

## Chapter: Chemical control and coordination

### Exercises

**Question 1. Define the following**

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

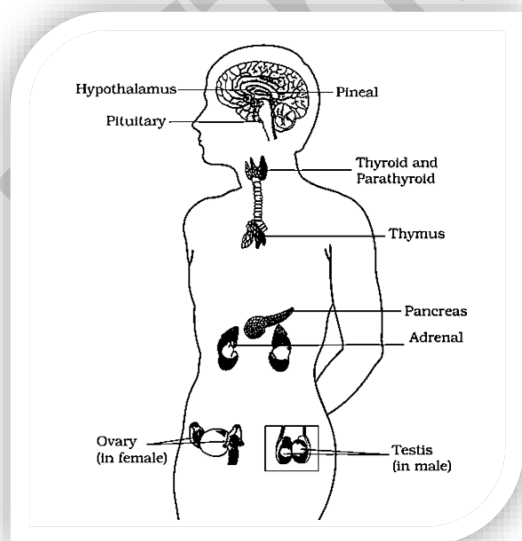
**Answer:**

1. Exocrine gland – These glands release their secretions into ducts that carry them either to the body's surface or to specific organs.
2. Endocrine gland – These ductless glands release their secretions into the circulation, where they are carried to distant target organs.
3. Hormone – It's a non-nutrient molecule that acts as an intercellular messenger and is only secreted in small doses.

**Question 2. Diagrammatically indicates the location of the various endocrine glands in our body.**

**Answer:**

The diagram depicts the various endocrine glands in our body are:



**Question 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:

Structure	Hormone(releasing)	Inhibiting
Hypothalamus	Adrenocorticotropin, Thyrotropin, Luteinizing hormone Follicle-stimulating hormone, Prolactin, Growth hormone Melanocyte stimulating hormone	Prolactin inhibiting hormone  Melanocyte stimulating hormone – inhibiting hormone
Pituitary	Neurohyophys – Oxytocin  Anti-diuretic hormone (Vasopressin)  Adenohypophysis –  Follicle-stimulating hormone (FSH)	

	<p>Growth hormone (GH)</p> <p>Luteinizing hormone (LH)</p> <p>Thyroid-stimulating hormone (TSH)</p> <p>Adrenocorticotropin hormone (ACTH)</p> <p>Intermediate lobe –</p> <p>Melanocyte-stimulating hormone (MSH)</p>	
Thyroid	<p>Calcitonin</p> <p>Tri-iodothyronine(T3)</p> <p>Tetraiodothyronine/Thyroxine(T4)</p>	
Parathyroid	Parathormone (PTH)	
Adrenal	<p>Adrenal cortex – Mineralocorticoids, Glucocorticoids</p> <p>Adrenal medulla – Adrenaline, Noradrenaline</p>	
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	

**Question 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) Pituitary gland
- (b) Thyroid gland
- (c) adrenal cortex
- (d) Testis and ovaries
- (e) Pigment cells of the dermis of the skin

**Question 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. It's a peptide hormone that the parathyroid gland secretes.
2. Calcium ion levels in the bloodstream control its secretion.
3. PTH increases the quantities of calcium ions in the blood.
4. PTH is a hormone that causes bone resorption.
5. Calcium ion reabsorption by the renal tubules is stimulated, which enhances calcium ion absorption from digested food.
6. PTH is a hypercalcemic hormone that raises  $\text{Ca}^{2+}$  levels in the blood.
7. It works in tandem with TCT to keep calcium levels in the body balanced, a process known as calcium homeostasis.

**(b) Thyroid hormones Thyroxine/tetraiodothyronine(T4)**

1. This hormone monitors the body's basal metabolic rate (BMR) as well as other aspects of development, such as brain development and bone ossification.
2. Body weight is under control.
3. It regulates tissue differentiation and adult frog metamorphosis in tadpole larvae.
4. RBC formation is inhibited
5. Tri-iodothyronine (T3) – Increases energy consumption and oxygen levels in the body. It also raises heart rate and contraction force, increasing cardiac output.

**(c) Thymosin**

1. T-lymphocyte differentiation is stimulated, resulting in cell-mediated immunity.
2. Antibody production is enhanced, resulting in humoral immunity.
3. In youngsters, the rate of cell division is accelerated, which encourages growth.

**(d) Androgens**

1. The interstitial cells in the intertubular space produce a group of hormones known as androgens, the most common of which is testosterone.
2. Examines the maturation, development, and functioning of male auxiliary sex organs such as the epididymis, vas deferens, urethra, seminal vesicles, and prostate gland, among others.
3. These cause the growth of facial and axillary hair, muscles, aggression, and a low vocal tone, among other things.
4. These are important stimulators in the process of spermatogenesis.
5. They influence male sexual behavior by acting on the central nervous system.
6. They have anabolic effects on glucose and protein metabolism.

(e) Estrogen

1. It stimulates the formation of ovarian follicles as well as the growth and development of the female reproductive organs (fallopian tube, uterus, and vaginal canal).
2. It induces a rise in LH secretion and a reduction in FSH secretion.
3. The uterus' sensitivity to the hormone oxytocin is increased.
4. The mammary gland's growth is aided.
5. The sexual behavior of women is restricted.

(f) Insulin

1. Glucose homeostasis is a controlled process.
2. Hepatocytes and adipocytes are affected.
3. Glucose transfer from the blood to the muscles is initiated.
4. Glucose oxidation is aided, resulting in glycogenesis, or the conversion of glucose to glycogen, resulting in hyperglycemia.

Glucagon

1. It is necessary for the maintenance of normal blood glucose levels.
2. Acts on hepatocytes, causing glycogen to be converted to glucose.
3. The gluconeogenesis phenomenon, or the conversion of non-carbohydrate particles such as proteins and lipids to glucose, is started.

**Question 6. Give an 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:

Hormone	Example
(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 – $\beta$ - oestradiol

**Question 7. Which hormonal deficiency is responsible for the following?**

(a) Diabetes mellitus

(b) Goitre

(c) Cretinism

Answer:

The hormonal deficiency which is responsible for the following diseases are:

- (a) Diabetes mellitus – Inadequate secretion of Insulin due to which there is an abnormally high glucose level in the blood
- (b) Goitre – Because of inadequate secretion of Thyroxin
- (c) Cretinism – Inadequate secretion of Thyroid

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

**Answer:**

Follicle-stimulating hormone (FSH) is a glycoprotein polypeptide hormone that cannot penetrate the target cell because it is not soluble in lipids. It attaches to the cell's surface, activating the cellular processes to carry out their functions.

FSH's Mechanism

1. The hormone-receptor complex is formed when the FSH molecule interacts with the receptor protein on the cell's surface.
2. Hormone production activates the adenyl cyclase enzyme in the receptor complex.
3. As a second messenger, this enzyme converts ATP to cyclic AMP, which stimulates the follicular cells of the granulosa membrane to create estrogens.

**Question 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:

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