



INDIAN SCHOOL AL WADI AL KABIR



Class: XI	Department: SCIENCE 2026 – 2027 SUBJECT: BIOLOGY	Date: 03/09/2026
Worksheet:09 with answers	UNIT- V- HUMAN PHYSIOLOGY CHAPTER:19- CHEMICAL CONTROL AND INTEGRATION	Note: A4 FILE FORMAT
CLASS & SEC:	NAME OF THE STUDENT:	ROLL NO.

I. MULTIPLE CHOICE QUESTIONS (1M)

- Which of the following statements is correct regarding the regulation and function of the pituitary hormones?
 - The posterior pituitary is under the direct neural regulation of the hypothalamus.
 - The anterior pituitary is under the direct neural regulation of the hypothalamus.
 - Somatostatin from the hypothalamus stimulates the release of growth hormone.
 - GnRH inhibits the release of gonadotropins from the pituitary gland.
- Match the hormone with its correct physiological function:
 - Melatonin – Regulates the 24-hour (diurnal) rhythm of our body.
 - TCT (Thyrocalcitonin) – Increases blood calcium levels.
 - PTH (Parathyroid Hormone) – Decreases blood calcium levels.
 - Thymosins – Decrease the production of antibodies.
- Which hormone interacts with intracellular receptors and mostly regulates gene expression or chromosome function?
 - Insulin
 - Epinephrine
 - Pituitary hormones
 - Cortisol
- Hypothyroidism during pregnancy causes defective development and maturation of the growing baby, leading to:
 - Gigantism and high intelligence quotient.
 - Dwarfism and normal mental development.
 - Cretinism, mental retardation, and abnormal skin.
 - Acromegaly and protrusion of the eyeballs.
- Which of the following cells in the pancreas secrete insulin, and what is its primary effect on blood glucose homeostasis?
 - Alpha cells; it increases blood glucose levels (hyperglycemia).
 - Beta cells; it decreases blood glucose levels (hypoglycemia).

- C. Delta cells; it inhibits glucagon secretion.
- D. Alpha cells; it enhances glycogen breakdown in the liver.

Two statements are given - one labelled as **Assertion (A)** and the other labelled as **Reason (R)**.

Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

- A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of the Assertion (A).
 - B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
 - C. Assertion (A) is true, but Reason (R) is false.
 - D. Assertion (A) is false, but Reason (R) is true.
6. **Assertion (A):** The anterior pituitary is under the direct neural regulation of the hypothalamus.
Reason (R): Hypothalamic hormones reach the anterior pituitary through a portal circulatory system.
7. **Assertion (A):** Insulin is a hypoglycemic hormone.
Reason (R): Insulin acts on hepatocytes and adipocytes, enhancing the cellular uptake and utilisation of glucose from the blood.
8. **Assertion (A):** Parathyroid hormone (PTH) is a hypercalcemic hormone.
Reason (R): PTH decreases calcium absorption from digested food and inhibits calcium reabsorption by the renal tubules.
9. **Assertion (A):** Hormones like epinephrine and FSH do not enter their target cells to alter cellular metabolism.
Reason (R): Amino acid derivatives and peptide hormones interact with membrane-bound receptors to generate second messengers like cyclic AMP.

II. VERY SHORT ANSWER TYPE QUESTIONS(2M)

- 10. What is the function of Cholecystikinin (CCK) and Gastric Inhibitory Peptide (GIP)?
- 11. Differentiate between Diabetes Mellitus and Diabetes Insipidus based on their causes.
- 12. What hormones are secreted by the heart and the kidneys, and what are their specific physiological functions?

III. SHORT ANSWER TYPE QUESTIONS (3M)

- 13. Give a detailed account of the classification of hormones based on their chemical nature.
- 14. Give a brief account of the anatomy and role of the adrenal cortex.
- 15. a) Which hormone aids in cell-mediated immunity?
b) Old-aged persons have weak immunity. Give reason.

