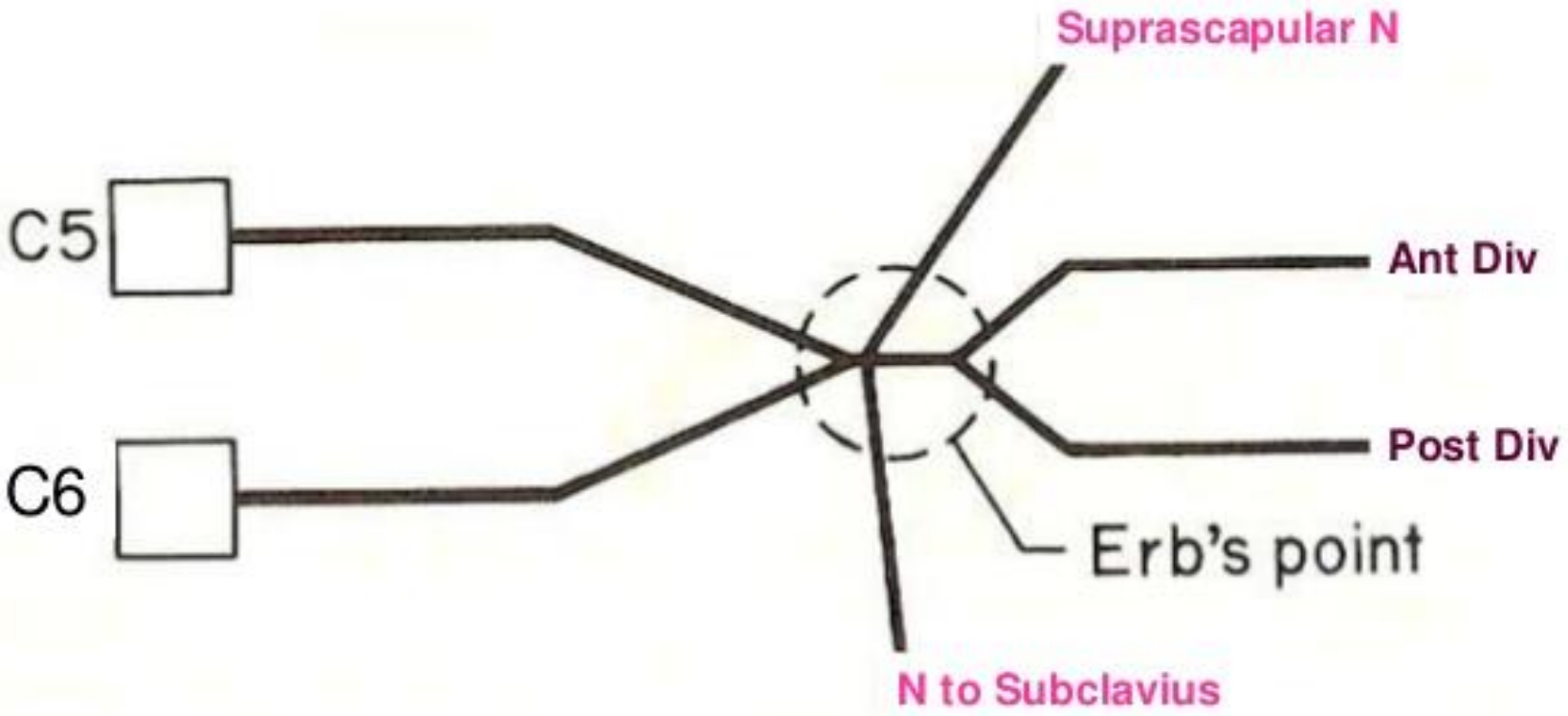


NERVE TO SUBCLAVIUS

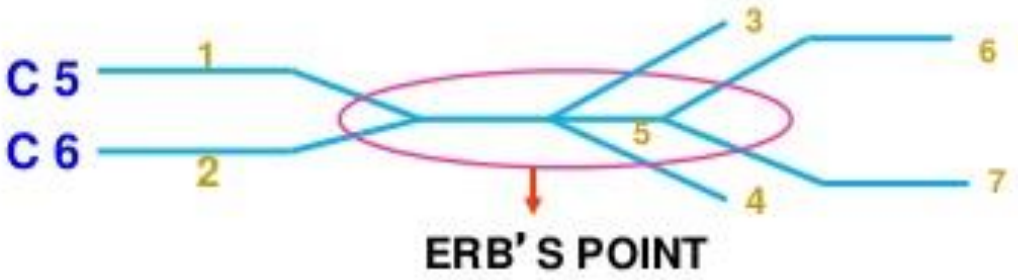
- Small & arises near the junction of C5 and C6 ventral rami (ERBS POINT)
- Descends anterior to the trunks of plexus and Subclavian vessels
- connected to Phrenic nerve (if it contains fibres of accessory phrenic nerve.)
- Supply Subclavius.


Middle scalene muscle
Dorsal scapular nerve
Nerve to subclavius
Suprascapular nerve
Suprascapular foramen
Axillary artery
Long thoracic nerve
Serratus anterior
C5 branch to phrenic nerve
Phrenic nerve
Anterior scalene tendon
Subclavian vein

ERB'S POINT


Suprascapular N
C5
C6
Ant Div
Post Div
Erb's point
N to Subclavius

Upper trunk lesions: ERB'S PALSY



- Cause of injury
  - Forceful separation of head from shoulder e.g. during birth
  - fall on shoulder.
- Nerve roots involved - C5, C6
- position of limb-
  - Arm hangs by side - Adducted - (no abduction)
  - medially rotated -(no lateral rotation)
  - Extension at elbow.- (no flexion)
  - Forearm is pronated.- (no supination)
- POLICEMAN'S TIP OR WAITER TIP HAND

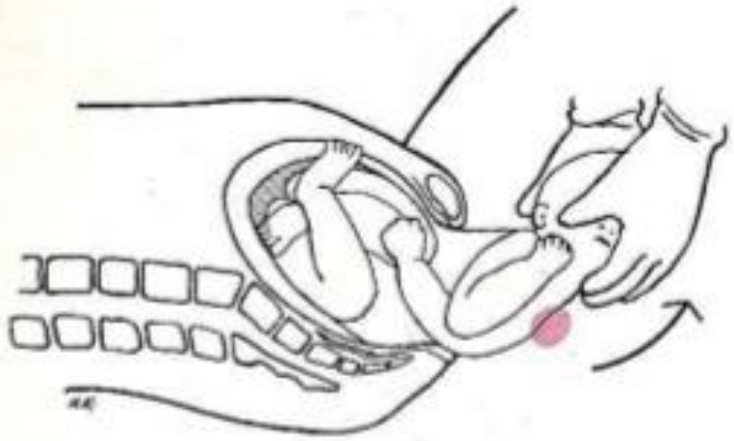
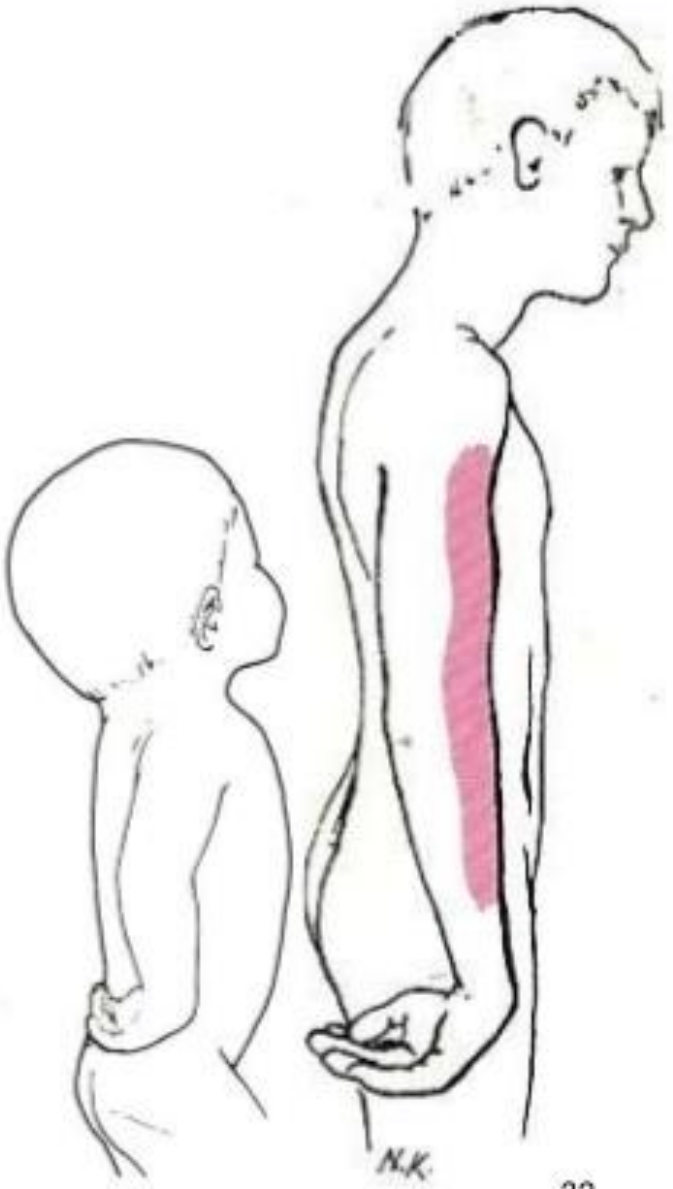
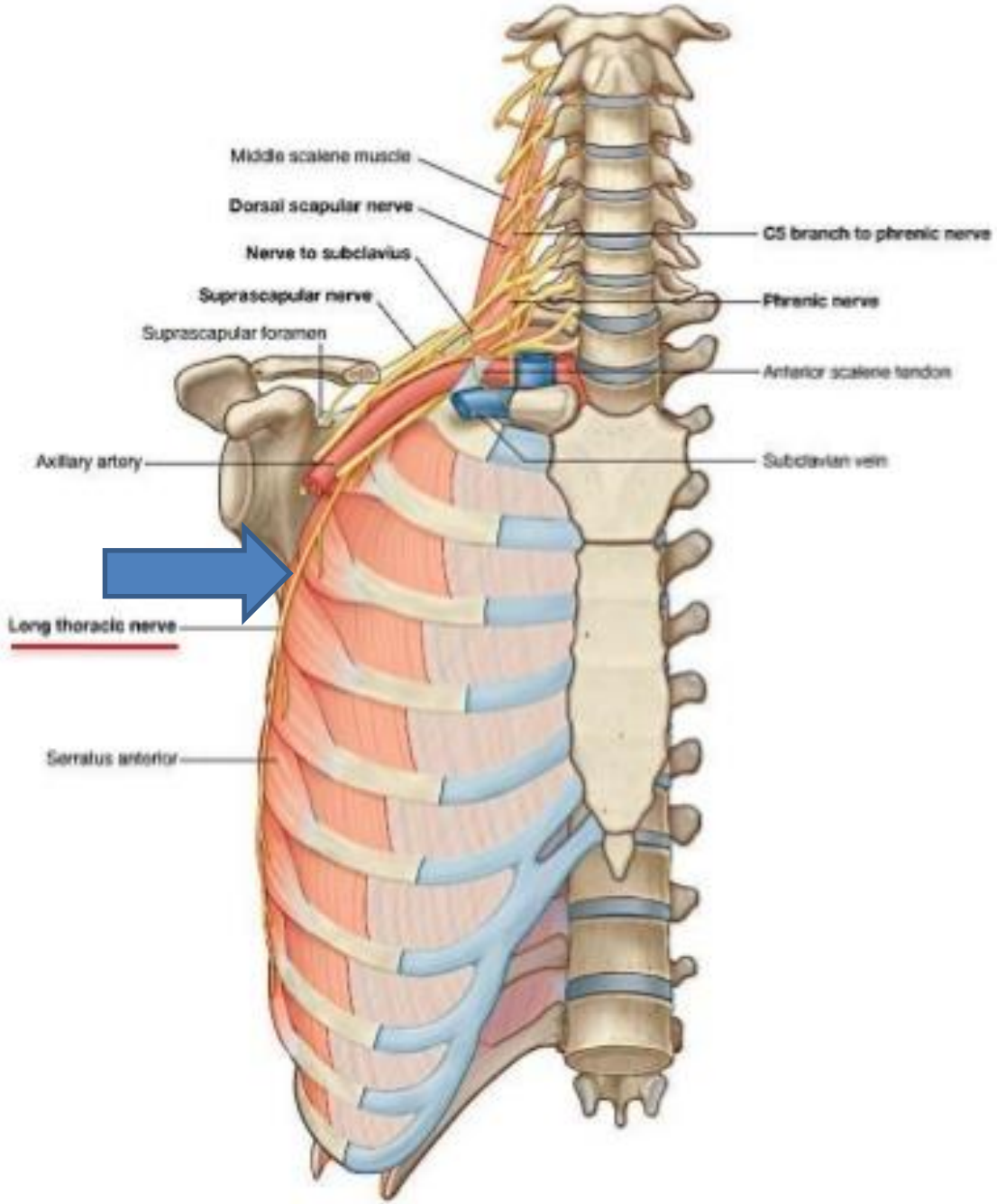


