2000 Endocrine Exam Questions

TTUHSC Physiology
Thomas A. Pressley, Section Leader

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

41. A. Basal metabolic rate is the rate of energy expenditure required to maintain body tissues while at rest.
    B. Metabolic rate is determined by numerous factors including activity, size, age, and sex.
    C. Most of the energy stored in the body is in the form of triglyceride.
    D. One kilocalorie (kcal) is the amount of energy required to raise the temperature of 1 kilogram of water 1 degree Celsius.
    E. Oxidation of carbohydrate or protein yields about 9 kcal/gm; oxidation of fat yields about 4 kcal/gm.

42. A. In a normally active human, the respiratory quotient (RQ) in the postprandial state is the same as during the fasting state.
    B. Measuring the respiratory quotient (RQ) helps one to estimate the relative amounts of the various food categories (carbohydrate, protein, and fat) being oxidized.
    C. The "fasting state" is usually defined as the metabolic state 10-14 hours after eating.
    D. The "postprandial state" refers to the period after meals during which nutrients are absorbed from the gut and transferred to storage depots.
    E. The respiratory quotient (RQ) is defined as the ratio of carbon dioxide produced to oxygen consumed in the steady state.

43. A. After a normal meal, glucose is stored largely in muscle and liver as glycogen or used to synthesize and store fatty acids.
    B. During a prolonged fast (more than 48 hours), gluconeogenesis provides most of the glucose released by the liver.
    C. During a prolonged fast (more than 48 hours), the continued production of glucose is dependent on cortisol.
    D. In the fasting state, the brain accounts for only about 10% of glucose uptake by tissues.
    E. In the fasting state, fatty acid β-oxidation is a major source of energy for many tissues.

44. A. Binding of insulin by the insulin receptor triggers the phospholipase/IP_3 signal transduction cascade.
    B. Glucose given by mouth stimulates more insulin secretion than glucose given intravenously when both produce an identical plasma glucose concentration.
    C. Insulin secretion in response to a sudden rise in plasma glucose concentration is biphasic, reflecting initial release from secretory granules, followed by synthesis of new hormone.
    D. In addition to its effects on intermediary metabolism, insulin is essential for normal growth and development.
    E. The circulating concentration of glucose 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.

45. A. Adipose tissue secretes a hormone called leptin, which acts on the hypothalamus to inhibit appetite and feeding behavior.
    B. After a normal meal, fatty acids are re-esterified to triglycerides in the intestinal mucosa, packaged into lipoprotein particles called chylomicrons, and transported through lymphatic channels 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 (β-hydroxybutyrate, acetoacetate, and acetone) for use as a source of energy by many tissues.
    E. In the fasting state, β-oxidation of fatty acids is a major source of energy for many tissues.

46. A. Glucagon prevents hypoglycemia by mobilizing glucose from the liver.
    B. Glucagon secretion is regulated primarily by plasma glucose concentration.
    C. Plasma glucagon concentrations tends to be high when the insulin concentration is high and low when the insulin concentration is low.
    D. The injection of glucagon promotes an increase in the circulating glucose concentration.
    E. When glucagon binds to its receptor, the adenylate cyclase signal transduction system is activated.

47. A. A high ratio of insulin to glucagon promotes storage of energy, and a low ratio promotes mobilization of glucose, fatty acids, and ketone bodies.
    B. Cortisol stimulates gluconeogenesis.
    C. Epinephrine inhibits glycogen breakdown by inactivating glycogen phosphorylase.
    D. 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.
    E. The "counterregulatory hormones" (glucagon, epinephrine, cortisol, and growth hormone) are secreted in response to hypoglycemia.

48. During prolonged starvation,

    A. glucagon and the other counterregulatory hormones play a lesser role in controlling intermediary metabolism than they do in people eating normally.
    B. oxidation of ketone bodies is important in supplying the energy needs of some tissues.
    C. insulin concentrations are lower than after an overnight fast.
    D. plasma leptin concentration falls as body fat stores decrease.
    E. the primary source of energy is triglycerides from adipocytes.

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

49. Insulin promotes

A. absorption of glucose by muscle and adipose tissue.
B. hepatic gluconeogenesis.
C. incorporation of amino acids into muscle protein.
D. increased glycogen synthase and decreased glycogen phosphorylase activity in liver and muscle.
E. stimulation of fatty acid synthesis in liver.

50. Glucagon stimulates hepatic

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

51. Exposure to a cold environment

A. depresses the sudomotor response.
B. initiates a decrease in thermoregulatory set point.
C. promotes behavioral changes such as a closed posture.
D. promotes piloerection.
E. results in shunting of the circulation to deep veins and arteries.

