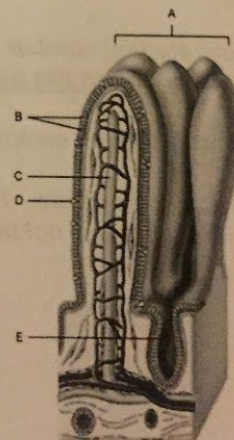


1. After secretion into the duodenum, the enzyme trypsinogen is converted into its active form by:
- ☒ A. enterokinase
 - B. procarboxypeptidase
 - C. lysolecithin
 - D. an alkaline pH
 - E. an acidic pH
2. Most ATP generated by the complete oxidation of glucose results from the reactions of:
- A. glycogenolysis
 - B. glycolysis
 - C. the Krebs cycle
 - ☒ D. the electron transport chain
 - E. gluconeogenesis
3. Intrinsic factor is required for:
- A. activation of pepsin
 - B. buffering of HCl
 - C. complete gastric emptying
 - ☒ D. absorption of vitamin B12
 - E. stimulation of mixing waves
4. Select the correct statement about electrolyte absorption.
- ☒ A. Chlorine ion absorption is coupled to glucose and amino acid transport.
 - B. Potassium moves across the epithelium by active transport.
 - C. If vitamin B is not present, calcium is not absorbed.
 - ☒ D. Iron and calcium are absorbed mostly by the duodenum.
5. Absorption of amino acids:
- A. involves co-transport of Na^+
 - B. involves hydrolysis of ATP
 - C. is carrier-mediated
 - ☒ D. all of the above

Use the diagram to answer the following question.

6. Paneth cells are found here

- A. A
- B. B
- C. C
- D. D
- ☒ E. E



7. Gastrin, histamine, serotonin, cholecystokinin, and somatostatin are hormones or paracrine factors that are released directly into the lamina propria. Which of the following cell types synthesize and secrete these products?
- ☒ A. enteroendocrine cells
 - B. parietal cells
 - C. zymogenic cells
 - D. mucous neck cells
 - E. goblet cells
8. The PRIMARY signal for insulin release is:
- A. a drop in blood glucose
 - B. secretion of islet-stimulating hormone (ISH) by the anterior pituitary
 - C. a drop in blood amino acids
 - ☒ D. a rise in blood glucose
 - E. activation of the "fight or flight" response
9. Which of the following is NOT a possible fate for fatty acids?
- A. incorporation into triglycerides via lipogenesis
 - B. cleavage into 2-carbon fragments and formation of acetyl-CoA
 - ☒ C. incorporation into glucose via reverse glycolysis
 - D. oxidation via the Krebs cycle
10. Which of the following vitamins has/have anti-oxidant properties?
- ☒ A. E
 - B. D
 - C. K
 - D. B12
 - ☒ E. Both vitamins D and E
11. During the absorptive state of metabolism:
- A. anabolic processes exceed catabolic processes
 - B. glycogen is hydrolyzed to provide glucose
 - C. insulin levels in the blood are higher than those of glucagon
 - D. the body draws on its nutrient reserves to provide energy
 - ☒ E. (a) and (c)
12. Which of the following statements is TRUE?
- A. There are no complete proteins. All animal products should be eaten with plant material to make a complete protein.
 - B. Glycogenesis is the breakdown of glycogen to yield glucose.
 - C. In order for amino acids to be oxidized for energy, they must first be deaminated.
 - ☒ D. The anaerobic metabolism of glucose yields pyruvic acid.
 - E. The body has an infinite capacity to store glycogen.
13. Mrs. Perry, a woman in her mid-40s, complains of extreme fatigue and faintness about 4 hours after each meal. What hormone might be deficient?
- A. insulin
 - B. somatostatin
 - ☒ C. glucagon
 - D. calcitonin
 - E. none of the above

14. What happens when we eat a high protein/low carbohydrate meal?
- A. secretion of insulin increases
 - B. secretion of glucagon increases
 - ☒ C. secretion of both insulin and glucagon increases
 - D. secretion of neither insulin nor glucagon increases
15. In the case of a person who consumes a normal, balanced diet, proteins are essential to the body for all of the following *except* _____.
- ☒ A. production of energy
 - B. production of some hormones
 - C. production of enzymes, clotting factors, and antibodies
 - D. formation of functional molecules like hemoglobin and cytochromes
16. Which of the following events is LEAST likely to occur during the post absorptive state?
- A. hydrolysis of triglycerides
 - ☒ B. use of ketones for energy
 - ☒ C. formation of glycogen
 - D. use of proteins as an energy source
 - E. synthesis of glucose from glycerol
17. As the body progresses from the absorptive to the postabsorptive state, the _____ continues to burn glucose while virtually every other organ in the body switches to fatty acids as its major energy source.
- A. liver
 - ☒ B. brain
 - ☒ C. pancreas
 - D. spleen
18. Which of the following does NOT occur in the mitochondria?
- A. electron transport
 - ☒ B. glycolysis
 - C. citric acid (Krebs) cycle
 - D. formation of malic acid from fumaric acid
19. Acetyl-CoA entering the Krebs cycle can come from which of the following sources?
- A. β -oxidation of fatty acids
 - B. pyruvic acid
 - C. amino acids
 - ☒ D. B) and C)
 - ☒ E. A), B) and C)
20. Which type of food molecule provides components for cellular structures like plasma membranes, myelin sheaths, and steroid hormones?
- ☒ A. lipids
 - B. glucose
 - C. complex carbohydrates
 - D. protein

