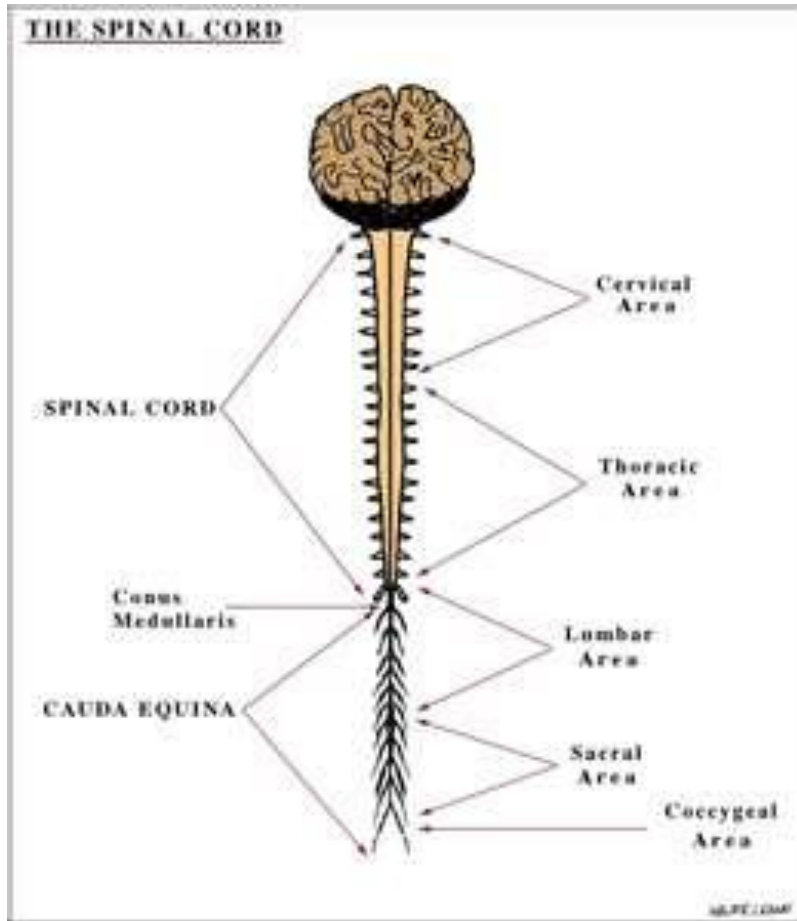
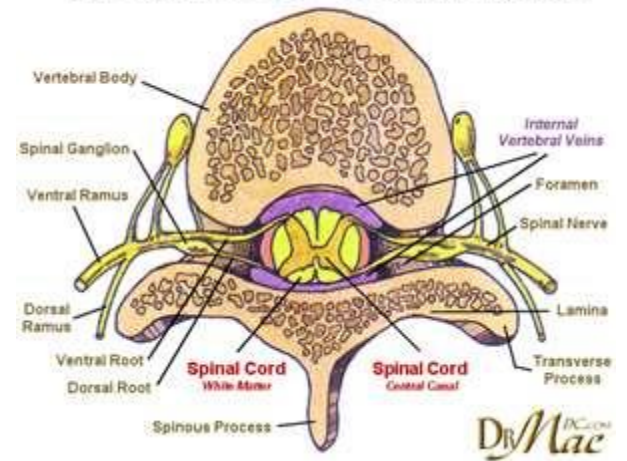


SPINAL CORD



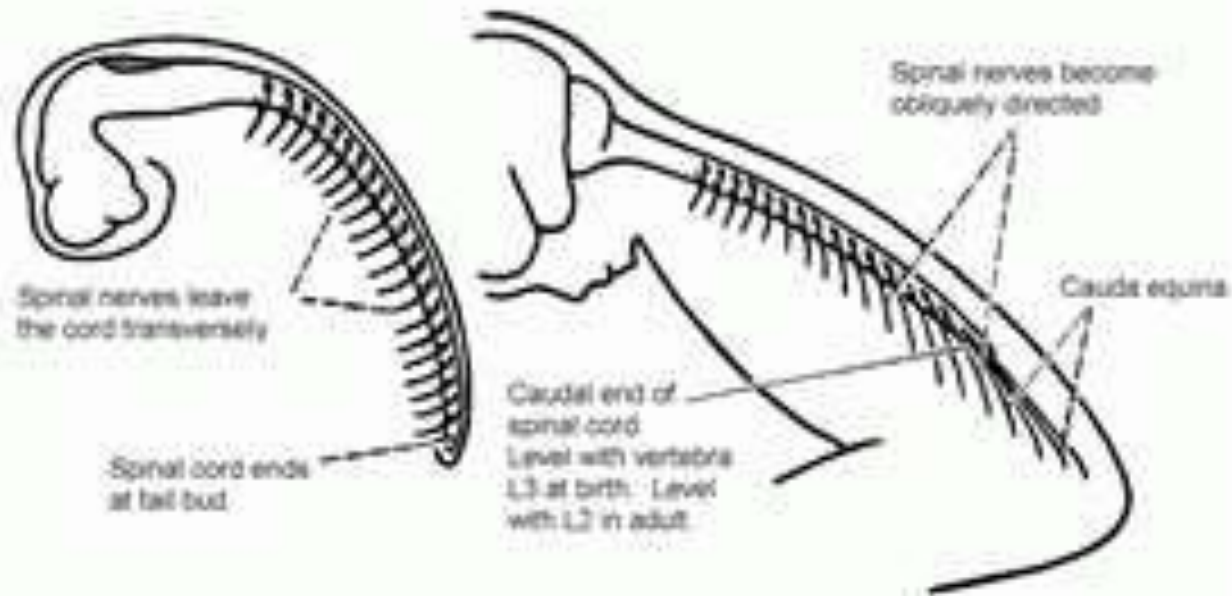
The Spinal Cord - Section Diagram



EXTENTS



GROWTH OF SPINAL CORD



Growth of the embryonic and fetal spinal cord

(Based on a figure of R. B. Jones
L.A. Matukale (1970) *Journal of
Human Embryology*, 4th edn
Edinburgh: Churchill)

MEASUREMENTS

- LENGTH

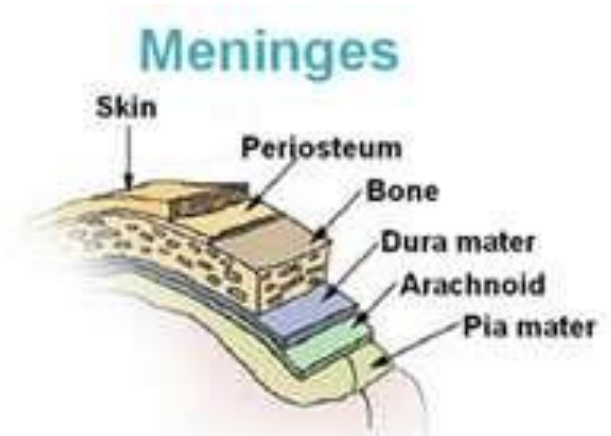
45 cm ---- Adult male (70 cm)

42 cm ---- Adult female(60 cm)

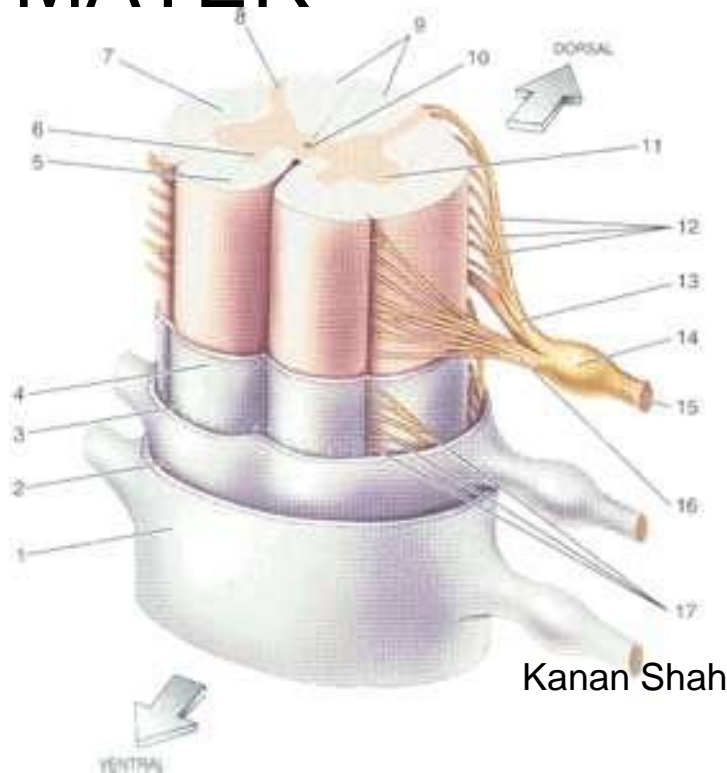
- WEIGHT --- 30 gms

COVERINGS

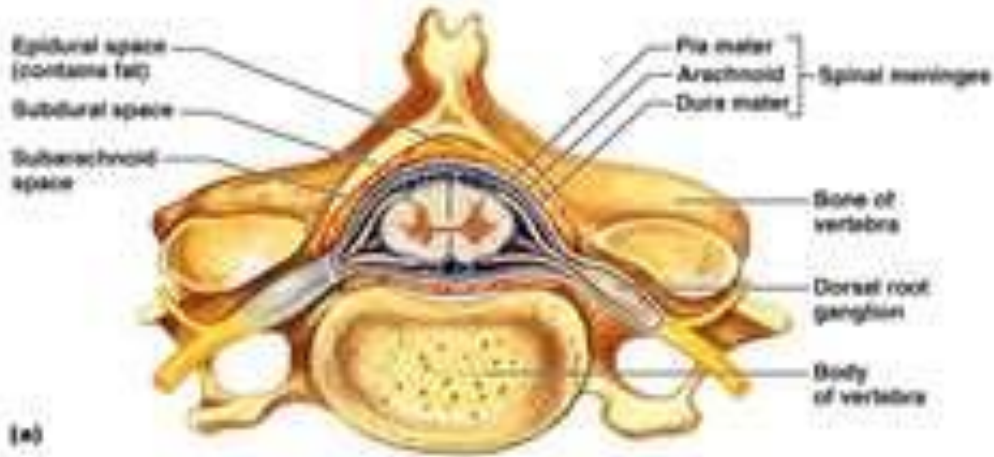
- DURA MATER
- ARACHNOID MATER
- PIA MATER



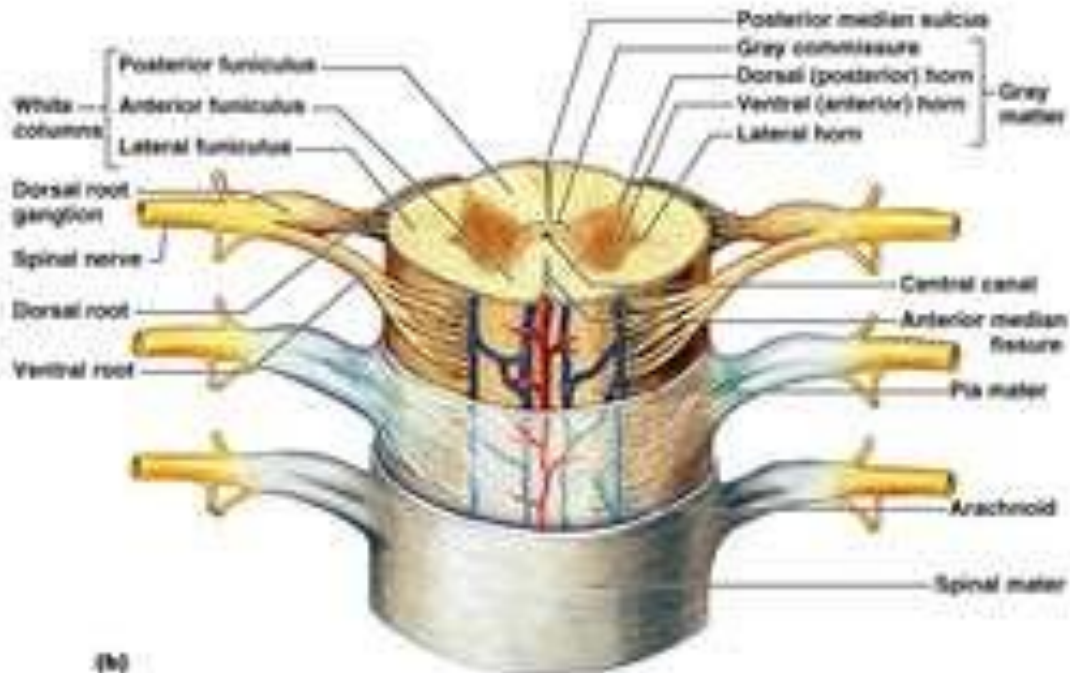
Dura mater – outer layer lining skull
Arachnoid (mater) – contains blood vessels
Subarachnoid space – filled with CSF
Pia mater – covers brain



Kanan Shah



(a)



(b)

