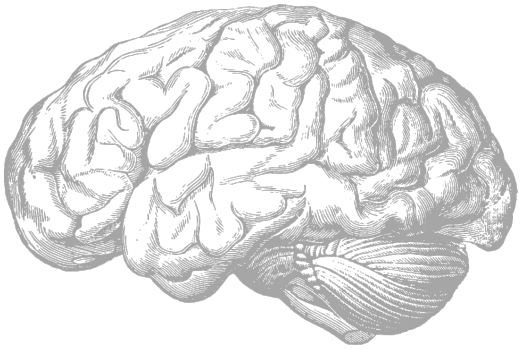
Nerve Supply of the Face (CNs V and VII)

CNS Block



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- Main Text
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The Editing File

Objectives

- List the nuclei of the deep origin of the trigeminal and facial nerves in the brain stem.
- Describe the type and site of each nucleus.
- Describe the superficial attachment of trigeminal and facial nerves to the brain stem.
- Describe the main course and distribution of trigeminal and facial nerves in the face.
- Clinical Anatomy: Describe the main motor & sensory manifestation in case of lesions of the trigeminal & facial nerves.

You can find helpful video by Clicking HERE!

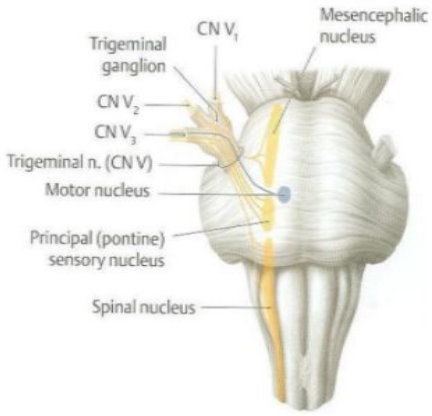
You can find Atlas by Clicking HERE!

Trigeminal Nerve V

Introduction:

Type

Mixed (sensory & motor).



Fibers

1. General Somatic Afferent:
Receives general sensations from face.

2. Special Visceral Efferent:
Supplying muscles developed from the 1st pharyngeal arch, (8 muscles).

Trigeminal Nerve Nuclei

Four Nuclei, (3 Sensory, 1 Motor) :

General Somatic Afferent

Mesencephalic Nucleus (Midbrain & Pons)

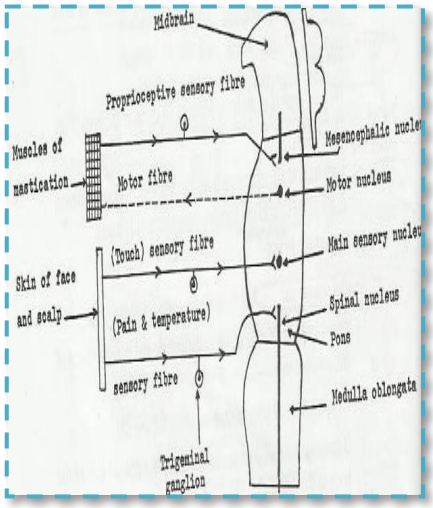
- Receives deep proprioceptive fibers from muscles of mastication.

Principal (Main) Sensory Nucleus (Pons)

- Receives touch fibers from face & scalp.

Spinal Nucleus (Pons, Medulla & Upper 2-3 Cervical Segments of Spinal Cord)

- receives pain & temperature sensations from face & scalp.



Special Visceral Efferent

Motor Nucleus (pons)

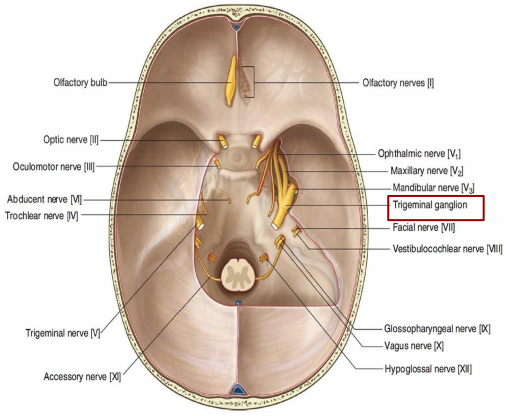
- Supplies: Four Muscles of mastication (temporalis, masseter, medial & lateral pterygoid).
- Other four muscles (Anterior belly of digastric, mylohyoid, tensor palati & tensor tympani).

