Intermittent fasting shows promise in improving gut health, weight management

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The human gut contains trillions of bacterial and other microbes collectively known as the gut microbiome. New research explores how these diverse microorganisms help manage weight. ASU researchers explore the effects of an intermittent fasting diet combined with protein pacing on body weight and overall health. Credit: The Biodesign institute at Arizona State University

A new study by researchers from Arizona State University and their colleagues highlights a dietary strategy for significant health

improvement and weight management.

Participants following an intermittent fasting and protein-pacing regimen, which involves evenly spaced protein intake throughout the day, saw better gut health, weight loss and metabolic responses. These benefits were notably greater than those seen with simple calorie restriction.

The findings, reported in the journal *Nature Communications*, could advance our understanding of the relationship between the gut microbiome and metabolism and improve strategies for managing obesity.

The researchers compared the effects of two low-calorie dietary interventions: a heart-healthy continuous calorie-restricted diet (based on USDA dietary recommendations), and a calorie-restricted regimen incorporating intermittent fasting and protein pacing.

The trial was conducted with 41 individuals who were overweight or obese over a period of eight weeks. Individuals in the intermittent fasting and protein-pacing group showed a decrease in symptoms of gastrointestinal problems and an increase in diversity of the gut microbiota compared with those in the calorie-restriction group.

The intermittent fasting protocol increased beneficial microbes in the gut that have been linked to a lean body type and improved overall health. Additionally, it increased the levels of certain proteins (cytokines) in the blood associated with weight loss, as well as amino acid byproducts that promote fat burning.

Intermittent fasting is an eating pattern that cycles between periods of fasting and eating. The method has recently gained popularity for its potential health benefits, including weight loss, improved metabolic

health and enhanced brain function.

"Given the gut microbiota's location and its constant interaction with the GI tract, we have been gaining a deeper understanding of its pivotal role in dietary responses these last several years," says Alex Mohr, lead author of the new study.

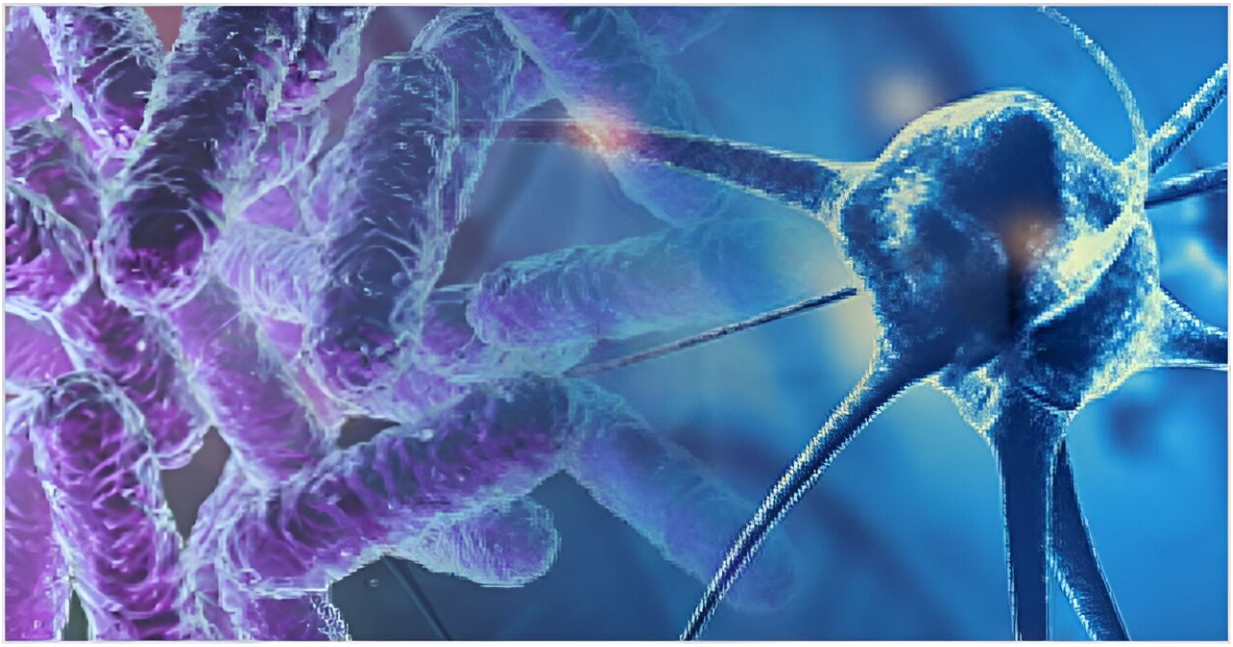
"While limited in duration and sample size, this comprehensive investigation—which included the analysis of the gut microbiome, cytokines, fecal short-chain fatty acids and blood metabolites—underscores the intricate interplay between diet, host metabolism and microbial communities."

