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#Reference From NCCN Guidelines

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# 1

## About multiple myeloma

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**Multiple myeloma is a rare blood cancer that usually starts in the white blood cells inside bones. While there isn't a cure yet, new treatments are giving people more hope and more years to live.**

## What is multiple myeloma?

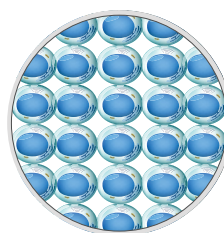
Multiple myeloma (also simply called myeloma) is a type of blood cancer that develops in bones and other areas of the body. It results when cancerous cells—called myeloma cells—build up in the bone marrow. Bone marrow is the soft, sponge-like center inside bones where most blood cells are made.

In someone with myeloma, the myeloma cells become so numerous in the bone marrow that they can crowd out healthy blood cells, causing harmful blood problems. This oversupply of myeloma cells also reduces the number of healthy blood cells in the body, which can increase the risk of infections. In addition, myeloma cells release large amounts of abnormal myeloma proteins, which can impair bodily functions (like kidney function). Myeloma cells can also destroy bone tissue, causing high calcium levels, bone pain, weakened bones, and bone fractures.

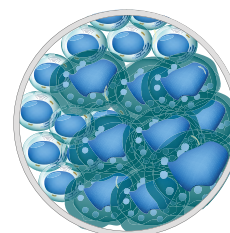
When myeloma cells build up in bone marrow, they can form tumors called plasmacytomas. Rarely, some people develop only one tumor (in bone or soft tissue), which is called solitary plasmacytoma. More often, people may have multiple plasmacytomas in different bones

## What is cancer?

Healthy



Cancer



Cancer is a disease where cells—the building blocks of the body—grow out of control. Cancer cells develop genetic errors (mutations) that cause them to make many more cancer cells. The cancer cells crowd out and overpower normal cells. This can end up harming the body.

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

or areas of the body, which is why it's called multiple myeloma.

Increased age (age 65 and over) greatly raises the risk of developing multiple myeloma. It's also more common in males than in females, twice as common in Black people than in White people, and two to three times more common in first-degree relatives of someone who already has myeloma.

## What causes multiple myeloma?

Many people wonder why they got cancer. Doctors don't know exactly what causes cancerous myeloma cells to form. What doctors do know is that myelomas and other cancers often start with abnormalities (mutations) in the cells, which allow the cells to grow unchecked. These types of mutations aren't typically passed down in families (hereditary mutation), but you may have a higher risk for myeloma if another family member also had myeloma.

The mutation occurs in the cells' genes. Genes carry the instructions in cells for making new cells and for controlling how cells behave. A gene mutation can turn normal plasma cells into cancerous myeloma cells.

What are plasma cells? Plasma cells come from white blood cells called B cells, a type of immune cell. Plasma cells fight infection and disease. They do this by making antibodies (also called immunoglobulins, shortened to Ig). Antibodies are proteins released into blood and other body fluids that help your body find and kill germs.

Like other healthy cells, plasma cells grow and then divide to make new cells. New cells are made as the body needs them. When plasma cells grow old or get damaged, they die—a normal and natural process.

But somewhere along the line, genetic alterations occur that turn a plasma cell into a myeloma cell. Myeloma cells make more and more new myeloma cells that aren't needed and don't die quickly when old or damaged. The myeloma cells continue to make millions of identical copies of themselves. They can spread throughout the bone marrow or grow

into a clump (mass) in one or more spots outside of the bone marrow. These masses, called plasmacytomas, can overpower normal bone cells, which destroys the surrounding bone.

Myeloma cells, like normal plasma cells, also make antibodies. But the antibodies made by myeloma cells are all copies of a single type of antibody. These antibodies are called monoclonal proteins, or M proteins. (The term monoclonal means "one clone" or "one type"). Myeloma cells make M proteins without control. Also, unlike normal antibodies, M proteins don't help to fight infections.

## Are there different types of myeloma?

There are two basic types of myeloma: active and smoldering.

### Active myeloma

Active (or symptomatic) myeloma causes symptoms and affects organs. Common symptoms that you may feel include bone pain, frequent infections, fatigue, and more. Myeloma that's causing symptoms should be treated.

Symptoms aren't the only reason for treating myeloma. Results from certain lab tests can also show when it's time to start treatment. These tests identify when someone has high levels of M protein in their blood or myeloma cells in their bone marrow. Tests can also find kidney problems, bone lesions, too much calcium or too few red blood cells in the bloodstream, and other signs of myeloma.

### Smoldering myeloma

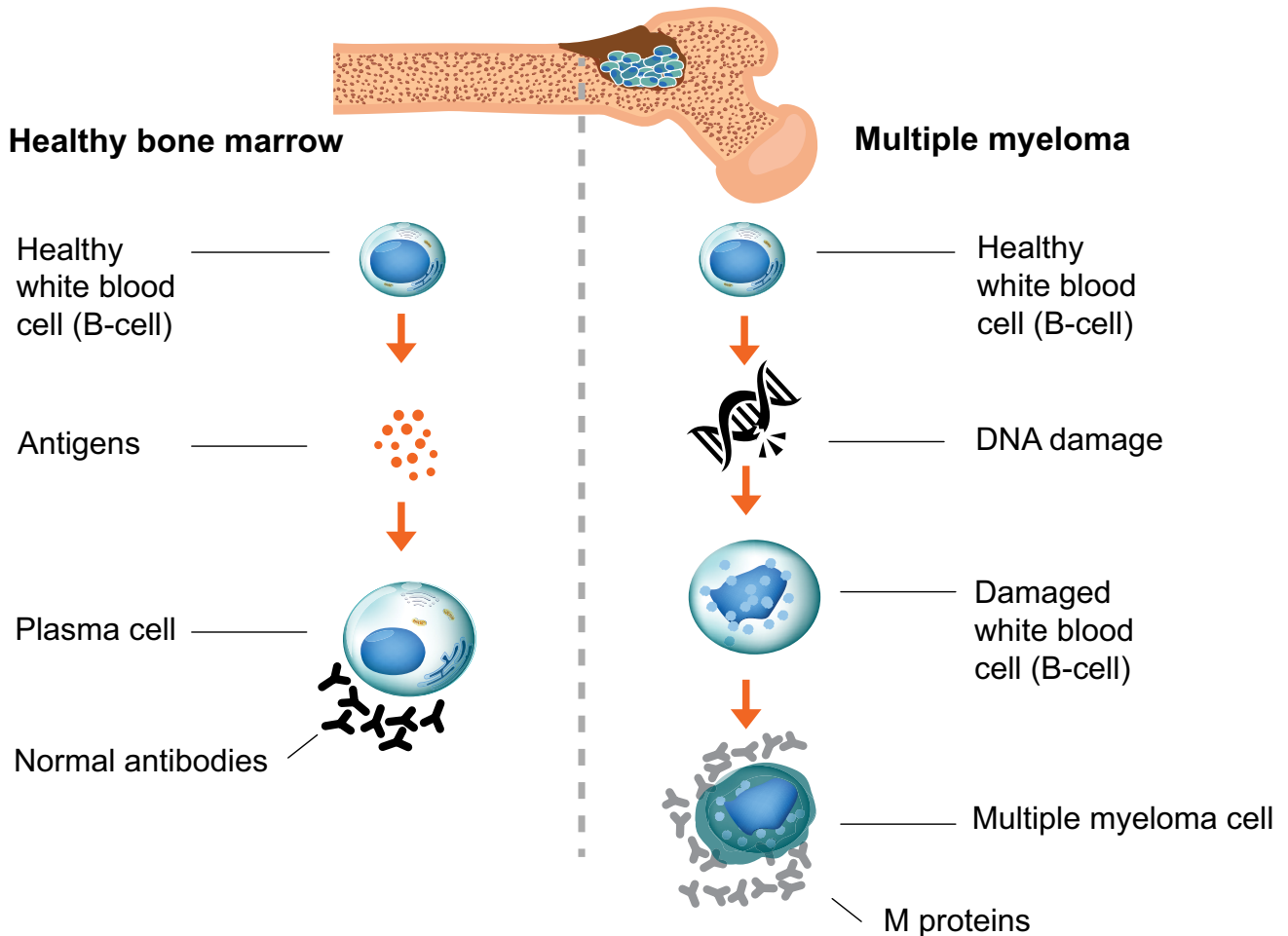
Smoldering myeloma is when myeloma isn't causing symptoms and doesn't require immediate treatment. People with smoldering myeloma have M protein in their blood and

plasma cells in their bone marrow but usually at lower levels than people with multiple myeloma. People with smoldering myeloma don't need to be treated, but they are tested regularly for signs of multiple myeloma. Those

### Where do myeloma cells come from?

When antigens (such as germs) invade the body, healthy white blood cells called plasma cells release germ-fighting antibodies to stop infection and disease. But in multiple myeloma, one or more mutations cause white blood cells to

become multiple myeloma cells. Multiple myeloma cells can multiply and spread rapidly. They also produce a lot of abnormal antibodies called M proteins, which can build up in the bone marrow and cause damage.



with high-risk smoldering myeloma can also be considered for clinical trials that explore the benefits of early treatment.

Smoldering myeloma sometimes turns into multiple myeloma. Those with higher-risk smoldering myeloma may require more frequent follow-up visits or even treatment. But in most people, smoldering myeloma can exist for years before becoming multiple myeloma.

## What are the symptoms of myeloma?

The most common symptoms of multiple myeloma are bone pain (often in the back), fatigue, and frequent infections.

Symptoms occur because myeloma cells and M proteins reduce the number of normal blood cells and normal antibodies. This can disrupt the functions of the blood, organs, and other parts of the body, causing symptoms.

However, some people with multiple myeloma have no symptoms that they're aware of. Their myeloma may be found by a blood or urine test taken during a doctor's visit for something else.

Common symptoms of active myeloma include:

### **Bone damage and pain**

Myeloma cells can cause bone damage when they crowd out normal cells in the bone marrow. Myeloma cells also release chemicals that begin to break down bone. Areas of bone damage are called lytic bone lesions, which can be very painful. Bone lesions also weaken bones, so they may break (fracture) easily.

## Common symptoms of multiple myeloma

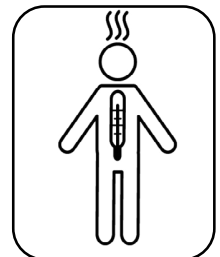
**Bone damage and pain**



**Fatigue and weakness**



**Frequent infections and fever**



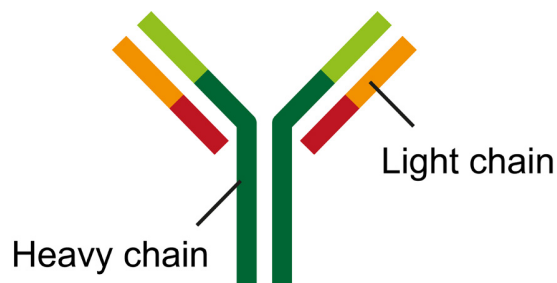
**Bruising or bleeding easily**



**Thirst and frequent urination**



## What are antibodies?



Understanding antibodies can help you understand your multiple myeloma diagnosis.

Antibodies (also called immunoglobulins, or Ig) are part of the immune system. They're made by plasma cells to fight infection. Antibodies identify harmful bacteria and viruses, and help the immune system to get rid of them.

Each plasma cell releases only one type of antibody. Like snowflakes, antibodies are similar but no two are alike. Each antibody has a different role. The type of antibody made is meant to attack the specific germ causing an infection or illness.

Antibodies are made of two pairs of protein "chains" that are bound together in a Y shape. This includes two identical "heavy" protein chains and two identical "light" protein chains.

- **Heavy chains** – There are five types of heavy chains: IgG, IgA, IgM, IgD, and IgE
- **Light chains** – There are two types of light chains: kappa and lambda

The five different types of heavy chains can bond with either of the two types of light chains. Altogether, there are 10 subtypes of antibodies (immunoglobulins): IgG kappa, IgA kappa, IgM kappa, IgD kappa, IgE kappa, IgG lambda, IgA lambda, IgM lambda, IgD lambda, and IgE lambda.

Myeloma cells also make antibodies, which are called M proteins. Like normal antibodies, M proteins are made of a pair of heavy chains and a pair of light chains. Myeloma cells make very large numbers of M proteins, and most of them are a single subtype. (The most common is IgG kappa.)

Sometimes, the myeloma cells only produce light chains, either kappa or lambda. This results in extra light chains circulating in the blood. These are called free light chains. Some people with myeloma have high levels of free light chains found in their blood or urine.

Knowing your M protein subtype will help you to better understand your test results. You can follow your M protein level after treatment to see if it's stable, increasing, or decreasing.

### Additional points:

- In about 1 out of 5 people with myeloma, the myeloma cells make only light chains and no complete M proteins. This is called light chain myeloma.
- In rare cases, the myeloma cells make very little or no M protein. This is called oligosecretory or nonsecretory myeloma.



The most common fracture site is in the bones of the spine (vertebrae). Fractures of the vertebrae can be very painful, although they can sometimes occur without any pain. Other common sites of bone damage from myeloma are the skull, hip bones, ribs, arms, and collarbone.

