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MCL basics

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Mantle cell lymphoma is a rare but treatable cancer of white blood cells that can develop in lymph nodes or other parts of your body. It's often a fast-growing cancer, but new treatments every year are giving people more hope and more years to live.

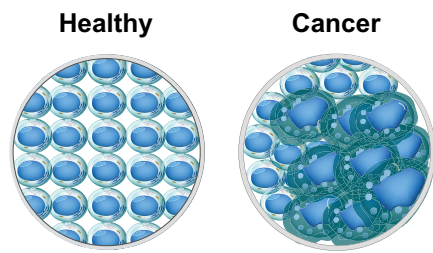
What is mantle cell lymphoma?

Mantle cell lymphoma (MCL) is cancer that develops from certain white blood cells called lymphocytes. Lymphocytes normally protect the body from infection. An abnormal growth of lymphocytes is a form of cancer called a lymphoma. A lymphoma commonly affects the lymph system but it can also affect other parts of the body.

What is the lymph system?

The lymph system is part of the immune (infection-fighting) system. The lymph system transports fluids to the bloodstream and fights germs. It's made up of lymph, lymph nodes, and other organs.

Lymph is a fluid that contains germ-fighting lymphocytes. Lymph nodes (sometimes called "glands") are small, bean-shaped structures. Hundreds of lymph nodes are located throughout your body. As lymph fluid travels through the body, lymph nodes catch and filter



What is cancer?

Cancer is a disease where cells—the building blocks of the body—grow out of control. This can end up harming the body. There are many types of cells in the body, so there are many types of cancers.

Cancer cells don't behave like normal cells. Cancer cells develop genetic errors that cause them to make many more cancer cells. The cancer cells crowd out and overpower normal cells.

Cancer cells avoid normal cell death. They also can spread far through blood vessels or lymphatic vessels to other areas of the body. They can replace many normal cells and cause organs to stop working.

Scientists have learned a great deal about cancer. As a result, today's treatments work much better than treatments in the past. Also, many people with cancer have more than one treatment choice.

out foreign particles and harmful cells. Lymph nodes are usually clustered in groups in your neck, chest, armpits, groin, pelvis, and along your gut. The spleen, tonsils, and thymus are also part of the lymph system.

When you get an infection, an army of lymphocytes fills up your lymph nodes to fight the germs. That's why the lymph nodes in your neck feel swollen when you have a cold, flu, or sinus infection.

What is a mantle cell?

A mantle cell is a type of B cell inside lymph nodes.

Inside each lymph node are little round clumps of cells called follicles which play a key role in the immune system. Follicles contain mostly B cells, a type of lymphocyte that fights bacteria, viruses, and other pathogens. When a foreign substance enters the lymph node, these cells spring into action to break up the substance and get rid of it.

As part of this process, many of the follicle cells group together into something like a boxing ring, called the germinal center. Inside the germinal center, the cells attack the foreign substance. Other follicle cells form a circle around the germinal center, like an audience surrounds the boxing ring. This outside area is called the mantle zone. Mantle cell lymphoma arises from B cells in this region of the lymph node.

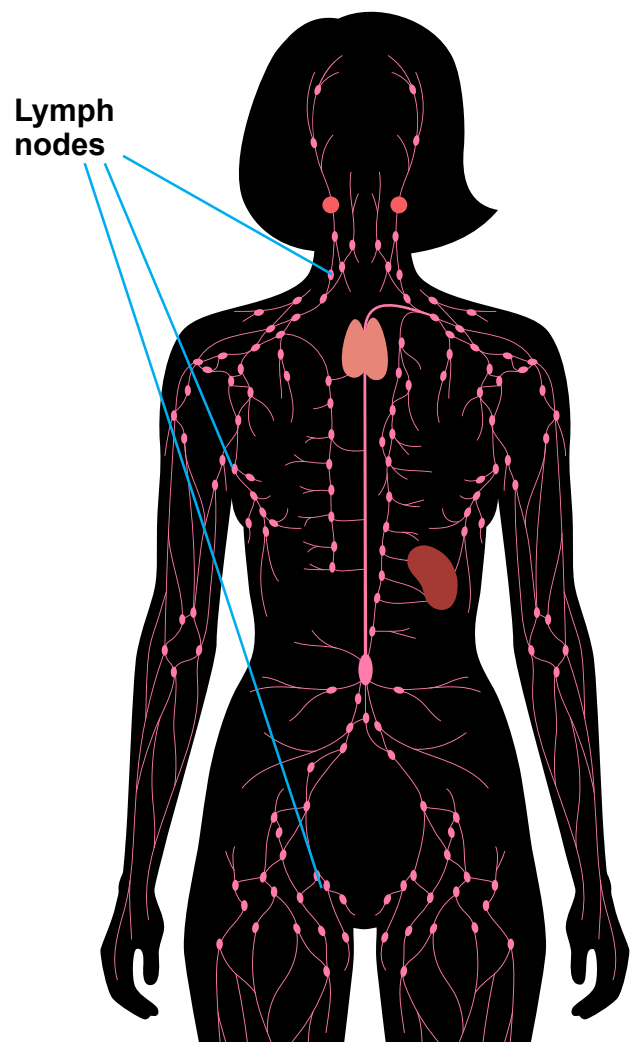
What causes mantle cell lymphoma?

Like many cancers, researchers aren't sure what causes some people to develop this type of lymphoma. In most people, no specific cause can be identified.

MCL occurs when lymphocytes develop a genetic change that causes them to start

Lymph nodes

There are hundreds of small bean-shaped structures throughout the human body called lymph nodes. Lymph nodes catch and filter out foreign particles and harmful cells, including cancer cells. Groups of lymph nodes are clustered in your neck, chest, armpits, groin, pelvis, and along your gut. Together, they form the lymph system.



overproducing a protein called cyclin D1. This protein stimulates these altered cells to grow out of control and become lymphoma cells. No one knows exactly what causes the mantle zone cells to develop this genetic change, but researchers are working on it.

How common is mantle cell lymphoma?

MCL is rare. It occurs in about 1 out of 200,000 people each year in the United States. MCL is most frequently found in older adults—the average age at diagnosis is in the mid-60s.

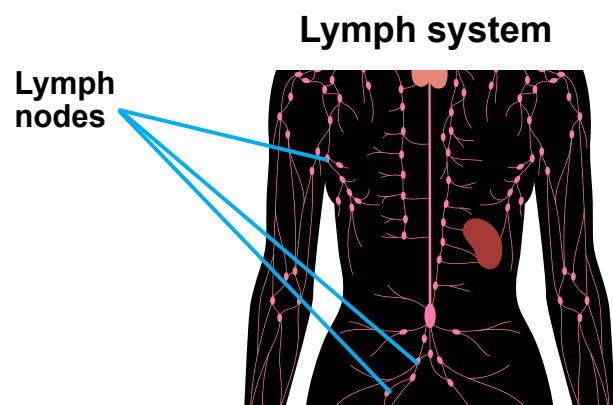
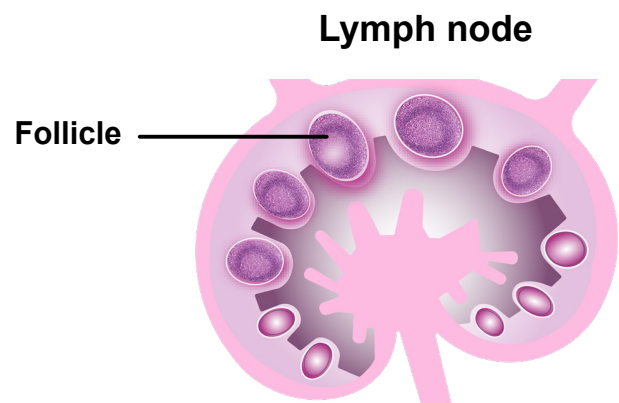
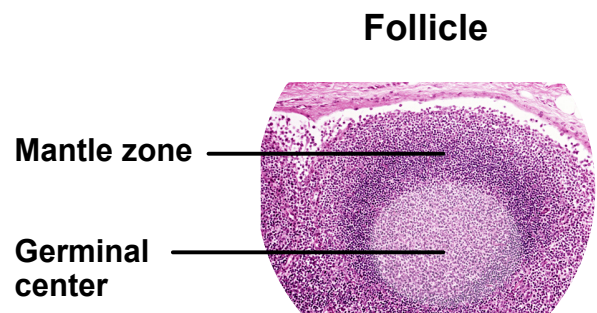
MCL is one of more than 70 different types of lymphomas. These are divided into two categories: Hodgkin lymphoma and non-Hodgkin lymphoma. MCL is a subtype of non-Hodgkin lymphoma that's less common than most other subtypes.

MCL usually grows quickly over weeks to months. Doctors describe quick-growing cancers as “aggressive.” However, for some people, MCL grows slowly. Cancer that grows slowly is referred to as “indolent.” As a result of these differences, each person should have individualized care and attention to their symptoms and test results to determine the best plan of action.

It's important to identify your specific type of lymphoma to make sure you get the right care and treatment.

Where is the mantle zone?

In the same way that an audience surrounds a boxing ring, the mantle zone surrounds the germinal center of a follicle, which is a clump of cells inside a lymph node.



How is mantle cell lymphoma identified?

Mantle cell lymphoma is often discovered when a person has painless, swollen lymph nodes in the neck, armpit, or groin. The lymph nodes swell up because of the overgrowth of lymphoma cells. The medical term for swollen lymph nodes is called lymphadenopathy. Other symptoms may include fever, drenching sweats at night, unexpected weight loss, fatigue, and stomach upset or pain.

Besides the lymph nodes, MCL is commonly found in the spleen, liver, bone marrow, blood stream, and gastrointestinal (GI) tract. The GI tract is made up of the stomach, intestines, and other organs that help digest food.

MCL is usually found in multiple parts of the body when it's first diagnosed. This is referred to as advanced disease. In rare cases, MCL may be limited to a smaller area. This is referred to as localized disease. Advanced disease and localized disease are treated differently. Multiple tests—like blood tests, genetic tests, and imaging scans—are needed to make sure it's MCL and not another disease or other type of cancer. These tests also find out how widespread the lymphoma is.

Because MCL is a less common form of lymphoma, it can sometimes be difficult to diagnose and treat. If possible, seek out a medical center that specializes in lymphomas. You can also ask for a second opinion.



What does aggressive mean?

