



Motor function of CNS.

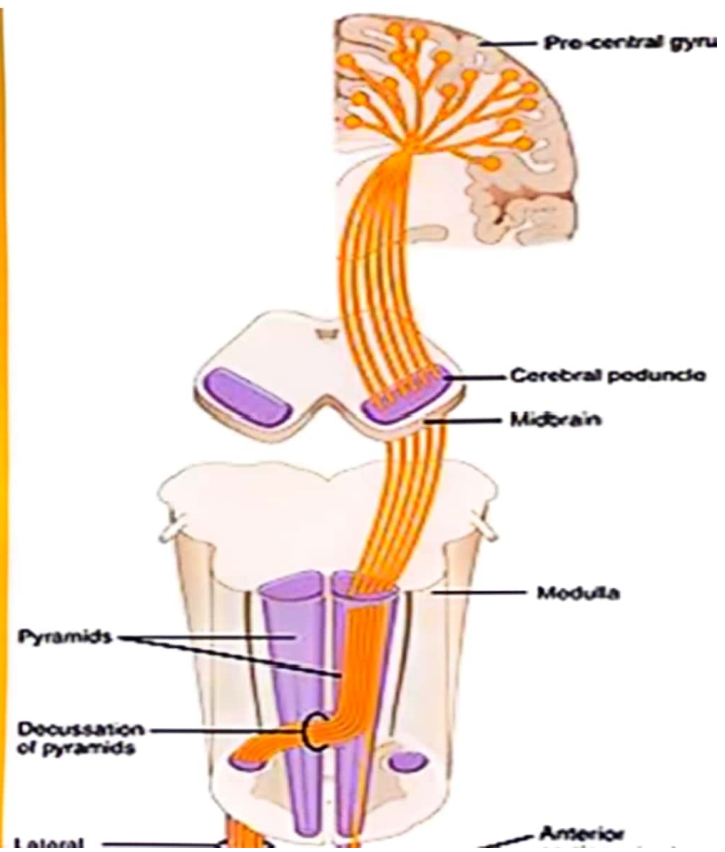
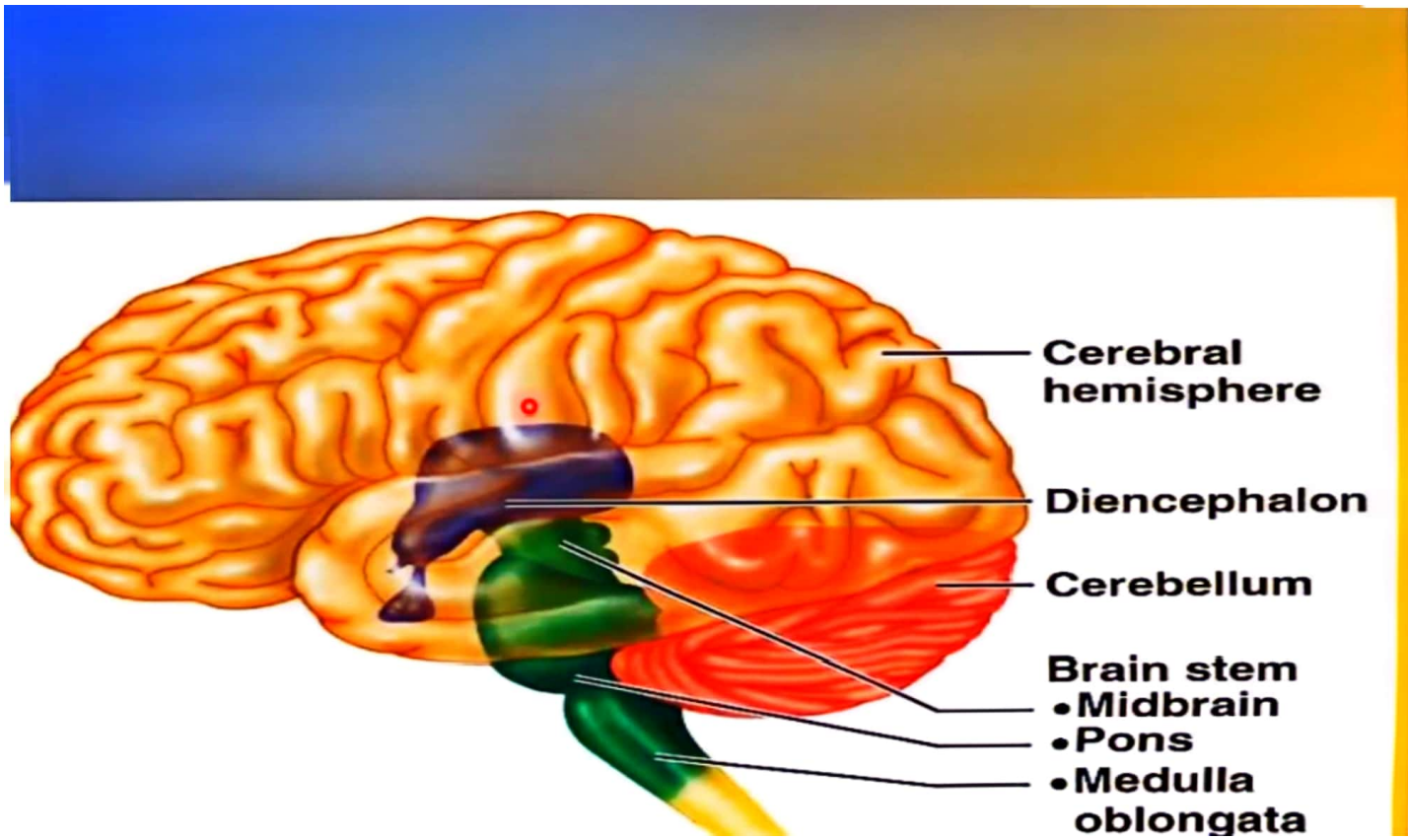
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The descending tracts

