Chapter 9

Chemical Coordination and Integration

Solutions (Set-1)

SECTION - A

School/Board Exam. Type Questions

Very Short Answer Type Questions :

1. Name a releasing hormone and an inhibiting hormone released by the master of master gland.

Sol. GnRH (Gonadotrophin releasing hormone) – A releasing hormone

Somatostatin – An inhibiting hormone

2. What is the role of FSH in females?

Sol. FSH stimulates the growth and development of ovarian follicles and secretion of estrogens.

3. How does the melatonin secretion follow the diurnal rhythm?

Sol. Melatonin level rises in the evening and throughout the night and drops during noon.

4. Which is the largest endocrine gland?

Sol. Thyroid gland.

5. Name the peptide hormones which act antagonistic to each other and are released from the same gland.

Sol. Insulin and glucagon.

6. Why is it advisable to eat iodised salt?

Sol. Iodine is essential for the synthesis of thyroid hormones. Deficiency of iodine can cause goitre.

7. Name any gland which is present on the surface of another gland.

Sol. Parathyroid glands are present on the surface of thyroid gland.

8. Which two organ systems are meant for internal communication and regulation of physiological functions of the body?

Sol. Nervous system and endocrine system.

9. Name any two hormones released from pars distalis.

Sol. Growth hormone and prolactin.

10. Which part of thyroid gland releases thyroxine hormone?

Sol. Follicular cells present in the follicles of thyroid gland.

Short Answer Type Questions :

11. Why is somatotrophin necessary for human body?

Sol. Somatotrophin is another name of growth hormone. It regulates the growth of the body by promoting protein anabolism, absorption of calcium in intestine, conversion of glycogen to glucose. It helps in synthesis and deposition of proteins, growth of the long bones and other parts of the skeleton.

12. The function of LH is different in males and females. Comment.

Sol. **Luteinising hormone (LH) :** LH has different functions in males and females. In males, LH stimulates testes to synthesise and secrete androgens (testosterone). It activates Leydig cells of the testes to secrete testosterone. In females, LH stimulates corpus luteum of the ovary to secrete progesterone. It stimulates the ovulation from fully matured Graafian follicles and also maintains the corpus luteum formed from the remnants of Graafian follicles after ovulation.

13. Write a short note on growth factors.

Sol. Several non-endocrine tissues of our body release hormones called growth factors. These growth factors are essential for the normal growth of tissues and their repairing/regeneration.

14. Why is adrenaline called triple F hormone?

Sol. Adrenaline controls flight, fight and fright responses of the body and hence is called triple F or '3F' hormone. Adrenaline is also called epinephrine which prepares the body for the emergency conditions. It is secreted by the adrenal medulla.

15. What effect does norepinephrine and epinephrine have on our body?

Sol. These hormones regulate heart beat, dilation of pupil, dilation or constriction of blood vessels, rate of respiration, contraction and relaxation of heart muscles. These also increase sweating, piloerection, alertness and breakdown of lipids and proteins to prepare the body for emergency situations.

16. How do glucagon and insulin maintain the homeostasis of glucose?

Sol. When the glucose level in the blood increases then pancreas secretes insulin which causes glycogenesis and decreases the level of glucose in the blood but when the glucose level decreases in blood, then pancreas secretes glucagon which causes glycogenolysis and gluconeogenesis and increases the level of glucose in the blood.

17. What are the similarities between

    (a) Vasopressin and oxytocin.

    (b) Testosterone and estrogen.

Sol. (a) Both are peptide hormones and both are produced by hypothalamus and released by neurohypophysis

    (b) Both are steroid hormones and are sex hormones.

18. Why do we need a special kind of regulation and coordination when nervous system is already present there?

Sol. Neural coordination is fast but its effects are short-lived. It occurs for a short period of time and also the nerve fibres (axons) responsible for neural coordination do not innervate all the cells of the body. Hence, there is a need of another special kind of regulation and coordination called endocrine system, which produces slow but long-lasting effects.

19. Why is pituitary gland called an endocrine gland?

Sol. Pituitary gland is an endocrine gland because it does not have any special ducts to release its secretions. It releases its secretions directly into blood which carries them to different target organs.

20. What are the functions of hormones released by hypothalamus?

Sol. The hormones released by hypothalamus either stimulate the secretions of pituitary gland or inhibit the secretions of pituitary gland. Vasopressin and oxytocin are two hypothalamic hormones which do not have any effect on pituitary gland.

21. Structure 'X' produces a releasing hormone which acts on 'Y' which produces peptide hormones that target on Z. Z releases steroid hormones which control secondary sexual characters in male. Identify X, Y, Z.

Sol. X – Hypothalamus

Y – Pituitary gland

Z – Testis

22. Name the hormones produced from the following :

(i) β-cells of pancreas

(ii) Pars intermedia

(iii) Thymus

(iv) Parathyroid gland

Sol. (i) Insulin

(ii) MSH – Melanocyte-stimulating hormone

(iii) Thymosins

(iv) Parathormone (PTH)

23. Which disease occurs if following conditions take place in the body? Write two symptoms of both the diseases.

(i) Hypersecretion of growth hormone (in childhood).

