

TMS TRENDS

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THIS IS YOUR BRAIN ON EXERCISE

Spring is here. There is no better time to help fight depression naturally with regular exercise. People who exercise have better mental fitness, and a new imaging study from UC Davis Health System shows why. Intense exercise increases levels of two common neurotransmitters – glutamate and gaba-aminobutyric acid, or GABA – that are responsible for chemical messaging within the brain.

Published in The Journal of Neuroscience, the finding offers new insights into brain metabolism and why exercise could become an important part of treating depression and other neuropsychiatric disorders linked with deficiencies in neurotransmitters, which drive communications between the brain cells that regulate physical and emotional health.

“Major depressive disorder is often characterized by depleted glutamate and GABA, which return to normal when mental health is restored,” said study lead author Richard Maddock, professor in the Department of Psychiatry and Behavioral Sciences. “Our study shows that exercise activated the metabolic pathway that replenishes these neurotransmitters.”

Maddock continues, “From a metabolic standpoint, vigorous exercise is the most demanding activity the brain encounters, much more intense than calculus or chess, but nobody knows what happens with all that energy. Apparently, one of the things it’s doing is making more neurotransmitters.”

The striking change in how the brain uses fuel during exercise has largely been overlooked in brain health research. While the new findings account for a small part of the brain’s energy consumption during exercise, they are an important step toward understanding the complexity of brain metabolism. The research also hints at the negative impact sedentary lifestyles might have on brain function, along with the role the brain might play in athletic endurance.

To understand how exercise affects the brain, the team studied 38 healthy volunteers. Participants exercised on a stationary bicycle. To measure glutamate and GABA, the researchers conducted a series of imaging

studies using a powerful 3-tesla MRI. The researchers measured GABA and glutamate levels in two different parts of the brain immediately before and after three vigorous exercise sessions lasting between eight and 20 minutes, and made similar measurements for a control group that did not exercise. Glutamate or GABA levels increased in the participants who exercised, but not among the non-exercisers. Significant increases were found in the visual cortex, which processes visual information, and the anterior cingulate cortex, which helps regulate heart rate, some cognitive functions and emotion. While these gains trailed off over time, there was some evidence of longer-lasting effects.

“It’s preliminary information, but it’s very encouraging,” said Maddock. These findings point to the possibility that exercise could be used as an alternative therapy for depression. This could be especially important for patients under age 25, who sometimes have more side effects from selective serotonin reuptake inhibitors (SSRIs), anti-depressant medications that adjust neurotransmitter levels.

A BRAIN TEASER TO CHALLENGE YOUR MIND

Only changing one letter at a time, find three words that take you from “CART” to “BAKE”.

CART

BAKE

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cart
card
care
cake
bake