



Myeloma Canada
InfoGuide Series

Myeloma Bone Disease



MYELOMA CANADA

MAKING MYELOMA MATTER

www.myeloma.ca





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Myeloma Canada wishes to thank Myeloma UK for their editorial support in the creation of this InfoGuide.

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The information in this InfoGuide is not meant to replace the advice of a medical professional. They are the best people to ask if you have questions about your specific medical/social situation.





Introduction

Myeloma Canada's *Myeloma Bone Disease InfoGuide* has been created specifically for people living with myeloma, their families and their caregivers. The goal of this InfoGuide is to help you better understand myeloma bone disease and the many options for its management and treatment. It also gives you tips on how to overcome challenges, such as pain and difficulties moving around, and provides you with the information you need to be able to make informed treatment decisions with your medical team.

Some of the more technical or unusual words in this InfoGuide appear in ***bold italics*** the first time they're used and are explained in the **Glossary** starting on page 24. As you read through the InfoGuide, refer to the "More Information" and "Did You Know?" boxes to learn more about selected topics. Moreover, don't be afraid to ask members of your, or your loved one's healthcare team to explain any terms or concepts you may have trouble understanding.

Throughout your journey with myeloma, your healthcare team will provide you with a large amount of information, including how to best manage your pain in order to improve your quality of life. Early identification, assessment and the treatment of symptoms is key. You may find it helpful to write down any questions that you have along the way and share these with your healthcare team regularly. They are the best people to help you understand what is happening and guide you to make informed decisions.

Be an informed and cautious information consumer

Be cautious of information that comes your way. While books and the internet offer a wealth of information, not all of it is correct, it may not apply to your unique situation, and it may be confusing or misleading. Well-intended people may also try to offer you health advice without knowing the details of your condition and its treatment. Certain online support groups may also be helpful, but again be wary of possible misinformation. It's important to know that your source is reputable and to discuss what you read with your healthcare team. Never make any change to your treatment plan without checking with them first, for any symptom you're experiencing.

Be sure to visit myeloma.ca for reliable, up-to-date resources, support group information and more.

Drug Access Navigator

Over the past 15 years, thanks to advances in research, new molecules and targeted therapies to treat myeloma are being developed at an impressive rate, with more options available than ever before. In Canada, access to, and coverage for, these new treatments varies across provinces and territories, making it often confusing and overwhelming to get the information you need.





About Myeloma Canada

Myeloma Canada is a registered non-profit organization created by, and for, people impacted by multiple myeloma. As the only national organization exclusively devoted to the Canadian myeloma community, Myeloma Canada has been making myeloma matter since its founding in 2005.

Working with leading myeloma researchers and clinicians as well as other cancer organizations and local support groups across Canada and internationally, Myeloma Canada seeks to strengthen the voice of the Canadian myeloma community and improve quality of life for those impacted by myeloma through awareness, education, advocacy, fostering an empowered community and supporting clinical research to find a cure.

Myeloma Canada's goals:

- **Increase awareness** of the disease and its effects on the lives of patients and their families
- **Educate** patients, families and caregivers
- **Advocate** for access to new therapies, treatment options and healthcare resources
- **Empower** patients and caregivers through community engagement
- **Advance** clinical research and promote access to new drug trials in Canada

Myeloma Canada educational publications

For more detailed information about myeloma and living with the disease, visit myeloma.ca and click on "Resources". From here, you can download Myeloma Canada's educational publications, watch educational videos, find a local support group and so much more.

Whether you're downloading a copy or requesting a printed version, all Myeloma Canada publications are free of charge. To order your printed copies of the materials below, email us at contact@myeloma.ca, or call us toll-free at 1-888-798-5771.

- *Multiple Myeloma Patient Handbook*
- *Multiple Myeloma Caregiver Handbook*
- *Managing Pain & Fatigue InfoGuide*
- *MGUS and Smouldering Multiple Myeloma*
- *High-dose Therapy and Autologous Stem Cell Transplantation InfoGuide*
- *Understanding Your Blood and Blood Tests InfoGuide*
- *Myeloma and the Kidney InfoGuide*
- *Clinical Trials as a Treatment Option InfoGuide*
- *Myeloma Bone Disease InfoGuide*





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Understanding Myeloma Bone Disease

What is myeloma bone disease?

Myeloma bone disease, a common feature of multiple myeloma, occurs when cancerous plasma (myeloma) cells in the bone marrow cause the surrounding bone to break down faster than it can be repaired, leading to bone fractures and pain. Myeloma bone disease most commonly affects the bones of the middle or lower back, hips and rib cage.

It may be difficult and frightening to think about facing myeloma bone disease when you've been diagnosed with myeloma. While it's common for people living with myeloma to develop bone complications at some point during their illness, that doesn't mean that everyone does. If you do, know that you're not alone and that your experience may differ considerably from someone else's. Your myeloma might affect one or two bones in your body, or it may not affect your bones at all.

As with myeloma in general, everyone's situation is unique to them.





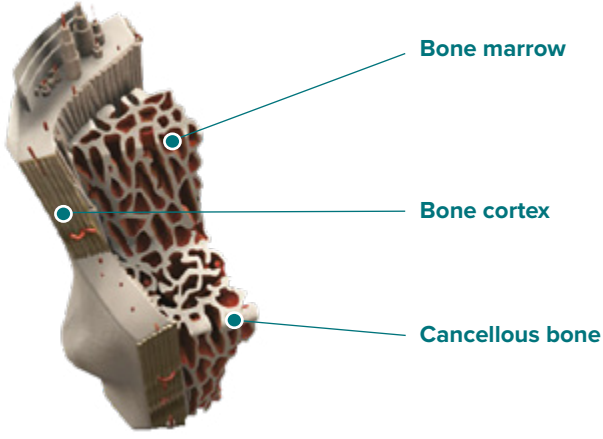
Why Does Myeloma Bone Disease Occur?

When you're dealing with a big change in your health, it can be very helpful to understand as much as you can about what's happening to your body. To understand why myeloma bone disease occurs, it's a good idea to start by learning more about bones, their healthy structure, and what happens to them when you have myeloma.

