

# MYELOPATHIES

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# SCENARIO

- Mr HM presents with a 2 year history of progressive weakness of both lower limbs. He now walks with the aid of a stick.
- The legs feel stiff and have episodes of kicking out on their own while he is sitting or lying down.
- He has numbness in both lower limbs up to around the umbilicus.
- He also experiences lower back ache.
- He also reports that he wets his pants before he reaches the toilet. He can however feel that his bladder is full.

## DEFINITION

- Disturbance or disease of the spinal cord
- Onset is acute or insidious

## BASIC ANATOMY

- The cord begins at cranio-cervical junction
- The cord ends at L1/L2 level.
- 8 cervical nerves (only 7 vertebra)
- 12 thoracic nerves
- 5 lumbar nerves
- 5 sacral nerves

## Basic anatomy....

- Cervical nerve roots emerge above the corresponding vertebra.
- Thoracic, lumbar and sacral nerve roots emerge below the corresponding vertebra.
- Because the cord ends at L1/L2, the cauda equina is formed to allow nerve roots to exit at correct level.

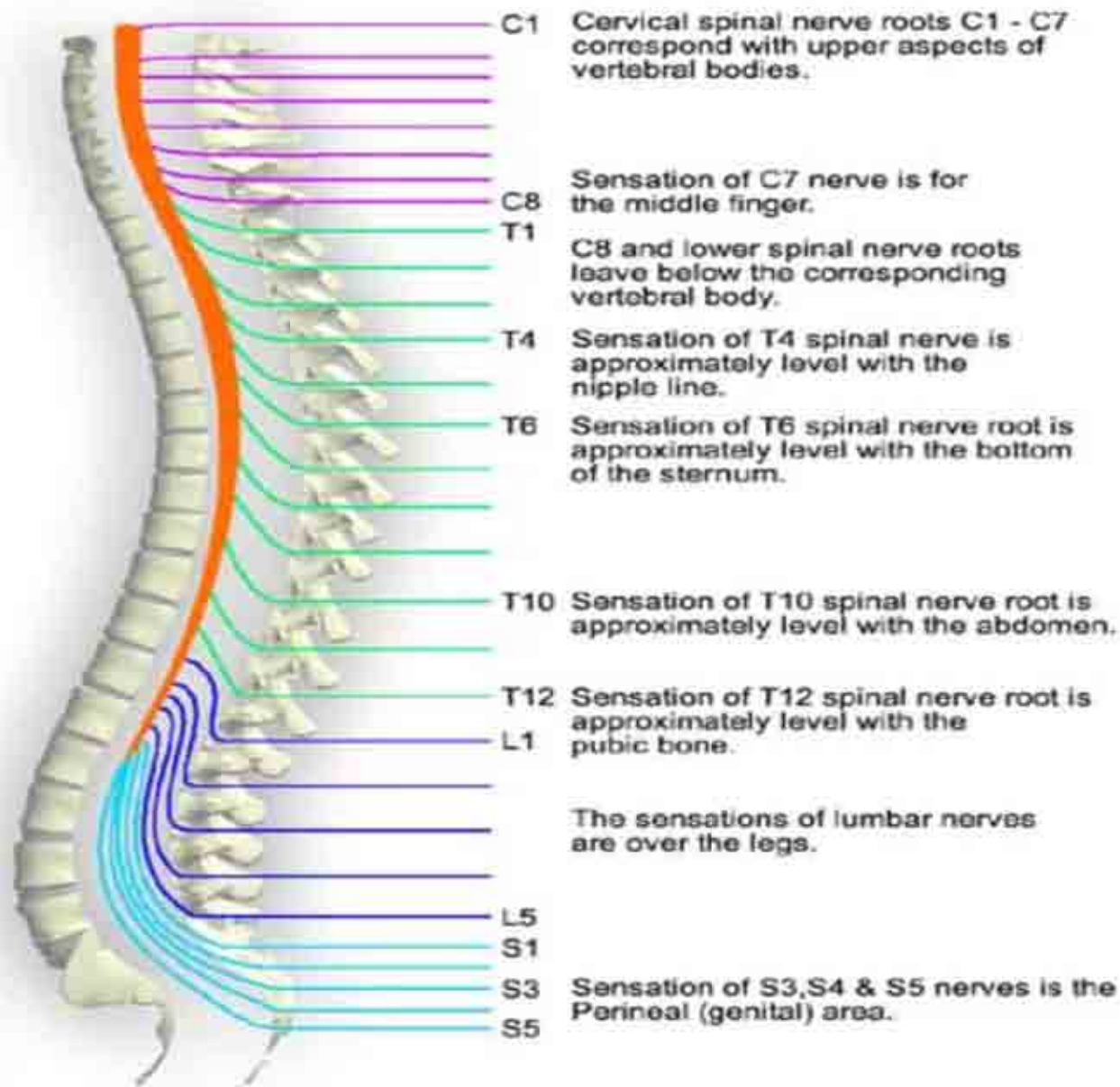
Bone notch at the base of the neck is C7.

The spinal cord ends approximately between L1 & L2.

Sacral cord segments (S1-S5 "Cauda Equina") are level with T12-L1 Vertebrae.

The sacral vertebrae are fused to make up the sacrum.

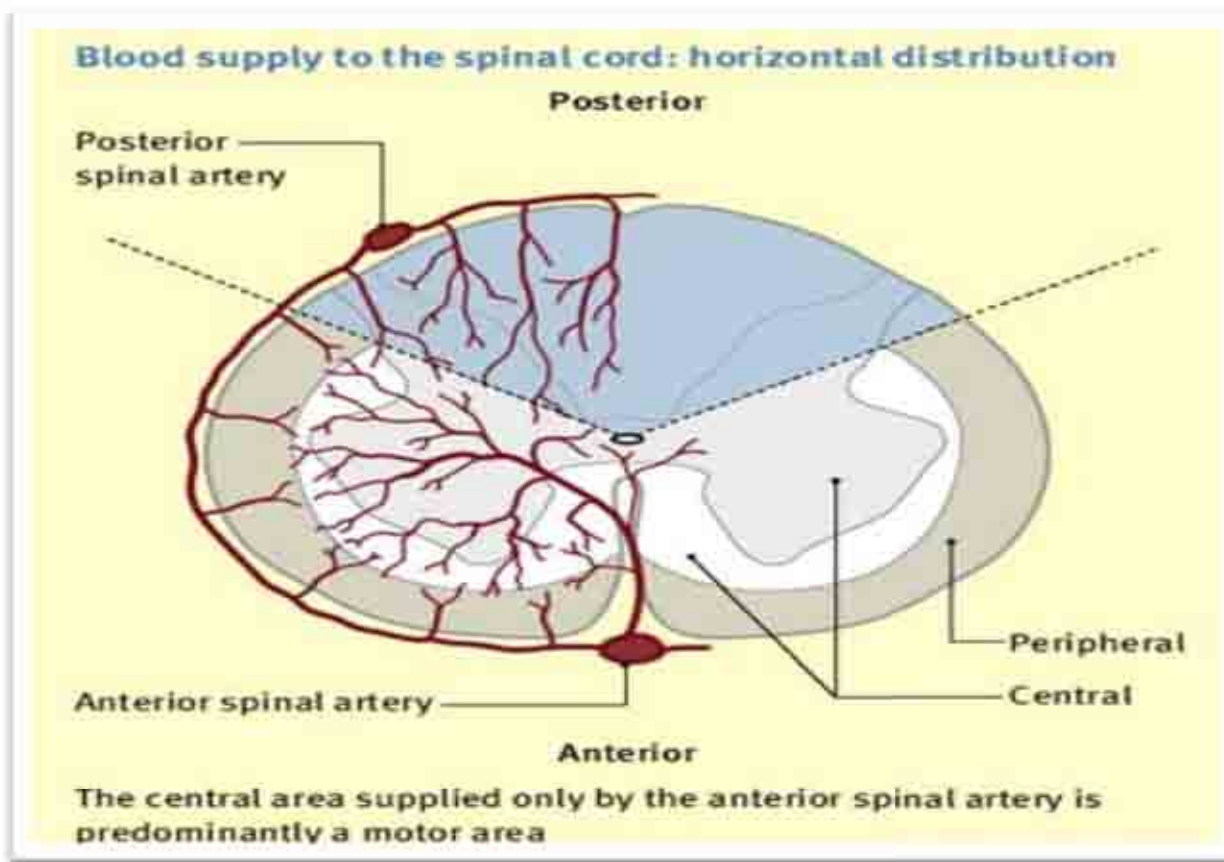
The coccygeal vertebrae are fused to make the coccyx or "tail bone".



