

Friday, March 18<sup>th</sup>, 2022

Following directions on the mark-sense form, write your **name, and student number** in the blanks and fill in the bubbles. In addition, write your **name** on this exam.

When finished with the test, turn in both the mark-sense form and the exam at the front of the room.

**PLACE ALL ANSWERS ON THE MARK-SENSE FORM**

**MULTIPLE CHOICE: Always choose the BEST, most complete answer. (2 points each)**

1. Which of the following is NOT a hormone secreted by the adrenal gland?
  - a) aldosterone
  - b) epinephrine
  - c) oxytocin
  - d) cortisol
  - e) androstenedione (an androgen)
  
2. Which of the following hormones will tend to RAISE plasma glucose?
  - a) glucagon
  - b) insulin
  - c) cortisol
  - d) Both A and C will raise plasma glucose.
  - e) Neither A, B nor C will raise plasma glucose.
  
3. What is the most likely cause for Addison's disease?
  - a) pituitary tumor
  - b) chronic cortisol overexposure
  - c) autoimmune damage to the adrenal glands
  - d) autoimmune damage to the thyroid glands
  - e) overuse of tanning beds
  
4. Which of the following is secreted by the adrenal medulla and is part of the acute response to stress?
  - a) cortisol
  - b) epinephrine
  - c) ACTH (adrenocorticotrophic hormone)
  - d) testosterone
  - e) CRH (corticotropin releasing hormone)

5. Which of the following best describes thyroglobulin?
- an immunoglobulin that specifically targets the thyroid gland
  - a major component of blood plasma
  - a protein released by the hypothalamus that controls the release of TSH (thyroid stimulating hormone)
  - a protein that fills the interstitial regions outside the follicles of the thyroid gland.
  - a large protein that serves as a backbone for the synthesis of thyroid hormones.
6. Methimazole inhibits the thyroid peroxidase enzyme and lowers the quantity of T3/T4 produced. Which of the following could be another effect of methimazole?
- lower metabolism
  - bulging eyes
  - warm hands
  - iodine deficiency
  - abnormally low TSH levels
7. Which of the following can result from chronically low iodine in the diet from infancy?
- profound cognitive deficits
  - short stature
  - goiter
  - A, B and C are all associated with low iodine in the diet.
  - Neither A, B nor C are characteristics associated with low iodine in the diet.
8. Which of the following is TRUE regarding the thyroid hormones T3 and T4?
- They bind nuclear receptors to promote transcription of a variety of new proteins in multiple target tissues.
  - They have a shorter half-life in blood plasma than most hormones.
  - They are secreted in response to sudden stress to elicit a fight or flight response.
  - They elicit a positive feedback effect on the secretion of TSH.
  - T3 and T4 have equally potent activity.
9. Which of the following is FALSE regarding growth hormone (GH)?
- It is a protein hormone.
  - It can be administered orally in pill form.
  - One of its key target tissues is liver.
  - Its secretion is inhibited by somatostatin.
  - Its secretion is inhibited by IGF-1 (insulin-like growth factor-1).
10. Which of the following conditions occurs as the result of abnormally high growth hormone (GH) secretion after puberty?
- gigantism
  - Laron dwarfism
  - hypoglycemia (lowered blood sugar)
  - acromegaly
  - decreased IGF-1 levels

11. Most of the long-term effects of growth hormone (GH) secretion are mediated by which of the following?
- somatostatin
  - GHRH (growth hormone releasing hormone)
  - ghrelin
  - fasting
  - IGF-1
12. ALL the following are comorbidities arising from growth hormone (GH) hypersecretion EXCEPT
- carpal tunnel syndrome
  - Type 2 diabetes
  - early closure of the epiphyseal plate
  - insulin resistance
  - cancer
13. Which of the following cell types is NOT important for bone growth, deposition, or turnover?
- osteoblasts
  - osteocytes
  - osteoclasts
  - chondrocytes
  - lymphocytes
14. Which physiological signal PROMOTES the secretion of parathyroid hormone (PTH)?
- too much sunshine
  - a rise in plasma  $\text{Ca}^{++}$  levels
  - too much osteoclast activity
  - a drop in plasma  $\text{Ca}^{++}$  levels
  - decreased bone density
15. Which of the following INCREASES the synthesis of calcitriol (vitamin  $\text{D}_3$ )?
- PTH secretion
  - exposure to sunlight
  - rickets
  - Both A and B
  - Both B and C
16. Which of the following is found in the femur of a prepubertal child but NOT found in the femur of an adult?
- epiphyseal plate
  - cartilage between articulating joints
  - bone marrow
  - osteoblasts
  - osteoclasts

