
Hydroxycarbamide for Acute Myeloid Leukaemia (AML)

**A Guide for
Patients**

Leukaemia Care
YOUR Blood Cancer Charity

Introduction

Hydroxycarbamide (also sometimes called hydroxyurea) is a chemotherapy drug which is used in patients with acute myeloid leukaemia (AML), chronic myeloid leukaemia (CML) and myeloproliferative neoplasms (MPNs) to reduce the high numbers of certain cell types in the blood. In acute leukaemia it is mainly used to control the numbers of immature cells called 'blasts' in the blood.

This patient information booklet is for patients, their family members, friends and carers who would like to know more about this drug. So, we will try and answer some questions like what is hydroxycarbamide, who receives it, how it is administered, what are the side effects and what other possible treatments are out there if hydroxycarbamide does not work.

This booklet was compiled by Saloua Najjam and peer reviewed by one of our medical professionals specialised in leukaemia, Nurse Advisor Fiona Heath. We are also grateful for the contribution of our patient reviewer, Stuart Johnson. This booklet was then updated by our Patient Information Writer, Isabelle Leach.

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

In this booklet

Introduction	2
In this booklet	3
About Leukaemia Care	4
What is hydroxycarbamide?	6
Who receives hydroxycarbamide?	8
How is hydroxycarbamide administered?	10
What are the side effects of hydroxycarbamide?	12
What happens if hydroxycarbamide doesn't work?	14
Glossary	16
Useful contacts and further support	19

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@leukaemicare.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.leukaemicare.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@leukaemicare.org.uk**

Patient magazine

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

What is hydroxycarbamide?

Hydroxycarbamide is a chemotherapy drug known as an antimetabolite and is used mainly for the treatment of myeloid blood cancers. Antimetabolite drugs interfere with the synthesis of DNA, and therefore prevent the growth or reproduction of cells.

As an antimetabolite, hydroxycarbamide prevents the excessive production of the blood cells in proliferative diseases. It is also useful in AML to reduce the high numbers of leukaemic white blood cells, and has also demonstrated an antileukaemic effect when used in combination with other drugs.

Acute myeloid leukaemia (AML) is a blood cancer which affects the myeloid cells, which include red cells, platelets and some white blood cells. When you have AML, it stops your body producing enough of these cells and it overproduces tumour cells in the bone marrow which replace the normal cells.

Myeloproliferative neoplasms are disorders of the bone marrow which contains three major types

of blood cells: red blood cells, white blood cells and platelets. Depending on which types of blood cells are over-multiplying in the bone marrow, patients will have different myeloproliferative neoplasms such as:

- Polycythaemia vera primarily involving over-production of red blood cells
- Essential thrombocythaemia primarily involving over-production of platelets
- Myelofibrosis involving fibrosis and inflammation within the bone marrow. Some patients have increased numbers of white blood cells or platelets which might need to be controlled using hydroxycarbamide

Some myeloproliferative diseases progress slowly and need little treatment, while others develop more rapidly and transform into AML.

Hydroxycarbamide is also used as supportive treatment for patients with chronic myeloid leukaemia (CML), although it does not alter

the course of their CML. In CML this is often for a temporary basis at the time of initial diagnosis to help reduce a high white cell count while patients are started on more definitive treatment agents such as tyrosine kinase inhibitors (like imatinib, nilotinib or dasatinib). Supportive treatment is treatment given to prevent, control or relieve complications and side effects, and to improve the patient's comfort and quality of life.

Who receives hydroxycarbamide?

Hydroxycarbamide can be given to the following patients:

Patients with AML as part of combination chemotherapy or as supportive treatment:

- At the time of initial diagnosis to control a high white blood count while the patient is assessed and commenced on definitive treatment
- In the palliative setting where it is being used as supportive care to control the white blood count and reduce the risk of complications such as leukostasis (thrombosis, strokes, respiratory distress etc). Many of these patients are 'end of life' and have exhausted active treatment options by this stage

Patients diagnosed with CML as supportive treatment, alone or with radiation therapy, in the chronic or accelerated phase of the disease.

Patients with a myeloproliferative disorder (myelofibrosis,

polycythaemia vera or essential thrombocythaemia).

