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Body clock link could aid obesity treatments

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Scientists at The University of Manchester have discovered that the body clock plays an important role in body fat. Their findings are helping develop new ways of treating obesity and the fatal diseases linked to being overweight.

The researchers, led by Professor David Ray, not only looked at the role of the clock in fat tissue in mice, but also collected samples from patients undergoing weight loss surgery. Fat and blood samples taken both before and after surgery allowed the researchers to compare their biochemistry. The results are published in the journal *Diabetes* today (Thursday 4 September).

Professor Ray explains what they found: "Essentially we discovered that the circadian clock, protein REVERB plays an important role in the safe accumulation of body fat. Usually as fat accumulates there is inflammation in the body which leads to diabetes and heart disease. Our research shows that this process is linked to the body clock."

The team found that REVERB affects obesity-related inflammation by regulating both a hormone that comes from fat, adiponectin, and a master regulator of inflammation A20. Mice lacking REVERB had enhanced fat storage but without the expected inflammation. They also registered higher levels of the hormone adiponectin, suggesting the hormone has an anti-inflammatory role.

Dr David Bechtold was one of the key researchers and says: "Our work demonstrates that it could be possible to switch unhealthy fat to a

healthier form by tapping into one of the elements which we discovered. We hope that would mean fewer obese people go on to develop more severe metabolic complications such as type 2 diabetes and heart disease."

As part of the study the researchers took fat and blood samples from morbidly obese patients both before and after weight loss surgery. After the surgery these people had both an increase in the hormone adiponectin in the circulation, but also the inflammation regulator A20 in fat itself. At the same time body fat was healthier, with less of the inflammation linked to diabetes and heart disease.

Professor Ray explains their findings: "Our analysis showed that in morbidly obese people who have undergone weight loss surgery the same pathway from the body clock to inflamed fat is activated. This helps explain why surgery results in rapid health improvements for obese people."

He continues: "We believe our research could open up a novel way to treat obesity without surgery. There is the potential for drug development that could stop so many people dying of obesity related diseases."

A clinical research study is now taking place at The University of Manchester, and Central Manchester University Hospitals NHS Foundation Trust led by Dr Martin Rutter to take this research further. The clinical research study is taking place at the National Institute for Health Research (NIHR)/Wellcome Trust Manchester Clinical Research Facility and The Manchester Diabetes Centre, the first centre to be established in the UK to provide specialist care and education for diabetes patients in the North West.

It is using "clock logic" to treat diabetes. Patients eat, sleep and take

medication at times that fit with their body clock in a bid to control the disease. It's hoped the study will demonstrate that strengthening our internal body clock by changing behaviour can be used to treat a condition in a similar way to drugs and surgery.

More information: DOI: 10.2337/db13-1835/-/DC1

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