It's important to know the opening from which each nerve pases through, will be discussed later in this lecture.

Trigeminal Ganglion

Site

Occupies a depression in the middle cranial fossa (temporal bone) **known as Trigeminal cave.**

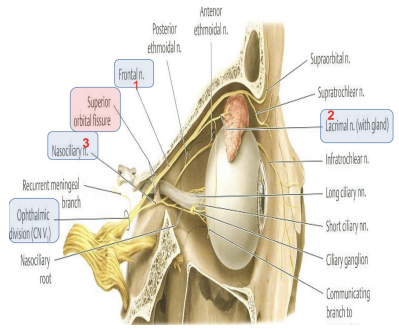
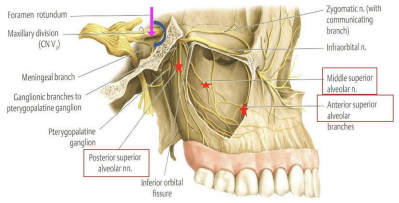
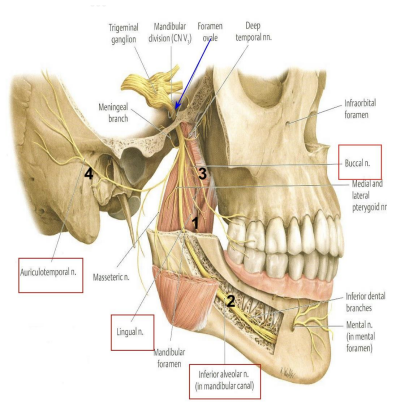
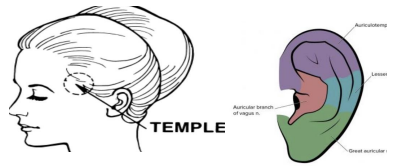


Importance

Contains cell bodies:
1. Whose **dendrites** carry sensations from the face.
2. Whose **axons** form the sensory roots of trigeminal nerve.

Trigeminal nerve emerges from the middle of the ventral surface of the pons by 2 roots (Large Lateral sensory root & small medial motor root).

Trigeminal Nerve Division

OPHTHALMIC (PURE SENSORY) Passes through the superior orbital fissure to the orbit	Frontal	Supplies skin of face & scalp.	
	Lacrimal	Supplies skin of face & lacrimal gland.	
	Nasociliary	Supplies skin of face, nasal cavity and eyeball.	
MAXILLARY (PURE SENSORY) Passes through the foramen rotundum	Superior Alveolar nerves (posterior, middle & anterior)	Upper teeth, gums & maxillary air sinus	
	Zygomaticofacial & Infraorbital nerves	Face	
MANDIBULAR (MIXED) Axons of cells of motor nucleus join **only the mandibular division.** Sensory branches supplies various regions on the side of head Mandibular N. passes through the foramen ovale	Mandibular Itself	Receives proprioceptive fibers from muscles of mastication.	
	Lingual	Receives general sensations from anterior 2/3 the of tongue.	
	Inferior Alveolar	Receives sensations from Lower teeth, gums & face (over mandible).	
	Buccal	Supplies Face (cheek on upper jaw).	
	Auriculotemporal	Supplies auricle, temple, parotid gland & TemporoMandibular joint.	
	Motor Branches	To 8 muscles (4 muscles of mastication & other 4 muscles).	

Trigeminal Neuralgia

1. Compression, degeneration or inflammation of the 5th cranial nerve may result in trigeminal neuralgia or tic douloureux (convulsions in the face)

2. Recurring episodes (recurrent attacks) of intense stabbing pain (excruciating pain)

3. Pain is radiating from the angle of the jaw along a branches of the trigeminal nerve

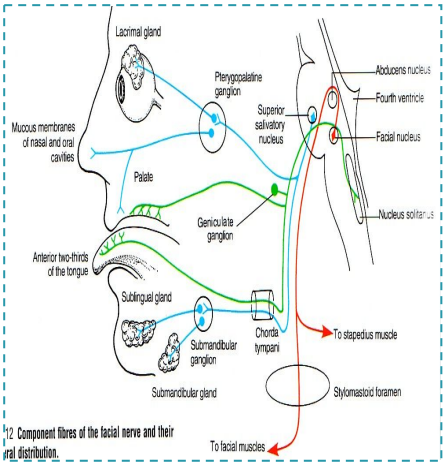
4. Usually involves maxillary & mandibular branches, rarely in the ophthalmic division.

