

كلية الطب البشري
Faculty of Medicine


الجامعة السعيدة
1970 - 1417 هـ

CNS Module-Spring 2021

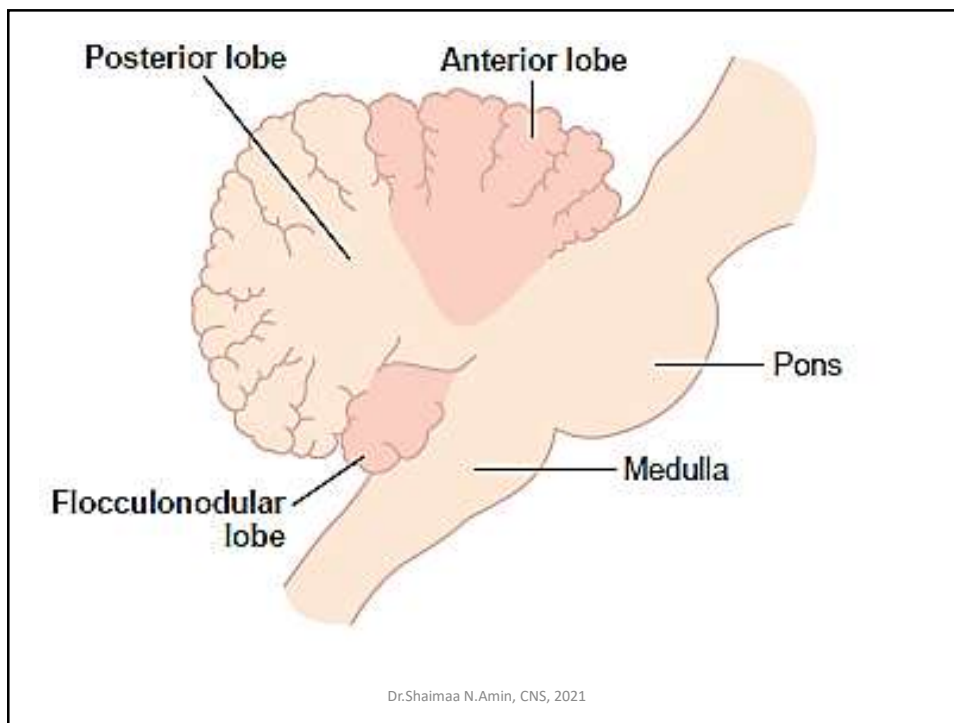
Physiology Lectures

Lectures 10&11

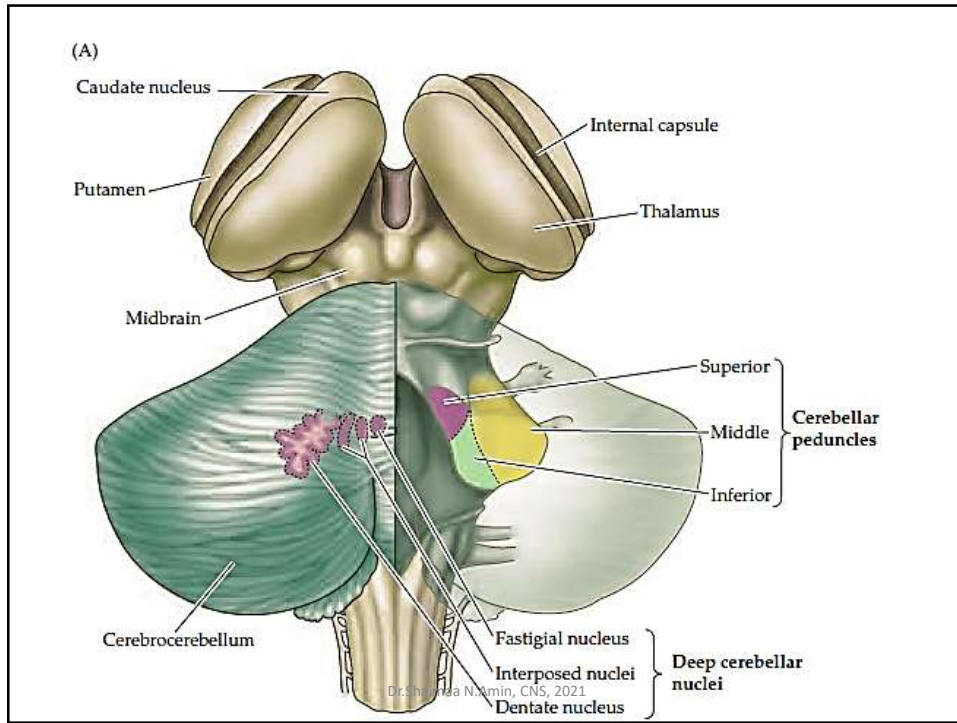
Topic 5: Cerebellum

Presented by:
Dr.Shaimaa Nasr Amin
