CONDITION

Agnogenic myeloid metaplasia

Learn about agnogenic myeloid metaplasia, now called primary myelofibrosis, including symptoms, diagnosis, treatment options, complications, and follow-up care.

WHAT IT IS
Long-term blood cancer of bone marrow stem cells

BODY SYSTEM
Blood and bone marrow

MAIN SYMPTOMS
Fatigue, left rib fullness, night sweats, weight loss

WHAT CAUSES IT
Acquired genetic changes

HOW IT IS DIAGNOSED
Bone marrow biopsy and molecular testing

MAIN TREATMENT
Risk-based treatment or active surveillance

CAN IT BE CURED?
Sometimes, donor stem-cell transplant may cure

IS IT AN EMERGENCY?
Sometimes, uncontrolled bleeding or severe breathing trouble

LONG-TERM OUTLOOK
Variable from years of stability to aggressive illness

Overview

Agnogenic myeloid metaplasia, or AMM, is an older name for primary myelofibrosis . Primary myelofibrosis is a long-term blood cancer that begins in a blood-forming stem cell in the bone marrow. It belongs to a group of conditions called myeloproliferative neoplasms , in which the bone marrow produces blood cells abnormally.

The bone marrow is the soft tissue inside certain bones where blood cells are made. In primary myelofibrosis, abnormal blood cells release chemical signals that can cause scar-like tissue, called fibrosis, to build up in the marrow. As normal blood production becomes less effective, the spleen and sometimes the liver may begin making blood cells. This is called extramedullary hematopoiesis .

The term "myeloid metaplasia" referred to this blood production outside the marrow.

"Agnogenic" meant that the cause was unknown. Modern genetic testing has identified several acquired gene changes involved in the disease, so specialists now use the name primary myelofibrosis.

Primary myelofibrosis varies widely from person to person. Some people have few symptoms and stable blood counts for years. Others develop anemia, an enlarged spleen, significant symptoms, or a more aggressive illness. Modern risk-assessment systems help the care team estimate how the condition may behave and choose an appropriate management plan.

Myelofibrosis can also develop after essential thrombocythemia or polycythemia vera, two other myeloproliferative neoplasms. Those conditions are called post-essential thrombocythemia myelofibrosis and post-polycythemia vera myelofibrosis rather than primary myelofibrosis.

Symptoms

Some people have no symptoms when primary myelofibrosis is discovered on a routine blood test. When symptoms occur, they may come from low blood counts, an enlarged spleen, inflammation, or increased blood cell turnover.

Possible symptoms include:

The spleen can become substantially enlarged, but spleen size does not always match symptom severity. Symptoms such as fatigue or weight loss also have many causes and do not by themselves establish a diagnosis.

- Fatigue, weakness, shortness of breath, or reduced exercise tolerance from anemia
- Fullness or discomfort under the left ribs from an enlarged spleen
- Feeling full after eating a small amount because the spleen presses on the stomach
- Unexplained weight loss, drenching night sweats, or fever
- Bone or joint pain
- Easy bruising, nosebleeds, or other bleeding
- Frequent or slow-to-resolve infections
- Itching
- Abdominal swelling or discomfort

Causes and risk factors

Primary myelofibrosis starts when a blood-forming stem cell develops acquired genetic changes. "Acquired" means the changes arise during a person's lifetime. They are usually not inherited from a parent and are not changes that a person can pass directly to a child.

Many people with primary myelofibrosis have a change involving the JAK2 , CALR , or MPL gene. These genes help control signals that tell blood cells when to grow. Other gene changes may influence disease behavior and are sometimes used in risk assessment. A person can still have primary myelofibrosis even if testing does not find one of the three main changes.

The marrow fibrosis is largely a reaction to abnormal signals produced by the affected blood cells. It is not simply scar tissue appearing on its own.

The condition is most often diagnosed in older adults, although it can occur at other ages. Rare families have an increased tendency to develop myeloproliferative neoplasms, but most affected people do not have a strong family history.

Primary myelofibrosis is not known to result from everyday activities, diet, stress, or something a person did wrong. In most individual cases, there is no single preventable cause.

Diagnosis

Diagnosing primary myelofibrosis usually requires evaluation by a hematologist, a doctor who specializes in blood disorders. No single symptom or blood test is enough to confirm it.

A complete blood count measures red blood cells, white blood cells, and platelets. Results vary by disease stage. A person may have anemia or abnormal white blood cell and platelet counts. A blood smear, in which cells are examined under a microscope, may show immature blood cells and red blood cells shaped like teardrops.

Other blood tests may include lactate dehydrogenase, or LDH, which can rise when blood cell production and breakdown increase. Tests may also assess kidney and liver function, iron levels, vitamin levels, and other possible explanations for abnormal blood counts.

A bone marrow biopsy is central to diagnosis. During this procedure, a clinician removes a small core of marrow, usually from the back of the hip bone. A pathologist examines the marrow's cells, structure, and degree of fibrosis. Sometimes it is difficult to draw out liquid marrow, a finding called a "dry tap," but the core biopsy can still provide useful information.

Molecular testing looks for JAK2, CALR, MPL, and sometimes additional gene changes. Chromosome testing may identify abnormalities that help with risk assessment. Testing for BCR::ABL1 helps rule out chronic myeloid leukemia, a different blood cancer.

Doctors also consider other causes of marrow fibrosis, including another myeloproliferative

neoplasm, certain cancers, infections, autoimmune disease, and uncommon marrow disorders. Diagnosis therefore depends on the combined findings from the medical history, examination, blood studies, genetic tests, and biopsy.

