

## Ceftriaxone up-Regulates Neuronal Glutamate/Glutamine Transporters in Early Stage of the APP/PS1 Transgenic Mice

ShuJuan Fan<sup>1\*</sup>, Xiaohui Xian<sup>1</sup>, Li Li<sup>2</sup>, Xiaoguang Yao<sup>1</sup>, Yuyan Hu<sup>1</sup>, Min Zhang<sup>1</sup> and Wenbin Li<sup>1</sup>

<sup>1</sup>Department of Pathophysiology, Hebei Medical University, China

<sup>2</sup>Central Laboratory, The Second Hospital of Hebei Medical University, China

Alzheimer's disease (AD) is characterized by progressive impairment of learning, memory and cognitive functions. Glutamate as neurotransmitter plays an important role in learning, memory and cognition. Excitatory synaptic transmission of glutamatergic neuron requires a continuous release of glutamate from presynaptic terminals. Increasing evidence has shown the down-regulated expression of neuronal glutamine transport (GLnT), vesicular glutamate transporters (VGLUTs) in hippocampal neurons of AD mice. Ceftriaxone (Cef) has been reported to alleviate the cognition deficits of APP/PS1 mice. Therefore, in order to elucidate the mechanism involved in the improvement of Cef for the cognition deficits of APP/PS1 mice, the present study was undertaken to explore whether Cef can up-regulate the expression of GLnT, VGLUTs and metabotropic glutamate receptors 2 and 3 (mGluR2/3), which are related to the release of glutamate from presynaptic terminals, and whether Cef could impact the levels of A $\beta$ 1-40 and A $\beta$ 1-42. The learning and memory functions were examined by Novel object recognition and Morris water maze tests. The expressions of GLnT, VGLUTs and mGluR2/3 in the hippocampus were assayed with immunohistochemistry and western blot analysis. It was shown that Cef treatment in doses of 200 mg/kg and 300 mg/kg significantly improved the learning and memory deficits of the APP/PS1 mice and up-regulated the expression of GLnT, VGLUTs and mGluR2/3. However, Cef had no effects on the levels of soluble and insoluble A $\beta$ 1-40 and A $\beta$ 1-42. The above results suggested that Cef could upregulate the expression of proteins associated the releasing of glutamate from neurons, which might contribute to the improvement of Cef for the cognitive deficits of the APP/PS1 mice in early stage of AD.

**Key words:** Ceftriaxone, GLnT, VGLUTs, APP/PS1 mice

### Biography:

ShuJuan Fan is a Doctor in Department of Pathophysiology, Hebei Medical University, China. She graduated from Hebei medical university. At present, She mainly focuses on the fundamental research of the prevention and therapy of Alzheimer's disease.