## Basic anatomy....

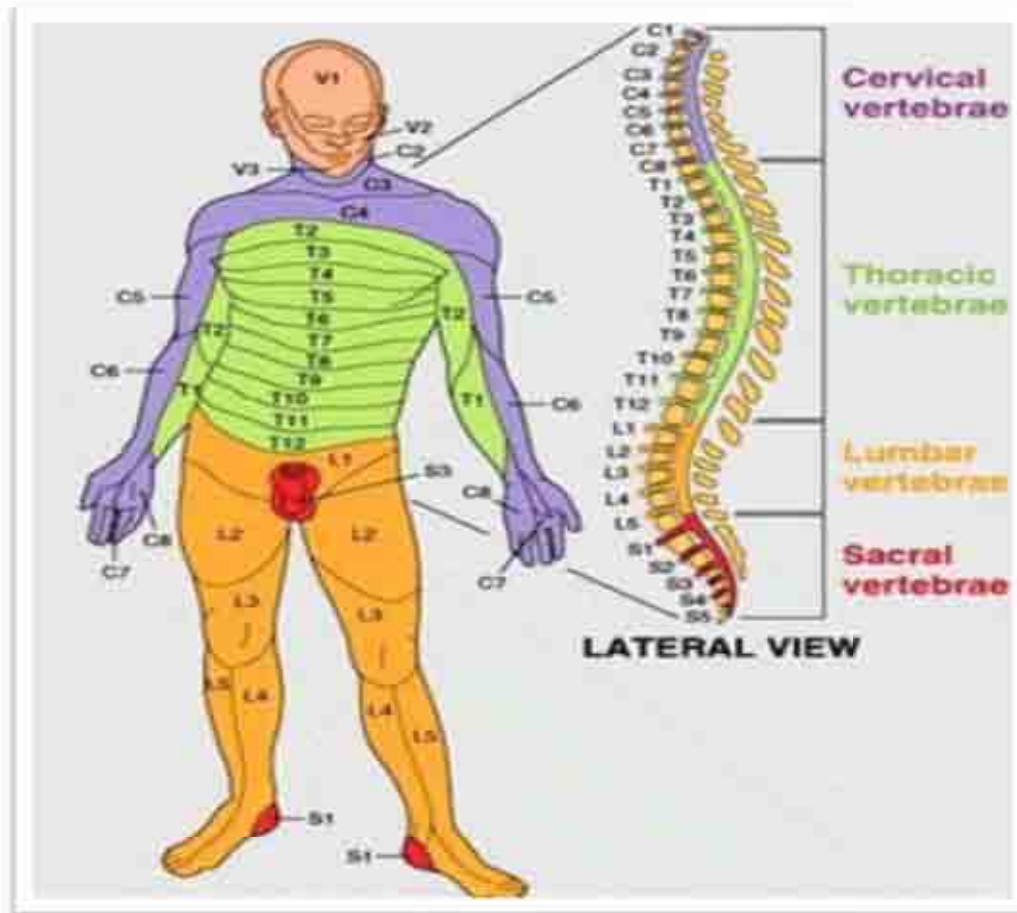
- Blood supply:
  - **1 anterior spinal artery**
  - **2 posterior spinal arteries**

# BLOOD SUPPLY OF SPINAL CORD

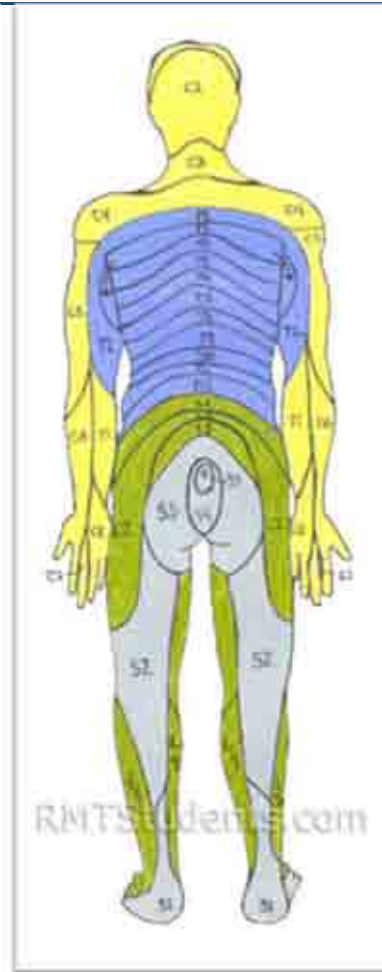




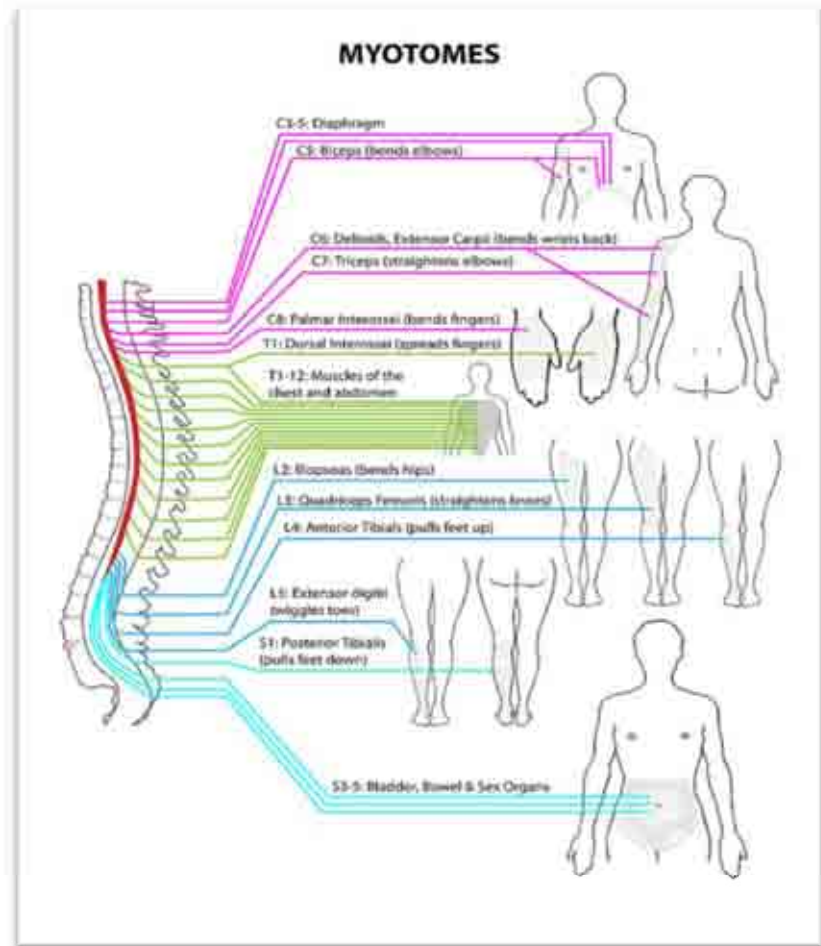
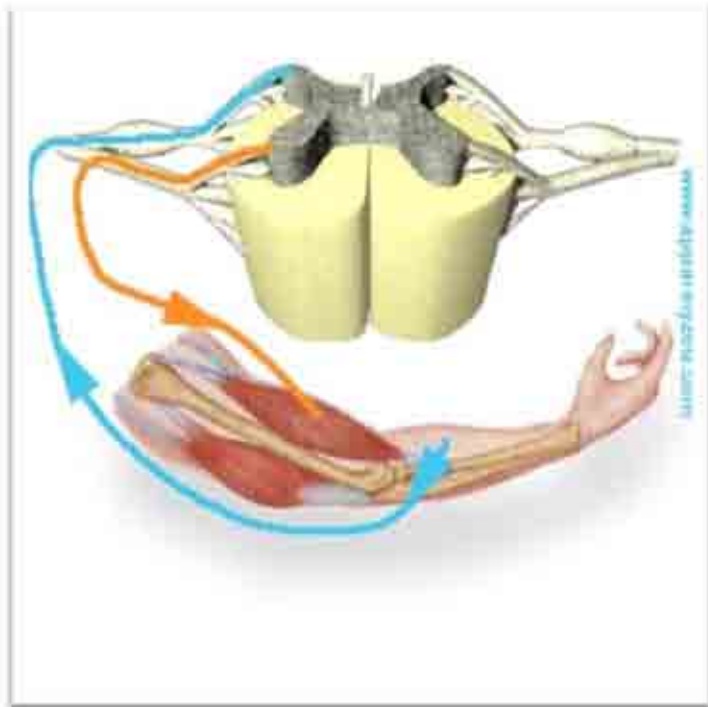
# Dermatomes



