Research finds higher disease protection in fat cells in females

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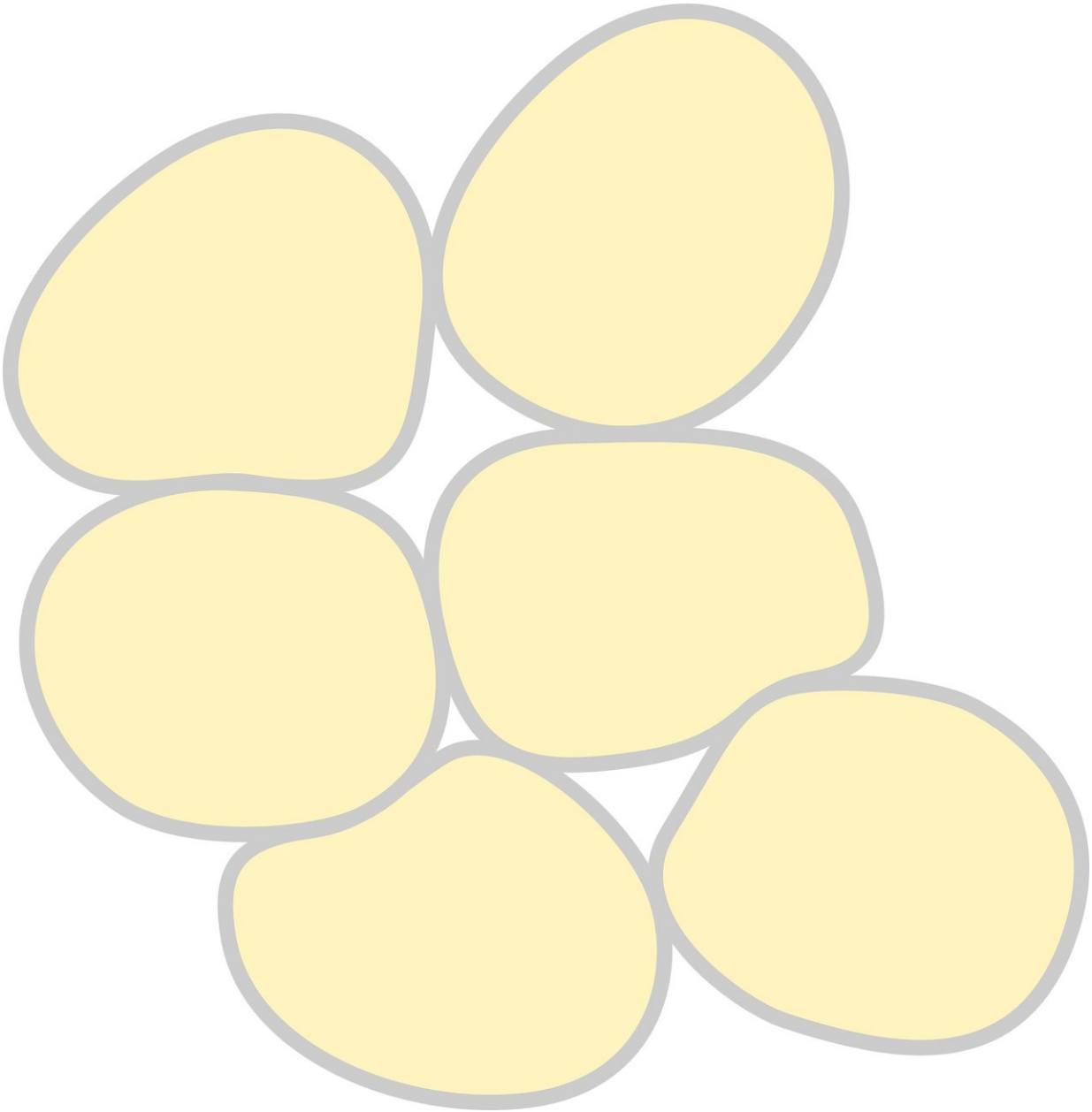

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Research from the University of Cincinnati finds a higher presence of mitochondria in fat tissue in females. The research suggests this provides women protection against obesity and metabolic diseases. The study was published in *Nature Metabolism*.

Mitochondria, explains Karthickeyan Chella Krishnan, Ph.D., assistant professor in the Department of Pharmacology and Systems Physiology in the UC College of Medicine, produce energy in cells in the body.

In research with animal models, Chella Krishnan discovered differing levels of mitochondria depending on the sex of the animal. His team also found the same result in humans as well.

"Using both mouse and human population, we found that the female's adipose tissue, or fat tissue, had more mitochondria than the male fat tissue," says Chella Krishnan. "We found that it's not only the number, even the genes that are expressed are associated with mitochondria, they were higher. We also found that the function was also higher. We believe this gets translated into metabolic diseases, meaning pre-menopausal females are mostly protected from metabolic diseases."

This research identified a mitochondrial gene, Ndufv2, that may be responsible for that protection. Chella Krishnan says just like other genes, this one is found in higher amounts in females and associated with lower obesity and lower incidence of complications from obesity including diabetes, high blood glucose and blood insulin levels and high cholesterol levels.

"Our research shows a statistical significance of protection against obesity," says Chella Krishnan. "We found that this is due to reactive oxygen species (ROS) generation. ROS is usually thought to be bad, but the problem there is the focus on pathological ROS. We found this ROS generation at a physiological level is good because it acts as a signal to increase mitochondrial biogenesis in the females resulting them not being obese. However, the males remained obese."

The human data used in this study came from cohorts in Finland and Sweden. Chella Krishnan says he hopes the findings prompt researchers to include more females in their studies.

"This would at least make them understand that you have to include both sexes in research, including pre-clinical and clinical studies," he says. "Most of the studies that have been published so far have been done only on males. Including both sexes will complete the picture."

More information: Karthickeyan Chella Krishnan, Sex-specific genetic regulation of adipose mitochondria and metabolic syndrome by Ndufv2, *Nature Metabolism* (2021). DOI: 10.1038/s42255-021-00481-w

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