Facial Nerve VII

Introduction:

Type

Mixed (special sensory, motor & parasympathetic).



12 Component fibres of the facial nerve and their oral distribution.

Fibers

Special Visceral Afferent

Carries taste sensation from the anterior 2/3 of the tongue.

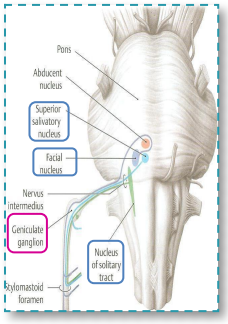
Special Visceral Efferent

Motor; supplying muscles developed from the 2nd pharyngeal arch.

General Visceral Efferent

Supplies parasympathetic secretory fibers to submandibular, sublingual, lacrimal, nasal & palatine glands.

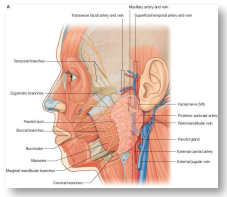
Facial Nerve Nuclei



The Facial Nerve has 3 nuclei:

Special Visceral Afferent	**Nucleus Solitarius** ○ It receives taste from the anterior 2/3 of tongue. ○ **Geniculate Ganglion**: Contains cell bodies of neurons of facial nerve; its fibres carrying taste sensations from anterior 2/3 of tongue; ending in solitary nucleus in M.O. It lies in internal acoustic meatus.
Special Visceral Efferent	**Motor Nucleus of Facial nerve** ○ It supplies muscles of face, posterior belly of digastric, stylohyoid, platysma, stapedius, and occipitofrontalis.
General Visceral Efferent	**Superior Salivatory Nucleus** ○ It sends Preganglionic parasympathetic secretory fibers to sublingual, submandibular, lacrimal, nasal & palatine glands.

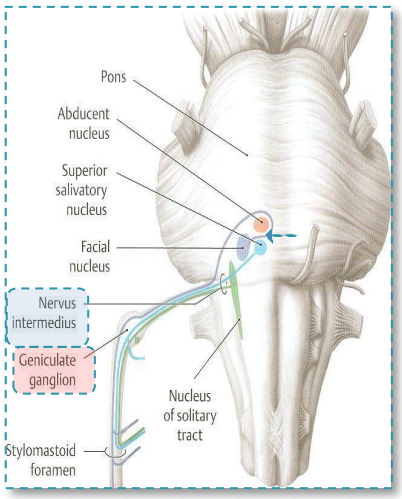
Course of the Facial Nerve

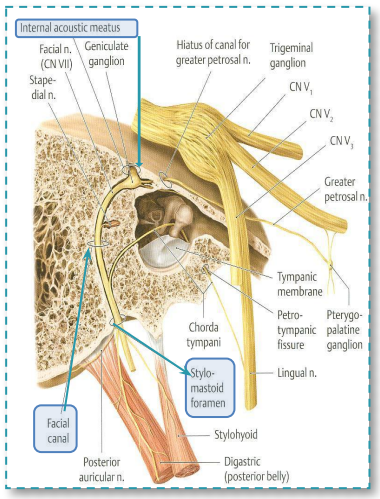


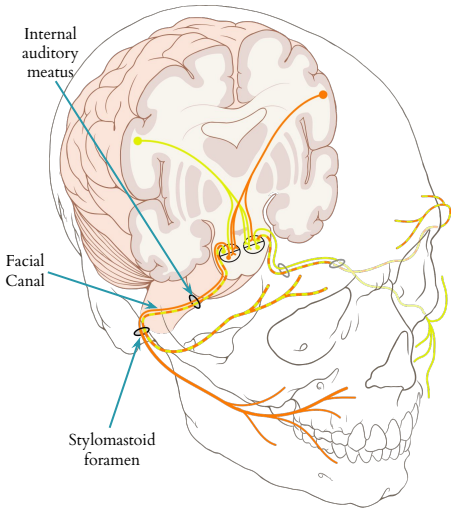
It emerges from the Cerebellopontine angle by 2 roots:
1. Medial motor root: contains motor fibers.
2. Lateral root (nervus intermedius): contains parasympathetic & taste fibers.

