

AAB Medical Technologist (MT) - Generalist Practice Exam (Sample)

Study Guide



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SAMPLE

Questions

SAMPLE

- 1. Which enzyme is a known marker for acute lymphocytic leukemia?**
 - A. Alkaline phosphatase**
 - B. Terminal deoxynucleotidyl transferase**
 - C. Lactate dehydrogenase**
 - D. Amylase**
- 2. What is the term used for abnormal red blood cells with a burr shape?**
 - A. Target cells**
 - B. Spur cells**
 - C. Burr cells**
 - D. Dacrocytes**
- 3. An Rh-negative woman gives birth to her first child, the Rh-positive boy. Within how many hours after giving birth should the mother receive anti D immunoglobulin?**
 - A. 48**
 - B. 72**
 - C. 96**
 - D. 24**
- 4. How do you calculate the reticulocyte production index given the following data: Hct 15%, Normal Hct 45%, Maturation correction 2.5, Reticulocyte percentage 9%?**
 - A. Divide reticulocyte percentage by normal Hct**
 - B. Multiple reticulocyte percentage by maturation correction**
 - C. Subtract Hct from normal Hct**
 - D. Multiply reticulocyte percentage by Hct**
- 5. What is the first component to be activated in the classical complement pathway?**
 - A. C1**
 - B. C3**
 - C. C2**
 - D. C4**

- 6. What type of thalassemia is referred to as Cooley's anemia?**
- A. Alpha thalassemia**
 - B. Beta thalassemia minor**
 - C. Beta thalassemia major**
 - D. Delta thalassemia**
- 7. What is an apheresis donation?**
- A. A donation of whole blood only**
 - B. A donation where the donor gives specific blood components**
 - C. A donation that excludes plasma**
 - D. A donation limited to platelets only**
- 8. What is the normal hematocrit value typically used for correction calculations?**
- A. 40%**
 - B. 45%**
 - C. 50%**
 - D. 55%**
- 9. How is the presence of anti-Jkb detected in a serum sample?**
- A. Direct microscopy**
 - B. Gel agglutination**
 - C. Tube method**
 - D. Flow cytometry**
- 10. What is the optimal pH range for the incubation phase in antibody screens?**
- A. 5.5-6.5**
 - B. 6.8-7.2**
 - C. 7.5-8.0**
 - D. 8.5-9.0**

Answers

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

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Explanations

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1. Which enzyme is a known marker for acute lymphocytic leukemia?

- A. Alkaline phosphatase**
- B. Terminal deoxynucleotidyl transferase**
- C. Lactate dehydrogenase**
- D. Amylase**

The identification of terminal deoxynucleotidyl transferase (TdT) as a known marker for acute lymphocytic leukemia (ALL) is grounded in its role in the development and differentiation of lymphoid cells. TdT is an enzyme involved in DNA synthesis, specifically in adding nucleotides to the 3' ends of a DNA molecule, which is crucial during the maturation of lymphocytes. In the context of ALL, the presence of TdT is typically used in immunophenotyping to help confirm the diagnosis. It is particularly associated with precursor lymphoblastic cells. Elevated levels of TdT can indicate an immature state of lymphoid cells, which is characteristic of leukemias primarily affecting lymphoid lineages. The other options, while they may serve specific functions in clinical biochemistry or other types of leukemia, do not specifically correlate with acute lymphocytic leukemia in the same manner as TdT. Alkaline phosphatase, for example, is associated with liver function and bone metabolism, lactate dehydrogenase is commonly elevated in tissue damage or certain malignancies, and amylase is primarily related to pancreatic function. However, none of these enzymes serves as a reliable marker particularly for ALL, making TdT

2. What is the term used for abnormal red blood cells with a burr shape?

- A. Target cells**
- B. Spur cells**
- C. Burr cells**
- D. Dacrocytes**

The abnormal red blood cells with a burr shape are commonly referred to as burr cells. These cells are characterized by their irregular, spiky projections that give them a distinctive appearance. Burr cells are often associated with various physiological conditions, such as liver disease, uremia, or lipid disorders, as they can be indications of alterations in the membrane lipid composition of red blood cells. The presence of these abnormal cells can be an important diagnostic clue for underlying health issues. While target cells (target cells) and dacrocytes (teardrop cells) have their distinct shapes and associations with other hematological disorders, they do not resemble the burr shape. Spur cells (another term that may be related to burr cells) can also refer to the same morphology, but the term "burr cells" is more widely used in hematology to describe this specific appearance.

