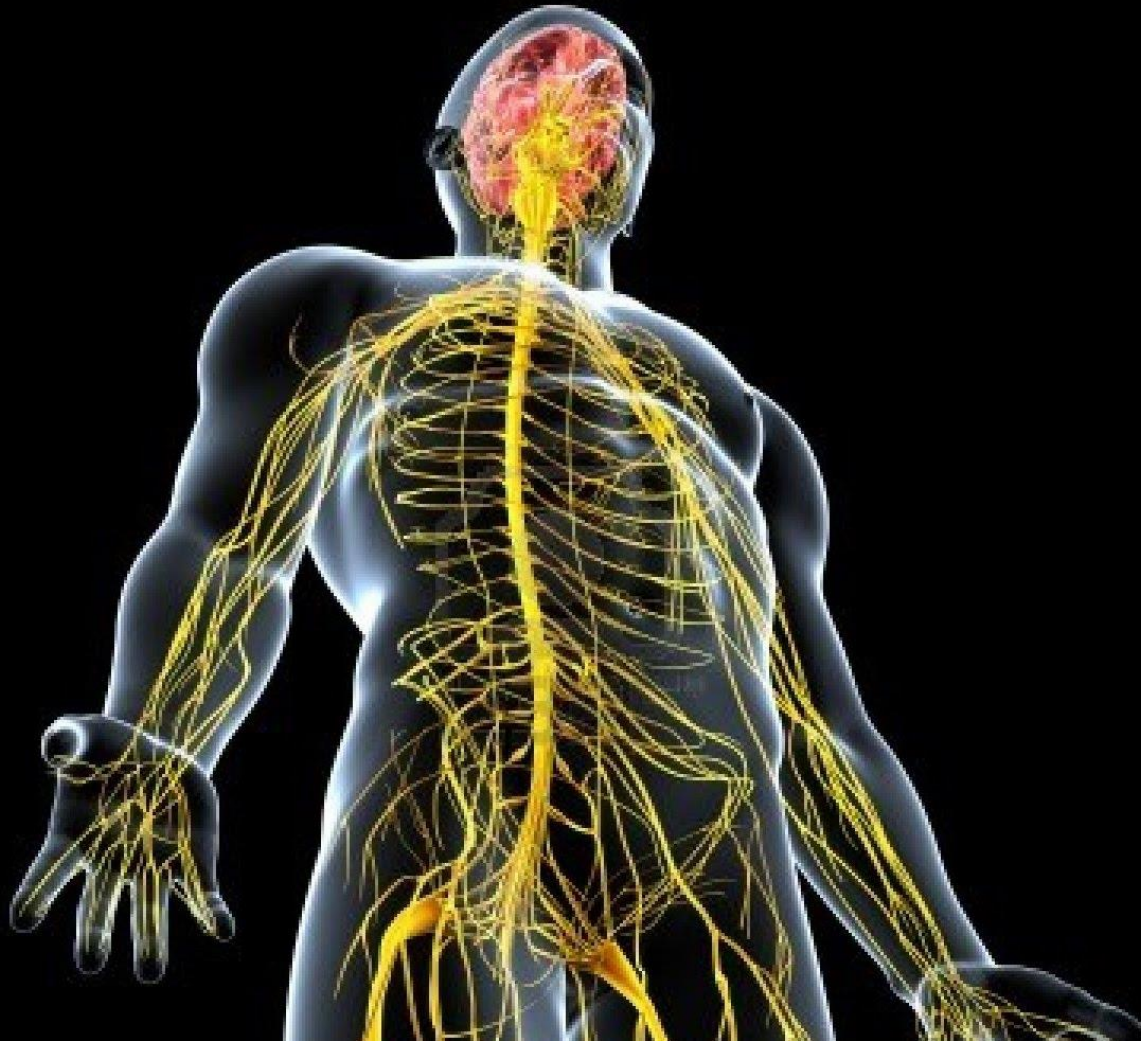


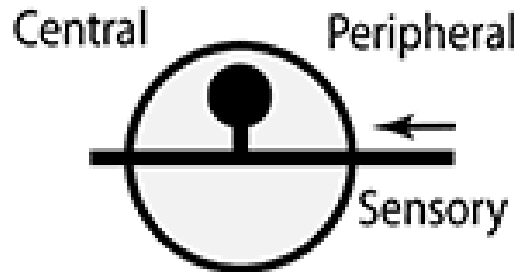
PNS - Spinal Nerves



MUDr. Azzat Al-Redouan

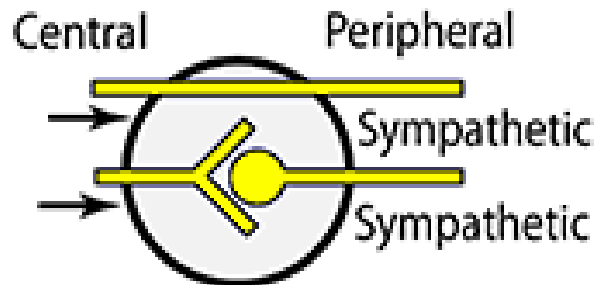
GANGLIA

3 TYPES OF GANGLIA



SENSORY GANGLION has cell bodies only and NO synapses Examples:

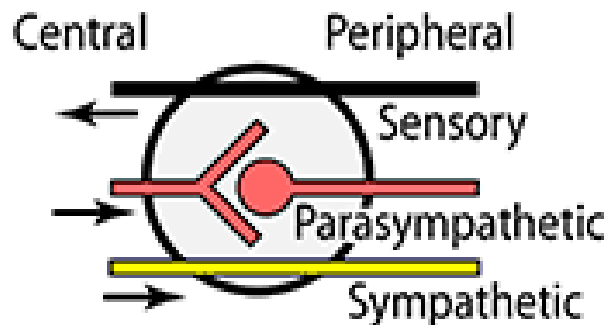
- Posterior (dorsal) root
- Trigeminal
- Glossopharyngeal
- Geniculate
- Vagal



SYMPATHETIC GANGLION has either a synapse or a fibre passing through it to synapse later.

Examples:

- Sympathetic chain
- Sympathetic peripheral ganglia (coeliac, renal, superior mesenteric)



PARASYMPATHETIC GANGLION has parasympathetic nerves synapsing and both a somatic sensory and a sympathetic nerve passing through it. Examples:

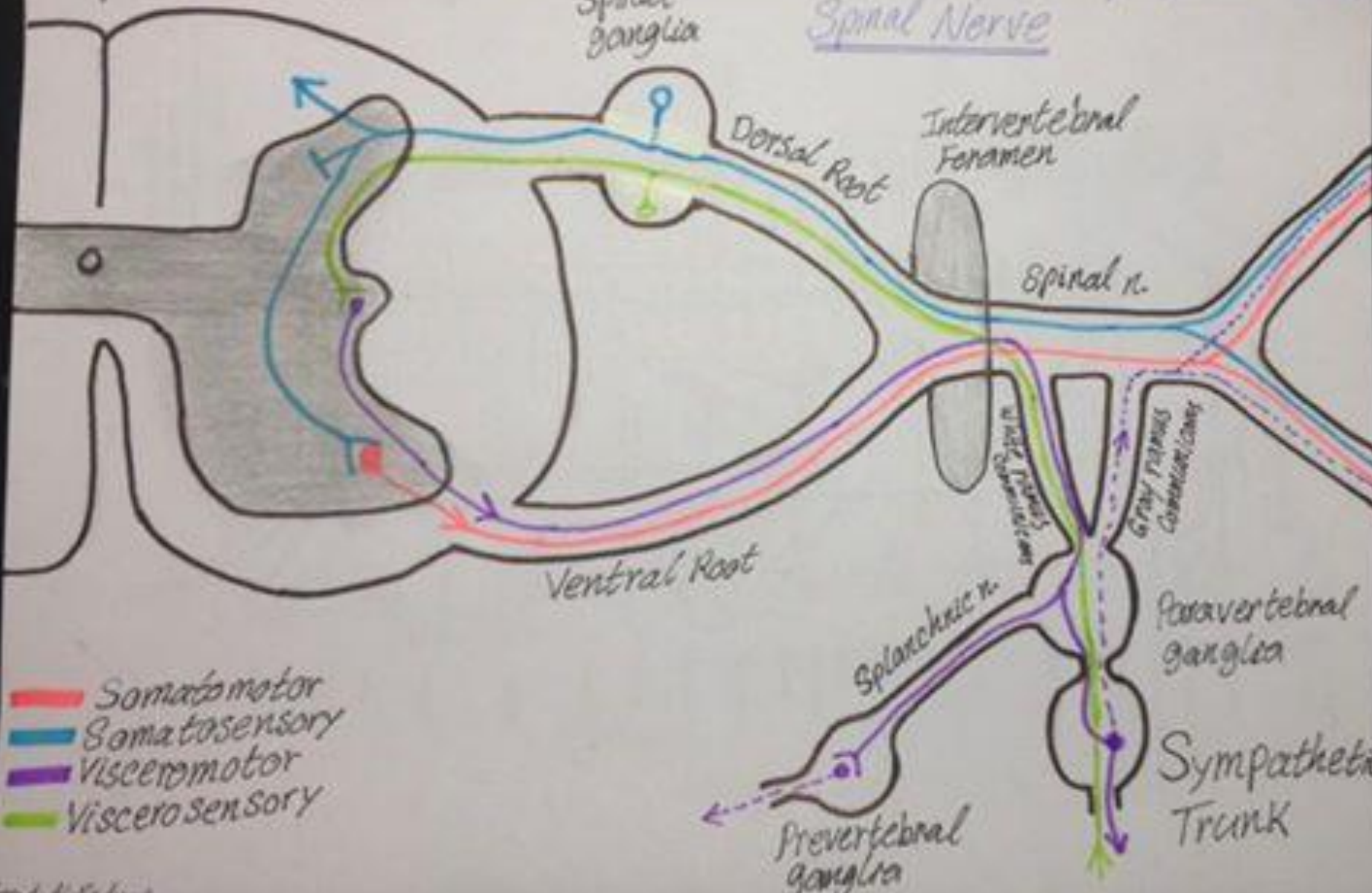
- Ciliary
- Ptergopalatine
- Submandibular
- Otic

Ganglion

Draw a ganglion

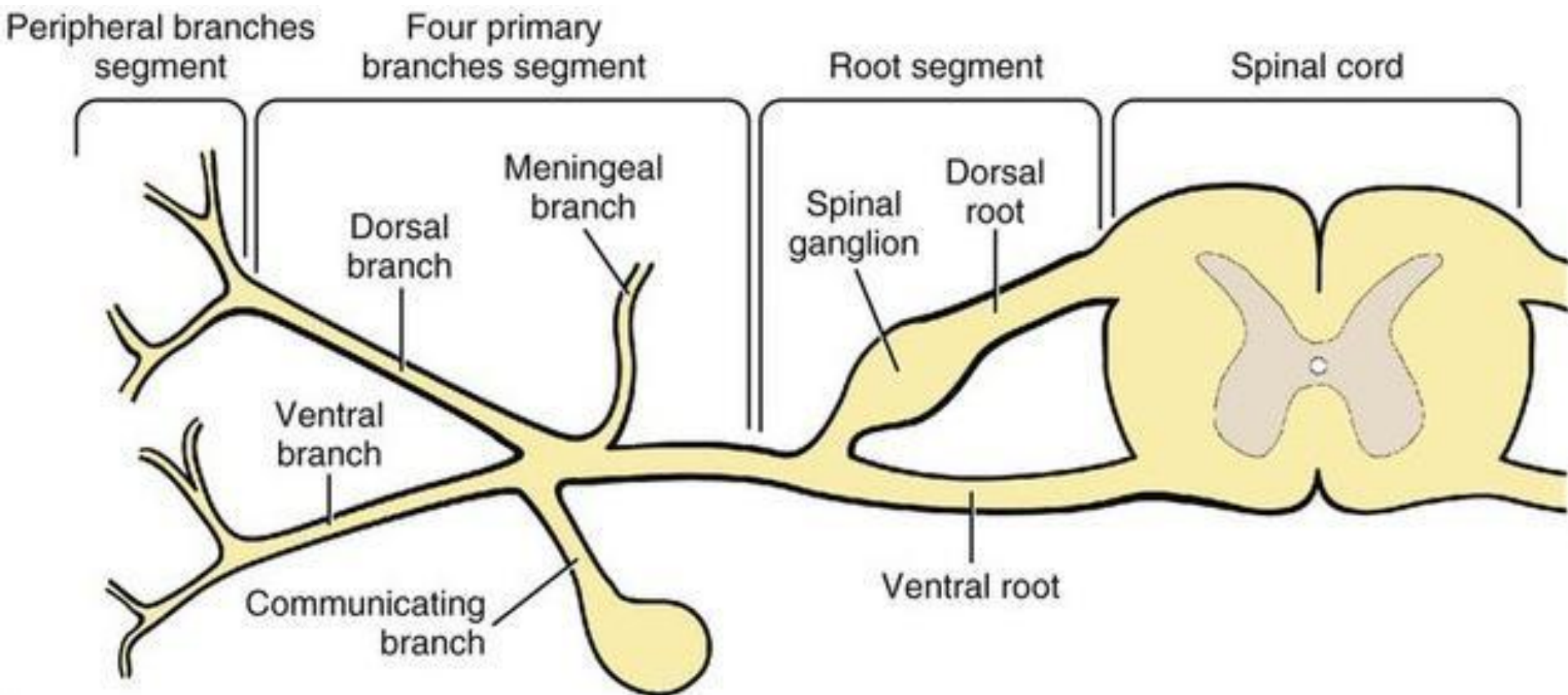
Spinal Cord

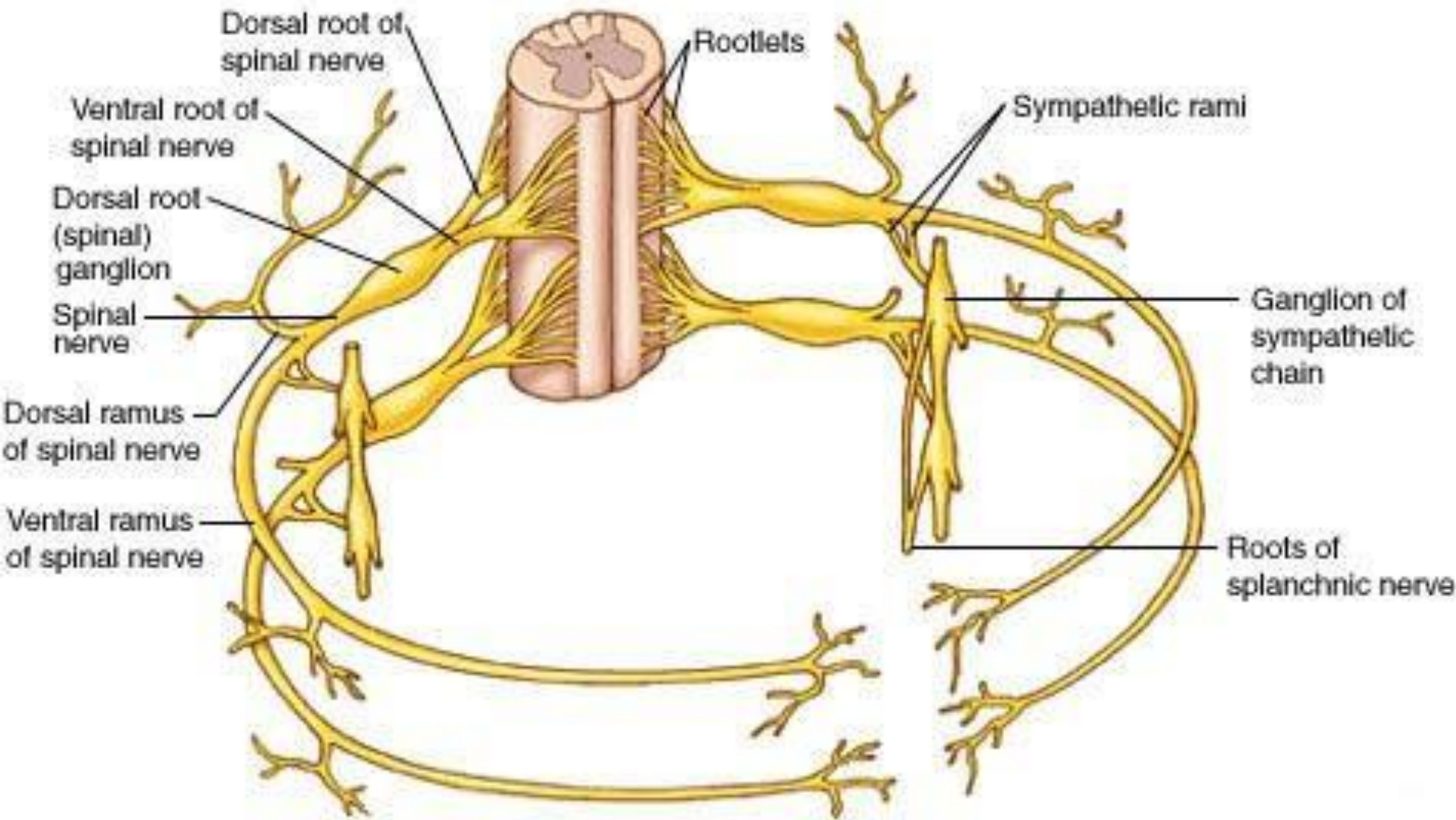
Spinal ganglia Spinal Nerve Trunk Branches



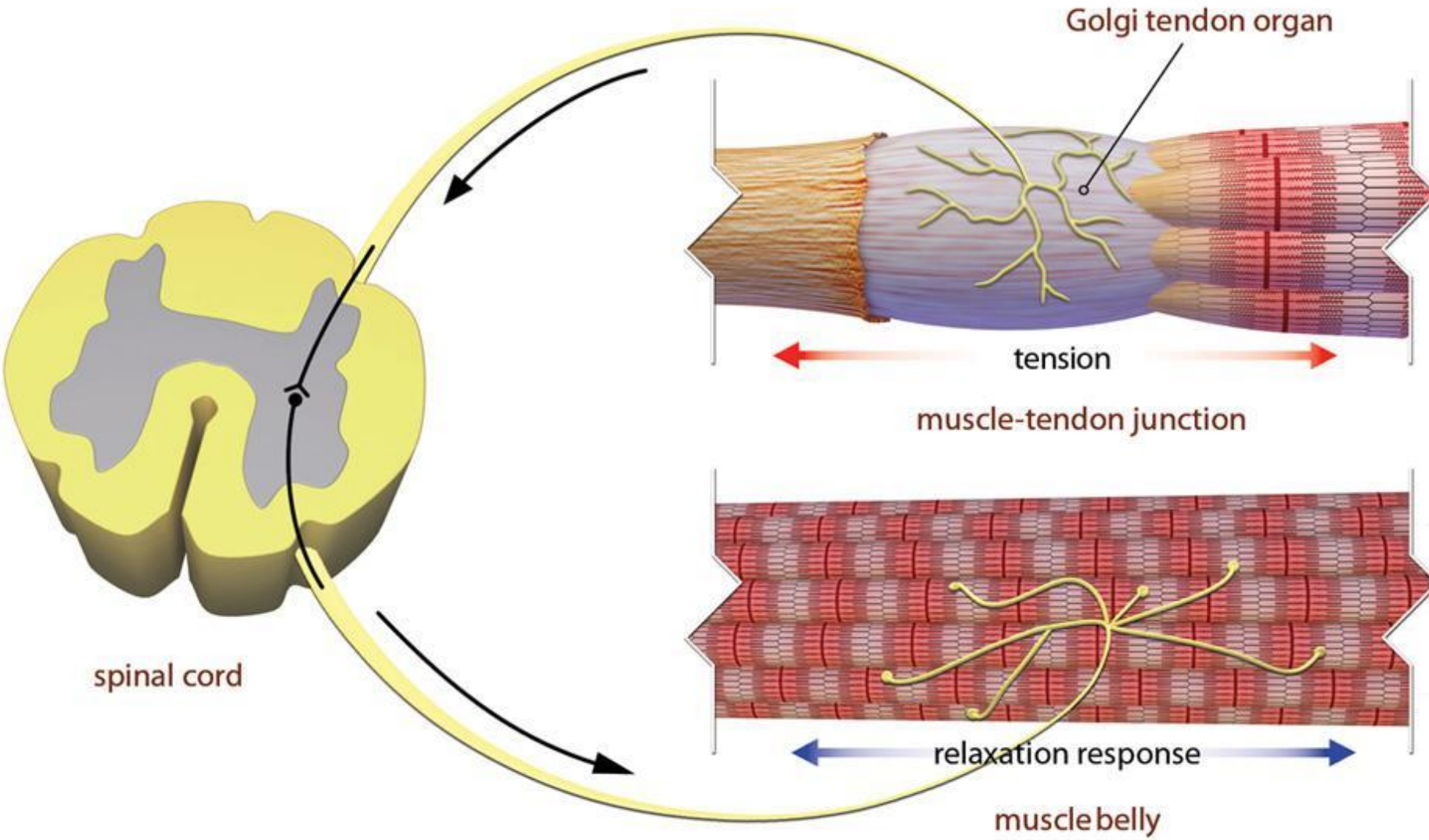
- Somatomotor
- Somatosensory
- Visceromotor
- Viscerosensory

Splanchnic n.
Prevertebral ganglia
Sympathetic Trunk
Paravertebral ganglia
Gray rami Communicantes





Spinal Cord Reflex Arc



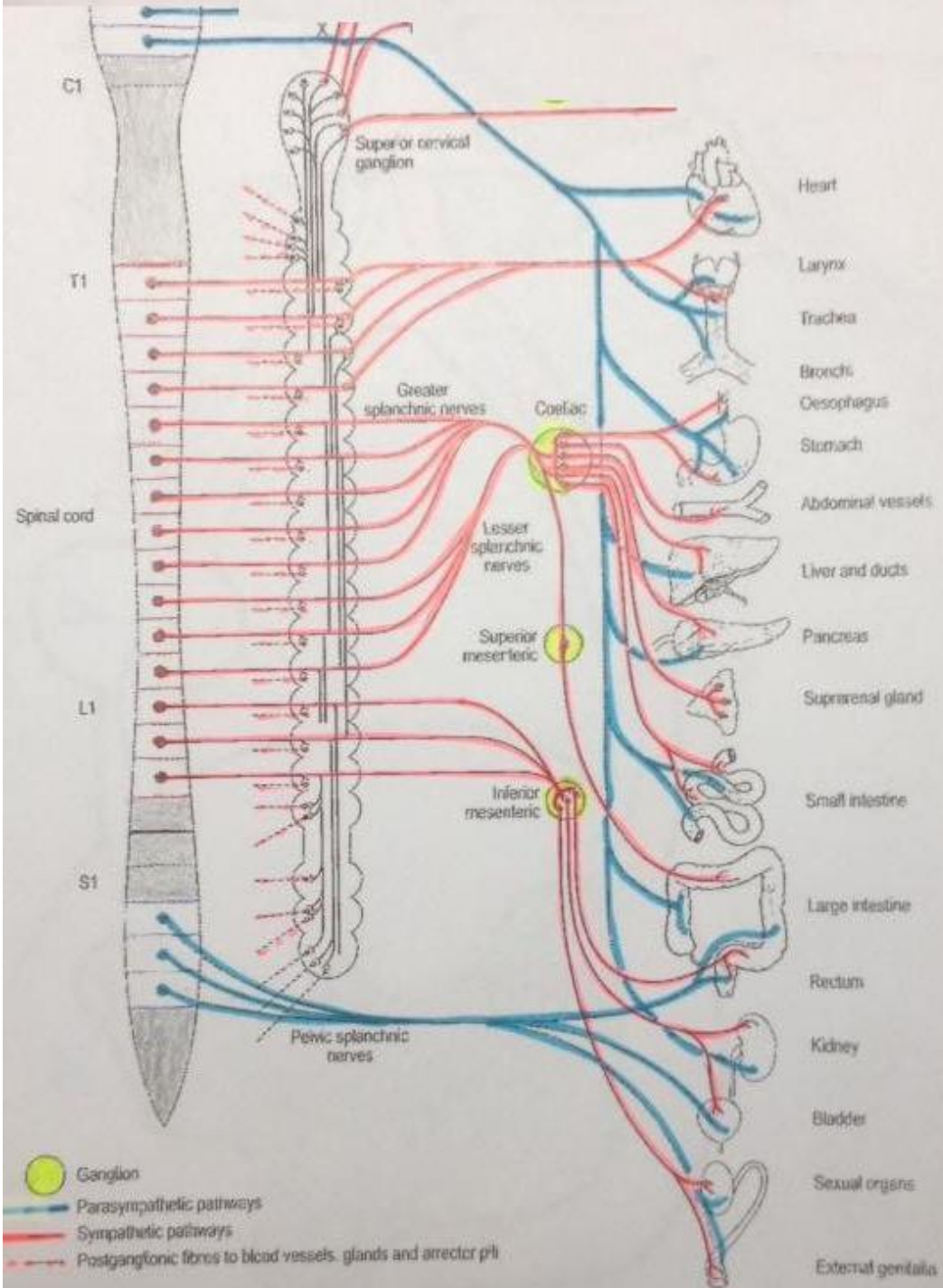
Spinal Nerve

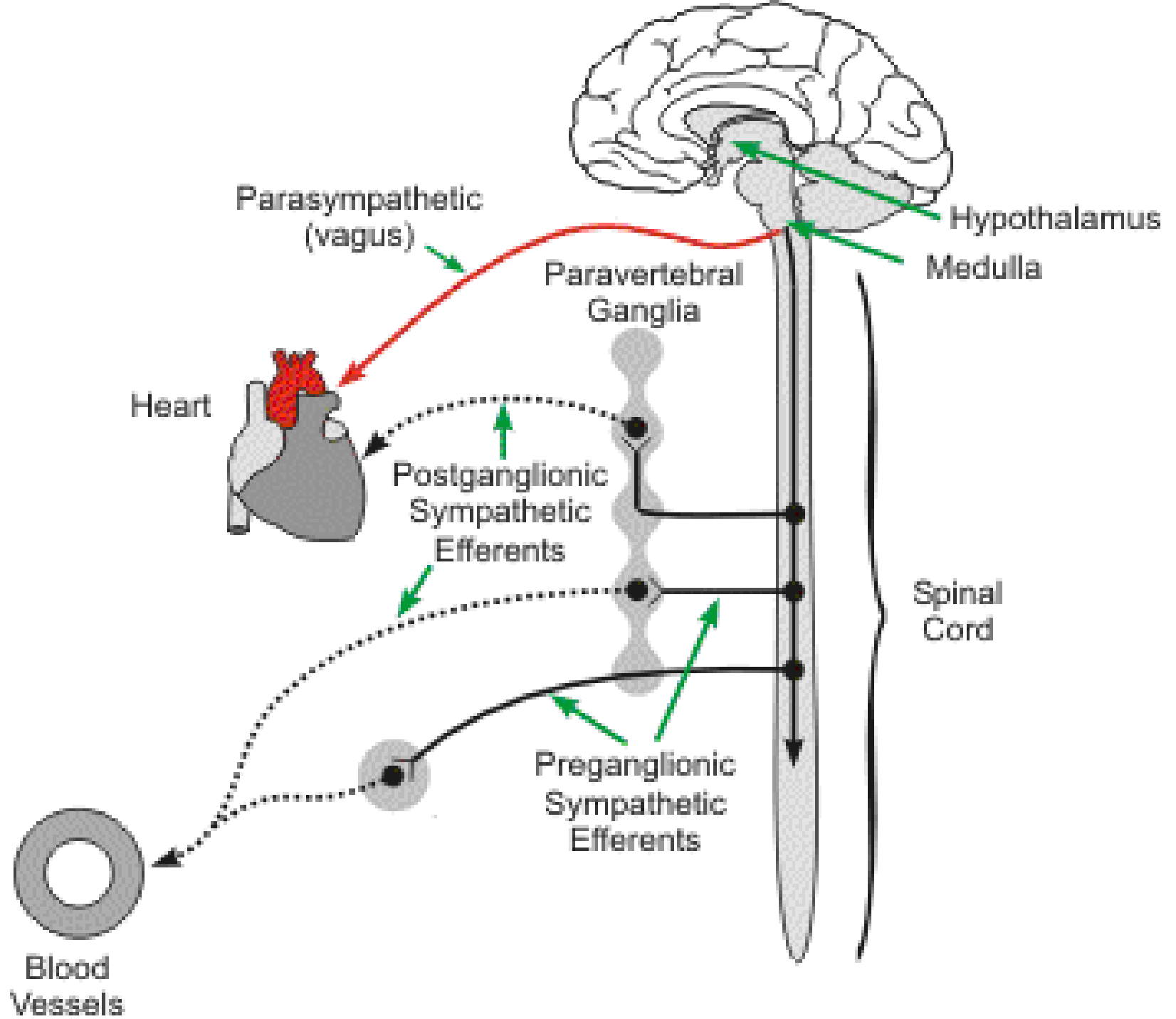
Draw a spinal nerve

Spinal Autonomic Nervous System

A) Sympathetic

B) Parasympathetic





Middle cervical cardiac N.

