

THE PROTECTIVE EFFECT OF RECOMBINANT HUMAN PARAOXONASE 1 SUBTYPE K192 IN CENTRAL NERVE SYSTEM AGAINST CHLORPYRIFOS POISONING

Xin Fei Han; Fan Zhang, Na Zhang; Pengsi Zhang; Min Zhao

Emergency Department; Shengjing Hospital of China Medical University; China

OBJECTIVES

To observe the protecting effect to the central nervous system of rHuPON1_{K192} in rats against chlorpyrifos poisoning.

METHODS

After injection of rHuPON1_{K192} (9000U/kg) 30 minutes ahead of the exposure to chlorpyrifos (organophosphorus pesticide), SD rats accepted intragastric administration at a dose of 330mg/kg(2LD50). Clinical manifestations including salivation time, muscle tremors of whole body, obvious dyspnea time, muscle strength above 3 grade (De Bleeker scores) were observed and recorded. Blood and tissue samples were collected at 8h. Serum and cerebral cortex acetyl cholinesterase activity were determined by colorimetric method. Immunohistochemical method and Western Blot method were applied to detect acetyl cholinesterase expression in hippocampus. Hippocampal neurons as well as its ultrastructural changes were observed under light microscope and transmission electron microscopy. All of above were analyzed and compared with the chlorpyrifos group and the control group.

RESULTS

The rats of the rHuPON1_{K192} pretreatment group were in a better general condition than the chlorpyrifos group. The time of salivation, muscle tremors of whole body, obvious dyspnea and muscle strength above 3 grade were all postponed compared with the chlorpyrifos group(the difference was statistically significant). Serum and cerebral cortex acetyl cholinesterase activity were higher than that of the chlorpyrifos group (the difference was statistically significant). Immunohistochemistry and Western Blot also showed acetyl cholinesterase expressing higher in hippocampus than that of the chlorpyrifos group (the difference was statistically significant). Hippocampal neurons of the control group appeared normal under light microscope and electron microscope. While in chlorpyrifos group, the neuron appeared necrosis and cavitation under light microscope, neurons showed edema, endoplasmic reticulum dysfunction, mitochondria swelling and part of the crest solution under electron microscopy. rHuPON1_{K192} pretreatment group showed slight tissue injury except glial cell edema.

CONCLUSIONS

rHuPON1_{K192} can relieve the acetyl cholinesterase inhibition from acute chlorpyrifos poisoning in serum and cerebral cortex, lighten the injury of hippocampal neurons, then protect the central nervous system.