X-Plain
Multiple Myeloma

Reference Summary

Introduction

Multiple myeloma is a type of cancer that affects white blood cells. Each year, nearly 15,000 people in the United States find out that they have multiple myeloma.

This reference summary will help you understand multiple myeloma and its treatment options.

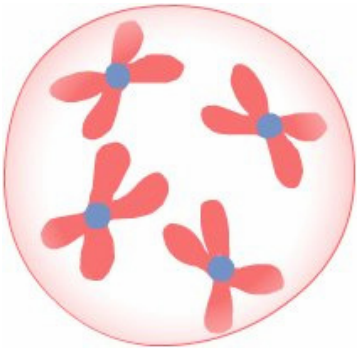
Cancer

The body is made up of very small cells. Normal cells in the body grow and die in a controlled way. Sometimes cells keep dividing and growing without normal controls, causing an abnormal growth called a tumor. If a tumor does not invade nearby tissues and body parts, it is called a benign tumor, or non-cancerous growth. Benign tumors are almost never life threatening.

If the tumor invades and destroys nearby cells, it is called a malignant tumor, or cancer. Cancer can sometimes be life threatening.

Cancerous cells sometimes spread to different parts of the body through blood vessels and lymph channels.

Lymph is a clear fluid produced by the body that drains waste from cells. It travels through special vessels and bean-shaped structures called lymph nodes.



Cancer treatments are used to kill or control abnormally growing cancerous cells.

Cancers in the body are given names, depending on where the cancer started. Cancer that begins in the pancreas will always be called pancreatic cancer, even if it spreads to other places in the body. Although doctors can

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locate where a cancer started, the cause of cancer in an individual patient cannot always be identified.

Cells contain hereditary, or genetic, materials called chromosomes. Chromosomes control the growth of cells. Cancer always arises from changes that occur in the chromosomes. When the chromosomes in a cell become abnormal, the cell can lose the ability to control its growth.

Sudden changes in genetic material can happen for a variety of reasons. These changes are sometimes inherited. Changes in chromosomes may also occur as a result of exposure to infections, drugs, tobacco, chemicals, or other factors. In the case of skin cancer, sunlight causes damage to the chromosomes leading to cancer.

Multiple Myeloma

Multiple myeloma is a type of cancer that affects certain white blood cells called plasma cells. Plasma cells and other white blood cells are part of the immune system, which helps protect the body from infection and disease.

All white blood cells begin their development in bone marrow, the soft, spongy tissue that fills the center of most bones. Certain white blood cells leave the bone marrow and finish growing in other parts of the body. Some develop into plasma cells when the immune system needs them to fight infection and disease.

Plasma cells produce antibodies, which are special chemicals that move through the bloodstream to help the body get rid of harmful substances. Each type of plasma cell responds to only one specific substance by making a large amount of antibodies that find and fight that one substance.

Since the body has many types of plasma cells, it can defend the body against many types of bacteria and diseases.

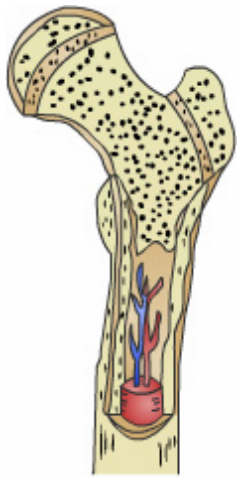
When cancer involves plasma cells, the body keeps producing more and more of these cells. The unneeded plasma cells, all abnormal and exactly alike, are called *myeloma cells*.

Myeloma cells tend to collect in bone marrow and in the hard, outer part of bones. Sometimes they collect in only one bone and form a single mass, or tumor, called a *plasmacytoma*. In most cases, myeloma cells collect in many bones, often forming

many tumors and causing other problems. When this happens, the disease is called multiple myeloma.

Since people with multiple myeloma have an abnormally large number of identical plasma cells, they also have too much of one type of antibody. These myeloma cells and antibodies can cause a number of serious medical problems.

As myeloma cells increase in number, they damage and weaken bones, causing pain and sometimes fractures. Bone pain can make it difficult for patients to move.



When bones become damaged, calcium is released into the blood. This may lead to *hypercalcemia,* too much calcium in the blood. Hypercalcemia can cause loss of appetite, nausea, thirst, fatigue, muscle weakness, restlessness, and confusion.

Myeloma cells prevent bone marrow from making normal plasma cells and other white blood cells that are important to the immune system. When this happens, the patient may not be able to fight infection and disease.