Superior cardiac branch

Middle cardiac branch

Inferior cardiac branch

Pulmonary plexus

Cardiac plexus

Esophageal plexus

Heart

Lungs,
bronchi &
pleurae

Esophagus

Celiac ganglion

Superior mesenteric
ganglion

Aorticorenal ganglion

Sympathetic
Parasympathetic
Mixed

Cervical sympathetic

Superior cervical ganglion

Inferior cervical ganglion

Pulmonary branch

Pulmonary splanchnic N.

Cardiac splanchnic N.

Vagus N.

Thoracic sympathetic

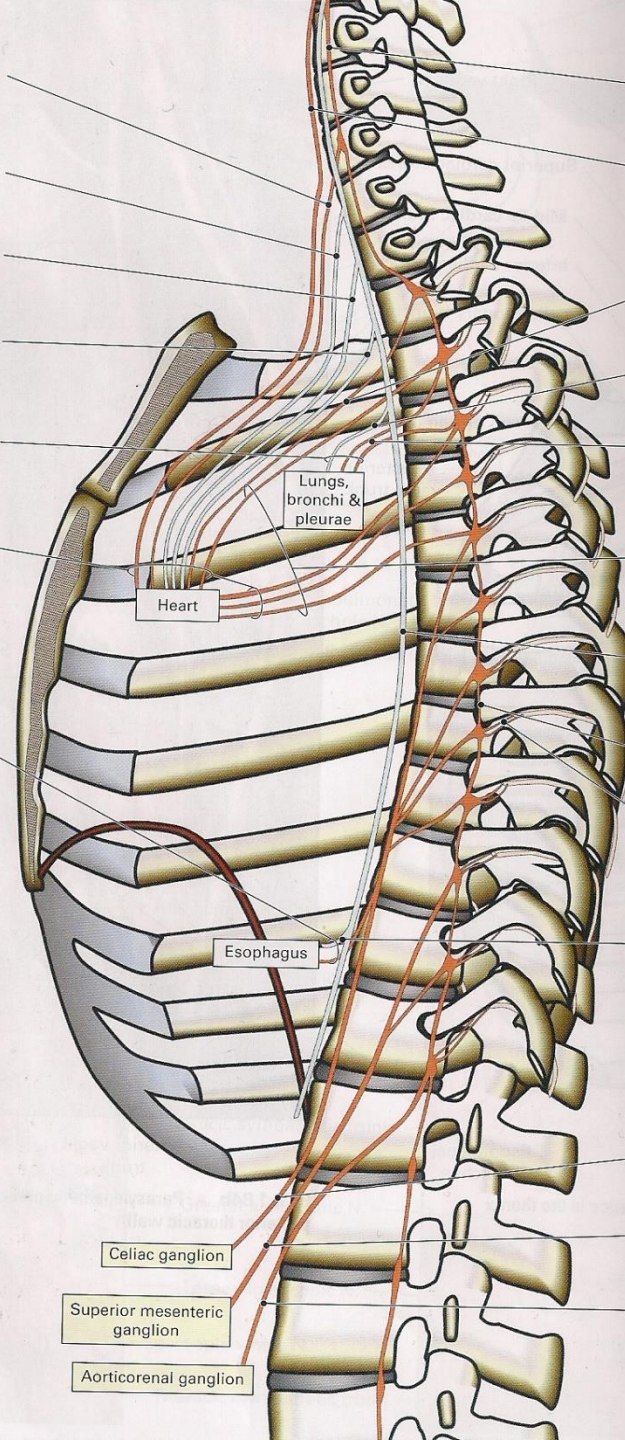
Rami communicantes

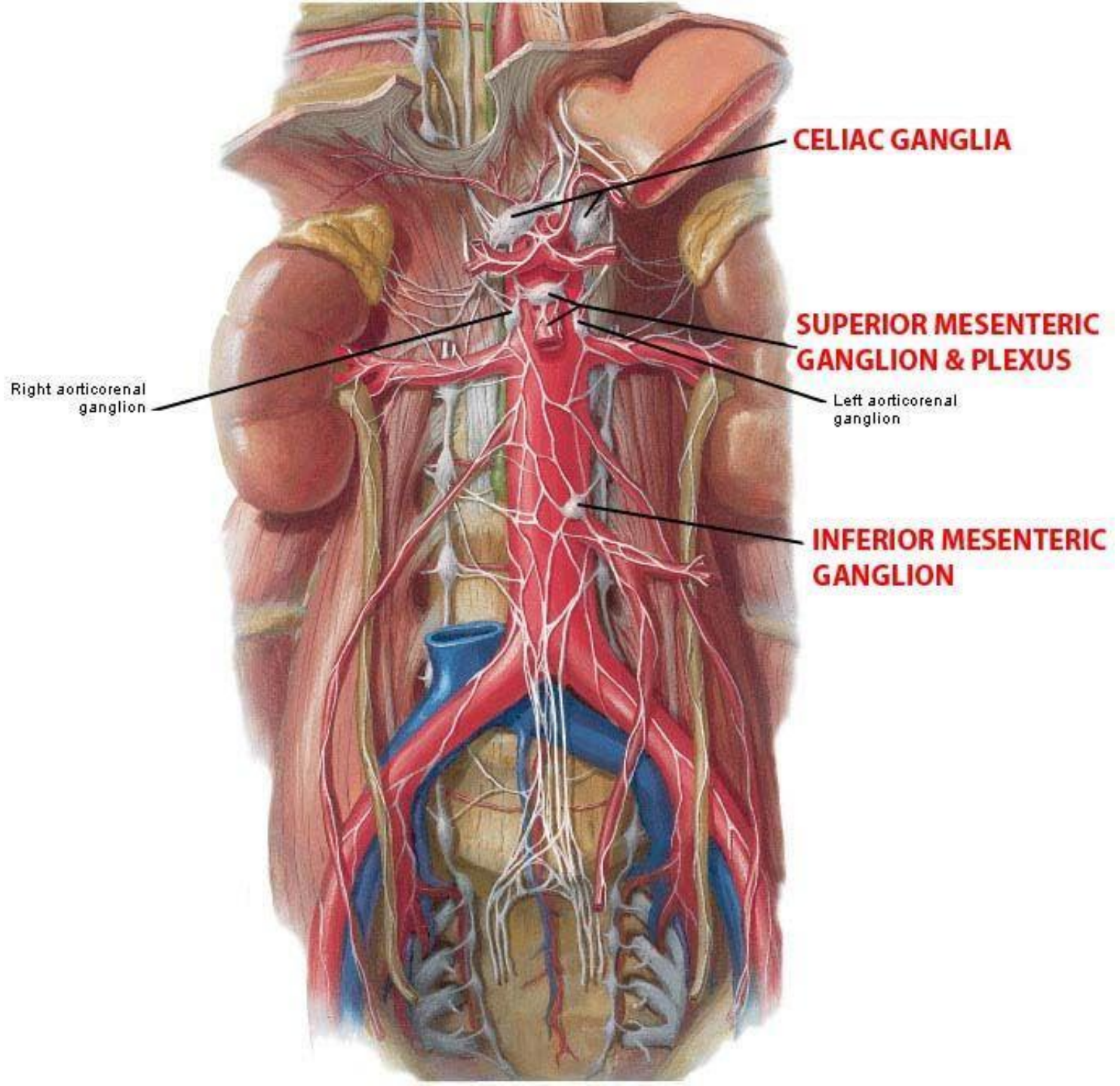
Esophageal branch

Greater splanchnic N.

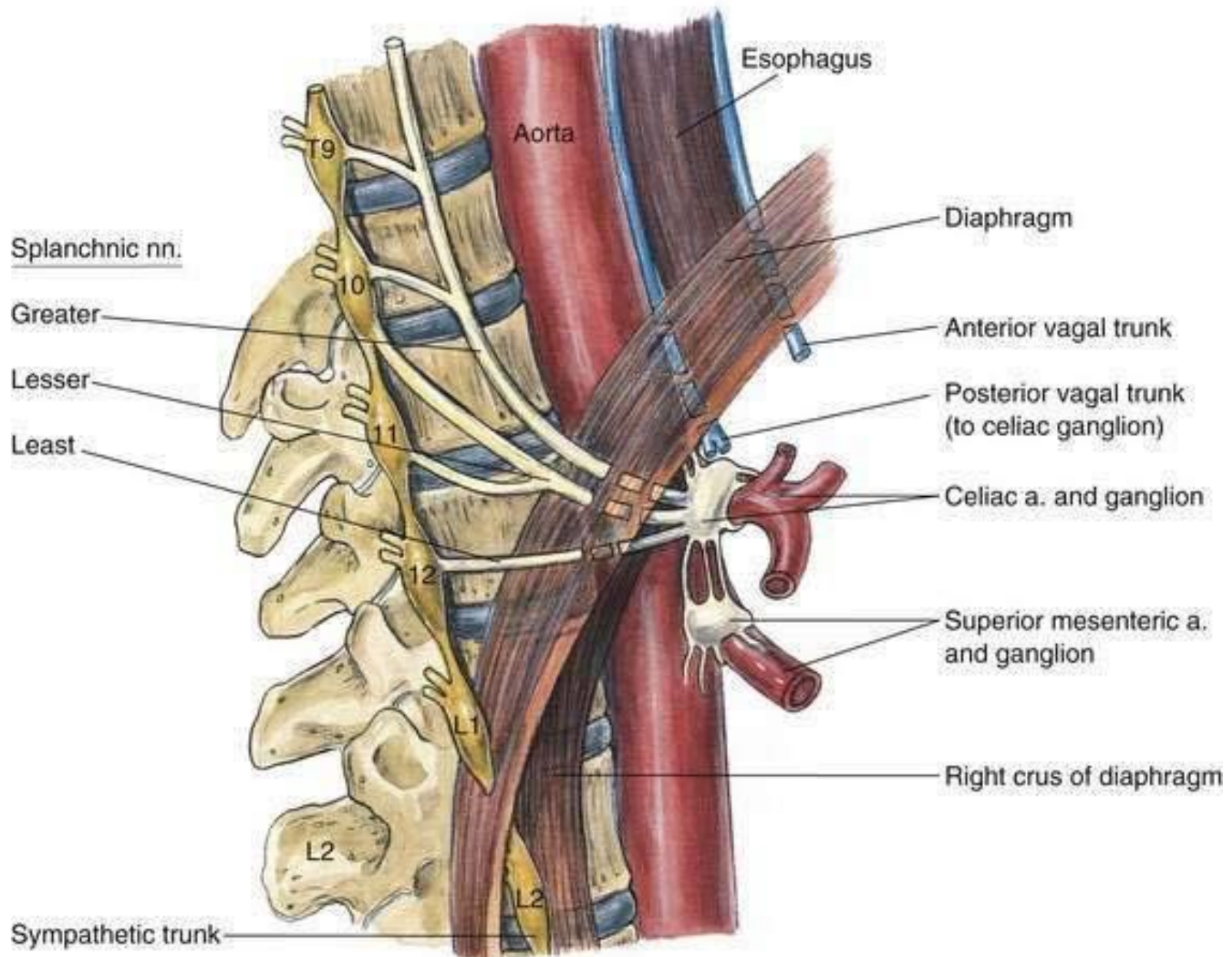
Lesser splanchnic N.

Least splanchnic N.

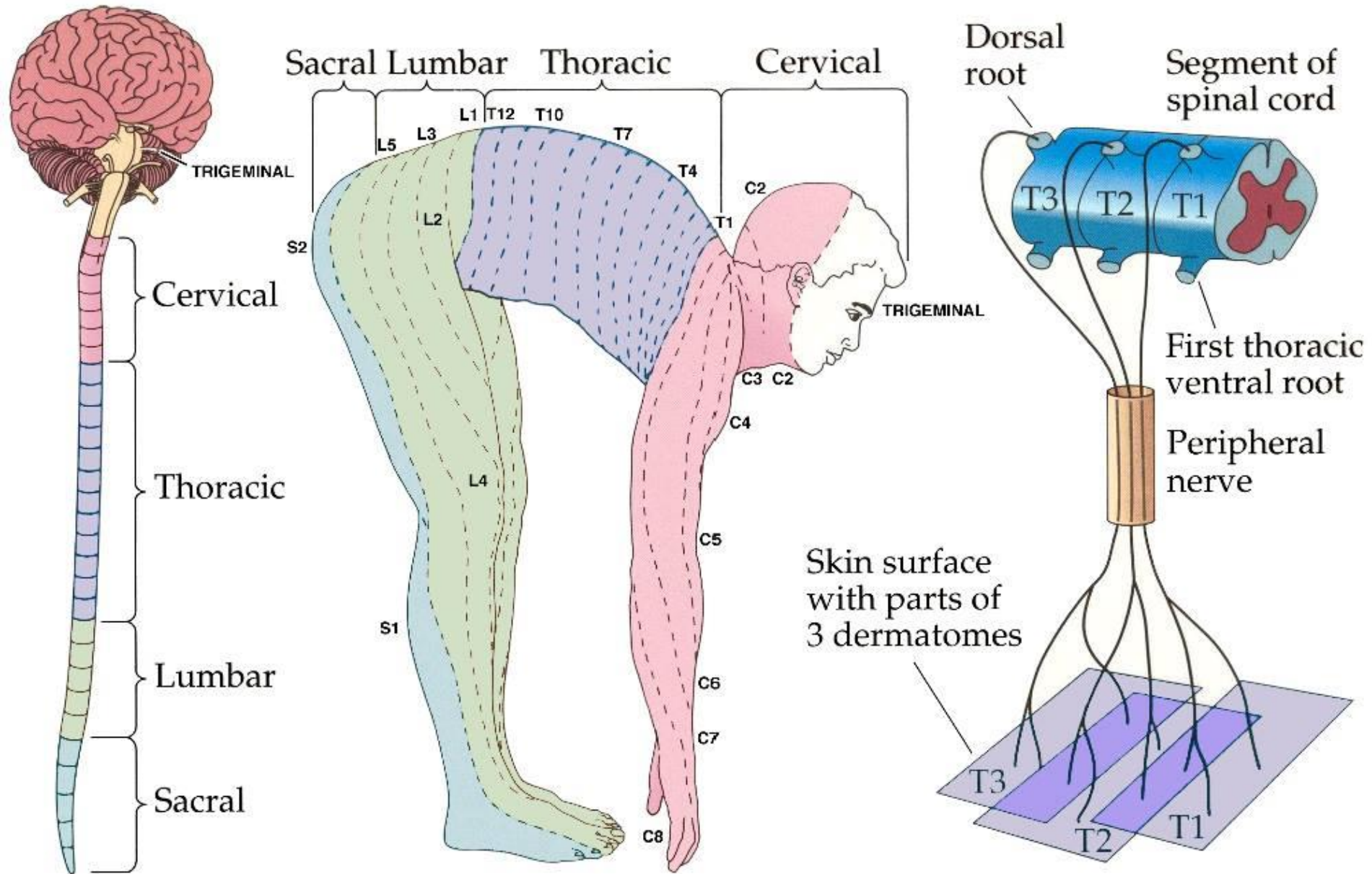




Celiac Ganglia



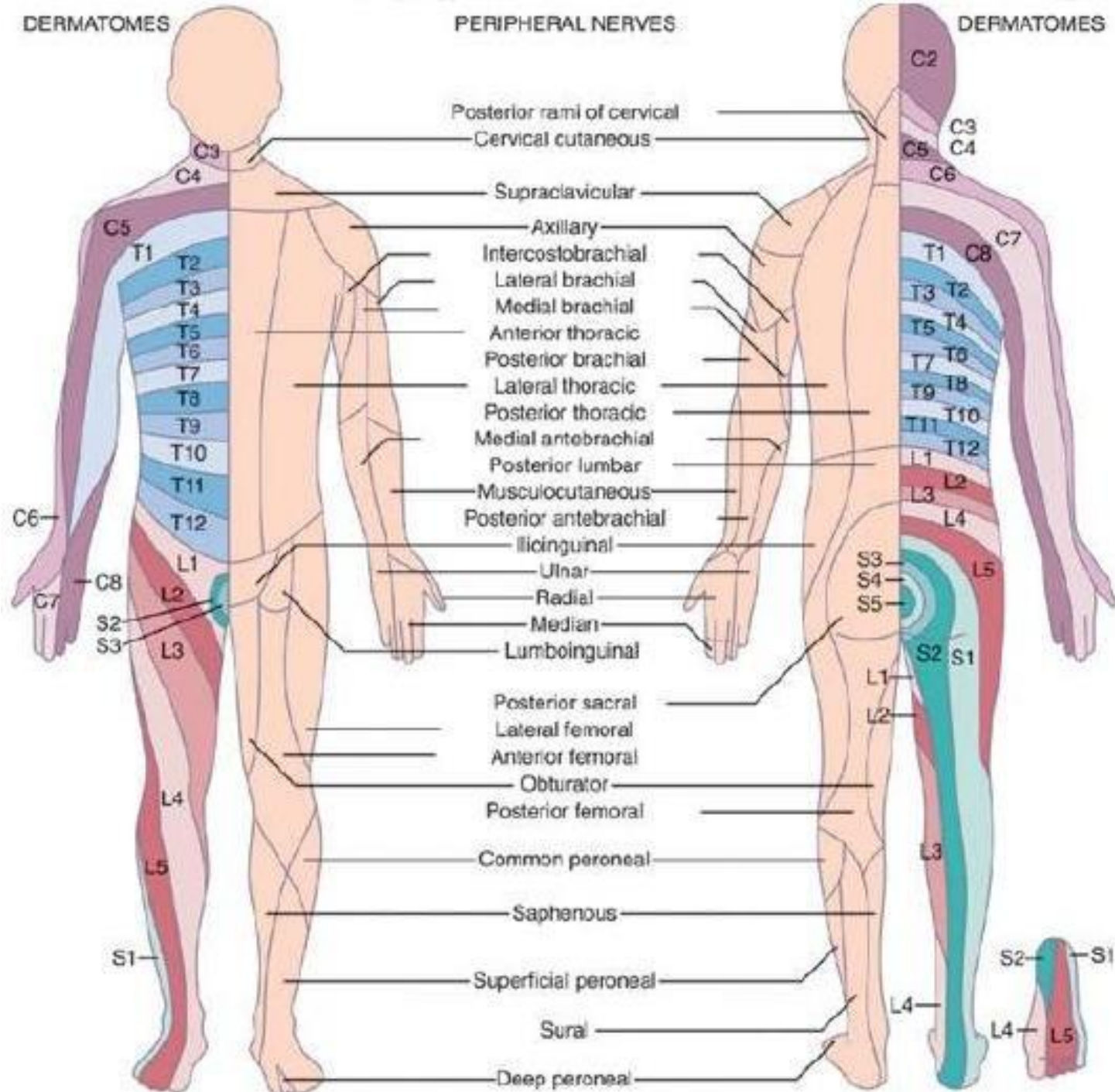
Dermatomes

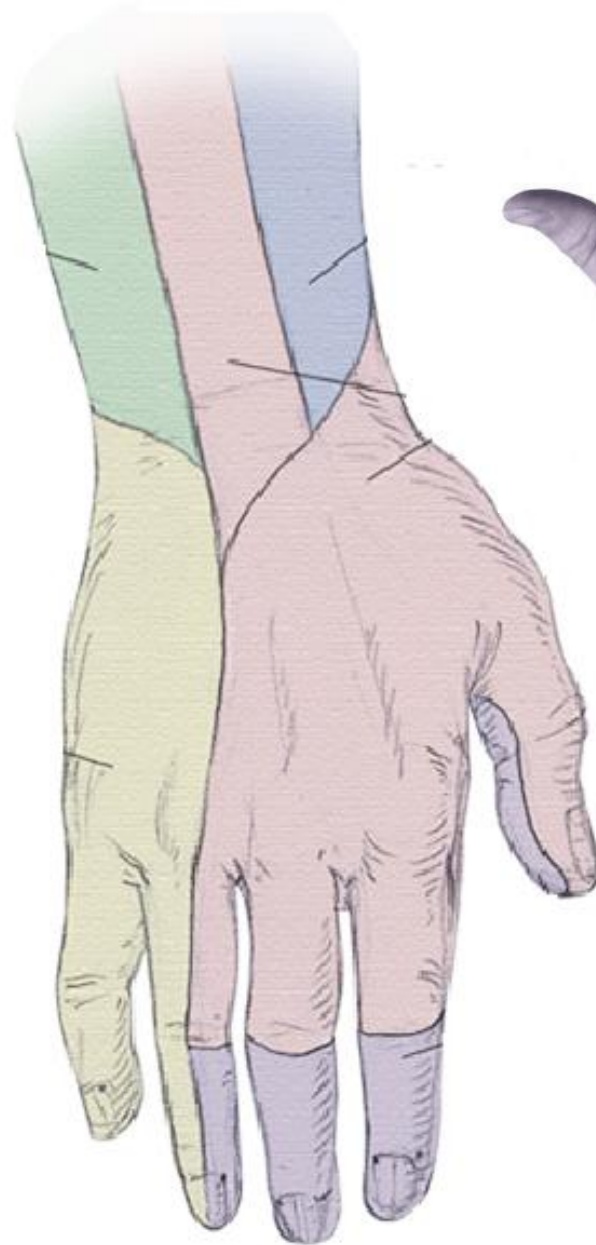
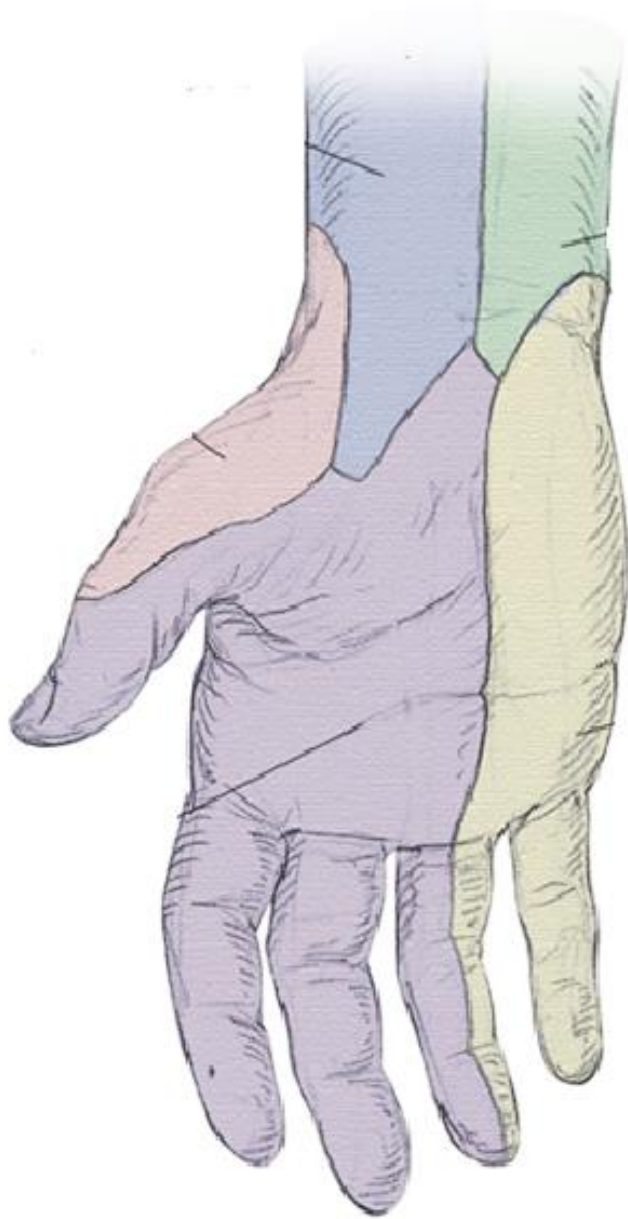


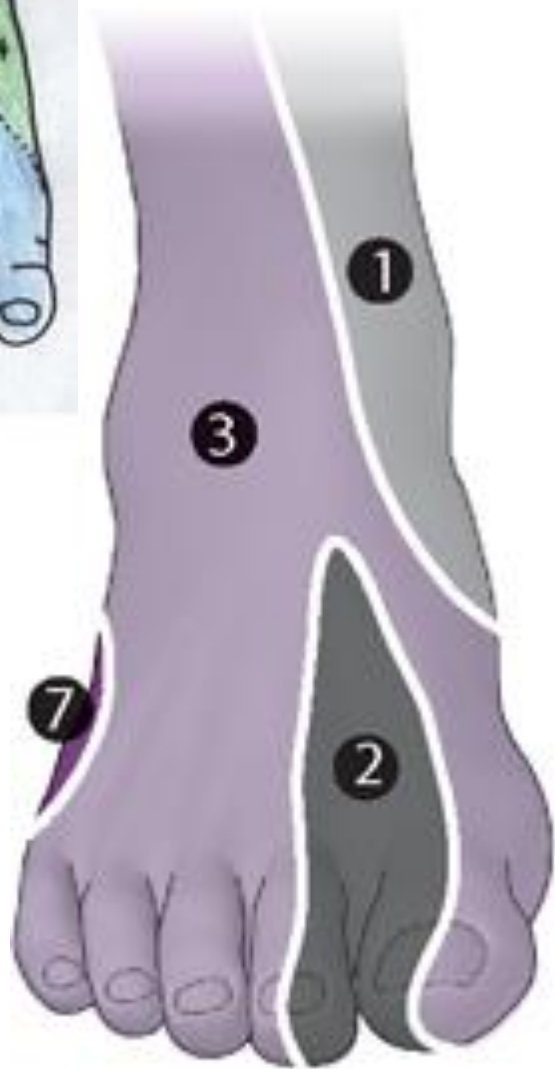
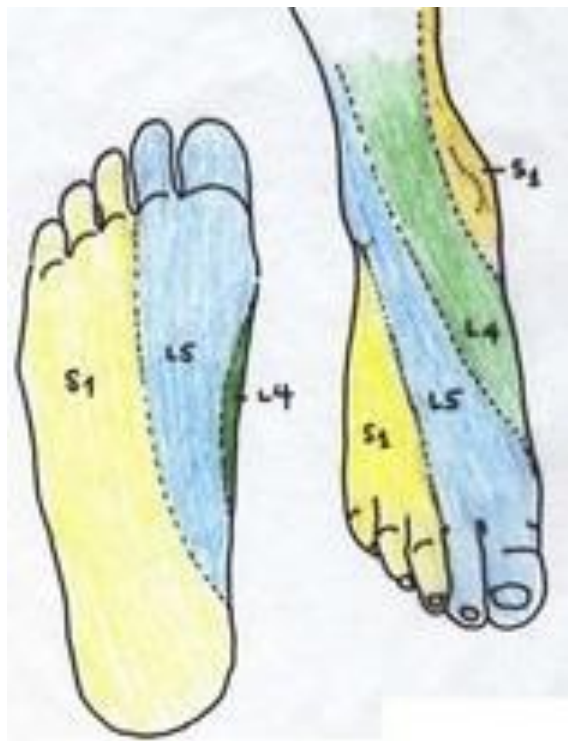
DERMATOMES

