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Treating Acute Myeloid Leukemia (AML)

If you've been diagnosed with acute myeloid leukemia (AML), your cancer care team will discuss your treatment options with you. Your options may be affected by the AML subtype and certain other prognostic factors, as well as your age, overall health, and personal preferences.

How is acute myeloid leukemia (AML) treated?

The main treatment for most types of AML is chemotherapy, sometimes along with a targeted therapy drug. This might be followed by a stem cell transplant. Other drugs (besides standard chemotherapy drugs) may be used to treat people with acute promyelocytic leukemia (APL). Surgery and radiation therapy aren't major treatments for AML, but they might be useful in certain circumstances.

- [Chemotherapy for Acute Myeloid Leukemia \(AML\)](#)
- [Targeted Therapy Drugs for Acute Myeloid Leukemia \(AML\)](#)
- [Non-Chemo Drugs for Acute Promyelocytic Leukemia \(APL\)](#)
- [Surgery for Acute Myeloid Leukemia \(AML\)](#)
- [Radiation Therapy for Acute Myeloid Leukemia \(AML\)](#)
- [Stem Cell Transplant for Acute Myeloid Leukemia \(AML\)](#)

Common treatment approaches

The way AML typically is treated is different from the treatment approach for acute promyelocytic leukemia (APL). The response rates for treatment can vary based on the subtype of AML, as well as other factors. Treatment options might be different if the AML doesn't respond to the initial treatment or if it comes back later on.

The treatment approach for children with AML can be slightly different from that used for adults. It's discussed separately in [Treatment of Children With Acute Myeloid Leukemia](#)

(AML).

- [Typical Treatment of Acute Myeloid Leukemia \(Except APL\)](#)
- [Treatment of Acute Promyelocytic Leukemia \(APL\)](#)
- [Treatment Response Rates for Acute Myeloid Leukemia \(AML\)](#)
- [If Acute Myeloid Leukemia \(AML\) Doesn't Respond or Comes Back After Treatment](#)

Who treats AML?

Based on your treatment options, you may have different types of doctors on your treatment team. These doctors could include:

- A **hematologist**: a doctor who treats disorders of the blood
- A **medical oncologist**: a doctor who treats cancer with medicines

Many cancer doctors are trained in both hematology and medical oncology, so they might be referred to as **hematologists/oncologists**.

You might have many other specialists on your treatment team as well, including physician assistants (PAs), nurse practitioners (NPs), nurses, nutrition specialists, social workers, and other health professionals.

- [Health Professionals Associated with Cancer Care](#)

Making treatment decisions

It's important to discuss all of your treatment options and their goals and possible side effects, with your treatment team to help make the decision that best fits your needs. Some important things to consider include:

- Your age and overall health
- The type of AML you have
- The likelihood that treatment will cure you (or help in some other way)
- Your feelings about the possible side effects from treatment

AML can often progress quickly if not treated, so it's important to start treatment as soon as possible after the diagnosis is made. But it's also very important to ask questions on anything you're not sure about.

If time allows, it's often a good idea to get a second opinion. A second opinion can give you more information and help you feel more confident about the treatment plan you choose.

- [Questions to Ask About Acute Myeloid Leukemia \(AML\)](#)
- [Seeking a Second Opinion](#)

Thinking about taking part in a clinical trial

Clinical trials are carefully controlled research studies that are done to get a closer look at promising new treatments or procedures. Clinical trials are one way to get state-of-the-art cancer treatment. In some cases they may be the only way to get access to newer treatments. They are also the best way for doctors to learn better methods to treat cancer.

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials.

- [Clinical Trials](#)

Considering complementary and alternative methods

You may hear about alternative or complementary methods to relieve symptoms or treat your cancer that your doctors haven't mentioned. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

Complementary methods are treatments that are used **along with** your regular medical care. **Alternative** treatments are used **instead of** standard medical treatment. Although some of these methods might be helpful in relieving symptoms or helping you feel better, many have not been proven to work. Some might even be harmful.

Be sure to talk to your cancer care team about any method you are thinking about using. They can help you learn what is known (or not known) about the method, which can help you make an informed decision.

- [Complementary and Integrative Medicine](#)

Help getting through cancer treatment

People with cancer need support and information, no matter what stage of illness they may be in. Knowing all of your options and finding the resources you need will help you make informed decisions about your care.

