

National Cancer Institute

What You Need
To Know About[™]

Multiple Myeloma

**U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES**

National Institutes of Health

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About This Booklet

This National Cancer Institute (NCI) booklet is about *multiple myeloma*,* a *cancer* that starts in *plasma cells*, a type of *white blood cell*. It's also called *plasma cell myeloma*. Each year in the United States, about 20,000 people learn they have this disease.

This booklet is only about multiple myeloma. It is not about bone cancer. Although multiple myeloma affects the bones, it begins in plasma cells.

Bone cancer begins in bone cells. It's diagnosed and treated differently from multiple myeloma. The NCI's fact sheet *Bone Cancer: Questions and Answers* provides information about bone cancer.

Also, this booklet is not about *plasmacytoma* (a collection of abnormal *plasma cells* that forms a single tumor) and other types of *plasma cell tumors*. You can find information on our Web site at <http://www.cancer.gov/cancertopics/types/myeloma>. Or, the Cancer Information Service (1-800-4-CANCER) can send you information about those diseases.

This booklet tells about diagnosis, treatment options, and tests the doctor may give you during follow-up visits. It also tells about *supportive care* before, during, or after treatment. Learning about the medical care for multiple myeloma can help you take an active part in making choices about your care.

*Words in *italics* are in the Dictionary on page 26. The Dictionary explains these terms. It also shows how to pronounce them.

This booklet has lists of questions that you may want to ask your doctor. Many people find it helpful to take a list of questions to a doctor visit. To help remember what your doctor says, you can take notes or ask whether you may use a tape recorder. You may also want to have a family member or friend go with you when you talk with the doctor—to take part in the discussion, to take notes, or just to listen.

For the latest information about multiple myeloma, please visit our Web site at <http://www.cancer.gov/cancertopics/types/myeloma>. Or, contact our Cancer Information Service. We can answer your questions about cancer. We can send you NCI booklets and fact sheets. Call **1-800-4-CANCER** (1-800-422-6237) or instant message us through the **LiveHelp** service at <http://www.cancer.gov/help>.

What Is Multiple Myeloma?

Multiple myeloma is a type of cancer. Cancer is a group of many related diseases. Myeloma is a cancer that starts in plasma cells, a type of white blood cell. It's the most common type of plasma cell cancer.

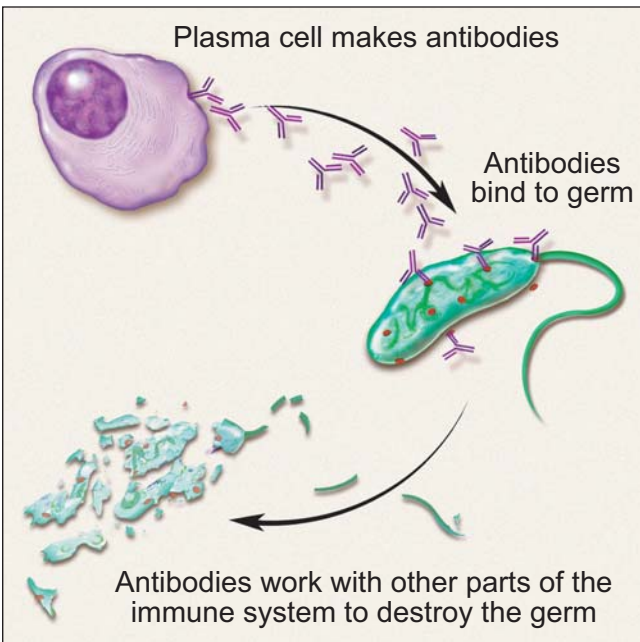
Normal Blood Cells

Most blood cells develop from cells in the *bone marrow* called *stem cells*. Bone marrow is the soft material in the center of most bones.

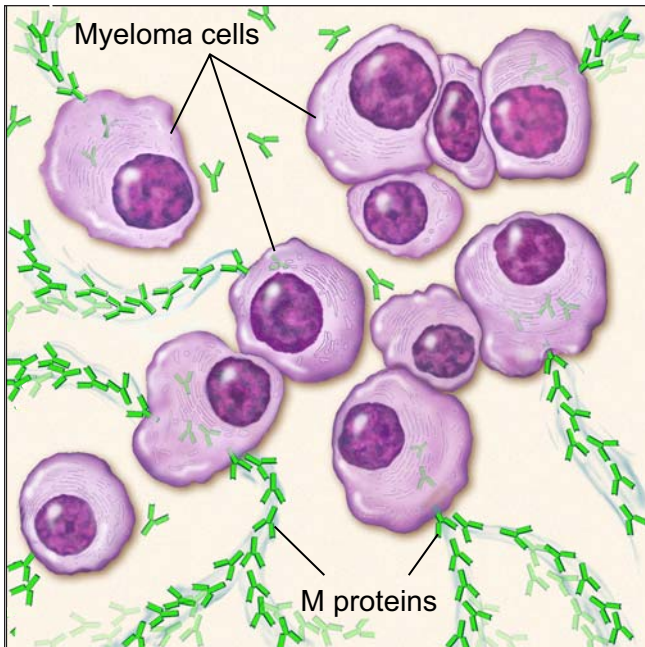
Stem cells mature into different types of blood cells. Each type has a special job:

- White blood cells help fight *infection*. There are several types of white blood cells.
- *Red blood cells* carry oxygen to *tissues* throughout the body.
- *Platelets* help form blood clots that control bleeding.

Plasma cells are white blood cells that make *antibodies*. Antibodies are part of the *immune system*. They work with other parts of the immune system to help protect the body from germs and other harmful substances. Each type of plasma cell makes a different antibody.



