Anatomy Team
MED 439

Revised & Approved

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MED439
KING SAUD UNIVERSITY

The Nerve Supply of the Face 5th & 7th

CNS Block

Don't forget to check the Editing File

Color index:

Content
Male slides
Female slides
Important
Doctors notes
Extra information, explanation

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Objectives

At the end of the lecture, students should be able to:

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

5th CN: Trigeminal Nerve

Dr's notes before starting keep in your mind these differences

Trigeminal nerve	Facial nerve
*general sensation of skin of the face	Receive taste sensation of the Anterior ⅔ of the tongue
Motor of muscle of mastication	Motor for the muscles of expression of the face
Sensory & motor	Sensory & motor & parasympathetic

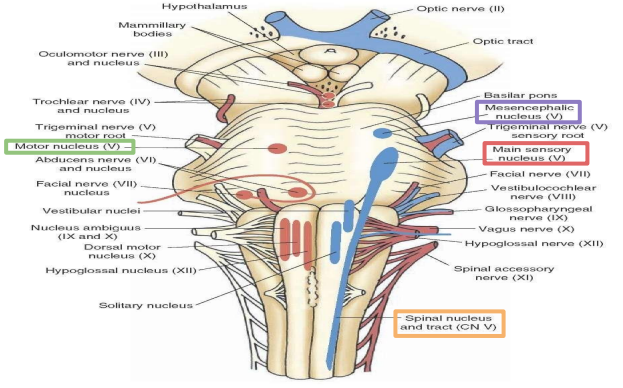
Type: Mixed (Sensory & Motor).(largest cranial nerve)

Receive: Sensory supply from the face (with an **exception** of a small area over ramus of mandible by great auricular nerve C2,C3).
Receives proprioceptive fibers from muscles of mastication.

Fibers:

1- General somatic Afferent
➔ Carrying general sensations from face and innervates the skin, mucous membranes and sinus of the face

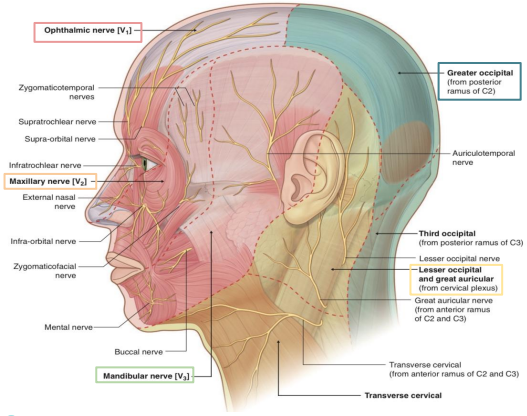
2- Special visceral Efferent
➔ Supplying muscles developed from the 1st pharyngeal arch. (8 muscles).



Nuclei (Deep origin): 3 Sensory + 1 Motor.

General somatic Afferent (Sensory):			Special visceral Efferent (motor):
Mesencephalic nucleus (Midbrain & pons)	**Principal (main) sensory nucleus** (Pons)	**Spinal nucleus** (pons, medulla & upper 2-3 cervical segments of spinal cord)	**Motor nucleus** (pons)
Receives **proprioceptive fibers** from muscles of mastication	Receives **touch fibers** from face & scalp	Receives **pain & temperature sensations** from face & scalp.	**Supplies**: 8 Muscles **1-** Four **Muscles of mastication** (temporalis, masseter, medial & lateral pterygoid). **2-** Other four muscles (Anterior belly of digastric, mylohyoid, tensor palati & tensor tympani).

5th CN: Trigeminal Nerve



Trigeminal Ganglia

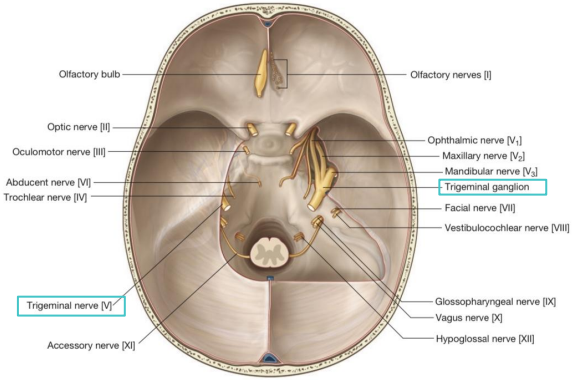
Site

Occupies a depression in the middle cranial fossa
(apex of petrous temporal bone)
(trigeminal impression)
Called the **trigeminal cave**.

