

Facial nerve (VII) mixed nerve																													
Deep origin (nuclei)		Motor nucleus	Parasympathetic nucleus (superior salivatory nucleus)	2 sensory nuclei																									
	Site	lower part of pons (below 4th ventricle)	Pons (dorsal to motor nucleus)	Nucleus solitarius Spinal trigeminal n																									
	Supply	<p>📝 Muscles of 2nd pharyngeal arch:</p> <p>1) Muscles of facial expression:</p> <ul style="list-style-type: none"> - Frontalis, orbicularis oculi, orbicularis oris, levators of the angle of mouth, buccinator. <p>2) Stapedius</p> <p>3) Stylohyoid</p> <p>4) Posterior belly of digastric</p> <p>Note: -</p> <table border="1"> <tr> <td>Upper 1/2 of the nucleus</td> <td rowspan="2">Receives corticobulbar fibers</td> <td>Bilateral</td> </tr> <tr> <td>Lower 1/2 of the nucleus</td> <td>From the opposite side only.</td> </tr> </table>	Upper 1/2 of the nucleus	Receives corticobulbar fibers	Bilateral	Lower 1/2 of the nucleus	From the opposite side only.	<p>📝 All glands except parotid "9"</p> <table border="1"> <tr> <td>Submandibular</td> <td rowspan="2">By Chorda Tympani N</td> </tr> <tr> <td>Sublingual</td> </tr> <tr> <td>Lacrimal</td> <td rowspan="3">By Greater superficial petrosal N</td> </tr> <tr> <td>Nasal</td> </tr> <tr> <td>Palatine</td> </tr> </table>	Submandibular	By Chorda Tympani N	Sublingual	Lacrimal	By Greater superficial petrosal N	Nasal	Palatine	<p>Taste fibers from anterior 2/3 of tongue</p> <p>Through: -</p> <p>Chorda tympani nerve.</p> <p>1) Posterior auricular nerve</p> <p>2) Small branches that join the tympanic plexus.</p>													
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Roots	Motor root	- Large & medial -the facial nerve proper "loops over 6 th CN nucleus in pontine tegmentum forming facial colliculus																											
	Sensory root	- Small & lateral → called nervus intermedius - contains both sensory & parasympathetic																											
Course	📝 From brainstem (Pons) → Facial Nerve crosses CPA (Cerebellopontine angle) with 8 th CN to Internal auditory meatus → passes within internal auditory canal → to geniculate ganglion → in the wall of middle ear → stylomastoid foramen → enters parotid gland where it gives its terminal branches .																												
Branches	<p>📝 <u>Intra temporal region" middle ear":</u></p> <table border="1"> <thead> <tr> <th></th> <th>Parasympathetic</th> <th>Sensory fibers</th> </tr> </thead> <tbody> <tr> <td>1) GSPN</td> <td>Lacrimal G.</td> <td>nasal & palatine glands</td> </tr> <tr> <td>2) Chorda tympani</td> <td>Submandibular & sublingual Glands</td> <td>Anterior 2/3rd of tongue</td> </tr> <tr> <td>3) Nerve to stapedius</td> <td></td> <td></td> </tr> <tr> <td>4) Sensory auricular branch</td> <td></td> <td></td> </tr> </tbody> </table> <p>📝 <u>Outside stylomastoid foramen:</u></p> <ul style="list-style-type: none"> - Post auricular N, N to stylohyoid, N to post belly of digastric <p>📝 <u>In parotid gland:</u></p> <ul style="list-style-type: none"> - 5 terminal branches temporal, zygomatic, buccal, mandibular, cervical → supply all muscles of face, scalp & platysma 					Parasympathetic	Sensory fibers	1) GSPN	Lacrimal G.	nasal & palatine glands	2) Chorda tympani	Submandibular & sublingual Glands	Anterior 2/3rd of tongue	3) Nerve to stapedius			4) Sensory auricular branch												
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Lesions	Cause	<p>1) Iatrogenic trauma: in CPA tumor surgery</p> <p>2) Schwannoma (Acoustic neuroma): a benign nerve sheath tumor mostly occurs in 8th CN leads to compression of the nerve leading to attacks of dizziness, and profound deafness and ataxia.</p>																											
	UMNL	<ul style="list-style-type: none"> ▪ lesion in corticobulbar tract → paralysis of the lower half of the opposite facial nucleus. → paralysis of muscles of lower half of the opposite side of face. 																											
	LMNL	<ul style="list-style-type: none"> ▪ Lesion in facial nucleus or facial nerve - It causes flaccid paralysis of all muscles of facial expression on the same side of the face. - Lesion may be located at any level: <table border="1"> <tr> <td>a. In facial colliculus (6,7)</td> <td>→ accompanied by abducent nuclear lesion.</td> </tr> <tr> <td>b. In basis pontis (7, Δ)</td> <td>→ accompanied by hemiplegia (paralysis of 1/2 of the body).</td> </tr> <tr> <td>c. At cerebellopontine angle (7,8)</td> <td>→ where it is accompanied by VIII lesion.</td> </tr> <tr> <td>d. At facial canal or stylomastoid foramen (Bell's palsy).</td> <td></td> </tr> </table> <p>📝 Signs of the Lower Motor Neuron Lesion of Facial Nerve: present on the same side of the face: -</p> <table border="1"> <thead> <tr> <th>Affected Muscle or nerve</th> <th>C/P</th> </tr> </thead> <tbody> <tr> <td>1) Frontalis</td> <td>→ Inability to raise eyebrow.</td> </tr> <tr> <td>2) Orbicularis oculi</td> <td>→ Inability to close the eye "remains open" & loss of corneal reflex</td> </tr> <tr> <td>3) Orbicularis oris</td> <td>→ Inability to whistle.</td> </tr> <tr> <td>4) Levators of the angle of mouth</td> <td>→ Drooping of angle of mouth.</td> </tr> <tr> <td>5) Paralysis of buccinator</td> <td>→ Accumulation of food in vestibule of mouth.</td> </tr> <tr> <td>6) Paralysis of stapedius</td> <td>→ Hyperacusis (hypersensitivity to sounds).</td> </tr> <tr> <td>7) Paralysis of chorda tympani</td> <td>→ Loss of taste sensation from anterior 2/3 of tongue & ↓ salivation</td> </tr> <tr> <td>8) Greater superficial petrosal n</td> <td>→ Loss of lacrimation.</td> </tr> </tbody> </table>			a. In facial colliculus (6,7)	→ accompanied by abducent nuclear lesion.	b. In basis pontis (7, Δ)	→ accompanied by hemiplegia (paralysis of 1/2 of the body).	c. At cerebellopontine angle (7,8)	→ where it is accompanied by VIII lesion.	d. At facial canal or stylomastoid foramen (Bell's palsy).		Affected Muscle or nerve	C/P	1) Frontalis	→ Inability to raise eyebrow.	2) Orbicularis oculi	→ Inability to close the eye "remains open" & loss of corneal reflex	3) Orbicularis oris	→ Inability to whistle.	4) Levators of the angle of mouth	→ Drooping of angle of mouth.	5) Paralysis of buccinator	→ Accumulation of food in vestibule of mouth.	6) Paralysis of stapedius	→ Hyperacusis (hypersensitivity to sounds).	7) Paralysis of chorda tympani	→ Loss of taste sensation from anterior 2/3 of tongue & ↓ salivation	8) Greater superficial petrosal n
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EAR

