ASCP Specialist in Hematology (SH) Practice Exam (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. **What are the primary components measured in a Complete Blood Count (CBC)?**
   - **A. Red blood cells and white blood cells only**
   - **B. Hematocrit and hemoglobin only**
   - **C. Red blood cells, white blood cells, hemoglobin, hematocrit, and platelets**
   - **D. Platelets and coagulation factors only**

2. **What is the most specific test for detecting Factor V Leiden mutation?**
   - **A. Activated Protein C Resistance (APC) clot-based assay**
   - **B. Factor V Mutation Assay**
   - **C. Antithrombin antigen assay**
   - **D. Complete blood count**

3. **What is the normal range for platelet count in adults?**
   - **A. 50,000 to 150,000 cells per microliter**
   - **B. 150,000 to 450,000 cells per microliter**
   - **C. 450,000 to 600,000 cells per microliter**
   - **D. 300,000 to 800,000 cells per microliter**

4. **What is the term for a low platelet count?**
   - **A. Leukemia**
   - **B. Thrombocytopenia**
   - **C. Anemia**
   - **D. Hemophilia**

5. **What role does folate play in erythropoiesis?**
   - **A. It aids in iron absorption**
   - **B. It is essential for DNA synthesis and cell division**
   - **C. It prevents blood clotting**
   - **D. It repairs damaged red blood cells**

6. **What type of leukemia is characterized by the presence of promyelocytes with heavy granulation?**
   - **A. Acute myeloid leukemia**
   - **B. Acute promyelocytic leukemia**
   - **C. Chronic myeloid leukemia**
   - **D. Acute lymphoblastic leukemia**

7. **Which type of anemia is associated with a deficiency of intrinsic factor?**
   - **A. Pernicious anemia**
   - **B. Iron deficiency anemia**
   - **C. Aplastic anemia**
   - **D. Sideroblastic anemia**

8. **What condition is characterized by the presence of Heinz bodies?**
   - **A. Thalassemia**
   - **B. G6PD deficiency**
   - **C. Sickle cell anemia**
   - **D. Iron deficiency anemia**

9. **How is anemia of chronic disease typically differentiated from iron deficiency anemia?**
   - **A. Anemia of chronic disease shows increased ferritin levels**
   - **B. Anemia of chronic disease shows low hemoglobin levels**
   - **C. Anemia of chronic disease shows high transferrin levels**
   - **D. Anemia of chronic disease has normal bone marrow cellularity**

10. **What happens if a sodium citrate sample is filled an inch below the fill line?**
    - **A. Unacceptable for coagulation studies**
    - **B. Acceptable for coagulation studies**
    - **C. Acceptable if additional blood can fill the tube**
    - **D. Acceptable if only the PT test is performed**

Answers

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

Explanations

1. What are the primary components measured in a Complete Blood Count (CBC)?

A. Red blood cells and white blood cells only

B. Hematocrit and hemoglobin only

C. Red blood cells, white blood cells, hemoglobin, hematocrit, and platelets

D. Platelets and coagulation factors only

The primary components measured in a Complete Blood Count (CBC) include red blood cells, white blood cells, hemoglobin, hematocrit, and platelets. This comprehensive panel provides valuable insights into an individual's overall health and blood-related conditions. Red blood cells (RBCs) are crucial for transporting oxygen throughout the body, while white blood cells (WBCs) are essential for the immune response, helping to defend the body against infections. Hemoglobin, found within red blood cells, is the protein responsible for carrying oxygen, and its level gives a direct indication of the blood's oxygen-carrying capacity. Hematocrit indicates the proportion of blood volume that is occupied by red blood cells, which is important for diagnosing conditions like anemia or polycythemia. Lastly, platelets play a vital role in blood clotting processes, making their measurement essential for evaluating bleeding disorders. By encompassing all these components, a CBC offers a comprehensive overview of an individual's hematological status and is widely used in clinical practice to help diagnose and monitor various conditions.

2. What is the most specific test for detecting Factor V Leiden mutation?

A. Activated Protein C Resistance (APC) clot-based assay

B. Factor V Mutation Assay

C. Antithrombin antigen assay

D. Complete blood count

The most specific test for detecting Factor V Leiden mutation is the Factor V Mutation Assay. This test directly identifies the specific genetic change in the Factor V gene responsible for the Leiden mutation, which is a single-point mutation that affects protein function and contributes to an increased risk of thrombosis. Unlike other tests, the Factor V Mutation Assay employs molecular techniques, such as polymerase chain reaction (PCR) and DNA sequencing, to confirm the presence of the mutation at the DNA level. This level of specificity is crucial for definitive diagnosis since it can distinguish Factor V Leiden from other forms of activated protein C resistance that may not be related to the mutation. In contrast, while the Activated Protein C Resistance assay can indicate a problem with the protein's function, it does not specifically identify the mutation itself and can yield false positives or negatives due to other factors. The Antithrombin antigen assay measures the levels of antithrombin but is unrelated to Factor V Leiden detection. A complete blood count provides general information about blood cells but does not offer any insight into specific genetic mutations associated with thrombotic risk.

