

Ameliorating of Memory Impairment and Apoptosis in Amyloid β -Injected Rats Via Inhibition of Nitric Oxide Synthase: Possible Participation of Autophagy

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Abstract

It has been proposed that appearance of amyloid beta ($A\beta$) in hippocampus is one of the characteristic features of Alzheimer's disease (AD). The role of Nitric oxide (NO) in neurodegenerative disorders is controversy in different contexts. Here, we examined the effect of NO on spatial memory. For this purpose, we compared the effects of three different concentrations of L-NG-Nitroarginine Methyl Ester (L-NAME) as a nitric oxide synthase (NOS) inhibitor. We used Morris water maze (MWM) for evaluation of behavioral alterations. We also assessed the apoptosis and autophagy markers as two possible interfering pathways with NO signaling by western blot method. We found that in $A\beta$ pretreated rats, intra-hippocampal injection of 1 or 2 ($\mu\text{g}/\text{side}$) of L-NAME caused a significant reduction in escape latency and traveled distance comparing to $A\beta$ -treatment group. Our molecular findings revealed that L-NAME could induce autophagy and attenuate apoptosis dose dependently. The protective role of autophagy and the deteriorative role of apoptosis is the hypothesis that can vindicate our findings. Thus using NOS inhibitors at low concentrations can be one of the therapeutic approaches in the future studies.

Keywords: MWM; L-NAME; Alzheimer's disease; Apoptosis; Autophagy.

Introduction

Recent statistics researches point out that aged human population and related elderly diseases are growing up. Alzheimer's disease

(AD) is the most common age-associated dementia which accounts for an estimated 60 to 80 percent of cases (1). In AD, appearance of amyloid beta ($A\beta$) in hippocampus is one of the characteristic features of dementia and memory impairment. Despite broad research funding in the field of AD, shortage of knowledge in AD care still exists. Nitric oxide synthase (NOS)

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