Novel Approaches in Astrocyte Protection: from Experimental Methods to Computational Approaches

Garzón D.

Cabezas R.

Vega N.

Ávila-Rodriguez M.

Gonzalez J.

Gómez R.M.

Echeverria V.

Aliev G.

Barreto G.E.

Astrocytes are important for normal brain functioning. Astrocytes are metabolic regulators of the brain that exert many functions such as the preservation of blood?brain barrier (BBB) function, clearance of toxic substances, and generation of antioxidant molecules and growth factors. These functions are fundamental to sustain the function and survival of neurons and other brain cells. For these reasons, the protection of astrocytes has become relevant for the prevention of neuronal death during brain pathologies such as Parkinson?s disease, Alzheimer?s disease, stroke, and other neurodegenerative conditions. Currently, different strategies are being used to protect the main astrocytic functions during neurological diseases, including the use of growth factors, steroid derivatives, mesenchymal stem cell paracrine factors, nicotine derivatives, and computational biology tools. Moreover, the combined use of experimental approaches with bioinformatics tools such as the ones obtained through system biology has allowed a broader knowledge in astrocytic protection both in normal and pathological conditions. In the present review, we highlight some of these recent paradigms in assessing astrocyte protection using experimental and computational approaches and discuss how they could be used for the study of restorative therapies for the brain in pathological conditions.

Astrocytes

Computational biology

Growth factors

Mesenchymal stem factors

Neurosteroids

Nicotine

estrogen

estrogen derivative

glial cell line derived neurotrophic factor

nicotine

platelet derived growth factor

neuroprotective agent

astrocyte

bioinformatics

biology

cell protection

degenerative disease

human

mesenchymal stem cell

neuroprotection

neuroscience

nonhuman

Review

animal

astrocyte

biology

drug effects

metabolism

molecularly targeted therapy

Neurodegenerative Diseases

procedures

Animals

Astrocytes

Computational Biology

Humans

Molecular Targeted Therapy

Neurodegenerative Diseases

Neuroprotective Agents