3. What is the normal range for platelet count in adults?

A. 50,000 to 150,000 cells per microliter

B. 150,000 to 450,000 cells per microliter

C. 450,000 to 600,000 cells per microliter

D. 300,000 to 800,000 cells per microliter

The normal range for platelet count in adults is indeed between 150,000 to 450,000 cells per microliter. This range is crucial for maintaining hemostasis, as platelets play a key role in blood clotting and wound healing. Counts below this range can indicate thrombocytopenia, which may lead to increased bleeding risk, while counts above this range can suggest thrombocytosis, potentially leading to clotting disorders. The other options do not reflect the widely accepted normal range. The range of 50,000 to 150,000 cells per microliter is too low and could suggest a pathological condition. Similarly, the ranges of 450,000 to 600,000 and 300,000 to 800,000 cells per microliter are above the upper limit of normal, potentially indicating a health concern that warrants further investigation. Understanding these ranges is essential for clinical practice and diagnosis in hematology.

4. What is the term for a low platelet count?

A. Leukemia

B. Thrombocytopenia

C. Anemia

D. Hemophilia

Thrombocytopenia refers specifically to a condition in which there is a low platelet count in the blood. Platelets, or thrombocytes, are essential for proper blood clotting and wound healing. When levels of platelets are below the normal range, it can lead to an increased risk of bleeding and bruising, as the body's ability to form clots is compromised. This condition can have various underlying causes, including bone marrow disorders, increased destruction of platelets, or low production of platelets due to other medical issues. Understanding thrombocytopenia is crucial for diagnosing and managing conditions that disrupt normal hemostasis. The other terms mentioned refer to different hematological conditions. For instance, leukemia involves a malignancy of blood cells that can affect platelet counts but is not synonymous with low platelet levels. Anemia pertains to a deficiency of red blood cells or hemoglobin, affecting oxygen transport but not directly related to platelets. Hemophilia is a genetic disorder that affects blood clotting factors and also does not specifically refer to platelet count. Thus, thrombocytopenia is the correct term for a low platelet count.

5. What role does folate play in erythropoiesis?

A. It aids in iron absorption

B. It is essential for DNA synthesis and cell division

C. It prevents blood clotting

D. It repairs damaged red blood cells

Folate, also known as vitamin B9, plays a critical role in erythropoiesis, which is the process of red blood cell production. Its primary function in this context is its involvement in DNA synthesis and cell division. During erythropoiesis, the rapid proliferation of erythroid progenitor cells requires accurate DNA replication and division. Folate acts as a coenzyme in the metabolism of nucleic acids, specifically facilitating the formation of purines and pyrimidines, which are essential for DNA synthesis. Without sufficient folate, the production of DNA is impaired, leading to ineffective erythropoiesis and the potential development of megaloblastic anemia, characterized by the production of oversized, dysfunctional red blood cells. This highlights why option B is the correct answer, as the essential role of folate in DNA synthesis directly supports the healthy formation and division of cells during red blood cell development. The other options refer to different physiological functions. For instance, while iron is important for hemoglobin synthesis, folate does not aid in iron absorption. Preventing blood clotting is typically associated with vitamin K and other anticoagulant mechanisms rather than folate. Repairing damaged red blood cells is a process not directly associated with folate,

6. What type of leukemia is characterized by the presence of promyelocytes with heavy granulation?

A. Acute myeloid leukemia

B. Acute promyelocytic leukemia

C. Chronic myeloid leukemia

D. Acute lymphoblastic leukemia

Acute promyelocytic leukemia (APL) is characterized specifically by the presence of promyelocytes that exhibit heavy granulation. This type of leukemia is a subtype of acute myeloid leukemia (AML) and is particularly noted for its distinct morphological features, including the presence of the promyelocyte cells that have abundant cytoplasmic granules and often multiple Auer rods. In APL, these promyelocytes can also sometimes be found in bundles known as "faggot cells," which further helps in identifying this leukemia. The heavy granulation is a hallmark finding in cytogenetic and morphological examinations, which is critical for diagnosis. Additionally, APL is commonly associated with specific genetic abnormalities, particularly the translocation t(15;17), which leads to the fusion of the promyelocytic leukemia (PML) gene and the retinoic acid receptor alpha (RARA) gene, confirming its identity as a distinct clinical entity within the broader category of acute myeloid leukaemias. Understanding these features is important for hematopathologists and medical professionals in order to provide appropriate treatment strategies, including the use of all-trans retinoic acid (ATRA), which has dramatically improved outcomes for patients with this specific type

