

Long Question Answer

Q1. What is meant by reflex-action? With the help of a labelled diagram trace the sequence of events which occur when we touch a hot object.

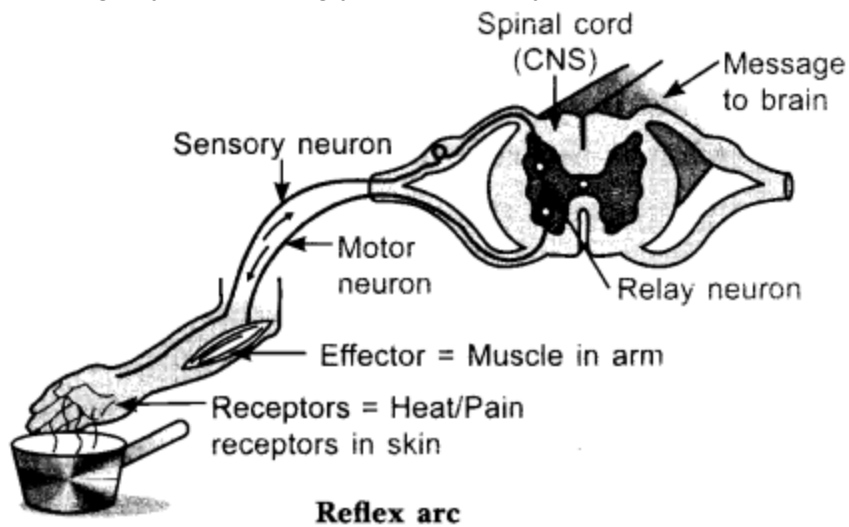
Answer

Stimulus: In the example above, the stimulus is the contact with the hot pot. This contact causes a nerve impulse that will travel to the spinal cord via the sensory neurons.

Sensory neurons: These neurons carry the nerve impulse to the spinal cord. Similar to the interneuron and motor neuron, sensory neurons receive incoming impulses at the dendrites. The impulses move away from the cell body along the axon to the synaptic terminal where the impulse is sent to the next interneuron with the help of a neurotransmitter (acetylcholine).

Interneurons: The interneuron is also known as relay neuron. These neurons are fully contained in the central nervous system. The interneuron serves as the connection between the sensory neurons and the motor neurons. **Synapse:** The synapse is a tiny space between two neurons. When an impulse gets to the end of one neuron and has to be sent down to the next neuron, the synapse acts as a bridge. The signal arrives at the end of one neuron (close to the synapse) as an electrical signal, crosses the synapse as a chemical signal (with the help of a neurotransmitter known as acetylcholine released by the synaptic vesicles at the synaptic terminal) and continues as an electrical signal in the next neuron.

Motor neurons: These neurons send nerve impulses away from the central nervous system to effector organs or muscle fiber in our example above. This causes the muscle fiber to contract, resulting in you snatching your hand away from the hot pot.



Response: To respond to the stimulus of the reflex arc, the muscle needs to contract to pull the hand quickly away from the hot pot. For this to happen, the impulse travels to the synaptic terminal of the motor neuron. Synaptic vesicles at the synaptic terminal will then release acetylcholine which will cross the synapse and bind to the receptors on the muscle fibers to trigger the muscle contraction known as the 'response'.

Q2.(a) Name the hormone which is released into the blood when its sugar level rises. Explain the need of Chemical communication in multicellular

organisms the organ which produces this hormone and its effect on blood sugar level. Also mention the digestive enzymes secreted by this organ with one function of each.

(b) Explain the need of Chemical communication in multicellular organisms.

Answer.

(a) Glucose is needed by cells for respiration. It is important that the concentration of glucose in the blood is maintained at a constant level. Insulin is a hormone produced by the β -cells that regulates glucose levels in the blood.

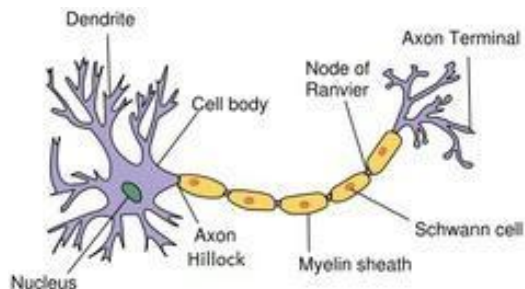
In order for multicellular organisms to function properly, their cells must communicate. For instance, your muscles must contract when your brain sends a message to contract. Pancreas produces insulin and β -cells which increase glucose in blood. It also – produces digestive enzyme (pancreatic amylase).

