Genetics and Molecular Research

Effects and mechanism of cerebroprotein hydrolysate on learning and memory ability in mice

L. An, X. Han, H. Li, Y. Ma, L. Shi, G. Xu, G. Yuan, J. Sun, N. Zhao, Y. Sheng, M. Wang and P. Du

College of Pharmacy, Beihua University; Jilin, Jilin, China

Corresponding authors: P. Du / M. Wang
E-mail: dupeige2001@126.com / wangmanli@126.com

Genet. Mol. Res. 15 (3): gmr.15038804
Received May 16, 2016
Accepted June 3, 2016
Published July 25, 2016
DOI http://dx.doi.org/10.4238/gmr.15038804

ABSTRACT. Cerebroprotein hydrolysate is an extract from porcine brain tissue that acts on the central nervous system in various ways to protect neurons and improve memory, attention, and vigilance. This study examined the effect and mechanism of cerebroprotein hydrolysate on learning and memory in mice with scopolamine-induced impairment. Mice were given an intraperitoneal injection of scopolamine hydrobromide to establish a murine model of learning and memory impairment. After 35 successive days of cerebroprotein hydrolysate treatment, their behaviors were observed in the Morris water maze and step-down test. Superoxide dismutase (SOD), Na^+-K^+-ATPase, and acetylcholinesterase (AChE) activity, and malondialdehyde (MDA), γ-aminobutyric acid (GABA), and glutamic acid (Glu) levels in the brain tissue of the mice were determined, and pathological changes in the hippocampus were examined. The results of the water-maze test showed that

cerebroprotein hydrolysate shortened the escape latency and increased the number of platform crossings. In the step-down test, cerebroprotein hydrolysate treatment prolonged the step-down latency and reduced the number of errors; cerebroprotein hydrolysate increased the activity of SOD, Na^+-K^+-ATPase, and AChE, reduced the levels of MDA, decreased the Glu/GABA ratio in brain tissue, and reduced pathological changes in the hippocampus. The results indicate that cerebroprotein hydrolysate can improve learning and memory in mice with scopolamine-induced impairment. This effect may be associated with its ability to reduce injury caused by free radicals, improve acetylcholine function, and modulate the Glu/GABA learning and memory regulation system, reducing excitotoxicity caused by Glu.

Key words: Cerebroprotein hydrolysate; Learning; Memory; Free radical injury