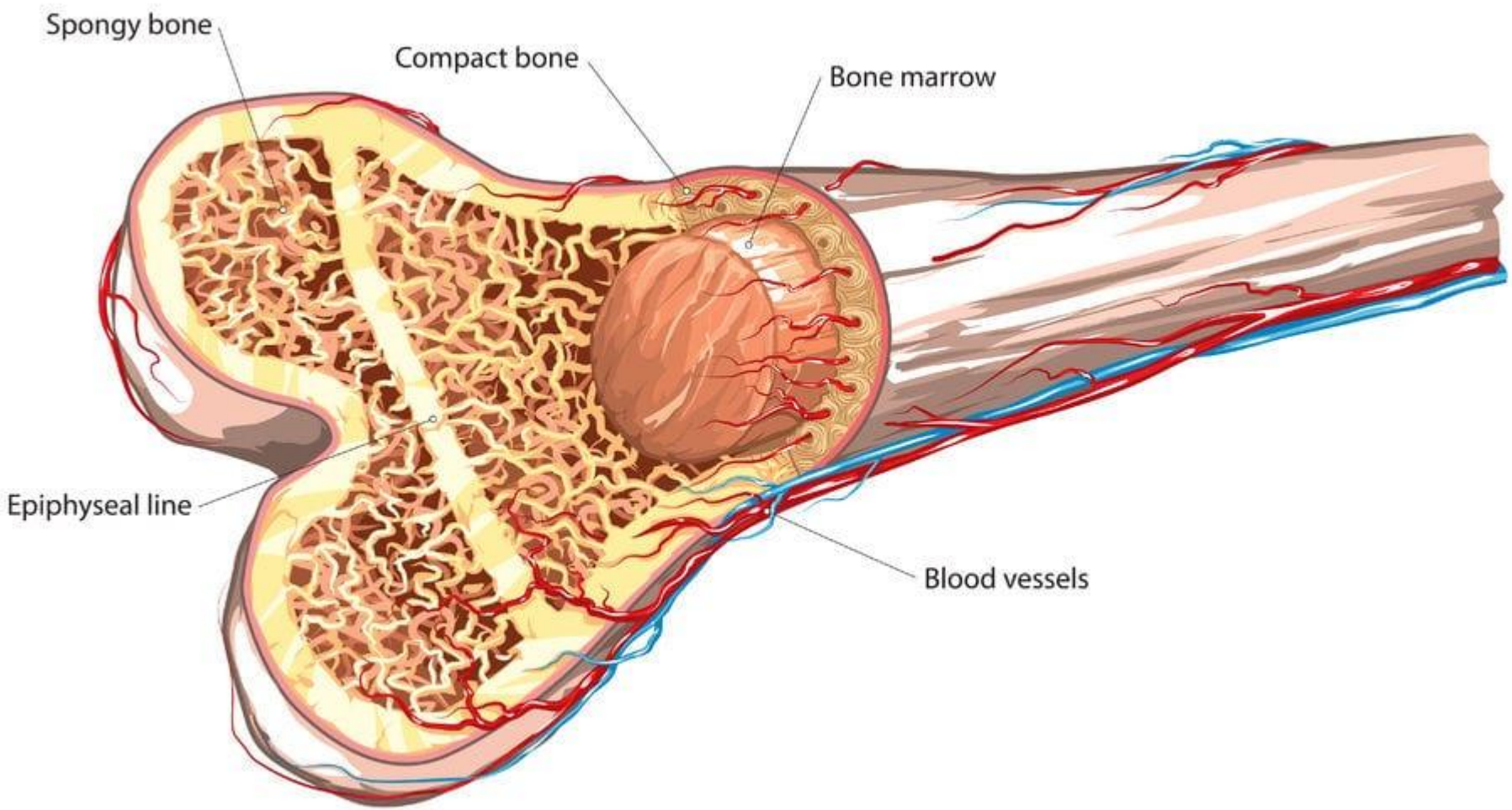
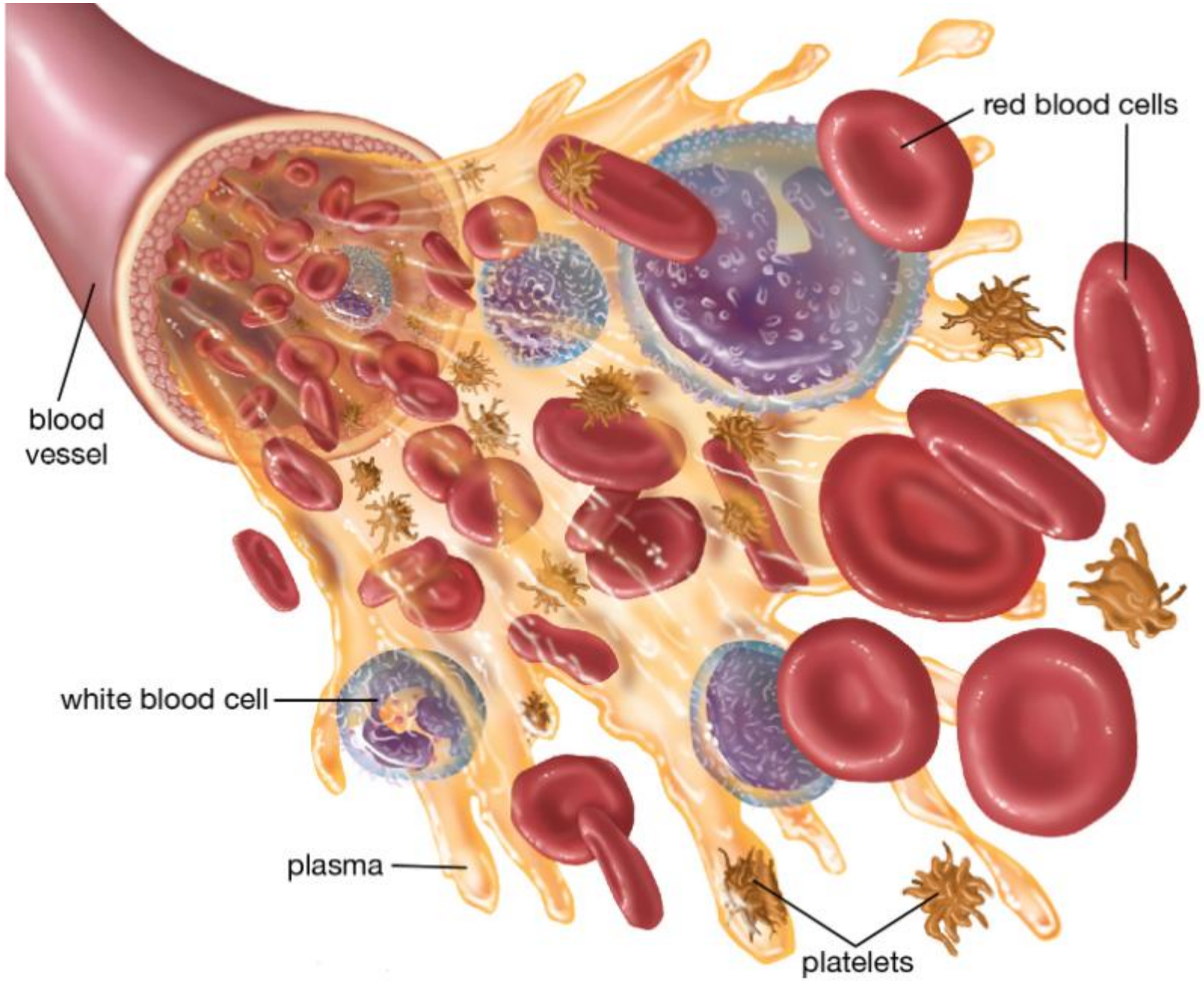
