



MED437  
KING SAUD UNIVERSITY



# Nerve Supply of the Face 5<sup>th</sup> & 7<sup>th</sup>

Lecture (7)

Please check our [Editing File](#)

هذا العمل مبني بشكل أساسي على عمل دفعة ٤٣٦ مع المراجعة والتدقيق وإضافة الملاحظات ولا يعني عن المصدر الأساسي للمذاكرة

- **Important**
- **Doctors Notes**
- Notes/Extra explanation

{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

# Objectives

**By the end of the lecture, students should be able to:**

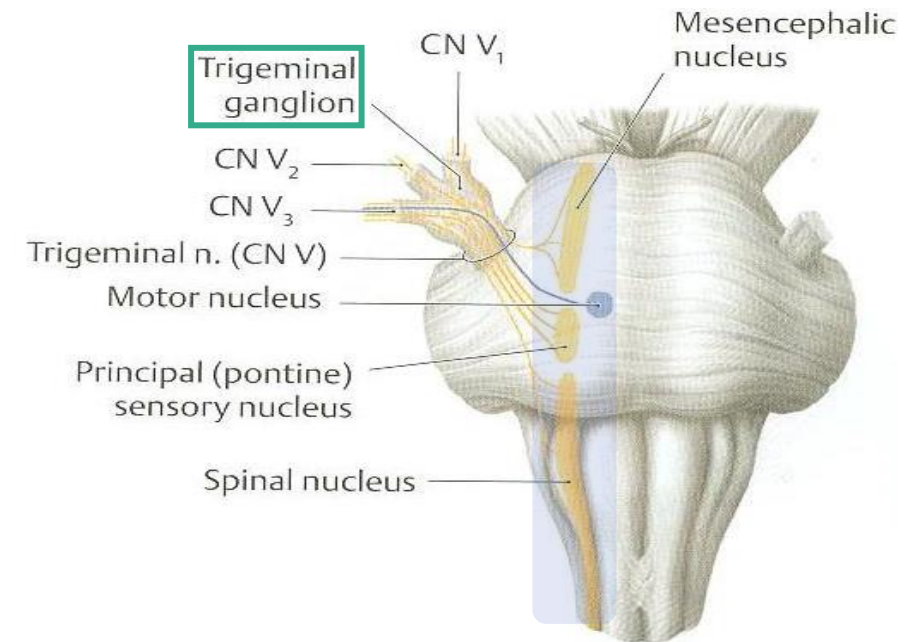
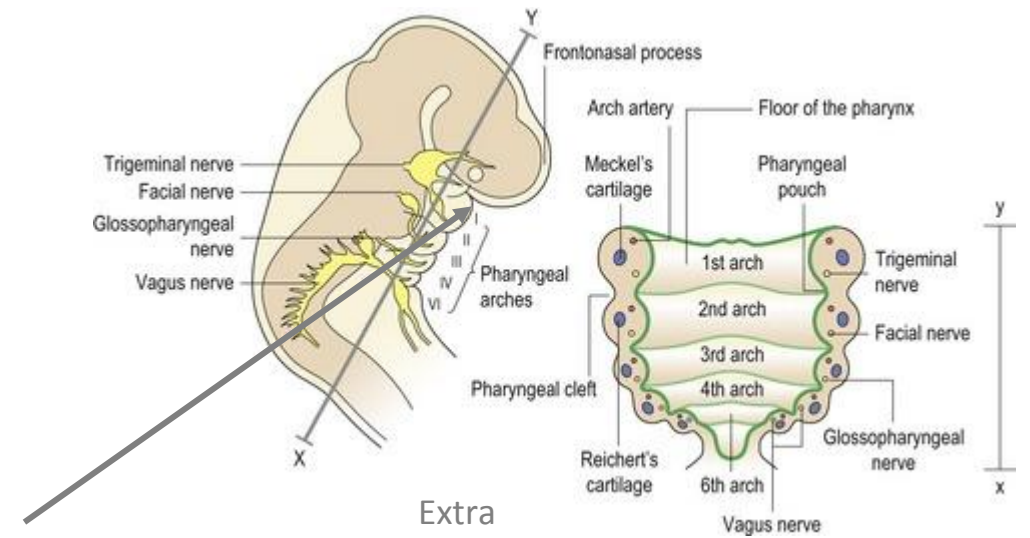
- ✓ List the nuclei of the deep origin of the trigeminal and facial nerves in the brain stem.
- ✓ Describe the type and site of each nucleus.
- ✓ Describe the superficial attachment of trigeminal and facial nerves to the brain stem.
- ✓ Describe the main course and distribution of trigeminal and facial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

# Trigeminal (V) 5<sup>th</sup> Cranial Nerve

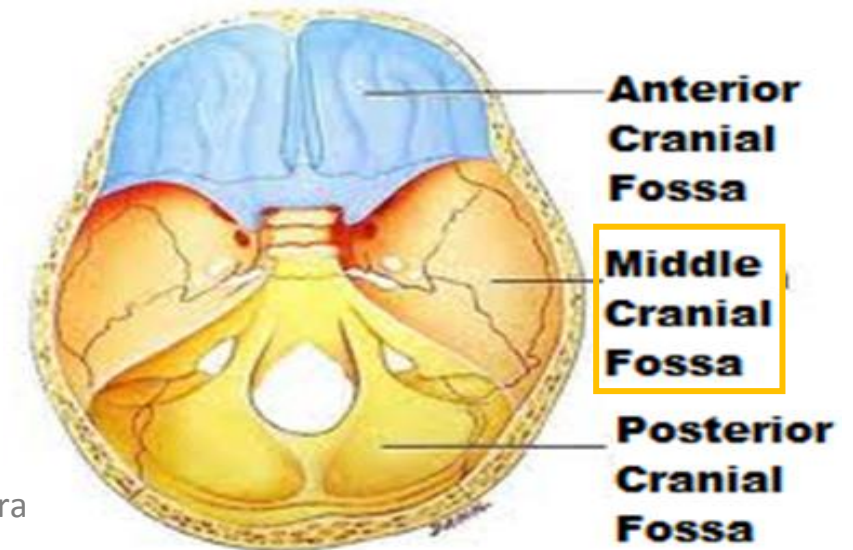
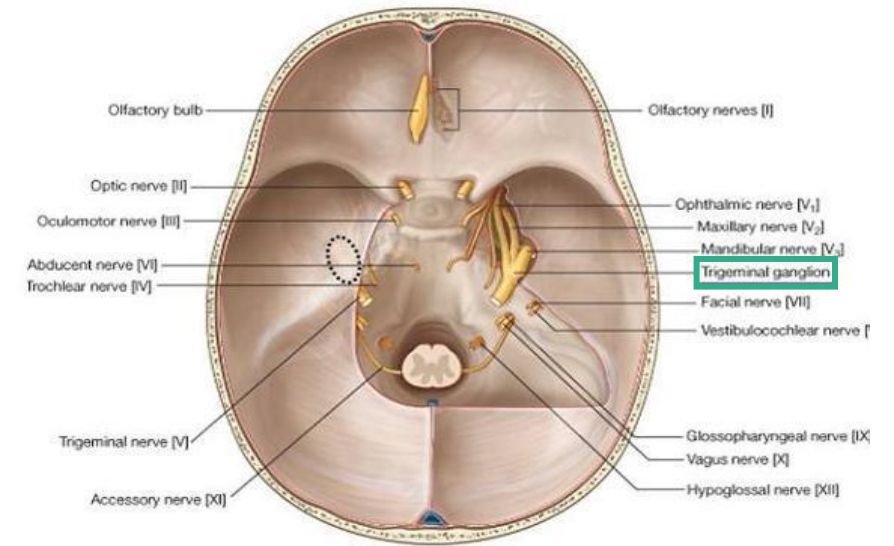
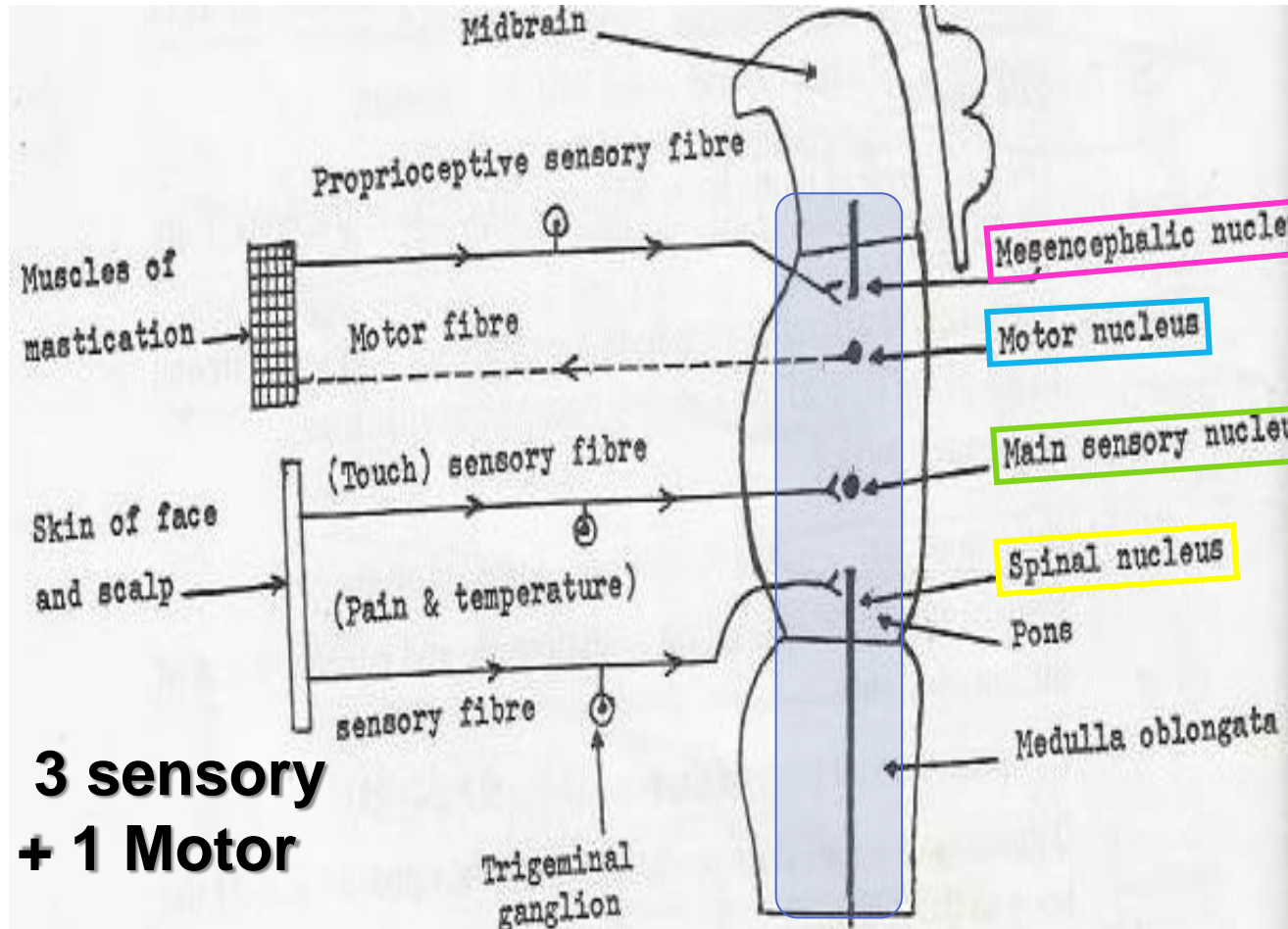
- Type: **Mixed** (sensory & motor).
- Fibers:
  1. *General somatic afferent*: afferent → sensory  
Carrying general sensations from **face**, and anterior part of **scalp**.
  2. *Special visceral efferent*: efferent → motor  
Supplying **muscles developed from the 1st pharyngeal arch**, (8 muscles will be mentioned in slide 5).

