



Physiology  
Team  
434



# REVISION

## GIT PHYSIOLOGY

### (Midterm Exam, L1-L6)

(MCQS + Important Notes)

**DONE BY:**

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1. Muscles in the propulsive and receiving segments of the GI tract respond differently to food movement through the gut. Which of the following statements correctly describes activity in the propulsive segment?
  - A. The circular and longitudinal muscles are contracted.
  - B. The longitudinal muscles are contracted and the circular muscles are relaxed.
  - C. Both the longitudinal muscles and circular muscles are relaxed.
  - D. The circular muscles are contracted and the longitudinal muscles are relaxed.**
2. Which of the following is characteristic of the segmenting movements in the small intestine?
  - A. It decreases particle size, which increases the surface area for digestion.
  - B. It brings the products of digestion to the mucosal surface for absorption.
  - C. It results in the mixing of the luminal contents in front of the propulsive segments (i.e. in the receiving segments)
  - D. All of the above.**
3. Which of the following is NOT involved in swallowing?
  - A. Contracture of the upper esophageal sphincter.**
  - B. Coordination by the swallowing center in the medulla oblongata.
  - C. The approximation of the vocal cords to close the glottis.
  - D. The raising of the larynx to close its entrance.
4. Choose the correct listing of the anatomical divisions of the stomach in the direction food normally passes.
  - A. Corpus, fundus, antrum.
  - B. Fundus, antrum, corpus.
  - C. Antrum, corpus, fundus.
  - D. Fundus, corpus, antrum.**
5. Which of the following salivary components continues to be active in the acidic environment of the stomach?
  - A. Alpha-amylase
  - B. Lingual lipase.**
6. If you follow the path that food normally takes through the digestive system, which of the following is in the correct order?
  - A. Upper esophageal sphincter, epiglottis, lower esophageal sphincter, pyloric canal, duct of Santorini, duct of Wirsung.
  - B. Pharynx, epiglottis, lower esophageal sphincter, pyloric canal, duct of Wirsung, duct of Santorini.
  - C. Pharynx, epiglottis, lower esophageal sphincter, pyloric canal, duct of Santorini, duct of Wirsung.**
  - D. Pharynx, upper esophageal sphincter, pyloric canal, lower esophageal sphincter, duct of Wirsung, duct of Santorini.



7. Pancreatic secretions have many of the same ions that plasma does, only the concentrations and their rate of secretion are different. Which of the following is true?
- A. A higher rate of pancreatic secretion results in increased bicarbonate and sodium ion. Plasma has less bicarbonate and more sodium.
  - B. A higher rate of pancreatic secretion results in increased bicarbonate and decreased chloride ion. Plasma has less bicarbonate and more chloride.**
  - C. A higher rate of pancreatic secretion increases its osmolarity and pH. Plasma has a lower osmolarity as pancreatic secretions.
  - D. A higher rate of pancreatic secretion results in increased bicarbonate and potassium ion. Plasma has lower levels of both ions.
8. Which of the following has little effect on pancreatic secretion or its components?
- A. Acetylcholine.
  - B. Sympathetic stimulation.**
  - C. Secretin
  - D. Cholecystokinin
  - E. VIP
9. Defective parietal cells would result in malabsorption of which vitamin?
- A. Vitamin B1
  - B. Vitamin B2
  - C. Niacin
  - D. Vitamin B12**
  - E. Folic acid.
10. Which of the following is absorbed primarily by passive diffusion powered by a concentration gradient?
- A. Sodium
  - B. Potassium**
  - C. Calcium
11. Of the approximately 9 liters of water that go through the GI tract daily, how much makes it out in the feces?
- A. 100 ml**
  - B. 1000 ml
  - C. 2000 ml
  - D. 1500 ml
  - E. 500 ml
12. The progressive wave of muscle contractions that proceeds along the esophagus, compressing the lumen and forcing food ahead of it is called:
- A. primary peristalsis**
  - B. segmentation
  - C. the migrating myoelectric complex
  - D. mass movement



