1999 Endocrine Exam Questions

TTUHSC Physiology
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Directions: Each of the questions below consists of five statements. Select the *one* that is *FALSE* in each case.

41. A. The basal metabolic rate is the rate of energy expenditure required to maintain body tissues under defined resting conditions.
    B. The principle storage form for energy in the body is carbohydrate.
    C. The respiratory quotient (RQ) when oxidizing carbohydrates gives a value of one.
    D. The *postprandial state* is the period after meals during which nutrients are absorbed from the gut and transferred to storage depots.
    E. The *fasting state* is the metabolic status after an overnight (10-14 hour) fast.

42. A. After a normal meal, glucose is stored largely in muscle and liver as glycogen or used to synthesize and store fatty acids.
    B. Glucose entry into cells is facilitated by transporters in the cell membrane.
    C. In the fasting state, the brain accounts for about half of glucose uptake by tissues.
    D. In the initial hours of a fast, glycogen breakdown provides most of the glucose released by the liver; the rest is produced by gluconeogenesis.
    E. Most of the energy derived from glucose oxidation comes from the metabolism of glucose to pyruvate.

43. A. After a normal meal, fatty acids are stored primarily as triglycerides in adipose tissue.
    B. After a normal meal, absorbed fatty acids are re-esterified to triglycerides in the intestinal mucosa and packaged into lipoprotein particles called chylomicrons for transport through the lymph and blood to adipose tissue.
    C. Fatty acids synthesized by the liver are packaged into lipoprotein particles called very-low density lipoproteins (VLDL) and transported through the bloodstream to adipose tissue.
    D. In the fasting state, adipocytes release ketone bodies for use as a source of energy in many tissues.
    E. In the fasting state, fatty acid β-oxidation is a major source of energy for many tissues.

Directions: Each of the questions below consists of five statements. Select the *one* that is *FALSE* in each case.

44. A. A low ratio of insulin to glucagon promotes storage of energy, and a high ratio promotes mobilization of glucose, fatty acids, and ketone bodies.
    B. Cortisol stimulates gluconeogenesis.
    C. Counter-regulatory hormones are secreted in response to hypoglycemia or stress and act to increase the concentration of circulating glucose, fatty acids, and ketone bodies in plasma.
    D. Epinephrine stimulates glycogen breakdown by activating glycogen phosphorylase.
    E. The influence of one metabolic pathway on others is exemplified by the Randle cycle, in which β-oxidation of fatty acids in the liver results in decreased glucose oxidation and increased gluconeogenesis.

45. A. Binding of insulin by the insulin receptor results in activation of adenylate cyclase.
    B. Equimolar amounts of insulin and C-peptide (connecting peptide) are secreted into the portal circulation.
    C. In amounts that produce the same circulating concentrations, glucose given by mouth stimulates more insulin secretion than glucose given intravenously.
    D. Insulin secretion in response to a stimulus is biphasic, consisting of a rapid release from secretory granules and a sustained release from new synthesis.
    E. The plasma glucose concentration is the major factor controlling the rate of insulin secretion.

Directions: Each of the questions below consists of five statements. Select the *one* that is *FALSE* in each case.

46. Glucagon

A. is secreted as a large precursor, proglucagon.
B. mobilizes substrates from energy stores.
C. produces its physiological effects by activation of adenylate cyclase.
D. secretion is stimulated by a decrease in plasma glucose concentrations.
E. secretion is stimulated by a protein-rich meal.

47. Glucagon stimulates hepatic

A. fatty acid synthesis.
B. gluconeogenesis.
C. glycogen breakdown.
D. ketone body production.
E. release of glucose.

48. Insulin promotes

A. fatty acid synthesis in liver.
B. glycogen deposition in liver and muscle.
C. inhibition of gluconeogenesis.
D. muscle protein breakdown.
E. triglyceride deposition in adipocytes.