### **Fatigue and feeling weak**

Fatigue is severe tiredness despite getting enough sleep and rest. Fatigue, feeling weak, and “brain fog” (having trouble thinking clearly) can be symptoms of anemia. Anemia is a condition in which the number of red blood cells drops below normal, which means there are fewer red blood cells to deliver oxygen throughout the body. Anemia can be caused in part by too many myeloma cells crowding out red blood cells in the bone marrow.

### **Frequent infections and fevers**

Fever is a sign that your body is trying to fight off an infection. Frequent fevers and infections are symptoms of having low levels of normal antibodies and possibly too few white blood cells (infection-fighting cells). A low number of white blood cells can result from too many myeloma cells in the bone marrow.

### **Bruising or bleeding easily**

Platelets are a type of blood cell that help heal wounds and stop bleeding. They do this by forming blood clots. However, too many myeloma cells in the bone marrow can crowd out the cells that make platelets. Symptoms of having a low number of platelets (thrombocytopenia) include bruising or bleeding easily, such as having nosebleeds and bleeding gums. Myeloma cells can also produce large amounts of abnormal proteins, which can interfere with blood clotting.

### **Thirst and peeing frequently**

High levels of M proteins made by the myeloma cells can cause kidney damage. The kidneys are a pair of organs that filter blood to remove waste. This waste leaves the body when you pee. Increased or decreased urine output can be a symptom of kidney damage.

Calcium is a mineral needed for healthy bones. But when myeloma damages bones, the bones release their calcium into the bloodstream. High levels of calcium in the bloodstream (hypercalcemia) can also damage the kidneys. Worsening kidney function can further raise calcium levels, creating a vicious cycle. It can also cause symptoms of extreme thirst, confusion, nausea, constipation, muscle twitching, bone pain, or other related symptoms.

## **Can myeloma be cured?**

Currently, myeloma can't be cured, but it can be treated and controlled for a significant amount of time. New treatments have resulted in more long-term survivors of myeloma now than ever before. For an increasing number of people, myeloma is a chronic medical problem they learn to live with rather than a disease that they die from.

For many people, treatment can keep myeloma under control and reduce or stop symptoms. Standard treatments for multiple myeloma include targeted drugs, immunotherapy drugs, chemotherapy, radiation, and different types of cellular therapy including bone marrow transplantation. These treatments may be given as a combination of pills, injections, or an infusion given through an IV (intravenous line). Another option is

participating in a clinical trial of a potential new treatment.

Sooner or later, myeloma usually comes back and requires additional treatment. People with longstanding multiple myeloma can eventually become resistant to therapies, which makes the cancer more difficult to treat.

## Key points

- Myeloma is a cancer of plasma cells in the blood.
- Plasma cells make antibodies. Antibodies help fight infections and play a key role in bone repair.
- Myeloma cells make too many copies of themselves.
- Myeloma cells make abnormal antibodies called M proteins that don't help to fight germs.
- A single mass of myeloma cells in one location is called a solitary plasmacytoma.
- When myeloma cells clump into locations throughout the bone marrow and cause bone or organ damage, it's called multiple myeloma.
- Smoldering myeloma doesn't cause symptoms or organ damage.
- Active (symptomatic) myeloma causes symptoms by taking over bone marrow or causing organ damage. This can result in high blood calcium, kidney damage, anemia, and weakened or destroyed bones.
- Eventually, multiple myeloma usually returns at some point after treatment.



### Create a medical binder

A medical binder or notebook is a great way to organize all of your records in one place.

- ✓ Make copies of blood tests, imaging results, and reports about your specific type of cancer. It will be helpful if you want to get a second opinion.
- ✓ Choose a binder that meets your needs. Consider a zipper pocket to include a pen, small calendar, and insurance cards.
- ✓ Create folders for insurance forms, test types (blood, imaging, pathology, radiology, genetics), treatments, and procedures. Organize items in the folder by date.
- ✓ Use online patient portals to view your test results and other records. Download or print the records to add to your binder.
- ✓ Add a section for questions and to take notes.

Bring your medical binder to appointments. You never know when you might need it.

# 2

## Testing for myeloma

- 13 General health tests
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- 22 Key points

**If your doctor suspects that you have myeloma, you'll need several medical tests before you receive treatment. Some tests check your general health. Other tests are for diagnosing your illness. All of these tests help doctors figure out whether you need treatment and what type of treatment is best for you.**

Just the thought of cancer is scary. Having tests for cancer can be scary, too. This chapter will help you know what to expect during testing. Testing will provide a diagnosis, which will help to plan treatment. These steps can help put thoughts into action, which may reduce some of the fear.

Not every person with myeloma will receive every test listed here.

## General health tests

### Medical history

Your medical history includes all the health events in your life and any medications you've taken. A medical history is needed for planning your treatment. You'll be asked about any illnesses, injuries, and health problems you've had. Some health problems run in families. So, your doctor may also ask about the health of your blood relatives.

Myeloma often causes symptoms, and it's important that your doctor knows if you have

them. Symptoms may result from a shortage of healthy blood cells. Or, they may result from damage to the bones or from myeloma cells collecting in certain parts of the body. However, some people may have few or no symptoms at all.

### Physical exam

Doctors typically perform a physical exam along with taking a medical history. A physical exam is a "hands on" review of your body for signs of disease.

During this exam, your doctor will listen to your lungs, heart, and gut. Parts of your body will likely be felt to see if organs are of normal size, are soft or hard, or cause pain when touched. Your doctor will also look for signs of other problems such as bruising, swollen glands, muscle weakness, or numbness/tingling/pain in your hands or feet (neuropathy).

## Diagnosis vs. prognosis

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

- ✓ **Diagnosis** means identifying an illness based on tests. Your diagnosis names what illness you have.
- ✓ **Prognosis** is the likely course and outcome of a disease. It's based on tests and your response to treatment. Your prognosis predicts how your illness will turn out.

## Blood tests

Your blood can tell doctors a lot about your health. Blood tests can reveal signs of myeloma in your bloodstream. Blood tests and other initial tests help confirm (diagnose) myeloma.

Blood is made of red blood cells, white blood cells, and platelets. It also has many proteins and other chemicals. Different types of blood tests are used to measure these different substances in the blood.

Some blood tests are used to assess the extent or amount of cancer in your body. This is referred to as the tumor burden. Other tests are used to check the health of your bones, kidneys, and other organs. Blood tests may be repeated sometimes to check how well cancer treatment is working and to check for side effects.

For a blood test, a needle is inserted into your vein to remove a sample of blood. The blood sample is then sent to a lab for testing. At the lab, a pathologist will look at the blood sample on a glass slide under a microscope (peripheral blood smear). Pathologists are experts in examining cells for disease. They can see the blood cells in more detail. They may be able to observe myeloma cells in the blood to make a diagnosis of multiple myeloma.

Blood tests used for myeloma include:

### **CBC with differential**

A complete blood count (CBC) is a test that measures the number of blood cells in a blood sample. It includes the number of white blood cells, red blood cells, and platelets. The CBC should include a differential. The differential measures the different types of white blood

cells in the sample. For example, too few normal blood cells are made when myeloma cells take over the bone marrow.

### **Serum quantitative immunoglobulins**

This test measures the amount of antibodies (IgA, IgG, IgM, and sometimes IgD and IgE) in the blood. It shows if the level of any type of antibody is too high or too low. An abnormal level of a single antibody could indicate that it's growing out of control.

### **SPEP**

Serum protein electrophoresis (SPEP) is a test that measures the amount of M proteins in the blood. This test is used for both diagnosis and monitoring.

### **SIFE**

Serum immunofixation electrophoresis (SIFE) identifies which type of M proteins are in the blood. It finds the type of M proteins by showing which forms of heavy chains (IgG, IgA, etc.) and light chains (kappa or lambda) are present.

### **Serum free light chain assay**

This test measures the amount of free light chains in the blood. This test is helpful even when it isn't possible to measure the amount of M proteins in the blood or urine using electrophoresis. Serum free light chain assay is used for both diagnosing and monitoring myelomas.

### **Blood chemistry tests**

Blood chemistry tests measure the levels of different chemicals in your blood. Chemicals in your blood come from your liver, bone, and other organs and tissues.

**Guide 1****Blood chemistry tests used to detect multiple myeloma**

<b>Albumin</b>	Albumin is the main protein in blood plasma. Low levels of this protein may be a sign of advanced myeloma or another health condition.
<b>Beta-2 microglobulin</b>	Beta-2 microglobulin is a protein made by many types of cells, including myeloma cells. The amount of this protein in your body usually reflects how advanced your myeloma is.
<b>BUN</b>	Blood urea nitrogen (BUN) is a waste product made by the liver. It's filtered out of blood into urine by the kidneys. BUN is measured with a blood chemistry test. High levels in the blood may be a sign of kidney damage.
<b>Calcium</b>	Calcium is a mineral found in many parts of the body, but especially in bones. High levels of calcium in the blood may be a sign of myeloma destroying bone. Too much calcium in your blood (hypercalcemia) can damage your kidneys and cause symptoms of fatigue, weakness, and confusion.
<b>Creatinine</b>	Creatinine is waste that's filtered out of blood into urine by the kidneys. High levels of creatinine in the blood may be a sign of kidney damage. Creatinine clearance is a measure of how long it takes your kidneys to rid the waste product from your blood. This test involves taking a 24-hour sample of urine and comparing it to the level of creatinine in your blood. This test shows how well your kidneys are working.
<b>LDH</b>	Lactate dehydrogenase (LDH) is a protein made by many types of cells, including myeloma cells. High levels of LDH may be a sign of advanced myeloma.
<b>Uric acid</b>	Uric acid is one of the chemicals that can be released by dying cancer cells. Very high levels of uric acid and other chemicals in the blood can be very dangerous. It can cause serious damage to organs such as the kidneys.
<b>Electrolytes</b>	Electrolytes are minerals in the blood that are needed for organs to work well. The electrolytes include sodium, calcium, potassium, chloride, and bicarbonate. Abnormal levels of these chemicals may be a sign of kidney damage.
<b>Liver function</b>	Liver function tests measure the levels of certain enzymes and proteins in your blood. Levels that are higher or lower than usual may indicate liver disease or damage.
<b>Heart function</b>	Two proteins made by the heart—NT-proBNP and BNP—can be measured in the blood. High levels of these proteins may be a sign that your heart isn't pumping enough blood (heart failure).

Abnormal levels of certain chemicals in the blood may be a sign that an organ isn't working well. These abnormal levels can be caused by cancer or other health problems.

The blood chemistry tests used to help detect multiple myeloma are listed in **Guide 1**.

## Urine tests

Besides blood, urine also reveals signs of disease. Urine tests can be used to diagnose myeloma, assess if your kidneys are working well, and check the results of cancer treatments. Urine tests are also used to assess the tumor burden—the extent or amount of myeloma in your body.

### Total protein

Total protein is a test that measures the total amount and type of protein in urine. For this test, urine is collected over a 24-hour period. This test can show the amount of light chains in the urine. Testing 24-hour urine for protein helps to measure the tumor burden in people with myeloma cells that mainly or only make light chains. This test can also show if you're losing albumin, an important protein, through your kidneys.

### UPEP

Urine protein electrophoresis (UPEP) measures the amount of M proteins and light chains in the urine. High levels of light chains in the urine indicate a greater risk of kidney damage in people with myeloma. This test is used along with other initial tests when myeloma is first found. It may be repeated to check how well treatment is working.

### UIFE

Urine immunofixation electrophoresis (UIFE) is a test that identifies the type of M proteins and light chains present in urine. UIFE is given along with other initial tests when myeloma is first found. It may also be repeated after treatment to check how well treatment is working.

**“Myeloma is a cancer for which we have dozens of available treatment options. If we partner with skilled myeloma specialists to make intelligent treatment decisions, we can expect to live many years of quality life.”**



## Tissue tests

To confirm if you have cancer, a sample of tissue or fluid must be removed from your body for testing. This is called a biopsy. A biopsy is generally a safe test and can often be done in about 30 minutes.

### Bone marrow biopsy and aspiration

Myeloma cells are often found in the bone marrow, so that's where people with myeloma are biopsied. The sample is usually taken out of the pelvic bone (near the hip), which contains a large amount of bone marrow and is close to the surface of the body.

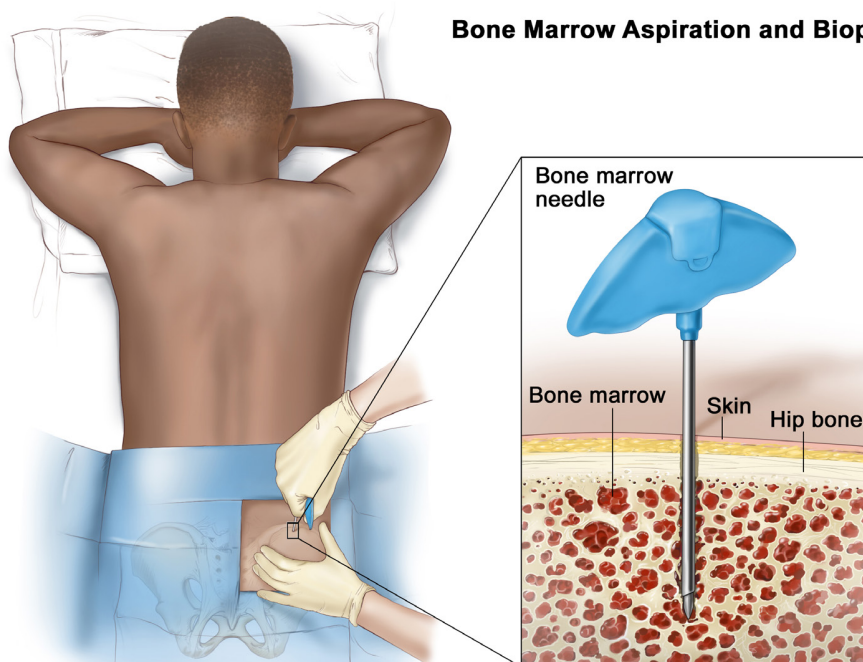
This is a two-part test that results in two samples. A bone marrow biopsy removes a small piece of solid bone along with a small amount of soft bone marrow inside the bone. A bone marrow aspiration removes a small amount of liquid bone marrow from inside the bone.