(ii) Hyposecretion of vasopressin.

Sol. (i) Gigantism :

(a) The person suffering from gigantism has extra ordinary growth in height caused by abnormal elongation of long bones in childhood.

(b) Vision may also be affected.

(ii) Diabetes insipidus :

(a) Person suffers from diuresis

(b) Dehydration

24. Describe GnRH.

Sol. GnRH (Gonadotropin Releasing Hormone) : GnRH is a hypothalamic hormone. GnRH is a releasing hormone which stimulates the pituitary gland to synthesise and release the gonadotropins (LH and FSH). LH and FSH further stimulate the male and female gonads.

25. FSH has different functions (roles) in males and females. Comment.

Sol. Follicle-stimulating hormone (FSH) : The FSH has different functions in males and females. In males, FSH helps in spermatogenesis (formation of sperms) and in females, FSH stimulates the growth and development of ovarian follicles and secretion of estrogen.

26. What are the characteristic features of the disease diabetes mellitus?

Sol. Diabetes mellitus is characterised by excess of glucose in urine, formation of harmful compounds such as ketone bodies, excessive urination and dehydration of body tissues.

27. How is corpus luteum formed?

Sol. During ovulation, the Graafian follicle ruptures and releases the egg. After ovulation, Graafian follicle is converted into a structure called corpus luteum, which is also called yellow body.

28. Describe the role of the hormone released from the pyloric region of the stomach.

Sol. Gastrin : The mucosa of pyloric region of the stomach synthesises, stores and secretes the hormone called gastrin. When food reaches the stomach, gastrin acts on gastric glands and stimulates the release of gastric juice containing digestive enzymes, for the digestion of food.

29. Which corticoids regulate the balance of water and electrolytes in the body. Also write their source of secretion.

Sol. There are three types of corticoids produced in our body by adrenal cortex. The balance of water and electrolytes is maintained by mineralocorticoids. The mineralocorticoids are produced by the zona glomerulosa layer of adrenal cortex. Aldosterone is the chief mineralocorticoid in our body.

30. Which pituitary hormone acts on the DCT of kidney? What is the role of that hormone there?

Sol. Vasopressin or antidiuretic hormone (ADH) : Vasopressin acts on kidneys and stimulates the reabsorption of water and electrolytes from the distal tubules. It reduces loss of water through urine. It causes urine to be hypertonic and prevents water loss from the body.

Long Answer Type Questions :

31. How does insulin affect our body?

Sol. Insulin acts on adipocytes, hepatocytes and muscle cells. It enhances the cellular uptake and utilisation of glucose. When the level of glucose in the blood increases, then β-cells of the pancreas get stimulated and release insulin which causes the following :

(i) Uptake of glucose by cells for respiration.

(ii) Uptake of glucose by liver and muscle cells for glycogenesis or conversion of glucose into glycogen.

(iii) Uptake of amino acids by cells and formation of proteins.

(iv) Fat synthesis in adipose tissues.

This would decrease the glucose concentration in blood and would increase rapid movement of glucose from blood to hepatocytes and adipocytes resulting in hypoglycemia (decrease in blood glucose level).

32. Why is glucagon important for our body?

Sol. Glucagon acts on liver cells and stimulates the conversion of stored glycogen into glucose. It is controlled by negative feedback. If the level of glucose in the blood decreases, it stimulates hepatocytes to undergo glycogenolysis which increases the level of glucose in the liver. The increased glucose is then transferred into the blood and maintains the blood glucose level. It also stimulates the process of gluconeogenesis *i.e.*, formation of glucose from deaminated acids and lactic acids and hence contributes to hyperglycemia. It also reduces cellular glucose uptake and utilisation.

33. Name the disorder which is caused by

    (i) Deficiency of iodine in diet.

    (ii) Deficiency of growth hormone in childhood

    (iii) Deficiency of insulin

    (iv) Excess of cortisol.

    Also write one feature of each disease.

Sol. (i) Goitre: Enlargement of thyroid gland takes place leading to swelling in the neck.

(ii) Pituitary dwarfism: Stunted physical growth leading to less than normal height of the affected individual.

(iii) Diabetes mellitus: Excessive urination and dehydration and increased thirst.

(iv) Cushing's syndrome : Disproportionate distribution of body fat leading to moon face.

34. Describe neurohypophysis.

Sol. Neurohypophysis : Neurohypophysis comprises of 25% portion of the pituitary gland. It is also called pars nervosa or posterior pituitary. It does not secrete any hormone of its own. It receives hormones (oxytocin and ADH) directly from the neurosecretory cells of the hypothalamus. The axons of the hypothalamic neurons extend into neurohypophysis. The vesicles present in these axons store these hormones which are directly secreted into the neurohypophysis.

