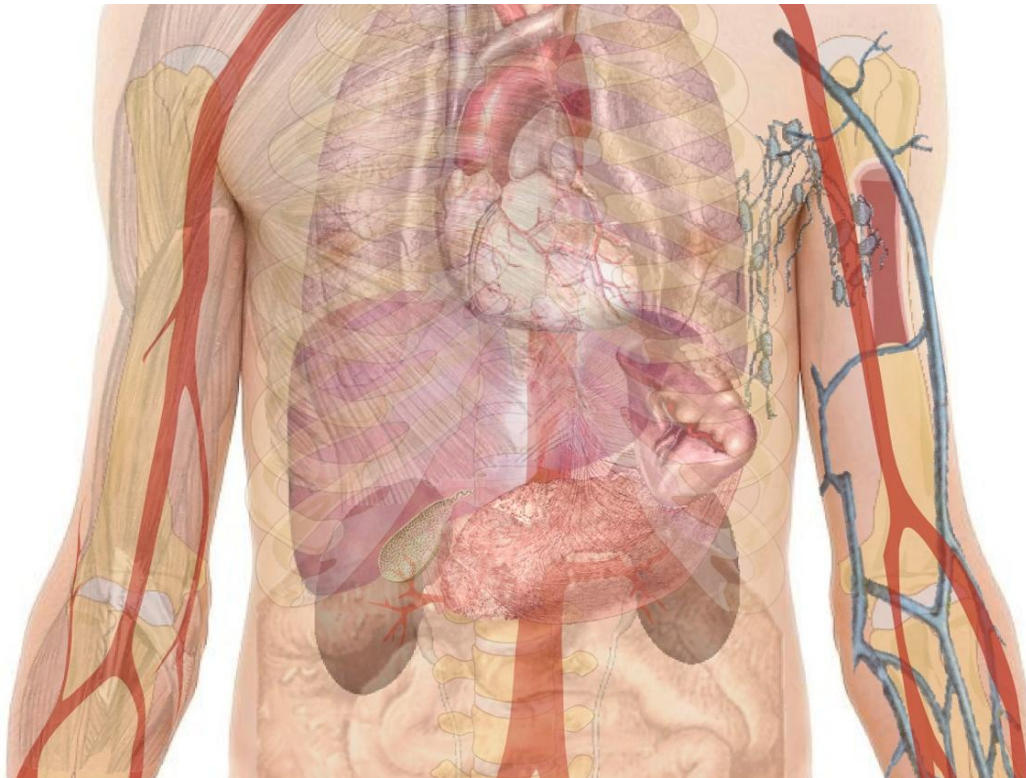


Cold can activate body's 'good' fat at a cellular level, study finds

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Lower temperatures can activate the body's 'good' fat formation at a cellular level, a new study led by academics at The University of Nottingham has found.

The research, published in the journal *Scientific Reports*, shows for the first time that the way in which fat is made within the [body](#) is not 'pre-programmed' during the early years of development as previously thought but even in adulthood cells can be influenced by our environment to change the type of fat that is formed.

The work could help us to better understand and tackle issues related to obesity and metabolism and develop new ways of controlling diseases such as diabetes.

The two-year study was led by Dr Virginie Sottile, Associate Professor in Stem Cell Biology & Cell Differentiation, and Professor Michael Symonds in the University's School of Medicine.

It centred on looking at how the body decides whether to form 'good' [brown adipose tissue](#) (BAT), which produces heat by burning fat, sugar and excess calories and helps to regulate blood sugar, or [white adipose tissue](#), the 'bad' type of fat which stores energy and accumulates, causing weight gain over time.

Brown fat is found most commonly in babies and hibernating animals as nature's way of keeping them warm while at their most vulnerable. However, in recent years scientists have discovered that a small amount of brown fat is found in adults, and that the body retains the ability to form more under certain conditions.

Dr Sottile said: "It has been known for quite some time that exposure to lower temperatures can promote the formation of brown fat but the mechanism of this has not yet been discovered. The trigger was believed to be the body's nervous system and changes in the way we eat when we are cold.

"However, our study has shown that even by making fairly modest

changes in [temperature](#) we can activate our stem cells to form brown fat at a [cellular level](#).

"The good news from these results is that our cells are not pre-programmed to form bad fat and our stem cells can respond if we apply the right change in lifestyle."

The study developed a new in vitro system made from bone marrow [stem cells](#) and studied what would happen if its ambient temperature fell below 37°C (the natural temperature of the human body). It found that when the mercury fell to 32°C, it triggered the production of [brown fat cells](#).

Dr Sottile added: "This new system gave us an advantage over previous rodent models as we could study more accurately how specifically human cells would be affected by a decrease in temperature.

"In the future, it could be used as a testing ground to rapidly screen potential treatments by looking at how specific molecules interact with the cells. We could even use patients' own [cells](#) to develop a tailored approach to finding out how we can more effectively treat them for diseases such as diabetes."

The researchers say that in the future people who are keen to make a positive impact on their weight by reducing their white fat stores and increasing their percentage of calorie-burning [brown fat](#) may not even have to brave lower temperatures to achieve this.

"The next step in our research is to find the actual switch in the cell that makes it respond to the change of temperature in its environment," said Dr Sottile. "That way, we may be able to identify drugs or molecules that people could swallow that may artificially activate the same gene and trick the body into producing more of this good fat."

More information: Ksenija Velickovic et al, Low temperature exposure induces browning of bone marrow stem cell derived adipocytes in vitro, *Scientific Reports* (2018). [DOI: 10.1038/s41598-018-23267-9](https://doi.org/10.1038/s41598-018-23267-9)

Provided by University of Nottingham

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