Because of its antimetabolite properties which slow down or stop the growth of cells in your body, hydroxycarbamide can also be used for:

- Certain types of head and neck cancers and ovarian cancer
- Sickle cell disease (hydroxycarbamide helps to prevent the formation of the sickle-shaped red blood cells)

If you wish to have further information on AML, CML or myeloproliferative disorders, please view our patient information booklets that are available on our website at www.leukaemiacare.org.uk



How is hydroxycarbamide administered?

Hydroxycarbamide is administered orally, usually as capsules. It is also available as an oral solution and as tablets. It is normally taken as an outpatient. Tablets and capsules must be swallowed whole with plenty of water. It is usually taken on a daily basis and the dose will sometimes need to be adjusted by your doctor quite regularly in response to changes in your full blood count.

In the palliative treatment setting, if a good clinical response is seen and the hydroxycarbamide is able to control the high white blood cell count, then it may be continued indefinitely while the response is maintained.

The dose of hydroxycarbamide will depend on several factors, including your height and weight, your general health, the type of cancer or condition being treated and your white blood cell count. Your doctor will determine your dose and schedule.

The length of treatment will vary according to your disease and response to treatment. The dose

of hydroxycarbamide may be reduced when there is evidence of low levels of red blood cells, neutrophil white blood cells or platelets.

Regular monitoring

Because of the effect of hydroxycarbamide on the bone marrow, patients taking hydroxycarbamide should have regular monitoring before and during treatment.

Blood samples for monitoring the full blood count, renal function, urea and electrolyte levels, uric acid level and liver enzyme levels will be taken regularly. Patients receiving long-term therapy for AML and CML should be monitored for secondary malignancies.

Pregnancy, lactation and fertility

Hydroxycarbamide should not be taken by women who are, or may be, pregnant as it can harm the baby. Drugs which affect DNA synthesis such as hydroxycarbamide, may be capable of introducing a genetic

mutation. For the same reason, men who are contemplating conception should not take hydroxycarbamide. Male and female patients should be advised to use adequate contraception before and during treatment with hydroxycarbamide. Fertility in males might be affected by treatment with hydroxycarbamide and they should be advised about sperm storage before they start treatment with hydroxycarbamide.

Hydroxycarbamide is excreted in human breast milk and should not be taken by women who are breast feeding.

What are the side effects of hydroxycarbamide?

Everyone will experience different side effects with hydroxycarbamide. 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.

Common side effects

- **Risk of infection** – Hydroxycarbamide may reduce the number of white cells in your blood which might make you more likely to get an infection.
- **Bruising and bleeding** – Hydroxycarbamide can reduce the number of platelets in your blood. Platelets are cells that help your blood to clot. Tell your doctor if you experience any unexplained bruising or bleeding.
- **Anaemia** – Your red blood cells may be reduced. These cells carry oxygen around the body, so if your red blood cell count is low then you may feel tired and breathless. If you do feel like this, contact your doctor as you may need a blood transfusion.
- **Tiredness** – Tiredness is often worse towards the end of your treatment and for some time after it has finished. Try to pace yourself and get as much rest as you need. Regular and gentle exercise can also help.
- **Diarrhoea** – Make sure you drink at least two litres of fluid a day. Your doctor can prescribe drugs to control your diarrhoea.
- **Constipation** – Try to drink at least two litres of fluid a day. Try to eat more foods that contain high levels of fibre such as fruit, vegetables and wholemeal bread.
- **Sore mouth** – Your mouth may become sore and you may develop mouth ulcers. Frequent mouth care is very important.
- **Hair loss** – Your hair may thin, but you are unlikely to lose all the hair from your head. It is almost always temporary and your hair will grow back after the treatment ends.
- **Increased uric acid** – As the hydroxycarbamide breaks down the cancer cells, uric acid is released. Too much uric acid can

cause swelling and pain in the joints, which is called gout.

