Catching cancer early often allows for more treatment options. Some early cancers may have signs and symptoms that can be noticed, but that is not always the case.

- Signs and Symptoms of Chronic Myelomonocytic Leukemia
- How Is Chronic Myelomonocytic Leukemia Diagnosed?

**Stages and Outlook (Prognosis)**

After a cancer diagnosis, staging provides important information about the extent of cancer in the body and anticipated response to treatment.

- How Is Chronic Myelomonocytic Leukemia Staged?
- Survival Rates for Chronic Myelomonocytic Leukemia

**Questions to Ask About CMML**

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

- What Should You Ask Your Doctor About Chronic Myelomonocytic Leukemia?

**Signs and Symptoms of Chronic Myelomonocytic Leukemia**

The most common sign of chronic myelomonocytic leukemia (CMML) is having too
many monocytes (on a blood test).

Having too many monocytes also causes many of the symptoms of CMML. These monocytes can settle in the spleen or liver, enlarging these organs. An enlarged spleen (called \textit{splenomegaly}) can cause pain in the upper left part of the abdomen. It can also cause people to complain of feeling full too fast when they eat. If the liver gets too large (called \textit{hepatomegaly}), it mainly causes discomfort in the upper right part of the abdomen.

\textbf{Low numbers of other types of blood cells} cause many of the signs and symptoms of CMML:

- A shortage of red blood cells (anemia) can lead to feeling very tired, with shortness of breath and pale skin.
- Not having enough normal white blood cells (leukopenia) can lead to frequent or severe infections.
- A shortage of blood platelets (thrombocytopenia) can lead to problems with easy bruising and bleeding. Some people notice frequent or severe nosebleeds or bleeding from the gums.

Other symptoms can include weight loss, fever, and loss of appetite. Of course, these problems occur not only with CMML but are more often caused by something other than cancer. Still, if you are having symptoms, you should tell your doctor so a cause can be found.

- \textbf{References}

See all references for Chronic Myelomonocytic Leukemia

Last Medical Review: January 19, 2014 Last Revised: February 17, 2016
MAH-noh-SIH-tik) leukemia (CMML), the doctors will look at cells from your blood and bone marrow to confirm this diagnosis.

**Blood tests**

The [complete blood count](#) (CBC) measures different cells in the blood, such as the red blood cells, the white blood cells, and the platelets. The CBC is often done with a [differential count](#) (or “diff”), which is a count of the different types of white blood cells in the blood sample. In a blood smear, some of the blood is put on a slide to see how the cells look under the microscope.

Patients with CMML have higher numbers of monocytes, with a monocyte count of at least 1,000 (per mm$^3$). Sometimes they have low numbers of other white blood cells. They may have shortages of red blood cells and blood platelets as well.

Some patients may have a small number of monoblasts in the blood. Monoblasts are the early, immature cells that grow and divide to make mature monocytes. Normally, these cells are only found in the bone marrow. It is never normal to see blasts in the blood, and it often signals a bone marrow problem.

Blood cells from CMML patients may also have certain abnormalities in size, shape, or other features that can be seen under the microscope. Blood abnormalities may suggest CMML, but the doctor cannot make an exact diagnosis without examining a sample of bone marrow cells.

**Other tests**

The doctor may also order tests to check for other possible causes of low blood counts, such as low levels of vitamin B12 and folate. Tests may also be done to look for other causes of a high white blood cell count, such as infection.

**Bone marrow tests**

Bone marrow samples are obtained from [bone marrow aspiration and biopsy](#), procedures that are usually done at the same time. The samples are usually taken from the back of the pelvic (hip) bone. These tests are used first for diagnosis and classification and may be repeated later to tell if the CMML is responding to therapy or is transforming into an acute leukemia.
For bone marrow aspiration, you lie on a table (either on your side or on your belly). After cleaning the area, the skin over the hip and the surface of the bone is numbed with local anesthetic, which may cause a brief stinging or burning sensation. A thin, hollow needle is then inserted into the bone and a syringe is used to suck out a small amount of liquid bone marrow (about 1 teaspoon). Even with the anesthetic, most patients still have some brief pain when the marrow is removed.

