Information for patients undergoing peripheral blood stem cell collection in preparation for autologous peripheral blood stem cell transplantation

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www.uhb.nhs.uk/patient-information-leaflets.htm
What are peripheral blood stem cells?
Stem cells are immature parent cells which live in the bone marrow. From these, stem cells all of your blood cells including red cells, white cells, and platelets grow and develop. Stem cells can be encouraged to leave the bone marrow and enter your blood stream by using a natural growth hormone, granulocyte stimulating factor (GCSF). This is also known as mobilisation.

Why do we need to collect stem cells from you?
Chemotherapy suppresses the stem cells that live in the bone marrow and therefore all other cells that grow from the stem cells. Without stem cells, you become anaemic and are susceptible to bleeding and infections. By collecting and freezing your stem cells prior to chemotherapy this enables us to safely give you higher doses of chemotherapy, as we can re-infuse the stem cells back to you after the chemotherapy to hasten the recovery of your bone marrow. Receiving your own stem cells back is called an autologous peripheral blood stem cell transplant.

What happens before the collection?
Before you undergo a stem cell collection (also known as apheresis or harvest), you will meet a specialist Apheresis Nurse. The nurse will explain the stem collection procedure and answer any questions that you may have. They will also organise to take a blood sample from you to test for infections such as HIV, hepatitis and syphilis, which need to be done before your cells can be collected, processed and stored. You will need to consent to these tests as your stem cell collection cannot take place without these tests being done. Also for females of child bearing potential a pregnancy screen must be performed prior to starting the course of GCSF injections.
How do we get the stem cells ready to be collected?

To collect stem cells from your blood the doctor will prescribe a course of granulocyte stimulating factor (GCSF) injections, a natural growth hormone that encourages the stem cells from the bone marrow into the peripheral blood (this is known as mobilisation). The Apheresis Nurse will give you an appointment with the dates of when to commence GCSF injections, the doses required and the date your stem cell collection will take place. These are documented at the back of this leaflet.

• **GCSF mobilisation post-chemotherapy treatment**

If we are collecting stem cells after chemotherapy, the GCSF injections are usually given daily at roughly the same time. They start the day after chemotherapy, depending on the type of chemotherapy that you have received. When we prescribe the GCSF injections, we will tell you when you should start receiving the injections and for how long. You will need to attend hospital for blood tests on a Monday, Wednesday and Friday following your chemotherapy treatment so that we can monitor when you are ready for collection. Your Apheresis nurse will let you know when and where to have your blood tests done.

• **GCSF-only mobilisation**

If the stem cells are to be collected using GCSF injections alone, the GCSF injections will be given daily at approximately the same time for 4 days. You will be given an appointment for stem cell collection 5 days from the start of the GCSF injections and asked to bring the fifth day’s injection with you on the day of collection.

How is GCSF given?

The GCSF injections will be provided with a syringe of sterile water that is used to dissolve the powdered form of the drug to form a liquid. The concentrated liquid is injected just under the skin at a site that suits you (see step-by-step guide). Most patients prefer to do their own injections after being taught by the nursing staff. However, it is possible to make alternative arrangements if you do not wish to
self-inject (e.g. a practice nurse, district nurse, Apheresis Nurse or even a reliable friend or relative can be taught). GCSF injections will be given daily but they should be given at approximately the same time each day. The most suitable places for the injections are back of the arms, top of the thighs and the stomach.

Step-by-step guide to give GCSF

1. Wash and dry your hands carefully.

2. Remove the syringe and the vial of powdered drug from the package.

3. Place the longer (white) needle onto the syringe of water and inject the water into the powdered vial to dissolve the powder. Once all of the powder has dissolved withdraw the concentrated liquid drug back into the syringe. Repeat this process until you have prepared the correct amount of vials so you can inject the correct dose. Once you have mixed up the required number of vials, decant all of the dissolved liquid into the larger syringe. Your Apheresis nurse will explain what dose of GSCF you need and it is also written at the back of this booklet.

4. Carefully change the needle on the syringe to the (brown) smaller needle. Dispose of the white needle into a yellow sharps disposal container immediately. Do not try to re-sheath or cover the needle.

5. Choose your injection site. Alternate your injections sites regularly to reduce discomfort and allow tissue recovery.

6. With thumb and forefinger, grasp a ‘pad’ of flesh (this is subcutaneous or fatty tissue). and insert the needle at an angle of 90 degrees.
7. Depress the plunger fully and withdraw the needle from the skin.

8. Dispose of the whole syringe into a yellow sharps disposal container immediately (do not try to re-sheath or cover the needle).

9. Wash and dry your hands again.

You should not miss doses or stop the injections unless you are told to do so. This could affect the success of your stem cell collection.