# Dermatomes.....

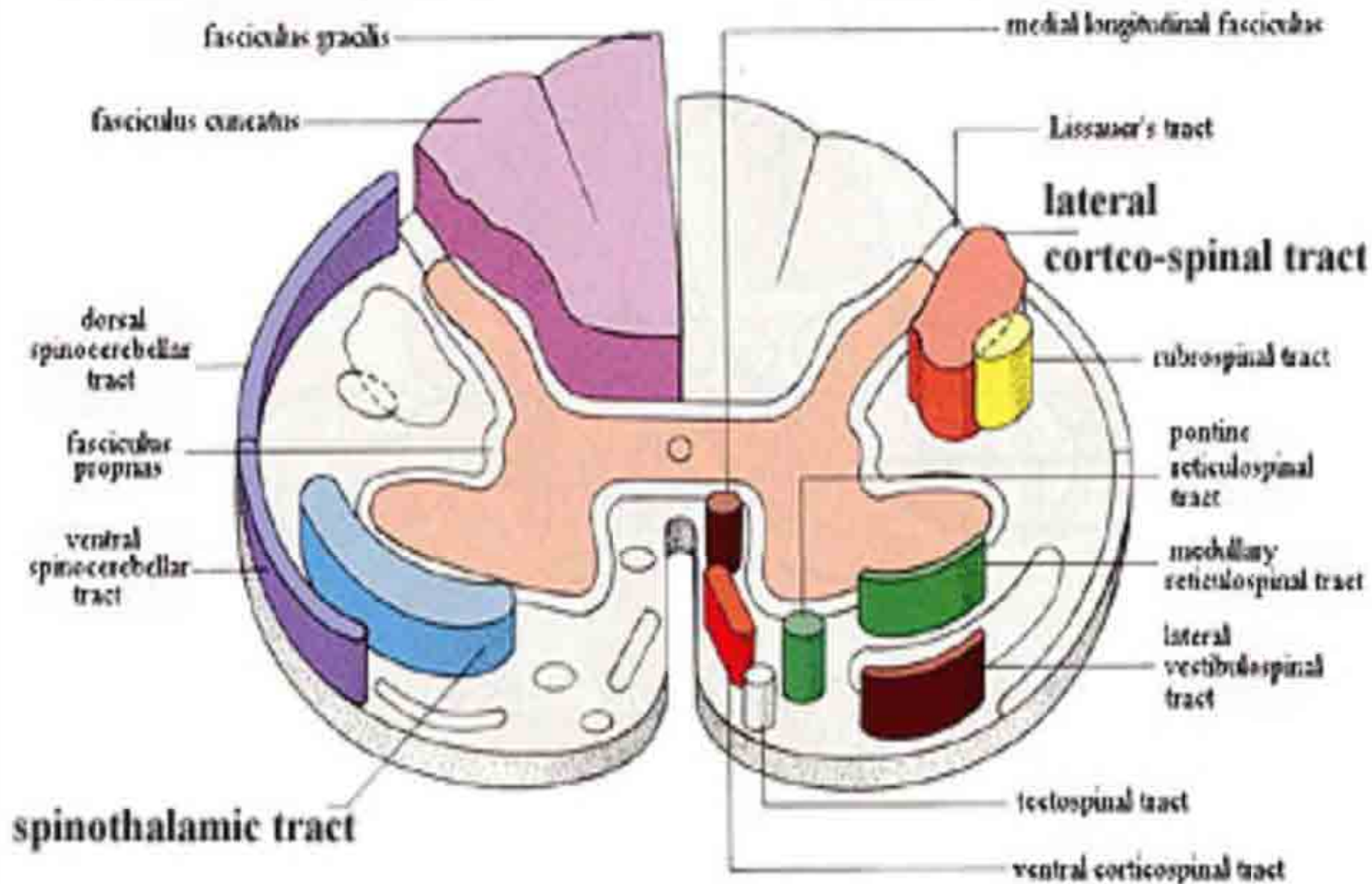


# MYOTOMES



## ASCENDING TRACTS

## DESCENDING TRACTS



# SYMPTOMS

- Paresthesias, numbness or cold sensation
- Heaviness, weakness or stiffness of the limbs
- +/- Pain localized over the spine or nerve root (often worsened by coughing, sneezing)
- Urgency or hesitancy of micturition
- Sexual dysfunction

# SIGNS

- Paraparesis/paraplegia motor
- Quadriparesis/Quadriplegia level
- Sensory level
- Bladder dysfunction
- +/- Tenderness over the spine
- +/- A Gibbus

# SCENARIO

- The patient was found to have:

- Motor level at T8
- Sensory level T10
- Urgency of micturition
- Tenderness over the lower back area

- Location of the lesion

- Paraparesis T8 cord level
- Lesion at T7/T8
- Interruption of continence fibers
- Mechanical

## Scenario.... Weakness

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Paraparesis</li><li>• Quadriparesis</li><li>• -Plegia</li><li>• Myotome</li></ul> | <ul style="list-style-type: none"><li>• Weakness of lower limbs</li><li>• Weakness of all 4 limbs</li><li>• Power 0/5</li><li>• Group of muscles served by a single nerve</li></ul> |
|---|---|



## Scenario..... Weakness

- NB
  - **THE HIGHEST LEVEL OF WEAKNESS CORRESPONDS TO THE LEVEL OF THE LESION IN THE SPINAL CORD.**
    - e.g. weakness up to (and including) hip flexion => L1
    - Weakness up to (and including) abdominal wall => T8 lesion
  - **LEARN MYOTOMES**

## Scenario.... Loss of sensation

- Sensory level => spinal cord lesion
- Spinothalamic level
  - Pain
  - Temperature
  - Crude touch
- Posterior column level
  - Vibration
  - Proprioception
  - Fine touch

## Scenario.... Loss of sensation

- NB:
  - THE 2 MODALITIES ARE NOT ALWAYS INVOLVED TO THE SAME EXTENT.
  - THE SPINOTHALAMIC LEVEL IS 2-3 LEVELS BELOW THE SPINAL CORD LEVEL.
  - LEARN ALL DERMATOMES

## Scenario.... Problems of continence

- Frequency + Urgency – Due to spastic bladder
- Overflow incontinence – Bladder voids automatically
- Bladder distention + inability to void – Common in acute spinal cord lesions

## Scenario.... Backache

- Can localize to vertebrae
  - e.g. # due to trauma
  - e.g. Collapse of vertebrae
- Radicular pain -> Pain starts at back and radiates along nerve pathway.
  - Due to involvement of nerve root.
  - e.g. collapse of vertebrae
- Lower back pain (Not corresponding to lesion level) – probably due to muscle spasm

# APPROACH TO THE PATIENT

- Rule out compressing lesion.
  - This can be operated on as an emergency
  - How? ..... **MRI**
- If no compressing lesion on MRI -> look for medical cause

# CAUSES OF A MYELOPATHY

## COMPRESSIVE

- Tumors
- Disc prolapse
- Vertebral collapse
- Hemorrhage
- Abscess

## NON-COMPRESSIVE

- Infections
- Demyelinating diseases
- Metabolic conditions
- Vascular problems
- Neoplasm
- Hereditary

## NON-COMPRESSIVE MYELOPATHIES

- o Infections:
    - . TB
    - . Syphilis
    - . Herpes
    - . Bilharzia
    - . HIV
    - . Toxoplasma
    - . Varicella
    - . CMV
- } Usually  
HIV  
associated



## NON-COMPRESSIVE MYELOPATHIES

### oDemyelinating:

- oMS

- oNeuromyelitis  
optica (De Vic's)

- oAcute  
demyelinatinge  
ncephalomyelit  
is (ADEM)