17. Which of the following BEST describes an X-linked inherited disorder?
- a) a defective gene on the X-chromosome for which there is no matching gene on the Y chromosome
  - b) a disorder more commonly seen in females than males
  - c) a defective gene on the Y chromosome not masked by the normal gene on the X chromosome
  - d) a defective gene that is expressed from both autosomes
  - e) a disorder caused by an extra copy of chromosome 21
18. Which term BEST describes an egg AFTER it has been ovulated and BEFORE it has been fertilized?
- a) primary oocyte
  - b) secondary oocyte
  - c) oogonium
19. When does MEIOSIS first commence in MALES?
- a) during embryogenesis
  - b) at birth
  - c) during childhood
  - d) at puberty
  - e) at ejaculation
20. A genotype of 47, XXX would be most likely to be associated with which of the following?
- a) a phenotypic male individual
  - b) a phenotypic female individual
  - c) an individual with ambiguous genitalia
  - d) an individual with female genitalia that masculinize at puberty
  - e) an individual with male external genitalia but also possessing ovaries
21. Which two hormones are critical for the development of the MALE ductal system (epididymis, vas deferens, seminal vesicles)?
- a) estrogen and aromatase
  - b) testosterone and estrogen
  - c) AMH (anti-Müllerian hormone) and estrogen
  - d) testosterone and DHT (dihydrotestosterone)
  - e) testosterone and AMH
22. Complete androgen insensitivity syndrome (CAIS) is characterized by which of the following?
- a) inability to produce testosterone
  - b) development of a male ductal system
  - c) defective testosterone receptors in target tissue
  - d) male external genitalia
  - e) excessive menstruation

23. What is the source for the majority of the testosterone produced in the developing and adult male?
- interstitial (Leydig) cells of the testis
  - Sertoli cells of the testis
  - adrenal gland
  - spermatogonia
  - mature sperm
24. The LOSS of which of the following enzymes in the steroid hormone pathway will interfere with the development of male external genitalia?
- aromatase (converts testosterone to estradiol)
  - 5-alpha-reductase (converts testosterone to DHT)
  - aldosterone synthase (converts corticosterone to aldosterone)
  - 28-hydroxysteroid dehydrogenase (converts pregnenolone to progesterone)
  - 21-hydroxylase (converts progesterone to deoxycorticosterone)
25. What triggers positive feedback on LH (luteinizing hormone) secretion that leads to ovulation?
- low estrogen levels
  - moderate estrogen levels
  - moderate androgen levels
  - sustained high estrogen levels
  - sustained high androgen levels
26. Why does supplementation with anabolic steroids often lead to a reduced sperm count?
- Individuals become exhausted from their gym workouts.
  - Individuals become too aggressive to eat nutritious food.
  - Negative feedback on the secretion of FSH (follicle stimulating hormone) and LH.
  - Anabolic steroids promote excess secretion of GnRH (gonadotropin releasing hormone).
  - Anabolic steroid use can cause breast development which confuses the sperm.
27. What is the fate of the majority of oocytes in the human female?
- They will be retained in primordial follicles forever.
  - They will continue to replicate mitotically throughout life.
  - They will be ovulated.
  - They will be fertilized.
  - They will die by atresia.
28. Which of the following hormones exerts a dominant effect on the endometrium (uterine lining) during the 14 days AFTER ovulation?
- estrogen
  - progesterone
  - HCG (human chorionic gonadotropin)
  - LH
  - FSH