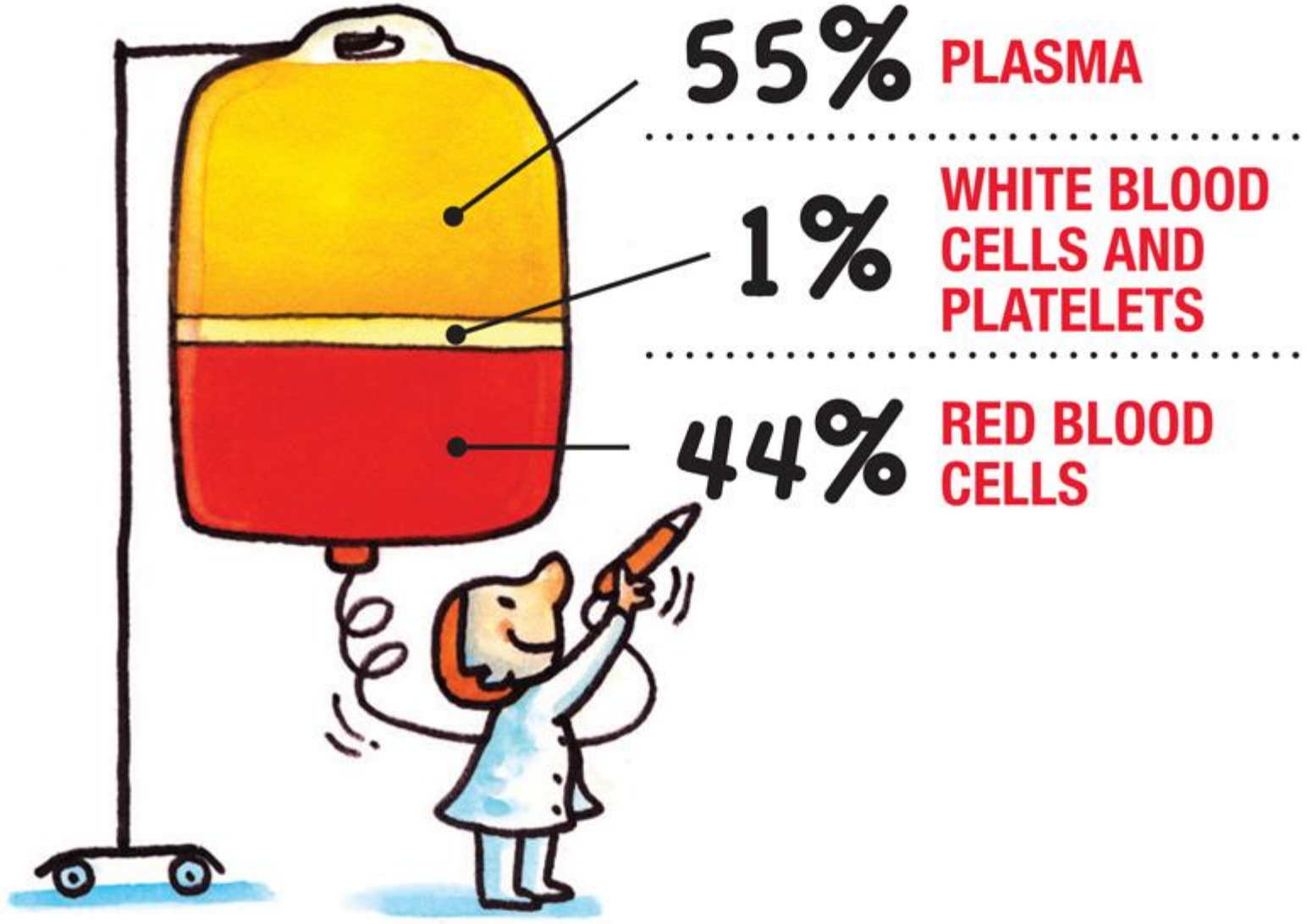

