Website address:
https://www.gesundheitsindustrie-bw.de/en/article/press-release/fat-cells-are-guardians-our-health

Fat cells are the guardians of our health

Researchers at the Universities of Cologne and Stuttgart have discovered a natural defense system that keeps fat cells healthy and helps to protect against diabetes, liver disease, and aging. Their study has been published in Science Advances.

Researchers have discovered part of the answer to why some people with obesity or diabetes develop fatty liver disease while others remain healthier. They showed that fat cells have their own protective mechanism that prevents them from dying prematurely under stress. If this mechanism fails, the fat cells disintegrate. This can lead to tissue damage, inflammation and serious metabolic disorders. The results were published under the title 'Linear ubiquitination prevents lipodystrophy and obesity-associated metabolic syndrome' in *Science Advances*. Researchers from the Universities of Cologne and Stuttgart were involved.

Protein complex carries out the protective mechanism

The protective mechanism, referred to as linear ubiquitination, is carried out by a protein complex called linear ubiquitin chain assembly complex (LUBAC). When LUBAC is intact, it allows fat cells to survive and helps to keep organs like the liver healthy. Without this protection, fat cells die and healthy fat tissue is lost. This process occurs not only in obesity, but also in rare disorders called lipodystrophies, which lead to similar complications, such as diabetes and fatty liver disease.

Also important during the aging process

The study also shows that this protective mechanism provided by the protein complex is important during the ageing process, when the gradual decline in adipose tissue health contributes to age-related metabolic diseases. Fortunately, the researchers were able to prevent these harmful effects in experimental models by blocking the main trigger responsible for the death of fat cells. This was even possible with a high-fat diet. Analysis of data from over 1,000 obese patients confirmed the findings: people with stronger fat cell protection had healthier livers and better blood sugar control.

Obesity affects over 650 million people worldwide and is one of the main causes of type 2 diabetes and fatty liver disease.

New approach to understanding and protecting metabolic health

By keeping fat cells alive and functional, it may be possible in future to prevent the consequences of their death. "Our work shows that fat cells are more than just storage units in the body – they are the guardians of our health. The discovery that fat cells have their own natural defence system opens up a new approach to understanding and protecting metabolic health," says Professor Dr Nieves Peltzer, lead author of the publication. First author Ximena Hildebrandt adds: "Fat cells can actually 'communicate' with their environment and protect themselves against stress. What was once thought to be merely harmful inflammation may actually be a protective mechanism that helps to maintain healthy fat. This new perspective could lead to better ways of preventing obesity-related health problems."

The new can be applied beyond obesity

According to the authors of this study, it is important to note that these findings can be applied beyond obesity: they can help patients with lipodystrophy who have missing or damaged fatty tissue. They also provide information on how the health of fat cells influences the ageing process. As fatty tissue gradually decreases with age, strengthening this protective mechanism could contribute to healthier ageing and help reduce the burden of metabolic diseases later in life.

Publication:
Linear ubiquitination prevents lipodystrophy and obesity-associated metabolic syndrome. Ximena Hildebrandt, Önay Veli, Armel Hyoubi, Julia Zinngrebe, Ali T. Abdallah, Julian Rodefeld, Anne Hoffmann, Liane Gardeweg, Öykü Kaya, Elena Wagner, Andreas Lindhorst, Matea Poggenberg, Yuan Wang, Joëlle Dimmler, Jutta

Schillings, Pegi Koci, Francesca Bonechi, Lucas Valdez Capuccino, Christine Kiefer, Konstantinos Kelepouras, Adhideb Ghosh, Falko Noé, Christian Wolfrum, Michael Singer, Gianmaria Liccardi, Tom Luedde, Aslihan Yavas, Ahmed Ghallab, Jan G. Hengsler, Philipp Antczak, Martin Gericke, Holger Winkels, Matthias Blüher, Henning Walczak, Alessandro Annibaldi, Pamela Fischer-Posovszky and Nieves Peltzer. Linear ubiquitination prevents lipodystrophy and obesity-associated metabolic syndrome. Science Advances. 17 Sep 2025. Vol 11, Issue 38.
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Further information

Contact:

Prof. Dr. Nieves Peltzer
Institute of Biomedical Genetics
University of Stuttgart
Phone: +49 (0) 711 685 65728

- University of Stuttgart