Associate Professor of Medical Physiology

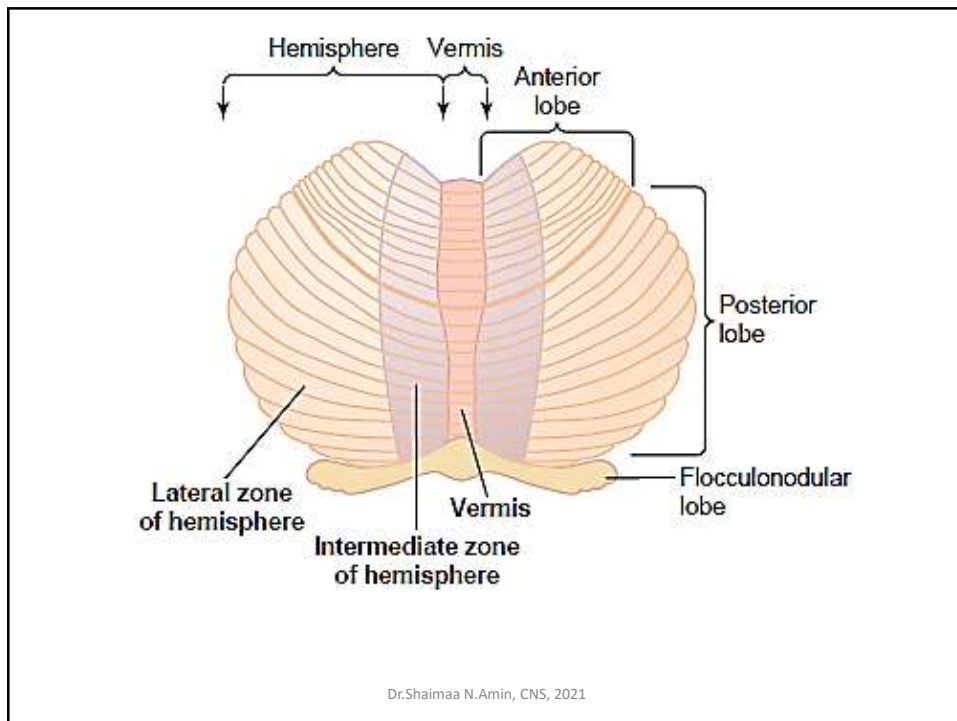
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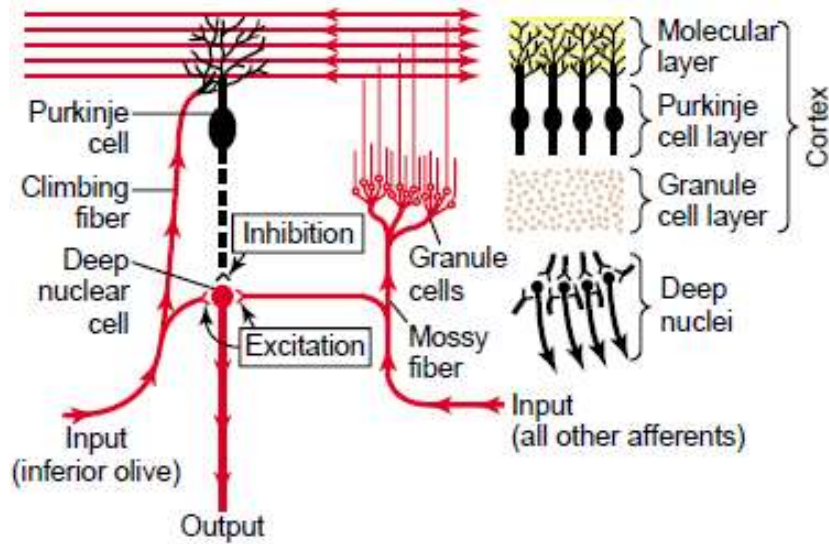


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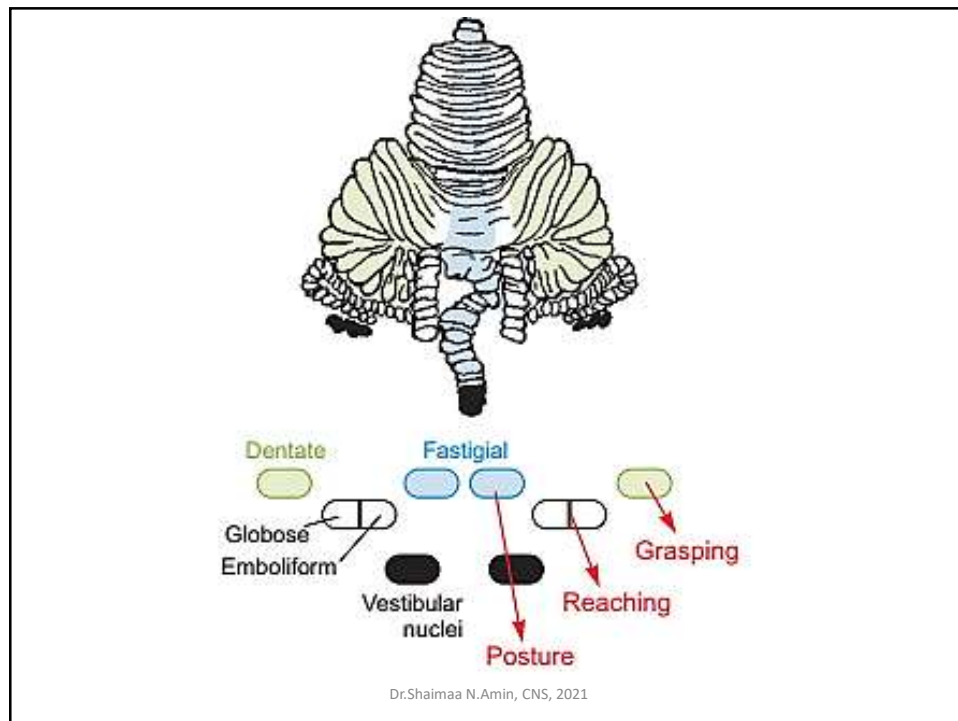


