

University of Central Florida (UCF) PCB3703C Human Physiology Lab Practice Exam 2 (Sample)

Study Guide



Everything you need from our exam experts!

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Questions

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1. Where are B lymphocytes processed?
 - A. Thymus
 - B. Liver
 - C. Bone marrow
 - D. Spleen
2. Which of the following is true about the role of the small intestine?
 - A. It is primarily a site for food storage.
 - B. It absorbs water but not nutrients.
 - C. It is where most nutrient absorption occurs.
 - D. It secretes digestive hormones only.
3. What distinguishes innate immunity from adaptive immunity?
 - A. Innate immunity develops over time, while adaptive does not
 - B. Innate immunity is specific to pathogens, adaptive is not
 - C. Innate immunity is immediate and non-specific, adaptive is specific and develops over time
 - D. Innate immunity is stronger than adaptive immunity
4. Lymphocytes are known to attack which types of infections?
 - A. Bacterial and viral
 - B. Fungal and viral
 - C. Bacterial, viral, and fungal
 - D. Bacterial, viral, fungal, and leukemia
5. What are the structures that connect the AV valves to the papillary muscles?
 - A. Chordae tendineae
 - B. Coronary arteries
 - C. Septal bands
 - D. Suspensory ligaments

6. How does the immune system differentiate between self and non-self cells?
- A. By recognizing antigen patterns on pathogens
 - B. By counting cell surface markers
 - C. By measuring cell size
 - D. By observing cell mobility
7. What is the role of platelets in the circulatory system?
- A. Carrying oxygen to tissues
 - B. Forming the immune response
 - C. Clotting blood
 - D. Transporting nutrients
8. What is a major function of insulin in the body?
- A. Enhancing heart rate
 - B. Lowering blood glucose levels
 - C. Increasing blood pressure
 - D. Stimulating appetite
9. What do osmoreceptors primarily detect?
- A. Changes in plasma phosphorus levels
 - B. Changes in plasma osmolality
 - C. Changes in blood pH
 - D. Changes in blood glucose levels
10. Which mechanism is NOT involved in human thermoregulation?
- A. Sweating
 - B. Vasodilation
 - C. Respiration
 - D. Behavioral changes

Answers

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

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Explanations

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1. Where are B lymphocytes processed?

- A. Thymus
- B. Liver
- C. Bone marrow
- D. Spleen

B lymphocytes, also known as B cells, are primarily processed in the bone marrow. This is a critical part of the hematopoietic system where all blood cells, including lymphocytes, are produced and matured. In the case of B cells, they undergo both development and maturation within the bone marrow. During this process, precursor cells differentiate into mature B cells that are capable of producing antibodies. Once they have matured, these B cells then migrate to peripheral lymphoid tissues, such as the spleen and lymph nodes, where they can encounter antigens and become activated. The other locations listed—thymus, liver, and spleen—serve different roles in the immune system. For instance, the thymus is where T lymphocytes mature, and the spleen acts as a filtration system for blood and a meeting point for immune cells, but it is not the site of B cell processing. Thus, the bone marrow is specifically the correct and key location for the processing of B lymphocytes.

2. Which of the following is true about the role of the small intestine?

- A. It is primarily a site for food storage.
- B. It absorbs water but not nutrients.
- C. It is where most nutrient absorption occurs.
- D. It secretes digestive hormones only.

The small intestine plays a crucial role in the digestive system, particularly in the absorption of nutrients. It is where the majority of digestion and absorption of nutrients from food takes place. After food is broken down in the stomach, it passes into the small intestine, where enzymes and bile aid in further digestion. The inner lining of the small intestine is equipped with villi and microvilli, which increase the surface area for absorption, allowing for efficient uptake of nutrients such as carbohydrates, proteins, fats, vitamins, and minerals into the bloodstream. This extensive surface area, combined with the large amount of time food spends in the small intestine, makes it the primary site for nutrient absorption in the digestive tract. In comparison, the small intestine is not primarily for food storage, as that function is associated more with the stomach. While the small intestine does absorb some water, its main responsibility is nutrient absorption rather than exclusively water. Additionally, while it does secrete digestive hormones, it is not limited to that function, as its primary role centers around nutrient uptake.

