

Campbell's Biology: Concepts and Connections, 7e (Reece et al.)
Chapter 26 Hormones and the Endocrine System

26.1 Multiple-Choice Questions

- 1) Hormones are chemicals produced by the endocrine system that
- A) control the formation of urine.
 - B) regulate a variety of body functions, such as metabolism.
 - C) are stimulated by the action of metabolic enzymes.
 - D) function to prevent a variety of diseases, such as diabetes.

Answer: B

Topic: 26.1

Skill: Knowledge/Comprehension

- 2) How are hormones distributed to tissues, and what determines which cells hormones will affect?
- A) They are carried throughout the body in the bloodstream, and each hormone affects target cells that have receptors for it.
 - B) They are carried to specific organs by lymphatic vessels and affect the cells in those organs.
 - C) They are delivered by neurosecretory cells to specific tissues and cells, which are affected.
 - D) They are distributed locally in the interstitial fluid and affect nearby responsive target cells.

Answer: A

Topic: 26.1

Skill: Knowledge/Comprehension

- 3) Compared to the endocrine system, the nervous system
- A) has a faster response, but the signal does not last as long.
 - B) has a slower response and a signal that does not last as long.
 - C) has a faster response with a longer-lasting signal.
 - D) has a slower response with a longer-lasting signal.

Answer: A

Topic: 26.1

Skill: Knowledge/Comprehension

- 4) Chemical signals secreted into the interstitial fluid that only affect target cells near the secretory cell are called
- A) hormones.
 - B) local regulators.
 - C) pheromones.
 - D) second messengers.

Answer: B

Topic: 26.1

Skill: Knowledge/Comprehension

- 5) Neurosecretory cells
A) are local regulators.
B) are restricted to the endocrine system.
C) participate in the nervous and endocrine systems.
D) produce hormones that will regulate nontarget cells.

Answer: C

Topic: 26.1

Skill: Knowledge/Comprehension

- 6) The two main classes of molecules that function as hormones are steroid hormones and hormones that are derived from
A) amino acids.
B) cholesterol.
C) nucleic acids.
D) long-chain fatty acids.

Answer: A

Topic: 26.2

Skill: Knowledge/Comprehension

- 7) Which of the following options lists the sequence of events in the cell-signaling process in the correct order?
A) reception, response, signal transduction
B) signal transduction, reception, response
C) signal transduction, response, reception
D) reception, signal transduction, response

Answer: D

Topic: 26.2

Skill: Knowledge/Comprehension

- 8) Why must some hormones bind to a membrane receptor on a target cell's surface in order to activate it?
A) for activation by ATP
B) because they are not water-soluble
C) because they cannot cross cell membranes
D) to stimulate endocytosis to internalize the hormone

Answer: C

Topic: 26.2

Skill: Knowledge/Comprehension

- 9) The result of binding a signal molecule to its receptor is
A) production of a protein by the target cell, followed by death.
B) cell division.
C) signal transduction.
D) partitioning of the nucleus within the target cell.

Answer: C

Topic: 26.2

Skill: Knowledge/Comprehension

- 10) A target cell that is affected by a particular steroid hormone would be expected to have
- A) an intracellular receptor protein that binds the hormone.
 - B) a cell-surface receptor protein that binds the hormone.
 - C) enzymes that are activated or inactivated by the intracellular hormone-receptor complex.
 - D) enzymes that are activated or inactivated by the hormone's second messenger.

Answer: A

Topic: 26.2

Skill: Knowledge/Comprehension

- 11) Steroid hormones are lipids made from
- A) amino acids.
 - B) cholesterol.
 - C) nucleic acids.
 - D) carbohydrates and amino acids.

Answer: B

Topic: 26.2

Skill: Knowledge/Comprehension

- 12) Which of the following statements about steroid hormones is *true*?
- A) Steroid hormones cause the production of cAMP.
 - B) Steroid hormones are polar molecules that cannot pass through the cell membrane.
 - C) Steroid hormones activate a transcription factor.
 - D) Steroid hormones bind to specific receptor proteins and the complex acts as a gene activator.

Answer: D

Topic: 26.2

Skill: Knowledge/Comprehension

- 13) A single steroid hormone can cause different effects in different cells by
- A) binding to different receptors.
 - B) acting on different organelles.
 - C) activating different second messengers.
 - D) activating different enzymes.

Answer: A

Topic: 26.2

Skill: Knowledge/Comprehension

- 14) Which of the following statements regarding endocrine glands is *true*?
- A) Some endocrine glands, like the pituitary, have other endocrine glands as their targets.
 - B) The sex organs and the thyroid gland produce steroid hormones.
 - C) The pancreas has only nonendocrine functions.
 - D) Most of the endocrine glands produce steroid hormones.