When medical professionals describe cancer as aggressive, they mean the cancer is growing or spreading more quickly than average.

Aggressive is also used to describe a treatment that's stronger or more intense than usual.

Can mantle cell lymphoma be cured?

MCL is usually a lifelong disease. But treatment can slow down its growth, reduce its symptoms, and prolong your life. For many people, treatment can put MCL into remission. Remission means there are no symptoms or signs of cancer. Remission may last for months or years. Often, MCL comes back and needs more or stronger treatment.

Treatments for MCL include chemotherapy, immunotherapy, targeted therapy, radiation therapy, stem cell transplant, cellular therapy, or a combination of these treatments.

Key points

- A lymphoma develops when infection-fighting lymphocytes multiply and grow out of control.
- Mantle cell lymphoma (MCL) is a cancer that develops from lymphocytes in the lymph system. The lymph system transports fluids to the bloodstream and helps kill germs in the body.
- MCL is a lymphoma of B cell lymphocytes. It forms in B cells from the mantle zones of lymph nodes. It can also develop in the spleen, liver, GI tract, and bone marrow.
- MCL is one of more than 70 different types of lymphomas. MCL is a less common type of non-Hodgkin lymphoma.
- MCL is often discovered when a person has painless, swollen lymph nodes in the neck, armpit, or groin. Other common symptoms of MCL include fevers and night sweats.
- MCL is usually diagnosed as an advanced lymphoma where the disease has developed in several areas of the body.
- MCL is usually an aggressive disease, which means it can grow quickly. However, some people have a slow-growing (indolent) type of the disease.
- MCL can sometimes be difficult to diagnose and treat. Seek out a medical center that specializes in lymphomas, if possible. Also, ask for a second opinion.
- MCL is usually a lifelong disease, but it can be treated and controlled. Often, it comes back and needs more treatment.



Try to remember that everyone's journey is different. Your physiological, mental, emotional, and spiritual response is unique.”

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Testing for MCL

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If you haven't been diagnosed yet, you'll need several medical tests before you receive treatment. Some tests look at your general health. Other tests are for diagnosing your illness. These tests also help doctors figure out whether you need treatment and what type of treatment is best for you.

A variety of tests are needed to find out if you have cancer and to determine how far the cancer has grown. Tests are used to plan treatment and to check how well treatment is working. If you haven't already been diagnosed, this chapter will help you know what tests you may have and what to expect during testing. Bring someone with you to listen, ask questions, and write down the answers.

Health history

Your doctors need to have all of your health information. They'll ask you about any health problems and treatments you've had. A complete report of your health is called a medical history. Medical history, health exams, and other health tests that are used to diagnose MCL and prepare for treatment are listed in **Guide 1**.

Medical history

Your doctor will ask about any health problems and treatments you've had during your lifetime. When you meet with your cancer doctors, be ready to talk about:

- Illnesses
- Injuries
- Health conditions
- Symptoms
- Medications and supplements

MCL can cause “B symptoms.” Let your doctor or care provider know if you have any of these B symptoms:

- Fevers
- Heavy sweating at night
- Unexplained weight loss

MCL may also affect your gastrointestinal (GI) tract and bone marrow. GI symptoms occasionally occur. These may include diarrhea, bloody stools, and pain in your abdomen.

Family history

Some cancers and other health conditions can run in families—although very few people with lymphoma have close relatives who also had it. Be prepared to discuss the health problems of your close relatives, especially your brothers and sisters, parents, and grandparents.

Physical exam

A physical exam of your body is done to look for signs of disease. It's also used to help assess what treatments may be options for you.

Checking for swelling

Certain parts of your body should be checked for swelling. Swelling of lymph nodes (lymphadenopathy) is often the first sign of MCL. Lymph nodes may be so swollen that they can be easily felt or seen under the skin. Your doctor will gently press on the areas of

your body that have lymph nodes, such as your neck, armpits, and groin. Your doctor will also feel your spleen and liver to assess their size.

Daily activities ability

Your doctor or health care provider will also rate your overall health and ability to do basic daily activities like walking, cleaning, bathing, and so forth. This is known as performance status. Doctors do this to help find the best treatment suited for you.

Guide 1

Health exams and tests before cancer treatment

Health history and exams	<ul style="list-style-type: none"> • Medical history, including B symptoms • Physical exam, including lymph nodes, liver, and spleen • Ability to do daily activities (performance status)
Blood tests	<ul style="list-style-type: none"> • Complete blood count (CBC) with differential • Comprehensive metabolic panel • Lactate dehydrogenase (LDH) • Uric acid • Beta-2 microglobulin
Infectious disease tests	<ul style="list-style-type: none"> • Hepatitis B test • Hepatitis C test
Imaging	<ul style="list-style-type: none"> • CT or PET/CT scans of chest, abdomen, pelvis (and neck, if needed) with contrast
Heart tests	<ul style="list-style-type: none"> • Echocardiogram or MUGA scan, if certain chemotherapy is planned
Biopsies	<ul style="list-style-type: none"> • Lymph node biopsy • Bone marrow biopsy with or without aspiration, if needed • Endoscopy or colonoscopy, if needed • Lumbar puncture, if needed

Blood tests

MCL can cause abnormal blood counts. Doctors test blood to look for this and other signs of disease. Blood tests are also used to learn when treatment should begin. A sample of your blood is removed with a needle inserted into a vein. This is called a blood draw.

Tests that may be done with your blood sample include:

CBC with differential

A complete blood count (CBC) measures parts of the blood. Test results include measurements of white blood cells, red blood cells, and platelets. Cancer and other health problems can cause low or high counts.

There are five types of white blood cells. A “differential” counts the number of each type of white blood cell. It also checks if the cell counts are in balance with each other.

Comprehensive metabolic panel

Your liver, bone, and other organs release chemicals into your blood. A comprehensive metabolic panel includes tests for up to 14 of these chemicals. The tests show if the levels of chemicals are too low or high. Abnormal levels can be caused by cancer or other health problems.

LDH

High levels of the protein lactate dehydrogenase (LDH) can be caused by cancer or other health problems. If related to lymphoma, high levels of LDH may be a sign that treatment may be needed soon.

Beta-2 microglobulin

High levels of beta-2 microglobulin can be caused by cancer as well as other health problems, like kidney disease.

Swollen glands

Swelling of lymph nodes (such as the “glands” in your throat) is often one of the first signs of mantle cell lymphoma. Lymph nodes may be so swollen that they can be easily felt or seen under the skin. Your doctor will gently press on the areas of your body that have lymph nodes, such as your neck, armpits, and groin.



Uric acid

Uric acid is released by cells when DNA breaks down. You may have a high level of uric acid before starting treatment. Levels can be high due to fast-growing cancer, kidney disease, or other health problems.

Hepatitis test

Some types of cancer treatments can weaken your immune system. This increases your chance of getting infections. Hepatitis B and hepatitis C infections in particular can become active again from certain cancer therapies. So, it's important to be tested for hepatitis viruses.

Biopsies

The only way to be sure that you have cancer is to test fluid or tissue for cancer cells. A biopsy is a procedure that removes a sample of fluid or tissue for testing. There are several types of biopsies.

Lymph node biopsy

For B-cell lymphomas like MCL, experts from NCCN advise getting an incisional or excisional biopsy of the lymph node(s). These biopsies remove lymph node tissue through a cut into your skin.

In certain situations, a core needle biopsy may be necessary if the lymph node is difficult to get to. For a core needle biopsy, the doctor (usually a radiologist) uses CT or ultrasound imaging to guide a long, hollow needle to obtain a sample of the lymph node tissue.

Bone marrow biopsy

MCL can develop in bone marrow, which is part of the lymph system. A bone marrow

Biopsy

A lymph node biopsy is a minor surgical procedure to remove a part or a whole lymph node. In this photo, the doctor is using an ultrasound monitor to locate the area in the body to be biopsied. After the procedure, the biopsy sample is tested to find out if it has cancer cells.



biopsy removes a core of bone and soft bone marrow. A bone marrow aspiration removes liquid bone marrow. Both procedures may be done at the same time. The samples will be sent to a lab for cancer testing.

GI biopsy

Compared with other types of lymphoma, MCL is more likely to involve the GI tract. To see inside the GI tract, doctors use procedures called endoscopy and colonoscopy. A device called an endoscope is used in the upper GI tract. A device called a colonoscope is used in the lower GI tract. Samples of tissue that may have cancer will be removed and tested.

Lumbar puncture

A lumbar puncture is a procedure that removes a sample of spinal fluid. It's also called a spinal tap. Your doctor may suspect that the cancer is in spinal fluid based on symptoms or the cancer type.

Imaging

Imaging makes pictures of the insides of your body. It's used to detect cancer in deep lymph nodes, organs, bone marrow, and other parts of the body. It provides useful information to determine the extent of cancer involvement.

PET/CT

Positron emission tomography (PET) and computed tomography (CT or CAT scan) are two types of imaging. When used together, they're called a PET/CT scan. The PET/CT scan is used to image your whole body.

Some cancer centers have one machine that does both tests at the same time.

- **PET scan** shows where your lymphoma has spread. A PET scan requires injecting a substance called a radiotracer into your bloodstream. The radiotracer is detected with a special camera during the scan. It highlights cells that may be cancerous. Afterward, the radiotracer is passed out of your body in your urine.

PET/CT scan

This is a PET/CT scanner. Imaging instruments, like this one, can show what's going on inside your body. During the scan, you lie down on a table that moves into the tunnel of the machine. The scan can detect even small amounts of cancer.



- **CT scan** uses x-rays to take many images of your body from different angles. A computer then combines the pictures to make a 3-D image. A CT scan of your chest, belly area, and between your hip bones is needed to help diagnose MCL. You may also need a CT of your neck to look for cancer in lymph nodes. Sometimes a contrast agent (also called contrast dye) is used to make the pictures clearer. Contrast is injected into the bloodstream and flushed out in urine. The contrast may cause you to feel flushed or get hives. Rarely, serious allergic reactions occur. Tell your doctor or the technician if you've had reactions to contrast in the past.

Diagnostic tests

Cancers of blood cells, like MCL, can be difficult to tell apart. Diagnostic tests reveal which cancer you have.

For these tests, your blood and tissue samples are sent to a laboratory. At the laboratory, a doctor called a hematopathologist tests the samples to look for signs (markers) of MCL. Hematopathologists are experts at diagnosing cancers of blood cells.

