

VESTIBULOCOCHLEAR NERVE

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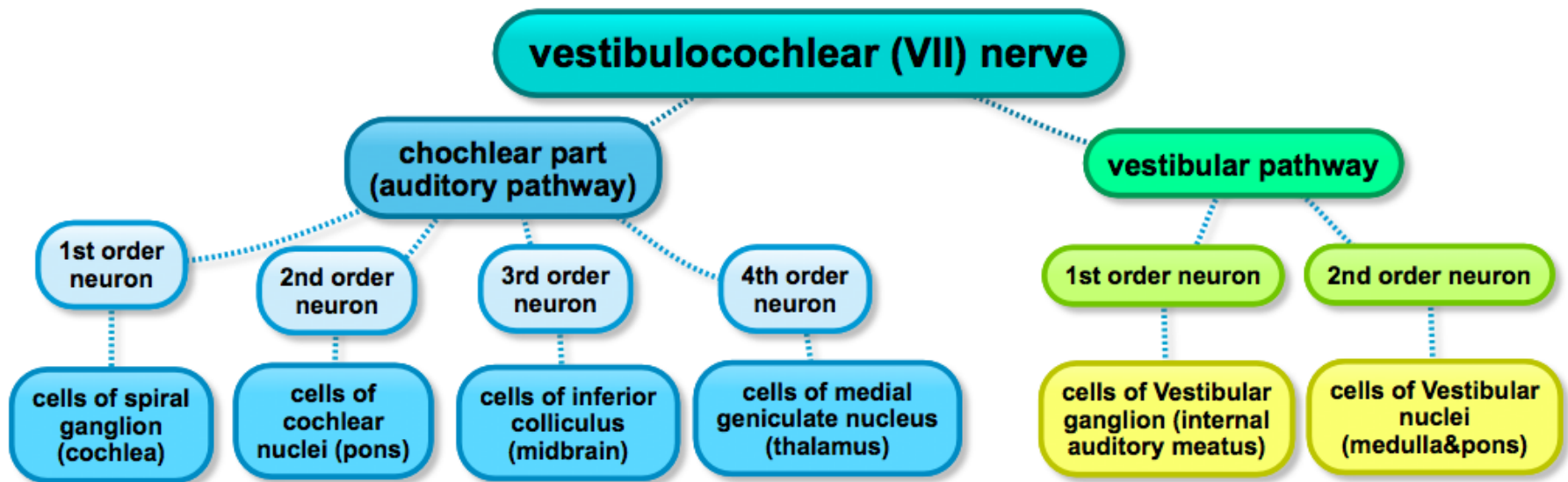


تنويه: هذا العمل لا يعتبر مصدر رئيسي للمذاكرة وإنما للمرجعة فقط

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Objective

- List the nuclei related to vestibular and cochlear nerves in the brain stem.
- Describe the type and site of each nucleus.
- Describe the vestibular pathways and its main connections.
- Describe the auditory pathway.



Overview

It known as the **eighth** cranial nerve, **transmits** sound and balance information from the **inner ear** to the **brain**

Vestibulocochlear nerve consist of two parts:

- 1- Vestibular nerve
- 2- Cochlear nerve

Number of nerve	Name	Component	Function	Opening in skull
VIII	Vestibular	Sensory (SSA)*	From utricle, saccule and semicircular canals. (Position and movement of head)*	Internal acoustic meatus
	Cochlear	Sensory (SSA)*	Organ of corti (Hearing)	

***control of posture and balance** by Vestibulospinal fibers .
coordination of head & eye movement by The ascending component of medial longitudinal fasciculus establishes connections with the nuclei of the Oculomotor, Trochlear & Abducent nerves (motor nuclei for extraocular muscles)

***SSA: Special Somatic afferent**

1- Vestibular nerve pathway

- Take information from **utricle**, **sacculle**, and **semicircular**.
- Nerve cells located in Vestibular ganglion (**1st order neuron**).
- **Enter** pons by **pontocerebellar angle**.
- Form Cells of Superior, Inferior, Lateral, Medial vestibular nucleus (**2nd order neuron**).
- Then the vestibular nucleus divided into:
 1. Fibers go to **flocculonodular lobe** of **cerebellum**
 2. Fibers descend as lateral vestibulospinal tract
 3. Fibers Join **medial longitudinal fasciculus** & descend as **medial vestibulospinal tract**
 4. Fibers go to **thalamus**, then go to **cerebral cortex** in postcentral gyrus

