CHAPTER

19

CHEMICAL COORDINATION AND INTEGRATION

CLASS 11TH

NCERT EXERCISE AND SOLUTIONS - BIOLOGY

Q. 1. Define the following:

(a) Exocrine gland
(b) Endocrine gland
(c) Hormone

ANSWER:-

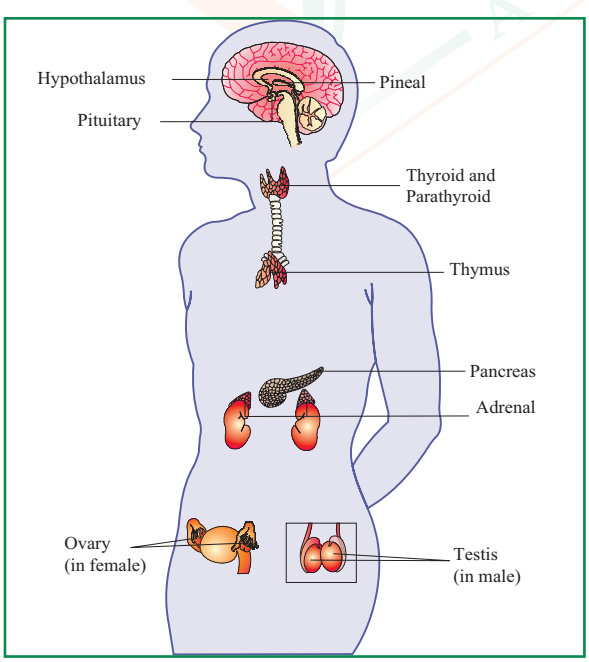
(a) **Exocrine Gland** – These glands release their secretions into ducts that carry them either to the body surface or specific organs.

(b) **Endocrine Gland** – These glands, which lack ducts, release their secretions directly into the bloodstream, transporting them to distant target organs.

(c) **Hormone** – A non-nutrient chemical that acts as an intercellular messenger, secreted in small quantities.

Q. 2. Diagrammatically indicate the location of the various endocrine glands in our body.

ANSWER:-



Q. 3. **List the hormones secreted by the following:**

(a) Hypothalamus **(b) Pituitary** **(c) Thyroid**
(d) Parathyroid **(e) Adrenal** **(f) Pancreas**
(g) Testis **(h) Ovary** **(i) Thymus**
(j) Atrium **(k) Kidney** **(l) G-I Tract**

ANSWER:-

Organ	Hormones Secreted
(a) Hypothalamus	Releasing hormones (e.g., TRH, GnRH, CRH, GHRH), inhibiting hormones (e.g., somatostatin, dopamine)
(b) Pituitary	Anterior: Growth hormone (GH), Prolactin (PRL), TSH, ACTH, LH, FSH Posterior: Oxytocin, ADH
(c) Thyroid	Thyroxine (T4), Triiodothyronine (T3), Calcitonin
(d) Parathyroid	Parathyroid hormone (PTH)
(e) Adrenal	Adrenal Cortex: Cortisol, Aldosterone, Androgens Adrenal Medulla: Adrenaline, Noradrenaline
(f) Pancreas	Insulin, Glucagon, Somatostatin, Pancreatic Polypeptide
(g) Testis	Testosterone, Inhibin
(h) Ovary	Estrogen, Progesterone, Inhibin, Relaxin
(i) Thymus	Thymosins
(j) Atrium	Atrial natriuretic factor (ANF)
(k) Kidney	Erythropoietin, Renin, Calcitriol
(l) G-I Tract	Gastrin, Secretin, Cholecystokinin(CCK), GIP, Motilin, Ghrelin

Q. 4. **Fill in the blanks:**

Hormones	**Target gland**
(a) Hypothalamic hormones	_____
(b) Thyrotrophin (TSH)	_____
(c) Corticotrophin (ACTH)	_____
(d) Gonadotrophins (LH, FSH)	_____
(e) Melanotrophin (MSH)	_____

ANSWER:-

(a) Hypothalamic Hormones – Target the pituitary gland
(b) Thyrotropin (TSH) – Acts on the thyroid gland
(c) Corticotropin (ACTH) – Stimulates the adrenal cortex
(d) Gonadotropins (LH, FSH) – Regulate the functions of the testes and ovaries
(e) Melanotropin (MSH) – Influences pigment cells in the skin's dermis

Q. 5. Write short notes on the functions of the following hormones:

(a) Parathyroid hormone (PTH)
(b) Thyroid hormones
(c) Thymosins
(d) Androgens
(e) Estrogens
(f) Insulin and Glucagon

ANSWER:-

(a) Parathyroid Hormone (PTH)

1. A peptide hormone secreted by the parathyroid gland.
2. Its secretion is regulated by the levels of circulating calcium ions.
3. PTH increases calcium ion levels in the blood.
4. It stimulates bone resorption to release calcium.
5. Enhances calcium reabsorption in renal tubules and promotes calcium absorption from digested food.
6. PTH acts as a hypercalcemic hormone, raising blood calcium levels.
7. Plays a vital role in maintaining calcium balance in the body alongside TCT (Calcitonin), ensuring calcium homeostasis.

