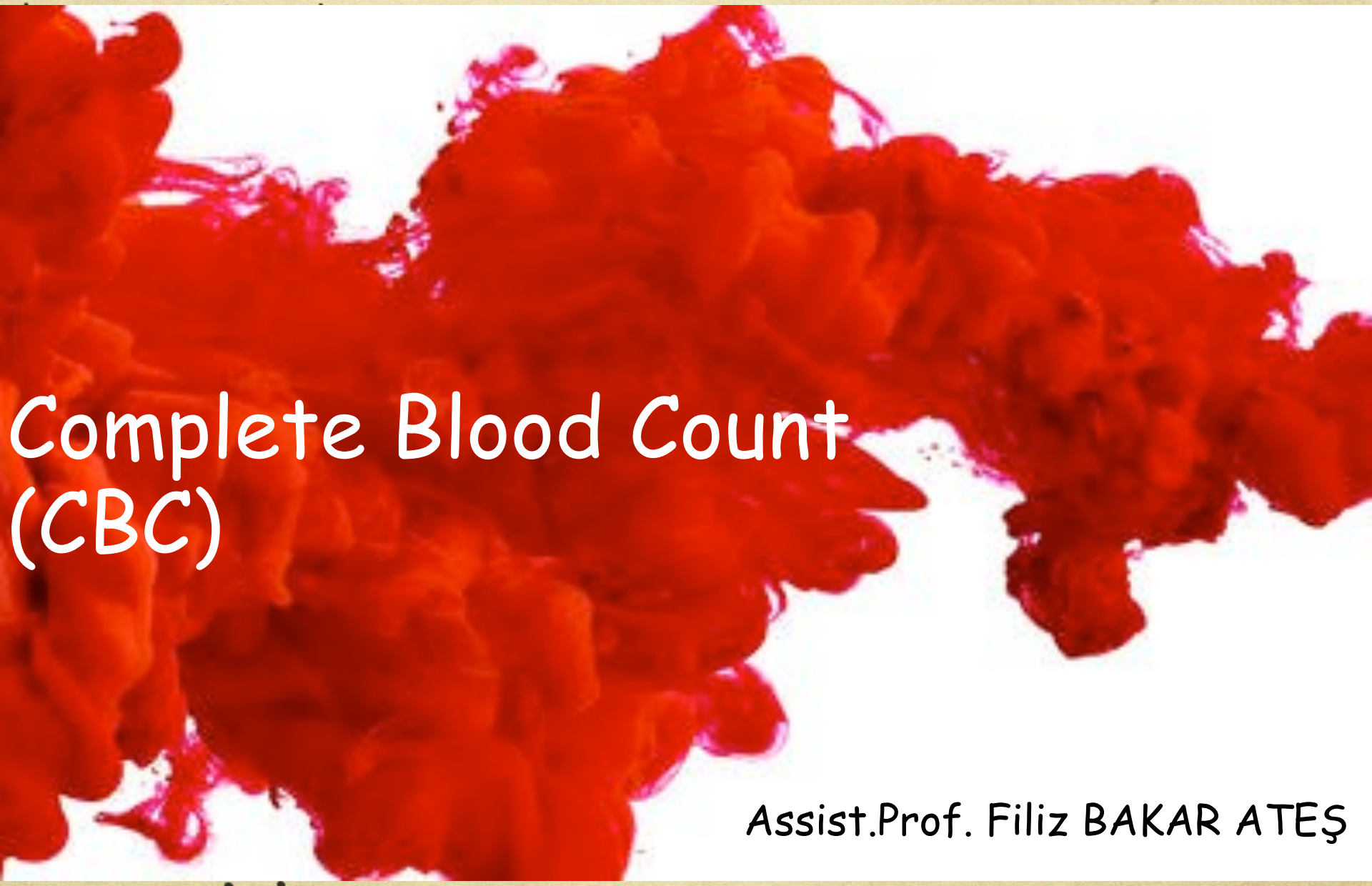


Complete Blood Count (CBC)

Assist.Prof. Filiz BAKAR ATEŞ

- The complete blood count (CBC) is one of the most common blood test used.
- It analyzes the three major types of cells in blood

1. red blood cells,
2. white blood cells, and
3. platelets.

- The CBC counts these cells, measures
- hemoglobin (the oxygen-carrying molecule in red blood cells),
- estimates the red cells' volume, and
- sorts the white blood cells into five subtypes, referred to as the CBC differential.

CBC TEST NAMES Acronym Definition

- WBC White Blood Cells
- RBC Red Blood Cells
- HGB Hemoglobin
- HCT Hematocrit
- MCV Mean Corpuscular Volume
- MCH Mean Corpuscular Hemoglobin
- MCHC Mean Corpuscular Hemoglobin Concentration
- RDW Red Cell Distribution Width
- PLT Platelets
- MPV Mean Platelet Volume

Which Specimen is Used ???