Whether you are thinking about treatment, getting treatment, or not being treated at all, you can still get supportive care to help with pain or other symptoms. Communicating with your cancer care team is important so you understand your diagnosis, what treatment is recommended, and ways to maintain or improve your quality of life.

Different types of programs and support services may be helpful, and they can be an important part of your care. These might include nursing or social work services, financial aid, nutritional advice, rehab, or spiritual help.

The American Cancer Society also has programs and services - including rides to treatment, lodging, and more - to help you get through treatment. Call our Cancer Knowledge Hub at 1-800-227-2345 and speak with one of our caring, trained cancer helpline specialists. Or, if you prefer, you can use our chat feature on cancer.org to connect with one of our specialists.

- [Palliative Care](#)
- [Programs & Services](#)

Choosing to stop treatment or choosing no treatment at all

For some people, when treatments have been tried and are no longer controlling the cancer, it could be time to weigh the benefits and risks of continuing to try new treatments. Whether or not you continue treatment, there are still things you can do to help maintain or improve your quality of life.

Some people, especially if the cancer is advanced, might not want to be treated at all. There are many reasons you might decide not to get cancer treatment, but it's important to talk to your doctors as you make that decision. Remember that even if you choose not to treat the cancer, you can still get supportive care to help with pain or other symptoms.

- [If Cancer Treatments Stop Working](#)

The treatment information given here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a

treatment plan different from these general treatment options. Don't hesitate to ask your cancer care team any questions you may have about your treatment options.

Chemotherapy for Acute Myeloid Leukemia (AML)

This is often used to treat [acute promyelocytic leukemia \(APL\)](#), and it is sometimes used for other types of AML as well.

Most chemo drugs used to treat AML are given into a vein (IV), usually through a [central venous catheter](#), although some can be injected under the skin or pills taken by mouth . If there are signs that the leukemia has reached the brain or spinal cord (which is not common with AML), chemo might also be given into the CSF (known as **intrathecal chemo**). This can be done with a thin tube (catheter) that is put in through a small hole in the skull (such as an Ommaya reservoir), or during a [lumbar puncture \(spinal tap\)](#)¹.

Most chemo regimens used to treat AML are intensive and can cause serious side effects, so treatment typically is given in the hospital.

Which chemo drugs are used to treat AML?

The chemo drugs used most often to treat AML are a combination of:

- Cytarabine (cytosine arabinoside or ara-C) and
- An anthracycline drug, such as daunorubicin (daunomycin) or idarubicin

Other chemo drugs that may be used to treat AML include:

- Cladribine (2-CdA)
- Fludarabine
- Mitoxantrone
- Etoposide (VP-16)
- Hydroxyurea
- Corticosteroid drugs, such as prednisone or dexamethasone
- Methotrexate (MTX)
- 6-mercaptopurine (6-MP)
- Azacitidine
- Decitabine
- Liposomal daunorubicin and cytarabine (Vyxeos, CPX351)

For more on how chemo is used to treat AML, see [Typical Treatment of Most Types of Acute Myeloid Leukemia \(AML\), Except APL](#).

Possible side effects of chemo

Chemo drugs can affect some normal cells in the body, which can lead to side effects. The side effects of chemo depend on the type and dose of drugs given and how long they are taken. Side effects can include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Diarrhea or constipation

Chemo drugs also affect the normal cells in bone marrow, which can lower blood cell counts. This can lead to:

- Increased risk of infections (from too few normal white blood cells)
- Easy bruising or bleeding (from too few blood platelets)

bloodstream. This can overwhelm kidneys, which aren't able to get rid of all of these substances at once. Excess amounts of certain minerals can also affect the heart and nervous system. This can be prevented by giving the patient extra fluids during treatment and by giving certain drugs, such as bicarbonate, allopurinol, and rasburicase, which help rid the body of these substances.

More information about chemotherapy

at <https://www.uptodate.com/contents/acute-myeloid-leukemia-in-adults-overview> on June 4, 2024.

Larson RA. Acute myeloid leukemia: Management of medically unfit adults. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/acute-myeloid-leukemia-management-of-medically-unfit-adults> on June 4, 2024.

