Growth factors

This page is about blood cell growth factors, in particular granulocyte-colony stimulating factor (G-CSF). You might have G-CSF as part of your treatment for lymphoma.

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What are growth factors?

Growth factors are chemicals that encourage cells to divide and develop. These are sometimes called ‘haematopoietic’ (blood-forming) drugs. There are lots of different growth factors that affect different types of cells. Your body makes growth factors naturally but growth factors can also be made in the laboratory. These can be used to stimulate the production of new cells in people who need them.

This page is about a growth factor called ‘granulocyte-colony stimulating factor’ (G-CSF). G-CSF encourages your bone marrow to make more white blood cells, which are important in fighting infection.

When are growth factors used?

G-CSF boosts the production of stem cells (immature cells that can develop into different types of blood cell) and white blood cells, particularly neutrophils, in your body. It decreases the duration of low white cell counts (neutropenia) following chemotherapy. If you are admitted to hospital with an infection and you have a low neutrophil count, you are usually given G-CSF.
G-CSF treatment is used:

- to prevent neutropenic sepsis (a serious, whole-body reaction triggered by an infection in people with a low neutrophil count)
- to help treat neutropenic sepsis
- to boost production of stem cells before or after a stem cell transplant.

**G-CSF to prevent neutropenic sepsis**

*Chemotherapy* for lymphoma aims to kill lymphoma cells but some healthy cells might also be affected. This includes white blood cells called neutrophils.

Your neutrophil count is checked before each cycle of chemotherapy. If your neutrophil count is low (neutropenia), you have an increased risk of picking up an infection or developing a serious complication called *neutropenic sepsis*. If this happens, or if your neutrophil count doesn’t recover quickly enough, your chemotherapy might need to be delayed. You might also have to have a lower dose of chemotherapy than planned.

Treatment with G-CSF helps your neutrophil count recover faster. It can be used to reduce your risk of getting neutropenic sepsis, or to prevent delays or dose reductions in your chemotherapy.

You might need G-CSF treatment if you are having chemotherapy for lymphoma (including high-dose chemotherapy before a *stem cell transplant*) and:

- you have a high risk of developing neutropenic sepsis (your doctor will tell you if this is the case)
- your treatment has already been delayed because of neutropenia or neutropenic sepsis
- your chemotherapy dose has been lowered because of neutropenia or neutropenic sepsis.

Whether or not you need treatment with G-CSF depends on:

- the *type* and *stage* of your lymphoma
- the *chemotherapy regimen* you are having
- whether you have had neutropenic sepsis before
- what *treatment* you’ve had in the past
- how old you are
- your general health.
G-CSF to treat neutropenic sepsis

Neutropenic sepsis is a serious condition. It is usually treated in hospital with antibiotics given into a vein.

If you have severe neutropenic sepsis and you don’t respond to antibiotic treatment, G-CSF might be added to your treatment. This helps your neutrophil count recover faster. It could reduce your risk of developing serious complications and reduce the length of time you have to stay in hospital.

G-CSF to boost stem cell production and mobilisation

Growth factors encourage your bone marrow to make stem cells in large numbers. They also encourage them to move out of your bone marrow and into your bloodstream, where they can be more easily collected. You might need G-CSF treatment if:

- you are having stem cells collected before an autologous (self) stem cell transplant
- you are donating stem cells to someone else who is having an allogeneic (donor) stem cell transplant
- you have had a stem cell transplant and your white blood cell count is not recovering quickly enough.

Having growth factors

Several different types of G-CSF are available in short-acting and long-acting forms:

- short-acting G-CSF: lenograstim and filgrastim
- long-acting G-CSF: pegfilgrastim and lipfilgrastim.

Short-acting G-CSF is given once a day. You usually have your first injection 1 to 3 days after your chemotherapy. You then have an injection every day until your neutrophil count recovers. This usually takes 5 to 7 days, although it can be longer.

Long-acting G-CSF is given as a single injection the day after chemotherapy has completed.

If you are having G-CSF before a stem cell transplant, you usually have your first injection 4 to 6 days before your stem cells are going to be collected.
Both short-acting and long-acting growth factors are given as subcutaneous injections (injections just underneath the skin). You usually have your first injection in hospital to make sure you don’t have a reaction to it. After that, you—or a friend or family member—might be taught how to inject yourself at home. It might seem daunting at first but it is much more straightforward than you might expect.

Alternatively, a community nurse might visit you every day to give you your injections, or you might have to go to your GP surgery.

If you are having injections at home, you need to store your growth factor in the fridge. They usually come in single-use, pre-filled syringes. They are easy to give.

1. Take a syringe out of the fridge about half an hour before each injection to make it a more comfortable temperature to inject.
2. Wash your hands thoroughly.
3. Decide where you are going to inject. Your nurse should tell you what areas are safe to use. Generally, these are the abdomen (tummy), outside of the thighs and top of the arms. Vary where you give the injections each day, so that an area doesn’t become sore or inflamed.
4. Clean the skin you’re going to inject with a sterile, alcohol-saturated wipe. Your hospital should give you these along with the pre-filled syringes.
5. Open the syringe packet and uncover the needle.
6. Pinch the skin you are going to inject, put the needle in, press the plunger and then pull the needle out.
7. Dispose of the used needle and syringe carefully in a ‘sharps bin’. Your hospital should give you this.

Cancer Research UK have a useful video of how to give yourself a subcutaneous injection.

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**Potential side effects of growth factors**

Side effects of G-CSF are not normally serious and usually get better when you stop treatment. The most common side effects of G-CSF are muscle and bone aches and pains, and headaches. A mild painkiller such as paracetamol should help. Ask your doctor which painkiller is best for you, particularly if you are on any other medication.

Some people get an itchy rash where they inject themselves. Choosing a different place can help.
G-CSF can reduce the number of platelets in your blood (thrombocytopenia), which might make you bruise or bleed more easily than usual.

Other side effects are less common. Some people can get an enlarged spleen, which can become serious if not picked up. Tell your doctor if you have:

- a feeling of fullness or discomfort on the left side of your abdomen (tummy), just under your ribs
- pain on the left side of your abdomen
- pain at the tip of your left shoulder.

G-CSF can cause lung problems (for example, inflammation or fluid on the lungs), particularly if you’ve recently had a chest infection. Occasionally, this can be serious. If you develop a cough, raised temperature or difficulty breathing, contact your medical team.

A small number of people have an allergic reaction to G-CSF. This is very unlikely but it is a good idea to know the signs you should look out for. Contact your doctor urgently if you have any of these symptoms after an injection:

- an itchy rash
- swelling of your face, lips, tongue or throat
- difficulty breathing
- feeling faint.

References

The full list of references for this page is available on our website. Alternatively, email publications@lymphoma-action.org.uk or call 01296 619409 if you would like a copy.

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