

Mitoxantrone-based chemotherapy

Mitoxantrone is used on its own or with other medicines to treat some people with acute myeloid leukaemia (AML).

Summary

- Mitoxantrone is a chemotherapy medicine used to treat some adults with acute myeloid leukaemia (AML).
- You have mitoxantrone as a drip (infusion) into a vein, usually via a central line.
- You will have regular blood tests to check how well the treatment is working and how your body is coping with it.
- You may get some side effects while you are having mitoxantrone. Some people have very few side effects, whereas other people experience more serious side effects.
- Some side effects can be serious if not treated promptly. Contact your haematology team straight away if:
 - You have chest pain, shortness of breath, or a fast and irregular heartbeat
 - You have swelling, due to a build-up of fluid, in your legs, ankles and feet
 - You feel tired, dizzy and short of breath
 - You have unexpected bruising or bleeding
 - You are getting frequent infections

[Download our leaflet about mitoxantrone-based chemotherapy](#) 

About mitoxantrone

Mitoxantrone is a chemotherapy medicine that stops your cancer cells from making and repairing DNA. This can stop cancer cells from growing and dividing.

The brand name for mitoxantrone is Onkotrone.

Your haematology team might recommend mitoxantrone for you if:

- You have newly-diagnosed AML and intensive treatment is suitable for you
- You have AML that did not respond to your first treatment or came back after treatment, and intensive treatment is suitable for you

<https://lcdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

You might have it on its own or combined with other chemotherapy medicines.

Your haematology team might recommend mitoxantrone in other circumstances. If they do, they will let you know exactly what treatment they recommend, and what you can expect from it.

[Back to top](#)

Before having mitoxantrone

Before starting mitoxantrone, your haematology team will carry out checks to make sure it's suitable for you.

These might include:

- Blood tests to measure your blood counts
- Blood tests to check your liver and kidney function
- Bone marrow tests
- Tests and scans to check your heart function

Things to tell your haematology team

Before starting treatment, you should let your haematology team know if you:

- Have liver or kidney problems
- Have heart problems or your heart isn't working well
- Have had mitoxantrone before
- Have previously had radiotherapy to your chest
- Have previously had other chemotherapy, especially daunorubicin or doxorubicin
- Have an infection or feel unwell
- Are due to have any vaccines
- Are or think you may be pregnant, want to have children, or are breastfeeding

Some medicines or drugs may interact with mitoxantrone. It is important to tell your haematology team about any medicines or supplements you are taking. This includes prescribed medicines and medicines you have bought yourself without a prescription.

Examples include:

- Some medicines that affect your heart
- Some medicines that help prevent blood clots

<https://cdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

- Some medicines that affect your immune system

[Back to top](#)

Having mitoxantrone

You can have mitoxantrone on its own or in combination with other medicines. Your haematology team will let you know exactly what medicines you are having.

You have mitoxantrone through a drip into a vein (or a central line, if you have one). You have treatment in cycles, with time in between for your bone marrow to recover. You will have blood tests, and sometimes other tests, to see how you have responded and to decide if you need further treatment.

How often you have mitoxantrone and how many cycles you have depends on the type of leukaemia you have, where you are in your treatment, and what other medicines you are having.

Newly diagnosed AML

Treatment for AML can be divided into three stages: induction (to get AML under control), consolidation (to keep AML under control) and maintenance (to reduce the risk of AML coming back). You might have mitoxantrone during the induction and consolidation stages. You usually have it alongside another chemotherapy medicine called cytarabine.

First induction

You have treatment in cycles, with different treatment on different days. Your haematology team will tell you exactly what treatments you'll have and when. Here we give an example of a cycle you might have as your first treatment.

- Day 1: Mitoxantrone + cytarabine
- Day 2: Mitoxantrone + cytarabine
- Day 3: Mitoxantrone + cytarabine
- Day 4: Cytarabine
- Day 5: Cytarabine
- Day 6: Cytarabine
- Day 7: Cytarabine
- After this you have blood tests to see if your blood counts have improved

<https://lcdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

It takes up to 30 minutes to have mitoxantrone. You have cytarabine as a continuous drip over 7 days.

