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Commentary

A Brief Note on Leukemic Stem Cells

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DESCRIPTION

In 1997 Leukemic Stem Cells (LSCs) or Cancer Stem Cells (CSCs) were found in Acute Myeloid Leukemia (AML), wide studies have been contributed to characterization and identification of such cell populations in various tissues. LSCs are now commonly recognized as a heterogeneous cell population that have the capacities of self-renewal, proliferation and differentiation. It has been shown that LSCs are controlled by critical surface antigens, microenvironment, intrinsic signaling pathways, and novel molecules like some ncRNAs. To date, significant development has been made in understanding of LSCs, leading to the development of numerous LSCs-targeted therapies. Furthermore, various novel therapeutic agents targeting LSCs are undergoing clinical trials.

Leukemias are now viewed as abnormal hematopoietic processes started by infrequent LSCs, which arise from the transformation of Hematopoietic Stem Cells (HSCs) or committed progenitor cells. During the course of malignant revolution, LSCs has the capacity of self-renewal, proliferation and differentiation through incessant genetic and epigenetic alteration and clonal modification. Thus, understanding how genetic and epigenetic heterogeneities grow in different leukemias has become and significant area for cancer research. Although CSCs have been found in both leukemia and solid tumors, not all of CSCs in the solid tumors follow the heterogeneity model of LSC.

The two main types of stem cell transplants are:

Autologous stem cell transplant: In this process, stem cells are collected from the patient's blood, harvested, frozen and stored until required, then filled back into the patient after he/she has received high dose chemotherapy and/or radiation therapy to abolish the cancer cells.

Allogeneic stem cell transplant: Stem cells are taken from a matching donor in this type of transplant. Patient undergoes a Human Leukocyte Antigens (HLA) test to determine if a donor's stem cells are the right match or not. In an HLA test, we compare the patient's tissue type blood with blood samples from the donor.

Before a stem cell transplant for leukemia, you will undergo a conditioning routine, which includes intensive treatment to kill as many leukemia cells as possible. You may receive high doses of chemotherapy and, in some situations, radiation therapy. You may also receive reduced-intensity conditioning (sometimes referred to as a mini-allogeneic transplant), which uses lower and less toxic doses of chemotherapy or total body radioactivity before the transplant.

Once this preparative schedule is complete, you are ready to undergo the transplant. Much like a blood transfusion, you'll get the stem cells intravenously. The process takes time about an hour. After inflowing the bloodstream, the stem cells travel to the bone marrow and start to make new blood cells in a method known as engraftment.

In the months following the transplant, your care team will screen your blood counts. You may require transfusions of red blood cells and platelets. Sometimes, the rigorous treatments you receive before the stem cell transplantation for leukemia can leads to side effects, such as infection. In this case, your doctor may manage IV antibiotics.

A benefit of an allogeneic transplant is that the stem cells come from a healthy donor with no malignant cells. However, since it can be problematic to find a matching donor, an autologous transplant is usually more usual. Also, if you had an allogeneic stem cell transplant, your doctor may suggest certain drugs to reduce the risk of Graft-Versus-Host-Disease (GVHD), a condition where the donated cells attack the patient's tissues.

CONCULSION

Recovery from a leukemia stem cell transplant may take some months. Your hematologic oncology team will work together with the rest of your care team to support you throughout the process. A stem cell transplant can be used to restore healthy bone marrow in patients with leukemia. Stem cells helps to stimulate new bone marrow growth and restore the immune system.

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