52. In menopausal women, there is

A. altered thermoregulatory status.
B. decreased ovarian activity.
C. depletion of primordial follicles.
D. increased gonadotropin secretion.
E. prolonged luteal function.

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.

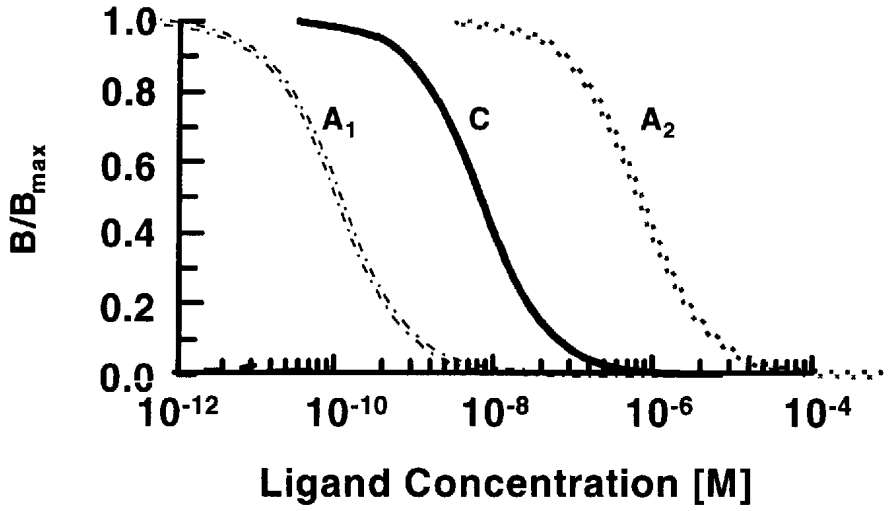
53. Uncontrolled Type I diabetes mellitus is characterized by

A. autoimmune destruction of the pancreatic α cells.
B. decreased insulin sensitivity.
C. hypoglycemia.
D. increased glucose utilization.
E. ketoacidosis.

54. In a fifty-yard dash, the major source of energy is

A. anerobic glycolysis.
B. breakdown of muscle protein.
C. lipid synthesis.
D. liver glycogen.
E. mixed oxidation of carbohydrates and fat.

55. This graph depicts the results from a hypothetical displacement experiment using radiolabeled cortisol. "C" represents the addition of nonlabeled cortisol. "A1" and "A2" refer to the addition of cortisol analogs.



Which of the following statements is true?

A. A_1 binds with greater cooperativity than A_2.
B. A $K_{1/2}=10^{-8}$ M should be observed in a cortisol dose-response relationship.
C. Cortisol binds to the receptor with a $K_D = 10^{-6}$ M.
D. Cortisol binds to the receptor with a $K_D = 10^{-10}$ M.
E. The receptor has a greater affinity for A_2 than for cortisol.

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. Poor Attendance Factor (PAF), a newly discovered mediator secreted by the adrenal medulla, is a hydrophobic derivative of tryptophan. It is likely that PAF

A. binds to nuclear receptors.
B. circulates in the bloodstream solely as the free hormone.
C. exerts its biological effects by direct covalent modification of its target proteins.
D. has a time course for its effects measured in seconds.
E. initiates a second messenger cascade upon binding to its membrane receptor.

57. The classical receptor/signal transduction model postulates a hormone or signaling molecule that binds reversibly to a high-affinity receptor (nuclear or membrane) and then initiates a series of biochemical events that produce a biological response. An example of an illness that results from defective receptors is

A. congenital adrenal hyperplasia.
B. pheochromocytoma.
C. pseudohyperaldosteronism.
D. testicular feminization.
E. Type 1 diabetes mellitus.

58. In the following list of signaling molecules, which does not follow the classical receptor/signal transduction model?

A. β-endorphin
B. gonadotropin releasing hormone (GnRH)
C. nitric oxide
D. somatostatin
E. triiodothyronine (T_3)

59. A hyperthyroid patient has a low plasma level of thyroid stimulating hormone (TSH). The most likely source of the hyperthyroidism is

A. an excessive dietary intake of iodine.
B. an organification defect.
C. defective thyrotropin releasing hormone (TRH) secretion by the hypothalamus.
D. impaired thyroid peroxidase.
E. thyroid autoimmunity.

