

*Anterior
humeral
circumflex*

Brachial Plexus

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Introduction

- The brachial plexus is an arrangement of nerve fibres, running from the spine, formed by the ventral rami of the lower cervical and upper thoracic nerve roots, specifically from above the fifth cervical vertebra to underneath the first thoracic vertebra (C5-T1).
- It proceeds through the neck, the axilla (armpit region) and into the arm.

Levels (pneumonics)

▶ Roots

▶ Trunks

▶ Divisions

▶ Cords

▶ Branches

▶ Real

▶ (Athletic) Trainers

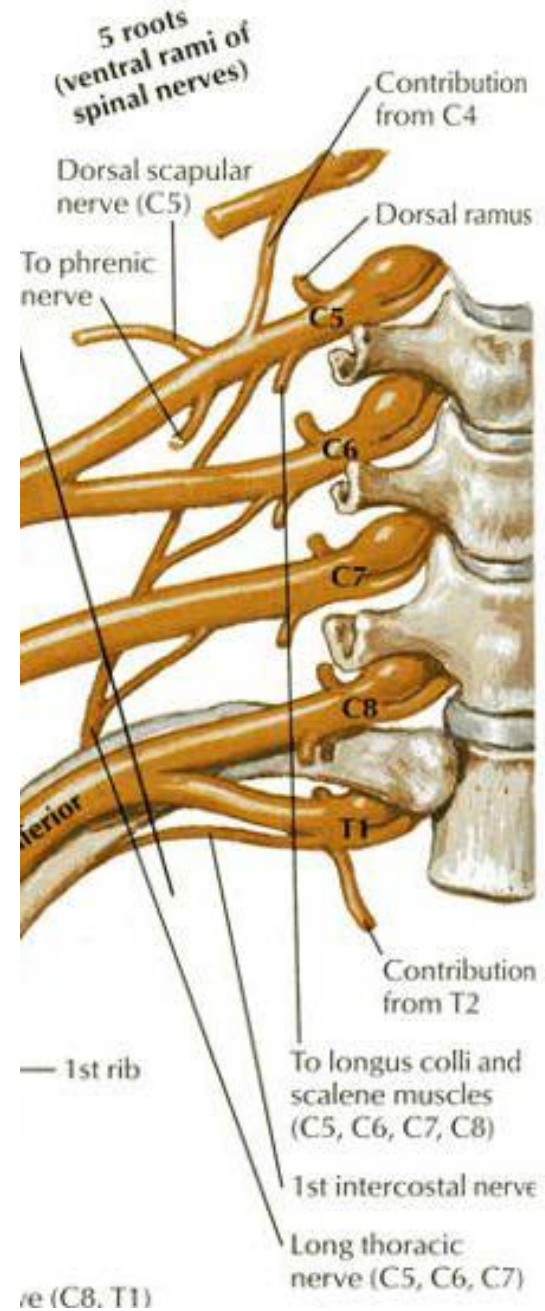
▶ Drink

▶ Cold

▶ Beer

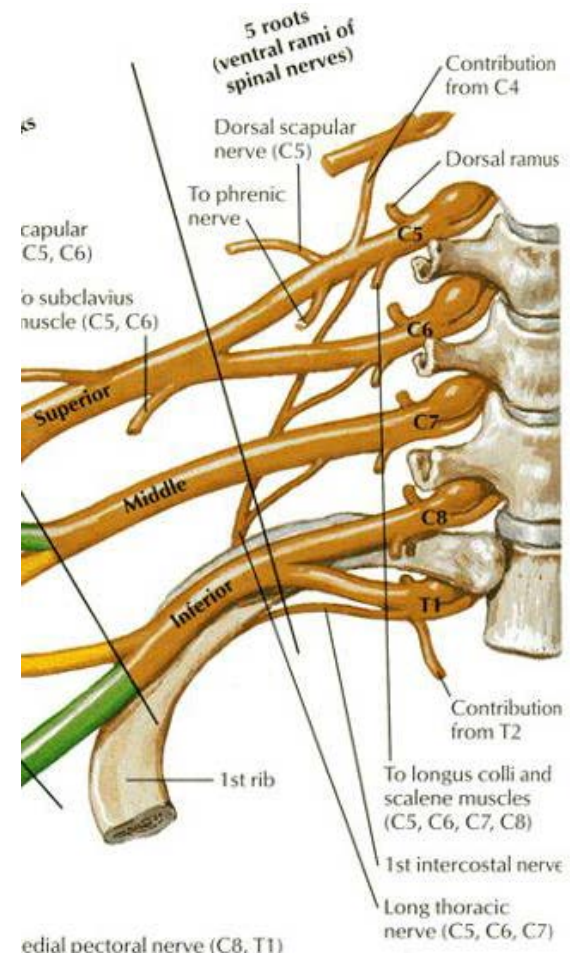
Roots

- The ventral rami of spinal nerves C5 to T1 are referred to as the roots of the brachial plexus.



