Abstract: Macrophages are a diverse phenotype of professional phagocytic cells derived from bone-marrow precursors and parent monocytes in the peripheral blood.The term macrophage is formed by the combination of the Greek terms "Makro" meaning big and "phagein" meaning eat. Review of Literature Macrophage Typing According to the activation state and functions of macrophages, they can be divided into M1-type (classically activated macrophage) and M2-type (alternatively activated macrophage). The role of M1 macrophages is to secrete pro-inflammatory cytokines and chemokines, present antigens, and thus participate in the positive immune response and function as an immune monitor. The main pro-inflammatory cytokines it produces are IL-6, IL-12 and TNF-alpha. M2 macrophages mainly secrete Arginase-I, IL-10 and TGF-? and other anti-inflammatory cytokines, which have the function of reducing inflammation and contributing to tumor growth and Immunosuppressive function It plays an important role in wound healing and tissue repair. In a word, macrophages are a "double-edged sword", which can not only stop the spread of cancer cells, but also help the growth and spread of cancer cells.advances in human genetics have identified a number of genes associated with primary immunodeficiencies or Infectious disease Tuberculosis has been a major human disease for thousands of years and thus there has been considerable Chronic disease Atherogenesis Monocytes are recruited relatively early and selectively to major arteries in response to local accumulation of lipoproteins, e.g. in hyperlipidemia.Unlike the antigen-specific receptor found on T and B lymphocytes Chemotaxis Upon sensing an antigen belonging to a potentially harmful foreigner invader, macrophages stimulate the expansion of activated T cells and secrete chemokines that function to recruit appropriate effector cells to aid in their neutralization and clearance.The surrounding microenvironment largely determines the activation phenotype of recruited macrophages, which can most simply be classified as falling within a spectrum consisting of two opposing phenotypes: classically activated, or M1, macrophages (CAMs), and alternatively activated, or M2, macrophages (AAMs).Classically activated macrophages, who play a dominant role in anti-bacterial defence and promoting Th1-type responses Phagocytosis and Tissue Repair To return a tissue to homeostasis after a disruptive event, the phagocytic clearance of damaged and redundant material is essential.These phenotypes can be mimicked in experimental macrophage models derived from monocytes and in conjunction with stimulatory factors, although given the complexity of in vivo tissue spaces these model cells are inherently imperfect.Classification and Origins of Tissue Macrophages: Macrophages are professional phagocytes involved in the recycling and clearance of erythrocytes during the steady state, the removal of apoptotic cells and cellular debris, tissue remodeling, and host responses to infectious disease.Adaptive Stimulation The phagocytosis and subsequent destruction of foreign material by macrophages also provide a means to generate antigenic peptide sequences for presentation to T lymphocytes by way of cell-surface MHC class II receptors.Obstructive lesions may be repaired by fibrous tissue, or exacerbated by clotting induced by macrophages (and platelets) and by plaque rupture induced by macrophage metalloproteinases.Polymorphisms in genes expressed in macrophages such as those associated with cholesterol uptake and efflux (and thus foam-cell formation) have been implicated in development of chronic heart disease as have a number of other genes known to be expressed by macrophages, but without a clearly defined function.Additionally, there are subsets of specialized resident macrophages

whose phenotypes are uniquely adapted to their location, such as brain microglia, liver Kupffer cells, bone osteoclasts, and lung alveolar macrophages.Role in Pathogenesis and Disease: Macrophages illustrate well the interplay between intrinsic cellular properties (especially genetically determined) and environmental influences, including infections, toxins, drugs and pollutants.Both contribute to the complex patterns of gene expression which underlie cellular responses such as growth, phagocytosis and endocytosis, adhesion, migration, secretion and cell–cell interactions (trophic or cytocidal).Production of oxygen metabolites may exacerbate lipoprotein oxidation and promote its uptake by macrophages via a range of scavenger receptors, resulting in foam–cell formation.Such macrophages can interact with local endothelium, smooth muscle cells and fibroblasts, as well as T lymphocytes to initiate and perpetuate a modified form of chronic inflammation resulting in atheroma formation.In mouse models in which macrophages are almost entirely ablated due to a loss of function mutation in the gene encoding colony–stimulating factor 1 (CSF–1), tumor progression is stalled and metastasis ablated.In cases where chronic inflammation is believed to be involved in the etiology of cancer, macrophages may contribute to malignancy by releasing DNA–damaging free radicals in addition to a host of growth and proliferation factors which may contribute to uncontrolled or dysregulated growth.Macrophages are associated with regions of basement membrane destruction, an essential pre–requisite for metastasis and through a complicated interplay between chemokines and growth factors produced by both the cancer cells and the macrophages contribute to intravasation.Examples include inflammatory events triggered by infection or injury and physiological changes within the host (i.e. embryonic development and postpartum mammary gland involution, during which a great deal of tissue remodeling occurs.It performs these roles via four basic innate functions: sensing, chemotaxis, phagocytosis and repair, and adaptive stimulation.