Normal plasma cells help protect the body from germs and other harmful substances.



Myeloma cell (abnormal plasma cell) making M proteins.

Myeloma Cells

Myeloma, like other cancers, begins in cells. In cancer, new cells form when the body doesn't need them, and old or damaged cells don't die when they should. These extra cells can form a mass of tissue called a growth or *tumor*.

Myeloma begins when a plasma cell becomes abnormal. The abnormal cell divides to make copies of itself. The new cells divide again and again, making more and more abnormal cells. These abnormal plasma cells are myeloma cells.

In time, myeloma cells collect in the bone marrow. They may damage the solid part of the bone. When myeloma cells collect in several of your bones, the

disease is called “multiple myeloma.” This disease may also harm other tissues and organs, such as the kidneys.

Myeloma cells make antibodies called *M proteins* and other proteins. These proteins can collect in the blood, urine, and organs.

Risk Factors

No one knows the exact causes of multiple myeloma. Doctors seldom know why one person develops this disease and another doesn't. However, we do know that multiple myeloma isn't contagious. You cannot catch it from another person.

Research has shown that certain *risk factors* increase the chance that a person will develop this disease. Studies have found the following risk factors for multiple myeloma:

- **Age over 65:** Growing older increases the chance of developing multiple myeloma. Most people with myeloma are diagnosed after age 65. This disease is rare in people younger than 35.
- **Race:** The risk of multiple myeloma is highest among African Americans and lowest among Asian Americans. The reason for the difference between racial groups is not known.
- **Being a man:** Each year in the United States, about 11,200 men and 8,700 women are diagnosed with multiple myeloma. It is not known why more men are diagnosed with the disease.
- **Personal history of *monoclonal gammopathy of undetermined significance* (MGUS):** MGUS is a *benign* condition in which abnormal plasma cells make M proteins. Usually, there are no symptoms, and the abnormal level of M protein is found with a blood test. Sometimes, people with MGUS develop

certain cancers, such as multiple myeloma. There is no treatment, but people with MGUS get regular lab tests (every 1 or 2 years) to check for a further increase in the level of M protein. They also get regular exams to check for the development of symptoms.

- **Family history of multiple myeloma:** Studies have found that a person's risk of multiple myeloma may be higher if a close relative had the disease.

Many other suspected risk factors are under study. Researchers have studied whether being exposed to certain chemicals or germs (especially *viruses*), having alterations in certain *genes*, eating certain foods, or being obese increases the risk of developing multiple myeloma. Researchers continue to study these and other possible risk factors.

Having one or more risk factors does not mean that a person will develop myeloma. Most people who have risk factors never develop cancer.

Symptoms

Common symptoms of multiple myeloma include:

- Bone pain, usually in the back and ribs
- Broken bones, usually in the spine
- Feeling weak and very tired
- Feeling very thirsty
- Frequent infections and fevers
- Weight loss
- Nausea or constipation
- Frequent urination

Most often, these symptoms are not due to cancer. Other health problems may also cause these symptoms. Only a doctor can tell for sure. Anyone with these symptoms should tell the doctor so that problems can be diagnosed and treated as early as possible.

Diagnosis

Doctors sometimes find multiple myeloma after a routine blood test. More often, doctors suspect multiple myeloma after an *x-ray* for a broken bone. Usually though, patients go to the doctor because they are having other symptoms.

To find out whether such problems are from multiple myeloma or some other condition, your doctor may ask about your personal and family medical history and do a physical exam. Your doctor also may order some of the following tests:

- **Blood tests:** The lab does several blood tests:
 - Multiple myeloma causes high levels of proteins in the blood. The lab checks the levels of many different proteins, including M protein and other *immunoglobulins* (antibodies), *albumin*, and *beta-2-microglobulin*.
 - Myeloma may also cause *anemia* and low levels of white blood cells and platelets. The lab does a *complete blood count* to check the number of white blood cells, red blood cells, and platelets.
 - The lab also checks for high levels of *calcium*.
 - To see how well the kidneys are working, the lab tests for *creatinine*.



- **Urine tests:** The lab checks for *Bence Jones protein*, a type of M protein, in urine. The lab measures the amount of Bence Jones protein in urine collected over a 24-hour period. If the lab finds a high level of Bence Jones protein in your urine sample, doctors will monitor your kidneys. Bence Jones protein can clog the kidneys and damage them.
- **X-rays:** You may have x-rays to check for broken or thinning bones. An x-ray of your whole body can be done to see how many bones could be damaged by the myeloma.
- **Biopsy:** Your doctor removes tissue to look for cancer cells. A biopsy is the only sure way to know whether myeloma cells are in your bone marrow. Before the sample is taken, *local anesthesia* is used to numb the area. This helps reduce the pain. Your doctor removes some bone marrow from your hip

bone or another large bone. A *pathologist* uses a microscope to check the tissue for myeloma cells.

There are two ways your doctor can obtain bone marrow. Some people will have both procedures during the same visit:

- ***Bone marrow aspiration***: The doctor uses a thick, hollow needle to remove samples of bone marrow.
- ***Bone marrow biopsy***: The doctor uses a very thick, hollow needle to remove a small piece of bone and bone marrow.

You may want to ask your doctor these questions before having a bone marrow aspiration or biopsy:

- Will you remove the sample of bone marrow from the hip or from another bone?
- Where will I go for this procedure?
- Will I have to do anything to prepare for it?
- How long will it take? Will I be awake?
- Will it hurt? What will you do to prevent or control the pain?
- Are there any risks? What are the chances of infection or bleeding after the procedure?
- How long will it take me to recover?
- How soon will I know the results? Who will explain them to me?
- If I do have multiple myeloma, who will talk to me about next steps? When?