35. Give endocrine functions of juxtaglomerular cells of kidney.

Sol. Kidneys : The juxtaglomerular cells of kidney produce a hormone called erythropoietin which stimulates erythropoiesis (formation of RBC). It activates bone marrow cells to produce RBCs. Juxtaglomerular cells also produce renin hormone which is released in response to decreased arterial pressure as well as decreased sodium ion concentration. Renin converts angiotensinogen into angiotensin-I. Later on, angiotensin-I is converted into angiotensin-II. Angiotensin-II then stimulates adrenal cortex to release aldosterone which helps in reabsorption of sodium ions from the nephric filtrate and water retention.

36. How does liver control reabsorption of sodium ions in order to maintain the electrolyte balance?

Sol. Liver : Liver produces a protein called angiotensinogen. Angiotensinogen is converted into angiotensin-I by the action of renin. This angiotensin-I is then converted into angiotensin-II. The angiotensin-II, then stimulates the adrenal cortex to release aldosterone. The aldosterone now helps in reabsorption of the sodium ions from the filtrate through convoluted tubules of kidneys. The renin required for the conversion is secreted by juxtaglomerular apparatus of nephron in the kidney.

37. Which hormone(s) regulate(s) the following? Also write their source glands.

    (i) BMR

    (ii) Calcium metabolism

    (iii) Sleep-wake cycle

    (iv) Differentiation of T-lymphocytes

    (v) Secondary sexual characteristics

    (vi) Spermatogenesis and oogenesis

Sol. (i) Thyroid hormones : From thyroid gland.

(ii) Parathormone and thyrocalcitonin : PTH from parathyroid glands and TCT from thyroid gland.

(iii) Melatonin : From pineal gland.

(iv) Thymosins : From thymus gland.

(v) Testosterone and estrogen : Testosterone from testes and estrogen from ovaries.

(vi) Testosterone and estrogen, respectively : Testosterone from testes and estrogen from ovaries and LH and FSH from pituitary.

38. How does light regulate the formation of melatonin? What effect does melatonin has on our body?

Sol. Light reduces melatonin formation and hence maintains normal rhythm of sleep-wake cycle. During day time when light falls on retina, it decreases melatonin secretion and during night, in the absence of light it increases melatonin secretion and induces or promotes sleep. In addition to this, melatonin influences metabolism, body temperature, pigmentation of skin, menstrual cycle as well as defense capability of an individual.

39. Describe the structure of thyroid gland.

Sol. Thyroid gland is composed of two lateral lobes which are located on either sides of the trachea. These lobes are connected to each other with a thin flap of connective tissue called **isthmus**. The lobes contain follicles and stromal tissues. These follicles are held together by areolar connective tissue. Each thyroid follicle is composed of follicular cells, enclosing a cavity. The follicular cells present in the follicles release two hormones, namely, tetraiodothyronine (T_4) or thyroxine and triiodothyronine (T_3). These have similar effects on the target cells and hence are grouped together as thyroid hormones (TH).

40. How does parathormone regulate calcium levels in the body?

Sol. The release of parathormone is regulated by the circulating levels of calcium (Ca^{2+}) ions in the blood. PTH acts on bones and other skeletal structures and mobilises the calcium (Ca^{2+}) into the blood from the bones. It maintains the calcium balance between the blood and other tissues. When the calcium level in the blood decreases, then parathyroid hormone is released in order to increase the calcium level in the blood. The parathormone causes reabsorption of calcium from the renal tubules, absorption of calcium from the digested food and demineralisation or dissolution of skeletal structures. Hence, PTH (parathormone) is a hypercalcemic hormone that increases the calcium level in the blood when it decreases.

41. Describe the lobular structure located on the dorsal side of the heart and aorta.

Sol. Thymus gland is located on the dorsal side of heart and aorta. It acts as a primary lymphoid organ where development and maturation of T-lymphocytes occur. T-lymphocytes are involved in cell-mediated immunity (immune response). Thymus secretes hormones called thymosins which help in differentiation of T-cells and production of antibodies from B-lymphocytes (humoral immunity). Thymus helps in accelerating cell division, developing resistance to infection and attainment of sexual maturity also. As the age increases, the thymus begins to degenerate.

42. What are the major functions of cortisol?

Sol. Cortisol is the main glucocorticoid which stimulates

(i) Gluconeogenesis, *i.e.*, synthesis of glucose from non-carbohydrates such as amino acids and glycerol.

(ii) Lipolysis, *i.e.*, breakdown of fats in adipose tissue to release fatty acids in the blood.

(iii) Proteolysis, *i.e*. degradation of proteins and hence, increases the level of amino acids in the blood and inhibit cellular uptake and utilisation of amino acids.

(iv) Cortisol is also involved in maintaining the cardiovascular system as well as the kidney functions. Cortisol produces antiinflammatory reactions and also suppresses the immune response. The cortisol helps in formation of RBC and thereby increases RBCs count but decreases WBCs count in the blood.

