

CBSE NCERT Solutions for Class 11 Biology Chapter 22

Back of Chapter Questions

1. Define the following:

(a) Exocrine gland

(b) Endocrine gland

(c) Hormone

Solution:

(a) Exocrine gland: Exocrine glands secrete their products into ducts that lead to the target tissue. For example, enzymes. The salivary gland secretes saliva into the collecting duct, which leads to the mouth.

(b) Endocrine gland: Endocrine glands secrete their products directly into the blood. For example, hormones. Insulin is a peptide hormone produced in beta cells of the pancreas that allows your body to use glucose from the food that you eat for energy or to store glucose for future use.

(c) Hormone: Hormones are chemical organic substances secreted in plants and animals that act like messenger molecules in the body. After being made in one part of the body, they travel to other parts of the body where they control how cells and organs do their work. For example, Insulin is a peptide hormone produced in beta cells of the pancreas that allows your body to use glucose from the food that you eat for energy or to store glucose for future use.

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

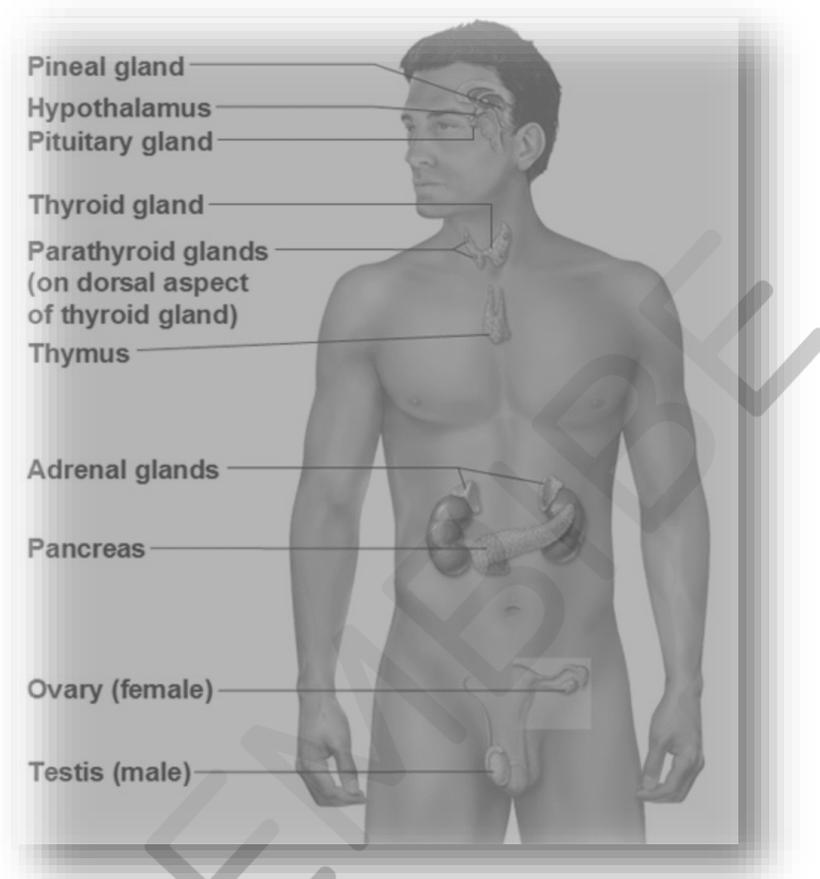
Solution:

Figure: Location of the various endocrine glands in our body

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:

Endocrine glands	Hormones secreted
a) Hypothalamus	<p>(1) <u>Releasing hormones</u>: Stimulate the secretions of the pituitary hormone. They include:</p> <ul style="list-style-type: none">(i) Gonadotrophin-releasing hormone (GnRH)(ii) Thyrotrophin-releasing hormone (TRH)(iii) Somatotropin-releasing hormone(iv) Adrenocorticotrophin-releasing hormone <p>(2) <u>Inhibiting hormones</u>: Inhibit the secretions of the pituitary hormone. They include:</p> <ul style="list-style-type: none">(i) Somatostatin(ii) Growth-inhibiting hormone(iii) Melanocyte-inhibiting hormone
b) Pituitary	<p>The pituitary gland has two components, i.e., adenohypophysis and neurohypophysis.</p> <p>(1) <u>Adenohypophysis hormones</u>:</p> <ul style="list-style-type: none">(i) Growth hormone (GH)(ii) Prolactin(iii) Thyroid-stimulating hormone (TSH)

