PBIO 376 **NAME**_____
First Exam

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)

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 B_{12}
    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 (O_2) consumption and carbon dioxide (CO_2) 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 <u>type 2 diabetes</u>?
    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) adrenocorticotropic 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.