43. What are the different functions of testis including its endocrine function?

Sol. In males, a pair of testes is present in the scrotal sac located outside the abdominal cavity. They perform dual function. These act as primary sex organs as well as endocrine glands. Testis is composed of seminiferous tubules and interstitial or stromal tissue. The seminiferous tubule is responsible for the formation of sperms and hence, fulfil the function of primary sex organ whereas Leydig cells or interstitial cells located in between the seminiferous tubules are responsible for the secretion of steroid hormones called androgens, mainly testosterone. These cells secrete testosterone under the influence of LH secreted by anterior pituitary.

44. Describe endocrine system.

Sol. The endocrine system consists of endocrine glands which are also called ductless glands as they lack ducts and release their secretions directly into the venous blood or lymph. These chemicals (hormones) are then taken up by the specific organs from the blood circulation to initiate a particular metabolic change. The endocrine system is slower than nervous system in terms of coordination and regulation because hormones are first secreted by glands and poured into blood, from there these are then transported to target tissues which also take time to respond. The endocrine system may take time but its effects and actions are long lasting and more varied, influencing all components of metabolism.

45. Write a detailed note on the endocrine cells present in different parts of the GIT and their hormones produced.

Sol. GIT refers to gastro-intestinal tract. Endocrine cells present in different parts of the GIT secrete four major peptide hormones, namely, gastrin, secretin, cholecystokinin and gastric inhibitory peptide.

(1) **Gastrin :** It acts on the gastric glands and stimulates the secretion of hydrochloric acid and enzymes like pepsinogen in gastric juice.

(2) **Secretin :** It acts on the exocrine pancreas and stimulates the secretion of water and bicarbonate ions in pancreatic juice.

(3) **Cholecystokinin (CCK) :** It acts on both pancreas and gall bladder and stimulates the secretion of pancreatic juice and bile juice, respectively.

(4) **Gastric inhibitory peptide (GIP) :** It inhibits gastric secretion and motility.

SECTION - B

Model Test Paper

Very Short Answer Type Questions :

1. Name the anatomical and physiological connection between the nervous system and endocrine system.

Sol. Hypothalamus.

2. Pituitary gland is located in the cavity of which bone of the skull?

Sol. Sphenoid bone.

3. What is the location of thymus?

Sol. Thymus is located on the dorsal side of the heart and the aorta.

4. Which two hormones are responsible for maintaining the calcium levels in the blood?

Sol. Thyrocalcitonin and parathormone.

5. Which hormones are released from outermost layer of adrenal cortex?

Sol. Mineralocorticoids.

6. Name the two emergency hormones.

Sol. Epinephrine and norepinephrine.

7. Why is pancreas called a composite gland?

Sol. Pancreas is called a composite gland because it functions as both endocrine and exocrine gland.

8. Name the two peptide hormones secreted by pancreas.

Sol. Glucagon and insulin.

Short Answer Type Questions :

9. How is hypothalamus connected to hypophysis?

Sol. The hypothalamus is connected to the hypophysis by a stalk called infundibulum through which hypophyseal portal veins reach the anterior lobe and the axons of neurosecretory cells reach the posterior lobe of hypophysis.

10. How does gigantism occur?

Sol. Over secretion of growth hormone before puberty causes gigantism. The person suffering from gigantism has excessive growth in height caused by abnormal elongation of long bones in childhood.

11. Give the structure and location of gland which secretes melatonin.

Sol. Pineal gland secretes melatonin and is located on the dorsal side of forebrain.

Structure : Pineal gland contains a stalk called pineal stalk and a small, rounded, reddish structure called pineal body.

12. What are the symptoms of cretinism?

Sol. Symptoms of Cretinism : Stunted growth, mental retardation, low intelligence quotient, abnormal skin, deaf-mutism etc.

13. What is the function of thymus gland?

Sol. Thymus secretes the peptide hormones called thymosins which help in differentiating T-cells and producing antibodies. They accelerate cell division, develop resistance to infection and promote attainment of sexual maturity.

14. Why is it important to maintain calcium level in the body?

Sol. Calcium level maintenance in the blood plasma is essential for proper functioning of heart, muscles, nerves etc. Calcium is also essential for the growth of bones, teeth etc.

15. How does cortisol suppress the immune system?

Sol. Cortisol suppresses the immune response because it retards the phagocytotic activities of WBCs. It also suppresses the synthesis of antibodies by inhibiting the production of lymphocytes in the lymphoid tissues and is therefore called an immunosuppressor.

Short Answer Type Questions :

16. Why do females require estrogen at the time of puberty?

Sol. At the time of puberty, the estrogen is required for the full growth, development and functioning of female primary sex organs *i.e.*, ovaries and other female sexual organs like vagina, uterus, fallopian tubes, duct system of mammary gland etc. Estrogen stimulates development of ovarian follicles and differentiation of ovum in ovary. The estrogen controls the appearance of female secondary sexual characters such as high pitch voice, development of breasts, female pattern of body hair, body contours like broadening of pelvis, fat deposition in thighs and hips, onset of menstrual cycle and regulation of sexual behaviours.