Staging

If the biopsy shows that you have multiple myeloma, your doctor needs to learn the extent (stage) of the disease to plan the best treatment. Staging may involve having more tests:

- **Blood tests:** For staging, the doctor considers the results of blood tests, including albumin and beta-2-microglobulin.
- **CT scan:** An x-ray machine linked to a computer takes a series of detailed pictures of your bones.
- **MRI:** A powerful magnet linked to a computer is used to make detailed pictures of your bones.

Doctors may describe multiple myeloma as *smoldering*, Stage I, Stage II, or Stage III. The stage takes into account whether the cancer is causing problems with your bones or kidneys. Smoldering multiple myeloma is early disease without any symptoms. For example, there is no bone damage. Early disease with symptoms (such as bone damage) is Stage I. Stage II or III is more advanced, and more myeloma cells are found in the body.

Treatment

People with multiple myeloma have many treatment options. The options are *watchful waiting*, *induction therapy*, and *stem cell transplant*. Sometimes a combination of methods is used.

Radiation therapy is used sometimes to treat painful bone disease. It may be used alone or along with other therapies. See the Supportive Care section on page 19 to learn about ways to relieve pain.

The choice of treatment depends mainly on how advanced the disease is and whether you have symptoms. If you have multiple myeloma without symptoms (smoldering myeloma), you may not need cancer treatment right away. The doctor monitors your health closely (watchful waiting) so that treatment can start when you begin to have symptoms.

If you have symptoms, you will likely get induction therapy. Sometimes a stem cell transplant is part of the treatment plan.

When treatment for myeloma is needed, it can often control the disease and its symptoms. People may receive therapy to help keep the cancer in remission, but myeloma can seldom be cured. Because standard treatment may not control myeloma, you may want to talk to your doctor about taking part in a *clinical trial*. Clinical trials are research studies of new treatment methods. See the Taking Part in Cancer Research section on page 24.

Your doctor can describe your treatment choices, the expected results, and the possible *side effects*. You and your doctor can work together to develop a treatment plan that meets your needs.

Your doctor may refer you to a specialist, or you may ask for a referral. Specialists who treat multiple myeloma include *hematologists* and *medical oncologists*. Your health care team may also include an *oncology nurse* and a *registered dietitian*.

Before treatment starts, ask your health care team to explain possible side effects and how treatment may change your normal activities. Because cancer treatments often damage healthy cells and tissues, side effects are common. Side effects may not be the same for each person, and they may change from one treatment session to the next.

You may want to ask your doctor these questions before you begin treatment:

- What stage of myeloma do I have?
- Is the disease affecting my kidneys?
- How do I get a copy of the report from the pathologist?
- What are my treatment choices? Which do you recommend for me? Why?
- Will I have more than one kind of treatment? How will my treatment change over time?
- What are the expected benefits of each kind of treatment?
- What are the risks and possible side effects of each treatment? What can we do to control the side effects?
- What can I do to prepare for treatment?
- Will I need to stay in the hospital? If so, for how long?
- What is the treatment likely to cost? Will my insurance cover the cost?
- How will treatment affect my normal activities?
- Would a clinical trial be right for me? Can you help me find one?
- How often should I have checkups?

Watchful Waiting

People with smoldering myeloma or Stage I myeloma may be able to put off having cancer treatment. By delaying treatment, you can avoid the side effects of treatment until you have symptoms.

If you and your doctor agree that watchful waiting is a good idea, you will have regular checkups (such as every 3 months). You will receive treatment if symptoms occur.

Although watchful waiting avoids or delays the side effects of cancer treatment, this choice has risks. In some cases, it may reduce the chance to control myeloma before it gets worse.

You may decide against watchful waiting if you don't want to live with untreated myeloma. If you choose watchful waiting but grow concerned later, you should discuss your feelings with your doctor. Another approach is an option in most cases.

You may want to ask your doctor these questions before choosing watchful waiting:

- If I choose watchful waiting, can I change my mind later on?
- Will the cancer be harder to treat later?
- How often will I have checkups?
- Between checkups, what problems should I tell you about?

Induction Therapy

Many different types of drugs are used to treat myeloma. People often receive a combination of drugs, and many different combinations are used to treat myeloma.

Each type of drug kills cancer cells in a different way:

- **Chemotherapy:** Chemotherapy kills fast-growing myeloma cells, but the drug can also harm normal cells that divide rapidly.
- **Targeted therapy:** Targeted therapies use drugs that block the growth of myeloma cells. The targeted therapy blocks the action of an abnormal protein that stimulates the growth of myeloma cells.
- **Steroids:** Some steroids have antitumor effects. It is thought that steroids can trigger the death of myeloma cells. A steroid may be used alone or with other drugs to treat myeloma.

You may receive the drugs by mouth or through a vein (*IV*). The treatment usually takes place in an outpatient part of the hospital, at your doctor's office, or at home. Some people may need to stay in the hospital for treatment.

The side effects depend mainly on which drugs are given and how much:

- **Blood cells:** When a drug used for myeloma treatment lowers the levels of healthy blood cells, you're more likely to get infections, bruise or bleed easily, and feel very weak and tired. Your health care team will check for low levels of blood cells. If your levels are low, your health care team may stop therapy for a while or reduce the dose of drug. There are also medicines that can help your body make new blood cells.

- **Cells in hair roots:** Chemotherapy may cause hair loss. If you lose your hair, it will grow back, but it may be somewhat different in color and texture.
- **Cells that line the *digestive tract*:** Chemotherapy and targeted therapy can cause poor appetite, nausea and vomiting, diarrhea, constipation, or mouth and lip sores. Ask your health care team about medicines and other ways to help you cope with these problems.