## Non-compressive myelopathies....

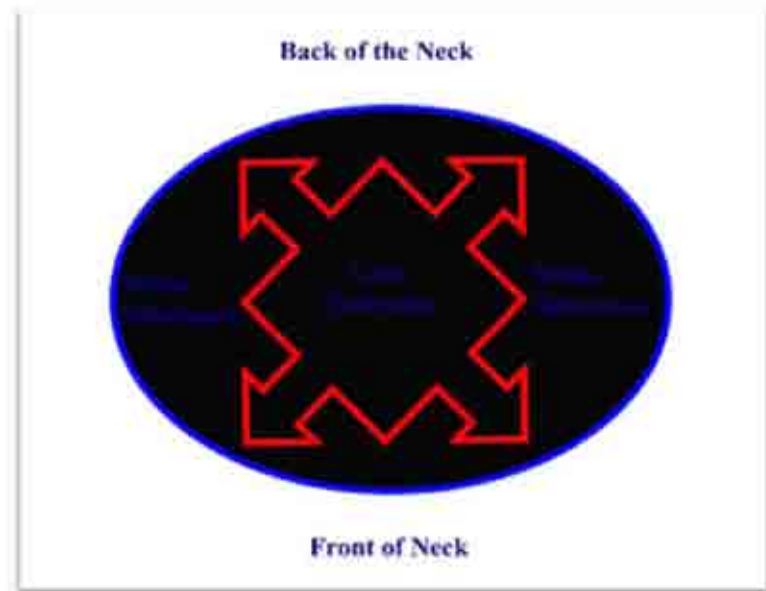
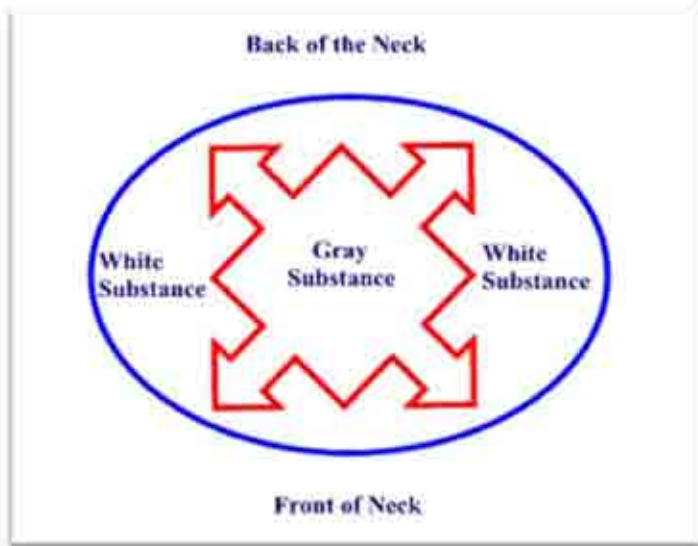
- o Metabolic conditions: Vit B12 deficiency
- o Vascular: Anterior spinal artery occlusion
- o Neoplasms:
  - Primary
    - Astrocytoma
    - Ependymoma
    - lymphoma
  - Secondary
    - Metastasis e.g. prostate



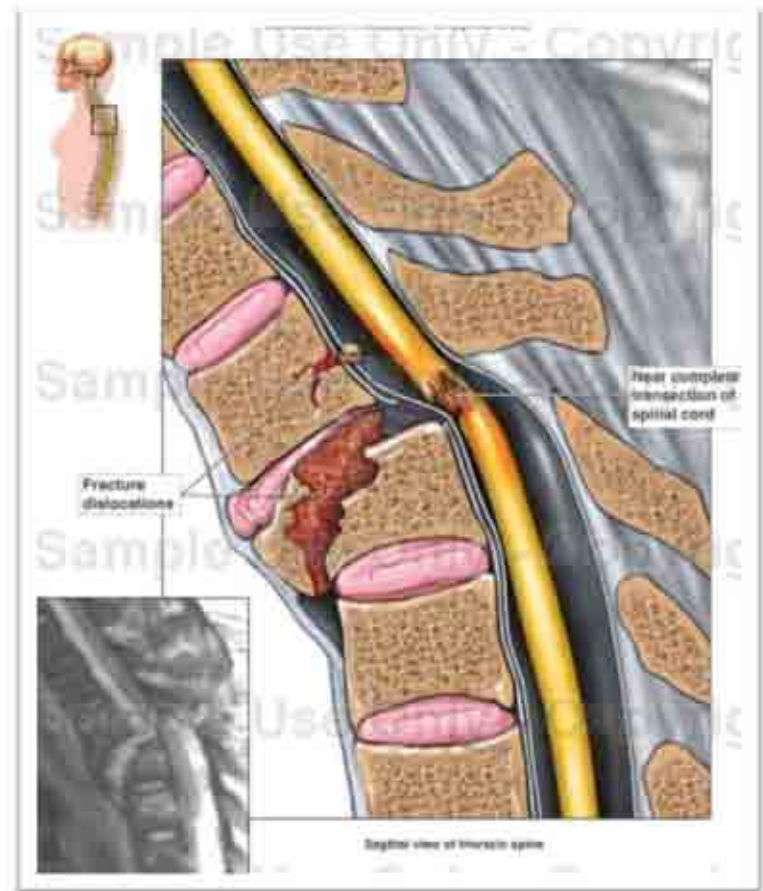
# CORD SYNDROMES

- Transection of the cord
- Anterior spinal artery syndrome
- Postero-lateral cord syndrome
- Hemisection of the cord
- Central cord syndrome

# 1. TRANSECTION OF THE CORD



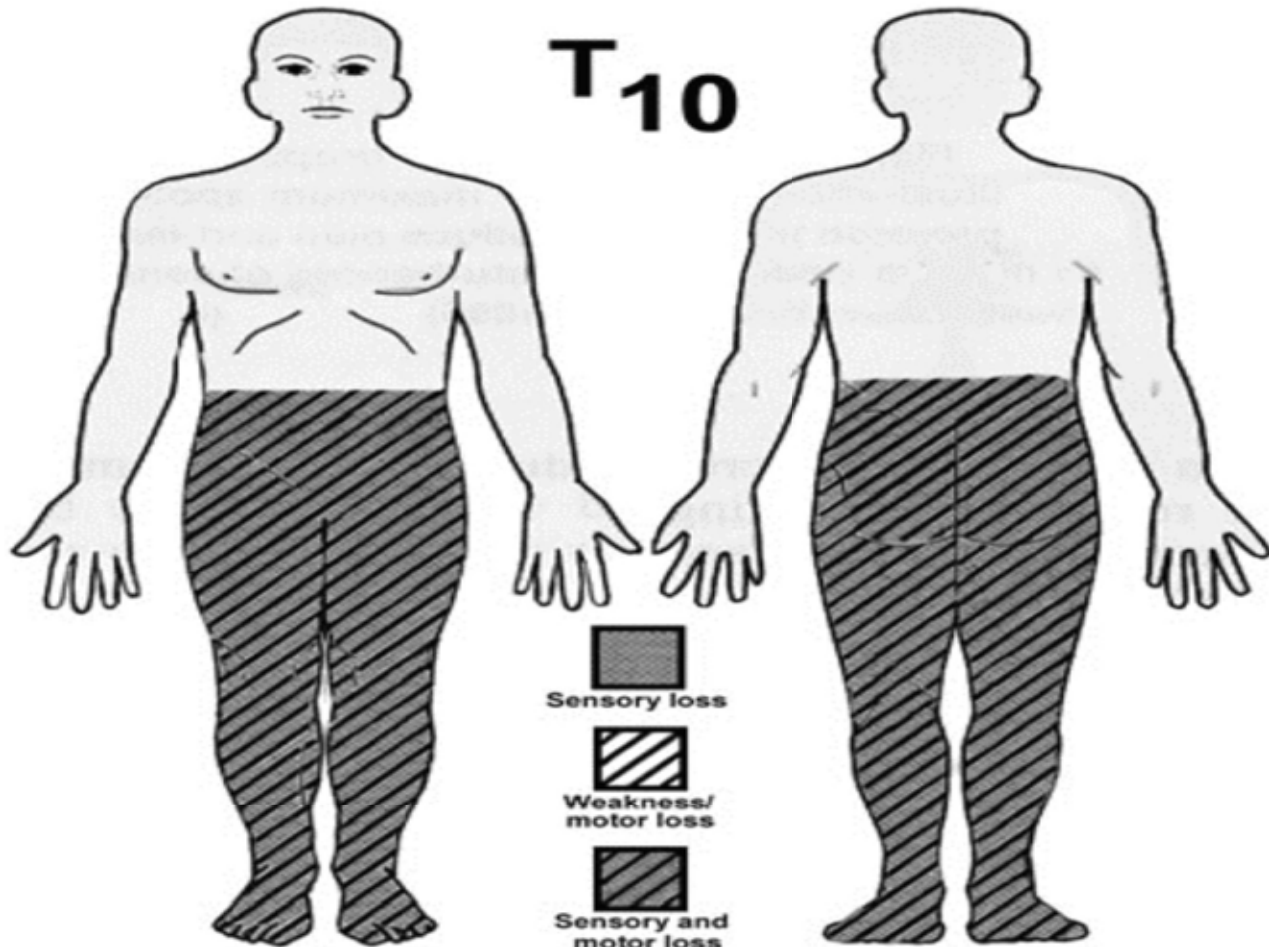
# Transection of the Cord....