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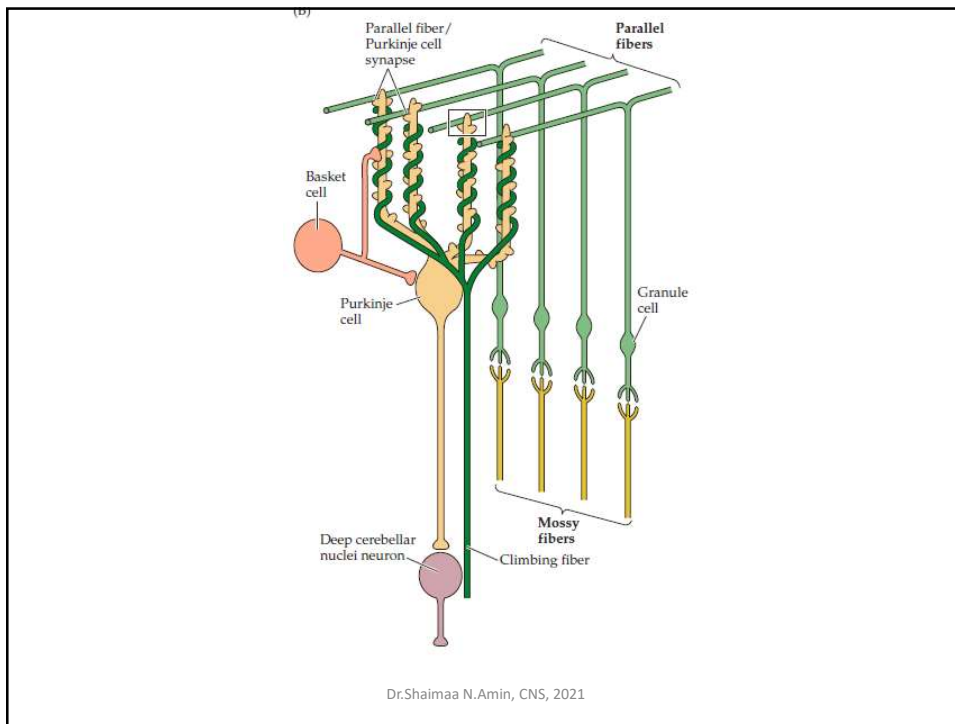
Histological Structure And Connections Of The Cerebellum



