

How research into the coronavirus pandemic may be revealing the cause of chronic fatigue syndrome.

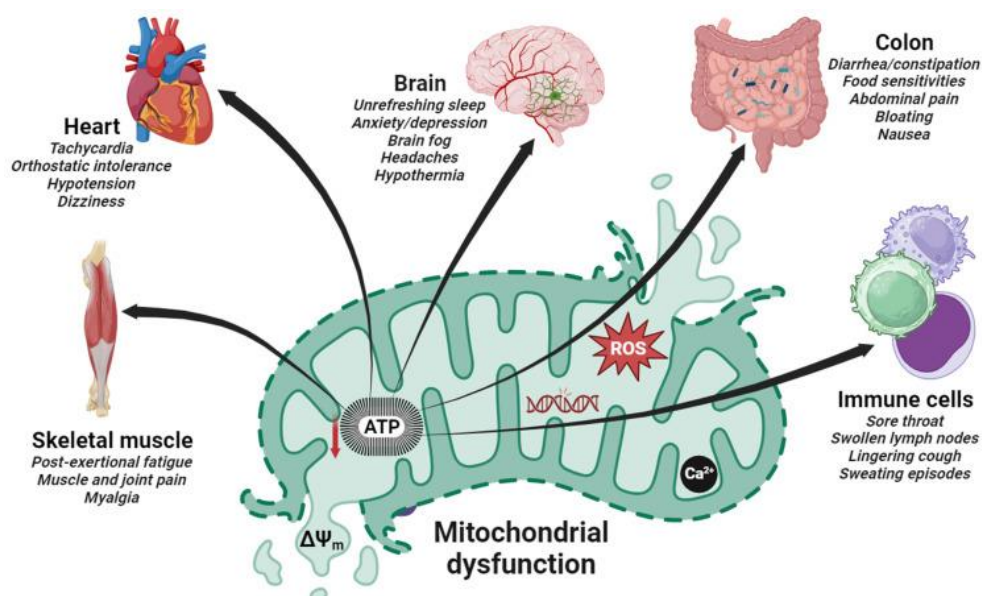
Anyone who has ever experienced a viral illness will have probably also experienced on occasions, a profound fatigue that has lasted for longer than they had expected. In extreme instances, that fatigue may last for weeks or even months. Prolonged episodes are called chronic fatigue syndrome. It is characterised by disabling post-exertional fatigue, muscle and joint pain, brain impairments, unrefreshing sleep, problems with bladder and bowel regulation, and neuropsychiatric symptoms.

It has attracted a number of names such as post-viral fatigue syndrome (PVFS), fibromyalgia, myalgic-encephalomyelitis (ME) and even been unkindly called “Yuppie Flu”. For several decades the cause has been hotly debated and even now, there is no way in which a simple test can be performed to make a definite diagnosis. There is also no effective treatment.

Lately though, there has been an accumulation of medical literature concerning mitochondrial dysfunction related to the post viral syndromes. This has greatly accelerated following the devastating effects of the coronavirus pandemic on some of the sufferers, who are now said to be experiencing the “long CoViD syndrome”.

Mitochondria are the tiny organelles that are found inside all living cells. They are thought to have been independent bacteria with their own DNA, during the early stages of evolution. At some point, they were taken up by larger organisms and began a productive coexistence. Mitochondria can generate energy from sugars like glucose which they export in the form of a molecule called adenosine triphosphate (ATP). This high energy substance is used to drive all the functions of the body from muscle contraction to processing other foodstuff and transporting useful and waste materials from one place to another.

Given their crucial role in almost every cellular function within our bodies, any disturbance in their ability to generate energy will have widespread effects from blood clotting to nerve impulses and the performance of immune cells. These and many other problems were seen in patients who either died from CoViD or became severely ill for long period, after they were infected.



The illustration shows the range of effects caused by reductions in energy (ATP) production after a virus infects our cells and interferes with mitochondrial functions. Reactive oxygen species are highly reactive chemicals of various types that interfere with our cells in ways that can cause inflammation and damage our DNA. The mitochondrial membrane potential ($\Delta\Psi_m$) is an essential component in the process of energy storage. When this fails, energy production declines and we experience fatigue.

Attention is now focused on ways in which to identify mitochondrial dysfunction reliably and help doctors distinguish genuine chronic fatigue cases, after viral illnesses. Treatments to restore mitochondrial energy generation are also being sought.

Dr Peter Smith. April 2024

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Mitochondrion 54 (2020) 1–7

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