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### **Effect of Aerobic Exercise on the expression of VEGF in hippocampus and the Spatial Learning and Memorizing Abilities in CUMS-induced depressive Rats**

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**Objective** Through the 4 weeks aerobic exercise intervention in rats with CUMS (chronic unpredictable mild stress) to build depression model of rats, and to explore the effects of aerobic exercise intervention on hippocampal VEGF expression and spatial learning and memorizing ability in depressive model rats.

**Methods** 30 adult 3-month-old Sprague-Dawley rats weighing  $300 \pm 20$  g were used. After adaptive feeding for 1 week, they were randomly divided into 3 groups: control group (C), the model group (M), and exercise group (E). M and E groups were subjected to CUMS stimulation for 4 weeks and/or aerobic exercise for 4 weeks according to different modeling procedures. After exercise or CUMS, the behavioral index was tested by sucrose preference test (SPT) and Morris water maze (MWZ). The 5-HT expression of whole brain was detected by ELISA. And Real-time PCR, Western Blotting, HE staining and immunofluorescence method test the expression of VEGF and morphological structure to change in hippocampus.

**Results** Compared with the C group, the sucrose intake and the percentage of syrup preference were significantly decreased in the CUMS-induced depression rats, the 5-HT depression in the whole brain was significantly decreased, the hippocampal neurons were disorderly arranged and the number was less, and the hippocampal VEGF gene and protein were significantly decreased. While aerobic exercise can significantly improve the depression-like behavior, learning and memorizing ability of rats with depression, increase the expression of 5-HT in whole brain, and the hippocampal neurons are arranged neatly, clearly and in large quantities, and increase the gene and protein expression of VEGF in hippocampus.

**Conclusions** Four weeks aerobic exercise intervention can significantly up-regulate the expression of VEGF in hippocampus and improve learning and memorizing ability and depressive symptoms. It was suggested that the increased expression of VEGF in the hippocampus may be one of the neurobiological mechanisms in depression and spatial learning and memorizing ability.