## Trigeminal Ganglion

- *Site*: Occupies a depression in the middle cranial fossa (Trigeminal impression). see next slide
- *Importance*: Contains cell bodies:
  1. Whose dendrites carry sensations from the face and scalp.
  2. Whose axons form the sensory root of trigeminal nerve.



# Trigeminal (V) 5th Cranial Nerve Nuclei (deep origin)



Extra

# Trigeminal (V) 5th Cranial Nerve Nuclei

Four nuclei: (3 sensory + 1 Motor).

\*chewing

General somatic afferent:

Special visceral efferent:

**1. Mesencephalic nucleus** (midbrain & pons): receives *proprioceptive* fibers from muscles of mastication\*.

**2. Principal (main) sensory nucleus** (pons): receives *touch* fibers from face & scalp

**3. Spinal nucleus** (pons, medulla & upper 2-3 cervical segments of spinal cord): receives *pain & temperature* sensations from face & scalp.

**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).

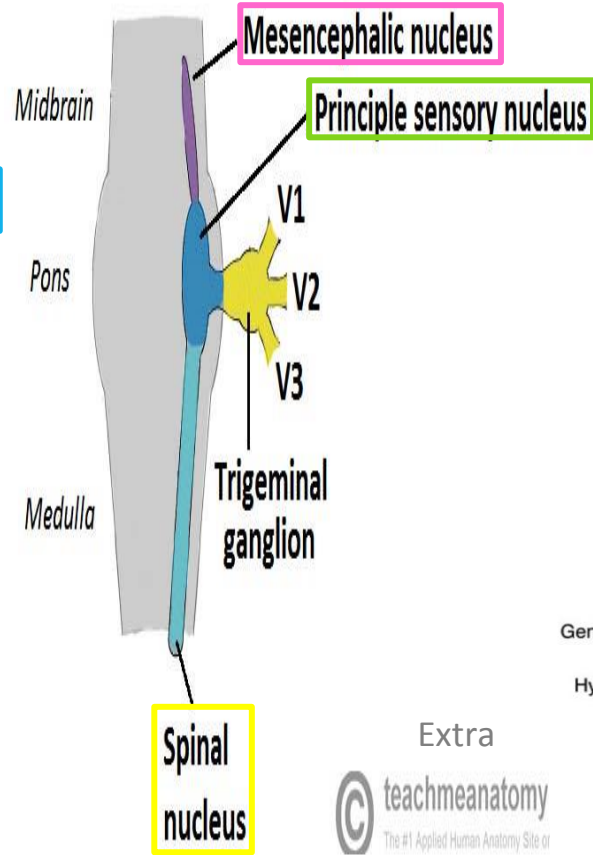
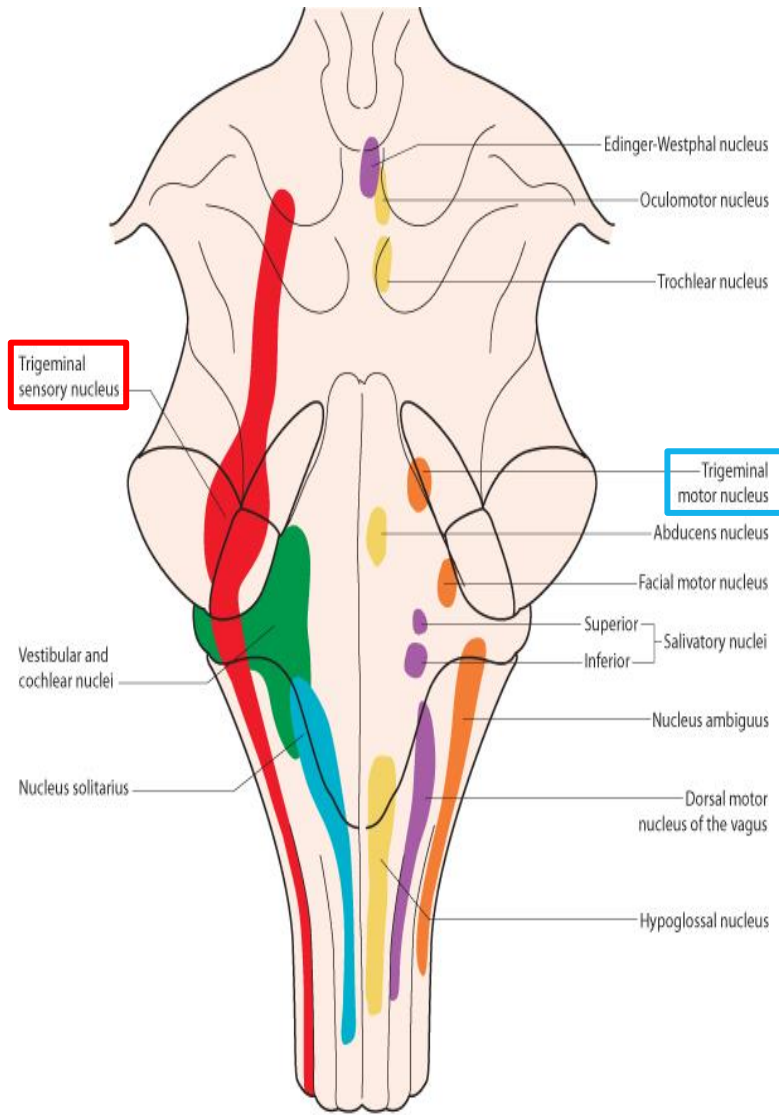
Mnemonics:

Masseter = master

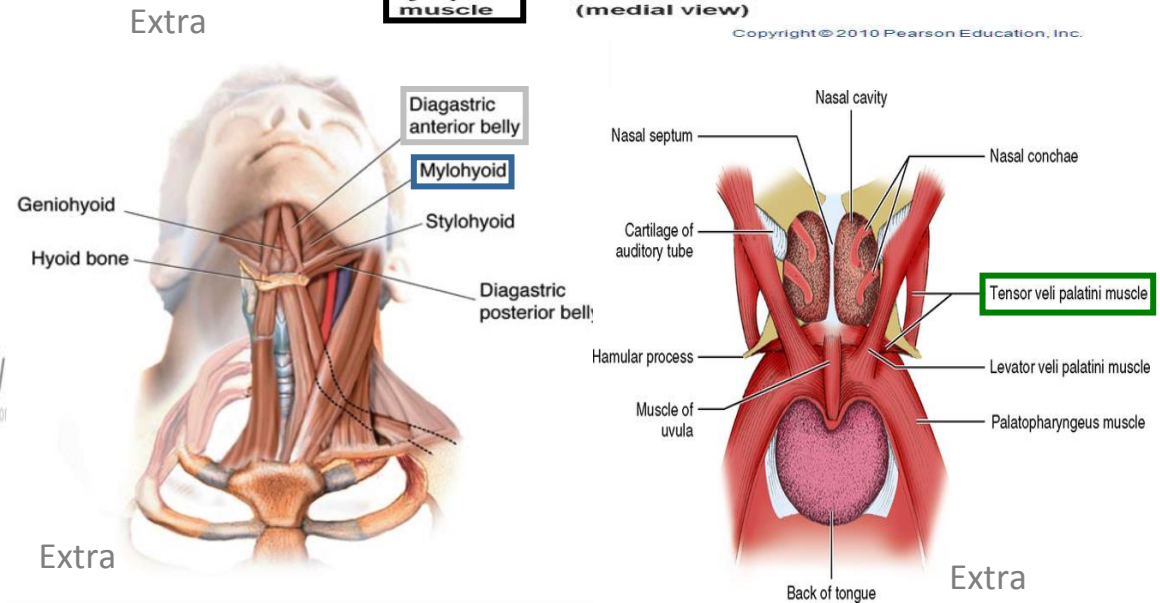
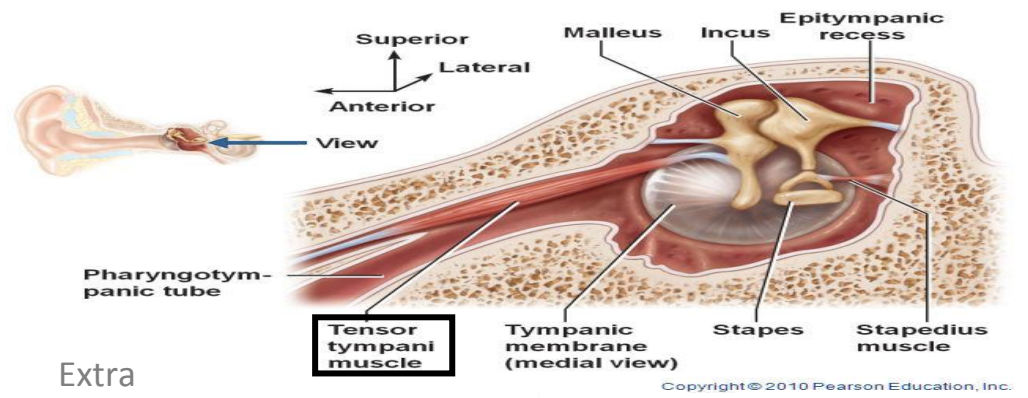
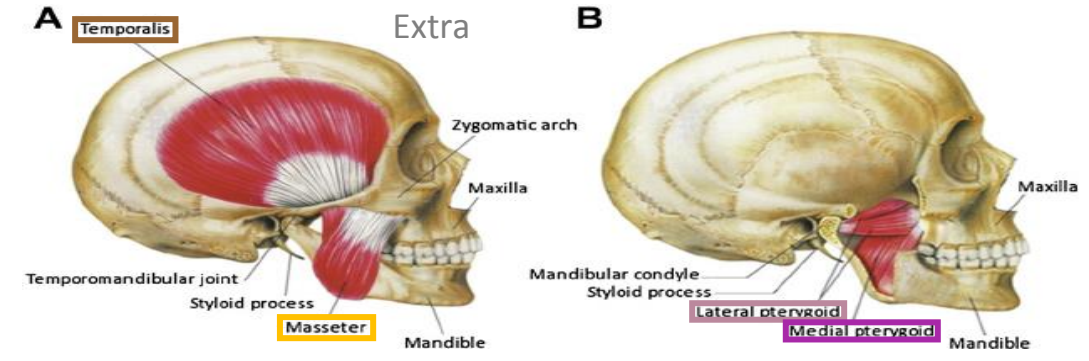
Pterygoid = pretty good

For the diagrams see next slide

the other name of it is tractus nucleus  
لانها زي التراكات نازلة لتحت.