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. Laboratory studies of a woman complaining of weight gain and fatigue produced the following data:

	Result	Normal Range
Serum T_4	3 µg/dl	5-12 µg/dl
Resin T_3 Uptake	20%	25%-35%
Serum TSH	12 mU/l	0.3-5.0 mU/l
^{131}I uptake	9% at 24 h	10-25% at 24 h

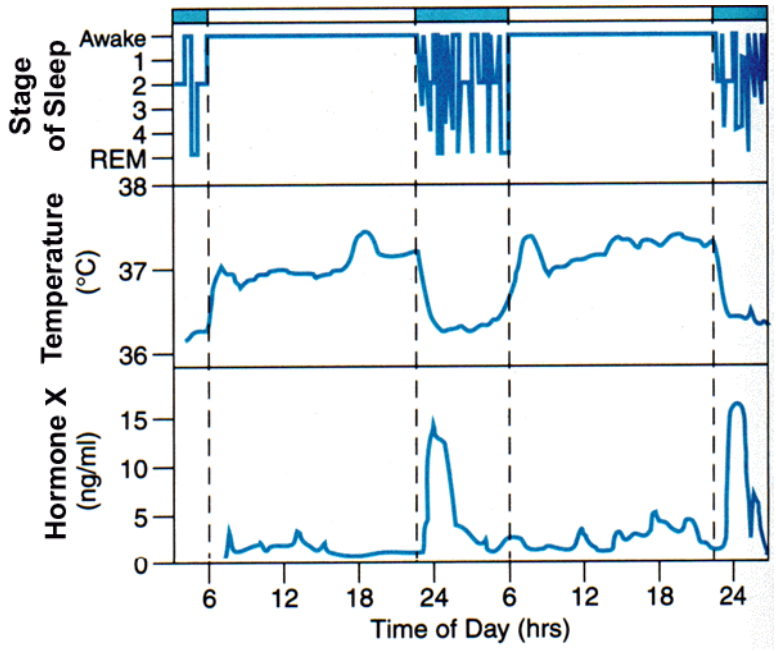
What do you conclude about the woman's endocrine status?

A. euthyroid
B. primary hypothyroidism
C. secondary hypothyroidism
D. thyroid binding globulin (TBG) deficiency
E. TBG excess

61. Experimental animals given daily injections of a substance for a week show enlarged adrenal glands, but no change in hepatic glycogen content. This substance is

A. adrenocorticotropic hormone (ACTH).
B. aldosterone.
C. corticotropin releasing hormone (CRH).
D. cortisol.
E. metyrapone.

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.



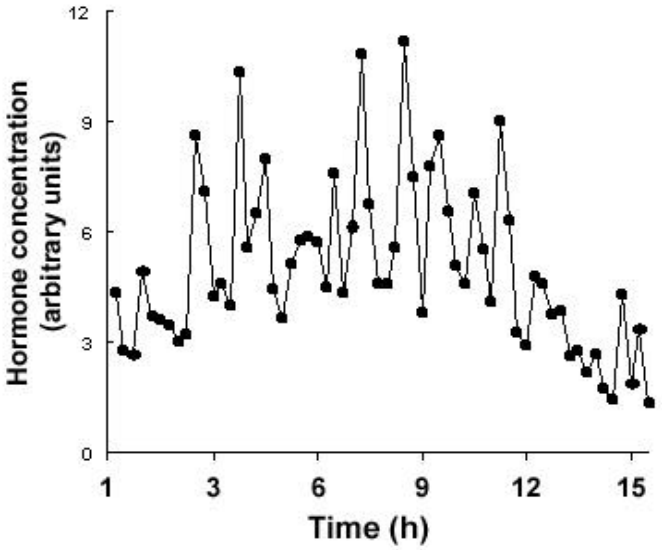
62. The figure above depicts physiological status over two days in a prepubescent child. Hormone X is likely to be

A. antidiuretic hormone (ADH).
B. chorionic gonadotropin (hCG).
C. growth hormone.
D. insulin.
E. progesterone.

63. Heat conservation by the shifting of blood flow works by the same principle as

A. a Donnan equilibrium.
B. feedback inhibition of pituitary secretion.
C. Starling's Law of the Heart.
D. the countercurrent mechanism for concentrating urine.
E. the milk "let-down" response.

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 graph above depicts the time course of circulating

A. luteinizing hormone (LH) in adult males.
B. LH in the follicular phase.
C. progesterone in the luteal phase.
D. prolactin during nursing.
E. triiodothyronine (T_3) during acclimation to a warm environment.

65. A patient experiencing the "chill" of a fever will

A. have a flushed appearance.
B. have an increased thermoregulatory set point.
C. have a relatively thin insulating shell.
D. sweat profusely.
E. all of the above.

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. Note that a lettered pair may be used more than once.

