

Myeloma Canada
InfoGuide Series

Understanding Your Blood and Blood Tests





MYELOMA CANADA

MAKING MYELOMA MATTER

www.myeloma.ca





Reviewers

Healthcare Professionals

Joanne Hickey, B.Sc, MD, FRCPC
Hematologist
Health Science Centre
St John's, NL

Cindy Manchulenko, RN, BN, MSN
Clinical Trials Nurse Coordinator
BC Cancer - Vancouver
Vancouver, BC

Myeloma Canada wishes to acknowledge and thank the many patients and caregivers who provided their valuable input.

Editors

Gabriele Colasurdo, MSc
Director, Science & Research
Myeloma Canada
Montreal, QC

Marcie Baron
Director, Corporate Communications & Marketing
Myeloma Canada
Montreal, QC

Jessy Ranger
Director, Patient Programs, Health Policy & Advocacy
Myeloma Canada
Montreal, QC

Karine Gravel
Project Manager, Education & Patient Services
Myeloma Canada
Montreal, QC

The information in this InfoGuide is not meant to replace the advice of a medical professional. They are the best people to ask if you have questions about your specific medical/social situation.



Introduction

This InfoGuide is for people living with myeloma, their families and their caregivers. It will help you learn more about the different types of blood cells, the effects of myeloma and myeloma treatments on the blood, and the key blood tests involved in diagnosing and monitoring myeloma. It also gives you tips on how to track blood test results.

Some of the more technical or unusual words in this InfoGuide appear in ***bold italics*** the first time they're used and are explained in the **Glossary** starting on page 15. As you read through the InfoGuide, refer to the "More Information" and "Did You Know?" boxes to learn more about selected topics. Moreover, don't be afraid to ask members of your, or your loved one's healthcare team to explain any terms or concepts you may have trouble understanding.

Throughout your journey with myeloma, your healthcare team will provide you with a large amount of information, including how to best manage your pain in order to improve your quality of life. Early identification, assessment and the treatment of symptoms is key. You may find it helpful to write down any questions that you have along the way and share these with your healthcare team regularly. They are the best people to help you understand what is happening and guide you to make informed decisions.

Be an informed and cautious information consumer

Be cautious of information that comes your way. While books and the internet offer a wealth of information, not all of it is correct, it may not apply to your unique situation, and it may be confusing or misleading. Well-intended people may also try to offer you health advice without knowing the details of your condition and its treatment. Certain online support groups may also be helpful, but again be wary of possible misinformation. It's important to know that your source is reputable and to discuss what you read with your healthcare team. Never make any change to your treatment plan without checking with them first, for any symptom you're experiencing.

Be sure to visit myeloma.ca for reliable, up-to-date resources, support group information and more.

Drug Access Navigator

Over the past 15 years, thanks to advances in research, new molecules and targeted therapies to treat myeloma are being developed at an impressive rate, with more options available than ever before. In Canada, access to, and coverage for, these new treatments varies across provinces and territories, making it often confusing and overwhelming to get the information you need.





About Myeloma Canada

Myeloma Canada is a registered non-profit organization created by, and for, people impacted by multiple myeloma. As the only national organization exclusively devoted to the Canadian myeloma community, Myeloma Canada has been making myeloma matter since its founding in 2005.

Working with leading myeloma researchers and clinicians as well as other cancer organizations and local support groups across Canada and internationally, Myeloma Canada seeks to strengthen the voice of the Canadian myeloma community and improve quality of life for those impacted by myeloma through awareness, education, advocacy, fostering an empowered community and supporting clinical research to find a cure.

Myeloma Canada's goals:

- **Increase awareness** of the disease and its effects on the lives of patients and their families
- **Educate** patients, families and caregivers
- **Advocate** for access to new therapies, treatment options and healthcare resources
- **Empower** patients and caregivers through community engagement
- **Advance** clinical research and promote access to new drug trials in Canada

Myeloma Canada educational publications

For more detailed information about myeloma and living with the disease, visit myeloma.ca and click on "Resources". From here, you can download Myeloma Canada's educational publications, watch educational videos, find a local support group and so much more.

Whether you're downloading a copy or requesting a printed version, all Myeloma Canada publications are free of charge. To order your printed copies of the materials below, email us at contact@myeloma.ca, or call us toll-free at 1-888-798-5771.

