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Stem Cell Harvesting for Autologous Peripheral Blood Stem Cell Transplant

What is an Autologous Stem Cell Transplant?
An autologous stem cell transplant uses healthy blood stem cells from your own body to replace your diseased or damaged bone marrow. It is usually for people who require high doses of chemotherapy and radiation to cure their condition. As such high doses are likely to damage the bone marrow, an autologous stem cell transplant helps to replace the damaged bone marrow.

What are peripheral blood stem cells?

Stem cells are cells present in the bone marrow that have the unique ability to grow and develop into the blood cells that your body requires to function (these include red blood cells, white blood cells and platelets).

Why do we need to collect stem cells from you?

The collection and proper storage of your stem cells by freezing them before chemotherapy allow us to give you higher doses of chemotherapy drugs. The stem cells collected before chemotherapy are injected back into your bloodstream later to speed up the recovery of your bone marrow.

What happens before the stem cell collection?

Before a stem cell collection, also called apheresis or harvesting, you will be asked to answer a screening questionnaire and go through an assessment by our doctor.

A specialist apheresis nurse will explain the procedure for peripheral blood stem cell collection and address any concerns.

We will also take a blood sample from you to check for infections such as hepatitis, HIV, and syphilis. A pregnancy test will be performed for females of childbearing age.

How do we collect the stem cells?

Our doctor will recommend a course of GCSF (granulocyte stimulating factor) injections. GCSF is a natural growth hormone, which mobilises your stem cells into your bloodstream.

The GCSF injections are usually given for five days, preferably at the same timing each day. An appointment will be made five days from the start of the GCSF injections for the peripheral blood stem cell collection.

Our apheresis nurse will inform you of the date of commencement of the GCSF injections and the doses required.

How is GCSF administered?

The GCSF injections are available in the forms of pre-filled syringes that need to be stored in the fridge. The GCSF injections are administered just under your skin. The suitable places for these injections include the top of the thighs, the back of the arm, and stomach. GCSF injections should ideally be given in the evening at the same time each day.

Most patients prefer to do their own injections after being taught by the nurse. Relatives and carers can also be taught to administer the injections for you. Injections can also be given in our clinic or by your general practitioner.

Step–by–step instructions for giving GCSF injections:

1. Wash and dry your hands.
2. Remove the required number of GCSF injections from the packaging. You may need to take several injections each day to ensure your body receives the optimum dose of GCSF injections. Our Apheresis Nurse will explain the right dose needed for you.
3. Choose the injection site. Rotate the sites of injections regularly to avoid discomfort and allow the skin to recover.
4. Grasp a 'pad' of fatty tissue under the skin using your thumb and forefinger and insert the needle making an angle of 90 degrees with the skin.
5. Gently push the plunger thoroughly and then withdraw the needle from your skin.
6. Discard the syringe and needle immediately into a yellow sharps disposal bin. Do not cover or re-sheath the needle.
7. Rewash and dry your hands.
8. Bring the yellow sharps bin and unused syringes back to the clinic when you visit us for your stem cell collection procedure.

Do not stop or miss the doses of GCSF injections unless advised by our doctor. This may affect the success of stem cell collection.

What are the side effects of GCSF injections?

GCSF injections may cause some pulsating pain in the bone as your bone marrow is being stimulated to form new stem cells. You may also develop mild symptoms of flu. You can take painkillers such as paracetamol to relieve these side effects.

However, if you feel severe pain in the stomach, shoulder tip, or chest, contact our doctor immediately for advice.

When will my stem cells be collected?

You will be given an appointment for the stem cell collection at the Haematology Ward in Mount Elizabeth Novena Hospital. It is vital that you attend your appointment on the correct date; otherwise, it will affect the entire process.

A sample of blood will be taken to check if there are enough stem cells circulating in your bloodstream. The results of this blood test are usually available after 2 hours. If your blood count is high enough, we can begin the stem cell collection procedure.

If your blood counts are too low, the stem cell collection cannot be performed on that day.