Larson RA. Acute myeloid leukemia in younger adults: Post-remission therapy. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/acute-myeloid-leukemia-in-younger-adults-post-remission-therapy> on June 4, 2024.

Larson RA, Uy G. Acute myeloid leukemia: Induction therapy in medically fit adults. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/acute-myeloid-leukemia-induction-therapy-in-medically-fit-adults> on June 4, 2024.

National Cancer Institute. Acute Myeloid Leukemia Treatment (PDQ)—Health Professional Version. 2024. Accessed at <https://www.cancer.gov/types/leukemia/hp/adult-aml-treatment-pdq> on June 3, 2024.

National Comprehensive Cancer Network. NCCN Practice Guidelines in Oncology (NCCN Guidelines): Acute Myeloid Leukemia. V.3.2024. Accessed at <https://www.nccn.org> on June 3, 2024.

Last Revised: June 5, 2024

Targeted Therapy Drugs for Acute Myeloid Leukemia (AML)

In recent years, drugs that target specific parts of cancer cells have been developed. Targeted drugs work differently from standard chemotherapy (chemo) drugs, and they tend to have different side effects. They can sometimes be helpful even when chemo isn't, or they can be used along with chemo to help it work better.

- [FLT3 inhibitors](#)
- [IDH inhibitors](#)

- [Gemtuzumab ozogamicin \(Mylotarg\)](#)
- [BCL-2 inhibitor](#)
- [Hedgehog pathway inhibitor](#)
- [More information about targeted therapy](#)

Some targeted drugs can be useful in treating people with certain types of acute myeloid leukemia (AML).

FLT3 inhibitors

In some people with AML, the leukemia cells have a change (mutation) in the *FLT3* gene. This gene normally helps the cells make a protein (also called FLT3) that helps the cells grow, and the gene change causes the cell to make more of this protein. Drugs that target the FLT3 protein can help treat some of these leukemias. Your doctor can test your leukemia cells to see if they have an *FLT3* mutation. If so, one of these drugs might be helpful.

- **Midostaurin (Rydapt)** and **quizartinib (Vanflyta)** are FLT3 inhibitors that can be used along with certain [chemotherapy drugs](#) to treat newly diagnosed adults whose leukemia cells have a mutation in the *FLT3* gene.
- **Gilteritinib (Xospata)** can be used to treat adults whose leukemia cells have a mutation in the *FLT3* gene and whose AML has not gotten better on previous treatments or has recurred (come back).

These drugs are taken by mouth as pills or tablets, typically once or twice a day.

Common side effects of FLT3 inhibitors can include fever, low levels of white blood cells (with increased risk of infection), nausea, vomiting, diarrhea, redness or sores in the mouth, muscle or bone pain, headache, abnormal liver tests, and respiratory infections. Other side effects are also possible, depending on the drug.

Less often, these drugs might cause **serious side effects**. For example:

Quizartinib and gilteritinib may cause serious **heart rhythm problems**. This might lead to an irregular heartbeat, which could be life threatening. Your doctor will check your blood mineral levels and get electrocardiograms (EKGs) to test your heart rhythm before and during treatment with one of these drugs.

Gilteritinib might cause serious **nervous system problems**, which could show up as

seizures or confusion. Tell someone on your cancer care team right away if you have either of these symptoms.

Midostaurin can sometimes cause serious **lung problems**, which might show up as a cough, chest pain, or shortness of breath. Tell someone on your cancer care team right away if you have any of these symptoms.

Rarely, gilteritinib might cause a serious side effect known as **differentiation syndrome**. This occurs when the leukemia cells release certain chemicals into the blood. It most often occurs during the first treatment cycle. Symptoms can include fever, breathing problems from fluid buildup in the lungs and around the heart, low blood pressure, liver or kidney damage, and severe fluid buildup elsewhere in the body. It can often be treated by stopping the drug for a while and giving a steroid such as dexamethasone.

IDH inhibitors

In some people with AML, the leukemia cells have a mutation in either the *IDH1* or *IDH2* gene. These genes help the cells make certain proteins, which are also called IDH1 and IDH2. Mutations in one of these genes can stop blood cells from maturing the way they normally would.

Targeted drugs called **IDH inhibitors** can block these IDH proteins. These drugs seem to work by helping the leukemia cells mature (differentiate) into more normal cells. Because of this, they are sometimes referred to as **differentiation agents**.

