



Understanding Your Lab Results

Multiple myeloma (MM) is a cancer of the blood—and the results of blood and other lab tests are important for diagnosing and monitoring MM. This resource provides you with definitions of values that are commonly monitored in MM and provides the range of levels that are considered normal for each. Use this tool to better understand your results. Just remember to always discuss your results with your doctor; only your doctor can fully explain your individual results.

LAB TESTS USED TO DIAGNOSE AND MONITOR MULTIPLE MYELOMA

As you review these charts, please remember that “normal” ranges are based on individual laboratories and may vary slightly from lab to lab. And always rely on your doctor for a full explanation of what your results may mean.

LABORATORY ASSESSMENT	NORMAL RANGE ^a
SERUM PROTEIN ELECTROPHORESIS	
Protein	6.0-7.8 g/dL
Albumin	3.5-5.5 g/dL
α ₁ -Globulin	0.2-0.4 g/dL
α ₂ -Globulin	0.5-0.9 g/dL
β-Globulin	0.6-1.1 g/dL
γ-Globulin	0.7-1.7 g/dL
Albumin/globulin (A/G) ratio	0.8-2.0
Monoclonal spike (M spike)	–
IMMUNOGLOBULIN, SERUM	
IgA	70-300 mg/dL
IgG	640-1430 mg/dL
IgM	20-140 mg/dL
COMPLETE METABOLIC PROFILE	
Sodium	136-145 mEq/L
Potassium	3.5-5.0 mEq/L

LABORATORY ASSESSMENT	NORMAL RANGE ^a
Chloride	98-106 mEq/L
Blood urea nitrogen (BUN)	8-20 mg/dL
Creatinine	0.7-1.3 mg/dL
Calcium	9.0-10.5 mg/dL
Creatinine clearance	Men: 97-137 mL/min Women: 88-128 mL/min
Alkaline phosphatase (ALP)	36-92 U/L
Aminotransferase, alanine (ALT)	0-35 U/L
Aminotransferase, aspartate (AST)	0-35 U/L
Bilirubin, total	0.3-1.2 mg/dL
Glucose, fasting	70-105 mg/dL
Lactate dehydrogenase (LDH)	60-160 U/L

^aLab values are ranges based on individual labs; values may vary slightly from lab to lab.



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LABORATORY ASSESSMENT	NORMAL RANGE ^a	LABORATORY ASSESSMENT	NORMAL RANGE ^a
SERUM FREE LIGHT CHAINS		Mean corpuscular hemoglobin concentration (MCHC)	32-36 g/dL
Serum kappa	3.3-19.4 mg/L	Red blood cell distribution width (RDW)	≤14.5%
Serum lambda	5.71-26.3 mg/L	Platelets	150-350 x 10 ³ /μL
Kappa/lambda, free	0.26-1.65	Lymphocytes	20%-40%
Kappa/lambda, free (renal impairment)	0.37-3.1	Monocytes	2%-9%
β ₂ -Microglobulin (B2M)	<2.7 mg/L	Absolute neutrophil count (ANC)	1.5-7.0 x 10 ⁹ /L
COMPLETE BLOOD COUNT (CBC) WITH DIFFERENTIAL		Granulocytes	25%-70%
White blood cell count (WBC)	3.9-10.7 x 10 ³ cells/μL	URINE PROTEIN ELECTROPHORESIS	
Red blood cell count (RBC)	4.2-5.9 x 10 ⁶ cells/μL	Protein	<100 mg/24 h
Hemoglobin (Hgb)	12-17 g/dL	Albumin	<0.05 g/dL
Hematocrit (HCT)	36%-51%	α ₁ -Globulin	0%
Mean corpuscular volume (MCV)	80-100 fL	α ₂ -Globulin	0%
Mean corpuscular hemoglobin (MCH)	28-32 pg	β-Globulin	0%
		γ-Globulin	0%
		Creatinine	15-25 mg/kg per 24 h

^aLab values are ranges based on individual labs; values may vary slightly from lab to lab.

GLOSSARY

Below are definitions of some of the terms you may see in your test results. Understanding what these terms mean may help you to more fully discuss your results with your doctor.

Absolute neutrophil count (ANC)

The number of neutrophils (a type of white blood cell) in a sample of your blood. Neutrophils play an important role in your immune system by destroying bacteria. If you have a low ANC, this could be a sign of a condition called neutropenia, which can be a side effect of some MM treatments, and may put you at a higher risk of infection. If this happens, your doctor may make adjustments to your treatment plan to help increase your neutrophils.



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Albumin

A protein made by your liver. Albumin is the largest protein component of the serum (the watery part of your blood that contains disease-fighting antibodies). Measuring the amount of albumin in your blood may help your doctor determine the stage of your MM and can provide information about your overall health.

α_1 -globulin, α_2 -globulin (blood serum)

Types of proteins known as globulins that can be found in your serum (the watery part of your blood that contains disease-fighting antibodies). These proteins are separated into 3 groups: α (alpha), β (beta), and γ (gamma). Higher levels of α (or alpha) globulins can be a sign of inflammation or kidney disease, whereas lower levels can be a sign of liver disease or malnutrition.

β_2 -microglobulin (B2M; blood serum)

A protein made by malignant (cancerous) myeloma cells that can help to show how much cancer is in your body. By measuring the amount of B2M (also called beta-microglobulin) in your blood, your doctor can help to determine how advanced your MM is. Your doctor may also use B2M to help determine the right treatment plan for you and to monitor your response to treatment.

