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# Chronic Myeloid Leukemia Early Detection, Diagnosis, and Staging

Know the signs and symptoms of chronic myeloid leukemia. Find out how CML is tested for, diagnosed, and staged.

## Detection and Diagnosis

Finding cancer early, before it has spread, often allows for more treatment options. Some early cancers may have signs and symptoms that can be noticed, but that's not always the case.

- [Can Chronic Myeloid Leukemia Be Found Early?](#)
- [Signs and Symptoms of Chronic Myeloid Leukemia](#)
- [Tests for Chronic Myeloid Leukemia](#)

## Phases and Outlook (Prognosis)

After diagnosis, determining the phase of CML provides important information about the likely response to treatment.

- [Phases of Chronic Myeloid Leukemia](#)

## Questions to Ask About CML

Here are some questions you can ask your cancer care team to help you better understand your CML diagnosis and treatment options.

- [Questions To Ask About Chronic Myeloid Leukemia](#)

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## Can Chronic Myeloid Leukemia Be Found Early?

The American Cancer Society recommends screening tests for certain cancers in people who have no symptoms because these cancers are easier to treat if found early. But at this time, no screening tests are routinely recommended to find chronic myeloid leukemia (CML) early.

CML can sometimes be found when routine blood tests are done for other reasons, like a routine physical. Test results might show that a person's white blood cell count is very high, even though they don't have any symptoms.

It's important to report any [symptoms](#) that could be caused by CML to a doctor right away.

### Hyperlinks

1. [www.cancer.org/cancer/types/chronic-myeloid-leukemia/references.html](http://www.cancer.org/cancer/types/chronic-myeloid-leukemia/references.html)

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## Signs and Symptoms of Chronic Myeloid

# Leukemia

- [Problems caused by a shortage of blood cells](#)

The symptoms of chronic myeloid leukemia (CML) are often vague and are more often caused by other things. Overall, the signs and symptoms of leukemia can affect men or women and do not differ by sex or gender. They include:

- Weakness
- [Fatigue](#)<sup>1</sup>
- Night sweats
- Weight loss
- Fever
- Bone pain (caused by leukemia cells spreading from the marrow cavity to the surface of the bone or into the joint)
- An enlarged spleen (felt as a mass under the left side of the ribcage)
- Pain or a sense of "fullness" in the belly
- Feeling full after eating even a small amount of food

But these aren't just symptoms of CML. They can happen with other cancers, as well as with many conditions that aren't cancer.

## Problems caused by a shortage of blood cells

Many of the signs and symptoms of CML occur because the leukemia cells replace the bone marrow's normal blood-making cells. As a result, people with CML don't make enough red blood cells, properly functioning white blood cells, and platelets.

- [Anemia](#)<sup>2</sup> is a shortage of red blood cells. It can cause weakness, tiredness, and shortness of breath.
- **Leukopenia is a shortage of normal white blood cells.** This shortage increases the risk of infections. Although patients with leukemia may have very high white blood cell counts, the leukemia cells don't protect against infection the way normal white blood cells do.
- [Neutropenia](#)<sup>3</sup> means that the level of normal neutrophils is low. Neutrophils, a type of white blood cell, are very important in fighting infection from bacteria. People who are neutropenic have a high risk of getting very serious bacterial

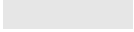


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# Tests for Chronic Myeloid Leukemia

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## Bone marrow samples

Leukemia starts in the bone marrow, so checking the bone marrow for leukemia cells is a key part of testing for it. Bone marrow samples are obtained from 2 tests that are usually done at the same time:

- Bone marrow aspiration
- Bone marrow biopsy

The samples are usually taken from the back of the pelvic (hip) bone, but sometimes other bones are used instead. Q.tput somou.e.fvpelvpm to bey don,r ie my bey taken fros



can't find the Philadelphia chromosome in bone marrow cells with cytogenetic testing.

PCR can be used to help diagnose CML. It's also useful after treatment to see if copies of the *BCR-ABL* gene are still there. If copies of this gene are found it means that the leukemia is still present, even when the cells can't be seen with a microscope.

## Imaging tests

[Imaging tests](#)<sup>5</sup> are used to get pictures of the inside of your body. They aren't needed to diagnose CML, but are sometimes used to look for the cause of symptoms or to see if the spleen or liver are enlarged.

