

Brain ischemic injury is a complex of pathophysiological events following transient or permanent reduction of brain blood flow. It results in a disruption of neuronal and astrocytic physiological functions, long-term reduction of brain blood flow leads to the cell death. Number of recent studies is focused on astrocytes, which might play key roles in surviving cells, including neurons, during ischemic injury. Astrocytes provide many important functions, such as maintenance of ionic homeostasis, prevention of excitotoxicity, scavenging free radicals and others and thus astrocytes may dramatically swell during ischemic conditions and contribute notably to the development of cytotoxic edema. This thesis summarizes mechanisms possibly contributing to the astrocytic swelling during brain ischemic injury as well as methods used for studying astrocyte volume changes and their quantification. Since the brain edema dramatically complicates both course and treatment of ischemic injury, knowledge of mechanisms leading to astrocytic swelling and their volume regulation during ischemia/reperfusion might be used for developing new therapeutic approaches for the treatment of cerebral ischemia, mainly for reduction of negative impact of edema.