IV. CASE STUDY BASED QUESTIONS (4M)

- 16. A 32-year-old individual reports to a clinic experiencing a specific set of symptoms. The person has noticed a significant weight loss despite increased appetite, feels abnormally warm even in cool rooms, has an elevated heart rate, and feels constantly nervous or anxious. Upon examination, the doctor observes a visible swelling in the neck and notes that the patient's eyeballs appear slightly protruding. The doctor concludes that these changes are due to a disease caused by the malfunction of an endocrine gland located on either side of the trachea.
 - A. Name the specific endocrine disorder the patient is suffering from, and state whether it is a type of hypo- or hypersecretion.
 - B. Describe the physical connection between the two lobes of the affected gland.
 - C. Which major physiological role of the thyroid hormones explains the patient's elevated heart

rate and rapid weight loss?

- D. Apart from iodinated hormones (T3 and T4), name the protein hormone secreted by this gland and state its primary function.

V. LONG ANSWER TYPE QUESTIONS (5M)

17. a) Describe the anatomical relationship between the thyroid and parathyroid glands.
b) Explain the clinical features of hyperthyroidism (Graves' disease) and contrast it with the physiological consequences of hypoparathyroidism.
18. Explain the mechanism of hormone action with neat labelled diagrams.

Answer Key

Q. No.	Answer
1	A. The posterior pituitary is under the direct neural regulation of the hypothalamus.
2	A. Melatonin – Regulates the 24-hour (diurnal) rhythm of our body.
3	D. Cortisol
4	C. Cretinism, mental retardation, and abnormal skin
5	B. Beta cells; it decreases blood glucose levels (hypoglycemia).
	ASSERTION & REASONING
6.	D. Assertion (A) is false, but Reason (R) is true.
7.	A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
8.	C. Assertion (A) is true, but Reason (R) is false.
9.	A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
II	VERY SHORT ANSWER TYPE QUESTIONS(2M)
10.	Cholecystokinin (CCK) • Secreted by: Endocrine cells of the small intestine wall (duodenum). • Trigger: Presence of fats and proteins in the chyme. • Functions: ○ Acts on the pancreas to stimulate the secretion of pancreatic enzymes. ○ Acts on the gallbladder to stimulate the contraction and release of bile juice. Gastric Inhibitory Peptide (GIP) • Secreted by: Endocrine cells of the small intestine wall. • Trigger: Presence of food (chyme) entering the duodenum. • Functions: ○ Inhibits gastric secretion (stops acid release in the stomach). ○ Inhibits gastric motility (slows down stomach movement).
11.	Diabetes Mellitus: ○ Cause: Deficiency of insulin (secreted by beta-cells of the pancreas) or receptor insensitivity. ○ Symptoms: High blood glucose (hyperglycemia), excretion of glucose in urine, and formation of harmful ketone bodies.

	Diabetes Insipidus: ○ Cause: Deficiency or low secretion of Antidiuretic Hormone (ADH / Vasopressin) from the posterior pituitary. ○ Symptoms: Inability of kidneys to reabsorb water, leading to excessive urination (polyuria), dehydration, and intense thirst.
12.	Heart (Atrial Wall): Secretes Atrial Natriuretic Factor (ANF) when blood pressure rises. ANF causes the dilation of blood vessels, which effectively lowers the elevated blood pressure. Kidney (Juxtaglomerular Cells): Secretes a peptide hormone called Erythropoietin in response to low oxygen levels. This hormone targets bone marrow to stimulate erythropoiesis, which is the production and maturation of red blood cells.
III	SHORT ANSWER TYPE QUESTIONS (3M)
13.	(i) peptide, polypeptide, protein hormones (e.g., insulin, glucagon, pituitary hormones, hypothalamic hormones, etc.) (ii) steroids (e.g., cortisol, testosterone, estradiol and progesterone) (iii) iodothyronines (thyroid hormones) (iv) amino-acid derivatives (e.g., epinephrine).
14.	Structure The adrenal cortex is the outer layer of the adrenal gland, located superior to each kidney. It is divided into three distinct structural zones from the outside in: 1. Zona glomerulosa (outer layer) 2. Zona fasciculata (middle layer) 3. Zona reticularis (inner layer) Function These zones secrete steroid hormones collectively known as corticosteroids, which perform vital physiological roles: • Mineralocorticoids (e.g., Aldosterone): Secreted by the outer layer to act on renal tubules, stimulating sodium and water reabsorption to maintain electrolyte balance, osmotic pressure, and blood volume. • Glucocorticoids (e.g., Cortisol): Secreted by the middle layer to regulate carbohydrate metabolism by stimulating gluconeogenesis, lipolysis, and proteolysis, while also producing anti-inflammatory responses. • Sex Corticoids (Androgens): Secreted by the inner layer in trace amounts to stimulate the development of axial, pubic, and facial hair during puberty.
15.	a) Hormone Aiding Cell-Mediated Immunity • Thymosin: This peptide hormone, secreted by the thymus gland, plays a critical role in accelerating the differentiation, maturation, and proliferation of T-lymphocytes, which directly provide cell-mediated immunity. b) Reason for Weak Immunity in Old-Aged Persons

