THE MODERN ASPECTS OF NEUROPROTECTION

Prisich K.S., Zhurenko D.S., Tsubanova N.A.
The National University of Pharmacy, Kharkiv, Ukraine
tsubanova@rambler.ru

In those days actual problem of modern pharmacy and medicine is effective neuroprotection and invented new neuroprotective drugs.

The aim of neuroprotection is to rescue ischemic tissue and improve functional outcome by intervention on ischemic cascade. A lot of experimental trials demonstrated that neuroprotection is effective in infarction volume reduction. Unfortunately most of the effective agents in preclinical studies failed in clinical trials.

Neuroprotective agents which are most frequently used there are calcium channel blockers; glutamate antagonists; GABA agonists; antioxidants/radical scavengers; phospholipid precursor; nitric oxide signal-transduction down-regulator; leukocyte inhibitors; hemodilution; and a miscellany of other agents. Among promising ongoing efforts, therapeutic hypothermia, high-dose human albumin therapy, and hyperacute magnesium therapy are considered in detail.

One of effective neuroprotective drugs is Citicoline. Citicoline refers to the exogenously supplied form of cytidine 5-diphosphocholine (CDP-choline), a product of the rate-limiting step in the synthesis of phosphatidylcholine from choline. Orally administered citicoline is hydrolyzed in the gut to cytidine and choline, which are rapidly absorbed cross the blood-brain barrier, and can be incorporated into the phospholipid fraction of neuronal membranes. CDP-choline increases phospholipid synthesis, inhibits phospholipid degradation and free fatty acid release, increases CNS levels of norepinephrine and dopamine, and restores mitochondrial and membrane ATPase activities. While CDP-choline and its components do not directly affect phospholipase A2 (PLA2) activity in vitro, when studied in vivo citicoline attenuates ischemia-induced PLA2 stimulation and thereby diminishes the injurious consequences of phospholipid hydrolysis – namely, the generation of arachidonic acid, whose metabolism leads to formation of reactive oxygen species, lipid peroxides and toxic aldehydes. Citicoline also inhibits glutamate-induced apoptosis in cultured cerebellar granule neurons and increases glutamate uptake and expression of the membrane glutamate transporter EAAT2 in cultured astrocytes.

Future of neuroprotection is seen in concentration on the subgroup with existing penumbra, the combination of neuroprotection and thrombolysis and in prophylactic neuroprotection. The unification of the design in experimental and clinical trials is the main prerequisite for potential success in the clinical testing.