



## **Biotech Products > Interferon Patient Information**

### **WHAT IS CHRONIC MYELOID LEUKEMIA:**

Chronic myeloid leukaemia is a cancer of blood cells in which the bone marrow makes too many white cells. Chronic myeloid leukaemia (also called CML) is a slowly progressing blood and bone marrow disease that usually occurs during or after middle age, and rarely occurs in children. This cancer starts in bone marrow and can then spread to blood, lymph nodes, spleen, liver, central nervous system and other organs.

### **WHAT ARE THE TYPES OF BLOOD CELLS:**

There are three types of mature blood cells:

- Red blood cells that carry oxygen and other materials to all tissues of body
- White blood cells that fight infection and disease
- Platelets that help prevent bleeding by causing blood clots to form

In CML, too many bone marrow stem cells develop into a type of white blood cell called granulocytes. Some of these bone marrow stem cells never become mature white blood cells. These are called blast cells. Over time, the granulocytes and blast cells crowd out the red blood cells and platelets in the bone marrow.

### **WHAT ARE THE SYMPTOMS OF CML:**

Symptoms of chronic myeloid leukaemia include tiredness, night sweats, and fever. These and other symptoms may be caused by CML or by other conditions. A doctor should be consulted if any of the following problems occur:

- Occasional fever
- Easily tired, lack of energy, weakness
- Loss of appetite
- Shortness of breath with activity
- Left sided abdominal pain with an enlarged spleen
- Excessive sweating
- Unusual weight loss
- Intolerance to warm temperatures
- Petechiae (Small purple, reddish spots under the skin)
- Pale skin secondary to anaemia (decreased red blood cells)
- Bone and joint pain
- Bleeding gums
- Enlarged lymph nodes

Sometimes CML does not cause any symptoms at all

### **WHAT YOUR DOCTOR CAN DO:**

- Diagnose disease by asking about your symptoms, performing a physical exam, and ordering laboratory blood tests (tests to measure blood cell counts and presence of Philadelphia chromosome)
- Check for swelling in body organs such as liver, spleen, and in lymph nodes under the arm, groin and neck.
- Order a bone marrow biopsy or aspiration (inserting a needle to remove a small sample of bone and/or liquid bone marrow); a spinal tap (checks cerebrospinal fluid for presence of leukaemia cells); and a chest X-ray.

- Prescribe antibiotics to fight infections and anti-nausea medicines to control treatment side effects.
- Recommend treatment for CML

### **PHILADELPHIA CHROMOSOME:**

Every cell in the body contains genetic material (DNA) that determines how the cell looks and acts. DNA is contained inside chromosomes. In CML, part of the DNA from one-chromosome moves to another chromosome. This change is called “Philadelphia chromosome”. It results in the bone marrow making an enzyme, called tyrosine kinase that causes too many stem cells to develop into white blood cells (granulocytes or blasts). The Philadelphia chromosome is not passed from parent to child.

### **HOW CML IS DIAGNOSED:**

- **Physical examination:** An examination of body to check general signs of health, including checking for signs of disease such as an enlarged spleen.
- **Medical history:** A medical history of the patient’s past illnesses and treatments is also taken.
- **Complete blood count:** The blood sample is checked for the following:
  - The number of red blood cells, white blood cells, and platelets.
  - The amount of haemoglobin (the protein that carries oxygen) in red blood cells.
- **Blood chemistry study:** A sample of blood is examined to measure the amounts of certain substances released into the blood by organs and tissues in the body. An abnormal amount of a substance can be a sign of disease in the organ or tissue that produces it.
- **Cytogenetic analysis:** A procedure in which the cells in a sample of blood are looked at for Philadelphia chromosome.
- **Bone marrow biopsy and aspiration:** The removal of a small piece of bone and bone marrow by inserting a needle into the hipbone or breastbone. A pathologist views the sample under a microscope to look for abnormal cells.

