

# Physiology

1. One of the followings with regard to the metabolic rate is NOT true:

- a. It represents the heat produced by a body per meter square surface area per hour.
- b. It is increased during sympathetic stimulation.
- c. To measure the BMR the tested person must be in sleep during measurement.
- d. It reflects the metabolic activities that are taking place in the body per time unit.
- e. O<sub>2</sub> consumption is used for indirect calorimetric measurements of metabolic rate.

2. With regard to haustral contractions at the colon, all the followings are true EXCEPT:

- a. Have propulsive effect over cecal content.
- b. Are phasic contractions.
- c. Are similar with segmentation contractions in the small intestine.
- d. Are present all the day.
- e. Initiated by activation of gastrocolic reflexes.

3. Compared to the BASAL RATE of salivary secretion, by parasympathetic stimulation all the followings are increased in the final saliva EXCEPT:

- a. pH of saliva.
- b. K<sup>+</sup> concentration.
- c. Amount of saliva.
- d. Cl<sup>-</sup> concentration.
- e. Na<sup>+</sup> concentration.

4. Which of the following is WRONG:

- a. Carboxypeptidases is an exopeptidases
- b. beta-glycosidase is present in human secretion
- c. iron is transported in the ferrous form rather than the ferric form.
- d. The final saliva is a hypotonic solution
- e. In intestine, bilirubin is transformed into urobilinogen

5. Wrong about leptin:

- a. is important in long term regulation of the body weight.
- b. Produced when there is high storage of fat in adipose cells
- c. acts on specific receptors in the hypothalamic centers
- d. activates feeding centers
- e. secreted by adipose cells

6. Right about proteins:

- a. continue the last part of digestion inside the enterocytes
- b. Absorbed as mono-amino acids only
- c. Their digestion starts in the mouth by the action of amylase
- d. Proline is absorbed by Na<sup>+</sup> independent carriers
- e. Most of its digestion takes place in the stomach

7. secretion of pancreatic enzymes by:

- a. Duct cells
- b. Endocrine portion of the pancreas
- c. Acinar cells
- d. Zymogen granules
- e. duodenal mucosa

8. wrong about lipids:

- a. Bile is used to solubilize lipid
- b. Digestion on brush border
- c. most of its digestion appears in the intestine
- d. Absorbed by simple diffusion
- e. Reform triglycerides inside epithelial cells in the intestine

9. about pancreas secretions:

- a. the pancreas secretes by exocrine secretion only, which empties into pancreatic duct
- b. Pepsinogen is secreted in the pancreas by acinar cells
- c. Pancreatic polypeptide increase pancreatic secretion
- d. Gastric phase of pancreatic secretion control is caused by amino acids and fatty acids
- e. high  $\text{Cl}^-$  in slow secretion & enterokinases activate the secreted enzymes

10. Wrong about mass contractions:

- a. Causes feces to be forced to move into the rectum
- b. facilitated by gastrocolic and duodenocolic reflexes
- c. Present all the day
- d. Mucosal irritation causes it to increase
- e. begin at transverse colon

11. Which of the following doesn't affect blood flow to the GI tract:

- a. CCK
- b. Secretin
- c. GIP
- d. CCI
- e. kinins

12. Which of the following causes mucosal block:

- a. B12
- b. Ca
- c. Vitamin K
- d. Fe
- e. Cl

13. About defecation:

- a. parasympathetic to muscle of anus
- b. Intrinsic reflexes caused by parasympathetic innervation
- c. Intrinsic reflexes are strong enough to cause defecation
- d. Voluntary act while defecation causes internal sphincter to relax
- e. Closure in glottis causes decreasing in abdominal pressure

14. Lowest RQ:

diabetic hyperglycemia

15. The absorption of ..... is not affected by blocking the activity of  $\text{Na}^+/\text{K}^+$  pump at the basolateral membrane of absorptive cells

