EXERCISES

Remember to check your answers carefully with the Answers to Exercises, page 536.

A Match the following cells with their definitions as given below.

basophil
eosinophil
erythrocyte
hematopoietic stem cell
lymphocyte
monocyte
neutrophil
platelet

1. mononuclear white blood cell (agranulocyte) formed in lymph tissue; it is a phagocyte and the precursor of a macrophage _____
2. thrombocyte or cell fragment that helps blood clot _____
3. cell in the bone marrow that gives rise to different types of blood cells _____
4. mononuclear leukocyte formed in lymph tissue; produces antibodies _____
5. leukocyte with dense, reddish granules having an affinity for red acidic dye; associated with allergic reactions _____
6. red blood cell _____
7. leukocyte (polymorphonuclear granulocyte) formed in the bone marrow; granules do not stain intensely and have a pale color _____
8. leukocyte (granulocyte) with dark-staining blue granules; releases histamine and heparin _____

B Give the meanings of the following terms.

1. coagulation _____
2. granulocyte _____
3. mononuclear _____
4. polymorphonuclear _____
5. globulins _____
6. erythroblast _____
7. megakaryocyte _____
8. macrophage _____

THREE SHORT CLINICAL CASES

1. A 65-year-old woman visits her physician complaining of shortness of breath and swollen ankles. Lab tests reveal that her hematocrit is 18.0 and her hemoglobin 5.8. Her blood smear shows macrocytes and her blood level of vitamin B_{12} is very low. What is a likely diagnosis?
   a. Aplastic anemia
   b. Hemochromatosis
   c. Pernicious anemia

2. A 22-year-old college student visits the clinic with a fever, complaining of a sore throat. Blood tests show a WBC of 28,000 per mm^3 with 95% myeloblasts (polys are 5%). Platelet count is 15,000 per mm^3, hemoglobin is 10 g/dL, and the hematocrit is 22.5. What is your diagnosis?
   a. Chronic lymphocytic leukemia
   b. Acute myelogenous leukemia
   c. Thalassemia

3. A 35-year-old woman goes to her physician complaining of spots on her legs and bleeding gums. On examination, she has tiny purple spots covering her legs and evidence of dried blood in her mouth. Her CBC shows hemoglobin 14 g/dL, hematocrit 42%, WBC 5000/mm^3 with normal differential, and platelet count 4000/mm^3 (with megakaryocytes in bone marrow). What is your diagnosis?
   a. Sickle cell anemia
   b. Hemolytic anemia
   c. Autoimmune thrombocytopenic purpura

CASE REPORT

Four-year-old Sally has been running a low-grade fever for several weeks, with recurrent sore throat, earache, and cough. Her mother takes her to the family physician, who diagnoses her condition as otitis. Sally continues to be fatigued and anorexic. Her mother then notices bruising on her legs and arms. The family physician finally orders blood tests and an antibiotic drug. Peripheral blood tests reveal Hgb 7.4, platelet count 40,000, and WBC count 85,000 with 90% lymphoblasts. A bone marrow biopsy is ordered.

1. What's the likely diagnosis for this patient?
   a. AML
   b. CLL
   c. ALL
   d. CML

2. The probable cause of Sally's ecchymoses is
   a. Neutropenia
   b. Thrombocytopenia
   c. Anorexia
   d. Otitis

3. The likely explanation for Sally's fatigue is
   a. Anemia
   b. Sore throat and cough
   c. Thrombocytopenia
   d. Neutropenia

4. Treatment for Sally's condition is likely to be
   a. Prolonged antibiotic therapy
   b. IV feeding
   c. Surgery to repair the bone marrow
   d. Chemotherapy

9. hemoglobin _____
10. plasma _____
11. reticulocyte _____
12. myeloblast _____

C **Give the medical terms for the following descriptions.**

1. liquid portion of blood _____
2. orange-yellow pigment produced from hemoglobin when red blood cells are destroyed _____
3. iron-containing nonprotein part of hemoglobin _____
4. proteins in plasma; separated into alpha, beta, and gamma types _____
5. hormone secreted by the kidneys to stimulate bone marrow to produce red blood cells _____
6. foreign material that stimulates the production of an antibody _____
7. plasma protein that maintains the proper amount of water in the blood _____
8. proteins made by lymphocytes in response to antigens in the blood _____

D **Give short answers for the following.**

1. Name four types of plasma proteins. _____
2. What is the Rh factor? _____
3. What is hemolysis? _____
4. A person with type A blood has _____ antigens and _____ antibodies in his or her blood.
5. A person with type B blood has _____ antigens and _____ antibodies in his or her blood.
6. A person with type O blood has _____ antigens and _____ antibodies in his or her blood.
7. A person with type AB blood has _____ antigens and _____ antibodies in his or her blood.
8. Can you transfuse blood from a type A donor into a type B recipient? _____ Why or why not? _____
9. Can you transfuse blood from a type AB donor into a type O recipient? _____ Why or why not? _____

10. What is electrophoresis? _____
11. What is immunoglobulin? _____
12. What is differentiation? _____
13. What is plasmapheresis? _____
14. Why is type O the universal donor? _____

13

E **Match the following terms related to clotting with their meanings as given below.**

coagulation	heparin	thrombin
fibrin	prothrombin	warfarin (Coumadin)
fibrinogen	serum	

