

Hematopoiesis

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Aim of the lecture

- Knowledge the organization of hematopoiesis.

Question of the lecture:

- What are the major type of factors contribute in the organization of hematopoiesis?

- Interplay between the intrinsic genetic processes of blood cells and their environment.
- This interplay determines whether HSCs, progenitors, and mature blood cells remain quiescent, proliferate, differentiate, self-renew, or undergo apoptosis.

Regulation of Hematopoiesis

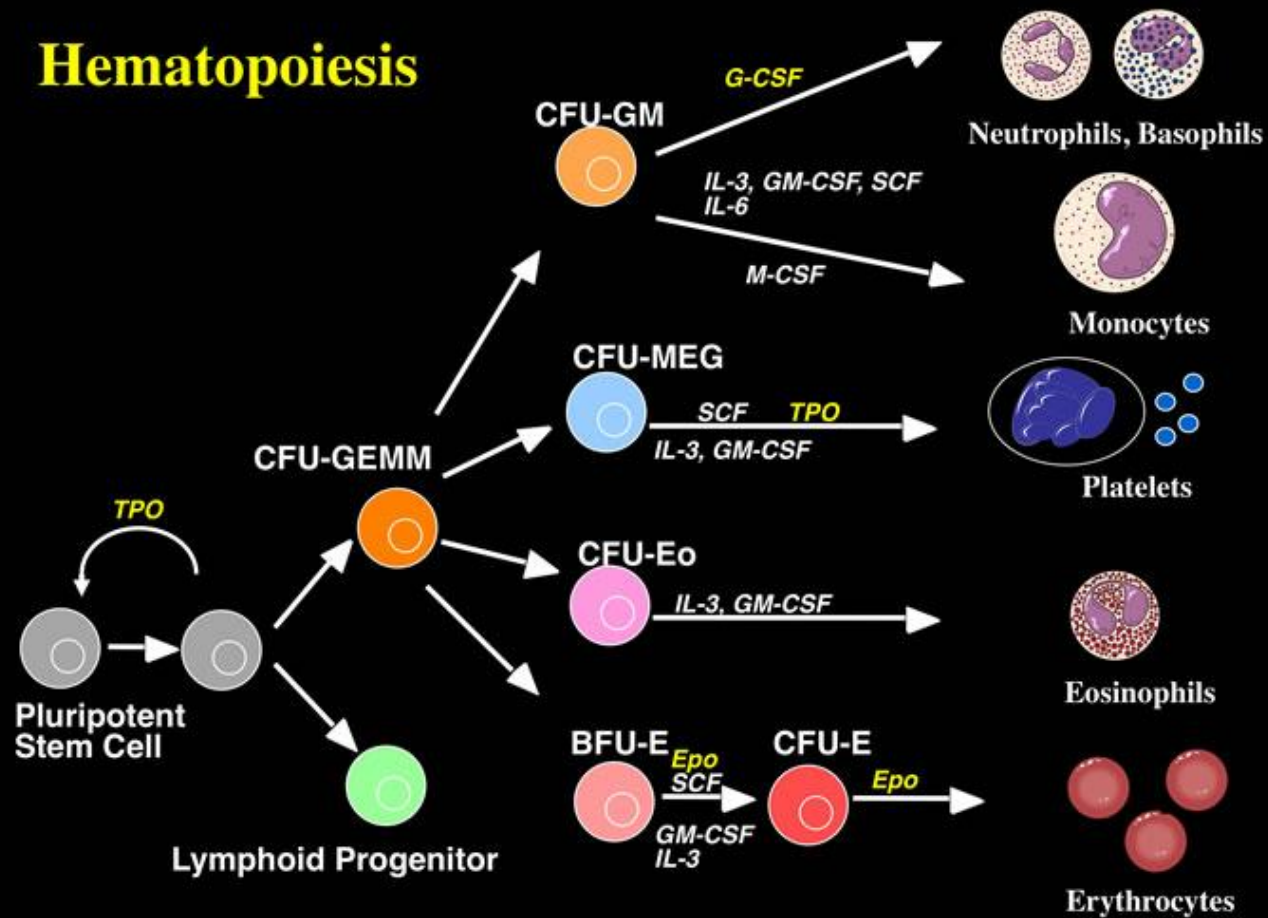
Cytokines

1. Cytokines are a broad family of proteins that mediate positive and negative effects on cellular quiescence, apoptosis, proliferation, and differentiation.
2. Cytokines function by engaging a specific receptor and activating a variety of signaling pathways.
 - Cytokines modulate cell growth mediators.
 - Cytokines may also facilitate the interactions between stem cells and elements in the microenvironment including extracellular matrix (ECM) components.
3. Hematopoietic regulatory cytokines are produced through both autocrine and paracrine mechanisms and in many cases are produced by nonhematopoietic cells including bone marrow stroma and endothelium.

Cytokine signaling:
Inactive Janus kinases
(JAK) associate with
cytokine receptor

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Hematopoiesis



Chemokine

1. These molecules regulate blood cell trafficking and homing to sites of need and may also be negative and positive growth regulators.
2. Chemokines can inhibit progenitor growth.
3. Regulate migration of hematopoietic progenitors.
4. Mediate T-cell development in the thymus.

Genetic Factors

1. The Rb family, the E2Fs, cyclins, SCL, Hox, and other gene families appear to regulate proliferation and self renewal of early hematopoietic cells.
2. The bcl family and others regulate apoptosis in hematopoietic cells.
3. The developmental fate of cells is predetermined by intrinsic genetic processes as occurs in embryogenesis.