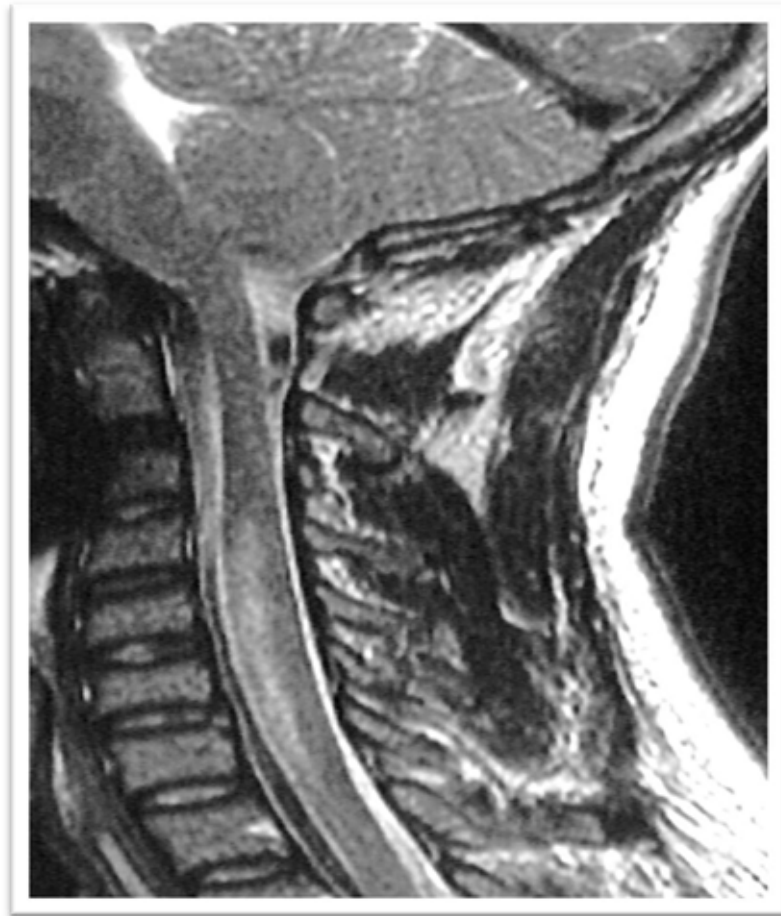
## Transection of the cord....

- Weakness below the lesion
- Spinothalamic sensory fallout below the lesion
- Loss of posterior column sensation below the lesion
- Causes – trauma, viral, post viral

**T<sub>10</sub>**

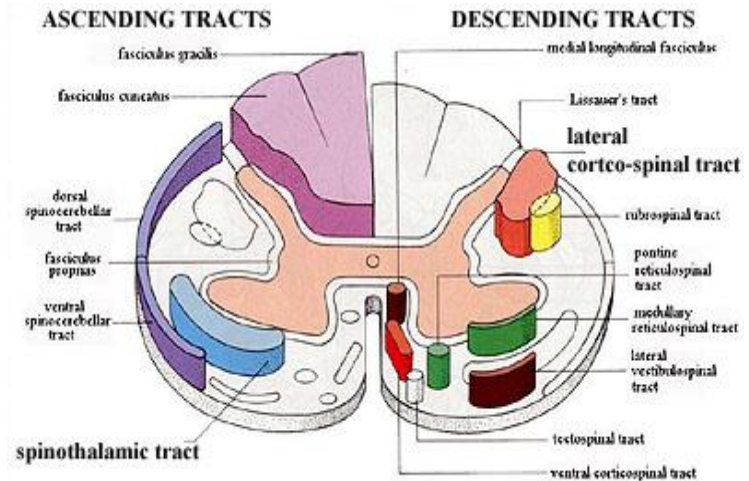
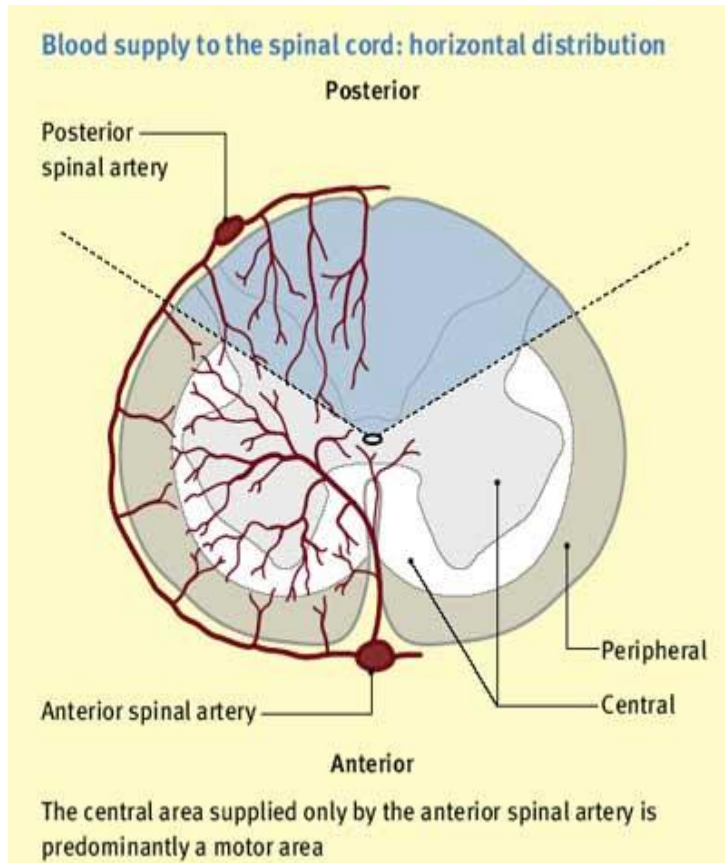


## 2. ANTERIOR SPINAL ARTERY SYNDROME





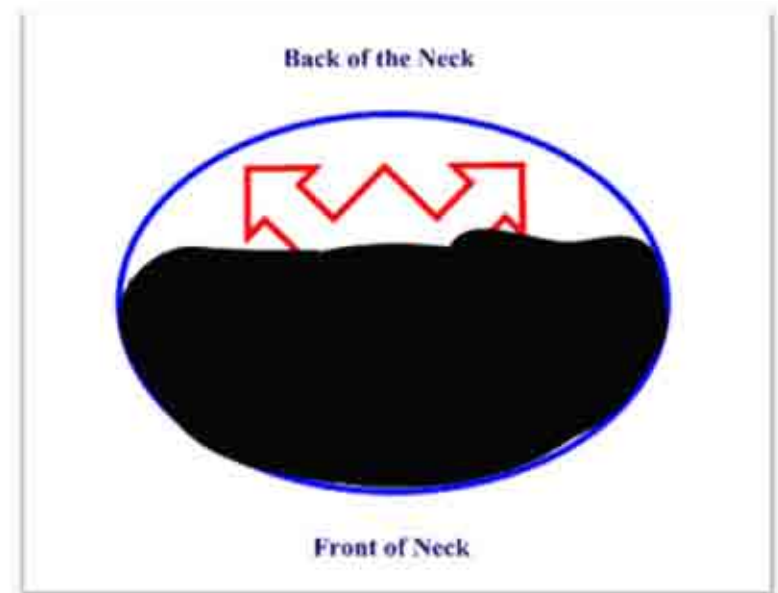
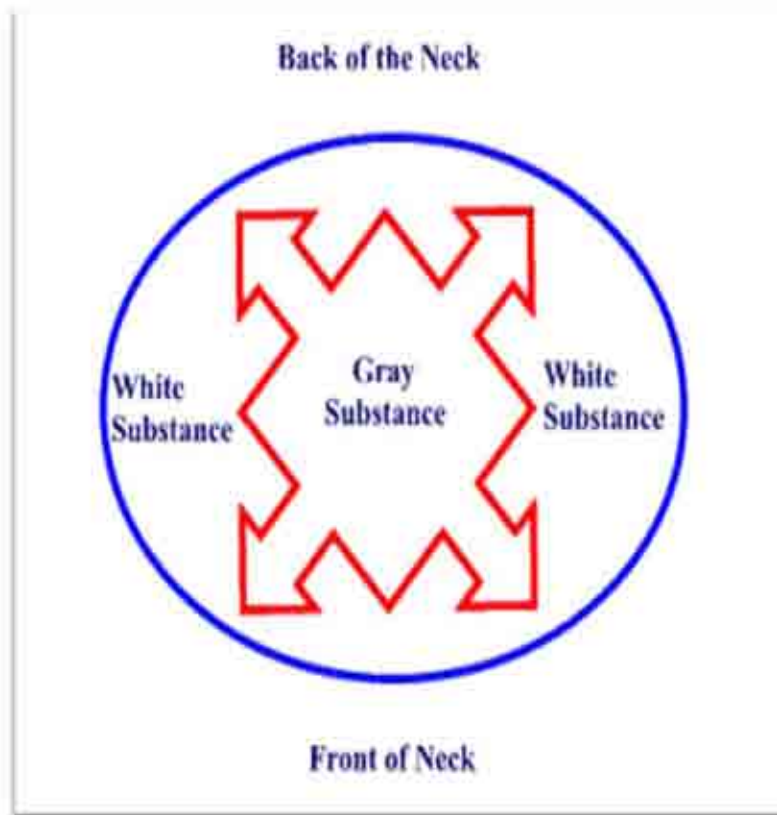
# Anterior spinal artery syndrome....



