

Inflammatory mechanisms and oxidative stress as key factors responsible for progression of neurodegeneration: Role of brain innate immune system

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Chronic inflammation is characterized by longstanding microglial activation followed by sustained release of inflammatory mediators, which aid in enhanced nitrosative and oxidative stress. The sustained release of inflammatory mediators propels the inflammatory cycle by increased microglial activation, promoting their proliferation and thus stimulating enhanced release of inflammatory factors. Elevated levels of several cytokines and chronic neuroinflammation have been associated with many neurodegenerative disorders of central nervous system like age-related macular degeneration, Alzheimer disease, multiple sclerosis, Parkinson's disease, Huntington's disease, and tauopathies. This review highlights the basic mechanisms of neuroinflammation, the characteristics of neurodegenerative diseases, and the main immunologic responses in CNS neurodegenerative disorders. A comprehensive outline for the crucial role of microglia in neuroinflammation and neurodegeneration and the role of Toll-like receptor signalling in coexistence of inflammatory mechanisms and oxidative stress as major factors responsible for progression of neurodegeneration have also been presented. © 2016 Bentham Science Publishers.

Microglia

Neurodegenerative disorders

Neuroinflammation

Oxidative stress

Toll-like receptors

CD11b antigen

CD14 antigen

CD200 antigen

CD200 receptor

CD36 antigen

CD47 antigen

chaperonin 60

immunoglobulin enhancer binding protein

intercellular adhesion molecule 1

interferon regulatory factor 3

interferon regulatory factor 5

interferon regulatory factor 7

interleukin 1beta

interleukin 6

lymphocyte function associated antigen 1

monocyte chemotactic protein 1

nitric oxide

reactive oxygen metabolite

scavenger receptor A

toll like receptor

toll like receptor 1

toll like receptor 2

toll like receptor 4

toll like receptor 5

toll like receptor 7

transcription factor AP 1

tumor necrosis factor

unindexed drug

vascular cell adhesion molecule 1

very late activation antigen 6

cytokine

Alzheimer disease

Article

blood brain barrier

cell survival

central nervous system

disease course

DNA polymorphism

gene mutation

human

innate immunity

microglia

nerve degeneration

nervous system inflammation

nonhuman

oxidative stress

protein expression

signal transduction

animal

brain

degenerative disease

disease course

immunology

inflammation

innate immunity

metabolism

oxidative stress

pathology

pathophysiology

physiology

Animals

Brain

Cytokines

Disease Progression

Humans

Immunity, Innate

Inflammation

Microglia

Neurodegenerative Diseases

Oxidative Stress