Bones: Our physical support system

Bones are a major part of our ***skeletal system***, which also includes ***joints*** – areas where firm, smooth, flexible tissue connects bones together, allowing us to move freely. Bones are made up of a dense outer shell, called the bone cortex, and a softer, spongier middle, called cancellous bone (see Figure 1). ***Bone marrow*** is found in the spaces of the cancellous bone.

Figure 1: Healthy bone structure



Bone is made up of a dense outer shell called the cortex and a spongier middle called cancellous bone. Bone marrow is found in the spaces of the cancellous bone.

Bones have five extremely important functions in your body:

1. **Support** – help to hold you up and keep your soft organs in place.
2. **Protection** – protect your soft inner organs. For example, your skull protects your brain.
3. **Movement** – along with your muscular system, bones help you move. Without bones, you wouldn't be able to walk, swim or play catch!
4. **Storage** – bones store minerals that are essential for the proper functioning of your body. For example, the calcium in bones is released to help your nervous system work properly.
5. **Blood cell formation** – new blood cells are constantly being formed in your bone marrow.

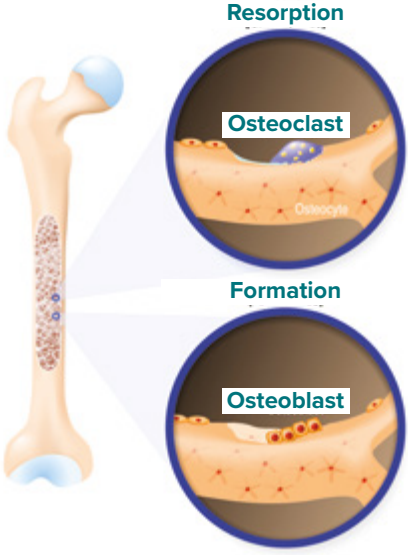
Bone cells: Busy bodies of your body

Although your bones are made up of minerals and are hard, they're still living tissue full of blood vessels, nerves and cells. These cells include two very important types that play a key role in the healthy activity of bones:

- ***Osteoblasts*** – cells that form new bone;
- ***Osteoclasts*** – cells that break down old bone.

Osteoblasts and osteoclasts are constantly at work, breaking down old or damaged bone and building new bone. This ongoing cycle is known as ***bone remodelling*** (Figure 2) and is responsible for maintaining your bone thickness, strength and health. In healthy bone, the activity of osteoblasts and osteoclasts is equal. This means that your bone mass remains the same despite the constant changes that are happening throughout your bones.

Figure 2: Bone remodelling



Bone cells called osteoclasts break down old or damaged bone (resorption). Other bone cells called osteoblasts then lay down new bone (formation). The breakdown and build up is equal in healthy bone.

Bone cell activity in myeloma: Breakdown in bone remodelling

Unlike healthy bone cell activity, myeloma cells send signals that prevent osteoblasts from building new bone and speed up the breakdown activity of osteoclasts. In other words, the bone breaks down faster than it can be built up or renewed. Additionally, the osteoclasts produce chemicals that stimulate myeloma cells to grow. So a vicious cycle of bone loss and spreading myeloma eventually leads to the ***lytic lesions*** (damaged areas of bone that appear as holes on an X-ray) and ***fractures*** that are unfortunately, the hallmarks of myeloma bone disease.

More Information

The crossed signals of myeloma bone disease

Myeloma cells cause bones to break down by producing molecules known as ***cytokines*** and ***growth factors*** that increase the activity of osteoclasts and reduce the activity of osteoblasts. Here are some of the problem-causing chemicals in the bones of someone with myeloma:

- **IL-6, or interleukin 6** – one of the cytokines produced by osteoclasts to stimulate the growth of myeloma cells;
- **TGF-ß, or transforming growth factor beta** – a protein that normally keeps cell growth in check; in some cancers it stops working properly, allowing myeloma cells to multiply;
- **IGF, or insulin-like growth factor** – a protein that is produced in the bone marrow and can stimulate the growth of myeloma cells;
- **FGF, or fibroblast growth factor** – a protein that normally keeps cell growth in check; if something goes wrong with FGF or the other proteins it works with, myeloma cells can start to multiply;
- **BMP, or bone morphogenic protein** – normally stimulates the production of bone and keeps the growth of other cells in check; when it malfunctions in certain cancers, bone growth slows and myeloma cells are able to multiply;
- **RANKL, or receptor activator of nuclear factor kappaB ligand** – a protein normally produced in the bone marrow; in myeloma, more than usual quantities of RANKL are produced which boosts the activity of osteoclasts;
- **DKK1,** a protein secreted by myeloma cells that prevents osteoblasts from normally developing and building new bone.





Signs and Symptoms of Myeloma Bone Disease

There are several signs and symptoms of myeloma bone disease, many of which may improve as your myeloma treatment progresses (see page 10). As with anything else, you are the only one who knows what and how you're feeling. If you're experiencing any new or different symptoms, including pain, it's important to share this information with your healthcare team as quickly as possible. Together, you can come up with a plan that may help you manage and control your pain.

Bone pain

The most common symptom of myeloma bone disease is pain, which is usually felt in the mid and lower back, ribs and hips, but it can occur anywhere bone has been damaged by complications resulting from your myeloma. Some people may experience more pain than others. Typically, bone pain feels worse when you move and better when you lie down. Sometimes more severe bone disease can cause pain that can wake you up at night.

As we mentioned earlier, in a healthy person, cells called osteoclasts work to break down old bone, while cells called osteoblasts work to form new replacement bone. Together, these cells continually rebuild bones to keep them strong in a roughly equal rate of bone destruction and formation. This rate is skewed in myeloma because myeloma cells in the bone marrow cause the surrounding bone to be broken down faster than it can be formed or repaired. This can lead to bone thinning ***(osteopenia)***, disappearance of pockets of bone (lytic lesions), and higher than normal calcium levels in the blood ***(hypercalcemia)***.

