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# Blood Cancer

## Multiple Myeloma

### Definitions

**Bone marrow:** The spongy material that fills the bone cavity; the source of red blood cells and many white blood cells.

**Malignant:** Cancerous and capable of spreading.

**Monoclonal:** Cells derived from a single common ancestor cell.

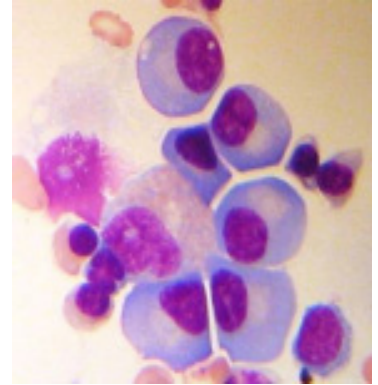
**Pathologist:** A physician who examines tissues and fluids to diagnose disease in order to assist in making treatment decisions.

**Plasma cell:** A white blood cell in your bone marrow that plays an important part of the immune system, producing antibodies to help fight infection and disease.

### What is multiple myeloma?

Multiple myeloma is a blood cancer of the plasma cell. While this cancer cannot be cured, it can be treated. Multiple myeloma patients are now living longer, healthier lives. According to the National Cancer Institute, each year about 20,000 individuals receive a diagnosis of multiple myeloma, which is the second most prevalent blood cancer after non-Hodgkin lymphoma. About 50,000 people in the United States live with multiple myeloma.

Myeloma begins when a plasma cell becomes abnormal. The abnormal cell divides, and the new cells divide again and again, making more and more abnormal, or myeloma, cells. Over time, the myeloma cells collect in the bone marrow and in the solid part of the bone, crowding out normal blood cells. This causes extensive destruction within the skeleton involving multiple bones, resulting in widespread bone pain and many fractures; this is the reason this disease is called “multiple myeloma.” In addition to making bone tumors, these abnormal plasma cells usually secrete an abnormal protein known as the monoclonal component or “M component.” The M component in the blood stream and urinary system can lead to abnormal clotting and kidney failure.



Myeloma cells collect in the bone marrow and in the bone, crowding out normal blood cells.

### Who is most likely to have multiple myeloma?

The average age at diagnosis is about 65 to 70 years. Only 1 percent of cases occur in individuals under age 40. Multiple myeloma occurs more slightly frequently in men than women. Myeloma is one of the top 10 causes of cancer death among African Americans. Native Pacific Islanders also have a high incidence of this disease.

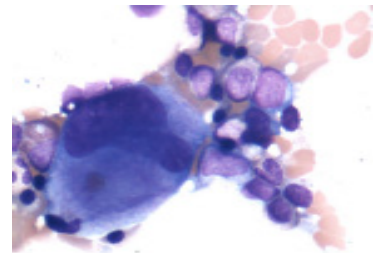
Genetics play in role in contracting this disease, experts believe, as do factors including age, exposure to radiation or toxins, a declining immune system, and obesity. Also, a personal history of monoclonal gammopathy of undetermined significance (MGUS)—a condition in which abnormal plasma cells make a low level of monoclonal proteins—is associated with multiple myeloma.

### What characterizes multiple myeloma?

Multiple myeloma is characterized by excessive abnormal plasma cells in the bone marrow and overproduction of intact monoclonal immunoglobulin or Bence-Jones protein. Signs of multiple myeloma include high calcium counts, anemia, renal damage, susceptibility to bacterial infection, impaired production of normal immunoglobulin, and osteoporosis.

Symptoms and complications include bone pain, usually in the back; broken bones, usually in the spine; weakness; fatigue; thirst; frequent infections and fevers; weight loss; nausea and constipation; and frequent urination. While these symptoms are usually not due to cancer, you should see a doctor if you experience them so that any problems can be diagnosed and treated as early as possible.

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Normal blood in bone marrow.

## What kinds of questions should I ask my doctors?

Ask any question you want. There are no questions you should be reluctant to ask. Here are a few to consider:

- Please describe the type of cancer I have and what treatment options are available.
- What stage is the cancer in?
- What are the chances for full remission?
- What treatment options do you recommend? Why do you believe these are the best treatments?
- What are the pros and cons of these treatment options?
- What are the side effects?
- Should I receive a second opinion?
- Is your medical team experienced in treating the type of cancer I have?
- Can you provide me with information about the physicians and others on the medical team?

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## How does the pathologist make a diagnosis?

After obtaining a personal and family medical history and performing a physical exam, your primary care physician may order a **blood test, urine test, or x-ray.**

The pathologist checks the blood for high levels of calcium, the presence of anemia and/or a monoclonal protein. The urine is examined for Bence Jones protein, a type of monoclonal protein that can cause kidney damage.

In addition, a hematologist (specialist in blood diseases) or pathologist may remove a **specimen** from your bone marrow for the pathologist to examine for cancer cells. Local anesthesia is used to reduce discomfort.

## What else does the pathologist look for?

If **abnormal plasma cells** are found, your physician will order more tests to determine the **stage** of the cancer and the best treatment option. These tests may include more blood tests or CT (computed tomography) or MRI (magnetic resonance imaging) scans that allow the pathologist to look closely at your bones. Stage 1 cancers have fewer myeloma cells, and stage 2 and 3 cancers have progressively more.

## How do doctors determine what treatment will be necessary?

The pathologist consults with your primary care physician after reviewing the test results. Together, using their combined experience and knowledge, they determine treatment options most appropriate for your condition.

## What kinds of treatments are available for multiple myeloma?

The treatment depends on the stage and symptoms of your disease. Treatment options may include **anticancer drugs, stem cell transplantation, or radiation therapy.**

Anticancer drug treatment kills cancer cells throughout the body. Chemotherapy drugs include melphalan, cyclophosphamide, vincristine, and doxorubicin. Prednisone, a steroid, also is often used. Your doctor also may recommend a combination of drugs or new treatments. You may receive drugs by mouth or intravenously, usually as an outpatient or at home, rather than in a hospital.

Stem cell transplantation allows your physician to provide more aggressive cancer-fighting treatment—higher-than-usual doses of chemotherapy, radiation therapy, or both. This aggressive hospital treatment kills both myeloma cells and normal blood cells in the bone marrow. After these cells have been destroyed, you receive healthy stem cells transplanted through a flexible tube placed in a large vein in your neck or chest area. New, healthy blood cells develop from the transplanted stem cells, which usually come from a healthy part of your body (autologous) or from a donor (allogeneic).

Radiation therapy kills myeloma cells and helps to control pain with high-energy rays. Local radiation is directed at the bone or part of the body where myeloma cells have collected and are causing pain. Total-body radiation is given before stem cell transplantation; these treatments may be given two or three times a day for several days before the transplant. Depending on the kind of complications of multiple myeloma you experience, you may need pain medication or a brace for back pain, dialysis for kidney complications, antibiotics for infections, medications to prevent bone loss, or erythropoietin injections that stimulate red blood cell production for anemia.

Multiple myeloma patients also are encouraged to stay active, follow a healthy diet, and drink fluids to dilute Bence Jones fragments in the urine. Staying positive and proactive and maintaining a strong support network is also important.

**Clinical trials** of new treatments for multiple myeloma may be found at [www.cancer.gov/clinicaltrials](http://www.cancer.gov/clinicaltrials). These treatments are highly experimental in nature but may be the best option for advanced cancers.

**For more information,** go to [www.cancer.gov](http://www.cancer.gov) (National Cancer Institute) or [www.mayoclinic.com](http://www.mayoclinic.com) (Mayo Clinic) and type the keywords **multiple myeloma** into the search box.