-Voluntary movements to be done accurately in our bodies, many higher and lower nerve centers must cooperate for this performance.

-The order of the movement is developed in the motor association areas in the frontal lobe of the cerebral cortex. Then the program of these movements is also developed in the basal ganglia and the cerebellum, which through the whole movement they modulate and modify the performance of the muscle secondary to **afferent impulses** that arise from these muscles. Finally the motor area **(4)** and the pre-motor area **(6)** in the frontal lobe send the excitatory impulses to the skeletal muscles to carry on the movements.

-The skeletal muscle contractions are of **two** types :-

1-Reflex contractions like in withdrawal reflex.

2-Voluntary contractions like in writing or doing skilled movements.

-The descending tracts are classified into two groups:

A-Pyramidal tract.

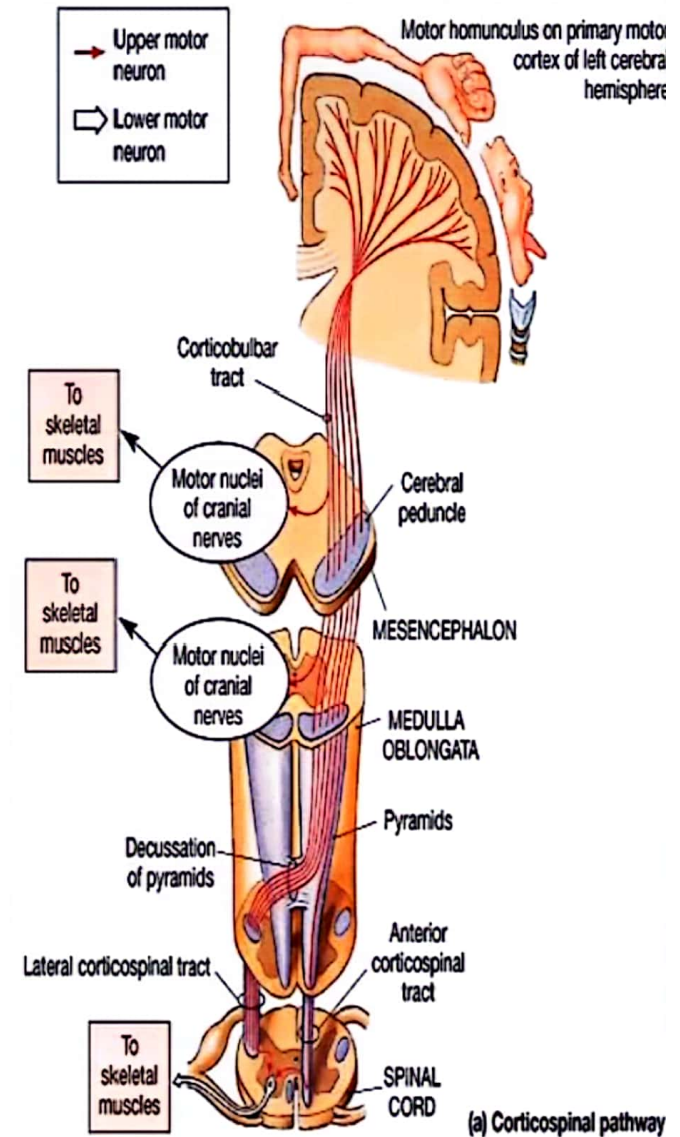
B-Extra-pyramidal tracts .

