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# Blood Cancer

## Acute Myeloid Leukemia

### Definitions

**Acute:** Developing quickly and requiring urgent care.

**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.

**Myeloid:** A particular type of white blood cell.

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

### What is acute myeloid leukemia (AML)?

The second most common type of acute leukemia in adults, AML is a cancer of the blood and bone marrow. This type of cancer starts in the bone marrow, moves rapidly into the blood, and can spread further into the lymph nodes, liver, spleen, and central nervous system. This cancer must be treated quickly.

Close to 12,000 new cases of AML are diagnosed each year. With proper treatment, AML can be kept in remission for a long time or cured in some adults. The five-year survival rate for adults ranges from 15 to 70 percent and continually improves as treatments are refined and new ones discovered.

### Who is most likely to have AML?

Males and smokers, especially smokers over age 60, have an increased risk of AML. Other risk factors include past chemotherapy or radiation therapy treatment, past treatment for childhood acute lymphoblastic leukemia (ALL), exposure to radiation, and a history of a blood disorder such as a myelodysplastic syndrome.

### What characterizes AML?

AML is characterized by the bone marrow making immature, abnormal white blood cells known as myeloblasts or myeloid blasts. These cells do not mature into healthy blood cells. Instead, they develop into leukemia cells and begin to crowd out healthy white and red blood cells and platelets in the blood and bone marrow. As leukemia cells become more numerous, the production of normal blood cells is impaired. The decreased number of red cells leads to anemia; the decreased white cell production results in an inability to fight infection; and the decreased platelet production causes excessive bleeding.

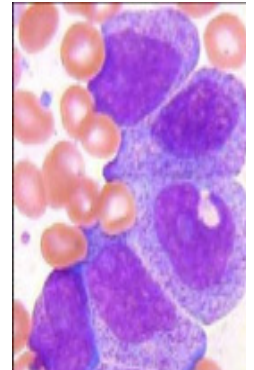
Symptoms include fever; fatigue or weakness; easy bruising or bleeding; and weight or appetite loss. These symptoms may be caused by conditions other than leukemia – that's why seeing your physician for examination and diagnosis is important.

### How does the pathologist make a diagnosis?

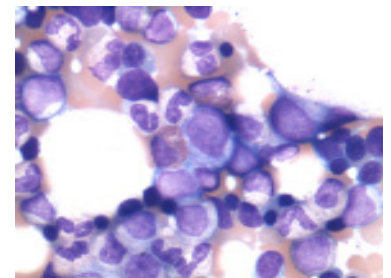
Your primary care physician conducts a physical exam and medical history. Depending on your symptoms, your physician may order tests including a **complete blood count** so that the pathologist can measure the number of red blood cells, white blood cells, and platelets and check for the presence of myeloblasts and lymphoblasts, another abnormal white blood cell type. **Blood chemistry studies** also may be ordered to measure the amounts of certain substances released into the blood by organs or tissues. Unusual amounts of a substance may be a sign of disease in the organ or tissue producing it.

### What else does the pathologist look for?

If necessary, a hematologist (specialist in blood diseases) or pathologist will obtain a **specimen** of bone marrow by inserting a needle into your hipbone or breastbone. The pathologist examines this specimen under a microscope, looking for abnormal cells. Your pathologist also may do a **cytogenetic analysis**, examining the specimen for changes to blood  
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As leukemia cells become numerous, they crowd out healthy cells, making the body less effective in fighting infection and preventing bleeding.



Healthy blood cells 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 is the stage of my cancer?
- 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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cell chromosomes, since chromosomal abnormalities are associated with leukemia. Another diagnostic test the pathologist conducts is **immunophenotyping**. During this test, the pathologist compares the leukemia cells to normal cells of the immune system to determine the subtype of AML.

To determine whether or not the cancer has spread, your physician may order a **chest x-ray, lumbar puncture** (which collects fluid from the spinal column), or other x-ray scans.

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

The pathologist consults with your primary care physician and hematologist/oncologist after reviewing the test results. Together, using their combined experience and knowledge, they determine treatment options most appropriate for your condition. Important factors usually are the age of the patient, the AML subtype, whether you have received chemotherapy in the past to treat cancer, and whether the cancer has come back.

## What kinds of treatments are available for AML?

The treatment of AML is done in two phases. The first phase kills the leukemia cells and puts the cancer into remission. The second phase kills any remaining cancer, to prevent relapse.

During each phase, **chemotherapy** is usually given. Chemotherapy uses drugs to stop the growth of cancer cells. Systemic chemotherapy kills or stops cells from dividing throughout the body. For AML, chemotherapy may be directed into sites where leukemic cells persist such as the cerebral spinal fluid (intrathecal chemotherapy). Combination chemotherapy uses more than one anticancer drug. The drugs chosen depend upon the subtype of the cancer and whether it has spread to the brain or spinal cord.

**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 leukemic 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 come from a healthy part of your body (autologous) or from a donor (allogeneic).

Other special drugs such as **arsenic trioxide** and **all-trans-retinoic acid (ATRA)** kill certain types of leukemia cells or help leukemia cells mature into white blood cells. These drugs are used to treat a subtype of AML called acute promyelocytic leukemia.

**Monoclonal antibody therapy** treats the cancer with antibodies made in the laboratory. These antibodies identify substances that help cancer cells grow, attach to these substances, and kill and block the growth of cancer cells. This therapy is also used to deliver drugs, toxins or radioactive material directly to cancer cells.

**Clinical trials** of new treatments for AML 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. A particular type of treatment in clinical trials is biologic therapy, which uses the natural defenses of the immune system to fight cancer.

**For more information**, go to [www.cancer.gov](http://www.cancer.gov) (National Cancer Institute) or [www.cancer.org](http://www.cancer.org) (American Cancer Society). Type the keywords **acute myeloid leukemia** into the search box.

Healing begins with the pathologist's diagnosis. Pathologists are the doctors who ensure you receive the right tests, the right diagnosis, and the right treatment.