Potential causes of bone pain in myeloma include:

- **Bone lesions** – soft spots that develop in locations where the bone has been damaged (most often on the spine, pelvis, or ribs). Bone lesions can lead to bone fractures and are the most common cause of pain in people with myeloma;
- **Bone fractures** – these occur when a weak bone cracks or breaks;
- ***Vertebral (spinal bone) fracture,* collapse, compression and/or thinning** – these are often the cause of persistent, severe pain;
- ***Kyphosis* (curve in the back)** – caused by vertebral collapse and frequently leads to chronic back pain and mobility problems;
- ***Plasmacytoma*** – depending on its location, can cause dull, aching pain as it grows. It may destroy bone and press on its surroundings (e.g., bones, nerves or organs). Removing or shrinking a plasmacytoma, usually with ***radiotherapy*** and/or chemotherapy, can help relieve this pain.

Listen to your body and call your doctor immediately if you have any worsening pain or severe new pain. Although not all pain may be necessarily related to myeloma (e.g., degenerative or chronic back problems), the goal is to find the cause of the pain and to treat it as quickly as possible. To learn more about bone complications, download or order Myeloma Canada's *Managing Pain and Fatigue InfoGuide*.

Unfortunately, the onset of pain in myeloma bone disease is a bit unpredictable. It can get worse over time or come on suddenly and severely, which can be a symptom of a fractured bone. Treating your myeloma is actually one of the best ways to relieve pain, because it slows further bone breakdown and reduces the chance of getting fractures. For more information, read the **"Managing Myeloma Bone-Related Pain"** section, starting on page 14.

Myeloma Canada's *Managing Pain and Fatigue InfoGuide*

The *Managing Pain and Fatigue InfoGuide* provides you with even more information on myeloma-related pain and fatigue. To download your free copy, visit the "Resources" section on myeloma.ca, and choose "Educational Publications". If you prefer to order a printed copy, email us at contact@myeloma.ca, or call toll-free at **1-888-798-5771.**

Did you know?

Not all fractures are the same

- **Pathological fractures** are broken bones caused by lytic lesions
- **Compression fractures** are caused by the collapse of vertebrae (bones of the spine) that have been weakened by myeloma

Height loss and kyphosis

Fractures that form in the ***vertebrae*** (bones of the spine) cause the spine to compress and collapse, either suddenly or slowly over time. If only a little compression is present in your spine, you might feel some discomfort in your back, weakness, tingling and changes in sensation that often affect your legs and arms. If your spine is very compressed, you may experience pain, numbness, significant weakness, difficulty with passing urine and/or difficulty with controlling bowel movements. In severe cases, when the spinal cord becomes affected by collapsed vertebrae, it can lead to paralysis. It's very important to contact your healthcare team immediately if you experience any of the symptoms above.

People who have had myeloma bone disease for a long time and have had multiple vertebrae collapse often lose some of their height. They may develop a curved spine, which is called ***kyphosis***.

Figure 3: Your spine



Cervical spine:
7 vertebrae (C1 - C7)

Thoracic spine:
12 vertebrae (T1 - T12)

Lumbar spine:
5 vertebrae (L1 - L5)

Sacrum:
5 vertebrae (S1 - S5)

Coccyx:
4 vertebrae

The spine consists of 33 bones, the vertebrae, that form a bony tube protecting the spinal cord. **In the cervical, thoracic and lumbar regions** of the spine (see diagram) the vertebrae can move a little, to give the body flexibility. **In the sacrum and coccyx**, vertebrae are fused together to provide rigid support at the hips.

In patients with myeloma bone disease, the vertebrae may develop small fractures and collapse, compressing the nerves that run through them.

Osteopenia

Since more bone is broken down than built up in myeloma bone disease, it's not uncommon for bones to become thinner. This thinning is called osteopenia, which can lead to small fractures in the spine and ribs, causing pain and discomfort. The presence of these fractures is often what leads to the initial diagnosis of myeloma.

Hypercalcemia

Another symptom of myeloma's over-active bone breakdown is the release of too much calcium from bones into the blood stream. A high calcium blood level is known as hypercalcemia. It can cause fatigue, appetite loss, nausea, vomiting, constipation, increased thirst, confusion and general weakness. These symptoms are so general that doctors and patients often assume they're the result of the myeloma itself or its treatment. Hypercalcemia is most frequently detected when myeloma is first diagnosed, and is less common once treatment has been started.





Imaging Tests for Myeloma Bone Disease

Since many people with myeloma have myeloma bone disease when they're first diagnosed, imaging tests are usually done, along with blood, urine and bone marrow tests. Although imaging tests might seem inconvenient, they're essential for getting you the right diagnosis and, ultimately, the best treatment possible. Because imaging tests can show areas of bone thinning, lytic lesions and fractures, some of them will be repeated throughout your myeloma journey. Types of imaging tests include:

- ***Whole-body low-dose computerized tomography (WBLDCT)*** - the first-choice initial imaging test for diagnosing myeloma bone disease. If WBLDCT is unavailable to you, ***skeletal survey*** may be used as the initial imaging test.
- If initial imaging results (WBLDCT or skeletal survey) are negative or unclear, whole-body ***magnetic resonance imaging (MRI)*** is required. If whole-body MRI is unavailable to you, MRI of the spine and pelvis should be used.
- If MRI is unavailable to you, whole-body ***fluoro-deoxyglucose positron emission tomography/computed tomography (FDG-PET/CT)*** is widely available in most Canadian centres.

WBLDCT: Looking beyond bone

As its name suggests, WBLDCT uses low doses of radiation to look at the spine, skull, ribs, pelvis and the long bones of the arms and legs. WBLDCT can also help your doctor see whether your myeloma exists outside of the bones, for example in soft tissue, and precisely pinpoint where radiotherapy, or treatment with radiation (see page 18), should be given.

Skeletal survey

Skeletal survey is a series of X-rays (pictures of the bones) of your whole body. It is no longer the gold standard for diagnosing myeloma bone disease, in particular due to its low sensitivity for detecting bone lesions. Lytic lesions are only detectable if more than 30% of the dense outer surface (cortex) of the affected bone is destroyed. If available, newer and more sensitive imaging techniques are preferred.

MRI: The benefits of more detail

The main advantage of MRI imaging is that it can show a very detailed view of bone marrow and so, it enables for early detection of myeloma cells in the bone marrow. MRI can also detect spinal cord or nerve compression and soft tissue plasmacytomas. Lastly, MRI uses magnetic energy instead of radiation. See Figures 4a and 4b.

