

# Wisdom Education Academy

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## Control and Coordination

Different organs work together in an organism to carry out different functions, this is known as coordination. Proper control and coordination is necessary to carry out essential functions of the life.

### Animals Nervous System

Animals nervous system consists of specialized nerve cells also known as neurons. A typical neuron consists of cell body, axon and dendrites. Cell body contains nucleus. Dendrites detects the information from the environment. This information is picked up by the dendritic tips and sets off the electrical impulse which travels from dendrite to cell body and then to axon.

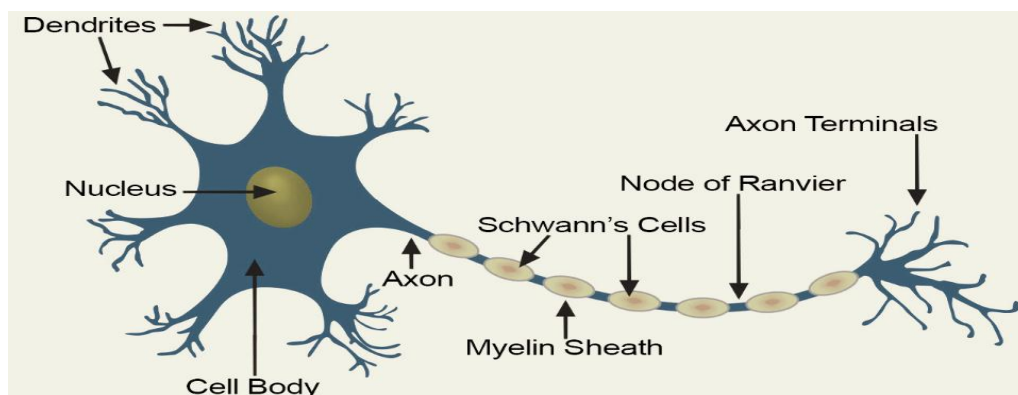


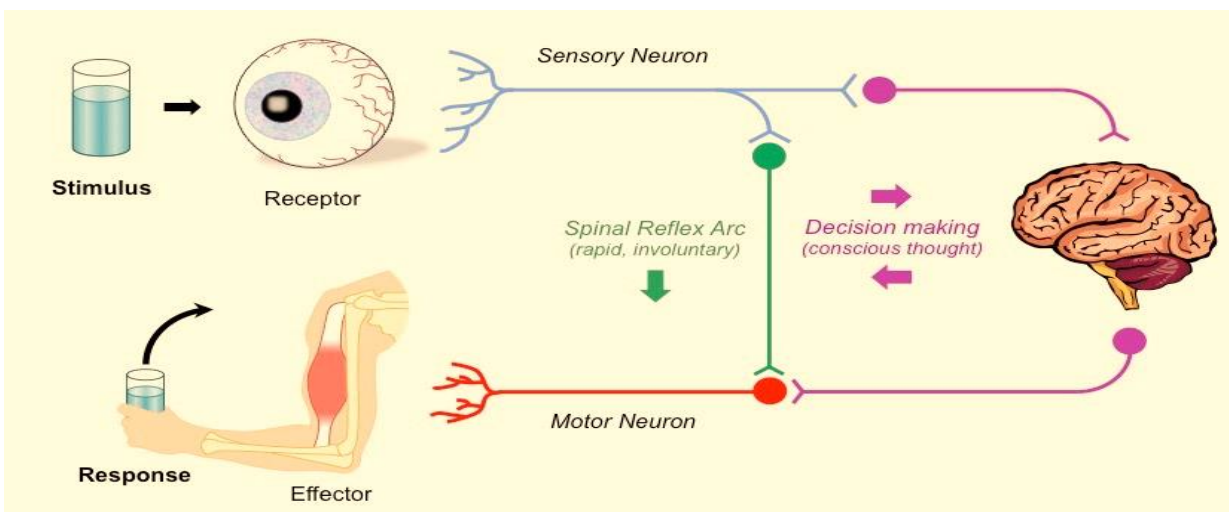
Fig.1. Structure of the Neuron

### Reflex Action

A sudden response to some environment stimulus is known as reflex. For example, we sudden take off our hand from the flame without thinking.

