



Chapter – 22

Chemical Coordination & Integration

NCERT Back Exercises:

Ques 1: Define the following:

- (i) Exocrine gland
- (ii) Endocrine gland
- (iii) Hormone

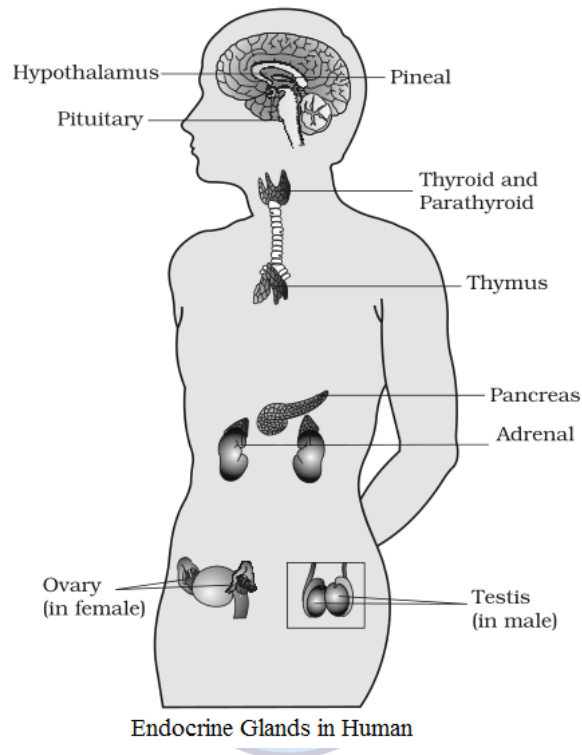
Ans 1:

- (i) Exocrine gland: These are the glands that liberate their secretions into ducts conveying either on the surface of the body or to particular organs of the body
- (ii) Endocrine gland: These are ductless glands which liberate their secretions into the bloodstream, conveying it to target organs that are located at a distance
- (iii) Hormone: It is a non-nutrient chemical that serves as an intercellular messenger and is secreted in trace amounts



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

Ans 2:



Ques 3: List the hormones secreted by the following:

- (i) Hypothalamus**
- (ii) Pituitary**
- (iii) Thyroid**
- (iv) Parathyroid**
- (v) Adrenal**
- (vi) Pancreas**
- (vii) Testis**
- (viii) Ovary**



(xi) Thymus

(x) Atrium

(xi) Kidney

(xii) G-I Tract

Ans 3:

The hormones secreted by the following structures are as follows:

(i) Hypothalamus

Hormone secreted:

- (i) Adrenocorticotropin-releasing hormone (ARH)
- (ii) Thyrotropin-releasing hormone (TRH)
- (iii) Luteinising hormone-releasing hormone (LH-RH)
- (iv) Follicle-stimulating hormone-releasing hormone (FSH – RH)
- (v) Prolactin-releasing hormone (PRH)
- (vi) Growth hormone – releasing hormone
- (vii) Melanocyte stimulating hormone – releasing hormone

Inhibiting hormone:

- (i) Growth inhibiting hormone
- (ii) Prolactin inhibiting hormone
- (iii) Melanocyte stimulating hormone – inhibiting hormone

(ii) Pituitary

Hormone secreted:

(i) *Neurohypophysis:*

- Oxytocin
- Anti-diuretic hormone (Vasopressin)

(ii) *Adenohypophysis:*

- Follicle-stimulating hormone (FSH)
- Growth hormone (GH)
- Luteinising hormone (LH)
- Thyroid stimulating hormone (TSH)
- Adrenocorticotropin hormone (ACTH)

Intermediate lobe:

- Melanocyte-stimulating hormone (MSH)



(iii) Thyroid

Hormones secreted:

- (i) Calcitonin
- (ii) Tri-iodothyronine(T_3)
- (iii) Tetraiodothyronine/Thyroxine(T_4)

(iv) Parathyroid

Hormones secreted:

- (i) Parathormone(PTH)

(v) Adrenal

Hormones secreted:

- (i) Adrenal cortex – Mineralocorticoids, Glucocorticoids
- (ii) Adrenal medulla – Adrenaline, Noradrenaline

(vi) Pancreas

Hormones secreted:

- (i) Glucagon
- (ii) Insulin
- (iii) Somatostatin



(vii) Testis

Hormones secreted:

- (i) Testosterone
- (ii) Androsterone

(viii) Ovary

Hormones secreted:

- (i) Relaxin
- (ii) Oestrogen
- (iii) Progesterone

(ix) Thymus

Hormones secreted:

- (i) Thymosin



(x) Atrium

Hormones secreted:

- (i) Atrial natriuretic factor (ANF)

(xi) Kidney

Hormones secreted:

- (i) Erythropoietin

(xii) G-I Tract

Hormones secreted:

- (i) Stomach – Gastrin
(ii) Intestine – Secretin, Enterogastrone, Cholecystokinin, Enterocrinin, Duocrinin
(iii) Liver - Angiotensinogen

Ques 4: Fill in the blanks:

Hormones Target gland

- (i) Hypothalamic hormones _____
(ii) Thyrotrophin (TSH) _____
(iii) Corticotrophin (ACTH) _____
(iv) Gonadotrophins (LH, FSH) _____
(v) Melanotrophin (MSH) _____

Ans 4:

- (i) Hypothalamic hormones – **Pituitary gland**
(ii) Thyrotrophin (TSH) – **Thyroid gland**
(iii) Corticotrophin (ACTH) – **adrenal cortex**
(iv) Gonadotrophins (LH, FSH) - **Testis and ovaries**
(v) Melanotrophin (MSH) – **Pigment cells of the dermis of the skin**

Ques 5: Write short notes on the functions of the following hormones:

- (i) **Parathyroid hormone (PTH)**
(ii) **Thyroid hormones**
(iii) **Thymosins**
(iv) **Androgens**
(v) **Estrogens**
(vi) **Insulin and Glucagon**



Ans 5:

- (i) Parathyroid hormone (PTH): It is secreted by Parathyroid gland. It increases the Ca^{2+} levels in the blood. PTH promotes the reabsorption of calcium from nephrons and also, promotes the absorption of calcium from digested food. Thus, it plays an important role in calcium balance in the body.
- (ii) Thyroid hormones: Thyroid hormones play an important role in the regulation of the basal metabolic rate. These hormones also support the process of red blood cell formation. Thyroid hormones control the metabolism of carbohydrates, proteins and fats. Maintenance of water and electrolyte balance is also influenced by thyroid hormones. Thyroid gland also secretes a protein hormone called thyrocalcitonin (TCT) which regulates the blood calcium levels.
- (iii) Thymosins: It plays a major role in the differentiation of T-lymphocytes, which provide cell-mediated immunity. It also promotes production of antibodies to provide humoral immunity.
- (iv) Androgens: It regulate the development, maturation and functions of the male accessory sex organs like epididymis, vas deferens, seminal vesicles, prostate gland, urethra etc. Androgens mainly testosterone stimulate muscular growth, growth of facial and axillary hair, aggressiveness, low pitch of voice etc. It stimulates spermatogenesis and formation of mature sperms and also influences male sexual behaviour. These hormones also produce synthetic effects on protein and carbohydrate metabolism.
- (v) Estrogens: It produce wide ranging actions such as stimulation of growth and activities of female secondary sex organs, development of growing ovarian follicles, appearance of female secondary sex characters (e.g., high pitch of voice, etc.), mammary gland development. Estrogens also regulate female sexual behaviour.
- (vi) Insulin and Glucagon: These hormones are secreted by pancreas and helps in regulation of glucose level in body.
Insulin plays a major role in the regulation of glucose homeostasis. It acts mainly on hepatocytes and adipocytes (cells of adipose tissue), and enhances cellular glucose uptake and utilisation. It also stimulates conversion of glucose to glycogen (glycogenesis) in the target cells. Glucagon plays an important role in maintaining the normal blood glucose levels. Glucagon acts mainly on the liver cells (hepatocytes) and stimulates glycogenolysis resulting in an increased blood sugar (hyperglycemia). It also stimulates the process of gluconeogenesis which also contributes to hyperglycemia.



Ques 6: Give example(s) of:

- (i) **Hyperglycemic hormone and hypoglycemic hormone**
- (ii) **Hypercalcemic hormone**
- (iii) **Gonadotrophic hormones**
- (iv) **Progestational hormone**
- (v) **Blood pressure lowering hormone**
- (vi) **Androgens and estrogens**

Ans 6:

- (i) Hyperglycemic hormone and hypoglycemic hormone: Glucagon and Insulin respectively
- (ii) Hypercalcemic hormone: Parathormone hormone (PTH)
- (iii) Gonadotrophic hormones: Follicle-stimulating hormone (FSH) and Luteinizing Hormone (LH)
- (iv) Progestational hormone: Progesterone
- (v) Blood pressure lowering hormone: Atrial natriuretic factor (ANF)
- (vi) Androgens and estrogens: Androgen - Testosterone and androsterone
Estrogen: β - oestradiol

Ques 7: Which hormonal deficiency is responsible for the following?

- (i) **Diabetes mellitus**
- (ii) **Goitre**
- (iii) **Cretinism**

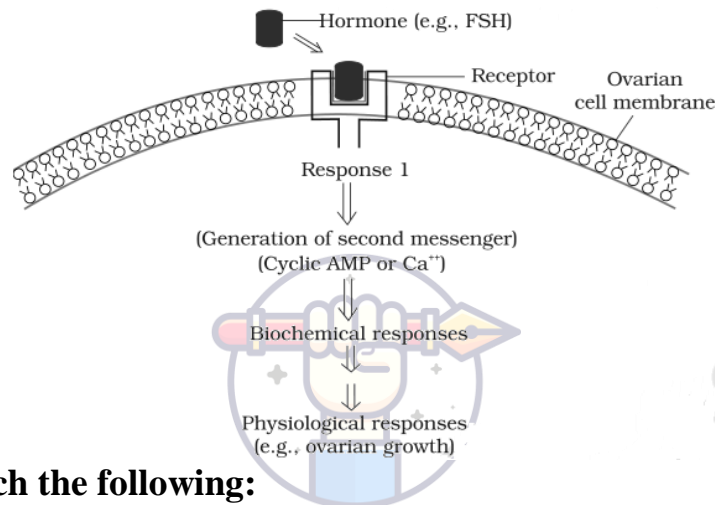
Ans 7: The hormonal deficiency that is responsible for the following are:

- (i) Diabetes mellitus: Insulin (inadequate secretion) caused due to abnormally high glucose levels in the blood.
- (ii) Goitre: Thyroxin (inadequate secretion)
- (iii) Cretinism: Thyroid (inadequate secretion)



Ques 8: Briefly mention the mechanism of action of FSH.

Ans 8: Follicle stimulating hormone (FSH) stimulates growth and development of the ovarian follicles in females. FSH produces its effect by binding to its specific receptors present on the ovarian cell membrane. Binding of FSH hormone to its specific receptor present over the cell surface activates an enzyme called adenylate cyclase. This enzyme converts ATP into cyclic AMP. The cyclic AMP is called the second messenger and carries out various biochemical responses in the cell by activating the existing enzyme system in the cell. The biochemical responses then lead to physiological responses like ovarian growth.



Ques 9: Match the following:

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

Ans 9:

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