Myeloma cancer cells can also prevent new red blood cells from growing. Red blood cells carry oxygen and without enough of them, a person has *anemia*.

Patients with anemia may feel unusually tired or weak because they lack the normal oxygen carrying capacity of the blood.

Multiple myeloma patients can have serious problems with their kidneys. Extra antibodies and calcium can prevent the kidneys from filtering and cleaning the blood correctly.

Symptoms and Causes

Symptoms of multiple myeloma depend on how advanced the disease is. In the earliest stage of the disease, there may be no symptoms.

When symptoms of multiple myeloma occur, they may include:

- bone pain, often in the back or ribs
- broken bones
- weakness and fatigue

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- weight loss
- repeated infections

When myeloma is in advanced stages, symptoms may include:

- nausea
- vomiting
- constipation
- problems with urination
- weakness or numbness in the legs

Currently, there is no known cause of multiple myeloma. It is not contagious and most multiple myeloma patients are between 50 and 70 years old. By studying large numbers of people all over the world, researchers have found certain risk factors that increase a person's risk of getting multiple myeloma.

Some of the risk factors include:

- Older people are more likely to get it than younger people
- It is twice as common in black people as in white people
- High-energy radiation, such as atomic radiation
- A family member who has multiple myeloma in very rare cases

Long exposure to chemicals, such as:

- Benzene has been suggested but not totally proven
- Overweight people may be at a higher risk too.
- Patients who have had previous diseases involving their plasma cells may be at an increased risk.

Diagnosis

Multiple myeloma may be found as part of a routine physical exam before patients have symptoms. The doctor asks about personal and family medical history when performing a complete physical exam. The doctor may order a number of tests to determine the cause of symptoms. If a patient has bone pain, x-rays can show whether any bones are damaged or broken.

Samples of the patient's blood and urine are checked to find out whether they contain high levels of antibody proteins called *M proteins*. These are the chemicals made by

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cancerous plasma cells. The doctor may take a sample of bone marrow to determine if it contains cancerous cells. A sample is taken by doing either a bone marrow aspiration or a bone marrow biopsy.

A pathologist examines the sample under a microscope to see whether myeloma cells are present. For a bone marrow aspiration, the doctor inserts a needle into the hipbone or breastbone to withdraw a sample of fluid and cells from the bone marrow. For a bone marrow biopsy, the doctor uses a larger needle to withdraw a sample of solid tissue from the marrow. To plan a patient's treatment, the doctor must know what stage the myeloma is in. Staging is a careful attempt to find out what parts of the body are affected by the cancer.

Results of the patient's exam, blood tests, and bone marrow tests help the doctor determine what stage the disease is in. Staging usually involves a series of x-rays to determine the number and size of tumors in the bones. In some cases, a patient must have *MRIs* done if more detailed views of the bones are needed.

The more advanced the stage of multiple myeloma, the further the cancer has spread in the body.

Treatment

Treatment for multiple myeloma depends on what stage the cancer is in and the patient's symptoms. The doctor also considers the person's age and general health.

Plasmacytoma and multiple myeloma are very hard to cure. Although patients who have a plasmacytoma may be free of symptoms for a long time after treatment, many eventually develop multiple myeloma.

For patients with multiple myeloma, treatment can improve the quality of their life by controlling the symptoms and complications of the disease. People who have multiple myeloma but no symptoms usually do not receive treatment because the risks and side effects may outweigh the benefits. However, treatment begins when symptoms appear.

Treatment for multiple myeloma is usually chemotherapy and sometimes radiation therapy. Chemotherapy is the use of drugs to treat cancer. Radiation therapy uses high-energy rays to damage cancer cells and stop them from growing.

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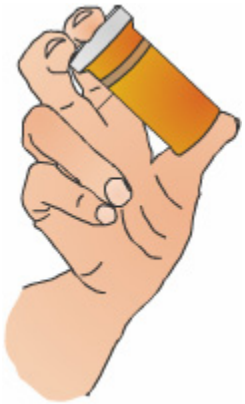
Chemotherapy and radiation therapy are very powerful treatments. They can help patients feel better by relieving symptoms such as pain. However, it is hard to limit therapy so that only cancer cells are destroyed; healthy cells are affected too. Since healthy cells may also be damaged, treatment can cause side effects. Side effects of cancer treatment vary from person to person. They may even be different from one treatment to the next.

Besides limiting cancer growth, treatment reduces symptoms such as pain caused by bone damage or by tumors pressing on nerves. Pain medicine, a back or neck brace, and relaxation techniques are usually suggested to help relieve pain.