Vestibular nerve pathway

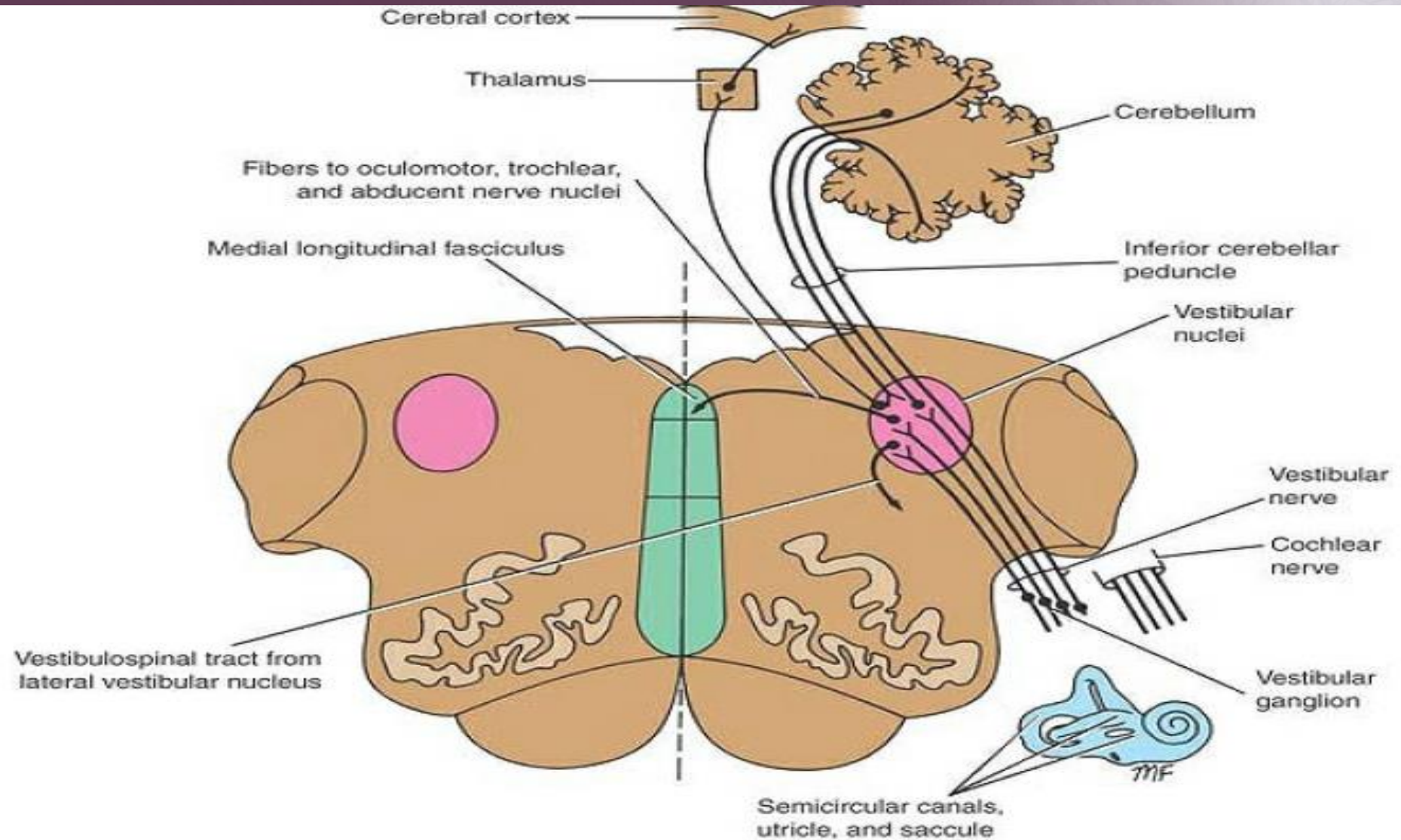
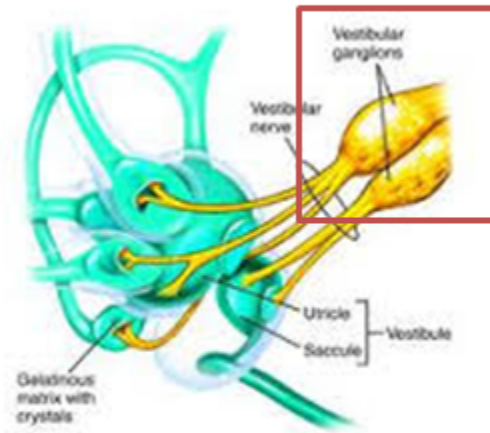


Figure 11-13 Vestibular nerve nuclei and their central connections.