Figure 4: MRI images

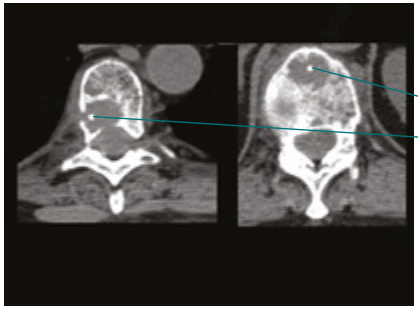


Figure 4a: Advanced myeloma of the spine with lytic lesions

Healthy bone marrow looks bright on an MRI. On an image from an MRI scan of a spine, it is possible to see the bone marrow of the vertebrae and areas of myeloma bone disease. Diseased areas are dark, and healthy areas are bright.

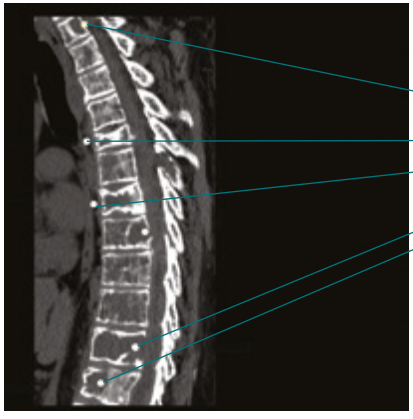


Figure 4b: Advanced myeloma of the spine with lytic lesions and compression fracture

FDG-PET/CT: Bone disease has nowhere to hide

Whole body FDG-PET/CT uses a short-lived, low-dose radioactive tracer molecule to distinguish between healthy tissue and diseased tissue. The tracer molecule is injected into the body and accumulates in areas where there is myeloma bone disease. The body is then scanned and the radioactive tracer reveals where the myeloma has settled.





Treating Myeloma Bone Disease

Several new treatment options are available for helping with bone disease. Unfortunately, current treatments are unable to revert or cure the damaged bone. However, these treatments will help slow progression, reduce symptoms and sometimes even correct complications related to myeloma bone disease.

Bone protectors: A treatment revolution

The treatment of myeloma bone disease has been revolutionized in recent years by bone protectors such as ***bisphosphonates*** and ***RANKL*** inhibitors (see page 11) . Bisphosphonates work by latching on to calcium so they can make their way into the bones. Once in the bones, these drugs slow down the over-active osteoclasts and their bone-destroying ability. On the other hand, RANKL inhibitors prevent the activation of osteoclasts and reduce the process of bone breakdown by binding to a specific protein (RANKL) in the body.

The slowed bone breakdown resulting from bone protectors brings with it a long list of benefits:

- Reduction in bone pain and reduced need for painkillers;
- Prevention and correction of hypercalcemia;
- Reduced need for radiotherapy (see page 15);
- Reduced chance of fractures;
- Better ability to move.

Types of bone protectors

Three bisphosphonates and one RANKL inhibitor are available for use in Canada to treat both, the bone disease and and the hypercalcemia that accompany myeloma. (Table 1)

Table 1 – Bone protectors available in Canada

Type of bone protector	Form of drug	Treatment schedule
Bisphosphonates		
Sodium clodronate (Bonefos)	Oral capsules	Once or twice per day
Pamidronate disodium (Aredia)	Intravenous infusion	Given over 120 minutes every month*
Zoledronic acid (Zometa)	Intravenous infusion	Given over 15 minutes every month*
RANKL inhibitors		
Denosumab (Xgeva)	Subcutaneous injection	Given every month*

*Frequency of administration depends on the length of treatment and other clinical factors.

Potential side effects of bone protectors

Bone protector drugs don't typically cause serious side effects. Like anything else however, side effects may differ from person-to-person, and can range from mild to more serious.

Some of the milder potential side effects of intravenous bisphosphonates include:

- **Mild fever and flu-like symptoms** shortly after the drug is administered. These symptoms generally last for only 2 to 3 hours and are usually successfully treated with non-prescription painkillers, such as acetaminophen (Tylenol).
  Note: ***Non-steroidal anti-inflammatory drugs (NSAIDs)*** such as ibuprofen (Motrin or Advil), naproxen (Naprosyn or Aleve) and diclofenac (Voltaren) should be avoided.
- **General bone aches and pains** are other potential side effects of intravenous bisphosphonates and are mostly linked to the onset of fever or flu-like symptoms. These aches and pains can persist for a day or two after each infusion. They too, can be managed with non-prescription pain medication.
- **Mild vein irritation at the infusion site** if the drug is being administered by intravenous infusion, can occur as well, and should go away in 1 or 2 days on its own or with the help of warm compresses.
- **Mild, short-term nausea** is the most common side effect of oral bisphosphonates.

All bisphosphonates – especially in intravenous form – can also cause more serious side effects such as kidney function deterioration. This side effect is of particular concern because myeloma can affect kidney function all on its own. In fact, people with kidney damage (creatinine clearance <30mL/min) should not take certain bisphosphonates, may require a reduced dose, or should consider an alternative with less kidney toxicity, such as the RANKL inhibitor, denosumab. To prevent damage to your kidneys, your doctor will check your kidney function regularly with a simple blood test while you're taking bisphosphonates.

Myeloma and the kidney

To learn more about how myeloma may affect the kidney, please consult Myeloma Canada's *Myeloma and the Kidney InfoGuide*. Some topics addressed include the role of the kidneys, why and how myeloma may affect the kidneys, the symptoms of kidney disease and how it's diagnosed and managed. Like all Myeloma Canada educational publications, the InfoGuide is available at no charge. You can download a copy from our website at myeloma.ca, or order a printed copy by emailing us at contact@myeloma.ca, or calling us toll-free at 1-888-798-5771.

Some common side effects for myeloma patients receiving denosumab include nausea, diarrhea, anemia, back pain, thrombocytopenia, peripheral edema, rash, hypocalcemia, headache, upper respiratory tract infection, pneumonia and unusual thigh bone fractures characterized by pain in your hip, groin or thigh. Allergic (hypersensitivity) reactions may also occur.