13. Vitamin B12 is absorbed mainly in the:

- A. stomach
- B. ileum**
- C. colon
- D. jejunum

14. Saliva contains the carbohydrate-digesting enzyme:

- A. pepsin
- B. carboxypeptidase
- C. amylase**
- D. trypsin
- E. lipase

15. Which is the primary absorptive organ of the digestive system?

- A) small intestine**
- B) stomach
- C) colon
- D) pancreas

16. Which tissue layer provides for primary digestive motility?

- A) Mucosa
- B) submucosa
- C) mesentery
- D) muscularis mucosa**

17. during swallowing:

- A) All processes are consciously controlled
- B) the swallowing center located in the medulla oblongata inhibits the medullary respiratory center**
- c) the food bolus is forced down the esophagus by gravity

18. Proteins are primarily digested to and absorbed as...

- A) amino acids**
- B) monosaccharides
- C) nucleic acids
- D) fatty acids & glycerol

19. HCL secretion by the stomach...

- A) Is triggered by chewing
- B) denatures proteins
- C) activates enzymes that digest proteins
- D) all of these**

20. What prevents food from entering the nasal passages during swallowing?

- A) elevation of uvula**
- B) contraction of pharyngeal muscles
- C) apposition of vocal folds
- D) elevation of epiglottis



21. The serosa is...
- A) abdominal cavity containing the stomach inner lining of the digestive tract
  - B) outer connective tissue covering of the digestive tract**
22. Some absorption occurs in the large intestine, but this is mostly limited to...
- A) amino acids
  - B) water & electrolytes**
  - C) fatty acids
23. The major chemical digestive activity that takes place in the stomach is...
- A) breakdown of starch
  - B) breakdown of proteins**
  - C) digestion of fats
  - D) neutralization of acid by buffers & mucous
24. Bile acts on...
- A) distention in the stomach
  - B) acid in the stomach
  - C) fat in the stomach
  - D) fat in the duodenum**
25. Chief cells of gastric mucosa secrete...
- A) Trypsin
  - B) bicarbonate ions
  - C) pepsinogen**
  - D) HCL
26. Which of the following is true about pancreatic secretions?
- A) CCK causes release of bicarbonate
  - B) secretin causes release of enzymes
  - C) gastrin stimulates release of enzymes
  - D) CCK stimulates release of enzymes while secretin stimulates release of bicarbonate**
27. The hormone that inhibit gastric secretion and motility is...
- A) Gastrin
  - B) histamine
  - C) secretin**
  - D) Pepsin
28. Intrinsic factor is...
- A) secreted by parietal cells and is responsible for vitamin B12 absorption**
  - B) not necessary for normal body function
  - C) abundant in pernicious anemia
  - D) an aminopeptidase



29. The ileocecal sphincter:

- A) Prevents acid from entering the esophagus
- B) prevents bacterial growth in the stomach
- C) prevents bacterial infection of small intestine**
- D) inhibits gastric emptying

30. The intrinsic nerve plexuses...

- A) are located in the mucosal region
- B) network of neurons that act as "gut" brain
- C) are made up of two plexuses
- D) B+C**

31. Lipids:

- A) are broken down by pepsin
- B) are absorbed into lacteals
- C) become part of micelles in the duodenum
- D) B+C**

