Why exercise gets on your nerves

It’s not only the muscles that experience fatigue during exercise. It happens to our nerve cells too. New study uncovers the dual role of serotonin.

Most of us know the feeling where the body stops cooperating with the mind when it’s fatigued. Your pace goes down and the agility in your movements starts to disappear. No matter how much you tell yourself to up the pace, nothing happens. Your muscles no longer obey your orders. They are fatigued.

But it’s not only the muscles that are fatigued – so, too, are the nerve cells in the spinal cord.

A new Danish study now argues that this so-called neural fatigue is caused by the neurotransmitter serotonin, which is involved with everything from sex drive to muscle contractions.

The dual role of serotonin

When small amounts of serotonin are released in the spinal cord, it strengthens the brain’s signals to the muscles and the legs start running.

But when too much serotonin is released in the spinal cord, it gets difficult for the brain’s signals to reach the legs, which then start to feel heavy.

"It’s long been known that serotonin strengthens the signalling from the brain to the muscles. However, some studies have shown that serotonin can also cause fatigue. Our results show how serotonin can have this dual role,” says one of the researchers behind the study, Associate Professor Jean- François Perrier of Copenhagen University’s Department of Neuroscience and Pharmacology.

The findings have just been published in the journal *PNAS*.

May help cerebral palsy patients

Since the researchers have identified how serotonin can inhibit the brain’s signals to the muscles, this may open up for new targets in the treatment of conditions such as spasticity.

“Spastic movement is characterised by certain neurons being extraordinarily sensitive to signals from the brain and responding dramatically to them by activating the muscles in a spastic movement,” says Perrier.

“Here it may be possible for us to create new forms of treatment by exploiting some of the mechanisms in which serotonin makes the muscles relax.”

The new findings may also explain why many people on antidepressants often feel drained of energy:
“Many antidepressants such as Prozac and Citalopram work by blocking the reuptake of serotonin. This results in the spinal cord being flooded with serotonin, which blocks the brain’s signals to the muscles. This causes the feeling of muscle fatigue,” says Florence Cotel, another Copenhagen University researcher involved in the project.

Read the Danish version of this article at videnskab.dk [13]

Fact box

Serotonin is involved in a long series of the body’s mechanisms.

In addition to muscle contractions, serotonin is also involved in the regulation of mood, sleep, appetite, sex drive, memory, learning and intestinal movements.

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Florence Cotel


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