The drugs used for myeloma may also cause dizziness, drowsiness, numbness or tingling in hands or feet, and low blood pressure. Most of these problems go away when treatment ends.

You may find it helpful to read the NCI booklet *Chemotherapy and You*. You may also want to read the NCI fact sheet *Targeted Cancer Therapies: Questions and Answers*.

You may want to ask your doctor these questions before having induction therapy:

- Which drugs will I get? What will the treatment do?
- When will treatment start? When will it end? How often will I have treatments?
- Where will I go for treatment? Will I have to stay in the hospital?
- Will I have side effects during treatment? What side effects should I tell you about? Can I prevent or treat any of these side effects?
- Will there be lasting side effects? How long will they last? What can I do about them?
- How often will I need checkups?

Stem Cell Transplant

Many people with multiple myeloma may get a stem cell transplant. A stem cell transplant allows you to be treated with high doses of drugs. The high doses destroy both myeloma cells and normal blood cells in the bone marrow. After you receive high-dose treatment, you receive healthy stem cells through a vein. (It's like getting a blood *transfusion*.) New blood cells develop from the transplanted stem cells. The new blood cells replace the ones that were destroyed by treatment.

Stem cell transplants take place in the hospital. Some people with myeloma have two or more transplants.

Stem cells may come from you or from someone who donates their stem cells to you:

- **From you:** An *autologous stem cell transplant* uses your own stem cells. Before you get the high-dose chemotherapy, your stem cells are removed. The cells may be treated to kill any myeloma cells present. Your stem cells are frozen and stored. After you receive high-dose chemotherapy, the stored stem cells are thawed and returned to you.
- **From a family member or other donor:** An *allogeneic stem cell transplant* uses healthy stem cells from a donor. Your brother, sister, or parent may be the donor. Sometimes the stem cells come from a donor who isn't related. Doctors use blood tests to be sure the donor's cells match your cells. Allogeneic stem cell transplants are under study for the treatment of multiple myeloma.
- **From your identical twin:** If you have an identical twin, a *syngeneic stem cell transplant* uses stem cells from your healthy twin.

There are two ways to get stem cells for people with myeloma. They usually come from the blood (*peripheral blood stem cell transplant*). Or they can come from the bone marrow (*bone marrow transplant*).

After a stem cell transplant, you may stay in the hospital for several weeks or months. You'll be at risk for infections because of the large doses of chemotherapy you received. In time, the transplanted stem cells will begin to produce healthy blood cells.

You may find it helpful to read the NCI fact sheet *Bone Marrow Transplantation and Peripheral Blood Stem Cell Transplantation: Questions and Answers*.

You may want to ask your doctor these questions before having a stem cell transplant:

- What kind of stem cell transplant will I have? If I need a donor, how will we find one?
- How long will I be in the hospital? Will I need special care? How will I be protected from germs? Will my visitors have to wear a mask? Will I?
- What care will I need when I leave the hospital?
- How will we know if the treatment is working?
- What are the risks and the side effects? What can we do about them?
- What changes in normal activities will be necessary?
- What is my chance of a full recovery? How long will that take?
- How often will I need checkups?

Second Opinion

Before starting treatment, you might want a second opinion about your diagnosis and treatment plan. Some people worry that the doctor will be offended if they ask for a second opinion. Usually the opposite is true. Most doctors welcome a second opinion. And many health insurance companies will pay for a second opinion if you or your doctor requests it.

If you get a second opinion, the doctor may agree with your first doctor's diagnosis and treatment plan. Or the second doctor may suggest another approach. Either way, you have more information and perhaps a greater sense of control. You can feel more confident about the decisions you make, knowing that you've looked at your options.

It may take some time and effort to gather your medical records and see another doctor. In most cases, it's not a problem to take several weeks to get a second opinion. The delay in starting treatment usually won't make treatment less effective. To make sure, you should discuss this delay with your doctor. Some people with multiple myeloma need treatment right away.

There are many ways to find a doctor for a second opinion. You can ask your doctor, a local or state medical society, a nearby hospital, or a medical school for names of specialists. NCI's Cancer Information Service at 1-800-4-CANCER can tell you about nearby treatment centers. Other sources can be found in the NCI fact sheet *How To Find a Doctor or Treatment Facility If You Have Cancer*.

Nonprofit groups with an interest in multiple myeloma may be of help. Such groups are listed in the NCI fact sheet *National Organizations That Offer Services to People With Cancer and Their Families*.

Supportive Care

Multiple myeloma and its treatment can lead to other health problems. At any stage of the disease, you can have supportive care.

Supportive care is treatment to prevent or fight infections, to control pain and other symptoms, to relieve the side effects of therapy, and to help you cope with the feelings that a diagnosis of cancer can bring. You may receive supportive care to prevent or control these problems and to improve your comfort and quality of life during treatment.

You can get information about supportive care on NCI's Web site at <http://www.cancer.gov/cancerinfo/coping> and from NCI's Cancer Information Service at **1-800-4-CANCER** or **LiveHelp** (<http://www.cancer.gov/help>).

Infections

Because people with multiple myeloma get infections very easily, you may receive *antibiotics* and other drugs.

Some people receive *vaccines* against the flu and pneumonia. You may want to talk with your health care team about when to get certain vaccines.

The health care team may advise you to stay away from crowds and from people with colds and other contagious diseases. If an infection develops, it can be serious and should be treated promptly. You may need to stay in the hospital for treatment.