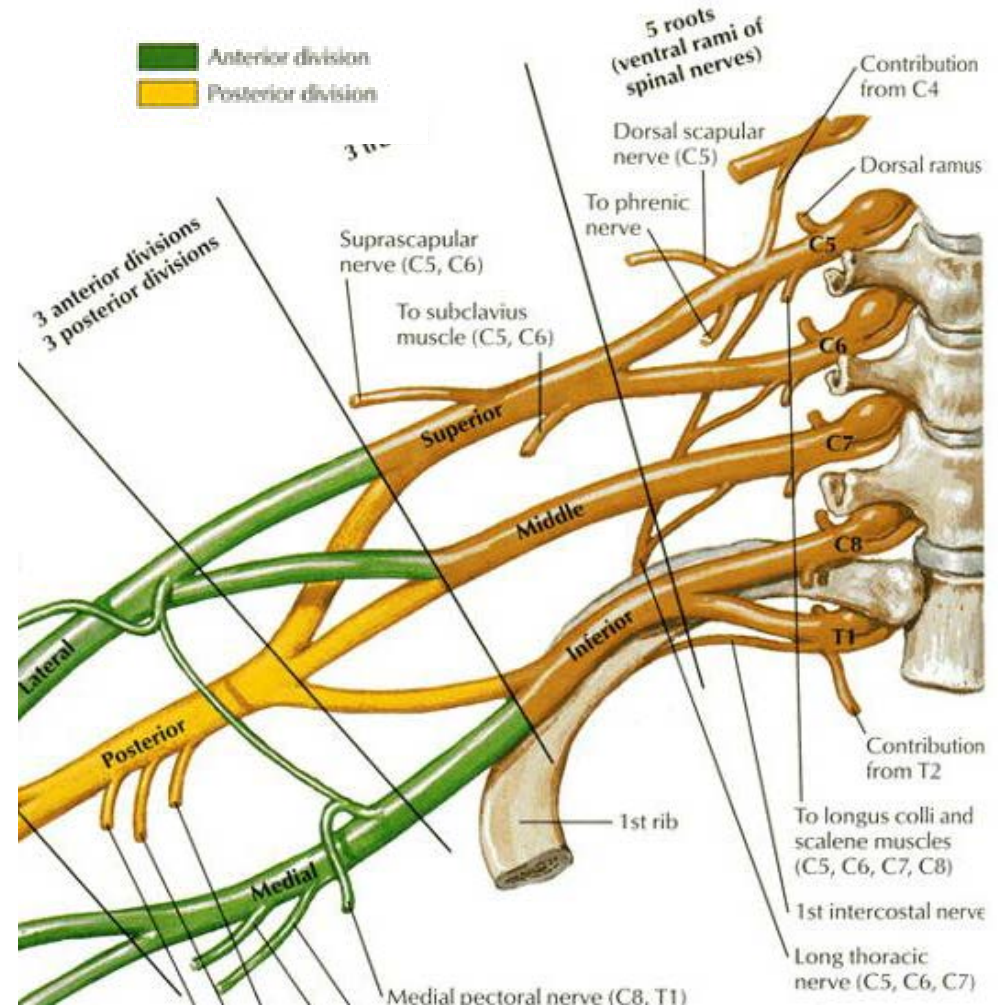
Trunks

- Shortly after emerging from the intervertebral foramina, the 5 roots unite to form three trunks.
- The ventral rami of C5 and C6 unite to form the **Upper Trunk**.
- The ventral ramus of C7 continues as the **Middle Trunk**.
- The ventral rami of C8 and T1 unite to form the **Lower Trunk**.



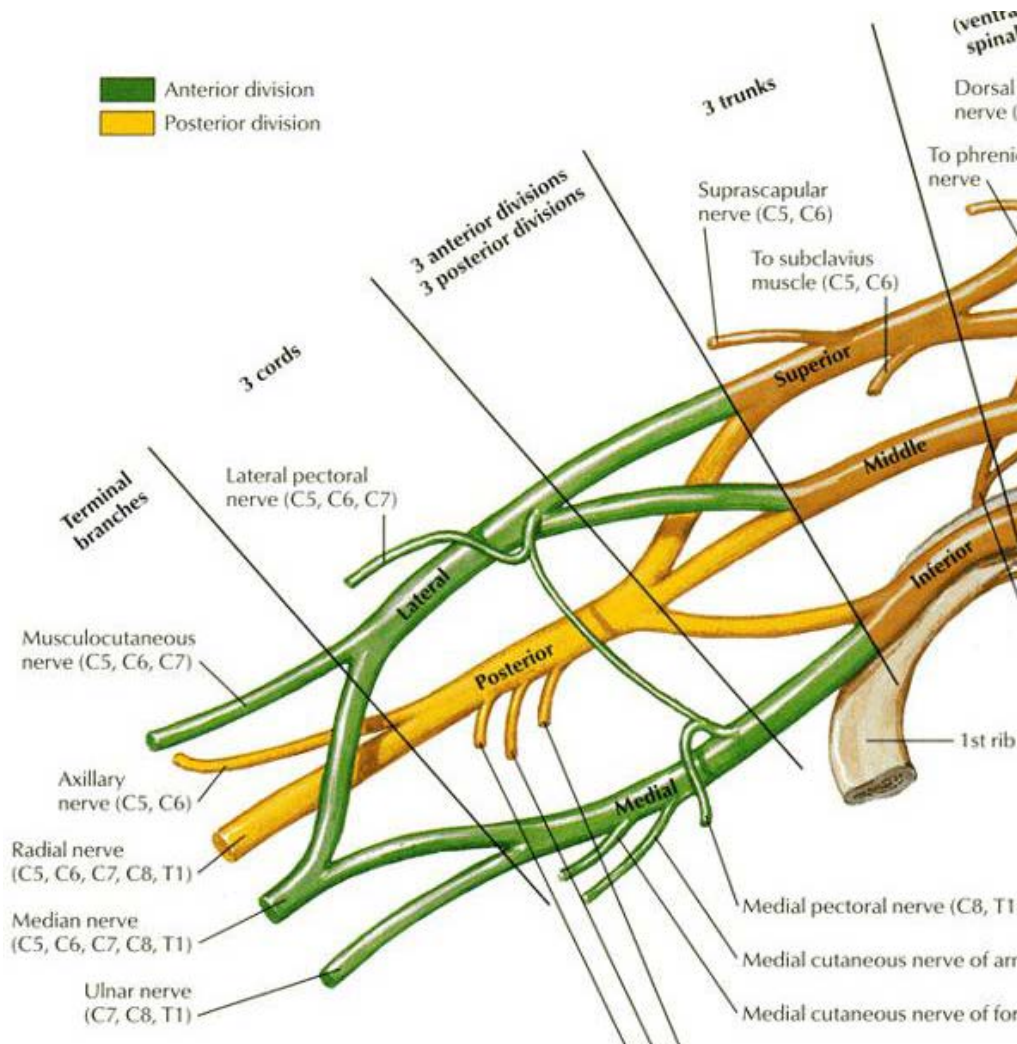
Divisions

- Each trunk splits into an **anterior division** and a **posterior division**.
- The anterior divisions usually supply flexor muscles
- The posterior divisions usually supply extensor muscles.