- *Multiple Myeloma Patient Handbook*
- *Multiple Myeloma Caregiver Handbook*
- *Managing Pain & Fatigue InfoGuide*
- *MGUS and Smouldering Multiple Myeloma*
- *High-dose Therapy and Autologous Stem Cell Transplantation InfoGuide*
- *Understanding Your Blood and Blood Tests InfoGuide*
- *Myeloma Bone Disease InfoGuide*
- *Myeloma and the Kidney InfoGuide*
- *Clinical Trials as a Treatment Option InfoGuide*
- *Myeloma Immunotherapy InfoGuide*





Table of Contents

The Micro-Universe of Your Blood 1

Red blood cells – the oxygen carriers 2
White blood cells – keeping you safe 3
Platelets – damage control 4
Blood proteins – protection in your plasma 4

Multiple Myeloma and Your Blood 5

Over-production of plasma cells – too much of a good thing 5
Effects of too many plasma cells – decoding the symptoms of multiple myeloma 5

Blood Tests for Multiple Myeloma 8

Diagnostic blood tests – finding out if you have myeloma 8
Staging blood tests – understanding your disease path 10

Questions for Your Healthcare Team 14

Glossary 15

Make Myeloma Matter 18

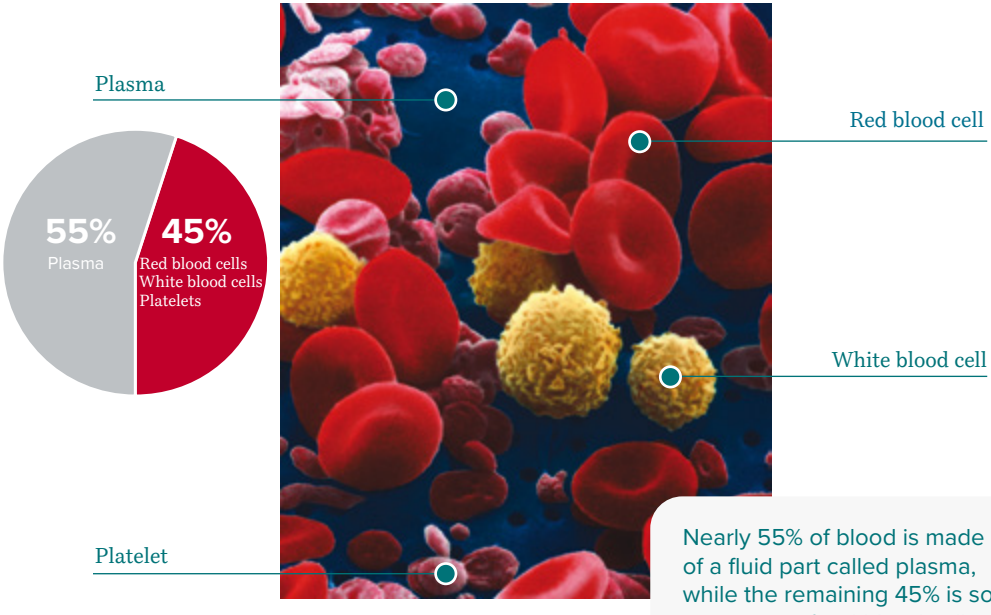




The Micro-Universe of Your Blood

On the surface, blood seems fairly simple. It, however, plays an essential role in your health and is actually quite complex once you look at it under a microscope. It helps to energize you by transporting nutrients and oxygen throughout your body and it redistributes body heat to keep you feeling comfortable. Learning more about blood and its components will help you better understand how myeloma and its different treatments affect your blood and explain the purpose of the blood tests that you will undergo as your disease is diagnosed and monitored.

Figure 1: Composition of the blood



Nearly 55% of blood is made up of a fluid part called plasma, while the remaining 45% is solid, consisting of red blood cells, white blood cells and platelets.

Red blood cells – the oxygen carriers

Red blood cells (RBCs) or ***erythrocytes*** carry oxygen to your tissues to keep you healthy and give you energy. They also transport carbon dioxide back to your lungs so it can leave your body when you exhale. Erythrocytes get their red colour from a protein they carry called ***hemoglobin (Hgb or Hg)***. If you don't have enough red blood cells (a condition called ***anemia***), the other cells in your body won't receive enough oxygen to function properly and you will feel weak and tired.

