

Sensory (Afferent)			
Visceral		Somatic	
General	Special	General	Special
GVA	SVA	GSA	SSA

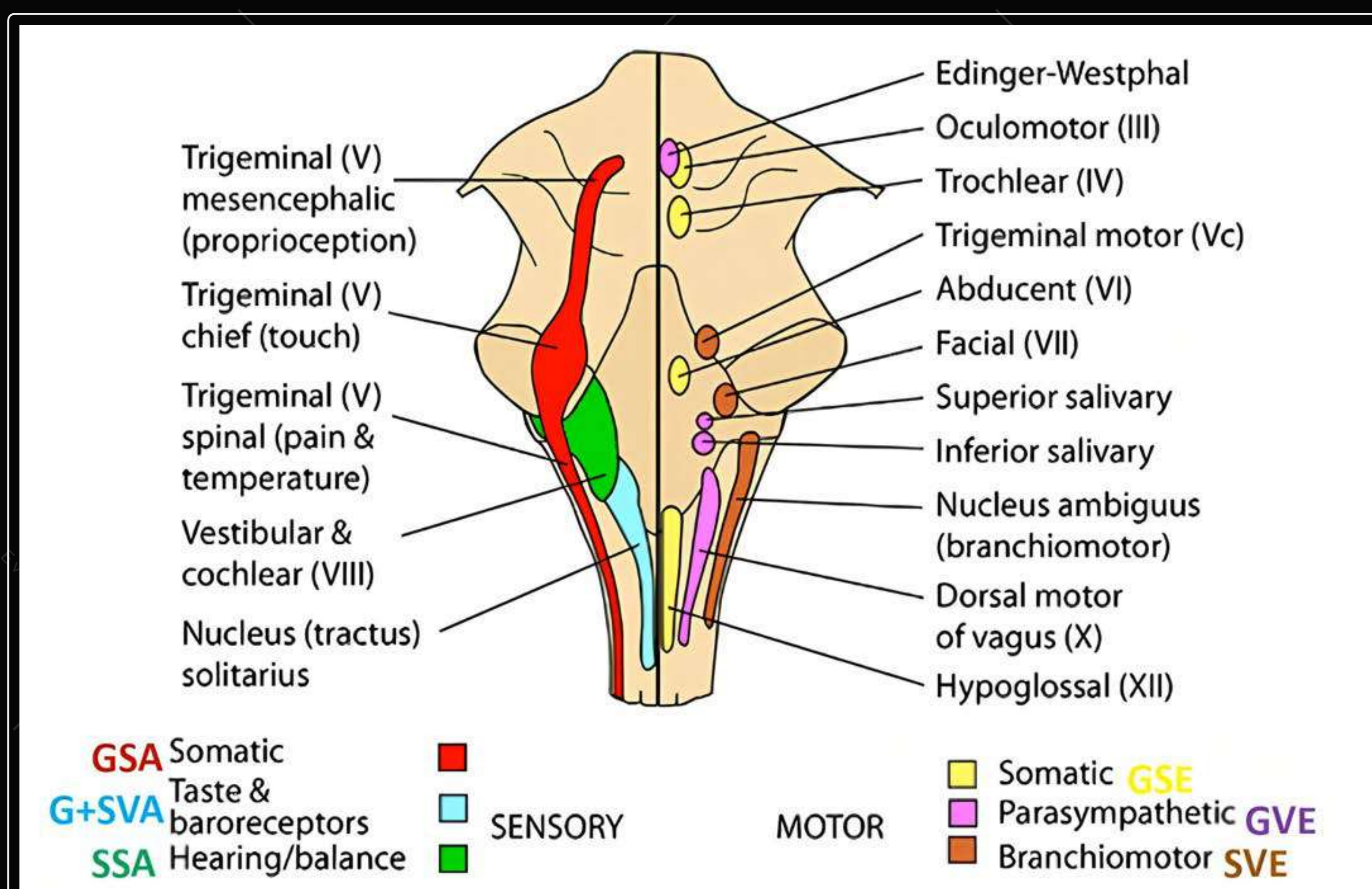
In the brain stem, there are nuclei that are arranged in 7 different columns.

They are classified into either

- Sensory (afferent) > that has 4 columns located at lateral side of midline
- Motor (efferent) > that has 3 columns located at medial side of midline

They are classified into somatic or visceral then each one classified into general or special

Motor (Efferent)		
Somatic	Visceral	
General	Special	General
GSE	SVE	GVE



Cranial nuclei are classified according to its nerves

Olfactory Nerve CN I

Class: SVA

It arises from the bipolar neurons located in the nasal mucosa, the olfactory epithelium.

Optic Nerve CN II

Class: SSA

It consists of axons of neurons located in the ganglion cell layer of the retina.

Oculomotor Nerve CN III

2 Nuclei

Oculomotor nucleus

Class: GSE

Supplies the extrinsic muscles of the eyeball except superior oblique and lateral rectus.

