

THE MYSTERY OF STROKE: THE ROLE OF CALCIUM AND MAGNESIUM IN THE PENUMBRA NEURONS' DEATH

Summary

Penumbra zone is localized on the border of ischaemic focus. Low cerebral blood flow allows the neurons to survive but it is insufficient for normal processes. Calcium ions play a significant role in the development of apoptosis within the neurons in penumbra. Intracellular calcium "switches on" releasing cytochrom c from mitochondria – which is an important component of apoptosis. Extracellular calcium binds to the specific receptor localized on the cell membrane and activates antiapoptotic pathway which helps the cell to survive. Magnesium, in contrast to cal-

cium ions, also exerts an antiapoptotic effect in the intracellular localization. Inhibition of glutamate (aminoacid which takes part in excitotoxicity) had brought the hope that magnesium could have been used in the stroke treatment. Unfortunately huge clinical trial with magnesium early administration in the acute ischemic stroke did not show the significant benefits of magnesium treatment. Future studies should be focused on recognition of molecular mechanism of magnesium and calcium ions acting in the excitotoxicity and apoptosis of the penumbra neurons.