ACAAI Board Practice Exam (Sample)

Study Guide

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Questions

1. When is it appropriate to obtain a baseline hearing test following the onset of otitis media with effusion?

A. 1 month

B. 3 months

C. 6 months

D. 1 year

2. Which cell surface molecules are absent in X-linked agammaglobulinemia?

A. CD4 and CD8

B. CD19 and CD20

C. CD45 and CD32

D. CD3 and CD28

3. What integrin ligands are found on the surface of activated endothelium?

A. ICAM-1, ICAM-2, and VCAM-1

B. CD28 and CTLA-4

C. Integrin α4β1 and αLβ2

D. CD40 and CD80

4. Which medications are known to decrease glucocorticoid metabolism?

A. Macrolides and statins

B. Ketoconazole, oral contraceptives, and macrolides

C. Beta-blockers and furosemide

D. Calcium channel blockers and antibiotics

5. Which mitogens are known to stimulate T cells?

A. Pokeweed, phytohemagglutinin, and concanavalin A

B. Pokeweed, lipopolysaccharide, and staphylococcus aureus Cowan

C. Concanavalin A, staphylococcus aureus Cowan, and lipopolysaccharide

D. Pokeweed, concanavalin A, and lipopolysaccharide

6. What is the CD marker for CD40L found on T cells?

A. CD154

B. CD32

C. CD19

D. CD28

7. Which lab value is monitored to assess the interval progression of AFRS post-FESS?

A. Increase of total serum IgE

B. Decrease of serum-specific IgE

C. Increases of IgE >10%

D. Levels of circulating eosinophils

8. What is the classic finding on CT scan of the chest in patients with ABPA?

A. Ground glass opacities

B. Central bronchiectasis

C. Pleural effusions

D. Cardiomegaly

9. What role does skin-prick testing to aeroallergens play in recurrent sinusitis patients with pansinusitis?

A. Establishing bacterial infections

B. Identifying fungal sensitization

C. Evaluating sinus severity

D. Differentiating viral from bacterial sinusitis

10. What condition is the use of omalizumab primarily indicated for?

A. Chronic urticaria

B. Chronic asthma

C. Allergic rhinitis

D. Seasonal allergies

Answers

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

Explanations

1. When is it appropriate to obtain a baseline hearing test following the onset of otitis media with effusion?

A. 1 month

B. 3 months

C. 6 months

D. 1 year

Obtaining a baseline hearing test following the onset of otitis media with effusion is most appropriate after three months. The rationale behind this timing is that otitis media with effusion often impacts hearing, but the effusion may resolve on its own over time. Waiting three months allows for an adequate period to assess whether the effusion is persistent or if it has resolved spontaneously, which can be particularly common in children. If the effusion remains after this period, a hearing test can provide crucial information regarding the extent of any resulting hearing loss and guide subsequent management decisions, such as considerations for interventions like tympanostomy tube placement. Obtaining a hearing test too early, such as at one month, may not reflect the true status since the effusion might not have had enough time to resolve or stabilize. Therefore, three months serves as an optimal timeframe to evaluate the situation and make informed decisions regarding further treatment.

2. Which cell surface molecules are absent in X-linked agammaglobulinemia?

A. CD4 and CD8

B. CD19 and CD20

C. CD45 and CD32

D. CD3 and CD28

In X-linked agammaglobulinemia (XLA), there is a significant defect in B-cell development due to mutations in the BTK gene. This impairment leads to a marked reduction in B cells, which directly affects the expression of certain cell surface molecules that are typically present on B lymphocytes. CD19 and CD20 are crucial markers for B cells. CD19 is involved in B-cell signaling and is expressed on all stages of B-cell development, while CD20 plays a role in B-cell activation and differentiation. In individuals with XLA, the absence of functional B cells means that these markers will not be present on the surface of the affected cells. The presence of other options like CD4, CD8, CD45, CD32, CD3, and CD28 relates mainly to other types of immune cells, such as T cells or are associated with different functions and cell lineages. Therefore, the main reason why the correct answer identifies CD19 and CD20 is that their expression is directly tied to the functionality and presence of B cells, which are critically lacking in X-linked agammaglobulinemia.