Two tests they use are protein tests and molecular tests.

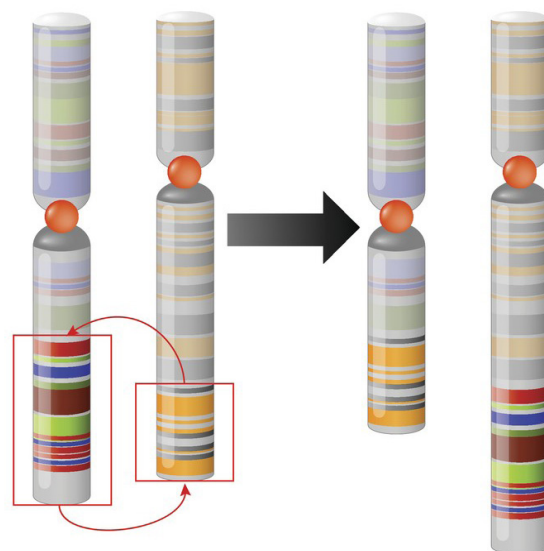
Protein tests

The hematopathologist will test your samples to look for proteins on the surface and inside of cancer cells. The hematopathologist looks for common patterns of proteins—like a “signature”—in the sample. Finding, or not finding, these proteins can reveal the type of cancer.

For example, MCL cells have high levels of a protein called cyclin D1, as well as CD5, CD20, and other specific proteins. On the other hand, the proteins CD200 and LEF1 are usually missing in MCL. So, a sample that contains the first group of proteins but doesn't

Translocation

A translocation means that parts of two chromosomes are switched. The translocation in mantle cell lymphoma occurs when the bottom of chromosome 11 switches places with the bottom of chromosome 14. This leads to an increase in cyclin D1, a protein that helps control the cell cycle. The presence of too much cyclin D1 is one of the key features of MCL.



contain the second two proteins suggests a diagnosis of MCL.

Similarly, tests show that most people with typical MCL produce the SOX11 protein. On the other hand, having a low or absent level of the SOX11 protein may indicate slow-growing (indolent) MCL.

Ki-67 is another protein that's important in MCL. High levels of Ki-67 are linked to a type of MCL that grows quickly.

The hematopathologist will also look at your cells under a microscope to find any visible abnormalities. For instance, large, rapidly-dividing cells may indicate a rare subtype of MCL called blastoid variant. This MCL subtype may be seen at diagnosis or appear later on. The blastoid variant grows faster and is more difficult to treat than typical MCL.

Molecular tests

Genes and chromosomes contain the instructions to make cells work and to make new cells. Abnormal changes in genes and chromosomes can lead to lymphoma. Sometimes it helps to test for these changes. The results can be used for diagnosis and prognosis.

Most MCL cells are known to have a specific change, called a translocation, in their chromosomes. A translocation means that parts are switched between two chromosomes. The MCL translocation occurs when a part of chromosome 14 trades places with a part of chromosome 11. This translocation is what causes cells to make too much cyclin D1, a protein that helps control the cell cycle. Too much of this protein leads to the development of MCL. Using biopsy samples, the hematopathologist can test the chromosomes

Diagnosis vs. Prognosis

What's the difference between your diagnosis and your prognosis? These two words sound alike but they're very different.

Diagnosis: The identification of an illness based on tests. The diagnosis names what illness you have.

Prognosis: The likely course and outcome of a disease based on tests. The prognosis predicts how your disease will turn out.

in your cells to find out if you have this genetic abnormality.

Other changes are also involved in MCL. Certain abnormal changes in genes can affect how well the cancer is likely to respond to treatment. So it may be useful to test for certain genes that have abnormal changes. In particular, an abnormal change in the *TP53* gene is linked to faster-growing MCL and poor results with standard cancer treatment.

Heart tests

Some cancer treatments can damage your heart. To plan treatment, your doctor may test how well your heart pumps blood. You may get an echocardiogram or multigated acquisition (MUGA) scan. An echocardiogram uses sound waves to make pictures of your heart. A MUGA scan makes pictures using a radiotracer and special camera.

Fertility and pregnancy

Some cancer treatments may affect your ability to conceive or bear children. However, options are available. Sperm can be frozen and stored in a sperm bank until after cancer treatment. Eggs can be removed from ovaries and stored for later use. Discuss your thoughts and preferences with your doctors.

Some cancer treatments can harm an unborn baby. If you might be pregnant now, get a pregnancy test before your treatment. Also, take steps to avoid getting pregnant or causing a pregnancy during treatment. Your doctors can tell you which birth control methods are best to use.



Report any unusual feelings of sadness, loss of interest in activities, anxiety, and sleep problems to your doctor. Many people experience these feelings, and they should not go untreated.”

Tips for testing

Results from blood tests, imaging studies, and biopsies will be used to determine your treatment plan. It's important you understand what these tests mean. Ask questions and keep copies of your test results. Online patient portals are a handy way to access your test results.

Follow these tips for testing:

- Bring someone with you to doctor visits, if possible.
- Write down questions and take notes during appointments. Don't be afraid to ask your care team questions. Get to know your care team and help them get to know you.
- Get copies of blood tests, imaging results, and reports about the specific type of cancer you have.
- Organize your papers. Create files for insurance forms, medical records, and test results. You can do the same on your computer.
- Keep a list of contact information for everyone on your care team. Add it to your phone. Hang the list on your refrigerator or keep it in a place where someone can access it in an emergency. Keep your primary care physician informed of any changes.

Key points

- Your health care provider will ask you about any health problems and treatments you've had in your lifetime.
- Fevers, night sweats, or weight loss without dieting can be symptoms of MCL.
- Your provider will check the size of your lymph nodes, spleen, and liver.
- You'll be rated on your ability to do everyday activities. This is used to assess whether certain treatments are good options for you.
- Blood tests will be done to look for signs of cancer and other health problems.
- A biopsy is the only way to be sure that you have mantle cell lymphoma. Other types of biopsies may also be needed.
- Imaging tests allow your care providers to look inside your body to find signs of cancer. Imaging also shows where the cancer is located.
- Protein tests identify a signature-like pattern of proteins that can reveal whether you have MCL or another type of lymphoma.
- Molecular tests can find certain genetic changes that may confirm the diagnosis and help understand your prognosis.
- You may undergo heart tests to see if you're healthy enough to have certain cancer treatments.
- Some cancer treatments can harm an unborn baby. If you might be pregnant, get a pregnancy test before treatment.



What is high-risk MCL?

People who have an abnormal change in the *TP53* gene have a high-risk type of mantle cell lymphoma. Having this genetic alteration means there's a greater risk for aggressive, fast-growing lymphoma. Standard cancer treatments don't work as well against this type of MCL, so there's a greater likelihood for poor results.

Experts strongly recommend that people with this type of high-risk MCL join an appropriate clinical trial.

3

MCL treatment options

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There isn't one single recommended treatment for MCL—there are many treatment options. You and your doctors will work together to figure out the best treatment for you.

Treatment decisions are based on different factors such as your age, level of fitness (performance status), and overall health. Often the most important factor is the extent of the cancer. Doctors classify this by cancer stage.

Cancer stage

A cancer stage is a number that stands for the extent of cancer in the body. For mantle cell lymphoma (MCL), the extent of cancer depends on its locations. A lower number means fewer areas of cancer development in the body and a higher number means more. This number is based mostly on the results from your biopsies, blood tests, and imaging.

Doctors use a specific rating system for most lymphomas. This system includes four stages. For treatment purposes, the stages are often grouped together like this:

Stage 1 and stage 2 refer to the early stages of MCL. These cancers haven't progressed to many locations in the body. MCL is rarely diagnosed at these stages. For more information about stage 1 and stage 2 mantle cell lymphomas, see Chapter 5.

Stage 3 and stage 4 are advanced stages of MCL. In these stages, the lymphoma occurs in lymph nodes in several areas in the body. It

may also be found in the spleen, bone marrow, or other organs. Almost all people with MCL are diagnosed when the cancer has reached these stages.

Treatment options for advanced MCL are partly based on how fast the cancer is growing. Advanced MCL is described as aggressive (fast growing) or indolent (slow growing). Most people who are diagnosed with advanced MCL have the aggressive kind.

Treatment types

Treating MCL includes treatment of the cancer and support for you.

MCL can be thought of as an ongoing (chronic) disease. So, the aim of treatment is to reduce symptoms, control the cancer, get the lymphoma into remission, and extend life. Researchers are always testing new treatments. Newer treatments are helping people with MCL live longer with fewer health problems than before.

Not everyone receives the same treatment. Also, some people can handle more intense treatment while others cannot. Your doctor will tailor your treatment based on the tests described in Chapter 2.

Current types of treatment include:

Chemoimmunotherapy

This treatment combines the use of chemotherapy and immunotherapy. These treatments used together are often more effective than both treatments used separately.

Chemotherapy uses drugs to damage and destroy rapidly dividing cells, like cancer cells. Chemotherapy harms healthy cells, too. That's why chemotherapy can cause side effects.

Some chemotherapy drugs are given through an intravenous (IV) infusion into a vein in your arm or another part of your body. Other chemotherapy drugs can be taken as a pill.

Chemotherapy is given in treatment cycles. One cycle is made up of a few treatment days followed by a period of rest. This lets the body recover before the next cycle. One cycle is often 3 or 4 weeks long. However, the cycle schedule varies depending on which drugs are used.

Immunotherapy consists of medicines that are based on antibodies. Antibodies are natural proteins of the immune system. They help your body fight germs and other threats.

Antibodies can also be made in a lab. These antibodies are designed to treat specific types of cancer. Rituxan (rituximab) is a monoclonal antibody treatment for MCL. It recognizes and attaches to a specific protein (CD20) that's found on the surface of most B cells.

Rituximab marks these cells so that your immune system can find and destroy them. Rituxan is given through an IV.

For chemoimmunotherapy, some regimens are intense and some are less intense. Good results can be achieved with both types of regimens. Intense regimens have more risk of side effects, so they aren't often given to older adults or those with other health problems.

Corticosteroids

Corticosteroids (steroids) are drugs that are often used to reduce swollen lymph tissue. Prednisone and dexamethasone are the two main corticosteroids used for lymphoma treatment. They're included in some chemoimmunotherapy regimens. They may be given as a pill, a liquid, or an IV injection. (These are not the same kind of steroids that bodybuilders use to get big muscles.)

