

STEM CELL TRANSPLANTATION



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INTRODUCTION

Stem cell transplants are sometimes used to treat lymphoma patients who are in remission or who have a relapse during or after treatment. Although only a small number of patients with lymphoma are treated with this therapy, this number is growing. Stem cell transplants allow to use higher doses of chemotherapy (and sometimes radiation) than would normally be tolerated. High-dose chemotherapy destroys the bone marrow, which prevents new blood cells from being formed. This could lead to life-threatening infections, bleeding, and other problems due to low blood cell counts. Stem cells are very primitive cells that can create new blood cells.

DEFINITION:

• A stem cell transplant is a procedure that is used in conjunction with high-dose chemotherapy, which is frequently more effective than conventional chemotherapy in destroying myeloma cells. Because high-dose chemotherapy also destroys normal blood-producing stem cells in the bone marrow, these cells must be replaced in order to restore blood cell production.

BLOOD-FORMING STEM CELLS USED FOR A STEM CELL TRANSPLANT CAN COME FROM:

- ☞ The blood (for a peripheral blood stem cell transplant, or PBSCT)
- ☞ The bone marrow (for a bone marrow transplant, or BMT)
- ☞ Umbilical cord blood (for a cord blood transplant)
- ☞ Most stem cell transplants are now PBSCTs.

STEM CELLS

☞ Stem cells are a remarkable type of cell that can divide and develop into any one of the three main types of cells found in the blood:

☞ Red blood cells, White blood cells, and Platelets.

USES:

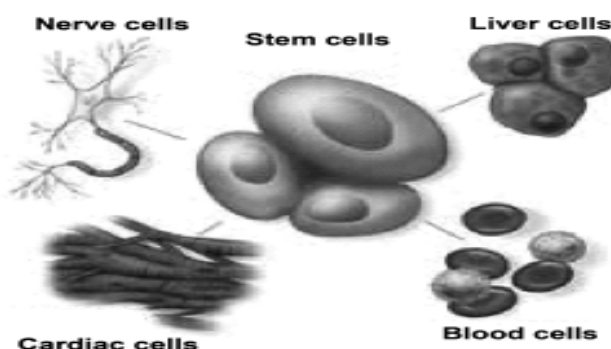
☞ A stem cell transplant may be necessary if the bone

marrow stops working and doesn't produce enough healthy stem cells.

☞ A stem cell transplant also may be performed if high-dose chemotherapy or radiation therapy is given in the treatment of blood disorders such as leukemia, lymphoma or multiple myeloma.

☞ A stem cell transplant can help your body make enough healthy white blood cells, red blood cells or platelets, and reduce your risk of life-threatening infections, anemia and bleeding.

TYPES OF STEM CELL TRANSPLANTS:



☞ There are many types of stem cell transplants. This section defines each of the various types of transplants. First, stem cell transplants are defined by the source of the stem cells.

Bone marrow transplants are those that are obtained from the bone marrow. However, they are rarely performed today in myeloma because of the ability to collect stem cells from the peripheral blood (see below). Bone marrow transplants are sometimes used if insufficient numbers of stem cells can be obtained from the peripheral blood.

Peripheral blood stem cell (PBSC) transplants are obtained from the peripheral blood. PBSC transplants are now performed much more often than bone marrow transplants because they are easier to collect, they provide a more reliable number of stem cells, the procedure puts less strain on the donor's system, and the patient recovers more quickly