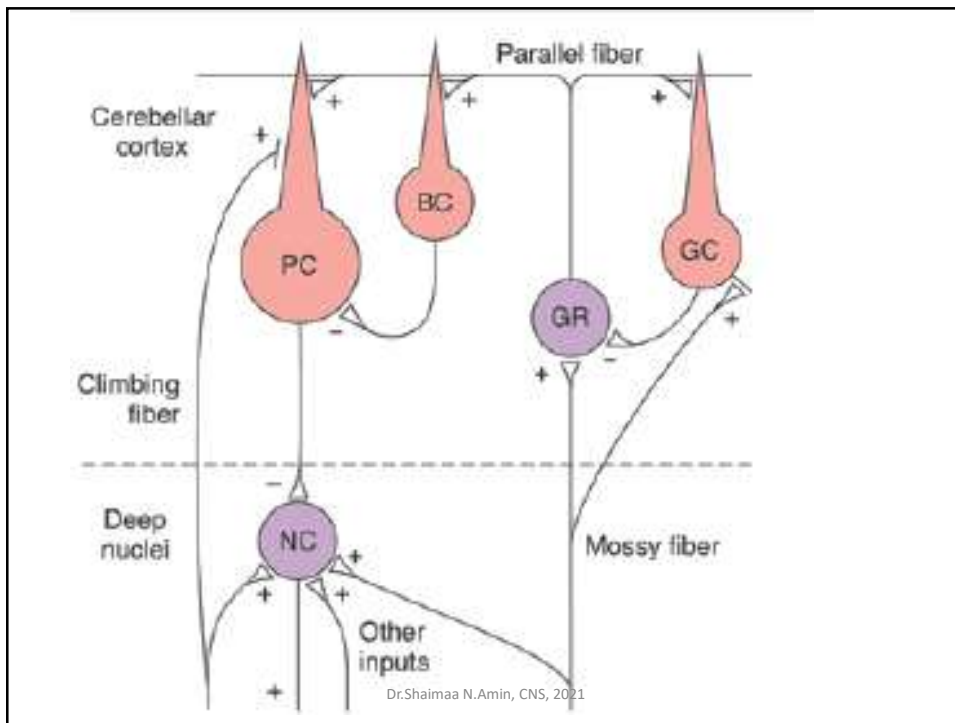
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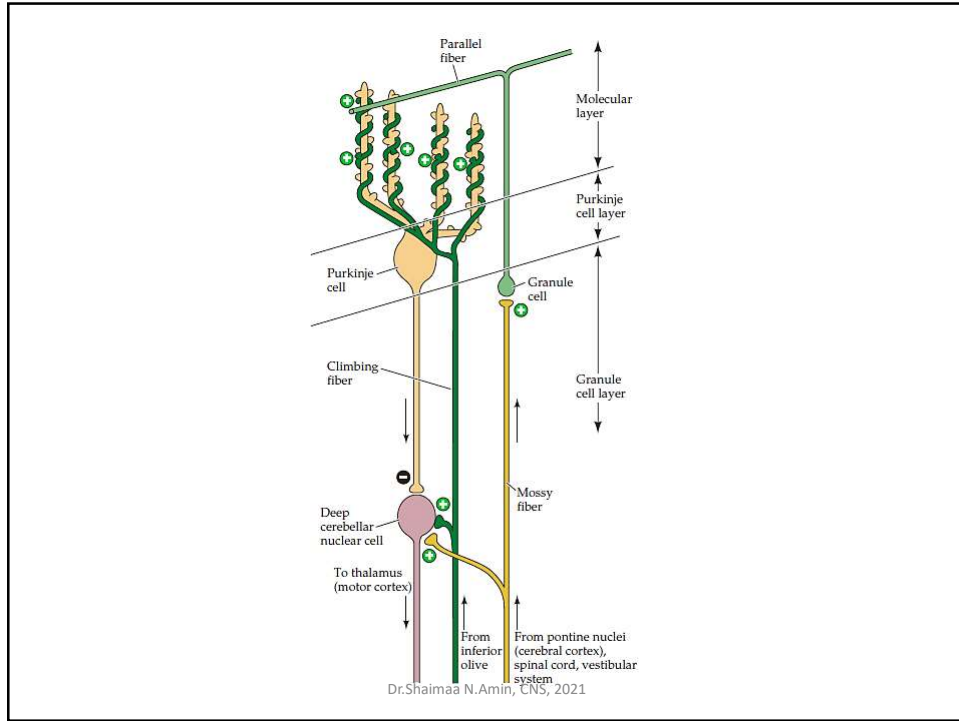
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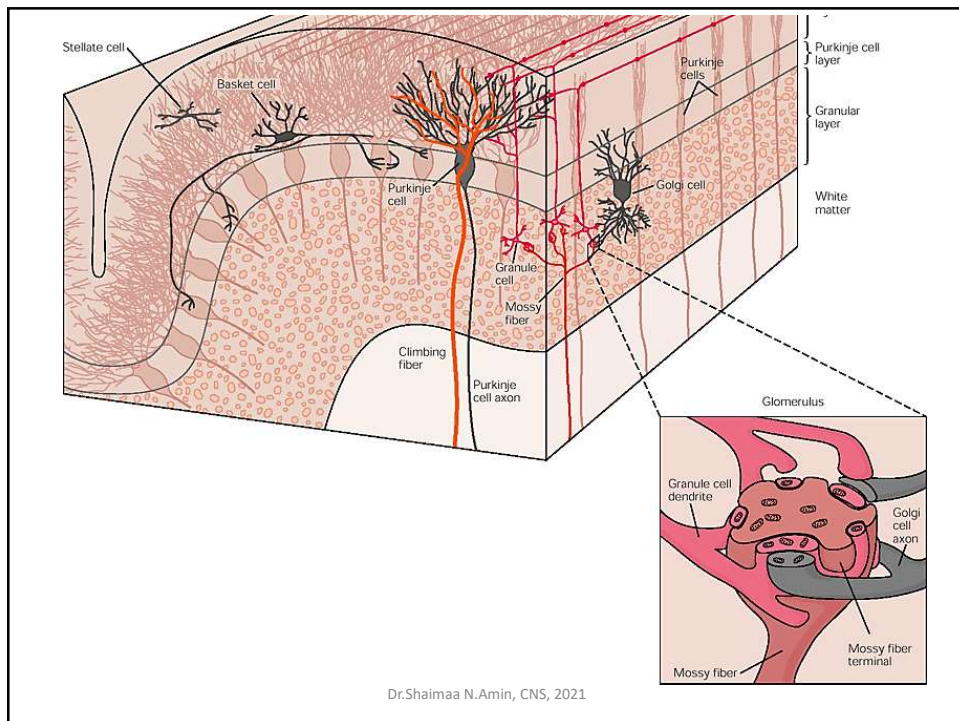
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- **All afferent fibers to the cerebellum (climbing and mossy) end in the cortex which consists of 3 layers:**

1-A superficial molecular layer

2-A middle layer purkinje cells.

3-A deep granular layer.

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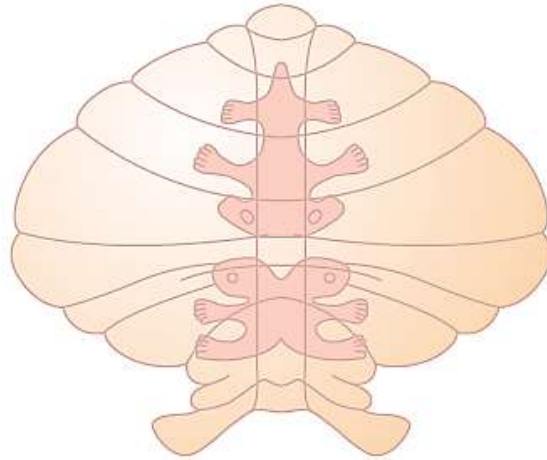
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Afferent fibres → Cerebellum → the Purkinje cells → efferent impulses to the Cerebellar nuclei i.e. dentate, interpositus and fastigial nuclei → impulses pass to various areas of the brain i.e. brain stem and thalamus.

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Topographic representation of the body in the cerebellum



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Cerebellar Connections

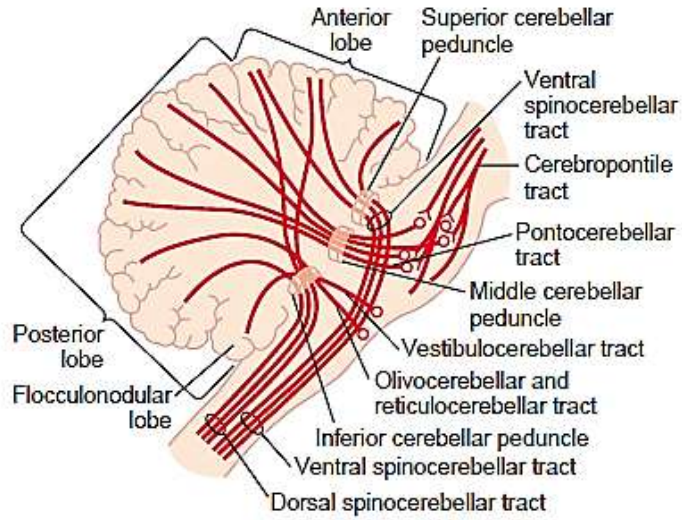
- **Afferent fibres that pass to the cerebellum are:**

