

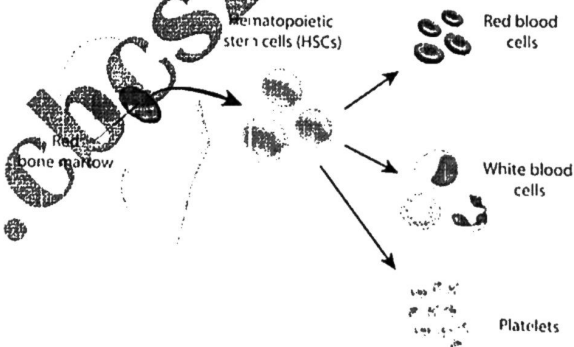
Hematopoiesis

Hematopoiesis is the process by which immature precursor cells develop into mature blood cells. The currently accepted theory on how this process works is called the monophyletic theory which simply means that a single type of stem cell gives rise to all the mature blood cells in the body. This stem cell is called the pluripotential (pluripotent) stem cell.

Age of Human	Site of hematopoiesis
Embryo	yolk sac and liver
3rd to 7th month	spleen
4th and 5th months	marrow cavity - esp. granulocytes and platelets
7th month	marrow cavity - erythrocytes
Birth	mostly bone marrow; spleen and liver when needed
Birth to maturity	number of active sites in bone marrow decreases but retain ability for hematopoiesis
Adult	bone marrow of skull, ribs, sternum, vertebral column, pelvis, proximal ends of femurs

Bone marrow has a vascular compartment and an extra vascular compartment. The vascular compartment is supplied by a nutrient artery which branches into central longitudinal arteries which send out radial branches that eventually open into sinuses.

These sinuses converge into a central vein that carries the blood out of the bone marrow into the general circulation. Hematopoiesis takes place in the extravascular compartment. The extravascular compartment consists of a stroma of reticular connective tissue and a parenchyma of developing blood cells, plasma cell, macrophages and fat cells.



The high activity of the bone marrow is demonstrated by its daily output of mature blood cells: 2.5 billion erythrocytes, 2.5 billion platelets, 50-100 billion granulocytes. The numbers of lymphocytes and monocytes is also very high.

Bone marrow is the site for other important activities in addition to hematopoiesis. These include the removal of aged and defective erythrocytes and the differentiation of B lymphocytes. It is also the site of numerous plasma cells.

Process of Hematopoiesis:

The monophyletic theory of hematopoiesis states that pluripotent stem cells multiply to produce more pluripotent stem cells, thus ensuring the steady and lasting supply of stem cells. Some of the pluripotent stem cells differentiate into precursor cells that are at least partially committed to become one type of mature blood cell.