Figure 2

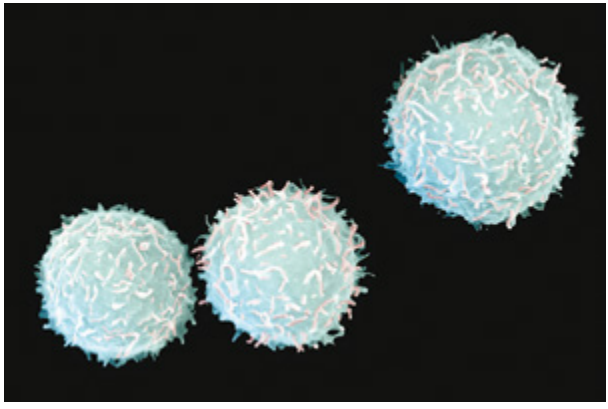


Red blood cells (RBCs) transport oxygen to the tissues and carbon dioxide to the lungs.

White blood cells – keeping you safe

White blood cells (WBCs) or ***leukocytes*** are part of your body's defense system. Although your body has many other levels of defense – most of which are designed to keep disease-causing organisms from entering your blood stream – they can fail. That's when your leukocytes kick into action to fight infections and diseases that have reached or originated in your blood. If you have too few white blood cells (a condition called ***leukopenia***) you will be more likely to get sick with colds, flu and other infections.

Figure 3



White blood cells (WBCs) help to fight infections and disease.

More Information

The many types of white blood cells

There are five different kinds of white blood cells, or leukocytes:

1. ***Neutrophils*** kill and ingest bacteria and fungi, and clear away what they identify as "foreign" debris
2. ***Lymphocytes*** are divided into two types. B-lymphocytes can develop into ***plasma cells***, the cells that produce different types of antibodies called immunoglobulins that protect us from disease. T-lymphocytes and natural killer cells protect against viral infections, and can detect and destroy some types of cancer cells
3. ***Monocytes*** eat up dead or damaged cells and help defend against infections
4. ***Eosinophils*** kill parasites and are involved in allergic reactions
5. ***Basophils*** are involved in inflammatory and allergic reactions

Platelets – damage control

If you get injured, platelets, or ***thrombocytes***, help stop bleeding and repair damage to your blood vessels by helping to form blood clots. If you have too few platelets (a condition called ***thrombocytopenia***), you could experience one or more of the following signs or symptoms:

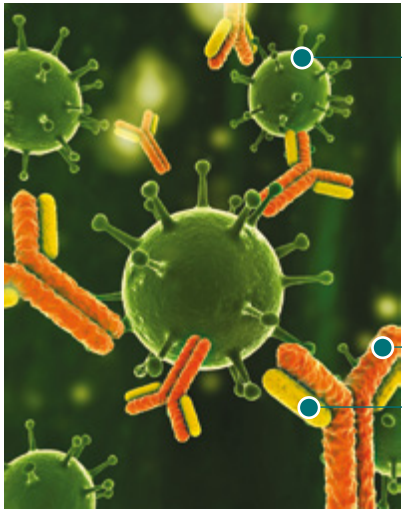
- Easy or excessive bruising
- Prolonged bleeding from cuts
- Spontaneous bleeding from your gums or nose

Blood proteins – protection in your plasma

Blood proteins, or ***serum proteins***, are proteins found in your blood plasma, the liquid part of your blood. There are several different types of plasma proteins, but the most important ones for people with myeloma to know about are immunoglobulins, albumin and beta-2 (β2) microglobulin.

- ***Immunoglobulins*** are antibodies that protect us against disease. Each immunoglobulin has two parts: two ***heavy chains*** that are type G, A, D, E or M; and two ***light chains*** that are type kappa (κ) or lambda (λ).

Figure 4



Immunoglobulins (antibodies) are Y-shaped molecules. The heavy and light chains of the antibody contain specific binding sites that attach to bacteria or viruses, ultimately leading to their destruction thereby protecting against disease.

- Serum ***albumin*** is produced in the liver and normally makes up about 60% of human plasma protein.
- ***Beta-2 (ß2) microglobulin*** is a small protein normally found on the surface of many cells, including some WBCs, and in small amounts in the blood and urine.





Multiple Myeloma and Your Blood

Over-production of plasma cells – too much of a good thing

Now that you know a bit more about blood, it's easier to understand how multiple myeloma affects it. This cancer causes a specific type of WBC that is formed in the bone marrow, called a plasma cell, to over-produce. It sounds harmless, especially because plasma cells normally protect us from disease and infection by creating antibodies.

