CHAPTER – 7

Control and Coordination

Living organisms respond and react to various stimuli like heat, light, cold, touch, pressure etc. Plants and animals both respond to stimuli but in different manner.

Example : withdrawl of hand on touching a hot object.

Control and Coordination in Animals

It is brought about in all animals with the help of two main systems

a) Nervous System b) Endocrine System

Nervous System :

Functions

i) To receive the information from environment ii) To receive the information from various body parts. (Stimuli fi Response)

iii) To act accordingly through muscles and glands.

Stimulus : Any change in environment or within that bring about the reaction eg: touching a hot plate.

Response : The reaction of our body to these changes. eg. withdrawal of our hand **How do we detect that we are touching a hot object?**

Receptors : Are specialised tips of some nerve cells that detect the information from the environment.

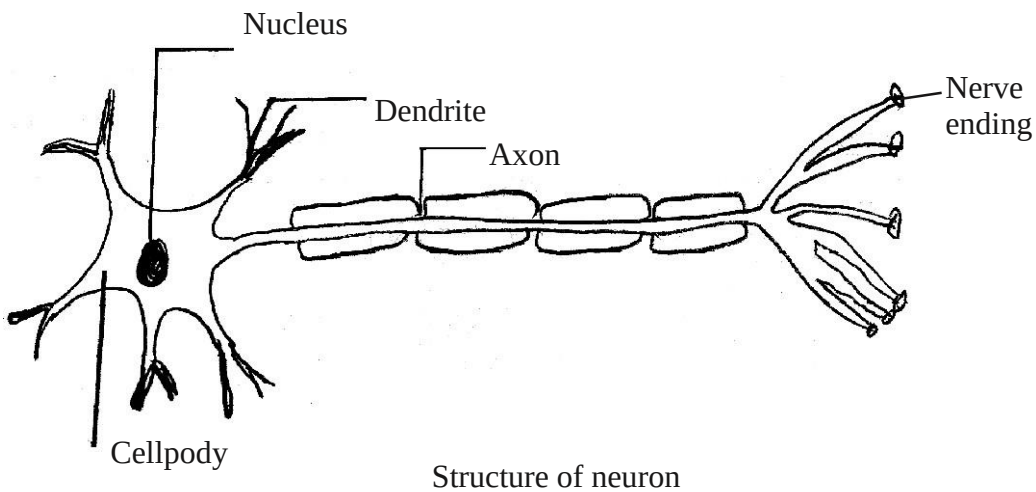
Receptors are Sense Organs

Inner Ear	Photo receptors Eyes	Skin	Olfactory Receptor (Nose)	Gustatory Receptor (Tongue)
Hearing/ Balance of the body	Visual Stimulus	Pain Touch Heat	Smell Detection	Taste Detection

Neuron : Structural and functional unit of nervous system. **Neuron**

(3 main parts)

I	II	III
Dendrite	Cell body and Axon	Synapse
↓	↓	↓
Information is acquired	Information travels as an electrical signal	Part where electrical impulse is converted into chemical message for onward transmission to next neuron by release of neurotransmitters



Structure of neuron
Fig. 7.1 (a) P 115

Synapse : The point of contact between the terminal branches of axon of one neuron with the dendrite of another neuron is called synapse.

Reflex Action

A quick, sudden, immediate response of the body to the certain stimuli that involves **Spinal cord.** eg. (not brain) withdrawal of hand, knee jerk etc.

Reflex arc : The pathway through which impulses pass is called reflex arc.

Stimulus ⟹ **RECEPTOR** Sensory Nerves

›

eg. Heat

›

eg. Withdrawal of Hand

ORGAN (MUSCLE) Motor Nerves ⟸ Response

Refer to diagram Fig 7.2 Reflex arc

ORGAN (SKIN)

Spinal Cord

Response **EFFECTOR**

Responses are of three main types

Voluntary : Controlled by fore brain

eg. Talking, Writing

Involuntary : Controlled by mid and hind brain eg. Heart beat, vomiting, regulation of heartbeat

Reflex action : controlled by spinal cord eg. Withdrawl of hand on touching a hot object.

Human Nervous System

- Central Nervous System (CNS
- Peripheral Nervous System (PNS)
- Autonomic Nervous System (ANS)

Brain — Fore Brain, Mid Brain, Hind Brain

Spinal Cord.