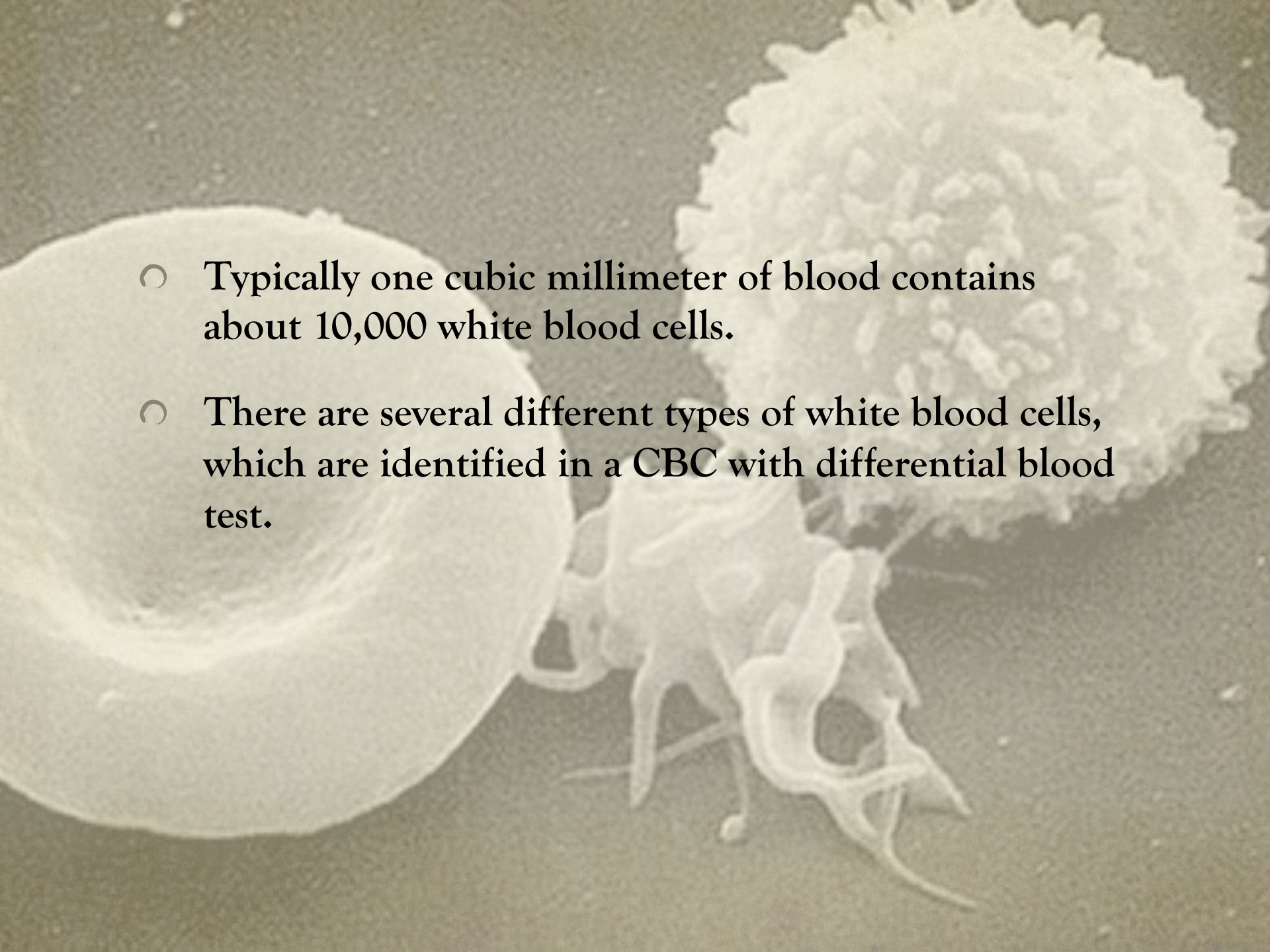
- Whole blood,
- uncentrifuged,
- anticoagulated with EDTA (Purple or lavender cap)

Cell Counts

- White cells, red cells (erythrocytes) and platelets are counted **per unit volume** of whole blood.
- Unit volume: per **cubic millimeter** (mm3) which is the same as **μL**

Leucocytes

- White blood cells (WBC), sometimes referred to as leukocytes, are produced by the immune system to help defend the body against infection.
- They are formed in the bone marrow and enter the blood for migration to key organs; such as the spleen or lymph nodes.
- These cells are bigger than red blood cells, and there are far fewer WBCs in the bloodstream.
- A high white blood cell count likely indicates that an infection is present somewhere in the body,
- A low number might indicate that an infection or disease has slowed the ability of the bone marrow to produce new white blood cells.



