High fat diet may help dysfunctional mitochondria

By ACSH Staff — July 2, 2015

Mitochondrial disease is essentially a disease that impacts how our bodies produce energy. Mitochondria are quite literally the energy factories in most of our cells, they are an integral part in how we convert lots of different food sources into a common energy currency, adenosine triphosphate (ATP), that can be used in the brain or the liver or wherever it is needed.

Given its importance, any disease that impacts how we use energy is devastating.

Mitochondria work by combining food with oxygen. Oxidation can be good, like when a car burns gasoline, or it can be bad, like when a car rusts. Because mitochondria are used in all organs, a mild or severe case of mitochondrial disease will impact organs to varying degrees. It can affects 1 in 5,000 people so science is researching how to prevent, like with transplants during the fertilization process (so-called Three Person IVF) and after a person is born.

![Image](https://www.acsh.org)

In young but rapidly aging mice, high-fat diet feeding (right) ramps up heat production and metabolic activity relative to cooler mice fed a normal chow diet (left). Image: Courtesy of the Salk Institute for Biological Studies

There may be some hope, according to a new study in mice - a hormone called FGF21, an "anti-aging" gene, assists mitochondria that are functioning poorly by letting them burn fat instead of sugar. But when the fat runs out, problems still occur. Yet on a high-fat diet, the effect is dramatic, the hormone causes dysfunctional mitochondria to behave more like normal ones.

It isn't a cure for mitochondrial disease, but it may make it manageable, like diabetes.

Citation: Christopher E. Wall, Jamie Whyte, Jae M. Suh, Weiwei Fan, Brett Collins, Christopher Liddle, Ruth T. Yu, Annette R. Atkins, Jane C. Naviaux, Kefeng Li, Andrew Taylor Bright, William A. Alaynick, Michael Downes, Robert K. Naviaux, and Ronald M. Evans High-fat diet and FGF21 cooperatively promote aerobic thermogenesis in mtDNA mutator mouse PNAS June 29, 2015,