49. Type 2 (non-insulin-dependent) diabetes mellitus is characterized by

A. a high prevalence of obesity.
B. an onset usually after age 40.
C. autoimmune destruction of pancreatic β-cells.
D. decreased sensitivity to insulin.
E. an impaired glucose tolerance test.

Directions: Each of the questions below consists of five statements. Select the *one* that is *FALSE* in each case.

50. The hyperglycemia of diabetes mellitus is the result of

A. decreased excretion of glucose in the urine.
B. decreased postprandial uptake of glucose by muscle.
C. exaggerated release of glucose from the liver during the fasting state.
D. increased hepatic gluconeogenesis.
E. increased hepatic glycogen breakdown.

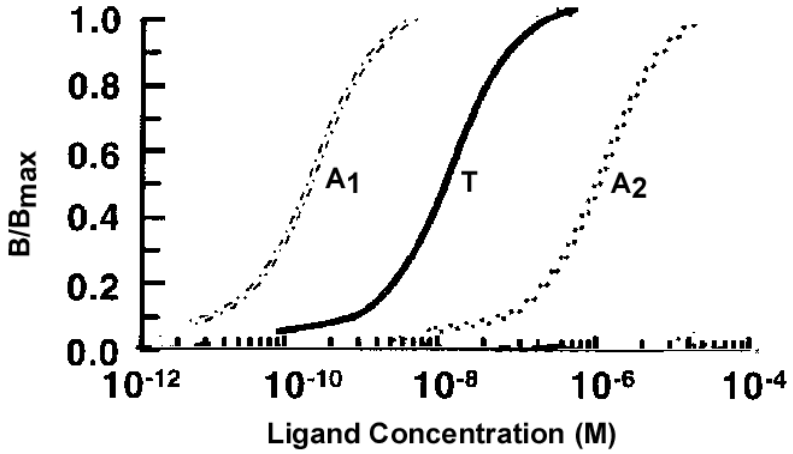
51. During starvation

A. glucagon and the other counter-regulatory hormones play a lesser role in controlling intermediary metabolism than they do when on a normal diet.
B. oxidation of ketone bodies is important in supplying the energy needs of some tissues.
C. plasma glucose and insulin concentrations are lower than in the normal postprandial state.
D. protein is relatively spared until fat stores are exhausted.
E. the primary source of energy is triglycerides from adipocytes.

52. Sudden exposure to a cold environment would result in

A. a closed posture that minimizes surface area.
B. closure of cutaneous arteriovenous shunts.
C. increased cholinergic stimulation of cutaneous blood vessels.
D. piloerection.
E. shivering.

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Select the *one* that is *best* in each case.



53. This graph depicts the results from a hypothetical equilibrium binding experiment using radiolabeled testosterone (T) and two labeled agonists (A_1 and A_2). Which of the following statements *is true*?

A. A_1 binds with greater cooperativity then A_2.
B. A_2 binds to the receptor with a $K_D=10^{-8}$ M.
C. A $K_{1/2}=10^{-10}$ M should be observed in a testosterone dose-response relationship.
D. Testosterone binds the receptor with a $K_D=10^{-8}$ M.
E. The receptor has a greater affinity for A_2 than for A_1.

54. A kilocalorie is

A. 10,000 calories.
B. the amount of energy available from 1 kilogram of carbohydrate.
C. the amount of energy required by one giant armadillo to outrun one jackalope at 20° C.
D. the amount of energy required to raise the temperature of 1 kilogram of water 1° C.
E. none of the above.

55. In an environment warmer than body temperature, the only means of dissipating body heat is by

A. shifting blood flow to the deep veins.
B. shivering.
C. swearing.
D. sweating.
E. sympathetic nervous system activation.

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Select the *one* that is *best* in each case.