29. Where within the female reproductive tract is an egg MOST LIKELY to be fertilized?

- a) vagina
- b) cervix
- c) uterus
- d) Fallopian tube
- e) ovary

30. Which of the following is NOT true regarding oxytocin?

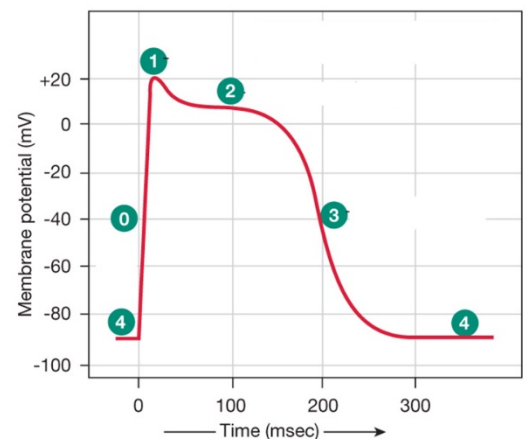
- a) It promotes uterine contractions.
- b) Its secretion is negatively regulated by uterine contractions.
- c) Its secretion is positively regulated by the dropping of the baby lower in the uterus.
- d) Its secretion is positively regulated by cervical stretch.
- e) It promotes milk ejection.

31. What causes the left AV (mitral) valve to close?

- a) contraction of the atria
- b) contraction of the papillary muscles
- c) when the pressure in the left ventricle is higher than the pressure in the left atrium
- d) when the pressure in the left atrium is higher than the pressure in the left ventricle
- e) when the pressure in the aorta is higher than the pressure in the left ventricle

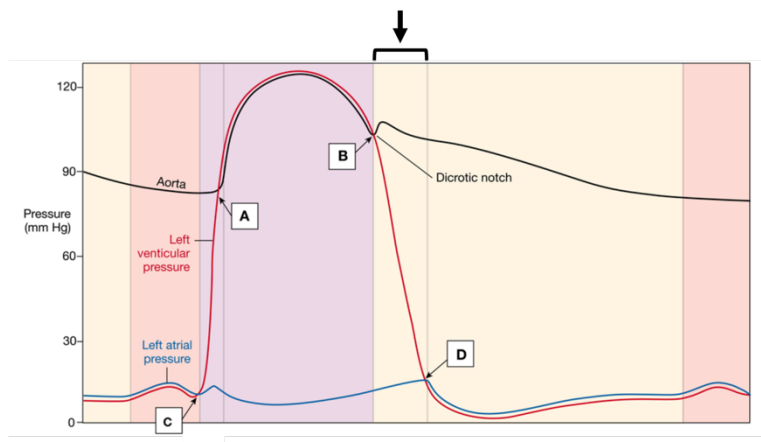
32. Refer to the figure at right, showing an action potential in a contractile cell of the heart. Opening of which of the following types of channels is responsible for repolarization (phase 3)?

- a)  $\text{Na}^+$  channel
- b)  $\text{K}^+$  channel
- c)  $\text{Ca}^{++}$  channel
- d)  $\text{Cl}^-$  channel
- e)  $\text{I}_f$  channel ("funny" channel)



33. Refer to the figure at right. Which of the following best explains the rapid change in pressure that is occurring during the phase of the cardiac cycle indicated by the arrow?

- a) the ventricles are contracting
- b) the atria are contracting
- c) all the valves are open
- d) all the valves are closed
- e) the volume in the ventricles is rapidly changing



34. Which of the following can slow the heart rate?

- a) parasympathetic input to the SA node
- b) sympathetic input to the SA node
- c) sympathetic input to contractile cells in the ventricles
- d) epinephrine
- e) increased central venous pressure

35. The baroreceptor reflex is important for homeostatic regulation of

- a) mean arterial pressure.
- b) atrial contraction.
- c) end-diastolic volume.
- d) body weight.
- e) extracellular fluid volume.

36. When hypoventilation leads to increased arterial CO<sub>2</sub>, this is known as

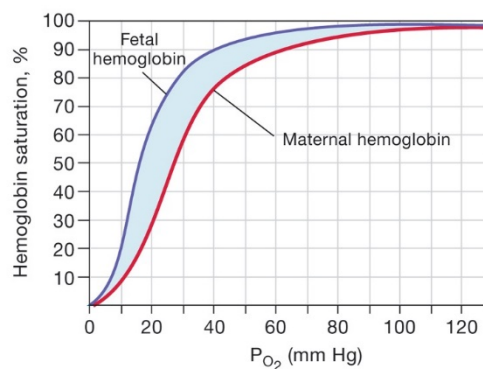
- a) respiratory acidosis.
- b) metabolic acidosis.
- c) respiratory alkalosis.
- d) metabolic alkalosis.

