
Low-dose Cytarabine for Acute Myeloid Leukaemia (AML)

A Guide for
Patients

Introduction

Cytarabine (also called cytosine arabinoside or Ara-C) is a treatment for leukaemia, particularly acute myeloid leukaemia (AML). It can be administered at different doses, generally referred to as 'high', 'intermediate' and 'low'. High and intermediate dose cytarabine are generally used as part of the intensive chemotherapy treatment of AML. Low-dose cytarabine generally refers to the doses of cytarabine commonly used in the non-intensive treatment of AML, either alone or in combination with other drugs.

This booklet was compiled by Saloua Najjam, PhD and peer reviewed by one of our medical professionals who is specialised in leukaemia therapy, Dr Steve Knapper, University Hospital of Wales, Cardiff. The booklet has then been updated by our Patient Information Writer, Isabelle Leach. We are also grateful to leukaemia patients Julie Quigley,

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If you would like any information on the sources used for this booklet, please email communications@leukaemicare.org.uk for a list of references.

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About Leukaemia Care

Leukaemia Care is a national charity dedicated to ensuring that people affected by blood cancer have access to the right information, advice and support.

Our services

Helpline

Our helpline is available 8:30am – 5:00pm Monday - Friday and 7:00pm – 10:00pm on Thursdays and Fridays. If you need someone to talk to, call **08088 010 444**.

Alternatively, you can send a message via WhatsApp on **07500068065** on weekdays 9:00am – 5:00pm.

Nurse service

We have two trained nurses on hand to answer your questions and offer advice and support, whether it be through emailing **nurse@leukaemicare.org.uk** or over the phone on **08088 010 444**.

Patient Information Booklets

We have a number of patient information booklets like this available to anyone who

has been affected by a blood cancer. A full list of titles – both disease specific and general information titles – can be found on our website at **www.leukaemicare.org.uk/support-and-information/help-and-resources/information-booklets/**

Support Groups

Our nationwide support groups are a chance to meet and talk to other people who are going through a similar experience. For more information about a support group local to your area, go to **www.leukaemicare.org.uk/support-and-information/support-for-you/find-a-support-group/**

Buddy Support

We offer one-to-one phone support with volunteers who have had blood cancer themselves or been affected by it in some

way. You can speak to someone who knows what you are going through. For more information on how to get a buddy call **08088 010 444** or email **support@leukaemiacare.org.uk**

Online Forum

Our online forum, **www.healthunlocked.com/leukaemia-care**, is a place for people to ask questions anonymously or to join in the discussion with other people in a similar situation.

Patient and carer conferences

Our nationwide conferences provide an opportunity to ask questions and listen to patient speakers and medical professionals who can provide valuable information and support.

Website

You can access up-to-date information on our website, **www.leukaemiacare.org.uk**.

Campaigning and Advocacy

Leukaemia Care is involved in campaigning for patient well-being, NHS funding and drug and treatment availability. If you would like an update on any of the work we are currently doing or want to know how to get involved, email **advocacy@leukaemiacare.org.uk**

Patient magazine

Our magazine includes inspirational patient and carer stories as well as informative articles by medical professionals: **www.leukaemiacare.org.uk/communication-preferences/**

What is low-dose cytarabine?

Cytarabine (also called cytosine arabinoside or Ara-C) is an antimetabolite chemotherapy drug that has been used for the treatment of AML for over 40 years. Antimetabolite drugs interfere with the synthesis of the DNA, and therefore prevent the growth or reproduction of the leukaemia cells.

The doses of cytarabine given to patients may be determined according to their body surface area, which takes into account the patient's height and weight. Three dose regimens of cytarabine are generally described:

- **High-dose cytarabine:** 2000 to 3000mg per square meter (mg/m²) of body surface area, twice daily over three days.
- **Intermediate-dose cytarabine:** Around 5000mg/m² in total (given as 1000mg/m² daily), going up to six doses of 1500mg/m² given over five days (usually two doses on days one, three and five).
- **Low-dose cytarabine:** 20mg given twice daily for 10 days.

However, a lot of patients with AML are older than 60 years, and a large proportion of these patients cannot tolerate the high- and intermediate-dose cytarabine chemotherapies because of their age, other illnesses and the likelihood of early death. Therefore, these patients are given low-dose cytarabine which can provide temporary control of the disease without excessive side effects.

Low-dose cytarabine (20mg) is available to be diluted into solutions containing the appropriate dose prescribed. These solutions are suitable for subcutaneous (injection under the skin) and intravenous use (injection or infusion into the vein).

Who receives low-dose cytarabine?

