



Understanding and managing
**acute myeloid
leukemia (AML)**





What is this booklet for?

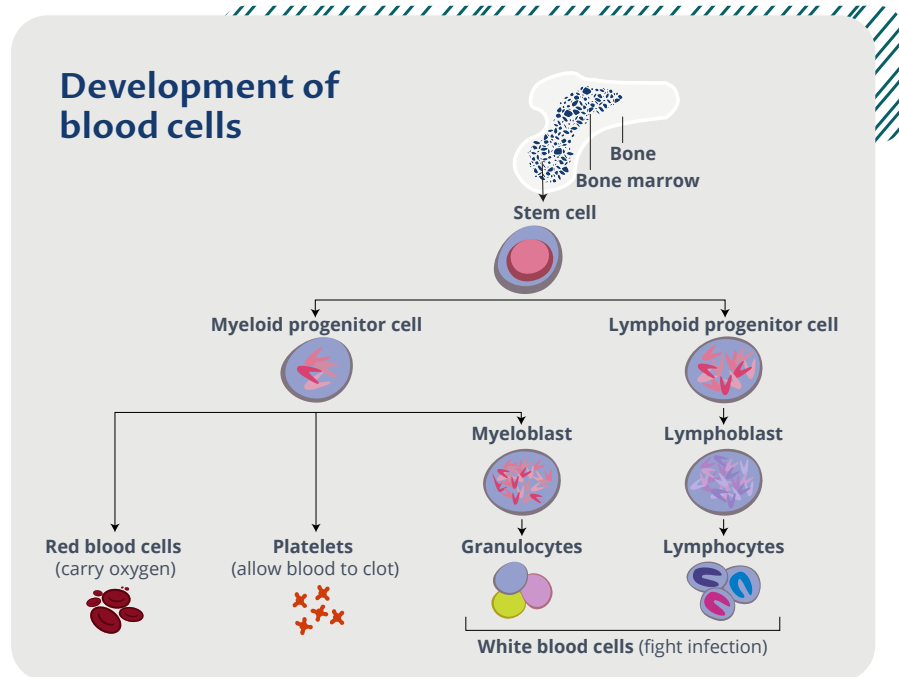
This booklet was designed to answer some questions you may have about AML. It summarizes the treatment options that are available in Canada. It can also serve as a starting point for discussions with your doctor, so that you can decide together what is best for you.

Once you have a better understanding of each treatment option, you can stay informed and take an active role in your AML treatment process.



What is AML?

AML is a type of leukemia, a cancer that forms in blood cells and bone marrow (the spongy part inside bones). The bone marrow is where stem cells are formed; these stem cells turn into blood cells.



In AML, changes in myeloid progenitor cells stop immature white blood cells (myeloblasts) from developing properly and instead become **leukemic blast cells**. The leukemic blast cells multiply and don't function properly, **blocking the production of normal healthy blood cells**.

AML is a fast-growing cancer and is the second most common blood cancer diagnosed in Canadians.

What are the different subtypes of AML?

AML is classified into subtypes that are based on lab test results. The World Health Organization (WHO) classification is the main system used to classify AML into subtypes.

AML with **genetic abnormalities**:

- Acute promyelocytic leukemia (APL) with *PML::RARA* fusion
- AML with *RUNX1::RUNX1T1* fusion
- AML with *CBFB::MYH11* fusion
- AML with *DEK::NUP214* fusion
- AML with *RBM15::MRTFA* fusion
- AML with *BCR::ABL1* fusion
- AML with *KMT2A* rearrangement
- AML with *MECOM* rearrangement
- AML with *NUP98* rearrangement
- AML with *NPM1* mutation
- AML with *CEBPA* mutation
- AML, myelodysplasia-related
- AML with other defined genetic alterations

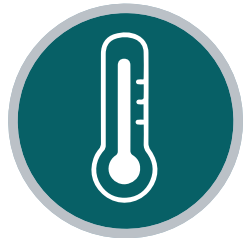
AML defined by **differentiation** (how much or how little the cancerous tissue looks like the normal tissue it came from):

- AML with minimal differentiation
- AML without maturation
- AML with maturation
- Acute basophilic leukemia
- Acute myelomonocytic leukemia
- Acute monocytic leukemia
- Acute erythroid leukemia
- Acute megakaryoblastic leukemia

Identifying your AML subtype is an important step in planning your treatment. For more information on chromosomes, please refer to page 9.

