

Hematology: Introduction to Blood

Question 1: Before we start exploring the lab, let me ask you: what do you think we hematologists work with?

1. Blood

- 2. Bones
- 3. Heart
- 4. Brain cells

Question 2: The purple tubes contain EDTA as an additive, which is a strong anticoagulant. What's the role of an anticoagulant in hematology?

1. Prevent blood clotting

- 2. Preserve the sample
- 3. Degrade the sample
- 4. Induce blood clotting

Question 3: Which component of the blood is responsible for blood clotting?

1. Platelets

- 2. Red blood cells
- 3. White blood cells
- 4. Hemoglobin

Question 4: What's the role of red blood cells?

1. Transport of O₂ from the lungs

- 2. Immune defense against viral infections
- 3. Immune defense against bacterial infections
- 4. Transport of albumin to muscle cells

Question 5: What are neutrophils, eosinophils, basophils, lymphocytes, and monocytes?

1. They are all white blood cells

- 2. They are all different variants of hemoglobin
- 3. They are all minerals
- 4. They are part of the blood plasma

Question 6: According to the complete blood count of the control sample (click 'View Image'), how many red blood cells are present in the tube, considered that the tube contains 10 ml of blood?

1. 5.1×10^{10} cells

- 2. 5.1×10^{12} cells
- 3. 5.1×10^{11} cells
- 4. The number of red blood cells are not measured in a complete blood count

Question 7: The measured hematocrit of the control sample is 42. What's the percentage of the blood plasma?

1. 58

- 2. 42
- 3. 1
- 4. 100

Question 8: While the sample is being analyzed, let's review the functions of our equipment.

How does an automatic hematology analyzer determine the total number of cells?

1. Based on electrical resistance
2. It's determined manually by the lab technician
3. With an in-built microscope
4. With an in-built PCR machine

Question 9:

Here's the result for Patient 1. Which parameters show an abnormal value? Scroll down to select the correct

answer.

1. White blood cells count (WBC) and platelets (PLT)
2. Red blood cell count (RBC) and hematocrit (HCT)
3. All
4. None

Question 10: It looks like there are no abnormalities in the complete blood count of Patient 3. However, Patient 2 shows some abnormal values.

Which blood cell disorder can we rule out for Patient 2?

1. White blood cell (WBC) disorder
2. Red blood cell (RBC) disorder
3. All of the options are correct
4. Anemia

Question 11: What does the complete blood count of Patient 2 suggest?

1. Anemia
2. Polycythemia
3. Porphyria
4. Leukopenia

Question 12: Following the fixation, the dry blood smear is stained. Why is staining essential in analyzing the blood sample?

1. To visualize the different blood cells
2. To preserve the sample
3. To test the pH of the sample
4. To visualize the hemoglobin content

Question 13: What is visible on the microscopic image of the stained blood sample?

Click 'Explore' to see the microscope screen and use the arrows to navigate through the sample.

1. Red blood cells, white blood cells and platelets
2. Red blood cells and white blood cells
3. Red blood cells and platelets
4. white blood cells and platelets

Question 14: How many white blood cells do you count in the image?

1. 2
2. 16
3. Roughly 200
4. 1

Question 15: What's the advantage of a blood smear compared to a complete blood count?

1. To obtain a clear image of the blood cell morphology
2. It serves as an additional quality control
3. It helps identify viral infections
4. Blood smears are obtained more quickly than complete blood count

Question 16: Which structures does Giemsa stain?

1. Phosphate groups in the DNA
2. The cell membrane
3. Endosomes
4. Extracellular matrix

Question 17: What can you detect in the blood smear of Patient 1?

1. Intracellular parasites
2. Extracellular parasites
3. Viruses
4. Bacteria

Question 18: Which abnormal blood cell morphology can you observe in the sample from Patient 2?

1. Abnormally shaped red blood cells
2. Abnormally segmented nuclei of neutrophils
3. Abnormal number of platelets
4. There are no abnormalities visible

Question 19: What is your observation for the blood smear of Patient 3?

1. There are no abnormalities visible
2. Platelets appear abnormally shaped
3. Red blood cells have a fuzzy cell membrane
4. White blood cells appear abnormally shaped

Question 20: What could you test for in the case of Patient 3 to confirm your diagnosis of hemophilia?

1. All options are correct
2. Measure the amount of clotting factor VIII and IX in the blood
3. Measure the speed of blood clotting
4. Gene sequencing