37. How does surfactant affect the compliance of the lungs?

- a) surfactant has no effect on compliance
- b) surfactant increases compliance by lowering surface tension
- c) surfactant decreases compliance by increasing surface tension

38. The figure at right shows that fetal hemoglobin has a \_\_\_\_\_ affinity for O<sub>2</sub> than maternal hemoglobin.

- a) lower
- b) higher

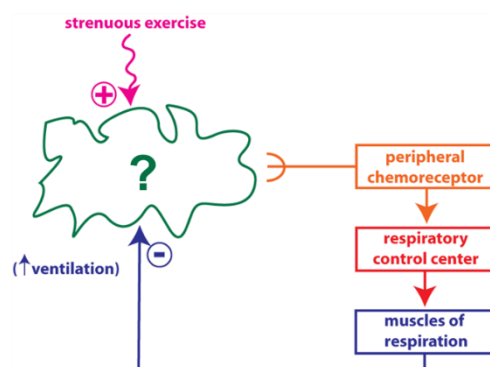


39. In a resting, healthy adult breathing air at sea level, the main factor controlling ventilation is

- a) lung compliance.
- b) hemoglobin saturation.
- c) arterial PO<sub>2</sub>.
- d) pH.
- e) arterial PCO<sub>2</sub>.

40. Refer to the figure at right. What factor is being sensed by the peripheral chemoreceptor to cause hyperventilation in someone engaged in strenuous exercise?

- a) decreased arterial PO<sub>2</sub>
- b) decreased arterial PCO<sub>2</sub>
- c) increased plasma [H<sup>+</sup>]
- d) increased plasma pH
- e) decreased hemoglobin saturation



41. The plasma membrane folds found on the apical surface of an enterocyte are called

- a) plicae circulares
- b) crypts
- c) villi
- d) microvilli
- e) lamina propria

42. The interstitial cells of Cajal (ICC cells)

- a) are neurons in the enteric nervous system.
- b) are enteroendocrine cells in the stomach.
- c) secrete histamine.
- d) deliver antigens to gut-associated lymphoid tissue (GALT).
- e) generate slow waves and are electrically coupled to gastrointestinal smooth muscle.



43. An increase in  $H^+$  in the lumen of the stomach normally triggers secretion of
- histamine
  - gastrin
  - cholecystokinin
  - acetylcholine
  - somatostatin
44. Which of the following stimulates bile release during the digestive period?
- contraction of the Sphincter of Oddi
  - contraction of the pyloric sphincter
  - cholecystokinin (CCK)
  - insulin
  - gastrin
45. What are chylomicrons?
- lipoproteins produced by the liver that deliver cholesterol to cells
  - lipoproteins produced by enterocytes
  - large droplets where fat digestion occurs
  - tiny particles that deliver fat digestion products to the apical membrane of enterocytes
  - proteins that serve as ID tags for lipoproteins
46. Which of the following is TRUE regarding glycogenesis in the liver?
- Glycogenesis transforms glycogen into glucose.
  - Glycogenesis raises blood amino acids.
  - Glycogenesis lowers blood sugar.
  - Glycogenesis converts amino acids into glucose.
  - Glycogenesis mobilizes glucose for use by muscle.
47. The dominant hormone associated with the fasted state is which of the following?
- glucagon
  - somatostatin
  - insulin
  - amylin
  - C-peptide

48. Which chemical can serve as a metabolic energy source under prolonged glucose starvation?
- a) oxygen
  - b) carbon dioxide
  - c) urea
  - d) ketone
  - e) cholesterol
49. Which of the following is characterized by a reduced ability of peripheral tissues to respond to insulin?
- a) Type 1 diabetes mellitus
  - b) Type 2 diabetes mellitus
  - c) diabetes insipidus
  - d) neonatal diabetes
  - e) hypoglycemia
50. The influence of the fetal testis on the development of the Müllerian and Wolffian ducts can be best described as what kind of signaling activity?
- a) autocrine
  - b) paracrine
  - c) feedforward regulation
  - d) positive feedback
  - e) negative feedback

**END OF TEST**

Turn in your mark-sense form  
and your question sheets  
at the front of the room.

Best wishes in your future endeavors.

***And have a great Spring Break!!!***