

Chemical Coordination and Integration — NEET Biology

PYQ (2005-2021)

Class 11 Biology · 46 real NEET & AIPMT questions, year-tagged · answers checked by RankUp

NEET 2021

1. Erythropoietin hormone which stimulates R.B.C. formation is produced by :

- (A) Alpha cells of pancreas
- (B) The cells of rostral adenohypophysis
- (C) The cells of bone marrow
- (D) Juxtaglomerular cells of the kidney

NEET 2020 · Q80

2. Match the following columns and select the correct option.

Column - I | Column - II

(a) Pituitary gland | (i) Grave's disease

(b) Thyroid gland | (ii) Diabetes mellitus

(c) Adrenal gland | (iii) Diabetes insipidus

(d) Pancreas | (iv) Addison's disease

- (A) (a)-iv, (b)-iii, (c)-i, (d)-ii
- (B) (a)-iii, (b)-ii, (c)-i, (d)-iv
- (C) (a)-iii, (b)-i, (c)-iv, (d)-ii
- (D) (a)-ii, (b)-i, (c)-iv, (d)-iii

NEET 2020 · Q81

3. Select the correct statement.

- (A) Glucocorticoids stimulate gluconeogenesis.
- (B) Glucagon is associated with hypoglycemia.
- (C) Insulin acts on pancreatic cells and adipocytes.
- (D) Insulin is associated with hyperglycemia.

NEET 2019 · Q109

4. How does steroid hormone influence the cellular activities ?

- (A) Changing the permeability of the cell membrane.
- (B) Binding to DNA and forming a gene-hormone complex.
- (C) Activating cyclic AMP located on the cell membrane.
- (D) Using aquaporin channels as second messenger.

NEET 2019 · Q161

5. Which of the following glucose transporters is insulin-dependent ?

- (A) GLUT I
- (B) GLUT II
- (C) GLUT III
- (D) GLUT IV

NEET 2019 · Q179

6. Match the following hormones with the respective disease :

(a) Insulin — (i) Addison's disease

(b) Thyroxin — (ii) Diabetes insipidus

(c) Corticoids — (iii) Acromegaly

(d) Growth Hormone — (iv) Goitre

(v) Diabetes mellitus

Select the correct option.

- (A) (a)-(v), (b)-(i), (c)-(ii), (d)-(iii)
- (B) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
- (C) (a)-(v), (b)-(iv), (c)-(i), (d)-(iii)
- (D) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

NEET 2018 · Q140

7. Which of the following is an amino acid derived hormone?

- (A) Estradiol
- (B) Ecdysone
- (C) Epinephrine
- (D) Estriol

NEET 2017 · Q86

8. Hypersecretion of Growth Hormone in adults does not cause further increase in height, because:

- (A) Growth Hormone becomes inactive in adults.
- (B) Epiphyseal plates close after adolescence.
- (C) Bones lose their sensitivity to Growth Hormone in adults.
- (D) Muscle fibres do not grow in size after birth.

NEET 2017 · Q126

9. A temporary endocrine gland in the human body is:

- (A) Pineal gland
- (B) Corpus cardiacum
- (C) Corpus luteum
- (D) Corpus allatum

NEET 2017 (Gujarati paper) · Q89

10. Thymosin is responsible for:

- (A) Inhibiting the production of antibodies
- (B) Decreasing the blood calcium level in old individuals
- (C) Increased production of T-lymphocytes
- (D) Decreased production of T-lymphocytes

NEET 2017 (Gujarati paper) · Q103

11. Cholecystokinin acts on:

- (A) Gastric glands and liver
- (B) Pancreas and duodenum
- (C) Pancreas and intestine
- (D) Pancreas and gall bladder

NEET 2016 Phase 2 · Q147

12. Which hormones do stimulate the production of pancreatic juice and bicarbonate?

- (A) Angiotensin and epinephrine
- (B) Gastrin and insulin
- (C) Cholecystokinin and secretin
- (D) Insulin and glucagon

NEET 2016 Phase 2 · Q150

13. Graves' disease is caused due to

- (A) hyposecretion of thyroid gland
- (B) hypersecretion of thyroid gland
- (C) hyposecretion of adrenal gland
- (D) hypersecretion of adrenal gland

NEET 2016 Phase 2 · Q153

14. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances cellular glucose uptake and utilization.