Chemoimmunotherapy

Chemoimmunotherapy combines chemotherapy and immunotherapy treatments. These treatments used together are often more effective than both treatments used separately.

Some chemotherapy drugs are given through an intravenous (IV) infusion into a vein in your arm. This patient is receiving chemotherapy through a subcutaneous IV access port in the upper chest.



Targeted therapy

Targeted therapy drugs attack certain cancer cells to slow their growth and spread. Targeted therapy harms normal cells less than chemotherapy does.

There are three main targeted therapies for MCL:

- **Kinase inhibitors.** Kinases are enzymes with many cell functions. A kinase called Bruton's tyrosine kinase (BTK) helps cancerous B cells develop and grow. Drugs that block BTK can reduce the number of new MCL cells that are made. These drugs, called BTK inhibitors, include Imbruvica (ibrutinib), Calquence (acalabrutinib), Brukinsa (zanubrutinib), and Jaypirca (pirtobrutinib). BTK inhibitors are oral medicines given as capsules or tablets.
- **BCL-2 inhibitors.** BCL-2 is a protein inside of B cells that helps prevent cell death. BCL-2 can build up in cancer cells and save them from dying. Venclexta (venetoclax) is a drug that blocks the effect of BCL-2. This allows the cancer cells to self-destruct. Venclexta is given as a pill. It's currently in clinical trials for treating MCL.
- **Proteasome inhibitors.** Velcade (bortezomib) is a drug that targets proteasomes inside cancer cells. Proteasomes are sometimes called the cell's "garbage disposal" because they grind up and get rid of the cell's waste. Velcade halts the proteasomes from working. This causes a pile-up of waste within the cancer cell, which can poison and kill it. Velcade is given through an IV into a vein or under the skin.



What is a regimen?

A regimen is a plan that defines the dosage, schedule, and duration of a treatment. Regimens for MCL often include multiple drugs.

Immunomodulators

Immunomodulators are drugs that are used in cancer care to boost the immune system. Revlimid (lenalidomide) is an immunomodulator that's used to treat MCL. It's given as a capsule. Other drugs, like Rituxan and Imbruvica, may be used with Revlimid.

Observation

In some cases, no treatment is the right treatment. For MCL, this may be the case with slow-growing, indolent MCL that isn't causing any symptoms. While treatment may not be necessary, having regular tests and visits is recommended to see if the cancer begins to grow. This is why it's called observation. If symptoms begin, treatment will also begin.

Radiation therapy

Radiation therapy uses high-energy x-rays to treat MCL. The x-rays damage the DNA in cancer cells. This either kills the cancer cells or stops new cancer cells from being made.

A very focused type of radiation, involved-site radiation therapy (ISRT), is used for MCL that's confined to a limited area. ISRT targets only the lymphoma in the lymph node or affected area while avoiding the surrounding areas. This reduces many of the side effects of regular radiation therapy.

Radiation therapy may also be used for MCL that comes back after treatment (relapse).

Stem cell transplant

A stem cell transplant replaces unhealthy, damaged, or destroyed stem cells with healthy stem cells. The healthy stem cells form new bone marrow and new blood cells.

A stem cell transplant is an intense treatment. So, it may not be part of your plan. (If it is, it helps to plan ahead: Ask your doctor for a referral to the transplant center early on. Switching from chemoimmunotherapy to the transplant may go more smoothly.)

There are two types of stem cell transplants:

- ▶ **An autologous transplant** is also called high-dose therapy with autologous stem cell rescue (or HDT/ASCR). First, many of your healthy stem cells will be removed and stored for later. Next, you'll receive high doses of chemotherapy to destroy the cancer cells. Chemotherapy will also wipe out the blood-producing cells in the bone marrow. Your healthy stem cells will then be returned to your body to "rescue" your bone marrow.
- ▶ **An allogeneic transplant** uses healthy stem cells from a donor. You'll first receive treatment, called conditioning, to eliminate as much cancer as possible and help prevent your body from rejecting the transplanted cells. Next, you'll receive the

donor cells, which will form new, healthy bone marrow and a new immune system. The new immune system will then attack cancer cells that weren't killed by earlier treatment. An allogeneic stem cell transplant is only used in certain cases for MCL treatment.

CAR T-cell therapy

This treatment may be used if chemoimmunotherapy and targeted therapy aren't enough to halt the cancer. Chimeric antigen receptor (CAR) T-cell therapy is a treatment made from your own T cells. T cells are lymphocytes that hunt and destroy cancer cells, infected cells, and other damaged cells. However, cancer cells learn how to hide from your T cells, which allows the cancer to grow. CAR T-cell therapy reprograms your natural T cells to recognize and target cancer cells.

First, your own T cells are removed from your body using a special machine. A CAR is added to your T cells in a laboratory. This genetically alters the T cells to hunt specifically for cancer cells. The CAR T cells are infused back into your body where they find and kill MCL cells.

CAR T-cell therapy may be a way to accomplish the same results as an allogeneic transplant but without some of the long-term side effects. CAR T-cell therapy is a fairly new treatment for MCL. So, more research is needed to learn about its effectiveness and its long-term side effects.

Clinical trials

Therapy may also be given as part of a clinical trial. A clinical trial is a type of medical research study. Clinical trials are a key way to assess new treatment approaches. After being developed and tested in a laboratory, potential new ways of fighting cancer need to be studied in people. If found to be safe and effective in a clinical trial, a drug, device, or treatment approach may be approved by the U.S. Food and Drug Administration (FDA).

Everyone with cancer should carefully consider all the treatment options available for their cancer type, including standard treatments and clinical trials. Talk to your doctor about whether a clinical trial may make sense for you.

Phases

Most cancer clinical trials focus on treatment. Treatment trials are done in phases.

- **Phase 1 trials** study the dose, safety, and side effects of an investigational drug or treatment approach. They also look for early signs that the drug or approach is helpful.
- **Phase 2 trials** study how well the drug or approach works against a specific type of cancer.
- **Phase 3 trials** test the drug or approach against a standard treatment. If the results are good, it may be approved by the FDA.
- **Phase 4 trials** study the long-term safety and benefit of an FDA-approved treatment.



Finding a clinical trial

In the United States

NCCN Cancer Centers

[NCCN.org/cancercenters](https://www.nccn.org/cancercenters)

The National Cancer Institute (NCI)

[cancer.gov/about-cancer/treatment/clinical-trials/search](https://www.cancer.gov/about-cancer/treatment/clinical-trials/search)

Worldwide

The U.S. National Library of Medicine (NLM)

clinicaltrials.gov/

Need help finding a clinical trial?

NCI's Cancer Information Service (CIS)

1.800.4.CANCER (1.800.422.6237)

[cancer.gov/contact](https://www.cancer.gov/contact)

Who can enroll?

Every clinical trial has rules for joining, called eligibility criteria. The rules may be about age, cancer type and stage, treatment history, or general health. These requirements ensure that participants are alike in certain ways in order to compare how they respond to a specific treatment.

Informed consent

Clinical trials are managed by a group of experts called a research team. The research team will review the study with you in detail, including its purpose and the risks and benefits of joining. All of this information is also provided in an informed consent form. This is an agreement that confirms you've been fully told about your part in the trial. Read the form carefully and ask questions before signing it. Take time to discuss it with family, friends, or others you trust. Keep in mind that you can leave and seek treatment outside of the clinical trial at any time.

Start the conversation

Don't wait for your doctor to bring up clinical trials. Start the conversation and learn about all your treatment options. Ask if a clinical trial is available for your situation. If you find a study that you may be eligible for, ask your treatment team if you meet the requirements. If you have already started standard treatment, you may not be eligible for certain clinical trials. Try not to be discouraged if you cannot join. New clinical trials are always becoming available.

Frequently asked questions

There are many myths and misconceptions surrounding clinical trials. The possible benefits and risks are not well understood by many with cancer.

Will I get a placebo?

Placebos (inactive versions of real medicines) are almost never used alone in cancer clinical trials. It's common to receive either a placebo with a standard treatment or a new drug with a standard treatment. You'll be informed if a placebo is part of a clinical trial before you enroll.

Are clinical trials free?

There's no fee to enroll in a clinical trial. The study sponsor pays for research-related costs, including the study drug. You may, however, have costs indirectly related to the trial, such as the cost of transportation or childcare due to extra appointments and the costs of routine patient care during the trial. Depending on the trial, you may continue to receive standard cancer care. The standard therapy is billed to—and often covered by—insurance. You're responsible for copays and any costs for this care that aren't covered by your insurance.



A common myth is that palliative care is only for terminally ill patients. They are so much more! It is worth reaching out to palliative care in your hospital or clinic. They treat the whole patient, not just cancer.”

Supportive care

Supportive care (sometimes called palliative care) is health care that relieves symptoms caused by cancer or by its treatment. Supportive care aims to improve your quality of life.

Supportive care is important at any stage of cancer, not just at the end of life. In fact, people who start supportive care when they begin treatment tend to have improved outcomes and better quality of life.

Supportive care addresses many needs: relieving symptoms, preventing or lessening treatment side effects, and providing emotional or spiritual support, financial aid, or family counseling. Supportive care can help with making treatment decisions. It can also assist with coordinating care between health providers. Supportive care may be able to arrange transportation to and from doctor's visits and help set up home care. Supportive care can help answer your questions about nutrition and diet.

Speak to your care team about how you're feeling and if you're having any side effects. Some people with MCL develop chronic infections or low blood cell counts. Treatments are available to fight infections and strengthen immunity. Ask about supportive care if you have infections that keep coming back.

Supportive care involves the whole person, not just their cancer. If you're having a problem that's interfering with your treatment or affecting your quality of life, ask what supportive care resources may be available to help you.

Treatment side effects

All treatments can cause unwanted health problems called side effects. Some side effects may be harmful to your health. Others may just be unpleasant.

Side effects differ between people. Side effects can depend on the treatment type, length or dose of treatment, and the person. Some people have side effects while others have none. Some people have mild side effects while others have severe effects.

Most side effects appear shortly after treatment starts. Most side effects go away in days or weeks after treatment is over. Other side effects may be long-term or appear years later.

“Ask your oncologist for a list of possible side effects right before each treatment. Track your side effects and report them to your doctor.”



Don't ignore or disregard side effects. If left untreated, side effects may delay your scheduled treatment. So don't be afraid to speak up. Tell your treatment team about any new or worse symptoms you get. There are ways to prevent some side effects. There are also ways to help you feel better.

