

Friday, February 17th, 2023

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)

KEY: answers are in red, bold-face

1. Which of the following is an exocrine secretion of the gastrointestinal tract?
 - a) cholecystokinin
 - b) secretin
 - c) H⁺ ions**
 - d) gastrin
 - e) hepcidin
2. The frequency of segmentation contractions in the duodenum during the digestive period is determined by the
 - a) frequency of action potentials at the peak of the slow wave.
 - b) frequency of slow waves.**
 - c) migrating motor complex.
 - d) excitatory input of the vagus nerve.
 - e) rate of stomach emptying.
3. The folds of the apical membrane of cells in the small intestine are called
 - a) villi.
 - b) crypts.
 - c) plicae circulares.
 - d) lacteals.
 - e) microvilli.**
4. Which of the following is NOT a characteristic of a parietal cell?
 - a) membranes containing H⁺/K⁺-ATPases
 - b) abundant mitochondria
 - c) vesicles filled with hydrochloric acid**
 - d) innervated by enteric neurons that release acetylcholine
 - e) located in gastric glands in the body of the stomach

5. Which of the following decreases acid secretion?
- a) food in the stomach
 - b) somatostatin**
 - c) gastrin
 - d) histamine
 - e) gastric phase stimuli
6. Which of the following is a step that could lead to the development of a duodenal ulcer?
- a) infection with *H. pylori* bacteria
 - b) gastritis in the antrum
 - c) endocrine dysregulation causing increased gastrin secretion
 - d) hypersecretion of acid
 - e) ALL the above are steps that could lead to the development of a duodenal ulcer.**
7. Misoprostol is a prostaglandin drug that is used to prevent NSAID-induced gastric ulcer. What is the direct effect that prostaglandins have in the stomach?
- a) stimulate mucus secretion**
 - b) inhibit the proton pump
 - c) reduce inflammation
 - d) inactivate pepsin
 - e) stimulate histamine secretion
8. Which cell secretes bicarbonate (HCO_3^-) in response to the hormone secretin?
- a) beta cell in islet of Langerhans
 - b) hepatocyte in liver
 - c) enteroendocrine cell in duodenum
 - d) duct cell in pancreas**
 - e) chief cell in stomach
9. Which of the following plays a key role in the activation of pancreatic zymogens?
- a) pepsin
 - b) bile salts
 - c) enteropeptidase**
 - d) H^+/K^+ -ATPase
 - e) CFTR

10. ALL of the following are typically found in bile, EXCEPT
- a) bicarbonate.
 - b) apolipoproteins.**
 - c) cholesterol.
 - d) phospholipids.
 - e) bile salts.
11. What is the role of the hormone hepcidin?
- a) decreases iron absorption by the small intestine**
 - b) binds to vitamin B₁₂
 - c) stimulates smooth muscle contractions in the gallbladder
 - d) inhibits segmentation in the small intestine
 - e) activates secretion of zymogens
12. Chylomicrons are
- a) tiny particles that ferry fat digestion products to the surface of enterocytes.
 - b) brush border enzymes.
 - c) coated with bile salts.
 - d) triacylglycerol-rich lipoproteins that are synthesized from absorbed lipids.**
 - e) cholesterol-rich lipoproteins that are excreted in the bile.
13. Which of the following is a key step in the transfer of dietary fats to storage in adipose tissue?
- a) receptor-mediated endocytosis
 - b) triacylglycerol in chylomicrons is digested by lipoprotein lipase**
 - c) synthesis of ketones from fatty acids
 - d) beta-oxidation to form acetyl-CoA
 - e) absorbed fatty acids diffuse into intestinal capillaries
14. Which of the following is NOT synthesized by hepatocytes (cells in the liver)?
- a) bile salts
 - b) glycogen
 - c) chylomicrons**
 - d) plasma proteins
 - e) cholesterol
15. The muscle in the external anal sphincter is innervated by
- a) sympathetic postganglionic neurons.
 - b) parasympathetic postganglionic neurons.
 - c) enteric neurons located in the myenteric plexus.
 - d) somatic motor neurons.**
 - e) enteroendocrine cells.

