

Department of Clinical Haematology

Peripheral Blood Stem Cell Collection Cyclophosphamide priming

Information for patients

You may find this booklet helpful if you or someone close to you is going to have a peripheral blood stem cell collection. This is sometimes referred to as a stem cell harvest.

Stem cells are collected so that high doses of chemotherapy can be given safely. The stem cells will restore bone marrow function after it has been destroyed by the high doses of chemotherapy. This is referred to as High Dose Treatment and Stem Cell Rescue.

High dose treatment and stem cell rescue is used to treat lymphoma, myeloma and leukaemia. It can also be used to treat other cancers and non-cancerous conditions.

The aim of the booklet is to help you understand what stem cells are, why they are collected and how they are collected.

There is a separate leaflet available which explains high dose treatment and stem cell rescue in more detail.

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What are stem cells?

Stem cells are immature cells in the bone marrow that grow into blood cells. They can grow into red cells, white cells or platelets. Special proteins called growth factors that occur in the body help with the making of stem cells. These growth factors can now be made in the laboratory.

Stem cells are normally found in the bone marrow but can be made to spill over into the blood stream in great numbers by giving chemotherapy, and growth factors together, or growth factors alone.

Why are stem cells collected?

As part of your treatment it may have been decided to collect stem cells so that you can have high dose chemotherapy followed by peripheral blood stem cell rescue in the future. In some cases cells are collected, frozen and stored so that they are available for use at a later date if you require any further treatment.

What is a stem cell rescue?

A stem cell rescue allows high doses of chemotherapy to be given. This can be used to treat leukaemia, lymphoma, myeloma and other forms of cancer. This may improve the chances of achieving a long term remission of your disease.

The aim of high dose chemotherapy is to destroy cancer cells. However, as a result of the treatment your bone marrow cells will also be destroyed. You cannot live a normal life without a functioning bone marrow so stem cells are given to 'rescue' you from the effects of the chemotherapy.

The stem cells are given back to you through a central line like a blood transfusion. These cells find their way to the bone marrow and begin making more blood cells. This takes about two to three weeks.

How are stem cells collected?

Stem cells are collected at an outpatient visit at the National Blood Service (NBS) Centre at the John Radcliffe Hospital in Oxford.

They are collected using a special machine called a cell separator. This machine spins and separates the blood into layers – white cells, red cells, platelets and plasma. The white cell layer is the one that contains the stem cells. The stem cells are collected into a bag, while the rest of your cells are returned to you.

The total amount collected is about 150-200 ml. At the same time a similar amount of plasma is collected in which to freeze your stem cells. At the end of the procedure the stem cells are taken to the laboratory for freezing.

A nurse will stay with you throughout the whole procedure. Two collections are usually needed. These are carried out two days in a row. Sometimes one is enough but sometimes three collections are needed. Each collection takes about three to four hours.

What does a stem cell collection involve?

You will meet with the doctor and nurse who will explain the procedure to you. They will do some blood tests to check for hepatitis B & C viruses, HIV and syphilis. These are routine tests. They are done because your stem cells are stored in bags in a tank along with stem cells belonging to other people. Everyone who has stem cells stored has to be tested. This is to reduce the risk of contamination. We need your written consent for testing of your blood for these viruses.

In order to carry out the collection we need to have access to two veins, one to withdraw blood and one to return blood to

you. Your veins will be assessed to see if they are suitable for the procedure. The nurse may do this herself or ask the nurses in the NBS to make the assessment. If your veins are not suitable the nurse will arrange for you to have a central line inserted.

The collection of stem cells can be divided into 3 stages. The first 2 stages are called priming:

Stage 1 Chemotherapy

Stage 2 Growth factors

Stage 3 Collection of stem cells (sometimes called a harvest).

Stage 1 – Chemotherapy

Chemotherapy is given to you as an outpatient. It can be done in the Haematology Clinic in Oxford or at the hospital where you usually have your treatment. The chemotherapy you are given can vary. This booklet explains about Cyclophosphamide chemotherapy. If you are having different chemotherapy, your nurse will give you a separate information sheet.

On the first day (day 1) you will be given Cyclophosphamide through a drip over one hour. This is given in the morning. You will be given an anti-sickness injection just before you have the chemotherapy. You will probably be at the hospital for about 4-5 hours.

Are there any side effects of cyclophosphamide chemotherapy?

Cyclophosphamide can cause irritation to the bladder and in rare cases can cause bleeding in the urine. It is important that you drink at least 3 litres of fluid in the 24 hours after the

chemotherapy. You will be given an injection of a drug called Mesna through the drip just before you have the chemotherapy. This protects the lining of the bladder from the effects of the cyclophosphamide. You will be given two Mesna tablets to take home. They should be taken two hours and six hours after the chemotherapy. Your nurse will tell you what time to take them. It is important that you look at the colour of your urine. If it is red, report it to the doctor or nurse at the hospital.

Other side effects of cyclophosphamide include lightheadedness, dizziness or hot flushes at the time you are having it. If this happens it can be slowed down so that it is going at a rate that is comfortable for you and does not cause these symptoms. Some people complain of a strange taste in the mouth or irritation of the nose.

Cyclophosphamide can cause people to feel sick or actual vomiting. This is usually a delayed effect which can happen during the night or the next day after the cyclophosphamide has been given. You will be given anti-sickness medication by your nurse before you have the cyclophosphamide. You will also be supplied with anti-sickness tablets to take at home with instructions to take them regularly for up to 48 hours to prevent vomiting. If the tablets are not effective in controlling sickness you should get in touch with your hospital team.

