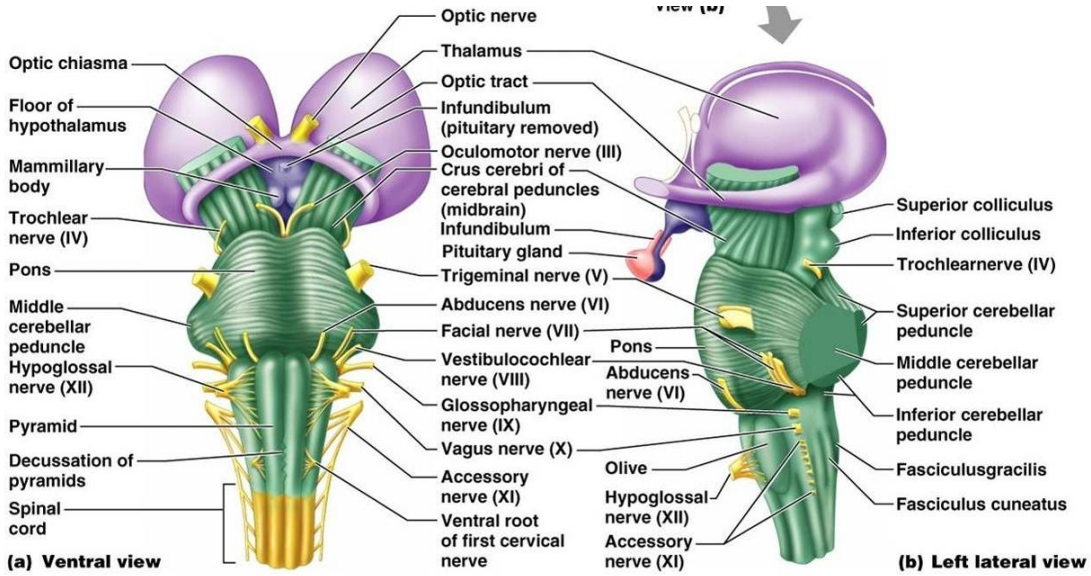
Internal Features of the Midbrain

- The **aqueduct divides** the midbrain into two parts:

1. Ventral part (Cerebral peduncles)
2. Dorsal part (Tectum)



1) Ventral part (Cerebral peduncles)

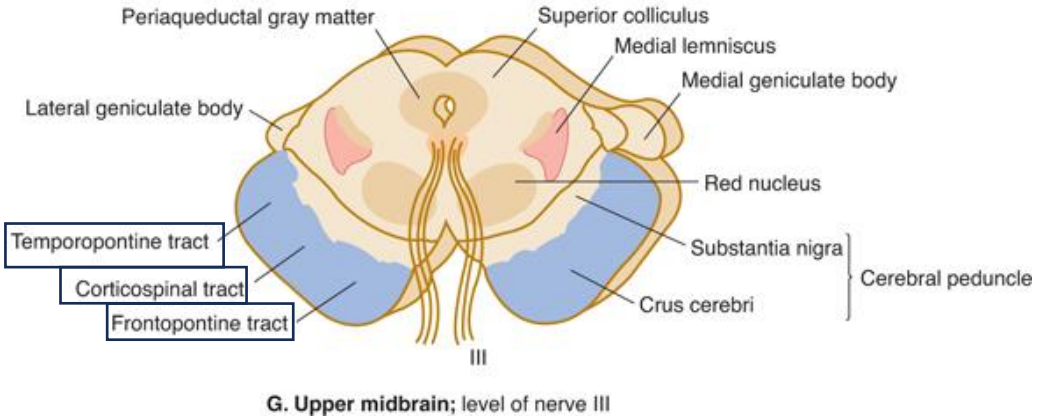
- Each cerebral peduncle is divided into 3 parts:

a) Crus Cerebri b) Substantia Nigra c) Tegmentum

a) Crus Cerebri

- It is the **anterior part** of the cerebral peduncle.
- It contains the following fibers:

Fiber	Types
Medial one fifth (1/5)	Fronto-pontine fibers
Lateral one fifth (1/5)	Non Fronto-pontine fibers
Middle three fifths (3/5)	Corticospinal and Corticobulbar fibers.