3. What distinguishes innate immunity from adaptive immunity?

- A. Innate immunity develops over time, while adaptive does not
- B. Innate immunity is specific to pathogens, adaptive is not
- C. Innate immunity is immediate and non-specific, adaptive is specific and develops over time
- D. Innate immunity is stronger than adaptive immunity

The distinction between innate immunity and adaptive immunity centers on several key characteristics, with one of the most significant being their modes of action. Innate immunity is characterized as immediate and non-specific, meaning it acts quickly to provide a generalized defense against a broad range of pathogens as soon as they are detected. This includes physical barriers like skin, as well as immune cells like macrophages and neutrophils that respond to any foreign intruder without the need for prior exposure. Conversely, adaptive immunity is specific and tailored to particular pathogens. It involves a learning process where the immune system is exposed to specific antigens and, as a result, develops a memory of these antigens. This allows for a more effective and rapid response upon subsequent encounters with the same pathogen, but it takes time to establish—hence, it develops over time. This distinction underscores why the correct answer identifies innate immunity as immediate and non-specific, while adaptive immunity is specific and takes time to develop. Understanding these fundamental differences is crucial for studying how the immune system protects the body against infections and diseases.

4. Lymphocytes are known to attack which types of infections?

- A. Bacterial and viral
- B. Fungal and viral
- C. Bacterial, viral, and fungal
- D. Bacterial, viral, fungal, and leukemia

Lymphocytes are a specific type of white blood cell that play a crucial role in the immune response, particularly in identifying and attacking various pathogens and abnormal cells. They are primarily categorized into B cells and T cells, each with distinct functions related to different types of infections. B cells are responsible for producing antibodies that target bacteria and viruses, effectively neutralizing them or marking them for destruction by other immune cells. T cells, on the other hand, are involved in directly attacking infected cells, particularly those infected with viruses, or in identifying and eliminating cancerous cells. This includes recognizing and attacking leukemic cells, which are cancerous cells originating from lymphocytes themselves. The correct answer highlights that lymphocytes can target a broad spectrum of infections: bacterial, viral, and fungal, as well as being involved in combating hematological malignancies like leukemia. This connection is important as it underscores the role of the immune system in not only fighting infectious pathogens but also in monitoring and suppressing aberrant cell growth. Understanding this enables better insights into how lymphocytes function and their importance in both infectious diseases and cancer.

5. What are the structures that connect the AV valves to the papillary muscles?

- A. Chordae tendineae
- B. Coronary arteries
- C. Septal bands
- D. Suspensory ligaments

The chordae tendineae are the structures that connect the atrioventricular (AV) valves to the papillary muscles. These fibrous cords play a critical role in the heart's function. When the ventricles contract, the pressure increase causes the AV valves to close, preventing backflow of blood into the atria. The chordae tendineae help maintain tension on the valve leaflets, ensuring they remain sealed during ventricular contraction. The papillary muscles, which are attached to the ventricular walls, contract simultaneously with the ventricles, pulling on the chordae tendineae to prevent the valves from prolapsing into the atria. This coordinated mechanism is essential for maintaining proper blood flow direction and heart efficiency during the cardiac cycle. Other options do not fulfill this role: coronary arteries supply blood to the heart muscle itself, septal bands are structures associated with the electrical conduction system, and suspensory ligaments are not relevant in the context of heart valve function.

6. How does the immune system differentiate between self and non-self cells?

- A. By recognizing antigen patterns on pathogens
- B. By counting cell surface markers
- C. By measuring cell size
- D. By observing cell mobility

The immune system differentiates between self and non-self cells primarily by recognizing antigen patterns on pathogens. This process is fundamental to immune function, as it allows the body to distinguish between its own cells, which generally carry self-antigens, and foreign invaders such as bacteria and viruses, which possess distinct non-self antigens. Antigens are molecules or molecular structures that are recognized by immune cells, specifically by antibodies and receptors on immune cells known as lymphocytes. These antigens are unique patterns presented on the surfaces of pathogens, such as proteins or polysaccharides, which the immune system can identify as foreign. When the immune system encounters these non-self antigens, it triggers an immune response to eliminate the threat. This ability to recognize and respond to non-self antigens helps to prevent infections while also maintaining tolerance to self-antigens, which is crucial to avoid autoimmune reactions. Other factors such as counting cell surface markers, measuring cell size, or observing cell mobility, while relevant in different contexts of immunology, do not play the primary role in the immune system's ability to discriminate between self and non-self. The recognition of antigen patterns is the core mechanism driving this essential function.

