

# Autonomic nervous system

The autonomic nervous system regulates a variety of body process that takes place without conscious effort. The autonomic system is the part of the [peripheral nervous system](#) that is responsible for regulating involuntary body functions, such as heartbeat, blood flow, breathing, and digestion.

## Origin of the Cranial Nerves ( V, VII, IX, X )

There are twelve cranial nerves in total. Scientists use Roman numerals from I–XII to label the cranial nerves in the brain. The olfactory nerve (CN I) and optic nerve (CN II) originate from the **cerebrum**.

Cranial nerves III – XII arise from the **brain stem** (Figure 1). They can arise from a specific part of the brain stem (midbrain, pons or medulla), or from a junction between two parts:

- **Midbrain** – the trochlear nerve (IV) comes from the posterior side of the midbrain. It has the longest intracranial length of all the cranial nerves.
- **Midbrain-pontine junction** – oculomotor (III).
- **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).

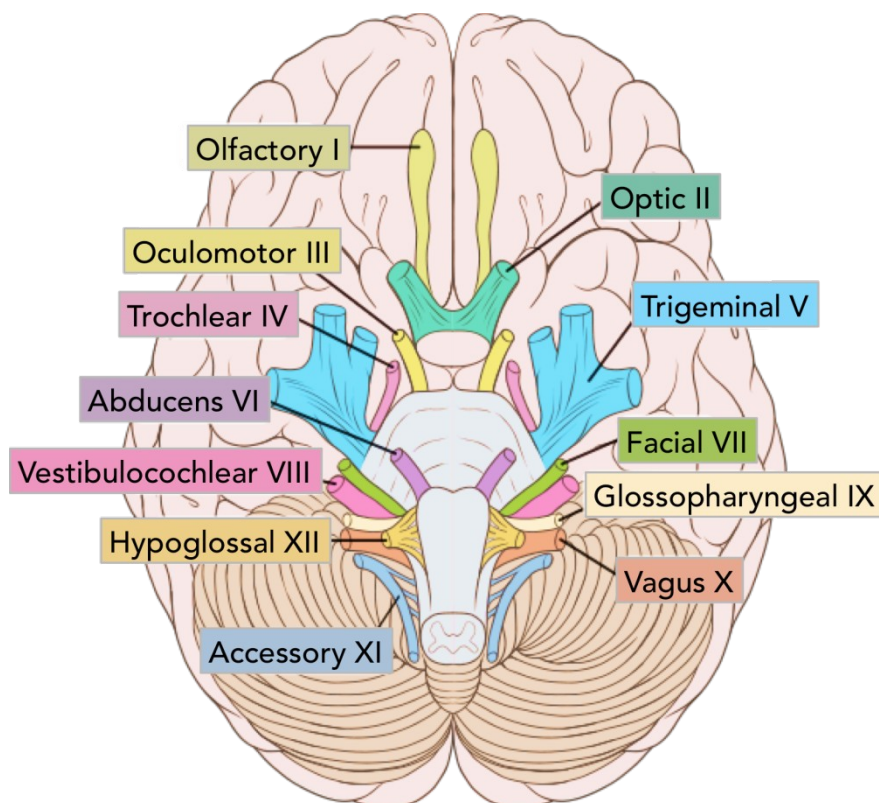


Figure 1 – The location of the cranial nerves on the cerebrum and brainstem.

# Functions

## V. Trigeminal nerve

The trigeminal nerve is the largest cranial nerve and has both motor and sensory functions. Its motor functions help a person to chew and clench the teeth and gives sensation to muscles in the tympanic membrane of the ear. Its sensory division has three parts that connect to sensory receptor sites on the face:

The ophthalmic part gives sensation to parts of the eyes, including the cornea, mucosa in the nose, and skin on the nose, the eyelid, and the forehead.

The maxillary part gives sensation to the middle third of the face, side of the nose, upper teeth, and lower eyelid.

The mandibular part gives sensation to the lower third of the face, the tongue, mucosa in the mouth, and lower teeth.

## VII. Facial nerve

The facial nerve functions to produce facial expressions. The facial nerve also has both motor and sensory functions. The facial nerve is made up of four nuclei. The four nuclei originate in the pons and medulla and join together to travel to the geniculate ganglion. They serve different functions:

- movement of muscles that produce facial expression
- movement of the lacrimal, submaxillary, and submandibular glands
- the sensation of the external ear
- the sensation of taste

## IX. Glossopharyngeal nerve

The glossopharyngeal nerve possesses both motor and sensory functions.

The sensory function receives information from the throat, tonsils, middle ear, and back of the tongue. It is also involved with the sensation of taste for the back of the tongue.

The motor division provides movement to the stylopharyngeus, which is a muscle that allows the throat to shorten and widen.

The glossopharyngeal nerve starts in the medulla oblongata in the brain and leaves the skull through the jugular foramen, which leads to the tympanic nerve.

## X. Vagus nerve

The vagus nerve is the longest cranial nerve as it starts in the medulla and extends to the abdomen. The vagus nerve has a range of functions, providing motor, sensory, and parasympathetic functions. The sensory part provides sensation to the outer part of the ear, the throat, the heart, abdominal organs. It also plays a role in taste sensation.

The motor part provides movement to the throat and soft palate.

The parasympathetic function regulates heart rhythm and innervates the smooth muscles in the airway, lungs, and gastrointestinal tract.