Figure 6-25. The superior part of the brachial plexus may be injured by violent stretching of the neck during delivery of a baby.



LONG THORACIC NERVE

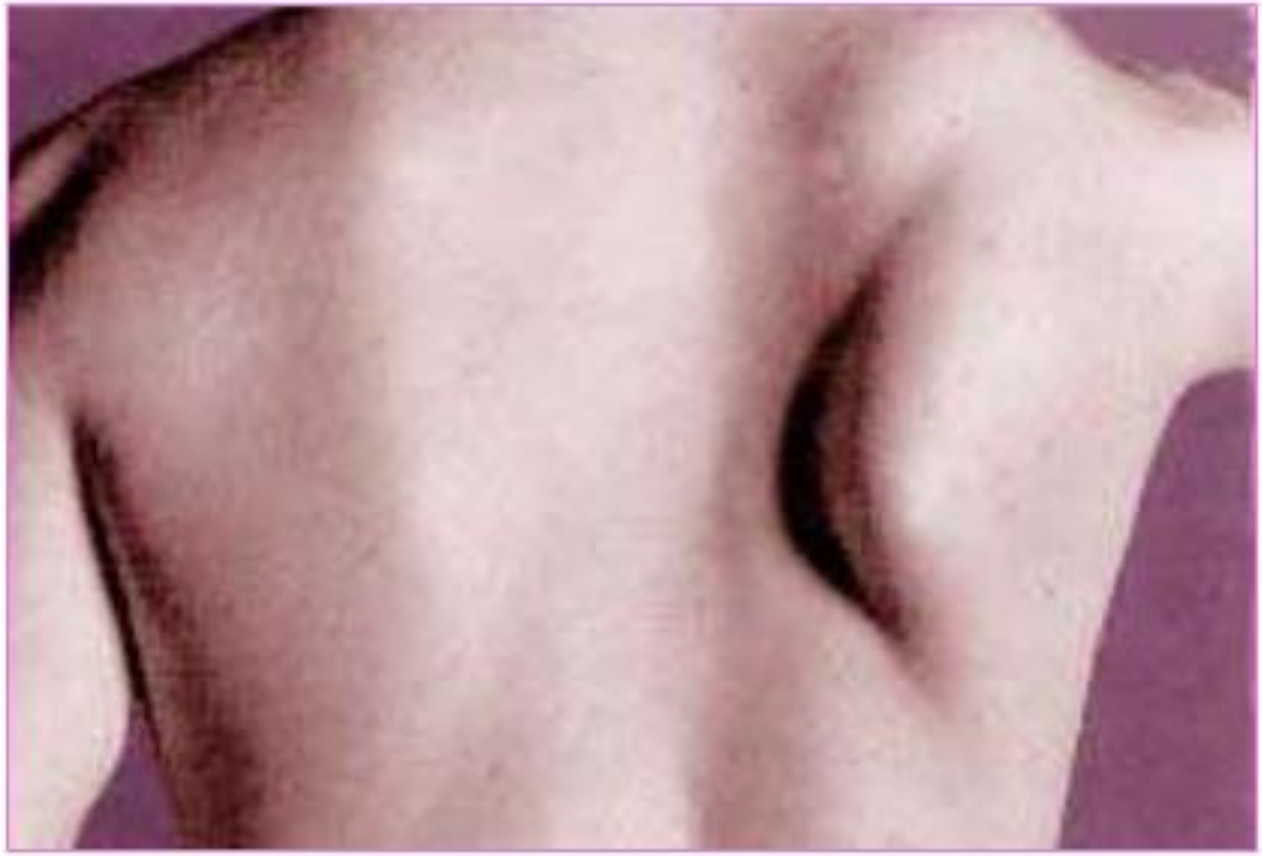
- Arises from roots C 5,6,7
- Forms on first digitations of serratus anterior muscle
- run vertically downwards just behind the mid axillary line.
- Nerve supply
  - C5 – supply first two digitations,
  - C6 – next two digitations,
  - C7 – lowest four digitations.



Lesion of long thoracic nerve

- CAUSES
  - Sudden heavy loads on shoulder
  - Carrying heavy loads on shoulder
- Symptom and sign
  - Winging of scapula
  - prominence of medial border of scapula
  - Loss of pushing and punching actions.
  - Abduction of arm affected.

- Demonstrated by
  - asking the patient to push against resistance with the forearm extended at the elbow and flexed to 90° at the shoulder.



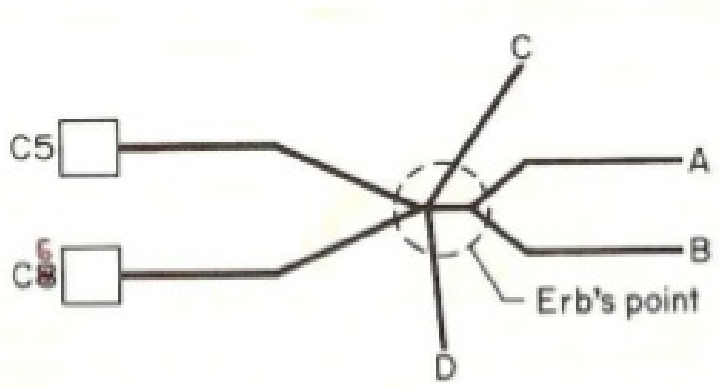
Winging of scapula

SUPRASCAPULAR NERVE

– Derived from upper trunk C5,6 at erb's point

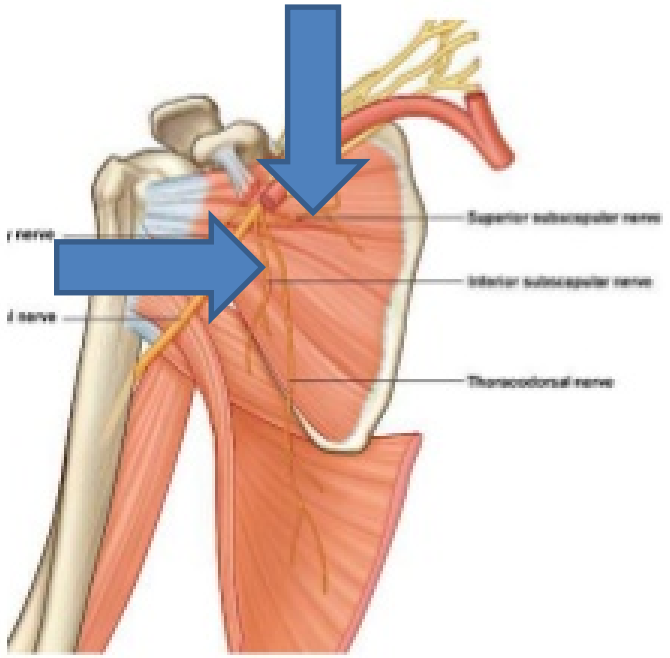
– Supplies

- Supraspinatus,
- Infraspinatus
- Articular rami to Shoulder and Acromio clavicul



