

Thursday, March 14th, 2024

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 glands does not secrete steroid hormones?
 - a. adrenal cortex
 - b. adrenal medulla
 - c. testis
 - d. ovary
 - e. zona reticularis of the adrenal cortex

2. Which of these conditions causes Addison's disease (low cortisol production)?
 - a. a cortisol-secreting tumor in the adrenal gland
 - b. autoimmune attack on the thyroid gland
 - c. a pituitary tumor that secretes high levels of ACTH (adrenocorticotrophic hormone)
 - d. autoimmune attack on the adrenal gland
 - e. excessive tanning

3. Which of the following hormones will promote Na⁺ reabsorption in the kidney in response to a drop in blood pressure?
 - a. GnRH (gonadotropin releasing hormone)
 - b. ACTH
 - c. aldosterone
 - d. cortisol
 - e. oxytocin

4. If you are out on an urban walk, and a car jumps the sidewalk heading right for you, which hormone is likely to be most helpful for you to flee the car and survive this stressful situation?
 - a. T3 (thyroid hormone)
 - b. cortisol
 - c. epinephrine
 - d. PTH (parathyroid hormone)
 - e. estrogen

5. Which of these conditions can cause a goiter (enlarged thyroid gland)?
 - a. thyroid tumor
 - b. low dietary iodine causing iodine deficiency
 - c. Hashimoto's thyroiditis
 - d. Graves' disease
 - e. ALL the above can cause a goiter.

6. Which of the following disorders causes much lower than normal secretion of TSH (thyroid stimulating hormone)?
 - a. Graves' disease
 - b. Hashimoto's thyroiditis
 - c. endemic low iodine
 - d. hyperparathyroidism
 - e. elevated blood pressure

7. Which of the following drugs would most likely be prescribed to treat HyPERthyroidism?
 - a. synthetic T4
 - b. synthetic T3
 - c. synthetic T3/T4 combination
 - d. methimazole (inhibits thyroid peroxidase)
 - e. iodine supplementation

8. What does thyroid hormone (T3/T4) do?
 - a. contributes to nervous system development in children
 - b. increases basal metabolic rate in adults
 - c. BOTH A and B
 - d. decreases basal metabolic rate in adults
 - e. BOTH A and D

9. GH (growth hormone) has many target tissues. Which of the following is the principal target tissue that mediates the indirect, growth-promoting effects of GH by secreting the IGFs (insulin-like growth factors)?
- pancreas
 - kidney
 - brain
 - liver
 - lungs
10. Which of the following is a direct metabolic effect of GH?
- promotes protein breakdown
 - raises plasma glucose
 - inhibits bone growth
 - increases insulin sensitivity
 - lowers plasma glucose
11. When is the best time to provide GH supplementation to a patient in order to increase height?
- at night
 - first thing in the morning
 - in response to a high protein meal
 - after puberty
 - before puberty
12. Individuals with Laron Syndrome (dwarfism caused by complete loss of functional GH receptors) would exhibit which plasma levels for GH and IGF-1 (insulin-like growth factor-1)?
- high GH, high IGF-1
 - high GH, low IGF-1
 - low GH, high IGF-1
 - low GH, low IGF-1
 - normal GH, high IGF-1
13. Which type of cell is primarily responsible for the synthesis and deposition of bone matrix (hydroxyapatite)?
- chondrocyte
 - fibroblast
 - osteoclast
 - osteoblast
 - thecal cell

14. Which of the following is associated with hyperparathyroidism?
- accidental damage to the parathyroid gland from neck surgery
 - osteoporosis (fragile bones due to loss of bone mineral density)
 - DiGeorge Syndrome (born without parathyroid glands)
 - autoimmune damage to parathyroid glands
 - low serum calcium
15. Which of the following is secreted in response to a RISE in plasma calcium?
- PTH
 - calcitonin
 - calcitriol ($1,25(\text{OH})_2\text{D}_3$ or active vitamin D)
 - cortisol
 - anti-Müllerian hormone (AMH)
16. Which of the following organs or tissues are important in maintaining plasma calcium at the appropriate level?
- intestine
 - kidney
 - bone
 - parathyroid gland
 - ALL of the above tissues are important in maintaining plasma calcium levels.
17. When does sexual differentiation begin in humans?
- week 7 of embryonic development
 - birth
 - childhood
 - puberty
 - menopause
18. What is the sexual phenotype of a 47, XXX individual? How many Barr bodies would be found in this Individual's somatic cell nuclei?
- phenotypic male; 1 Barr body
 - phenotypic male; 2 Barr bodies
 - phenotypic female; 1 Barr body
 - phenotypic female; 2 Barr bodies
 - intersex phenotype; 1 Barr body