A- Pyramidal tracts

-The pyramidal tract is **one way, direct** connection between **UMN** and **AHC**.

It contains about one million fibers only **60 %** of them are **myelinated** and this myelination becomes complete one year after birth .

-It is called "pyramidal" because it is the only tract which contains the axons of certain cells called "the Pyramidal" or "**Betz** "cells which are found in the 5th layer in the motor area "4". These cells are never found in any other area except in area (4).



Functions of the pyramidal tract:-

- 1-It initiates and facilitates isolated skilled voluntary movements, specially those which need training and educations as writing, threading a needle, typing .
- 2- It increase muscle tone and other deep reflexes.
- 3- It inhibits the primitive withdrawal reflex (Babiniski's sign).

B-The extra-pyramidal tract:

- Any descending tract other than pyramidal is called extra-pyramidal tract.
- They are group of " **multi-stations** " descending fibers originating from more wider areas in the cerebral cortex including area " 4 " area " 6 " in the frontal lobe, **basal ganglia** and other many brain stem centers (reticular formation, tectum of mid brain, red nucleus, olivary nuclei and vestibular nucleus), where they terminate finally around **gamma cells** (mainly) and **anterior horn cells** in different levels of the spinal cord.
- Some of these tracts descend **directly** without crossing while others **cross** to opposite side, a third type may innervate **both sides**.

-The most important extrapyramidal tracts are :-

A) Reticulo-spinal tracts:- which arise from reticular formation in the brain stem.

B) Vestibulo-spinal tract: arises from vestibular nucleus to A.H. cells.

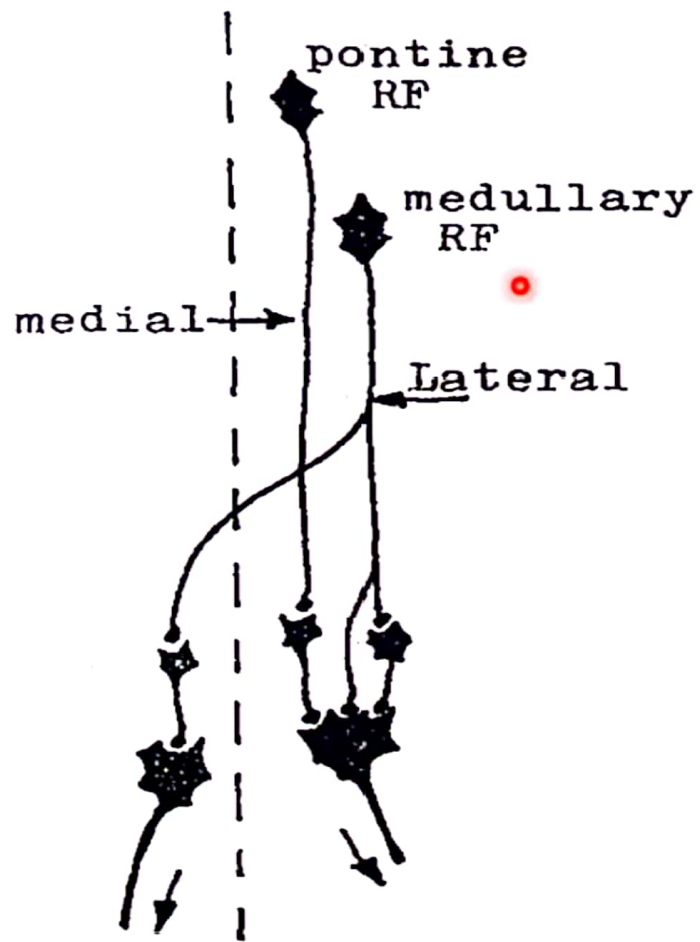
C) Rubro-spinal tract: - from red nucleus in mid brain which receives many impulses from higher cortical area, basal ganglia and cerebellum.