Importance

Contains cell bodies :

1- Whose dendrites carry sensation from the face.
2- Whose axons form the sensory root of trigeminal nerve.



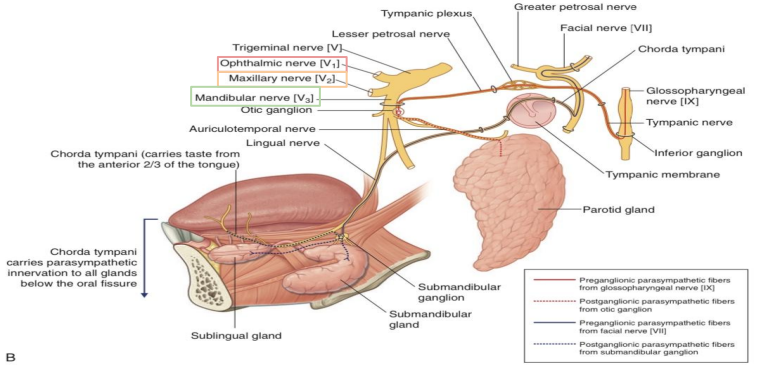
Trigeminal Nerve

- **Emerges from the middle of the ventral surface of the pons by 2 roots:**
  1. Large lateral sensory root
  2. Small medial motor root.

- **Divides into divisions nucleus (dendrites of trigeminal ganglion) :**
  1. Ophthalmic CN V1
  2. Maxillary CN V2
  3. Mandibular CN V3

DR. It's important to know the openings where each nerve pass through. will be discussed later in this lecture

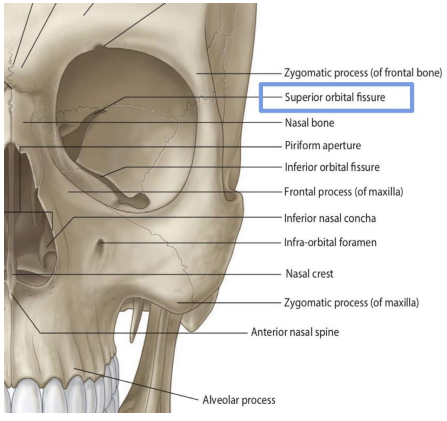
Axons of cells of motor nucleus join **only** the mandibular division CN V3



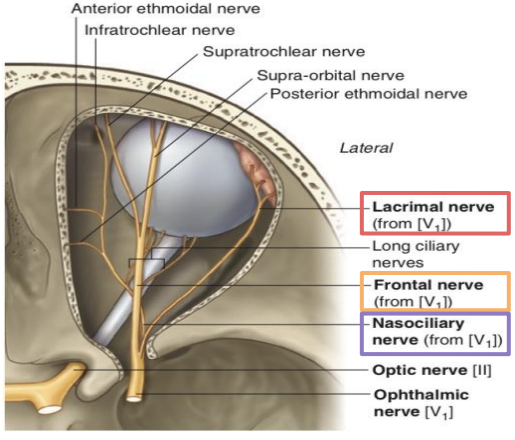
B

Ophthalmic Division (CN V1)

Ophthalmic Division CN V1



Pure sensory.
It divides into 3 branches which pass through superior orbital fissure to the orbit.

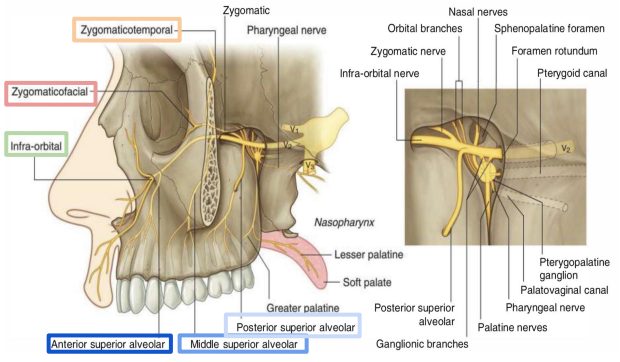
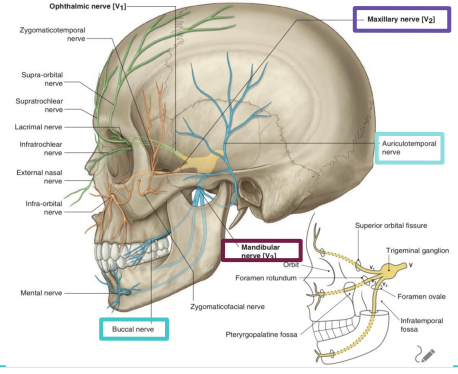
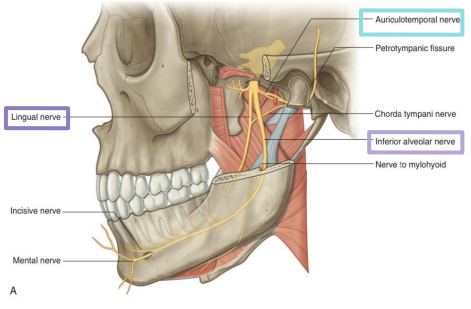


