

PDGF-BB Preserves Mitochondrial Morphology, Attenuates ROS Production, and Upregulates Neuroglobin in an Astrocytic Model Under Rotenone Insult

Cabezas R.

Vega-Vela N.E.

González-Sanmiguel J.

González J.

Esquinas P.

Echeverria V.

Barreto G.E.

Platelet-derived growth factor, subtype BB (PDGF-BB) is a mitogenic growth factor produced in different cell types such as platelets, fibroblasts, neurons, and astrocytes. Previous reports have shown that different PDGF isoforms exert a neuroprotective effect in neurons and astrocytes against multiple degenerative insults. Previously, we showed that pretreatment with PDGF-BB for 24 h increased cell viability, preserved nuclear morphology and mitochondrial membrane potential following stimulation with rotenone, and reduced free radical production nearly to control conditions. In the present study, we explored the potential mechanisms associated with PDGF-BB protection against oxidative damage. Our results showed that PDGF-BB protected astrocytic cells through multiple responses, including decrease in the expression of cytoskeleton proteins, attenuated free radicals (reactive oxygen species (ROS)) production, preservation of mitochondrial ultrastructure, and improved expression of neuroglobin (Ngb1). In summary, these findings point out that PDGF-BB protects astrocytic cells by a reduction in ROS production and activation of antioxidant mechanisms.

© 2017, Springer Science+Business Media New York.

Astrocytes

Mitochondria

Neuroglobin

PDGF-BB

Reactive oxygen species

Rotenone

cytoskeleton protein

immunoglobulin enhancer binding protein

neuroglobin

platelet derived growth factor BB

reactive oxygen metabolite

rotenone

biological marker

immunoglobulin enhancer binding protein

neuroglobin

phosphatidylinositol 3 kinase

platelet derived growth factor

protein kinase B

reactive oxygen metabolite

rotenone

antioxidant activity

Article

astrocyte

cell protection

cell structure

cell ultrastructure

controlled study

mitochondrion

oxidative stress

protein expression

protein function

upregulation

astrocyte

cytoskeleton

drug effect

human

metabolism

mitochondrion

signal transduction

tumor cell line

ultrastructure

upregulation

Astrocytes

Biomarkers

Cell Line, Tumor

Cytoskeleton

Humans

Mitochondria

Neuroglobin

NF-kappa B

Phosphatidylinositol 3-Kinases

Platelet-Derived Growth Factor

Proto-Oncogene Proteins c-akt

Reactive Oxygen Species

Rotenone

Signal Transduction

Up-Regulation