17. Describe the hormone released by atrial walls of the heart.

Sol. Heart : The atrial walls of the heart secrete a very important peptide hormone called ANF or atrialnatriuretic factor. This hormone decreases the blood pressure. When the blood pressure increases, the ANF is released from the atrial wall of the heart that causes dilation of blood vessels and decreases the blood pressure. ANF is secreted in response to increased return of deoxygenated venous blood to heart.

18. What are the functions of CCK and GIP?

Sol. Cholecystokinin : When the food reaches the duodenum, cholecystokinin (CCK) is released from the duodenum. CCK acts on both pancreas and gall bladder and stimulates the secretion of pancreatic juice and bile juice, respectively. CCK stimulates the contraction of gall bladder to release bile.

GIP - Gastric inhibitory peptide : GIP is released from duodenum and this hormone inhibits gastric secretion and motility.

19. What are second messengers? What is the function of second messengers?

Sol. Hormones which interact with membrane-bound receptors normally do not enter the target cell, but generate the second messengers. When these hormones bind to the receptor and form a hormone-receptor complex, conformational changes in the cytoplasmic part of the receptor take place. The cytoplasmic part of the receptor then produces second messengers such as Ca^{2+}, cAMP, IP_3 etc., which in turn activate the existing enzyme system of the cell and accelerate the biochemical reactions in the cell.

20. Why do peptide hormones require extracellular receptors while steroid hormones do not?

Sol. Hormones are basically of two types - lipid soluble (*e.g.*, steroid hormones like testosterone, estrogen) and lipid insoluble (*e.g.*, amino acid derivatives like adrenaline, peptide like vasopressin and oxytocin, insulin and glucagon). Lipid-soluble hormones can easily pass through plasma membrane and directly enter the cells. Lipid-insoluble hormones cannot directly pass through the membrane and usually require extracellular receptors for carrying out their activity.

21. Enumerate three major functions of estrogens.

Sol. Functions of estrogens :

(a) Development of growing ovarian follicles.

(b) Stimulation of growth and activities of female secondary sex organs.

(c) Appearance of female secondary sex characters *e.g.*, high pitch of voice, etc.

Long Answer Type Questions :

22. Write down the mechanism of action of protein hormones by extracellular receptors.

Sol. Mechanism of action of protein hormone by binding to the extracellular receptor : The hormone circulating in tissue fluid comes in contact with the external domain of the extracellular receptor present on the surface of the cell. When the hormone binds to the receptor and forms a hormone-receptor complex, it brings about conformational changes in the cytoplasmic part of the receptor. The cytoplasmic part of the receptor then produces second messengers such as Ca^{2+}, cAMP, IP_3 etc., which activate the existing enzyme system of the cell and accelerate the biochemical reactions in the cell.

23. Briefly describe adenohypophysis.

Sol. Adenohypophysis : It comprises of about 75% part of pituitary gland. It consists of two portions – **Pars distalis** and **Pars intermedia.** However, in humans, the pass intermedia is almost merged with pass distalis. The pars distalis releases growth hormone, prolactin, TSH (thyroid-stimulating hormone), ACTH (adrenocorticotrophin hormone), LH (luteinising hormone), FSH (follicle-stimulating hormone) and pars intermedia releases melanocyte-stimulating hormone (MSH). The releasing or inhibiting hormones released from the hypothalamus are carried to the adenohypophysis through the hypophyseal portal veins.

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Solutions (Set-2)

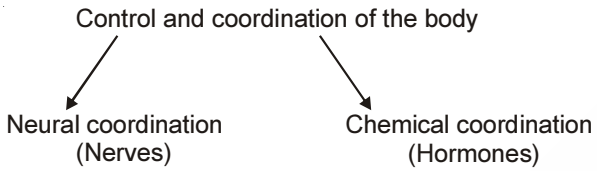
Objective Type Questions

(Endocrine System)

1. _____ are responsible for chemical coordination.

(1) Neurons (2) Nephrons (3) Hormones (4) Enzymes

Sol. Answer (3)



2. Neural coordination is

(1) Fast and long lived (2) Fast and short lived

(3) Slow and long lived (4) Slow and short lived

Sol. Answer (2)

Neural coordination via neurous is fast and short lived while chemical coordination via hormones is slow and lasts longer.

3. The ductless glands

(1) Produce non-nutrient intercellular messengers (2) Are found only in non chordates

(3) Are absent in human body (4) Are called exocrine glands

Sol. Answer (1)

Ductless glands are endocrine glands which secrete hormones which are

- Non-nutrient chemicals
- Act as intercellular messengers
- Secreted in trace amounts.

