POSTER PRESENTATION

B364 Withdrawal of habituated wheel running decreases cell proliferation and the number of immature neuron in the mice hippocampus through the BDNF-independent pathway

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Physical activity or exercise is a key to promote brain health. In particular, accumulating evidences have reveiled that exercise improves function of the hippocampus, a brain area responsible for learning, memory and emotion. However, little is known how reduction of physical activity affects hippomcampal plasticity, despite its clinical significances that some mental health problem are considered to be due to inactive life style. In this study, we investigated whether reduction of physical activity by withdrawal of habituated wheel running leads to deleterious effects on hippocampal neurogenesis and brain-derived neurotrophic factor (BDNF) expression in mice. Male C57BL/6 mice were reared in a cage attached with a running wheel from 4 to 11 weeks of age and subsequently kept in a standard cage until 17 weeks of age (Run-WD; with WD for withdrawal). Age-matched sedentary mice were kept in a standard cage throughout the experiment (Sed). Through another set of experiments, effects of long-term wheel running (4 to 11 weeks of age) on the hippocampus were confirmed. As well as previous findings, wheel running increased volume of the dentate gyrus (DG), the number of Ki-67-positive proliferating cells, the number of doublecortin-positive immature neuron, and BDNF expression. DG volume and BDNF expression in Run-WD mice were not differ from those in Sed mice, suggesting that the beneficial effects of exercise on these factors were abolished after withdrawal of running. Intriguingly, the number of both proliferating cells and immature neuron were smaller in Run-WD mice than in Sed mice, suggesting that physical inactivity by withdrawal of habituated wheel running deteriorates a part of neurogenesis. Because BDNF expression didn't differ between Sed and Run-WD, the mechanisms underlying would be regulated through the BDNF-independent pathway. Herein we propose a hypothesis that physical inactivity is a risk factor of neuropsychological disorders related to hippocampal function.

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