32. Which of the following would most likely decrease the number of spike potentials generated in the GI smooth muscle?

- A) Sympathetic Stimulation**
- B) Acetylcholine
- C) Stretching of the muscle

33. Which of the following is the main digestible carbohydrate normally consumed in the human diet?

- A) Starch**
- B) Cellulose
- C) Maltose

34. Inhibition of myenteric plexus leads to which of the following conditions?

- A) Decrease in gut motility**

35. Stimulation of the submucosal plexus results in an increase in which of the following?

- A) Stomach PH
- B) Secretion of the gut**
- C) Motility of the gut

36. Inhibition of vagal function has the greatest effect on which segment of the alimentary tract?

- A) Anal sphincter
- B) Descending colon
- C) STOMACH**



37. The volume of food in the stomach has which of the following effects on stomach emptying?

As the volume increases, the rate of emptying increases

38. Which of the following is true of the gastro enteric reflex?

B) It leads to defecation

C) It stimulates contractions of the colon

A) It leads to increased peristaltic activity in the small intestine

39. Which of the following decreases blood flow to the villi of the small intestine?

B) Norepinephrine

40. A patient with **trigeminal** neurapraxia (temporary segmental demyelination of the trigeminal nerve leading to conduction difficulties) would have the greatest difficulty with which of the following activities?

A) Secondary peristalsis in the esophagus

B) Swallowing

C) Secondary peristalsis in the esophagus

D) Chewing

41. Sodium export through the brush border of the intestinal epithelial cells occurs by which of the following mechanisms?

A): passive diffusion

B) Facilitated diffusion

42. Which of following digestive organs does not show peristalsis:

A) Esophagus

B) Stomach

C) Small intestine

D) Caecum

43. Regarding slow-waves:

A) Cause Muscle contractions by themselves.

B) Are Action potential

C) Cause Sodium Ions to Enter.

D) Cause by interaction between smooth muscle cells and interstitial cells of Cajal.

E) Both C+D



## Important Notes:

- ICC are involved in the generation of slow waves, which trigger action potentials.
- Each action potential gives rise to a twitch-like contraction; if the frequency of action potentials is sufficient, a tonic-like level of contraction is observed.
- Elevation of intracellular calcium is required to initiate this contraction.
- Smooth muscle fibers are coupled via gap junctions allowing low resistance propagation of electrical signals through the fibers.
  
- THE MUCOSAL LAYER IS THE INNERMOST LAYER, IT CONSISTS OF:

### 1-MUCOUS EPITHELIUM:

LOCATION	TYPE
MOUTH, OROPHARYNX, ESOPHAGUS, ANUS	STRATIFIED SQUAMOUS
REMAINDER OF THE G.I. TRACT	SIMPLE COLUMNAR

- 2-LOOSE CONNECTIVE (LAMINA PROPRIA).
- 3-THIN MUSCLE LAYER (MUSCULARIS MUCOSA).

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## -CHARACTERISTICS OF G.I. WALL:

- FUNCTIONS AS A SYNCYTIUM.
- BUNDLES OF 1000+ FIBERS.
- FIBERS ELECTRICALLY CONNECTED BY GAP JUNCTIONS.
- IMPULSE TRAVELS RAPIDLY FROM FIBER TO FIBER.
- CONTINUAL SLOW ELECTRICAL ACTIVITY.

-ALLOWS FOR TWO BASIC TYPES OF WAVES:	
<b>1-SLOW WAVES:</b>	<b>2-SPIKES:</b>
<ul style="list-style-type: none"> <li>-ARE NOT ACTION POTENTIALS</li> <li>-SLOW UNDULATING CHANGES IN THE MEMBRANE POTENTIAL</li> <li>-OCCURS 3 PER MINUTE IN STOMACH AND 12 PER MINUTE IN SMALL INTESTINE</li> </ul>	<ul style="list-style-type: none"> <li>-TRUE ACTION POTENTIALS</li> <li>-OCCUR AUTOMATICALLY WHEN RESTING POTENTIAL</li> <li>-GOES BELOW 40 MILLI VOLTS= 1-10 SPIKES PER SECOND</li> </ul>





**-NEURAL CONTROL- ENTERIC NERVOUS SYSTEM:**

- FROM ESOPHAGUS TO ANUS.
- LOCATED IN WALL OF GUT.
- NEURONS NUMBER 100 MILLION- SAME NUMBER AS FOUND IN THE SPINAL CORD.
- TWO PLEXUS OF NERVES: MYENTERIC PLEXUS - SUBMUCOSAL PLEXUS.
- CONTROLS GASTRO-INTESTINAL MOVEMENT AND SECRETION.