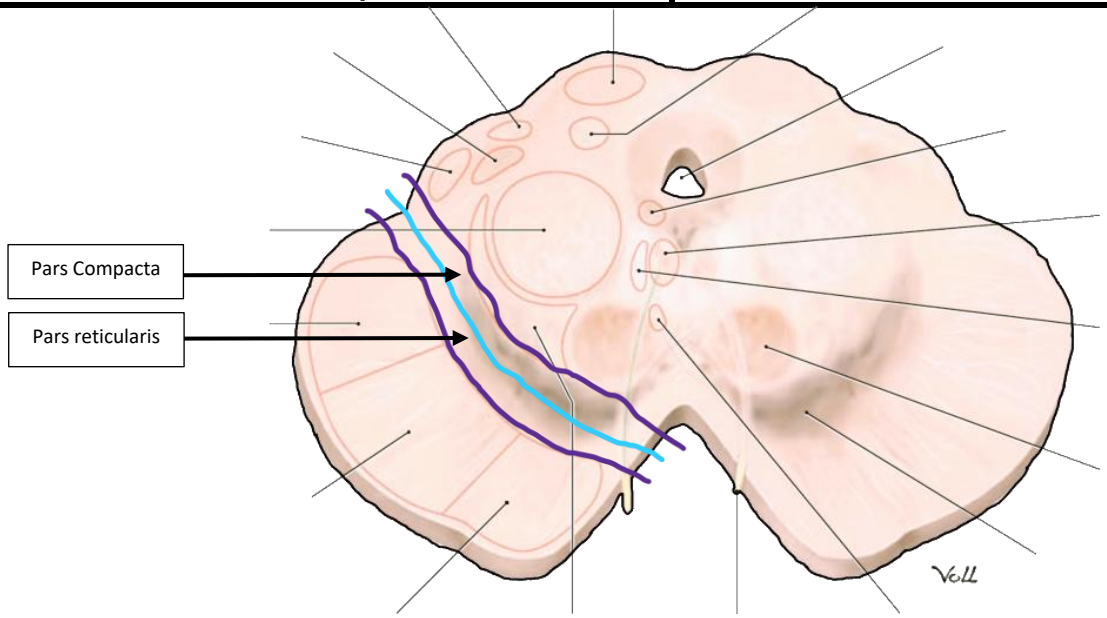


G. Upper midbrain; level of nerve III

b) Substantia Nigra

- *It is one of the **extrapyramidal motor nuclei**.*
- ***Lesion** in the Substantia Nigra causes **Parkinson's** disease.*
- *It's divided into 2 parts:*

Pars Compacta	Pars Reticularis
Posterior	Anterior
The nerve cells **contain melanin** pigment and **secrete dopamine**.	The nerve cells secrete **GABA**



