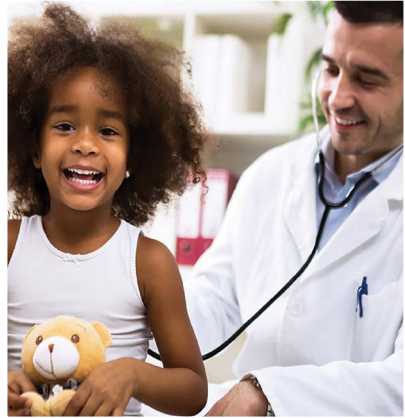


- **ESSENTIAL THROMBOCYTHEMIA**
- **POLYCYTHEMIA VERA**
- **MYELOFIBROSIS**







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# MPN Advocacy & Education International

MPN Advocacy and Education International provides educational programs, materials, and resources for patients, caregivers, physicians, and entire healthcare teams to improve their understanding of myelofibrosis, polycythemia vera, and essential thrombocythemia. They are dedicated to making a difference in the lives of those affected by MPNs and strive to grow awareness and advocate on behalf of the MPN community.

## Advocacy

Our advocacy efforts extend beyond responding to the unmet needs of the MPN Community. We identify concerns in a meaningful and productive way and create initiatives that impact quality care, treatment access, new drug development and represent MPN patients and organizations who are unable to address the issues surrounding a blood cancer diagnosis. Women and MPN and Pediatric and Young Adult initiatives have expanded the interest and exploration into the unmet needs of these patient groups.

## Education

MPN Education programs are held across the country and internationally each year. Our speakers are MPN specialists who share updated information on research, clinical trials, treatment options, and comprehensive quality of life direction. Dr. Ruben Mesa, MD, is our scientific advisor and frequent speaker at our educational programs. [VIEW EVENTS](#)

Please visit our website at [www.mpnadvocacy.com](http://www.mpnadvocacy.com) for more information on events, advocacy initiatives, patient support groups in your area and numerous [resources](#).



# What are Myeloproliferative Neoplasms (MPN)?

**Myelo** – prefix referring to bone marrow  
**Proliferative** – increasing the numbers of cells

**Neoplasm** – any new and abnormal growth, where cell multiplication is uncontrolled and progressive.

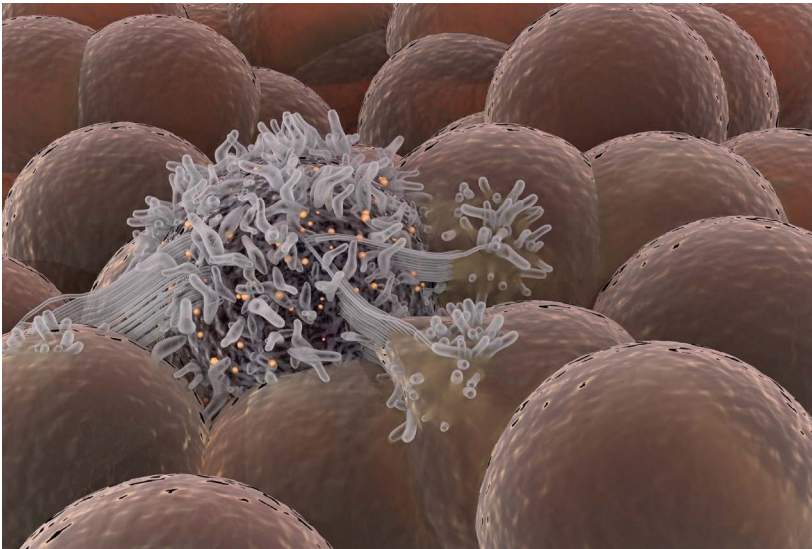
## MYELOPROLIFERATIVE NEOPLASMS

Myeloproliferative Neoplasms are the uncontrolled growth of blood cells created in the bone marrow. A genetic mutation in the blood-forming (progenitor) myeloid stem cell disrupts the body's production of normal blood cells, including the red blood cells, white blood cells, and platelets. The abnormal stem cells begin to take over the normal stem cells, causing a disruption in the function that those cells serve. The uncontrolled growth of red cells or platelets can lead to thrombosis (dangerous clots), excessive bleeding, and fibrosis of the marrow that eventually causes insufficient blood cell production.

