

# Biology

## Chapter 22- Chemical Coordination and Integration

### 1. Define the following:

#### a) Exocrine gland

**Ans:** Exocrine glands, such as sebaceous glands, sweat glands, salivary glands, and intestinal glands, secrete their secretions on the surface or into a specific region via ducts in order to conduct a metabolic function.

#### b) Endocrine gland

**Ans:** The endocrine gland is a unique gland (from the epithelium that forms it) that secretes informational molecules or hormones that are injected into the venous blood or lymph to reach the target organ because there is no duct connecting the gland to the target organ. As a result, endocrine glands, such as the thyroid gland, are sometimes known as ductless glands.

#### c) Hormone.

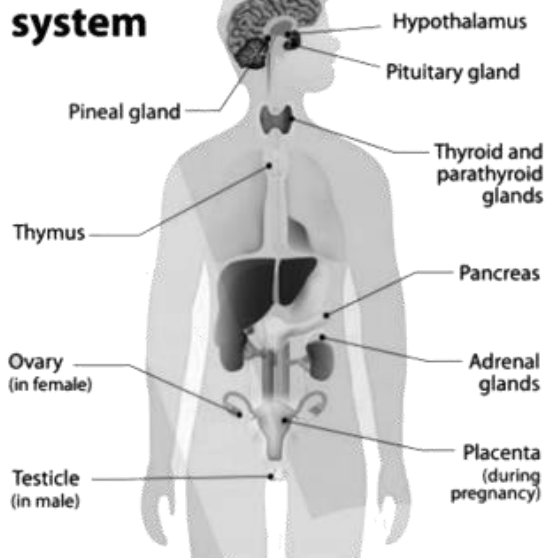
**Ans:** Hormone is a chemical produced by an endocrine gland or a specialised nerve cell and released in very minute amounts into the bloodstream to control the growth or function of a specific tissue organ in a distant area of the body, such as insulin.

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

**Ans:**



## Endocrine system



### 3. List the hormones secreted by the following:

#### a) Hypothalamus

**Ans:** Two sorts of hormones are produced by hypothalamus: releasing hormones (that stimulate secretion of pituitary hormones) and inhibiting hormones (that inhibit secretion of pituitary hormones).

These hormones include:

1. Thyrotropin-releasing hormone
2. Corticotropin-releasing hormone
3. Follicle-stimulating hormone-releasing hormone
4. Luteinizing hormone-releasing hormone
5. Growth hormone-releasing hormone
6. Growth inhibiting hormone
7. Prolactin releasing hormone
8. Prolactin inhibiting hormone
9. Melanocyte stimulating hormone releasing hormone
10. Melanocyte stimulating hormone-inhibiting hormone.

#### b) Pituitary

**Ans:** Different hormones are secreted by different regions of the pituitary gland.

- The anterior lobe of the pituitary gland secretes the following hormones:



1. Follicle stimulating hormone
  2. Luteinizing hormone
  3. Thyroid stimulating hormone
  4. Adrenocorticotrophic hormone
  5. Somatotrophic or Growth hormone
  6. Prolactin hormone or Luteotropic hormone.
- **Middle (intermediate) lobe of pituitary gland: Melanocyte stimulating hormone.**
- Posterior lobe of pituitary:**
1. Oxytocin
  2. Vasopressin or antidiuretic hormone.

**c) Thyroid**

**Ans:** Thyroid secretes Thyroxine or tetraiodothyronine, Triiodothyronine and Calcitonin hormones.

**d) Parathyroid**

**Ans:** Parathyroid gland secretes a single hormone called parathormone (PTH) or Collip's hormones.

**e) Adrenal**

**Ans:** Adrenal glands have two regions, namely, outer adrenal cortex and inner adrenal medulla. Both these regions secrete different hormones.

