on 2-13: Erythrocyte Sedimentation Rate

E/FALSE

The ESR is a specific diagnostic test for certain diseases.

ANS: F PTS: 1

The type of plasma proteins present affect the sedimentation rate of the red blood cells.

ANS: T PTS: 1

One ESR method is Quick's ESR.

ANS: F PTS: 1

Vibration of the counter where the sedimentation rate is performed will falsely increase the result.

ANS: T PTS: 1

The presence of sickle cells in the blood will cause a decreased sedimentation rate.

ANS: T PTS: 1

The Sediplast ESR reference ranges differ for males and females, but the ZSR reference range is the same for all ages and genders.

ANS: T PTS: 1

Tubes from completed ESR tests must be discarded into biohazard sharps containers.

ANS: T PTS: 1

Control solutions are not available for use with the ESR test.

ANS: F PTS: 1

Automated methods for performing the ESR have not yet been developed.

ANS: F PTS: 1

The ZSR test requires correlation of the test result with the patient's hematocrit.

ANS: T PTS: 1

TIPLE CHOICE

All of the following are ESR methods EXCEPT:

a. Sediplast
b. Quick's ESR
c. Westergren
d. Zeta
e. Wintrobe

on 2-1: Introduction to Hematology

TIPLE CHOICE

All of the following are true of blood vessels EXCEPT:
a. Arteries are thick-walled, the strongest type of blood vessel.
b. Veins carry deoxygenated blood.
c. There are about 10,000 miles of blood vessels in an adult.
d. Capillaries are the smallest blood vessels.

ANS: C PTS: 1

In cardiopulmonary circulation:
a. blood is carried from the heart to the tissues
b. blood circulates from the heart to the lungs to the tissues
c. blood circulates from the heart to the lungs where O_2 is picked up by the blood and CO_2 is released
d. blood is carried from the heart to the tissues and back to the heart, providing O_2 to the tissues

ANS: C PTS: 1

All of the following statements are true of blood EXCEPT:
a. It makes up 10%–15% of the total body weight.
b. Adult blood volume is approximately 5 liters.
c. It is composed of formed elements suspended in a fluid called plasma.
d. About 50%–60% of blood volume is plasma.

ANS: A PTS: 1

"Thick-walled, elastic, and muscular" describes which type of blood vessel?
a. capillaries
b. arteries
c. veins
d. venules

ANS: B PTS: 1

Which of the following functions is carried out by blood?
a. It delivers nutrients and CO_2 to the tissues.
b. It regulates body temperature.
c. It delivers O_2 to the lungs and tissues.
d. none of the above (a–c)
e. all of the above (a–c)

ANS: B PTS: 1

PLETION

A chemical that prevents blood coagulation is a(n) _____.

ANS: anticoagulant

PTS: 1

ɔn 2-2: Hemoglobin

ΓIPLE CHOICE

The hemoglobin molecule:
a. is made up of eight globin chains
b. contains protein and heme
c. contains four heme groups
d. all of the above

ANS: B PTS: 1

Which is true concerning hemoglobin(s)?
a. They cannot be measured on small handheld analyzers.
b. They are named according to the type of globin chain.
c. Thalassemias are caused by abnormalities in the heme portion.
d. Hb A_{1c} is the major hemoglobin in infants.

ANS: B PTS: 1

Which is true of hemoglobin analysis?
a. It is an indirect measure of oxygen-carrying capacity.
b. It measures the red cell volume.
c. It is always determined from an anticoagulated venous blood sample.
d. No stable standard is available.

ANS: A PTS: 1

All of the following are true of hemoglobin EXCEPT:
a. Hemoglobin is usually included in the CBC.
b. The reference value for females is higher than for males.
c. Hemoglobin transports CO_2 from the tissue to the lungs.
d. The reference value for newborns is higher than for adult males.

ANS: B PTS: 1

Which of the following is true for hemoglobin analysis?
a. The specific gravity method estimates Hgb level.
b. The reference range for adult females is 12–17 g/dL.
c. The Hgb level is unaffected by RBC count.
d. It does not require use of Standard Precautions.

ANS: A PTS: 1

PLETION

The protein portion of the hemoglobin molecule is the _____.

ANS:
globin
globin chains

PTS: 1

Hemoglobin is the main constituent of _____.

n 2-3: Microhematocrit

/FALSE

The hematocrit result can be used to estimate the iron content of red blood cells.

ANS: F PTS: 1

After centrifugation, the hematocrit is read by measuring from the bottom of the red cell column to the top of the buffy coat.

ANS: F PTS: 1

When the centrifugation of the microhematocrit sample is complete, the centrifuge lid should be opened and the rotor brought to a stop by placing the hands on it.