4. Choose the **incorrect** statement?

(1) Hormones are required in trace amounts

(2) Hormones are intra-cellular messengers

(3) Hormones are secreted by endocrine glandular cells

(4) Hormones are secreted in response to a particular stimulus

Sol. Answer (2)

Hormones are secreted in trace amounts and act as inter-cellular messengers.

(Human Endocrine System)

5. The glands present in the brain are

(1) Parathyroid gland and thyroid gland (2) Pituitary gland and thymus

(3) Hypophysis and pineal gland (4) Pineal gland and thymus

Sol. Answer (3)

Parathyroid and thyroid gland – located at the site of trachea

Thymus gland – located on dorsal side of heart and the aorta.

6. The two glands located in the neck region are

(1) Thyroid gland and parathyroid gland (2) Pituitary gland and pineal gland

(3) Adrenal gland and thymus (4) Pineal gland and thyroid gland

Sol. Answer (1)

Thyroid and parathyroid gland – neck region

Pituitary gland and pineal gland – brain gland

Adrenal gland – over kidney

Thymus gland – dorsal surface of heart.

7. Hypothalamus forms an important link between

(1) Digestive system and nervous system

(2) Nervous system and respiratory system

(3) Nervous system and endocrine system

(4) Integumentary system and reproductive system

Sol. Answer (3)

Hypothalamus forms an anatomical and physiological link between nervous system and endocrine system.

– Hypothalamus is connected to pituitary gland through infundibulum and is located in the basal part of (diencephalon) forebrain.

– Hypothalamus contains several groups of neurosecretory cells called nuclei which produce hormones.

8. The neurosecretory cells of hypothalamus which produce hormones are called

(1) Nephrons (2) Nuclei

(3) Granular cells (4) Globular cells

Sol. Answer (2)

Nephrons – Unit of excretory system.

Nuclei – Nuclei consists of compact clusters of neurous. Neurosecretory nuclei of hypothalamus secrete hormones.

Granular cells – Granular cells are small neurous, present in various parts of the brain, they have smallcell-bodies.

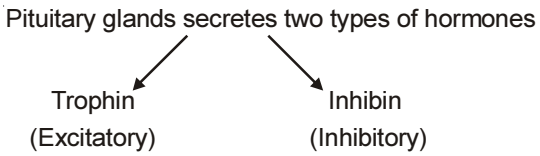
9. Hypothalamic hormones directly regulate the synthesis and secretion of

(1) Thyroid hormones (2) Pituitary hormones

(3) Adrenal hormones (4) Parathormone

Sol. Answer (2)

Hypothalamic hormones directly regulate the synthesis and secretion of pituitary gland which further regulates the synthesis and secretion of hormones of other glands like thyroid hormones adrenal hormones and parathormones etc.



10. Somatostatin inhibits the release of

(1) Prolactin (2) Melanin (3) Thymosin (4) Growth hormone

Sol. Answer (4)

Somatostatin is also known as growth hormone inhibitory hormones (GHIH) which inhibits the release of growth hormone.

11. GnRH stimulates _____ to release _____.

(1) Hypothalamus, gonadotropins (2) Pituitary gland, gonadotropins

(3) Pituitary gland, growth hormone (4) Hypothalamus, growth hormone

Sol. Answer (2)

GnRH hormone secreted by hy hypothalamus gland stimulates the release of FSH (follicle stimulating hormone) and LH (Leuteinising Hormone) by the pituitary gland.

12. Which of the following is under the direct control of neurosecretory cells?

(1) Pars distalis and pars intermedia (2) Pars intermedia and pars nervosa

(3) Pars nervosa only (4) Pars distalis only

Sol. Answer (3)

The hormones that are released from part nervosa are – Oxytocin and ADH. The hormones are secreted by the neurosecretory nuclei that are present is the hypothalamus. The axons extend upto the pars nervosa where the hormones are stored and released later.

13. The neuroendocrine structure is

(1) Hypothalamus (2) Adrenal cortex (3) Pancreas (4) Thyroid

Sol. Answer (1)

The neuroendocrine structure is hypothalamus which is considered as the connecting link between the nervous system and endocrine system.

14. Adenohypophysis in humans consists of two portions

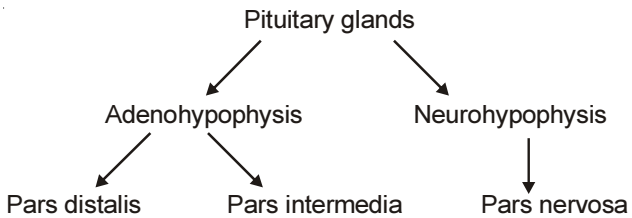
(1) Pars distalis and Pars nervosa

(2) Pars intermedia and Pars distalis

(3) Pars nervosa and Pars intermedia

(4) Anterior and posterior pituitary

Sol. Answer (2)



15. The hormone **not** released by pars distalis, in man is

(1) Growth hormone (2) Prolactin

(3) Melanocyte stimulating hormone (4) Luteinizing hormone

Sol. Answer (3)

MSH is secreted by pars intermedia in man.