Once the diagnosis is established, the care team may use a scoring system that includes factors such as symptoms, age, blood counts, immature cells in the blood, chromosome findings, and gene changes. These scores estimate risk for groups of patients; they cannot predict exactly what will happen to one person.

Treatment and management

Treatment depends on symptoms, blood counts, spleen size, overall health, genetic findings, and estimated disease risk. Personal priorities also matter because treatments differ in their goals and side effects.

People without significant symptoms or high-risk features may be monitored without immediate treatment. This is sometimes called active surveillance or watchful waiting. It does not mean the condition is being ignored. Regular visits and blood tests are used to identify meaningful changes.

JAK inhibitors block parts of the abnormal growth-signaling pathway involved in myelofibrosis. Available medicines include ruxolitinib, fedratinib, pacritinib, and momelotinib. Depending on the clinical situation, these medicines may reduce spleen size and improve symptoms such as night sweats, itching, weight loss, or bone discomfort.

The choice of JAK inhibitor may be influenced by platelet counts, anemia, previous treatment, other medical conditions, and access to therapy. These medicines do not usually eliminate the abnormal stem-cell population and are not considered curative. They can lower blood counts or cause other important side effects, so laboratory and clinical monitoring are necessary. Treatment should not be stopped or changed without guidance because symptoms can return quickly after some JAK inhibitors are discontinued.

Anemia may be managed with red blood cell transfusions when needed. Selected patients may receive medicines intended to stimulate red blood cell production or improve anemia. The likely benefit depends on the cause and severity of the anemia, natural erythropoietin levels, other treatments, and individual risk factors.

An enlarged spleen is usually managed with medicine. Surgery to remove the spleen or low-dose radiation to the spleen is reserved for selected situations because benefits may be temporary and complications can be significant.

An allogeneic hematopoietic cell transplant , often called a donor stem-cell transplant, is the

only treatment with the potential to cure primary myelofibrosis. It replaces the patient's blood-forming cells with cells from a compatible donor. Transplant can also cause severe or life-threatening complications, so it is generally considered for people whose disease risk justifies those risks and whose overall health permits the procedure. Early referral to a transplant center may be useful when higher-risk disease is identified, even if transplantation is not immediately planned.

Clinical trials may provide access to new medicines or combinations. Supportive care-such as nutrition support, symptom control, vaccination planning, and treatment of infections-remains important at every stage.

Complications

Primary myelofibrosis can interfere with the production and function of all major blood cell types.

Anemia can cause severe fatigue, breathlessness, or a need for repeated transfusions. Low platelets can increase bleeding, while abnormal platelet and blood-cell activity may also contribute to blood clots. Low or poorly functioning white blood cells, along with some treatments, may increase infection risk.

A very enlarged spleen can cause persistent pain, early fullness after eating, or pressure on nearby organs. Less commonly, blood flow problems may cause damage to part of the spleen. Increased pressure in veins around the liver, called portal hypertension, can lead to fluid buildup or enlarged veins in the digestive tract.

Repeated red blood cell transfusions can eventually cause excess iron to collect in the body. The care team may monitor iron levels and organ function when transfusions are frequent.

In some people, primary myelofibrosis progresses to acute myeloid leukemia, a faster-growing blood cancer. Changes in blood counts, rising numbers of immature cells, or new symptoms may prompt additional testing, but these findings can have other explanations.

Follow up

Routine follow-up usually includes a discussion of symptoms, a physical examination, and complete blood counts. The clinician may check spleen size and review weight, activity level, bleeding, infections, and treatment side effects. Molecular or marrow testing may be repeated if the disease appears to change, but it is not necessarily needed at every visit.

Tell the care team between scheduled visits about increasing fatigue, new bruising, persistent

fever, worsening abdominal fullness, unexplained weight loss, or a clear change in night sweats. These concerns often need prompt assessment but are not always emergencies.

Seek urgent medical guidance for a fever if the care team has said that white blood cell levels or treatment place you at high infection risk. Follow the specific fever plan provided by the treating clinic.

Call emergency services for severe trouble breathing, chest pain, fainting, uncontrolled bleeding, signs of stroke, or sudden severe abdominal pain-especially pain under the left ribs with dizziness or weakness. These symptoms require immediate evaluation regardless of whether they are caused by myelofibrosis.

Sources

- National Cancer Institute. Myeloproliferative Neoplasms Treatment (PDQ®)-Health Professional Version . National Cancer Institute; accessed March 8, 2025.
- National Comprehensive Cancer Network. NCCN Guidelines for Patients: Myeloproliferative Neoplasms . NCCN Foundation; 2024.
- Tefferi A. Primary myelofibrosis: 2023 update on diagnosis, risk-stratification, and management. American Journal of Hematology . 2023;98(5):801-821.
- Arber DA, Orazi A, Hasserjian RP, et al. International Consensus Classification of Myeloid Neoplasms and Acute Leukemias: integrating morphologic, clinical, and genomic data. Blood . 2022;140(11):1200-1228.
- Khoury JD, Solary E, Abla O, et al. The 5th edition of the World Health Organization Classification of Haematolymphoid Tumours: myeloid and histiocytic/dendritic neoplasms. Leukemia . 2022;36:1703-1719.
- Leukemia & Lymphoma Society. Myelofibrosis . Leukemia & Lymphoma Society; reviewed for patient education and treatment information, accessed March 8, 2025.