Are there any side effects of GCSF?

The GCSF may cause some pulsating bone pain (as your bone marrow is being stimulated to produce stem cells) and make you feel a little like you have the flu. Taking simple painkillers such as paracetamol will help with this but please ensure you do not exceed recommended daily dose. A warm bath may also help relieve the discomfort.

If you feel very unwell or have stomach, chest pain, or shoulder
tip pain please contact the hospital who prescribed your GCSF for further advice or go to your nearest accident and emergency department if outside of normal working hours.

In rare circumstances splenic rupture (a ruptured spleen) may occur as a result of GCSF injections, therefore if you have any of the following, please go to your nearest accident and emergency department immediately:

- Any upper left side abdominal pain
- A feeling of fullness
- Any type of abdominal discomfort

**When will my stem cells be collected?**

We will ask you to come up to the Apheresis Unit, Bay A ward 621 at 08:00 on the day we expect your cells to be ready for collection – usually on a Monday or Wednesday morning. On this day, you will have a blood test which will tell us if there are enough stem cells circulating in your blood stream to be collected. The results of this test take about 2 hours to come back. If your blood count is suitable you can proceed for stem cell collection.

If your blood count is not high enough you will not be ready for stem collection that day. We will give you an injection of Plerixafor and delay the collection until the following day. Plerixafor is only licensed for lymphoma and myeloma patients.

Plerixafor given with G-CSF helps to release stem cells from the bone marrow into the blood stream. Plerixafor needs to be given on ward 621 at 18:00 on that evening and you will need to stay for 30 minutes to be monitored for any reactions to the drug. The following day you will need to attend Ward 621 at 09:00 for stem cell collection. We appreciate this may be inconvenient for you but the timing of the drug is essential to ensure we do our best to achieve a successful stem cell collection.

Please expect to stay all day on the day of collection. If on day 1 of collection we do not collect enough stem cells you will need to have further injections that evening and come back the next day for a second collection. Occasionally even after 2 or 3 days of collections if
we still do not have enough stem cells we may have to re-schedule you for another collection in a few months time.

**Are there any side effects of Plerixafor?**

While being treated with Plerixafor some of the most common side effects you may experience include diarrhoea, nausea, vomiting, fatigue, redness and swelling at the injection site, pain in your joints, headache and dizziness.

Less common side effects that have been reported in some patients include, abdominal pain and swelling, excessive sweating, dry mouth, redness of the skin, stomach discomfort, constipation, indigestion, muscle or bone pain, a reduced sensation to stimuli as touch or generally not feeling well.

You should let your doctor know if you have difficulty breathing, eye swelling or hives shortly after your Plerixafor injection as these could be signs of an allergic reaction to Plerixafor. You should also let your doctor know if you feel light-headed. Some patients have experienced a sudden drop in their blood pressure when standing from a lying or sitting position. Do not stand up abruptly from a lying or sitting position on days when you are taking Plerixafor. Allergic reactions and low blood pressure usually occur within 1 hour of Plerixafor administration.
How will my stem cells be collected?

We will place a needle in your arm and blood will be drawn out and into a machine called a cell separator. Here it will be spun and the stem cells separated out and collected in a bag. We will only need to collect about 300mls in total (less than a normal blood donation). The remaining blood will be returned to you through a needle or cannula in your other arm. The whole process usually takes approximately 4 to 6 hours. Once collected, the cells are sent to the National Blood Service Laboratory in Birmingham, counted, frozen and stored.

Please be aware that it is common to collect stem cells on at least two consecutive days to ensure that we have enough stem cells for your transplant.

What complications might I expect whilst on the machine?

Most people have no problems during the collection and only very rarely do we need to stop the procedure. It is not painful but can be a little uncomfortable. It can also be quite tedious as you are unable to move around.

You may experience some tingling. This often occurs around the mouth initially and is caused by a low calcium level in your blood. This is caused by citric acid that is mixed with your blood while it is in the machine to prevent it from clotting. It is important to inform the nurses if you experience this and it is easily counteracted by giving you some calcium tablets to chew. Occasionally if the tingling does not improve following the calcium tablets then calcium will be given intravenously (directly into your vein).
Very occasionally patients experience low blood pressure whilst on the machine. This is more likely if you have been taking tablets for high blood pressure and we will usually ask you not to take these on the morning of the procedure.

Sometimes we have difficulties with the flow of blood from the needle in your arm. This may be a problem if your veins are very small, or if you have had a lot of chemotherapy given through them in the past. Very rarely we have to put a temporary catheter into a large vein in the groin to get around this. This will only remain in place for the collection procedures. If we think that you may need one of these lines the doctor will discuss it with you. If a groin line is required, it will usually mean that you will need to stay in hospital for the line to be cared for and might also require low doses of a blood-thinning drug to prevent clots from forming around the line. The line will be removed as soon as possible after we have collected sufficient stem cells.
Do I need to bring anything with me on the day or make any special arrangements?

