

## 12-1 How Can Blood Diseases Be Identified?

Blood is a tissue. It has many different cells with many different jobs. If you look at blood under the microscope, you will find three different cell types—red cells, white cells, and platelets. In a normal person the numbers of types of blood cells are fairly constant. Sometimes, however, the number of cells will change due to a certain disease. Noticing this change in number can help a physician in the diagnosis of a person's disease.

### INTERPRETATION

### OBJECTIVES

In this exercise, you will:

- a. learn how to recognize three blood cell types.
- b. examine diagrams of blood samples from six hospital patients.
- c. match the blood samples with certain diseases.

### KEYWORDS

Define the following keywords:

diagnosis \_\_\_\_\_

platelet \_\_\_\_\_

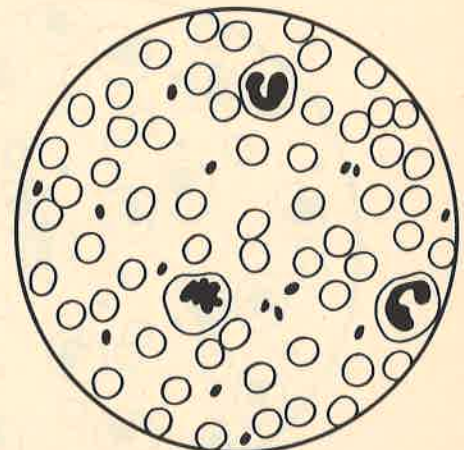
red blood cell \_\_\_\_\_

white blood cell \_\_\_\_\_

### PROCEDURE

#### Part A. Normal Blood Cells

1. Examine Figure 1, which shows human blood cells magnified 1000 times.
2. Count each cell type present.  
HINT: To help avoid counting cells twice place a checkmark on each cell as you count.
  - a. red blood cells—round, very numerous, no nucleus.
  - b. white blood cells—round, few in number, larger than red blood cells, nucleus present.
  - c. platelets—dotlike, many but less than red cells, very small.



**FIGURE 1.** Normal blood sample

3. Record the number of each cell type for Figure 1 in Table 1. These numbers are for normal blood.
4. Using the numbers 1, 2, or 3, rank the cells in order from the most common (1) to the least common (3). Enter these rankings in the next column in Table 1 marked *Rank*.

**Part B. Examining Abnormal Blood Cells**

1. Examine Figures 2 to 6. These represent human blood samples from people with certain diseases.
2. Count each cell type and record the number for each sample in Table 1 under the right column.
3. Complete the rank columns using the numbers 1 to 3 as with the normal blood sample.

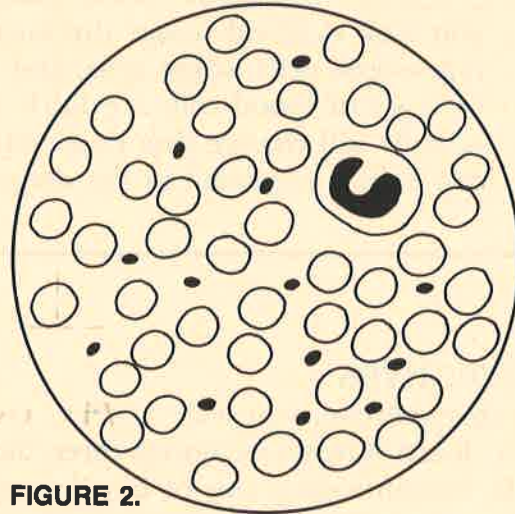


FIGURE 2.

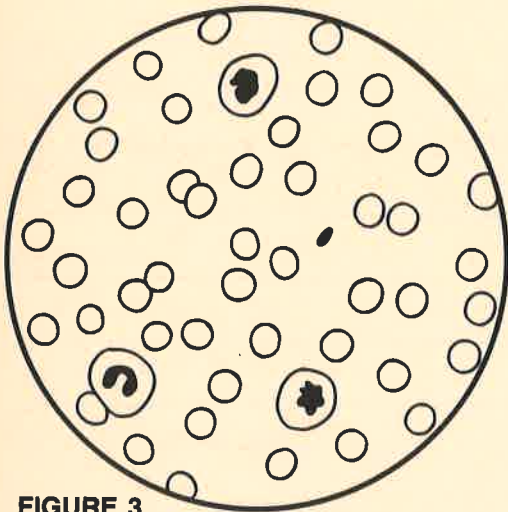


FIGURE 3.

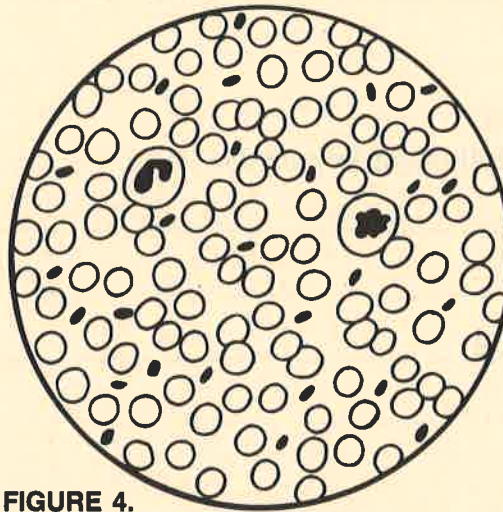


FIGURE 4.

