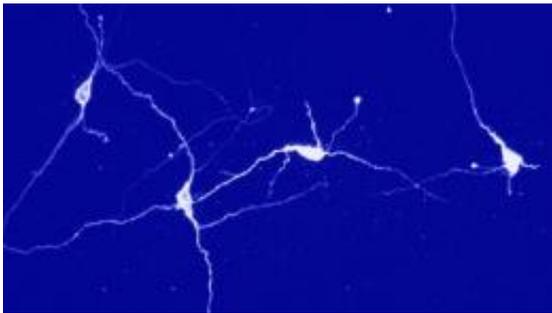


## 3 p.m. slump? Why a sugar rush may not be the answer

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Neurons. Image credit: Denis Burdakov

(Medical Xpress) -- A new study has found that protein and not sugar activates the cells responsible for keeping us awake and burning calories. The research, published in the 17 November issue of the scientific journal *Neuron*, has implications for understanding obesity and sleep disorders.

Wakefulness and energy expenditure rely on "orexin cells", which secrete a stimulant called orexin/hypocretin in the brain. Reduced activity in these unique cells results in narcolepsy and has been linked to weight gain.

Scientists at the University of Cambridge compared actions of different nutrients on orexin cells. They found that amino acids - nutrients found in proteins such as egg whites - stimulate orexin neurons much more

than other nutrients.

"[Sleep patterns](#), health, and body weight are intertwined. Shift work, as well as [poor diet](#), can lead to obesity," said lead researcher Dr Denis Burdakov of the Department of Pharmacology and Institute of Metabolic Science. "[Electrical impulses](#) emitted by orexin cells stimulate [wakefulness](#) and tell the body to burn calories. We wondered whether [dietary nutrients](#) alter those impulses."

To explore this, the scientists highlighted the orexin cells (which are scarce and difficult to find) with genetically targeted fluorescence in mouse brains. They then introduced different nutrients, such as amino acid mixtures similar to egg whites, while tracking orexin cell impulses.

They discovered that amino acids stimulate orexin cells. Previous work by the group found that glucose blocks orexin cells (which was cited as a reason for after-meal sleepiness), and so the researchers also looked at interactions between sugar and protein. They found that [amino acids](#) stop glucose from blocking orexin cells (in other words, protein negated the effects of sugar on the cells).

These findings may shed light on previously unexplained observations showing that protein meals can make people feel less calm and more alert than carbohydrate meals.

"What is exciting is to have a rational way to 'tune' select brain cells to be more or less active by deciding what food to eat," Dr Burdakov said. "Not all brain cells are simply turned on by all nutrients, dietary composition is critical.

"To combat obesity and insomnia in today's society, we need more information on how diet affects sleep and appetite cells. For now, research suggests that if you have a choice between jam on toast, or egg

whites on toast, go for the latter! Even though the two may contain the same number of calories, having a bit of protein will tell the body to burn more calories out of those consumed."

**More information:** The paper 'Activation of central orexin/hypocretin neurons by dietary amino-acids' will be published in the 17 November edition of *Neuron*.

Provided by University of Cambridge

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