Side effects of common MCL treatments

Different treatments have different side effects. Ask your treatment team for a complete list of the side effects of your treatments. Also ask what can be done to relieve your side effects.

- tiredness
- nausea
- vomiting
- diarrhea
- headache
- low blood cell counts
- constipation
- infection
- fever or chills
- decreased appetite
- rash
- sores and swelling in the mouth
- shortness of breath
- irregular heartbeat
- hair loss
- tingling, numbness, or pain in hands or feet

Key points

- Treatment decisions are based on factors such as age, level of fitness, and overall health. Often the most important factor is the extent of the cancer—how much it has grown.
- The extent of cancer is represented by cancer stage. A lower number means less cancer in the body and a higher number means more.
- Stage 1 and stage 2 refer to the early stages of MCL. These cancers are found in only one or just a few areas near each other in the body. MCL is rarely diagnosed at these stages.
- Stage 3 and stage 4 are advanced or later stages of MCL. These cancers are found in several locations around the body. Almost all people with MCL are diagnosed when the cancer has reached these stages.
- There are many types of treatment for MCL. Not everyone with MCL receives the same treatment.
- Chemotherapy uses drugs to kill cancer cells. Immunotherapy uses manufactured antibodies to destroy cancer cells. Chemoimmunotherapy is a more effective combination of these two treatments.
- Targeted therapy drugs attack certain cancer cells to slow their growth.
- An autologous stem cell transplant uses high doses of chemotherapy followed by stem cell “rescue.” An allogeneic transplant replaces your stem cells with donor cells, which create a new immune system that can then attack the lymphoma.

- CAR T-cell therapy removes and reprograms your own T cells to recognize and target specific cancer cells.
- Clinical trials give people access to new tests and treatments that they couldn't usually receive otherwise.
- Supportive care is an important part of your treatment. It can help prevent or reduce the side effects of treatment, among other things.
- All treatments cause side effects. Be sure to tell your treatment team if you get any physical or emotional effects after treatment.



**Take our survey,
and help make the
NCCN Guidelines for Patients
better for everyone!**

[NCCN.org/patients/comments](https://www.nccn.org/patients/comments)

4

Treatment for advanced MCL

- 31 Treatment for fast-growing MCL
- 34 Treatment for slow-growing MCL
- 35 Key points

Most people diagnosed with mantle cell lymphoma have advanced disease. Advanced stage MCL requires intense therapy, but treatment methods continue to evolve. This chapter explains the treatment process.

People who have stage 3 or stage 4 mantle cell lymphoma are considered to have advanced MCL. (For information about early-stage MCL, see Chapter 5.)

The goal of treating advanced MCL is to remove as much lymphoma as possible and keep the disease under control. Treatment may continue for months or even years.

Treatment for advanced MCL depends on whether the lymphoma is aggressive (fast growing) or indolent (slow growing). Most people who are diagnosed with advanced MCL have the fast-growing type. ***For Treatment for slow-growing MCL, see page 34.***

Treatment for fast-growing MCL

Advanced, fast-growing MCL usually requires more than one type of therapy. The first therapy given is called initial treatment (also called first-line treatment). If the lymphoma comes back after initial treatment, your treatment team will suggest another therapy (second-line treatment).

If the lymphoma comes back after both the initial treatment and the second-line treatment,



What is a relapse?

Although newer approaches to treatment have improved results, most people with MCL will eventually experience a relapse. A relapse is when cancer gets better after treatment but later returns.

Unfortunately, most cancer drugs begin to lose their effect against the cancer sooner or later. This is the main reason why relapses occur. The cancer becomes “resistant” to the drug. So, each time MCL relapses, it may be more difficult to treat it than the time before.

you may want to try a third (third-line) treatment option.

First-line treatment

Initial (first-line) treatment is given in three phases: induction, consolidation, and maintenance.

Induction therapy

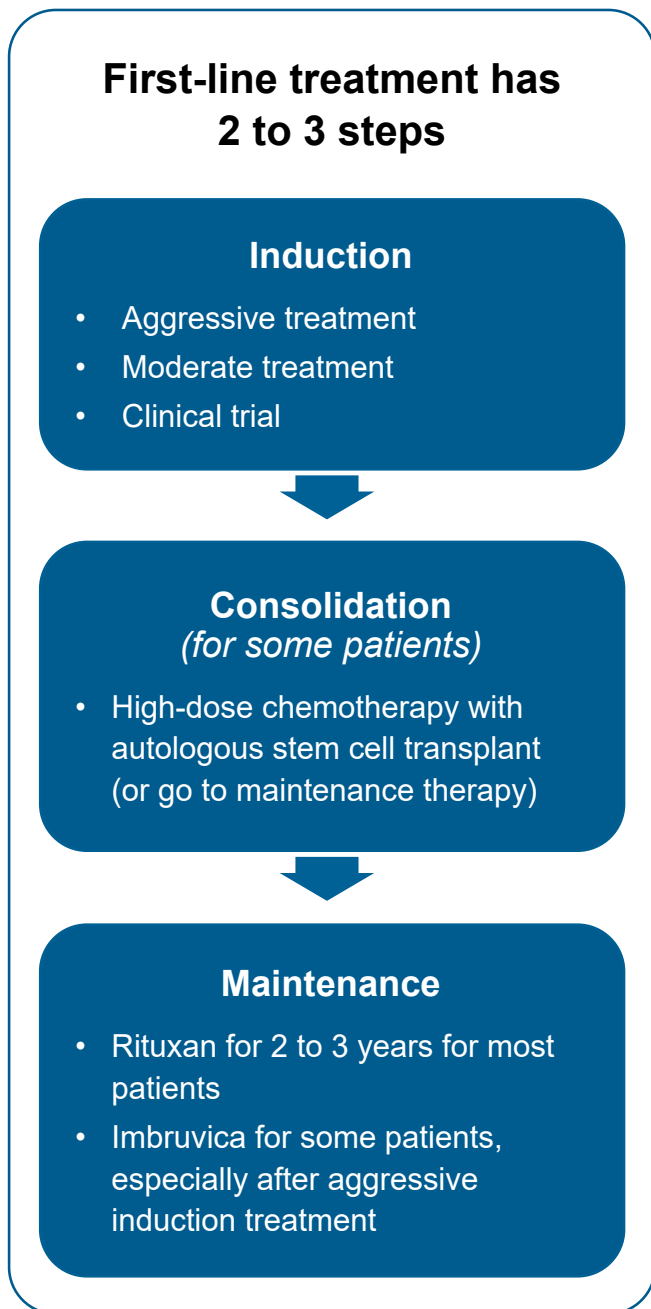
The goal of the induction phase is to reduce the amount of cancer as much as possible. The choice of induction treatment depends on whether your body can handle aggressive treatment. Preferred options for first-line induction therapy are listed in **Guide 2**. Another highly recommended treatment option for people with advanced stage MCL is to join a clinical trial.

After induction therapy, your treatment team will evaluate your results to see how well the therapy worked:

- **Complete response** – If tests can no longer detect the lymphoma, you’ve had a complete response to induction therapy. A complete response is also called

remission. The lymphoma can still return, but you may be able to take a break from treatment for a while.

- **Partial response** – A partial response to induction therapy means that the lymphoma has decreased in size but is still there. If you have a partial response, you may need additional therapy.
- **No response** – If the lymphoma continues to grow or seems unaffected by first-line therapy, another “line” of therapy—second-line therapy—is available. *See Chapter 6 for treatment for Relapsed and refractory MCL.*



Consolidation phase

The consolidation phase of first-line treatment begins after achieving a complete response to induction therapy. The goal of the consolidation phase is to bolster the results of induction therapy and to delay the lymphoma from coming back.

If you didn’t have a complete response to induction therapy, you may have additional therapy first to try to achieve a complete response before going ahead with consolidation therapy. The preferred additional therapy is targeted treatment with a BTK inhibitor (Imbruvica, Calquence, or Brukinsa), although chemoimmunotherapy may also be an option.

Consolidation treatment typically involves high-dose chemotherapy followed by an autologous stem cell transplant. Not all patients with MCL can go through this intense treatment. Those who can’t may be better off with a different option (like a clinical trial) or skipping consolidation altogether.

Guide 2
First-line induction treatment options for MCL

Aggressive treatment	LYMA regimen*	<ul style="list-style-type: none"> 4 cycles of RDHAP (Rituxan [rituximab], dexamethasone, cytarabine, and platinum-based chemotherapy), followed by RCHOP (Rituxan, Cytoxan [cyclophosphamide], Adriamycin [doxorubicin hydrochloride], Oncovin [vincristine], and prednisone)
	NORDIC regimen*	<ul style="list-style-type: none"> Dose-intensified chemoimmunotherapy with Rituxan and Cytoxan, Oncovin, Adriamycin, and prednisone, alternating with Rituxan and high-dose cytarabine
	BR followed by rituximab and high-dose cytarabine*	<ul style="list-style-type: none"> Bendeka (bendamustine) and Rituxan, followed by Rituxan and high-dose cytarabine
	TRIANGLE regimen*	<ul style="list-style-type: none"> RCHOP and Imbruvica (ibrutinib), alternating with RDHAP
	HyperCVAD+R	<ul style="list-style-type: none"> HyperCVAD (Cytoxan, Oncovin, Adriamycin, and dexamethasone alternating with high-dose methotrexate and cytarabine) and Rituxan
Moderate treatment	BR*	<ul style="list-style-type: none"> Bendeka and Rituxan
	VR-CAP*	<ul style="list-style-type: none"> Velcade (bortezomib), Rituxan, Cytoxan, Adriamycin, and prednisone
	RCHOP*	<ul style="list-style-type: none"> Rituxan, Cytoxan, Adriamycin, Oncovin, and prednisone
	LR*	<ul style="list-style-type: none"> Revlimid (lenalidomide) and Rituxan
	RBAC	<ul style="list-style-type: none"> Rituxan, Bendeka, and cytarabine

* = preferred therapy

Maintenance phase

The goal of maintenance therapy is to prevent or delay the lymphoma from coming back. Or, if MCL is still present, maintenance therapy is used to keep the lymphoma under control.

Maintenance therapy typically includes Rituxan given by intravenous (IV) infusion every 8 weeks for up to 2 to 3 years. For people who received aggressive induction therapy, maintenance may also include Imbruvica oral medicine daily (tablets, capsules, or liquid) or a similar BTK inhibitor for 2 years.

