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CRANIAL NERVES

6

QUESTIONS

Cranial Nerves & Nucleus

1. **Cranial nerve related to apex of the petrous temporal bone:**
   - A. VIII *(PGI 05)*
   - B. VII
   - C. VI
   - D. V
   - E. IX

2. **Which of the following cranial nerves present in the posterior fossa?** *(AIIMS 06)*
   - A. 3rd to 12th
   - B. 4th to 12th
   - C. 5th to 12th
   - D. 6th to 12th

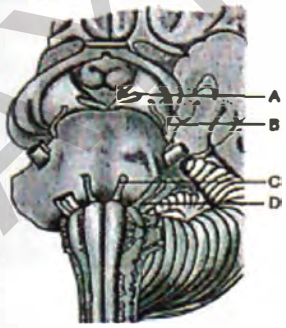
3. **Most common nerve involved in an intracranial aneurysm is** *(DNB 01, NBE P 14)*
   - A. Trochlear
   - B. VII
   - C. VIII
   - D. Oculomotor

4. **The cranial nerve with the largest intra-cranial course is:** *(DNB 03, NBE P 13)*
   - A. Abducens- nerve
   - B. Trochlear nerve
   - C. Optic nerve
   - D. Trigeminal nerve

5. **Which of the following is not a mixed nerve?**
   - A. Vagus *(NBE P 13)*
   - B. Glossopharyngeal
   - C. Facial
   - D. Trochlear

6. **Which is the only nerve which exits the brainstem on dorsal side-** *(NBE P 15)*
   - A. Facial
   - B. Trigeminal
   - C. Trochlear
   - D. Abducent

7. **The nerve supplying the superior oblique muscle exits the brainstem at which of the following sites:**



   - A. A *(AIIMS 15)*
   - B. B
   - C. C
   - D. D

8. **Site of lesion affecting V, VI & VII cranial nerve**
   - A. Midbrain *(PGI 2K)*
   - B. Pons
   - C. Medulla
   - D. C-P angle

9. **Which of these nerve root is the control centre for the stapedial reflex?** *(AIIMS 15)*
   - A. Superior olivary complex
   - B. Lateral lemniscus
   - C. Inferior colliculus
   - D. Medial geniculate body

10. **Nucleus of occulomotor nerve is in-** *(NBE P 13)*
    - A. Midbrain
    - B. Pons
    - C. Medulla
    - D. Thalamus

11. **All of the following have general visceral efferent fibers except:** *(AIIMS 15)*
    - A. Facial nerve
    - B. Olfactory nerve
    - C. Oculomotor nerve
    - D. Glossopharyngeal nerve

12. **True about Edinger-Westphal nucleus:** *(PGI 12,15)*
    - A. It gives rise to special visceral efferents
    - B. It gives rise to special somatic efferents
    - C. It gives rise to General visceral efferents
    - D. Lies in pons
    - E. Its fibres pass through oculomotor nucleus

13. **Which of the following nuclei belongs to the general visceral efferent column** *(AIIMS 04)*
    - A. Facial nerve nucleus
    - B. Trigeminal nerve nucleus
    - C. Dorsal nucleus of Vagus
    - D. Nucleus ambiguous

14. **General visceral fibres do not supply-** *(NBE P 13)*
    - A. Smooth muscles
    - B. Skeletal muscles
    - C. Cardiac muscles
    - D. Glands

15. **All of the following cranial nerves contain Somatic Efferents, Except OR Cranial Nerve with no somatic motor nucleus is:** *(NBE P 15, 14; AI 08)*
    - E. VII Nerve (Facial nerve)
    - F. III Nerve (Occulomotor nerve)
    - G. IV Nerve (Trochlear nerve)
    - H. VI Nerve (Abducent nerve)

16. **Nucleus in brain common to IX, X and XI cranial nerves:** *(NBE P 15, 14, 13; Jipmer 03, DNB 05)*
    - A. Nucleus solitarius
    - B. Nucleus ambiguous

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C. Dentate nucleus
D. Red nucleus

17. **Seventh, Ninth ant Tenth cranial nerves end in-**
A. Nucleus Tractus Solitarius *(AIIMS 15; Jipmer 02)*
B. Nucleus Ambiguous
C. Dorsal Nucleus of vagus
D. Long and of V nerve

18. **Nucleus ambiguous is related to all cranial nerve-**
A. VIII *(NBE P 13)*
B. IX
C. X
D. XI

19. **Which nerves does not arise form the medulla:**
A. Facial *(AIIMS 14, WB 05, DNB 04)*
B. Glossopharyngeal
C. Vagus
D. Dorsal horn of gray matter

20. **The cranial nerve with the longest intracranial course-** *(PGI 15, 13)*
A. Optic
B. Abducent
C. Trigemina
D. Oculomotor
E. Trochlear

21. **The smallest caranial nerve is the-** *(DNB 02)*
A. Olfactory *(AMU 02)*
B. Oculomotor
C. Trochlear
D. Accessry

22. **Which of the cranial nerve decussate with in the brain :** *(NIMHANS 01, DNB 02, WB 03)*
A. Trochlear
B. Optic
C. Oculomotor
D. Trigeminal

23. **Which is a direct content of cavernous sinus :**
A. Ophthalmic division of trigeminal nerve
B. Trochlear nerve *(DNB 03, 14)*
C. Abducent nerve
D. Occulomotor nerve

24. **Most common nerve involved in an intracranial aneurysm is** *(DNB 04, AI 06)*
A. Trochlear
B. VII
C. VIII
D. Oculomotor

25. **Cranial Nerve which emerges from dorsal surface of brain** *(NBE P 15, 13; AI 02, UP 03)*
A. II
B. IV
C. VI
D. VII

26. **Which is the Nucleus of Masseteric Reflex?**
A. Superior sensory nucleus of trigeminal nerve
B. Spinal nucleus of trigeminal nerve *(AI 08)*
C. Mesencephalic nucleus of trigeminalnerve
D. Dorsal nucleus of vagus nerve

27. **Nucleus ambiguous is tested by-** *(NBE P 13)*
A. Corneal reflex
B. Gag reflex
C. Stapedial reflex
D. None

Auditory Pathway

28. **Auditory transmission is via:** *(DNB 01, UP 04)*
A. Lateral lemniscus
B. Medial lemniscus
C. Lateral geniculate body
D. Frontal cortex

29. **Trapezoid body is associated with:** *(PGI 06)*
A. Auditory pathway
B. Visual pathway
C. Pyramidal pathway
D. Gustatory pathway
E. Extra-pyramidal pathway

30. **Auditory pathway passes through:** *(DNB 02, PGI 06)*
A. Medial geniculate body
B. Lateral geniculate body
C. Reciculate formation
D. Cerebellar fornix

Occulomotor, Trochlear, Abducent & Trigeminal Nerve

31. **Superior rectus is supplied by which cranial nerve**
A. Superior division of 3rd nerve *(PGI 2K)*
B. Inferior div. or 3rd nerve
C. Abducent nerve
D. Trochlear nerve

32. **Which of the following is supplied by contra lateral nerve nucleus?** *(AIIMS 14)*
A. Superior rectus
B. Inferior rectus
C. Medial rectus
D. Inferior oblique

33. **Trochlear nerve all true except:** *(AIIMS 11)*
A. Longest intracranial course
B. Arises from dorsum of brainstem
C. Supply ipsilateral superior oblique muscle
D. Enter orbit through sup. Orbital fissureoutside annual of Zinn.