### Computed tomography (CT) scan

A [CT scan](#)<sup>6</sup> can show if any [lymph nodes](#)<sup>7</sup> or organs in your body are enlarged. It isn't needed to diagnose CML, but it may be done if your doctor suspects the leukemia is growing in an organ, like your spleen.

In some cases, a CT can be used to guide a biopsy needle precisely into a suspected abnormality, such as an abscess. For this procedure, called a CT-guided needle biopsy, you remain on the CT scanning table while a radiologist moves a biopsy needle through your skin and toward the mass. CT scans are repeated until the needle is in the mass. A sample is then removed and looked at with a microscope. This is rarely needed in CML.

### Magnetic resonance imaging (MRI)

[MRIs](#)<sup>8</sup> are very helpful in looking at the brain and spinal cord.

### Ultrasound

[Ultrasound](#)<sup>9</sup> can be used to look at lymph nodes near the surface of your body or to look for enlarged organs inside your abdomen (belly) such as the kidneys, liver, and spleen.

## Hyperlinks

1. [www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests.html](http://www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests.html)
2. [www.cancer.org/cancer/diagnosis-staging/tests/understanding-your-lab-test-](http://www.cancer.org/cancer/diagnosis-staging/tests/understanding-your-lab-test-)



- [results.html](#)
3. [www.cancer.org/cancer/diagnosis-staging/tests/understanding-your-lab-test-results.html](http://www.cancer.org/cancer/diagnosis-staging/tests/understanding-your-lab-test-results.html)
  4. [www.cancer.org/cancer/types/chronic-myeloid-leukemia/causes-risks-prevention/what-causes.html](http://www.cancer.org/cancer/types/chronic-myeloid-leukemia/causes-risks-prevention/what-causes.html)
  5. [www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/imaging-radiology-tests-for-cancer.html](http://www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/imaging-radiology-tests-for-cancer.html)
  6. [www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/ct-scan-for-cancer.html](http://www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/ct-scan-for-cancer.html)
  7. [www.cancer.org/cancer/diagnosis-staging/lymph-nodes-and-cancer.html](http://www.cancer.org/cancer/diagnosis-staging/lymph-nodes-and-cancer.html)
  8. [www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/mri-for-cancer.html](http://www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/mri-for-cancer.html)
  9. [www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/ultrasound-for-cancer.html](http://www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/ultrasound-for-cancer.html)
  10. [www.cancer.org/cancer/types/chronic-myeloid-leukemia/references.html](http://www.cancer.org/cancer/types/chronic-myeloid-leukemia/references.html)

## References

[See all references for Chronic Myeloid Leukemia](#)

# Phases of Chronic Myeloid Leukemia

- [Phases of chronic myeloid leukemia](#)
- [Prognostic factors for chronic myeloid leukemia](#)

Most types of cancer are assigned a stage based on the size of the tumor and the extent of cancer spread. Stages can be helpful in making treatment decisions and predicting prognosis (outlook).

But because chronic myeloid leukemia (CML) is a disease of the bone marrow, it isn't staged like most cancers. The outlook for someone with CML depends on the phase of the disease and the amount of blasts in the bone marrow, as well as other factors like the age of the patient, blood counts, and if the spleen is enlarged.

## Phases of chronic myeloid leukemia

CML is classified into 3 groups that help predict outlook. Doctors call these groups **phases** instead of stages. The phases are based mainly on the number of immature white blood cells (blasts) in the blood or bone marrow. Different groups of experts have suggested slightly different cutoffs to define the phases, but a common system (proposed by the World Health Organization) is described below. Not all doctors may agree with or follow these cutoff points for the different phases. If you have questions about what phase your CML is in, be sure to have your doctor explain it to you in a way that you understand.

### Chronic phase

Patients in the chronic phase typically have less than 10% blasts in their blood or bone marrow samples. These patients usually have fairly mild symptoms (if any) and usually respond to standard treatments. Most patients are diagnosed in the chronic phase.

