Mastering A&P Immune System Practice Test (Sample)

Study Guide

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Questions

1. Which of the following best illustrates artificially acquired active humoral immunity?

A. Antivenoms.

B. Infection.

C. Vaccines.

D. Antibodies received in breast milk.

2. What role do memory cells play in the immune response?

A. Destroying infected cells

B. Providing long-term immunity

C. Releasing histamine

D. Producing regulatory signals

3. How do interferons protect against infection in healthy cells?

A. Interferons block viral reproduction in healthy cells through the production of antiviral proteins.

B. Interferons perform complement activation.

C. Interferons perform opsonization to coat microorganisms.

D. Interferons promote fever, or an abnormally high body temperature.

4. What is the role of mast cells in the immune system?

A. To produce antibodies

B. To release histamine

C. To directly kill infected cells

D. To regulate immune tolerance

5. How does the immune system distinguish self from non-self?

A. Through the use of antibodies

B. By recognizing surface proteins

C. Through Major Histocompatibility Complex (MHC) molecules

D. Using the blood-brain barrier

6. Which type of cells are primarily responsible for the adaptive immune response?

A. Red blood cells

B. B cells and T cells

C. Macrophages and neutrophils

D. Platelets and dendritic cells

7. Patients infected with the hepatitis C virus will most likely receive treatment based on what?

A. Vaccines

B. Antibiotics

C. Interferons

D. Corticosteroids

8. What is the main function of cytotoxic T cells?

A. To signal other immune cells

B. To directly kill infected or cancerous cells

C. To produce antibodies

D. To maintain immune memory

9. What type of fluid is primarily collected by lymphatic vessels?

A. blood

B. plasma

C. interstitial fluid

D. intracellular fluid

10. Which characteristic of adaptive immunity ensures that vaccinations effectively prevent disease?

A. Immunological memory

B. Pathogen recognition

C. Natural immunity

D. Immediate response

Answers

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

Explanations

1. Which of the following best illustrates artificially acquired active humoral immunity?

A. Antivenoms.

B. Infection.

C. Vaccines.

D. Antibodies received in breast milk.

Artificially acquired active humoral immunity occurs when a person is exposed to a pathogen, or a component of a pathogen, through deliberate means, such as vaccination, which stimulates the immune system to produce its own antibodies. Vaccines introduce antigens (inactivated or weakened pathogens) to the immune system without causing the disease, prompting the body to create a specific immune response. This response leads to the development of memory cells that provide long-term immunity against future infections by that pathogen. In this context, vaccines serve as a prime example of artificially acquired active immunity because the immune system learns to recognize the vaccine-provided antigens and mounts a defense against them, resulting in the production of antibodies and an immune memory that can last for years or even a lifetime. This is in contrast to naturally acquired immunity, where the body develops immunity after being infected with the actual pathogen.

2. What role do memory cells play in the immune response?

A. Destroying infected cells

B. Providing long-term immunity

C. Releasing histamine

D. Producing regulatory signals

Memory cells play a crucial role in the immune response by providing long-term immunity. When the body encounters a pathogen for the first time, it mounts a primary immune response, during which specific T and B cells are activated and cloned. Some of these cells differentiate into memory cells, which remain in the body even after the initial infection has been cleared. These memory cells are equipped to rapidly recognize and respond to the same pathogen upon subsequent exposures. This ability allows the immune system to respond more effectively and swiftly, often preventing reinfection or significantly reducing the severity of the disease. This long-lasting presence of memory cells is what underlies the effectiveness of vaccinations, as they help the body "remember" how to fight off specific pathogens in the future. In contrast, the other options encompass different aspects of immune function. Destroying infected cells pertains to the action of cytotoxic T cells in the immune response, while releasing histamine is primarily associated with mast cells and involves allergic responses. Producing regulatory signals relates to various immune cells, including regulatory T cells, which help maintain balance in the immune system by modulating the activity of other immune cells. However, none of these functions encompass the primary role of memory cells, which is fundamentally linked to sustaining long-term immunity.

