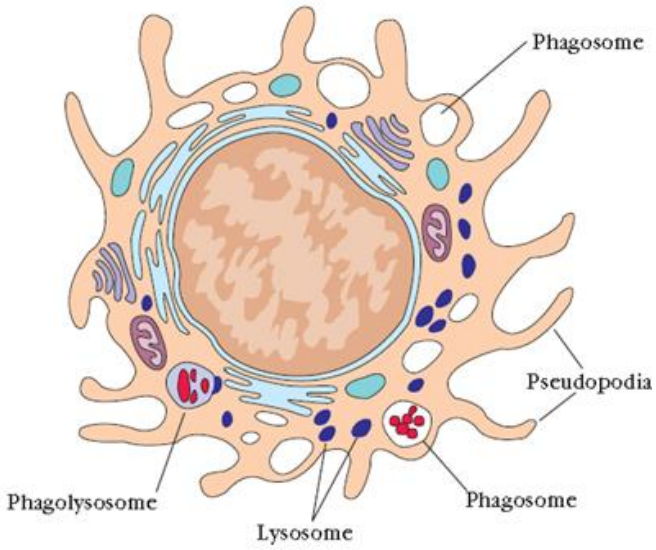
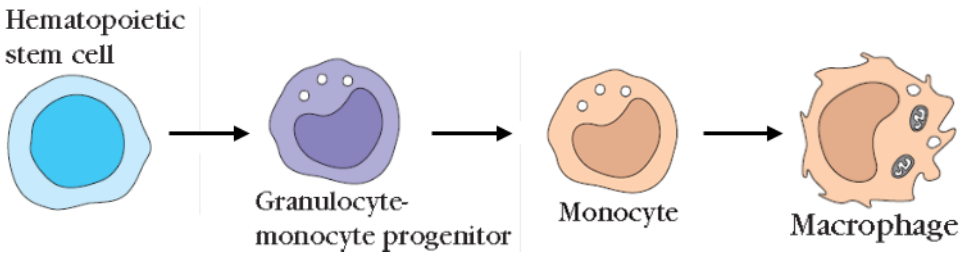
MACROPHAGES

Macrophages form a widely dispersed cellular system throughout the body, interacting with host cells and foreign invaders through their versatile surface markers and secretory responses, to maintain physiologic homeostasis. They are specialized migratory or immobile phagocytes, present within the circulation and extravascular tissue compartment.

GROWTH AND DIFFERENTIATION TO MACROPHAGE: During haematopoiesis in the bone marrow, granulocyte-monocyte progenitor cells differentiate into pro-monocytes, which leave the bone marrow and enter the blood, where they further differentiate into mature monocytes. Monocytes circulate in the bloodstream for about 8 h, during which they enlarge; they then migrate into the tissues and differentiate into specific tissue macrophages. During that phase the cell volume and cytoplasmic granules increase in number.



M-CSF (macrophage colony-stimulating factor), GM-CSF (granulocyte-macrophage- cell stimulating factors) are the major growth factor promotes survival as well as differentiation of macrophage from monocyte.



FEATURES: The cell shape varies, depending on the tissue type in which the macrophage resides (e.g., lung, liver, spleen, brain).

A characteristic feature of macrophages is their prominent electron-dense membrane-bound lysosomes, which can be seen fusing with phagosomes to form secondary lysosomes.

SURFACE RECEPTORS ON MONOCYTE/MACROPHAGE: Fc Receptors, Complement Receptors, Toll-Like Receptors, Human Leukocyte Antigen (HLA) Class II Receptors, Chemokine Receptors, CD11 (surface adhesion receptor), CD14, CD16, and CD68.

FUNCTIONS:

- Monocytes and macrophages are mostly motile, migratory, amoeboid cells, but also capable of sessile, "fixed" life in tissues.
- Resident macrophages of the liver and marrow, as well as in lung and other tissues, play a major role in the recognition, phagocytosis, and endocytosis of foreign particles and modified host components. They serves as antigen presenting cells (APCs) where they process and then present antigenic peptides to the cell surface by MHC-II molecules.
- Macrophages promote complement activation and formation of membrane attack complex (MAC).
- They inform the rest of the immune system to get ready to fight infection.
- Macrophage connects innate immune system with adaptive immune system.