Summary of Vestibular nerve pathway .

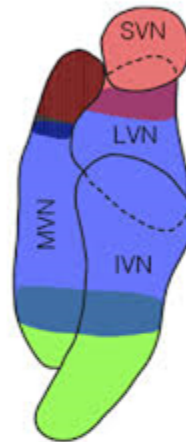


internal auditory meatus



Vestibular ganglion (1st order neuron).

rostral medulla



vestibular nucleus (2nd order neuron).

Fibers go to flocculonodular lobe of cerebellum

Fibers descend as lateral vestibulospinal tract

Fibers Join medial longitudinal fasciculus

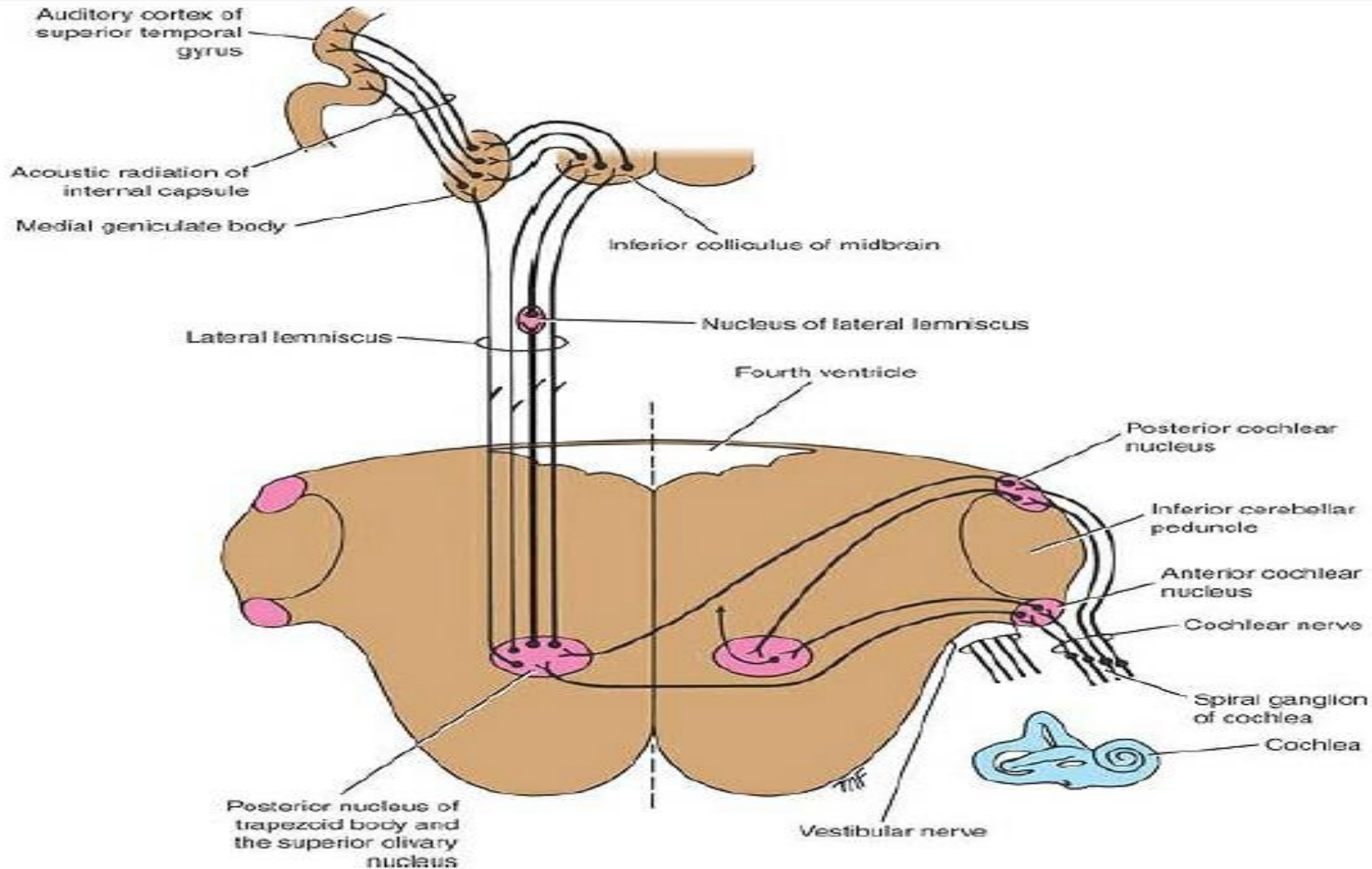
Fibers go to thalamus, then go to cerebral cortex