Passes through internal auditory meatus to inner ear where it runs in facial canal.

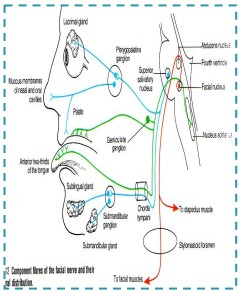
Emerges from the Stylomastoid foramen & enter the parotid gland where it ends.







Branches of Facial Nerve



There are 3 branches that emerges in the Facial Canal:

Greater Petrosal

It carries preganglionic parasympathetic fibers to lacrimal, nasal & palatine glands.

Chorda Tympani

It carries:

a) Preganglionic parasympathetic fibers to submandibular & sublingual glands.
b) Taste fibers from anterior ⅔ of tongue.

Nerve to Stapedius

It controls the amplitude (range) of sound waves from the external environment to the inner ear.

Just as it emerges from the facial canal through the stylomastoid foramen, it gives:

Posterior auricular:

To occipitofrontalis muscle.

Muscular branches:

To posterior belly of digastric & stylohyoid.

Inside parotid gland:

It gives 5 terminal motor branches to the muscles of the face:

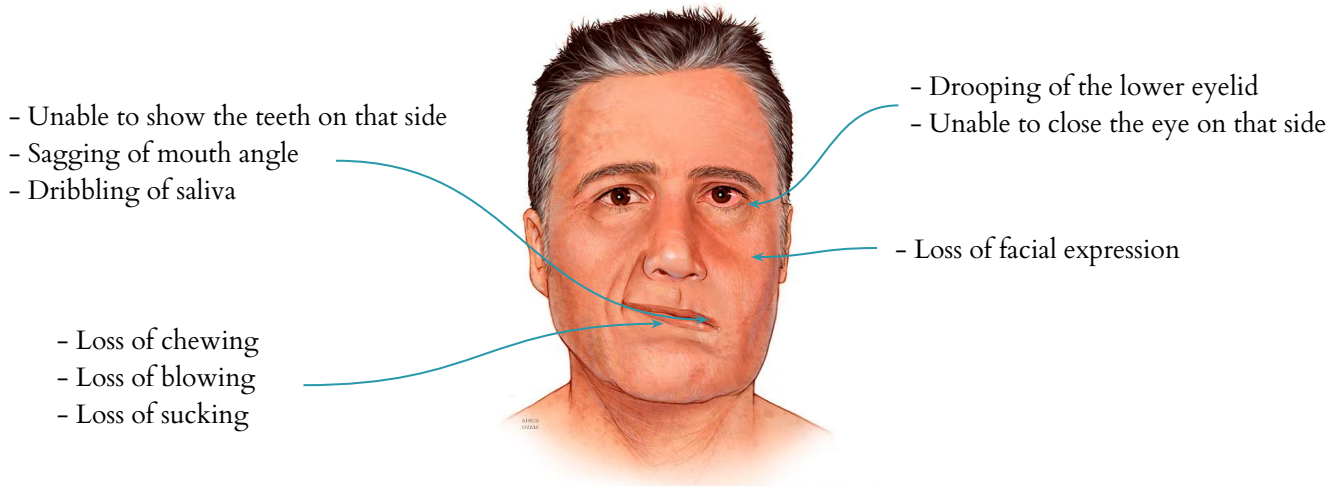
1- Temporal
2- Zygomatic
3- Buccal
4- Mandibular
5- Cervical (for platysma muscle)

Lesion of Facial Nerve

Bell's Palsy

Damage of the facial nerve itself will result in **paralysis** of muscles of facial expressions of the same side, and the whole side of the face is affected

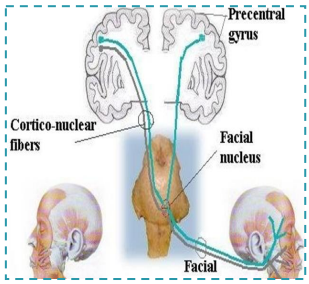
Face is distorted in LMN lesion (Bell's Palsy):



NB. In upper motor neuron lesion (upper face is intact).

