



## Structure of Vestibulocochlear Nerve, its Symptoms and Function

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### Description

Vestibulocochlear nerve, also called auditory nerve, acoustic nerve, or eighth cranial nerve, a nerve in the human ear serving the organs of balance and hearing. It consists of two anatomically and functionally distinct parts: the cochlear nerve, distributed to the organ of hearing, and the vestibular nerve, distributed to the organ of balance.

The fibers of the cochlear nerve terminate at terminals around the bases of the inner and outer hair cells of the organ of Corti and begin in groups of nerve cells, the dorsal and ventral cochlear nuclei located at the base of the brain at the junction of the pons and medulla oblongata. The vestibular part of the vestibulocochlear nerve originates from a group of nerve cells called the vestibular ganglion, in the internal acoustic meatus, a canal in the temporal bone through which the facial and auditory nerves and some blood vessels pass. The sensory endings of this part of the nerve are in the semicircular canal and in the utricle and sac, the structures of the inner ear responsible for the sense of balance.

### Structure

The vestibulocochlear nerve consists mostly of bipolar neurons and is divided into two major divisions: the cochlear nerve and the vestibular nerve.

Cranial nerve 8, the vestibulocochlear nerve, goes to the middle part of the brainstem called the pons (which is then largely composed of fibers leading to the cerebellum). The 8th cranial nerve runs between the base of the pons and the medulla oblongata (lower part of the brainstem). This connection between the pons, medulla, and cerebellum, which contains the 8th nerve, is called the cerebellopontine angle. The vestibulocochlearis nerve is accompanied by the labyrinthine artery, which usually branches off from the anterior inferior cerebellar artery in the cerebellopontine angle and then goes with the 7th nerve through the internal acoustic meatus

to the inner ear.

The cochlear nerve travels away from the cochlea of the inner ear, where it begins as a spiral ganglion. Processes from the organ of Corti conduct afferent transmission to the spiral ganglia. It is the inner hair cells of the organ of Corti that are responsible for activating afferent receptors in response to pressure waves impinging on the basilar membrane by transducing sound. The exact mechanism by which sound is transmitted by neurons of the cochlear nerve is uncertain; two competing theories are the place theory and the time theory.

The vestibular nerve travels from the vestibular system of the inner ear. The vestibular ganglion harbors the cell bodies of bipolar neurons and extends processes to the five sense organs. Three of them are cristae located in the ampullae of the semicircular canals. The cristae hair cells activate afferent receptors in response to rotational acceleration. The other two sensory organs supplied by vestibular neurons are the sac maculae and the utricle. Macular hair cells in the utricle activate afferent receptors in response to linear acceleration, whereas macular hair cells in the saccule respond to a vertically directed linear force.

### Symptoms

Symptoms of damage

Damage to the vestibulocochlear nerve can cause the following symptoms:

- hearing loss
- vertigo
- false sensation of movement
- loss of balance (in dark places)
- nystagmus
- motion sickness
- visual-induced tinnitus

**Function**

This is the nerve along which the sensory cells (hair cells) of the inner ear transmit information to the brain. It consists of the cochlear nerve, which carries details of hear-

ing, and the vestibular nerve, which carries information about balance. It emerges from the pontomedullary junction and exits the internal skull via the internal acoustic meatus in the temporal bone. The vestibulocochlear nerve carries axons of the special somatic afferent type.