

# Front-loading calories early in the day reduces hunger but does not affect weight loss

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There's the old saying in dieting that one must "breakfast like a king, lunch like a prince, and dine like a pauper," based on the belief that

consuming the bulk of daily calories in the morning optimizes weight loss by burning calories more efficiently and quickly. But according to a new study publishing September 9 in *Cell Metabolism*, whether a person eats their largest meal early or late in the day does not affect the way their body metabolizes calories. However, people who ate their largest meal in the morning did report feeling less hungry later in the day, which could foster easier weight loss in the real world.

"There are a lot of myths surrounding the timing of eating and how it might influence either [body weight](#) or health," says senior author Professor Alexandra Johnstone, a researcher in the field of appetite control at the Rowett Institute, University of Aberdeen, Scotland. "This has been driven largely by the circadian rhythm field. But we in the nutrition field have wondered how this could be possible. Where would the energy go? We decided to take a closer look at how [time of day](#) interacts with metabolism."

In this study, the investigators recruited healthy subjects who were overweight or obese to have their diets controlled and their metabolisms measured over a period of time; 16 men and 14 women completed the study. Each participant was randomly assigned to eat either a morning-loaded or an evening-loaded [diet](#) for four weeks. The diets were isocaloric, with a balance of 30% protein, 35% carbohydrate, and 35% fat. After a washout period of one week in which calories were balanced throughout the day, each participant crossed over to the opposite diet for four weeks. In that way, each participant acted as their own study control.

Throughout the study, the subjects' total daily energy expenditures were measured using the doubly labeled water method, an isotope-based technique that looks at the difference between the turnover rates of the hydrogen and oxygen of body water as a function of carbon dioxide production. The primary endpoint of the study was [energy balance](#)

measured by body weight. Overall, the researchers found that energy expenditures and total [weight loss](#) were the same for the morning-loaded and evening-loaded diets. The subjects lost an average of just over 3 kg (about 7 pounds) during each of the four-week periods.

The secondary end points were subjective appetite control, glycemic control, and body composition. "The participants reported that their appetites were better controlled on the days they ate a bigger breakfast and that they felt satiated throughout the rest of the day," Johnstone says. "This could be quite useful in the [real-world](#) environment, versus in the research setting that we were working in."

One limitation of the study is that it was conducted under free-living conditions rather than in the lab. Additionally, certain metabolic measurements were available only after breakfast and not after dinner.

Johnstone notes that this type of experiment could be applied to the study of intermittent fasting (also called time-restricted eating), to help determine the best time of day for people following this type of diet to consume their calories.

The group plans to expand its research into how the time of day affects metabolism by conducting studies similar to the one described here in subjects who do shift work. It's possible these individuals could have different metabolic responses due to the disruption of their circadian rhythms. "One thing that's important to note is that when it comes to timing and dieting, there is not likely going to be one diet that fits all," Johnstone concludes. "Figuring this out is going to be the future of diet studies, but it's something that's very difficult to measure."

**More information:** Alexandra. M. Johnstone, Timing of daily calorie loading affects appetite and hunger responses without changes in energy metabolism in healthy subjects with obesity, *Cell Metabolism* (2022).

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