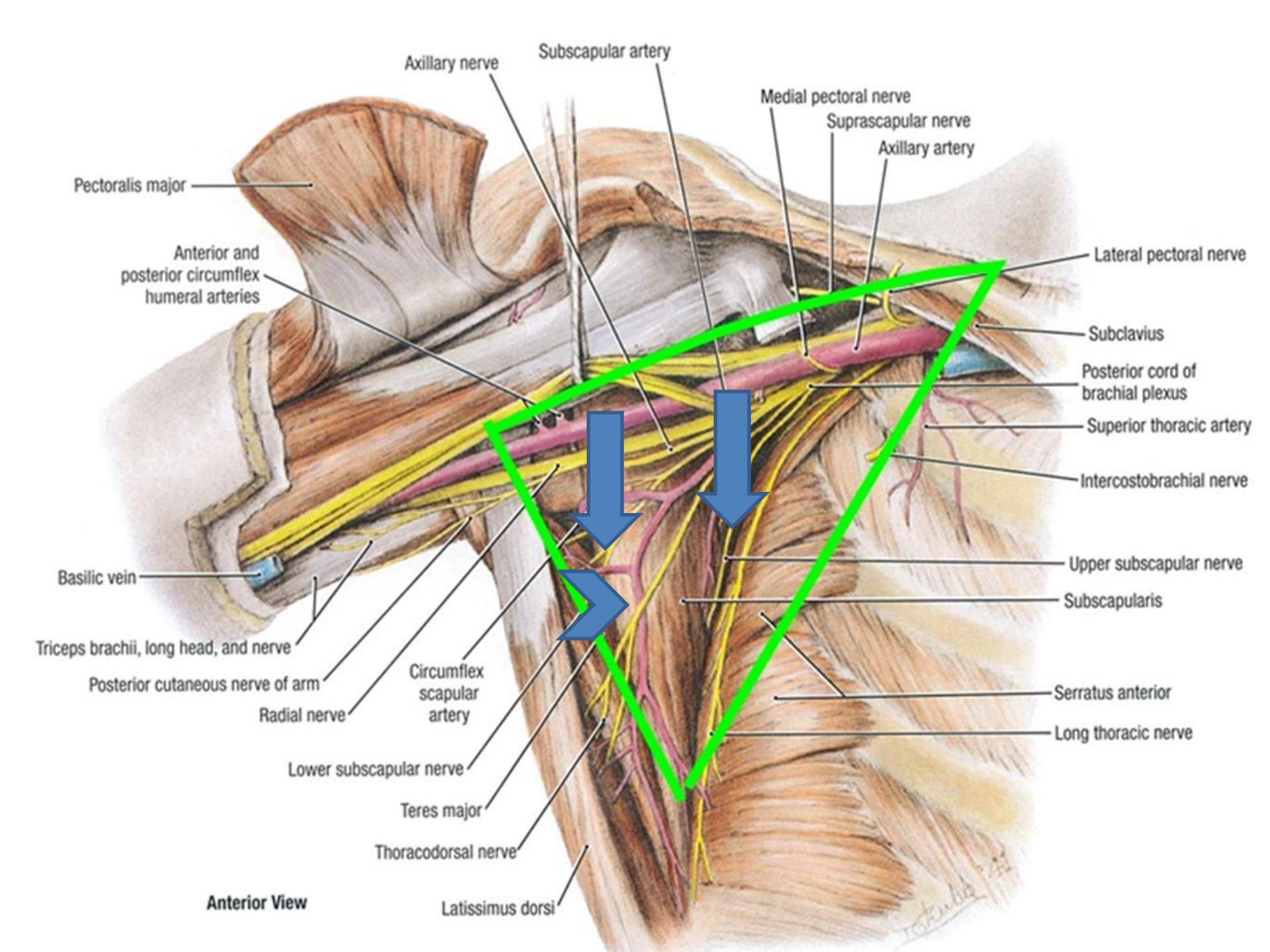
1. **UPPER SUBSCAPULAR NERVE**
    - Smaller than lower.
    - Enters Subscapularis at a high level.
    - Frequently double.
    - Supplies subscapularis

2. **LOWER SUBSCAPULAR NERVE**
    - Pass deep to sub scapular art.
    - Supplies
        - Subscapularis (lower part)
        - Teres major



THORACODORSAL NERVE

- Arises between upper and lower Sub scapular nerves .
- Accompanies sub scapular artery along posterior axillary wall.
- Supplies Latissimus dorsi.

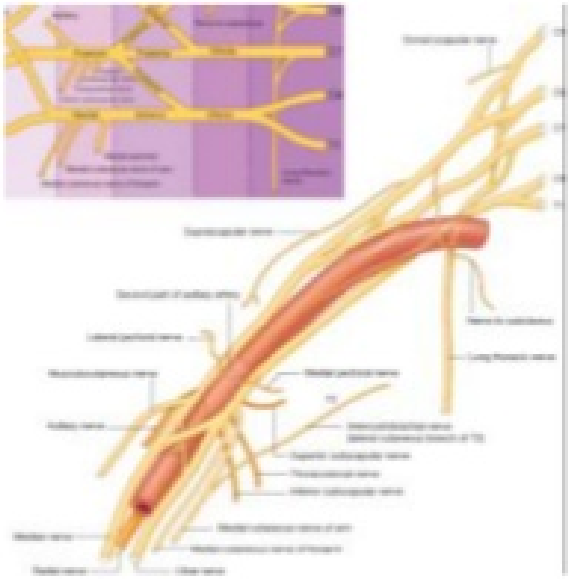

Axillary nerve
Subscapular artery
Medial pectoral nerve
Suprascapular nerve
Axillary artery
Pectoralis major
Anterior and posterior circumflex humeral arteries
Lateral pectoral nerve
Subclavius
Posterior cord of brachial plexus
Superior thoracic artery
Intercostobrachial nerve
Basilic vein
Upper subscapular nerve
Subscapularis
Triceps brachii, long head, and nerve
Posterior cutaneous nerve of arm
Radial nerve
Circumflex scapular artery
Serratus anterior
Long thoracic nerve
Lower subscapular nerve
Teres major
Thoracodorsal nerve
Latissimus dorsi
Anterior View