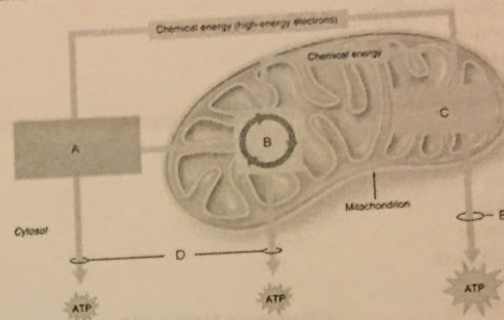
Use the diagram to answer the next two questions.

21. Involves sugar activation, sugar cleavage, oxidation, and ATP formation.

A. A
B. B
C. C
D. D
E. E

22. Occurs via substrate level phosphorylation.

A. A
B. B
C. C
D. D
E. E



23. The process of breaking triglycerides down into glycerol and fatty acids is known as _____.

A. gluconeogenesis
B. glycogenesis
C. lipogenesis
D. lipolysis

24. Which regulatory chemical stimulates gastric gland activity and motility?

A. secretin
B. CCK
C. gastrin
D. vasoactive peptide
E. histamine

25. Protective collections of lymphocytes and macrophages are found in _____.

A. Peyer's patches
B. the gastric pits
C. the muscularis externa
D. the muscularis mucosae
E. the intestinal crypts

26. How does the absorption of lipids differ from the absorption of carbohydrates and proteins in the small intestine?

A. Lipids are absorbed into capillaries; carbohydrates and proteins into lacteal
B. Lipids are not absorbed in the small intestine
C. Lipids are absorbed into lacteals; carbohydrates and proteins into capillaries
D. They are all absorbed into the same structure

27. The short reflexes in the digestive system are stimulated by _____.

A. the enteric nerve plexuses
B. higher brain centers
C. the parasympathetic system
D. the sympathetic system
E. the central nervous system

28. On the surface of the tongue, taste buds are associated with the:
- A. filiform papillae
 - B. gustatory papillae
 - ☒ C. fungiform papillae
 - D. A and B
 - E. B and C
29. The muscularis of most organs of the gastrointestinal tract consists of two layers of smooth muscle except in the:
- A. duodenum
 - B. ileum
 - ☒ C. rectum
 - ☒ D. stomach
 - E. esophagus
30. When NAD^+ is _____ it becomes NADH. When FADH_2 is _____ it becomes FAD.
- A. phosphorylated; deaminated
 - ☒ B. reduced; oxidized
 - C. made; recycled
 - D. phosphorylated; dephosphorylated
 - E. oxidized; reduced
31. The function of the hepatic portal circulation is to:
- A. carry toxins to the venous system for disposal through the urinary tract
 - ☒ B. collect absorbed nutrients for metabolic processing and storage
 - C. distribute hormones
 - D. return glucose to the general circulation when blood sugar is low
32. Which of the following is **not** a function of the digestive system?
- A. mechanical processing
 - B. absorption
 - C. secretion
 - ☒ D. ingestion
 - ☒ E. filtration
33. The layer of loose connective tissue that directly supports the digestive epithelium is the
- ☒ A. lamina propria.
 - B. muscularis mucosae.
 - C. submucosa.
 - D. submucosal neural plexus.
 - E. myenteric plexus.
34. The _____ are double sheets of peritoneal membrane that suspend the visceral organs and carry nerves, lymphatics, and blood vessels.
- A. serosa
 - B. adventitia
 - ☒ C. mesenteries
 - D. fibrosa
 - E. lamina propria