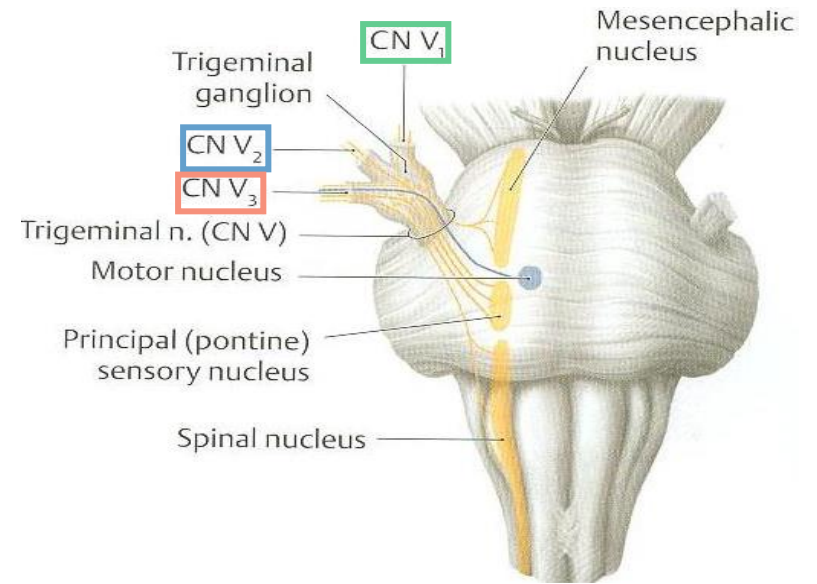
Extra  
 teachmeanatomy  
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# Trigeminal (V) 5th Cranial Nerve

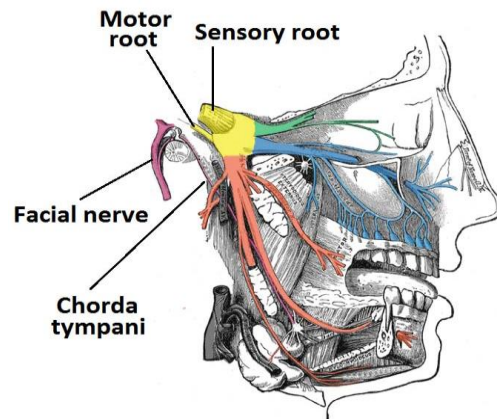
- Emerges from the **middle** of the **ventral surface of the pons** by 2 roots (Large Lateral sensory root & small medial motor root)\*.
- Divides into 3 divisions (dendrites of trigeminal ganglion):
  1. Ophthalmic, CV1
  2. Maxillary, CV2
  3. Mandibular, CV3
- Axons of cells of motor nucleus **join only the mandibular division.**

\* To remember:  
**M**otor → **m**edial  
**L**arge → **L**ateral

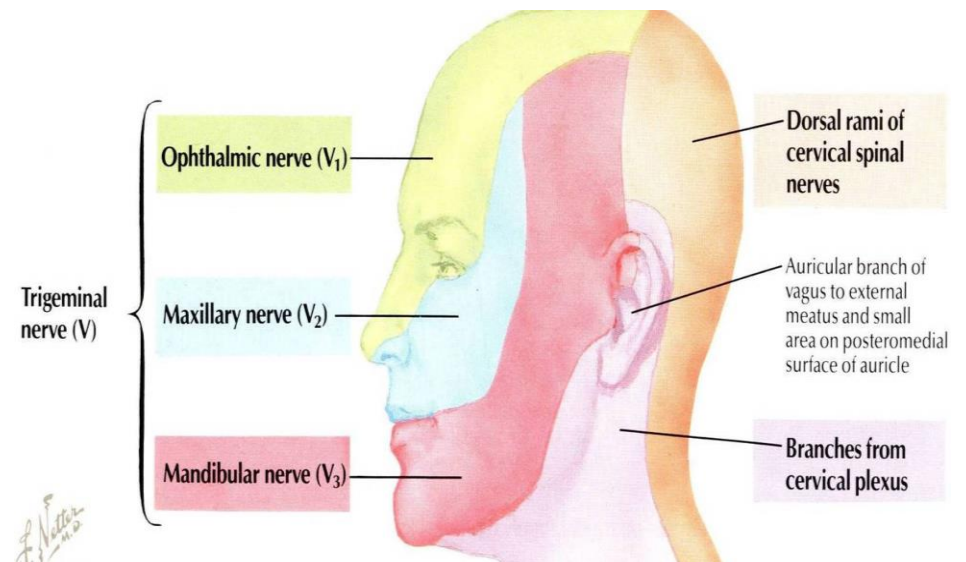


**Very important:**  
 1- ophthalmic nerve supplies tip of the nose and the upper eyelid  
 2- maxillary nerve supplies the lower eyelid, ala of the nose ( wing of the nose ) and the upper lip  
 3- mandibular nerve supplies the lower lip

The trigeminal nerve doesn't supply the area above the parotid gland



- Ophthalmic (V1)
- Maxillary (V2)
- Mandibular (V3)



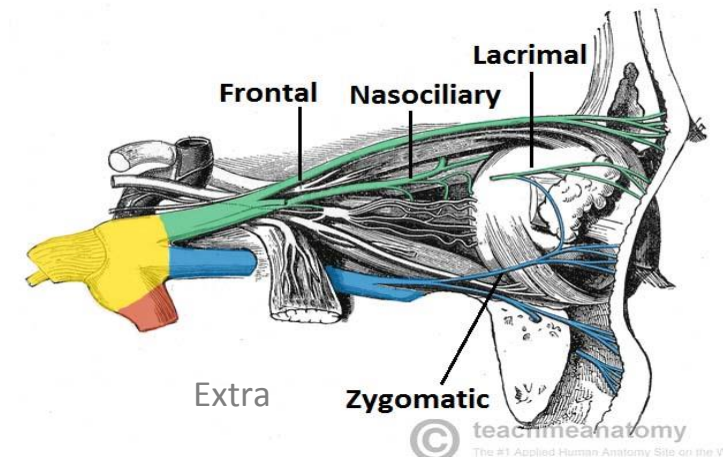
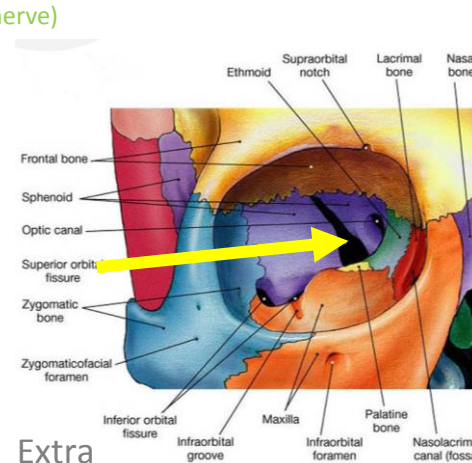
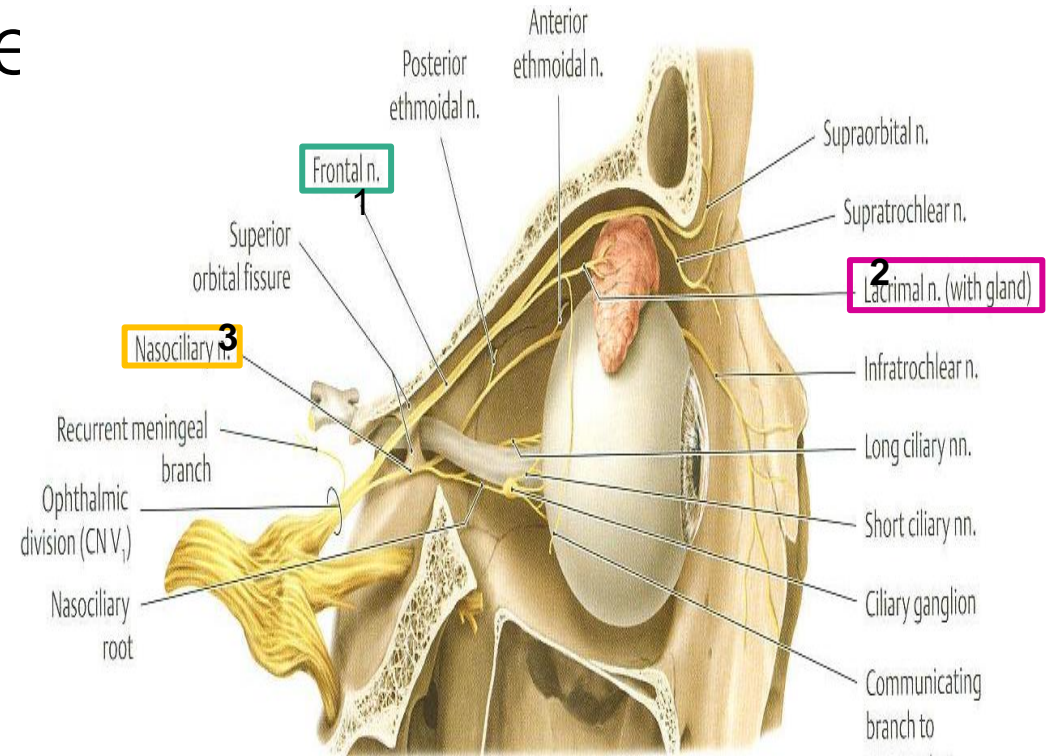
# Trigeminal (V) 5th Cranial Nerve

## 1. Ophthalmic nerve

- PURE SENSORY
- Divides into *3 branches* which pass through superior orbital fissure to the orbit:

- 1. Frontal:** supplies skin of face & scalp.
- 2. Lacrimal:** supplies skin of face & lacrimal gland. *(just sensation the secretion is from facial nerve)*
- 3. Nasociliary:** supplies skin of face, nasal cavity & eyeball.