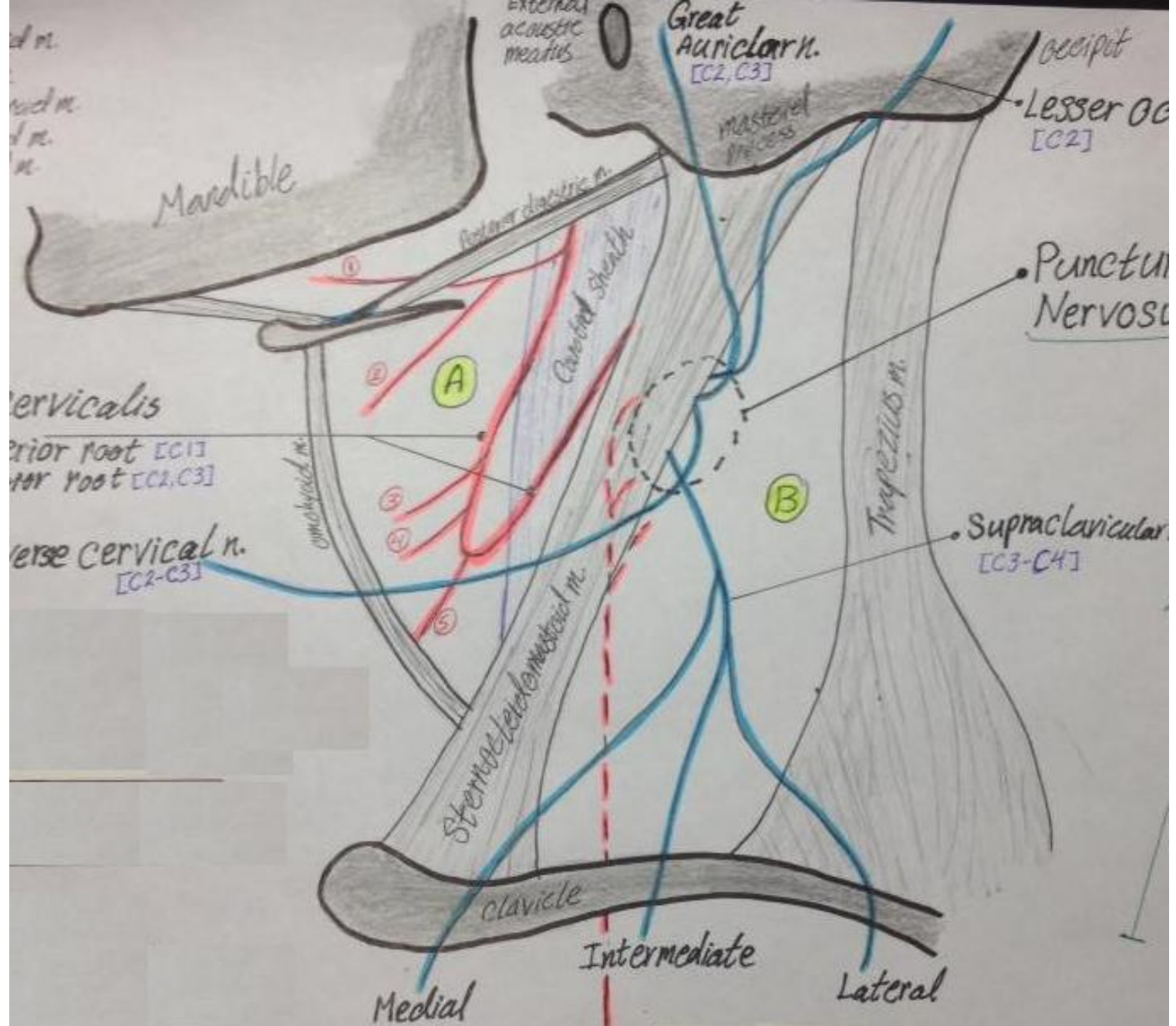
PERIPHERAL NERVES

DERMATOMES







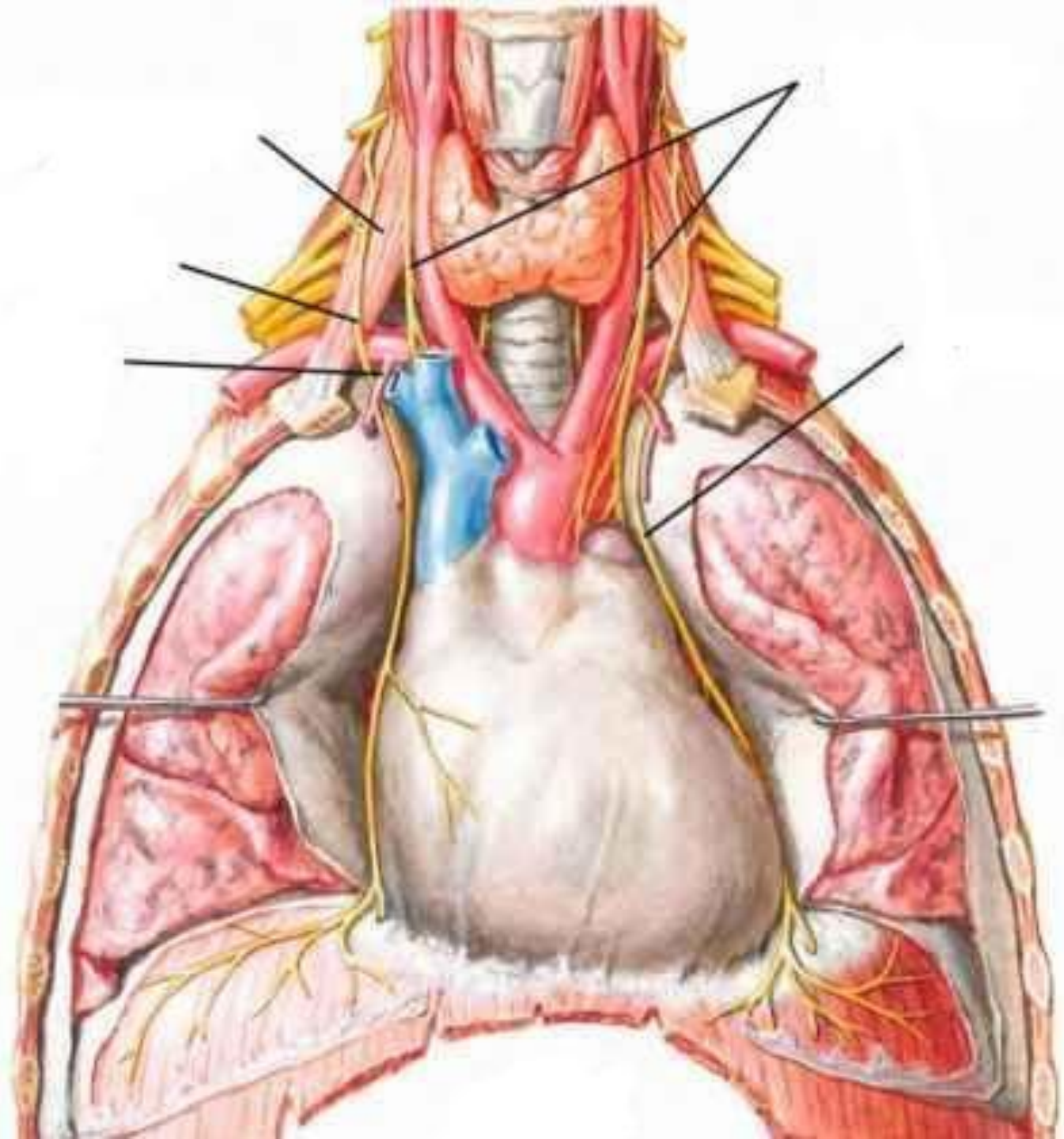


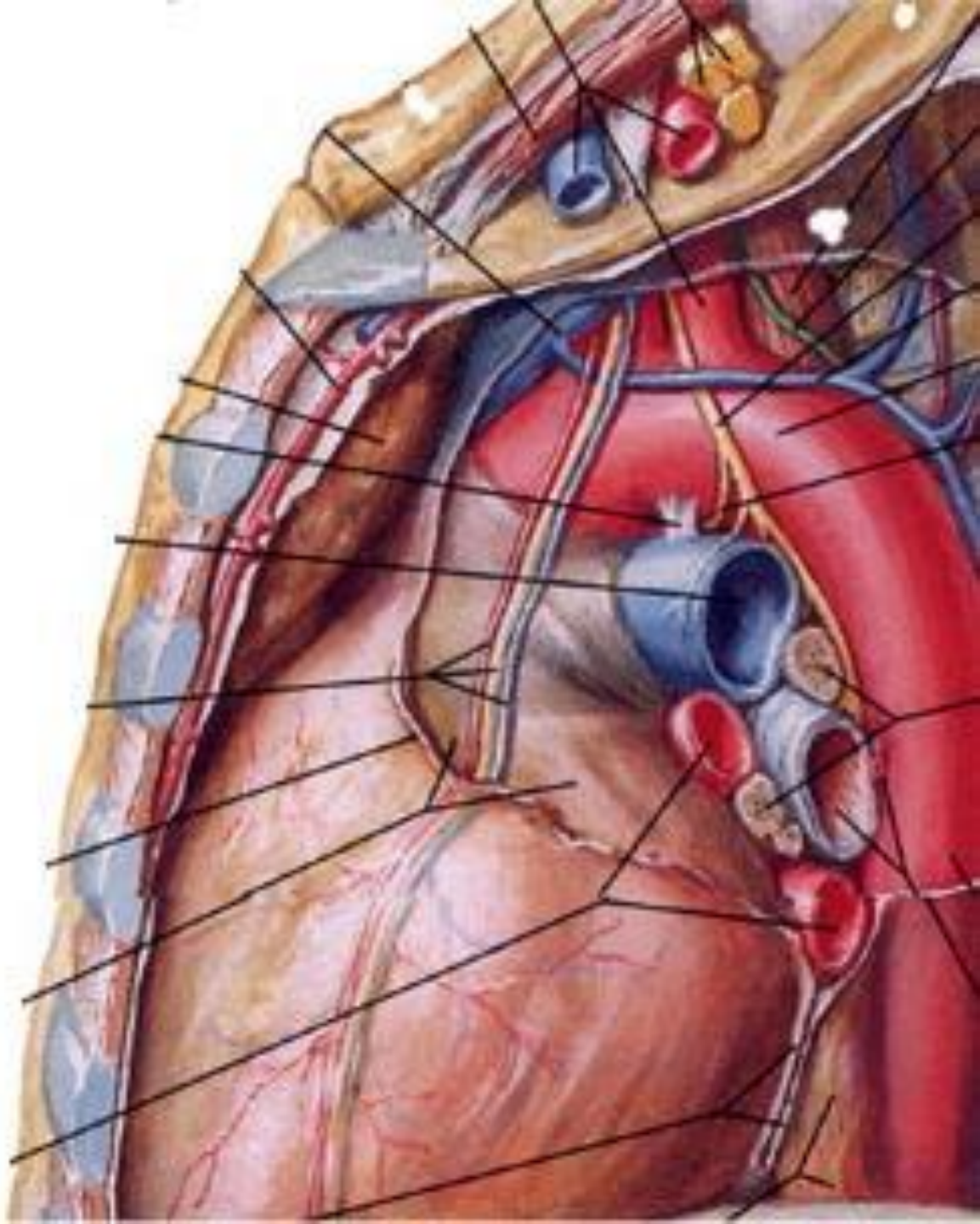
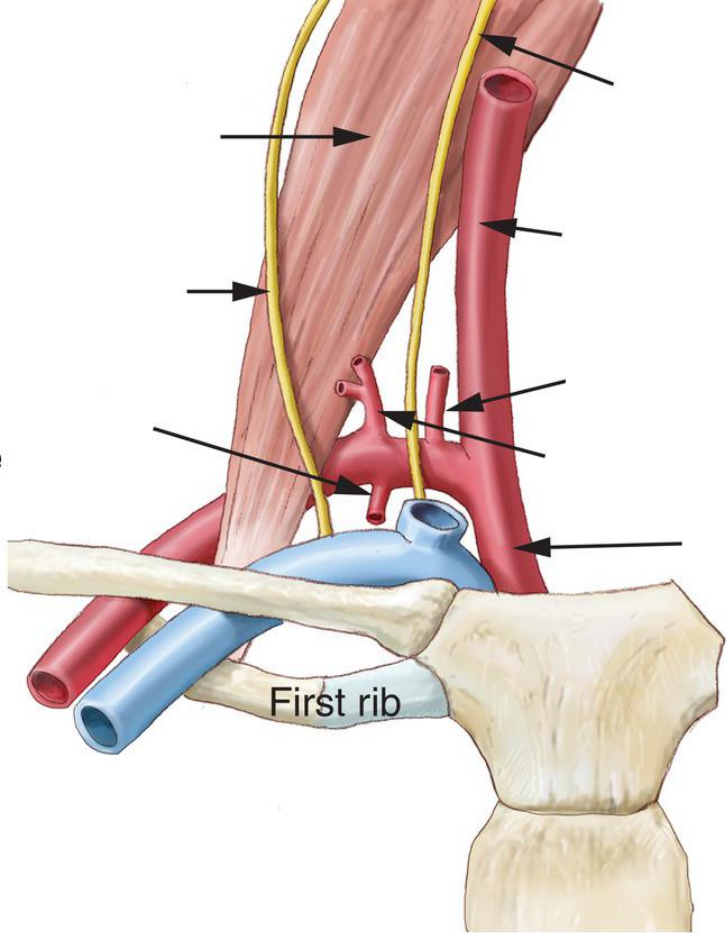
Azzat Al-Redwan