You may be given a light sedative before the test. Your provider will then clean the area of skin where the biopsy will be done. Next, you'll receive local anesthesia to numb the area of skin and bone beneath.

Once numb, a hollow needle will be inserted into your skin and then pushed into the bone to remove the liquid bone marrow with a syringe.

### Bone marrow biopsy

Doctors use a bone marrow biopsy and aspiration to remove samples of solid bone marrow and liquid bone marrow for testing. These samples are often removed at the same time on the pelvic bone.



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Then the needle will be inserted into the bone to remove the solid bone sample. You'll notice a feeling of pressure as this is happening and you might feel some pain while the samples are being removed. Afterward, your skin may be bruised for a few days. There's a small risk of bleeding or infection, but these aren't common.

### Lab tests

After the tissue samples are collected, they'll be sent to a lab for testing. A pathologist will view the samples under a microscope to look for myeloma cells. The pathologist may also perform other tests on the samples. It often takes several days before the test results are known. The lab tests that may be performed on the tissue samples are:

#### Immunohistochemistry/pathology review

This test is used to identify the number and the type of myeloma cells in the bone marrow. A diagnosis of myeloma can be made when at least 10% of the plasma cells (1 out of every 10 cells) in the bone marrow sample are myeloma cells.

#### Flow cytometry

This test can identify abnormal plasma cells in the bone marrow by detecting certain characteristic proteins on the outer surface of the cells. Flow cytometry isn't always done at diagnosis, but might be done after treatment to look for traces of myeloma.

#### FISH

Fluorescence in situ hybridization (FISH) testing looks for abnormal changes in the chromosomes of myeloma cells. Chromosomes are long strands of genes inside each cell that carry DNA—the body's "instruction manual." Identifying abnormal changes in chromosomes can help your

treatment team to better understand your diagnosis and prognosis, and to more precisely plan your treatment. Abnormal changes include deletions and additions to chromosomes, as well as translocations (swapping) of parts between chromosomes. FISH provides one of the important factors to determine whether myeloma can be considered standard risk or high risk.

High risk is associated with any of the following:

- Deletion of part or all of chromosome 17
- Translocation of part of chromosome 4 with part of chromosome 14
- Translocation between parts of chromosomes 14 and 16
- Translocation between parts of chromosomes 14 and 20
- Copies (duplication/amplification) or deletion of part of chromosome 1

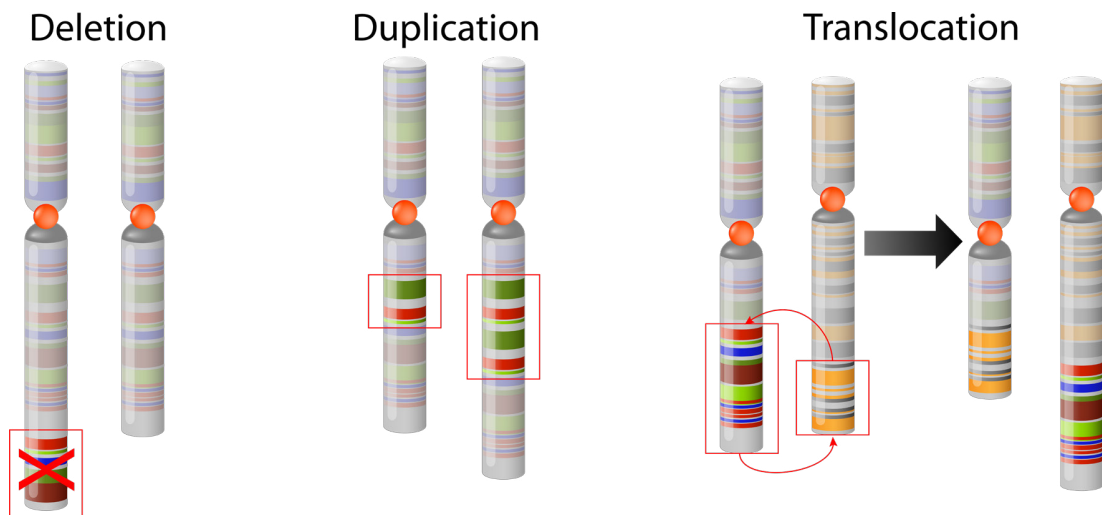


Hope is a huge part of the cancer process. Because if you lose that, you don't have the inner strength you need to fight."

## How abnormal changes in chromosomes affect myeloma

Chromosomes are made up of genes that carry DNA, the body's genetic instructions. Abnormal changes in chromosomes can disrupt a gene's function. An abnormality may cause genes to make too many or too few proteins, for example, leading to disease or illness.

Abnormal changes that are important in multiple myeloma include:



### Deletion

A loss of a part of a chromosome. For example, a deletion of all or part of chromosome 13 may indicate more aggressive myeloma.

### Duplication/amplification

A duplication is when part of a chromosome is repeated. An amplification is when those genes are duplicated multiple times. Amplification of a part of chromosome 1 (1q21) is linked with more aggressive myeloma.

### Translocation

A translocation is when part of one chromosome breaks off and switches places with part of another chromosome. For example, a translocation between part of chromosome 4 and part of chromosome 14 is associated with high-risk myeloma.

## Imaging tests

Imaging tests take pictures (images) of the inside of your body. These tests are often easy to undergo. You'll be asked to stop eating or drinking for several hours before the test. You should also remove any metal objects that are on your body.

Imaging machines are large and can be very noisy, so you might want to ask for ear protection. The loud, strange sounds in the machine are normal. When you're lying in the machine, it might seem to be very close to your face. It helps to close your eyes and relax while the machine is working. Let your health care provider know if you are claustrophobic or afraid of closed spaces. You may be given a mild sedative to help you relax.

Because myeloma cells may live inside any bone in your body, it's important that your whole body be scanned in order not to miss the diagnosis.

### Low-dose CT scan

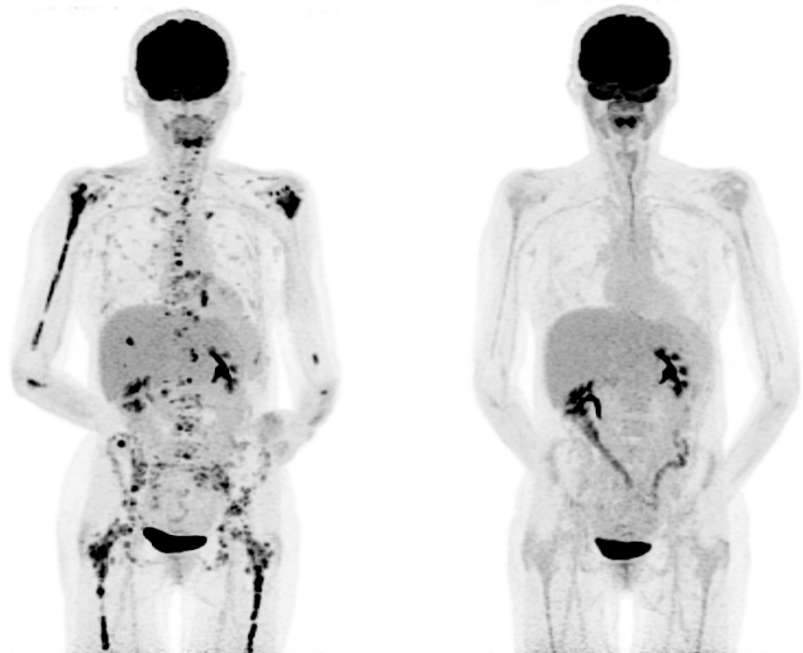
CT takes many pictures of a body part from different angles using x-rays. A computer combines all the pictures to make one clear picture. The amount of radiation used for this type of scan is much lower than standard doses of a CT scan.

A low-dose CT scan may be used to check the whole body. It can show whether or not lytic bone lesions are present. Lytic bone lesions look as if the bone has been eaten away. These lesions may cause pain and weaken the bones. Since bone lesions are common for people with multiple myeloma, an imaging test such as a whole-body low-dose CT scan is strongly recommended.

### PET scans

**These PET scans show a patient before (left) and after (right) CAR T-cell treatment for multiple myeloma.**

Image: National Cancer Institute



## PET/CT scan

PET and CT are two types of imaging tests. These tests are often done at the same time. When used together, it's called a PET/CT scan. A PET/CT scan may be done with one or two machines depending on the cancer center.

A whole-body PET scan is very good at showing where active myeloma is located in the body. It can also help show bone damage from myeloma.

To create images, a radiotracer first needs to be injected into your body through a vein. The radiotracer emits a small amount of energy that's detected by the PET scanner. The radiotracer makes myeloma cells appear brighter in the images. The most commonly used radiotracer is called FDG. NCCN experts recommend using FDG when PET/CT scans are being done.

## Bone survey

A bone survey uses x-rays to take pictures of your entire skeleton to look for broken or damaged bones. Bone surveys have mostly been replaced by CT scans, which show bone lesions much better than regular x-rays. However, whole-body x-rays may still be done at some medical centers if other imaging tests aren't available.

## MRI scan

MRI uses radio waves and powerful magnets to take pictures of the inside of the body. It makes images of bone and bone marrow. This type of scan may show abnormal areas where myeloma cells have replaced bone marrow. MRI is particularly useful for telling the difference between smoldering myeloma and multiple myeloma. Unlike CT or PET/CT, MRI doesn't expose the individual to any radiation.

### PET/CT scan

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



## Special tests used in certain cases

Not everyone requires every test. These tests are only used in certain circumstances:

### Plasma cell proliferation

This is a blood test that shows what percentage of the myeloma cells are dividing. A large number of dividing cells is a sign that the cancer is growing fast.

### Serum viscosity

Serum viscosity is a blood test that measures the thickness of your blood. A large amount of M proteins in your blood can make your blood very thick—a rare condition called hyperviscosity. Hyperviscosity is associated with myeloma that produces a higher number of immunoglobulins. This condition can lead to neurological symptoms, headaches, vision problems, bleeding, and damage to your kidneys and other organs.

### Echocardiogram

An echocardiogram is an ultrasound of the heart. It uses sound waves to make pictures. This test is used to check how well your heart is beating and pumping blood. An echocardiogram is sometimes needed because multiple myeloma symptoms and treatments can affect heart function in some people.

### Light chain amyloidosis

Amyloid is a rare protein found in people with abnormal plasma cells that make abnormally folded light chains. Amyloid can collect and build up in tissues and organs throughout the body. The buildup of amyloid, called amyloidosis, can damage organs such as

the heart and kidneys. Tests for light chain amyloidosis can be done on a sample of bone marrow, the fat pad (fat from just under the skin of the belly), or an organ that may have amyloid deposits in it.

## Key points

- ▶ Cancer tests are used to make a diagnosis, plan treatment, and check how well treatment is working.
- ▶ Your health history and a physical exam inform your doctor about your health.
- ▶ Blood and urine tests check for signs of disease.
- ▶ Tests of tissue or fluid from the bone marrow are used to confirm myeloma.
- ▶ Tests that take pictures of your whole body may show bone damage from myeloma. These pictures can also show spots of myeloma cancer growth that are outside of your bones.

# 3

## Overview of myeloma treatments

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**There's no single recommended treatment for multiple myeloma—there are many treatment options. You and your care team will work together to figure out the best treatment for you.**

## Standard treatment

Most people with myeloma receive a combination of several treatments. However, no one with myeloma will receive every treatment described in this chapter.

Standard treatment for multiple myeloma often involves a combination of three medications—sometimes called triplet therapy. This often includes:

- a targeted therapy
- an immunomodulator
- a corticosteroid

These aren't the only medications for multiple myeloma, though. Different types of therapies treat myeloma in different ways. **See Guide 2.** You may be given a chemotherapy drug instead of the immunomodulator, for example.

Some people may receive a four-drug treatment. Others who are frail may start with a two-drug treatment and step up to a three-drug treatment as they improve.

You'll also receive treatment to help relieve myeloma symptoms and the side effects of myeloma therapy. Participating in a clinical trial of a new drug is another treatment option.

In addition, standard treatment may be followed by a stem cell transplant or another therapy. Not every person with myeloma can have a stem cell transplant, though.

Here's a look at the medications used for standard treatment, starting with targeted therapy:

## Targeted therapy

Targeted therapy drugs identify specific features of cancer cells to find and attack them. Because these drugs target cancer cells, they're less likely to harm normal cells throughout your body. The two most common targeted therapy options to treat myeloma are proteasome inhibitors and antibody drugs, but a variety of medications are available:

- **Proteasome inhibitors** block the action of certain proteins (proteasomes) that allow myeloma cells to survive.
- **Monoclonal antibodies** are artificial antibodies that attach to proteins on cancer cells. Monoclonal antibodies invite other immune cells to attack cancer cells.
- **CAR T-cell therapy** is a treatment made from your own T cells. A T cell is a type of white blood cell that hunts and destroys cancer cells, infected cells, and other damaged cells. CAR T-cell therapy reprograms your natural T cells to enhance their ability to recognize and target cancer cells.
- **Small molecule inhibitors** are drugs whose molecules are so small, they can penetrate inside cancer cells. Once inside, a small molecule inhibitor targets proteins or other molecules that cause the cancer cell to die.