label
البرنامج التدريبي لإعداد الصيادلة

TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL	LAB
CBC With Differential/Platelet					
WBC	5.7		x10E3/uL	4.0-10.5	01
RBC	5.27		x10E6/uL	4.10-5.60	01
Hemoglobin	15.4		g/dL	12.5-17.0	01
Hematocrit	44.1		%	36.0-50.0	01
MCV	84		fL	80-98	01
MCH	29.2		pg	27.0-34.0	01
MCHC	34.9		g/dL	32.0-36.0	01
RDW	13.7		%	11.7-15.0	01
Platelets	268		x10E3/uL	140-415	01
Neutrophils	47		%	40-74	01
Lymphs	46		%	14-46	01
Monocytes	6		%	4-13	01
Eos	1		%	0-7	01
Basos	0		%	0-3	01
Neutrophils (Absolute)	2.6		x10E3/uL	1.8-7.8	01
Lymphs (Absolute)	2.6		x10E3/uL	0.7-4.5	01
Monocytes(Absolute)	0.4		x10E3/uL	0.1-1.0	01
Eos (Absolute)	0.1		x10E3/uL	0.0-0.4	01
Baso (Absolute)	0.0		x10E3/uL	0.0-0.2	01
Immature Granulocytes	0		%	0-1	01
Immature Grans (Abs)	0.0		x10E3/uL	0.0-0.1	01







Evaluate the cells that circulate in blood, including

- Red blood cells (RBCs).
- White blood cells (WBCs).
- Platelets (PLTs).