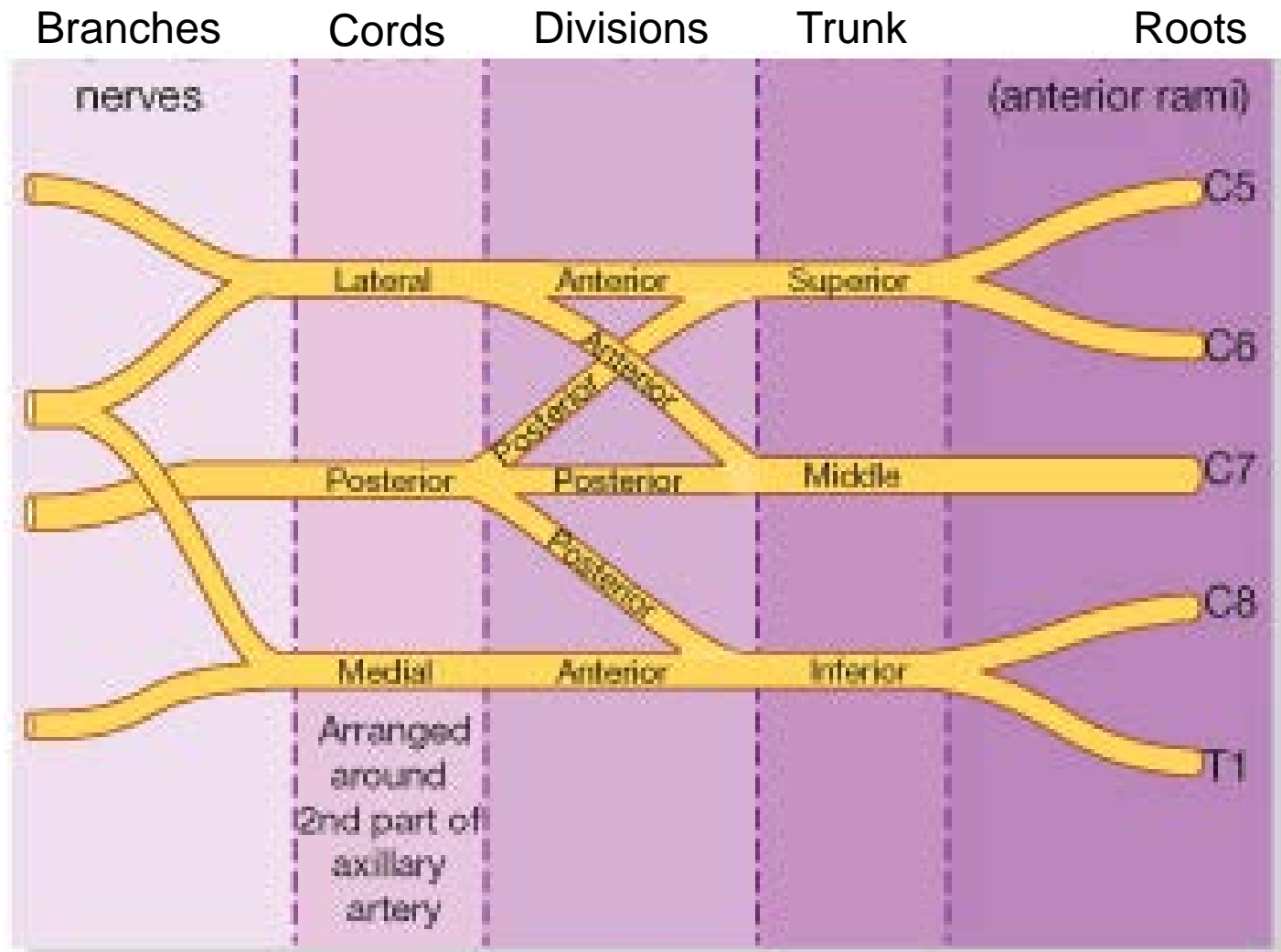


Cords

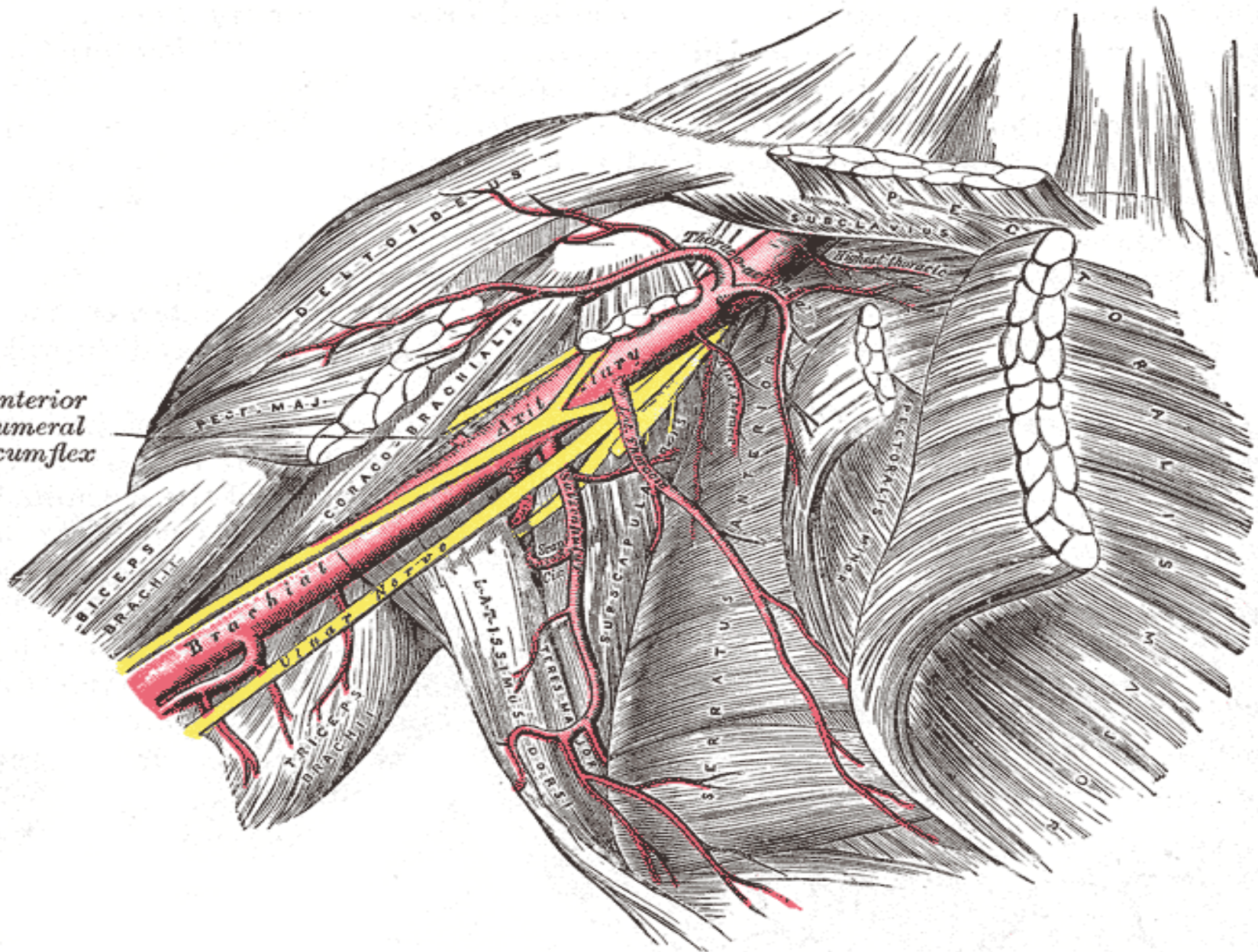
- The anterior divisions of the upper and middle trunks unite to form the **lateral cord**.
- The anterior division of the lower trunk continues as the **medial cord**.
- All 3 posterior divisions from each of the 3 cords all unite to form the **posterior cord**.
- The cords are named according to their position relative to the axillary artery.