Too many plasma cells can cause a number of problems in your body. If you have myeloma, your plasma cells may make up 10% or more of your bone marrow (the spongy inner core of your bone) instead of the normal 2% to 3%, causing the crowding out and suppression of the production of other types of blood cells that you need, such as red blood cells (see page 2), other types of white blood cells (see page 3) or platelets (see page 4).

The cancerous (malignant) or mutated plasma cells also usually pump out only one type of plasma protein (see page 4), called a clone, instead of the variety of immunoglobulins or antibodies that they are supposed to. This abnormal clone is referred to by the medical community as a myeloma ***paraprotein*** or ***monoclonal protein (M-protein)***, and shows up in blood tests as a monoclonal spike, which is also called an ***M-spike or M-peak***. Your blood tests may additionally show an increase in beta-2 microglobulin.

Effects of too many plasma cells – decoding the symptoms of multiple myeloma

Many of the multiple myeloma symptoms you may experience can be explained by the effects of the cancerous myeloma plasma cells on your blood and bones.

Fatigue

Myeloma may interfere with your body's production of red blood cells and can lead to anemia, causing you to look pale, and feel weak, fatigued and short of breath. For more information, consult the Myeloma Canada InfoGuide, *Managing Pain & Fatigue.*

Repeated infections and fevers, or wounds that are slow to heal

Low levels of white blood cells, called leukopenia, can lead your immune system to malfunction, leaving you vulnerable to infections or fevers.

In addition, even though the level of immunoglobulins (antibodies) may be high, a large percentage may be composed of paraprotein, an abnormal antibody that is not effective in fighting infections. Normally, immunoglobulins retain the memory of fighting an infection such as a cold, but in myeloma the malfunction causes the immune system to "forget" how to fight the virus, causing repeated infections.

Abnormal bleeding

Myeloma and some of the medications used to treat it can interfere with the production of platelets, preventing your blood from clotting normally. A low platelet count, called thrombocytopenia, can put you at risk of bleeding too much if you get hurt.

High level of calcium in the blood (hypercalcemia)

The myeloma cells in your bone marrow may damage your bone, creating weak spots (called lytic lesions), or inhibiting the normal rebuilding of bone, leading to a thinning of bone and conditions such as ***osteopenia*** and ***osteoporosis***.

When bone breaks down, the calcium it contains is released into the bloodstream. Too much calcium in your blood can cause loss of appetite, nausea, vomiting, frequent urination, increased thirst, constipation, weakness, confusion or, in extreme cases, stupour or coma.

This bone degeneration might also cause bone pain, particularly in your back or ribs, or fractures. For more information, consult the Myeloma Canada InfoGuide, *Myeloma Bone Disease*.

Kidney (renal) damage

Too much protein and calcium in the blood can damage your kidneys, increasing your risk of developing kidney, or renal, disease. Light chain (See page 4) myeloma can also increase the risk of kidney damage.

Hyperviscosity syndrome

In some cases, the overabundance of proteins in your blood can cause your blood to thicken – this is called ***hyperviscosity syndrome***. Symptoms of hyperviscosity syndrome can include bleeding from the nose or mouth, blurred vision, neurologic symptoms (e.g., headache, dizziness and confusion), visual disturbances and heart problems.

More Information

Help yourself to safer treatment

The medications that are prescribed to treat your myeloma can also affect your blood. Blood-related side effects can include:

- Too few RBCs (higher risk of anemia)
- Too few WBCs (higher risk of infections)
- Too few platelets (higher risk of bleeding too much)
- Higher risk of deep vein thrombosis (DVT) or blood clots in the legs
- Higher blood glucose (sugar) levels

Whenever you are prescribed a new medication, be sure to talk with your healthcare team, including your pharmacist, to make sure you understand how to take it and what its potential side effects might be. Here is a list of questions to ask:

- How do I take this medication?
- Can this medication interact with food, vitamins, supplements or other drugs I'm taking?
- What are all of the potential side effects?
- Which side effects are serious and need to be treated immediately?
- Are there ways to treat or manage the less serious side effects (e.g., by changing the medication or dose, or using supportive therapies that help reduce the side effect)?