16. Melanocyte stimulating hormone in man is released by

(1) Hypothalamus (2) Pars nervosa (3) Pars distalis (4) Pars intermedia

Sol. Answer (4)

MSH in man is secreted by pars intermedia.

17. The hormone which promotes protein anabolism, absorption of calcium from the bowel and retards use of blood glucose for ATP production

(1) Melatonin (2) Adrenaline (3) Growth hormone (4) Insulin

Sol. Answer (3)

Growth hormone regulates the growth of the body. Hence, it promotes protein anabolism, intestinal absorption of Ca^{2+} and conservation of glucose thus retards the use of blood glucose for ATP production.

18. Dwarfism occurs when there is

(i) Over secretion of growth hormone (ii) Under secretion of growth hormone

(iii) Over secretion of somatostatin (iv) Under secretion of somatostatin

(1) (i) and (iii) (2) Only (ii) (3) (ii) and (iii) (4) (ii) and (iv)

Sol. Answer (3)

Dwarfism : Is the stunted growth due to premature stoppage of body growth and reduced development of skeleton. The dwarfism occurs before puberty. The causes of dwarfism is :

(a) Under secretion of growth hormone

(b) Over secretion of somatostatin.

19. Excess of which hormone is responsible for gigantism?

(1) Growth hormone (2) Somatostatin

(3) Adrenaline (4) GnRH

Sol. Answer (1)

Gigantism : Over secretion of growth hormone before puberty causes gigantism.

Gigantism is the extraordinary growth in height caused by abnormal elongation of long bones is the childhood.

Somatostatin inhibits the secretion of growth hormone.

20. Prolactin activates

(1) Growth of breasts and secretion of milk in mammary glands

(2) Secondary sexual characters in males

(3) Melatonin secretion

(4) Estrogen secretion

Sol. Answer (1)

- Growth of breasts and secretion of milk in mammary glands – Prolactin
- Secondary sexual characters in males – LH (Leuteinising Hormone)
- Melatonin secretion – MSH (Melonocye stimulating hormone)
- Estrogen secretion – FSH (Follicle stimulating hormone).

21. ACTH controls the secretion of

(1) Insulin (2) Norepinephrine (3) Epinephrine (4) Glucocorticoids

Sol. Answer (4)

ACTH controls the secretion of glucocorticoid hormones from the adrenal cortex.

- ACTH acts by binding to the ACTH receptors, which are located primarily on adrenocortical cells of the adrenal cortex.
- Epinephrine and nor-epinephrine are secreted by adrenal medulla.
- Insulin is secreted by pancreas.

22. If 'X' is a hormone which controls the carbohydrate metabolism in the body and 'Y' is a hormone which controls the secretion of 'X', then 'X' and 'Y' are

(1) Insulin and somatotrophin (2) Aldosterone and growth hormone

(3) Glucocorticoid and ACTH respectively (4) Glucocorticoid and GHRH

Sol. Answer (3)

Carbohydrate metabolism is regulated by glucocorticoid released by adrenal cortex of adrenal gland and secretion of glucocorticoid is stimulated by ACTH.

- Somatotrophin regulates the release of GH.
- Aldosterone regulates the water and electrolyte balance in the body.
- GHRH secreted by hypothalamus stimulates the release of growth hormone from the pituitary gland.

23. $X \xrightarrow{GnRH} Y \xrightarrow{LH} Z$

The glands which are represented as X, Y and Z are

(1) Pituitary gland, ovary and testis, respectively

(2) Hypothalamus, adrenal gland and liver, respectively

(3) Hypothalamus, pituitary gland and testis/ovary, respectively

(4) Pituitary gland, thyroid gland and parathyroid gland, respectively

Sol. Answer (3)

Hypothalamus $\xrightarrow{GnRH}$ pituitary gland $\xrightarrow{LH}$ testes/ovary.

24. In females, LH stimulates _____ in the ovary to secrete _____.

(1) Graafian follicle, ICSH respectively (2) Graafian follicle, prolactin respectively

(3) Corpus luteum, FSH respectively (4) Corpus luteum, progesterone respectively

Sol. Answer (4)

In females LH stimulates the corpus luteum to secrete progesterone.

- Graafian follicles are stimulated by FSH or follicle stimulating hormones and stimulates the development of follicles and oocyte.

25. Graafian follicle gets converted into _____ after ovulation under the effect of _____.

(1) Corpus callosum, GnRH (2) Corpus luteum, LH

(3) Corpus albicans, FSH (4) Ovarian follicle, prolactin

Sol. Answer (2)

Graafian follicle get converted ino corpus luteum after ovulation which occurs under the effect of LH (luteinising hormone).

26. Which of the following is **incorrect** w.r.t. neurohypophysis?

(1) Neurohypophysis is also called pars nervosa

(2) It synthesises two hormones, oxytocin and vasopressin

(3) It receives neurohormones directly from neurosecretory cells

(4) It comprises 25% portion of pituitary gland

Sol. Answer (2)

Neurohypophysis releases oxytocin and vasopressin which are synthesised by the hypothalamus.