Innervation in GIT	
-PARASYMPATHETIC- PRE GANGLIONIC	-SYMPATHETIC- POST GANGLIONIC
<ul style="list-style-type: none"> <li>-CRANIO-SACRAL.</li> <li>-INCREASE ACTIVITY OF ENTERIC SYSTEM.</li> <li>-SOME MAY BE INHIBITED.</li> <li>- ACETYLCHOLINE.</li> </ul>	<ul style="list-style-type: none"> <li>-ORIGIN- T5-L2, INHIBITS ACTIVITY</li> <li>-THORACO-LUMBAR</li> <li>-SLIGHT EXTENT INHIBITS BY NOREPINEPHRINE ON SMOOTH MUSCLE AND GREATER EXTENT ON ENTERIC SYSTEM</li> </ul>

**-NEURO-TRANSMITTERS:**

- ACETYLCHOLINE- PARASYMPATHETIC.
- NOREPINEPHRINE- SYMPATHETIC.
- CHOLECYSTOKININ- AT GALL BLADDER.

**Volume:**

- Saliva= 800 – 1500 ml\day = (1.5 L/day)
- Water in saliva= 0.5 L saliva\day
- Gastric juice= 2-3 l\day
- Stomach can store= 0.8 – 1.5 L of food
- Pancreatic secretion= 1.2 – 1.5 L\day

**PH:**

- Saliva = 6-7 (Acidic)
- Pepsin= 1.5-3.5
- Succus Entericus= 7.5 – 8
- Gastric juice= 0.8
- Pancreatic enzymes activity = 8

Hormones/Enzymes	Secreted cells	Function
<b>Pepsinogen</b>	chief cells	Digestion of Proteins
<b>Lipase enzyme</b>	Fundus mucosa	hydrolyze TAG to MG&FA
<b>Alpha-Amylase</b>	Salivary glands and Pancreas	Digestion of CHO
<b>Intrinsic factor</b>	parietal cells (oxyntic)	Absorption of B12 in Ilium
<b>VIP</b>	-	Relaxation of Gastroesophageal stomach
<b>GRP</b>	-	Stimulation of Gastrin (G cells)
<b>GIP</b>	K cells	Inhibit emptying of stomach + decreases gastric secretion + increase secretion of insulin
<b>Gastrin</b>	G-cells	Stimulation of Parietal cells + contraction of gastroesophageal Sphincter
<b>HCL</b>	parietal cells (oxyntic)	Increase digestion and motility of Stomach
<b>Mucus &amp; HCO<sub>3</sub></b>	Mucus Neck Cells	Neutralization the acidity
<b>Secretin</b>	S-cells	Inhibit emptying of Stomach + relaxation of gastroesophageal sphincter + increase HCO <sub>3</sub> secretion from the pancreas + decrease gastric secretion
<b>Enterogastrones</b>	intestines	inhibitory hormones
<b>CCK</b>	I-cells in duodenum and jejunum	Inhibit emptying of Stomach + relaxation of gastroesophageal sphincter + increase pancreatic enzymes + contraction of gall bladder

- Pepsinogen is converted to pepsin by: **HCL**
- The hunger pangs are felt in: **Stomach**
- SOME SHORT CHAIN FATTY ACIDS ARE DIRECTLY ABSORBED INTO THE BLOOD SYSTEM.
- Trypsinogen** is converted to trypsin by: **Enterokinase or Trypsin**
- Chymotrypsinogen, Procarboxypeptidase** are converted to their active forms by **Trypsin**.

*Good luck*

*We are not what happened to us, we are what we choose become.*