Blood Tests for Multiple Myeloma

Diagnostic blood tests – finding out if you have myeloma

The complete blood count – your basic starting point

The most basic blood test your doctor will do is called a ***complete blood count (CBC)***. A CBC measures the total or "absolute values" of red blood cells, white blood cells and platelets. This test can help your doctor identify the cause of symptoms such as weakness, fatigue or bruising, and can help in the diagnosis of many other conditions, such as anemia and infection. Although everyone has different amounts of blood cells in their body, there is a "normal" range for each type of cell to do its job and keep you well. The ranges will vary depending on your gender, age and the lab conducting the test. Additional detail is provided by a blood differential test that measures the percentage of each type of white blood cell (neutrophils, lymphocytes, monocytes, eosinophils and basophils) that you have in your blood.

If you have myeloma, your doctor will be most interested in the following components of your blood:

- ***Red blood cells:*** shows whether there are enough red blood cells to properly transport oxygen to your tissues
- ***White blood cells:*** shows whether there are enough white blood cells for your immune system to protect you against diseases and infections
- ***Platelets:*** indicates whether there are enough platelets for your blood to clot properly
- ***Beta-2 (ß2) microglobulin:*** the blood should be tested at the time of diagnosis to determine the level of beta-2 microglobulin, a small immunoglobulin found on the surface of many cells
- ***Albumin:*** shows whether your liver is functioning properly, and if not, how serious the problem is
- ***Lactate dehydrogenase (LDH):*** LDH is an enzyme found in almost all cells. High levels of LDH are an indicator that cells have been damaged or destroyed. LDH, B2 microglobulin, albumin, and cytogenetic tests are used in the Revised International Staging System (R-ISS; see page 11).

- ***Creatinine:*** reveals your kidney function
- ***Glucose:*** measures the amount of glucose, or sugar, in your blood, which can be high if you're taking certain medications (e.g., steroids such as dexamethasone or prednisone), or if you have diabetes or pre-diabetes
- ***Calcium:*** too much in your blood can be a sign of bone breakdown

Did you know?

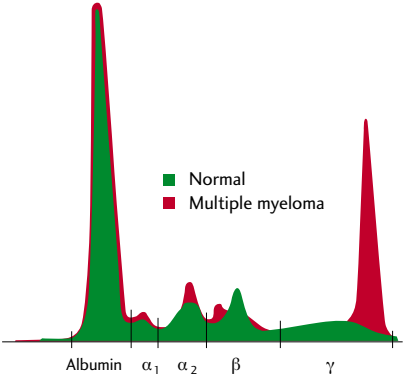
It's important to get your blood tested regularly because it can be affected by both your myeloma and your myeloma treatments.

Specialized myeloma blood tests – a more targeted approach

There are several blood tests that can give you and your doctor a lot more information than a CBC:

- ***Serum protein electrophoresis (SPEP):*** can show whether there is an unusual amount of one immunoglobulin (i.e., antibody) in the blood. If you have multiple myeloma, you will probably have a higher than normal level of a certain immunoglobulin, which shows up on a blood test as a monoclonal protein, also called an M-protein, paraprotein, M-spike or M-peak. For IgA myeloma, the M-protein component is often low, so occasionally the total IgA immunoglobulin level is monitored instead of the actual M-protein.

Figure 5 : Serum protein electrophoresis (SPEP).



Comparison between a normal test result and one in multiple myeloma. The latter shows an M-spike i.e. a higher than normal level of one type of immunoglobulin or antibody.

- **Immunofixation (IFE):** can reveal whether or not you have a monoclonal protein, as well as the type of myeloma protein. The test can be done along with the SPEP test.
- **Quantitative immunoglobulin test:** measures the total amount (both normal and abnormal) of three different kinds of antibodies: immunoglobulin (Ig) G, A and M
- **A serum free light chain assay (sFLC)** can measure the amount of kappa (κ) and lambda (λ) light chains in the blood

More Information

Types of myeloma

- About 65% of myeloma patients have IgG type myeloma, with either κ or λ light chain proteins (written as IgG κ or IgG λ).
- The next most common type of myeloma is IgA, with either κ or λ light chains (written as IgA κ or IgA λ).
- IgM, IgD and IgE myelomas are quite rare.
- In about 10% of cases, the myeloma cells produce only light chains and no heavy chains; this is referred to as "light chain" or "Bence Jones" myeloma.
- In rare cases (about 1% to 2%), the myeloma is non-secretory, which means there is very little or no monoclonal protein of any type. This type of myeloma can't be measured with a simple blood test.