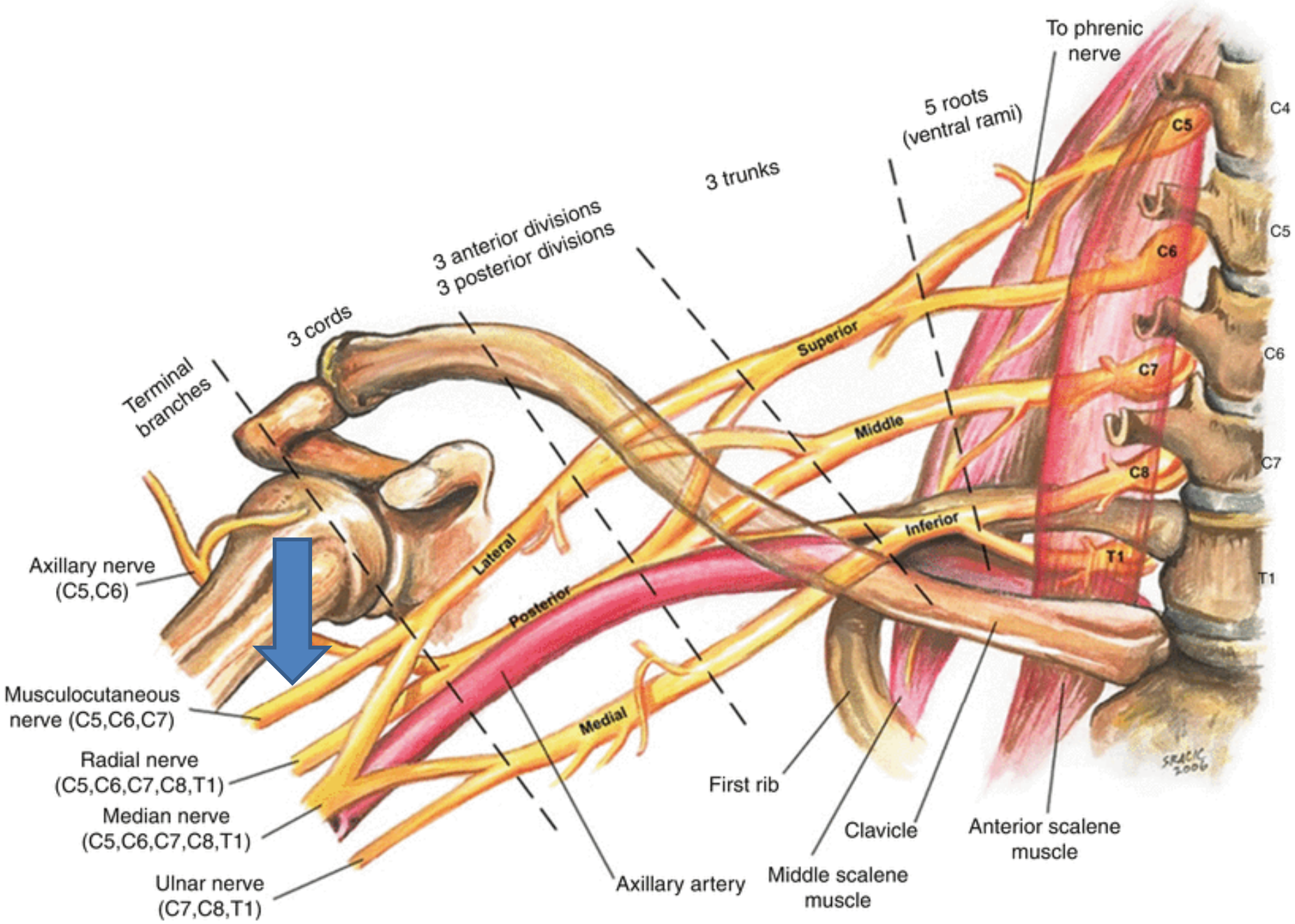
MUSCULOCUTANEOUS NERVE

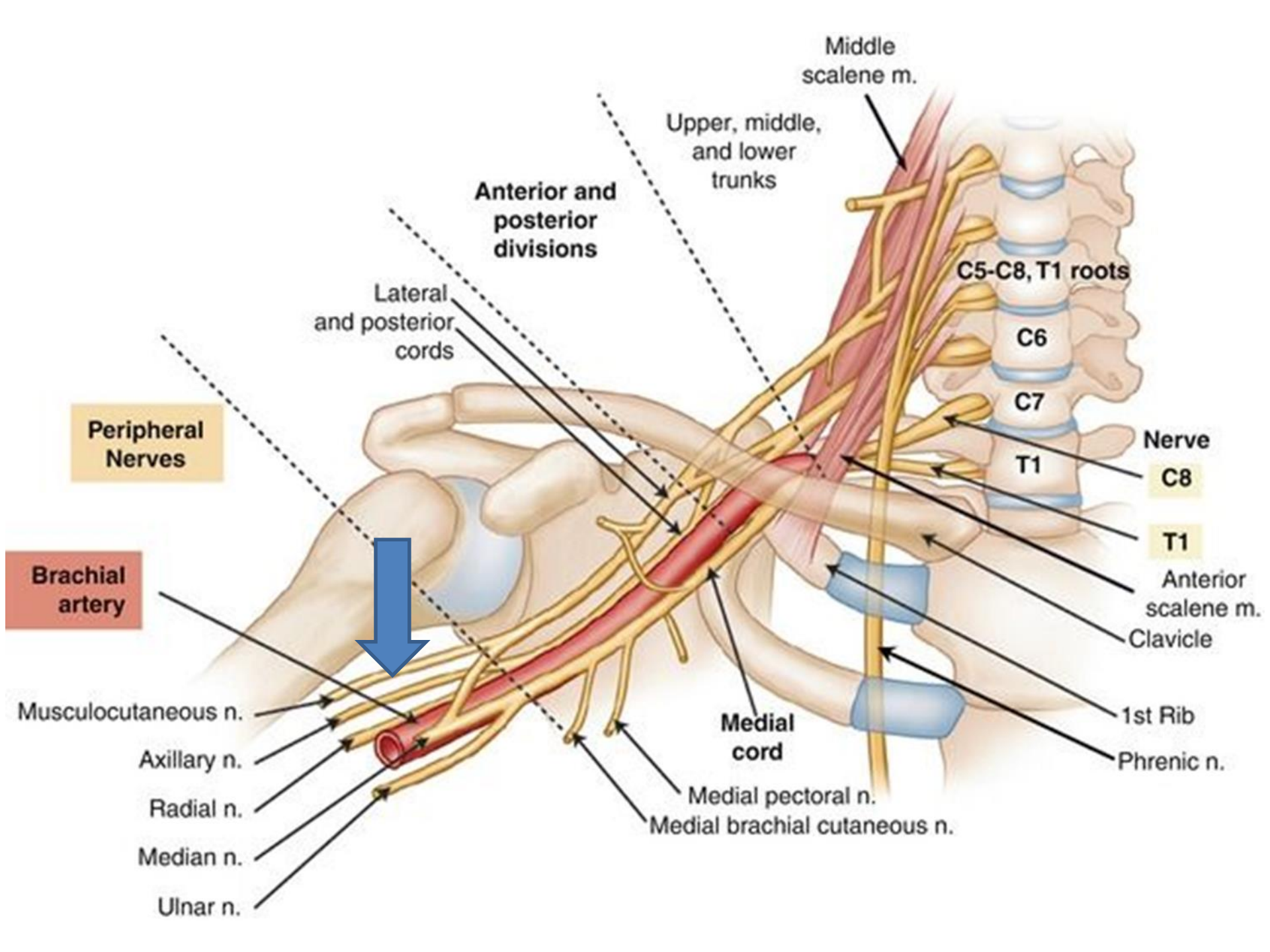
- Arise opposite lower border of Pectoralis Minor.
- Derived from C5-C7 cervical ventral rami

Course :

- Supplies Coracobrachialis and then pierces it.
- Descends laterally between Biceps and Brachialis to lateral side of arm.
- Just below elbow it pierces deep fascia.
- Continues as lateral cutaneous nerve of forearm..

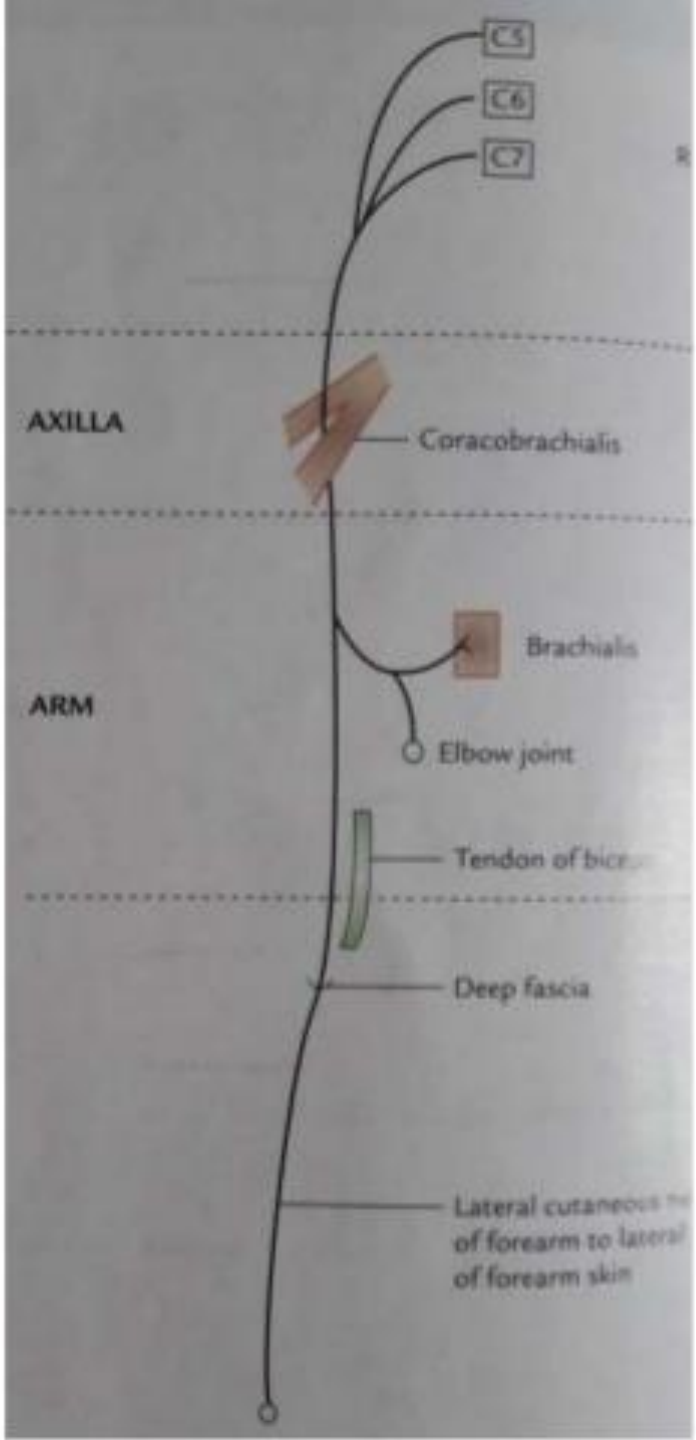



To phrenic nerve
5 roots (ventral rami)
3 trunks
3 anterior divisions
3 posterior divisions
3 cords
Terminal branches
Superior
Middle
Inferior
Lateral
Posterior
Medial
C4
C5
C6
C7
C8
T1
Axillary nerve (C5,C6)
Musculocutaneous nerve (C5,C6,C7)
Radial nerve (C5,C6,C7,C8,T1)
Median nerve (C5,C6,C7,C8,T1)
Ulnar nerve (C7,C8,T1)
Axillary artery
First rib
Middle scalene muscle
Clavicle
Anterior scalene muscle


Middle scalene m.
Upper, middle, and lower trunks
Anterior and posterior divisions
Lateral and posterior cords
C5-C8, T1 roots
C6
C7
T1
Nerve
C8
T1
Peripheral Nerves
Brachial artery
Anterior scalene m.
Clavicle
1st Rib
Phrenic n.
Musculocutaneous n.
Axillary n.
Radial n.
Median n.
Ulnar n.
Medial cord
Medial pectoral n.
Medial brachial cutaneous n.

– Supplies –

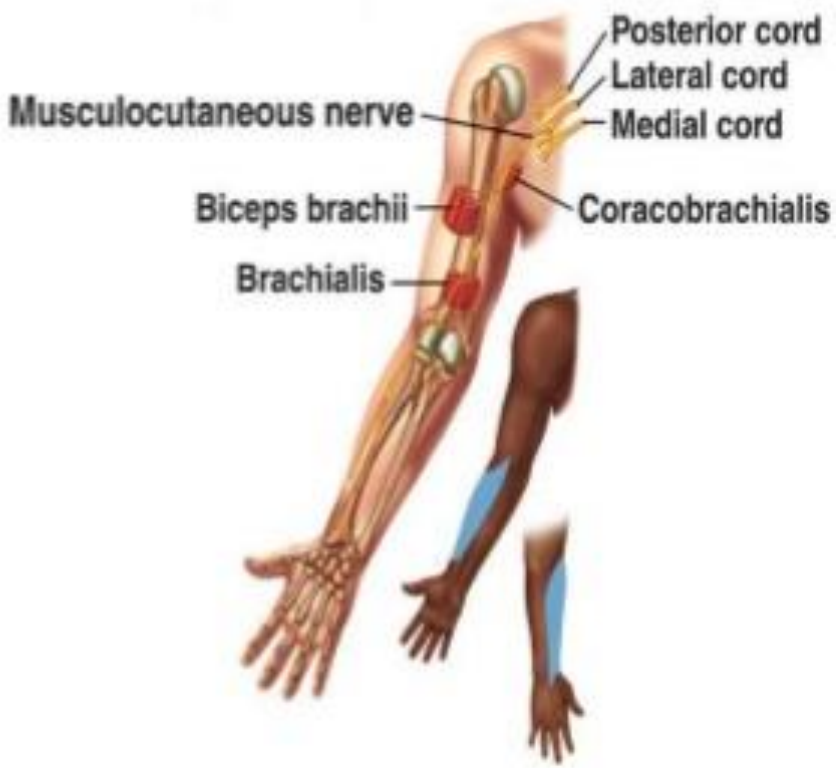
- Coracobrachialis,
- Biceps and
- most of Brachialis.
- Branch to Brachialis supplies Elbow joint.
- Br to humerus via nutrient art



LESIONS OF MUSCULOCUTANEOUS NERVE

Commonest causes

- Isolated lesion is rare.
- injuries to
  - upper arm and
  - shoulder including fracture of humerus.