A. cortisol : cortisone
B. 25(OH)-cholecalciferol (25-OH D_3) : 1,25$(OH)_2$-cholecalciferol (1,25$(OH)_2D_3$)
C. 25(OH)-cholecalciferol (25-OH D_3) : 24,25$(OH)_2$-cholecalciferol (24,25$(OH)_2D_3$)
D. testosterone : dihydrotestosterone
E. testosterone : estradiol

66. corticosterone : aldosterone

67. angiotensin I : angiotensin II

68. norepinephrine : epinephrine

A. dopamine : prolactin
B. glucagon : insulin
C. growth hormone releasing hormone (GHRH) : growth hormone
D. luteinizing hormone (LH) : chorionic gonadotropin (hCG)
E. proinsulin : insulin

69. thyroglobulin : thyroxine (T_4)

70. testosterone : luteinizing hormone (LH)

71. parathyroid hormone (PTH) : calcitonin

72. proopiomelanocortin (POMC) : adrenocorticotropic hormone (ACTH)

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 heading or component that is *most closely* associated with it. Note that a lettered heading or component may be used more than once.

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

73. Formed by the action of aromatase

74. Secreted from the posterior pituitary

75. "Rescues" the corpus luteum

76. First endocrine recognition of pregnancy

A. decrease in frequency of the hypothalamic pulse generator
B. milk “let-down” response
C. post-menopausal gonadotropin levels
D. preovulatory luteinizing hormone (LH) surge
E. prepubertal gonadotropin levels

77. Decreased negative feedback by estrogen

78. Reduced secretion of gonadotropin releasing hormone (GnRH)

79. Feedback regulation of hypothalamus by progesterone

80. High concentrations of circulating estrogen

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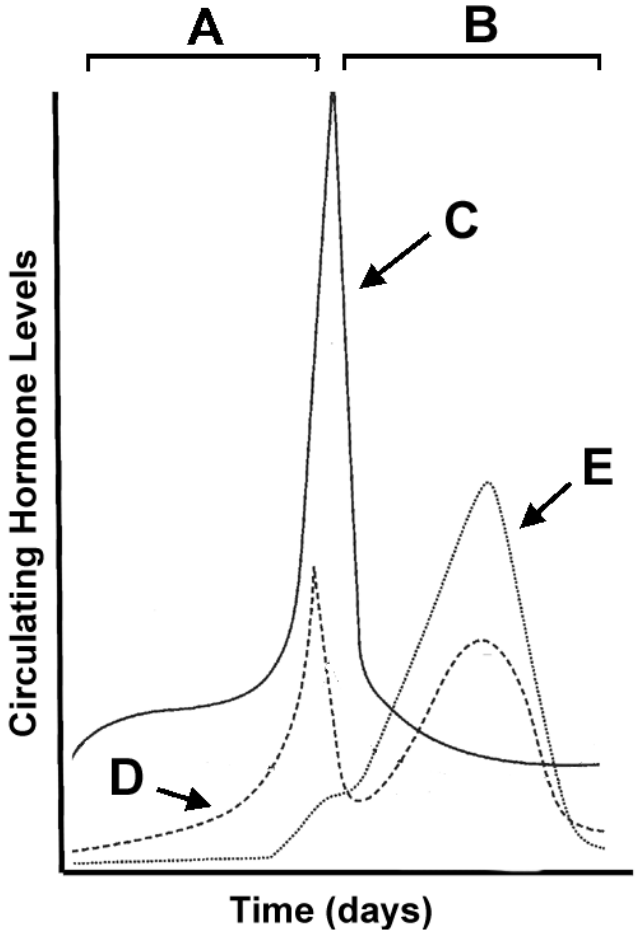

The figure above depicts an idealized human menstrual cycle.

81. Luteal phase

82. Progesterone

83. Estradiol

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A. gonadotropin releasing hormone (GnRH)
B. follicle stimulating hormone (FSH)
C. inhibin
D. luteinizing hormone (LH)
E. relaxin

84. Stimulates androgen production from theca cells

85. Stimulates gonadotrophs of the anterior pituitary

86. Primary site of action is on granulosa cells.

A. Addison's disease
B. Cushing's disease
C. Graves' disease
D. Kallman's syndrome
E. Turner's syndrome

87. Absence of gonadotropin releasing hormone (GnRH)

88. Adrenal excess

89. Adrenal insufficiency

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. Secreted by the zona glomerulosa of the adrenal cortex

91. Excess can result in hypertension.

92. 17α-hydroxylase deficiency results in impaired synthesis.

(a) growth hormone
(b) thyroid hormone

93. Essential in the neonate for maturation of the central nervous system

94. Secretion is stimulated by hypoglycemia.

95. Excess in the infant can lead to gigantism.

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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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) parathyroid hormone
(b) calcitonin

96. Secretion is stimulated by high circulating Ca^{2+} concentrations.

97. Stimulates 1,25-dihydrocholecalciferol formation

98. Stimulates renal phosphate excretion

(a) estradiol
(b) testosterone

99. Secreted by Leydig cells

100. Precursors include androstenedione, a weak androgen

Answers:

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