Second induction

If your leukaemia does not respond completely to your first induction treatment, you might need another cycle. In this case, you might have a cycle similar to the one we show here:

- Day 1: Mitoxantrone + cytarabine
- Day 2: Mitoxantrone + cytarabine
- Day 3: Cytarabine
- Day 4: Cytarabine
- Day 5: Cytarabine
- After this you have blood tests to see if your blood counts have improved

It takes up to 30 minutes to have mitoxantrone. You have cytarabine as a continuous drip over 5 days.

Consolidation

If you respond to mitoxantrone and cytarabine induction, you have consolidation treatment to keep your AML under control. You might have the following treatment on the following days:

- Day 1: Mitoxantrone + cytarabine
- Day 2: Mitoxantrone + cytarabine
- Day 3: Cytarabine
- Day 4: Cytarabine
- Day 5: Cytarabine
- After this you have blood tests to see how your body has responded to treatment

It takes up to 30 minutes to have mitoxantrone. You have cytarabine as a continuous drip over 5 days.

AML that did not respond to treatment or came back after treatment

If your AML did not respond to treatment or came back after treatment, there are several different treatment options. Your haematology team will let you know what they recommend for you, and what to expect from treatment.

<https://lcdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

Mitoxantrone-based treatment options include:

- Mitoxantrone with another chemotherapy medicine called cytarabine (mitoxantrone + cytarabine)
- Mitoxantrone with other chemotherapy medicines called etoposide and cytarabine (MEC)
- Mitoxantrone with other chemotherapy medicines called cytarabine and cladribine, as well as a growth factor to help your bone marrow recover (CLAG-M)
- Mitoxantrone on its own

Your haematology team might suggest mitoxantrone combined with other medicines. They will let you know what dosing schedule you are on, how often you will have treatment, and if you need to stay in hospital.

Mitoxantrone and cytarabine

If you are having mitoxantrone + cytarabine, you have the following treatment on the following days:

- Day 1: Mitoxantrone + cytarabine
- Day 2: Mitoxantrone + cytarabine
- Day 3: Mitoxantrone + cytarabine
- After this you have blood tests to see how your body has responded to treatment

It takes up to 30 minutes to have mitoxantrone. You have cytarabine as a drip over 3 hours, every 12 hours.

Mitoxantrone, etoposide and cytarabine (MEC)

If you are having MEC, you have the following treatment on the following days:

- Day 1: Mitoxantrone + etoposide + cytarabine
- Day 2: Mitoxantrone + etoposide + cytarabine
- Day 3: Mitoxantrone + etoposide + cytarabine
- Day 4: Mitoxantrone + etoposide + cytarabine
- Day 5: Mitoxantrone + etoposide + cytarabine
- After this you have blood tests to see how your body has responded to treatment

It takes up to 30 minutes to have mitoxantrone. You have etoposide as a drip over 30 to 60 minutes. You have cytarabine as a drip which can take up to 4 to 6 hours.

<https://lcdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

Cladribine, cytarabine, growth factor and mitoxantrone (CLAG-M)

If you are having CLAG-M, you have the following treatment on the following days:

- Day 1: G-CSF (This stands for granulocyte colony-stimulating factor. It's a growth factor that encourages your bone marrow to make white blood cells.)
- Day 2: Mitoxantrone + cladribine + cytarabine + G-CSF
- Day 3: Mitoxantrone + cladribine + cytarabine + G-CSF
- Day 4: Mitoxantrone + cladribine + cytarabine + G-CSF
- Day 5: Cladribine + cytarabine + G-CSF
- Day 6: Cladribine + cytarabine + G-CSF
- After this you have blood tests to see how your body has responded to treatment

It takes up to 30 minutes to have mitoxantrone. You have cytarabine as a drip which can take up to 4 to 6 hours. You have cladribine as a drip over 2 hours. You have G-CSF as an injection under your skin, usually in your tummy or leg.

Mitoxantrone on its own

If you are having mitoxantrone on its own, you have it for 5 days. After this you have blood tests to see how your body has responded to treatment. It takes up to 30 minutes to have mitoxantrone.

Dose

Your haematology team will work out the best dose of mitoxantrone, and any other medicine you may have with it, based on your height, weight and how well you respond to treatment. They will tell you what dose they recommend for you.

[Back to top](#)

Precautions

There are several precautions to be aware of when you are having mitoxantrone.

