

Appetite, consumption controlled by clockwork genes at cross-purposes in flies

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One of the pioneers in research on sleep:wake circadian genes, Amita Sehgal, Ph.D., has discovered that fruit flies' appetite and consumption are controlled by two rival sets of clocks, one in neurons and the other in the fly fat body, which is analogous to the liver.

These research results, which extend the [circadian clock](#) repertoire into metabolism, will be reported at the American Society for Cell Biology 49th Annual Meeting, Dec. 5-9, 2009 in San Diego.

In [fruit flies](#), *Drosophila melanogaster*, neurons and fat body tissue exert opposing effects on the storage of nutrient reserves, and thereby on food consumption and the response to starvation, explained Sehgal, Howard Hughes Medical Institute investigator at the University of Pennsylvania Medical School.

The fat [body clock](#) promotes the storage of nutrients, thereby allowing the animal to survive periods of starvation, while clocks in the nervous system deplete nutrient stores and promote feeding, most likely to replace the nutrients consumed.

Thus, Sehgal concluded that a circadian rhythm of feeding is likely controlled by the interaction of these metabolic and neuronal clocks.

To understand how [circadian rhythms](#) drive feeding and metabolism, Sehgal charted the expression levels of molecules in the fat body that are known to change over the day:night cycle.

These experiments led to the identification of several molecules that function in [lipid metabolism](#), immune response, detoxification and other different pathways.

The feedback is complicated, noted Sehgal. "We have found that metabolic signals, such as feeding, can change the expression of some of these molecules.

Thus, clocks can drive rhythms of metabolic function, and metabolic signals can affect the clock," she commented.

Circadian clocks have been around for billions of years; even organisms at the roots of the tree of life, such as bacteria, have clockwork genes. However, scientists' understanding of 24-hour circadian clocks has dawned only in recent decades when cell biologists began experimenting with the fruit fly and discovered that 24-hour cycling genes controlled its sleeping patterns.

Research has shown that clockwork genes set the pace for many human body organs, such as the liver whose clock drives rhythms in metabolic function.

Source: American Society for Cell Biology

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