STD 10-FIRST BELL- BIOLOGY- CLASS-07

Chapter – 1

Sensations and Responses

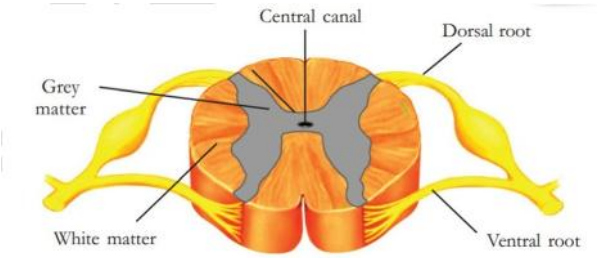
Spinal Cord

- Spinal cord is a tubular structure protected inside the vertebral column and it is the continuation **of the medulla oblongata.**

Protection of spinal cord

- Spinal cord **protected** inside the **vertebral column**
- It is covered by a three layered membrane called **meninges.**
- The space between the meninges and the central canal are filled with the nutritive fluid called **cerebrospinal fluid.**

Structure of spinal cord



- The outer part of the spinal cord is made up of white matter and the inner part is made up of grey matter.
- There is a canal at the center of the grey matter called the central canal.
- The spinal cord is connected to different parts of the body through 31 pairs of spinal nerves.

Formation of spinal nerves

- Spinal nerves formed from the combination of nerve fibres from its dorsal and ventral roots
- There are 31 pairs of spinal nerves arising from the spinal cord.
- Each spinal nerve is connected to the spinal cord by a dorsal root and a ventral root.

Ø: How does the dorsal root differ from ventral root?

- Sensory impulses reach the spinal cord through the dorsal root.
- Motor impulses go out of the spinal cord through the ventral root.

Dorsal root	**Ventral root**
Consists of sensory nerve fibres.	Consists of motor nerve fibres.
Carries sensory impulses to the spinal cord	Carries motor impulses to the outer from the spinal cord

Functions of the spinal cord

- Impulses from different parts of the body are transmitted to and from brain through the spinal cord.
- The spinal cord coordinates the repeated movements during walking, running etc.
- The spinal cord initiates reflex action (Spinal reflex)

Things to be taken care of while attending a person suffering injury of the spinal cord.

- An injury of the vertebral column can affect the spinal cord. So a victim of such an injury should not be lifted up holding his or her arms and legs.
- Don't allow the victim to move his head and neck.
- The victim should be allowed to rest in a horizontal position on a flat surface.
- Call the ambulance for immediate medical help

Reflex actions

- The accidental and involuntary responses towards stimuli are called reflex actions.

Examples

- The sudden withdrawal of legs while stepping on fire accidently.
- Withdrawal of hand when it touches a thorn unknowingly.
- When a house fly flies towards the eye, the eye blinks.

➢ Reflex actions do not happen consciously. Reflex actions occur without the involvement of the conscious areas of the brain because it is initiated by spinal cord and independent of brain.

➢ Mainly spinal cord acts as the centre of reflex action.

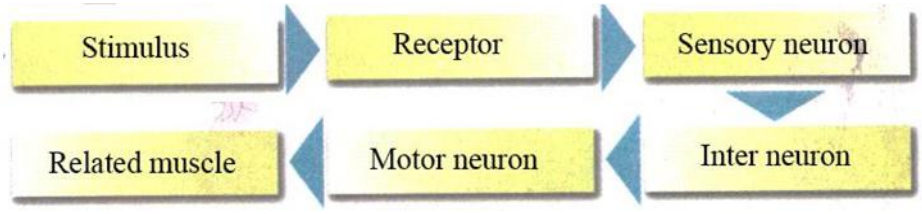
Ø: **Why is the need for reflex actions?**

On the basic of control center reflex actions are of two types

- **Spinal reflex**
  - Reflexes formed from the **spinal cord** are called Spinal reflex.
    E.g. the sudden withdrawal of legs while stepping on fire accidently
- **Cerebral reflex/ cranial reflex**
  - Reflexes formed from the brain are called cerebral reflexes.
    Eg. Winking of eyes when light suddenly falls on our eye or when objects move towards them.
    The contraction of the pupil of the eye in bright light.

Reflex arc

- **Reflex arc is the pathway of impulses in the reflex action.**



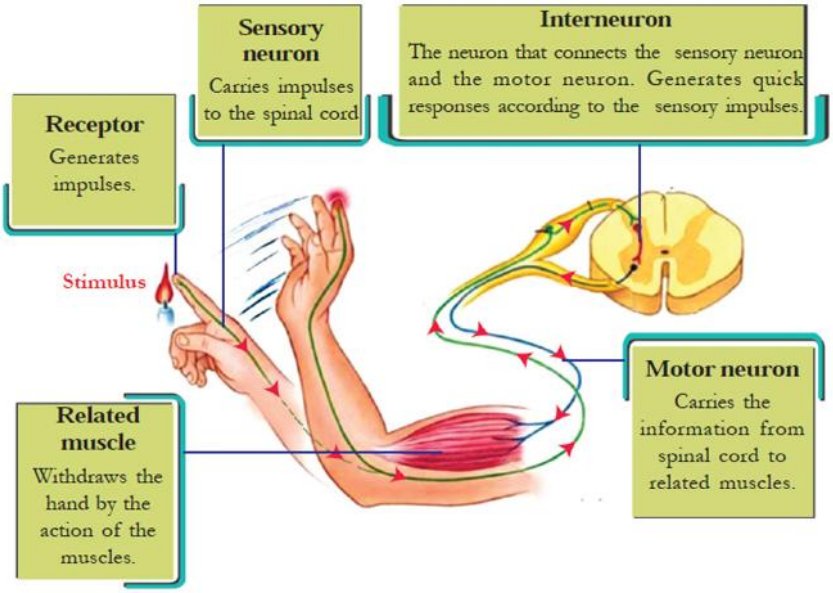
Parts of reflex arc

- **Receptor**- Part that receives the stimulus.
- **Sensory neuron** – Carries the impulses from the receptor to the spinal cord/ Cerebrum.
- **Inter neuron**- Connects the sensory neuron and the motor neuron.
- **Motor neuron** - Carries the messages from the spinal cord/ Cerebrum to the effector muscles.
- **Effector** – The action takes place in response to stimulus.

Cerebral reflex arc

- Light fall on the eyes → Receptors, receive the stimuli → Impulses are formed →Sensory neuron carries impulses, to the brain → Motor neuron carries response to the eyes → blink our eyes.

Spinal reflex arc



Ø: **What does the illustration indicate?**

- Reflex action

Spinal reflex arc - Flow chart

- Receptors stimulated → Sensory neuron carries impulse to the spinal cord → Inter neurons in the spinal cord pass the message to the motor neuron → Motor nerve carries the message of the spinal cord to the muscles → Response takes place

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