- **Nuclear export inhibitors** prevent proteins from leaving the nucleus of cancer cells, which stops the cancer cells from functioning.
- **Bispecific antibodies** are drugs that seek two targets. A bispecific antibody attaches to both T cells and to myeloma cells, bringing the cells together so that the T cells attack the myeloma cells.

### Side effects of targeted therapy

A side effect is an unhealthy or unpleasant physical or emotional condition caused by treatment. Each treatment for myeloma can cause side effects.

Common side effects of targeted therapy medications include fatigue, drowsiness, weakness, headache, chills, loss of appetite, nausea, vomiting, diarrhea, constipation, and fatigue. Some targeted therapies can also

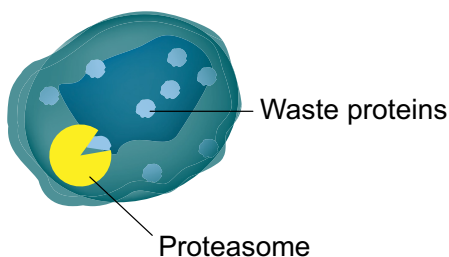
lower the level of important minerals in the body.

These medications may also reduce the number of red blood cells, white blood cells, or platelets. A low white blood cell count can increase the risk of infection. A low platelet count can increase the risk of bruising and bleeding. Other common side effects are blood clots, shortness of breath, skin rash, common cold, muscle aches, heart issues, and numbness or tingling in the hands or feet (called peripheral neuropathy).

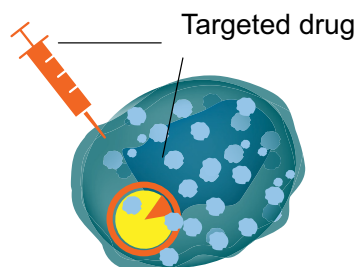
The reactions to treatment differ between people. Some people have many side effects while others have few. Some side effects can be very serious while others can be unpleasant but not serious. Most side effects appear soon after treatment starts and go away after treatment ends. Other side effects are long-term or may appear years later.

### How targeted therapy works: One example

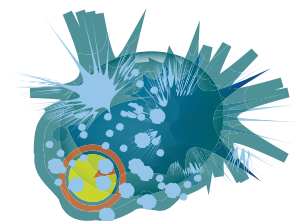
Targeted therapy drugs work in different ways. One way is by blocking a process that keeps the myeloma cell alive. One such process: Proteasomes that clear out waste proteins in myeloma cells.



But a targeted drug can block proteasomes from carrying out this process. If the proteasomes are halted, then the waste proteins build up inside the cells.



Eventually, the myeloma cells become overloaded with waste proteins and are destroyed.





## Guide 2 Medications for multiple myeloma

Brand name	Generic name	Type of treatment
Abecma	idecabtagene vicleucel	CAR T-cell therapy
Adriamycin	doxorubicin hydrochloride	chemotherapy
Alkeran	melphalan	chemotherapy
Bendeka	bendamustine	chemotherapy
Carvykti	ciltacabtagene autoleucel	CAR T-cell therapy
Cytosan	cyclophosphamide	chemotherapy
Darzalex	daratumumab	monoclonal antibody
Darzalex Faspro	daratumumab and hyaluronidase-fihj	monoclonal antibody
Decadron	dexamethasone	steroid
Deltasone	prednisone	steroid
Doxil	doxorubicin hydrochloride liposome	chemotherapy
Empliciti	elotuzumab	monoclonal antibody
Etopophos	etoposide	chemotherapy
Kyprolis	carfilzomib	proteasome inhibitor
Ninlaro	ixazomib	proteasome inhibitor
Platinol	cisplatin	chemotherapy
Pomalyst	pomalidomide	immunomodulator
Revlimid	lenalidomide	immunomodulator
Sarclisa	isatuximab-irfc	monoclonal antibody
Tecvayli	teclistamab-cqyv	bispecific antibody
Thalomid	thalidomide	immunomodulator
Treanda	bendamustine	chemotherapy
Velcade	bortezomib	proteasome inhibitor
Venclexta	venetoclax	small molecule inhibitor
Xpovio	selinexor	nuclear export inhibitor

The side effects of myeloma therapy depend on the drug and the dose. Some of the side effects are caused by several drugs but differ in how likely they are to occur. Other side effects are caused by only one type of drug. For example, side effects of CAR T-cell therapy include headaches, confusion, seizures, and a dangerous condition called cytokine release syndrome. This condition's side effects include fever, chills, nausea, headaches, racing heartbeat, low blood pressure, and trouble breathing.

Not all side effects of different targeted therapies are listed here. Be sure to ask your treatment team for a complete list of common and rare side effects. If a side effect bothers you, tell someone on your treatment team. There may be ways to help you feel better. There are also ways to prevent some side effects.

## Immunomodulators

Immunomodulators are a type of immunotherapy. Immunotherapy uses your body's immune system—your natural defense against infection and disease—to fight cancer. Immunomodulators spur specific parts of the immune system to find and attack cancer cells.

Immunotherapy treats cancer cells throughout the body. Treatment that affects the whole body is called systemic therapy.

Immunomodulators are oral drugs that are often prescribed for many months or even years.

### Side effects of immunomodulators

Immunomodulators may cause drowsiness, fatigue, constipation, rashes, low blood cell

counts, serious blood clots, and peripheral neuropathy. Immunomodulators can also lead to birth defects, so avoid becoming pregnant or getting someone pregnant while using them. Side effects are more common with thalidomide than with other immunomodulators.

## Steroids

Corticosteroids (often just called steroids) are used to relieve swelling and inflammation. Some steroids also have anti-cancer effects. Steroids can be used alone to treat myeloma or be used with chemotherapy, targeted therapy, or both. Steroids may be given as a pill, a liquid, or an IV injection.

### Side effects of steroids

Common side effects of steroids are feeling hungry, trouble sleeping, slow wound healing, upset stomach, and swelling in the ankles, feet, and hands. Steroids may also significantly increase blood sugar levels. Steroids make some people feel irritable and cranky. Changes in mood can happen from day to day.

Most side effects of steroids go away after the drugs are stopped. When used for a long time, steroids can lead to weakening of bones, thinning of skin, weight gain, muscle weakness, and increased risk of diabetes, cataracts, ulcers, and infections.

## Chemotherapy

Chemotherapy (or chemo) is a drug therapy for destroying cancer cells. Chemotherapy is a systemic (whole-body) therapy that kills fast-growing cells throughout the body. Cancer cells are fast-growing cells, but some normal cells are fast-growing too.

Different types of chemotherapy drugs work in different ways to kill cancer cells or stop new ones from being made. Many chemotherapy drugs are liquids that are slowly injected into a vein (IV infusion). Some are pills that are swallowed. The drugs travel in the bloodstream to treat cancer throughout the body.

Chemotherapy is given in cycles. Each cycle has days of treatment followed by days of rest. This allows the body to recover before the next treatment cycle. Cycles vary in length depending on which drugs are used. Often, the cycles are 14, 21, or 28 days long. The number of treatment days per cycle and the total number of cycles given also vary based on the chemotherapy used.

### Side effects of chemotherapy

Like other therapies, the side effects of chemotherapy depend on many factors. These include the drug, the dose, and the person. In general, side effects are caused by the death of fast-growing cells, which are found in the intestines, mouth, and blood. Some chemotherapy drugs can also cause damage to your bone marrow.

Common side effects of chemotherapy are nausea, vomiting, diarrhea, mouth sores, loss of appetite, hair loss, and low blood cell counts. Feeling very tired (fatigue) or weak is also common.

Not all side effects of chemotherapy are listed here. Be sure to ask your treatment team for a complete list of common and rare side effects. If a side effect bothers you, tell your treatment team. There may be ways to help you feel better. There are also ways to prevent some side effects.

**Seek out a cancer specialist, cancer center, or hospital experienced in treating people with multiple myeloma.**

**“Be your own advocate. Talk to someone who has gone through the same thing as you. Ask a lot of questions, even the ones you are afraid to ask. You have to protect yourself and ensure you make the best decisions for you, and get the best care for your particular situation.”**



## Stem cell transplant

Cancer and its treatment—especially when used in high doses—can damage and destroy cells in the bone marrow. A stem cell transplant replaces the damaged or destroyed cells with healthy stem cells. This is also called a stem cell rescue or a bone marrow transplant. (It's not like a heart or lung transplant. The rescue cells are given simply through an IV infusion.)

A stem cell transplant includes powerful chemotherapy to destroy cancerous cells in your bone marrow. Healthy bone marrow cells

that are wiped out in the process are then restored with healthy stem cells. Stem cells can develop into all types of mature blood cells. In a stem cell transplant, the stem cells grow new blood cells and bone marrow over time.

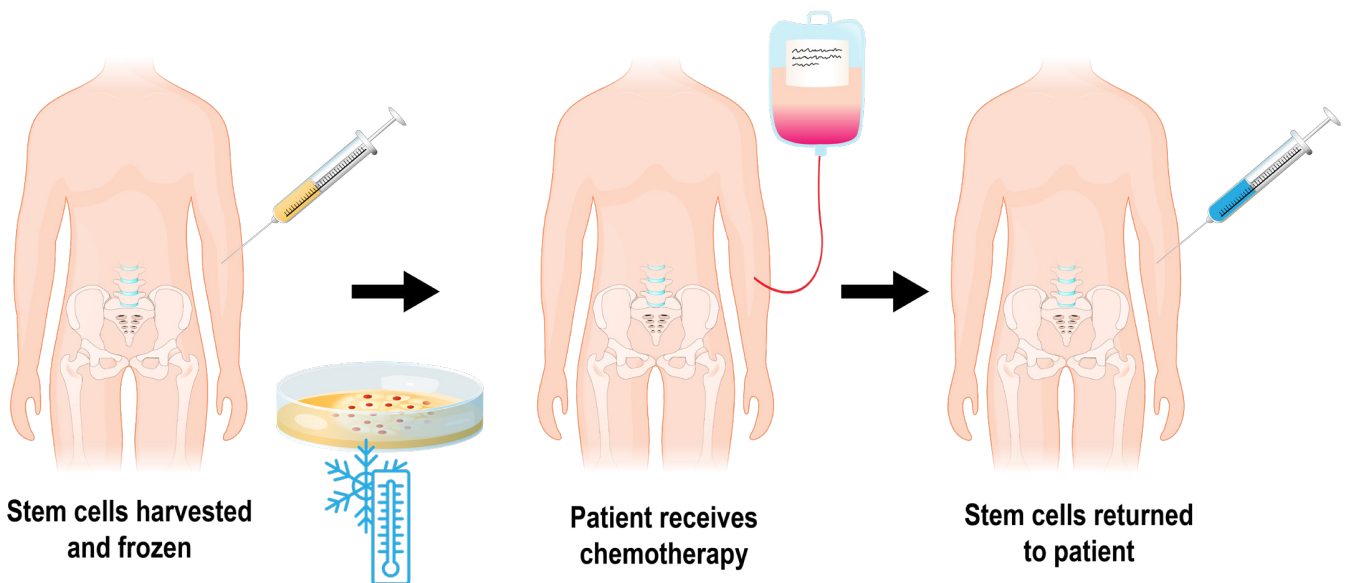
There are two main types of stem cell transplants. An autologous stem cell transplant uses your own blood stem cells to regrow bone marrow. An allogeneic stem cell transplant uses blood stem cells that come from another person (donor). Allogeneic stem cell transplants are much riskier and are now only

### Autologous stem cell transplant

**First, stem cells are removed (harvested) from the patient's blood or bone marrow.**

**Second, the harvested stem cells are concentrated and frozen for preservation. Meanwhile, the patient receives high-dose chemotherapy to destroy any myeloma cells in the bone marrow.**

**Lastly, the stem cells are returned (transfused) to the patient, where they'll grow healthy new cells in the bone marrow.**



given to people with multiple myeloma during clinical trials.

Autologous stem cell transplants are a common treatment for multiple myeloma, but they're not for everyone. A stem cell transplant is an intense treatment. Doctors consider many factors when deciding who will benefit from this procedure. Some of these factors include your fitness level, health status, vital organ function, cancer stage, previous treatments, other medical conditions, available supportive care, and additional factors—including your wishes.

A stem cell transplant is usually performed only after standard treatment has already been given. At some centers, people can receive an autologous transplant as an outpatient procedure, without an overnight stay.

Some people who aren't able to have a stem cell transplant at first may be able to have one if their condition improves after initial treatment. Be sure to discuss this with your care team or stem cell transplant specialist.

Here's a step-by-step description of an autologous stem cell transplant:

### **Collecting the stem cells**

The first step of an autologous stem cell transplant is to collect, or harvest, the blood stem cells. For myeloma treatment, blood stem cells are usually taken from the bloodstream. A few sessions may be needed to obtain enough blood stem cells. You may be given injections (shots) of growth factors beforehand to boost the amount of stem cells in your bloodstream and your bone marrow.