- Typically one cubic millimeter of blood contains about 10,000 white blood cells.
- There are several different types of white blood cells, which are identified in a CBC with differential blood test.

Eritrocytes

- Red blood cells (RBC), often referred to as erythrocytes, are responsible for delivering oxygen throughout the body.
- There are between 3.6 to 6.1 million in a single milliliter of blood.
- A low red blood cell count can indicate anemia, which can lead to fatigue.

Hemoglobin

- Hemoglobin (HGB) is an iron-rich protein found inside red blood cells which gives blood its red color.
- Oxygen travels through the bloodstream bound to hemoglobin.
- The amount of hemoglobin in the blood is an indicator of the amount of oxygen the blood can carry.
- A low hemoglobin number is a good indicator of anemia; whereas, dehydration can temporarily increase hemoglobin levels

What does hematocrit represent?

- Hematocrit (HCT) refers to the amount of your blood that is occupied by red blood cells.
- A low hematocrit percentage is a good indicators of anemia.
- The value is expressed as a percentage of cells in blood.
- For example, a hematocrit value of 42% means that there are 42 milliliters of red blood cells in 100 milliliters of blood.

Mean Corpuscular Volume

- Mean Corpuscular Volume (MCV) measures the size of red blood cells.
- Larger red blood cells may indicate anemia due to vitamin B6 or folic acid deficiency; smaller red blood cells may indicate anemia due to iron deficiency.
- Some drugs can cause MCV to increase without necessarily causing anemia.

Mean Corpuscular Hemoglobin

- Mean corpuscular hemoglobin (MCH) measures the amount of hemoglobin in red blood cells.
- Both hemoglobin and hematocrit are used to calculate this number.
- Low levels indicate anemia.

Red Cell Distribution Width

- Red blood cells can come in different sizes.
- Red cell distribution width (RDW) looks at the range of these sizes in a blood sample.
- If anemia is suspected, based on other blood counts, RDW test results are often used together with MCV results to figure out what the cause of the anemia might be.

Platelets

- Platelets (PLT) are tiny cells produced by the bone marrow to help your blood clot in the event of a cut or scrape.
- A high number might be seen in people with cancer, a blood disease, or rheumatoid arthritis.
- A decreased platelet count is called thrombocytopenia.
- There are a number of possible causes of thrombocytopenia, including a disorder of the immune system that causes antibodies produced by the spleen to kill platelets (idiopathic thrombocytopenia purpura).
- This can be problematic and often warrants immediate medical care.

Mean Platelet Volume

- The mean platelet volume (MPV) test measures the average volume (size) of your platelets.
- A higher-than-normal MPV has been shown to be associated with a greater risk of heart attacks and stroke.

CBC Differential...
What do the differential values represent?

- The differential is a breakdown of the different types of white blood cells.
- There are actually two main types of white blood cells:

1. Phagocytes
2. Lymphocytes.

CBC Differential...
What do the differential values represent?

- Phagocytes: attack germs directly and are powerful defenses against certain infections.
- Lymphocytes: which include T-cells, play a large role in fighting chronic infections.
- The 5 subtypes of white blood cells are displayed both as a percentage of white blood cells and as an absolute number of cells.

CBC DIFFERENTIAL TEST NAMES

- NEU Neutrophils (Sometimes labeled GR or Grans.)
- LYM Lymphocytes
- MONO Monocytes
- EOS Eosinophils
- BASO Basophils

Neutrophils (NEU)

- Surround, engulf, and destroy invading microbes.
- Normally accounting for anywhere between 38% and 80% of the white blood cell count.
- The bacterial infection; a low number can put you at a greater risk of experiencing sickness from a bacterial infection.

Lymphocytes

- Produce antibodies, which are specific proteins that attack and help destroy specific germs
- Lymphocytes include T-cells, B-cells, and natural killer (NK) cells
- Account for between 15% and 49% of the total white blood cell count.
- Viral infections can either increase or decrease the total percentage of lymphocytes.

Monocytes (MONO) / Mononuclear phagocytes

- The largest white blood cells in the bloodstream
- They remove dead cells and microbes from the blood.
- A low number can put you at a higher risk of getting sick from an infection, particularly those caused by bacteria.

Eosonophils (EOS)

- A type of phagocyte that produces the anti-inflammatory protein histamine, are usually elevated in people with allergies or parasitic infections.

Basophil (BAS)

- Basophil (BAS) cells are responsible for controlling inflammation and damage of tissues in the body, such as liver inflammation due to hepatitis.

References

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- Handbook of Clinical Biochemistry, 2nd Edition, R. Swaminathan