- a. Galactose
- b. Dipeptides
- c.  $\text{Cl}^-$
- d. Vit D
- e. water

16. True about Leptin

- A- is secreted by endocrine cells along the GI
- B- gene defect that produces nonfunctional leptin hormone can induce obesity
- C- it acts on hypothalamus centers to increase food intake
- D- its concentration in blood is high in thin people
- E- low fat store in body in stimulatory factor for its secretion

17. blood flow to GI glands could be affected by all except

- A- autonomic nervous system
- B- submucosal plexus
- C- hormones secreted along GIT
- D- secretory glands stimulation
- E- Interstitial cells of Cajal

18. one of the following is true with regard to defecation reflexes in normal adult

- A- voluntary control is ensured by relaxation of external anal sphincter
- B- appears as series of voluntary reflexes after the distention of rectum
- C- generate motor activities which are present all the day over the colon
- D- the intrinsic component of the reflex is provided by sympathetic neurons
- E- as a result of increased activity of intrinsic reflex, defecation will follow without the voluntary stage of defecation

19. GI transit can decrease by ?

- A- muscarinic receptors activation
- B- release of VIP
- C- high cellulose in chyme
- D- lactase deficiency
- E- intestinal irritation

20. Wrong about RQ (respiratory quotient):

- A- it is higher when glucose is used as a source of energy
- B- it is higher in diabetic patients during crises
- C- brain tissue has the highest RQ
- D- increase by increasing the ratio of CO<sub>2</sub> production / O<sub>2</sub> consumption
- E- for a given body it is low in the third week of starvation

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

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21. Drug that acts to inhibit activity of lipase enzyme could result in

- A- Steatorrhea
- B- increased lipid absorption
- C- more formation of chylomicrons
- D- B12 deficiency
- E- affecting the formation of micells

22. Gastric HCL secretion can be decreased by stimulation of

- A- S cells (somatostatin releasing cells)
- B- Vagus nerve
- C- H<sub>2</sub> receptors a-somatostatin
- D- G cells
- E- Enterochromaffin like cells

23. True about salivary gland secretion

- A- during the low rate of secretion the final (secondary) saliva has lower K<sup>+</sup> concentration than primary saliva
- B- at high rate of secretion, it contains lower Cl<sup>-</sup> concentration than primary saliva
- C- decreases by unconditioned reflexes
- D- regulated by hormones secreted along the GIT
- E- condition reflexes are stimulating sympathetic control

24. Contractions along the intestine can be described by all EXCEPT

- A- tonic contractions are set by the activity of interstitial cells of Cajal
- B- the rhythm of segmentation contraction is set by basic electrical rhythm at that segment
- C- segmentation and peristaltic contractions propel chime in analward direction
- D- coordinated movements during peristaltic reflex need intact neural activities of myenteric plexus
- E- increased velocity of chime propulsion decreasing absorption of fluids

25. Which of the following is true regarding protein digestion

- A- pepsin is acting as exopeptidase
- B- optimal activity of pancreatic enzymes is at high PH
- C- the final digestion process is carried out by brush border enzymes
- D- pancreatic proteolytic enzymes are secreted from acinar cells as active enzymes
- E- pepsinogen is activated in duodenum by enterokinase

26. True about pancreatic secretion

- A- secretion is inhibited by pancreatic poly peptide
- B- pancreatic amylase is secreted from pancreas as inactive form
- C- optimal activity of pancreatic enzymes is at low PH
- D- enterokinase is important for activation of amylase
- E- at low rate of secretion concentration of CL-is lower than at high rate of secretion

27. Wrong about CCK (cholecystokinin)

- A- causes contraction of the gallbladder
- B- causes relaxation of Oddi sphincter
- C- activates pancreatic duct cells
- D- stimulates enzyme secretion from the pancreas
- E- its release is stimulated by high fat content in meal

28. Which of the following conditions results in steatorrhea?

- a. Deficiency of vitamin B12.
- b. Malabsorption of proteins.
- c. Lactase deficiency.
- d. Maldigestion of lipids.
- e. Decreased secretion of intrinsic factor.

29. Intrinsic factor is required for:

- a. Reabsorption of bile salts.
- b. Digestion of fat.
- c. Absorption of vitamin B12.
- d. Absorption of vitamin K.
- e. Absorption of Fe<sup>++</sup>.