MPN are classified as "blood cancer" because the uncontrolled proliferation of blood cells can be fatal. MPN are chronic cancers, meaning that they can be managed for many years with proper treatment and active observation. The three main types of MPN are essential thrombocythemia (ET), polycythemia vera (PV) and myelofibrosis (MF).



# Essential Thrombocythemia (ET) or Primary Thrombocytosis (PT)



CANCER CELL SPREADING AMONG HEALTHY BONE MARROW

Essential Thrombocythemia occurs when the bone marrow makes too many platelet-forming cells (megakaryocytes), which release too many platelets (thrombocytes) into the bloodstream. In addition, these platelets do not function properly, which can cause excessive bleeding or thrombosis (blood clot inside a blood vessel that obstructs blood flow). When platelets are overacting, they encourage fibrocytes in the marrow to lay down reticulin and collagen, causing Myelofibrosis.

# Polycythemia Vera (PV, P Vera) or Polycythaemia Rubra Vera (PRV)



Polycythemia Vera occurs when the bone marrow makes too many red blood cells. It may also result in the production of too many other types of blood cells, such as white blood cells and platelets. Polycythemia Vera makes the blood thicker and slows blood flow to the organs and prevents them from getting enough oxygen. Thick blood also increases the risk of venous or arterial thrombosis or clots that can cause strokes.

Up to 95 percent of PV patients have the JAK2 gene mutation, which plays a significant role in the production of red blood cells, white blood cells and platelets. With proper care, treatments, and all around good healthy choices, many PV patients are able to live long and productive lives.

*NOTE: Secondary Polycythemia is not a blood cancer because the condition of elevated red count is due to something other than a genetic mutation (i.e., smoking, dehydration).*

# Primary Myelofibrosis (PMF) or Chronic Idiopathic Myelofibrosis

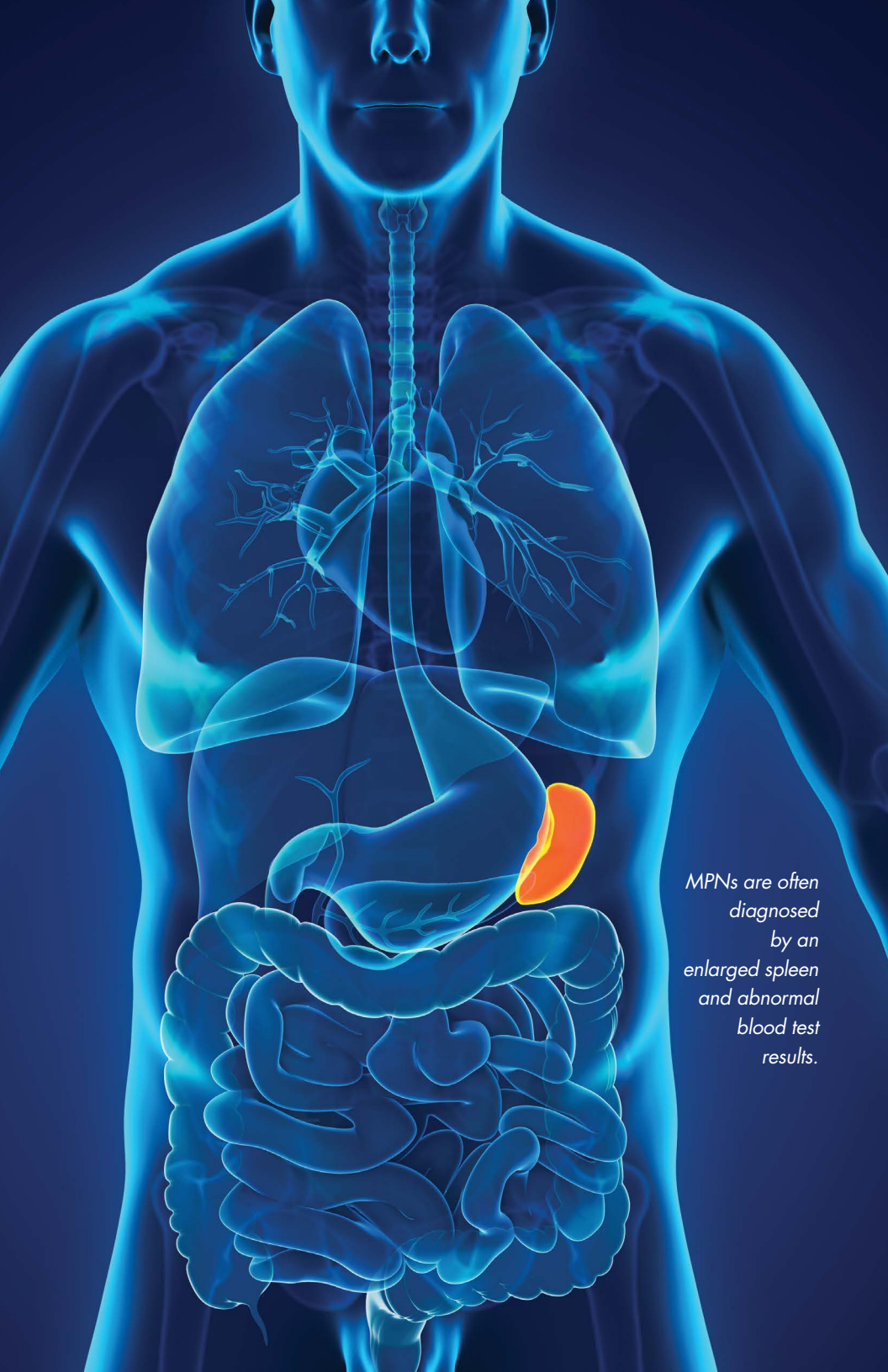
Myelofibrosis is an increase in the fibrous tissue of the bone marrow. In primary myelofibrosis, a genetic mutation in the blood-forming stem cell disrupts the body's production of normal blood cells, including the red blood cells, white blood cells, and platelets. The abnormal cells begin to take over the normal cells causing a disruption in the function that those cells serve. Extensive scarring in the bone marrow occurs known as fibrosis. Secondary Myelofibrosis is caused by Polycythemia Vera or Essential Thrombocythemia.