The ear is designed for **hearing** and **equilibrium**

Outer ear (External)	Middle ear (Tympanic Cavity)	Inner (Internal) ear (Labyrinth)
<p>1 Auricle (Pinna)</p> <ul style="list-style-type: none"> - Funnel-like structure - collect sound waves <p>2 External Acoustic Meatus (External Auditory Canal)</p> <ul style="list-style-type: none"> - S-shaped tube - change pressure on eardrum. <p>3 Eardrum (tympanic membrane)</p> <ul style="list-style-type: none"> - Cone shaped 	<ul style="list-style-type: none"> ▪ Air-filled space in temporal bone ▪ Contains 3 bones called Auditory Ossicles: "MIS" <ol style="list-style-type: none"> 1 Malleus 2 Incus 3 Stapes ▪ Oval Window: <ul style="list-style-type: none"> - Opening of tympanic cavity that leads to inner ear ▪ Auditory Tube (Eustachian Tube): <ul style="list-style-type: none"> - Connects middle ear to back of nasopharynx - Conducts air between tympanic cavity & outside of body through nose & mouth - Helps maintain equal pressure of both sides of eardrum 	<p>1 Semicircular canals, vestibule</p> <ul style="list-style-type: none"> - Provide sense of equilibrium. - Pass to vestibular nerve. <p>2 Cochlea</p> <ul style="list-style-type: none"> - Functions in hearing - Contains Spiral Organ (Organ of Corti) that has hair cells which pass sounds to cochlear nerve.
	<ul style="list-style-type: none"> ▪ Related to facial nerve 	