These drugs can be used to treat AML patients who have an *IDH1* or *IDH2* mutation. You can have your blood or bone marrow tested to see if your leukemia cells have one of these mutations.

- **Ivosidenib (Tibsovo)** is an IDH1 inhibitor. It can be used to treat AML with an *IDH1* mutation, either as the first treatment in people who are older or are not healthy enough to tolerate strong chemo, or to treat AML that comes back after treatment or is no longer responding to other treatments.
- **Olutasidenib (Rezlidhia)** is an IDH1 inhibitor that can be used to treat AML with an *IDH1* mutation that comes back after treatment or is no longer responding to other treatments.
- **Enasidenib (Idhifa)** is an IDH2 inhibitor. It can be used to treat AML with an *IDH2* mutation, either as the first treatment in people who are older or are not healthy enough to tolerate strong chemo, or to treat AML that comes back after treatment

or is no longer responding to other treatments.

- Serious or life-threatening infections, especially in people who have already had a stem cell transplant
- Changes in heart rhythm

BCL-2 inhibitor

Venetoclax (Venclexta) targets BCL-2, a protein in cancer cells that helps them live longer than they should. This drug can be used with chemo in people newly diagnosed with AML who are 75 years or older, or who are not healthy enough to tolerate strong chemo. It's taken by mouth once a day.

Side effects can include low levels of certain white blood cells (neutropenia), low red blood cell counts (anemia), diarrhea, nausea, bleeding, low platelet counts, and feeling tired. Less common but more serious side effects can include **pneumonia** and other **serious infections**.

Tumor lysis syndrome (TLS) is another possible side effect of this drug. It's more common in people who have large numbers of leukemia cells in their body when treatment starts. When the leukemia cells are killed, they break open and release their contents into the bloodstream. This can overwhelm the kidneys to the point that they get rid of all of these substances quickly. This can lead to the build-up of too many minerals in the blood and even kidney failure. The excess minerals can also cause problems with the heart and nervous system. To help keep this from happening, you may start at a very low dose and then slowly increase it over time. Sometimes, other medicines may be given to help lower your white blood cell count below a certain level before starting this drug. Your treatment team will do blood tests and also watch for signs of TLS.

Hedgehog pathway inhibitor

AML cells can have mutations (changes) in genes that are part of a cell signaling pathway called **hedgehog**. The hedgehog pathway is crucial for the development of the embryo and fetus and is important in some adult cells, but it can be overactive in leukemia cells.

Glasdegib (Daurismo) is a drug that targets a protein in this pathway. It can be used with chemotherapy in people with newly diagnosed AML who are 75 years or older, or who are not healthy enough to tolerate strong chemo.

This drug is taken by mouth once a day.

Side effects can include muscle and bone pain, fatigue, low white blood cell counts (neutropenia), low red blood cell counts (anemia), bleeding, nausea, low platelet counts (thrombocytopenia), and redness or sores in the mouth.

Because the hedgehog pathway affects fetal development, this drug should not be taken by women who are pregnant or could become pregnant. It is not known if this drug could harm the fetus if taken by a male partner. Anyone taking this drug should use reliable birth control during and for some time after treatment.

More information about targeted therapy

To learn more about how targeted drugs are used to treat cancer, see [Targeted Cancer Therapy](#)².

To learn about some of the side effects listed here and how to manage them, see [Managing Cancer-related Side Effects](#)³.

Hyperlinks

1. www.cancer.org/cancer/managing-cancer/side-effects/infusion-immune-reactions.html
2. www.cancer.org/cancer/managing-cancer/treatment-types/targeted-therapy.html
3. www.cancer.org/cancer/managing-cancer/side-effects.html

References

Larson RA. Acute myeloid leukemia: Management of medically unfit adults. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/acute-myeloid-leukemia-management-of-medically-unfit-adults> on June 4, 2024.

Larson RA. Acute myeloid leukemia in younger adults: Post-remission therapy. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/acute-myeloid-leukemia-in-younger-adults-post-remission-therapy> on June 4, 2024.

Larson RA, Uy G. Acute myeloid leukemia: Induction therapy in medically fit adults. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/acute-myeloid-leukemia-induction-therapy-in-medically-fit-adults> on June 4, 2024.