19. Which of the following hormones is directly responsible for promoting the development of the male ductal system (seminal vesicle, vas deferens, epididymis) in a paracrine fashion?
- anti-Müllerian hormone (AMH)
 - estrogen
 - testosterone
 - GnRH (gonadotropin-releasing hormone)
 - somatostatin
20. The rare condition called Swyer Syndrome results in the development of someone with an XY genotype into a female-appearing individual with a uterus, fallopian tubes, and vagina, but no ovaries or testes. What gene product is non-functional or missing in most of these individuals?
- estrogen receptor
 - androgen receptor
 - GH receptor
 - GH
 - sex-determining region of the Y chromosome (SRY)
21. When does meiosis first begin during the process of gamete development in human females?
- prior to birth
 - during childhood
 - during the follicular phase of the cycle after puberty
 - during the luteal phase of the cycle after puberty
 - at menopause
22. Complete development of male external genitalia is dependent on which enzyme and hormone?
- aromatase, estrogen
 - 5-alpha reductase, DHT (dihydrotestosterone)
 - 21-hydroxylase, aldosterone
 - 5-alpha reductase, estrogen
 - aromatase, testosterone

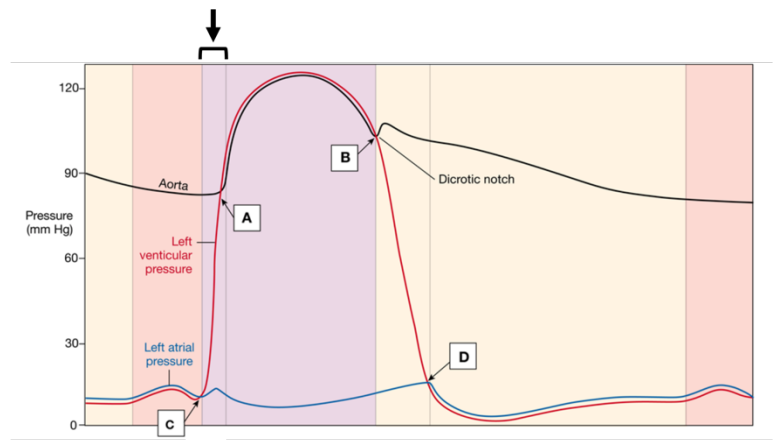
23. What forms the structural basis for the blood-testis barrier?
- Leydig (interstitial) cells within the interstitial testis
 - special fluids within the epididymis
 - tight junctions between adjacent Sertoli cells
 - regression of the Müllerian ducts
 - flagella within the seminiferous tubules
24. Which of the following hormones exhibits negative feedback on the secretion of both LH (luteinizing hormone) and FSH (follicle-stimulating hormone)?
- aldosterone
 - renin
 - insulin
 - testosterone
 - TRH (thyrotropin-releasing hormone)
25. Why don't 45, XO females develop ovaries?
- They lack the SRY gene.
 - Two X chromosomes are required at certain times during development to make ovaries.
 - GnRH secreting cells fail to migrate to the hypothalamus during development.
 - They have a mutation in the androgen receptor.
 - They have high levels of testosterone that prevent ovarian development.
26. What is the ultimate fate for the majority of eggs produced by human females?
- ovulation
 - fertilization
 - used to produce new bone marrow
 - maintained throughout life to secrete estrogen
 - programmed cell death (atresia)

27. Which of the following will elicit a positive feedback effect on the secretion of both LH and FSH?
- sustained high estrogen secretion midway through the follicular phase of the female cycle
 - X chromosome inactivation in somatic cells
 - high progesterone secretion during the luteal phase of the female cycle
 - high basal body temperature after ovulation
 - tonic (steady and continuous) administration of GnRH
28. Secretion of the hormone oxytocin stimulates smooth muscle contractions in the uterus. Which of the following is another effect of oxytocin?
- beard growth
 - promotes regression of the Müllerian ducts
 - promotes binding of the sperm head to the outer layer of the egg
 - stimulates smooth muscle contraction in the breast to eject milk
 - promotes sperm maturation
29. Where in the female reproductive tract is fertilization most likely to occur?
- fallopian tube
 - fluid outside ovary
 - uterus
 - cervix
 - vagina
30. Which of these events occurs in the epididymis?
- spermatocytes complete meiosis
 - sperm acquire progressive forward motility
 - sperm develop tails
 - spermatogonia divide by mitosis
 - acrosomal membrane fuses with the outer layer of the egg

31. Which of the following is TRUE about the right ventricle?
- pumps blood at a lower pressure than the left ventricle
 - pumps blood to the coronary arteries
 - normally pumps blood to the right atrium
 - contraction in the right ventricle creates the second heart sound
 - pumps blood to the systemic circulation

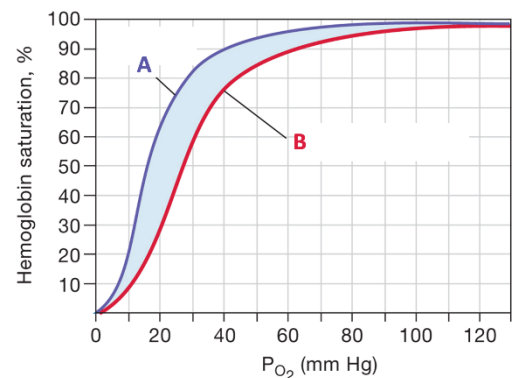
32. Which of the following prevents the transfer of electrical excitation between the atria and ventricles, so that the atria contract before the ventricles?
- intercalated disks
 - AV node
 - bundle of His
 - fibrous connective tissue skeleton associated with the valves
 - papillary muscles