34. **A patient is unable to move eye outward beyond midline. The lesion is in-** *(NBE P 13)*
A. Trochlear nerve
B. Obturator nerve
C. Abducent nerve
D. None

35. **False statement about trigeminal nerve:**
A. Carries sensation from face and scalp
B. Has motor branch *(PGI 10)*
C. Arise from C8 nerve root
D. Composed of spinal nucleus

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36. **Trigmenial nerve has how many nuclei in CNS:**
A. Three *(DNB 01, Jipmer 02)* ☐
B. Four ☐
C. Five ☐
D. Six ☐

37. **All of the following are division of the Vth cranial nerve except-** *(NBE P 13)*
A. Ophthalmic ☐
B. Optic ☐
C. Mandibular ☐
D. Maxillary ☐

38. **A patient has loss of sensation at angle of mandible (jaw) and parotid area. Which of the following nerve is most likely to be injured.** *(PGI 05, Jipmer 01)*
A. Mandibular nerve *(DNB 02, AI 04)* ☐
B. Auriculotemporal nerve ☐
C. Lesser occipital nerve ☐
D. Greater auricular nerve ☐
E. Supraclavicular nerve ☐

39. **Nerve supply of tip of nose is** *(DNB 03, AIIMS 02)*
A. Maxillary nerve (Orbital br) *(NBE P15,14, PGI 06)* ☐
B. Ophthalmic nerve (External nasal br) ☐
C. Facial nerve ☐
D. Mandibular branch of Vth nerve ☐

40. **Unilateral trigeminal N. injury is tested by:**
A. Elevation and lowering of jaw *(PGI 13,08)* ☐
B. Inability to tense the jaw ☐
C. Blinking of eye ☐
D. Corneal reflex ☐

41. **Afferent (sensory) component of corneal reflex is mediated by:** *(AIIMS 15, NBE P 14,13; AI 06)*
A. Vagus nerve ☐
B. Facial nerve ☐
C. Trigeminal nerve/ Nasociliary Nerve ☐
D. Glossopharyngeal nerve ☐

42. **All of the following are true about location of otic ganglia except:** *(AIIMS 15)*
A. Inferior to foramen ovale ☐
B. Lateral to tensor veli palatini ☐
C. Lateral to mandibular nerve ☐
D. Anterior to middle meningeal artery ☐

43. **Nervus spinosus is a branch of which of the following?** *(NBE P 13)*
A. Maxillary nerve ☐
B. Mandibular nerve ☐
C. Facial nerve ☐
D. Nerve of pterygoid canal ☐

44. **Branch of anterior division of mandibular nerve-**
A. Menigeal *(NBE P 13)* ☐
B. Masseteric ☐
C. Auriculotermporal ☐
D. Lingual ☐

45. **Branch(es) mandibular nerve includes all except:**
A. Auriculotemporal *(PGI 12)* ☐
B. Lingual ☐
C. Inferior alveolar ☐
D. Lacrimal nerve ☐
E. Buccal ☐

46. **Middle superior alveolar nerve is a branch of**
A. Mandibular division of trigeminal nerve ☐
B. Palatine division of maxillary nerve *(AIIMS 10,09)* ☐
C. Anterior nasal division of maxillary nerve ☐
D. Inferior alveolar nerve ☐

47. **True about V3 nerve is all except** *(PGI 09)*
A. Lingual nerve runs with chorda tympani ☐
B. Auriculotemporal embrace middle meningeal artery ☐
C. Otic ganglion is medial to nerve ☐
D. Pure motor ☐
E. Formed in foramen ovale ☐

48. **Which of the following regarding mandibular nerve is correct-** *(AI 04)*
A. Branch of facial nerve ☐
B. Purely motor ☐
C. Passes through foramen ovale ☐
D. Related to sphenopalatine ganglion ☐

49. **Which of the following is not supplied by the anterior division of mandibular nerve (V3)?**
A. Temporalis *(AI 11)* ☐
B. Medial pterygoid ☐
C. Lateral pterygoid ☐
D. Masseter ☐

50. **Which nerve is in close relation with root of the lower third molar :** *(DNB 08, NBE P 14)*
A. Inferior alvolar nerve ☐
B. Chorda tympani nerve ☐
C. Lingual nerve ☐
D. Myolohyoid nerve ☐

51. **Nerve supply of the tympanic membrane is by the**
A. Auriculotemporal *(DNB 04, NBE P 13)* ☐
B. Lesser occipital ☐
C. Greater occipital ☐
D. Parasympathetic ganglion ☐

52. **Sensory nerve supply of pinna is:**
A. Mandibular nerve *(NBE P 14; DNB 06, 04)* ☐
B. Maxillary nerve ☐
C. Facial nerve ☐
D. Abducent nerve ☐

53. **Mandibular nerve does not supply:-**
A. Buccinator *(DNB 04, AIIMS 14)* ☐
B. Masseter ☐
C. Tensor tympani ☐
D. Temporalis ☐
E. Diagastric (ant. belly) ☐

54. **All are branches of mandibular nerve except-**
A. Nerve to medial pterygoid *(NBE P 13)* ☐
B. Lingual ☐
C. Nerve to pterygoid canal ☐
D. Inferior alveolar ☐

55. **Upper premolars are supplied by**
A. Anterior superior alveolar *(WB 09, DNB 10)* ☐
B. Middle superior alveolar ☐
C. Posterior superior alveolar ☐
D. Inferior alveolar ☐

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56. The sensory supply of the palate is through all of the following, except : (AI 02)
A. Facial nerve ☐
B. Hypoglossal nerve ☐
C. Glossopharyngeal nerve ☐
D. Maxillary divi1sion of trigeminal nerve ☐

Facial Nerve

57. Nerve of wrisberg contain(s): (PGI 13)
A. Motor fibers ☐
B. Sensory fibers ☐
C. Secretory fibers ☐
D. Parasympathetic fibers ☐
E. Sympathetic fibers ☐

58. Which of the following is/are branch of facial nerve:
A. Chorda tympani (PGI 09) ☐
B. Lesser petrosal nerve ☐
C. Greater petrosal nerve ☐
D. Zygomatic nerve ☐
E. Nerve to stapedius ☐

59. Branch of facial nerve in facial canal are A/E (PGI 04)
A. Greater petrosal nerve (NBE P 15, 14) ☐
B. Lesser petrosal ☐
C. Chordatympani ☐
D. Nerve to Stapedius ☐

60. All the muscles of the face are supplied by facial nerve except : (DNB 04, JIPMER 05)
A. Levator anguli oris ☐
B. Corrugator supercilli ☐
C. Leavator palpebrae superioris ☐
D. Risorius ☐

61. Posterior belly of digastric is supplied by-
A. Mandibular nerve (DNB 06) ☐
B. Hypoglosal nerve ☐
C. Accessory nerve ☐
D. Facial nerve ☐

62. Stapedius muscle is supplied by.....nerve:
A. Facial (NBE P 15, PGI 03, DNB 02) ☐
B. Vagus ☐
C. Glossopharyngeal ☐
D. Trochlear ☐

63. First branch of facial nerve is: (PGI 09, 13; DNB 14)
A. Chorda tympani ☐
B. Nerve to stapedius ☐
C. Lesser superficial petrosal N ☐
D. Greater superficial petrosal N ☐

64. A person met with knife injury to face & resultant damage to facial nerve. It leads to impaired decreased secretion from: (PGI 12)
A. Parotid gland ☐
B. Sublingual gland ☐
C. Lacrimal gland ☐
D. Parotid gland, sublingual gland & submandibular gland
E. None ☐

65. Facial nerve supplies: (PGI 14, 09)
A. Risorius / Stapedius / Buccinator ☐
B. Anterior belly of digastric ☐
C. Lateral pterygoiod ☐
D. Zygomaticus / Stylohyoid / Platysma
E. Auricular muscles

66. Facial N. stimulation during testing of nerve indicated by contraction of muscle:
A. Temporalis (AIIMS 07
B. Masseter
C. Sternoleidomastoid
D. Orbiculatris oris

67. All the following muscles are innervated by the facial nerve except (AIIMS
A. Occipito-frontalis
B. Anterior belly of digastric
C. Risorius
D. Procerus

68. Sensory fibres from the taste buds in the bard and soft palate travel along: (AIIMS
A. Trigeminal nerve
B. Facial nerve
C. Glossopharynegeal nerve
D. Vagus nerve

69. Otic ganglia is related to- (NBE P
A. 9th nerve
B. 10th nerve
C. 8th nerve
D. 7th nerve

70. Greater petrosal nerve is formed from- (NBE P
A. Geniculate ganglion
B. Plexus around ICA
C. Plexus around middle meningeal artery
D. None of the above

71. Nerve to pterygoid canal is formed from- (NBE P
A. Deep petrosal nerve + greater petrosal nerve
B. Facial nerve
C. Lesser superficial petrosal nerve
D. Lesser petrosal nerve

72. Deep petrosal nerve is formed from- (NBE P
A. Symathetic plexus around carotid
B. Facial nerve
C. Glossopharyngeal
D. Internal carotid plexus

73. In the fracture of middle cranial fossa, absence of tears (lacrimation) would be due to lesion in:
A. Trigeminal ganglion (NBE P 15, 13; AI 01
B. Ciliary ganglion (AIIMS 13, 1
C. Greater petrosal nerve
D. Cervical ganglion

74. Parasympathetic supply to lacrimal glands are pas through- (NBE P
A. Lesser petorsal nerve
B. Chorda tympani
C. Greater petorsal nerve
D. Lingual nerve

75. Vidian nerve is formed by union of- (NBE P
A. Superficial petrosal nerve & deep petrosal nerve
B. Greater petrosal nerve and superficial petrosal nerve
C. Greater petrosal nerve and deep petrosal nerve
D. Greater petrosal nerve & external petrosal nerve

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ANSWERS & EXPLANATIONS:

Cranial Nerves & Nucleus

1. **C i.e. VI; D i.e. V** 2. **A i.e. 3rd to 12th** 3. **D i.e. Occulomotor nerve**
[Ref: Moore 4/e p. 1093; Snell's 7/e p.801, 903, 908; Harrison 16/e P-2437; Gray's Students 1/e P-777-778, 783, 801- 805, 903, 908]

- *Cranial nerve 5 & 6 are related to apex of petrous bone*Q.
- *Only 1st & 2nd cranial nerves do not arise from brain stem and so do not pass through posterior- cranial fossa*Q. And all other C.N (i.e. 3rd to 12th) pass through posterior cranial fossa.
- **1, 2, 8** (i.e. olfactory, optic, vestibulocochlear) nerves are **pure sensory** Q
- **3, 4, 6, 11, 12** (occulomotor, trochlear, abducent, accessory & hypoglassal) are *pure motor* Q & remaining are mixed.

