Exercise Questions **Page Number - 329**

1. Define the following:

(a) Exocrine gland

(b) Endocrine gland

(c) Hormone

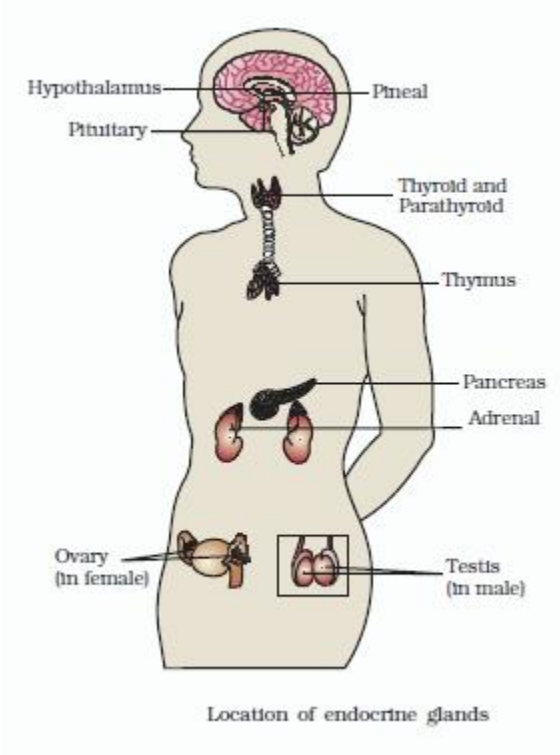
Solution:

1. Exocrine gland – These glands liberate their secretions into ducts conveying either on the surface of the body or to particular organs of the body
2. Endocrine gland – These ductless glands liberate their secretions into the bloodstream, conveying it to target organs located at a distance
3. Hormone – It is a non-nutrient chemical which serves as a intercellular messenger and is secreted in trace amounts

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

Solution:

The diagram indicating the location of the various endocrine glands in our body are:



Location of endocrine glands

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

Solution:

The hormones secreted by the following structures are as follows:

Name of the structure	**Hormone secreted**	
Hypothalamus	Releasing hormone	Inhibiting hormone
	Adrenocorticotropin-releasing hormone (ARH) Thyrotropin-releasing hormone (TRH) Lutenising hormone-releasing hormone (LH-RH) Follicle-stimulating hormone-releasing hormone (FSH – RH) Prolactin-releasing hormone (PRH) Growth hormone – releasing hormone Melanocyte stimulating hormone – releasing hormone	Growth inhibiting hormone Prolactin inhibiting hormone Melanocyte stimulating hormone – inhibiting hormone
Pituitary	Neurohyophysis – Oxytocin Anti-diuretic hormone (Vasopressin)	

	Adenohypophysis – Follicle-stimulating hormone (FSH) Growth hormone (GH) Leutinising hormone (LH) Thyroid stimulating hormone (TSH) Adrenocorticotropin hormone (ACTH) Intermediate lobe – Melanocyte-stimulating hormone (MSH)
Thyroid	Calcitonin Tri-iodothyronine(T_3) Tetraiodothyronine/Thyroxine(T_4)
Parathyroid	Parathormone (PTH)
Adrenal	Adrenal cortex – Mineralocorticoids, Glucocorticoids Adrenal medulla – Adrenaline, Noradrenaline
Pancreas	Glucagon, Insulin, Somatostatin
Testis	Testosterone, Androsterone
Ovary	Relaxin, Oestrogen, Progesterone,
Thymus	Thymosin
Atrium	Atrial natriuretic factor (ANF)
Kidney	Erythropoietin
G-I Tract	Stomach – Gastrin Intestine – Secretin, Enterogastrone, Cholecystokinin, Enterocrinin, Duocrinin Liver – Angiotensinogen

4. Fill in the blanks:

Hormones Target gland

(a) Hypothalamic hormones _____

(b) Thyrotrophin (TSH) _____

(c) Corticotrophin (ACTH) _____

(d) Gonadotrophins (LH, FSH) _____

(e) Melanotrophin (MSH) _____

Solution:

(a) Hypothalamic hormones – Pituitary gland

(b) Thyrotrophin (TSH) – Thyroid gland

(c) Corticotrophin (ACTH) – adrenal cortex

(d) Gonadotrophins (LH, FSH) – Testis and ovaries

(e) Melanotrophin (MSH) – Pigment cells of the dermis of the skin

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

Solution:

(a) Parathyroid hormone (PTH)

1. It is a peptide hormone which is secreted by the parathyroid gland
2. The circulating levels of calcium ions regulates its secretion
3. The levels of calcium ions in the blood is increased by PTH.
4. The bone resorption process is triggered by PTH.
5. The reabsorption of calcium ions by the renal tubules is triggered which increases calcium ions absorption from the food that is digested
6. PTH is a hypercalcemic hormone which increases the blood Ca2+ levels
7. It has a critical role to play in balancing calcium in the body along with TCT, i.e., in calcium homeostasis.

(b) Thyroid hormones Thyroxine/tetraiodothyronine(T_4)

1. This hormone checks the basal metabolic rate (BMR) and body growth such as mental development and ossification of bones
2. The body weight is controlled.
3. It controls the tissue differentiation and metamorphosis of tadpole larva into an adult frog
4. Formation of RBC is suppressed

5. Tri-iodothyronine(T_3) – The energy consumption and body's oxygen are increased. It also increases heart rate and force of contraction which inturn increases the cardiac output

(c) Thymosin

1. The differentiation of T-lymphocytes is triggered which provides cell-mediated immunity
2. The antibody production is facilitated to provide humoral immunity
3. The rate of division of cell in children is triggered thereby promotes growth

(d) Androgens

1. The interstitial cells located in the intertubular space generate a collection of hormones called as androgens, testosterone mainly
2. Checks the maturation, development and functions of the male accessory sex organs such as epididymis, vas deferens, urethra, seminal vesicles, prostate gland etc.
3. These trigger the growth of facial and axillary hair, muscles, aggressiveness, low pitch of voice etc.
4. In the phenomena of spermatogenesis, these play a critical stimulatory role
5. They act on the central neural system which influences the male sexual behavior
6. They generate anabolic effects on carbohydrate metabolism and protein

(e) Estrogen

1. It triggers the development of ovarian follicles and the growth & development of the female reproductive organs namely the fallopian tube, uterus and vagina
2. It causes the LH secretion to increase and FSH secretion to decrease
3. The sensitivity of the uterus to the hormone – oxytocin is enhanced
4. The development of mammary gland is facilitated
5. The female sexual behavior is regulated.

(f) Insulin

1. Glucose homeostasis is regulated
2. It acts on hepatocytes and adipocytes
3. The transport of glucose to the muscles from blood is triggered
4. The oxidation of glucose is facilitated and brings about glycogenesis, i.e., the conversion of glucose to glycogen causing hyperglycemia

Glucagon

1. It is critical in maintaining normal blood glucose levels
2. Acts on hepatocytes which triggers the conversion of glycogen to glucose
3. The gluconeogenesis phenomena is triggered i.e., the conversion of non-carbohydrate particles namely – proteins and fats to glucose

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

Solution:

(a) Hyperglycemic hormone and hypoglycemic hormone – Glucagon and Insulin respectively

(b) Hypercalcemic hormone – Parathormone hormone (PTH)

(c) Gonadotrophic hormones – Follicle-stimulating hormone (FSH) and Luteinizing 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

7. Which hormonal deficiency is responsible for the following?

(a) Diabetes mellitus

(b) Goitre

(c) Cretinism

Solution:

The hormonal deficiency that is responsible for the following are:

(a) Diabetes mellitus – Insulin (inadequate secretion) which is caused due to abnormally high glucose levels in the blood

(b) Goitre – Thyroxin (inadequate secretion)

(c) Cretinism – Thyroid (inadequate secretion)

8. Briefly mention the mechanism of action of FSH.

Solution:

Follicle stimulating hormone or FSH is a glycoprotein polypeptide hormone which is not soluble in lipid and therefore cannot enter the target cell. It binds to the surface of the cell which activates the cellular systems to carry out its functionalities.

Mechanism of FSH

1. FSH molecule binds to the receptor protein which is located on the surface of the cell forming the hormone-receptor complex
2. The formation of hormone causes the receptor complex to activate the adenyl cyclase enzyme
3. This enzyme converts ATP to cyclic AMP as a second messenger which inturn activates the follicular cells of membrane of granulose to produce estrogens.

9. Match the following:

Column I	Column II

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

Solution:

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