Peduncle	Afferent
1-Superior cerebellar peduncle	Ventral spino-cerebellar tract
2-Middle cerebellar peduncle	Cortico-ponto-cerebellar tract
3-Inferior cerebellar peduncle	A-Dorsal spinocerebellar tract B-Vestibulo-cerebellar tract C-Olivo-cerebellar tract

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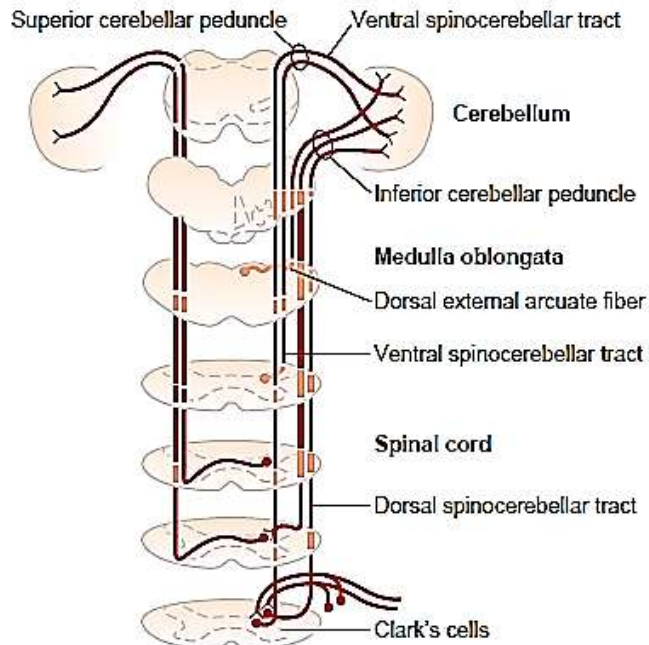
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I. Afferent fibres to the cerebellum



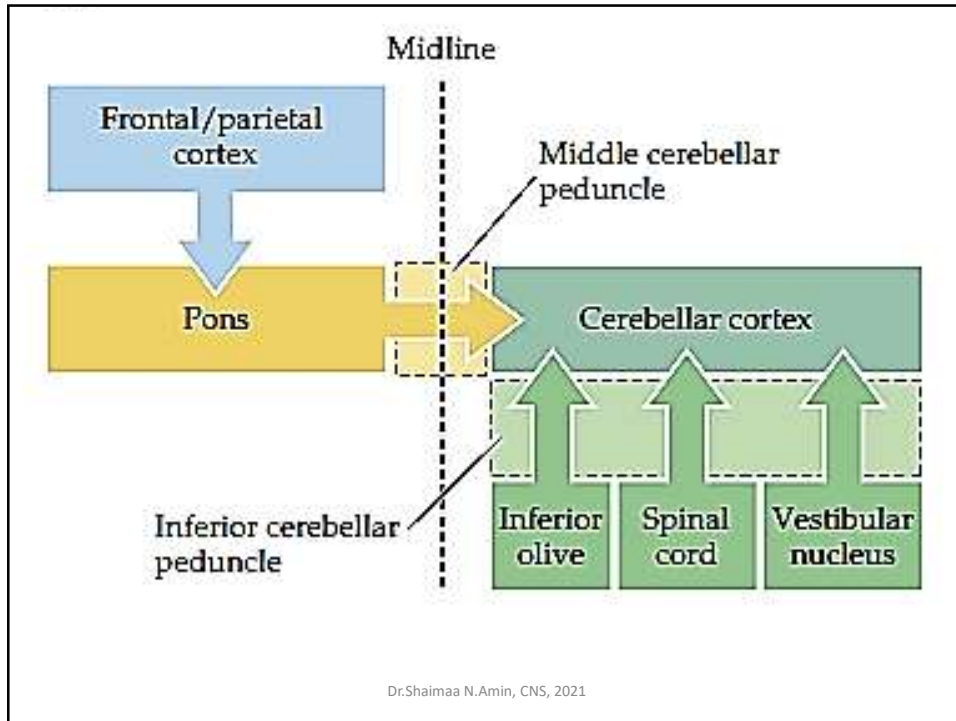
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Cerebellar Connections

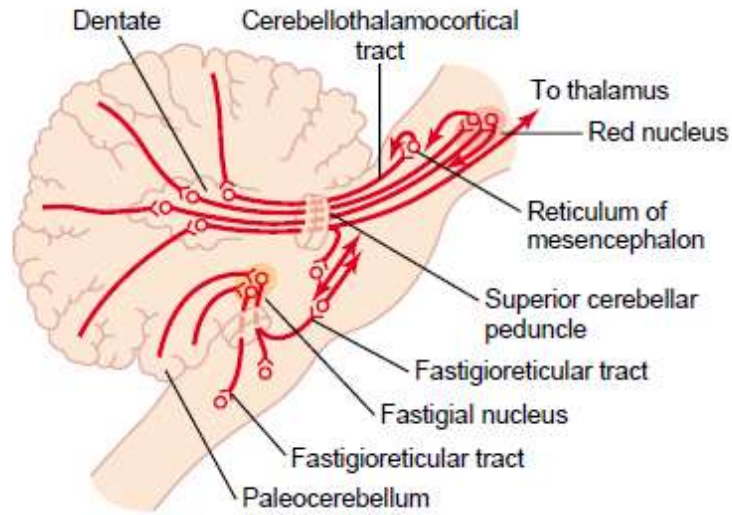
- Efferent fibres from the cerebellum are:

Peduncle	Afferent
1-Superior cerebellar peduncle	A-Dentato-thalamo-cortical tract B-Dentato-rubro-spinal tract.
3-Inferior cerebellar peduncle	A-fibers to reticular formation of the pons. B-Fibers to reticular formation of the medulla.

