University of Central Florida (UCF) PCB3703C Human Physiology Exam 4 Practice (Sample)

Study Guide

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Questions

1. What are the three phases of gastric secretion?

   A. Cephalic, gastric, intestinal

   B. Digestive, storage, elimination

   C. Absorption, secretion, metabolism

   D. Oral, gastric, intestinal

2. Which component is part of the wall of the GI tract?

   A. Subcutaneous layer

   B. Mucous membranes

   C. Serous membrane

   D. Dermal layer

3. What is one potential risk associated with a sliding hiatus hernia?

   A. Constipation

   B. Esophagitis

   C. Diarrhea

   D. Weight gain

4. What happens to potassium during Cajal cell depolarization?

   A. It flows inside the cell

   B. It leaves the cell

   C. It remains unchanged

   D. It combines with sodium

5. What condition can result from the deficiency of sex hormones due to hypocholesterolemia?

   A. Hypoglycemia

   B. Hypergonadism

   C. Infertility

   D. Hypertension

6. Which fiber type carries sensory information, such as from chemoreceptors and mechanoreceptors, to the brainstem?

A. Efferent fibers

B. Afferent fibers

C. Autonomic fibers

D. Contractile fibers

7. A patient presents with postprandial pain and vomits fresh blood. What might be the diagnosis?

A. Cholecystitis

B. Gastritis

C. Pneumonia

D. Pancreatitis

8. Which demographic treatment option for cirrhosis is mentioned?

A. Insulin therapy

B. Fluid extraction procedures

C. Antibiotic treatment

D. Chemotherapy

9. What is the result of cholecystokinin (CCK) stimulation on the gallbladder?

A. Decreased contractility

B. Increased contractility

C. Inhibition of bile production

D. Relaxation of the sphincter of Oddi

10. Which system plays a key role in the control of GI functions?

A. Endocrine system

B. Musculoskeletal system

C. Nervous system

D. Respiratory system

Answers

1. A
2. B
3. B
4. A
5. C
6. B
7. B
8. B
9. B
10. C

Explanations

1. What are the three phases of gastric secretion?

A. Cephalic, gastric, intestinal

B. Digestive, storage, elimination

C. Absorption, secretion, metabolism

D. Oral, gastric, intestinal

The three phases of gastric secretion are indeed the cephalic, gastric, and intestinal phases. In the cephalic phase, the anticipation of food and sensory stimuli (such as the sight, smell, and taste of food) trigger the brain to signal the stomach to prepare for digestion. This phase stimulates gastric secretions even before food enters the stomach. The gastric phase follows, which occurs once food enters the stomach. This phase is characterized by the secretion of gastric acid and enzymes that continue the digestion process, aided by the physical presence of the food. Stretching of the stomach wall and the presence of peptides in the stomach stimulate gastric secretions in this phase. Finally, the intestinal phase occurs as partially digested food moves into the small intestine. This phase involves the regulation of gastric secretion in response to the contents of the small intestine, as intestinal hormones and local feedback mechanisms are activated to ensure that gastric activity is balanced with the digestive needs of the intestine. The other options do not accurately define the phases of gastric secretion. The digestive, storage, and elimination phases refer to broader processes in digestion, while absorption, secretion, and metabolism cover more general functions of the gastrointestinal system but do not pertain specifically to gastric secretion. Similarly, oral,

2. Which component is part of the wall of the GI tract?

A. Subcutaneous layer

B. Mucous membranes

C. Serous membrane

D. Dermal layer

The mucous membranes are an integral part of the wall of the gastrointestinal (GI) tract. These membranes line the lumen of the GI tract from the mouth to the anus and are composed of epithelial tissue that secretes mucus, which plays several key roles. The mucus serves as a lubricant, facilitates the movement of food through the digestive system, and protects the underlying tissues from the abrasive nature of food and from digestive enzymes. Additionally, the mucous membranes are involved in the absorption of nutrients. In contrast, the other options do not form part of the GI tract wall. The subcutaneous layer is a layer of connective tissue that primarily supports skin and is not found in the walls of the GI tract. The serous membrane, while associated with body cavities and organs, does not directly make up the wall of the GI tract; instead, it provides a protective outer lining to some abdominal organs. The dermal layer refers specifically to skin structure and is not relevant to the internal architecture of the GI tract.