Your doctor or care team may recommend collecting stem cells to use for a transplant

now as well as additional cells for a transplant in the future if your myeloma comes back.

### **High-dose chemotherapy**

The next step is high-dose chemotherapy. This chemotherapy is given to destroy any myeloma cells in your bone marrow. But it also destroys normal cells in your bone marrow. This greatly weakens your immune system, leaving you very vulnerable to infections. You may have to stay in a special "clean room" in the hospital, receive antibiotics, or take other precautions to avoid infection for the next few weeks.

### **Replacing the stem cells**

A day or two after chemotherapy, your blood stem cells will be put back into your body with a transfusion. A transfusion is a slow injection of blood products into a large vein. This process can take several hours to complete.

The transplanted stem cells will eventually travel to your bone marrow and begin to grow. This is called engraftment. Depending on the type of transplant, it usually takes about 2 to 4 weeks for your bone marrow and blood cells to return to minimum safe levels. Until then, you will have little or no immune defense. It may take a few weeks or months for blood cells to fully recover so that your immune system is back to normal.

### **Side effects of stem cell transplant**

High-dose chemotherapy can result in nausea, vomiting, diarrhea, hair loss, and mouth sores. You'll likely feel tired and weak after the transplant and while waiting for the new blood stem cells to grow in the bone marrow. This

weak and unpleasant feeling might last for several weeks after you go home, too.

Autologous stem cell transplant is the most common type of transplant used for active multiple myeloma. But it's not considered a cure because the myeloma may come back (relapse) even after long periods of disease control (remission). A second stem cell transplant may be possible for some people who've been in remission for at least 2 years or more.

## Radiation therapy

Radiation therapy is a type of local therapy. Local therapy treats cancer cells only in a specific area of the body. In myeloma, radiation therapy is most commonly used to treat a painful area of bone damage or a plasmacytoma that's causing pain. Radiation therapy is sometimes used as the only treatment for a solitary plasmacytoma (a single mass of myeloma cells).

Radiation therapy involves a large machine that sends out high-energy rays to a specific area. The rays damage the genes in cancer cells. This either kills the cancer cells or stops new cancer cells from being made. Radiation therapy usually requires a series of treatments over several days or weeks.

### Side effects of radiation therapy

Side effects of radiation therapy differ among people. Side effects may not occur in the first few visits. Over time, you may have nausea or diarrhea. You may lose your appetite and may even lose weight during treatment. Patients often have fatigue that begins after the treatment has finished and can last for several

weeks. Other side effects occur in treated areas, such as redness of the skin or hair loss.

## Surgery

Surgery is an operation to remove or repair a part of the body. Surgery can be used to remove a solitary plasmacytoma located outside of the bone if it's causing symptoms and can't be treated with radiation alone. Surgery is rarely used to treat multiple myeloma, but it may be used to fix fractures in bones or stabilize a fracture in the vertebrae that may be affecting the spinal cord.

### Side effects of surgery

You may experience weakness, tiredness, or pain after the surgery. Other common side effects are swelling and surgical scars. Infections may occur occasionally.

## Clinical trials

A clinical trial is a type of medical research study. 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 of 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 I** 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 II** trials study how well the drug or approach works against a specific type of cancer.
- **Phase III** trials test the drug or approach against a standard treatment. If the results are good, it may be approved by the FDA.
- **Phase IV** trials study the long-term safety and benefit of an FDA-approved treatment.

### 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 specific ways and that the trial is as safe as possible for the participants.

### 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. 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 your participation in the clinical trial is voluntary, which means you can leave and seek treatment outside of the clinical trial at any time.



## 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](https://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)

## Start the conversation

Don't wait for your doctor to bring up clinical trials. Start the conversation and learn about all of your treatment options. 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



Without clinical trials, our treatment wouldn't change. It would always remain the same. Some people refer to clinical trials as receiving tomorrow's best treatment today."

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 medications) are almost never used alone in cancer clinical trials. It is common to receive either a placebo with a standard treatment or a new drug with a standard treatment. You will be informed, verbally and in writing, if a placebo is part of a clinical trial before you enroll.

#### Are clinical trials free?

There is 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 child care due to extra appointments. During the trial, you will continue to receive standard cancer care. This care is billed to—and often covered by—insurance. You are responsible for copays and any costs for this care that are not covered by your insurance.

## Adjunctive treatment and supportive care

Adjunctive treatment is another treatment given at the same time as the main (primary) cancer treatment. Adjunctive treatment is given to assist the main treatment by improving its safety or how well it works.

For myeloma, adjunctive treatment also includes supportive care. Supportive care helps to manage the symptoms of myeloma and the side effects of myeloma treatment. Supportive care is available at any stage of myeloma. It's an important part of your overall treatment.

Here are some ways to treat health problems caused by myeloma and myeloma treatment:

### Reducing bone damage

Multiple myeloma often weakens and destroys bones, a condition called osteoporosis. This can lead to problems such as bone pain, bone fractures, and compression of the spine. Medications are available to help strengthen bones and reduce the risk of bone problems, such as fractures.

Bisphosphonates are one type of medication that can improve bone health. Bisphosphonates lessen bone pain and help slow down the destruction of bone



caused by myeloma cells. They're given as a liquid that's injected into a vein (IV infusion). Bisphosphonates commonly used with multiple myeloma therapy include pamidronate disodium (Aredia) and zoledronic acid (Zometa). A different type of drug called denosumab (Xgeva) can also help prevent serious bone problems in people with multiple myeloma. Denosumab is given as a shot (injection) under the skin every 4 weeks.

NCCN experts recommend that either bisphosphonates or denosumab be given to anyone receiving primary treatment for myeloma. Denosumab is a better choice than bisphosphonates for people whose kidneys don't work very well.

Bisphosphonates and denosumab can cause side effects such as rotting of the jawbone in the mouth (osteonecrosis). So it's very important to see your dentist before starting this kind of treatment. It's also very important to have good dental care before and during treatment with these medications.

To help prevent or treat a bone fracture, you may be referred to an orthopedic surgeon. Surgeons can prevent bone fractures by placing a rod to support the bone and hold it in place. Surgery may also be used to treat fractures in the bones of the spine (vertebrae).

Two similar procedures that may be used are vertebroplasty and kyphoplasty.

### **Vertebroplasty**

Vertebroplasty is used to treat compression fractures in the vertebrae. A compression fracture is a break in a vertebra caused by the collapse of bones in the spine. This surgery involves injecting a type of cement into the vertebra. The cement supports and strengthens the bones for pain relief and to hold them in place.

### **Kyphoplasty**

Kyphoplasty is also used to treat compression fractures in the vertebrae. It involves a balloon-like device that's placed in the fractured vertebrae and then inflated. This spreads out the vertebrae to restore the normal shape and height of the spine. Then the balloon is removed and a type of cement is injected to support the vertebrae and hold them in place.

Bone damage can be painful. Radiation therapy can be used to treat this pain.

### **Decreasing kidney damage**

Myeloma cells cause calcium to be released from the bone into the bloodstream. A high level of calcium in the blood is dangerous for the kidneys. If this happens, you'll be treated with IV fluids and other drugs to help your kidneys flush out the calcium.

Very high levels of M proteins can cause the blood to become very thick. This is called hyperviscosity. Very thick blood can damage the kidneys and other organs. Hyperviscosity can be treated by a process called plasmapheresis. This treatment filters blood through a machine to remove the M proteins.

High levels of abnormal M proteins, including light chains, can also damage the kidneys. Free light chains combine with another protein in the kidneys. This makes the light chains become too large to pass through the kidneys. The damage caused by this blockage is called myeloma kidney. Prompt treatment of myeloma is required to prevent permanent kidney damage.

To prevent kidney failure, your doctor may recommend staying hydrated. This means drinking plenty of fluids, especially water. You'll also be told to avoid using certain medications like NSAIDs (such as ibuprofen and naproxen)

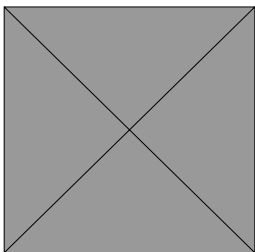
and IV contrast, which is often given before an imaging test. Your doctor will watch you closely for signs of kidney damage, especially if you're taking bisphosphonates for a long time.

## Treating anemia

Myeloma cells may crowd out the normal blood cells in the bone marrow. This can cause anemia—a condition in which the number of red blood cells is too low. With treatment of myeloma, anemia will improve. Sometimes anemia may be treated with a drug called erythropoietin. Erythropoietin helps the bone marrow to make more red blood cells.

Your doctor will measure your blood cell levels at different times during your care. You may also be given a “type and screen” test to make sure your red blood cells won't react to a donor's blood during a transfusion. This test should also be done before receiving treatment with daratumumab.

Read more about anemia at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.



## Avoiding infections

Myeloma and certain myeloma treatments can increase the risk of infection. But the risk of infection can be greatly reduced with vaccines for pneumonia and the flu—two infections that people with myeloma often get.

Another infection is shingles, which causes a painful skin rash. Shingles can be a side

effect of bortezomib, carfilzomib, ixazomib, and daratumumab. If you're receiving these myeloma treatments, you might also be given pills or shots to prevent shingles from starting.

If your immunoglobulin level is low, you may be given intravenous immunoglobulins to prevent frequent and serious infections.

## Preventing blood clots

People with myeloma have a much higher risk of forming blood clots in their bodies, particularly in the first 6 months after being newly diagnosed with myeloma. A blood clot that travels to the lungs, heart, or brain can be dangerous, even deadly.

Some drugs used for treating myeloma—particularly immunomodulatory drugs like thalidomide, lenalidomide, pomalidomide, and carfilzomib—have a greater chance of causing blood clots. If these drugs are used, then you may also need anti-clotting treatment with blood thinners or antiplatelet drugs.

Blood thinners are medications that thin out the blood to lower the risk of blood clots. NCCN experts recommend taking either blood thinners or aspirin (an anti-platelet drug) while being treated for myeloma, depending on your risk of clotting. This is a complex decision that must compare the risks for clotting against the risks for bleeding, both of which may occur at the same time in people with myeloma.

Be sure to talk with your care team about preventing blood clots before taking any new medication—even a drug such as aspirin.

## Fighting fatigue

Fatigue is a common problem for people with multiple myeloma. Fatigue is tiredness despite getting enough sleep. Fatigue may be due to

your cancer, your cancer treatment, or another medical problem. Learning how to conserve energy may help.

Exercise can also lessen fatigue. Plus, exercise is critical for staying healthy. If you need help, ask to be referred for physical therapy. Almost every person with myeloma can do some sort of exercise.

### Reducing anxiety and depression

Anxiety and depression are very common in people with cancer. These emotions can be overwhelming. They can leave you feeling helpless and prevent you from taking part in your daily life.

Medication, talk therapy, and exercise are some ways to lessen these symptoms. You shouldn't "tough it out." If you're feeling depressed or anxious, be sure to ask your treatment team for help. Your treatment team may recommend seeing a therapist or mental health professional to help you with these symptoms.

## Key points

- Myeloma treatment most often involves a combination of several treatments.
  - Targeted therapy drugs are aimed at specific or unique features of cancer cells.
  - Immunotherapy uses your body's natural defenses against infection and disease to destroy cancer cells.
  - Chemotherapy drugs kill fast-growing cells, including both cancer cells and normal cells.
- A stem cell transplant replaces damaged or diseased cells in the bone marrow with healthy stem cells. It also involves high-dose chemotherapy to wipe out any remaining myeloma cells in the body.
  - A clinical trial studies a test or treatment to see how safe it is and how well it works.
  - Adjunctive treatment for the symptoms of myeloma and the side effects of treatment is very important.
  - Blood clots can be very dangerous in people with multiple myeloma. Ask your care team about treatment to prevent blood clots.



**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)

# 4

## Primary treatment

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- 44 Smoldering myeloma
- 44 Key points

**The previous chapter discussed the many treatment options for multiple myeloma. This chapter explains how the treatment process will begin for you.**

Primary treatment is the first treatment used to rid the body of cancer. Adjunctive treatment and supportive care are also important parts of the overall care for anyone with cancer.

This chapter outlines primary treatment for active multiple myeloma, solitary plasmacytoma, and smoldering myeloma:

- **Active multiple myeloma** is when myeloma cells are found in many sites throughout the bone marrow. It can cause bone lesions, organ damage, and many symptoms. Active multiple myeloma needs to be treated.
- **Solitary plasmacytoma** consists of a single mass of myeloma cells in bone or soft tissue. It often causes bone pain or fractures. Solitary plasmacytoma requires treatment to the affected area.
- **Smoldering myeloma** isn't active, doesn't cause any symptoms or organ problems, and rarely needs treatment.

## Active multiple myeloma

Multiple myeloma that's causing symptoms is called active or symptomatic multiple myeloma. Treatment focuses on both fighting the cancer as well as relieving symptoms.

There are a number of good treatments for active myeloma—and new ones are being

developed all the time. Your specific treatment will depend on the extent or aggressiveness of the myeloma, your health, your related symptoms, and other considerations.

Your treatment team will first try therapy that has shown the greatest chance of success in people whose myeloma is like yours. This is called primary treatment. If primary treatment doesn't reduce myeloma, you can have additional treatment.