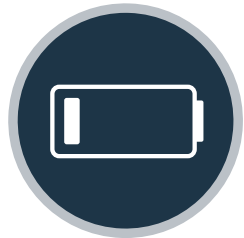
What are the signs and symptoms of AML?

Most people with AML don't experience any obvious signs or symptoms. The disease is often discovered during a routine blood test. Some of the signs and symptoms that you may experience may be similar to other diseases. You may experience:



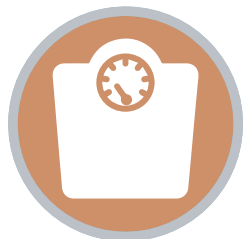
Aches and pains, mild fever, and swelling

- When you have fewer normal blood cells



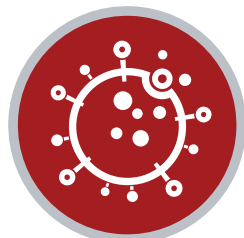
Fatigue, shortness of breath during normal physical activities, and pale complexion

- When your red blood cell count is low (anemia)



Weight loss

- When you are eating less or using more energy



Infection

- When your white blood count is low (neutropenia), your immune system is not working properly to guard against infection



Bruising easily, ongoing bleeding from minor cuts, or pinhead-sized red spots on your skin (petechiae)

- When your platelet count is low (thrombocytopenia)



What are the possible tests for AML?



Blood tests

Complete blood count (CBC)

A CBC measures the components of the blood, including white blood cells, red blood cells, and platelets. Usually, individuals with AML have lower-than-normal numbers of red blood cells and platelets in their blood. People may also have higher-than-normal or lower-than-normal white blood cell counts.

Blood cell examination

A **blood smear** is a kind of test during which blood cells are stained (dyed) and looked at through a microscope. Normally, there are no immature blood cells in a healthy person's blood, but a person with AML usually has leukemic blast cells in the blood.



Bone marrow tests

Since AML starts in the bone marrow, samples of bone marrow must be removed and tested before starting any treatment. There are two ways to take a closer look at the AML cells in the bone marrow: **bone marrow aspiration** and **bone marrow biopsy**. The tests help to determine the percentage of leukemic blast cells present. Usually, a diagnosis of AML can be confirmed when 20% or more cells in the bone marrow are leukemic blast cells.



Molecular tests

Cytogenetic (chromosomal) analysis

This test uses a microscope to examine the chromosomes inside the cells. About 60% of people with AML have abnormal chromosomes. The results help your doctor plan your treatment.

Polymerase Chain Reaction (PCR)

This test is used to find and measure genetic mutations and chromosomal changes that cannot be seen even with a powerful microscope. A PCR is given during or after treatment, and the results help doctors determine the amount of minimal residual disease (MRD), which is the small number of leukemic blast cells left after treatment.

DNA is the material that carries all the information about how our bodies look and function. Each piece of information is carried on a different section of the DNA and these sections are called "genes." Genes tell a cell how to make a specific protein, which is used by the cell to grow and survive. DNA is organized into tightly coiled thread-like bundles called "chromosomes" that contain thousands of genes. Some changes called "mutations," can happen in your genes.

The results of molecular tests can help doctors assess the outcome of AML and plan your treatment accordingly.

What factors will determine treatment options for your AML?

Before starting treatment for AML, discuss your options with your doctor. Make sure you understand the benefits and risks of each approach so you can take an active role in the process. Your treatment plan is based on the following factors:

- Your age and overall health status
- Your subtype of AML
- Your lab test results
- Whether you have:
 - A serious infection at the time of diagnosis
 - AML in your central nervous system
 - AML that has not responded to treatment or has relapsed (the return or worsening of cancer after a period of improvement)
- Your medical history, including previous chemotherapy treatment or if you've had a myelodysplastic syndrome (MDS)

After considering the above factors, your doctor will recommend one or more of the treatment options listed on pages 12–17.