The Scheme of the Brachial Plexus



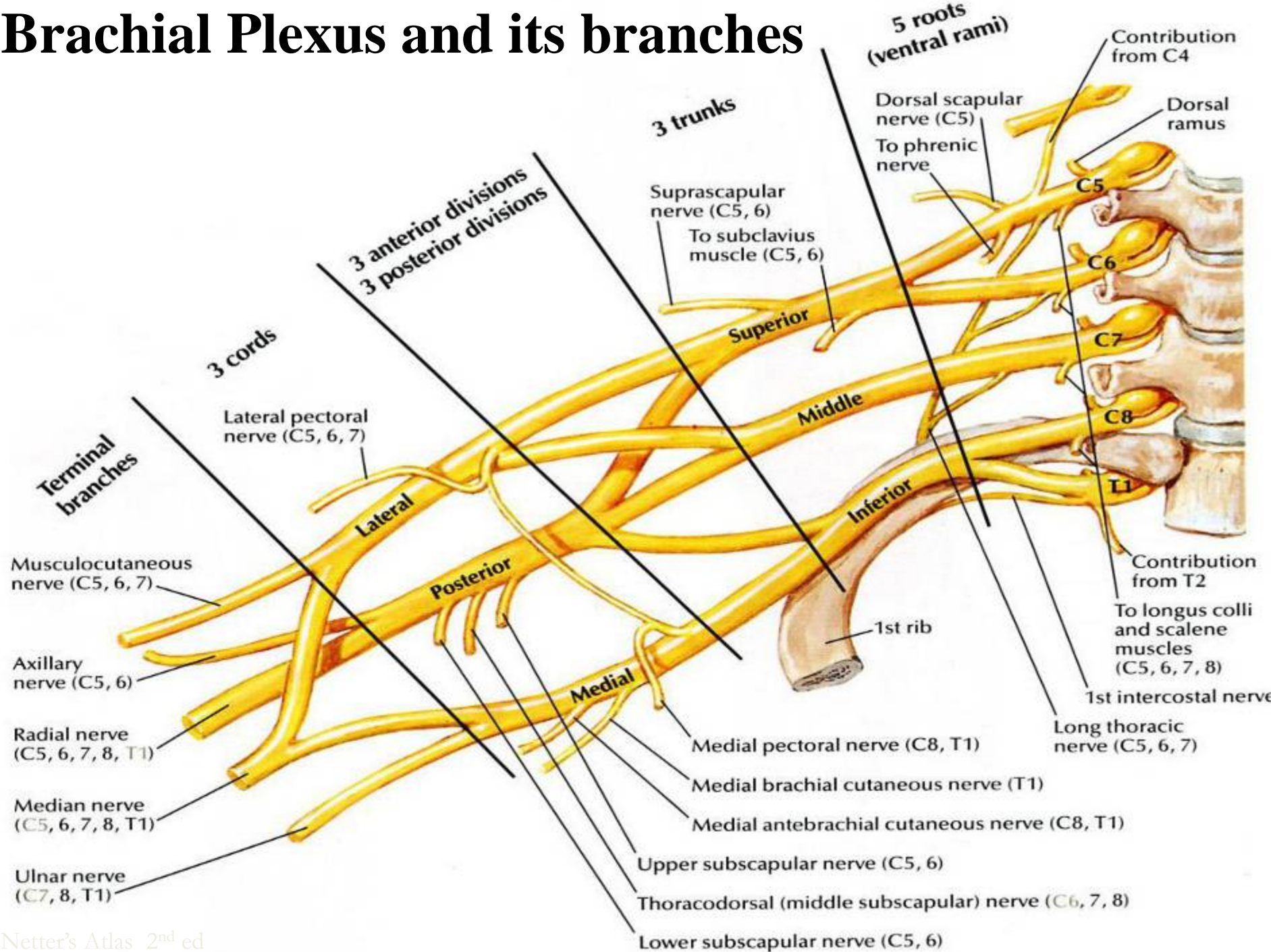
*Anterior
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Branches of the brachial plexus

- Branches are either from portions of the brachial plexus (e.g. root, trunk, divisions and cords) or are terminal branches.
- Nerves that are branches from portions of the brachial plexus usually contain only one type of axon; either sensory or motor
- Terminal Branches are mixed nerves containing both sensory and motor axons.