- *It projects two types of **inhibitory fibers**:*

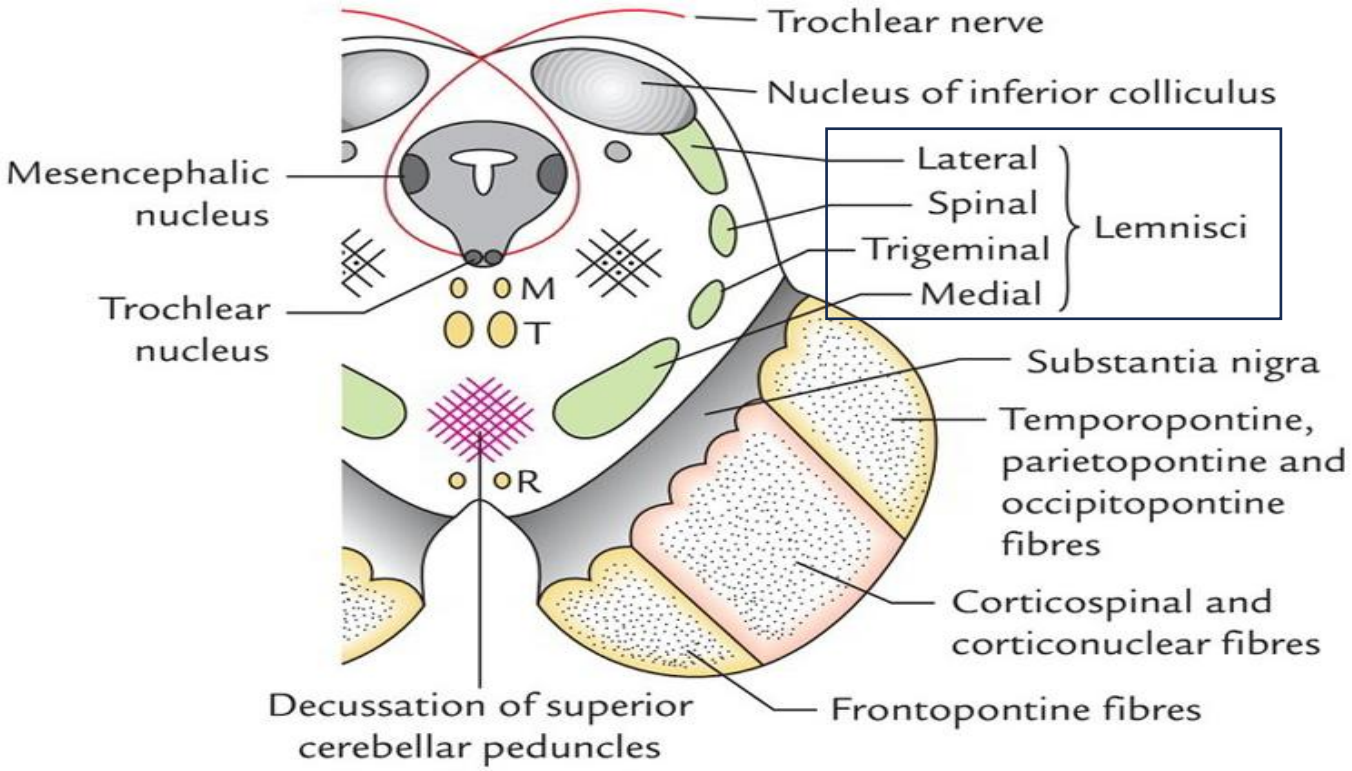
Nigro-striate fibers	Nigro-thalamic fibers
They convey dopamine to the corpus striatum to inhibit the activity of the caudate nucleus.	They convey GABA to the thalamus to inhibit the activity of the ventral anterior and ventral lateral thalamic nuclei.