In the days following the cyclophosphamide the number of white blood cells in your blood will be much lower than normal before they rise in time for the stem cell harvest. This means that your risk of infection is increased and immunity is too low to fight an infection. You must contact the hospital for advice if you develop a temperature of 37.5 ° C or above.

You may lose some of your hair. This varies from person to person and is difficult to predict. Your nurse can advise you on wigs and other headwear that is available.

Cyclophosphamide may affect your fertility (being able to get pregnant or father a child). If you are worried about this, you can talk to your doctor or nurse before treatment starts.

Stage 2 - Growth Factors

Starting the day **after** you receive the chemotherapy (day 2) up to and including the first day of the stem cell collection (day 10) you will have daily injections of growth factor (GCSF). These injections will help the bone marrow to make more stem cells than normal and for them to spill over into the blood stream.

The injections are given just under the skin in the arm, leg or stomach. They should be given at about the same time each day, usually in the evening. We can teach you to give these injections to yourself or we can arrange for the district nurse or practice nurse at your GP's surgery to give them to you. You should not have the injection on day 10 until after the first collection has been done. The nurses in the NBS Centre will give you the injection after the collection has finished or they will phone you at home for you to give it to yourself.

Are there any side effects from GCSF?

You may have some side effects. You may get a fever and mild flu-like symptoms. If your temperature is above 37.5 ° C, you should phone the hospital for advice. Taking two paracetamol tablets every four to six hours may help your symptoms. Take no more than eight tablets in 24 hours.

Some patients get a pain in the breastbone, legs or back when they are having growth factor injections. These are the areas where the bone marrow is found. As it is being made to grow

more quickly you may feel some discomfort. Again paracetamol tablets may help these symptoms.

If you are troubled by any of these symptoms and paracetamol is not helping please phone the hospital for advice.

Stage 3 - Collection of Stem Cells

The collections are performed as an outpatient in the National Blood Service Centre at the John Radcliffe Hospital, Oxford on two days in a row, days 10 and 11 after the chemotherapy.

The collection takes about three to four hours. You will be lying on a bed. The NBS will contact you directly with the appointment times. The collections are usually carried out in the morning.

On the first day, a blood count will be taken before starting the collection. This is to check that there are enough stem cells circulating in your blood to collect. You will probably be at the hospital for about 5-6 hours each day. If there are not enough cells to collect the procedure will be delayed until the next day.

If your veins are good enough you will have a needle placed in each arm, one to take blood from you and one to return blood to you. If you have a Hickman line this can be used to return blood to you. If you have an apheresis line, this can be used for taking and returning blood, therefore both arms are free of needles.

Are there any side effects from a stem cell collection?

Side effects are few. They may include feeling cold, lightheaded or dizzy. The drug used to stop the blood clotting in the machine may cause some tingling around the lips and face or pins and needles in the fingers or toes. This is because this drug can lower your body's calcium level. This is only temporary. It can easily be put right by having a drink of milk or by taking calcium tablets that the nurse may give you.

It is important to report these symptoms so that they can be treated.

You may feel tired after the collection as some of your red blood cells are removed with the stem cells and you may be anaemic for a few days afterwards. If you feel tired you may need to rest. Your blood count will usually recover itself as you begin to make new red cells. Occasionally, patients need to have a blood transfusion.

Your platelet count may also fall and you may need to have a platelet transfusion.

Most people suffer few or no side effects. It is a good idea to have a light breakfast on the morning of the collection. Try not to drink too much before the harvest and empty your bladder just before being connected to the machine. If you need to go to the toilet during the collection, men can use a bottle and women a commode.

You may eat and drink during the procedure although you may need help especially if you have a needle in both arms.

It is advisable to have someone drive you home after the procedure.

In some patients, we can have difficulty collecting the stem cells and we may give you another drug (Plerixifor injection) on the day of the harvest to help release the stem cells. This would be discussed with you on the day of the harvest, if appropriate.

Occasionally, we do not manage to collect enough stem cells to go ahead with the high dose therapy. In this case we would arrange for you to discuss the possibility of an alternative treatment option with your consultant.

What happens once the cells are collected?

Your stem cells will be frozen and stored until they are required. If you are to proceed with high dose treatment the plan for this will be discussed with you by your nurse and consultant. If you do not go on to have high dose treatment for the foreseeable future the stem cells can be stored for a number of years for future use.

Summary of stem cell collection process

Days	1	2	3	4	5	6	7	8	9	10	11
Cyclophosphamide	*										
GCSF injections		*	*	*	*	*	*	*	*	*	
Stem cell collection										*	*

How to contact us

If you have any questions about the procedure, please ask your doctor or nurse, or telephone:

Day Treatment Unit Tel: 01865 235554

or

Haematology Ward Tel: 01865 235048

Additional information and support

Booklets in this series:

‘High Dose Treatment and Stem Cell Rescue’

‘Chemotherapy’

‘Coping with the side effects of chemotherapy’

‘Caring for your Central Line’

‘Welcome to the Haematology Department’

Macmillan Cancer Support

We also recommend that you read the following publications. All booklets and fact sheets are available from Macmillan Cancer Support, free of charge, by telephoning the number below. If you have access to a computer, all the information can be viewed on their website www.macmillan.org.uk.

Publications order line
0800 500 800

The Macmillan Support Line
0808 808 0000 (Mon-Fri 9am-8pm)

- Understanding Chemotherapy
- Coping with Fatigue
- Diet and the Cancer Patient
- Coping with Hair Loss
- Sexuality and Cancer
- Understanding High Dose Treatment with Stem Cell Support
- The Emotional Effects of Cancer
- Work and Cancer
- Adjusting to Life after Cancer Treatment

PI.8 Peripheral Blood Stem Cell Collection
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