اعرفها من اسمها + supply skin of the face





# Trigeminal (V) 5th Cranial Nerve

## 2. Maxillary nerve

- PURE SENSORY
- *Supplies:*
  - Upper teeth, gums & maxillary air sinus (posterior, middle & anterior superior alveolar nerves).
  - Face: (zygomaticofacial & infraorbital nerves).

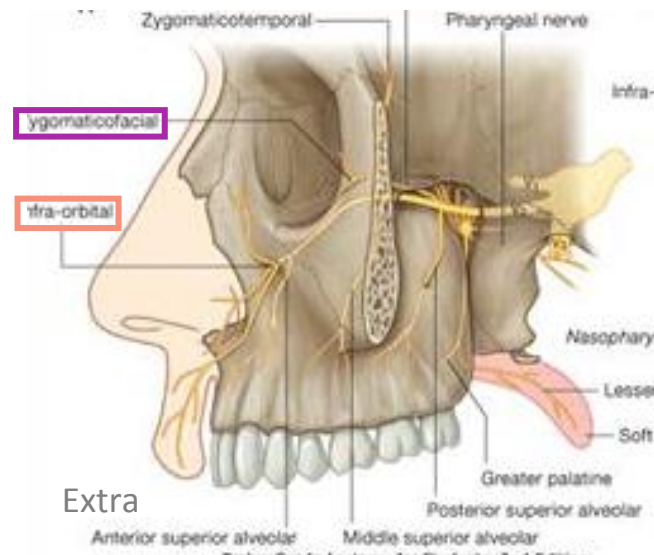
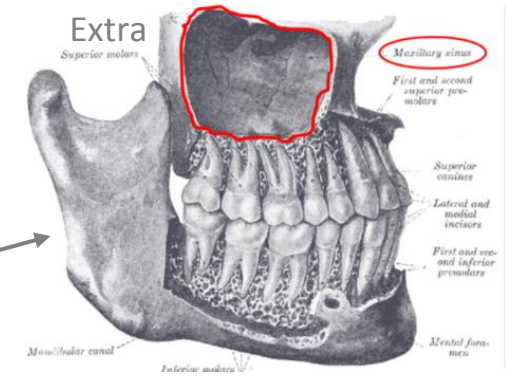
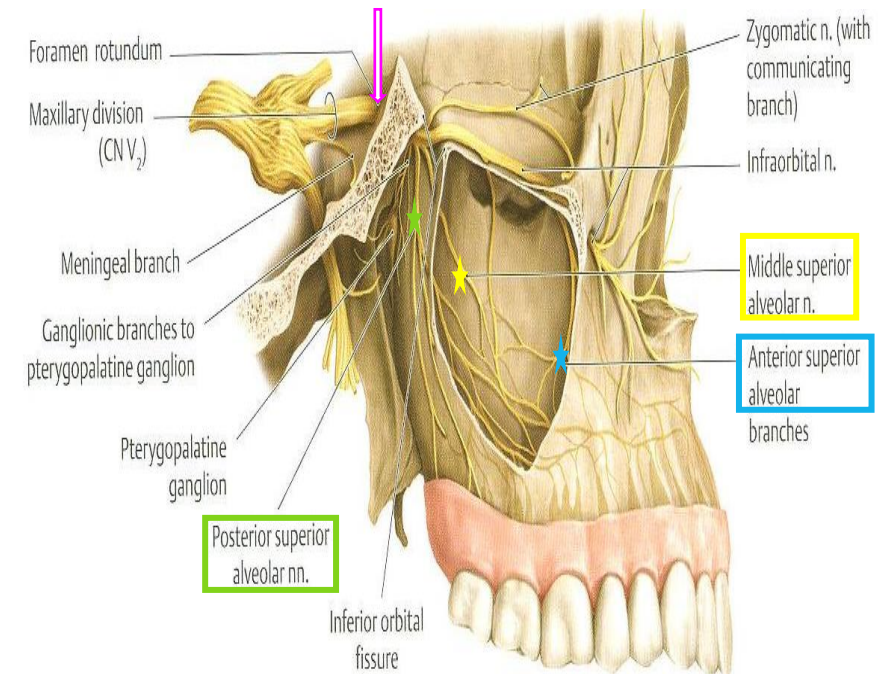
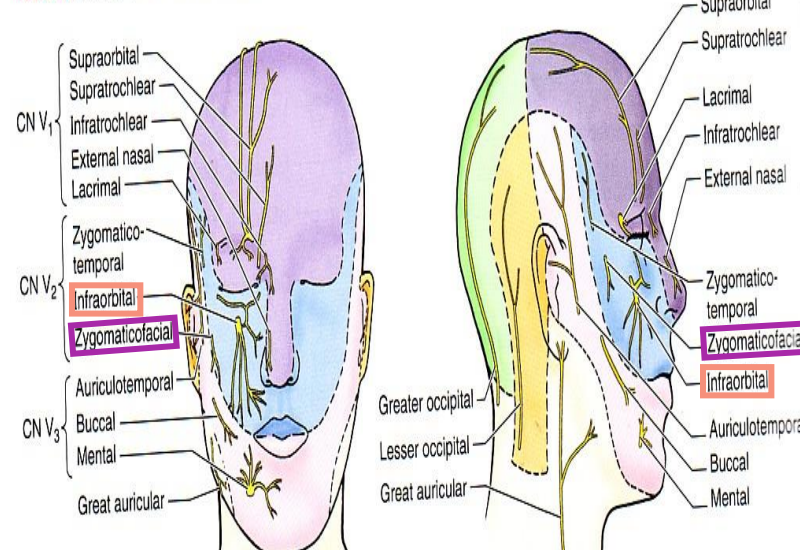


Table 7.4. Nerves of the Face and Scalp



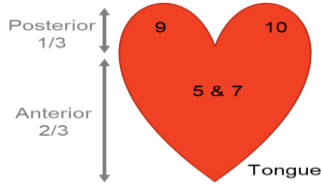
# Trigeminal (V) 5th Cranial Nerve

## 3. Mandibular

MIXED (sensory and motor)

**Motor Branches**

to 8 muscles (4 muscles of mastication & other 4 muscles).



**Sensory Branches**

حار وبارد وليس التذوق

**1. Lingual:**  
receives General sensations from anterior 2/3 the of tongue.

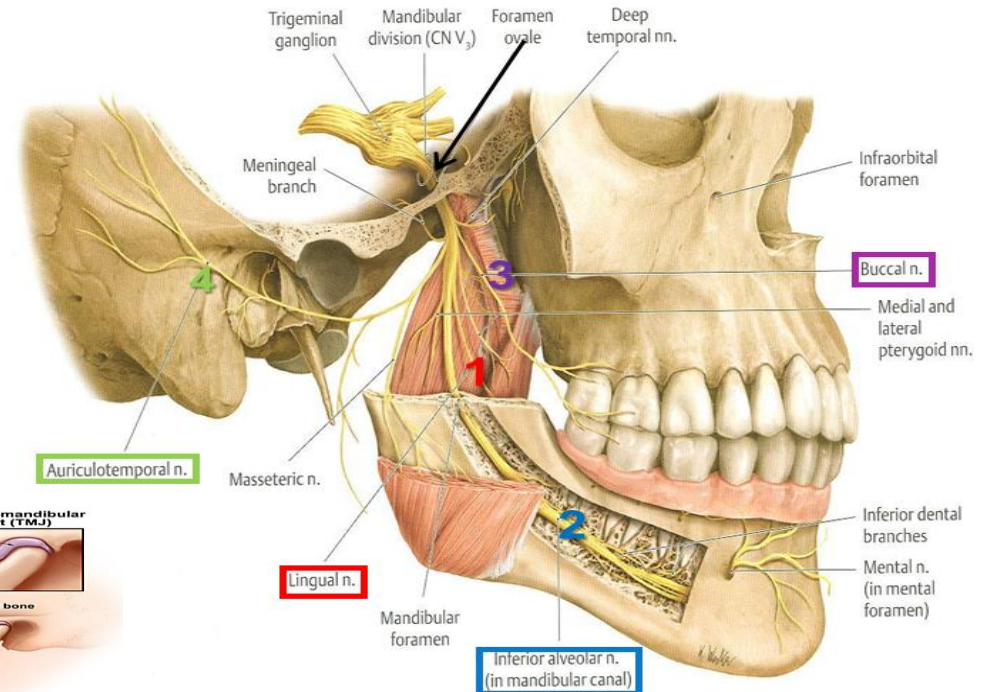
General sensation = pain + temperature + touch  
Special = taste

**4. Auriculotemporal:**  
supplies auricle, temple, parotid gland & TMJ *tempromendibular joint.*

**2. Inferior alveolar:**  
supplies Lower teeth, gums & face.  
Through mandible bone through mandibular canal

**3. Buccal:**  
supplies Face (cheek on upper jaw)

we have two nerves called ( buccal ) :  
- From trigeminal sensory  
- From facial motor ( from the 2<sup>nd</sup> arch )