You will be attached to the machine for approximately 4 hours, so you may wish to bring something to occupy you during the procedure, (books, ipod, etc) or you can bring a relative/friend for company. We have some portable DVD players and free WiFi suitable for mobile devices. Any such devices such as tablets, phones and laptops are brought in at your own risk. It is also advisable to wear comfortable clothes and loose or short sleeves that allow easy access to your arms.

You will be able to eat and drink normally during the day. We do provide tea, coffee, biscuits and lunch but feel free to bring in your own snacks too.

You are likely to feel very tired after the procedure and therefore we advise that you do not drive and that you arrange for someone to take you home afterwards. If you need hospital transport at any time, please let us know.

Free parking (car park A only)

If you arrive by car please park in car park A and take the ticket as normal. Give your parking ticket to the Apheresis Team on Ward 621 and they can give you an exit ticket so you can receive free parking. Directions can be found on the Trust’s website: www.uhb.nhs.uk.

What happens after the collection?

After the procedure is completed you are free to go home but you must remain contactable by phone. Your cells will be sent straight to the lab for counting and storage. The lab will phone us later that day to let us know if enough cells have been collected.

If we have not collected enough cells we will contact you later that day as you will need to have another dose of GCSF that evening (and maybe Plerixafor) and come back to the Apheresis Unit the next day for another collection. Please be aware that some patients need to attend for up to 4 days in a row to ensure
they collect enough cells for their stem cell transplant. The Apheresis team will let you know whether this is necessary or not.

If we are still unable to collect sufficient cells, despite our best efforts, your doctor may recommend a further attempt at collecting more cells at a later date or an alternative treatment plan.

Once all the collections have been completed, we will arrange for you to be seen in the outpatient clinic to discuss your future treatment plan.

What happens next?

Your cells will be stored at the stem cell laboratory until you are ready to have your transplant when your cells will be given back to you just like a blood transfusion.
GCSF injection instructions and stem cell collection appointment sheet

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GCSF instructions and appointment details

The GCSF injections will start on .................................................................

They are likely to be given for ................................................................. days.

You will receive GCSF once a day at ...........................................................

The dose of each injection will be ........................................ microgrammes.

Each dose will consist of ................................................................. vials.

Blood tests required before collection  Yes / No

Please attend .................................................................

Please attend Bay A, Ward 621 on ...........................................................
at 08:00 for a blood test and possible stem cell collection.
(Further instructions regarding GCSF injections and attending the unit will be given at this appointment)

If you have any further questions or concerns please contact the
Apheresis team: Monday–Friday 08:00–18:00
Apheresis Unit (Ward 621): 0121 371 6272

For emergencies outside of normal working hours please contact
Ward 625: 0121 371 6252 or 6293 or 6291 (24hrs)
For all appointments in the Outpatients area of the Queen Elizabeth Hospital Birmingham, please enter through the main entrance 1 and check in using the self check-in kiosks.

When visiting our hospitals we recommend parking in the following car parks:

For the **Queen Elizabeth Hospital Birmingham** use Car Park A

For the **Heritage Building** (Queen Elizabeth Hospital) or **Nuffield House** use Car Park D

If you are using a sat nav, please make sure it has been updated recently. The post code B15 2GW will bring you onto the hospital site. Once on site, please follow road signs to the relevant car park.

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**Entrances**

1. Outpatients and all wards/departments (QEHB)
2. West Entrance (All wards and departments, Heritage Building)
3. Cancer Centre
4. Main Entrance (All wards and departments, Heritage Building)
5. Institute of Translational Medicine
6. East Block Day Unit

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**Key**

- **Disabled Parking**
- **P** Parking
- **Bus Stop – Centro / West Midlands Travel**
- **Pedestrian Route**
- **Cycle Storage**
- **Smoking Shelter**

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**Car Parking Charges**

- 0–1 hour £2.80
- 3 hours £4.10
- 4 hours £4.80
- 5 hours £5.50
- 6 hours £6.20
- 8 hours £6.90
- Over 8 hours £13.80
- Weekly Pass £19.30
- Disabled Parking Free

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**Public transport**

There are a number of public transport routes serving the hospital. Please check with providers for details of services and timetables. You can also call Traveline on 0871 200 22 33 or visit networkwestmidlands.com

The Trust provides free monthly health talks on a variety of medical conditions and treatments. For more information visit www.uhb.nhs.uk/health-talks.htm or call 0121 371 4323.