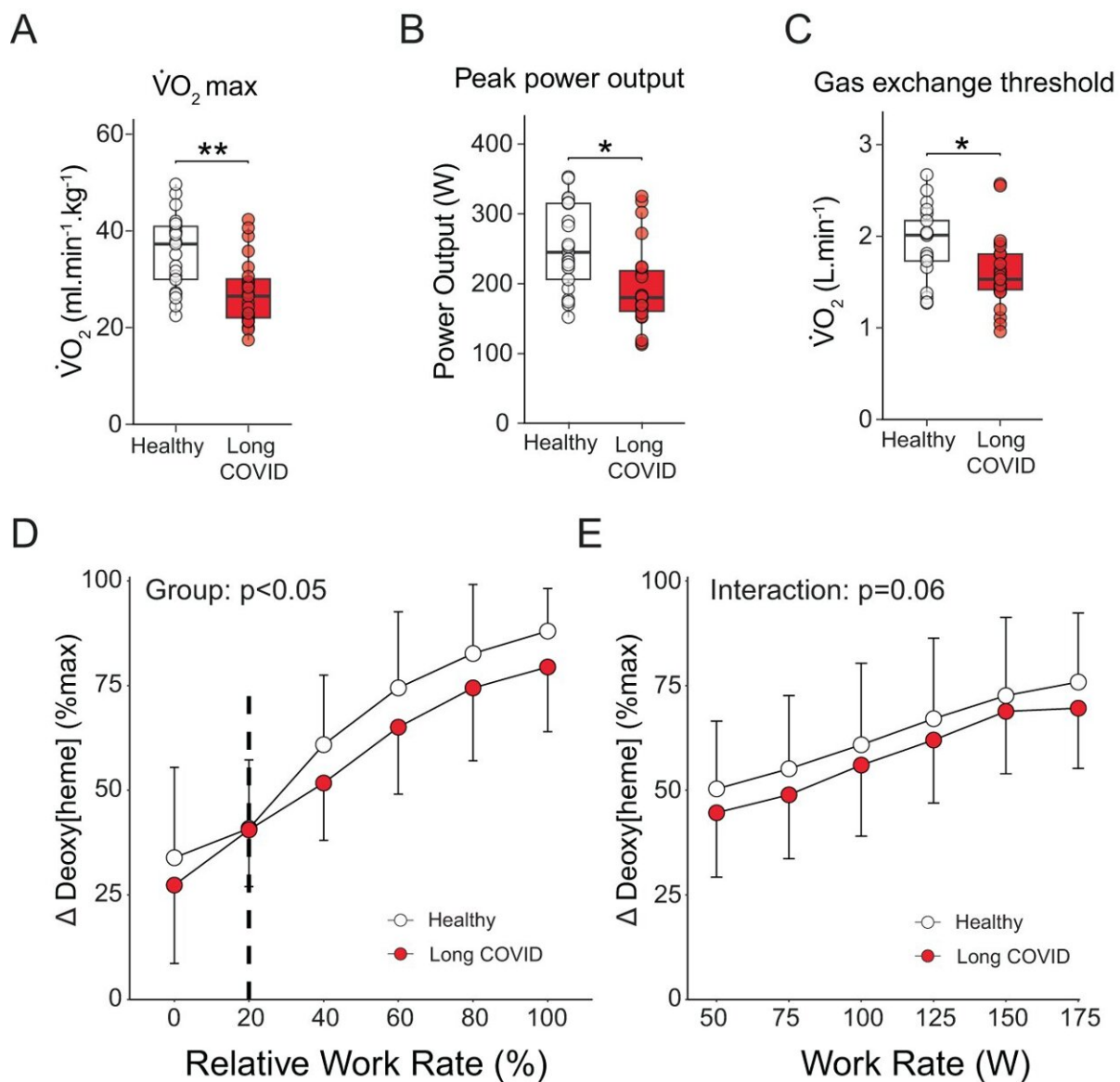


Researchers discover that tiredness experienced by long COVID patients has a physical cause

January 4 2024



Credit: *Nature Communications* (2024). DOI: 10.1038/s41467-023-44432-3

Researchers from Amsterdam UMC and Vrije Universiteit Amsterdam (VU) have discovered that the persistent fatigue in patients with long COVID has a biological cause, namely mitochondria in muscle cells that produce less energy than in healthy patients. The results of the study were [published](#) in *Nature Communications*.

"We're seeing clear changes in the muscles in these patients," says Michèle van Vugt, Professor of Internal Medicine at Amsterdam UMC.

A total of 25 long COVID patients and 21 healthy control participants participated in the study. They were asked to cycle for 15 minutes. This cycling test caused a long-term worsening of symptoms in people with long COVID, called post-exertional malaise (PEM). Extreme fatigue occurs after physical, cognitive, or emotional exertion beyond an unknown, individual threshold. The researchers looked at the blood and [muscle tissue](#) one week before the cycling test and one day after the test.

"We saw various abnormalities in the muscle tissue of the patients. At the [cellular level](#), we saw that the mitochondria of the muscle, also known as the energy factories of the cell, function less well and that they produce less energy," says Rob Wüst, Assistant Professor at Department of Human Movement Sciences at the VU University.

"So, the cause of the fatigue is really biological. The brain needs energy to think. Muscles need energy to move. This discovery means we can now start to research an appropriate treatment for those with long COVID," adds van Vugt.

One of the theories about long COVID is that coronavirus particles may remain in the body of people who have had the coronavirus. "We don't see any indications of this in the muscles at the moment," says Van Vugt. The researchers also saw that the heart and lungs functioned well in the patients. This means that the long-lasting effect on patient's fitness is not caused by abnormalities in the heart or lungs.

Exercising within your own limits

Exercising is not always good for patients with long COVID. "In concrete terms, we advise these patients to guard their physical limits and not to exceed them. Think of light exertion that does not lead to worsening of the complaints. Walking is good, or riding an electric bike, to maintain some [physical condition](#). Keep in mind that every patient has a different limit," says Brent Appelman, researcher at Amsterdam UMC.

"Because symptoms can worsen after physical exertion, some classic forms of rehabilitation and physiotherapy are counterproductive for the recovery of these patients," van Vugt adds.

Long COVID symptoms

Although the majority of people infected with the SARS-CoV-2 virus recover within weeks, a subgroup, estimated to be around one in eight, will get long COVID. Symptoms in patients with long COVID, post-acute sequelae or COVID or post-COVID syndrome (PCS) include severe cognitive problems (brain fog), fatigue, exercise intolerance, autonomic dysregulation, postural orthostatic tachycardia syndrome (POTS), orthostatic intolerance, and worsening of symptoms after PEM.

More information: Muscle Abnormalities Worsen After Post-Exertional Malaise in Long COVID, *Nature Communications* (2024).

[DOI: 10.1038/s41467-023-44432-3](https://doi.org/10.1038/s41467-023-44432-3)

www.nature.com/articles/s41467-023-44432-3

Provided by Amsterdam University Medical Center

Citation: Researchers discover that tiredness experienced by long COVID patients has a physical cause (2024, January 4) retrieved 25 June 2024 from

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