	• Thymus Degeneration: The thymus gland undergoes progressive degeneration with age and is gradually replaced by fibrous and fatty tissue. • Decreased Hormone Production: As a direct result of this degeneration, the secretion of thymosins drops drastically in elderly individuals. • Impaired T-Cell Maturation: This decline severely reduces the production and maturation of active T-lymphocytes, leading to a highly weakened immune response (both cell-mediated and humoral immunity) in older individuals.
IV	CASE STUDY BASED QUESTIONS (4M)
16.	A. The patient is suffering from Exophthalmic goitre (Graves' disease), which is a form of hyperthyroidism (hypersecretion of thyroid hormones). B. The two lobes of the thyroid gland are interconnected across the trachea by a thin flap of connective tissue called the isthmus. C. These symptoms are caused by the disruption of thyroid hormones, which play an important role in the regulation of the basal metabolic rate (BMR). D. The gland secretes a protein hormone called Thyrocalcitonin (TCT), which regulates and lowers blood calcium levels.
V	LONG ANSWER TYPE QUESTIONS (5M)
17.	a) Anatomical Relationship • Location: The thyroid gland is a two-lobed structure situated on either side of the trachea in the ventral neck region, with the lobes joined across the center by an isthmus. • Parathyroid Arrangement: In humans, there are exactly four parathyroid glands. They are structurally embedded directly on the posterior (back) surface of the thyroid gland, with one pair positioned on each of the two thyroid lobes. b) Hyperthyroidism vs. Hypoparathyroidism • Hyperthyroidism (Graves' Disease): This is an overactive condition where the thyroid gland secretes thyroid hormones (T_3/T_4). It leads to severe systemic abnormalities including an enlarged thyroid gland, rapid weight loss despite increased appetite, protrusion of the eyeballs (exophthalmos), elevated heart rate, muscle tremors, and a drastically accelerated basal metabolic rate (BMR). Hypoparathyroidism: This is an underactive condition caused by the deficiency of Parathyroid Hormone (PTH). Because PTH normally stimulates bone resorption and renal calcium reabsorption to raise blood calcium levels, a lack of it leads to a severe drop in blood calcium levels (hypocalcemia). This electrolyte imbalance causes muscle twitches, cramps, and painful involuntary muscle spasms known as hypocalcemic tetany.
18.	Hormones produce their effects by binding to the specific proteins (hormone receptors) located in target tissues. • A hormone binds to its specific receptor to form a hormone-receptor complex. • It leads to biochemical changes in target tissue and thereby regulates metabolism and physiological functions. Hormone receptors are of 2 types. • Membrane- bound receptors: Some hormones (e.g. protein hormones, FSH) interact with

	membrane - bound receptors (do not enter the target cell). It generates second messengers(e.g. cyclic AMP, IP3 ● It in turn regulates cellular metabolism and causes physiological effects. ● Intercellular receptors (mostly nuclear receptors): Some hormones (e.g, steroid hormones, iodothyronines) interact with intercellular receptors. They mostly regulate gene expression, or chromosome function by the interaction of the hormone-receptor complex with the genome. Cumulative biochemical actions result in physiological and developmental effects, Along with FIG 19.5 a) and b) from NCERT
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