ANS: F PTS: 1

Plastic or Mylar-wrapped capillary tubes should be used for microhematocrit determinations when possible.

ANS: T PTS: 1

The microhematocrit can be determined using capillary blood or anticoagulated venous blood.

ANS: T PTS: 1

Spun hematocrits should be run in duplicate and the results averaged.

ANS: T PTS: 1

The reference hematocrit value for newborns is lower than that for adults.

ANS: F PTS: 1

In the packed cell column after centrifugation of blood, the leukocytes are at the bottom of the column.

ANS: F PTS: 1

PLETION

The layers of blood cells that form when a tube of whole blood is centrifuged are collectively called the _____.

ANS: packed cell column

PTS: 1

A glass or plastic tube of very small diameter used for laboratory procedures is called a(n) _____.

ANS:

on 2-4: The Hemacytometer

E/FALSE

When the hemacytometer cover glass is in place, the depth of the chamber is 1 mm.

ANS: F PTS: 1

Before beginning counts, cells should be allowed to settle in the chamber for 2 minutes.

ANS: T PTS: 1

Dirt and debris on the hemacytometer and cover glass can be mistakenly identified as cells.

ANS: T PTS: 1

The area of the nine (9) large squares is 9 mm^2.

ANS: T PTS: 1

It is not necessary to disinfect the hemacytometer and cover glass since only diluted blood is used.

ANS: F PTS: 1

TIPLE CHOICE

All of the following are true of the hemacytometer and cover glass EXCEPT:
a. They must meet National Institute of Standards and Technology (NIST) standards.
b. If a certified hemacytometer is used, any cover glass can be used.
c. They must be disinfected after use.
d. They should be gently washed and dried to avoid scratches.

ANS: B PTS: 1

Which of the following statements is true of the hemacytometer?
a. When viewed from the top, it has two polished raised platforms.
b. The depressions surrounding the platforms are called ditches.
c. The depressions surrounding the platforms form the letter *I*.
d. All of the above (a–c) are true.
e. None of the above (a–c) are true.

ANS: A PTS: 1

Which of the following statements is true of hemacytometers?
a. The cover glass covers one side at a time.
b. The cover glass regulates the depth of the fluid.
c. The chamber depth in the Neubauer counting chambers is 1 mm.
d. Each of the nine large squares is 3 × 3 mm.
e. None of the statements (a–d) is true.

ANS: B PTS: 1

Which of the following can be counted using the hemacytometer?

ɔn 2-5: Manual RBC and WBC Counts

ΓIPLE CHOICE

All of the following are true of RBC and WBC counts EXCEPT:
a. Many are performed in large reference laboratories.
b. They can be performed on automated instruments.
c. The majority are performed manually.
d. Many are performed by instruments that use a laser beam.

ANS: C PTS: 1

Which of the following is true of automated cell counters?
a. All are relatively complicated to operate.
b. They are based on one of two major types of technology.
c. They are used only in large hospital laboratories.
d. They are too complex for use in POLs.

ANS: B PTS: 1

Which of the following is true of manual cell counts?
a. They can be performed when blood counts are decreased due to chemotherapy.
b. They are more accurate than automated counts.
c. They cannot be used to monitor a patient's progress.
d. The RBC and WBC cannot be performed separately.

ANS: A PTS: 1

Which of the following is true regarding the WBC count reference ranges?
a. In conventional units, the range for adult females is $4–5.5 \times 10^6/\mu L$.
b. In SI units, the range for the adult male is $4–5.5 \times 10^{12}/\mu L$.
c. In SI units, the reference range for an adult is $4–11 \times 10^9/L$.
d. For an adult, the reference range is $9–30 \times 10^9/L$.

ANS: C PTS: 1

All of the following are pathological causes of leukocytosis EXCEPT:
a. infection
b. obstetric labor
c. leukemias
d. polycythemia

ANS: B PTS: 1

PLETION

A condition in which the RBC count or blood hemoglobin is decreased below normal is _____.

ANS: anemia

PTS: 1

An opening is also called a(n) _____.

on 2-6: Platelet Count

E/FALSE

Uncontrolled bleeding can occur if the platelet count falls to 10,000/µL.

ANS: T PTS: 1

Excessive bleeding can occur in thrombocytosis.

ANS: F PTS: 1

Radiation and chemotherapy treatments usually cause increases in the platelet count.

ANS: F PTS: 1

The diluting fluid used in Unopette platelet counts lyses RBCs.

ANS: T PTS: 1

The technician should wait 2 minutes after filling the hemacytometer before beginning the platelet count.

ANS: F PTS: 1

Before filling the hemacytometer, a few drops of well-mixed diluted sample should be discarded using the Unopette capillary.