LESIONS OF MUSCULOCUTANEOUS NERVE

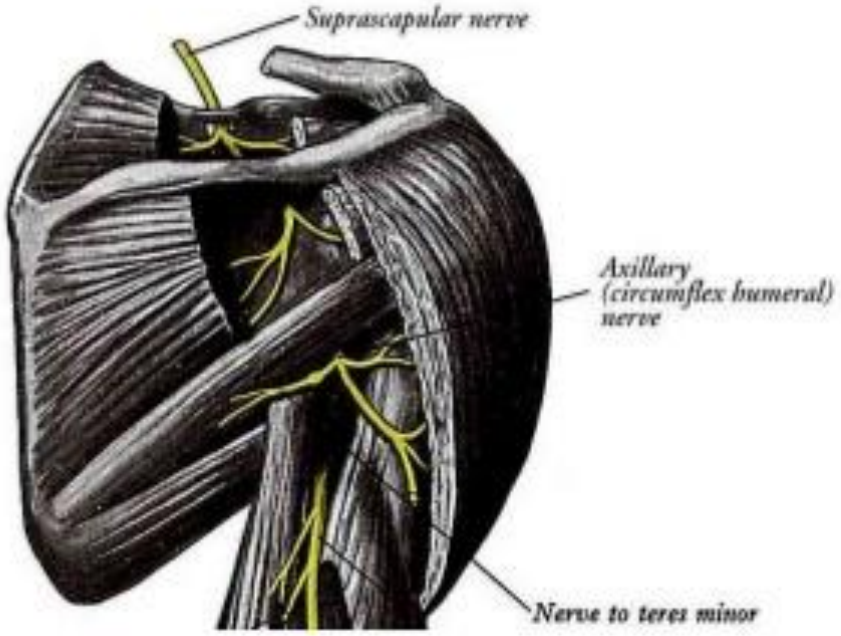
Symptom and sign

- Marked weakness of elbow flexion
  - because of *paralysis* of
    - biceps brachii and much of
    - brachialis

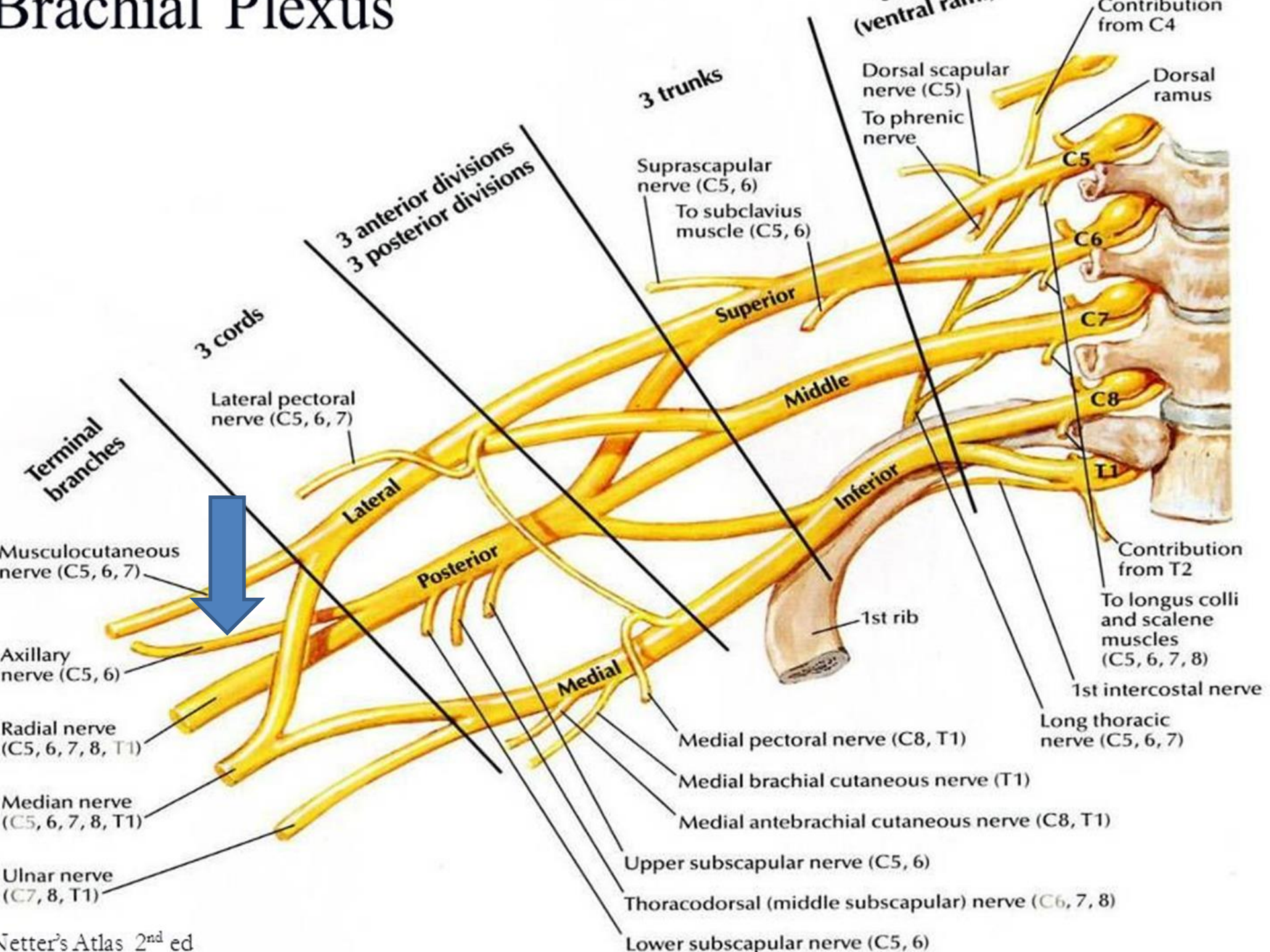
- Sensory impairment
  - on the extensor aspect of the forearm in the distribution of lateral cutaneous nerve of the forearm.

AXILLARY (CIRCUMFLEX) NERVE

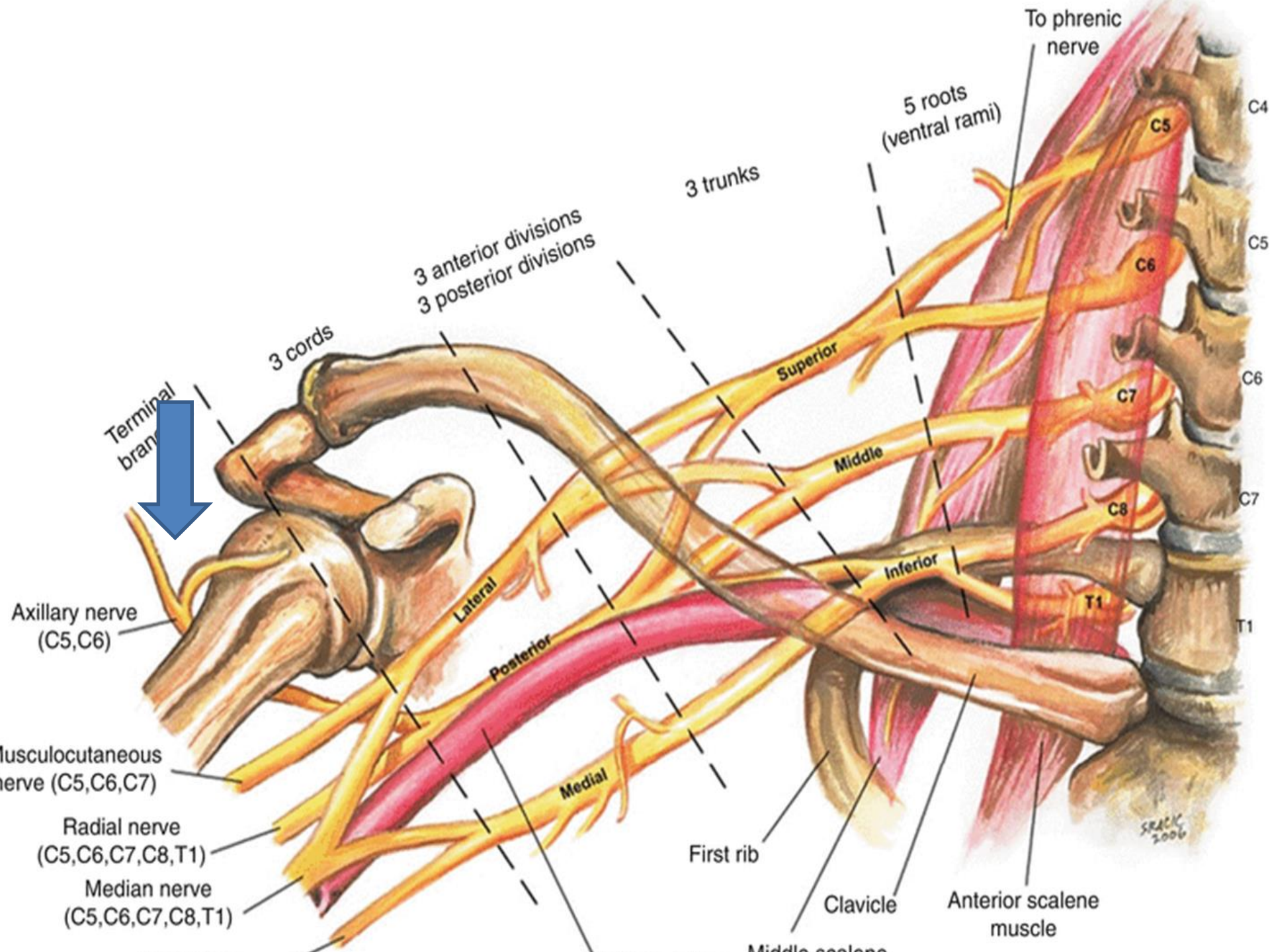
- From posterior cord (C5 - C6) .
- Posterior to Axillary artery (3rd part) and anterior to Subscapularis,
- Above posterior circumflex humeral vessels, traverses **quadrangular space.**
- Axillary trunk <u>supplies</u> a branch to shoulder joint.