The treatment options and prognosis (chance of recovery) depend on patient’s age, phase of CML, amount of blasts in blood or bone marrow, size of spleen at diagnosis, and patient’s general health.

### **PHASES OF CHRONIC MYELOID LEUKEMIA**

Chronic myeloid leukaemia has 3 phases: –

- Chronic phase
- Accelerated phase
- Blastic phase

After chronic myeloid leukaemia has been diagnosed, tests are done to find out if the cancer has spread. The disease is classified by phase: – chronic phase, accelerated phase, or blastic phase. It is important to know the phase in order to plan the best treatment. As amount of blast cells increases in blood and bone marrow, there is less room for healthy white blood cells, red blood cells, and platelets. This may result in infections, anaemia, and easy bleeding, as well as bone pain and pain or fullness below the ribs on the left side. The amount of blast



cells in the blood and bone marrow and the severity of symptoms determine the phase of the disease.

**TREATMENT OPTIONS:** Treatment based on the phase of CML: –

- **Chemotherapy:** Anti-Cancer medications like Interferon Alfa, Ara-C, hydroxyurea, busulfan and Imatinib
- **Radiation:** Using high doses of X-rays to destroy abnormal cells
- **Bone Marrow Transplantation:** Destroying abnormal bone marrow with radiation or chemotherapy and replacing it with donor or patients own bone marrow
- **Surgery:** removal of spleen
- **Blood and/or blood product transfusions**

**Chemotherapy:** It is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing cells or by stopping the cells from dividing. Because some normal cells such as blood and hair can be affected, side effects can occur. Hydroxyurea, busulfan and cytosine arabinoside are commonly used drugs in CML. Their uses are limited due to availability of safer and more effective newer drug options.

**New drug:** Imatinib is a new type of cancer drug, called a tyrosine kinase inhibitor. It blocks enzyme, tyrosine kinase that causes stem cells to develop into more white blood cells (granulocytes or blasts) than the body needs. Imatinib has shown higher efficacy and safety in-patients with all phases of CML.

**Biologic therapy:** Substances made by the body or made in a laboratory are used to boost, direct, or restore the body's natural defences against cancer. Interferons are proteins that are produced naturally in our body in response to certain infections. A type of Interferon, Interferon Alfa helps body immune system to slow the growth of cancer cells. The side effects of interferon therapy include muscle aches, bone pain, headaches, tiredness, chills, fever, disorientation and sometimes-serious neurological problems.

**High-dose chemotherapy with stem cell transplantation:** It is a method of giving very high doses of chemotherapy and replacing blood-forming cells destroyed by cancer treatment. Stem cells (immature blood cells) are removed from blood or bone marrow of patient or a donor and are frozen for storage. After chemotherapy is completed, stored stem cells are thawed and given back to patient through an infusion. Over a short time, these reinfused stem cells grow into (and restore) the body's blood cells.

**Surgery:** Splenectomy is surgery to remove the spleen in patients with CML.

**WHAT YOU CAN DO:**

- See your doctor regularly to evaluate treatment with physical exams and periodic blood tests.
- Talk to your doctor about a well balanced diet including adequate protein sources.
- Take your anti-cancer medications as directed by your doctor. Report any unusual or persistent side effects to your doctor as soon as possible.



- Since most anti-cancer medications lower your resistance to infections, avoid crowded areas and people with colds or other infections.
- Protect yourself from cuts or other injuries. Bleeding is increased with leukaemia and anti-cancer medications.
- Perform good dental care and see your dentist regularly. Leukaemia and chemotherapy may increase and worsen bleeding as well as dental infections.
- Join a support group to share information and emotional support.

**WHAT YOU CAN EXPECT:**

- Early detection and treatment makes a significant difference in remission (no evidence of disease after treatment), cure and survival rates.
- Complications may include a relapse (return of cancer) and metastasis (spreading of cancer) to other organs and tissues.
- New drug therapies have increased remission rates and now offer alternative treatments to bone marrow transplants.