ANS: T PTS: 1

One large corner square of the hemacytometer ruled area is counted in manual platelet counts.

ANS: F PTS: 1

TIPLE CHOICE

Which of the following is the reference range for platelets in the blood?
a. $1.5–4 \times 10^5$/L
b. $1.5–4 \times 10^{11}$ /µL
c. 150,000–400,000/L
d. 150,000–400,000/µL

ANS: D PTS: 1

A decrease below the normal number of platelets is:
a. always caused by bone marrow damage
b. caused by a release of platelets from the spleen
c. thrombocytopenia
d. caused by chronic granulocytic leukemia

ANS: C PTS: 1

Which of the following is NOT true of blood collection for platelet counts?
a. Capillary blood can be used.

ɔn 2-7: Preparing and Staining a Blood Smear

ΓIPLE CHOICE

All of the following are true of blood collected for blood smears EXCEPT:
a. The preferred specimen is capillary blood.
b. Anticoagulant must always be used in blood for blood smears.
c. Venous blood with EDTA can be used.
d. Capillary blood can be collected into capillary tubes.

ANS: B PTS: 1

Which of the following is correct concerning quality assessment when preparing a blood smear?
a. The procedure should produce minimal alteration of cell distribution and morphology.
b. Venous anticoagulated blood must be well mixed before making a smear.
c. The only anticoagulant that can be used for smears is EDTA.
d. All of the above (a–c) are true.

ANS: D PTS: 1

Which of the following is NOT true when making blood smears?
a. Smears must be stained before they air-dry.
b. Smears from anticoagulated venous blood should be made within 2 hours of blood collection.
c. Smears should have a feathered edge.
d. Capillary blood is preferred over venous blood.

ANS: A PTS: 1

When preparing slides by the two-slide method, which is true?
a. A large drop of blood makes the best smear.
b. The spreader slide can be used to prepare several smears.
c. The smear should cover one-half to three-fourths of the slide.
d. Smears with holes and ridges are acceptable.

ANS: C PTS: 1

Which of the following is true regarding the preparation and staining of a blood smear?
a. Smears must be stained immediately.
b. Smears can be immersed in methanol and stained later.
c. Smears can be preserved by immersing in ethanol.
d. Wright's stain contains no preservative.

ANS: B PTS: 1

PLETION

The fluid portion of the cell surrounding the nucleus is the _____.

ANS: cytoplasm

PTS: 1

on 2-8: Normal Blood Cell Morphology

E/FALSE

The neutrophilic band cell is shaped like a curved sausage.

ANS: T PTS: 1

The nucleus of the monocyte has a smooth appearance.

ANS: F PTS: 1

White blood cells should be observed in an area of the smear where red cells are just touching.

ANS: T PTS: 1

Red blood cells are about one-third the diameter of platelets.

ANS: F PTS: 1

The neutrophil is the most numerous leukocyte in normal adult blood.

ANS: T PTS: 1

Normal RBCs are 6–8 μm in diameter and have a round purple nucleus.

ANS: F PTS: 1

The basophil is named because it has blue (basophilic) cytoplasm.

ANS: F PTS: 1

The lymphocyte is the smallest WBC.

ANS: T PTS: 1

The nuclei of platelets are small and granular.

ANS: F PTS: 1

Monocytes are derived from megakaryocytes.

ANS: F PTS: 1

TIPLE CHOICE

All of the following are formed elements found in normal blood EXCEPT:

a. RBCs (erythrocytes)
b. WBCs (leukocytes)
c. megakaryocytes
d. platelets

ANS: C PTS: 1

on 2-9: White Blood Cell Differential Count

E/FALSE

Bacterial infections cause an increased percentage of neutrophils and band cells.

ANS: T PTS: 1

Eosinophils are usually increased in allergic reactions.

ANS: T PTS: 1

Deficiency of vitamin B_{12} is one cause of microcytosis.

ANS: F PTS: 1

The differential count is performed while examining the stained smear using the oil immersion objective.

ANS: T PTS: 1

The area of the smear to be examined is called the feathered edge.

ANS: T PTS: 1

The cells should be counted while observing the smear in an area where the cells are overlapping.

ANS: F PTS: 1

The term *poikilocytosis* is used when RBCs have varied sizes.