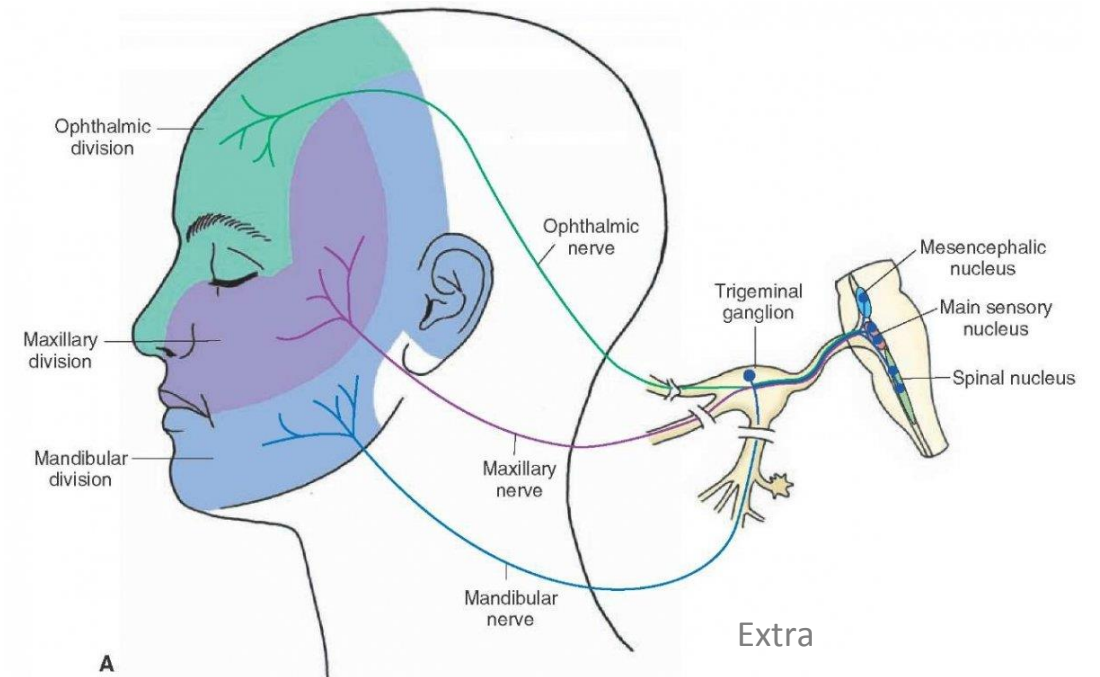


# Trigeminal (V) 5th Cranial Nerve

## Trigeminal Neuralgia

المريض يجي يشتكي من ألم رهيب عند وضع المشط زي الدبابيس في الوجه

- *Compression, degeneration or inflammation* of the **5<sup>th</sup> cranial nerve** may result in a condition called **trigeminal neuralgia** or **tic douloureux** (spasmodic contraction of the muscles, most often in the face)
- This condition is characterized by *recurring episodes of intense stabbing 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.



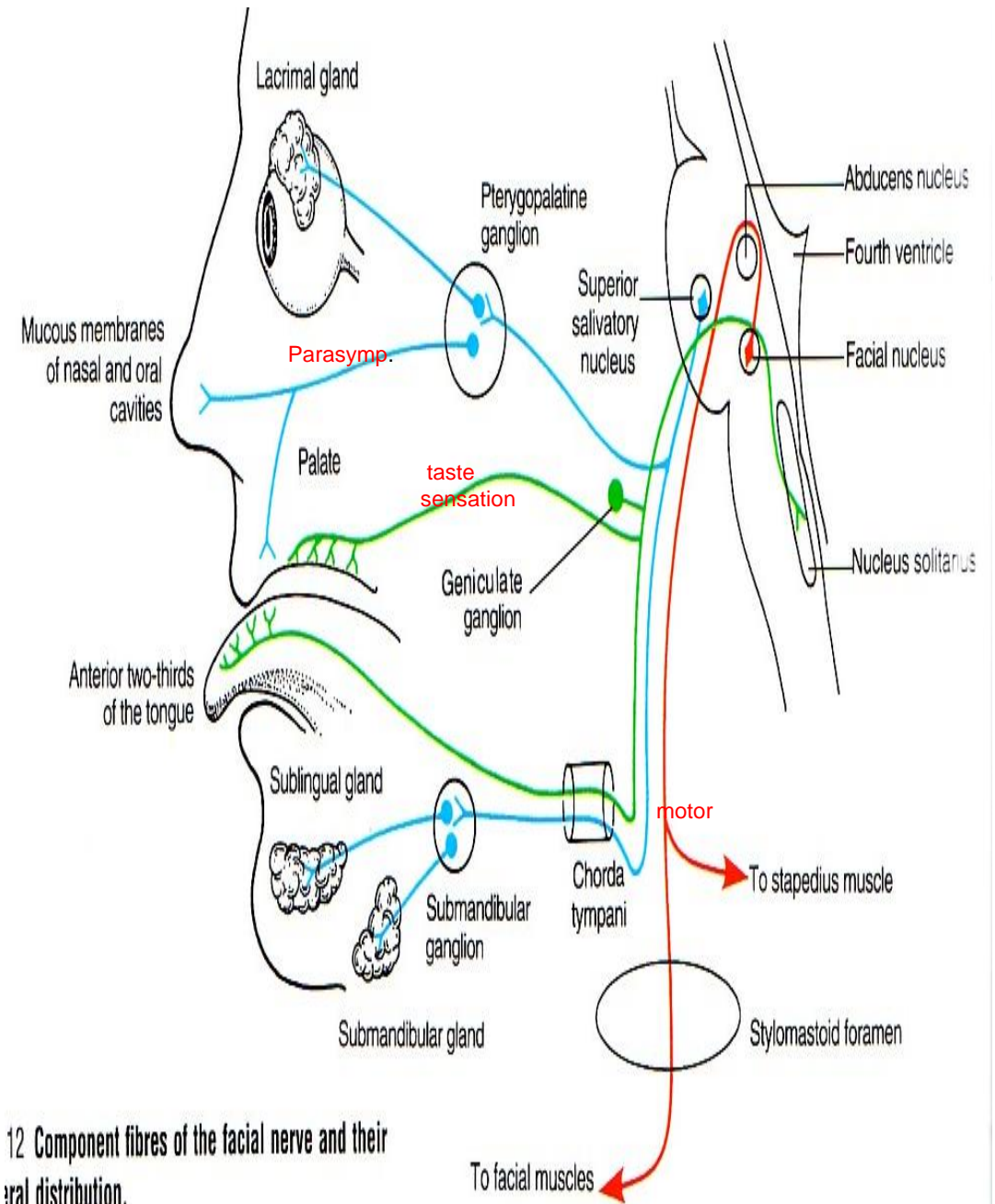
# Facial (VII) 7<sup>th</sup> Cranial Nerve

- Type: Mixed (Motor, special sensory (اللتذوق), parasympathetic).
- Fibers:

**1. Special visceral afferent:** carrying *taste sensation from anterior 2/3 of the tongue.*

**2. Special visceral efferent:** supplying *muscles developed from the 2<sup>nd</sup> pharyngeal arch. (muscles of facial expression)*

**3. General visceral efferent:** supplying *parasympathetic secretory fibers (secretomotor) to submandibular, sublingual, lacrimal, nasal & palatine glands.*



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

# Facial (VII) 7th Cranial Nerve Nuclei

## 3 Nuclei :

- **Special visceral afferent: (nucleus solitarius):** هي اللي تتذوق  
receives *taste from the anterior 2/3 of tongue.*

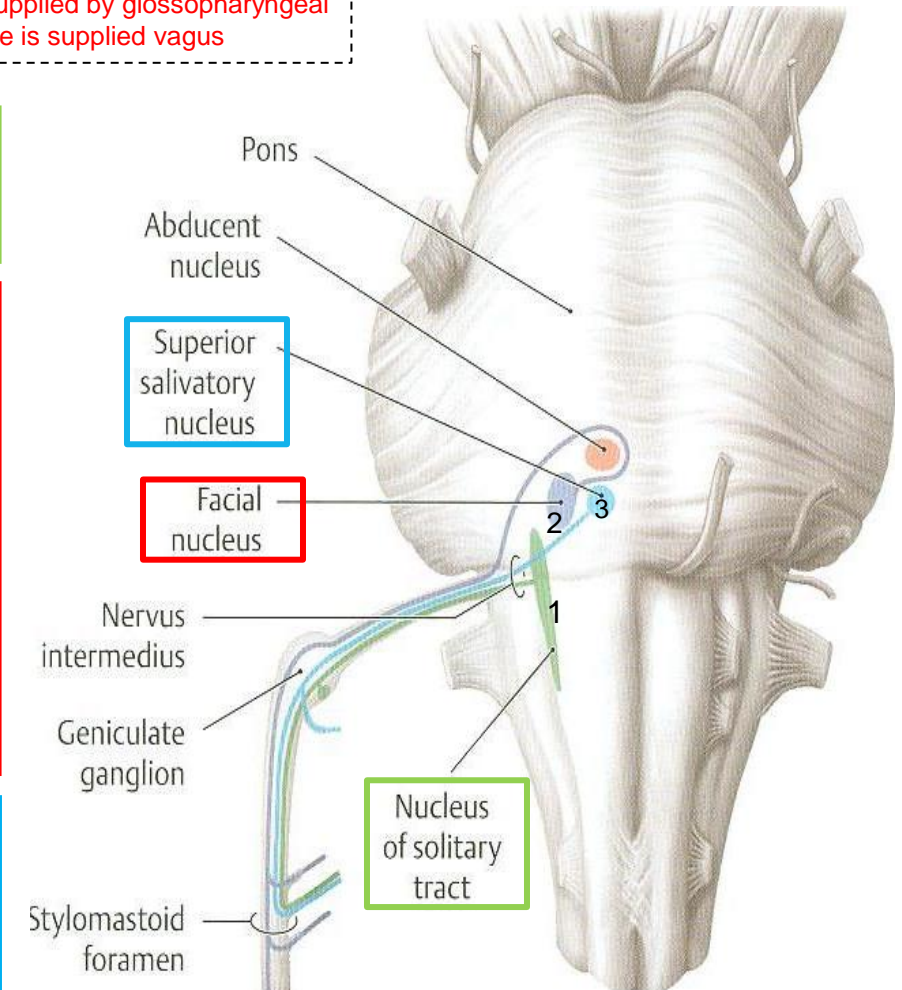
- **Special visceral efferent: (motor nucleus of facial nerve):**  
supplies: **Muscles of the face,**  
**Muscles of scalp, (Occipitofrontalis).**  
**Muscles of the auricle.**  
**Posterior belly of digastric,**  
**Platysma,**  
**Stylohyoid,**  
**Stapedius,**

- **General visceral efferent: (superior salivatory nucleus):**  
sends preganglionic parasympathetic secretory fibers to *sublingual, submandibular, lacrimal, nasal & palatine glands.*

Sublingual and submandibular are related to salivary gland

Remember :The nerves of taste have to go to solitarius nucleus:

