

Hypoxic-ischemic insult is a most common form of perinatal brain damage that threatens a newborn's life and can lead to permanent neurological sequelae. However, detailed aspects of the cerebral ischemia in the immature brain stay unanswered.

We decided to use the model of focal cerebral ischemia induced by intrahippocampal endothelin-1 (ET-1) in 12-days-old rats. The knowledge about consequences of ET-1 induced ischemia and the role of endothelin receptors (ETA and ETB) in ischemia-induced consequences in immature brain are poor at present. Agonists and selective antagonists of the ETA and ETB receptors were used to determine the role of these receptors in the development of ischemia, changes in regional blood flow and tissue oxygenation, local changes of biochemical parameters and acute neuronal death.

Our results indicate that activation of the ETA receptors causes a strong decrease of the blood flow, induced related hypoxia and subsequent neuronal degeneration, whereas activation of ETB receptors has a likely modulatory role. Moreover, ischemia causes an increase of excitatory amino acids concentration, whereas inhibitory amino acids, except taurine, decreased after ischemia. These facts provide new insights in a case of perinatal ischemia.

This thesis demonstrates the wide range of different effects of the focal ischemia in immature brain, which may contribute experimentally ongoing and clinical follow-up study, as well as the development of effective treatment.