Myelofibrosis patients experience myeloid metaplasia – myeloid (blood-forming) tissues locate outside the bone marrow (typically the spleen or liver). This causes extra medullary hematopoiesis, production of immature blood cells in organs outside the bone marrow.

Myelofibrosis is often diagnosed by an enlarged spleen and abnormal blood test results.

Myelofibrosis occurs in about 1.5 out of every 100,000 people in the United States annually. Men, women and children can all be affected and more people are being diagnosed at an earlier age.





*MPNs are often  
diagnosed  
by an  
enlarged spleen  
and abnormal  
blood test  
results.*

# SIGNS & SYMPTOMS

Signs of disease are characteristics that can be seen and objectively measured such as genetic mutations, blood counts, and visible rash. Symptoms are things experienced by the patient such as itching, headaches, and bone pain. Each MPN patient experiences signs and symptoms in different combinations over time.



**Common to PV:** headaches; dizziness; weakness; shortness of breath; double or blurred vision; itching all over after a warm bath; reddened skin, burning feeling on hands or feet; bleeding from gums; excessive sweating; excessive fatigue; gouty arthritis in a joint; enlarged spleen; decreased libido.

**Common to ET:** high platelet count; weakness; bleeding takes time to clot; headache; dizziness; chest pain; tingling/numbness in the hands and feet due to tiny vessel clots; blood clots in tiny blood vessels of the brain causing headaches, changes in speech or awareness; foggy brain; decreased libido; shortness of breath.

**Common to MF:** enlarged spleen, bone pain, extreme fatigue, unexplained weight loss, decreased libido.

**Splenomegaly:** enlarged spleen. Spleens get enlarged when they are overworked. Typically, they trap elderly-nonfunctioning red cells, break down the hemoglobin and ship it to

the liver for detoxification. When you consistently stress the system, the spleen gets larger. The spleen is also a major reservoir of platelets so it will also work overtime with increased platelet counts.



## TESTS & PROCEDURES

**Complete Blood Count (CBC)** is a simple blood test that measures all the components of the whole blood including the number of each type of blood cell, the size and shape of red cells, the amount of hemoglobin, and hematocrit (percentage of red cells in the blood).

**Blood Smear** takes a small sample of blood and examines it under a microscope. It can reveal abnormal number, size and shape of blood cells, and is helpful to diagnose Myelofibrosis or Polycythemia Vera.

**Erythropoietin (EPO)** is a blood test that measures the level of EPO in your blood. EPO is a hormone that instructs the marrow to make new blood cells.

With Polycythemia Vera, the EPO level is very low. People with Secondary Polycythemia usually have normal or high levels of EPO.