Blood urea nitrogen (BUN)

The amount of urea nitrogen (a byproduct that forms when protein breaks down) in your blood. Your doctor may look at your BUN to help monitor how well your kidneys are working. Higher levels of urea nitrogen in your blood may be a sign of decreased kidney function, which is common in people with MM.

Calcium (blood serum)

An important mineral for the formation of bones. Higher levels of calcium in your blood may be a sign of bone damage, which can be caused by MM. Calcium levels can be used to help diagnose MM.

Creatinine

A byproduct of your body's creation of energy from nutrients (energy metabolism). When your kidneys are working properly, they filter creatinine out of the blood and remove it from your body through urine. Higher-than-normal levels of creatinine can be a sign that your kidneys aren't working the way they should.



Free light chains (kappa, lambda, kappa/lambda ratio)

Small protein chains produced by plasma cells, a type of white blood cell that makes large amounts of a specific antibody that fights bacteria and viruses. Light chains combine with other, longer protein chains, known as heavy chains, to form immunoglobulins (antibodies that play an important role in fighting infections). Scientists don't know why, but plasma cells produce more light chains than are needed to create immunoglobulins, and these extra light chains end up in your blood on their own as "free" light chains.

There are 2 types of light chains, known as kappa and lambda—and each plasma cell produces only 1 type. The amount of free light chains in your blood, and the ratio of the 2 types, can help to show the activity of myeloma cell growth and can be used to help diagnose MM.

γ-globulin (blood serum)

An important immunoglobulin (antibody that plays an important role in fighting infections) used in the diagnosis and monitoring of MM. On the results of your Serum Protein Electrophoresis (SPEP) test, a spike in the γ (or gamma) region can be a sign of inflammation or a disease, such as MM. Diagnosis of MM must also consider other factors, such as M-protein level.

Hemoglobin, Hematocrit

Hemoglobin is a substance in your red blood cells (blood cells that carry oxygen through your body) that carries oxygen from your lungs to the tissues in your body. Hematocrit is a blood test that is used to determine if you have low levels of hemoglobin in your blood (a condition called anemia). Your doctor may use your hemoglobin level to help determine the stage of your MM. Anemia can be a sign that the myeloma cells are taking up most of your bone marrow and not leaving enough space for your normal marrow cells to make red blood cells.

Immunoglobulins (IgA, IgM, IgG, IgD, IgE)

Antibodies that play an important role in fighting infections. There are 5 different types of immunoglobulins in your blood, which scientists have named IgA, IgM, IgG, IgD, and IgE. Each of these has a slightly different role to play in your immune system.

When you have MM, the malignant (or cancerous) myeloma cells may produce large amounts of one type of immunoglobulin. Your doctor may test your blood for the levels of immunoglobulins to help determine which specific type of myeloma you have. IgG and IgA myelomas are the most common.



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Lactate dehydrogenase (LDH)

A protein that is found in many tissues in your body, including your heart, liver, kidneys, muscles, brain, blood cells, and lungs. Your doctor may check the levels of LDH in your blood to help assess the stage of your disease.

Lymphocytes

Small white blood cells that make up the majority of your immune system and are found throughout your body, including in your lymph nodes, bone marrow, intestines, and blood. There are 2 major types of lymphocytes: T cells and B cells. When a healthy person gets an infection, his or her B cells mature into the plasma cells in the bone marrow that make antibodies (or immunoglobulins) to help the body fight the infection. But when you have MM, your B cells become damaged and mature into malignant (or cancerous) MM cells instead. This is why your lymphocyte levels may be low if you have MM.

Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC)

Measures involving your red blood cells (blood cells that carry oxygen through your body): MCV measures the average size (or volume) of your red blood cells; MCH measures how much hemoglobin (the substance in your red blood cells that carries oxygen) is in your red blood cells; and MCHC measures the amount of hemoglobin in your red blood cells relative to the size of the cell (called hemoglobin concentration). MCV is sometimes used, along with other lab test results, to help diagnose and monitor MM. Your doctor may also use these tests to help diagnose types of anemia.

Monoclonal spike (M spike)

An important measurement used for diagnosing multiple myeloma and for monitoring how well treatment is working. When you have MM, the malignant myeloma cells duplicate many times and produce an excess of an abnormal immunoglobulin called monoclonal protein (or M protein). So when the Serum Protein Electrophoresis (SPEP) test shows a spike in M protein, this is a sign of MM.

Platelets

Small substances in your blood that help the blood to form a thickened mass (or blood clot) to help stop bleeding. Your doctor may monitor the amount of platelets in your blood because MM and some of the treatments used to fight MM can cause a drop in your platelet level (called thrombocytopenia), which can lead to increased bleeding and bruising.



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Protein (blood serum, urine)

A group of compounds that help make up the majority of a cell. High levels of protein in your blood, or protein in your urine, can be a sign of MM or other conditions.

Red blood cell (RBC) count

A measure of the total number of red blood cells (the cells that carry oxygen through your body) in your blood. A low RBC count can be a sign of MM and may be used to help diagnose the disease. Your doctor may also monitor your RBC count to check for anemia (low RBC count), which can be a side effect of some MM treatments. Anemia can cause weakness, a reduced ability to exercise, shortness of breath, and dizziness.

Red blood cell distribution width (RBW)

A calculation of the differences in the size of red blood cells (blood cells that carry oxygen through your body) in your blood. Your doctor may monitor your RBW to look for signs of anemia.

White blood cell (WBC) count

The total number of white blood cells in a sample of your blood. White blood cells help to protect your body by fighting against foreign materials such as bacteria and viruses. Multiple myeloma and its treatment can cause a drop in white blood cells, which can leave you at greater risk of infection. Your doctor may monitor your WBC count and adjust treatment as needed.

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