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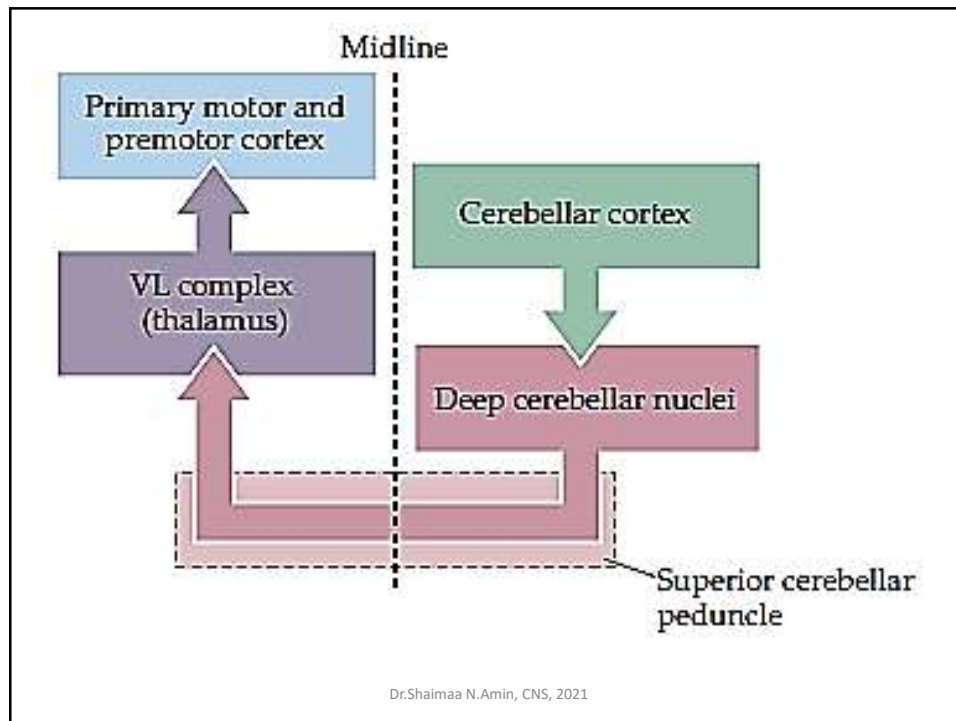
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II. Efferent fibres from the cerebellum



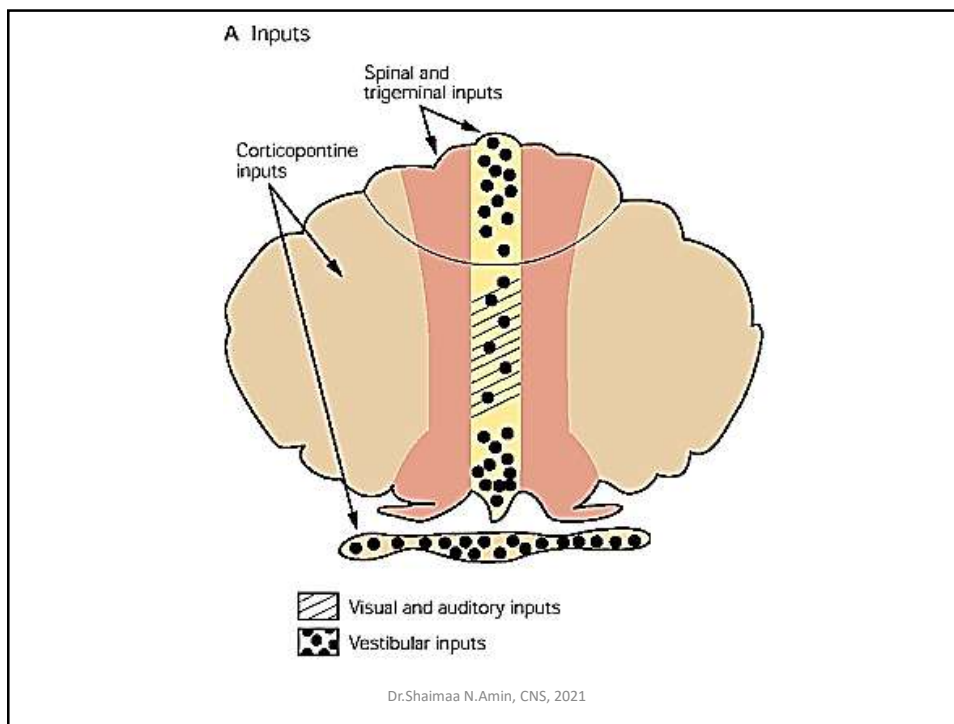
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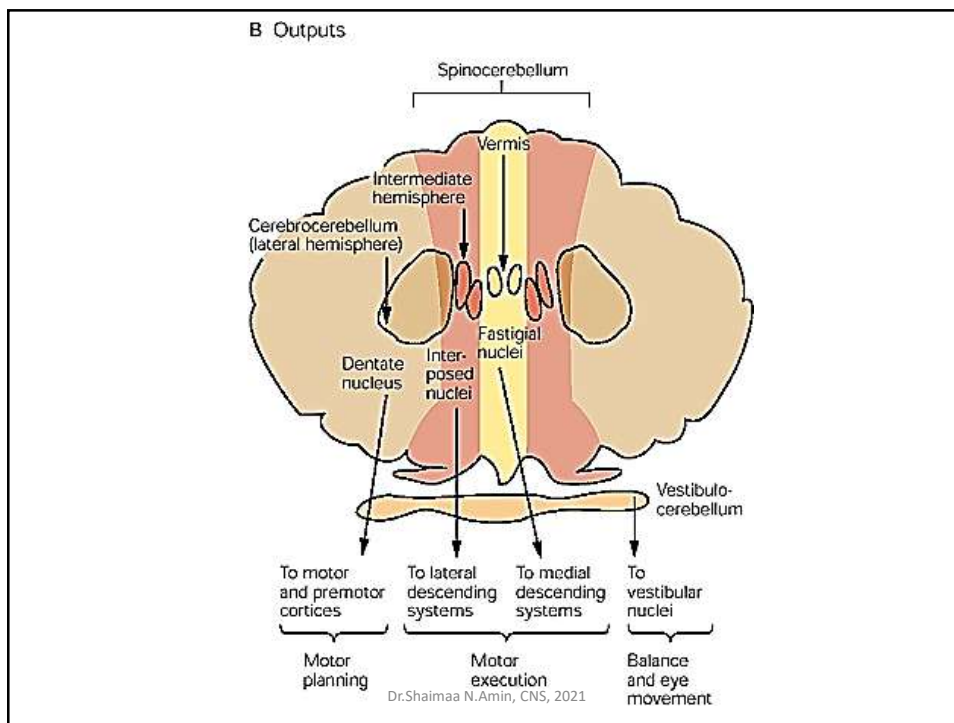