DURA MATER

- SPINAL DURA MATER

Single layered

Does not form FOLDS

EPIDURAL space present

CEREBRAL DURA MATER

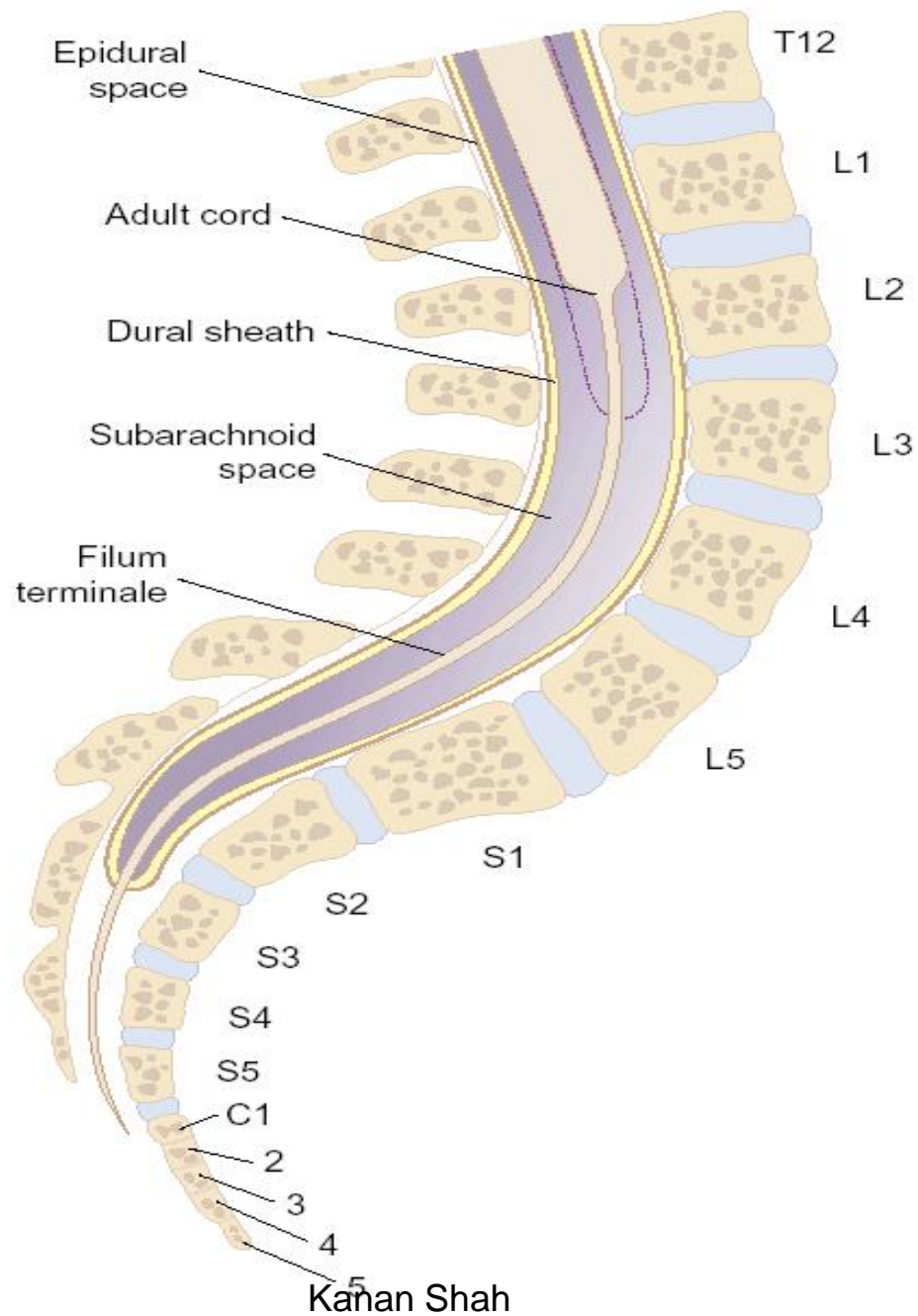
Double layered

form FOLDS.

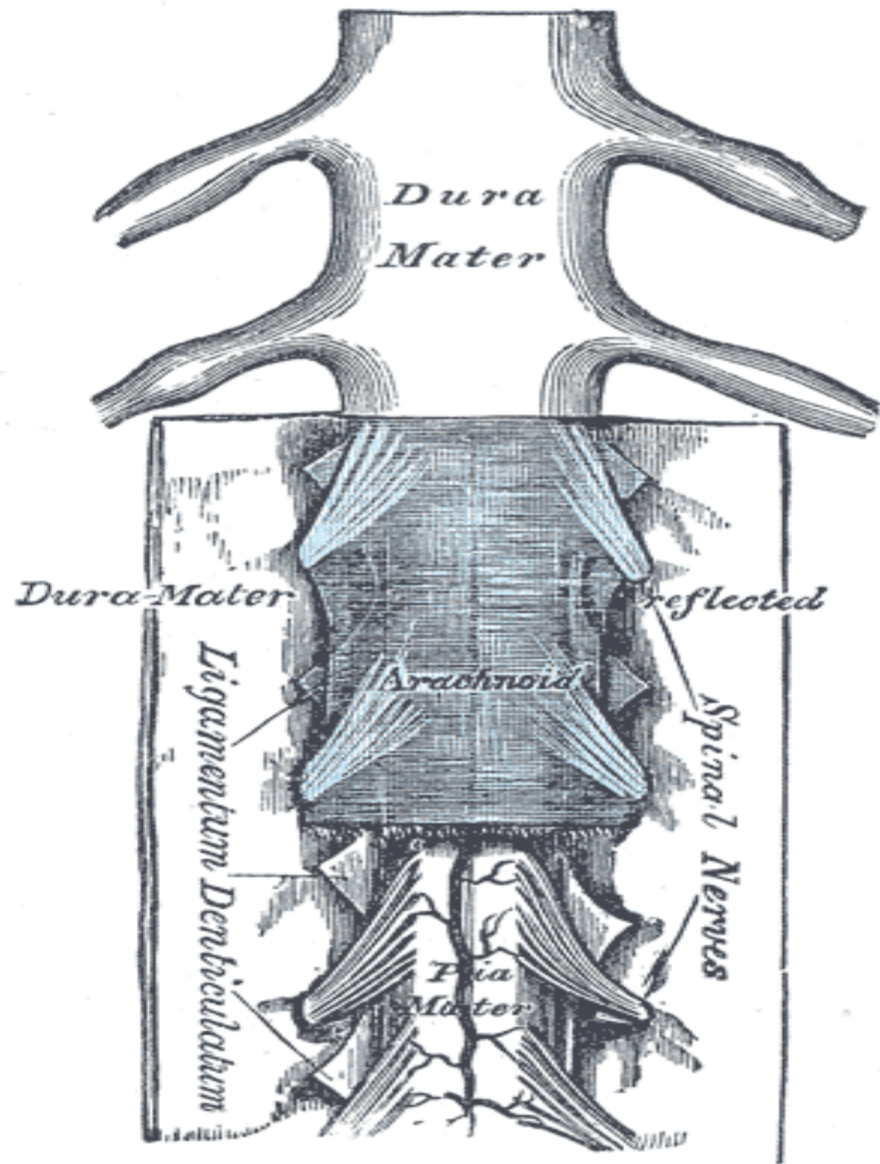
absent

PIA MATER

- THICKER ,FIRMER AND LESS VASCULAR THAN CEREBRAL
- FILUM TERMINALE –INTERNUM
EXTERNUM
- SUBARACHNOID SEPTUM
- LINEA SPLENDENS
- LIGAMENTUM DENTICULATA



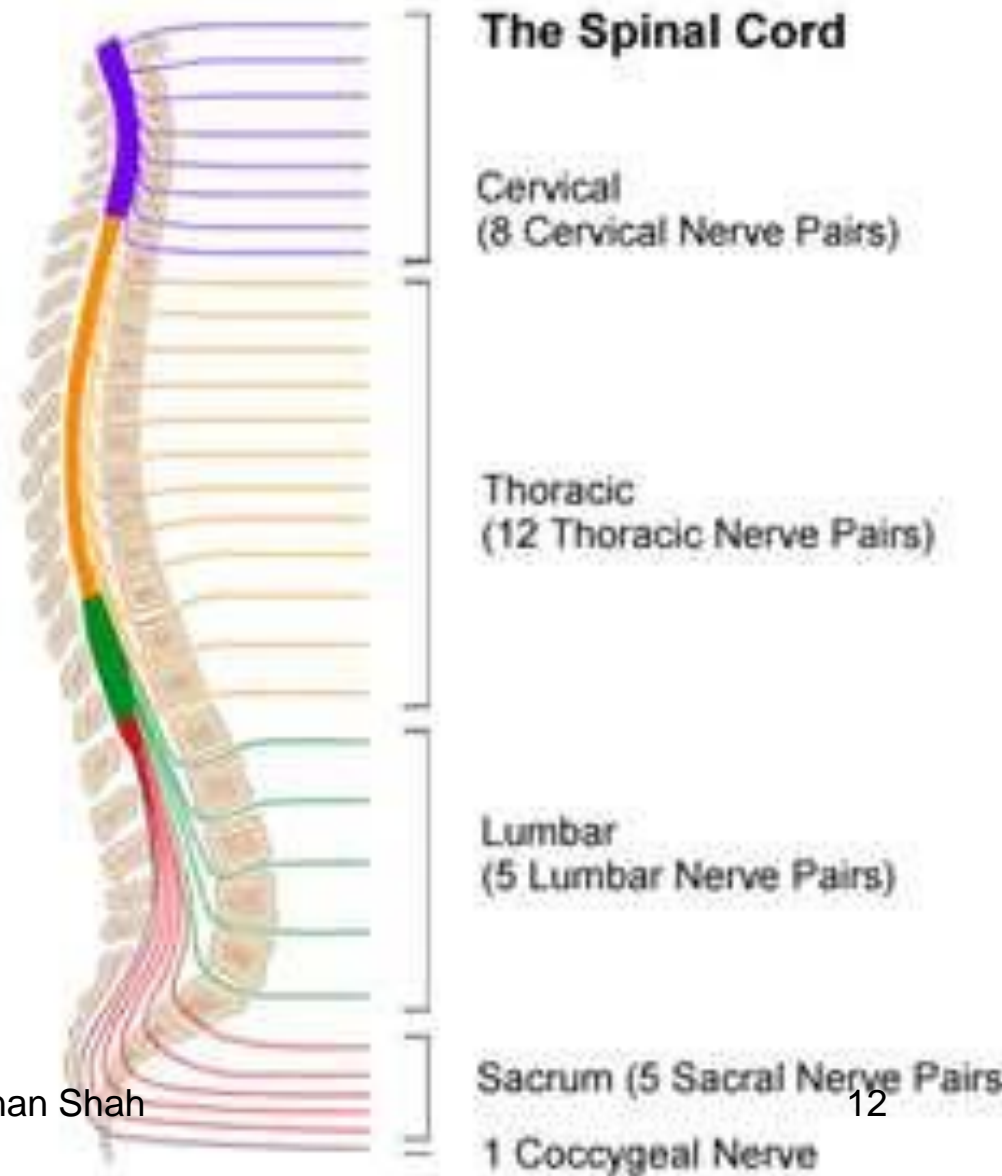
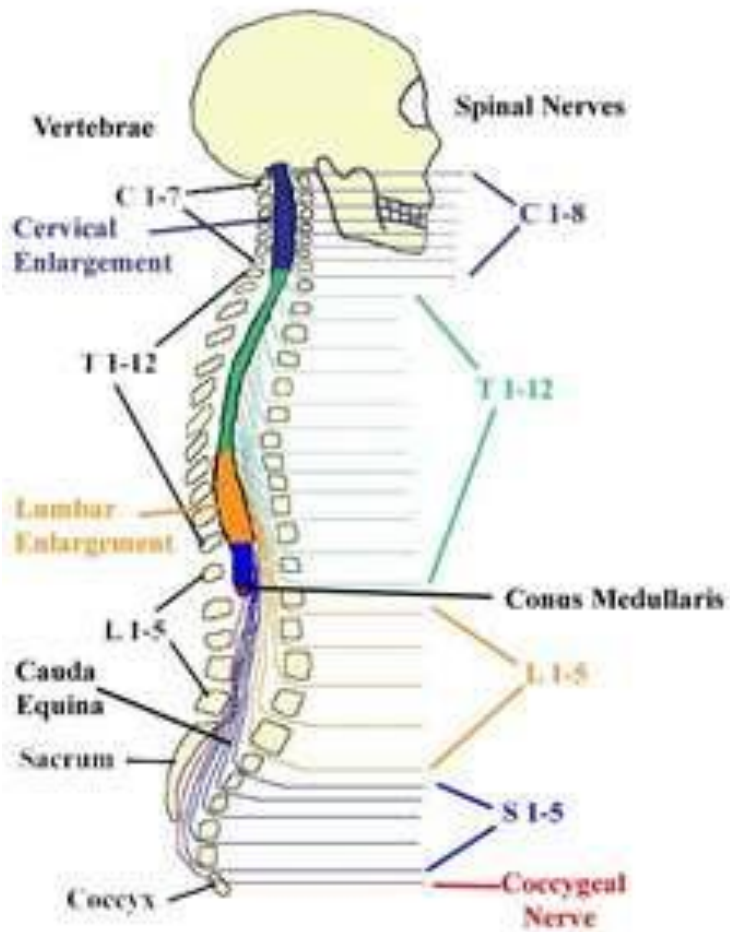
The termination of the spinal cord in the