Low-dose cytarabine is mainly given to patients with AML who are older than 60 years or who cannot withstand intensive chemotherapy.

Low-dose cytarabine is sometimes used in combination with other chemotherapies. Combinations of low-dose cytarabine with chemotherapy drugs such as venetoclax and glasdegib in recent clinical trials have shown possible improvements in remission rates with manageable side effects, but neither of these combinations has yet been approved for standard use in the UK.

If you wish to have further information on AML please view our collection of patient information booklets that are available on our website at www.leukaemiacare.org.uk

How is low-dose cytarabine administered?

Your doctor will see you before the cytarabine is administered and the following clinical assessments will be carried out:

- Full blood count
- Liver function tests
- Urea/electrolyte levels as a measure of kidney function

These tests will be performed before each treatment cycle.

You will then need to read and sign a consent form summarising the receipt of verbal and written information in relation to your disease, treatment and potential side effects.

Low-dose cytarabine solution can be administered to patients as a subcutaneous injection. A subcutaneous injection is given into the fatty tissue under the skin.

Schedules for low-dose cytarabine

Classical low-dose cytarabine for unfit patients with AML is cytarabine of 20mg given twice-daily subcutaneously for 10

days, every four to six weeks. It is sometimes given as a dose of 20mg/m² once daily for 10 days every four to six weeks. Sometimes it may be possible for these injections to be given in the patient's home by a district nurse or family member, or even the patient themselves.

Generally the low-dose cytarabine courses will be repeated while any clinical benefit of the drug is seen, provided the patient continues to tolerate the treatment well. Sometimes patients may go on to receive more than 10 cycles of treatment. It may be possible to introduce a greater time interval between cycles in the event of a sustained response.



What are the side effects of low-dose cytarabine?

Everyone will experience different side effects with low-dose cytarabine. The most common side effects are shown below. It is important to report side effects to your doctor or nurse so that they can be managed and treated effectively.

Side effects from cytarabine are dose-dependent. Therefore, they are relatively mild with low-dose cytarabine.

Common side effects

- Nausea, vomiting and abdominal pain (for which anti-emetics can be prescribed to help with sickness)
- Loss of appetite
- Anaemia due to low red blood cell levels
- Mild bleeding due to low platelet levels
- Increased uric acid levels
- Changes in renal function or urinary retention
- Reversible changes to liver enzyme levels

- Sore mouth
- Muscle or joint pain
- Feeling tired
- Hair thinning (or loss)
- Eye problems, including redness or soreness, or increased sensitivity to light

Uncommon side effects

- Shortness of breath or pneumonia
- Headache
- Inflammation of the skin at the injection site (as a result, the injection site may be changed)
- Skin ulceration, itching and burning pain of palms and soles

What happens if low-dose cytarabine doesn't work?

If after a few weeks of treatment your results are not promising, your consultant will consider alternatives. One of them will be to find similar drugs that have the same effect as low-dose cytarabine on leukaemia cells without any strong side effects. Your doctor will discuss in more detail how the similar drug works, the way of having it administered and its side effects.

Other than cytarabine, there are a number of approved drugs that could be considered as non-intensive chemotherapies for treating your AML including azacitidine, hydroxycarbamide and etoposide. There may also be clinical trials available.

Overall, following the outcome of your treatment with low-dose cytarabine, your consultant is the best person to discuss with and decide on the next step to take.

Leukaemia Care offers nationwide support groups for people affected by a diagnosis of a blood or lymphatic cancer. Visit www.leukaemiacare.org.uk, or call **08088 010 444**, to find out more and to find a group near you.

Glossary

Acute Myeloid Leukaemia (AML)

A rapid and aggressive cancer of the myeloid cells in the bone marrow.

Acute Lymphoblastic Leukaemia (ALL)

A leukaemia in which lymphocytes start multiplying uncontrollably in the bone marrow resulting in high numbers of abnormal, immature lymphocytes called blasts. Lymphocytes are a type of white blood cell involved in the immune response.

Anaemia

A condition where the number of red blood cells are reduced. Red blood cells contain haemoglobin and transport oxygen to body cells. This may be due to a lack of iron, leukaemia, or sickle cell disease.

Antimetabolite

A drug that interferes with the enzymes necessary for DNA synthesis, and therefore preventing growth or reproduction of cells.

Bone Marrow

The soft blood-forming tissue that fills the cavities of bones

and contains fat, immature and mature blood cells, including white blood cells, red blood cells and platelets.

Chemotherapy

Drugs that work in different ways to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing.

Electrolytes

Salts and minerals in the blood that help conduct electrical impulses in the body. They include sodium, potassium, chloride and bicarbonate among others.