56. Medical Proficiency Hormone (MPH), a newly discovered factor secreted by the anterior pituitary, is a highly-charged glycoprotein consisting of two subunits connected by disulfide bonds. It is likely that MPH

A. binds to nuclear receptors.
B. exerts its biological effects by direct covalent modification of its target proteins.
C. has a time course for its effects measured in days.
D. initiates a second messenger cascade upon binding to its membrane receptor.
E. is tightly bound to globulins while in the bloodstream.

57. Delivery of a signaling molecule (i.e., mediator, hormone, or neurotransmitter) to the target cell involves passive diffusion in

A. autocrine communication.
B. endocrine communication.
C. paracrine communication.
D. neurocrine communication.
E. all of the above.

58. A hypothyroid patient has a low plasma level of thyroid stimulating hormone (TSH) that can be increased by injections of thyrotropin releasing hormone (TRH). The most likely source of the hypothyroidism is

A. low dietary iodide intake.
B. the anterior pituitary gland.
C. the hypothalamus.
D. the posterior pituitary gland.
E. the thyroid gland.

59. A hybrid glycoprotein consisting of the α subunit of follicle stimulating hormone (FSH) and the β subunit of thyrotropin is injected into a female rabbit. Which response will occur within the next 15 min?

A. The basal metabolic rate will decrease.
B. The concentration of circulating estradiol will decrease.
C. The concentration of circulating progesterone will increase.
D. The concentration of circulating thyroxine will increase.
E. The rabbit will ovulate.

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Select the *one* that is *best* in each case.

60. Experimental animals given daily injections of a substance for a week show enlarged adrenal glands and elevated hepatic glycogen content. This substance is

A. adrenocorticotropic hormone (ACTH).
B. aldosterone.
C. cortisol.
D. renin.
E. RU486.

61. Increased circulating somatomedin C concentrations are observed

A. during treatment of hypopituitary children with thyroxine.
B. in adults with acromegaly.
C. in children with precocious puberty.
D. in diabetic children.
E. in the pygmy tribes of equatorial Africa.

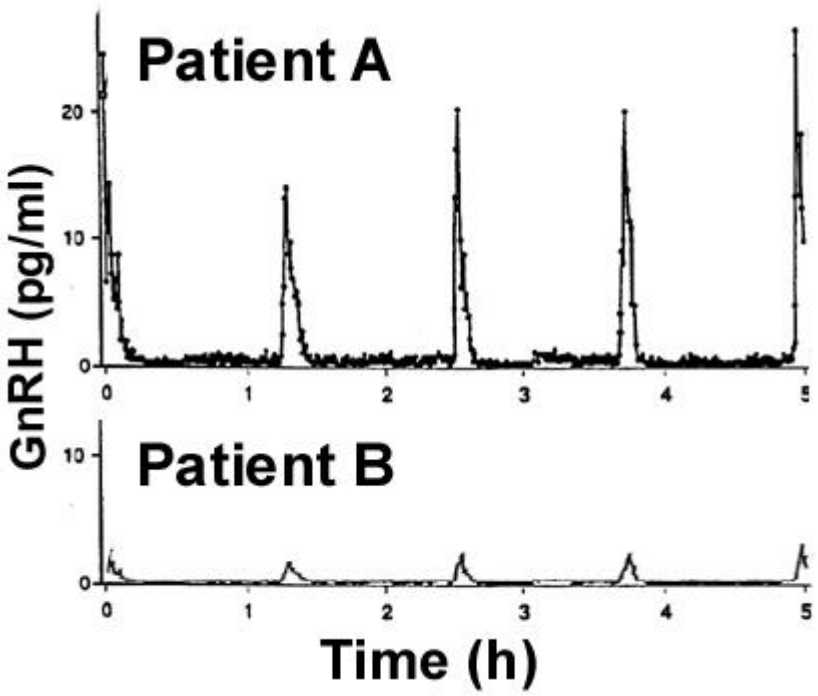
62. Which of the following would increase the intestinal absorption of calcium in a nephrectomized animal?