Phrenic n. [C3-C4-C5] *Deep Laying an

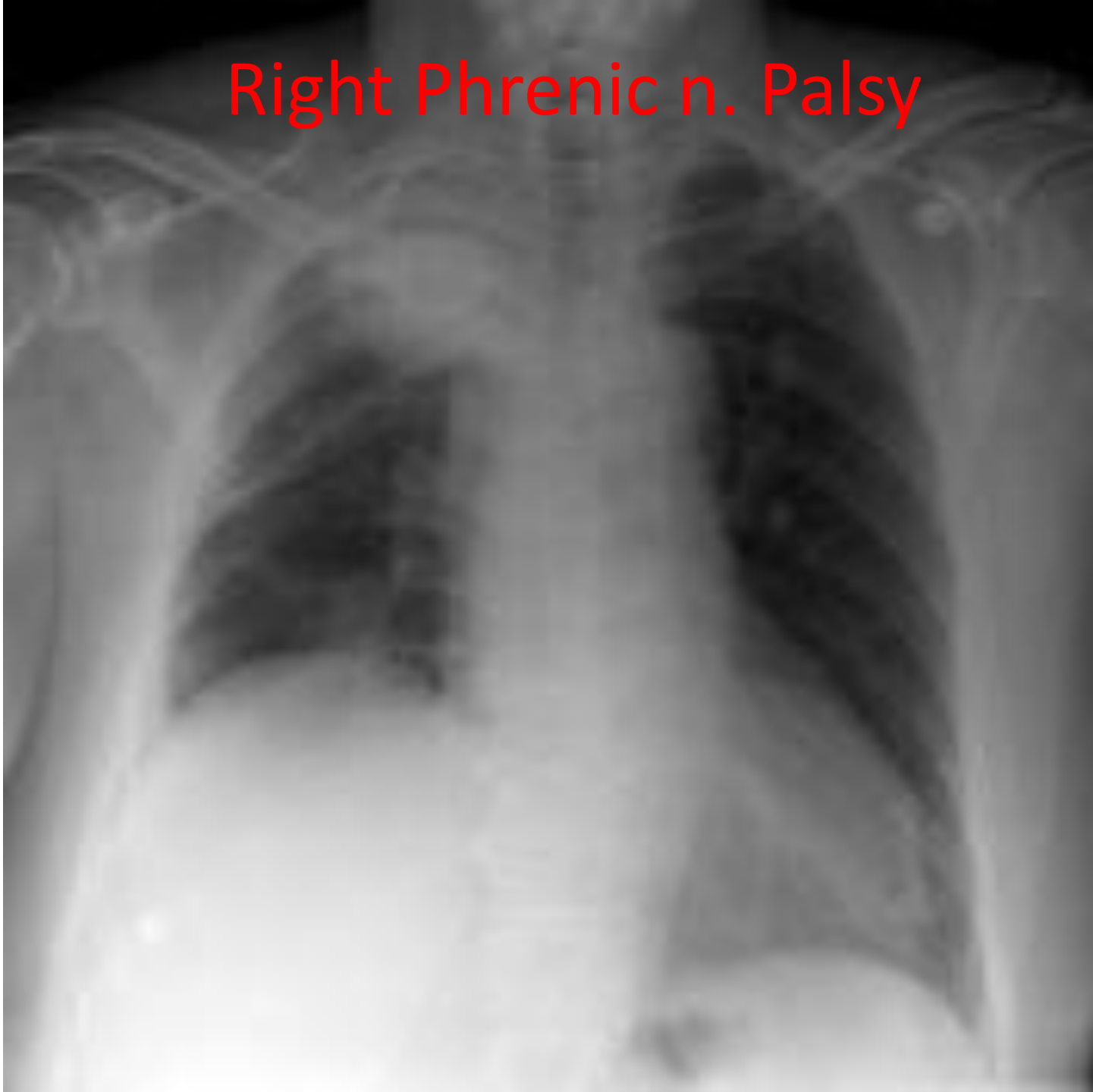
CERVICAL PLEXUS

Draw the cervical plexus

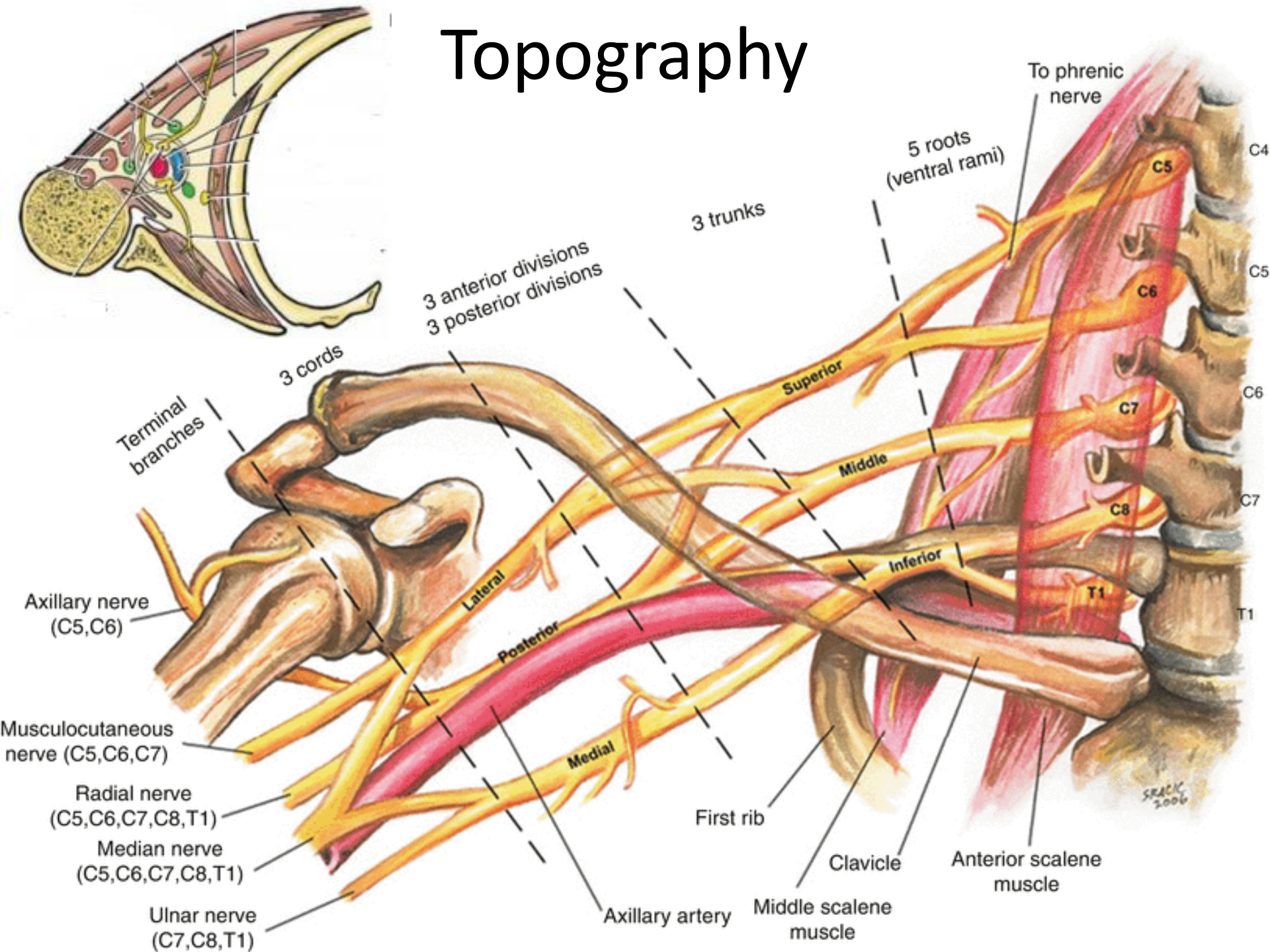




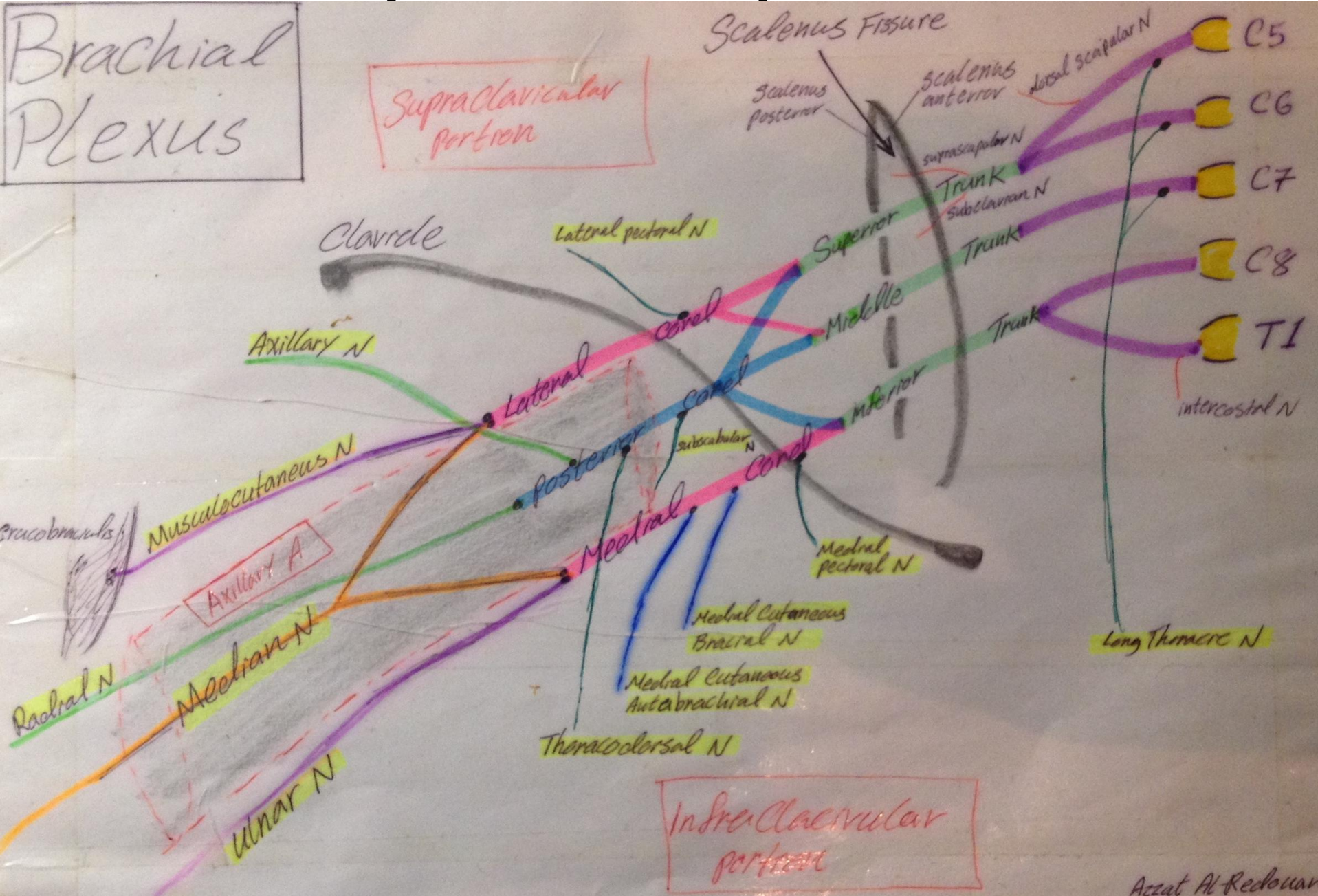
Right Phrenic n. Palsy



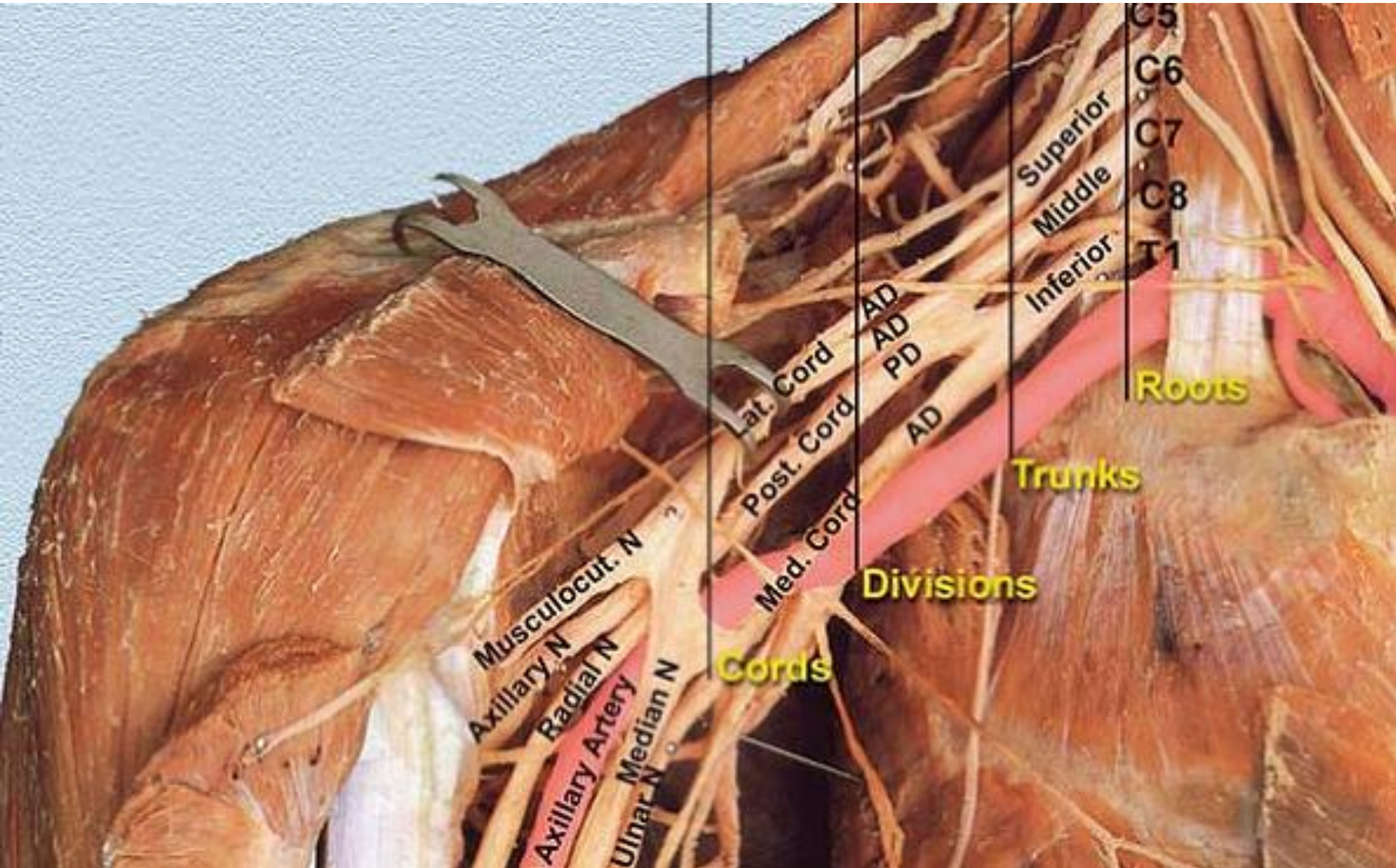
Topography



brachial plexus – simplified scheme



Dissection Appearance



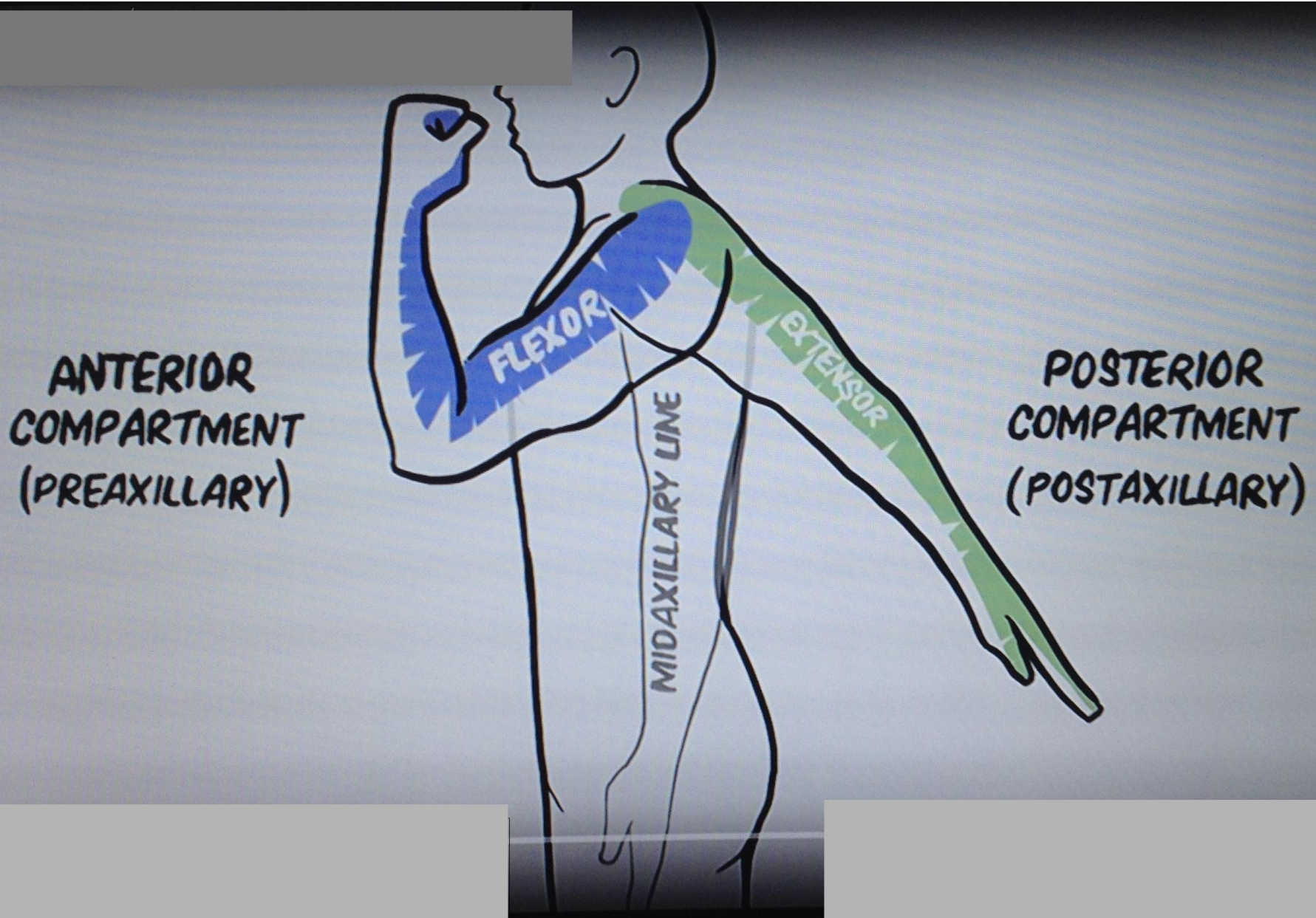
Dissection Appearance



BRACHIAL PLEXUS

Draw the brachial plexus

General Overview of Function



Clinical Application – Injuries

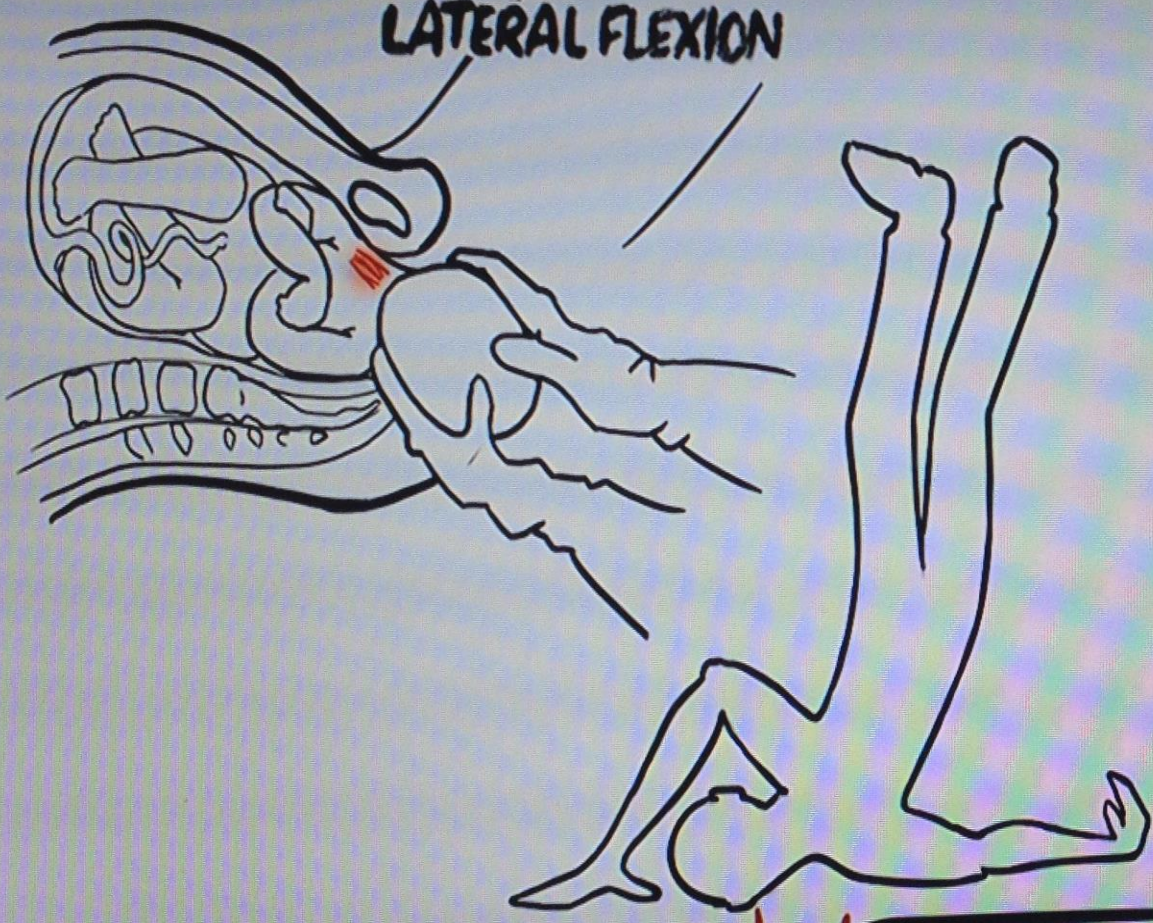
(Upper Roots) *Injury at supraclavicular portion.



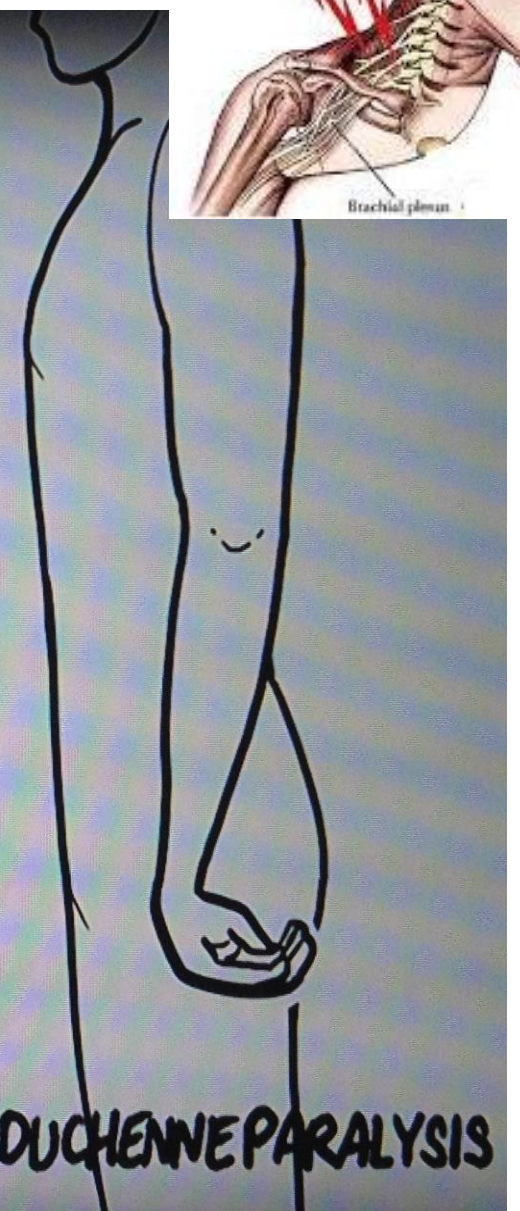
the Brachial Plexus- Animated Review [HD]

UPPER BRACHIAL PLEXUS INJURY

LATERAL FLEXION



ERB-DUCHENNE PARALYSIS

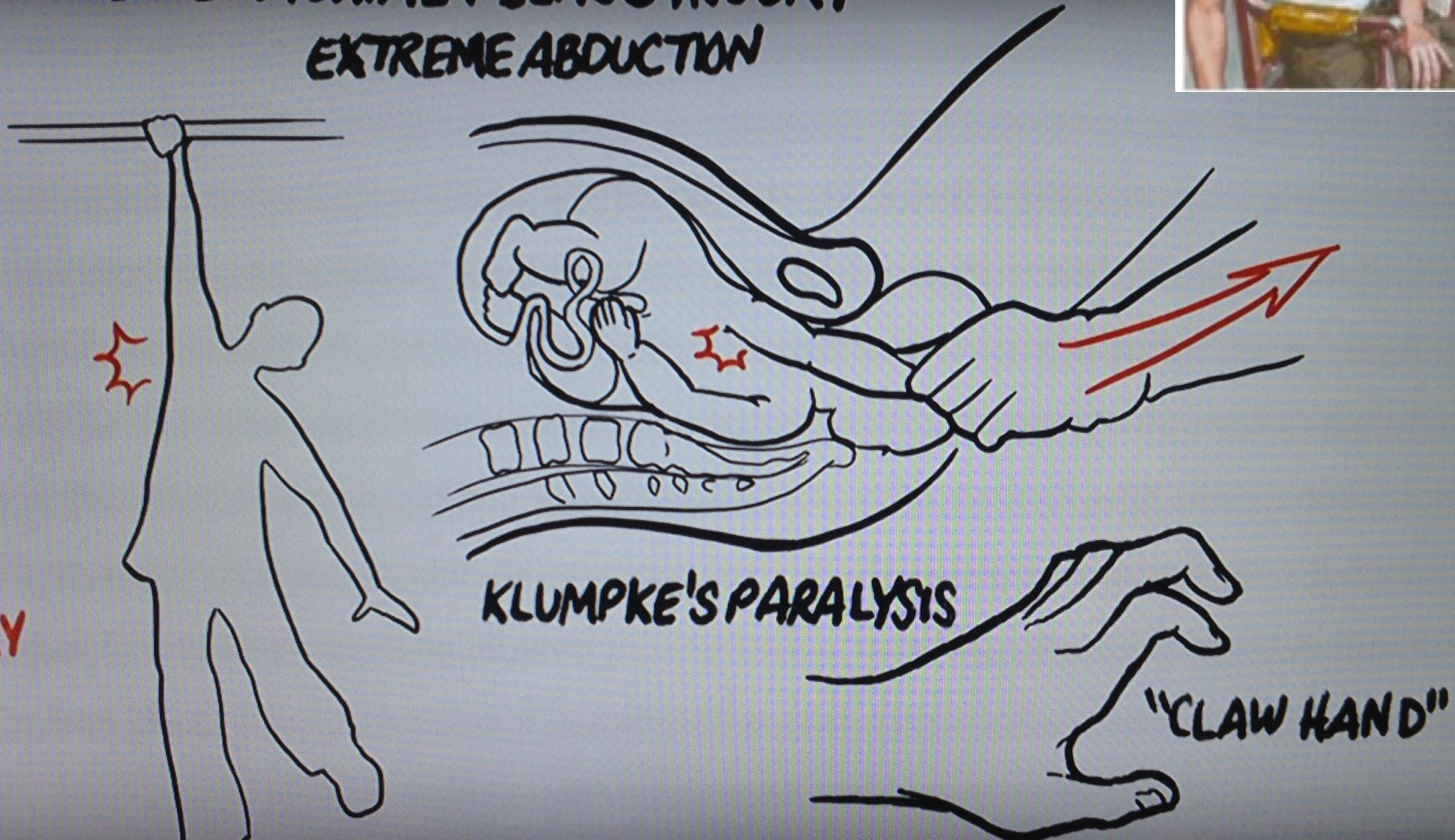


Clinical Application – Injuries

(Lower Roots) *Injury Infraclavicular portion, axillary fossa.



The Brachial Plexus- Animated Review [HD]
LOWER BRACHIAL PLEXUS INJURY
EXTREME ABDUCTION



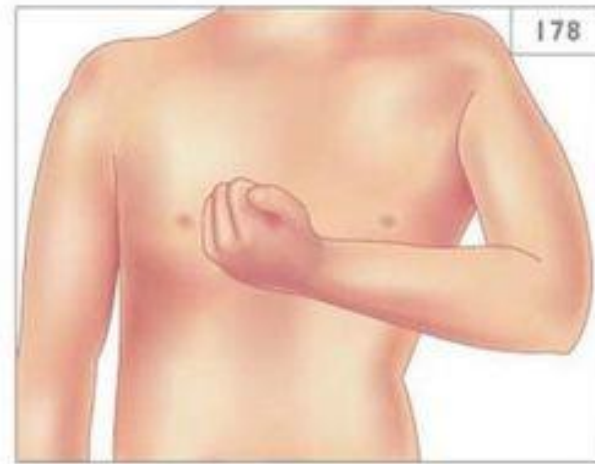
Clinical Application – Injuries

(Upper Roots Injury)

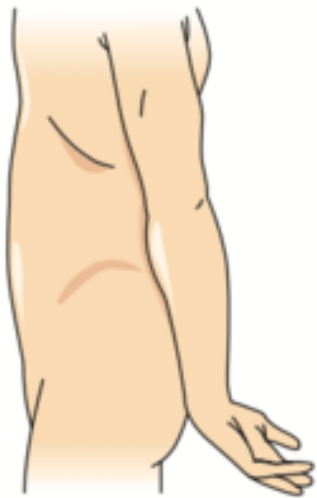
(Lower Roots Injury)



177 Erb's palsy.

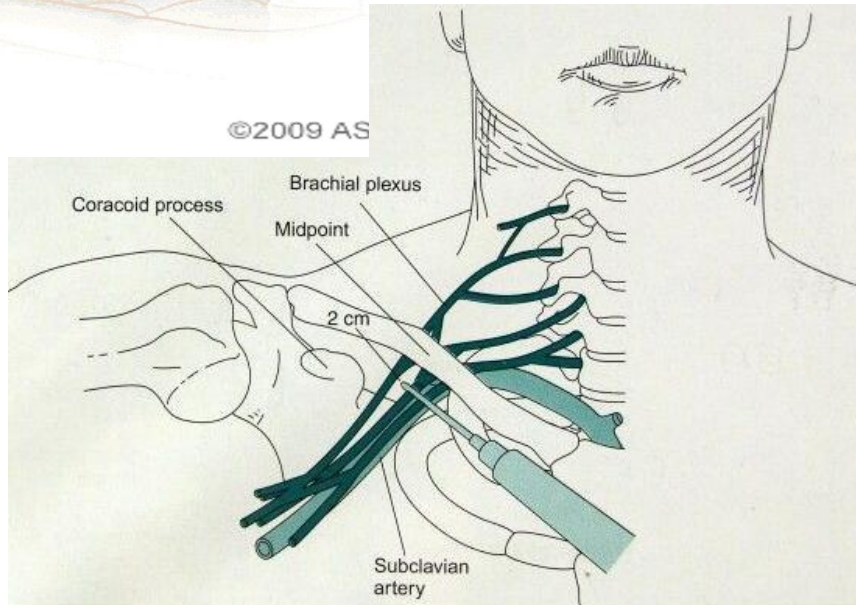
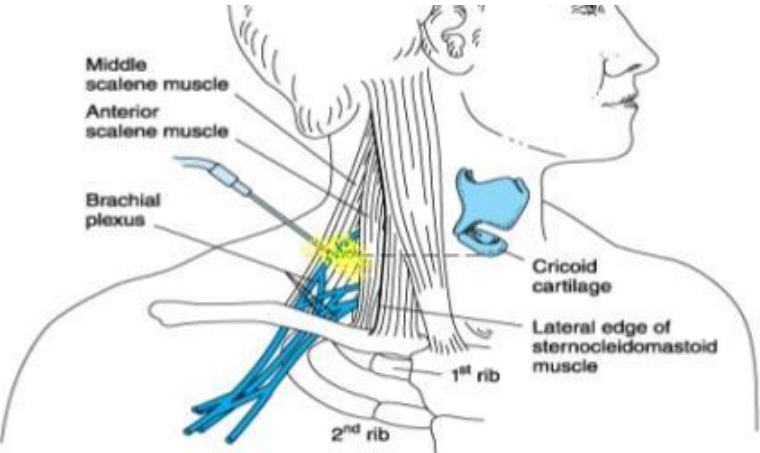
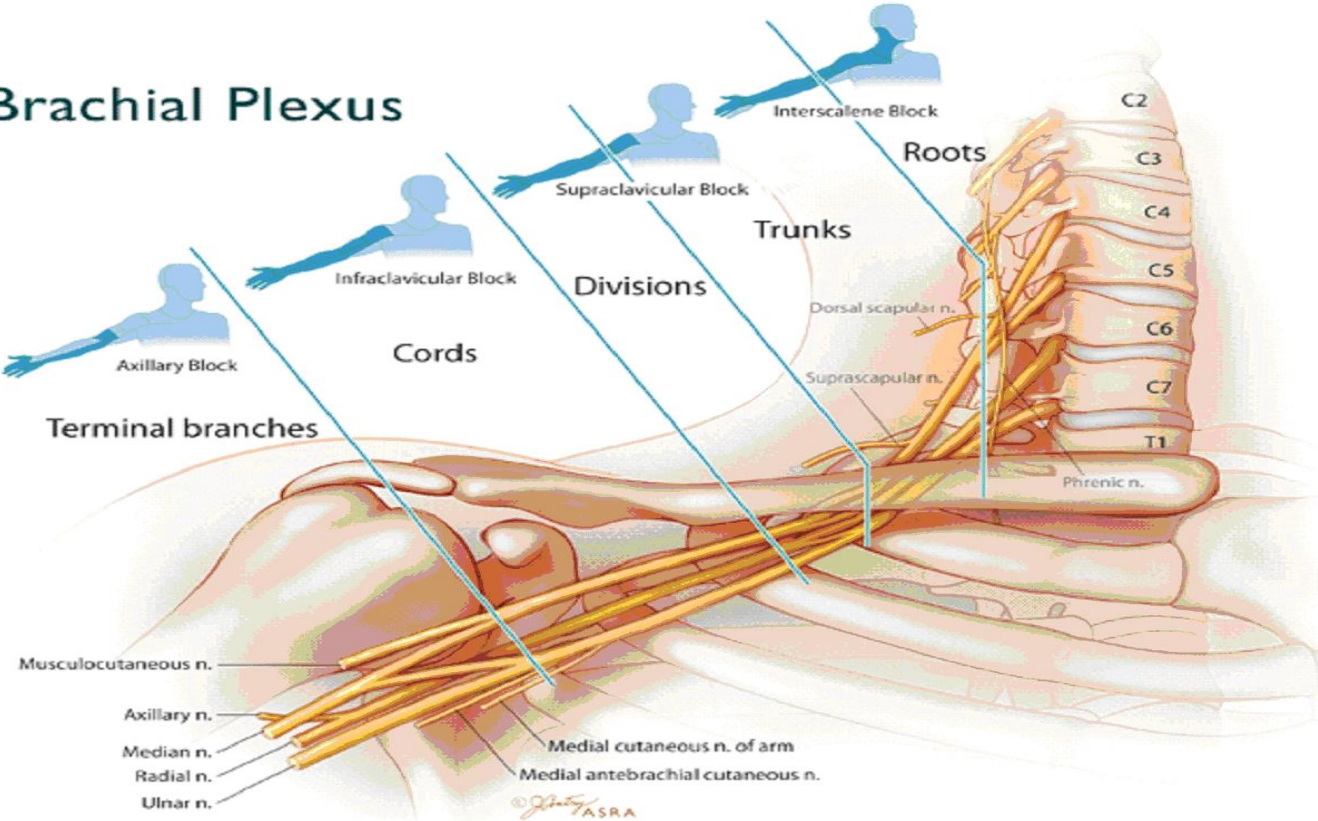


178 Klumpke palsy.



Clinical Application – Anaesthesia

Brachial Plexus



Clinical Application – Imaging (Sonography)

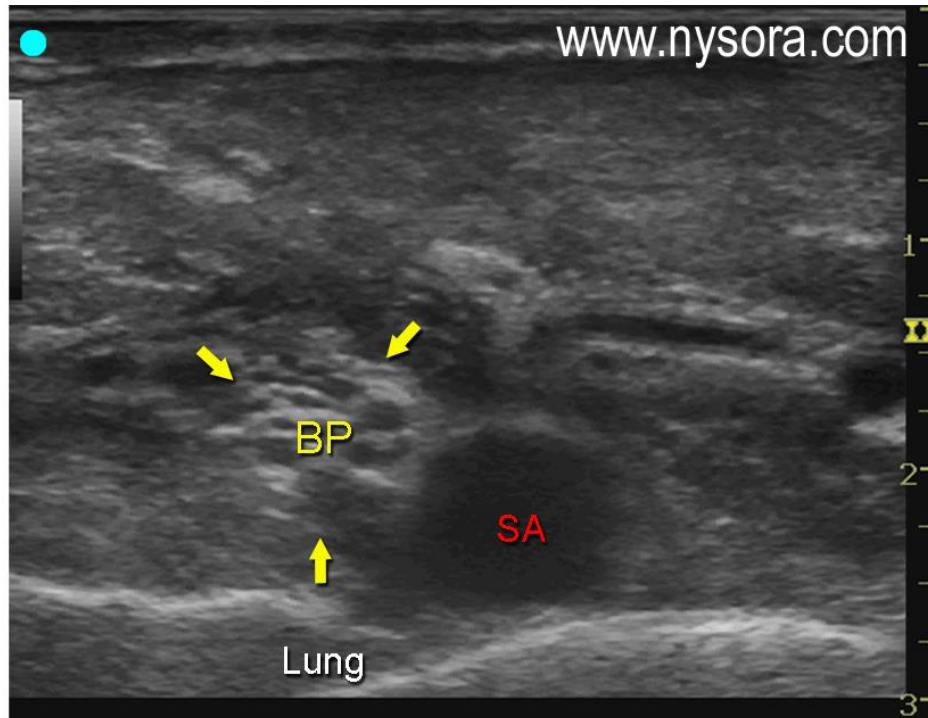
*Can detect compression e.g.tumors

*Anaesthesia guidance

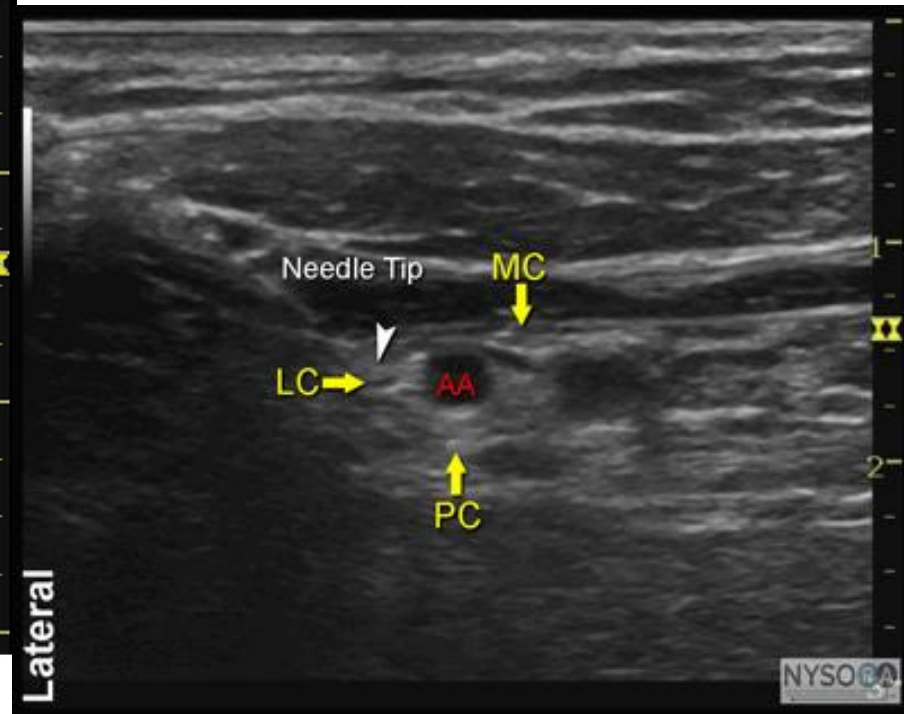


Supraclavicular

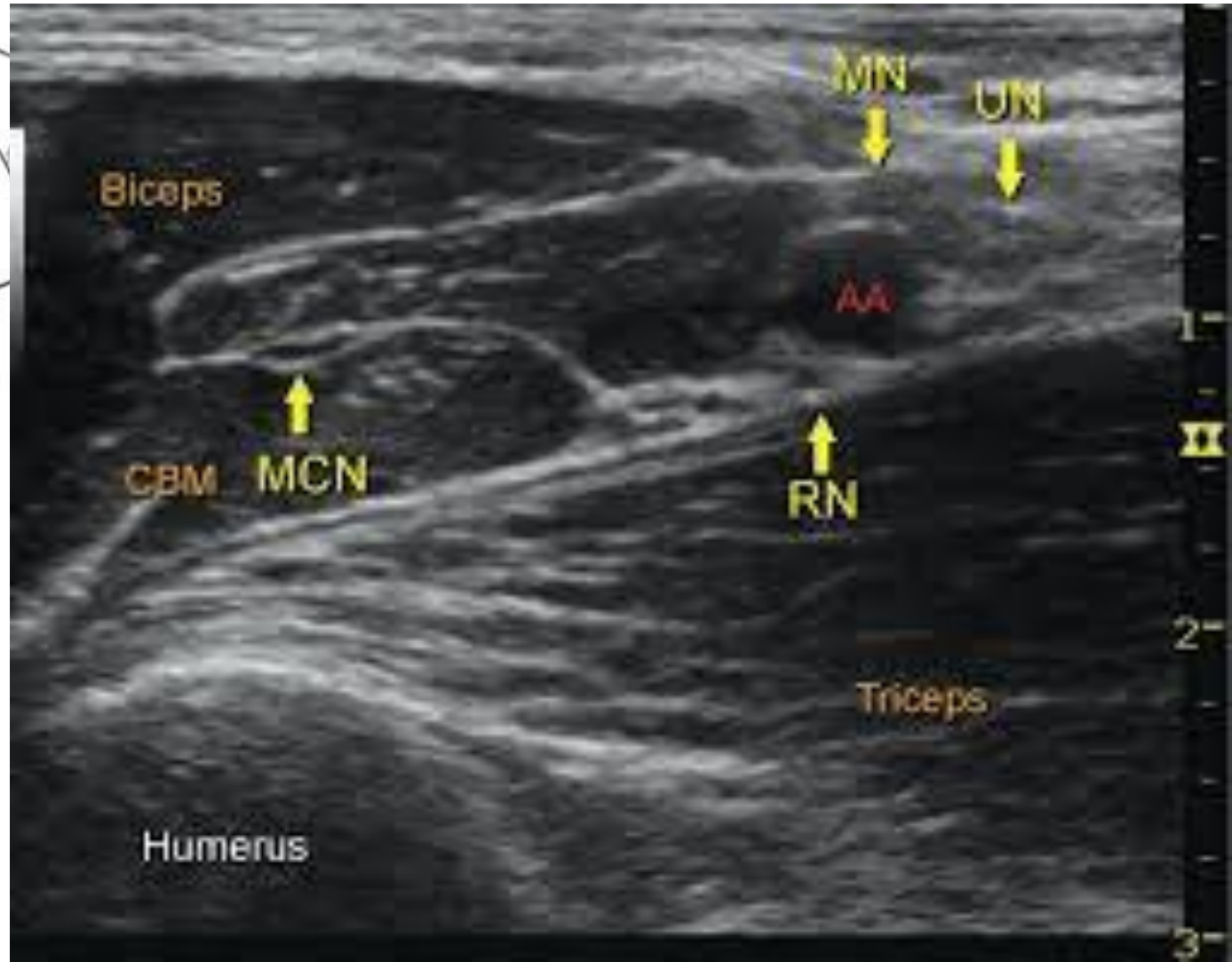
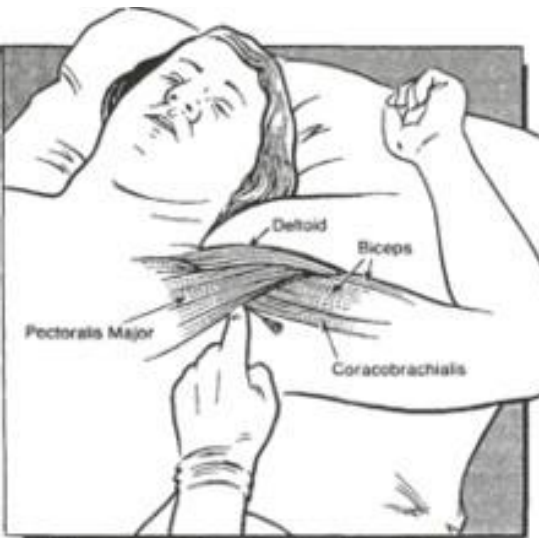
Infraclavicular