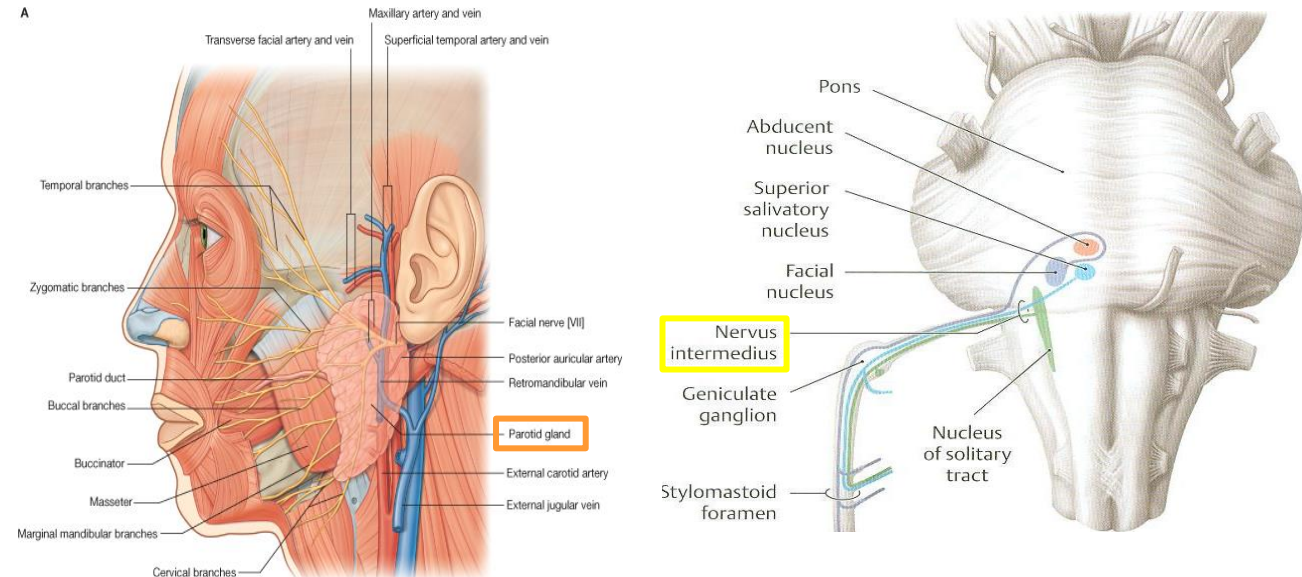
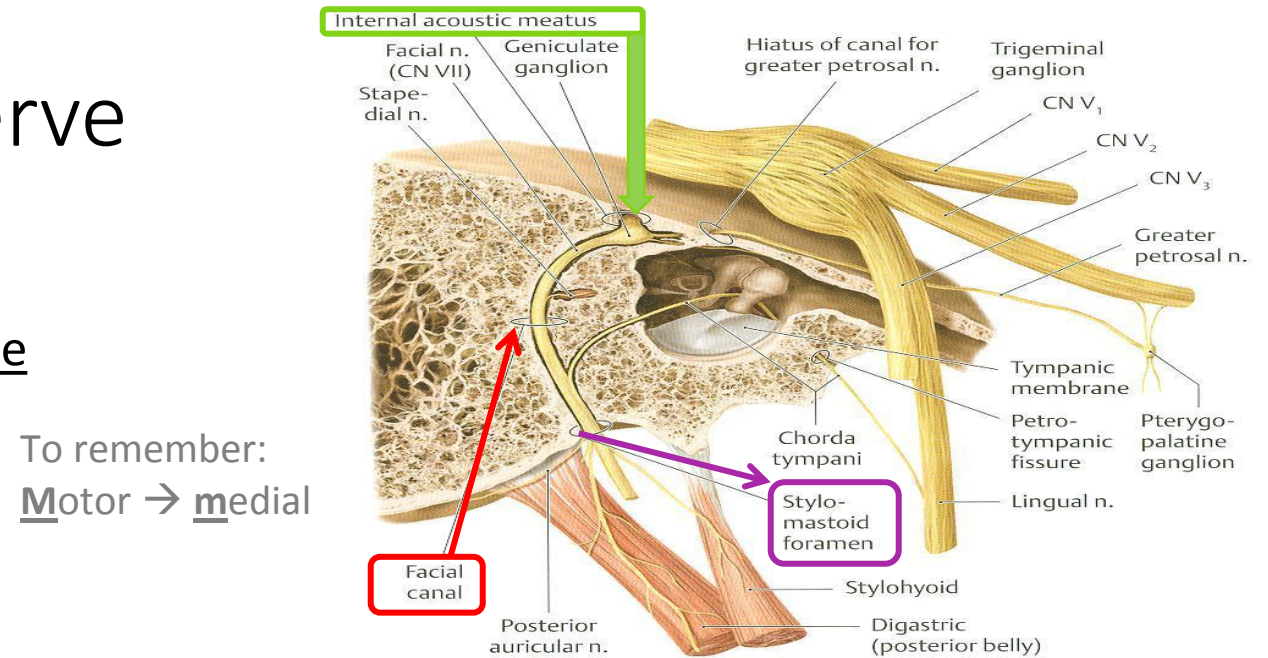
- Anterior 2/3 is supplied by facial
- Posterior 1/3 is supplied by glossopharyngeal
- Root of the tongue is supplied vagus



# Facial (VII) 7th Cranial Nerve Course

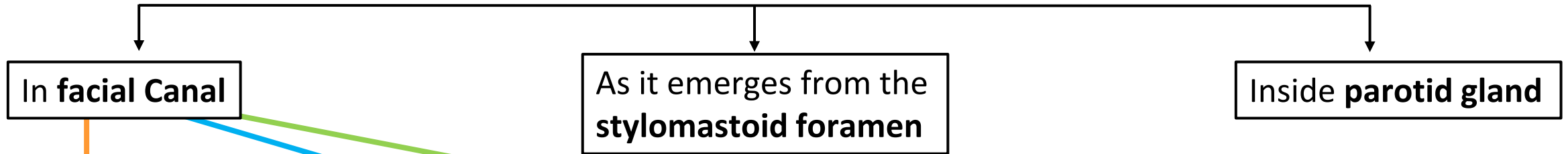
- Emerges from the cerebellopontine angle by 2 roots:
  - Medial motor root*: contains motor fibers.
  - Lateral root (nervous intermedius)*: contains parasympathetic & taste fibers.
- Course:
  - Passes through internal auditory meatus to inner ear where it runs in facial canal.
  - Emerges from the stylomastoid foramen & enters the parotid gland where it ends.

7<sup>th</sup> and 8<sup>th</sup> cranial nerves and vestibular artery run in facial canal



# Facial (VII) 7th Cranial Nerve

## Branches

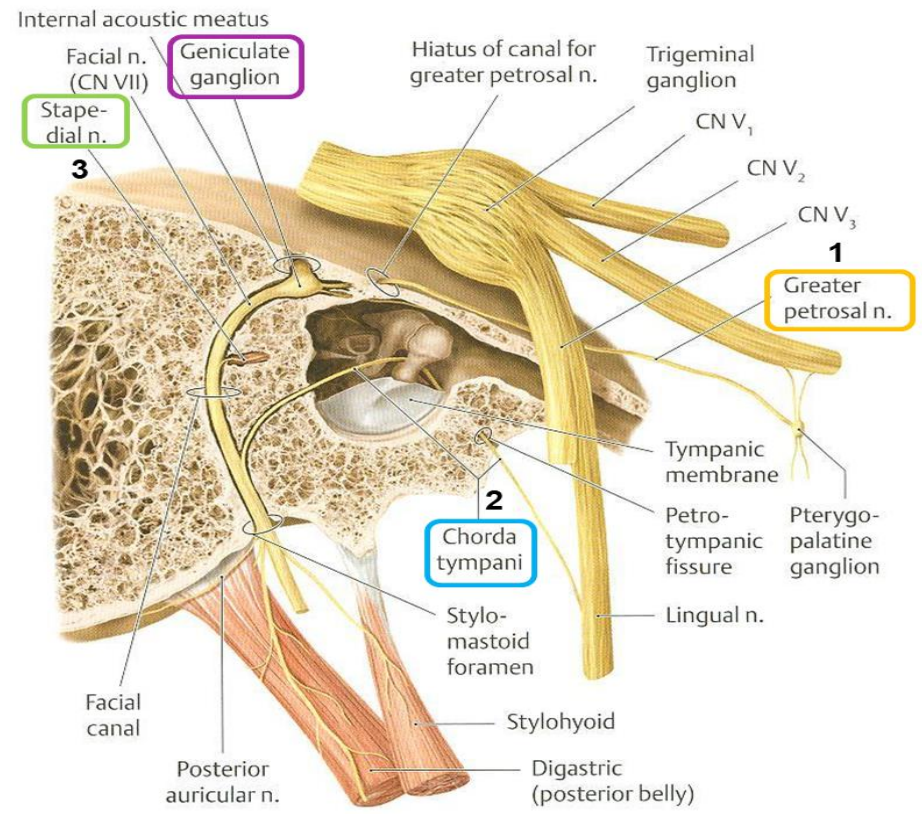


**1. Greater petrosal nerve:** carries preganglionic parasympathetic fibers to **pterygopalatine** ganglion then postganglionic to **lacrimal, nasal & palatine glands** تخليق تعيط.

