

7 November 2007

By: Stefan Anitei, Science Editor



Fat Food Means Bad Sleep

An impairment of the internal circadian clock

Too much ice-cream, bacon and cheese means more than a big belly and bad cholesterol. Fat rich diets seem to also impair the body's internal clock, as found by a new research published in *Cell Metabolism*.

The fatty diet on mice induced a rapid change in their normal activity patterns: the rodents ate more during the day, when mice, nocturnal mammals, should have been asleep. All these were linked to a change in the molecules involved in the circadian clock and metabolic chemistry.

"We found that, as an animal on a high-fat diet gains weight, it eats at the inappropriate time for its sleep/wake cycle. All of the excess calories are consumed when the animal should be resting. For a human, that would be like raiding the refrigerator in the middle of the night and binging on junk food. You can begin to see changes in the animals' daily habits very rapidly—within a matter of days," said Joe Bass of Northwestern University.

There seems to be a strong connection between the circadian processes and metabolism. Bass' team and others found that Clock mutant mice overeat, turning obese.

"While the effects of the molecular circadian clock on metabolic processes have now been well documented, much less is known about how metabolic processes, such as nutrient status, may alter the circadian clock." said Bass.

His team put mice on a diet that delivered 45 % of their required calories from fat. Specialists say humans should not get more than 30 % of calorie needs from fat. In two weeks, the animals displayed important behavioral changes.

Their sleep/wake cycle prolonged, a clear sign that the brain nucleus controlling it was impaired. The mice were kept in constant darkness, thus they did not have light clues, their behavior being dictated just by their internal clocks.

In case of rodents kept in 12 hours of light and 12 hours of darkness, those fed a regular diet displayed a constant daily rhythm of food consumption and activity, 80 % of their activity and feeding taking place during the dark period.

But those on high-fat diet, in just one week, started eating more during the periods when light was on. These individuals also presented a change in the activity of main genes involved in the control of the circadian rhythm in brain nuclei, liver and fat tissue.

"The high-fat diet suppressed the activity of the core clock genes. It's not only activity and feeding that shifts, but also the molecular processes involved in metabolism. The changes appear to be global. The clock is an ancient mechanism for matching behavior to changes in the external environment that vary in accordance with the rotation of the earth, and the cycle of light and darkness. We now show that the clock is also clearly influenced by the composition of the diet." said Bass.

