

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



ES Physiology Test Bank - Guyton

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1. Which of the following is expected to exhibit the greatest biological activity?

- A) Insulin like growth factor-1 free in the plasma
- B) Cholecalciferol (vitamin D3)
- C) Cortisol bound to corticosteroid binding globulin
- D) T4 bound to thyroxine binding globulin
- E) Aldosterone bound to plasma albumin

A

3. After menopause, hormone replacement therapy with estrogen-like compounds is effective in preventing the progression of osteoporosis. What is the mechanism of their protective effect?

- A) They stimulate the activity of osteoblasts
- B) They increase absorption of calcium from the gastrointestinal tract
- C) They stimulate calcium reabsorption by the renal tubules
- D) They stimulate parathyroid hormone (PTH) secretion by the parathyroid gland

A

4. Neurons that secrete antidiuretic hormone or oxytocin terminate in

which of the following structures?

- A) Posterior pituitary
- B) Median eminence
- C) Mammillary body
- D) Paraventricular nucleus
- E) Supraoptic nucleus

A

5. Which of the following represents a physiological action of growth hormone?

- A) Increases the breakdown of muscle protein
- B) Increases utilization of glucose in muscle
- C) Decreases storage of lipids in adipose cells
- D) Decreases gene transcription
- E) Decreases gluconeogenesis in the liver

C

12. Antidiuretic hormone (ADH) is increased by which of the following?

- A) A hyperosmotic extracellular fluid in the hypothalamus
- B) A hyperosmotic extracellular fluid in the adenohypophysis
- C) A hypoosmotic extracellular fluid in the hypothalamus

D) A hypoosmotic extracellular fluid in the adenohypophysis

E) A hypoosmotic fluid in the atria of the heart

A

13. In an individual with panhypopituitarism, which selection below best describes the plasma hormone changes that would occur?

A) ↓GHRH, ↓somatostatin, ↓growth hormone, ↓somatomedin C

B) ↓GHRH, ↓somatostatin, ↓growth hormone, ↑somatomedin C

C) ↑GHRH, ↑somatostatin, ↑growth hormone, ↓somatomedin C

D) ↑GHRH, ↑somatostatin, ↓ growth hormone, ↓somatomedin C

E) ↑GHRH, ↓somatostatin, ↓growth hormone, ↓somatomedin C

E

15. A patient has nephrogenic diabetes insipidus. Which of the following would either be expected or a suggested intervention?

A) Decreased plasma sodium concentration

B) Increased secretion of ADH from the supraoptic nuclei

C) High urine osmolality

D) Increased AVPR2 function

E) Decrease secretion of ADH from the supraoptic and paraventricular nuclei

B

16. Which of the following would most likely cause a decrease in the release of thyroid-stimulating hormone?

- A) Decreased iodine enzyme
- B) Decreased iodine pump activity in thyroid gland
- C) Decreased body temperature
- D) Increased thyrotropin releasing hormone
- E) Increased plasma thyroxine by venous infusion

E

17. The increased cardiac output caused by elevated circulating levels of thyroid hormones is most likely caused by

- A) Direct actions of thyroid-stimulating hormone on the heart
- B) Direct actions of thyroid-stimulating hormone on the brain
- C) An increase in the metabolic demand of the tissues
- D) An increase in plasma cholesterol and triglycerides
- E) An increase in total body weight

C

18. If a radioimmunoassay is properly conducted and the amount of radioactive hormone bound to antibody is low, what would this

result indicate?

- A) Plasma levels of endogenous hormone are high
- B) Plasma levels of endogenous hormone are low
- C) More antibody is needed
- D) Less radioactive hormone is needed

A

19. Which of the following depicts the most likely sequence of events in an individual exposed to cold?

- A) ↑Thyrotropin-releasing hormone, ↑thyroid-stimulating hormone, ↑thyroxine
- B) ↑Thyrotropin-releasing hormone, ↓thyroid-stimulating hormone, ↑thyroxine
- C) ↑Thyroid-stimulating hormone, ↑thyrotropin-releasing hormone, ↑thyroxine
- D) ↑Thyroid-stimulating hormone, ↓thyrotropin-releasing hormone, ↑thyroxine
- E) ↑Thyroxine, ↑thyrotropin-releasing hormone, ↑thyroidstimulating hormone

A

21. In an individual with a thyroid hormone producing adenoma, one

might expect which of the following?