Detect a variety of diseases and conditions, such as

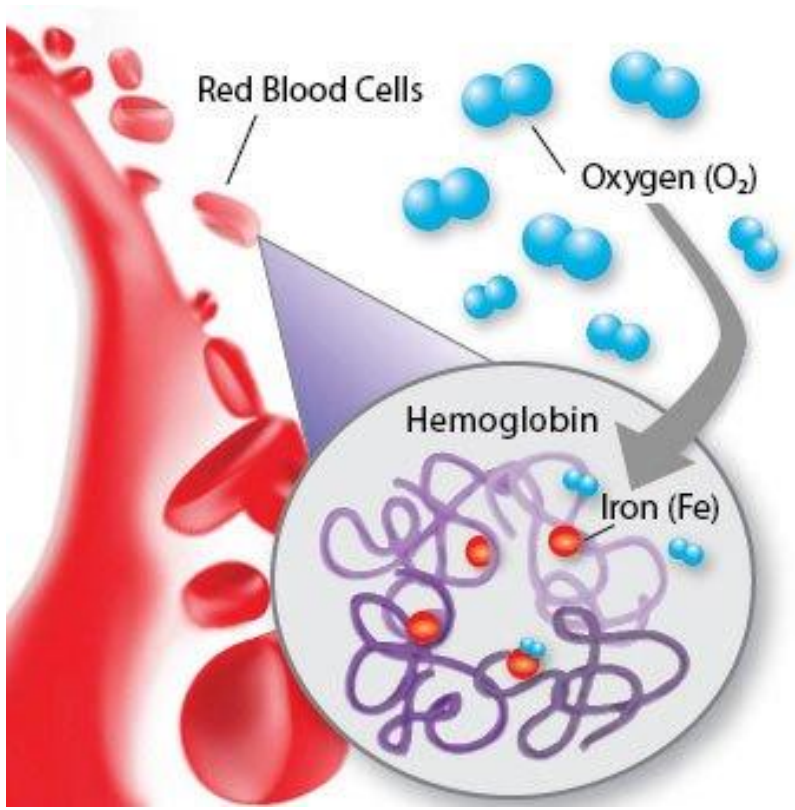
- Anemia.
- Infections.
- Bleeding.

- Blood cells are produced and mature primarily in the bone marrow and, under normal circumstances, are released into the bloodstream as needed.

Red Blood Cells

Also called erythrocytes

- Produced in the bone marrow and released into the bloodstream when they mature.
- They contain hemoglobin, a protein that transports oxygen throughout the body. The typical lifespan of an RBC is 120 days.
- A number of conditions can affect the production of new RBCs and/or their lifespan, in addition to those conditions that may result in significant bleeding.



- RBCs normally are **uniform** in size and shape, but their appearance can be affected by a variety of conditions, such as vitamin B12 and folate deficiencies and iron deficiency.
- An example of a common condition affecting RBCs is anemia, which results from low red blood cell counts and low hemoglobin.
- Various diseases can lead to anemia, so additional tests are often needed to determine the cause.

- Red blood cell (RBC) count.
- Hemoglobin.
- Hematocrit.

• Red blood cell **indices** provide information on the **physical features** of the RBCs:

- Mean corpuscular volume (MCV).
- Mean corpuscular hemoglobin (MCH).
- Mean corpuscular hemoglobin concentration (MCHC).
- Red cell distribution width (RDW).

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MCV	84		fL	80-98	01
MCH	29.2		pg	27.0-34.0	01
MCHC	34.9		g/dL	32.0-36.0	01
RDW	13.7		%	11.7-15.0	01

Causes of a low RBC count (anemia):

- Trauma.
- Conditions that cause red blood cells to be destroyed.
- Sudden (acute) or chronic bleeding.
- Nutritional deficiency.
- Bone marrow damage.
- Bone marrow disorders.
- Chronic inflammatory disease or condition.
- Kidney failure.

