



# The Cycle of Multiple Myeloma: the Disease Process

Multiple myeloma (MM) is a chronic (long-lasting) and progressive (worsening over time) disease that requires a long-term treatment plan to help manage it. This article is designed to help you learn the basics about this disease—how it starts, how it continues over time, how it can affect your health, and how you can help to manage it.

## WHY IT'S HELPFUL

Once you understand how the disease works, you can begin to ask more informed questions and become more involved in your care.

## KEY POINTS

1. MM is cancer of a type of immune cell called a plasma cell
2. When you have MM, genetic changes to your immune cells transform them from healthy infection- and disease-fighting cells into malignant (cancerous) myeloma cells
3. Once myeloma cells begin to grow in your bone marrow, they begin a continuous cycle of growth—making MM a chronic (long-lasting) and progressive (worsening over time) disease
4. As myeloma cells continue to grow, they can lead to kidney damage, anemia, bone pain, a weakened immune system, and other problems
5. You can take an active role in managing your MM

## HOW MULTIPLE MYELOMA STARTS

MM is cancer of a type of immune cell called a plasma cell. The plasma cell is a type of white blood cell that is made in your bone marrow (the tissue inside your bones). These cells produce antibodies that help your body fight infection, disease, and even cancer.

But when you have MM, changes to your cells' genetic makeup cause your normal plasma cells to transform into malignant (or cancerous) myeloma cells. These malignant myeloma cells then connect with other cells in your bone marrow, giving them a foundation to grow even more myeloma cells.

## HOW MULTIPLE MYELOMA CONTINUES OVER TIME

Once myeloma cells begin to grow in your bone marrow, a continuous cycle of growth begins. There are 2 different, but equally important, parts of the cycle of MM:

1. Myeloma cells grow and multiply within your bone marrow. They overcrowd the tissue space, leaving no room for your healthy immune cells to grow. Myeloma cells also release chemicals (called cytokines) that can stop healthy immune cells from working.
2. When your healthy immune cells can't grow, they can't fight off diseases, including MM. Your weakened immune system then allows more myeloma cells to grow.

This cycle keeps going around and around—and this is what makes MM a chronic and progressive disease that requires a long-term plan to help manage it.

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## HOW MULTIPLE MYELOMA CAN AFFECT YOUR HEALTH

Untreated MM can cause a range of harmful effects to your body. This is why it's so important to work with your healthcare team to help manage the disease.

If myeloma cells continue to grow in your bone marrow, they can cause symptoms commonly referred to as CRAB (**C**alcium, **R**enal, **A**nemia, **B**one) and infection:

- **CALCIUM IN YOUR BLOOD:** Myeloma cells connect with other cells in your bone marrow, which can eventually lead to extra calcium in your blood. This puts a strain on your kidneys, which are responsible for filtering your blood, and can lead to other symptoms such as fatigue (extreme tiredness), loss of appetite, increased thirst and/or urination, restlessness, nausea and vomiting, and even trouble thinking or confusion.
- **RENAL (OR KIDNEY) PROBLEMS:** In addition to the problems caused by extra calcium in your blood, myeloma cells also release a type of protein (called M-protein) that can damage your kidneys. You need your kidneys to help prevent waste and extra fluids from building up in your body, to keep levels of electrolytes (such as sodium, potassium, and phosphate) stable, and to make hormones that help keep your bones strong and your blood pressure in check.
- **ANEMIA:** With less space in your bone marrow for healthy red blood cells, you have a higher risk of anemia. This means that your blood cannot carry enough oxygen to the rest of your body. Anemia can cause symptoms such as fatigue, headache, shortness of breath, and feelings of being very cold, dizzy, or irritable.
- **BONE PROBLEMS:** Myeloma can cause bone destruction, which can result in bone pain. This damage occurs as MM interferes with 2 ways that bones normally develop: reducing the activity of osteoblasts, which usually help build new bone; and promoting the activity of osteoclasts, which usually break down old bone.
- **INFECTION CAUSED BY A WEAKENED IMMUNE SYSTEM:** When myeloma cells crowd out the other cells in your body, you are left at higher risk of infection and disease. A weakened immune system also allows more myeloma cells to grow.

## HOW YOU CAN TAKE AN ACTIVE ROLE TO HELP MANAGE MULTIPLE MYELOMA

Because MM is a long-lasting disease, you and your healthcare team will need to work together to develop a long-term plan to help manage it.



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Stay informed and get involved with your healthcare team:

- Learn more about MM and your options
- Follow the advice of your doctors and nurses and keep all of your appointments
- Take your medicines as prescribed and for as long as they are prescribed
- Ask questions whenever you don't understand something
- Make sure to always share your thoughts, feelings, and any symptoms or side effects with your healthcare team

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