

Targeting the production of monocytes/macrophages-derived cytokines by anti-inflammatory herbal drugs

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Abstract

Macrophages and their immature undifferentiated predecessors, monocytes, are part of the innate immune system with primary function in defense against infection, malignancy and in immunity. Of the various protein mediators produced by monocytes/macrophages are proinflammatory cytokines such as tumour necrosis factor- α (TNF- α), interleukin-1 (IL-1 β) and IL-6. The regulated release of these cytokines result in the initiation of inflammation through activation of immune cells and upregulation of expression of adhesion molecules that eventually lead to leucocyte infiltration to extravascular sites. Hence, one of the most attractive approaches of alleviating the severity of chronic inflammatory diseases is suppressing the production of monocytes/macrophages-derived TNF- α , IL-1 β and IL-6. This review highlights some common targets of the monocytes/macrophage-derived cytokines expression, experimental models of proinflammatory cytokines release, and mechanism of action of some exemplary antiinflammatory herbal drugs. The effects of crude drug preparations on transcription factors (e.g. nuclear factor- κ B), signalling pathways including the mitogen-activated protein kinase cascades and induction of immunosuppressive proteins (IL-10) are among the common targets discussed.

Keywords: Monocytes; macrophages; inflammation; herbal drugs; proinflammatory cytokines; TNF- α ; IL-1 β ; IL-6; IL-8; IL-10; HMGB1

Introduction

Monocytes are members of the granulocytes (neutrophils, basophils, eosinophils, mast cells, natural killer cells and monocytes) cell populations that constitute the innate immune system (Papatriantafyllou, 2011). Being the first line of defense of the body, their primary function is that of cell mediated immunity against infection and malignancy. Monocytes are formed in the bone marrow from a common monocyte, macrophage and dendritic pluripotent stem cell precursors (Gordon and Taylor, 2011). Following the differentiation process that lasts less than 24 hours, mature monocytes leave the bone marrow and enter the bloodstream