Follow-up care

During the maintenance phase, you'll have visits with your care team every 3 to 6 months. You'll also be tested for any signs that MCL has returned (relapsed) and checked for any side effects.

If you have a relapse or recurrence during or after first-line therapy, you can try to join a clinical trial. If you can't find a suitable clinical trial, you can have second-line treatment. **For information on second-line treatment, see Chapter 6.**

Treatment for slow-growing MCL

People with indolent MCL often have no symptoms and no swollen glands when they're diagnosed. The lymphoma exists only in their bone marrow and blood (although some may have it in their spleen or gastrointestinal tract).

For people with indolent MCL that has no symptoms, doctors often take a watch-and-

Treatment if you have *TP53* mutation

If molecular testing found that you have a change in the *TP53* gene, NCCN experts strongly recommend joining a clinical trial as an initial treatment option.



If you don't want to join a clinical trial or no clinical trials are available, then treatment depends on whether your body can handle aggressive therapy.

- ✓ **Aggressive therapy** – If you can undergo aggressive therapy, the recommended first treatment is the TRIANGLE regimen, which is described

in **Guide 2**. This regimen is followed by maintenance therapy with Rituxan infusion every 8 weeks for 3 years as well as daily Imbruvica (ibrutinib) for 2 years, or until the lymphoma returns.

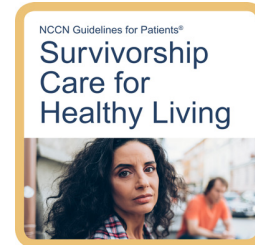
- ✓ **Moderate therapy** – If your treatment team recommends less aggressive first-line therapy, see the options for *Moderate treatment* in **Guide 2**. Depending on which induction treatment you have, you might receive maintenance therapy next with Rituxan every 8 weeks for 2 to 3 years, or until the lymphoma returns.

wait (observation) approach instead of starting treatment immediately. MCL can be indolent for months, or even years, before it needs to be treated.

If MCL symptoms begin, you'll need to be re-evaluated. Your doctor will assess if the lymphoma is now growing faster. It may be biopsied again and tested for a genetic *TP53* mutation. Most people with MCL don't have a *TP53* mutation. If you develop MCL symptoms or have other signs that the lymphoma is growing, then you and your care team should decide whether treatment should begin. **For Treatment for fast-growing MCL, see page 31.**

Key points

- The goal of treatment is to remove as much lymphoma as possible and keep the disease under control.
- Initial (first-line) treatment is the first drug or therapy given to treat your lymphoma.
- Initial treatment is often given in phases. The first phase is induction therapy. The most common induction therapy for advanced MCL is chemoimmunotherapy with or without a BTK inhibitor.
- Induction therapy may be followed by either consolidation therapy or maintenance therapy, or both.
- Consolidation therapy often involves high-dose chemotherapy and an autologous stem cell transplant. Rituximab is used for maintenance therapy.
- If initial treatment doesn't work or the lymphoma relapses, you may receive



Survivorship

Living with cancer is called survivorship. It starts when your cancer is diagnosed. Read more about survivorship in NCCN Guidelines for Patients: Survivorship Care for Healthy Living, available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.

the same or a different type of treatment (second-line treatment).

- Slow-growing MCL is uncommon. People with slow-growing MCL usually don't have symptoms or swollen glands when diagnosed.
- People with indolent MCL who have no symptoms don't usually get treatment. But they continue to be tested.
- If symptoms begin, people with indolent MCL are re-evaluated. If necessary, they'll begin treatment.

5

Treatment for early MCL

37 Treatment for stage 1 and stage 2 MCL

39 Key points

Most people with MCL have the fast-growing, aggressive kind. But a small number of people have early-stage MCL. This chapter discusses how early MCL can be treated.

The early stages of mantle cell lymphoma are stage 1 and stage 2. Stage 1 MCL is defined as cancer in one lymph node or in one group of nearby lymph nodes. Stage 2 MCL has affected two or more lymph nodes or groups of nearby lymph nodes.

Because these lymphomas occur in fewer areas in the body, people seldom show significant symptoms. That’s one reason why MCL is rarely diagnosed at these stages.

Treatment for stage 1 and stage 2 MCL

Initial treatment

Either radiation therapy or chemoimmunotherapy, or both, may be enough to control stage 1 or 2 MCL. Chemoimmunotherapy options for early MCL are listed in **Guide 3**.

In some cases, treatment for stage 1 or stage 2 MCL may not be needed right away. Instead, a watch-and-wait approach (also called observation) is used to decide when to start treatment. People under observation continue to have tests to keep an eye on their lymphoma. They see their doctor every 2 or 3 months, or longer if the disease has been stable for a while. If symptoms arise, they’ll begin treatment.

Follow-up care

After initial treatment, your care team will evaluate your results to see how well the

Guide 3

Initial treatment options for early MCL

BR*	• Bendeka (bendamustine) and Rituxan (rituximab)
VR-CAP*	• Velcade (bortezomib), Rituxan, Cytosan (cyclophosphamide), Adriamycin (doxorubicin hydrochloride), and prednisone
RCHOP*	• Rituxan, Cytosan, Adriamycin, Oncovin (vincristine), and prednisone
LR*	• Revlimid (lenalidomide) and Rituxan
RBAC	• Rituxan, Bendeka, and cytarabine

* = preferred therapy

therapy worked. You may need additional therapy depending on what type of response you had to the initial treatment:

Complete response

If tests can no longer detect lymphoma, you've had a complete response to initial therapy. A complete response is often called remission. The lymphoma can still return, but you may be able to take a break from treatment for a while.

Meanwhile, you'll continue to see your care team for follow-up tests. These tests look for signs that the lymphoma has returned. Typical tests and schedules are:

- **Physical exam and lab tests** every 3 or 6 months for at least 5 years, then once a year or when recommended by your doctor
- **CT imaging** once or twice a year for the first 2 years

Early-stage MCL that has a complete response to treatment may still return later on (relapse). If follow-up tests show that the cancer has relapsed, you'll need additional therapy.

Partial response

A partial response to induction therapy means that the lymphoma has decreased in size but is still there. If you have a partial response, additional therapy may be recommended to try to put the cancer into remission (complete response).

Progression

Progression means MCL has continued to grow or spread even with treatment. You'll need additional therapy to get the lymphoma under control.

Additional therapy

The choice of additional therapy depends on which treatment you had first. In general, if your earlier treatment was:

- **Only radiation therapy** then you'll likely need more aggressive additional treatment. *See Chapter 3 for treatment for advanced MCL.*
- **Chemoimmunotherapy with or without radiation therapy** then you'll probably need much more aggressive therapy—the kind recommended for relapsed or refractory MCL. *See Chapter 6 for treatment for relapsed and refractory MCL.*

In certain cases, though, relapsed MCL can be treated with the same type of therapy recommended for newly-diagnosed advanced stage MCL. *For such cases, see Chapter 3 for treatment for advanced MCL.*



Hope is a huge part of the cancer process. Because if you lose that, you don't have the inner strength you need to fight.”

Key points

- MCL in its early stages is found in fewer areas in the body. MCL is rarely diagnosed at these stages.
- Radiation therapy or less intense chemoimmunotherapy may be enough to control cancer growth in early-stage MCL. Some people have both therapies.
- Some people with early-stage MCL may not need treatment immediately, depending upon their age and health. Their doctors may choose to “watch” them instead.
- If symptoms begin, people with early MCL are re-evaluated. If necessary, they’ll begin treatment.
- Early-stage MCL that has a complete response to treatment may still relapse later on.
- Early-stage MCL that partially responds to less intense treatment will need more aggressive treatment.
- Early-stage MCL that continues to grow or spread after treatment will need the kind of treatment recommended for relapsed or refractory MCL.



Let us know what you think!

Please take a moment to complete an online survey about the NCCN Guidelines for Patients.

[NCCN.org/patients/response](https://www.nccn.org/patients/response)

6

Relapsed and refractory MCL

- 41 Second-line therapy
- 43 Additional therapy
- 44 Supportive care
- 45 Advance care planning
- 46 Key points

If first-line treatment doesn't work or the lymphoma returns, additional types of treatment are often available. In addition to a number of effective, approved therapies, you can also consider clinical trials.

In many people, mantle cell lymphoma often improves with treatment, but then eventually comes back (relapses). In other cases, first-line treatment may have no effect or the lymphoma may even get worse—this is called refractory disease. It means the cancer didn't respond to therapy.

The treatment for relapsed and refractory MCL is second-line therapy.

Second-line therapy

As with first-line therapy, the goal of second-line therapy is to achieve remission. Remission is when the signs and symptoms of cancer have disappeared.

The idea behind second-line treatment is to try a different strategy than first-line treatment. Treatment choices for relapsed and refractory MCL are affected by previous therapy, age, overall health, and other diseases or conditions you may have.

Preferred options

In recent years, clinical trials have shown that targeted therapy with one of the BTK inhibitors can be more effective than other therapies for relapsed or refractory MCL. So, one of the BTK inhibitors is commonly chosen for second-line treatment. Preferred options include either Brukinsa (zanubrutinib) or Calquence (acalabrutinib). If you've been prescribed a

“Just look around you. Sometimes it's easy to forget that you are surrounded by people who care about your well-being and success!”



BTK inhibitor for second-line therapy, you may need to continue taking it indefinitely or until MCL relapses again.

Another second-line treatment strategy is immunotherapy with a combination of both Revlimid (lenalidomide) and Rituxan (rituximab).

Radiation therapy is sometimes used to treat MCL within a lymph node or other small area if it's causing troublesome symptoms like pain.

Other treatment options

Other drug combinations are useful in specific cases. Options for second-line treatment are listed in **Guide 4**.

Guide 4 Second-line treatment options for MCL

Preferred treatment options	<ul style="list-style-type: none"> • Brukinsa (zanubrutinib) • Calquence (acalabrutinib) • Revlimid (lenalidomide) and Rituxan (rituximab)
Other recommended treatment	<ul style="list-style-type: none"> • Imbruvica (ibrutinib) with or without Rituxan
Used in certain cases	<ul style="list-style-type: none"> • Imbruvica and Venclexta (venetoclax) • Venclexta with or without Rituxan • Velcade (bortezomib) with or without Rituxan • Bendeka (bendamustine) and Rituxan <i>(Not recommended if you've been treated with Bendeka before)</i> • Bendeka, Rituxan, and cytarabine <i>(Not recommended if you've been treated with Bendeka before)</i> • gemcitabine, oxaliplatin, and Rituxan • dexamethasone, cytarabine, platinum-based chemotherapy, and Rituxan <i>(Exclude Rituxan if you've been treated with it before)</i>

Additional therapy

If second-line therapy appears to be working, then additional therapy (third-line therapy) may be able to get the lymphoma under control.