National Cancer Institute. Acute Myeloid Leukemia Treatment (PDQ)—Health Professional Version. 2024. Accessed at <https://www.cancer.gov/types/leukemia/hp/adult-aml-treatment-pdq> on June 3, 2024.

National Comprehensive Cancer Network. NCCN Practice Guidelines in Oncology (NCCN Guidelines): Acute Myeloid Leukemia. V.3.2024. Accessed at <https://www.nccn.org> on June 3, 2024.

Last Revised: June 5, 2024

Non-Chemo Drugs for Acute Promyelocytic Leukemia (APL)

that makes them sensitive to certain drugs that aren't like standard chemo drugs. These drugs help the blasts mature into normal white blood cells. This process is known as **differentiation**, and these drugs are called **differentiation agents**. Since the blasts don't die, they don't release the harmful proteins into the blood, which helps keep the clotting process from getting out of control. But these drugs can also have side effects of their own.

Two of these drugs can be used to treat APL:

- All-trans-retinoic acid (ATRA, tretinoin, or Vesanoid)
- Arsenic trioxide (ATO, Trisenox)

For more on how these drugs are used for APL, see [Treatment of Acute Promyelocytic Leukemia \(APL\)](#).

All trans-retinoic acid (ATRA)

ATRA is a medicine related to vitamin A. It is typically part of the initial (**induction**) treatment of APL, either along with chemo, or along with arsenic trioxide (see below). It is also often used for some time after as part of the **consolidation** phase of treatment to help keep the leukemia from coming back. For this phase of treatment, it may be used with chemo or with arsenic trioxide (or possibly with both). For longer-term **maintenance**, ATRA might be used by itself or with chemo.

ATRA can have **side effects** similar to those seen if you take too much vitamin A. Symptoms can include headache, fever, dry skin and mouth, skin rash, swollen feet, sores in the mouth or throat, itching, and irritated eyes. It can also cause blood lipid levels (like cholesterol and triglycerides) to go up. Often liver blood test results become abnormal. These side effects often go away when the drug is stopped.

Arsenic trioxide (ATO)

Arsenic trioxide (ATO) can act in a way similar to ATRA in patients with APL. It can be given with ATRA in the induction and consolidation phases of treatment, but it is also helpful in treating people whose APL comes back after treatment with ATRA plus chemo. In these people, ATO might be given along with ATRA and/or the [targeted drug](#) gemtuzumab ozogamicin (Mylotarg).

Side effects of ATO can include fatigue (tiredness), nausea, vomiting, diarrhea, abdominal (belly) pain, and nerve damage (called **neuropathy**) leading to numbness

and tingling in the hands and feet. ATO can also cause problems with heart rhythm, which can be serious. Your doctor may check your heart rhythm with an EKG often (even daily) while you are getting this drug.

Differentiation syndrome

The most important side effect of either of these drugs is known as **differentiation syndrome**

Last Revised: June 5, 2024

Surgery for Acute Myeloid Leukemia (AML)

- [Surgery to place a central venous catheter](#)

Surgery has a very limited role in the treatment of acute myeloid leukemia (AML). Because leukemia cells are spread widely throughout the bone marrow and blood, it's not possible to cure this type of cancer with surgery. Surgery rarely has any role even in the [diagnosis](#)¹ of AML, since this can usually be done with a bone marrow aspirate and biopsy.

On rare occasions, an isolated tumor of leukemia cells (known as a myeloid sarcoma, granulocytic sarcoma, or chloroma) may be treated with surgery.

Surgery to place a central venous catheter

Often before [chemotherapy](#) starts, a minor type of surgery is done to place a small flexible tube, called a [central venous catheter \(CVC\)](#)² (also known as a central line or venous access device), into a large vein in the chest. This may be done by a surgeon in the operating room, or by a special type of radiologist. The end of the tube stays just under the skin or sticks out in the chest area or upper arm.

The CVC can be left in place during treatment (often for several months) to give intravenous (IV) medicines, such as chemotherapy, and to take blood samples for tests. This lowers the number of needle sticks needed during treatment.

If you have a CVC, it is very important to learn how to care for it to keep it from getting infected.