33. Refer to the figure at right. What is occurring in the heart at the time indicated by the bracket?
- the ventricles are relaxing
 - the atria are contracting
 - all the valves are open
 - the pressure in the ventricles is not changing
 - the volume in the ventricles is not changing



34. Which of the following is increased by parasympathetic input to the heart?
- time between action potentials in the SA node
 - contraction strength
 - opening of I_f ("funny") channels
 - Ca^{++} permeability in contractile cells
 - Ca^{++} permeability in SA node cells

35. Muscle pumping involves contraction of skeletal muscles that compresses veins and increases venous return. What is the effect of increasing venous return?
- decreases central venous pressure
 - increases preload (the filling of the heart)
 - increases heart rate
 - increases total peripheral resistance
 - decreases end-diastolic volume
36. In heart failure, cardiac output decreases, lowering blood flow to certain tissues. What occurs because of low blood flow to the kidney?
- decreased production of angiotensin II
 - decreased secretion of aldosterone
 - decreased ECF volume
 - increased secretion of renin
 - increased glucose reabsorption
37. Which of the following occurs in the genetic disorder cystic fibrosis?
- increased sympathetic activity stimulating airway smooth muscle contraction
 - lack of surfactant secretion by type II alveolar cells
 - lack of fluid secretion by airway epithelial cells
 - increased mucus secretion by goblet cells
 - thickened connective tissue in alveoli
38. Which of the following is TRUE about surfactant?
- Surfactant increases the surface tension of the fluid lining the alveoli.
 - Surfactant decreases the compliance of the lungs.
 - Surfactant contains amphipathic molecules that collect at the air-water interface.
 - Surfactant is secreted by type I alveolar cells.
 - Surfactant sticks the pleural membranes together, which decreases the work of breathing.
39. Which line represents the hemoglobin saturation curve for fetal hemoglobin?
- A
 - B



40. Fill in the blank. During strenuous exercise, _____ stimulates the peripheral chemoreceptor to cause hyperventilation.
- decreased PO_2
 - increased PCO_2
 - increased pH
 - decreased PCO_2
 - increased $[H^+]$
41. The folds of the apical cell membrane of an enterocyte are called
- microvilli
 - plicae circulares
 - villi
 - lacteals
 - crypts
42. ALL the following stimulate acid secretion EXCEPT
- gastrin
 - acetylcholine released from enteric neurons that innervate parietal cells
 - histamine
 - food in the stomach
 - prostaglandins
43. Duodenal ulcers occur when H pylori infection causes antral gastritis, endocrine dysfunction, and acid hypersecretion. Which of the following hormones shows increased secretion that stimulates parietal cell proliferation and acid hypersecretion?
- secretin
 - somatostatin
 - insulin
 - gastrin
 - CCK (cholecystokinin)

44. Which of the following proteins plays a key role in fluid and bicarbonate secretion by duct cells in the pancreas?
- H⁺/K⁺-ATPase
 - SGLT2
 - CFTR
 - nicotinic acetylcholine receptor
 - enteropeptidase
45. Which of the following is an effect of the hormone CCK (cholecystokinin)?
- stimulates smooth muscle contraction in the Sphincter of Oddi
 - inhibits smooth muscle contraction in the gallbladder
 - promotes release of bile into the duodenum
 - stimulates acid secretion in the stomach
 - ALL of the above are effects of CCK
46. What are micelles?
- triacylglycerol-rich lipoproteins synthesized by enterocytes
 - cholesterol-rich lipoproteins synthesized by hepatocytes
 - lipoproteins that deliver cholesterol to cells
 - tiny particles that deliver fat digestion products to the apical membrane of enterocytes
 - large droplets of triacylglycerol where fat digestion occurs
47. Which of the following is a leptin-deficient state that can be effectively treated with leptin injections?
- type 1 diabetes mellitus
 - degeneration of adipose tissue (lipodystrophy)
 - adrenal insufficiency (hypocortisolism)
 - common obesity
 - Cushing's syndrome (hypercortisolism)

48. Which of the following is not characteristic of the fasted state?
- a. hepatic glucose production
 - b. increased glucose uptake by adipocytes
 - c. gluconeogenesis
 - d. ketogenesis
 - e. lipolysis
49. Which of the following hormones has its secretion triggered by increased plasma glucose?
- a. GH (growth hormone)
 - b. insulin
 - c. glucagon
 - d. cortisol
 - e. epinephrine
50. Insulin resistance is the key characteristic in
- a. the fed state.
 - b. adrenal insufficiency.
 - c. growth hormone resistance.
 - d. the metabolic response to the ketogenic diet.
 - e. type 2 diabetes mellitus.

END OF TEST

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

Have a great break from classes.
Best wishes for the future!