A. $1,25(OH)_2$-cholecalciferol
B. $24,25(OH)_2$-D_3
C. $25(OH)$-D_3
D. calcitonin
E. parathyroid hormone (PTH)

63. Licorice-induced pseudohyperaldosteronism results from inhibition of

A. 5α-steroid reductase.
B. 11-steroid hydroxylase.
C. 11β-hydroxysteroid dehydrogenase.
D. 17α-steroid hydroxylase.
E. 21-steroid hydroxylase.

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Select the *one* that is *best* in each case.



64. The figure above depicts the hypothetical time course of gonadotropin releasing hormone (GnRH) concentrations in hypothalamic/pituitary portal blood. Patient A is a healthy adult female in the follicular phase of the menstrual cycle. Patient B is a(n)

A. normal adult female in the luteal phase.
B. normal adult male.
C. ovariectomized female.
D. post-menopausal female.
E. prepubescent female.

65. Menopause is characterized by the

A. absence of follicles in the ovaries.
B. failure of follicles in the ovaries to develop in response to gonadotropin stimulation.
C. failure of the pituitary to respond to gonadotropin releasing hormone (GnRH).
D. inability of the endometrium to respond to estrogens and progesterone.
E. loss of gonadotropin releasing hormone (GnRH) secretion.

Directions: Each group of questions below consists of five lettered word or phrase pairs, followed by a list of numbered word or phrase pairs. Consider carefully the relationships between the members of each pair. For each numbered word or phrase pair, select the *one* lettered pair whose relationship is *most* similar.

A. corticosterone : aldosterone
B. glucagon : cortisol
C. glucagon : insulin
D. testosterone : dihydrotestosterone
E. thyroxine (T_4) : 3,5',3'-triiodothyronine (reverse T_3)

66. cortisol : cortisone

67. epinephrine : glucagon

68. parathyroid hormone (PTH) : calcitonin

69. testosterone : estradiol

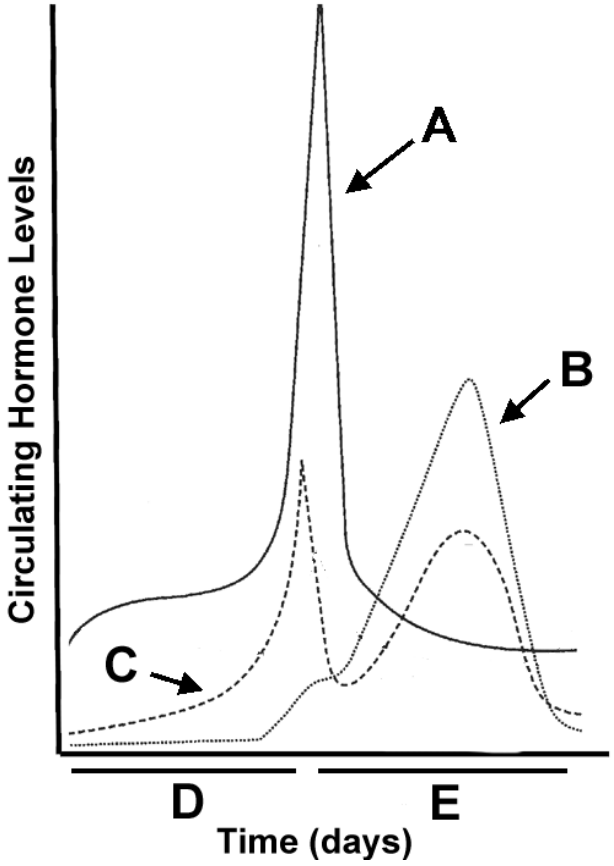
A. angiotensin I : angiotensin II
B. inhibin : testosterone
C. insulin : relaxin
D. luteinizing hormone (LH) : chorionic gonadotropin (hCG)
E. renin : angiotensin

70. proinsulin : insulin

71. prolactin : chorionic somatomammotropin (hCS)

72. oxytocin : vasopressin (ADH)

Directions: Each group of questions below consists of five lettered headings or a diagram with five lettered components, followed by a list of numbered words, phrases, or statements. For each numbered word, phrase, or statement, select the one lettered component that is most closely associated with it.