3. How do interferons protect against infection in healthy cells?

A. Interferons block viral reproduction in healthy cells through the production of antiviral proteins.

B. Interferons perform complement activation.

C. Interferons perform opsonization to coat microorganisms.

D. Interferons promote fever, or an abnormally high body temperature.

Interferons are a crucial part of the immune response, particularly in defending against viral infections. They are signaling proteins produced and released by host cells in response to the presence of pathogens, such as viruses. When healthy cells detect the presence of viral infections, they release interferons, which then bind to nearby uninfected cells. This interaction triggers the healthy cells to express genes that lead to the production of antiviral proteins. These antiviral proteins are instrumental in establishing an antiviral state within the cells. They inhibit viral replication by interfering with various stages of the viral life cycle, including preventing the translation of viral proteins and degrading viral RNA. This synergistic action creates an environment where the virus cannot effectively replicate, thus limiting the spread of infection. By preparing neighboring cells to combat an impending viral attack, interferons play a vital role in the non-specific immune response and help contain infections at an early stage, providing critical time for the adaptive immune system to engage. In contrast, the other options pertain to different immune mechanisms that do not describe the specific role of interferons. Complement activation refers to a group of proteins that enhance the ability to clear pathogens but is not a function of interferons. Opsonization is the process by which pathogens are marked for destruction by

4. What is the role of mast cells in the immune system?

A. To produce antibodies

B. To release histamine

C. To directly kill infected cells

D. To regulate immune tolerance

Mast cells play a crucial role in the immune system, particularly in the body's response to allergens and infections. Their primary function is to release histamine and other chemical mediators when they encounter certain stimuli, such as allergens or pathogens. Histamine is a key molecule involved in inflammatory responses and contributes to processes such as vasodilation, increased permeability of blood vessels, and the recruitment of other immune cells to the site of infection or inflammation. This release of histamine leads to several physiological responses, including swelling, redness, and itching, which are common in allergic reactions. Additionally, relying on mast cells' histamine release is vital for fighting off infections by enhancing blood flow and facilitating the movement of immune cells to affected tissues. Understanding the role of mast cells in releasing histamine is essential, as it underscores their significant function in initiating and modulating immune responses.

5. How does the immune system distinguish self from non-self?

A. Through the use of antibodies

B. By recognizing surface proteins

C. Through Major Histocompatibility Complex (MHC) molecules

D. Using the blood-brain barrier

The immune system distinguishes self from non-self primarily through Major Histocompatibility Complex (MHC) molecules. MHC molecules are proteins found on the surface of cells that present antigenic peptides to T cells. When T cells encounter these MHC molecules, they can determine whether the presented peptide is a normal self-antigen or a foreign antigen that signals an infection or disease. MHC molecules play a critical role in the adaptive immune response by ensuring that T cells can recognize cells as part of the body (self) or as foreign invaders (non-self). This recognition is essential for the immune system to target pathogens effectively while avoiding attacks on the body's own tissues, thereby preventing autoimmunity. While antibodies also play a role in recognizing foreign antigens, their primary function is in the recognition and neutralization of pathogens rather than making the initial distinction of self versus non-self. Surface proteins can contribute to this process, but MHC molecules are more specific in their role of presenting antigens to T cells. The blood-brain barrier is involved in protecting the brain from potential threats but is not directly involved in the immune system's ability to distinguish between self and non-self.

6. Which type of cells are primarily responsible for the adaptive immune response?

A. Red blood cells

B. B cells and T cells

C. Macrophages and neutrophils

D. Platelets and dendritic cells

The primary cells responsible for the adaptive immune response are B cells and T cells. This adaptive immune response is crucial because it allows the body to specifically recognize and remember pathogens, providing long-term protection against disease. B cells are integral to the humoral immune response, as they produce antibodies that bind to specific antigens on pathogens, neutralizing them or marking them for destruction by other immune cells. T cells, on the other hand, are critical for cellular immunity. They can directly kill infected cells, help B cells in the antibody production process, and regulate the overall immune response. In summary, the adaptive immune response relies heavily on the interactions and functions of B cells and T cells to ensure a targeted and efficient attack against specific pathogens, which is essential for the development of immunological memory and future protection.

