Medical Laboratory Scientist (MLS) ASCP Practice Exam (Sample)

Study Guide

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Questions

1. In metabolic alkalosis, what is the status of the blood gases?

A. All values decreased

B. All values increased

C. Only pH decreased

D. pCO2 increased while pH decreased

2. Myelomonocytic leukemia is associated with an increase in which cell precursors?

A. Myeloid and monocytic cell precursors

B. Red blood cell precursors

C. Lymphoid cell precursors

D. Megakaryocytic cell precursors

3. In what condition is adiponectin usually decreased?

A. Diabetes

B. Obesity

C. Hyperlipidemia

D. Hypertension

4. What distinguishing characteristic does Gilbert's syndrome have?

A. It involves elevated liver enzymes

B. It leads to harmful jaundice requiring treatment

C. It is associated with harmless jaundice

D. It is a dominant genetic disorder

5. What type of leukemia is associated with the erythrocytic series?

A. Promyelocytic leukemia

B. Acute lymphocytic leukemia

C. Erythroleukemia

D. Megakaryoblastic leukemia

6. What does the term "infarction" refer to?

- **A. A temporary oxygen deficiency**
- **B. Tissue death due to lack of oxygen**
- **C. The process of blood clot formation**
- **D. An area undergoing inflammation**

7. Where is urobilinogen primarily formed in the body?

- **A. Liver**
- **B. Kidney**
- **C. Intestine**
- **D. Spleen**

8. What does a 1+ blood reaction grade indicate?

- **A. Reaction has numerous small clumps and cloudy red supernatant**
- **B. Has many medium-sized clumps and clear supernatant**
- **C. Has several large clumps and clear supernatant**
- **D. Has one solid clump, no free cells, and clear supernatant**

9. Chylomicrons are primarily composed of which type of macromolecule?

- **A. Proteins**
- **B. Triglycerides**
- **C. Cholesterol**
- **D. Phospholipids**

10. What feature is most often found in patients who have undergone a splenectomy on a Wright's stained blood smear?

- **A. Howell-Jolly bodies**
- **B. Smudge cells**
- **C. Bite cells**
- **D. Basophilic stippling**

Answers

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

Explanations

1. In metabolic alkalosis, what is the status of the blood gases?

A. All values decreased

B. All values increased

C. Only pH decreased

D. pCO2 increased while pH decreased

In metabolic alkalosis, the key characteristic of the blood gas values is that the pH is elevated, indicating a more alkaline state. This occurs due to an increase in bicarbonate (HCO3-) concentration or a loss of hydrogen ions (H+). Typically, in metabolic alkalosis, the body's compensatory response may lead to an increase in pCO2 as the respiratory system attempts to retain carbon dioxide to counteract the elevated pH. However, the pCO2 may or may not be significantly elevated depending on the severity of the alkalosis and the compensatory mechanisms in play. It's important to note that while the pCO2 can show variable changes, the primary disturbance is the increase in bicarbonate leading to elevated pH. The statement that all values are increased does not accurately reflect what occurs in metabolic alkalosis, as it's not true that every parameter rises uniformly. While bicarbonate is expected to be increased, the behavior of pCO2 and other values can vary based on the individual's respiratory compensation. Thus, stating that all values are increased does not appropriately capture the essence of metabolic alkalosis and its effect on blood gas values.

2. Myelomonocytic leukemia is associated with an increase in which cell precursors?

A. Myeloid and monocytic cell precursors

B. Red blood cell precursors

C. Lymphoid cell precursors

D. Megakaryocytic cell precursors

Myelomonocytic leukemia, which is classified under acute myeloid leukemia (AML), specifically entails the overproduction of both myeloid and monocytic cell precursors. This type of leukemia arises from the hematopoietic stem cells that give rise to these specific lineages, leading to an increase in myeloid precursors (which develop into granulocytes and other myeloid cells) as well as monocytic precursors. In this condition, the abnormal proliferation disrupts normal blood cell production, resulting in characteristic findings in blood tests such as leukocytosis (an increased white blood cell count) with the presence of immature cells. The focus on myeloid and monocytic precursors is critical because the pathology specifically targets these lineages, which can lead to symptoms such as anemia, thrombocytopenia, and leukemia-related complications as a result of the imbalance in cell maturation and survival. The incorrect options involve other cell lineages. Red blood cell precursors are not primarily affected in myelomonocytic leukemia, as the condition does not primarily influence erythropoiesis. Lymphoid cell precursors pertain to lymphoid malignancies, such as lymphoblastic leukemias, thus are not relevant

