

**GI Physiology TLE**  
**February 2, 1998**

1. Which of the following is not directly activated by the autonomic nervous system?
  - a) muscularis mucosa
  - b) lower esophageal sphincter
  - c) internal anal sphincter
  - d) upper esophageal sphincter
  - e) tenia coli
  
2. Atropine is a muscarinic cholinergic antagonist. Which of the following functions will not be altered by perfusion of the target cell with atropine.
  - a) acid secretion by the parietal cell
  - b) fluid secretion by the salivary acinar cell
  - c) contraction of ileal longitudinal smooth muscle
  - d) gastric emptying
  - e) relaxation of ileocecal sphincter
  
3. Which of the following best describes intracellular events in response to vasoactive intestinal peptide stimulation?
  - a) increase in nitric oxide synthase
  - b) activation of adenylate cyclase
  - c) activation of phospholipase C
  - d) activation of guanylate cyclase
  - e) activation of tyrosine kinase pathways
  
4. Which of the following is directly involved in carbohydrate digestion in the intestine?
  - a) carboxypeptidase lipase
  - b) intrinsic factor
  - c) GIP
  - d) isomaltase
  - e) pepsin
  
5. Which of the following will not occur in response to ingesting an appetizing meal?
  - a) An increase in osmolarity of salivary juice.
  - b) An increase in the proportion of blood flow to gastric muscles as compared to gastric mucosa.
  - c) A reverse gradient of  $[Na^+]$  and  $[O_2]$  from the base to the villus tip.
  - d) An increase in adenosine and histamine in the pancreatic vasculature.
  - e) Evidence for sympathetic driven autoregulation in intestinal vasculature.

6. Which of the following features does not set the smooth muscle apart from the skeletal muscle?
- a) large surface:volume ratio
  - b)  $\text{Ca}^{++}$  is the initial signal for contraction
  - c) absence of troponin
  - d) myosin light chain needs to be phosphorylated for actin myosin interaction
  - e) an actin:myosin ratio of  $> 2:1$
7. Which of the following is unlikely to occur as part of the enterogastric reflex?
- a) An increase in serum secretin.
  - b) Decrease in antral contractions.
  - c) Relaxation of the lower esophageal sphincter.
  - d) A decrease in parietal cell function.
  - e) Activation of neuronal pathways in the celiac plexus.
8. Which of the following is not associated with pancreatic function during digestion?
- a) Activation of adrenergic neurons by CCK to stimulate enzyme secretion.
  - b) Activation of cholinergic neurons by CCK to stimulate enzyme secretion.
  - c) Potentiation of CCK stimulated amylase release by secretin.
  - d) Increase in  $\text{CO}_2$  diffusion into ductal epithelium.
  - e) Cholinergic activation of acinar exocytosis to release lipase.
9. Which of the following would not occur as a consequence of falling serum  $\text{Ca}^{2+}$  levels?
- a) Decrease in serum parathyroid hormone.
  - b) Increase in serum 1,25 dihydroxy Vit D<sub>3</sub>.
  - c) Increase in serum parathyroid hormone.
  - d) Activation of enterocyte basolateral  $\text{Na}^+/\text{Ca}^{++}$  ATPase.
  - e) Increase in calbindin in venous effluent of the villus.
10. Which of the following would you expect to find in the colon of a gnotobiotic (grown in a sterile, germ free environment) animal fed the vegetarian lasagna meal designed in class?
- a) Short chain fatty acids
  - b) Taurolithocholic acid
  - c) Urobilinogen
  - d) Taurocholic acid
  - e) trypsin inhibitor