c) Tegmentum

- *It contains* ***Tracts & Nuclei****:*

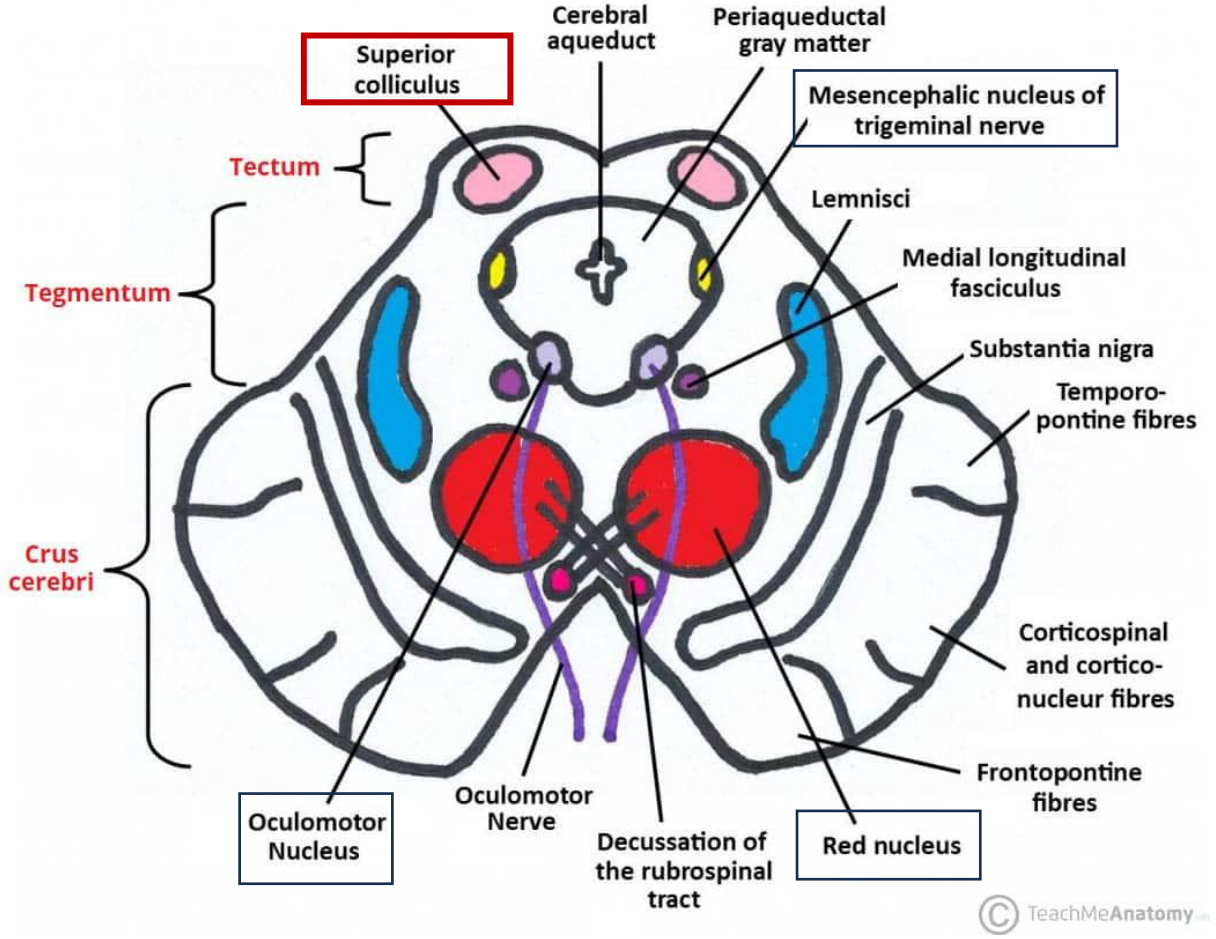
1) Tracts:

Medial Lemniscus	*Conveys kinesthesia, discriminative touch & vibration from opposite side of the body.*
Trigeminal Lemniscus	*Conveys sensation from opposite side of the body.*
Spinal Lemniscus	*Conveys pain & temperature from opposite side of the body.*
Lateral Lemniscus	*Conveys auditory sensation to inferior colliculus from the two ears mainly the opposite side.*



2) Nuclei:

Cranial Nerve Nuclei	Oculomotor (CN III)	At the level of **superior colliculus**
	Trochlear (CN IV)	At the level of **inferior colliculus**
	Trigeminal (CN V)	**Mesencephalic nucleus** of trigeminal nerve
Other nuclei	Red Nucleus	Extrapyramidal motor nucleus, at the level of **superior colliculus**
	Locus Ceruleus	A **pigmented** area in the upper pons and lower midbrain (at the level of **inferior colliculus**). Its cells **contain melanin** pigments and **secrete norepinephrine**.
	Reticular Formation	-