- (A) Insulin
- (B) Glucagon
- (C) Secretin
- (D) Gastrin

NEET 2016 Phase 2 · Q157

15. The posterior pituitary gland is not a 'true' endocrine gland because

- (A) it is provided with a duct
- (B) it only stores and releases hormones
- (C) it is under the regulation of hypothalamus
- (D) it secretes enzymes

NEET 2016 Phase 1 · Q108

16. Which of the following pairs of hormones are not antagonistic (having opposite effects) to each other?

- (A) Parathormone - Calcitonin
- (B) Insulin - Glucagon
- (C) Aldosterone - Atrial Natriuretic Factor
- (D) Relaxin - Inhibin

NEET 2016 Phase 1 · Q147

17. The amino acid Tryptophan is the precursor for the synthesis of:

- (A) Melatonin and Serotonin
- (B) Thyroxine and Triiodothyronine
- (C) Estrogen and Progesterone
- (D) Cortisol and Cortisone

AIPMT 2015

18. A chemical signal that has both endocrine and neural roles is:

- (A) Cortisol
- (B) Melatonin
- (C) Calcitonin
- (D) Epinephrine

AIPMT 2014

19. Identify the hormone with its correct matching of source and function:

- (A) Melatonin – pineal gland, regulates the normal rhythm of sleep-wake cycle
- (B) Progesterone – corpus-luteum, stimulation of growth and activities of female secondary sex organs
- (C) Atrial natriuretic factor – ventricular wall, increases the blood pressure
- (D) Oxytocin – posterior pituitary, growth and maintenance of mammary glands

AIPMT 2014

20. Fight-or-flight reactions cause activation of:

- (A) the kidney, leading to suppression of renin-angiotensin-aldosterone pathway
- (B) the adrenal medulla, leading to increased secretion of epinephrine and norepinephrine
- (C) the pancreas leading to a reduction in the blood sugar levels
- (D) the parathyroid glands, leading to increased metabolic rate

NEET 2013

21. A pregnant female delivers a baby who suffers from stunted growth, mental retardation, low intelligence quotient and abnormal skin. This is the result of

- (A) Deficiency of iodine in diet
- (B) Low secretion of growth hormone
- (C) Cancer of the thyroid gland
- (D) Over secretion of pars distalis

NEET 2013

22. Which of the following statements is correct in relation to the endocrine system?

- (A) Adenohypophysis is under direct neural regulation of the hypothalamus
- (B) Organs in the body like gastrointestinal tract, heart, kidney and liver do not produce any hormones
- (C) Non-nutrient chemicals produced by the body in trace amount that act as intercellular messenger are known as hormones
- (D) Releasing and inhibitory hormones are produced by the pituitary gland

NEET 2013

23. Select the answer which correctly matches the endocrine gland with the hormone it secretes and its function/deficiency symptom:

- (A) Anterior pituitary – Oxytocin – Stimulates uterus contraction during child birth
- (B) Posterior pituitary – Growth hormone (GH) – Oversecretion stimulates abnormal growth
- (C) Thyroid gland – Thyroxine – Lack of iodine in diet results in goitre
- (D) Corpus luteum – Testosterone – Stimulates spermatogenesis

AIPMT 2012 Prelims

24. Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside it (mostly in the nucleus)?

