# Chronic Myelomonocytic Leukemia

Chronic myelomonocytic leukemia (CMML) is a rare blood cancer in which the bone marrow does not make white blood cells effectively. It mostly affects adults and rarely children.

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## What is chronic myelomonocytic leukemia ?

Chronic myelomonocytic leukemia (CMML) is a rare, slowly progressing blood cancer. “Myelo-" means “marrow,” referring to the bone marrow.

A stem cell (blood-producing cell) in the bone marrow mutates (changes). These changes happen after conception, meaning these mutations are not passed down from your parents.

The change in the stem cell causes it to make too many blasts and monocytes. Blasts are immature blood cells that can become either red blood cells or different types of white blood cells. Monocytes are the largest white blood cells in the blood that fight infections. “Mono-” means one, and “cyte” means cell.

Monocytes take up a lot of space in the bone marrow. The bone marrow struggles to make other blood cells (red blood cells, platelets, and other white blood cells).

CMML shares features with two other types of disorders: myelodysplastic and myeloproliferative. Myelodysplastic refers to the inability (“dys”) of the bone marrow to make (“plastic”) mature, functional blood cells. Myeloproliferative refers to the bone marrow making too many blood cells — monocytes in this case.

# Types of chronic myelomonocytic leukemia

The WHO classifies CMML into two subtypes based on the number of white blood cells in the blood.

- **Myelodysplastic CMML (MD-CMML):** There are less than 13,000 white blood cells/μL in the blood.
- **Myeloproliferative CMML (MP-CMML):** There are 13,000 or more white blood cells/μL in the blood.

The World Health Organization (WHO) also separates CMML into two subgroups based on the percentage of blast cells in the blood and bone marrow.

- **CMML-1:** <5% in blood and <10% in bone marrow
- **CMML-2:** 5-19% in blood and 10-19% in bone marrow

The WHO removed CMML-0 (<2% in blood and <5% in bone marrow) from the subgroup list in 2022. It did not impact the prognosis.

# Chronic myelomonocytic leukemia facts and stats

- Around 1,100 new cases of CMML occur each year.
- Average age at diagnosis is between 71 and 74 years old.
- Response rate to treatments ranges from 40% to 50%.
- 90% of CMML cases result from specific genetic mutations (changes).
- Between 15-30% of CMML cases transform into **acute myeloid leukemia** (https://leukemiarf.org/leukemia/acute-myeloid-leukemia/).
- Around 10% of CMML-2 patients and 20% of CMML-1 patients survive longer than five years.

# Causes and risk factors of chronic myelomonocytic leukemia

Mutations in the TET2 (50% of cases), RAS (30% of cases), SRSF2, ASXL1, and DNMT3A genes contribute to the development of CMML. Scientists do not know why these genetic changes occur.

Risk factors include:

- Age (Risk increases as age increases.)
- Biological sex (CMML affects men two times as often as women.)
- Previous cancer treatment using chemotherapy

People with CMML have a higher risk of their cancer transforming into acute myeloid leukemia. This happens when the number of blast cells in your blood increase above 20%.

# Signs and symptoms of chronic myelomonocytic leukemia

Signs and symptoms depend on which CMML subtype you have.

Symptoms of the myelodysplastic subtype may include:

- Easy bruising/bleeding
- Fatigue due to anemia (low red blood cell count)
- Fever
- Recurrent infections due to leukopenia (low white blood cell count)
- Weakness

Symptoms of the myeloproliferative subtype may include:

- Bone pain
- Enlarged spleen and/or liver
- Feeling of fullness below the ribs (due to larger spleen or liver)
- Feeling very tired (fatigued)
- Heavy night sweats
- Loss of appetite/weight
- Shortness of breath

# Diagnosing chronic myelomonocytic leukemia

Your doctor asks about your medical history and performs a thorough physical examination.