16. What is the main function of the hypothalamus?
- a) activating intestinal motility
 - b) maintaining homeostasis within the body**
 - c) secreting digestive enzymes
 - d) initiating voluntary movement
 - e) controlling breathing
17. Which of the following behaviors or pathologies can result from damage to the Lateral Hypothalamic Area (LHA)?
- a) anorexia (reduced food intake)**
 - b) decreased physical activity
 - c) hyperphagia (increased food intake)
 - d) insulin resistance
 - e) obesity
18. Which of the following is FALSE regarding the resting metabolic rate (RMR) in humans?
- a) Its value can vary based on age, sex, and fitness level.
 - b) Its value can be affected by the category of food you eat (fat, carbohydrate, or protein).
 - c) It is a measure of heat production by the body at rest.
 - d) It can be calculated by measuring oxygen (O₂) consumption and carbon dioxide (CO₂) produced.
 - e) It should be measured right after a meal.**
19. Which of the following hormones is associated with hunger and promotes food intake?
- a) POMC
 - b) ghrelin**
 - c) GLP-1
 - d) leptin
 - e) insulin
20. Which of the following metabolic processes is likely to occur in the FASTED state?
- a) glycogenolysis**
 - b) glycolysis
 - c) glycogenesis
 - d) lipogenesis
 - e) protein synthesis
21. Which tissue possesses the highest level of triglycerides?
- a) brain
 - b) muscle
 - c) adipose**
 - d) liver
 - e) pancreas

22. Name the hormone or neuropeptide whose activity dominates the FED state.
- a) somatostatin
 - b) glucagon
 - c) ghrelin
 - d) insulin**
 - e) NPY
23. Insertion of glucose transporters (GLUT4) into the skeletal muscle cell membrane occurs in response to hormones and what else?
- a) alcohol
 - b) eating a stick of butter
 - c) exercise**
 - d) fasting
 - e) sleep
24. Which of the following hormones is secreted in response to a drop in plasma glucose?
- a) insulin
 - b) leptin
 - c) amylin
 - d) glucagon**
 - e) GLP-1
25. The measurement of plasma glucose level first thing in the morning before eating breakfast is called
- a) Fehling's test.
 - b) fasting plasma glucose test.**
 - c) Kraft insulin assay.
 - d) oral glucose tolerance test.
 - e) hemoglobin A1c test (glycated hemoglobin test or HbA1c).
26. Which of the following characteristics is attributable to BOTH type 1 and type 2 diabetes?
- a) generally an autoimmune disorder
 - b) usually diagnosed in children
 - c) when poorly controlled, it can result in kidney failure and foot ulcers**
 - d) diagnosed in 10% of all diabetics
 - e) often described as a disease of "lifestyle"

27. Which of the following are treatments for type 2 diabetes?
- a) insulin injection
 - b) weight loss
 - c) drug that increases insulin sensitivity
 - d) drug that promotes glucose excretion by the kidney
 - e) **ALL of the above are treatments for type 2 diabetes.**
28. Which of the following is a characteristic of hormones that are bound to carrier proteins when transported through the bloodstream?
- a) **They have a long half-life in plasma.**
 - b) They are rapidly destroyed by tissues.
 - c) They rapidly associate with receptors and have a brief time course of action.
 - d) They have a short half-life in plasma.
 - e) They are rapidly excreted in the urine.
29. Which of the following hormones is NOT secreted by the anterior pituitary?
- a) thyroid-stimulating hormone (TSH; also called thyrotropin)
 - b) adrenocorticotrophic hormone (ACTH)
 - c) growth hormone (GH)
 - d) follicle-stimulating hormone (FSH)
 - e) **vasopressin (also called antidiuretic hormone; ADH)**
30. Your body has stopped producing a key peptide hormone, forcing you to take a drug that is a recombinant version of the hormone. What is the most likely route of administration for this drug?
- a) pill
 - b) **injection**
 - c) powder dissolved in tea
 - d) topical gel
 - e) ALL these routes of administration are equally possible.

END OF TEST

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