Hyperlinks

1. www.cancer.org/cancer/types/acute-myeloid-leukemia/detection-diagnosis-staging/how-diagnosed.html
2. www.cancer.org/cancer/managing-cancer/making-treatment-decisions/tubes-lines-ports-catheters.html

References

Larson RA. Acute myeloid leukemia: Induction therapy for in medically fit adults. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/acute-myeloid-leukemia-induction-therapy-in-medically-fit-adults> on June 4, 2024.

Radiation Therapy for Acute Myeloid Leukemia (AML)

[More information about radiation therapy](#)

To learn more about how radiation is used to treat cancer, see [Radiation Therapy](#)².

To learn about some of the side effects listed here and how to manage them, see [Managing Cancer-related Side Effects](#)³.

Hyperlinks

1. www.cancer.org/cancer/managing-cancer/treatment-types/radiation/effects-on-different-parts-of-body.html
2. www.cancer.org/cancer/managing-cancer/treatment-types/radiation.html
3. www.cancer.org/cancer/managing-cancer/side-effects.html

References

Larson RA, Uy G. Acute myeloid leukemia: Induction therapy in medically fit adults. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/acute-myeloid-leukemia-induction-therapy-in-medically-fit-adults> on June 4, 2024.

National Comprehensive Cancer Network. NCCN Practice Guidelines in Oncology (NCCN Guidelines): Acute Myeloid Leukemia. V.3.2024. Accessed at <https://www.nccn.org> on June 3, 2024.

Last Revised: June 5, 2024

Stem Cell Transplant for Acute Myeloid Leukemia (AML)

A stem cell transplant (SCT), also known as a bone marrow transplant (BMT), lets

doctors give higher doses of treatment to try to cure acute myeloid leukemia (AML). This treatment is intense, and not everyone with AML is a good candidate for it.

- [Stem cell transplants for acute myeloid leukemia \(AML\)](#)
- [Allogeneic stem cell transplants](#)
- [Autologous stem cell transplant](#)
- [More information about stem cell transplant](#)

The doses of [chemotherapy \(chemo\) drugs](#) that doctors can give to treat acute myeloid leukemia (AML) are limited by the serious side effects they can cause. Even though higher doses of chemo drugs might kill more cancer cells, they can't be given because they could severely damage the bone marrow, which is where new blood cells are made. This could lead to life-threatening infections, bleeding, and other problems caused by [low blood cell counts](#)¹.

Stem cell transplants for acute myeloid leukemia (AML)

Doctors can sometimes use a [stem cell transplant](#)² (SCT), also called a bone marrow transplant, to give higher doses of chemotherapy than normally could be given. (Sometimes [radiation therapy](#) is given as well.) After the treatment is finished, the patient gets an infusion of blood-forming stem cells to restore their bone marrow.

The blood-forming stem cells used for a transplant can come either from blood or from bone marrow. Sometimes stem cells from a baby's umbilical cord blood are used.

Stem cell transplants (SCT) differ based on whom the blood-forming stem cells come from.

Allogeneic stem cell transplants

This is the most common type of SCT used to treat AML.

In an allogeneic SCT, the stem cells come from someone other than the patient – usually a donor whose tissue type (also known as the HLA type) closely matches the patient's. Tissue type is based on certain substances on the surface of cells in the body.

The best donor is often a close relative, such as a brother or sister, if they are a good match. If no close relatives match, stem cells might be available from a matched unrelated donor (MUD), an unrelated volunteer whose tissue type matches that of the patient. But the use of stem cells from a MUD is linked to more complications. Sometimes umbilical cord stem cells are used. These stem cells come from blood drained from the umbilical cord and placenta after a baby is born and the umbilical cord is cut.

For most patients with AML, especially those at higher risk of the leukemia returning after treatment, an allogeneic SCT is preferred over an autologous SCT (see below). Leukemia is a disease of the blood and bone marrow, so giving the a disease of rggood

Leukemia (Except APL)

The most common approaches to treating acute myeloid leukemia (AML) in adults are described here. To learn how AML in children is treated, see [Treatment of Children With](#)

starting chemo. In this treatment, the person's blood is passed through a special machine that removes white blood cells (including leukemia cells) and returns the rest of the blood to the person.