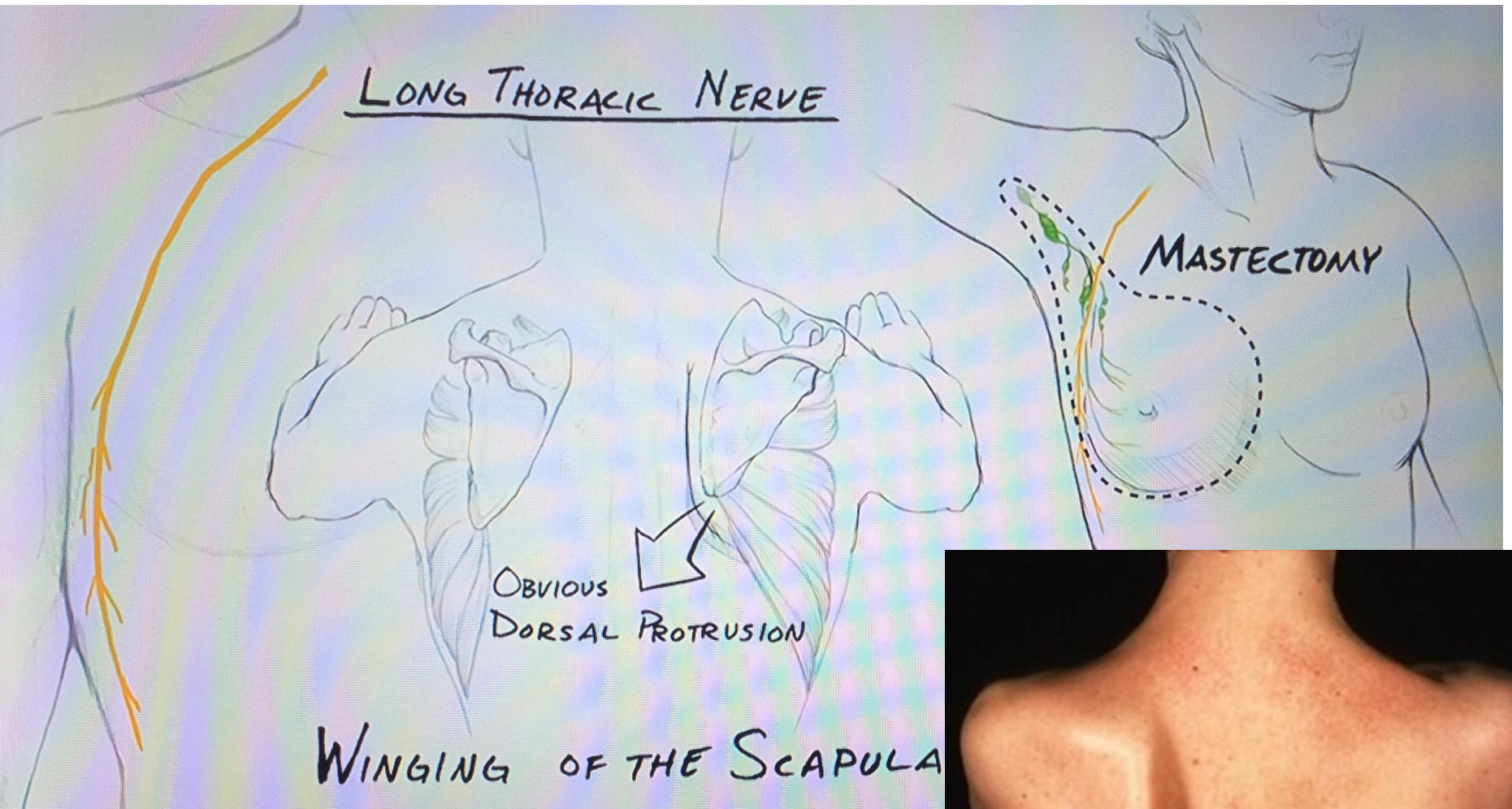
Supraclavicular Brachial Plexus



Axillary view

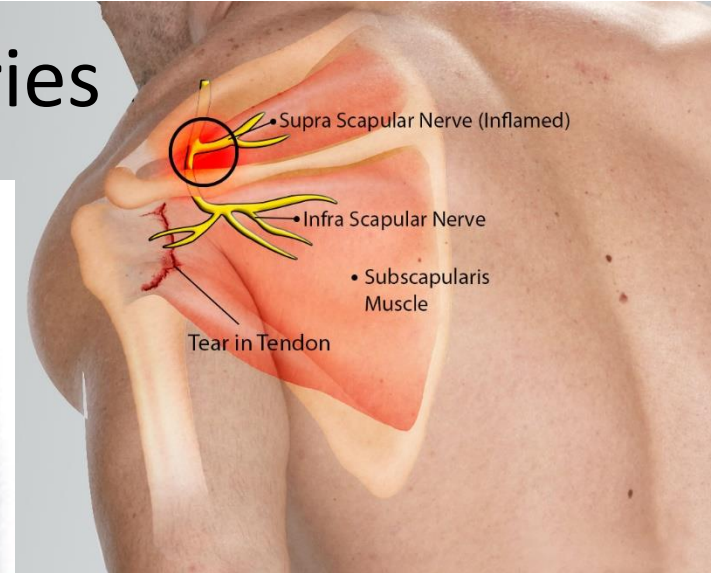
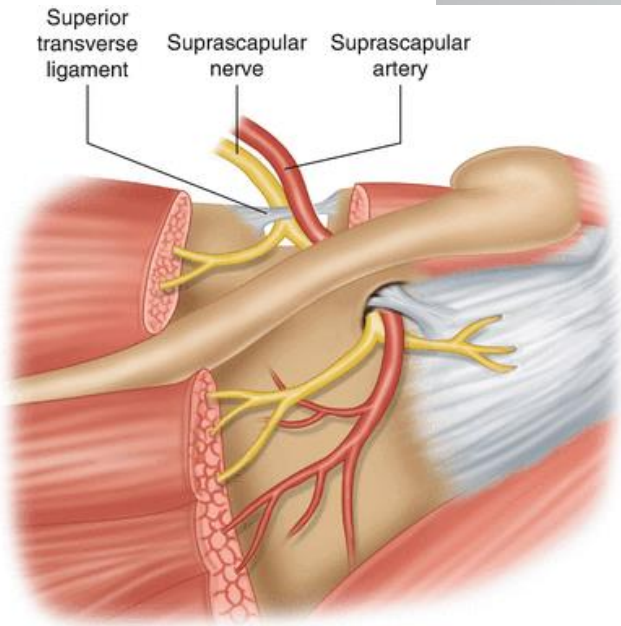
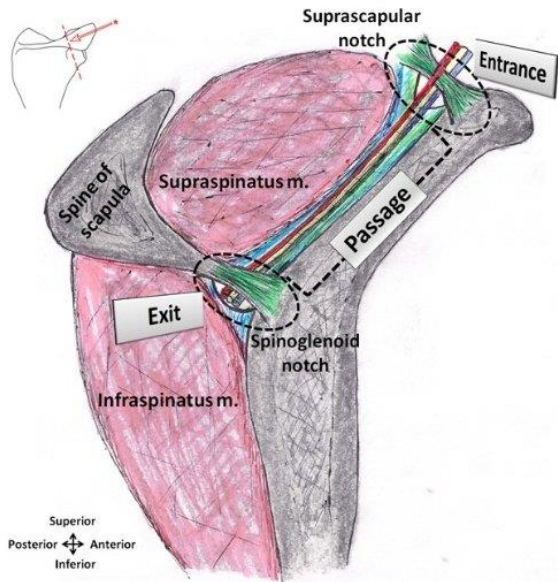


Long Thoracic n. & Common Injuries

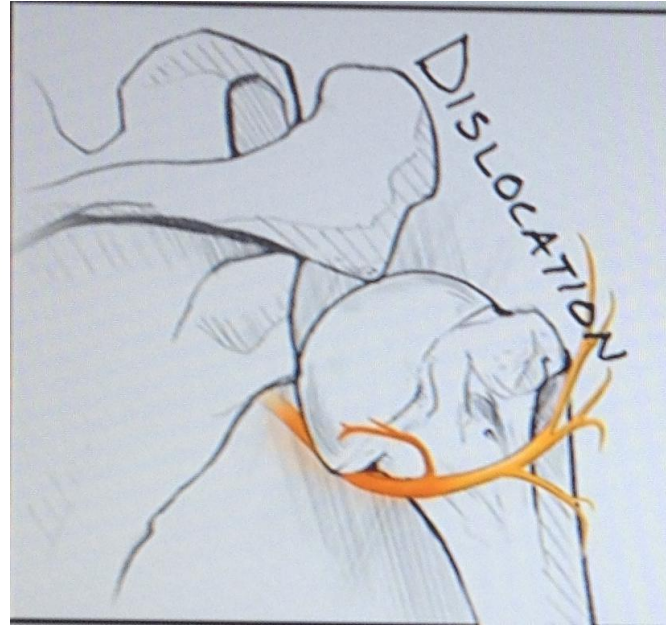
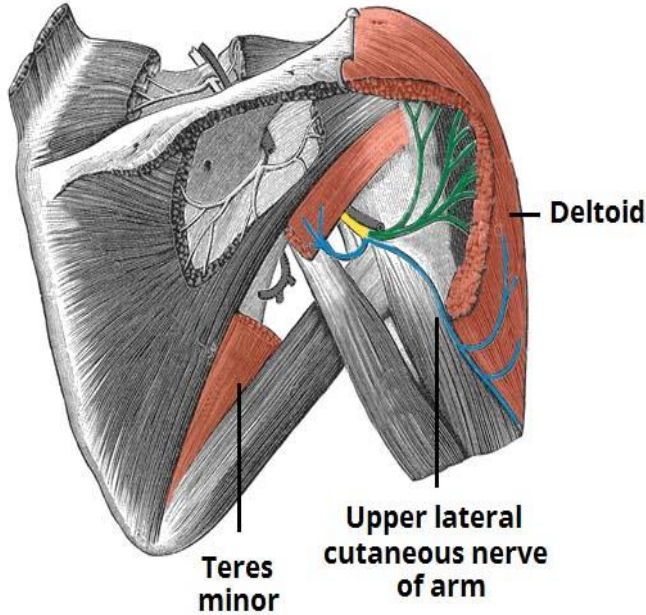


C5-C7

Suprascapular n. & Common Injuries

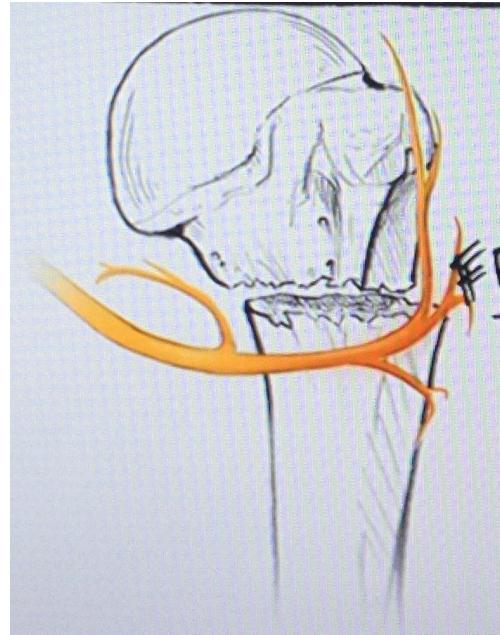


Axillary n. & Common Injuries



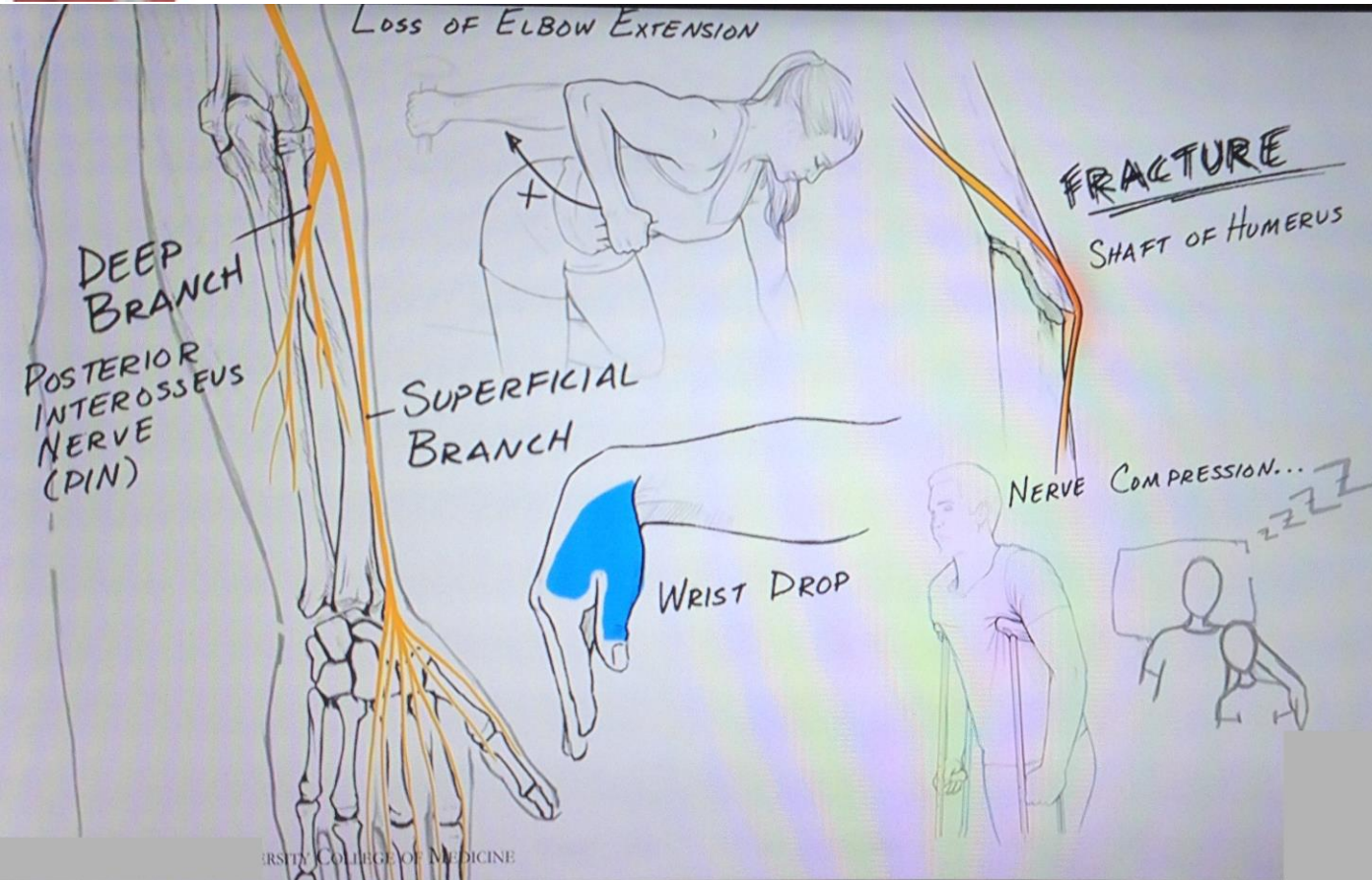
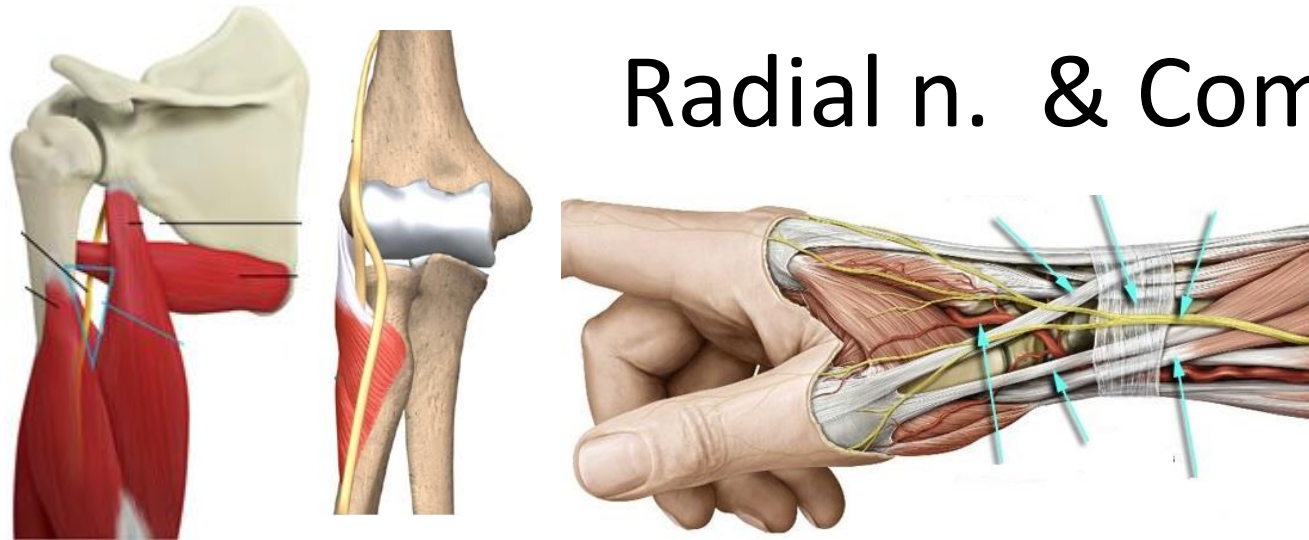
C5-C6

- Anterior terminal division
- Posterior terminal division



Radial n. & Common Injuries

C5-C8



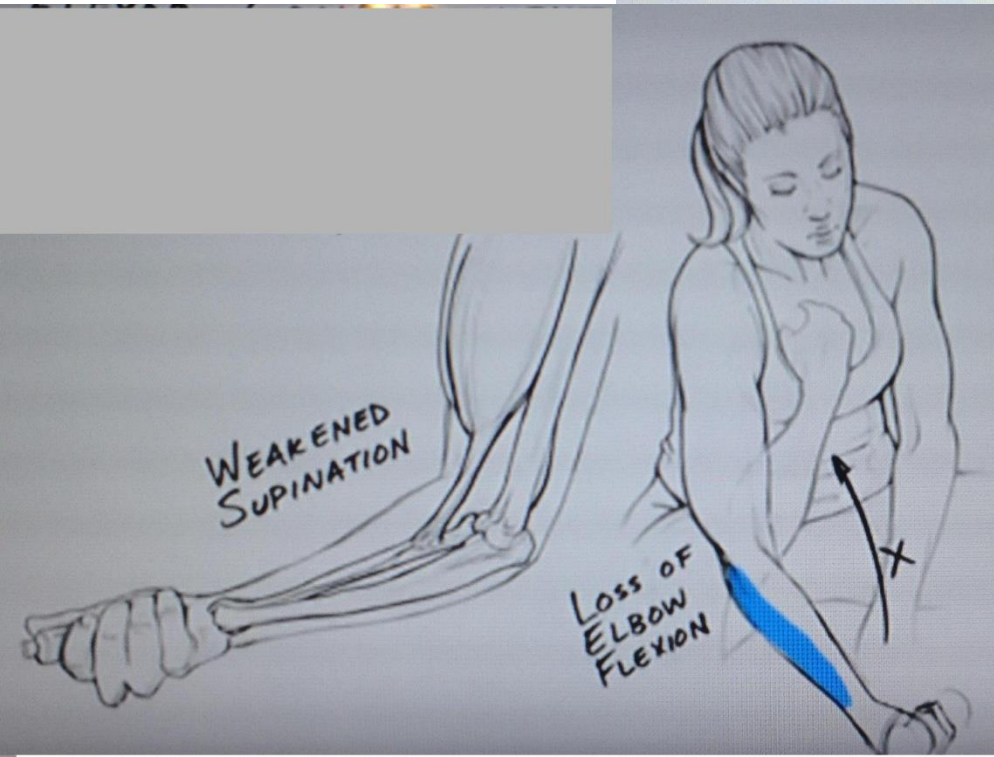
Musculocutaneous n. & Common Injuries

C5-C7

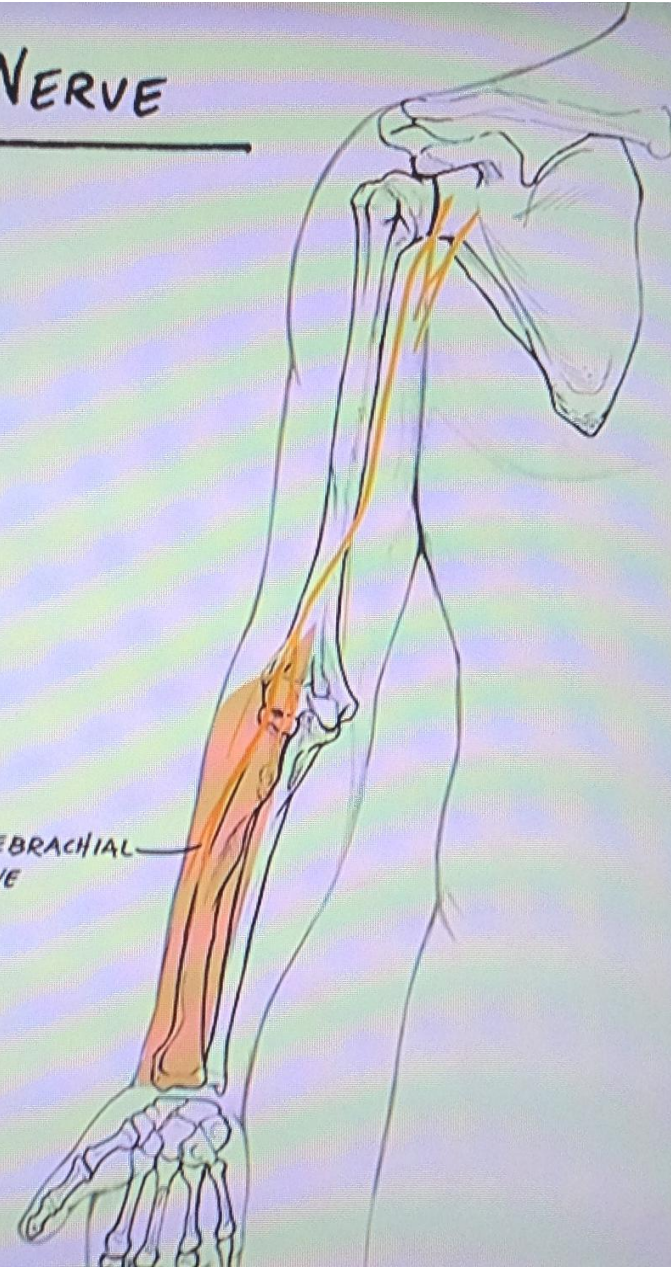
MUSCULOCUTANEOUS NERVE

FLEXOR COMPARTMENT

- CORACOBRACHIALIS
- BRACHIALIS
- BICEPS BRACHII

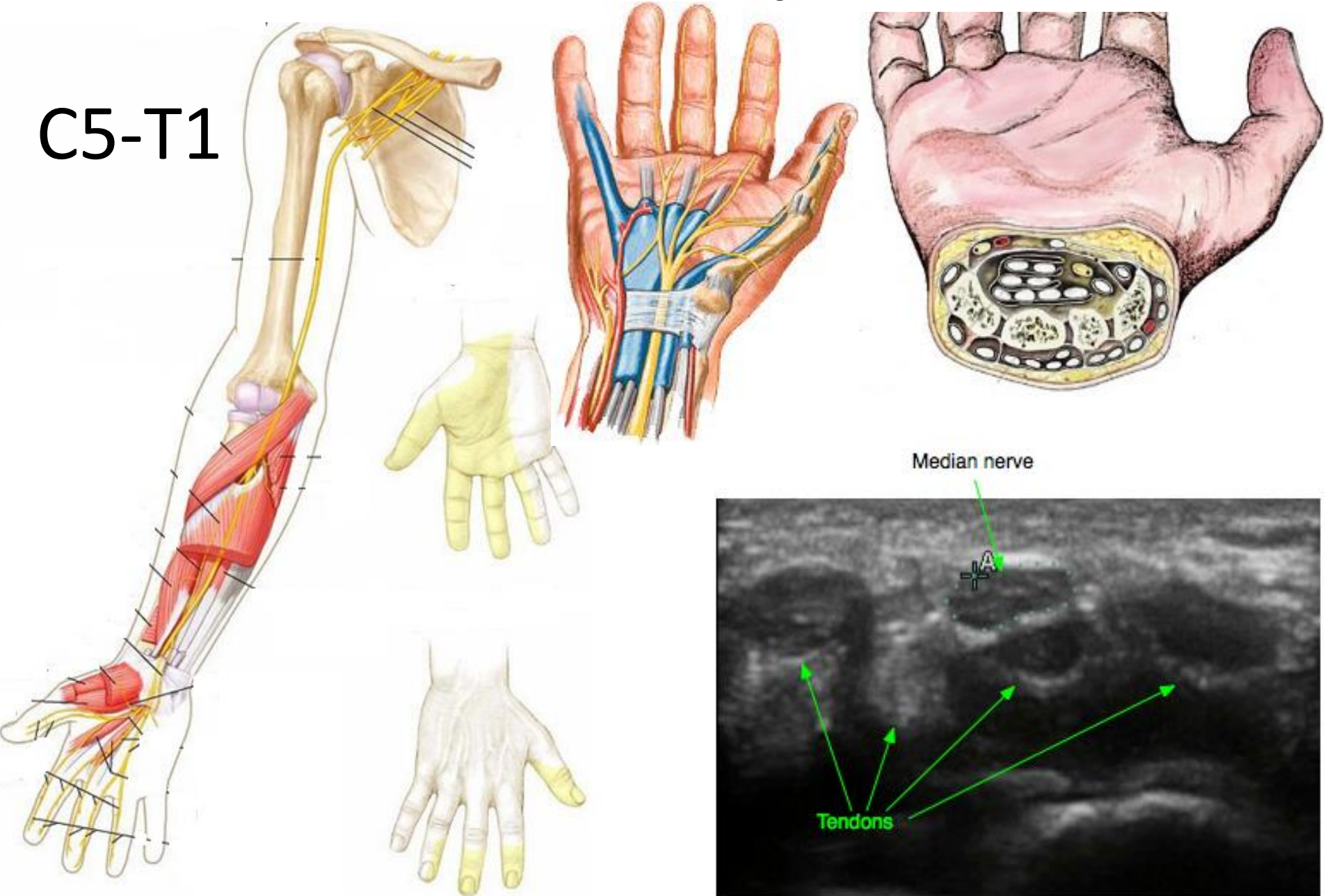


LATERAL ANTEBRACHIAL CUTANEOUS NERVE



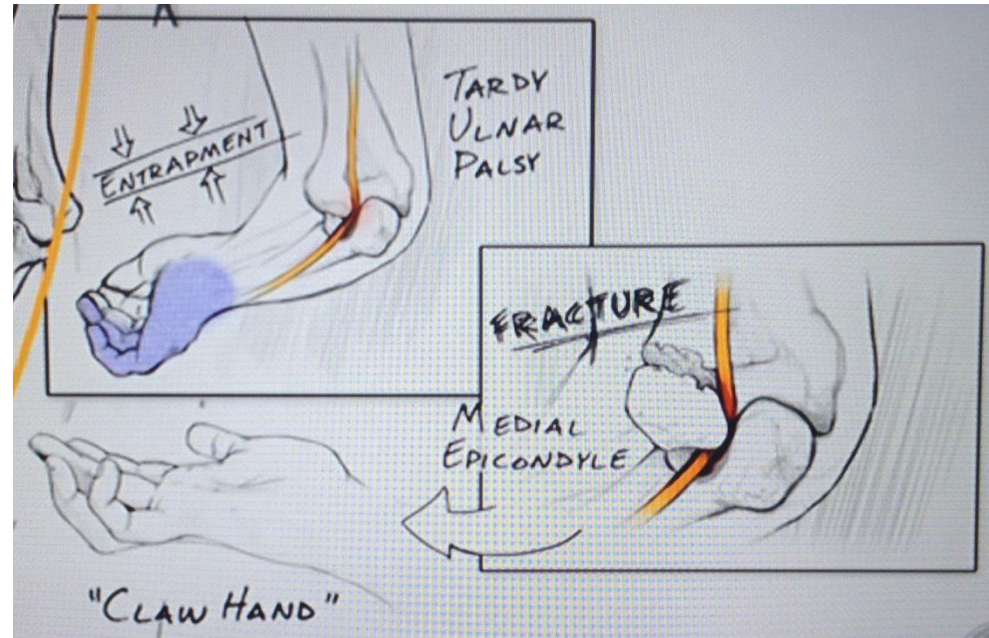
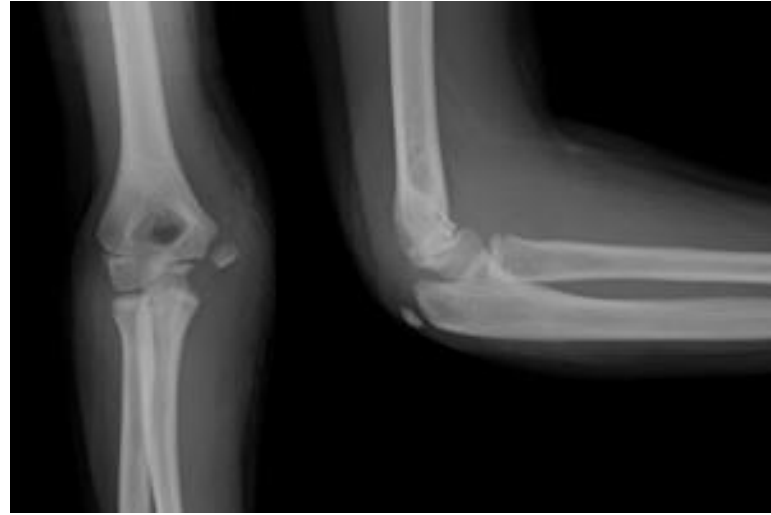
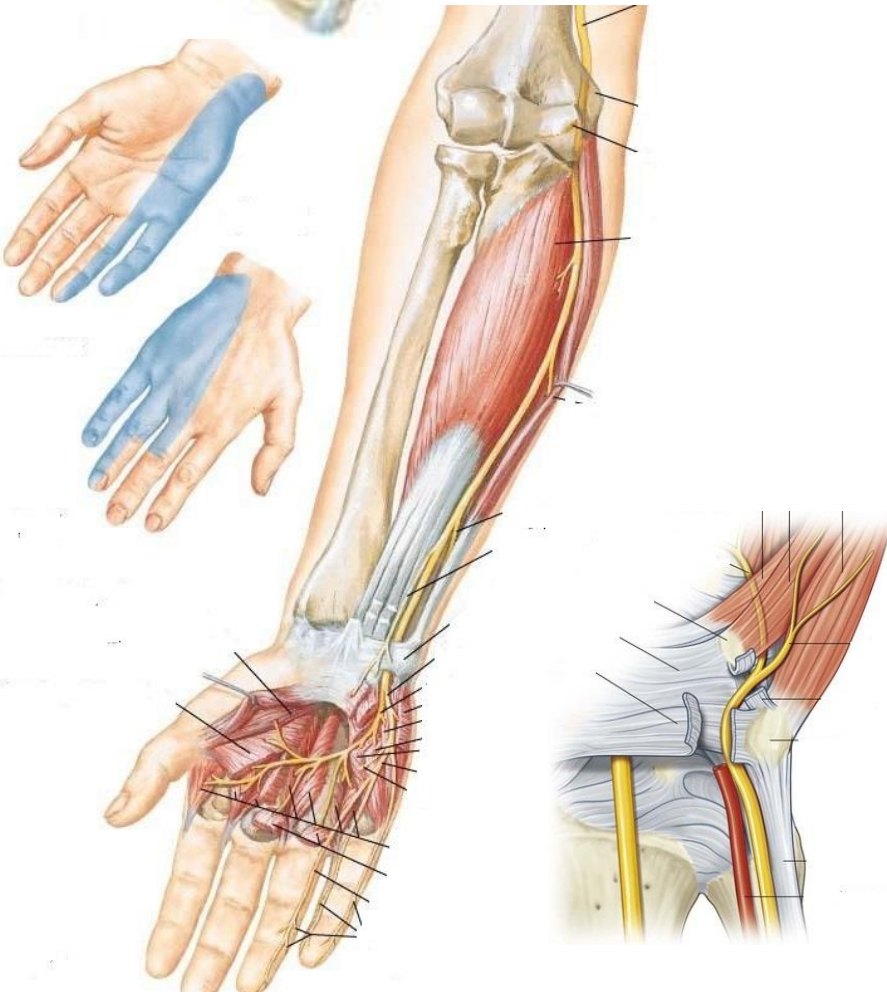
Median n. & Common Injuries