**3. Nerve to stapedius :** control the amplitude of sound waves from the external environment to the inner ear.

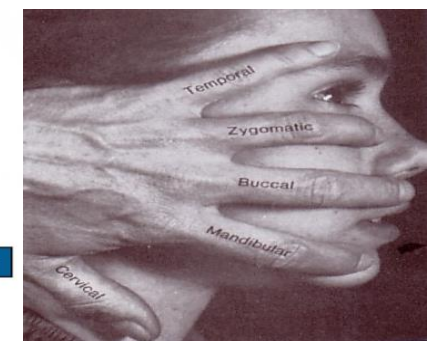
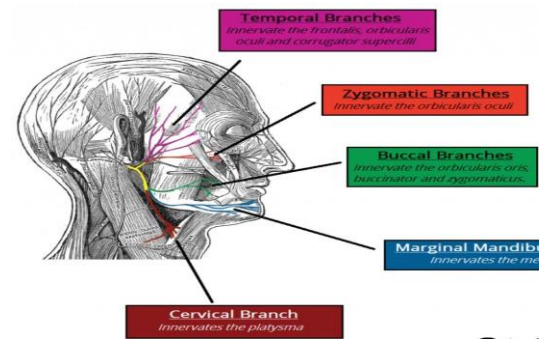
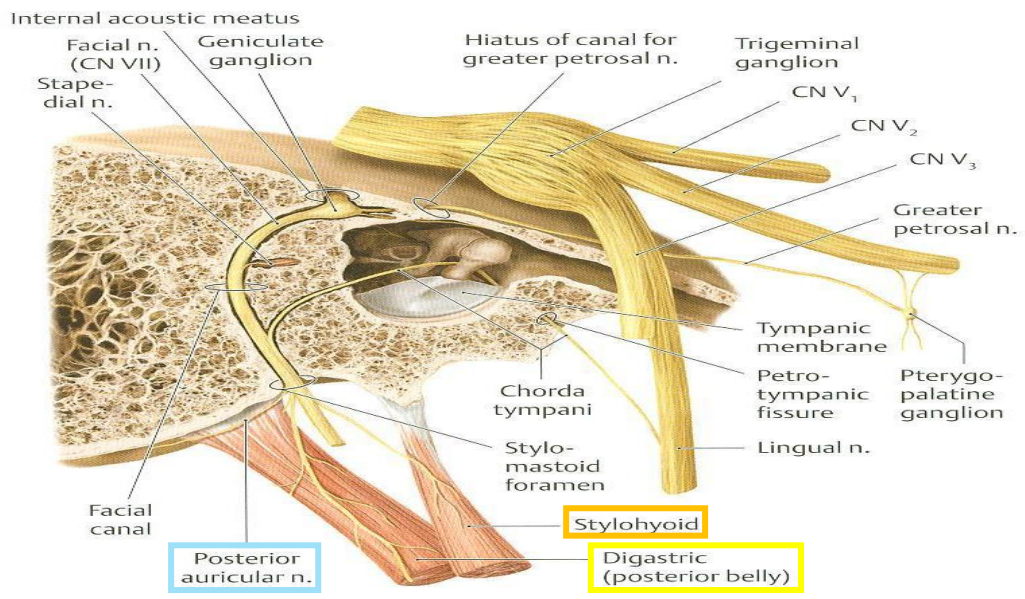
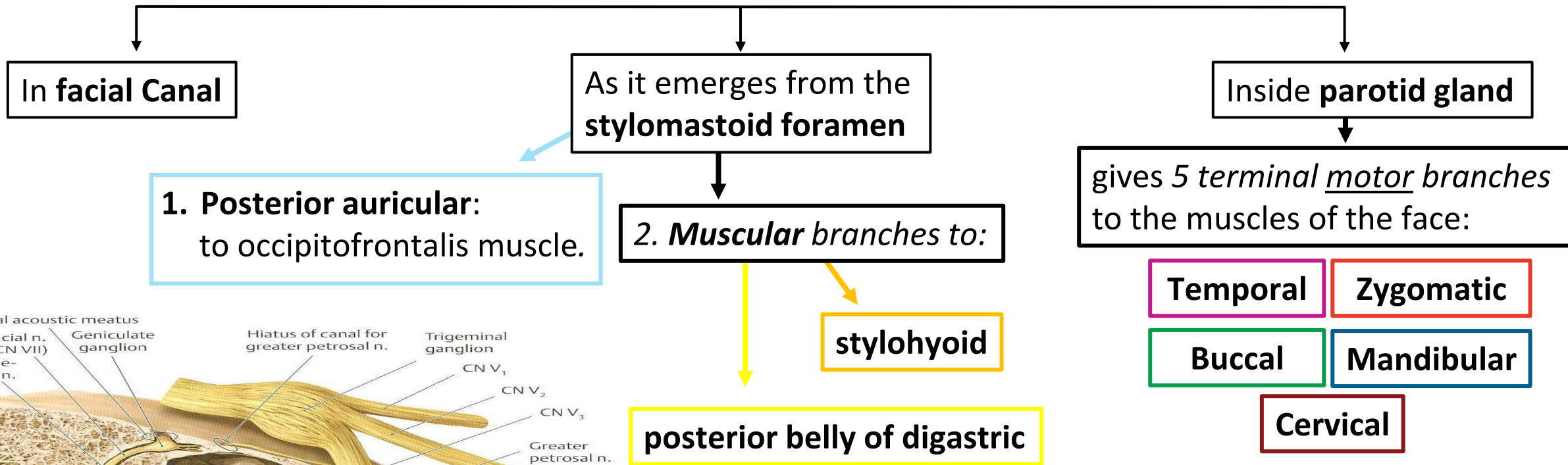
**2. Chorda tympani:** carries  
 a) preganglionic parasympathetic fibers to submandibular & sublingual glands.  
 b) taste fibers from anterior 2/3 of tongue.

N.B.: **Geniculate ganglion:** contains cell bodies of neurones ; its fibres carrying taste sensations from anterior 2/3 of tongue; ending in solitary nucleus in M.O. Lies in internal acoustic meatus.



# Facial (VII) 7th Cranial Nerve

## Branches



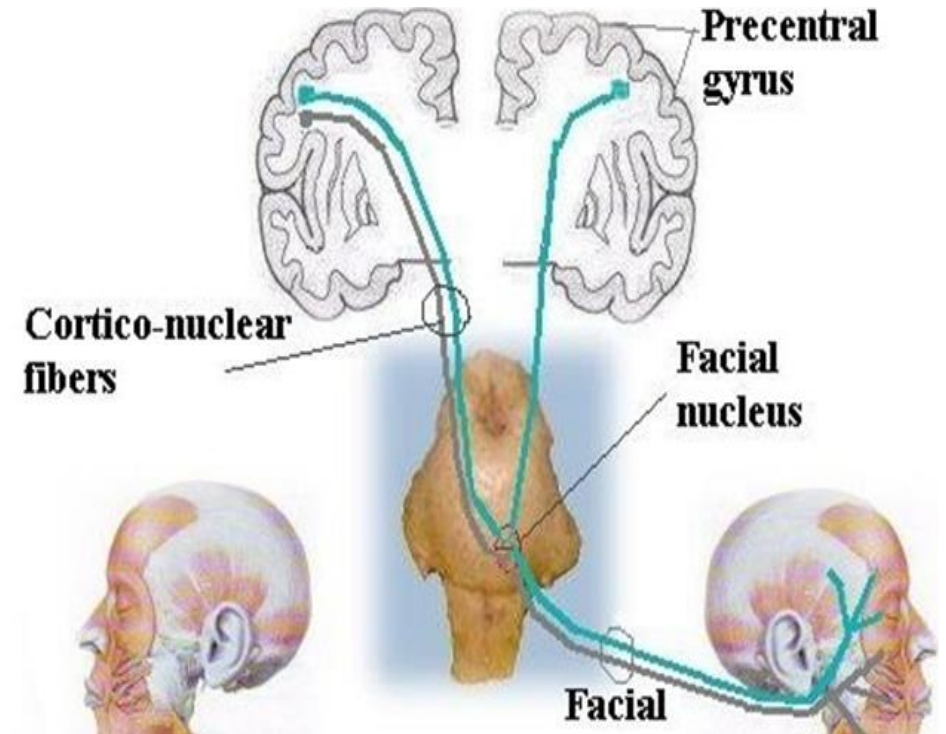
Extra



# Facial (VII) 7th Cranial Nerve

## Bell's Palsy

- Damage of the facial nerve results in paralysis of muscles of facial expressions : **Facial (Bell's) palsy**; **also called** lower motor neuron lesion (*whole face affected*) يا انو اكل خبطة على وشو او يكون من جو حار وبارد ويلتهب
- NB. In upper motor neuron lesion (upper face is intact) . زي اللي تصوير في الجلطات يكون الجزء العلوي شغال لانو ياخذ سبلاي من الجهتين.
- Face is distorted: (effect is on the same side of injury)
  - Drooping of lower eyelid,
  - Sagging of mouth angle,
  - Dribbling of saliva,
  - Loss of facial expressions,
  - Loss of chewing,
  - Loss of blowing,
  - Loss of sucking,
  - Unable to show teeth or close the eye **on that side.**

