Macrophage plasticity, polarization and function in response to curcumin, a diet-derived polyphenol, as an immunomodulatory agent

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Monocytes and macrophages are important cells of the innate immune system that have diverse functions, including defense against invading pathogens, removal of dead cells by phagocytosis, antigen presentation in the context of MHC class I and class II molecules, and production of various pro-inflammatory cytokines and chemokines such as IL-1? IL-6, TNF-? and MCP-1. In addition, pro-inflammatory (M1) and anti-inflammatory (M2) macrophages clearly play important roles in the progression of several inflammatory diseases. Therefore, therapies that target macrophage polarization and function by either blocking their trafficking to sites of inflammation, or skewing M1 to M2 phenotype polarization may hold clinical promise in several inflammatory diseases. Dietary-derived polyphenols have potent natural anti-oxidative properties. Within this group of polyphenols, curcumin has been shown to suppress macrophage inflammatory responses. Curcumin significantly reduces co-stimulatory molecules and also inhibits MAPK activation and the translocation of NF-?B p65. Curcumin can also polarize/repolarize macrophages toward the M2 phenotype. Curcumin-treated macrophages have been shown to be highly efficient at antigen capture and endocytosis via the mannose receptor. These novel findings provide new perspectives for the understanding of the immunopharmacological role of curcumin, as well as its therapeutic potential for impacting macrophage polarization and function in the context of inflammation-related disease. However, the precise effects of curcumin on the migration, differentiation, polarization and immunostimulatory functions of macrophages remain unknown. Therefore, in this review, we

summarized whether curcumin can influence macrophage polarization, surface molecule expression, cytokine and chemokine production and their underlying pathways in the prevention of inflammatory diseases. © 2018 Elsevier Inc.

Curcumin

Cytokine

Dietary polyphenols

Immune system

Inflammation

Macrophage

chemokine

curcumin

cytokine

lipid

mannose receptor

nitric oxide

prostaglandin

toll like receptor

allergy

Alzheimer disease

antigen presentation

asthma

atherosclerosis

biological activity

cell migration

cell plasticity

cytokine production

human

inflammation

inflammatory disease

liver fibrosis

macrophage

macrophage function

malaria

malignant neoplasm

metabolic disorder

mycobacteriosis

nonhuman

obesity

polarization

pregnancy

protein expression

Review

tumor immunity