- Mitoxantrone can make you feel confused or very tired. Take care if you are driving or using tools or machinery.
- You should not have live vaccines whilst having treatment and for 3 months after you stop. Tell your haematology team if you are due to have any vaccines, and they can let you know whether or not it is safe to have.

<https://lcdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

[Back to top](#)

Pregnancy, breastfeeding and fertility

Mitoxantrone may harm unborn babies.

- If you could get pregnant, it is important to use effective contraception. You need to do this while you are having mitoxantrone and for 4 months after you stop.
- If you could make someone pregnant, it is important to use effective contraception. You need to do this while you are having mitoxantrone and for 6 months after you stop.
- If you think you might be pregnant, tell your haematology team as soon as possible. They may recommend stopping mitoxantrone for a while. They could also recommend switching to a different treatment.
- If you are planning to get pregnant, or make someone pregnant, tell your haematology team. They can discuss your treatment options with you.

Breastfeeding

Mitoxantrone can pass into breast milk during treatment and for up to a month after stopping. This can be a risk for breastfed babies or children. You should not breastfeed when having mitoxantrone and for at least a month after you stop.

[Back to top](#)

Monitoring

During your treatment with mitoxantrone you will have regular blood tests. You will also have bone marrow tests and may have heart tracings and heart scans. Your haematology team will let you know what tests you need and how often.

Your haematology team will use the results of these tests to:

- Check how well mitoxantrone is working for you
- Make sure your blood counts have not dropped too low
- Check how well your liver and kidneys are working
- Check how well your heart is working

<https://lcdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

Other cancers

Having mitoxantrone can increase your chance of getting a different leukaemia or blood cancer. It may also increase your chance of getting some other types of cancer.

Your haematology team will monitor your blood counts to check for any signs of leukaemia or blood cancers. If you have any worrying symptoms, tell them. These include fatigue, unexpected bruising or bleeding and frequent or long-lasting infections.

Cancer Research UK have more [information about the signs and symptoms of cancer](#).
If you have any of these symptoms, tell your haematology team.

Bone marrow not making new blood cells

Treatment with mitoxantrone can affect your bone marrow. This can stop or slow down how quickly your bone marrow is able to make new blood cells.

Your haematology team will do regular blood tests to check your blood cell counts.

Heart problems

Treatment with mitoxantrone can affect your heart, during treatment, and sometimes months or years after treatment.

Your haematology team will carry out regular checks and scans of your heart during treatment.

Tumour lysis syndrome

Chemotherapy kills cancer cells. When lots of cancer cells breakdown quickly, they can release a large amount of chemicals into your blood. This is known as tumour lysis syndrome. It can affect how well your kidneys work, as well as causing changes to your heartbeat and sometimes fits (seizures). Your haematology team will monitor you closely so they can treat it quickly if it happens.

[Back to top](#)

How long to have mitoxantrone

The number of cycles you have depends on how you respond to treatment and how well your body is coping with it.

- If you are newly-diagnosed and you're having mitoxantrone, you usually have a maximum of two induction and two consolidation cycles.
- If you are having mitoxantrone for AML that has come back or not responded to treatment your haematology team will let you know how many cycles of treatment you will have, based on your individual situation.

[Back to top](#)

Side effects

Like all medicines, mitoxantrone can cause side effects. Some of these may be serious. Side effects are different for everyone, and we cannot predict what side effects you may or may not get.

Tell your haematology team about any side effects you have. They may be able to suggest things you can do or give you medicines to help.

If you are getting side effects that are difficult to cope with, your medical team might suggest:

- Changing how often you have mitoxantrone
- Stopping mitoxantrone treatment

[Back to top](#)

Serious side effects

Your medical team will closely monitor you for serious side effects so that they can treat them promptly if they happen.

The following side effects may be serious and require urgent treatment. Contact your doctor or nurse straight away if you have any of these side effects.

<https://lcdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

The most important serious side effects for people having mitoxantrone are:

- Your heart not functioning properly. You may get symptoms like:
 - Chest pain
 - Shortness of breath
 - Swelling, due to a build up of fluid, in your legs, ankles and feet
 - A fast, irregular heartbeat

Mitoxantrone can lower your blood cell counts. This can mean you may be more likely to get infections, fever, bruising, bleeding, shortness of breath or feeling very tired. If you get any of these symptoms, tell your doctor or nurse straight away.

