Targeting the nicotinic acetylcholine receptors (nAChRs) in astrocytes as a potential therapeutic target in Parkinson?s disease

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Parkinson?s disease (PD) is a relatively common disorder of the Central Nervous System (CNS), whose etiology is characterized by a selective and progressive degeneration of dopaminergic neurons, and the presence of Lewy bodies in the pars compacta of the substantia nigra, and gaping dopamine depletion in the striatum. Patients with this disease suffer from tremors, slowness of movements, gait instability, and rigidity. These patients may also present functional disability, reduced quality of life, and rapid cognitive decline. It has been shown that nicotine exerts beneficial effects in patients with PD and in in-vitro and in-vivo models of this disease. Astrocytes are an important component in the immune response associated with PD, and that nicotine might be able to inhibit the inflammation-related apoptosis of these cells, being this a potential strategy for PD treatment. This action of nicotine could be due mainly to activation of ?7 nicotinic acetylcholine receptors (?7-nAChRs) expressed in glial cells. However, nicotine administration can protect dopaminergic neurons against degeneration by inhibiting astrocytes activation in the substantia nigra pars compacta (SNpc) and therefore reduce inflammation. Owing to the toxicity and capacity of nicotine to induce addiction, analogues of this substance have been designed and tested in various experimental paradigms, and targeting ?7-nAChRs expressed in glial cells may be a novel therapeutic strategy for PD treatment.

Apoptosis

Astrocytes

nAChRs

Neuroinflammation

Neuroprotection

Nicotine

Parkinson disease

nicotine

nicotinic receptor

neuroprotective agent

nicotinic receptor

apoptosis

Article

astrocyte

cell activation

cognitive defect

disability

disease course

dopaminergic nerve cell

drug mechanism

gait disorder

glia cell

human

immune response

in vitro study

in vivo study

muscle rigidity

nerve cell plasticity

nervous system inflammation

neuroprotection

nonhuman

Parkinson disease

priority journal

protein expression

protein targeting

quality of life

substantia nigra pars compacta

tremor

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