### Primary treatment

Primary treatment for active (symptomatic) myeloma usually includes several treatments given during the same time:

- **Standard therapy** is a combination of three (or sometimes four) drugs to attack and destroy myeloma cells. A common three-drug combination includes a targeted therapy, an immunomodulator, and a steroid. **See Guide 3.** Individuals who aren't able to take a three-drug combination can start with two medications.
- **Bone-building therapy** strengthens bones and protects them from damage.
- **Adjunctive treatment and supportive care** can ease the symptoms of myeloma and the side effects of myeloma treatment.

The choice of primary treatment depends on whether stem cell transplant might be part of your treatment plan. Some drugs, such as chemotherapy drugs, can cause severe damage to healthy cells in your bone marrow. This makes it more difficult to harvest stem cells for a transplant. If you're likely to have a stem cell transplant later, then chemo drugs aren't recommended for primary treatment.

### Guide 3

#### Medication combinations for primary treatment

There are many triplet therapy combinations available for standard therapy. Sometimes even four medications are used. Each combination often—but not always—includes a targeted therapy medication, an immunotherapy medication, and a steroid.

Treatment may differ based on whether or not you're likely to receive a stem cell transplant. Your treatment team will consider all your health factors and the status of your myeloma to determine the right choice of treatment for you.

These are some of the commonly preferred or recommended combinations for primary treatment, but others are also available:

Primary treatment options if getting a stem cell transplant	Primary treatment options if <i>not</i> getting a stem cell transplant
<ul style="list-style-type: none"> <li>bortezomib, lenalidomide, and dexamethasone</li> </ul>	<ul style="list-style-type: none"> <li>bortezomib, lenalidomide, and dexamethasone</li> </ul>
<ul style="list-style-type: none"> <li>carfilzomib, lenalidomide, and dexamethasone</li> </ul>	<ul style="list-style-type: none"> <li>daratumumab, lenalidomide, and dexamethasone</li> </ul>
<ul style="list-style-type: none"> <li>daratumumab, lenalidomide, bortezomib, and dexamethasone</li> </ul>	<ul style="list-style-type: none"> <li>daratumumab, bortezomib, melphalan, and prednisone</li> </ul>
	<ul style="list-style-type: none"> <li>daratumumab, bortezomib, cyclophosphamide, and dexamethasone</li> </ul>
	<ul style="list-style-type: none"> <li>carfilzomib, lenalidomide, and dexamethasone</li> </ul>
	<ul style="list-style-type: none"> <li>ixazomib, lenalidomide, and dexamethasone</li> </ul>

#### Adjunctive treatment

Primary treatment for myeloma also includes adjunctive treatment. Adjunctive treatment assists primary treatment by improving its safety or how well it works. Adjunctive treatment includes supportive care to manage the symptoms of myeloma and the side effects of myeloma treatment.

Adjunctive treatments are recommended based on the symptoms and side effects you have:

- Medication, radiation therapy, or surgery to reduce bone pain
- Medication to lower high calcium levels
- Plasmapheresis to reduce hyperviscosity

- Erythropoietin to treat anemia
- Vaccines and medications to prevent and treat infections
- Intravenous immunoglobulin to reduce infections
- Intravenous fluids and other treatment to reverse kidney damage
- Blood thinners to reduce the risk of developing blood clots

Bone damage from myeloma is very common, so treatment with bisphosphonates or denosumab is recommended. For people whose kidneys don't work well, denosumab is a better choice than bisphosphonates.

Medications such as thalidomide, lenalidomide, pomalidomide, and carfilzomib can cause serious blood clots. If these drugs are part of your primary treatment, then you may also need blood thinners. Blood thinners are medications that lower the chances of getting a blood clot.

Other adjunctive treatments may be given as symptoms of myeloma or side effects of treatment appear.

## Testing for stem cell transplant

In addition to standard therapy, stem cell transplantation may be a major part of your treatment. So, your care team wants to know as early as possible if you can have a stem cell transplant. Testing for a stem cell transplant is done soon after you begin primary treatment.

The transplant itself, which includes high-dose chemotherapy, usually occurs right after completing primary treatment. Sometimes people with myeloma have their stem cells collected and stored for a transplant at a later time or for a second transplant in the future.

## Follow-up tests

In addition to tests to see if you can have a stem cell transplant, other tests are done to see if the treatment is working or if the disease is getting worse (progressing). Many of the tests used for follow-up are the same ones used to diagnose myeloma.

Common follow-up tests include:

- Blood tests such as CBC with differential, platelet count, and others
- Serum free light chain assay
- Whole-body MRI, low-dose CT scan, or FDG PET/CT scan

Less common tests, if needed, include:

- Serum quantitative immunoglobulins, SPEP, and SIFE
- 24-hour urine testing for total protein, UPEP, and UIFE
- Bone marrow aspirate and biopsy with FISH

Follow-up tests indicate whether the treatment has had an effect on the cancer. This is called treatment response.

## Treatment response

A treatment response (also called a remission) is a measurable improvement caused by treatment. **See Guide 4.** The response is defined by how well treatment destroys myeloma cells or reduces bone lesions. Symptoms also usually improve with a response to treatment.

How well your myeloma responds to primary treatment can determine your next step. It may indicate you're ready for a stem cell transplant or maintenance therapy.

Another outcome is when myeloma responds to treatment, but then comes back months or years later. This is called a recurrence or relapse. People with longstanding multiple myeloma can eventually become resistant to therapies, which makes the cancer more difficult to treat.

Multiple myeloma that doesn't respond to treatment is called progressive disease.

### Stem cell transplant

Treatment for active myeloma may or may not include a stem cell transplant. A stem cell transplant isn't a treatment option for everyone. This treatment destroys cells in the bone marrow with chemotherapy and then replaces them with healthy blood stem cells. Your care team will look at a number of factors to decide if it's the right choice for you.

If your doctor thinks you'll have an autologous stem cell transplant, then your stem cells will be removed (harvested) after 4 to 6 cycles of primary treatment, when the number of myeloma cells is low. When possible, enough stem cells should be collected for two transplants. This is done in case you have a second transplant as later treatment.

After the stem cell transplant, you'll have follow-up tests to check for a treatment response. Tests to measure the level of M proteins in your blood and urine should be done at least every 3 months.

### Maintenance therapy

You'll be offered maintenance therapy after an autologous stem cell transplant or other therapy. Maintenance therapy is medication that's given less often or in lower doses to keep (maintain) the good results of prior treatments.

The preferred maintenance treatment following autologous stem cell transplant is lenalidomide. Other maintenance options are bortezomib or daratumumab. In certain high-risk cases, maintenance therapy includes lenalidomide plus carfilzomib or bortezomib, with or without dexamethasone.

Be sure to discuss with your care team the benefits and risks of taking maintenance therapy. One risk, for instance, is that maintenance therapy (especially with lenalidomide) slightly increases the risk of developing another cancer.

#### Guide 4 Possible results of primary treatment

<b>Remission</b>	When the signs and symptoms of cancer decrease or disappear. Remission may be partial or complete.
<b>Relapse</b>	When cancer comes back after being in remission for a while.
<b>Progression</b>	When the cancer doesn't improve or becomes worse after treatment.

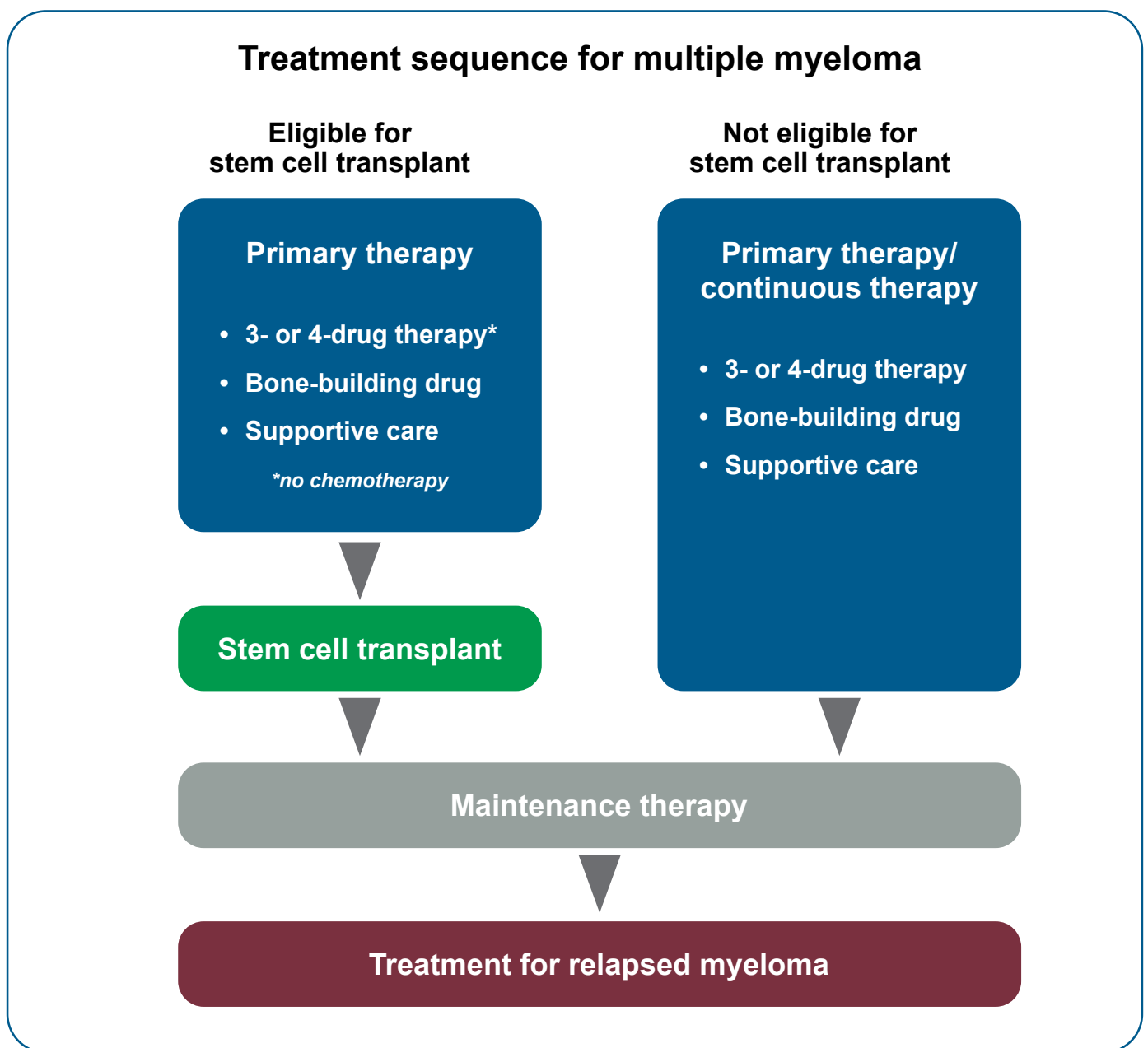


### Continuous therapy

If you aren't able to have a stem cell transplant, or you don't want a transplant right away, then another option is to continue having primary treatment. With this option, primary treatment is given until no further improvement is seen on follow-up tests.

### More follow-up tests

After a stem cell transplant, or during maintenance or continuing therapy, you'll have more follow-up tests to determine whether the myeloma is getting worse or getting better. These tests also check whether your treatments are having any harmful (toxic)



effects on your body. Many of these follow-up tests will be the same ones you've had before.

Even with the best treatment, multiple myeloma often comes back (relapses) after primary treatment. If your multiple myeloma relapses or progresses, you'll receive additional therapy that's different from your primary treatment. Read about additional treatment in Chapter 5.

## Solitary plasmacytoma

A solitary plasmacytoma is a single mass of myeloma cells in a bone or soft tissue. A solitary plasmacytoma is a type of active myeloma.

A person with a solitary plasmacytoma who has 10% or more abnormal plasma cells in the bone marrow is considered to have multiple myeloma. The following treatment is specifically for people who have solitary plasmacytoma, not multiple myeloma.

### Primary treatment

Because there's only one cancer mass, treatment for solitary plasmacytoma requires only local therapy. Local therapy treats a specific area or part of the body, not the whole body. For a solitary plasmacytoma, local therapies include radiation and sometimes surgery. Radiation may be given as primary treatment with or without surgery. In some cases, systemic therapy is given to people who have a high risk of developing multiple myeloma.

### Clinical trial

A clinical trial is also a primary treatment option for people with solitary plasmacytoma. An NCCN panel of myeloma experts encourages

people with solitary plasmacytoma to consider joining a clinical trial.

### Follow-up tests

After primary treatment, people with solitary plasmacytoma should have follow-up tests every 3 to 6 months. Blood tests are necessary at each follow-up visit. Imaging should be done on an annual basis. Other follow-up tests are given as needed. Regular follow-up testing is key to detect signs of progression to multiple myeloma.

**“People assume that when treatment is finished, cancer is finished. It is not that simple. The people around you return to their normal routines, but your life is forever changed.”**



## Progressive disease

If follow-up tests indicate that the plasmacytoma is progressing even after treatment, then further testing is necessary. This includes all the tests required for diagnosing multiple myeloma.

It's important to know that about half of people with solitary plasmacytoma never progress to multiple myeloma.

## Smoldering myeloma

Myeloma that isn't causing symptoms is called smoldering myeloma. Smoldering myeloma often takes months or years to turn into active multiple myeloma. For this reason, treatment isn't usually needed right away. In some cases, though, smoldering myeloma is treated anyway if it appears that it will soon turn into active myeloma.