3. An Rh-negative woman gives birth to her first child, the Rh-positive boy. Within how many hours after giving birth should the mother receive anti D immunoglobulin?

A. 48

B. 72

C. 96

D. 24

The appropriate window for administering anti-D immunoglobulin to an Rh-negative mother who has given birth to an Rh-positive child is within 72 hours of delivery. This timing is crucial to prevent the mother from developing antibodies against Rh-positive blood cells, which could lead to complications in future pregnancies. Administering the immunoglobulin helps to neutralize any Rh-positive cells that may have entered the mother's bloodstream during delivery, thereby reducing the risk of Rh sensitization. If this treatment is delayed beyond the 72-hour mark, the effectiveness decreases significantly, increasing the likelihood of the mother producing antibodies that could affect subsequent pregnancies. The other timeframes mentioned, such as 48, 96, or 24 hours, do not align with current guidelines for optimal intervention. Ensuring the administration of anti-D immunoglobulin within the established 72-hour period contributes to better maternal-fetal outcomes in cases involving Rh incompatibility.

4. How do you calculate the reticulocyte production index given the following data: Hct 15%, Normal Hct 45%, Maturation correction 2.5, Reticulocyte percentage 9%?

A. Divide reticulocyte percentage by normal Hct

B. Multiple reticulocyte percentage by maturation correction

C. Subtract Hct from normal Hct

D. Multiply reticulocyte percentage by Hct

To calculate the reticulocyte production index (RPI), the reticulocyte percentage must first be adjusted for the patient's hematocrit (Hct) as compared to the normal Hct. The reticulocyte percentage helps assess bone marrow response to anemia. In this case, you start with the reticulocyte percentage of 9%. Since the patient's Hct is 15% and the normal Hct is 45%, a maturation correction factor is needed to account for the degree of anemia. The maturation correction, in this scenario, is 2.5. To find the RPI, you multiply the reticulocyte percentage by the maturation correction. This calculation effectively adjusts the observed reticulocyte count to reflect how well the bone marrow is responding to anemia, which is particularly important in patients with varying levels of Hct. Using the maturation correction allows clinicians to understand whether the reticulocyte response is adequate given the severity of anemia. A high RPI indicates a strong response to anemia, whereas a low RPI may indicate inadequate bone marrow response. In this question, selecting the option that states to multiply the reticulocyte percentage by the maturation correction accurately describes the correct computation for the reticulocyte production index.

5. What is the first component to be activated in the classical complement pathway?

A. C1

B. C3

C. C2

D. C4

In the classical complement pathway, the first component to be activated is C1. This pathway is initiated when an antigen-antibody complex forms, allowing the C1 protein complex to bind to the Fc region of the antibody. C1 is composed of three subcomponents: C1q, C1r, and C1s. Upon activation, C1q binds to the antibody, leading to a conformational change that activates C1r, which in turn activates C1s. The activation of C1 then triggers a cascade of reactions that ultimately result in the cleavage of C2 and C4, and the production of C3 convertase. This step is crucial as it sets in motion the entire complement activation process, which plays a significant role in immune responses, including opsonization, inflammation, and lysis of pathogens.

6. What type of thalassemia is referred to as Cooley's anemia?

A. Alpha thalassemia

B. Beta thalassemia minor

C. Beta thalassemia major

D. Delta thalassemia

Cooley's anemia is a term specifically used to describe beta thalassemia major, which is a severe form of thalassemia. This condition arises due to a significant reduction or absence of beta-globin chains, which leads to ineffective erythropoiesis and severe anemia. Individuals with beta thalassemia major typically require regular blood transfusions to manage their anemia and prevent complications associated with chronic low hemoglobin levels. In contrast, alpha thalassemia (which is not Cooley's anemia) involves different genetic mutations that affect the production of alpha-globin chains. Beta thalassemia minor represents a carrier state with a milder phenotype and does not result in the severe clinical manifestations seen in Cooley's anemia. Delta thalassemia, while also a form of thalassemia, does not match the definition or characteristics of Cooley's anemia either. Understanding the specific genetic and clinical aspects of these conditions helps in identifying the characteristics of Cooley's anemia accurately.