- (A) Cortisol, testosterone
- (B) Insulin, glucagon
- (C) Thyroxine, insulin
- (D) Somatostatin, oxytocin

AIPMT 2012 Prelims

25. A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neuro-hormonal control system ?

- (A) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal cortex
- (B) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal medulla
- (C) Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse
- (D) Hypothalamus activates the parasympathetic division of brain

AIPMT 2012 Prelims

26. What is correct to say about the hormone action in humans ?

- (A) FSH stimulates the secretion of estrogen and progesterone
- (B) Glucagon is secreted by β -cells of Islets of Langerhans and stimulates glycogenolysis
- (C) Secretion of thymosins is stimulated with aging
- (D) In females, FSH first binds with specific receptors on ovarian cell membrane

AIPMT 2011 Mains

27. The 24 hour (diurnal) rhythm of our body such as the sleep-wake cycle is regulated by the hormone

- (A) Adrenaline
- (B) Melatonin
- (C) Calcitonin
- (D) Prolactin

AIPMT 2011 Prelims

28. Match the source gland with its respective hormone as well as the function

- (A) Thyroid – Thyroxine – Regulates blood calcium level
- (B) Anterior pituitary – Oxytocin – Contraction of uterus muscles during child birth
- (C) Posterior pituitary – Vasopressin – Stimulates resorption of water in the distal tubules in the nephron
- (D) Corpus luteum – Estrogen – Supports pregnancy

29. Given below is an incomplete table about certain hormones, their source glands and one major effect of each on the body in humans. Identify the correct option for the three blanks A, B and C.

Gland A - Oestrogen - Maintenance of secondary sexual characters

Alpha cells of Islets of Langerhans - B - Raises blood sugar level

Anterior pituitary - C - Over secretion leads to gigantism

- (A) A: Placenta, B: Glucagon, C: Calcitonin
- (B) A: Ovary, B: Glucagon, C: Growth hormone
- (C) A: Placenta, B: Insulin, C: Vasopressin
- (D) A: Ovary, B: Insulin, C: Calcitonin

30. Select the correct matching of a hormone, its source and function.

Hormone - Source - Function

- (A) Vasopressin - Posterior pituitary - Increases loss of water through urine
- (B) Norepinephrine - Adrenal medulla - Increases heart beat, rate of respiration and alertness
- (C) Glucagon - Beta-cells of Islets of Langerhans - Stimulates glycogenolysis
- (D) Prolactin - Posterior pituitary - Regulates growth of mammary glands and milk formation in females

31. Which one of the following pairs is incorrectly matched?

- (A) Insulin - Diabetes mellitus (disease)
- (B) Glucagon - Beta cells (source)
- (C) Somatostatin - Delta cells (source)
- (D) Corpus luteum - Relaxin (secretion)

32. Injury to adrenal cortex is not likely to affect the secretion of which one of the following?

- (A) Cortisol
- (B) Aldosterone
- (C) Both Androstenedione and Dehydroepiandrosterone
- (D) Adrenaline

33. Toxic agents present in food which interfere with thyroxine synthesis lead to the development of

- (A) Thyrotoxicosis
- (B) Toxic goitre
- (C) Cretinism
- (D) Simple goitre

34. A health disorder that results from the deficiency of thyroxine in adults and characterised by (i) a low metabolic rate, (ii) increase in body weight and (iii) tendency to retain water in tissues is:

- (A) simple goitre
- (B) myxoedema
- (C) cretinism
- (D) hypothyroidism

35. The blood calcium level is lowered by the deficiency of

- (A) Calcitonin
- (B) Parathormone
- (C) Thyroxine
- (D) Both Calcitonin and Parathormone

AIPMT 2008 Prelims · Q168

36. In human adult females oxytocin

- (A) Causes strong uterine contractions during parturition
- (B) Is secreted by anterior pituitary
- (C) Stimulates growth of mammary glands
- (D) Stimulates pituitary to secrete vasopressin

AIPMT 2008 Prelims · Q199

37. Which of the following pairs of organs includes only the endocrine glands?

- (A) Adrenal and Ovary
- (B) Parathyroid and Adrenal
- (C) Pancreas and Parathyroid
- (D) Thymus and Testes

AIPMT 2007 Prelims · Q151

38. A person is having problems with calcium and phosphorus metabolism in his body. Which one of following glands may not be functioning properly?