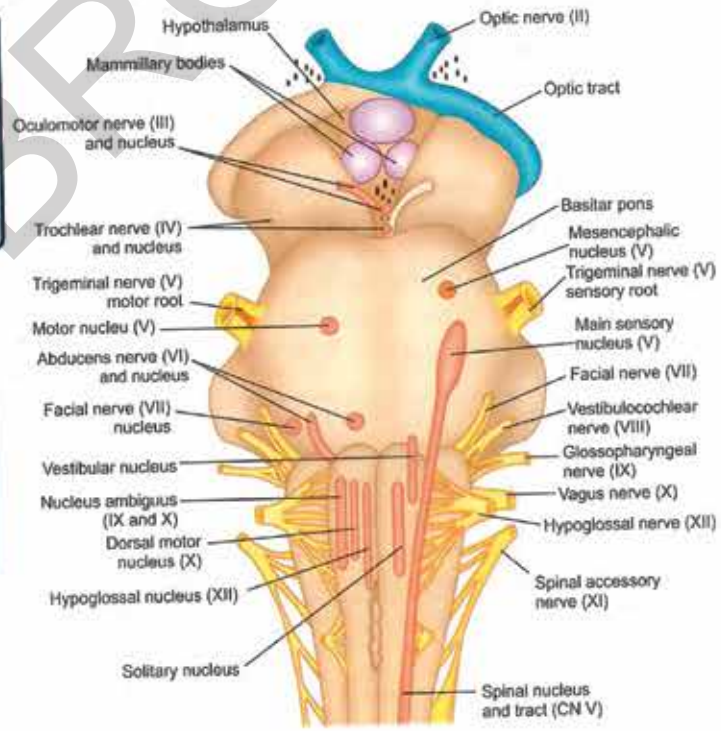
- **Abducent (6th)** is one of the commonest involved nerve in *raised intracranial tension* Q because of its long course through the cisterna points & sharp bends of petrous temporal bone
- **Intracranial aneurysm** commonly present with either *occulomotor (3rd) or abducent (6th) nerve palsy* Q
- **Trigeminal (5th)** is the **largest cranial nerve**Q

- **Vagus nerve (10th)** has *the most extensive distribution* Q of all the cranial nerves. Except vagus all cranial nerves are confined to head & neck.
- **Olfactory hallucinations** are seen in *uncinate fits or temporal lobe epilepsy* Q
- **Facial (7th) nerve** is the *most frequently paralyzed* Q of all cranial nerves. **Facial nerve** has *longest intraosseous course*Q
- ***Olfactory (1) nerve* is the only nerve that projects directly to *cerebral cortex;* *optic nerve*** terminates in thalamus while others are attached to brain stem. *3rd, 4th* Q nerve attach to **midbrain;** *5th* to **pons;** *6th, 7th, 8th* Q nerve to junction **between pons & medulla;** and *9th, 10th, 11th, 12th* Q nerve attach to **medulla.** ***Olfactory nerve is shortest cranial nerve***Q.

4. **B i.e. Trochlear nerve** 5. **D i.e. Trochlear** 6. **C i.e. Trochlear** 7. **B i.e. B**
8. **D. i.e. C-P angle; B. i.e. Pons** *[Ref: P.L. Dhingra 3/e P-143-45; Gray's 40/e p. 276]*

- **Trochlear (4th) nerve** is the only cranial nerve to *emerge dorsally from the brain stem*Q **& only cranial nerve whose fibers originate completely from contralateral nucleus (i.e. only crossed cranial nerve)**Q**. It has** *longest intra cranial course*Q **(making it susceptible to raised ICT) and most slender cranial nerve** (in terms of axons it contains).

- **Trochlear (4th) CN** innervating **superior oblique (SO4)** can be identified by its **dorsal emergence from midbrain and by passing on to lateral surface of curs of cerebral peduncle**Q (seen in figure).
- *3rd & 4th*Q cranial nerve attach to **mid brain;** *5th* Q c.n. to **pons;** *6th, 7th & 8th* Q to **junction between pons & medulla;** *9th, 10th, 11th, & 12th* Q attach to **medulla**
- **Acoustic neuroma** is *most common cerebellopontine angle tumor*Q. *5th nerve is the earliest nerve to be involved.*Q f/b 8th, 9th, 10th, 6th, 7th etc.



9. **A i.e. Superior Ovary Complex** *[Ref: Gray's 40/ep 628]*

Acoustic (Stapedial) Reflex involves contraction of Stapedial muscle in response to loud sound, resulting in stiffness of middle ear ossicles & tilting of stapes in oval window. **Control center of stapedial reflex is superior olivary complex (SOC)**Q. Pathway includes

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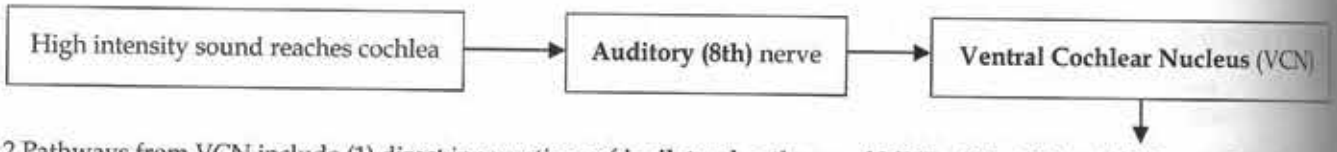
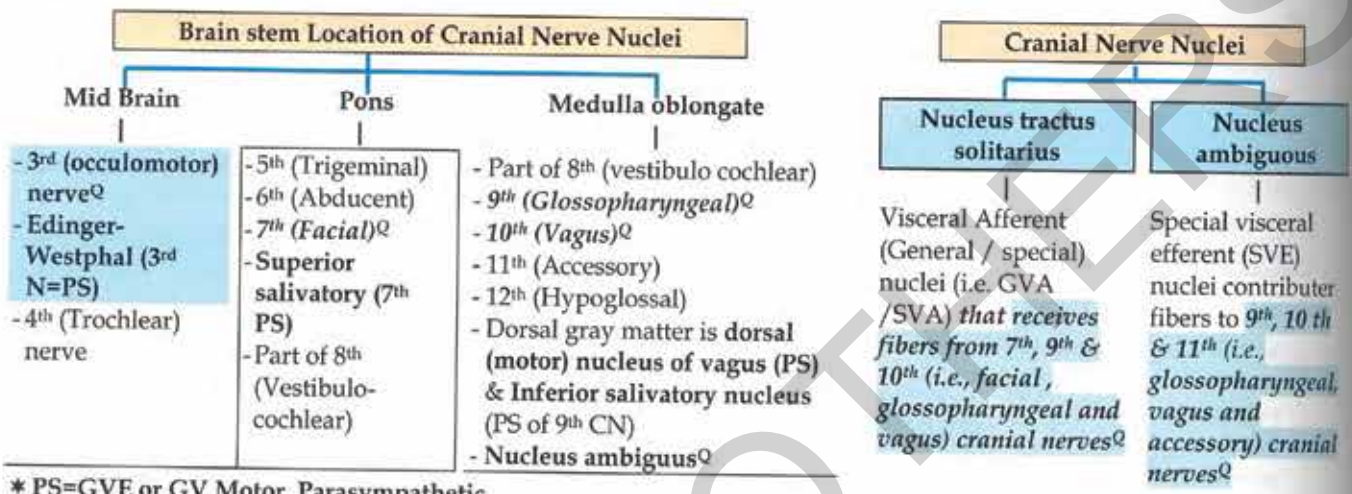


2 Pathways from VCN include (1) direct innervations of **ipsilateral pathway of MN7→SN→SM and (2) Second pathway from VCN to SOC** →Innervations of both **ipsilateral & contralateral facial motor nucleus (MN7) →Stapedial nerve (SN) →Stapedial muscle (SM).**

