

## **PATIENT INFORMATION ON HEMATOPOIETIC PROGENITOR (STEM) CELL COLLECTIONS**

### **What are Hematopoietic Progenitor Cells (HPCs)?**

HPCs are immature cells (stem cells) that grow and divide into mature red blood cells, white blood cells or platelets. These cells usually reside in the bone marrow of an adult and are found in very small numbers in the circulating blood. The type of blood cell that a stem cell develops into is determined by the needs of your body and the stimulus of special substances called “growth factors”. Stem cells can be collected from circulating blood by a blood cell separation (hemapheresis) procedure or can be obtained from the bone marrow via a surgical procedure called a bone marrow harvest.

### **What is a hemapheresis HPC (Stem Cell) collection?**

This is a procedure that involves the separation and collection of stem cells from the circulating blood. The collection is accomplished by a procedure using a machine such as the COBE Spectra. The machine uses a centrifuge to separate mononuclear cells, which include stem cells, from other blood components and plasma. The stem cells are collected in a bag and all other blood components are returned to you. Small amounts of your blood are continuously drawn and returned to you, allowing multiple liters of your blood to be processed. This allows the collection of adequate numbers of stem cells.

### **What happens before a stem cell collection?**

Before a stem cell collection, you may receive a prescribed dose of chemotherapy and/or other drugs such as Neupogen (Filgrastim) called “growth factors”. These drugs cause the bone marrow to produce and release large numbers of stem cells into the circulating blood where they can be collected during the hemapheresis procedure. Your doctor will also arrange for a central venous catheter to be placed into your chest. It is placed by special clinicians under fluoroscopy (x-ray) guidance. The end of the catheter is guided into the large vein leading to your heart. This allows for adequate blood flow into the hemapheresis machine during the stem cell collection.

After you are started on the Neupogen injections (usually every morning), a sample of your blood will be drawn daily to determine the number of stem cells that are in your circulating blood. When you have produced sufficient stem cells and the count is adequate, the hemapheresis procedures will begin. You will be directed to the hospital where the hemapheresis nurse from the Inland Northwest Blood Center will meet you and start the collection process.

The collection process lasts several hours (usually 4-5) so that your total blood volume may be processed 3 times through the machine in order to collect the required number of stem cells. All of the stem cells needed may not be collected in one day so; subsequent days for collection will be scheduled. The process may need to be continued several days in a row.

### **What are the risks of a hemapheresis (blood cell separation) procedure?**

A blood thinner (anticoagulant) called Citrate is added to your blood during collection so the blood will not clot. The anticoagulant binds with the free calcium in your blood and may cause your calcium level to drop. The use of Citrate can cause tingling or numbness around the mouth, fingers or toes. It may also cause nausea and vomiting and in extreme instances, muscle spasms. To prevent these side effects, we slowly infuse calcium to you during the procedure. If you have any of these symptoms you need to report it to your hemapheresis nurse so the symptoms can be controlled by slowing down the procedure and, therefore, allowing your body to “catch up” with metabolizing the citrate.

Additional risks of this procedure include:

- Hemolysis – destruction of red blood cells
- Thrombosis – blood clots
- Vaso-vagal reaction – a reflex of the involuntary nervous system causing slowing of the heart rate and a drop in blood pressure resulting in dizziness and/or fainting
- Thrombocytopenia – reduction of the platelet count

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Most of these complications are unusual. The procedure is quite safe, since at any one time, only a small amount of blood is actually outside of your body in the machine.

Qualified medical staff operate the blood cell separator (hemapheresis machine) and will monitor you and your medical status at all times during the procedure. The blood cell separator uses sterile tubing that is used one time only and then discarded.

### **What are the risks of central venous catheters?**

Complications can include:

- Pain
- Bleeding
- Bruising
- Nerve injury
- Pneumothorax – collapsed lung
- Hemothorax – collection of blood around the lung
- Air embolus – introducing air into the vascular tree
- Infection

Most of the complications are very rare due to the specialized technique of guiding these catheters to the right place under fluoroscopy (x-ray).

### **What are the risks of “growth factors” such as Neupogen (Filgrastim)?**

Neupogen is given daily by subcutaneous injection in a dose prescribed by your physician.

It commonly causes:

- Bone pain
- Headache
- Muscle pain
- Fatigue
- Nausea
- Rash
- Insomnia

Many of these symptoms can be controlled by increased hydration and mild analgesics prescribed by your physician.

Less commonly, Neupogen can cause:

- Enlargement of the spleen with a rare possibility of rupture
- An allergic reaction
- Abnormalities of blood chemistries
- Certain types of inflammation of the eye (episcleritis and iritis)

During the period of time that you are taking Neupogen in preparation for your stem cell collection, you should report any unusual symptoms to your physician.

### **What role does Mozobil (plerixafor) play in stem cell collections?**

Mozobil is used in combination with Neupogen to move the stem cells from the bone marrow into the circulating blood stream so that they can be collected. It is given each evening as a subcutaneous injection (maximum of 4 doses). The stem cell collection is then scheduled the next morning, approximately 11 hours after the dose is given. The peak action of the drug occurs 10-14 hours after the dose is given. More stem cells will be able to be collected with Mozobil; therefore it can decrease the number of days that the hemapheresis procedure needs to be done. The side effects of Mozobil are similar to Neupogen.