- (A) parotid
- (B) pancreas
- (C) thyroid
- (D) parathyroid

AIPMT 2007 Prelims · Q186

39. Compared to a bull a bullock is docile because of

- (A) higher levels of cortisone
- (B) lower levels of blood testosterone
- (C) lower levels of adrenaline/noradrenaline in its blood
- (D) higher levels of thyroxine

AIPMT 2007 Prelims · Q199

40. Feeling the tremors of an earthquake a scared resident of seventh floor of a multistoried building starts climbing down the stairs rapidly. Which hormone initiated this action?

- (A) adrenaline
- (B) glucagon
- (C) gastrin
- (D) thyroxine

AIPMT 2006 Prelims · Q108

41. Which one of the following statements is correct ?

- (A) Neurons regulate endocrine activity, but not vice versa
- (B) Endocrine glands regulate neural activity and nervous system regulates endocrine glands
- (C) Neither hormones control neural activity nor the neurons control endocrine activity
- (D) Endocrine glands regulate neural activity, but not vice versa

AIPMT 2006 Prelims · Q165

42. A steroid hormone which regulates glucose metabolism is :

- (A) cortisol
- (B) corticosterone
- (C) 11-deoxycorticosterone
- (D) cortisone

AIPMT 2006 Prelims · Q167

43. Which one of the following is not a second messenger in hormone action ?

- (A) cGMP
- (B) Calcium
- (C) Sodium
- (D) cAMP

44. Which of the following is an accumulation and release centre of neurohormones ?

- (A) Posterior pituitary lobe
- (B) Intermediate lobe of the pituitary
- (C) Hypothalamus
- (D) Anterior pituitary lobe

45. Which hormone causes dilation of blood vessels, increased oxygen consumption and glycogenolysis ?

- (A) ACTH
- (B) Insulin
- (C) Adrenalin
- (D) Glucagon

46. Secretin and cholecystokinin are digestive hormones. They are secreted in :

- (A) oesophagus
- (B) ileum
- (C) duodenum
- (D) pyloric stomach

Answer key and explanations

1. Answer: (D) Juxtaglomerular cells of the kidney

The juxtaglomerular cells of the kidney produce erythropoietin, which stimulates RBC formation in the bone marrow. The bone marrow is where RBCs are made, not where the hormone is produced.

2. Answer: (C) (a)-iii, (b)-i, (c)-iv, (d)-ii

Low ADH from the pituitary causes diabetes insipidus, hyperthyroidism causes Graves' disease, low adrenal cortex hormones cause Addison's disease, and insulin deficiency from the pancreas causes diabetes mellitus. Hence diabetes insipidus, Graves' disease, Addison's disease, diabetes mellitus is correct.

3. Answer: (A) Glucocorticoids stimulate gluconeogenesis.

Glucocorticoids such as cortisol stimulate gluconeogenesis, lipolysis and proteolysis, raising blood glucose. Glucagon causes hyperglycaemia, insulin causes hypoglycaemia, and insulin acts mainly on liver cells and adipocytes, not on pancreatic cells.

4. Answer: (B) Binding to DNA and forming a gene-hormone complex.

Steroid hormones are lipid soluble; they enter the cell, bind intracellular receptors and the hormone-receptor complex binds the genome to regulate gene expression. cAMP second messengers are used by protein/peptide hormones acting on membrane receptors.

5. Answer: (D) GLUT IV

GLUT4, found in skeletal muscle and adipose tissue, is moved to the cell membrane in response to insulin, making glucose uptake there insulin-dependent. GLUT1, GLUT2 and GLUT3 transport glucose independently of insulin.

6. Answer: (C) (a)-(v), (b)-(iv), (c)-(i), (d)-(iii)

Insulin deficiency causes diabetes mellitus, thyroxine disorders cause goitre, deficient adrenal corticoids cause Addison's disease and excess growth hormone in adults causes acromegaly. Diabetes insipidus is due to ADH deficiency, not insulin.

