

Haematopoiesis (paediatrics)

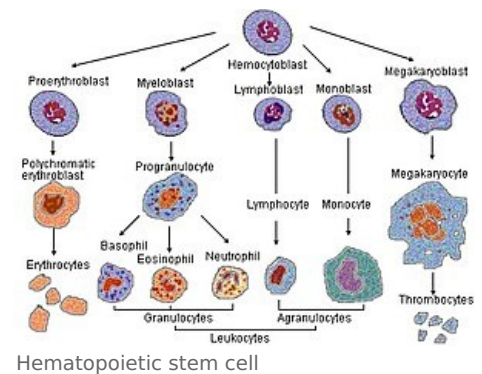
Cells within the hematopoietic islets in the bone marrow contain red blood cells, granulocytes (neutrophils, eosinophils, basophils), monocytes and macrophages, lymphocytes, platelets, and their precursors. The first morphologically identifiable **precursors** are the proerythroblast (giving rise to the erythroblast), myeloblast, monoblast, lymphoblast and megakaryoblast (precursor of the megakaryocyte).

The life span of blood cells is as follows:

- erythrocytes 100 to 120 days (60 days in newborn),
- platelets 7 to 10 days,
- granulocytes 12 hours,
- lymphocytes have a long lifespan.

The shorter lifespan of erythrocytes in the neonatal period is one of the factors involved in neonatal hyperbilirubinemia.

At the beginning of hematopoietic cell differentiation is the **pluripotent stem cell**, which differentiates into **lymphoid**, **erythroid** and **myeloid precursor cells**. The lymphoid precursor cell differentiates into pre-T-lymphocytes (→ T-lymphocytes) and pre-B-lymphocytes (→ B-lymphocytes → plasmocytes). Erythroid precursor cells differentiate into erythroblasts (→ reticulocyte → erythrocyte). The myeloid precursor cell differentiates into megakaryoblast (→ megakaryocyte → thrombocyte), myeloblast (→ promyelocyte → myelocyte → metamyelocyte → rod → segment), monoblast (→ monocyte → macrophage), eosinophiloblast (→ eosinophil), mast cells (mast cells), and basophilic granulocytes.



Pluripotent stem cell

- *Lymphoid stem cell (lymphoblast):*
 - for T → T-lymphocyte;
 - for B → B-lymphocyte → plasmocyte.
- *Erythroid precursor cell (proerythroblast)* → erythroblast → reticulocyte → erythrocyte.
- *Myeloid precursor cell:*
 - megakaryoblast → megakaryocyte → thrombocyte;
 - myeloblast → promyelocyte → myelocyte → metamyelocyte → rod → segment;
 - monoblast → monocyte - macrophage;
 - eosinophiloblast → eosinophil;
 - basophilic granulocyte;
 - mast cell.

Hematopoietic cells differentiate from progenitor cells under the influence of **hematopoietic growth factors** (HGFs). HGFs also influence extramedullary hematopoiesis, including T-lymphocytes, macrophages, endothelial cells, and fibroblasts. HGFs include *erythropoietin*, *thrombopoietin*, *G-CSF* (granulocyte colony-stimulating factor), *GM-CSF* (granulocyte-monocyte colony-stimulating factor). Erythropoietin, G-CSF, and GM-CSF are used therapeutically. More recently, a new erythroid-stimulating protein (darbepoetin α) and a chemical modification of G-CSF (pegfilgrastim) have been synthesized. These latter preparations are still under investigation and in clinical trials.

There are also growth factors for stem cells themselves, SCF (stem cell factor = c-kit-ligand) and FL (flt 3-ligand).

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Source

- HAVRÁNEK, Jiří: *Hematology - general introduction*. (edited)

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