11. Which of the following cellular processes are inconsequential to the effectiveness of polysaccharide based oral rehydration therapy?
- a) epithelial polarity
  - b)  $\text{Na}^+/\text{K}^+$  ATPase
  - c)  $\text{Na}^+$ -glucose transporter (SGLT-1)
  - d) facilitated diffusion glucose carriers
  - e) enteropeptidase
12. Which of the following motility patterns is/are characteristic of normal physiology?
- a) Propulsion as a result of segmentation
  - b) Secondary peristalsis
  - c) Migratory myoelectric complexes
  - d) Haustral shuttling
  - e) All of the above.
13. Which of the following is not a crucial part of the defense mechanisms of the digestive system.
- a) Secretory component
  - b) Prostaglandins
  - c) Glycocalyx
  - d) Lingual lipase
  - e) UDP glucuronyl transferase
14. Patients diagnosed with inherited disorders of  $\text{Na}^+$ -dependent L-neutral amino acid carriers do not show drastic signs of protein deficiency. Which of the following best explains this?
- a) Presence of a  $\text{H}^+$ -dipeptide transporter on the BLM
  - b) Presence of a  $\text{H}^+$ -dipeptide transporter on the BBM
  - c) Presence of surface aminopeptidases
  - d) Presence of other Na-dependent L-neutral amino acid carriers
  - e) Increase in basolateral membrane facilitated diffusion carriers.
15. Cholera and cystic fibrosis are at the opposite ends of the spectrum of malfunctioning of epithelial fluid transport. Which of the following cellular processes is most directly affected in both these diseases?
- a) Basolateral membrane  $\text{K}^+$  channels
  - b) Apical membrane  $\text{K}^+$  channels
  - c) Apical membrane  $\text{Cl}^-$  channels
  - d) Apical membrane  $\text{Cl}^-/\text{HCO}_3^-$  exchangers
  - e) Tight Junctions

16. Arthritic patients administered non-steroidal anti-inflammatory drugs (NSAID) often develop ulcers. Which of the following mechanisms is **unlikely** to occur in these individuals.
- a) A decrease in vasodilation and therefore blood flow to the gastric mucosa
  - b) An increase in surface cell bicarbonate production
  - c) An increase in non-ionic NSAIDs into the gastric lamina propria
  - d) A decrease in neck cell mucus production
  - e) A decrease in gastric transepithelial barrier resistance
17. Which of the following is incorrect about bilirubin metabolism?
- a) Uptake into the hepatocyte is enhanced by the large fenestrations in the sinusoids
  - b) It is conjugated by specific nucleoside-dependent enzymes in the hepatic cytosol
  - c) It is hydrophilic and therefore requires special membrane transporters and readily diffuses in the cytosol and in the plasma
  - d) It exits the hepatocyte canalicular membrane via multi-organic anion transporters.
  - e) It has no physiological relevance and yet its incorrect metabolism has serious pathological consequences.
18. Which of the following will lead to fat malabsorption?
- a) Bile acid-dependent bile secretion.
  - b) Formation of mixed micelles in the intestinal lumen, comprised of 2-monoglycerides, phospholipids and cholesterol.
  - c) Lack of specific transporters for fatty acids in the brush border membrane leading to monomolecular diffusion
  - d) Decrease in pH of intestinal lumen to values below pKa of bile acids
  - e) Activation of lipase by co-lipase.
19. Which of the following would you expect to see following a normal swallow?
- a) Tertiary peristalsis
  - b) A "bird beak" profile when you do an upper GI scan with a radio-opaque dye
  - c) Secondary peristalsis
  - d) Diffuse contractions of the lower two thirds of the esophagus
  - e) Release of neurotransmitters from neuronal varicosities in the region of the esophagus adjoining the upper esophageal sphincter
20. Which of the following would you not expect to find in the gastric epithelium?
- a) An ATP-driven, H<sup>+</sup> pump located in elaborate tubulovesicular compartments.
  - b) Protein-filled zymogen granules near the apical membrane.
  - c) Protein-filled zymogen granules near the basolateral membrane.
  - d) High levels of carbonic anhydrase.
  - f) High levels of mobilferrin.

## Answers

1. D
2. E
3. B
4. D
5. B
6. B
7. C
8. A ?
9. A
10. D
11. E
12. E
13. D
14. B
15. C
16. B
17. C
18. C ?
19. C
20. E