Full Blood Count

A full blood count is performed on a blood sample using automated equipment to provide the concentration of haemoglobin in the blood, measures of the red cell components, the white cell count, including the different types of white cells, and the platelet count.

Induction

Treatment intended to kill the majority of the leukaemia cells in the blood and bone marrow and to restore normal blood cell production.

Leukaemia

A group of cancers that are usually in the bone marrow and result in high numbers of abnormal white blood cells. These white blood cells are not fully developed and are called blasts or leukaemia cells. Depending on the type of white blood cell involved, the leukaemia will have varying characteristics, such as being acute (develops quickly) or chronic (develops slowly).

Myeloid Cell

A cell originating in the bone marrow which will eventually become the following white blood cells: neutrophils, monocytes (present in the blood), macrophages (present in different tissues), basophils, and eosinophils. Myeloid cells can also become red blood cells and platelets.

Myelodysplastic Syndromes

Also called myelodysplasia, these myelodysplastic disorders occur when the bone marrow does not make enough normal blood cells. The blood cells made are not fully developed and not able to work normally. These blood cells include red blood cells which

supply oxygen to the body's tissues, white blood cells which fight infection and platelets which help blood clot.

Platelets

A small blood cell that helps the body form clots to stop bleeding.

Red Blood Cells

A small blood cell that contains haemoglobin and carries oxygen to all tissues of the body.

Remission

Remission is said to have occurred when the blood cell counts have returned to normal and there are less than 5% of abnormal, immature leukaemia cells still present in the bone marrow. Complete remission is said to have occurred when there are no leukaemia cells anywhere else in the body.

Urea

Urea is one of the main products of the breakdown of body proteins and is excreted by the kidneys into the urine. Raised urea levels are associated with kidney failure.

Glossary (cont.)

Uric Acid

A product of the metabolic breakdown of purine nucleotides which are the chemical building blocks of DNA. Uric acid is a normal component of urine.

White Blood Cell (or Leukocytes)

White blood cells are one of the types of cells found in the blood and bone marrow, along with red blood cells and platelets. The main role of white blood cells is creating an immune response against both infectious disease and foreign invaders. There are several different types of white blood cells, and each has a different role. The granulocytes, so called because they contain small granules in their cells, include the neutrophils (protects against bacterial infections and inflammation), eosinophils (protects against parasites and allergens) and basophils (creates the inflammatory reactions during an immune response). The other group of white blood cells do not have any granules in their cells, and includes lymphocytes (recognise bacteria, viruses and toxins, to which they produce

antibodies) and monocytes (clears infection products from the body).

Useful contacts and further support

There are a number of helpful sources to support you during your diagnosis, treatment and beyond, including:

- Your haematologist and healthcare team
- Your family and friends
- Your psychologist (ask your haematologist or CNS for a referral)
- Reliable online sources, such as Leukaemia Care
- Charitable organisations

There are a number of organisations, including ourselves, who provide expert advice and information.

Leukaemia Care

We are a charity dedicated to supporting anyone affected by the diagnosis of any blood cancer.

We provide emotional support through a range of support services including a helpline, patient and carer conferences, support group, informative website, one-to-one buddy service and high-quality patient information. We also have a nurse on our help line for any medical queries relating to your diagnosis.

Helpline: **08088 010 444**
www.leukaemiacare.org.uk
support@leukaemiacare.org.uk

Bloodwise

Bloodwise is the leading charity into the research of blood cancers. They offer support to patients, their family and friends through patient services.

020 7504 2200
www.bloodwise.org.uk

Cancer Research UK

Cancer Research UK is a leading charity dedicated to cancer research.

0808 800 4040
www.cancerresearchuk.org

Macmillan

Macmillan provides free practical, medical and financial support for people facing cancer.

0808 808 0000
www.macmillan.org.uk

Maggie's Centres

Maggie's offers free practical, emotional and social support to people with cancer and their families and friends.

0300 123 1801
www.maggiescentres.org

Citizens Advice Bureau (CAB)

Offers advice on benefits and financial assistance.

08444 111 444
www.adviceguide.org.uk

Leukaemia Care is a national charity dedicated to providing information, advice and support to anyone affected by a blood cancer.

Around 34,000 new cases of blood cancer are diagnosed in the UK each year. We are here to support you, whether you're a patient, carer or family member.

Want to talk?

Helpline: **08088 010 444**

(free from landlines and all major mobile networks)

Office Line: **01905 755977**

www.leukaemicare.org.uk

support@leukaemicare.org.uk

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Leukaemia Care is registered as a charity in England and Wales (no.1183890) and Scotland (no. SC049802).
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Leukaemia Care
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