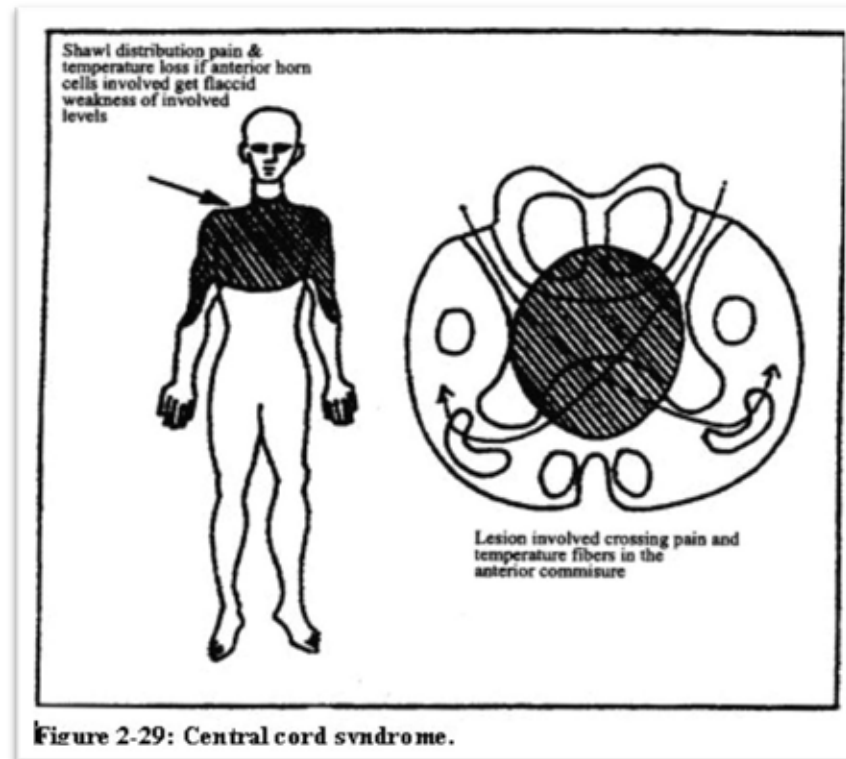
## Anterior Spinal Artery Syndrome....

- Weakness below the lesion
- Spinothalamic sensory fallout below the lesion
- Posterior columns intact

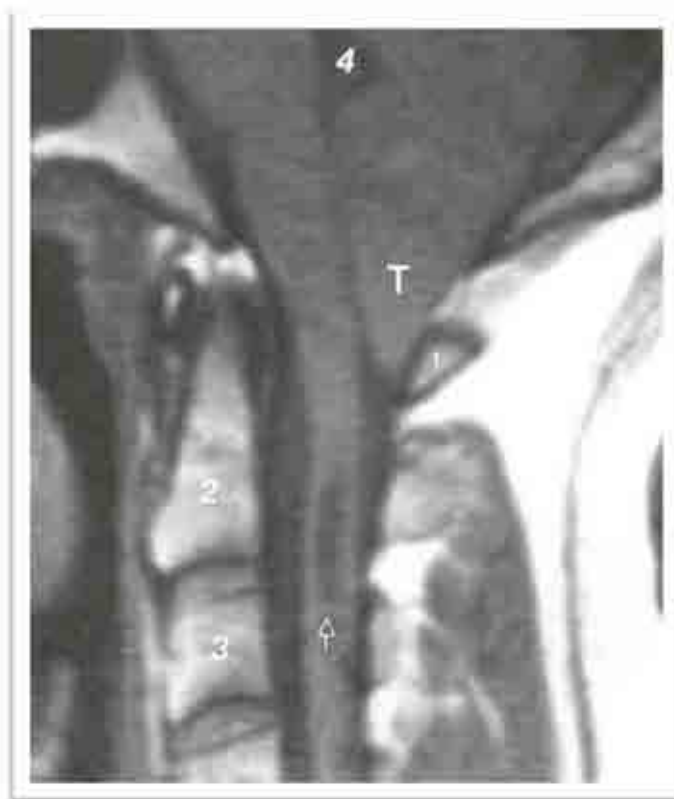
# Anterior spinal artery syndrome....