3. What integrin ligands are found on the surface of activated endothelium?

A. ICAM-1, ICAM-2, and VCAM-1

B. CD28 and CTLA-4

C. Integrin α4β1 and αLβ2

D. CD40 and CD80

Activated endothelium expresses specific integrin ligands that are crucial for mediating interactions with circulating leukocytes during the inflammatory response. In this case, ICAM-1 (Intercellular Adhesion Molecule 1), ICAM-2, and VCAM-1 (Vascular Cell Adhesion Molecule 1) are key players in the adhesion and migration of leukocytes from the bloodstream into tissues. ICAM-1 and ICAM-2 engage with integrins like αLβ2 (LFA-1), facilitating the firm adhesion of leukocytes to the endothelium, which is especially important during inflammatory conditions. VCAM-1 binds to the integrin α4β1 (VLA-4), promoting the adhesion of lymphocytes and monocytes. The presence of these ligands on activated endothelial cells is vital for orchestrating leukocyte trafficking to sites of injury or inflammation, thus contributing to the overall immune response. The other choices do not represent integrin ligands associated with activated endothelium. CD28 and CTLA-4 are co-stimulatory receptors involved in T-cell activation rather than ligands expressed on endothelial cells. Integrins α4β1 and αLβ2 mentioned in a different choice

4. Which medications are known to decrease glucocorticoid metabolism?

A. Macrolides and statins

B. Ketoconazole, oral contraceptives, and macrolides

C. Beta-blockers and furosemide

D. Calcium channel blockers and antibiotics

The correct answer identifies medications that are known to inhibit glucocorticoid metabolism, thereby increasing the levels and effects of glucocorticoids in the body. Ketoconazole is a well-known antifungal agent that functions as an inhibitor of steroidogenesis. It particularly affects the enzymes responsible for cortisol synthesis and metabolism. This capacity allows it to increase glucocorticoid levels effectively, which is useful in certain pathological conditions. Oral contraceptives can also decrease the metabolism of glucocorticoids. This occurs because the estrogen component in many oral contraceptives induces changes in liver enzyme activity, particularly those involving cytochrome P450 enzymes, which are important in the metabolic breakdown of steroids. Macrolides, particularly erythromycin, has been shown to inhibit CYP3A4, an enzyme involved in the metabolism of various drugs, including glucocorticoids. This inhibition can lead to increased levels of glucocorticoids when used concurrently. This combination of drugs—ketoconazole, oral contraceptives, and macrolides—creates a scenario in which glucocorticoid metabolism is significantly reduced, enhancing their pharmacological effects or duration of action. Understanding these interactions is crucial in clinical practice to avoid

5. Which mitogens are known to stimulate T cells?

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D. Pokeweed, concanavalin A, and lipopolysaccharide

The selection of pokeweed, phytohemagglutinin, and concanavalin A as mitogens that stimulate T cells is grounded in their well-established roles in immunology. Each of these substances has been shown to induce T cell proliferation and activation. Pokeweed mitogen is derived from the pokeweed plant and is known for its ability to stimulate lymphocyte proliferation, particularly effective in stimulating T cells. Phytohemagglutinin (PHA) is a potent plant lectin that specifically activates T cells by cross-linking surface glycoproteins, leading to cell division. Concanavalin A (Con A), another plant lectin, is also capable of inducing T cell activation through similar mechanisms. Collectively, these agents provide a robust means for investigating T cell responses in vitro, as they effectively promote cell division and activation in T cell populations. Hence, this combination accurately represents mitogens that specifically stimulate T cells, making it the best choice among the available options.

6. What is the CD marker for CD40L found on T cells?

A. CD154

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C. CD19

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The CD marker for CD40L, which is expressed on activated T cells, is known as CD154. CD40L plays a critical role in the immune response by interacting with CD40 on antigen-presenting cells, thereby promoting their activation and enhancing the subsequent immune response. This interaction is pivotal for T cell-dependent activation of B cells and is essential for processes like class switching and affinity maturation of antibodies. Understanding the function of CD154 helps clarify its significance in both normal immune responses and in various immunological conditions. The other markers listed—CD32, CD19, and CD28—have distinct roles in the immune system but do not refer to CD40L. CD32 is an Fc receptor, CD19 is a pan-B cell marker, and CD28 is a co-stimulatory molecule crucial for T cell activation. Each marker has its unique functions, but none correlate with the CD40L function like CD154 does.