**Bone Marrow Tests** are two tests to see whether the bone marrow is healthy. The bone marrow is collected from needles inserted through the pelvic bone on the patient's backside. It can be done in an office or hospital. If done without twilight anesthesia, insist on adequate sedation and pain medication prior to the procedure. There are no stitches and there is some tenderness for a few days following.

**Bone Marrow Aspirate** is a technique for obtaining bone marrow fluid through a needle for microscopic examination, cytogenetics and flow cytometry.

**Bone Marrow Biopsy** is a technique where a small amount of bone containing marrow is obtained through slightly larger needle to identify the presence of myelofibrosis, and to assess marrow cellularity and architecture.

**Flow Cytometry** is a technique by which individual blood or marrow cells can be analyzed for clonality.

**Cytogenetics** is a technique used to analyze the number and integrity of a cell's chromosomes.

**Phlebotomy or Venesection** is the removal of whole blood from a vein. This is often used with Polycythemia Vera patients to reduce the number of red cells and induce iron deficiency to slow their accumulation. It controls the signs and symptoms but not the progression of the disease.



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# Coping with Myeloproliferative Neoplasms

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If you've been diagnosed with myelofibrosis, polycythemia vera, or essential thrombocythemia, it's important to have a primary care physician, hematologist, and healthcare team that you feel comfortable with and at ease asking any question important to you. An empathetic, knowledgeable group can make your journey less trying. It's okay to get a second opinion if you choose. The more knowledgeable you are about your MPN the more empowered you will be in making decisions with your family, caregivers and physician(s).

## Educate yourself and others

Educate yourself, caregiver, and family members. Learn everything you need to know about your diagnosis. Attend educational symposia and hear from the experts in the field of MPNs. View webcasts after events if you are unable to attend. Visit the numerous sites that focus on MPNs and read as much as possible. Ask questions.

## Hematologist /Oncologist

Most hematologists have few, if any, MPN patients. That's okay. A great hematologist will support you getting a consultation with a MPN expert, and then follow the suggested treatment plan. Since these are long-term, chronic cancers, they can be monitored regularly and change treatments only when signs and symptoms change.



## Prepare for appointments

Keep a calendar or journal where you note symptoms from day to day (some

days are better than others) and any changes in medication.

## Write questions that come up before your appointment

Take notes during your appointments or have someone else take notes. If you don't understand what your doctor is saying, ask for explanations.

Know whom to call if you need medical attention outside of a scheduled doctor appointment.

Create a Health History document that you can add to over time. This will help you and your doctors see what has changed over time.

## Carry an ID Card & avoid possible complications

Carry an ID card that requests a call to your hematologist immediately if you are in an emergency situation that may require medical care or surgeries. List your MPN on that card with your physician's name and phone number.

If you are having elective surgery, make sure you meet with your entire healthcare team to discuss your MPN and whether you may require special needs.

## Join a local support group

Join a support group. There are many support groups across the country and abroad. Support group meetings are a safe place to hear from other patients and caregivers who share similar experiences, issues, and concerns. You will hear updates on research, clinical trials and treatment options.



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# FAQs

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## FREQUENTLY ASKED QUESTIONS & ANSWERS

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### **Are men and women affected differently?**

Men and women with MPNs may simply have different issues. For example: women may require special needs when pregnant or during menopause. More research needs to be spent on defining these differences and it is a subject matter MPN Advocacy and Education International discusses at all symposia.

### **What causes MF, PV, ET?**

The most common cause of MPNs is an abnormal proliferation of white blood cells, red blood cells and platelets which can be caused by genetic mutations (called acquired defects or mutations). Exposure to certain chemicals and high levels of radiation have been possible culprits however more research needs to be done.

### **Is there a cure for MPNs?**

The only known cure for some patients is a bone marrow transplant. This procedure is not recommended for everyone and many factors must be considered. Other treatments are being tested and research is ongoing to find a cure.

### **How long will I live with an MPN?**

Many MPN patients live long and productive lives. Since 2005 when the JAK2 gene mutation was discovered, an avalanche of interest, research, and new drug development has emerged in the world of MPNs. This event has created

such a great awareness and focus in the field that more accurate information is available, more treatment options are available and more are on the horizon, and a better understanding of prevalence and survival data is being collected.

### **How successful are bone marrow or stem cell transplants?**

Some patients do very well after a BMT or SCT. Typically, their donors are a perfect match and they were excellent candidates for this procedure. It is not a procedure for everyone and there are many factors to considered with your health care team.