- **Tumour lysis syndrome** - A serious side effect that may occur if the white blood cells are destroyed rapidly is tumour lysis syndrome. The greatly increased blood uric acid levels may cause damage to the kidneys, heart or liver. Patients can be given allopurinol and fluids to treat or prevent the symptoms of tumour lysis syndrome which include renal problems, heart rate disturbances, seizures, and death due to multi-organ failure. Allopurinol is a drug to reduce the production of uric acid in the body and is used for the treatment of gout, kidney stones and certain patients with cancer.

Uncommon side effects

- **Nervous system disorders**
 - Dizziness, headaches, drowsiness and convulsions.
- **Skin and subcutaneous tissue disorders** - Rash, discoloured nails and partial or complete body hair loss (alopecia).

- **Effects on the lungs** - Hydroxycarbamide can cause damage to the lungs. Always tell your doctor if you develop a cough, fever, wheezing or breathlessness as this may be an indication of this.
- **Skin damage** - The use of prolonged hydroxycarbamide can cause skin ulceration. Also, the risk of skin cancer is also increased.

For more information about the common side effects of treatment, you can order our booklet via our website www.leukaemiacare.org.uk or by calling the helpline on **08088 010 444**.

What happens if hydroxycarbamide doesn't work?

Hydroxycarbamide is administered to patients with AML as supportive treatment to reduce the number of leukaemic white blood cells.

If patients with AML respond to first-line treatment of cytarabine and daunorubicin, the need for hydroxycarbamide to reduce high numbers of leukaemic cells is uncommon. Similarly, the introduction of the tyrosine kinase inhibitors has transformed the treatment of CML. Therefore, hydroxycarbamide is mainly used in patients who are not fit enough for intensive chemotherapy, which includes elderly patients and those with other illnesses, or patients who are resistant to first-line treatment.

Other drugs like hydroxycarbamide include:

- Interferon alpha for MPNs, and occasionally CML.
- Anagrelide for essential thrombocythaemia, and sometimes myelofibrosis, as it is useful in reducing the number of platelets.

- Busulfan and etoposide may be oral alternatives for MPNs and can be possible options for palliative AML.

Cytotoxic (cell destroying) chemotherapy is one of the best ways to reduce high leukaemic white blood cell counts. Low-dose chemotherapy such as cytarabine or azacitidine has been used in AML patients to achieve a gradual decrease of the number of leukaemic white blood cells.

Another option is leukapheresis which removes large numbers of white blood cells from the blood. This process involves collecting blood from a vein in one arm, passing it through a machine to remove the excess of white blood cells, and then re-inserting the blood back through a vein in the other arm.



Glossary

Acute Myeloid Leukaemia (AML)

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

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 bone and contains fat, immature and mature blood cells, including the 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.

Essential Thrombocythaemia

A myeloproliferative disease characterised by an increased number of platelets which leads to frequent blood clotting and/or bleeding.

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 red cell components, the white cell count, including the different types of white cells, and the platelet count.

Leukaemia

A group of cancers that usually begin 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).

Primary Myelofibrosis

A myeloproliferative disease, involving the red blood cells and granulocyte white blood cells, in which the normal bone marrow tissue is gradually replaced with a fibrous scar-like material.

Polycythaemia Vera

A myeloproliferative disease where an excess of red blood cells are produced as a result of an abnormality of the bone marrow. The high number of red cells increases the blood's thickness (viscosity).

Platelet

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

Red Blood Cell

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

Sickle Cell Disease

An inherited blood disorder where abnormal sickle-shaped red blood cells are formed in the bone marrow and break down prematurely, leading to anaemia and crises as small blood vessels become blocked.

Tyrosine Kinase Inhibitors

A drug that inhibits the tyrosine kinase enzymes which activate many of the proteins for cell growth. Inhibiting or blocking tyrosine kinases can prevent cancer cell growth.

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

Glossary (cont.)

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, which do not have granules in their cells, include the lymphocytes (recognises 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.leukaemicare.org.uk
support@leukaemicare.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

Leukaemia Care,
One Birch Court,
Blackpole East,
Worcester,
WR3 8SG

Leukaemia Care is registered as a charity in England and Wales (no.1183890) and Scotland (no. SC049802).
Company number: 11911752 (England and Wales).
Registered office address: One Birch Court, Blackpole East, Worcester, WR3 8SG

Leukaemia Care
YOUR Blood Cancer Charity