C5-T1

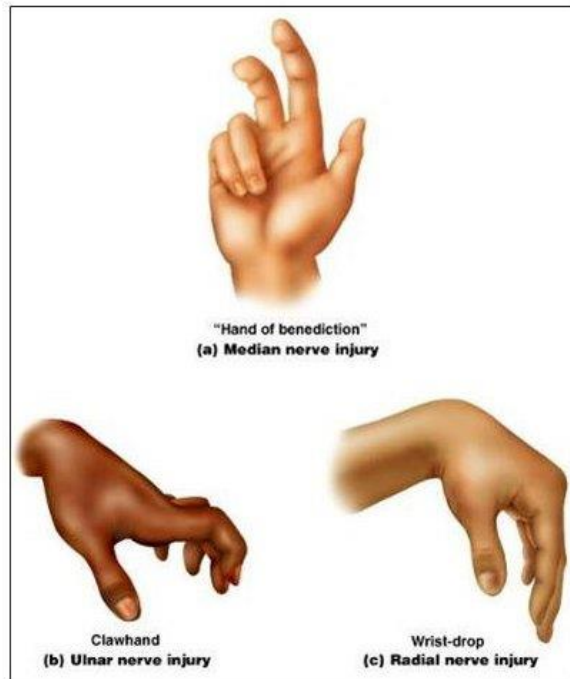


Ulnar n. & Common Injuries

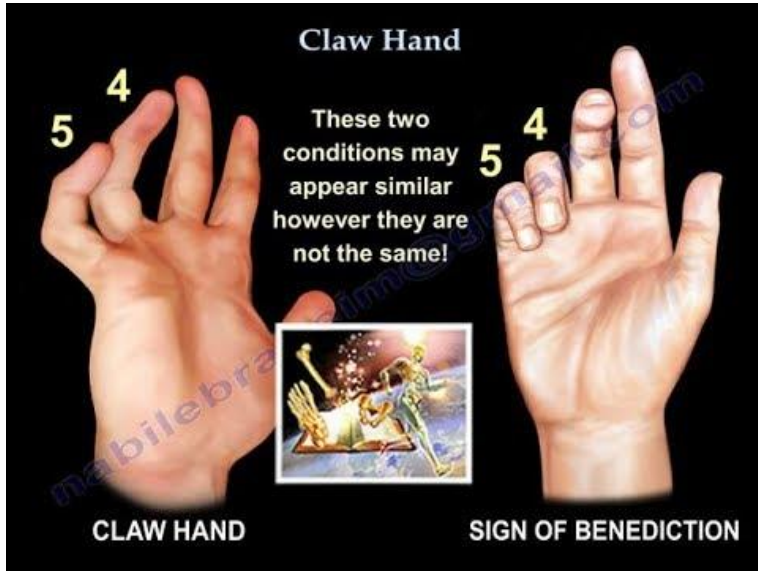
C7-T1



COMMON NERVE INJURIES RECAP



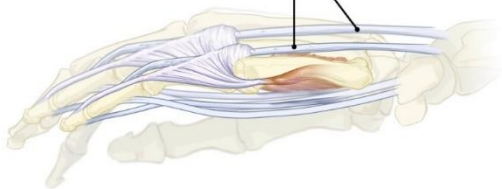
- Ulnar nerve
 - “Claw hand”
 - Inability to extend fingers at interphalangeal joints, results in permanent flexion = claw
- Median nerve
 - “Ape hand”
 - Inability to oppose thumb
- Radial nerve
 - “Wrist drop”
 - Inability to extend the hand, inability to fully extend forearm



CLAW HAND

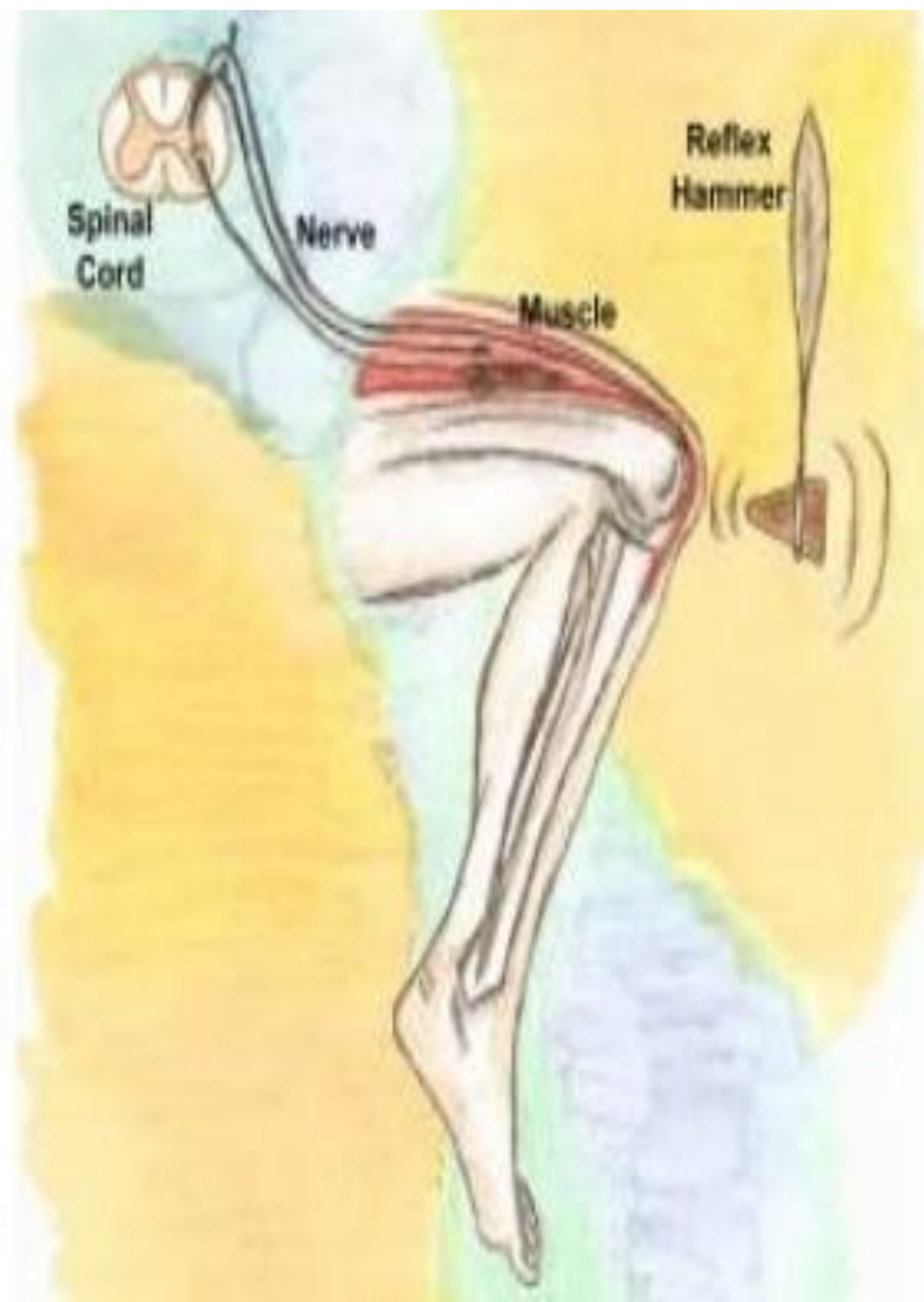
INJURY TO THE ULNAR NERVE

EXTENSOR DIGITORUM IS UNOPPOSED



Reflexes

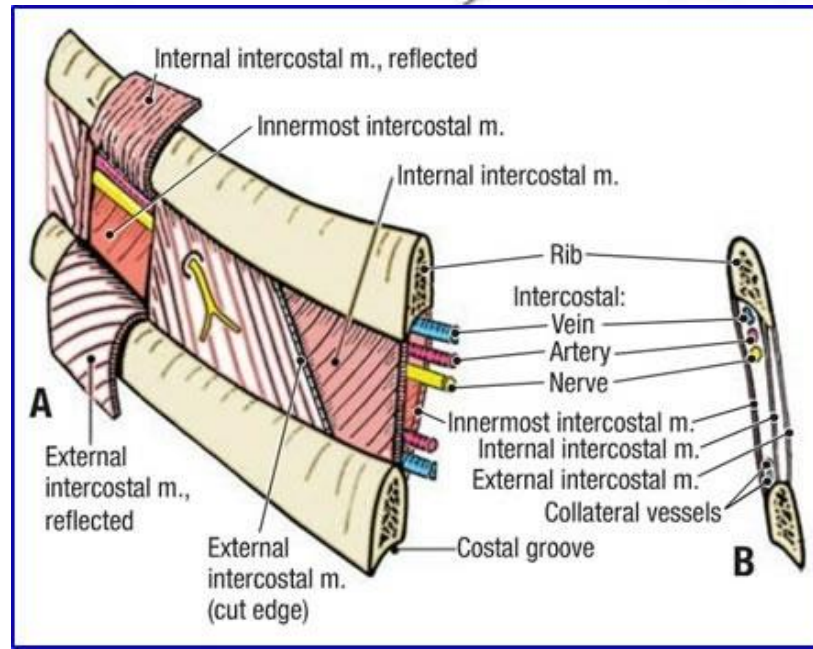
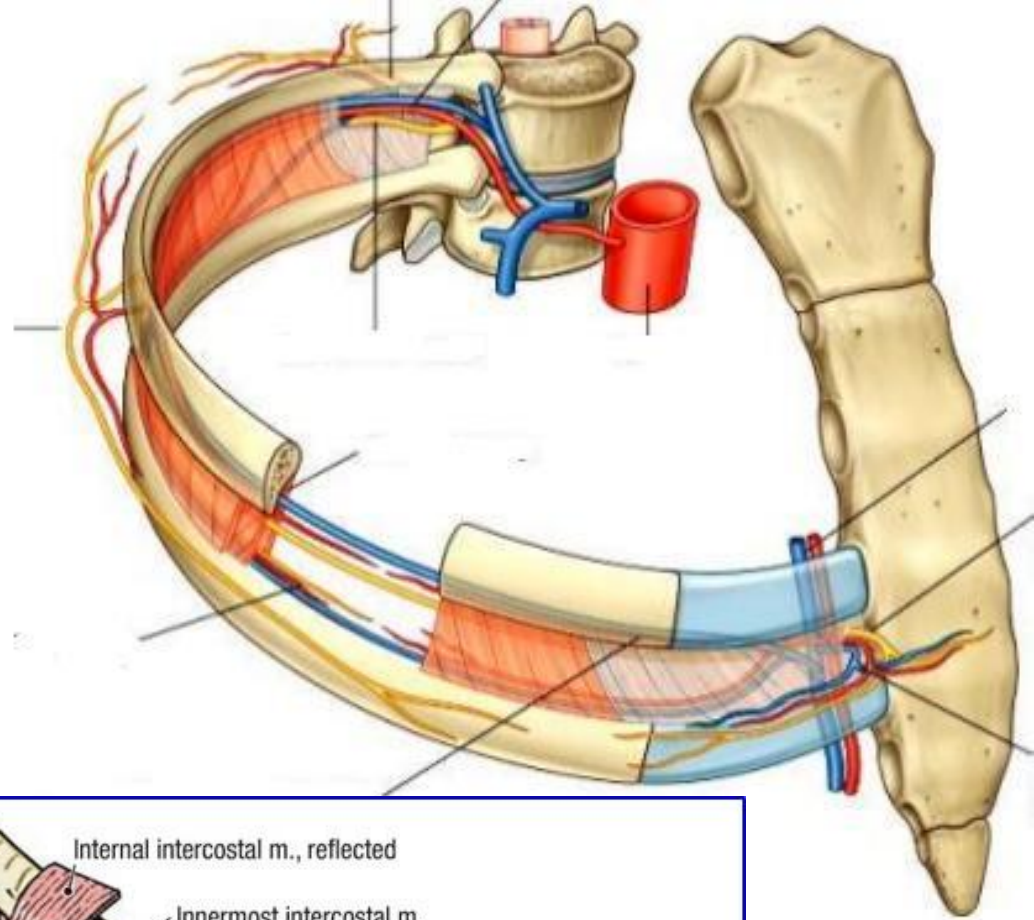
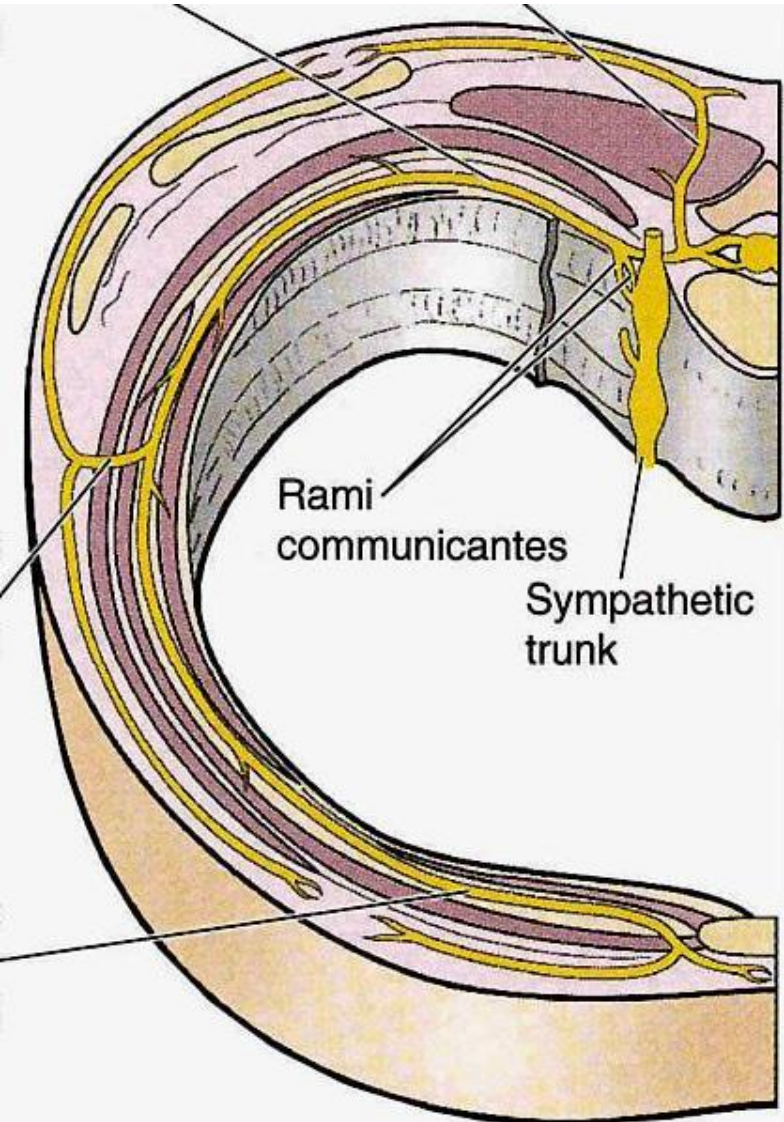
- Some, but not all, of the nerve roots have a reflex. C5, C6 and C7 have reflexes. L4 and S1 have reflexes.
- For example, when the C6 nerve is pinched, there is loss of the pronator reflex in the forearm. When the L5 nerve is pinched, there is no reflex loss. Not all nerves have a reflex which can be tested.
- List of Reflexes of Commonly Injured Nerve Roots
- C5 – Flexion at the elbow, biceps.
- C6 – Flexion at the elbow, brachioradialis.
- C7 – Extension at the elbow, triceps.
- C8 – Finger flexion.
- L4 – The knee reflex, quadriceps.
- L5 – No reflex.
- S1 – The ankle reflex, gastrocnemius.



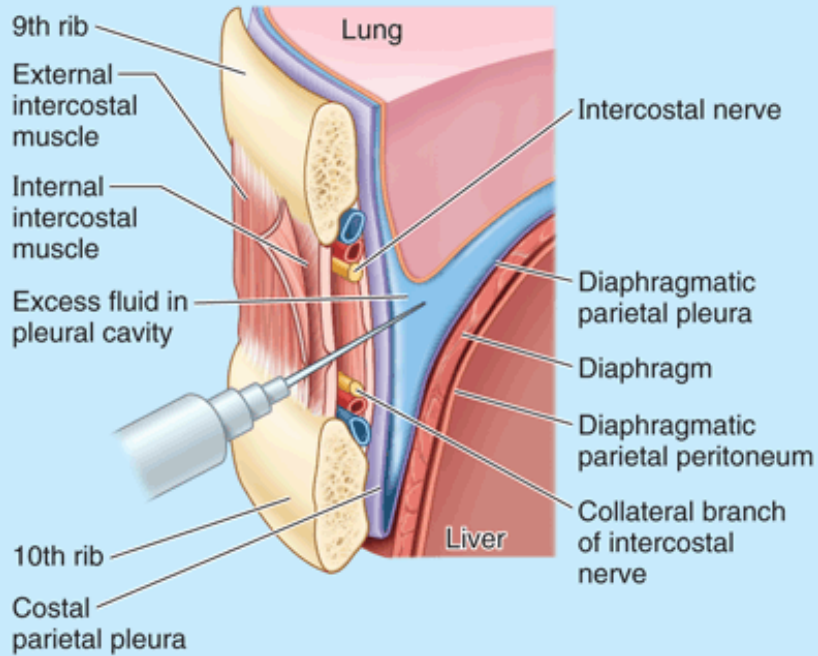
Examine the function of brachial plexus:

- a) on your self
- b) on a colleague

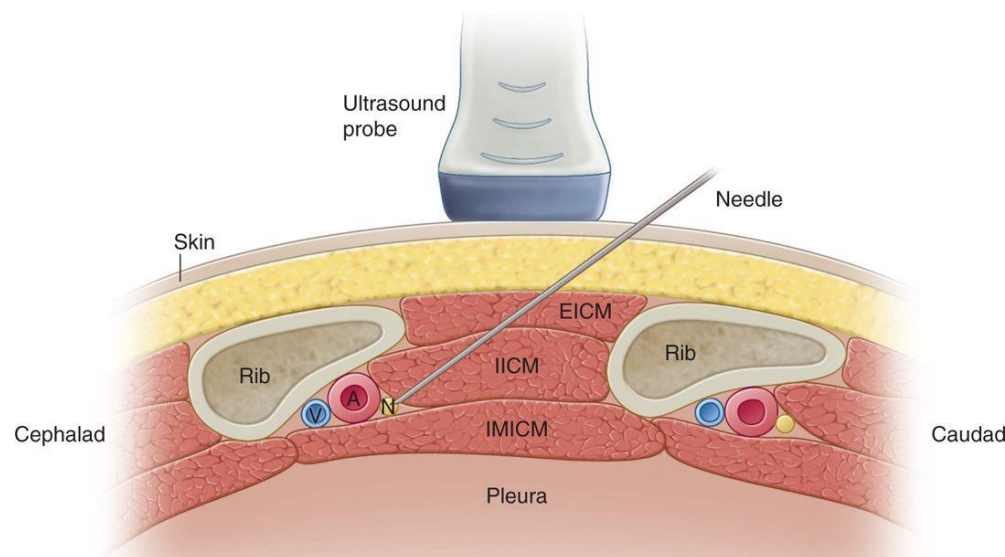
Intercostal nerves



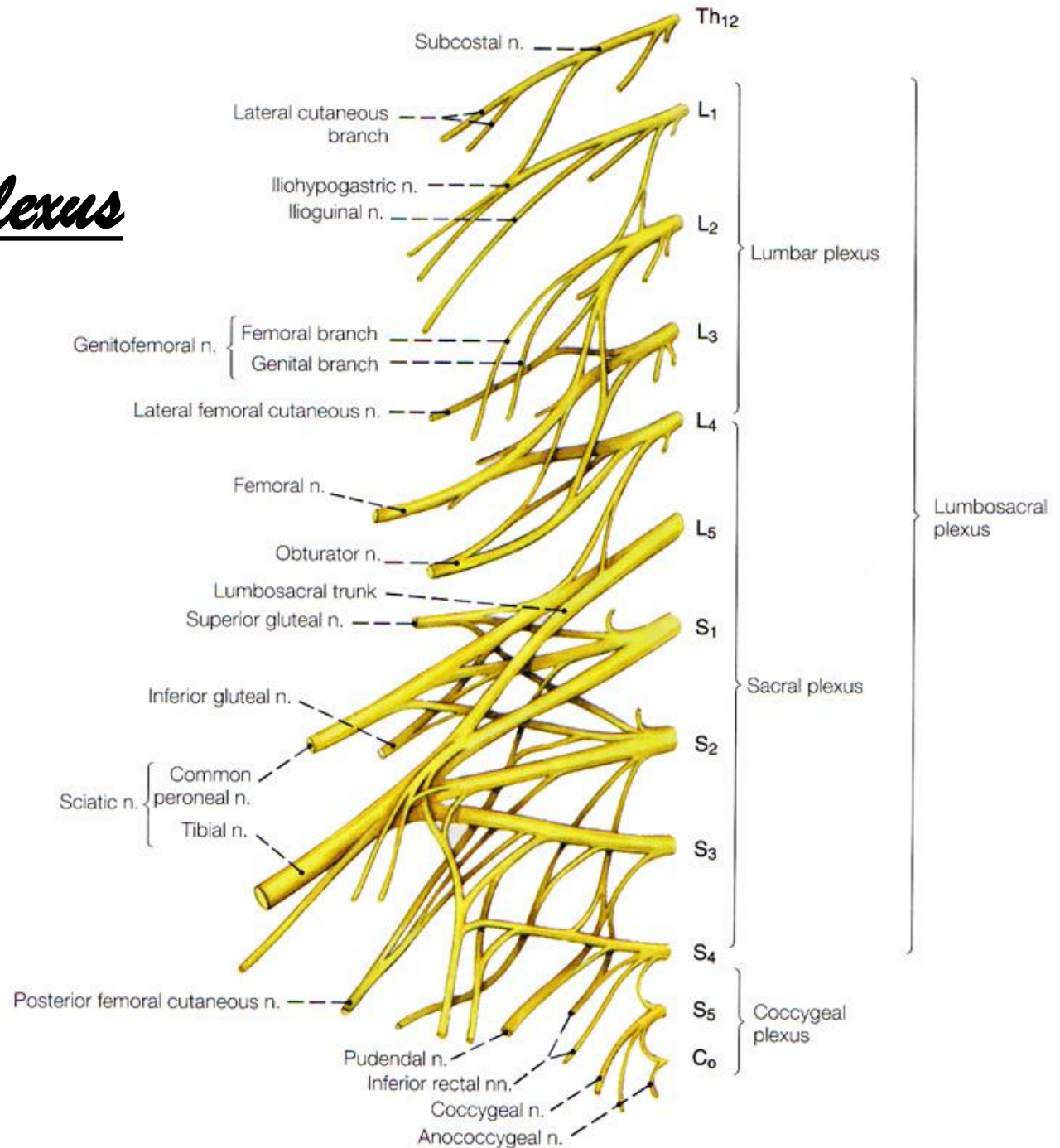
Pleural cavity needle

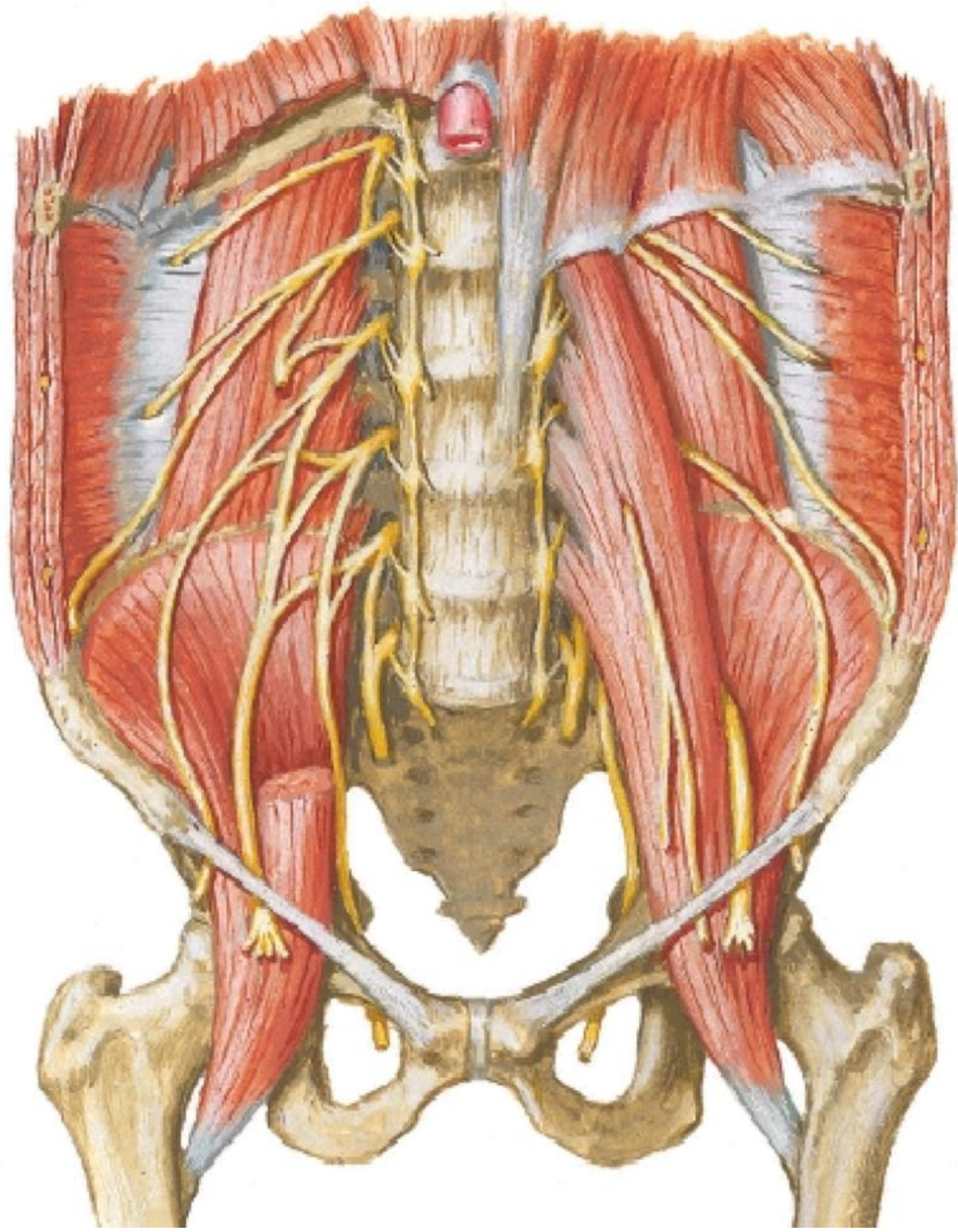


Intercostal n. block



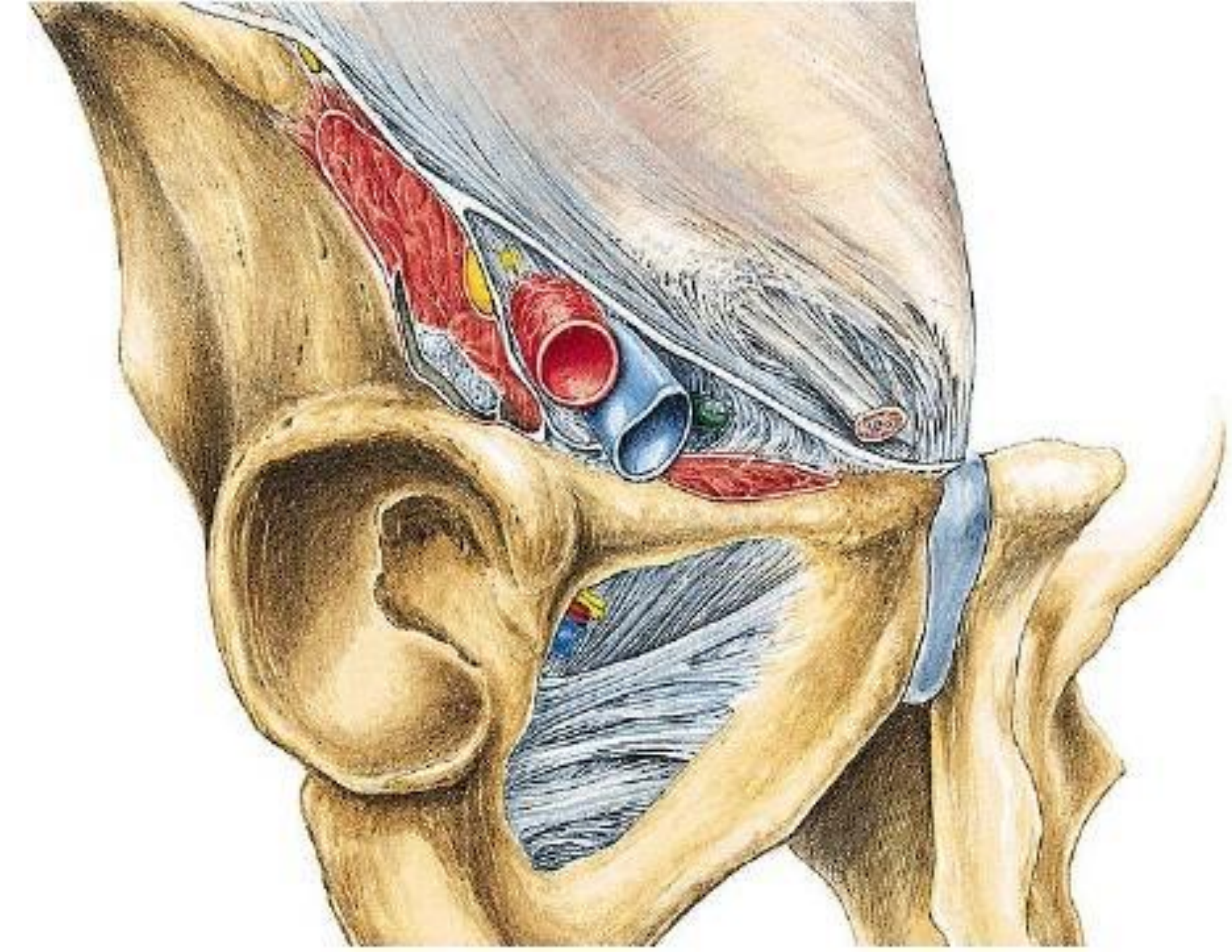
Lumbosacral Plexus





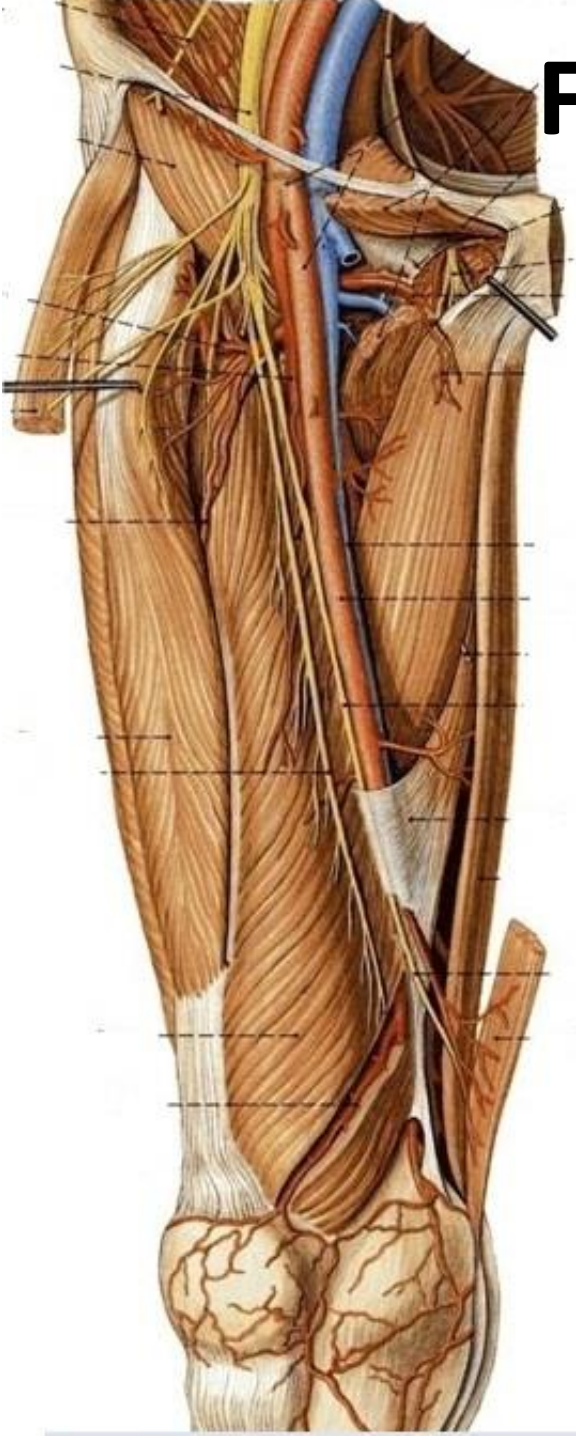
LUMBAR PLEXUS

Draw the Lumbar plexus



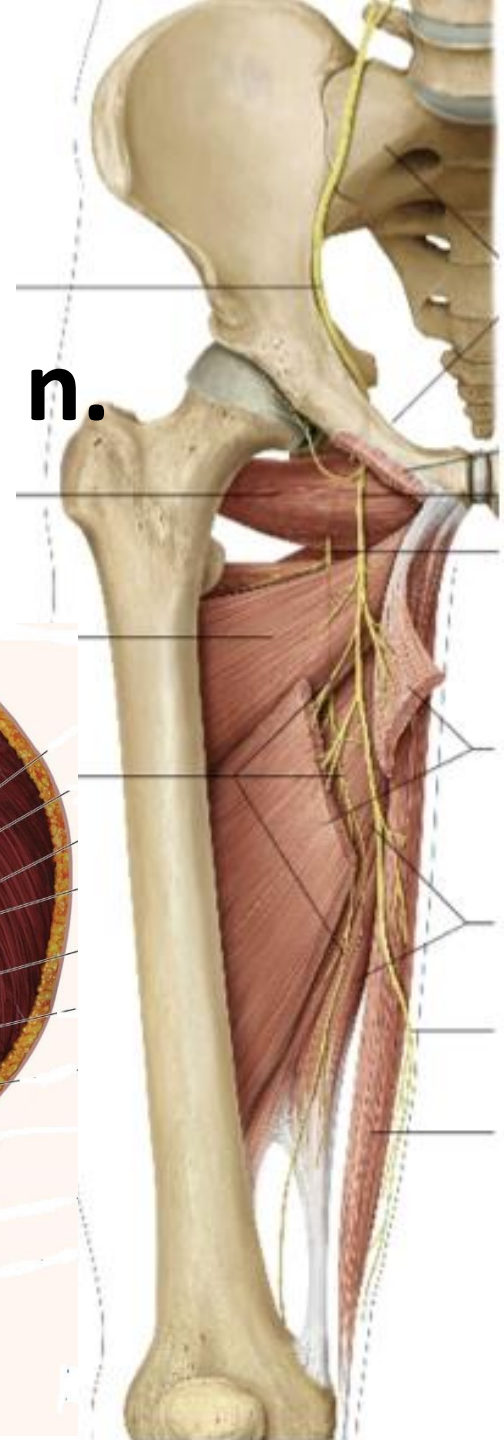
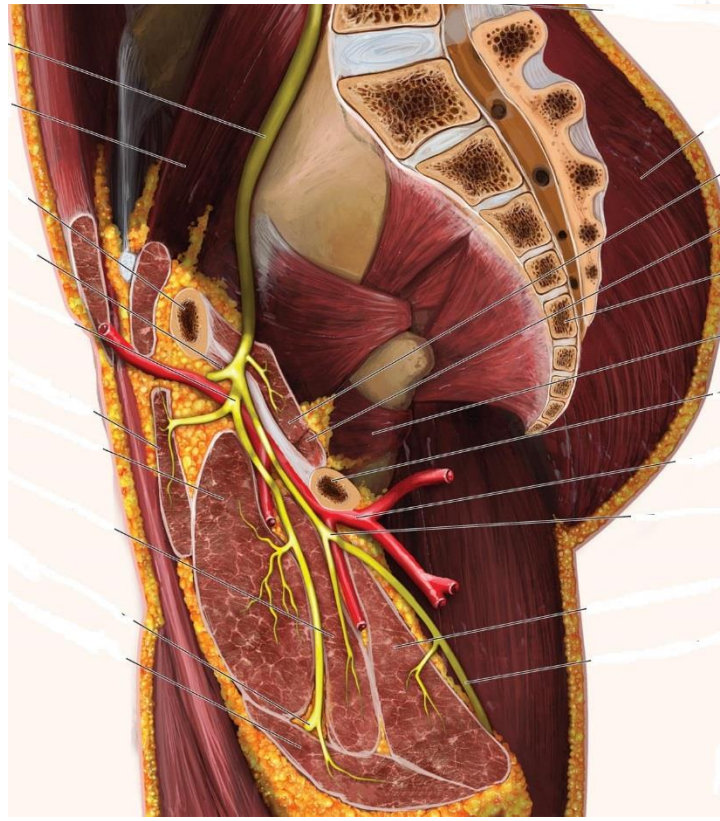
Femoral n.

L2-L4

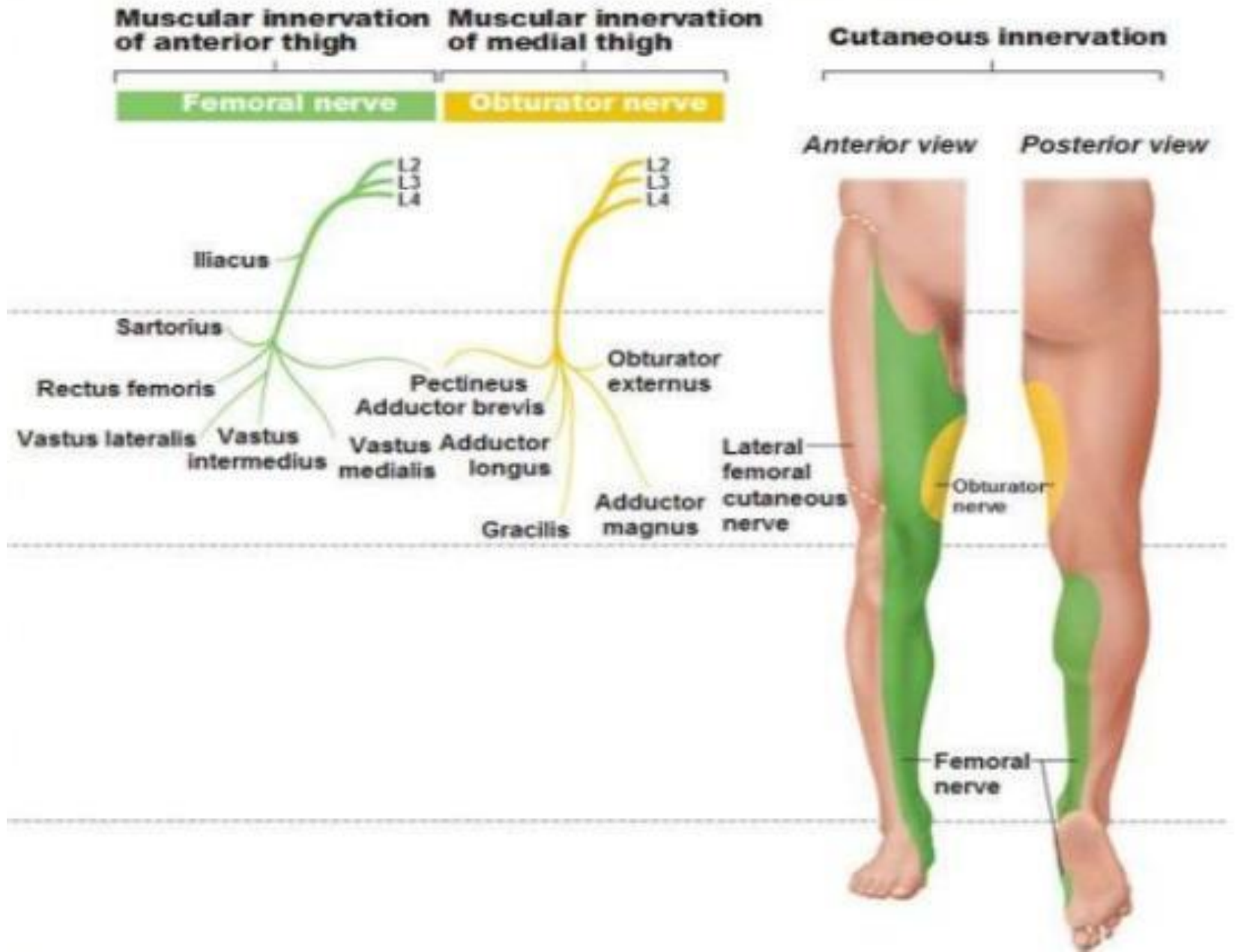


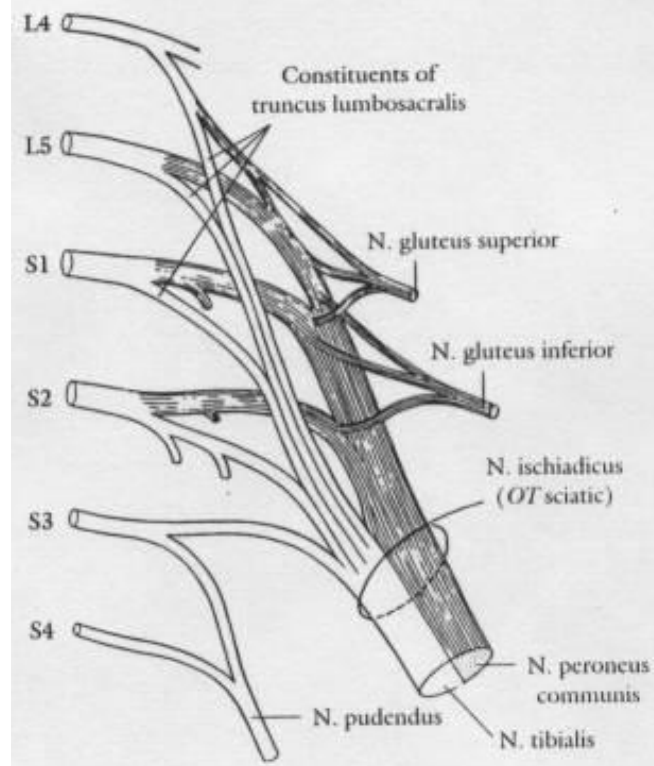
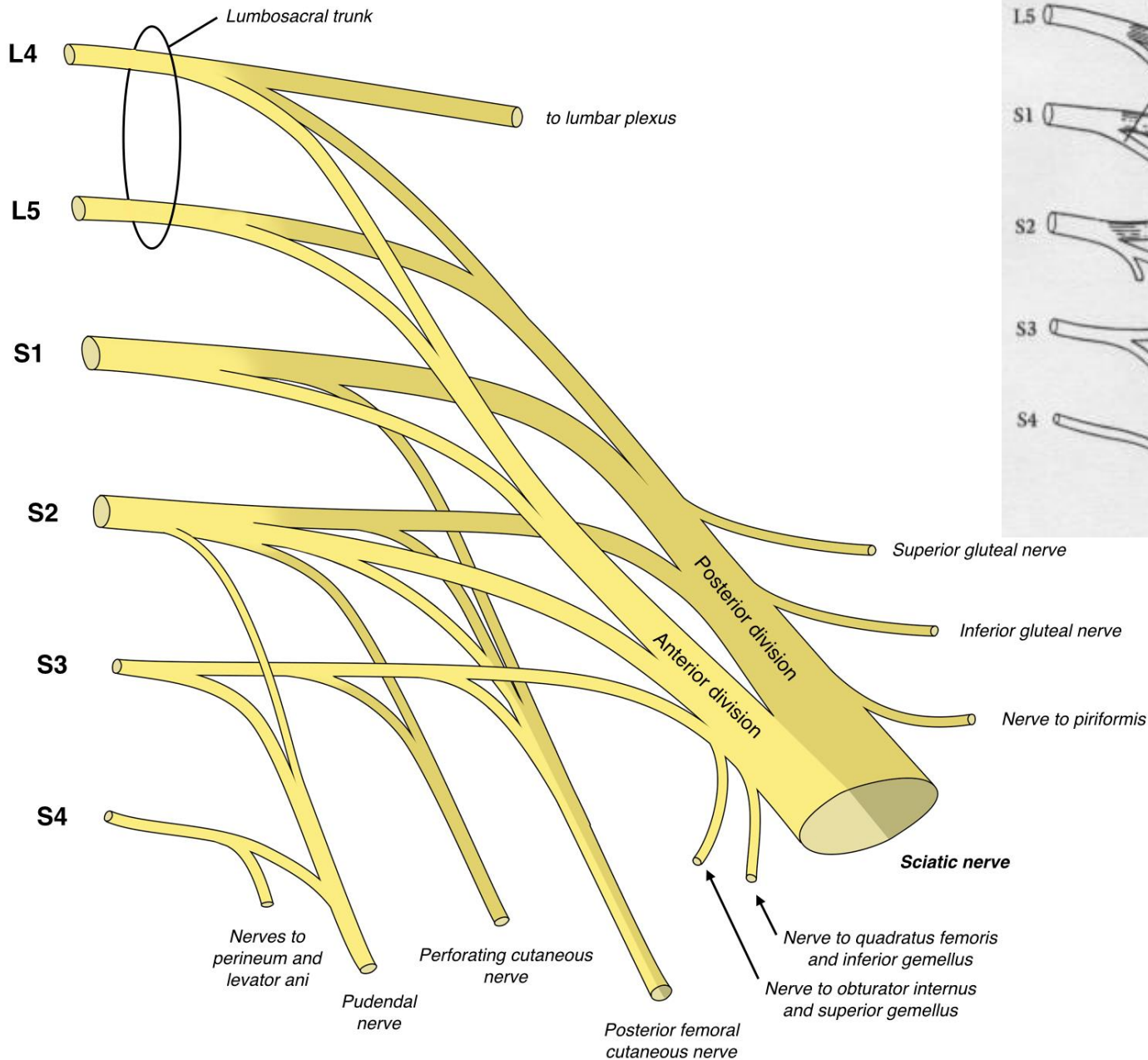
Obturator n.

L2-L4

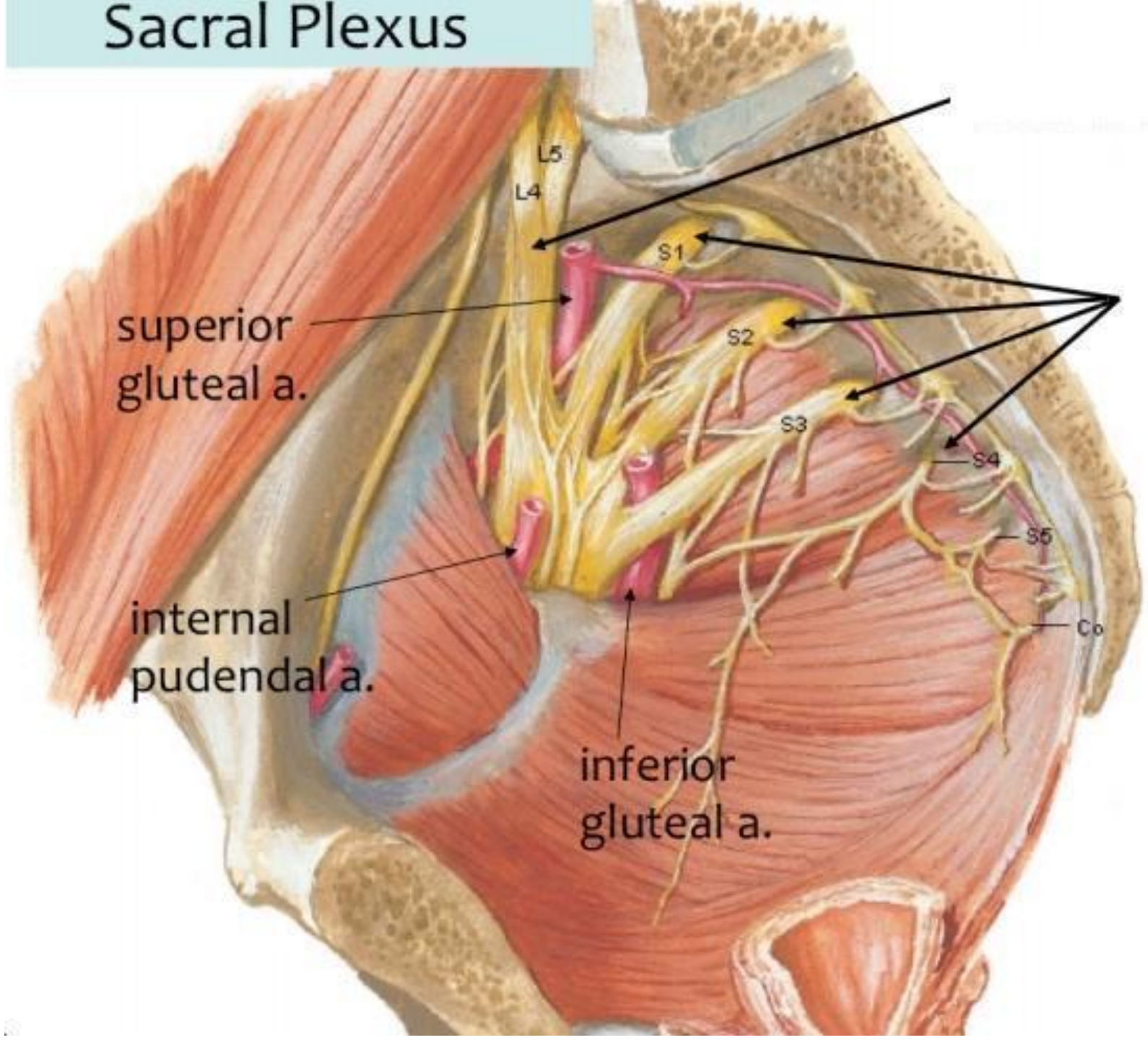


Lumbar plexus Syndrome



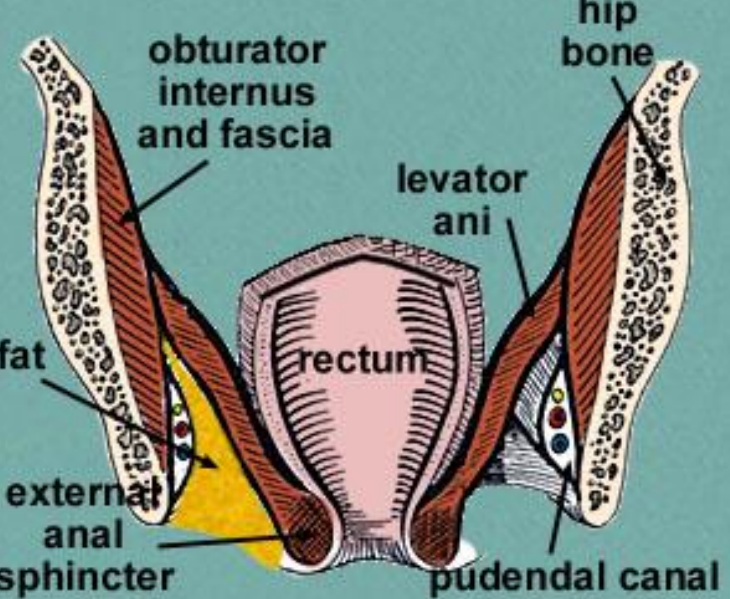


Sacral Plexus

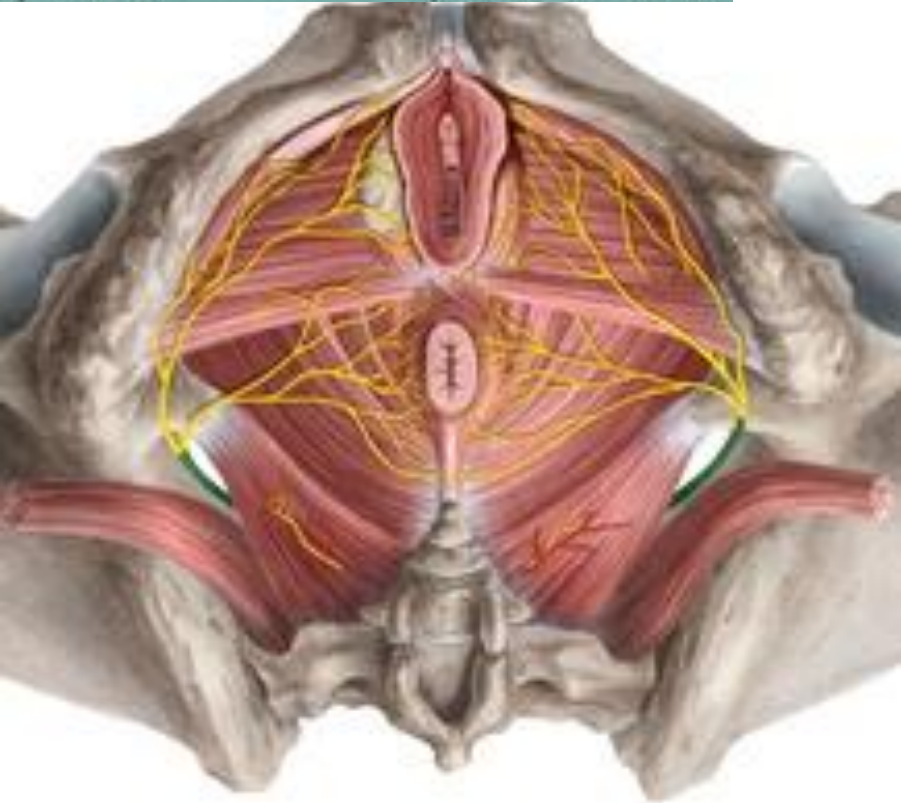
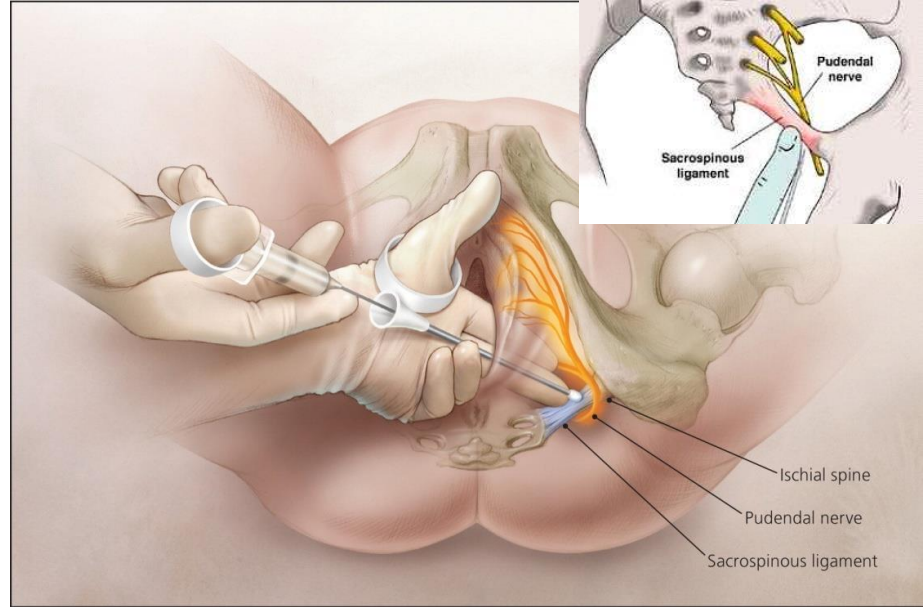


