

Cord Blood and Tissue Stem Cell Storage Education Part 2



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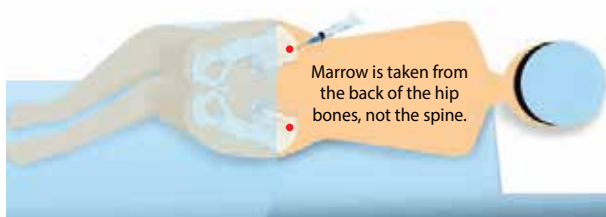
Haematopoietic/Blood Stem Cells

Blood stem cells, known as hematopoietic stem cells, reside primarily in marrow, the spongy interior of bones. These “starter” cells resupply three types of blood cells: erythrocytes, commonly known as red blood cells; platelets, also called the blood-clotting cells; and leukocytes, the white blood cells of the immune system. When the body needs to replace red blood cells, platelets for blood clotting, or immune cells, stem cells located in the bone marrow mature in a process called haematopoiesis. Haematopoiesis goes on constantly in the human body, but certain conditions call for increased activity. For example, when a person moves to a high altitude or attempts to recover from serious bleeding, increased numbers of stem cells must move from the bone marrow into the bloodstream.

Sources of haematopoietic/blood stem cells

Bone marrow

- Bone marrow is the spongy tissue in the centre of some bones. Its main job is to make blood cells that circulate in your body, which includes immune cells that recognize invaders and fight infection.
- Bone marrow has a rich supply of stem cells. The bones of the pelvis (hip) contain the most marrow and have large numbers of stem cells in them. For this reason, cells from the pelvic
- bone are used most often for a bone marrow transplant.
- When the bone marrow is removed (harvested), the donor gets general anaesthesia (drugs are used to put the patient into a deep sleep so they don't feel pain).
- A large needle is put through the skin and into the back of the hip bone. The thick liquid marrow is pulled out



through the needle. This is repeated several times until enough marrow has been taken out or harvested.

Peripheral blood

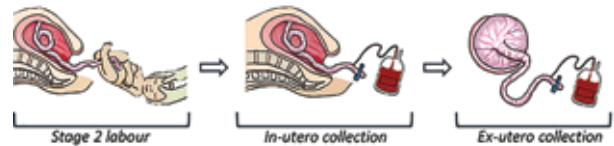
- Normally, few stem cells are found in the blood. But giving hormone-like substances called growth factors to stem cell donors a few days before the harvest causes their stem cells to grow faster and move from the bone marrow into the blood.
- For a peripheral blood stem cell transplant, the stem cells are taken from blood. A special thin flexible tube (called a catheter) is put into a large vein in the donor and attached to tubing that carries the blood to a special machine.
- The machine separates the stem cells from the rest of the blood, which is given back to the donor during the same procedure.
- This takes several hours, and may need to be repeated for a few days to get enough stem cells. In general, at any given moment, there is one blood stem cell circulating in a person's bloodstream for every 100 present in bone marrow.



- Although it is not precisely understood how the body signals for more blood stem cells to move out of the marrow, scientists are studying some factors that seem to increase the rate of release.

Umbilical cord blood

- A large number of stem cells are normally found in the blood of new-born babies. After birth, the blood that is left behind in the placenta and umbilical cord (known as cord blood) can be taken and stored for later use in a stem cell transplant. The cord blood is frozen until needed. A



cord blood transplant uses blood that normally is thrown out after a baby is born.

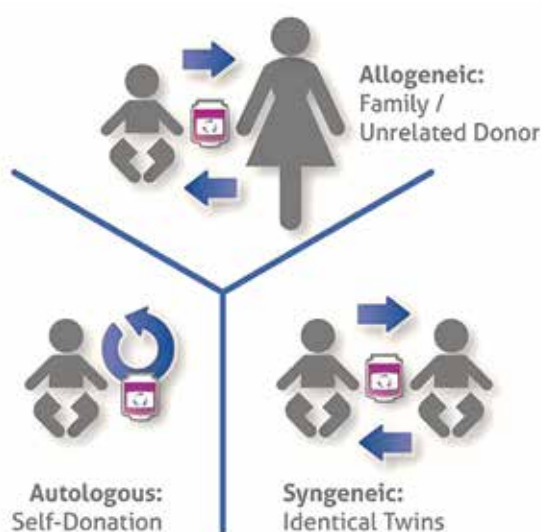
- Collecting the cord blood is quick and easy and poses no risk to the mother or baby.

Why would someone need a haematopoietic stem cell transplant?

- Stem cell transplants are used to replace bone marrow that isn't working or has been destroyed by disease, chemo, or radiation. In some diseases, like leukaemia, aplastic anaemia, certain inherited blood diseases, and some diseases of the immune system, the stem cells in the bone marrow don't work the way they should.
- Damaged or diseased stem cells can make too few blood cells, too few immune cells, or too many abnormal cells. Any of these problems can cause the body to not have enough normal red blood cells, white blood cells, or platelets. A stem cell transplant may help correct these problems.
- In some cancers, such as certain leukaemias, multiple myeloma, and some lymphomas, a stem cell transplant can be an important part of treatment. It works like this: high doses of chemo, which is sometimes given with radiation, work better than standard doses to kill cancer cells. But high doses can also cause the bone marrow to completely stop making blood cells, which we need to live.
- This is where stem cell transplants come in. The transplanted cells replace the body's source of blood cells after the bone marrow and its stem cells have been destroyed by the treatment. This transplant lets doctors use much higher doses of chemo to try to kill all of the cancer cells.



Types of stem cell transplants for treating haematological malignancies and disorders



In a typical stem cell transplant for cancer very high doses of chemo are used, often along with radiation therapy, to try to destroy all the cancer cells. This treatment also kills the stem cells in the bone marrow. Soon after treatment, stem cells are given to replace those that were destroyed.

These stem cells are given into a vein, much like a blood transfusion. Over time they settle in the bone marrow and begin to grow and make healthy blood cells. This process is called engraftment.

There are 3 basic types of transplants. They are named based on who gives the stem cells:

Allogeneic - the cells are donated from a matched related or unrelated donor

Autologous - the cells come from you

Syngeneic - the cells are donated from your identical twin or triplet

Reference

American Cancer Society. Stem cell transplant.

<http://www.cancer.org/treatment/treatmentsandsideeffects/treatmenttypes/bonemarrowandperipheralbloodstemcelltransplant/bone-marrow-and-peripheral-blood-stem-cell-transplant-to-c>