What treatment options are available for AML?

Not everyone with AML receives the same treatment. Various factors (listed on the previous page) will help your doctor determine the treatment that is most appropriate for you. Your treatment will focus on **remission**. The main phases of treatment are:

- **Induction** (aiming for complete **remission**, meaning there are no signs of cancer and blood counts have recovered)
- **Consolidation** (may occur after induction as needed to kill any cancer cells that might be left in the body)
- **Maintenance** (aiming to maintain remission and prevent cancer from returning)

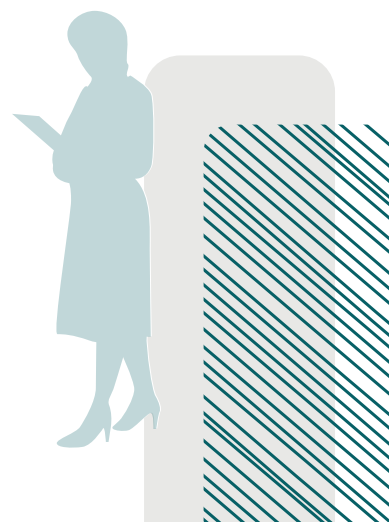
First-line treatment

The first treatment your doctor gives you for your AML can also be referred to as a “first-line” treatment.

Second-line treatment

Sometimes, people with AML don't respond to first-line treatment and will be treated with different medications. Others may respond at first, but eventually their AML returns or stops responding. If this occurs, your doctor may decide to give you another treatment, otherwise known as a “second-line” treatment.

Now let's take a closer look at the available AML treatment options.



Treatment options for AML

Treatment option	Induction therapy
What it does	Chemotherapy aims to kill cancer cells, get blood counts back to normal and eliminate the symptoms of AML. Targeted therapy seeks to stop molecules that help cancer cells grow and/or survive.
Line of treatment	Induction chemotherapy is often given right after diagnosis. Targeted therapy depends on the specific type of AML and other therapies you have received.
Mode of administration	There are several types of induction therapies and each one works differently. Some are given by mouth (orally), while others are inserted into a vein. Sometimes, multiple drugs may be given together.
Treatment duration	The goals and duration of induction therapy should be discussed with your doctor, as they may vary. Induction chemotherapy typically requires a hospital stay of 4–6 weeks.

Treatment option	Consolidation therapy (also called post-remission therapy)
What it does	Consolidation therapy is used to destroy cancer cells which are remaining or have come back after previous treatment.
Line of treatment	Consolidation therapy is a second-line treatment that is usually necessary at some point during remission. This is because some cancer cells may remain in the body even after first-line treatment.
Mode of administration	There are two basic treatment choices and each works differently: <ul style="list-style-type: none">• Intensive chemotherapy (see previous page)• Stem cell transplantation (SCT) (see next page)
Treatment duration	The duration of consolidation therapy depends on the risk factors of each person. The number of intensive chemotherapy cycles varies, but often require a hospital stay.



Treatment options for AML

Treatment option	Stem cell transplantation (SCT)
What it does	<p>SCT replaces the normal stem cells that get destroyed by the high-dose chemotherapy.</p> <p>Reduced-intensity allogeneic SCT involves lower doses of chemotherapy and is used in people with additional risk factors, including age and overall health.</p>
Line of treatment	SCT may be part of your consolidation therapy as a second-line treatment.
Mode of administration	<p>There are two types of SCT:</p> <ul style="list-style-type: none"> • Allogeneic SCT transfers the stem cells of a healthy person (donor) into your body to slow the growth of AML. The goal is to restore the body's ability to make normal cells after chemotherapy. • Autologous SCT is less common for AML and involves using your own stem cells rather than a donor's.
Treatment duration	You will receive the healthy stem cells through a transfusion, a slow injection into a vein which may take several hours. It usually takes about 2–4 weeks for new stem cells to begin growing after SCT.