### **Are MPNs inherited?**

Some studies indicate that MPNs can be inherited. Research suggests that inherited gene mutations such as JAK 2, may predispose individuals to developing an MPN. People are not born with this mutation, it is acquired.

### **What is the JAK2 gene mutation?**

A genetic mutation found in approximately 50% of myelofibrosis patients, 95% of polycythemia vera patients, and approximately 50% of essential thrombocythemia patients.

### **What is the CALR mutation?**

Calreticulin mutation in early blood forming cells are associated with essential thrombocythemia and primary myelofibrosis.

### **Are there many other mutations seen in MPN patients?**

Yes. For example, BCR-ABL1-negative, MPL, CBL, LNK, TET2, IDH1/2.

### **What are the main symptoms and treatments for MF, PV, and ET?**

Please read about symptoms and treatments on the individual pages for myelofibrosis, polycythemia vera, and essential thrombocythemia.

### **Do young people get MPNs?**

Yes. Infants are sometimes diagnosed with an MPN. Most often we hear about young adults or older patients but MPNs can strike anyone at any age.

### **Are there diets or healthy life choices that will make my diagnosis easier?**

It is always wise to maintain a healthy diet and exercise plan no matter what. It is doubly important when living with a chronic disease or illness. Good nutrition maintains energy and strengthens the immune system. Physical activity every day promotes restful sleep and elevates your mood. Sleep or rest when able. Yoga or meditation can be beneficial to reduce stress and increase energy. Participate in a support group.

### **Do all MPN patients take medications?**

No. There are some patients who do well without medication. Your physician will discuss your specific diagnosis and treatment needs and options.

### **Are there MPN centers?**

There are many cancer centers and academic institutions who have

experienced clinicians who see a number of MPN patients. Visit our website for a list of centers, [mpnadvocacy.com/resources/mpn-centers](http://mpnadvocacy.com/resources/mpn-centers).

### **Is there an environmental component to an MPN diagnosis?**

There are many patients who believe their exposure to toxins, chemicals, and other hazardous waste may have played a role in their diagnosis. More studies are needed to confirm and explain these possibilities.

### **When is it appropriate to have a discussion regarding a stem cell transplant?**

All questions related to stem cell transplants should be discussed with your hematologist.

### **Are there MPN Support Groups?**

Yes, check out our list of support groups at [mpnadvocacy.com/mpn-support-groups](http://mpnadvocacy.com/mpn-support-groups)

### **Are there educational programs I can attend?**

Yes. MPN Advocacy and Education International hosts educational programs each year in many different cities. Visit our events page to see where we will be this year. [Mpnadvocacy.com/events/](http://Mpnadvocacy.com/events/)

### **Is there research being done specifically about MPNs?**

Yes. The MPN Research Foundation funds cutting edge research projects. Most academic institutions with MPN researchers and clinicians are conducting specific MPN research and clinical trials.

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# Resources

**Patient support; prescription and co-pay assistance and more**

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## **MPN Patient/Caregiver Support**

If you are seeking a safe place to meet other patients and caregivers in your area, our website offers an updated list of MPN support groups across the country and internationally. Online groups are very active including Facebook and can provide useful information and support if you prefer using that format, for more information go to [mpnadvocacy.com](http://mpnadvocacy.com).

## **MPN Cancer Centers**

If you are looking for a medical institution or MPN Cancer Center in your area, visit our website for a comprehensive list of alternatives, [mpnadvocacy.com/resources/mpn-centers/](http://mpnadvocacy.com/resources/mpn-centers/) or call us 517.899.6889.

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## **ADDITIONAL RESOURCES:**

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### **MPN Research Foundation**

Research/Patient Support  
[mpnresearchfoundation.org](http://mpnresearchfoundation.org)

### **MPN Education Foundation**

Patient Support  
[mpninfo.org](http://mpninfo.org)

### **MPN Forum**

MPN Quarterly Journal Publication  
[mpnforum.com](http://mpnforum.com)

## **Patient Access Network (PAN) Foundation**

Prescription Assistance  
[panfoundation.org](http://panfoundation.org)  
866-316-7263

## **Incyte Corporation**

Prescription Assistance Program for Jakafi  
[incytecares.com](http://incytecares.com)  
855-452-5234

## **Leukemia and Lymphoma Society**

Co-pay Assistance  
[lls.org](http://lls.org)  
877-557-2672

## **National Organization for Rare Disorders (NORD)**

Advocacy/Education  
[rarediseases.org](http://rarediseases.org)

## **BMTinfonet**

Bone Marrow Transplant Support  
[bmtinfonet.org](http://bmtinfonet.org)

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## **FOLLOW US:**

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# Glossary of Terms

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**Allogenic:** Cells that are genetically different and immunologically incompatible; cell types that are antigenically distinct.