Anemia

Myeloma and its treatment can lead to anemia, which may make you feel very tired. Drugs or a blood transfusion can help with this problem.

Pain

Multiple myeloma often causes bone pain. Your health care provider can suggest ways to relieve or reduce pain:

- A brace that relieves pain in the neck or back
- Drugs that fight pain anywhere in the body
- *Radiation therapy* from a large machine aimed at the bone
- Surgery to fix a compressed (squeezed) spinal cord

Some people get pain relief from massage or *acupuncture* when used along with other approaches. Also, you may learn relaxation techniques such as listening to slow music or breathing slowly and comfortably.

You may find it helpful to read the NCI booklet *Pain Control*.

Thinning Bones

Myeloma cells keep new bone cells from forming, and bones become thin wherever there are myeloma cells. Your doctor may give you drugs to prevent bone thinning and help reduce the risk of fractures. Physical activity, such as walking, also helps keep bones strong.

Too Much Calcium in the Blood

Multiple myeloma may cause calcium to leave the bones and enter the bloodstream. If you have a very high level of calcium in your blood, you may lose your appetite. You also may feel nauseated, restless, or confused. A high calcium level can also make you very tired, weak, *dehydrated*, and thirsty. Drinking a lot of fluids and taking drugs that lower the calcium in the blood can be helpful.

Kidney Problems

Some people with multiple myeloma have kidney problems. If the problems are severe, a person may need *dialysis*. Dialysis removes wastes from the blood. A person with serious kidney problems may need a kidney transplant.

Amyloidosis

Some people with myeloma develop *amyloidosis*. This problem is caused by abnormal proteins collecting in tissues of the body. The buildup of proteins can cause many problems, some of them severe. For example, proteins can build up in the heart, causing chest pain and swollen feet. There are drugs to treat amyloidosis.

Nutrition and Physical Activity

It's important for you to take care of yourself by eating well, drinking plenty of fluids, and staying as active as you can.

You need the right amount of calories to maintain a good weight. You also need enough protein to keep up your strength. Eating well may help you feel better and have more energy.

However, you may not feel like eating during treatment or soon after. You may be uncomfortable or tired. You may find that foods do not taste as good as they used to. In addition, the side effects of treatment (such as poor appetite, nausea, vomiting, or mouth sores) can make it hard to eat well. Your doctor, a registered dietitian, or another health care provider can suggest ways to deal with these problems. Also, the NCI booklet *Eating Hints for Cancer Patients* has many useful ideas and recipes.

Research shows that people with cancer feel better when they are active. Walking, yoga, swimming, and other activities can keep you strong and increase your energy. Exercise may reduce nausea and pain and make treatment easier to handle. It also can help relieve stress. Whatever physical activity you choose, be sure to talk to your doctor before you start. Also, if your activity causes you pain or other problems, be sure to let your doctor or nurse know about it.

Follow-up Care

You'll need regular checkups after treatment for multiple myeloma. Checkups help ensure that any changes in your health are noted and treated if needed. If you have any health problems between checkups, you should contact your doctor.

Your doctor will check for return of cancer. Even when the cancer seems to have been completely destroyed, the disease sometimes returns because undetected myeloma cells remained somewhere in the body after treatment. Also, checkups help detect health problems that can result from cancer treatment.

Checkups may include a careful physical exam, blood tests, x-rays, or bone marrow biopsy.

The NCI has publications to help answer questions about follow-up care and other concerns. You may find it helpful to read the NCI booklet *Facing Forward: Life After Cancer Treatment*. You may also want to read the NCI fact sheet *Follow-up Care After Cancer Treatment: Questions and Answers*.

You may want to ask your doctor these questions after you have finished treatment:

- How often will I need checkups?
- Which follow-up tests do you suggest for me?
- Between checkups, what health problems or symptoms should I tell you about?

Sources of Support

Learning you have myeloma can change your life and the lives of those close to you. These changes can be hard to handle. It's normal for you, your family, and your friends to have new and confusing feelings to work through.

Concerns about treatments and managing side effects, hospital stays, and medical bills are common. You may also worry about caring for your family, keeping your job, or continuing daily activities.

Here's where you can go for support:

- Doctors, nurses, and other members of your health care team can answer many of your questions about treatment, working, or other activities.
- Social workers, counselors, or members of the clergy can be helpful if you want to talk about your feelings or concerns. Often, social workers can suggest resources for financial aid, transportation, home care, or emotional support.

- Support groups can also help. In these groups, patients or their family members meet with other patients or their families to share what they have learned about coping with the disease and the effects of treatment. Groups may offer support in person, over the telephone, or on the Internet. You may want to talk with a member of your health care team about finding a support group.
- Information specialists at **1-800-4-CANCER** and at **LiveHelp** (<http://www.cancer.gov/help>) can help you locate programs, services, and publications. They can give you names of national organizations that offer services to people with cancer and their families.

For tips on coping, you may want to read the NCI booklet *Taking Time: Support for People With Cancer*.

Taking Part in Cancer Research

Doctors all over the country are conducting many types of clinical trials (research studies in which people volunteer to take part). Clinical trials are designed to answer important questions and to find out whether new approaches are safe and effective.

Research already has led to advances in treatment, such as stem cell transplants. And doctors continue to look for better ways to treat myeloma.

Researchers are testing new drugs and drug combinations. They are also testing ways to improve stem cell transplants for people with multiple myeloma.

Even if people in a trial do not benefit directly, they still make an important contribution by helping doctors learn more about myeloma and how to control it. Although clinical trials may pose some risks, doctors do all they can to protect their patients.