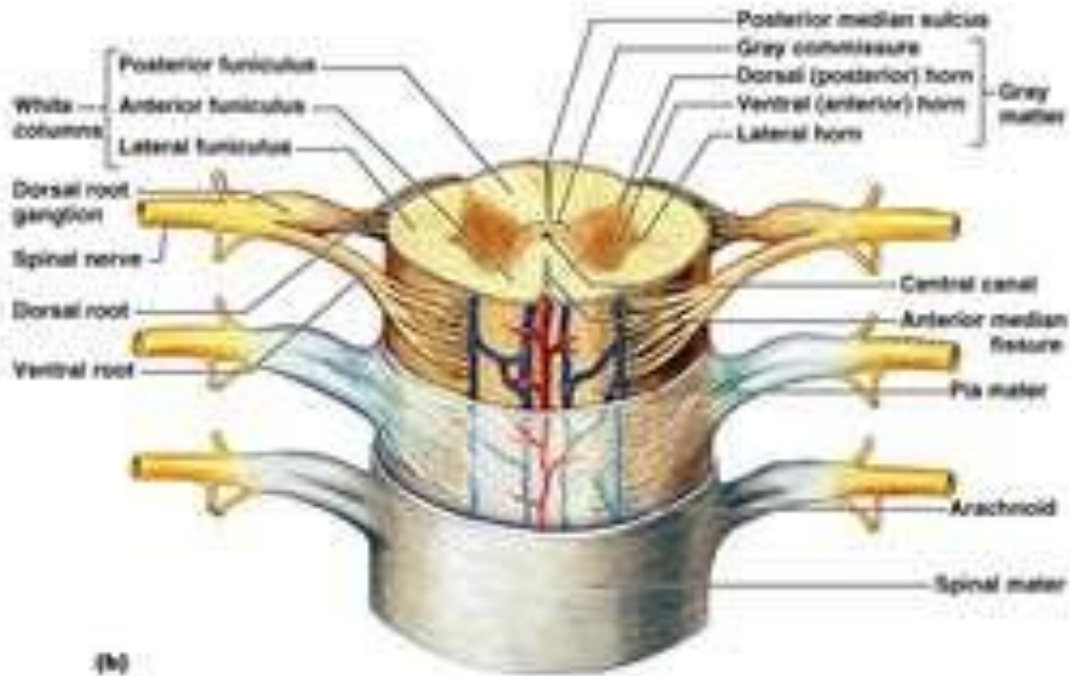
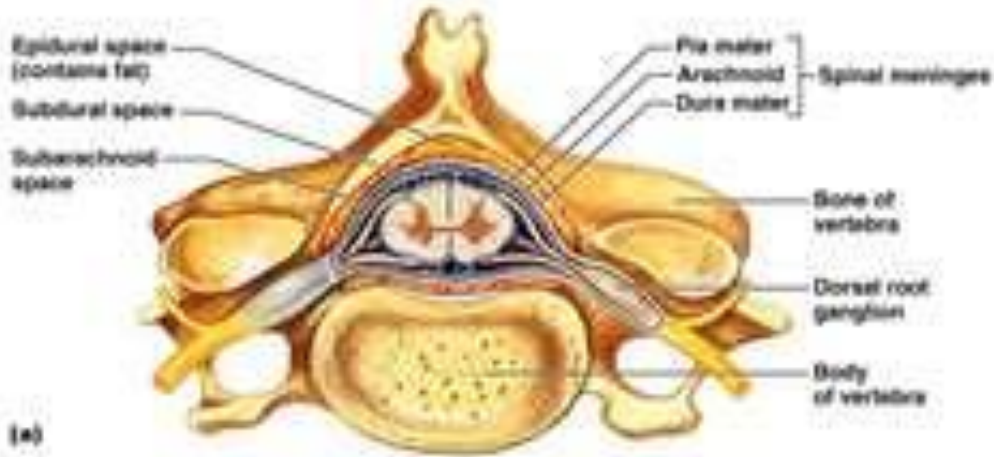


EXTERNAL FEATURES

- FISSURE
- SULCI
- NERVES --- NEUROMERE or
SPINAL CORD SEGMENT
- CONUS MEDULARIS –Terminal ventricle
- CAUDA EQUINA
- ENLARGEMENTS

SPINAL NERVES

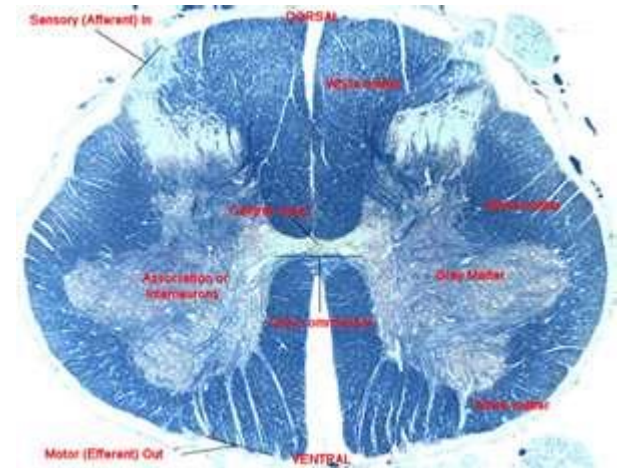
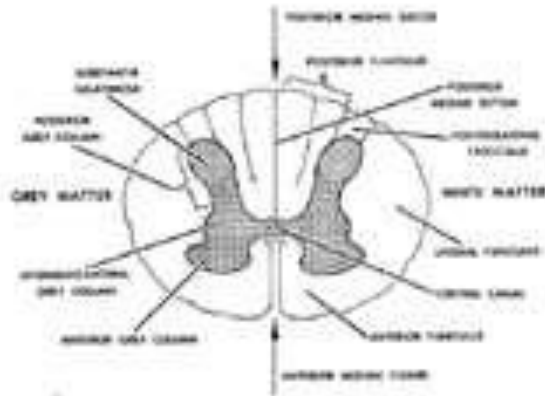




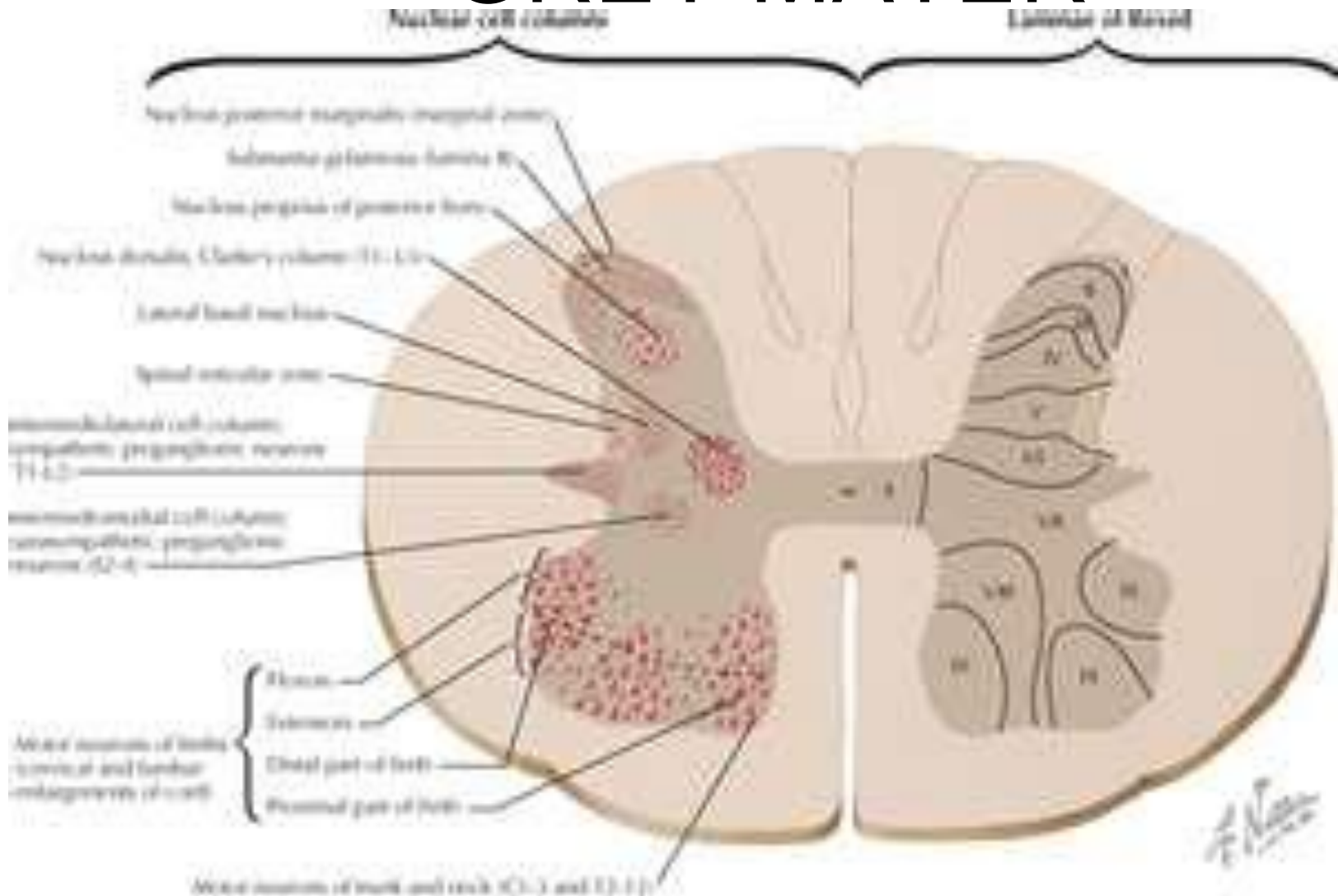
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INTERNAL FEATURES

