Brown fat in the fight against obesity

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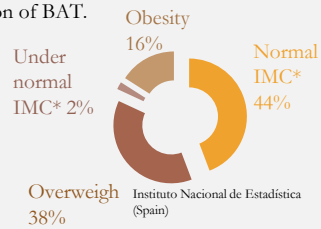
Obesity is one of the biggest problems in the actual society. In 2013, 53,7% of Spanish population had overweigh problems, percentage which is increasing every year. Due to this, the develop of a therapy against obesity is needed. In last years, a possible way of study has appeared, the stimulation of BAT.



What is BAT?

BAT are the acronym of brown adipose tissue. This tissue can be found in the interescapular zone, the perirrenal and all around the aorta. It has the ability of spend energy because of fatty acids oxidation. This ability, allows this tissue to regulate the thermogenesis process and to consume the excess of WAT (white adipose tissue), which is the responsible of obesity.

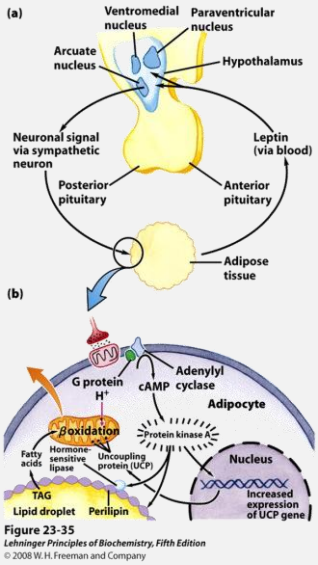


Figure 23-35
Lehninger Principles of Biochemistry, Fifth Edition
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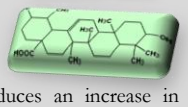
BAT effect scheme

In this scheme, is explained the classic metabolic way, responsible of the BAT thermogenic effect. As can be seen, the cells received a neuronal stimuli, that produces the activation of receptors labeled to G proteins. These G proteins, induce an activation of protein kinase A, which produce a change in the genomic transcription. Change, that allows the cell to produce UCPs. The UCPs, uncouple the electron transport chain generating an increase in the temperature and a high spending of fatty acids.

Molecules with effect on the BAT

Ursolic acid

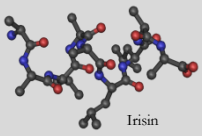

Ursolic acid

Produces an increase in the BAT volume and in the activity by the interaction with receptors (as insuline and IGF-1 receptors).

BMP8B

Increase P38 MAPK signaling and the pool of active HSL, enabling greater lipolytic activity and likely thermogenic activity in response to a given adrenergic stimulation, that induces an increase in BAT too.

PGC1-a-dep myokine


Irisin

Produce an increase in Irisin; molecule which acts on white adipose cells in culture and in vivo to stimulate UCP1 expression and a broad program of brown-fat-like development

Materials and methods

In this work, a test of each molecules is suggested. The **ursolic acid** effect would be tested adding different concentrations of this molecule, in a high fatty acids diet of a mice's group. Studies with microarrays to determine variations in the genetic expression should be done as well as histological determination of the BAT Previous studies suggest a diminution in the weigh of these animals.

In the experiments with **BMP8B,** the animals tested would consume different concentrations of this molecule in their high fatty acids diet. Because of the stimulation on the SNS; an histological study of the hypothalamus and BAT should be done, as well as microarrays and temperature determination (useful to determine the BAT activity)

Experiments with **PGC1-a-dep myokine** should be done using intramuscular injection in the mice. Histological determinations should be done in the muscle and BAT, as well as microarrays and temperature determination. Previous studies suggest a diminution in the WAT and an increase in muscle tissue and BAT.

Conclusions

As previous studies with these molecules suggest; they have a effect in the stimulation of the BAT and in its growth. More studies should be done, to have more accuracy in the results and have enough information to create a safety therapy against obesity in humans. Despite the fact that the results of these experiments don't are available yet, the use of this molecules seems to be the future of obesity treatments.

Expected results

Due to the previous studies about these molecules, a decrease in the WAT (an the consequence diminution of obesity) would appear in the experiments with the three molecules. The therapy with ursolic acid seems to be the one with more future, because is a molecule present in some vegetables. The other molecules would be used for specific patients because of are molecules that need more control; are hormone or hormone inductors.

Diffusion plan

To diffuse our investigation, our results should be exposed in different media options: science blogs, webs and online journals of science. Triptychs would be done too, and should be distributed in different investigation centers, hospital and other centers with a scientific activities. The most important diffusion option is to publish in an important journal; so we should try to publish one a high position journal of the Scientific Journal Ranking

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