## Observation

Observation without treatment is an option for some people with smoldering myeloma. Observation means that your doctor will watch for cancer growth with regular follow-up tests.

## Clinical trial

A clinical trial is a preferred primary treatment option for people with smoldering myeloma. An NCCN panel of myeloma experts strongly encourages people with smoldering myeloma to enroll in a clinical trial if one is open and is the right fit.

## Follow-up tests

Many of the tests used for follow-up are the same as those used to confirm active myeloma and assess symptoms. During observation,

you should have follow-up tests every 3 to 6 months to check the status of smoldering myeloma to see if treatment is needed.

## Progression

If smoldering myeloma grows and starts causing symptoms, that means it has progressed to active (symptomatic) myeloma. From this point, it should be tested and treated as multiple myeloma.

## Key points

- Treatment for active multiple myeloma focuses on fighting the cancer as well as relieving symptoms.
- The choice of medication used for primary treatment of multiple myeloma depends on whether an autologous stem cell transplant is part of your overall treatment plan.
- Adjunctive treatment for multiple myeloma includes supportive care to manage myeloma symptoms and side effects of treatment.
- Maintenance therapy is given less often or in lower doses than primary therapy. Its goal is to keep up the good results of previous treatment.
- Treatment for solitary plasmacytoma usually requires only local therapy to treat the single cancer mass.
- Treatment for smoldering myeloma isn't usually needed right away because it doesn't show symptoms and often takes months or years to turn into active multiple myeloma.

# 5

## Additional treatment

- 46 Progression
- 46 Relapse
- 46 Treatment for relapse or progression
- 49 Revisiting your goals and preferences
- 50 Key points

**The previous chapter discussed the many options for primary treatment. This chapter explains the treatment options available after primary treatment.**

Primary treatment is the first treatment used to rid the body of cancer. Additional treatment is used when myeloma progresses or relapses after primary or other treatment.

## Progression

Progressive disease means that the myeloma has remained or has grown even with treatment. This growth could be indicated by different test results, such as:

- an increase in M proteins in your blood or urine
- an increase in plasma cells in your bone marrow
- an increase in the number or size of bone lesions

Having progressive disease doesn't mean you're out of treatment options. Your doctors will suggest trying something new, such as a different combination therapy or a clinical trial.

## Relapse

A relapse is when cancer improves after treatment, but then returns. Most people with multiple myeloma can expect to have multiple relapses over the course of their treatment. The fear of having a relapse is likely the most common psychological difficulty that occurs

after cancer treatment. So, stressing out about a relapse is understandable. If this kind of stress is bothering you, ask your care team for help.

A relapse can happen within a few months or up to years after starting different treatments. Signs of a myeloma relapse are when monoclonal protein increases, symptoms come back, or new symptoms begin. A relapse can sometimes cause worse symptoms than when the myeloma first appeared. Worse symptoms can be a sign of more aggressive cancer.

Fortunately, there are many treatment options for multiple myeloma, even if it has relapsed.

## Treatment for relapse or progression

Additional treatments for relapsed or progressive multiple myeloma include clinical trials, medications you haven't tried before, stem cell transplant, and possibly CAR T-cell therapy. **See Guide 5.**

### Clinical trial

A clinical trial is a treatment option for many people with multiple myeloma. Clinical trials give people access to treatment options that they couldn't usually receive otherwise. Ask your treatment team how to join a clinical trial. Joining a clinical trial becomes ever more important for someone who has relapsed myeloma.

### Medications you haven't tried

Additional treatment includes medications or therapies that you haven't already tried or that you haven't used for at least 6 months. A variety of options are available for previously

treated multiple myeloma, depending on which therapies you've already tried and how well they worked. Preferred triplet combinations for previously treated multiple myeloma are listed in **Guide 6**.

Talk to your treatment team about which treatment options are available to you. They can explain the reasons for choosing one combination of medications over another. And they can discuss the side effects that may occur. Some therapies may put you at risk for serious side effects. Certain medications are stronger than others and may be harmful to people who are frail or elderly. Some drugs are given only after you've had at least 1 to 4 prior treatments.

Your care team will consider these things, along with the extent of your disease, before deciding on your next treatment. It's important

to discuss these factors, and your treatment goals, with your care team to decide the best option for you.

### If treatment stops working

Sometimes a treatment doesn't work against a person's cancer. Or, the treatment works at first but then the cancer becomes resistant (refractory) to it over time. When resistance happens, a different medication—or a different combination of medications—can be tried in place of the resistant one. For example, if myeloma becomes refractory to bortezomib, then this triplet combination:

- *bortezomib*, lenalidomide, and dexamethasone

can be switched to:

- *daratumumab*, lenalidomide, and dexamethasone

For a person with advanced multiple myeloma, resistance can become a serious problem. A person's cancer can become resistant to several medications or even entire drug classes. This level of resistance can make it more difficult to keep the cancer under control. However, there will likely be one or more other therapies and medications still available, depending on the person, their cancer, and various other factors.

When at least 3 or more other therapies have been tried, these medications and combinations may be used for relapsed or resistant multiple myeloma:

- bendamustine
- bendamustine, bortezomib, and dexamethasone
- bendamustine, carfilzomib, and dexamethasone

## Guide 5 Treatment options for relapsing or progressive multiple myeloma

### Clinical trial

### Triplet combination for previously treated multiple myeloma

### Stem cell transplant

#### Also consider:

- CAR T-cell therapy
- Supportive care
- Revisiting treatment goals and preferences

- › bendamustine, lenalidomide, dexamethasone
- › high-dose cyclophosphamide
- › sequentially dosed (fractionated) cyclophosphamide
- › teclistamab-cqyv
- › selinexor and dexamethasone
- › idecabtagene vicleucel and ciltacabtagene autoleucel

### Stem cell transplant

An autologous stem cell transplant may be an option for someone who hasn't already had one. An autologous stem cell transplant is also sometimes an option for someone with relapsed or progressive multiple myeloma who had a long-lasting response (usually at least 2 years or more) to an earlier stem cell transplant.

#### Guide 6

#### Triplet combinations for additional treatment

**There are many medication combinations for previously treated multiple myeloma. Some of the more common triplet combinations are:**

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ixazomib, lenalidomide, and dexamethasone

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bortezomib, lenalidomide, and dexamethasone

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daratumumab, lenalidomide, and dexamethasone

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carfilzomib, lenalidomide, and dexamethasone

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daratumumab, bortezomib, and dexamethasone

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daratumumab, carfilzomib, and dexamethasone

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isatuximab-irfc, carfilzomib, and dexamethasone

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daratumumab, pomalidomide, and dexamethasone

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isatuximab-irfc, pomalidomide, and dexamethasone

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pomalidomide, bortezomib, and dexamethasone

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carfilzomib, pomalidomide, and dexamethasone

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ixazomib, pomalidomide, and dexamethasone

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Other recommended combinations are available for use in specific cases.

## CAR T-cell therapy

For some people with relapsed or progressive myeloma, CAR T-cell therapy may be an option. CAR T-cell therapy is a special type of immunotherapy. It changes some of your body's immune cells (T cells) to help them better find and kill cancer cells.

To create CAR T cells, immune cells are first removed from your blood. Next, the cells are modified in a lab to grow chimeric antigen receptors (CARs) on their surface. These CAR T cells are multiplied in the lab and then injected back into the body. Once in circulation, the CAR T cells have an improved ability to identify a specific antigen on cancer cells and then destroy those cells.

CAR T-cell therapy is a relatively new and potentially risky treatment. It's only given to people who've tried at least four other therapies. The two CAR T-cell therapies available for multiple myeloma are Abecma (idecabtagene vicleucel) and Carvykti (ciltacabtagene autoleucel).

## Supportive care

If tests show progressive disease during or after additional treatment, then supportive care is also recommended. There are many types of supportive care (sometimes called palliative care). Supportive care is given to relieve the symptoms of cancer and the side effects of cancer treatment. It doesn't treat the cancer, but it aims to improve your quality of life.

Supportive care includes pain relief, emotional or spiritual support, financial guidance, and family counseling. Supportive care is available at any stage of cancer, not just when cancer has advanced. Ask your care team if you want any type of supportive care.

## Revisiting your goals and preferences

It's important to have regular talks with your care team about your goals for treatment and your treatment plan. Your treatment plan may change because of new information. Tests may find new results. How well the treatment is working may change. Or, you may change your mind about treatment. Any of these changes will require a new treatment plan.

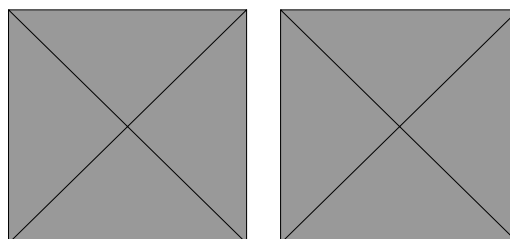
Myeloma is a cancer that tends to come back again over time, regardless of treatment. So be prepared to revisit your treatment goals and personal preferences.

## Survivorship

Survivorship focuses on the health and well-being of a person with cancer from diagnosis until the end of life. This includes the physical, mental, emotional, social, and financial effects of cancer that begin at diagnosis, continue through treatment and recovery, and arise afterward.

Survivorship also includes concerns about follow-up care, late effects of treatment, cancer recurrence, and quality of life. Support from family members, friends, and caregivers is also an important part of survivorship.

Read more about survivorship at [NCCN.org/patientguidelines](https://www.nccn.org/patientguidelines) and on the [NCCN Patient Guides for Cancer](#) app.





## Advance care planning

Advance care planning means making decisions now about the care you would want to receive if you became unable to speak or act for yourself.

Advance care planning is for everyone, not just for those who are very sick. It's a way to ensure your wishes are understood and respected. You can change your plan at any time.

Advance care planning starts with an honest conversation with your doctor. Ask your doctor about your prognosis—the course your cancer will take. Find out what you might expect if your cancer spreads. Discuss the medications or therapies that will give you the best quality of life.

Include family and friends in your advance care planning. Make your wishes clear. It's important that everyone understands what you want.

## Key points

- A relapse is when symptoms come back or new symptoms begin after a period of improvement.
- Most people with multiple myeloma can expect to have relapses.
- Progression is when myeloma continues to grow even after treatment.
- Drug resistance is when a treatment doesn't work or stops working against cancer.
- Cancer can become resistant to a number of medications or even entire drug classes.
- Because your treatment plan may change, it's helpful to have regular talks with your care team about your goals for treatment.
- Myeloma is a cancer that tends to come back again over time, regardless of treatment.
- Supportive care is given to relieve the symptoms of cancer and the side effects of cancer treatment.
- Advance care planning means making decisions now about the care you would want to receive if you were unable to speak or act for yourself.

# 6

## Making treatment decisions

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- 53 Questions to ask
- 57 Resources

**It's important to be comfortable with the cancer treatment you choose. This choice starts with 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 your options and share your 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 ignored, there is generally 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!

Seek out a myeloma specialist, if you can, because they have experience diagnosing and treating a lot of people with myeloma.

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 doctors who are not part of your insurance plan.
- Make plans to have copies of all your records sent to the doctor you will 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 websites listed at the end of this book.

## Questions to ask

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. Be clear about your goals for treatment and find out what to expect from treatment. Keep a notebook handy to jot down the answers to your questions.

### Questions to ask about testing and staging

1. Can my myeloma be cured? If not, how well can treatment stop it from growing?
2. What tests will I have? How do I prepare for testing?
3. Where do I go to get tested? How long will the tests take? Will any test hurt?
4. What if I'm pregnant or planning to get pregnant?
5. How often are these tests wrong?
6. Should I bring someone with me? Should I bring a list of my medications?
7. How soon will I know the results and who will explain them to me?
8. Would you give me a copy of the pathology report and other test results?
9. Will my tumor or biopsy tissue be saved for further testing? Can I have it sent to another facility for additional testing?
10. Who will talk with me about the next steps? When?

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## Questions to ask 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. How many patients like me have you treated?
3. Will the treatment hurt?
4. What will happen if I do nothing?
5. How do my age, overall health, and other factors affect my options?
6. Are my chances any better for one option than another? Less time-consuming? Less expensive?
7. How do you know if my treatment is working? What are my options if treatment stops working?
8. What are the short- and long-term side effects of treatment? What can be done to prevent or relieve the side effects?
9. How will treatment affect me? Will my sense of smell or taste change? Will my hair fall out?
10. Can I stop treatment at any time? What will happen if I stop treatment?

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## Questions to ask about getting treatment

1. Do I go to the hospital or somewhere else for treatment? How often? How long is each visit?
2. What if I have to travel for treatment?
3. Do I have a choice of when to begin treatment? Can I choose the days and times of treatment?
4. How do I prepare for treatment? Do I have to stop taking any of my medicines? Are there foods I should avoid?
5. Can I bring someone with me when I get treated?
6. How much will the treatment cost? What does my insurance cover? Are there any grants available to me? What can I do if the treatments are too expensive?
7. Who can I call when you're off duty? Should I go to the emergency room?
8. Will I be able to return to my normal activities? If so, when?
9. What emotional and psychological help is available for me and for those taking care of me?

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## Questions to ask about clinical trials

1. Are there clinical trial options for me?
2. What are the treatments used in the clinical trial? What does the treatment do?
3. Has the treatment been used before? Has it been used for other types of cancer?
4. What are the risks and benefits of joining the clinical trial and the treatment being tested?
5. Will the trial need a biopsy sample?
6. What side effects should I expect? How will the side effects be controlled?
7. How often will I receive the treatment? 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? If so, how much?