10. **A i.e. Midbrain**



✱ **PS=GVE or GV Motor, Parasympathetic**

11. **B i.e. Olfactory Nerve** *[Ref: MTx]*

General visceral efferent (GVE)= Parasympathetic involuantry motor nerve nucleus include EW nu of 3rd, **superior salivatory nu of 7th, inferior salivatory of 9th**, dorsal motor nucleus of **10th cranial nerve** and **lacrimatory nucleus.**

12. **C i.e. It gives rise to GVE; E i.e. Its fibres pass through oculomotor nucleus**
13. **C. i.e. Dorsal nucleus of vagus** 14. **B i.e. Skeletal muscles** 15. **A i.e. Facial** 16. **B i.e. Nucleus ambiguus**
17. **A i.e. Nucleus tractus solitarius** 18. **A i.e. VIII**

[Ref: Snell NA 7/e 332-344; IBS NA 7/e p – 106-109; Gray's 39/e p- 332; BDC 4/e vol III p. 332, 335]

- **Accessory parasympathetic nucleus (Edinger-Westphal nucleus) of occulomotor nerve (CN3)Q** is situated posterior to main occulomotor nucleus in **mid brainQ**. EW nucleus gives rise to **GVE (general visceral efferent) fibresQ.** Preganglionic fibres synapse in **ciliary ganglion** and postganglionic fibers pass through the **short ciliary nerve** to **contrictor papillae of iris & ciliary muscles.**
- All the skeletal muscles (except for those derived from branchial arch) are supplied by nerves containing general somatic efferent nucleus. Branchial arch muscles are supplied by cranial nerves containing special viscera efferent nucleus.
- So *5th (masticatory nucleus), 7th (facial nucleus), 9, 10, 11th (nucleus ambiguus) and 12th cranial nerves (spinal accessory nucleus)Q* have **special visceral component**, where as **cranial nerves responsible for eye and tongue movements** i.e., *3rd, 4th, 6th and 12th (hypoglossal nucleus)Q* have **general somatic efferent** component.
- In the same way peripheral nerves supplying skeletal muscles (eg musculocutaneous nerve supplying biceps brachi muscle) also possess GSE component.
- *7th, 9th, 10th cranial nerves end in nucleus trachus solitariesQ.*

GVE (GVM) Nucleus	Nerve	Location	Ganglion/Through	Supply
Edinger Westphal	3rd	Mid brain	Ciliary GQ/Short ciliary N	Sphincter (Constrntor) pupillae & ciliary musclesQ
Lacrimatory Nu	7th (GPN)	Pons	Pterygo palatine G	Lacrimal, Nasal, Palatal glandsQ
Superior salivatory	7th (CT)	Pons	Submandibular GQ	Submandibular & sublingual glandsQ
Inferior salivatory	9thQ	Pons	Otic GanglionQ	Parotid glandQ
Dorsal Nu of vagus	10th	Medulla	Vagus Nerve	Thoracic (ie heart) & abdominal visceraQ

*GPN= Greater Petrosal Nerve & CT=Chorda tympani

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19. **A i.e. Facial**

The 3rd & 4th cranial nerves belong to midbrain; 5th, 6th, 7th, & part of 8th to mid brain and remaining (8th, 9th, 10th, 11th, 12th,) to medulla oblongetaQ.

20. **E i.e., Trochlear** 21. **C i.e. Trochlear** 22. **A i.e., Trochlear**
23. **C i.e. Abducent nerve** 24. **D i.e. Occulomotor nerve**

Intra cranial aneurysm commonly presents with either an occulomotor (IIIrd)or abducent (VIth) nerve palsy Q

25. **B i.e. Trochlear Nerve i.e. IVth C.N.** *[Ref: Moore 4/e p.1093]*

Nerve	Feature
Trochlear (4th)	**Emerge dorsally from the brain stem** Q **Longest Intracranial course** Q
Trigeminal (5th)	**Largest cranial nerve** Q
Vagus (10th)	**Most extensive distribution** Q
Facial (7th)	**Most commonly paralyzed** Q
Facial (7th)	**Longest intraosseous course** Q
Abducent (6th)	**Most commonly involved in raised ICT**Q
Occulomotor (3rd) & Abducent (6th)	Commonly involved in inracranial aneurysm.

26. **C i.e., Mesencephalic nucleus of trigeminal nerve** 27. **B i.e. Gag reflex**
[Ref: Gray's 39/e p. 341; BDC 4/e vol-III p- 335; Lange 25/e p- 113; High Yield Neuroanatomy 3/e p-91]

Reflex	Nucleus Involved
Jaw Jerk (Masseteric) Reflex	**Mesencephalic (afferent)** and **motor (efferent) nucleus of trigeminal nerve**Q
Gag Reflex	Touching of soft palate & pharynx send information to **ipsilateral caudal spinal nucleus V to →bilateral Nucleus Ambiguus**Q r/i elevation of palate & gagging.

Reflex Involving Trigeminal (V) Nerve

Corneal Reflex

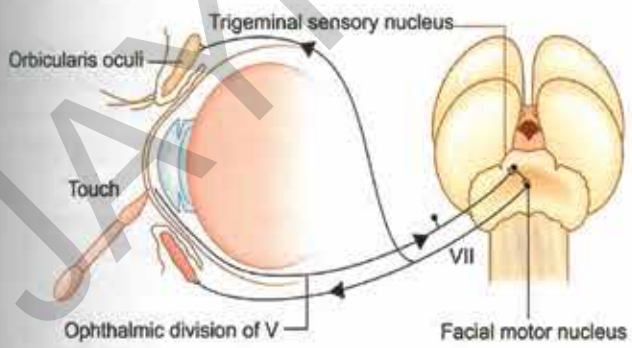
Touching the cornea or shinning a bright light into the eye elicits reflex closure of eye.

Afferent

- ***Via nasociliary branch of opthalmic division of trigeminal (V) nerve***Q reach trigeminal sensory nucleus
- Optic pathway in shinning bright light

Efferent

Facial motor nucleus in pons to facial nerveQ activating *palpebral component of orbicularis oculi*



Jaw Jerk – Masseteric Reflex

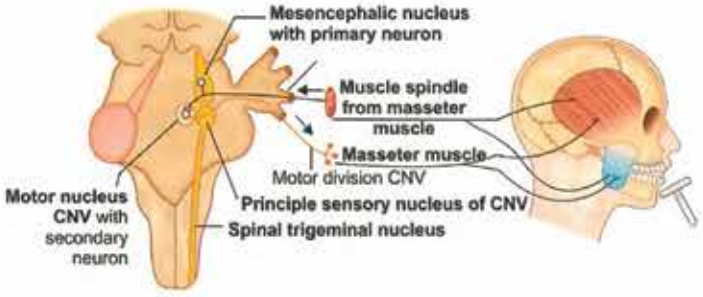
It is a *monosynaptic stretch reflex* in which , hitting on mentum, causes rapid stretching of muscles that close the jaw (masseter, temporalis , medial pterygoid)

Afferent

Stretching activates muscle spindle afferent which travel via ***mandibular division of trigeminal (V) nerve***Q (GSA) to ***mesencephalic nucleus of trigeminal neve***Q

Efferent

Motor nucleus of trigeminal nerveQ to mandibular division of trigeminal nerve which innervate the muscles that close the jaw



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Auditory Pathway

28. **A i.e. Lateral leminiscus** 29. **A i.e., Auditory pathway** 30. **A. i.e. Medial Geniculate body**

- **Medial geniculate body** is related to ***auditory pathway***^{Q} where as **Lateral geniculate body** is related to ***visual pathway***^{Q}
- **Trapezoid body** is related to ***auditory pathway***^{Q}
- **Auditory pathway** is : Superior olivary nucleus^{Q} → Lateral lemininscus^{Q} → Inferior colliculus^{Q} & Inferior brachium → Medial geniculate body^{Q} (Mnemonic – "**SLIM**")

Occulomotor, Trochlear, Abducent & Trigeminal Nerve

31. **A. i.e. Superior division of 3rd nerve** 32. **A i.e. Superior rectus** *[Ref: BDC 4/e Vol III P-107; Barr's 9/ep 120]*

- ***Superior rectus & LPS are supplied by superior division of occulomotor nerve***^{Q}.
- Among ocular muscles, **superior rectus & superior oblique are supplied by contralateral nucleus of 3rd (occulomotor) & 4th (trochlear) nerves respectively.** LPS, pupillary constrictors & ciliary muscles of lens have bilateral inervation: and other muscles are innervated by ipsilateral nerve nucleus.

33. **C i.e. Supplies ipsilateral superior oblique muscle**
[Ref: Gray's 40/e p 275-288, 427-29, 655-56, 660, 666; Last's 12/e p 404, 501, 495; BDC 5/e vol-III p-349-50; Snell's 9/e p 607]

Trochlear nerve is **thinnest** nerve. It is the ***only nerve to emerge from dorsum of brain stem***^{Q} has ***longest intracranial course. It enters orbit through outer part of superior orbital fissure (ie lateral to annulus of Zinn)***^{Q} and supplies superior oblique muscle. Because it's a crossed cranial nerve (with decussation in mid brain), the trochlear nerve **nucleus supplies contralateral superior oblique muscle**.

