How is cyclophosphamide given?

Cyclophosphamide can be given as a tablet or intravenously (into a vein). In myeloma, it is most often used in tablet form.

Cyclophosphamide is most often given in combination with other anti-myeloma drugs, for example, the immunomodulatory drug (IMiD) thalidomide and the steroid dexamethasone (CTD), or the proteasome inhibitor drug bortezomib (Velcade®) and dexamethasone (VCD).

It is important that you follow the instructions for taking cyclophosphamide as prescribed. If you are sick shortly after taking it or if you miss a dose, you should contact your doctor immediately for advice before taking the next dose.

The tablets should be swallowed whole with water, preferably on an empty stomach. If you suffer from indigestion or stomach irritation you can take the tablets with food.

You should take cyclophosphamide in the morning and drink plenty of clear fluids throughout the day. This will help to empty your bladder and avoid a build-up of cyclophosphamide which may irritate the lining of the bladder. If you have any blood in your urine while taking cyclophosphamide, contact your doctor immediately.

Cyclophosphamide comes in 50mg tablets. Your doctor will measure your height and weight to calculate the correct dose of cyclophosphamide for you.

Other information about cyclophosphamide

Women must not take cyclophosphamide if they are pregnant, and must not become pregnant whilst taking cyclophosphamide, as it is expected to be harmful to an unborn baby.

This means you must use effective methods of contraception while on treatment and for up to a year after treatment has finished if you are a woman of childbearing potential or if you are a man and your partner is a woman of child bearing potential.
What is cyclophosphamide?

Cyclophosphamide is a chemotherapy drug used in the treatment of myeloma. It belongs to a class of chemotherapy drugs called alkylating agents.

Possible side effects of cyclophosphamide

Cyclophosphamide has a number of possible side effects which can vary considerably from patient to patient.

It is important to report any side effects to your doctor or nurse as soon as possible so they can be treated or managed promptly.

The side effects of cyclophosphamide commonly affect parts of the body where there are rapidly multiplying cells such as the hair follicles, bone marrow, skin and the lining of the mouth and digestive tract.

**Nausea, vomiting and appetite loss**

Cyclophosphamide can cause nausea and/or vomiting, which can begin 2–3 hours after taking the treatment and may last for up to 24 hours. You may be given anti-sickness (anti-emetic) drugs to prevent or reduce nausea and vomiting. You should take these as prescribed rather than waiting until you feel sick. There are several types of anti-emetic available so if the one you have is not effective, ask your doctor to try another.

You should keep drinking to avoid dehydration, especially if you have been vomiting. If vomiting is prolonged and you can’t keep anything down, you should contact your doctor or nurse for advice.

Sometimes, cyclophosphamide can alter your sense of taste and smell, which may contribute to your loss of appetite, nausea and/or vomiting. It is usually temporary and should disappear when you have finished your treatment.

**Low blood counts**

Cyclophosphamide can cause a decrease in the number of red blood cells, white blood cells and platelets in your blood. This can cause anaemia and fatigue, as well as making you more susceptible to infection and increasing your risk of bleeding. You may be given supportive treatments to help alleviate these side effects and boost your blood cell counts.

**Diarrhoea**

In most cases, diarrhoea is temporary and your normal bowel pattern should return once treatment has finished. You should maintain a good fluid intake to prevent dehydration and a balanced diet low in highly spiced or fatty foods. You may be prescribed anti-diarrhoeal treatment and if your diarrhoea is severe, you may also need intravenous fluids via a drip.

**Effects on fertility**

Cyclophosphamide may affect your ability to become pregnant or father a child. Speak to your doctor or nurse about how this may affect you and what your options are.

It is also possible that cyclophosphamide may bring on an early menopause in women who have not yet gone through it.

**Sore mouth and throat**

Cyclophosphamide can sometimes cause a sore mouth and throat (oral mucositis) which can result in mouth ulcers and mouth infections. This can sometimes make eating, drinking and swallowing difficult. You should maintain good oral hygiene if you have mucositis. Your nurse will show you how to care for your mouth and how to keep it clean with mouthwashes and brushes or foam sticks. Your doctor can also prescribe painkillers if necessary.

If eating and drinking become difficult, you may need intravenous fluids and/or nutritional supplements until you are able to resume eating and drinking normally.

**Hair thinning or loss**

Thinning of the hair can start within two to four weeks of your first dose of cyclophosphamide (complete hair loss is unlikely) and may also affect your eyelashes, eyebrows and other body hair. This is nearly always temporary and normally your hair should start to grow back a month or so after finishing treatment. During this time, you should avoid hair dyes and use a very mild shampoo to avoid scalp irritation.

How does it work?

Cyclophosphamide works by damaging the DNA within myeloma cells. Damaging the DNA stops the myeloma cells multiplying and results in their death.

**Figure 1: Mechanism of action of cyclophosphamide**

- DNA replication prevents the cell from dividing
- Chromosomes separate
- Cell divides
- 1 × parent cell
- 2 × daughter cells
- 46 chromosomes (23 pairs)
- 23 pairs each
- Cyclin-dependent kinase (Cdk) prevents the cell from dividing
- Cyclophosphamide
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