35. Sandwiched between the layer of circular and longitudinal muscle in the muscularis externa is the
- A. mucosa.
 - B. submucosa.
 - C. muscularis mucosa.
 - ☒ D. myenteric plexus.
 - E. submucosal neural plexus.
36. A stratified squamous epithelial lining can be found in all of the following **except** in the
- A. anal canal.
 - B. esophagus.
 - ☒ C. stomach.
 - D. oropharynx.
 - E. oral cavity.
37. Circular folds and intestinal villi
- ☒ A. increase the surface area of the mucosa of the small intestine.
 - B. carry products of digestion that will not pass through the walls of blood capillaries.
 - C. produce new cells for the mucosa of the small intestine.
 - D. secrete digestive enzymes.
 - E. produce hormones.
38. Put the following layers of the digestive tract wall in order from the lumen to the deepest layer.
- 1. lamina propria
 - 2. muscularis externa
 - 3. submucosa
 - 4. digestive (mucous) epithelium
 - 5. serosa
 - 6. muscularis mucosae
- A. 5, 2, 3, 6, 1, 4
 - ☒ B. 4, 1, 6, 3, 2, 5
 - C. 4, 6, 3, 1, 2, 5
 - D. 5, 4, 2, 6, 1, 3
 - E. 1, 4, 3, 6, 2, 5
39. Functions of the stomach include all of the following **except**
- A. storage of ingested food.
 - B. denaturation of proteins.
 - C. initiation of protein digestion.
 - ☒ D. absorption of triglycerides.
 - E. mechanical breakdown of food.
40. Chief cells secrete
- ☒ A. pepsinogen.
 - B. gastrin.
 - C. mucus.
 - D. hydrochloric acid.
 - E. intrinsic factor.
41. Gastric pits are
- A. ridges in the body of the stomach.
 - B. involved in absorption of liquids from the stomach.
 - ☒ C. openings into gastric glands.
 - D. acid scars in the esophagus.
 - E. hollows where proteins are stored.

42. During the intestinal phase of gastric regulation, _____
- ☐ A. the gastroenteric reflex reduces stomach activity
 - ☒ B. the stomach is initially stimulated and later inhibited
 - ☐ C. the enterogastric reflex is turned off
 - ☐ D. secretin causes more HCl release
43. A drug that blocks the action of carbonic anhydrase in parietal cells would result in
- ☐ A. a lower pH during gastric digestion.
 - ☒ B. a higher pH during gastric digestion.
 - ☐ C. decreased production of pepsinogen by chief cells.
 - ☐ D. increased protein digestion in the stomach.
 - ☐ E. decreased gastrin production.
44. The primary trigger for bile release is
- ☐ A. CCK
 - ☐ B. secretin
 - ☒ C. bile salts
 - ☐ D. the vagus nerve
 - ☐ E. bile canaliculus.
- A or C are both correct.*
45. The term essential amino acid refers to those amino acids that:
- ☐ A. contribute to structural proteins
 - ☐ B. are stored
 - ☒ C. the body cannot synthesize
 - ☐ D. become part of the metabolic reserves
 - ☐ E. must be made in the liver
46. Bile salts aid in the digestion of fats by _____ large fat droplets.
- ☐ A. dehydrating
 - ☐ B. anabolizing
 - ☐ C. binding
 - ☐ D. combining
 - ☒ E. emulsifying
47. The middle segment of the small intestine is the
- ☐ A. ileum.
 - ☐ B. duodenum.
 - ☒ C. jejunum.
 - ☐ D. pylorus.
 - ☐ E. cecum.
48. The teniae coli are
- ☐ A. tears of the colon.
 - ☒ B. longitudinal bands of smooth muscle in the colon wall.
 - ☐ C. ridges in the mucosa of the colon.
 - ☐ D. polyps that obstruct the sigmoid colon.
 - ☐ E. tumors normally confined in the sigmoid colon.

49. The enzyme amylase digests
- A. peptides.
 - ☒ B. polysaccharides.
 - C. disaccharides.
 - D. triglycerides.
 - E. nucleotides.
50. The major stimulus for the secretion of secretin is:
- A. the sight and aroma of food
 - B. entry of a bolus of food into the esophagus
 - C. CCK
 - D. distension of the stomach
 - ☒ E. entry of acidic chyme into the duodenum
51. The difference between the effects of secretin and the effects of CCK on the pancreas is that:
- A. secretin stimulates secretion of pancreatic juice, while CCK inhibits secretion of pancreatic juice.
 - B. secretin stimulates the acini of the pancreas, while CCK stimulates the pancreatic islets.
 - C. secretin stimulates alpha cells, while CCK stimulates beta cells.
 - ☒ D. secretin causes dilation of the pancreatic duct, while CCK causes constriction of the duct.
 - ☒ E. secretin stimulates secretion of pancreatic juice rich in bicarbonate, while CCK stimulates secretion of pancreatic juice rich in digestive enzymes.
52. The primary chemical digestion in the large intestine results from:
- A. the continued action of pancreatic juice
 - ☒ B. bacterial enzymes
 - C. hydrochloric acid
 - D. secretions by colonic epithelial cells
 - ☒ E. there is no chemical digestion in the large intestine
53. The creation of an acidic environment in the stomach lumen:
- A. is stimulated by histamine
 - ☒ B. is stimulated by gastrin
 - C. is energy-requiring
 - D. involves creation of a blood alkaline tide
 - ☒ E. all of the above
54. An ingested protein will be digested by enzymes secreted by the (please note that the organs do NOT have to be listed in the correct order): *pancreas*
- ☒ A. mouth, stomach, colon
 - ☒ B. small intestine, mouth, liver
 - ☒ C. pancreas, small intestine, stomach
 - D. stomach, liver, small intestine
 - E. stomach, liver, pancreas