34. **C i.e. Abducent nerve**

Inability to move eye outward beyond midline suggests lateral rectus (LR_6) palsy which is supplied by abducent nerve^{Q}.

35. **C i.e. Arise from C8 nerve root** 36. **B i.e. Four** *[Ref: Snell Neuroanatomy 7/e p 341-43]*

Trigeminal nerve has 4 ***nuclei***^{Q} which are **main sensory nucleus** (carrying sensation from ***face & anterior scalp)***^{Q}, **motor nucleus** (supplying muscles of mastication, tensor tympani / palatini, mylohyoid & digastric anterior belly), **mesencephalic nucleus** and **spinal nucleus** (***extending in medulla oblongata & spinal cord upto C2 segment)***^{Q}.

37. **B i.e. Optic** 38. **D i.e. Great auricular nerve** 39. **B. i.e. Opthalmic nerve**
[Ref: Snell's 8/e P-727-729; Last's 11/e p.366-367, 346; Gray's 39/e p. 512-515; BDC 4/e Vol. III P-57- 58]

- **Trigeminal (5th) nerve has 3 motor branches i.e. ophthalmic (V1), maxillary (V2) and mandibular (V3) nerve**^{Q}.
- **Angle of mandible** is supplied by ***great auricular nerve*** ($C_{2,3}$)^{Q}. **Tip of nose** is supplied by ***ophthalmic division of trigeminal***^{Q}; and **side and alae** of **nose** is supplied by ***maxillary division of trigeminal nerve***^{Q}
- The skin of face is supplied by three divisions of trigeminal nerve, except for the ***small area over the angle of mandible and parotid gland which is supplied by great auricular nerve***^{Q} (C_2, C_3)
- Spatial representation of face in spinal nucleus of trigeminal nerve (particularly for pain) is more akin to an *onion skin pattern* with fibers from central area of face reaching the highest (cranial) part of nucleus & fibers from more posterior part passing to progressively lower (caudal) levels of nucleus.

40. **A. i.e. Elevation & Lowering of jaw; D. i.e. Corneal Reflex**
41. **C i.e. Trigeminal nerve / Nasociliary nerve**

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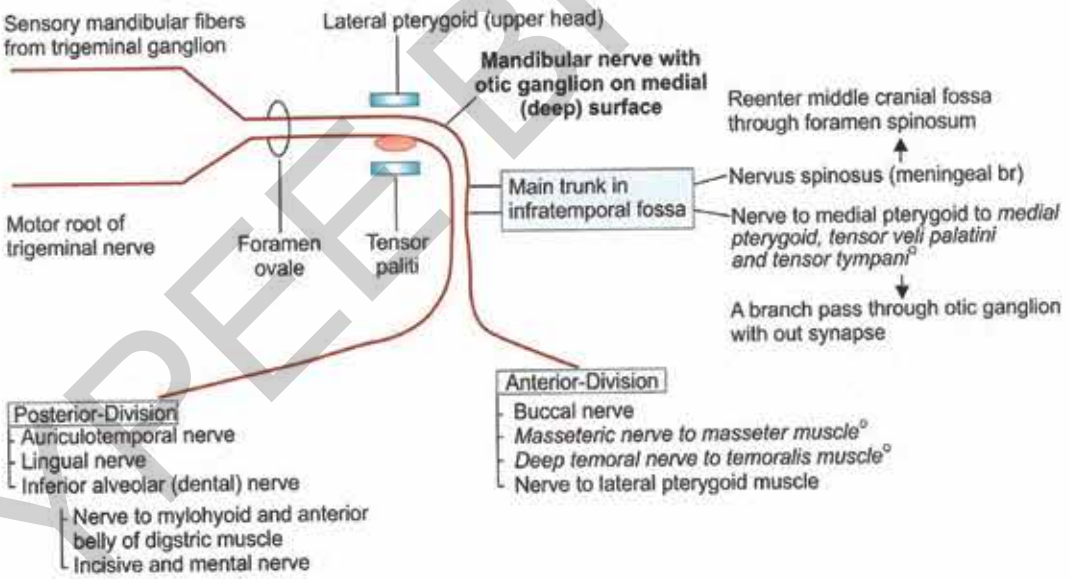
Testing of Trigeminal Nerve

Reflex	Sensory	Motor
- Loss of sneezing reflex - *Loss of Corneal (Blink) reflex*Q (i.e. blinking in response to cornea being touched) **Afferent:** **Short & long ciliary branches of Nasociliary nerve (a branch of ophthalmic division of trigeminal= Vth nerve)**Q **Efferent:** *Facial nerve*Q Ideally both eyes should blink when either cornea is irritated	*Loss of ability to recognize light touch, thermal & pain sensation in face*Q	- On clenching teeth the **temporal & messeter** muscle should stand out with equal prominence on both side; if there is paralysis the muscle on that side will *fail to become prominent*Q - On opening mouth *jaw will deviate towards normal side*Q, being pushed over by healthy lateral pterygoid muscle

Condition	Cause
Neither eye blink	Ipsilateral nasoaciliary or bilateral 7th nerve damage
Only ipsilateral eye blinks	Contralateral 7th nerve damage
Only Contra lateral eye blinks	Ipsilateral 7th nerve damaged

42. **C i.e. Lateral to mandibular nerve** 43. **B i.e. Mandibular nerve** 44. **B i.e. Masseteric** 45. **D i.e. Lacrimal nerve**

- **Lacrimal nerve** is the **branch of ophthalmic division of trigeminal nerve** (V_1)Q. Whereas, **auriculotemporal n, lingual n, inferior alveolar (dental) n, buccal n,** messeteric n, deep temporal n, nerves to lateral & medial pterygoid and **nervous spinosus** are **branches of mandibular division of trigeminal nerve** (V_3).
- **Otic ganglion** lies inferior to **foramen ovale, lateral to tensor vali palatini, medial to mandibular nerve & lateral pterygoid and anterior to middle meningeal arery**Q.



46. **C i.e. Anterior nasal division of maxillary nerve** *[Ref: Gray's 40/e p 544-45, 519, 494-93; Last's 11/e p 367-377, 383-84, 516-17;*

Superior alveolar nerves (Anterior, Middle and Posterior) are branches of maxillary nerve.
Infraorbital nerve is anterior continuation of maxillary nerve that gives *origin to middle and anterior superior alveolar nerve*Q in infraorbital groove and canal respectively.

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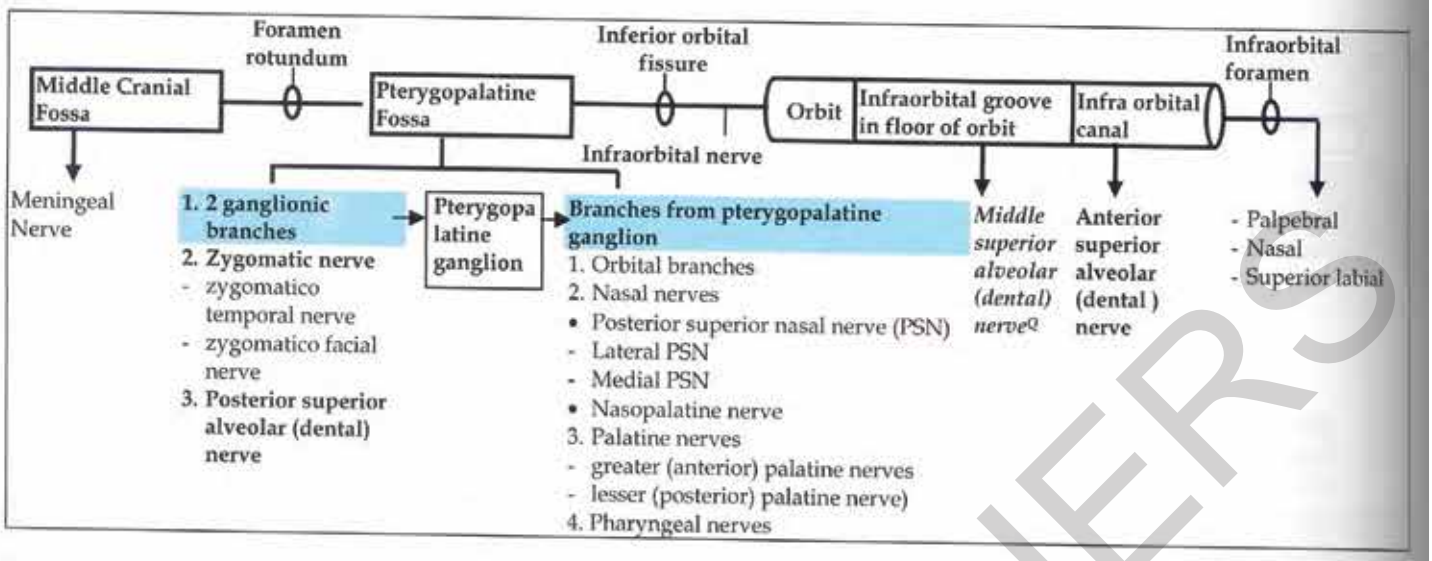

47. **D i.e. Pure motor** **48.** **C i.e. Passes through foramen ovale** **49.** **B i.e. Medial pterygoid**

Temporalis, messeter and lateral pterygoid muscles are supplied by ***anterior division of mandibular nerve*** whereas ***medial pterygoid muscle*** is supplied by the **main trunk** of **mandibular nerve.**

50. **C i.e. Lingual nerve**

Lingual nerve (br. of mandibular nerve) comes in contact with the mandible, where the thin lingual plate forms a shallow groove below and medial to the ***last (3rd) molar tooth***, just above the posterior end of the mylohyoid line.