	<p>(iv) Adrenocorticotrophic hormone (ACTH)</p> <p>(v) Luteinizing hormone (LH)</p> <p>(vi) Follicle-stimulating hormone (FSH)</p> <p>(vii) Melanocyte-stimulating hormone (MSH)</p> <p>(2) <u>Neurohypophysis hormones:</u></p> <p>(i) Oxytocin (Birth Hormone)</p> <p>(ii) Vasopressin [Anti-diuretic Hormone(ADH)]</p>
c) Thyroid	<p>(i) Thyroxin</p> <p>(ii) Triiodothyronine</p> <p>(iii) Calcitonin</p>
d) Parathyroid	parathyroid hormone (PTH)
e) Adrenal	<p>The adrenal gland is divided into two parts, the outer adrenal cortex and the inner adrenal medulla.</p> <p>(1) <u>Adrenal cortex hormones:</u></p> <p>(i) Mineralocorticoids: The hormone secreted is known as aldosterone.</p> <p>(ii) Glucocorticoids: The hormone secreted is cortisol.</p> <p>(2) <u>Adrenal medulla hormones:</u></p> <p>(i) Adrenaline</p> <p>(ii) Nor-adrenaline</p>
f) Pancreas	(i) Insulin

	(ii) Glucagon
g) Testis	Testosterone
h) Ovary	(i) Estrogen (ii) Progesterone
i) Thymus	Thymosins
j) Atrium	Atrial natriuretic factor (ANF)
k) Kidney	Erythropoietin
l) G-I tract	(i) Gastrin, secretin (ii) Cholecystokinin (CCK) (iii) Gastric inhibitory peptide (GIP).

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:

Hormones	Target gland
(a) Hypothalamic hormones	Pituitary gland
(b) Thyrotrophin (TSH)	Thyroid gland
(c) Corticotrophin (ACTH)	Adrenal gland
(d) Gonadotrophins (LH, FSH)	Testis and Ovaries
(e) Melanotrophin (MSH)	Hypothalamus

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): **Parathyroid glands secrete** a peptide hormone named parathyroid hormone (PTH). It increases the level of calcium in the blood. It also promotes the **reabsorption of calcium from nephrons** and promotes the **absorption of calcium from digested food**. Therefore, it plays an important role in **maintaining a balance of calcium in the body**.
- b. Thyroid hormones: The thyroid gland secretes **thyroxine, triiodothyronine, and thyrocalcitonin**.

Thyroxine (T_4) maintains the basal metabolic rate of the body and **regulates the metabolism** of carbohydrate, fat, and protein. Thyroid hormones also support the process of **red blood cell formation** and to maintain **water and electrolyte balance**.

Thyrocalcitonin or calcitonin **lowers calcium level in blood** plasma. It plays a significant role in calcium levels along with the parathyroid hormone.

Triiodothyronine (T_3) plays a **significant role in almost all the vital functions of the body** like metabolic rate, heart and digestive functions, muscle control, brain development and its function, and the maintenance of bones.

- c. Thymosins: The **thymus gland secretes thymosin**. It plays a significant role in protecting the body against infectious agents. It helps in the differentiation of T-lymphocytes and also promotes the production of antibodies. Hence, it **offers both humoral and cell-mediated immunity**. Thymosin also **helps in the development of sex glands**.
- d. Androgens: **Leydig cells of testis produce androgens** such as testosterone. Testosterone is a male sex hormone that controls the **development of secondary sex characters** like the growth of the reproductive organs, facial hairs, hoarse voice, etc. Androgens also regulate the functions, development, and **maturation of male accessory organs** such as epididymis and prostate glands. It stimulates **spermatogenesis** for the formation of mature sperms and also influences **male sexual behaviour**.
- e. Estrogens: Estrogen is synthesised and **secreted by the growing ovarian follicles**. It is the female sex hormone that controls the **development of secondary sex characters** like enlargement of mammary glands, high pitch voice, etc. It plays an essential role in the growth and development of **female secondary sex organs**. It also helps in the **development of growing ovarian follicles**. It influences **female sexual behaviour**.
- f. Insulin and Glucagon: The pancreas secretes insulin and glucagon to maintain the homeostasis of glucose levels in the blood.

α -cells of the pancreas secrete glucagon, which increases the blood glucose during the hypoglycemic condition in the body. Additionally, glucagon is responsible for the process of **gluconeogenesis/glycogenolysis**, which contributes to hyperglycemia. Glucagon reduces cellular uptake and utilisation of glucose.

β -cells secrete insulin that lowers blood glucose during the hyperglycemic state in the body. Additionally, insulin is responsible for the conversion of glucose to glycogen (**glycogenesis**) in the target cells, which contributes to hyperglycemia. Insulin increases cellular uptake and utilisation of 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: Hyperglycemic hormone is **glucagon**, and the hypoglycemic hormone is **insulin**.

(b) Hypercalcemic hormone: Parathyroid hormone (**PTH**)

(c) Gonadotrophic hormones: Luteinizing hormone (**LH**) and follicle-stimulating hormone (**FSH**)

(d) Progestational hormone: **Progesterone**

(e) Blood pressure-lowering hormone: **Nor-adrenalin**

(f) Androgens and estrogens: An example of androgen is **testosterone**, and an example of estrogen is **estradiol**.

7. Which hormonal deficiency is responsible for the following:

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

Solution:

(a) Diabetes mellitus: It is characterised by abnormally high glucose levels in the blood due to the **deficiency of insulin** hormone secreted by the pancreas.