### Accelerated phase

Patients are considered to be in accelerated phase if any of the following are true:

- The blood samples have 15% or more, but fewer than 30% blasts
- Basophils make up 20% or more of the blood
- Blasts and promyelocytes combined make up 30% or more of the blood
- Very low platelet counts ( $100 \times 1,000/\text{mm}^3$  or less) that are not caused by treatment

- New chromosome changes in the leukemia cells with the Philadelphia chromosome

Patients whose CML is in an accelerated phase may have symptoms such as fever, poor appetite, and weight loss. CML in the accelerated phase doesn't respond as well to treatment as CML in the chronic phase.

### **Blast phase (also called acute phase or blast crisis)**

Bone marrow and/or blood samples from a patient in this phase have 20% or more blasts. Large clusters of blasts are seen in the bone marrow. The blast cells have spread to tissues and organs beyond the bone marrow. These patients often have fever, poor appetite, and weight loss. In this phase, the CML acts a lot like an [acute leukemia](#)<sup>1</sup>.

### **Prognostic factors for chronic myeloid leukemia**

Along with the phase of CML, there are other factors that may help predict the outlook for survival. These factors are sometimes helpful when choosing treatment. Factors that tend to be linked with shorter survival time are called **adverse prognostic factors**.

#### **Adverse prognostic factors:**

- Accelerated phase or blast phase
- Enlarged spleen
- Areas of bone damage from growth of leukemia
- Increased number of basophils and eosinophils (certain types of granulocytes) in blood samples
- Very high or very low platelet counts
- Age 60 years or older
- Multiple chromosome changes in the CML cells

Many of these factors are taken into account in the **Sokal system**, which develops a score used to help predict prognosis. This system considers the person's age, the percentage of blasts in the blood, the size of the spleen, and the number of platelets. These factors are used to divide patients into low-, intermediate-, or high-risk groups. Another system, called the **Euro score**, includes the above factors, as well as the percentage of blood basophils and eosinophils. Having more of these cells indicates a poorer outlook.

The Sokal and Euro models were helpful in the past, before the newer, more effective drugs for CML were developed. It's not clear how helpful they are at this time in predicting a person's outlook. [Targeted therapy](#)<sup>2</sup> drugs like imatinib (Gleevec<sup>®</sup>) have changed the treatment of CML dramatically. These models haven't been tested in people who are being treated with these drugs.

## Hyperlinks

1. [www.cancer.org/cancer/types/leukemia.html](http://www.cancer.org/cancer/types/leukemia.html)
2. [www.cancer.org/cancer/types/chronic-myeloid-leukemia/treating/targeted-therapies.html](http://www.cancer.org/cancer/types/chronic-myeloid-leukemia/treating/targeted-therapies.html)

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# Survival Rates for Chronic Myeloid Leukemia

Drugs that are highly effective in treating most cases of chronic myeloid leukemia (CML) first became available in 2001. There's no accurate information yet on how long patients treated with these drugs may live. All that's known is that most patients who have been treated with these drugs, starting in 2001 (or even before), are still alive.

One large study of CML patients treated with imatinib (Gleevec<sup>®</sup>) found that about 90% of them were still alive 5 years after starting treatment. Most of these patients had normal white blood cells and chromosome studies after 5 years on the drug.

## Hyperlinks

1. [www.cancer.org/cancer/types/chronic-myeloid-leukemia/references.html](http://www.cancer.org/cancer/types/chronic-myeloid-leukemia/references.html)

## References

[See all references for Chronic Myeloid Leukemia](#)

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## Questions To Ask About Chronic Myeloid Leukemia

As you cope with cancer and cancer treatment, you need to have honest, open talks with your cancer care team. You should be able to ask any question, no matter how small it might seem. Here are some you might want to ask. Nurses, social workers, and other members of the treatment team may also be able to answer many of your questions.

- What [phase](#) is my chronic myeloid leukemia (CML) in?
- What are my [treatment choices](#)<sup>1</sup>?
- Which treatment do you recommend, and why?
- How long will treatment last and what will it be like?
- Will my insurance cover treatment? How much will I have to pay?
- How often will you test my blood or bone marrow to see how treatment is working?
- What side effects are there to the treatments that you recommend?
- What can I do to be ready for treatment?
- Should I consider a [stem cell transplant](#)<sup>2</sup> at this time?
- What are the chances that my leukemia will come [back once](#)<sup>3</sup> I am in remission?
- What type of follow-up will I need after treatment?

reports, may be useful in case you decide to seek a second opinion later.

## **Hyperlinks**