Frontal
Supplies skin of face & scalp

Lacrimal
Supplies skin of face, lacrimal gland.

Nasociliary
Supplies skin of face & Nasal cavity & eyeball

Maxillary & Mandibular Division (CN V2&3)

	Maxillary (CN V2)	Mandibular (CN V3)	
Type	Pure sensory	Mixed	
★ **Passes through**	Foramen rotundum	Foramen ovale.	
Supplies	**1- Upper teeth, gum & maxillary air sinus** ➔ **Anterior**, **middle** & **posterior superior** alveolar nerves. **2-Face:** ➔ **Zygomaticofacial nerve.** ➔ **Infraorbital nerve.**	**Sensory branches** supply various regions on the side of head. **1- Lingual :** receives general sensations from anterior ⅔ the of tongue. **2- Inferior alveolar:** supplies lower teeth, gums & face (over mandible). **3- Buccal:** supplies face (cheek on upper jaw). **4- Auriculotemporal:** Supplies auricle, temple, parotid gland & TMJ.	**Motor branches:** **Supplies**: 8 Muscles **1-** Four **Muscles of mastication** (temporalis, masseter, medial & lateral pterygoid). **2-** Other four muscles (Anterior belly of digastric, mylohyoid, tensor palati & tensor tympani).
Picture			

Trigeminal Neuralgia

Compression, degeneration or inflammation of the **5th** cranial nerve may result in a condition called **trigeminal neuralgia** or tic **douloureux**. (French word) (convulsions in the face) (spasmodic contraction of the muscles in the face)

This condition is characterized by:

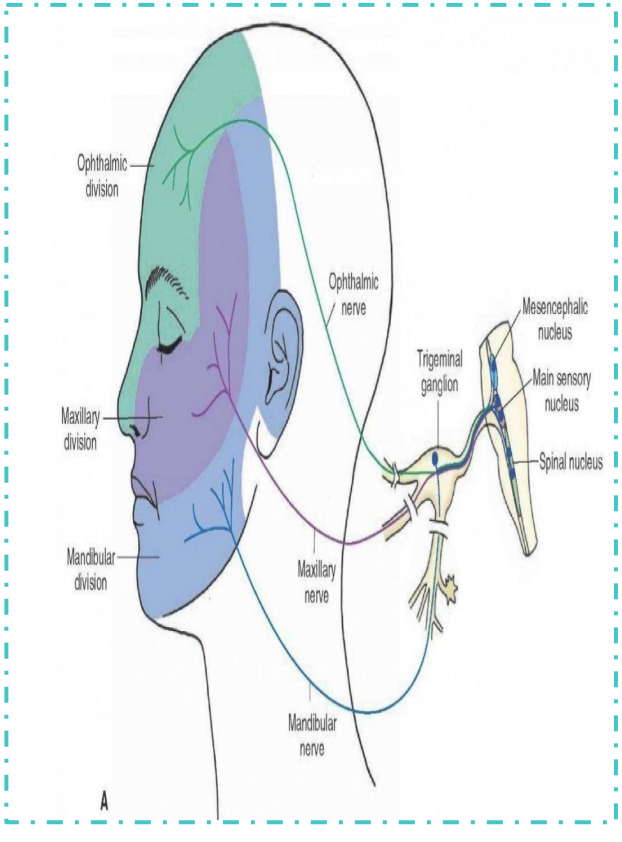
1. Recurring episodes (recurrent attacks) of **intense** stabbing pain (excruciating pain)
2. **Severe** excruciating pain radiating from the angle of the jaw along a branches of the trigeminal nerve.

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

Usually the problem comes from the contact between a normal blood vessel and the trigeminal nerve at the base of the brain. This contact puts pressure on the nerve and causes it to malfunction.

-Trigeminal neuralgia can occur as a result of aging, or it can be related to multiple sclerosis or a similar disorder that damages the myelin sheath protecting certain nerves.