Two intravenous (IV) lines are required – the blood is removed through one IV, goes through the machine, and then is returned to the person through the other IV. Sometimes, a single large catheter is placed in a vein in the neck or under the collar bone for the pheresis, instead of using IV lines in both arms. This type of catheter is called a [central venous catheter \(CVC\)](#)³ or **central line** and has both IVs built in.

This treatment lowers the number of leukemia cells right away. The effect is only for a short time, but it may help until the chemo has a chance to work.

Induction

return within several months.

Consolidation (post-remission therapy)

Induction is considered successful if the leukemia goes into remission. Further treatment (called consolidation) is given then to try to destroy any remaining leukemia cells and help prevent a relapse.

Consolidation for younger people

For younger people (typically those under 60), the main options for consolidation therapy are:

Several cycles of **chemo** with high-dose cytarabine (ara-C) (sometimes known as **HiDAC**)

As with induction, some older people or those in poor health may not be able to tolerate intensive consolidation treatment. Often, giving them more intensive therapy raises the risk of serious side effects (including dying from treatment) without providing much more of a benefit. These people may be treated with regimens such as:

- Higher-dose [cytarabine](#) (usually not quite as high as in younger people)
- Standard-dose cytarabine, possibly along with idarubicin, daunorubicin, or mitoxantrone. (For people who got a [targeted drug](#) such as midostaurin or quizartinib during induction, this is typically continued during consolidation as well.)
- A non-myeloablative [stem cell transplant](#) (mini-transplant)

get intensive treatment is fairly standard. It includes cycles of intensive chemo, sometimes along with a targeted drug or a stem cell transplant (as discussed above). Many people who are older are healthy enough to be treated in the same way, although sometimes the chemo may be less intense.

But people who are much older or are in poor health might not be able to tolerate this intense treatment. In fact, intense chemo could actually shorten their lives. And some people might decide they don't want such intense treatment, even if they could get it, because of the serious side effects it might cause. Treatment of these people is often not divided into phases, but it may be given every so often for as long as it seems helpful.

Options for these people might include:

- **Low-intensity chemo** with a drug such as low-dose cytarabine (LDAC), azacitidine (Vidaza), or decitabine (Dacogen)
- **Low-intensity chemo plus a targeted drug** such as venetoclax (Venclexta) or glasdegib (Daurismo)
- **A targeted drug**, such as: Gemtuzumab ozogamicin (Mylotarg), if the AML cells have the CD33 protein; Ivosidenib (Tibsovo), alone or with the chemo drug azacitidine, if the AML cells have an *IDH1* gene mutation; Enasidenib (Idhifa), if the AML cells have an *IDH2* gene mutation

Some people might decide against chemo and other drugs and instead choose only [supportive \(or palliative\) care](#)⁷. This focuses on treating any symptoms or complications that arise and keeping the person as comfortable as possible.

Hyperlinks

1. www.cancer.org/cancer/types/leukemia-in-children/treating/children-with-aml.html
2. www.cancer.org/cancer/types/acute-myeloid-leukemia/detection-diagnosis-staging/signs-symptoms.html
3. www.cancer.org/cancer/managing-cancer/making-treatment-decisions/tubes-lines-ports-catheters.html
4. www.cancer.org/cancer/managing-cancer/treatment-types/blood-transfusion-and-donation.html
5. www.cancer.org/cancer/types/acute-myeloid-leukemia/detection-diagnosis-staging/signs-symptoms.html

and-leukostasis-in-hematologic-malignancies on June 5, 2024.

Last Revised: June 6, 2024

Treatment of Acute Promyelocytic Leukemia (APL)

The most common approaches to treating acute promyelocytic leukemia (APL) in adults are described here. To learn how APL in children is treated, see [Treatment of Children With Acute Promyelocytic Leukemia \(APL\)](#)¹.

- [Induction](#)
- [Consolidation \(post-remission therapy\)](#)
- [Maintenance](#)

Treating APL that doesn't go away or comes back58 68.7 11.1 re f 0 Q BT 1 e4 8(American Car

Induction

The goal of induction, the first part of treatment, is to get the number of leukemia cells to very low levels, putting the APL into remission. The most important drug in the initial treatment of APL is **all-trans-retinoic acid (ATRA)**. This is usually combined with one of these:



Maintenance

For some people, especially those at higher risk of recurrence, maintenance

National Cancer Institute. Acute Myeloid Leukemia Treatment (PDQ)—Health Professional Version. 2024. Accessed at <https://www.cancer.gov/types/leukemia/hp/adult-aml-treatment-pdq> on June 3, 2024.