2- Cochlear nerve pathway

- Hair cells of Organ of Corti **dendrites** with cochlear nerve
- Nerve cells located in Spiral ganglia (**1st order neuron**)
- **Enter** pons by **pontocerebellar angle**
- Then synapses in **dorsal and ventral cochlear nuclei** (**2nd order neuron**) in **ICP***
- **MOST OF FIBERS decussate** in trapezoid body and the axon ascend as lateral lemniscus
- The axon ascend to inferior colliculus in midbrain (**3rd order neuron**)
- It goes to **medial geniculate body** in thalamus (**4th order neuron**)
- Pass to superior temporal cortex (**primary auditory cortex**)
- (**Brodmann's areas 41, 42**) located in the dorsal surface of the superior temporal gyrus (**Heschl's gyri**) The region surrounding the primary auditory cortex is known as the **auditory association cortex** or Wernick's area (**Brodmann's areas 22**)
- **Wernick's area** is related to recognition and processing of language by the brain.

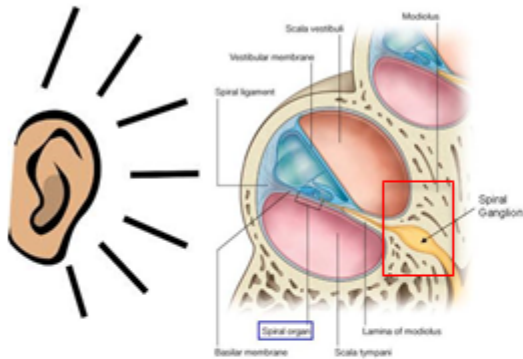
*Inferior cerebellar peduncle

Cochlear nerve pathway



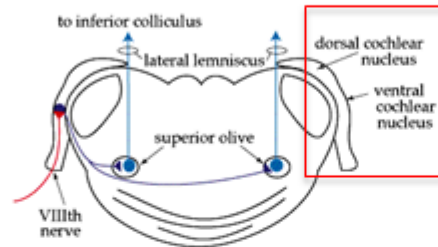
Summary of Cochlear nerve pathway

Inner ear



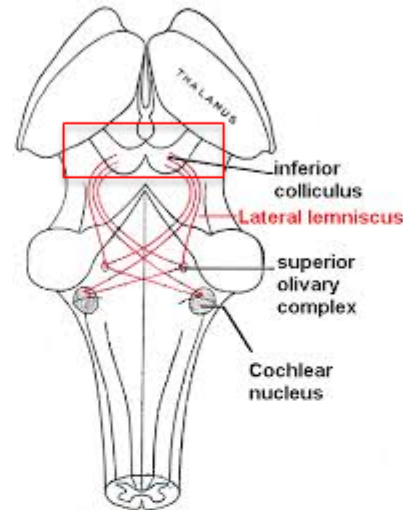
Spiral ganglia
(1st order neuron)

Rostral medulla oblongata



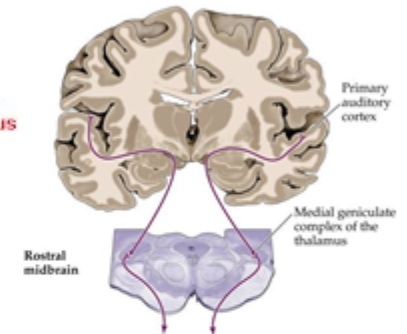
dorsal and ventral cochlear nuclei (2nd order neuron) in ICP

Mid Brain



to inferior colliculus in midbrain (3rd order neuron)

Thalamus



- medial geniculate body in thalamus (4th order neuron)
- Pass to superior temporal cortex (primary auditory cortex)

MCQs

1- Cochlear and vestibular nerves meet and emerge through:

- A. Jugular foramen
- B. Foramen ovale
- C. Internal acoustic meatus

2- Which nerve, some of its fibers go to cerebellum:

- A. Cochlear nerve
- B. Vestibular nerve

3- Inferior colliculus are:

- A. Third order neuron of vestibular nerve
- B. Second order neuron of cochlear nerve
- C. Third order neuron of cochlear nerve

4- Most fibers of cochlear nerve decussate in:

- A. Trapezoid body
- B. Dorsal cochlear nucleus
- C. Ventral cochlear nucleus

4-A
3-C
2-B
1-C