-Trigeminal neuralgia can also be caused by a tumour compressing the trigeminal nerve.



5th CN: Trigeminal Nerve

This whole page is Found in males only

Importance of Mandibular nerve

- Every time you eat you should thank mandibular nerve.
- It is one of the most important nerves for the function of your mouth, and without it, you wouldn't be able to chew.
- It helps you feel sensations, including temperature and pain
- Your mandibular nerve also helps you with other important functions besides eating that include the ability to speak and breath
- Understanding this nerve can help you understand any pain or discomfort you experience around your mouth

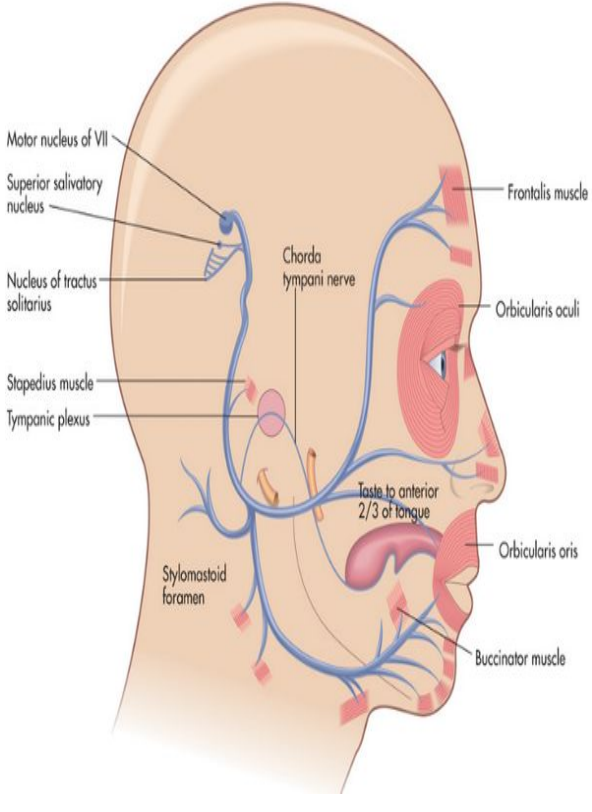
Trigeminal Nerve & Dental Work

- The mandibular nerve plays a role just about every time you get dental work done, especially in the lower part of your mouth.
- Anytime you have dental work done, you'll face a small risk of permanent nerve damage.
- Wisdom tooth extraction is a common case in which patients face this risk.
- And in any dental surgery, you'll need local anaesthesia, so your mandibular nerve won't transmit pain messages during the surgery.
- Local anaesthetics block the part of the nerve that is affected.
- However, nerve damage also makes a rare complication for procedures like dental implants and other dental surgeries.
- That's why you should always work with an experienced, responsible dentist who can minimize your risk.

7th CN: Facial nerve

Has **mixed** types: (**Special Sensory, motor, Parasympathetic**)
it's important for non-verbally communicate with each other by facial expression.

Fibers	Nuclei
Special visceral afferent	**Special visceral afferent:** **(nucleus solitarius).**
carrying taste sensation from the anterior 2/3 of the tongue.	receives taste from the anterior 2 /3 of the tongue.
Special visceral efferent	**Special visceral efferent** **(motor nucleus of facial nerve)**
Supply muscles developed from the 2nd pharyngeal arch. The muscles of facial expression, The posterior belly of the digastric, The stylohyoid muscle, The auricular muscle, The stapedius muscle of the middle ear.	Supplies: muscles of face (facial expressions), posterior belly of digastric, stylohyoid, platysma, stapedius, and occipitofrontalis.
General visceral efferent	**General visceral efferent:** **(Superior salivatory nucleus)**
Supplying parasympathetic secretomotor fibers to: Submandibular, Sublingual, Lacrimal, Nasal & Palatine glands.	Sends preganglionic parasympathetic secretory fibers to sublingual, submandibular, lacrimal , nasal & palatine glands.



-A lift of an eyebrow, the wrinkling of a nose, or the slight twinge of the corner of the mouth can tell us quite a bit if we are paying attention.
-We notice these small changes and interpret not only what they indicate about the people we are interacting with, but also what they indicate regarding their behaviour towards us, and the relationships forming between us.

7th CN: Course Of Facial Nerve

01

Emerges from the cerebellopontine angle by 2 routs:
- **Medial motor root:** contains motor fibers
- **Lateral root** (nervous intermedius): contains: parasympathetic & taste fibers.