3. What is one potential risk associated with a sliding hiatus hernia?

A. Constipation

B. Esophagitis

C. Diarrhea

D. Weight gain

A sliding hiatus hernia occurs when a portion of the stomach pushes through an opening in the diaphragm into the chest cavity. This condition can lead to gastroesophageal reflux disease (GERD), where stomach acid flows back into the esophagus. One of the significant complications of GERD is esophagitis, which is the inflammation of the esophagus due to the irritating effects of gastric acid. This inflammation can result in symptoms such as heartburn, difficulty swallowing, and pain. If left untreated, chronic esophagitis may lead to more serious conditions, including esophageal ulcers or Barrett's esophagus. In contrast to esophagitis, the other listed options are less directly associated with a sliding hiatus hernia. For example, constipation and diarrhea are primarily related to gastrointestinal motility issues and dietary factors rather than mechanical effects of a hernia. Weight gain may be a consequence of lifestyle factors rather than a direct risk connected to the presence of a sliding hiatus hernia. Thus, esophagitis stands out as a pertinent risk directly linked to the complications that may arise from this condition.

4. What happens to potassium during Cajal cell depolarization?

A. It flows inside the cell

B. It leaves the cell

C. It remains unchanged

D. It combines with sodium

During Cajal cell depolarization, potassium does not flow inside the cell; rather, it moves in the opposite direction. When a cell depolarizes, typically, the membrane potential becomes less negative due to the influx of positive ions, primarily sodium, rather than potassium, which is usually involved in repolarization. In the context of depolarization, potassium ions are more concentrated inside the cell compared to outside. During this phase, voltage-gated sodium channels open, allowing sodium ions to enter and causing the depolarization. As the cell repolarizes following this phase, potassium channels open, enabling potassium to leave the cell, which helps restore the resting membrane potential. Thus, during the depolarization of Cajal cells, potassium actually tends to remain unchanged initially, and it is the influx of sodium that primarily contributes to depolarization. Therefore, the correct understanding of potassium's behavior during this process is that it is not flowing inside the cell.

5. What condition can result from the deficiency of sex hormones due to hypocholesterolemia?

A. Hypoglycemia

B. Hypergonadism

C. Infertility

D. Hypertension

The correct answer, infertility, results from a deficiency of sex hormones, which can occur in conditions associated with hypocholesterolemia. Cholesterol is a crucial precursor for the synthesis of steroid hormones, including sex hormones like estrogen and testosterone. When levels of cholesterol are low, the body may struggle to produce sufficient amounts of these hormones, leading to disruptions in reproductive function. Infertility can manifest as irregular menstrual cycles in females or reduced sperm production in males. This hormonal imbalance can inhibit various bodily functions related to reproduction, making it difficult for individuals to conceive. Therefore, the link between low cholesterol levels and impaired sex hormone production directly correlates to the risk of infertility. Understanding this relationship highlights the importance of maintaining healthy cholesterol levels for overall hormonal balance and reproductive health.

6. Which fiber type carries sensory information, such as from chemoreceptors and mechanoreceptors, to the brainstem?

A. Efferent fibers

B. Afferent fibers

C. Autonomic fibers

D. Contractile fibers

Afferent fibers are responsible for transmitting sensory information from peripheral receptors, such as chemoreceptors, which detect changes in chemical concentrations, and mechanoreceptors, which respond to mechanical pressure or distortion, to the central nervous system. The sensory data gathered by these receptors is crucial for the brain to interpret and respond to the surrounding environment. In contrast, efferent fibers carry signals away from the central nervous system to effectors, such as muscles and glands, thereby controlling movements and functions. Autonomic fibers are a subset of efferent fibers specifically involved in involuntary bodily functions. Contractile fibers, on the other hand, refer to muscle fibers responsible for muscle contraction and movement, rather than the transmission of sensory information. Overall, it is the afferent fibers that play the essential role in relaying sensory information to the brainstem, making this the correct answer.