Tests needed to diagnose CMML may include:

- **Blood tests:** These tests count the number of platelets, white blood cells, and red blood cells in a sample of your blood.
- **Bone marrow aspiration or biopsy:** Your doctor uses a thin, hollow needle to remove small samples of bone marrow or bone tissue for analysis.
- **Flow cytometry:** This test distinguishes CMML from similar conditions that increase monocyte counts. One of them includes reactive monocytosis. Inflammatory conditions or infections cause reactive monocytosis.
- **Imaging:** Imaging detects enlarged organs, such as the liver or spleen. Imaging may include:
  - Computed tomography (CT) scans
  - Magnetic resonance imaging (MRI) scans
  - Ultrasounds (US)
  - X-rays
- **Genetic testing:** This test detects abnormal genes that often contribute to CMML development. These findings guide your doctor's treatment recommendation. Specific genetic mutations might mean that certain treatments will not work as well as others.

# Treatments for chronic myelomonocytic leukemia

Treatment depends on your age, CMML subtype, current symptoms, response to treatment, and general health.

Treatment options for CMML include:

- **Chemotherapy:** (https://leukemiarf.org/patients/treatment/options/chemotherapy/) Chemotherapy drugs damage or kill cancer cells. Doctors give these treatments either in pill form or as injections into a vein, muscle, or underneath the skin.
- **Clinical trials** (https://leukemiarf.org/clinical-trials/)**:** Researchers test new drugs through clinical trials at specific medical centers. Eligible patients can try these promising treatments if they take part in the trials. These treatments often are not widely available.
- **Erythropoiesis-stimulating agents:** These drugs encourage the production of more red blood cells. This treats anemia (low red blood cell count).
- **Granulocyte colony-stimulating factor:** This growth factor encourages the development of white blood cells. Doctors may also use this treatment after chemotherapy, which lowers the number of white blood cells.
- **Radiation:** (https://leukemiarf.org/patients/treatment/options/radiation-therapy/) Doctors use high-intensity beams of energy to kill off cancer cells. Radiation may also shrink enlarged spleens that cause pain and digestive problems.
- **Stem cell transplant** (https://leukemiarf.org/patients/treatment/options/transplants/)**(bone marrow transplant):** Your doctor removes the mutated stem cells and replaces them with healthy stem cells. Healthy stem cells most often come from a donor but may also come from your own healthy cells. Bone marrow transplant is the only treatment that can effectively cure CMML.
- **Supportive therapies:** These therapies may replace or support intensive treatments, such as chemotherapy. They can decrease cancer symptoms or side effects from cancer treatments. Supportive therapies may include:
  - Antibiotics to treat recurrent infections
  - Counseling
  - Exercise
  - Meditation and relaxation exercises
  - Nutritional and dietary changes
  - Pain management
  - Transfusions to treat low red blood cell or platelet levels
- **Watch and Wait (https://leukemiarf.org/patients/treatment/options/watch-and-wait/):** Your doctor may decide to watch your condition without starting treatment right away. This delays or avoids harmful side effects caused by treatment.

# Helpful resources

Support can make a significant difference when you face a cancer diagnosis. You can connect with others who understand these challenges through our **peer support (https://leukemiarf.org/patients/support/)** programs. We offer an online support community and a mentoring program. We also have a **directory of resources** (https://leukemiarf.org/patients/resources/) to help patients, families, and caregivers.

## Clinical Trials Hub: A resource for leukemia patients and caregivers

Do you have questions about clinical trials? On our new Clinical Trials Hub learn how clinical trials are developed or if they are right for you. You can also use the new Search Tool to see if there is a current leukemia-focused trial you would qualify for.

**LEARN MORE (HTTPS://LEUKEMIARF.ORG/CLINICAL-TRIALS/)**

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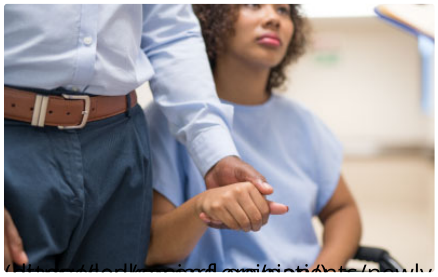
### Coping with your diagnosis

### Choosing a treatment provider



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**Primary diagnosis (if patient/caregiver)**

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