Brachial Plexus



Netter's Atlas 2nd ed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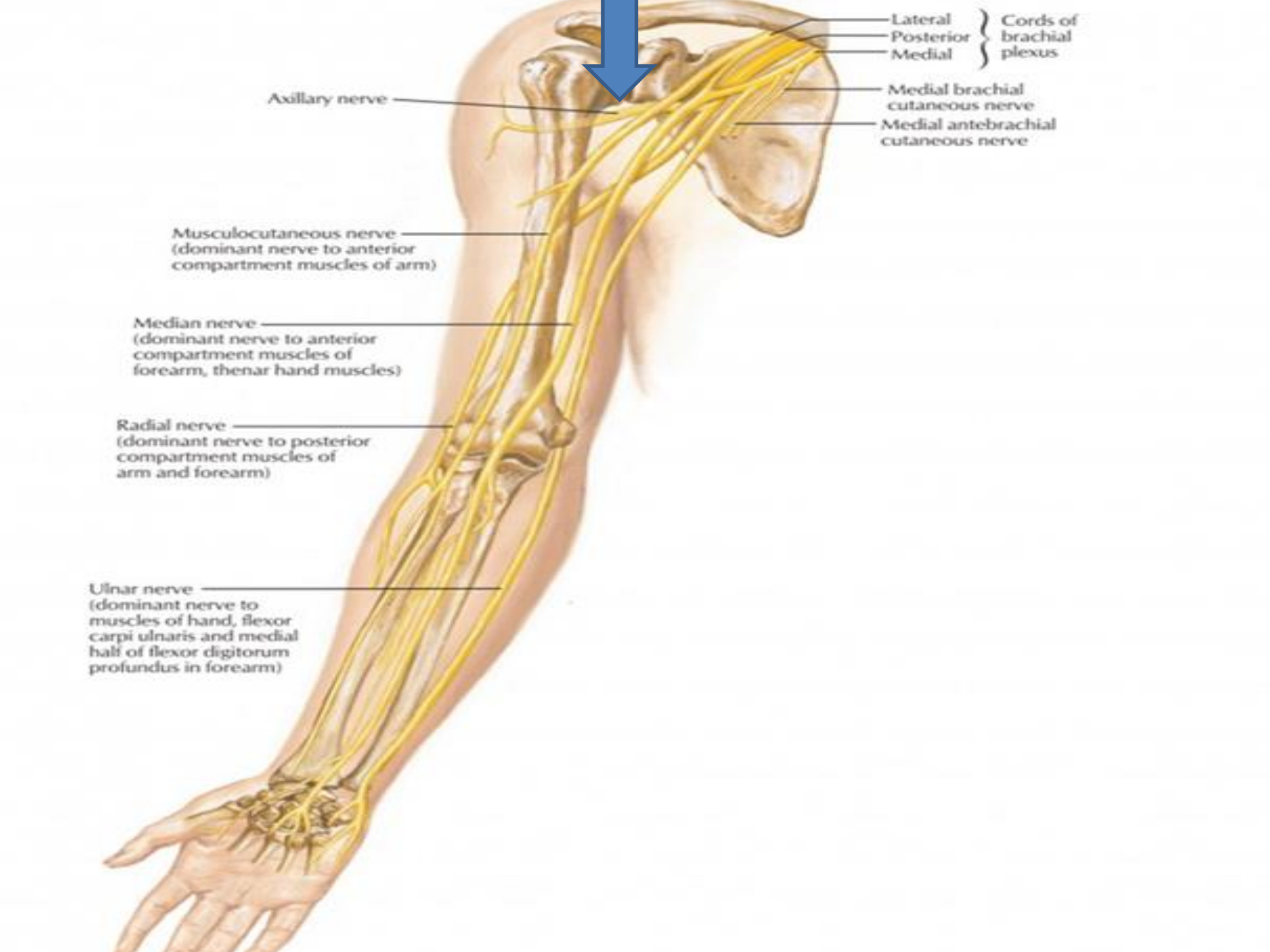
First rib
Clavicle
Anterior scalene muscle
Middle scalene


Lateral
Posterior
Medial
Cords of brachial plexus
Axillary nerve
Medial brachial cutaneous nerve
Medial antebrachial cutaneous nerve
Musculocutaneous nerve (dominant nerve to anterior compartment muscles of arm)
Median nerve (dominant nerve to anterior compartment muscles of forearm, thenar hand muscles)
Radial nerve (dominant nerve to posterior compartment muscles of arm and forearm)
Ulnar nerve (dominant nerve to muscles of hand, flexor carpi ulnaris and medial half of flexor digitorum profundus in forearm)

BRACHIAL PLEXUS- POST CORD Axillary N cont'd

- Divides into
  - anterior and
  - posterior branches.

Anterior branch

- along posterior circumflex humeral vessels,
- curves behind the humeral neck,

Supplies

- Deltoid (deep to).
- skin over its middle part.(cutaneous branches which pierce the muscle)

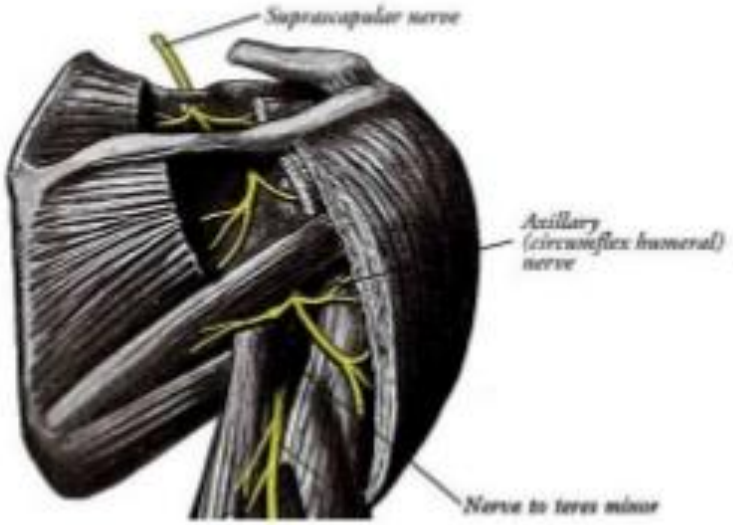
Posterior branch

supplies

- Teres minor
  - » Branch to Teres minor has a **pseudoganglion**
- posterior and lower part of Deltoid.
- upper part of long head of Triceps
- upper lateral cutaneous nerve of arm

LESIONS OF AXILLARY NERVE

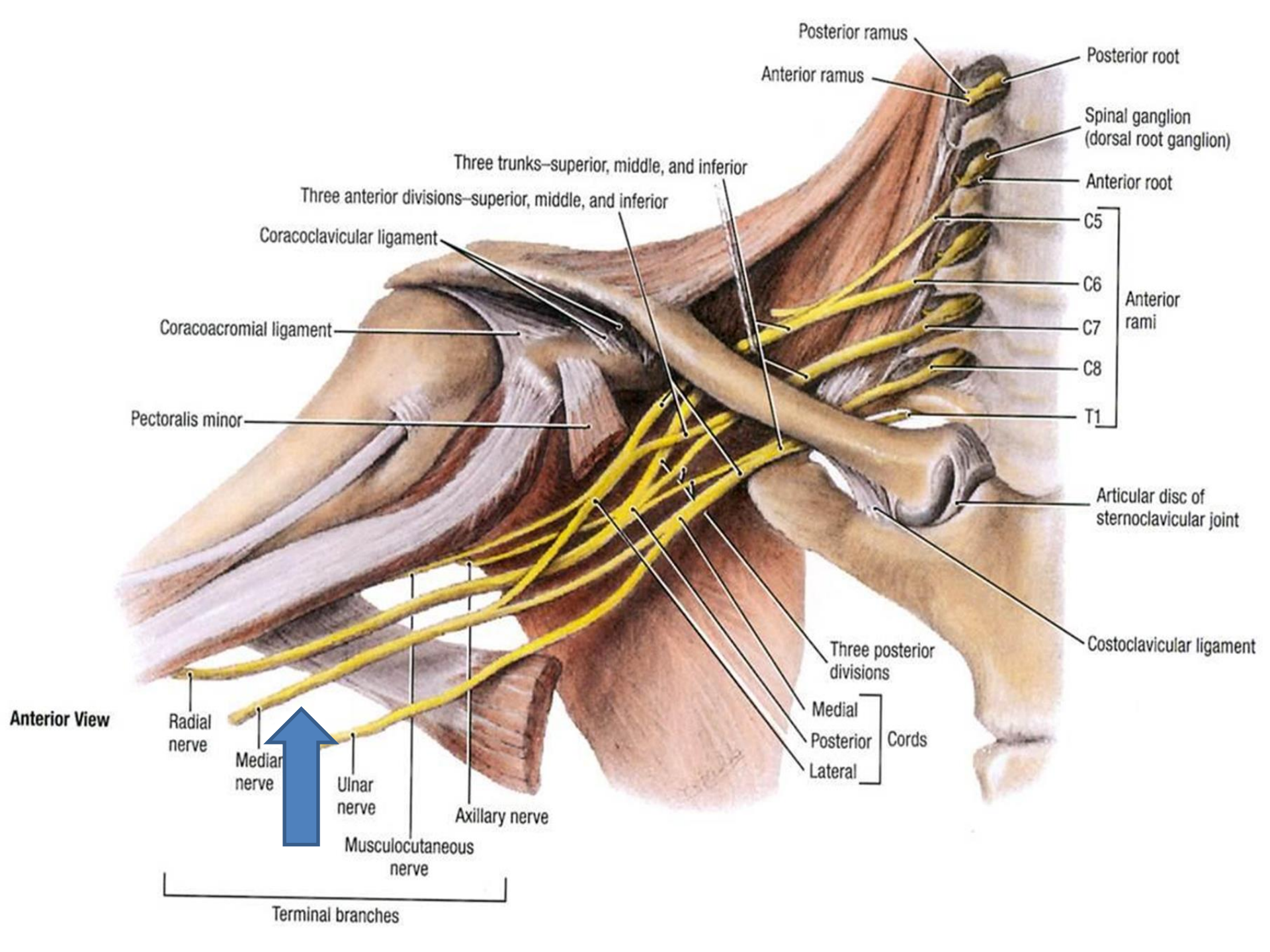
- Commonest causes
  - Dislocations of shoulder
  - Fractures of upper end humerus
  - Misplaced injections into deltoid



- Symptom and sign
  - Wasting and weakness of Deltoid-
    - abduction of shoulder affected.
  - sensory loss on outer aspect of upper arm below acromion.

