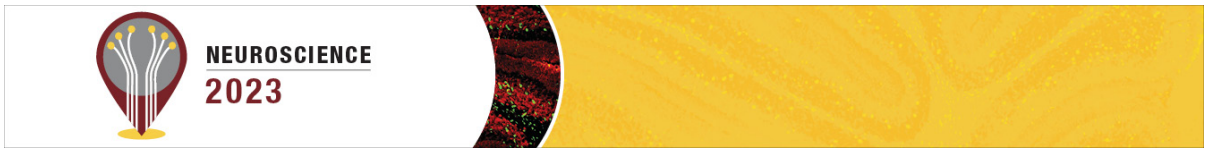

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Session PSTR447 - Postnatal Neurogenesis: Molecular Mechanisms and Regulation

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PSTR447.20 / A20 - Exercise type influences the promoting effect of exercise on hippocampal neurogenesis in mice

November 15, 2023, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Wed. Nov. 15, 2023 11:00 AM - 12:00 PM

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Abstract
[Background] A growing number of studies have revealed the beneficial effects of exercise on brain function, which are most pronounced in the hippocampus. Long-term exercise induces various structural changes in the hippocampus, including neurogenesis, contributing to improved cognitive function, dementia, and depression. The effects on the hippocampus depend on exercise conditions. Although the intensity of exercise has been widely recognized as a dominant factor, we recently found that exercise type is another factor affecting the effects of exercise on the hippocampus (Tsuchida et al., Neurosci Lett, 2022). Briefly, we compared the treadmill exercise, one of the most used types of exercise in rodents, and rotarod exercise, used to assess motor learning and coordination, at matched intensities. Although the treadmill activated hippocampal neural activity in mice, the rotarod did not, suggesting that the effects on hippocampal neural activity depend on the type of exercise. However, it is unclear whether the effects of long-term exercise on hippocampal function also depend on the type of exercise. [Purpose] This study aimed to examine whether the effects of long-term exercise on hippocampus in mice differ depending on the type of exercise. [Methods] The exercise period was 5 weeks. The exercise intensity of the treadmill was 15 m/min, and that of the rotarod was 30 rpm, which were almost equivalent at just below the lactate threshold. In the 5th week of exercise intervention, the hippocampus-dependent spatial learning and memory were examined by Morris water maze. Although depression-like behavior is partially regulated by the hippocampus, it is a non-hippocampus-dependent variable and was examined by a forced swim test (FST). [Results] The density of Doublecortin (DCX)-positive immature neurons was significantly increased by the treadmill, but not by the rotarod exercise, compared to that of the respective control groups. In addition, the density of DCX-positive neurons in treadmill runners was significantly higher than that in rotarod runners. Contrary to our hypothesis, spatial learning and memory were not improved by either type of exercise. FST showed that depression-like behavior improved in both types of exercise, suggesting that rotarod exercise, although cannot activate hippocampal neurons, has an antidepressant effect. [Conclusion] These results demonstrate that long-term treadmill exercise enhances hippocampal neurogenesis more efficiently than does the intensity-matched rotarod exercise. These results strengthen our claim that exercise type is another important factor influencing the effects of exercise on the hippocampus.