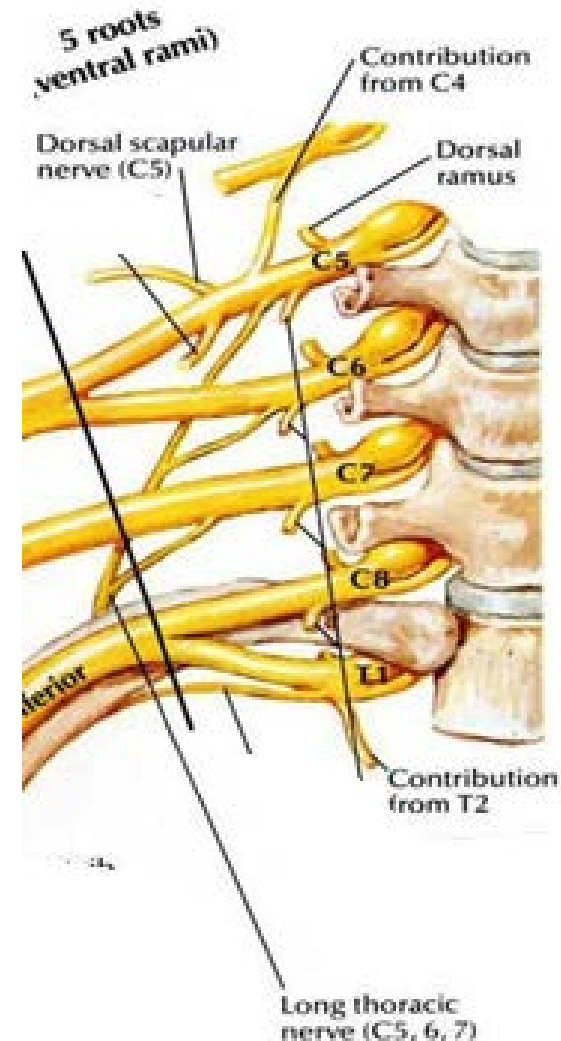
Brachial Plexus and its branches



Branches from the root

Two nerves

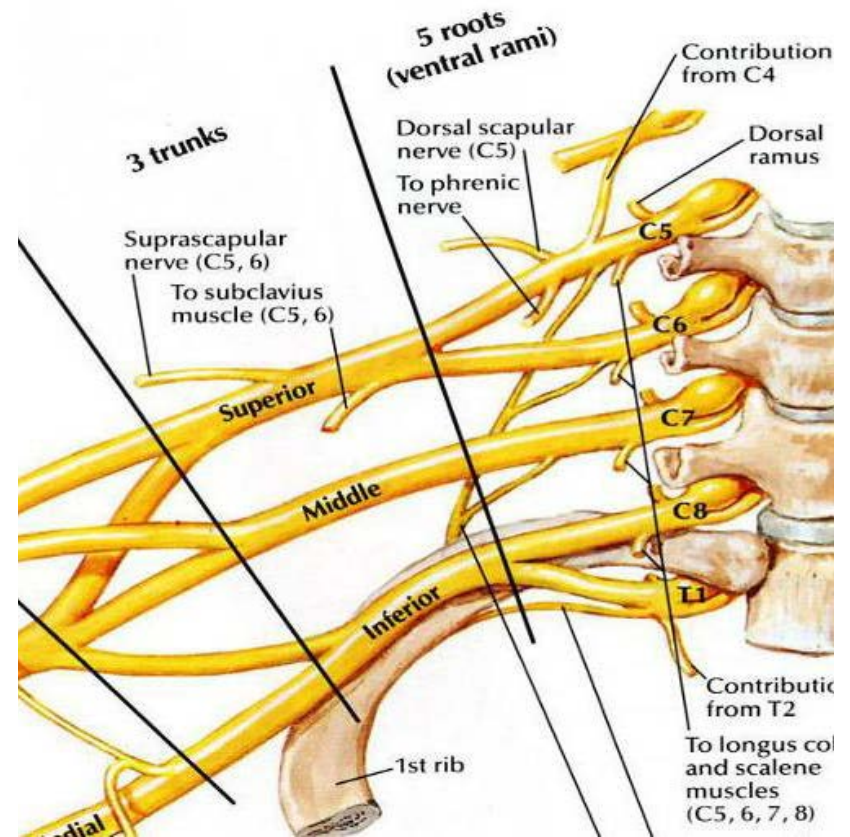
- Dorsal Scapular nerve
 - Derived from C5 root
 - Innervates the Rhomboid major and minor muscles
- Long Thoracic nerve
 - Derived from C 5,6,7
 - Innervates the serratus anterior muscle



Branches from the trunk

Two nerves

- Both originates from the Upper Trunk
 - Nerve to subclavius muscle
 - Suprascapular nerve
 - Innervates supra and infraspinatus muscles



Branches from the Cords

From the Lateral Cord

- Lateral Pectoral nerve
 - Innervates the clavicular head of the pectoralis major muscle

From the Medial Cord

- Medial Pectoral nerve
 - Innervates the sternocostal head of the pectoralis major muscle
 - Innervates the pectoralis minor muscle
- Cutaneous Branches
 - Medial brachial cutaneous
 - Carries sensation from the lower medial portion of the arm
 - Medial antebrachial cutaneous
 - Carries sensation from the medial (ulnar portion of the forearm)

Note : *The medial and lateral pectoral nerves often join together to act as a single nerve innervating both the pectoralis major & minor muscles*

Branches from the Cords

From the Posterior Cord

- Lower Scapular nerve
 - Supplies Teres Major
 - Supplies Subscapularis
- Thoracodorsal nerve
 - Supplies Latissimus dorsi and Teres Major
- Upper Scapular nerve
 - Supplies Subscapularis

Terminal branches: Lateral cord

Musculocutaneous nerve is derived from the lateral cord.

- This nerve innervates the muscles in the flexor compartment of the arm
- Carries sensation from the lateral (radial) side of the forearm.

Lateral cord contributes also to the **Median** nerve

- Motor innervation to most of the flexors muscles in the forearm and intrinsic muscles of the thumb (thenar muscles).
- Sensory innervation is from the lateral (radial) $3^{1/2}$ digits (the thumb and first $2^{1/2}$ fingers)

Terminal branches: Medial Cord

Ulnar nerve is derived from the medial cord

Motor innervation is mainly to intrinsic muscles of the hand

Sensory innervation is from the medial (ulnar) 1 & 1/2 digits
(the 5th. and 1/2 of the 4th. digits).

Medial cord contributes also to the **Median** nerve

- Motor innervation is to most of the flexors muscles in the forearm and intrinsic muscles of the thumb (thenar muscles).
- Sensory innervation is from the lateral (radial) 3^{1/2} digits (the thumb and first 2 and ^{1/2} fingers

Terminal branches: Posterior Cord

Axillary nerve is derived from the posterior cord.

Motor innervation is deltoid and teres minor muscles that act on the shoulder joint.

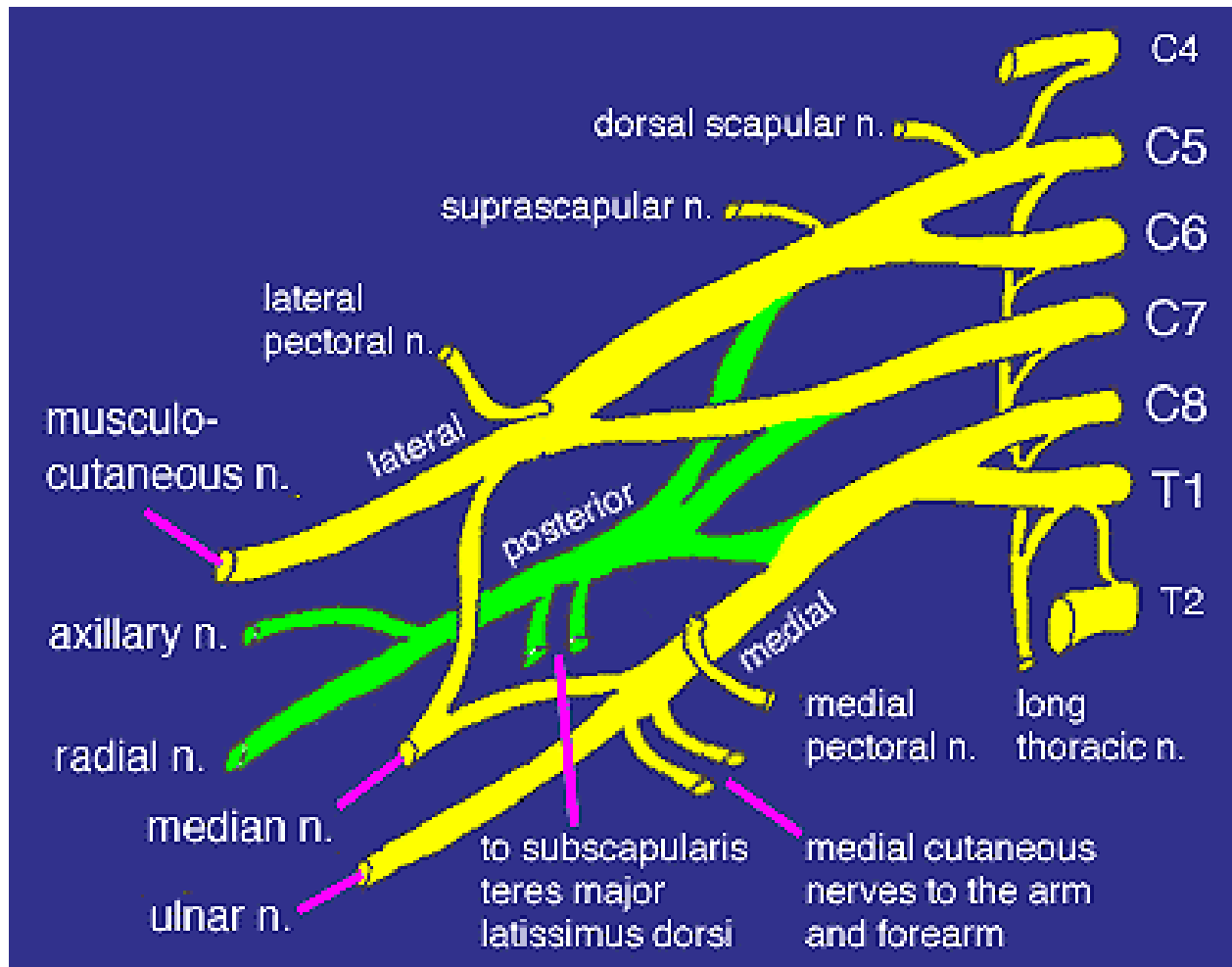
Sensory innervation is from the skin just below the point of the shoulder.