7. Answer: (C) Epinephrine

Epinephrine (adrenaline) is a catecholamine made from the amino acid tyrosine. Estradiol and estriol are steroid hormones made from cholesterol, and ecdysone is an insect steroid hormone.

8. Answer: (B) Epiphyseal plates close after adolescence.

Growth in length of long bones happens at the epiphyseal (growth) plates, which ossify and close after adolescence, so excess GH in adults cannot add height. It instead thickens bones of the face, hands and feet (acromegaly), showing the hormone is still active.

9. Answer: (C) Corpus luteum

The corpus luteum forms from the ruptured Graafian follicle after ovulation, secretes progesterone, and degenerates if pregnancy does not follow, so it is temporary. The pineal gland is permanent, and the corpus cardiacum and corpus allatum are insect glands.

10. Answer: (C) Increased production of T-lymphocytes

The thymus secretes thymosins, which promote the differentiation of T-lymphocytes for cell-mediated immunity and also aid antibody production. Lowering blood calcium is the job of thyrocalcitonin, not thymosin.

11. Answer: (D) Pancreas and gall bladder

Cholecystikinin (CCK), released by the duodenum, acts on the pancreas to secrete pancreatic enzymes and on the gall bladder to release bile. Gastric glands are stimulated by gastrin, not CCK.

12. Answer: (C) Cholecystikinin and secretin

Secretin, from the duodenum, makes the exocrine pancreas release water and bicarbonate, and cholecystikinin stimulates secretion of pancreatic enzymes and bile release. Gastrin acts on the stomach, while insulin and glucagon are endocrine pancreatic hormones that regulate blood glucose.

13. Answer: (B) hypersecretion of thyroid gland

Graves' disease (exophthalmic goitre) is a form of hyperthyroidism caused by excess thyroid hormone, with bulging eyes, high metabolic rate and weight loss. Too little thyroid hormone causes cretinism or myxoedema, and adrenal disorders cause Addison's disease or Cushing's syndrome.

14. Answer: (A) Insulin

Insulin, a peptide hormone from pancreatic beta cells, acts mainly on liver cells and fat cells to increase glucose uptake and use, lowering blood sugar. Glucagon raises blood glucose, and secretin and gastrin are gastrointestinal hormones.

15. Answer: (B) it only stores and releases hormones

Oxytocin and vasopressin are made by neurosecretory cells of the hypothalamus and only stored in and released from the posterior pituitary (neurohypophysis), so it makes no hormones of its own. It is ductless and secretes no enzymes, and being regulated by the hypothalamus applies to the anterior pituitary too.

16. Answer: (D) Relaxin - Inhibin

Parathormone raises and calcitonin lowers blood calcium; insulin lowers and glucagon raises blood glucose; aldosterone retains Na^+ and water while ANF promotes their loss. Relaxin (softens pelvic ligaments at parturition) and inhibin (suppresses FSH) act on unrelated targets, so they are not antagonistic.

17. Answer: (A) Melatonin and Serotonin

Tryptophan is converted to serotonin (5-hydroxytryptamine), which in the pineal gland is converted to melatonin. Thyroid hormones come from tyrosine, while estrogen, progesterone, cortisol and cortisone are steroids derived from cholesterol.

18. Answer: (D) Epinephrine

Epinephrine (adrenaline) is released into the blood by the adrenal medulla as a hormone and is also a neurotransmitter of sympathetic nerves. Cortisol, melatonin and calcitonin act only as hormones.

19. Answer: (A) Melatonin - pineal gland, regulates the normal rhythm of sleep-wake cycle

Melatonin is secreted by the pineal gland and regulates the diurnal (24-hour) sleep-wake rhythm, so this match is correct. Atrial natriuretic factor comes from the atrial wall and lowers blood pressure, growth of female secondary sex organs is due to estrogen, and oxytocin causes milk ejection rather than growth of mammary glands.