### Reflex Arch

Sensory neurons synapse in the spinal cord before it passes to the brain. This pathway is known as reflex arch.



## Nervous System

Vertebrates nervous system is classified as central nervous system and peripheral nervous system. Brain and spinal cord are the parts of central nervous system. Peripheral nervous system consists of autonomic nervous system and somatic nervous system. Autonomic nervous system consists of spinal nerves and cranial nerves.

## Human Brain

Brain is divided into forebrain, midbrain and hindbrain.

- **Forebrain** consists of cerebrum, hypothalamus and thalamus. Forebrain is specialized in hearing, sight, smell etc. It also controls voluntary movements in our body such as movement of leg muscles. Centre for hunger is also located in the separate part of forebrain. Cerebrum or the cerebral cortex consists of 4 lobes- parietal lobe, temporal lobe, occipital lobe and frontal lobes. (NTSE LEVEL)

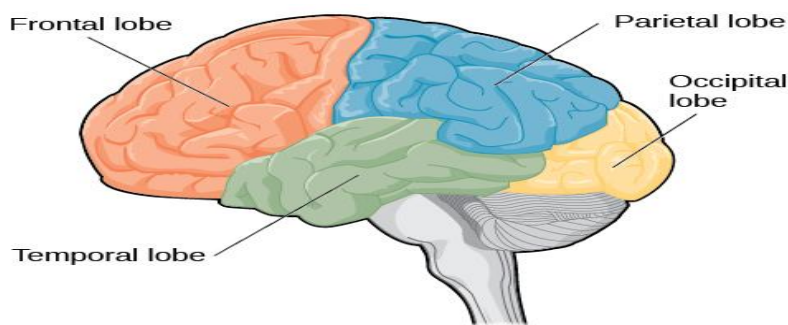


Fig. 3. Different Lobes of the Brain

- **Midbrain** is located between the forebrain and hindbrain. It controls certain involuntary actions in the body.
- **Hindbrain** consists of pons, medulla and cerebellum. It controls salivation, blood pressure and vomiting. Cerebellum also controls certain important functions such as riding a bicycle, picking up a pencil. It also maintains posture and balance of the body.

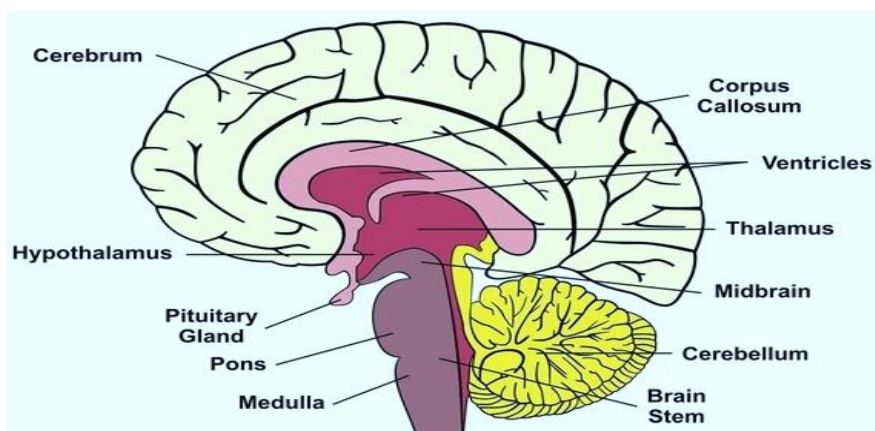


Fig.4. Structure of Human Brain

Brain is protected in a bony case known as cranium. Cranium also contains a fluid filled in it known as cerebrospinal fluid (CSF) that protects the brain from mechanical shock and injury. And spinal cord is protected by vertebral column.

## How nervous tissue causes action?

Information is received by nervous tissue, then it passes to brain muscles and then it causes the action. The junction between the two neurons is known as synapse. Information are passed from one neuron to another neuron via electrical or chemical transmission.