MEDIAN NERVE

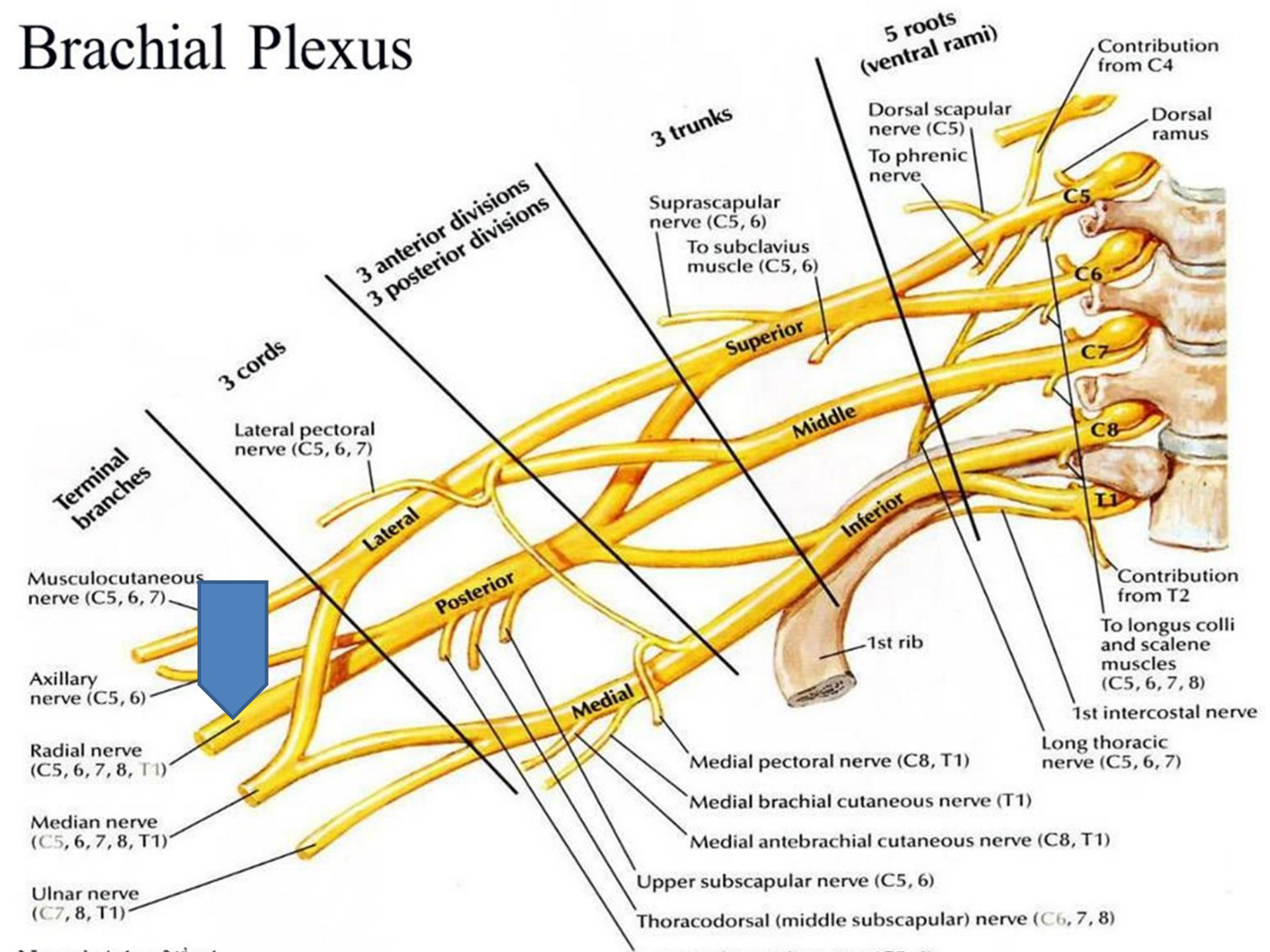
- Roots: C6 – T1. (Also contains fibres from C5 in some individuals).
- Motor Functions: Innervates most of the flexor muscles in the forearm, the thenar muscles, and the two lateral lumbricals associated with the index and middle fingers.
- Sensory Functions: Gives off the palmar cutaneous branch, which innervates the lateral part of the palm, and the digital cutaneous branch, which innervates the lateral three and a half fingers on the anterior (palmar) surface of the hand.

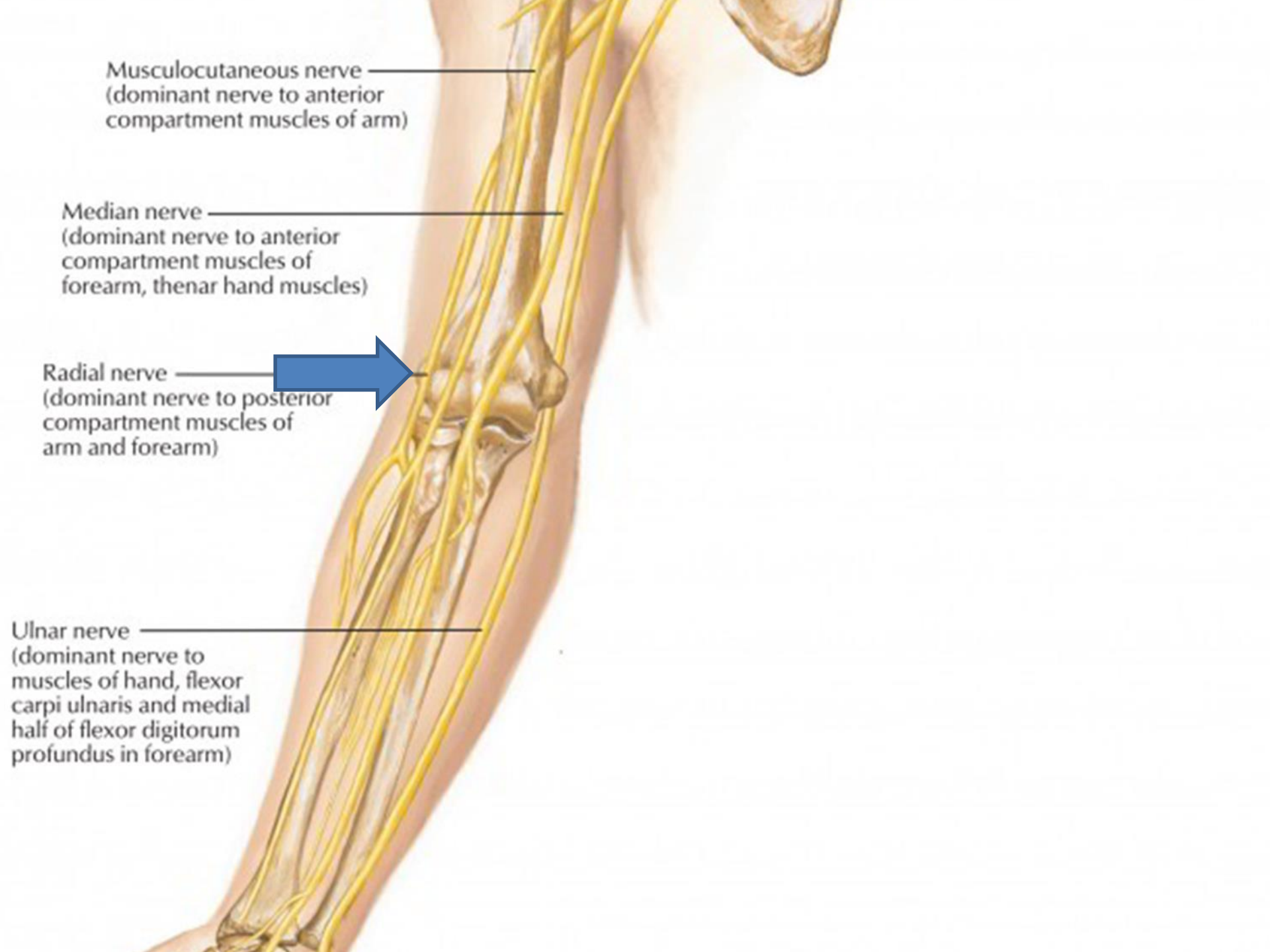

Posterior ramus
Anterior ramus
Posterior root
Spinal ganglion
(dorsal root ganglion)
Anterior root
Three trunks–superior, middle, and inferior
Three anterior divisions–superior, middle, and inferior
Coracoclavicular ligament
C5
C6
C7
C8
T1
Anterior
rami
Coracoacromial ligament
Pectoralis minor
Articular disc of
sternoclavicular joint
Costoclavicular ligament
Three posterior
divisions
Medial
Posterior
Lateral
Cords
Anterior View
Radial
nerve
Median
nerve
Ulnar
nerve
Axillary nerve
Musculocutaneous
nerve
Terminal branches

RADIAL NERVE

- Roots: C5 – T1.
- Motor Functions: Innervates the triceps brachii, and the muscles in the posterior compartment of the forearm (which are primarily, but not exclusively, extensors of the wrist and fingers).
- Sensory Functions: Innervates the posterior aspect of the arm and forearm, and the posterolateral aspect of the hand.