7. Patients infected with the hepatitis C virus will most likely receive treatment based on what?

A. Vaccines

B. Antibiotics

C. Interferons

D. Corticosteroids

Patients infected with the hepatitis C virus most likely receive treatment with interferons because these are proteins that play a critical role in the immune response to viral infections. Interferons can enhance the ability of the immune system to fight off the virus and have antiviral properties that can inhibit the replication of the hepatitis C virus within the liver cells. In the case of hepatitis C, interferon-based therapies have historically been a cornerstone of treatment, often used in combination with ribavirin or other antiviral drugs to increase effectiveness. This approach can lead to sustained virologic response, meaning the virus can become undetectable in the patient's blood over time, which is the goal of treatment. In contrast, while vaccines can be effective for preventing viral infections, there is currently no vaccine available for hepatitis C. Antibiotics are used to treat bacterial infections but are ineffective against viral infections like hepatitis C. Corticosteroids can suppress inflammation and the immune response but are not indicated for viral hepatitis treatment and may even worsen viral infections by dampening the immune response. Thus, the use of interferons aligns with the necessity for a targeted antiviral therapy that specifically addresses the hepatitis C virus.

8. What is the main function of cytotoxic T cells?

A. To signal other immune cells

B. To directly kill infected or cancerous cells

C. To produce antibodies

D. To maintain immune memory

Cytotoxic T cells, also known as CD8+ T cells, play a crucial role in the immune response, particularly in identifying and eliminating infected or cancerous cells. Their main function is to directly kill these abnormal cells, which can present foreign antigens from viruses or mutated proteins on their surface. This targeting is facilitated by the recognition of specific antigen-MHC (Major Histocompatibility Complex) class I complexes displayed on the infected or cancerous cells. Once engaged, cytotoxic T cells release perforins and granzymes, which create pores in the target cell membrane and induce apoptosis, effectively eliminating the threat. This direct killing mechanism is vital for controlling infections and preventing the proliferation of cancer cells, making cytotoxic T cells a key component of the body's adaptive immune response. Through this action, they help maintain the integrity of the body's cellular environment and contribute to overall immune surveillance.

9. What type of fluid is primarily collected by lymphatic vessels?

A. blood

B. plasma

C. interstitial fluid

D. intracellular fluid

Lymphatic vessels primarily collect interstitial fluid, which is the fluid found in the spaces between cells in tissues. This fluid is essential for nutrient exchange and waste removal at the cellular level. As it accumulates, the lymphatic system helps to drain this interstitial fluid, preventing swelling and maintaining fluid balance within the body. Once collected, this interstitial fluid is then referred to as lymph. The lymphatic system plays a crucial role in transporting this fluid back to the circulatory system, where it can enter the bloodstream. This process is vital, as it helps to maintain homeostasis and provides a pathway for the movement of immune cells throughout the body. Blood, plasma, and intracellular fluid are not the primary components of lymph. Blood contains both red and white blood cells suspended in plasma, while plasma is merely the liquid component of the blood. Intracellular fluid refers to the fluid within the cells themselves, which is separate from interstitial fluid. Thus, the focus on interstitial fluid accurately reflects what lymphatic vessels are designed to collect and transport.

10. Which characteristic of adaptive immunity ensures that vaccinations effectively prevent disease?

A. Immunological memory

B. Pathogen recognition

C. Natural immunity

D. Immediate response

Immunological memory is the key characteristic of adaptive immunity that enables vaccinations to effectively prevent disease. When a vaccine is administered, it introduces a harmless component or an inactivated form of a pathogen that stimulates the immune system without causing the disease. This exposure leads to the activation of specific immune cells, including B lymphocytes and T lymphocytes, which produce antibodies and develop a memory of that particular pathogen. Once the immune system has encountered the vaccine, it retains a memory of the pathogen through the formation of long-lived memory B and T cells. If the individual is later exposed to the actual pathogen, the immune system can respond quickly and decisively. This rapid and robust response occurs because the memory cells recognize the pathogen and can produce antibodies or mobilize other immune responses much more efficiently than during the initial exposure. This is why vaccinations are effective in preventing diseases: they prime the immune system to respond effectively upon encountering the real pathogen in the future, thereby preventing illness.