Staging blood tests – understanding your disease path

If your myeloma is active or symptomatic – meaning that you have changes in your blood and symptoms such as bone pain or fatigue – your doctor can conduct blood tests to figure out the level, or stage, of your disease. The Revised International Staging System (R-ISS) uses three blood tests: beta-2 microglobulin, albumin, and lactate dehydrogenase (see page 8). The R-ISS also takes into consideration some high-risk chromosomal abnormalities you may have. The abnormalities can be detected by using a test called fluorescent in situ hybridization (FISH) on a sample of purified plasma cells from your bone marrow.

High-risk chromosomal abnormalities are associated with more aggressive or harder to treat myeloma. Such abnormalities include del(17p) (a deletion of the short arm of chromosome 17), t(4;14) (translocation of chromosomes 4 and 14), and t(14;16) (translocation of chromosomes 14 and 16).

Although additional high-risk chromosomal abnormalities have been identified, they are not used to calculate your R-ISS stage.

R-ISS stage	R-ISS Test
I	ß2 microglobulin is less than 3.5 mg/L **AND** Albumin is equal to or greater than 35 g/L **AND** No high-risk chromosomal abnormalities **AND** Normal LDH level
II	All possible combinations of R-ISS stages I and III
III	ß2 microglobulin is equal to or greater than 5.5 mg/L **AND** Presence of at least one high-risk chromosomal abnormality del(17p), t(4;14), and t(14;16) **OR** High LDH level

More Information

Help yourself to easier test tracking

Although it's not necessary, it is recommended to track your blood test results so you can monitor the changes in your blood over time. Blood test tracking may also help you identify questions to ask your healthcare team (see page 14). You can use the tracking chart below, create your own log in a blank notebook or graph your test results using a spreadsheet.

Name of blood test	Normal range (Canadian values)*	Date and Result		
Total protein	60–80 g/L			
Total immunoglobulin IgG IgA IgM	 5.65–17.65 g/L 0.85–3.85 g/L 0.55–3.75 g/L			
Total M protein (M-spike)	0.0 g/L			
ß2 microglobulin	0.0–3.0 mg/L			
Albumin	35–50 g/L			
Hemoglobin (Hgb or Hb)	Women: 120–160 g/L Men: 140–180 g/L			
Total erythrocytes or red blood count (RBC)	Women: 4.2–5.4 x 10^{12}/L Men: 4.6–6.2 x 10^{12}/L			
Total white blood cell count (WBC)	3.5–12.0 x 10^{9}/L			
Neutrophils	1.7–7.0 x 10^{9}/L			
Platelet count	150–400 x 10^{9}/L			
Other:				
Other:				

* Please note that normal values may vary from one lab to another. The ranges are for reference only.

Name of blood test	Date and Result				
Total protein					
Total immunoglobulin IgG . . . . . . IgA . . . . . . IgM.					
Total M protein (M-spike)					
ß2 microglobulin					
Albumin					
Hemoglobin (Hgb or Hb)					
Total erythrocytes or red blood count (RBC)					
Total white blood cell count (WBC)					
Neutrophils					
Platelet count					
Other:					
Other:					





Questions for Your Healthcare Team

When it comes to your health, you can never ask too many questions! Your healthcare team is there to support you, and make sure you understand what's happening to your body and why.

In the space below, you can write down any questions you have for your doctors or nurses, and take this InfoGuide with you to medical appointments so you can refer to it. Here are some questions to start you off:

- What blood tests have I had? What were the results?
- What type of myeloma do I have?
- What stage is it at?
- What other tests will I need?
- What medications will I need to take? How could they affect my blood?



Glossary

Albumin: A protein made by the liver that is tracked by blood tests as a way to monitor liver function. Albumin may also be used along with creatinine and blood urea nitrogen (BUN) to track kidney function. In addition, the albumin level is used in the International Staging System.

Anemia: Low red blood cell count, causing fatigue and weakness.

Basophil: A white blood cell, or leukocyte that eats up dead or damaged cells and helps to defend the body against infection.

Bence-Jones myeloma: See light chain myeloma.

Beta-2 (β2) microglobulin: A very small immunoglobulin (microglobulin) found on the outside of cells; a test for β2 microglobulin levels in the blood is done at diagnosis and is used in the International Staging System.

Calcium: A mineral that is an important part of bones and teeth. When bone is broken down by the body, calcium is released into the blood stream.