Extra

UMN and LMN



Lower Motor Neuron Lesion

Results from injury of facial nerve fibres below facial nucleus as in internal acoustic meatus; in the middle ear; in the facial canal or in parotid gland.

Manifested by complete paralysis of facial muscles on the same side of lesion.

Upper Motor Neuron Lesion

This occurs after injury to the pyramidal tract (corticonuclear) above facial nucleus...

Leads to paralysis of facial muscles of lower ½ of face of opposite side but the upper ½ of the face intact because:

- Muscle of lower ½ of face receive pyramidal fibres from opposite cerebral cortex only,
- While Muscle of upper ½ of face receive pyramidal fibres from both cerebral hemispheres (Bilateral represented).

Summary

- Both trigeminal & facial nerves are mixed.

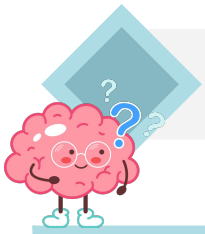
- **Nuclei of trigeminal** nerve are found in **midbrain, pons & medulla.** They
are of the general somatic afferent & special visceral efferent types.

- **The trigeminal nerve** emerges from the **pons** and **divides into:** ophthalmic, maxillary & mandibular divisions that **receive sensory supply from the face** (with an exception of a small area over ramus of mandible by great auricular nerve C2,3).

- **All motor fibers** are included in the mandibular division & supply muscles of mastication.

- **Nuclei of facial nerve** are found in **pons.** They are of the special visceral afferent & efferent types, as well as general visceral efferent type.

- **The facial nerve** emerges from the **cerebellopontine angle**, gives **motor fibers** to **muscles of facial expression, secretory fibers** to submandibular, sublingual, lacrimal, nasal & palatine glands & receives **taste fibers** from anterior 2/3 of tongue.



Test Yourself !:

Q1. Stimulation of which of the following nerves could lead to salivation and lacrimation?			
A. Facial.	B. Glossopharyngeal.	C. Trigeminal.	D. Vagus.
Q2. Lesion of mandibular nerve may result in:			
A. Loss of sensation of skin over the nose.	B. Loss of lacrimation.	C. Loss of sensory supply of upper teeth.	D. Loss of general sensations of anterior 2/3 of tongue.

A1. A A2. D

Cranial Nerves Mnemonic

Extra Slide

Cranial Nerve	Mnemonic for Cranial Nerves	Mnemonic for Cranial Nerves type
I: Olfactory – Sensory	On	Some
II: Optic – Sensory	Occasion	Say
III: Oculomotor – Motor	Our	Marry
IV: Trochlear – Motor	Trusty	Money
V: Trigeminal – Both	Truck	But
VI: Abducens – Motor	Acts	My
VII: Facial – Both	Funny	Brother
VIII: Vestibulocochlear – Sensory	Very	Says
IX: Glossopharyngeal – Both	Good	Big
X: Vagus – Both	Vehicle	Brains
XI: Accessory – Motor	Any	Matter
XII: Hypoglossal – Motor	How	More

MCQs

Q1. Which of the following is NOT a branch of the ophthalmic nerve of the trigeminal?			
A. Lacrimal nerve	B. Frontal nerve	C. Nasociliary nerve	D. Supraorbital nerve
Q2. Which of the following is a sensory branch of the mandibular nerve of the trigeminal?			
A. Zygomaticofacial nerve	B. Auriculotemporal nerve	C. Infraorbital nerve	D. Supraorbital nerve
Q3. Local anesthesia is applied to _____ nerve of trigeminal during lower teeth surgeries			
A. Maxillary	B. Mandibular	C. Ophthalmic	D. Zygomatic
Q4. What is the site of the geniculate ganglion?			
A. Facial canal	B. External acoustic meatus	C. Internal acoustic meatus	D. Stylomastoid foramen
Q5. Which facial nerve branch transfers taste sensations from the anterior 2/3 of the tongue?			
A. Chorda tympani	B .Mandibular nerve	C. Lingual nerve	D. Greater petrosal nerve
Q6. Which branch of the trigeminal passes through the foramen rotundum?			
A. Maxillary	B. Mandibular	C. Ophthalmic	D. Lingual

A1. D A2. B A3. B A4. C A5. A A6. A

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Retal alshohail

Norah Almania

Deena Almahawas

Omar Almogren

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