Mohr led the microbiome and molecular investigations, evaluating gut microbial composition, inflammatory molecules called cytokines, SCFAs (metabolites derived from dietary fiber, important for regulating energy balance) and the metabolome.

Mohr is a researcher with the Biodesign Center for Health Through Microbiomes at ASU. Rosa Krajmalnik-Brown, the center director, and researchers Devin Bowes, Karen Sweazea and Corrie Whisner are also contributors to the study.

Corresponding author Paul Anciero of the Department of Health and Human Physiological Sciences at Skidmore College led the clinical trial, which tracked weight loss and body composition.

The study also included contributions from ASU researchers Paniz Jasbi and Judith Klein-Seetharaman, with the School of Molecular Sciences, and Dorothy Sears and Haiwei Gu, with the College of Health Solutions.



Intermittent fasting has been shown to positively influence the gut microbiome by promoting the growth of beneficial bacteria, which can enhance overall digestive health. A new study shows the benefits of an intemittent fasting and protein pacing diet for weight management. Credit: The Biodesign institute at Arizona State University

Diet, microbiome and weight loss

The gut microbiome refers to the diverse community of microorganisms residing in the gastrointestinal tract, including bacteria, viruses, fungi and other microbes. Numbering in the many trillions of organisms, this complex ecosystem plays a crucial role in essential bodily functions and overall health.

The gut microbiome helps break down food, produce vitamins and promote the absorption of nutrients. It plays a role in the development and function of the immune system by protecting the body against

harmful pathogens. Finally, the gut microbiome keenly regulates metabolism, impacting body weight, fat storage and insulin sensitivity.

Caloric restriction, intermittent fasting (limiting food consumption to certain windows on some days) and protein pacing (controlled protein intake at specific meals) have been shown to affect body weight and composition, but the effect of these dietary modifications on the gut microbiome has been unclear until now.

"A healthy gut microbiome is essential for overall health, particularly in managing obesity and metabolic diseases," says Sweazea, the ASU principal investigator of this study.

"The gut bacteria influence how we store fat, balance glucose levels and respond to hormones that make us feel hungry or full. Disruptions in the gut microbiota can lead to increased inflammation, insulin resistance and weight gain, underscoring the critical role of gut health in preventing and managing metabolic disorders."

Study and findings

The clinical trial involved 27 female and 14 male participants who were overweight or obese. Participants were divided into two groups: one following the intermittent fasting and protein pacing regimen, and the other adhering to a heart-healthy, calorie-restricted diet. Both groups were monitored over eight weeks for changes in weight, body composition, gut microbiome composition and plasma metabolomic signatures.

Participants following the intermittent fasting and protein pacing regimen experienced a significant reduction in gut symptoms and an increase in beneficial gut bacteria, particularly from the Christensenellaceae family. The study also found these microbes are

associated with improved fat oxidation and metabolic health. In contrast, the calorie-restricted group showed an increase in metabolites linked to longevity-related pathways.

Despite both groups having similar average weekly energy intake, the intermittent fasting and protein pacing group achieved greater weight loss and fat reduction with an average loss of 8.81% of their initial body weights during the study. In comparison, those on a calorie-restricted diet lost an average of 5.4% body weight.

Participants who followed the intermittent fasting and protein-pacing diet experienced reductions in overall body fat, including belly fat and deep abdominal fat, and saw an increase in the percentage of lean body mass.

The study underscores the potential of intermittent fasting and protein-pacing diets in improving gut health and weight management. While further research is necessary, these findings offer a promising avenue for creating effective dietary interventions for obesity and related metabolic disorders.

"By identifying shifts in specific microbes, functional pathways and associated metabolites, this line of work holds promise for personalized health strategies as we can better tailor nutritional regimens to enhance gut function and metabolic outcomes," Mohr says.

More information: Alex E. Mohr et al, Gut microbiome remodeling and metabolomic profile improves in response to protein pacing with intermittent fasting versus continuous caloric restriction, *Nature Communications* (2024). DOI: 10.1038/s41467-024-48355-5

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