Answer: A

Topic: 26.3

Skill: Knowledge/Comprehension

15) Which of the following endocrine glands synthesizes melatonin?

- A) pineal
- B) adrenal cortex
- C) thyroid
- D) parathyroid

Answer: A

Topic: 26.3

Skill: Knowledge/Comprehension

16) Which of the following hormones stimulates and maintains metabolic processes?

- A) calcitonin
- B) thyroxine
- C) oxytocin
- D) melatonin

Answer: B

Topic: 26.3

Skill: Knowledge/Comprehension

17) Which of the following options correctly pairs an endocrine gland or hormone with an aspect of metabolism that it regulates?

- A) parathyroid = stimulates the adrenal cortex to secrete glucocorticoids
- B) pancreas = stimulates growth of the uterine lining
- C) insulin = regulates blood glucose levels
- D) prolactin = manages blood potassium levels

Answer: C

Topic: 26.3

Skill: Knowledge/Comprehension

18) Which of the following is an endocrine gland that raises blood calcium levels?

- A) parathyroid
- B) thyroid gland
- C) pituitary gland
- D) testes

Answer: A

Topic: 26.3

Skill: Knowledge/Comprehension

19) Which of the following statements about glands and hormones is *true*?

- A) The anterior pituitary is composed of endocrine cells.
- B) The posterior pituitary is composed of lymphatic tissue.
- C) The pituitary is the master control center of the endocrine system.
- D) The hypothalamus is an endocrine gland responsible for producing the hormone calcitonin.

Answer: A

Topic: 26.4

Skill: Knowledge/Comprehension

20) Which of the following hormones is released by neurosecretory cells extending from the hypothalamus?

- A) estrogen
- B) growth hormone
- C) oxytocin
- D) calcitonin

Answer: C

Topic: 26.4

Skill: Knowledge/Comprehension

21) Which of the following hormones affects the greatest variety of cell types?

- A) endorphin
- B) melatonin
- C) growth hormone
- D) calcitonin

Answer: C

Topic: 26.4

Skill: Knowledge/Comprehension

22) TRH is a type of _____ hormone secreted by the _____.

- A) steroid . . . thyroid gland
- B) releasing . . . hypothalamus
- C) peptide . . . thymus
- D) releasing . . . anterior pituitary

Answer: B

Topic: 26.4

Skill: Knowledge/Comprehension

23) Which gland requires the element iodine to produce its hormones?

- A) adrenal medulla
- B) thyroid
- C) pineal
- D) ovary

Answer: B

Topic: 26.5

Skill: Knowledge/Comprehension

24) An excess of T₃ and T₄ in the blood is hyperthyroidism, which in its most common form is called

- A) goiter.
- B) sterility.
- C) Graves' disease.
- D) botulism.

Answer: C

Topic: 26.5

Skill: Knowledge/Comprehension

25) Which of the following processes depends on the presence of appropriate calcium levels in the blood and interstitial fluid?

- A) transmission of nerve signals from cell to cell
- B) synthesis of interferons
- C) capillary dilation
- D) movement of hormones throughout the body

Answer: A

Topic: 26.6

Skill: Knowledge/Comprehension

26) Which of the following may be a consequence of excessive secretion of parathyroid hormone?

- A) convulsive contractions of skeletal muscles
- B) gigantism
- C) exhaustion of the immune system
- D) loss of calcium from the bone

Answer: D

Topic: 26.6

Skill: Knowledge/Comprehension

27) Which of the following pairs of hormones have opposite effects?

- A) testosterone and melatonin
- B) progesterone and insulin
- C) parathyroid hormone and calcitonin
- D) oxytocin and prolactin

Answer: C

Topic: 26.6

Skill: Knowledge/Comprehension

28) Which gland exerts primary control over the concentration of sugar in the blood?

- A) liver
- B) pineal
- C) pancreas
- D) parathyroid

Answer: C

Topic: 26.7

Skill: Knowledge/Comprehension

29) Which of the following is a nonsteroid hormone?

- A) glucagon
- B) a glucocorticoid
- C) estrogen
- D) androgen

Answer: A

Topic: 26.7

Skill: Knowledge/Comprehension

30) Which of the following statements best describes the relationship of insulin to glucagon?

- A) They work together to prepare the body to deal with stress.
- B) Insulin stimulates the pancreas to secrete glucagon.
- C) They are antagonistic hormones.
- D) Insulin is a steroid hormone; glucagon is a protein hormone.

