Immunome Research
ISSN: 1745-7580
OPEN ACCESS Freely available online
Commentary

Haematopoiesis: Types and its Importance

Erul Miao*

Department of Immunology, Hawler Medical Institute, Erbil, Iraq

DESCRIPTION

A Hematopoietic Stem Cells (HSC) induced to differentiate (undergo haematopoiesis) loses its ability to self-renew and makes one of two broad lineage commitment choices. It can become a Common Myeloid-erythroid Progenitor (CMP), which gives rise to all erythrocytes (erythroid lineage), granulocytes, monocytes, and macrophages (myeloid lineage), or it can become a Common Lymphoid Progenitor (CLP), which gives rise to B lymphocytes, T-lymphocyte and NK-cell. Myeloid and NK cells are members of the innate immune system and are the first cells to respond to infection or other insults. Lymphocytes are members of the adaptive immune response and generate a sophisticated antigen-specific immune response that also contributes to immune memory.

As HSCs progress down their chosen lineage, they lose their ability to contribute to other cell lineages. Interestingly, both myeloid and lymphoid lineages give rise to dendritic cells, antigen-presenting cells with distinct features and functions that play an important role in the initiation of adaptive immune responses.

Regulation of lineage commitment during hematopoiesis

Each step of a hematopoietic stem cell to commit to a particular cell lineage is accompanied by genetic changes. Several genes have been identified that determine lineage commitment. Many of them are transcriptional regulators. For example, the transcription factor GATA-2 is required for the development of all hematopoietic lineages; with its deficiency, animals die in the process of embryogenesis. Another transcriptional regulator, Bmi-1, is required for the self-renewal capacity of HSCs, and in its absence animals die within 2 months of birth due to the inability to repopulate their red and white blood cells. Ikaros and Notch are a family of transcriptional regulators that have a more specific effect on haematopoiesis. Ikaros is required for lymphoid but not myeloid development; animals survive in its absence, but cannot mount a full immune response (i.e., they are severely Immunocompromised). Notch 1, one of four members of the Notch family, regulates the choice between T- and B-lymphocyte lineages. More major regulators of lineage commitment during haematopoiesis continue to be identified.

The rate of haematopoiesis and the production and release of specific cell lineages also respond to environmental changes experienced by the body. For example, infection can lead to the release of cytokines that markedly enhance the development of myeloid cells, including neutrophils. Researchers have also recently shown that the release of mature cells from the bone marrow responds to daily cycles and is regulated by the sympathetic nervous system.

Distinguishing blood cells

Early researchers initially classified cells based on their appearance under the microscope, often using dyes. Their observations were particularly useful in distinguishing myeloid from lymphoid lineages, granulocytes from macrophages, neutrophils from basophils, and eosinophils. Haematoxylin and Eosin (H&E) staining is still commonly used in combination to distinguish between cell types in blood smears and tissues. They highlight intracellular differences due to their sensitivity to pH and different affinities for charged macromolecules in the cell. Thus, the basic dye haematoxylin binds basophilic nucleic acids, staining them blue, and the acidic dye eosin binds eosinophilic proteins in granules and cytoplasm, staining them pink. Microscopists have made insightful conclusions about the functioning of cells by studying in detail the structure of stained cells, as well as the behaviour of living cells in solution. The advent of the flow cytometer in the 1980s revolutionized our understanding of cell subtypes, allowing us to assess multiple surface and internal proteins expressed by individual cells simultaneously. The development of increasingly sophisticated fluorescence microscopy approaches to observe living cells *in vitro* and *in vivo* has allowed researchers to penetrate the complexities of the immune response in time and space. These advances, combined with the ability to genetically manipulate cellular function, have also revealed a remarkable diversity of cell types among myeloid and lymphoid cells and continue to reveal new functions and unexpected relationships between hematopoietic cells. Thus, while our understanding of cell subtypes is impressive, it is far from complete.

Correspondence to: Dr. Erul Miao, Department of Immunology, Hawler Medical Institute, Erbil, Iraq, E-mail: erumiao12@hotmail.com

Received: 29-Nov-2022, Manuscript No. IMR-22-20974; **Editor assigned:** 02-Dec-2022, Pre Qc No. IMR-22-20974 (PQ); **Reviewed:** 16-Dec-2022, QC No. IMR-22-20974; **Revised:** 21-Dec-2022, Manuscript No. IMR-22-20974 (R); **Published:** 30-Dec-2022, DOI: 10.35248/1745-7580.22.18.212

Citation: Miao E (2022) Haematopoiesis: Types and its Importance. Immunome Res 18: 212.

Types

Erythropoiesis: Red blood cells, or erythrocytes, carry oxygen from your lungs to organs throughout your body. They also carry carbon dioxide to your lungs so you can get rid of it by exhaling it. Your blood has more red blood cells than any other type of blood cell. The production of red blood cells is called erythropoiesis.

Leucopoiesis: White blood cells, or leukocytes, fight infection and protect your body from harmful invaders, or germs. They also destroy abnormal cells. The production of white blood cells is called leucopoiesis.

Thrombopoiesis: Platelets, or thrombocytes, are sticky cell fragments that clump together to form a clot if you're injured. They create a seal in damaged tissue that prevents you from losing too much blood. The production of platelets is called thrombopoiesis.