

Physical exercise modulates iron in Alzheimer's disease

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PET scan of a human brain with Alzheimer's disease. Credit: public domain

A recent experimental study shows how regular physical exercise modulates iron metabolism in both the brain and the muscles. The findings also help to better understand the benefits of exercise in

Alzheimer's disease. The study was published in a special issue of the *International Journal of Molecular Sciences* titled "Redox Active Metals in Neurodegenerative Diseases: Therapeutic Implications."

Dysregulation of brain [iron metabolism](#) and iron accumulation is known to be associated with aging and AD, although underlying mechanisms remain unclear. It is known that iron load and inflammation regulate the synthesis of hepcidin, the main iron regulatory protein. In particular, the inflammation-modulating cytokine interleukin-6 (IL-6), also known to modulate brain-muscle crosstalk, is involved in the activation of hepcidin synthesis in the brain. Although regular physical exercise is known to have a beneficial effect on total body iron metabolism and anti-inflammatory action, the role of regular exercise on iron homeostasis in the brain and in the context of AD remains unclear.

The researchers used wild-type mice and 5xFAD [transgenic mice](#), modeling AD to explore the effect of regular physical exercise on the modulation of iron homeostasis. Half of the mice had unlimited use of a running wheel during the six-month experiment. The levels of iron and iron-related proteins were analyzed in the brain and skeletal muscle. The researchers also investigated the potential involvement of iron in the crosstalk between the brain and periphery upon regular exercise.

The current study demonstrates that regular physical exercise modulates iron storage and trafficking in both the brain and skeletal muscle. Moreover, this study is the first to report a reduction of cortical hepcidin in response to regular physical exercise. The results suggest that IL-6 is a key modulator of hepcidin in exercise-induced brain iron modulation. These findings illuminate the [benefits of exercise](#) in AD, and may provide new insight for [disease prevention](#) or effective treatment approaches.

More information: Irina Belaya et al, Regular Physical Exercise

Modulates Iron Homeostasis in the 5xFAD Mouse Model of Alzheimer's Disease, *International Journal of Molecular Sciences* (2021). [DOI: 10.3390/ijms22168715](https://doi.org/10.3390/ijms22168715)

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