Answer: C

Topic: 26.7

Skill: Knowledge/Comprehension

31) When the concentration of glucose in the blood rises following digestion of a meal, what is the hormonal response?

- A) Levels of both glucagon and insulin increase.
- B) More glucagon is released.
- C) More insulin is released.
- D) Neither glucagon nor insulin is released.

Answer: C

Topic: 26.7

Skill: Knowledge/Comprehension

32) Which of the following hormones causes glucose release and, consequently, a rise in the concentration of sugar in the blood?

- A) insulin
- B) glucagon
- C) calcitonin
- D) oxytocin

Answer: B

Topic: 26.7

Skill: Knowledge/Comprehension

33) What is the metabolic abnormality that underlies the characteristic symptoms of diabetes mellitus?

- A) a failure of the kidney tubules to reabsorb enough glucose from the urine
- B) an inability of the body's cells to switch from glucose metabolism to fat metabolism between meals
- C) an inability of the body's cells to retain glucose they have absorbed from the blood
- D) an inability of the body's cells to absorb enough glucose from the blood

Answer: D

Topic: 26.8

Skill: Knowledge/Comprehension

34) Which of the following is associated with obesity, often does not show up until after the age of 40, and occurs because cells of the body fail to respond adequately to insulin?

- A) type 1 diabetes
- B) type 2 diabetes
- C) hyperglycemia
- D) hypoglycemia

Answer: B

Topic: 26.8

Skill: Knowledge/Comprehension

35) Which of the following glands is located nearest the kidneys?

- A) ovaries
- B) pancreas
- C) pineal glands
- D) adrenal glands

Answer: D

Topic: 26.9

Skill: Knowledge/Comprehension

36) Which of the following glands secretes hormones that enable the body to respond to stress?

- A) pancreas
- B) adrenal
- C) pineal
- D) parathyroid

Answer: B

Topic: 26.9

Skill: Knowledge/Comprehension

37) Which of the following is a function of epinephrine?

- A) release of glucose from the liver
- B) decreased heart rate
- C) decreased metabolic rate
- D) increase in digestive activities

Answer: A

Topic: 26.9

Skill: Knowledge/Comprehension

38) Which of the following act mainly to regulate salt and water balance?

- A) mineralocorticoids
- B) glucocorticoids
- C) androgens
- D) oxytocin

Answer: A

Topic: 26.9

Skill: Knowledge/Comprehension

39) High levels of which of the following hormones can suppress the body's immune system?

- A) glucagon
- B) mineralocorticoids
- C) glucocorticoids
- D) antidiuretic hormone

Answer: C

Topic: 26.9

Skill: Knowledge/Comprehension

40) Which of the following is one of the three major categories of sex hormones?

- A) glucocorticoids
- B) estrogens
- C) glucagons
- D) prolactins

Answer: B

Topic: 26.10

Skill: Knowledge/Comprehension

41) Androgens stimulate

- A) the female reproductive system.
- B) growth of breasts in mammals.
- C) growth of facial hair in humans.
- D) ovulation.

Answer: C

Topic: 26.10

Skill: Knowledge/Comprehension

42) The hormone prolactin, found in distantly related vertebrates, exerts different effects in different species. From an evolutionary standpoint, this is an indication that prolactin

- A) can only have functions related to childbirth.
- B) is an ancient hormone whose function diversified through evolution.
- C) was a recent evolutionary adaptation.
- D) was not required in fish and amphibians.

Answer: B

Topic: 26.11

Skill: Knowledge/Comprehension

43) Prolactin is a hormone whose molecular structure has remained stable over evolutionary time, but whose hormonal role has changed dramatically in different animal species. This is an excellent example of how evolution

- A) is responsible for mutation in vertebrates.
- B) occurs rapidly at the molecular level to keep up with changing environmental influences.
- C) has stayed within narrow boundaries in regard to regulation of homeostasis.
- D) can both preserve unity and promote diversity.

