Clinical Laboratory Hematology, 4e **(McKenzie)**
Chapter 1   Introduction

Multiple-Choice Questions, Level I

1) Which two populations account for the greatest difference in reference intervals?
A) Adults and 12-year-olds
B) Newborns and 12-year-olds
C) Newborns and adults
D) Whites and blacks
Answer: C
Learning Objective: 1.1.3
Reference: Reference Intervals for Blood Cell Concentration

2) What component of plasma assists in the transport of bilirubin?
A) Enzymes
B) Hydrogen
C) Calcium
D) Albumin
Answer: D
Learning Objective: 1.1.2
Reference: Composition of Blood

3) When bilirubin is increased above the reference range, what disease process should be suspected if liver disease is ruled out?
A) Increased osmotic pressure
B) Hormone imbalance
C) Decreased albumin
D) Increased metabolism of hemoglobin
Answer: D
Learning Objective: 1.1.2
Reference: Composition of Blood

4) Which of the following can explain a decrease in the number of circulating erythrocytes?
A) Blood loss
B) Infection
C) Dehydration
D) Neutropenia
Answer: A
Learning Objective: 1.1.2
Reference: Composition of Blood

5) Platelets and coagulation proteins are circulating components responsible for what process?
A) Hemolysis
B) Hemostasis
C) Normal cell production
D) Immune defense
Answer: B
Learning Objective: 1.1.1
Reference: Composition of Blood

6) The predominant blood leukocyte found in children is the:
A) Monocyte
B) Lymphocyte
C) Neutrophil
D) Eosinophil
Answer: B
Learning Objective: 1.1.3
Reference: Reference Intervals for Blood Cell Concentration

7) The cellular component of blood that is involved in hemostasis is:
A) Leukocyte
B) Erythrocyte
C) Thrombocyte
D) Hemoglobin
Answer: C
Learning Objective: 1.1.1
Reference: Composition of Blood

8) The protein found in erythrocytes that is responsible for oxygen transport is:
A) Albumin
B) Gamma globulin
C) Oxygen protein
D) Hemoglobin
Answer: D
Learning Objective: 1.1.1
Reference: Composition of Blood

9) Which of the following is *not* a cellular component of blood?
A) Leukocyte
B) Platelets
C) Erythrocyte
D) Albumin
Answer: D
Learning Objective: 1.1.2
Reference: Composition of Blood

10) The liquid portion of blood is called _____ and makes up about _____ (percentage) of the total blood volume:
A) Bilirubin; 4%
B) Plasma; 55%
C) Erythrocytes; 65%
D) Cellular elements; 45%
Answer: B
Learning Objective: 1.1.2
Reference: Composition of Blood

11) An abnormal test result is defined as:
A) The opposite of a normal test result
B) A value that is outside the reference interval for a particular analyte
C) Only those values that fall below the reference interval for multiple analytes
D) Only those values that are above the reference interval for a single analyte
Answer: B
Learning Objective: 1.1.5
Reference: Investigation of a Hematologic Problem

12) Which of the following is *not* a role of the clinical laboratory professional?
A) Correlate lab results with appropriate disease states
B) Correlate lab results with disease pathophysiology
C) Correlate lab results with treatment
D) Order reflex tests
Answer: D
Learning Objective: 1.1.5
Reference: Investigation of a Hematologic Problem

13) Which of the following is a hematology screening test?
A) Complete blood count (CBC)
B) Activated partial thromboplastin time (APTT)
C) Osmotic pressure
D) Chloride concentration
Answer: A
Learning Objective: 1.1.6
Reference: Investigation of a Hematologic Problem

14) Which of the following represents an event in the pre-examination phase of laboratory testing?
A) Reporting of results
B) Interpretation of laboratory data
C) Performing a test procedure
D) Labeling a blood collection tube
Answer: D
Learning Objective: 1.1.7
Reference: Investigation of a Hematologic Problem

15) Irradiated packed red blood cells are used to:
A) decrease bleeding when there is a deficiency or abnormal function of platelets
B) decrease the risk of febrile nonhemolytic transfusion reaction
C) reduce the risk of graft-versus-host disease
D) treat the neutropenic patient who is septic and unresponsive to antimicrobials and who has chance of marrow recovery
Answer: C
Learning Objective: 1.1.2
Reference: Blood Component Therapy

16) The term for the process of blood cells passing through blood vessel walls into surrounding tissues is:
A) Osmosis
B) Capillary action
C) Vasoconstriction
D) Diapedesis
Answer: D
Learning Objective: 1.1.1
Reference: Composition of Blood

17) Which of the following is an expected finding in a newborn?
A) WBC count $= 2 \times 10^9$/L
B) PLT count $= 100 \times 10^9$/L
C) Hemoglobin $= 17.0$ g/dL
D) RBC count $= 3.50 \times 10^9$/L
Answer: C
Learning Objective: 1.1.3
Reference: Reference Intervals for Blood Cell Concentration

18) Which of the following blood cell components would be most influenced in a patient with an infection of the tonsils (tonsillitis)?
A) Leukocyte
B) Erythrocyte
C) Thrombocyte
D) Hemoglobin
Answer: A
Learning Objective: 1.1.1
Reference: Composition of Blood