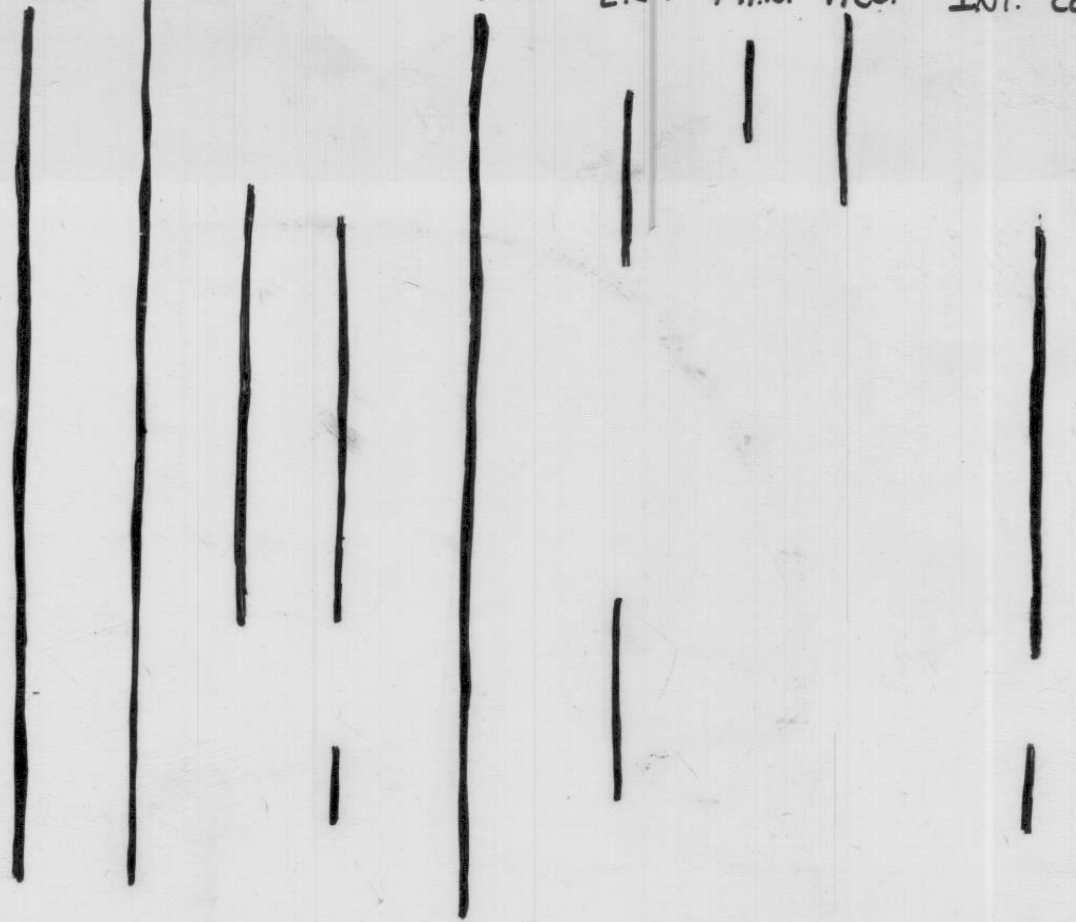
- GREY MATER
- WHITE MATER



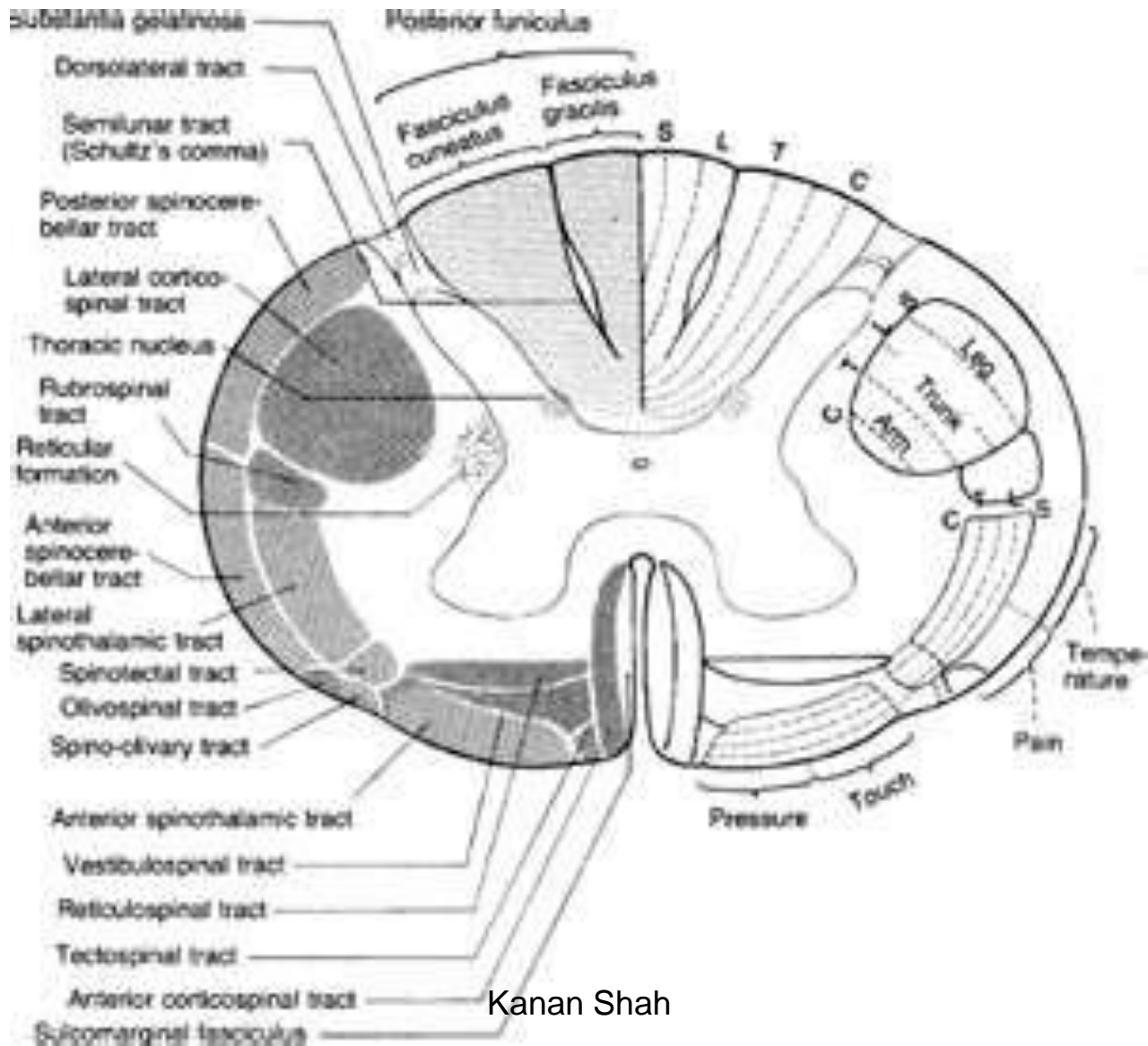
GREY MATTER



SG NP DN VA M.M. L.M PH.N. Acc. INT. COLUMN

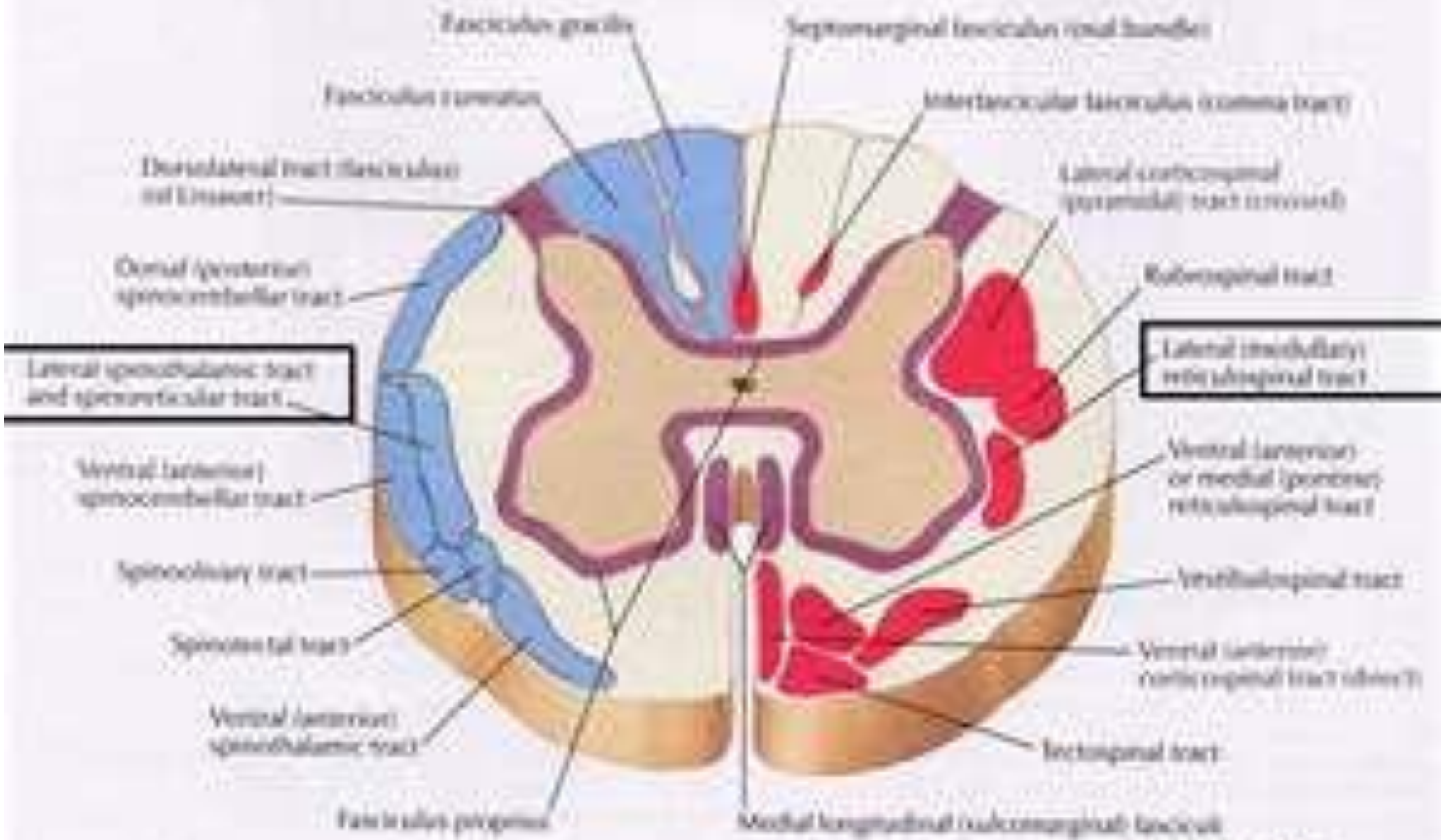


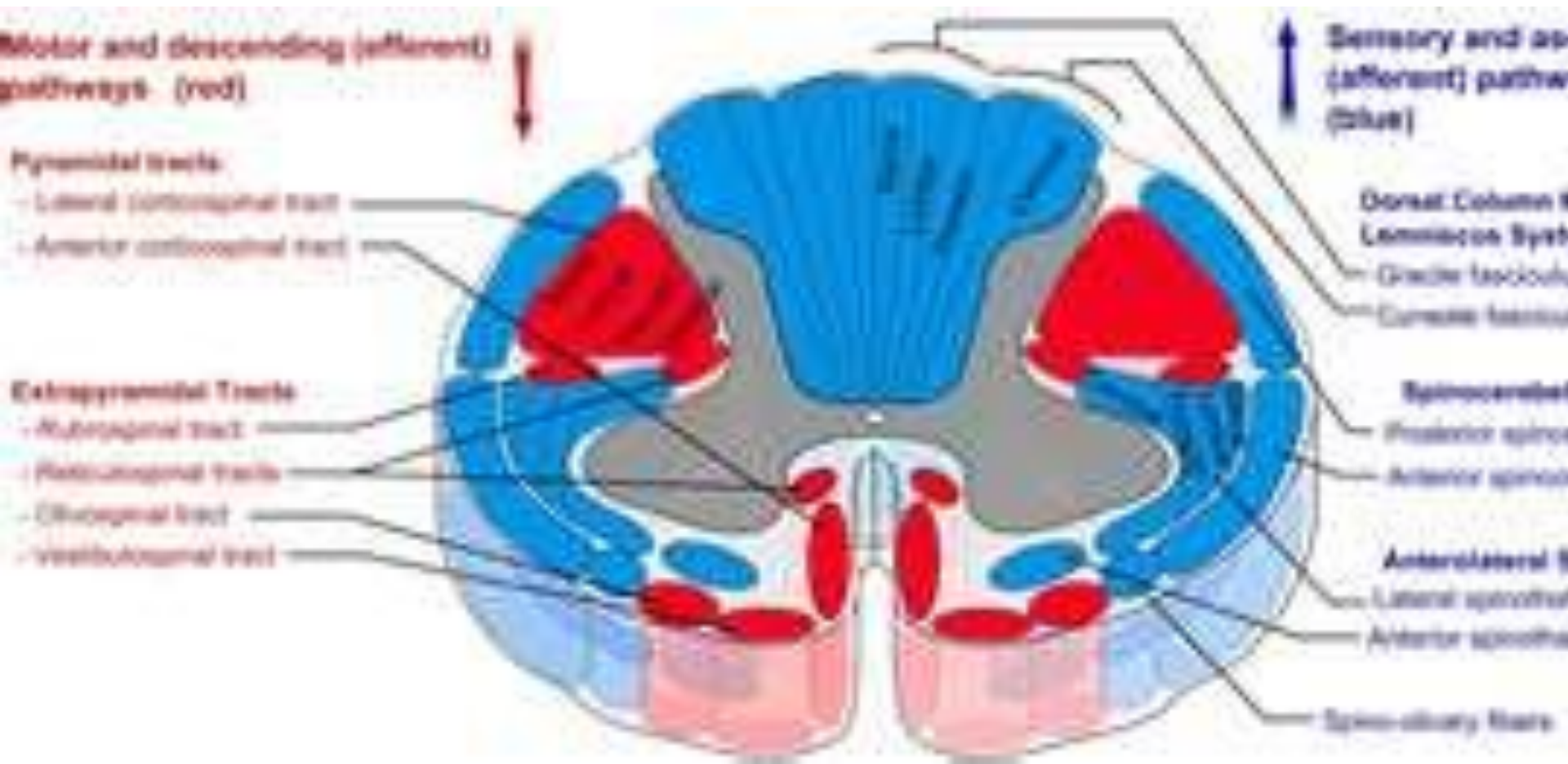
WHITE MATTER



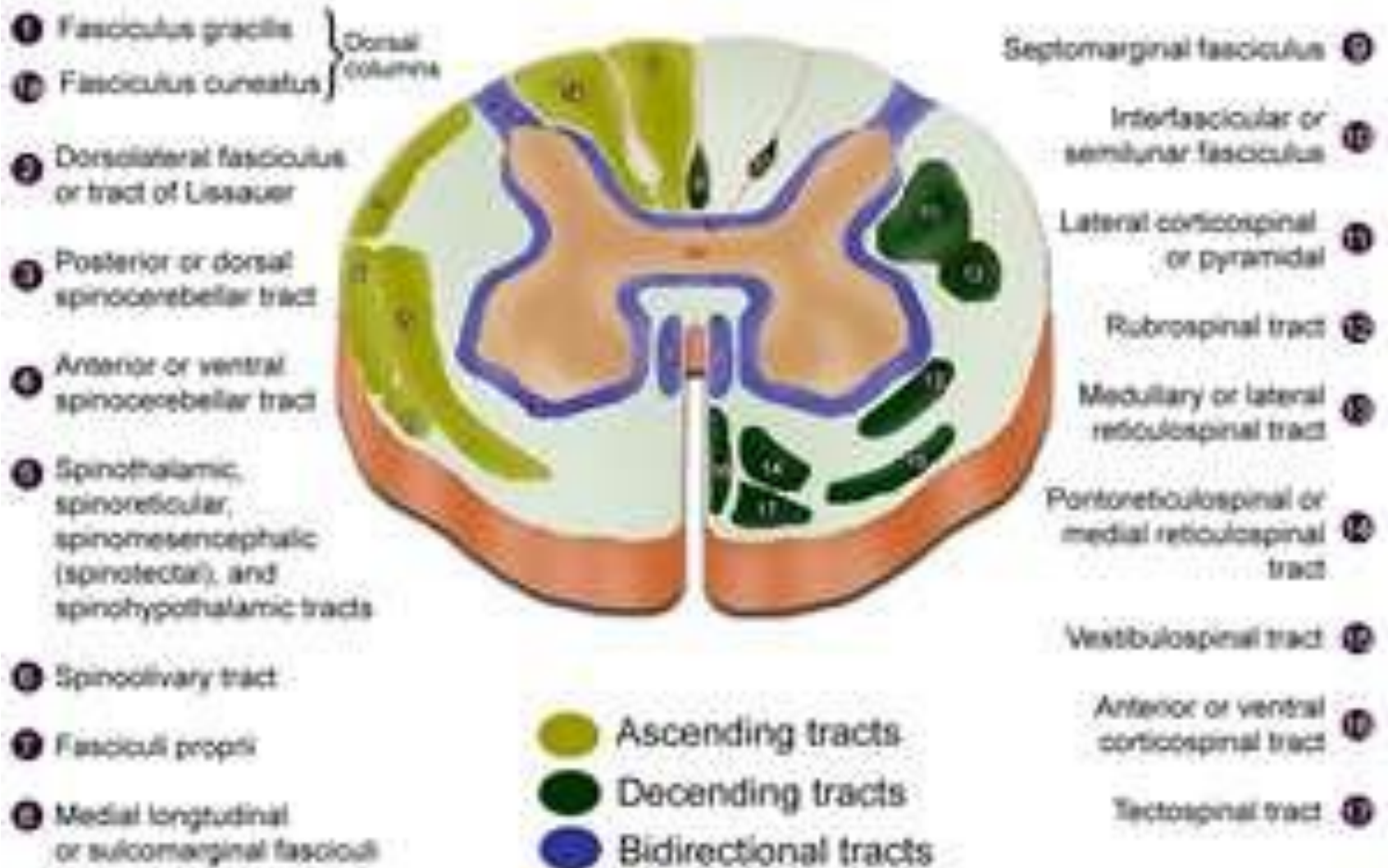
Principal fiber tracts of spinal cord

- Ascending pathways
- Descending pathways
- Fibers passing in both directions





Spinal Cord Crosssection: Detailed Ananatomy



DESCENDING TRACTS

STIM. TO FLEXORS +
↑ INHIBITORY TO EXT. MUSCLES

CORTICOSPINAL TR.