ANS: F PTS: 1

TIPLE CHOICE

Which of the following is NOT a reference range for differential count on an adult?
a. 25%–40% lymphocytes
b. 3%–9% neutrophils
c. 0%–7% bands
d. 1%–3% eosinophils

ANS: B PTS: 1

In the WBC differential count:
a. an average of 7–20 platelets/oil immersion field is considered normal
b. a 1-month-old infant will have 45%–50% neutrophils
c. 45%–50% neutrophils is normal for an adult
d. 7%–13% bands is normal for an adult

ANS: A PTS: 1

Which of the following statements about the WBC differential count is NOT correct?
a. Viral infections usually cause increased lymphocytes and increased total WBCs.
b. Neutrophils and bands can be increased in bacterial infections.

on 2-10: Principles of Automated Hematology

E/FALSE

In the 1600s, William Harvey recorded his observations as RBCs passed through the capillaries.

ANS: T PTS: 1

Blood cells were routinely counted by manual methods until the late 1950s.

ANS: T PTS: 1

Manual counts have a higher coefficient of variation than counts performed on instruments.

ANS: T PTS: 1

The first automated counters performed only WBC counts.

ANS: F PTS: 1

Blood cells are good conductors of electricity.

ANS: F PTS: 1

In light scatter instruments, laser is preferred to tungsten-halogen light because laser light has multiple wavelengths.

ANS: F PTS: 1

Results of a three-part differential can be displayed as a histogram.

ANS: T PTS: 1

Five-part differentials are often displayed as scattergrams.

ANS: T PTS: 1

TIPLE CHOICE

All of the following are true of automated cell counts EXCEPT:
a. They have more variation than manual methods.
b. More than 60 parameters can be reported.
c. Only the WBCs, RBCs, hemoglobin, platelets, and reticulocytes are directly counted or measured.
d. Hematocrit and indices values are calculated.

ANS: A PTS: 1

Which of the following technologies is NOT commonly used in the United States?
a. electrical impedance
b. combination of electrical impedance and light scatter
c. light scattering

ɔn 2-11: Abnormalities in Blood Cell Morphology

ΓIPLE CHOICE

Nuclear remnants remaining after the nucleus is lost and commonly seen in pernicious anemia are:
a. basophilic stippling
b. basophilia
c. Howell-Jolly bodies
d. erythrocyte indices

ANS: C PTS: 1

An immature blood cell normally found only in the bone marrow is a(an):
a. keratocyte
b. blast cell
c. codocyte
d. elliptocyte
e. Cabot cell

ANS: B PTS: 1

All of the following are related to the red blood cell indices EXCEPT:
a. MCH
b. the size and hemoglobin content of RBCs
c. femtoliter
d. drepanocyte
e. hematocrit

ANS: D PTS: 1

Another name for sickle cells is:
a. codocyte
b. elliptocyte
c. drepanocyte
d. keratocyte
e. stomatocyte

ANS: C PTS: 1

A patient with an artificial heart valve could have damaged red blood cells called:
a. codocytes
b. sickle cells
c. stomatocytes
d. nucleated RBCs
e. keratocytes

ANS: E PTS: 1

All of the following are true of RBCs with a diameter greater than 8 µm EXCEPT:
a. They are called macrocytes.
b. They are called megalocytes.
c. The condition can be caused by deficiency of B_{12}.
d. The condition can be caused by iron deficiency.

ANS: D PTS: 1

Which is true of red cells in iron deficiency anemia?
a. They are normocytic.
b. They are macrocytic.
c. They are hypochromic.
d. They are normocytic and hypochromic.
e. They are hyperchromic.

on 2-12: Reticulocyte Count

E/FALSE

The reference value for the adult reticulocyte count is 0.5%–1.5%.

ANS: T PTS: 1

Folic acid deficiency is one cause of reticulocytosis.

ANS: F PTS: 1

Newborns have high reticulocyte counts that decrease to adult levels by 2 weeks of age.

ANS: T PTS: 1

When new methylene blue is used to stain reticulocytes, the proportion of blood to stain is two (2) parts blood to one (1) part stain.

ANS: F PTS: 1

Successful treatment of anemia should result in an increase in reticulocytes.

ANS: T PTS: 1

The stained network of DNA in the cytoplasm of reticulocytes is called a reticulum.

ANS: F
The remnants are RNA.

PTS: 1

TIPLE CHOICE

Which is NOT true of the reticulocyte count?
a. It estimates the number of immature RBCs in the circulating blood.
b. It estimates the amount of hemoglobin in the average red cell.
c. It indirectly estimates the rate of RBC production.
d. It can be used to monitor the course of treatment for anemia.

ANS: B PTS: 1

Which of the following is true concerning the reticulocyte count reference value?
a. In a healthy adult, approximately 1% of the RBCs will stain as reticulocytes.
b. Reticulocyte counts above 2% in an adult are above the reference range.
c. Newborns have low reticulocyte counts that increase to adult levels by 2 weeks of age.
d. None of the above is true.

ANS: A PTS: 1

All of the following are true of reticulocytosis EXCEPT:
a. It can be a response to acute blood loss.