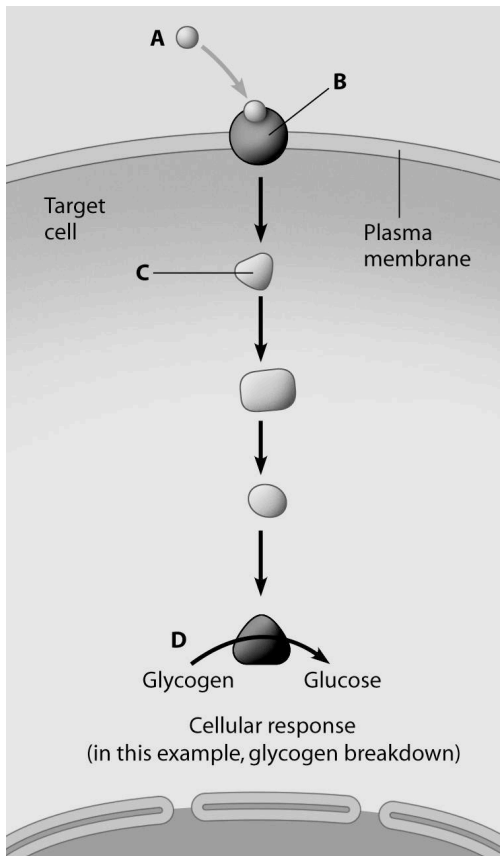
Answer: D

Topic: 26.11

Skill: Knowledge/Comprehension

26.2 Art Questions

1) Which molecule in this figure portraying water-soluble hormone action is the receptor protein?



A) molecule A

B) molecule B

C) molecule C

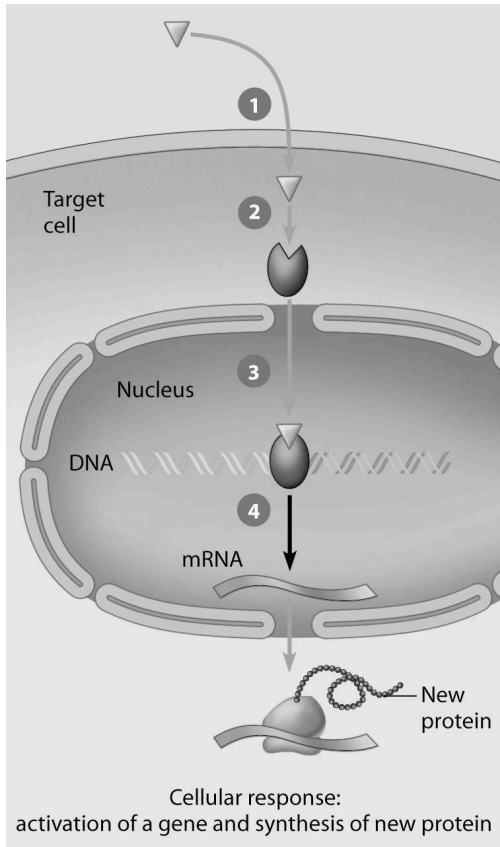
D) molecule D

Answer: B

Topic: 26.2

Skill: Knowledge/Comprehension

2) Which step in this figure portraying lipid-soluble hormone action shows transcription in response to the bound hormone-receptor complex?



A) step 1

B) step 2

C) step 3

D) step 4

Answer: D

Topic: 26.2

Skill: Application/Analysis

26.3 Scenario Questions

After reading the paragraph, answer the question(s) that follow.

Recent studies have shown that the onset of puberty in American girls has decreased from an average of 12-13 years of age to as young as 8-10. Many scientists that study premature puberty suggest that steroids in our food and in the environment may be contributing factors, since steroids are known to cross cell membranes and bind to receptors inside cells.

Why are hormones present in our foods? Synthetic testosterone compounds (similar to those used by some athletes) make young animals gain weight faster so they are ready for market sooner. Female animals receive synthetic estrogen to inhibit the reproductive cycle and divert all energy into weight gain. In the United States, up to two-thirds of meat animals are raised using hormones. In addition, hormones are used to increase milk production in dairy cattle.

Scientific investigation of the exact effects of environmental steroids on humans is extremely difficult since there are multiple sources of hormones in the environment. A valid study would require a control group who hasn't been exposed to the chemicals being studied. Since everyone has had some exposure to environmental hormones, no control group is available to use as a reference.

- 1) When environmental estrogens trigger premature puberty, the main organs affected are the
- A) ovaries and uterus.
 - B) thyroid gland and pituitary gland.
 - C) adrenal cortex.
 - D) pituitary gland and parathyroid glands.

Answer: A

Topic: 26.3, 26.4

Skill: Knowledge/Comprehension

- 2) How are steroids able to cross cell membranes and enter cells?
- A) Steroids and cell membranes both contain receptor proteins.
 - B) Steroids are nonpolar lipids, and the cell membrane is lipid based.
 - C) Steroids can diffuse through open channel proteins in the membrane.
 - D) Steroids move through cell membranes, such as water, by osmosis.

Answer: B

Topic: 26.2

Skill: Knowledge/Comprehension