7. What is an apheresis donation?

- A. A donation of whole blood only
- B. A donation where the donor gives specific blood components**
- C. A donation that excludes plasma
- D. A donation limited to platelets only

Apheresis donation refers to a method of collecting specific components of a donor's blood, such as platelets, plasma, or red blood cells, while returning the remaining components back to the donor's circulation. This process allows for targeted donation of particular blood components that are needed for medical treatments or therapies. By focusing on the collection of specific blood components, apheresis can be particularly useful in situations where there is a high demand for certain components, such as platelets for patients undergoing chemotherapy or red cells for those with anemia. Other types of blood donations, like whole blood donations, do not allow for this level of specificity, as they involve the collection of all components of the blood at once. In contrast, apheresis donations do not exclude plasma; rather, they can actually involve the collection of plasma alongside other components. Additionally, while some apheresis procedures may focus on platelets, the definition is broader and includes the ability to collect various components based on medical needs, which is why the correct answer highlights the specificity of the blood components donated.

8. What is the normal hematocrit value typically used for correction calculations?

- A. 40%
- B. 45%**
- C. 50%
- D. 55%

The typical normal hematocrit value used for correction calculations is 45%. This value represents the proportion of blood volume that is occupied by red blood cells in healthy adults, and it serves as a standard reference point for various clinical assessments. Understanding the normal range of hematocrit is crucial for medical technologists when interpreting laboratory results, particularly in the context of diagnosing and managing certain conditions. Using 45% allows for appropriate calibrations when physicians need to evaluate anemia, polycythemia, or hydration status, among other factors. This standardization helps in ensuring consistency and accuracy when determining the need for further investigations or treatments based on hematocrit values.

9. How is the presence of anti-Jkb detected in a serum sample?

- A. Direct microscopy**
- B. Gel agglutination**
- C. Tube method**
- D. Flow cytometry**

The presence of anti-Jkb in a serum sample is typically detected using gel agglutination techniques. This method involves mixing the serum sample with red blood cells that have the Jkb antigen on their surface. If anti-Jkb antibodies are present in the serum, they will bind to the Jkb-antigen bearing red blood cells and form visible agglutinates in the gel medium. Gel agglutination provides several advantages, including improved sensitivity and the ability to standardize the testing process. It allows for clear visualization of agglutination results and can help differentiate specific antibody reactions more effectively compared to other methods. Other methods like the tube method can also detect antibodies but may not be as efficient or standardized as gel agglutination. Flow cytometry could be used for more detailed analysis of antibody binding in certain research settings, but it is not typically employed for routine blood typing or antibody detection like anti-Jkb. Direct microscopy is generally not a standard method for antibody detection in serum samples.

10. What is the optimal pH range for the incubation phase in antibody screens?

- A. 5.5-6.5**
- B. 6.8-7.2**
- C. 7.5-8.0**
- D. 8.5-9.0**

The optimal pH range for the incubation phase in antibody screens is typically between 6.8 and 7.2. This pH range is conducive for maximizing the efficacy of antibody-antigen interactions, which is crucial for ensuring accurate results in serological tests. At this slightly acidic to neutral pH, proteins are in a more natural state, promoting proper folding and maintaining the structural integrity necessary for antigenic sites to be accessible and reactive. If the pH deviates too far from this range, such as being too low (acidic) or too high (alkaline), the integrity of the antibodies and the antibodies' ability to bind to their corresponding antigens may be compromised. This could lead to false-negative results due to diminished binding affinity or altered activity of the immune components involved. In summary, the chosen pH range supports optimal reaction conditions for detecting antibodies, thereby enhancing the reliability of the test outcomes in clinical settings.