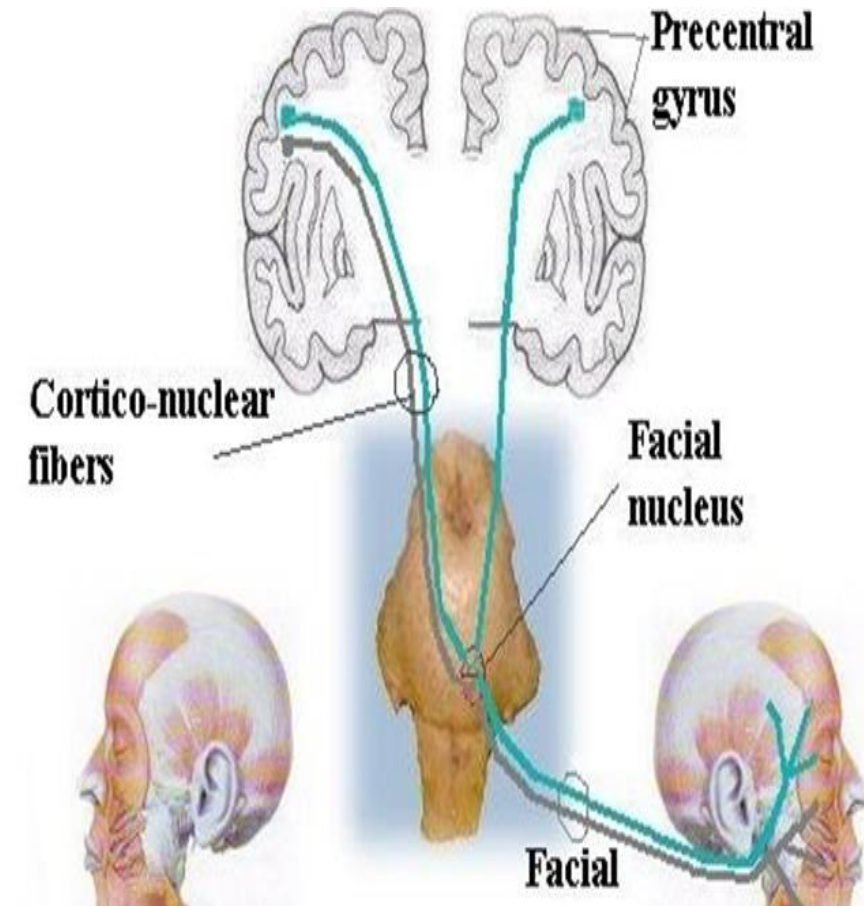


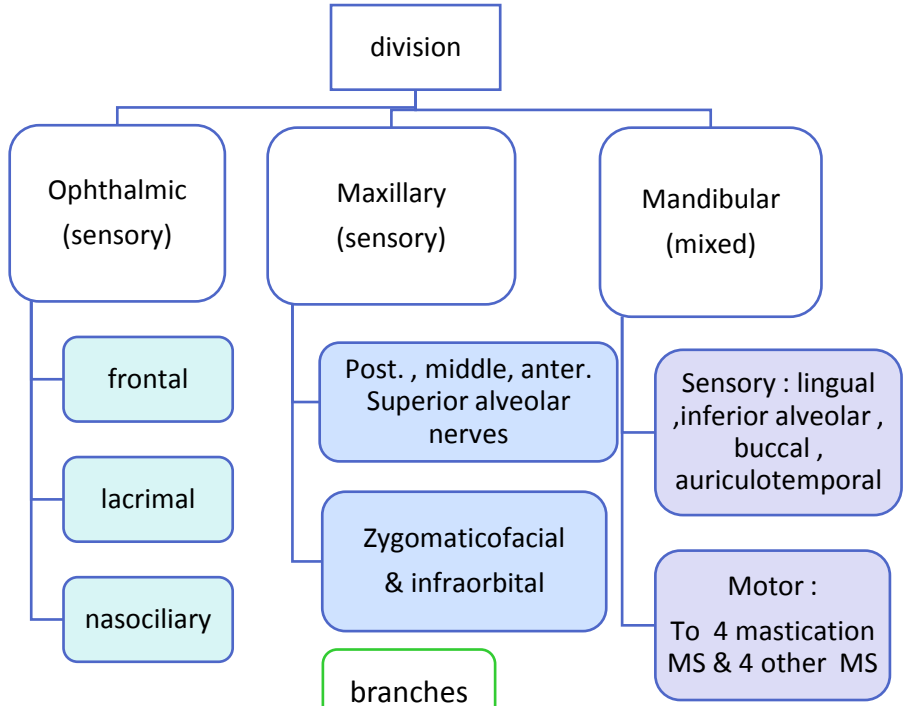
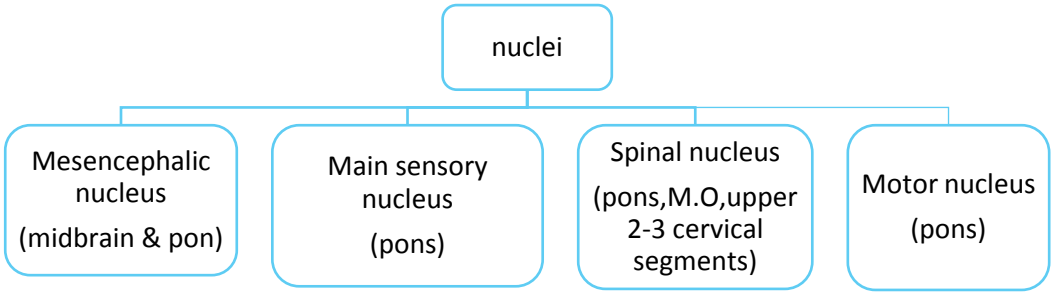
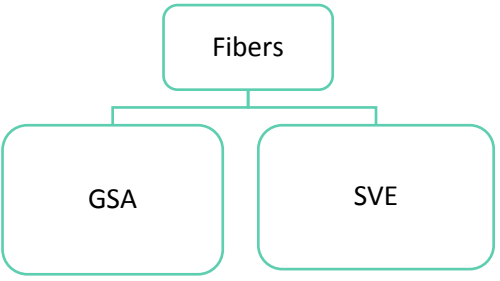
# For Your Information

Only on the girls' slides

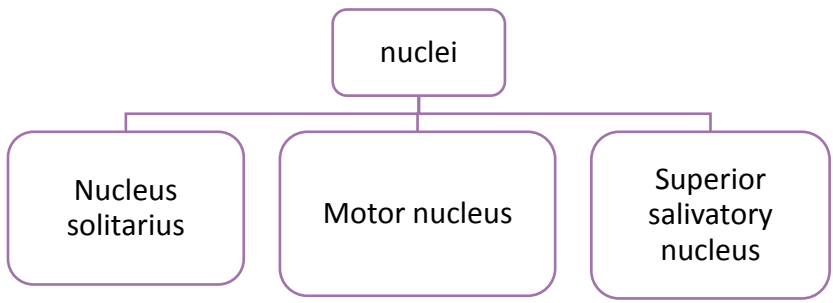
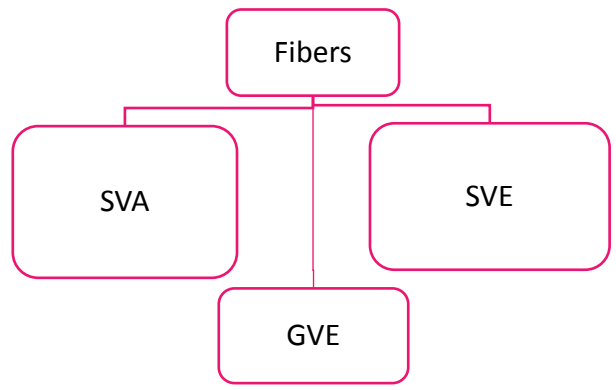
This slide is extra from Dr. Sanaa to differentiate between upper and lower motor lesions.

Lower Motor Neuron Lesion	Upper Motor Neuron Lesion
<p>Results from <b>injury of facial nerve</b> fibres:                      in internal acoustic meatus;                      in the middle ear;                      in the facial canal, or                      in parotid gland.</p>	<p>This occurs after injury to the pyramidal tract (corticonuclear) above facial nucleus...</p>
<p>Manifested by <b>complete paralysis of facial muscles</b> on the <b>same side</b> of lesion.</p>	<p>Leads to <b>paralysis of facial muscles of lower ½ of face of opposite side</b> but the upper ½ of the face not affected because the lower part of facial nucleus &amp; Ms. of lower ½ of face receive pyramidal fibres from opposite cerebral cortex only, while Ms. of upper ½ of face are normal because they receive pyramidal fibres from both cerebral hemispheres.</p>
<p>If lesion of facial nerve <b>above the origin of chorda tympani and nerve to stapedius</b>, the paralysis of facial muscles will be associated with :</p> <ul style="list-style-type: none"> <li>1- Hyperacusis : sounds are heard more acute due to paralysis of stapedius ms.</li> <li>2- Loss of taste sensation from anterior 2/3 of tongue.</li> </ul>	

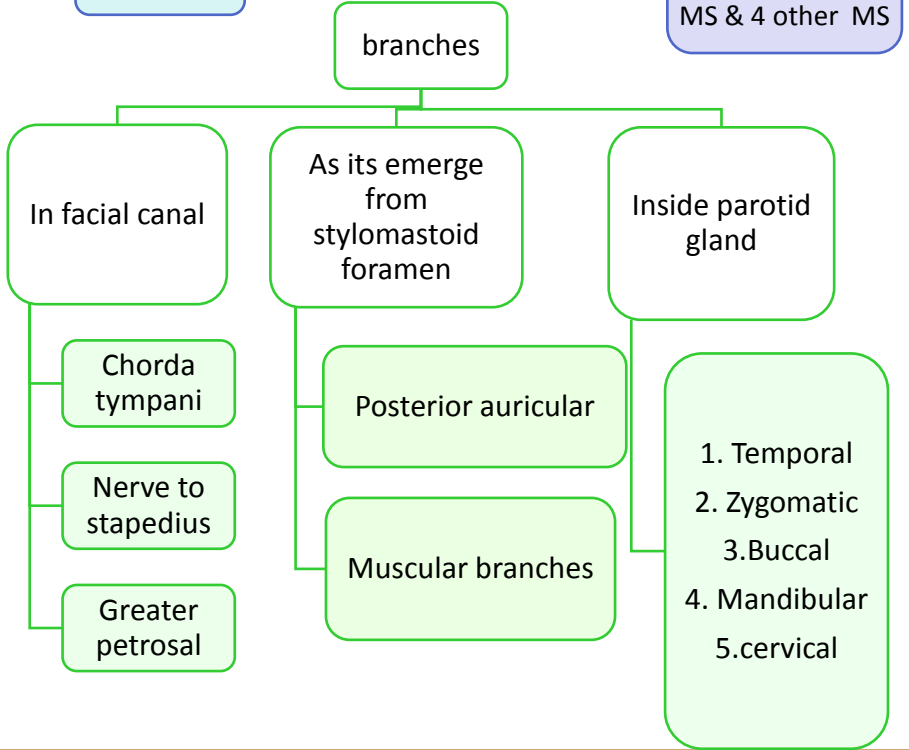




Trigeminal nerve  
(mixed : sensory & motor)



Facial nerve  
(mixed: motor, sensory, parasympathetic)



# 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).
- 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, 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.

# Questions

1-The special visceral efferent fibers of the trigeminal nerve supplies:

- A- temporalis muscle
- B- posterior belly of digastric
- C- omohyoid
- D- ventral pterygoid

Answer: A

2- which of the following true about the TRIGEMINAL nerve is true :

- A- the axons of the cells of motor nucleus join only maxillary division
- B- it emerges the middle of the dorsal surface of the pons
- C- the TRIGEMINAL GANGLION occupies the middle cranial fossa
- D- all the above

Answer :C

3-TRIGEMINAL NEURALGIA rarely involves :

- A-maxillary branch
- B-mandibular branch branch
- C- ophthalmic
- D-all the above

Answer: C

4- the posterior aulicular branch of the FACIAL nerve supply :

- A- posterior belly of digastric
- B-stylohyoid
- C-occipitofrontalis muscle
- D-A&B

Answer:C

5-Damage of the FACIAL nerve will lead to which of the following deformities :

- A-Erb-Duchenne palsy
- B-Klumpke palsy
- C-Bell's palsy
- D-Cerebral palsy

Answer: C

6-List the branches of the ophthalmic division of the trigeminal nerve.

FRONTAL ,LACRIMAL ,NASOCILIARY

7- list the branches of the facial nerve inside parotid gland and what do they supply .

TEMPORAL ,ZYGOMATIC ,BUCCAL, MANDIBULAR ,CERVICAL → muscles of the face



Good luck  
Special thank for team436 ❤️

**Team Leaders:**

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**Team Members:**

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Rinad Alghoraiby  
Rawan Mishal**

- References:
  1. Girls' & Boys' Slides
  2. Greys Anatomy for Students
  3. TeachMeAnatomy.com

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