Treatment option	Radiation therapy
What it does	<p>Radiation therapy uses x-rays or other high-energy rays to kill cancer cells.</p> <p>This treatment option may be used to treat a large mass of cancer cells in the brain or spine.</p>
Line of treatment	Radiation therapy may be given to destroy bone marrow cells before SCT (known as conditioning treatment), or for certain types of AML.
Mode of administration	<p>You may have radiation therapy to:</p> <ul style="list-style-type: none"> • The whole body to prepare for SCT • Treat a build-up of cancer cells outside the bone marrow • Relieve pain if the AML has spread to an area of bone • The brain to treat AML that has spread to the central nervous system
Treatment duration	The duration of treatment may vary depending on certain factors. Your medical team will consider your personal needs to plan the type and amount of radiation, and when and how it is given.

Treatment options for AML

Treatment option	Maintenance therapy (also called post-consolidation therapy)
What it does	Maintenance therapy may be given to prevent cancer from returning once remission has been achieved. The goal is to prolong remission.
Line of treatment	This therapy can be the third (and sometimes final) phase of treatment for certain people. Not everyone will receive maintenance therapy – it may be recommended depending on your type of disease, consolidation, and risk of relapse.
Mode of administration	The specific type of maintenance therapy depends on previous treatments given and your specific type of AML.
Treatment duration	If maintenance therapy is needed, it may be given for a long time and occur over years.

Joining a clinical trial can be a good option for you. A clinical trial is a type of research that studies a test or treatment in people. It gives people access to healthcare options that otherwise wouldn't be available. Ask your medical team if there is an open clinical trial that is right for you.



What else should you know about your AML treatment?

Treatment side effects

- During treatment for AML, your doctor will monitor you for side effects and any changes in your condition. You may experience mild to severe side effects depending on your age, overall health, and treatment plan – most go away after treatment.
- Long-term side effects are common and may last for months or years after treatment ends. Be sure to continue your follow-up appointments so that your medical team can monitor your AML even after treatment.
- Common side effects may include:
 - Anemia (from a decrease in red blood cells)
 - Increased bleeding or bruising (from a drop in platelet count)
 - Infection (from a large drop in white blood cells)

Speak to your doctor if you are experiencing side effects.

After remission

- Advances in the treatment of AML have resulted in improved remission rates.
- The number of people with AML who have gone into remission or have been cured increases each year.
- People diagnosed specifically with the APL subtype have higher cure rates overall compared with adults who have other AML subtypes.
- Some adults with other subtypes of AML may be cured or have long periods of remission.
- If remission is achieved, you will continue to be monitored by your doctor for any changes in your condition. It's possible that you may receive maintenance therapy, but not all individuals diagnosed with AML receive this phase of treatment.

Talk to your doctor to learn more about what happens if your AML is in remission.



What questions should you ask your doctor?



Being an active participant in your cancer care can give you and your family a greater sense of control. One way to achieve this is by building a relationship with your medical team based on open communication.

Consider bringing this list of questions to your next doctor's appointment.

Diagnosis

- What subtype of AML do I have? From what type of cell did it form? Is this cancer common?
- Will I need to have other tests before we can decide on treatment?
- What tests do you recommend for me?
- Where will the tests take place? How long will the tests take?
- How do I prepare for testing? How will the test be done? What can I expect?

General treatment

- Should I start treatment now? Why or why not?
- What should I do to be ready for treatment?
- What are my treatment options?
- Which one do you recommend for me? Why?
- What is the treatment frequency?
- How often will you test my blood or bone marrow to see how treatment is working?
- What should be avoided or taken with caution while receiving treatment?

Side effects of treatment

- What are the possible risks or side effects of my treatment? How serious are they and what should I report right away?
- How can I manage the side effects?

Other considerations

- Can treatments be taken at home?
- How will treatment affect my daily activities?
- What if I miss a treatment?
- Are there any limits on what I can do?
- Should I still take the other medications I am on?
- Is it okay to continue with the supplements I am currently taking?
- What costs will I encounter?
- In cases of emergency, how can I reach your office on nights, holidays, or weekends?

Be sure to write down any questions you have that are not on this list. For instance, you might want information about how you'll feel so that you can plan your work schedule. Or you may want to ask about qualifying for clinical trials.

What resource is available to you?



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AML and its treatment.

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