A) ↑ T4, ↓ T3, ↓ TRH, ↓ TSH

B) ↑ T4, ↑ T3, ↓ TRH, ↓ TSH

C) ↑ T4, ↑ T3, ↑ TRH, ↓ TSH

D) ↑ T4, ↑ T3, ↓ TRH, ↑ TSH

E) ↓ T4, ↑ T3, ↓ TRH, ↓ TSH

B

24. Which of the following enzymes catalyzes the conversion of cholesterol to pregnenolone?

A) Aldosterone synthase

B) Lipoprotein lipase

C) Hormone sensitive lipase

D) 11β-Hydroxylase

E) Cholesterol desmolase

E

25. Which of the following would most likely occur if plasma aldosterone levels were low?

A) Hyperkalemia

B) Hypokalemia

C) Hypernatremia

D) Hypertension

A

27. During a chronic infusion of aldosterone in an experimental animal model, one would expect which of the following?

A) ↑Blood pressure, ↔extracellular fluid volume, ↓urinary sodium excretion

B) ↑Blood pressure, ↓extracellular fluid volume, ↔urinary sodium excretion

C) ↑Blood pressure, ↔extracellular fluid volume, ↑urinary sodium excretion

D) ↑Blood pressure, ↑extracellular fluid volume, ↔urinary sodium excretion

E) ↑Blood pressure, ↔extracellular fluid volume, ↔urinary sodium excretion

D

29. In response to a physiological stimulus such as the stress of taking an important quiz, which of the following reflects the most likely sequence of events?

A) ↑Cortisol, ↑corticotropin, ↑corticotropin-releasing hormone

B) ↑Corticotropin-releasing hormone, ↑corticotropin, ↑cortisol

C) ↑Cortisol, ↓corticotropin, ↑corticotropin-releasing hormone

D) ↑Corticotropin-Releasing hormone, ↑corticotropin, ↓cortisol

E) ↑Cortisol, ↑corticotropin, ↓corticotropin-releasing hormone

B

30. Which of the following best characterizes the metabolic actions of cortisol?

A) ↑Muscle glucose uptake, ↑muscle amino acid uptake,

↑adipose tissue fat uptake

B) ↑Muscle glucose uptake, ↓muscle amino acid uptake, ↑adipose

tissue fat uptake

C) ↓Muscle glucose uptake, ↓muscle amino acid uptake,

↑adipose tissue fat uptake

D) ↓Muscle glucose uptake, ↑muscle amino acid uptake,

↓adipose tissue fat uptake

E) ↓Muscle glucose uptake, ↓muscle amino acid uptake, ↓adipose

tissue fat uptake

E

31. Which of the following is most likely to occur as a result of chronic hyperglycemia associated with untreated type 1 diabetes mellitus?

- A) Increased intracellular fluid volume
- B) Decreased urinary glucose
- C) Metabolic alkalosis
- D) Osmotic diuresis and polyuria
- E) Improved eyesight

D

38. Which of the following best describes insulin?

- A) Lipid-soluble hormone tightly bound to plasma proteins
- B) Peptide hormone that activates an intracellular receptor
- C) Peptide hormone that activates a G-coupled protein receptor
- D) Peptide hormone that activates an enzyme-linked receptor
- E) Steroid hormone that activates an enzyme-linked receptor

D

39. If one were to experience a sudden decrease in extracellular fluid calcium, which of the following would most likely be the first physiological response to buffer the change in calcium?

