Human body can predict mealtimes, shows study

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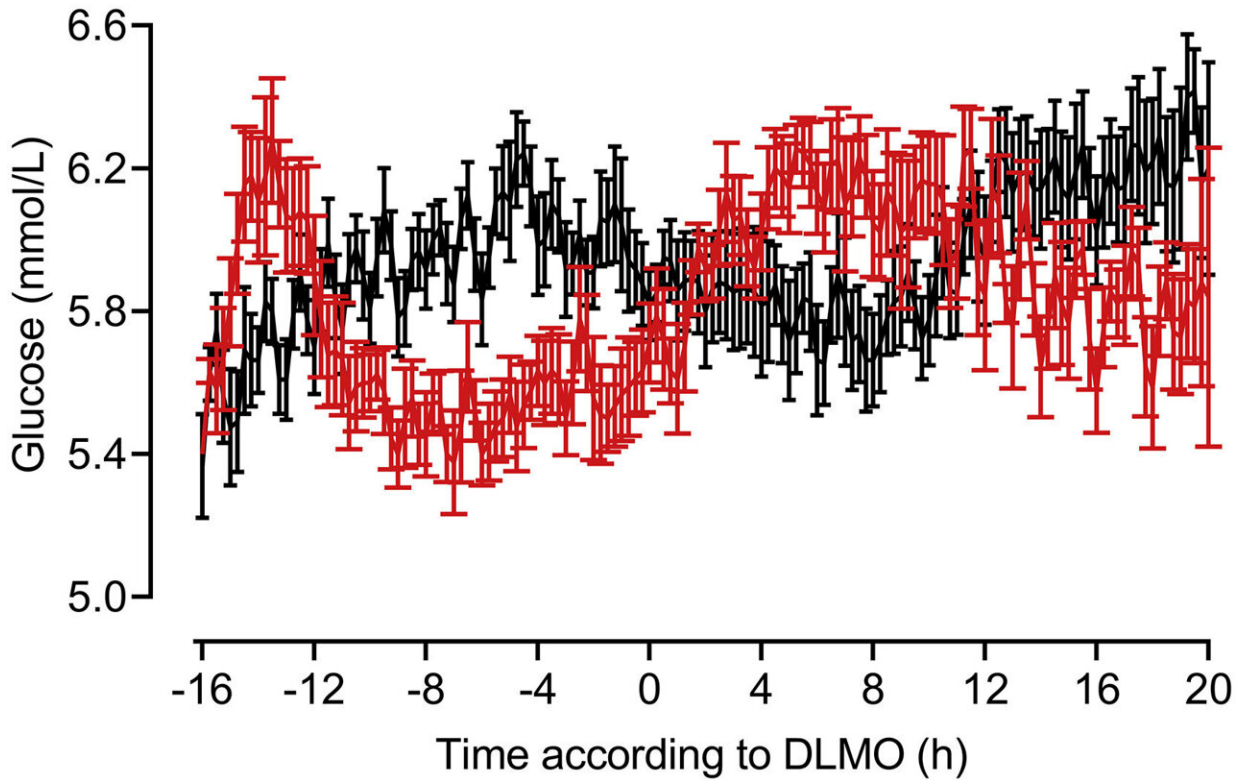

Interstitial glucose concentrations with respect to dim light melatonin (DLMO, time zero) throughout the 37-h constant routine Data show mean ± SEM (n = 11 small meal group, black; n = 9 large meal group, red). Credit: *Current Biology* (2023). DOI: 10.1016/j.cub.2023.02.005

The human body can predict the timing of regular meals, according to a

new study from the University of Surrey. The research team also found that daily blood glucose rhythms may be driven not only by meal timing but by meal size.

In the first study of its kind, researchers from Surrey, led by Professor Jonathan Johnston, investigated if the human circadian system anticipates large meals. Circadian rhythms/systems are physiological changes, including metabolic ones, that follow a 24-hour cycle and are usually synchronized to environmental signals, such as light and dark cycles.

Previous studies in this field have focused on animal controls and until now it has been undetermined whether human physiology can predict mealtimes and food availability.

Jonathan Johnston, Professor of Chronobiology, and Integrative Physiology at the University of Surrey said, "We often get hungry around the same time every day, but the extent to which our biology can anticipate mealtimes is unknown. It is possible that metabolic rhythms align to meal patterns and that regularity of meals will ensure that we eat at the time when our bodies are best adapted to deal with them."

To learn more, 24 male participants undertook an eight-day laboratory study with strict sleep-wake schedules, exposure to light-dark cycles, and food intake. For six days, 12 participants consumed small meals hourly throughout the waking period, with the remaining participants consuming two large daily meals (7.5 and 14.5 hours after waking).

After six days, all participants were then put on the same feeding schedule for 37 hours and received small meals hourly in a procedure known to reveal internal circadian rhythms. Glucose was measured every 15 minutes during the study, and hunger levels were measured hourly during waking hours on days two four and six in the first stage of the

study and then hourly for the final 37 hours.

Analyzing results of the first six days of the study, researchers found the glucose concentration of participants in the small meal group increased upon waking and remained elevated throughout the day until declining after their last meal. In the large meal group, there was a similar increase in glucose concentration upon waking however there was a gradual decline leading up to the first meal.

In the final 37 hours, when both groups were fed the same small meals hourly, all participants exhibited an initial rise in glucose concentration upon waking. However, in those who had previously received two large meals, glucose levels began to decline before the anticipated large meal (which they did not receive) whereas for participants who had always consumed small meals hourly, their glucose levels continued to rise as previously seen.

In addition, in the large meal group, there was an increase in hunger preceding projected mealtimes which sharply declined after the anticipated mealtime had passed.

Professor Johnston added, "What we have found is that the human body is rhythmically programmed to anticipate mealtimes particularly when food is not readily accessible. This suggests that there is a physiological drive for some people to eat at certain times as their body has been trained to expect food rather than it just being a psychological habit."

This study was published in the journal *Current Biology*.

More information: Jonathan D. Johnston, Human glucose rhythms and subjective hunger anticipate meal timing, *Current Biology* (2023). DOI: 10.1016/j.cub.2023.02.005. www.cell.com/current-biology/f … 0960-9822(23)00144-6

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