30. The absorption of which of the following is blocked at the mucosa by absorptive cells and transported toward interstitial fluids when needed by the body?

- a. Mg<sup>++</sup>.
- b. Ca<sup>++</sup>.
- c. Fe<sup>++</sup>.
- d. Vitamin B12.
- e. Vitamin K.

31. The site where we have the highest absorption of fluids is

- a. Stomach.
- b. Duodenum.
- c. Jejunum.
- d. Ileum.
- e. Colon.

32. The final digestion of protein is taking place in (at):

- a. Stomach.
- b. Lumen of duodenum.
- c. Brush border of jejunum mucosa.
- d. Inside absorptive cells.
- e. Lumen of ileum.

33. Lowest respiratory quotient can be in:

- a. Vegetarians.
- b. High carbohydrate diet.
- c. High protein diet.
- d. Diabetics with crisis of hyperglycemia.
- e. Sleeping person.

Previously mentioned but without choices :)

34. One of the followings is true during starvation:

- a. The last depletion is for carbohydrate deposits.
- b. The body is in a positive balance.
- c. Their metabolic rate is higher than before starting starvation.
- d. The first depletion of body nutrient stores is for fat.
- e. The rate of protein depletion between weeks 1-6 is slower than for fat.

35. Feeding behaviors can be inhibited in all the following conditions EXCEPT:

- a. Increased leptin level in blood.
- b. Increased metabolic rate in the body.
- c. Increased Insulin level.
- d. Defect in OB gene.
- e. Increased fat deposits.

36. Tracing a food bolus along the GI tract, choose the correct chronological order of motility patterns that this bolus will go through:

- 1. Receptive Relaxation
- 2. Segmentation Contractions
- 3. Primary Peristaltic Wave
- 4. Pyloric Pump

- A. 1, 3, 4, 2
- B. 1, 3, 2, 4
- C. 3, 1, 4, 2
- D. 3, 2, 1, 4
- E. 2, 3, 1, 4.

37. Choose the correct statement regarding the interstitial cells of Cajal (ICCs):

- A. ICCs are responsible for tonic contraction of GI smooth muscle cells
- B. ICCs are responsible for the slow action potentials (slow waves) in smooth muscle
- C. ICCs are neurons that communicate with smooth muscle cells through gap junctions
- D. ICCs control ENS activity
- E. None of the above

38. All of the following are true about deglutition EXCEPT:

- A. It is initiated voluntarily
- B. It involves reflex centers in the brain
- C. Respiration is impeded during the esophageal phase
- D. It is less effective when lying down
- E. All of the above are true statements

39. A healthy 30-year-old man decides to indulge in a large meal at his favorite restaurant. Several hours later, he feels the urge to defecate, but manages to hold it. What local changes are taking place in this individual?

Option	Relaxation of the internal anal sphincter	Contraction of the external anal sphincter	Contraction of the rectum
A.	Yes	Yes	Yes
B.	Yes	Yes	No
C.	Yes	No	Yes
D.	No	Yes	Yes
E.	No	No	No

40. Which of the following would completely eliminate the cephalic phase of gastric secretion?

- A. Histamine H2 blockers
- B. CCK-B receptor blockers
- C. Vagotomy (i.e. cutting the vagus nerve or branches of it)
- D. Sympathectomy (i.e. cutting sympathetic nerves)
- E. Atropine

21. A	22. A	23. B	24. E	25. B	26. A	27. C	28. D	29. C	30. C
31. D	32. D	33. D	34. E	35. D	36. C	37. E	38. C	39. A	40. C

41. Three samples of saliva were obtained under different conditions and degrees of stimulation. Using the information mentioned below, choose the incorrect statement:

Saliva sample	Notes
Sample A	Among the three samples, it has the highest $[K^+]$
Sample B	The most alkaline saliva among the three samples
Sample C	Very poor in water and electrolytes

