The cranial nerves are a group of 12 paired nerves in the peripheral nervous system (PNS) integral to the reception of sensory information and transmission of muscle commands.
PERIPHERAL NERVOUS SYSTEM
The nerves and ganglia outside the CNS that connect it to tissues throughout body regions

**SENSORY (AFFERENT)**
Carry impulses from sensory organs to the CNS

**MOTOR (EFFERENT)**
Carry impulses from the CNS to innervate muscles

**VISCERAL/AUTONOMIC**
- Receives signals from internal organs
- Controls involuntary actions of organs and glands
- Involved in “rest and digest” activities
- Involved in “fight or flight” responses

**SOMATIC**
- Receives signals from the skeletal muscles and skin
- Controls voluntary actions of skeletal muscles
OLFACTORY NERVE

The olfactory nerve (CN I) originates in the nasal cavity and passes through each side of the nose, terminating in masses of gray matter called the olfactory bulbs.

SENSORY
Transmits signals for smell

FUN FACT!
Problems with the sense of smell increase as people get older, and they are more common in men than women.
OPTIC NERVE

The optic nerve (CN II) originates in the retina of each eye and terminates in the thalamus. From there, signals are transmitted to the visual cortex.

SENSORY

Receives signals for vision from each retina.
The **Oculomotor nerve (CN III)** extends from the midbrain and divides into the superior and inferior branches to control the muscles of the eye.

**MOTOR**
Innervates the extrinsic and intrinsic eyeball muscles, in addition to the upper eyelid muscle.

**PARASYMPATHETIC**
Constricts the pupil to reduce the amount of light that enters, and contracts the ciliary muscles to adapt for short range vision.
TROCHLEAR NERVE

The trochlear nerve (CN IV) originates in the midbrain and travels via the superior orbital fissure of the sphenoid to enter each orbit.

MOTOR
Innervates the superior oblique muscle that controls the up and down movement of the eye.

FUN FACT!
Though it is the smallest cranial nerve (by number of axons), CN IV has the longest intracranial course.
MOTOR
Innervates the muscles of mastication and the pharyngeal arch

SENSORY
Receives impulses from the skin, mucous membranes, and sinuses

FUN FACT!
Irritation of nerve cells in the nose sends signals to the brain via the trigeminal nerve, which causes you to sneeze.

TRIGEMINAL NERVE
Each trigeminal nerve (CN V) divides into three major branches: ophthalmic, maxillary, and mandibular.

- ophthalmic branch
- maxillary branch
- mandibular branch
ABDUCENS NERVE
The abducens nerve (CN VI) fibers originate in the abducens nucleus in the pons and pass through the superior orbital fissure of the sphenoid.

MOTOR
Innervates the lateral rectus muscle that causes the abduction (lateral rotation) of eyeballs

FUN FACT!
Proprioception signals beginning in the abducens nerves travel to the brain via the trigeminal nerves and are thus not part of the CN VI nerve.
The motor part of the facial nerve (CN VII) begins in the pons and ends in five branches: temporal, zygomatic, buccal, mandibular, and cervical. The sensory fibers end in the pons and gustatory cortex.

**MOTOR**
Innervates muscles in the face, scalp, and neck as well as the stapedius in the ear

**SENSORY**
Receives signals from taste buds in the anterior portion of the tongue and some proprioceptors in the face and scalp

**PARASYMPATHETIC**
Supplies the lacrimal, salivary, and mucous glands

**FUN FACT!**
The stapes is one of the three ossicle bones, and the stapedius—innervated by CN VII—controls it.
The vestibulocochlear nerve (CN VIII) has two branches: cochlear and vestibular. Both enter the brainstem and synapse with cells in the cochlear nucleus of the medulla oblongata.

**MOTOR**
The cochlear nerves transmit signals for hearing; the vestibular nerves transmit signals for equilibrium.
The glossopharyngeal nerve (CN IX) originates in the medulla oblongata and exits the skull via the jugular foramen.

**MOTOR**
Innervates the stylopharyngeus muscle to elevate the pharynx and larynx.

**SENSORY**
receives signals from proprioceptors in swallowing muscles, baroreceptors in the carotid sinus, and chemoreceptors in the carotid body. Provides sensory function to the oropharynx.

**PARASYMPATHETIC**
Innervates the parotid gland to secrete saliva.

**FUN FACT!**
Since the CN IX innervates the oropharynx, it receives the information that triggers the vagus nerve to produce the gag reflex.
**VAGUS NERVE**

The *vagus nerve (CN X)* originates in the medulla oblongata and exits the skull via the jugular foramen, dividing into numerous branches that supply many parts of body.

**MOTOR**

Innervates muscles of the pharynx, larynx, and soft palate for vocalization and swallowing.

**SENSORY**

Receives signals from the external ear, some taste buds in the epiglottis and pharynx, and proprioceptors in the throat and neck.

**PARASYMPATHETIC**

Controls heart rate, breathing, sweating, movements of the gut, and other subconscious activities. Also vasodilates blood vessels, which is the cause of fainting from stress.

**FUN FACT!**

Historically, the vagus nerve was called the *pneumogastric nerve*, as it innervates both the lungs and the stomach.
**ACCESSORY NERVE**

The accessory nerve (CN XI) arises from the first five segments of the cervical portion on the spinal cord.

**MOTOR**

Innervates the sternocleidomastoid muscle in the neck and the trapezius muscle in the shoulder to control head movements.
The hypoglossal nerve (CN XII) is responsible for movement of the tongue. Of the eight muscles, only the palatoglossus is not controlled by hypoglossal nerve; instead, it is innervated by the vagus nerve.

**MOTOR**

Innervates the tongue’s extrinsic and intrinsic muscles.

**FUN FACT!**

Its name is derived from ancient Greek, hypo meaning under, and glossal meaning tongue.
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