Neural Control and Coordination

Neural System

Coordination between organ systems and the functions of the organs is crucial to maintain a physiological balance, called homeostasis.

The neural system and the endocrine system maintain homeostasis in our body.

Neurons are called the structural and functional units of the neural system.

The human neural system is divided into the central neural system (CNS) and the peripheral neural system (PNS).

The brain and spinal cord from the central neural system, and the cranial and spiral nerves form the peripheral neural system.

The peripheral neural system can be divided into somatic neural system and the autonomic neural system.

The autonomic neural system is further classified into the sympathetic neural system and the parasympathetic neural system.

A neuron is a branched nerve cell and is the longest cell in the body.

The two main parts of a neuron are the cyton and nerve processes.
**Generation and Conduction of Nerve Impulse**

The nerve impulse is the sum of mechanical, chemical and electrical disturbances created by stimulus in a neuron.

The nerve impulse can be divided into resting membrane potential and action membrane potential.

The electrical potential difference across the neural membrane in an unexcited nerve fibre is called resting potential, and the neuron is called a polarized nerve fibre.

The reversal of polarity across the two sides of the membrane is called depolarisation.

The action potential travels as a wave of depolarization along the length of a nerve fibre in a particular direction and is called a nerve impulse.

The junctions that help transmit a nerve impulse from one neuron to another are called synapses.

Synapses are of two types-chemical synapses and electrical synapses.

The synaptic cleft is a fluid-filled gap between the axon terminal and the Dendron of another neuron.

**Central Neural System**

The brain and spinal cord of vertebrates are collectively known as the central neural system.

The brain is divided into forebrain, midbrain and hindbrain.
The forebrain consists of the cerebrum, thalamus and hypothalamus.

The thalamus is located between the forebrain and midbrain and acts as a major coordinating centre for sensory and motor signaling.

The hypothalamus is situated at the base of the thalamus and it contains the centers that control body temperature, the urge to eat and drink and the circadian rhythms.

The collection of structures within the forebrain, including the amygdale and hippocampus, is known as the limbic system.

The midbrain is located between the thalamus/hypothalamus of the forebrain and pons of the hindbrain.

The hindbrain is formed of the pons, cerebellum and medulla Oblongata.

The midbrain and the hindbrain form the brain stem. It acts as a relay station for auditory and visual information. That is, every impulse conducted between brain and spinal cord passes through the brainstem.

An involuntary response to an external stimulus that occurs without any conscious effort or thought and requires the involvement of a part of the central neural system is called reflex action.

The Eye

Human beings have a pair of spherical eyes located I eye sockets or orbits of the skull.

The wall of the human eye ball is composed of three layers-sclera, choroid and retina.

The retina contains three layers- ganglion, bipolar and photoreceptor cells.

Rods and cones are the two types of photoreceptor cells.
The cones are responsible for colour vision and daylight vision, which is also known as photopic vision.

The rods are responsible for twilight vision, which is also known as scotopic vision.

The optical part of the retina contains two spots known as the blind spot and the fovea.

An inverted image forms on the retina and the impulse is carried to the visual cortex of the brain, where it is perceived in its correct form.

The Ear

Anatomically, the ear is divided into three sections- the outer ear, the middle ear and the inner ear.

The outer ear comprises the pinna and the external auditory meatus.

The middle ear consists of the tympanic cavity that separates the external and inner ears.

The Eustachian tube connects the tympanic cavity to the pharynx and helps maintain equal air pressure on both sides of the eardrum.

The inner ear consists of a bony and membranous labyrinth, which consists of the cochlea and vestibular apparatus.

The crista and macula are the specific receptors of the vestibular apparatus that maintain body balance and posture.