Cranial Nerves → Arise from the brain

Spinal Nerves → Arise from Spinal Card

Sympathetic System

Para Sympathetic System

Nervous System

Human Brain

Human brain has three major parts or regions a) Forebrain b) Mid Brain c) Hind Brain

FOREBRAIN

Most complex/specialized part of the brain is CEREBRUM

FUNCTIONS :

1. Thinking part of the brain
2. Control the voluntary actions.
3. Store information **(Memory)**
4. Centre associated with **HUNGER**
5. Receives sensory impulses from various body parts and integrates it

Mid Brain :

- HYPOTHALAMUS : Chemical co-ordination
- PITUITARY GLAND : Secretes hormones

Hind Brain :

- CEREBELLUM i) Controls posture and balance
  ii) Control precision of voluntary actions
- MEDULLA Controls involuntary actions
  eg. blood pressure, salivation, vomiting
- PONS Involuntary action, regulation of respiration

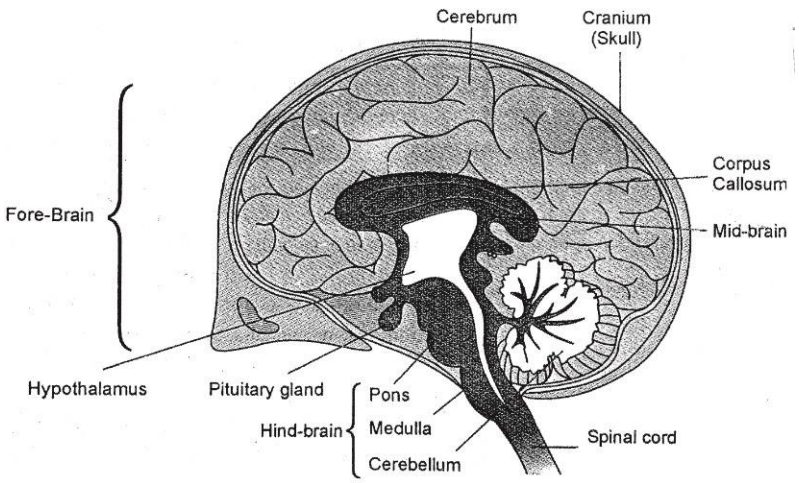


Fig 7.3 Human Brain

PROTECTION OF BRAIN AND SPINAL CORD

Brain : Brain is protected by a fluid filled balloon which acts as shock absorber and enclosed in cranium (Brain Box) **Spinal Cord :** Spinal Cord is enclosed in Vertebral column.

Coordination between Nervous and Muscular Tissue

Information [collected by Nervous (Sensory Nerve)] → Central Nervous Processed tissue [CNS] → Information System by [CNS] → Decesion made [by CNS] → (Motor Nerves) Message → Passed to muscles → Muscles [Change in shape and arrangement of proteins] → Contraction [Muscle cell] → Muscle shorten → Action

Coordination in Plants

Movement in Plants

- Movement dependent on growth → Tropic movements [directional movements in response to stimulus]
- Movement independent of growth [immediate response to stimulus] — eg. dropping of leaves of Touch-me-not plant on touching it

Tropic movements:

- Phototropism → Movement towards light
- Geotropism → Movement towards gravity
- Chemotropism → Movement towards Chemicals/ growth of pollen tube towards avule
- Hydrotropism → Movement towards / water

Plant hormones :

Are chemical compounds which help to coordinate growth, development and responses to the environment.

Plant hormones : Main plant hormones are :

a) **Auxin :** [Synthesized at shoot tip]

Function : – Helps in growth

Phototropism : more growth of cells towards light.

b) **Gibberellin :** Helps in the growth of the stem

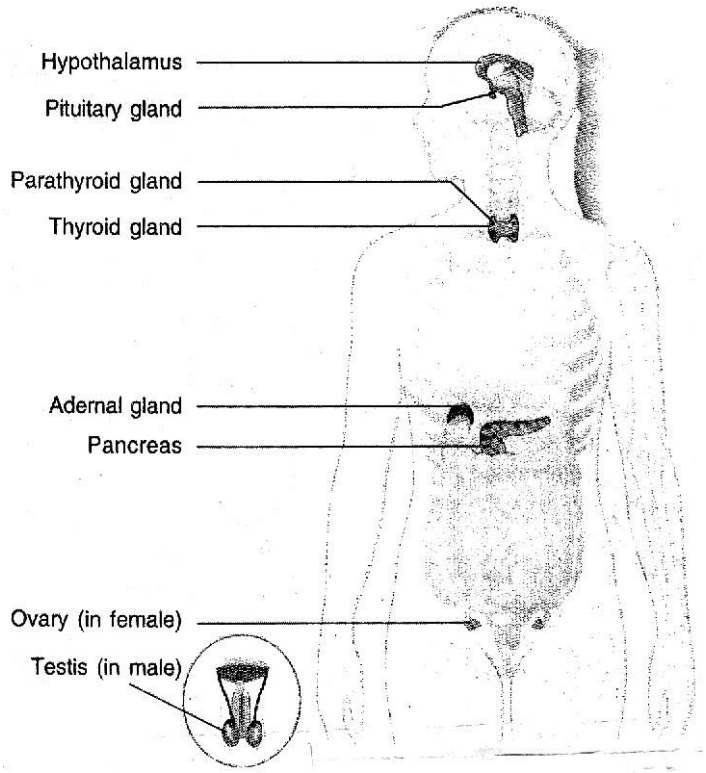
c) **Cytokinins :** Promotes cell division