Another potentially rare, but serious bisphosphate side effect is called ***osteonecrosis of the jaw (ONJ)***. This happens when tiny spots in the jaw are damaged and unable to repair themselves, causing pain and poor healing. This damage can be precipitated by dental procedures or everyday wear and tear.

More Information

Help yourself to safer treatment

There are a few things you can do to help prevent ONJ before you start, and while taking, bone protector drugs:

- Make an appointment with your dentist for a complete dental check-up;
- If required, arrange to have any oral surgery or tooth extractions done before you start bone protector treatment;
- Get regular dental check-ups;
- Keep your doctor informed on your dental health;
- Drink lots of water – at least 6 to 8 glasses a day;
- Take all of your medications as prescribed;
- Report any side effects to your doctor as quickly as possible.

Which bone protector is right for me?

Although all bone protectors are good treatment choices for myeloma bone disease, there are some differences among them. It's important to discuss these differences before starting your treatment, along with any potential risk factors you might have with your healthcare team. You may also be prescribed a particular bone protector depending on your insurance coverage and lifestyle.

The general advice offered by Canadian guidelines on bone protectors is that these drugs should be used with caution in people with poor kidney function and conditions such as ***Bence Jones proteinuria***, diabetes or hypertension. Risk factors for developing kidney problems while on bone protectors increase if you are over the age of 65 and/or are female, and are taking certain other medication. It's important that your healthcare provider is aware of all medications you're on. And of course, you should not take bone protectors if you experience an allergic reaction to them.

Each type of bone protector drug has a different potency. As such, and as is the case with any medication, it's important to carefully discuss your options, as well as review the pros and cons, with your healthcare team.

How long should I be on bone protectors?

According to various consensus statements on the use of bisphosphonates in myeloma, the recommendation, at the time of this printing, is for people living with myeloma to receive bisphosphonates for a minimum of 2 years. Infusions are generally given monthly, however their frequency may be decreased to once every 3 months after 1-2 years of monthly infusions. This is done to decrease the risk of complications that may be associated with long-term bisphosphonate use.

Depending on the degree of your response to your myeloma treatment, bisphosphonates may be continued beyond 2 years. If discontinued, bisphosphonate treatment is usually re-started after disease relapse (myeloma progression).

The RANKL inhibitor, denosumab, is recommended to be continued monthly without a pause because your risk of bone fracture may drop back to previous levels. If denosumab must be discontinued, bisphosphonate alternatives should be considered.





Managing Myeloma Bone-Related Pain

Pain is the most common symptom of myeloma bone disease. Thankfully, through advancements in research we've seen many new and effective ways to help treat and manage it. We now have a wide range of pain management options, from pain medication, to surgery, to massage. Your healthcare team can help you choose which pain therapy, or therapies, are best for you.

Pain can be categorized as either **acute, chronic** or **breakthrough:**

- **Acute pain** comes on quickly, can be mild to severe, lasts for a relatively short time, and is resolved after the injury heals. Examples of acute pain are a stubbed toe, a cut finger, pain from a needle or surgery.
- **Chronic pain** can be mild to severe and is either constant or repeatedly comes back over the course of months or years. Due to its long-term persistent nature, chronic pain can also be very difficult from a physical and emotional point of view. Examples of chronic pain are arthritis and back pain.
- **Breakthrough pain** is an abrupt, sharp spike of pain that "overrides" chronic pain and can last for a few minutes or hours. Breakthrough pain can be a sign that the body is developing a resistance to pain-relief medications or that the underlying cause of the pain may be getting worse. Breakthrough pain can also occur when someone does more (or different) physical activity than usual.

Pain caused by myeloma bone disease is often relieved by treatment of the myeloma itself. Responding well to treatment is a major factor in reducing progression of myeloma bone disease, easing pain, and improving your quality of life.

Managing pain and fatigue

Myeloma Canada's *Managing Pain and Fatigue InfoGuide* is an excellent resource that provides comprehensive information on myeloma-related pain and fatigue. The InfoGuide is written for people living with myeloma, their families and friends and is intended to help you explain, manage and cope with your pain and fatigue. You can download your free copy at myeloma.ca. To order a hard copy, email us at contact@myeloma.ca or call, toll-free 1-888-798-5771.

Tracking your pain

Keeping track of your pain, medications, and side effects in a journal or with electronic or online tools can help you better understand what makes the pain better or worse.

Radiotherapy: Targeted therapy

Radiotherapy, or radiation treatment, applied to a particular area of bone may be helpful for people with severe pain that's confined to a small or specific area. The reason radiotherapy helps is that it kills the myeloma cells in the bone, which in turn reduces bone pain. In fact, pain relief from radiotherapy is sometimes faster than from drug treatment and can be the first kind of pain-reduction therapy given. On top of its pain-relieving effects, radiotherapy can lead to stronger bones because the bones lay down more calcium as they recover from the radiation exposure.

Pain medication

There are many kinds of pain medication that can help with different types and levels of pain, such as:

- **Mild pain:** Acetaminophen (i.e., Tylenol)
- **Moderate pain:** Dihydrocodeine
- **Severe pain:** Morphine and fentanyl (i.e., Duragesic)
- **Pain involving the nerves (neuropathic pain):** Gabapentin (i.e., Neurontin), amytriptyline (i.e., Elavil), and pregabalin (i.e., Lyrica)

You and your doctor can work together to find the right solution for you – no two people are alike – so it might take some trial and error. Your doctor will usually start you on a low-dose or milder pain medication and increase to the dose or type that controls your pain best and gives you the least number of side effects. You may find that you get the most relief from a combination of medications. If your usual combination of pain medications ever becomes less effective, contact your doctor or nurse.

Pain medications to treat mild, moderate, or severe pain come in a variety of forms - pills, capsules, liquids, patches, sprays or injections. **Although non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen (Motrin or Advil), naproxen (Naprosyn or Aleve) and diclofenac (Voltaren) are common and effective painkillers, people with myeloma should avoid them, particularly if they have kidney damage.**

When your doctor prescribes a new pain management plan, ask about timing and potential side effects so that you know what to expect. Your oncology pharmacist is also an excellent resource to help you better understand and manage possible medication side effects you may experience.