27. P is a small, round, reddish structure located on the dorsal side of forebrain. It contains a stalk and releases a hormone Q which controls diurnal rhythm of the body. P and Q are

(1) Hypothalamus, MSH respectively

(2) Pineal gland, melanin respectively

(3) Pineal gland, melatonin respectively

(4) Pituitary gland, MSH respectively

Sol. Answer (3)

Pineal gland is a small, round reddish structure located on the dorsal side of forebrain. It releases the hormone called melatonin which controls the diurnal rhythm of the body.

Light reduces melatonin formation and hence maintains the normal rhythm of sleep-wake cycle.

28. A hormone which maintains BMR, regulates the metabolism of proteins and erythropoiesis is

(1) Adrenaline (2) Thymine

(3) Thyroxine (4) Thymosin

Sol. Answer (3)

Thyroxine : hormone maintains the BMR, regulates the metabolism of proteins and erythropoiesis.

Adrenaline : hormone initiates the stress response.

Thymine : is a nitrogenous base which is present in the DNA.

Thymosin : is a hormone of the thymus gland and it stimulates the development of disease fighting T-cells.

29. Cretinism can be prevented or cured by the administration of

(1) Renin (2) Aldosterone

(3) Glucagon (4) Thyroxine

Sol. Answer (4)

Cretinism can be prevented by the administration of thyroxine because cretinism is caused by failure of thyroid gland secretion which slows body growth.

30. A gland X is present over the surface of another gland Y. Latter secretes a hormone that controls the metabolism of proteins, fats and carbohydrates. The X and Y are

(1) Parathyroid and thyroid gland, respectively

(2) Pituitary and hypothalamus, respectively

(3) Adrenal gland and kidney, respectively

(4) Thymus and heart, respectively

Sol. Answer (1)

Parathyroid glands (four pairs) are found on the surface of thyroid gland and thyroid gland secetes thyroxine which regulates the metabolism of proteins, fats and carbohydrates.

- Pituitary gland is present on the surface of the hypothalamus, and associated through a stalk while latter controls the pituitary gland through trophic and inhibitory hormones.
- Adrenal gland is present on the dorsal surface of kidney which secretes calcitonin and latter controls the Ca^{2+} homestasis.

31. Ram has high level of calcium in his blood. Excess of which hormone can cause this effect?

(1) Thyrocalcitonin (2) Growth hormone (3) Parathormone (4) Insulin

Sol. Answer (3)

Ram has high level of calcium in his blood. This may be caused by high amount of parathormone which results in the increased blood calcium level by increasing the osteoclast activity and increase absorption of calcium in the blood from the renal tubules.

Thyrocalcitonin has antagonistic effect on parathormone *i.e.* decreases the blood calcium level while growth hormone also increases the deposition of calcium in the bones.

32. Progesterone and estradiol are

(1) Peptide hormones (2) Amino acid derivatives

(3) Iodothyronines (4) Steroid hormones

Sol. Answer (4)

Steroid hormone : Progesterone and estradiol.

Peptide hormone : Oxytocin, vasopressin.

Amino acid hormone : Thyroxine, norepinephrine, epinephrine.

Iodothyronin : T_3 and T_4

(Hormones of Heart, Liver, Kidney and Gastro-intestinal Tract and Mechanism of Hormone Action)

33. $\underset{(A)}{\text{Angiotensinogen}} \xrightarrow{X} \underset{(B)}{\text{Angiotensin-I}}$.

'X' in the given statement refers to

(1) Angiotensin-II (2) Aldosterone

(3) Renin (4) Rennin

Sol. Answer (3)

Angiotensinogen $\xrightarrow{\text{Renin}}$ Angiotensin I

Rennin is a proteolytic enzyme found is the stomach.

34. Secretin promotes the release of

(1) HCl and sodium carbonate ions
(2) HCl and bicarbonate ions in gastric juice
(3) Water and bicarbonate ions in pancreatic juice
(4) Pancreatic enzymes and mucus

Sol. Answer (3)

Secretin stimulates the release water and bicarbonate ions in pancreatic juice.

35. CCK is secreted by

(1) Duodenum
(2) Pyloric part of stomach
(3) Caecum
(4) Rectum

Sol. Answer (1)

CCK is secreted by duodenal mucosa.

Cholecystokinin stimulates flow of pancreatic enzymes and contraction of gall bladder.

36. Which of the following forms a hormone receptor complex on the cell membrane?

(1) Cortisol (2) Testosterone (3) Insulin (4) Progesterone

Sol. Answer (3)

Water soluble hormones do not cross the cell membrane. They bind to the extracellular receptors which generates second messengers such as Ca^{2+}, CAMP, IP_3 etc. This further activates the existing enzyme system of the cell and accelerates the biochemical reaction in the cell.

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