Clone: An exact copy. Multiple myeloma is a cancerous proliferation of a single clone of plasma cells producing a monoclonal immunoglobulin.

Complete blood count (CBC): A common set of tests that measures the total or "absolute values" of red blood cells, white blood cells and platelets.

Creatinine: A byproduct of muscle breakdown, which is transported through the blood to the kidneys to leave the body in the urine. If the kidneys are not functioning well, the creatinine level in the blood will rise.

Erythrocyte: A red blood cell. In a complete blood count (CBC), the red blood count (RBC) measures the number of red blood cells in the blood.

Deep vein thrombosis (DVT): Blood clots in the veins, such as in the legs, which interfere with blood circulation.

Eosinophil: A lymphocyte that kills parasites and is involved in allergic responses.

Gamma globulin: An immunoglobulin or antibody (see immunoglobulin).

Glucose: A sugar. A high level of glucose in the blood can be a sign of diabetes or pre-diabetes, or it can be a side effect of high-dose steroid treatment (e.g., with dexamethasone or prednisone).

Heavy chain: One of the main components of immunoglobulins. Immunoglobulins (Ig) are composed of two heavy and two light chains, and there are five types of heavy chains: G, A, D, E and M. Heavy chain myelomas are classified based on the type of heavy chain affected; the most common forms are IgG and IgA.

Hemoglobin: A protein found in red blood cells that can pick up and release oxygen and carbon dioxide. It gives red blood cells their characteristic red colour. In a complete blood count (CBC), the hemoglobin (Hgb or Hb) test measures the amount of hemoglobin in the blood.

Hypercalcemia: A high or excessive level of calcium in the blood. Hypercalcemia may cause constipation, increased frequency of urination, weakness and, in extreme cases, confusion, stupour or coma.

Hyperviscosity syndrome: Abnormal thickening of the blood, usually from an increase in the number of immunoglobulins. Symptoms can include bleeding from the nose or mouth, blurred vision, neurologic symptoms (e.g., headache, dizziness and confusion), visual disturbances and heart problems.

Immunofixation (IFE): A test to measure monoclonal proteins (i.e., M-spike or M-peak) that can be performed on a sample of blood or urine.

Immunoglobulin: An antibody or gamma globulin; a form of protein composed of two heavy and two light chains. Immunoglobulins protect against disease and infection.

Leukocyte: A white blood cell.

Leukopenia: A low level of leukocytes (white blood cells) in the blood. Leukopenia prevents your immune system from protecting you against infection and disease.

Light chain: One of the main components of immunoglobulins. Immunoglobulins are composed of two heavy and two light chains. Light chains come in two types: kappa (κ) or lambda (λ).

Light chain myeloma: A form of myeloma in which the myeloma cells produce only light chains and no heavy chains; it is also referred to as Bence-Jones myeloma.

Lymphocyte: A type of white blood cell. T-lymphocytes and natural killer cells protect against viral infections, and can detect and destroy some forms of cancer cells. B lymphocytes can develop into plasma cells.

Lytic lesions: Weak spots, holes or "punched out" areas in the bone.

M-peak: Another term for M-spike, an abnormally high level of one type of monoclonal protein.

M-spike: Another term for M-peak.

Microglobulin: A very small immunoglobulin or antibody.

Monoclonal protein: The particular immunoglobulin that cancerous myeloma cells are over-producing.

Non-secretory myeloma: An uncommon form of myeloma in which there is little or no monoclonal protein in the blood or urine.

Osteopenia: A condition in which the density of the minerals in the bone is lower than normal, but is not low enough to be classified as osteoporosis.

Osteoporosis: Weakening or thinning of the bone because of abnormally low bone mineral density. Osteoporosis increases the risk of bone breakage (fracture).

Paraprotein: Another term for monoclonal protein, M-protein or M-spike.

Plasma: The yellow fluid that makes up about half of the total blood volume.

Plasma cells: Cells that develop from B lymphocytes, which manufacture different types of immunoglobulins (antibodies).

Plasma proteins: Proteins that circulate in the blood plasma. Some of the most common plasma proteins are albumin, immunoglobulins (antibodies or gamma globulins), microglobulins (small-sized immunoglobulins) and proteins involved in blood clotting.

Platelet: A very small, cell-like particle in the blood that plays a critical role in forming blood clots and stopping bleeding. It is also referred to as a thrombocyte.