If you are interested in being part of a clinical trial, talk with your doctor. You may want to read the NCI booklet *Taking Part in Cancer Treatment Research Studies*. This booklet describes how treatment studies are carried out and explains their possible benefits and risks.

NCI's Web site includes a section on clinical trials at <http://www.cancer.gov/clinicaltrials>. It has general information about clinical trials as well as detailed information about specific ongoing studies of myeloma. Information specialists at **1-800-4-CANCER** or at **LiveHelp** at <http://www.cancer.gov/help> can answer questions and provide information about clinical trials.

Dictionary

Definitions of thousands of terms are on the NCI Web site in the NCI Dictionary of Cancer Terms. You can access it at <http://www.cancer.gov/dictionary>.

Acupuncture (AK-yoo-PUNK-cher): The technique of inserting thin needles through the skin at specific points on the body to control pain and other symptoms.

Albumin (al-BYOO-mun): A protein found in blood, egg white, milk, and other substances.

Allogeneic stem cell transplant (A-loh-jeh-NAY-ik): A procedure in which a person receives blood-forming stem cells (cells from which all blood cells develop) from a genetically similar, but not identical, donor. This is often a sister or brother, but could be an unrelated donor.

Amyloidosis (am-a-loy-DOE-sis): A group of diseases in which protein is deposited in specific organs (localized amyloidosis) or throughout the body (systemic amyloidosis). Amyloidosis may be either primary (with no known cause) or secondary (caused by another disease, including some types of cancer). Generally, primary amyloidosis affects the nerves, skin, tongue, joints, heart, and liver; secondary amyloidosis often affects the spleen, kidneys, liver, and adrenal glands.

Anemia (a-NEE-mee-a): A condition in which the number of red blood cells is below normal.

Antibiotic (an-tih-by-AH-tik): A drug used to treat infections caused by bacteria and other microorganisms.

Antibody (AN-tee-BAH-dee): A type of protein made by plasma cells (a type of white blood cell) in response to an antigen (foreign substance). Each antibody can bind to only one specific antigen. The purpose of this

binding is to help destroy the antigen. Antibodies can work in several ways, depending on the nature of the antigen. Some antibodies destroy antigens directly. Others make it easier for white blood cells to destroy the antigen.

Autologous stem cell transplant (aw-TAH-luh-gus): A procedure in which blood-forming stem cells (cells from which all blood cells develop) are removed, stored, and later given back to the same person.

Bence Jones protein: A small protein made by plasma cells (white blood cells that produce antibodies). It is found in the urine of most people with multiple myeloma (cancer that begins in plasma cells).

Benign (beh-NINE): Not cancerous. Benign tumors may grow larger but do not spread to other parts of the body.

Beta-2-microglobulin (MY-kroh-GLOB-yoo-lin): A small protein normally found on the surface of many cells, including lymphocytes, and in small amounts in the blood and urine. An increased amount in the blood or urine may be a sign of certain diseases, including some types of cancer, such as multiple myeloma or lymphoma.

Biopsy (BY-op-see): The removal of cells or tissues for examination by a pathologist. The pathologist may study the tissue under a microscope or perform other tests on the cells or tissue.

Bone marrow (MAYR-oh): The soft, sponge-like tissue in the center of most bones. It produces white blood cells, red blood cells, and platelets.

Bone marrow aspiration (MAYR-oh as-pih-RAY-shun): The removal of a small sample of bone marrow (usually from the hip) through a needle for examination under a microscope.

Bone marrow biopsy (MAYR-oh BY-op-see): The removal of a sample of tissue from the bone marrow with a needle for examination under a microscope.

Bone marrow transplant (MAYR-oh): A procedure to replace bone marrow that has been destroyed by treatment with high doses of anticancer drugs or radiation. Transplantation may be autologous (an individual's own marrow saved before treatment), allogeneic (marrow donated by someone else), or syngeneic (marrow donated by an identical twin).

Calcium (KAL-see-um): A mineral found in teeth, bones, and other body tissues.

Cancer (KAN-ser): A term for diseases in which abnormal cells divide without control. Cancer cells can invade nearby tissues and can spread to other parts of the body through the blood and lymph systems.

Chemotherapy (KEE-moh-THAYR-uh-pee): Treatment with drugs that kill cancer cells.

Clinical trial: A type of research study that tests how well new medical approaches work in people. These studies test new methods of screening, prevention, diagnosis, or treatment of a disease.

Complete blood count: CBC. A test to check the number of red blood cells, white blood cells, and platelets in a sample of blood.

Creatinine (cree-AT-ih-nin): A compound that is excreted from the body in urine. Creatinine levels are measured to monitor kidney function.

CT scan: Computed tomography scan. A series of detailed pictures of areas inside the body taken from different angles; the pictures are created by a computer linked to an x-ray machine. Also called computerized tomography and computerized axial tomography (CAT) scan.

Dehydration: A condition caused by the loss of too much water from the body. Severe diarrhea or vomiting can cause dehydration.

Dialysis (dye-AL-ih-sis): The process of filtering the blood when the kidneys are not able to cleanse it.

Digestive tract (dy-JES-tiv): The organs through which food and liquids pass when they are swallowed, digested, and eliminated. These organs are the mouth, esophagus, stomach, small and large intestines, and rectum and anus.

Gene: The functional and physical unit of heredity passed from parent to offspring. Genes are pieces of DNA, and most genes contain the information for making a specific protein.

Hematologist (HEE-muh-TAH-loh-jist): A doctor who specializes in treating blood disorders.

Immune system (ih-MYOON SIS-tem): The complex group of organs and cells that defends the body against infections and other diseases.

Immunoglobulin (IH-myoo-noh-GLOB-yoo-lin): A protein that acts as an antibody.