02

It passes through internal auditory meatus to the inner ear where it runs in facial canal.

03

Emerges from the stylomastoid foramen & enters the parotid gland where it ends.

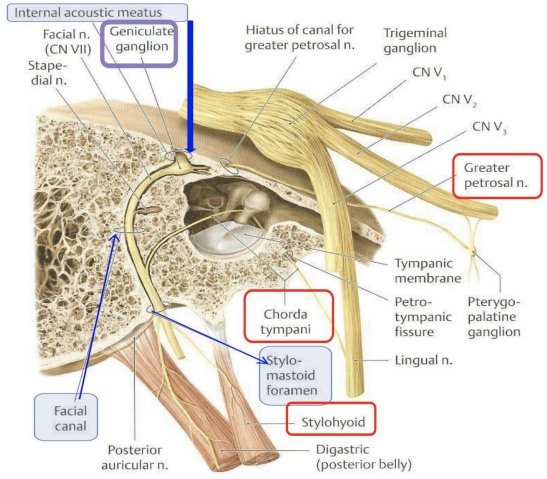
Branches Of The Facial Nerve

In the facial canal

A — **Greater petrosal nerve**
- carries preganglionic parasympathetic fibers to lacrimal, nasal & palatine glands.

B — Female's doctor:very important — **Chorda tympani**
- **Preganglionic parasympathetic fibers** to submandibular ganglion then postganglionic fibers to submandibular & sublingual glands.
- **Taste fibers** from anterior 2/3 of tongue.

C — **Nerve to stapedius**
- control the amplitude (range) of sound waves from external environment to inner ear.



N.B. 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 Lies in internal acoustic meatus.

Branches Of The Facial Nerve cont..

Once it emerges from stylomastoid foramen

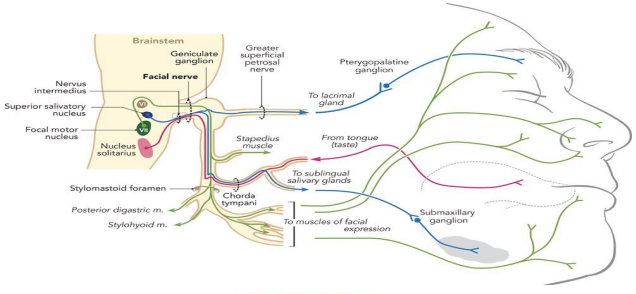
- Posterior auricular innervates: **occipitofrontalis muscle**
- Muscular branches innervates: **posterior belly of digastric & stylohyoid.**

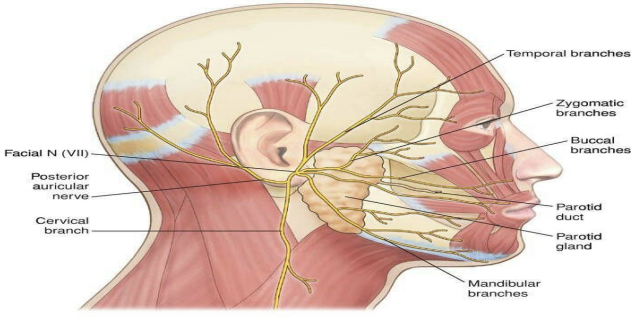
Inside parotid gland

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

- Temporal
- Zygomatic
- Buccal
- Mandibular
- Cervical

Innervates muscles of the face





Bell's Palsy

- Damage of the facial nerve results in paralysis of muscles of facial expressions: Facial (Bell's) palsy; lower motor neuron lesion (whole face affected)
- **Face is distorted:**

- Drooping of lower eyelid

- Sagging of mouth angle

- Dribbling of saliva

- Unable to show teeth or close the eye on that side.

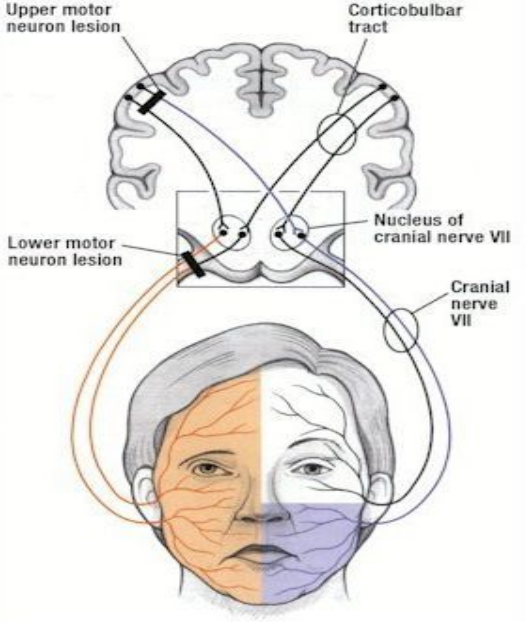
- Loss of facial expression
- Loss of blowing
- Loss of sucking
- Loss of chewing,

