



Press Release

Epigenetic Enzyme Regulates Fat Formation

Freiburg researchers demonstrate that LSD1 plays a key role in metabolic processes

The human body reacts to environmental influences like cold or nutritional imbalance through adaptation. There is a change in metabolic processes in white adipose tissue in mammals. This results in the development of brown-like or beige fat cells, which are located in white fat depots and generate heat in response to cold exposure. A team led by Prof. Dr. **Roland Schuele** and Dr. **Delphine Duteil** from the Department of Urology and the Clinical Research Center at the Medical Center – University of Freiburg demonstrated that the levels of the epigenetic enzyme lysine-specific demethylase 1 (LSD1) increase in white adipose tissue in response to environmental stimuli such as cold and that this enzyme regulates the formation of beige fat cells. Schuele is a member of the Cluster of Excellence BIOS Centre for Biological Signalling Studies of the University of Freiburg and the head of the Collaborative Research Center 992 “Medical Epigenetics,” which contributed funding to the project. The team published the findings in the online edition of the journal *Nature Communications*.

The Freiburg researchers showed that LSD1 controls genes that are crucial for the formation of fat. In experiments performed in cell culture or in mice, inhibition or the complete absence of LSD1 prevents the formation of fat. This demonstrates that LSD1 is essential for the development of white adipose tissue. Increased levels of the enzyme in mice promoted the formation of islets of beige fat in white adipose tissue. These animals reacted more strongly to cold stimuli and produced beige fat more quickly.

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They also gained less weight and did not develop type 2 diabetes when fed a high-fat diet.

Increased levels of LSD1 in cell culture stimulated the activity of mitochondria, the power plants of the cell, leading to the generation of heat. The scientists observed that LSD1 promotes the expression of genes involved in metabolic processes and the respiratory chain. In addition, LSD1 promotes the expression of and interacts with the transcription factor nuclear respiratory factor 1 (Nrf1), which activates important mitochondrial genes.

Original publication:

Duteil, D./Metzger, E./ Willmann, D./ Karagianni, P./ Friedrichs, N./ Greschik, H./ Guenther, T./Buettner, R./ Talianidis, I./ Metzger, D./ Schuele, R. (2014): LSD1 promotes oxidative metabolism of white adipose tissue. In: Nature Communications 5: 4093. doi: 10.1038/ncomms5093

Caption:

The image shows adipose tissue of mice with normal (left) or increased (right) levels of LSD1. Increased levels of the enzyme promote the formation of beige fat, causing the mice to gain less weight. Source: Delphine Duteil

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