Annals of General Psychiatry

Poster presentation

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Effects of nitric oxide synthase inhibition in the CA1 region of rat hippocampus on spatial learning

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from International Society on Brain and Behaviour: 3rd International Congress on Brain and Behaviour
Thessaloniki, Greece. 28 November – 2 December 2007

Published: 17 April 2008

Annals of General Psychiatry 2008, **7**(Suppl 1):S118 doi:10.1186/1744-859X-7-S1-S118

This abstract is available from: http://www.annals-general-psychiatry.com/content/7/S1/S118

Background

Nitric oxide (NO) is thought to be involved in synaptic plasticity contributing to learning and memory in several brain areas including the hippocampus [1]. The hippocampus is believed to have a critical role in the processing of spatial information [2]. But, data on the role of hippocampal NO in spatial or other types of learning are not consistent [3,4]. In the present study the effect of NO synthase inhibition in the CA1 region of rat hippocampus on spatial localization was investigated in the Morris water maze.

Materials and methods

Rats cannulated in the CA1 region of their hippocampus received bilateral injections of vehicle (saline) or N-omega-nitro L-arginine methyl ester (L-NAME), a NO synthase inhibitor (50,100 and 200 microgram/0.5 microlitre) through the cannulae 30 minutes before training each day. Animals were subjected to 5 days of training in the Morris water maze; 4 days with the invisible platform to test spatial learning and the 5th day with the visible platform to test motivation and sensorimotor coordination.

Results

The results showed dose-dependent increases ($p<0.001$) in escape latency, traveled distance, heading angle, and dose-dependent decreases ($p<0.01$) in target quadrant entries in L-NAME-received groups as compared to the control group. This impairment was reversed by co-administration of mole equivalent doses of L-arginine, the NO precursor.

Conclusions

On the basis of the present data, it is concluded that processes mediated by NO synthesis in the hippocampus are essentially involved in spatial learning.

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