(b) Thyroid Hormones (Thyroxine/Tetraiodothyronine - T4)

1. Regulates basal metabolic rate (BMR) and body growth, including mental development and bone ossification.
2. Helps maintain body weight.
3. Controls tissue differentiation and the metamorphosis of tadpoles into adult frogs.
4. Suppresses red blood cell (RBC) formation.
5. Tri-iodothyronine (T3): Increases energy consumption, oxygen use, heart rate, and cardiac output.

(c) Thymosin

1. Promotes differentiation of T-lymphocytes, enabling cell-mediated immunity.
2. Facilitates antibody production for humoral immunity.
3. Stimulates cell division in children, supporting growth.

(d) Androgens

1. Produced by interstitial cells in the intertubular space, primarily testosterone.
2. Regulate maturation, development, and functions of male accessory sex organs (e.g., epididymis, vas deferens, prostate gland).
3. Stimulate growth of facial and axillary hair, muscles, and traits like deeper voice and aggressiveness.

4. Play a key role in spermatogenesis.
5. Influence male sexual behavior through effects on the central nervous system.
6. Exert anabolic effects on carbohydrate metabolism and protein synthesis.

(e) Estrogen

1. Supports the development of ovarian follicles and growth of female reproductive organs (fallopian tubes, uterus, and vagina).
2. Increases LH secretion while reducing FSH secretion.
3. Enhances uterine sensitivity to oxytocin.
4. Promotes mammary gland development.
5. Regulates female sexual behavior.

(f) Insulin

1. Maintains glucose homeostasis.
2. Targets hepatocytes and adipocytes.
3. Facilitates glucose transport from blood to muscles.
4. Promotes glucose oxidation and glycogenesis (conversion of glucose to glycogen), lowering blood glucose levels.

Glucagon

1. Essential for maintaining normal blood glucose levels.
2. Stimulates glycogen breakdown into glucose in hepatocytes.
3. Promotes gluconeogenesis (conversion of proteins and fats into glucose).

Q. 6. Give example(s) of:

(a) Hyperglycemic hormone and hypoglycemic hormone
(b) Hypercalcemic hormone
(c) Gonadotrophic hormones
(d) Progestational hormone
(e) Blood pressure lowering hormone
(f) Androgens and estrogens

ANSWER:-

(a) Hyperglycemic hormone and hypoglycemic hormone – Glucagon and Insulin, respectively
(b) Hypercalcemic hormone – Parathormone hormone (PTH)
(c) Gonadotrophic hormones – Follicle-stimulating hormone (FSH) and luteinising hormone (LH)
(d) Progestational hormone – Progesterone
(e) Blood pressure lowering hormone – Atrial natriuretic factor (ANF)
(f) Androgens and estrogens – Androgen – Testosterone and androsterone
Estrogen – β- oestradiol

Q. 7. **Which hormonal deficiency is responsible for the following:**

(a) Diabetes mellitus
(b) Goitre
(c) Cretinism

ANSWER:-

The hormonal deficiencies associated with the conditions mentioned are as follows:

(a) **Diabetes Mellitus** – Caused by insufficient insulin secretion, leading to abnormally high blood glucose levels.
(b) **Goitre** – Results from inadequate secretion of thyroxine.
(c) **Cretinism** – Arises due to insufficient thyroid hormone secretion.

Q. 8. **Briefly mention the mechanism of action of FSH.**

ANSWER:-

Follicle-stimulating hormone (FSH) is a glycoprotein polypeptide hormone that is not lipid-soluble and, therefore, cannot directly enter target cells. Instead, it binds to cell surface receptors, triggering intracellular systems to perform its functions.

Mechanism of FSH Action

1. FSH binds to receptor proteins located on the target cell's surface, forming a hormone-receptor complex.
2. This complex activates the enzyme adenyl cyclase.
3. Adenyl cyclase converts ATP into cyclic AMP (cAMP), which acts as a second messenger.
4. cAMP stimulates the follicular cells in the granulosa membrane to produce estrogens.

Q. 9. **Match the following:**

	Column I	**Column II**
(a)	**T4**	**(i) Hypothalamus**
(b)	**PTH**	**(ii) Thyroid**
(c)	**GnRH**	**(iii) Pituitary**
(d)	**LH**	**(iv) Parathyroid**

ANSWER:-

(a) – (ii)
(b) – (iv)
(c) – (i)
(d) – (iii)