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Exercise reduced the extracellular Glu concentration of striatum neurons in PD model rats by up-regulating mGluR2/3 expression

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Objective To investigate the effects of motor intervention on the extracellular Glu concentration and mGluR2/3 mRNA and mGluR2/3 protein expression levels of striatum neurons in PD model rats.
Methods Rat model of unilateral injury was established by injecting neurotoxin 6-hydroxydopamine (6-OHDA) into the right brain medial forebrain bundle (MFB)，the sham operation group was given the same dose of normal saline at the same site.Apomorphine (APO) induced rotation behavior test with substantia nigra and striatum TH immunohistochemical staining used to evaluate the reliability of the model. The exercise group began to exercise the treadmill training intervention (11m/min，30min/day，5day/week) at 1 weeks after the operation. Open field experiment and climbing pole experiment used to evaluate the ability of autonomous activity and movement coordination in rats.Western blotting used to detect tyrosine hydroxylase and mGluR2/3 expression level. RT-PCR was used to detect the expression level of mGluR2 and mGluR3 mRNA in the striatum；In vivo microdialysis combined with high performance liquid chromatography (HPLC) used to detect extracellular Glu concentration in striatal neurons.
Results The results of the microdialysis combined with high performance liquid chromatography (HPLC) showed that，compared with control group，in PD group，Glu concentration of the extracellular of striatal neurons was significantly increased at third and fifth weeks，and the difference was very significant (*P<0.01*)；Compared with PD group，in PD+Ex group，Glu concentration of the extracellular of striatal neurons was significantly decreased at third and fifth weeks，and the difference was very significant (*P<0.05，P<0.01*)；Compared with the PD+Ex group，in PD+Ex+ APICA group，Glu concentration of the extracellular of striatal neurons was significantly increased at third and fifth weeks，and the difference was very significant (*P<0.05, P<0.01*). RT-PCR test results indicated that,the expression level of striatal mGluR3 mRNA of PD group decreased compared with the control group，and the difference was significant (*P<0.01*)；Compared with the PD group，in the PD+Ex group，the expression level of striatal mGluR3 mRNA increased，a the difference was very significant (*P<0.01*)；6-OHDA damage and exercise intervention had no effect on the expression of striatum mGluR2 mRNA，and the difference was was not significant (*P>0.05*). Western blotting results indicated that，the expression level of striatum mGluR2/3 protein of PD group was decreased compared with the control group，and the difference was vey significant (*P*<0.01)，compared with the PD group，in PD+Ex group，the expression level of striatum mGluR2/3 protein was increased，and the difference significant (*P*<0.05) . The correlation between the extracellular Glu concentration of the striatum neurons and the total moving distance in PD rats showed that，at third weeks，the extracellular Glu concentration of striatal neurons was negatively correlated with the total movement distance (r=-0.82，*P<0.05*)，at fifth weeks，the extracellular Glu concentration of striatal neurons was negatively correlated with the total movement distance (r=-0.91，*P<0.01*).

Conclusions The expression level of mGluR2/3 decreased in rats with PD model with increased Gu concentration. The decrease of Gulu concentration and the increase of expression level of mGluR2/3 in the striatum striatum of PD model rats could be induced by the training intervention of running platform, which promoted the improvement of motor dysfunction in PD model rats.