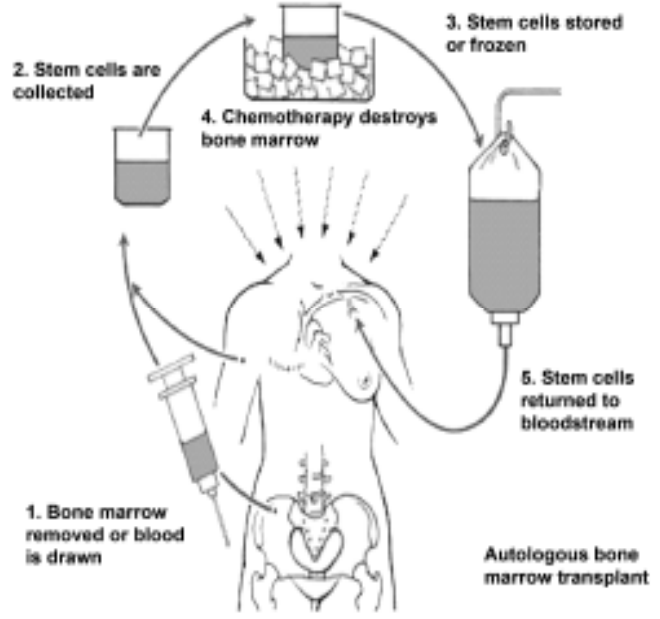
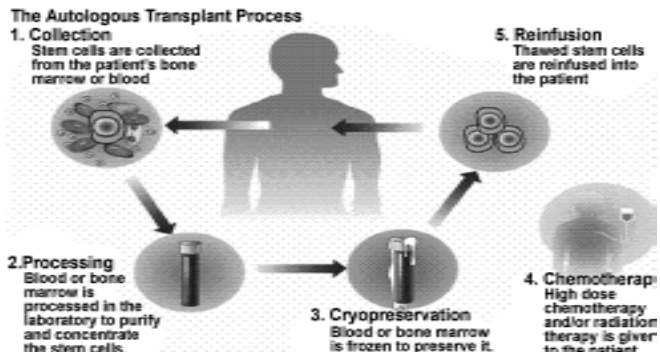
Cord blood transplants refer to transplants where the stem cells are obtained from umbilical cord blood. Historically they have not been used frequently due to limited numbers of stem cells that can be collected from each umbilical cord. Recently, however, exciting new data have been generated using multiple cord blood units from more than one donor.

☞ There are 2 main types of stem cell transplants. The blood-forming stem cells come from different sources.



AUTOLOGOUS STEM CELL TRANSPLANT

In an autologous stem cell transplant, the patient’s own stem cells are removed from his or her bone marrow or peripheral blood. They are collected on several occasions in the weeks before treatment. The cells are frozen and stored while the person gets treatment (high dose chemotherapy and/or radiation) and are then reinfused into the patient’s blood. This is the most common type of transplant used to treat lymphoma, but it generally isn’t an option if the lymphoma has spread to the bone marrow or blood. If that occurs, it may be hard to get a stem cell sample that is free of lymphoma cells. Even after purging (treating the stem cells in the lab to kill or remove lymphoma cells), it’s possible to return some lymphoma cells with the stem cell transplant.

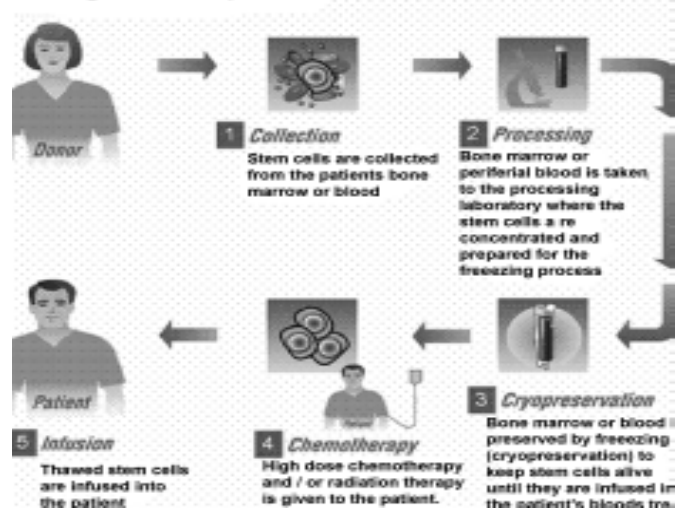


ALLOGENEIC STEM CELL TRANSPLANT

In an allogeneic stem cell transplant, the stem cells come from someone else. The donor’s tissue type (also known as the HLA type) needs to match the patient’s tissue type as closely as possible to help prevent the risk of major problems with the transplant. Usually this donor is a brother or sister if they have the same tissue type as

the patient. If there are no siblings with a good match, the cells may come from an HLA-matched, unrelated donor or a stranger who has volunteered to donate their cells.

The Allogeneic Transplant Process



The stem cells for an allogeneic SCT are usually collected from a donor’s bone marrow or peripheral (circulating) blood on several occasions. In some cases, the source of the stem cells may be blood collected from an umbilical cord (the cord that attaches a baby to the placenta) after a baby is born. This blood is rich in stem cells. Regardless of the source, the stem cells are then frozen and stored until they are needed for the transplant.

