The Effects of Exercise on Neuroinflammation Induced by LPS in Mice

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INTRODUCTION. Neuroinnflammation is a biological response of central nervous system (CNS) after different cellular stress. In this process, microglial cells proliferate and change their morphology to executive and phagocytic state (amoeboid form, activated microglia) and became able to release proinflammatory mediators like interleukins (IL) IL-1β and IL-6. These changes represents a pathological mechanism of aging and neurological disorders such as depression and Alzheimer's disease. OBJECTIVES. We investigated the effects of exercise on neuroinflammation and sickness behavior induced by bacterial lipopolysaccharide (LPS) in mice. MATERIAL AND METHODS**.** Mice (N=81, Swiss, male, 12-15 weeks, 46 ± 0.6 g) were divide into two groups: sedentary control group (SED); and exercise group (voluntary running wheels, RW). After six weeks of exercise, the animals were treated with LPS (0.33 mg / kg, ip) or vehicle (0.9% saline solution, SAL), for construction of four experimental groups: SED-SAL (N=25), SED-LPS (N=24), RW-SAL (N=13) and RW-LPS (N=19). There weren't deaths induced by exercise or LPS. All animals were subjected to behavioral tasks followed by death (cervical dislocation) for dissection of quadriceps muscle, prefrontal cortex and hippocampus. RESULTS AND DISCUSSION. Adherence to RW exercise was 45.1 ± 5%. After 4 hours of treatment, LPS increased the concentration of IL-1β and IL-6 in the prefrontal cortex of mice, but not in the hippocampus. Exercise attenuated neuroinflammatory effects of LPS. LPS also decreased the concentrations of dopamine (DA) and its metabolite 3,4-dihydroxyphenylacetic (DOPAC) in the prefrontal cortex, which was partially attenuated by exercise. Exercise decreased the DOPAC/DA ratio in the prefrontal cortex of SAL- and LPS-treated mice. LPS-treated mice showed impaired locomotion in the open field: distance, rearings and speed (average and maximal). Exercise attenuated the sickness behavior and improved locomotion the LPS-treated mice. CONCLUSIONS**.** These data reinforce the anti-inflammatory effects of exercise on brain cortex of mice.

Keywords: neuroinnflammation; sickness behavior; exercise

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