- A) Increased calcium absorption in the gut
- B) Decreased phosphate absorption in the gut
- C) Increased parathyroid hormone from the anterior pituitary
- D) Decreased renal excretion of phosphate

E) Increased exchange of calcium with the bone fluid

E

47. All of the following statements about parathyroid hormone are true EXCEPT one. Which one is the EXCEPTION?

A) PTH directly activates osteoblasts and osteocytes

B) PTH inhibits the production of vitamin D hormones

C) PTH promotes bone resorption in response to decreased plasma calcium

D) PTH promotes the movement of calcium from bone fluid to the extracellular fluid

E) PTH promotes calcium reabsorption in the renal distal tubule and collecting duct

B

48. A 46-year-old man has “puffy” skin and is lethargic. His plasma TSH concentration is low and increases markedly when he is given TRH. What is the most likely diagnosis?

A) Hyperthyroidism due to a thyroid tumor

B) Hyperthyroidism due to an abnormality in the hypothalamus

C) Hypothyroidism due to an abnormality in the thyroid

D) Hypothyroidism due to an abnormality in the hypothalamus

E) Hypothyroidism due to an abnormality in the pituitary

D

52. Which of the following pairs of hormones and the corresponding action is incorrect?

A) Glucagon—increased glycogenolysis in liver

B) Glucagon—increased glycogenolysis in skeletal muscle

C) Glucagon—increased gluconeogenesis

D) Cortisol—increased gluconeogenesis

E) Cortisol—decreased glucose uptake in muscle

B

55. Which hormone is largely unbound to plasma proteins?

A) Cortisol

B) T₄

C) ADH

D) Estradiol

E) Progesterone

C

57. Why is milk produced by a woman only after delivery, not before?

A) Levels of LH and FSH are too low during pregnancy to support milk production

B) High levels of progesterone and estrogen during pregnancy suppress milk production

C) The alveolar cells of the breast do not reach maturity until after delivery

D) High levels of oxytocin are required for milk production to begin, and oxytocin is not secreted until the baby stimulates the nipple

B

58. Which of the following increases the rate of excretion of calcium ions by the kidney?

A) A decrease in calcitonin concentration in the plasma

B) An increase in phosphate ion concentration in the plasma

C) A decrease in the plasma level of PTH

D) Metabolic alkalosis

C

67. A 30-year-old woman is breastfeeding her infant. During suckling, which hormonal response is expected in the woman?

A) Increased secretion of ADH from the supraoptic nuclei

B) Increased secretion of ADH from the paraventricular nuclei

C) Increased secretion of oxytocin from the paraventricular nuclei

D) Decreased secretion of neurophysin

E) Increased plasma levels of both oxytocin and ADH

C

72. Which of the following would be associated with parallel changes in aldosterone and cortisol secretion?

A) Addison's disease

B) Cushing's disease

C) Cushing's syndrome (adrenal tumor)

D) A low-sodium diet

E) Administration of a converting enzyme inhibitor

A

75. A 55-year-old man has developed the syndrome of inappropriate antidiuretic hormone secretion due to carcinoma of the lung.

Which physiological response would be expected?

A) Increased plasma osmolality

B) Inappropriately low urine osmolality (relative to plasma osmolality)

C) Increased thirst

D) Decreased secretion of ADH from the pituitary gland

D

81. Which hormone activates enzyme-linked receptors?

A) ADH

B) Insulin

C) ACTH

D) PTH

E) Aldosterone

B

84. Which finding is most likely in a patient who has myxedema?

A) Somnolence

B) Palpitations

C) Increased respiratory rate

D) Increased cardiac output

E) Weight loss

A

87. Which of the following stimulates the secretion of PTH?

A) An increase in extracellular calcium ion activity above the normal value

B) An increase in calcitonin concentration

- C) Respiratory acidosis
- D) Increased secretion of PTH-releasing hormone from the hypothalamus
- E) None of the above

E

88. A 40-year-old woman consumes a high-potassium diet for several weeks. Which hormonal change is most likely to occur?

- A) Increased secretion of DHEA
- B) Increased secretion of cortisol
- C) Increased secretion of aldosterone
- D) Increased secretion of ACTH
- E) Decreased secretion of CRH