- A. The consistency of Sample (C) can most likely be produced in cases of "fight or flight"
- B. Among all samples, sample (B) is closest to plasma in composition
- C. High salivary flow rate is expected to produce sample (A) saliva
- D. ENS has no control over the production of any of the saliva samples
- E. More than one of the above

42. Loss of D cells increases acid secretion mainly by which of the following mechanisms:

- A. Increased acetylcholine release
- B. Reduced parietal cell inhibition
- C. Decreased gastrin secretion
- D. Decreased Secretin Release
- E. Parasympathetic stimulation

43. All of the following increase pancreatic secretion EXCEPT

- A. Cholecystokinin
- B. Secretin
- C. Acetylcholine
- D. Vasodilation of pancreatic blood vessels
- E. Pancreatic polypeptide

44. The effects of cholecystokinin on gallbladder smooth muscle, sphincter of Oddi, and exocrine pancreas, respectively, are:

- A. Contraction, contraction, stimulation of secretion from duct cells
- B. Contraction, contraction, stimulation of secretion from acinar cells
- C. Contraction, relaxation, stimulation of secretion from duct cells
- D. Contraction, relaxation, stimulation of secretion from acinar cells.
- E. Contraction, no effect, increase enzymatic secretions

45. Digestion and absorption of which of the following is NOT impaired by pancreatic insufficiency:

- A. Triglycerides
- B. Starch
- C. Vitamin D
- D. Proteins
- E. Sucrose

46. Choose the incorrect pair of (nutrient – mode of entry into absorptive cell):

- A. Glucose –  $Na^+$ -dependent mechanism
- B. Fructose – facilitated diffusion
- C. Bile salts – active transport
- D. Tripeptide –  $Na^+$ -independent mechanism
- E. Monoglycerides – simple diffusion

47. Which of the following is a similarity between calcium and iron absorption:

- A. Their absorption is increased by parathyroid hormone
- B. Their extent of absorption is enhanced by vitamins
- C. Their absorption requires binding to proteins secreted into the intestinal lumen
- D. Both are absorbed by passive mechanisms
- E. More than one of the above

48. Orlistat is an orally-administered medication used in management of obesity. It interferes with digestion. Possible side effects include steatorrhea. From a physiological perspective, which of the mechanisms proposed below most likely applies to Orlistat:

- A. Blocks fatty acid transporters on epithelial cells
- B. Inhibits pancreatic lipase activation by trypsin
- C. Interferes with Na<sup>+</sup> transport across intestinal epithelial cells
- D. Prevents triglyceride hydrolysis
- E. B+D

49. Provided below is a very brief health profile of four patients. Relying on this information, choose the correct statement afterwards:

Patient A	Suffers from COPD (a respiratory condition involving decreased gas exchange)
Patient B	Has untreated type 2 diabetes
Patient C	Suffers from obesity
Patient D	Suffers from underfeeding

- A. Patient C may have an overly active leptin hormone
- B. Patient A may benefit from increasing the proportion of fat in his diet
- C. Patient B has a higher respiratory quotient than a healthy non-diabetic individual
- D. Patient D has a higher respiratory quotient than a well-fed individual
- E. None of the above

50. The basal metabolic rate (BMR) was measured to be 58 Cal/hour using open-circuit indirect calorimetry. To confirm the results, the BMR was measured again using closed-circuit indirect calorimetry. Results are shown below. What should the final air volume in the spirometer be such that it yields an equivalent BMR?

(Note: Energy equivalent of oxygen consumption = 4.8 Cal/Liter of O<sub>2</sub> consumption)

Closed-circuit indirect calorimetry results	
Initial total air volume	15 Liters
Final air volume after 20 min of respiration	?

- A. 13 Liters
- B. 11 Liters
- C. 9 Liters
- D. 4 Liters
- E. 2 Liters

51. about pancreatic secretion, all true except:

- a-CCK increase enzymatic production.
- b- HCO<sub>3</sub> and water production is increased by secretin
- c- controlled by parasympathatic system.
- d-effected by blood flow to pancreas.
- e-decrease HCO<sub>3</sub> concentration during active secretion

52. about swallowing, all true except:

- a-composed of voluntary and involuntary phases.
- b-primary peristalsis is initiated at the pharynx
- c-secondary peristalsis is initiated in the esophagus by reminiscent of food in the esophagus.
- d- preceded by relaxation wave to open the lower esophageal sphincter.
- e- closure of epiglottis is voluntary.