Additional treatment includes:

- antibiotics to treat infections
- medications to control calcium levels in the blood
- dialysis or plasmapheresis to clean the blood
- blood transfusions to treat anemia
- operations for broken bones



It is important for the patient to:

- exercise and be active to reduce calcium loss
- drink a lot of fluid every day to help the kidneys clean blood
- stay out of crowds and away from people with colds or other infectious diseases
- eat well to counteract loss of appetite, nausea, and vomiting. Many clinical trials are available for patients. Clinical trials are experiments designed to help find out whether a new treatment is safe and effective. These treatments are thought to be at least as good as regular treatments. If you are interested in clinical trial treatments, you should ask your doctor.

Chemotherapy

Chemotherapy is the use of drugs to treat cancer. It is the main treatment for multiple myeloma. Doctors may prescribe two or more drugs that work together to kill myeloma cells. Many myeloma chemotherapy drugs are taken by mouth; others are injected into blood vessels. Anticancer drugs often are given in cycles: a treatment period, a rest period, another treatment period, and so on.

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Most patients take chemotherapy at home, as outpatients at the hospital, or at a doctor's office. However, depending on their health and the drugs being given, patients may need to stay in the hospital during treatment.

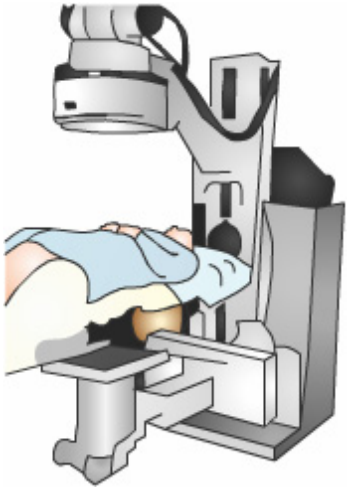
The following side effects result when chemotherapy affects healthy cells:

- Low resistance to infection results when white blood cells are affected
- Baldness when hair follicles are affected
- Loss of appetite, nausea, vomiting when the digestive tract is affected

The side effects of chemotherapy usually go away over time after treatment stops.

Radiation Therapy

Radiation therapy, also called radiotherapy, uses high-energy rays to damage cancer cells and stop them from growing. A large machine aims rays at a tumor and the area close to it.



Radiation therapy is the main treatment for patients with a single plasmacytoma. They usually receive radiation therapy every weekday for 4-5 weeks in an outpatient clinic. People who have multiple myeloma sometimes receive radiation therapy in addition to the chemotherapy. The purpose of radiation therapy is to help control the growth of tumors in the bones and relieve the pain that these tumors cause. Treatment usually lasts1-3 weeks.

During radiation therapy, the patient may be more tired than usual. Resting is important, but doctors usually advise patients to stay as active as they can. Also, the skin in the treated area may become red or dry.

The skin should be exposed to air but protected from the sun, and patients should avoid wearing clothes that rub the treated area. They should **not** use any lotion or cream on the skin without first talking with their doctor.

Patients may have other side effects, depending on the areas treated. For example, radiation to the lower back may cause nausea, vomiting, or diarrhea. Medicine can ease and reduce side effects, which usually go away gradually after radiation therapy is stopped.

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Stem Cell Transplantation

Stem cells are the basics cells in the bone marrow. They form all the blood cells. In advanced cases of multiple myeloma, replacing the bone marrow and its stem cells with new healthy stem cells becomes necessary. This is known as stem cell transplantation. The patient's myeloma-producing bone marrow is destroyed by high doses of drugs and radiation. It is then replaced by healthy stem cells.

Healthy stem cells may come from a donor, or they may be removed from the patient and stored before the high-dose treatment.

If the patient's own stem cells are used, they are usually treated outside the body to remove myeloma cells.

Patients who have a stem cell transplant usually stay in the hospital for several weeks. Until the transplanted stem cells begin to produce enough white blood cells, patients must be carefully protected from infection. Patients who have a stem cell transplant face an increased risk of infection, bleeding, and other side effects of chemotherapy and radiation.

Donated stem cells may react against a patient's tissues. This is known as *graft-versus-host disease* or GVHD. GVHD can be mild or very severe and can occur at any time after a transplant.

Stem cell transplantation may have to be repeated few times.

Summary

Multiple myeloma is a type of cancer that affects certain white blood cells called plasma cells. Multiple myeloma is very hard to cure. However, several treatment options are available to improve the quality of life by controlling the symptoms and complications of the disease.

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