D) Olivo-spinal tract: - is relatively short tract ends around A.H.C till the **cervical region** only. It arises from the inferior olivary nuclei in the medulla and descends without crossing (direct), causing **facilitation** to muscle tone. Olivary nuclei receive impulses from basal ganglia.

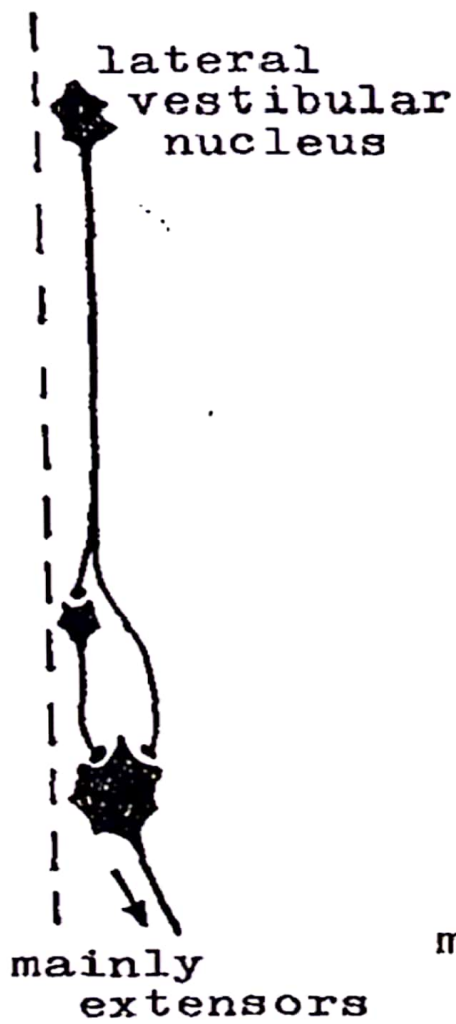
E) Tecto-spinal tracts :-

1- **Lateral**, from superior colliculus of the mid brain.

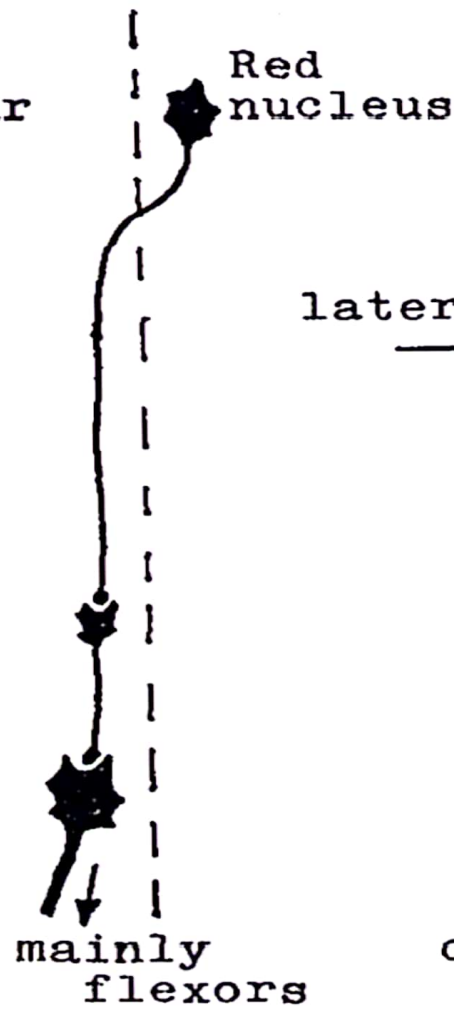
2- **Medial**, from inferior colliculus of the mid brain.