**Anemia:** When the number of red blood cells is below normal, it can result in fatigue, weakness, and shortness of breath.

**Antibody:** A molecule created to adhere to and interact with the antigen that triggered its synthesis. The antigen-antibody reaction is important to an immune response.

**Antigen:** A substance on the surface of a cell that triggers an immune response; it also reacts with the product of the response (the antibody). Part of the body's immune response.

**Asymptomatic:** Exhibits no symptoms

**Blood Cancer:** A malignant neoplasm of blood-forming tissue, characterized by abnormal proliferation of leukocytes.

**Blood Clot:** Blood forms a clot when it comes in contact with a "thrombogenic" substance causing the blood to convert from a liquid to a solid state (also known as coagulation). Thrombogenic substances include collagen, tissue factor and von Willebrand factor.

**Bone Marrow:** The soft, fatty, vascular tissue inside bones that produce blood cells.

**Bone Marrow Aspiration:** A technique for obtaining bone marrow tissue through a needle "usually in the pelvic bone) for examination.

**Bone Marrow Biopsy:** A procedure used to remove soft tissue, called marrow, from inside the bone. Blood and tissue is tested for disease or disease progression. Can be done under local anesthetic, or with "conscious sedation" to ensure a minimum discomfort from the procedure.

**Bone Marrow Transplant (BMT):** A procedure to replace damaged or destroyed bone marrow with healthy bone marrow stem cells. Also called a Stem Cell Transplant. Autologous transplants use the patient's own cells. Allogeneic transplants use cells from a donor for a patient.

**CAL-Reticulan:** A mutation of the CALR gene is known to cause MPN.

**Chemotherapy:** A cancer treatment that can be given orally and/or intravenously using chemical agents or drugs that are selectively destructive to specific cancer cells.

**Chronic Myeloid/Myelogenous Leukemia:** The bone marrow produces excessive white blood cells, caused by the Philadelphia chromosome or the BCR-ABL fusion gene. Since granulocytes are involved in the type of leukemia, it is also referred to as CGL or chronic granulocytic leukemia.

**Coagulation:** The process by which the blood converts from liquid to a semisolid mass (blood clot), caused by a thrombogenic substance.



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**Complete Blood Count/CBC:**

A blood test that measures the concentration of white blood cells, red blood cells, and platelets in the blood.

**Constitutional Symptom:** Something that affects the health status of a patient and indicates a disease (e.g. unexpected weight loss, fever, vomiting, fainting).

**Cytokine:** A small nonantibody protein chemical released by cells that instruct other cells. Regulate the intensity and duration of immune response and mediate cell-to-cell communication. Cytokines included interferons, interleukins, lymphokine and chemokine.

**Deep Vein Thrombosis:** A blood clot that forms in a deep vein of the body, usually the thigh or leg. If and when the clot breaks off and moves through the bloodstream, it becomes an embolism, which can get lodged in the brain, heart or lungs, causing severe damage.

**Donor:** Some MPN patients choose to have Bone Marrow Transplants. Donors who are considered a Perfect Match are the optimal candidates and are often a family member. Many donors are unknown to the recipient although some do connect after successful transplants.

**Embolism:** A blood clot that breaks off and moves through the bloodstream, lodges in a blood vessel and blocks it. An embolism can become lodged in the brain, heart, lungs or other area, causing severe damage.

**Erythrocytes:** Red blood cells; carry oxygen from lungs to the tissues.

**Erythromelalgia:** Sudden dilation of peripheral blood vessels, often triggered by heat or exertion; causes throbbing, burning, or severe itchiness of the skin. Usually affects hands and feet.

**Essential Thrombocythemia (ET):** Blood disorder characterized by the overproduction of platelets and megakaryocytes in bone marrow. Also known as primary thrombocytosis.

**Fatigue:** A condition marked by extreme tiredness and inability to function normally due to a lack of energy.

**Fibrosis:** Thickening and scarring of connective tissue.

**Foggy Brain:** Common symptoms of MPN patients include loss of thought clarity, difficulty in thinking, short-term memory loss, routine tasks are forgotten.

