Chemotherapy for acute myeloid leukaemia (AML)

Chemotherapy uses anti-cancer (cytotoxic) drugs to destroy or damage leukaemia cells. It works by disrupting the way leukaemia cells grow and divide. As the drugs circulate in the blood they can reach leukaemia cells wherever they are in the body.

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Chemotherapy for AML is usually given as several sessions (cycles) of treatment. Each cycle lasts 5-10 days and is followed by a rest period of 3-4 weeks. The rest period allows your body to recover from the side effects of the treatment. Most people have three or four cycles of chemotherapy. The complete course of treatment can last about six months.

Induction chemotherapy

The main aim of treatment for AML is to try to cure it. The first step is to achieve a remission. Remission is when the abnormal, immature cells - or blasts - can no longer be detected in your blood or bone marrow, and normal bone marrow has developed again.

The treatment given is called induction chemotherapy. Most people have two cycles of induction chemotherapy. You may be able to go home between treatments if you are well enough.

The possible side effects of the treatment are explained below.

The most commonly used induction chemotherapy drugs are:

- cytarabine (Ara C, cytosine arabinoside)
- daunorubicin
- mitoxantrone
- etoposide (VP-16, Etopophos®, Vepesid®)
- idarubicin (Zavedos®)
- fludarabine (Fludara®).

You may have some of these drugs if you choose to take part in the AML-17 trial. One of the things the trial is trying to find out is whether giving a monoclonal antibody called gemtuzumab (Mylotarg®) with chemotherapy is better than chemotherapy alone.

If the induction chemotherapy doesn’t destroy all of the leukaemia cells, you’ll be given further cycles of chemotherapy that aims to get the leukaemia into remission.

Consolidation chemotherapy

When you are in remission there may still be a small number of abnormal cells in your body, even if doctors can no longer detect any signs of the leukaemia. To reduce the risk of the leukaemia coming back, you’ll be given further cycles of chemotherapy. This is known as consolidation chemotherapy.

The most commonly used drugs for consolidation chemotherapy are:
Cytoxan® (cyclophosphamide), cytarabine, etoposide, amsacrine (Amsidine®), mitoxantrone.

High-dose chemotherapy treatment

For some people, high-dose chemotherapy with a stem cell or bone marrow transplant may be helpful. The doctors will consider whether chemotherapy alone is likely to cure the leukaemia or whether a transplant is needed. They will take into account the results of the cytogenetics tests (which look at changes in chromosomes in the genes of the leukaemia cells) and your response to induction chemotherapy.

If there’s a high risk that your leukaemia will come back after chemotherapy, your doctor may suggest that you have high-dose chemotherapy, or chemotherapy with radiotherapy, followed by a transplant. The transplant will be carried out using a donor’s stem cells or bone marrow.

Low-dose chemotherapy treatment

This may be the best option for people who aren’t fit enough to have intensive chemotherapy, and for people who choose not to have intensive treatment. The chemotherapy drugs may be given by drip (infusion), by mouth or by injection under the skin (subcutaneous). They can often be given to you as an outpatient.

You may be asked to take part in a trial called LI-1 (less intensive-1). This trial is looking at the use of new drugs to treat people who aren’t fit enough to have standard chemotherapy. Your doctor or specialist nurse will explain more about the trial.

The doctors will monitor you closely to see how well your leukaemia is responding to the chemotherapy. They will plan what further treatment is necessary depending on how the leukaemia responds.

Our section on chemotherapy discusses the treatment and its side effects in more detail. Information about individual drugs is also available.

How chemotherapy is given

Chemotherapy drugs for AML are usually given into a vein (intravenously). This might be by a drip (intravenous infusion) or by injection. Chemotherapy given into a vein goes directly into the bloodstream where it can be carried to all areas of your body. You will usually have your treatment given through a central line, PICC line or implantable port.

Central lines

Most people having treatment for AML will have a central line. A central line is a long, thin hollow tube that is inserted into a vein in your chest. Hickman® and Groshong® lines are both commonly used types of central line.

A central line can be used to give chemotherapy intravenously and to take blood samples, so you won’t need repeated injections or needles put into your vein while you have one.
A central line

It is designed to stay in place for many months, throughout all your chemotherapy treatment sessions.

You'll be given a general or local anaesthetic before the central line is put in. The doctor or chemotherapy nurse will explain the procedure to you. After the line has been put in place, you may have some mild pain or stiffness for a few days. Your doctor can give you painkillers for this.

The nurses can show you how to care for your line to prevent blockages or infection. Before you go home, make sure you're confident about looking after it. If you have any problems, contact the staff in the chemotherapy clinic or on the ward for advice.

If you're not comfortable looking after the line yourself, then you can be referred to a district nurse who can help look after the line while you're at home.

**PICC lines and implantable ports**

Instead of a central line, a [PICC line](https://www.macmillan.org.uk/medical-information-and-support/cancer-treatment/chemotherapy/administrating-chemotherapy/picc-line) (peripherally inserted central venous catheter) or an [implantable port](https://www.macmillan.org.uk/medical-information-and-support/cancer-treatment/administering-chemotherapy/implantable-port) may be used.

A PICC line is a long, thin tube put into a vein near the crook of your arm. An implantable port is a thin, soft plastic tube that's put into a vein in the chest and has an opening (port) just under the skin of the chest or arm.

Your doctor or chemotherapy nurse will explain the procedure to you. You'll be given a local anaesthetic before the line is put in.

**Supportive care**

During your chemotherapy, you'll also need treatment for the symptoms caused by a lack of normal blood cells. The reduction in numbers of blood cells may be due to both the leukaemia itself and the chemotherapy.