Brachial Plexus

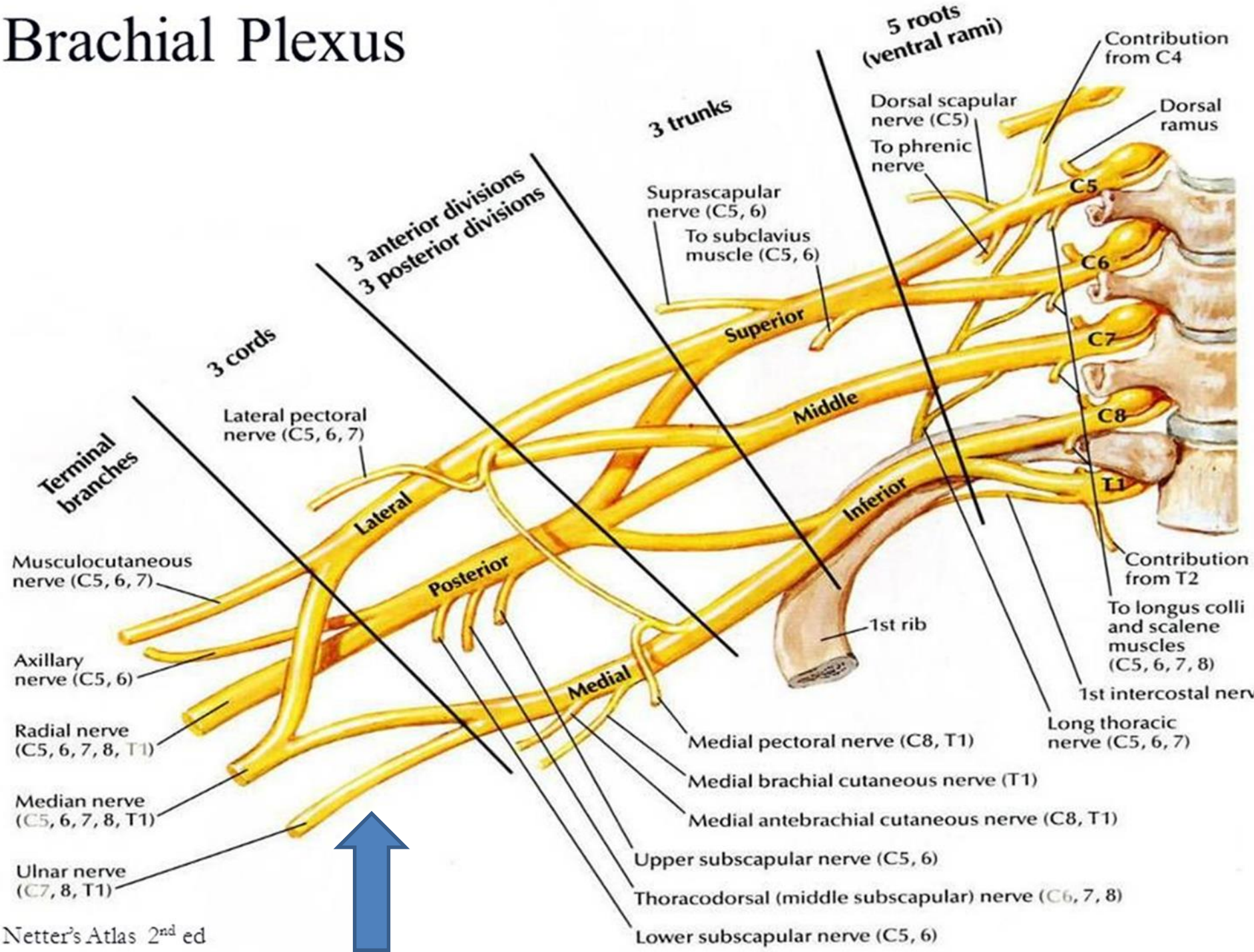



Musculocutaneous nerve
(dominant nerve to anterior
compartment muscles of arm)
Median nerve
(dominant nerve to anterior
compartment muscles of
forearm, thenar hand muscles)
Radial nerve
(dominant nerve to posterior
compartment muscles of
arm and forearm)
Ulnar nerve
(dominant nerve to
muscles of hand, flexor
carpi ulnaris and medial
half of flexor digitorum
profundus in forearm)

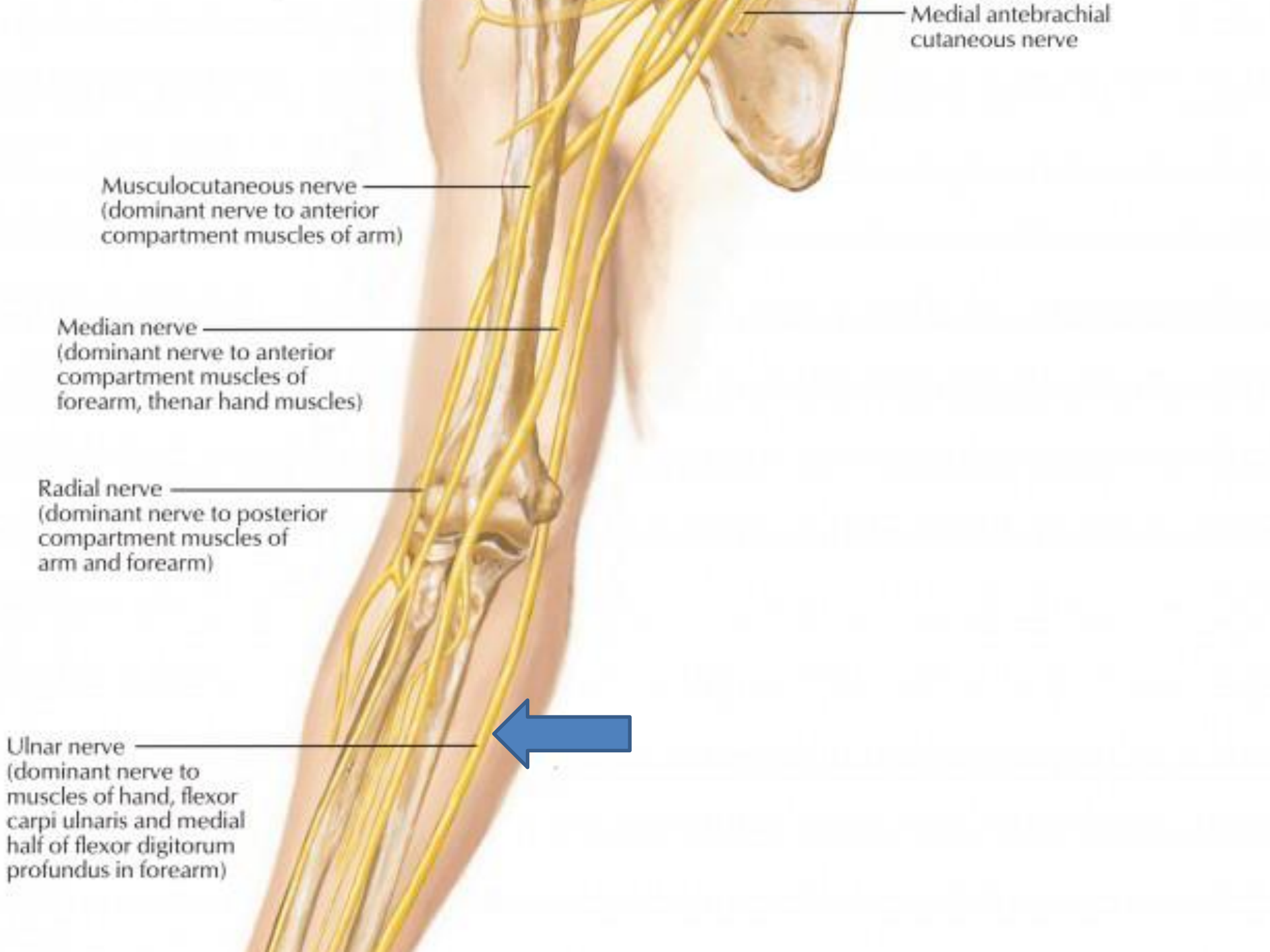
ULNAR NERVE

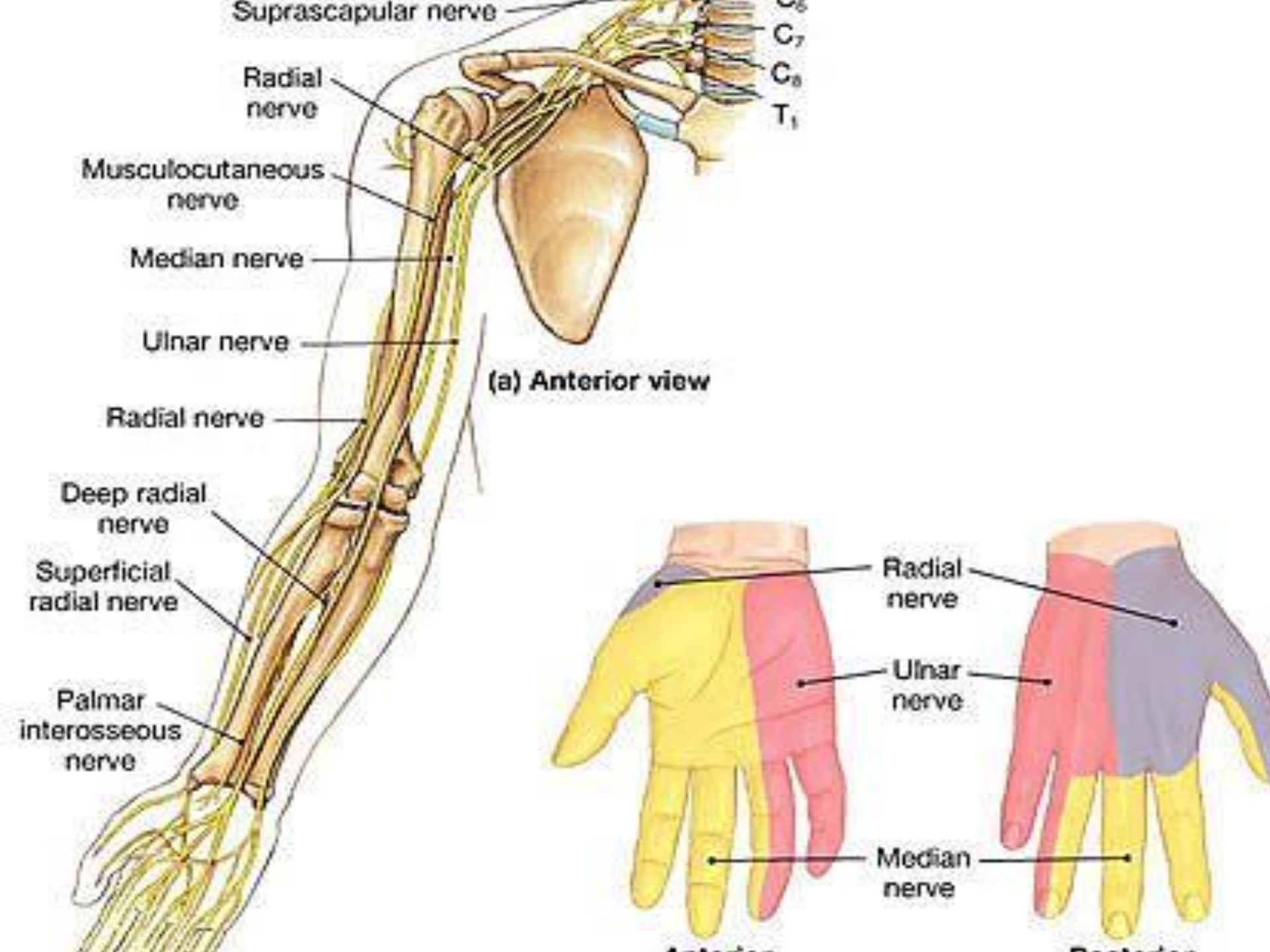
- Motor Functions: Innervates the muscles of the hand (apart from the thenar muscles and two lateral lumbricals), flexor carpi ulnaris and medial half of flexor digitorum profundus.
- Sensory Functions: Innervates the anterior and posterior surfaces of the medial one and half fingers, and associated palm area

Brachial Plexus



Netter's Atlas 2nd ed


Medial antebrachial cutaneous nerve
Musculocutaneous nerve (dominant nerve to anterior compartment muscles of arm)
Median nerve (dominant nerve to anterior compartment muscles of forearm, thenar hand muscles)
Radial nerve (dominant nerve to posterior compartment muscles of arm and forearm)
Ulnar nerve (dominant nerve to muscles of hand, flexor carpi ulnaris and medial half of flexor digitorum profundus in forearm)


Suprascapular nerve
Radial nerve
Musculocutaneous nerve
Median nerve
Ulnar nerve
Radial nerve
Deep radial nerve
Superficial radial nerve
Palmar interosseous nerve
C7
C8
T1
(a) Anterior view
Radial nerve
Ulnar nerve
Median nerve


Thank you!