



Exercise Biochemistry Review

Proceedings of IBEC 2018, Beijing, China, October 23-25
PO-233

The Neuroprotective Effects of Aerobic Exercise and Oral Resveratrol on Hippocampal Neurons in Diabetic Rats

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Objective The purpose of this study is to explore the effects of aerobic exercise combined with oral resveratrol on ethology and BDNF and CREB proteins of hippocampus neurons in diabetic rats, in order to provide a theoretical basis for revealing the neuroprotective mechanism of exercise and resveratrol.

Methods 45 male Sprague Dawley rats, aged 8 weeks, were randomly divided into 5 groups: normal control (NC), diabetes control (DC), diabetes exercise (DE), diabetes resveratrol (DR) and diabetes exercise and resveratrol (DER). Exercise-related groups performed 8-week swimming training (60min/d, 5d/week). Morris maze test, 7d. Escape latency time, strategy of finding platform performance, the protein expression of BDNF and CREB from hippocampus neurons were measured.

Results 1) Compared with DM, DR and RE groups, the escape latency of DRE group was significantly shortened ($p < 0.01$), and the strategy of finding platform performance was remarkably improved ($p < 0.05$). 2) Compared with NC group, the protein expression of BDNF of DM group was obviously decreased ($p < 0.01$), while in DRE group was improved significantly than that in DE group ($p < 0.05$). 3) The level of CREB expression in DM group clearly lower than in group NC ($p < 0.01$), and the expression of CREB in DER and DE groups were remarkably increased ($P < 0.01$).

Conclusions Eight weeks of swimming training and/or oral resveratrol could increase the expression level of BDNF and CREB protein in the hippocampal neurons of diabetic rats, and improve the ability of spatial learning from behavioral study. It is suggested that the aerobic exercise training and the SIRT1 mechanism of resveratrol perhaps improve the situation of high glucose and indirectly stimulate the expression of BDNF and CREB protein. As a result, that leads to improve the impair of learning and memory which caused by diabetes.