7. Which lab value is monitored to assess the interval progression of AFRS post-FESS?

A. Increase of total serum IgE

B. Decrease of serum-specific IgE

C. Increases of IgE >10%

D. Levels of circulating eosinophils

To assess the interval progression of Aspirin-Exacerbated Respiratory Disease (AFRS) following Functional Endoscopic Sinus Surgery (FESS), monitoring increases in Immunoglobulin E (IgE) levels, particularly a rise greater than 10%, is important. This is because IgE is a key mediator in allergic responses and is often elevated in various conditions related to asthma and allergic rhinitis, including AFRS. As AFRS involves a hypersensitivity reaction, tracking IgE can offer insights into the inflammatory status and the effectiveness of treatments post-surgery. An increase of IgE exceeding 10% could indicate heightened allergic activity or progression of the underlying condition. This tracking helps in adjusting management strategies and understanding how the patient is responding to the intervention of FESS. In contrast, simply measuring total serum IgE may not provide sufficient information about disease progression specific to AFRS after surgery, as total IgE levels can fluctuate for various reasons not directly linked to the progression of the disease. Monitoring serum-specific IgE provides insights into particular allergens but does not assess overall disease activity as comprehensively as the percentage increase in total IgE does. Lastly, while circulating eosinophil levels can be significant in evaluating allergic responses, they do

8. What is the classic finding on CT scan of the chest in patients with ABPA?

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The classic finding on a CT scan of the chest in patients with Allergic Bronchopulmonary Aspergillosis (ABPA) is central bronchiectasis. This is characterized by a permanent dilation of the bronchi, which occurs as a result of recurrent infections and inflammation, often associated with the hypersensitivity reactions to the Aspergillus species. In ABPA, bronchiectasis tends to have a central location, typically affecting the proximal airways and can be a consequence of chronic inflammation and mucus plugging. Consequently, the presence of central bronchiectasis is not just a diagnostic clue; it also reflects the underlying pathophysiological processes occurring in the lungs of patients with ABPA. Other findings on imaging, such as ground glass opacities, may be observed in various other pulmonary conditions, but they are not specific to ABPA. Similarly, pleural effusions and cardiomegaly can be related to numerous different causes and are not characteristic features of ABPA. Thus, the identification of central bronchiectasis on a CT scan serves as a key indicator of this condition and aligns with the typical presentation seen in affected patients.

9. What role does skin-prick testing to aeroallergens play in recurrent sinusitis patients with pansinusitis?

A. Establishing bacterial infections

B. Identifying fungal sensitization

C. Evaluating sinus severity

D. Differentiating viral from bacterial sinusitis

In the context of recurrent sinusitis, especially in patients experiencing pansinusitis, skin-prick testing for aeroallergens serves a significant role in identifying potential allergic contributions to their condition. By identifying fungal sensitization, healthcare providers can better understand if the patient's sinusitis may be related to allergic reactions, particularly to mold or other environmental allergens. Fungal sensitization can exacerbate sinus issues, leading to inflammation and recurrent symptoms. Understanding a patient's immune response to specific allergens can guide treatment decisions, including the potential use of allergen avoidance strategies or immunotherapy. Hence, recognizing these allergies is crucial for managing sinusitis effectively. In contrast, while bacterial infections might contribute to sinusitis, skin-prick testing does not help establish these infections directly. Similarly, evaluating sinus severity is typically assessed through imaging studies rather than allergy testing. Differentiating between viral and bacterial sinusitis is also accomplished through clinical evaluation and other diagnostic methods, rather than through skin-prick tests, which are not designed for this purpose. Thus, identifying fungal sensitization stands out as the clear role of skin-prick testing in this scenario.

10. What condition is the use of omalizumab primarily indicated for?

A. Chronic urticaria

B. Chronic asthma

C. Allergic rhinitis

D. Seasonal allergies

Omalizumab is primarily indicated for the treatment of chronic asthma, particularly in patients with moderate to severe persistent allergic asthma that is not well controlled with standard inhaled corticosteroids or other controller medications. The mechanism of action involves the binding of omalizumab to immunoglobulin E (IgE), which helps to prevent IgE from attaching to mast cells and basophils. This action significantly reduces the inflammatory responses associated with allergic asthma, leading to improved asthma control and reduced exacerbations. While omalizumab may offer benefits in other allergic conditions such as chronic urticaria and allergic rhinitis, its primary focus in clinical guidelines is on asthma management. It is critical to choose appropriate therapies based on the specific condition being treated, and in this case, chronic asthma is the condition for which omalizumab has the most substantial evidence supporting its efficacy.