Abstract

Verterbate brain is extremely demanding on energy and oxygen consumption. A few seconds of the oxygen deprivation can disrupt brain homeostasis and cause an ionic imbalance, resulting in neuronal death by apoptosis or necrosis. The mechanisms, that are responsible for protection of the CNS against the disruption of homeostasis are called neuroprotection. Neuroprotection in the brain is mostly provided by glial cells. There are several types of glia in the human brain, but not all of them are responsible for neuroprotection equally. However, in general we can say that all the glial cells are responsible for the maintainance of ionic balance, which play an important role in neuroprotection. Astroglia and mikroglia dominantly contribute to protectiion of the CNS. These cells can be activated by any disruption of the CNS and actively execute a number of neuroprotective actions. Activated astrocytes form astrogliosis, which covers and separates the affected area of the brain from healthy tissue, thereby preventing further spread of ischemic damage. Activated microglia can transform into phagocytes which clean the extracellular space from dead cells and their parts. Neuroprotection research is nowadays very popular. This is because of urgent need better understanding of the causes of neurodegenerative diseases. Scientists are currently focused on the inhibition of pro-inflammatory cytokines that are found in all neurodegenerative diseases. They are hoping that can these molecules may help to reveal the true nature of these diseases, which could lead to better prevention and treatment. This thesis summarizes current knowledge about glial cells in neuroprotection. Special emphasize is given to their importance in maintaining the ionic and glutamate equilibria and protecting neurons against excitotoxicity. A part of the thesis is devoted to the role of glial cells in hypoxic and ischemic brain damage and possible importance of HDAC and TNF- α inhibitors for future therapy is mentioned in the end.