Radial nerve is also derived from the posterior cord.

Called "*Great Extensor Nerve*" because it innervates the extensor muscles of the elbow, wrist and fingers.

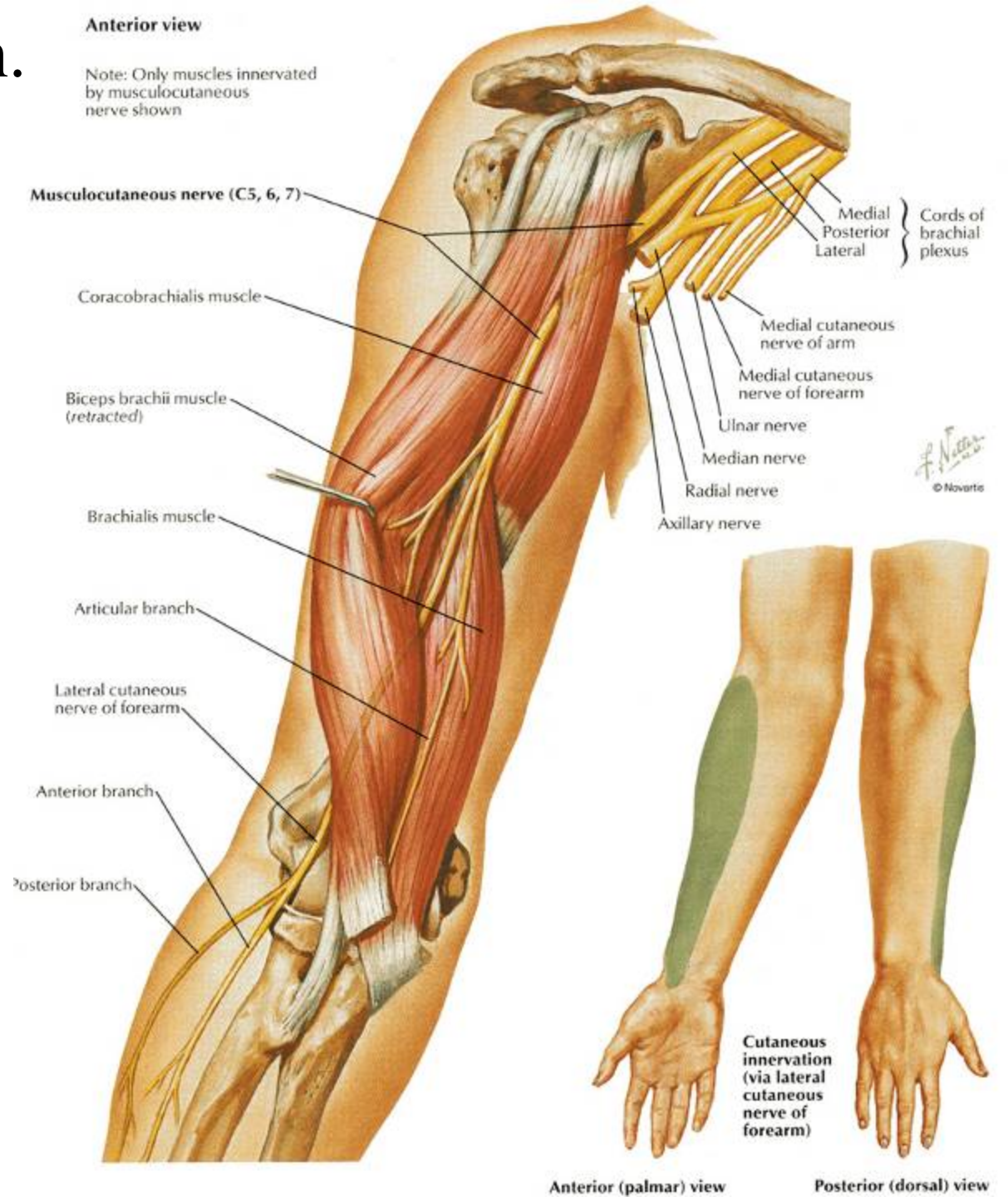
Sensory innervation is from the skin on the dorsum of the hand on the radial side.