Remember to always ask your doctor which pain medication is best for you to use, even when it comes to non-prescription choices.

Cannabinoids and/or medical cannabis (marijuana)

It's important to talk to your healthcare team about the risks and benefits of using ***cannabinoids*** and/or medical cannabis products, before starting. Some people use cannabinoids in addition to traditional pain medication to help reduce or eliminate the amount of prescription pain medication they take. Cannabinoids and/or medical cannabis may not work for everyone.

Nerve blocks: Freezing out pain

A long-lasting anaesthetic injected into or near the nerves is sometimes used to help relieve pain by completely preventing pain signals from getting to the brain. This procedure is called a **temporary nerve block**. **Permanent nerve blocks** can be done by destroying, rather than "freezing", nerve tissue.

Surgery: Strengthening and supporting

Surgery can reduce pain by strengthening areas of bone that have fractured or are at risk of becoming fractured. Surgery can also be used to help treat spinal cord compression and relieve pressure on the nerves surrounding the spine.

Types of surgery

Two surgical procedures, ***percutaneous vertebroplasty*** and ***balloon kyphoplasty***, have been developed to treat fractures of the spine. These procedures are normally performed by a spinal surgeon specialist and can be done under either local or general anaesthesia.

- **Percutaneous vertebroplasty** is used to repair fractures in one or more vertebrae. It involves injecting a small amount of acrylic material (bone cement) into the vertebra through a hollow tube called a cannula. This procedure not only eases pain, but also restores strength. Up to two or three vertebrae can be treated at a time.
- **Balloon kyphoplasty** is a procedure similar to percutaneous vertebroplasty, but in addition to stabilizing damaged vertebrae, it aims to reshape and restore their height. During balloon kyphoplasty a balloon is inserted into the fractured vertebra and inflated before the cement is inserted (Figure 5). This helps restore vertebrae to their original shape before strengthening them with cement.

Figure 5: Balloon kyphoplasty



A balloon is inserted into the centre of the compressed bone through a tiny tube.

The balloon is inflated, raising the collapsed section.

The cavity is filled with bone cement. The bone cement stabilizes and preserves the re-established height of the bone.

Who can benefit from surgery?

Although they're similar, percutaneous vertebroplasty and balloon kyphoplasty are not interchangeable and shouldn't be used on everyone with myeloma bone disease. In general, your healthcare team will try more conservative treatments for your back pain first (e.g., pain medication and radiotherapy). Treatments will depend on the location of the pain, the type of fracture and how long ago the fracture first occurred.

When evaluating if surgery is a recommended option for you, your doctor will consider the following (Table 2):

Table 2: Evaluating if surgery is an option

When surgery IS a good option:	When surgery is NOT a good option:
Your pain has persisted for more than 2 months	The severely compressed vertebrae cannot be treated with surgery
It has been less than 12 months since the collapse occurred	It has been more than 12 months since the collapse occurred
Other causes of pain have been ruled out	You have other conditions that might interfere with the success of the surgery, such as a bleeding disorder or nerve problems as a result of the collapsed vertebrae

Keep in mind that even if you are a candidate for surgery, percutaneous vertebroplasty and balloon kyphoplasty are not yet available in all hospitals. However, more and more specialists are being trained to do these procedures and availability is improving all the time.

Non-medical treatments

There are many ways that you can relieve your pain aside from medication and surgery, many of which can be done in the comfort of your own home! Always ask your doctor, nurse or other members of your healthcare team about the possible risks and benefits of any non-medical therapies you are considering.

Some common non-medical strategies used to help treat or relieve pain:

- **Electrotherapy** with ***transcutaneous electrical nerve stimulator (TENS)*** machines deliver small electrical pulses that stimulate the release of the body's natural pain-killers (endorphins). Speak to your cancer centre's ***physiotherapist*** about treatment with a TENS machine.
- **Massage therapy** can ease muscle tension and help relax the body. It's very important to tell the massage therapist that a forceful massage could damage your bones or cause bruising.
- **Acupuncture** applies pressure to points along the body to stimulate nerves reaching the brain, making the body release its own endorphins. It's believed that acupuncture may help restore balance, health, and relieve pain. Since people living with myeloma are at increased risk of infection, you should consult your doctor before undergoing any form of acupuncture.

You can also try some of the following at home to help control your pain:

- **Applying hot and cold** - Heating pads, hot water bottles, hot and cold compression packs, and/or ice packs can all be effective short-term pain relievers. It's best not to place any of these directly on your skin to avoid possible damage or burns. Alternating between hot and cold very often produces the best results;
- **Back or neck brace** - An orthopedic brace may sometimes be used to relieve pain associated with fractures in the vertebrae or to stabilize areas where there is a risk of fracture;
- **Relaxation techniques** such as meditation, visualization, guided imagery and/or aromatherapy can all be helpful in relieving your pain. Ask your healthcare provider or cancer centre if they have any information on these methods. You can also learn more in the self-help or health section of your bookstore;
- **Diversion therapy** - Distraction by talking to friends, laughing, listening to music/podcast, watching TV, or petting your pet may not take away your pain, but they may distract your attention for a while;
- **Stretching and relaxation exercises** (i.e., tai chi, yoga, qigong);
- **Muscle strengthening exercises**;
- **Correct postural positioning** - The way you sit or lie down can affect your pain. Shift your position until you're at your most comfortable. Use supportive pillows and ask for help from a family member or friend if you need to;
- **Lifestyle changes** regarding nutrition, exercise, and exercise habits.

Getting things off your chest

Anxiety and stress can make your pain feel worse. Try to talk about your worries and concerns with those who are close to you, or, if you prefer, consult your doctor or a professional counsellor. You might also want to join or start an online or in-person myeloma support group.

For more information on support groups in the Myeloma Canada network near you, Myeloma Canada's virtual support groups, or Myeloma Peer Support program, see page 23 or visit myeloma.ca. If sharing your feelings with others doesn't feel right to you, expressing yourself through drawing or writing in a journal can also be beneficial and support healing.





