

Testosterone protects mitochondrial function and regulates neuroglobin expression in astrocytic cells exposed to glucose deprivation

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Testosterone is a hormone that has been shown to confer neuroprotection from different insults affecting the central nervous system (CNS). Testosterone induces this protection by different mechanisms that include the activation of anti-apoptotic pathways that are directly implicated in neuronal survival. However, little attention has been devoted to its actions on glial cells. In the present study, we have assessed whether testosterone exerts protection in a human astrocyte cell model, the T98G cells. Our results indicate that testosterone improves cell survival and mitochondrial membrane potential and reduces nuclear fragmentation and reactive oxygen species (ROS) generation. These effects were accompanied by a positive regulation of neuroglobin, an oxygen-binding and sensor protein, which may serve as a regulator of ROS and nitrogen reactive species (NOS), and these protective effects of testosterone may be at least in part mediated by estradiol and DHT. In conclusion, these findings suggest that astroglia may mediate some of the protective actions of testosterone in the brain upon pathological conditions. © 2016 Toro-Urrego, Garcia-Segura, Echeverria and Barreto.

Brain

Glucose deprivation

Mitochondria

Neuroglobin

Neuroprotection

Testosterone

estradiol

glucose

hemoprotein

neuroglobin

nitrogen

reactive oxygen metabolite

testosterone

Article

astrocyte

cell structure

cell survival

cell viability

central nervous system

controlled study

glia cell

human

macroglia

mitochondrial membrane potential

mitochondrial permeability

mitochondrion

nerve cell

nonhuman

oxygen affinity

protein expression