NON-MYELOABLATIVE TRANSPLANT (MINI-TRANSPLANT):

- ☞ This is a type of allogeneic transplant in which lower doses of chemo and radiation are used than in a standard SCT. These lower doses do not completely destroy the cells in the bone marrow. When the donor stem cells are given, they enter the body and establish a new immune system, which sees the lymphoma cells as foreign and attacks them (a “graft-versus-lymphoma” effect).
- ☞ Doctors have learned that if they use small doses of certain chemo drugs and low doses of total body radiation, an allogeneic transplant can still sometimes work with less serious side effects.
- ☞ This type of transplant may be an option for some patients who couldn’t tolerate a regular allogeneic transplant because it’s too toxic. In fact, a patient can receive a non-myeloablative transplant as an outpatient.
- ☞ The major side effect is graft-versus-host disease, which can be serious. Non-myeloablative transplants are not a standard treatment for patients with lymphoma, but they may help some patients.

Possible side effects

- ☞ Side effects from a stem cell transplant are generally divided into early and long-term effects.



- ☞ Low blood cell counts (with fatigue and increased risks of infection and bleeding)

- ☞ Nausea and vomiting, Loss of appetite, Diarrhea, Mouth sores, Hair loss

- ☞ One of the most common and serious short-term effects is the increased risk for infection. Antibiotics are often given to try to keep this from happening. Other side effects, like low red blood cell and platelet counts, may require blood product transfusions or other treatments.

Long-term side effects: Some complications and side effects can persist for a long time or may not occur until months or years after the transplant. These include: Graft-versus-host disease (GVHD), which occurs only in allogeneic transplants, Infertility and premature menopausal symptoms in female patients (caused by damage to the ovaries), Infertility in male patients, Damage to the thyroid gland that can cause problems with metabolism, Cataracts, Damage to the lungs, causing shortness of breath, Bone damage called aseptic necrosis (if damage is severe, the patient may need to have part of the affected bone and the joint replaced), Possible development of leukemia several years later

Graft-versus-host disease (GVHD): This is one of the most serious complications of allogeneic (donor) stem cell transplants. It occurs because the immune system of the patient is taken over by that of the donor. The donor immune system then may recognize the patient's own body tissues as foreign and may react against them.

- ☞ Symptoms can include severe skin rashes, itching, mouth sores (which can affect eating), nausea, and severe diarrhea. Liver damage may cause yellowing of the skin and eyes (jaundice). The lungs may also be damaged. The patient may also become easily fatigued and develop muscle aches.

- ☞ GVHD is often described as either acute or chronic, based on how soon after the transplant it begins. Sometimes GVHD can become disabling, and if it's severe enough, it can be life-threatening. Usually, immune-suppressing drugs can be used to help control GVHD, although they may have their own side effects.

THE TRANSPLANT PROCESS

There are several steps in the transplant process.

Patient evaluation and preparation

You will first be evaluated to find out if you are eligible for a transplant. A transplant is very hard on your body. For many people, transplants can mean a cure, but complications can lead to death in some cases. You will want to weigh the pros and cons before you start.

Many different medical tests may be done, these might include:

- ☞ HLA tissue typing, A complete health history and physical exam, Evaluation of your psychological and emotional strengths, Identifying who will be your primary

- caregiver throughout the transplant process, Bone marrow biopsy, CT scan or MRI, Heart tests, such as an EKG (electrocardiogram) or echocardiogram, Lung studies, such as a chest x-ray and PFTs (pulmonary function tests), Consults with other members of the transplant team, such as a dentist, dietitian, or social worker, Blood tests, such as a complete blood count, blood chemistries, and screening for viruses like hepatitis B, CMV, and HIV

Eligibility

- ☞ Younger people, those who are in the early stages of disease, or those who have not already had a lot of treatment, often do better with transplants.

- ☞ Some transplant centers set age limits. For instance, they may not allow regular allogeneic transplants for people over 50 or autologous transplants for people over 60 or 65.

- ☞ Some people also may not be eligible for transplant if they have other major health problems, such as serious heart, lung, liver, or kidney disease.