Edinger-Westphal nucleus

Class: GVE

It is the parasympathetic part of the oculomotor nerve. This nucleus gives preganglionic motor fibers to the constrictor of the pupil and ciliary muscle.

Trochlear Nerve CN IV

Trochlear nucleus

Class: GSE



Supplies superior oblique muscle of eyeball

Trigeminal Nerve CN V

4 Nuclei

Motor nucleus of trigeminal

Class: SVE

Supplies the skeletal muscles derived from the first branchial arch. These are the four muscles of mastication, anterior belly of digastric, mylohyoid, tensor palati and tensor tympani.

Main sensory nucleus of trigeminal

Class: GSA (TOUCH)

This nucleus is responsible for receiving touch sensation from the head

Mesencephalic nucleus

Class: GSA (PROPIOCEPTIVE)

This nucleus is responsible for carrying proprioceptive sensation from the head

** Spinal nucleus of trigeminal

Class: GSA (PAIN & TEMPERATURE)

This nucleus receives pain and temperature sensation from the head

Abducent Nerve CN VI

Abducent Nucleus

Class: GSE

Supplies the lateral rectus muscle of the eyeball

Facial Nerve CN VII

3 Nuclei

Facial Nucleus

Class: SVE

Supplies the muscles of the second branchial arch. These are the muscles of the face and auricle, occipitofrontalis, platysma, posterior belly of digastric, stylohyoid and stapedius

Superior salivary nucleus

Class: GVE

It gives preganglionic secretomotor fibers to the lacrimal, nasal, palatine, buccal, submandibular and sublingual glands. These fibers are carried by the facial nerve

Solitary Nucleus of Tongue & Epiglottis

Class: SVA

Taste fibers from the anterior two-thirds of the tongue which are carried through the chorda tympani branch of facial nerve.

Vestibulocochlear Nerve CN VIII

2 Nuclei

Vestibular nuclei

Class: SSA

Which receives vestibular impulses (responsible for equilibrium)

Cochlear nuclei

Class: SSA

Which receive auditory impulses from the cochlea.

Glossopharyngeal nerve CN IX

5 Nuclei

Nucleus ambiguus (3rd, 4th, 6th brachial arch)

Class: SVE

from the upper part of the nucleus run through the glossopharyngeal nerve to supply stylopharyngeus

Inferior salivary nucleus

Class: GVE

It gives preganglionic secretomotor fibers to the parotid gland

Solitary nuclei of tactus solitarius

Class: GVA

The upper part of this nucleus receives general sensory fibers running in the glossopharyngeal nerve

Solitary nuclei of tongue and epiglottis

Class: SVA

Taste fibers from the posterior third of the tongue which are carried through the lingual branches of glossopharyngeal nerve.

Spinal nuclei of trigeminal

Class: GSA

**explained in the trigeminal chart

vagus Nerve CN X

5 Nuclei

Cranial part: Nucleus Ambiguus (3rd, 4th, 6th brachial arch)

Class: SVE

Fibers from the greater part of the nucleus, supply the muscles of the pharynx (except stylopharyngeus), muscles of the palate (except tensor palati) and intrinsic muscles of the larynx.

Dorsal nuclei of Vagus

Class: GVE

It gives preganglionic parasympathetic motor fibers to the bronchial tree, abdominal viscera, and gastrointestinal tract till the junction of the right two thirds and left third of the transverse colon. It also gives preganglionic parasympathetic inhibitory fibers to the heart.

Solitary nuclei of tactus solitarius

Class: GVA

The lower and greater part of the nucleus receives general visceral sensory fibers running in the vagus nerve; these fibers carry general sensation from the respiratory tract, abdominal viscera and gastrointestinal tract till the junction of the right two-thirds and left third of the transverse colon

Solitary nuclei of tongue and epiglottis

Class: SVA

Taste fibers from the most posterior part of the tongue and epiglottis as well as vallecula which are carried through the internal laryngeal branch of vagus nerve

Spinal nuclei of trigeminal

Class: GSA

**explained in the trigeminal chart

Spinal Accessory Nerve CN XI

2 Nuclei

Cranial part: Nucleus Ambiguus (3rd, 4th, 6th brachial arch)

Class: SVE

Fibers from the greater part of the nucleus, supply the muscles of the pharynx (except stylopharyngeus), muscles of the palate (except tensor palati) and intrinsic muscles of the larynx.

