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The Regulation of NF-κB-TNF-α/IDO/5-HT Axis by Aerobic Exercise against Hippocampal Neuroinflammation in CUMS Depressive Mice

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Objective To study the effect of aerobic exercise on the anti-chronic stress depression and the key metabolic enzymes indoleamine 2,3 peroxidase (IDO) of tryptophan and kynurenine pathway.
Methods Adopt the method of random numbers to make depression modelling for mice with 1 or 2 kinds of stimulating factors for 28 days in view of the 13 kinds of chronic stress stimulation. Collect and analyse motionless time for FST and TST of mice by using the Noldus EthoVision XT9 system. Test the serum factor level of laboratory mice with Cusabio imported IDO, NF-ƙB and TNF-α kit. Make real-time fluorescent quantitative PCR verification of the mRNA expression and protein expression level of IDO, 5-HT, NF-ƙB and TNF-α in hippocampus.
Results After 4 weeks of chronic stress stimulation, the motionless time for FST and TST of mice in the Model Group obviously prolonged ($p<0.05$). The bioactivity of IDO, NF-ƙB and TNF-α in hippocampus increased. The mRNA expression of IDO, NF-ƙB and TNF-α in hippocampus increased, while the mRNA expression of 5-HT decreased ($p<0.01$). Aerobic exercise can shorten the motionless time of mice, inhibit the activity of IDO, NF-ƙB and TNF-α, reduce the mRNA expression quantity of IDO, NF-ƙB and TNF-α and enhance the expression of 5-HT.
Conclusions Aerobic exercise has an antidepressant effect on mice for chronic stress depression, which is related to the IDO activation induced by inhibit inflammatory cytokines. Aerobic exercise may inhibit the NF-ƙB to reduce the pathway of tryptophan and kynurenine, affect the direct and indirect induced effect of IDO, and adjust its activity and expression.