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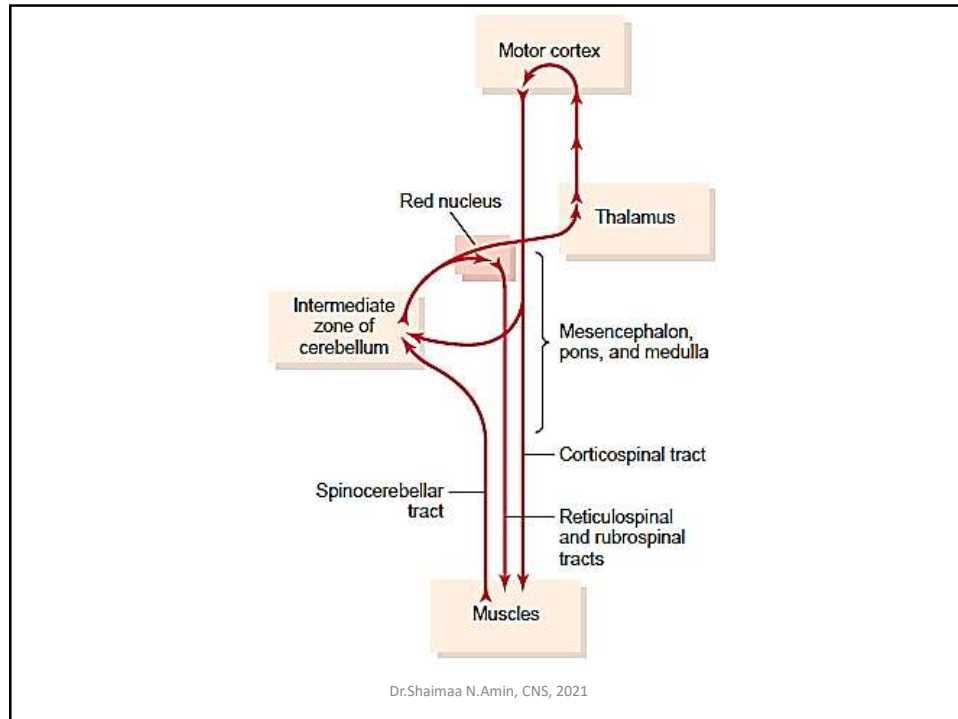
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Functions of the cerebellum

A. Functions of the cerebellum in voluntary movements:

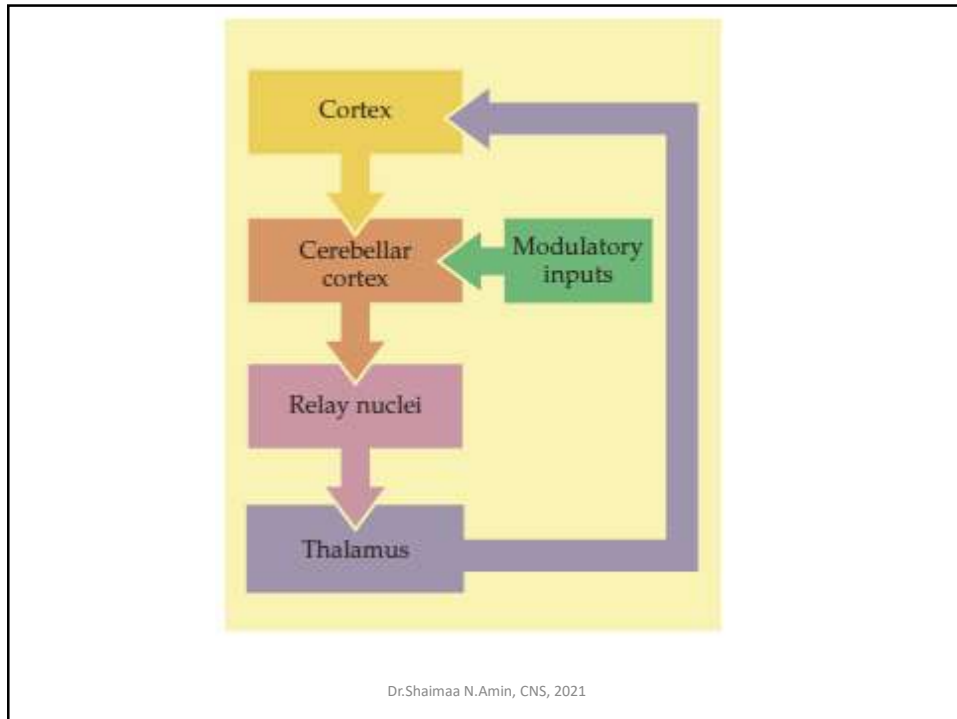
- 1-Servo-comparator function.
- 2-The braking effect.
- 3-Planning and timing function.