Spinal part

Class: Unknown

From anterior horn cells of the upper 5 or 6 cervical spinal segments

Hypoglossal Nerve CN XII

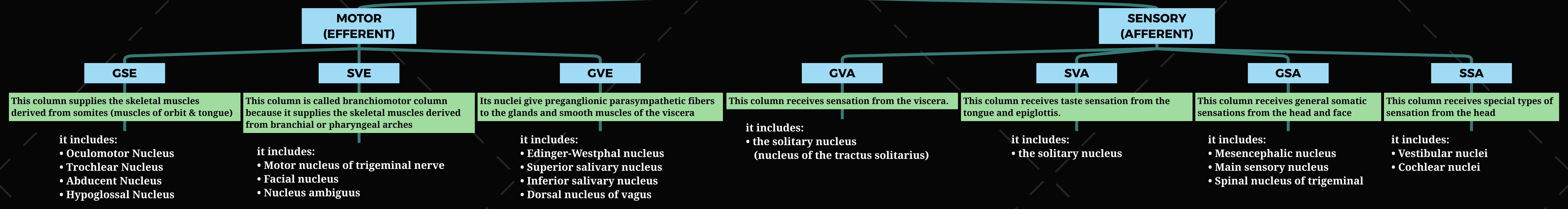
1 Nuclei

Hypoglossal nucleus

Class: GSE

Supplies all intrinsic and extrinsic muscles of the tongue except palatoglossus.

Cranial nuclei are classified according to its functions



Important notes for MCQ:

- 3 cranial nerves are pure sensory (olfactory, optic, and vestibulocochlear). Parasympathetic supply is considered motor supply as it is secreto-motor to glands (stimulate secretion of glands).
- 4 cranial nerves are mixed, both sensory and motor (trigeminal, facial, glossopharyngeal, and vagus).
- Nucleus solitarius responsible for taste sensation is shared by 3 nerves (facial, glossopharyngeal, and vagus) = (7,9,10).
- Spinal nucleus of trigeminal receives general sensory fibers from facial, glossopharyngeal, and vagus nerves.
- CN 3, 4 and their nuclei located in Mid Brain
- CN 5, 6, 7, 8 and their nuclei located in Pons
- CN 9, 10, 11, 12 and their nuclei located in Medulla
- 5 cranial nerves are pure motor (oculomotor, trochlear, abducent, accessory, and hypoglossal).
- Cranial nerves giving parasympathetic outflow are (oculomotor, facial, glossopharyngeal, and vagus) = 1973.
- Nucleus ambiguus responsible for supply of muscles developed from 3rd, 4th, and 6th pharyngeal arches is shared by 3 nerves (glossopharyngeal, vagus, and accessory) = (9,10,11).

Lemnisci

- Medial lemniscus** - These are the axons of the gracile and cuneate tracts as well as the ventral spinothalamic tract
- Trigeminal lemniscus** - These are the axons of the spinal nucleus and the main sensory nucleus of the trigeminal
- Spinal lemniscus** - These are the axons of the lateral spinothalamic tract
- Lateral lemniscus** - These are the axons of the trapezoid and superior olivary nuclei.

Decussations

- Sensory Decussation**
 - Decussation of the axons of the gracile and the cuneate nuclei which form the internal arcuate fibers.
 - They decussate at the middle level of the medulla
- Motor Decussation**
 - Decussation of the corticospinal fibers at the lower level of the medulla
- Ventral tegmental decussation**
 - Lies at the upper level of the midbrain.
 - It is formed by the decussating rubrospinal and rubroreticular tracts
- Dorsal tegmental decussation**
 - Lies at the upper level of the midbrain.
 - It is formed by the decussating tectospinal and tectobulbar tracts.
- Decussation of the superior cerebellar peduncle**
 - Lies at the lower level of the midbrain.
 - These are the axons of the dentate nucleus crossing to the opposite side to reach the red nucleus and the thalamus.

اسئلة ارشيف

1. The motor nuclei of the facial nerve are situated in the _____?

- a. Floor of the third ventricle
- b. Cerebellum
- c. Midbrain
- d. Pons
- e. Medulla oblongata

** Ans:(d)

2. All of the following nerves carry parasympathetic except? Select one:

- a. Glossopharyngeal nerve
- b. Facial nerve
- c. Trochlear nerve.
- d. Oculomotor nerve
- e. Mandibular nerve

** Ans:(c)

3. All of the followings are nuclei of trigeminal except? Select one:

- a. Spinal nucleus
- b. Main sensory nucleus
- c. Mesencephalic nucleus
- d. Solitary nucleus
- e. Motor nucleus to muscles of mastication

** Ans:(d)

4. Which of the followings parasympathetic nuclei of the facial nerve ?

- a. Inferior salivary nucleus
- b. Superior salivary nucleus
- c. Edinger westphal nucleus
- d. Solitary nucleus
- e. Mesencephalic nucleus

** Ans: (b)

5. Which nucleus presents in the medulla and pons?

- a. Solitary nucleus
- b. Spinal nucleus of the trigeminal nerve
- c. Vestibular nuclei
- d. Mesencephalic nucleus of the trigeminal nerve
- e. Olivary nucleus

** Ans:(b)

6. Which nucleus passes in all of the brain stem? Select one:

- a. Solitary nucleus
- b. Spinal nucleus of the trigeminal nerve
- c. Vestibular nucleus
- d. Mesencephalic nucleus of the trigeminal nerve
- e. Olivary nucleus

** Ans:(b)

7. Which of the followings nuclei are motor?

- a. Nucleus ambiguus
- b. Solitary nucleus
- c. Inferior vestibular nucleus
- d. Spinal nucleus of trigeminal

** Ans:(a)