Improving Your Ability to Move

Making exercise easier: Keep it low-impact

It's normal to feel frightened about potentially losing your ability to move around as freely as you once did, but if you do eventually face this challenge, know that there are a lot of ways to improve your range of movement throughout the course of your disease. It's important to talk to your doctor or nurse before starting any new exercise or sport, just to make sure you're not putting yourself in harm's way. If you have trouble walking and are worried about falls, speak with your doctor or nurse for a referral to see a physiotherapist or ***occupational therapist***. These movement specialists can help by giving you exercises that may strengthen your muscles, give you tips and tricks to avoid injuries and help you stay as mobile as possible, for as long as possible.

Exercise can help you stay fit and strong as well as boost your feelings of well-being. The type of physical activity you can do will depend on how severe your bone disease is and the amount of pain you're in. Generally, low-impact exercise such as walking, swimming or climbing stairs is recommended. You can make it fun by exercising with friends or choosing to work out in beautiful places, such as a lake, a local building with a distinctive staircase, or a nature trail. High-impact exercise, such as jogging or contact sports, is usually not recommended.

More Information

Can exercise help myeloma and myeloma bone disease?

We know there are many benefits to exercising, but what about people with myeloma? The answer is, yes! In healthy people, weight-bearing activities can strengthen bones, but so far there haven't been studies on the effects of weight training on bone thinning in people with myeloma. Research on exercise training for people living with myeloma has shown that those who exercised experienced decreased fatigue and improved sleep patterns. Most importantly, the exercise didn't injure them. Again, never start, or change, your exercise regime without talking to your healthcare team first.

If you're given the green light to exercise, you may want to check with your cancer centre if there are exercise programs or classes offered for people living with cancer, myeloma or bone disease. Remember to build up your exercise routine gradually by doing a little bit, often. Set realistic goals and don't be disheartened if you have a tough day – try to stay consistent.





Quick-Help Myeloma Bone Disease Checklist

Now that you have a better understanding of myeloma bone disease, here's a checklist of important things to remember as you progress through your treatment plan:

- Tell your doctor or nurse about any new symptoms, including pain, as quickly as possible, so together you can decide on the best course of action.
- Take all of your medications as prescribed and keep a record of them to show your doctor or nurse.
- Talk to your doctor or healthcare team about incorporating exercise into your daily routine, or if you're considering changing your current regime.
- If you're having difficulty moving around, talk to your doctor to see if you're entitled to any benefits or financial assistance.
- If you're also being followed by an orthopedic surgeon or radiotherapist, make sure they're consulting with your myeloma specialist about any changes in your condition or treatment.
- Stay informed and get lots of support.

Resources that can help you understand, manage and navigate your diagnosis

There is a vast array of educational videos and publications from Myeloma Canada that can help demystify your diagnosis. Please visit the Resources section on our website at myeloma.ca to learn more. All publications are offered to you free-of-charge. **You can download them at myeloma.ca, or order printed copies by e-mailing us at contact@myeloma.ca or by calling, toll-free 1-888-798-5771.**

The *Multiple Myeloma Patient Handbook* is an excellent resource for those who are newly diagnosed, as well as their family and loved ones. Designed to provide educational support to patients, caregivers, families and friends, this Handbook gives accurate, reliable, and clear information on myeloma. Some of the topics covered include the causes and effects of myeloma, how it's diagnosed, and treatment options available in Canada.

Be sure to visit Myeloma Canada's YouTube channel (www.youtube.com/myelomacanada) which features over 100 educational videos, webinars, and inspiring patient journey videos that you can watch at your own pace and leisure.





Beyond Family and Friends: Myeloma Support Groups and Programs

Local Support Groups and Programs

Talking to people outside your immediate circle may be easier than talking to family and close friends. Meeting and speaking to others with shared experiences through support groups can truly provide you with invaluable information and support. Other patients may be, or have already been, in a similar situation to yours. They understand what you're going through and how to help from a different perspective. Sometimes relief can be found just by speaking to people that can personally identify and relate to you, your experiences and your feelings.

Visit myeloma.ca and click on the "Find Support" tab to find a support group near you. If a patient support group doesn't exist in your area, consider forming one yourself. Myeloma Canada can help you get started.

Virtual, Online Support Groups

You may also be able to meet and connect with other patients through an online support group. Myeloma Canada has created, and is the lead administrator of four online, virtual patient support groups on Facebook. These closed groups offer a safe environment for myeloma patients to connect and exchange experiences with others facing similar challenges. Thanks to the Facebook "translate" button, language barriers can be overcome, enabling you to communicate, in your mother tongue, with people nation-wide. Moreover, the information shared on the page is private and can't be viewed by the public. All members must request to join the group to gain access. Tojoin, go to Facebook and search for the *"Myeloma Canada Patient & Caregiver Support Group"*, *"Myeloma Canada Support Group for Young Patients and Caregivers"*, *"Myeloma Canada Caregiver Support Group"*, or *"Groupe de soutien virtuel francophone de Myélome Canada"* if you are looking to join a francophone virtual support group.

Myeloma Peer Support

In addition to joining a support group, you may want to talk with someone who has first-hand experience either living with myeloma, or as a caregiver to someone with the disease. Myeloma Canada's *Myeloma Peer Support* program provides you with this opportunity. To find out more, visit myeloma.ca, "Find Support".



Glossary

Balloon kyphoplasty: A surgical procedure used to restore the height of vertebrae and then strengthen them with bone cement.

Bence-Jones proteinuria (or protein): A myeloma protein present in urine. The amount of Bence-Jones protein is expressed in terms of grams per 24 hours. Normally a very small amount of protein (less than 0.1 grams per 24 hours) can be present in the urine, but this is albumin rather than Bence-Jones protein. The presence of any Bence-Jones protein is abnormal.

Bisphosphonates: Drugs used to prevent the loss of bone mass and used to treat myeloma bone disease, as well as bone-weakening conditions like osteoporosis.

Bone marrow: Spongy tissue that is found inside your bones. It is soft, fatty and full of blood vessels. Your bone marrow is where most of the blood cells in your body are made.

Bone remodelling: The biological process of new bone replacing old bone.

Cannabinoids: A group of closely related chemicals found in the cannabis plant (or flower) that can provide certain therapeutic effects. Cannabinoids bind to cannabinoid receptors in the central nervous system.