20. Answer: (B) the adrenal medulla, leading to increased secretion of epinephrine and norepinephrine

In emergencies the sympathetic system stimulates the adrenal medulla to secrete epinephrine and norepinephrine (the fight-or-flight hormones), raising heart rate, blood glucose and alertness. Blood sugar rises rather than falls, and the kidney and parathyroid are not the effectors of this response.

21. Answer: (A) Deficiency of iodine in diet

Iodine deficiency during pregnancy causes hypothyroidism in the developing baby, leading to cretinism with stunted growth, mental retardation, low IQ and abnormal skin. Low growth hormone causes dwarfism without mental retardation.

22. Answer: (C) Non-nutrient chemicals produced by the body in trace amount that act as intercellular messenger are known as hormones

Hormones are defined as non-nutrient chemicals produced in trace amounts that act as intercellular messengers. The adenohypophysis is controlled by hypothalamic hormones via the portal system, not directly by nerves, and releasing hormones come from the hypothalamus, not the pituitary.

23. Answer: (C) Thyroid gland - Thyroxine - Lack of iodine in diet results in goitre

The thyroid secretes thyroxine, and lack of iodine in the diet causes goitre. Oxytocin is released by the posterior pituitary and GH by the anterior pituitary, and testosterone comes from Leydig cells, not the corpus luteum.

24. Answer: (A) Cortisol, testosterone

Cortisol and testosterone are lipid-soluble steroid hormones that pass through the cell membrane and bind to intracellular (mostly nuclear) receptors. Insulin, glucagon, somatostatin and oxytocin are peptide hormones that bind to membrane receptors; thyroxine enters the cell but insulin does not.

25. Answer: (B) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal medulla

In a fright response the sympathetic nervous system stimulates the adrenal medulla to release epinephrine and norepinephrine (fight-or-flight). These hormones come from the medulla, not the adrenal cortex, and the parasympathetic division is not activated in an emergency.

26. Answer: (D) In females, FSH first binds with specific receptors on ovarian cell membrane

FSH is a glycoprotein hormone, so in females it first binds to specific receptors on the membrane of ovarian cells. FSH stimulates follicle growth and oestrogen secretion but not progesterone, glucagon comes from α -cells (not β -cells), and thymosin secretion falls with age.

27. Answer: (B) Melatonin

Melatonin, secreted by the pineal gland, regulates the 24-hour (diurnal) rhythm including the sleep-wake cycle. Adrenaline is the emergency hormone, calcitonin lowers blood calcium and prolactin stimulates milk production.

28. Answer: (C) Posterior pituitary - Vasopressin - Stimulates resorption of water in the distal tubules in the nephron

Vasopressin (ADH) is released from the posterior pituitary and acts on the distal tubule and collecting duct to increase water reabsorption. Calcium is regulated by thyrocalcitonin and parathyroid hormone, oxytocin is released from the posterior pituitary, and the corpus luteum supports pregnancy mainly through progesterone.

29. Answer: (B) A: Ovary, B: Glucagon, C: Growth hormone

Oestrogen that maintains female secondary sexual characters comes from the ovary, the α -cells of the islets of Langerhans secrete glucagon which raises blood sugar, and over-secretion of growth hormone from the anterior pituitary causes gigantism. Insulin lowers blood sugar, and calcitonin is from the thyroid.

30. Answer: (B) Norepinephrine - Adrenal medulla - Increases heart beat, rate of respiration and alertness

Norepinephrine (with epinephrine) from the adrenal medulla is an emergency hormone that raises heart rate, breathing rate and alertness. Vasopressin (ADH) reduces water loss in urine, glucagon comes from alpha cells (beta cells make insulin), and prolactin is secreted by the anterior pituitary.

31. Answer: (B) Glucagon - Beta cells (source)

Glucagon is secreted by the alpha (α) cells of the islets of Langerhans, while beta (β) cells secrete insulin, so this pair is wrong. Delta cells secrete somatostatin, the corpus luteum secretes relaxin, and insulin deficiency causes diabetes mellitus.

