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Journal Of Leukemia

Editorial

Brief Note on Human Hematopoietic Stem Cell

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EDITORIAL NOTE

An immature cell can develop into various blood cells, such as red blood cells, white blood cells, and platelets. Hematopoietic stem cells are found in the bone marrow and the peripheral blood.

Hematopoietic stem cells are produced by a small population of cells that can self-renew. During the differentiation stage, the progeny of these cells develop into various lineage-committed progenitor cells.

Under normal conditions, only a small number of hematopoietic stem and progenitor cells can be found in the blood. Treating with drugs or introducing new chemicals can rapidly mobilize large numbers of hematopoietic and progenitor cells into the circulation.

Autologous or allogeneic transplantation of sick or injured B cells from unrelated donors is a promising treatment for various diseases of the blood and the immune system. It has been shown that these cells can also be used to treat specific disorders.

Human hematopoietic cells (HSPCs) are being studied to identify and isolate primitive cell types that can provide rapid and sustained hematological recovery following cytoreductive therapy or transplantation. This review focuses on the various steps involved in the identification and isolation of HSPCs.

Hematopoiesis is the process of producing all the mature blood cells in the body. It is essential to maintain the proper number of blood cell types in circulation.

Hematopoietic stem cells can give rise to various types of blood cells, such as monocytes and erythrocytes. The two lines, lymphoid and myeloid, are responsible for the formation of the dendritic cell. Lymphoid cells include natural killer cells and T cells.

Hematopoietic stem cells are used for the treatment of various cancers and other immune system diseases. Hematopoietic stem cells are mainly found in the bone marrow of adult humans. They can also be found in umbilical cord blood and peripheral blood.

Adult stem and progenitor cells can be obtained from the pelvis, at the iliac crest, using a needle and syringe. They can be removed as a liquid or through a core biopsy.

Since hematopoietic stem cells can't be isolated as a pure cell population, they can only be isolated using flow cytometry. Flow cytometry can isolate them by detecting different cell surface markers. Hematopoietic stem cells that lack the usual markers of blood cell proliferation are referred to as Lin-cells (bone marrow derived lineage-negative cells that are negatively selected by several antibodies for lymphocytes, macrophages, granulocytes and erythrocytes).

Hematopoietic stem cells are essential to hematopoiesis, the formation of the cells within the blood. Hematopoietic stem cells can replenish all blood cell types (i.e., are multipotent) and self-renew. A small number of Hematopoietic stem cells can expand to generate a very large number of daughter Hematopoietic stem cells. This phenomenon is used in bone marrow transplantation when a small number of Hematopoietic stem cells reconstitute the hematopoietic system. This process indicates that, after bone marrow transplantation, symmetrical cell divisions into two daughter Hematopoietic stem cells must occur. Stem cell self-renewal is thought to occur in the stem cell niche in the bone marrow, and it is reasonable to assume that key signals present in this niche will be important in self-renewal. There is much interest in the environmental and molecular requirements for HSC self-renewal, as understanding the ability of HSC to replenish themselves will eventually allow the generation of expanded populations of HSC in vitro that can be used therapeutically. One key question to be addressed is the extent to which HSPCs have a self-renewal capacity. Many studies have demonstrated that self-renewing HPSCs can proliferate indefinitely. However, it has been shown that HPCs can undergo differentiation, resulting in a clonal loss. For example, adult HLCs have been isolated from the marrow of 6-month old mice, with both the progenitor cells and the differentiated cells being identified. It is not clear whether adult or fetal HL cells have the same self-cell renewal potential.

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Received: August 24, 2021; **Accepted:** September 07, 2021; **Published:** September 14, 2021

Citation: Agarwal S (2021) Brief Note on Human Hematopoietic Stem Cell. J Leuk. 9(8):e131.