Causes of a high RBC count (polycythemia):

- Dehydration.
- Lung (pulmonary) disease.
- Congenital heart disease.
- Kidney tumor.
- Smoking.
- Genetic causes.
- Polycythemia vera.

Causes of low red blood cells indices

- MCV, MCH, MCHC: Indicates RBCs are smaller than normal (microcytic).

Causes of high red blood cells indices

- Indicates RBCs are larger than normal (macrocytic), for example in anemia caused by vitamin B12 or folate deficiency, myelodysplasia, liver disease, hypothyroidism, etc.
- MCHC values (hyperchromia) are seen in conditions where the hemoglobin is more concentrated inside the red cells, such as autoimmune hemolytic anemia, in burn patients, and hereditary spherocytosis, a rare congenital disorder.

CBC

Component Results

Component	Your Value	Standard Range	Units
WBC COUNT	6.7	4.5 - 11.0	K/UL
RBC COUNT	4.51	3.50 - 5.50	MIL/UL
HEMOGLOBIN	14.1	12.0 - 15.0	G/DL
HEMATOCRIT	42.3	36.0 - 48.0	%
MCV	93.7	79.0 - 101.0	FL
MCH	31.2	25.0 - 35.0	PG
MCHC	33.3	31.0 - 37.0	%
RDW-CV	12.4	11.0 - 16.0	FL

Patient Name: **Malkiewicz, Judith A** DOB: 12/8/1950 Page: 1

Patient Number: 6325 Gender: Female 7/11/2011

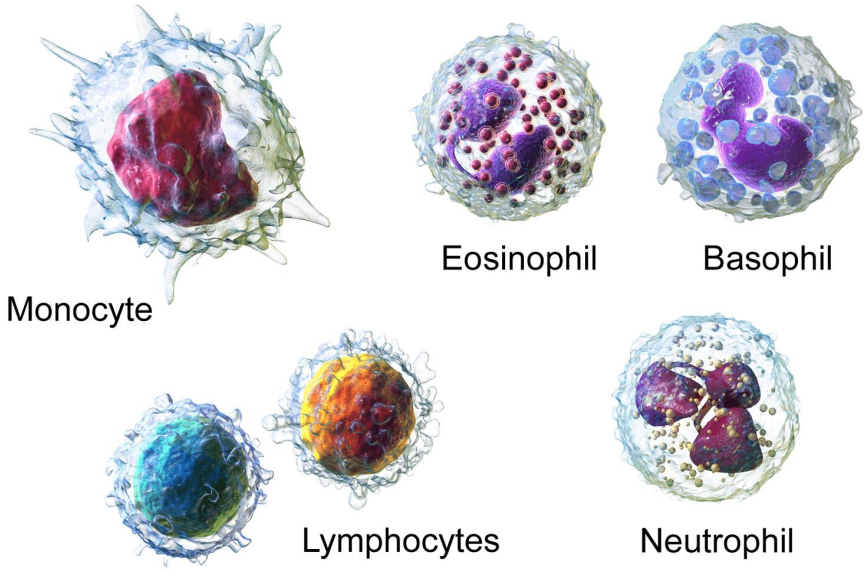
Report Date: 7/11/2011 1:50 PM

Result	Value (Previous)	Units	Range	Lab
ONCOLOGY COMPLETE BLOOD COUNT - *F^COMPLETE*	*Ordered by: JAMES C. MOORE, MD*			
Comments: Y				
WBC	2.8 *Low*	K/UL	4.0-10.0	PVHS-HC
RBC	2.92 *Low*	M/UL	4.20-5.40	PVHS-HC
HGB	9.2 *Low*	G/DL	12.0-16.0	PVHS-HC
HCT	27.0 *Low*	%	37.0-47.0	PVHS-HC
MCV	92.5	FL	81.0-98.0	PVHS-HC
MCH	31.4	PG	27.0-32.5	PVHS-HC
MCHC	33.9	G/DL	32.0-36.0	PVHS-HC
RDW	19.5 *High*	%	11.5-14.5	PVHS-HC

White Blood Cells

Also called leukocytes

- Cells that exist in the blood, the lymphatic system, and tissues and are an important part of the body's natural defense (immune) system.
- They help protect against infections and also have a role in inflammation, and allergic reactions.
- There are five different types of WBCs and each has a different function. They include neutrophils, lymphocytes, basophils, eosinophils, and monocytes.