32. Answer: (D) Adrenaline

Adrenaline (epinephrine) is made by the adrenal medulla, so damage to the cortex leaves it unaffected. The cortex makes glucocorticoids (cortisol), mineralocorticoids (aldosterone) and adrenal androgens such as DHEA and androstenedione.

33. Answer: (D) Simple goitre

Substances in food that block thyroid hormone synthesis (goitrogens) lower thyroxine levels. The pituitary responds by releasing more TSH, so the gland enlarges into a simple (non-toxic) goitre. Thyrotoxicosis and toxic goitre are conditions of excess thyroxine.

34. Answer: (B) myxoedema

Myxoedema is the specific adult form of thyroxine deficiency, with low BMR, weight gain and puffy water-retaining tissues. Cretinism is thyroxine deficiency in children, and simple goitre is thyroid enlargement due to iodine shortage.

35. Answer: (B) Parathormone

Parathormone raises blood Ca^{2+} by mobilising it from bone and increasing reabsorption, so its deficiency causes hypocalcaemia. Calcitonin lowers blood calcium, so a lack of it would tend to raise the level.

36. Answer: (A) Causes strong uterine contractions during parturition

Oxytocin causes strong contractions of the uterine smooth muscle during birth and triggers milk ejection. It is made in the hypothalamus and released from the posterior pituitary, not the anterior.

Mammary gland growth is driven by other hormones such as prolactin, oestrogen and progesterone.

37. Answer: (B) Parathyroid and Adrenal

Parathyroid and adrenal glands are purely endocrine. The pancreas also has an exocrine part, and the ovary and testis also produce gametes, so each of the other pairs includes an organ with non-endocrine functions.

38. Answer: (D) parathyroid

Parathyroid hormone controls blood calcium and phosphate by acting on bone, kidney and intestine, so faulty calcium-phosphorus metabolism points to the parathyroid. Thyroid calcitonin also lowers calcium but is a minor regulator; parotid is a salivary gland.

39. Answer: (B) lower levels of blood testosterone

A bullock is a castrated bull; without testes it makes little testosterone, the hormone that drives aggressive male behaviour, so it is docile. Its adrenal and thyroid hormones are not the cause.

40. Answer: (A) adrenaline

Fear triggers the sympathetic nervous system to release adrenaline from the adrenal medulla, the 'fight or flight' hormone that raises heart rate, breathing and blood glucose for quick action. Glucagon, gastrin and thyroxine do not mediate emergency responses.

41. Answer: (B) Endocrine glands regulate neural activity and nervous system regulates endocrine glands

The neural and endocrine systems control each other: the hypothalamus (nervous tissue) controls the pituitary, while hormones such as thyroxine and adrenaline change the activity of the nervous system. So the statement that neurons regulate endocrine glands but not the other way round is wrong.

42. Answer: (A) cortisol

Cortisol is the main glucocorticoid; it raises blood sugar by stimulating gluconeogenesis and other effects on carbohydrate metabolism. 11-deoxycorticosterone acts mainly as a mineralocorticoid on salt balance.

43. Answer: (C) Sodium

cAMP, cGMP and Ca^{2+} act as second messengers that relay hormone signals inside the cell. Sodium ions are not used as second messengers.

44. Answer: (A) Posterior pituitary lobe

Oxytocin and vasopressin are made by hypothalamic neurons, travel down their axons, and are stored in and released from the posterior pituitary. The hypothalamus produces these neurohormones but the place where they collect and are released is the neurohypophysis.

45. Answer: (C) Adrenalin

Adrenaline (the fight-or-flight hormone) raises oxygen use, breaks down glycogen and widens blood vessels in muscles and heart. Glucagon also causes glycogenolysis but does not produce these vascular and metabolic stress effects.

46. Answer: (C) duodenum

When acidic chyme and fat enter the duodenum, its mucosa releases secretin and CCK, which act on the pancreas, liver and gall bladder. The pyloric stomach releases gastrin, not these hormones.

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