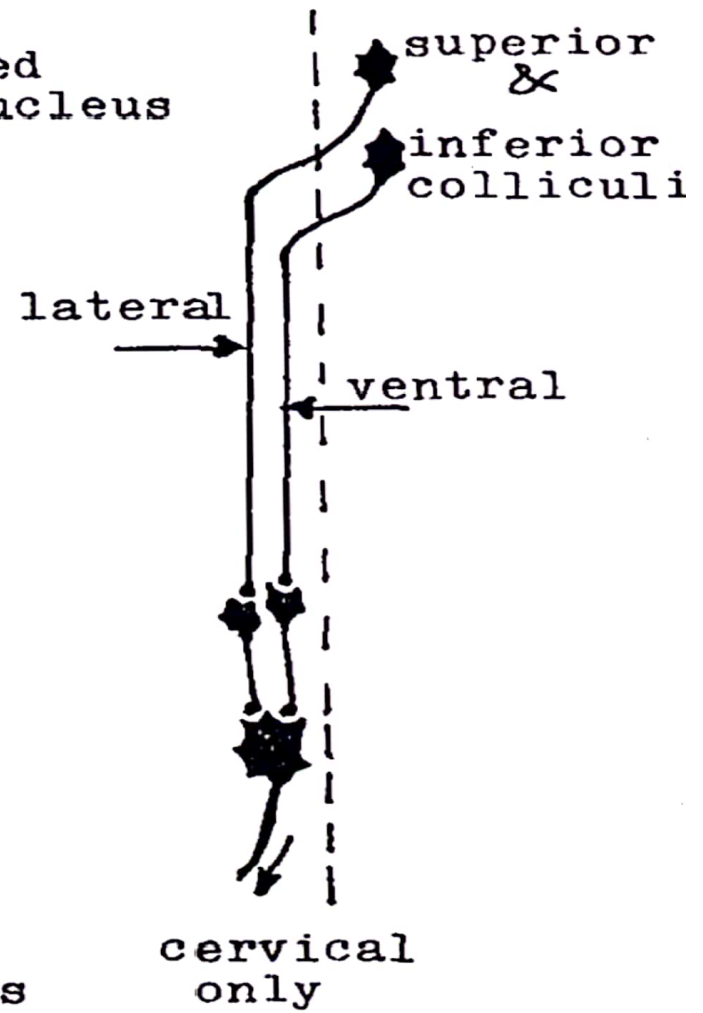
Reticulospinal Ts.



Vestibulospinal T.