In this case, you may be given a dose of Plerixafor as an injection. Plerixafor can help to improve the effectiveness of GCSF by stimulating the entry of stem cells into the bloodstream from the bone marrow. Plerixafor injection will be given by nurses on the haematology ward at around 11 pm. You will be monitored after the injection to assess your response and check for the development of any adverse reactions. You will remain in hospital overnight and proceed to a second day of stem cell collection the next morning.

It should be noted that Plerixafor is approved for use only for patients with **lymphoma** or **myeloma**.

Are there any side effects of Plerixafor?

Plerixafor injection may cause a few side effects such as nausea, vomiting, diarrhoea, fatigue, and redness and swelling at the site of the injection. You may also develop pain in your joints, headaches and dizziness.

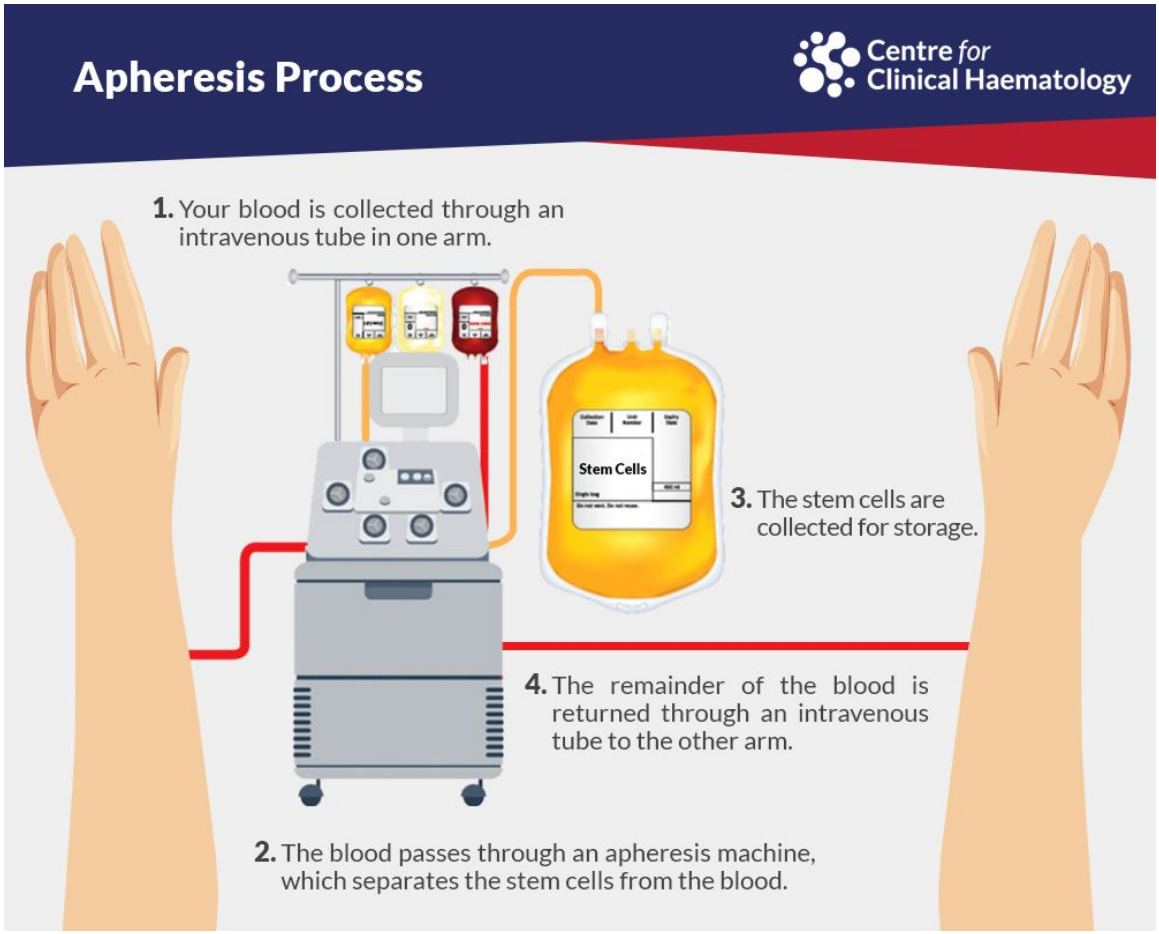
Some rare side effects caused due to Plerixafor injection include abdominal pain, excessive sweating, dryness of mouth, stomach discomfort, redness of the skin, constipation, indigestion, reduced sensations, muscle or bone pain, or a feeling of not being well.