3. In what condition is adiponectin usually decreased?

A. Diabetes

B. Obesity

C. Hyperlipidemia

D. Hypertension

Adiponectin is a protein hormone produced by adipose (fat) tissue that plays a crucial role in regulating glucose levels as well as fatty acid breakdown. In the context of obesity, adiponectin levels are typically decreased. This reduction is significant because adiponectin is known to have anti-inflammatory effects and enhances insulin sensitivity, which are both crucial for metabolic health. In individuals with obesity, higher levels of fat tissue are associated with lower secretion of adiponectin. This decreased adiponectin is linked to various metabolic issues, including insulin resistance, which can progress to type 2 diabetes. The relationship between obesity and decreased adiponectin demonstrates how increased adiposity can lead to adverse metabolic consequences, emphasizing the hormone's importance in metabolic regulation. While diabetes, hyperlipidemia, and hypertension can be interconnected with adiponectin levels, they do not universally lead to a decrease in this hormone as seen in obesity. Thus, the condition that most prominently features decreased adiponectin levels is obesity.

4. What distinguishing characteristic does Gilbert's syndrome have?

A. It involves elevated liver enzymes

B. It leads to harmful jaundice requiring treatment

C. It is associated with harmless jaundice

D. It is a dominant genetic disorder

Gilbert's syndrome is primarily characterized by harmless jaundice, which results from elevated levels of unconjugated bilirubin in the bloodstream due to a reduced activity of the enzyme glucuronosyltransferase in the liver. This condition is typically benign and does not lead to any serious health concerns. The jaundice observed in Gilbert's syndrome is often subtle and may not require any medical intervention or treatment, distinguishing it from other hepatic conditions that involve more severe jaundice. While it is true that Gilbert's syndrome is associated with a genetic mechanism, which is dominant, the defining feature is the presence of harmless jaundice rather than the genetic aspect or enzyme elevation typically seen in more serious liver diseases. The elevation of liver enzymes can occur in various liver disorders, but in the case of Gilbert's syndrome, liver function tests usually remain normal aside from the bilirubin elevation. This reinforces that the primary characteristic of Gilbert's syndrome is indeed the harmless nature of the jaundice it produces.

5. What type of leukemia is associated with the erythrocytic series?

A. Promyelocytic leukemia

B. Acute lymphocytic leukemia

C. Erythroleukemia

D. Megakaryoblastic leukemia

Erythroleukemia is a specific type of acute myeloid leukemia that is characterized by the proliferation of erythroid and myeloid cells. It affects the erythrocytic series by leading to an abnormal increase in the production of red blood cell precursors. This condition is marked by the presence of myeloblasts and erythroblasts in the bone marrow, contributing to significant disturbances in normal hematopoiesis. In erythroleukemia, both the myeloid and erythroid lineages are involved, which allows for the disruption of the typical production of healthy red blood cells. The presence of both cell types helps ensure that the diagnosis is centered around the erythrocytic series, highlighting the direct association of this leukemia with red blood cell abnormalities. Other types of leukemia mentioned, such as promyelocytic leukemia, acute lymphocytic leukemia, and megakaryoblastic leukemia, do not primarily focus on or significantly involve the erythrocytic lineage. Promyelocytic leukemia primarily affects myeloid cells, whereas acute lymphocytic leukemia is largely associated with lymphocyte precursors. Megakaryoblastic leukemia involves the megakaryocyte lineage, leading to disorders related to platelet production rather than the

6. What does the term "infarction" refer to?

A. A temporary oxygen deficiency

B. Tissue death due to lack of oxygen

C. The process of blood clot formation

D. An area undergoing inflammation

The term "infarction" specifically refers to tissue death due to a lack of oxygen, which occurs when blood supply is restricted or blocked. This deficiency prevents adequate oxygen and nutrients from reaching the cells, leading to cell death and potential damage to the affected tissue. Infarction is often associated with conditions such as myocardial infarction (heart attack) and cerebral infarction (stroke), where the interruption of blood flow is typically caused by a blockage in a blood vessel, often due to a blood clot. The other options describe different processes or conditions that do not encompass the concept of infarction. For example, the temporary oxygen deficiency refers more to hypoxia, not irreversible tissue death. The process of blood clot formation pertains to thrombosis, which can lead to infarction but is not synonymous with it. An area undergoing inflammation involves the immune response to injury or infection, which may precede or accompany infarction but is distinctly different from the actual process of tissue death.