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## Resources

### American Cancer Society

[cancer.org/cancer/multiple-myeloma.html](https://cancer.org/cancer/multiple-myeloma.html)

### Blood & Marrow Transplant Information Network

[bmtinfonet.org](https://bmtinfonet.org)

### Cancer.Net

[cancer.net/cancer-types](https://cancer.net/cancer-types)

### CancerCare

[cancercares.org](https://cancercares.org)

### Cancer Support Community

[cancersupportcommunity.org](https://cancersupportcommunity.org)

### International Myeloma Foundation

[myeloma.org](https://myeloma.org)

### Multiple Myeloma Research Foundation

[themmrf.org](https://themmrf.org)

### National Bone Marrow Transplant Link

[nbmtlink.org](https://nbmtlink.org)

### National Cancer Institute

[cancer.gov/types/myeloma](https://cancer.gov/types/myeloma)

### National Coalition for Cancer Survivorship

[canceradvocacy.org](https://canceradvocacy.org)

### PAN Foundation

[panfoundation.org](https://panfoundation.org)

### The Leukemia & Lymphoma Society

[lls.org/myeloma/myeloma-overview](https://lls.org/myeloma/myeloma-overview)

### U.S. National Library of Medicine Clinical Trials Database

[clinicaltrials.gov](https://clinicaltrials.gov)

NCCN Guidelines for Patients®  
Multiple Myeloma, 2023



## 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://NCCN.org/patients/feedback)





## Words to know

### **active (symptomatic) myeloma**

When abnormal plasma cells (myeloma cells) have increased in the bone marrow and are causing symptoms such as kidney problems and bone damage.

### **adjunctive treatment**

Medication for symptoms of myeloma and for side effects of treatment that's given at the same time as the main cancer treatment.

### **allogeneic stem cell transplant**

A treatment that destroys cells in the bone marrow with chemotherapy and then replaces them with healthy stem cells from another person (donor). Rarely used for multiple myeloma therapy.

### **amyloidosis**

A health condition in which a protein called amyloid builds up in and damages organs.

### **anemia**

A health condition in which the number of red blood cells is low.

### **antibody**

A protein made by plasma cells to help fight off infections. Also called immunoglobulin.

### **antigen**

A substance (such as a virus, bacteria, allergen, or toxin) that triggers a response from the body's immune system.

### **aspiration**

A procedure that removes a small amount of liquid bone marrow to be tested for a disease.

### **asymptomatic**

Having no signs or symptoms of disease.

### **autologous stem cell transplant**

A treatment that destroys cells in the bone marrow with chemotherapy and then replaces them with your own healthy stem cells.

### **B cell**

A type of white blood cell that turns into a plasma cell in response to germs.

### **biopsy**

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

### **bisphosphonates**

Drugs that help improve bone strength and prevent loss of bone mass.

### **blood stem cell**

An immature cell from which all other types of blood cells are made.

### **bone lesion**

An area of bone damage or abnormal tissue in the bone.

### **bone marrow**

The soft, sponge-like tissue in the center of most bones where blood cells are made.

### **chemotherapy**

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

### **chromosomes**

The structures within cells that contain coded instructions for cell behavior.

### **clinical trial**

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

## Words to know

### **complete blood count (CBC)**

A test that measures the number of blood cells in a blood sample. It includes the number of white blood cells, red blood cells, and platelets.

### **CT scan**

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

### **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.

### **flow cytometry**

A test that measures myeloma cells in the bone marrow.

### **fluorescence in situ hybridization (FISH)**

A lab test that uses special dyes to look for abnormal changes in a cell's genes and chromosomes.

### **fracture**

A crack or break in a bone.

### **free light chain**

The unattached, shorter fragments of M proteins that are made by myeloma cells.

### **heavy chain**

The longer protein chain that is part of an antibody.

### **high-dose chemotherapy**

An intensive drug treatment to kill cancer and disease-fighting cells so transplanted blood stem cells aren't rejected by the body.

### **hyperviscosity**

A condition in which the blood becomes very thick because of too many proteins in the blood.

### **immunoglobulin**

A protein that is made by plasma cells to help fight off infection. Also called an antibody.

### **intravenous (IV)**

A method of giving drugs by a needle or tube inserted into a vein.

### **light chain**

The shorter protein chain that is part of an antibody.

### **light chain myeloma**

A condition in which myeloma cells make only free light chains and no complete M proteins.

### **local therapy**

Treatment that affects only one specific area of the body.

### **lymphocyte**

A type of white blood cell that helps to protect the body from infection.

### **MRI**

A test that uses radio waves and powerful magnets to view parts of the inside of the body and how they're working.

### **maintenance treatment**

Medication that's given in a lower dose or less often to keep (maintain) good results of prior treatments.

### **M protein**

An abnormal antibody made by myeloma cells that doesn't fight germs. Also called monoclonal protein or paraprotein.

### **mutation**

An abnormal change in the genetic code (DNA) of a gene within cells.

### **pathologist**

A doctor who's an expert in testing cells and tissue to find disease.

## Words to know

### **plasma cell**

A type of white blood cell that makes germ-fighting proteins called antibodies.

### **plasmacytoma**

A mass formed by abnormal plasma cells (myeloma cells).

### **PET scan**

A test that uses radioactive material to see the shape and function of organs and tissues inside the body.

### **primary treatment**

The main treatment used to rid the body of cancer.

### **prognosis**

The likely or expected course and outcome of a disease.

### **progression**

The growth or spread of cancer after being tested or treated.

### **radiation therapy**

A treatment that uses high-energy rays (radiation) to destroy cancer cells.

### **remission**

The decrease or disappearance of the signs and symptoms of cancer.

### **relapse**

The return of myeloma signs or symptoms after a period of improvement.

### **side effect**

An unhealthy or unpleasant physical or emotional response to treatment.

### **smoldering myeloma**

Myeloma that isn't causing symptoms or damaging organs.

### **solitary plasmacytoma**

Cancer that is a single mass of myeloma cells.

### **stem cell transplant**

Treatment that uses chemotherapy to destroy cells in the bone marrow and then replaces them with healthy blood stem cells.

### **supportive care**

Treatment for symptoms of cancer or for the side effects of cancer treatment.

### **systemic therapy**

Drugs used to treat cancer cells throughout the body.

### **tumor burden**

The extent or amount of cancer in the body.

# NCCN Contributors

This patient guide is based on the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Multiple Myeloma, Version 3.2023. It was adapted, reviewed, and published with help from the following people:

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# NCCN Cancer Centers

Abramson Cancer Center  
at the University of Pennsylvania  
Philadelphia, Pennsylvania  
800.789.7366 • [penncancer.org/cancer](http://penncancer.org/cancer)

Case Comprehensive Cancer Center/  
University Hospitals Seidman Cancer  
Center and Cleveland Clinic Taussig  
Cancer Institute  
Cleveland, Ohio  
800.641.2422 • [UH Seidman Cancer Center](http://UHSeidmanCancerCenter.org)  
[uhhospitals.org/services/cancer-services](http://uhhospitals.org/services/cancer-services)  
866.223.8100 • [CC Taussig Cancer Institute](http://CCTaussigCancerInstitute.org)  
[my.clevelandclinic.org/departments/cancer](http://my.clevelandclinic.org/departments/cancer)  
216.844.8797 • Case CCC  
[case.edu/cancer](http://case.edu/cancer)

City of Hope National Medical Center  
Duarte, California  
800.826.4673 • [cityofhope.org](http://cityofhope.org)

Dana-Farber/Brigham and Women's  
Cancer Center | Massachusetts  
General Hospital Cancer Center  
Boston, Massachusetts  
617.732.5500 • [youhaveus.org](http://youhaveus.org)  
617.726.5130  
[massgeneral.org/cancer-center](http://massgeneral.org/cancer-center)

Duke Cancer Institute  
Durham, North Carolina  
888.275.3853 • [dukecancerinstitute.org](http://dukecancerinstitute.org)

Fox Chase Cancer Center  
Philadelphia, Pennsylvania  
888.369.2427 • [foxchase.org](http://foxchase.org)

Fred & Pamela Buffett Cancer Center  
Omaha, Nebraska  
402.559.5600 • [unmc.edu/cancercenter](http://unmc.edu/cancercenter)

Fred Hutchinson Cancer Center  
Seattle, Washington  
206.667.5000 • [fredhutch.org](http://fredhutch.org)

Huntsman Cancer Institute  
at the University of Utah  
Salt Lake City, Utah  
800.824.2073 • [huntsmancc.org](http://huntsmancc.org)

Indiana University  
Melvin and Bren Simon  
Comprehensive Cancer Center  
Indianapolis, Indiana  
888.600.4822 • [www.cancer.iu.edu](http://www.cancer.iu.edu)

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Mayo Clinic Cancer Center  
Phoenix/Scottsdale, Arizona  
Jacksonville, Florida  
Rochester, Minnesota  
480.301.8000 • Arizona  
904.953.0853 • Florida  
507.538.3270 • Minnesota  
[mayoclinic.org/cancercenter](http://mayoclinic.org/cancercenter)

Memorial Sloan Kettering  
Cancer Center  
New York, New York  
800.525.2225 • [mskcc.org](http://mskcc.org)

Moffitt Cancer Center  
Tampa, Florida  
888.663.3488 • [moffitt.org](http://moffitt.org)

O'Neal Comprehensive  
Cancer Center at UAB  
Birmingham, Alabama  
800.822.0933 • [uab.edu/onealcancercenter](http://uab.edu/onealcancercenter)

Robert H. Lurie Comprehensive Cancer  
Center of Northwestern University  
Chicago, Illinois  
866.587.4322 • [cancer.northwestern.edu](http://cancer.northwestern.edu)

Roswell Park Comprehensive  
Cancer Center  
Buffalo, New York  
877.275.7724 • [roswellpark.org](http://roswellpark.org)

Siteman Cancer Center at Barnes-  
Jewish Hospital and Washington  
University School of Medicine  
St. Louis, Missouri  
800.600.3606 • [siteman.wustl.edu](http://siteman.wustl.edu)

St. Jude Children's  
Research Hospital/  
The University of Tennessee  
Health Science Center  
Memphis, Tennessee  
866.278.5833 • [stjude.org](http://stjude.org)  
901.448.5500 • [uthsc.edu](http://uthsc.edu)

Stanford Cancer Institute  
Stanford, California  
877.668.7535 • [cancer.stanford.edu](http://cancer.stanford.edu)

The Ohio State University  
Comprehensive Cancer Center -  
James Cancer Hospital and  
Solove Research Institute  
Columbus, Ohio  
800.293.5066 • [cancer.osu.edu](http://cancer.osu.edu)

The Sidney Kimmel Comprehensive  
Cancer Center at Johns Hopkins  
Baltimore, Maryland  
410.955.8964  
[www.hopkinskimmelcancercenter.org](http://www.hopkinskimmelcancercenter.org)

The University of Texas  
MD Anderson Cancer Center  
Houston, Texas  
844.269.5922 • [mdanderson.org](http://mdanderson.org)

UC Davis  
Comprehensive Cancer Center  
Sacramento, California  
916.734.5959 • 800.770.9261  
[health.ucdavis.edu/cancer](http://health.ucdavis.edu/cancer)

UC San Diego Moores Cancer Center  
La Jolla, California  
858.822.6100 • [cancer.ucsd.edu](http://cancer.ucsd.edu)

UCLA Jonsson  
Comprehensive Cancer Center  
Los Angeles, California  
310.825.5268 • [cancer.ucla.edu](http://cancer.ucla.edu)

UCSF Helen Diller Family  
Comprehensive Cancer Center  
San Francisco, California  
800.689.8273 • [cancer.ucsf.edu](http://cancer.ucsf.edu)

University of Colorado Cancer Center  
Aurora, Colorado  
720.848.0300 • [coloradocancercenter.org](http://coloradocancercenter.org)

University of Michigan  
Rogel Cancer Center  
Ann Arbor, Michigan  
800.865.1125 • [rogelcancercenter.org](http://rogelcancercenter.org)

University of Wisconsin  
Carbone Cancer Center  
Madison, Wisconsin  
608.265.1700 • [uwhealth.org/cancer](http://uwhealth.org/cancer)

UT Southwestern Simmons  
Comprehensive Cancer Center  
Dallas, Texas  
214.648.3111 • [utsouthwestern.edu/simmons](http://utsouthwestern.edu/simmons)

Vanderbilt-Ingram Cancer Center  
Nashville, Tennessee  
877.936.8422 • [vicc.org](http://vicc.org)

Yale Cancer Center/  
Smilow Cancer Hospital  
New Haven, Connecticut  
855.4.SMILOW • [yalecancercenter.org](http://yalecancercenter.org)

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**9 am to 10 am (Monday to Friday)**

**Nanavati Max Hospital (Vile Parle):**

**10 am to 12 pm (Monday to Saturday)**

**S. L. Raheja Hospital (Mahim):**

**12 pm to 4 pm (Monday to Saturday)**

**Suvarna Hospital (Borivali):**

**5 pm to 6 pm (Monday and Friday)**

**Sushrut Hospital (Chembur):**

**By appointment**

**Hinduja Hospital (Khar):**

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**Galaxy Healthcare (Borivali):**

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