

Understanding Myeloma

What is myeloma?

Myeloma (also known as multiple myeloma or plasma cell myeloma) is a cancer of the plasma cells (the final maturation stage of B-lymphocytes) that usually arise in the bone marrow. Myeloma develops when plasma cells undergo a cancerous (malignant) change and become myeloma cells. These myeloma cells multiply without any proper order, forming collections known as tumours that accumulate in other parts of the body, especially in the bone marrow and on the surfaces of different bones in the body.

This can lead to a number of problems:

- These tumours secrete chemicals that stimulate other bone cells (osteoclasts) to remove calcium from the bone. As a result bones can become weaker and break more easily.
- Calcium levels in the blood may be increased, leading to constipation, confusion and kidney problems.
- The bone marrow may become so full of myeloma cells that the production of normal blood cells is reduced.
- Myeloma cells secrete abnormal antibody proteins, called paraproteins, which can cause problems with the kidneys and other organs.

Signs & symptoms

The symptoms of myeloma depend on how advanced the disease is. In the earliest stages, there may be no symptoms and myeloma (or a precursor condition called MGUS) may be incidentally picked up during a routine blood test.

In others, symptoms may include:

- Bone pain or fractures.
- Anaemia (causing lack of energy, shortness of breath, feeling faint or lightheaded).
- Frequent or repeated infections.
- Increased bleeding or bruising.

Diagnosis

To confirm a diagnosis the following investigations may be required:

- Blood & urine tests – to measure the amount and determine the type of paraprotein, calcium levels, kidney function and the levels of the various blood cells in your blood.
- Bone marrow biopsy.
- Radiological imaging: x-ray, CT scan, or MRI scan.

Treatment options

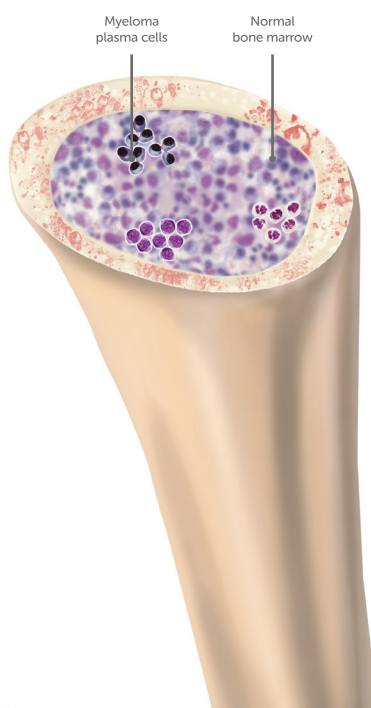
- **Active monitoring** – careful observation may initially be appropriate for those with no symptoms or problems caused by the disease when it is diagnosed.
- **Steroid therapy** – treatment using steroids such as prednisone or dexamethasone.
- **Chemotherapy** – treatment using anti-cancer drugs. This usually involves a combination of cytotoxic drugs given in several cycles.
- **Radiotherapy** – the use of high energy x-rays to kill cancer cells and shrink tumours.
- Stem cell transplant may be appropriate for some patients.

- **Clinical trials** – these may allow patients to receive medications not funded.
- **Supportive care** – to assist patients and their family during treatment and recovery.

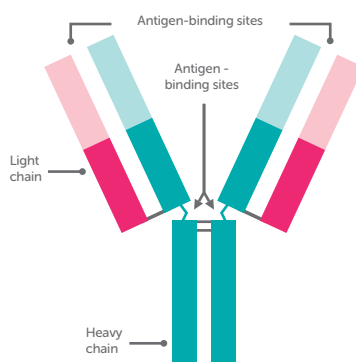
Who gets myeloma?

Myeloma is a relatively rare disease

- 15% of blood cancers are myeloma.
- Around 380 people are diagnosed in New Zealand each year.
- Average age at diagnosis is 65 -70 years
- Pacific Islanders and Maori have a higher incidence of myeloma.
- The cause of myeloma is unknown.



Immunoglobulin structure



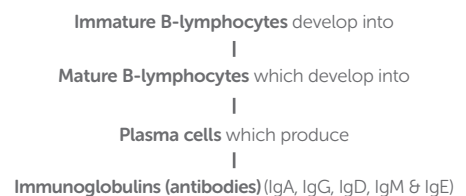
What are plasma cells and immunoglobulins?

Plasma cells are a type of blood cell that develops from mature B-lymphocytes in the bone marrow. They play an important role in protecting the body against infection and disease by producing proteins called immunoglobulins (Ig), also known as antibodies.

Immunoglobulins (Ig) are produced by plasma cells in response to bacteria, viruses and other harmful substances found in the body. Once released into the blood stream, immunoglobulins circulate and when needed attach themselves to a protein (antigen) on the surface of their target. It is much easier for other white blood cells to destroy harmful organisms and other unwanted substances when they have immunoglobulins attached to them.

There are different types of plasma cells that produce different types of immunoglobulins in response to foreign substances (e.g. bacteria and viruses) that enter the body. Each type of immunoglobulin is designated a letter (IgA, IgD, IgE, IgG and IgM) and each type of normal antibody has a slightly different function in a healthy person.

How immunoglobulins are made



Immunoglobulins are usually Y shaped molecules made up of two heavy chains and two light chains. There are five main families of immunoglobulins which are named after the heavy chains that form an important part of their structure. These are; IgA, IgG, IgD, IgM and IgE. There are two classes of light chains: kappa (κ) and lambda (λ).

In myeloma, sometimes an incomplete antibody molecule is made by the cancer cell, leading to an excess of either the kappa or lambda light chains in the urine (Bence Jones protein) and blood.

Blood cells