Induction therapy (in-DUK-shun THAYR-uh-pee): Treatment designed to be used as a first step toward shrinking the cancer and in evaluating response to drugs and other agents. Induction therapy is followed by additional therapy to eliminate whatever cancer remains.

Infection: Invasion and multiplication of germs in the body. Infections can occur in any part of the body and can spread throughout the body. The germs may be bacteria, viruses, yeast, or fungi. They can cause a fever and other problems, depending on where the infection occurs.

IV: Into or within a vein. IV usually refers to a way of giving a drug or other substance through a needle or tube inserted into a vein. Also called intravenous.

Local anesthesia (A-nes-THÉE-zhuh): Drugs that cause a temporary loss of feeling in one part of the body. The patient remains awake but has no feeling in the part of the body treated with the anesthetic.

M protein (PROH-teen): An antibody found in unusually large amounts in the blood or urine of people with multiple myeloma and other types of plasma cell tumors. Also called monoclonal protein.

Medical oncologist (MEH-dih-kul on-KAH-loh-jist): A doctor who specializes in diagnosing and treating cancer using chemotherapy, hormonal therapy, and biological therapy. A medical oncologist often is the main health care provider for someone who has cancer. A medical oncologist also gives supportive care and may coordinate treatment given by other specialists.

Monoclonal gammopathy of undetermined significance: MGUS. A benign condition in which there is a higher-than-normal level of a protein called M protein in the blood. Patients with monoclonal gammopathy of undetermined significance are at an increased risk of developing cancer.

MRI: Magnetic resonance imaging (mag-NEH-tik REH-zuh-nunts IH-muh-jing). A procedure in which radio waves and a powerful magnet linked to a computer are used to create detailed pictures of areas inside the body.

Multiple myeloma (MUL-tih-pul MY-eh-LOH-muh): A type of cancer that begins in plasma cells (white blood cells that produce antibodies). Also called Kahler disease, myelomatosis, or plasma cell myeloma.

Oncology nurse (on-KAH-loh-jee): A nurse who specializes in caring for people who have cancer.

Pathologist (puh-THAH-loh-jist): A doctor who identifies diseases by studying cells and tissues under a microscope.

Peripheral blood stem cell transplant (puh-RIH-fuh-rul): A method of replacing blood-forming cells destroyed by cancer treatment. Immature blood cells (stem cells) in the circulating blood that are similar to those in the bone marrow are given to the patient after treatment. This helps the bone marrow recover and continue producing healthy blood cells. Transplantation may be autologous (an individual's own blood cells saved earlier), allogeneic (blood cells donated by someone else), or syngeneic (blood cells donated by an identical twin).

Plasma cell (PLAZ-muh): A type of white blood cell that produces antibodies.

Plasma cell myeloma (PLAZ-muh MY-eh-LOH-muh): A type of cancer that begins in plasma cells (white blood cells that produce antibodies). Also called multiple myeloma, Kahler disease, or myelomatosis.

Plasma cell tumor (PLAZ-muh TOO-mer): A tumor that begins in plasma cells (white blood cells that produce antibodies). Multiple myeloma, monoclonal gammopathy of undetermined significance (MGUS), and plasmacytoma are types of plasma cell tumors.

Plasmacytoma (PLAZ-muh-sy-TOH-muh): A type of cancer that begins in plasma cells (white blood cells that produce antibodies). A plasmacytoma may turn into multiple myeloma.

Platelet (PLATE-let): A type of blood cell that helps prevent bleeding by causing blood clots to form.

Radiation therapy (RAY-dee-AY-shun THAYR-uh-pee): The use of high-energy radiation from x-rays, gamma rays, neutrons, and other sources to kill cancer cells and shrink tumors. Also called radiotherapy and irradiation.

Red blood cell: RBC. A cell that carries oxygen to all parts of the body. Also called erythrocyte.

Registered dietitian (dy-eh-TIH-shun): A health professional with special training in the use of diet and nutrition to keep the body healthy. A registered dietitian may help the medical team improve the nutritional health of a patient.

Risk factor: Something that may increase the chance of developing a disease. Some examples of risk factors for cancer include age, a family history of certain cancers, use of tobacco products, certain eating habits, obesity, lack of exercise, exposure to radiation or other cancer-causing agents, and certain genetic changes.

Side effect: A problem that occurs when treatment affects healthy tissues or organs. Some common side effects of cancer treatment are fatigue, pain, nausea, vomiting, decreased blood cell counts, hair loss, and mouth sores.

Smoldering myeloma (MY-eh-LOH-muh): A very slow-growing type of myeloma in which abnormal plasma cells (a type of white blood cell) make too much of a single type of monoclonal antibody (a protein). This protein builds up in the blood or is passed in the urine. Patients with smoldering myeloma usually have no symptoms, but need to be checked often for signs of progression to fully developed multiple myeloma.

Stem cell: A cell from which other types of cells develop. For example, blood cells develop from blood-forming stem cells.

Stem cell transplant: A method of replacing immature blood-forming cells that were destroyed by cancer treatment. The stem cells are given to the person after treatment to help the bone marrow recover and continue producing healthy blood cells.

Steroid (STAYR-oyd): A type of drug used to relieve swelling and inflammation. Some steroid drugs may also have antitumor effects.

Supportive care: Care given to improve the quality of life of patients who have a serious or life-threatening disease. The goal of supportive care is to prevent and treat as early as possible the symptoms of a disease, side effects caused by treatment of a disease, and psychological, social, and spiritual problems related to a disease or its treatment. Also called palliative care, comfort care, and symptom management.