AREA 4, 6, 3, 1, 2

→ LOWER MEDULLA

CROSS → LAT. CORTICOSPINAL

UNCROSS → ANT. CORTICOSPINAL

↓
TERMINATION
CONTRA. SP. GRAY MAT.

EXTRAPYRAMIDAL SYSTEM:

SKILFUL, VOLUNTARY MOVEMENT
OF NON-POSTURAL TYPE

RUBRO SPINAL TR.

RCD ⊙ → CROSS

FACILITATES FLEXOR MUSCLES +
INHIBIT EXTENSOR MUSCLES

VESTIBULOSPINAL TR.

VESTIBULAR ⊙ ← ARCHICEREBELLUM
⊙ OF 3rd, 4th & 6th C.N.
LMN OF SP. CORD

FACILITATES EXTENSOR
MOTOR NEURONS +
INHIBIT THE FLEXORS

MAINTENANCE OF EQUILIBRIUM +
POSTURE OF THE BODY + LIMBS

RETICULOSPINAL TR.

MEDIAL RETICULOSPINAL

RETICULAR ⊙

FACILITATES

EXTENSOR MOTOR NEURONS + INHIBIT THE
FLEXORS.

LAT. RETICULOSPINAL

INHIBITS EXTENSOR

MOTOR NEURONS + FACILITATES THE FLEXORS

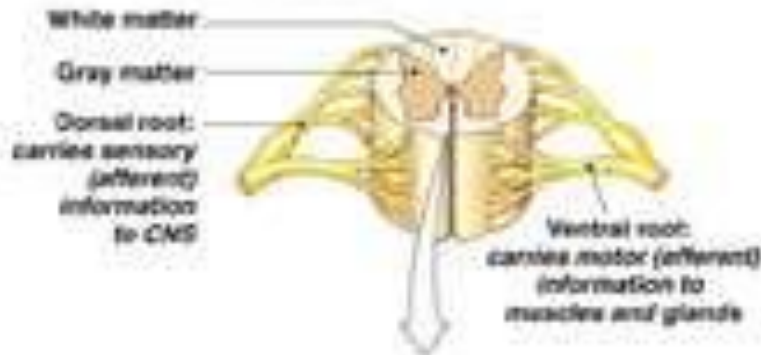
TECTOSPINAL TR.

OLIVOSPINAL TR.

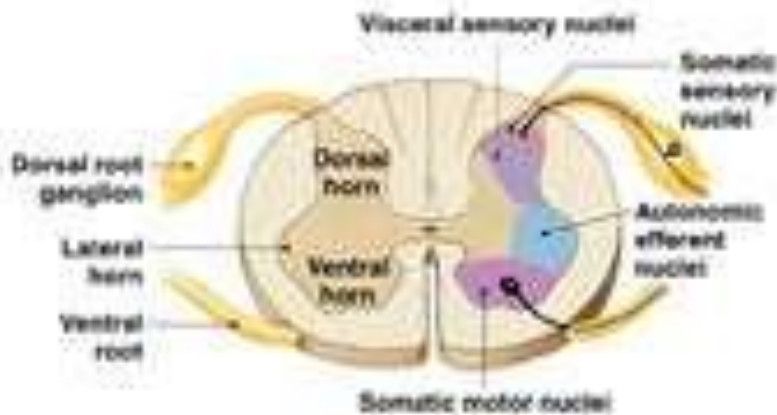
ASCENDING TRACTS

| NAME | FUNCTION |
|---|---|
| ANT. SPINO THALAMIC TR. LAT. DIVI. OF DORSAL ROOT → ○ PROPRIUS → CROSS → L.SP.TH.TR. → SP. LEMNISCUS → VPLG OF Thalamus | PAIN, TEMP. |
| POST. SPINO THALAMIC TR. MED. DIVI. OF DORSAL ROOT → ○ PROPRIUS → CROSS → A.SP.TH.TR. → MED. LEMNISCUS → VPLG OF Thalamus | FINE TOUCH PRESSURE |
| SPINO RETICULAR TR. UNCROSS → RETICULAR ○ OF BRAIN STEM → THALAMIC & HYPOTHALAMIC ○ | SLOW PAIN INTEGRATED WITH EMOTIONAL BEHAVIOR RESPONSE |
| SPINO TECTAL TR. CROSS → SUP. COLLICULUS & MIDBRAIN RETICULAR ○ | SPINO VISUAL RE. |
| POST. SPINO CEREBELLAR TR. COLLAT. OF ASCENDING TR. OF POST. FUNICULI → ○ DORSALIS → UNCROSSED → ICP → CEREBELLUM (T ₁ - L ₂) | UNCONSCIOUS PROPRIOCEPTIVE, FINE TOUCH, PRESSURE COORDINATION LOWER 1/2 OF BODY & LOWER LIMB AREA ← INDIVIDUAL MUSCLE EQUIVALANT TO IT FOR UPPER PART OF BODY & U.L. CUNGO CEREBELLAR TR. |
| ANT. SPINOCEREBELLAR TR. COLLATERALS OF POST FUNICULI → LAMINA V TO VII → CROSS → ICP → CEREBELLUM UNCROSS | UNCONSCIOUS PROPRIOCEPTIVE & EXTROCEPTIVE FROM LOWER 1/2 OF BODY & L.L. ROSTRAL SPINO CEREBELLAR TR. |

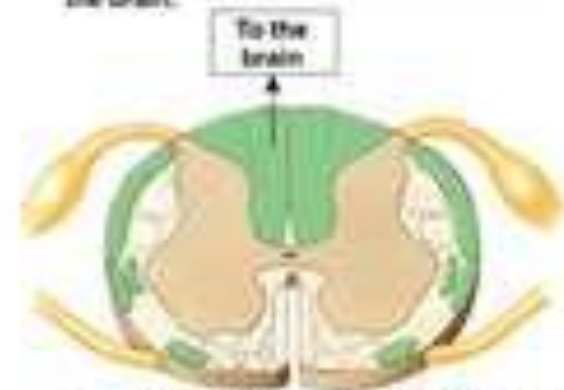
(a) One segment of spinal cord, ventral view, showing its pair of nerves



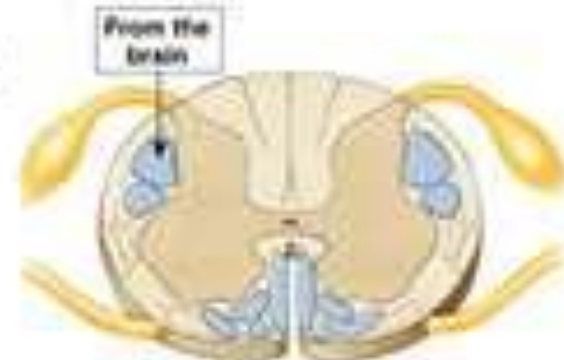
(b) Gray matter consists of sensory and motor nuclei



(c) White matter in the spinal cord consists of axons carrying information to and from the brain.



Ascending tracts carry sensory information to the brain.

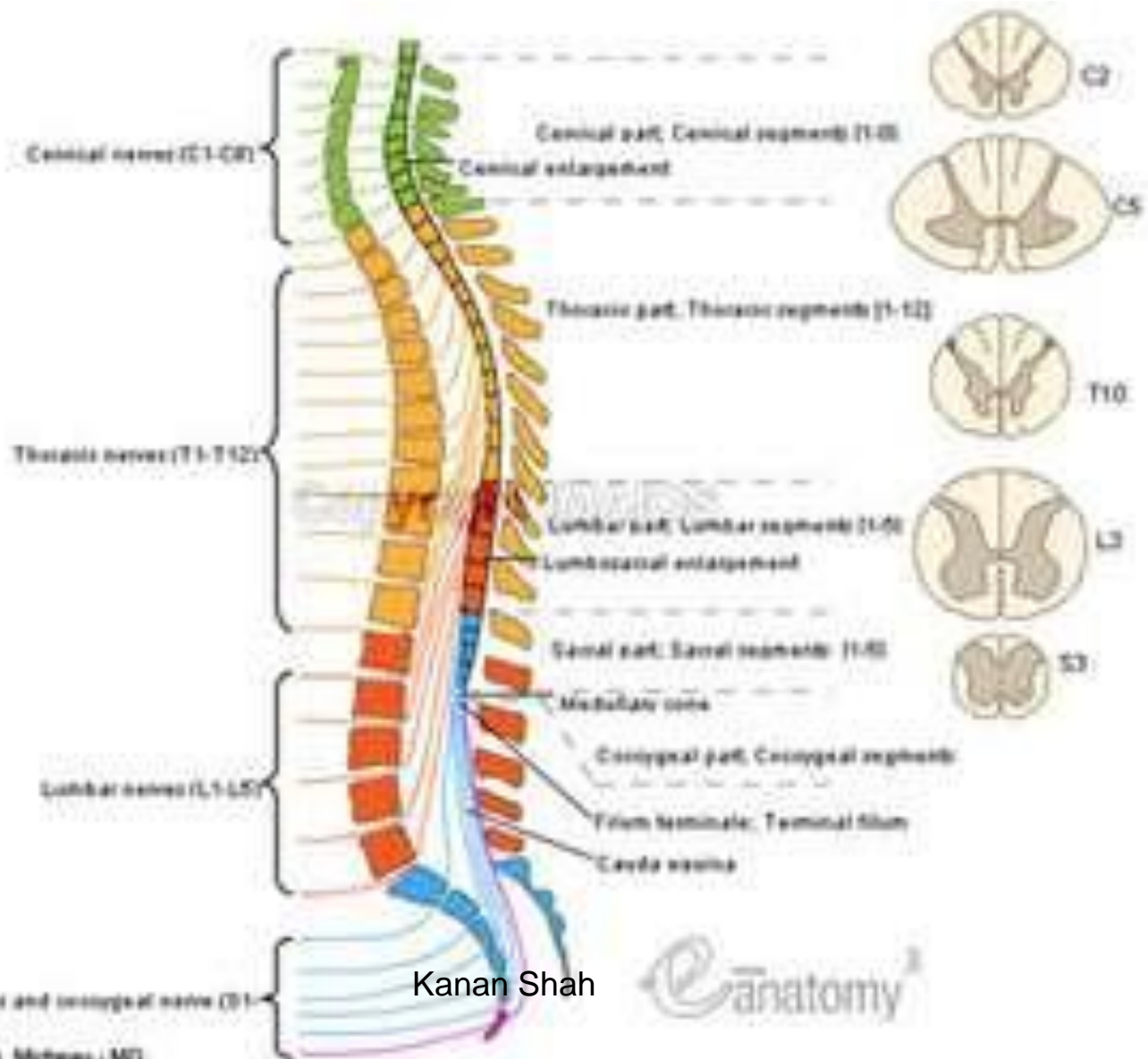


Descending tracts carry commands to motor neurons.

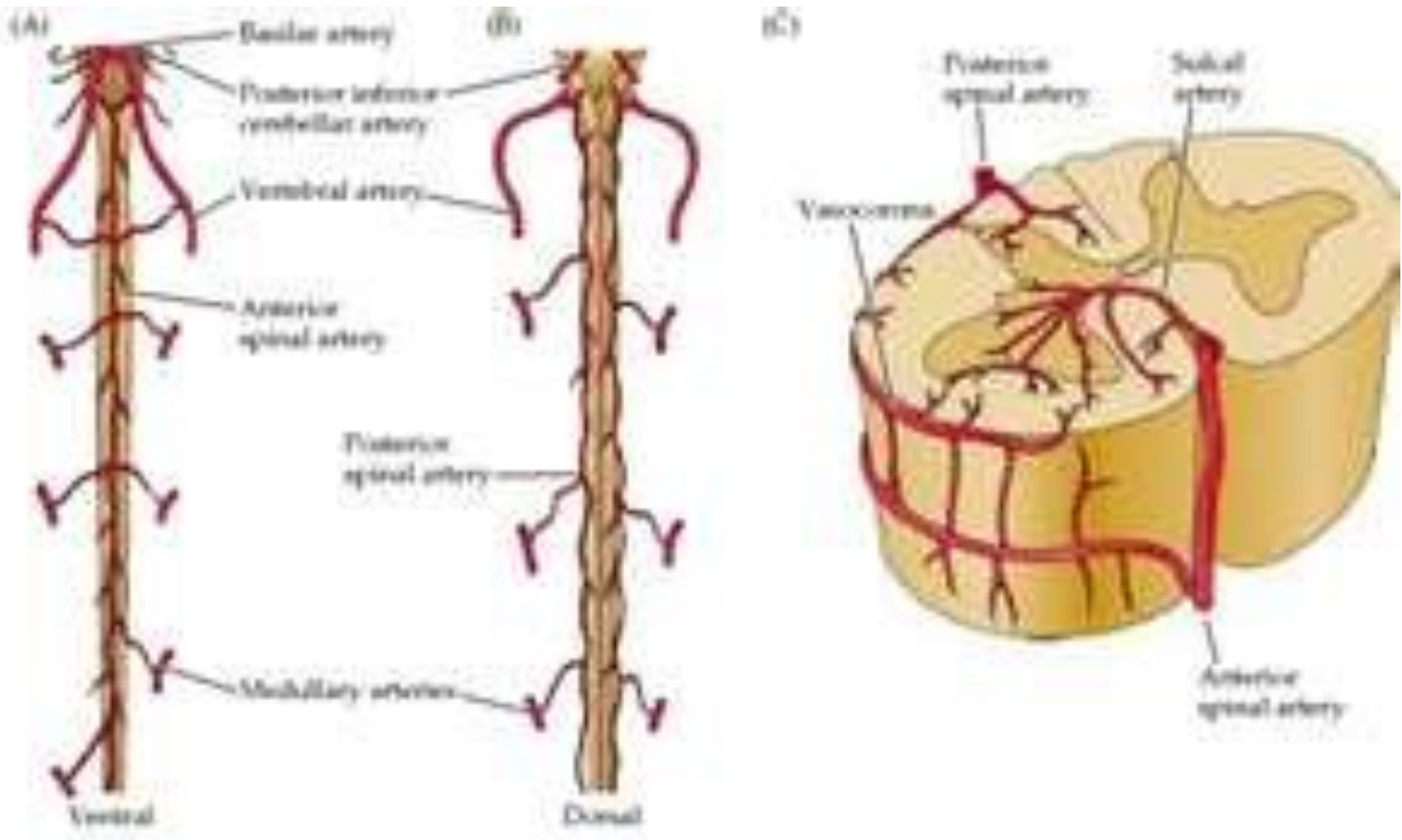
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Fig. 9-7

