

Researchers reveal one reason why fat cells fail

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Yale University researchers have found one of the mechanisms that cause fat cells to lose their ability to efficiently store and use energy -- a scientific mystery and a phenomenon that contributes to a major public health problem.

The Yale team discovered a mechanism that allows cellular fat droplets to expand when excess [metabolic energy](#) is present -- i.e., when the body has taken in more food than it can burn off -- helping them to take in [fatty acids](#), the end products of our meals. The obese suffer a myriad of health problems when [fat cells](#) can no longer do this job. The scientists report their findings in the Oct. 5 issue of the journal [Cell Metabolism](#).

"Dozens of things go wrong at the same time when cells are overwhelmed by excess fat storage, and the million-dollar question is: Which of these factors cause the breakdown of cellular balance?" said Tobias Walther, associate professor of [cell biology](#) and senior author of the study.

Walther's lab and collaborators at the Gladstone Institutes in San Francisco discovered that an enzyme within cells senses tension at the surface of the expanding fat droplets. This triggers the production of more surface components of fat droplets, enabling them to expand and accommodate more fatty acids without adverse consequences. This process is crucial for the fat cells' ability to remain in harmony with their environment.

"Without this mechanism, fat droplets within cells where energy is stored undergo quick expansion and form one big glump," rather than individual droplets, Walther said.

Walther said there are probably many such mechanisms that regulate intake and expenditure of energy as we take in food.

"The cells must balance fluctuations in [energy](#)

[availability](#), and we are exploring other mechanisms that help maintain this dynamic storage capacity," he said.

"By showing exactly how our cells are supposed to store individual fat molecules, our research offers clues about what happens when things go awry and fat accumulates in the body," said Dr. Robert Farese, Jr. a senior investigator at the Gladstone Institutes.

Provided by Yale University

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