How exercise training promotes a sound mind in a sound body

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A new study from Karolinska Institutet in Sweden shows that the same mechanisms behind the beneficial effects of exercise training on the brain also help to counteract fat and to strengthen the immune system.

The results, which are published in the journal *Cell Metabolism*, can ultimately give rise to new obesity and diabetes drugs.

In 2014, researchers at Karolinska Institutet reported that they had discovered a mechanism behind the beneficial effect of exercise training on the brain. A follow-up study now demonstrates that the same process also boosts fat metabolism and strengthens the anti-inflammatory properties of the immune system.

"We've linked the two parts of the expression 'sound mind, sound body'," says Jorge Ruas, principal investigator at the Department of Physiology and Pharmacology, Karolinska Institutet. "Our research adds to the understanding of why exercise training benefits the body and in the long run can lead to the development of new treatments for obesity or diabetes."

In the earlier study, the researchers were able to show that trained muscles help to clean the blood in a way similar to the kidneys and liver. Through exercise training, the muscles can convert the stress marker kynurenine into kynurenic acid. High levels of kynurenine have been measured in people with depression and mental illness.

For this present study, the researchers further examined the function of kynurenic acid. Using mice fed on a fat-rich diet that made them overweight and raised their blood sugar levels, they found that a daily dose of kynurenic acid stopped the mice putting on weight and gave them better glucose tolerance, despite no change in their food intake.

The researchers posit the explanation that kynurenic acid activated the cell receptor GPR35, which is found in both fat cells and immune cells. This led in the former to a conversion of white fat into energy-burning brown fat, and in the latter to an enhancement of their anti-inflammatory properties.

"We've shown that kynurenic acid prevents weight gain despite excessive energy intake," says Dr Ruas. "Our next step is to identify the complex chain of interacting molecules that's affected by diet and training."

More information: "Kynurenic acid and GPR35 regulate adipose tissue energy homeostasis and inflammation" *Cell Metabolism* (2018). www.cell.com/cell-metabolism/f … 1550-4131(18)30053-6

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