7. Where is urobilinogen primarily formed in the body?

A. Liver

B. Kidney

C. Intestine

D. Spleen

Urobilinogen is primarily formed in the intestine as a product of the metabolism of bilirubin. After bilirubin is excreted from the liver and enters the intestine via bile, it is chemically modified by intestinal bacteria into urobilinogen. This compound can either be reabsorbed into the bloodstream and eventually excreted by the kidneys in urine or converted into stercobilin and eliminated in the feces, which gives stool its characteristic brown color. Thus, the intestine plays a crucial role in the conversion of bilirubin to urobilinogen, making it the correct location of formation for this compound. Understanding the metabolic pathway and the role of intestinal bacteria in this process highlights the importance of the digestive system in the breakdown and processing of waste products in the body.

8. What does a 1+ blood reaction grade indicate?

A. Reaction has numerous small clumps and cloudy red supernatant

B. Has many medium-sized clumps and clear supernatant

C. Has several large clumps and clear supernatant

D. Has one solid clump, no free cells, and clear supernatant

A 1+ blood reaction grade indicates the presence of numerous small clumps of red blood cells with a cloudy red supernatant. This grading system is used in blood typing and compatibility testing to assess the strength of an agglutination reaction when blood is mixed with specific antisera. In the context of blood typing, the formation of small clumps suggests a weak positive reaction—indicating that some antibody-antigen interactions are occurring. This can help in determining the presence of certain blood group antigens. The other options describe stronger or more distinct reactions. A higher grade would typically involve larger clumps or a clearer supernatant, indicating a more significant agglutination response, which corresponds to greater interaction between the red blood cells and the antibodies present in the testing reagent. Conversely, a grade indicating a solid clump with no free cells would denote a very strong agglutination reaction, which is not consistent with the 1+ grade.

9. Chylomicrons are primarily composed of which type of macromolecule?

A. Proteins

B. Triglycerides

C. Cholesterol

D. Phospholipids

Chylomicrons are primarily composed of triglycerides, which constitute the largest portion of their structure. These lipoproteins are synthesized in the intestinal mucosa after a meal rich in fats and serve the critical function of transporting dietary lipids, mainly triglycerides, from the intestines to other tissues in the body, including muscle and adipose tissue. Triglycerides are the main storage form of fat in the body and are formed from glycerol and three fatty acid chains. In the case of chylomicrons, they are advantageous for transporting fats because they can aggregate large amounts of triglycerides while being soluble enough to travel through the aqueous environment of the bloodstream. While chylomicrons do contain other components like proteins, phospholipids, and cholesterol, these make up a smaller proportion of their overall composition compared to triglycerides. The apolipoproteins present in chylomicrons help stabilize their structure and facilitate interaction with receptors on cells for uptake, but they do not constitute the main macromolecular component. Understanding that triglycerides are the predominant component helps clarify the role of chylomicrons in lipid transport following nutrient absorption.

10. What feature is most often found in patients who have undergone a splenectomy on a Wright's stained blood smear?

A. Howell-Jolly bodies

B. Smudge cells

C. Bite cells

D. Basophilic stippling

Howell-Jolly bodies are small, round remnants of nuclear material that are typically found in red blood cells. These bodies can appear in the peripheral blood of patients who have had a splenectomy, which is the surgical removal of the spleen. The spleen plays a crucial role in filtering the blood and removing abnormal or damaged red blood cells as well as cellular debris, including Howell-Jolly bodies. After splenic removal, the absence of this filtration process allows for the persistence of these nuclear remnants in the bloodstream, leading to their increased presence on a Wright's stained blood smear. Understanding this connection is vital, as Howell-Jolly bodies serve as an important indicator of the spleen's absence and can also aid in diagnosing patients at risk for infections or other complications related to their splenectomy.