Compression fractures: Breaks in the bones of the spine that cause it to collapse and compress.

Cytokines: Molecules secreted by cells of the immune system that send signals and stimulate the growth/activity in a particular type of cell. Can be toxic in high amounts.

Fracture: A break in a bone.

Fluoro-deoxyglucose positron emission tomography/computed tomography (FDG-PET/CT): FDG-PET/CT uses a short-lived, low-dose radioactive tracer molecule to distinguish between healthy tissue and diseased tissue. The tracer molecule is injected into the body and accumulates in areas where there is myeloma bone disease. The body is then scanned and the radioactive tracer reveals where the myeloma has settled.

Growth factors: Molecules that stimulate cell growth.

Hypercalcemia: A high calcium blood level. In myeloma, hypercalcemia usually results from the bones releasing too much calcium into the blood stream.

Joints: Structures that hold the bones together and allow them to move.

Kyphosis: A curvature of the spine.

Lytic lesions: Damaged area of a bone that shows up as a dark spot on an X-ray. Lytic lesions look like holes in the bone and are evidence that the bone is being weakened.

Magnetic resonance imaging (MRI): An imaging technique that uses magnetic fields and radio waves instead of radiation. Along with a computer, MRI produces two- or three-dimensional images of the inside of your body.

Non-steroidal anti-inflammatory drugs (NSAIDs): A type of drug used to prevent or treat pain that does not contain steriods, and that reduces targeted areas of inflammation in the body (e.g., ibuprofen, naproxen). Because they are hard on the kidneys, NSAIDs are not recommended for people with myeloma.

Occupational therapist: A health professional trained in ensuring that disabled, injured or ill people are able to function optimally in their day-to-day environment.

Osteoblasts: Cells that work to form new replacement bone.

Osteoclasts: Cells that work to break down old bone.

Osteonecrosis of the jaw (ONJ): A condition in which the bones of the jaw do not heal properly, causing ongoing, sometimes painful, complications.

Osteopenia: Thinning or weakening of the bone (lower than normal bone density). Osteopenia is a less severe form of bone loss than osteoporosis.

Pathological fractures: Broken bone caused by disease, rather than injury.

Percutaneous vertebroplasty: A procedure used to repair and stabilize a vertebral compression fracture that involves injecting bone cement into the vertebra to stabilize and strengthen it.

Physiotherapist: A health professional trained in restoring proper body movement following an injury or illness.

Plasmacytoma: A collection of plasma cells found in a single location (i.e., tumour or mass) rather than diffusely throughout the bone marrow, soft tissue, or bone.

RANKL: Receptor Activator of Nuclear factor kappaB Ligand: A protein normally produced in the bone marrow; in myeloma, more than usual quantities of RANKL are produced which boosts the activity of osteoclasts.

Radiotherapy (radiation therapy): Treatment with high energy radiation (i.e., X-rays, gamma rays, electrons, etc.) that shrinks, damages or kills malignant cells. The radiation may come from outside the body (external radiation) or from radioactive materials placed directly in the tumour (implant radiation). External radiation is used in myeloma.

Side effects: Symptoms that occur as a result of treatment. Common side effects of standard cancer treatments are fatigue, nausea, vomiting, decreased blood cell counts, hair loss and mouth sores.

Skeletal survey: A series of X-rays (pictures of the bones) of your whole body. This is no longer the gold standard for diagnosing because of its low sensitivity for detecting bone lesions. If available, newer and more sensitive imaging techniques are preferred.

Skeletal system: A body system that consists of the bones and the joints.

Spinal cord: A bundle of nervous tissue that extends from the brain and through the bones of the spine.

Vertebrae: The bones of the spine.

Whole-body low-dose computerized tomography (WBLDCT): WBLDCT combines x-ray equipment and computers to produce cross-sectional images of the whole-body and uses less ionizing radiation than conventional scans. This technique is the first-choice, initial imaging test for diagnosing myeloma bone disease.





Make Myeloma Matter

Every year, Myeloma Canada provides information to thousands of people impacted by myeloma through programs and services such as InfoSessions, Meet & Greets, the Myeloma Matters online newsletter, webinars, educational and patient journey videos, InfoGuides, and much more.

That's why we need your help. As the only national, charitable organization created by, and for, Canadians impacted by myeloma, we depend on your support and generous donations. Your contribution helps to improve the lives of those affected by myeloma by empowering the community through awareness, education and advocacy programs, and supporting research to find a cure. With your help, we've been making myeloma matter since we were founded in 2005.

Every donation is greatly appreciated and enables us to continue our vital work. There are many options for giving. Whether it's a one-time, a pre-arranged monthly, or a legacy gift, every donation brings us closer to finding a cure.

Ways You Can Help

Donate

We invite you to make your donation online at myeloma.ca, over the phone by calling toll-free at **1-888-798-5771,** or by mailing a cheque payable to Myeloma Canada to:

Myeloma Canada
1255 TransCanada, Suite 160
Dorval, QC H9P 2V4

Fundraise

There are many ways you can support Myeloma Canada, such as taking part in the annual Multiple Myeloma March held in cities across Canada, or by fundraising for Myeloma Canada in your local community. When so much about myeloma is beyond the control of the people that it impacts, fundraising can be a rewarding and fun way of doing something positive for yourself and for others touched by the disease.

Contact Myeloma Canada's fundraising team, toll-free, at 1-888-798-5771 for more information or visit www.myeloma.ca.



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Myeloma Canada would like to thank Amgen, Bristol Myers Squibb, Janssen, Sanofi Genzyme, and Takeda for providing unrestricted educational grants that partially funded and helped make the creation of this InfoGuide possible.

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MAKING MYELOMA MATTER

Myeloma Canada publications are extensively reviewed by patients and healthcare professionals prior to publication.

Sincere thanks to the fundraising efforts of the Canadian myeloma community who make myeloma matter by helping to advance Myeloma Canada's objectives of awareness, education, advocacy, community empowerment and support of clinical research so that a cure may be found.

Charitable registration number: 862533296RR0001

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First Edition: April 2012
Reprint: February 2016
Revised: June 2021