### 3. CENTRAL CORD SYNDROME



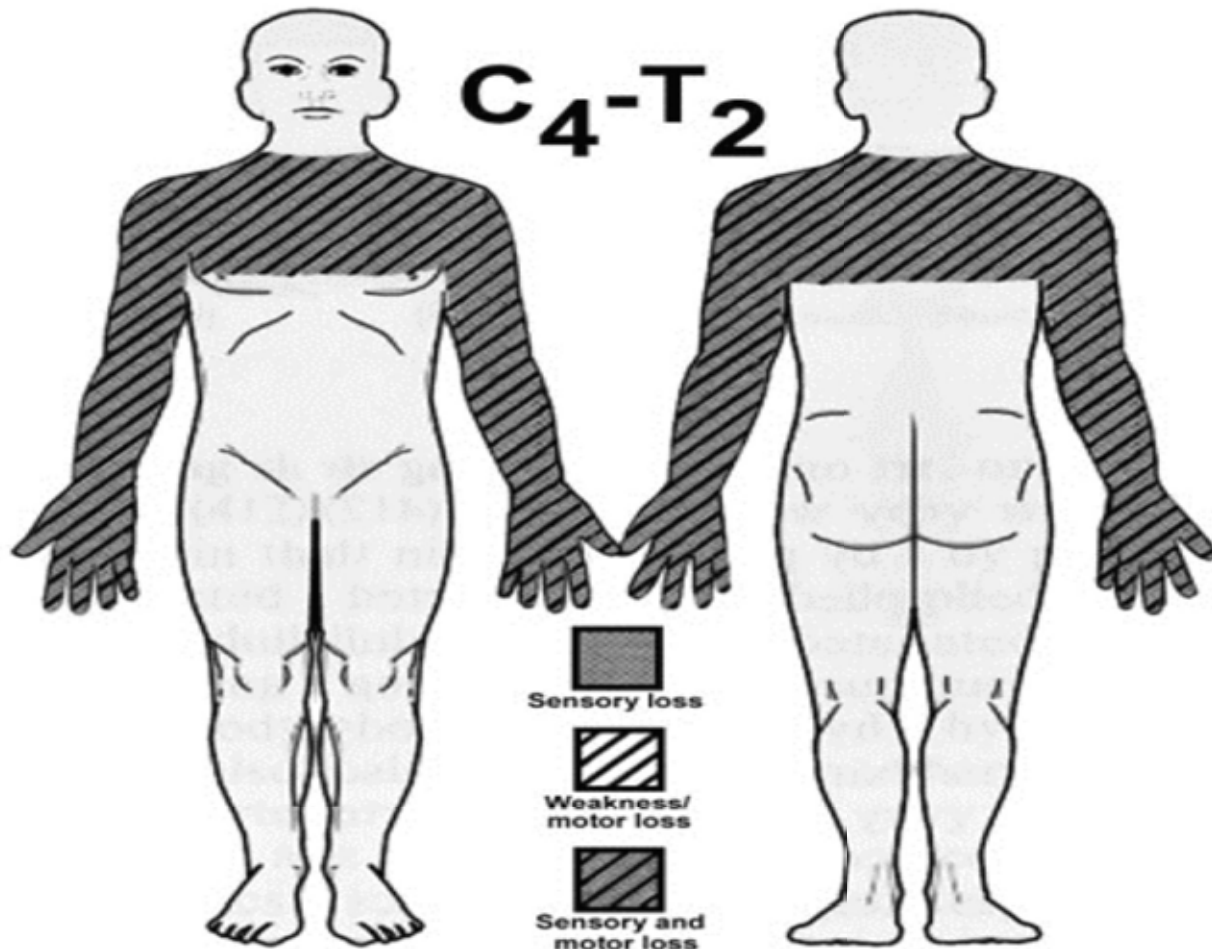
# Central Cord Syndrome - Syringa

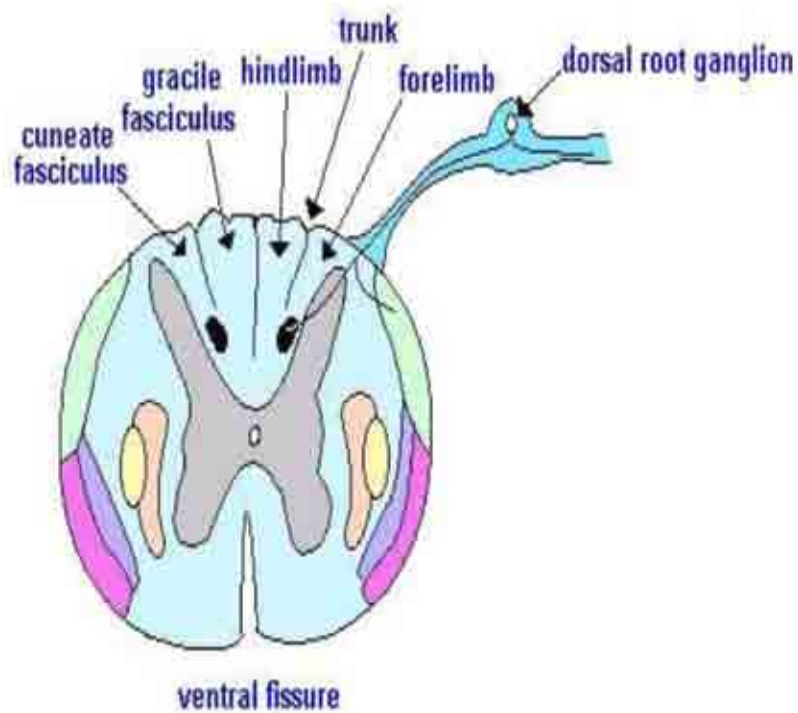


# Central Cord Syndrome....

- Suspended sensory level
- Sacral sparring
- Weakness with UMN signs below the lesion
- LMN signs at level of the lesion
- Causes – Syring, Tumors, demyelination, granulomas

**C<sub>4</sub>-T<sub>2</sub>**





### Key to pathways

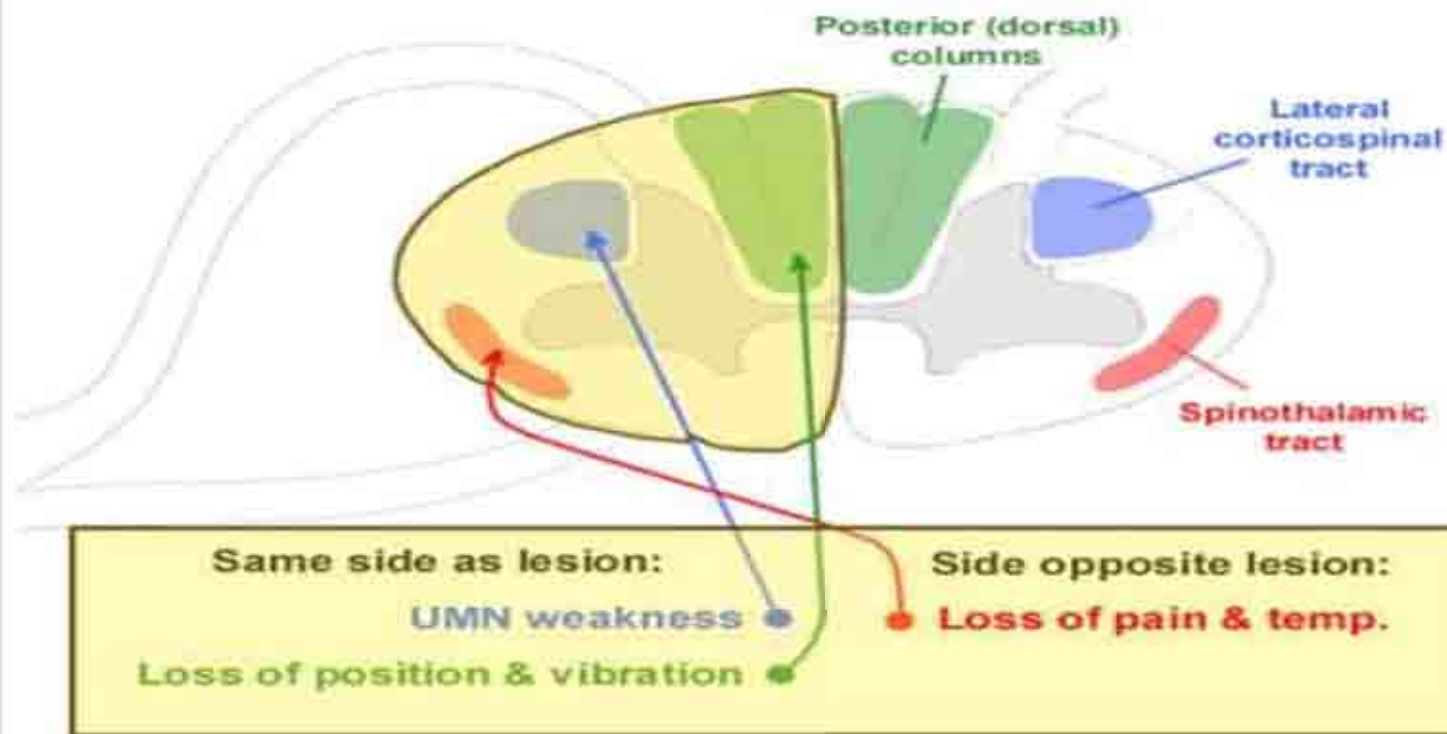
- spinothalamic
- dorsal spinocerebellar (hindlimb, ipsilateral)
- ventral spinocerebellar (hindlimb, contralateral)
- spinocuneocerebellar (forelimb, ipsilateral)
- cranial spinocerebellar (forelimb ipsilateral)
- spinoreticular (ARF)