B. Other functions:

- 1-Function in equilibrium.
- 2-Function in muscle tone.

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Cerebellar lesions in human

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The neocerebellar syndrome

- Due to damage of the deep cerebellar nuclei as well as the cerebellar cortex.
- Manifestations occur on the *same side* of the lesion.

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The manifestations of neocerebellar syndrome include:

A. Ataxia:

B-Other manifestations

- 1- Disturbance of Posture and Gait
- 2- Dysarthria
- 3- Dysmetria
- 4- Intention tremors
- 5- Rebound phenomena
- 6- Adiadochokinesia
- 7- Decomposition of movements
- 8- Nystagmus
- 9- Hypotonia

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1- Disturbance of Posture and Gait :

- a- head is tilted to the side of the lesion.**
- b- unsteady drunken gait (zigzag line) .**
- C- patient tends to fall towards the side of the lesion .**

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2- Dysarthria :

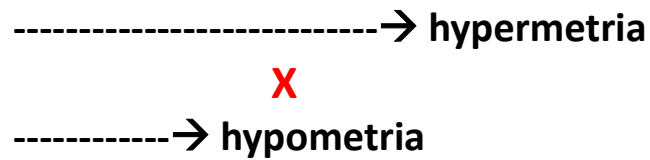
Slurred or Scanning Speech

= Staccato speech

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3- Dysmetria :



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4-Intention tremors:

Mechanism:

**Dysmetria initiates gross correction action →
 correction overshoot to the other side → So
 fingers oscillates back and forth**

Appears only during movement

Absent : Rest and sleep

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5- Rebound phenomena :

Inability to stop the movement at the proper time = inability to put on the brake .

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6- Adiadochokinesia

**Inability to do rapid successive movements
e.g. repeated supination and pronation**

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7- Decomposition of movements :

Inability to do a complex movement that involves simultaneous motion at more than one joint

Test : Heel – knee test

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8-Nystagmus :

This is tremor of the eye ball, which occurs when the patient attempts to fix his gaze on an object to the side of his head (*Horizontal nystagmus*).

It is due to absence of damping function.

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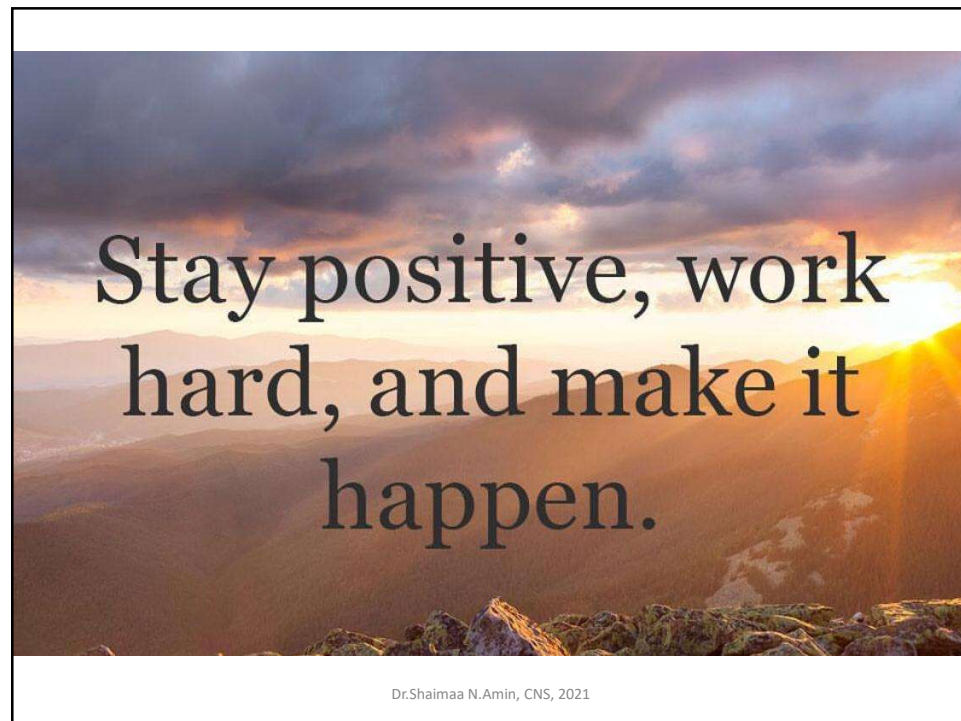
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9-Hypotonia:

Marked hypotonia on the side of the lesion due to loss of the facilitatory effect of the cerebellum on the stretch reflex.

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