(b) Cell-to-cell signaling is a critical component of coordinating cellular activities. Through this communication, messages are carried from signaling cells to receiving cells, also known as target cells. This signaling occurs with proteins and other types of signaling molecules. Other things which happens in our body due to cell communication are – growth and development, cellular reproduction, tissue repair, sensing pain, etc.

Q3.State the structural and the functional unit of the nervous system. Draw its neat labelled diagram and write two functions.

Answer.

The structural and functional unit of the nervous system is the neuron.



The functions of the neuron are:

(a) Passing of information takes place-

(i) By electric impulse (inside the neuron) and

(ii) In the form of chemicals (At synapse)

(b) Reflex action- spontaneous, involuntary and automatic response to a stimulus to protect us from harmful situations. For example, on touching a hot object unknowingly we instantly withdraw our hand.

Q4. State the functions of plant hormones. Name four different types of plant hormones.

Answer.

Plant hormones help to coordinate growth, development and responses in environment.

Four different types of plant hormones are – Auxins, Gibberellins, Cytokinin, Ethylene and Abscisic acid.

1. Auxins control the tropic (growth related) movements of the plants in response to light, gravity, touch etc by increasing the size of cells. Under the influence of auxins, the plant stem bends towards unidirectional light where as the roots bend away from it.
2. Gibberellins stimulate stem elongation and leaf expansion. Its application causes stem elongation in small plants such as cabbage. Spraying gibberellins on sugarcane plant increases the stem size and hence the yield.
3. Cytokinin are produced in regions of the plant body where rapid cell division occur, such as root tips, developing shoot buds, young fruits and seeds. Cytokinin promote growth by stimulating cell division. They also help in production of new leaves and chloroplasts in leaves.
4. Ethylene causes ripening of the fruits.
5. Abscisic acid inhibits (i.e., slows down) the growth in different parts of the plant body. It also inhibits germination of seeds. It increases the tolerance of plant to different kinds of stresses such as temperature changes. So, it is also called the stress hormone in plants. It also causes the drying and falling of older leaves, flowers and fruits.

Q5. Describe the central nervous system in human beings.

Solution:

The central nervous system in human beings is highly developed. It consists of (i) brain and (ii) spinal cord. Brain is the highest coordinating center in the body. It is protected by a bony box in the skull called the cranium. Brain is covered by three membranes, called meninges. The space between the membranes is filled by cerebrospinal fluid that protects the brain from mechanical shocks.

The brain is broadly divided into three regions

(i) Fore brain (ii) Mid brain and (iii) Hind brain.

Each region of the brain consists of various centers. The fore brain includes cerebrum and olfactory lobes. The cerebrum is the most complex and specialized part of the brain. It consists of two cerebral hemisphere. The cerebrum has sensory areas where information is received from sense organs. Similarly, there is the motor area from where impulses are sent to the muscle or effectors organs. In the cerebrum, specific regions for each kind of stimulus and its response are located. Pairs of cranial nerves arise from the brain. The hind brain consists of three centers, cerebellum, pons and medulla oblongata. Medulla oblongata is the regulating center for swallowing, coughing, sneezing and vomiting. The pons takes part in regulation of respiration. Coordination and the adjustment of movement and posture are under the control of cerebellum.

Spinal cord is a part of the central nervous system, which lies in the vertebral canal. It is a downward continuation of the medulla oblongata. In the spinal cord, the arrangement of white and grey matter is reverse of that of the brain. The grey matter containing cytons is the inner region and white matter containing myelinated axons is the outer. In the center of the spinal cord runs a small central canal. This central canal, which runs the entire length of the spinal cord, is continuous with the ventricles of the brain. The spinal cord in transverse section has H-shaped structure because it has fissures on the ventral and the dorsal sides. The dorsal fissure almost reaches the gray matter while the anterior median fissure falls short of it. Spinal cord gives off 31 pairs of nerves.

Q6. Nervous and hormonal system together perform the function of control and coordination in human beings. Justify the statement.

Solution:

In humans, the nervous system is the most important, rather essential, system for regulation, control and coordination of body functions. It makes possible a range of adaptive responses to changes in the environment in the interests of the individuals. This system helps the individual to respond in a coordinated manner to environmental changes, to control various movements and to prolong the life by protecting the body against harmful stimuli. Coordination in humans is brought about by the secretions of endocrine glands. Endocrine glands are the ductless glands, which secrete the chemical substances called hormones directly into the blood. Any chemical substance, which is formed in the tissues of endocrine glands and are carried by the blood to other parts of the body for its specific actions is termed as a hormone. An organ, which responds to such a hormone, is known as the target organ. Hence, hormones and

nervous system together perform the function of control and coordination in the human beings.