Syngeneic stem cell transplant (SIN-juh-NAY-ik): A procedure in which a patient receives blood-forming stem cells (cells from which all blood cells develop) donated by his or her healthy identical twin.

Targeted therapy (THAYR-uh-pee): A type of treatment that uses drugs or other substances, such as monoclonal antibodies, to find and attack specific cancer cells.

Tissue (TISH-oo): A group or layer of cells that work together to perform a specific function.

Transfusion (trans-FYOO-zhun): The infusion of components of blood or whole blood into the bloodstream. The blood may be donated from another person, or it may have been taken from the person earlier and stored until needed.

Tumor (TOO-mer): An abnormal mass of tissue that results when cells divide excessively or do not die when they should. Tumors may be benign (not cancerous) or malignant (cancerous). Also called neoplasm.

Vaccine: A substance or group of substances meant to cause the immune system to respond to a tumor or to microorganisms, such as bacteria or viruses. A vaccine can help the body recognize and destroy cancer cells or microorganisms.

Virus (VY-rus): A microorganism that can infect cells and may cause disease.

Watchful waiting: Closely monitoring a patient's condition but withholding treatment until symptoms appear or change. Also called observation.

White blood cell: WBC. Refers to a blood cell that does not contain hemoglobin. White blood cells include lymphocytes, neutrophils, eosinophils, macrophages, and mast cells. These cells are made by bone marrow and help the body fight infections and other diseases.

X-ray: A type of high-energy radiation. In low doses, x-rays are used to diagnose diseases by making pictures of the inside of the body. In high doses, x-rays are used to treat cancer.

National Cancer Institute Information Resources

You may want more information for yourself, your family, and your doctor. The following NCI services are available to help you.

Telephone

NCI's Cancer Information Service (CIS) provides accurate, up-to-date information about cancer to patients and their families, health professionals, and the general public. Information specialists translate the latest scientific information into plain language, and they will respond in English or Spanish, as well as through TRS providers for the hearing or speech impaired. Calls to the CIS are confidential and free.

Telephone: **1-800-4-CANCER** (1-800-422-6237)

Internet

NCI's Web site provides information from numerous NCI sources. It offers current information about cancer prevention, screening, diagnosis, treatment, genetics, supportive care, and ongoing clinical trials. It has information about NCI's research programs, funding opportunities, and cancer statistics.

Web site: **<http://www.cancer.gov>**

Spanish Web site: **<http://www.cancer.gov/espanol>**

If you're unable to find what you need on the Web site, contact NCI staff. Use the online contact form at **<http://www.cancer.gov/contact>** or send an email to **cancergovstaff@mail.nih.gov**.

Also, information specialists provide live, online assistance through **LiveHelp** at **<http://www.cancer.gov/help>**.

National Cancer Institute Publications

NCI provides publications about cancer, including the booklets and fact sheets mentioned in this booklet. Many are available in both English and Spanish.

You may order these publications by telephone, on the Internet, or by mail. You may also read them online and print your own copy.

- **By telephone:** People in the United States and its territories may order these and other NCI publications by calling the NCI's Cancer Information Service at **1-800-4-CANCER**.
- **On the Internet:** Many NCI publications may be viewed, downloaded, and ordered from **<http://www.cancer.gov/publications>** on the Internet. People in the United States and its territories may use this Web site to order printed copies. This Web site also explains how people outside the United States can mail or fax their requests for NCI booklets.
- **By mail:** NCI publications may be ordered by writing to the address below:
Publications Ordering Service
National Cancer Institute
P.O. Box 24128
Baltimore, MD 21227

Clinical Trials

- *Taking Part in Cancer Treatment Research Studies*

Finding a Doctor, Support Groups, or Other Organizations

- *How To Find a Doctor or Treatment Facility If You Have Cancer* (also in Spanish)
- *Cancer Support Groups: Questions and Answers*
- *National Organizations That Offer Services to People With Cancer and Their Families* (also in Spanish)

Cancer Treatment and Supportive Care

- *Chemotherapy and You* (also in Spanish)
- *Targeted Cancer Therapies: Questions and Answers*
- *Radiation Therapy and You* (also in Spanish)
- *Bone Marrow Transplantation and Peripheral Blood Stem Cell Transplantation: Questions and Answers* (also in Spanish)
- *Eating Hints for Cancer Patients* (also in Spanish)
- *Pain Control* (also in Spanish)

Coping With Cancer

- *Taking Time: Support for People with Cancer*

Life After Cancer Treatment

- *Follow-up Care After Cancer Treatment: Questions and Answers*
- *Facing Forward: Life After Cancer Treatment* (also in Spanish)
- *Facing Forward: Ways You Can Make a Difference in Cancer*

Advanced or Recurrent Cancer

- *Coping With Advanced Cancer*
- *When Cancer Returns*

Complementary Medicine

- *Thinking about Complementary & Alternative Medicine: A guide for people with cancer*
- *Complementary and Alternative Medicine in Cancer Treatment: Questions and Answers (also in Spanish)*

Caregivers

- *When Someone You Love Is Being Treated for Cancer: Support for Caregivers*
- *When Someone You Love Has Advanced Cancer: Support for Caregivers*
- *Facing Forward: When Someone You Love Has Completed Cancer Treatment*
- *Caring for the Caregiver: Support for Cancer Caregivers*

The National Cancer Institute

The National Cancer Institute (NCI), part of the National Institutes of Health, is the Federal Government's principal agency for cancer research and training. NCI conducts and supports basic and clinical research to find better ways to prevent, diagnose, and treat cancer. The Institute also supports education and training for cancer research and treatment programs. In addition, NCI is responsible for communicating its research findings to the medical community and the public.

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