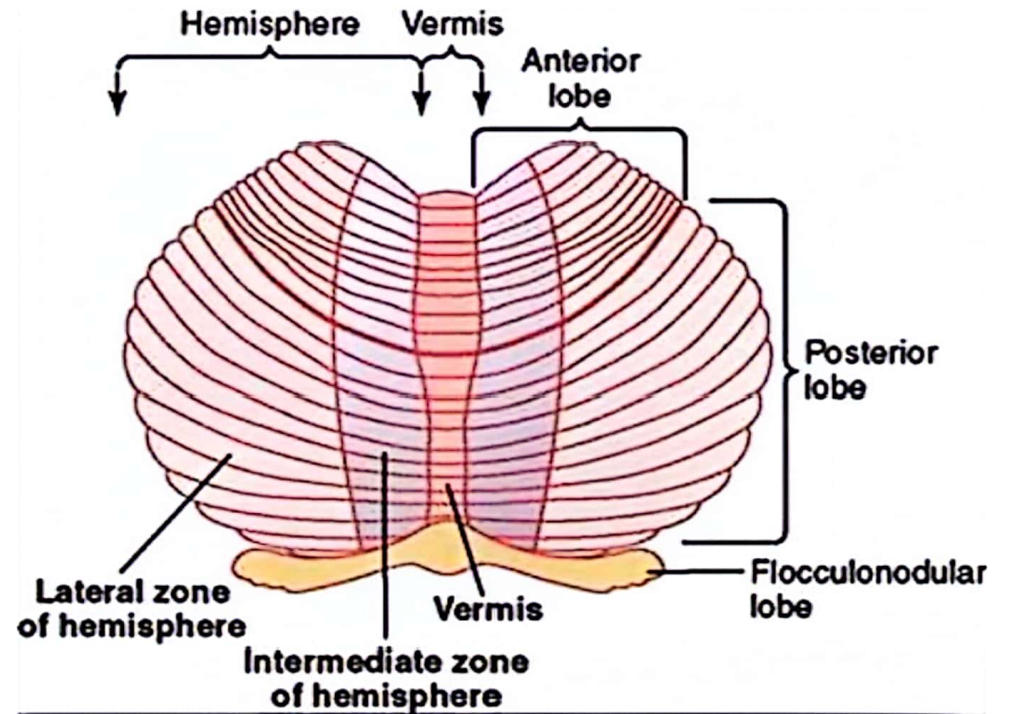
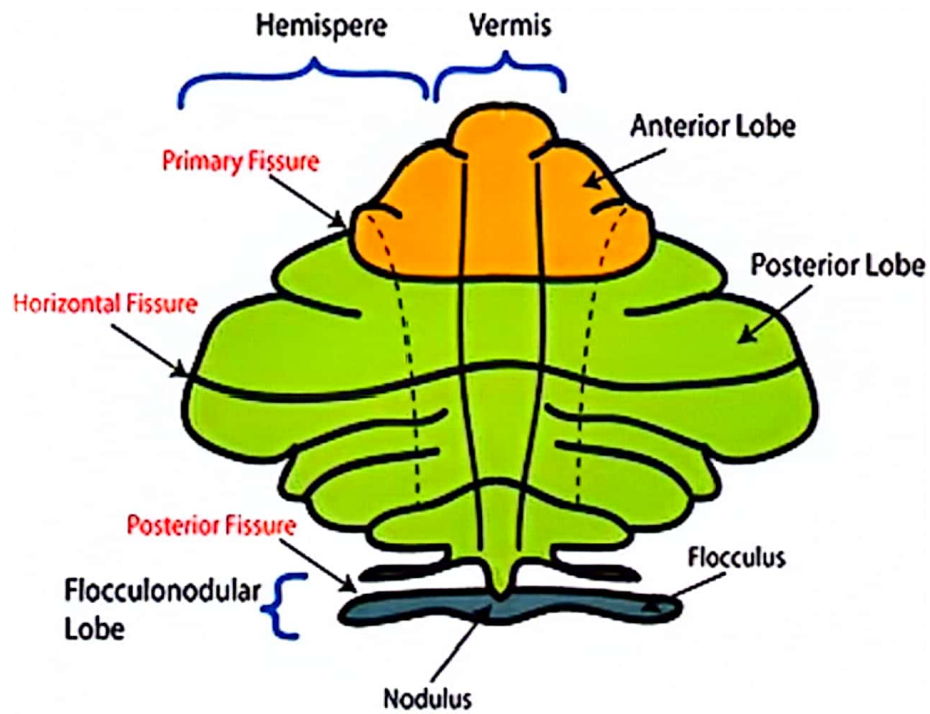


Rubrospinal tract



Tectospinal tract

Crebellum



Cerebellum

Functions of the cerebellum:

1. Control of equilibrium (mainly performed by the **flocculo-nodular lobe**) which is assisted by its connection to the labyrinth through the vestibular nuclei.

2. Regulation of the muscle tone; the **paleo-cerebellum** is inhibitory to the muscle tone while the **neo-cerebellum** is excitatory to it.

3. Regulation of the gross involuntary movements: through its connection with basal ganglia, motor areas and other extra pyramidal system.

4. Role of cerebellum in ballistic movement:

Most rapid movements of the body such as the movements of the fingers in typing and the saccadic movements of the eyes.

5. Control of voluntary movements

Mainly the function of **neo-cerebellum**, controlling the timing and the progression from one movement to another rather than initiation of these movements through the following functions:

Thank You