

# Well-functioning fat may be the key to fewer old-age ailments

February 17 2022

---



Anders Gudiksen and one of the participants. Credit: Anders Gudiksen, University of Copenhagen

Fat tissue plays an important role in human health. However, our fat tissue loses function as we age, which can lead to type 2 diabetes, obesity, cancer and other ailments. High levels of lifelong exercise seem to counteract this deterioration. This, according to research at the University of Copenhagen, where biologists studied the link between aging, exercise and fat tissue function in Danish men.

How well does your fat function? It isn't a question that one gets asked very often. Nonetheless, research in recent years suggests that the function of our [fat tissue](#), or adipose tissue, is central to why our bodies decay with age, and strongly linked to human diseases like diabetes 2, cancer as obesity often develop and fat cells undergo functional changes as we get older. Thus, overall health is not just influenced by the amount of fat we bear, but about how well our fat tissue functions.

A new University of Copenhagen study demonstrates that even though our fatty tissue loses important function with age, a high volume of exercise can have a significant impact for the better.

"Overall health is closely linked with how well our fat tissue functions. In the past, we regarded fat as an energy depot. In fact, fat is an organ that interacts with other organs and can optimize metabolic function. Among other things, fat tissue releases substances that affect muscle and brain metabolism when we feel hungry and much more. So, it's important that fat tissue works the way it should," explains Assistant Professor Anders Gudiksen of the University of Copenhagen's Department of Biology.

## **Fat cell function worsens with age**

Gudiksen and a group of colleagues looked at the role of age and physical training in maintaining fat tissue function. Specifically, they studied mitochondria, the tiny power plants within fat cells.

Mitochondria convert calories from food to supply cells with energy. To maintain the life processes within cells, they need to function optimally.

The researchers compared mitochondrial performance across a range of young and older untrained, moderately trained and highly exercise trained Danish men. The results demonstrate that the ability of mitochondria to respire—i.e., produce energy—decreases with age, regardless of how much a person exercises. However, Anders Gudiksen explains:

"Although mitochondrial function decreases with age, we can see that a high level of lifelong exercise exerts a powerful compensatory effect. In the group of well-trained [older men](#), fat cells are able to respire more than twice as much as in untrained older men."

## **More training means less waste in cells**

Just as a car engine produces waste when converting chemical to usable energy, so do mitochondria. Mitochondrial waste comes in the form of oxygen free radicals, known as ROS (Reactive Oxygen Species). ROS that isn't eliminated damages cells and the current theory is that elevated ROS can lead to a wide range of diseases including cancer, diabetes, cardiovascular disease and Alzheimer's. Therefore, the regulation of ROS is important.

"The group of older people who train most form less ROS and maintain functionality to eliminate it. Indeed, their mitochondria are better at managing waste produced in [fat cells](#), which results in less damage. Therefore, exercise has a large effect on maintaining the health of fat tissue, and thereby probably keeping certain diseases at bay as well," says Gudiksen.

The researchers can also see that the older participants who exercised

most throughout life have more mitochondria, allowing for more respiration and, among other things, an ability to release more of the fat-related hormones important for the body's energy balance.

"Our results show that you can actually train your fat tissue to a very high degree—but that you needn't cycle 200km a week to achieve a positive effect. What you shouldn't do, is do nothing at all," concludes Anders Gudiksen, who hopes that the research world will focus more on what people can do to maintain the health of their fatty [tissue](#).

The next step for the UCPH researchers will be to investigate where exactly cellular damage occurs when people don't exercise and what impact this has on the body as a whole over time. Concurrently, the researchers are exploring ways to pharmacologically manipulate the mechanism in the mitochondria that converts calories into heat instead of depositing calories as fat, in turn lowering the production of the harmful oxygen radicals.

## About the study

- Study subjects were 20-32-year-old untrained men and 62-73-year-old men, who throughout their lives were either untrained, moderately trained or highly trained. All men were healthy, unmedicated and had a BMI below 30.
- The researchers suggest that the study estimates are conservative as the participants are unlikely to represent the population as a whole, where a higher proportion of people are probably in poorer physical shape and suffer from health problems than the participants recruited. None of the study's older participants took prescription medication, whereas a large proportion of the population in this age group otherwise does.
- The [scientific paper](#) about the study is published in *The Journals of Gerontology: Series A*.

- The study was conducted by Anders Gudiksen, Albina Qoqaj, Stine Ringholm and Henriette Pilegaard of the Department of Biology, Jørgen Wojtaszewski of the Department of Nutrition, Exercise and Sports, and Peter Plomgaard of the Department of Clinical Medicine at the University of Copenhagen.

**More information:** Anders Gudiksen et al, Ameliorating Effects of Lifelong Physical Activity on Healthy Aging and Mitochondrial Function in Human White Adipose Tissue, *The Journals of Gerontology: Series A* (2021). [DOI: 10.1093/gerona/glab356](https://doi.org/10.1093/gerona/glab356)

Provided by University of Copenhagen

Citation: Well-functioning fat may be the key to fewer old-age ailments (2022, February 17) retrieved 7 May 2024 from <https://medicalxpress.com/news/2022-02-well-functioning-fat-key-old-age-ailments.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.