C

91. A young woman comes to the emergency department with a vertebral compression fracture. Radiographs of the spine indicate generalized demineralization. She is vegetarian, does not smoke or drink alcohol, and has a normal plasma potassium concentration of 5.4 mEq/l, a sodium concentration of 136 mEq/l, and a plasma calcium concentration of 7.0 mg/dl. Her vitamin D3

value is several

times greater than normal, although her 1,25-dihydroxycholecalciferol concentration is at the lower limit of detectability. She has been in renal failure for the past 5 years and undergoes hemodialysis three times each week. What is the cause of her low 1,25-dihydroxycholecalciferol level?

- A) Metabolic acidosis
- B) Metabolic alkalosis
- C) She is unable to form 1,25-dihydroxycholecalciferol because of her extensive kidney disease
- D) She is undergoing dialysis with a dialysis fluid that does not contain calcium
- E) She is taking receiving calcium supplements

C

94. Which finding would likely be reported in a patient with a deficiency in iodine intake?

- A) Weight loss
- B) Nervousness
- C) Increased sweating
- D) Increased synthesis of thyroglobulin

E) Tachycardia

D

95. A 37-year-old woman presents to her physician with an enlarged thyroid gland and high plasma levels of T4

and T3. Which of the following is likely to be decreased?

A) Heart rate

B) Cardiac output

C) Peripheral vascular resistance

D) Ventilation rate

E) Metabolic rate

C

99. Cortisone is administered to a 30-year-old woman for the treatment of an autoimmune disease. Which of the following is most likely to occur?

A) Increased ACTH secretion

B) Increased cortisol secretion

C) Increased insulin secretion

D) Increased muscle mass

E) Hypoglycemia between meals

C

101. The function of which of the following is increased by an elevated parathyroid hormone concentration?

- A) Osteoclasts
- B) Hepatic formation of 25-hydroxycholecalciferol
- C) Phosphate reabsorptive pathways in the renal tubules
- D) All the above

A

102. Which statement about peptide or protein hormones is usually true?

- A) They have longer half-lives than steroid hormones
- B) They have receptors on the cell membrane
- C) They have a slower onset of action than both steroid and thyroid hormones
- D) They are not stored in endocrine-producing glands

B

104. Cortisol and GH are most dissimilar in their metabolic effects on which of the following?

- A) Protein synthesis in muscle
- B) Glucose uptake in peripheral tissues
- C) Plasma glucose concentration

D) Mobilization of triglycerides

A

106. Cortisone is administered to a patient for the treatment of an autoimmune disease. Which of the following would least likely occur in response to the cortisone treatment?

A) Hypertrophy of the adrenal glands

B) Increased plasma levels of C-peptide

C) Decreased CRH secretion

D) Increased blood pressure

E) Hyperglycemia

A

110. Which finding is most likely to occur in a patient who has uncontrolled type 1 diabetes mellitus?

A) Decreased plasma osmolality

B) Increased plasma volume

C) Increased plasma pH

D) Increased release of glucose from the liver

E) Decreased rate of lipolysis

D

111. GH secretion would most likely be suppressed under which

condition?

- A) Acromegaly
- B) Gigantism
- C) Deep sleep
- D) Exercise
- E) Acute hyperglycemia

E

114. Which condition contributes to “sodium escape” in persons with Conn’s syndrome?

- A) Decreased plasma levels of atrial natriuretic peptide
- B) Increased plasma levels of angiotensin II
- C) Decreased sodium reabsorption in the collecting tubules
- D) Increased arterial pressure

D

116. A 30-year-old woman reports to the clinic for a routine physical examination, which reveals she is pregnant. Her plasma levels of TSH are high, but her total T4 concentration (protein bound and free) is normal. Which of the following best reflects this patient’s clinical state?

- A) Graves’ disease

- B) Hashimoto's disease
- C) A pituitary tumor that is secreting TSH
- D) A hypothalamic tumor that is secreting TRH
- E) The patient is taking thyroid extract

B

119. A sustained program of lifting heavy weights will increase bone mass. What is the mechanism of this effect of weightlifting?