Hormones of adrenal cortex are grouped into three categories:

1. Glucocorticoids, e.g., cortisol
2. Mineralocorticoids, e.g., aldosterone
3. Sexcorticoids e.g. testosterone.

Adrenal medulla secretes two hormones

1. Epinephrine (adrenaline)
2. Nor-epinephrine (nor-adrenaline).

**f) Pancreas**

**Ans:** Pancreas secretes Insulin, Glucagon and Somatostatin hormones.

**g) Testis**

**Ans:** Testis secretes androgens hormone.



**h) Ovary**

**Ans:** Ovary secretes Estrogens such as estradiol, Progesterone and Relaxin.

**i) Thymus**

**Ans:** Thymus secretes thymosin hormone.

**j) Atrium**

**Ans:** Atrium secretes atrial natriuretic factor (ANF).

**k) Kidney**

**Ans:** Kidney secretes Renin and Erythropoietin hormones.

**l) G-I Tract.**

**Ans:** G.I. tract secretes following hormones:

1. Gastrin
2. Secretin
3. Cholecystokinin
4. Enterocrinin
5. Duocrinin
6. Villikinin

**4. Fill in the blanks:**

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

**Ans:**

- a) Pituitary
- b) Thyroid
- c) Adrenal cortex
- d) Gonads – Tests in male and ovaries in female
- e) Skin.

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

**a) Parathyroid hormones (PTH)**



**Ans:** Parathyroid hormone raises calcium levels while lowering phosphate levels in the blood.

**b) Thyroid hormones**

**Ans:** Thyroxine, triiodothyronine, and calcitonin are the three hormones secreted by the thyroid gland. Thyroxine and triiodothyronine regulate the body's overall metabolism, encourage tissue development, and induce tissue differentiation. Calcitonin is a hormone that controls calcium levels in the blood.

**c) Thymosin**

**Ans:** Thymosin is produced by the thymus gland. Cell division is accelerated, T-lymphocyte growth and differentiation is stimulated, and sexual maturity is accelerated.

**d) Androgens**

**Ans:** The testis secretes androgens. They influence male sexual behaviour and sex drive by stimulating the development of the male reproductive system, the production of sperm, and the development of male accessory sex characteristics.

**e) Estrogens**

**Ans:** Estrogens are produced by the ovaries. They encourage the female reproductive system to mature and become fully functional, as well as the differentiation of ova and the development of accessory sex characteristics

**f) Insulin and Glucagon.**

**Ans:** Insulin is produced in the pancreas by the  $\beta$ -cells. It reduces blood glucose levels and stimulates protein and fat synthesis. The  $\alpha$ -cells of the pancreas produce glucagon. It causes a rise in blood glucose levels.

**6. Give example(s) of**

**a) Hyperglycemic hormone and hypoglycemic hormone**

**Ans:** Parathormone (PTH)

**b) Hypercalcemic hormone**

**Ans:** Glucagon, Insulin

**c) Gonadotrophic hormones**

**Ans:** Follicle stimulating hormone (FSH) and Luteinizing hormone (LH)



**d) Progestational hormone**

**Ans:** Progesterone

**e) Blood pressure lowering hormone**

**Ans:** Atrial natriuretic factor

**f) Androgens and estrogens.**

**Ans:** Testosterone and Estradiol.

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

**a) Diabetes mellitus**

**Ans:** Diabetes mellitus is characterised by excessively high blood glucose levels caused by a lack of the hormone insulin.

**b) Goitre**

**Ans:** Goitre is a condition in which the thyroid gland enlarges abnormally owing to a lack of thyroxine hormone in the body.

**c) Cretinism.**

**Ans:** Cretinism is a condition in which a baby's development is slowed owing to a lack of thyroid hormone in the body.

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

**Ans:** (Follicle stimulating hormone) is a glycoprotein that is lipid insoluble and so cannot penetrate target cells. It forms a hormone-receptor complex by binding to particular receptor molecules on the cell membrane's surface. The enzyme adenylate cyclase is released from the receptor site as a result of this combination. From ATP, this enzyme produces cell cyclic adenosine monophosphate (cAMP). The cAMP stimulates the cell's existing enzyme system. The metabolic processes in the cell are accelerated as a result of this. The hormone is referred to as the first messenger, whereas cAMP is referred to as the second messenger. The hormone-receptor complex alters the permeability of the cell membrane to allow items to pass across it more easily. As the cell obtains the required ingredients, its actions grow.

**9.**

**Column I**

(a)  $T_4$

(b) PTH

(c) GnRH

(d) LH

**Column II**

(i) Hypothalamus

(ii) Thyroid

(iii) Pituitary

(iv) Parathyroid.

**Ans:**

(a)  $T_4$  – Thyroid

(b) PTH – Parathyroid

(c) GnRH – Hypothalamus

(d) LH – Pituitary