[Back to top](#)

Very common side effects

Very common side effects affect more than 10 in every 100 people who are having mitoxantrone. They include:

- Infections. Signs of infection include:
 - A high temperature (38°C or higher)
 - Sore throat, sneezing, blocked or runny nose, earache
 - Coughing or shortness of breath
 - Burning or stinging when you pee, or peeing more often than usual
 - Sickness or diarrhoea
 - Pain or redness around any drips or central lines you have
- Feeling tired, dizzy or short of breath due to a low red blood cell count (anaemia)
- Frequent or long-lasting infections due to a low white blood cell count
- Feeling sick or being sick
- Hair loss

Hair loss

Hair loss is usually temporary. It happens gradually. Some people prefer to shave their hair or cut it short. This can give you a feeling of control and reduce the emotional impact of it

<https://lcdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [0808 010 444](tel:0808010444)

falling out. You could also cover your hair loss, if you choose to. There are lots of options like hats, headscarves, wraps, turbans or wigs.

Cancer Hair Care UK has more [information on hair loss](#), including how to care for Afro-textured hair during chemotherapy.

[Back to top](#)

Common side effects

Common side effects affect more than 1 but less than 10 out of every 100 people who are having mitoxantrone. Common side effects include:

- Unexpected bruising or bleeding, like nosebleeds, bleeding gums, blood spots or rashes due to a low platelet count
- Loss of appetite
- Lack of energy, fatigue, feeling tired, weak or exhausted
- Shortness of breath
- A fast, irregular heartbeat
- Swelling of your legs, feet and ankles
- Chest pain, you may also get pain in your arms, jaw, neck, back and tummy
- Feeling lightheaded or dizzy
- Sweating
- Constipation or diarrhoea
- Sore mouth or lips
- Fever

Changes to the colour of your pee

Mitoxantrone may cause your pee to become a blue-green colour 24 hours after having it. The whites of your eyes, skin and nails may also have a blueish colour (this may look different on black or brown skin).

This is normal, and not anything to worry about, but if you are concerned, talk to your haematology team.

[Back to top](#)

What to do if you get side effects

Tell your haematology team if you get any side effects. They may be able to suggest things to help. This could include:

- Asking a heart doctor (cardiologist) to see you if you have problems with your heart
- Giving you medicines like antibiotics, antifungals or antivirals to treat and prevent infections
- Giving you blood or platelet transfusions if you have low levels of blood cells
- Giving you mouthwashes, rinses and gels to help with sore mouth
- Giving you medicines to prevent and treat sickness and diarrhoea

You may need to stay in hospital to manage some of these side effects.

[Blood Cancer UK](#) and [Macmillan](#) have more information on coping with side effects and treatment.

[Back to top](#)

Sources we used to develop this information

Amgen. Neulasta Pre-Filled Syringe – Patient Information Leaflet [Internet]. 2023. Available from <https://www.medicines.org.uk/emc/product/10091/pil> [Accessed Oct 2024].

Amgen. Neulasta Pre-Filled Syringe – Summary of Product Characteristics [Internet]. 2023. Available from <https://www.medicines.org.uk/emc/product/10091/smpc> [Accessed Oct 2024].

Amgen. Neupogen 30 MU (0.3 mg/ml) solution for injection – Patient Information Leaflet [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/3000/pil> [Accessed Oct 2024].

Amgen. Neupogen 30 MU (0.3 mg/ml) solution for injection – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/3000/smpc> [Accessed Oct 2024].

<https://cdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

Amgen. Neupogen Singleject 30 MU/0.5 ml solution for injection in a pre-filled syringe – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/608/smpc> [Accessed Oct 2024].

Amgen. Neupogen Singleject 30 MU/0.5 ml solution for injection in a pre-filled syringe – Patient Information Leaflet [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/608/pil> [Accessed Oct 2024].

Amgen. Neupogen Singleject 48 MU/0.5 ml solution for injection in a pre-filled syringe – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/609/smpc> [Accessed Oct 2024].

Amgen. Neupogen Singleject 48 MU/0.5 ml solution for injection in a pre-filled syringe – Patient Information Leaflet [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/609/pil> [Accessed Oct 2024].

Atnahs Pharma UK. Leustat injection – Patient Information Leaflet [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/13187/pil> [Accessed Oct 2024].