- (b) Goitre: It is characterised by an abnormal enlargement of the thyroid gland due to the iodine deficiency that causes hypothyroidism **due to reduced levels of T₃ and T₄ hormones** secreted by the thyroid gland.
- (c) Cretinism: It is characterised by stunted growth in the baby due to the **deficiency of T₃ and T₄ hormones** secreted by the thyroid gland (hypothyroidism) in pregnant women.

8. Briefly mention the mechanism of action of FSH.

Solution:

- Follicle-stimulating hormone (FSH) is secreted by the pars distalis region of the anterior pituitary. FSH is essential for pubertal development and the function of women's ovaries and men's testes.
- In females, FSH stimulates the growth and maturation of ovarian follicle. As the follicle grows and matures, the granulosa cells of the ovarian follicles in the ovaries release an inhibitory hormone known as inhibin that suppresses the process of FSH production.
- In males, FSH is required for spermatogenesis within the specialised cells of testes called Sertoli cells. Once mature sperms are produced, Sertoli cells release an inhibitory hormone known as inhibin that suppresses the process of FSH production.

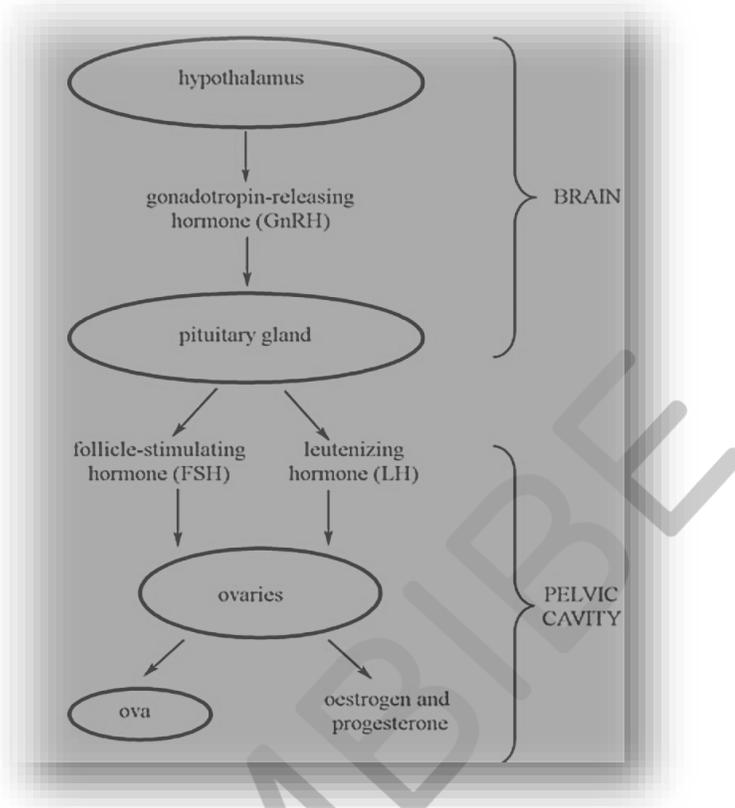


Figure: Mode of action of FSH in females

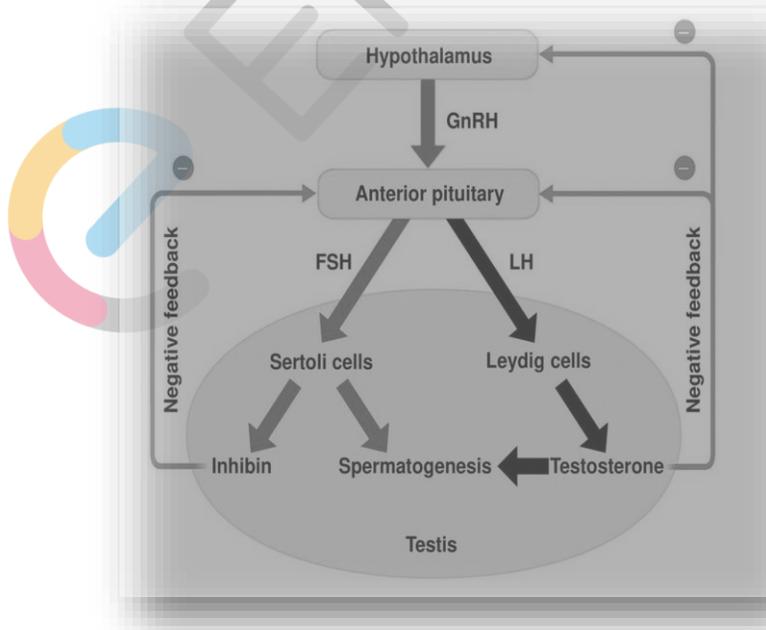


Figure: Mode action of FSH in males

9. Match the following:

Column I	Column II
(a) T ₄	(i) Hypothalamus
(b) PTH	(ii) Thyroid
(c) GnRH	(iii) Pituitary
(d) LH	(iv) Parathyroid

Solution:

Column I	Column II
(a) T ₄	(ii) Thyroid
(b) PTH	(iv) Parathyroid
(c) GnRH	(i) Hypothalamus
(d) LH	(iii) Pituitary

