

Transplanting Peripheral Blood Stem Cells

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Peripheral blood stem cell [1] transplantation is a procedure that begins with the donor's peripheral blood being drawn for particular cells known as stem cells. These cells are collected using a filtration method, then preserved (usually by freezing), and then given to the recipient following intensive care. In most cases, stem cells are used instead of bone marrow cells. After the intensive care, they go to the recipient's bone marrow spaces and restore the bone marrow. Despite the fact that the procedure does not require surgery, it is still a form of transplantation. Tiny, circular cells with a squat nucleus and little cytoplasm surround stem cells. Despite their unremarkable nature, stem cells have the ability to perform "acts of biological resurrection." Unlike other types of cells in the body, which have a finite lifespan and die after dividing a certain number of times, stem cells can replicate indefinitely. The stem cell is indestructible (in cellular terms).

Red blood cells, platelets, granulocytes, and lymphocytes are among the many types of cells that make up the blood and immune system, and the blood stem cell will give rise to them all. Because of their ability to regenerate and heal damaged tissue, stem cells are a fascinating field of medicine. Stem cells and their potential for tissue regeneration are also used in some current treatments, such as bone marrow transplantation [2]. Other treatments being researched include implanting stem cells into a damaged body part and instructing them to expand and differentiate into healthy tissue. A stem cell may choose to differentiate rather than live forever. It can then transform into a regular blood cell, such as a red blood cell (erythrocyte), a white blood cell (leukocyte), or a large cell (megakaryocytic), which then fragments into the platelets needed for blood clotting. Stem cells are rarely seen in the bloodstream under normal circumstances. To get enough stem cells into the bloodstream, a special drug regimen is used to entice them out of the bone marrow and into the peripheral bloodstream (the blood stream).

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The stem cells [3] are skimmed off after the blood is pumped through a pump. The process of removing cells is known as pheresis or apheresis (from the Greek "aphaeresis" for removal). The stem cells can then be used for transplant right away or stored suspended in DMSO and frozen in liquid nitrogen until required.

The patient requires high-dose chemotherapy and/or radiation therapy for several days prior to the transplant to kill diseased cells (the leukemic cells, lymphoma cells, solid tumor cells, the diseased immune system cells in scleroderma, etc.) The stem cells are defrosted and given to the patient as a blood transfusion once the chemotherapy is over. They've already been biologically primed to move to the bone marrow, where they'll be able to create new blood and immune cells [4] and replace those that have been killed by the procedure. The stem-cell preparation is injected into a vein, and the stem cells behave like homing pigeons, heading straight for the bone marrow space once in the bloodstream.

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