Atnahs Pharma UK. Leustat injection – Summary of Product Characteristics [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/13187/smpc> [Accessed Oct 2024].

Baxter Healthcare. Onkotrone Injection 2 mg/ml concentrate for solution for infusion – Summary of Product Characteristics [Internet]. 2020. Available from <https://www.medicines.org.uk/emc/product/1844/smpc> [Accessed Sep 2024].

Baxter Healthcare. Onkotrone Injection 2 mg/ml concentrate for solution for infusion – Patient Information Leaflet [Internet]. 2020. Available from <https://www.medicines.org.uk/emc/product/1844/pil> [Accessed Sep 2024].

Chugai Pharma UK. Granocyte 13 million IU/mL, powder and solvent for solution for injection/infusion – Summary of Product Characteristics [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/1577/smpc> [Accessed Oct 2024].

Chugai Pharma UK. Granocyte 13 million IU/mL, powder and solvent for solution for injection/infusion – Patient Information Leaflet [Internet]. 2022. Available from <https://www.medicines.org.uk/emc/product/1577/pil> [Accessed Oct 2024].

Chugai Pharma UK. Granocyte 13 million IU/mL, powder and solvent for solution for injection/infusion in a pre-filled syringe – Summary of Product Characteristics [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/7808/smhc> [Accessed Oct 2024].

Chugai Pharma UK. Granocyte 13 million IU/mL, powder and solvent for solution for injection/infusion in a pre-filled syringe – Patient Information Leaflet [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/7808/pil> [Accessed Oct 2024].

Chugai Pharma UK. Granocyte 34 million IU/mL, powder and solvent for solution for injection/infusion – Summary of Product Characteristics [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/7807/smhc> [Accessed Oct 2024].

Chugai Pharma UK. Granocyte 34 million IU/mL, powder and solvent for solution for injection/infusion – Patient Information Leaflet [Internet]. 2022. Available from <https://www.medicines.org.uk/emc/product/7807/pil> [Accessed Oct 2024].

Chugai Pharma UK. Granocyte 34 million IU/mL, powder and solvent for solution for injection/infusion in a pre-filled syringe – Summary of Product Characteristics [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/7806/smhc> [Accessed Oct 2024].

Chugai Pharma UK. Granocyte 34 million IU/mL, powder and solvent for solution for injection/infusion in a pre-filled syringe – Patient Information Leaflet [Internet]. 2022. Available from <https://www.medicines.org.uk/emc/product/7806/pil> [Accessed Oct 2024].

Dohner, H., Wei, A.H., Appelbaum, F.R., Craddock, C., DiNardo, C.D., Dombret, H., Ebert, B.L., Fenaux, P., Godley, L.A., Hasserjian, R.P. and Larson, R.A., 2022. Diagnosis and management of AML in adults: 2022 recommendations from an international expert panel on behalf of the ELN. *Blood, The Journal of the American Society of Hematology*, 140(12), pp.1345-1377. Hospira UK. Cytarabine Injection Solution 100 mg/ml – Patient Information Leaflet [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/1570/pil> [Accessed Oct 2024].

Hospira UK. Cytarabine Injection Solution 20 mg/ml – Patient Information Leaflet [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/1571/pil> [Accessed Oct 2024].

Hospira UK. Cytarabine Injection Solution 20 mg/ml – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/1571/smpc> [Accessed Oct 2024].

Hospira UK. Cytarabine Injection Solutions 100 mg/ml – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/1570/smpc> [Accessed Oct 2024].

LIPOMED GmbH. Litak 2mg/ml solution for injection – Patient Information Leaflet [Internet]. 2022. Available from <https://www.medicines.org.uk/emc/product/6194/pil> [Accessed Oct 2024].

LIPOMED GmbH. Litak 2mg/ml solution for injection – Summary of Product Characteristics [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/6194/smpc> [Accessed Oct 2024].

Medac GmbH. Etoposide 20 mg/ml concentrate for solution for infusion – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/9070/smpc> [Accessed Oct 2024].

Meyer P, Ho AD, Ehninger G, Mjaaland I, Heidemann E, Seither E. Mitoxantrone in the treatment of relapsed and refractory acute leukemia. *Investigational New Drugs*. 1985 Jun;3:203-6. Napp Pharmaceuticals. Pelmeg 6 mg solution for injection in pre-filled syringe – Patient Information Leaflet [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/9849/pil> [Accessed Oct 2024].