A bone marrow biopsy is usually done just after the aspiration. A small piece of bone and marrow (about 1/16 inch in diameter and 1/2 inch long) is removed with a slightly larger needle that is twisted as it is pushed down into the bone. The biopsy may also cause some brief pain. Once the biopsy is done, pressure will be applied to the site to help prevent bleeding.

A pathologist (a doctor specializing in the diagnosis of diseases using laboratory tests) examines the bone marrow samples under a microscope. A hematologist (a doctor specializing in medical treatment of diseases of the blood and blood-forming tissues) or an oncologist (a doctor specializing in medical treatment of cancer) usually reviews these as well.

**What doctors look for in the bone marrow**

The doctors will look at the bone marrow aspirate and biopsy to evaluate the types and amount of blood-forming cells and to determine if the bone marrow shows evidence of infections, cancer cells, or other disorders. They will examine the size and shape of the cells and determine whether the red cells contain iron particles or the other cells contain granules (microscopic collections of enzymes and other chemicals that help white blood cells to fight infections). The percentage of marrow cells that are blasts is particularly important. Blasts are very early (immature) cells that are produced by bone marrow stem cells. Blasts eventually mature into normal blood cells. In CMML, some of the blasts do not mature properly, so there may be too many blasts and not enough mature cells. For a diagnosis of CMML, a patient must have less than 20% blasts in the bone marrow. A patient who has more than 20% blasts in the bone marrow is considered to have acute leukemia.

Additional tests are done on the bone marrow to help the doctor diagnose CMML and exclude other blood diseases:

**Immunocytochemistry**

Cells from the bone marrow sample are treated with special antibodies that cause certain types of cells to change color. The color change can be seen only under a
microscope. This testing is helpful in distinguishing CMML from other types of leukemia and from other diseases.

**Flow cytometry**

This technique is sometimes used to examine the cells from bone marrow and blood samples. It can be very helpful in diagnosing leukemia and lymphoma. A sample of cells is treated with special antibodies and passed in front of a laser beam. Each antibody sticks only to certain types of cells. If the sample contains those cells, the laser will cause them to give off light. The instrument detects the light, and a computer counts the cells. This test may not be needed for all patients.

**Cytogenetics**

This test looks at the chromosomes inside the cells. DNA in human cells is packed into chromosomes. Each cell should have 46 chromosomes (23 pairs). Chromosome abnormalities are fairly common in CMML. Sometimes pieces of chromosomes or even whole chromosomes are missing. CMML cells may also have extra copies of all or part of some chromosomes. Chromosome translocations may also be seen. This is where portions of chromosomes may trade places with each other. Chromosome testing can also help the doctors be sure that the problem isn’t a different chronic leukemia, called chronic myeloid leukemia or CML. The leukemia cells in CML often contain an abnormal chromosome caused by a certain translocation (translocation (9;22)). This is called the *Philadelphia chromosome*. If the Philadelphia chromosome is present, the diagnosis is CML, not CMML.

Cytogenetic testing can take several weeks because the bone marrow cells need time to grow in laboratory dishes before their chromosomes can be viewed under the microscope. The results of cytogenetic testing are written in a shorthand form that describes which chromosome changes are present. For example:

- A minus sign (-) or the abbreviation del is used to mean a deletion. For example, if a copy of chromosome 7 is missing, it can be written as -7 or del(7). Often, only a part of the chromosome is lost. There are 2 parts to a chromosome, called p and q. Thus the loss of the q part of chromosome 5 is called 5q- or del(5q).
- A plus sign is used when there is an extra copy of all or part of a chromosome. For example, +8 means that chromosome 8 has been duplicated and too many copies of it are found within the cell.
- The letter t is used to indicate a translocation, which is when a piece of one chromosome breaks off and becomes part of another chromosome.
Molecular genetic studies

This is another type of test that can be used to find chromosome and gene abnormalities. An example of this is fluorescent in situ hybridization, more commonly called FISH. In FISH, specific gene sequences are stained with a fluorescent dye. These sequences may correspond to a certain area of a chromosome or even a certain translocation. An advantage of FISH is that it doesn't require actively dividing cells. This allows the testing to go a bit faster.