1. anticoagulant substance found in liver cells, bloodstream, and tissues _____
2. protein threads that form the basis of a blood clot _____
3. plasma protein that is converted to thrombin in the clotting process _____
4. plasma minus clotting proteins and cells _____
5. drug given to patients to prevent formation of clots _____
6. plasma protein that is converted to fibrin in the clotting process _____
7. process of clotting _____
8. enzyme that helps convert fibrinogen to fibrin _____

F **Divide the following terms into component parts and give meanings of the complete terms.**

1. anticoagulant _____
2. hemoglobinopathy _____
3. cytology _____
4. leukocytopenia _____
5. morphology _____
6. megakaryocyte _____
7. sideropenia _____
8. phagocyte _____
9. myeloblast _____
10. plateletpheresis _____

11. monoblast _____
12. myelopoiesis _____
13. hemostasis _____
14. thrombolytic _____
15. hematopoiesis _____

G **Match the following terms concerning red blood cells with their meanings as given below.**

anemia	hemoglobin	microcytosis
anisocytosis	hemolysis	poikilocytosis
erythropoiesis	hypochromic	polycythemia vera
hematocrit	macrocytosis	spherocytosis

1. any irregularity in the shape of red blood cells _____
2. oxygen-containing protein in red blood cells _____
3. formation of red blood cells _____
4. deficiency in numbers of red blood cells _____
5. destruction of red blood cells _____
6. pertaining to reduction of hemoglobin in red blood cells _____
7. variation in size of red blood cells _____
8. abnormal numbers of round, rather than normally biconcave-shaped, red blood cells _____
9. increase in number of small red blood cells _____
10. general increase in numbers of red blood cells; erythremia _____
11. increase in numbers of large red blood cells _____
12. separation of blood so that the percentage of red blood cells in relation to the volume of a blood sample is measured _____

H **Describe the problem in each of the following forms of anemia.**

1. iron deficiency anemia _____
2. pernicious anemia _____
3. sickle cell anemia _____
4. aplastic anemia _____
5. thalassemia _____

I **Give the meanings of the following terms for blood dyscrasias.**

1. autoimmune thrombocytopenic purpura _____
2. granulocytosis _____
3. hemophilia _____
4. hemochromatosis _____
5. multiple myeloma _____
6. mononucleosis _____

J **Match the term in Column I with its meaning in Column II. Write the letter of the meaning in the space provided.**

COLUMN I		COLUMN II
1. relapse	_____	A. Deficiency of all blood cells
2. remission	_____	B. Immunoglobulin fragment found in the urine of patients with multiple myeloma
3. palliative	_____	C. Increase in numbers of granulocytes; seen in allergic conditions
4. Bence Jones protein	_____	D. Large blue or purplish patches on skin (bruises)
5. ecchymoses	_____	E. Symptoms of the disease return
6. pancytopenia	_____	F. Tiny purple or flat red spots on skin as a result of small hemorrhages
7. apheresis	_____	G. Symptoms of the disease disappear
8. eosinophilia	_____	H. Separation of blood into its parts
9. petechiae	_____	I. Preparation of erythrocytes separated from plasma
10. packed cells	_____	J. Relieving but not curing

K **Match the following laboratory test or clinical procedure with its description.**

antiglobulin (Coombs) test
autologous transfusion
bleeding time
bone marrow biopsy
coagulation time
erythrocyte sedimentation rate
hematocrit
hematopoietic stem cell transplantation
platelet count
red blood cell count
red blood cell morphology
white blood cell differential

1. microscopic examination of a stained blood smear to determine the shape of individual red blood cells _____
2. percentage of red blood cells in a volume of blood _____
3. determines the number of clotting cells per mm^3 or μL of blood _____
4. time required for venous blood to clot in a test tube _____
5. speed at which erythrocytes settle out of plasma _____
6. percentage of the total WBCs made up by different types of white blood cells (immature and mature forms) _____
7. test for the presence of antibodies that coat and damage erythrocytes _____
8. peripheral stem cells from a compatible donor are infused into a recipient's vein to repopulate the bone marrow _____
9. time required for blood to stop flowing from a small puncture wound _____
10. microscopic examination of a core of bone marrow removed with a needle _____
11. number of erythrocytes per mm^3 or μL of blood _____
12. blood is collected from and later reinfused into the same patient _____

L **Give the meanings of the following abbreviations in Column I and then select from the sentences in Column II the best association for each.**

COLUMN I

1. Hgb _____ _____
2. GVHD _____ _____
3. ALL _____ _____
4. PT _____ _____
5. CML _____ _____
6. EPO _____ _____
7. IgA, IgE, IgD _____ _____
8. CLL _____ _____
9. Hct _____ _____
10. AML _____ _____

COLUMN II

A. Blood protein that helps transport oxygen to body tissues.
B. Malignant condition of white blood cells in which immature granulocytes predominate; normal bone marrow is replaced by myeloblasts.
C. Malignant condition of white blood cells in which immature lymphocytes predominate; children are affected and onset is sudden.
D. Test used to follow patients who are taking certain anticoagulants.
E. Percentage of erythrocytes in a volume of blood.
F. Malignant condition of white blood cells in which both mature and immature granulocytes are present; a slowly progressive illness.
G. Immune reaction of donor's cells/tissue to recipient's cells/tissue; a possible outcome of hematopoietic stem cell or bone marrow transplantation.
H. Proteins containing antibodies.
I. Malignant condition of white blood cells in which relatively mature lymphocytes predominate in lymph nodes, spleen, and bone marrow; usually seen in elderly patients.
J. Hormone that stimulates the growth of red blood cells.