Electrical transmission	Chemical transmission
No need of neurotransmitter is needed	Neurotransmitter is needed
Fast mode of nerve impulse transmission	Slow mode of nerve impulse transmission
Impulse are directly transmitted from one neuron to another neuron	Impulse are not directly transmitted from one neuron to another neuron

## Coordination in plants

Plants though do not have nervous system or muscles but they also respond towards the stimulus. For example, when we touch *Mimosa pudica* (touch-me-not plant), its leaves fold up and droop. There are two types of movements in plants - dependent on growth and independent of growth. When we touch the *Mimosa pudica*, its leaves fold up but no growth occurs, so it does not involve any growth. But movement of seedling is due to growth. Plants convey information from cell to cell through electrical-chemical means.

### Hormones produced by the plant (NTSE LEVEL)

Hormone	Function
Auxins	Promote root growth
Cytokinin	Promote shoot growth and cell division
Gibberellin	Promotes flowering
Absciscic acid	Retards growth
Ethylene	It helps in fruit ripening

### Movement due to growth

The most common example of movement of growth are tendrils. Tendrils are sensitive to touch. When they come in contact with some object, the part of tendril away from the object will grow fast compare to the part of tendril which is in contact with the object. So it is a directional movement and it appears as if the plant is moving.

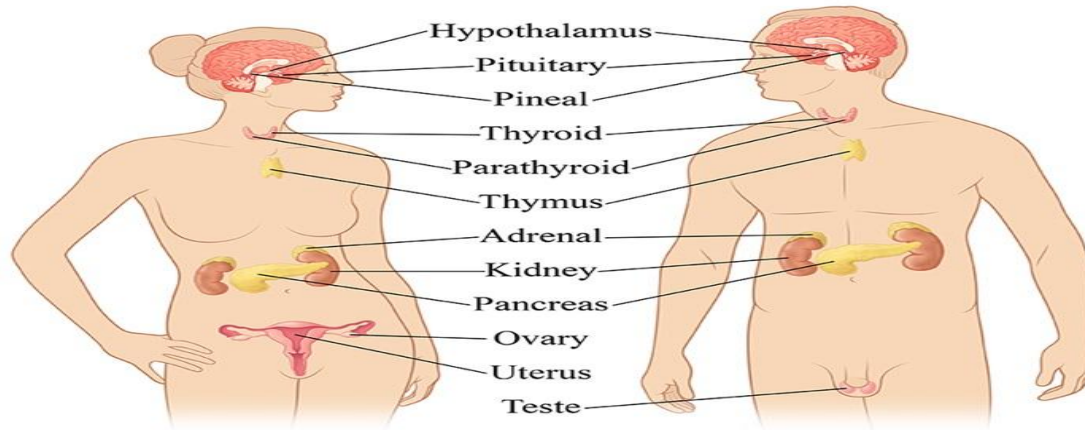
Directional movements of the plants are known as tropic movements. The movement can be towards the stimulus or away from the stimulus. Examples of some movements in plants are mentioned below-

Phototropism	Movement due to light
Gravitropism	Movement due to gravity
Hydrotropism	Movement due to water

<b>Chemotropism</b>	Movement due to some chemicals
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## Endocrine Glands

They are the chemical messengers that are secreted in small quantities. There are two types of glands- endocrine glands and exocrine glands. Endocrine glands do not have ducts to carry the secretion and they produce the hormones.



**Fig.5. Human Endocrine Glands**

Exocrine glands do have ducts to carry their secretion. List of different hormones secreted and their function are given below- (NTSE LEVEL)

Endocrine Gland	Function
Thyroid gland	Produces thyroxine that regulates carbohydrate, protein and fat metabolism
Adrenal gland	Produces adrenaline and it is secreted at the time of fear, fight or flight
Pancreas	Produces insulin and glucagon which regulate glucose metabolism in our body.
Testis	Produces male hormone known as testosterone required male secondary sexual characteristics such as beard and moustaches.
Pituitary gland	Secretes growth hormone that regulates the growth and development of an organism
Ovaries	Produces oestrogen needed for female sexual development

# Thank You

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