VARIATION IN CROSS SECTION AT DIFFERENT LEVEL



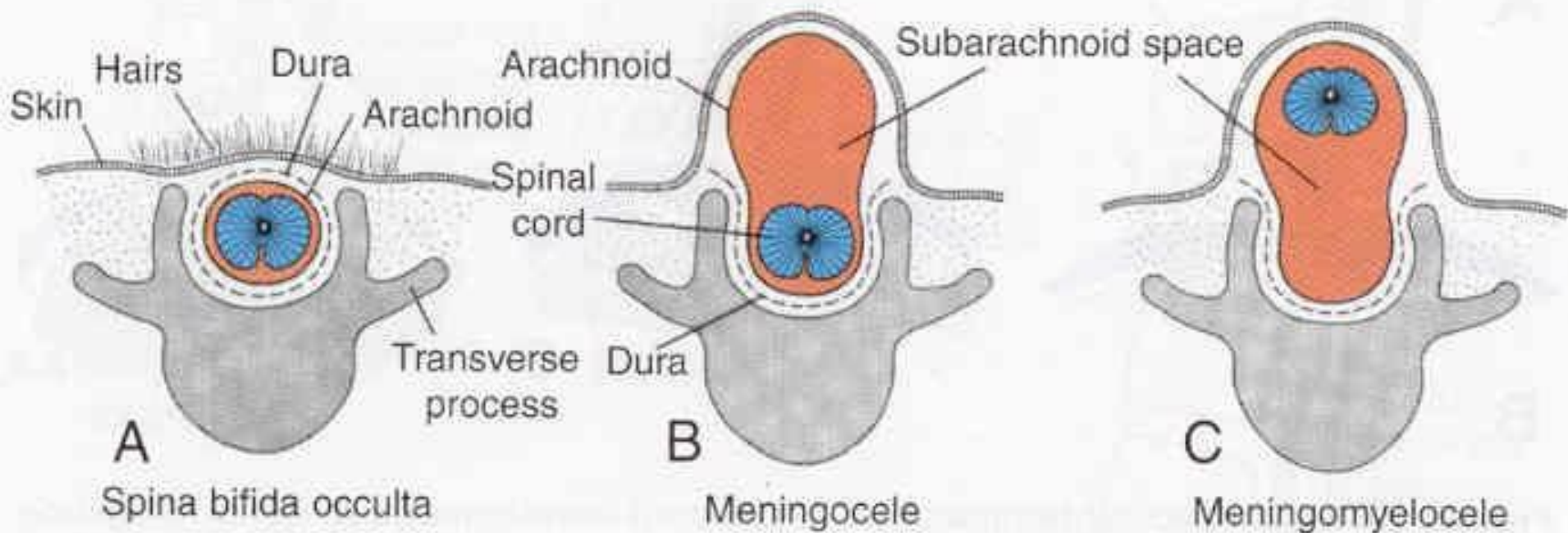
BLOOD SUPPLY



Applied anatomy

- Congenital
- Hereditary
- Acquired

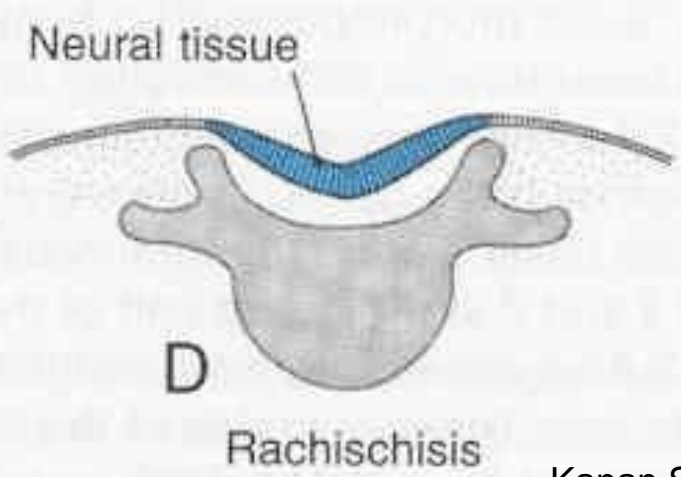
- Developmental defects:
- **RACHISCHIASIS** : Neural groove fails to close.



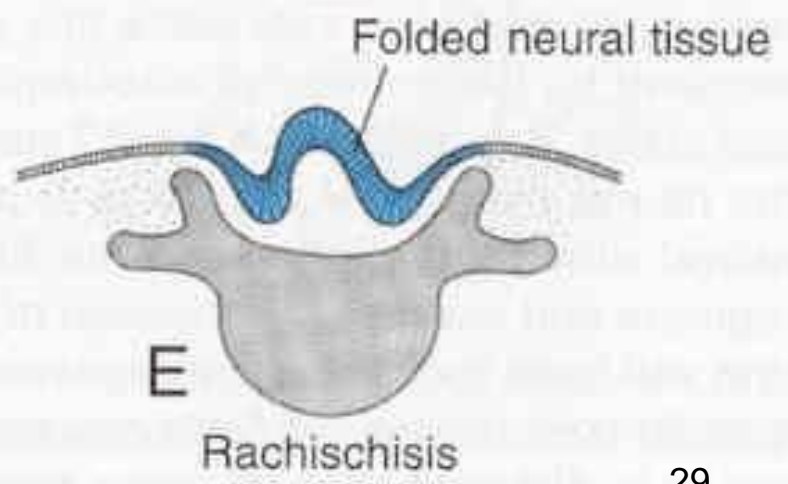
A
Spina bifida occulta

B
Meningocele

C
Meningomyelocele



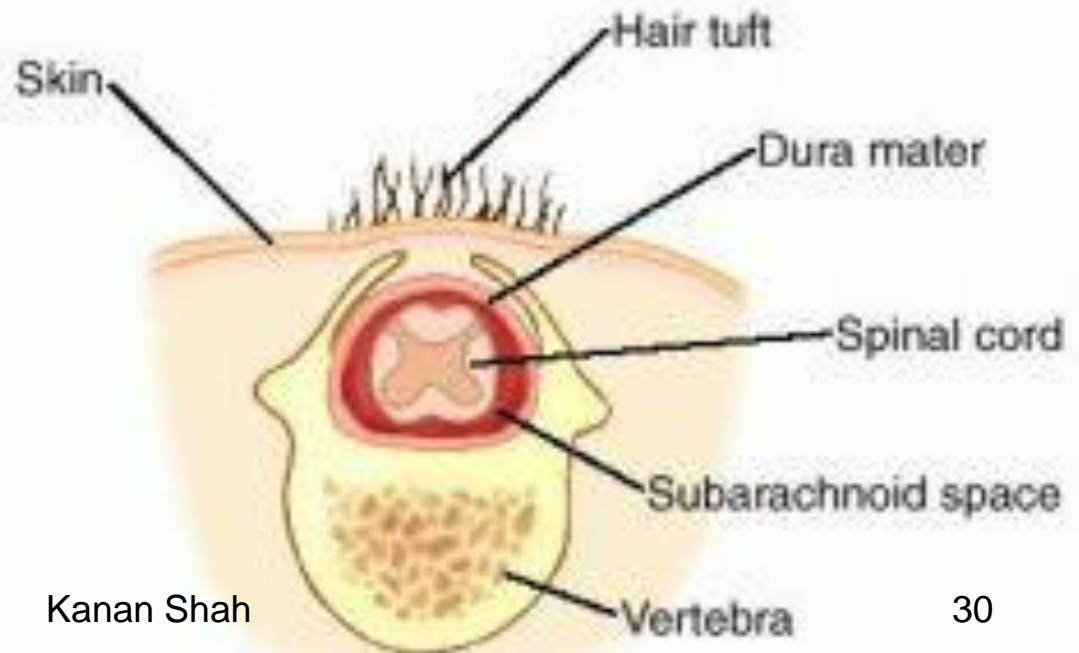
D
Rachischisis



E
Rachischisis

SPINA BIFIDA :

- Spina bifida occulta
- Meningocele
- Meningomyelocele
(Arnold chiari malformation)
- Syringomyelocele
- Ant. Spina bifida

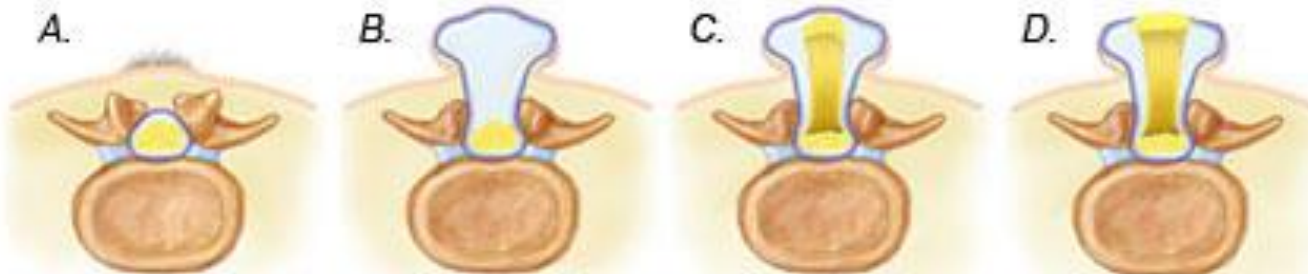


Cyst on baby's back
from spina bifida



Normal newborn vertebra

- A. Spina bifida occulta
- B. Spina bifida with meningocele
- C. Spina bifida with meningocele
- D. Spina bifida with myeloschisis