Branches Scheme



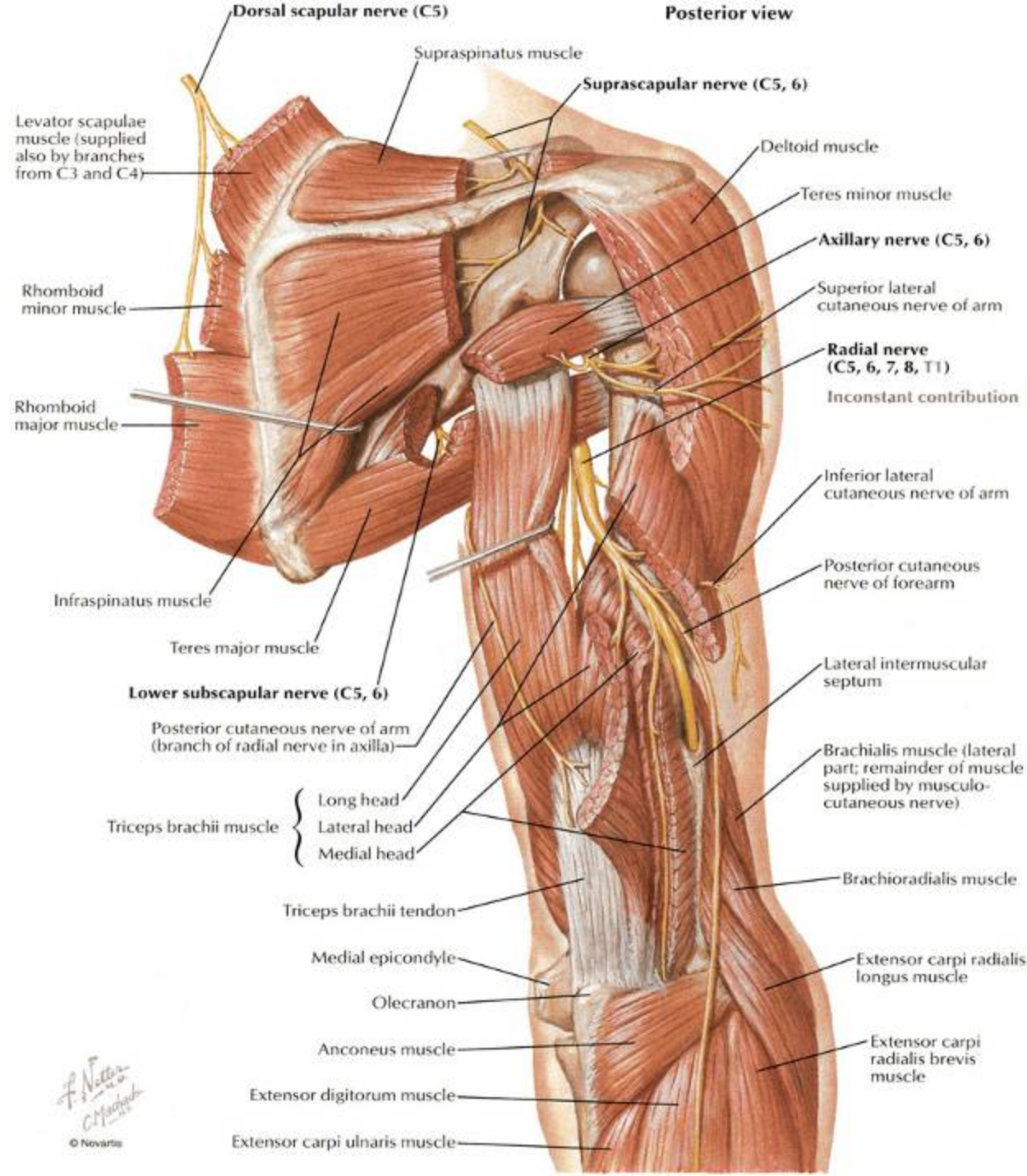
musculocutaneous n.

(C5-C7)



axillary n. (C5-C6)

radial n. (C5-T1)



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Brachial Plexus Branches & Muscular Innervations

Dorsal Scapular N.

- ▶ Levator Scapulae
- ▶ Rhomboid Major/Minor

Lateral Pectoral N.

- ▶ Pectoralis Major/Minor

Suprascapular N.

- ▶ Infraspinatus
- ▶ Supraspinatus

Musculocutaneous N.

- ▶ Biceps Brachii
- ▶ Brachialis
- ▶ Coracobrachialis

Brachial Plexus Branches & Muscular Innervations

Axillary N.

- ▶ Deltoid
- ▶ Teres Minor

Upper Subscapular N.

- ▶ Subscapularis

Thoracodorsal N.

- ▶ Latissimus Dorsi

Lower Subscapular N.

- ▶ Subscapularis
- ▶ Teres Major

Brachial Plexus Branches & Muscular Innervations

Median Nerve.

1. Abductor Pollicis Brevis/Longus
2. Flexor Carpi Radialis
3. Flexor Digitorum Superficialis
4. Flexor Digitorum Profundus (Lat. 2)
5. Flexor Pollicis Brevis (Lat.) & Longus
6. Lumbricales (Lat. 2)
7. Opponens Pollicis
8. Palmaris Longus
9. Pronator Quadratus
10. Pronator Teres

Radial Nerve.

1. Abductor Pollicis Brevis
2. Anconeus
3. Brachioradialis
4. Extensor Carpi Radialis Brevis/Longus
5. Extensor Carpi Ulnaris
6. Extensor Digiti Minimi
7. Extensor Digitorum Communis
8. Extensor Indicis
9. Extensor Pollicis Brevis/Longus
10. Supinator
11. Triceps Brachii

Brachial Plexus Branches & Muscular Innervations

Ulnar N.

1. Abductor Digiti Minimi
2. Adductor Pollicis
3. Dorsal Interossei
4. Flexor Carpi Ulnaris
5. Flexor Digiti Minimi
6. Flexor Digitorum Profundus (Med. 2)
7. Flexor Pollicis Brevis (Med.)
8. Lumbricals (Med. 2)
9. Opponens Digiti Minimi
10. Palmar Interossei