19) When decreased in concentration, which of the following formed elements could result in hypoxia?
A) Leukocytes
B) Erythrocytes
C) Platelets
D) None of the above
Answer: B
Learning Objective: 1.1.1
Reference: Composition of Blood

20) Which component of blood passes through blood vessel walls into surrounding tissues to defend the body against invading foreign antigens?
A) Red blood cells
B) Platelets
C) Leukocytes
D) Gamma globulin
Answer: C
Learning Objective: 1.1.1
Reference: Composition of Blood

21) Which of the following blood constituents is associated with increased red blood cell destruction?
A) Bilirubin
B) Albumin
C) Blood urea nitrogen
D) Immunoglobulin
Answer: A
Learning Objective: 1.1.1
Reference: Composition of Blood

22) All of the following must be considered when establishing a reference interval for a group of individuals *except:*
A) The geographic area
B) Age of the population
C) Occupations of the population
D) Sex of the population
Answer: C
Learning Objective: 1.1.3
Reference: Reference Intervals for Blood Cell Concentration

23) Which of the following tests could be reflexed as the result of an abnormal prothrombin time?
A) Molecular analysis of clotting factors
B) Complete blood count
C) Measurement of albumin
D) Hemoglobin analysis
Answer: A
Learning Objective: 1.1.5
Reference: Investigation of a Hematologic Problem

24) Which of the following could be reflexed as the result of decreased RBC indices on a screening CBC?
A) Serum iron studies to rule out Iron Deficiency Anemia
B) Platelet aggregation studies to rule out disorders of hemostasis
C) Urine Culture and Sensitivity to rule out infection
D) Thyroid function studies to rule out thyroid gland disorders
Answer: A
Learning Objective: 1.1.5
Reference: Investigation of a Hematologic Problem

25) Patients who are unable to dissolve a fibrin blood clot are likely to present with which of the following pathologies?
A) Anemia
B) Bleeding
C) Thrombosis
D) Leukemia
Answer: C
Learning Objective: 1.1.4
Reference: Hemostasis

26) An unlabeled blood collection tube is delivered to the hematology laboratory. The laboratory professional requests a redraw because an error in which phase of laboratory testing has occurred?
A) Pre-examination
B) Examination
C) Post-examination
D) Analytical
Answer: A
Learning Objective: 1.1.7
Reference: Investigation of a Hematologic Problem

Short-Answer Questions

1) Explain how a reference interval is determined.
Answer: A reference interval for a given geographical region is determined by calculating the mean for a group of "normal healthy" individuals. Conditions that must be considered include physiologic differences in a given population as well as the geographic area. Once the mean has been determined, a calculation to determine the standard deviation must be performed. The range is calculated by taking the mean and 2 standard deviations above and below the mean value.
Learning Objective: 1.1.3
Reference: Reference Intervals for Blood Cell Concentration

2) Compare expected hemoglobin values and WBC counts between infants and adults.
Answer: Hemoglobin values and WBC counts are higher in infants and children than in adults.
Learning Objective: 1.1.3
Reference: Reference Intervals for Blood Cell Concentration

3) Explain how the hemostatic pathway is activated in times of need.
Answer: Traumatic events to body tissue stimulate the activation of repair mechanisms. As a result of both external and internal stimuli, the hemostatic pathway becomes activated in stages called *primary* and *secondary hemostasis* and f*ibrinolysis.*
Learning Objective: 1.1.4
Reference: Hemostasis

4) Give two reasons for transfusing leukoreduced, packed red blood cells.
Answer: Reasons for transfusing leukoreduced packed red blood cells are to decrease the risk of febrile nonhemolytic transfusion reactions, to decrease the risk of HLA sensitization, and to decrease the risk of CMV transmission.
Learning Objective: 1.1.2
Reference: Blood Component Therapy

5) Explain how screening tests and reflexing testing are related.
Answer: In an attempt to reach a cost-effective and efficient diagnosis, a physician's investigation into a hematologic or hemostatic problem begins with screening tests. The results of these tests provide the clues to the diagnosis. Depending on the results of screening tests, more specific tests (reflex tests) can be ordered. The laboratory professional can aid the physician in choosing the appropriate reflex tests that will narrow the scope for the patient diagnosis.
Learning Objective: 1.1.5, 1.1.6
Reference: Investigation of a Hematologic Problem

6) Explain how algorithmic protocols are used for follow-up testing.

Answer: Reflex test protocols are often designed as testing algorithms. These algorithms are follow-up tests that can include not only hematologic tests but also chemical, immunologic, microbiologic, and/or molecular analysis. As scientists learn more about the pathophysiology and treatment of hematologic disease and hemostasis, the number of tests designed to assist in diagnosis expands and, without testing guidelines, the cost can increase due to inappropriate and unnecessary test selection. Errors in selection of the most appropriate laboratory tests and interpretation of results can result in misdiagnosis or treatment errors and is a major source of poor patient outcomes. Algorithms are increasingly important to aid in diagnosis due to the vast number and complexity of tests available to the physician.

Learning Objective: 1.1.8

Reference: The Value of Laboratory Testing