Spina Bifida

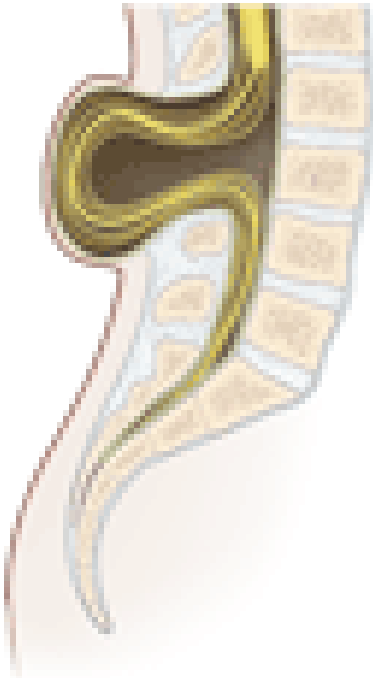


Spina Bifida Occulta

Meningocele



Myelomeningocele



APPLIED ANATOMY

CAUSES --

TRAUMA

IMPAIRMENT OF BLOOD SUPPLY

INFECTION

DEGENERATIVE or

DEMYELINATING DISORDERS

TUMOURS: Meningioma

Glioma

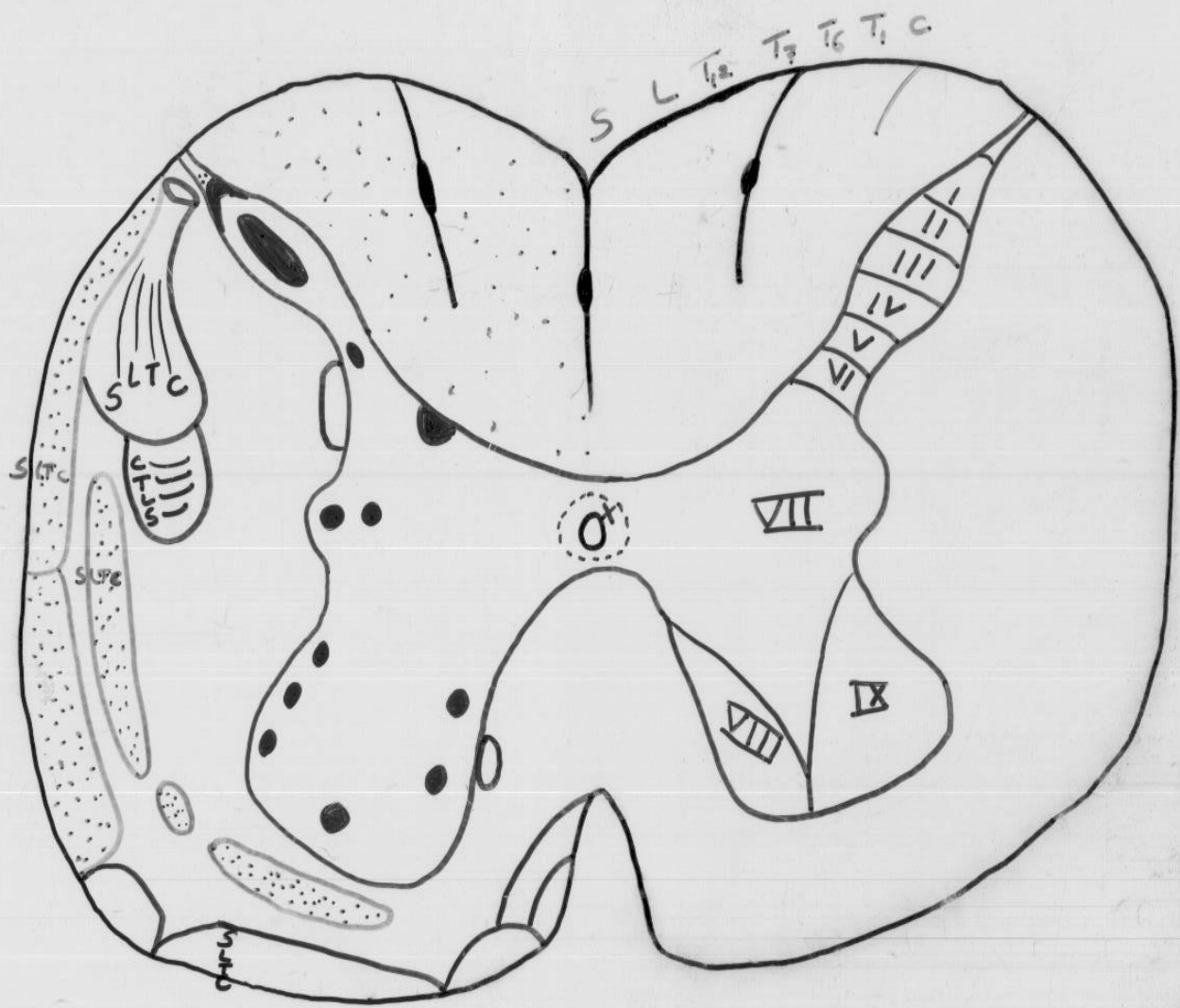
Neurofibroma

Ependymoma

FROIN'S SYNDROME (Loculation
syndrome)

LESIONS

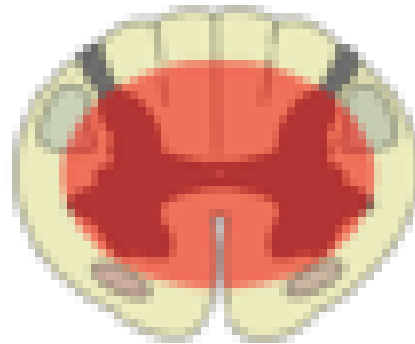
- Affecting afferent system:
 - Dorsal nerve roots
 - Post. White funiculus
 - Spino - thalamic tracts
 - Syringomyelia



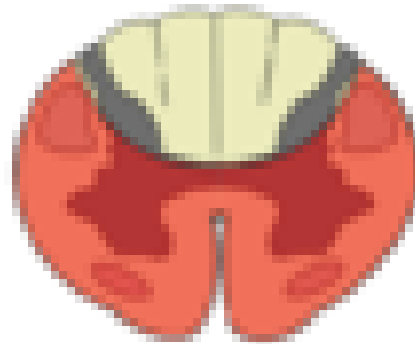
- Affecting efferent system :
LMN PARALYSIS
UMN PARALYSIS
AMYOTROPHIC LATERAL
SCLEROSIS
---Both UMN & LMN affected

Incomplete lesions of the spinal cord

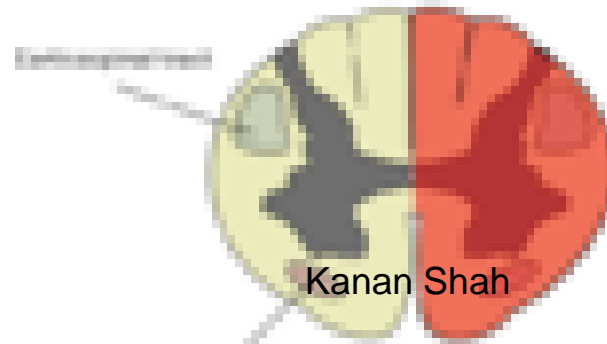
Central Cord Syndrome



Anterior Cord Syndrome

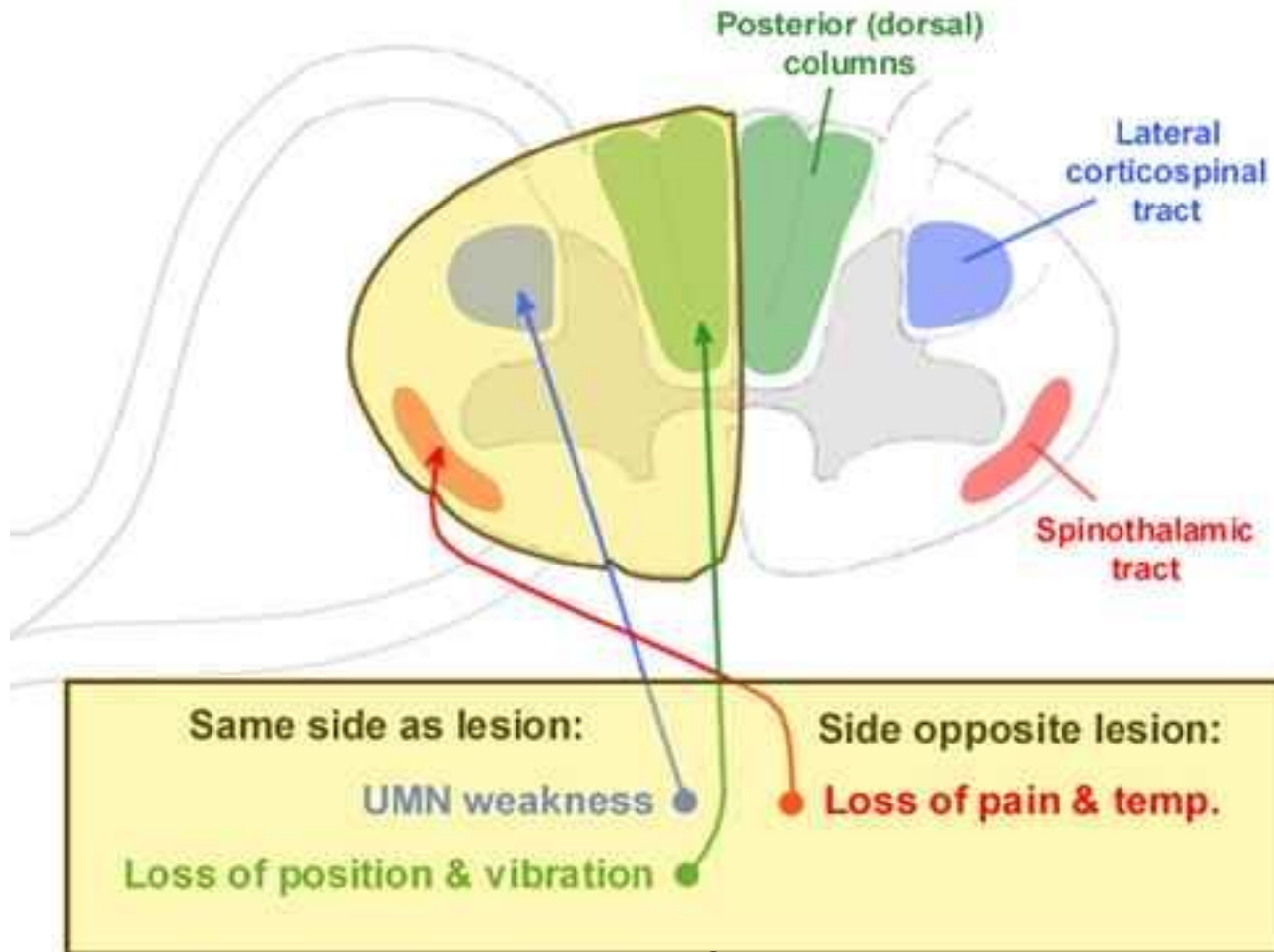


Brown-Séquard Syndrome



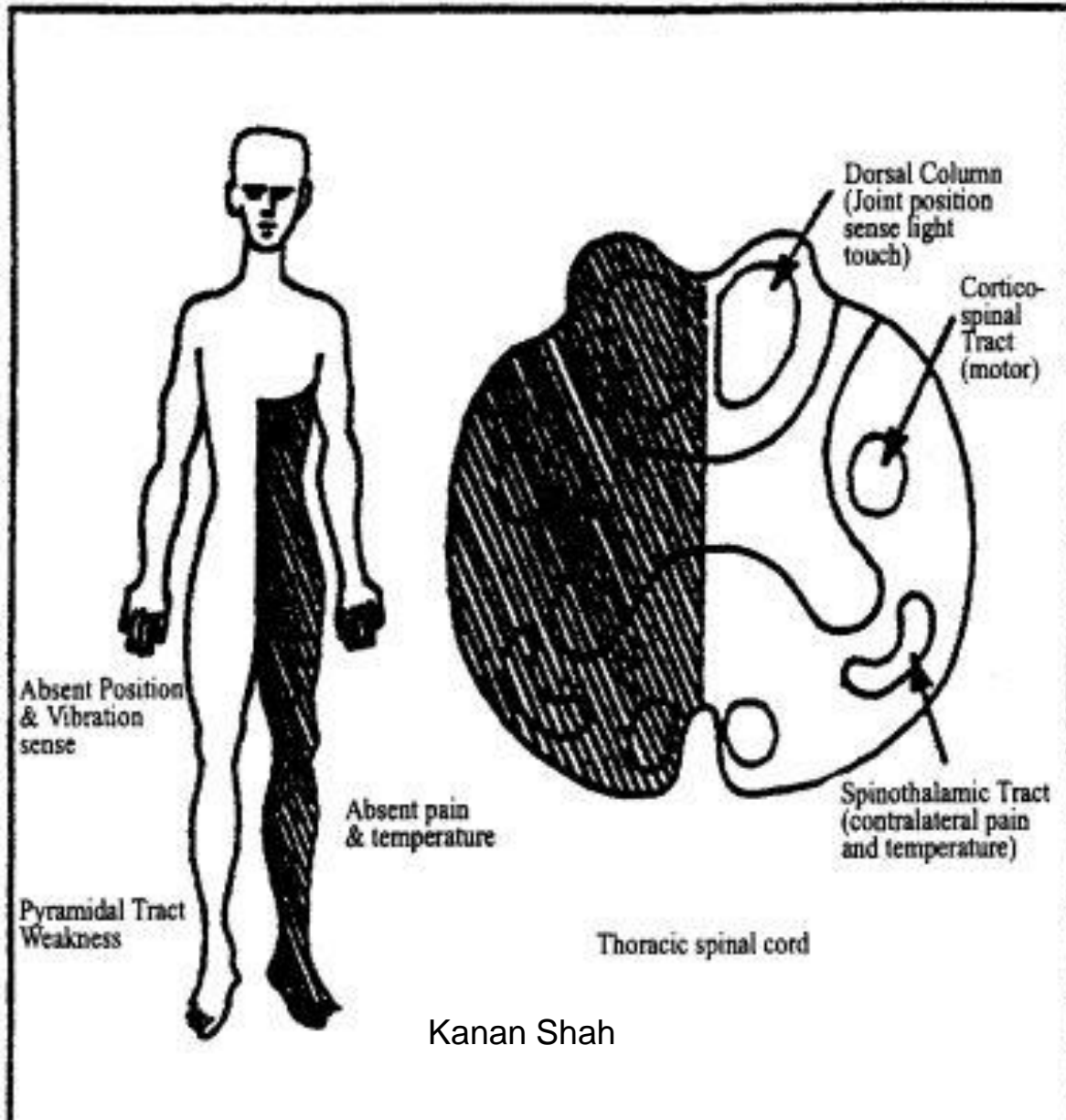
- Affecting posterior & lateral funiculi
 - Subacute combined degeneration
- Thrombosis of ant. Spinal artery
- Hereditary diseases
 - Friedreich's ataxia- Dist. Of speech, dementia, ataxia

