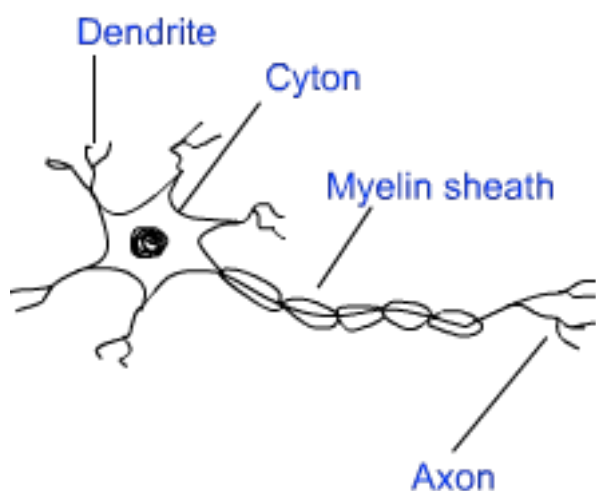


CBSE Class 10 Science
NCERT Exemplar Solution
Chapter 7
Control and Coordination

Long Answer Questions

45. Draw the structure of a neuron and explain its function.

Ans. Neuron is a highly specialized cell which is responsible for transmission of nerve impulses. The neuron consists of the following parts:

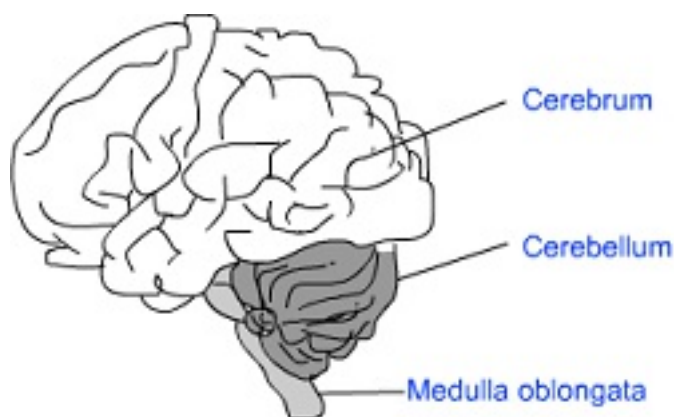


- Cyton or cell body: The cell body or cyton is somewhat star-shaped; with many hair-like structures protruding out of the margin. These hair-like structures are called dendrites. Dendrites receive the nerve impulses.
- Axon: This is the tail of the neuron. It ends in several hair-like structures; called axon terminals. The axon terminals relay nerve impulses.
- Myelin Sheath: There is an insulator cover around the axon. This is called myelin sheath. The myelin sheath insulates the axon against nerve impulses from the surroundings.

46. What are the major parts of the brain? Mention the functions of different parts.

Ans. The brain is covered by a three layered system of membranes; called meninges. Cerebrospinal fluid is filled between the meninges. The CSF provides cushion to the brain against mechanical shocks. The brain is located inside the skull for maximum protection.

The human brain can be divided into three regions, viz. forebrain, midbrain and hindbrain.



Human Brain

Some main structures of the human brain are explained below.

Cerebrum: The cerebrum is the largest part in the human brain. It is divided into two hemispheres; called cerebral hemispheres.

Functions of cerebrum:

- The cerebrum controls the voluntary motor actions.
- It is the site of sensory perceptions; like tactile and auditory perceptions.
- It is the seat of learning and memory.

Hypothalamus: The hypothalamus lies at the base of the cerebrum. It controls sleep and wake cycle (circadian rhythm) of the body. It also controls the urges for eating and drinking.

Cerebellum: Cerebellum lies below the cerebrum and at the back of the whole structure. It coordinates the motor functions. When you are riding your bicycle; the perfect coordination between your pedaling and steering control is achieved by the cerebellum.

Medulla: Medulla forms the brain stem; along with the pons. It lies at the base of the brain and continues into the spinal cord. Medulla controls various involuntary functions; like heart beat, respiration, etc.

47. What constitutes the central and peripheral nervous systems? How are the components of central nervous system protected?

Ans. Central nervous system is composed of the brain and spinal cord. Peripheral nervous

system is composed of nerves which are outside the spinal cord.

Central nervous system has a well-developed system for protection. Brain is enclosed in skull for protection. Spinal cord is enclosed in vertebral column for protection. Additionally, the cerebrospinal fluid provides a cushion against mechanical shocks.

48. Mention one function for each of these hormones:

(a) Thyroxin

Ans. Controls general metabolism and growth in the body.

(b) Insulin

Ans. Controls blood sugar level

(c) Adrenaline

Ans. Prepares the body for emergency situations and hence is also called 'Fight and flight' hormone.

(d) Growth hormone

Ans. Growth

(e) Testosterone.

Ans. Sperm production, development of secondary sexual characters during puberty.

49. Name various plant hormones. Also, give their physiological effects on plant growth and development.

Ans.

Plant hormones	Effect on plant growth
Auxin	Cells grow longer
Gibberellins	Growth of stem
Cytokinin	Rapid cell division in fruits and seeds
Abscisic acid	Inhibition of growth

50. What are reflex actions? Give two examples. Explain a reflex arc.

Ans. The sudden involuntary movement in a voluntary organ; in response to a stimulus; is called reflex action.

Examples of reflex action:

(a) Moving your hand away from a hot iron plate

(b) Blinking of eyes

Reflex Arc: The path of electrical impulse during a reflex action is called reflex arc. A reflex arc is composed of a sensory neuron, spinal cord, motor neuron and muscle. It involves following steps:

- The sensory neuron picks signals from the stimulus and carries the signals to the spinal cord.
- Spinal cord process the signals and sends message through the motor neuron.
- Motor neuron transmits the signals to the effector muscle so that the muscle can take immediate action.

51. “Nervous and hormonal systems together perform the function of control and coordination in human beings.” Justify the statement.

Ans. Control and coordination of functioning of various systems is under the direct control of nervous system. It is the nervous system which governs the way a particular organ or organ system has to work. This control is achieved by a complex network of neurons which carry signals in the form of electric impulses; to and from the brain.

The hormonal system, on the other hand, coordinates the functioning of nervous system. The hormonal system has somewhat indirect control on various functions. It tells a system to either slow down or pace; according to the situation.

Nervous and hormonal systems are complementary to each other. Thus, it can be said that nervous and hormonal system together perform the function of control and coordination in human beings.

52. How does chemical coordination take place in animals?

Ans. Hormones facilitate chemical control in animals. Hormones are chemicals which are directly released in bloodstream. A particular hormone reaches the target site through blood. Hormone tells the target tissue to behave in a particular manner.

To understand this, let us take the example of adrenalin. Adrenalin is secreted by adrenal gland. It reaches the heart and lungs and also to the GI tract. Heart speeds up its pumping action so that more blood could be supplied to the limbs and facial muscles. But activity of the GI tract is slowed down to ensure better blood supply in limbs. Thus, adrenalin prepares the body for a fight or flight situation.

53. Why is the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron but not the reverse?

Ans. Electrical impulse travels through a neuron. But to be transmitted to another neuron, it needs to be passed in the form of neurotransmitters. Neurotransmitters are specialized chemicals. These can enter a neuron only through specialized channels. Such channels are present in dendrites but not in axon. On the other hand, a neurotransmitter can enter a dendrite. Due to this, the flow of signals in a synapse is from axonal end of one neuron to dendritic end of another neuron but not the reverse.