7. Which type of anemia is associated with a deficiency of intrinsic factor?

A. Pernicious anemia

B. Iron deficiency anemia

C. Aplastic anemia

D. Sideroblastic anemia

The type of anemia associated with a deficiency of intrinsic factor is pernicious anemia. Intrinsic factor is a glycoprotein produced by the stomach's parietal cells and is essential for the absorption of vitamin B12 in the intestines. Vitamin B12 is crucial for red blood cell production and DNA synthesis. When intrinsic factor is deficient, whether due to autoimmune destruction of parietal cells or other factors, the absorption of vitamin B12 is impaired. This leads to a reduction in red blood cell production, resulting in the characteristic macrocytic anemia observed in pernicious anemia. In contrast, iron deficiency anemia arises from insufficient iron, which is necessary for hemoglobin production, while aplastic anemia is a condition where the bone marrow fails to produce enough blood cells. Sideroblastic anemia involves a defect in hemoglobin synthesis associated with abnormal iron metabolism. Thus, pernicious anemia is specifically linked to intrinsic factor deficiency and its consequences on vitamin B12 absorption and red blood cell development.

8. What condition is characterized by the presence of Heinz bodies?

A. Thalassemia

B. G6PD deficiency

C. Sickle cell anemia

D. Iron deficiency anemia

Heinz bodies are associated specifically with G6PD deficiency, which is a genetic enzyme deficiency that leads to the destruction of red blood cells when they are exposed to oxidative stress. In G6PD deficiency, the lack of the enzyme glucose-6-phosphate dehydrogenase prevents the proper formation of NADPH, essential for maintaining reduced glutathione levels. As a result, red blood cells become more susceptible to oxidative damage, leading to the precipitation of denatured hemoglobin and the formation of Heinz bodies. Heinz bodies can be visualized using special staining techniques, such as the supravital stain, and are significant in diagnosing and managing G6PD deficiency. Therefore, recognizing Heinz bodies is a crucial part of identifying patients at risk for hemolytic crises, especially after exposure to certain foods, medications, or infections that can trigger oxidative stress. In other conditions listed, while some may involve abnormal red blood cell morphology or hemolysis, none are characterized specifically by the presence of Heinz bodies. Thalassemia may exhibit target cells and microcytic hypochromic anemia, sickle cell anemia primarily presents with sickle-shaped cells and severe complications related to vaso-occlusion, and iron deficiency anemia often results in microcy

9. How is anemia of chronic disease typically differentiated from iron deficiency anemia?

- **A. Anemia of chronic disease shows increased ferritin levels**
- B. Anemia of chronic disease shows low hemoglobin levels
- C. Anemia of chronic disease shows high transferrin levels
- D. Anemia of chronic disease has normal bone marrow cellularity

Anemia of chronic disease (ACD) is typically characterized by increased ferritin levels compared to iron deficiency anemia (IDA). In ACD, the body retains iron stores due to the influence of inflammatory cytokines, which leads to elevated ferritin levels as the body attempts to sequester iron and limit its availability to pathogens. Thus, serum ferritin acts as an acute phase reactant, often increasing during chronic inflammatory states, making it a key differentiator from IDA, which is characterized by low ferritin levels due to depletion of iron stores. In contrast, iron deficiency anemia is marked by low ferritin levels as the iron stores are diminished, and transferrin levels are generally elevated as the body attempts to increase iron absorption in response to low iron availability. Other characteristics, such as the hemoglobin levels and bone marrow cellularity, do not provide a definitive differentiation between these two types of anemia. In conclusion, the elevated ferritin levels in anemia of chronic disease is the primary reason this option accurately represents the distinction from iron deficiency anemia.

10. What happens if a sodium citrate sample is filled an inch below the fill line?

- **A. Unacceptable for coagulation studies**
- B. Acceptable for coagulation studies
- C. Acceptable if additional blood can fill the tube
- D. Acceptable if only the PT test is performed

When a sodium citrate sample is not filled to the appropriate fill line, it can lead to an unacceptable blood to anticoagulant ratio. Sodium citrate acts as an anticoagulant, and the correct volume of blood is crucial for accurate coagulation results. An inch below the fill line significantly reduces the volume of blood relative to the amount of anticoagulant in the tube, which can artificially prolong coagulation times and lead to misleading test results. In coagulation studies, maintaining the correct blood to citrate ratio is essential to ensure that the clotting factors are adequately preserved for accurate testing. If the volume is insufficient, the anticoagulant will not function as intended, thus rendering the sample unsuitable for reliable testing. Consequently, the sample is deemed unacceptable for coagulation studies when it is not filled to the specified line.