7. A patient presents with postprandial pain and vomits fresh blood. What might be the diagnosis?

A. Cholecystitis

B. Gastritis

C. Pneumonia

D. Pancreatitis

The scenario of postprandial pain accompanied by vomiting fresh blood strongly suggests a diagnosis of gastritis. Gastritis is characterized by inflammation of the stomach lining, and it can manifest with symptoms following meals, especially if the inflammation is aggravated by the ingestion of certain foods or irritants. The presence of fresh blood in the vomit indicates that there may be erosion or bleeding in the gastric mucosa, which is a common complication of gastritis. In the case of gastritis, the condition may be acute or chronic, with acute cases often triggered by factors such as excessive alcohol consumption, stress, or infection (e.g., Helicobacter pylori). The timing of the pain after eating aligns with gastritis since the stomach lining may become more irritated as food is consumed, leading to discomfort and complications like bleeding. While other conditions such as cholecystitis, pancreatitis, or pneumonia could cause abdominal pain, they do not typically present with vomiting fresh blood as a prominent feature. For example, cholecystitis is related to gallbladder inflammation and generally presents with pain in the right upper quadrant rather than specifically postprandial symptoms coupled with hematemesis. Pancreatitis can cause abdominal pain and nausea but does not usually

8. Which demographic treatment option for cirrhosis is mentioned?

A. Insulin therapy

B. Fluid extraction procedures

C. Antibiotic treatment

D. Chemotherapy

Fluid extraction procedures are relevant in the management of cirrhosis, particularly to alleviate complications associated with the condition. Patients with cirrhosis often develop ascites, which is the accumulation of fluid in the abdominal cavity. This can lead to significant discomfort and an increased risk of infections, such as spontaneous bacterial peritonitis. Fluid extraction, commonly performed through a procedure called paracentesis, involves the removal of excess fluid from the abdomen. This intervention not only provides symptomatic relief but also aids in the accurate assessment of the underlying condition, as the fluid can be analyzed for diagnostic purposes. In cases where ascites is tense or resistant to diuretics, this procedure becomes a critical part of managing the patient's overall care. The other options listed have different clinical applications and do not specifically target the management of cirrhosis itself in the same direct manner. Insulin therapy pertains primarily to diabetes management, antibiotic treatment is generally used for infections rather than for cirrhosis directly, and chemotherapy is typically associated with cancer treatment rather than liver disease management.

9. What is the result of cholecystokinin (CCK) stimulation on the gallbladder?

A. Decreased contractility

B. Increased contractility

C. Inhibition of bile production

D. Relaxation of the sphincter of Oddi

Cholecystokinin (CCK) plays a critical role in the digestion of fats and proteins by influencing the gallbladder's function. When CCK is released, typically in response to the presence of fats and proteins in the small intestine, it stimulates the gallbladder to contract. This contraction is crucial for the expulsion of bile, which is necessary for the emulsification and digestion of fats. The increased contractility of the gallbladder facilitated by CCK leads to the release of bile into the duodenum, supporting the digestive process. This action helps ensure that dietary fats are effectively broken down and absorbed. In contrast, the other options involve mechanisms that are not aligned with the physiological effects of CCK. For example, decreased contractility would impede bile release, inhibiting digestion rather than aiding it. Similarly, CCK enhances bile production but does not inhibit it. The relaxation of the sphincter of Oddi is also an action stimulated by CCK, but the primary effect regarding the gallbladder is its contraction, leading to increased contractility and subsequent bile release. Thus, the understanding of CCK's role ultimately reinforces why increased contractility is the correct outcome concerning the gallbladder's response to this hormone

10. Which system plays a key role in the control of GI functions?

A. Endocrine system

B. Musculoskeletal system

C. Nervous system

D. Respiratory system

The nervous system plays a crucial role in the control of gastrointestinal (GI) functions by integrating complex reflexes and regulating both voluntary and involuntary activities involved in digestion. This system includes the central nervous system (CNS) and the enteric nervous system, which is often referred to as the "second brain" because of its autonomy and capability to manage gut behavior independently. The enteric nervous system coordinates various aspects of digestion, such as peristalsis (the contraction wave that moves food through the GI tract), secretion of digestive enzymes, and blood flow to the digestive organs. Additionally, the CNS influences GI activity through hormones and neurotransmitters, allowing for a responsive relationship between the brain and digestive functions. This integration is essential for ensuring that the body effectively processes food, absorbs nutrients, and eliminates waste. In contrast, other systems like the endocrine system also contribute to GI regulation via hormones, but their action is often slower and not as immediate as that of the nervous system's reflexes. The musculoskeletal system and the respiratory system do not play a direct role in the control of GI functions; instead, they support other body functions unrelated to digestion.