**Gene Mutation:** A change in the DNA sequence. Gene mutations that are often associated with MPNs include JAK2V617F mutation, MPL mutation and calreticulin (CALR) mutation.

**Genes:** The basic building blocks of heredity that are present in all cells.

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**Gout:** Acute arthritis (swelling) of joints, typically the big toe, due to excess uric acid that isn't processed through the kidneys. Uric acid crystalizes and accumulates in the joints.

**Graft vs Host Disease:** Complication of allogeneic SCT in which the new immune cells in the transplanted marrow treat the recipient's tissues (the patient's) as foreign and cause an immunologic attack.

**Hematologist/Oncologist:**

A physician who specializes in blood diseases and cancers. Many hematologists treat tumor cancers as well as blood cancers.

**Hematocrit:** Percentage of red blood cells in a volume of whole blood. The percentage by volume of whole blood that consists of blood cells (the remainder is plasma).

**Hematopoiesis:** Formation and development of blood cells.

**Hematopoietic Stem Cell:** A cell that develops into any type of specialized blood cell.

**Hemoglobin:** The part of the red blood cell that carries oxygen.

**Hypertension:** High blood pressure

**Idiopathic:** The cause for a disease process is unknown; also called Agnogenic.

**JAK Inhibitor:** A medication that blocks the activity of one or more of the JAK enzymes (JAK1, JAK2, JAK3, TYK2). JAK

inhibitors are used to treat certain types of cancer and inflammatory conditions.

**JAK positive:** The somatic genetic mutation found in approximately 50 percent of myelofibrosis patients, 95 percent of polycythemia vera patients, and approximately 50 percent of essential thrombocythemia patients.

**JAK 2 (JAK2v617F):** The genetic mutation found in approximately 50 percent of myelofibrosis patients, 95 percent of polycythemia vera patients, and approximately 50 percent of essential thrombocythemia patients.

**Leukocytes:** White blood cells; kill micro-organisms (infection) that invades the body.

**Leukocytosis:** Overproduction of white cells

**Lymphocyte:** A type of white blood cell (leukocyte) that is responsible for the immune response and aids in defending the body against disease. There are two primary types of lymphocytes: B cells and T cells.

**Matched Unrelated Donor:**

Someone, not related to the patient, who donates his/her marrow stem cells for transplantation to someone with a blood cancer or disorder.

**Mean Platelet Volume:** Measures the average amount (volume) of platelets. Used with platelet count to diagnose some diseases.

**MPL gene:** A mutation of the MPL gene is known to cause MPN.

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**MRI Scan:** A scan that uses magnets and radio frequency waves to produce images inside the body.

**Mutation:** The change or alteration of something. Gene mutation changes the way a gene functions.

**Myelofibrosis (MF):** Two definitions (descriptive and disease): 1) increased fibrosis in the bone marrow, and 2) a rare bone marrow cancer that disrupts normal blood cell production. Causes excessive fibrous scar tissue formation. Symptoms include anemia and enlarged spleen.

**Myeloproliferative Neoplasms (MPN):** Diseases of the blood and bone marrow, in which the body makes too many blood cells. The three main types MPNs are: polycythaemia vera (PV), essential thrombocythaemia (ET), and myelofibrosis.

**Neoplasm:** An abnormal mass of tissue that results when cells divide more than they should or do not die when they should.

**Neutropenia:** A significant decrease in the number of white blood cells.

**Night Sweats:** Episodes of excessive sweating while sleeping.

**Pegylated:** Time-released medication

**Petechiae:** Flat, red, pinpoint spots under the skin caused by bleeding.

**Philadelphia Chromosome:** An abnormality of chromosome 22, which is associated with chronic myeloid leukemia (CML).

### **Phlebotomy, Venesection:**

Withdrawing blood from the body, usually in large amounts, for treatment purposes. Phlebotomy is a mainstay of treatment for the polycythemia vera (PV) to lower hemoglobin and hematocrit levels.

**Platelet Count:** The number of platelets in a given volume of blood. Either quoted as per liter (e.g., reference range of 150-400 x 10<sup>9</sup> per liter) or per microliter (reference range of 150,000-400,000).

**Platelets:** Small cell fragments that help blood clot.

**Polycythemia Vera (PV):** Blood disorder of the bone marrow where the stem cells produce excessive clonal red cells that rapidly multiply and are released into the bloodstream. Causes high red cell count (hematocrit) and Hemoglobin and increased blood volume and viscosity; can cause thrombosis, migraines, strokes. White cells and platelets may also increase.