FISH is very good for finding translocations; it can even find some that may be too small to be seen with usual cytogenetic testing. Another molecular genetic test that can be used to find specific genetic abnormalities is called polymerase chain reaction (PCR). These tests are not needed to make a diagnosis of CMML, but they may be used in some cases. It is sometimes used to look for certain gene or chromosome changes, such as the Philadelphia chromosome, which is associated with CML.

These tests can be done on cells besides bone marrow cells, such as cells from the blood.

- References
See all references for Chronic Myelomonocytic Leukemia

How Is Chronic Myelomonocytic Leukemia Staged?

Doctors often group cancers into different stages based on the size of the tumor and how far the cancer has spread from the original site in the body. The stage of a cancer can help predict the outlook for a cancer. Often, the stage of a cancer is used to decide which treatment is needed.

Chronic myelomonocytic leukemia (CMML) is a disease of the bone marrow. It cannot
be staged by looking at the size of a tumor like some other cancers. Instead, CMML is split into 2 groups based on cell counts in the blood and bone marrow:

- **CMML-1**: Blasts make up less than 5% of white cells in the blood and less than 10% of the cells in the bone marrow.
- **CMML-2**: Blasts make up 5% to 20% of the white cells in the blood, or they make up 10% to 20% of the cells in the bone marrow.

**References**

See all references for Chronic Myelomonocytic Leukemia

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Survival Rates for Chronic Myelomonocytic Leukemia

There is more than one way to describe a person’s likely prognosis (outlook). The statistics below talk about median survival. Median survival is the amount of time for half the patients in a group to die. This is a middle value -- half the patients live longer than this, and half do not live this long.

In order to get median survival estimates, doctors have to look at people who were treated several years ago. Improvements in treatment since then may result in a more favorable outlook for people now being diagnosed with chronic myelomonocytic leukemia (CMML).

Median survival estimates are based on previous outcomes of large numbers of people who had the disease, but they cannot predict what will happen in any particular person’s case. Many other factors may affect a person’s outlook, such as their age and overall health. Your doctor can tell you how the numbers below may apply to you, as he or she is familiar with the aspects of your particular situation.

Patients with CMML-1 tend to live longer than those with CMML-2. In one study of CMML patients diagnosed between 1975 and 2005, the median survival times with CMML-1 and CMML-2 were 20 months and 15 months, respectively. However, some
patients lived much longer. About 20% of CMML-1 patients and about 10% of CMML-2 patients survived longer than 5 years. Also, patients with CMML-2 are more likely to go on to develop acute leukemia than patients with CMML-1. In the same study, 18% of CMML-1 patients and 63% of CMML-2 patients developed acute myeloid leukemia within 5 years of their CMML diagnosis.

In addition to the type of CMML, other factors may be helpful in predicting survival. These include blood cell counts, certain chromosome changes, and blood levels of LDH (lactate dehydrogenase).

References
See all references for Chronic Myelomonocytic Leukemia

What Should You Ask Your Doctor About Chronic Myelomonocytic Leukemia?

It is important to have frank, open, and honest discussions with your doctor about your condition. Your doctor and the rest of the health care team want to answer all of your questions. For instance, consider these questions:

- What treatment choices do I have?
- Which treatment, if any, do you recommend, and why?
- What are the side effects of the treatments that you recommend?
- How can I help reduce the side effects I may have from the treatment?
- What is the outlook for my survival?
- Should I seek a second opinion, and who do you recommend as an expert in this disease?

References
See all references for Chronic Myelomonocytic Leukemia