VESTIBULOCOCHLEAR NERVE

	Vestibular nerve	Cochlear (Auditory) Nerve					
Type	It is a pure sensory nerve						
	Equilibrium & balance of body (position & movement of the head)	Hearing					
Origin	Arise from hearing and equilibrium apparatus of inner ear, pass through internal auditory meatus and enter brainstem at pons-medulla border. (CPA)						
	Ganglion "Bipolar" (1st order neurons)						
	Scarpa's (vestibular) ganglion	Cochlear "spiral" ganglion					
	Peripheral processes						
	Processes terminate in vestibular receptors in the semicircular canals" hair cells "	Terminate in the organ of Corti in the cochlea " hair cells "					
	Central processes						
	Form vestibular nerve	Form cochlear nerve					
Termination	2nd order neurons						
	<p>A. Cerebellum: in archicerebellum (Flocculo-nodular lobe).</p> <p>B. The 4 vestibular nuclei:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="background-color: #fce4d6;">Pons</td> <td style="background-color: #e1bee7;">Sup</td> <td style="background-color: #e1bee7;">Lat</td> </tr> <tr> <td style="background-color: #fce4d6;">Medulla</td> <td style="background-color: #e1bee7;">inf</td> <td style="background-color: #e1bee7;">Med</td> </tr> </table>	Pons	Sup	Lat	Medulla	inf	Med
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Pathway	<p> Connections of the vestibular nuclei:</p> <table border="1" style="width: 100%;"> <tr> <td style="background-color: #fce4d6;">Input</td> <td> <ul style="list-style-type: none"> ▪ Vestibular nerve ▪ Cerebellum: cerebello-vestibular fibers </td> </tr> <tr> <td style="background-color: #fce4d6;">Output</td> <td> <ul style="list-style-type: none"> ▪ Cerebellum (archicerebellum): through the inferior cerebellar peduncle (ICP). ▪ Spinal cord: via the lateral and medial vestibulospinal tracts. ▪ Nuclei that move the extraocular muscles: of the two sides (III, IV, VI) via the medial longitudinal fasciculus (MLF) to coordinate movements of the two eyes. ▪ Thalamus (VPMN) and cerebral cortex: (vestibular area that Located in lower part of post-central gyrus) for conscious awareness of vestibular sensation (position of head in space.) </td> </tr> </table>	Input	<ul style="list-style-type: none"> ▪ Vestibular nerve ▪ Cerebellum: cerebello-vestibular fibers 	Output	<ul style="list-style-type: none"> ▪ Cerebellum (archicerebellum): through the inferior cerebellar peduncle (ICP). ▪ Spinal cord: via the lateral and medial vestibulospinal tracts. ▪ Nuclei that move the extraocular muscles: of the two sides (III, IV, VI) via the medial longitudinal fasciculus (MLF) to coordinate movements of the two eyes. ▪ Thalamus (VPMN) and cerebral cortex: (vestibular area that Located in lower part of post-central gyrus) for conscious awareness of vestibular sensation (position of head in space.) 	<p> Auditory Pathway:</p> <ul style="list-style-type: none"> - Organ of Corti in cochlea" hair cells" → spiral ganglion → cochlear nerve → dorsal & ventral cochlear nuclei → trapezoid body & superior olivary nucleus → lateral lemniscus → inferior colliculus in tectum of midbrain → medial geniculate body → auditory radiation → primary auditory area (41 & 42) → auditory association area or Wernick's area (22) which is related to recognition and processing of language by brain. <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p> Note:</p> <ul style="list-style-type: none"> - Representation of cochlea is bilateral at all levels above cochlear nuclei. </div>	
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Lesions	Tinnitus, vertigo, dizziness, nausea, nystagmus, loss of balance and ataxia	<p>1) Lesion in the cochlea, cochlear nerve or cochlear nuclei → complete ipsilateral deafness.</p> <p>2) Lesion in the lateral lemniscus, MGB or auditory area: → partial deafness" on the 2 sides mainly on the opposite side (bilateral diminution of hearing).</p>					