Omega-3 fatty acids stimulate brown adipose tissue metabolism

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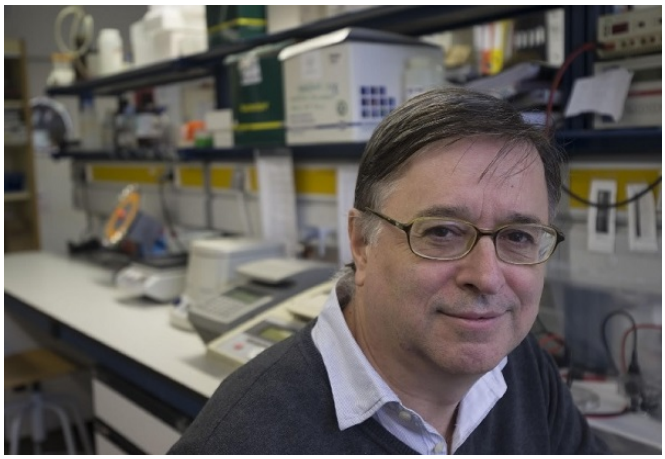

The research, led by Professor Francesc Villarroya, could open new perspectives for the treatment of diabetes, obesity and other pathologies of fat metabolism. Credit: Universidad de Barcelona

Omega-3 fatty acids are able to stimulate the activation of brown and beige adipose tissues, a discovery that would promote the development of new therapies for obesity and other metabolism diseases, according to a research study published in the journal *Nature Communications* under the supervision of Professor Francesc Villarroya, from the Department of Biochemistry and Molecular Biomedicine and the Biomedical Research Center Red-Fisiopatología de la Obesidad y Nutrición (CIBEROBN) of the Institute of Health Carlos III.

In the new study, carried out in laboratory animal models, the research team noticed that Omega-3 fatty acids (n-3 PUFAS) stimulate the activation of brown and beige adipose tissue through a specific receptor (GPR120), which enables the release of the hormone FGF21 (21 fibroblast growth factor). This hormone, built by the adipocyte, is a molecule that regulates lipid glucose and metabolism and therefore, it is an effective target for the action mechanism of Omega-3.

"This discovery has implications in the understanding of the positive effects of n-3 PUFAS on the control of metabolic diseases and other aspects regarding the treatment for obesity and type 2 diabetes," says Professor Francesc Villarroya, member of the Institute of Biomedicine of the University of Barcelona (IBUB) and head of the Research Group in Genetics and Molecular Biology of Mitochondrial Proteins and Associated Diseases.

Protection key factors to tackle obesity

The study shows that Omega-3 fatty acids enable the adaptive thermogenesis in mammals' brown adipose tissue, an essential mechanism for the adaption of the organism to cold environments. With rodents, it has been proved that the brown adipose tissue is able to create warmth and protect from obesity through the activation of energy expenditure.

According to the conclusions of the article published in *Nature Communications*, the specific receptor GPR120 for the Omega poli-unsaturated fatty acids enables the activation of brown adipose tissue, which is linked –in several scientific studies- to protection from obesity and metabolic diseases such as diabetes or dyslipemia (alterations in lipid metabolism).

The main function of brown adipose tissue is to burn calories and to make physical warmth out of fat (thermogenesis). However, a recent study by this research team has defined that brown adipose tissue also acts as an endocrine organ and can secrete factors that activate fat and carbohydrates metabolism. The most known factors up to now are FGF21, neuregulin 4 and interleukin-6, among other molecules of biological interest.

According to Francesc Villarroya, "these molecules, released by the adipose tissue (brown adipocytes or batokines) have positive metabolic effects. For this reason, they could be used in new therapies for

obesity and related metabolic diseases."

More information: Tania Quesada-López et al. The lipid sensor GPR120 promotes brown fat activation and FGF21 release from adipocytes, *Nature Communications* (2016). DOI: 10.1038/ncomms13479

Provided by University of Barcelona