51. **A i.e. Aurico-temporal nerve** *[Ref: BDC 4th/e Vol III P-255; Snell's 7th/e P-834]*

Nerve Supply of Tympanic Membrane

Outer Surface
- *Antero-inferior part by auricotemporal nerve* (branch of mandibular V_2 nerve)
- *Postero-superior part by auricular branch of Vagus*

Inner Surface
Tympanic branch of *glossopharyngeal nerve through tympanic plexus*

52. **A i.e. Mandibular nerve**

Auriculotemporal nerve, a branch of mandibular nerve (V3) supplies the external acoustic meatus, external surface of auricle above this, skin of temporal region and TM joint.

53. **A. i.e. Buccinator** *[Ref: IBS Embryology 7/e P-115; MTx]* **54.** **C i.e. Nerve to pterygoid canal**

- **Buccinator** is supplied by ***facial (7th) nerve***
- **Mandibular nerve** (branch of trigeminal/5th nerve) is nerve of ***1st branchial arch*** & supplies all muscles derived from it, i.e.
- **Branches of mandibular nerve include nervus spinous (meningeal), nerve to lateral pterygoid, buccal, auriculo-temporal, lingual, inferior alveolar (dental) nerve.**

Mnemonic

My
Tense
Aunt digest
Preferably
lateral &
medial
Temporal
Mass

Muscles of Ist arch (supplied by **Mandibular n.**)
- **Mylohyoid**
- **Tensor veli palati**
- **Tensor-tympani**
- **Anterior belly of Digastric**
- **Pterygoid (lateral & medial)**
- **Temporalis**
- **Masseter**

55. **B i.e. Middle superior alveolar** **56.** **B i.e. Hypoglossal nerve**

Palate is supplied by ***trigeminal (maxillary, mandibular), facial & glossopharyngeal nerves***

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Facial Nerve

57. **B i.e. Sensory fibers; C i.e. Secretory fibers; D i.e. Parasympathetic fibers** *[Ref: Gray's 40/e p. 629-30; Moore 7/e p. 853; Snell NA 7/e p. 346-48; BDC 6/e vol 3p. 370-72]*

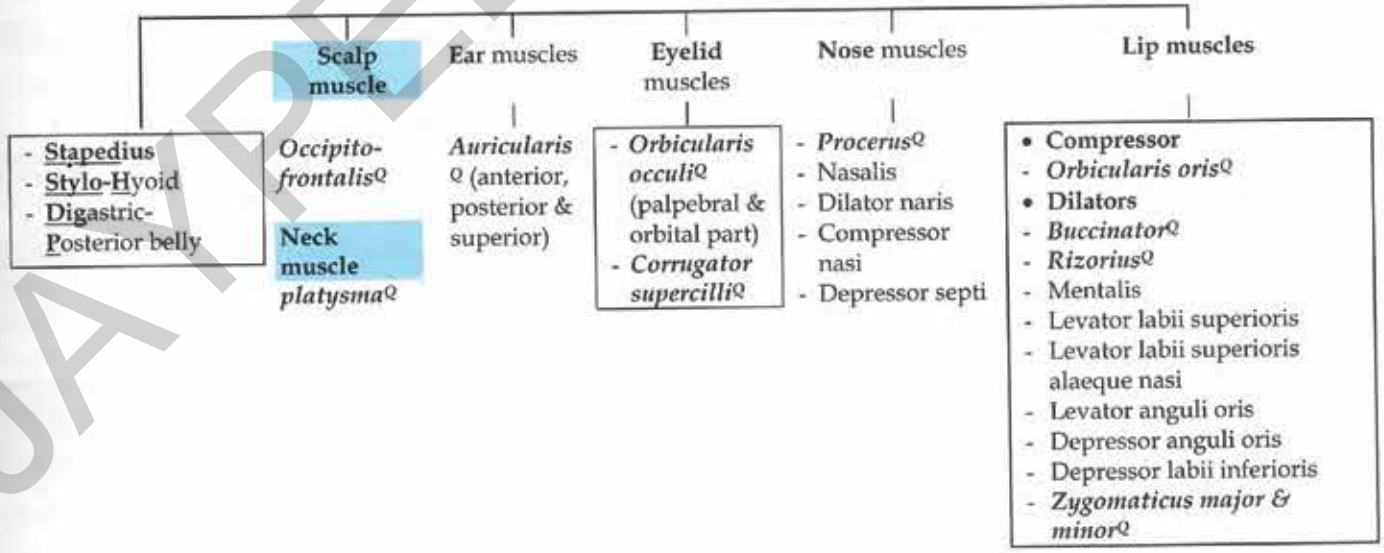
- **Facial nerve (7)** has two separate roots or components till IAM (1) a main **motor root supplying muscles of facial expression** and (2) a **sensory, parasympathetic (secretomotor)** component k/a nervus **intermedius** or **nerve of Wrisberg**, which contain sensory fibers concerned with perception of taste and parasympathetic secretomotor fibers to various glands.
- **Facial nerve proper (motor part)** has **SVE;** whereas **nervus intermedius (Wrisberg nerve)** contains **GSA, SVA and GVE fibers**. Both components along with ***vestibulocochlear (8th) nerve***Q and ***labyrinthine vessels***Q enter the temporal bone through **internal acoustic meatus (IAM)** separately and merge with in the meatus.

58. **A i.e. Chorda tympani; C i.e. Greater petrosal nerve; D i.e. Zygomatic nerve; E i.e. Nerve to stapedius**
59. **B. i.e. Lesser petrosal** 60. **C i.e. Levator palpebrae superioris** 61. **D i.e. Facial nerve**
62. **A i.e. Facial nerve** 63. **D. i.e. Greater Superficial petrosal nerve** 64. **E i.e. None**
65. **A i.e. Risorius; D i.e. Zygomaticus; E i.e. Auricular muscles** 66. **D i.e. Orbicularis oris**
67. **B. i.e. Anterior belly of digastric** 68. **B i.e. Facial nerve** 69. **A i.e. 9th nerve**

[Ref: Gray's 40/e p 495-94, 629-30, 295, 234, 543; BDC 5/e vol-III p 354-58; Moore 6/e p 853-54, 1056-57, 1068-70; Snell 9/e p 612-13; Last's 12/e p 493-98; BRS-Neuroanatomy 4/e p 183-85; Fuller's 2/e p-85]

- ***Before exiting cranium, through stylomastoid foramen, all parasympathetic secretomotor fibers leave facial nerve***Q. So facial nerve lesion in face would result only in motor involvement of terminal branches.
- ***Greater superficial petrosal nerve***Q is 1st branch of facial nerve, it arises from geniculate ganglion. ***Nerve to stapedius and chorda tympani braces also arise in facial canal***Q.
- **Anterior belly of digastric** is supplied by ***mylohyoid nerve (br. of trigeminal n.)***Q and **posterior belly of digastric** is supplied by ***facial nerve***Q.
- **Stapedius** muscle is supplied by ***7th cranial nerve*** Q & **tensor tympani muscle** is supplied by ***mandibular (5th C.N.) nerve***Q – both are muscles of middle ear.
- **Gustatory nerve supply of soft palate** travels along ***facial nerve***Q. The pathway is
  Lesser palatine nerve → Greater petrosal nerve → Geniculate ganglion → Nucleus of solitary tract

- **Sensory innervation of face & anterosuperior part of scalp is** provided mainly by ***trigeminal nerve***Q, whereas **motor innervation of facial muscles** (including muscles of scalp, eyelids, nose, lip except levator palpebrae superioris which is supplied by 3rd nerve) is provided by **nerve of IInd pharyngeal arch i.e. facial nerve (CN VII)**. Muscles of mastication (i.e. masseter, temporalis, lateral & medial pterygoid) are supplied by mandibular division of trigeminal nerve.
- Facial nerve supplies muscle of IInd pharyngeal arch; Mn- "**Stupid Style Has Dipped – Scalp, Ear, Eye lid, Nose, Lip & Neck Expression**" i.e.