Third-line and further therapies generally include any treatment for MCL that you haven't already had. These may include the

BTK inhibitor Jaypirca (pirtobrutinib), CAR T-cell therapy with Tecartus (brexucabtagene autoleucel), or a different type of systemic therapy than one you had before.

The type of additional therapy you receive is based on several factors. An important factor is how well second-line therapy treated the lymphoma. Other factors include your age,

Guide 5

Additional therapy options for relapsed or refractory MCL

BTK inhibitor	<ul style="list-style-type: none"> • Only if: <ul style="list-style-type: none"> • You haven't taken a BTK inhibitor before, or • You have taken a BTK inhibitor before, but will now be taking a different one
CAR T-cell therapy	<ul style="list-style-type: none"> • Only if you've already had chemoimmunotherapy and BTK inhibitor(s)
High-dose chemotherapy and autologous stem cell transplant	<ul style="list-style-type: none"> • Only in selected cases and only if you've never had a stem cell transplant before
Allogeneic stem cell transplant with or without radiation therapy	<ul style="list-style-type: none"> • Only if your MCL is in remission and you've already had CAR-T cell therapy
Clinical trial	<ul style="list-style-type: none"> • People who have relapsed or refractory MCL are strongly encouraged to join a clinical trial
Observation	<ul style="list-style-type: none"> • Only if your MCL is in remission and you're not currently taking a BTK inhibitor
Radiation therapy	<ul style="list-style-type: none"> • Low-dose radiation therapy can be used to relieve pain symptoms
Additional supportive care	<ul style="list-style-type: none"> • Besides relieving cancer symptoms and side effects of treatment, supportive care can help with psychological, social, and spiritual issues.

overall health, and which treatments you've already had.

For example, if your second-line treatment was immunotherapy with Revlimid and Rituxan, your next treatment may be a BTK inhibitor. Or, if you tried a BTK inhibitor as your second-line treatment but it's losing its effect, you might begin Jaypirca. Jaypirca is also a BTK inhibitor but it works in a slightly different way than other BTK inhibitors.

Another option: NCCN experts strongly encourage people with relapsed or refractory MCL to join a clinical trial.

These and other options for additional therapy are listed in **Guide 5**.

Read more about side effects of CAR T-cell therapy in *NCCN Guidelines for Patients: Immunotherapy Side Effects: CAR T-Cell Therapy*, available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.

Follow-up care

After treatment, you'll need to see your care team frequently so they can check how you're doing. You'll likely have follow-up visits every 3 to 6 months or as often as your care team recommends.

Follow-up tests often include in-person check-ups to evaluate how you feel, as well as evaluations such as a physical exam, blood tests, and imaging tests (CT scans). The follow-up plan is adapted for each person and can be adjusted for someone who's in a long remission (for example, visits less often).

Supportive care

The main concern for most people with cancer is to find treatment that works. Having cancer is about more than treatment, though. Cancer care is a rollercoaster that includes many additional physical and emotional challenges. It's important to know that you can get support for these challenges.

Supportive care is for relieving the symptoms of cancer and the side effects of cancer treatment. It's also for other issues related to cancer.

For people with relapsed or refractory MCL, an important type of supportive care may be radiation therapy to relieve pain. Low-dose radiation therapy is not given to cure the lymphoma but can alleviate symptoms such as bone pain. For other types of pain, you may receive medicine or other treatment.

There's also treatment available for mouth sores and swelling (oral mucositis), which is a side effect of some cancer therapies.

Supportive care can also help with psychological, social, and spiritual issues. Ask your care team what supportive care resources are available to help you.

Living with cancer is called survivorship. It starts when your cancer is diagnosed. Read more about survivorship in *NCCN Guidelines for Patients: Survivorship Care for Cancer-Related Late and Long-Term Effects*, available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.

Advance care planning

When cancer is diagnosed very late or keeps progressing despite all treatment efforts, it may be time to consider what lies ahead. This exploration of what's important to you is called advance care planning.

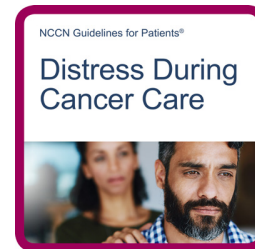
Advance care planning is for everyone, not just for those who are very sick. Even when cancers are curable, talking about future scenarios should begin when starting treatment.

Advance care planning means deciding what care you would want if you become unable to make medical decisions for yourself. It's about making sure that your wishes are understood and respected. The focus is on you receiving the best possible care at the end of your life. People with incurable cancer can set up an advance care plan early on to feel less stressed and better able to cope with their condition.

You can decide if there is a point where you might want to stop cancer treatment. You can also decide what treatments you would want for symptom relief.

Once you've made these decisions, you'll fill out a legal document that explains what you want to be done if you aren't able to tell your care team yourself. This document is called an advance directive. Doctors are required to follow the instructions in an advance directive when you're too ill to make decisions about your care.

Tell your care team and family about your advance directive and its contents. Give a copy of your advance directive to all your doctors. Make sure you give a copy to anyone you've authorized to make decisions on your behalf (health care proxy). If your family or



It's important to ask for help

Depression, anxiety, fear, and distress are very common feelings for people with cancer. These feelings can make it harder to deal with cancer and cancer treatment. They can hold you back even when you want to move forward. Getting help when you're feeling worried or hopeless is an important part of cancer care. If you're feeling anxious or overwhelmed, ask your treatment team for help.

More information about cancer and distress is available at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.

If loved ones disagree with your plan, speak to your care team. Sometimes they or other specialists can help you and your family navigate these difficult conversations.

You can change your advance care plan at any time. Frequent conversations with your care team can help.

Key points

- If first-line treatment doesn't work or the lymphoma relapses, second-line treatment is done using a different strategy.
- Preferred options for second-line treatment include BTK inhibitors or immunomodulators.
- NCCN experts strongly encourage people with relapsed or refractory MCL to join a clinical trial.
- Additional therapy can be used after second-line treatment to give it a boost or to get the lymphoma under control.
- Additional treatment, if appropriate, may include a different type of BTK inhibitor, CAR T-cell therapy, or a type of systemic therapy you haven't had before.
- Supportive care is an important part of your treatment care. It can help prevent or reduce the side effects of treatment, among other things.
- Advance care planning means deciding what care you would want if you become unable to make medical decisions for yourself.
- Supportive care and advance care planning are for everyone, not just for those who are very sick.



We want your feedback!

Our goal is to provide helpful and easy-to-understand information on cancer.

Take our survey to let us know what we got right and what we could do better.

[NCCN.org/patients/feedback](https://www.nccn.org/patients/feedback)

7

Making treatment decisions

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It's important to be comfortable with the cancer treatment you choose. This choice starts with having an open and honest conversation with your care team.

It's your choice

Treatment decisions are very personal. What's important to you may not be important to someone else.

In shared decision-making, you and your care team share information, discuss the options, and agree on a treatment plan. It starts with an open and honest conversation between you and your team.

Some things that may play a role in your decision-making:

- What you want and how that might differ from what others want
- Your religious and spiritual beliefs
- Your feelings about certain treatments, like surgery or chemotherapy
- Your feelings about pain or side effects
- Cost of treatment, travel to treatment centers, and time away from school or work
- Quality of life and length of life
- How active you are and the activities that are important to you

Think about what you want from treatment. Discuss openly the risks and benefits of specific treatments and procedures. Weigh

options and share concerns with your care team. If you can build a relationship with your team, you'll feel supported when considering options and making treatment decisions.

Second opinion

It's normal to want to start treatment as soon as possible. While cancer treatment shouldn't be delayed indefinitely, there's usually time to have another cancer care provider review your test results and suggest a treatment plan. This is called getting a second opinion, and it's a normal part of cancer care. Even doctors get second opinions!

If you can, seek out a lymphoma specialist who has experience diagnosing and treating people with cancers like mantle cell lymphoma.

Things you can do to prepare for a second opinion:

- Check with your insurance company about its rules on second opinions. There may be out-of-pocket costs to see providers who are not part of your insurance plan.
- Make plans to have copies of all your records sent to the provider you'll see for your second opinion.

Support groups

Many people diagnosed with cancer find support groups to be helpful. Support groups often include people at different stages of treatment. Some people may be newly diagnosed, while others may be finished with treatment. If your hospital or community doesn't have support groups for people with cancer, check out the online resources listed on page 55 of this book.

Questions to ask

Be clear about your goals for treatment and find out what to expect from treatment. Possible questions to ask your cancer care team are listed on the following pages. Feel free to use these or come up with your own. Use the blank part of the page to jot down the answers to your questions.

Questions about testing

1. What tests will I have?
2. Where do I go to get tested? How long will the tests take? Will any test hurt?
3. How do I prepare for testing?
4. Will my insurance pay for all of the tests you are recommending?
5. Can I bring someone with me to the appointments?
6. Should I bring a list of my medications?
7. How soon will I know the results and who will explain them to me?
8. How can I get a copy of the pathology report and other test results?
9. Is there an online portal with my test results?
10. Who will talk with me about the next steps? When?

Questions about treatment options

1. What are my treatment options? Are you suggesting options from the NCCN Guidelines, or have you modified the standard approach in my situation?
2. What will happen if I do nothing?
3. Will the treatment hurt?
4. How do my age, sex, overall health, and other factors affect my options?
5. Are my chances any better for one option than another? Less time-consuming? Less expensive?
6. How do I get a second opinion?
7. How long do I have to decide about treatment, and is there a social worker or someone who can help me decide?
8. What supportive care services are available to me during and after treatment?
9. What are my options if treatment stops working?
10. Can I stop treatment at any time? What will happen if I stop treatment?

Questions about getting treatment

1. Do I have a choice of when to begin treatment? Can I choose the days and times of treatment?
2. Does this hospital or cancer center offer the best treatment for my cancer?
3. How much will the treatment cost? How much does my insurance cover?
4. Are there any programs to help pay for treatment?
5. What should I know if I need to travel for treatment?
6. Can I bring someone with me when I get treated?
7. Who should I contact with questions or concerns on weekends or non-office hours?
8. How will you know if the treatment is working?
9. What follow-up care is needed after treatment?
10. What are the chances of the cancer worsening or returning?