You should inform our doctor if you experience difficulty in breathing, eye swelling, or hives on the skin shortly after the Plerixafor injection. These symptoms could be due to an allergic reaction to Plerixafor. You should also inform our doctor if you develop severe dizziness or lightheadedness.

In some cases, patients may develop a sudden drop in blood pressure while standing or getting up suddenly from a sitting or lying down position. Hence, it is advisable to avoid standing up abruptly from a sitting and lying position when you are receiving Plerixafor injections.

Low blood pressure and allergic reactions usually occur within an hour of giving Plerixafor injections.

How will my stem cells be collected?



We will insert a cannula into one arm to draw your blood into a machine known as the cell separator. This machine spins the blood, which results in the separation of your stem cells which are then collected in a bag.

We will collect only a few hundred millilitres of blood, which is less than the amount of blood drawn during a blood donation.

The remaining blood will be returned to your body through a cannula in your other arm. The entire process takes approximately six hours.

If the amount of stem cells collected is insufficient, you will be required to repeat this process for up to three days in a row.

What complications might occur during this procedure?

Most people do not develop any complications during stem cell collection. The process is not painful, though it may cause mild discomfort.

You may experience a few side effects like tingling around the mouth that occurs due to the low calcium level in your blood. This might occur due to the citric acid, which is mixed with your blood while it is being processed in the cell separator machine to inhibit its clotting.

Inform our nurse if you experience this as the symptoms can be easily be relieved by chewing calcium tablets. If the tingling does not reduce even after chewing calcium tablets, intravenous calcium would be given directly into your vein.

In rare cases, patients develop low blood pressure during the procedure. This symptom may occur in patients who are using medications for high blood pressure. We may ask you to omit these medications in the morning to avoid low blood pressure during stem cell collection.

If the veins in your arms are very narrow, there may be difficulties obtaining a good blood flow. In such cases, we may put a temporary catheter into a larger vein of your neck or chest. The catheter will remain in place only during the collection procedure. The line can be removed immediately after the collection of sufficient stem cells.

Please inform our Apheresis team if you are taking any other medications as you may have to stop using them for a few days before and after the procedure.

Do I need to bring anything with me on the day or make special arrangements?

- You will be attached to the cell separator machine for several hours during the procedure. Hence, it is advisable to bring something that will keep you occupied like a magazine or book. You can also bring an electronic device as the hospital provides free WiFi.
- You can eat food and drink normally throughout the day.
- It should be noted that you will have to stay connected to the collection machine until the procedure is completed. Hence, if you need to visit a restroom during the procedure, our team will help you use a bottle or bedpan.
- You may feel tired after the procedure. Hence, it is advisable to avoid driving and arrange for someone to drive you home after the procedure.

What happens after the stem cell collection?

Once the procedure is completed, your stem cells will be sent to a stem cell laboratory for counting and storage immediately.

You will be monitored for a short while after the procedure before going home. If we have not collected an adequate number of stem cells, you will be given another dose of GCSF in the evening and asked to revisit us the next day for another session of stem cell collection.

If we are still not able to collect sufficient stem cells, our doctor would recommend another attempt at a later date or advise an alternative treatment.

What happens next?

The cells will be stored appropriately in a stem cell laboratory until you are ready for your stem cell transplant when your cells are given back to you in a way similar to blood transfusions.