- WBCs are present in the blood at relatively stable numbers. However, these numbers may temporarily shift higher or lower depending on what is going on in the body.
- For instance, an infection can stimulate bone marrow to produce a higher number of neutrophils to fight off a bacterial infection.
- With allergies, there may be an increased number of eosinophils.
- An increased number of lymphocytes may be produced with a viral infection.
- In certain diseases, such as leukemia, abnormal (immature or mature) white cells may rapidly multiply.

- White blood cell (WBC) count is a count of the total number of white blood cells in blood sample.
- White blood cell differential may be included as part of the CBC or may be done in follow up if the WBC count is high or low. The WBC differential identifies and counts the number of the five types of white blood cells present (neutrophils, lymphocytes, monocytes, eosinophils, and basophils).
- The individual count can be reported as an absolute count and/or as a percentage of total.

Causes of high white blood cell count (leukocytosis)

- Infections, most commonly caused by bacteria and some viruses, less commonly by fungi or parasites
- Inflammation or inflammatory conditions such as rheumatoid arthritis, vasculitis or inflammatory bowel disease
- Leukemia, myeloproliferative neoplasms
- Conditions that result in tissue death (necrosis) such as trauma, burns, surgery or heart attack
- Allergic responses (e.g., allergies, asthma)

Causes of low white blood cell count (leukopenia)

- Bone marrow damage (e.g., toxin, chemotherapy, radiation therapy, drugs)
- Bone marrow disorders—the bone marrow does not produce sufficient WBCs (e.g., myelodysplastic syndrome, vitamin B12 or folate deficiency)
- Lymphoma or other cancer that has spread (metastasized) to the bone marrow
- Autoimmune disorders—the body attacks and destroys its own WBCs (e.g., lupus)
- Dietary deficiencies (e.g., vitamin B12 deficiency)
- Overwhelming infections (e.g., sepsis)
- Diseases of the immune system, such as HIV, which destroy T lymphocytes

Causes of neutropenia

- Severe, overwhelming infection (sepsis)
- Autoimmune disorders
- Dietary deficiencies
- Reaction to drugs
- Immunodeficiency
- Myelodysplasia
- Bone marrow damage (e.g., chemotherapy, radiation therapy)
- Cancer that spreads to the bone marrow
- Congenital neutropenia

Causes of neutrophilia

- Acute bacterial infections
- Inflammation
- Trauma, heart attack, or burns
- Stress, rigorous exercise
- Certain leukemias (e.g., chronic myeloid leukemia)
- Cushing syndrome

lymphocytopenia

- Autoimmune disorders (e.g., lupus, rheumatoid arthritis)
- Infections (e.g., HIV, viral hepatitis, typhoid fever, influenza, Covid-19)
- Bone marrow damage (e.g., chemotherapy, radiation therapy)
- Corticosteroids

lymphocytosis

- Acute viral infections (e.g., chicken pox, cytomegalovirus (CMV), Epstein-Barr virus (EBV), herpes, rubella)
- Certain bacterial infections (e.g., pertussis (whooping cough), tuberculosis (TB))
- Toxoplasmosis
- Chronic inflammatory disorder (e.g., ulcerative colitis)
- Lymphocytic leukemia, lymphoma
- Stress (acute)

High monocyte

- Chronic infections (e.g., tuberculosis, fungal infection)
- Infection within the heart (bacterial endocarditis)
- Collagen vascular diseases (e.g., lupus, scleroderma, rheumatoid arthritis, vasculitis)
- Monocytic or myelomonocytic leukemia (acute or chronic)

High eosinophil

- Asthma, allergies such as hay fever
- Drug reactions
- Parasitic infections
- Inflammatory disorders (celiac disease, inflammatory bowel disease)
- Some cancers, certain acute or chronic leukemias or lymphomas
- Addison disease
- Connective tissue disorders