53. which of the following produce the highest metabolic rate:

- a-sleep
- b-hypothyroidism.
- c-basal state.
- d-fever
- e- Malnutrition

54. Which one of the following might happen if there is deficiency in lipase?

- A. Steatorrhea
- B. Vitamin K deficiency
- C. Increased synthesis of chylomicrons
- D. Increased absorption of lipids
- E. More than one of the above

55. All of the following stimulate HCl secretion except:

- A. Gastrin
- B. Histamine
- C. Parasympathetic Stimulation
- D. Somatostatin

56. The remaining food particles in the esophagus initiate:

- A. Primary peristalsis
- B. Secondary peristalsis
- C. MMC

57. All the following may cause obesity except:

- A. overproduction of leptin
- B. Hypoparathyroidism
- C. OB gene abnormality
- D. Unresponsive leptin receptors

58. causes stimulation in the feeding centres:

- A. Increased metabolic rate
- B. Increased leptin hormone
- C. Low glucose level
- D. Distension of stomach and duodenum
- E. More than one of the above

59. All of the following are true regarding lipid digestion and absorption except:

- A. Pancreas secretes enzymes and coenzymes for lipid digestion
- B. Bile salts are important for micelle formation
- C. Micelle formation helps lipids absorption
- D. The digestion products of triglycerides (monoglycerides) are transported inside the absorptive cells by Na<sup>+</sup> dependent secondary transport
- E. Chylomicrons are formed inside the enterocytes and taken away from the villi by lacteals

60. One of the following is NOT a function of saliva:

- A. Keeping the mouth clean
- B. Facilitated the absorption of carbohydrates by oral mucosa
- C. Helps in stimulation of taste buds
- D. Has protective action
- E. Due to its much content, it facilitates the slippage of food bolus along the esophagus.

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41. C	42. B	43. E	44. D	45. E	46. D	47. B	48. D	49. B	50. B
51. E	52. E	53. D	54. E	55. D	56. B	57. A	58. E	59. D	60. B



1. blood flow toward gastrointestinal tract is controlled by all of the following , except :  
ICC ( interstitial cells of cajal)
2. all of the following may describe the contraction that appear along the small intestine except :  
increased velocity of chyme propulsion may lead to an increased intestinal absorption
3. one of the following describes pepsinogens :  
more than one of the above ( secreted mainly by chief cells + more active in media with low ph )
4. gastric HCl secretions is increased by all of the following except :  
activation of enterogastric reflex
5. one of the following concerning pancreatic secretion is not true :  
HCO<sub>3</sub><sup>-</sup> is decreased at high rate of secretion
6. One of the following about digestion of protein is true :  
some of the digestion processes are carried out by brush border & cytosomal peptidases
7. one of the followings with regard to fat absorption is true :  
none of the above
8. by blocking the activity of Na<sup>+</sup>/K<sup>+</sup> pump at absorptive cells , this will affects :  
water
9. with regard the absorption of vitamins , one of the following is not true :  
vitamin A is absorbed by facilitated diffusion
10. all of the following with regard to RQ are true except :  
increasing by decreasing the ratio of CO<sub>2</sub> production / O<sub>2</sub> consumption
11. in normal person , feeding can be stimulated by increasing  
body metabolic rate
12. one of the following about starvation is true :  
depletion of proteins appear in 3 phases
13. Which of the following is true  
Gastric secretion decreases with enterogastric reflex
14. Is under neural control only:  
Salivary secretion
15. pepsin is activated by low PH  
pepsin is activated by low PH
16. what is wrong about absorption in the following statements:
  - a. Vit D absorption is decreased in conditions of steatorrhea
  - b. Vit K is removed from villus by lacteals
  - c. Vit A absorption is through facilitated diffusion\*\*\*
  - d . more than one of the above
  - e. none of the above
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