This treatment includes having a drip (transfusion) of red blood cells and platelets to replace your normal blood cells. You may also need antibiotics to prevent and treat any infections. These can be given through your central line.

**Possible side effects of chemotherapy**

**Risk of infection**

While the chemotherapy drugs are acting on the leukaemia cells in your body, they also reduce the number of normal cells in your blood for a while. When the number of white blood cells is low (neutropenia), you're more [likely to get an infection](https://www.macmillan.org.uk/medical-information-and-support/cancer-treatment/chemotherapy/risk-of-infection).

Your blood will be tested regularly during your chemotherapy. You'll probably be given tablets or other medicines to reduce the risk of developing an infection. If you get an infection, you'll be given medicines to treat it. Most infections are caused by bacteria already in your own body. These don't normally cause
infection, but when your immunity is low, they’re more likely to cause a problem.

If your temperature goes above 38°C (100.4°F) or you suddenly feel ill, even with a normal temperature, contact your haematology team at the hospital straight away.

While you’re having chemotherapy it’s best to avoid coming into contact with someone who may have an infection. This includes keeping away from large groups of people. You may also be told to be careful about what you eat in order to avoid infection from raw, undercooked or contaminated food. The hospital will tell you how to prepare foods and which foods to avoid.

You may be given injections of a drug called **G-CSF** (granulocyte-colony stimulating factor). This is a type of protein that stimulates the bone marrow to produce more white blood cells. G-CSF may help reduce the length of time that your white blood cell count is low. The injections are given under the skin (subcutaneously).

**Anaemia (low level of red blood cells)**

If the level of red blood cells in your blood is low, you may become anaemic. This can make you feel tired and **breathless**. Anaemia can be treated with **blood transfusions**.

**Bruising and bleeding**

Platelets help the blood to clot. In leukaemia, the number of platelets in your blood is lower than normal, and chemotherapy may temporarily reduce the number even more.

This means that you may develop blood spots or rashes on the skin (petechiae), bruise very easily, have nosebleeds, or bleed more heavily than usual from even minor cuts and grazes.

If you develop any unexplained bruising or bleeding, such as nosebleeds, blood spots, rashes on the skin or bleeding gums, contact the hospital immediately.

You may need to have a **drip (transfusion) of platelets** before your chemotherapy begins, and at times during your treatment, to increase the number of platelets in your blood.

**Tiredness (fatigue)**

**Feeling tired** is a common side effect of chemotherapy, especially towards the end of treatment and for some weeks after it’s over. It’s important to try to pace yourself and get as much rest as you need. Try to balance this with taking some **gentle exercise**, such as short walks, which will help. If tiredness is making you feel sleepy, don’t drive or operate machinery.

**Sore mouth**

Your mouth may become **sore or dry**, or you may notice small ulcers during treatment. Drinking plenty of fluids, and cleaning your teeth regularly and gently with a soft toothbrush, can help to reduce the risk of this happening. Some people find that sucking on ice may be soothing. Tell your nurse or doctor if you have any of these problems, as they can prescribe mouthwashes and medicine to prevent or clear mouth infections.

If you **don’t feel like eating** meals, you can supplement your diet with nutritious drinks or soups. A wide range of drinks is available and you can buy them at most chemists. You can ask your doctor to refer you to a dietitian for advice about **eating well if your mouth is sore** during your chemotherapy.

**Feeling sick**

Some chemotherapy drugs can make you feel **sick (nausea) or possibly be sick (vomit)**. Your specialist will prescribe anti-sickness (anti-emetic) drugs to prevent this. Let your doctor or nurse know if your anti-sickness drugs aren’t helping, as there are several different types you can try.

**Losing your hair**

Some chemotherapy drugs cause all or most of your hair to fall out, which can be very upsetting. There are lots of ways you can cover up hair loss if you choose to. There are a variety of wigs, hats, turbans, scarves or bandanas available.

We have more information about **hair loss**, along with a video of Bengu talking about her experience of losing her hair during treatment for leukaemia.
Hair usually starts to fall out within a few weeks of starting chemotherapy or, very occasionally, within a few days. You might notice your hair comes out more when you brush, comb or wash it, and you may find hair on your pillow in the morning.

“Losing my hair didn’t bother me as much as I thought. You know, I thought I would have been a lot more upset. But I just accepted the fact that this was going to happen. There was nothing I could do about it and it was going to grow again anyway.”

Norma

You may lose underarm, body and pubic hair as well. Some chemotherapy drugs also make your eyelashes and eyebrows fall out.

Your hair will usually grow back over a few months after you’ve finished treatment. It will be very fine at first and may be a slightly different colour or texture than before.

You’ll probably have a full head of hair after 3–6 months.

Helpful tips

- Cutting hair short before chemotherapy starts can stop the weight of long hair pulling on the scalp, which can make hair fall out earlier.
- Wearing a hairnet, soft cap or turban at night stops your hair becoming tangled and helps to collect loose hair.
- Ask your hairdresser to cut and style your wig for you.

Chemotherapy affects people in different ways. Some people find they feel quite well at times during their treatment, but most find they become tired and have to take things more slowly. Do as much as you feel like doing and try not to overdo it.

Always tell your doctor or nurse about the side effects you have. They can often prescribe medicines to improve them or change any medicines you’re already taking to more effective ones.

Watch videos about coping with the side effects of cancer

- Denton’s story of coping with fatigue
- Bengu’s story of coping with hair loss
- Avoiding infection if you have reduced immunity
- Coping with a sore mouth.

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