About Chronic Myelomonocytic Leukemia

Overview of CMML

If you have been diagnosed with chronic myelomonocytic leukemia or are worried about it, you likely have a lot of questions. Learning some basics is a good place to start.

- What Is Chronic Myelomonocytic Leukemia?

Research and Statistics

See the latest estimates for new cases of chronic myelomonocytic leukemia in the US and what research is currently being done.

- What Are the Key Statistics About Chronic Myelomonocytic Leukemia?
- What's New in Chronic Myelomonocytic Leukemia Research and Treatment?

What Is Chronic Myelomonocytic Leukemia?

Chronic myelomonocytic leukemia (CMML) is a type of cancer that starts in blood-forming cells of the bone marrow and invades the blood.

Cancer starts when cells in the body begin to grow out of control. Cells in nearly any part of the body can become cancer, and can spread to other areas of the body. To learn more about how cancers start and spread, see What Is Cancer?

Normal bone marrow
Bone marrow is found inside certain bones such as the skull, ribs, pelvis, and spine. It is made up of blood-forming cells, fat cells, and supporting tissues that help the blood-forming cells grow. A small fraction of the blood-forming cells are a special type of cell known as *stem cells*. Stem cells are needed to make new cells. When a stem cell divides, it makes 2 cells: one cell that stays a stem cell and another cell that can keep changing and dividing to make blood cells.

There are 3 types of blood cells: red blood cells, white blood cells, and platelets.

**Red blood cells** pick up oxygen in the lungs and carry it to the rest of the body. These cells also bring carbon dioxide back to the lungs. Having too few red blood cells is called *anemia*. People with anemia can appear pale and feel tired and weak. Severe anemia can cause shortness of breath.

**White blood cells** (also known as *leukocytes*) are important in defending you against infection. The 2 major types of white blood cells are lymphocytes and granulocytes.

*Lymphocytes* are immune cells in the bone marrow, the blood, and in lymph nodes. Some kinds of lymphocytes make the antibodies that help your body fight germs. Other kinds directly kill invading germs by producing toxic substances that damage the cells.

*Granulocytes* are a group of white blood cells that destroy bacteria. They are called *granulocytes* because they contain granules that can be seen under the microscope. These granules are made up of enzymes and other substances which can destroy germs that cause infections.

In the bone marrow, granulocytes develop from young cells called *myeloblasts*. The most common type of granulocyte is the neutrophil; which is crucial in fighting bacteria. Other types of granulocytes are basophils, and eosinophils. When the number of neutrophils in the blood is low, it is called *neutropenia*. This can lead to severe infections.

*Monocytes* are related to the granulocyte family. They also help protect you against bacteria. The early cells in the bone marrow that turn into monocytes are called *monoblasts*. When monocytes leave your bloodstream and go into tissue, they become macrophages. Macrophages can destroy germs by surrounding and digesting them. They are also important in helping lymphocytes recognize germs and begin producing antibodies to fight them.

*Platelets* are thought of as a type of blood cell, but they are actually small pieces of a cell. They start as a large cell in the bone marrow cell called the *megakaryocyte*. Pieces of this cell break off and enter your bloodstream as platelets, which you need for your
blood to clot. Platelets plug up damaged areas of blood vessels caused by cuts or bruises. If you have a shortage of platelets, called *thrombocytopenia*, you can bleed and bruise a lot.

**Chronic myelomonocytic leukemia**

CMML patients have a high number of monocytes in their blood (at least 1,000 per \( \text{mm}^3 \)). Often, the monocyte count is much higher, causing their total white blood cell count to become very high as well. Usually there are abnormal cells in the bone marrow, but the amount of blasts (very early/immature cells) is below 20%. Many patients have enlarged spleens (an organ that lies just below the left rib cage). About 15% to 30% of CMML patients go on to develop *acute myeloid leukemia*.

Because CMML patients have abnormal-looking (dysplastic) cells in their bone marrow, for a long time CMML was considered to be a type of *myelodysplastic syndrome*. Still, it didn't fit in well with other diseases in that category because the major characteristic of myelodysplastic syndromes is having too few blood cells.

Patients with CMML may have shortages of some blood cells, but a main problem is too many of a certain type of white blood cell (the monocyte). In this way CMML is more like a *myeloproliferative disease* (*myelo* -- bone marrow, *proliferative* -- excessive growth). *Chronic myeloid leukemia* is an example of a myeloproliferative disease where there is an overproduction of white blood cells. Since CMML has features of both myelodysplastic syndrome and myeloproliferative disorder, experts created a new category for it: myelodysplastic/myeloproliferative diseases. CMML is the most common disease in this group. Much less common diseases in this group are *atypical chronic myeloid leukemia* and *juvenile myelomonocytic leukemia*. All of these diseases produce a lot of abnormal blood cells.

- References

See all references for Chronic Myelomonocytic Leukemia

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Chronic Myelomonocytic Leukemia?

Chronic myelomonocytic leukemia (CMML) is rare, only occurring in 4 of every million people in the United States each year. That works out to about 1,100 cases each year.

This disease is rare in young people. Almost 9 of 10 of cases are diagnosed in people 60 and older. CMML occurs more often in men than in women.

Visit the American Cancer Society’s Cancer Statistics Center for more key statistics.

- References
See all references for Chronic Myelomonocytic Leukemia

What's New in Chronic Myelomonocytic Leukemia Research and Treatment?

Genetics

Research on the causes, diagnosis, and treatment of chronic myelomonocytic (MY-eh-loh-MAH-noh-SIH-tik) leukemia (CMML) is being done at many cancer research centers. Scientists are making progress in understanding how changes in a person’s DNA and RNA can cause normal bone marrow cells to develop into leukemia cells.

Studies have found that changes in the structure or activity of certain genes in CMML cells may help predict patients’ prognosis and how likely the patient is to develop acute leukemia. This information may eventually be used to help guide treatment decisions.

As more information from this research unfolds, it may be used in designing new drugs or eventually in developing gene therapy. This approach replaces the abnormal DNA of cancer cells with normal DNA to restore normal control of cell growth.
Chemotherapy

Studies are in progress to find the most effective combination of chemotherapy drugs while still avoiding unnecessary side effects. New drugs are continually being developed and tested. An oral (by mouth) form of azacitidine is being tested. Research is underway to determine whether patients with certain unfavorable prognostic features will benefit from more intensive chemotherapy.

Stem cell transplant

Scientists continue to refine this procedure to increase its effectiveness, reduce complications, and determine which patients are likely to be helped by this treatment.

- References
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