## 4. POSTERO-LATERAL CORD SYNDROME

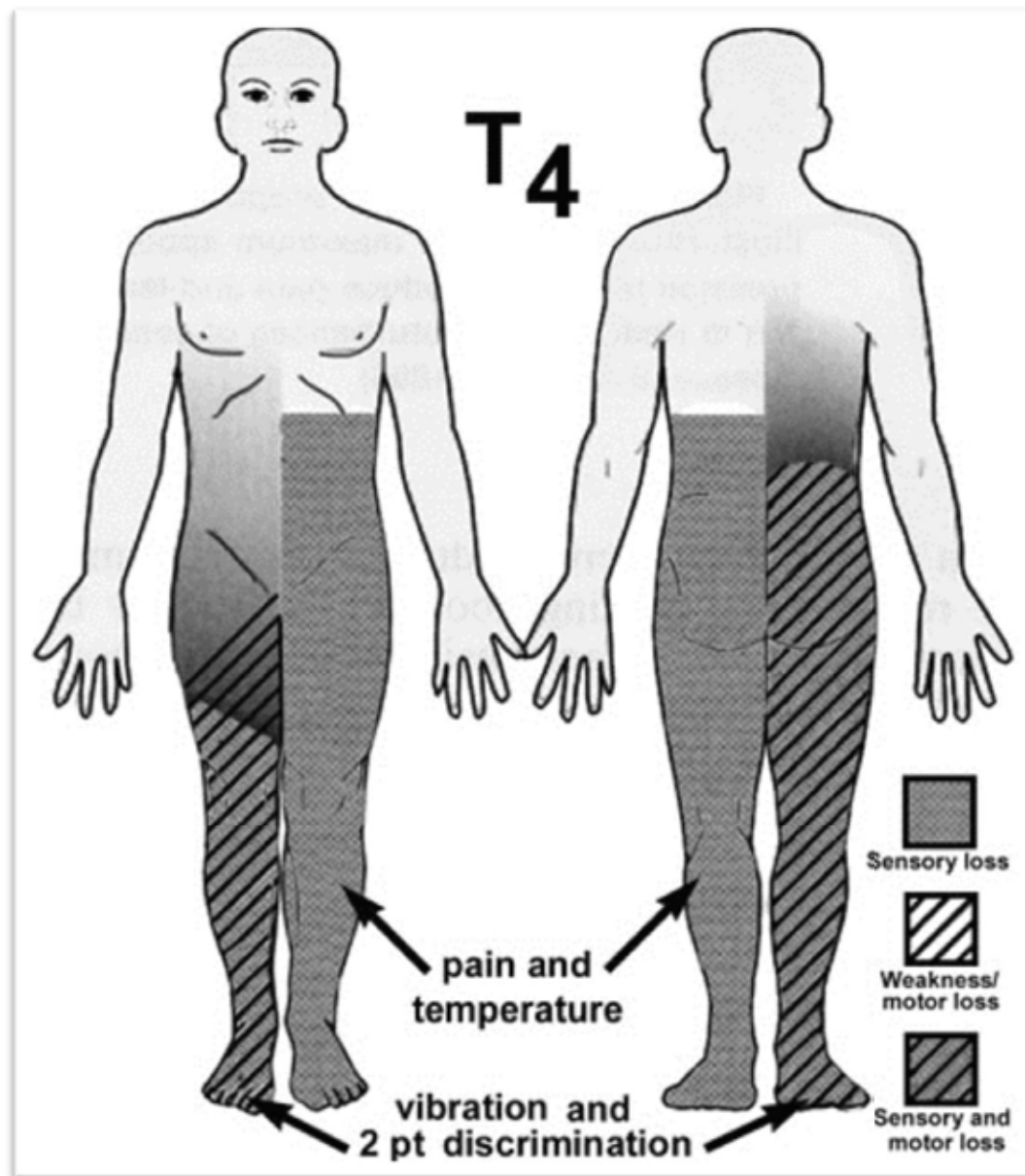
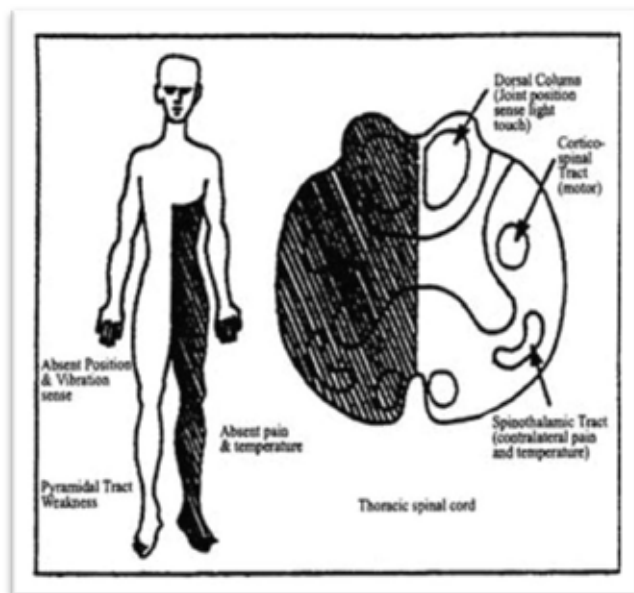
- Spasticity below the lesion
- Posterior column fallout below the lesion
- No spinothalamic sensory fallout
- Causes – HIV, Vit B12 deficiency, trauma, hereditary

## Brown-Sequard Syndrome of Spinal Cord Hemisection

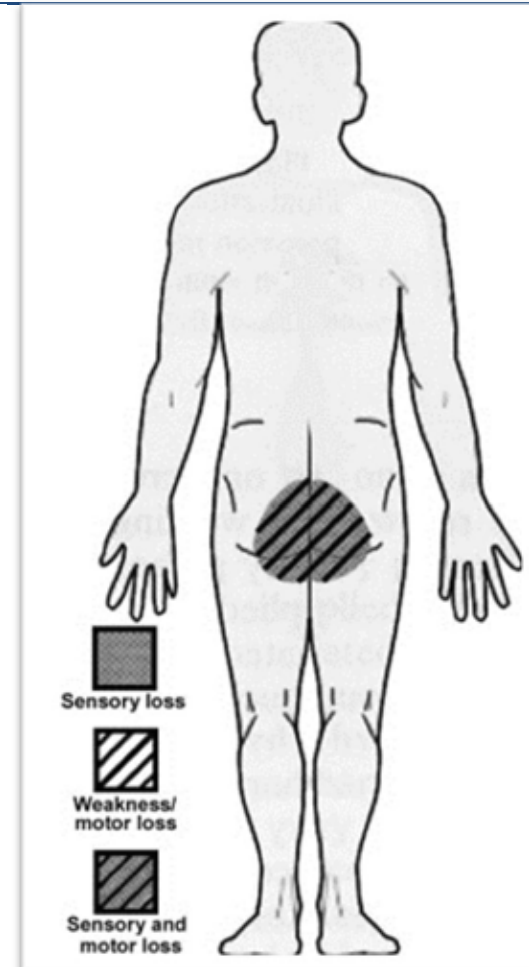
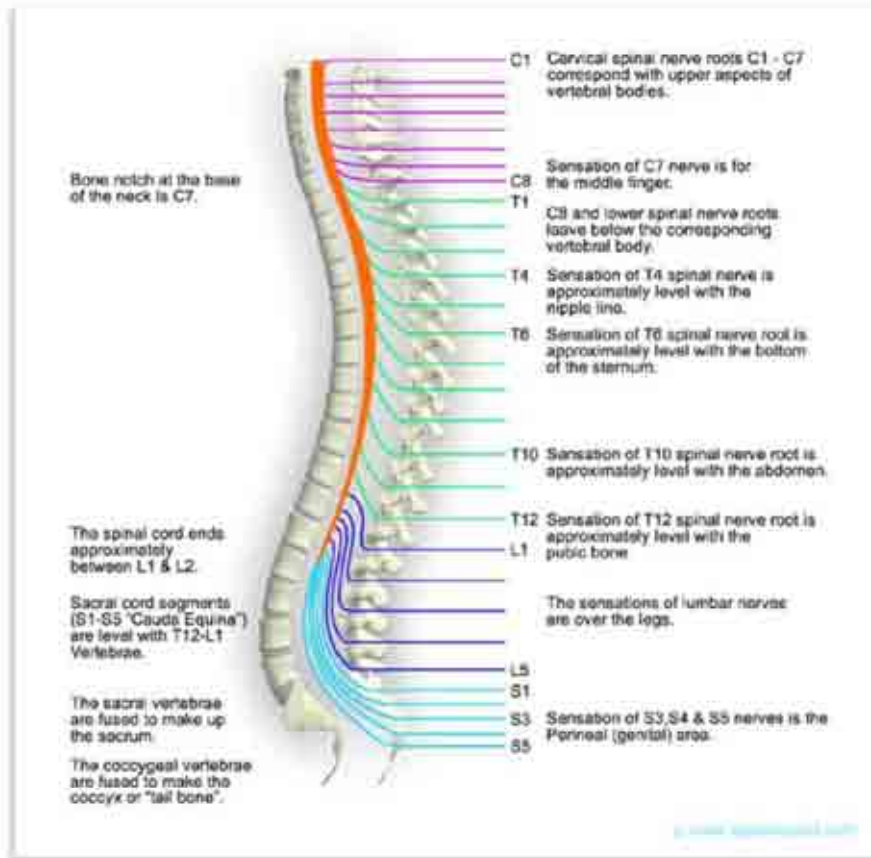


## 5. HEMISECTION OF THE CORD

- Brown Sequard syndrome
  - Ipsilateral posterior column fallout
  - Ipsilateral corticospinal tract fallout
  - Contralateral spinothalamic fallout
- Causes – Trauma, tumors, demyelination



# Cauda equina and Conus medullaris



THANK YOU