Superior colliculus
Cerebral aqueduct
Periaqueductal gray matter
Mesencephalic nucleus of trigeminal nerve
Tectum
Lemnisci
Tegmentum
Medial longitudinal fasciculus
Substantia nigra
Temporo-pontine fibres
Crus cerebri
Corticospinal and cortico-nucleur fibres
Frontopontine fibres
Oculomotor Nucleus
Oculomotor Nerve
Decussation of the rubrospinal tract
Red nucleus
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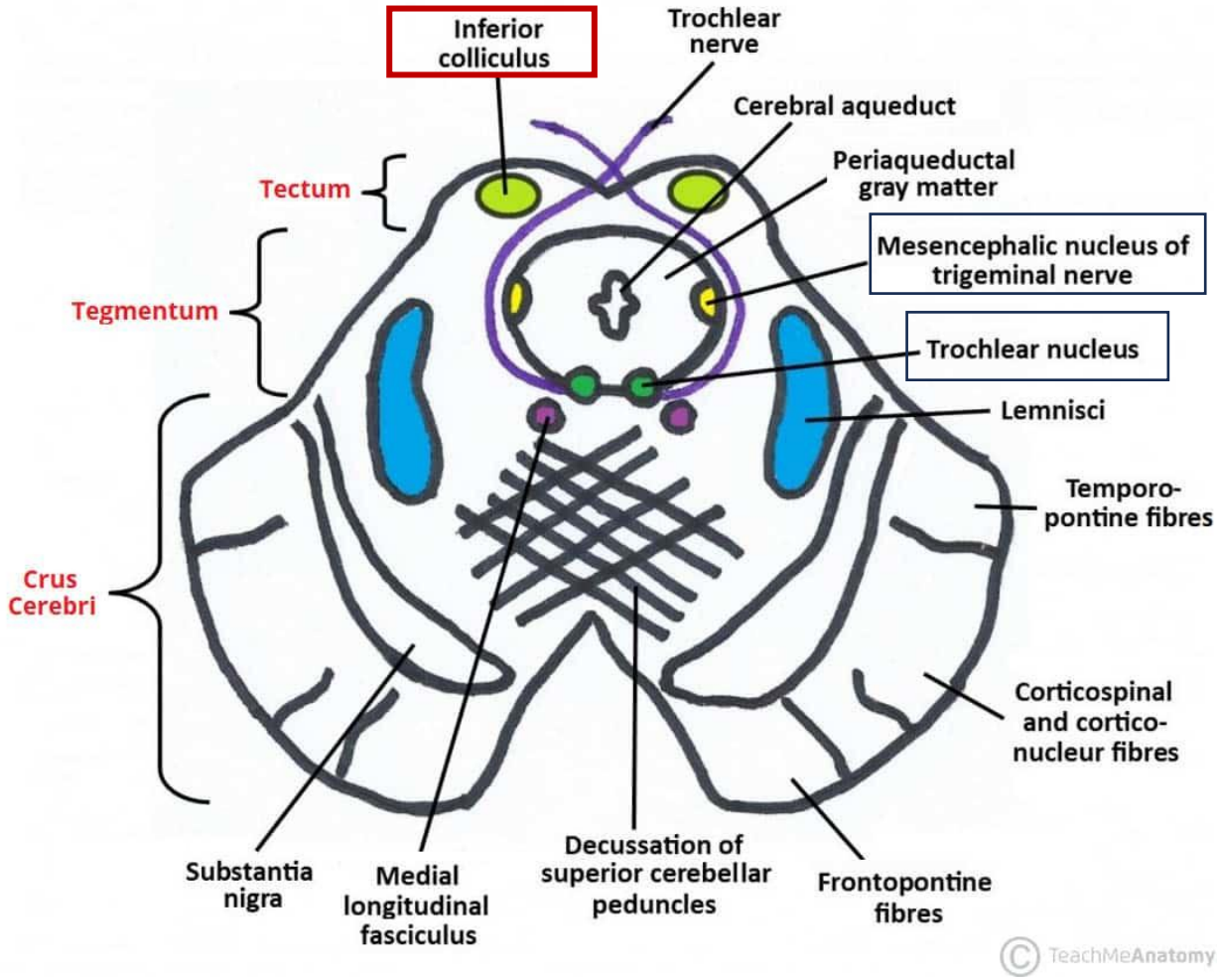
Inferior colliculus
Trochlear nerve
Cerebral aqueduct
Periaqueductal gray matter
Tectum
Mesencephalic nucleus of trigeminal nerve
Tegmentum
Trochlear nucleus
Lemnisci
Temporo-pontine fibres
Crus Cerebri
Corticospinal and cortico-nucleur fibres
Substantia nigra
Medial longitudinal fasciculus
Decussation of superior cerebellar peduncles
Frontopontine fibres
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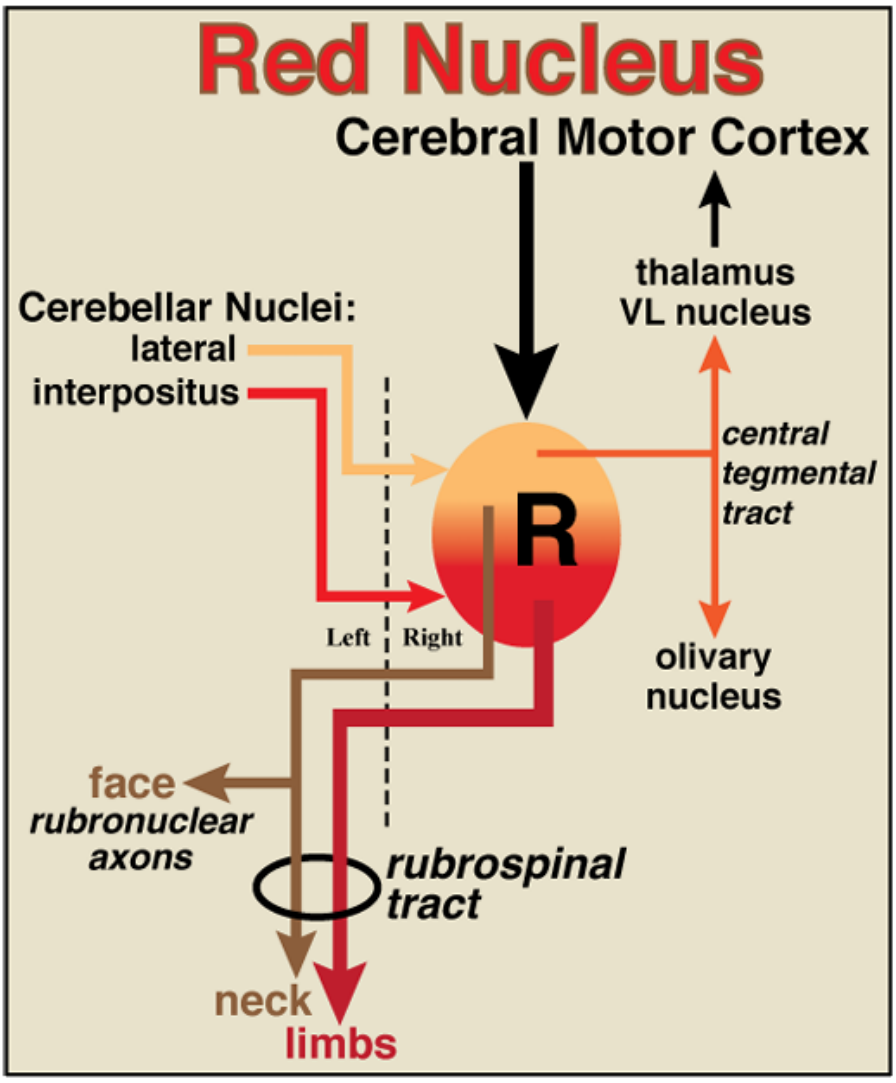
Red Nucleus:

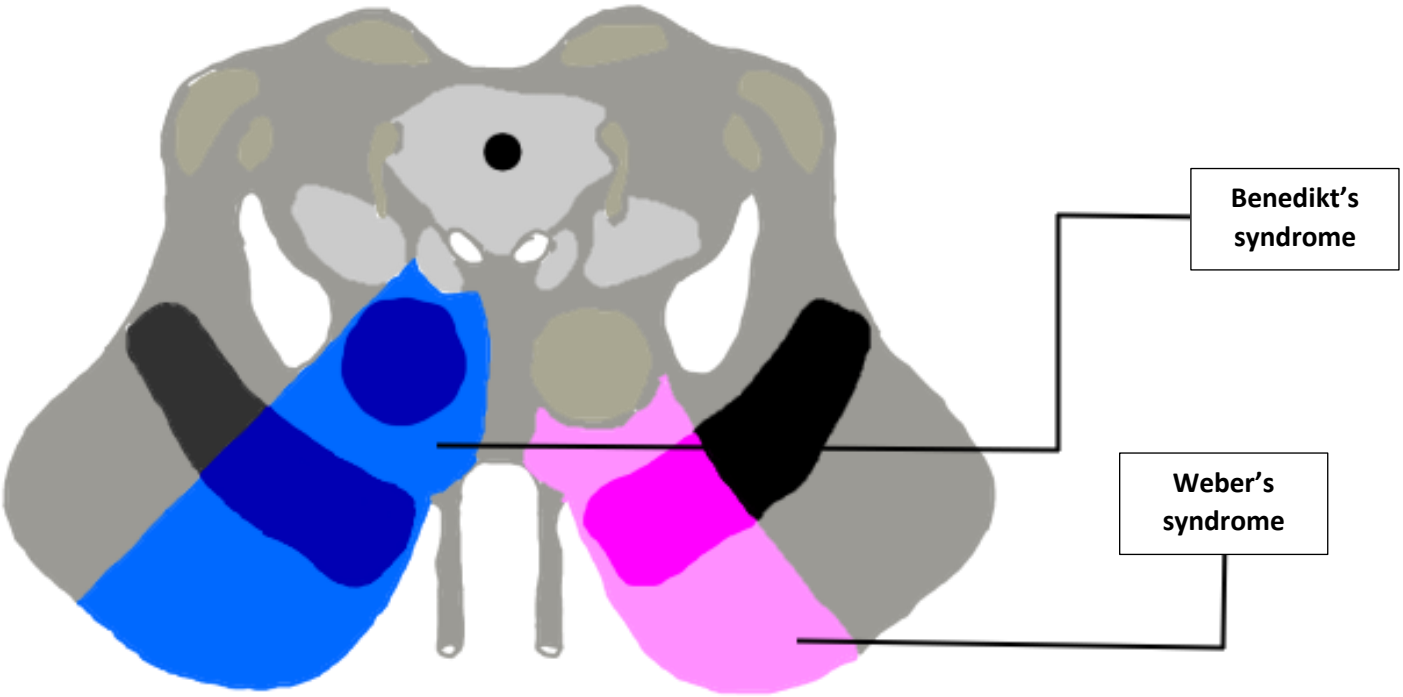
- *It is an* ***extrapyramidal motor nucleus****.*
- *It relays motor impulses* ***from the cerebral cortex and cerebellum to the thalamus & the spinal cord*** *(cortico-rubro-spinal and dentato-rubro-spinal).*
- *Lesion: results in signs of* ***cerebellar damage*** *(contralateral tremor and ataxia).*