d) **Abscisic acid :** Inhibits growth, cause witting of leaves. (Stress hormone)

Hormones in Animals

Hormones : These are the chemical messengers secreted in very small amounts by specialised tissues called ductless glands. They act on target tissues/organs usually away from their source.

Endocrine System helps in control and coordination through chemical compounds called HORMONES



S. No.	Hormone	Endocrine Gland	Location	Functions
1.	Thyroxine	Thyroid	Neck/ Throat region	Regulation of metabolism of carbohydrates, fats and proteins.
2.	Growth hormone	Pituitary	Mid	Regulates growth and development.
3.	Adrenaline	Adrenal	Above both	Regulation (increasing) of blood pressure, heart

			kidneys	heat, carbohydrate metabolism (during emergency)
4. SEX Hormone	- Testosterone	Testes Ovaries	Genital/ lower abdomen area	Changes associated with puberty (Sexual maturity)
5.	in Males estrogen	GONADS	Below stomach	Reduces and regulates blood sugar level
	Insulin	Pancreas		

IODISED SALT IS NECESSARY BECAUSE :

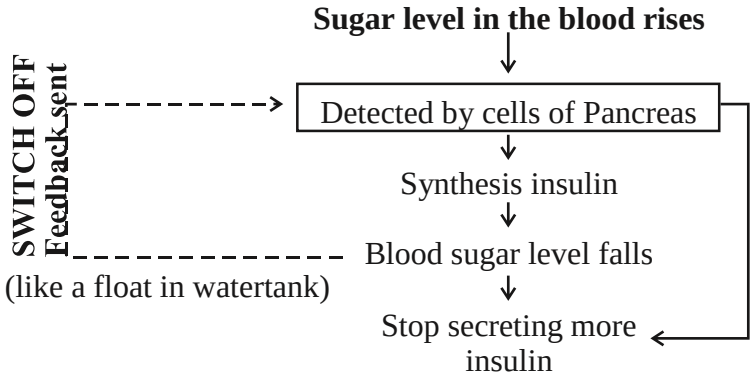
Iodine mineral is essential part of thyronine hormone so it is important that we must consume iodised salt as in turn it is essential for thyroid gland as it controls carbohydrate, proteins and fat metabolism for best balance of growth deficiency of iodine might cause disease called **goitre Diabetes :**

Cause : It is due to deficiency of Insulin hormone secreted by Pancreas that is responsible to lower/control the blood sugar levels.

Treatment : Patients have to internally administer injections of insulin hormone fi which helps in regulating blood-sugar level.

Feedback Mechanism

fi makes sure that hormones should be secreted in precise quantities and at right time, which is regulated by feedback mechanism.



EXERCISE

(Question Bank)

Very Short Answers (1 Mark)

1. Where is auxin synthesized in plants?
2. Which gland is known as Master gland?
3. Name the hormone that regulates blood sugar level.
4. What is synapse.
5. What are tropic movements? Give one examples
6. Define hormones
7. Which hormone has inhibiting effect on growth of plants
8. What is phototropism?
9. What are the components of central Nervous System.
10. What happens at synapse between two neurons. **Short Answers** (2 Marks)

1. Draw diagram of neuron and label cell body, dendrites and axon.
2. What is reflex arc? Explain with the help of a flow-chart.
3. Mention one function of each of the following

   i) Cerebellum ii)

   Pons.
4. What is the cause of diabetes? How it can be controlled.

5. Why it is advisable to use iodised salt.
6. What are the different receptors present in our body? What are their functions.
7. What are plant hormones? Name a plant hormone that promotes growth in plants.
8. What are sensory and motor neurons? Write their functions. **Long Answers** (5 Marks)

1. What are hormones (in animals) List four characteristics of hormones. Name the hormone required for the following.

   i)Development of moustache and beard in human male ii) Lowering of blood glucose.

2. Mention the functions of
   a) Fore brain
   b) Mid brain
   c) Hind brain