- A) Elevated metabolic activity stimulates parathyroid hormone secretion
- B) Mechanical stress on the bones increases the activity of osteoblasts
- C) Elevated metabolic activity results in an increase in dietary calcium intake
- D) Elevated metabolic activity results in stimulation of calcitonin secretion

B

120. The hormone most responsible for maintaining milk production after parturition is

- A) Estrogen
- B) Progesterone
- C) Oxytocin

D) Prolactin

E) Inhibin

D

122. Which physiological response is greater for T3 than for T4?

A) Secretion rate from the thyroid

B) Plasma concentration

C) Plasma half-life

D) Affinity for nuclear receptors in target tissues

E) Latent period for the onset of action in target tissues

D

124. For milk to flow from the nipple of the mother into the mouth of the nursing infant, what must occur?

A) Myoepithelial cells must relax

B) Prolactin levels must fall

C) Oxytocin secretion from the posterior pituitary must take place

D) The baby's mouth must develop a strong negative pressure over the nipple

E) All the above

C

127. When compared with the late-evening values typically observed in normal subjects, plasma levels of both ACTH and cortisol would be expected to be higher in which persons?

- A) Normal subjects after waking in the morning
- B) Normal subjects who have taken dexamethasone
- C) Patients with Cushing's syndrome (adrenal adenoma)
- D) Patients with Addison's disease
- E) Patients with Conn's syndrome

A

128. Which of the following conditions or hormones would most likely increase GH secretion?

- A) Hyperglycemia
- B) Exercise
- C) Somatomedin
- D) Somatostatin
- E) Aging

B

30. What would be associated with parallel changes in aldosterone and cortisol secretion?

- A) Addison's disease

- B) Cushing's disease
- C) Cushing's syndrome (ectopic ACTH-producing tumor)
- D) A high-sodium diet
- E) Administration of a converting enzyme inhibitor

A

132. A 59-year-old woman has osteoporosis, hypertension, hirsutism, and hyperpigmentation. Magnetic resonance imaging indicates that the pituitary gland is not enlarged. Which condition is most consistent with these findings?

- A) Pituitary ACTH-secreting tumor
- B) Ectopic ACTH-secreting tumor
- C) Inappropriately high secretion rate of CRH
- D) Adrenal adenoma
- E) Addison's disease

B

137. What does not increase when insulin binds to its receptor?

- A) Fat synthesis in adipose tissue
- B) Protein synthesis in muscle
- C) Glycogen synthesis
- D) Gluconeogenesis in the liver
- E) Intracellular tyrosine kinase activity

D

138. Release of which hormone is an example of neuroendocrine secretion?

- A) GH
- B) Cortisol
- C) Oxytocin
- D) Prolactin
- E) ACTH

C

140. Inhibition of the iodide pump would be expected to cause which change?

- A) Increased synthesis of T4
- B) Increased synthesis of thyroglobulin
- C) Increased metabolic rate
- D) Decreased TSH secretion
- E) Extreme nervousness

B

142. Which pituitary hormone has a chemical structure most similar to that of ADH?

- A) Oxytocin

- B) ACTH
- C) TSH
- D) FSH
- E) Prolactin

A

144. Which of the following is most likely to occur in the early stages of type 2 diabetes?

- A) Increased insulin sensitivity
- B) Decreased hepatic glucose output
- C) Increased plasma levels of C-peptide
- D) Increased plasma [β -hydroxybutyric acid]
- E) Hypovolemia

C

147. A 45-year-old woman has a mass in the sella turcica that compresses the portal vessels, disrupting pituitary access to hypothalamic secretions. The secretion rate of which hormone would most likely increase in this patient?

- A) ACTH
- B) GH
- C) Prolactin

D) LH

E) TSH

C

148. Which of the following is not produced by osteoblasts?

A) Alkaline phosphatase

B) RANK ligand

C) Collagen

D) Pyrophosphate

E) Osteoprotegerin

D