defenses against disease. Biological therapy is sometimes called biological response modifier therapy or immunotherapy.

**Surgery** — If the spleen is swollen, the doctor may remove it in a procedure called a splenectomy. This is only done in rare cases.

**Bone marrow transplantation** — Bone marrow transplantation is used to replace the patient’s bone marrow with healthy bone marrow. First, the immune system is weakened with chemotherapy and radiation therapy. Healthy blood cells are then taken from another person (a donor) whose tissue is the same as or almost the same as the patient’s. The donor may be a twin (the best match), a brother or sister, or a person who is not related. The healthy blood from the donor is given to the patient through a needle in the vein, and the blood replaces the leukemic blood. A bone marrow transplant using blood from a relative or person not related to the patient is called an allogeneic bone marrow transplant.

The overall goal of treatments for CLL are to slow the formation of CLL cells, keep patients feeling well enough to carry out everyday activities, and to protect patients from infection.

**What is the prognosis for patients with CLL?**
The chance of recovery (prognosis) depends on how the leukemia cells look under a microscope, the genetic make-up of the leukemia cells, how far the leukemia has spread, and the patient’s age and general health.

**Can CLL be prevented?**
At this time, there is no known way to prevent the disease.

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**Chronic Lymphocytic (Lymphoid) Leukemia (CLL)**

**What is leukemia?**
Leukemia is cancer—an abnormal, uncontrolled growth of cells that begins in the developing cells of the bone marrow, the soft, spongy tissue inside the large bones of the body where blood cells are formed. There are more than a dozen varieties of leukemia. The two main classifications of leukemia are myelogenous (myeloid) and lymphocytic (lymphoid), and each can be acute (progressing quickly) or chronic (progressing slowly). The four most common types of leukemia are:

- Chronic lymphocytic (lymphoid) leukemia
- Acute lymphocytic (lymphoid) leukemia
- Chronic myelogenous (myeloid) leukemia
- Acute myelogenous (myeloid) leukemia

**What is chronic lymphocytic leukemia?**
Chronic lymphocytic leukemia is a blood and bone marrow disease that usually progresses slowly. CLL is the most common type of leukemia in adults.

Chronic lymphocytic leukemia (CLL) is a disease in which too many underdeveloped infection-fighting white blood cells (called lymphocytes) are found in the body. Lymphocytes are made by the bone marrow and by other organs of the lymph system.

The bone marrow makes cells called blasts that develop (mature) into several different types of blood cells that have specific jobs within the body. Red blood cells carry oxygen and other materials to the tissues of the body, white blood cells fight infection, and platelets make the blood clot.

Lymphocytes are found in the lymph, which is a colorless, watery fluid present in the lymph vessels. The lymph vessels are part of the lymph system, which is made up of thin tubes that branch out, like blood vessels, into all parts of the body. Along the network of vessels are groups of small, bean-shaped organs called lymph nodes. Clusters of lymph nodes are found in the underarm, pelvis, neck and abdomen. The spleen (an organ in the upper abdomen that makes lymphocytes and filters old blood cells from the blood), the thymus (a small organ beneath the breastbone), and the tonsils (an organ in the throat) are also part of the lymph system.
Lymphocytes fight infection by making substances called antibodies, which attack germs and other harmful bacteria in the body. In CLL, the developing lymphocytes do not mature correctly and too many are produced while too few die. These lymphocytes are then found in the blood and the bone marrow. They also collect in the lymph tissues, making them swell. The extra lymphocytes may crowd out other blood cells in the blood and bone marrow. If the bone marrow cannot make enough red blood cells to carry oxygen, then anemia may develop. If the bone marrow cannot make enough platelets to make the blood clot normally, bleeding or bruising may occur more easily.

**What are the symptoms of CLL?**
CLL progresses slowly, and there may be no symptoms in its early stages. However, as the disease progresses, symptoms may begin to appear. Call your doctor if the following signs or symptoms appear:

- Fatigue
- Swollen lymph nodes
- Persistent weakness or tiredness
- Bleeding that occurs easily
- Loss of appetite and/or weight loss
- Abnormal bruising
- Excessive sweating, especially at night
- Fever and infection

**What causes CLL?**
At this time, the cause of CLL remains unknown.

**Who gets CLL?**
CLL usually occurs in:

- People 60 years of age or older.
- People with a family history of CLL or cancer of the lymph system
- People who have relatives who are Russian Jews or Eastern European Jews

**How is CLL diagnosed?**
If you have symptoms, your doctor will do a physical examination and may order blood tests to count the number of each of the different kinds of blood cells. More blood tests may be done if the results of the initial blood tests are not normal. Your doctor also may do a bone marrow biopsy. During this test, a needle is inserted into a bone (usually the hip bone), and a small amount of bone marrow is taken out and examined under a microscope. Your doctor can then tell what kind of leukemia is present and plan the best treatment.

If the doctor diagnoses CLL, more tests may be done to determine if the cancer cells have spread to other parts of the body. This is called staging. The stage of a disease—usually ranging from stage I to stage IV—gives an indication of how far the disease has spread.

**Stages of the Disease (Rai Classification System)**

- **Stage 0** — Too many lymphocytes in the blood without any other symptoms. This stage is indolent (slow-growing).
- **Stage I** — There are too many lymphocytes in blood and lymph nodes are enlarged.
- **Stage II** — Too many lymphocytes in blood, spleen or liver is enlarged and lymph nodes are larger than normal.
- **Stage III** — Too many lymphocytes, decreased red blood cells, and lymph nodes, liver, or spleen are enlarged.
- **Stage IV** — Too many lymphocytes, decreased platelets and red blood cells, and lymph nodes, liver or spleen may be enlarged.

**How is CLL treated?**
Treatment of CLL depends upon:

- The stage of the disease.
- Red and white blood cell counts (and platelet count).
- Presence of symptoms.
- Whether the liver, spleen or lymph nodes are enlarged.
- Whether CLL has recurred.

Different types of treatment are available for patients. Some are standard and some are being tested in clinical trials. Treatment for CLL may include one or more of the following:

- **Observation** — Monitoring the patient's condition without giving any treatment until symptoms appear.
- **Chemotherapy** — Chemotherapy uses drugs to kill cancer cells. Chemotherapy may be taken by pill, or it may be put into the body by a needle in a vein or muscle. Chemotherapy is called a systemic treatment because the drug enters the bloodstream, travels through the body and can kill cancer cells throughout the body.
- **Radiation therapy** — Radiation therapy uses X-rays or other high-energy rays to kill cancer cells and shrink tumors. Radiation for CLL usually comes from a machine outside the body (external radiation therapy).
- **Treatment of complications** — This involves treating the complications of leukemia, such as infection.
- **Biological therapy** — Biological therapy tries to get the body to fight cancer. It uses materials made by the patient’s body or made in a laboratory to boost, direct or restore the body's natural