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What is a Stem Cell or Bone Marrow Transplant?

Stem cell transplants are used in the treatment of cancers such as **leukaemia**, **myeloma**, **lymphoma**, and other blood or immune system diseases that affect the bone marrow.

A stem cell transplant, also known as a bone marrow transplant or a hematopoietic stem cell transplant, is a medical procedure that replaces your bone marrow with healthy stem cells. These cells either come from your own body or are taken from a donor.

What are Stem Cells?

Stem cells are cells present in the bone marrow that have the unique ability to grow into the blood cells that your body requires to function. Blood stem cells grow into different blood cells, which include red blood cells, white blood cells and platelets:

Red blood cells

These make up the bulk of your blood. Your red blood cells carry oxygen throughout your body. If you have insufficient red blood cells, you may be anaemic.

White blood cells

The white blood cells fight pathogens such as viruses and bacteria. They make up a part of your immune system.

Platelets

Your platelets help to form clots and stop bleeding.

Cancer and cancer treatment, such as chemotherapy, may damage your blood stem cells which will affect the normal production of red blood cells, white blood cells and platelets.

What are the different types of transplant?

Autologous Stem Cell Transplantation

The stem cells used for an autologous transplant are collected from your own body. This is sometimes done because intensive chemotherapy or radiation therapy treatment can damage your stem cells and immune system. Therefore, doctors may remove and store stem cells prior to your cancer treatment.

After chemotherapy, these stem cells are returned to your body to help build and restore your immune system and body's ability to produce blood cells and fight infection.

Autologous transplants can be done if:

- You have certain blood cancers such as **myeloma** or **lymphoma**
- You have types of cancer which are treated with high doses of chemotherapy, e.g. germ cell tumours
- You have autoimmune conditions such as multiple sclerosis

Allogeneic Stem Cell Transplantation

The stem cells used in an allogeneic stem cell transplant are taken from a donor. Allogeneic stem cell transplantation is commonly used for treating aggressive forms of acute leukaemia and myelodysplastic syndromes. It is also used for the treatment of aplastic anaemia, red cell disorders (such as thalassemia) as well as in some cases of lymphoma and myeloma.

Before the actual transplant, chemotherapy is given with or without radiation; it is done to remove any abnormal cells from the bone marrow, so it is ready to receive donor stem cells. This phase is called conditioning and takes 5-8 days.

On the day of the transplant, healthy cells from the donor are infused into the bloodstream through an intravenous (IV) line or tube. This process is similar to receiving medication or blood through an intravenous line. These cells make their way into the bone marrow, where they begin to grow and produce healthy red blood cells, white blood cells and platelets. This phase is called engraftment and takes about 10-14 days.

Allogeneic stem cell transplants require a "donor match". A donor match comes from a healthy donor whose human leukocyte antigens (HLA) match yours. This process is called HLA typing. The

best donor match often comes from siblings with the same parents. However, other family members or an unrelated volunteer may be a match too.

In the event that a suitable donor match cannot be found, there are other options that may be considered, including:

- **Haploidentical transplants**
  Stem cells taken from a parent, child, or sibling may not always be a perfect match for a patient's HLA type. However, they may be a 50% match. Doctors are now using this type of transplant more often, and outcomes are similar to those of matched sibling and unrelated donor transplants.

- **Umbilical cord blood transplants**
  In umbilical cord transplants, stem cells from the umbilical cord blood are used. Cord blood is rich in stem cells and may be reserved and frozen after birth and used in a transplant if necessary.

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What are the differences between blood stem cell and bone marrow transplant?

Both blood stem cell and bone marrow transplants produce the same result. A patient will receive stem cells in the same way. The difference between the two comes from how the cells are extracted from the donor.

With most donations, the stem cells are collected from a donor's bloodstream through a process called **peripheral blood stem cell collection (PBSC)**. Their blood passes through a small tube and into a machine that collects the stem cells. The rest of the blood is then returned to the body. The process is similar to donating blood; however, it takes longer.

While most donations are done through PBSC, others are done through the collection of a donor's bone marrow in a surgical procedure. A needle is used to extract the bone marrow from the donor's pelvis while they are under general anaesthesia. A patient receiving cells from a donor extracted by this method would be considered to be having a bone marrow transplant.

The method chosen depends on the condition being treated and factors such as the patient's health and age. The transplant doctor will advise you as to which method is best suited to your condition.

What is the recovery process after a stem cell transplant?

Once the donor cells have engrafted and you have recovered from your stem cell transplant, you will be discharged home.

After the transplant, you will be monitored very closely with regular visits to the post-transplant clinic.

During the initial recovery period, you are at high risk of infection as your immune system will be suppressed and will take time to regain its normal function. You will need to be monitored closely for infections and will receive antibiotics and antivirals to reduce the risk of infection. Our doctors and nurses will advise you on how to prevent infection, as well as how to watch for signs of infections.

Patients who have had an allogeneic stem cell transplant are also at higher risk of developing a condition called **Graft Versus Host Disease (GVHD)**. This occurs when the donor cells grow too aggressively and attack the cells in the patient's body. GVHD can be mild, moderate or severe. Your transplant team will be monitoring you for signs of GVHD very carefully and will give you drugs both to prevent and manage GVHD.

During this recovery period, you will have blood tests and bone marrow tests at regular intervals to monitor your condition and to see how well you have responded to the transplant. You may occasionally require blood and platelet transfusions if your blood counts are low.

What should you consider before a stem cell transplant?

Our doctors will recommend the transplant option best suited for you based on several factors.

Factors to be considered in your pre-transplant assessment include your disease type, your response to treatment as far, your age and your general health.

The whole transplant procedure is long and involves approximately a one-month in-patient admission, followed by a prolonged recovery phase. While our transplant team will be here to support you as best as possible through your journey, it is always important to identify family members and/or caregivers who can be there to support you along the way too.