7. What is the role of platelets in the circulatory system?

- A. Carrying oxygen to tissues
- B. Forming the immune response
- C. Clotting blood
- D. Transporting nutrients

Platelets, or thrombocytes, play a crucial role in hemostasis, which is the process that prevents excessive bleeding when there is an injury to a blood vessel. Their primary function is to initiate blood clotting to seal wounds and prevent blood loss. When a blood vessel is damaged, platelets are activated, adhere to the site of injury, and aggregate to form a temporary "platelet plug." They also release chemical signals that promote further clotting and the healing process. This process is vital for maintaining the integrity of the circulatory system and ensuring that blood remains within the vessels during times of injury or trauma. In contrast, other options focus on functions that are not associated with platelets. For example, the transport of oxygen is primarily the role of red blood cells, while immune responses are predominantly mediated by white blood cells. Nutrient transport is mainly the role of plasma proteins and specific transport cells in the bloodstream. Thus, the unique function of platelets in clot formation distinctly sets them apart as essential components of the circulatory system.

8. What is a major function of insulin in the body?

- A. Enhancing heart rate
- B. Lowering blood glucose levels
- C. Increasing blood pressure
- D. Stimulating appetite

Insulin plays a crucial role in regulating blood glucose levels in the body. When blood glucose levels rise after eating, insulin is secreted by the pancreas and facilitates the uptake of glucose by cells, particularly muscle and fat cells. This process not only lowers blood glucose levels, preventing hyperglycemia, but also promotes the storage of glucose as glycogen in the liver and muscles, and encourages the conversion of glucose into fat when in excess. Thus, its primary function is to maintain glucose homeostasis and provide cells with the energy they need for metabolic processes. This action is vital for overall health and energy balance in the body.

9. What do osmoreceptors primarily detect?

- A. Changes in plasma phosphorus levels
- B. Changes in plasma osmolality
- C. Changes in blood pH
- D. Changes in blood glucose levels

Osmoreceptors are specialized sensory neurons that play a crucial role in monitoring the body's fluid balance. They primarily detect changes in plasma osmolality, which refers to the concentration of solutes in the blood plasma. When the osmolality increases, indicating higher solute concentration and lower water concentration, osmoreceptors stimulate mechanisms to conserve water and restore balance. Conversely, if osmolality decreases, indicating lower solute concentration and higher water concentration, they help in promoting water loss. This detection of plasma osmolality is vital for homeostasis, influencing thirst, the release of antidiuretic hormone (ADH), and regulating renal function to maintain optimal hydration status. This specific function highlights the significance of osmoreceptors in ensuring that the body's water and electrolyte levels remain within a narrow range, which is essential for proper physiological function.

10. Which mechanism is NOT involved in human thermoregulation?

- A. Sweating
- B. Vasodilation
- C. Respiration
- D. Behavioral changes

The mechanism that is not directly involved in human thermoregulation is respiration. While breathing does play a role in the overall metabolism and can influence body temperature to some extent due to heat exchange with the air, it is not a primary physiological mechanism for temperature regulation. On the other hand, sweating is an essential mechanism for heat loss through evaporation, helping maintain a stable internal body temperature when external conditions are hot. Vasodilation, which is the widening of blood vessels, increases blood flow to the skin, facilitating heat loss. Behavioral changes, such as seeking shade, removing clothing, or adjusting activity levels, also contribute significantly to how we regulate body temperature in response to environmental changes. These mechanisms work together to maintain homeostasis, particularly in response to heat stress.

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