Input	*Output*
Cortico-rubral tract: from the motor and premotor areas of the cerebral cortex. -	*Rubro-spinal tract: to the spinal cord.*
Dentato-rubral tract: from the opposite dentate nucleus of the cere	*Rubro-thalamic tract: to the motor nuclei of the thalamus (VA and VL nuclei).*



Lesions of the Midbrain

	Affected structure	Sign
WEBER's Syndrome (Occlusion of posterior cerebral artery)	Corticospinal artery	Contralateral hemiplegia
	Oculomotor nerve	Ipsilateral ophthalmoplegia: - Ptosis. - External strabismus. - Mydriasis. - Loss of ipsilateral light reflex.
BENEDIKT's Syndrome (Occlusion of posterior cerebral	Red Nucleus	contralateral tremor and ataxia.



2) Dorsal part (Tectum)

- They consist of **four colliculi (Corpora quadrigemina):**

	2 Superior Colliculi		2 Inferior Colliculi
Connection	To each other	Posterior Commissure	Commissure of inferior colliculus
	To thalamus	To lateral geniculate body by superior brachium	To medial geniculate body by inferior brachium
Function	- It is **not a relay** nucleus in the visual pathway. - An important **visual reflex center**. - An **auditory reflex center**.		- A **relay** nucleus in the **auditory** pathway. - An **auditory reflex center** for reflexes associated with sound.
Fig