Napp Pharmaceuticals. Pelmeg 6 mg solution for injection in pre-filled syringe – Summary of Product Characteristics [Internet]. 2021. Available from <https://www.medicines.org.uk/emc/product/9849/smpc> [Accessed Oct 2024].

Neon Healthcare. Etopophos 100 mg Powder for Solution for Injection – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/10514/smpc> [Accessed Oct 2024].

Neon Healthcare. Etopophos 100 mg Powder for Solution for Injection – Patient Information Leaflet [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/10514/pil> [Accessed Oct 2024].

Pfizer. Nivestim 12 MU/0.2 ml solution for injection/infusion – Patient Information Leaflet [Internet]. 2023. Available from <https://www.medicines.org.uk/emc/product/575/pil> [Accessed Oct 2024].

<https://lcdemo-stage.gb.aldryn.io/about-leukaemia/treatments/mitoxantrone-based-chemotherapy/>

Leukaemia Care Registered Charity Number 1183890. Scotland Registered Charity Number SC049802

Helpline: [08088 010 444](tel:08088010444)

Pfizer. Nivestim 12 MU/0.2 ml solution for injection/infusion – Summary of Product Characteristics [Internet]. 2023. Available from <https://www.medicines.org.uk/emc/product/575/smpc> [Accessed Oct 2024].

Pfizer. Nivestim 30 MU/0.5 ml solution for injection/infusion – Patient Information Leaflet [Internet]. 2023. Available from <https://www.medicines.org.uk/emc/product/10170/pil> [Accessed Oct 2024].

Pfizer. Nivestim 30 MU/0.5 ml solution for injection/infusion – Summary of Product Characteristics [Internet]. 2023. Available from <https://www.medicines.org.uk/emc/product/10170/smpc> [Accessed Oct 2024].

Pfizer. Nivestim 48 MU/0.5 ml solution for injection/infusion – Patient Information Leaflet [Internet]. 2023. Available from <https://www.medicines.org.uk/emc/product/10171/pil> [Accessed Oct 2024].

Pfizer. Nivestim 48 MU/0.5 ml solution for injection/infusion – Summary of Product Characteristics [Internet]. 2023. Available from <https://www.medicines.org.uk/emc/product/10171/smpc> [Accessed Oct 2024].

Pfizer. Zavedos 1mg/mL Solution for Injection – Patient Information Leaflet [Internet]. 2023. Available from <https://www.medicines.org.uk/emc/product/13262/pil> [Accessed Oct 2024].

Pfizer. Zavedos 1mg/mL Solution for Injection – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/13262/smpc> [Accessed Oct 2024].

Sandoz. Zarzio 30 MU/0.5 ml solution for injection or infusion in a pre-filled syringe – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/6672/smpc> [Accessed Oct 2024].

Sandoz. Zarzio 48 MU/0.5 ml solution for injection or infusion in a pre-filled syringe – Patient Information Leaflet [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/10447/smpc> [Accessed Oct 2024].

Teva Pharma B.V. Lonquex 6 mg solution for injection in a pre-filled syringe – Summary of Product Characteristics [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/5422/smpc> [Accessed Oct 2024].

Teva Pharma B.V. Lonquex 6 mg solution for injection in a pre-filled syringe – Patient Information Leaflet [Internet]. 2024. Available from <https://www.medicines.org.uk/emc/product/5422/pil> [Accessed Oct 2024].

Need support?

You are not alone. We're here for you whether you have a diagnosis yourself or know someone who has. If you'd like advice, support, or a listening ear, call our freephone helpline on 08088 010 444 or send a WhatsApp message to 07500 068 065.

[Talk to us →](#)

Help us improve our information

We aim to provide information that's reliable, up-to-date, and covers what matters to you. Please complete our short survey to help us improve our information and make sure it meets your needs.

[Complete our short survey →](#)

About our information

This information is aimed at people in the UK. We do our best to make sure it is accurate and up to date but it should not replace advice from your health professional. Find out more [about our information](#).

Page last reviewed: 31 January 2025

Updated February 2026

Next review due: 31 January 2028