Class-X

# CONTROL AND CO-ORDINATION

# **ENDOCRINE GLANDS AND HORMONES**

# CHEMICAL CO-ORDINATION IN HUMANS (Endocrine glands and hormones)

The control and coordination in higher animals called vertebrates (including human beings) takes place through nervous system as well as hormonal system called endocrine system.

 Any chemical substance which is formed in the tissues of endocrine glands are carried by the blood to other parts of the body for its specific actions is termed as hormone. The term hormone was coined by *Starling*.

• Hormones are also called "primary messengers" or "chemical messengers".

#### Discovery:

- First discovered hormone was **secretin**.
- It was discovered by *Bayliss* and *Starling*. Brain.

#### Characteristics of hormones:

- They are the secretions of endocrine glands.
- They are produced at a place and act on target organs which are mainly away from their source.
- They are poured directly into the blood stream.
- They are required in very small quantities.

The branch of biology which deals with study of endocrine system and its physiology is known as "*endocrinology*".

- Thomas Addison" is known as Father of Endocrinology.
- The glands which pour their secretion directly in the blood are called endocrine glands. These glands lack ducts, so these glands are called ductless glands. e.g. Thyroid gland, parathyroid gland.
- Whereas the glands with duct are called exocrine glands. e.g. Sweat gland, salivary gland.

Pancreas has both exocrine and endocrine part, so it is also called mixed gland or common gland or heterocrine gland.

Difference between Nervous and Hormonal Coordination		
S.No.	Nervous Coordination	Hormonal Coordination
1	It is sent as an electrical impulse along axons, and as a chemical across synapse	It is sent as a chemical messenger via blood stream.
2	Information travels rapidly, in milliseconds	Information travels slowly
3	Information is directed to specific receptors—one or a few nerve fibres, gland cells or other neurons.	Information is spread throughout the body by blood from which the target cells or organs pick it up.
4	It gets response immediately	It get response usually slowly
5	Its effects are short-lived	Its effects are generally more prolonged

 ENDOCRINE SYSTEM: A group of endocrine glands which produces various hormones is called as endocrine system. the endocrine glands present in the human body are:

- (a) hypothalamus gland
- (b) pituitary gland
- (c) pineal gland
- (d) thyroid gland
- (e) parathyroid glands

- (f) thymus
- (g) adrenal glands
- (h) pancreas
- (i) ovaries (only in females)
- (j) testes (only in males)

the hormones produced by endocrine glands act as messengers between the nervous system and the organs of our body.



THE POSITIONS ENDOCRINE GLANDS IN THE HUMAN BODY.

(a) Hypothalamus: Hypothalamus gland is present in the brain. The function of hypothalamus is to regulate the secretions of hormones from pituitary gland.

### (b) Pituitary Gland

(or Hypophysis) :

- It is a small ovoid structure attached to the base of brain (hypothalamus) by a short stalk called infundibulum.
- Pituitary gland is also known as the master gland as it controls other endocrine glands
- This gland consists of three lobes-anterior, middle and posterior.
- Each lobe of the pituitary gland secretes different sets of hormones.

## (c) Pineal Gland

- It is a small gland reddish-grey in colour, about the size of a pea, attached to the roof of the third ventricle of the brain. It regulates the biological clock (circadian rhythm).
- It contributes in regulating gonadal development. It controls development & concentration of melanin. It secretes melatonin hormone.

#### (d) Thyroid Gland:

- The thyroid gland consists of two lobes joined together by an isthmus.
- It is situated in the lower part of the neck and when enlarged it forms goitre.
  Two hormones secreted by the thyroid gland are.

#### (e) Parathyroid Gland:

- These are small ovoid pea shaped glands. They lie on the posterior surface of the thyroid gland.
- The parathyroid secretion, parathormone (Collip's hormone) has two main functions:
- it regulates the balance between the calcium in bones and in extracellular tissue fluid, thus affecting the amount of calcium in the blood.
- It increases the blood calcium level.
- it also controls the excretion of phosphates in the urine, probably by reducing tubular reabsorption of phosphorus by the kidney tubule.

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#### (f) Thymus Gland:

- This gland is situated in the thorax in midline under the sternum in front of trachea.
- It secretes a hormone namely thymosin. It helps in producing T-lymphocytes.

# (g) Adrenal Gland:

- These are two small semilunar structures lying one each on upper pole of the kidneys. That is why they are also known as supra renal glands.
- Each gland consists of two structurally & physiologically separate parts known as cortex and medulla.

#### (h) Ovary:

Secretes progesteron (pregnancy hormone) and estrogen that develop secondary sexual characters of female.

#### (i) Testis:

Secretes Testosterone (spermatogenesis & secondary sexual characters).