Quantitative immunoglobulin test: A blood test that can measure how much of the immunoglobulins IgG, IgA and IgM are in the blood.

Red blood cell (RBC): A type of cell that transports oxygen to the cells of the body and carries carbon dioxide away from the tissue so it can leave the body through the lungs. Red blood cells make up about 40 - 45% of the blood and are produced in the bone marrow. Since they only live for 120 days, continuous production is needed to maintain health.

Renal: Referring to the kidneys.

Revised International Staging System (R-ISS): A system used to stage and predict myeloma survival.

Serum: The portion of the blood consisting of plasma plus certain plasma proteins. When used in the name of a test (e.g., "serum calcium") it refers to the level of that component present in the blood.

Monocyte: A type of leukocyte (white blood cell) that clears away dead or damaged cells in the blood and helps to defend against infections.

Neutrophil: A form of leukocyte (white blood cell) that kills and ingests bacteria and fungi, and clears away what it identifies as "foreign" debris.

Serum free light chain assay (sFLC): A test that measures the amount of kappa (κ) or lambda (λ) light chains in the blood. An assay can be performed on a sample of blood or urine.

Serum protein electrophoresis (SPEP): A blood test to measure the amount of monoclonal protein in the blood.

Thrombocyte: A platelet or small blood cell that is important for helping the blood to clot.

Thrombocytopenia: Low platelet count, which increases the risk of abnormal bleeding and bruising.

White blood cells: Specialized cells that help the body to fight disease and infection. There are five main types of white blood cells: neutrophils, lymphocytes, monocytes, eosinophils and basophils. White blood cells are also referred to as leukocytes.

White blood count (WBC): In a complete blood count (CBC), this measures the total number of white blood cells in the blood.





Make Myeloma Matter

Every year, Myeloma Canada provides information to thousands of people impacted by myeloma through programs and services such as InfoSessions, Meet & Greets, the Myeloma Matters online newsletter, webinars, educational and patient journey videos, InfoGuides, and much more.

That's why we need your help. As the only national, charitable organization created by, and for, Canadians impacted by myeloma, we depend on your support and generous donations. Your contribution helps to improve the lives of those affected by myeloma by empowering the community through awareness, education and advocacy programs, and supporting research to find a cure. With your help, we've been making myeloma matter since we were founded in 2005.

Every donation is greatly appreciated and enables us to continue our vital work. There are many options for giving. Whether it's a one-time, a pre-arranged monthly, or a legacy gift, every donation brings us closer to finding a cure.

Ways You Can Help

Donate

We invite you to make your donation online at **myeloma.ca,** over the phone by calling toll-free at **1-888-798-5771,** or by mailing a cheque payable to Myeloma Canada to:

Myeloma Canada
1255 TransCanada, Suite 160
Dorval, QC H9P 2V4

Fundraise

There are many ways you can support Myeloma Canada, such as taking part in the annual Multiple Myeloma March held in cities across Canada, or by fundraising for Myeloma Canada in your local community. When so much about myeloma is beyond the control of the people that it impacts, fundraising can be a rewarding and fun way of doing something positive for yourself and for others touched by the disease.

Contact Myeloma Canada's fundraising team, toll-free, at 1-888-798-5771 for more information or visit www.myeloma.ca.

This InfoGuide was partially funded by unrestricted educational grants from Amgen, Celgene, Janssen and Takeda.

Myeloma Canada

Mailing Address:
Myeloma Canada
1255 TransCanada, Suite 160
Dorval, QC H9P 2V4

Telephone:
Toll-free: 1-888-798-5771

E-mail:
contact@myeloma.ca

Website:
www.myeloma.ca

Follow us on social media for the most up-to-date information and resources:

MYELOMA CANADA
MAKING MYELOMA MATTER

Myeloma Canada publications are extensively reviewed by Myeloma Canada Patient Advisory Council (PAC) and scientific advisors prior to publication. To learn more about the patients and caregivers, as well as the healthcare professionals who have collaborated, refer to the "About Us" section on our website at www.myeloma.ca.

Sincere thanks to the fundraising efforts of the Canadian myeloma community who make myeloma matter by helping to advance Myeloma Canada's objectives of awareness, education, advocacy, community empowerment and support of clinical research so that a cure may be found.

Charitable registration number: 862533296RR0001

© 2022 Multiple Myeloma Canada

First Edition: September 2012
Reprint: February 2016
Revised: September 2022