SACRAL PLEXUS

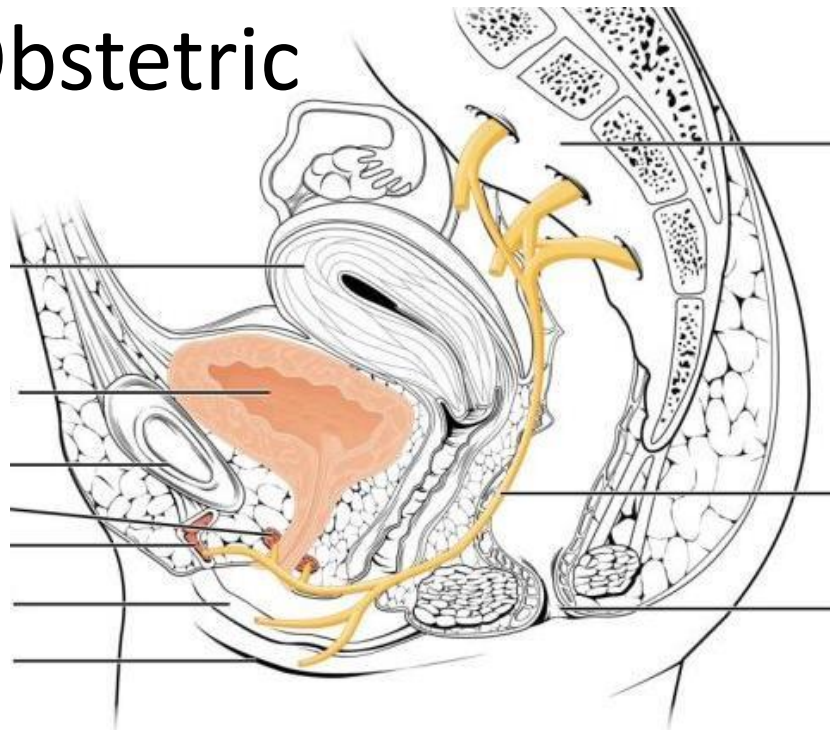
Draw the Sacral plexus



S2-S4

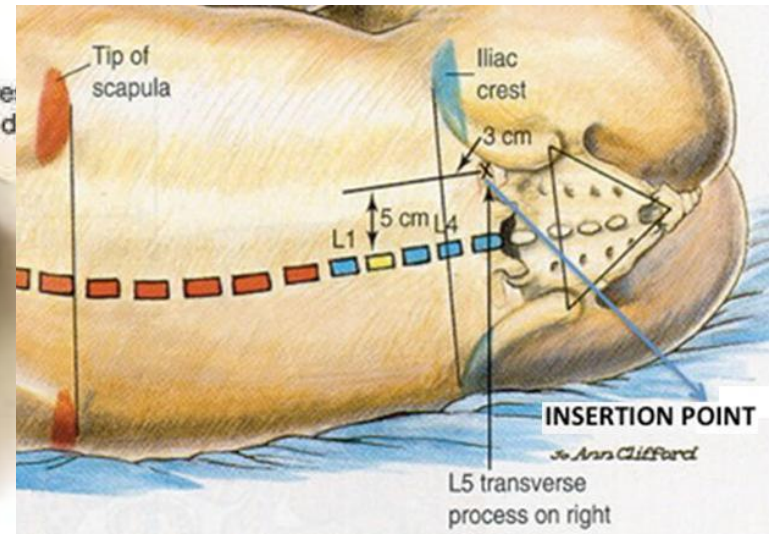
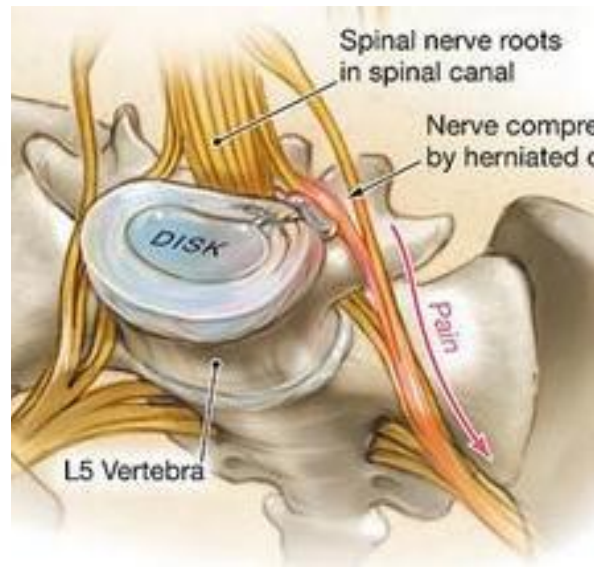
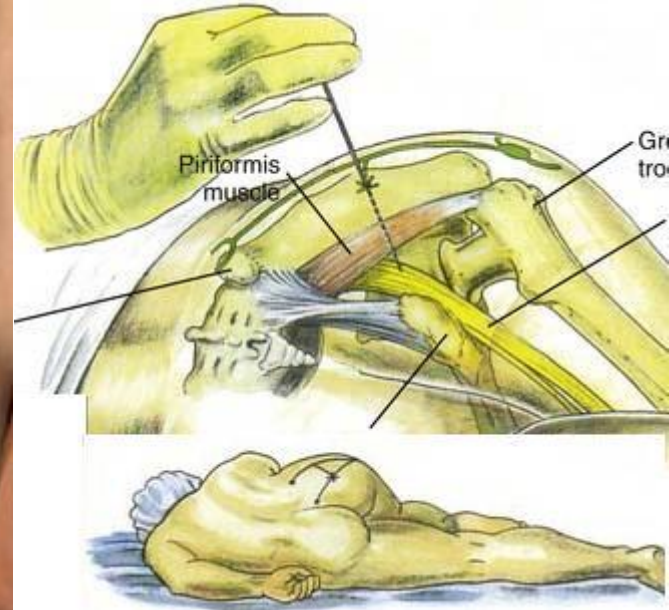
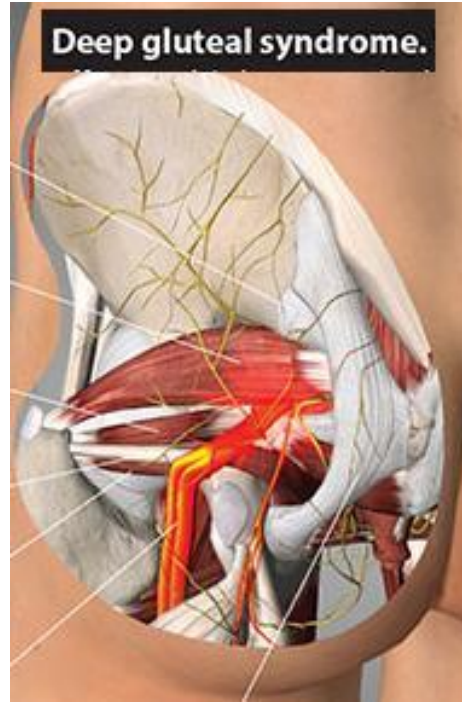
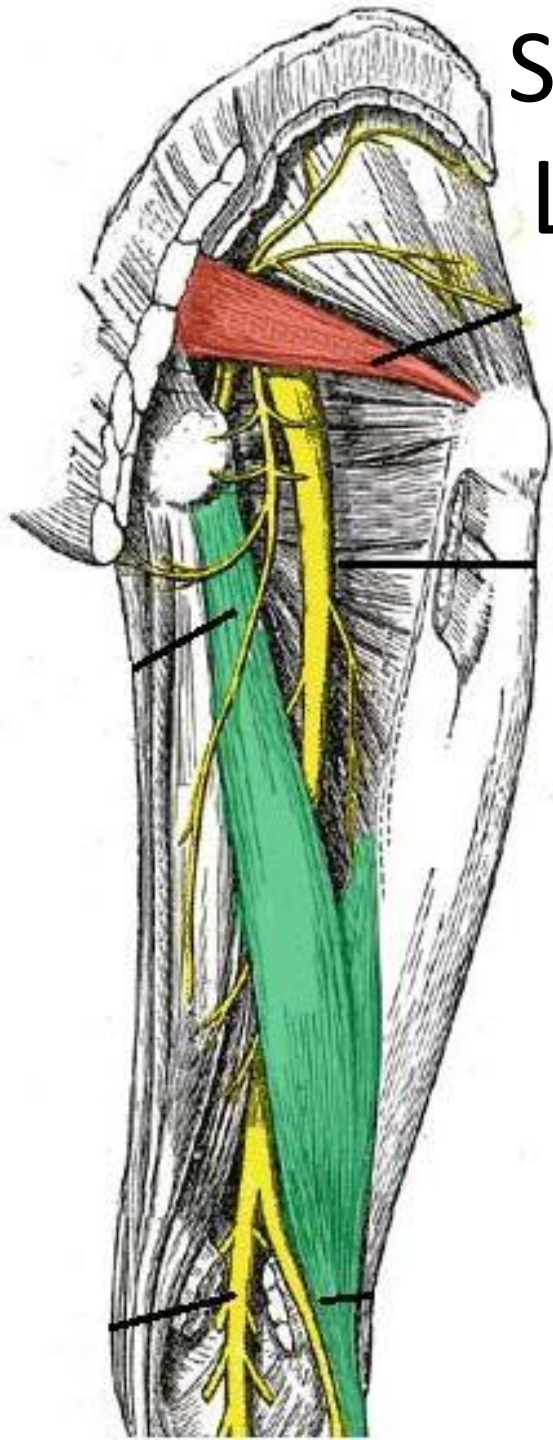


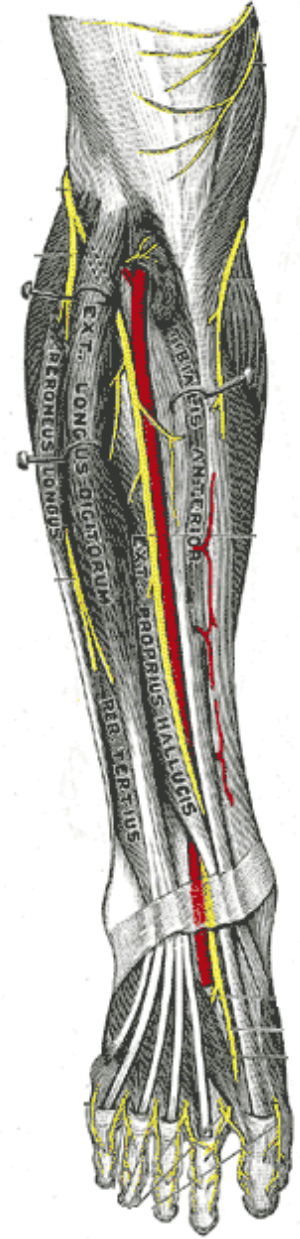
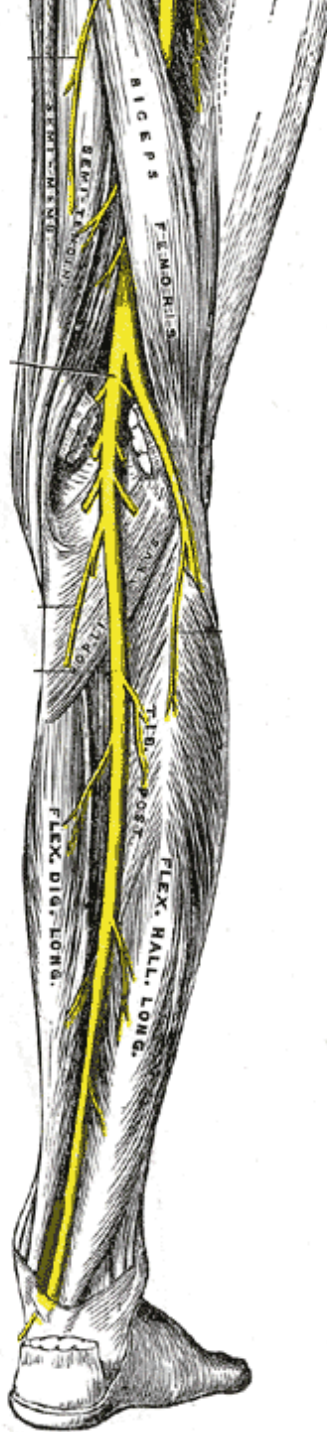
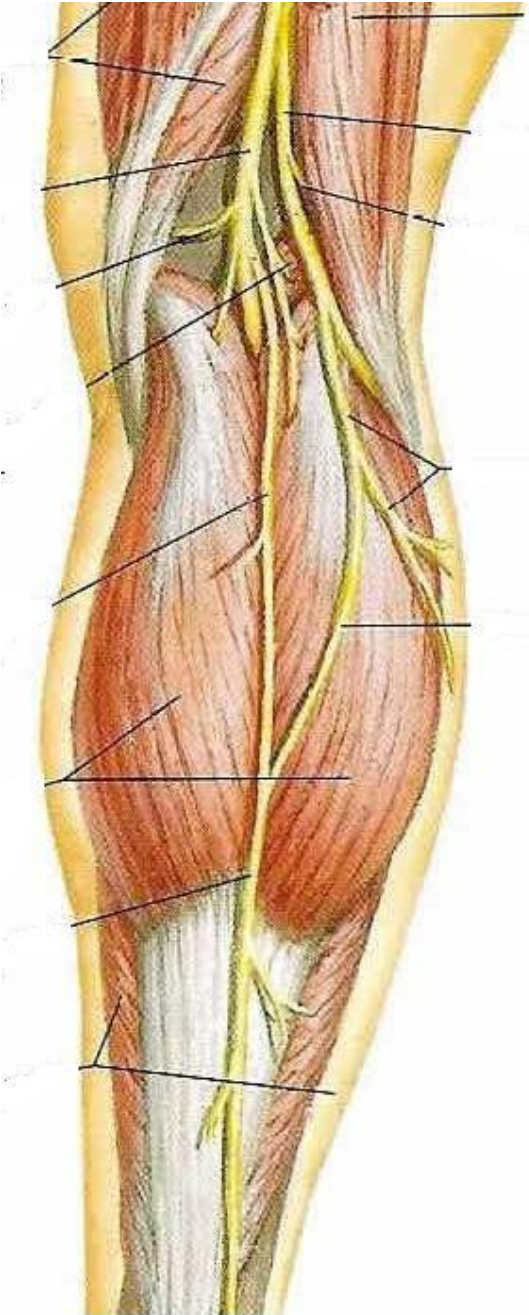
Pudendal n.
In Obstetric



Sciatic n. & Sciatica

L5-S3





Sensation

Motor Function

Peroneal Nerve

Palpate dorsal surface of the foot



Peroneal Nerve

The ability to dorsiflex ankle and toes



Tibial Nerve

Palpate plantar surface of foot



Tibial Nerve

The ability to plantar flex ankle and toes



Common Fibular nerve injuries

L4-S2



Tibial n. - Proximal injury

L4-S3

Sensory:

Sensory Loss over:

Lateral side of the leg and foot (sural nerve).

Trophic **ulcers** in the sole.



Complete division results in the following clinical features:

Motor:

All the muscles in the back of the leg and the sole of the foot are paralyzed.

The opposing muscles **Dorsiflex** the foot at the ankle joint *and Evert the foot* at the subtalar joint, an attitude referred to as

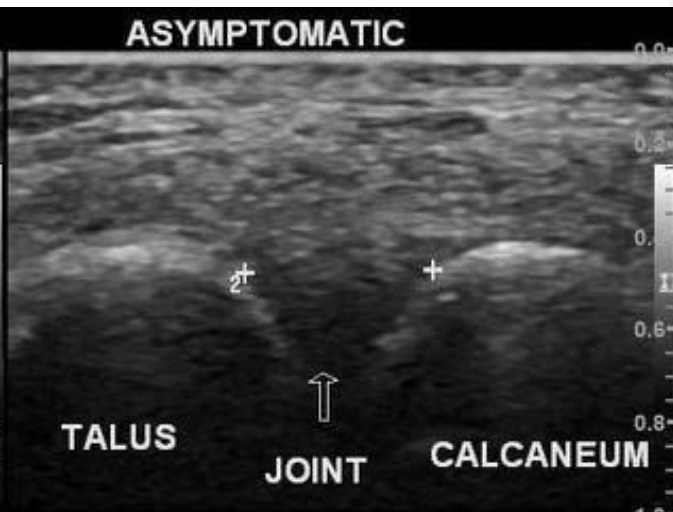
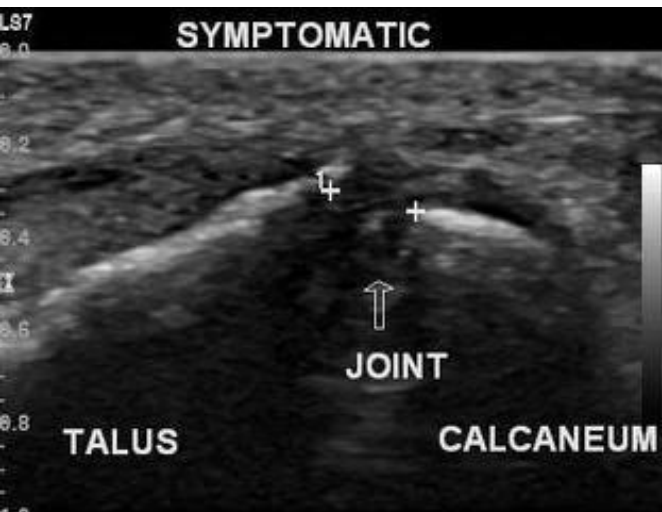
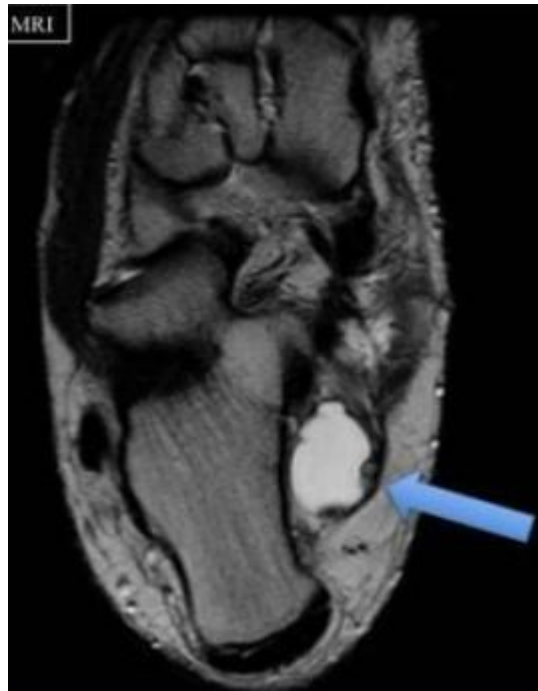
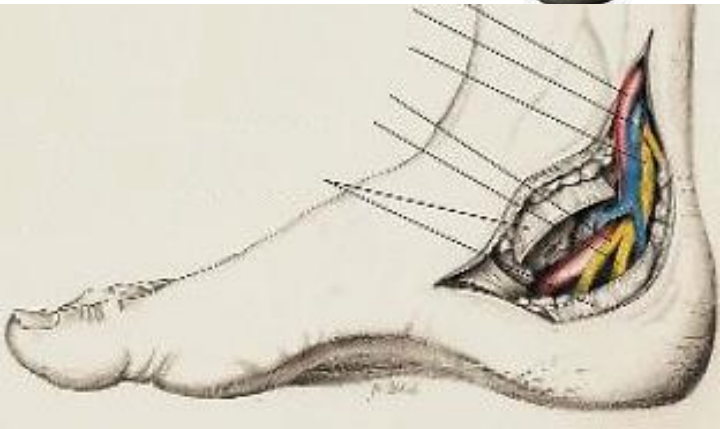
Talipes

Calcaneovalgus.

Tarsal Tunnel Syndrome

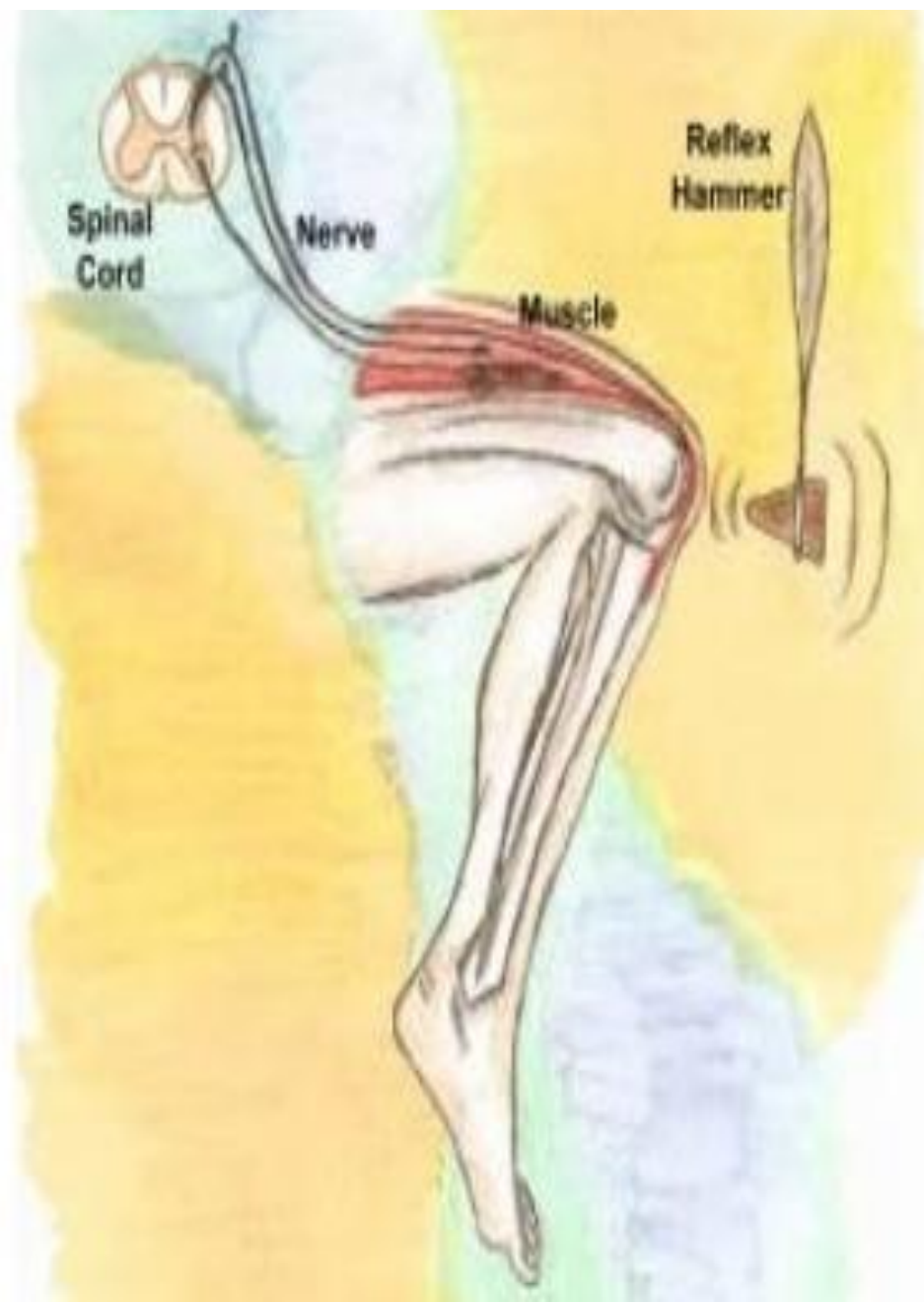


Tibial n. - distal injury L4-S2



Reflexes

- Some, but not all, of the nerve roots have a reflex. C5, C6 and C7 have reflexes. L4 and S1 have reflexes.
- For example, when the C6 nerve is pinched, there is loss of the pronator reflex in the forearm. When the L5 nerve is pinched, there is no reflex loss. Not all nerves have a reflex which can be tested.
- List of Reflexes of Commonly Injured Nerve Roots
- C5 – Flexion at the elbow, biceps.
- C6 – Flexion at the elbow, brachioradialis.
- C7 – Extension at the elbow, triceps.
- C8 – Finger flexion.
- L4 – The knee reflex, quadriceps.
- L5 – No reflex.
- S1 – The ankle reflex, gastrocnemius.



THE APPLICATION OF DERMATOMES & CUTANEOUS INNERVATIONS

MOTOR

KEY MUSCLES
(posting on reverse side)

	R	L	
C5	<input type="checkbox"/>	<input type="checkbox"/>	Elbow flexors
C6	<input type="checkbox"/>	<input type="checkbox"/>	Wrist extensors
C7	<input type="checkbox"/>	<input type="checkbox"/>	Elbow extensors
C8	<input type="checkbox"/>	<input type="checkbox"/>	Finger flexors (distal phalanx of middle finger)
T1	<input type="checkbox"/>	<input type="checkbox"/>	Finger abductors (little finger)
UPPER LIMB TOTAL (MAXIMUM)			<input type="checkbox"/> + <input type="checkbox"/> = <input type="checkbox"/> (25) (25) (50)

Comments:

	R	L	
L2	<input type="checkbox"/>	<input type="checkbox"/>	Hip flexors
L3	<input type="checkbox"/>	<input type="checkbox"/>	Knee extensors
L4	<input type="checkbox"/>	<input type="checkbox"/>	Ankle dorsiflexors
L5	<input type="checkbox"/>	<input type="checkbox"/>	Long toe extensors
S1	<input type="checkbox"/>	<input type="checkbox"/>	Ankle plantar flexors
LOWER LIMB TOTAL (MAXIMUM)			<input type="checkbox"/> + <input type="checkbox"/> = <input type="checkbox"/> (25) (25) (50)

SENSORY

KEY SENSORY POINTS

0 = absent
1 = impaired
2 = normal
NT = not testable

	LIGHT TOUCH		PIN PRICK	
	R	L	R	L
C2				
C3				
C4				
C5				
C6				
C7				
C8				
T1				
T2				
T3				
T4				
T5				
T6				
T7				
T8				
T9				
T10				
T11				
T12				
L1				
L2				
L3				
L4				
L5				
S1				
S2				
S3				
S4-5				
TOTALS		<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	= <input type="checkbox"/> <input type="checkbox"/>
		(MAXIMUM) (50) (50)	(50) (50)	

Any anal sensation (Yes/No)

PIN PRICK SCORE (max: 112)

LIGHT TOUCH SCORE (max: 112)

• Key Sensory Points

NEUROLOGICAL LEVEL <small>The most caudal segment with normal function</small>	<table border="1" style="font-size: small;"> <tr><td></td><td>R</td><td>L</td></tr> <tr><td>SENSORY</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>MOTOR</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </table>		R	L	SENSORY	<input type="checkbox"/>	<input type="checkbox"/>	MOTOR	<input type="checkbox"/>	<input type="checkbox"/>	COMPLETE OR INCOMPLETE? <small>incomplete = Any sensory or motor function in S4-S5</small>	<input type="checkbox"/>	ZONE OF PARTIAL PRESERVATION <small>Caudad extent of partially involved segments</small>	<table border="1" style="font-size: small;"> <tr><td></td><td>R</td><td>L</td></tr> <tr><td>SENSORY</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>MOTOR</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </table>		R	L	SENSORY	<input type="checkbox"/>	<input type="checkbox"/>	MOTOR	<input type="checkbox"/>	<input type="checkbox"/>
	R	L																					
SENSORY	<input type="checkbox"/>	<input type="checkbox"/>																					
MOTOR	<input type="checkbox"/>	<input type="checkbox"/>																					
	R	L																					
SENSORY	<input type="checkbox"/>	<input type="checkbox"/>																					
MOTOR	<input type="checkbox"/>	<input type="checkbox"/>																					
ASJA IMPAIRMENT SCALE		<input type="checkbox"/>																					

Examine the function of sciatic nerve:

- a) on your self
- b) on a colleague

Ask before being Asked !