Brown-Sequard Syndrome of Spinal Cord Hemisection

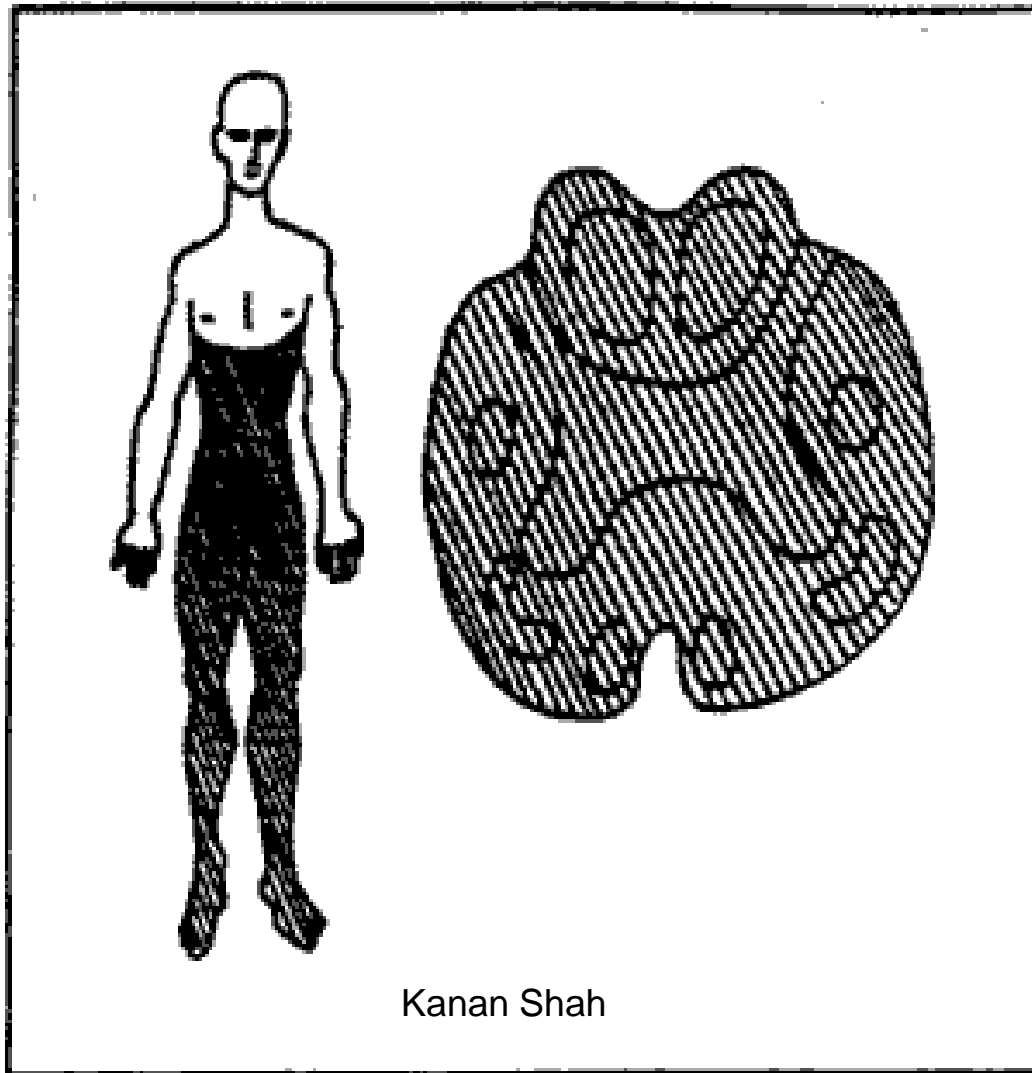


Brown- sequard syndrome

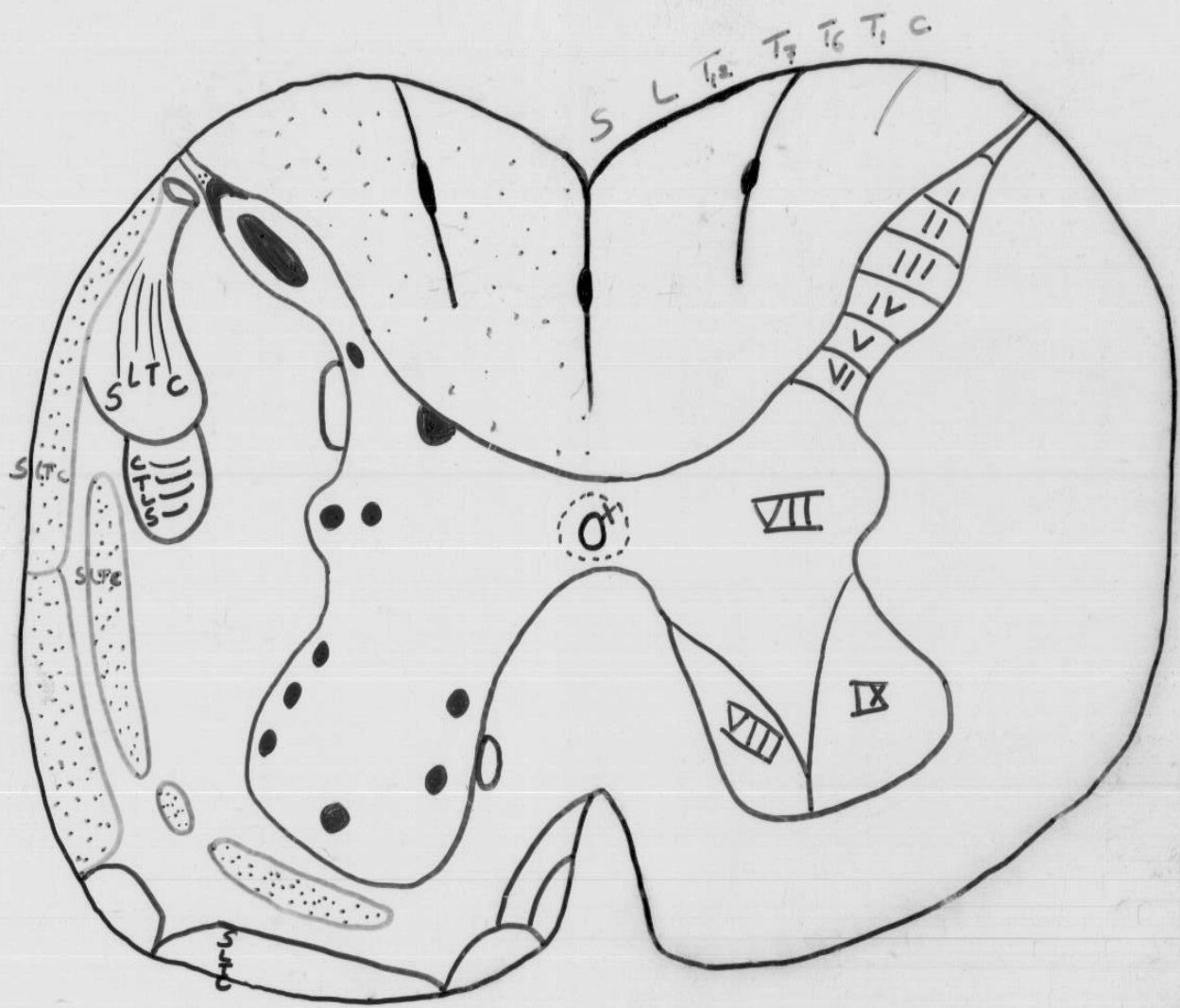
Hemisection of the sp.cord



Transaction of the sp.cord



Kanan Shah



- Compression of cord—

Monoplegia

Diplegia

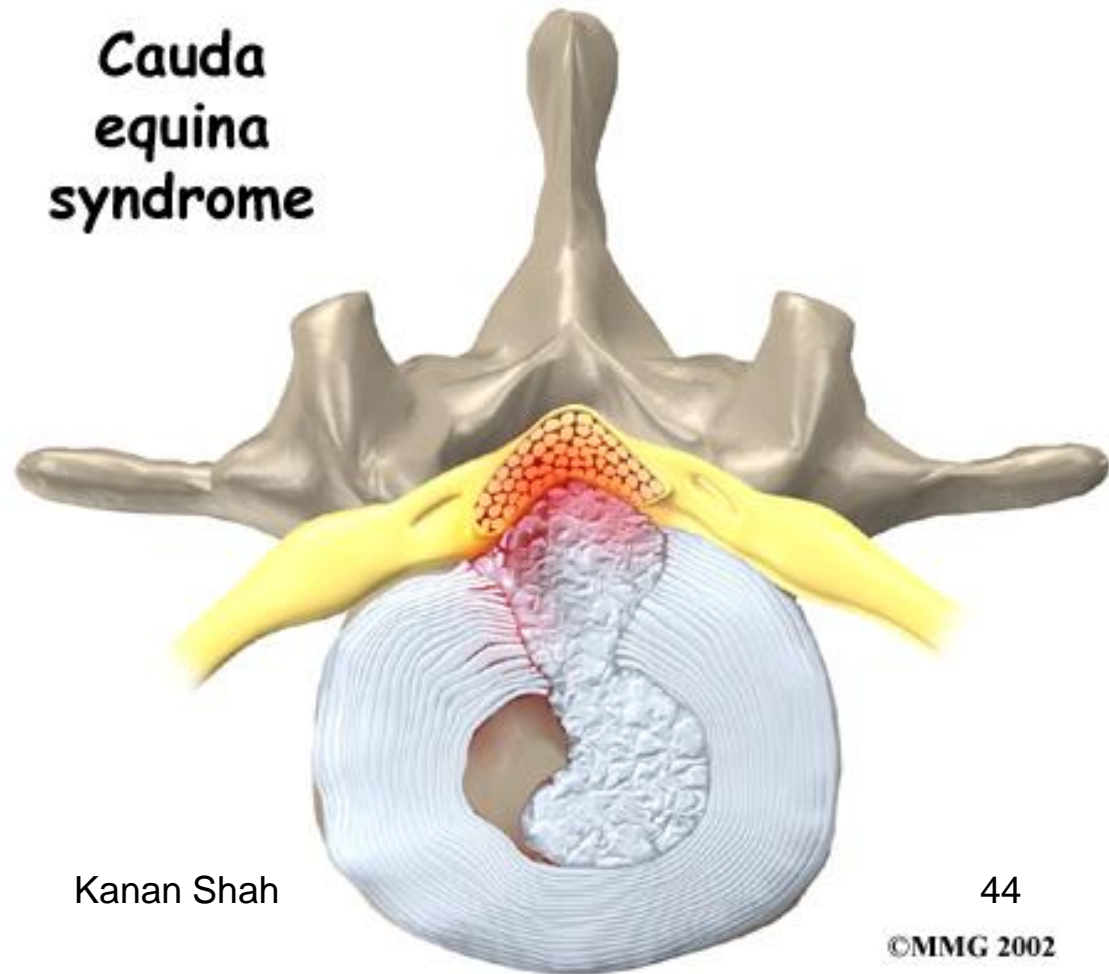
Paraplegia

Quadriplegia

• CAUDA EQUINA SYNDROME :

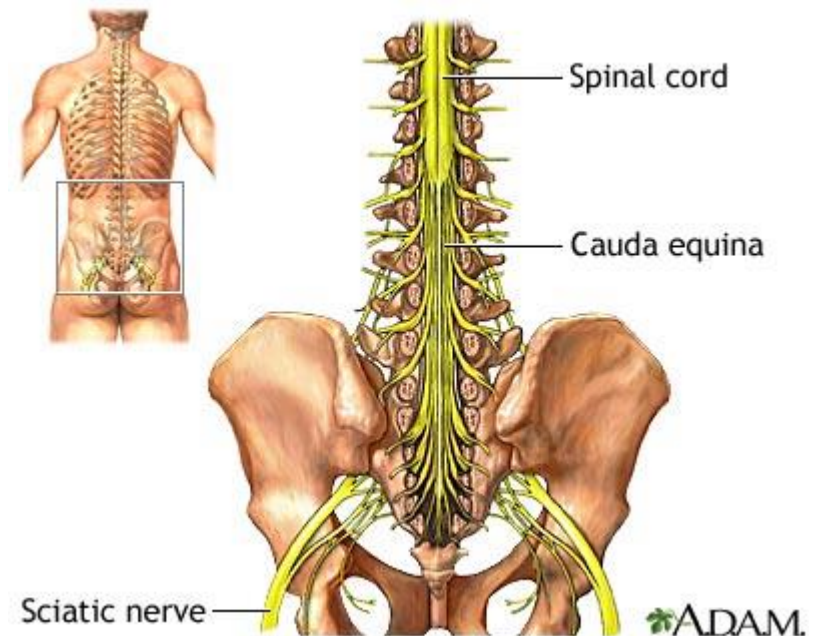
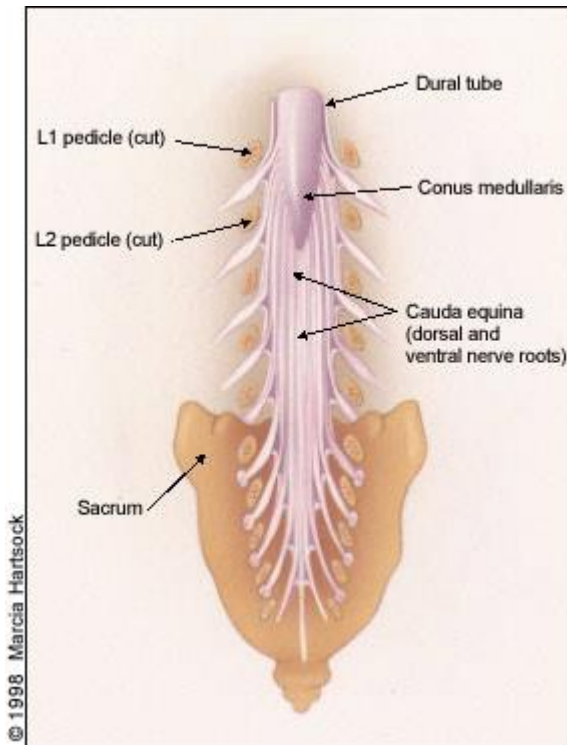
Atrophy , LMN PARALYSIS ,
Areflexia , Sensory loss, Root pains
Late bladder & bowel disturbances.

**Cauda
equina
syndrome**



CONUS MEDULLARIS SYNDROME :

Saddle shape anesthesia,
Neurogenic bladder , Loss of anal &
bulbocavernous reflex , Bowel
disturbances.



- CORDOTOMY
- RHIZOTOMY
- LEMINECTOMY

Aknowledgement

- Essentials of Head, Neck & Brain
AsimKumar Dutta
- Human Anatomy –B D Chaurasia



THANK YOU