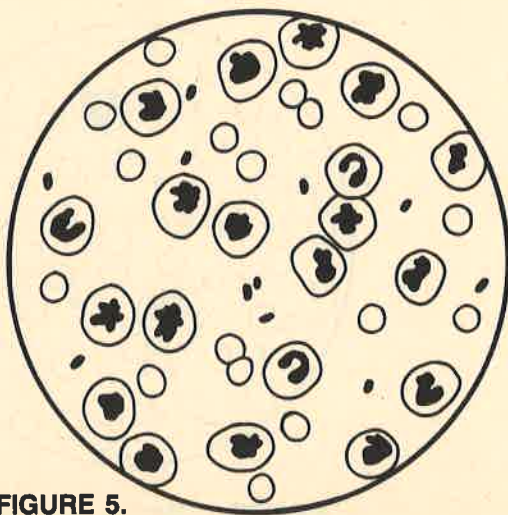


FIGURE 5.

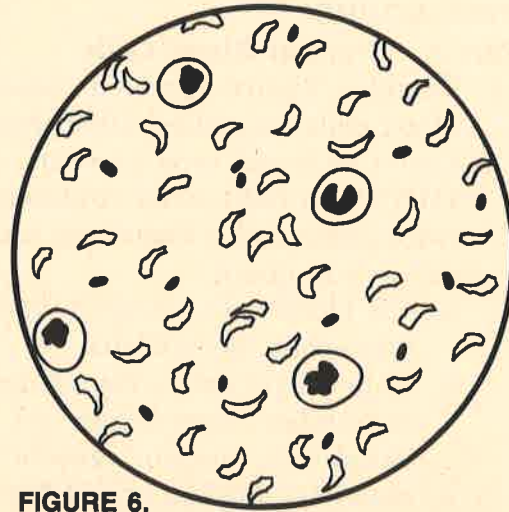


FIGURE 6.

**Table 1. Blood Cell Counts**

Cell type	Fig. 1		Fig. 2		Fig. 3		Fig. 4		Fig. 5		Fig. 6	
	No.	Rank	No.	Rank	No.	Rank	No.	Rank	No.	Rank	No.	Rank
Red												
White												
Platelet												
Disease diagnosis												

**Part C. Diagnosing Blood Diseases**

1. Read over the following case histories for five hospital patients.
2. Match each case history with the appropriate blood sample.
3. Record the name of the disease below each sample in Table 1 in the space provided for disease diagnosis.

**Case History:** Male, white, age 28; has admitted to injecting drugs for the past 6 years, has pneumonia and skin cancer

**Blood analysis:** Few white cells present

**Disease Diagnosis:** AIDS (acquired immunodeficiency syndrome)

**Case History:** Male, black, age 15; is always tired and short of breath

**Blood Analysis:** Red cells—shaped like crescent moons

**Disease Diagnosis:** Sickle-cell anemia

**Case History:** Female, oriental, age 14; has a fever, sore throat, and frequent nosebleeds

**Blood Analysis:** Red cells—low in number; White cells—high in number  
Blood cell rank—white = 1, red = 2, platelets = 3

**Disease Diagnosis:** Leukemia (leuk = white, emia = blood)

**Case History:** Male, white, age 68; has frequent headaches, nosebleeds, shows high blood pressure, a very red complexion

**Blood Analysis:** Red cells—a very high number

**Disease Diagnosis:** Polycythemia (poly = many, cyth = cell, emia = blood)

**Case History:** Female, white, age 22; has sudden appearances of purple marks under the skin, bruises easily, blood does not clot easily after a cut

**Blood Analysis:** Platelets—very few in number

Blood cell rank—red = 1, white = 2, platelets = 3

**Disease Diagnosis:** Thrombocytopenia purpurea (thrombo = platelet, cyto = cell, penia = shortage, purpurea = purple)

## QUESTIONS

1. What is the function of
  - a. red blood cells? \_\_\_\_\_
  - b. white blood cells? \_\_\_\_\_
  - c. platelets? \_\_\_\_\_
2. How many
  - a. red blood cells are in a drop of normal blood? \_\_\_\_\_
  - b. white blood cells are in a drop of normal blood? \_\_\_\_\_
  - c. platelets are in a drop of normal blood? \_\_\_\_\_
3. Rank your answers given to question 2 as to the most common (1) to the least common (3). \_\_\_\_\_
4. Do your rankings for normal blood in Table 1 agree with your answer to question 3? \_\_\_\_\_
5. Explain why a person with AIDS may also have pneumonia. (Keep in mind the main job of white blood cells). \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. The rank of blood cells in a normal person and one with polycythemia is the same. How can you conclude that the person has polycythemia? \_\_\_\_\_  
\_\_\_\_\_
7. The rank of blood cells in a normal person and one with sickle-cell anemia is the same. How can you conclude that the person has sickle-cell anemia? \_\_\_\_\_  
\_\_\_\_\_
8. Name a blood disease that shows
  - a. too many white blood cells \_\_\_\_\_
  - b. too few platelets \_\_\_\_\_
  - c. too few red blood cells \_\_\_\_\_
  - d. too many red blood cells \_\_\_\_\_
  - e. too few white blood cells \_\_\_\_\_
9. Explain why a person with thrombocytopenia purpura shows many bruises or purple marks. \_\_\_\_\_  
\_\_\_\_\_
10. Explain how the counting and appearance of blood cells can help in the diagnosis of blood diseases. \_\_\_\_\_  
\_\_\_\_\_