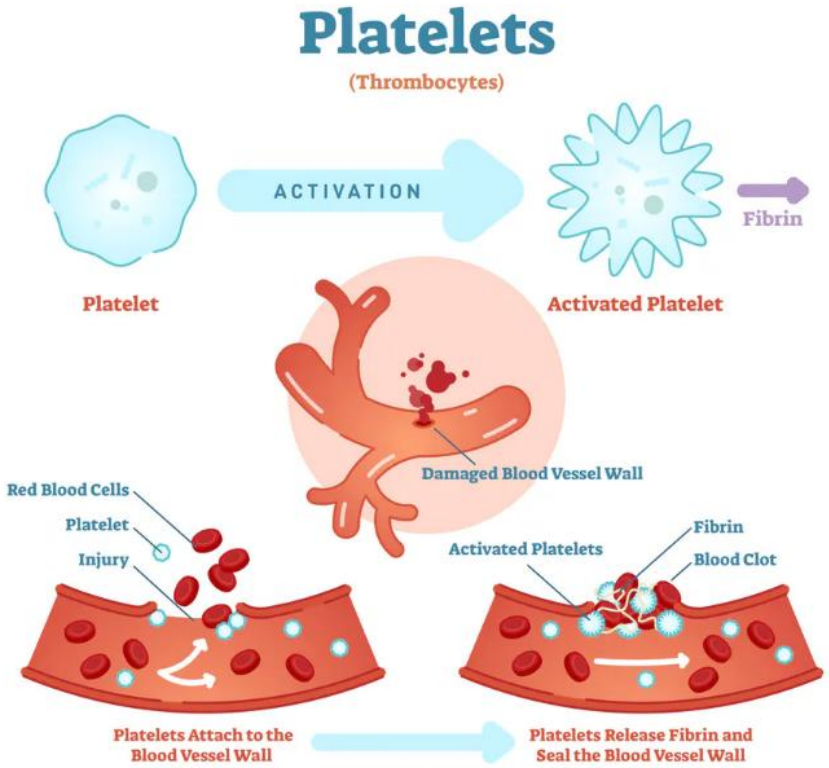
High basophil

- Rare allergic reactions (hives, food allergy)
- Inflammation (rheumatoid arthritis, ulcerative colitis)
- Some leukemias
- Uremia

Platelets

Also called thrombocytes

- Platelets are actually tiny cell fragments that circulate in blood and are essential for normal blood clotting.
- When there is an injury and bleeding begins, platelets help stop bleeding by adhering to the injury site and clumping together to form a temporary plug.
- They also release chemical signals that attract and promote clumping of additional platelets and eventually become part of a stable blood clot at the site of the injury that remains in place until the injury heals.



- low platelets (thrombocytopenia) or dysfunction of platelets may increased risk of excessive bleeding and bruising.
- An excess of platelets (thrombocytosis) can cause excessive clotting.

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Eos (Absolute)	0.1		x10E3/uL	0.0-0.4	01
Baso (Absolute)	0.0		x10E3/uL	0.0-0.2	01
Immature Granulocytes	0		%	0-1	01
Immature Grans (Abs)	0.0		x10E3/uL	0.0-0.1	01

- The platelet count.
- Mean platelet volume (MPV).
- Platelet distribution width (PDW).

thrombocytopenia

- Viral infection (mononucleosis, measles, hepatitis)
- Rocky mountain spotted fever
- Platelet autoantibody
- Drugs (acetaminophen, quinidine, sulfa drugs)
- Cirrhosis
- Autoimmune disorders (e.g., ITP)
- Sepsis
- Leukemia, lymphoma
- Myelodysplasia
- Chemo or radiation therapy

thrombocytosis

- Cancer (lung, gastrointestinal, breast, ovarian, lymphoma)
- Rheumatoid arthritis, inflammatory bowel disease, lupus
- Iron deficiency anemia
- Hemolytic anemia
- Myeloproliferative disorder (e.g., essential thrombocythemia)

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MCH	31.2	25.0 - 35.0	PG
MCHC	33.3	31.0 - 37.0	%
RDW-CV	12.4	11.0 - 16.0	FL
PLATELET COUNT	221	150 - 420	K/UL
MPV	9.8	7 - 10	FL