

Growth Factors

This Infosheet explains what growth factors are, why they are needed in myeloma, how they are given and how often, and what the possible side-effects are.

What are growth factors?

Growth factors are chemicals produced in the body which stimulate the bone marrow to make blood cells. There are growth factors for each of the different types of blood cells – red blood cells, white blood cells and platelets.

■ **Red blood cells:** The growth factor that stimulates the production of red blood cells

is called erythropoietin (or EPO for short)

■ **White blood cells:** The group of growth factors that stimulate white blood cell production are called colony stimulating factors (or CSFs for short). Mature white blood cells survive in the body for only a few hours or days, so there is a continual demand for them to be replaced

■ **Platelets:** Growth factors for platelets also exist but they are unlikely to be used by myeloma patients

When growth factors are mentioned in relation to myeloma, it is usually in relation to growth factors for white blood cells.

Why are growth factors needed in myeloma?

White blood cells are an essential part of the body's immune system and help fight infection. One of the side-effects of chemotherapy, often used in the treatment of myeloma, is a reduction in the number of white blood cells. Myeloma patients can also have lower numbers of white blood cells as a result of the myeloma cells inhibiting the production of the normal blood-producing cells in the bone marrow.

Neutrophils are an important type of white blood cell and are particularly affected by chemotherapy. A reduction in neutrophils is called neutropenia. Patients who are neutropenic can feel very fatigued.

Macrophages are another type of white blood cell important in fighting infection.

To increase numbers of white blood cells and help reduce the risk of infection, synthetic growth factors are sometimes used. Examples of these synthetic growth factors include:

- G-CSF (granulocyte-colony stimulating factor)
- GM-CSF (granulocyte macrophage colony stimulating factor)

G-CSF is the one that myeloma patients are most likely to be given.

If you are neutropenic (have a low neutrophil count) then your doctor may prescribe a short course of G-CSF injections. G-CSF stimulates the bone marrow to make more neutrophils and therefore shortens the length of time that you are neutropenic and vulnerable to infection.

G-CSF is also commonly given to myeloma patients who are having their stem cells harvested (collected) as part of the stem cell transplant process. The G-CSF stimulates the bone marrow to produce more stem cells, making collection easier and usually more successful.

How are growth factors given?

Growth factors are normally given by injection under the skin (subcutaneously) in the thigh, abdomen or arm. You can give yourself the injections or a family member can do it for you. Alternatively your GP or a community/practice nurse can give you them.

How often are growth factors given?

If growth factors are given because of a low white cell count they are usually given daily until the white blood cell count returns to normal (or a period of infection is over). After that the dose is either reduced or stopped. Growth factors are not usually given on a long-term basis.

To boost stem cells for collection as part of the stem cell transplant process, G-CSF is usually given once or twice daily for 5 – 7 days until the actual collection takes place. If chemotherapy treatment is used as part of the stem cell mobilisation treatment, G-CSF is given following the chemotherapy, usually for about 10 days.

Are there any potential side-effects of growth factors?

G-CSF and GM-CSF are generally well tolerated by most patients. However, side-effects can occur. The most common side-effect is flu-like symptoms (fever, aches and joint pain). These symptoms are temporary and should disappear when the injections are stopped. It may be necessary to take pain-killers to relieve the joint pain.

Future directions

There have been several new growth factors introduced for the treatment of cancer-related neutropenia over the past few years, and the development of new drugs for neutropenia continues to be an area of ongoing active research.

About this Infosheet

The information in this Infosheet is not meant to replace the advice of your medical team. They are the people to ask if you have questions about your individual situation. All Myeloma UK publications are extensively reviewed by patients and healthcare professionals prior to publication.

Other information available from Myeloma UK

Myeloma UK has a range of Essential Guides, Infoguides and Infosheets available covering many areas of myeloma, its treatment and management.

To order your free copies or to talk to one of our Myeloma Information Specialists about any aspect of myeloma, call the **Myeloma Infoline: 0800 980 3332** or **1800 937 773** from Ireland.

The Myeloma Infoline is open from Monday to Friday, 9am to 5pm and is free to phone from anywhere in the UK and Ireland. From outside the UK and Ireland, call **0131 557 9988** (charged at normal rate).

Information and support about myeloma is also available around the clock at **www.myeloma.org.uk**

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