

Mothers who exercise during pregnancy can prevent their children from havin

Study analyzes the effects of gestational swimming of rats on baby health and the potential for prevention of activity against hypoxia-ischemia

Reporting: *Vinicius Rodrigues Dutra*

Neonatal hypoxia-ischemia, which is an event that causes damage to the central nervous system, occurs when there is a reduction in the supply of oxygen to the brain. It is one of the major causes of neurological damage in preterm newborns, leading in 50% of these cases to chronic deficiencies and permanent brain damage, such as cerebral palsy, attention deficit hyperactivity disorder (ADHD). Among babies born at term, that is, they are not preterm, the incidence of hypoxia-ischemia is 1.5 per thousand births, a number that increases among preterm babies.

In his postdoctoral studies, conducted at the Postgraduate Program in Biochemistry at the Universidade Federal do Rio Grande do Sul (UFRGS), neuroscientist [Eduardo Sanches](#), aided by PhD student [Luz Elena Carabali](#), analyzes whether the swimming during pregnancy alters the offspring's brain development and decreases the damage caused by hypoxia-ischemia lesions. The study was conducted in the Neuroprotection and Neurometabolic Diseases and Brain Ischemia Laboratories, coordinated by Professors [Angela Wyse](#) and [Carlos Alexandre Netto](#), respectively, and their results are described in the article [Pregnancy swimming causes short and long-term neuroprotection against hypoxia-ischemia in very immature rats](#), highlight of its edition in *Pediatric Research*, magazine of the group *Nature*. In fact, the research shows that the offspring of mothers who used to swim during pregnancy had a lower cognitive deficit, presenting a reduction in the size of the hypoxic-ischemic lesion and a decrease in the negative characteristics that the lesion induces.

In the study, 12 female Wistar rats were used, which were divided into two groups: swimmer and sedentary. The first group was submitted to 20 minutes of daily swimming during the 21 days of the gestational period, while the second group remained in a box, without exercises, for the same period. After the birth, a brain lesion was made with the offspring of both groups to obstruct an artery, so limiting the oxygen supply of the brain and generating a hypoxic atmosphere in its encephalon during a certain time. Animals without lesions were maintained in both groups to the control group. Henceforth, several tests were conducted to compare the possible effects of swimming on the protection of the offspring's brains.

Some of the animals underwent behavioral tests. Throughout the lactational phase, memory and reflexes were tested, such as in the straightening test, in which the rats were placed belly up and time was set for them to turn around, or in the Morris water maze, where they should be guided by what they remembered about the environment to find a platform in a water tank. The offspring of mothers which swam had a performance considerably better in tests compared to the offspring of sedentary mothers.

Another group of the rats underwent a biochemical analysis. They were euthanized between 24 and 48 hours after the injury then they had their brains examined, especially the hippocampal region and the cerebral cortex. The activities of Na⁺/K⁺-ATPase (sodium and potassium ionic pump) were investigated, for hypoxia-ischemia causes a decrease in the energy supply of the brain and in the function of this pump, which is important for the maintenance of the brain. In addition, the levels of BDNF (Brain Derived Neurotrophic Factor) were also evaluated, because BDNF – a mechanism responsible for cell survival – is believed to be encouraged by physical exercise, being. In both analyzes, the animals whose mothers had undergone physical exercises had a lower reduction of Na⁺/K⁺-ATPase activity and higher levels of BDNF compared to the animals in the sedentary group, a result which demonstrates that the central nervous system of these animals responds



Studies show that benefits of physical exercise are transgenerational - Photo: Arrondissement de Villeray Saint Michel Parc Extension CC BY-ND 2.0

better in the case of damage.

Eduardo Sanches recalls that BDNF is an important factor in the prevention of several diseases and that physical exercise is recommended to prevent neurodegenerative diseases, such as Alzheimer and metabolic disorders (such as stroke and hypoxia-ischemia itself). The group chose swimming because it presents better results than treadmill exercise, for example, in which the animal only exercises if it wants, whereas in swimming it has no choice. However, the researcher points out those clinical studies demonstrate that the benefits of any physical exercise are generally transgenerational – if the parents exercise, their children will gain as a result. "It's a simple and inexpensive strategy compared to a treatment if the child has any problem during parturition," he says.

Translated by Marcelo Viana Soares, under the supervision and translation revision of Professor Elizamari R. Becker (PhD/UFRGS).

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