The figure above depicts an idealized human menstrual cycle.

73. Progesterone

74. Secretory phase

75. Secreted by gonadotrophs in the anterior pituitary

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A. chorionic gonadotropin
B. estradiol
C. oxytocin
D. progesterone
E. prolactin

76. Secreted by both the developing ovarian follicle and the corpus luteum

77. Milk let-down reflex

78. First endocrine recognition of pregnancy

79. Stimulation of milk synthesis and secretion

A. $1,25(OH)_2$ cholecalciferol
B. adrenocorticotropic hormone (ACTH)
C. pro-opiomelanocortin (POMC)
D. growth hormone
E. somatostatin

80. Undergoes proteolysis to yield β-endorphin

81. Similar in structure to prolactin

82. Precursor can be derived from dietary sources

Directions: Each group of questions below consists of five lettered headings or a diagram with five lettered components, followed by a list of numbered words, phrases, or statements. For each numbered word, phrase, or statement, select the one lettered component that is most closely associated with it.

A. acromegaly
B. congenital adrenal hyperplasia
C. gigantism
D. hypothyroidism
E. pheochromocytoma

83. Adrenomedullary hypersecretion

84. Excess growth hormone secretion in a child

85. 11-hydroxylase deficiency

A. Addison's disease
B. Cushing's disease
C. Graves' disease
D. iodide deficiency
E. precocious puberty

86. Hypothyroidism

87. Autoimmune disorder leading to an increased basal metabolic rate (BMR), increased appetite, weight loss, and an intolerance to heat.

88. Adrenal insufficiency

89. Progressive weakness, anorexia, weight loss, hypotension, and mucocutaneous hyperpigmentation

Directions: Each set of lettered headings below is followed by a list of numbered words or phrases. For each numbered word or phrase select

A. if the item is associated with (A) only.
B. if the item is associated with (B) only.
C. if the item is associated with both (A) and (B).
D. if the item is associated with neither (A) nor (B).

(A) aldosterone
(B) cortisol

90. Enhanced secretion when stimulated with angiotensin II

91. Decreased secretion associated with 11-hydroxylase deficiency

92. Enhanced NaCl absorption in the sweat ducts upon long-term acclimation to a hot climate

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(A) growth hormone
(B) thyroid hormone

93. Deficiency in the infant can lead to dwarfism.

94. Secretion is stimulated by hypoglycemia.

95. Synthesis involves endocytosis of a high-molecular-weight precursor, followed by proteolytic digestion in the lysosomes.

Directions: Each set of lettered headings below is followed by a list of numbered words or phrases. For each numbered word or phrase select

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D. if the item is associated with neither (A) nor (B).

(A) Graves' disease
(B) iodide deficiency

96. Goiter

97. Thyroid-stimulating immunoglobulins (TSI)

(A) progesterone
(B) testosterone

98. Thermogenic effect

99. Requires aromatase for synthesis

100. Secreted by Sertoli cells

Answers:

41. B
42. E
43. D
44. A
45. A
46. A
47. A
48. D
49. C
50. A
51. A
52. C
53. D
54. D
55. D
56. D
57. E
58. C
59. D
60. A
61. B
62. A
63. C
64. E
65. B
66. E
67. B
68. C
69. A
70. A
71. D
72. C
73. B
74. E
75. A
76. B
77. C
78. A
79. E
80. C
81. D
82. A
83. E
84. C
85. B
86. D
87. C
88. A
89. A
90. A
91. C
92. A
93. C
94. A
95. B
96. C
97. A
98. A
99. D
100. D