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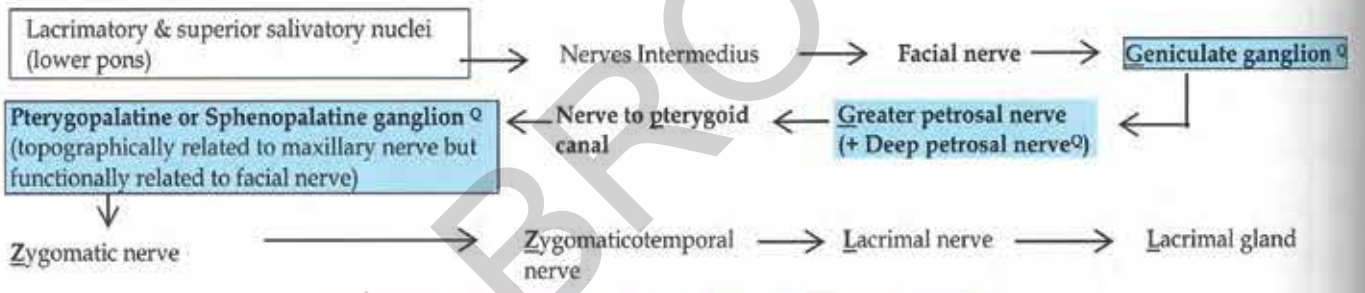
70. **A i.e. Geniculate Ganglion** 71. **A i.e. Deep + Greater petrosal N** 72. **A i.e. Symathetic plexus around carotid**
73. **C i.e. Greater petrosal nerve** 74. **C i.e. Greater petorsal nerve** 75. **C i.e. Greater PN and Deep PN**
76. **C i.e. Sphenopalatine ganglion** 77. **B i.e. Sublingual gland & Ciliary ganglion** 78. **C i.e. Geniculate ganglion**
79. **B i.e. Mandibular N.** *[Ref: BDC 5/e Vol.III 294; Snell's 7/e p.843; Moore 5/e p. 1138]*

- Lacrimal secretion is diminished with damage to ***pterygo-palatine or spheno-palatine or hay fever ganglion*** Q and ***geniculate ganglion*** Q.
- **Geniculate ganglion** is *morphologically & functionally related to facial nerve;* where as **pterygo (spheno) palatine ganglion** is *part of maxillary nerve* and *only functionally related to facial nerve* through ***greater petrosal nerve*** Q; that's why the better answer is geniculate ganglion.
- **Greater (superficial) petrosal nerve** arise *from geniculate ganglion of facial nerve (as its first branch) & enters middle cranial fossa* Q. In **foramen lacerum it unites with deep petrosal nerve to form nerve of pterygoid canal. Deep petrosal nerve is a branch of sympathetic plexus around internal carotid artery** so **carries cervical sympathetic fibres.** ***Ultimately fibres supply lacrimal gland & mucosal glands of nose, palate & pharynx after passing through pterygo or spheno-palatine ganglion &*** Q
- **Pterygo (or spheno) palatine ganglion** is the *largest parasympathetic peripheral ganglion. Topographically,* it is related to the *maxillary nerve,* but *functionally* it is connected to *facial nerve* through *greater petrosal branch.* It serves as a relay station for secretomotor fibres to the ***lacrimal gland, mucous glands of nose, paranasal sinuses, palate & pharynx***Q. (Hay fever ganglion)
- **Innervation of lacrimal gland** or **secretomotor pathway of lacrimation (Mn G2 P2 Z2 L2)**- any damage in this pathway will *diminish lacrimation.*



Petrosal Nerves (PN)

Greater PN	Deep PN	Lesser PN	External PN
First branch of geniculate ganglion of facial nerveQ. **In foramen lacerum joins deep PN to form nerve to pterygoid canal** i.e. **Vidian nerve. It supplies parasympathetic secretomotor fibers to lacrimal gland**Q.	Branch of **sympathetic plexus around ICA**Q & carry cervical sympathetic fibers	Arises from **tympanic plexus of glossopharyngeal (9th) CN & passes via otic ganglion to supply parotid gland**Q **(Parasympathetic secretomotor fibers)**Q.	In consistent branch of **sympathetic plexus around middle meningeal artery**

Mn: **Lacrination** shows **Genuine** (=geniculate ganglion) **Great pain** (greater petrosal nerve) on **Face (Facial nerve)"**

Ganglion	Related (Connected) to	
	Morphologically/Anatomically/ Topgraphically	Functionally
Geniculate	Facial (7) N	Facial (7)NQ.
Pterygo (Spheno) Palatine	Maxillary (V_2) NQ	Facial (7) NQ through greater petrosal N
Otic	Mandibular (V_3) NQ	Glossopharyngeal (9)NQ

80. **C i.e. VIIth nerve** 81. **D i.e. Parotid gland**
[Ref: Moore 4/e p.870, 948, 1100; Snell's 7/e p. 904; Fuller's 2/e p-85; BDC 4/e Vol.III 138-41,103]

Facial nerve ***supplies lacrimal gland, mucosal glands of nose, palate & pharynx, submandibular & sublingual glands but not parotid gland*** Q in which it is divided into terminal branches.

82. **D i.e. Contains postganglionic parasympathetic fibres:**

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83. **A i.e. Branch given by facial nerve in temporal bone; C i.e. It joins lingual nerve; D i.e. It carries taste sensation; E i.e. It carries Secretomotor fibers to sublingual & submandibular gland** *[Ref: Snell 7/e P-779; 841; Moore 4/e P-870, 948, 1100]*

Chorda tympai nerve contains preganglionic secretomotor parasympathetic fibres that synapse on cell bodies in the submandibular ganglion. It does not contain post ganglionic parasympathetic fibres.

Glossopharyngeal Nerve

84. **B i.e. Glossopharyngeal nerve** *[Ref: Gray's 39/e p. 651; BDC 4th/e Vol III p.255; Snell's 7th/e p.834]*

Glossopharyngeal nerve^{Q} → Tympanic nerve/Tympanic plexus → Middle ear^{Q}, Auditory tube^{Q}, Mastoid antrum^{Q}

Vagus Nerve

85. **A i.e. Phrenic nerve anterior, vagus nerve posterior** *[Ref: BDC 6/e Vol I p. 192, 274, 277, 78]*

Relationship of Vagus (V) & Phrenic (P) Nerves

Level	On Left side	On Right side
Thoracic inlet	From anterior to posterior **Vagus, phrenic, Recurrent laryngeal nerve^{Q}**	**Right phrenic is anterior & lateral to right vagus^{Q}**
Arch of Aorta (T_4)	From anterior to posterior **Phrenic**, Cardiac nerves, **Vagus, Recurrent laryngeal nerve**	
Ascending & Descending Aorta (T_5)	**Phrenic nerve is anterior & vagus is posterior**	

86. **B i.e. Carries post ganglionic parasympathetic fibres** *[Ref: Grays Students 1/e P-180, 188-90, 805-06, 800; BDC 4/e Vol. III P-183-85; A.K Dutta Neuroanatomy 2/e P-248-51; Snell's 7/e P- 904-08,818; IBS Neuroanatomy 6/e P-114- 15, 240-46]*

Parasympathetic general visceral efferent out flow of vagus is through ***preganglionic fibers^{Q}***, as postganglionic neurons related to vagus are located in thoracic and abdominal autonomic plexus, close to or, with in, the viscera supplied. It supplies

- ***Gastrointestinal tract from pharynx to the junction of the right 2/3rd and left 1/3rd of transverse colon^{Q}***. (The left 1/3rd of transverse colon, descending colon, the sigmoid colon, rectum and upper part of anal canal are supplied by sacral part of parasympathetic system). As a rule, parasympathetic ***nerve stimulate intestinal movements and inhibit the sphincters^{Q}***, they are *secretomotor to mucosal glands.*
- ***Heart^{Q} and lung^{Q}*** the parasympathetic preganglionic neurons are located in the dorsal nucleus of vagus and stimulation *reduces heart rate and leads to broncho constriction*

87. **B i.e. Recurrent laryngeal nerve and internal laryngeal nerve**

Anastomosis between Laryngeal Nerves (LN) or laryngeal branches of Vagus Nerve includes

1. Galen's Anastomosis (Ansa Galen or Ramus Anastomoticus)	2. Human Communicating Nerve
Between **Recurrent Laryngeal Nerve (RLN)** and **Internal Laryngeal nerve^{Q}** (i.e. internal branch of superior laryngeal nerve). Mostly (not always) posterior branch of RLN is involved in anastomosis	Between **RLN (distal part)** and **External Laryngeal Nerve^{Q}** (i.e. external branch of superior laryngeal nerve)

Mn: **Both involve RLN. But E (Gal En) has I (internal) and I (CommunIcating) has E (External) LN"**

88. **A. i.e. It passes anterior to inferior thyroid artery; C. i.e. It passes between branches of inferior thyroid vessels; D. i.e. It passes posterior to inferior thyroid vessels** *[Ref: BDC 4th/e Vol III P-185]*

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89. **C i.e Superior**

Right recurrent laryngeal n. may be ***superficial or deep to the inferior thyroid artery***[Q]. *Occasionally some* branches are *superficial & some* are *deep*. Left recurrent layrngeal n. is usually deep to inferior thyroid artery.