**Primary Myelofibrosis:** A disorder of the bone marrow that disrupts normal production of blood cells. It causes excessive scarring in the bone marrow. Symptoms include enlarged spleen and anemia. Myelofibrosis is one of the Myeloproliferative Neoplasms (MPNs).

**Proliferative:** Takes part in rapid and repeated production of offspring (e.g., new cells).

**Pruritus:** Severe itching.

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**Pulmonary Embolism:** The obstruction of one or more of the pulmonary arteries in the lungs, caused by a blood clot that has traveled from somewhere else in the body.

**Purpura:** Patches of purple/blue discoloration of skin (Bruises) when blood enters the skin and mucous membranes; can occur as petechiae, ecchymosis, and hematomas.

**Radiation Therapy:** A type of treatment that uses high energy to kill cancer cells.

**Red Blood Cells (RBCs):** Cells that carry oxygen through the body.

**Reynaud's Syndrome:** A disorder in which the fingers or toes experience decreased blood circulation and the skin color.

**Secondary Myelofibrosis:** Myelofibrosis occurring as a progression from another of the MPNs, generally following PV, ET, or CML.

**Spleen:** An organ located on the left side of the abdomen that is part of the lymphatic system. The spleen makes lymphocytes, filters the blood, stores blood cells, and destroys old blood cells.

**Splenectomy:** Surgical removal part or the entirety of the spleen.

**Splenomegaly:** Enlargement of the spleen.

**Stem Cell:** A cell that can become a more mature type of blood cell.

**Stem Cell Transplant:** A procedure in which healthy bone marrow stem cells are used to replace diseased or damaged bone marrow. Also called a bone marrow transplant.

**Stroke:** Rapid loss of brain function due to a disturbance of blood flow to the brain such as a blockage or hemorrhage.

**Thrombocythemia/Thrombocytosis:** A higher than normal number of platelets in the blood.

**Thrombopoietin:** Hormone that regulates megakaryocyte (platelet precursors) production, and thus platelets; it operates through its receptor (Mpl) to stimulate production.

**Thrombosis/Thrombus:** The formation of a blood clot in a blood vessel causing a total or partial obstruction of a vein or artery.

**Transfusion:** Procedure in which a patient receives blood products reds, platelets, or stem cells intravenously.

**Ultrasound:** High frequency sound waves used to look at organs and structures inside the body.

**Vascular:** Pertaining to vessels that carry/circulate fluid; usually referring to blood vessels (veins and arteries).

**White Blood Cells (WBCs):** Blood cells that fight infection and anything it perceives as foreign.

For a comprehensive list of terms and definitions visit our website:  
[mpnadvocacy.com/resources/glossary-of-terms/](https://mpnadvocacy.com/resources/glossary-of-terms/)

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# QUESTIONS FOR YOUR HEMATOLOGIST...

(CUT OUT AND TAKE WITH YOU)

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- ☐ How many MPN patients do you see?
- ☐ How long have you been seeing MPN patients?
- ☐ What kinds of treatments are available?
- ☐ What will the treatment you prescribe do?
- ☐ Will I be in remission?
- ☐ Will treatments just address my symptoms?
- ☐ Are there clinical trials going on now?
- ☐ Am I a candidate for a clinical trial?
- ☐ What should I expect if I want to have children?
- ☐ Do men and women with MPNs have different issues?
- ☐ What side effects are there with treatments?
- ☐ How long will I have to take drugs?
- ☐ What should my primary care physician know?
- ☐ What are red flags over the course of my treatment?
- ☐ Will I convert to another blood cancer?
- ☐ How do you feel about alternative treatments?
- ☐ What should my family/caregiver know?
- ☐ Is depression as prevalent with an MPN as other cancers?
- ☐ What life changes or health changes should I make?
- ☐ If my treatment is not covered by my insurance, what alternatives do I have?
- ☐ Will this diagnosis and treatment affect my intimate relationships?
- ☐ Are you open to my choices and input in caring for my cancer?
- ☐ Do you get updates on clinical trials and other up to date information about MPN research, etc.?
- ☐ I am tracking my lab reports and how I feel at each visit. Can I have copies of my lab reports?





**Sign up for our  
Free Monthly  
Newsletter  
MPN Community  
Connection**

Stay informed and updated on  
issues related to myelofibrosis,  
polycythemia vera and  
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