

Cell dysfunction linked to obesity and metabolic disorders

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By measuring the radioactive isotope carbon-14, scientists at Karolinska Institutet have revealed an association between lipid cell dysfunction and diseases such as obesity, diabetes and blood lipid disorders. The study, which is presented in the journal *Nature*, can lead to new approaches to combating metabolic diseases.

The results show that fat cells in overweight people have a higher capacity for storing fats but a lower capacity for ridding themselves of them.

"One might intuitively think that this was the case," says Peter Arner, who led the study together with Kirsty Spalding. "But this is the first time that someone has demonstrated that the metabolism of fat in the fat cells differs between healthy and [obese individuals](#). This paves the way for new research fields and therapies that affect the storage and release of fat from fat cells."

The researchers used tissue samples from almost 100 people, ranging in weight from slim to massively obese. By ascertaining the age of the fat in the fat cells, they were able to draw conclusions on how the fat is stored and removed from the fat mass over time. The method for determining the age of the fat in fat cells is based on the incorporation of radioactive carbon-14 from the atmosphere into the body. Cold War nuclear testing caused a sharp increase in atmospheric carbon-14, which has gradually declined since testing stopped.

"We can use measurements of carbon-14 in fat against known levels of ^{14}C in the atmosphere to date stamp the fat," says Dr Spalding, the developer of the method for examining fat tissue and other biological samples.

The researchers concluded that the fat stored in the fat cells of healthy people is renewed on average six times during the ten years of a fat-cell's lifespan. On the other hand, people with a preliminary stage of [type II diabetes](#) ([insulin resistance](#)) showed a reduced ability to rid their fat cells of fat.

This also applied to people with familial combined hyperlipidemia, a common form of congenital [blood lipid](#) disorder associated with a high risk of coronary artery disease. These people, however, also displayed a reduced ability to store fat in their [fat cells](#). When the metabolism is upset in this way, it could mean that the concentration of triglycerides and cholesterol in the blood rises.

More information: Peter Arner, Samuel Bernard, Mehran Salehpour, Göran Possnert, Jakob Liebl, Peter Steier, Bruce A. Buchholz, Mats Eriksson, Erik Arner, Hans Hauner, Thomas Skurk, Mikael Rydén, Keith N. Frayn, Kirsty L. Spalding, Dynamics of human adipose lipid turnover in health and metabolic disease, *Nature*, online 25 September 2011, [DOI:10.1038/nature10426](https://doi.org/10.1038/nature10426)

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