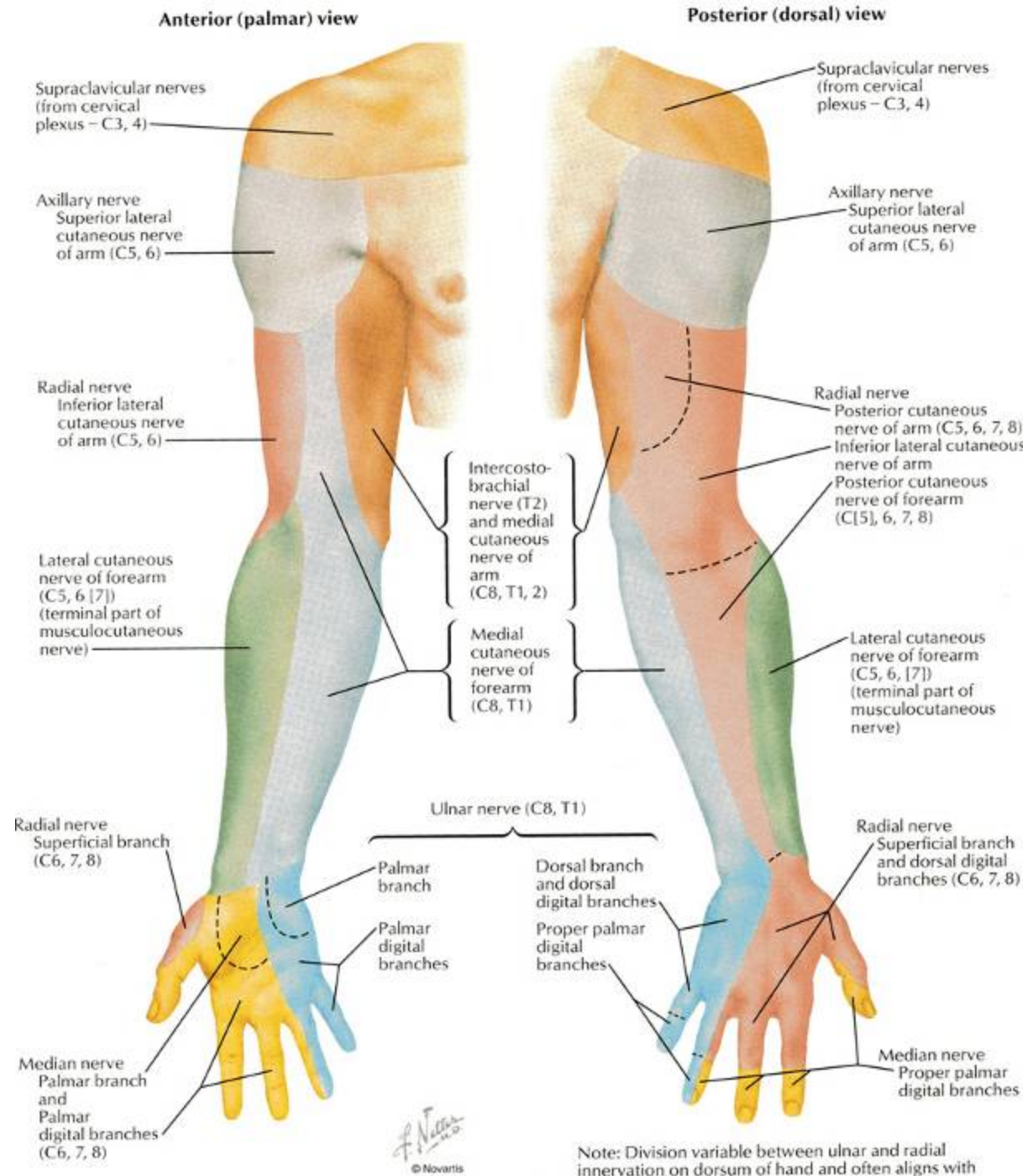
Long Thoracic N.

- ▶ Serratus Anterior

Medial Pectoral N.

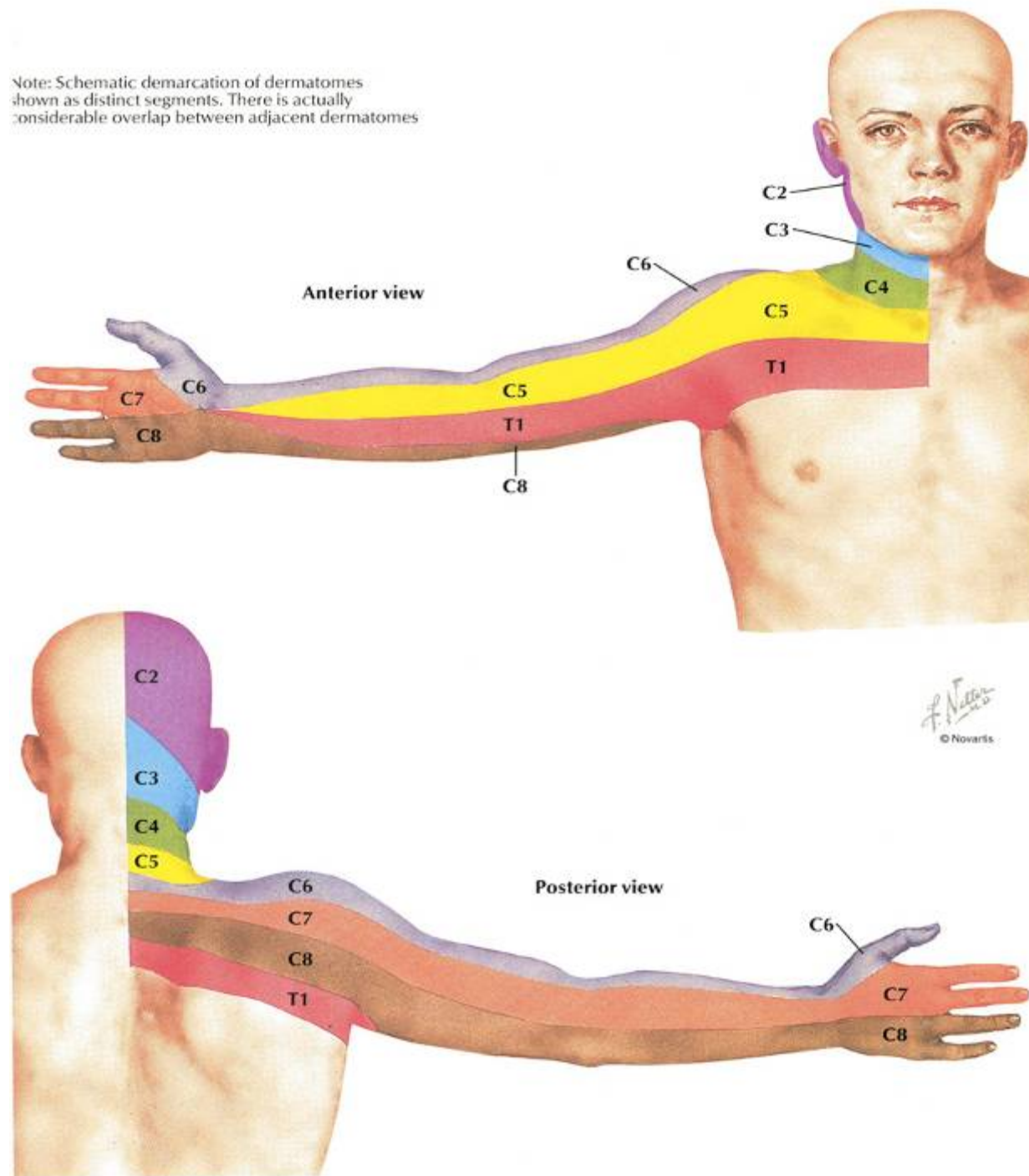
- ▶ Pectoralis Major

upper limb - cutaneous innervation



upper limb – dermatome pattern

Note: Schematic demarcation of dermatomes shown as distinct segments. There is actually considerable overlap between adjacent dermatomes





Any Question?

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QUESTIONS