PROCESS: The first step in the process of stem cell transplantation is the collection of stem cells from a patient or a donor. When a patient's own stem cells are used, they are frozen and stored until needed. Stem cells can be collected from a donor when they are needed. The patient then receives high-dose chemotherapy and the stem cells are infused into the patient's bloodstream. The stem cells travel to the bone marrow and begin to produce new blood cells, replacing the normal cells lost during high dose chemotherapy.

Conditioning treatment

- ☞ Conditioning, also known as bone marrow preparation or myeloablation, is treatment with high-dose chemo and/or radiation therapy. It's done for one or more of these reasons:

- ☞ To make room in the bone marrow for the transplanted stem cells

- ☞ To suppress the patient's immune system to lessen the chance of graft rejection

- ☞ To destroy all of the cancer cells anywhere in the patient's body

- ☞ No one conditioning treatment is used for every transplant. Your treatment will be planned just for you based on the type of cancer you have, the type of transplant, and any chemo or radiation therapy you have had in the past.

- ☞ If chemo is part of your treatment plan, it will be given in an intravenous (IV) line or as pills. If radiation therapy is planned, it's given to the entire body (called total body irradiation or TBI). TBI may be given in a single treatment session or in divided doses over a few days.

Infusion of stem cells: After the conditioning treatment, you are given a couple of days to rest before getting the stem cells. They will be given through your IV catheter,

Graduation Day

much like a blood transfusion. If the stem cells were frozen, you may get some medicines before the stem cells are given. This is done to reduce your risk of reacting to the preservatives that are used when freezing the cells. If the stem cells were frozen, they are thawed in warm water then given right away. For allogeneic or syngeneic transplants, the donor cells may be harvested in an operating room, and then processed in the lab. Once they are ready, the cells are brought in and infused. The length of time it takes to get all the stem cells depends on how much fluid the stem cells are in.

☞ Infusion side effects are rare and usually mild. The preserving agent used when freezing the cells (called dimethylsulfoxide or DMSO) causes many of the side effects. You might have a strong taste of garlic or creamed corn in your mouth. Sucking on candy or sipping flavored drinks during and after the infusion can help with the taste.

☞ Your body will also smell like this. The smell may bother those around you, but you might not even notice it. The smell, along with the taste, may last for a few days, but slowly fades away. Often having cut oranges in the room will offset the odor. Patients who have transplants from cells that were not frozen do not have this problem because the cells are not mixed with the preserving agent.

Other short-term side effects of the stem cell infusion might include: ☞ Fever or chills, Shortness of breath, Hives, Tightness in the chest, Low blood pressure

☞ Coughing, Chest pain, Less urine output and Feeling weak

References

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3. LaRoche V, Eastlund DT, McCullough J. Review: immunohematologic aspects of allogeneic hematopoietic progenitor cell transplantation. *Immunohematology.* 2004, pp 217–225.

On 24.06.2013, programme began with inviting the Fresh M.Sc(N) graduates (2010 - 2012) followed by the yr B.Sc(N) graduates (2008 - 2012) to the auditorium. The function started with prayer song. Prof. Rajeswari. H, M.Sc. (N), Vice Principal of SNNC delivered the welcome address. The chief guest of the program was Mrs. Shamshad Begum, M.Sc. (N), Principal of Govt. College of Nursing, Hyderabad. Dr. Subbarao,



Administrative office, NMCH, Dr. Narasimha Reddy, Medical Superintendent, NMCH, Dr. Rammohan, Assist Medical Superintendent NMCH were participate.

All the Graduates received Graduation certificate from Chief guest, Principals of Sree Narayana Nursing College. The dignitaries on the dias blessed and delivered speech to the new graduates Dr. Indira. S, Ph.D. said about 5'S' (service, smile, selfishness, silent, simplicity) & 5 L's (Leadership, love for care, listening carefully, like social services, learn for life).

The Chief guest Mrs. Shamshad Begum, Principal, Govt. College of Nursing, Hyderabad has congratulated the graduates and their parents. She about confident, it wont come within one day it need practice . The parents of the graduate students shared their experience about Narayana Nursing Institution. The vote of thanks was given by Prof. Uma maheswari, M.Sc (N), H.O.D of OBG, The program come to an end with National Anthem.

