

The fight against obesity -- a new insight

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With obesity still on the increase, it appears that the main weapon in the fight against it - reducing energy consumption by eating less - is ineffective. There is evident need to search for new treatment strategies dealing with the opposite aspect of the energy balance: increasing energy consumption. Researchers at Maastricht University have now found a way to increase cells' energy consumption: mitochondrial uncoupling. The findings are published in this week's *PLoS ONE*.

PhD candidate Sander Wijers and his colleagues Patrick Schrauwen, Prof. Wim Saris and Wouter van Marken Lichtenbelt have shown that this process occurs naturally in human skeletal muscle cells when exposed to mild cold. They carried out muscle biopsies on 11 lean, healthy male subjects both under normal and mild cold conditions. Their results could lead to the development of drugs that stimulate mitochondrial uncoupling, and thus contribute to obesity treatment.

Fats and sugars are broken down in the mitochondria, or energy factories of the cells. ATP - the energy source used, for example, when muscles contract and for many other cellular processes - is formed using the energy released in this process. In some cases, such as when exposed to cold, not all the energy released from sugars and fats is used to produce ATP; stored energy is used for heat, reducing the availability of ATP for cellular processes.

This phenomenon is called mitochondrial uncoupling. Fats and sugars are still broken down in the uncoupled mitochondria, but the energy released is not entirely used for cellular processes. More energy is

therefore required to carry out the same physical functions.

Further genomic and proteomic research is required to identify the proteins responsible for uncoupling in skeletal muscle mitochondria. The animal proteins UCP1, UCP2, UCP4 and UCP5 detected in tests appear not to exist in human muscle tissue. And although UCP3 is found in human muscles, it seems to be involved primarily in fatty acid metabolism, not in mitochondrial uncoupling.

Citation: Wijers SLJ, Schrauwen P, Saris WHM, van Marken Lichtenbelt WD (2008) Human Skeletal Muscle Mitochondrial Uncoupling Is Associated with Cold Induced Adaptive Thermogenesis. *PLoS ONE* 3(3): e1777. doi:10.1371/journal.pone.0001777

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