Bell's palsy face Vs Normal face

Motor neuron lesions

Lower motor neuron lesion

- Results from injury of facial nerve fibers below facial nucleus 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

- It occurs after injury to the pyramidal tract (corticonuclear) above facial nucleus.
- Leads to paralysis of facial muscles of lower 1⁄2 of face of opposite side but the upper 1⁄2 of the face intact.

because:

- Muscles of lower 1⁄2 of face receive pyramidal fibers from opposite cerebral cortex only.
- While Muscles of upper 1⁄2 of face receive pyramidal fibers from both cerebral hemispheres (Bilateral represented).

MCQ

Q1: Trigeminal nerve divides into three divisions, motor nucleus join only in?			
A: CN V1	B: CN V2	C: CN V3	D: CN V1 & CN V3

Q2: Frontal supplies..			
A: Skin of face & scalp	B: Skin of face & sensory for lacrimal gland	C: Skin of face , nasal cavity & eyeball	D: Scalp & eyeball

Q3: Nasociliary supplies..			
A: Skin of face & scalp	B: Skin of face & sensory for lacrimal gland	C: Skin of face , nasal cavity & eyeball	D: Scalp & eyeball

Q4: Maxillary nerve supplies the following <u>except</u>?			
A: Maxillary air sinus	B: Cheek on upper jaw	C: Zygomaticofacial nerve	D: Infraorbital nerve

Q5: Lesion of mandibular nerve may result in ?			
A: Loss of general sensations of anterior ⅔ of tongue	B: Loss of sensory supply of upper teeth	C: Loss of sensation of skin over the nose	D: Loss lacrimation

Q6: The special visceral efferent fibers of the trigeminal nerve supplies?			
A: Posterior belly of digastric	B: Omohyoid	C: Ventral pterygoid	D: Temporalis muscles

Answer key:
1(C),2(A),3(C),4(B),5(A),6(D)

MCQ

Q7: The facial nerve supplies which of the following?			
A: Anterior belly of digastric	B: posterior belly of digastric	C: Muscles of mastication	D: All of them

Q8:Which of the following is a branch of the facial nerve in the facial canal?			
A: Posterior auricular	B:Temporal muscle	C:Ventral pterygoid	D:Corda tympani

Q9: A 30-year-old pregnant female, came to the hospital with the inability to voluntarily move the right side of her face, close her eye and slight drooping at the corner of her mouth, what's the most likely diagnoses in her condition?			
A:Bell palsy	B:Jugular foramen syndrome	C:Chronic meningitis	D:None of them

Q10: paralysis of facial muscles on the same side is a Characteristics of which of the following lesions?			
A:Upper motor lesion	B:Lateral motor lesion	C:Lower motor lesion	D:A&C

Q11:which of the following facial branches responsible for the taste sensation from the anterior ⅔ of the tongue?			
A:Greater petrosal nerve	B:Corda tympani	C: Nerve to stapedius	D:parotid gland

Q12:The facial nerve Emerges from the cerebellopontine angle by 2 routes, which are ?			
A:anterior & posterior routes	B:medial & lateral routes	C:anterior & lateral routes	D: posterior & medial

Answer key:
7(B) , 8(D) , 9(A) , 10(C) , 11(B) , 12(B)

SAQ

Q1: What is the importance of the trigeminal ganglia?

Q2: List the branches of the ophthalmic.

Q3:Enumerate the branches of the facial nerve in the Facial canal..

Q4: Enumerate the branches of the facial nerve inside the parotid gland.

Answers

1 : Contains cell bodies :

1- Whose dendrites carry sensation from the face & scalp.
2- Whose axons form the sensory root of trigeminal nerve.

2 :

1- **Frontal:** Supplies skin of face & scalp
2- **Lacrimal:** Supplies skin of face & sensory for lacrimal gland
3- **Nasociliary:** Supplies skin of face, nasal cavity & eyeball

3 :

Greater petrosal nerve, Corda tympani, Nerve to stapedius

4:

Temporal , Zygomatic, Buccal, Mandibular, Cervical

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