Important Branches of Vagus (10) CN.

Superior Laryngeal Nerve

runs over superior constrictor & reach middle constrictor where it divides

External Laryngeal Nerve

- Accompanies *superior thyroid artery*[Q]
- Pierce inferior constrictor
- Supply *cricothyroid muscle*[Q]

Internal Laryngeal Nerve

- **Accompanies superior laryngeal vessels**[Q]
- **Runs along superior border of inferior pharyngeal constrictor muscle & pierce thyrohyoid membrane**[Q]
- Supply *mucous membrane of larynx upto vocal folds*[Q]

Recurrent Laryngeal Nerve

- Right. recurrent laryngeal n. arise in *neck*, may be *superficial, deep or both to inferior thyroid artery*[Q]
- Left recurrent laryngeal n. arise in *thorax*, loops around *ligamentum arteriosum* and is usually deep to inferior thyroid a.
- Passes deep to inferior constrictor & enter larynx
- It supply
  - All intrinsic muscles of larynx except cricothyroid
  - *Mucous membrane below vocal cord*[Q]
  - Br. to deep cardiac plexus, trachea, oesophagus & inf. constrictor

90. **A. i.e. Cricothyroid**

91. **D i.e. Paralysis of cricothyroid muscle**

External larymgeal nerve (external branch of superior laryngeal nerve) ***runs along with superior thyroid artery and supplies cricothyroid muscle***[Q]. **All other muscles of vocal cord or larynx** (except cricothyroid) are supplied by ***recurrent laryngeal nerve***[Q].

92. **A. i.e. Vocalis; B. i.e. Posterior cricoarytenoid**

93. **A. i.e. Recurrent laryngeal nerve**

[Ref: BDC 4/e Vol III P-244-46; P. L. Dhingra 3/e P-337-8; Last's 11/e p.351, 411, 397, 401, 216, 381]

- ***All intrinsic muscles of larynx i.e. posterior cricoarytenoid (abductor); thyroarytenoid, inter arytenoid / transverse arytenoid, lateral cricoarytenoid (adductors); Vocalis (tensor); thyroepiglottic (openers)***[Q] are supplied by **reccurent laryngeal nerve** ***except cricothyroid***[Q] which is supplied by **external laryngeal nerve**
- *Stylopharyngeus*[Q] is supplied by **glossopharyngeal** nerve
- *Omohyoid*[Q] is supplied by **ansa cervicalis**

Nerve supply of Larynx (Vocal cord)

Motor	Sensory
- ***Cricothyroid muscle by external laryngeal n. (br. of superior laryngeal n.)***[Q]	- Mucous membrane upto vocal folds by ***internal layrngeal n.***[Q]
- **All others** (oblique/transverse/thyro-arytenoid; lateral/posterior-cricoarytenoid & thyro-epiglottic) by ***recurrent laryngeal n.***[Q]	- Mucous membrane below vocal folds by ***recurrent laryngeal n.***[Q]

Cranial and Spinal Accessory Nerve

94. **C i.e. Superior (pharyngeal) constrictor & soft palate (Levator Palitini)**

95. **C i.e. Tensor veli palate**

96. **C i.e. Stylopharyngeus**

[Ref: Gray's 40/e p 572-68; BDC 4/e vol-III p-211, 223; Keith Moore 6/e p 938, 941, 1028, 1037; Snell's 9/e p 648, 635]

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Cranial and Spinal Accessory Nerve

Pharyngeal Plexus

- **Pharyngeal plexus** is formed by paryngeal branch of [Mnemonic "GCS"]

1. Vagus nerve carrying fibres of **Cranial accessory nerve** (main)
2. **Superior** cervical sympathetic ganglion
3. **Glossopharyngeal** nerve

- Pharyngeal plexus lies on the external surface of pharynx, especially *on the middle constrictor*. The **pharyngeal branch of vagus** (X) emerges from upper part of *inferior vagal ganglion* and consists mainly of filaments derived from **cranial accessory nerve**; almost all the neuronal cell bodies are in the **nucleus ambguus**. The pharyngeal branch of vagus supplies ***all the muscles of pharynx (excluding stylopharyngeus[Q], which is supplied by the glossopharyngeal nerve[Q]) and of the soft palate (excluding tensor veli palatine which is supplied by mandibular division of trigeminal nerve via nerve to pterygoid)[Q].***
- Therefore **cranial accessory nerve/pharyngeal branch of vagus/ pharyngeal plexus** innervates ***superior, middle and inferior pharyngeal constrictor[Q]*** (all 3 in external layer); ***palatopharyngeus and salpingopharyngeus[Q]*** (in internal layer) of pharynx and ***palatoglossus, palatopharyngeus, musculus uvulae, and levator veli palatine in soft palate[Q].***

Accessory Nerve

Spinal

- ***Sterno cleidomastoid muscle[Q]***
- ***Trapezius[Q]***

Clinical presentation

- Weakness of shrugging movements of shoulder
- Winging of scapula while upper limbs are at the side

Cranial

- ***Pharynx except stylopharyngeus muscle*** [Q] which is supplied by *glossopharyngeal nerve*
- ***Soft palate except tensor veli palatini*** [Q] which is supplied by *nerve to pterygoid from mandibular nerve*

- **Pharyngeal muscles** – *superior/middle/inferior-constrictors & palato/salpingo/crico-pharyngeus[Q] (except Stylopharyngeus)* are supplied by **pharyngeal plexus** of cranial accessory nerve. *Stylopharyngeus* [Q] is supplied by **Glossopharyngeal nerve.**
- **Soft palate muscles** – ***palato-glossus/pharyngeus, musculus uvulae & levator veli palatini*** **(except Tensor Veli palatini)** are supplied by pharyngeal plexus of cranial accessory nerve. ***Tensor veli palatini*** [Q] is supplied by **nerve to medial pterygoid from mandibular nerve.**
- **Larynx muscles** – *oblique/transverse/thyro-arytenoid, lateral/posterior-cricoarytenoid & thyro-epiglottic* are supplied by **recurrent laryngeal nerve except cricothyroid which is supplied by external laryngeal nerve[Q].**

97. C i.e. Cut to spinal part of accessory nerve
[Ref: BDC III/4th/71,72,198; BDC I/4th/76; Surgical anatomy by Lee MC Gregor 12th/439, 438]

Inability to raise arm above the level of head following surgical procedure or the posterior triangle suggests the diagnosis of injury to spinal part of accessory nerve.[Q]

Over head abduction i.e. abduction in the range of 120° to 180° (above head to brush hair) Occurs at the Scapulo thoracic linkage and is aided by upward rotation of Scapulae by the action of **trapezius and serratus anterior. Trapezius is supplied by the spinal part of the accessory nerve** which runs in the middle of the roof of the posterior triangle.

98. B i.e. Sternocleidomastoid

Abduction at shoulder

- Glenohumeral Joint (0-120°)
  - Initial abduction (0-150°) → **Supraspinatus** (Suprascapular nerve)
  - Abduction upto 90° (15°-90°) → **Deltoid** (Axillary nerve)
  - Abduction (90°-120°) → Deltoid (+short external rotators) This final 30° of Abduction requires the humerus to be externally rotated allowing the grater tubercle to pass posterior to acromian (Axillary nerve)
- Scapulothoracic Linkage (120°-180°) → The final 60° of abduction or overhead abduction occurs at scapulothoracic linkage due to Trapezius (spinal acessary nerve) and Serratus Anterior muscle (supplied by nerve to serratus anterier)

Hypoglossal Nerve

99. A. i.e. Thyrohyoid **100. D i.e. Sternohyoid** *[Ref: BDC 4/e Vol III P-130; Last's Anatomy 11/e p. 356, 345-346]*

Thyrohyoid & Geniohyoid[Q] **are supplied by first cervical nerve through hypoglossal nerve.**

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