Maternal Exercise Improves Antioxidant Defenses in Brain of Young Wistar Rats

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Physical exercise during pregnancy has been considered beneficial to mother and child. Recent studies showed that maternal swimming improves offspring's learning and memory, increases hippocampal neurogenesis and levels of neurotrophic factors in rats. The objective of this study was to investigate the effect of maternal swimming previous and during pregnancy on oxidative stress parameters in offspring’s brain. Adult female Wistar rats were distributed in one of the following groups: control, conditioned, trained, or conditioned+trained. The conditioned rats were submitted to five sessions of swimming (30 min/day) prior to mating with adult male rats. Trained rats were submitted to five sessions of swimming/week during all the gestational period. The litter was sacrificed in the 7th-day-of-life, and the cerebellum, striatum, parietal cortex and hippocampus were dissected. We performed the dichlorofluorescein assay, and measure antioxidant status, evaluating the activities of superoxide-dismutase (SOD), catalase (CAT) and glutathione-peroxidase (GPx), as well as non-enzymatic antioxidant potential. Our results showed that maternal exercise prior and during pregnancy increased reactive species levels in cerebellum, parietal cortex and hippocampus. SOD activity was increased in parietal cortex of rats delivered from mothers trained and conditioned+trained. CAT and GPx activities, as well as non-enzymatic antioxidant potential, were increased in cerebellum, parietal cortex and hippocampus of rats whose mothers were submitted to exercise prior and during pregnancy. Striatum was not affected by maternal exercise. In conclusion, maternal exercise induced a neurometabolic programming in the offspring's brain. Whether confirmed in humans, this outcome could bring benefit against neuro-oxidative stress related-diseases.

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