

Insulin stimulates Akt activity with the inhibition of apoptosis in neuroblastoma cells

Yong Han*, Sung-Jin Kim

Dept. of Pharmacology, School of Dentistry, Kyung Hee University

Insulin has been known to exert a variety of actions in the glucose metabolism in peripheral tissues such as liver, muscle and adipocytes. Recently it has been suggested that insulin has also important neuronal actions in brain tissues. In the present study, we designed a series of experiments to explore neuroprotective effects of insulin.

AMPA receptors mediate most of the fast excitatory amino acid transmission in the central nervous system; Stimulation of glutamate receptors triggers apoptosis as well as excitotoxic cascade. Although many attentions were focused on the AMPA receptor-mediated apoptosis, the mechanism is unclear.

Insulin significantly inhibited the AMPA-induced neuroblastoma cell damage as evidenced by MTT assay. However, insulin had little effects on the AMPA-induced glial cell damage. In the flow cytometry studies and DNA fragmentation assay, insulin had been shown to inhibit AMPA-induced DNA breakdown. Interestingly, insulin reduced activities of SAPK/JNK which was stimulated by AMPA; however, AMPA could not reduce the Akt activities which was stimulated by insulin.

Taken together, these results suggest that insulin has neuroprotective effects by inhibiting AMPA-induced apoptosis.

Key Words : Insulin, AMPA, excitotoxicity, apoptosis