National Comprehensive Cancer Network. NCCN Practice Guidelines in Oncology (NCCN Guidelines): Acute Myeloid Leukemia. V.3.2024. Accessed at <https://www.nccn.org> on June 3, 2024.

Last Revised: June 6, 2024

Treatment Response Rates for Acute Myeloid Leukemia (AML)

The goal of treatment for acute myeloid leukemia (AML) is to put the leukemia into

[NCCN Guidelines for Acute Myeloid Leukemia Treatment Response Rates for Acute Myeloid Leukemia \(AML\) Treatment](#) (co go1H0Treato geatment 0 0 0 rg

have chromosome changes in their leukemia cells that are linked to a poorer outlook. About half of these people go into remission after initial treatment.

If the leukemia goes into remission, people typically get more chemo (consolidation) to try to get rid of any remaining leukemia cells. Up to half of people who get consolidation go into long-term remission (and may be cured). But this number is also affected by prognostic factors, such as a person's age and health, and whether the leukemia cells have certain gene or chromosome changes. Getting an allogeneic [stem cell transplant](#) as consolidation is linked with a higher success rate, but it also has a higher risk of death as a complication.

Remission rates for acute promyelocytic leukemia (APL)

The outlook for people with acute promyelocytic leukemia (APL) tends to be better than for those with other types of AML, although again [prognostic factors](#)⁴ can be important. About 9 out of 10 people with APL will go into remission with standard [induction treatment](#). With consolidation and maintenance, about 8 or 9 out of 10 people with APL stay in long-term remission.

Hyperlinks

1. www.cancer.org/cancer/types/acute-myeloid-leukemia/detection-diagnosis-staging/how-classified.html
2. www.cancer.org/cancer/types/acute-myeloid-leukemia/detection-diagnosis-staging/signs-symptoms.html
3. www.cancer.org/cancer/types/acute-myeloid-leukemia/detection-diagnosis-staging/how-classified.html
4. www.cancer.org/cancer/types/acute-myeloid-leukemia/detection-diagnosis-staging/how-classified.html

References

Appelbaum FR. Chapter 95: Acute leukemias in adults. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa. Elsevier: 2020.

Larson RA. Acute myeloid leukemia in younger adults: Post-remission therapy. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/acute-myeloid-leukemia-in-younger-adults-post-remission-therapy> on June 5, 2024.

Larson RA. Initial treatment of acute promyelocytic leukemia in adults. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/initial-treatment-of-acute-promyelocytic-leukemia-in-adults> on June 5, 2024.

Larson RA. Treatment of relapsed or refractory acute promyelocytic leukemia in adults. UpToDate. 2024. Accessed at <https://www.uptodate.com/contents/treatment-of-relapsed-or-refractory-acute-promyelocytic-leukemia-in-adults> on June 5, 2024.

National Comprehensive Cancer Network. NCCN Practice Guidelines in Oncology (NCCN Guidelines): Acute Myeloid Leukemia. V.3.2024. Accessed at <https://www.nccn.org> on June 5, 2024.

Last Revised: June 6, 2024

If Acute Myeloid Leukemia (AML) Doesn't Respond or Comes Back After Treatment

Most often, acute myeloid leukemia (AML) will go into remission after the initial treatment. But sometimes it doesn't go away completely (known as **refractory** disease), or it comes back (**relapses**) after a period of remission. If this happens, other treatments can be tried, as long as a person is healthy enough for them.

- [Treatment for relapsed or refractory acute myeloid leukemia \(most types\)](#)
- [Treatment for relapsed or refractory acute promyelocytic leukemia \(APL\)](#)
- [Supportive treatment for leukemia that won't go away](#)

Treatment for relapsed or refractory acute myeloid leukemia (most types)

an *IDH1* mutation, or enasidenib (Idhifa) for AML with an *IDH2* mutation. Other options might include chemo or a stem cell transplant.

(NCCN Guidelines): Acute Myeloid Leukemia. V.3.2024. Accessed at <https://www.nccn.org> on June 5, 2024.

Last Revised: June 6, 2024

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