## CRANIAL NERVE

VIII Vestibulocochlear



XII



IX Glossopharyngeal

X

Vagus





The cranial nerves are a set of 12 paired nerves that arise directly from the brain. The first two nerves (olfactory and optic) arise from the cerebrum, whereas the remaining ten emerge from the brain stem. The names of the cranial nerves relate to their function and they are also numerically identified in

roman numerals (I-XII)





# Oh, Oh, Oh, To Touch And Feel Very Good Velvet, Such A Heaven

- Olfactory nerve (CN I)
- Optic nerve (CN II)
- Occulomotor nerve (CN III)
- Trochlear nerve (CN IV)
- Trigeminal nerve (CN V)
- Abducens nerve (CN VI)
- Facial nerve (CN VII)
- Vestibulocochlear nerve (CN VIII)
- Glossopharyngeal nerve (CN IX)
- Vagus nerve (CN X)
- Accessory nerve (CN XI)
- Hypoglossal nerve (CN XII)



Origin of the Cranial Nerve

There are twelve cranial nerves in total. The olfactory nerve (CN I) and optic nerve (CN II) originate from the cerebrum.

Cranial nerves III – XII arise from the brain stem They can arise from a specific part of the brain stem (midbrain, pons or medulla), or from a junction between two parts:







	Midbrain – the trochl
	nerve (IV) comes from
	posterior side of t
IV	midbrain. It has t
	longest intracranial len
	of all the cranial nerves.
ngeal IX	
	Midbrain-ponti







# **Pons** – trigeminal (V).

**Pontine-medulla** junction abducens, facial, vestibulocochlear (VI-VIII).

Medulla oblongata – posterior to the olive: glossopharyngeal, vagus, accessory (IX-XI). Anterior to the olive: hypoglossal (XII).





Mohamed el fiky



### "Some say marry money, but my brother says big brains matter most"

- Sensory (CN I)
- Sensory (CN II)
- Motor (CN III)
- Motor (CN IV)
- Both (CN V)
- Motor (CN VI)
- Both (CN VII)
- **Sensory (CN VIII)**
- Both (CN IX)
- Both (CN X)
- Motor (CN XI)
- Motor (CN XII)



## Mnemonic for CN Function

Some	(CN I)
Say	(CN II)
Marry	(CN III)
Money	(CN IV)
But	(CNV)
My	(CN VI)
Brother	(CN VII)
Says	(CN VIII)
Big	(CN IX)
Brains	(CN X)
Matter	(CN XI)
Most!	(CN XII)

S = Sensory functionM = Motor functionB = BOTH (Sensory and Motor function)









# Modalities cranial nerves (SSS, SVS and SVM).

Simplistically, each cranial nerve can be described as being sensory, motor or both. They can more specifically transmit seven types of information; three are unique to



# Sensory (afferent) Modalities: General somatic sensory (GSS) – general sensation

- General somatic senso from skin.
- General visceral sensory (GVS) general sensation from viscera.
  - Special somatic sensory (SSS) senses derived from ectoderm (e.g. sight, sound, balance).
    Special visceral sensory (SVS) senses derived from endoderm (e.g. taste, smell).



# Motor (efferent) Modalities: General somatic motor (GSM) – skeletal muscles. General visceral motor (GVM) – smooth muscles of gut and autonomic motor. Special visceral motor (SVM) – muscles derived from pharyngeal arches.







# **1st. OLFACTORY NERVE**

The olfactory nerve (CN I) is the first and shortest cranial nerve. It is a special visceral afferent nerve, which transmits information relating to smell.



Embryologically, the olfactory nerve is derived from the olfactory placode (a thickening of the ectoderm layer), which also give rise to the glial cells which support the nerve.





**Anatomical Course** The anatomical course of the olfactory nerve describes the transmission of special sensory information from the nasal epithelium to the primary olfactory cortex of the brain.



Nasal Epithelium cranial cavity.



# The sense of smell is detected by olfactory receptors located within the nasal epithelium. Their axons (fila olfactoria) assemble into small bundles of true olfactory nerves, which penetrate the small foramina in the cribriform plate of the ethmoid bone and enter the



### **Nasal Epithelium**

The sense of smell is detected by olfactory receptors located within the nasal epithelium. Their axons (fila olfactoria) assemble into small bundles of true olfactory nerves, which penetrate the small foramina in the cribriform plate of the ethmoid bone and enter the cranial cavity.





# **Olfactory Bulb**

Once in the cranial cavity, the fibres enter the olfactory bulb, which lies in the olfactory groove within the anterior cranial fossa.

The olfactory bulb is an ovoid structure which contains specialised neurones, called mitral cells. The olfactory nerve fibres synapse with the mitral cells, forming collections known as synaptic glomeruli. From the glomeruli, second order nerves then pass posteriorly into the olfactory tract.





### Olfactory tract

# **Olfactory Tract**

The olfactory tract travels posteriorly on the inferior surface of the frontal lobe. As the tract reaches the anterior perforated substance (an area at the level of the optic chiasm) it divides into medial and lateral stria:

- Lateral stria carries the axons to the primary olfactory cortex, located within the uncus of temporal lobe.
- Medial stria carries the axons across the medial plane of the anterior commissure, where they meet the olfactory bulb of the opposite side.



The primary olfactory cortex sends nerve fibres to many other areas of the brain, notably the piriform cortex, the amygdala, olfactory tubercle and the secondary olfactory cortex. These areas are involved in the memory and appreciation of olfactory sensations.



o It is sensory nerve Carries impulses for sense of smell ORIGIN: olfactory epithelium OPENING IN SKULL: opens in cribriform plate of ethmoid bone to receptors in roof of nasal cavity. Attaches to cerebrum.



### Lesion leads to bilateral anosmia can be caused by disease of olfactory mucous membrane, such as the common cold.