Questions about side effects

1. What are the short- and long-term side effects of the treatments?
2. What can be done to prevent or relieve the side effects?
3. Does the cancer itself cause any side effects?
4. Which side effects are most common and how long do they usually last?
5. Which side effects are serious or life-threatening?
6. What symptoms should I report right away, and who do I contact?
7. Do any medications worsen side effects?
8. Do any side effects lessen or worsen in severity over time?
9. Will you stop or change treatment if there are serious side effects?

Questions about clinical trials

1. Do you recommend that I consider a clinical trial for treatment?
2. How do I find clinical trials that I can participate in?
3. What are the treatments used in the clinical trial?
4. Has the treatment been used for other types of cancer?
5. What are the risks and benefits of this treatment?
6. What side effects should I expect and how will they be managed?
7. How long will I be in the clinical trial?
8. Will I be able to get other treatment if this doesn't work?
9. How will you know if the treatment is working?
10. Will the clinical trial cost me anything?

Questions about your care team's experience

1. Are you board certified? If yes, in what area?
2. What is your experience as well as your team's experience with treating the type of cancer I have?
3. How many patients like me (of the same age, gender, race) have you treated?
4. Will you be consulting with experts to discuss my care? Whom will you consult?
5. Is this treatment (or procedure) a major part of your practice? How often have you done this treatment (or procedure) in the last year?
6. How many of your patients have had complications? What were the complications?

Resources

Be The Match

bethematch.org

Cancer Hope Network

cancerhopenetwork.org

Lymphoma Research Foundation

lymphoma.org

National Bone Marrow Transplant Link

nbmtlink.org

National Cancer Institute

cancer.gov/types/lymphoma

NCI Office of Cancer Survivorship

cancercontrol.cancer.gov/ocs

The Leukemia & Lymphoma Society

LLS.org/Patientsupport

Triage Cancer

triagecancer.org



Words to know

allogeneic stem cell transplant

A cancer treatment that replaces abnormal blood stem cells with healthy donor cells. Also called allogeneic hematopoietic cell transplant.

autologous stem cell transplant

A cancer treatment that removes a patient's own healthy stem cells and later returns them to the bone marrow after chemotherapy. Also called high-dose chemotherapy with autologous stem cell rescue (HDT/ASCR).

B cell

A type of white blood cell (lymphocyte) that protects the body from infection. Also called B lymphocyte.

B symptoms

Fevers, heavy sweats, and unexpected weight loss caused by B-cell lymphomas.

BTK inhibitor

A drug that blocks an enzyme called BTK. Blocking BTK slows or stops cancer cells from growing.

beta-2 microglobulin

A small protein made by many types of cells.

biopsy

A procedure that removes fluid or tissue samples to be tested for disease.

bone marrow

The sponge-like tissue in the center of most bones.

bone marrow aspiration

A procedure that removes a liquid bone marrow sample to test for a disease.

bone marrow biopsy

A procedure that removes bone and solid bone marrow samples to test for a disease.

cancer stage

A rating of cancer based on its location and extent.

CAR T-cell therapy

An immunotherapy that alters a person's own T cells to recognize and destroy their cancer.

chemotherapy

Cancer drugs that stop the cell life cycle so cells don't increase in number.

chromosomes

Structures within cells that contain coded instructions for cell function.

clinical trial

A type of research that assesses how well health tests or treatments work in people.

complete blood count (CBC)

A lab test that measures the number of red blood cells, white blood cells, and platelets.

complete blood count (CBC) with differential

A lab test that measures the number of blood cells including each type of white blood cell.

complete response

An absence of all signs and symptoms of cancer after treatment.

comprehensive metabolic panel

Lab test of up to 14 chemicals in your blood.

computed tomography (CT)

A test that uses x-rays from many angles to make a picture of the insides of the body.

Words to know

consolidation therapy

A shorter and more intense treatment phase to further reduce the number of cancer cells.

corticosteroids

A class of drugs used to reduce redness, swelling, and pain, but also to kill cancer cells.

diagnosis

An identification of an illness based on tests.

early stage

A cancer that has had little or no growth into nearby tissues.

echocardiogram

A test that uses sound waves to make pictures of the heart.

excisional biopsy

A procedure that removes lymph nodes to test for cancer cells.

gastrointestinal (GI) tract

The group of organs through which food passes after being eaten. Also called the digestive tract.

gene

Coded instructions for making proteins that control how cells behave and make new cells.

gene mutation

An abnormal change in the coded instructions within cells.

hematopathologist

A doctor who examines cancers of the blood and immune cells.

imaging

A test that makes pictures (images) of the insides of the body.

immune system

The body's natural defense against disease.

immunomodulator

A cancer drug that modifies some parts of the body's disease-fighting system.

immunotherapy

A treatment with drugs that help the body find and destroy cancer cells.

incisional biopsy

A procedure that removes a tissue sample from a tumor.

induction therapy

The first treatment that is given to greatly reduce the extent of cancer.

involved-site radiation therapy (ISRT)

Treatment with radiation that's focused on areas with cancer growth.

lactate dehydrogenase (LDH)

A blood test that indicates the amount of lymphoma and cellular damage in the body.

lumbar puncture

A procedure that removes spinal fluid with a needle. Also called a spinal tap.

lymph

A clear fluid containing white blood cells.

lymph node

A small, bean-shaped, disease-fighting structure.

lymph system

A network of organs and vessels that collects and transports lymph fluid.

lymphadenopathy

A medical term meaning swollen lymph nodes.

lymphocyte

One of three main types of white blood cells that help protect the body from infections.

Words to know

lymphoma

A cancer of white blood cells (lymphocytes) within the lymph system.

maintenance therapy

A treatment phase given to prolong good treatment results.

mantle zone

A ring of B cells that surrounds the germinal center of a follicle inside lymph nodes.

medical history

A report of all your health events and medications.

monoclonal antibody

A type of cancer drug that stops growth signals.

multigated acquisition (MUGA) scan

A test that uses radiation to make pictures of the heart.

observation

A period of testing for changes in cancer status while not receiving treatment.

performance status

A rating of a person's ability to do daily activities.

positron emission tomography (PET)

A test that uses radioactive material to see where lymphoma is located in the body.

prognosis

The likely course and outcome of a disease based on tests.

radiation therapy

A treatment that uses intense energy to kill cancer cells.

relapse

The return of cancer after a period of improvement.

side effect

An unhealthy or unpleasant physical or emotional response to treatment.

spleen

An organ on the left side of the body that helps prevent disease by filtering the blood.

supportive care

Health care that includes symptom relief and improving quality of life. Also sometimes called palliative care.

T cell

A type of white blood cell (lymphocyte) that attacks infected cells and cancer cells.

targeted therapy

A drug treatment that slows the growth process specific to cancer cells.

translocation

The switching of parts between chromosomes.

uric acid

A chemical that is released into the blood when cells and other substances in the body break down.

white blood cell

A type of blood cell that fights disease and infection.

NCCN Contributors

This patient guide is based on the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for B-Cell Lymphomas, Version 4.2023. It was adapted, reviewed, and published with help from the following people:

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Cleveland, Ohio
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800.641.2422 • uhhospitals.org/services/cancer-services
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Case CCC
216.844.8797 • case.edu/cancer

City of Hope National Medical Center
Duarte, California
800.826.4673 • cityofhope.org

**Dana-Farber/Brigham and Women's Cancer Center |
Massachusetts General Hospital Cancer Center**
Boston, Massachusetts
617.732.5500 • youhaveus.org
617.726.5130 • massgeneral.org/cancer-center

Duke Cancer Institute
Durham, North Carolina
888.275.3853 • dukecancerinstitute.org

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402.559.5600 • unmc.edu/cancercenter

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206.667.5000 • fredhutch.org

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Salt Lake City, Utah
800.824.2073 • huntsmancancer.org

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888.600.4822 • www.cancer.iu.edu

Mayo Clinic Comprehensive Cancer Center
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Jacksonville, Florida
Rochester, Minnesota
480.301.8000 • Arizona
904.953.0853 • Florida
507.538.3270 • Minnesota
mayoclinic.org/cancercenter

Memorial Sloan Kettering Cancer Center
New York, New York
800.525.2225 • mskcc.org

Moffitt Cancer Center
Tampa, Florida
888.663.3488 • moffitt.org

O'Neal Comprehensive Cancer Center at UAB
Birmingham, Alabama
800.822.0933 • uab.edu/onealcancercenter

**Robert H. Lurie Comprehensive Cancer Center
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Chicago, Illinois
866.587.4322 • cancer.northwestern.edu

Roswell Park Comprehensive Cancer Center
Buffalo, New York
877.275.7724 • roswellpark.org

**Siteman Cancer Center at Barnes-Jewish Hospital
and Washington University School of Medicine**
St. Louis, Missouri
800.600.3606 • siteman.wustl.edu

**St. Jude Children's Research Hospital/
The University of Tennessee Health Science Center**
Memphis, Tennessee
866.278.5833 • stjude.org
901.448.5500 • uthsc.edu

Stanford Cancer Institute
Stanford, California
877.668.7535 • cancer.stanford.edu

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800.293.5066 • cancer.osu.edu

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UCLA Jonsson Comprehensive Cancer Center

Los Angeles, California

310.825.5268 • cancer.ucla.edu

UCSF Helen Diller Family Comprehensive Cancer Center

San Francisco, California

800.689.8273 • cancer.ucsf.edu

University of Colorado Cancer Center

Aurora, Colorado

720.848.0300 • coloradocancercenter.org

University of Michigan Rogel Cancer Center

Ann Arbor, Michigan

800.865.1125 • rogelcancercenter.org

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Madison, Wisconsin

608.265.1700 • uwhealth.org/cancer

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Dallas, Texas

214.648.3111 • utsouthwestern.edu/simmons

Vanderbilt-Ingram Cancer Center

Nashville, Tennessee

877.936.8422 • vicc.org

Yale Cancer Center/Smilow Cancer Hospital

New Haven, Connecticut

855.4.SMILOW • yalecancercenter.org

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Suvarna Hospital (Borivali):

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By appointment

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#Reference From NCCN Guidelines